

# TP44

低损耗功率材料  
LOW-LOSS POWER FERRITE

TP44 为低损耗锰锌功率铁氧体，初始磁导率 ( $\mu_i$ ) 2000，饱和磁通密度 ( $B_s$ ) 500 mT (25 °C) / 400 mT (100 °C)，居里温度高于 220 °C。优势集中在 100 kHz 高磁通段：100 kHz / 200 mT 为 600 kW/m<sup>3</sup> (25 °C) → 330 kW/m<sup>3</sup> (100 °C)，较 TP40 的 480 kW/m<sup>3</sup> 低约三成，25 kHz / 200 mT 在 100 °C 更只有 50 kW/m<sup>3</sup>；100 °C 残留磁通密度 ( $B_r$ ) 80 mT、矫顽力 ( $H_c$ ) 8 A/m，100 kHz 相对损耗因子低于  $5 \times 10^{-6}$ ，为三支之中最低，磁滞损耗维持低位。到 300 kHz / 100 mT 则为 800 → 500 kW/m<sup>3</sup>，反而高于 TP40 的 400 kW/m<sup>3</sup>，因此它的甜蜜点是 100–200 kHz。典型应用为 100–200 kHz 的开关电源主变压器、LED 驱动与工业电源、适配器。在 300 kHz 以下低损耗高  $B_s$  群中，TP44 是 100 kHz 段的低损耗版， $\mu_i$  与 TP40 相同，可在不改匝数下直接替换；工作点靠近 300 kHz 时 TP40 / TP45 更合适；需要  $\mu_i$  2500 减少匝数时选 TP45 (100 kHz / 200 mT 损耗同级)。

TP44 is a low-loss MnZn power ferrite with an initial permeability ( $\mu_i$ ) of 2000, a saturation flux density ( $B_s$ ) of 500 mT at 25 °C (400 mT at 100 °C) and a Curie temperature above 220 °C. Its advantage is concentrated in the 100 kHz high-flux region: 600 kW/m<sup>3</sup> at 25 °C falling to 330 kW/m<sup>3</sup> at 100 °C for 100 kHz / 200 mT, about 30 % below TP40's 480 kW/m<sup>3</sup>, and only 50 kW/m<sup>3</sup> at 100 °C for 25 kHz / 200 mT; a remanence ( $B_r$ ) of 80 mT and coercivity ( $H_c$ ) of 8 A/m at 100 °C and a relative loss factor below  $5 \times 10^{-6}$  keep hysteresis loss low. At 300 kHz / 100 mT it reads 800 → 500 kW/m<sup>3</sup>, above TP40's 400 kW/m<sup>3</sup>, so its sweet spot is 100–200 kHz. Typical uses are 100–200 kHz switch-mode main transformers, LED drivers, industrial supplies and adapters. Within the sub-300 kHz low-loss high- $B_s$  group TP44 is the low-loss version for the 100 kHz region; with the same  $\mu_i$  as TP40 it drops in without changing turns. TP40/TP45 suit operating points nearer 300 kHz; TP45 ( $\mu_i$  2500, same-level 100 kHz / 200 mT loss) saves turns.

SMPS Main Transformer

LED Driver

Industrial Power

Adapter

## 电磁特性 MAGNETIC CHARACTERISTICS

| 特性<br>Characteristic                    | 条件<br>Condition            | 25 °C    | 100 °C | 单位<br>Unit        |
|-----------------------------------------|----------------------------|----------|--------|-------------------|
| 初始磁导率<br>Initial Permeability $\mu_i$   | 100 kHz & <0.2 mT          | 2000±25% |        |                   |
| 增幅磁导率<br>Amplitude Permeability $\mu_a$ | 25 kHz/400 mT              | > 3000   | > 2700 |                   |
| 饱和磁通密度<br>Saturation Flux Density $B_s$ | 1200 A/m 100 Hz            | 500      | 400    | mT                |
| 残留磁通密度<br>Remanence $B_r$               | 1200 A/m 100 Hz            | 150      | 80     | mT                |
| 矫顽力<br>Coercivity $H_c$                 | 1200 A/m 100 Hz            | 12       | 8      | A/m               |
| 相对损耗因子<br>Loss Factor                   | 100 kHz & <0.2 mT          | < 5      |        | $10^{-6}$         |
| 居里温度<br>Curie Temperature $T_c$         | 100 kHz & <0.2 mT          | >220     |        | °C                |
| 密度<br>Density $D$                       | 阿基米德法<br>Archimedes method | 4.8      |        | g/cm <sup>3</sup> |
| 电阻率<br>Electrical Resistivity $\rho$    | 直流电流 DC Current            | >6.5     |        | $\Omega \cdot m$  |

