

# 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

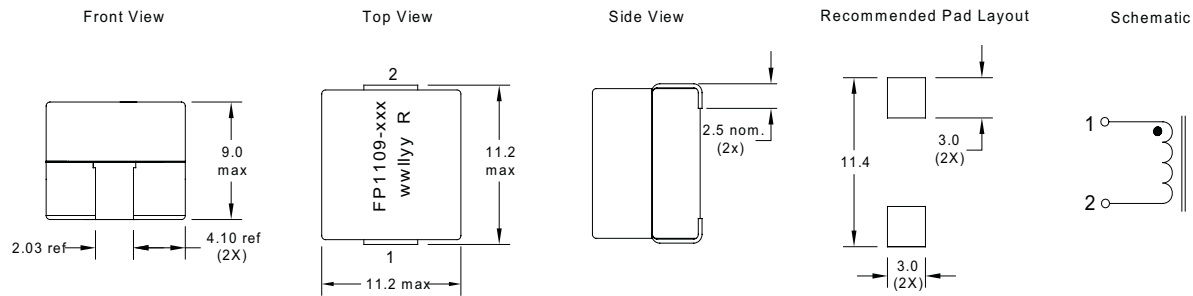
- Storage temperature range (component):  
-40 °C to +125 °C
- Operating temperature range: -40 °C to +125 °C  
(ambient plus self-temperature rise)
- Solder reflow temperature:  
J-STD-020 (latest revision) compliant



Product Specifications							
Part Number <sup>7</sup>	OCL <sup>1</sup> ± 20% (nH)	FLL <sup>2</sup> Min. (nH)	I <sub>rms</sub> <sup>3</sup> (Amps)	I <sub>sat</sub> <sup>14</sup> @ 25°C (Amps)	I <sub>sat</sub> <sup>25</sup> @ 125°C (Amps)	DCR (mΩ) @ 20°C	K-factor <sup>6</sup>
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

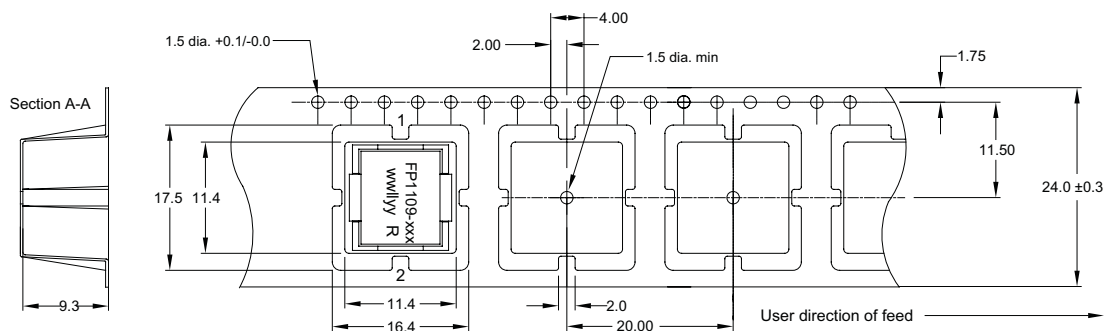
- Open Circuit Inductance (OCL) Test Parameters: 100kHz, 0.10V<sub>rms</sub>, 0.0A<sub>dc</sub>
- Full Load Inductance (FLL) Test Parameters: 100kHz, 0.1V<sub>rms</sub>, I<sub>sat</sub><sup>1</sup>
- I<sub>rms</sub>: DC current for an approximate temperature rise of 40°C without core loss. Derating is 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<sub>sat</sub><sup>1</sup>: Peak current for approximately 30% rolloff at +25°C.
- I<sub>sat</sub><sup>25</sup>: Peak current for approximately 30% rolloff at +125°C.
- K-factor: Used to determine B<sub>p-p</sub> for core loss (see graph). B<sub>p-p</sub> = K \* L \* ΔI \* 10<sup>-3</sup>, B<sub>p-p</sub>: (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



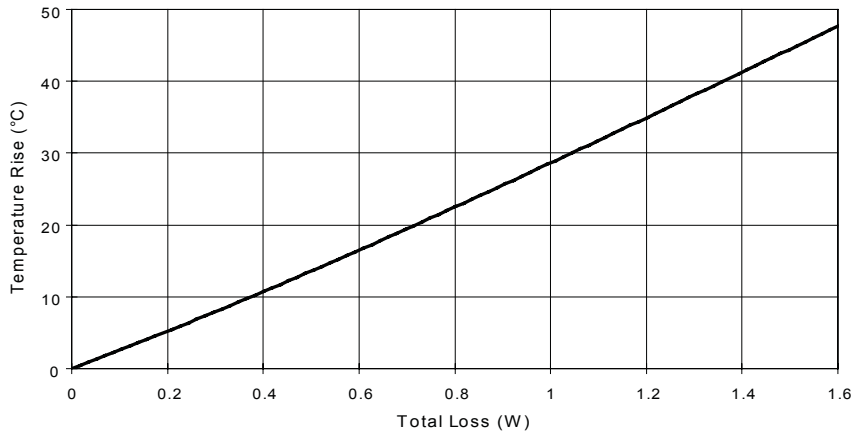
Part Marking: FP1109      xxx = Inductance value in μH. (R = Decimal point). If no "R" is present, then last character is # of zeros      wwlllyy = Date code      R = Revision level

