鐵研 TAK

TP45

较高磁导率功率材料
HIGHER-PERMEABILITY LOW-LOSS POWER FERRITE

TP45 为较高磁导率锰锌功率铁氧体，初始磁导率（μi）2500，饱和磁通密度（Bs）500 mT（25 ℃）/ 400 mT（100 ℃），居里温度高于 210 ℃。μi 较 TP40 / TP44 高 25 %，同一激磁电感所需匝数较少，反激与适配器变压器可减少绕线层数与漏感，而损耗并未因此牺牲：100 kHz / 200 mT 为 600 → 300 kW/m³，与 TP44 同级；300 kHz / 100 mT 为 620 → 420 kW/m³；500 kHz / 50 mT 为 270 → 200 kW/m³，频段上缘可延伸至 500 kHz 之低磁通工作点；100 ℃ 之矫顽力（Hc）7 A/m、残留磁通密度（Br）70 mT。典型应用为适配器与充电器之反激变压器、通信电源，以及 300 kHz 级半桥 / LLC 变压器。于中频六种材料中，TP45 以 μi 区隔：匝数与漏感为设计限制者采 TP45；沿用 μi 2000 匝数设计而需降低损耗者采 TP44；大尺寸通用磁芯采 TP40。100 ℃ 之 Bs 保持率 80 %，与 TP44 相同，热态饱和裕度以 400 mT 计算。

TP45 is a higher-permeability MnZn power ferrite with an initial permeability (μi) of 2500, a saturation flux density (Bs) of 500 mT at 25 °C (400 mT at 100 °C) and a Curie temperature above 210 °C. A μi 25 % above TP40/TP44 reduces the number of turns for a given magnetising inductance, so flyback and adapter transformers require fewer winding layers and exhibit lower leakage, without a loss penalty: 600 → 300 kW/m³ at 100 kHz / 200 mT, equivalent to TP44; 620 → 420 kW/m³ at 300 kHz / 100 mT; and 270 → 200 kW/m³ at 500 kHz / 50 mT, so the usable band extends to low-flux operating points around 500 kHz; at 100 °C the coercivity (Hc) is 7 A/m and the remanence (Br) 70 mT. Typical applications are flyback transformers for adapters and chargers, telecom supplies and 300 kHz-class half-bridge/LLC transformers. Among the six mid-frequency grades TP45 is distinguished by μi: it is recommended where turns and leakage are the design constraint, TP44 where an existing μi 2000 turns design is retained and loss must be reduced, and TP40 for large general-purpose cores. Its Bs retention at 100 °C is 80 %, the same as TP44; the hot-state saturation margin should be calculated at 400 mT.

Flyback Transformer | Adapter / Charger | Telecom Power | Half-Bridge / LLC 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	> 4000	> 3500	
饱和磁通密度 Saturation Flux Density Bs	1200 A/m 100 Hz	500	400	mT
残留磁通密度 Remanence Br	1200 A/m 100 Hz	130	70	mT
矫顽力 Coercivity Hc	1200 A/m 100 Hz	10	7	A/m
相对损耗因子 Loss Factor	100 kHz & <0.2 mT	<10		10^{-6}
居里温度 Curie Temperature Tc	100 kHz & <0.2 mT	>210		℃
密度 Density D	阿基米德法 Archimedes method	4.8		g/cm^3
电阻率 Electrical Resistivity ρ	直流电流 DC Current	>6		Ω·m

功率损耗 Pcv POWER LOSS · KW/M³

测试条件 Condition	25 ℃	100 ℃
100 kHz/200 mT	600	300
300 kHz/100 mT	620	420
500 kHz/50 mT	270	200

Steinmetz 系数 Pcv = K·f^α·B^β

频段 Range	K	α	β
80 ≤500	7.85E-08	1.87237	2.54868
100 ≤500	4.75E-07	1.7414	2.35204

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

TP45

特性曲线
CHARACTERISTIC CURVES











