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TAK

TECHNOLOGY
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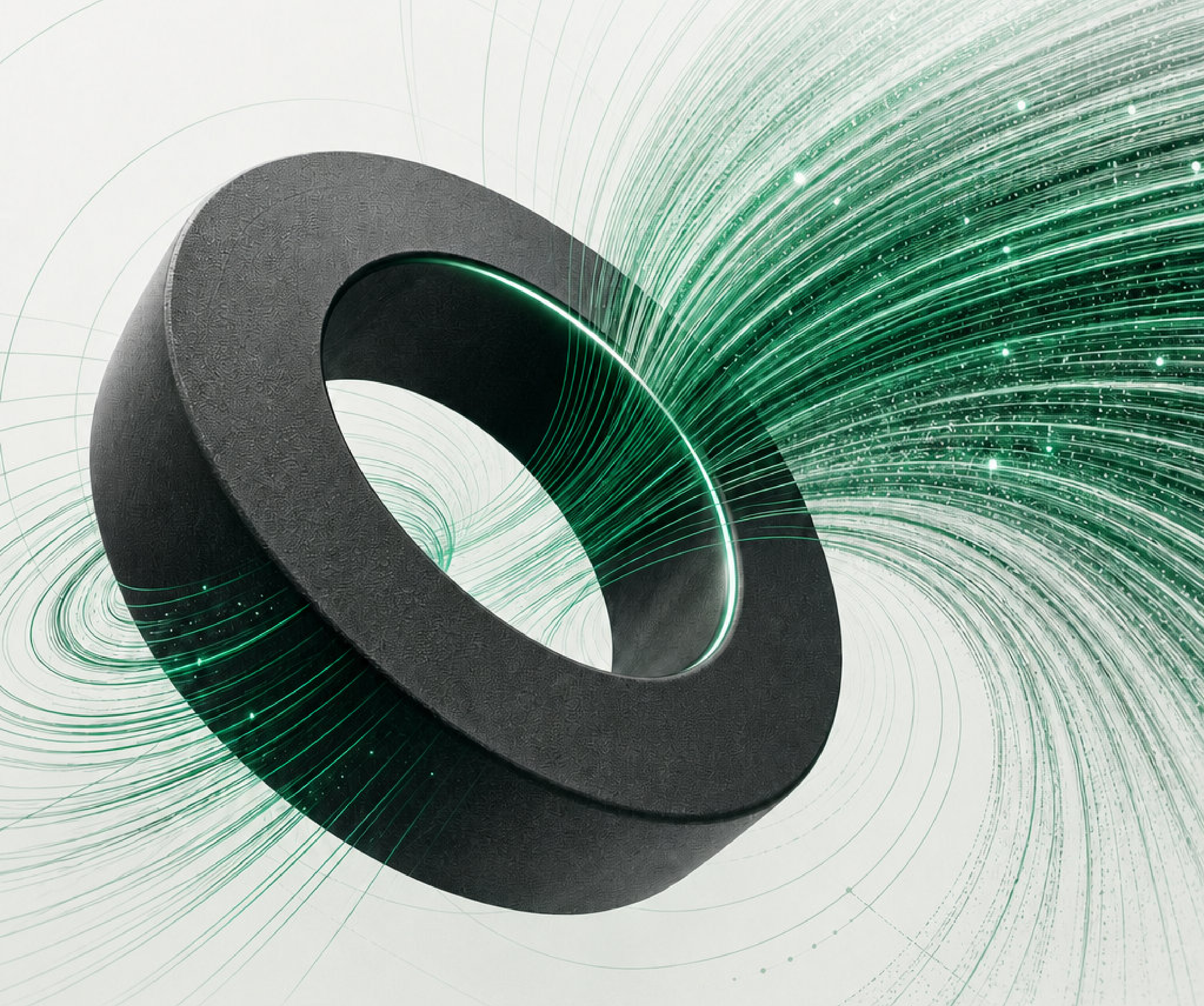
镍锌铁氧体目录书

NiZn FERRITE CATALOG

2027

PRODUCT CATALOG



ISO 9001:2015

IATF 16949:2016

ISO 14001:2015

鐵研科技股份有限公司

www.takferrite.com

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公司简介 COMPANY OVERVIEW

鐵研科技（TAK©）成立于 1996 年，三个字母承载我们对技术（Technology）、品质保证（Assurance）与领先者（Keeper）的承诺。近三十年来，我们专注磁性材料一件事，从镍锌铁氧体起家，发展为横跨材料科学与精密制造的综合性磁性元件供应商。

Founded in 1996, TAK© carries our commitment to Technology, quality Assurance and being an industry Keeper. For nearly three decades we have done one thing — magnetic materials — growing from NiZn ferrite into an integrated magnetics supplier spanning materials science and precision manufacturing.

鐵研是业内少数在镍锌（NiZn）与锰锌（MnZn）两大铁氧体体系上，都能以自有技术贯通“材料配方 → 粉料制备 → 成型烧结 → 研磨加工 → 成品磁芯”整段工艺的一贯化厂家：关键原料自主制备、材料配方逐年迭代、工艺参数闭环优化，从实验室到量产线一气呵成。这让我们能直接从材料层面回应客户的电气规格，而不受制于外购粉料的性能上限。

TAK is one of the few makers running the full chain in-house for both NiZn and MnZn ferrites — material formulation, powder preparation, pressing & sintering, grinding, finished cores. Key raw materials are made in-house, formulations iterate every year and process parameters are optimised in closed loop, so customer electrical specs can be answered at the material level, unconstrained by purchased-powder ceilings.

2026 年起，我们进一步布局铁镍合金（FeNi）磁芯产品线——合金材料采策略性外购，由鐵研完成产品开发与制造，将产品组合延伸至更高饱和磁通密度与大电流的应用场景。

From 2026 TAK is extending into FeNi alloy cores — the alloy material is strategically sourced, with product development and manufacturing by TAK — reaching towards higher-saturation, high-current applications.

核心优势 Core Advantages

双体系全链自主 Full-chain In-house

镍锌与锰锌同厂量产、配方到成品一贯完成；正极材料以台湾工研院技术为基底，于大陆基地规模化生产。

NiZn & MnZn made in-house end-to-end; ITRI-based cathode materials at production scale.

材料研发实力 Materials R&D

6 名材料开发专家每年推出新型锰镍锌配方、22 名产品开发工程师；与工研院、辅仁大学长期合作，可为客户开发专属 NiZn 材料。

Six materials specialists with new formulations yearly and 22 product engineers; custom NiZn grades with ITRI and Fu Jen University.

客户协同开发 Co-development

与行业龙头共建联合实验室与测试平台，技术路线提前 3–5 年布局，从配方到工艺全流程敏捷定制。

Joint labs with industry leaders, roadmaps 3–5 years ahead, agile customisation from formulation to process.

制程与品质 Process & Quality

自主研发自动化设备持续升级；ISO 9001 / IATF 16949 / ISO 14001 体系管控，全检设备确保不良品零流出。

Self-developed automation; ISO 9001 / IATF 16949 / ISO 14001 systems, 100% inspection, zero defect outflow.

稳定团队与经验传承 Team Stability

员工平均在职逾 10 年、工程团队平均年资逾 15 年，技术经验持续沉淀。

Average tenure over 10 years — 15+ in engineering — keeping know-how accumulating.

差异化价值 Differentiated Value

极少数能同时满足日系品质标准、大陆供应链效率与欧美创新需求的供应商；两岸生产基地服务全球客户。

Japanese quality, mainland efficiency and Western innovation at once — strait-spanning plants, global customers.

主要产品：高性能磁性材料（NiZn / MnZn 铁氧体磁芯）· 铁镍合金磁芯（2026 年起）· 新能源电池正极材料 · 定制磁性解决方案。以稳定的核心团队与深度客户协作，持续为全球客户创造价值——技术领先、品质为本。

Main products: high-performance magnetic materials (NiZn/MnZn ferrite cores) · FeNi alloy cores (from 2026) · new-energy cathode materials · customised magnetic solutions. Technology leadership, quality first — value for customers worldwide.

发展沿革 DEVELOPMENT HISTORY

1990 年代：创业与基础建设 1990s — Founding & Foundations

1996 公司成立，主营镍锌系电感磁芯制造。
Company founded, focusing on NiZn inductor core manufacturing.

1997 成为日本 TDK 合格供应商（线性磁芯 / SMD磁芯）；通过德国 RWTÜV ISO 9001 认证；在中国东莞石碣设立分厂。
Qualified supplier to TDK (linear / SMD cores); RWTÜV ISO 9001 certified; Dongguan Shijie plant established.

1998 开发锰锌系电感磁芯。
MnZn inductor cores developed.

2000 年代：技术突破与多元化布局 2000s — Breakthroughs & Diversification

2000 开始量产 MnZn 铁氧体产品。
Volume production of MnZn ferrites began.

2003 加入国际电工委员会（IEC），参与磁性元件标准化。
Joined IEC, participating in magnetics standardisation.

2004 自台湾工研院技术移转“高容量锂镍钴正极材料”，成立电池材料事业部；收购法国汤姆逊（Thomson）台湾工厂。
Li-Ni-Co cathode technology transferred from ITRI; battery materials BU formed; Thomson's Taiwan plant acquired.

2005 成立河源鐵研電子科技（中国广东连平）。
Heyuan TAK Electronics established (Lianping, Guangdong).

2006 量产二元锂镍钴正极材料；建成镍锌铁氧体 3000 吨/年、锰锌铁氧体 1000 吨/年产线。
Binary Li-Ni-Co cathode in production; 3,000 t/y NiZn and 1,000 t/y MnZn lines built.

2010 年代：产能扩张与高端应用 2010s — Capacity & High-end Applications

2009 推出锂镍钴锰三元正极材料。
NCM ternary cathode materials launched.

2010 发布高压实二元材料；锰锌铁氧体产能扩至 2000 吨/年。
High-density binary cathode released; MnZn capacity expanded to 2,000 t/y.

2013 通过汽车行业 IATF 16949 认证。
IATF 16949 automotive certification obtained.

2014 开发低碱度锂镍钴正极材料。
Low-alkalinity Li-Ni-Co cathode developed.

2020 推出高频镍锌 / 锰锌材料，服务云计算、大数据领域。
High-frequency NiZn/MnZn grades launched for cloud computing and big-data applications.

发展沿革（续）与愿景 HISTORY (CONT.) & VISION

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2020 年代：绿色制造与智能化升级 2020s — Green & Smart Manufacturing

2021 导入伺服压机、气氛箱式烧结炉，提升 MnZn 产品品质。
Servo presses and atmosphere box furnaces introduced, lifting MnZn quality.

2023 扩大 MnZn 产线产能，拓展产品应用覆盖。
MnZn capacity expanded, broadening application coverage.

2025 取得环境管理体系 ISO 14001 认证。
ISO 14001 environmental management certified.

2026 持续增加 MnZn 产线产能，满足客户订单需求；开始开发铁镍合金（FeNi）磁芯产品线。
MnZn line capacity further expanded to meet customer demand; FeNi alloy-core product line development began.

愿景与理念 Vision & Philosophy

技术创新 Innovation
持续创新以提升产品性能与竞争力。
Continuous innovation for performance and competitiveness.

产品多样化 Diversification
拓展产品线，覆盖人工智能、物联网与新能源等新兴领域。
Broader lines covering AI, IoT and new energy.

品质提升 Quality
优化生产工艺与品质管制体系，提高稳定性与可靠性。
Refined processes and QC for stability and reliability.

市场拓展 Markets
加强国际市场布局，积极参与全球竞争。
Deeper international presence and global competitiveness.

可持续发展 Sustainability
注重生态环保与社会责任。
Environmental care and social responsibility.

联络方式 Contact Information

鐵研科技股份有限公司
TAK Technology Co., Ltd.
桃园市芦竹区安中街 28 巷 5 号
No. 5, Lane 28, Anzhong St., Luzhu Dist., Taoyuan City, Taiwan
电话 Tel 886-3-2624980
传真 Fax 886-3-2624950
邮箱 E-mail taiwan@takferrite.com

东莞锂研电子有限公司
Dongguan Liyan Electronics Co., Ltd.
中国广东省东莞市石碣镇
东风南路 75 号 1 号楼 401 室
Rm. 401, Bldg. 1, No. 75 Dongfeng S. Rd., Shijie Town, Dongguan, Guangdong, China
电话 Tel 86-769-86310390
传真 Fax 86-769-86310396
邮箱 E-mail sales6@takferrite.com

河源鐵研電子科技有限公司
Heyuan TAK Electronics Technology Co., Ltd.
中国广东省河源市连平县元善镇
石龙工业园区
Shilong Industrial Park, Yuanshan Town, Lianping County, Heyuan, Guangdong, China
电话 Tel 86-762-4329901
传真 Fax 86-762-4329002
邮箱 E-mail sales6@takferrite.com

扫码进入官网 Scan to visit

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符号定义 SYMBOLS AND TERMS

符号 Symbol	参数描述 Description	单位 Unit	符号 Symbol	参数描述 Description	单位 Unit
U	电压 voltage	V	Jp	磁极化强度 magnetic polarization	T
I	电流 current	A	ηB	磁滞常数 hysteresis material constant	10^{-6} mT^{-1}
R	电阻 resistance	Ω	L	电感值 inductance	H
X	电抗 reactance	Ω	L0	线圈电感 inductance of a coil	H
Z	复数阻抗（Z = R + jX） complex impedance	Ω	AL	电感系数（单匝^{2}感值） inductance factor (per N^2)	nH/N^2
ρ	电阻率 resistivity	Ω·m	μ0	真空磁导率 magnetic constant	$=4\pi\times10^{-7}$ $H\cdot m^{-1}$
Pv (Pcv)	单位体积磁芯损耗 volumetric core loss	kW/m^3	μ	绝对磁导率 absolute permeability	$V\cdot s\cdot A^{-1}\cdot m^{-1}$
t	时间 time	s	μr	相对磁导率 relative permeability	-
τ	周期时间 periodic time	s	μa	振幅磁导率 amplitude permeability	-
f	频率 frequency	s^{-1} = Hz	μΔ	增量磁导率 incremental permeability	-
fmax	最大应用频率 maximum application frequency	Hz	μi	初始磁导率 initial permeability	-
ω	角频率（ω = 2πf） angular frequency	s^{-1}	μ*	复数磁导率（μ* = μ′ – jμ″） complex permeability	-
T	温度 temperature	°C	μ′	磁导率实部 real part of complex permeability	-

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符号定义（续） SYMBOLS AND TERMS

符号 Symbol	参数描述 Description	单位 Unit	符号 Symbol	参数描述 Description	单位 Unit
Tc	居里温度 Curie temperature	℃	μ″	磁导率虚部 imaginary part of complex permeability	-
T.F. (αF)	温度因子（＝比温度系数 αμr） temperature factor (= relative temperature coefficient αμr)	10^{-6} K^{-1}	μw，μapp	表观磁导率 apparent permeability	-
α	磁导率温度系数（未经 μi 归一化） temperature coefficient of permeability (not normalized)	K^{-1}	μe	有效磁导率 effective permeability	-
αμr	比温度系数（＝T.F.；μi 归一化之温度系数） relative temperature coefficient of permeability (= T.F.)	10^{-6} K^{-1}	Q	品质因子 quality factor	-
H	磁场强度 magnetic field strength	$A \cdot m^{-1}$	tanδ	损耗因子 loss factor	-
Hc	矫顽力 coercive field strength	$A \cdot m^{-1}$	tanδ / μi	相对损耗因子 relative loss factor	-
B	磁通密度 magnetic flux density	T	Ae	有效截面积 effective cross-sectional area	mm^2
Bs	饱和磁通密度 saturation flux density	T	le	有效磁路长度 effective magnetic path length	mm
B̂	峰值磁通密度 peak flux density	T	j	虚数 imaginary unit	√-1
Br	剩磁（残留磁通密度） remanence (residual flux density)	mT	DF	磁导率减落系数 disaccommodation factor	-
φ	磁通量 magnetic flux	Wb	C1/C2	磁芯常数（形状因子） geometric core constant	mm^{-1}/mm^{-3}
M	磁化强度 magnetization	$A \cdot m^{-1}$	fr	交越频率（μ″＝μ′） crossover frequency	MHz

从 Maxwell 到电磁参数：推导地图

FROM MAXWELL TO ELECTROMAGNETIC PARAMETERS

本章不把这些名词当作各自独立的定义，而是回到共同源头——Maxwell 方程式与三条本构关系——再沿三条脉络推导出来。下图为全章推导地图：顶端为源头，往下分为 A（由场方程直接导出）、B（由非线性 M–H 本构决定其形状）、C（需材料微观与动态物理，Maxwell 之外）三支。

Rather than treating these terms as isolated definitions, this chapter returns to a common origin — Maxwell's equations plus three constitutive relations — and derives them along three branches: A (directly from the field equations), B (shape set by the non-linear M–H law) and C (requiring the material's microscopic and dynamic physics, beyond Maxwell).

图 T-1　从 Maxwell 方程式到电磁参数：推导地图。实线绿框 = 可由场方程严格导出；虚线框 = 形状或存在须由材料物理供给。

Fig. T-1 From Maxwell's equations to the electromagnetic parameters — the derivation map. Solid green = rigorously derived from the field equations; dashed = shape or existence supplied by material physics.

推导主线（一）：由场方程到电感

DERIVATION (1) — FROM FIELD EQUATIONS TO INDUCTANCE

1. 安培定律 → 磁场强度 H Ampère's law → field strength H

在均匀环形磁芯上，沿磁路积分安培定律，得到磁场强度与绕组电流、匝数的关系——这是把“电流”翻译成“磁场”的第一步。

On a uniform toroid, integrating Ampère's law around the magnetic path relates the field strength to the winding current and turns — the first step from current to field.

$$\oint \vec{H}\cdot d\vec{l} = NI \;\Rightarrow\; H = \frac{NI}{l_e}$$

安培定律（均匀环形磁芯）
Ampère's law (uniform toroid)

2. 通量连续 ∇·B=0 → 有效几何参数 Ae、le Flux continuity → effective geometry Ae, le

磁通无源意味着沿磁路守恒；据此把截面与路径不均匀的磁芯，浓缩为等效截面积 Ae、等效磁路长 le 与体积 Ve（IEC 60205）三个常数。

A source-free flux is conserved along the path; this condenses a geometrically non-uniform core into three constants — the effective area Ae, path length le and volume Ve (IEC 60205).

$$\nabla\cdot\vec{B} = 0 \;\Rightarrow\; \Phi = B\,A_e = \text{const.}$$

磁通连续，配合等效磁路积分 → 有效截面积 Ae / 磁路长 le（IEC 60205）
Flux continuity with the equivalent-circuit integration → effective Ae, le (IEC 60205)

3. 法拉第定律 → 感应电压 Faraday's law → induced voltage

磁通随时间变化，在绕组中感应出电压，这是电感之所以“感”的根本。

A time-varying flux induces a voltage in the winding — the very origin of inductance.

$$v = -N\frac{d\Phi}{dt} = -NA_e\frac{dB}{dt}$$

法拉第感应电压
Faraday induced voltage

4. 合并 → 电感与 AL 值 Combining → inductance and AL

把上三式与本构 $B=\mu_0\mu_e H$ 合并，电感正比于匝数平方与 Ae、反比于 le；将几何参数与材料并成单一电感系数 AL，设计者只需乘上匝数平方。开气隙时气隙磁阻串入，μe 主要由气隙决定而非材料温度漂移——这是电感稳定化的由来。

Combining these with $B=\mu_0\mu_e H$, inductance scales with the turns squared and Ae and inversely with le; geometry and material are lumped into one factor AL. An air gap adds series reluctance, so μe is set by the gap rather than the material's temperature drift — the origin of inductance stabilization.

$$L = \frac{N\Phi}{I} = \mu_0\,\mu_e\frac{N^2 A_e}{l_e} = A_L\,N^2$$

合并 → 电感与 AL 值
Combined → inductance and AL

推导主线（二）：交流损耗与涡流 DERIVATION (2) — AC LOSSES AND EDDY CURRENTS

5. 令 μ 为复数 → 阻抗、tanδ、Q Complex μ → impedance, tanδ, Q

交流下 B 相对 H 落后相位，磁导率写成 μ=μ′−jμ″（采 e^jωt 相量惯例）。代入电感阻抗 Z=jωL₀μ，μ″ 给出实部 = 串联损耗电阻 Rs（发热），μ′ 给出虚部 = 电抗 Xs（储能）；两者之比即损耗因子 tanδ=μ″/μ′，其倒数即品质因数 Q。

Under AC drive B lags H, so μ=μ′−jμ″ (e^jωt phasor convention). In the coil impedance Z=jωL₀μ, μ″ produces the real part — the series loss resistance Rs (heat) — and μ′ the imaginary part, the reactance Xs (storage); their ratio is the loss factor tanδ=μ″/μ′ and its reciprocal the quality factor Q.

$$Z = j\omega L_0(\mu' - j\mu'') = \omega L_0\mu'' + j\omega L_0\mu' = R_s + jX_s$$

令 μ 复数 → 串联电阻 Rs（发热）+ 电抗 Xs（储能）
Complex μ → series resistance Rs (heat) + reactance Xs (storage)

6. |Z| ∝ |μ| → 标准化阻抗 ZN |Z| ∝ |μ| → normalized impedance ZN

EMI 抑制元件的阻抗正比于复数磁导率之模 |μ|；除去尺寸与匝数即得标准化阻抗 ZN（Ω/mm），在指定测量频率下只反映材料本身，可用于跨尺寸比较。

The impedance of a suppression part scales with the modulus |μ|; removing size and turns gives the normalized impedance ZN (Ω/mm), which at a stated measuring frequency reflects the material alone and allows comparison across sizes.

$$|Z| = \omega\mu_0|\mu|\frac{N^2A_e}{l_e},\quad |\mu| = \sqrt{\mu'^2 + \mu''^2}\ \Rightarrow\ Z_N \propto |\mu|$$

阻抗正比于 |μ|；归一化 → 标准化阻抗 ZN（定频下）
Impedance ∝ |μ|; normalized → ZN (at a stated frequency)

7. 导体中的扩散 → 涡流损耗与趋肤深度 Field diffusion in conductors → eddy loss & skin depth

在良导体中忽略位移电流并取 J=σE，安培–麦克斯韦式 ∇×H=J+∂D/∂t 化简为 ∇×H=σE；与法拉第定律合并后，磁场满足扩散方程并激发涡流——涡流损耗与趋肤深度 δ 皆由此式导出。涡流损耗正比于（频率×磁通×尺寸）平方、反比于电阻率，这正是高电阻率镍锌在高频远胜金属的原因；两者的数量级、材料差异与绕组选线依据，详见后续“电阻率、涡流与趋肤深度 ρ·δ”词卡。

Neglecting displacement current and taking J=σE, the Ampère–Maxwell law ∇×H=J+∂D/∂t reduces to ∇×H=σE inside a good conductor; combined with Faraday's law the field obeys a diffusion equation and drives eddy currents — the origin of both eddy loss and skin depth δ. Eddy loss scales as (f × B × size)² and inversely with resistivity, which is why high-ρ NiZn beats metals at HF; magnitudes, material differences and winding-wire selection are given in the ρ·δ card that follows.

$$P_e \approx \frac{\pi^2 d^2 f^2 \hat{B}^2}{6\rho}$$

薄片涡流损耗（d 为片厚）∝ (频率×磁通×厚度)²/电阻率
Thin-sheet eddy loss (d = thickness) ∝ (f × B × d)² / resistivity

以上 A 支各量皆由场方程与线性本构严格导出。以下 B 支（Bs / Br / Hc / Isat / Pv / PF）之数值形状，须由材料非线性 M–H 回线供给；C 支（亚铁磁性来源 / Snoek / Tc / αμr / DF / λs）则须引入 Maxwell 之外的微观与动态物理。详见后续词卡。
Branch-A quantities above follow rigorously from the field equations; Branches B and C follow from material physics, as detailed in the cards that follow.

源头：Maxwell 方程式与本构关系 ∇×E · ∇×H SOURCE — MAXWELL'S EQUATIONS & CONSTITUTIVE RELATIONS

麦克斯韦（Maxwell）四式描述电场与磁场如何被电荷、电流及彼此的时变所激发，是一切电磁现象的共同源头；但四式本身不含任何材料性质。要把“场”接到一块铁氧体磁芯，必须再补上三条本构关系：磁（$B=\mu_0\mu_r H$）、导电（$J=\sigma E$）与介电（$D=\varepsilon E$）——三者的系数 $\mu_r(\omega)$、σ、$\varepsilon(\omega)$ 皆须由测量或材料模型供给，且此处写成的线性形式仅适用于线性、等向、小信号或指定工作点。本章其余专有名词，即是把这组方程连同边界条件与准静态假设套用到磁芯几何参数与工作条件后的结果。交流量一律采 $e^{j\omega t}$ 相量惯例。

Maxwell's four equations describe how electric and magnetic fields are excited by charge, current and each other's time-variation — the common origin of all electromagnetic behaviour; yet the equations themselves carry no material information. To connect the fields to a ferrite core one adds three constitutive relations: magnetic ($B=\mu_0\mu_r H$), conductive ($J=\sigma E$) and dielectric ($D=\varepsilon E$) — whose coefficients $\mu_r(\omega)$, σ and $\varepsilon(\omega)$ must come from measurement or a material model, and whose linear form here holds only for a linear, isotropic, small-signal or specified operating point. The remaining terms in this chapter follow from applying that set, together with the boundary conditions and a quasi-static assumption, to the core geometry and operating conditions. AC quantities use the $e^{j\omega t}$ phasor convention throughout.

但须诚实区分三类来源：① 由场方程直接导出——有效磁导率 μe 与电感 AL、复数磁导率 μ′/μ″、损耗因子 tanδ、品质因数 Q、阻抗 Z 与标准化阻抗 ZN、涡流损耗与趋肤深度 δ；② 由材料非线性 M–H 本构决定其形状——饱和磁通密度 Bs、剩磁 Br、矫顽力 Hc、饱和电流 Isat、Steinmetz 损耗与性能因数 PF；③ Maxwell 方程给不出、须引入材料的微观与动态物理——亚铁磁性的来源、Snoek 极限、居里温度 Tc、温度系数 αμr、减落系数 DF 与磁致伸缩 λs。本章即依此三支脉络编排，总览见本章开头之推导地图。

Three sources must be told apart honestly: ① derived directly from the field equations — effective permeability μe and inductance AL, complex permeability μ′/μ″, loss factor tanδ, quality factor Q, impedance Z and normalized impedance ZN, eddy-current loss and skin depth δ; ② with their shape set by the non-linear M–H constitutive law — saturation flux density Bs, remanence Br, coercivity Hc, saturation current Isat, Steinmetz loss and performance factor PF; ③ beyond Maxwell, requiring the material's microscopic and dynamic physics — the origin of ferrimagnetism, Snoek's limit, Curie temperature Tc, temperature coefficient αμr, disaccommodation DF and magnetostriction λs. The chapter is organized along these three branches; see the derivation map at the start of this chapter.

$$\nabla\cdot\vec{D}=\rho_f,\qquad \nabla\cdot\vec{B}=0$$

高斯电定律 / 高斯磁定律（无磁单极）
Gauss's law / no magnetic monopoles

$$\nabla\times\vec{E}=-\frac{\partial\vec{B}}{\partial t},\qquad \nabla\times\vec{H}=\vec{J}+\frac{\partial\vec{D}}{\partial t}$$

法拉第感应定律 / 安培–麦克斯韦定律
Faraday's law / Ampère–Maxwell law

$$\vec{B}=\mu_0(\vec{H}+\vec{M}),\quad \vec{J}=\sigma\vec{E},\quad \vec{D}=\varepsilon\vec{E}$$

三条本构关系：磁 / 导电 / 介电。$B=\mu_0(H+M)$ 为通式；$B=\mu_0\mu_r H$ 仅在线性、等向、小信号或指定工作点下成立。
Three constitutive relations: magnetic / conductive / dielectric. $B=\mu_0(H+M)$ is general; $B=\mu_0\mu_r H$ holds only for a linear, isotropic, small-signal or specified operating point.

∇ 向量微分算子；ρf 自由电荷密度（本卡专用，与电阻率 ρ 不同）；J 电流密度；μ_0 真空磁导率；μr 相对磁导率；M 磁化强度；σ 电导率；ε 介电常数。
∇ vector differential operator; ρf free charge density (this card only — distinct from resistivity ρ); J current density; μ_0 vacuum permeability; μr relative permeability; M magnetization; σ conductivity; ε permittivity.

物理量解释与公式（续） PHYSICAL QUANTITIES — EXPLANATIONS & FORMULAS

A 支 · 由场方程直接导出 BRANCH A — DERIVED DIRECTLY FROM THE FIELD EQUATIONS

由安培定律 ∮H·dl=NI 与法拉第定律 v=−N dΦ/dt，加上通量连续 ∇·B=0，直接得到 L=AL·N²；令磁导率为复数 μ→μ′−jμ″，同一组式子即长出 μ′/μ″、tanδ、Q 与阻抗 Z、ZN；再纳入导体中的 ∇×H=σE，便得到涡流损耗与趋肤深度。

Ampère's law ∮H·dl=NI, Faraday's law v=−N dΦ/dt and flux continuity ∇·B=0 give L=AL·N² directly; letting permeability go complex, μ→μ′−jμ″, the same relations grow μ′/μ″, tanδ, Q and the impedance Z, ZN; adding ∇×H=σE inside the conductor yields eddy-current loss and skin depth.

有效磁导率、电感与 AL 值 μe · AL EFFECTIVE PERMEABILITY, INDUCTANCE & THE AL VALUE

将线圈的电感与磁芯几何参数、材料联系起来的是安培定律与法拉第定律：磁芯把磁通集中 μe 倍，电感因而正比于匝数平方、有效截面积，反比于有效磁路长度。为方便设计，把一颗磁芯的几何参数与材料合并成单一“电感系数”AL，设计者只需乘上匝数平方即得电感。开气隙可降低并稳定 μe——气隙磁阻串联进磁路，使 μe 主要由气隙而非材料温度漂移决定。

Ampère's and Faraday's laws link a coil's inductance to the core geometry and material: the core concentrates the flux by a factor μe, so inductance scales with the square of the turns and the effective area, and inversely with the effective path length. For convenience the geometry and material of one core are lumped into a single inductance factor AL; the designer simply multiplies by N². An air gap lowers and stabilizes μe — its reluctance adds in series so μe is set by the gap rather than the material's temperature drift.

$$L = \mu_0\,\mu_e\,\frac{N^2 A_e}{l_e} = A_L\,N^2$$

电感 = 有效磁导率 × 匝数² × 磁芯几何参数。
Inductance = effective permeability × turns² × core geometry.

$$\frac{1}{\mu_e} = \frac{1}{\mu_i} + \frac{l_g}{l_e}$$

开气隙后之有效磁导率（气隙长 lg）。
Effective permeability with an air gap of length lg.

N 匝数；Ae 有效截面积；le 有效磁路长度；lg 气隙长度；AL 电感系数（nH/N²）；磁芯常数 C1 = le/Ae。
N turns; Ae effective area; le effective path length; lg gap length; AL inductance factor (nH/N²); core factor C1 = le/Ae.

磁化曲线与磁导率家族 μ MAGNETIZATION CURVE & THE PERMEABILITY FAMILY

磁导率描述 B–H 曲线上 B 与 H 的比值（割线，如 μi、μa）或其斜率（微分，如 μΔ），随工作点与激磁条件而异，故有一整组定义。退磁态下取极小场的斜率为初始磁导率 μi；以峰值测量的为振幅磁导率μa；叠加直流偏磁后对小交流信号量得的为增量磁导率 μΔ；开气隙后的等效值为有效磁导率 μe。因 B–H 为非线性，这些值并不相等，材质表须注明测量条件（频率、磁通密度、温度）。

Permeability is the ratio B/H on the B–H curve (a secant, as for μi and μa) or its slope (a differential, as for μΔ), and depends on the operating point and drive, hence a whole family of definitions. The small-field slope in the demagnetized state is the initial permeability μi; the peak-measured value is the amplitude permeability μa; the small-AC slope under DC bias is the incremental permeability μΔ; the gapped value is the effective permeability μe. Because B–H is non-linear these differ, so datasheets state the measurement conditions (frequency, flux density, temperature).

$$\mu = \frac{1}{\mu_0}\,\frac{B}{H}, \qquad \mu_i = \frac{1}{\mu_0}\lim_{H\to 0}\frac{B}{H}$$

初始磁导率为 H→0 之极限斜率。
Initial permeability is the limiting slope as H → 0.

$$\mu_a = \frac{1}{\mu_0}\,\frac{\hat{B}}{\hat{H}}$$

振幅磁导率以峰值 B̂、Ĥ 定义。
Amplitude permeability uses the peak values B̂, Ĥ.

B̂、Ĥ 为磁通密度与磁场强度之峰值；本册 μi 于低磁场（<0.2 mT）、指定频率之环形磁芯量得。
B̂, Ĥ are the peak flux density and field strength; μi in this volume is measured on a toroid at low flux (<0.2 mT) and the stated frequency.

物理量解释与公式（续） PHYSICAL QUANTITIES — EXPLANATIONS & FORMULAS

复数磁导率 μ′ – jμ″ COMPLEX PERMEABILITY

交流下 B 相对 H 有相位落后，磁导率遂以复数表示：实部 μ′ 为可储能的电感性分量，虚部 μ″ 为损耗性分量。将复数磁导率代入电感阻抗，μ′ 贡献电抗（储能），μ″ 贡献串联电阻（发热）。μ′、μ″ 随频率变化：低频 μ′≈μi、μ″ 极小；接近铁磁共振或畴壁弛豫频率时 μ′ 陡降、μ″ 出现峰值。EMI 元件两个区段都用得上：低频感抗区由 μ′ 主导，以阻挡与反射抑制噪声（共模扼流圈即工作于此）；进入损耗区后 μ″ 增大，把噪声能量转为热耗散（磁珠、套管即工作于此）。

Under AC drive B lags H in phase, so permeability is written as a complex quantity: the real part μ′ is the energy-storing inductive component, the imaginary part μ″ the lossy one. Substituted into the coil impedance, μ′ yields reactance (storage) and μ″ a series resistance (heating). Both vary with frequency: at low frequency μ′≈μi and μ″ is tiny; near ferrimagnetic resonance or wall relaxation μ′ falls sharply and μ″ peaks. EMI parts use both regions: in the low-frequency inductive region μ′ dominates and noise is blocked and reflected (common-mode chokes work here); above the turnover μ″ rises and noise energy is dissipated as heat (beads and sleeves work here).

$$\mu = \mu' - j\mu''$$

$$Z_L = j\omega L_0(\mu' - j\mu'') = \omega L_0\mu'' + j\omega L_0\mu'$$

第一项 $\omega L_0\mu''$ = 串联电阻 Rs，第二项 $\omega L_0\mu'$ = 电抗 Xs。
The first term $\omega L_0\mu''$ is the series resistance Rs, the second $\omega L_0\mu'$ the reactance Xs.

ω = 2πf 角频率；L0 = $\mu_0 N^2 Ae/le$ 为空心（μ=1）电感；j 虚数单位。
ω = 2πf angular frequency; L0 = $\mu_0 N^2 Ae/le$ is the air-core (μ=1) inductance; j the imaginary unit.

损耗因子与相对损耗因子 tanδ · tanδ/μi LOSS FACTOR & RELATIVE LOSS FACTOR

在低磁通（小信号）下，磁芯的总损耗以损耗角正切 tanδ = μ″/μ′ 表示，等于串联损耗电阻与电抗之比。tanδ 由三部分组成：磁滞损耗（正比于激磁量）、涡流损耗（正比于频率）与剩余损耗（弛豫 / 共振）。为在不同磁导率材料间公平比较，取相对损耗因子 tanδ/μi；开气隙后之等效损耗则按有效磁导率折算。本册材质表以 $\times10^{-6}$ 标示指定频率下的 tanδ/μi。

At low flux (small signal) the total core loss is expressed by the loss tangent tanδ = μ″/μ′, equal to the ratio of series loss resistance to reactance. It has three parts: hysteresis (proportional to drive), eddy-current (proportional to frequency) and residual (relaxation/resonance) loss. For a fair comparison across permeabilities the relative loss factor tanδ/μi is used; with an air gap the effective loss scales by μe. Datasheets in this volume quote tanδ/μi $\times10^{-6}$ at the stated frequency.

$$\tan\delta = \frac{\mu''}{\mu'} = \frac{R_s}{\omega L_s} = \tan\delta_h + \tan\delta_f + \tan\delta_r$$

总损耗 = 磁滞 + 涡流 + 剩余三分量。
Total loss = hysteresis + eddy + residual components.

$$\tan\delta_e = \mu_e \cdot \frac{\tan\delta}{\mu_i}$$

开气隙后之等效损耗角。
Effective loss tangent after gapping.

Rs、Ls 串联损耗电阻与电感；μe 有效磁导率；下标 h/f/r 分别为磁滞 / 涡流 / 剩余。
Rs, Ls series loss resistance and inductance; μe effective permeability; subscripts h/f/r denote hysteresis/eddy/residual.

物理量解释与公式（续） PHYSICAL QUANTITIES — EXPLANATIONS & FORMULAS

品质因数 Q QUALITY FACTOR

品质因数 Q 衡量每弧度储能与耗能之比，是谐振电路与天线用磁芯的关键指标：Q 越高，选择性越锐、插入损耗越低、谐振越纯。Q 恰为损耗角正切之倒数，也等于电抗与串联损耗电阻之比。本册高频稳定系材料即以“高 Q、低 tanδ/μi”为设计目标，用于 RF 调谐、滤波与谐振。

The quality factor Q measures the ratio of stored to dissipated energy per radian — the key figure for resonant-circuit and antenna cores: higher Q means sharper selectivity, lower insertion loss and cleaner resonance. Q is the reciprocal of the loss tangent and equals reactance over series loss resistance. The high-frequency stable grades here target high Q (low tanδ/μi) for RF tuning, filtering and resonance.

$$Q = \frac{1}{\tan\delta} = \frac{\omega L_s}{R_s} = \frac{X}{R}$$

X 电抗；R 等效串联损耗电阻；ω = 2πf。

X reactance; R equivalent series loss resistance; ω = 2πf.

阻抗与标准化阻抗 Z · ZN IMPEDANCE & NORMALIZED IMPEDANCE

EMI 抑制磁珠 / 磁环的核心指标是阻抗 Z：把复数磁导率代入线圈阻抗，其大小正比于 |μ|、匝数平方与磁芯几何参数。低频段 Z 呈电感性（μ′ 主导），高频段转为电阻性（μ″ 主导）而有效吸收噪声——这正是抑制元件所利用的区段。为让不同尺寸、不同匝数的样品能彼此比较，将 |Z| 折算到单匝并除以磁芯几何因数 Ae/le，得标准化阻抗 ZN（Ω/mm）——在指定测量频率下，ZN 只反映材料本身。

The key figure for EMI-suppression beads/rings is the impedance Z: inserting the complex permeability into the coil impedance, its magnitude scales with |μ|, the turns squared and the core geometry. At low frequency Z is inductive (μ′-dominated); at high frequency it turns resistive (μ″-dominated) and absorbs noise effectively — the band suppression parts exploit. To compare samples of different size and turns, |Z| is reduced to one turn and divided by the core geometry factor Ae/le, giving the normalized impedance ZN (Ω/mm); at a stated measuring frequency ZN reflects the material alone.

$$|Z| = \omega\,\mu_0\,|\mu|\,\frac{N^2 A_e}{l_e}, \qquad |\mu| = \sqrt{\mu'^2 + \mu''^2}$$

阻抗大小正比于复数磁导率之模 |μ|。

Impedance magnitude scales with the modulus |μ| of the complex permeability.

$$Z_N = \frac{|Z|}{N^2}\cdot\frac{l_e}{A_e} = \omega\,\mu_0\,|\mu|$$

于指定频率下仅与材料 |μ| 有关。le/Ae 以 mm⁻¹ 代入时 ZN 之单位即为 Ω/mm（SI 下为 Ω/m）。

At a stated frequency ZN depends only on the material |μ|. With le/Ae in mm⁻¹ the result is in Ω/mm (Ω/m in SI).

|μ| 复数磁导率之模；N 匝数；Ae、le 有效截面积与磁路长度。ZN 为 EMI 用材料跨尺寸比较与频段判读之基准；具专属扫描之材质见其 ZN–f 特性曲线。

|μ| modulus of complex permeability; N turns; Ae, le effective area and path length. ZN is the basis for comparing EMI grades across sizes and for reading their frequency behaviour; see the ZN–f curves of the grades that carry a dedicated sweep.

电阻率、涡流与趋肤深度 ρ · δ RESISTIVITY, EDDY CURRENTS & SKIN DEPTH

承推导主线（二）“导体中的扩散”一节：铁氧体相对于金属磁性材料的最大优势在于高电阻率——晶粒间的绝缘界面使涡流难以流通。对厚度 d、磁通均匀之薄片导体，涡流损耗正比于（磁通密度×频率×厚度）平方而反比于电阻率；用于块体磁芯时 d 取特征尺寸，仅为量级比较。锰锌 ρ 约 0.1–10 Ω·m，涡流损耗在数百 kHz 以上已需纳入设计；镍锌 ρ 约 10^5–10^7 Ω·m，涡流分量可忽略，故能工作到数十 MHz 以上。趋肤深度 δ 描述交流磁场在导电介质中的穿透深度：对绕组铜线 δ 随频率升高而变浅，是高频改用多股绞线 / 利兹线的依据（见附录工程速查）；对高电阻率的镍锌本体，δ 远大于磁芯尺寸，其高频上限并非由趋肤深度决定，而是由畴壁弛豫与铁磁共振（见 Snoek 极限）及尺寸共振主导。

Following the field-diffusion step of Derivation (2): the chief advantage of ferrites over metallic magnetic materials is high resistivity — insulating grain boundaries impede eddy currents. For a thin sheet of thickness d in a uniform flux, eddy loss scales as (flux × frequency × thickness)² and inversely with resistivity; applied to a bulk core, d is a characteristic size and the result is an order-of-magnitude comparison only. MnZn (ρ ≈ 0.1–10 Ω·m) must account for eddy loss above a few hundred kHz, whereas NiZn (ρ ≈ 10^5–10^7 Ω·m) has a negligible eddy component and works above tens of MHz. Skin depth δ is the penetration of an AC field into a conducting medium: in winding copper δ shrinks with frequency and is the basis for stranded/litz wire at high frequency (see the quick-reference appendix); in high-resistivity NiZn δ far exceeds the core dimensions, so its high-frequency limit is set not by skin depth but by domain-wall relaxation and ferrimagnetic resonance (see Snoek's limit) and by dimensional resonance.

$$P_e \approx \frac{\pi^2 d^2 f^2 \hat{B}^2}{6\,\rho}$$

薄片涡流损耗（d 为片厚；正比于频率平方、反比于电阻率）。
Eddy-current loss of a thin sheet (d = thickness; ∝ f², ∝ 1/ρ).

$$\delta = \sqrt{\frac{2}{\omega\mu\sigma}} = \sqrt{\frac{\rho}{\pi f \mu}}$$

趋肤深度随频率升高而变浅（绕组铜线为主要适用对象）。
Skin depth shrinks as frequency rises (chiefly for winding copper).

ρ 电阻率；σ = 1/ρ 电导率（本卡专用；磁致伸缩卡之 σ 为机械应力）；δ 趋肤深度；$\mu = \mu_0\mu_r$ 绝对磁导率；本册镍锌 ρ 约 10^5–10^7 Ω·m。
ρ resistivity; σ = 1/ρ conductivity (in this card only — σ denotes mechanical stress in the magnetostriction card); δ skin depth; $\mu = \mu_0\mu_r$ absolute permeability; NiZn ρ here is ~10^5–10^7 Ω·m.

物理量解释与公式（续） PHYSICAL QUANTITIES — EXPLANATIONS & FORMULAS

B 支 · 由非线性 M–H 本构决定 BRANCH B — SET BY THE NON-LINEAR M–H CONSTITUTIVE LAW

场方程给出能量关系 ∮H dB（每周期单位体积损耗 = 回线面积），但 B–H 回线本身的形状——何时饱和、残留多少剩磁、矫顽力多大——由材料的非线性磁化与磁畴运动供给。饱和裕度、直流叠加与功率损耗皆源于此。

The field equations give the energy relation ∮H dB (loss per cycle per volume = loop area), but the shape of the B–H loop itself — when it saturates, how much remanence and coercivity — is supplied by the material's non-linear magnetization and domain motion. Saturation margin, DC bias and power loss all stem from here.

磁滞回线 Bs · Br · Hc HYSTERESIS LOOP (SATURATION, REMANENCE, COERCIVITY)

以交变磁场往复激磁时，B 对 H 描出一封闭回线。沿起始磁化曲线增大 H，B 趋近饱和磁通密度 Bs（畴壁移动与磁矩转动皆完成）；将 H 降回零，残留磁通密度为剩磁 Br；使 B 归零所需之反向磁场为矫顽力 Hc。回线所围面积正是每周期、每单位体积的磁滞损耗能量。软磁铁氧体以“窄回线、小 Hc”为特征，故低频损耗小；功率材质追求高 Bs 以提升饱和裕度，抑制材质则反之利用损耗。

Cycling the field traces a closed B–H loop. Rising along the initial curve, B approaches the saturation flux density Bs (wall motion and rotation complete); returning H to zero leaves the remanence Br; the reverse field bringing B to zero is the coercivity Hc. The loop area is exactly the hysteresis loss energy per cycle per unit volume. Soft ferrites feature narrow loops and small Hc, hence low low-frequency loss; power grades seek high Bs for saturation margin, while suppression grades instead exploit the loss.

$$w_h = \oint H\,dB \quad [\mathrm{J/m^3}], \qquad P_h = f\oint H\,dB$$

回线面积 = 每周期磁滞损耗；乘以频率即磁滞功率损耗。

Loop area = hysteresis loss per cycle; times frequency gives the hysteresis power loss.

Bs 饱和磁通密度；Br 剩磁；Hc 矫顽力；f 频率；wh 每周期损耗密度。

Bs saturation flux density; Br remanence; Hc coercivity; f frequency; wh loss energy density per cycle.

饱和磁通密度与直流叠加 Bs · Isat SATURATION FLUX DENSITY & DC BIAS

当磁场强到所有磁畴皆对齐，磁通密度趋于饱和值 Bs，此后再增大 H 几乎不增 B，磁导率崩塌。在含直流分量的应用（功率电感、扼流圈）中，直流偏磁使工作点沿 B–H 曲线上移，可用的增量磁导率随之下降；当电感量跌至额定值的某比例（如 –30 %）时对应的电流即饱和电流 Isat。设计时须确保峰值工作磁通密度留有裕度、不逾越膝点，Bs 越高者裕度越大。

When the field is strong enough to align all domains, the flux density approaches the saturation value Bs; beyond it, further H barely raises B and permeability collapses. In applications with a DC component (power inductors, chokes) the DC bias moves the operating point up the B–H curve, lowering the usable incremental permeability; the current at which inductance has fallen to a set fraction (e.g. −30 %) of rating is the saturation current Isat. Designs must keep the peak working flux density in reserve below the knee — the higher the Bs, the larger the margin.

$$H_{dc} = \frac{N I_{dc}}{l_e} \quad \Rightarrow \quad \mu_\Delta = \frac{1}{\mu_0}\left(\frac{\Delta B}{\Delta H}\right)_{H_{dc}}$$

直流偏磁场决定工作点，增量磁导率 μΔ 随之下降。

The DC bias field sets the operating point; the incremental permeability μΔ falls accordingly.

Idc 直流电流；Hdc 偏磁场；μΔ 增量磁导率；Isat 电感跌落至规定比例时之电流。

Idc DC current; Hdc bias field; μΔ incremental permeability; Isat the current at which inductance drops to the specified fraction.

物理量解释与公式（续） PHYSICAL QUANTITIES — EXPLANATIONS & FORMULAS

磁芯损耗与 Steinmetz 方程 Pv CORE LOSS & THE STEINMETZ EQUATION

在高磁通（功率）工况下，磁芯单位体积损耗 Pv 同样分为磁滞、涡流与剩余三部分：磁滞损耗正比于频率，涡流损耗正比于频率平方且与电阻率成反比，故高电阻率的镍锌在高频远优于金属。工程上以经验性的 Steinmetz 幂函数描述 Pv 对频率与磁通密度的依存，系数 Cm、α、β 由材质测量拟合，并随温度变化；其系数与指数仅适用于拟合时所用之材质、温度、频率、磁通密度与波形范围。锰锌功率材常刻意将损耗最低点调整到工作温度（多在 80–100 ℃），镍锌则非以此为设计目标——实际温度特性以各材质曲线为准。

Under high flux (power) operation the volumetric core loss Pv again splits into hysteresis, eddy-current and residual terms: hysteresis loss scales with frequency, eddy loss with frequency squared and inversely with resistivity — so high-resistivity NiZn greatly outperforms metals at HF. In practice the empirical Steinmetz power law captures the dependence of Pv on frequency and flux density, with coefficients Cm, α, β fitted per grade and varying with temperature; they are valid only over the grade, temperature, frequency, flux-density and waveform range used for the fit. MnZn power grades are often tuned so the loss minimum falls at the operating temperature (typically 80–100 °C); NiZn is not designed for this — refer to each grade's curves.

$$P_v = C_m\, f^{\alpha}\, \hat{B}^{\beta}$$

Steinmetz 幂函数。Cm、α、β 为经验拟合值，仅在拟合所用之材质、频段与磁通密度范围内有效——本公司实测拟合之 α、β 即随材质与频段跨越相当大的范围，不可套用单一通用区间；请逐材质查其 Steinmetz 系数表。本册功率格之测量条件详见各材质表。

The Steinmetz power law. Cm, α and β are empirical fits valid only over the grade, frequency band and flux-density range used for the fit — TAK's own fitted α and β span a wide range across grades and bands, so no single universal interval applies; read the Steinmetz coefficient table of each grade. Power-loss conditions are stated in each grade table.

$$P_e \;\propto\; \frac{(d\, f\, \hat{B})^2}{\rho}$$

涡流损耗与电阻率成反比。

Eddy-current loss varies inversely with resistivity.

Pv 单位体积损耗（kW/m³）；Cm、α、β Steinmetz 系数；d 特征尺寸；ρ 电阻率；B̂ 峰值磁通密度。

Pv volumetric loss (kW/m³); Cm, α, β Steinmetz coefficients; d characteristic size; ρ resistivity; B̂ peak flux density.

性能因数 PF PERFORMANCE FACTOR

性能因数以“在固定损耗密度（常取 Pv = 500 kW/m³）下所能达到的频率×最大磁通密度”衡量功率材质的通量处理能力：PF 越高，代表在相同散热条件下能传递更大的功率密度，或在相同功率下体积更小。它是功率转换设计选料的直观指标，并用来界定各材质最适用的频段。

The performance factor gauges a power grade's throughput as the product frequency × maximum flux density achievable at a fixed loss density (commonly Pv = 500 kW/m³): a higher PF means more power density for the same cooling, or smaller size for the same power. It is the intuitive figure of merit for power-conversion material selection and delimits each grade's best frequency band.

$$PF = f \times B_{max} \qquad (P_v = \mathrm{const})$$

于指定损耗密度下量得。

Evaluated at the specified loss density.

f 工作频率；Bmax 该损耗密度下之最大磁通密度。

f operating frequency; Bmax the maximum flux density at that loss density.

物理量解释与公式（续） PHYSICAL QUANTITIES — EXPLANATIONS & FORMULAS

C 支 · 材料微观与动态物理（Maxwell 之外）

BRANCH C — MICROSCOPIC & DYNAMIC PHYSICS (BEYOND MAXWELL)

以下各量 Maxwell 方程无法给出，必须引入材料的微观与动态物理：磁化 M 的来源（次晶格反平行、超交换）、磁导率与带宽的取舍（Snoek）、随温度崩塌（居里温度、温度系数）、随时间漂移（减落）与磁弹耦合（磁致伸缩）。

Maxwell's equations cannot yield the following; they require the material's microscopic and dynamic physics: the origin of magnetization M (antiparallel sublattices, super-exchange), the permeability–bandwidth trade-off (Snoek), collapse with temperature (Curie temperature, temperature coefficient), drift with time (disaccommodation) and magneto-elastic coupling (magnetostriction).

铁氧体与亚铁磁性 FERRITES & FERRIMAGNETISM

铁氧体为尖晶石（spinel）结构之陶瓷氧化物，金属离子分居四面体（A）与八面体（B）两个次晶格。两个次晶格的磁矩经由氧离子以“超交换”作用反平行耦合，但因大小不等而未完全抵消，净磁矩即亚铁磁性的来源——这与金属中电子自旋平行排列的铁磁性不同。宏观上材料分割为许多磁畴，各畴内自发磁化方向一致；外加磁场时，磁化过程由“畴壁移动”（弱场）与“磁矩转动”（强场）共同完成。

Ferrites are ceramic oxides with a spinel structure in which metal ions occupy two sublattices — tetrahedral (A) and octahedral (B). Their moments couple antiparallel through the oxygen ion (super-exchange); being unequal they do not fully cancel, and the net moment gives rise to ferrimagnetism — distinct from the parallel-spin ferromagnetism of metals. Macroscopically the material splits into magnetic domains, each spontaneously magnetized; under an applied field, magnetization proceeds by domain-wall motion (weak field) and moment rotation (strong field).

$$\vec{B} = \mu_0(\vec{H} + \vec{M}), \qquad \vec{M} = \chi\,\vec{H}$$

磁通密度 B 由外场 H 与材料磁化强度 M 共同构成。
Flux density B is the sum of the applied field H and the material magnetization M.

$$\mu_r = 1 + \chi = \frac{B}{\mu_0 H}$$

相对磁导率即磁化率 χ 加一。
Relative permeability is the susceptibility χ plus one.

μ_0 = 4π×10⁻⁷ H/m 为真空磁导率；χ 为磁化率；μr 为相对磁导率。

μ_0 = 4π×10⁻⁷ H/m is the permeability of free space; χ the susceptibility; μr the relative permeability.

Snoek 极限 μi·fr SNOEK'S LIMIT

Snoek 极限揭示了尖晶石铁氧体“高磁导率”与“高带宽”不可兼得的物理本质：材料的静态磁化率与其铁磁共振频率的乘积，受旋磁比 γ 与饱和磁化强度 Ms 之乘积所限，近似为一常数。因此提高 μi 必然压低可用频率上限，反之亦然。这解释了为何本册高磁导率的 L 系（μi 数千）仅适用于较低频，而超低磁导率的 V4F1 / M5E1（μi 仅十余）方能胜任数十至上百 MHz——选料时 μi 与带宽须权衡。

Snoek's limit reveals the physical trade-off that spinel ferrites cannot be simultaneously high-permeability and high-bandwidth: the product of the static susceptibility and the ferrimagnetic resonance frequency is bounded by the product of the gyromagnetic ratio γ and the saturation magnetization Ms, and is approximately constant. Raising μi therefore necessarily lowers the usable upper frequency, and vice versa. This is why the high-μ L-series here (μi in the thousands) serves only lower frequencies, while the very-low-μ V4F1/M5E1 (μi ≈ 10) handle tens to hundreds of MHz — μi and bandwidth must be traded off in selection.

$$(\mu_i - 1)\,f_r \;\approx\; \frac{2}{3}\,\frac{\gamma}{2\pi}\,\mu_0 M_s \;=\; \text{const}$$

静态磁化率与共振频率之积受 Ms 所限。
The product of static susceptibility and resonance frequency is bounded by Ms.

f_{FMR} 铁磁共振频率；γ 旋磁比（≈2.2×10⁵ m/A·s）；Ms 饱和磁化强度。

f_{FMR} ferrimagnetic resonance frequency; γ gyromagnetic ratio (≈2.2×10⁵ m/A·s); Ms saturation magnetization.

物理量解释与公式（续） PHYSICAL QUANTITIES — EXPLANATIONS & FORMULAS

温度系数与居里温度 αμr · Tc TEMPERATURE COEFFICIENT & CURIE TEMPERATURE

磁导率随温度变化，源于磁晶各向异性与自发磁化的温度依存。未归一化的温度系数 α 描述单位温度的磁导率变化率；为便于在不同磁导率的材料间比较，本册材质表采“比温度系数”αμr（=α/μi，亦称温度因子 T.F.）。温度升高时 μ 一般先缓升，接近居里温度 Tc 时因自发磁化趋零而急剧崩塌——超过 Tc，材料失去亚铁磁性、退化为顺磁；实际曲线形状依材质而异，详见各材质之 μi–T 曲线。高 Tc 是高温下维持特性的必要条件，但温度漂移大小仍取决于 αμr，两者须分别确认。

Permeability varies with temperature through the temperature-dependence of magnetocrystalline anisotropy and spontaneous magnetization. The un-normalized coefficient α gives the change of permeability per degree; to compare grades of different permeability the datasheets in this volume use the relative temperature coefficient αμr (= α/μi, also called the temperature factor T.F.). On heating, μ typically rises gently then collapses sharply near the Curie temperature Tc as the spontaneous magnetization vanishes — above Tc the material loses its ferrimagnetism and becomes paramagnetic; the exact shape differs by grade, see each μi–T curve. A high Tc is necessary to hold characteristics hot, but the size of the drift is set by αμr — check both.

$$\alpha = \frac{\mu_2-\mu_1}{\mu_1\,(T_2-T_1)},\qquad \alpha_{\mu r} = \frac{\alpha}{\mu_i} = \frac{\mu_2-\mu_1}{\mu_1^2\,(T_2-T_1)}\quad [\mathrm{K}^{-1}]$$

温度系数 α 与比温度系数 αμr（μ1、μ2 为参考温度 T1、T2 下之磁导率，μi = μ1）。
Temperature coefficient α and relative coefficient αμr (μ1, μ2 at reference temperatures T1, T2; μi = μ1).

$$M_s(T)\to 0 \quad \text{as} \quad T\to T_c$$

居里温度处自发磁化归零。
Spontaneous magnetization vanishes at the Curie temperature.

μ1、μ2 为 T1、T2 之磁导率；Ms 自发磁化强度；Tc 居里温度。
μ1, μ2 permeabilities at T1, T2; Ms spontaneous magnetization; Tc Curie temperature.

减落系数（磁导率时效）DF DISACCOMMODATION

磁芯经退磁（热扰动或交流退磁）后，磁导率并非固定，而是随时间依对数规律缓慢下降，称为减落。其物理来源是材料中的离子（如 Fe^{2+}、空位）在磁畴壁附近重新排列、逐渐“钉扎”畴壁，使可动性降低。减落因数 DF 以两个时间点的磁导率差、对磁导率平方与时间对数归一化来表征，是衡量长期稳定性的重要指标，对高精度电感与滤波器尤为关键。

After demagnetization (thermal or AC), a core's permeability is not fixed but decreases slowly and logarithmically with time — disaccommodation. Physically, ions in the material (e.g. Fe^{2+}, vacancies) rearrange near the domain walls and progressively pin them, reducing mobility. The disaccommodation factor DF characterizes this via the permeability drop between two instants, normalized by permeability squared and the log of the time ratio — a key long-term-stability metric, critical for precision inductors and filters.

$$DF = \frac{\mu_1-\mu_2}{\mu_1^2\,\log_{10}(t_2/t_1)}$$

μ1、μ2 为退磁后 t1、t2 时刻之磁导率。
μ1, μ2 are the permeabilities at times t1, t2 after demagnetization.

t1、t2 为退磁后之测量时刻（如 10 min 与 100 min）；μ1、μ2 对应之磁导率。
t1, t2 measurement times after demagnetization (e.g. 10 and 100 min); μ1, μ2 the corresponding permeabilities.

物理量解释与公式（续） PHYSICAL QUANTITIES — EXPLANATIONS & FORMULAS

磁致伸缩与应力敏感性 λs MAGNETOSTRICTION & STRESS SENSITIVITY

磁化会使材料产生微小形变（磁致伸缩 λs）；其逆效应（Villari 效应）则使机械应力改变磁导率与损耗。因此装配夹持、灌胶固化或热膨胀造成的残留应力，会经由应力各向异性能改变磁特性，甚至在交流激磁下引发可闻噪音（磁致伸缩嗡鸣）。低 λs 的材质对安装应力较不敏感、噪声较低；设计时应避免对磁芯施加不均匀夹持力。

Magnetization slightly deforms the material (magnetostriction λs); its inverse (the Villari effect) means mechanical stress changes permeability and loss. Residual stress from clamping, potting or thermal expansion thus alters the magnetic behaviour through the stress-anisotropy energy, and under AC drive can even excite audible noise (magnetostrictive hum). Low-λs grades are less sensitive to mounting stress and quieter; designs should avoid uneven clamping of the core.

$$K_\sigma = \tfrac{3}{2}\lambda_s\,\sigma \quad \Rightarrow \quad \Delta\mu \propto -K_\sigma$$

应力各向异性能与 λs、应力成正比；λs→0 时磁导率对应力不敏感。
The stress-anisotropy energy scales with λs and stress; as λs→0 permeability becomes stress-insensitive.

λs 饱和磁致伸缩系数；σ 机械应力；Kσ 应力各向异性能。
λs saturation magnetostriction constant; σ mechanical stress; Kσ stress-anisotropy energy.

机械与热性质 E · λ · α MECHANICAL & THERMAL PROPERTIES

铁氧体属陶瓷材料，质脆、对冲击与拉伸应力敏感：抗压远高于抗拉，故设计上应避免拉伸与弯曲负载，夹持力须均匀分布。热导率仅为铝的数十分之一，磁芯内部热量不易导出，功率设计须以表面散热与绕组布局为主要散热途径。

Ferrites are ceramic: brittle and far stronger in compression than in tension, so tensile and bending loads should be avoided and clamping force distributed evenly. Thermal conductivity is a small fraction of that of aluminium — heat does not readily leave the core interior, so power designs must rely on surface cooling and winding layout.

机械性质 Mechanical

项目 Property	符号	参考范围 Reference range
抗拉强度 Tensile strength	σt	20 – 40 MPa
抗折强度 Flexural strength	σb	80 – 120 MPa
抗压强度 Compressive strength	σc	600 – 900 MPa
维氏硬度 Vickers hardness	HV15	550 – 700
杨氏模量 Modulus of elasticity	E	120 – 160 GPa
断裂韧性 Fracture toughness	K IC	0.8 – 1.2 MPa·m^1/2

热性质 Thermal

项目 Property	符号	参考范围 Reference range
热导率 Thermal conductivity	λ	3.5 – 7 W/(m·K)
线膨胀系数 Linear expansion	α	7 – 12 $\times 10^{-6}$ /K
比热 Specific heat	c	0.6 – 0.8 J/(g·K)

上列为参考值；实际数值依材料配方与产品形状设计而异，不作为规格承诺。各材质之密度与居里温度见材质规格页。
Reference values only; actual figures vary with material formulation and product geometry and are not a specification commitment. Per-grade density and Curie temperature are given on the material pages.

磁棒（ROD）电感计算：开磁路与表观磁导率

ROD INDUCTANCE: OPEN CIRCUIT & APPARENT PERMEABILITY

前一章的 $L=\mu_0\mu_e\cdot N^2Ae/le$ 适用于闭磁路；在没有人为添加气隙时 μe 接近 μi（环形最接近，两片式磁芯受组合面的间隙影响因此 μe 会低于 μi），研磨气隙品则由气隙决定。但磁棒是开磁路：磁通离开磁棒顶端后须经空气回流，称为开磁路或开放磁路，因此计算磁棒上的磁导率称为"表观磁导率"μrod，会远低于材料 μi，故不可直接套用闭磁路公式。

The closed-circuit result $L=\mu_0\mu_e\cdot N^2Ae/le$ of the previous chapter applies where no gap is deliberately added, with μe approaching μi (closest for toroids; two-piece cores read below μi because of the mating-face clearance), while ground-gap parts are gap-dominated. A rod is an OPEN magnetic circuit: flux leaving the rod ends must return through air — hence the term open magnetic circuit — so the permeability computed on a rod, the apparent permeability μrod, is far below the material μi and the closed-circuit formula must not be applied directly.

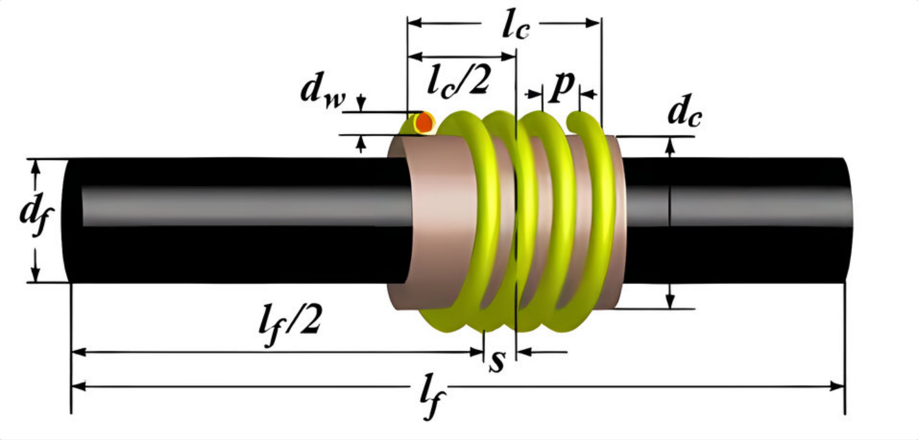

图 R-1　线圈绕于铁氧体磁棒（开磁路，磁通经空气回流）。符号：lf 磁棒长、df 磁棒径、lc 线圈长、dc 线圈径、dw 线径、p 节距、s 线圈中心偏离磁棒中心之位移。（图片来源：Coil64）

Fig. R-1 A coil on a ferrite rod (open magnetic circuit; flux returns through air). lf rod length, df rod diameter, lc coil length, dc coil diameter, dw wire diameter, p pitch, s offset of coil centre from rod centre. (Image source: Coil64)

表观（磁棒）磁导率 μrod

μrod 由退磁效应决定：退磁因子 N（0<N<1）随棒的长径比 l/d 而变——棒越细长，N 越小、μrod 越高（但仍远低于 μi）。球形 N=1/3；细长棒 N→0。

μrod is governed by demagnetization: the factor N (0<N<1) depends on the rod's length/diameter ratio l/d — the longer and thinner the rod, the smaller N and the higher μrod (still far below μi). Sphere N=1/3; a long thin rod N→0.

$$\mu_{rod} = \frac{\mu_i}{1+N(\mu_i-1)}$$

表观（磁棒）磁导率；退磁因子 N 随长径比 l/d 而变（磁棒越长 N 越小）

Apparent (rod) permeability; demagnetizing factor N falls as the length/diameter ratio l/d rises

磁棒电感计算：长径比主导与电感估算

ROD INDUCTANCE: ASPECT-RATIO DOMINANCE & ESTIMATION

形状主导：μrod 对长径比 l/d

下表以 prolate 精确退磁因子计算 μrod。关键观察：当 μi 够高时，μrod 几乎与 μi 无关、由 l/d 主导——短棒（l/d=5）μi=800 与 2000 几乎同值。因此要提升磁棒电感，“拉长棒身（增大 l/d）”通常比“改用更高 μi 材料”更有效。

The table computes μrod with the exact prolate demagnetizing factor. Key point: once μi is high enough, μrod is almost independent of μi and dominated by l/d — for a short rod (l/d=5), μi=800 and 2000 give virtually the same value. To raise a rod's inductance, lengthening it (higher l/d) is usually more effective than a higher-μi material.

长径比 l / d	退磁因子 N Demag factor N	μrod（μi=800）	μrod（μi=2000）
5	0.056	18	18
10	0.020	46	48
15	0.011	83	89
20	0.0067	125	138
30	0.0034	213	254

μrod = μi/(1+N(μi−1))，N = 轴向退磁因子（prolate 球体近似）。数值仅供趋势说明；实棒因非理想球体、线圈未必全长，须以下页方法或实测修正。
Values illustrate the trend only; real rods need the method overleaf or measurement.

电感估算（全长线圈）

得 μrod 后，全长线圈的电感可用电感系数估算（n = 匝数）：

With μrod, the inductance of a full-length coil follows from the inductance factor (n = turns):

$$L = A_L\, n^2, \qquad A_L = \mu_0\, \mu_{rod}\, \frac{A_e}{l_e}$$

实用电感（全长线圈）：n 匝数、Ae 磁棒截面、le 磁棒长
Practical inductance (full-length coil): n turns, Ae rod area, le rod length

磁棒电感计算：Coil64 计算法与使用限制

ROD INDUCTANCE: THE COIL64 METHOD & ITS LIMITS

退磁公式仅为一阶估算——Payne（G3RBJ）指出纯退磁法常需 0.2–0.7 的经验修正才与实测相符。实务上建议用开源计算器 Coil64（Coil32）的 “磁棒线圈 Ferrite rod” 模块，其基于 Payne 磁阻理论，并以 Cainov 回归修正线圈偏离棒中心。

The demag formula is only a first-order estimate — Payne (G3RBJ) showed the pure demagnetization approach often needs an empirical factor of 0.2–0.7 to match measurement. In practice use the open-source calculator Coil64 (Coil32) 'Ferrite rod' mode, based on Payne's reluctance theory with a Cainov regression correcting for coil offset.

计算法 The method

Coil64 先算空心单层线圈电感 L_air（Wheeler / Weaver 式），再乘上磁棒有效磁导率因子 μ_L（＝有磁棒 / 空心之电感比）与线圈偏心修正 k_x：

Coil64 first computes the air-core single-layer inductance L_air (Wheeler/Weaver), then multiplies by the rod permeability factor μ_L (cored-to-air inductance ratio) and the coil-offset correction k_x:

$$L = L_{air} \cdot \mu_L \cdot k_x$$

Coil64 法：空心单层线圈电感 × 磁棒有效磁导率因子 × 线圈偏心修正
Coil64: air-core single-layer inductance × rod permeability factor × coil-offset correction

$$\mu_L = \frac{L_F}{L_{air}}$$

磁棒有效磁导率因子＝有磁棒 / 空心线圈之电感比（Payne 定义）
Rod permeability factor = ratio of cored to air-core inductance (Payne's definition)

使用限制（超出则误差显著）

- 绕线节距 ≤ 2×线径
  Winding pitch ≤ 2× wire diameter
- 线圈直径 ≤ 2×磁棒径
  Coil diameter ≤ 2× rod diameter
- 线圈长 < 3/4 磁棒长
  Coil length < 3/4 of rod length
- 线圈距磁棒端 ≥ 1/8 线圈长；置中取最大 L
  Coil ≥ 1/8 (of its length) from the rod edge; centered gives max L
- 材料 μi > 100
  Material μi > 100

本页公式为一阶设计估算；量产请以 Coil64 计算＋样品实测为准。Q 与自谐振频率（SRF）另受线圈分布电容与材料损耗影响。TAK R 系磁棒之材料 μi 见第 01 章材料特性。
These are first-order design estimates; for production rely on Coil64 plus measured samples. Q and SRF also depend on distributed capacitance and material loss; see Chapter 01 for TAK R-series μi.

镍锌材料特性

NiZn FERRITE MATERIALS

高电阻率镍锌系列：1 MHz–数百 MHz 高频电感、射频器件、EMI 抑制、天线与无线充电；共 6 类 27 种材质，另收录可替代 NiZn 抑制应用之 MnZn EMI 材料 ME03。

High-resistivity NiZn family — 27 grades in 6 classes plus ME03 (MnZn EMI grade covering NiZn suppression applications), each with full data & curves.

本章系列 SERIES IN THIS CHAPTER

- 高磁通耐热冲击材料（5 种材质）
  High Flux & Thermal Shock Resistant Ferrite (5 grades)
- 宽温稳定材料（2 种材质）
  Wide Temp. Stable Materials (2 grades)
- 高磁导高磁通EMI材料（2 种材质）
  High Perm. & High Flux & EMI Materials (2 grades)
- 高磁导EMI材料（5 种材质）
  High Perm. & EMI Materials (5 grades)
- 镍镁锌及镁锌材料（5 种材质）
  Ni-Mg-Zn & Mg-Zn Materials (5 grades)
- 高频稳定材料（8 种材质）
  High Frequency Stable Materials (8 grades)
- ME03（MnZn EMI · 替代 NiZn 抑制应用）
  MnZn EMI grade covering NiZn suppression

材料介绍与应用领域 INTRODUCTION & APPLICATIONS

镍锌铁氧体（NiZn Ferrite）是一种具有尖晶石结构的软磁铁氧体材料，主要由氧化铁（Fe_2O_3）、氧化镍（NiO）和氧化锌（ZnO）通过陶瓷工艺烧结而成。与锰锌铁氧体（MnZn Ferrite）相比，NiZn铁氧体具有更高的电阻率，使其在高频（1 MHz至数百MHz）应用中表现优异，同时具备较低的磁芯损耗和良好的温度稳定性。

Nickel-Zinc Ferrite (NiZn Ferrite) is a soft magnetic ferrite material with a spinel structure, primarily sintered from iron oxide (Fe_2O_3), nickel oxide (NiO), and zinc oxide (ZnO) through ceramic processing. Compared to manganese-zinc ferrite (MnZn Ferrite), NiZn ferrite exhibits significantly higher resistivity, making it particularly suitable for high-frequency applications (1 MHz to several hundred MHz) with lower core losses and excellent temperature stability.

体系定位与主要应用差异 Positioning & Application Differences

在软磁铁氧体家族中，MnZn 与 NiZn 是两大主要体系，根本差异在电阻率：MnZn 电阻率低（约 0.1–10 Ω·m），磁导率与饱和磁通密度高，是 2 MHz 以下功率转换与高磁导应用的主力；NiZn 电阻率高出数个数量级（约 10^5–10^7 Ω·m），涡流损耗极低，因此在 MnZn 因损耗急升而退场的 MHz 频段之上仍能稳定工作。高电阻率同时让 NiZn 磁芯不需绝缘即可直接绕线，适合磁棒、磁珠、夹扣式等开放磁路元件。

Within the soft-ferrite family, MnZn and NiZn are the two principal systems; the fundamental difference is resistivity. MnZn — low resistivity (≈0.1–10 Ω·m) with high permeability and saturation flux density — dominates power conversion and high-permeability applications below ~2 MHz. NiZn is several orders of magnitude more resistive (≈10^5–10^7 Ω·m) with negligible eddy-current loss, so it keeps working in the MHz range and above, where MnZn losses rise steeply; windings go directly on the un-insulated core — ideal for rods, beads and clamp-on shapes.

就主要应用而言：功率变压器、PFC 与储能电感等 2 MHz 以下之功率磁件，以 MnZn 为主场；MHz 级以上之信号与天线应用（磁棒天线、RFID、高Q电感）、高频功率转换，以及 30 MHz 以上之 EMI 抑制（磁珠、磁环、套管、共模滤波），则是 NiZn 的核心领域。本册另收录两类补充：面向 30–1000 MHz 宽频抑制的 MnZn 体系特例 ME03，以及成本导向之镍镁锌・镁锌系列。

In application terms, power magnetics below ~2 MHz — power transformers, PFC and energy-storage chokes — are MnZn territory; NiZn is the core choice for MHz-range signal and antenna applications (antenna rods, RFID, high-Q inductors), high-frequency power conversion, and EMI suppression above ~30 MHz (beads, rings, sleeves, common-mode filters). Two complements are also included: ME03, the MnZn-family exception for 30–1000 MHz broadband suppression, and the cost-oriented NiMgZn/MgZn series.

延伸阅读顺序：次页“跨体系材料定位”→“六分类选用指引”→“材料分类速查表”→各材质页。

Reading order: cross-family positioning (overleaf) → six-class selection guide → quick-reference tables → grade datasheets.

镍锌应用领域（按终端市场） NiZn Application Fields — by End Market

- 电子产品：笔记本电脑、平板电脑、智能手机、液晶显示器、主板、显卡等。
  Electronic Products: Laptops, tablets, smartphones, LCD monitors, motherboards, graphics cards, etc.
- 通信设备：无线路由器、基站天线、通信模块等。
  Communication Equipment: Wireless routers, base station antennas, communication modules, etc.
- 电源电子：电源模块、变压器、滤波器等。
  Power Electronics: Power modules, transformers, filters, etc.
- 汽车电子：BMS、车载音响系统、车载导航、车载充电器等。
  Automotive Electronics: BMS, Car audio systems, car navigation, car chargers, etc.
- 工业应用：工业电源、传感器、电动工具、电机等。
  Industrial Applications: Industrial power supplies, sensors, power tools, motors, etc.
- 新能源：光伏逆变器、风力发电控制器等。
  New Energy: Photovoltaic inverters, wind power generation controllers, etc.

MnZn / NiZn 跨体系材料定位——NiZn 视角

CROSS-FAMILY POSITIONING — NiZn PERSPECTIVE

本页以 NiZn 视角定位两大材料体系：MHz 级信号 / 天线、高频功率与 30 MHz 以上 EMI 抑制为 NiZn 主场——先在下表找到应用场景与对应材料，再到本册第 01 章读取材质规格；表中同时列出本公司对应之 MnZn 材料名以便跨体系比较。

Positioned from the NiZn perspective: MHz-range signal/antenna, high-frequency power and >30 MHz EMI suppression are NiZn home ground. Find your application and the corresponding materials below, then read Chapter 01; matching TAK MnZn grades are listed for cross-family comparison.

应用 Application	NiZn 对应材料 NiZn materials	MnZn 对应材料 MnZn materials	分界原则 Boundary rule
NiZn 专属与跨体系场景 NiZn-dominant & cross-family scenarios			
天线棒 / RFID / 高Q电感 Antenna rods / RFID / high-Q inductors	V4F1 M5E1 V2F1 M9A M61 M61H M63 Q1C1（高频稳定）	—	MHz 级开放磁路天线与高Q应用为 NiZn 主场（约1–100 MHz 按 μi 阶梯） NiZn home ground ~1–100 MHz, stepped by μi
高频功率 / 大电流电感 HF power / high-current inductors	DL3 DL4 DL5 DL6 DL5H G5A G5B（高磁通耐热冲击）	TM61 / TM65★	>5 MHz 或 SMD 耐焊需求选 NiZn NiZn above ~5 MHz or for SMD reflow
宽温功率电感（低温度系数） Wide-temp inductors (low αμr)	SL50 SL80（宽温稳定）	TM83★	需低温度系数时选 NiZn NiZn when a low temperature coefficient is required
NiZn EMI 抑制 NiZn EMI suppression	L43 L6A L8A L22A L28A G5A G5B（高磁导 EMI）	ME03★（30–1000 MHz，本册收录）	开放磁路 / 夹扣式等形状用 NiZn NiZn for open-circuit & clamp-on shapes
低μ调谐 / 高频谐振 Low-μ tuning / HF resonance	V4F1 ~ M63（μi 10 ~ 180）	—	MnZn 无对应类别 No MnZn equivalent
经济型电感 / EMI（镁锌） Cost-effective inductors / EMI (MgZn)	MGB1 MG2 MF1 MF2 MF3（镍镁锌及镁锌）	—	成本导向之中低频电感 / EMI Cost-driven low/mid-frequency parts

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MnZn / NiZn 跨体系材料定位——NiZn 视角（续）

CROSS-FAMILY POSITIONING — NiZn PERSPECTIVE

应用 Application	NiZn 对应材料 NiZn materials	MnZn 对应材料 MnZn materials	分界原则 Boundary rule
MnZn 应用场景（对应 MnZn 材料名如下） MnZn scenarios with corresponding grades			
开关电源变压器 Switching PSU transformers	—	TP44 / TP45	≤0.5 MHz 均为 MnZn 主场 MnZn territory at ≤0.5 MHz
LLC / 谐振与桥式变压器 LLC / resonant & bridge transformers	—	TM59★	1 MHz 以内 MnZn；更高频谐振用 NiZn 高频稳定系 MnZn within 1 MHz; higher-frequency resonance → NiZn HF-stable grades
MHz级高频功率变压器 MHz-class HF power transformers	DL3～DL5H · SL50/SL80	TM61	>5 MHz 之功率 / 谐振应用改用 NiZn Switch to NiZn above ~5 MHz
宽温 / 高温环境电源 Wide/high-temperature power	—	TM83★	MnZn 主场（无 NiZn 对应） MnZn only
PFC扼流圈 / 储能电感 PFC chokes / energy-storage inductors	—	TM82	MnZn 主场（无 NiZn 对应） MnZn only
VRM / TLVR / PoL 电感 VRM / TLVR / PoL inductors	DL3～DL5H（高磁通耐热冲击）	TM65★	≤3 MHz 用 MnZn；>5 MHz 用 NiZn MnZn up to 3 MHz; NiZn above 5 MHz
脉冲 / 栅极驱动变压器 Pulse / gate-drive transformers	—	TM71	MnZn 主场（无 NiZn 对应） MnZn only
宽频信号变压器 / 互感器 Wideband signal transformers / CTs	V4F1～Q1C1（高Q）	E02～T12（按 μi）	约 0.5–1 MHz 以上改用 NiZn NiZn above ~0.5–1 MHz
低频电源 / 镇流器 / 巴伦 Low-frequency power / ballasts / baluns	V4F1～Q1C1（高频稳定） L43～L28A（高磁导 · 宽频）	T2 / T2M · TB2	低频电源与镇流器为 MnZn 主场；RF / 宽频巴伦实务多用 NiZn MnZn for LF power & ballasts; RF / wideband baluns typically use NiZn
共模扼流圈 / 电源EMI滤波 Common-mode chokes / mains EMI filters	L43～L28A（高磁导 EMI）	T10 / T12（按 μi）	噪声 <2 MHz 用 MnZn 高导；>2 MHz 段用 NiZn MnZn high-perm below 2 MHz; NiZn above 2 MHz
EMI抑制磁珠 / 磁环 / 套管 EMI beads / rings / sleeves	L43～L28A · G5A/G5B	ME03★	30–1000 MHz 宽频抑制用 ME03★（本册收录）；其他形状 / 频段用 NiZn EMI ME03 for 30–1000 MHz broadband (in this volume); other shapes → NiZn EMI

NiZn 六分类选用指引 NiZn CLASS SELECTION GUIDE

六分类与收录材质 CLASSES & GRADES IN THIS CATALOG

NiZn 分类 Class	收录材质 Grades	典型应用方向 Typical applications
高磁通耐热冲击材料	DL3 DL4 DL5 DL6 DL5H	高频功率 / 大电流电感；>5 MHz 功率 / 谐振与 SMD 耐焊需求 HF power / high-current inductors; >5 MHz power & SMD reflow
宽温稳定材料	SL50 SL80	宽温功率电感——需低温度系数之场合 Wide-temperature inductors requiring a low temperature coefficient
高磁导高磁通EMI材料	G5A G5B	EMI 抑制与中低频（0.1–1 MHz）功率兼容（G5A / G5B） EMI suppression plus 0.1–1 MHz power capability (G5A/G5B)
高磁导EMI材料	L43 L6A L8A L22A L28A	共模扼流圈 / 电源 EMI 滤波（噪声 >2 MHz）与抑制磁珠 Common-mode chokes / mains EMI filters (>2 MHz) and beads
镍镁锌及镁锌材料	MGB1 MG2 MF1 MF2 MF3	成本导向之中低频电感 / EMI（镍镁锌 · 镁锌） Cost-effective low/mid-frequency inductors and EMI (MgZn)
高频稳定材料	V4F1 M5E1 V2F1 M9A M61 M61H M63 Q1C1	天线棒 / RFID / 高Q电感；低μ调谐与高频谐振（μi 10～180） Antenna rods / RFID / high-Q; low-μ tuning & HF resonance (μi 10–180)

体系分界原理（定性）| Family boundaries

- MnZn：高磁导率 · 高Bs · 低电阻率 —— 功率转换与 2 MHz 以下应用之主场。

  MnZn: high permeability, high Bs, low resistivity — power conversion and <2 MHz.
- NiZn：高电阻率 —— MHz 以上信号 / 天线 · 与 30 MHz 以上 EMI 抑制之主场（见“材料介绍与应用领域”章）。

  NiZn: high resistivity — MHz-plus signal/antenna and 30 MHz+ EMI suppression.
- ME03：MnZn 体系中面向 30–1000 MHz 抑制的特例。30 MHz 以上套管 / 磁珠抑制先看 ME03（本册收录）；其他形状与更高频段见本册 03 章 EMI 抑制类。

  ME03: the MnZn-family exception for 30–1000 MHz suppression.

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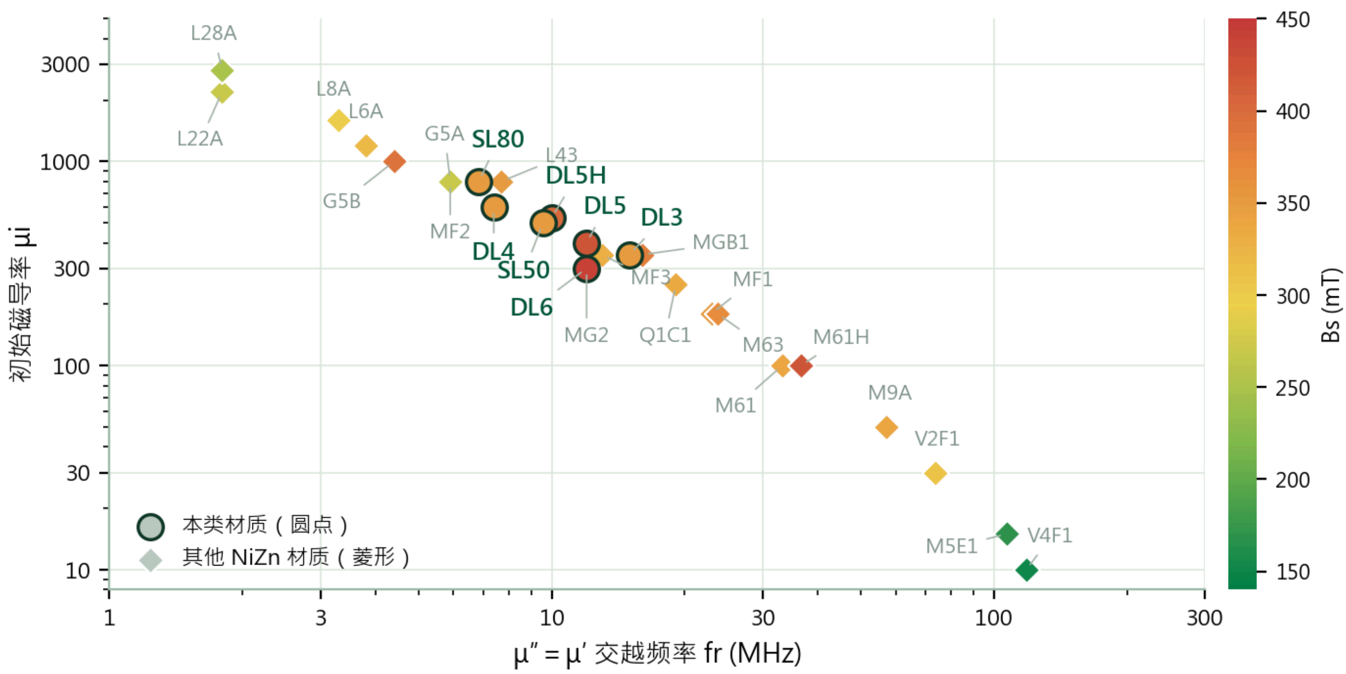
NiZn 分类速查：高磁通耐热冲击 / 宽温稳定

NiZn QUICK REFERENCE: HIGH FLUX & THERMAL SHOCK / WIDE-TEMP STABLE

特性 Property	符号 Symbol	单位 Unit	DL3	DL4	DL5	DL6	DL5H	SL50	SL80
初始磁导率 Initial Permeability	μi	—	350	600	400	300	530	500	800
饱和磁通密度 Saturation Flux Density	Bs（3000 A/m）	mT	350	350	420	440	400	350	350
相对损耗因子 Relative Loss Factor	tanδ/μi	$\times10^{-6}$	15/30	12/80	15/34	20/50	35/80	18/35	15/30
测量频率 Measuring Frequency	f	MHz	0.1/2.0	0.1/1.5	0.1/2.0	0.1/2.0	0.1/1.0	0.1/1.0	0.1/1.0
比温度系数 Temperature Coefficient	αμr	$\times10^{-6}$/K	25	30	25	25	20	0~2	0~4
测量温度范围 Measuring Temp. Range	ΔT	—	20～60 ℃	20～60 ℃	20～60 ℃	20～60 ℃	20～60 ℃	-40～140 ℃	-40～140 ℃
居里温度 Curie Temperature	Tc	℃	>200	>200	>240	>260	>200	>180	>170
密度 Density	D	g/cm³	5.0	5.0	5.1	5.2	5.1	5.0	5.0
电阻率 Resistivity	ρ	Ω·m	10^7	10^7	10^7	10^7	10^7	10^7	10^7

NiZn 材质定位图：μi × 交越频率 fr × Bs Material Positioning Map — μi vs. Crossover Frequency fr, colored by Bs



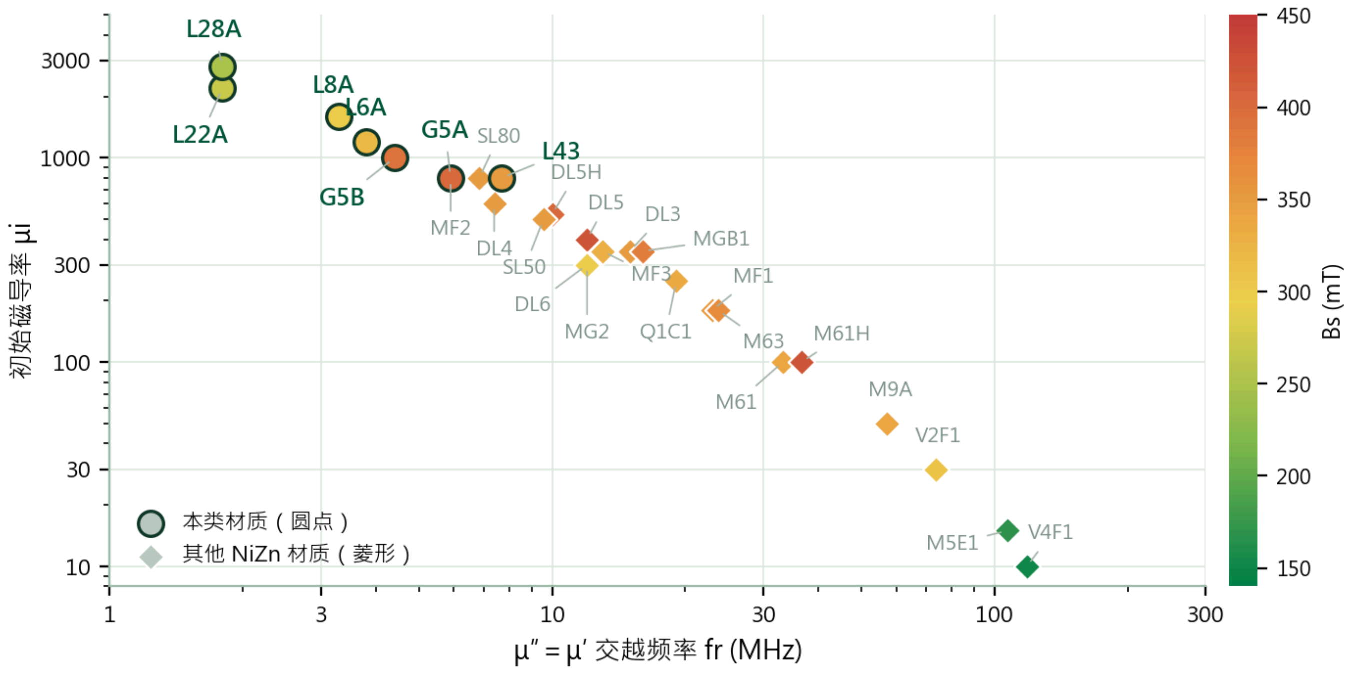
注：fr 为标准试环实测 μ′ / μ″ 曲线之 μ″ = μ′ 交越频率：低于 fr 感抗为主（电感应用），高于 fr 损耗吸收为主（EMI 抑制）；颜色 = Bs（3000 A/m），精确值见上表。
fr = measured μ″/μ′ crossover on standard test toroids; inductive below fr, loss-absorbing above; color = Bs at 3000 A/m — exact values in the table above.

