

FP1109

High frequency, high current power inductors



SMD Device

Product features

- 11.2 x 11.2 x 9.0mm maximum surface mount package
- Ferrite core material
- High current carrying capacity, low core losses
- Controlled DCR tolerance for sensing circuits
- Inductance range from 205nH to 950nH
- Current range from 11.5 to 69 amps
- Frequency range up to 2MHz

Applications

- Multi-phase regulators
- Voltage Regulator Module (VRM)
- Desktop and server VRMs and EVRDs
- Data networking and storage systems
- Graphics cards and battery power systems
- Point-of-load modules
- DCR sensing

Environmental data

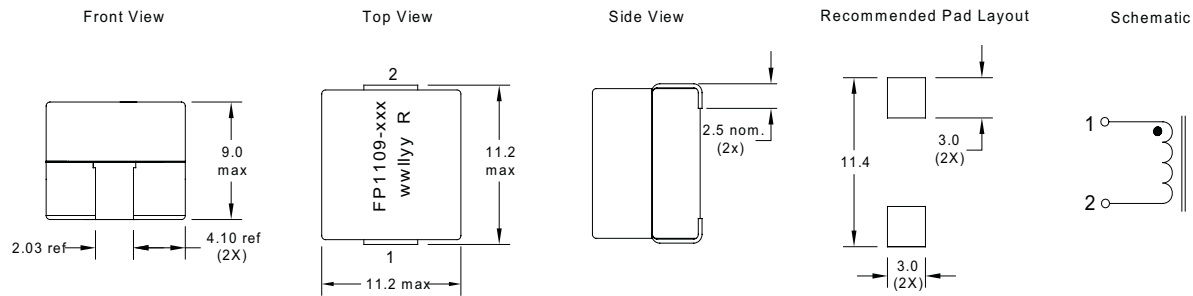
- Storage temperature range (component): -40 °C to +125 °C
- Operating temperature range: -40 °C to +125 °C (ambient plus self-temperature rise)
- Solder reflow temperature: J-STD-020 (latest revision) compliant



| Product Specifications | | | | | | | |
|--------------------------|-----------------------------|----------------------------|--------------------------------------|--|---|-----------------|-----------------------|
| Part Number ⁷ | OCL ¹ ± 20% (nH) | FLL ² Min. (nH) | I _{rms} ³ (Amps) | I _{sat} ¹⁴ @ 25°C (Amps) | I _{sat} ²⁵ @ 125°C (Amps) | DCR (mΩ) @ 20°C | K-factor ⁶ |
| FP1109-R20-R | 205 | 122 | 35 | 69 | 52 | 0.42 ±10% | 233 |
| FP1109-R23-R | 247 | 147 | | 55 | 41 | | 233 |
| FP1109-R27-R | 270 | 160 | | 51 | 38 | | 233 |
| FP1109-R33-R | 311 | 185 | | 44 | 33 | | 233 |
| FP1109-R47-R | 463 | 275 | | 27 | 20 | | 233 |
| FP1109-R58-R | 548 | 325 | | 22.5 | 17 | | 233 |
| FP1109-1R0-R | 950 | 565 | | 11.5 | 8.5 | | 233 |

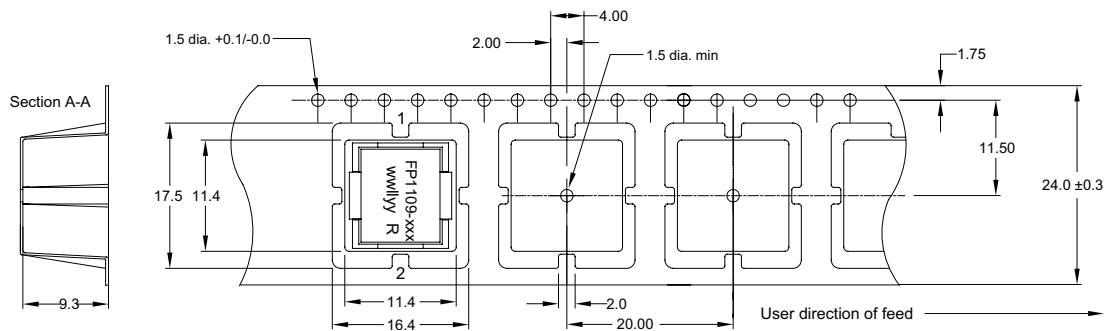
- Open Circuit Inductance (OCL) Test Parameters: 100kHz, 0.10V_{rms}, 0.0A_{dc}
- Full Load Inductance (FLL) Test Parameters: 100kHz, 0.1V_{rms}, I_{sat}¹
- I_{rms}: DC current for an approximate temperature rise of 40°C without core loss. Derating is necessary for AC currents. PCB pad layout, trace thickness and width, air-flow and proximity of other heat generating components will affect the temperature rise. It is recommended the part temperature not exceed 125°C under worst case operating conditions verified in the end application.
- I_{sat}¹: Peak current for approximately 30% rolloff at +25°C.
- I_{sat}²⁵: Peak current for approximately 30% rolloff at +125°C.
- K-factor: Used to determine B_{p-p} for core loss (see graph). B_{p-p} = K * L * ΔI * 10⁻³, B_{p-p}: (Gauss), K: (K-factor from table), L: (inductance in nH), ΔI (peak-to-peak ripple current in amps).
- Part Number Definition: FP1109-xxx-R
 - FP1109 = Product code and size
 - xxx= Inductance value in μH, R = decimal point. If no "R" is present, then third character = # of zeros
 - "-R" suffix = RoHS compliant

