

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 high-power 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



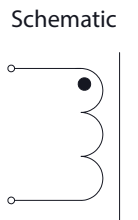
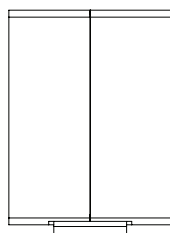
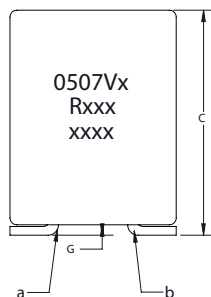
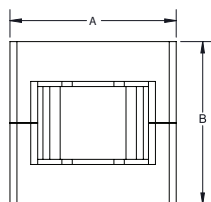
Product specifications

Part number ⁵	OCL ¹ (nH) ±15%	FLL ² (nH) minimum	I _{rms} ³ (A)	I _{sat} ¹ ⁴ (A)	I _{pk} ² ⁵ (A)	I _{pk} ³ ⁶ (A)	DCR (mΩ) @ +20 °C ±9%	K-factor ⁷
FP0507V1-R050-R	50	36	35	80	70	66	0.47	886

- Open Circuit Inductance (OCL) Test parameters: 100 kHz, 0.1 Vrms, 0.0 Adc, +25 °C
- Full Load Inductance (FLL) Test parameters: 100 kHz, 0.1 Vrms, I_{sat}¹, +25 °C
- I_{rms}: 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 under worst case operating conditions verified in the end application.

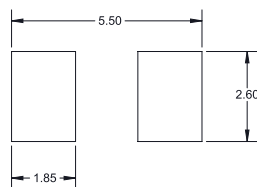
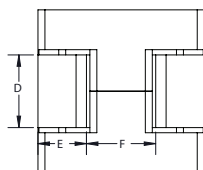
- I_{sat}¹: Peak current for approximately 20% rolloff @ +25 °C
- I_{sat}²: Peak current for approximately 20% rolloff @ +100 °C
- I_{sat}³: Peak current for approximately 20% rolloff @ +125 °C
- K-factor: Used to determine Bp-p for core loss (see graph). Bp-p = K * L * ΔI * 10⁻³. Bp-p:(Gauss), K: (K-factor from table), L: (Inductance in nH), ΔI (Peak to peak ripple current in Amps).
- 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)



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

Recommended pad layout



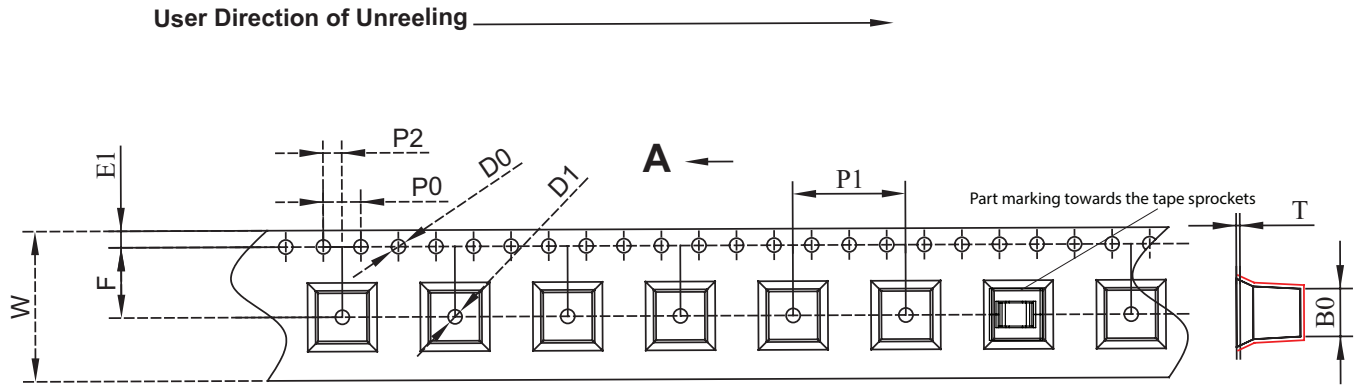
Part marking: 0507Vx=Version indicator Rxxx= inductance value in μH, R=decimal point, xxxx= lot code

