

TM61

兆赫级低损耗功率材料

MHZ-BAND LOW-LOSS POWER FERRITE

TM61 为兆赫级低损耗锰锌功率铁氧体，初始磁导率 (μ_i) 1000，饱和磁通密度 (B_s) 540 mT (25 °C) / 440 mT (100 °C)，居里温度高于 260 °C。1 MHz / 50 mT 为 190 kW/m³ (25 °C) → 155 kW/m³ (100 °C)，3 MHz / 10 mT 仍只有 100 → 90 kW/m³，两点都是越热越低；100 °C 残留磁通密度 (B_r) 50 mT、矫顽力 (H_c) 15 A/m。 μ_i 1000 意味着磁导率的频率上限往上推，MHz 级仍保有可用的感量与低损耗，GaN / SiC 开关把频率推到 1–3 MHz 时磁芯不会成为效率瓶颈。典型应用为 MHz 级 DC-DC 变换器、GaN / SiC 谐振与隔离变压器、高频功率电感。在 700 kHz–5 MHz 群中，TM61 是变压器取向的一支：1 MHz / 50 mT 的热态损耗低于 TM65 (180 kW/m³)，但直流偏磁能力略低 (220 nH 档 100 °C $I_{@90\%}$ 42.1 A 对 47.3 A)，大电流电感选 TM65；2 MHz 以上、需要 $T_c > 290$ °C 时选 TM63。500 kHz / 100 mT 为 550 → 700 kW/m³，700 kHz 以下不是它的主场。

TM61 is an MHz-band low-loss MnZn power ferrite with an initial permeability (μ_i) of 1000, a saturation flux density (B_s) of 540 mT at 25 °C (440 mT at 100 °C) and a Curie temperature above 260 °C. Loss at 1 MHz / 50 mT is 190 → 155 kW/m³ from 25 °C to 100 °C and at 3 MHz / 10 mT still only 100 → 90 kW/m³, both falling with temperature; at 100 °C remanence (B_r) is 50 mT and coercivity (H_c) 15 A/m. A μ_i of 1000 pushes the permeability roll-off upward, so usable inductance and low loss persist into the MHz range even with GaN/SiC switching at 1–3 MHz. Typical uses are MHz-class DC-DC converters, GaN/SiC resonant and isolation transformers and high-frequency power inductors. Within the 700 kHz–5 MHz group TM61 is the transformer-oriented grade: its hot-state loss at 1 MHz / 50 mT is below TM65's 180 kW/m³, but its DC-bias capability is slightly lower ($I_{@90\%}$ = 42.1 A vs 47.3 A at 100 °C, 220 nH band), so high-current inductors go to TM65; above 2 MHz, or where $T_c > 290$ °C is needed, choose TM63. At 500 kHz / 100 mT it reads 550 → 700 kW/m³, so below 700 kHz is not its home ground.

MHz DC-DC Converter

GaN / SiC Resonant Transformer

Isolation Transformer

High-Frequency Power Inductor

电磁特性 MAGNETIC CHARACTERISTICS

特性 Characteristic	条件 Condition	25 °C	100 °C	单位 Unit
初始磁导率 Initial Permeability μ_i	100 kHz & <0.2 mT	1000±25%		
增幅磁导率 Amplitude Permeability μ_a	25 kHz/400 mT	> 2200	> 2000	
饱和磁通密度 Saturation Flux Density B_s	1200 A/m 50 Hz	540	440	mT
残留磁通密度 Remanence B_r	1200 A/m 50 Hz	90	50	mT
矫顽力 Coercivity H_c	1200 A/m 50 Hz	20	15	A/m
相对损耗因子 Loss Factor	100 kHz	<5	<10	10 ⁻⁶
居里温度 Curie Temperature T_c	100 kHz & <0.2 mT	>260		°C
密度 Density D	阿基米德法 Archimedes method	4.85		g/cm ³
电阻率 Electrical Resistivity ρ	直流电流 DC Current	10		Ω·m

功率损耗 P_{cv} POWER LOSS · KW/M³

测试条件 Condition	25 °C	100 °C
500 kHz/100 mT	550	700
1 MHz/50 mT	190	155
3 MHz/10 mT	100	90

Steinmetz 系数 $P_{cv} = K \cdot f^\alpha \cdot B^\beta$

频段 Range	K	α	β
100 ≤ 500	1.15E-08	1.29795	3.63096
100 ≤ 1000	5.21E-09	1.35237	3.7374
100 ≤ 3000	5.60E-06	1.65511	1.57087

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TM61

特性曲线

CHARACTERISTIC CURVES