鐵研 TAK

NiZn 分类速查：高磁导 / EMI NiZn QUICK REFERENCE: HIGH PERMEABILITY / EMI

特性 Property	符号 Symbol	单位 Unit	G5A	G5B	L43	L6A	L8A	L22A	L28A
初始磁导率 Initial Permeability	μi	—	800	1000	800	1200	1600	2200	2800
饱和磁通密度 Saturation Flux Density	Bs（3000 A/m）	mT	400	390	350	320	300	270	250
相对损耗因子 Relative Loss Factor	tanδ/μi	$\times 10^{-6}$	10/30	15/45	20/30	15/30	15/35	20/35	25/40
测量频率 Measuring Frequency	f	MHz	0.1/1.0	0.1/1.0	0.1/0.5	0.1/0.5	0.1/0.3	0.1/0.3	0.1/0.3
比温度系数 Temperature Coefficient	αμr	$\times 10^{-6}$/K	10	8	4	15	4	8	6
测量温度范围 Measuring Temp. Range	ΔT	—	20 ~ 60 ℃	20 ~ 60 ℃	20 ~ 60 ℃	20 ~ 60 ℃	20 ~ 60 ℃	20 ~ 60 ℃	20 ~ 60 ℃
居里温度 Curie Temperature	Tc	℃	>190	>180	>160	>150	>120	>90	>80
密度 Density	D	g/cm^3	5.1	5.1	5.0	5.0	5.0	5.0	5.0
电阻率 Resistivity	ρ	Ω·m	10^7	10^7	10^7	10^7	10^7	10^7	10^7

NiZn 材质定位图：μi × 交越频率 fr × Bs Material Positioning Map — μi vs. Crossover Frequency fr, colored by Bs

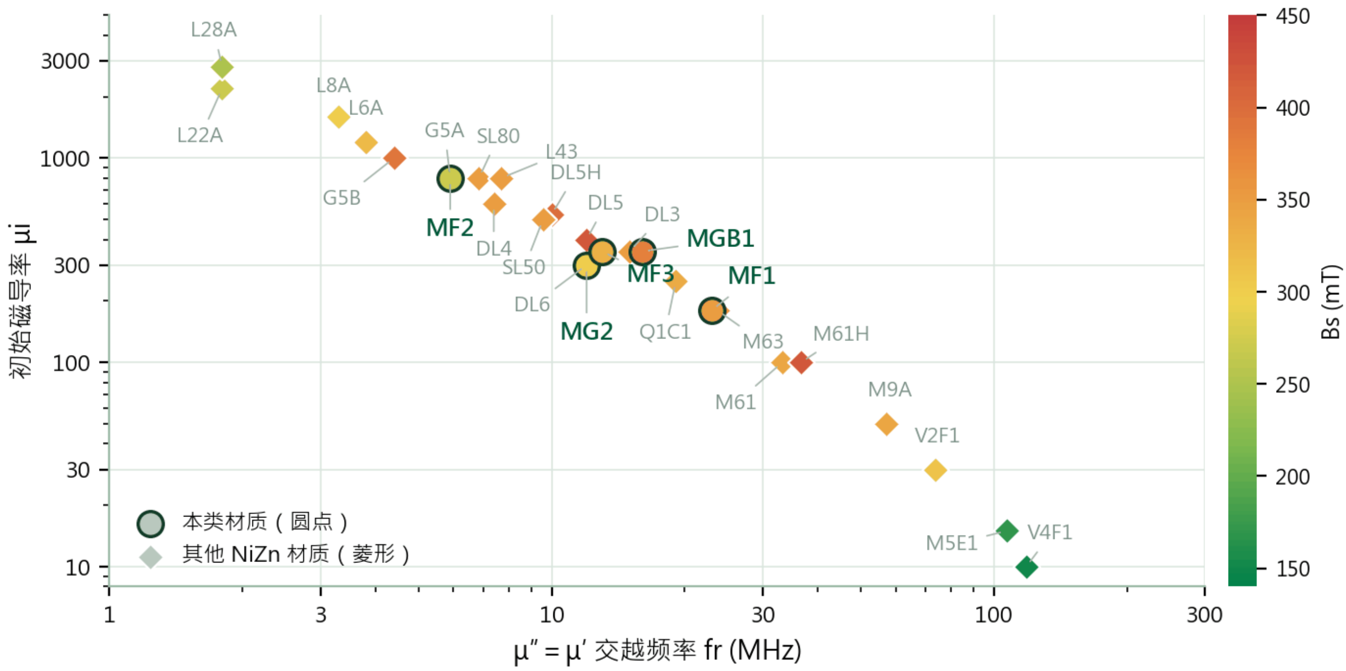


注：fr 为标准试环实测 μ′ / μ″ 曲线之 μ″ = μ′ 交越频率：低于 fr 感抗为主（电感应用），高于 fr 损耗吸收为主（EMI 抑制）；颜色 = Bs（3000 A/m），精确值见上表。
fr = measured μ″/μ′ crossover on standard test toroids; inductive below fr, loss-absorbing above; color = Bs at 3000 A/m — exact values in the table above.

NiZn 分类速查：镍镁锌及镁锌 NiZn QUICK REFERENCE: NI-MG-ZN & MG-ZN

特性 Property	符号 Symbol	单位 Unit	MGB1	MG2	MF1	MF2	MF3
初始磁导率 Initial Permeability	μi	—	350	300	180	800	350
饱和磁通密度 Saturation Flux Density	Bs（3000 A/m）	mT	380	300	350	270	330
相对损耗因子 Relative Loss Factor	tanδ/μi	$\times 10^{-6}$	15/35	80/70	55/70	25/50	20/25
测量频率 Measuring Frequency	f	MHz	0.1/2.0	0.1/0.5	0.1/0.5	0.1/0.5	0.1/1.0
比温度系数 Temperature Coefficient	αμr	$\times 10^{-6}$/K	25	9	35	15	10
测量温度范围 Measuring Temp. Range	ΔT	—	20～60 ℃	20～60 ℃	20～60 ℃	20～60 ℃	20～60 ℃
居里温度 Curie Temperature	Tc	℃	>200	>150	>210	>130	>160
密度 Density	D	g/cm^3	5.1	4.85	4.9	4.85	4.9
电阻率 Resistivity	ρ	Ω·m	10^7	10^7	10^7	10^7	10^7

NiZn 材质定位图：μi × 交越频率 fr × Bs Material Positioning Map — μi vs. Crossover Frequency fr, colored by Bs



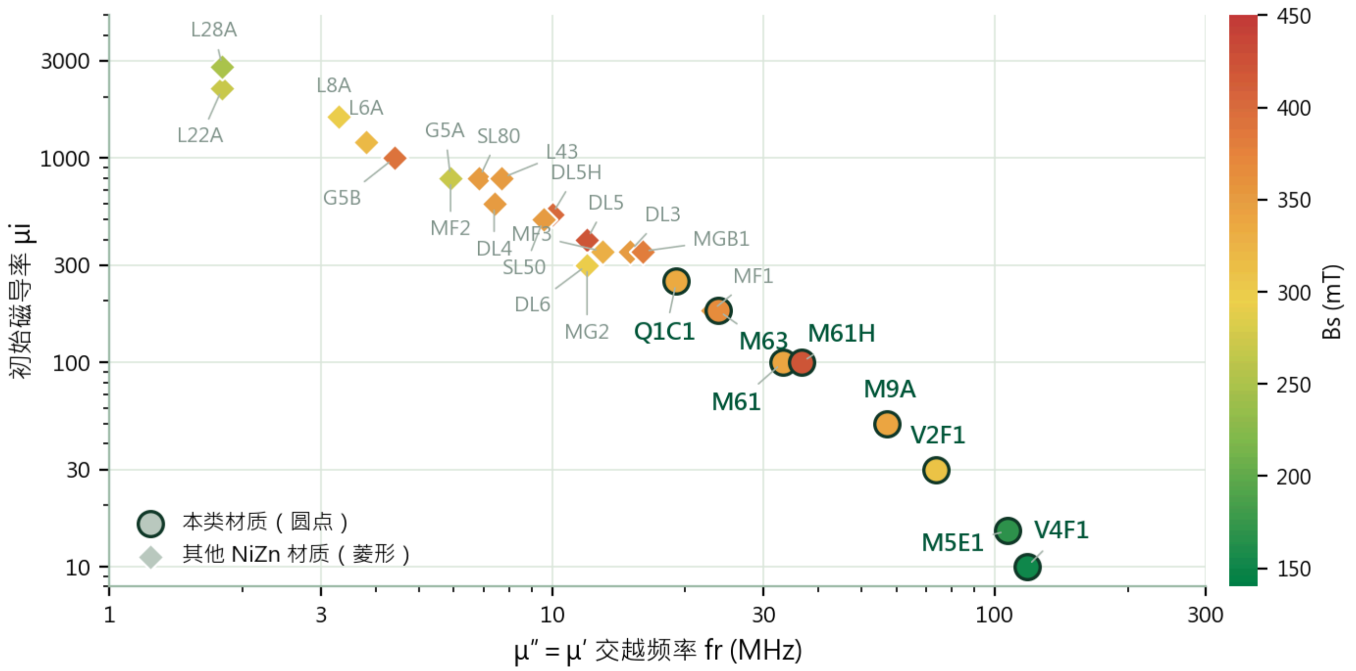
注：fr 为标准试环实测 μ′ / μ″ 曲线之 μ″ = μ′ 交越频率：低于 fr 感抗为主（电感应用），高于 fr 损耗吸收为主（EMI 抑制）；颜色 = Bs（3000 A/m），精确值见上表。
fr = measured μ″/μ′ crossover on standard test toroids; inductive below fr, loss-absorbing above; color = Bs at 3000 A/m — exact values in the table above.

鐵研 TAK

NiZn 分类速查：高频稳定 NiZn QUICK REFERENCE: HIGH-FREQUENCY STABLE

特性 Property	符号 Symbol	单位 Unit	V4F1	M5E1	V2F1	M9A	M61	M61H	M63	Q1C1
初始磁导率 Initial Permeability	μi	—	10	15	30	50	100	100	180	250
饱和磁通密度 Saturation Flux Density	Bs（3000 A/m）	mT	150	170	310	340	340	420	365	335
相对损耗因子 Relative Loss Factor	tanδ/μi	$\times 10^{-6}$	600/700	400/420	160/270	100/120	80/100	50/50	50/80	35/45
测量频率 Measuring Frequency	f	MHz	25/100	10/50	10/50	5/20	1.0/5.0	1.0/5.0	0.5/5	0.5/2.5
比温度系数 Temperature Coefficient	αμr	$\times 10^{-6}$/K	40	10	25	60	-2	15	10	10
测量温度范围 Measuring Temp. Range	ΔT	—	20～60 ℃	20～60 ℃	20～60 ℃	20～60 ℃	20～60 ℃	20～60 ℃	20～60 ℃	20～60 ℃
居里温度 Curie Temperature	Tc	℃	＞320	＞320	＞300	＞300	＞300	＞280	＞300	＞140
密度 Density	D	g/cm^3	4.9	4.9	4.9	4.9	4.9	5.0	4.9	4.9
电阻率 Resistivity	ρ	Ω·m	10^7	10^7	10^7	10^7	10^7	10^7	10^7	10^7

NiZn 材质定位图：μi × 交越频率 fr × Bs Material Positioning Map — μi vs. Crossover Frequency fr, colored by Bs



注：fr 为标准试环实测 μ′ / μ″ 曲线之 μ″ = μ′ 交越频率：低于 fr 感抗为主（电感应用），高于 fr 损耗吸收为主（EMI 抑制）；颜色 = Bs（3000 A/m），精确值见上表。
fr = measured μ″/μ′ crossover on standard test toroids; inductive below fr, loss-absorbing above; color = Bs at 3000 A/m — exact values in the table above.

鐵研 TAK

DL3 高磁通耐热冲击材料

HIGH FLUX & THERMAL SHOCK RESISTANT FERRITE

DL3 为镍锌铁氧体材料，初始磁导率（μi）约 350，饱和磁通密度（Bs）约 350 mT（25 ℃）/ 280 mT（100 ℃），居里温度高于 200 ℃。中等磁导率搭配约 10^7 Ω·m 的高电阻率，使其在低磁通条件下维持极低的相对损耗因子（15×10^{-6} @0.1 MHz / 30×10^{-6} @2.0 MHz），信号失真与插入损耗小；优异的耐热冲击性能可承受回流焊的急剧温变，特别适合 SMD 型元件。典型应用为宽频与平衡–不平衡（Balun）变压器、共模与差模 EMI 抑制、射频调谐元件、中高频小功率电感与 RF choke，亦用于汽车 ABS 传感器等精密磁传感磁芯。在 DL 系列中，DL3 为基准通用型：需要更高灵敏度时选 DL4（μi 约 600）；需要更高饱和磁通与耐温时选 DL5 / DL6；DL5H 则兼顾较高磁导率与较高 Bs。

DL3 is a NiZn ferrite with an initial permeability (μi) of approx. 350, a saturation flux density (Bs) of approx. 350 mT at 25 °C (280 mT at 100 °C) and a Curie temperature above 200 °C. Its medium permeability combined with a high resistivity of about 10^7 Ω·m keeps the relative loss factor very low under low flux (15×10^{-6} at 0.1 MHz / 30×10^{-6} at 2.0 MHz), minimising signal distortion and insertion loss, while its excellent thermal-shock resistance withstands the rapid temperature swings of reflow soldering — well suited to SMD parts. Typical uses are wideband and balun transformers, common- and differential-mode EMI suppression, RF tuning elements, mid/high-frequency low-power inductors and RF chokes, as well as precision sensing cores such as automotive ABS sensors. Within the DL family, DL3 is the general-purpose baseline: choose DL4 (μi approx. 600) for higher sensitivity, DL5/DL6 for higher flux density and temperature capability, or DL5H to balance both.

Wideband / Balun Transformer | EMI Suppression | RF Tuning | Power Inductor / RF Choke | Automotive Sensor

电磁特性 MAGNETIC CHARACTERISTICS

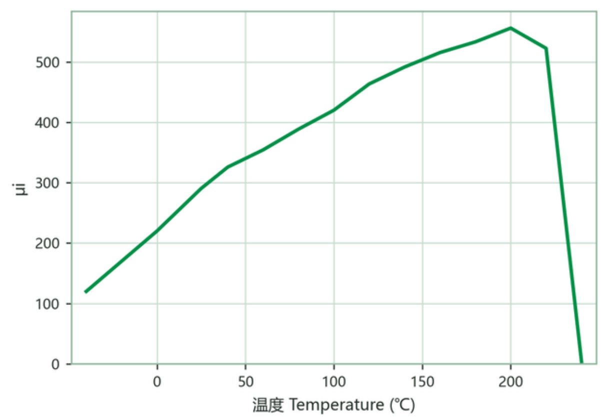
特性 Characteristic	条件 Condition	值 Value	单位 Unit
初始磁导率 μi Initial Permeability	100 kHz & <0.2 mT	350±25%	
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 25 ℃ 100 Hz	350	mT
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 100 ℃ 100 Hz	280	mT
残留磁通密度 Br Remanence	3000 A/m · 25 ℃ 100 Hz	205	mT
残留磁通密度 Br Remanence	3000 A/m · 100 ℃ 100 Hz	125	mT
矫顽力 Hc Coercivity	3000 A/m · 25 ℃ 100 Hz	45	A/m
矫顽力 Hc Coercivity	3000 A/m · 100 ℃ 100 Hz	40	A/m
αμr（温度系数） Temperature coefficient of permeability	20 ~ 60 ℃	25	$\times10^{-6}$/K
相对损耗因子 tanδ/μi Relative Loss Factor	0.1 MHz & <0.2 mT	15	$\times10^{-6}$
相对损耗因子 tanδ/μi Relative Loss Factor	2.0 MHz & <0.2 mT	30	$\times10^{-6}$
居里温度 Tc Curie Temp.	100 kHz & <0.2 mT	>200	℃
密度 D Density	阿基米德法 Archimedes method	5.0	g/cm³
电阻率 ρ Volume Resistivity	直流电流 DC Current	10^7	Ω·m
功率损耗 Pcv Power Loss	100 kHz/100 mT | 500 kHz/30 mT | 1 MHz/30 mT · 25 °C	925 | 422 | 1160	kW/m³

备注：各项数值均为环形磁芯T31×19×8测得的典型数值，由于几何形状和尺寸的影响，产品规格将与这些数据有所差异。25 ℃ 之功率损耗 Pcv 为 T31×19×8 环形磁芯绕线 3 匝实测。

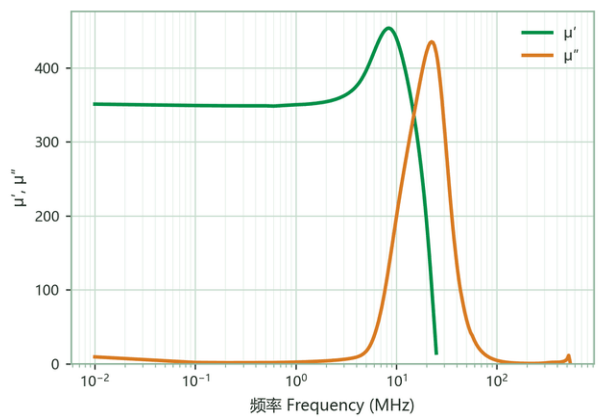
Note: all values are typical data measured on a T31×19×8 toroidal core; actual product specifications will vary with geometry and size. Pcv values at 25 °C are measured on a T31×19×8 toroid wound with 3 turns.

特性曲线详见次页 CHARACTERISTIC CURVES — SEE NEXT PAGE

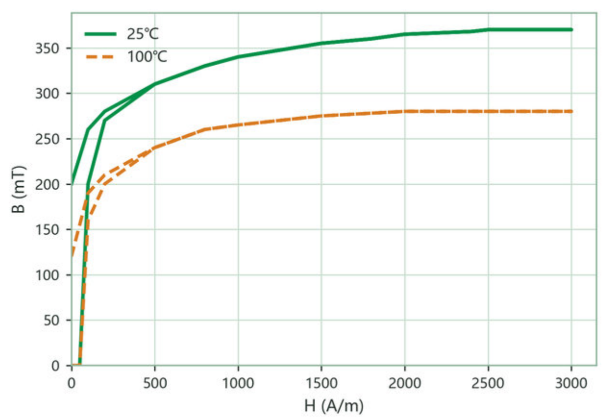
DL3 特性曲线 CHARACTERISTIC CURVES



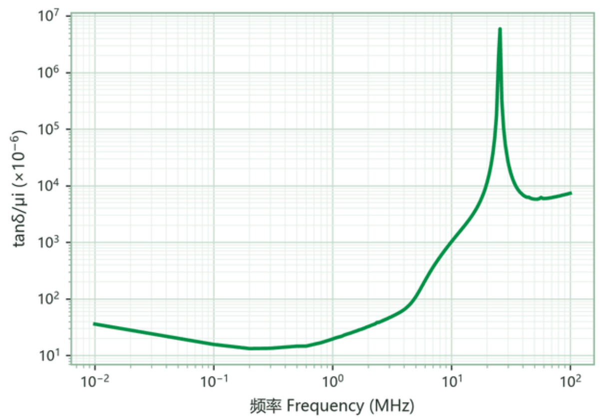
初始磁导率—温度特性
Initial Permeability vs. Temperature



复数磁导率—频率特性
Complex Permeability (μ′, μ″) vs. Frequency



静态磁化曲线
Static Magnetization Curves (B–H)



相对损耗因子—频率特性
Relative Loss Factor (tanδ/μi) vs. Frequency

鐵研 TAK

DL4 高磁通耐热冲击材料

HIGH FLUX & THERMAL SHOCK RESISTANT FERRITE

DL4 为镍锌铁氧体材料，初始磁导率（μi）约 600，饱和磁通密度（Bs）约 350 mT（25 ℃）/ 265 mT（100 ℃），居里温度高于 200 ℃。较高的磁导率提高单位匝数的感量——在环形等闭磁路的精密变压器与滤波器中最为直接；低矫顽力（Hc 约 32 A/m）使磁滞损与信号失真维持低位，低磁通下相对损耗因子仅 12×10^{-6}（0.1 MHz），适合精密信号路径；损耗随频率上升较快（80×10^{-6} @1.5 MHz），故适用频带较 DL3 略偏低中频。耐热冲击与耐焊性能优异，可承受回流焊的急剧温变。典型应用为高精度宽频变压器、传感线圈、EMI 滤波器与阻抗调谐线圈，特别适合对灵敏度要求高的 SMD 设计，亦可用于低电流高频功率电感等信号 / 电源混合模块。在 DL 系列中，DL4 是灵敏度取向的一支：与 DL3（μi 约 350）相比标称磁导率高约七成、频带略窄；需要高饱和磁通与耐温时改选 DL5 / DL6。

DL4 is a NiZn ferrite with an initial permeability (μi) of approx. 600, a saturation flux density (Bs) of approx. 350 mT at 25 °C (265 mT at 100 °C) and a Curie temperature above 200 °C. The higher permeability raises the inductance per turn — most directly in toroids and other closed-magnetic-circuit precision transformers and filters — while the low coercivity (Hc approx. 32 A/m) keeps hysteresis loss and signal distortion low; with a relative loss factor of only 12×10^{-6} at 0.1 MHz under low flux it suits precision signal paths, though the loss rises faster with frequency (80×10^{-6} at 1.5 MHz), placing its useful band somewhat lower than DL3's. Excellent thermal-shock resistance and solderability withstand reflow temperature swings. Typical uses are high-accuracy wideband transformers, sensing coils, EMI filters and impedance-tuning coils — especially sensitivity-critical SMD designs — as well as low-current HF power inductors in mixed signal/power modules. Within the DL family, DL4 is the sensitivity-oriented grade: its nominal permeability is roughly 70 % above DL3's (μi approx. 350) over a slightly narrower band; choose DL5/DL6 for higher flux density and temperature capability.

Wideband Transformer | Sensing Coil | EMI Filter | Impedance Tuning Coil | HF Power Inductor

电磁特性 MAGNETIC CHARACTERISTICS

特性 Characteristic	条件 Condition	值 Value	单位 Unit
初始磁导率 μi Initial Permeability	100 kHz & <0.2 mT	600±25%	
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 25 ℃ 100 Hz	350	mT
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 100 ℃ 100 Hz	265	mT
残留磁通密度 Br Remanence	3000 A/m · 25 ℃ 100 Hz	170	mT
残留磁通密度 Br Remanence	3000 A/m · 100 ℃ 100 Hz	110	mT
矫顽力 Hc Coercivity	3000 A/m · 25 ℃ 100 Hz	32	A/m
矫顽力 Hc Coercivity	3000 A/m · 100 ℃ 100 Hz	20	A/m
αμr（温度系数） Temperature coefficient of permeability	20 ~ 60 ℃	30	$\times10^{-6}$/K
相对损耗因子 tanδ/μi Relative Loss Factor	0.1 MHz & <0.2 mT	12	$\times10^{-6}$
相对损耗因子 tanδ/μi Relative Loss Factor	1.5 MHz & <0.2 mT	80	$\times10^{-6}$
居里温度 Tc Curie Temp.	100 kHz & <0.2 mT	>200	℃
密度 D Density	阿基米德法 Archimedes method	5.0	g/cm^3
电阻率 ρ Volume Resistivity	直流电流 DC Current	10^7	Ω·m
功率损耗 Pcv Power Loss	100 kHz/100 mT | 500 kHz/30 mT | 1 MHz/30 mT · 25 °C	756 | 420 | 1233	kW/m^3

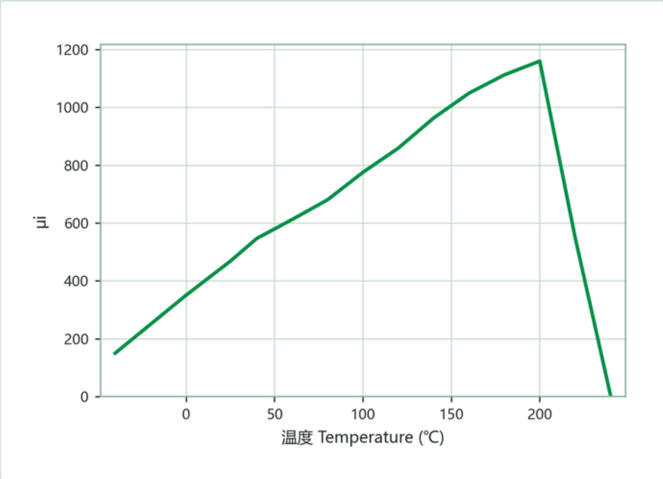
备注：各项数值均为环形磁芯T31×19×8测得的典型数值，由于几何形状和尺寸的影响，产品规格将与这些数据有所差异。25 ℃ 之功率损耗 Pcv 为 T31×19×8 环形磁芯绕线 3 匝实测。

Note: all values are typical data measured on a T31×19×8 toroidal core; actual product specifications will vary with geometry and size. Pcv values at 25 °C are measured on a T31×19×8 toroid wound with 3 turns.

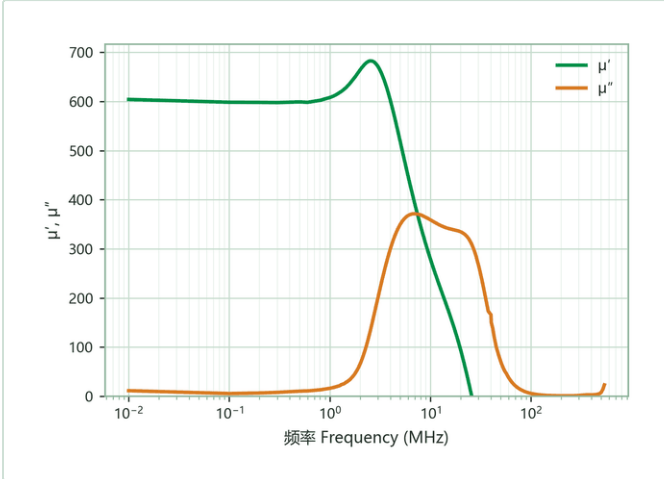
特性曲线详见次页 CHARACTERISTIC CURVES — SEE NEXT PAGE

DL4 特性曲线

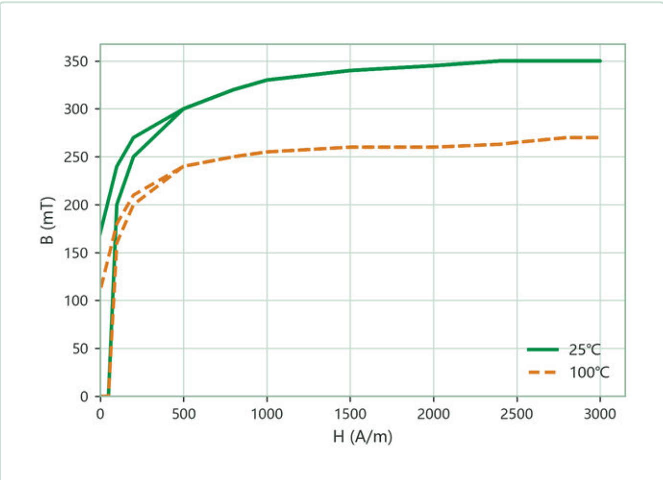
CHARACTERISTIC CURVES



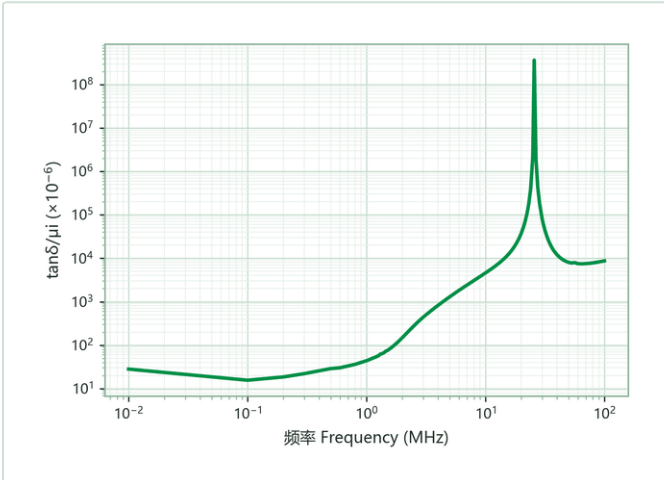
初始磁导率—温度特性
Initial Permeability vs. Temperature



复数磁导率—频率特性
Complex Permeability (μ′, μ″) vs. Frequency



静态磁化曲线
Static Magnetization Curves (B–H)



相对损耗因子—频率特性
Relative Loss Factor (tanδ/μi) vs. Frequency

鐵研 TAK

DL5 高磁通耐热冲击材料

HIGH FLUX & THERMAL SHOCK RESISTANT FERRITE

DL5 为镍锌铁氧体材料，初始磁导率（μi）约 400，饱和磁通密度（Bs）约 420 mT（25 ℃）/ 350 mT（100 ℃），居里温度高于 240 ℃。特点是磁通密度随温度的衰减小——100 ℃ 仍保有 350 mT，配合仅 8 A/m 的高温矫顽力与高于 240 ℃ 的居里温度，在高温、高电流下不易饱和、损耗增幅小；相对损耗因子至 2.0 MHz 仍仅 34×10⁻⁶，可支持中高频功率应用。耐热冲击与耐焊性能优异，适合长时间运行于高温环境的 SMD 电源模块。典型应用为高功率宽频电感、EMI 滤波器与耐高温共模扼流圈，特别适合中高频、高电流的工业与车规级功率设计。在 DL 系列中，DL5 是功率取向的主力：相较 DL3 / DL4 具有更高的 Bs 与耐温；需要极限磁通与耐温时改选 DL6（Bs 约 440 mT、Tc >260 ℃）；需要较高磁导率同时保有高 Bs 时可选 DL5H（μi 约 530）。

DL5 is a NiZn ferrite with an initial permeability (μi) of approx. 400, a saturation flux density (Bs) of approx. 420 mT at 25 °C (350 mT at 100 °C) and a Curie temperature above 240 °C. Its defining trait is how little flux density it loses with temperature — 350 mT remains at 100 °C — which, together with a coercivity of only 8 A/m at 100 °C and the >240 °C Curie point, resists saturation and keeps losses in check under high current at elevated temperature; the relative loss factor stays at just 34×10⁻⁶ up to 2.0 MHz, supporting mid/high-frequency power use. Excellent thermal-shock resistance and solderability suit SMD power modules running hot for long periods. Typical uses are high-power wideband inductors, EMI filters and high-temperature common-mode chokes, particularly mid/high-frequency, high-current industrial and automotive-grade power designs. Within the DL family, DL5 is the power-oriented mainstay: it carries a higher Bs and temperature rating than DL3/DL4; choose DL6 (Bs approx. 440 mT, Tc >260 °C) for the extreme end, or DL5H (μi approx. 530) when higher permeability is needed while keeping a high Bs.

High-Power Wideband Inductor | EMI Filter | High-Temperature Common-Mode Choke | Automotive / Industrial Power Inductor

电磁特性 MAGNETIC CHARACTERISTICS

特性 Characteristic	条件 Condition	值 Value	单位 Unit
初始磁导率 μi Initial Permeability	100 kHz & <0.2 mT	400±25%	
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 25 ℃ 100 Hz	420	mT
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 100 ℃ 100 Hz	350	mT
残留磁通密度 Br Remanence	3000 A/m · 25 ℃ 100 Hz	280	mT
残留磁通密度 Br Remanence	3000 A/m · 100 ℃ 100 Hz	220	mT
矫顽力 Hc Coercivity	3000 A/m · 25 ℃ 100 Hz	25	A/m
矫顽力 Hc Coercivity	3000 A/m · 100 ℃ 100 Hz	8	A/m
αμr（温度系数） Temperature coefficient of permeability	20 ~ 60 ℃	25	$\times10^{-6}$/K
相对损耗因子 tanδ/μi Relative Loss Factor	0.1 MHz & <0.2 mT	15	$\times10^{-6}$
相对损耗因子 tanδ/μi Relative Loss Factor	2.0 MHz & <0.2 mT	34	$\times10^{-6}$
居里温度 Tc Curie Temp.	100 kHz & <0.2 mT	>240	℃
密度 D Density	阿基米德法 Archimedes method	5.1	g/cm³
电阻率 ρ Volume Resistivity	直流电流 DC Current	10^7	Ω·m
功率损耗 Pcv Power Loss	32 kHz / 125 mT · 25 °C/100 °C/120 °C	396 / 279 / 258	kW/m³
功率损耗 Pcv Power Loss	64 kHz / 100 mT · 25 °C/100 °C/120 °C	604 / 412 / 378	kW/m³
功率损耗 Pcv Power Loss	100 kHz/100 mT | 500 kHz/30 mT | 1 MHz/30 mT · 25 °C	1015 | 436 | 1119	kW/m³

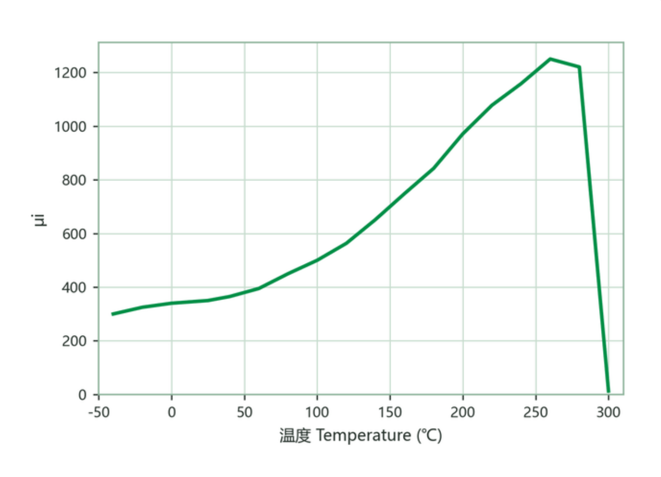
备注：各项数值均为环形磁芯T31×19×8测得的典型数值，由于几何形状和尺寸的影响，产品规格将与这些数据有所差异。25 ℃ 之功率损耗 Pcv 为 T31×19×8 环形磁芯绕线 3 匝实测。

Note: all values are typical data measured on a T31×19×8 toroidal core; actual product specifications will vary with geometry and size. Pcv values at 25 °C are measured on a T31×19×8 toroid wound with 3 turns.

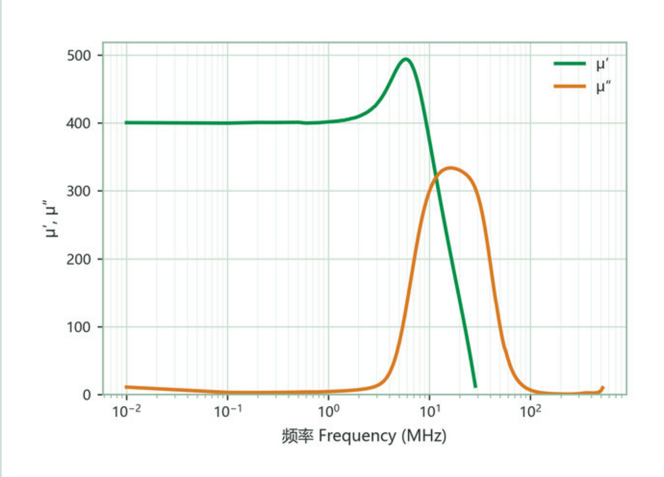
特性曲线详见次页 CHARACTERISTIC CURVES — SEE NEXT PAGE

鐵研 TAK

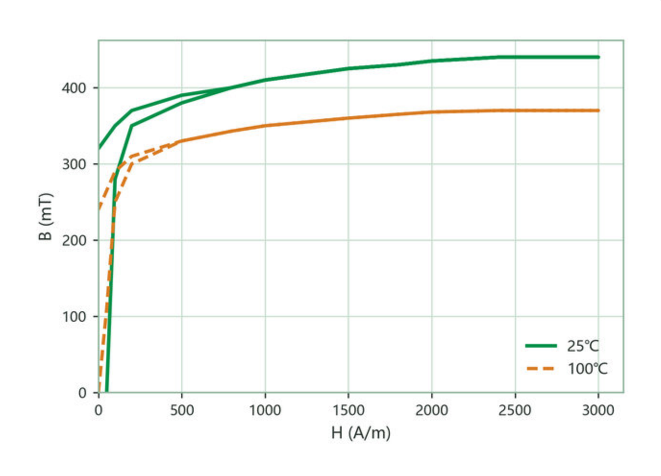
DL5 特性曲线 CHARACTERISTIC CURVES



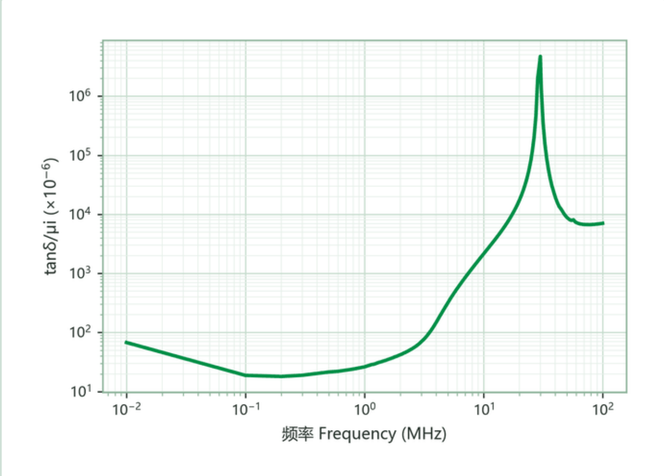
初始磁导率—温度特性
Initial Permeability vs. Temperature



复数磁导率—频率特性
Complex Permeability (μ′, μ″) vs. Frequency



静态磁化曲线
Static Magnetization Curves (B–H)



相对损耗因子—频率特性
Relative Loss Factor (tanδ/μi) vs. Frequency

鐵研 TAK

DL6 高磁通耐热冲击材料

HIGH FLUX & THERMAL SHOCK RESISTANT FERRITE

DL6 为镍锌铁氧体材料，初始磁导率（μi）约 300，饱和磁通密度（Bs）约 440 mT（25 ℃）/ 370 mT（100 ℃），居里温度高于 260 ℃。此材料以略低的磁导率换取全系列最高的磁通密度与温度上限——100 ℃ 仍保有 370 mT，Tc 高于 260 ℃，可承受极端温度循环（–40 ℃ 至 +200 ℃）与高温回流焊；低磁通下相对损耗因子 20×10⁻⁶（0.1 MHz）/ 50×10⁻⁶（2.0 MHz），中高频损耗仍低。典型应用为极端温度环境下的高功率电感与射频滤波器，以及航空航天、油井勘探等专用磁性元件，支持车规与军规电源系统的高电流、高磁通设计，亦适合高可靠性 SMD 元件。在 DL 系列中，DL6 是极限工况版：相较 DL5（Bs 约 420 mT、Tc >240 ℃）再往磁通与耐温推进一级，代价是标称磁导率略低、达到同样感量需要较多匝数；若温度与磁通需求未达极端等级，DL5 通常是更均衡的选择。

DL6 is a NiZn ferrite with an initial permeability (μi) of approx. 300, a saturation flux density (Bs) of approx. 440 mT at 25 °C (370 mT at 100 °C) and a Curie temperature above 260 °C. It trades a slightly lower permeability for the family's highest flux density and temperature ceiling — 370 mT still available at 100 °C and a Curie point above 260 °C — withstanding extreme temperature cycling (–40 °C to +200 °C) and high-temperature reflow; the relative loss factor stays low into the mid/high-frequency range (20×10^{-6} at 0.1 MHz / 50×10^{-6} at 2.0 MHz). Typical uses are high-power inductors and RF filters in extreme-temperature environments, dedicated magnetics for aerospace and downhole exploration, and high-current, high-flux designs in automotive- and military-grade power systems, as well as high-reliability SMD parts. Within the DL family, DL6 is the extreme-duty grade: over DL5 (Bs approx. 420 mT, Tc >240 °C) it pushes flux density and temperature one step further at the cost of a slightly lower nominal permeability — more turns for the same inductance; when conditions are less extreme, DL5 is usually the more balanced choice.

High-Power Inductor | RF Filter | Aerospace / Downhole Magnetics | Automotive / Military Power

电磁特性 MAGNETIC CHARACTERISTICS

特性 Characteristic	条件 Condition	值 Value	单位 Unit
初始磁导率 μi Initial Permeability	100 kHz & <0.2 mT	300±25%	
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 25 ℃ 100 Hz	440	mT
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 100 ℃ 100 Hz	370	mT
残留磁通密度 Br Remanence	3000 A/m · 25 ℃ 100 Hz	300	mT
残留磁通密度 Br Remanence	3000 A/m · 100 ℃ 100 Hz	204	mT
矫顽力 Hc Coercivity	3000 A/m · 25 ℃ 100 Hz	57.7	A/m
矫顽力 Hc Coercivity	3000 A/m · 100 ℃ 100 Hz	44.3	A/m
αμr（温度系数） Temperature coefficient of permeability	20 ~ 60 ℃	25	$\times10^{-6}$/K
相对损耗因子 tanδ/μi Relative Loss Factor	0.1 MHz & <0.2 mT	20	$\times10^{-6}$
相对损耗因子 tanδ/μi Relative Loss Factor	2.0 MHz & <0.2 mT	50	$\times10^{-6}$
居里温度 Tc Curie Temp.	100 kHz & <0.2 mT	>260	℃
密度 D Density	阿基米德法 Archimedes method	5.2	g/cm³
电阻率 ρ Volume Resistivity	直流电流 DC Current	10^7	Ω·m
功率损耗 Pcv Power Loss	32 kHz / 125 mT · 25 °C/100 °C/120 °C	390 / 278 / 254	kW/m³
功率损耗 Pcv Power Loss	64 kHz / 100 mT · 25 °C/100 °C/120 °C	600 / 410 / 375	kW/m³
功率损耗 Pcv Power Loss	100 kHz/100 mT | 500 kHz/30 mT | 1 MHz/30 mT · 25 °C	1063 | 451 | 1112	kW/m³

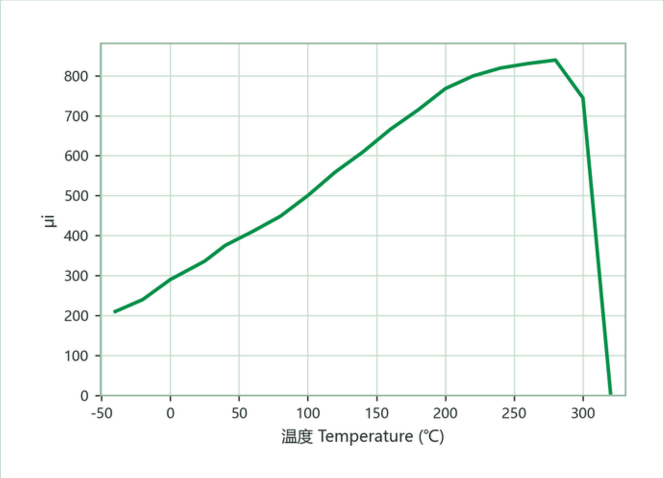
备注：各项数值均为环形磁芯T31×19×8测得的典型数值，由于几何形状和尺寸的影响，产品规格将与这些数据有所差异。25 ℃ 之功率损耗 Pcv 为 T31×19×8 环形磁芯绕线 3 匝实测。

Note: all values are typical data measured on a T31×19×8 toroidal core; actual product specifications will vary with geometry and size. Pcv values at 25 °C are measured on a T31×19×8 toroid wound with 3 turns.

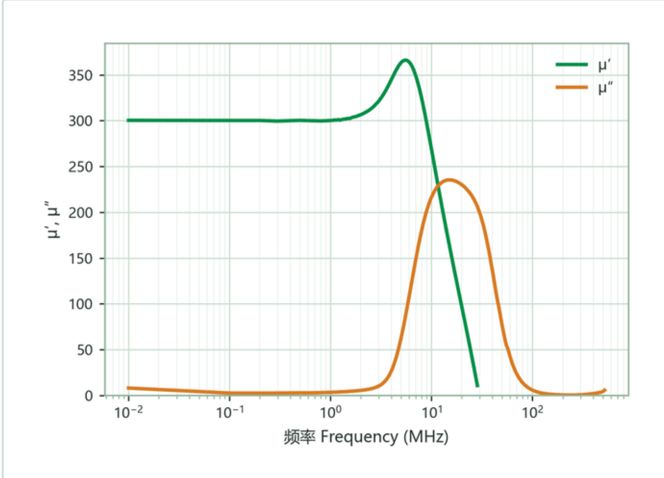
特性曲线详见次页 CHARACTERISTIC CURVES — SEE NEXT PAGE

鐵研 TAK

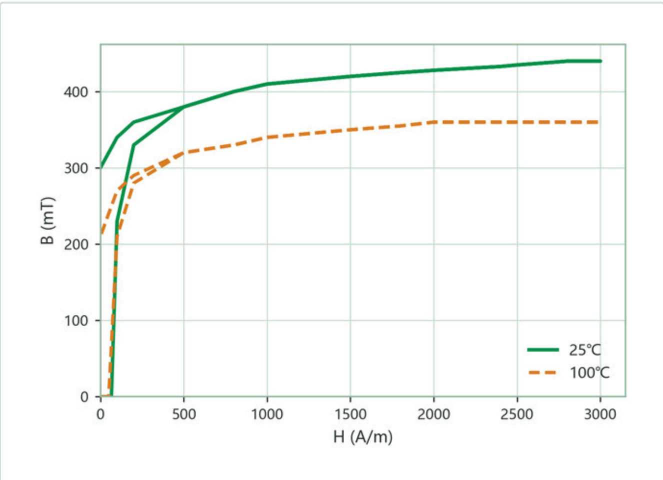
DL6 特性曲线
CHARACTERISTIC CURVES



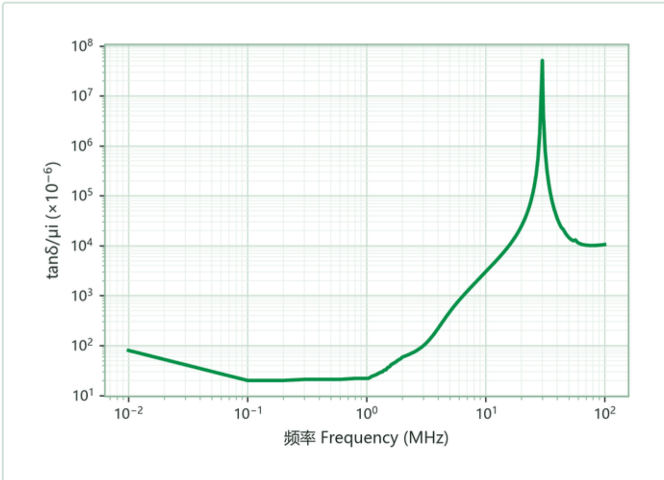
初始磁导率—温度特性
Initial Permeability vs. Temperature



复数磁导率—频率特性
Complex Permeability (μ′, μ″) vs. Frequency



静态磁化曲线
Static Magnetization Curves (B–H)



相对损耗因子—频率特性
Relative Loss Factor (tanδ/μi) vs. Frequency

鐵研 TAK

DL5H 高磁通耐热冲击材料

HIGH FLUX & THERMAL SHOCK RESISTANT FERRITE

DL5H 为镍锌铁氧体材料，初始磁导率（μi）约 530，饱和磁通密度（Bs）约 400 mT（25 ℃）/ 305 mT（100 ℃），居里温度高于 200 ℃。此材料把 DL 功率系的磁导率推到最高，同时保住 400 mT 级的饱和磁通：较高的 μi 提高单位匝数的感量——在环形等闭磁路设计中，同感量所需匝数较少，有利于降低铜损与绕线体积；低矫顽力（Hc 约 22 A/m）亦使磁滞损维持低位。损耗因子于 1.0 MHz 达 80×10⁻⁶，适用频带较 DL5 略偏低中频。耐热冲击与耐焊性能优异，可承受急冷急热与高温回流焊。典型应用为高功率宽频电感、EMI 滤波器与共模扼流圈，特别适合追求感量密度的 SMD 电源模块与工业、车规功率设计。在 DL 系列中，DL5H 是“高磁导×高磁通”的折衷版：相较 DL5（μi 约 400、Bs 420 mT、Tc >240 ℃）标称磁导率高约三成，代价是耐温上限与 100 ℃ 磁通略低——长时间高温工作优先选 DL5 / DL6，常温至中温、重视感量与体积时选 DL5H。

DL5H is a NiZn ferrite with an initial permeability (μi) of approx. 530, a saturation flux density (Bs) of approx. 400 mT at 25 °C (305 mT at 100 °C) and a Curie temperature above 200 °C. It pushes permeability to the top of the DL power side while holding a 400 mT-class flux density: the higher μi raises the inductance per turn — in toroids and other closed magnetic circuits this directly cuts the turns needed for a given inductance, saving copper loss and winding volume — while the low coercivity (Hc approx. 22 A/m) keeps hysteresis loss small. With the loss factor reaching 80×10^{-6} at 1.0 MHz, its useful band sits somewhat lower than DL5's. Excellent thermal-shock resistance and solderability withstand rapid thermal cycling and high-temperature reflow. Typical uses are high-power wideband inductors, EMI filters and common-mode chokes, especially SMD power modules and industrial/automotive power designs where inductance density matters. Within the DL family, DL5H is the high-permeability × high-flux compromise: over DL5 (μi approx. 400, Bs 420 mT, Tc >240 °C) it offers roughly 30 % higher nominal permeability at the cost of a lower temperature ceiling and less flux at 100 °C — prefer DL5/DL6 for sustained hot operation, DL5H when inductance and size lead under normal-to-warm conditions.

High-Power Wideband Inductor | EMI Filter | Common-Mode Choke | SMD Power Inductor

电磁特性 MAGNETIC CHARACTERISTICS

特性 Characteristic	条件 Condition	值 Value	单位 Unit
初始磁导率 μi Initial Permeability	100 kHz & <0.2 mT	530±25%	
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 25 ℃ 100 Hz	400	mT
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 100 ℃ 100 Hz	305	mT
残留磁通密度 Br Remanence	3000 A/m · 25 ℃ 100 Hz	180	mT
残留磁通密度 Br Remanence	3000 A/m · 100 ℃ 100 Hz	100	mT
矫顽力 Hc Coercivity	3000 A/m · 25 ℃ 100 Hz	22	A/m
矫顽力 Hc Coercivity	3000 A/m · 100 ℃ 100 Hz	16	A/m
αμr（温度系数） Temperature coefficient of permeability	20～60 ℃	20	$\times10^{-6}$/K
相对损耗因子 tanδ/μi Relative Loss Factor	0.1 MHz & <0.2 mT	35	$\times10^{-6}$
相对损耗因子 tanδ/μi Relative Loss Factor	1.0 MHz & <0.2 mT	80	$\times10^{-6}$
居里温度 Tc Curie Temp.	100 kHz & <0.2 mT	>200	℃
密度 D Density	阿基米德法 Archimedes method	5.1	g/cm³
电阻率 ρ Volume Resistivity	直流电流 DC Current	10^7	Ω·m
功率损耗 Pcv Power Loss	100 kHz/100 mT | 500 kHz/30 mT | 1 MHz/30 mT · 25 °C	609 | 528 | 1484	kW/m³

备注：各项数值均为环形磁芯T31×19×8测得的典型数值，由于几何形状和尺寸的影响，产品规格将与这些数据有所差异。25 ℃ 之功率损耗 Pcv 为 T31×19×8 环形磁芯绕线 3 匝实测。

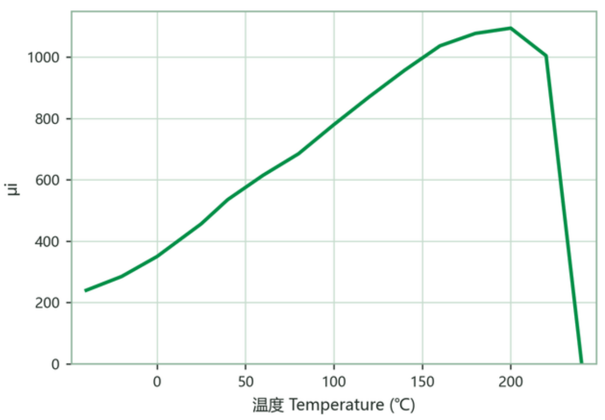
Note: all values are typical data measured on a T31×19×8 toroidal core; actual product specifications will vary with geometry and size. Pcv values at 25 °C are measured on a T31×19×8 toroid wound with 3 turns.

特性曲线详见次页 CHARACTERISTIC CURVES — SEE NEXT PAGE

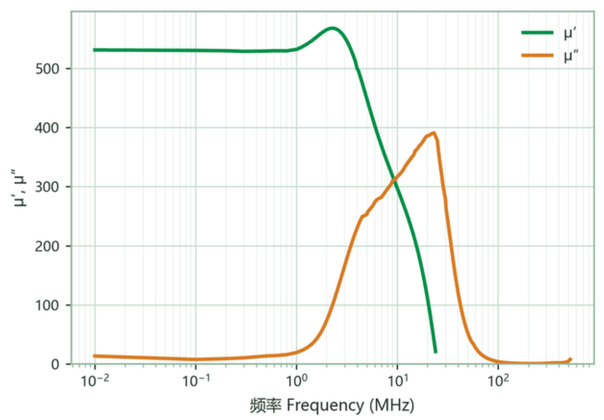
鐵研 TAK

DL5H

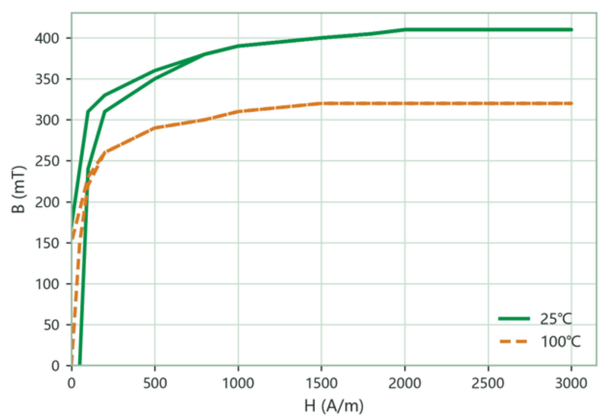
特性曲线
CHARACTERISTIC CURVES



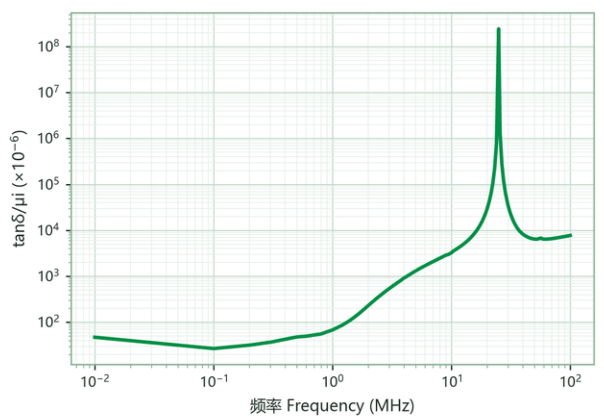
初始磁导率—温度特性
Initial Permeability vs. Temperature



复数磁导率—频率特性
Complex Permeability (μ′, μ″) vs. Frequency



静态磁化曲线
Static Magnetization Curves (B–H)



相对损耗因子—频率特性
Relative Loss Factor (tanδ/μi) vs. Frequency

鐵研 TAK

SL50 宽温稳定材料 WIDE TEMP STABLE MATERIALS

SL50 为镍锌铁氧体材料，初始磁导率（μi）约 500，饱和磁通密度（Bs）约 350 mT（25 ℃）/ 230 mT（100 ℃），居里温度高于 180 ℃。本材料的核心是温度稳定性：温度系数 αμr 在 –40 ~ 140 ℃ 全范围内仅 $0 \sim 2\times10^{-6}$/K——磁导率在整个车载温度区间内几乎持平，配合 18×10^{-6}（0.1 MHz）/ 35×10^{-6}（1.0 MHz）的低损耗因子，滤波与调谐特性不随温度漂移。相对地，其 100 ℃ 饱和磁通仅约 230 mT，不以功率磁通见长，定位在低磁通与 EMI 用途。典型应用为宽频 EMI 滤波器、信号线抗干扰磁环与共模扼流圈，以及 RF/IF 线圈、高频滤波与匹配电感、高速数据线磁珠；亦见于车载传感器与 ADAS、RFID 天线及通信设备滤波器等需要全温域一致特性的场合。与同定位的 SL80（μi 约 800）相比，SL50 磁导率较低、温度系数更紧（0 ~ 2 对 0 ~ 4）；与 DL 系列（αμr 约 $20 \sim 30\times10^{-6}$/K）相比，温度漂移低一个数量级——需要温度不敏感的滤波 / 谐振特性时，应优先选用 SL 系列。

SL50 is a NiZn ferrite with an initial permeability (μi) of approx. 500, a saturation flux density (Bs) of approx. 350 mT at 25 °C (230 mT at 100 °C) and a Curie temperature above 180 °C. Its defining property is temperature stability: the permeability temperature coefficient αμr stays within $0–2\times10^{-6}$/K across the full −40 to 140 °C range — essentially flat over the entire automotive temperature span — and with a low loss factor of 18×10^{-6} at 0.1 MHz / 35×10^{-6} at 1.0 MHz, filter and tuning characteristics do not drift with temperature. In exchange, Bs at 100 °C is only about 230 mT, so the grade is positioned for low-flux and EMI duties rather than power flux. Typical uses are broadband EMI filters, signal-line suppression rings and common-mode chokes, plus RF/IF coils, HF filtering/matching inductors and high-speed data-line beads; it also serves automotive sensors and ADAS, RFID antennas and communication-equipment filters where characteristics must hold across the whole temperature range. Against SL80 (μi approx. 800) of the same wide-temperature family, SL50 offers a lower permeability with a tighter coefficient (0–2 vs 0–4); against the DL family (αμr approx. $20–30\times10^{-6}$/K) its drift is an order of magnitude lower — the SL grades are the first choice when temperature-insensitive filtering or resonance is required.

Broadband EMI Filter | Common-Mode Choke | High-Speed Data-Line Bead | RF / IF Coil | RFID Antenna

电磁特性 MAGNETIC CHARACTERISTICS

特性 Characteristic	条件 Condition	值 Value	单位 Unit
初始磁导率 μi Initial Permeability	100 kHz & <0.2 mT	500±25%	
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 25 ℃ 100 Hz	350	mT
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 100 ℃ 100 Hz	230	mT
残留磁通密度 Br Remanence	3000 A/m · 25 ℃ 100 Hz	180	mT
残留磁通密度 Br Remanence	3000 A/m · 100 ℃ 100 Hz	110	mT
矫顽力 Hc Coercivity	3000 A/m · 25 ℃ 100 Hz	100	A/m
矫顽力 Hc Coercivity	3000 A/m · 100 ℃ 100 Hz	80	A/m
αμr（温度系数）Temperature coefficient of permeability	-40 ~ 140 ℃	0~2	$\times10^{-6}$/K
相对损耗因子 tanδ/μi Relative Loss Factor	0.1 MHz & <0.2 mT	18	$\times10^{-6}$
相对损耗因子 tanδ/μi Relative Loss Factor	1.0 MHz & <0.2 mT	35	$\times10^{-6}$
居里温度 Tc Curie Temp.	100 kHz & <0.2 mT	>180	℃
密度 D Density	阿基米德法 Archimedes method	5.0	g/cm³
电阻率 ρ Volume Resistivity	直流电流 DC Current	10^7	Ω·m
功率损耗 Pcv Power Loss	100 kHz/100 mT | 500 kHz/30 mT | 1 MHz/30 mT · 25 °C	994 | 254 | 652	kW/m³

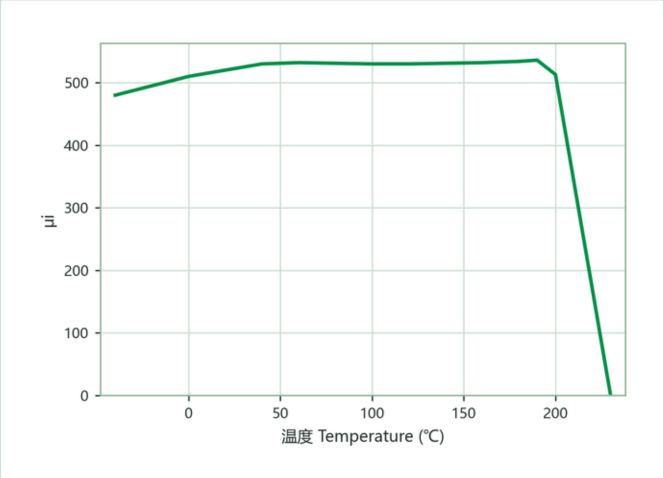
备注：各项数值均为环形磁芯T22×14×8测得的典型数值，由于几何形状和尺寸的影响，产品规格将与这些数据有所差异。25 ℃ 之功率损耗 Pcv 为 T22×14×8 环形磁芯绕线 3 匝实测。

Note: all values are typical data measured on a T22×14×8 toroidal core; actual product specifications will vary with geometry and size. Pcv values at 25 °C are measured on a T22×14×8 toroid wound with 3 turns.

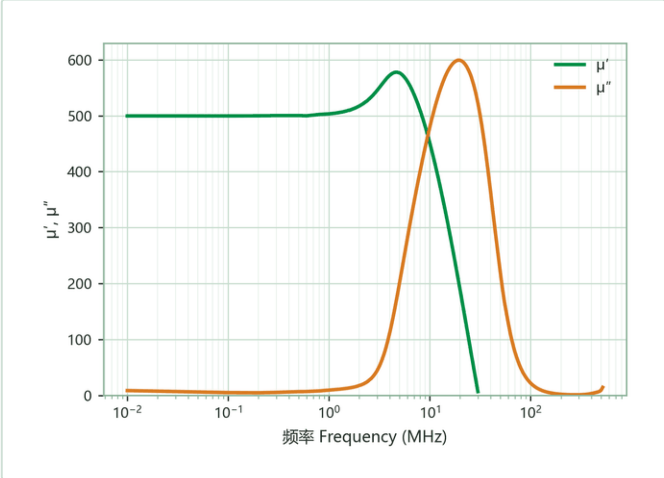
特性曲线详见次页 CHARACTERISTIC CURVES — SEE NEXT PAGE

鐵研 TAK

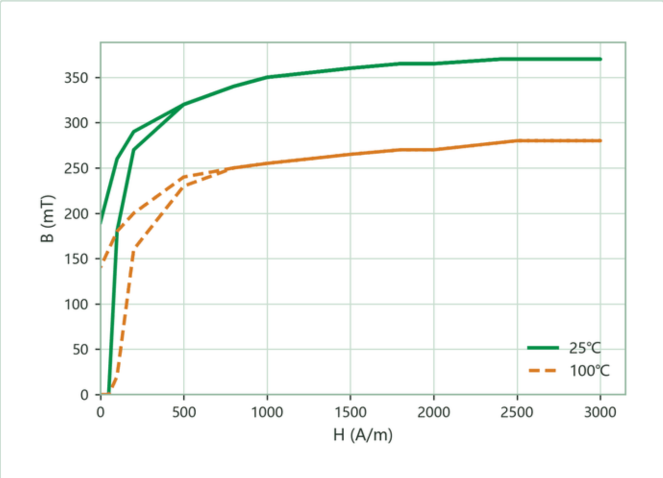
SL50 特性曲线 CHARACTERISTIC CURVES



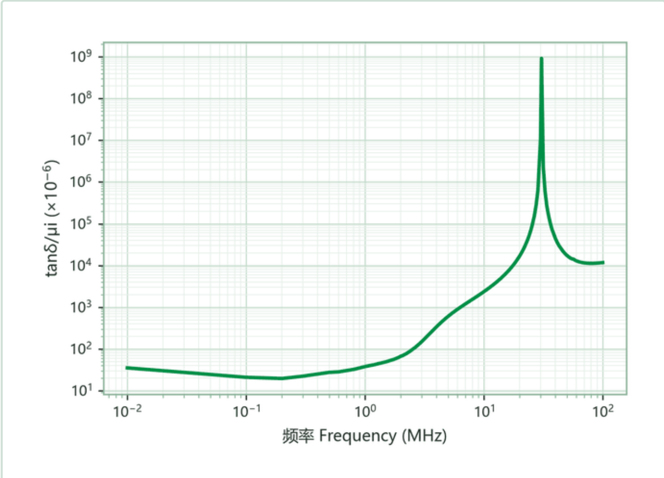
初始磁导率—温度特性
Initial Permeability vs. Temperature



复数磁导率—频率特性
Complex Permeability (μ′, μ″) vs. Frequency



静态磁化曲线
Static Magnetization Curves (B–H)



相对损耗因子—频率特性
Relative Loss Factor (tanδ/μi) vs. Frequency

鐵研 TAK

SL80 宽温稳定材料 WIDE TEMP STABLE MATERIALS

SL80 为镍锌铁氧体材料，初始磁导率（μi）约 800，饱和磁通密度（Bs）约 350 mT（25 ℃）/ 260 mT（100 ℃），居里温度高于 170 ℃。本材料是宽温稳定家族的高磁导支：温度系数 αμr 在 –40～140 ℃ 全范围内仅 $0～4×10^{-6}$/K，磁导率全温域几乎持平；相对损耗因子 $15×10^{-6}$（0.1 MHz）/ $30×10^{-6}$（1.0 MHz），滤波与阻抗特性不随温度漂移。较高的 μi 在环形等闭磁路中提供较高的单位匝数感量与阻抗，可以较少匝数达成滤波目标。典型应用为 EMI 滤波器、共模扼流圈与信号线抗干扰磁环，以及 RF/IF 线圈与高频小电流电感；亦用于车载传感器与 ADAS、RFID 天线、无线充电与通信设备滤波器等需要全温域一致特性的场合。与 SL50（μi 约 500、αμr 0～2）相比，SL80 以略宽的温度系数换取约六成的标称磁导率增幅。另外，TAK 有三种标称 μi≈800 的材料——SL80、G5A 与 L43——适用频段相近，依需求分流：需要全温域低漂移选 SL80；需要高 Bs 的差模 / 功率承载选 G5A（Bs 约 400 mT）；以 EMI 宽频抑制为主选 L43。

SL80 is a NiZn ferrite with an initial permeability (μi) of approx. 800, a saturation flux density (Bs) of approx. 350 mT at 25 °C (260 mT at 100 °C) and a Curie temperature above 170 °C. It is the high-permeability member of the wide-temperature-stable family: the temperature coefficient αμr stays within $0–4×10^{-6}$/K across −40 to 140 °C, keeping permeability essentially flat over the whole range, and with a relative loss factor of $15×10^{-6}$ at 0.1 MHz / $30×10^{-6}$ at 1.0 MHz the filtering and impedance characteristics do not drift with temperature. The higher μi delivers more inductance and impedance per turn in toroids and other closed magnetic circuits, reaching filtering targets with fewer turns. Typical uses are EMI filters, common-mode chokes and signal-line suppression rings, plus RF/IF coils and HF small-current inductors; it also serves automotive sensors and ADAS, RFID antennas, wireless charging and communication-equipment filters where characteristics must hold across the full temperature range. Against SL50 (μi approx. 500, αμr 0–2), SL80 trades a slightly wider temperature coefficient for roughly 60 % more nominal permeability. TAK offers three grades at a nominal μi of approx. 800 — SL80, G5A and L43 — with similar frequency reach; split by need: SL80 for the lowest drift across temperature, G5A (Bs approx. 400 mT) for differential-mode/power current capability, and L43 for broadband EMI suppression.

EMI Filter | Common-Mode Choke | RF / IF Coil | Wireless Charging Coil | RFID Antenna

电磁特性 MAGNETIC CHARACTERISTICS

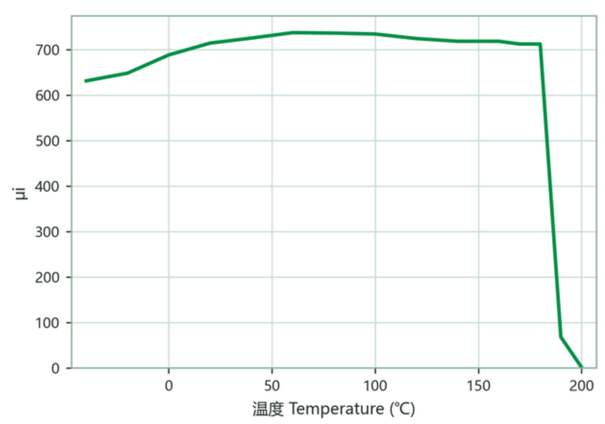
特性 Characteristic	条件 Condition	值 Value	单位 Unit
初始磁导率 μi Initial Permeability	100 kHz & <0.2 mT	800±25%	
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 25 ℃ 100 Hz	350	mT
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 100 ℃ 100 Hz	260	mT
残留磁通密度 Br Remanence	3000 A/m · 25 ℃ 100 Hz	190	mT
残留磁通密度 Br Remanence	3000 A/m · 100 ℃ 100 Hz	109	mT
矫顽力 Hc Coercivity	3000 A/m · 25 ℃ 100 Hz	50.5	A/m
矫顽力 Hc Coercivity	3000 A/m · 100 ℃ 100 Hz	44.5	A/m
αμr（温度系数）Temperature coefficient of permeability	-40～140 ℃	0~4	$×10^{-6}$/K
相对损耗因子 tanδ/μi Relative Loss Factor	0.1 MHz & <0.2 mT	15	$×10^{-6}$
相对损耗因子 tanδ/μi Relative Loss Factor	1.0 MHz & <0.2 mT	30	$×10^{-6}$
居里温度 Tc Curie Temp.	100 kHz & <0.2 mT	>170	℃
密度 D Density	阿基米德法 Archimedes method	5.0	g/cm³
电阻率 ρ Volume Resistivity	直流电流 DC Current	10^7	Ω·m
功率损耗 Pcv Power Loss	100 kHz/100 mT | 500 kHz/30 mT | 1 MHz/30 mT · 25 °C	630 | 189 | 593	kW/m³

备注：各项数值均为环形磁芯T22×14×8测得的典型数值，由于几何形状和尺寸的影响，产品规格将与这些数据有所差异。25 ℃ 之功率损耗 Pcv 为 T22×14×8 环形磁芯绕线 3 匝实测。

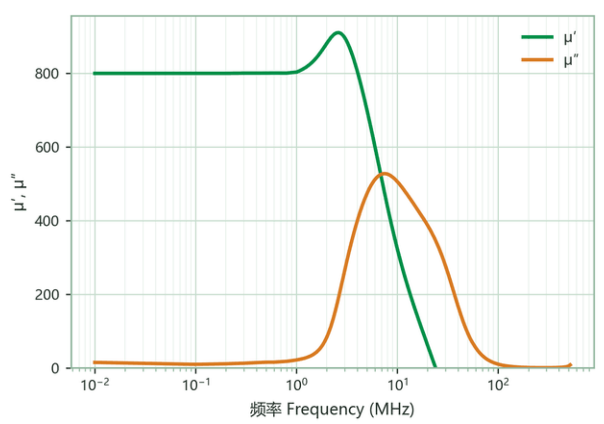
Note: all values are typical data measured on a T22×14×8 toroidal core; actual product specifications will vary with geometry and size. Pcv values at 25 °C are measured on a T22×14×8 toroid wound with 3 turns.

特性曲线详见次页 CHARACTERISTIC CURVES — SEE NEXT PAGE

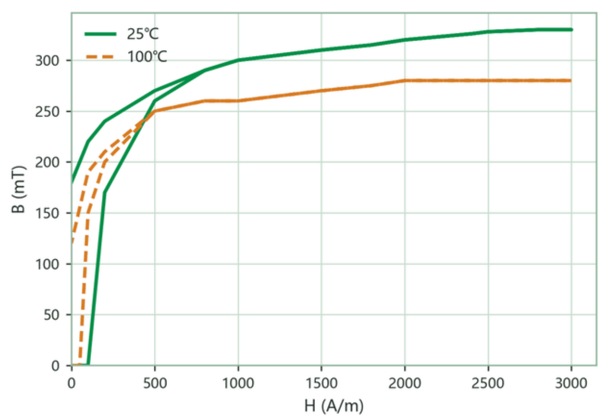
SL80 特性曲线 CHARACTERISTIC CURVES



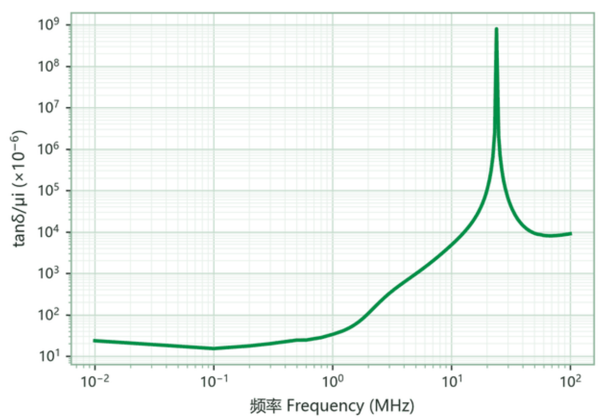
初始磁导率—温度特性
Initial Permeability vs. Temperature



复数磁导率—频率特性
Complex Permeability (μ′, μ″) vs. Frequency



静态磁化曲线
Static Magnetization Curves (B–H)



相对损耗因子—频率特性
Relative Loss Factor (tanδ/μi) vs. Frequency

鐵研 TAK

G5A

高磁导高磁通EMI材料

HIGH PERM. & HIGH FLUX & EMI MATERIALS

G5A 为镍锌铁氧体材料，初始磁导率（μi）约 800，饱和磁通密度（Bs）约 400 mT（25 ℃）/ 310 mT（100 ℃），居里温度高于 190 ℃。本材料在 μi≈800 的阻抗水平上配置了高饱和磁通：差模滤波与功率电感的导线直接承载工作电流，较高的 Bs（100 ℃ 仍有约 310 mT）使阻抗与感量在直流偏置及大电流下不易塌陷；相对损耗因子低至 10×10⁻⁶（0.1 MHz）/ 30×10⁻⁶（1.0 MHz），亦可胜任 0.1～1 MHz 的功率电感与直流转换器。典型应用为电源模块的功率电感、EMI 共模 / 差模滤波器与高频变压器，车用领域见于 ADAS 传感器与电机驱动系统的 EMC 防护。同为标称 μi≈800 的三种材料中，G5A 以高 Bs 主打差模与功率承载（宽温低漂移选 SL80、EMI 宽频抑制选 L43）；需要更高阻抗与储能时可选 G5B（μi 约 1000、Bs 约 390 mT）。

G5A is a NiZn ferrite with an initial permeability (μi) of approx. 800, a saturation flux density (Bs) of approx. 400 mT at 25 °C (310 mT at 100 °C) and a Curie temperature above 190 °C. It pairs the μi ≈ 800 impedance level with a high saturation flux density: in differential-mode filters and power inductors, where the winding carries the working current, the higher Bs (about 310 mT still available at 100 °C) keeps impedance and inductance from collapsing under DC bias and high current; with a relative loss factor as low as 10×10^{-6} at 0.1 MHz / 30×10^{-6} at 1.0 MHz, it also serves 0.1–1 MHz power inductors and DC converters. Typical uses are power inductors in power modules, common- and differential-mode EMI filters and high-frequency transformers; in automotive it protects ADAS sensors and motor-drive systems as EMC components. Among the three grades at a nominal μi of approx. 800, G5A leads with high Bs for differential-mode and power current capability (choose SL80 for temperature stability, L43 for broadband EMI suppression); step up to G5B (μi approx. 1000, Bs approx. 390 mT) for higher impedance and energy storage.

Power Inductor | Differential-Mode EMI Filter | Common-Mode Choke | HF Transformer | ADAS / Motor-Drive EMC

电磁特性 MAGNETIC CHARACTERISTICS

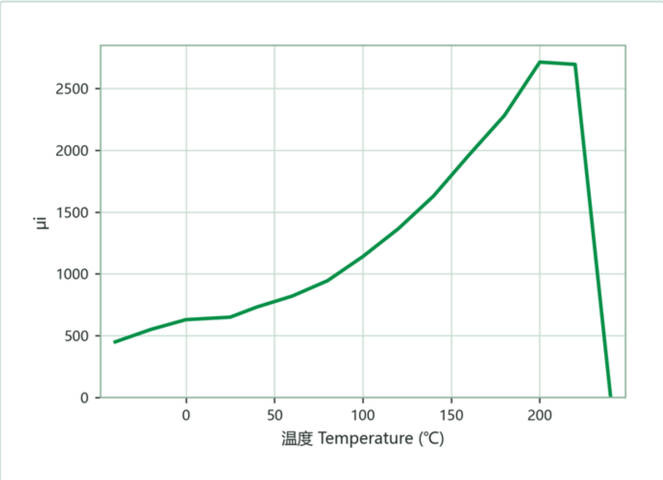
特性 Characteristic	条件 Condition	值 Value	单位 Unit
初始磁导率 μi Initial Permeability	100 kHz & <0.2 mT	800±25%	
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 25 ℃ 100 Hz	400	mT
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 100 ℃ 100 Hz	310	mT
残留磁通密度 Br Remanence	3000 A/m · 25 ℃ 100 Hz	250	mT
残留磁通密度 Br Remanence	3000 A/m · 100 ℃ 100 Hz	220	mT
矫顽力 Hc Coercivity	3000 A/m · 25 ℃ 100 Hz	25	A/m
矫顽力 Hc Coercivity	3000 A/m · 100 ℃ 100 Hz	15	A/m
αμr（温度系数） Temperature coefficient of permeability	20～60 ℃	10	$\times10^{-6}$/K
相对损耗因子 tanδ/μi Relative Loss Factor	0.1 MHz & <0.2 mT	10	$\times10^{-6}$
相对损耗因子 tanδ/μi Relative Loss Factor	1.0 MHz & <0.2 mT	30	$\times10^{-6}$
居里温度 Tc Curie Temp.	100 kHz & <0.2 mT	>190	℃
密度 D Density	阿基米德法 Archimedes method	5.1	g/cm³
电阻率 ρ Volume Resistivity	直流电流 DC Current	10^7	Ω·m
功率损耗 Pcv Power Loss	100 kHz/100 mT | 500 kHz/30 mT | 1 MHz/30 mT · 25 °C	562 | 366 | 994	kW/m³

备注：各项数值均为环形磁芯T31×19×8测得的典型数值，由于几何形状和尺寸的影响，产品规格将与这些数据有所差异。25 ℃ 之功率损耗 Pcv 为 T31×19×8 环形磁芯绕线 3 匝实测。

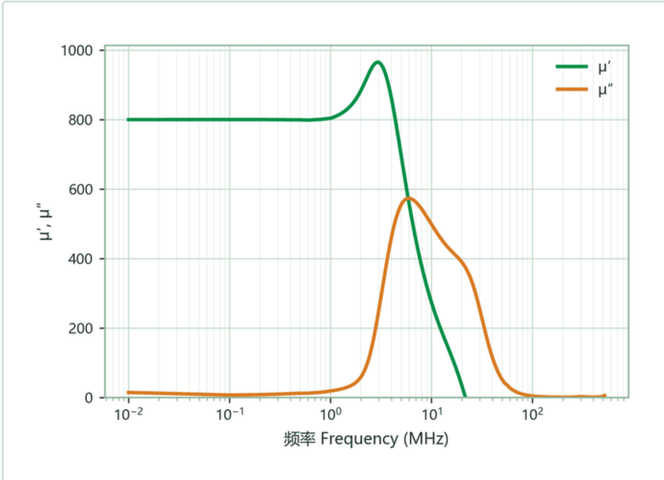
Note: all values are typical data measured on a T31×19×8 toroidal core; actual product specifications will vary with geometry and size. Pcv values at 25 °C are measured on a T31×19×8 toroid wound with 3 turns.

特性曲线详见次页 CHARACTERISTIC CURVES — SEE NEXT PAGE

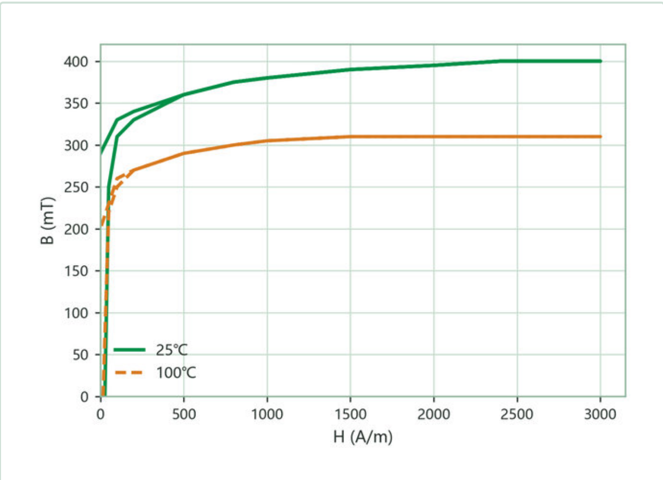
G5A 特性曲线 CHARACTERISTIC CURVES



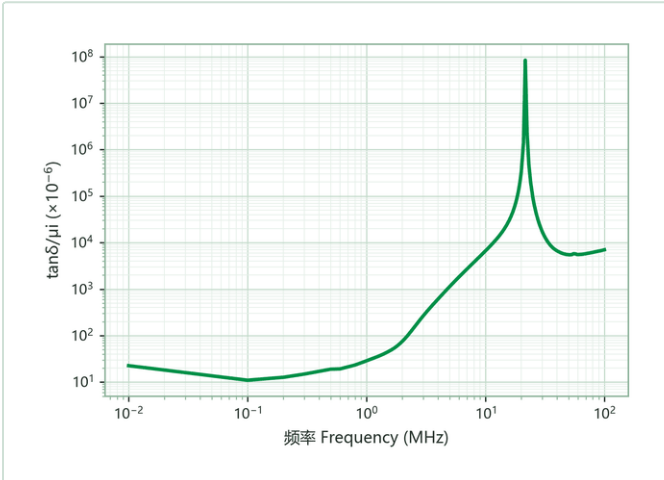
初始磁导率—温度特性
Initial Permeability vs. Temperature



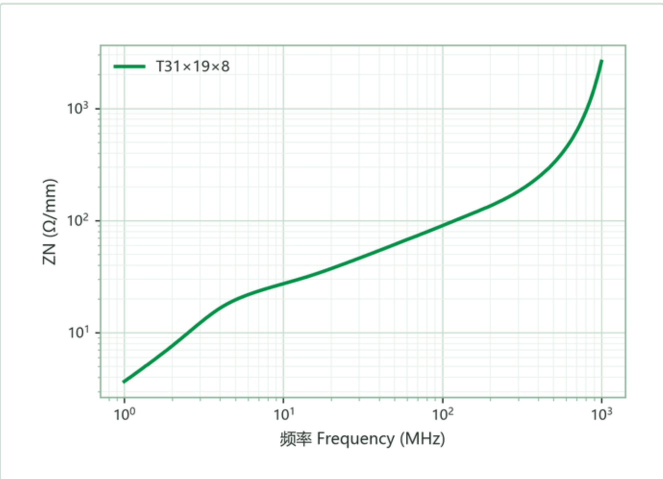
复数磁导率—频率特性
Complex Permeability (µ′, µ″) vs. Frequency



静态磁化曲线
Static Magnetization Curves (B–H)



相对损耗因子—频率特性
Relative Loss Factor (tanδ/µi) vs. Frequency



标准化阻抗—频率特性（Φ0.5 mm 漆包线 100 mm · 单圈测量）
Normalized Impedance ZN vs. Frequency (single turn of Φ0.5 mm wire, 100 mm long)

鐵研 TAK

G5B 高磁导高磁通EMI材料

HIGH PERM. & HIGH FLUX & EMI MATERIALS

G5B 为镍锌铁氧体材料，初始磁导率（μi）约 1000，饱和磁通密度（Bs）约 390 mT（25 ℃）/ 300 mT（100 ℃），居里温度高于 180 ℃。本材料在保持 G5 家族高饱和磁通的前提下，把标称磁导率再提高两成五：共模滤波可用更少匝数取得同等阻抗，功率电感的储能与感量密度亦更高；矫顽力仅 25 A/m，磁滞损低，损耗因子 15×10^{-6}（0.1 MHz）/ 45×10^{-6}（1.0 MHz）。典型应用为电源模块、电流补偿电感、共模与差模滤波器，车用领域同样适用于 ADAS 与电机驱动的 EMC 防护。与 G5A（μi 约 800、Bs 约 400 mT、Tc >190 ℃）的取舍：两者 Bs 与耐温同级，G5B 的优势在阻抗与感量密度，G5A 在 1 MHz 端的损耗略低（30 对 45×10^{-6}）——高频端占比高的设计选 G5A，其余多数共模 / 功率场合 G5B 通用性更高。

G5B is a NiZn ferrite with an initial permeability (μi) of approx. 1000, a saturation flux density (Bs) of approx. 390 mT at 25 °C (300 mT at 100 °C) and a Curie temperature above 180 °C. It raises the G5 family's nominal permeability by a further 25 % while keeping the high saturation flux: common-mode filters reach the same impedance with fewer turns, and power inductors gain energy-storage and inductance density; with a coercivity of only 25 A/m the hysteresis loss stays low, and the loss factor is 15×10^{-6} at 0.1 MHz / 45×10^{-6} at 1.0 MHz. Typical uses are power modules, current-compensated inductors and common-/differential-mode filters, including ADAS and motor-drive EMC protection in automotive. Against G5A (μi approx. 800, Bs approx. 400 mT, Tc >190 °C): Bs and temperature rating are on the same level; G5B leads in impedance and inductance density while G5A is slightly lower-loss at the 1 MHz end (30 vs 45×10^{-6}) — pick G5A when the upper band dominates the design, G5B for most other common-mode and power duties.

Common-Mode Choke | Current-Compensated Inductor | Power Inductor | EMI Filter | ADAS / Motor-Drive EMC

电磁特性 MAGNETIC CHARACTERISTICS

特性 Characteristic	条件 Condition	值 Value	单位 Unit
初始磁导率 μi Initial Permeability	100 kHz & <0.2 mT	1000±25%	
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 25 ℃ 100 Hz	390	mT
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 100 ℃ 100 Hz	300	mT
残留磁通密度 Br Remanence	3000 A/m · 25 ℃ 100 Hz	235	mT
残留磁通密度 Br Remanence	3000 A/m · 100 ℃ 100 Hz	150	mT
矫顽力 Hc Coercivity	3000 A/m · 25 ℃ 100 Hz	25	A/m
矫顽力 Hc Coercivity	3000 A/m · 100 ℃ 100 Hz	20	A/m
αμr（温度系数） Temperature coefficient of permeability	20 ~ 60 ℃	8	$\times10^{-6}$/K
相对损耗因子 tanδ/μi Relative Loss Factor	0.1 MHz & <0.2 mT	15	$\times10^{-6}$
相对损耗因子 tanδ/μi Relative Loss Factor	1.0 MHz & <0.2 mT	45	$\times10^{-6}$
居里温度 Tc Curie Temp.	100 kHz & <0.2 mT	>180	℃
密度 D Density	阿基米德法 Archimedes method	5.1	g/cm^3
电阻率 ρ Volume Resistivity	直流电流 DC Current	10^7	Ω·m
功率损耗 Pcv Power Loss	100 kHz/100 mT | 500 kHz/30 mT | 1 MHz/30 mT · 25 °C	460 | 264 | 832	kW/m^3

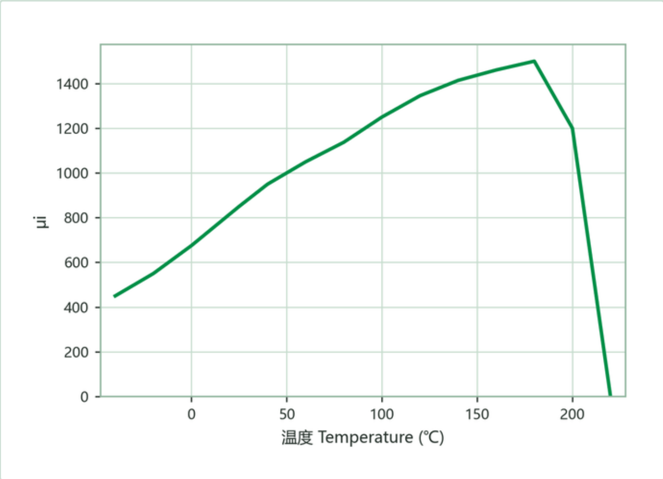
备注：各项数值均为环形磁芯T31×19×8测得的典型数值，由于几何形状和尺寸的影响，产品规格将与这些数据有所差异。25 ℃ 之功率损耗 Pcv 为 T31×19×8 环形磁芯绕线 3 匝实测。

Note: all values are typical data measured on a T31×19×8 toroidal core; actual product specifications will vary with geometry and size. Pcv values at 25 °C are measured on a T31×19×8 toroid wound with 3 turns.

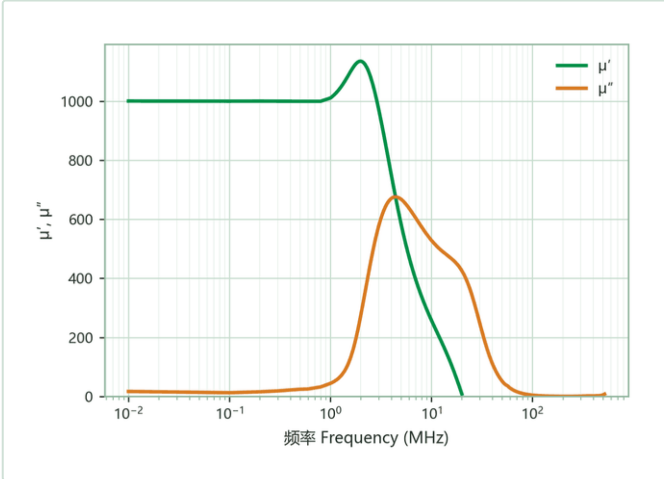
特性曲线详见次页 CHARACTERISTIC CURVES — SEE NEXT PAGE

G5B

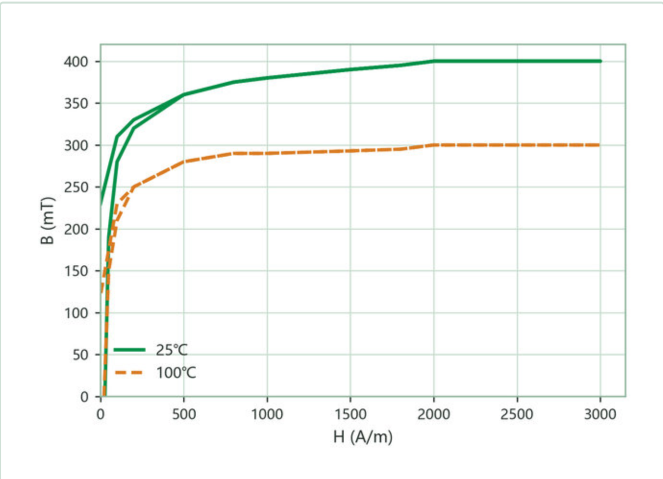
特性曲线 CHARACTERISTIC CURVES



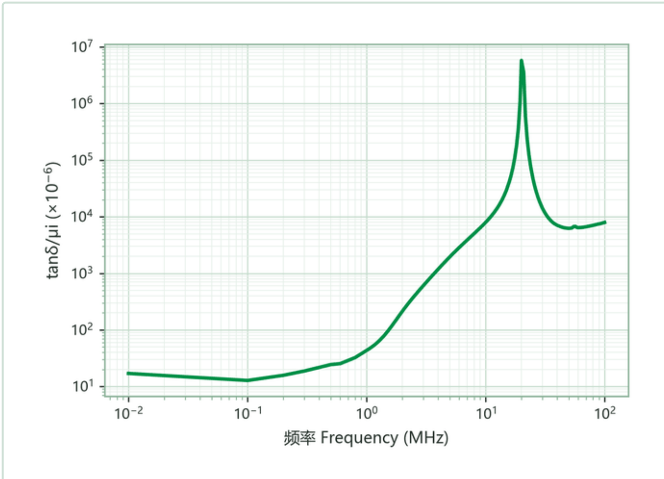
初始磁导率—温度特性
Initial Permeability vs. Temperature



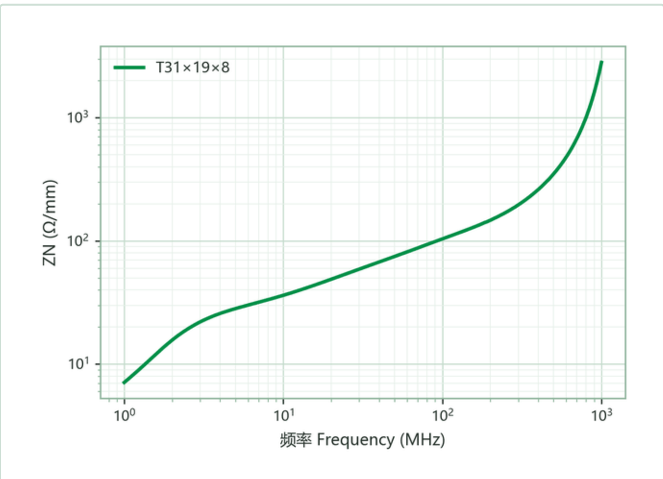
复数磁导率—频率特性
Complex Permeability (μ′, μ″) vs. Frequency



静态磁化曲线
Static Magnetization Curves (B–H)



相对损耗因子—频率特性
Relative Loss Factor (tanδ/μi) vs. Frequency



标准化阻抗—频率特性（Φ0.5 mm 漆包线 100 mm · 单圈测量）
Normalized Impedance ZN vs. Frequency (single turn of Φ0.5 mm wire, 100 mm long)

鐵研 TAK

L43 高磁导EMI材料

HIGH PERM. & EMI MATERIALS

L43 为镍锌铁氧体材料，初始磁导率（μi）约 800，饱和磁通密度（Bs）约 350 mT（25 ℃）/ 245 mT（100 ℃），居里温度高于 160 ℃。本材料是 EMI 抑制取向的主力：低磁通下损耗因子仅 20×10⁻⁶（0.1 MHz），而进入数十 MHz 后 μ″ 损耗成分快速升高、阻抗转为电阻主导，把共模噪声转为热耗散而非反射回线路。标准化阻抗曲线同时提供 T31×19×8 环形与 RH5×1.5×10 磁珠两种夹具的实测（见次页）——共模扼流圈与大尺寸磁环请参照环形数据，磁珠与套管请参照磁珠数据。典型应用为 EMI 抑制滤波器、共模扼流圈、信号线抗干扰磁环与电源输入端滤波，亦用于 RFID 天线。同为标称 μi≈800 的三种材料中，L43 以宽频抑制见长（全温域低漂移选 SL80、高 Bs 差模 / 功率选 G5A）；在 L 系阶梯中 L43 频带最宽，需要更低频段的更高阻抗时，依序选 L6A（μi 约 1200）、L8A（约 1600）、L22A / L28A（2200 / 2800）。

L43 is a NiZn ferrite with an initial permeability (μi) of approx. 800, a saturation flux density (Bs) of approx. 350 mT at 25 °C (245 mT at 100 °C) and a Curie temperature above 160 °C. It is the mainstay EMI-suppression grade: the loss factor is only 20×10^{-6} at 0.1 MHz under low flux, while above a few tens of MHz the μ″ loss component rises rapidly and the impedance becomes resistance-dominated, dissipating common-mode noise as heat instead of reflecting it back into the line. Its normalized-impedance curves are given for two fixtures — a T31×19×8 toroid and an RH5×1.5×10 bead (see next page): consult the toroid data for common-mode chokes and larger rings, the bead data for beads and sleeves. Typical uses are EMI suppression filters, common-mode chokes, signal-line suppression rings and power-inlet filtering, as well as RFID antennas. Among the three grades at a nominal μi of approx. 800, L43 leads in broadband suppression (choose SL80 for temperature stability, G5A for high-Bs differential-mode/power); within the L family L43 has the widest band — for higher impedance at lower frequencies step up to L6A (μi approx. 1200), L8A (approx. 1600) or L22A/L28A (2200/2800).