### Packaging information - mm

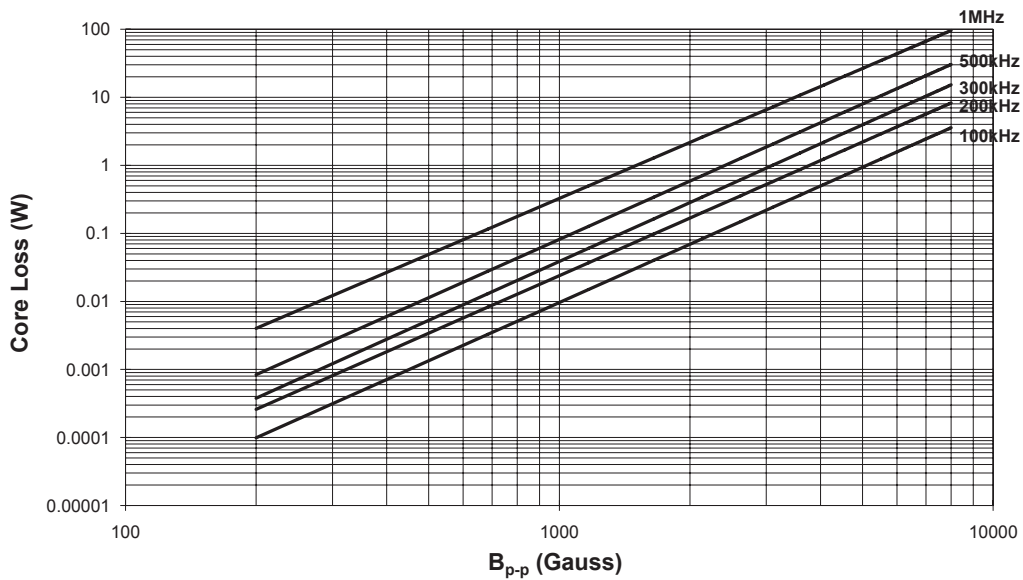


Supplied in tape-and-reel packaging, 350 parts per reel, 13" diameter reel.

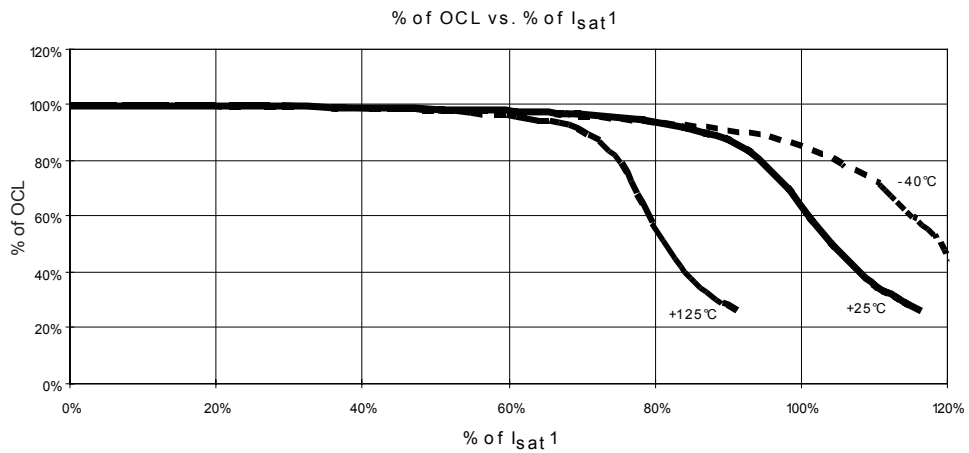
**Temperature rise vs total loss**



**Core loss vs Bp-p**



**Inductance characteristics**



### Solder Reflow Profile

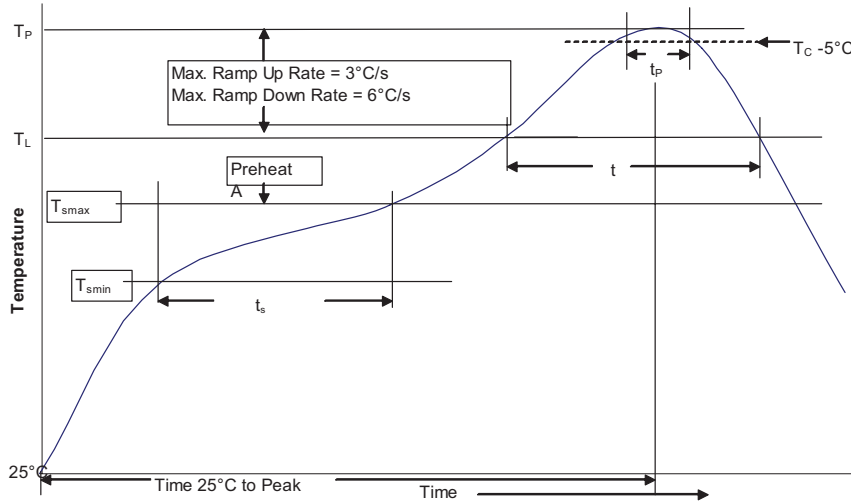


Table 1 - Standard SnPb Solder ( $T_C$ )

Package Thickness	Volume $\text{mm}^3$ <350	Volume $\text{mm}^3$ $\geq 350$
<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 $\text{mm}^3$ <350	Volume $\text{mm}^3$ 350 - 2000	Volume $\text{mm}^3$ >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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