Dimensions- mm



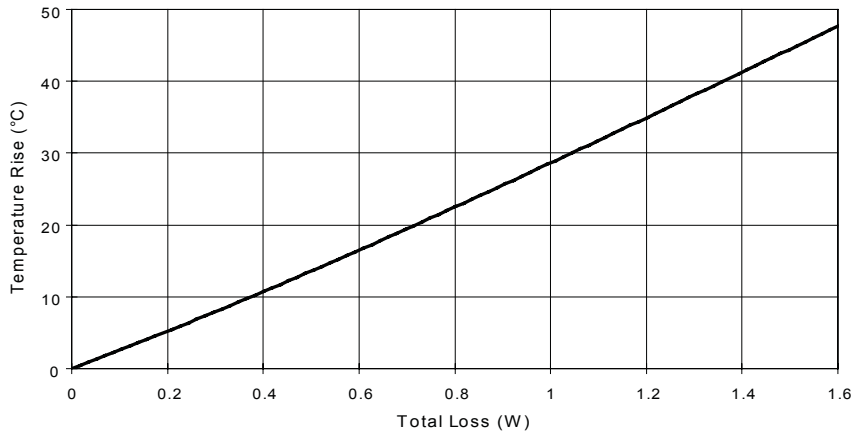
Part Marking: FP1109 xxx = Inductance value in μH. (R = Decimal point). If no "R" is present, then last character is # of zeros wwlllyy = Date code R = Revision level

Packaging information - mm

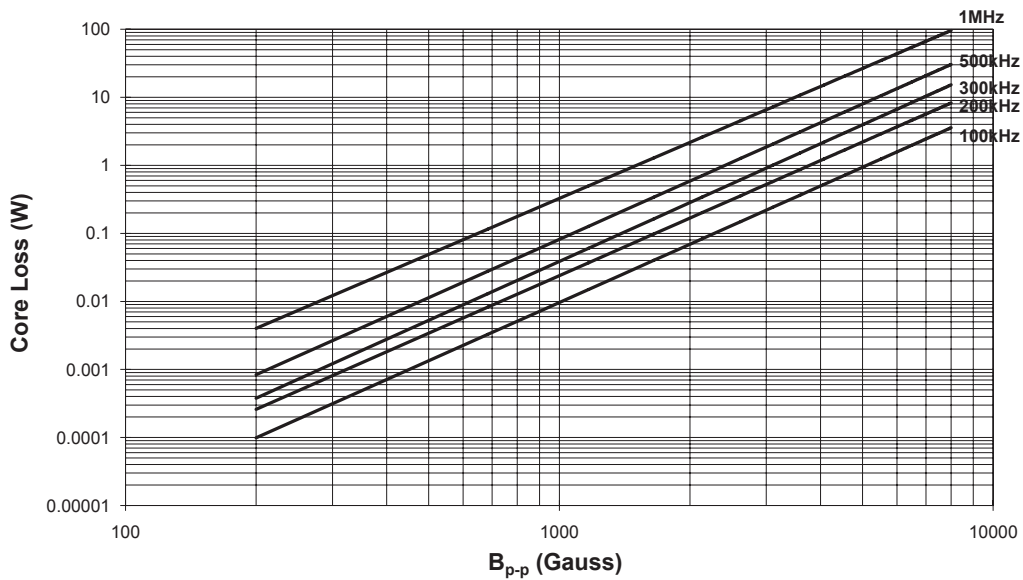


Supplied in tape-and-reel packaging, 350 parts per reel, 13" diameter reel.