EMI Suppression Bead | Common-Mode Choke | Signal-Line Ring | Power-Inlet Filter | RFID Antenna

电磁特性 MAGNETIC CHARACTERISTICS

特性 Characteristic	条件 Condition	值 Value	单位 Unit
初始磁导率 μi Initial Permeability	100 kHz & <0.2 mT	800±25%	
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 25 ℃ 100 Hz	350	mT
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 100 ℃ 100 Hz	245	mT
残留磁通密度 Br Remanence	3000 A/m · 25 ℃ 100 Hz	100	mT
残留磁通密度 Br Remanence	3000 A/m · 100 ℃ 100 Hz	60	mT
矫顽力 Hc Coercivity	3000 A/m · 25 ℃ 100 Hz	22	A/m
矫顽力 Hc Coercivity	3000 A/m · 100 ℃ 100 Hz	17	A/m
αμr（温度系数） Temperature coefficient of permeability	20 ~ 60 ℃	4	$\times10^{-6}$/K
相对损耗因子 tanδ/μi Relative Loss Factor	0.1 MHz & <0.2 mT	20	$\times10^{-6}$
相对损耗因子 tanδ/μi Relative Loss Factor	0.5 MHz & <0.2 mT	30	$\times10^{-6}$
居里温度 Tc Curie Temp.	100 kHz & <0.2 mT	>160	℃
密度 D Density	阿基米德法 Archimedes method	5.0	g/cm³
电阻率 ρ Volume Resistivity	直流电流 DC Current	10^7	Ω·m

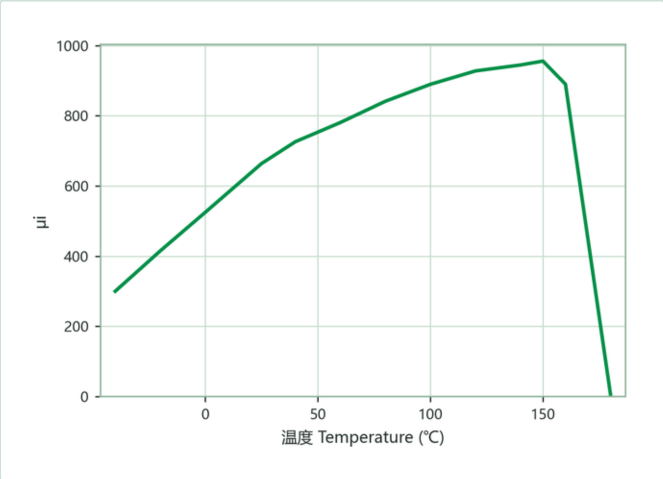
备注：各项数值均为环形磁芯T31×19×8测得的典型数值，由于几何形状和尺寸的影响，产品规格将与这些数据有所差异。

Note: all values are typical data measured on a T31×19×8 toroidal core; actual product specifications will vary with geometry and size.

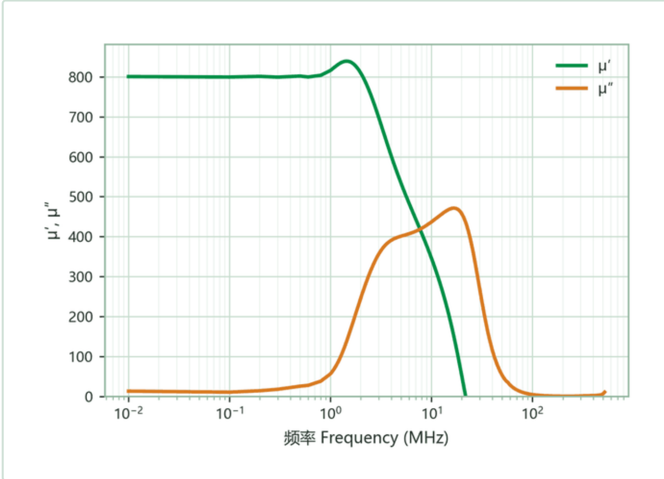
特性曲线详见次页 CHARACTERISTIC CURVES — SEE NEXT PAGE

L43 特性曲线

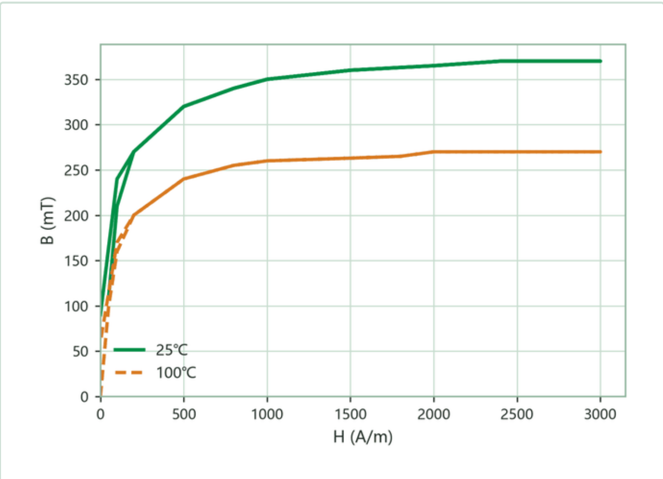
CHARACTERISTIC CURVES



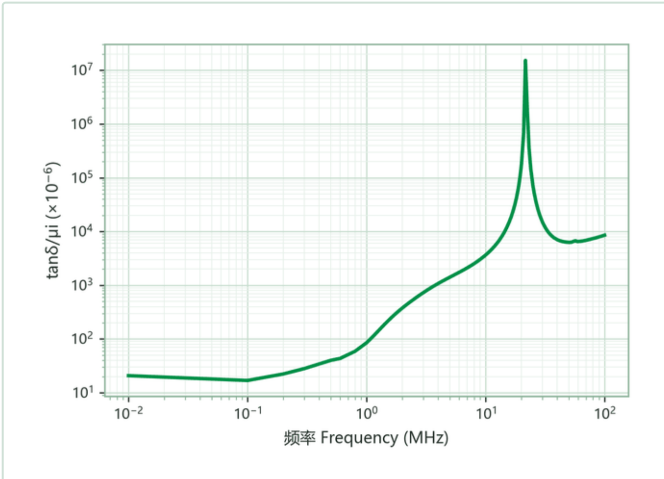
初始磁导率—温度特性
Initial Permeability vs. Temperature



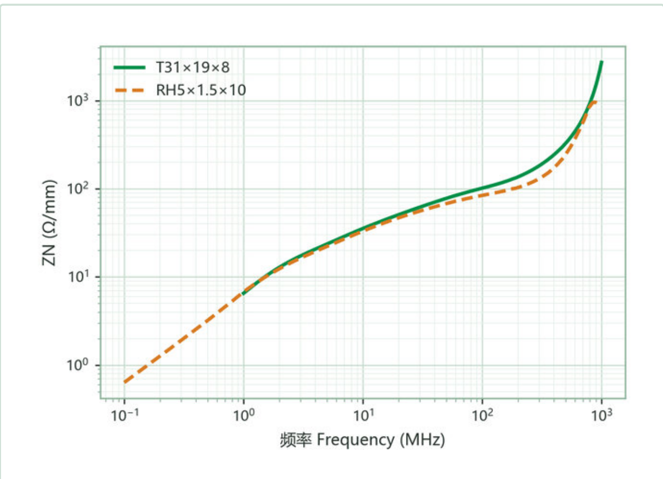
复数磁导率—频率特性
Complex Permeability (μ′, μ″) vs. Frequency



静态磁化曲线
Static Magnetization Curves (B–H)



相对损耗因子—频率特性
Relative Loss Factor (tanδ/μi) vs. Frequency



标准化阻抗—频率特性（Φ0.5 mm 漆包线 100 mm · 单圈测量）
Normalized Impedance ZN vs. Frequency (single turn of Φ0.5 mm wire, 100 mm long)

L6A 高磁导EMI材料 HIGH PERM. & EMI MATERIALS

L6A 为镍锌铁氧体材料，初始磁导率（μi）约 1200，饱和磁通密度（Bs）约 320 mT（25 ℃）/ 205 mT（100 ℃），居里温度高于 150 ℃。磁导率较 L43 高五成，使共模阻抗的重心移往较低频段——在数 MHz 至数十 MHz 的数据通信频段可用较少匝数取得足够阻抗；低磁通损耗因子 15×10^{-6}（0.1 MHz）/ 30×10^{-6}（0.5 MHz），插入损耗维持低位。高电阻率（约 10^7 Ω·m）有利于长期绝缘可靠性。典型应用为信号线共模滤波器、数据通信 EMI 抑制与低频抑制磁环。在 L 系阶梯中，L6A 介于 L43（μi 约 800、频带最宽）与 L8A（约 1600、低频阻抗更高）之间；μi 越高的档位低频阻抗越高、居里温度越低，选型时以"需要抑制的最低频率"与"工作温度裕度"权衡。

L6A is a NiZn ferrite with an initial permeability (μi) of approx. 1200, a saturation flux density (Bs) of approx. 320 mT at 25 °C (205 mT at 100 °C) and a Curie temperature above 150 °C. Its permeability, 50 % above L43's, shifts the impedance toward lower frequencies — in the data-communication range of a few to a few tens of MHz it reaches sufficient impedance with fewer turns; the low-flux loss factor is 15×10^{-6} at 0.1 MHz / 30×10^{-6} at 0.5 MHz, keeping insertion loss low, and the high resistivity of about 10^7 Ω·m supports long-term insulation reliability. Typical uses are signal-line common-mode filters, data-communication EMI suppression and low-frequency suppression rings. In the L-family ladder, L6A sits between L43 (μi approx. 800, widest band) and L8A (approx. 1600, higher low-frequency impedance); higher-μi steps give more low-frequency impedance at a lower Curie temperature — balance the lowest frequency to be suppressed against the operating-temperature margin.

Signal-Line Common-Mode Filter | Data-Line EMI Suppression | Low-Frequency Suppression Ring

电磁特性 MAGNETIC CHARACTERISTICS

特性 Characteristic	条件 Condition	值 Value	单位 Unit
初始磁导率 μi Initial Permeability	100 kHz & <0.2 mT	1200±25%	
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 25 ℃ 100 Hz	320	mT
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 100 ℃ 100 Hz	205	mT
残留磁通密度 Br Remanence	3000 A/m · 25 ℃ 100 Hz	210	mT
残留磁通密度 Br Remanence	3000 A/m · 100 ℃ 100 Hz	40	mT
矫顽力 Hc Coercivity	3000 A/m · 25 ℃ 100 Hz	20	A/m
矫顽力 Hc Coercivity	3000 A/m · 100 ℃ 100 Hz	15	A/m
αμr（温度系数） Temperature coefficient of permeability	20 ~ 60 ℃	15	$\times10^{-6}$/K
相对损耗因子 tanδ/μi Relative Loss Factor	0.1 MHz & <0.2 mT	15	$\times10^{-6}$
相对损耗因子 tanδ/μi Relative Loss Factor	0.5 MHz & <0.2 mT	30	$\times10^{-6}$
居里温度 Tc Curie Temp.	100 kHz & <0.2 mT	>150	℃
密度 D Density	阿基米德法 Archimedes method	5.0	g/cm³
电阻率 ρ Volume Resistivity	直流电流 DC Current	10^7	Ω·m

备注：各项数值均为环形磁芯T31×19×8测得的典型数值，由于几何形状和尺寸的影响，产品规格将与这些数据有所差异。

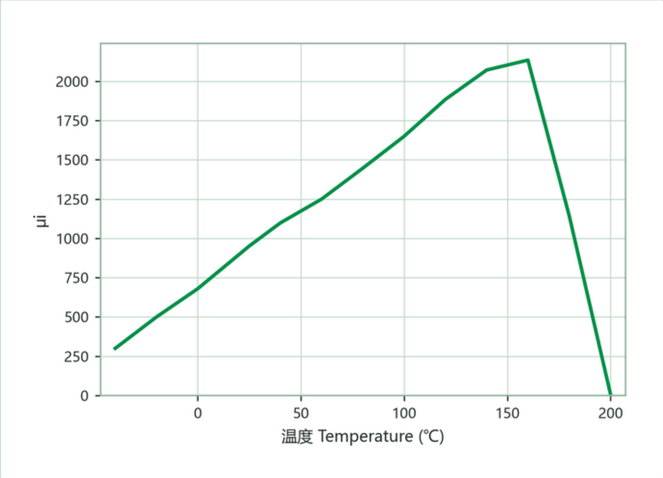
Note: all values are typical data measured on a T31×19×8 toroidal core; actual product specifications will vary with geometry and size.

特性曲线详见次页 CHARACTERISTIC CURVES — SEE NEXT PAGE

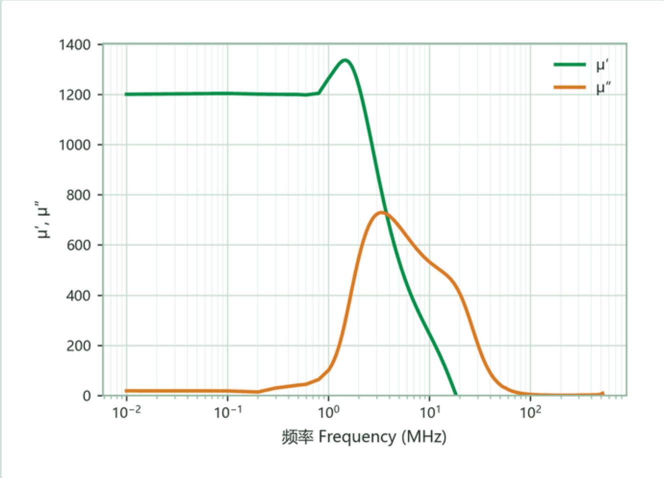
鐵研 TAK

L6A

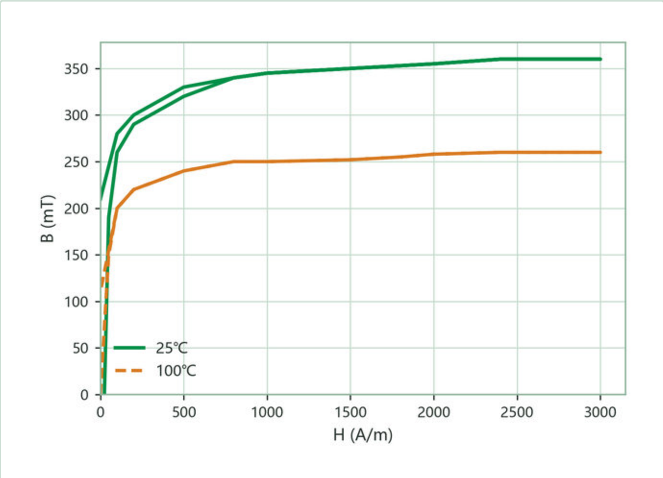
特性曲线
CHARACTERISTIC CURVES



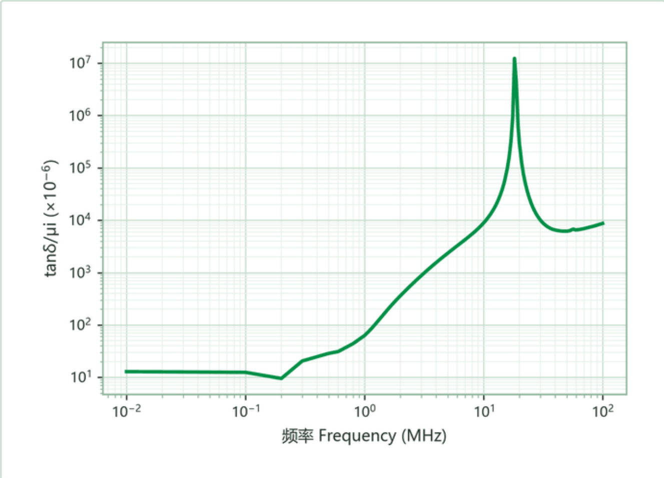
初始磁导率—温度特性
Initial Permeability vs. Temperature



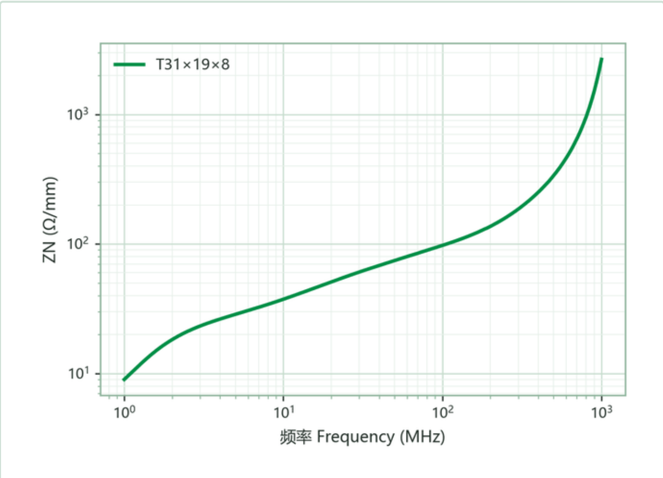
复数磁导率—频率特性
Complex Permeability (μ′, μ″) vs. Frequency



静态磁化曲线
Static Magnetization Curves (B–H)



相对损耗因子—频率特性
Relative Loss Factor (tanδ/μi) vs. Frequency



标准化阻抗—频率特性（Φ0.5 mm 漆包线 100 mm · 单圈测量）
Normalized Impedance ZN vs. Frequency (single turn of Φ0.5 mm wire, 100 mm long)

鐵研 TAK

L8A 高磁导EMI材料

HIGH PERM. & EMI MATERIALS

L8A 为镍锌铁氧体材料，初始磁导率（μi）约 1600，饱和磁通密度（Bs）约 300 mT（25 ℃）/ 110 mT（100 ℃），居里温度高于 120 ℃。高磁导率使其在数百 kHz 至数 MHz 的低频段即可建立显著阻抗，适合以有限匝数抑制电源线与大电流线路的传导噪声；低磁通损耗因子 15×10⁻⁶（0.1 MHz）/ 35×10⁻⁶（0.3 MHz）。标准化阻抗曲线提供 T31×19×8 环形与 RH5×1.5×10 磁珠两种夹具实测（见次页），依元件型态选用对应数据。典型应用为低频 EMI 滤波器、大尺寸共模扼流圈与电源线抗干扰磁环，常见于电源系统与工控设备。在 L 系阶梯中，L8A 位于 L6A（μi 约 1200）与 L22A（约 2200）之间；本材料居里温度较低（>120 ℃），100 ℃ 时磁通余裕明显缩小，工作温度偏高的场合应改选 L6A 或 L43。

L8A is a NiZn ferrite with an initial permeability (μi) of approx. 1600, a saturation flux density (Bs) of approx. 300 mT at 25 °C (110 mT at 100 °C) and a Curie temperature above 120 °C. The high permeability builds significant impedance already in the hundreds-of-kHz to few-MHz range, suppressing conducted noise on power lines and high-current paths with a limited number of turns; the low-flux loss factor is 15×10^{-6} at 0.1 MHz / 35×10^{-6} at 0.3 MHz. Normalized-impedance curves are given for two fixtures — a T31×19×8 toroid and an RH5×1.5×10 bead (see next page); use the data matching the component type. Typical uses are low-frequency EMI filters, large common-mode chokes and power-line suppression rings in power systems and industrial equipment. In the L-family ladder L8A sits between L6A (μi approx. 1200) and L22A (approx. 2200); its Curie temperature is on the low side (>120 °C) and the flux margin shrinks markedly at 100 °C — prefer L6A or L43 when the operating temperature runs high.

Low-Frequency EMI Filter | Large Common-Mode Choke | Power-Line Suppression Ring

电磁特性 MAGNETIC CHARACTERISTICS

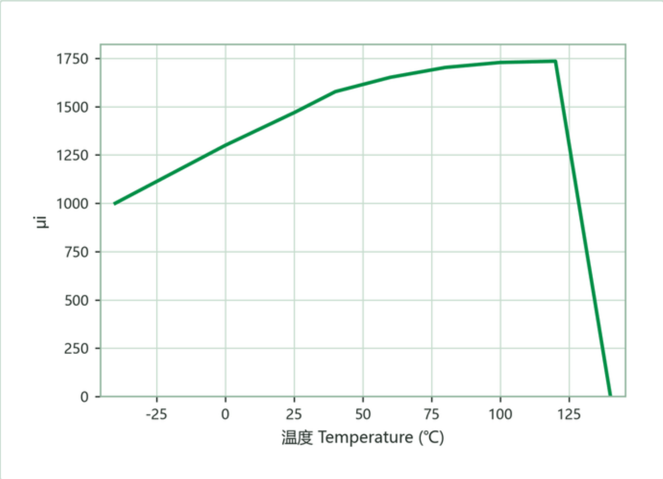
特性 Characteristic	条件 Condition	值 Value	单位 Unit
初始磁导率 μi Initial Permeability	100 kHz & <0.2 mT	1600±25%	
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 25 ℃ 100 Hz	300	mT
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 100 ℃ 100 Hz	110	mT
残留磁通密度 Br Remanence	3000 A/m · 25 ℃ 100 Hz	120	mT
残留磁通密度 Br Remanence	3000 A/m · 100 ℃ 100 Hz	30	mT
矫顽力 Hc Coercivity	3000 A/m · 25 ℃ 100 Hz	15	A/m
矫顽力 Hc Coercivity	3000 A/m · 100 ℃ 100 Hz	11	A/m
αμr（温度系数） Temperature coefficient of permeability	20～60 ℃	4	$\times10^{-6}$/K
相对损耗因子 tanδ/μi Relative Loss Factor	0.1 MHz & <0.2 mT	15	$\times10^{-6}$
相对损耗因子 tanδ/μi Relative Loss Factor	0.3 MHz & <0.2 mT	35	$\times10^{-6}$
居里温度 Tc Curie Temp.	100 kHz & <0.2 mT	>120	℃
密度 D Density	阿基米德法 Archimedes method	5.0	g/cm³
电阻率 ρ Volume Resistivity	直流电流 DC Current	10^7	Ω·m

备注：各项数值均为环形磁芯T31×19×8测得的典型数值，由于几何形状和尺寸的影响，产品规格将与这些数据有所差异。

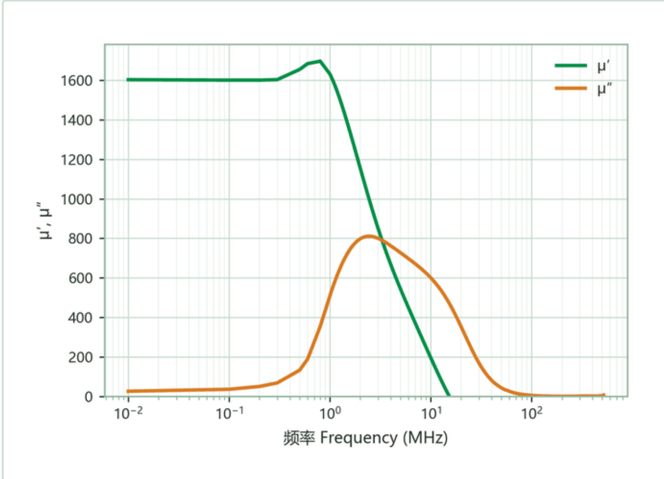
Note: all values are typical data measured on a T31×19×8 toroidal core; actual product specifications will vary with geometry and size.

特性曲线详见次页 CHARACTERISTIC CURVES — SEE NEXT PAGE

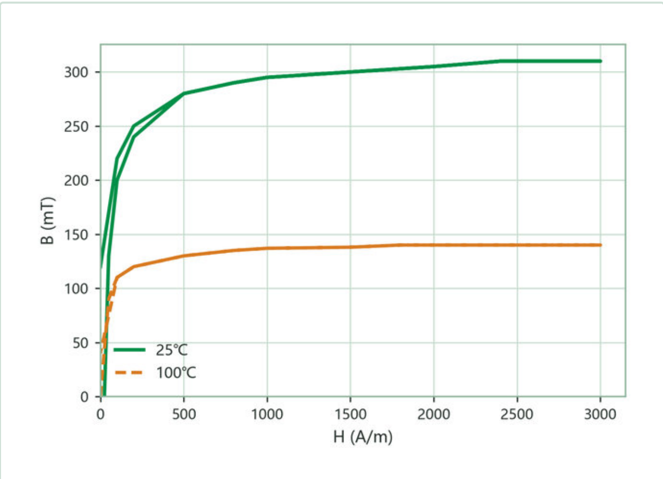
L8A 特性曲线 CHARACTERISTIC CURVES



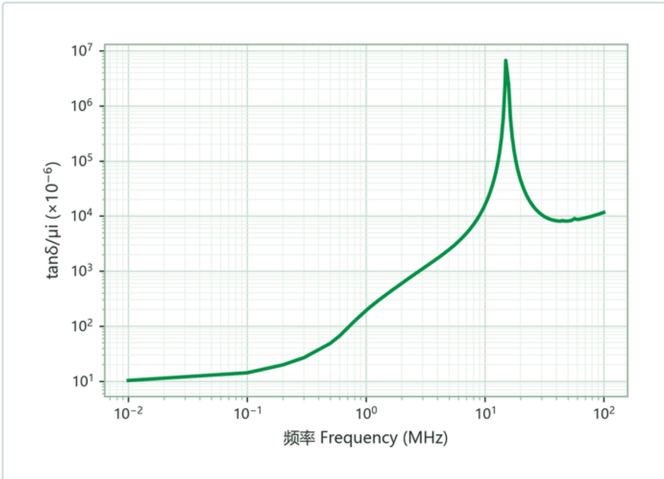
初始磁导率—温度特性
Initial Permeability vs. Temperature



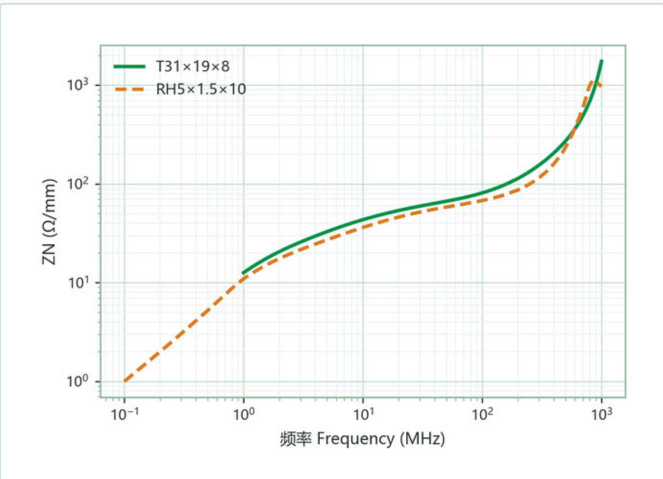
复数磁导率—频率特性
Complex Permeability (μ′, μ″) vs. Frequency



静态磁化曲线
Static Magnetization Curves (B–H)



相对损耗因子—频率特性
Relative Loss Factor (tanδ/μi) vs. Frequency



标准化阻抗—频率特性（Φ0.5 mm 漆包线 100 mm · 单圈测量）
Normalized Impedance ZN vs. Frequency (single turn of Φ0.5 mm wire, 100 mm long)

鐵研 TAK

L22A 高磁导EMI材料 HIGH PERM. & EMI MATERIALS

L22A 为镍锌铁氧体材料，初始磁导率（μi）约 2200，饱和磁通密度（Bs）约 270 mT（25 ℃）/ 180 mT（80 ℃），居里温度高于 90 ℃。高 μi 使其在百 kHz 级的低频段即具高阻抗，矫顽力仅约 9 A/m、磁滞损很低，市电输入端与大型共模电感可在低频取得有效衰减；损耗因子 20×10^{-6}（0.1 MHz）/ 35×10^{-6}（0.3 MHz）。典型应用为低频 EMI 抑制、电源输入端滤波器与大型共模电感。本材料居里温度高于 90 ℃，属 L 系温度上限较低的一端，适用于室温至中温环境；工作温度较高或需要更宽频带时往 L8A、L6A、L43 方向优先选择。与 L28A（μi 约 2800）为相邻档位，两者标称 μi 差在 ±25% 公差带内互有重叠，依低频阻抗需求与温度裕度择一即可。

L22A is a NiZn ferrite with an initial permeability (μi) of approx. 2200, a saturation flux density (Bs) of approx. 270 mT at 25 °C (180 mT at 80 °C) and a Curie temperature above 90 °C. The high μi provides high impedance already in the hundreds-of-kHz range, and the coercivity of only about 9 A/m keeps hysteresis loss very low, giving mains-input filters and large common-mode inductors effective low-frequency attenuation; the loss factor is 20×10^{-6} at 0.1 MHz / 35×10^{-6} at 0.3 MHz. Typical uses are low-frequency EMI suppression, mains-input filters and large common-mode inductors. With its Curie temperature above 90 °C it belongs to the cooler end of the L family — suited to room-to-moderate temperatures; prefer L8A, L6A or L43 when the operating temperature or bandwidth demands more. L28A (μi approx. 2800) is the adjacent step — the nominal difference lies within the ±25 % tolerance overlap, so choose by low-frequency impedance need and temperature margin.

Mains-Input EMI Filter | Large Common-Mode Inductor | Low-Frequency Suppression Ring

电磁特性 MAGNETIC CHARACTERISTICS

特性 Characteristic	条件 Condition	值 Value	单位 Unit
初始磁导率 μi Initial Permeability	100 kHz & <0.2 mT	2200±25%	
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 25 ℃ 100 Hz	270	mT
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 80 ℃ 100 Hz	180	mT
残留磁通密度 Br Remanence	3000 A/m · 25 ℃ 100 Hz	110	mT
残留磁通密度 Br Remanence	3000 A/m · 80 ℃ 100 Hz	52	mT
矫顽力 Hc Coercivity	3000 A/m · 25 ℃ 100 Hz	9	A/m
矫顽力 Hc Coercivity	3000 A/m · 80 ℃ 100 Hz	8	A/m
αμr（温度系数） Temperature coefficient of permeability	20 ~ 60 ℃	8	$\times10^{-6}$/K
相对损耗因子 tanδ/μi Relative Loss Factor	0.1 MHz & <0.2 mT	20	$\times10^{-6}$
相对损耗因子 tanδ/μi Relative Loss Factor	0.3 MHz & <0.2 mT	35	$\times10^{-6}$
居里温度 Tc Curie Temp.	100 kHz & <0.2 mT	>90	℃
密度 D Density	阿基米德法 Archimedes method	5.0	g/cm³
电阻率 ρ Volume Resistivity	直流电流 DC Current	10^7	Ω·m

备注：各项数值均为环形磁芯T31×19×8测得的典型数值，由于几何形状和尺寸的影响，产品规格将与这些数据有所差异。

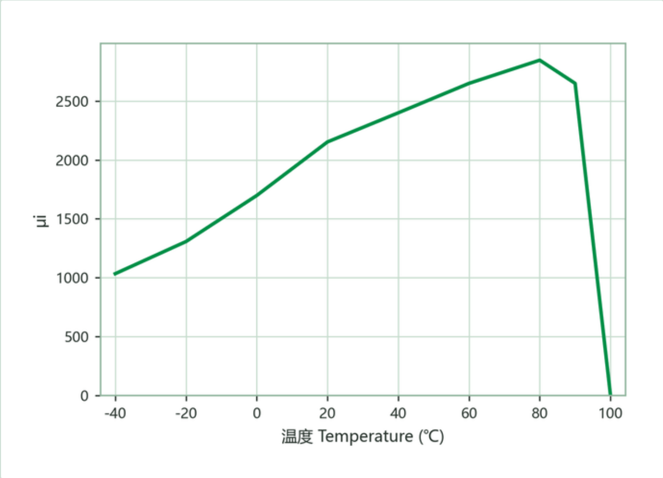
Note: all values are typical data measured on a T31×19×8 toroidal core; actual product specifications will vary with geometry and size.

特性曲线详见次页 CHARACTERISTIC CURVES — SEE NEXT PAGE

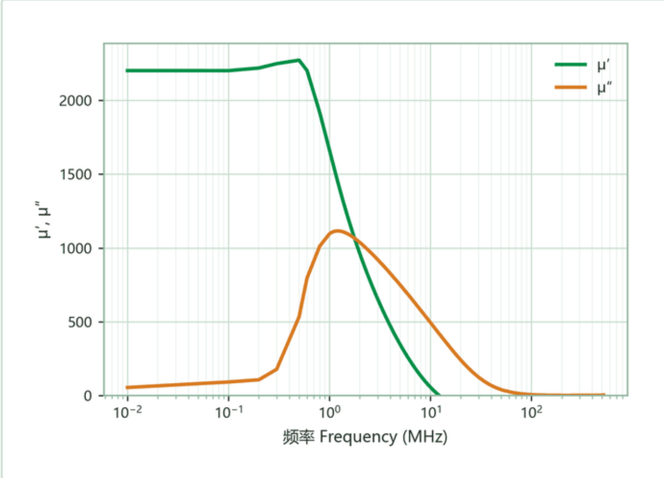
鐵研 TAK

L22A

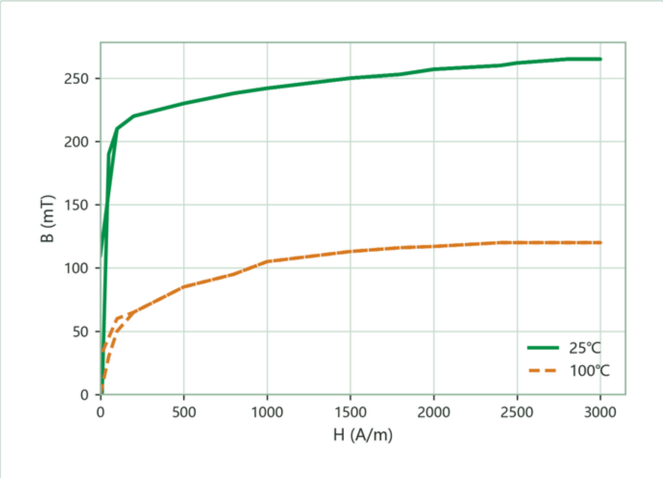
特性曲线 CHARACTERISTIC CURVES



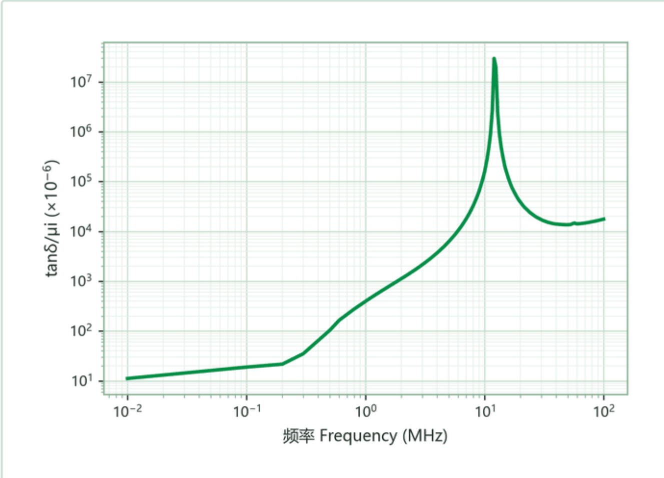
初始磁导率—温度特性
Initial Permeability vs. Temperature



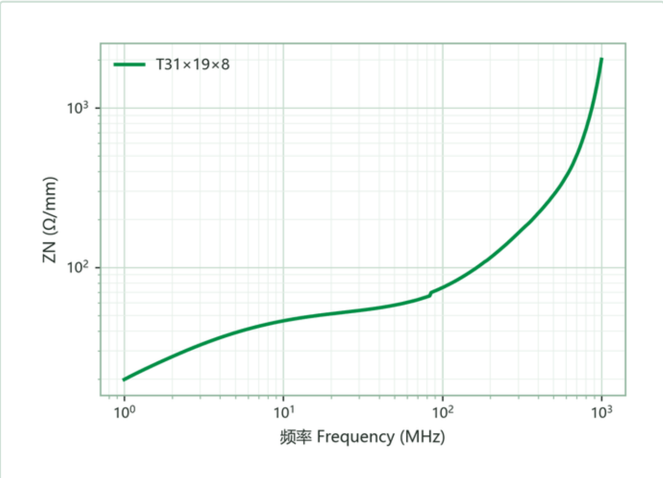
复数磁导率—频率特性
Complex Permeability (μ′, μ″) vs. Frequency



静态磁化曲线
Static Magnetization Curves (B–H)



相对损耗因子—频率特性
Relative Loss Factor (tanδ/μi) vs. Frequency



标准化阻抗—频率特性（Φ0.5 mm 漆包线 100 mm · 单圈测量）
Normalized Impedance ZN vs. Frequency (single turn of Φ0.5 mm wire, 100 mm long)

鐵研 TAK

L28A 高磁导EMI材料 HIGH PERM. & EMI MATERIALS

L28A 为镍锌铁氧体材料，初始磁导率（μi）约 2800，为本册 NiZn 各材质之最，饱和磁通密度（Bs）约 250 mT（25 ℃）/ 160 mT（80 ℃），居里温度高于 80 ℃。最高的磁导率带来 L 系最高的低频阻抗——在数百 kHz 的传导噪声频段可用最少匝数达标；矫顽力仅约 8 A/m，磁滞损极低。高电阻率与长期稳定性使其适合通信线路的持续抑制。典型应用为低频 EMI 滤波器、信号线共模电感与电源输入端抑制。本材料居里温度高于 80 ℃，为全系最低，适用于室温环境；温升明显或高温环境应改选 L22A 以下档位。与 L22A 为相邻档位（标称 μi 2800 对 2200，公差带互有重叠）：需要最高低频阻抗时选 L28A，需要多一分温度裕度时选 L22A。

L28A is a NiZn ferrite with an initial permeability (μi) of approx. 2800 — the highest of the NiZn grades in this volume — a saturation flux density (Bs) of approx. 250 mT at 25 °C (160 mT at 80 °C) and a Curie temperature above 80 °C. The highest permeability yields the L family's highest low-frequency impedance, meeting conducted-noise targets in the hundreds-of-kHz range with the fewest turns; the coercivity of only about 8 A/m keeps hysteresis loss minimal, and the high resistivity and long-term stability sustain suppression on communication lines. Typical uses are low-frequency EMI filters, signal-line common-mode inductors and power-inlet suppression. Its Curie temperature, above 80 °C, is the lowest of the family — intended for room-temperature environments; move to L22A or below where self-heating or ambient temperature is significant. L22A is the adjacent step (nominal μi 2800 vs 2200, with overlapping tolerance bands): pick L28A for maximum low-frequency impedance, L22A for extra temperature margin.

Low-Frequency EMI Filter | Signal-Line Common-Mode Inductor | Power-Inlet Suppression

电磁特性 MAGNETIC CHARACTERISTICS

特性 Characteristic	条件 Condition	值 Value	单位 Unit
初始磁导率 μi Initial Permeability	100 kHz & <0.2 mT	2800±25%	
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 25 ℃ 100 Hz	250	mT
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 80 ℃ 100 Hz	160	mT
残留磁通密度 Br Remanence	3000 A/m · 25 ℃ 100 Hz	100	mT
残留磁通密度 Br Remanence	3000 A/m · 80 ℃ 100 Hz	50	mT
矫顽力 Hc Coercivity	3000 A/m · 25 ℃ 100 Hz	8	A/m
矫顽力 Hc Coercivity	3000 A/m · 80 ℃ 100 Hz	7	A/m
αμr（温度系数）Temperature coefficient of permeability	20～60 ℃	6	$\times10^{-6}$/K
相对损耗因子 tanδ/μi Relative Loss Factor	0.1 MHz & <0.2 mT	25	$\times10^{-6}$
相对损耗因子 tanδ/μi Relative Loss Factor	0.3 MHz & <0.2 mT	40	$\times10^{-6}$
居里温度 Tc Curie Temp.	100 kHz & <0.2 mT	>80	℃
密度 D Density	阿基米德法 Archimedes method	5.0	g/cm^3
电阻率 ρ Volume Resistivity	直流电流 DC Current	10^7	Ω·m

备注：各项数值均为环形磁芯T31×19×8测得的典型数值，由于几何形状和尺寸的影响，产品规格将与这些数据有所差异。

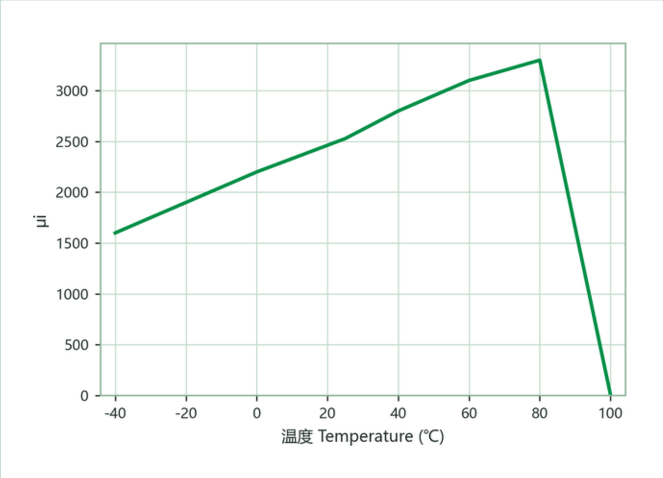
Note: all values are typical data measured on a T31×19×8 toroidal core; actual product specifications will vary with geometry and size.

特性曲线详见次页 CHARACTERISTIC CURVES — SEE NEXT PAGE

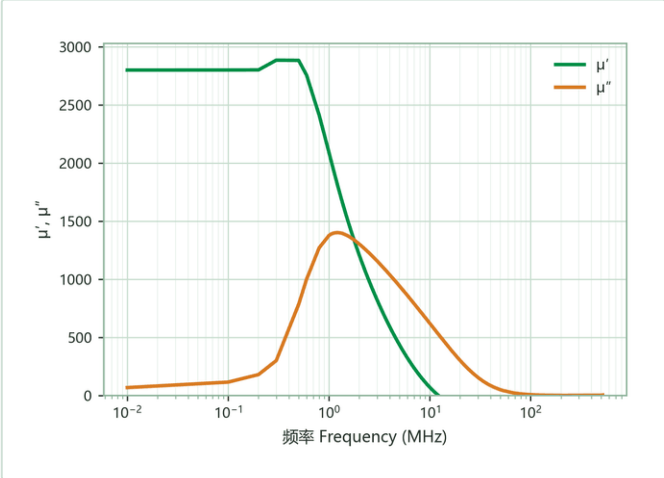
鐵研 TAK

L28A

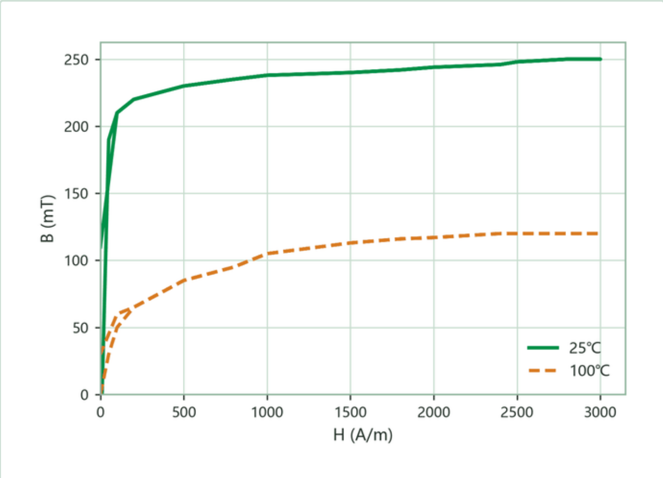
特性曲线 CHARACTERISTIC CURVES



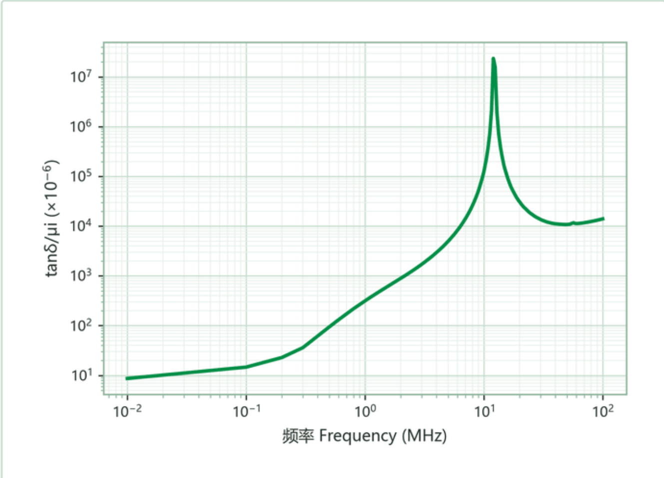
初始磁导率—温度特性
Initial Permeability vs. Temperature



复数磁导率—频率特性
Complex Permeability (μ′, μ″) vs. Frequency



静态磁化曲线
Static Magnetization Curves (B–H)



相对损耗因子—频率特性
Relative Loss Factor (tanδ/μi) vs. Frequency

鐵研 TAK

MGB1 镍镁锌材料

NI-MG-ZN MATERIALS

MGB1 为镍镁锌铁氧体材料，初始磁导率（μi）约 350，饱和磁通密度（Bs）约 380 mT（25 ℃）/ 320 mT（100 ℃），居里温度高于 200 ℃。以镁取代部分镍的配方在降低材料成本的同时，保住了相当完整的特性组合：Bs 达 380 mT、Tc 高于 200 ℃，低磁通损耗因子 15×10⁻⁶（0.1 MHz）/ 35×10⁻⁶（2.0 MHz）与纯镍锌通用材同级，是镍镁锌组的性能上限。典型应用为宽频 EMI 抑制、高速数据线磁珠与中高频滤波电感，亦用于一般 choke 与 RFID 天线等对成本敏感的量产场合。与同标称 μi 350 的 DL3 相比，MGB1 的定位是成本效率（DL3 主打耐热冲击与 SMD 回流焊可靠性）；镍镁锌 / 镁锌组内需要更低成本可退至 MG2 或 MF 系，但损耗与温度特性亦随之让步。

MGB1 is a Ni-Mg-Zn ferrite with an initial permeability (μi) of approx. 350, a saturation flux density (Bs) of approx. 380 mT at 25 °C (320 mT at 100 °C) and a Curie temperature above 200 °C. Substituting part of the nickel with magnesium lowers material cost while retaining a remarkably complete property set: Bs of 380 mT, Tc above 200 °C, and a low-flux loss factor of 15×10^{-6} at 0.1 MHz / 35×10^{-6} at 2.0 MHz on par with the standard NiZn grades — the performance ceiling of the Ni-Mg-Zn group. Typical uses are broadband EMI suppression, high-speed data-line beads and mid/high-frequency filter inductors, as well as cost-sensitive volume parts such as standard chokes and RFID antennas. Against DL3 at the same nominal μi of 350, MGB1 is positioned for cost efficiency (DL3 leads in thermal-shock and SMD reflow reliability); within the Ni-Mg-Zn / Mg-Zn group, MG2 or the MF grades cut cost further at the expense of loss and temperature behaviour.

Broadband EMI Suppression | Data-Line Bead | Mid/High-Frequency Filter Inductor | Standard Choke

电磁特性 MAGNETIC CHARACTERISTICS

特性 Characteristic	条件 Condition	值 Value	单位 Unit
初始磁导率 μi Initial Permeability	100 kHz & <0.2 mT	350±25%	
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 25 ℃ 100 Hz	380	mT
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 100 ℃ 100 Hz	320	mT
残留磁通密度 Br Remanence	3000 A/m · 25 ℃ 100 Hz	250	mT
残留磁通密度 Br Remanence	3000 A/m · 100 ℃ 100 Hz	180	mT
矫顽力 Hc Coercivity	3000 A/m · 25 ℃ 100 Hz	18	A/m
矫顽力 Hc Coercivity	3000 A/m · 100 ℃ 100 Hz	15	A/m
αμr（温度系数） Temperature coefficient of permeability	20～60 ℃	25	$\times10^{-6}$/K
相对损耗因子 tanδ/μi Relative Loss Factor	0.1 MHz & <0.2 mT	15	$\times10^{-6}$
相对损耗因子 tanδ/μi Relative Loss Factor	2.0 MHz & <0.2 mT	35	$\times10^{-6}$
居里温度 Tc Curie Temp.	100 kHz & <0.2 mT	>200	℃
密度 D Density	阿基米德法 Archimedes method	5.1	g/cm³
电阻率 ρ Volume Resistivity	直流电流 DC Current	10^7	Ω·m

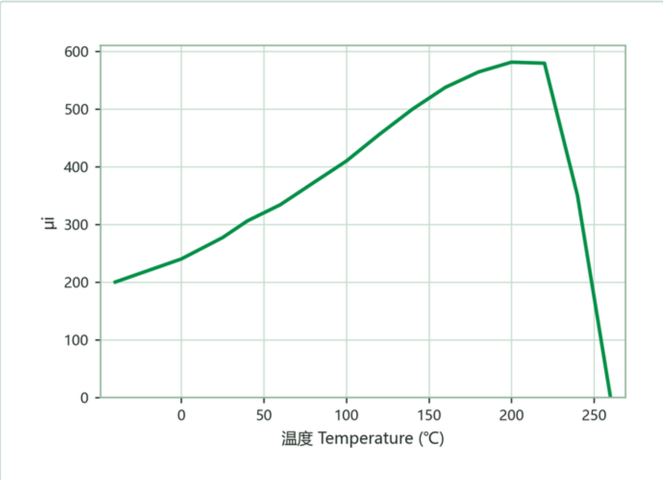
备注：各项数值均为环形磁芯T31×19×8测得的典型数值，由于几何形状和尺寸的影响，产品规格将与这些数据有所差异。

Note: all values are typical data measured on a T31×19×8 toroidal core; actual product specifications will vary with geometry and size.

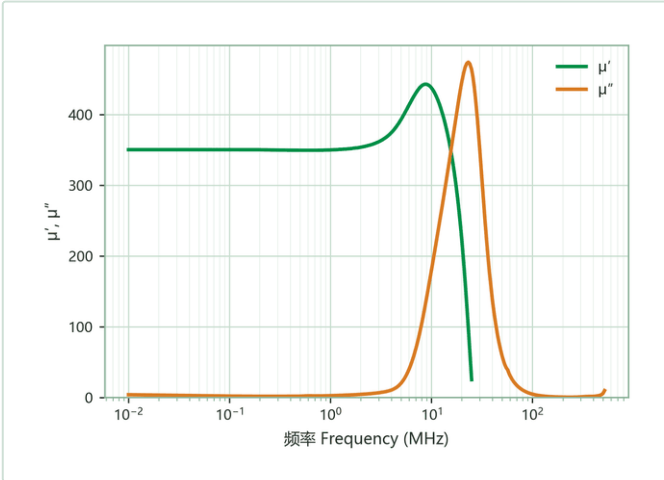
特性曲线详见次页 CHARACTERISTIC CURVES — SEE NEXT PAGE

MGB1

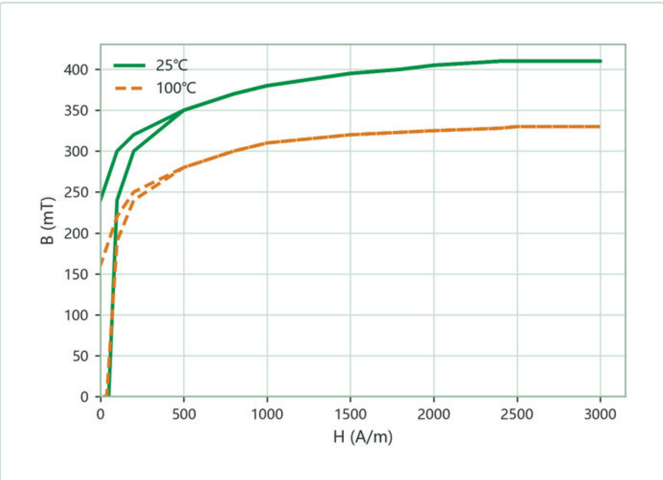
特性曲线
CHARACTERISTIC CURVES



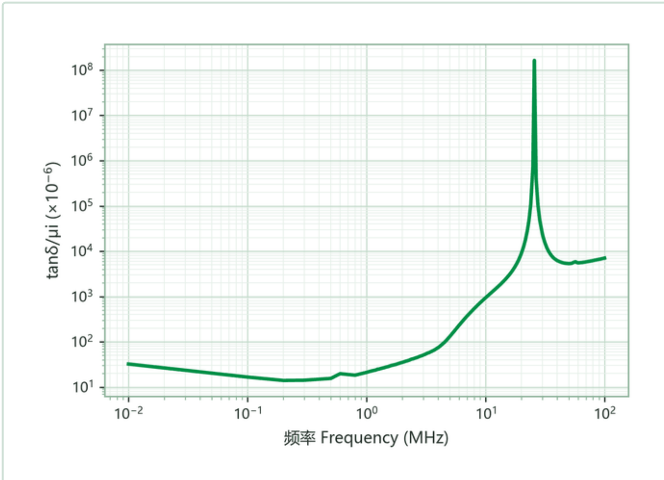
初始磁导率—温度特性
Initial Permeability vs. Temperature



复数磁导率—频率特性
Complex Permeability (μ′, μ″) vs. Frequency



静态磁化曲线
Static Magnetization Curves (B–H)



相对损耗因子—频率特性
Relative Loss Factor (tanδ/μi) vs. Frequency

鐵研 TAK

MG2 镍镁锌材料

NI-MG-ZN MATERIALS

MG2 为镍镁锌铁氧体材料，初始磁导率（μi）约 300，饱和磁通密度（Bs）约 300 mT（25 ℃）/ 190 mT（100 ℃），居里温度高于 150 ℃。本材料是镍镁锌组的常规经济档：特性在低至中频范围平稳，损耗因子约 80×10⁻⁶（0.1 MHz），适合对信号品质要求不苛刻、以成本为先的量产元件。典型应用为一般电感（choke）、低频滤波器、信号线共模滤波器与中低频变压器。与 MGB1（μi 约 350、Bs 380 mT、Tc >200 ℃、损耗低一级）相比，MG2 以特性余裕的收敛换取更低的成本；信号路径或高温场合建议升级 MGB1，纯粹的低成本低功率场合 MG2 即可胜任。

MG2 is a Ni-Mg-Zn ferrite with an initial permeability (μi) of approx. 300, a saturation flux density (Bs) of approx. 300 mT at 25 °C (190 mT at 100 °C) and a Curie temperature above 150 °C. It is the standard economy step of the Ni-Mg-Zn group: characteristics stay steady over the low-to-mid band with a loss factor of about 80×10^{-6} at 0.1 MHz — intended for cost-first volume parts where signal quality demands are modest. Typical uses are standard chokes, low-frequency filters, signal-line common-mode filters and low/mid-frequency transformers. Against MGB1 (μi approx. 350, Bs 380 mT, Tc >200 °C, one class lower in loss), MG2 trades property margin for a lower cost; upgrade to MGB1 for signal paths or hot environments, while MG2 fully serves plain low-cost, low-power duties.

Standard Choke | Low-Frequency Filter | Common-Mode Filter | Low/Mid-Frequency Transformer

电磁特性 MAGNETIC CHARACTERISTICS

特性 Characteristic	条件 Condition	值 Value	单位 Unit
初始磁导率 μi Initial Permeability	100 kHz & <0.2 mT	300±25%	
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 25 ℃ 100 Hz	300	mT
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 100 ℃ 100 Hz	190	mT
残留磁通密度 Br Remanence	3000 A/m · 25 ℃ 100 Hz	175	mT
残留磁通密度 Br Remanence	3000 A/m · 100 ℃ 100 Hz	85	mT
矫顽力 Hc Coercivity	3000 A/m · 25 ℃ 100 Hz	25	A/m
矫顽力 Hc Coercivity	3000 A/m · 100 ℃ 100 Hz	15	A/m
αμr（温度系数）Temperature coefficient of permeability	20～60 ℃	9	$\times10^{-6}$/K
相对损耗因子 tanδ/μi Relative Loss Factor	0.1 MHz & <0.2 mT	80	$\times10^{-6}$
相对损耗因子 tanδ/μi Relative Loss Factor	0.5 MHz & <0.2 mT	70	$\times10^{-6}$
居里温度 Tc Curie Temp.	100 kHz & <0.2 mT	>150	℃
密度 D Density	阿基米德法 Archimedes method	4.85	g/cm^3
电阻率 ρ Volume Resistivity	直流电流 DC Current	10^7	Ω·m

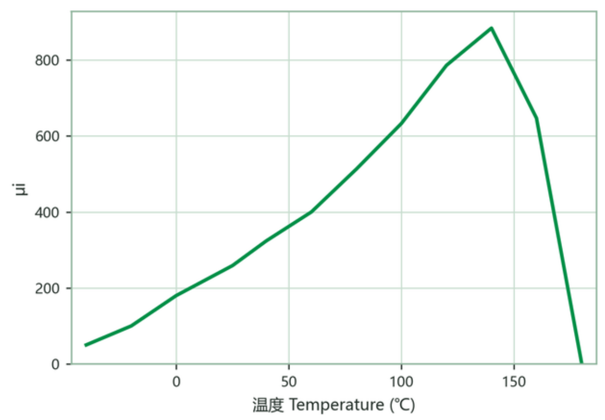
备注：各项数值均为环形磁芯T31×19×8测得的典型数值，由于几何形状和尺寸的影响，产品规格将与这些数据有所差异。

Note: all values are typical data measured on a T31×19×8 toroidal core; actual product specifications will vary with geometry and size.

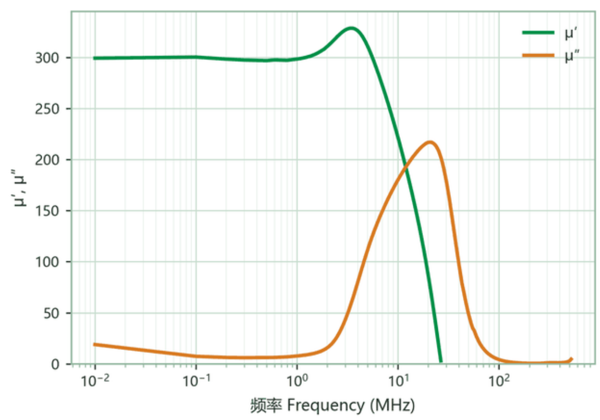
特性曲线详见次页 CHARACTERISTIC CURVES — SEE NEXT PAGE

鐵研 TAK

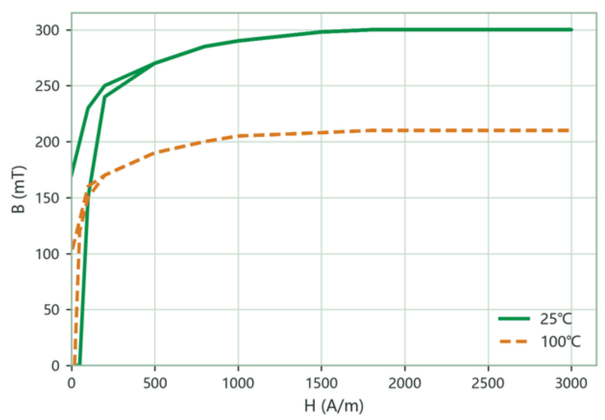
MG2 特性曲线 CHARACTERISTIC CURVES



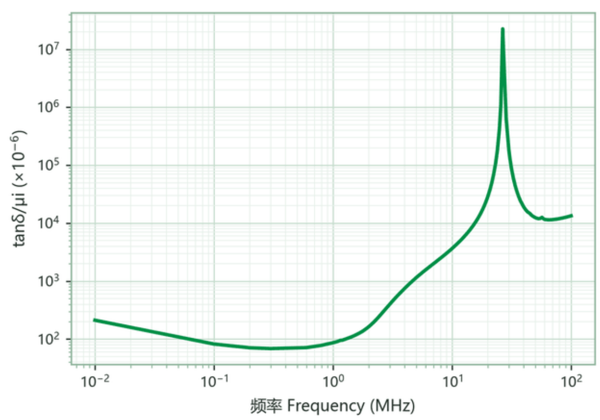
初始磁导率—温度特性
Initial Permeability vs. Temperature



复数磁导率—频率特性
Complex Permeability (μ′, μ″) vs. Frequency



静态磁化曲线
Static Magnetization Curves (B–H)



相对损耗因子—频率特性
Relative Loss Factor (tanδ/μi) vs. Frequency

鐵研 TAK

MF1

镍镁锌材料

NI-MG-ZN MATERIALS

MF1 为镍镁锌铁氧体材料，初始磁导率（μi）约 180，饱和磁通密度（Bs）约 350 mT（25 ℃）/ 185 mT（100 ℃），居里温度高于 210 ℃。低磁导率使其可用频率上限较高，配合高于 210 ℃ 的居里温度，在 MHz 级的 RF / IF 频段维持稳定；Bs 350 mT 亦具备一定的磁通承载。典型应用为 RF / IF 滤波器、谐振电感与高频信号线 EMI 抑制，属于以最低材料成本覆盖高频小信号用途的档位。MF 系编号与磁导率并非依序对应——MF1 是低 μi 高频支、MF2（μi 约 800）才是高磁导低频支、MF3（约 350）居中且损耗最低——选型时请以 μi 与频段对应，勿以编号推测。

MF1 is a Ni-Mg-Zn ferrite with an initial permeability (μi) of approx. 180, a saturation flux density (Bs) of approx. 350 mT at 25 °C (185 mT at 100 °C) and a Curie temperature above 210 °C. The low permeability raises its usable frequency ceiling, and with the Curie point above 210 °C it stays stable in the MHz-range RF/IF bands, while Bs of 350 mT retains a fair flux capability. Typical uses are RF/IF filters, resonant inductors and HF signal-line EMI suppression — the step that covers high-frequency small-signal duties at the lowest material cost. Note that MF numbering does not follow permeability: MF1 is the low-μi high-frequency branch, MF2 (μi approx. 800) is the high-permeability low-frequency branch, and MF3 (approx. 350) sits between with the lowest loss — select by μi and band, not by the numeral.

RF / IF Filter | Resonant Inductor | Signal-Line EMI Suppression

电磁特性 MAGNETIC CHARACTERISTICS

特性 Characteristic	条件 Condition	值 Value	单位 Unit
初始磁导率 μi Initial Permeability	100 kHz & <0.2 mT	180±25%	
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 25 ℃ 100 Hz	350	mT
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 100 ℃ 100 Hz	185	mT
残留磁通密度 Br Remanence	3000 A/m · 25 ℃ 100 Hz	240	mT
残留磁通密度 Br Remanence	3000 A/m · 100 ℃ 100 Hz	85	mT
矫顽力 Hc Coercivity	3000 A/m · 25 ℃ 100 Hz	25	A/m
矫顽力 Hc Coercivity	3000 A/m · 100 ℃ 100 Hz	15	A/m
αμr（温度系数）Temperature coefficient of permeability	20～60 ℃	35	$\times10^{-6}$/K
相对损耗因子 tanδ/μi Relative Loss Factor	0.1 MHz & <0.2 mT	55	$\times10^{-6}$
相对损耗因子 tanδ/μi Relative Loss Factor	0.5 MHz & <0.2 mT	70	$\times10^{-6}$
居里温度 Tc Curie Temp.	100 kHz & <0.2 mT	>210	℃
密度 D Density	阿基米德法 Archimedes method	4.9	g/cm^3
电阻率 ρ Volume Resistivity	直流电流 DC Current	10^7	Ω·m

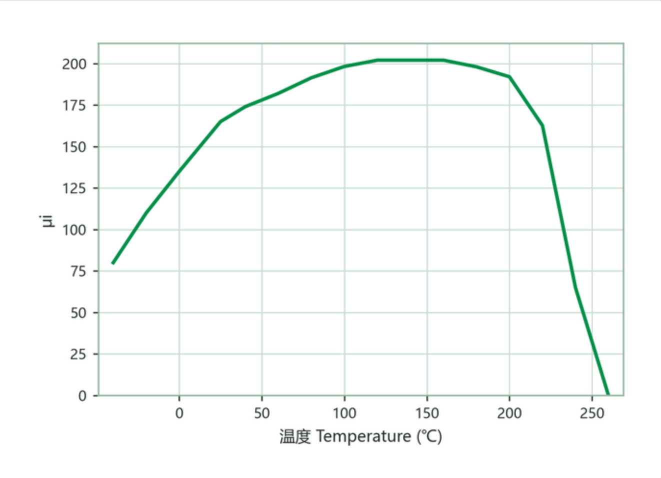
备注：各项数值均为环形磁芯T31×19×8测得的典型数值，由于几何形状和尺寸的影响，产品规格将与这些数据有所差异。

Note: all values are typical data measured on a T31×19×8 toroidal core; actual product specifications will vary with geometry and size.

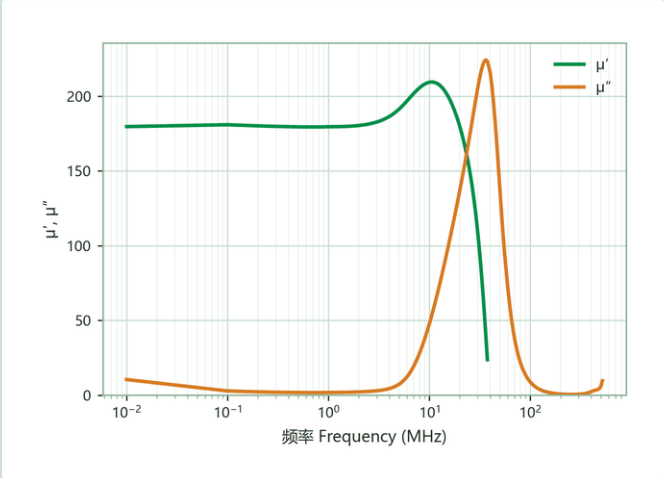
特性曲线详见次页 CHARACTERISTIC CURVES — SEE NEXT PAGE

鐵研 TAK

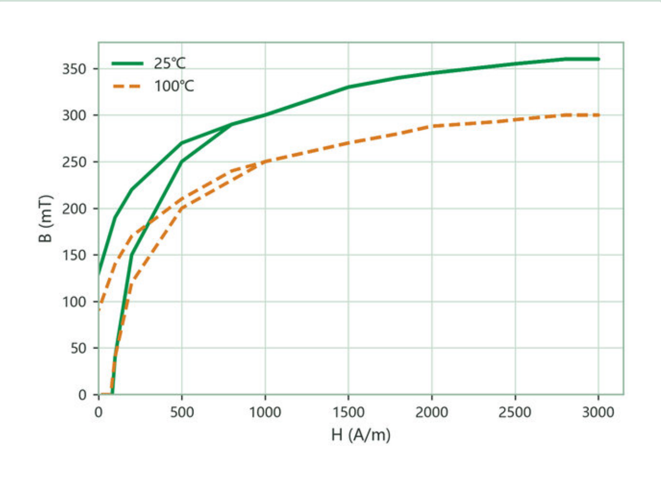
MF1 特性曲线 CHARACTERISTIC CURVES



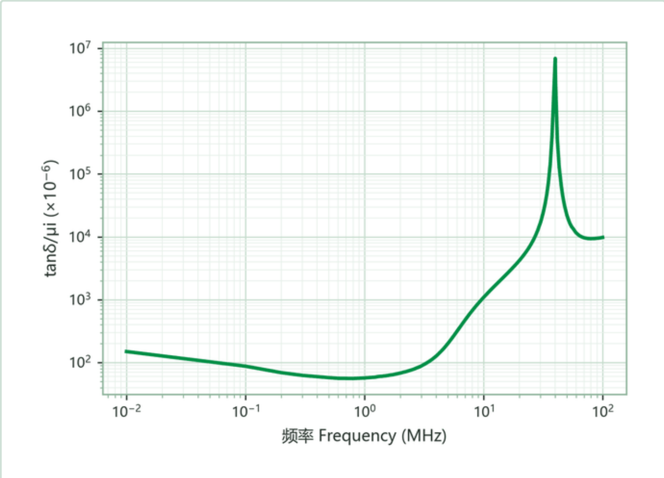
初始磁导率—温度特性
Initial Permeability vs. Temperature



复数磁导率—频率特性
Complex Permeability (μ′, μ″) vs. Frequency



静态磁化曲线
Static Magnetization Curves (B–H)



相对损耗因子—频率特性
Relative Loss Factor (tanδ/μi) vs. Frequency

鐵研 TAK

MF2 镁锌材料 MG-ZN MATERIALS

MF2 为镁锌铁氧体材料（无镍配方），初始磁导率（μi）约 800，饱和磁通密度（Bs）约 270 mT（25 ℃）/ 95 mT（100 ℃），居里温度高于 130 ℃。本材料是镁锌系的高磁导支：在低频段提供与 μi≈800 纯镍锌材同级的阻抗与感量，材料成本则明显较低；矫顽力仅 16 A/m，磁滞损低，损耗因子 25×10⁻⁶（0.1 MHz）/ 50×10⁻⁶（0.5 MHz）。典型应用为电源输入端滤波器、大型共模扼流圈与低频 EMI 抑制。与同标称 μi 800 的 L43 相比，MF2 走经济取向，L43 走 EMI 特性取向（宽频抑制与双夹具阻抗数据）；MF2 于 100 ℃ 时磁通仅余约 95 mT、Tc >130 ℃，高温或带大电流的场合应改选纯镍锌档位。

MF2 is a Mg-Zn ferrite (nickel-free) with an initial permeability (μi) of approx. 800, a saturation flux density (Bs) of approx. 270 mT at 25 °C (95 mT at 100 °C) and a Curie temperature above 130 °C. It is the high-permeability branch of the Mg-Zn line: at low frequencies it delivers impedance and inductance on par with the μi ≈ 800 NiZn grades at a clearly lower material cost; with a coercivity of only 16 A/m, hysteresis loss stays low and the loss factor is 25×10^{-6} at 0.1 MHz / 50×10^{-6} at 0.5 MHz. Typical uses are mains-input filters, large common-mode chokes and low-frequency EMI suppression. Against L43 at the same nominal μi of 800, MF2 is the economy option while L43 is the EMI-characterised option (broadband suppression with dual-fixture impedance data); since only about 95 mT of flux remains at 100 °C and Tc is >130 °C, switch to the NiZn grades for hot or high-current duties.

Mains-Input Filter | Large Common-Mode Choke | Low-Frequency EMI Suppression

电磁特性 MAGNETIC CHARACTERISTICS

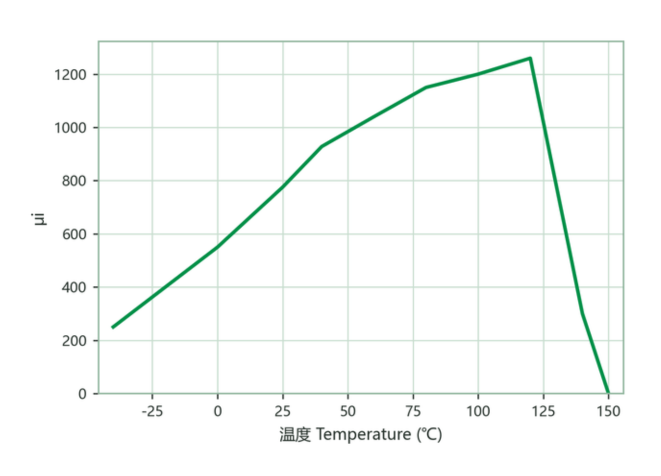
特性 Characteristic	条件 Condition	值 Value	单位 Unit
初始磁导率 μi Initial Permeability	100 kHz & <0.2 mT	800±25%	
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 25 ℃ 100 Hz	270	mT
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 100 ℃ 100 Hz	95	mT
残留磁通密度 Br Remanence	3000 A/m · 25 ℃ 100 Hz	125	mT
残留磁通密度 Br Remanence	3000 A/m · 100 ℃ 100 Hz	8	mT
矫顽力 Hc Coercivity	3000 A/m · 25 ℃ 100 Hz	16	A/m
矫顽力 Hc Coercivity	3000 A/m · 100 ℃ 100 Hz	6	A/m
αμr（温度系数） Temperature coefficient of permeability	20 ~ 60 ℃	15	$\times10^{-6}$/K
相对损耗因子 tanδ/μi Relative Loss Factor	0.1 MHz & <0.2 mT	25	$\times10^{-6}$
相对损耗因子 tanδ/μi Relative Loss Factor	0.5 MHz & <0.2 mT	50	$\times10^{-6}$
居里温度 Tc Curie Temp.	100 kHz & <0.2 mT	>130	℃
密度 D Density	阿基米德法 Archimedes method	4.85	g/cm³
电阻率 ρ Volume Resistivity	直流电流 DC Current	10^7	Ω·m

备注：各项数值均为环形磁芯T31×19×8测得的典型数值，由于几何形状和尺寸的影响，产品规格将与这些数据有所差异。

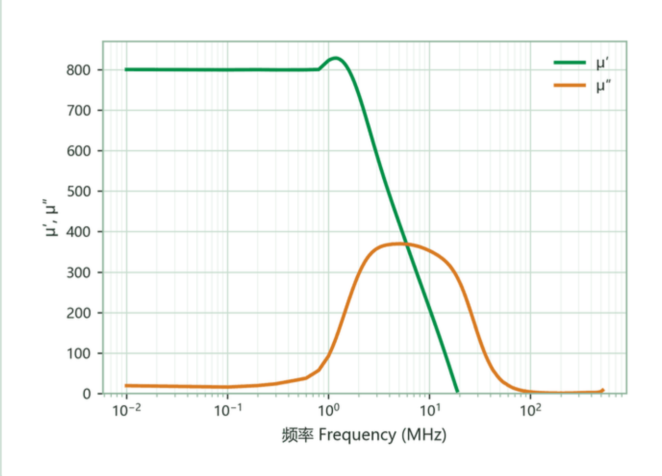
Note: all values are typical data measured on a T31×19×8 toroidal core; actual product specifications will vary with geometry and size.

特性曲线详见次页 CHARACTERISTIC CURVES — SEE NEXT PAGE

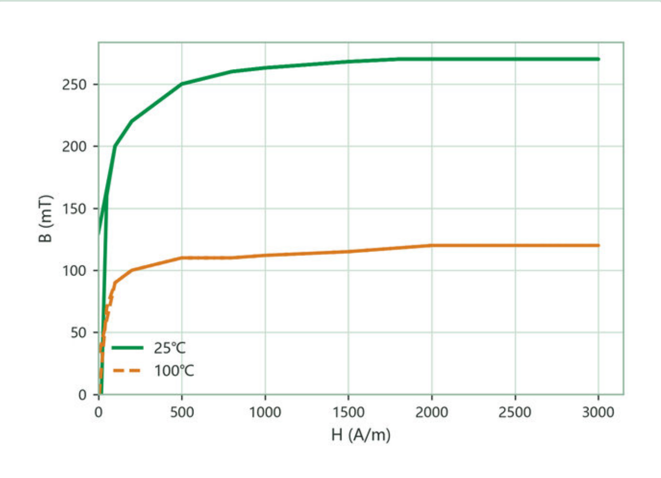
MF2 特性曲线 CHARACTERISTIC CURVES



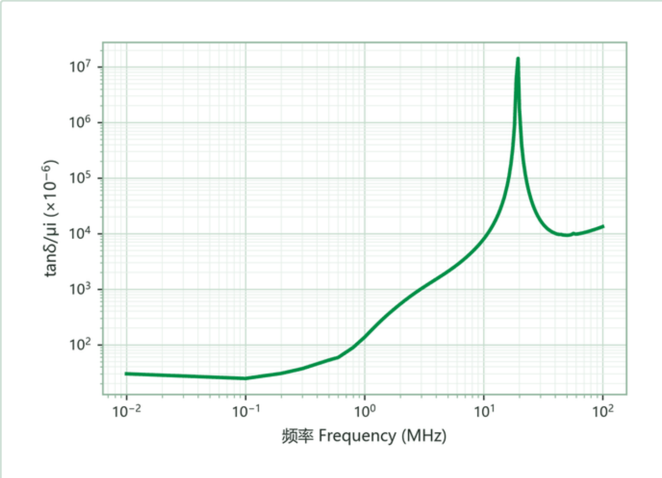
初始磁导率—温度特性
Initial Permeability vs. Temperature



复数磁导率—频率特性
Complex Permeability (μ′, μ″) vs. Frequency



静态磁化曲线
Static Magnetization Curves (B–H)



相对损耗因子—频率特性
Relative Loss Factor (tanδ/μi) vs. Frequency

鐵研 TAK

MF3

镍镁锌材料

NI-MG-ZN MATERIALS

MF3 为镍镁锌铁氧体材料，初始磁导率（μi）约 350，饱和磁通密度（Bs）约 330 mT（25 ℃）/ 230 mT（100 ℃），居里温度高于 160 ℃。本材料是本组的信号级：温度系数约 10×10⁻⁶/K、损耗因子 20×10⁻⁶（0.1 MHz）/ 25×10⁻⁶（1.0 MHz），温度漂移与损耗之低在本组配方中相当突出，可在频率与温度变动下维持稳定的感量与 Q 值。典型应用为 RFID 线圈、低频与高频射频滤波器，以及宽频 EMI 抑制磁环。在 MF 系中，MF3 损耗最低、特性最均衡（MF1 为低 μi 高频支、MF2 为高 μi 低频支）；若需要更高的温度等级，可对照纯镍锌之 DL3 / MGB1（同 μi 350 档）。

MF3 is a Ni-Mg-Zn ferrite with an initial permeability (μi) of approx. 350, a saturation flux density (Bs) of approx. 330 mT at 25 °C (230 mT at 100 °C) and a Curie temperature above 160 °C. It is the signal-grade member of this group: a temperature coefficient of about 10×10^{-6}/K and a loss factor of 20×10^{-6} at 0.1 MHz / 25×10^{-6} at 1.0 MHz — remarkably low drift and loss for this composition class — keep inductance and Q stable against frequency and temperature. Typical uses are RFID coils, LF/HF RF filters and broadband EMI suppression rings. Within the MF line, MF3 has the lowest loss and the most balanced characteristics (MF1 is the low-μi high-frequency branch, MF2 the high-μi low-frequency branch); for a higher temperature class, see the NiZn grades DL3/MGB1 at the same μi ≈ 350 step.

RFID Coil | RF Filter | Broadband Suppression Ring

电磁特性 MAGNETIC CHARACTERISTICS

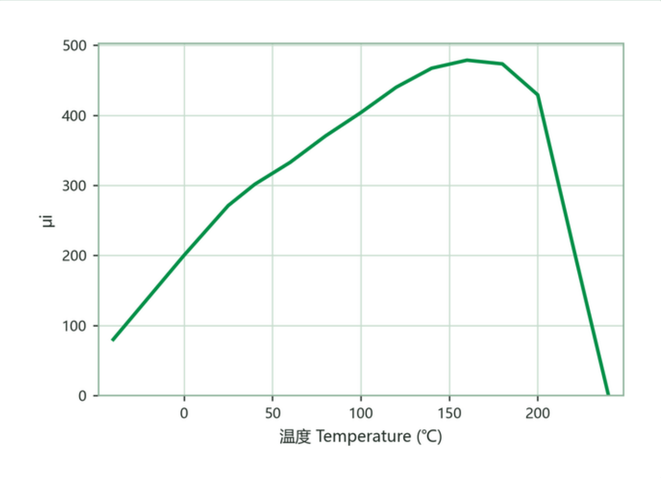
特性 Characteristic	条件 Condition	值 Value	单位 Unit
初始磁导率 μi Initial Permeability	100 kHz & <0.2 mT	350±25%	
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 25 ℃ 100 Hz	330	mT
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 100 ℃ 100 Hz	230	mT
残留磁通密度 Br Remanence	3000 A/m · 25 ℃ 100 Hz	160	mT
残留磁通密度 Br Remanence	3000 A/m · 100 ℃ 100 Hz	120	mT
矫顽力 Hc Coercivity	3000 A/m · 25 ℃ 100 Hz	55	A/m
矫顽力 Hc Coercivity	3000 A/m · 100 ℃ 100 Hz	40	A/m
αμr（温度系数） Temperature coefficient of permeability	20～60 ℃	10	$\times10^{-6}$/K
相对损耗因子 tanδ/μi Relative Loss Factor	0.1 MHz & <0.2 mT	20	$\times10^{-6}$
相对损耗因子 tanδ/μi Relative Loss Factor	1.0 MHz & <0.2 mT	25	$\times10^{-6}$
居里温度 Tc Curie Temp.	100 kHz & <0.2 mT	>160	℃
密度 D Density	阿基米德法 Archimedes method	4.9	g/cm^3
电阻率 ρ Volume Resistivity	直流电流 DC Current	10^7	Ω·m

备注：各项数值均为环形磁芯T31×19×8测得的典型数值，由于几何形状和尺寸的影响，产品规格将与这些数据有所差异。

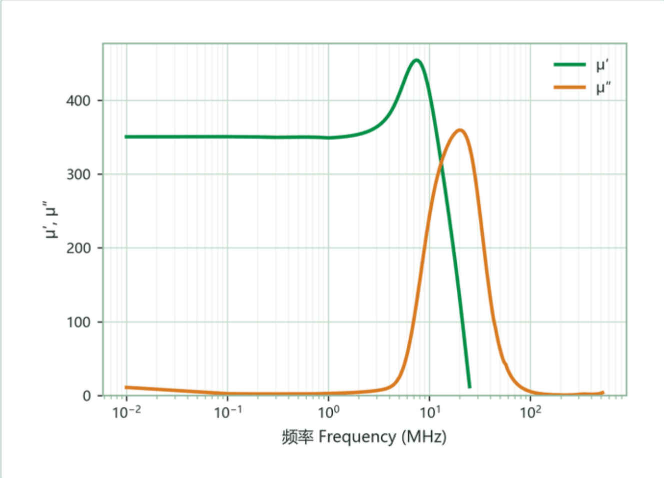
Note: all values are typical data measured on a T31×19×8 toroidal core; actual product specifications will vary with geometry and size.

特性曲线详见次页 CHARACTERISTIC CURVES — SEE NEXT PAGE

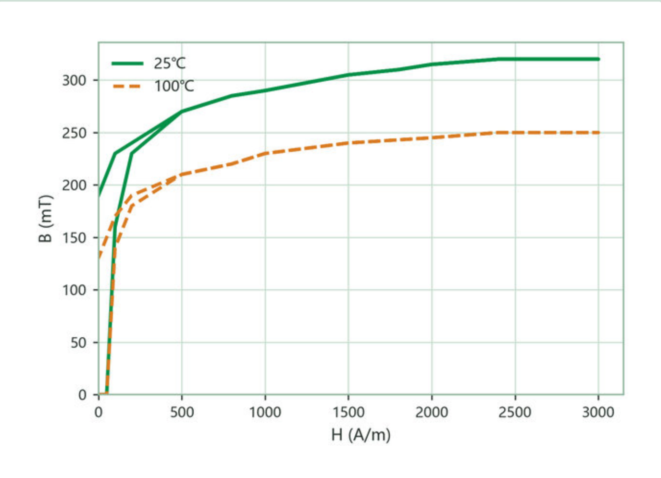
MF3 特性曲线 CHARACTERISTIC CURVES



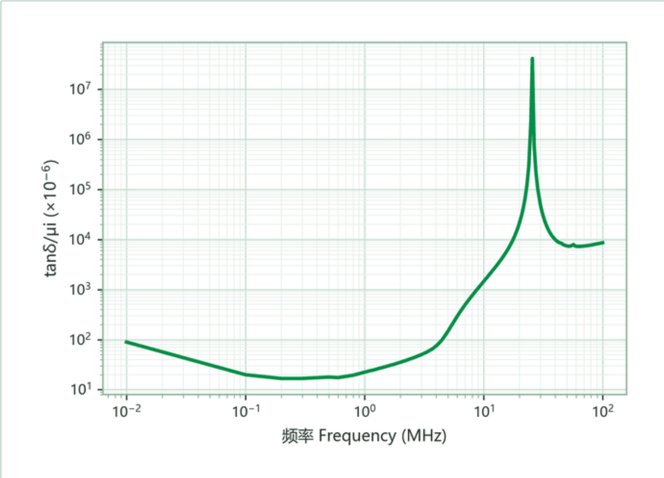
初始磁导率—温度特性
Initial Permeability vs. Temperature



复数磁导率—频率特性
Complex Permeability (μ′, μ″) vs. Frequency



静态磁化曲线
Static Magnetization Curves (B–H)



相对损耗因子—频率特性
Relative Loss Factor (tanδ/μi) vs. Frequency

鐵研 TAK

V4F1 高频稳定材料 HIGH FREQUENCY STABLE MATERIALS

V4F1 为镍锌铁氧体材料，初始磁导率（μi）约 10，饱和磁通密度（Bs）约 150 mT（25 ℃）/ 140 mT（100 ℃），居里温度高于 320 ℃。本材料以极低的磁导率换取极高的频率上限——依 Snoek 极限，μi 越低共振频率越高，V4F1 因此能在 VHF / UHF 频段仍保持感性行为与低插入损耗，是本册高频族的频率端点；居里温度高于 320 ℃、Bs 随温度几乎不变，特性对温度极不敏感。典型应用为 UHF 频段以上的抑制磁珠、超高频 RF 滤波器与高速信号线的共模噪声抑制，亦见于无线充电与医疗电子的高频电路。同族的 V2F1（μi 约 30）名称相近但定位不同——V4F1 的 μi 反而更低、频率上限更高；一般 100 MHz 级以下的滤波与谐振选 V2F1 或 M5E1 即可，V4F1 保留给最高频段。

V4F1 is a NiZn ferrite with an initial permeability (μi) of approx. 10, a saturation flux density (Bs) of approx. 150 mT at 25 °C (140 mT at 100 °C) and a Curie temperature above 320 °C. It trades an extremely low permeability for an extremely high frequency ceiling — by Snoek's law, the lower the μi the higher the resonance frequency — so V4F1 keeps inductive behaviour and low insertion loss into the VHF/UHF range, the frequency end-point of this volume's high-frequency family; with Tc above 320 °C and Bs almost unchanged with temperature, its characteristics are highly temperature-insensitive. Typical uses are suppression beads above the UHF band, ultra-high-frequency RF filters and common-mode noise suppression on high-speed lines, plus HF circuits in wireless charging and medical electronics. Despite the similar name, V2F1 (μi approx. 30) is positioned differently — V4F1's μi is in fact lower and its frequency ceiling higher; for filtering and resonance below the 100 MHz class choose V2F1 or M5E1, reserving V4F1 for the topmost band.

UHF Suppression Bead | VHF / UHF RF Filter | High-Speed Line Choke

电磁特性 MAGNETIC CHARACTERISTICS

特性 Characteristic	条件 Condition	值 Value	单位 Unit
初始磁导率 μi Initial Permeability	100 kHz & <0.2 mT	10±25%	
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 25 ℃ 100 Hz	150	mT
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 100 ℃ 100 Hz	140	mT
残留磁通密度 Br Remanence	3000 A/m · 25 ℃ 100 Hz	95	mT
残留磁通密度 Br Remanence	3000 A/m · 100 ℃ 100 Hz	90	mT
矫顽力 Hc Coercivity	3000 A/m · 25 ℃ 100 Hz	1450	A/m
矫顽力 Hc Coercivity	3000 A/m · 100 ℃ 100 Hz	1400	A/m
αμr（温度系数） Temperature coefficient of permeability	20～60 ℃	40	$\times10^{-6}$/K
相对损耗因子 tanδ/μi Relative Loss Factor	25 MHz & <0.2 mT	600	$\times10^{-6}$
相对损耗因子 tanδ/μi Relative Loss Factor	100 MHz & <0.2 mT	700	$\times10^{-6}$
居里温度 Tc Curie Temp.	100 kHz & <0.2 mT	>320	℃
密度 D Density	阿基米德法 Archimedes method	4.9	g/cm^3
电阻率 ρ Volume Resistivity	直流电流 DC Current	10^7	Ω·m

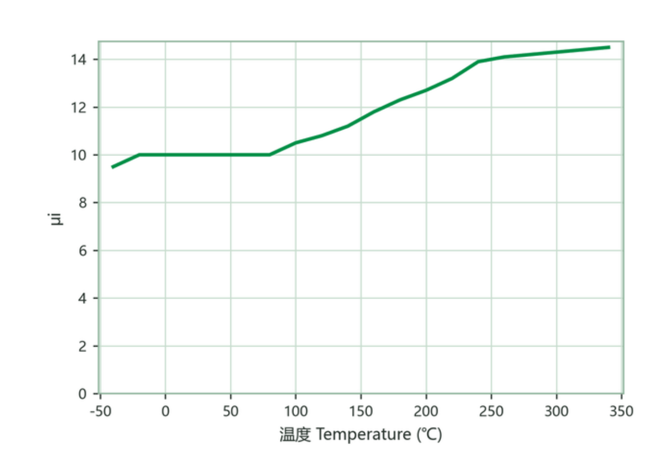
备注：各项数值均为环形磁芯T31×19×8测得的典型数值，由于几何形状和尺寸的影响，产品规格将与这些数据有所差异。

Note: all values are typical data measured on a T31×19×8 toroidal core; actual product specifications will vary with geometry and size.

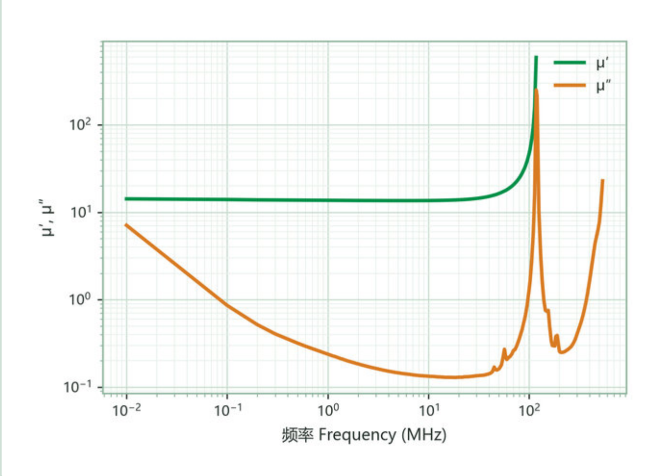
特性曲线详见次页 CHARACTERISTIC CURVES — SEE NEXT PAGE

V4F1 特性曲线 CHARACTERISTIC CURVES

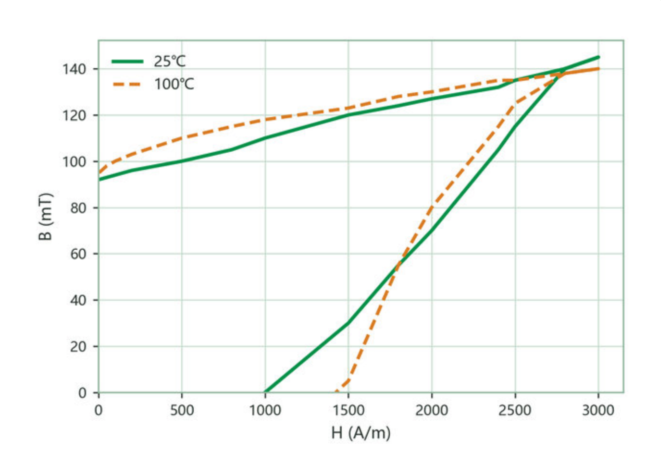
鐵研 TAK



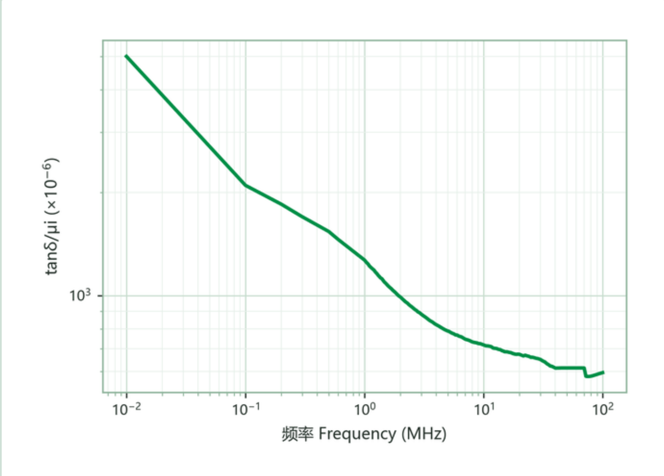
初始磁导率—温度特性
Initial Permeability vs. Temperature



复数磁导率—频率特性
Complex Permeability (μ′, μ″) vs. Frequency



静态磁化曲线
Static Magnetization Curves (B–H)



相对损耗因子—频率特性
Relative Loss Factor (tanδ/μi) vs. Frequency

铁研 TAK

M5E1

高频稳定材料
HIGH FREQUENCY STABLE MATERIALS

M5E1 为镍锌铁氧体材料，初始磁导率（μi）约 15，饱和磁通密度（Bs）约 170 mT（25 ℃）/ 165 mT（100 ℃），居里温度高于 320 ℃。低磁导率把可用频率上限推至百 MHz 级，在 10～130 MHz 频段维持稳定的低损耗与高 Q；温度系数约 10×10⁻⁶/K，配合高于 320 ℃ 的居里温度，频率与温度特性都非常稳定，适合对调谐精度敏感的射频电路。典型应用为 RF 天线匹配电感、宽频 EMI 滤波器与中高频射频变压器。在高频族阶梯（μi 10→250）中，M5E1 介于 V4F1（约 10）与 V2F1（约 30）之间：频率上限略低于 V4F1，但 Q 值与匹配稳定性更佳，是 VHF 频段匹配与滤波的首选档。

M5E1 is a NiZn ferrite with an initial permeability (μi) of approx. 15, a saturation flux density (Bs) of approx. 170 mT at 25 °C (165 mT at 100 °C) and a Curie temperature above 320 °C. The low permeability pushes the usable ceiling to the hundred-MHz class, holding low loss and high Q across 10–130 MHz; with a temperature coefficient of about 10×10^{-6}/K and Tc above 320 °C, both frequency and temperature behaviour are very stable — suited to tuning-sensitive RF circuits. Typical uses are RF antenna-matching inductors, broadband EMI filters and mid/high-frequency RF transformers. In the high-frequency ladder (μi 10 → 250) M5E1 sits between V4F1 (approx. 10) and V2F1 (approx. 30): its ceiling is slightly below V4F1's, but its Q and matching stability are better — the first pick for VHF matching and filtering.

