TM50A

中高频高磁导率功率材料
MID-HIGH-FREQUENCY HIGH-PERMEABILITY POWER FERRITE

鐵研 TAK

TM50A 为中高频高磁导率锰锌功率铁氧体，初始磁导率（μi）2500，为中高频与高频功率材料中最高，饱和磁通密度（Bs）550 mT（25 ℃）/ 450 mT（100 ℃），居里温度高于 240 ℃。在 TM59 推出之前，TM50A 为 500 kHz / 100 mT 高温损耗最低之材料（800 → 700 kW/m³），配合高 μi 与 450 mT 之热态 Bs，长期作为 300–500 kHz LLC 主变压器与谐振电感之主要材料；500 kHz / 50 mT 为 120 → 100 kW/m³，1 MHz / 30 mT 为 210 → 150 kW/m³，有效适用频率以 500 kHz 为上限。于中高频功率材料两种之中，TM50A 属前一代：新设计建议采用 TM59（同一工作点 600 → 550 kW/m³，Br 较低、100 ℃ 直流偏磁能力较高）；TM50A 持续供应既有设计，并在需以 μi 2500 减少匝数时仍为适当选择。300 kHz / 100 mT 之 Pcv 由 25 ℃ 的 150 升至 100 ℃ 的 280 kW/m³，热设计应以热态值评估。

TM50A is a mid-high-frequency high-permeability MnZn power ferrite with an initial permeability (μi) of 2500, the highest among the mid-high- and high-frequency power grades, a saturation flux density (Bs) of 550 mT at 25 °C (450 mT at 100 °C) and a Curie temperature above 240 °C. Before the introduction of TM59 it was the grade with the lowest hot-state loss at 500 kHz / 100 mT (800 → 700 kW/m³) and, together with its high μi and 450 mT hot-state Bs, the principal material for 300–500 kHz LLC main transformers and resonant inductors; at 500 kHz / 50 mT it reads 120 → 100 kW/m³ and at 1 MHz / 30 mT 210 → 150 kW/m³, so its effective upper frequency is about 500 kHz. Of the two mid-high-frequency grades TM50A is the earlier generation: TM59 is recommended for new designs (600 → 550 kW/m³ at the same operating point, lower Br and higher DC-bias capability at 100 °C); TM50A remains in supply for existing designs and remains appropriate where μi 2500 is required to reduce the number of turns. At 300 kHz / 100 mT the loss rises from 150 kW/m³ at 25 °C to 280 kW/m³ at 100 °C, so the thermal design should be evaluated at the hot-state value.

LLC Main Transformer (existing designs) | Resonant Inductor | Telecom / Server Power | 300–500 kHz Transformer

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	100 kHz & <0.2 mT	2500±25%		
增幅磁导率 Amplitude Permeability μa	25 kHz/400 mT	> 3500	> 3500	
饱和磁通密度 Saturation Flux Density Bs	1200 A/m 100 Hz	550	450	mT
残留磁通密度 Remanence Br	1200 A/m 100 Hz	90	70	mT
矫顽力 Coercivity Hc	1200 A/m 100 Hz	18	8	A/m
相对损耗因子 Loss Factor	100 kHz & <0.2 mT	<5		10^{-6}
居里温度 Curie Temperature Tc	100 kHz & <0.2 mT	>240		℃
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 Pcv POWER LOSS · KW/M³

测试条件 Condition	25 ℃	100 ℃	测试条件 Condition	25 ℃	100 ℃
300 kHz/100 mT	350	280	500 kHz/100 mT	800	700
500 kHz/50 mT	120	100	1000 kHz/30 mT	210	150

Steinmetz 系数 Pcv = K·f^α·B^β

频段 Range	K	α	β
100 ≤500	1.16E-07	1.4754	2.89164
100 ≤1000	2.31E-06	1.51745	2.20134

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

TM50A

特性曲线
CHARACTERISTIC CURVES