- 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

Packaging information (mm)

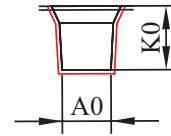
Drawing not to scale

Supplied in tape and reel packaging, 850 parts per 13" diameter reel

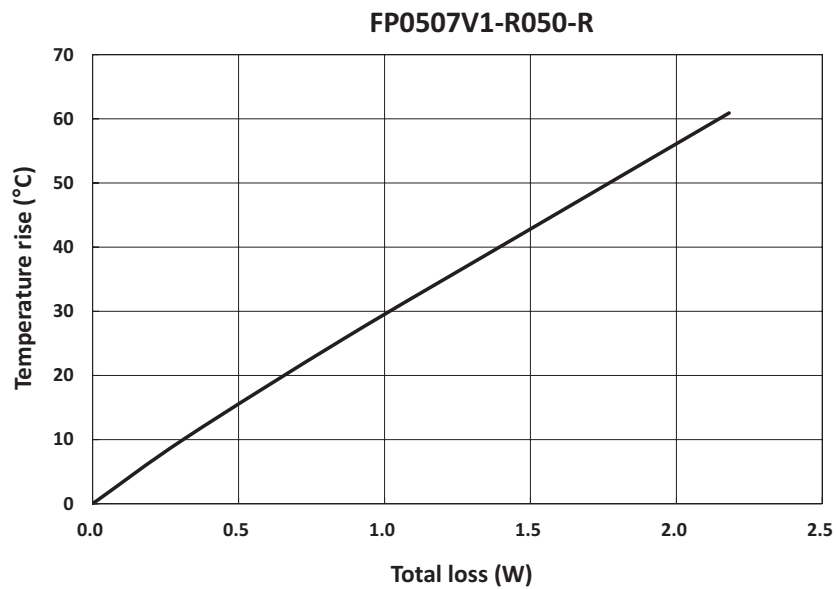


W ±0.3	16.00
F ±0.1	7.50
E1 ±0.10	1.75
P0 ±0.10	4.00
P1 ±0.1	12.00
P2 ±0.1	2.00
D0 +0.10/-0	1.50
D1 +0.10/-0	1.50
A0	5.2 ±0.10
B0	5.1 ±0.10
Ko	6.8 ±0.10
T	0.4 ±0.05

