TM59

中高频低损耗功率材料
MEDIUM-HIGH FREQUENCY LOW-LOSS POWER FERRITE

TM59 为中高频低损耗锰锌功率铁氧体，初始磁导率（μi）1900，饱和磁通密度（Bs）530 mT（25 ℃）/ 430 mT（100 ℃），居里温度高于 260 ℃。损耗谷底就落在工作温度：500 kHz / 50 mT 由 25 ℃ 的 80 kW/m³ 降到 100 ℃ 的 50 kW/m³，1 MHz / 50 mT 为 350 → 250 kW/m³，磁芯越热越省——正是伺服器 LLC 在满载热态所需要的走向。全系最低的残留磁通密度（Br 35 mT @100 ℃）与 10 A/m 的矫顽力把磁滞损压在低位；100 ℃ 的直流偏磁能力在同一颗UD 磁芯的八材质实测中居首（220 nH 档 I@90 % 48.4 A），所以除了主变压器，也是谐振电感与输出电感的同材料选择，整台电源可统一料号。典型应用为 300 kHz–1 MHz 的 LLC 谐振变压器、伺服器与通信电源、高频 DC-DC 以及 VRM / TLVR 电感。在高频群中，需要更高 μi 与更大磁通摆幅时选 TM50A；工作频率越过 1 MHz 则换 TM65。

TM59 is a medium-high-frequency low-loss MnZn power ferrite with an initial permeability (μi) of 1900, a saturation flux density (Bs) of 530 mT at 25 °C (430 mT at 100 °C) and a Curie temperature above 260 °C. Its loss minimum sits right at operating temperature: at 500 kHz / 50 mT the loss falls from 80 kW/m³ at 25 °C to 50 kW/m³ at 100 °C, and at 1 MHz / 50 mT from 350 to 250 kW/m³ — the hotter the core, the lower the loss, exactly what a server LLC stage needs at full-load steady state. The lowest remanence in the series (Br 35 mT at 100 °C) and a coercivity of 10 A/m keep hysteresis loss small, and its 100 °C DC-bias capability ranks first among eight grades measured on the same UD core (220 nH band, I@90 % = 48.4 A), so besides the main transformer it is also the same-material choice for resonant and output inductors — one grade for the whole supply. Typical uses are 300 kHz–1 MHz LLC resonant transformers, server and telecom power, high-frequency DC-DC and VRM/TLVR inductors. Within the high-frequency group, choose TM50A for higher μi and larger flux swing, or TM65 once the switching frequency passes 1 MHz.

LLC Resonant Transformer | Server / Telecom Power | High-Frequency DC-DC | VRM / TLVR Inductor

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	1900±25%		
增幅磁导率 Amplitude Permeability μa	25 kHz/400 mT	> 3000	> 3000	
饱和磁通密度 Saturation Flux Density Bs	1200 A/m 100 Hz	530	430	mT
残留磁通密度 Remanence Br	1200 A/m 100 Hz	55	35	mT
矫顽力 Coercivity Hc	1200 A/m 100 Hz	15	10	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	>260		℃
密度 Density D	阿基米德法 Archimedes method	>4.85		g/cm³
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	250	230	800 kHz/60 mT	330	250
500 kHz/50 mT	80	50	1 MHz/30 mT	100	70
500 kHz/100 mT	600	550	1 MHz/50 mT	350	250

Steinmetz 系数 Pcv = K·f^α·B^β

频段 Range	K	α	β
100 ≤300	5.129E-09	1.455	3.5423
100 ≤1000	8.028E-11	2.0925	3.6525

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TM59

特性曲线
CHARACTERISTIC CURVES