Antenna Matching Inductor | Broadband EMI Filter | HF RF Transformer

电磁特性 MAGNETIC CHARACTERISTICS

特性 Characteristic	条件 Condition	值 Value	单位 Unit
初始磁导率 μi Initial Permeability	100 kHz & <0.2 mT	15±25%	
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 25 ℃ 100 Hz	170	mT
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 100 ℃ 100 Hz	165	mT
残留磁通密度 Br Remanence	3000 A/m · 25 ℃ 100 Hz	110	mT
残留磁通密度 Br Remanence	3000 A/m · 100 ℃ 100 Hz	105	mT
矫顽力 Hc Coercivity	3000 A/m · 25 ℃ 100 Hz	1400	A/m
矫顽力 Hc Coercivity	3000 A/m · 100 ℃ 100 Hz	1380	A/m
αμr（温度系数） Temperature coefficient of permeability	20～60 ℃	10	$\times10^{-6}$/K
相对损耗因子 tanδ/μi Relative Loss Factor	10 MHz & <0.2 mT	400	$\times10^{-6}$
相对损耗因子 tanδ/μi Relative Loss Factor	50 MHz & <0.2 mT	420	$\times10^{-6}$
居里温度 Tc Curie Temp.	100 kHz & <0.2 mT	>320	℃
密度 D Density	阿基米德法 Archimedes method	4.9	g/cm^3
电阻率 ρ Volume Resistivity	直流电流 DC Current	10^7	Ω·m

备注：各项数值均为环形磁芯T31×19×8测得的典型数值，由于几何形状和尺寸的影响，产品规格将与这些数据有所差异。

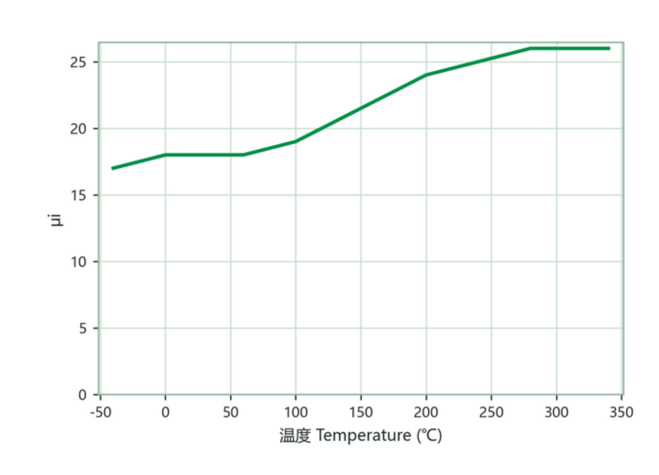
Note: all values are typical data measured on a T31×19×8 toroidal core; actual product specifications will vary with geometry and size.

特性曲线详见次页 CHARACTERISTIC CURVES — SEE NEXT PAGE

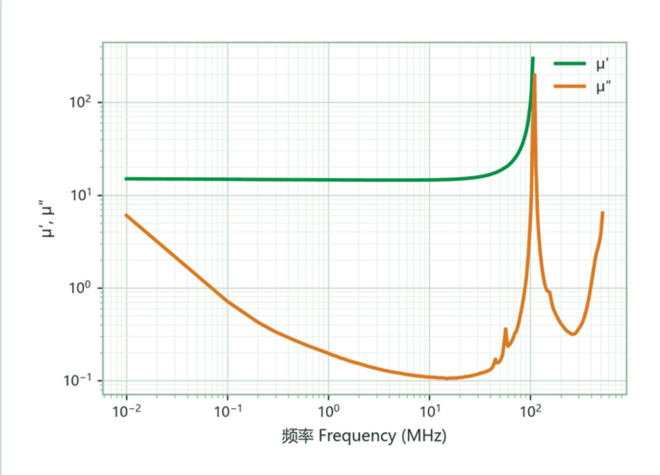
M5E1

特性曲线
CHARACTERISTIC CURVES

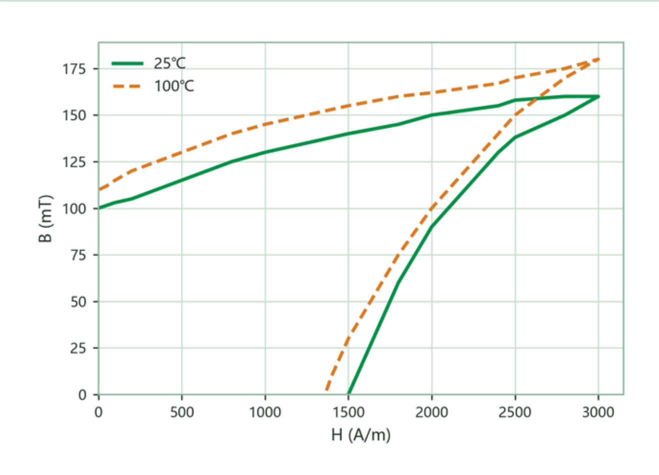
鐵研 TAK



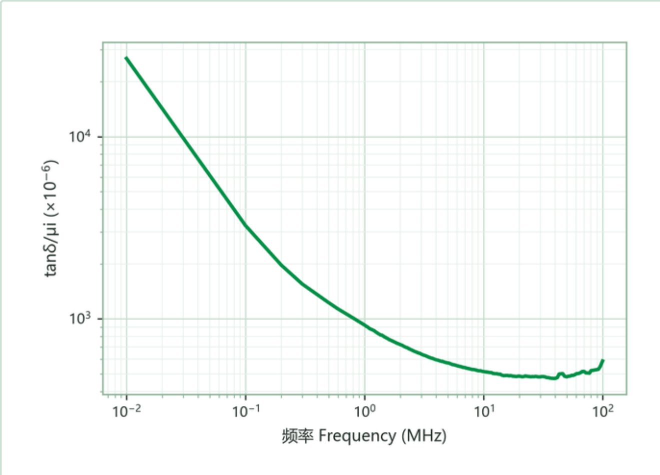
初始磁导率—温度特性
Initial Permeability vs. Temperature



复数磁导率—频率特性
Complex Permeability (µ′, µ″) vs. Frequency



静态磁化曲线
Static Magnetization Curves (B–H)



相对损耗因子—频率特性
Relative Loss Factor (tanδ/µi) vs. Frequency

鐵研 TAK

V2F1

高频稳定材料
HIGH FREQUENCY STABLE MATERIALS

V2F1 为镍锌铁氧体材料，初始磁导率（μi）约 30，饱和磁通密度（Bs）约 310 mT（25 ℃）/ 270 mT（100 ℃），居里温度高于 300 ℃。与同族更低 μi 的档位相比，V2F1 在保住约 90 MHz 频率上限的同时，把饱和磁通拉回 310 mT 的水平——高频电路带有偏置或功率成分时，磁通余裕明显优于 V4F1 / M5E1；居里温度高于 300 ℃，严苛温度下 Q 值稳定。典型应用为 90 MHz 以下的高频滤波器、RF 谐振元件与中频段低损耗射频电感。名称相近的 V4F1（μi 约 10）定位在更高频段——编号与 μi 高低无关，选型以频段与磁通需求为准：需要更高频选 V4F1 / M5E1，需要更高 Q 的中频段选 M9A。

V2F1 is a NiZn ferrite with an initial permeability (μi) of approx. 30, a saturation flux density (Bs) of approx. 310 mT at 25 °C (270 mT at 100 °C) and a Curie temperature above 300 °C. Compared with the lower-μi members of the family, V2F1 keeps a frequency ceiling of about 90 MHz while restoring the saturation flux to the 310 mT level — a clearly better flux margin than V4F1/M5E1 when the HF circuit carries bias or power; the Curie point above 300 °C keeps Q stable under demanding temperatures. Typical uses are HF filters below 90 MHz, RF resonant devices and low-loss mid-band RF inductors. Despite the similar name, V4F1 (μi approx. 10) targets a higher band — the numeral does not order the permeability; select by band and flux need: V4F1 or M5E1 for higher frequencies, M9A for higher-Q mid-band work.

HF Filter | RF Resonant Inductor | RF Power Choke

电磁特性 MAGNETIC CHARACTERISTICS

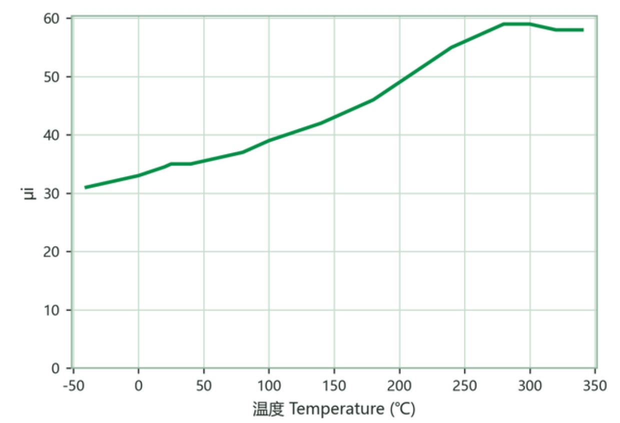
特性 Characteristic	条件 Condition	值 Value	单位 Unit
初始磁导率 μi Initial Permeability	100 kHz & <0.2 mT	30±25%	
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 25 ℃ 100 Hz	310	mT
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 100 ℃ 100 Hz	270	mT
残留磁通密度 Br Remanence	3000 A/m · 25 ℃ 100 Hz	180	mT
残留磁通密度 Br Remanence	3000 A/m · 100 ℃ 100 Hz	160	mT
矫顽力 Hc Coercivity	3000 A/m · 25 ℃ 100 Hz	610	A/m
矫顽力 Hc Coercivity	3000 A/m · 100 ℃ 100 Hz	600	A/m
αμr（温度系数） Temperature coefficient of permeability	20～60 ℃	25	$\times10^{-6}$/K
相对损耗因子 tanδ/μi Relative Loss Factor	10 MHz & <0.2 mT	160	$\times10^{-6}$
相对损耗因子 tanδ/μi Relative Loss Factor	50 MHz & <0.2 mT	270	$\times10^{-6}$
居里温度 Tc Curie Temp.	100 kHz & <0.2 mT	>300	℃
密度 D Density	阿基米德法 Archimedes method	4.9	g/cm^3
电阻率 ρ Volume Resistivity	直流电流 DC Current	10^7	Ω·m

备注：各项数值均为环形磁芯T31×19×8测得的典型数值，由于几何形状和尺寸的影响，产品规格将与这些数据有所差异。

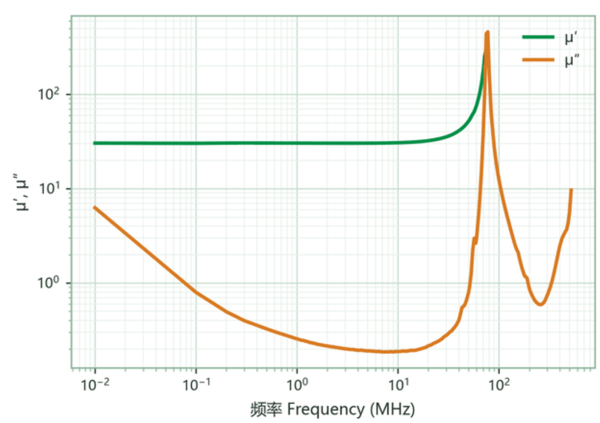
Note: all values are typical data measured on a T31×19×8 toroidal core; actual product specifications will vary with geometry and size.

特性曲线详见次页 CHARACTERISTIC CURVES — SEE NEXT PAGE

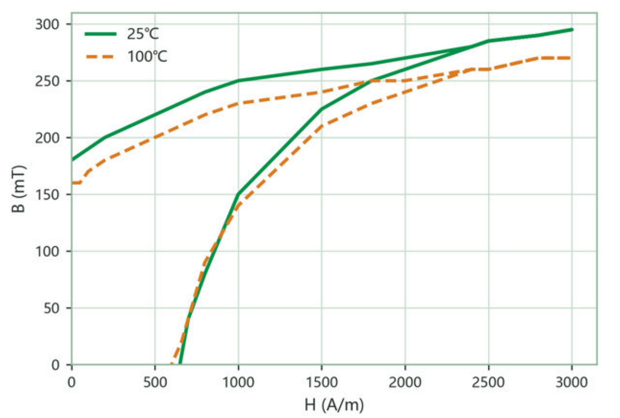
V2F1 特性曲线 CHARACTERISTIC CURVES



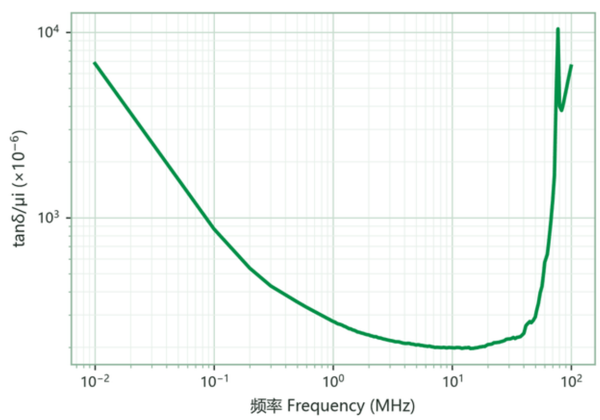
初始磁导率—温度特性
Initial Permeability vs. Temperature



复数磁导率—频率特性
Complex Permeability (μ′, μ″) vs. Frequency



静态磁化曲线
Static Magnetization Curves (B–H)



相对损耗因子—频率特性
Relative Loss Factor (tanδ/μi) vs. Frequency

鐵研 TAK

M9A 高频稳定材料 HIGH FREQUENCY STABLE MATERIALS

M9A 为镍锌铁氧体材料，初始磁导率（μi）约 50，饱和磁通密度（Bs）约 340 mT（25 ℃）/ 300 mT（100 ℃），居里温度高于 300 ℃。本材料在 5～50 MHz 频段展现优异 Q 值（损耗因子 100×10⁻⁶ @5 MHz / 120×10⁻⁶ @20 MHz），且 Bs 达 340 mT、100 ℃ 仍有 300 mT——在高频族中属于少数兼顾“高 Q”与“磁通承载”的档位，适合需要承受功率的射频磁性元件。典型应用为短波与中频 RF 滤波器、功率级射频扼流圈与调谐电感。阶梯位置在 V2F1（μi 约 30）与 M61（约 100）之间：频率上限较 V2F1 低、较 M61 高，功率承载与 Q 的均衡使其成为 HF 频段功率射频的主力档。

M9A is a NiZn ferrite with an initial permeability (μi) of approx. 50, a saturation flux density (Bs) of approx. 340 mT at 25 °C (300 mT at 100 °C) and a Curie temperature above 300 °C. It shows excellent Q across 5–50 MHz (loss factor 100×10^{-6} at 5 MHz / 120×10^{-6} at 20 MHz) while keeping Bs at 340 mT with 300 mT still available at 100 °C — one of the few high-frequency grades combining high Q with real flux capability, suited to RF magnetics that must carry power. Typical uses are shortwave/mid-frequency RF filters, power-stage RF chokes and tuning inductors. In the ladder it sits between V2F1 (μi approx. 30) and M61 (approx. 100): a lower ceiling than V2F1 but higher than M61, and its balance of power handling and Q makes it the workhorse for HF power RF.

Shortwave RF Filter | RF Power Choke | Tuning Inductor

电磁特性 MAGNETIC CHARACTERISTICS

特性 Characteristic	条件 Condition	值 Value	单位 Unit
初始磁导率 μi Initial Permeability	100 kHz & <0.2 mT	50±25%	
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 25 ℃ 100 Hz	340	mT
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 100 ℃ 100 Hz	300	mT
残留磁通密度 Br Remanence	3000 A/m · 25 ℃ 100 Hz	230	mT
残留磁通密度 Br Remanence	3000 A/m · 100 ℃ 100 Hz	190	mT
矫顽力 Hc Coercivity	3000 A/m · 25 ℃ 100 Hz	590	A/m
矫顽力 Hc Coercivity	3000 A/m · 100 ℃ 100 Hz	580	A/m
αμr（温度系数）Temperature coefficient of permeability	20～60 ℃	60	$\times10^{-6}$/K
相对损耗因子 tanδ/μi Relative Loss Factor	5.0 MHz & <0.2 mT	100	$\times10^{-6}$
相对损耗因子 tanδ/μi Relative Loss Factor	20 MHz & <0.2 mT	120	$\times10^{-6}$
居里温度 Tc Curie Temp.	100 kHz & <0.2 mT	>300	℃
密度 D Density	阿基米德法 Archimedes method	4.9	g/cm^3
电阻率 ρ Volume Resistivity	直流电流 DC Current	10^7	Ω·m

备注：各项数值均为环形磁芯T31×19×8测得的典型数值，由于几何形状和尺寸的影响，产品规格将与这些数据有所差异。

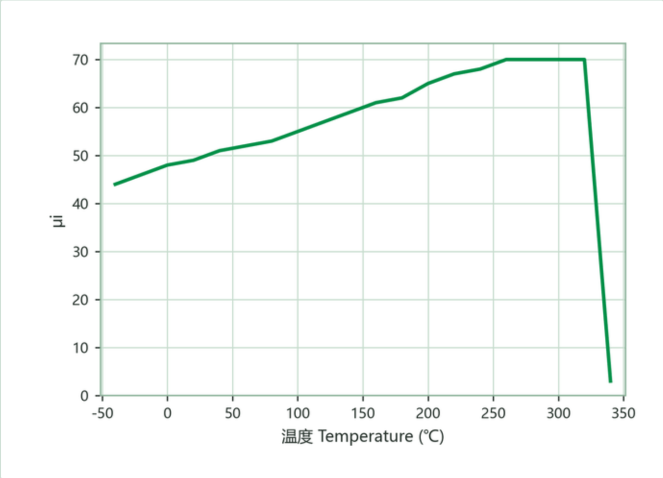
Note: all values are typical data measured on a T31×19×8 toroidal core; actual product specifications will vary with geometry and size.

特性曲线详见次页 CHARACTERISTIC CURVES — SEE NEXT PAGE

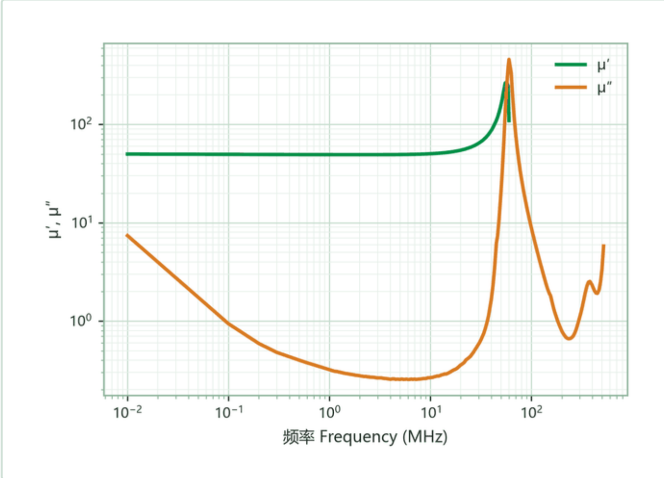
鐵研 TAK

M9A

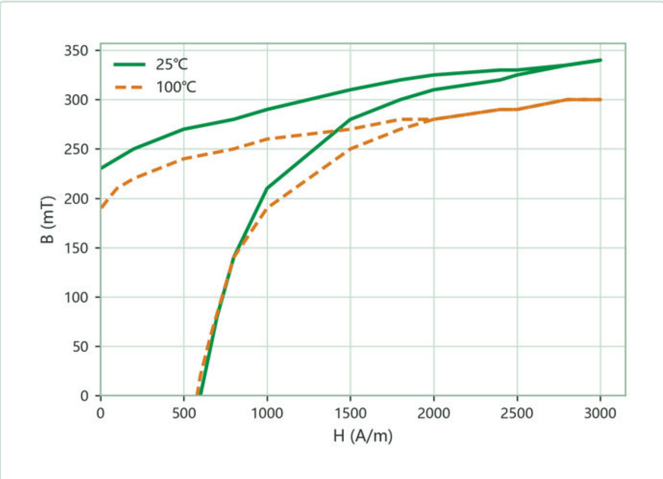
特性曲线
CHARACTERISTIC CURVES



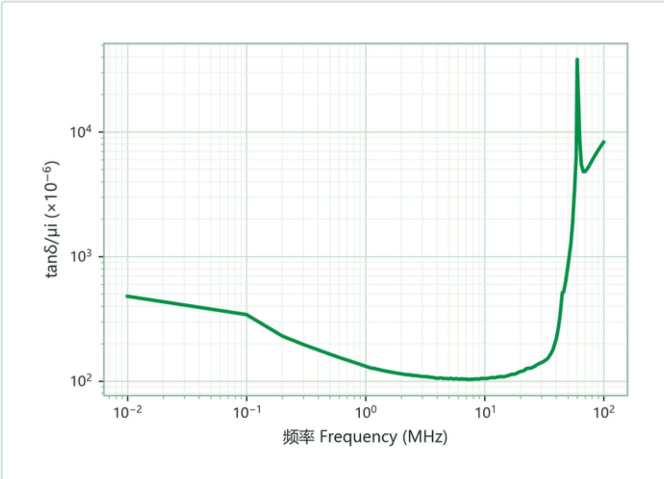
初始磁导率—温度特性
Initial Permeability vs. Temperature



复数磁导率—频率特性
Complex Permeability (μ′, μ″) vs. Frequency



静态磁化曲线
Static Magnetization Curves (B–H)



相对损耗因子—频率特性
Relative Loss Factor (tanδ/μi) vs. Frequency

鐵研 TAK

M61

高频稳定材料
HIGH FREQUENCY STABLE MATERIALS

M61 为镍锌铁氧体材料，初始磁导率（μi）约 100，饱和磁通密度（Bs）约 340 mT（25 ℃）/ 280 mT（100 ℃），居里温度高于 300 ℃。本材料的最大特点是温度稳定性：温度系数约 -2×10^{-6}/K、几乎为零，配合高于 300 ℃ 的居里温度，感量与阻抗在宽温域内几乎不漂移；20 MHz 以下维持低损耗。作为 EMI 抑制材料，其标准化阻抗以 RH5×1.5×10 磁珠实测（曲线见次页）。典型应用为中频电感、EMI 共模扼流圈与功率射频模块的滤波元件，磁珠型 EMI 抑制亦适用。与名称相近的 M61H 同为 μi≈100：M61 以近零温度漂移见长，M61H（Bs 约 420 mT）以功率承载见长——温度稳定选 M61、大电流选 M61H。

M61 is a NiZn ferrite with an initial permeability (μi) of approx. 100, a saturation flux density (Bs) of approx. 340 mT at 25 °C (280 mT at 100 °C) and a Curie temperature above 300 °C. Its signature is temperature stability: a temperature coefficient of about -2×10^{-6}/K — essentially zero — together with the >300 °C Curie point keeps inductance and impedance nearly drift-free over a wide temperature span, while losses stay low below 20 MHz. As an EMI-suppression material its normalized impedance is measured on an RH5×1.5×10 bead (curve on the next page). Typical uses are mid-frequency inductors, EMI common-mode chokes and filter elements in RF power modules, as well as bead-type EMI suppression. M61H shares the same μi ≈ 100 despite the similar name: M61 leads in near-zero drift, M61H (Bs approx. 420 mT) in power capability — pick M61 for temperature stability, M61H for high current.

Mid-Frequency Inductor | EMI Common-Mode Choke | RF Power Filter | EMI Suppression Bead

电磁特性 MAGNETIC CHARACTERISTICS

特性 Characteristic	条件 Condition	值 Value	单位 Unit
初始磁导率 μi Initial Permeability	100 kHz & <0.2 mT	100±25%	
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 25 ℃ 100 Hz	340	mT
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 100 ℃ 100 Hz	280	mT
残留磁通密度 Br Remanence	3000 A/m · 25 ℃ 100 Hz	220	mT
残留磁通密度 Br Remanence	3000 A/m · 100 ℃ 100 Hz	180	mT
矫顽力 Hc Coercivity	3000 A/m · 25 ℃ 100 Hz	400	A/m
矫顽力 Hc Coercivity	3000 A/m · 100 ℃ 100 Hz	200	A/m
αμr（温度系数）Temperature coefficient of permeability	20～60 ℃	-2	$\times10^{-6}$/K
相对损耗因子 tanδ/μi Relative Loss Factor	1.0 MHz & <0.2 mT	80	$\times10^{-6}$
相对损耗因子 tanδ/μi Relative Loss Factor	5.0 MHz & <0.2 mT	100	$\times10^{-6}$
居里温度 Tc Curie Temp.	100 kHz & <0.2 mT	>300	℃
密度 D Density	阿基米德法 Archimedes method	4.9	g/cm^3
电阻率 ρ Volume Resistivity	直流电流 DC Current	10^7	Ω·m

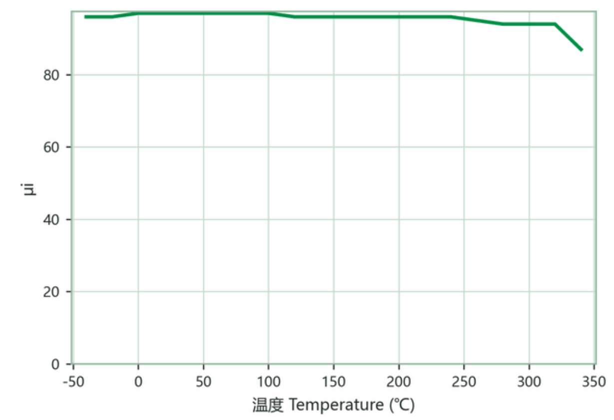
备注：各项数值均为环形磁芯T31×19×8测得的典型数值，由于几何形状和尺寸的影响，产品规格将与这些数据有所差异。

Note: all values are typical data measured on a T31×19×8 toroidal core; actual product specifications will vary with geometry and size.

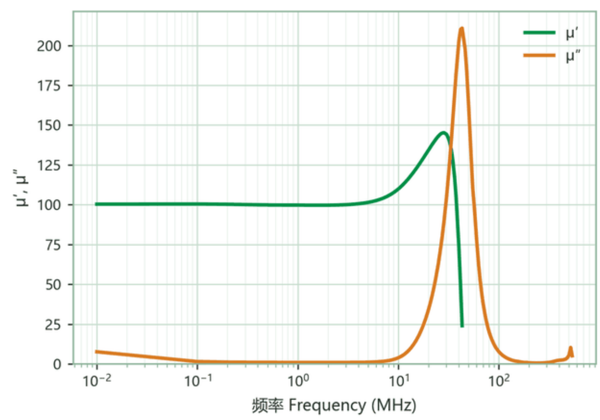
特性曲线详见次页 CHARACTERISTIC CURVES — SEE NEXT PAGE

鐵研 TAK

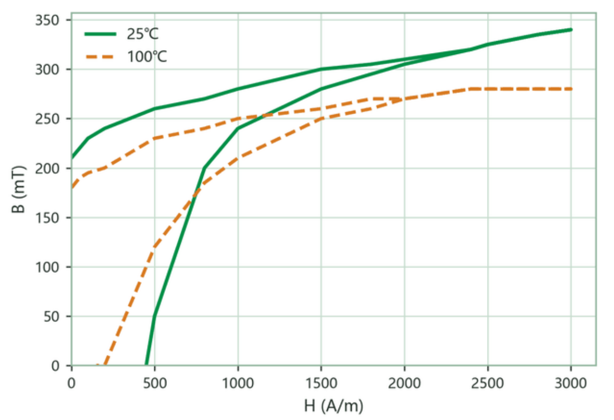
M61 特性曲线 CHARACTERISTIC CURVES



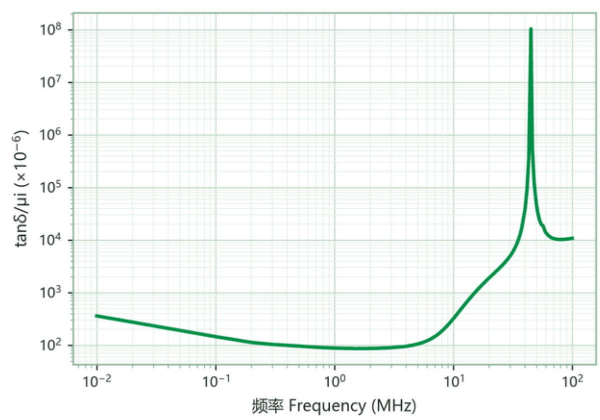
初始磁导率—温度特性
Initial Permeability vs. Temperature



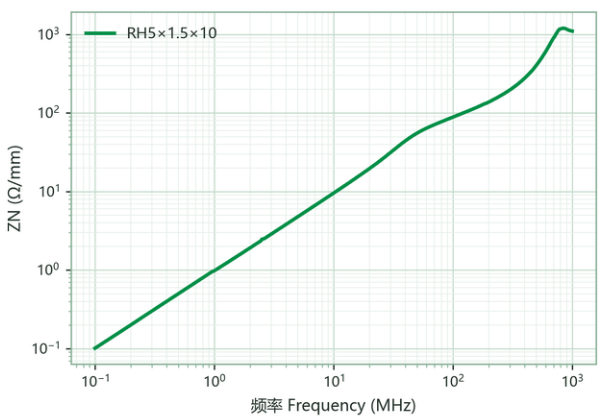
复数磁导率—频率特性
Complex Permeability (μ′, μ″) vs. Frequency



静态磁化曲线
Static Magnetization Curves (B–H)



相对损耗因子—频率特性
Relative Loss Factor (tanδ/μi) vs. Frequency



标准化阻抗—频率特性（Φ0.5 mm 漆包线 100 mm · 单圈测量）
Normalized Impedance ZN vs. Frequency (single turn of Φ0.5 mm wire, 100 mm long)

鐵研 TAK

M61H 高频稳定材料 HIGH FREQUENCY STABLE MATERIALS

M61H 为镍锌铁氧体材料，初始磁导率（μi）约 100，饱和磁通密度（Bs）约 420 mT（25 ℃）/ 370 mT（100 ℃），居里温度高于 280 ℃。与 M61 同一磁导率档位，但把饱和磁通推到 420 mT、100 ℃ 仍保有 370 mT——高频电感在大电流偏置下的磁通余裕因此大幅增加；损耗因子 50×10^{-6}（1.0 / 5.0 MHz）维持低位，功率条件下的损耗表现同样出色。典型应用为大电流高频电感、无线充电线圈与耐高温的射频功率滤波器。与 M61 的分工：M61 温度系数近零（约 -2×10^{-6}/K），适合对感量漂移敏感的滤波与调谐；M61H 以稍高的温度系数（约 15×10^{-6}/K）与略低的居里温度（>280 ℃ 对 >300 ℃），换取全族最高一级的磁通承载——带功率的场合选 M61H。

M61H is a NiZn ferrite with an initial permeability (μi) of approx. 100, a saturation flux density (Bs) of approx. 420 mT at 25 °C (370 mT at 100 °C) and a Curie temperature above 280 °C. It shares M61's permeability step but pushes the saturation flux to 420 mT with 370 mT retained at 100 °C — greatly enlarging the flux margin of HF inductors under heavy DC bias; the loss factor stays low at 50×10^{-6} (1.0 and 5.0 MHz), so loss behaviour under power is equally strong. Typical uses are high-current HF inductors, wireless-charging coils and high-temperature RF power filters. Division of labour with M61: M61's near-zero temperature coefficient (approx. -2×10^{-6}/K) suits drift-sensitive filtering and tuning; M61H accepts a slightly higher coefficient (approx. 15×10^{-6}/K) and a slightly lower Curie point (>280 °C vs >300 °C) in exchange for the family's highest flux capability — choose M61H wherever power flows.

High-Current HF Inductor | Wireless Charging Coil | RF Power Filter

电磁特性 MAGNETIC CHARACTERISTICS

特性 Characteristic	条件 Condition	值 Value	单位 Unit
初始磁导率 μi Initial Permeability	100 kHz & <0.2 mT	100±25%	
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 25 ℃ 100 Hz	420	mT
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 100 ℃ 100 Hz	370	mT
残留磁通密度 Br Remanence	3000 A/m · 25 ℃ 100 Hz	255	mT
残留磁通密度 Br Remanence	3000 A/m · 100 ℃ 100 Hz	195	mT
矫顽力 Hc Coercivity	3000 A/m · 25 ℃ 100 Hz	105	A/m
矫顽力 Hc Coercivity	3000 A/m · 100 ℃ 100 Hz	95	A/m
αμr（温度系数） Temperature coefficient of permeability	20 ~ 60 ℃	15	$\times10^{-6}$/K
相对损耗因子 tanδ/μi Relative Loss Factor	1.0 MHz & <0.2 mT	50	$\times10^{-6}$
相对损耗因子 tanδ/μi Relative Loss Factor	5.0 MHz & <0.2 mT	50	$\times10^{-6}$
居里温度 Tc Curie Temp.	100 kHz & <0.2 mT	>280	℃
密度 D Density	阿基米德法 Archimedes method	5.0	g/cm^3
电阻率 ρ Volume Resistivity	直流电流 DC Current	10^7	Ω·m

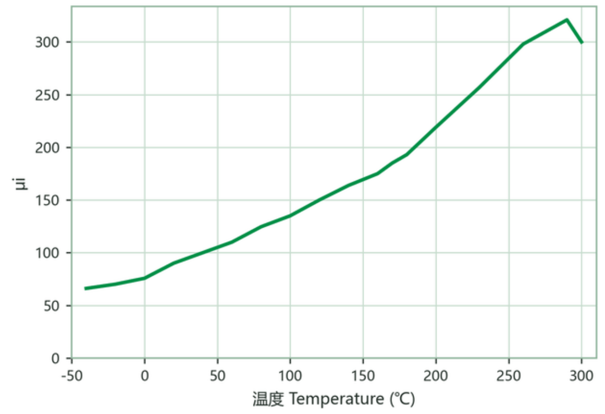
备注：各项数值均为环形磁芯T31×19×8测得的典型数值，由于几何形状和尺寸的影响，产品规格将与这些数据有所差异。

Note: all values are typical data measured on a T31×19×8 toroidal core; actual product specifications will vary with geometry and size.

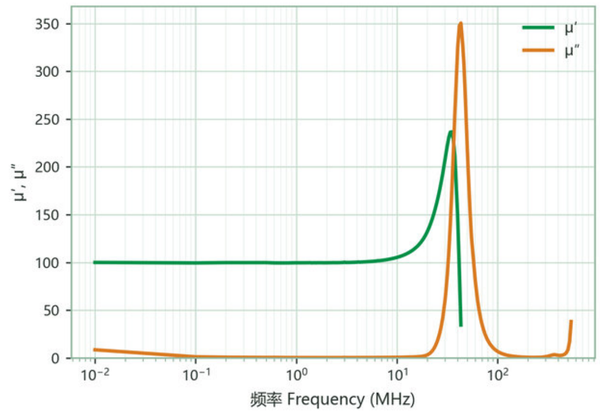
特性曲线详见次页 CHARACTERISTIC CURVES — SEE NEXT PAGE

M61H

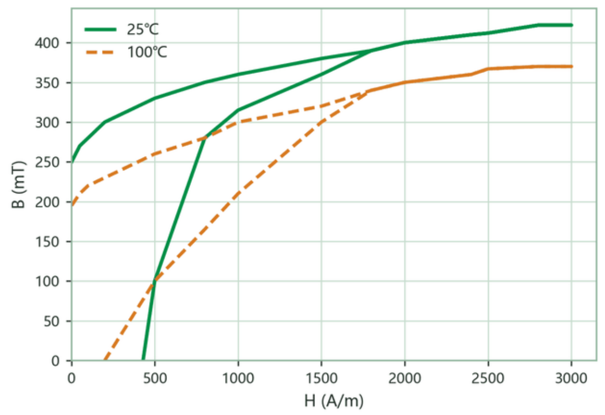
特性曲线
CHARACTERISTIC CURVES



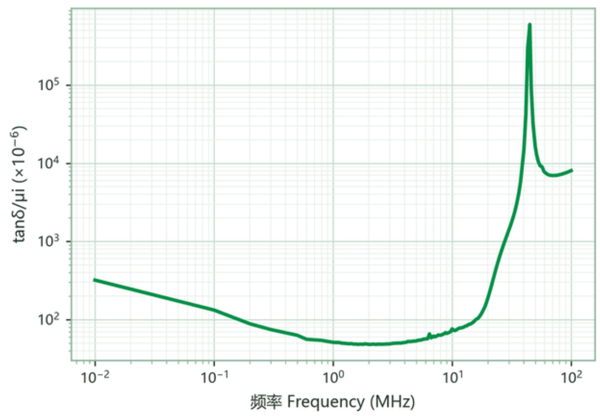
初始磁导率—温度特性
Initial Permeability vs. Temperature



复数磁导率—频率特性
Complex Permeability (μ′, μ″) vs. Frequency



静态磁化曲线
Static Magnetization Curves (B–H)



相对损耗因子—频率特性
Relative Loss Factor (tanδ/μi) vs. Frequency

鐵研 TAK

M63 高频稳定材料

HIGH FREQUENCY STABLE MATERIALS

M63 为镍锌铁氧体材料，初始磁导率（μi）约 180，饱和磁通密度（Bs）约 365 mT（25 ℃）/ 290 mT（100 ℃），居里温度高于 300 ℃。在中高磁导率下仍保持低损耗（损耗因子 50×10⁻⁶ @0.5 MHz / 80×10⁻⁶ @5.0 MHz），且 Bs 365 mT、Tc 高于 300 ℃——磁导率、损耗、磁通与耐温四者的均衡使其成为中低频至 HF 功率电感的通用主力。作为 EMI 抑制材料，其标准化阻抗以 RH5×1.5×10 磁珠实测（曲线见次页）。典型应用为中低频至高频功率电感、射频滤波器与工业电子的能量传输模块。阶梯位置在 M61（μi 约 100）与 Q1C1（约 250）之间：需要更高频率上限选 M61，需要更高感量密度选 Q1C1（其居里温度较低，>140 ℃）。

M63 is a NiZn ferrite with an initial permeability (μi) of approx. 180, a saturation flux density (Bs) of approx. 365 mT at 25 °C (290 mT at 100 °C) and a Curie temperature above 300 °C. It keeps losses low at a mid-high permeability (loss factor 50×10^{-6} at 0.5 MHz / 80×10^{-6} at 5.0 MHz) while holding Bs at 365 mT and Tc above 300 °C — a balance of permeability, loss, flux and temperature that makes it the general-purpose workhorse for low/mid-to-HF power inductors. As an EMI-suppression material its normalized impedance is measured on an RH5×1.5×10 bead (curve on the next page). Typical uses are low/mid-to-high-frequency power inductors, RF filters and energy-transfer modules in industrial electronics. In the ladder it sits between M61 (μi approx. 100) and Q1C1 (approx. 250): go to M61 for a higher frequency ceiling, to Q1C1 for higher inductance density (at a lower Curie temperature, >140 °C).

HF Power Inductor | RF Filter | EMI Suppression Bead | Energy-Transfer Module

电磁特性 MAGNETIC CHARACTERISTICS

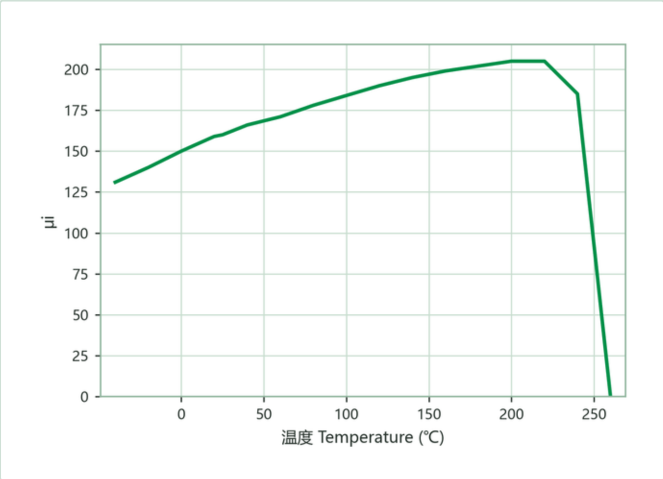
特性 Characteristic	条件 Condition	值 Value	单位 Unit
初始磁导率 μi Initial Permeability	100 kHz & <0.2 mT	180±25%	
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 25 ℃ 100 Hz	365	mT
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 100 ℃ 100 Hz	290	mT
残留磁通密度 Br Remanence	3000 A/m · 25 ℃ 100 Hz	240	mT
残留磁通密度 Br Remanence	3000 A/m · 100 ℃ 100 Hz	190	mT
矫顽力 Hc Coercivity	3000 A/m · 25 ℃ 100 Hz	200	A/m
矫顽力 Hc Coercivity	3000 A/m · 100 ℃ 100 Hz	150	A/m
αμr（温度系数）Temperature coefficient of permeability	20～60 ℃	10	$\times10^{-6}$/K
相对损耗因子 tanδ/μi Relative Loss Factor	0.5 MHz & <0.2 mT	50	$\times10^{-6}$
相对损耗因子 tanδ/μi Relative Loss Factor	5.0 MHz & <0.2 mT	80	$\times10^{-6}$
居里温度 Tc Curie Temp.	100 kHz & <0.2 mT	>300	℃
密度 D Density	阿基米德法 Archimedes method	4.9	g/cm³
电阻率 ρ Volume Resistivity	直流电流 DC Current	10^7	Ω·m

备注：各项数值均为环形磁芯T31×19×8测得的典型数值，由于几何形状和尺寸的影响，产品规格将与这些数据有所差异。

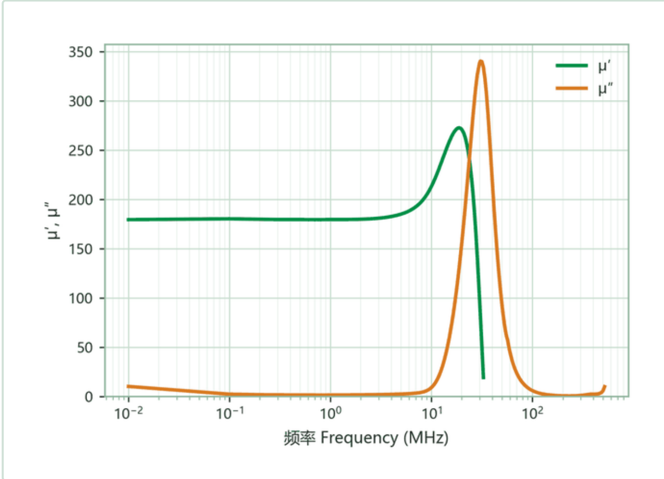
Note: all values are typical data measured on a T31×19×8 toroidal core; actual product specifications will vary with geometry and size.

特性曲线详见次页 CHARACTERISTIC CURVES — SEE NEXT PAGE

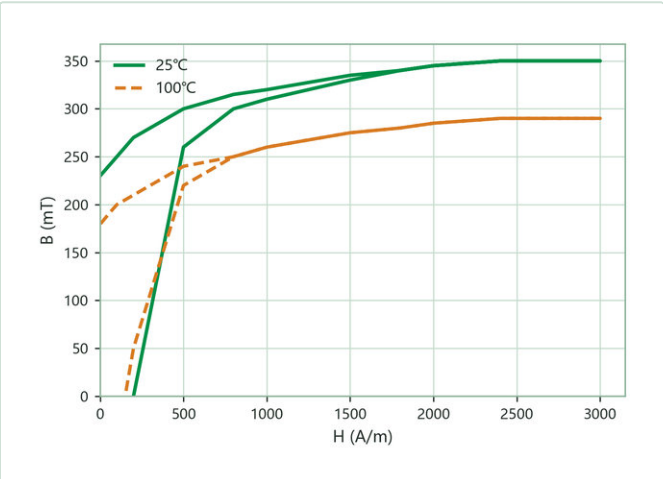
M63 特性曲线 CHARACTERISTIC CURVES



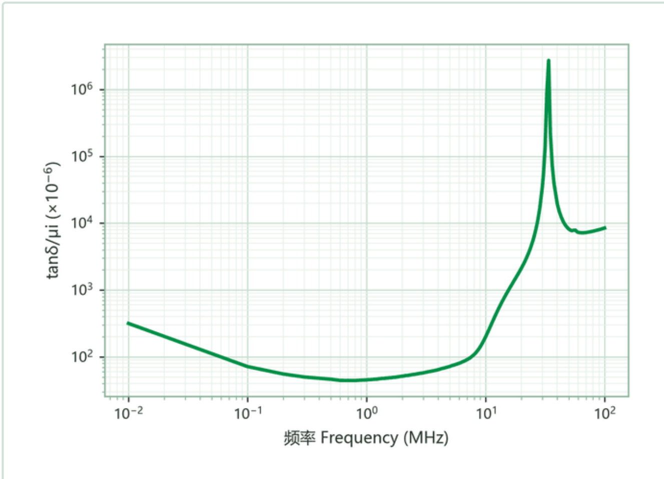
初始磁导率—温度特性
Initial Permeability vs. Temperature



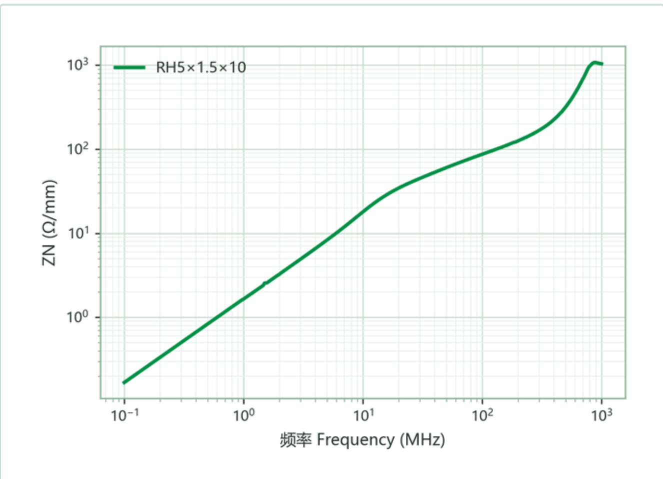
复数磁导率—频率特性
Complex Permeability (μ′, μ″) vs. Frequency



静态磁化曲线
Static Magnetization Curves (B–H)



相对损耗因子—频率特性
Relative Loss Factor (tanδ/μi) vs. Frequency



标准化阻抗—频率特性（Φ0.5 mm 漆包线 100 mm · 单圈测量）
Normalized Impedance ZN vs. Frequency (single turn of Φ0.5 mm wire, 100 mm long)

铁研 TAK

Q1C1 高频稳定材料 HIGH FREQUENCY STABLE MATERIALS

Q1C1 为镍锌铁氧体材料，初始磁导率（μi）约 250，饱和磁通密度（Bs）约 335 mT（25 ℃）/ 240 mT（100 ℃），居里温度高于 140 ℃。本材料是高频族的高磁导端点：损耗因子仅 35×10⁻⁶（0.5 MHz）/ 45×10⁻⁶（2.5 MHz），在此磁导率档位属于相当低的水平，单位匝数感量高，有利于元件小型化。作为 EMI 抑制材料，其标准化阻抗以 RH5×1.5×10 磁珠实测（曲线见次页）。典型应用为低频 EMI 滤波器、RF 调谐元件与追求小型化的电源模块电感。与 M63（μi 约 180、Tc >300 ℃）相比，Q1C1 感量密度更高，但居里温度明显较低（>140 ℃）——温度环境严苛时回选 M63 / M61，常温小型化设计则 Q1C1 是本族首选。

Q1C1 is a NiZn ferrite with an initial permeability (μi) of approx. 250, a saturation flux density (Bs) of approx. 335 mT at 25 °C (240 mT at 100 °C) and a Curie temperature above 140 °C. It is the high-permeability end of the high-frequency family: a loss factor of only 35×10^{-6} at 0.5 MHz / 45×10^{-6} at 2.5 MHz is remarkably low for this permeability step, and the high inductance per turn favours miniaturisation. As an EMI-suppression material its normalized impedance is measured on an RH5×1.5×10 bead (curve on the next page). Typical uses are low-frequency EMI filters, RF tuning elements and compact power-module inductors. Against M63 (μi approx. 180, Tc >300 °C), Q1C1 offers higher inductance density at a clearly lower Curie temperature (>140 °C) — fall back to M63/M61 in harsh thermal environments; for compact room-temperature designs Q1C1 is the family's first choice.

Low-Frequency EMI Filter | RF Tuning Element | Compact Power-Module Inductor | EMI Suppression Bead

电磁特性 MAGNETIC CHARACTERISTICS

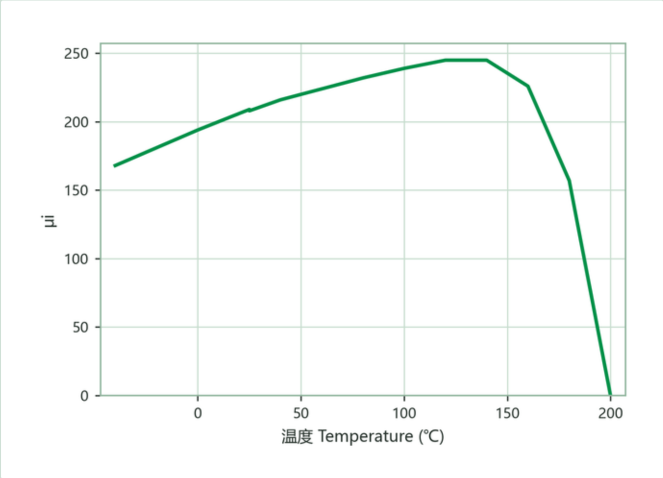
特性 Characteristic	条件 Condition	值 Value	单位 Unit
初始磁导率 μi Initial Permeability	100 kHz & <0.2 mT	250±25%	
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 25 ℃ 100 Hz	335	mT
饱和磁通密度 Bs Saturation Flux Density	3000 A/m · 100 ℃ 100 Hz	240	mT
残留磁通密度 Br Remanence	3000 A/m · 25 ℃ 100 Hz	200	mT
残留磁通密度 Br Remanence	3000 A/m · 100 ℃ 100 Hz	130	mT
矫顽力 Hc Coercivity	3000 A/m · 25 ℃ 100 Hz	140	A/m
矫顽力 Hc Coercivity	3000 A/m · 100 ℃ 100 Hz	140	A/m
αμr（温度系数） Temperature coefficient of permeability	20～60 ℃	10	$\times10^{-6}$/K
相对损耗因子 tanδ/μi Relative Loss Factor	0.5 MHz & <0.2 mT	35	$\times10^{-6}$
相对损耗因子 tanδ/μi Relative Loss Factor	2.5 MHz & <0.2 mT	45	$\times10^{-6}$
居里温度 Tc Curie Temp.	100 kHz & <0.2 mT	>140	℃
密度 D Density	阿基米德法 Archimedes method	4.9	g/cm^3
电阻率 ρ Volume Resistivity	直流电流 DC Current	10^7	Ω·m

备注：各项数值均为环形磁芯T31×19×8测得的典型数值，由于几何形状和尺寸的影响，产品规格将与这些数据有所差异。

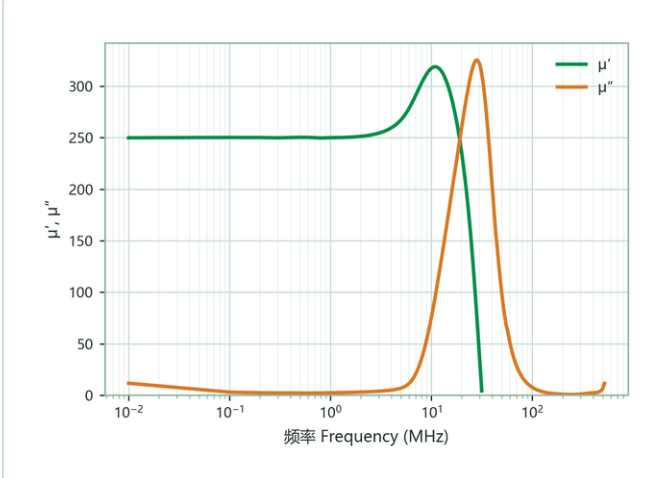
Note: all values are typical data measured on a T31×19×8 toroidal core; actual product specifications will vary with geometry and size.

特性曲线详见次页 CHARACTERISTIC CURVES — SEE NEXT PAGE

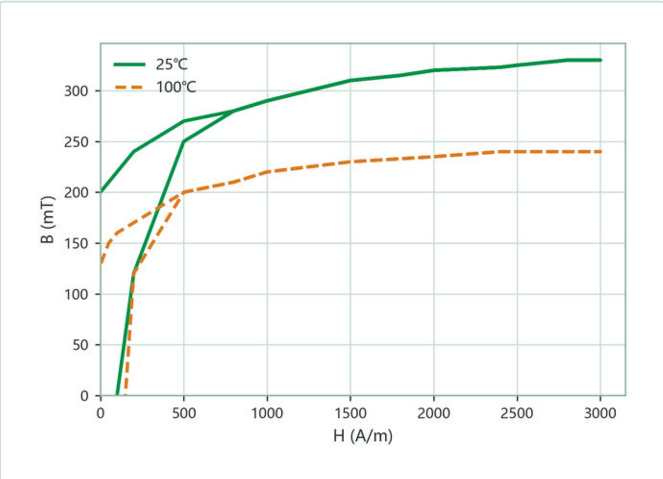
Q1C1 特性曲线 CHARACTERISTIC CURVES



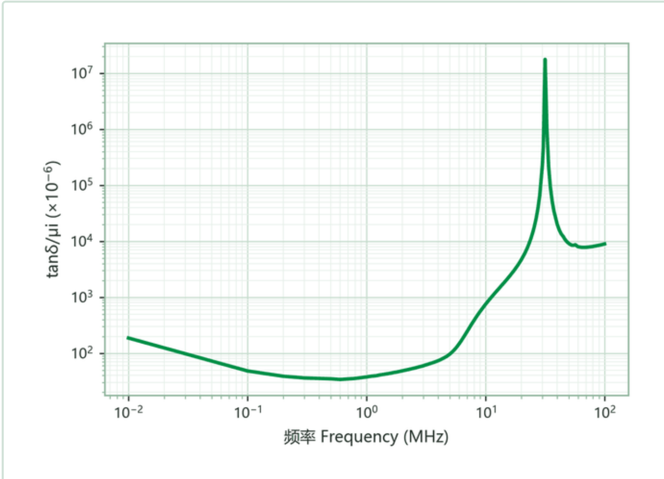
初始磁导率—温度特性
Initial Permeability vs. Temperature



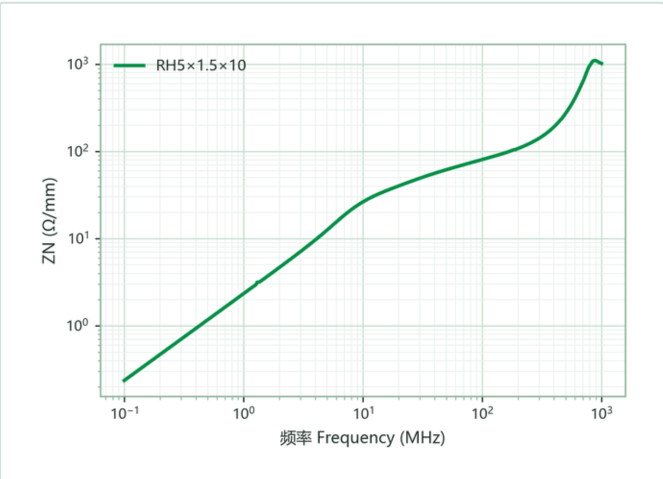
复数磁导率—频率特性
Complex Permeability (μ′, μ″) vs. Frequency



静态磁化曲线
Static Magnetization Curves (B–H)



相对损耗因子—频率特性
Relative Loss Factor (tanδ/μi) vs. Frequency



标准化阻抗—频率特性（Φ0.5 mm 漆包线 100 mm · 单圈测量）
Normalized Impedance ZN vs. Frequency (single turn of Φ0.5 mm wire, 100 mm long)

鐵研 TAK

ME03

EMI 抑制材料
EMI SUPPRESSION FERRITE

ME03 为 MnZn 体系的 EMI 抑制铁氧体材料，初始磁导率（μi）约 350，饱和磁通密度（Bs）约 400 mT（25 ℃）/ 350 mT（100 ℃），居里温度高于 260 ℃。此材料以较低的磁导率，换取较高的饱和磁通密度、居里温度与 30 MHz 以上的宽频损耗特性——标准化阻抗 ZN（标称值）于 30 / 100 / 300 MHz 分别约 25 / 55 / 115 Ω/mm，于该频段呈电阻主导，可将高频共模噪声转为热耗散而非储存于磁路中。与同频段的 NiZn 抑制材料相比，ME03 的饱和磁通密度明显较高，在导线带有直流或工作电流时阻抗衰减较小；居里温度高于 260 ℃，亦有利于高温环境下的特性稳定。典型应用为 EMI 磁珠、EMI 磁环与共模扼流圈，用于高速数据传输接口、电源输入端与车用线束的传导噪声抑制。电阻率约 10^4 Ω·m，属中高电阻率，绕线时仍建议使用绝缘导线或表面涂覆磁芯。本材料属 MnZn 体系，之所以收录于本册，是因为它可在上述抑制应用中直接替代 NiZn；完整 MnZn 材料系列另见《锰锌铁氧体目录书》。

ME03 is a MnZn-system EMI-suppression ferrite with μi approx. 350, Bs approx. 400 mT at 25 °C (350 mT at 100 °C) and a Curie temperature above 260 °C. It trades permeability for a high saturation flux density, a high Curie temperature and a broadband loss characteristic above 30 MHz: normalized impedance ZN (typical) is approx. 25 / 55 / 115 Ω/mm at 30 / 100 / 300 MHz, where the impedance is resistive-dominated and converts high-frequency common-mode noise into heat instead of storing it in the magnetic circuit. Against NiZn suppression grades covering the same band, the markedly higher Bs keeps the impedance from collapsing when the conductor also carries DC or operating current, and the >260 °C Curie point sustains the characteristics at elevated temperature. Typical uses are EMI beads, EMI rings and common-mode chokes for high-speed data interfaces, power inlets and automotive harnesses. With a resistivity of about 10^4 Ω·m, insulated wire or a coated core is still recommended for winding. ME03 belongs to the MnZn family and is listed here because it substitutes directly for NiZn in these suppression applications; the full MnZn range is given in the MnZn Ferrite Catalog.

EMI Bead | EMI Ring | Common-Mode Choke | Automotive Harness Suppression | High-Speed Interface Filter

电磁特性 MAGNETIC CHARACTERISTICS

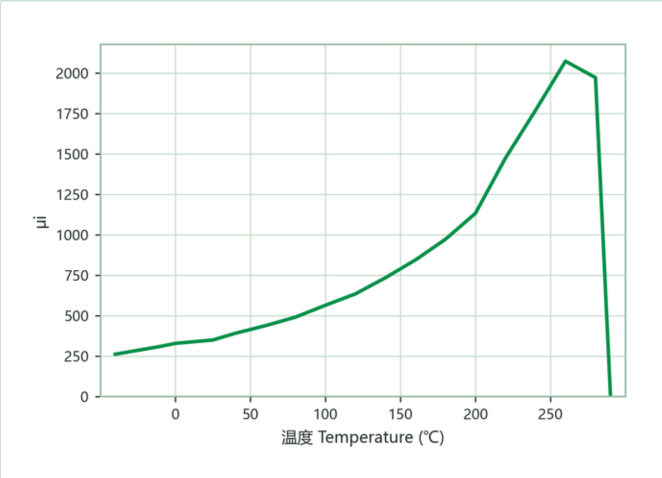
特性 Characteristic	条件 Condition	25 ℃	100 ℃	单位 Unit
初始磁导率 Initial Permeability μi	f=10 kHz, B<0.25 mT	350 ±25%		
饱和磁通密度 Saturation Flux Density Bs	1200 A/m, 1 kHz	400	350	mT
残留磁通密度 Remanence Br	1200 A/m, 1 kHz	350	300	mT
矫顽力 Coercivity Hc	1200 A/m, 1 kHz	100	50	A/m
居里温度 Curie Temperature Tc	f=10 kHz, B<0.25 mT	≥260		℃
密度 Density D	Archimedes method（阿基米德法）	4.80		g/cm³
电阻率 Electrical Resistivity ρ	DC Current (直流电流)	10^4		Ω·m
标准化阻抗 Normalized Impedance ZN	30 MHz	≥25		Ω/mm
标准化阻抗 Normalized Impedance ZN	100 MHz	≥55		Ω/mm
标准化阻抗 Normalized Impedance ZN	300 MHz	≥115		Ω/mm

备注：各项数值均为环形磁芯 T22×14×8 实测之典型数值，由于几何形状和尺寸的影响，产品规格将与这些数据有所差异；标准化阻抗 ZN 于 Φ5×Φ1.5×10（RH5×1.5×10）磁珠磁芯、绕线 1 匝（线径 Φ0.5 mm）实测。

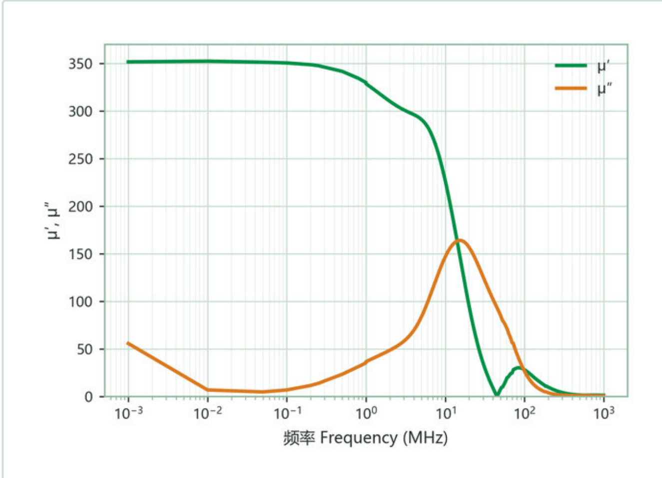
Note: all values are typical data measured on a T22×14×8 toroidal core; actual product specifications will vary with geometry and size. Normalized impedance ZN is measured on a Φ5×Φ1.5×10 (RH5×1.5×10) bead core wound with a single turn of Φ0.5 mm wire.

特性曲线详见次页 CHARACTERISTIC CURVES — SEE NEXT PAGE

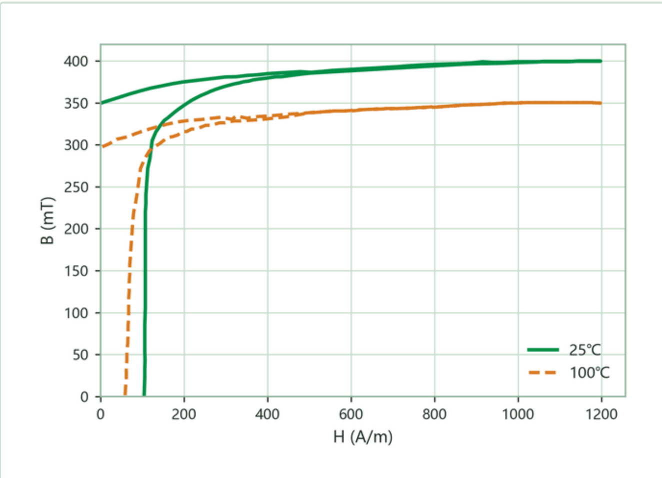
ME03 特性曲线 CHARACTERISTIC CURVES



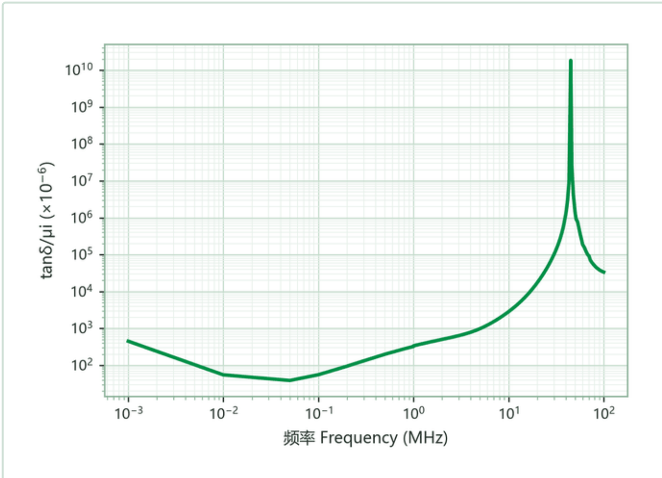
初始磁导率—温度特性
Initial Permeability vs. Temperature



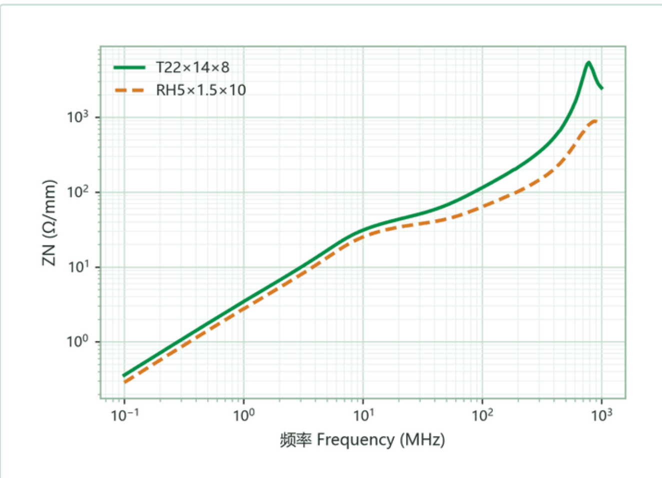
复数磁导率—频率特性
Complex Permeability (μ′, μ″) vs. Frequency



静态磁化曲线
Static Magnetization Curves (B–H)



相对损耗因子—频率特性
Relative Loss Factor (tanδ/μi) vs. Frequency



标准化阻抗—频率特性（Φ0.5 mm 漆包线 100 mm · 单圈测量）
Normalized Impedance ZN vs. Frequency (single turn of Φ0.5 mm wire, 100 mm long)

CHOKE 类

CHOKE & ROD CORES

磁棒、鼓形磁芯、螺纹磁芯与接着组合等线圈类磁芯。

Rod, drum, threaded and bonded-assembly cores for wound chokes.

本章系列 SERIES IN THIS CHAPTER

常规DR系列 外形尺寸图 STANDARD DR DRUM CORES — OUTLINE DRAWINGS

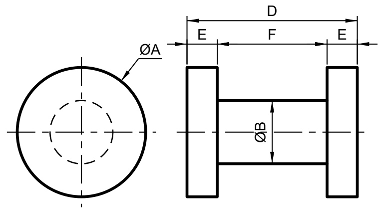


Fig.1
标准 Standard

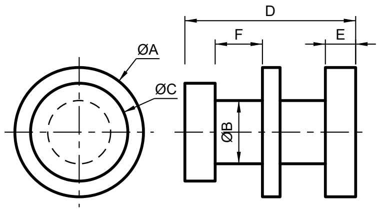


Fig.2
D-7

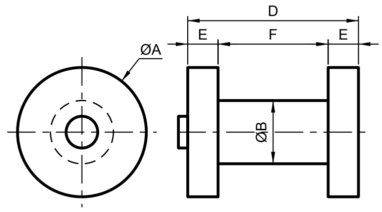


Fig.3
ST

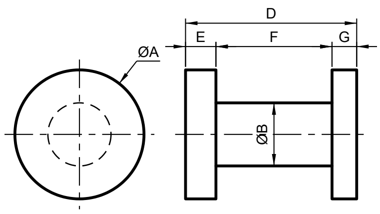


Fig.4
D-1

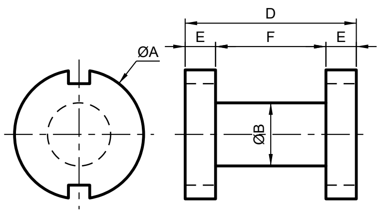


Fig.5
R槽 R-slot

尺寸范围（依外形与 A/B）尺寸规格列表 RANGES (BY TYPE & A/B) — DIMENSION LIST

外形 Type	A (mm)	B (mm)	C 范围 C range (mm)	D 范围 D range (mm)	E 范围 E range (mm)	F 范围 F range (mm)	G 范围 G range (mm)	Fig
标准 Standard	1.50±0.06	0.80±0.06	/	1.3	/	0.7	/	1
标准 Standard	1.83±0.10	1.14±0.10	/	1.14	/	0.38	/	1
标准 Standard	2.00±0.06	1.20±0.06	/	1.7	/	0.9	/	1
标准 Standard	2.50±0.10	0.90±0.15	/	1.7 ~ 2	/	0.8 ~ 1.2	/	1
标准 Standard	2.50±0.10	1.00±0.15	/	1.9 ~ 2.6	/	1.2	/	1
标准 Standard	2.65±0.10	1.50±0.10	/	2.5	/	1.5	/	1
标准 Standard	3.00±0.10	1.80±0.15	/	4	/	2.5	/	1
标准 Standard	3.50±0.10	2.00±0.10	/	7	/	4	/	1
标准 Standard	3.55±0.10	1.80±0.10	/	2.4	/	1.4	/	1
标准 Standard	3.60±0.10	1.30±0.15	/	1.7	/	0.8	/	1
标准 Standard	3.60±0.10	1.50±0.15	/	2 ~ 2.5	/	1.2 ~ 1.5	/	1

尺寸范围（依外形与 A/B）尺寸规格列表（续） RANGES (BY TYPE & A/B) — DIMENSION LIST

外形 Type	A (mm)	B (mm)	C 范围 C range (mm)	D 范围 D range (mm)	E 范围 E range (mm)	F 范围 F range (mm)	G 范围 G range (mm)	Fig
标准 Standard	3.65±0.08	1.60±0.08	/	0.85 ~ 1.9	/	0.35 ~ 0.9	/	1
标准 Standard	3.65±0.08	1.80±0.08	/	1.3 ~ 2.4	/	0.7 ~ 1.4	/	1
标准 Standard	4.00±0.10	1.50±0.10	/	2.4 ~ 4	/	1.2 ~ 2	/	1
标准 Standard	4.00±0.09	1.60±0.09	/	1.55 ~ 2	/	0.8 ~ 1.2	/	1
标准 Standard	4.00±0.10	1.90±0.10	/	4.5	/	2.3	/	1
标准 Standard	4.00±0.10	2.00±0.10	/	2.7 ~ 4.5	/	1 ~ 2.5	/	1
标准 Standard	4.00±0.09	2.20±0.09	/	2.6	/	1.6	/	1
标准 Standard	4.50±0.10	1.70±0.10	/	3.2	/	1.3	/	1
标准 Standard	4.60±0.09	2.60±0.09	/	4.1	/	2.8	/	1
标准 Standard	4.80±0.09	2.80±0.09	/	4	/	2.4	/	1
标准 Standard	5.00±0.10	2.30±0.10	/	1.75 ~ 3.75	/	0.95 ~ 2.65	/	1
标准 Standard	5.30±0.10	2.00±0.15	/	6	/	3	/	1
标准 Standard	5.30±0.10	2.60±0.10	/	2.8	/	1.5	/	1
标准 Standard	5.30±0.10	2.70±0.10	/	3.6	/	2.4	/	1
标准 Standard	5.40±0.10	2.00±0.10	/	2	/	1.2	/	1
标准 Standard	6.00±0.10	1.50±0.10	/	3	/	1.5	/	1
标准 Standard	6.00±0.10	2.00±0.10	/	8	/	4.2	/	1
标准 Standard	6.50±0.10	3.50±0.10	/	7.5	/	4	/	1
标准 Standard	7.50±0.10	3.00±0.10	/	4	/	2	/	1
标准 Standard	8.00±0.10	4.00±0.10	/	4 ~ 10	/	2.8 ~ 6	/	1
标准 Standard	8.38±0.15	3.00±0.15	/	4	/	2	/	1
标准 Standard	8.40±0.15	5.00±0.15	/	10	/	7	/	1

尺寸范围（依外形与 A/B）尺寸规格列表（续） RANGES (BY TYPE & A/B) — DIMENSION LIST

外形 Type	A (mm)	B (mm)	C 范围 C range (mm)	D 范围 D range (mm)	E 范围 E range (mm)	F 范围 F range (mm)	G 范围 G range (mm)	Fig
标准 Standard	8.50±0.10	3.00±0.10	/	4.2	/	2.5	/	1
标准 Standard	8.50±0.15	3.80±0.15	/	4.3	/	2.7	/	1
标准 Standard	8.70±0.15	3.30±0.15	/	4.2	/	2.65	/	1
标准 Standard	9.00±0.10	4.00±0.10	/	4.1	/	2	/	1
标准 Standard	9.00±0.10	4.50±0.10	/	5	/	3.5	/	1
标准 Standard	9.50±0.10	4.50±0.10	/	5.5	/	3	/	1
标准 Standard	9.55±0.10	6.15±0.10	/	6.9	/	5	/	1
标准 Standard	9.60±0.10	4.00±0.10	/	4.3	/	2.6	/	1
标准 Standard	9.70±0.10	6.20±0.10	/	7	/	4.9	/	1
标准 Standard	9.85±0.10	6.40±0.10	/	7.1	/	4.9	/	1
标准 Standard	9.90±0.10	5.00±0.10	/	3.9	/	2	/	1
标准 Standard	10.00±0.10	3.60±0.10	/	6	/	3	/	1
标准 Standard	10.00±0.10	4.90±0.10	/	5.2	/	3	/	1
标准 Standard	10.00±0.10	5.90±0.10	/	7	/	5	/	1
标准 Standard	10.00±0.10	6.00±0.10	/	16	/	10.5	/	1
标准 Standard	11.00±0.15	5.60±0.10	/	5.8	/	3	/	1
标准 Standard	11.70±0.15	5.20±0.15	/	4	/	2	/	1
标准 Standard	12.00±0.15	7.00±0.15	/	7	/	4	/	1
标准 Standard	12.70±0.15	5.50±0.15	/	13	/	9	/	1
标准 Standard	13.00±0.15	4.40±0.15	/	15	/	10	/	1
标准 Standard	13.00±0.15	4.50±0.15	/	15	/	10	/	1
标准 Standard	13.00±0.15	4.80±0.15	/	15	/	9	/	1

尺寸范围（依外形与 A/B）尺寸规格列表（续） RANGES (BY TYPE & A/B) — DIMENSION LIST

外形 Type	A (mm)	B (mm)	C 范围 C range (mm)	D 范围 D range (mm)	E 范围 E range (mm)	F 范围 F range (mm)	G 范围 G range (mm)	Fig
标准 Standard	13.00±0.15	4.90±0.15	/	15	/	9	/	1
标准 Standard	13.00±0.15	5.15±0.15	/	18	/	13	/	1
标准 Standard	13.00±0.15	5.20±0.15	/	15	/	9～10	/	1
标准 Standard	13.00±0.15	5.25±0.15	/	18	/	13	/	1
标准 Standard	13.00±0.15	5.60±0.15	/	16	/	11	/	1
标准 Standard	13.00±0.15	5.80±0.15	/	18	/	13	/	1
标准 Standard	14.00±0.15	6.00±0.15	/	6	/	3.5	/	1
标准 Standard	14.00±0.15	6.20±0.15	/	19	/	13	/	1
标准 Standard	15.00±0.15	5.00±0.15	/	14～15	/	7～8.7	/	1
标准 Standard	15.00±0.15	5.20±0.15	/	15	/	8.9	/	1
标准 Standard	15.00±0.15	6.00±0.15	/	10	/	6	/	1
标准 Standard	15.00±0.15	8.50±0.15	/	25	/	18	/	1
D-7	10.00±0.15	7.00±0.15	/	16	1.5	5.5	/	2
D-7	11.95 +0.10/-0.20	6.60±0.15	10.55	13	1.23	4.65	/	2
ST	2.50±0.10	0.90±0.15	/	1.9	/	1.2	/	3
ST	2.50±0.10	1.00±0.15	/	2.4	/	1	/	3
ST	3.50±0.10	1.00±0.15	/	1.9	/	1	/	3
D-1	3.00±0.10	1.50±0.10	/	4	1.2	2.2	0.6	4
D-1	4.00±0.10	0.80±0.10	/	4.5	1.5	2.3	0.7	4
D-1	5.30±0.10	2.50±0.15	/	6.5	1.4	4.2	0.9	4
D-1	6.50±0.15	2.00±0.15	/	7.5	2.5	4	1	4
D-1	12.50±0.15	4.50±0.15	/	15	2.9	10	2	4
D-1	12.50±0.15	5.00±0.15	/	15	2.9	10	2	4
R槽 R-slot	2.00±0.06	1.00±0.06	/	2.7	/	1.8	/	5
R槽 R-slot	2.50±0.07	1.00±0.07	/	2.7	/	1.8	/	5

尺寸范围（依外形与 A/B）尺寸规格列表（续） RANGES (BY TYPE & A/B) — DIMENSION LIST

外形 Type	A (mm)	B (mm)	C 范围 C range (mm)	D 范围 D range (mm)	E 范围 E range (mm)	F 范围 F range (mm)	G 范围 G range (mm)	Fig
R槽 R-slot	2.70±0.08	1.30±0.08	/	3	/	2	/	5
R槽 R-slot	3.90±0.08	1.80±0.08	/	1.7	/	0.8	/	5
R槽 R-slot	4.20±0.09	1.50±0.09	/	2	/	1	/	5
R槽 R-slot	4.20±0.09	1.80±0.09	/	1.37	/	0.5	/	5
R槽 R-slot	4.45±0.09	1.80±0.09	/	1.8	/	0.8	/	5
R槽 R-slot	5.40±0.10	3.00±0.10	/	4	/	2.2	/	5
R槽 R-slot	6.80±0.10	3.00±0.10	/	2.7 ~ 4	/	1.4 ~ 2.4	/	5
R槽 R-slot	7.80±0.15	4.50±0.15	/	4.4	/	3	/	5
R槽 R-slot	8.00±0.10	4.00±0.10	/	10	/	6	/	5
R槽 R-slot	8.00±0.10	5.00±0.10	/	11	/	6	/	5
R槽 R-slot	8.40±0.10	4.00±0.10	/	2	/	0.9	/	5
R槽 R-slot	8.80±0.15	3.80±0.15	/	2.4	/	0.6	/	5
R槽 R-slot	9.00±0.15	7.00±0.15	/	13	/	9	/	5
R槽 R-slot	9.50±0.10	5.00±0.10	/	5	/	3.1	/	5
R槽 R-slot	9.60±0.10	4.60±0.10	/	11	/	7.2	/	5
R槽 R-slot	10.00±0.10	3.70±0.10	/	4	/	1.5	/	5
R槽 R-slot	10.00±0.15	4.00±0.10	/	12	/	6	/	5
R槽 R-slot	10.00±0.15	5.80±0.10	/	20	/	14	/	5
R槽 R-slot	12.00±0.15	5.50±0.15	/	9.5	/	5	/	5
R槽 R-slot	12.00±0.15	6.30±0.15	/	15	/	9	/	5
R槽 R-slot	13.00±0.15	4.35±0.15	/	15	/	10.2	/	5
R槽 R-slot	13.00±0.15	6.00±0.15	/	15	/	10	/	5

常规DR系列（续） STANDARD DR DRUM CORES

尺寸范围（依外形与 A/B）尺寸规格列表（续） RANGES (BY TYPE & A/B) — DIMENSION LIST

外形 Type	A (mm)	B (mm)	C 范围 C range (mm)	D 范围 D range (mm)	E 范围 E range (mm)	F 范围 F range (mm)	G 范围 G range (mm)	Fig
R槽 R-slot	13.00±0.15	6.70±0.15	/	15	/	9	/	5
R槽 R-slot	14.00±0.15	5.00±0.15	/	20	/	15	/	5
R槽 R-slot	14.00±0.15	6.00±0.15	/	15	/	10	/	5
R槽 R-slot	14.00±0.15	6.40±0.20	/	18	/	12	/	5
R槽 R-slot	14.00±0.15	7.50±0.15	/	16	/	11	/	5
R槽 R-slot	14.00±0.15	8.00±0.20	/	19	/	15	/	5

备注：同外形且 A 相同，B ~ G 可依需求设计调整；E = (D−F)/2；表列为现有品名之范围，范围外请洽询。

Note: For the same shape with identical A, B–G are adjustable by design; E = (D − F)/2; listed ranges cover current part names — other sizes on request.

MEMO

一体式（结构1）外形尺寸图 ONE-PIECE (STRUCTURE 1) — OUTLINE DRAWINGS

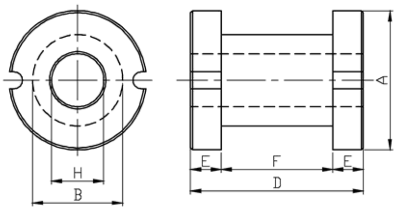


Fig.1

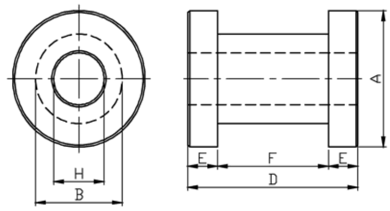


Fig.2

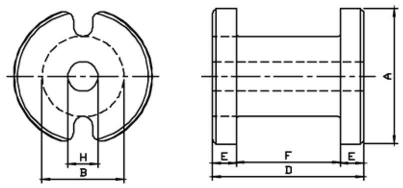


Fig.3

一体式（结构1）尺寸规格列表 ONE-PIECE (STRUCTURE 1) — DIMENSION LIST

品名 Product name	A (mm)	B (mm)	D (mm)	E (mm)	F (mm)	H (mm)	Fig
DRH14×20R	13.40±0.30	8.80±0.30	20.00±0.60	3.00±0.20	14.00±0.30	5.10±0.30	1
DRH18×20R	18.00±0.50	11.00±0.30	20.00±0.80	3.75±0.20	12.50±0.40	4.00±0.30	1
DRH19×22R	19.00±0.50	10.90±0.30	22.00±0.80	3.90±0.20	14.20±0.40	4.00±0.30	1
DRH22×24R	22.00±0.50	13.00±0.30	24.00±0.80	3.75±0.30	16.50±0.40	4.80±0.30	3
DRH25.6×20.3R	25.60±0.50	13.00±0.30	20.30±0.80	3.85±0.30	12.60±0.40	5.35±0.30	1
DRH28×22	28.00±1.00	12.50±0.40	22.00±1.00	5.25±0.30	11.50±0.50	5.00±0.30	2
DRH28×20	28.00±1.00	16.70±0.50	20.00±1.00	3.00±0.30	14.00±0.50	5.00±0.30	2
DRH28×25	28.00±1.00	17.00±0.50	25.00±1.00	4.50±0.30	16.00±0.50	5.00±0.30	2

三合一（结构2）外形尺寸图 THREE-IN-ONE (STRUCTURE 2) — OUTLINE DRAWINGS

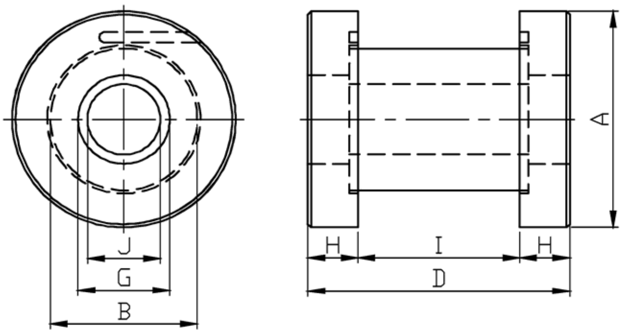


Fig.4

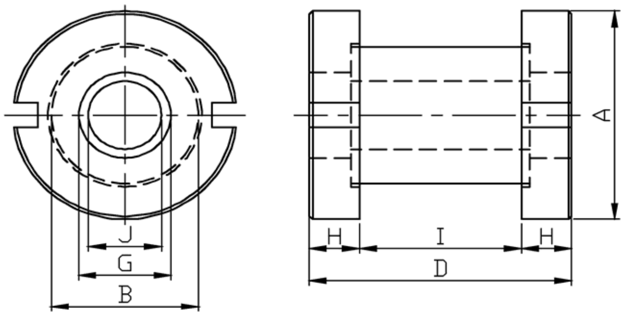


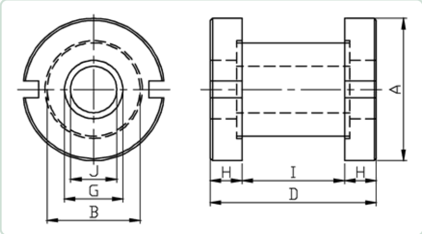
Fig.5

三合一（结构2）尺寸规格列表 THREE-IN-ONE (STRUCTURE 2) — DIMENSION LIST

品名 Product name	A (mm)	B (mm)	D (mm)	G (mm)	H (mm)	I (mm)	J (mm)	Fig
DRH20×19	20.00±1.00	13.00±0.40	19.00±0.70	6.30±0.30	3.00±0.20	13.00±0.50	5.30±0.30	4
DRH20×22.5R	20.00±1.00	13.00±0.40	22.50±0.80	6.30±0.30	3.10±0.20	16.30±0.60	5.35±0.30	5
DRH22×18.5	22.00±1.00	13.00±0.40	18.50±0.65	6.30±0.30	3.10±0.20	12.30±0.45	5.35±0.30	4
DRH22.4×14	22.40±1.00	13.00±0.40	14.00±0.50	6.35±0.30	3.10±0.20	7.80±0.30	5.35±0.30	4
DRH22×18	22.40±1.00	13.00±0.40	18.00±0.65	6.35±0.30	3.10±0.20	11.80±0.45	5.35±0.20	4
DRH22×14R	22.80±0.80	13.00±0.40	14.00±0.50	6.30±0.30	3.10±0.20	7.80±0.30	5.35±0.30	5
DRH23×15	22.80±1.00	13.00±0.40	15.00±0.55	6.50±0.30	3.00±0.20	9.00±0.35	5.35±0.30	4
DRH22.8×18R	22.80±1.00	13.00±0.40	18.00±0.85	6.30±0.30	3.10±0.20	11.80±0.45	5.35±0.30	5
DRH22×21	22.80±0.80	13.00±0.40	21.00±0.75	6.30±0.20	3.20±0.20	14.60±0.50	5.35±0.20	4
DRH26×14	26.00±1.00	13.00±0.40	14.00±0.50	6.30±0.30	4.00±0.20	6.00±0.25	5.35±0.30	4
DRH26×20	26.00±1.00	13.00±0.40	20.00±0.70	6.35±0.30	4.00±0.20	12.00±0.45	5.35±0.30	4
DRH26×25	26.00±1.00	16.00±0.40	25.00±0.90	6.30±0.30	4.00±0.20	17.00±0.60	5.35±0.30	4
DRH30×20	30.00±1.00	13.00±0.40	20.00±0.70	6.30±0.30	4.00±0.30	12.00±0.45	5.30±0.30	4
DRH30×25	30.00±1.00	13.00±0.40	25.00±0.90	6.30±0.30	4.00±0.30	17.00±0.60	5.30±0.30	4
DRH35×25	35.00±1.00	13.00±0.40	25.00±0.90	6.35±0.30	4.00±0.30	17.00±0.60	5.35±0.30	4
DRH40×28	40.00±1.00	20.00±0.60	28.00±1.00	6.50±0.30	6.00±0.40	16.00±0.60	5.60±0.30	4
DRH40×30	40.00±1.00	20.00±0.60	30.00±1.00	6.50±0.30	5.00±0.40	20.00±0.70	5.60±0.30	4
DRH40×35	40.00±1.00	20.00±0.60	35.00±1.00	6.50±0.30	6.00±0.40	23.00±0.80	5.60±0.30	4

DRH系列（续） DRH SERIES

三合一（结构3）外形尺寸图 THREE-IN-ONE (STRUCTURE 3) — OUTLINE DRAWINGS



三合一（结构3）尺寸规格列表 THREE-IN-ONE (STRUCTURE 3) — DIMENSION LIST

品名 Product name	A (mm)	B (mm)	D (mm)	G (mm)	H (mm)	I (mm)	J (mm)
DRH24×20R	24.00±0.80	13.00±0.40	20.00±0.70	6.30±0.30	4.00±0.20	12.00±0.45	5.35±0.30
DRH24×24R	24.00±0.80	13.00±0.40	24.00±0.85	6.30±0.30	3.50±0.20	17.00±0.60	5.35±0.30
DRH24×24.5R	24.00±0.80	13.00±0.40	24.50±0.90	6.30±0.30	4.00±0.20	16.50±0.60	5.35±0.30
DRH25×25R	25.00±1.00	13.50±0.40	25.00±0.90	5.00±0.30	4.50±0.30	16.00±0.60	5.35±0.30
DRH26×20R	26.00±0.80	13.00±0.40	20.00±0.70	6.30±0.30	4.00±0.30	12.00±0.45	5.35±0.30
DRH26×22R	26.00±0.80	13.00±0.40	22.00±0.80	6.35±0.30	4.00±0.20	14.00±0.50	5.35±0.30
DRH26×24R	26.00±0.80	13.00±0.40	24.00±0.85	6.35±0.30	4.00±0.30	16.00±0.60	5.35±0.30
DRH28×22R	28.00±1.00	16.90±0.50	22.00±0.80	6.40±0.30	4.00±0.25	14.00±0.50	5.00±0.30
DRH28×25R	28.00±1.00	17.00±0.50	25.00±0.90	6.30±0.30	4.00±0.25	17.00±0.60	4.50±0.25
DRH35×25R	35.00±1.00	21.00±0.60	25.00±0.90	8.00±0.40	3.50±0.30	18.00±0.65	4.00±0.30
DRH35×27R	35.00±1.00	21.00±0.60	27.00±0.95	8.00±0.40	4.50±0.30	18.00±0.65	4.00±0.30
DRH35×30R	35.00±1.00	21.00±0.60	30.00±1.00	8.00±0.40	4.00±0.40	22.00±0.80	4.00±0.30
DRH35×35R	35.00±1.00	21.00±0.60	35.00±1.00	8.00±0.40	3.50±0.30	28.00±1.00	4.00±0.30
DRH45×35R	45.00±1.00	27.00±0.80	35.00±1.00	9.00±0.40	4.70±0.40	25.60±1.00	6.50±0.30

备注：以上为未涂装规格，其中D、H、I尺寸可调。

Note: Dimensions above are pre-coating; D, H and I are adjustable.

