# **FP0507V** High frequency, high current power inductors



#### **Product features**

- Vertical design utilizes less board space
- · High current carrying capacity
- Low core loss
- 5.2 mm x 5.0 mm footprint surface mount package in 6.6 mm height
- Moisture sensitivity level (MSL): 1
- Ferrite core material

#### Applications

- Multi-phase and Vcore regulators
- Voltage Regulator Modules (VRMs) and highpower density VRMs
  - Server and desktop
  - Central processing unit (CPU)
  - Graphics processing unit (GPU)
  - Application specific integrated circuit (ASIC)
- Data networking and storage systems
- Graphics cards and battery power systems
- Point-of-load modules (POL)

#### **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 number⁵	OCL <sup>1</sup> (nH) ±15%	FLL <sup>2</sup> (nH) minimum	I <sup>3</sup> (A)	l <sub>sat</sub> 1 <sup>4</sup> (Å)	l <sub>sat</sub> 2⁵ (Å)	I <sub>sat</sub> 3 <sup>6</sup> (Å)	DCR (mΩ) @ +20 °C ±9%	K-factor <sup>7</sup>
FP0507V1-R050-R	50	36	35	80	70	66	0.47	886
1. Open Circuit Inductance (	OCL) Test parameters: 10	10 kHz. 0.1 Vrms. 0.0 Adc. +	25 °C		4. L <sub>en</sub> 1 : Peak (	current for approximately	v 20% rolloff @ +25 °C	

2. Full Load Inductance (FLL) Test parameters: 100 kHz, 0.1 Vrms, Isat1, +25 °C

3. Imm: DC current for an approximate temperature rise of 40 °C without core loss. Derating is necessary for AC currents. PCB layout, trace thickness and width, air-flow, and proximity of other heat generating components will affect the temperature rise. It is recommended that the temperature of the part not exceed +125 °C underworst case operating conditions verified in the end application.

.1 : Peak current for approximately 20% rolloff

5. Isat2 : Peak current for approximately 20% rolloff @ +100 °C

6. Isat3 : Peak current for approximately 20% rolloff @ +125 °C

7. K-factor: Used to determine Bp-p for core loss (see graph). Bp-p = K \* L \* ΔI \* 10<sup>-3</sup>. Bp-p:(Gauss), K: (K-factor from table), L: (Inductance in nH),  $\Delta$ I (Peak to peak ripple current in Amps).

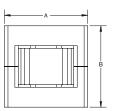
8. Part Number Definition: FP0507Vx-Rxxx-R

FP0507 = Product code and size

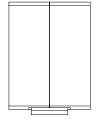
Vx= Version indicator

Rxxx=Inductance value in µH, R=decimal point -R suffix = RoHS compliant

## **Dimensions (mm)**





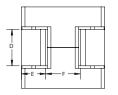


Schematic

Dimension	
A	5.2 maximum
В	5.0 maximum
С	6.6 maximum
D	2.1 nominal
E	1.4 nominal
F	2.0 nominal
G	0.15 minimum

Recommended pad layout

5.50



Part marking: 0507Vx=Version indicator Rxxx= inductance value in uH, R=decimal point, xxxx= lot

- 1.85 -

code

All soldering surfaces to be coplanar within 0.1 millimeters

Tolerances are +/- 0.15 millimeters unless stated otherwise

Pad layout tolerances are +/-0.1 millimeters unless stated otherwise

DCR is measured from point "a" to point "b"

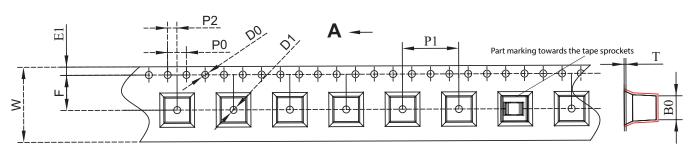
Do not route traces or vias underneath the inductor

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# Packaging information (mm)

Drawing not to scale Supplied in tape and reel packaging, 850 parts per 13" diameter reel