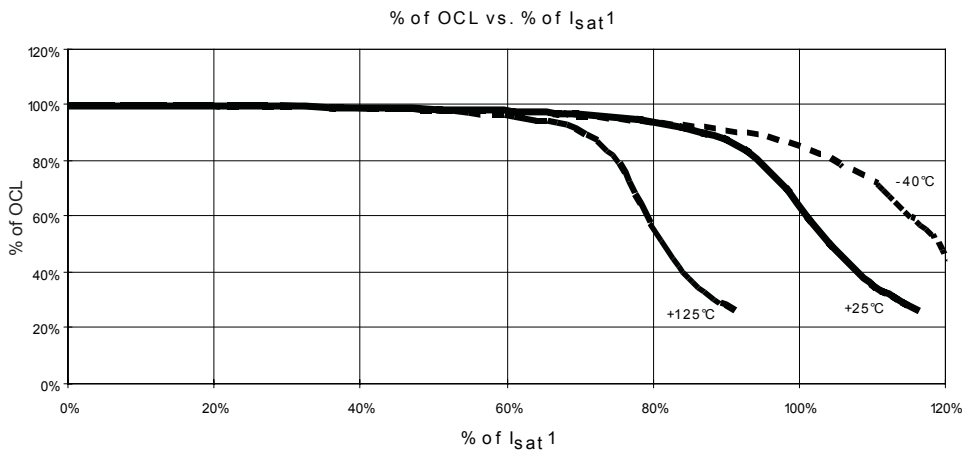
Temperature rise vs total loss



Core loss vs Bp-p



Inductance characteristics



Solder Reflow Profile

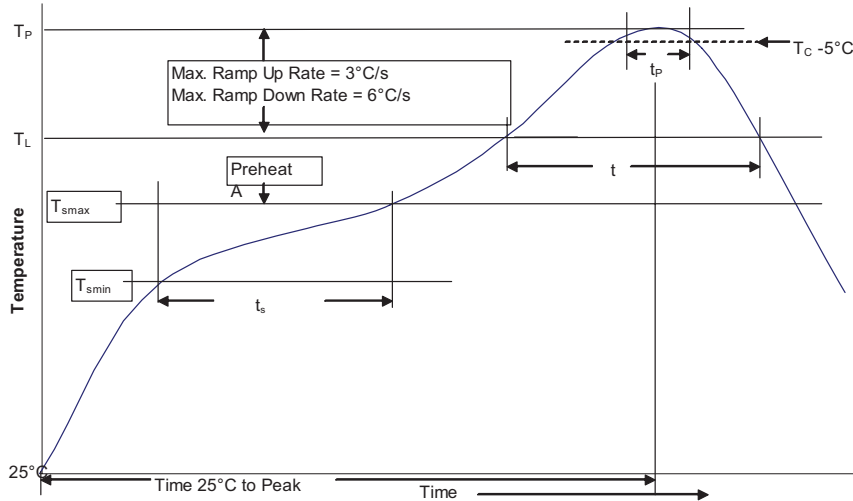


Table 1 - Standard SnPb Solder (T_c)

| Package Thickness | Volume mm^3 <350 | Volume mm^3 ≥ 350 |
|---------------------|---------------------------|---------------------------------|
| <2.5mm | 235°C | 220°C |
| $\geq 2.5\text{mm}$ | 220°C | 220°C |

Table 2 - Lead (Pb) Free Solder (T_c)

| Package Thickness | Volume mm^3 <350 | Volume mm^3 350 - 2000 | Volume mm^3 >2000 |
|-------------------|---------------------------|---------------------------------|----------------------------|
| <1.6mm | 260°C | 260°C | 260°C |
| 1.6 - 2.5mm | 260°C | 250°C | 245°C |
| >2.5mm | 250°C | 245°C | 245°C |

Reference JDEC J-STD-020

| Profile Feature | Standard SnPb Solder | Lead (Pb) Free Solder |
|--|---|-----------------------|
| Preheat and Soak | • Temperature min. (T_{smin}) | 100°C |
| | • Temperature max. (T_{smax}) | 150°C |
| | • Time (T_{smin} to T_{smax}) (t_s) | 60-120 Seconds |
| Average ramp up rate T_{smax} to T_p | 3°C/ Second Max. | 3°C/ Second Max. |
| Liquidous temperature (T_L) | 183°C | 217°C |
| Time at liquidous (t_L) | 60-150 Seconds | 60-150 Seconds |
| Peak package body temperature (T_p)* | Table 1 | Table 2 |
| Time (t_p)** within 5 °C of the specified classification temperature (T_c) | 20 Seconds** | 30 Seconds** |
| Average ramp-down rate (T_p to T_{smax}) | 6°C/ Second Max. | 6°C/ Second Max. |
| Time 25°C to Peak Temperature | 6 Minutes Max. | 8 Minutes Max. |

* Tolerance for peak profile temperature (T_p) is defined as a supplier minimum and a user maximum.

** Tolerance for time at peak profile temperature (t_p) is defined as a supplier minimum and a user maximum.

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