三合一（结构4）外形尺寸图 THREE-IN-ONE (STRUCTURE 4) — OUTLINE DRAWINGS

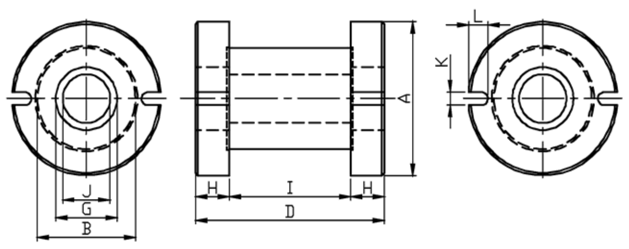


Fig.6

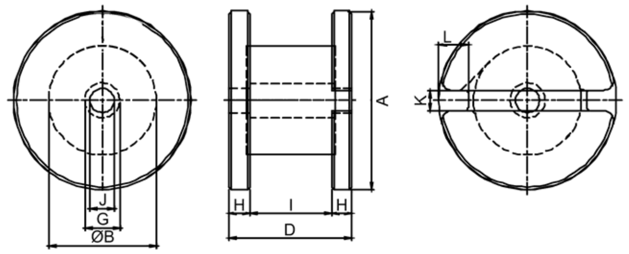
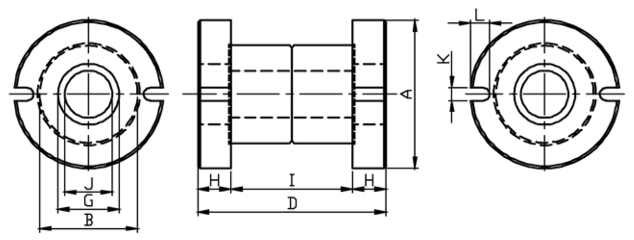


Fig.7

三合一（结构4）尺寸规格列表 THREE-IN-ONE (STRUCTURE 4) — DIMENSION LIST

品名 Product name	A (mm)	B (mm)	D (mm)	G (mm)	H (mm)	I (mm)	J (mm)	K (mm)	L (mm)	Fig
DRH25×21R	25.00 ±1.00	13.50 ±0.40	21.00 ±1.00	5.00±0.30	4.50±0.30	12.00 ±0.50	3.50±0.20	3.75 ref	5.25 ref	6
DRH25×25R	25.00 ±1.00	13.50 ±0.40	25.00 ±1.00	5.00±0.30	4.50±0.30	16.00 ±0.50	3.50±0.20	3.75 ref	5.25 ref	6
DRH35×25RB	35.00 ±1.00	19.00 ±0.50	25.00 ±1.00	4.80±0.30	4.00±0.20	17.00 ±0.80	5.30±0.30	4.50 ref	5.50 ref	6
DRH35×25RA	35.00 ±1.00	21.00 ±0.40	25.00 ±1.00	4.80±0.30	3.90±0.30	17.10 ±0.80	6.90±0.30	4.15 ref	5.10 ref	7
DRH36×18R	36.00 ±1.00	21.00 ±0.60	18.00 ±0.80	7.00±0.30	4.50±0.30	9.00±0.40	5.00±0.30	4.00 ref	7.00 ref	6
DRH36×27R	36.00 ±1.00	21.00 ±0.60	27.00 ±1.00	7.00±0.30	4.50±0.30	18.00 ±0.80	5.00±0.30	4.00 ref	7.00 ref	6
DRH36×36R	36.00 ±1.00	21.00 ±0.60	36.00 ±1.00	7.00±0.30	4.50±0.30	27.00 ±0.80	5.00±0.30	4.00 ref	7.00 ref	6
DRH46×18R	46.00 ±1.00	27.00 ±0.80	18.00 ±1.00	9.50±0.40	5.00±0.30	8.00±0.30	7.00±0.30	5.00 min	8.70±0.30	6
DRH46×36R	46.00 ±1.00	27.00 ±0.80	36.00 ±1.00	9.50±0.40	5.00±0.30	26.00 ±0.80	7.00±0.30	5.00 min	8.70±0.30	6
DRH55×20R	55.00 ±1.20	32.50 ±0.80	20.00 ±1.00	9.50±0.40	6.00±0.30	8.00±0.30	7.00±0.30	6.00 ref	10.75 ref	6
DRH55×37R	55.00 ±1.20	32.50 ±0.80	37.00 ±1.00	9.50±0.40	6.00±0.30	25.00 ±0.80	7.00±0.30	6.00 ref	10.75 ref	6

四合一（结构5）外形尺寸图 FOUR-IN-ONE (STRUCTURE 5) — OUTLINE DRAWINGS



四合一（结构5）尺寸规格列表 FOUR-IN-ONE (STRUCTURE 5) — DIMENSION LIST

品名 Product name	A (mm)	B (mm)	D (mm)	G (mm)	H (mm)	I (mm)	J (mm)	K (mm)	L (mm)
DRH55×63R	55.00±1.20	32.50±0.80	63.00±1.50	9.50±0.40	5.00±0.30	53.00±1.00	7.00±0.30	6.00 ref	10.75 ref

MEMO

R CORE系列 R ROD CORE SERIES

R CORE系列 外形尺寸图 R ROD CORE SERIES — OUTLINE DRAWINGS

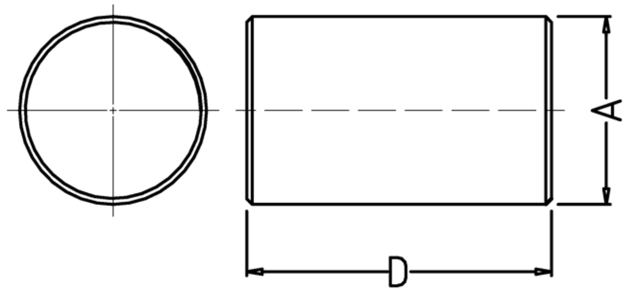


Fig.1

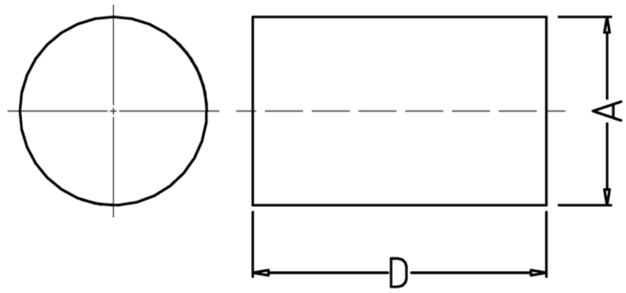


Fig.2

尺寸范围（依外形与外径） 尺寸规格列表 DIMENSION RANGES (BY TYPE & OD) — DIMENSION LIST

外径 A OD A (mm)	长度 D 范围 Length D range (mm)	Fig	外径 A OD A (mm)	长度 D 范围 Length D range (mm)	Fig
1.00±0.10	4	1	3.70±0.10	14	1
1.20±0.10	4	1	3.80±0.10	4.7 ~ 12.4	1
1.40±0.10	4 ~ 4.3	1	3.85±0.10	14	1
1.48±0.10	6.5	1	3.90±0.10	2.5 ~ 21.4	1
1.50±0.10	4	1	4.00±0.10	10 ~ 40	1
1.55±0.10	14.5	1	4.10±0.15	20 ~ 30	1
1.60±0.10	18	1	4.30±0.10	4.05	1
1.70±0.10	15	1	4.40±0.10	7.3	1
1.75±0.10	9	1	4.50±0.10	4.25	1
1.90±0.10	6 ~ 6.5	1	4.60±0.10	6.42	1
2.00±0.10	9 ~ 10	1	4.70±0.10	5 ~ 28	1
2.26±0.10	2.16	1	4.75±0.10	12.7	1
2.30±0.10	16	1	4.80±0.10	3.9 ~ 17.8	1
2.40±0.10	20	1	4.90±0.10	6.4	1
2.50±0.10	2.5 ~ 10	1	5.00±0.10	9 ~ 38	1
2.67±0.10	10	1	5.20±0.10	3.65 ~ 7.15	1
2.85±0.10	10	1	5.30±0.10	7.1	1
2.90±0.10	5.3 ~ 12	1	5.40±0.10	5.58	1
3.17±0.10	12	1	5.50±0.10	6.8 ~ 8	1
3.20±0.15	20	1	5.65±0.10	4.2	1
3.50±0.10	7.5 ~ 25	1	5.80±0.10	7.9	1
3.55±0.10	2.9	1	5.85±0.10	11 ~ 30	1
3.65±0.10	2.4	1	6.00±0.15	8 ~ 40	1

R CORE系列（续） R ROD CORE SERIES

尺寸范围（依外形与外径）尺寸规格列表（续） DIMENSION RANGES (BY TYPE & OD) — DIMENSION LIST

外径 A OD A (mm)	长度 D 范围 Length D range (mm)	Fig	外径 A OD A (mm)	长度 D 范围 Length D range (mm)	Fig
6.10±0.10	9.1	1	10.00±0.15	16～40	1
6.20±0.15	23.5	1	11.00±0.15	5.8～37	1
6.30±0.10	9.2	1	11.70±0.15	4	1
6.35±0.15	6.5～40	1	11.80±0.15	7.2～32	1
6.40±0.10	6.35	1	11.85±0.15	9	1
6.43±0.15	13.6	1	12.00±0.20	12～20	1
6.50±0.15	10.25～30	1	12.70±0.20	5.8～27	1
7.00±0.15	9～40	1	13.00±0.15	7	1
7.20±0.10	22	1	14.00±0.15	5.25～25	1
7.50±0.10	7.9～25	1	14.20±0.20	15	1
8.00±0.15	20～40	1	14.30±0.20	42	1
8.38±0.10	6.6	1	14.50±0.20	6.75	1
8.40±0.10	10	1	15.00±0.20	14～35	1
8.70±0.10	4.2	1	16.00±0.25	18	1
8.80±0.15	30	1	18.00±0.25	18	1
9.35±0.15	25	1	19.00±0.25	38	1
9.50±0.15	19～43	1	21.00±0.30	35	1
9.52±0.15	25.4	1	25.70±0.35	25	1
9.53±0.15	31.75～44	1	3.00±0.10	1.3～38	2
9.60±0.10	6	1	7.60±0.10	28.5～40	2
9.75±0.10	6.9	1	7.70±0.10	6.2	2
9.80±0.10	11～25	1	7.80±0.10	7～18	2
9.85±0.15	16	1	7.90±0.10	8.9～15	2
9.90±0.15	16	1	8.00±0.10	8.06～10	2

备注：品名规则 R{外径A}×{长度D}；长度 D 可依需求后段加工调整，表列范围外请洽询。
Note: P/N rule R{OD A}×{length D}; length D is adjustable by post-machining — sizes outside the listed range on request.

ROO系列 外形尺寸图 ROO ROD CORES — OUTLINE DRAWINGS

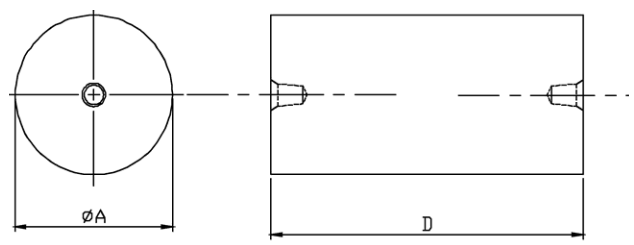


Fig.1

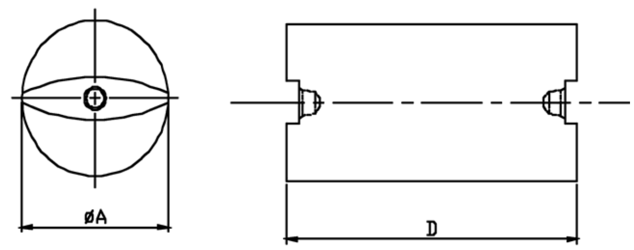


Fig.2

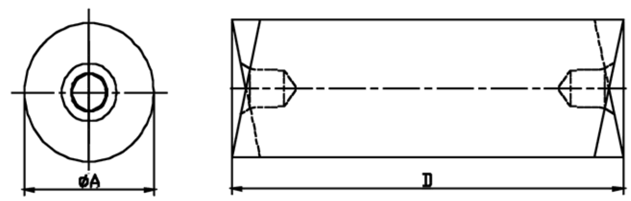


Fig.3

ROO系列 尺寸规格列表 ROO ROD CORES — DIMENSION LIST

品名 Product name	A (mm)	D (mm)	Fig	品名 Product name	A (mm)	D (mm)	Fig
ROO1.32×3.96T	1.32±0.10	3.96±0.20	2	ROO3×12	3.00±0.10	12.00±0.25	1
ROO1.56×4.7T	1.56±0.10	4.75±0.20	2	ROO3.17×15.5T	3.17±0.10	15.50±0.30	2
ROO1.56×4.8T	1.56±0.10	4.80±0.20	2	ROO3.18×15.87T	3.18±0.10	15.87±0.30	2
ROO1.75×8	1.75±0.10	8.00±0.20	1	ROO3.2×15T	3.20±0.10	15.00±0.30	2
ROO1.78×4.32T	1.78±0.10	4.32±0.20	2	ROO3.3×10T	3.30±0.10	10.00±0.20	2
ROO1.9×6	1.90±0.10	6.00±0.20	1	ROO3.5×11T	3.50±0.10	11.00±0.20	2
ROO1.9×6.5	1.90±0.10	6.50±0.20	1	ROO3.5×17.5	3.50±0.10	17.50±0.35	1
ROO1.91×8.18T	1.91±0.10	8.18±0.20	2	ROO3.5×22T	3.50±0.10	22.00±0.50	2
ROO2×9	2.00±0.10	9.00±0.20	1	ROO3.6×18T	3.60±0.10	18.00±0.40	2
ROO2×14T	2.00±0.10	14.00±0.25	2	ROO3.96×19.05T	3.96±0.10	19.05±0.40	2
ROO2.5×4.2T	2.50±0.10	4.20±0.15	2	ROO4×9.5	4.00±0.10	9.50±0.20	1
ROO2.72×7.87	2.72±0.10	7.87±0.20	1	ROO4×14T	4.00±0.10	14.00±0.25	2
ROO2.72×7.92T	2.72±0.10	7.92±0.20	2	ROO4×15	4.00±0.10	15.00±0.30	1
ROO2.72×8.0T	2.72±0.10	8.00±0.20	2	ROO4×20T	4.00±0.10	20.00±0.40	2
ROO2.8×8T	2.80±0.10	8.00±0.20	2	ROO4.6×15.8	4.60±0.15	15.80±0.30	1
ROO3×6	3.00±0.10	6.00±0.20	1	ROO4.8×20T	4.80±0.15	20.00±0.40	2
ROO3×6T	3.00±0.10	6.00±0.20	2	ROO5×15	5.00±0.15	15.00±0.30	1
ROO3×8T	3.00±0.10	8.00±0.20	2	ROO5×20	5.00±0.15	20.00±0.40	1

ROO系列（续） ROO ROD CORES

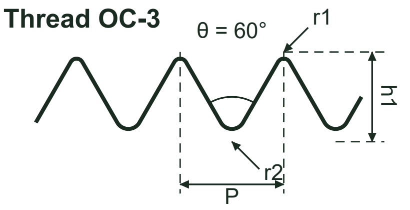
ROO系列 尺寸规格列表（续） ROO ROD CORES — DIMENSION LIST

品名 Product name	A (mm)	D (mm)	Fig	品名 Product name	A (mm)	D (mm)	Fig
ROO5.1×20ST	5.10+0.00/-0.20	20.00 +0.00/-0.60	3	ROO6.35×25.4T	6.35±0.15	25.40±0.50	2
ROO6×15	6.00±0.15	15.00±0.30	1	ROO6.35×31.75T	6.35±0.15	31.75±0.60	2
ROO6×24	6.00±0.15	24.00±0.50	1	ROO6.50×20T	6.50±0.15	20.00±0.40	2
ROO6×30	6.00±0.15	30.00±0.60	1	ROO8×30	8.00±0.15	30.00±0.60	1
ROO6×24.7ST	6.10+0.00/-0.20	25.00 +0.00/-0.60	3	ROO8×31.75	8.00±0.15	31.75±0.60	1
ROO6.35×22.2	6.35±0.15	22.20±0.50	1	ROO9.45×25.4T	9.53±0.20	25.40±0.50	2

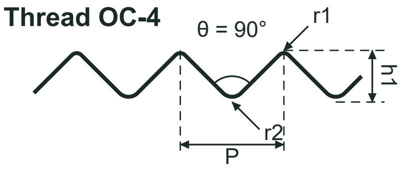
MEMO

螺纹磁芯系列 THREADED CORES

螺牙牙型图 THREAD SHAPES



牙型 Thread shape (Thread OC-3)



牙型 Thread shape (Thread OC-4)

螺牙尺寸标准 THREAD STANDARD

牙型 Thread	节距 P Pitch P (mm)	咬合深度 h1 Depth h1 (mm)	牙角 θ Degree θ (°)	牙顶圆角 r1 Crest radius r1 (mm)	牙底圆角 r2 Root radius r2 (mm)
OC-3	0.50±0.03	0.23+0.10/-0.05	60±5	0.08+0	0.22
OC-3	0.60±0.03	0.28+0.10/-0.03	60±5	0.08+0	0.22
OC-3	0.75±0.03	0.35+0.14/-0.03	60±5	0.08+0	0.22
OC-3	1.00±0.03	0.47+0.12/-0.03	60±5	0.08+0	0.22
OC-4	0.50±0.03	0.17+0.06/-0.03	90+3/-5	0.05+0	0.15
OC-4	0.60±0.03	0.20+0.08/-0.03	90+3/-5	0.05+0	0.15
OC-4	0.80±0.03	0.23±0.10	90±3	0.09+0	0.15

TH 系列 产品编码 TH — ORDERING CODE SYSTEM

TH	Q1C1	TH	6.18×19	S4
	适用材质 Available material	形状符号 Configuration symbol	外径(A) × 长度(D) OD (A) × Length (D)	辅助符号 Auxiliary symbol

尺寸范围 Dimension — TH：外径 OD (A) 2.6 ~ 7.5、长度 Length (D) 3.9 ~ 44

THP 系列 产品编码 THP — ORDERING CODE SYSTEM

THP	Q1C1	THP	7.5×6.5	PS2(OC-3)
	适用材质 Available material	形状符号 Configuration symbol	外径(A) × 长度(D) OD (A) × Length (D)	辅助符号 Auxiliary symbol

尺寸范围 Dimension — THP：外径 OD (A) 5.7 ~ 8.75、长度 Length (D) 4.6 ~ 8.5

TH 系列 外形尺寸图 TH THREADED CORES — OUTLINE DRAWINGS

Standard

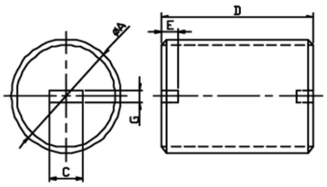


Fig.1

S8

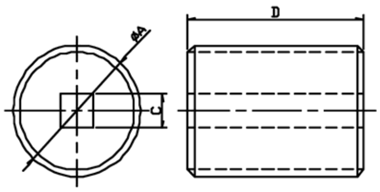


Fig.2

S4

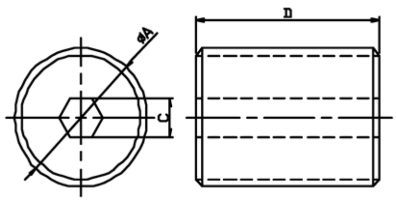


Fig.3

S14

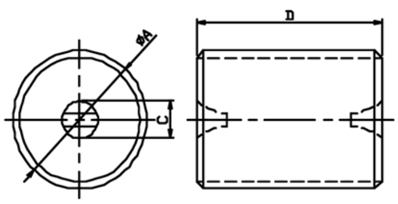


Fig.4

S1

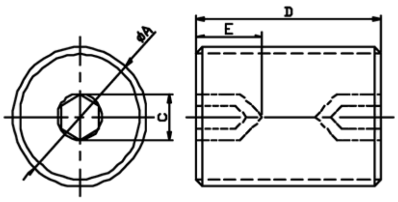


Fig.5

TH 系列 尺寸规格列表 TH THREADED CORES — DIMENSION LIST

品名 Product name	A (mm)	C (mm)	D (mm)	E (mm)	G (mm)	Fig
TH2.6×4.4	2.60±0.03	1.10±0.10	4.40±0.10	0.60±0.10	0.40±0.10	1
TH3.18×5	3.18±0.03	1.30±0.10	5.00±0.10	1.20±0.10	0.70±0.10	1
TH3.2×5S8	3.20±0.03	1.00±0.07	5.00±0.10	/	/	2
TH3.2×3.9	3.20±0.03	1.30±0.10	3.90±0.10	1.20±0.10	0.70±0.10	1
TH3.2×5.5	3.20±0.03	1.30±0.10	5.50±0.10	1.20±0.10	0.70±0.10	1
TH3.2×3S14	3.20±0.03	1.60±0.15	3.00±0.10	1.00±0.10	0.90±0.10	4
TH3.2×5S14	3.20±0.03	1.60±0.15	5.00±0.10	1.00±0.10	0.90±0.10	4
TH3.3×6	3.28±0.03	1.30±0.10	6.00±0.10	1.20±0.10	0.70±0.10	1
TH3.5×7.75	3.50±0.03	1.55±0.10	7.75±0.10	1.00±0.10	0.55±0.10	1
TH3.66×8	3.66±0.03	1.50±0.10	8.00±0.15	1.20±0.10	0.80±0.10	1
TH3.7×8S8	3.70±0.03	1.50±0.10	8.00±0.15	/	/	2
TH3.9×5	3.90±0.03	1.50±0.15	5.00±0.10	1.20±0.10	0.80±0.10	1
TH4×6	4.00±0.03	1.50±0.10	6.00±0.10	1.20±0.10	0.80±0.10	1
TH4.5×15S4	4.50±0.03	2.00±0.10	15.00±0.30	/	/	3
TH4.6×6S8	4.60±0.03	1.50±0.10	6.00±0.10	/	/	2
TH4.6×6S4	4.60±0.03	2.00±0.10	6.00±0.10	/	/	3
TH4.6×9.53S4	4.60±0.03	2.00±0.10	9.53±0.20	/	/	3
TH4.6×8S14	4.60±0.03	2.60±0.15	8.00±0.15	1.70±0.10	1.00±0.10	4
TH5.7×15	5.70±0.03	2.40±0.15	15.00±0.30	1.20±0.15	1.15±0.10	1

螺纹磁芯系列（续） THREADED CORES

鐵研 TAK

TH 系列尺寸规格列表（续） TH THREADED CORES — DIMENSION LIST

品名 Product name	A (mm)	C (mm)	D (mm)	E (mm)	G (mm)	Fig
TH5.85×8	5.85±0.03	2.40±0.15	8.00±0.20	1.25±0.15	1.20±0.10	1
TH6×9	6.00±0.03	2.40±0.15	9.00±0.15	1.30±0.15	1.15±0.10	1
TH6×20S4	6.00±0.03	2.70±0.10	20.00±0.40	/	/	3
TH6.18×19S4	6.18±0.03	2.70±0.10	19.00±0.40	/	/	3
TH6.18×25S4	6.18±0.03	2.70±0.10	25.00±0.50	/	/	3
TH6.25×20S4	6.25±0.03	2.70±0.10	20.00±0.40	/	/	3
TH6.25×28S4	6.25±0.03	2.70±0.10	28.00±0.60	/	/	3
TH6.3×25.4S4	6.30±0.03	2.70±0.10	25.40±0.60	/	/	3
TH7.5×36S1	7.50±0.03	2.70±0.10	36.00±0.60	8.30±0.20	/	5

MEMO

螺纹磁芯系列（续） THREADED CORES

THP 系列 外形尺寸图 THP THREADED CORES — OUTLINE DRAWINGS

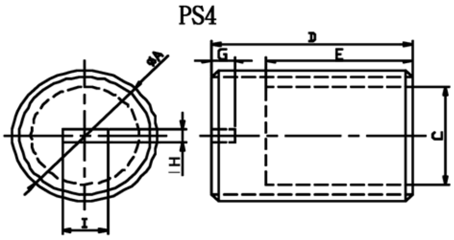


Fig.6

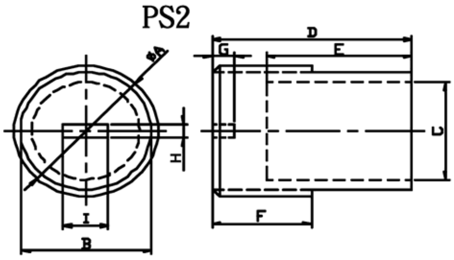


Fig.7

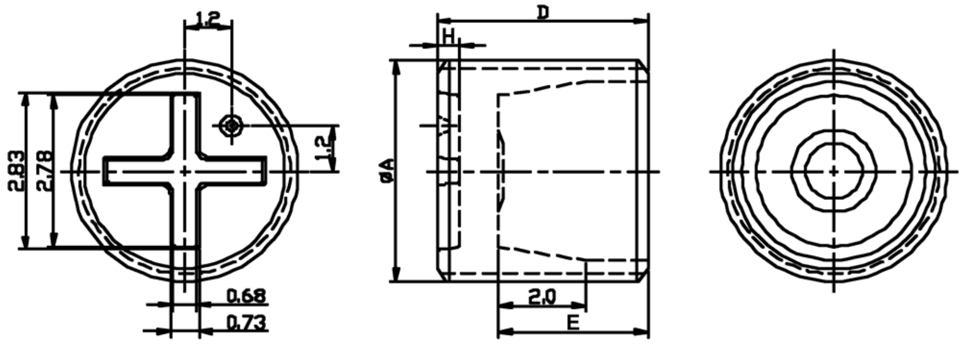


Fig.8

THP 系列 尺寸规格列表 THP THREADED CORES — DIMENSION LIST

品名 Product name	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	H (mm)	I (mm)	Fig
THP4.4×2.6PS5	4.40 ±0.03	/	3.40±0.10	2.60±0.10	1.70±0.15	/	0.50±0.15	0.54±0.15	2.64±0.15	6
THP5×2.8PS4	5.00±0.03	/	4.00±0.15	2.80±0.10	1.80±0.15	/	/	/	/	8
THP5.7×5.3PS2	5.70 +0.06/-0.00	5.40 +0.05/-0.15	4.20 +0.20/-0.15	5.30±0.15	4.00±0.15	3.00 +0.50/-0.00	0.80±0.15	0.60±0.15	3.60±0.15	7
THP5.8×5.3PS2	5.80 +0.08/-0.00	5.40 +0.10/-0.15	4.25±0.15	5.30±0.15	3.00±0.15	3.00 +0.50/-0.00	0.65±0.15	0.60±0.15	3.60±0.15	7
THP5.95×2.7PS4	5.95±0.03	/	4.60±0.15	2.70±0.20	1.20±0.15	/	1.00±0.15	0.60±0.10	3.60±0.15	6
THP6.07×4.6PS2	6.07±0.03	5.50±0.15	4.20 +0.20/-0.10	4.60±0.15	2.10±0.15	3.20±0.20	1.15±0.15	1.75±0.15	/	7
THP6.49×5.7PS4	6.49±0.03	/	5.28±0.15	5.70±0.20	3.35±0.20	/	0.80±0.15	0.80±0.15	4.00±0.15	6
THP6.5×5.7PS2	6.50±0.03	6.00 +0.15/-0.10	5.00±0.15	5.70±0.20	4.40 ±0.20	4.30±0.30	0.80±0.15	0.70±0.15	3.90±0.15	7
THP7.41×6.5PS2	7.41±0.15	6.70±0.20	5.40±0.20	6.50±0.20	4.15±0.15	4.30±0.20	0.95±0.15	0.90±0.15	4.90±0.15	7
THP7.5×6.5PS2	7.45±0.03	6.80 +0.10/-0.30	5.35±0.20	6.50±0.20	4.15±0.20	5.30±0.30	0.90±0.15	0.80±0.15	4.80±0.20	7
THP7.5×6.5PS4	7.45 +0.00/-0.08	/	5.60±0.20	6.50±0.20	4.15±0.20	/	0.90±0.20	0.80±0.15	4.80±0.15	6
THP8.75×8.5PS4	8.47±0.03	/	6.80±0.10	8.50±0.20	6.60±0.20	/	1.00±0.20	1.00±0.20	5.00±0.20	6

THP 系列 尺寸规格列表（续） THP THREADED CORES — DIMENSION LIST

品名 Product name	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	H (mm)	I (mm)	Fig
THP8.7×9PS2	8.70±0.03	8.20±0.20	6.70 +0.25/-0.20	9.00±0.25	6.90±0.20	6.00±0.30	1.00±0.15	1.05±0.15	5.05±0.15	7
THP8.75×8.50PS2	8.75±0.03	8.00 +0.20/-0.30	6.30 +0.20/-0.00	8.50±0.20	6.40±0.20	4.30±0.30	1.00±0.20	0.80±0.10	4.80±0.15	7

MEMO

EMI 抑制类

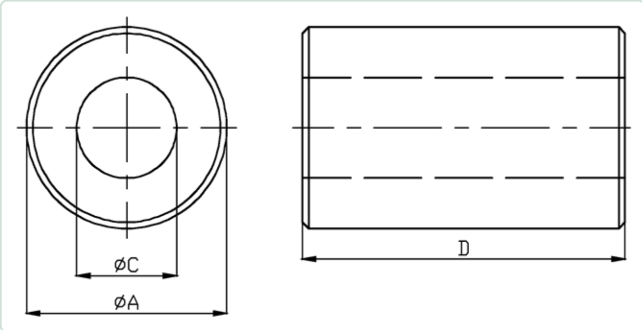
EMI SUPPRESSION CORES

抑制用磁珠、异形磁芯与新能源车用系列。

Suppression beads, shaped cores and EV-application series.

本章系列 SERIES IN THIS CHAPTER

RH系列 外形尺寸图 RH BEAD CORES — OUTLINE DRAWINGS



RH系列 尺寸规格列表 RH BEAD CORES — DIMENSION LIST

品名 Product name	A (mm)	C (mm)	D (mm)	品名 Product name	A (mm)	C (mm)	D (mm)
RH1.8×0.8×6	1.80±0.10	0.80±0.10	6.00±0.10	RH4×2×10	4.00±0.10	2.00±0.10	10.00±0.20
RH2×1.05×3.8	2.00±0.10	1.05±0.10	3.80±0.10	RH4×2.2×25	4.00±0.10	2.20±0.10	25.00±0.50
RH2.5×0.8×4	2.50±0.10	0.80±0.10	4.00±0.10	RH4.1×1.6×4	4.10±0.10	1.60±0.10	4.00±0.10
RH2.5×1×1.48	2.50±0.10	1.00±0.10	1.48±0.10	RH4.1×2×5	4.10±0.10	2.00±0.10	5.00±0.10
RH3×1×4	3.00±0.10	1.00±0.10	4.00±0.10	RH4.5×3×15	4.50±0.10	3.00±0.10	15.00±0.30
RH3×1.2×4	3.00±0.10	1.20±0.10	4.00±0.10	RH5×1.5×6	5.00±0.10	1.50±0.10	6.00±0.10
RH3.5×0.65×6.7	3.50±0.10	0.65±0.10	6.70±0.10	RH5×2×19	5.00±0.10	2.00±0.10	19.00±0.40
RH3.5×0.7×3.6	3.50±0.10	0.70±0.10	3.60±0.10	RH5×2.4×6	5.00±0.10	2.40±0.10	6.00±0.10
RH3.5×0.8×3	3.50±0.10	0.80±0.10	3.00±0.10	RH5×2.5×12.7	5.00±0.10	2.50±0.10	12.70±0.25
RH3.5×0.85×5	3.50±0.10	0.85±0.10	5.00±0.10	RH5.08×1.57×11	5.08±0.10	1.57±0.10	11.00±0.15
RH3.5×0.86×11.4	3.50±0.10	0.86±0.10	11.40±0.15	RH5.1×1.5×4	5.10±0.10	1.50±0.10	4.00±0.10
RH3.5×1×6	3.50±0.10	1.00±0.10	6.00±0.10	RH5.1×1.58×11.1	5.10±0.10	1.58±0.10	11.10±0.20
RH3.5×1.2×6	3.50±0.10	1.20±0.10	6.00±0.10	RH5.33×2.5×6.35	5.33±0.10	2.50±0.10	6.35±0.10
RH3.5×1.3×3.25	3.50±0.10	1.30±0.10	3.25±0.10	RH5.7×1.5×8	5.70±0.10	1.50±0.10	8.00±0.10
RH3.5×1.5×2	3.50±0.10	1.50±0.10	2.00±0.10	RH6×1×3	6.00±0.10	1.00±0.10	3.00±0.10
RH3.5×1.8×4.7	3.50±0.10	1.80±0.10	4.70±0.10	RH6×2.5×30	6.00±0.10	2.50±0.10	30.00±0.60
RH3.5×2×15	3.50±0.10	2.00±0.10	15.00±0.30	RH6×2.8×10	6.00±0.10	2.80±0.10	10.00±0.20
RH3.55×1.78×3.1	3.55±0.10	1.78±0.10	3.10±0.10	RH6×3×9.8	6.00±0.10	3.00±0.10	9.80±0.15
RH3.6×0.8×5.3	3.60±0.10	0.80±0.10	5.30±0.10	RH6.35×3.18×25.4	6.35±0.15	3.18±0.15	25.40±0.50
RH3.94×1.78×3.81	3.94±0.10	1.78±0.10	3.81±0.10	RH6.35×3.70×6.35	6.35±0.10	3.70±0.10	6.35±0.10
RH4×1.2×3.5	4.00±0.10	1.20±0.10	3.50±0.10	RH6.5×4.3×10	6.50±0.10	4.30±0.10	10.00±0.20
RH4×1.5×3	4.00±0.10	1.50±0.10	3.00±0.10	RH6.6×3.28×10	6.60±0.10	3.28±0.10	10.00±0.20
RH4×2×6	4.00±0.10	2.00±0.10	6.00±0.10	RH7×4×14.3	7.00±0.10	4.00±0.10	14.30±0.20

RH系列 尺寸规格列表（续） RH BEAD CORES — DIMENSION LIST

品名 Product name	A (mm)	C (mm)	D (mm)	品名 Product name	A (mm)	C (mm)	D (mm)
RH7.5×2.38×7.55	7.50±0.10	2.38±0.10	7.55±0.15	RH12×5.35×14.4	12.00±0.15	5.35±0.15	14.40±0.25
RH7.8×4×12.7	7.80±0.10	4.00±0.10	12.70±0.15	RH12×5.4×13.4	12.00±0.15	5.40±0.15	13.40±0.25
RH8×3×14	8.00±0.10	3.00±0.10	14.00±0.25	RH12×5.6×6	12.00±0.10	5.60±0.10	6.00±0.10
RH8×3×30	8.00±0.10	3.00±0.10	30.00±0.60	RH12×6×6	12.00±0.10	6.00±0.10	6.00±0.10
RH8×4×13	8.00±0.10	4.00±0.10	13.00±0.25	RH12×6.3×15	12.00±0.15	6.30±0.15	15.00±0.30
RH8×5.8×5	8.00±0.10	5.80±0.10	5.00±0.15	RH12×6.5×15	12.00±0.15	6.50±0.15	15.00±0.30
RH8.9×5.35×13.9	8.90±0.10	5.35±0.10	13.90±0.25	RH12×7×15	12.00±0.15	7.00±0.15	15.00±0.30
RH9×3.2×13.5	9.00±0.10	3.20±0.10	13.50±0.25	RH12×7.3×5	12.00±0.15	7.30±0.15	5.00±0.10
RH9×3.5×14	9.00±0.15	3.50±0.10	14.00±0.25	RH12×8×15.7	12.00±0.15	8.00±0.15	15.70±0.30
RH9.5×2.6×20.95	9.50±0.15	2.60±0.15	20.95±0.40	RH12.3×5.07×12.7	12.30±0.15	5.07±0.15	12.70±0.25
RH9.5×2.8×20.95	9.50±0.15	2.80±0.15	20.95±0.40	RH12.3×5.08×12.7	12.30±0.15	5.08±0.15	12.70±0.25
RH9.5×4.7×7.5	9.50±0.15	4.70±0.10	7.50±0.15	RH12.7×7.9×6.35	12.70±0.15	7.90±0.15	6.35±0.15
RH9.5×4.9×10.5	9.50±0.10	4.90±0.10	10.50±0.20	RH12.7×8×12.7	12.70±0.15	8.00±0.15	12.70±0.25
RH9.5×4.9×19.05	9.50±0.10	4.90±0.10	19.05±0.35	RH12.7×8.5×15	12.70±0.15	8.50±0.15	15.00±0.30
RH9.5×5×13	9.50±0.10	5.00±0.10	13.00±0.25	RH12.8×5×25	12.80±0.15	5.00±0.15	25.00±0.50
RH9.5×5.2×9.5	9.50±0.15	5.20±0.10	9.50±0.20	RH12.8×8×15	12.80±0.15	8.00±0.15	15.00±0.30
RH9.5×5.2×10	9.50±0.10	5.20±0.10	10.00±0.20	RH13×3.2×13.5	13.00±0.20	3.20±0.20	13.50±0.25
RH9.52×5.08×10.4	9.52±0.10	5.08±0.10	10.40±0.20	RH13×5.35×18.4	13.00±0.20	5.35±0.20	18.40±0.40
RH9.7×4.7×10	9.70±0.10	4.70±0.10	10.00±0.20	RH13×8×15	13.00±0.20	8.00±0.15	15.00±0.30
RH10×4.5×15.4	10.00±0.10	4.50±0.10	15.40±0.30	RH13.5×3.5×12.6	13.50±0.20	3.50±0.15	12.60±0.25
RH10×6×10	10.00±0.10	6.00±0.10	10.00±0.20	RH13.9×7.2×28.5	13.90±0.20	7.20±0.20	28.50±0.55
RH10.2×5.5×10.3	10.20±0.15	5.50±0.15	10.30±0.20	RH14×6×15.4	14.00±0.20	6.00±0.20	15.40±0.30
RH10.5×2.6×15.7	10.50±0.15	2.60±0.15	15.70±0.30	RH14×6.6×28.5	14.00±0.20	6.60±0.20	28.50±0.50
RH10.5×3.08×20	10.50±0.15	3.08±0.15	20.00±0.20	RH14×8.5×28	14.00±0.20	8.50±0.20	28.00±0.50
RH10.5×5.15×20	10.50±0.15	5.15±0.15	20.00±0.40	RH14.2×6.15×28.5	14.20±0.20	6.15±0.20	28.50±0.50
RH10.5×5.5×20	10.50±0.15	5.50±0.15	20.00±0.40	RH14.2×6.3×26	14.20±0.20	6.30±0.20	26.00±0.50
RH10.5×5.6×20	10.50±0.15	5.60±0.15	20.00±0.40	RH14.2×7.2×15	14.20±0.20	7.20±0.20	15.00±0.30
RH11×3.2×13	11.00±0.15	3.20±0.15	13.00±0.25	RH14.2×8.2×23.5	14.20±0.20	8.20±0.20	23.50±0.50
RH11×3.5×16	11.00±0.15	3.50±0.15	16.00±0.30	RH14.3×6.35×28.6	14.30±0.20	6.35±0.20	28.60±0.50
RH11×4×14.3	11.00±0.15	4.00±0.15	14.30±0.25	RH14.3×7.3×28.5	14.30±0.20	7.30±0.20	28.50±0.50
RH11.5×5.5×18.5	11.50±0.15	5.50±0.15	18.50±0.40	RH14.5×6×28	14.50±0.25	6.00±0.25	28.00±0.50
RH11.5×5.6×28.5	11.50±0.20	5.60±0.20	28.50±0.50	RH14.5×6.35×28.5	14.50±0.25	6.35±0.20	28.50±0.50

RH系列 尺寸规格列表（续） RH BEAD CORES — DIMENSION LIST

品名 Product name	A (mm)	C (mm)	D (mm)	品名 Product name	A (mm)	C (mm)	D (mm)
RH14.5×6.6×28	14.50±0.25	6.60±0.20	28.00±0.50	RH17.5×10.6×28.5	17.50±0.30	10.60±0.30	28.50±0.50
RH14.5×7.2×28.5	14.50±0.25	7.20±0.20	28.50±0.50	RH17.5×10.7×28.5	17.50±0.30	10.70±0.30	28.50±0.50
RH14.5×7.3×23.5	14.50±0.25	7.30±0.20	23.50±0.40	RH18.5×12.5×29	18.50±0.20	12.50±0.15	29.00±0.60
RH14.5×8.2×28.5	14.50±0.25	8.20±0.20	28.50±0.50	RH18.7×10.15×28.6	18.70±0.35	10.15±0.35	28.60±0.50
RH14.5×8.5×28	14.50±0.25	8.50±0.20	28.00±0.50	RH19×5.3×17.85	19.00±0.35	5.30±0.20	17.85±0.30
RH15.5×7.3×28.5	15.50±0.25	7.30±0.20	28.50±0.50	RH19×13×28	19.00±0.30	13.00±0.30	28.00±0.50
RH15.7×7.3×28.5	15.70±0.25	7.30±0.25	28.50±0.50	RH19×13×29	19.00±0.40	13.00±0.35	29.00±0.50
RH15.88×7.9×28.6	15.88±0.30	7.90±0.30	28.60±0.50	RH20×4.83×19	20.00±0.30	4.83±0.30	19.00±0.40
RH15.9×7.9×28.5	15.90±0.25	7.90±0.25	28.50±0.50	RH20×5.6×24.4	20.00±0.40	5.60±0.35	24.40±0.40
RH16×5.35×18.4	16.00±0.25	5.35±0.25	18.40±0.40	RH20.5×11.5×29	20.50±0.40	11.50±0.35	29.00±0.50
RH16×8×16	16.00±0.25	8.00±0.20	16.00±0.35	RH20.7×4.83×28.9	20.70±0.35	4.83±0.20	28.90±0.50
RH16×9×28	16.00±0.25	9.00±0.25	28.00±0.50	RH21×4×18	21.00±0.40	4.00±0.25	18.00±0.30
RH16×9×28.5	16.00±0.25	9.00±0.30	28.50±0.50	RH21×4×29.2	21.00±0.40	4.00±0.20	29.20±0.50
RH16.9×5.1×15.4	16.90±0.25	5.10±0.15	15.40±0.30	RH21×4.4×18.1	21.00±0.40	4.40±0.25	18.10±0.30
RH16.9×5.3×15.4	16.90±0.15	5.30±0.15	15.40±0.30	RH21×5×29	21.00±0.40	5.00±0.25	29.00±0.40
RH17×4.2×19.6	17.00±0.25	4.20±0.20	19.60±0.40	RH21×6.5×19.4	21.00±0.30	6.50±0.25	19.40±0.40
RH17×4.5×18.4	17.00±0.25	4.50±0.20	18.40±0.40	RH25×15×12	25.00±0.40	15.00±0.40	12.00±0.40
RH17×4.6×13.4	17.00±0.25	4.60±0.15	13.40±0.30	RH25.7×12.7×7.28	25.70±0.40	12.70±0.40	7.28±0.30
RH17×9.5×28	17.00±0.30	9.50±0.25	28.00±0.50	RH25.7×13×28.5	25.70±0.40	13.00±0.40	28.50±0.60
RH17.02×9.1×30	17.02±0.30	9.10±0.25	30.00±0.50	RH25.9×12.83×28.6	25.90±0.50	12.83±0.40	28.60±0.60
RH17.45×9.5×28.6	17.45±0.30	9.50±0.30	28.60±0.50	RH25.9×12.9×28.5	25.90±0.40	12.90±0.40	28.50±0.60
RH17.5×9.5×12.7C	17.50±0.20	9.50±0.20	12.70±0.30	RH26×13×28.5	26.00±0.50	13.00±0.40	28.50±0.60
RH17.5×9.5×12.7	17.50±0.25	9.50±0.30	12.70±0.25	RH27×6.5×27	27.00±0.60	6.50±0.30	27.00±0.60
RH17.5×9.5×28.5	17.50±0.20	9.50±0.20	28.50±0.50	RH27×7×29	27.00±0.60	7.00±0.30	29.00±0.60
RH17.5×9.65×28.5	17.50±0.30	9.65±0.30	28.50±0.50	RH27.3×6.6×26.6	27.30±0.60	6.60±0.30	26.60±0.60
RH17.5×10×28	17.50±0.30	10.00±0.30	28.00±0.50	RH28.1×14.1×28.6	28.10±0.60	14.10±0.30	28.60±0.60
RH17.5×10.2×12.7	17.50±0.30	10.20±0.30	12.70±0.25				

R6H/R10H/R8H系列 R6H / R10H / R8H CORES

R6H/R10H 系列 外形尺寸图 R6H / R10H SERIES — OUTLINE DRAWINGS

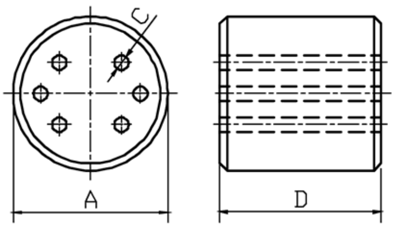


Fig.1

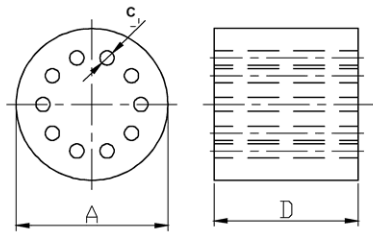


Fig.2

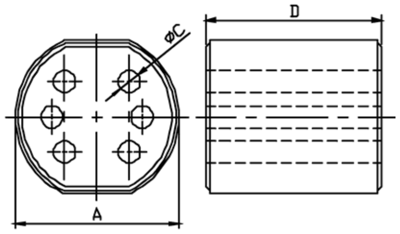
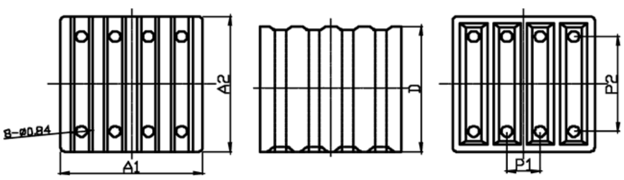


Fig.3

R6H/R10H 系列 尺寸规格列表 R6H / R10H SERIES — DIMENSION LIST

品名 Product name	A (mm)	C (mm)	D (mm)	Fig
R6H6×0.8×10H	6.00±0.20	0.80±0.10	10.00±0.30	3
R6H6×0.85×9.8	6.00±0.20	0.85±0.15	9.80±0.30	1
R6H6×0.85×10	6.00±0.20	0.85±0.15	10.00±0.30	1
R6H6×0.85×10B	6.00±0.20	0.85±0.15	10.00±0.30	1
R6H6×0.9×10	6.00±0.20	0.90±0.15	10.00±0.30	1
R6H6×0.9×10C	6.00±0.20	0.90±0.15	10.00±0.30	1
R6H6.25×0.9×10	6.25±0.20	0.90±0.15	10.00±0.30	1
R10H10×10	10.00±0.20	0.97±0.15	10.00±0.30	2

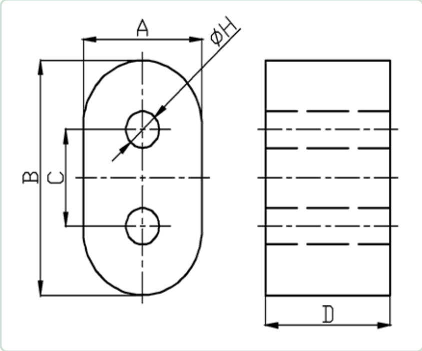
R8H 系列 外形尺寸图 R8H SERIES — OUTLINE DRAWINGS



R8H 系列 尺寸规格列表 R8H SERIES — DIMENSION LIST

品名 Product name	A1 (mm)	A2 (mm)	D (mm)	P1 (mm)	P2 (mm)
SR8H10.8×10.8×10	10.80±0.25	10.80±0.25	10.00±0.30	2.50±0.15	7.60±0.20

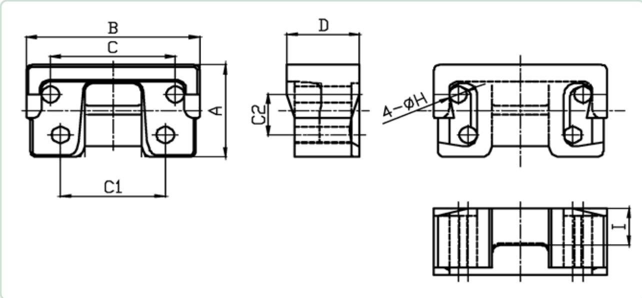
RID 系列 1 外形尺寸图 RID SERIES 1 — OUTLINE DRAWINGS



RID 系列 1 尺寸规格列表 RID SERIES 1 — DIMENSION LIST

品名 Product name	A (mm)	B (mm)	C (mm)	D (mm)	H (mm)
RID1.9×2×3.4	1.90±0.15	3.40±0.15	1.40±0.20	2.00±0.15	0.90±0.15
RID2×1.5×3.5	2.00±0.15	3.50±0.15	1.73±0.20	1.50±0.15	0.90±0.15
RID2×1.8×3.5	2.00±0.15	3.50±0.15	1.80±0.20	1.80±0.15	0.90±0.15
RID2.6×2×5.3	2.60±0.15	5.30±0.15	2.50±0.15	2.00±0.15	1.20±0.15
RID2.6×3.2×5.3	2.60±0.15	5.30±0.15	2.50±0.15	3.20±0.15	1.40±0.15
RID3×2×5.1	3.00±0.15	5.10±0.15	2.60±0.15	2.00±0.15	1.20±0.15
RID3×4×5.1	3.00±0.15	5.10±0.15	2.60±0.15	4.00±0.15	1.20±0.15
RID3×3×6.5	3.00±0.15	6.50±0.15	3.50±0.15	3.00±0.15	1.15±0.15
RID3×3.5×6.5	3.00±0.15	6.50±0.15	3.50±0.15	3.50±0.15	1.20±0.15
RID4×6×6.9	4.00±0.15	6.90±0.15	2.90±0.15	6.00±0.15	1.90±0.15
RID5.35×8×9.4	5.35±0.15	9.40±0.20	5.30±0.20	8.00±0.20	2.60±0.15
RID6.5×4×12	6.50±0.20	12.00±0.20	5.00±0.20	4.00±0.20	4.00±0.20
RID7.5×6.6×13.3	7.50±0.20	13.30±0.30	5.70±0.20	6.60±0.20	3.80±0.20
RID7.5×4×13.3	7.50±0.20	13.30±0.30	5.80±0.20	4.00±0.20	4.20±0.20
RID7.5×7×13.3	7.50±0.20	13.30±0.30	5.80±0.20	7.00±0.20	4.20±0.20
RID7.5×10.3×13.3	7.50±0.20	13.30±0.30	5.80±0.20	10.30±0.20	4.20±0.20
RID8.5×14×14	8.50+0.00/-0.50	14.00±0.30	5.70±0.20	14.00±0.20	3.50±0.20

RID 系列 2 外形尺寸图 RID SERIES 2 — OUTLINE DRAWINGS



RID 系列 2 尺寸规格列表 RID SERIES 2 — DIMENSION LIST

品名 Product name	A (mm)	B (mm)	C (mm)	C1 (mm)	C2 (mm)	D (mm)	H (mm)	I (mm)
RID2.5×1.8×4.3A	2.50±0.05	4.30±0.075	3.10±0.05	2.60±0.05	1.10±0.05	1.80±0.05	0.44±0.05	1.00±0.05

RID 系列 3 外形尺寸图 RID SERIES 3 — OUTLINE DRAWINGS

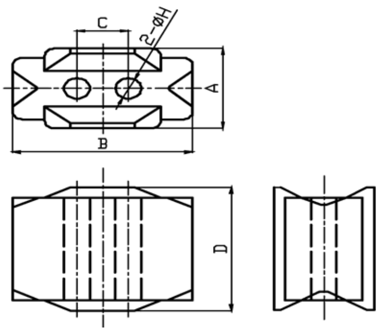


Fig.1

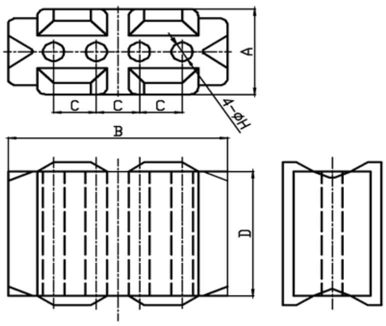


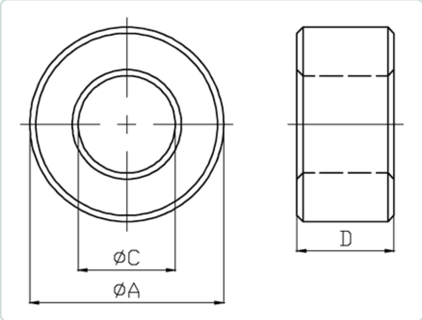
Fig.2

RID 系列 3 尺寸规格列表 RID SERIES 3 — DIMENSION LIST

品名 Product name	A (mm)	B (mm)	C (mm)	D (mm)	H (mm)	Fig
RID1.55×2.4×2.8 H0.4	1.55±0.05	2.80±0.075	0.80±0.05	2.40±0.05	0.40±0.05	1
RID1.85×3.1×4.1 H0.4	1.85±0.05	4.10±0.075	0.80±0.05	3.10±0.05	0.40±0.05	2

T CORE系列 T (TOROID) CORES

T CORE系列 外形尺寸图 T (TOROID) CORES — OUTLINE DRAWINGS



T CORE系列 尺寸规格列表 T (TOROID) CORES — DIMENSION LIST

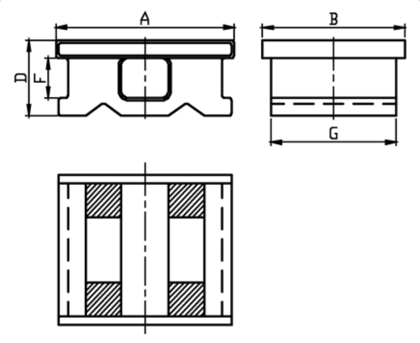
品名 Product name	A (mm)	C (mm)	D (mm)	品名 Product name	A (mm)	C (mm)	D (mm)
T2.54×1.27×1.27	2.54±0.10	1.27±0.10	1.27±0.10	T9.5×4.75×3.17	9.50±0.20	4.75±0.10	3.17±0.10
T3×1×2	3.00±0.10	1.00±0.10	2.00±0.10	T9.5×5×5.05	9.50±0.20	5.00±0.10	5.05±0.10
T3.05×1.27×2.54	3.05±0.10	1.27±0.10	2.54±0.10	T9.65×5.05×5	9.65±0.20	5.05±0.10	5.00±0.10
T3.5×1.7×1.5	3.50±0.10	1.70±0.10	1.50±0.10	T9.8×4.8×3.8	9.80±0.20	4.80±0.10	3.80±0.10
T3.5×2×2	3.50±0.10	2.00±0.10	2.00±0.10	T10×5×5	10.00±0.20	5.00±0.10	5.00±0.10
T4×1.5×3	4.00±0.10	1.50±0.10	3.00±0.10	T10×6×4	10.00±0.20	6.00±0.15	4.00±0.10
T4×2×2	4.00±0.10	2.00±0.10	2.00±0.10	T12×6×4	12.00±0.20	6.00±0.15	4.00±0.10
T4×2.2×1.5	4.00±0.10	2.20±0.10	1.50±0.10	T12.7×7.15×4.78	12.70±0.20	7.15±0.15	4.78±0.10
T4.3×2.8×2.5	4.30±0.10	2.80±0.10	2.50±0.10	T12.7×7.9×6.35	12.70±0.20	7.90±0.15	6.35±0.15
T4.4×2.8×1.35	4.40±0.10	2.80±0.10	1.35±0.10	T13×7.1×4.8	13.00±0.20	7.10±0.15	4.80±0.10
T4.5×3×1.5	4.50±0.10	3.00±0.10	1.50±0.10	T14×7×3	14.00±0.20	7.00±0.15	3.00±0.10
T4.8×2.7×1.5	4.80±0.10	2.70±0.10	1.50±0.10	T14×8×5	14.00±0.20	8.00±0.15	5.00±0.10
T5×2.75×1.6	5.00±0.10	2.75±0.10	1.60±0.10	T14×8×7	14.00±0.20	8.00±0.15	7.00±0.15
T5×3×1.5	5.00±0.10	3.00±0.10	1.50±0.10	T14×8.4×6	14.00±0.20	8.40±0.15	6.00±0.15
T5.08×1.3×3.2	5.08±0.10	1.30±0.10	3.20±0.10	T14×9×5	14.00±0.20	9.00±0.15	5.00±0.10
T5.84×3.05×3.18	5.84±0.10	3.05±0.10	3.18±0.10	T14.6×8.2×5.5	14.60±0.20	8.20±0.15	5.50±0.10
T6×3×3	6.00±0.15	3.00±0.10	3.00±0.10	T15.85×9.2×4.6	15.85±0.30	9.20±0.15	4.60±0.10
T7.6×3.5×3	7.60±0.15	3.50±0.10	3.00±0.10	T16×8×16	16.00±0.30	8.00±0.15	16.00±0.20
T7.6×3.6×4.2	7.60±0.15	3.60±0.10	4.20±0.10	T16×9×5	16.00±0.30	9.00±0.20	5.00±0.10
T7.62×3.18×3.18	7.62±0.15	3.18±0.10	3.18±0.10	T16×9.6×6.3	16.00±0.30	9.60±0.20	6.30±0.15
T8×4×4	8.00±0.15	4.00±0.10	4.00±0.10	T16×11.8×8	16.00±0.30	11.80±0.20	8.00±0.15
T9×5×3	9.00±0.20	5.00±0.10	3.00±0.10	T16.2×9.8×7	16.20±0.30	9.80±0.20	7.00±0.15
T9.4×4.5×12	9.40±0.20	4.50±0.10	12.00±0.10	T16.2×12×8	16.20±0.30	12.00±0.20	8.00±0.15

T CORE系列 尺寸规格列表（续） T (TOROID) CORES — DIMENSION LIST

品名 Product name	A (mm)	C (mm)	D (mm)	品名 Product name	A (mm)	C (mm)	D (mm)
T17×9.6×6.3	17.00±0.30	9.60±0.20	6.30±0.15	T27×14×15	27.00±0.50	14.00±0.30	15.00±0.30
T17×10.7×6.8	17.00±0.30	10.70±0.20	6.80±0.15	T28×16×13	28.00±0.50	16.00±0.35	13.00±0.25
T17.5×9.5×6.3	17.50±0.30	9.50±0.20	6.30±0.15	T29×19×7.5	29.00±0.60	19.00±0.40	7.50±0.15
T18×10×10	18.00±0.30	10.00±0.20	10.00±0.15	T31×19×7	31.00±0.60	19.00±0.40	7.00±0.20
T20×10×10	20.00±0.30	10.00±0.20	10.00±0.15	T31×19×13	31.00±0.60	19.00±0.40	13.00±0.25
T21.5×9.6×11.3	21.50±0.30	9.60±0.20	11.30±0.20	T33×20×9.5	33.00±0.60	20.00±0.40	9.50±0.20
T21.5×10.3×11.7	21.50±0.30	10.30±0.20	11.70±0.20	T36×23×10	36.00±0.80	23.00±0.45	10.00±0.20
T22×14×8	22.00±0.40	14.00±0.25	8.00±0.15	T38×19×12.7	38.00±0.80	19.00±0.40	12.70±0.25
T22.1×13.7×15	22.10±0.40	13.70±0.25	15.00±0.30	T48×32×17	48.00±1.00	32.00±0.70	17.00±0.35
T22.2×13.8×6.35	22.20±0.40	13.80±0.25	6.35±0.15	T49×32×19	49.00±1.00	32.00±0.60	19.00±0.20
T25×15×10	25.00±0.40	15.00±0.30	10.00±0.20	T50.8×25.4×38.1	50.80±0.80	25.40±0.60	38.10±0.80
T25×15×15	25.00±0.40	15.00±0.30	15.00±0.30	T61×35.55×12.7	61.00±1.00	35.55±0.80	12.70±0.40
T25.7×15.4×7.5	25.70±0.50	15.40±0.30	7.50±0.15				

MEMO

SMB 系列 1 外形尺寸图 SMB SERIES 1 — OUTLINE DRAWINGS



SMB 系列 1 尺寸规格列表 SMB SERIES 1 — DIMENSION LIST

品名 Product name	A (mm)	B (mm)	D (mm)	F (mm)	G (mm)
SMB7.5×6×3C	7.50±0.30	6.00±0.30	3.00±0.20	1.60±0.15	5.30±0.20
SMB12×10×4.6C	12.00±0.20	10.00±0.20	4.60±0.15	1.80±0.10	8.50±0.20

SMB 系列 2 外形尺寸图 SMB SERIES 2 — OUTLINE DRAWINGS

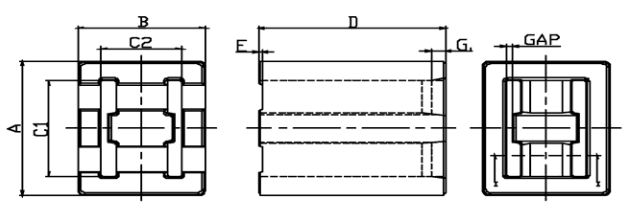


Fig.1

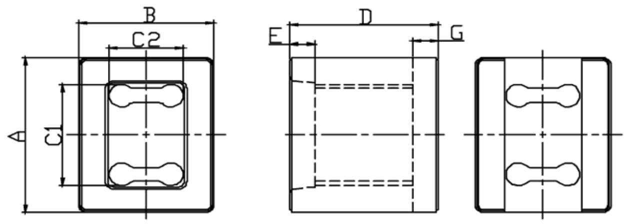


Fig.2

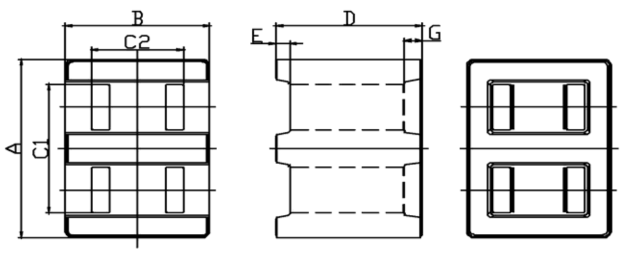


Fig.3

SMB 系列 2 尺寸规格列表 SMB SERIES 2 — DIMENSION LIST

品名 Product name	A (mm)	B (mm)	C1 (mm)	C2 (mm)	D (mm)	E (mm)	G (mm)	GAP (mm)	Fig
SMB11×8.8×9.6T	11.00 ±0.20	8.80 ±0.20	7.20 ±0.15	4.80 ±0.15	9.60 ±0.15	1.00 ±0.15	1.50 ±0.15	/	2
SMB13.72×10.41×15.24 GAP0.55	13.72 ±0.20	10.41 ±0.20	9.80 ±0.15	6.48 ±0.15	15.24 ±0.25	0.30 ±0.10	1.15 ±0.10	0.55 ref	1

SMB 系列 2 尺寸规格列表（续） SMB SERIES 2 — DIMENSION LIST

品名 Product name	A (mm)	B (mm)	C1 (mm)	C2 (mm)	D (mm)	E (mm)	G (mm)	GAP (mm)	Fig
SMB13.72×10.41×15.8 GAP0.55	13.72 ±0.20	10.41 ±0.20	9.80 ±0.15	6.48 ±0.15	15.80 ±0.25	0.30 ±0.10	1.15 ±0.10	0.55 ref	1
SMB13.72×10.41×10.52	13.72 ±0.20	10.41 ±0.20	9.80 ±0.15	6.60 ±0.15	10.52 ±0.15	1.00 ±0.15	1.30 ±0.15	/	3

MEMO

FBC系列 外形尺寸图 FBC CORES — OUTLINE DRAWINGS

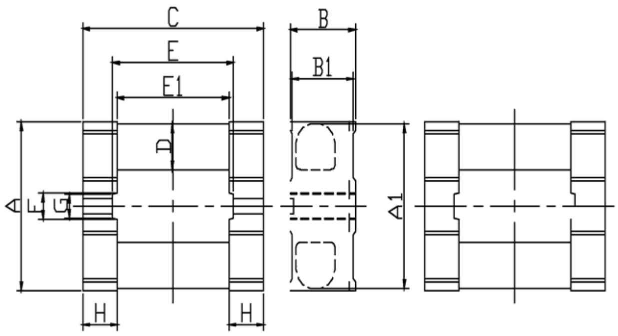


Fig.1

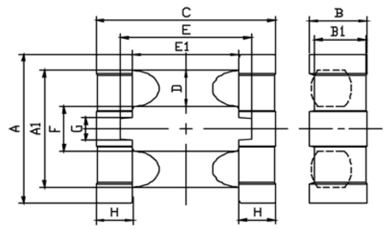


Fig.2

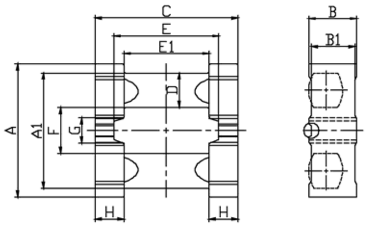


Fig.3

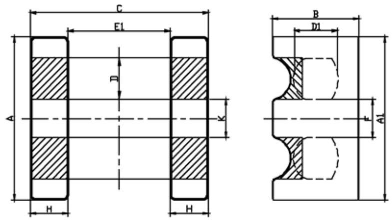


Fig.4

FBC系列 尺寸规格列表 FBC CORES — DIMENSION LIST

品名 Product name	A (mm)	A1 (mm)	B (mm)	B1 (mm)	C (mm)	D (mm)	D1 (mm)	E (mm)	E1 (mm)	F (mm)	G (mm)	H (mm)	K (mm)	Fig
FBC5.7×8.55×3	5.70 ±0.10	5.55 ±0.10	3.00 +0.05/-0.15	2.85 +0.05/-0.15	8.55 ±0.10	1.55 ±0.15	/	5.60 ±0.10	5.20 ±0.10	2.45 ±0.10	0.05 ref	1.60 ±0.10	/	1
FBC5.9×6.65×2.25	5.90 ±0.10	5.10 ±0.10	2.25 +0.05/-0.15	2.10 +0.05/-0.15	6.65 ±0.10	1.50 ±0.15	/	4.20 ±0.10	3.50 ±0.10	2.10 ±0.10	0.65 ±0.07	1.58 ±0.10	/	1
FBC10.5×11.5×3.8	10.50 ±0.10	9.10 ±0.10	3.80 ±0.10	3.50 ±0.10	11.50 ±0.10	2.75 ±0.15	/	8.40 ±0.10	6.80 ±0.10	3.60 ±0.10	1.50 ±0.10	2.35 ±0.05	/	1
FBC10.7×11.8×5.8 C	10.70 ±0.15	10.70 ±0.15	5.80 ±0.15	/	11.80 ±0.15	2.75 ±0.15	3.00 ±0.10	/	6.85 ±0.15	2.50 ±0.10	/	2.50 ±0.15	2.45 ±0.40	4
FBC11×11.5×3.8	11.00 ±0.10	9.00 ±0.10	3.80 ±0.10	3.50 ±0.10	11.50 ±0.10	2.75 ±0.15	/	8.40 ±0.10	6.80 ±0.10	3.50 ±0.10	1.50 ±0.10	2.35 ±0.05	/	2
FBC13×14.5×3.65	13.00 ±0.15	9.40 ±0.15	3.65 ±0.15	3.20 +0.05/-0.15	14.50 ±0.15	2.85 ±0.15	/	11.10 ±0.15	10.30 ±0.15	3.70 ±0.10	0.80 ±0.10	2.10 ±0.10	/	3

FP系列 外形尺寸图 FP SHAPED CORES — OUTLINE DRAWINGS

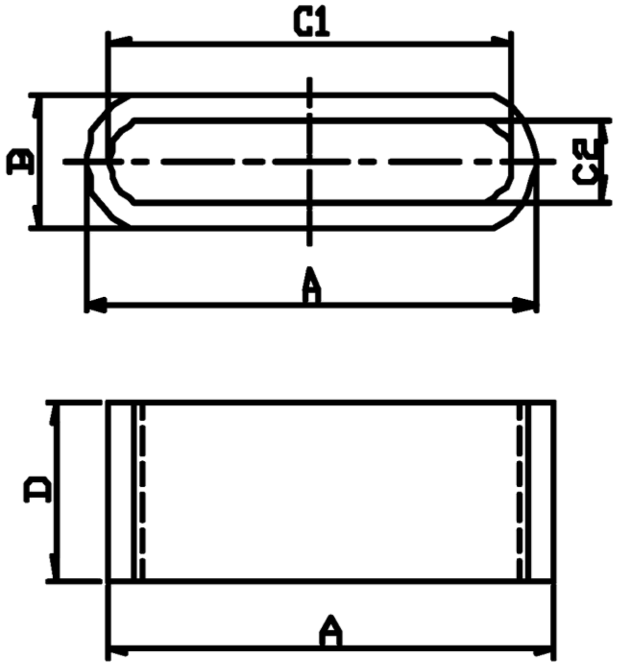


Fig.1

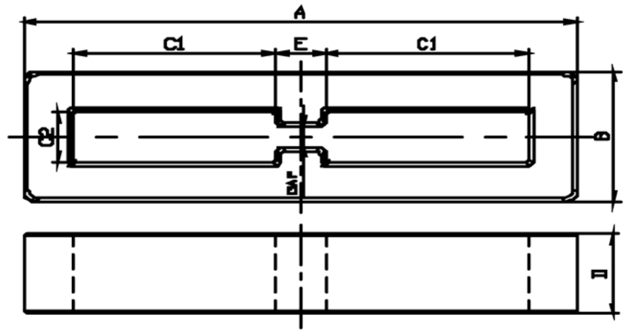


Fig.2

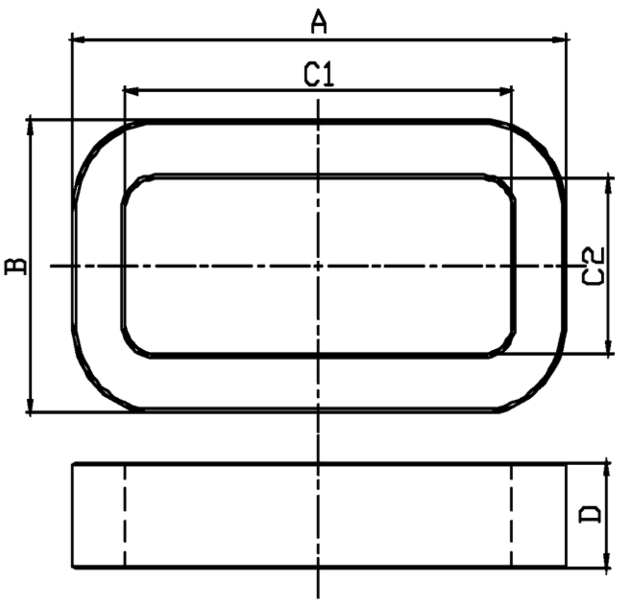


Fig.3

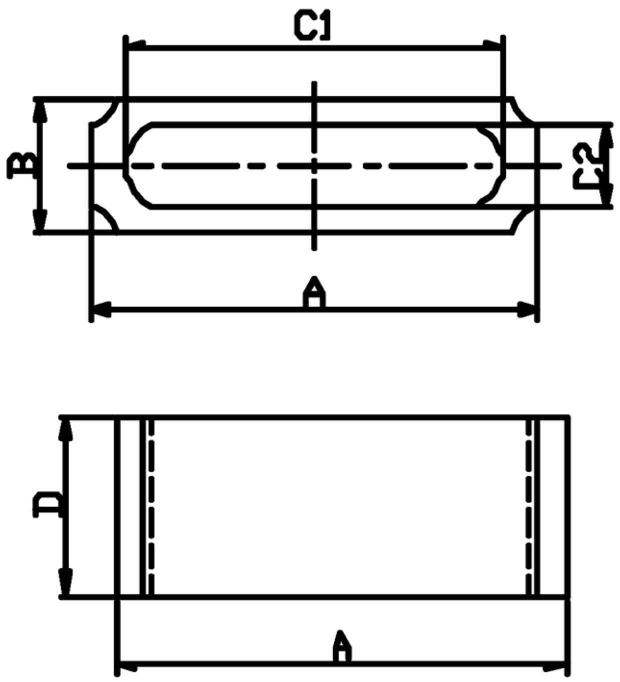


Fig.4

FP系列（续） FP SHAPED CORES

FP系列 尺寸规格列表 FP SHAPED CORES — DIMENSION LIST

品名 Product name	A (mm)	B (mm)	C1 (mm)	D (mm)	C2 (mm)	E (mm)	GAP (mm)	Fig
FP10.8×8.5×8	10.80±0.20	8.50±0.15	6.00±0.12	8.00±0.15	3.75±0.10	/	/	1
FP23.5×6.3×12	23.50±0.50	6.30±0.20	19.20±0.40	12.00±0.25	1.00±0.20	/	/	1
FP26×5×15	26.00±0.55	5.00±0.25	21.80±0.65	15.00±0.25	1.00±0.20	/	/	1
FP28×14.6×7.7	28.00±0.70	14.60±0.30	23.00±0.50	7.70±0.25	1.50±0.20	/	/	1
FP33.5×6.5×15	33.50±0.70	6.50±0.20	29.00 min	15.00±0.20	1.50 +0.50/-0.00	/	/	4
FP33.5×10×6.5	33.50±0.70	10.00±0.20	28.00±0.70	6.50±0.15	1.50±0.20	/	/	1
FP34×15×6	34.00±0.65	15.00±0.30	29.80±0.60	6.00±0.15	0.90±0.20	/	/	1
FP38.5×25.4×12.0	38.50±0.80	25.40±0.50	27.00 min	12.00±0.25	1.90±0.20	/	/	4
FP40×6.5×12	40.00±0.80	6.50±0.20	34.80±0.80	12.00±0.25	1.50±0.40	/	/	4
FP45×13×8 GAP2.0	45.00±0.90	13.00±0.30	16.50 +0.50/-0.00	8.00±0.30	5.00 +0.40/-0.00	4.00±0.20	2.00	2
FP55×45×8	55.00±1.10	45.00±0.90	25.00±0.50	8.00±0.15	15.00±0.20	/	/	1
FP58.4×13.4×11	58.40±1.20	13.40±0.30	52.60±1.00	11.00±0.30	7.60±0.30	/	/	1
FP71×38×22	71.00±1.40	38.00±0.80	59.00±1.20	22.00±0.45	26.00±0.50	/	/	3
FP77.9×41.65×22	77.90±1.60	41.65±0.90	61.30±1.20	22.00±0.40	25.00±0.50	/	/	3
FP80×60×20	80.00±2.00	60.00±1.40	50.00±1.00	20.00±0.40	30.00±0.60	/	/	1
FP94×70×20.6	94.00±2.00	70.00±1.40	50.00±1.00	20.60±0.50	26.00±0.50	/	/	1

OT系列 外形尺寸图 OT CORES — OUTLINE DRAWINGS

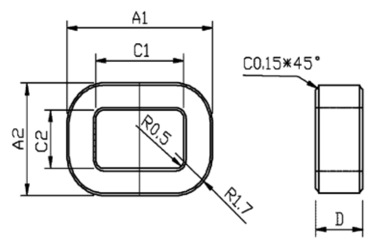


Fig.1

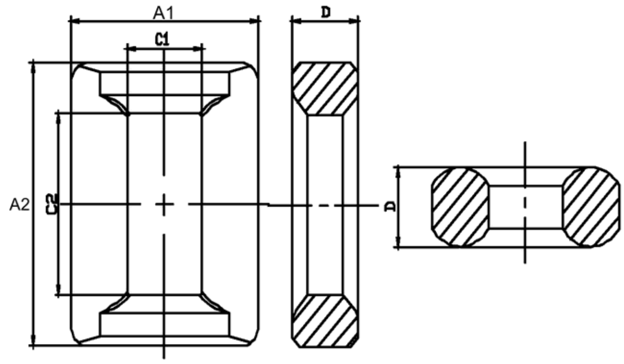


Fig.2

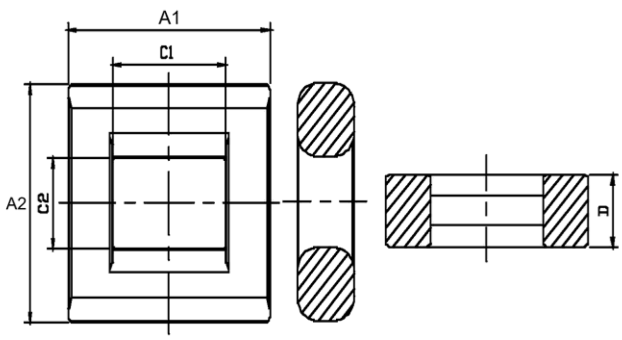
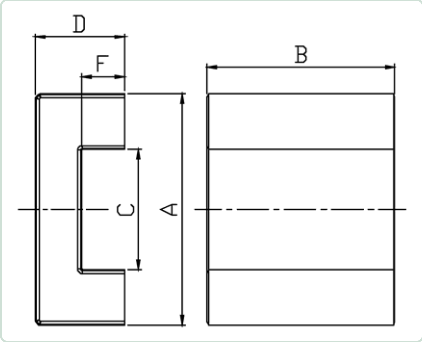


Fig.3

OT系列 尺寸规格列表 OT CORES — DIMENSION LIST

品名 Product name	A1 (mm)	A2 (mm)	C1 (mm)	C2 (mm)	D (mm)	Fig
OT6.9×4.75×2.3	6.90 ±0.10	4.60 ±0.10	4.50 ±0.10	2.70 ±0.10	2.30 ±0.10	1
OT8.6×10.7×3.0	8.60 ±0.20	10.70 ±0.20	3.45 ±0.20	6.80 ±0.20	3.00 ±0.20	2
OTC22.65×21×6.45	22.95 ±0.35	21.30 ±0.35	12.40 ±0.25	7.70 ±0.25	6.75 ±0.25	3
OT40.62×28.78×20	40.62 ±0.50	40.62 ±0.50	28.78 ±0.40	28.78 ±0.40	20.00 ±0.40	1

UU系列 外形尺寸图 UU CORES — OUTLINE DRAWINGS



UU系列 尺寸规格列表 UU CORES — DIMENSION LIST

品名 Product name	A (mm)	B (mm)	C (mm)	D (mm)	F (mm)
UU9.8×7.2×2.7	9.80±0.40	2.70±0.15	4.20±0.15	7.20±0.15	4.20±0.15
UU17×13×2.8	17.00±0.40	13.00±0.30	11.30±0.30	2.80±0.15	1.10±0.15
UU17.3×13×3	17.30±0.40	13.00±0.30	11.60±0.30	3.00±0.15	1.30±0.15
UU20.8×13×5.75	20.80±0.30	13.00±0.25	11.80±0.20	5.75±0.15	1.75±0.15
UU21×10×7	21.00±0.40	10.00±0.30	15.60±0.30	7.00±0.15	4.30±0.15
UU21×22.5×4.75	21.00±0.40	22.50±0.40	15.00±0.30	4.75±0.15	1.75±0.15
UU21.8×24×4.75	21.80±0.40	24.00±0.40	15.80±0.30	4.75±0.15	1.75±0.15
UU23.8×10×8.74	23.80±0.50	10.00±0.20	11.80±0.30	8.74±0.15	1.75±0.20
UU24×10×6	24.00±0.50	10.00±0.30	16.00±0.30	6.00±0.15	2.00±0.15
UU25×19×4.5	25.00±0.50	19.00±0.40	14.30±0.40	4.50±0.10	1.70±0.15
UU26×6×6.25	26.00±0.50	6.00±0.20	16.00±0.30	6.25±0.20	1.25±0.15
UU26×25×8	26.00±0.50	25.00±0.50	20.00±0.40	8.00±0.15	2.10±0.15
UU26×32×18	26.00±0.50	32.00±0.60	12.00±0.20	18.00±0.20	11.00±0.20
UU27.8×25.5×4.75	27.80±0.50	25.50±0.50	21.80±0.40	4.75±0.15	1.75±0.15
UU30×16×8.25	30.00±0.60	16.00±0.30	16.00±0.40	8.25±0.20	1.25±0.30
UU30×31×19	30.00±0.60	31.00±0.60	12.50±0.30	19.00±0.30	10.50±0.30
UU34×35×20	34.00±0.80	35.00±0.70	14.00±0.30	20.00±0.30	10.00±0.15
UU49.4×15.7×34.5	49.40±1.00	15.70±0.40	18.60±0.30	34.50±0.60	17.80±0.30
UU59.6×26.6×6.7	59.60±1.20	26.60±0.50	43.30±0.80	6.70±0.20	1.00±0.20

04

SMD 配套类

SMD PAIRED-CORE SETS

SRI+DR / SP+内磁芯等贴片配套系列，含 CPU CHOKE 配套；尺寸均含公差，每一表列对应一组配套。

SRI+DR / SP paired SMD sets incl. CPU choke sets; toleranced dimensions, one set per row.

本章系列 SERIES IN THIS CHAPTER

SRI+DR系列1 外形尺寸图（Fig.1–3） SRI + DR SERIES 1 — OUTLINE DRAWINGS (FIG.1–3)

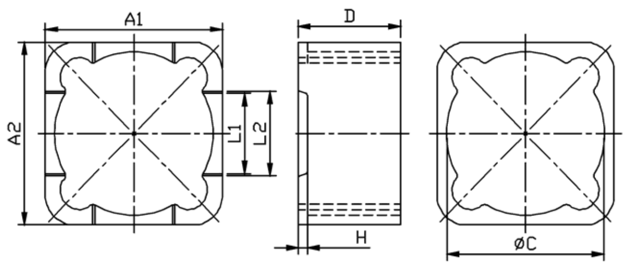


Fig.1

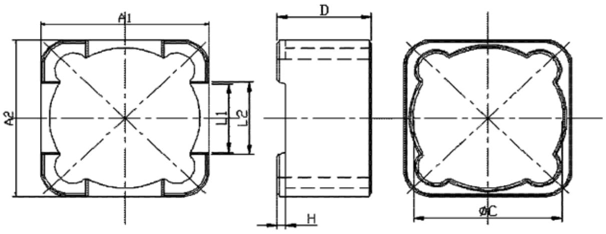


Fig.2

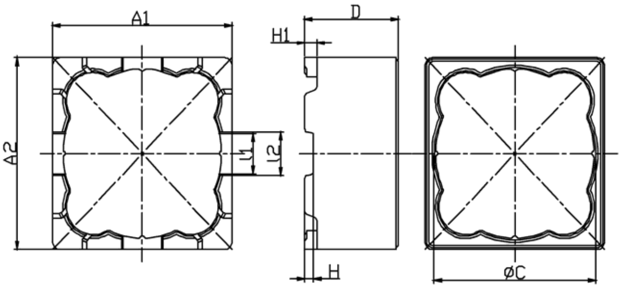


Fig.3

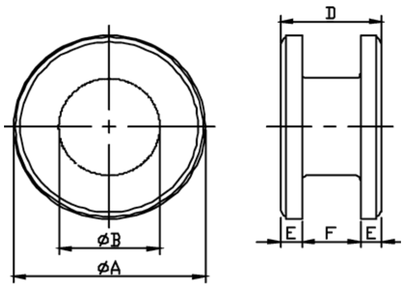


Fig.a

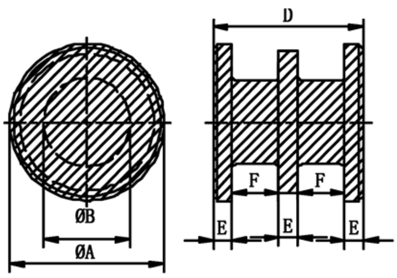


Fig.b

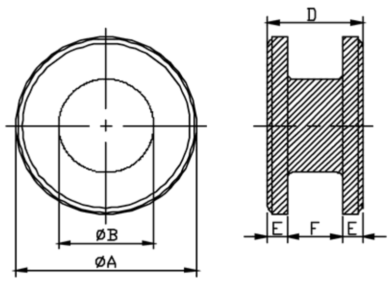


Fig.c

SRI+DR系列1 尺寸规格列表（Fig.1–3） SRI + DR SERIES 1 — DIMENSION LIST (FIG.1–3)

品名 Product name	部件 Part	A1=A2 (mm)	C (mm)	D (mm)	L1 (mm)	L2 (mm)	H (mm)	H1 (mm)	A (mm)	B (mm)	E (mm)	F (mm)	Fig
SRI12×10.65×3	SRI	12.00 ±0.15	10.65 ±0.15	3.00 ±0.15	5.30 ±0.15	5.55 ±0.15	0.60 ±0.10	/					1
DR9.85×3	DR			3.00 ±0.15					9.85 ±0.10	5.00 ±0.15	0.75 ±0.15	1.50 ±0.15	a
SRI12×10.65×3.65	SRI	12.00 ±0.15	10.65 ±0.15	3.65 ±0.15	5.30 ±0.15	5.55 ±0.15	0.60 ±0.10	/					1
DR9.85×3.8	DR			3.80 ±0.15					9.85 ±0.10	5.20 ±0.15	0.90 ±0.15	2.00 ±0.15	a
SRI12×10.65×5	SRI	12.00 ±0.15	10.65 ±0.15	5.00 ±0.15	5.30 ±0.15	5.55 ±0.15	0.60 ±0.10	/					1
DR9.85×5.2	DR			5.20 ±0.15					9.85 ±0.10	5.20 ±0.15	1.10 ±0.15	3.00 ±0.15	a

SRI+DR系列1 尺寸规格列表（Fig.1–3）（续） SRI + DR SERIES 1 — DIMENSION LIST (FIG.1–3)

品名 Product name	部件 Part	A1=A2 (mm)	C (mm)	D (mm)	L1 (mm)	L2 (mm)	H (mm)	H1 (mm)	A (mm)	B (mm)	E (mm)	F (mm)	Fig
SRI12×10.65×6.6-K	SRI	12.00 ±0.15	10.65 ±0.15	6.60 ±0.15	6.10 ±0.15	5.80 ±0.15	0.60 ±0.10	/					2
DR9.85×7-K	DR			7.10 ±0.15					9.85 ±0.10	5.70 ±0.15	1.05 ±0.15	5.05 ±0.15	a
SRI12×10.65×6.7	SRI	12.00 ±0.15	10.65 ±0.15	6.80 ±0.15	5.30 ±0.15	5.55 ±0.15	0.60 ±0.10	/					1
DR9.85×7	DR			7.00 ±0.15					9.85 ±0.10	6.20 ±0.15	1.05 ±0.15	4.90 ±0.15	a
SRI12×10.65×8.8	SRI	12.00 ±0.15	10.65 ±0.15	8.80 ±0.15	5.30 ±0.15	5.55 ±0.15	0.60 ±0.10	/					1
DR9.85×9	DR			9.00 ±0.15					9.85 ±0.10	6.50 ±0.15	1.25 ±0.15	6.50 ±0.15	a
SRI12.15×10.8×10.8	SRI	12.15 ±0.15	10.80 ±0.15	10.80 ±0.15	5.40 ±0.15	5.80 ±0.15	0.70 ±0.10	/					2
DR9.85×11CB5.8F8	DR			11.00 ±0.20					10.00 +0.00/-0.25	5.85 ±0.15	1.50 ±0.20	8.00 ±0.20	c
SRI12.2×10.78×6.35T	SRI	12.20 ±0.15	10.78 ±0.12	6.35 ±0.10	2.60 ±0.15	2.80 ±0.15	0.60 ±0.10	0.80 ±0.11					3
DR9.85×6.65W	DR			6.65 ±0.15					9.85 ±0.10	6.25 ±0.15	0.90 ±0.15	4.90 ±0.15	a
SRI12.2×10.78×8.65T	SRI	12.20 ±0.15	10.78 ±0.12	8.65 ±0.15	2.60 ±0.15	2.80 ±0.15	0.60 ±0.10	/					3
DR9.85×9D-7C	DR			9.00 ±0.15					9.85 ±0.10	5.20 ±0.15	1.00 ±0.15	3.00 ±0.15	b
SRI12.2×10.8×3.8	SRI	12.20 ±0.15	10.80 ±0.15	3.80 ±0.15	5.30 ±0.15	5.55 ±0.15	0.60 ±0.10	/					1
DR10×4	DR			4.00 ±0.15					10.00 ±0.10	5.20 ±0.15	1.00 ±0.15	2.00 ±0.15	a
SRI12.2×10.8×5	SRI	12.20 ±0.15	10.80 ±0.15	5.00 ±0.15	5.30 ±0.15	5.55 ±0.15	0.60 ±0.10	/					1
DR10×5.2	DR			5.20 ±0.15					10.00 ±0.10	5.20 ±0.15	1.10 ±0.15	3.00 ±0.15	a
SRI12.2×10.8×6.7	SRI	12.20 ±0.15	10.80 ±0.15	6.70 ±0.15	5.30 ±0.15	5.55 ±0.15	0.60 ±0.10	/					1
DR10×7B5.5F5	DR			7.00 ±0.15					10.00 ±0.10	5.50 ±0.15	1.00 ±0.15	5.00 ±0.15	a
SRI12.2×10.8×6.7	SRI	12.20 ±0.15	10.80 ±0.15	6.70 ±0.15	5.30 ±0.15	5.55 ±0.15	0.60 ±0.10	/					1
DR10×7	DR			7.00 ±0.15					10.00 ±0.10	6.20 ±0.15	1.05 ±0.15	4.90 ±0.15	a
SRI12.2×10.8×8.8	SRI	12.20 ±0.15	10.80 ±0.15	8.80 ±0.15	5.30 ±0.15	5.55 ±0.15	0.60 ±0.10	/					1
DR10×9	DR			9.00 ±0.15					10.00 ±0.10	6.50 ±0.15	1.25 ±0.15	6.50 ±0.15	a

SRI+DR系列1（续） SRI + DR SERIES 1

SRI+DR系列1 外形尺寸图（Fig.4–6） SRI + DR SERIES 1 — OUTLINE DRAWINGS (FIG.4–6)

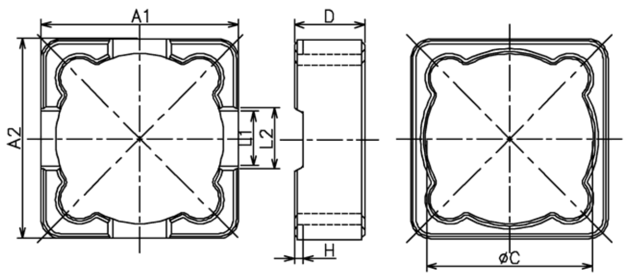


Fig.4

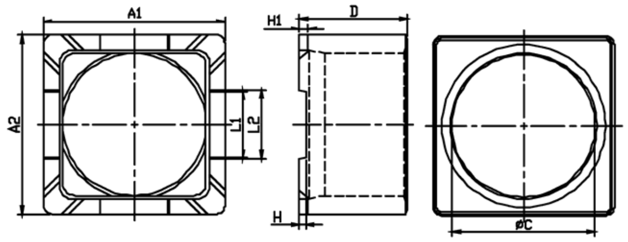


Fig.5

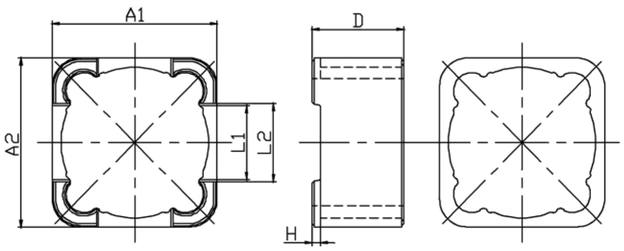


Fig.6

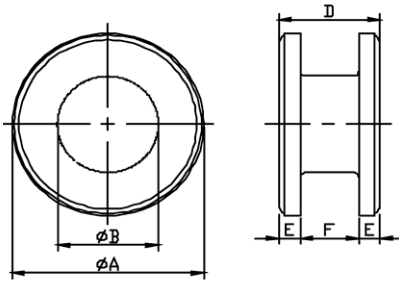


Fig.a

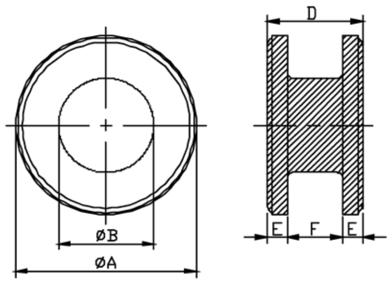


Fig.c

SRI+DR系列1 尺寸规格列表（Fig.4–6） SRI + DR SERIES 1 — DIMENSION LIST (FIG.4–6)

品名 Product name	部件 Part	A1=A2 (mm)	C (mm)	D (mm)	L1 (mm)	L2 (mm)	H (mm)	H1 (mm)	A (mm)	B (mm)	E (mm)	F (mm)	Fig
SRI10×8.5×3.65	SRI	10.00 ±0.15	8.50 ±0.15	3.65 ±0.15	2.70 ±0.15	3.15 ±0.15	0.45 ±0.10	/					4
DR8×3.95	DR			3.95 ±0.10					8.00 ±0.10	3.95 ±0.10	0.60 ±0.10	2.75 ±0.10	a
SRI10.5×8.3×6.3RTSB	SRI	10.50 ±0.15	8.30 ±0.15	6.30 ±0.15	3.90 ±0.15	4.10 ±0.15	0.40 ±0.10	0.50 ±0.10					5
DR7.9×7.1C	DR			7.10 ±0.15					7.90 ±0.10	5.40 ±0.15	1.10 ±0.15	4.90 ±0.15	c
SRI12×10.6×9D	SRI	12.00 ±0.25	10.60 ±0.15	9.00 ±0.15	5.15 ±0.15	5.35 ±0.15	0.65 ±0.10	/					6
DR9.85×9	DR			9.00 ±0.15					9.85 ±0.10	6.00 ±0.15	1.25 ±0.15	6.50 ±0.15	a

SRI+DR系列1（续） SRI + DR SERIES 1

SRI+DR系列1 外形尺寸图（Fig.7–9） SRI + DR SERIES 1 — OUTLINE DRAWINGS (FIG.7–9)

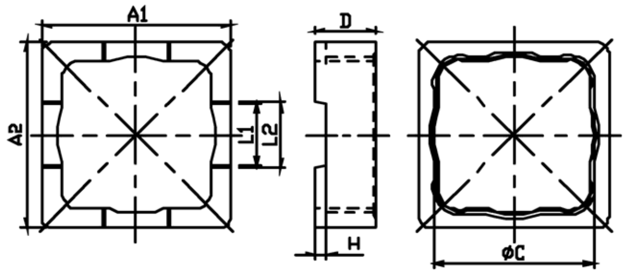


Fig.7

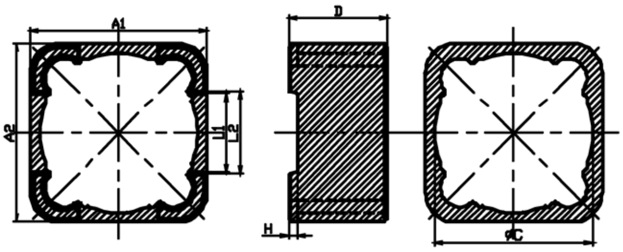


Fig.8

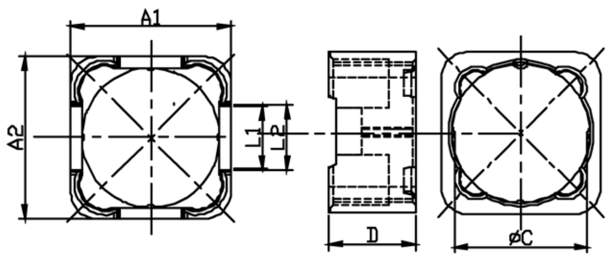


Fig.9

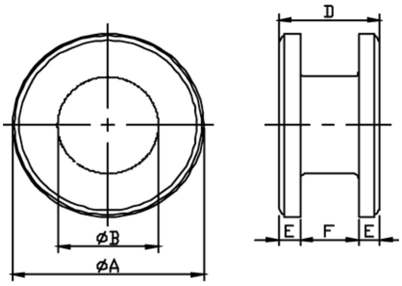


Fig.a

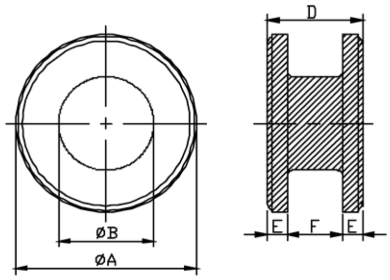


Fig.c

SRI+DR系列1 尺寸规格列表（Fig.7–9） SRI + DR SERIES 1 — DIMENSION LIST (FIG.7–9)

品名 Product name	部件 Part	A1=A2 (mm)	C (mm)	D (mm)	L1 (mm)	L2 (mm)	H (mm)	A (mm)	B (mm)	E (mm)	F (mm)	Fig
SRI12×10.6×5BCW	SRI	12.00 +0.40/-0.20	10.30 min	5.00 ±0.30	5.10 ±0.15	5.30 ±0.15	0.65 ±0.10					8
DR9.85×5.2CW	DR			5.20 ±0.15				9.85 ±0.10	4.80 ±0.15	1.05 ±0.15	3.10 ±0.15	c
SRI12×10.6×7BCR	SRI	12.00 +0.40/-0.20	10.30 min	7.00 ±0.30	5.10 ±0.15	5.30 ±0.15	0.65 ±0.10					8
DR9.85×7	DR			7.00 ±0.15				9.85 ±0.10	6.20 ±0.15	1.00 ±0.15	5.00 ±0.15	a
SRI12.35×10.8×3.6	SRI	12.35 ±0.15	10.80 ±0.15	3.60 ±0.15	5.40 ±0.15	7.00 ±0.15	0.70 ±0.10					7
DR9.9×3.9	DR			3.90 ±0.15				9.90 ±0.10	5.00 ±0.15	0.95 ±0.15	2.00 ±0.15	a

SRI+DR系列1（续） SRI + DR SERIES 1

SRI+DR系列1 尺寸规格列表（Fig.7–9）（续） SRI + DR SERIES 1 — DIMENSION LIST (FIG.7–9)

品名 Product name	部件 Part	A1=A2 (mm)	C (mm)	D (mm)	L1 (mm)	L2 (mm)	H (mm)	A (mm)	B (mm)	E (mm)	F (mm)	Fig
SRI12.35×10.8×5	SRI	12.35 ±0.15	10.80 ±0.15	5.00 ±0.15	5.40 ±0.15	7.00 ±0.15	0.70 ±0.10					7
DR9.85×5.2	DR			5.20 ±0.15				9.85 ±0.10	4.90 ±0.15	1.10 ±0.15	3.00 ±0.15	a
SRI12.35×10.8×6.6	SRI	12.35 ±0.15	10.80 ±0.15	6.60 ±0.15	5.40 ±0.15	7.00 ±0.15	0.70 ±0.10					7
DR9.85×7.1B6.4F4.9	DR			7.10 ±0.15				9.85 ±0.10	6.40 ±0.15	1.10 ±0.15	4.90 ±0.15	a
SRI12.5×10.5×6.3K	SRI	12.50 +0.05/-0.25	10.50 +0.20/-0.10	6.30 ±0.15	4.90 ±0.15	5.25 ±0.15	0.55 ±0.10					9
DR9.9×7C	DR			7.00 ±0.15				9.90 ±0.10	6.10 ±0.15	1.10 ±0.15	4.80 ±0.15	c

SRI+DR系列1 外形尺寸图（Fig.10） SRI + DR SERIES 1 — OUTLINE DRAWINGS (FIG.10)

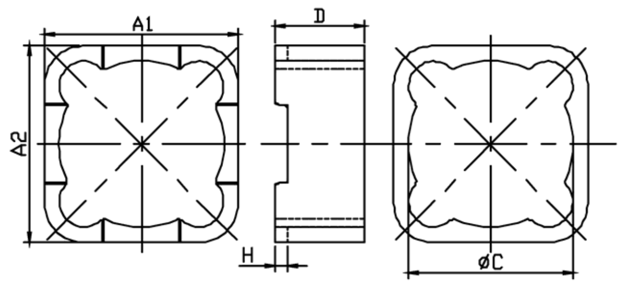


Fig.10

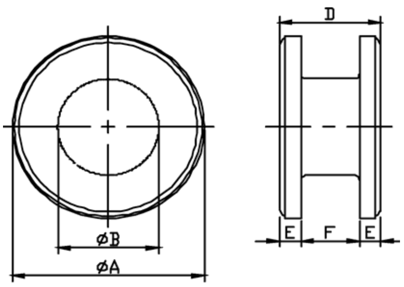


Fig.a

备注：图中斜线阴影部分表示为 Epoxy 涂装区域。
Note: hatched areas indicate the epoxy-coated regions.

