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

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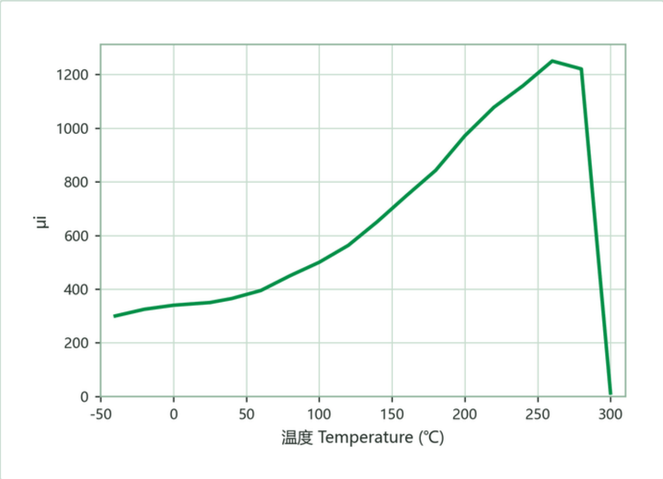
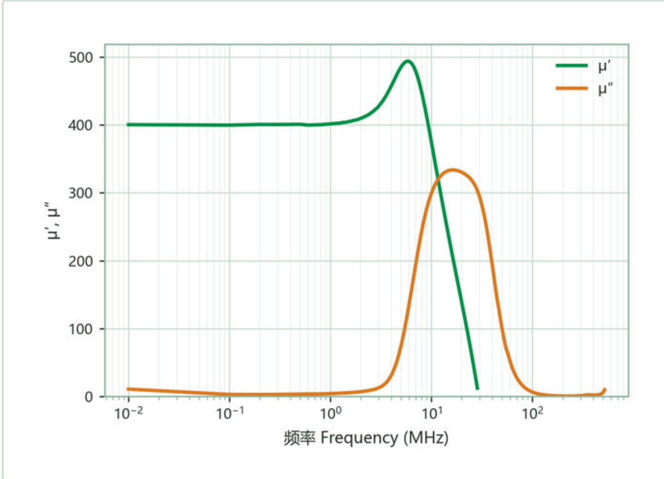
DL5 特性曲线

CHARACTERISTIC CURVES



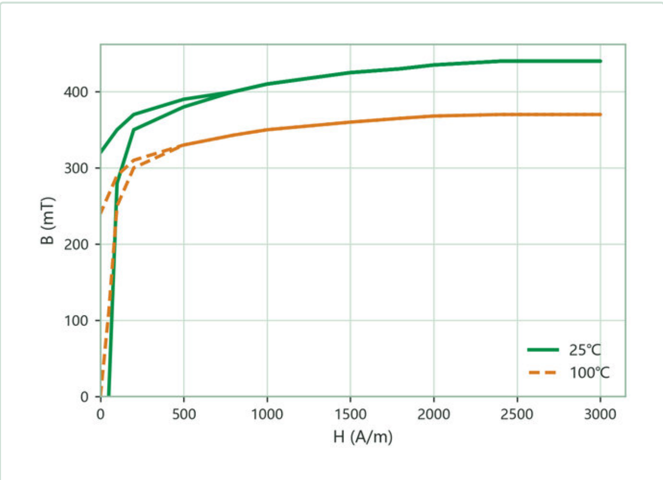
初始磁导率—温度特性

Initial Permeability vs. Temperature



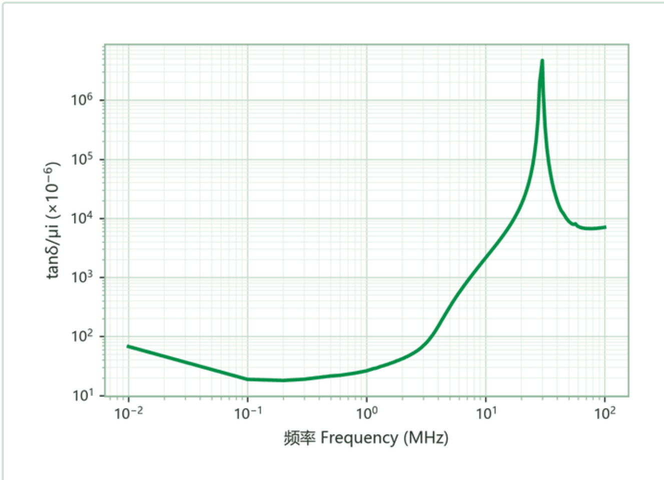
复数磁导率—频率特性

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