TP40

通用低损耗功率材料

GENERAL-PURPOSE LOW-LOSS POWER FERRITE

鐵研 TAK

TP40 为通用低损耗锰锌功率铁氧体，初始磁导率（μi）2000，饱和磁通密度（Bs）480 mT（25 ℃）/ 390 mT（100 ℃），居里温度高于 220 ℃。损耗极小值位于 100 ℃ 附近：100 kHz / 200 mT 之 Pcv 由 25 ℃ 的 720 kW/m³ 降至 100 ℃ 的 480 kW/m³，300 kHz / 100 mT 由 660 降至 400 kW/m³，矫顽力（Hc）亦由 12 A/m 降至 6.5 A/m，与开关电源满载时的磁芯温度相符。典型应用为 100–300 kHz 之正激、反激与半桥主变压器，以及工业与大功率电源，尤以 EE / EC / PQ 等大尺寸磁芯为主。于中频六种材料中，TP40 为通用基准：需要宽温损耗特性者采 TM80 / TM81 / TM83；100 kHz / 200 mT 之损耗要求更严者采 TP44（100 ℃ 330 kW/m³）；需以较高 μi 减少匝数者采 TP45（μi 2500）。大尺寸磁芯之内部热点温度高于表面，选用时应以磁芯内部温度对照损耗曲线。

TP40 is a general-purpose low-loss MnZn power ferrite with an initial permeability (μi) of 2000, a saturation flux density (Bs) of 480 mT at 25 °C (390 mT at 100 °C) and a Curie temperature above 220 °C. Its loss minimum lies near 100 °C: Pcv at 100 kHz / 200 mT decreases from 720 kW/m³ at 25 °C to 480 kW/m³ at 100 °C, at 300 kHz / 100 mT from 660 to 400 kW/m³, and coercivity (Hc) from 12 A/m to 6.5 A/m, consistent with the core temperature of a switch-mode supply at full load. Typical applications are 100–300 kHz forward, flyback and half-bridge main transformers and industrial and high-power supplies, particularly on large EE/EC/PQ cores. Among the six mid-frequency grades TP40 is the general-purpose reference: TM80/TM81/TM83 are recommended where a wide-temperature loss profile is required, TP44 (330 kW/m³ at 100 °C) where the 100 kHz / 200 mT loss budget is tighter, and TP45 (μi 2500) where a higher μi is needed to reduce the number of turns. Because the internal hot-spot temperature of a large core exceeds its surface temperature, the loss curve should be evaluated at the internal core temperature.

SMPS Main Transformer | Forward / Flyback Transformer | Industrial Power | Large-Size Core

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	2000±25%		
增幅磁导率 Amplitude Permeability μa	25 kHz/400 mT	> 3000	> 3200	
饱和磁通密度 Saturation Flux Density Bs	1200 A/m 100 Hz	480	390	mT
残留磁通密度 Remanence Br	1200 A/m 100 Hz	150	60	mT
矫顽力 Coercivity Hc	1200 A/m 100 Hz	12	6.5	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	>220		℃
密度 Density D	阿基米德法 Archimedes method	4.8		g/cm³
电阻率 Electrical Resistivity ρ	直流电流 DC Current	>9		Ω·m

功率损耗 Pcv POWER LOSS · KW/M³

测试条件 Condition	25 ℃	100 ℃
25 kHz/200 mT	110	60
100 kHz/200 mT	720	480
300 kHz/100 mT	660	400

Steinmetz 系数 Pcv = K·f^α·B^β

频段 Range	K	α	β
80 ≤500	3.91E-06	1.51865	2.16883
100 ≤500	4.48E-07	1.73981	2.42323

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

TP40

特性曲线
CHARACTERISTIC CURVES