## 功率损耗 $P_{cv}$ POWER LOSS · KW/M<sup>3</sup>

| 测试条件<br>Condition | 25 °C | 100 °C |
|-------------------|-------|--------|
| 25 kHz/200 mT     | 120   | 50     |
| 100 kHz/200 mT    | 600   | 330    |
| 300 kHz/100 mT    | 800   | 500    |

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

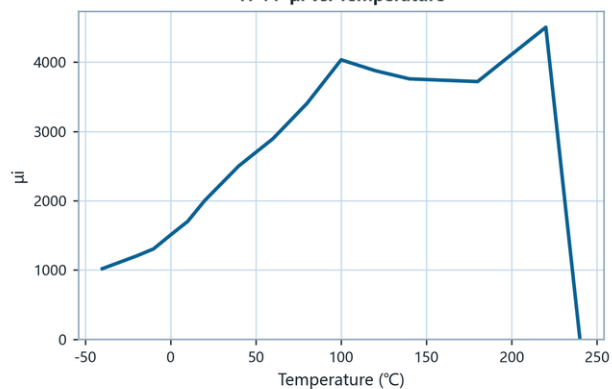
| 频段<br>Range | K        | $\alpha$ | $\beta$ |
|-------------|----------|----------|---------|
| 100 ≤ 500   | 6.64E-08 | 1.95132  | 2.55001 |

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

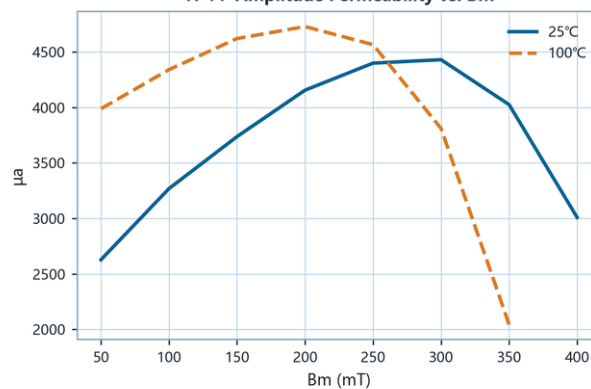
TP44

特性曲线

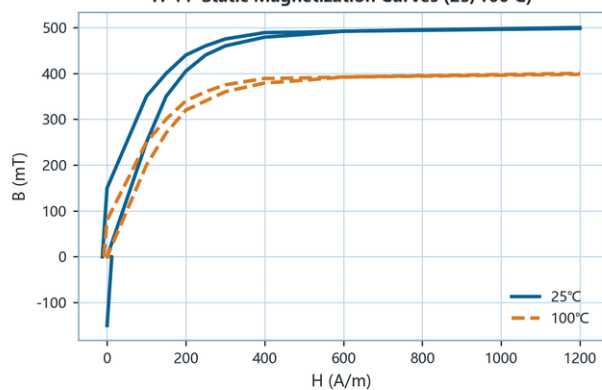
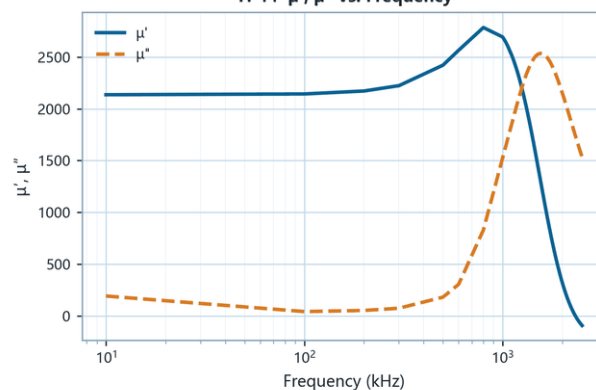
CHARACTERISTIC CURVES

TP44  $\mu_i$  vs. Temperature

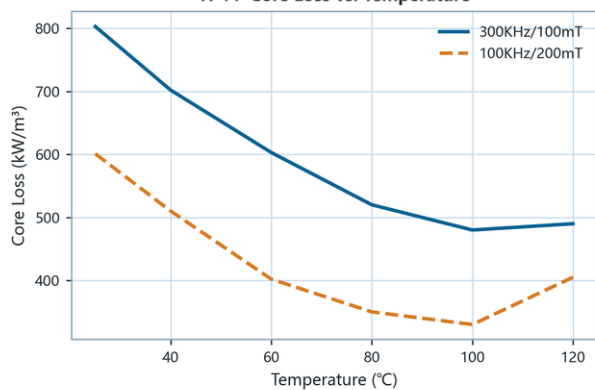
TP44 Amplitude Permeability vs. Bm



TP44 Static Magnetization Curves (25/100°C)

TP44  $\mu'$ ,  $\mu''$  vs. Frequency

TP44 Core Loss vs. Temperature



TP44 Core Loss vs. Flux Density