SRI+DR系列1 尺寸规格列表（Fig.10） SRI + DR SERIES 1 — DIMENSION LIST (FIG.10)

品名 Product name	部件 Part	A1=A2 (mm)	C (mm)	D (mm)	L1 (mm)	L2 (mm)	H (mm)	A (mm)	B (mm)	E (mm)	F (mm)	Fig
SRI10.1×8.6×4.8	SRI	10.10 ±0.15	8.60 ±0.15	4.80 ±0.15	3.95 ±0.15	4.10 ±0.15	0.65 ±0.10					10
DR7.8×5	DR			5.00 ±0.10				7.80 ±0.10	4.50 ±0.10	0.75 ±0.10	3.50 ±0.10	a

SRI+DR系列2 外形尺寸图（Fig.1–3） SRI + DR SERIES 2 — OUTLINE DRAWINGS (FIG.1–3)

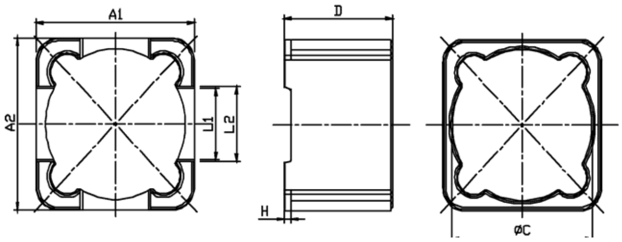


Fig.1

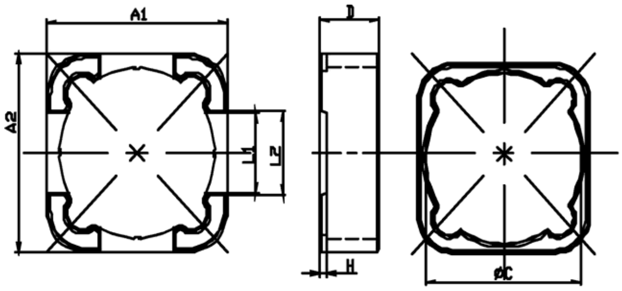


Fig.2

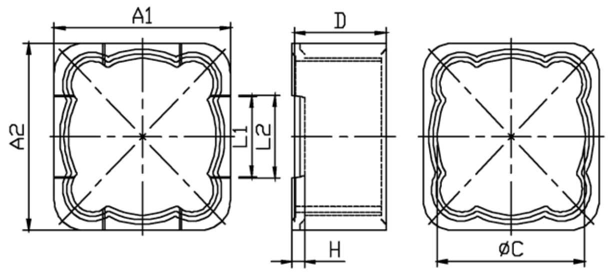


Fig.3

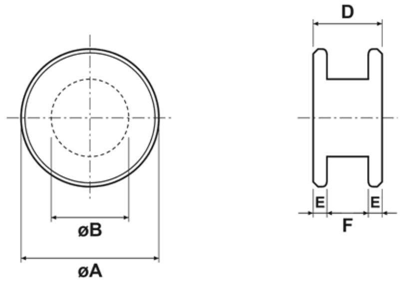


Fig.a

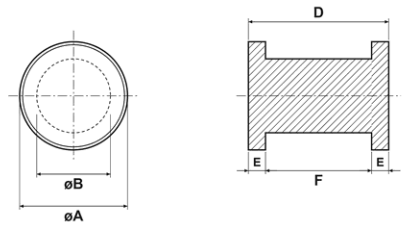


Fig.b

SRI+DR系列2 尺寸规格列表（Fig.1–3） SRI + DR SERIES 2 — DIMENSION LIST (FIG.1–3)

品名 Product name	部件 Part	A1 (mm)	A2 (mm)	C (mm)	D (mm)	L1 (mm)	L2 (mm)	H (mm)	A (mm)	B (mm)	E (mm)	F (mm)	Fig
SRI12.5×10.5×6.6A	SRI	12.50 +0.00/-0.30	12.50 +0.00/-0.30	10.50 +0.00/-0.30	6.60 ±0.10	5.10 ±0.15	5.50 ±0.15	0.65 ±0.10					3
DR9.7×7	DR				7.00 ±0.15				9.70 +0.15/-0.05	6.20 ±0.15	1.05 ±0.15	4.90 ±0.15	a
SRI12.5×10.7×4.8	SRI	12.50 ±0.15	12.50 ±0.15	10.70 ±0.15	4.80 ±0.15	5.20 ±0.15	5.40 ±0.15	0.55 ±0.10					1
DR9.9×5.25	DR				5.25 ±0.10				9.90 ±0.10	5.20 ±0.10	1.00 ±0.10	3.20 ±0.10	a
SRI15×12.8×6.8	SRI	15.00 ±0.25	15.00 ±0.25	12.80 ±0.25	6.80 ±0.20	6.00 ±0.15	6.25 ±0.15	0.60 ±0.10					2
DR11.7×6.8C	DR				6.90 ±0.20				11.80 ±0.20	6.90 ±0.20	1.10 ±0.20	4.70 ±0.20	b

SRI+DR系列2 尺寸规格列表（Fig.1–3）（续） SRI + DR SERIES 2 — DIMENSION LIST (FIG.1–3)

品名 Product name	部件 Part	A1 (mm)	A2 (mm)	C (mm)	D (mm)	L1 (mm)	L2 (mm)	H (mm)	A (mm)	B (mm)	E (mm)	F (mm)	Fig
SRI15×12.8×10	SRI	15.00 ±0.25	15.00 ±0.25	12.80 ±0.25	10.00 ±0.20	6.00 ±0.15	6.25 ±0.15	0.60 ±0.10					2
DR11.7×9.85C	DR				10.00 ±0.20				11.80 ±0.20	6.60 ±0.20	1.80 ±0.20	6.40 ±0.20	b

MEMO

SRI+DR系列2（续） SRI + DR SERIES 2

SRI+DR系列2 外形尺寸图（Fig.4–6） SRI + DR SERIES 2 — OUTLINE DRAWINGS (FIG.4–6)

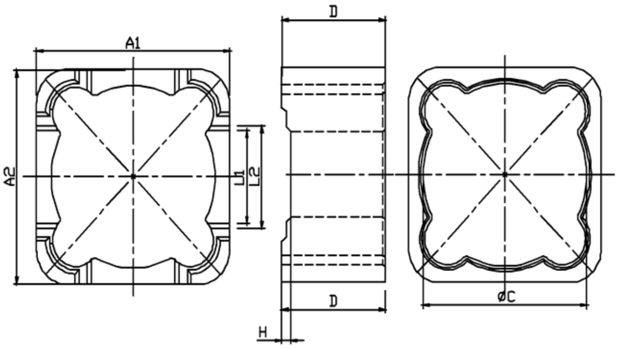


Fig.4

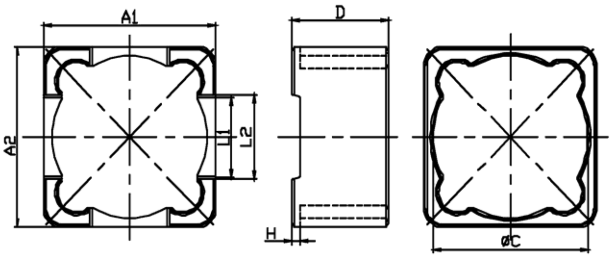


Fig.5

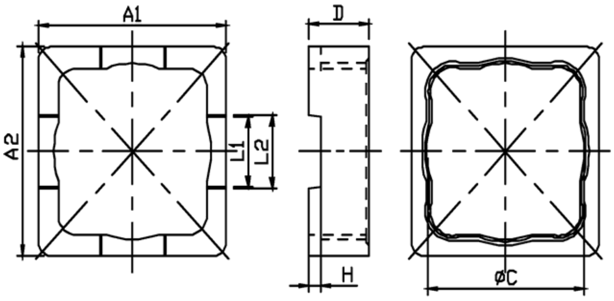


Fig.6

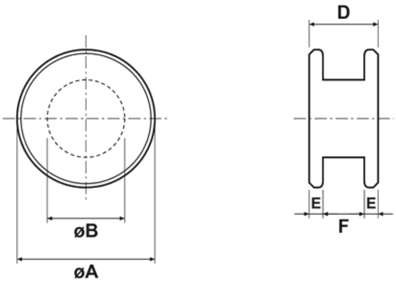


Fig.a

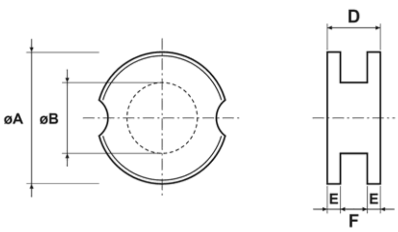


Fig.c

SRI+DR系列2 尺寸规格列表（Fig.4–6） SRI + DR SERIES 2 — DIMENSION LIST (FIG.4–6)

品名 Product name	部件 Part	A1 (mm)	A2 (mm)	C (mm)	D (mm)	L1 (mm)	L2 (mm)	H (mm)	A (mm)	B (mm)	E (mm)	F (mm)	Fig
SRI10×8.5×3.9	SRI	10.00 ±0.15	10.00 ±0.15	8.50 ±0.15	3.90 ±0.15	2.70 ±0.15	3.15 ±0.15	0.45 ±0.10					5
DR8×4	DR				4.00 ±0.10				8.00 ±0.10	4.50 ±0.10	0.80 ±0.10	2.40 ±0.10	a
SRI12.5×10.5×6.8	SRI	12.50 +0.00/-0.30	12.50 +0.00/-0.30	10.50 ±0.15	6.80 ±0.15	5.10 ±0.15	5.50 ±0.15	0.65 ±0.10					4
DR9.6×7	DR				7.00 ±0.10				9.60 ±0.10	5.50 ±0.10	1.00 ±0.10	5.00 ±0.10	a
SRI12.6×10.6×3	SRI	12.60 ±0.15	12.60 ±0.15	10.60 ±0.15	3.00 ±0.10	2.70 ±0.15	3.15 ±0.15	0.45 ±0.10					6
DR9.5×3.85R	DR				3.85 ±0.10				9.50 ±0.10	5.10 ±0.10	0.95 ±0.10	1.95 ±0.10	c

SRI+DR系列2（续） SRI + DR SERIES 2

SRI+DR系列2 尺寸规格列表（Fig.4–6）（续） SRI + DR SERIES 2 — DIMENSION LIST (FIG.4–6)

品名 Product name	部件 Part	A1 (mm)	A2 (mm)	C (mm)	D (mm)	L1 (mm)	L2 (mm)	H (mm)	A (mm)	B (mm)	E (mm)	F (mm)	Fig
SRI12.6×10.6×6	SRI	12.60 ±0.15	12.60 ±0.15	10.60 ±0.15	6.00 ±0.15	4.40 ±0.15	4.60 ±0.15	0.75 ±0.10					6
DR9.5×6.85R	DR				6.85 ±0.15				9.50 ±0.10	5.10 ±0.15	0.95 ±0.15	4.95 ±0.15	c

SRI+DR系列2 外形尺寸图（Fig.7–9） SRI + DR SERIES 2 — OUTLINE DRAWINGS (FIG.7–9)

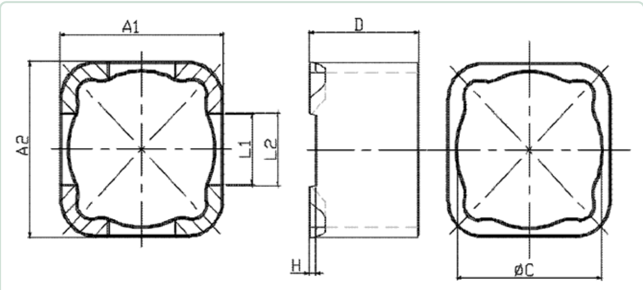


Fig.7

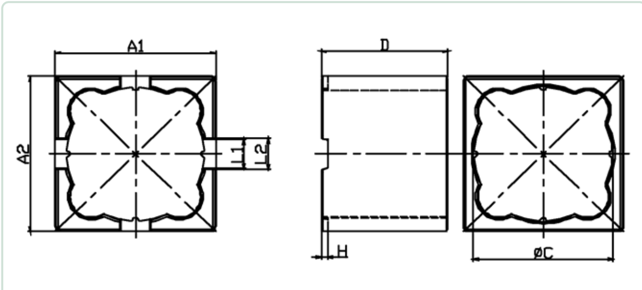


Fig.8

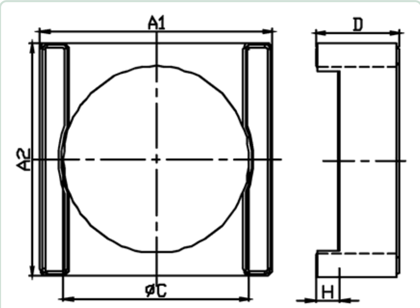


Fig.9

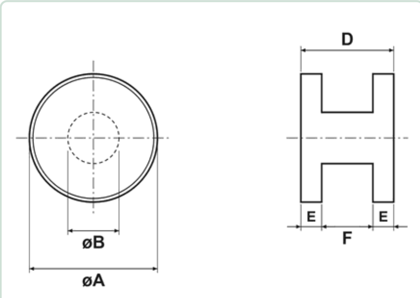


Fig.d

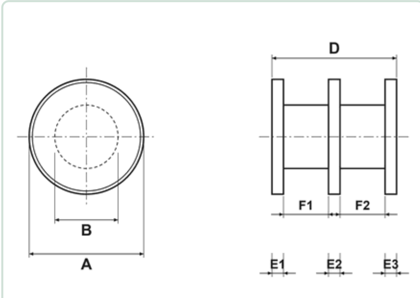


Fig.e

SRI+DR系列2 尺寸规格列表（Fig.7–9） SRI + DR SERIES 2 — DIMENSION LIST (FIG.7–9)

品名 Product name	部件 Part	A1 (mm)	A2 (mm)	C (mm)	D (mm)	L1 (mm)	L2 (mm)	H (mm)	A (mm)	B (mm)	E (mm)	F (mm)	Fig
SRI5.75×4.3×2.9	SRI	5.75 ±0.10	5.50 +0.05/-0.10	4.30 ±0.10	2.90 +0.10/-0.00	/	/	1.75 ±0.05					9
DR4×2.9	DR				2.90 +0.00/-0.10				4.00 ±0.10	1.60 ±0.10	0.65 ±0.10	1.60 ±0.10	d
SRI15×13.2×12.8RTS	SRI	15.00 ±0.40	15.00 ±0.40	13.20 ±0.20	12.80 ±0.15	6.00 ±0.15	6.25 ±0.15	0.60 ±0.10					7
DR11.9×12.65	DR				12.65 ±0.15				11.90 ±0.15	7.30 ±0.15	1.70 ±0.15	9.25 ±0.15	d
SRI15.1×12.95×11.9	SRI	15.10 ±0.20	15.10 ±0.20	12.95 +0.25/-0.15	11.90 ±0.10	2.80 ±0.10	3.00 ±0.10	0.60 ±0.10					8
DR11.95×13D-7C	DR				13.00 ±0.15				11.95 +0.10/-0.20	6.60 ±0.15	1.20 ±0.15	4.70 ±0.15	e

备注：Fig.e（DR11.95×13D-7C）为双段法兰鼓形磁芯，图上 E1 = E2 = E3（即表列 E）、F1 = F2（表列 F 为单段绕线窗长）；D≈E1 + F1 + E2 + F2 + E3。
Note: Fig.e (DR11.95×13D-7C) is a double-flange drum: E1 = E2 = E3 (= E listed), F1 = F2 (F listed is one winding window); D ≈ E1 + F1 + E2 + F2 + E3.

SRI+DR系列2（续） SRI + DR SERIES 2

SRI+DR系列2 外形尺寸图（Fig.10–12） SRI + DR SERIES 2 — OUTLINE DRAWINGS (FIG.10–12)

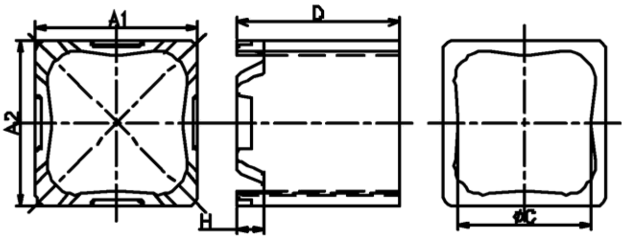


Fig.10

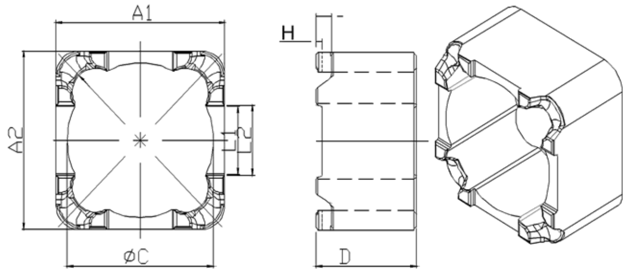


Fig.11

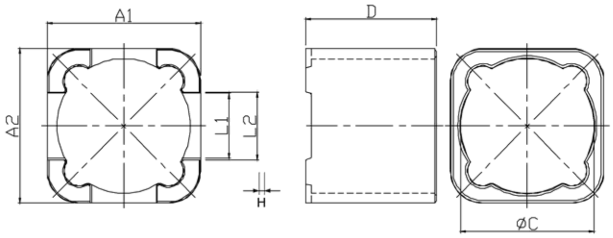


Fig.12

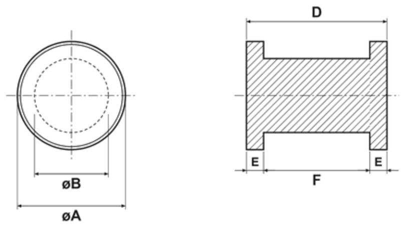


Fig.b

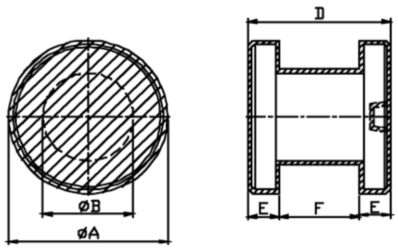


Fig.f

SRI+DR系列2 尺寸规格列表（Fig.10–12） SRI + DR SERIES 2 — DIMENSION LIST (FIG.10–12)

品名 Product name	部件 Part	A1 (mm)	A2 (mm)	C (mm)	D (mm)	L1 (mm)	L2 (mm)	H (mm)	A (mm)	B (mm)	E (mm)	F (mm)	Fig
SRI8×6.5×7.95	SRI	8.00 ±0.20	8.00 ±0.20	6.50 ±0.20	7.95 ±0.15	/	/	1.50 ±0.15					10
DR5.9×7.7C	DR				7.80 ±0.15				6.00 ±0.15	4.10 ±0.15	0.95 ±0.15	5.90 ±0.15	b
SRI14.8×12.8×7.8R	SRI	14.80 ±0.30	14.80 ±0.30	12.80 ±0.20	7.80 ±0.20	6.00 ±0.15	6.20 ±0.15	0.55 ±0.10					11
DR12×7.9C	DR				7.90 ±0.20				12.05 ±0.20	6.50 ±0.15	1.45 ±0.20	5.00 ±0.20	b
SRI15.5×13.5×13.2	SRI	15.50 ±0.25	15.50 ±0.25	13.50 ±0.25	13.20 ±0.20	6.50 ±0.15	6.75 ±0.15	0.60 ±0.10					12
DR12.4×13.2HC	DR				13.50 ±0.20				12.40 ±0.20	6.60 ±0.20	1.85 ±0.20	9.80 ±0.20	f

SRI+DR系列2（续） SRI + DR SERIES 2

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SRI+DR系列2 外形尺寸图（Fig.13–14） SRI + DR SERIES 2 — OUTLINE DRAWINGS (FIG.13–14)

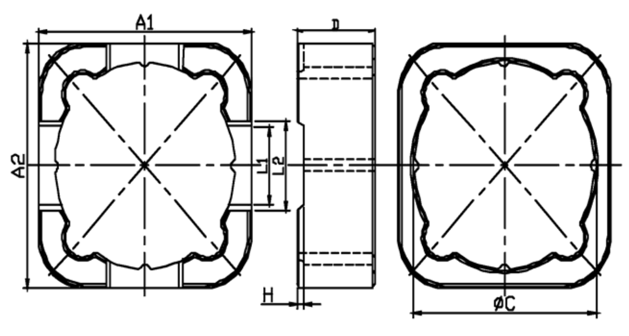

Fig.13

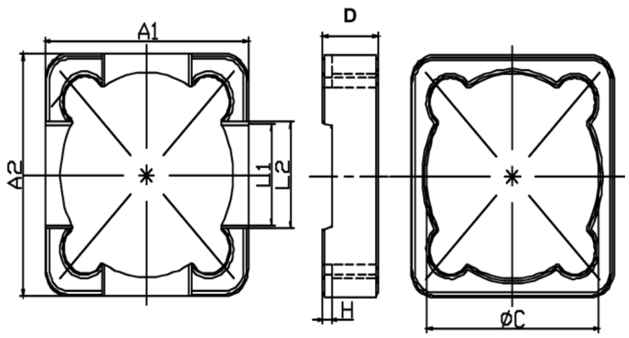

Fig.14

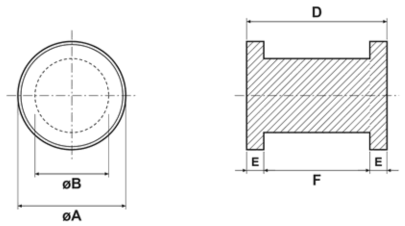

Fig.b

SRI+DR系列2 尺寸规格列表（Fig.13–14） SRI + DR SERIES 2 — DIMENSION LIST (FIG.13–14)

品名 Product name	部件 Part	A1 (mm)	A2 (mm)	C (mm)	D (mm)	L1 (mm)	L2 (mm)	H (mm)	A (mm)	B (mm)	E (mm)	F (mm)	Fig
SRI12.5×10.4×3.65	SRI	12.50 ±0.15	12.50 ±0.15	10.40 ±0.15	3.65 ±0.15	5.20 ±0.15	5.40 ±0.15	0.60 ±0.10					14
DR9.9×3.85C	DR				3.95 ±0.15				9.90 ±0.15	5.10 ±0.15	1.03 ±0.15	1.90 ±0.15	b
SRI18.7×15.15×10	SRI	18.70 ±0.25	18.70 ±0.25	15.15 ±0.20	10.00 ±0.20	6.40 ±0.15	7.00 ±0.15	0.60 ±0.10					13
DR14.75×10C	DR				10.00 ±0.20				14.75 +0.10/-0.30	9.50 ±0.20	1.10 ±0.15	7.80 +0.00/-0.45	b

SRI+DR系列3 外形尺寸图（Fig.1–3） SRI + DR SERIES 3 — OUTLINE DRAWINGS (FIG.1–3)

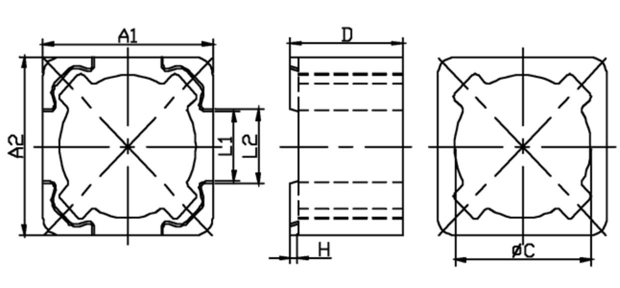

Fig.1

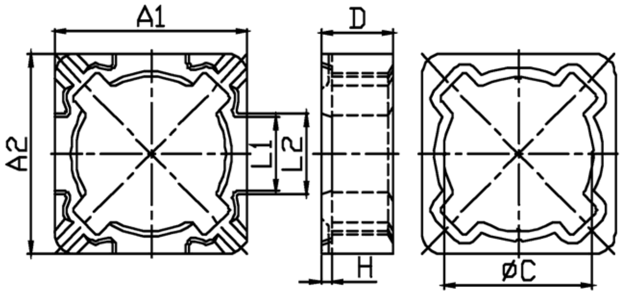

Fig.2

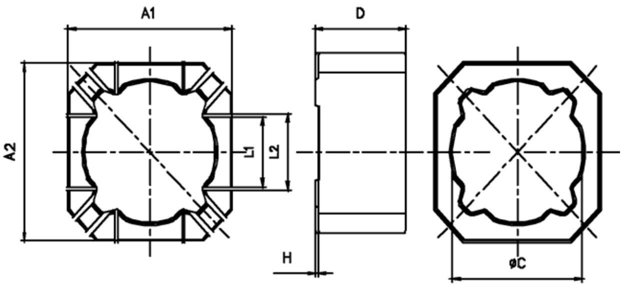

Fig.3

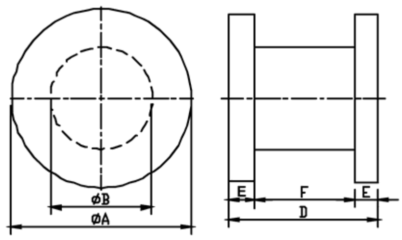

Fig.a

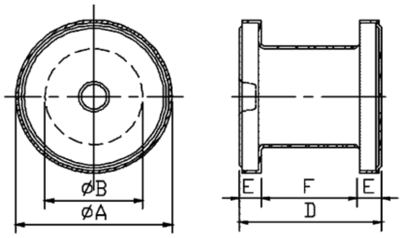

Fig.b

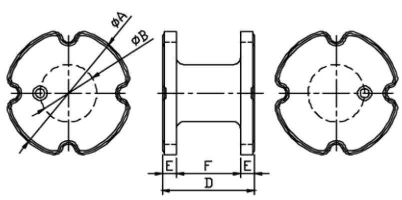

Fig.c

SRI+DR系列3 尺寸规格列表（Fig.1–3） SRI + DR SERIES 3 — DIMENSION LIST (FIG.1–3)

品名 Product name	部件 Part	A1=A2 (mm)	C (mm)	D (mm)	L1 (mm)	L2 (mm)	H (mm)	A (mm)	B (mm)	E (mm)	F (mm)	Fig
SRI6×4.6×3.3C	SRI	6.00 ±0.10	4.60 ±0.10	3.30 ±0.07	1.90 ±0.10	2.10 ±0.10	0.25 ±0.05					3
DR4.3×3R4P	DR			3.00 ±0.10				4.35 +0.08/-0.02	2.20 ±0.10	0.70 ±0.10	1.60 ±0.10	c
SRI7.3×5.59×2.65R	SRI	7.30 ±0.15	5.59 ±0.20	2.65 ±0.10	2.50 ±0.10	3.05 ±0.10	0.30 ±0.10					2
DR5.3×2.7AC	DR			2.70 max				5.30 ±0.20	2.54 ±0.20	0.55 ±0.15	1.45 ±0.20	b
SRI7.3×5.6×3.5	SRI	7.30 ±0.10	5.60 ±0.10	3.50 ±0.10	2.68 ±0.10	2.94 ±0.10	0.40 ±0.05					1
DR5.3×3.65	DR			3.65 ±0.10				5.30 ±0.10	2.80 ±0.10	0.68 ±0.10	2.30 ±0.10	a

SRI+DR系列3（续） SRI + DR SERIES 3

SRI+DR系列3 外形尺寸图（Fig.4–6） SRI + DR SERIES 3 — OUTLINE DRAWINGS (FIG.4–6)

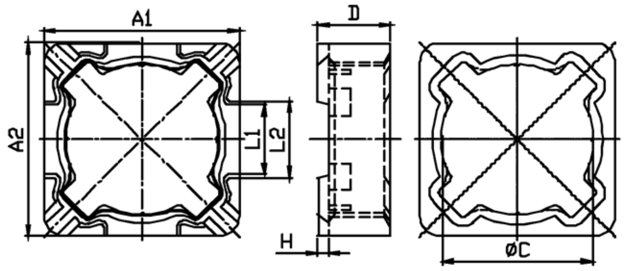

Fig.4

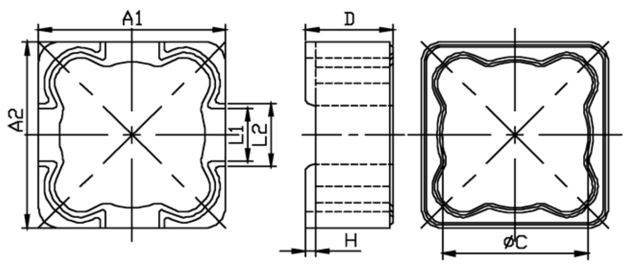

Fig.5

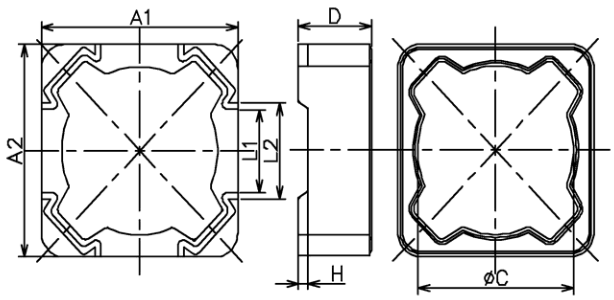

Fig.6

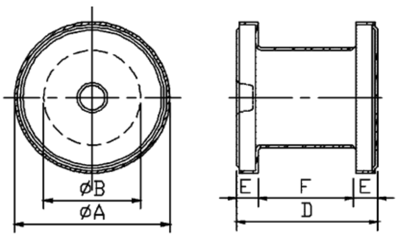

Fig.b

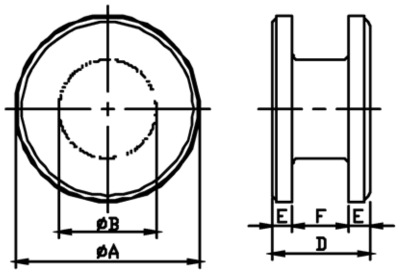

Fig.d

SRI+DR系列3 尺寸规格列表（Fig.4–6） SRI + DR SERIES 3 — DIMENSION LIST (FIG.4–6)

品名 Product name	部件 Part	A1=A2 (mm)	C (mm)	D (mm)	L1 (mm)	L2 (mm)	H (mm)	A (mm)	B (mm)	E (mm)	F (mm)	Fig
SRI7.3×5.59×2.65RTSK	SRI	7.30 ±0.15	5.59 ±0.20	2.65 ±0.10	2.35 ±0.10	2.90 ±0.10	0.30 ±0.05					4
DR5.3×2.7AC-ZK	DR			2.70 max				5.30 ±0.20	2.54 ±0.20	0.55 ±0.15	1.45 ±0.20	b
SRI7.3×5.7×2.7B	SRI	7.30 ±0.20	5.70 ±0.15	2.70 ±0.15	2.80 ±0.10	3.10 ±0.10	0.40 ±0.10					5
DR5.3×2.8	DR			2.80 ±0.15				5.30 ±0.10	2.60 ±0.10	0.65 ±0.10	1.50 ±0.15	d
SRI7.3×5.7×2.7XCW	SRI	7.30 ±0.10	5.70 ±0.10	2.70 ±0.15	2.80 ±0.10	3.10 ±0.10	0.40 ±0.05					6
DR5.3×2.8CW	DR			2.80 ±0.15				5.30 ±0.15	2.60 ±0.15	0.65 ±0.15	1.50 ±0.15	d

SRI+DR系列3（续） SRI + DR SERIES 3

SRI+DR系列3 尺寸规格列表（Fig.4–6）（续） SRI + DR SERIES 3 — DIMENSION LIST (FIG.4–6)

品名 Product name	部件 Part	A1=A2 (mm)	C (mm)	D (mm)	L1 (mm)	L2 (mm)	H (mm)	A (mm)	B (mm)	E (mm)	F (mm)	Fig
SRI7.3×5.7×3.5X	SRI	7.30 ±0.10	5.70 ±0.10	3.50 ±0.15	2.80 ±0.10	3.10 ±0.10	0.40 ±0.05					6
DR5.3×3.6	DR			3.60 ±0.15				5.30 ±0.10	2.80 ±0.10	0.60 ±0.10	2.40 ±0.15	d

SRI+DR系列3 外形尺寸图（Fig.7–8） SRI + DR SERIES 3 — OUTLINE DRAWINGS (FIG.7–8)

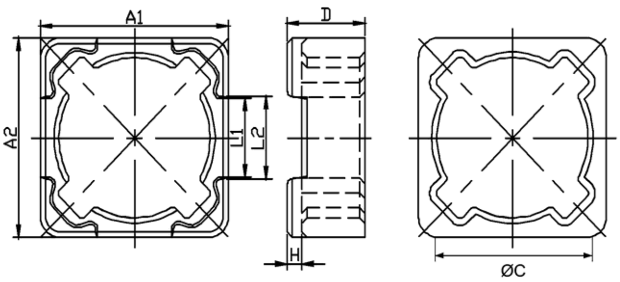

Fig.7

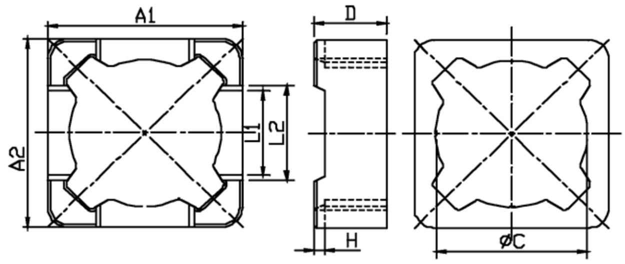

Fig.8

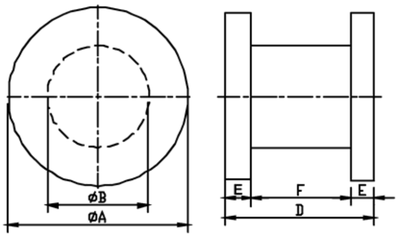

Fig.a

SRI+DR系列3 尺寸规格列表（Fig.7–8） SRI + DR SERIES 3 — DIMENSION LIST (FIG.7–8)

品名 Product name	部件 Part	A1=A2 (mm)	C (mm)	D (mm)	L1 (mm)	L2 (mm)	H (mm)	A (mm)	B (mm)	E (mm)	F (mm)	Fig
SRI7.3×5.6×2.7	SRI	7.30 ±0.15	5.60 ±0.20	2.70 ±0.15	2.50 ±0.10	3.05 ±0.10	0.50 ±0.10					7
DR5.3×2.8	DR			2.80 ±0.15				5.30 ±0.15	2.60 ±0.15	0.65 ±0.15	1.50 ±0.15	a
SRI7.3×5.6×3.5	SRI	7.30 ±0.15	5.60 ±0.20	3.50 ±0.15	2.85 ±0.10	3.00 ±0.10	0.50 ±0.05					7
DR5.3×3.45	DR			3.45 ±0.15				5.30 ±0.15	2.80 ±0.15	0.53 ±0.15	2.40 ±0.15	a
SRI7.3×5.6×3.5	SRI	7.30 ±0.15	5.60 ±0.20	3.50 ±0.15	2.85 ±0.10	3.00 ±0.10	0.50 ±0.05					7
DR5.3×3.65	DR			3.65 ±0.15				5.30 ±0.15	2.80 ±0.15	0.68 ±0.15	2.30 ±0.15	a
SRI7.3×5.6×4.8	SRI	7.30 ±0.15	5.60 ±0.20	4.80 ±0.15	2.85 ±0.10	3.00 ±0.10	0.50 ±0.05					7
DR5.3×5.0	DR			5.00 ±0.15				5.30 ±0.15	3.20 ±0.15	0.75 ±0.15	3.50 ±0.15	a

SRI+DR系列3 尺寸规格列表（Fig.7–8）（续） SRI + DR SERIES 3 — DIMENSION LIST (FIG.7–8)

品名 Product name	部件 Part	A1=A2 (mm)	C (mm)	D (mm)	L1 (mm)	L2 (mm)	H (mm)	A (mm)	B (mm)	E (mm)	F (mm)	Fig
SRI7.3×5.65×4.5(E)	SRI	7.30 ±0.15	5.65 ±0.20	4.50 ±0.15	2.85 ±0.10	3.00 ±0.10	0.50 ±0.05					7
DR5.3×4.6(E)	DR			4.60 ±0.15				5.30 ±0.15	2.80 ±0.15	0.70 ±0.15	3.20 ±0.15	a
SRI7.3×5.7×3.5T	SRI	7.30 ±0.10	5.70 ±0.10	3.50 ±0.10	2.75 ±0.10	3.15 ±0.10	0.45 ±0.05					8
DR5.1×3.65	DR			3.65 ±0.10				5.10 ±0.10	2.80 ±0.10	0.63 ±0.10	2.40 ±0.10	a

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SRI+DR系列4 SRI + DR SERIES 4

SRI 环件外形尺寸图 SRI RING — OUTLINE DRAWINGS

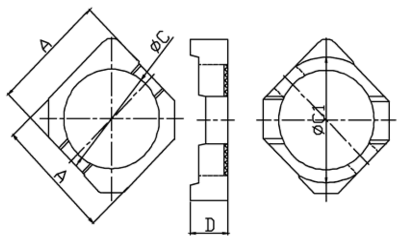

Fig.1

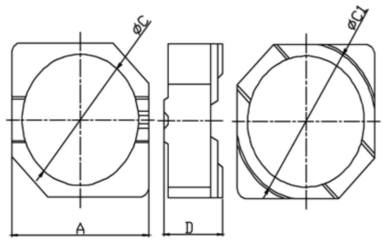

Fig.2

DR 鼓形磁芯外形尺寸图 DR DRUM — OUTLINE DRAWINGS

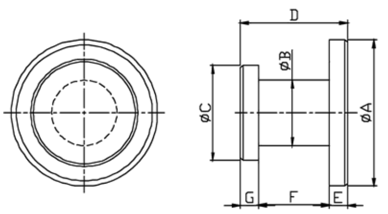

Fig.a

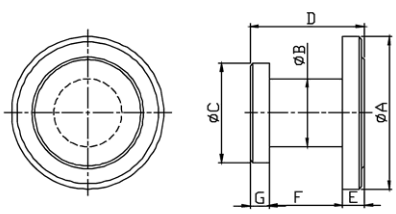

Fig.b

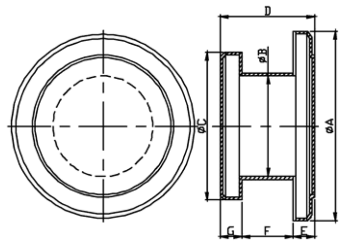

Fig.c

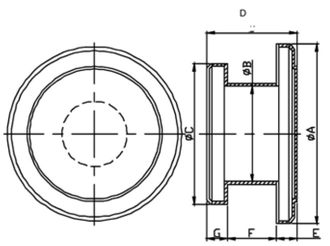

Fig.d

SRI+DR系列4 尺寸规格列表 SRI + DR SERIES 4 — DIMENSION LIST

品名 Product name	部件 Part	A (mm)	C (mm)	C1 (mm)	D (mm)	B (mm)	E (mm)	F (mm)	G (mm)	Fig
SRI3.05×2.4×0.9	SRI	3.05 ±0.10	2.40 ±0.10	2.90 ±0.10	0.90 ±0.10					2
DR2.8×1.05D-3	DR	2.80 ±0.10	2.00 ±0.10		1.05 ±0.10	0.85 ±0.10	0.30 ±0.10	0.45 ±0.10	0.30 ±0.10	a
SRI3.05×2.45×1.45	SRI	3.05 ±0.10	2.45 ±0.10	2.90 ±0.10	1.45 ±0.10					2
DR2.7×1.75D-3	DR	2.70 ±0.10	2.10 ±0.10		1.75 ±0.10	1.00 ±0.10	0.45 ±0.10	0.85 ±0.10	0.45 ±0.10	a
SRI3.8×3.15×1.3	SRI	3.80 ±0.10	3.15 ±0.10	3.60 ±0.10	1.30 ±0.10					2
DR3.5×1.5D-3	DR	3.50 ±0.10	2.60 ±0.10		1.50 ±0.10	1.10 ±0.10	0.40 ±0.10	0.70 ±0.10	0.40 ±0.10	a

SRI+DR系列4（续） SRI + DR SERIES 4

SRI+DR系列4 尺寸规格列表（续） SRI + DR SERIES 4 — DIMENSION LIST

品名 Product name	部件 Part	A (mm)	C (mm)	C1 (mm)	D (mm)	B (mm)	E (mm)	F (mm)	G (mm)	Fig
SRI3.8×3.15×1.5	SRI	3.80 ±0.10	3.15 ±0.10	3.60 ±0.10	1.50 ±0.10					2
DR3.5×1.7D-3	DR	3.50 ±0.10	2.60 ±0.10		1.70 ±0.10	1.20 ±0.10	0.45 ±0.10	0.80 ±0.10	0.45 ±0.10	a
SRI3.8×3.15×2.5	SRI	3.80 ±0.10	3.15 ±0.10	3.60 ±0.10	2.50 ±0.10					2
DR3.5×2.7D-3	DR	3.50 ±0.10	2.60 ±0.10		2.70 ±0.10	1.30 ±0.10	0.45 ±0.10	1.80 ±0.10	0.45 ±0.10	a
SRI4.7×3.9×1.6	SRI	4.70 ±0.10	3.90 ±0.10	4.85 ±0.10	1.60 ±0.10					2
DR4.6×1.7D-3	DR	4.60 ±0.10	3.40 ±0.10		1.70 ±0.10	1.60 ±0.10	0.48 ±0.10	0.75 ±0.10	0.48 ±0.10	a
SRI4.7×3.9×2.6	SRI	4.70 ±0.10	3.90 ±0.10	4.85 ±0.10	2.60 ±0.10					2
DR4.6×2.7D-3	DR	4.60 ±0.10	3.40 ±0.10		2.70 ±0.10	1.80 ±0.10	0.50 ±0.10	1.70 ±0.10	0.50 ±0.10	a
SRI5.7×4.9×1.4	SRI	5.70 ±0.10	4.90 ±0.10	5.80 ±0.10	1.40 ±0.10					2
DR5.6×1.7D-3	DR	5.60 ±0.10	4.20 ±0.10		1.70 ±0.10	2.00 ±0.10	0.48 ±0.10	0.75 ±0.10	0.48 ±0.10	a
SRI5.7×4.9×2.4	SRI	5.70 ±0.10	4.90 ±0.10	5.80 ±0.10	2.40 ±0.10					2
DR5.6×2.7D-3	DR	5.60 ±0.10	4.20 ±0.10		2.70 ±0.10	2.00 ±0.10	0.45 ±0.10	1.80 ±0.10	0.45 ±0.10	a
SRI6.7×5.7×2.6	SRI	6.70 ±0.15	5.70 ±0.15	6.80 ±0.15	2.60 ±0.15					2
DR6.6×2.7D-3	DR	6.60 ±0.15	4.80 ±0.15		2.70 ±0.15	2.30 ±0.15	0.45 ±0.10	1.80 ±0.15	0.45 ±0.10	a
SRI6.7×5.7×3.45	SRI	6.70 ±0.15	5.70 ±0.15	6.80 ±0.15	3.45 ±0.15					2
DR6.6×3.6D-3	DR	6.60 ±0.15	4.80 ±0.15		3.60 ±0.15	2.50 ±0.15	0.50 ±0.10	2.60 ±0.15	0.50 ±0.10	a
SRI10×8.2×2.35	SRI	10.00 ±0.15	8.20 ±0.15	9.80 +0.20/-0.05	2.35 ±0.15					1
DR9.6×2.7D-3	DR	9.60 ±0.15	7.50 ±0.15		2.70 ±0.15	4.00 ±0.15	0.65 ±0.15	1.40 ±0.15	0.65 ±0.15	b
SRI10×8.2×2.35	SRI	10.00 ±0.15	8.20 ±0.15	9.80 +0.20/-0.05	2.35 ±0.15					1
DR9.6×2.7D-3 C7.35	DR	9.60 ±0.15	7.35 ±0.15		2.70 ±0.15	4.00 ±0.15	0.65 ±0.15	1.40 ±0.10	0.65 ±0.15	b
SRI10×8.2×3.2	SRI	10.00 ±0.15	8.20 ±0.15	9.80 +0.20/-0.05	3.20 ±0.15					1
DR9.6×3.7D-3	DR	9.60 ±0.15	7.50 ±0.15		3.70 ±0.15	5.00 ±0.15	1.00 ±0.15	1.90 ±0.15	0.80 ±0.15	b
SRI10×8.2×3.2	SRI	10.00 ±0.15	8.20 ±0.15	9.80 +0.20/-0.05	3.20 ±0.15					1
DR9.6×3.7D-3 C7.35	DR	9.60 ±0.15	7.35 ±0.15		3.70 ±0.15	5.00 ±0.15	1.00 ±0.15	1.90 ±0.15	0.80 ±0.15	b

SRI+DR系列4（续） SRI + DR SERIES 4

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SRI+DR系列4 尺寸规格列表（续） SRI + DR SERIES 4 — DIMENSION LIST

品名 Product name	部件 Part	A (mm)	C (mm)	C1 (mm)	D (mm)	B (mm)	E (mm)	F (mm)	G (mm)	Fig
SRI10×8.2×4.3	SRI	10.00 ±0.15	8.20 ±0.15	9.80 +0.20/-0.05	4.30 ±0.15					1
DR9.6×4.7D-3	DR	9.60 ±0.10	7.50 ±0.10		4.70 ±0.20	5.30 ±0.10	0.85 ±0.15	3.00 ±0.15	0.85 ±0.15	b
SRI10×8.2×4.3	SRI	10.00 ±0.15	8.20 ±0.15	9.80 +0.20/-0.05	4.30 ±0.15					1
DR9.6×4.7D-3 C7.35	DR	9.60 ±0.10	7.35 ±0.10		4.70 ±0.20	5.30 ±0.10	0.85 ±0.15	3.00 ±0.15	0.85 ±0.15	b
SRI10×8.2×5.3	SRI	10.00 ±0.15	8.20 ±0.15	9.80 +0.20/-0.05	5.30 ±0.15					1
DR9.6×5.7D-3	DR	9.60 ±0.10	7.50 ±0.15		5.70 ±0.20	5.30 ±0.15	0.85 ±0.15	4.00 ±0.15	0.85 ±0.15	b
SRI10×8.2×5.3	SRI	10.00 ±0.15	8.20 ±0.15	9.80 +0.20/-0.05	5.30 ±0.15					1
DR9.6×5.7D-3 C7.35	DR	9.60 ±0.10	7.35 ±0.15		5.70 ±0.20	5.30 ±0.15	0.85 ±0.15	4.00 ±0.15	0.85 ±0.15	b
SRI10×8.2×2.35	SRI	10.00 ±0.15	8.20 +0.20/-0.10	9.85 +0.25/-0.00	2.35 ±0.15					1
DR9.6×2.7D-3C-Y C7.35	DR	9.65 ±0.15	7.40 ±0.15		2.75 ±0.20	4.05 ±0.15	0.70 ±0.15	1.35 ±0.20	0.70 ±0.15	d
SRI10×8.2×2.35	SRI	10.00 ±0.15	8.20 +0.20/-0.10	9.85 +0.25/-0.00	2.35 ±0.15					1
DR9.6×2.7D-3C-Y	DR	9.65 ±0.15	7.55 ±0.15		2.75 ±0.20	4.05 ±0.15	0.70 ±0.15	1.35 ±0.20	0.70 ±0.15	d
SRI10×8.2×2.35	SRI	10.00 ±0.15	8.20 +0.20/-0.10	9.85 +0.25/-0.00	2.35 ±0.15					1
DR9.6×2.7D-3C	DR	9.70 +0.10/-0.15	7.60 ±0.15		2.80 ±0.20	4.10 ±0.15	0.75 ±0.15	1.30 ±0.20	0.75 ±0.15	c
SRI10×8.2×2.35	SRI	10.00 ±0.15	8.20 +0.20/-0.10	9.85 +0.25/-0.00	2.35 ±0.15					1
DR9.6×2.7D-3C C7.35	DR	9.70 +0.10/-0.15	7.45 ±0.15		2.80 ±0.20	4.10 ±0.15	0.75 ±0.15	1.30 ±0.20	0.75 ±0.15	c
SRI10×8.2×3.2	SRI	10.00 ±0.15	8.20 ±0.15	9.85 +0.25/-0.00	3.20 ±0.15					1
DR9.6×3.7D-3C-Y	DR	9.65 ±0.15	7.55 ±0.15		3.75 ±0.20	5.05 ±0.15	1.05 ±0.15	1.85 ±0.15	0.85 ±0.15	d
SRI10×8.2×3.2	SRI	10.00 ±0.15	8.20 ±0.15	9.85 +0.25/-0.00	3.20 ±0.15					1
DR9.6×3.7D-3C-Y C7.35	DR	9.65 ±0.15	7.40 ±0.15		3.75 ±0.20	5.05 ±0.15	1.05 ±0.15	1.85 ±0.15	0.85 ±0.15	d
SRI10×8.2×3.2	SRI	10.00 ±0.15	8.20 ±0.15	9.85 +0.25/-0.00	3.20 ±0.15					1
DR9.6×3.7D-3C	DR	9.70 +0.10/-0.15	7.60 ±0.15		3.80 ±0.20	5.10 ±0.15	1.10 ±0.15	1.80 ±0.15	0.90 ±0.15	c
SRI10×8.2×3.2	SRI	10.00 ±0.15	8.20 ±0.15	9.85 +0.25/-0.00	3.20 ±0.15					1
DR9.6×3.7D-3C C7.35	DR	9.70 +0.10/-0.15	7.45 ±0.15		3.80 ±0.20	5.10 ±0.15	1.10 ±0.15	1.80 ±0.15	0.90 ±0.15	c

SRI+DR系列4（续） SRI + DR SERIES 4

SRI+DR系列4 尺寸规格列表（续） SRI + DR SERIES 4 — DIMENSION LIST

品名 Product name	部件 Part	A (mm)	C (mm)	C1 (mm)	D (mm)	B (mm)	E (mm)	F (mm)	G (mm)	Fig
SRI10×8.2×4.3	SRI	10.00 ±0.15	8.20 ±0.15	9.85 +0.25/-0.00	4.30 ±0.15					1
DR9.6×4.7D-3C-Y	DR	9.65 ±0.15	7.55 ±0.15		4.75 ±0.20	5.35 ±0.10	0.90 ±0.15	2.95 ±0.15	0.90 ±0.15	d
SRI10×8.2×4.3	SRI	10.00 ±0.15	8.20 ±0.15	9.85 +0.25/-0.00	4.30 ±0.15					1
DR9.6×4.7D-3C-Y C7.35	DR	9.65 ±0.15	7.40 ±0.15		4.75 ±0.20	5.35 ±0.10	0.90 ±0.15	2.95 ±0.15	0.90 ±0.15	d
SRI10×8.2×4.3	SRI	10.00 ±0.15	8.20 ±0.15	9.85 +0.25/-0.00	4.30 ±0.15					1
DR9.6×4.7D-3C	DR	9.70 +0.10/-0.15	7.60 ±0.15		4.80 ±0.20	5.40 ±0.10	0.95 ±0.15	2.90 ±0.15	0.95 ±0.15	c
SRI10×8.2×4.3	SRI	10.00 ±0.15	8.20 ±0.15	9.85 +0.25/-0.00	4.30 ±0.15					1
DR9.6×4.7D-3C C7.35	DR	9.70 +0.10/-0.15	7.45 ±0.15		4.80 ±0.20	5.40 ±0.10	0.95 ±0.15	2.90 ±0.15	0.95 ±0.15	c
SRI10×8.2×5.3	SRI	10.00 ±0.15	8.20 ±0.15	9.85 +0.25/-0.00	5.30 ±0.15					1
DR9.6×5.7D-3C-Y	DR	9.65 ±0.15	7.55 ±0.15		5.75 ±0.20	5.35 ±0.10	0.90 ±0.15	3.95 ±0.15	0.90 ±0.15	d
SRI10×8.2×5.3	SRI	10.00 ±0.15	8.20 ±0.15	9.85 +0.25/-0.00	5.30 ±0.15					1
DR9.6×5.7D-3C-Y C7.35	DR	9.65 ±0.15	7.40 ±0.15		5.75 ±0.20	5.35 ±0.10	0.90 ±0.15	3.95 ±0.15	0.90 ±0.15	d
SRI10×8.2×5.3	SRI	10.00 ±0.15	8.20 ±0.15	9.85 +0.25/-0.00	5.30 ±0.15					1
DR9.6×5.7D-3C	DR	9.70 +0.10/-0.15	7.60 ±0.15		5.80 ±0.20	5.40 ±0.10	0.95 ±0.15	3.90 ±0.15	0.95 ±0.15	c
SRI10×8.2×5.3	SRI	10.00 ±0.15	8.20 ±0.15	9.85 +0.25/-0.00	5.30 ±0.15					1
DR9.6×5.7D-3C C7.35	DR	9.70 +0.10/-0.15	7.45 ±0.15		5.80 ±0.20	5.40 ±0.10	0.95 ±0.15	3.90 ±0.15	0.95 ±0.15	c

SRI 环件外形尺寸图 SRI RING — OUTLINE DRAWINGS

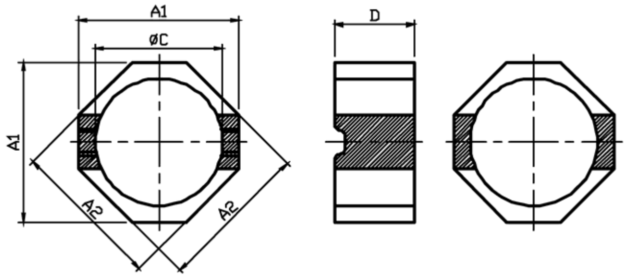

Fig.1

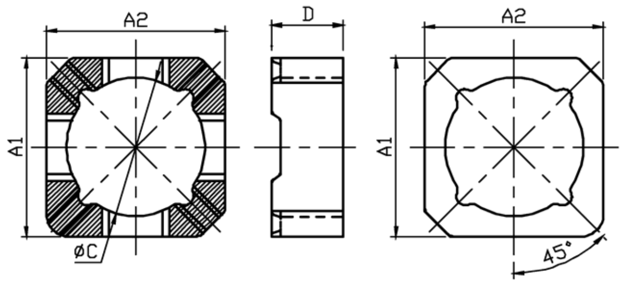

Fig.2

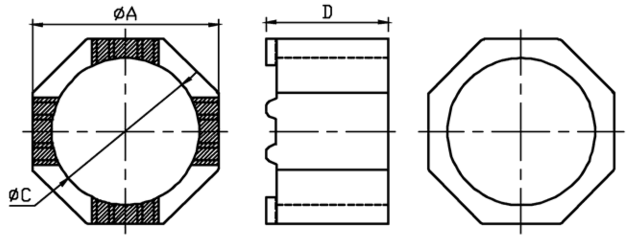

Fig.3

DR 鼓形磁芯外形尺寸图 DR DRUM — OUTLINE DRAWINGS

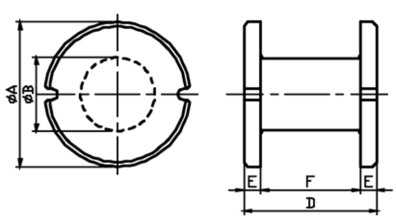

Fig.a

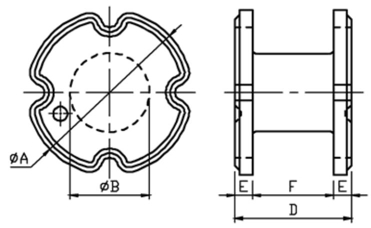

Fig.b

SRI+DR系列5 型式1 尺寸规格列表 SRI + DR SERIES 5 TYPE 1 — DIMENSION LIST

品名 Product name	部件 Part	A/A1 (mm)	A2 (mm)	C (mm)	D (mm)	A (mm)	B (mm)	E (mm)	F (mm)	Fig
SRI4.0×3.1×1.6C	SRI	4.00±0.15	4.00±0.15	3.10±0.15	1.60±0.15					2
DR2.8×1.4RP	DR				1.40±0.10	2.80±0.10	1.30±0.10	0.35±0.10	0.70±0.10	b
SRI5.1×4.2×2.7TC	SRI	5.40±0.15	5.10±0.15	4.20 +0.15/-0.10	2.70±0.15					1
DR3.9×2.7R	DR				2.70±0.15	3.90 +0.10/-0.15	2.50±0.10	0.50 ref	1.70±0.10	a
SRI10×7.9×6.6C4	SRI	10.00 ±0.15	/	7.90 +0.15/-0.05	6.60±0.10					3
DR7.5×6.35R	DR				6.35±0.10	7.50±0.10	5.00±0.10	0.75±0.08	4.85±0.10	a

备注：以上 Fig.a、b 产品B、D、E、F尺寸可调，Fig.1、2、3 产品D尺寸可调。

Note: For Fig.a/b parts, B, D, E and F are adjustable; for Fig.1/2/3 parts, D is adjustable.

SRI+DR系列5 型式2 外形尺寸图 SRI + DR SERIES 5 TYPE 2 — OUTLINE DRAWINGS

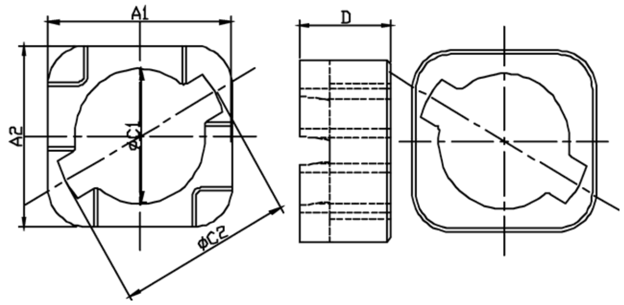

Fig.4

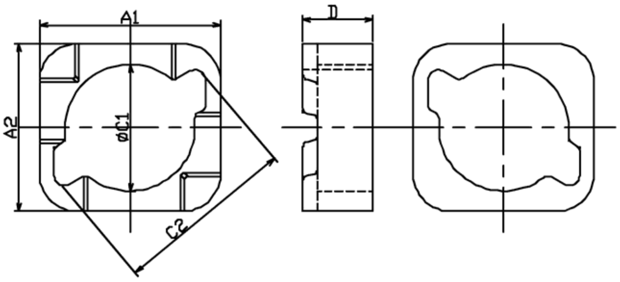

Fig.5

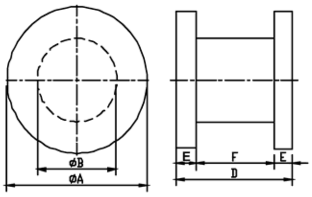

Fig.c

SRI+DR系列5 型式2 尺寸规格列表 SRI + DR SERIES 5 TYPE 2 — DIMENSION LIST

品名 Product name	部件 Part	A1 (mm)	A2 (mm)	C1 (mm)	C2 (mm)	D (mm)	A (mm)	B (mm)	E (mm)	F (mm)	Fig
SRI6.2×4.4×1.9D	SRI	6.20 ±0.15	5.90 ±0.20	4.40 ±0.20	5.40 ±0.20	1.90 ±0.15					4
DR4×1.8	DR					1.80 ±0.15	4.00 ±0.10	1.60 ±0.10	0.40 ±0.15	1.00 ±0.15	c
SRI6.2×4.4×1.9D	SRI	6.20 ±0.15	5.90 ±0.20	4.40 ±0.20	5.40 ±0.20	1.90 ±0.15					4
DR4×2	DR					2.00 ±0.15	4.00 ±0.10	1.60 ±0.10	0.50 ±0.15	1.00 ±0.15	c
SRI6.2×4.4×2.3D	SRI	6.20 ±0.15	5.90 ±0.20	4.40 ±0.20	5.40 ±0.20	2.30 ±0.15					4
DR4×2.4	DR					2.40 ±0.15	4.00 ±0.10	2.00 ±0.10	0.55 ±0.15	1.30 ±0.15	c
SRI6.2×4.4×4.1S	SRI	6.20 ±0.15	5.90 ±0.20	4.40 ±0.20	5.40 ±0.20	4.10 ±0.15					4
DR4×4.2	DR					4.20 ±0.15	4.00 ±0.10	2.10 ±0.10	0.60 ±0.15	3.00 ±0.15	c
SRI6.2×4.4×4.3D	SRI	6.20 ±0.15	5.90 ±0.20	4.40 ±0.20	5.40 ±0.20	4.30 ±0.15					4
DR4×4.4	DR					4.40 ±0.15	4.00 ±0.10	2.40 ±0.10	0.60 ±0.15	3.20 ±0.15	c
SRI6.2×4.4×2.4X	SRI	6.20 ±0.15	5.90 ±0.20	4.40 ±0.20	6.22 ±0.20	2.40 ±0.15					5
DR4×2.5	DR					2.50 ±0.15	4.00 ±0.10	2.00 ±0.10	0.60 ±0.15	1.30 ±0.15	c
SRI6.2×4.4×4.2X	SRI	6.20 ±0.15	5.90 ±0.20	4.40 ±0.20	6.22 ±0.20	4.20 ±0.15					5
DR4×4.3	DR					4.30 ±0.15	4.00 ±0.10	2.30 ±0.10	0.60 ±0.15	3.10 ±0.15	c

SRI 环件外形尺寸图 SRI RING — OUTLINE DRAWINGS

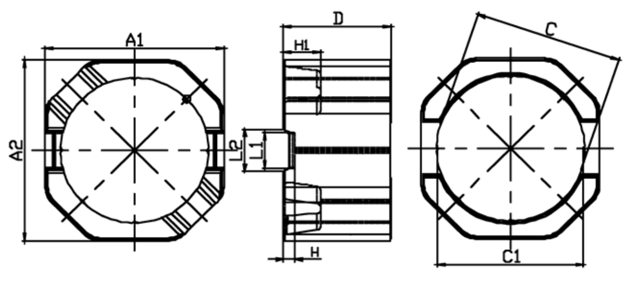

Fig.1

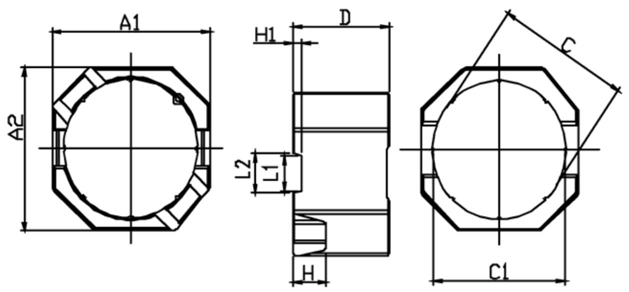

Fig.2

DR 鼓形磁芯外形尺寸图 DR DRUM — OUTLINE DRAWINGS

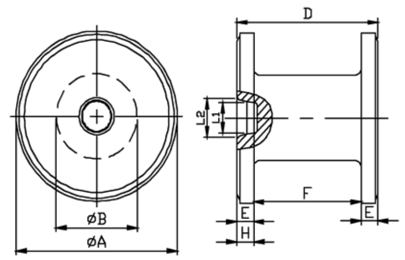

Fig.a

SRI+DR系列6 尺寸规格列表 SRI + DR SERIES 6 — DIMENSION LIST

品名 Product name	部件 Part	A1 (mm)	A2 (mm)	C (mm)	C1 (mm)	D (mm)	L1 (mm)	L2 (mm)	H (mm)	H1 (mm)	A (mm)	B (mm)	E (mm)	F (mm)	Fig
SRI5.95×5.1×4.25A	SRI	5.95 ±0.10	5.95 ±0.10	5.10 ±0.10	5.02 ±0.10	4.25 ±0.10	1.20 ±0.10	1.35 ±0.10	0.50 ±0.10	1.20 ±0.10					1
DR4.8×4.2HA	DR					4.20 ±0.10	0.85 ±0.05	1.05 ±0.05	0.60 ±0.05		4.80 ±0.10	2.60 ±0.10	0.50 ±0.10	3.20 ±0.10	a
SRI6.95×6×4.25	SRI	6.95 ±0.10	6.95 ±0.10	6.00 ±0.10	5.85 ±0.10	4.25 ±0.10	1.50 ±0.10	1.70 ±0.10	0.40 ±0.10	1.50 ±0.10					2
DR5.65×4.2H	DR					4.20 ±0.10	0.85 ±0.05	1.05 ±0.05	0.60 ±0.05		5.65 ±0.10	2.85 ±0.10	0.55 ±0.10	3.10 ±0.10	a
SRI10.5×8×3.7T	SRI	9.80 ±0.10	10.00 ±0.10	8.20 ±0.10	8.00 ±0.10	3.70 ±0.10	1.90 ±0.10	2.20 ±0.10	0.45 ±0.10	1.70 ±0.10					1
DR7.65×3.65H	DR					3.65 ±0.10	0.75 ±0.05	1.20 ±0.05	0.80 ±0.05		7.65 ±0.10	4.15 ±0.10	0.85 ±0.10	1.95 ±0.10	a
SRI10.5×8×5.85T	SRI	9.80 ±0.10	10.00 ±0.10	8.20 ±0.10	8.00 ±0.10	5.85 ±0.10	1.90 ±0.10	2.20 ±0.10	0.45 ±0.10	1.70 ±0.10					1
DR7.65×5.8	DR					5.80 ±0.10	0.75 ±0.05	1.20 ±0.05	0.80 ±0.05		7.65 ±0.10	4.25 ±0.10	0.85 ±0.10	4.10 ±0.10	a
SRI12.5×10.05×5.1T	SRI	12.10 ±0.12	12.50 ±0.12	10.05 +0.10/-0.15	9.85 ±0.15	5.10 ±0.15	2.50 ±0.10	3.50 ±0.10	0.45 ±0.10	2.50 ±0.10					1
DR9.6×5.2H	DR					5.20 ±0.10	0.60 ±0.05	1.30 ±0.05	1.00 ±0.05		9.60 ±0.10	6.40 ±0.10	0.80 ±0.10	3.60 ±0.10	a

SRI+DR系列6（续） SRI + DR SERIES 6

SRI+DR系列6 尺寸规格列表（续） SRI + DR SERIES 6 — DIMENSION LIST

品名 Product name	部件 Part	A1 (mm)	A2 (mm)	C (mm)	C1 (mm)	D (mm)	L1 (mm)	L2 (mm)	H (mm)	H1 (mm)	A (mm)	B (mm)	E (mm)	F (mm)	Fig
SRI12.5×10.05×7.3T	SRI	12.10 ±0.12	12.50 ±0.12	10.05 +0.10/-0.15	9.85 +0.15/-0.10	7.30 ±0.15	2.50 ±0.10	3.50 ±0.10	0.45 ±0.10	2.50 ±0.10					1
DR9.6×7.4H	DR					7.40 ±0.10	0.60 ±0.05	1.30 ±0.05	1.00 ±0.05		9.60 ±0.10	5.90 ±0.10	1.10 ±0.10	5.20 ±0.10	a

MEMO

SRI+DR系列7 SRI + DR SERIES 7

SRI 环件外形尺寸图 SRI RING — OUTLINE DRAWINGS

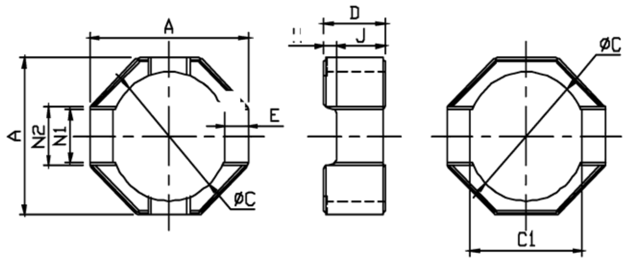

Fig.1

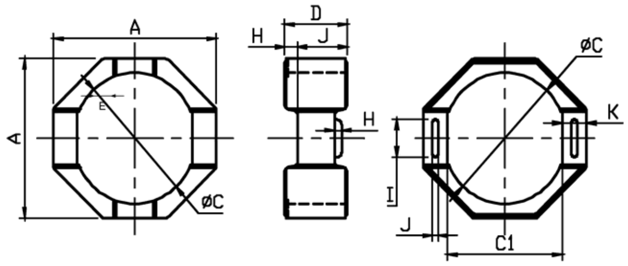

Fig.2

DR 鼓形磁芯外形尺寸图 DR DRUM — OUTLINE DRAWINGS

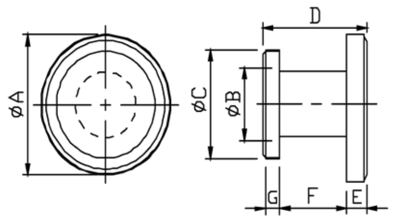

Fig.a

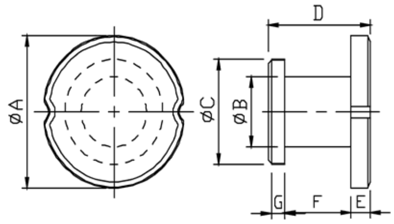

Fig.b

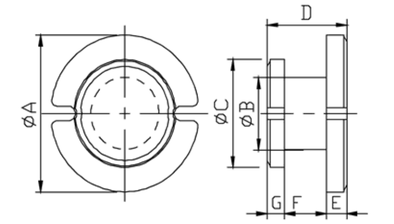

Fig.c

SRI+DR系列7 尺寸规格列表 SRI + DR SERIES 7 — DIMENSION LIST

品名 Product name	部件 Part	A (mm)	C (mm)	C1 (mm)	D (mm)	E (mm)	N1/K (mm)	N2/I (mm)	H (mm)	J (mm)	B (mm)	F (mm)	G (mm)	Fig
SRI6.9×5.5×2.0T	SRI	6.90 ±0.15	5.50 ±0.15	5.20 ±0.15	2.00 ±0.15	/	2.50 ref	2.00 ref	0.30 ref	/				1
DR6.9×2.6RD-3	DR	6.90 ±0.15	4.80 ±0.10		2.60 ±0.15	0.60 ±0.15					2.80 ±0.15	1.40 ±0.15	0.60 ±0.15	c
SRI8×6.6×2.1	SRI	8.00 ±0.15	6.50 ±0.15	6.30 +0.20/-0.15	2.10 ±0.10	/	0.95 +0.00/-0.20	2.10 ref	0.25 ±0.10	0.50 ref				2
DR8×2.7D-3	DR	8.00 ±0.15	5.80 ±0.10		2.70 ±0.15	0.60 ±0.10					3.50 ±0.15	1.50 ±0.10	0.60 ±0.10	a
SRI8.0×6.5×3.0	SRI	8.00 ±0.15	6.60 +0.15/-0.05	6.30 +0.15/-0.05	3.00 ±0.10	0.85 +0.05/-0.07	2.60 ±0.10	2.90 ±0.10	0.80 ±0.10	2.55 ±0.05				2
DR8.0×3.8D-3	DR	8.00 ±0.15	5.80 ±0.15		3.80 ±0.15	0.80 ±0.15					3.50 ±0.15	2.20 ±0.15	0.80 ±0.15	a
SRI8×6.6×3.4-6R8	SRI	8.00 ±0.15	6.60 +0.15/-0.05	6.30 +0.15/-0.05	3.40 +0.10/-0.05	0.85 +0.05/-0.07	2.60 ±0.10	2.90 ±0.10	0.80 ±0.10	2.55 ±0.05				2
DR8×4.2RD-3K-6R8	DR	8.00 ±0.15	5.70 ±0.08		4.20 +0.05/-0.10	0.80 ±0.10					4.00 ±0.15	2.60 ±0.10	0.75 +0.10/-0.15	b
SRI8×6.6×3.4A	SRI	8.00 ±0.15	6.60 ±0.15	6.30 ±0.15	3.40 +0.15/-0.05	/	1.93 ±0.10	2.13 ±0.10	0.85 ±0.10	/				1
DR8×4.2D-3C5.9	DR	8.00 ±0.15	5.90 ±0.10		4.20 +0.05/-0.15	0.78 ±0.10					4.00 ±0.10	2.60 ±0.10	0.78 ±0.10	a
SRI8.15×6.5×2.1B	SRI	8.15 ±0.15	6.50 ±0.15	6.62 ±0.15	2.10 ±0.10	/	0.80 +0.00/-0.10	2.10 ±0.10	0.25 ±0.07	0.50 ref				2
DR8.0×2.7D-3 C6.0	DR	8.00 ±0.15	5.90 ±0.10		2.70 +0.00/-0.20	0.60 ±0.10					3.10 ±0.10	1.50 ±0.10	0.50 ±0.10	a

SRI 环件外形尺寸图 SRI RING — OUTLINE DRAWINGS

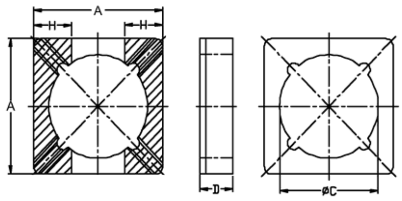

Fig.1

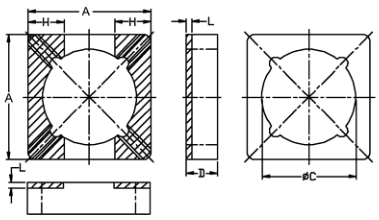

Fig.2

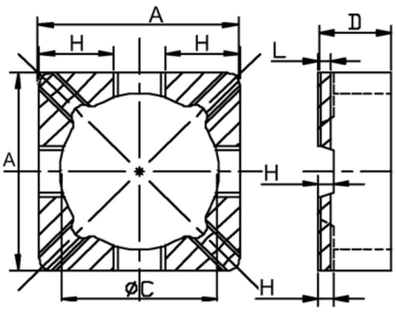

Fig.3

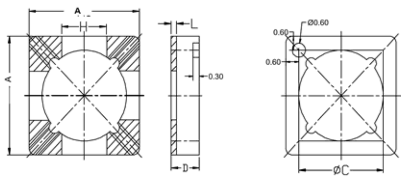

Fig.4

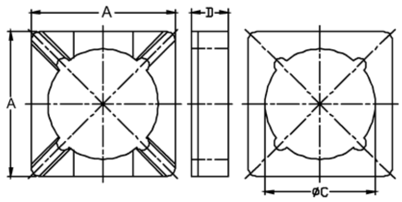

Fig.5

DR 鼓形磁芯外形尺寸图 DR DRUM — OUTLINE DRAWINGS

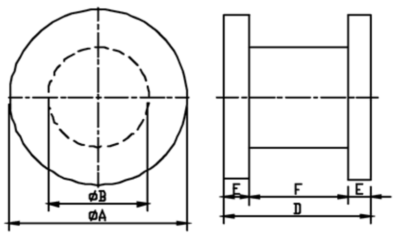

Fig.a

SRI+DR系列8 尺寸规格列表 SRI + DR SERIES 8 — DIMENSION LIST

品名 Product name	部件 Part	A (mm)	C (mm)	D (mm)	H (mm)	L (mm)	B (mm)	E (mm)	F (mm)	Fig
SRI5.05×3.85×0.85C5	SRI	5.05 ±0.10	3.85 ±0.10	0.85 +0.07/-0.05	1.50 ±0.25	0.20～0.60				2
DR3.65×0.85	DR	3.65 ±0.10		0.85 +0.07/-0.05			1.60 ±0.10	0.24 min	0.35 ±0.05	a
SRI5.05×3.85×0.85C2	SRI	5.05 ±0.10	3.85 ±0.10	0.85 +0.07/-0.05	1.50 ±0.25	/				1
DR3.65×0.85	DR	3.65 ±0.10		0.85 +0.07/-0.05			1.60 ±0.10	0.24 min	0.35 ±0.05	a
SRI5.05×3.85×1.1C5	SRI	5.05 ±0.10	3.85 ±0.10	1.10 +0.05/-0.10	1.50 ±0.25	0.20～0.50				2
DR3.65×1.1	DR	3.65 ±0.10		1.10 +0.05/-0.10			1.60 ±0.10	0.30 min	0.40 ±0.10	a
SRI5.05×3.85×1.1C6	SRI	5.05 ±0.10	3.85 ±0.10	1.10 +0.05/-0.10	1.50 ±0.25	0.20～0.50				3
DR3.60×1.1	DR	3.60 ±0.10		1.10 +0.05/-0.10			1.60 ±0.10	0.30 min	0.40 ±0.10	a

SRI+DR系列8 尺寸规格列表（续） SRI + DR SERIES 8 — DIMENSION LIST

品名 Product name	部件 Part	A (mm)	C (mm)	D (mm)	H (mm)	L (mm)	B (mm)	E (mm)	F (mm)	Fig
SRI5.05×3.85×1.1C2	SRI	5.05 ±0.10	3.85 ±0.10	1.10 ±0.10	1.50 ±0.25	/				1
DR3.55×1.1	DR	3.55 ±0.10		1.10 ±0.10			1.80 ±0.10	0.25 ±0.10	0.60 ±0.10	a
SRI5.05×3.85×1.3C2	SRI	5.05 ±0.10	3.85 ±0.10	1.30 ±0.10	1.50 ±0.25	/				1
DR3.55×1.3	DR	3.55 ±0.10		1.30 ±0.10			1.80 ±0.10	0.35 ±0.10	0.60 ±0.10	a
SRI5.05×3.85×1.7C5	SRI	5.05 ±0.10	3.85 ±0.10	1.65～1.73	1.50 ±0.25	0.20～0.80				2
DR3.65×1.7	DR	3.65 ±0.10		1.58～1.65			1.80 ±0.10	0.32 min	0.80 ±0.05	a
SRI5.05×3.85×1.7C2	SRI	5.05 ±0.10	3.85 +0.15/-0.05	1.70 +0.05/-0.10	1.50 ±0.25	/				1
DR3.55×1.7	DR	3.55 ±0.10		1.70 +0.05/-0.10			1.80 ±0.10	0.45 ±0.10	0.80 ±0.10	a
SRI5.05×3.85×1.9C5	SRI	5.05 ±0.10	3.85 ±0.10	1.90 +0.05/-0.15	1.50 ±0.25	0.20～0.90				2
DR3.65×1.9	DR	3.65 ±0.10		1.90 +0.05/-0.15			1.60 ±0.10	0.48 ±0.05	0.90 ±0.05	a
SRI5.05×3.85×1.9C2	SRI	5.05 ±0.10	3.85 ±0.10	1.90 +0.05/-0.10	1.50 ±0.25	/				1
DR3.55×1.9	DR	3.55 ±0.10		1.90 +0.05/-0.15			1.60 ±0.10	0.50 ±0.10	0.90 ±0.10	a
SRI5.05×3.85×1.9	SRI	5.05 ±0.10	3.85 typ	1.90 +0.05/-0.15	/	/				5
DR3.65×1.9	DR	3.65 ±0.10		1.90 +0.05/-0.15			1.60 ±0.10	0.48 ±0.05	0.90 ±0.05	a
SRI5.05×3.85×2.4C5	SRI	5.05 ±0.10	3.85 ±0.10	2.40 +0.05/-0.15	1.50 ±0.25	0.20～1.20				2
DR3.65×2.4	DR	3.65 ±0.10		2.40 +0.05/-0.15			1.80 ±0.10	0.47 ±0.10	1.40 ±0.10	a
SRI5.05×3.85×2.4C6	SRI	5.05 ±0.10	3.85 +0.15/-0.10	2.40 +0.05/-0.15	1.80 ±0.25	0.20～0.90				3
DR3.6×2.4	DR	3.60 ±0.10		2.40 +0.05/-0.15			1.90 ±0.10	0.38 ±0.07	1.60 ±0.10	a
SRI5.05×3.85×3.0C6H	SRI	5.05 ±0.10	3.85 ±0.10	3.00 ±0.10	2.20 ±0.20	0.20～0.90				4
DR3.65×2.9B1.85F1.9	DR	3.65 ±0.10		2.90 ±0.10			1.85 ±0.10	0.50 ±0.10	1.90 ±0.10	a
SRI5.05×3.85×1.3	SRI	5.10 ±0.10	3.85 ±0.10	1.30 ±0.10	/	/				5
DR3.55×1.3	DR	3.55 ±0.10		1.30 ±0.10			1.80 ±0.10	0.35 ±0.07	0.70 ±0.10	a
SRI5.1×3.9×1.3C5	SRI	5.10 +0.08/-0.10	3.90 +0.15/-0.10	1.30 ±0.10	1.50 ±0.25	0.20～0.60				2
DR3.65×1.3	DR	3.65 ±0.10		1.30 ±0.10			1.80 ±0.10	0.30 ±0.07	0.70 ±0.07	a

SRI 环件外形尺寸图 SRI RING — OUTLINE DRAWINGS

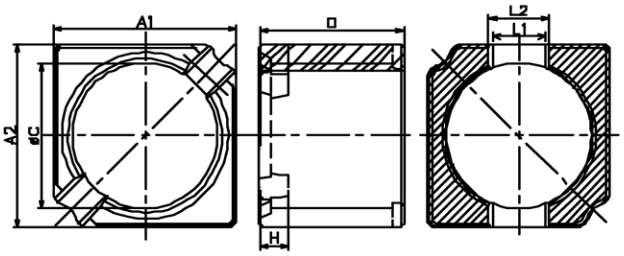

Fig.1

DR 鼓形磁芯外形尺寸图 DR DRUM — OUTLINE DRAWINGS

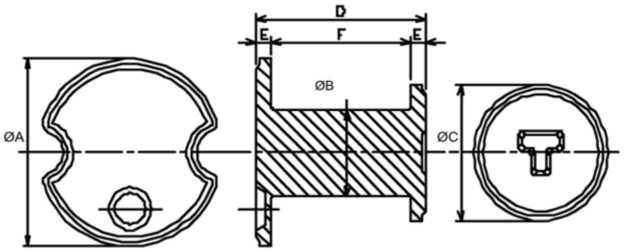

Fig.a

SRI+DR系列9 尺寸规格列表 SRI + DR SERIES 9 — DIMENSION LIST

品名 Product name	部件 Part	A1=A2 (mm)	C (mm)	D (mm)	L1 (mm)	L2 (mm)	H (mm)	A (mm)	B (mm)	E (mm)	F (mm)	Fig
SRI4.8×3.8×1.7TC	SRI	4.80 ±0.10	3.80 ±0.10	1.70 ±0.10	1.40 ±0.10	1.60 ±0.10	0.60 ±0.10					1
DR4×1.6RD-3C	DR		3.20 ±0.10	1.60 ±0.10				4.00 ±0.10	1.80 ±0.10	0.40 ±0.10	0.80 ±0.10	a
SRI4.8×3.8×2.7TC	SRI	4.80 ±0.10	3.80 ±0.10	2.70 ±0.10	1.40 ±0.10	1.60 ±0.10	0.60 ±0.10					1
DR4×2.6RD-3C	DR		3.00 ±0.10	2.60 ±0.10				4.00 ±0.10	1.80 ±0.10	0.40 ±0.10	1.80 ±0.10	a
SRI4.8×3.8×3.8TC	SRI	4.80 ±0.10	3.80 ±0.10	3.80 ±0.10	1.40 ±0.10	1.60 ±0.10	0.80 ±0.10					1
DR4×3.6RD-3C	DR		2.90 ±0.10	3.60 ±0.10				4.00 ±0.10	1.90 ±0.10	0.43 ±0.10	2.74 ±0.10	a

RI+DR系列1 RI + DR SERIES 1

RI 环件外形尺寸图 RI RING — OUTLINE DRAWINGS

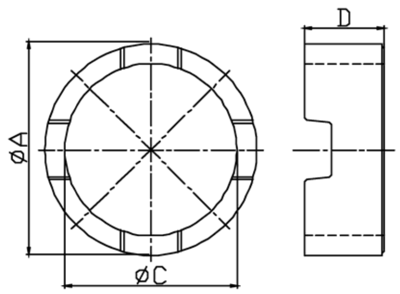

Fig.1

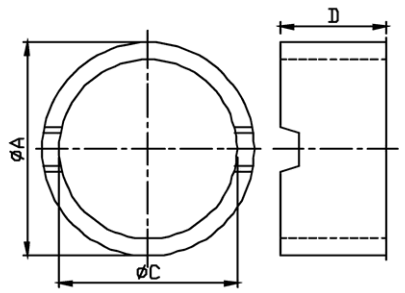

Fig.2

DR 鼓形磁芯外形尺寸图 DR DRUM — OUTLINE DRAWINGS

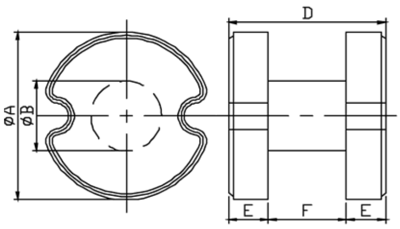

Fig.a

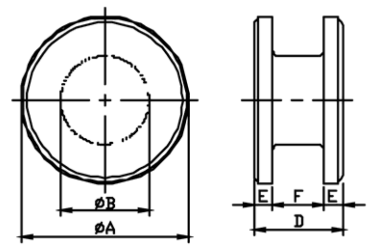

Fig.b

RI+DR系列1 尺寸规格列表 RI + DR SERIES 1 — DIMENSION LIST

品名 Product name	部件 Part	A (mm)	C (mm)	D (mm)	B (mm)	E (mm)	F (mm)	Fig
RI6.8×5.85×2.3T	RI	6.80 ±0.15	5.85 ±0.15	2.30 ±0.15				2
DR5.4×2.6	DR	5.40 ±0.10		2.60 ±0.10	2.30 ±0.10	0.60 ±0.15	1.40 ±0.10	b
RI6.8×5.85×2.7T	RI	6.80 ±0.15	5.85 ±0.15	2.70 ±0.15				2
DR5.4×2.7R	DR	5.40 ±0.10		2.70 ±0.10	2.20 ±0.10	0.65 ±0.15	1.40 ±0.10	a
RI6.8×5.85×3.8T	RI	6.80 ±0.15	5.85 ±0.15	3.80 ±0.15				2
DR5.4×4R	DR	5.40 ±0.10		4.00 ±0.10	2.20 ±0.10	0.90 ±0.15	2.20 ±0.10	a
RI6.8×5.85×3.8T	RI	6.80 ±0.15	5.85 ±0.15	3.80 ±0.15				2
DR4.8×4	DR	4.80 ±0.10		4.00 ±0.10	2.80 ±0.10	0.80 ±0.15	2.40 ±0.10	b
RI6.8×5.85×4.8T	RI	6.80 ±0.15	5.85 ±0.15	4.80 ±0.15				2
DR5.4×5R	DR	5.40 ±0.10		5.00 ±0.10	3.00 ±0.10	0.90 ±0.15	3.20 ±0.10	a
RI6.8×5.85×7.7T	RI	6.80 ±0.15	5.85 ±0.15	7.70 ±0.15				2
DR5.4×7.7R	DR	5.40 ±0.10		7.70 ±0.10	3.30 ±0.10	0.75 ±0.15	6.20 ±0.10	a

RI+DR系列1 尺寸规格列表（续） RI + DR SERIES 1 — DIMENSION LIST

品名 Product name	部件 Part	A (mm)	C (mm)	D (mm)	B (mm)	E (mm)	F (mm)	Fig
RI7.6×6.72×2.2T	RI	7.60 ±0.15	6.72 ±0.15	2.20 ±0.15				1
DR5.6×2.6R	DR	5.60 ±0.10		2.60 ±0.10	2.50 ±0.10	0.70 ±0.15	1.20 ±0.10	a
RI12.3×10.6×7.1	RI	12.30 ±0.20	10.60 ±0.20	7.10 ±0.15				1
DR9.85×7.1	DR	9.85 ±0.15		7.10 ±0.15	6.20 ±0.15	1.10 ±0.15	4.90 ±0.15	b
RI12.4×10.72×5.4	RI	12.40 ±0.20	10.72 ±0.20	5.40 ±0.15				1
DR10×5.2	DR	10.00 ±0.15		5.20 ±0.15	5.20 ±0.15	1.10 ±0.15	3.00 ±0.15	b
RI12.4×10.72×7.25	RI	12.40 ±0.20	10.72 ±0.20	7.25 ±0.15				1
DR10×7.1	DR	10.00 ±0.15		7.10 ±0.15	6.20 ±0.15	1.10 ±0.15	4.90 ±0.15	b

MEMO

RI+DR系列2 RI + DR SERIES 2

RI 环件外形尺寸图 RI RING — OUTLINE DRAWINGS

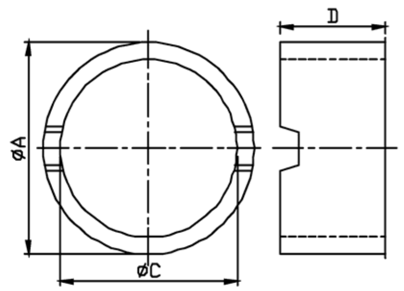

Fig.1

DR 鼓形磁芯外形尺寸图 DR DRUM — OUTLINE DRAWINGS

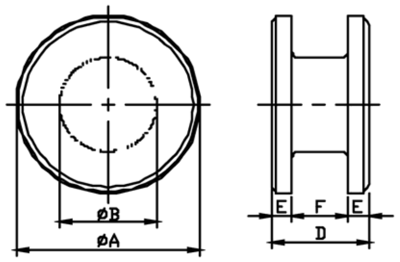

Fig.a

RI+DR系列2 尺寸规格列表 RI + DR SERIES 2 — DIMENSION LIST

品名 Product name	部件 Part	ΦA (mm)	ΦC (mm)	D (mm)	ΦB (mm)	E (mm)	F (mm)	Fig
RI5.9×4.8×1.8T	RI	5.90 ±0.10	4.80 ±0.10	1.80 ±0.15				1
DR4.5×2	DR	4.50 ±0.10		2.00 ±0.10	1.90 ±0.10	0.50 ±0.15	1.00 ±0.15	a
RI5.9×4.8×2.2T	RI	5.90 ±0.10	4.80 ±0.10	2.20 ±0.15				1
DR4.5×2.45	DR	4.50 ±0.10		2.45 ±0.10	2.00 ±0.10	0.58 ±0.15	1.30 ±0.15	a
RI8.38×6.7×2.55T	RI	8.38 ±0.15	6.70 ±0.15	2.55 ±0.15				1
DR4.8×2.5	DR	4.80 ±0.10		2.50 ±0.10	2.00 ±0.10	0.60 ±0.15	1.30 ±0.15	a
RI8.38×6.7×4.05T	RI	8.38 ±0.15	6.70 ±0.15	4.05 ±0.15				1
DR4.8×4	DR	4.80 ±0.10		4.00 ±0.10	2.80 ±0.10	0.80 ±0.15	2.40 ±0.15	a
RI12.2×10.4×6.1 2T	RI	12.20 ±0.25	10.40 +0.20/-0.10	6.10 ±0.15				1
DR9.6×6.3B5.8F4.4	DR	9.60 ±0.15		6.30 ±0.15	5.80 ±0.15	0.95 ±0.15	4.40 ±0.15	a

RI+DR系列2（续） RI + DR SERIES 2

RI+DR系列2 尺寸规格列表（续） RI + DR SERIES 2 — DIMENSION LIST

品名 Product name	部件 Part	ΦA (mm)	ΦC (mm)	D (mm)	ΦB (mm)	E (mm)	F (mm)	Fig
RI12.7×11.1×5.6T	RI	12.70 ±0.20	11.10 ±0.20	5.60 ±0.15				1
DR9.5×5.5	DR	9.50 ±0.15		5.50 ±0.15	5.50 ±0.15	1.25 ±0.15	3.00 ±0.15	a
RI12.7×11.1×5.8T	RI	12.70 ±0.20	11.10 ±0.20	5.80 ±0.15				1
DR9.8×5.8	DR	9.80 ±0.15		5.80 ±0.15	5.50 ±0.15	1.00 ±0.15	3.80 ±0.15	a
RI12.7×11.1×5.8T	RI	12.70 ±0.20	11.10 ±0.20	5.80 ±0.15				1
DR9.5×5.8	DR	9.50 ±0.15		5.80 ±0.15	5.50 ±0.15	1.10 ±0.15	3.60 ±0.15	a
RI12.7×11.1×6T	RI	12.70 ±0.20	11.10 ±0.20	6.00 ±0.15				1
DR9.6×6	DR	9.60 ±0.15		6.00 ±0.15	5.50 ±0.15	1.10 ±0.15	3.80 ±0.15	a
RI12.7×11.1×6T	RI	12.70 ±0.20	11.10 ±0.20	6.00 ±0.15				1
DR9.5×6	DR	9.50 ±0.15		6.00 ±0.15	5.50 ±0.15	1.10 ±0.15	3.80 ±0.15	a
RI13.1×11.1×6T	RI	13.10 ±0.20	11.10 ±0.20	6.00 ±0.15				1
DR9.5×6	DR	9.50 ±0.15		6.00 ±0.15	5.50 ±0.15	1.20 ±0.15	3.60 ±0.15	a