User Direction of Unreeling \_\_\_\_\_

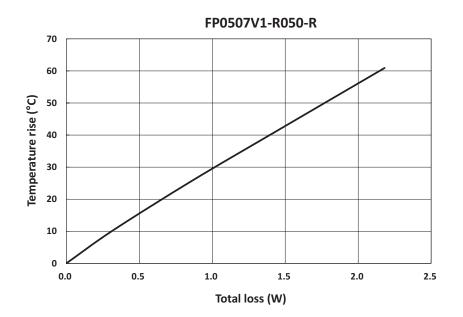


W ±0.3	16.00
F±0.1	7.50
E1±0.10	1.75
P0±0.10	4.00
P1±0.1	12.00
P2±0.1	2.00
D0+0.10/-0	1.50
D1+0.10/-0	1.50
A0	5.2±0.10
B0	5.1±0.10
Ко	6.8 ±0.10
Т	0.4 ±0.05

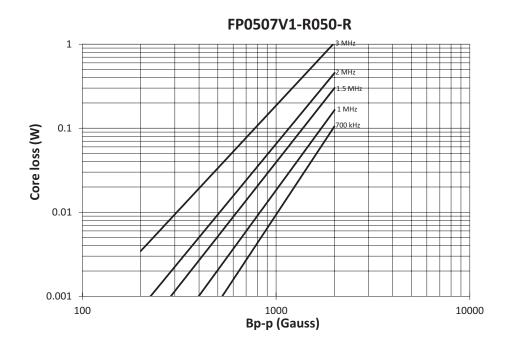
Α ---



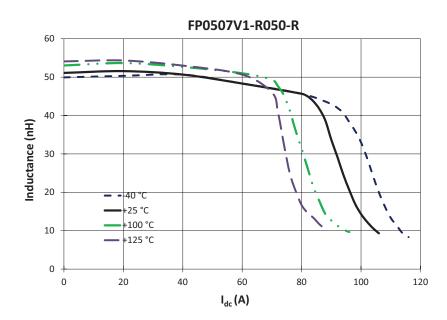
# Temperature rise vs. total loss



# Core loss vs Bp-p

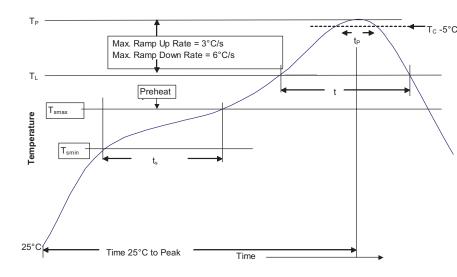


#### **Inductance characteristics**



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## Solder reflow profile



#### Table 1 - Standard SnPb solder (T<sub>c</sub>)

C Package Thickness	Volume mm3 <350	Volume mm3 ≥350
<2.5 mm)	235 °C	220 °C
≥2.5 mm	220 °C	220 °C

Table 2 - Lead (Pb) free solder (T<sub>c</sub>)

Package thickness	Volume mm <sup>3</sup> <350	Volume mm <sup>3</sup> 350 - 2000	Volume mm <sup>3</sup> >2000
<1.6 mm	260 °C	260 °C	260 °C
1.6 – 2.5 mm	260 °C	250 °C	245 °C
>2.5 mm	250 °C	245 °C	245 °C

#### **Reference JDEC J-STD-020**

Powerina Business Worldwide

Profile feature	Standard SnPb solder	Lead (Pb) free solder	
Preheat and soak • Temperature min. (T <sub>smin</sub> )	100 °C	150 °C	
• Temperature max. (T <sub>smax</sub> )	150 °C	200 °C	
• Time (T <sub>smin</sub> to T <sub>smax</sub> ) (t <sub>s</sub> )	60-120 seconds	60-120 seconds	
Average ramp up rate T <sub>smax</sub> to T <sub>p</sub>	3 °C/ second max.	3 °C/ second max.	
Liquidous temperature (TL) Time at liquidous (tL)	183 °C 60-150 seconds	217 °C 60-150 seconds	
Peak package body temperature (Tp)*	Table 1	Table 2	
Time $(t_p)^{**}$ within 5 °C of the specified classification temperature (T <sub>C</sub> )	20 seconds**	30 seconds**	
Average ramp-down rate (T <sub>p</sub> to T <sub>smax</sub> )	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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Electronics Division 1000 Eaton Boulevard Cleveland, OH 44122 United States www.eaton.com/electronics

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