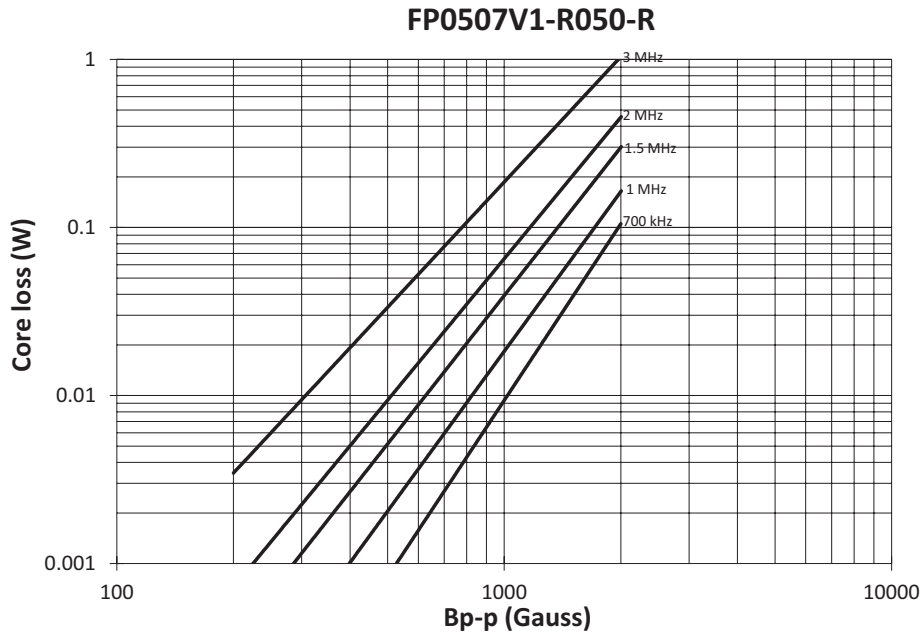
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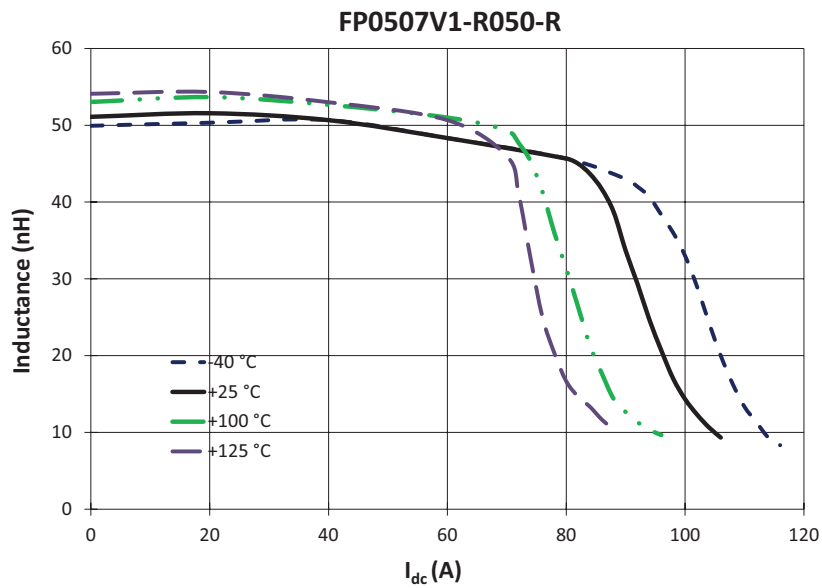
Temperature rise vs. total loss



Core loss vs Bp-p



Inductance characteristics



Solder reflow profile

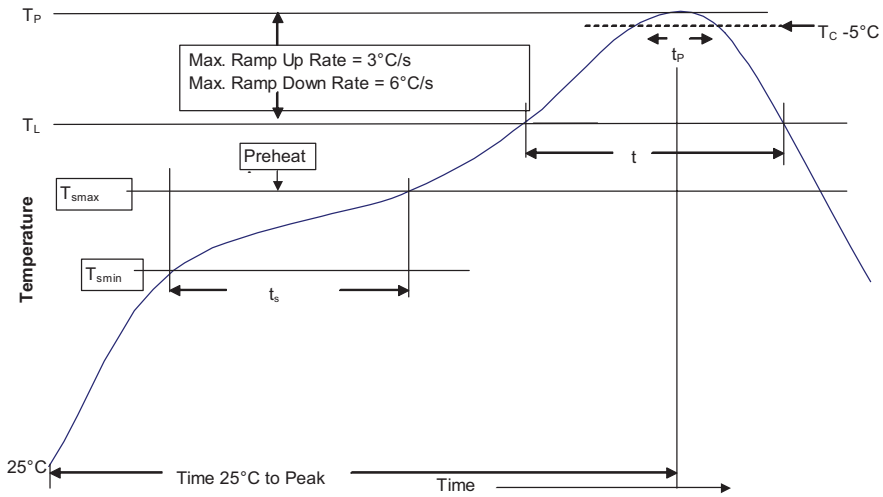


Table 1 - Standard SnPb solder (T_C)

Package Thickness	Volume mm ³ <350	Volume mm ³ ≥350
<2.5 mm	235 °C	220 °C
≥2.5 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
<1.6 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

Profile feature	Standard SnPb solder	Lead (Pb) free solder
Preheat and soak		
• Temperature min. (T_{smin})	100 °C	150 °C
• Temperature max. (T_{smax})	150 °C	200 °C
• Time (T_{smin} to T_{smax}) (t_s)	60-120 seconds	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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