MEMO

RI+DR系列3 RI + DR SERIES 3

RI 环件外形尺寸图 RI RING — OUTLINE DRAWINGS

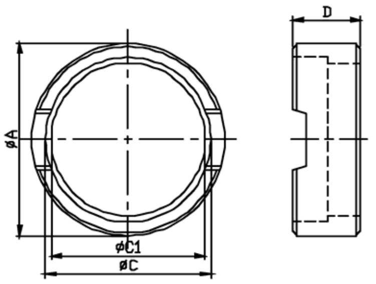

Fig.1

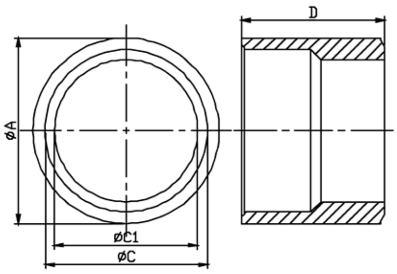

Fig.2

DR 鼓形磁芯外形尺寸图 DR DRUM — OUTLINE DRAWINGS

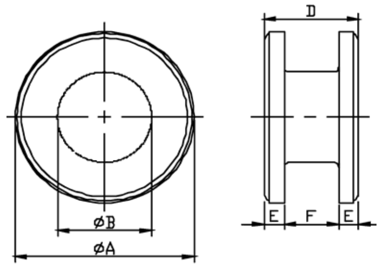

Fig.a

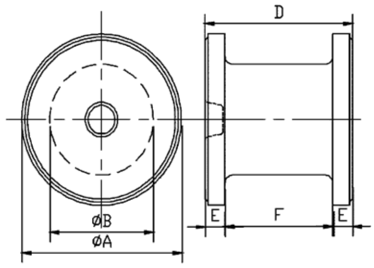

Fig.b

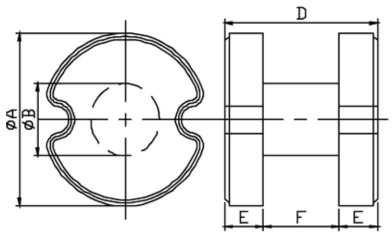

Fig.c

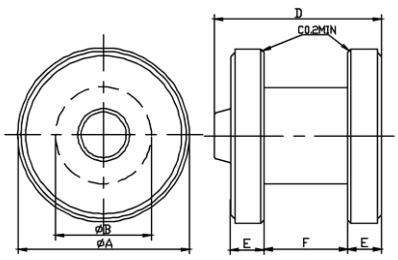

Fig.d

RI+DR系列3 尺寸规格列表 RI + DR SERIES 3 — DIMENSION LIST

品名 Product name	部件 Part	A (mm)	C (mm)	D (mm)	C1 (mm)	B (mm)	E (mm)	F (mm)	Fig
RI7.5×5.75×5.75	RI	7.47 ±0.12	6.55 ±0.10	5.75 ±0.12	5.65 ±0.10				2
DR5.5×6.5S	DR	5.48 ±0.07		6.50 ±0.12		2.20 ±0.10	1.02 ±0.12	4.00 ±0.12	d
RI7.5×5.75×3.5	RI	7.50 +0.00/-0.20	6.55 +0.05/-0.15	3.50 ±0.12	5.75 +0.05/-0.15				2
DR5.5×4.25S	DR	5.50 ±0.07		4.25 ±0.12		2.20 ±0.10	0.85 ±0.12	2.10 ±0.10	d
RI9.9×8.1×2 2T	RI	9.90 ±0.20	8.40 ±0.15	2.00 ±0.15	8.10 ±0.20				1
DR7×2.2R	DR	7.00 ±0.15		2.20 ±0.15		3.40 ±0.15	0.70 ±0.15	0.80 ±0.15	c

RI+DR系列3（续） RI + DR SERIES 3

RI+DR系列3 尺寸规格列表（续） RI + DR SERIES 3 — DIMENSION LIST

品名 Product name	部件 Part	A (mm)	C (mm)	D (mm)	C1 (mm)	B (mm)	E (mm)	F (mm)	Fig
RI9.9×8.1×3.2 2T	RI	9.90 ±0.20	8.40 ±0.15	3.20 ±0.15	8.10 ±0.20				1
DR7.5×5.55	DR	7.50 ±0.15		5.55 ±0.15		3.70 ±0.15	0.65 ±0.15	2.25 ±0.15	a
RI9.9×8.1×3.4T	RI	9.90 ±0.20	8.40 ±0.15	3.40 ±0.15	8.10 ±0.20				1
DR7.5×3.75	DR	7.50 ±0.15		3.75 ±0.15		3.70 ±0.15	0.50 ±0.15	2.55 ±0.15	a
RI9.9×8.1×3.4 2T	RI	9.90 ±0.20	8.40 ±0.15	3.40 ±0.15	8.10 ±0.20				1
DR7.5×3.75	DR	7.50 ±0.15		3.75 ±0.15		3.70 ±0.15	0.60 ±0.15	2.55 ±0.15	a
RI9.9×8.1×5.4 2T	RI	9.90 ±0.20	8.40 ±0.15	5.40 ±0.15	8.10 ±0.20				1
DR7.5×5.5B4.3F4	DR	7.50 ±0.15		5.50 ±0.15		4.30 ±0.15	0.75 ±0.15	4.00 ±0.15	a
RI9.9×8.1×6.4T	RI	9.90 ±0.20	8.40 ±0.15	6.40 ±0.15	8.10 ±0.20				1
DR7.5×6.4	DR	7.50 ±0.15		6.40 ±0.15		4.00 ±0.15	0.95 ±0.15	4.50 ±0.15	a
RI12.2×10.1×4.1 2T	RI	12.20 ±0.25	10.30 +0.20/-0.10	4.10 ±0.15	10.10 ±0.20				1
DR9.6×4.3	DR	9.60 ±0.15		4.30 ±0.15		4.00 ±0.15	0.85 ±0.15	2.60 ±0.15	a
RI12.2×10.1×5.3 2T	RI	12.20 ±0.25	10.30 +0.20/-0.10	5.30 ±0.15	10.10 ±0.20				1
DR9.6×5.5	DR	9.60 ±0.15		5.50 ±0.15		5.30 ±0.15	0.95 ±0.15	3.60 ±0.15	a
RI12.2×10.1×6.3 2T	RI	12.20 ±0.25	10.30 +0.20/-0.10	6.30 ±0.15	10.10 ±0.20				1
DR9.6×6.5	DR	9.60 ±0.15		6.50 ±0.15		5.50 ±0.15	1.05 ±0.15	4.40 ±0.15	a
RI12.2×10.1×6.3 2T	RI	12.20 ±0.25	10.30 +0.20/-0.10	6.30 ±0.15	10.10 ±0.20				1
DR9.6×6.5H	DR	9.60 ±0.15		6.50 ±0.15		5.50 ±0.15	1.05 ±0.15	4.40 ±0.15	b
RI12.2×10.1×6.3 2T	RI	12.20 ±0.25	10.30 +0.20/-0.10	6.30 ±0.15	10.10 ±0.20				1
DR9.6×6.5	DR	9.60 ±0.15		6.50 ±0.15		6.00 ±0.15	1.05 ±0.15	4.40 ±0.15	a
RI12.2×10.1×5.2 2T	RI	12.20 ±0.25	10.40 +0.15/-0.10	5.20 ±0.15	10.10 ±0.20				1
DR9.58×5.5	DR	9.58 ±0.15		5.50 ±0.15		5.50 ±0.15	0.90 ±0.15	3.70 ±0.15	a

CRI+CDR系列 CRI + CDR SETS

CRI 环外形尺寸图 CRI RING — OUTLINE DRAWINGS

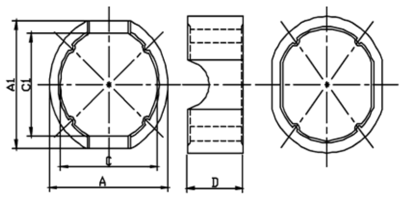

Fig.1

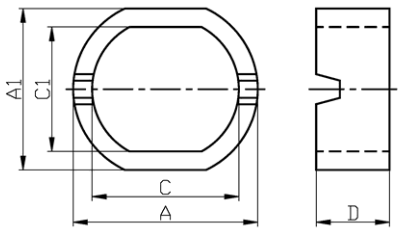

Fig.2

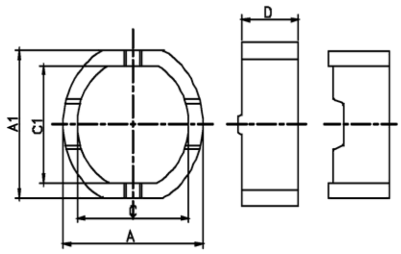

Fig.3

CDR 鼓形磁芯外形尺寸图 CDR DRUM — OUTLINE DRAWINGS

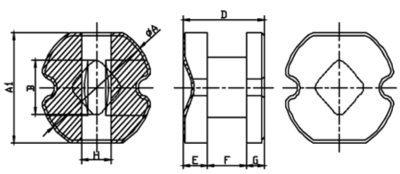

Fig.a

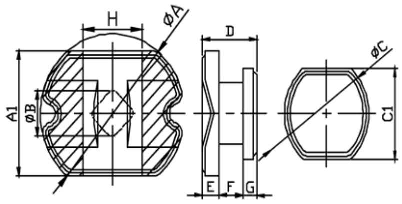

Fig.b

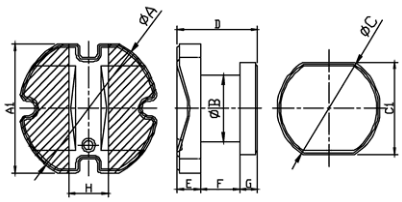

Fig.c

CRI+CDR系列 尺寸规格列表 CRI + CDR SETS — DIMENSION LIST

品名 Product name	部件 Part	A (mm)	A1 (mm)	C (mm)	C1 (mm)	D (mm)	B (mm)	E (mm)	F (mm)	G (mm)	H (mm)	Fig
CRI6.2×5.0×2.2T	CRI	6.20 ±0.15	5.75 ±0.15	5.00 ±0.15	4.55 ±0.15	2.20 ±0.15						2
CDR6.2×3.4RD-3C	CDR	6.20 ±0.15	5.55 ±0.15	4.55 ±0.15	4.00 ±0.15	3.40 ±0.15	2.80 ±0.15	1.20 ±0.15	1.50 ±0.15	0.70 ±0.15	2.00 ±0.30	b
CRI7.8×6.2×3.2TS	CRI	7.00 ±0.20	7.80 ±0.20	5.55 ±0.20	6.20 ±0.15	3.20 ±0.02						3
CDR7.8×4.5R4D-3C	CDR	7.80 ±0.15	7.00 ±0.15	5.80 ±0.15	5.00 ±0.15	4.50 ±0.15	3.90 ±0.15	1.30 ±0.10	2.20 ±0.15	1.00 ±0.15	2.50 ±0.30	c
CRI7.8×6.2×3.1T	CRI	7.80 ±0.15	7.00 ±0.15	6.20 ±0.15	5.50 ±0.15	3.10 ±0.15						2
CDR7.8×4.5RD-3C	CDR	7.80 ±0.15	7.00 ±0.15	5.80 ±0.15	5.00 ±0.15	4.50 ±0.15	3.40 ±0.15	1.50 ±0.15	2.30 ±0.15	0.70 ±0.15	2.50 ±0.30	b
CRI12.6×10.7×5	CRI	12.50 ±0.30	11.60 ±0.30	10.70 ±0.20	9.80 ±0.20	5.00 ±0.15						1
CDR10×5.4RC	CDR	10.00 ±0.15	9.00 ±0.15	/	/	5.40 ±0.15	5.50 ±0.15	1.60 ±0.15	2.60 ±0.15	1.20 ±0.15	3.00 ±0.30	a
CRI12.6×10.65×3.3T	CRI	12.60 ±0.30	11.60 ±0.30	10.65 ±0.20	9.65 ±0.20	3.15 ±0.15						2
CDR12.6×5.6RD-3C	CDR	12.60 ±0.20	11.60 ±0.20	9.90 ±0.15	8.90 ±0.15	5.60 ±0.20	4.80 ±0.15	2.15 ±0.15	2.35 ±0.15	1.10 ±0.15	3.40 ±0.50	b

SP+ST系列1 SP + ST SERIES 1

SP 遮罩磁芯外形尺寸图 SP SHIELD CORE — OUTLINE DRAWINGS

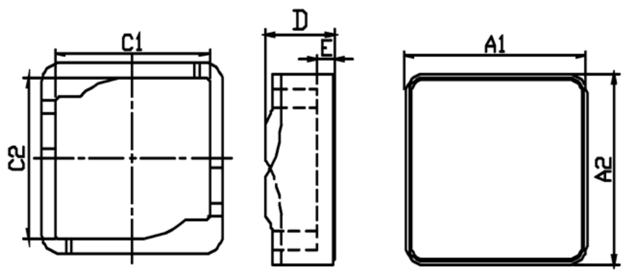

Fig.1

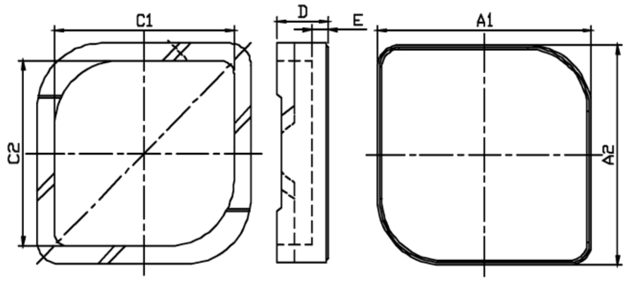

Fig.2

内磁芯外形尺寸图 INNER CORE — OUTLINE DRAWINGS

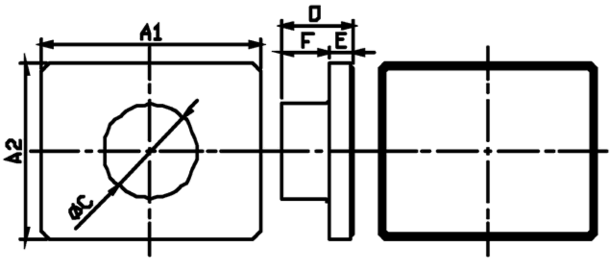

Fig.a

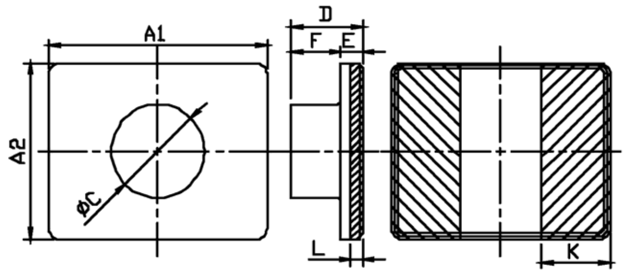

Fig.b

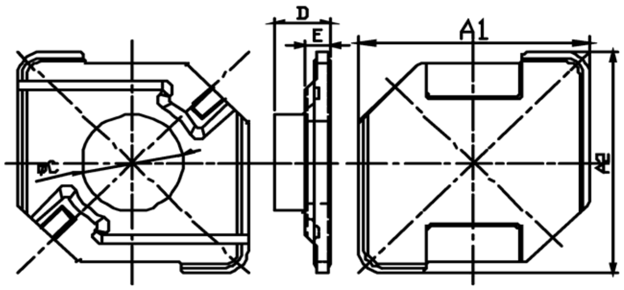

Fig.c

SP+ST系列1 尺寸规格列表 SP + ST SERIES 1 — DIMENSION LIST

品名 Product name	部件 Part	A1 (mm)	A2 (mm)	C1 (mm)	C2 (mm)	D (mm)	E (mm)	C (mm)	F (mm)	L (mm)	K (mm)	Fig
SP4×1.6T	SP	4.00 ±0.05	4.00 ±0.05	3.40 ±0.05	3.40 ±0.05	1.60 max	0.65 ±0.05					1
ST4×3.2×1.3C	ST	4.00 +0.10/-0.05	3.20 +0.10/-0.05			1.30 +0.15/-0.05	0.40 +0.15/-0.05	1.70 ±0.05	0.90 ±0.05	0.22 ref	1.25 ±0.20	b
SP4×1.6T	SP	4.00 ±0.05	4.00 ±0.05	3.40 ±0.05	3.40 ±0.05	1.60 max	0.65 ±0.05					1
ST4×3.2×1.3	ST	4.00 ±0.05	3.20 ±0.05			1.30 ±0.05	0.40 ±0.05	1.70 ±0.05	0.90 ±0.05	/	/	a
SP5×1.2	SP	5.00 ±0.10	5.00 ±0.10	4.20 ±0.10	4.20 ±0.10	1.20 +0.08/-0.13	0.40 ±0.10					2
ST5×1.225R	ST	5.00 ±0.10	5.00 ±0.10			1.225 ±0.10	0.55 +0.075/-0.125	2.20 ±0.05	/	/	/	c

SP 遮罩磁芯外形尺寸图 SP SHIELD CORE — OUTLINE DRAWINGS

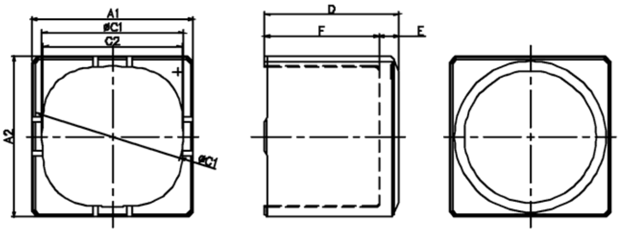

Fig.1

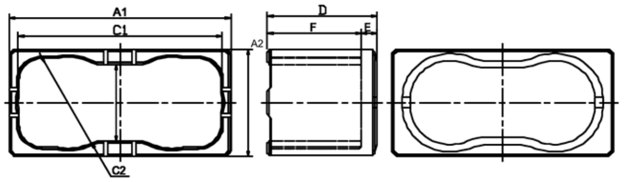

Fig.2

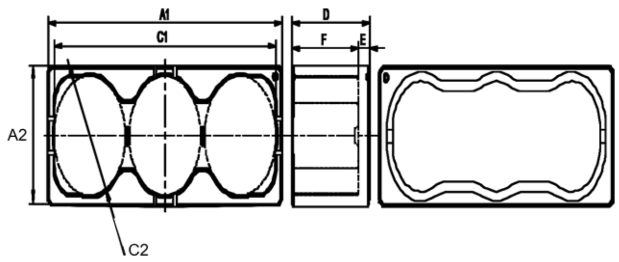

Fig.3

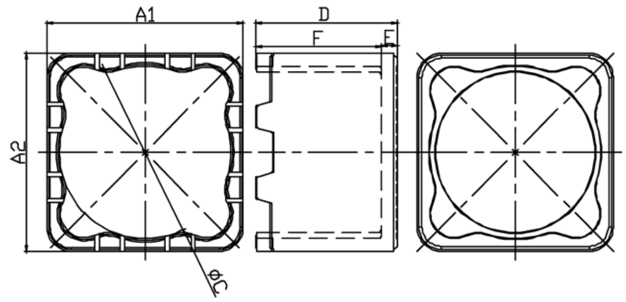

Fig.4

内磁芯外形尺寸图 INNER CORE — OUTLINE DRAWINGS

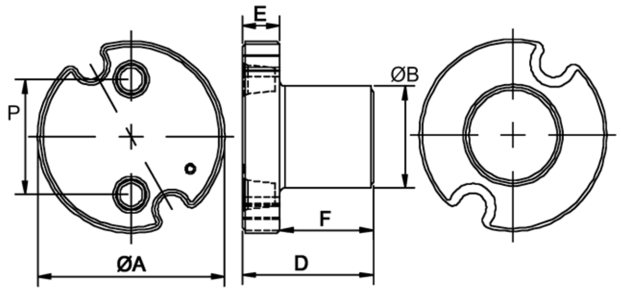

Fig.a

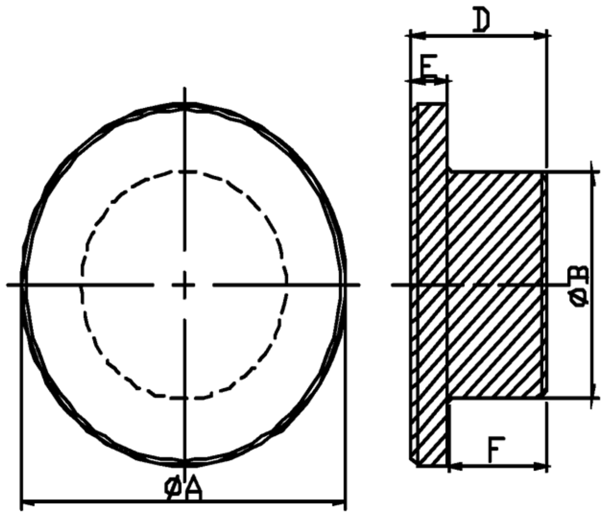

Fig.b

SP+ST系列2 尺寸规格列表 SP + ST SERIES 2 — DIMENSION LIST

品名 Product name	部件 Part	A1 (mm)	A2 (mm)	C1 (mm)	C2 (mm)	D (mm)	E (mm)	F (mm)	A (mm)	B (mm)	P (mm)	Fig
SP12.2×7.05RTSV	SP	12.20 ±0.15	12.20 ±0.15	10.65 ±0.15	10.65 ±0.15	7.05 ±0.15	1.20 ±0.10	5.85 ±0.15				4
ST10×5.95C-YV	ST					5.95 ±0.10	1.20 ±0.15	4.75 ±0.15	10.00 ±0.15	6.20 ±0.15	/	b

SP+ST系列2（续） SP + ST SERIES 2

SP+ST系列2 尺寸规格列表（续） SP + ST SERIES 2 — DIMENSION LIST

品名 Product name	部件 Part	A1 (mm)	A2 (mm)	C1 (mm)	C2 (mm)	D (mm)	E (mm)	F (mm)	A (mm)	B (mm)	P (mm)	Fig
SP12.2×8.8RTSV	SP	12.20 ±0.15	12.20 ±0.15	10.65 ±0.15	10.65 ±0.15	8.80 ±0.15	1.20 ±0.10	7.60 ±0.15				4
ST10×7.65C-YV	ST					7.65 ±0.10	1.20 ±0.15	6.45 ±0.15	10.00 ±0.15	6.20 ±0.15	/	b
SP12.5×13.7T	SP	12.50 +0.25/-0.15	12.50 +0.25/-0.15	10.70 +0.25/-0.15	10.30 +0.25/-0.15	13.70 ±0.20	2.00 ±0.20	11.70 ±0.20				1
ST10×8.6R	ST					8.60 +0.20/-0.10	2.00 ±0.15	6.60 +0.20/-0.10	10.00 +0.05/-0.10	6.30 +0.10/-0.05	6.00 ±0.30	a
SP15×7.3RTSV	SP	15.00 ±0.20	15.00 ±0.20	13.20 ±0.15	13.20 ±0.15	7.30 ±0.15	1.30 ±0.10	6.00 ±0.15				4
ST12×6.05C-YV	ST					6.05 ±0.10	1.40 ±0.15	4.65 ±0.15	12.00 ±0.15	7.00 ±0.15	/	b
SP15×9.1RTSV	SP	15.00 ±0.20	15.00 ±0.20	13.20 ±0.15	13.20 ±0.15	9.10 ±0.15	1.30 ±0.10	7.80 ±0.15				4
ST12×7.7C-Y	ST					7.70 ±0.10	1.40 ±0.15	6.30 ±0.15	12.00 ±0.15	7.00 ±0.15	/	b
SP15×13RTSV	SP	15.00 ±0.20	15.00 ±0.20	13.20 ±0.15	13.20 ±0.15	13.00 ±0.15	1.30 ±0.10	11.70 ±0.15				4
ST12×11.75C-YV	ST					11.75 ±0.10	1.40 ±0.15	10.35 ±0.15	12.00 ±0.15	7.00 ±0.15	/	b
SP16.5×13.7T	SP	16.50 +0.30/-0.10	16.50 +0.30/-0.10	14.50 +0.30/-0.10	14.50 +0.30/-0.10	13.70 ±0.20	2.00 ±0.20	11.70 ±0.20				1
ST14×8.5R	ST					8.50 ±0.20	2.00 ±0.15	6.50 +0.20/-0.10	14.00 +0.05/-0.15	8.30 ±0.10	8.00 ±0.30	a
SP18.5×13.7T	SP	18.50 +0.30/-0.05	18.50 +0.30/-0.05	16.50 +0.25/-0.05	16.50 +0.25/-0.05	13.70 ±0.20	2.00 ±0.20	11.70 ±0.25				1
ST16×7.8R	ST					7.80 +0.25/-0.15	2.00 ±0.15	5.80 ±0.15	16.00 +0.10/-0.15	10.00 +0.10/-0.15	9.00 ±0.30	a
SP22×13.8T	SP	22.00 +0.50/-0.20	22.00 +0.50/-0.20	20.00 +0.50/-0.10	20.00 +0.50/-0.10	13.80 +0.10/-0.20	2.00 ±0.20	11.80 ±0.20				1
ST19×9R	ST					9.00 +0.25/-0.15	2.30 ±0.15	6.70 ±0.15	19.00 +0.10/-0.15	13.50 +0.15/-0.10	11.00 ±0.30	a
SP27.7×14.7×13.7T	SP	27.70 ±0.50	14.70 +0.25/-0.10	25.50 +0.40/-0.00	12.50 +0.20/-0.10	13.70 ±0.25	2.00 ±0.20	11.70 ±0.20				2
ST12×8.5R	ST					8.50 +0.20/-0.10	2.00 ±0.15	6.50 +0.20/-0.10	12.00 +0.05/-0.10	7.30 +0.10/-0.05	7.50 ±0.30	a
SP41×14.7×11.7T	SP	41.00 +0.80/-0.20	14.70 +0.60/-0.10	38.80 +0.60/-0.30	12.50 +0.50/-0.10	11.70 ±0.25	2.00 ±0.20	9.70 ±0.20				3
ST12×7R	ST					7.00 +0.20/-0.10	2.00 ±0.15	5.00 ±0.15	12.00 +0.05/-0.10	7.30 +0.10/-0.00	7.50 ±0.30	a

备注：Fig.4 之 ØC 即表列 C1＝C2（涂装前后之尺寸差异不另分列）。

Note: ØC in Fig.4 corresponds to C1 = C2 in the list (pre-/post-coating differences are not listed separately).

SP CORE 系列 外形尺寸图 (Fig.1–3)

SP POT CORES (CPU CHOKE) — OUTLINE DRAWINGS (FIG.1–3)

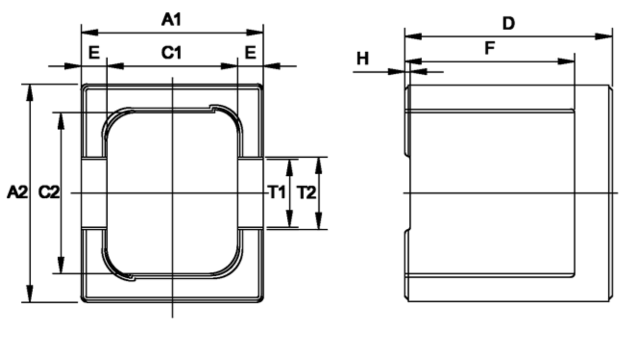

Fig.1

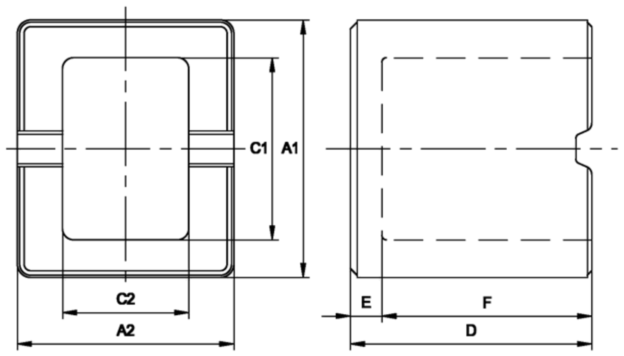

Fig.2

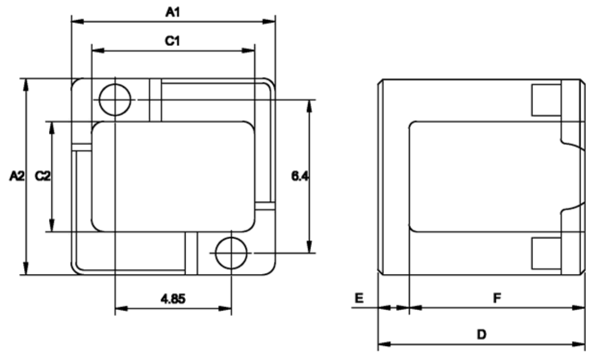

Fig.3

SP CORE 系列 尺寸规格列表 (Fig.1–3)

SP POT CORES (CPU CHOKE) — DIMENSION LIST (FIG.1–3)

品名 Product name	A1 (mm)	A2 (mm)	C1 (mm)	C2 (mm)	D (mm)	E (mm)	F (mm)	T1 (mm)	T2 (mm)	H (mm)	Fig
SP7.8×6.8T	7.80 ±0.20	7.80 ±0.20	5.95 ±0.10	5.60 ±0.10	6.80 ±0.20	0.90 ±0.10	5.70 ±0.20	2.60 ±0.10	2.80 ±0.10	0.22 ±0.05	1
SP7.8×7.0T	7.80 ±0.20	7.80 ±0.20	5.95 ±0.10	5.60 ±0.10	7.00 ±0.20	0.90 ±0.10	5.90 ±0.20	2.60 ±0.10	2.80 ±0.10	0.22 ±0.05	1
SP8.2×8.5T	8.20 ±0.15	8.20 ±0.15	6.80 ±0.10	4.60 ±0.10	8.50 ±0.20	1.20 ref	7.30 ±0.15	/	/	/	2
SP8.2×8.6T	8.20 ±0.15	8.20 ±0.15	6.80 ±0.10	4.60 ±0.10	8.60 ±0.15	1.10 ±0.10	7.50 ±0.15	/	/	/	3
SP8.2×9T	8.20 ±0.15	8.20 ±0.15	6.80 ±0.10	4.60 ±0.10	9.00 ±0.20	1.20 ±0.10	7.80 ±0.15	/	/	/	2
SP8.2×9.3T	8.20 ±0.15	8.20 ±0.15	6.80 ±0.10	4.60 ±0.10	9.30 ±0.20	1.20 ±0.10	8.10 ±0.15	/	/	/	2
SP10×9RA	10.00 ±0.20	10.00 ±0.20	7.50 ±0.15	6.00 ±0.10	9.00 ±0.15	1.00 ref	8.00 ±0.15	/	/	/	2
SP10×9R	10.00 ±0.20	10.00 ±0.20	7.80 ±0.15	6.00 ±0.10	9.00 ±0.15	1.00 ref	8.00 ±0.15	/	/	/	2
SP10.4×10×9T	10.40 ±0.15	10.00 ±0.15	8.20 ±0.10	7.20 ±0.10	9.00 ±0.20	1.10 ±0.10	8.00 ±0.20	3.20 +0.20/-0.00	0.22 ±0.05	10.40 ±0.15	1

CPU CHOKE | SP CORE 系列（续） SP POT CORES (CPU CHOKE)

SP CORE 系列 尺寸规格列表（Fig.1–3）（续） SP POT CORES (CPU CHOKE) — DIMENSION LIST (FIG.1–3)

品名 Product name	A1 (mm)	A2 (mm)	C1 (mm)	C2 (mm)	D (mm)	E (mm)	F (mm)	T1 (mm)	T2 (mm)	H (mm)	Fig
SP11.4×9.5T	11.40 ±0.15	11.40 ±0.15	8.90 ±0.10	8.35 ±0.10	9.50 ±0.20	1.25 ±0.05	8.20 ±0.20	3.70 +0.20/-0.00	0.27 ±0.05	11.40 ±0.15	1
SP12.3×10.5R	12.30 ±0.20	12.30 ±0.20	8.60 ±0.15	8.70 ±0.15	10.50 ±0.25	1.20 ref	9.30 ±0.20	/	/	/	2

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CPU CHOKE | SP CORE 系列（续） SP POT CORES (CPU CHOKE)

SP CORE 系列 外形尺寸图（Fig.4–6） SP POT CORES (CPU CHOKE) — OUTLINE DRAWINGS (FIG.4–6)

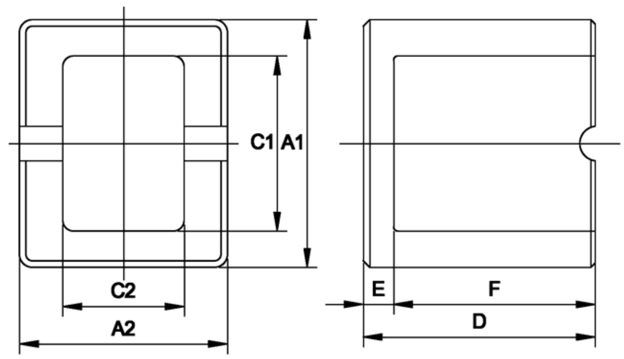

Fig.4

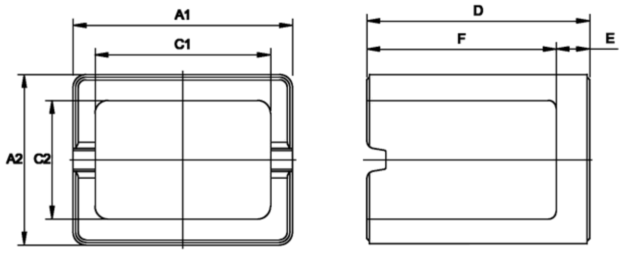

Fig.5

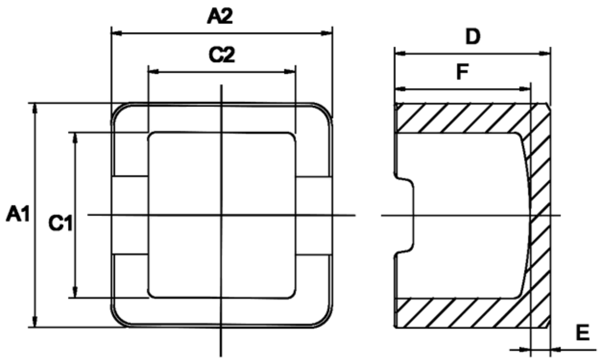

Fig.6

SP CORE 系列 尺寸规格列表（Fig.4–6） SP POT CORES (CPU CHOKE) — DIMENSION LIST (FIG.4–6)

品名 Product name	A1 (mm)	A2 (mm)	C1 (mm)	C2 (mm)	D (mm)	E (mm)	F (mm)	Fig
SP9×8.4×6.35R	9.00 ±0.15	8.40 ±0.15	6.50 ±0.15	4.90 ±0.10	6.35 ±0.10	0.80 ref	5.55 ±0.10	4
SP9×8.4×7.3R	9.00 ±0.15	8.40 ±0.15	6.50 ±0.15	4.90 ±0.10	7.30 ±0.15	1.00 ref	6.30 ±0.15	4
SP9×8.4×9R	9.00 ±0.15	8.40 ±0.15	6.50 ±0.15	4.90 ±0.10	9.00 ±0.15	1.30 ±0.20	7.70 ±0.15	4
SP10×7.3T	10.00 ±0.20	10.00 ±0.20	7.80 ±0.15	6.00 ±0.10	7.30 ±0.15	1.00 ref	6.30 ±0.15	4
SP10×9T	10.00 ±0.20	10.00 ±0.20	7.80 ±0.15	6.00 ±0.10	9.00 ±0.15	1.00 ref	8.00 ±0.15	4
SP10.2×7.2×8.7T	10.20 ±0.25	7.20 ±0.20	7.80 ±0.15	5.44 ±0.10	8.70 ±0.15	1.00 ±0.15	7.70 ±0.15	5
SP10.2×7.2×9.0T	10.20 ±0.25	7.20 ±0.20	7.80 ±0.15	5.44 ±0.10	9.00 ±0.15	1.00 ±0.15	8.00 ±0.15	5
SP11.3×7.8U	11.30 +0.25/-0.10	11.30 +0.25/-0.10	8.50 ±0.15	7.80 ±0.10	7.80 ±0.15	1.00 ±0.15	6.80 ±0.20	6

SP CORE 系列 尺寸规格列表（Fig.4–6）（续）

SP POT CORES (CPU CHOKE) — DIMENSION LIST (FIG.4–6)

品名 Product name	A1 (mm)	A2 (mm)	C1 (mm)	C2 (mm)	D (mm)	E (mm)	F (mm)	Fig
SP11.3×7.9T	11.30 +0.25/-0.10	11.30 +0.25/-0.10	8.50 ±0.15	7.80 ±0.10	7.90 +0.10/-0.20	1.25 ±0.15	6.65 ±0.15	4
SP11.3×9.7T	11.30 +0.25/-0.10	11.30 +0.25/-0.10	8.50 ±0.15	7.80 ±0.10	9.70 +0.25/-0.00	1.20 ±0.15	8.65 ±0.20	4
SP11.6×9T	11.60 ±0.20	11.60 ±0.20	9.20 ±0.15	7.70 ±0.15	9.00 ±0.15	1.35 ±0.15	7.65 ±0.15	4
SP11.6×10T	11.60 ±0.20	11.60 ±0.20	9.20 ±0.15	7.70 ±0.15	10.00 ±0.20	1.35 ±0.15	8.65 ±0.15	4
SP11.6×10.5T	11.60 ±0.20	11.60 ±0.20	9.20 ±0.15	7.70 ±0.15	10.50 ±0.20	1.35 ±0.15	9.15 ±0.15	4
SP11.6×10.8T	11.60 ±0.20	11.60 ±0.20	9.20 ±0.20	7.70 ±0.10	10.80 ±0.20	1.35 ref	9.45 ±0.15	4

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SP CORE 系列 外形尺寸图（Fig.7–9）

SP POT CORES (CPU CHOKE) — OUTLINE DRAWINGS (FIG.7–9)

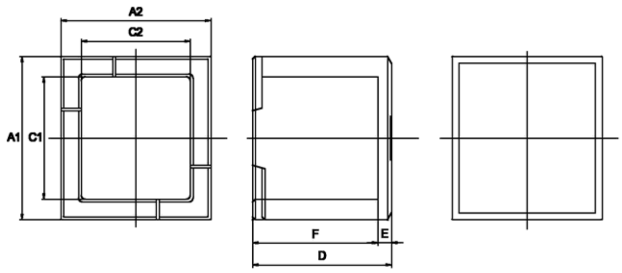

Fig.7

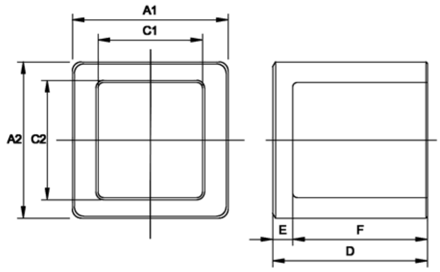

Fig.8

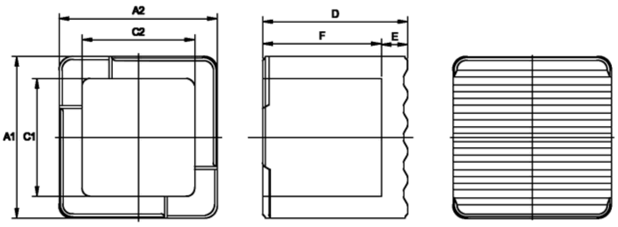

Fig.9

SP CORE 系列 尺寸规格列表（Fig.7–9）

SP POT CORES (CPU CHOKE) — DIMENSION LIST (FIG.7–9)

品名 Product name	A1 (mm)	A2 (mm)	C1 (mm)	C2 (mm)	D (mm)	E (mm)	F (mm)	Fig
SP12×11.05×10.3T	12.00 ±0.20	11.05 ±0.20	8.85 ±0.15	7.70 ±0.15	10.30 ±0.15	1.20 ref	9.10 ±0.15	7
SP12×10.7TW	12.00 ±0.20	12.00 ±0.20	8.60 +0.30/-0.00	8.40 +0.30/-0.00	10.70 ±0.20	1.70 ref	9.00 ±0.15	9
SP12.3×11.75×10.2	12.30 ±0.20	11.75 ±0.20	9.65 ±0.15	8.90 ±0.15	10.20 ±0.15	1.20 ±0.15	9.00 ±0.15	8
SP12.3×11.75×10.5	12.30 ±0.20	11.75 ±0.20	9.65 ±0.15	8.90 ±0.15	10.50 ±0.20	1.30 ±0.15	9.20 ±0.20	8
SP12.6×11.75×10.2	12.65 ±0.20	11.75 ±0.20	9.95 ±0.15	8.90 ±0.15	10.20 ±0.20	1.20 ref	9.00 ±0.15	8
SP12.6×11.75×10.5	12.65 ±0.20	11.75 ±0.20	9.95 ±0.15	8.90 ±0.15	10.50 ±0.20	1.20 ref	9.30 ±0.15	8

SP CORE 系列 外形尺寸图（Fig.10–12）

SP POT CORES (CPU CHOKE) — OUTLINE DRAWINGS (FIG.10–12)

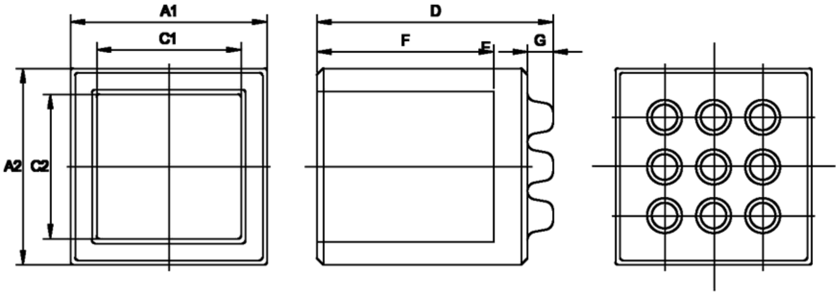

Fig.10

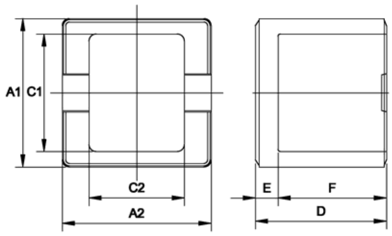

Fig.11

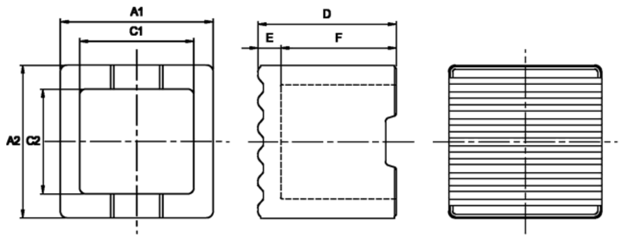

Fig.12

SP CORE 系列 尺寸规格列表（Fig.10–12）

SP POT CORES (CPU CHOKE) — DIMENSION LIST (FIG.10–12)

品名 Product name	A1 (mm)	A2 (mm)	C1 (mm)	C2 (mm)	D (mm)	E (mm)	F (mm)	G (mm)	Fig
SP10×9.6T	10.00 ±0.20	10.00 ±0.20	8.00 +0.15/-0.10	6.00 +0.15/-0.10	9.60 ±0.20	1.20 min	8.20 min	/	11
SP11.3×10.3TW	11.30 +0.25/-0.10	11.30 +0.25/-0.10	8.50 ±0.15	7.80 ±0.10	10.30 ±0.20	1.70 ref	8.60 ±0.15	/	12
SP12.5×11T	12.50 ±0.20	12.50 ±0.20	9.90 ±0.15	8.00 ±0.10	11.00 ±0.20	1.75 ±0.15	9.10 min	/	11
SP12.65×11.9×11.2S	12.65 ±0.20	11.90 ±0.20	9.65 ±0.15	8.90 ±0.15	11.20 ±0.15	/	9.00 ±0.15	1.00 ref	10

CPU CHOKE | SP CORE 系列（续） SP POT CORES (CPU CHOKE)

SP CORE 系列 外形尺寸图（Fig.13–15）

SP POT CORES (CPU CHOKE) — OUTLINE DRAWINGS (FIG.13–15)

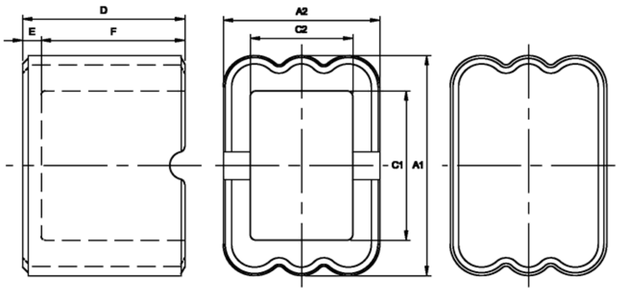

Fig.13

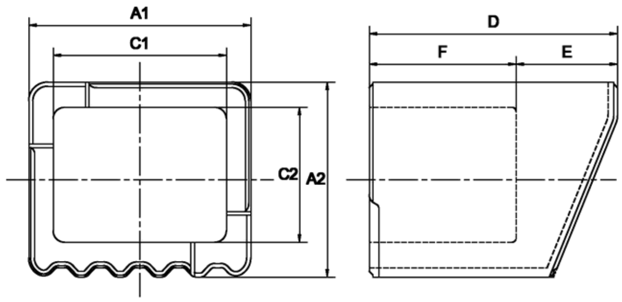

Fig.14

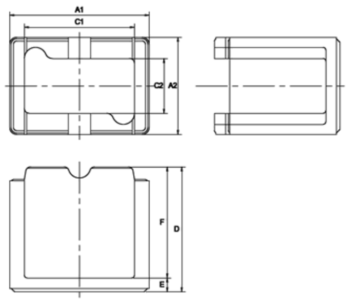

Fig.15

SP CORE 系列 尺寸规格列表（Fig.13–15）

SP POT CORES (CPU CHOKE) — DIMENSION LIST (FIG.13–15)

品名 Product name	A1 (mm)	A2 (mm)	C1 (mm)	C2 (mm)	D (mm)	E (mm)	F (mm)	Fig
SP10×7×9.5T	10.00 ±0.25	7.00 ±0.20	7.80 ±0.15	3.90 ±0.10	9.50 ±0.20	1.10 ±0.15	8.40 ±0.20	15
SP11.8×8.4×8.7RW	11.80 ±0.20	8.40 ±0.20	8.00 ±0.10	5.50 ±0.10	8.70 ±0.15	1.00 ±0.15	7.70 ±0.10	13
SP11.8×10.4×13.5TW	11.80 ±0.25	10.40 ±0.20	9.20 ±0.15	7.20 ±0.15	13.50 ±0.25	5.40 ref	8.10 ±0.20	14

备注：其中 D、E、F 尺寸可调。

Note: Dimensions D, E and F are adjustable.

CPU CHOKE | 配套 R CORE 系列 PAIRED R CORES (SP/SRI CPU CHOKE)

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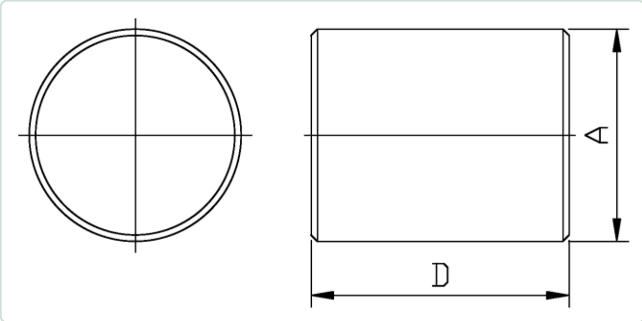
配套 R CORE 系列 外形尺寸图 PAIRED R CORES (SP/SRI CPU CHOKE) — OUTLINE DRAWINGS



配套 R CORE 系列 尺寸规格列表 PAIRED R CORES (SP/SRI CPU CHOKE) — DIMENSION LIST

品名 Product name	A (mm)	D (mm)
R3×5.15G	3.00±0.10	5.15±0.05
R3.5×3.9G	3.50±0.10	3.90±0.05
R4×5.1	4.00±0.10	5.10±0.10
R4.3×4.05	4.30±0.10	4.05±0.10
R4.5×4.25	4.50+0.05/-0.10	4.25±0.10
R4.7×5.45G	4.70±0.10	5.45+0.05/-0.10
R4.8×3.9	4.80±0.10	3.90±0.10
R4.9×6.4	4.90+0.05/-0.10	6.40±0.10
R5×4.15G	5.00±0.10	4.15±0.05
R5.2×7.15G	5.20±0.10	7.15+0.10/-0.05
R5.3×7.1	5.30±0.10	7.10±0.10
R5.5×6.8	5.50±0.10	6.80±0.10
R5.8×7.65	5.80±0.10	7.65±0.10
R6×7.35G	6.00±0.10	7.35±0.05
R6.1×9.1G	6.10±0.10	9.10±0.05
R7×7.2	7.00±0.10	7.20±0.10

备注：其中 D 尺寸可调 · G 表示需研磨。
Note: Dimension D is adjustable; G denotes a ground surface.

CPU CHOKE | 配套 AR CORE 系列 PAIRED AR (OVAL RING) CORES

配套 AR CORE 系列 外形尺寸图 PAIRED AR (OVAL RING) CORES — OUTLINE DRAWINGS

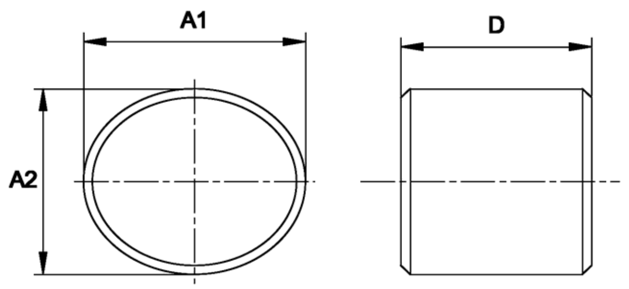


Fig.1

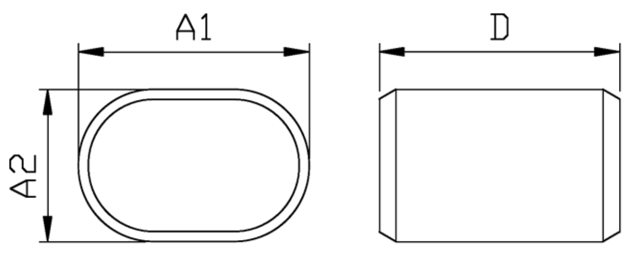


Fig.2

配套 AR CORE 系列 尺寸规格列表 PAIRED AR (OVAL RING) CORES — DIMENSION LIST

品名 Product name	A1 (mm)	A2 (mm)	D (mm)	Fig
AR4.6×3.2×3.45	4.60+0.05/-0.15	3.20+0.05/-0.15	3.45±0.10	1
AR5×3.6×6.62	5.00±0.10	3.60±0.10	6.62±0.15	2
AR5×4.2×4.3G	5.00±0.10	4.20±0.10	4.30±0.05	1
AR5.7×5.3×6.1G	5.70±0.10	5.30±0.10	6.10±0.05	1
AR5.85×5.45×7.15 G	5.85±0.10	5.45±0.10	7.15+0.05/-0.10	1

备注：其中 D 尺寸可调 · G 表示需研磨。

Note: Dimension D is adjustable; G denotes a ground surface.

CPU CHOKE | 配套 I CORE / SB CORE 系列 PAIRED I / SB CORES

I CORE 系列 外形尺寸图 I CORES — OUTLINE DRAWINGS

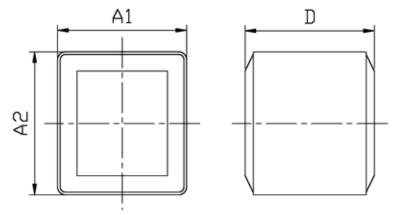


Fig.1

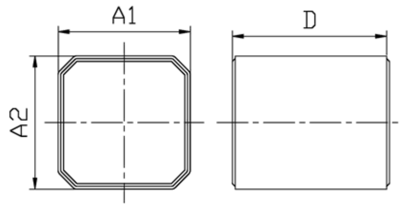


Fig.2

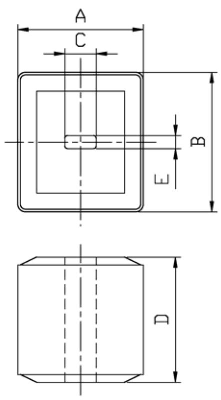
I CORE 系列 尺寸规格列表 I CORES — DIMENSION LIST

品名 Product name	A1 (mm)	A2 (mm)	D (mm)	Fig
I4.5×4.5×5.45G	4.50±0.10	4.50±0.10	5.45±0.05	2
I4.6×3.2×3.43	4.60+0.05/-0.15	3.20+0.05/-0.15	3.43±0.10	1
I4.8×4.8×5.6	4.80±0.10	4.80±0.10	5.60±0.10	2
I5.5×5.5×2.75G	5.50±0.10	5.50±0.10	2.75±0.05	1

备注：其中 D 尺寸可调，G 表示需研磨。

Note: Dimension D is adjustable; G denotes a ground surface.

SB CORE 系列 外形尺寸图 SB CORES — OUTLINE DRAWINGS



SB CORE 系列 尺寸规格列表 SB CORES — DIMENSION LIST

品名 Product name	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)
SB4.8×4.8×2.85	4.80+0.05/-0.10	2.85±0.05	1.50±0.05	4.80+0.05/-0.10	0.25±0.05
SB4.8×4.8×3.05	4.80+0.05/-0.10	3.05±0.05	1.50±0.05	4.80+0.05/-0.10	0.25±0.05
SB4.8×4.8×5.35G	4.80+0.05/-0.10	5.35±0.05	1.20±0.05	4.80+0.05/-0.10	0.50±0.05
SB4.8×4.8×5.63G	4.80+0.05/-0.10	5.63 ref	0.25±0.05	4.80+0.05/-0.10	1.50±0.05

备注：其中 D 尺寸可调，G 表示需研磨。

Note: Dimension D is adjustable; G denotes a ground surface.

CPU CHOKE | SRI CORE 系列 SRI SQUARE RING CORES

SRI CORE 系列 外形尺寸图 (Fig.1–3) SRI SQUARE RING CORES — OUTLINE DRAWINGS (FIG.1–3)

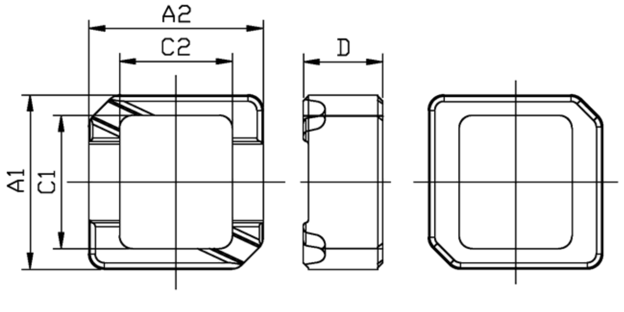


Fig.1

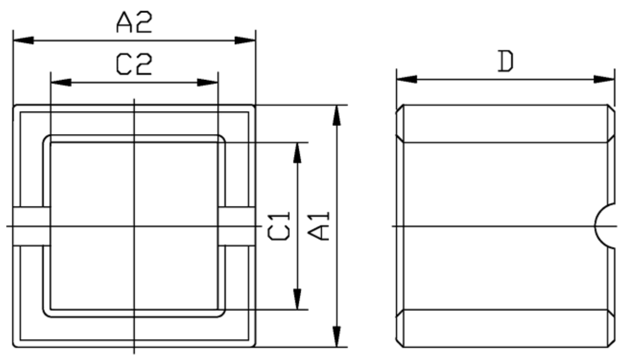


Fig.2

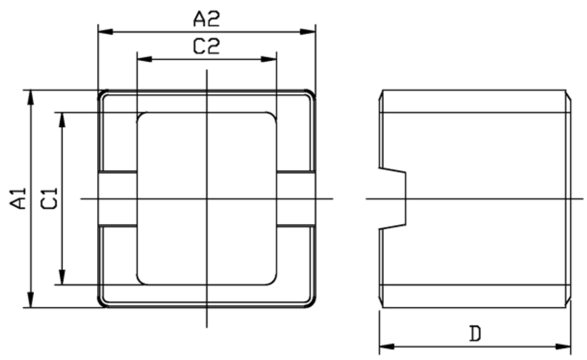


Fig.3

SRI CORE 系列 尺寸规格列表 (Fig.1–3) SRI SQUARE RING CORES — DIMENSION LIST (FIG.1–3)

品名 Product name	A1 (mm)	A2 (mm)	C1 (mm)	C2 (mm)	D (mm)	Fig
SRI6.8×5.2×3.3RT	6.80±0.15	6.80±0.15	5.20±0.15	4.40±0.10	3.30±0.10	1
SRI11×7.5×7.5	11.00±0.20	11.00±0.20	7.50±0.15	7.50±0.15	7.50±0.20	3
SRI11×7.5×9.5	11.00±0.20	11.00±0.20	7.50±0.15	7.50±0.15	9.50±0.20	3
SRI11×7.6×7.5	11.00±0.20	11.00±0.20	7.60±0.15	7.60±0.15	7.50±0.20	2
SRI11×7.6×9.5	11.00±0.20	11.00±0.20	7.60±0.15	7.60±0.15	9.50±0.20	2
SRI11.3×7.8×8.7	11.30±0.20	11.30±0.20	7.80±0.15	7.80±0.15	8.70±0.20	3
SRI11.3×7.8×9.5	11.30±0.20	11.30±0.20	7.80±0.15	7.80±0.15	9.50±0.20	3

CPU CHOKE | SRI CORE 系列（续） SRI SQUARE RING CORES

鐵研 TAK

SRI CORE 系列 外形尺寸图（Fig.4–6） SRI SQUARE RING CORES — OUTLINE DRAWINGS (FIG.4–6)

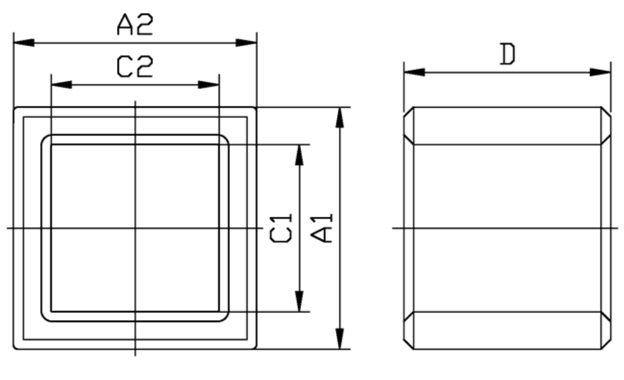


Fig.4

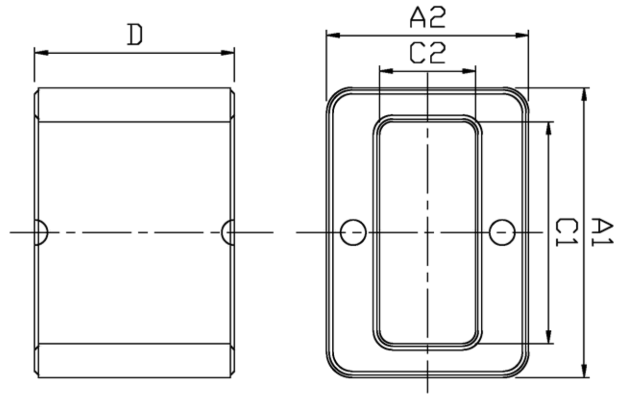


Fig.5

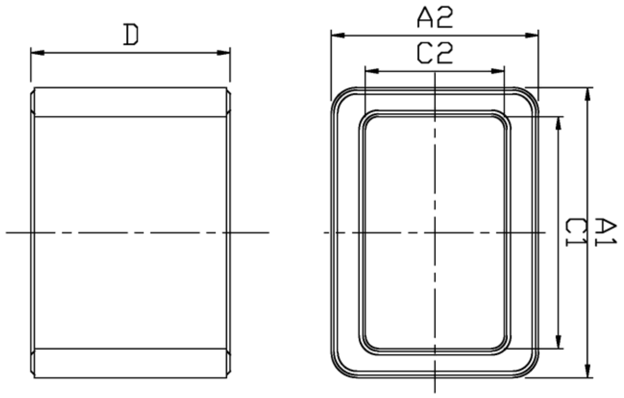


Fig.6

SRI CORE 系列 尺寸规格列表（Fig.4–6） SRI SQUARE RING CORES — DIMENSION LIST (FIG.4–6)

品名 Product name	A1 (mm)	A2 (mm)	C1 (mm)	C2 (mm)	D (mm)	Fig
SRI11.3×8.2×8.55T	11.30+0.25/-0.10	11.30+0.25/-0.10	8.20±0.15	8.20±0.15	8.55±0.15	4
SRI11.5×8.8×7.9	11.50±0.20	8.00±0.20	8.80±0.15	3.80±0.20	7.90±0.10	5
SRI11.5×9.2×7.9	11.50±0.20	8.20±0.20	9.20±0.15	5.50+0.20/-0.00	7.90±0.10	6

SRI CORE 系列 外形尺寸图（Fig.7–9） SRI SQUARE RING CORES — OUTLINE DRAWINGS (FIG.7–9)

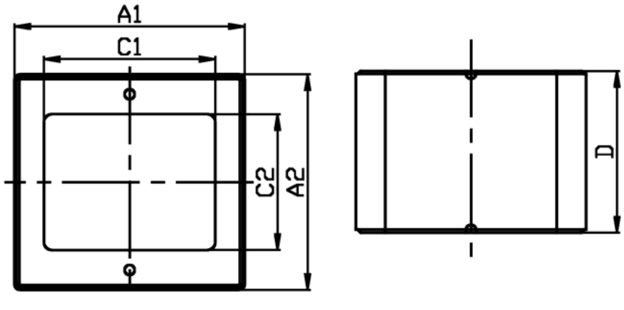


Fig.7

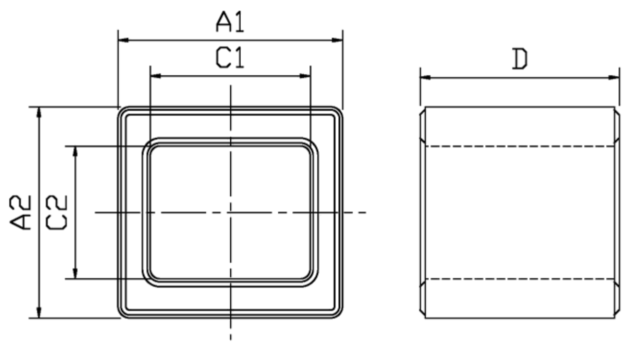


Fig.8

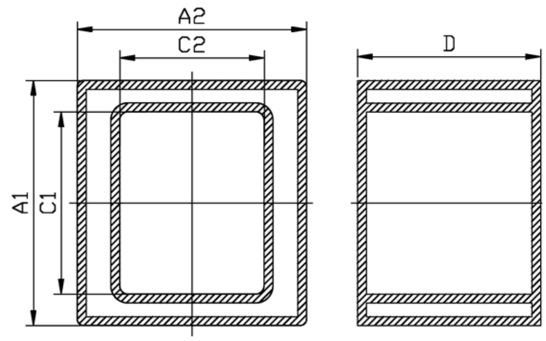


Fig.9

SRI CORE 系列 尺寸规格列表（Fig.7–9） SRI SQUARE RING CORES — DIMENSION LIST (FIG.7–9)

品名 Product name	A1 (mm)	A2 (mm)	C1 (mm)	C2 (mm)	D (mm)	Fig
SRI11.5×8.2×10.2	11.50±0.25	10.80±0.25	8.20±0.15	6.80±0.15	10.20±0.20	8
SRI11.5×8.6×8.1	11.55±0.15	10.80±0.15	8.60+0.15/-0.05	6.80+0.15/-0.05	8.10±0.10	7
SRI13×9.5×9.6C	13.00±0.30	12.00±0.30	9.50±0.20	8.60±0.20	9.60+0.40/-0.20	9

CPU CHOKE | SRI CORE 系列（续） SRI SQUARE RING CORES

SRI CORE 系列 外形尺寸图（Fig.10–11）

SRI SQUARE RING CORES — OUTLINE DRAWINGS (FIG.10–11)

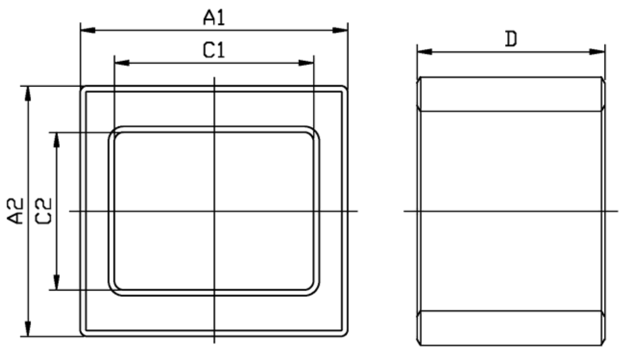


Fig.10

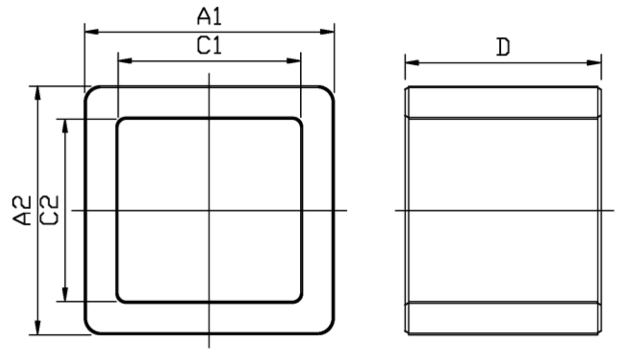


Fig.11

SRI CORE 系列 尺寸规格列表（Fig.10–11）

SRI SQUARE RING CORES — DIMENSION LIST (FIG.10–11)

品名 Product name	A1 (mm)	A2 (mm)	C1 (mm)	C2 (mm)	D (mm)	Fig
SRI13.5×9.7×9.35A	13.50±0.20	12.00±0.20	9.70±0.20	8.20±0.20	9.35±0.15	10
SRI15×11×10.8	15.00±0.25	15.00±0.25	11.00±0.20	11.00±0.20	10.80±0.20	11
SRI15×11×15	15.00±0.25	15.00±0.25	11.00±0.20	11.00±0.20	15.00±0.25	11

备注：其中 D 尺寸可调。

Note: Dimension D is adjustable.

配套电性目录

PAIRED-SET ELECTRICAL DATA

SRI+DR 配对分类×AL×感值×匝数×饱和；SP 遮罩磁芯感值档位。
数值统计自历年产品规格书。

SRI+DR pairing classes × AL × L × turns × saturation, and SP Shield Core L levels — summarised from issued product specifications.

本章系列 SERIES IN THIS CHAPTER

SRI + DR 屏蔽式绕线电感组 SRI + DR SHIELDED DRUM SETS

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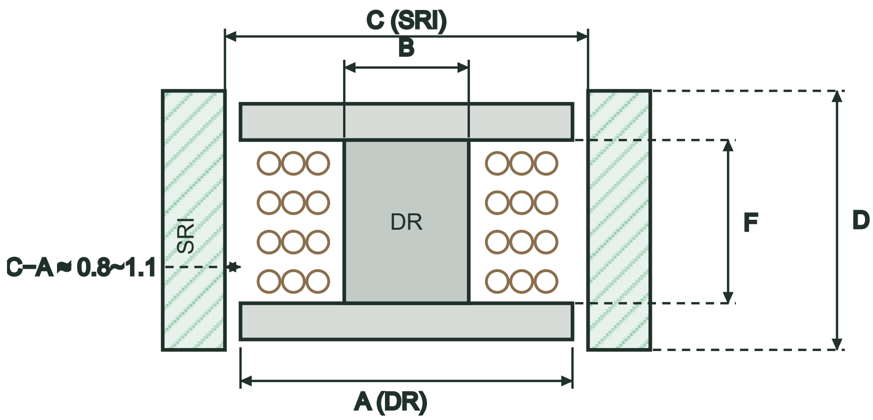
DR 磁芯绕线后嵌入 SRI 磁芯，即构成屏蔽式绕线电感——本公司产品规格书记录中最大宗的配套组合形态。SRI 与 DR 依下列尺寸规则配对；同一机械组合借由匝数、线径与 B / F 的搭配组合即可覆盖宽广感值范围，客户不需更换主要尺寸，以确保对应不同机种的灵活性。

A wound DR core nested into an SRI core forms a shielded wound inductor — the most common paired-core configuration in TAK's product spec records. SRI and DR pair by the dimensional rules below; one mechanical set covers a wide inductance range through turns, wire gauge and B/F combinations — customers keep the same main dimensions, retaining flexibility across different end products.

组合剖面与配对尺寸 SET CROSS-SECTION & PAIRING DIMENSIONS



尺寸配对规则 DIMENSIONAL PAIRING RULES

- SRI 内径 C ＝ DR 法兰外径 A ＋ 0.8 ~ 1.1 mm（间隙 Gap）
  SRI bore C = DR flange A + 0.8–1.1 mm sliding clearance
- SRI 高度 ≈ DR 总高 – 0.2 ~ 0.3 mm（嵌入后 DR 微凸，利于焊接与定位）
  SRI height ≈ DR height − 0.2–0.3 mm
- 同一法兰外径对应同一套环系列，仅高度变动（如 DR9.85 系 ＋ SRI12×10.65 系）
  One drum diameter maps to one ring series; only heights track each other
- D 型 DR（上下法兰不等径，品名带 D-3）自下方套入，SRI 内径可小于上法兰外径
  Asymmetric-flange drums (D-3) load from below; the bore may be smaller than the top flange
- 材质可根据客户需求进行调整：NiZn SRI 或 RI 磁芯＋ MnZn DR 磁芯（T2 / TM80 系）为高频屏蔽常用组合
  Materials follow customer needs: a NiZn SRI / RI core + a MnZn DR core (T2 / TM80) is the classic HF shielded set

SRI + DR 感值规格 INDUCTANCE SPECS

感值规律 — 同一组合，感值主要由绕线匝数决定 How inductance is set

$$L\,(\mu H) = AL \times N^2 \div 1000$$

AL 为该机械组合的每匝²电感常数。 匝数 N 与线径决定感值与 DCR；加研磨 GAP 或垫片可降低感值并提升饱和电流。

AL is the inductance factor (nH per turn²) of the mechanical set. Turns and wire set L and DCR; a ground gap or spacer lowers L and raises saturation current.

举例说明：以 DL5SRI12.5×10.5×6.3 ＋ T2DR9.9×7（AL≈78）为基准组合， 绕线 6.5 Ts 时 L＝3.3 µH；同一组合把绕线匝数增加到 20.5 Ts，L 即由 3.3 µH 升为 33 µH——不换磁芯、只改绕线就能切换感值档位。另一组合 DL5SRI10×8.2×4.35 ＋ T2DR9.55×4.55 绕线 30.5 Ts 得 L＝100 µH；同一组合 加入 0.317 mm 垫片（GAP 由 0 → 0.317 mm）、匝数减为 3 Ts，L 由 100 µH 降至 0.07 µH——加大 GAP 使感值下降、饱和电流大幅提升。

Worked examples: take DL5SRI12.5×10.5×6.3 + T2DR9.9×7 (AL≈78) as the base set — 6.5 turns give L = 3.3 µH, and raising the winding to 20.5 turns on the same set lifts L from 3.3 µH to 33 µH: the L level changes with the winding alone, no core change. Another set, DL5SRI10×8.2×4.35 + T2DR9.55×4.55, gives 100 µH at 30.5 turns; adding a 0.317 mm spacer (GAP 0 → 0.317 mm) and dropping to 3 turns takes L from 100 µH down to 0.07 µH — a larger gap lowers L and greatly raises the saturation current.

代表感值规格 REPRESENTATIVE SPECS

组合品名 Set (SRI & DR)	感值 L Inductance	测试绕线 Winding	饱和特性 Saturation	DCR max	频率 Freq.
DL5SRI6.7×5.7×2.6 DL5DR6.6×2.7D	39 µH ±20%	28.5 Ts / 2-UEW 0.21Φ	0.86 A ≥75%	—	1 kHz
DL5SRI10×8.2×4.35 T2DR9.55×4.55D	100 µH ±18%	30.5 Ts / 2-UEW 0.25Φ	1.8 A ≥83%	—	100 kHz
DL5SRI10×8.2×4.35 T2DR9.55×4.55D	0.07 µH ±10%	3 Ts＋垫片 GAP 0.317	162 A ≥70%	0.15 mΩ	100 kHz
DL5SRI12×10.5×6.6Q DL5DR9.9×7H	15 µH ±15%	14.5 Ts / 2-UEW 0.4Φ*2	6.8 A	—	100 kHz
DL5SRI12.3×10.85×8.8-M TM80DR9.75×9CB6.1F6.3-M	680 µH ±10%	90.5 Ts / 2-UEW 0.3Φ	1.2 A ≥80%	820 mΩ	1 kHz
DL5SRI12.5×10.5×6.3K T2DR9.9×7CB6.1F4.8	3.3 µH ±20%	6.5 Ts / 2-UEW 0.5Φ（绕法 1）	18.7 A ≥70%	15 mΩ	100 kHz
DL5SRI12.5×10.5×6.3K T2DR9.9×7CB6.1F4.8	33 µH ±20%	20.5 Ts / 2-UEW 0.5Φ（绕法 2）	18.7 A ≥70%	15 mΩ	100 kHz

SRI12.5×10.5×6.3K 两列＝同一机械组合的两种绕线规格；SRI10×8.2×4.35 之 0.07 µH 列＝同一组合加 0.317 mm 垫片 GAP 之低感大电流版（其 100 µH 标准绕线列相邻）。

The two SRI12.5×10.5×6.3K rows are two winding specs on one set; the 0.07 µH SRI10×8.2×4.35 row is the same set with a 0.317 mm spacer gap for a low-L high-current build.

B / F 绕线窗变体 — 微调 AL Winding-window variants

品名中 B＝中柱径、F＝绕线窗高（如 DR9.75×9C **B6.1 F6.3**）。 同一外形以 B / F 变体微调 AL：TM80DR9.75×6.85 之 B5.65→AL 62.4、B5.85→AL 64.3； DL5DR11.9×12.65 之 B6.8→AL 94.7、B7.3→AL 100.8。中柱加粗，AL 上升。

B = centre-post Ø, F = window height. Variants trim AL on the same outline: thicker post, higher AL.

SRI + DR 配对分类与电性规格 PAIRING FAMILIES & SPECS

配对分类 · 电性规格 PAIRING FAMILIES · ELECTRICAL SPECS

SRI 遮罩磁芯 SRI Shield Core (A×C×D)	配对 DR 鼓形磁芯 DR drum (A×D)	常见材质 Materials (SRI+DR)	AL 范围 nH/N² AL range	感值范围 L range	匝数范围 Turns	饱和特性 Saturation
SRI4.7×3.9 系列 SRI4.7×3.9 family						
SRI4.7×3.9×2.45	DR4.6×2.7	DL5+DL5	37.6	220 μH	76.5 Ts	0.21 A
SRI4.7×3.9×2.55	DR4.6×2.7	DL5+DL5	41.5	3.9 ~ 22 μH	9.5 ~ 23.5 Ts	0.3 A
SRI4.7×3.9×2.6	DR4.6×2.7	DL5+DL5	41.5	3.9 ~ 22 μH	9.5 ~ 23.5 Ts	0.3 A
SRI4.8×3.65 系列 SRI4.8×3.65 family						
SRI4.8×3.65×2.85	DR3.25×2.6	DL5+T2	32.5	47 μH	38 Ts	0.59 A
SRI4.8×3.8 系列 SRI4.8×3.8 family						
SRI4.8×3.8×1.7	DR4×1.6	DL5+TB2	32.2	20.94 μH	25.5 Ts	0.8 A
SRI4.8×3.8×2.7	DR4×2.6	DL5+TB2	28.8	18.7 μH	25.5 Ts	0.75 A
SRI5.7×4.9 系列 SRI5.7×4.9 family						
SRI5.7×4.9×1.4	DR5.6×1.7	DL5+DL5	53.3	27 μH	22.5 Ts	0.8 A
SRI5.95×5.1 系列 SRI5.95×5.1 family						
SRI5.95×5.1×4.25	DR4.8×4.35	DL5H+DL5	39.2	100 μH	50.5 Ts	0.63 A
SRI6.2×4.4 系列 SRI6.2×4.4 family						
SRI6.2×4.4×2.3	DR4×2.4	DL5+DL5 · DL6+DL6	28.8	10 ~ 56 μH	18.5 ~ 44.5 Ts	1 A
SRI6.2×4.4×2.4	DR4×2.5	DL6+DL6	32.5	100 μH	55.5 Ts	0.5 A
SRI6.2×4.4×4.2	DR4×4.3	DL6+DL6	29.4	75.02 μH	50.5 Ts	0.5 A
SRI6.5×5.1 系列 SRI6.5×5.1 family						
SRI6.5×5.1×2.95	DR4.78×2.95	TP44+TP44	55	5.5 μH	10 Ts	2.7 A
SRI6.7×5.7 系列 SRI6.7×5.7 family						
SRI6.7×5.7×2.6	DR6.6×2.7	DL5+DL5 · DL6+DL6	48	39 μH	28.5 Ts	0.86 A
SRI6.95×6 系列 SRI6.95×6 family						
SRI6.95×6×4.25	DR5.65×4.2	DL5+DL5	50.5	100 μH	44.5 Ts	0.81 ~ 0.85 A

SRI + DR 配对分类与电性规格（续） PAIRING FAMILIES & SPECS (CONT.)

配对分类 · 电性规格（续） PAIRING FAMILIES · ELECTRICAL SPECS

SRI 遮罩磁芯 SRI Shield Core (A×C×D)	配对 DR 鼓形磁芯 DR drum (A×D)	常见材质 Materials (SRI+DR)	AL 范围 nH/N² AL range	感值范围 L range	匝数范围 Turns	饱和特性 Saturation
SRI7.3×5.6 系列 SRI7.3×5.6 family						
SRI7.3×5.6×2.7	DR5.3×2.8	DL5+DL5 · DL6+DL6	47.6	10 ~ 22 µH	14.5 ~ 22.5 Ts	1 ~ 2 A
SRI7.3×5.7 系列 SRI7.3×5.7 family						
SRI7.3×5.7×2.7	DR5.3×2.8	DL5+DL5 · DL4+DL4	40.8	100 µH	49.5 Ts	0.7 A
SRI7.3×5.7×3.5	DR5.1×3.65	DL5+DL5	35.2	0.22 µH	2.5 Ts	10 A
SRI7.3×5.7×3.5	DR5.3×3.7	DL5+T2 · DL5+DL5	36.6	220 µH	77.5 Ts	0.7 A
SRI7.5×5.85 系列 SRI7.5×5.85 family						
SRI7.5×5.85×3.5	DR5.2×3.6	DL5+TM80	35.5	4.7 ~ 22 µH	11.5 ~ 24.5 Ts	1.9 ~ 4.38 A
SRI9.9×8.35 系列 SRI9.9×8.35 family						
SRI9.9×8.35×2.9	DR7.6×2.9	TP44+TP44	80	8 µH	10 Ts	2.7 A
SRI10×8.2 系列 SRI10×8.2 family						
SRI10×8.2×2.3	DR9.6×2.5	DL5+TB2	107.5	1.5 µH ~ 1 mH	3.5 ~ 97.5 Ts	0.45 ~ 9.5 A
SRI10×8.2×3.2	DR9.6×3.7	DL5+T2 · DL5+DL5	115	153.2 µH	36.5 Ts	0.95 A
SRI10×8.2×4.8	DR7.8×5.2	DL5+DL5 · DL5H+DL5H	54.6 ~ 56.8	20.75 µH ~ 1 mH	19.5 ~ 126.5 Ts	0.55 ~ 3.1 A
SRI10.5×8 系列 SRI10.5×8 family						
SRI10.5×8×3.7	DR7.65×3.65	DL5H+DL5	100.8	100 µH	31.5 Ts	1.6 A
SRI10.5×8×5.85	DR7.65×5.8	DL5H+DL5H · DL5H+DL5	67.5	100 µH	38.5 Ts	1.45 A
SRI12×10.5 系列 SRI12×10.5 family						
SRI12×10.5×4.8	DR9.85×5.2	DL5+TB2	80.8	22 µH	16.5 Ts	4.71 A
SRI12×10.5×6.6	DR9×6.9	DL5+TB2	62.4	0.39 µH	2.5 Ts	56 A
SRI12×10.5×6.6	DR9.85×7	DL5+TB2	71.3	15 µH	14.5 Ts	9.66 A

SRI + DR 配对分类与电性规格（续 2） PAIRING FAMILIES & SPECS (CONT.)

鐵研 TAK

配对分类 · 电性规格（续 2） PAIRING FAMILIES · ELECTRICAL SPECS

SRI 遮罩磁芯 SRI Shield Core (A×C×D)	配对 DR 鼓形磁芯 DR drum (A×D)	常见材质 Materials (SRI+DR)	AL 范围 nH/N² AL range	感值范围 L range	匝数范围 Turns	饱和特性 Saturation
SRI12×10.6 系列 SRI12×10.6 family						
SRI12×10.6×3.7	DR9.85×3.7	DL5H+DL5H	92.7	104 µH	33.5 Ts	1.2 A
SRI12×10.6×5	DR9.85×5.2	DL5+DL5 · DL6+DL6	78.3	4.7 ~ 100 µH	7.5 ~ 35.5 Ts	1.3 ~ 2.5 A
SRI12×10.6×8.8	DR9.9×9	DL5+DL5	75.6	2.2 ~ 43.96 µH	5.5 ~ 23.5 Ts	3.3 ~ 17.5 A
SRI12×10.6×9	DR9.85×9	DL5+DL5	80.6	4.7 µH ~ 1 mH	7.5 ~ 110.5 Ts	0.9 ~ 6.5 A
SRI12×10.65 系列 SRI12×10.65 family						
SRI12×10.65×6.6	DR9.85×7.1	DL6+DL6	75.6	10 µH	11.5 Ts	9.6 A
SRI12×10.65×6.7	DR9.85×7	DL5+DL5 · DL5+T2	66.2	12 ~ 220 µH	12.5 ~ 60.5 Ts	2.24 ~ 8.4 A
SRI12×10.65×6.7	DR10×7	DL5+DL5 · DL5+T2	72.3	47 µH	25.5 Ts	2.5 A
SRI12×10.65×6.7	DR10×6.8	DL5+T2	72.3	47 µH	25.5 Ts	2.5 A
SRI12×10.65×6.9	DR9.85×7.1	DL6+DL6	65.8	12 µH	13.5 Ts	2.4 A
SRI12×10.65×8.8	DR9.85×9	DL5+DL5 · DL5+T2	81.9 ~ 83.7	4.7 µH ~ 4.7 mH	7.5 ~ 237 Ts	0.4 ~ 8 A
SRI12×10.65×9.3	DR9.85×9.5	DL5+DL5	78.1	68 µH	29.5 Ts	3.6 A
SRI12×10.7 系列 SRI12×10.7 family						
SRI12×10.7×8.8	DR10×9	DL5+DL5	75.1	100 µH	36.5 Ts	2.2 A
SRI12.1×10.65 系列 SRI12.1×10.65 family						
SRI12.1×10.65×6.7	DR9.85×7	DL5+T2	76.8	12 µH	12.5 Ts	7.9 A
SRI12.1×10.65×8.8	DR9.85×9	DL5+T2 · DL5+DL5	94.1	6.8 ~ 68 µH	8.5 ~ 28.5 Ts	3.2 ~ 10 A
SRI12.2×10.78 系列 SRI12.2×10.78 family						
SRI12.2×10.78×8.65	DR9.85×9	DL5+DL5	85.7	36 ~ 65 µH	20.5 ~ 28.5 Ts	3 ~ 3.1 A

SRI + DR 配对分类与电性规格（续 3） PAIRING FAMILIES & SPECS (CONT.)

配对分类 · 电性规格（续 3） PAIRING FAMILIES · ELECTRICAL SPECS

SRI 遮罩磁芯 SRI Shield Core (A×C×D)	配对 DR 鼓形磁芯 DR drum (A×D)	常见材质 Materials (SRI+DR)	AL 范围 nH/N² AL range	感值范围 L range	匝数范围 Turns	饱和特性 Saturation
SRI12.3×10.85 系列 SRI12.3×10.85 family						
SRI12.3×10.85×5	DR9.75×5.05	DL5+TM80	75.6	10 μH	11.5 Ts	8 A
SRI12.3×10.85×6.7	DR9.75×6.85	DL5+TM80	62.4 ~ 64.3	15 ~ 22 μH	15.5 ~ 18.5 Ts	7.5 ~ 9.1 A
SRI12.3×10.85×8.8	DR9.75×9	DL5+TM80	83	680 μH	90.5 Ts	1.2 A
SRI12.5×10.05 系列 SRI12.5×10.05 family						
SRI12.5×10.05×7.3	DR9.6×7.4	DL5H+DL5 · DL5+DL5	105.9 ~ 110.8	10 ~ 82 μH	9.5 ~ 28.5 Ts	2.6 ~ 6.4 A
SRI12.5×10.5 系列 SRI12.5×10.5 family						
SRI12.5×10.5×6.3	DR9.9×7	DL5+T2	78.3	3.3 ~ 33 μH	6.5 ~ 20.5 Ts	6.2 ~ 18.7 A
SRI12.5×10.6 系列 SRI12.5×10.6 family						
SRI12.5×10.6×6.8	DR9.85×7	DL5+TB2	68.8	0.43 ~ 15 μH	2.5 ~ 14.5 Ts	9.66 ~ 56 A
SRI12.6×10.6 系列 SRI12.6×10.6 family						
SRI12.6×10.6×4.05	DR9.5×4.85	DL5+DL5	52.4	150 μH	53.5 Ts	0.9 A
SRI14.8×12.8 系列 SRI14.8×12.8 family						
SRI14.8×12.8×8.8	DR11.85×9	DL5+DL5	104.6	68 μH	25.5 Ts	3.5 A
SRI15×13.2 系列 SRI15×13.2 family						
SRI15×13.2×12.8	DR11.9×12.65	DL5+DL5	94.7 ~ 100.8	100 μH	31.5 ~ 32.5 Ts	3.2 ~ 4.5 A
SRI15.1×12.95 系列 SRI15.1×12.95 family						
SRI15.1×12.95×11.9	DR11.95×13	DL5+DL5	94.7	36 μH	19.5 Ts	4 ~ 6.5 A

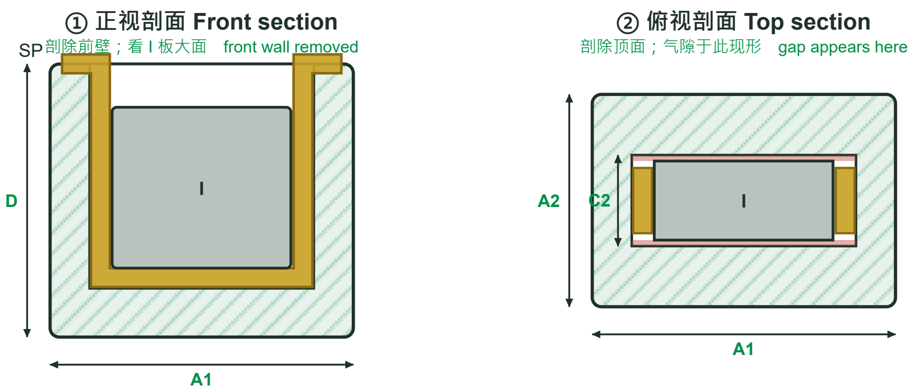
各系列完整尺寸与公差见本册 SRI+DR 各系列页；配套内磁芯若为 MnZn 材质（TP40 / TP44 / TM80 等材番）· 其尺寸请参阅《锰锌铁氧体目录书》。
Full dimensions and tolerances: see the SRI+DR series pages; MnZn inner cores (TP40/TP44/TM80 etc.) are listed in the MnZn catalogue.

SP + I 板组合 SP SHIELD CORE + I-PLATE SETS

SP 遮罩磁芯与 I 板 / R 棒 / SB 柱磁芯组成低感量、大电流的一体式屏蔽电感：内磁芯研磨 GAP 设定感值，饱和测试电流达 3.5 ~ 130 A，适用 VRM / 多相降压等大电流场合。遮罩磁芯与内磁芯为成对开模设计；同一遮罩磁芯以更换内磁芯切换感值档位。下图以 SP + I 板组合为例：绕组为几字铜片，I 板嵌入铜片横梁上并置中于遮罩磁芯内孔；气隙即 SP 内径减去 I 板厚度之尺寸（两侧各一段），合计 lg = C2 – t，以研磨 I 板厚度 t 设定感值，有效截面 Ae = w×l。

SP Shield Cores with I-Plate / R-rod / SB inner cores form integrated shielded inductors for low-L, high-current rails (saturation tested to 3.5–130 A). Shield Core and inner core are paired tooling; one Shield Core spans multiple L levels by swapping the inner core. The cross-section below shows the SP + I-Plate set: the winding is a formed copper clip; the I-Plate nests on the clip cross-bar and is centred in the Shield Core bore, so the gap is the SP bore minus the I-Plate thickness — one segment on each side, lg = C2 − t in total — set by grinding the plate thickness t. Effective area Ae = w×l.

组合剖面 SET CROSS-SECTION



磁隙 lg = C2 – t（SP 内径减去 I 板厚度，两侧各一段；图上放大），以研磨 t 设定感值；有效截面 Ae = w×l。
Gap lg = C2 − t (SP bore minus plate thickness), both faces in series — ground t sets L; Ae = w × l.
几字铜片 = 绕组（1 圈）：U 形开口朝上，于 I 板大面所在平面内绕其左·底·右三边，两腿顶端外翻贴 SP 顶面成焊端。
I 板嵌入铜片横梁上，插入深度由铜片尺寸限制；铜片条宽小于板厚 t，不侵入气隙。另有绕漆包线型式 = 1.5~2.5 圈，磁路相同。
Clip = 1-turn winding, U opening up; plate nests on its cross-bar. Wire-wound = 1.5–2.5 T, same magnetic path.

感值档位 — SP + I 板 L LEVELS · SP WITH I-PLATE

SP 遮罩磁芯 SP Shield Core	适配内磁芯 Inner core	感值档位 (μH) L levels	匝数范围 Turns	饱和测试 Sat. test	频率 Freq.
TP40SP8.1×6×8.4	TM71I5.8×4.5	0.1 / 0.18 / 0.2	—	45 ~ 50 A	200 kHz
W-TP40SP8.1×6×8.4	W-TP40I5.8×4.5	0.18	—	50 A	200 kHz
TM80SP8.1×6×9.2	TM82I6.6×4.4	0.18	—	57 A	200 kHz
TM80SP8.5×6.8×9.2	TM80I4.9×6	0.22	—	50 A	200 kHz
TM80SP8.5×6.8×9.3	TM82I5×6 TM82I5×6.7	0.1 / 0.15 / 0.2 / 0.22	—	55 ~ 80 A	100 kHz
TM80SP8.5×6.8×9.5	TM82I4.9×6.7 TM61I4.9×6.7 TM80I4.9×6.7 TM82I5×6.7	0.1 / 0.15 / 0.2	—	62 ~ 100 A	100 kHz
TM61SP8.5×6.8×9.5	TM61I4.9×6.7	0.15	—	70 A	100 kHz
TP40SP9.3×6.2×9	TM80I6×4	0.15	—	68 A	—

SP + I 板组合（续） SP SHIELD CORE + I-PLATE SETS (CONT.)

鐵研 TAK

感值档位 — SP + I 板（续） L LEVELS · SP WITH I-PLATE

SP 遮罩磁芯 SP Shield Core	适配内磁芯 Inner core	感值档位 (μH) L levels	匝数范围 Turns	饱和测试 Sat. test	频率 Freq.
TP40SP9.3×6.2×9.2	TM82I6×4	0.11 / 0.12 / 0.15	—	75 ~ 100 A	100 kHz
W-TP40SP9.3×6.2×10	W-TM80I5.95×3.95	0.47	—	30 A	—
TM80SP9.3×6.2×10	TM80I6×4	0.47	—	30 A	—
TP44SP9.9×8×8	TM71I5.3×5.3	0.15	—	70 A	—
TP44SP10×7×9	TM80I6×5.4	0.1 / 0.15 / 0.22 / 0.3	—	50 ~ 90 A	100 kHz
TP44SP10×7×9.1	TM80I5.5×5.5 TM82I6×5.4 TM80I6×5.4	0.1 / 0.15 / 0.22	—	60 ~ 90 A	100 kHz
TM80SP10×7×9.1	I 板 ×3 款 TM82 I ×3 sizes	0.15 / 0.3 / 0.4	—	25 ~ 90 A	100 kHz
TP44SP10×7×9.2	I 板 ×4 款 TM80 I ×4 sizes	0.15 / 0.2 / 0.22 / 0.3	—	40 ~ 70 A	100 kHz
W-TP44SP10×7×9.2	W-TM80I6.4×5.7	0.22	—	50 A	100 kHz
TP40SP10×7×9.2	TM82I5.8×5.8	0.45	—	24 A	100 kHz
TP40SP10×7.2×9.6	TM80I5×4.5	0.22	—	70 A	—
TP40SP10×7.2×9.7	I 板 ×3 款 TM80 / TM71 I ×3 sizes	0.22 / 0.42	—	40 ~ 70 A	—
TP40SP10×7.2×9.9	I 板 ×3 款 TM80 / TM71 TM81 I ×3 sizes	0.15 / 0.22 / 0.3 / 0.33 / 0.4 / 0.42 / 0.82 / 4	1.75 Ts	32 ~ 100 A	100 kHz
TP44SP10×9.6	TM80I4.8×4.8	1 / 1.1	3.75 Ts	27 ~ 30 A	100 kHz
W-TP44SP10×9.6	W-TM80I4.8×4.8	1 / 1.1	—	27 ~ 30 A	—
MGB1SP10×9.6×9.6	TM80I4.5×4.5 TP44I4.5×4.5	0.15 / 0.22 / 0.33	1.75 Ts	40 ~ 60 A	100 kHz
TP44SP10×10.1	TM71I4.5×5.3	0.47	—	50 A	—
TP44SP10×10.3	TM71I4.5×5.3	0.47	—	50 A	—
TP44SP10.1×9.85	TM80I5.5×5	0.5 / 0.8	—	38 ~ 48 A	—
TP44SP10.2×9.6×9.25	TM82I6×6	0.45	—	30 A	100 kHz
W-TP40SP10.3×6.5×8.3	W-TM80I4.8×3.8	0.3	—	50 A	—
TP40SP10.3×6.5×9.7	TM80I4.8×4.8	0.1 / 0.15 / 0.22 / 0.3 / 0.33 / 0.47 / 0.8	1.5 ~ 2.5 Ts	32 ~ 90 A	100 kHz

SP + I 板组合（续 2） SP SHIELD CORE + I-PLATE SETS (CONT.)

感值档位 — SP + I 板（续 2） L LEVELS · SP WITH I-PLATE

SP 遮罩磁芯 SP Shield Core	适配内磁芯 Inner core	感值档位 (μH) L levels	匝数范围 Turns	饱和测试 Sat. test	频率 Freq.
W-TP40SP10.3×6.5×9.7	W-TM80I4.8×3.8 W-TM80I4.8×4.8	0.15 / 0.22 / 0.3 / 0.33	1.5 Ts	50 ~ 70 A	100 kHz
TM80SP10.3×7.2×9.5	TM80I6×5.4	0.22	—	70 A	—
TP40SP10.5×7.3×9.7	TM71I5.4×5.4	1.2	—	25 A	—
W-TP40SP10.5×7.3×9.7	W-TM71I5.4×5.4	1.2	—	25 A	—
TM80SP11×8×8.2	TM80I6.6×4.6	1	—	25 A	—
TP40SP11×8×9.7	TM80I5.5×5.5	0.25	—	70 ~ 80 A	—
W-TP40SP11×8×9.7	W-TM80I5.5×5.5	0.25	—	70 A	—
TP40SP11.1×9.1×9.3	TM80I4.6×4.6	1	—	30 A	—
TP44SP11.1×9.4×9.85	TM81I4.8×4.8	1.1	—	32 A	—
MGB1SP11.3×7.9×11.3	MGB1I5×3 TM80I5×3	0.22 / 0.25	2.5 Ts	50 A	100 kHz
W-DL5SP11.4×9.5	W-TM80I5.4×5.4	1.1	—	44 A	—
TM80SP11.5×5.7×11.3	TM82I5.5×7	0.33	—	36 A	100 kHz
TM80SP11.7×5.7×11.3	TM82I5.5×7	0.1 / 0.15 / 0.33	—	36 ~ 130 A	100 kHz
MGB1SP12.8×12.2×7.6	TP44I7.8×3.8 TP40I7.8×3.8	33	12.75 Ts	—	100 kHz
MGB1SP13.5×13.2×10.5	TP40I6×7.8 TM80I6×7.8	1 / 4.7	3.5 ~ 5.5 Ts	20 ~ 40 A	100 kHz
W-MGB1SP13.5×13.2×10.5	W-TP40I6×7.8	1	3.75 Ts	40 A	100 kHz
TP40SP13.5×13.2×10.7	TM80I6.3×7.5 TP40I6.3×7.5	2.2	5.5 Ts	40 A	100 kHz
W-TP40SP13.5×13.2×10.7	W-TM80I6.3×7.5 W-TP40I6×7.8	2.2 / 3.3	5.5 ~ 6.5 Ts	28 ~ 40 A	—
TP40SP13.5×13.2×10.8	TM80I6.3×7.5	2.2	5.5 Ts	40 A	—

各系列完整尺寸与公差见本册 SP CORE / I CORE 系列页；同一遮罩磁芯各感值档位之内磁芯品名，可向本公司索取配对明细；MnZn 材质内磁芯尺寸请参阅《锰锌铁氧体目录书》。

Full dimensions and tolerances: see the SP CORE / I CORE series pages; inner-core part numbers for each L level are available on request; MnZn inner cores are listed in the MnZn catalogue.

SP + R 棒组合 SP SHIELD CORE + R-ROD SETS

感值档位 — SP + R 棒 L LEVELS · SP WITH R-ROD

SP 遮罩磁芯 SP Shield Core	适配内磁芯 Inner core	感值档位 (μH) L levels	匝数范围 Turns	饱和测试 Sat. test	频率 Freq.
MGB1SP7×7	DL5R3.5×4.45	0.5	3.75 Ts	18 A	100 kHz
W-MGB1SP7×7	W-DL5R3.5×4.45	0.5	—	18 A	—
DL5SP7.8×6.8	R 棒 ×3 款 TP40 R ×3 sizes	1 / 1.5 / 2.2	—	8 ~ 16 A	100 kHz
W-DL5SP7.8×6.8	R 棒 ×3 款 W-TP40 R ×3 sizes	1 / 2.2 / 6.2	—	4 ~ 15 A	100 kHz
DL5SP7.8×7	R 棒 ×16 款 TP40 / TM80 R ×16 sizes	0.22 / 0.3 / 0.47 / 0.56 / 0.6 / 0.68 / 0.82 / 1 ...(共15档)	—	3 ~ 52 A	100 kHz
W-DL5SP7.8×7	R 棒 ×12 款 W-TP40 / W-TM80 R ×12 sizes	0.3 / 0.47 / 0.68 / 1 / 1.5 / 2 / 2.2 / 3 ...(共12档)	5.5 ~ 7.5 Ts	3 ~ 27 A	100 kHz
TM80SP8.1×8.8	TM80R2.9×5.3	3.3	11.75 Ts	12.3 A	100 kHz
DL5SP8.2×9	R 棒 ×5 款 TM80 / TP40 TP40A R ×5 sizes	0.47 / 0.9 / 1 / 1.1 / 1.2	3.75 ~ 4.75 Ts	15 ~ 35 A	100 kHz
MGB1SP8.2×9	R 棒 ×3 款 TM80 / TP40 R ×3 sizes	0.68 / 0.7 / 0.9 / 1.2	—	15 ~ 30 A	—
W-MGB1SP8.2×9	R 棒 ×4 款 W-TM80 / W-TP40 R ×4 sizes	0.7 / 0.9 / 1 / 1.2	—	15 ~ 30 A	—
MGB1SP8.25×8.4×9.2	DL5R5.2×4.35	2.2	—	15 A	200 kHz
W-MGB1SP8.25×8.4×9.2	W-DL5R5.2×4.35	2.2	—	15 A	—
DL5SP8.4×6.35	TP40R3.5×4.5	1	—	18 A	—
DL5SP8.4×9	R 棒 ×7 款 TP40 / TM80 DL5 R ×7 sizes	1 / 1.2 / 2.2	4.5 ~ 5.75 Ts	15 ~ 25 A	100 kHz
W-DL5SP8.4×9	W-TM80R4.5×4.5	2.2	—	15 A	—
MGB1SP8.4×9	TP40R4.8×4.45	2.2	—	15 A	—
MGB1SP8.5×8.2×8.6	DL5R4.3×4.35	10	—	3.5 A	—
MF3SP8.5×8.3×8.6	TP44R5.5×5.2	10	—	5 A	—
MGB1SP8.5×8.4×9.2	DL5R5.2×4.35	2.2	—	15 A	—
DL5SP8.5×9	TP40R4.5×4.35	0.5	—	35 A	—
TP40SP8.5×9	TM80R4.5×4.88	1.2	—	20 A	—
DL5SP9×8.4×9	TP40R4.5×4.35	1.2	—	20.5 ~ 25 A	—
DL5SP10×8.7	TP40R4.3×5.35	0.33	—	36 A	—

感值档位 — SP + R 棒（续） L LEVELS · SP WITH R-ROD

SP 遮罩磁芯 SP Shield Core	适配内磁芯 Inner core	感值档位 (μH) L levels	匝数范围 Turns	饱和测试 Sat. test	频率 Freq.
MGB1SP10×9	R 棒 ×9 款 TP40 / TM80 MGB1 R ×9 sizes	0.15 / 0.3 / 0.33 / 0.8 / 1 / 1.5 / 4.7	1.5 ~ 6.5 Ts	8.5 ~ 50 A	100 kHz
DL5SP10×9	R 棒 ×7 款 TP40 / TM80 DL5 R ×7 sizes	0.22 / 0.33 / 0.47 / 0.5 / 1	2.5 Ts	25 ~ 55 A	100 kHz
W-DL5SP10×9	W-TP40R4.7×5.35	1	—	25 A	—
W-MGB1SP10×9	TP40R4.7×5.35	1	—	25 A	—
MGB1SP10×9.15	TP44R4.3×4.8 TP44R4.5×5.25	0.22 / 0.33	—	40 ~ 60 A	100 kHz
MGB1SP10×9.2	TP40R4.5×5.2 TM80R5×5.4	0.3 / 0.8	2.5 Ts	31 ~ 48 A	100 kHz
W-MGB1SP10×9.2	W-TP40R4.5×5.2 W-TM80R5×5.4 W-TP40R5×5.4	0.2 / 0.33 / 0.8	—	31 ~ 65 A	100 kHz
DL5SP10×9.2	TM80R4.8×5.2 TM80R4.8×5.5	0.36 / 0.5	—	45 A	—
W-DL5SP10×9.2	W-TM80R4.8×5.2 W-TM80R4.8×5.5	0.36 / 0.5	—	45 ~ 50 A	—
MGB1SP10×9.25	TP40R4.5×5.3	0.56	—	45 A	—
MGB1SP10×9.3	TP40R5×5.45	0.8	—	32 A	—
DL5SP10×9.3	TP40R4.3×5.35	0.33	—	36 A	—
MGB1SP10×9.4	TP40R5×5.45	0.8	—	32 A	—
TP40SP10×9.6	TP40R4.7×5.45	0.5	—	45 A	—
TP44SP10×9.6	TP40R5×5	0.3	—	60 A	—
MGB1SP10×9.6	TP40R4.7×5.45	0.5	—	45 A	—
MGB1SP10×9.6×9.6	TM80R5.5×5.25 MGB1R5.5×5.25 TP44R5×4.9	0.47 / 3.3	2.75 ~ 5.75 Ts	11 ~ 40 A	100 kHz
TP44SP10×9.85	TP44R4.5×5.18 TP40R5×5.35 TM80R5×5.35	0.33 / 0.47 / 0.8	—	40 ~ 50 A	—
TP40SP10×9.85	TM80R5×5.35	0.47	—	40 A	—
TP44SP10.1×9.6	TM80R5.8×5.8	4	—	13 A	—
DL5SP10.2×7.2×8.7	R 棒 ×10 款 TP40 / TM80 R ×10 sizes	0.1 / 0.15 / 0.22 / 0.33 / 0.36 / 0.47 / 1	1.5 ~ 3.5 Ts	25 ~ 70 A	100 kHz
DL5SP10.2×7.2×8.8	R 棒 ×5 款 TP40 / TP44 R ×5 sizes	0.15 / 0.22	—	16 ~ 70 A	—
DL5SP10.2×7.2×9	TP40R5.5×4.55	1	—	24 A	—

SP + R 棒组合（续 2） SP SHIELD CORE + R-ROD SETS (CONT.)

鐵研 TAK

感值档位 — SP + R 棒（续 2） L LEVELS · SP WITH R-ROD

SP 遮罩磁芯 SP Shield Core	适配内磁芯 Inner core	感值档位 (μH) L levels	匝数范围 Turns	饱和测试 Sat. test	频率 Freq.
W-MGB1SP10.2×10.4	W-TM80R4.5×5.1	0.47	—	50 A	100 kHz
TP40SP10.3×6.5×9.7	R 棒 ×14 款 TP40 / TM80 R ×14 sizes	0.47 / 0.8 / 1 / 1.2 / 1.5 / 2.2 / 4.7	2.75 ~ 5.75 Ts	13 ~ 35 A	100 kHz
W-TP40SP10.3×6.5×9.7	W-TM80R6×2.9	1.5	—	25 A	—
W-DL5SP10.4×10×9	R 棒 ×15 款 W-TP40 / TM80 R ×15 sizes	0.22 / 0.33 / 0.47 / 0.5 / 0.56 / 0.68 / 0.7 / 0.82 ...(共16档)	2.5 ~ 8.5 Ts	5 ~ 55 A	100 kHz
DL5SP10.4×10×9	R 棒 ×11 款 TP40 / TM80 R ×11 sizes	0.22 / 0.33 / 0.82 / 1 / 1.5 / 2.2 / 3.3 / 4.7 ...(共11档)	2.5 Ts	5 ~ 55 A	100 kHz
TM80SP10.6×10.75	TM80R4.4×7.3	3.3 / 3.5	—	20.5 A	100 kHz
DL5SP10.7×10×9	R 棒 ×4 款 TP40 / TM80 R ×4 sizes	0.47 / 2.2 / 3.3 / 10	—	5 ~ 36 A	100 kHz
W-DL5SP10.7×10×9	W-TP40R6×6.7	10	—	5 A	100 kHz
MGB1SP10.8×8×8.7	TP40R4.5×5 TP40R4.5×5.05	1	—	25 A	—
W-MGB1SP10.8×8×8.8	W-TM80R4.3×4.4	0.22	—	58 A	—
MGB1SP10.8×8×8.8	TM80R4.5×4.3	0.22	—	—	—
MGB1SP10.8×10.3	TM80R5.5×7.05 TM80R5×7	1.2 / 2.2	—	25 ~ 28 A	—
W-MGB1SP10.8×10.3	R 棒 ×3 款 W-TM80 R ×3 sizes	1.2 / 2.2 / 4.7	—	12 ~ 28 A	—
TP40SP11.1×9.1×9.3	TP40R4.5×5.2	0.25	2.5 Ts	60 ~ 70 A	100 kHz
W-MGB1SP11.1×9.1×9.3	W-TP40R4.5×5.6 W-TP40R4.5×5.85	0.36	—	45 A	—
W-TP40SP11.1×9.1×9.3	W-TP40R4.5×5.6	0.36	—	45 A	—
TP44SP11.1×9.4×9.85	TM80R5.5×5.15	1	—	35 A	—
MGB1SP11.3×9.25×9.3	TP40R4.5×5.6	0.36	—	45 A	—
W-MGB1SP11.3×9.25×9.3	W-TP40R4.5×5.6	0.36	—	45 A	—
DL5SP11.3×9.7×11.3	R 棒 ×11 款 TM80 / DL5 TP40 R ×11 sizes	0.3 / 0.47 / 0.56 / 1 / 1.1 / 1.2 / 2 / 2.2 ... (共9档)	3.5 Ts	15 ~ 50 A	100 kHz
W-MGB1SP11.3×9.7×11.3	W-TM80R5×6.55 W-TM80R5×7.42	0.47 / 1.1	—	20 ~ 42 A	100 kHz
W-DL5SP11.3×9.7×11.3	W-TM80R5×6.55 W-DL5R5×7 W-TM80R5×7	0.47 / 0.68	—	35 ~ 42 A	—

SP + R 棒组合（续 3） SP SHIELD CORE + R-ROD SETS (CONT.)

感值档位 — SP + R 棒（续 3） L LEVELS · SP WITH R-ROD

SP 遮罩磁芯 SP Shield Core	适配内磁芯 Inner core	感值档位 (μH) L levels	匝数范围 Turns	饱和测试 Sat. test	频率 Freq.
MGB1SP11.3×9.7×11.3	TP40R5×6.8 R5×7.05	1 / 1.1	—	28 ~ 37 A	—
TP40SP11.4×8×9.65	TM80R4.5×6.85 TM80R5×7.3	0.5 / 1.1	3.75 Ts	30 ~ 50 A	100 kHz
W-DL5SP11.4×9	R 棒 ×3 款 W-DL5 / W-TM80 W-TP40 R ×3 sizes	0.68 / 1.5 / 10	—	6 ~ 33 A	100 kHz
DL5SP11.4×9.5	R 棒 ×19 款 TP40 / TM80 W-TM80 / W-TP40 R ×19 sizes	0.22 / 0.33 / 0.36 / 0.47 / 0.68 / 0.82 / 1 / 1.1 ...(共16档)	9.5 Ts	6 ~ 55 A	100 kHz
W-DL5SP11.4×9.5	R 棒 ×15 款 W-TP40 / W-TM80 TM80 / TP40 R ×15 sizes	0.22 / 0.33 / 0.36 / 0.47 / 0.56 / 0.6 / 0.68 / 1 ...(共15档)	8.5 ~ 10.5 Ts	6 ~ 55 A	100 kHz
MGB1SP11.4×9.5	R 棒 ×3 款 TP44 / TM80 R ×3 sizes	0.22 / 8.2 / 10	9.75 Ts	7 ~ 90.8 A	100 kHz
W-DL5SP11.4×9.6	W-TP40R5.5×7.65	3.3	—	14 A	—
MGB1SP11.4×9.65	TM80R5×7.05	1	4.75 Ts	32 A	100 kHz
W-MGB1SP11.4×9.65	W-TP44R5.5×6.85	2	6.75 Ts	27 A	100 kHz
W-MGB1SP11.4×10.8	W-TM80R4.5×7.2 W-TM80R4.5×7.8	0.25 / 0.6	—	35 ~ 55 A	—
MGB1SP11.4×10.8	TM80R4.5×7.9	0.6	—	35 A	—
DL5SP11.45×9.6×9.5	DL5R5×3.9 TP40R5×3.9	0.22	—	68 A	—
DL5SP11.8×8.4×8.7	TP40R4.35×4.3	0.22	—	58 A	—
W-MF3SP12×12×10.5	W-TM80R6×7.55	3	—	16 A	—
TM80SP12.2×11.5	TM80R4.4×8.42	12	15.75 Ts	10.3 A	100 kHz
MGB1SP12.5×10	MGB1R5.5×9 TP40R5.5×9.3 MGB1R5.5×9.3	4.7	7 Ts	10 A	100 kHz
W-MGB1SP12.5×11.5	W-TM80R6×6.75	1	—	50 A	—
MGB1SP12.5×11.5	TM80R7.5×7.35	9.5	8.75 Ts	9 A	200 kHz
MGB1SP12.6×11.75×10.5	TP40R5.8×9.35	3.3	—	20 A	—
MGB1SP13.5×13.2×12.9	R 棒 ×4 款 TM80 / TP44 R ×4 sizes	1 / 15 / 33 / 68	3.75 ~ 29.75 Ts	5 ~ 45 A	100 kHz
W-MGB1SP13.5×13.2×12.9	W-TM80R6.5×7.7	33	23.5 Ts	9 A	100 kHz
MGB1SP13.5×13.5×12.9	TP44R7×7.66	1.85	—	36 A	100 kHz
W-DL5SP7.8×7T	W-TP40R4×5.3G	6.8	—	4 A	100 kHz

SP + SB 柱组合 SP SHIELD CORE + SB-POST SETS

感值档位 — SP + SB 柱 L LEVELS · SP WITH SB-POST

SP 遮罩磁芯 SP Shield Core	适配内磁芯 Inner core	感值档位 (μH) L levels	匝数范围 Turns	饱和测试 Sat. test	频率 Freq.
TP44SP10×9.6	TM80SB4.8×4.8 TP44SB4.8×4.8	0.36 / 1 / 1.1	—	20 ~ 50 A	200 kHz
W-TP44SP10×9.6	W-TM80SB4.8×4.8	0.36 / 0.68	—	26 ~ 30 A	200 kHz
W-MGB1SP10×9.6	W-TM80SB4.8×4.8	0.36	—	50 A	—
TP44SP10×9.85	TM80SB4.8×4.8	0.285 / 0.5 / 0.8	—	29 ~ 30 A	—
TP44SP10.1×9.6	TM80SB5×5	1.1	—	30 A	100 kHz
TP40SP10.3×6.5×9.7	SB 柱 ×5 款 TM80 / TP40 SB ×5 sizes	0.15 / 0.21 / 0.22 / 0.3 / 0.33 / 0.36 / 0.47 / 4.7	1.5 ~ 1.75 Ts	13 ~ 80 A	200 kHz
W-TP40SP10.3×6.5×9.7	SB 柱 ×3 款 W-TM80 SB ×3 sizes	0.22 / 0.3 / 0.36 / 0.47	—	28 ~ 42 A	—
W-TP44SP11.1×9.4×9.6	W-TM80SB4.8×4.8	0.36	—	35 A	—
TP44SP11.1×9.4×9.85	TM80SB4.8×4.8	0.36 / 33	23.5 Ts	9 A	100 kHz
TP44SP10×9.6	TM80SB4.8×4.8	1.1	—	27 A	—

各系列完整尺寸与公差见本册 SP CORE / R CORE / SB CORE 系列页；同一遮罩磁芯各感值档位之内磁芯品名，可向本公司索取配对明细；MnZn 材质内磁芯尺寸请参阅《锰锌铁氧体目录书》。

Full dimensions and tolerances: see the SP CORE / R CORE / SB CORE series pages; inner-core part numbers for each L level are available on request; MnZn inner cores are listed in the MnZn catalogue.

附录

APPENDIX

镍锌牌号对照、IEC/GB 国际标准、GAP 磁芯 AL 公差与工程速查（单位换算、趋肤深度、AL–N–L、拓扑设计）。

NiZn competitor cross-reference, IEC/GB standards, the gapped-core AL tolerance table and the engineering quick reference (units, skin depth, AL–N–L, topology design).

本章系列 SERIES IN THIS CHAPTER

鐵研 TAK

镍锌牌号对照（依 μi） NIZN CROSS-REFERENCE BY INITIAL PERMEABILITY

高频稳定（低 μi、高 Q） HIGH-FREQUENCY STABLE

TAK 牌号 Grade	μi	Bs mT	tanδ/μi ×10⁻⁶	YENGTAT	HUOHYOW	TDK	TDG	DMEGC	ACME	FAIR-RITE	FERROXCUBE	LAIRD	WÜRTH
V4F1	10	150	600	T4F	T5F	GT7				68 (16)			
M5E1	15	170	400	NE5K2	T5N		TN2D		L6	68 (16)	4E1 (15)		
V2F1	30	310	160	LF3	H11Y	GT5			L3	67 (40)	4E2 (25)		
M9A	50	340	100	LFQ6	TQ4		TN6D	DN5H	L4	67 (40)	4D2 (60)		
M61	100	340	80	R5K	TQ10	GT3 K1 (80)		DN10H	L5	61 (125)		HF (100)	
M61H	100	420	50	L1HF			TN12B						
M63	180	365	50							61 (125)	4C65 (125)	25 (125)	
Q1C1	250	335	35	LF25	HQ1-F	GT2				52 (250)	4B1 (250)		

高磁通耐焊接 HIGH-FLUX / SOLDER-RESISTANT

TAK 牌号 Grade	μi	Bs mT	tanδ/μi ×10⁻⁶	YENGTAT	HUOHYOW	TDK	TDG	DMEGC	ACME	FAIR-RITE	FERROXCUBE	LAIRD	WÜRTH
DL6	300	440	20	E4K	TB48	L11H	TN35B	DN30B	B30				
DL3	350	350	15	E4D	LGB-F				D1C	51 (350)			
DL5	400	420	15	E4S	T12S	L2H	TN41H	DN40B DN50B (500)	A31/B40				
DL5H	530	400	35	E5S	TL70H		TN39H	DN50B DN65H (650)	B60				
DL4	600	350	12	E5D	H7SH				D27				
G5A	800	400	10		TB40	L7H K10 (800) K8 (860)	TN80L	DN80H (800) DN85H (850)	K081	43 (800)	4A11 (850)	28 (850)	3W800 (800)
G5B	1000	390	15					DN100H (1000)					

以 TAK 材料之初始磁导率 μi 为对照基准（升序排列），并列饱和磁通密度 Bs 与相对损耗因子 tanδ/μi。竞品栏为依 μi 与应用领域列出之“初步筛选候选”，非可直接互换（drop-in）之等效品；国际厂商牌号后括号为其规格书之标称 μi。各厂测量条件不一（Bs 测量磁场尤其互异，故不逐格并列），实际 μi/Bs/损耗以各厂规格书为准；选用前须在相同磁芯外形、绕组、频率、磁通密度、温度与直流偏磁条件下复测验证。空格 = 该厂无对应型号；应用领域见各材质页。

Anchored on TAK initial permeability μi (ascending), with Bs and relative loss factor tanδ/μi alongside. Competitor cells give screening candidates by μi and application — not drop-in equivalents; for international makers the figure in parentheses is the nominal μi from that maker's datasheet. Measuring conditions differ between makers (Bs measuring fields especially, hence Bs is not tabulated per cell) — actual μi/Bs/loss are per each datasheet, and any substitution must be re-verified in the same core shape, winding, frequency, flux density, temperature and DC bias. Blank = no counterpart from that maker; applications are given on each grade page.

镍锌牌号对照（依 μi）（续） NIZN CROSS-REFERENCE BY INITIAL PERMEABILITY

EMI 抑制 / 低温度系数 EMI SUPPRESSION / LOW-TC

TAK 牌号 Grade	μi	Bs mT	tanδ/μi ×10⁻⁶	YENGTAT	HUOHYOW	TDK	TDG	DMEGC	ACME	FAIR-RITE	FERROXCUBE	LAIRD	WÜRTH
SL50	500	350	18			L6N	TN50D	DN50B (500) DN65H (650)	F52/A50	44 (500)			
L43	800	350	20	E5H	TS80		TN90H	DN80H	D28	43 (800)	4A11 (850)	28 (850)	3W800 (800)
SL80	800	350	15			K10 (800)		DN80H (800)	F80				
L6A	1200	320	15	E6H	TL12D		TN120L		K12/D35		4A15 (1200)		
L8A	1600	300	15	E7	H6LS	L8F HF70 (1500)	TN150P	DN150H	K151/D37			38 (1700)	
L22A	2200	270	20	E10H	T25S	M13 (2300)	TN200B	DN200 DN200L (2000)	K20/D40			26 (2000) 33 (2300)	
L28A	2800	250	25			M13 (2300)			K25				

通用型镍镁锌 / 镁锌 GENERAL NI-MG-ZN / MG-ZN

TAK 牌号 Grade	μi	Bs mT	tanδ/μi ×10⁻⁶	YENGTAT	HUOHYOW	TDK	TDG	DMEGC	ACME	FAIR-RITE	FERROXCUBE	LAIRD	WÜRTH
MF1	180	350	55	G2					H3B				
MG2	300	300	80	LF21/MG	T4N				H4				
MGB1	350	380	15	E4DS	T8SH		TN40H	DN35H					
MF3	350	330	20	LF21	LGB-F				H4	51 (350)			
MF2	800	270	25	E5			TN80G		M80				

以 TAK 材料之初始磁导率 μi 为对照基准（升序排列），并列饱和磁通密度 Bs 与相对损耗因子 tanδ/μi。竞品栏为依 μi 与应用领域列出之“初步筛选候选”，非可直接互换（drop-in）之等效品；国际厂商牌号后括号为其规格书之标称 μi。各厂测量条件不一（Bs 测量磁场尤其互异，故不逐格并列），实际 μi/Bs/损耗以各厂规格书为准；选用前须在相同磁芯外形、绕组、频率、磁通密度、温度与直流偏磁条件下复测验证。空格 = 该厂无对应型号；应用领域见各材质页。

Anchored on TAK initial permeability μi (ascending), with Bs and relative loss factor tanδ/μi alongside. Competitor cells give screening candidates by μi and application — not drop-in equivalents; for international makers the figure in parentheses is the nominal μi from that maker's datasheet. Measuring conditions differ between makers (Bs measuring fields especially, hence Bs is not tabulated per cell) — actual μi/Bs/loss are per each datasheet, and any substitution must be re-verified in the same core shape, winding, frequency, flux density, temperature and DC bias. Blank = no counterpart from that maker; applications are given on each grade page.

IEC/GB 国际标准 IEC/GB STANDARDS

TAK 相关工艺与参数测量标准主要遵循和参考 IEC 与 GB 的相关规定。本表仅列现行有效之标准。尺寸与表面缺陷极限：IEC/TC 51 已将原 IEC 62317（尺寸）与 IEC 60424（表面缺陷）两系列，连同 IEC 60133、60647、61185、61247、61596、IEC/TR 61604、IEC/PAS 62323 等，合并为 IEC 63093 系列"铁氧体磁心 尺寸和表面缺陷极限导则"（下列各分册均属该系列）；中国国家标准 GB/T 44069 系列等同采用之。

TAK's process and parameter-measurement practice follows the relevant IEC and GB publications; only publications currently in force are listed. Dimensions and surface irregularities: IEC/TC 51 merged the former IEC 62317 (dimensions) and IEC 60424 (surface irregularities) series — together with IEC 60133, 60647, 61185, 61247, 61596, IEC/TR 61604 and IEC/PAS 62323 — into IEC 63093, "Ferrite cores – Guidelines on dimensions and the limits of surface irregularities" (all parts below belong to that series); the Chinese series GB/T 44069 adopts it identically.

- IEC 63093-1：Part 1: General specification.（第 1 部分：通用规范。）
- IEC 63093-2：Part 2: Pot-cores.（第 2 部分：罐形磁心。）
- IEC 63093-3：Part 3: Half pot-cores for inductive proximity switches.（第 3 部分：感应式接近开关用半罐形磁心。）
- IEC 63093-4：Part 4: RM-cores.（第 4 部分：RM 型磁心。）
- IEC 63093-5：Part 5: EP-cores and associated parts.（第 5 部分：EP 型磁心及相关件。）
- IEC 63093-6：Part 6: ETD-cores for use in power supplies.（第 6 部分：电源用 ETD 型磁心。）
- IEC 63093-7：Part 7: EER-cores.（第 7 部分：EER 型磁心。）
- IEC 63093-8：Part 8: E-cores.（第 8 部分：E 型磁心。）
- IEC 63093-9：Part 9: Planar cores.（第 9 部分：平面磁心。）
- IEC 63093-10：Part 10: PM-cores and associated parts.（第 10 部分：PM 型磁心及相关件。）
- IEC 63093-11：Part 11: EC-cores for use in power supply applications.（第 11 部分：电源用 EC 型磁心。）
- IEC 63093-12：Part 12: Ring-cores.（第 12 部分：环形磁心。）
- IEC 63093-13：Part 13: PQ-cores.（第 13 部分：PQ 型磁心。）
- IEC 63093-14：Part 14: EFD-cores.（第 14 部分：EFD 型磁心。）
- IEC 63093-15：Part 15: U-cores.（第 15 部分：U 型磁心。）

- IEC 60205：Calculation of the effective parameters of magnetic piece parts.（磁性零件有效参数的计算。）
- IEC 60401-1：Terms and nomenclature for cores made of magnetically soft ferrites. Part 1: Terms used for physical irregularities.（软磁铁氧体磁心的术语和命名。第 1 部分：物理不规则性术语。）
- IEC 60401-2：Terms and nomenclature for cores made of magnetically soft ferrites. Part 2: Reference of dimensions.（软磁铁氧体磁心的术语和命名。第 2 部分：尺寸标注。）
- IEC 60401-3：Terms and nomenclature for cores made of magnetically soft ferrites. Part 3: Guidelines on the format of data appearing in manufacturers' catalogues of transformers and inductor cores.（软磁铁氧体磁心的术语和命名。第 3 部分：变压器与电感器磁心制造商目录数据格式导则。）
- IEC 60732：Measuring methods for cylindrical, tubular and screw cores of magnetic oxides.（磁性氧化物圆柱形、管形与螺纹磁心的测量方法。）
- IEC 61007：Transformers and inductors for use in electronic and telecommunication equipment. Measuring methods and test procedures.（电子与通信设备用变压器和电感器。测量方法与试验程序。）
- IEC 61332：Soft ferrite material classification.（软磁铁氧体材料分类。）
- IEC 61333：Marking on U and E ferrite cores.（U 型与 E 型铁氧体磁心的标志。）
- IEC 61631：Test method for the mechanical strength of cores made of magnetic oxides.（磁性氧化物磁心机械强度试验方法。）
- IEC 62024-1：High frequency inductive components. Electrical characteristics and measuring methods. Part 1: Nanohenry range chip inductors.（高频电感元件。电特性与测量方法。第 1 部分：纳亨级片式电感器。）
- IEC 62044-1：Cores made of soft magnetic materials. Measuring methods. Part 1: Generic specification.（软磁材料磁心。测量方法。第 1 部分：通用规范。）
- IEC 62044-2：Cores made of soft magnetic materials. Measuring methods. Part 2: Magnetic properties at low excitation level.（软磁材料磁心。测量方法。第 2 部分：低励磁水平下的磁特性。）
- IEC 62044-3：Cores made of soft magnetic materials. Measuring methods. Part 3: Magnetic properties at high excitation level.（软磁材料磁心。测量方法。第 3 部分：高励磁水平下的磁特性。）
- IEC 62211：Inductive components. Reliability management.（电感元件。可靠性管理。）
- IEC 62358：Ferrite cores. Standard inductance factor for gapped cores and its tolerance.（铁氧体磁心。气隙磁心的标准电感系数及其公差。）
- IEC 62398：Ferrite cores. Technology approval schedule (TAS).（铁氧体磁心。技术认可细则（TAS）。）

GAP 磁芯 AL 公差（IEC 62358:2012）

鐵研 TAK

AL TOLERANCE FOR GAPPED CORES (IEC 62358:2012)

- 适用范围：对罐形、RM、ETD、E、EER、EP、PQ 及低背系列之研磨 GAP 铁氧体磁芯，规定标准 AL 值（电感系数）及其公差。

  Scope: standard AL values (inductance factors) and their tolerances for Pot, RM, ETD, E, EER, EP, PQ and low-profile gapped ferrite cores.

- AL 标称值自 ISO 497 之 R10 优选数列选取；AL 测量依 IEC 62044-2。

  AL nominal values are selected from the R10 preferred-number series of ISO 497; AL is measured per IEC 62044-2.

- 公差以字母代码标示（下表）；为保证表列公差，各 AL 档位表适用 0.25 AQL（接收质量限）。

  Tolerances are designated by the letter codes below; 0.25 AQL applies to guarantee the tabulated tolerances.

- 该标准载明：公差为推荐值，制造商规格可能因历史原因而异，使用者应以制造商资料确认。

  The standard notes the tolerances are recommended; manufacturers' specifications may differ for historical reasons — confirm from the manufacturer's literature.

AL 公差 AL tolerance	字母代码 Letter code
±3 %	A
±5 %	J
±7 %	E
±10 %	K
±12 %	H
±15 %	L
±20 %	M

本表逐格摘自 IEC 62358:2012 表 1（公差对字母代码）；该标准现行版为 IEC 62358:2026（第 3 版，新增 PM / EC / EFD 外形），字母代码体系沿用。其表 2 以后为各外形之 AL 档位与公差表，所列外形与本册产品线无对应，未予转载。

Transcribed from Table 1 of IEC 62358:2012 (tolerance-to-letter codes); the standard is now in its third edition, IEC 62358:2026, which adds PM, EC and EFD shapes and retains the letter-code system. The per-shape AL tables that follow cover shapes outside this volume and are not reproduced.

- 重要界定：若以“气隙长度及其公差”方式指定（而非直接指定 AL），则 AL 值仅为近似值且不带公差——此情形在该标准范围之外。

  Where a gap length with tolerances is specified instead of an AL value, the AL value is only approximate and carries no tolerance — such cases are outside that standard's scope.

- 本册 SP+I、SRI+DR 配套即以研磨加工控制磁隙长度以设定电感，其 AL / 感值公差以本册“05 配套电性目录”各表及承认书为准。

  TAK's ground paired sets (SP+I, SRI+DR) are gap-controlled; their AL / inductance tolerances follow Chapter 05 of this volume and the approval sheet.

磁学单位换算与常数 MAGNETIC UNITS & CONSTANTS

鐵研 TAK

mT → G	Oe → A/m	kW/m^3 = mW/cm^3	nH/N^2 = mH/1000T
×10	×79.58	数值相同 same value	数值相同 same value

SI ↔ CGS 单位换算 UNIT CONVERSIONS

物理量 Quantity	SI 单位 SI unit	CGS / 惯用单位 CGS / customary	换算 Conversion
磁学量 Magnetic quantities			
磁通密度 B Flux density	特斯拉 T tesla	高斯 G gauss	1 T = 10^4 G 1 mT = 10 G
磁场强度 H Field strength	A/m	奥斯特 Oe oersted	1 Oe = 79.577 A/m 1 A/m = $4\pi\times10^{-3}$ Oe ≈ 0.012566 Oe
磁通 Φ Magnetic flux	韦伯 Wb weber	麦克斯韦 Mx maxwell	1 Wb = 10^8 Mx
磁动势 F Magnetomotive force	安匝 A·t ampere-turn	吉伯 Gb gilbert	1 A·t = $4\pi/10$ Gb ≈ 1.2566 Gb
电感 L Inductance	亨利 H henry	—	1 H = 10^3 mH = 10^6 μH = 10^9 nH
电感系数 AL Inductance factor	nH/N^2	mH/1000 匝 mH/1000 turns	数值相同 same numeric value
磁芯损耗密度 Pv Core loss density	kW/m^3	mW/cm^3	数值相同：1 kW/m^3 = 1 mW/cm^3 same numeric value
几何与电性 Geometry & electrical			
长度 Length	mm	inch / mil	1 in = 25.4 mm（精确 exact） 1 mil = 0.0254 mm
电阻率 ρ Resistivity	Ω·m	Ω·cm / μΩ·cm	1 Ω·m = 10^2 Ω·cm = 10^8 μΩ·cm
温度 Temperature	℃	K	T(K) = t(℃) + 273.15

读 CGS 制旧规格书：真空 / 空气中（μr=1）B(G) 与 H(Oe) 数值相等；磁化关系 SI 制 $B=\mu_0(H+M)$ ↔ CGS 制 $B=H+4\pi M$。
Reading CGS datasheets: in air B(G) equals H(Oe) numerically; $B=\mu_0(H+M)$ in SI corresponds to $B=H+4\pi M$ in CGS.

常用常数 CONSTANTS

常数 Constant	数值 Value	备注 Remarks
真空磁导率 μ_0 Vacuum permeability	$4\pi\times10^{-7}$ H/m ≈ 1.2566×10^{-6} H/m	SI 定义惯用值 Customary SI value
铜电阻率 ρ_{Cu}（20 ℃） Cu resistivity	1.7241×10^{-8} Ω·m	IEC 60028 标准退火铜（100% IACS） IEC 60028 annealed copper
铜电阻温度系数 α_{Cu} Cu temp. coefficient	0.00393 /K（20 ℃ 基准）	R(100 ℃) = R(20 ℃)×1.314 per IEC 60028
标准退火铜密度 Cu density	8.89 g/cm^3	IEC 60028

趋肤深度与单线选径 SKIN DEPTH & WIRE SIZING

鐵研 TAK

趋肤深度 Skin depth

$$\delta = \sqrt{\rho / (\pi \cdot f \cdot \mu_0)}$$

铜导线交流电流集中于表层 δ 内；有效导电截面随 √f 缩小。

AC current crowds into the outer layer of thickness δ; effective copper area shrinks with √f.

单线选径法则 Single-wire rule

$$d \leq 2\delta \text{（工作温度）}$$

裸径超过约 2δ 后，加粗单线几乎不再降低交流电阻——改用多股绞线 / 利兹线或扁铜带。

Beyond d≈2δ a thicker single wire barely helps — switch to stranded / litz wire or foil.

铜线趋肤深度速查 COPPER SKIN DEPTH

频率 f Frequency	δ @20 ℃ mm	δ @100 ℃ mm	单线建议最大裸径 2δ@100 ℃ Max bare dia, mm	≈ 对应线规 Nearest AWG
10 kHz	0.661	0.758	1.515	AWG 15 (1.450 mm)
20 kHz	0.467	0.536	1.071	AWG 18 (1.024 mm)
25 kHz	0.418	0.479	0.958	AWG 19 (0.912 mm)
50 kHz	0.296	0.339	0.678	AWG 22 (0.645 mm)
100 kHz	0.209	0.240	0.479	AWG 25 (0.455 mm)
150 kHz	0.171	0.196	0.391	AWG 27 (0.361 mm)
200 kHz	0.148	0.169	0.339	AWG 28 (0.320 mm)
300 kHz	0.121	0.138	0.277	AWG 30 (0.254 mm)
500 kHz	0.093	0.107	0.214	AWG 32 (0.203 mm)
700 kHz	0.079	0.091	0.181	AWG 33 (0.180 mm)
1 MHz	0.066	0.076	0.152	AWG 35 (0.142 mm)
2 MHz	0.047	0.054	0.107	AWG 38 (0.102 mm)
3 MHz	0.038	0.044	0.087	AWG 40 (0.079 mm)
5 MHz	0.030	0.034	0.068	—
10 MHz	0.021	0.024	0.048	—

δ=√(ρ/(π·f·μ0))，铜线；ρCu 依 IEC 60028（20 ℃ = 1.7241×10⁻⁸ Ω·m，100 ℃ ×1.314）。d≤2δ 为单线直径与铜利用率的设计起点：超过约 2δ 后增粗单线对交流电阻的改善迅速递减，宜改用多股绞线 / 利兹线或扁铜带。本表仅计趋肤效应；实际交流电阻另受邻近效应、绕组层数与填充率支配，多层绕组即使 d≤2δ 仍可能有显著交流损耗。末栏"≈对应线规"是 2δ 上限所对应之最粗线规，不是建议值——实际线径另由电流密度决定（见线规表），通常比它更细；比上限细一律合格。

δ=√(ρ/(π·f·μ0)) for copper. d ≤ 2δ is a starting point for strand diameter and copper utilisation: beyond about 2δ a thicker single wire brings rapidly diminishing returns — move to stranded/litz wire or foil. This table covers skin effect only; actual AC resistance is also governed by proximity effect, layer count and fill factor, and a multi-layer winding can show significant AC loss even when d ≤ 2δ. The last column, 'nearest AWG', is the thickest gauge meeting the 2δ limit, not a recommendation: the actual gauge is set by current density (see the wire table) and is usually finer — anything below the limit is acceptable.

线规电流密度速查（AWG 14–40） WIRE GAUGE & CURRENT DENSITY

线规 Gauge	裸径 mm Bare dia.	截面积 mm² Area	Ω/km @20 ℃	Ω/km @100 ℃	I @2.5 A/mm²	I @4 A/mm²	I @6 A/mm²
AWG 14	1.628	2.08	8.282	10.89	5.2	8.32	12.5
AWG 15	1.450	1.65	10.44	13.73	4.12	6.6	9.9
AWG 16	1.290	1.31	13.17	17.31	3.28	5.24	7.86
AWG 17	1.151	1.04	16.61	21.83	2.6	4.16	6.24
AWG 18	1.024	0.823	20.94	27.53	2.06	3.29	4.94
AWG 19	0.912	0.653	26.41	34.71	1.63	2.61	3.92
AWG 20	0.813	0.519	33.29	43.76	1.3	2.08	3.11
AWG 21	0.724	0.412	41.98	55.18	1.03	1.65	2.47
AWG 22	0.645	0.327	52.94	69.58	0.818	1.31	1.96
AWG 23	0.574	0.259	66.78	87.78	0.647	1.04	1.55
AWG 24	0.511	0.205	84.2	110.7	0.512	0.82	1.23
AWG 25	0.455	0.162	106.2	139.6	0.405	0.648	0.972
AWG 26	0.404	0.128	133.9	175.9	0.32	0.512	0.768
AWG 27	0.361	0.102	168.8	221.9	0.255	0.408	0.612
AWG 28	0.320	0.08	212.9	279.8	0.2	0.32	0.48
AWG 29	0.287	0.0647	268.4	352.8	0.162	0.259	0.388
AWG 30	0.254	0.0507	338.5	444.9	0.127	0.203	0.304
AWG 31	0.226	0.0401	426.7	560.9	0.1	0.16	0.241
AWG 32	0.203	0.0324	538.2	707.5	0.081	0.13	0.194
AWG 33	0.180	0.0255	678.6	892	0.0638	0.102	0.153
AWG 34	0.160	0.0201	855.8	1125	0.0503	0.0804	0.121
AWG 35	0.142	0.0159	1079	1418	0.0398	0.0636	0.0954
AWG 36	0.127	0.0127	1360	1788	0.0318	0.0508	0.0762
AWG 37	0.114	0.0103	1715	2254	0.0258	0.0412	0.0618
AWG 38	0.102	0.00811	2163	2843	0.0203	0.0324	0.0487
AWG 39	0.089	0.00621	2728	3586	0.0155	0.0248	0.0373
AWG 40	0.079	0.00487	3440	4522	0.0122	0.0195	0.0292

裸径 / 截面 / Ω/km(20 ℃) 依 ASTM B258 标准线规；100 ℃ 值 = ×1.314（αCu=0.00393/K）。电流栏 = 截面积×电流密度 J，J 档位惯例：2.5 = 密闭 / 多层线包保守值、4 = 一般、6 = 小体积且散热良好；实际温升取决于整体绕组与散热，以实测为准。漆包线完成外径依漆膜等级（IEC 60317），以线材规格书为准。
Bare dia/area/Ω-km per ASTM B258 wire gauge; 100 °C = ×1.314. Current = area × J (2.5 conservative / 4 typical / 6 well-cooled A/mm²); verify temperature rise by measurement. Enamelled overall diameter per IEC 60317 grade — see wire datasheets.

公式速查 FORMULAS

电感与匝数 Inductance & turns

$$L = A_L \cdot N^2 \qquad N = \sqrt{(L / A_L)}$$

AL 单位 nH/N²、L 换算为 nH 代入；AL 数值 = mH/1000 匝 数值。

AL in nH/N² with L in nH; the nH/N² figure equals mH per 1000 turns.

AL 与磁芯常数 AL & core constant

$$A_L = \mu_0 \cdot \mu_e \cdot A_e / l_e = \mu_0 \cdot \mu_e / C1$$

纯 SI 式（AL 用 H/N²、C1 用 m^{-1}）。本目录 C1 以 mm^{-1} 标示，故实用式为 AL[nH/N²] = 10^6·μ0·μe / C1[mm^{-1}]。由实测反推 μe = AL·C1/μ0。

Pure SI (AL in H/N², C1 in m^{-1}). C1 here is quoted in mm^{-1}, so the practical form is AL[nH/N²] = 10^6·μ0·μe / C1[mm^{-1}]. Back out μe = AL·C1/μ0.

气隙近似 Gapped-core estimate

$$A_L \approx \mu_0 \cdot A_e / (l_g + l_e/\mu_i)$$

未含边缘磁通（fringing），实际 AL 会偏高；研磨气隙以实测 / 承认书为准。

Fringing neglected — measured AL runs higher; per approval sheet.

饱和快速检查 Saturation check

$$\hat{B} = L \cdot \hat{I}_{pk} / (N \cdot A_e)$$

Î_pk = 峰值电流（含纹波）。L 须取该工作点之割线电感——若 L 随偏磁下降而仍代入小信号值，会低估 B̂。B̂ 需低于工作温度之 Bs 并留裕度。

Î_pk is the peak current including ripple. Use the secant inductance at that operating point — the small-signal L underestimates B̂ when L falls under bias. Keep B̂ below Bs at operating temperature.

直流电阻 DC resistance

$$R_{dc} = (\Omega/\text{km 表值}) \times N \times \text{MLT(mm)} \times 10^{-6}$$

MLT = 平均匝长；Ω/km 见〈线规电流密度速查〉表；100 °C 值 ×1.314。导线截面、铜损与温升以 I_rms（或直流分量）计算，非饱和检查所用之峰值。

MLT = mean length per turn; Ω/km from the Wire Gauge table; ×1.314 at 100 °C. Size the conductor and compute copper loss from I_rms (or the DC component), not the peak used for saturation.

取整与公差 Rounding & tolerance

$$N \in \text{整数}\ (\text{无半匝})$$

环形磁芯导线每穿孔一次即一匝。AL 公差常见 ±25%；IEC 62358 字母码 ±3~±20% ↔ A/J/E/K/H/L/M（详目录书附录）。

One pass through a toroid = one turn. AL tolerance typ. ±25%; IEC 62358 letter codes in the catalog appendix.

演算例：L=100 μH · 峰值 $\hat{I}_{pk}$=1.5 A · I_{rms}≈1.45 A · 工作 25 kHz Worked example

1. 选 A_L=250 nH/N² 之磁芯（Ae=25 mm²、MLT≈52 mm 设定值） → N = √(100 000/250) = **20** 匝（整数，免取舍）； 验算 L = 250×20² = 100 000 nH = **100 μH**。

   Pick an AL=250 nH/N² core (Ae=25 mm², MLT≈52 mm assumed) → N = √(100 000/250) = 20 turns; check L = 250×20² = 100 μH.

2. 饱和检查 B̂ = 100 μH×1.5 A/(20×25 mm²) = **0.30 T** — 对照所选材质工作温度之 Bs（见材质表）确认裕度。

   Saturation: B̂ = L·Î/(N·Ae) = 0.30 T — compare with Bs at operating temperature.

3. 线径与直流电阻（依 I_{rms}，非峰值）分三步： ①**由电流密度定截面**：I_{rms}/J = 1.45/4 = 0.363 mm²，〈线规电流密度速查〉表中截面 ≥ 此值之最细线规 = **AWG 21** （0.412 mm²，AWG 22 仅 0.327 不足）， I@4=1.65 A ≥ 1.45 A。②**以趋肤深度检核上限**：〈趋肤深度与单线选径〉表 25 kHz 之 2δ(100 ℃)=0.958 mm 为裸径上限，AWG 21 之 0.724 mm 通过（表上"≈对应线规"AWG 19 系上限 所对应之最粗线规，非建议值，详该表注）。③**算长度与电阻**： ℓ = N×MLT = 20×52 mm = 1.04 m → R_{dc} = 41.98 Ω/km × 1.04 m = **43.7 mΩ** （20 ℃）；100 ℃ 取表列 55.18 Ω/km → 57.4 mΩ。

   Wire and DCR (from I_{rms}, not the peak), in three steps: **(i) size by current density** — I_{rms}/J = 0.363 mm², and the thinnest gauge at or above that area in the Wire Gauge table is AWG 21 (0.412 mm²), with I@4 = 1.65 A ≥ 1.45 A. **(ii) check against skin depth** — the Skin Depth table gives 2δ(100 °C) = 0.958 mm at 25 kHz as the limit on bare diameter; AWG 21 at 0.724 mm passes (its "nearest AWG" column names the thickest gauge meeting that limit, not a recommendation). **(iii) length and resistance** — ℓ = N×MLT = 1.04 m, so R_{dc} = 43.7 mΩ at 20 °C and 57.4 mΩ at 100 °C.

AL–N–L 匝数速查表 TURNS VS AL AND TARGET L

匝数速查表 N = √(L/AL) TURNS LOOKUP

AL nH/N²	10 μH	22 μH	47 μH	100 μH	220 μH	470 μH	1 mH	2.2 mH	4.7 mH	10 mH
16	25.0	37.1	54.2	79.1	117	171	250	371	542	791
25	20.0	29.7	43.4	63.2	93.8	137	200	297	434	632
40	15.8	23.5	34.3	50.0	74.2	108	158	235	343	500
63	12.6	18.7	27.3	39.8	59.1	86.4	126	187	273	398
100	10.0	14.8	21.7	31.6	46.9	68.6	100	148	217	316
160	7.91	11.7	17.1	25.0	37.1	54.2	79.1	117	171	250
250	6.32	9.38	13.7	20.0	29.7	43.4	63.2	93.8	137	200
400	5.00	7.42	10.8	15.8	23.5	34.3	50.0	74.2	108	158
630	3.98	5.91	8.64	12.6	18.7	27.3	39.8	59.1	86.4	126
1 000	3.16	4.69	6.86	10.0	14.8	21.7	31.6	46.9	68.6	100
1 600	2.50	3.71	5.42	7.91	11.7	17.1	25.0	37.1	54.2	79.1
2 500	2.00	2.97	4.34	6.32	9.38	13.7	20.0	29.7	43.4	63.2
4 000	1.58	2.35	3.43	5.00	7.42	10.8	15.8	23.5	34.3	50.0
6 300	1.26	1.87	2.73	3.98	5.91	8.64	12.6	18.7	27.3	39.8

N = √(L/AL)，表值为理论匝数（未取整）。实务无半匝——环形磁芯导线每穿孔一次即一匝，N 取整数；取整后感值差异与 AL 公差（常见 ±25%，详承认书）相比通常次要，最终以样品实测为准。

N = √(L/AL), unrounded. In practice turns are integers (one pass through a toroid = one turn); rounding error is usually minor next to AL tolerance (typ. ±25%) — verify on samples.

符号与适用范围 SYMBOLS & SCOPE

符号 Symbol	说明 Description	单位 Unit
D	占空比 Duty cycle	—
fsw	开关频率 Switching frequency	Hz
ΔI	电感电流纹波（峰-峰） Inductor ripple current, pk-pk	A
B̂ac	交流磁通振幅（=ΔB/2）→ 查 Pcv 曲线 AC flux amplitude (=ΔB/2) → for Pcv curves	T
B̂max	峰值磁通密度（含直流偏磁）→ 对比 Bs Peak flux density incl. DC bias → compare with Bs	T
ΔB	磁通密度摆幅（峰-峰）=2·B̂ac Flux density swing, pk-pk = 2·B̂ac	T
Ae	有效截面积 Effective cross-section	m^2
le	有效磁路长度 Effective path length	m
AL	电感系数 Inductance factor	H/N^2
N	匝数 Number of turns	—

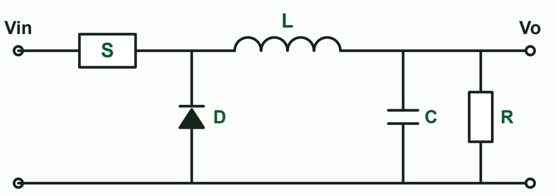
【磁通密度惯例（全书统一）】本册所有公式直接给出 B̂ac（交流磁通振幅）与 B̂max（含直流偏磁之峰值），与本目录材质表一致：Pcv 曲线之测量条件（以各材质表所列条件为准）与 Bs 均为峰值振幅，故 B̂ac 可直接代入 Pcv 曲线，B̂max 直接与工作温度之 Bs 比较，无须再自行换算。若参考他厂资料以峰-峰值 ΔB 表示，换算为 ΔB = 2·B̂ac。须注意：Pcv 曲线系于指定波形、频率与温度下量得，直接查表仅在这三者与实际工况相符时成立；PWM / 非正弦激磁或跨频段外插，应改用厂商损耗模型、iGSE 等改良式或实测。

[Flux convention] All formulas give B̂ac (AC amplitude) and B̂max (peak including DC bias), matching this catalog: the Pcv measuring conditions (as stated in each grade table) and Bs are peak amplitudes, so B̂ac goes straight into the Pcv curves and B̂max is compared with Bs at operating temperature — no further conversion. For sources quoting peak-to-peak, ΔB = 2·B̂ac. Note that Pcv curves are measured at a stated waveform, frequency and temperature; reading them directly is valid only when all three match the application. For PWM or non-sinusoidal excitation, or extrapolation across bands, use the vendor loss model, an improved form such as iGSE, or measurement.

各拓扑之适用模式（CCM / DCM / BCM / 谐振）逐页标示于该页首段，不同模式之公式不可互换；各式均为理想化近似，忽略二极管与开关压降、绕组电阻与杂散参数。建议材质依本目录既有分类与实测数据列出，未新增判断；NiZn 之功率适用性以材质表实测 Pcv 为界（多数 NiZn 无功率测量数据，故主功率拓扑以 MnZn 为主）。实际设计须以样品实测与热测试验证。

The applicable mode (CCM / DCM / BCM / resonant) is stated in the opening paragraph of each page; formulas are not interchangeable between modes. All expressions are idealized approximations that neglect diode and switch drops, winding resistance and parasitics. Suggested grades follow this catalog's existing classes and measured data with no new judgements added; NiZn power suitability is bounded by measured Pcv — most NiZn grades have no power measurement, so MnZn leads the main power topologies. Verify every design by measurement and thermal testing.

降压 Buck 电感速查 BUCK CONVERTER · INDUCTOR DESIGN



【适用模式：CCM 连续导通】输出电压低于输入电压；电感串在输出侧，直流分量大、交流摆幅小 —— 设计由饱和（直流偏磁）主导，而非磁芯损耗。

[Mode: CCM] Output below input. The inductor carries a large DC component with small AC swing — saturation, not core loss, usually governs the design.

工作关系 OPERATING RELATIONS

占空比 Duty cycle

$$D = V_o / V_{in}$$

CCM、忽略压降；含效率时 D = Vo/(Vin·η)。

CCM, drops neglected; with efficiency D = Vo/(Vin·η).

电感平均电流 Average inductor current

$$I_{L(avg)} = I_o$$

电感即输出电流路径，平均值等于负载电流。

The inductor carries the output current; its average equals the load current.

电感值 L INDUCTANCE

由纹波定 L L from ripple

$$L = V_o \cdot (1 - D) / (\Delta I \cdot f_{sw})$$

ΔI 常取 Io 的 20~40%；ΔI 越小 L 越大、铜损与体积增加。

ΔI is typically 20–40% of Io; smaller ripple means larger L, more copper and volume.

临界连续条件 CCM boundary

$$L_{crit} = V_o \cdot (1 - D) / (2 \cdot I_{o(min)} \cdot f_{sw})$$

低于此值进入 DCM，纹波与 EMI 上升。

Below this the converter enters DCM; ripple and EMI rise.

磁通与匝数 FLUX AND TURNS

交流磁通振幅（查损耗） AC flux amplitude — for loss

$$\hat{B}_{ac} = L \cdot \Delta I / (2 \cdot N \cdot A_e)$$

直接代入材质表 Pcv 曲线；Buck 之 B̂ac 通常很小，损耗以铜损为主。

Goes straight into the Pcv curves; in a buck B̂ac is small and copper loss usually dominates.

峰值磁通（饱和检查） Peak flux — saturation check

$$\hat{B}_{max} = L \cdot \hat{I} / (N \cdot A_e) \qquad \hat{I} = I_o + \Delta I/2$$

须低于工作温度之 Bs 并留裕度；Buck 之 B̂max 远大于 B̂ac。

Keep below Bs at operating temperature with margin; in a buck B̂max far exceeds B̂ac.

匝数 Turns

$$N = \sqrt{(L / A_L)} \qquad N \geq L \cdot \hat{I} / (\hat{B}_{max} \cdot A_e)$$

先由 AL 求 N，再以饱和式验算；两者取较大者，并取整数。

Take N from AL, then verify against saturation; use the larger value, rounded to an integer.

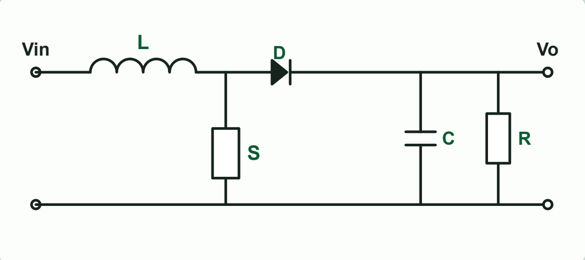
磁芯选用要点 CORE SELECTION

应用情境 Application	MnZn 建议 MnZn grades	NiZn 建议 NiZn grades	理由 Why
功率电感（20 k–500 kHz） Power inductor	TP40 / TP44 / TP45	—（此频段以 MnZn 为主）	低损耗、通用功率 Low loss, general power
高直流偏磁 / 抗饱和 High DC bias	T2 / T2M / TB2 / TM71 / TM82	DL5 / DL6（高 Bs 系）	高 Bs，配气隙抑制偏磁 High Bs, gapped for DC bias
宽温 / 车载 Wide temp. / automotive	TM80 / TM81 / TM83	SL50 / SL80（低温度系数）	宽温低损耗 Low loss over wide temperature
≥0.5 MHz 小功率 / SMD ≥0.5 MHz, low power	TM50A / TM61 / TM63	DL5 / DL6 / SL50 / SL80	NiZn 于高频段方具实测功率能力 NiZn power capability appears only at high frequency

含直流偏磁之电感须有足够总磁阻才能承受偏磁：高磁导铁氧体 以研磨气隙达成（AL 随气隙下降、抗饱和能力上升）；粉芯与分布气隙材料本身即具分布磁阻，不另开集中气隙。气隙近似见〈电感设计公式速查〉气隙公式；研磨气隙之实际 AL 以承认书为准。

An inductor with DC bias needs enough total reluctance: with high-permeability ferrite this comes from a ground gap (AL falls, saturation headroom rises), whereas powder and distributed-gap materials already carry distributed reluctance and take no discrete gap. See the AL formula card; actual ground-gap AL per the approval sheet.

升压 Boost 电感速查 BOOST CONVERTER · INDUCTOR DESIGN



【适用模式：CCM 连续导通】输出电压高于输入电压；电感接在输入侧，平均电流等于输入电流（大于输出电流）—— 低输入电压时最严苛。

[Mode: CCM] Output above input. The inductor sits at the input, so its average current equals the input current — the worst case is at minimum input voltage.

工作关系 OPERATING RELATIONS

占空比 Duty cycle

$$D = 1 - V_{in} / V_o$$

Vin 最低时 D 最大，为最严苛设计点。

D peaks at minimum Vin — the worst-case design point.

电感平均电流 Average inductor current

$$I_{L(avg)} = I_o / (1 - D) = I_{in}$$

远大于输出电流，直接决定线径与饱和裕度。

Well above the output current; it drives wire size and saturation margin.

电感值 L INDUCTANCE

由纹波定 L L from ripple

$$L = V_{in} \cdot D / (\Delta I \cdot f_{sw})$$

ΔI 常取 Iin 的 20~40%。

ΔI is typically 20–40% of the input current.

临界连续条件 CCM boundary

$$L_{crit} = V_{in} \cdot D \cdot (1 - D) / (2 \cdot I_{o(min)} \cdot f_{sw})$$

轻载常刻意进入 DCM 以缩小体积，需确认控制环稳定。

Light-load DCM is often intentional for size; confirm loop stability.

磁通与匝数 FLUX AND TURNS

交流磁通振幅（查损耗） AC flux amplitude — for loss

$$\hat{B}_{ac} = V_{in} \cdot D / (2 \cdot N \cdot A_e \cdot f_{sw})$$

即伏秒 / (2·N·Ae)；与 L·ΔI/(2·N·Ae) 等价，直接代入 Pcv 曲线。

Volt-seconds over 2·N·Ae; equivalent to L·ΔI/(2·N·Ae) and goes straight into the Pcv curves.

峰值磁通（饱和检查） Peak flux — saturation check

$$\hat{B}_{max} = L \cdot \hat{I} / (N \cdot A_e) \qquad \hat{I} = I_{in} + \Delta I/2$$

以最低输入电压、最大负载计算。

Evaluate at minimum input voltage and maximum load.

匝数 Turns

$$N = \sqrt{(L / A_L)}$$

再以饱和式验算并取整数；气隙调整 AL 以配合 N。

Verify against saturation and round to an integer; trim AL by the gap to suit N.

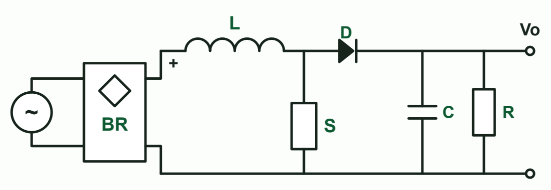
磁芯选用要点 CORE SELECTION

应用情境 Application	MnZn 建议 MnZn grades	NiZn 建议 NiZn grades	理由 Why
升压电感（20 k–500 kHz） Boost inductor	TP40 / TP44 / TP45	—（此频段以 MnZn 为主）	低损耗功率材 Low-loss power grades
高 Bs / 大偏磁 High Bs / heavy bias	T2 / T2M / TB2 / TM71 / TM82	DL5 / DL6（高 Bs 系）	抗饱和 Saturation headroom
高频（0.5–3 MHz） High frequency	TM50A / TM61 / TM63	SL50 / SL80（≤1 MHz 实测）	高频低损耗 Low loss at high frequency

升压电感之直流分量大，须开气隙；输入电流连续有利 EMI，但开关节点与二极管回路面积仍应最小化。

Boost inductors carry a large DC component and need a gap; continuous input current helps EMI, but keep the switching loop area small.

PFC 升压电感速查 BOOST PFC · INDUCTOR DESIGN



【适用模式：CCM 平均电流模式；BCM / CRM 之公式不同，不可套用本页】整流后的正弦半波输入，占空比在每个市电周期内连续变化 ——磁通摆幅与损耗须以“最严苛瞬时点”而非单一工作点评估。

[Mode: CCM average-current PFC; BCM/CRM formulas differ] The input is a rectified sine, so duty cycle varies continuously through each line cycle — evaluate flux swing and loss at the worst instantaneous point, not at a single operating point.

工作关系 OPERATING RELATIONS

瞬时占空比 Instantaneous duty cycle

$$D(\theta) = 1 - \sqrt{2}\cdot V_{ac}\cdot|\sin\theta| \,/\, V_o$$

θ = 市电相位；Vo 通常 385~400 V。

θ is the line phase; Vo is typically 385–400 V.

峰值输入电流 Peak input current

$$\hat{I}_{in} = \sqrt{2}\cdot P_{in} \,/\, V_{ac(min)}$$

最低市电电压、满载为最严苛点。

Worst case at minimum line voltage and full load.

电感值 L INDUCTANCE

由纹波定 L L from ripple

$$L = V_{in}(\theta)\cdot D(\theta) \,/\, (\Delta I\cdot f_{sw})$$

ΔI 常取峰值电流的 20~40%；最大纹波出现在 D≈0.5（Vin≈Vo/2）。

ΔI is typically 20–40% of peak current; maximum ripple occurs near D≈0.5 (Vin≈Vo/2).

最大纹波点 Worst-case ripple

$$\Delta I_{max} = V_o \,/\, (4\cdot L\cdot f_{sw})$$

由此式反推 L，可直接满足全市电周期之纹波上限。

Sizing L from this expression satisfies the ripple limit across the whole line cycle.

磁通与匝数 FLUX AND TURNS

交流磁通振幅（查损耗） AC flux amplitude — for loss

$$\hat{B}_{ac} = V_o \,/\, (8\cdot N\cdot A_e\cdot f_{sw})$$

对应 D≈0.5 之最大纹波点（B̂ac = ΔB/2）；磁芯损耗以此估算后，再依市电周期内之工作占比加权。

At the D≈0.5 worst-case ripple point (B̂ac = ΔB/2); estimate core loss here, then weight by the time spent near that condition over the line cycle.

峰值磁通（饱和检查） Peak flux — saturation check

$$\hat{B}_{max} = L\cdot(\hat{I}_{in} + \Delta I/2) \,/\, (N\cdot A_e)$$

以市电最低电压之峰值电流计算，并以高温 Bs 检查。

Use the peak current at minimum line voltage; check against Bs at high temperature.

匝数 Turns

$$N = \sqrt{(L \,/\, A_L)}$$

PFC 电感之 L 值大、匝数多，须同时检查窗口面积与绕线可行性。

PFC inductors need large L and many turns — check window area and winding feasibility as well.

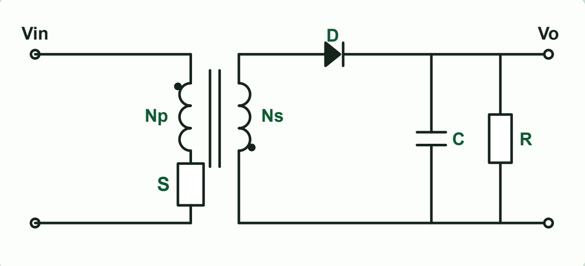
磁芯选用要点 CORE SELECTION

应用情境 Application	MnZn 建议 MnZn grades	NiZn 建议 NiZn grades	理由 Why
PFC 升压电感 PFC boost inductor	TP40 / TP44 / TP45	—（65–150 kHz 以 MnZn 为主）	低损耗功率材 Low-loss power grades
高 Bs / 大偏磁 High Bs / heavy bias	T2 / T2M / TB2 / TM71 / TM82	DL5 / DL6（高 Bs 系）	抗饱和 Saturation headroom
宽温 / 高温环境 Wide / high temperature	TM80 / TM81 / TM83	SL50 / SL80（低温度系数）	宽温低损耗 Low loss over temperature

PFC 电感兼具高直流分量与大交流摆幅，须同时检查饱和与磁芯损耗；铁氧体方案通常配较大气隙，或与其他磁性材料方案比较后选定。

A PFC inductor carries both a large DC component and a large AC swing — check saturation and core loss together; ferrite solutions typically use a larger gap.

反激 Flyback 变压器速查 FLYBACK TRANSFORMER · DESIGN



【适用模式：储能式 Po / Lp 仅适用 DCM / BCM，CCM 式见 Lp 栏】变压器同时是储能电感：开关导通时储能、关断时经二次侧释放。设计核心是"储能量"与气隙，而非传统变压器的伏秒平衡。

[Mode: the stored-energy Po/Lp forms are DCM/BCM only — see the Lp row for CCM] The transformer is also the energy-storage inductor — it stores energy while the switch is on and releases it through the secondary when off. Design centres on stored energy and the air gap.

工作关系 OPERATING RELATIONS

占空比与匝比 Duty cycle and turns ratio

$$V_o = V_{in}\cdot(N_s/N_p)\cdot D/(1-D)$$

反射电压 VR = (Np/Ns)·(Vo+VF) 决定开关耐压。

The reflected voltage VR = (Np/Ns)·(Vo+VF) sets the switch voltage rating.

储能量（DCM / BCM） Stored energy (DCM / BCM)

$$P_o = \tfrac{1}{2}\cdot L_p\cdot \hat{I}_p^{\,2}\cdot f_{sw}\cdot\eta$$

假设每周期磁通自零起，仅适用 DCM / BCM；CCM 之每周期净能量为 ½Lp(Îp²−Ivalley²)。

Assumes the flux starts from zero each cycle — DCM/BCM only; in CCM the net energy per cycle is ½Lp(Îp²−Ivalley²).

电感值 Lp PRIMARY INDUCTANCE

由储能定 Lp（DCM / BCM） Lp from stored energy (DCM / BCM)

$$L_p = 2\cdot P_o\,/\,(\eta\cdot\hat{I}_p^{\,2}\cdot f_{sw})$$

上式之反解，同样限 DCM / BCM。CCM 改由纹波反推 Lp = Vin·D/(ΔI·fsw)。

The inverse of the above, likewise DCM/BCM only. For CCM take Lp from the ripple: Lp = Vin·D/(ΔI·fsw).

气隙 Air gap

$$l_g \approx \mu_0\cdot N_p^{\,2}\cdot A_e\,/\,L_p$$

假设气隙磁阻远大于磁芯磁阻且忽略边缘磁通，故实际 AL 偏高，以实测或承认书为准。

Assumes gap-dominated reluctance and neglects fringing, so measured AL runs higher — per measurement or approval sheet.

磁通与匝数 FLUX AND TURNS

交流磁通振幅（查损耗） AC flux amplitude — for loss

$$\hat{B}_{ac} = V_{in}\cdot D\,/\,(2\cdot N_p\cdot A_e\cdot f_{sw})$$

反激为单极性激磁：DCM 时磁通自零起，B̂max≈2·B̂ac；CCM 时直流分量更大。

Flyback excitation is unipolar: in DCM the flux starts from zero so B̂max ≈ 2·B̂ac; in CCM the DC component is larger.

峰值磁通（饱和检查） Peak flux — saturation check

$$\hat{B}_{max} = L_p\cdot\hat{I}_p\,/\,(N_p\cdot A_e)$$

以最低输入电压、满载、最高工作温度之 Bs 检查。

Check at minimum input, full load, against Bs at the highest operating temperature.

一次 / 二次匝数 Primary and secondary turns

$$N_p = L_p\cdot\hat{I}_p\,/\,(\hat{B}_{max}\cdot A_e) \qquad N_s = N_p\cdot(V_o+V_F)\cdot(1-D)/(V_{in}\cdot D)$$

N 取整后回头验 B̂ 与 Lp（由气隙微调）。

After rounding N, re-check B̂ and Lp (trim with the gap).

磁芯选用要点 CORE SELECTION

应用情境 Application	MnZn 建议 MnZn grades	NiZn 建议 NiZn grades	理由 Why
通用反激（20 k–150 kHz） General flyback	TP40 / TP44 / TP45	—（此频段以 MnZn 为主）	低损耗功率材 Low-loss power grades
宽温 / 车载 Wide temp. / automotive	TM80 / TM81 / TM83	SL50 / SL80（低温度系数）	宽温稳定 Stable over wide temperature
高频（≥0.5 MHz） High frequency	TM50A / TM61 / TM63	DL5 / DL6 / SL50 / SL80	高频低损耗 Low loss at high frequency

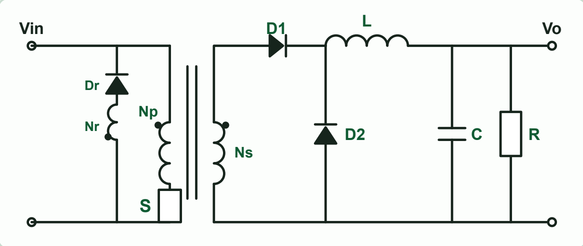
反激之漏感直接造成开关电压突波与 EMI，绕法（夹层绕）与气隙位置同等重要：有中柱之磁芯优先只开中柱，使边缘磁通远离绕组。

Leakage drives switch voltage spikes and EMI: winding arrangement and gap position matter as much as the numbers above — gap the centre leg only.

正激 Forward 变压器与输出电感速查

鐵研 TAK

FORWARD CONVERTER · TRANSFORMER & INDUCTOR



【适用模式：输出电感 CCM 连续导通】变压器只做能量传递（不储能），另配输出电感滤波。关键在单极性激磁 —— 磁通只走第一象限，剩磁 Br 直接吃掉裕度，且必须有复位机制。

[Mode: output inductor in CCM] The transformer transfers energy without storing it; a separate output inductor filters. Excitation is unipolar — flux stays in the first quadrant, remanence Br eats into the margin, and a reset scheme is mandatory.

工作关系 OPERATING RELATIONS

输出电压 Output voltage

$$V_o = V_{in}\cdot D\cdot(N_s/N_p)$$

与 Buck 同形式，仅多一个匝比。

Same form as a buck, with the turns ratio added.

占空比上限 Duty limit

$$D \le N_p/(N_p+N_r) \quad （1{:}1\ 复位时\ D \le 0.5）$$

复位绕组 Nr 须在关断期间把磁通归零，否则逐周期累积而饱和。

The reset winding Nr must return the flux to zero each cycle, otherwise flux staircases into saturation.

变压器与输出电感 TRANSFORMER & OUTPUT INDUCTOR

交流磁通振幅（查损耗） AC flux amplitude — for loss

$$\hat{B}_{ac} = V_{in}\cdot D\ /\ (2\cdot N_p\cdot A_e\cdot f_{sw})$$

单极性激磁只用到 B-H 回线的一半，等效交流振幅为总摆幅之半。

Unipolar excitation uses only half the B-H loop; the equivalent AC amplitude is half the total swing.

饱和检查（含剩磁） Saturation check — with remanence

$$B_r + 2\cdot\hat{B}_{ac} < B_s$$

单极性拓扑的关键限制：可用摆幅被剩磁压缩。此式为保守示意——实际周期起始磁通取决于复位伏秒是否足够与磁滞小回线，应以"周期起始磁通 + 本周期摆幅"核算；工程上常先取工作温度 Bs 的 50~60% 作为起始设计上限，再以实测修正。

The key limit of unipolar topologies: usable swing is compressed by remanence. Treat this as a conservative illustration — the actual cycle-start flux depends on whether the reset volt-seconds suffice and on the minor hysteresis loop, so evaluate cycle-start flux plus that cycle's swing. A common starting limit is 50–60% of Bs at operating temperature, refined by measurement.

一次侧匝数 Primary turns

$$N_p \ge V_{in}\cdot D\ /\ (2\cdot\hat{B}_{ac,max}\cdot A_e\cdot f_{sw})$$

以最高输入电压、最大 D 之组合计算。

Evaluate at the combination of maximum input voltage and maximum duty cycle.

输出电感 Output inductor

$$L = (V_{in}\cdot N_s/N_p - V_o)\cdot D\ /\ (\Delta I\cdot f_{sw})$$

与 Buck 输出电感同式；饱和与匝数计算沿用 Buck 页。

Same expression as the buck output inductor; use the buck page for its saturation and turns calculations.

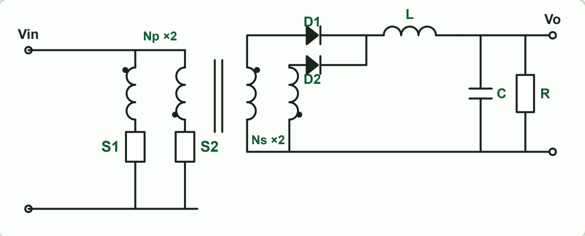
磁芯选用要点 CORE SELECTION

应用情境 Application	MnZn 建议 MnZn grades	NiZn 建议 NiZn grades	理由 Why
正激变压器 Forward transformer	TP40 / TP44 / TP45	—（此频段以 MnZn 为主）	低损耗、低 Br 有利单极性 Low loss; low Br helps unipolar drive
宽温 / 车载 Wide temp. / automotive	TM80 / TM81 / TM83	SL50 / SL80（低温度系数）	宽温稳定 Stable over temperature
输出电感 Output inductor	T2 / T2M / TB2 / TM71 / TM82	DL5 / DL6（高 Bs 系）	高 Bs 配气隙承受直流 High Bs, gapped for the DC component

单极性激磁的实际可用磁通摆幅被剩磁 Br 压缩，选材时"低 Br"与"高 Bs"同样重要；复位方式（复位绕组 / RCD / 主动箝位）决定 D 的上限与开关耐压。

With unipolar excitation the usable swing is limited by remanence, so low Br matters as much as high Bs; the reset scheme (reset winding / RCD / active clamp) sets the duty limit and switch voltage rating.

推挽 Push-Pull 变压器速查 PUSH-PULL TRANSFORMER · DESIGN



【适用模式：CCM 连续导通；fsw = 单一开关之切换频率 = 完整磁通周期频率】一次侧中心抽头、两开关交替导通，磁芯在正负两象限对称激磁 ——同尺寸磁芯的功率能力优于单极性拓扑，但必须处理磁通偏移（flux walking）。

[Mode: CCM; fsw = per-switch switching frequency = full magnetic cycle frequency] A centre-tapped primary with alternately switched halves drives the core symmetrically in both quadrants — better power capability than unipolar topologies for the same core, provided flux walking is controlled.

工作关系 OPERATING RELATIONS

输出电压 Output voltage

$$V_o = 2\cdot V_{in}\cdot D\cdot(N_s/N_p)$$

D = 单一开关之占空比，上限 0.5（两管不可同时导通）。

D is the duty of one switch, limited to 0.5 — the two switches must never conduct together.

开关耐压 Switch voltage stress

$$V_{ds} \geq 2\cdot V_{in} + \text{漏感突波}$$

中心抽头结构使关断管承受两倍输入电压，须含漏感尖峰裕度。

The centre-tapped structure exposes the off-state switch to twice the input voltage plus the leakage spike.

磁通与匝数 FLUX AND TURNS

交流磁通振幅（查损耗） AC flux amplitude — for loss

$$\hat{B}_{ac} = V_{in}\cdot D \;/\; (2\cdot N_p\cdot A_e\cdot f_{sw})$$

Np = 半个一次绕组匝数。双极性对称激磁，理想时无直流分量。

Np is the half-primary turns. Excitation is symmetric and bipolar, ideally with no DC component.

饱和检查 Saturation check

$$\hat{B}_{max} = \hat{B}_{ac} + B_{dc}(\text{偏移}) < B_s$$

理想时 B̂max = B̂ac；实务须为磁通偏移预留裕度（见注）。

Ideally B̂max equals B̂ac; in practice leave margin for flux walking (see note).

一次侧匝数 Primary turns

$$N_p \geq V_{in}\cdot D \;/\; (2\cdot \hat{B}_{ac,max}\cdot A_e\cdot f_{sw})$$

同样以最高输入电压、最大 D 计算后取整。

Evaluate at maximum input voltage and duty, then round.

输出电感 Output inductor

$$L = V_o\cdot(0.5 - D) \;/\; (\Delta I\cdot f_{sw})$$

两管交替导通使输出纹波频率为 2·fsw，电感值因而小于同功率之单端拓扑；饱和与匝数计算沿用 Buck 页。

Alternate conduction puts the output ripple at 2·fsw, so the inductor is smaller than in a single-ended topology; use the buck page for saturation and turns.

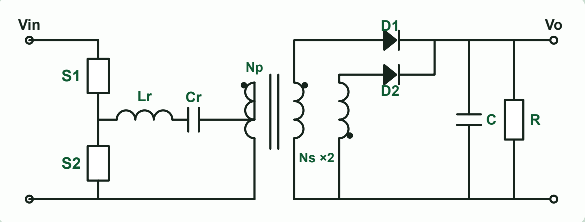
磁芯选用要点 CORE SELECTION

应用情境 Application	MnZn 建议 MnZn grades	NiZn 建议 NiZn grades	理由 Why
推挽变压器（20 k–200 kHz） Push-pull transformer	TP40 / TP44 / TP45	—（此频段以 MnZn 为主）	双极性激磁、低损耗 Bipolar drive, low loss
高 Bs / 偏移裕度 High Bs / walking margin	T2 / T2M / TB2 / TM71 / TM82	DL5 / DL6（高 Bs 系）	为磁通偏移预留裕度 Headroom against flux walking
宽温 / 车载 Wide temp. / automotive	TM80 / TM81 / TM83	SL50 / SL80（低温度系数）	宽温稳定 Stable over temperature

磁通偏移（flux walking）：两半周的伏秒若不完全相等，直流分量会逐周期累积而单边饱和。对策为峰值电流模式控制、串联隔直电容，或开一个小气隙降低磁化电感的敏感度 —— 但小气隙同时降低 AL。

Flux walking: unequal volt-seconds between half-cycles accumulate a DC component until one side saturates. Remedies are peak-current-mode control, a DC-blocking capacitor, or a small gap (which also lowers AL).

半桥 LLC 谐振变压器速查 HALF-BRIDGE LLC RESONANT TRANSFORMER



【适用模式：谐振（非 CCM / DCM 分类），设计点取 fr 附近、增益 M≈1】谐振槽 Lr–Cr–Lm 使开关达成零电压切换（ZVS），工作频率可达数百 kHz 以上。变压器需受控之激磁电感 Lm，因此通常须开设气隙；Lr 常以漏感整合实现。

[Mode: resonant (not a CCM/DCM case); designed near fr with gain M ≈ 1] The Lr–Cr–Lm tank gives the switches zero-voltage switching, allowing several hundred kHz and above. The transformer needs a controlled magnetizing inductance Lm, so it is almost always gapped; Lr is often integrated as leakage.

谐振参数 RESONANT PARAMETERS

谐振频率 Resonant frequency

$$f_r = 1 / (2\pi \cdot \sqrt{(L_r \cdot C_r)})$$

工作于 fr 附近增益≈1，效率最佳；调频控制在 fr 上下移动。

Near fr the gain is about unity and efficiency is best; frequency control moves around fr.

匝比 Turns ratio

$$n = N_p/N_s = V_{in} / (2 \cdot (V_o + V_F))$$

半桥一次侧方波振幅为 Vin/2，故以标称输入电压在 fr（增益 M≈1）设计。本页采中心抽头全波整流（见图），Ns 为半个二次绕组之匝数；改用全桥整流时 Ns 取全绕组、且分母之 2 须重新推导。

The half-bridge applies Vin/2, so design at the nominal input voltage at fr (gain M ≈ 1). This page assumes the centre-tapped full-wave rectifier shown in the figure, where Ns is one half of the secondary; with a full-bridge rectifier Ns is the whole winding and the factor 2 must be re-derived.

电感比 Inductance ratio

$$L_n = L_m / L_r \quad （常用 3\sim8）$$

Ln 小→增益范围宽但循环电流大；Ln 大→效率高但调压范围窄。

A small Ln widens the gain range at the cost of circulating current; a large Ln favours efficiency but narrows range.

ZVS 条件（半桥） ZVS condition (half-bridge)

$$L_m \le t_{dead} / (16 \cdot C_{oss} \cdot f_{sw})$$

系数 16 由半桥（两颗 Coss、一次侧 ±Vin/2）推得，全桥须重推。Coss 具强非线性，应取等效电荷值 Qoss/Vin，并于满载至轻载全工作点验证 ZVS。

The factor 16 follows from a half-bridge (two Coss, ±Vin/2 on the primary) and must be re-derived for a full bridge. Coss is strongly non-linear — use the charge-equivalent Qoss/Vin and verify ZVS from full to light load.

磁通与匝数 FLUX AND TURNS

交流磁通振幅（查损耗） AC flux amplitude — for loss

$$\hat{B}_{ac} = n \cdot (V_o + V_F) / (4 \cdot f_{sw} \cdot N_p \cdot A_e)$$

一次侧电压在半周内被二次侧箝位；最严苛点在最低工作频率。

The primary is clamped by the secondary each half-cycle; the worst case is at the lowest operating frequency.

一次侧匝数 Primary turns

$$N_p \ge n \cdot (V_o + V_F) / (4 \cdot f_{sw,min} \cdot \hat{B}_{ac,max} \cdot A_e)$$

以最低工作频率（增益最高、磁通最大）计算。

Evaluate at the minimum operating frequency, where gain and flux are highest.

气隙与 Lm Gap and Lm

$$l_g \approx \mu_0 \cdot N_p^2 \cdot A_e / L_m$$

Lm 由气隙控制；漏感整合（分槽绕线）可同时得到所需 Lr。

The gap sets Lm; a split-bobbin winding integrates the leakage to provide Lr.

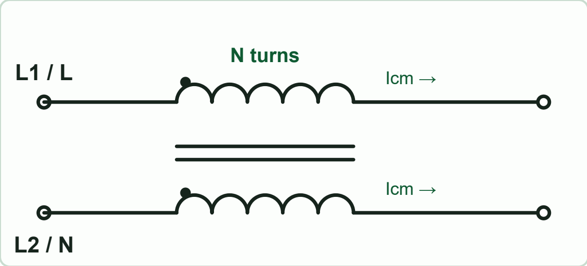
磁芯选用要点 CORE SELECTION

应用情境 Application	MnZn 建议 MnZn grades	NiZn 建议 NiZn grades	理由 Why
LLC 变压器（100–500 kHz） LLC transformer	TM50A / TM61 / TP45	—（此频段以 MnZn 为主）	高频低损耗 Low loss at high frequency
高频（≥0.5 MHz） ≥0.5 MHz	TM61 / TM63	DL5 / DL6 / SL50 / SL80	NiZn 于此频段具实测功率能力 NiZn shows measured power capability in this band
宽温 / 车载 Wide temp. / automotive	TM80 / TM81 / TM83	SL50 / SL80（低温度系数）	宽温稳定 Stable over temperature

LLC 之磁芯损耗对工作频率与增益点敏感：轻载时频率上升、磁通下降，但循环电流与绕组交流电阻上升，铜损可能反而主导；设计验证须涵盖满载、轻载与启动 / 过载等极端点。

Core loss in an LLC depends strongly on frequency and gain point: at light load frequency rises and flux falls, but circulating current and AC winding resistance rise so copper loss can dominate — verify at full load, light load and start-up/overload.

共模电感 Common-Mode Choke 速查 COMMON-MODE CHOKE · DESIGN



【本页不适用导通模式：以阻抗–频率为设计轴】两绕组同向绕于同一磁芯：共模电流的磁通相加（呈现高阻抗），差模（工作）电流的磁通在理想平衡下相互抵消。设计以“阻抗-频率”为轴，而非电感值。

[No conduction mode applies: this page is impedance-versus-frequency driven] Two windings wound in the same sense on one core: common-mode flux adds (high impedance) while differential (line) current flux cancels under ideal balance. Design is driven by impedance versus frequency, not by inductance.

阻抗与衰减 IMPEDANCE AND ATTENUATION

共模阻抗 Common-mode impedance

$$Z_{cm} = 2\pi\cdot f\cdot L_{cm} \quad \text{（低损耗感性区）；一般 } |Z_{cm}| = \omega\cdot L_0\cdot|\mu| \text{ ，} R_s = \omega\cdot L_0\cdot\mu'' \text{、} X_s = \omega\cdot L_0\cdot\mu'$$

ωLcm 仅在 μ″ 尚小的低频感性区成立；进入损耗区后以电阻性 μ″ 分量为主（NiZn 之 EMI 工作区多在此），超过自谐振后由寄生电容主导而下降。Lcm 为单一绕组值。

ωLcm holds only in the low-loss inductive region; above the turnover the resistive μ″ term dominates (where NiZn EMI parts usually operate), and above self-resonance parasitic capacitance takes over. Lcm is a single-winding value.

插入损耗 Insertion loss

$$A(\text{dB}) = 20\cdot\log_{10}(1 + Z_{cm}/(Z_S+Z_L))$$

CISPR/LISN 测量惯例 ZS = ZL = 25 Ω（两线并联之 50 Ω）。

With the CISPR/LISN convention ZS = ZL = 25 Ω (two 50 Ω lines in parallel).

所需电感 Required inductance

$$L_{cm} \geq (Z_S+Z_L)\cdot(10\hat{}(A/20) - 1) \,/\, (2\pi\cdot f)$$

由需要衰减的最低频率反推；再由 AL 求匝数 N=√(Lcm/AL)。

Derive from the lowest frequency needing attenuation, then N = √(Lcm/AL).

磁通与饱和 FLUX AND SATURATION

共模磁通 Common-mode flux

$$\hat{B}_{cm} = L_{cm}\cdot\hat{I}_{cm} \,/\, (N\cdot A_e)$$

Lcm 与 N 均取单一绕组值（口径不一致会有 2 倍误差）。共模电流多在 mA 量级、磁通远低于 Bs，但高共模电流、直流偏流或线路不平衡仍可能饱和。

Take both Lcm and N for a single winding (mixing conventions gives a factor-of-two error). Common-mode currents are usually milliamps and the flux far below Bs, but high common-mode current, DC offset or line imbalance can still saturate the core.

差模漏感 Differential leakage

$$L_{dm} \approx (0.5\text{~}2\%)\cdot L_{cm}$$

此为常见测量范围而非通则，实际依绕法、间距、磁芯与测量端口而定。漏感兼作差模滤波并承受全部工作电流，须与净安匝一并检查。

A commonly measured range, not a rule — it depends on the winding arrangement, spacing, core and measurement port. The leakage also filters differential noise and carries the full line current; check it together with the net ampere-turns.

磁芯选用要点 CORE SELECTION

应用情境 Application	MnZn 建议 MnZn grades	NiZn 建议 NiZn grades	理由 Why
低频段共模抑制（<1 MHz） Low-frequency CM (<1 MHz)	E02 / T05 / T07 / T10 / T12（高磁导）	L22A / L28A（μi 最高）	高 μi 取得低频大阻抗 High μi gives impedance at low frequency
宽频共模抑制（1–30 MHz） Broadband CM (1–30 MHz)	—（MnZn 高磁导于此段已下滑）	L43 / L6A / L8A	NiZn 高电阻率、损耗型阻抗 NiZn: high resistivity, lossy impedance
高频 / VHF（>30 MHz） HF / VHF (>30 MHz)	—	M61 / M63 / M9A / V2F1 / V4F1	低 μi 高频材，阻抗峰在高频 Low-μi grades peak at high frequency
抗热冲击 / 低温度系数 Thermal shock / low TC	—	G5A / G5B / SL50 / SL80	回流焊与宽温环境 Reflow and wide-temperature environments

饱和检查须涵盖三个来源：①净安匝（共模电流、直流偏流与线路不平衡；差模安匝仅在理想平衡下抵消）；②差模漏感承受之全部工作电流；③局部漏磁集中处。选材则以“所需抑制频段的阻抗峰位置”为准——μi 越高、阻抗峰越低频，可直接查本目录之 ZN 曲线。

Check saturation against three sources: net ampere-turns (common-mode current, DC offset, line imbalance — differential ampere-turns cancel only under ideal balance), the full line current in the differential leakage, and local leakage-flux concentrations. Select by where the impedance peak sits in the band you must suppress — higher μi moves it lower; see the ZN curves in this catalog.

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鐵研科技股份有限公司

TAK TECHNOLOGY CO., LTD.

鐵研科技股份有限公司

TAK Technology Co., Ltd.

桃园市芦竹区安中街 28 巷 5 号

No. 5, Lane 28, Anzhong St., Luzhu Dist.,
Taoyuan City, Taiwan

Tel: 886-3-2624980

Fax: 886-3-2624950

Email: taiwan@takferrite.com

东莞锂研电子有限公司

Dongguan Liyan Electronics Co., Ltd.

中国广东省东莞市石碣镇
东风南路 75 号 1 号楼 401 室

Rm. 401, Bldg. 1, No. 75 Dongfeng S. Rd., Shijie
Town, Dongguan, Guangdong, China

Tel: 86-769-86310390

Fax: 86-769-86310396

Email: sales6@takferrite.com

河源鐵研電子科技有限公司

Heyuan TAK Electronics Technology Co., Ltd.

中国广东省河源市连平县元善镇
石龙工业园区

Shilong Industrial Park, Yuanshan Town,
Lianping County, Heyuan, Guangdong, China

Tel: 86-762-4329901

Fax: 86-762-4329002

Email: sales6@takferrite.com

www.takferrite.com

Compiled by Anson Chang