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

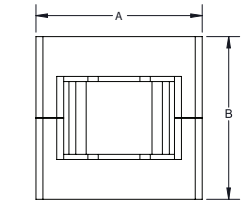
Powering Business Worldwide

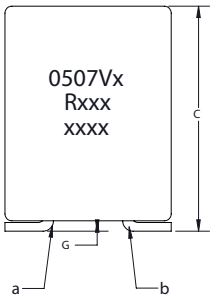
Product specifications

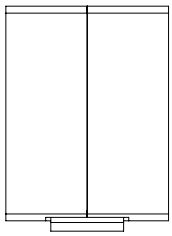
Part number[5]	OCL[1] (nH) ±15%	FLL[2] (nH) minimum	I_{rms}[3] (A)	$I_{sat}1$[4] (A)	$I_{sat}2$[5] (A)	$I_{sat}3$[6] (A)	DCR (mΩ) @ +20 °C ±9%	K-factor[7]
FP0507V1-R050-R	50	36	35	80	70	66	0.47	886

1. Open Circuit Inductance (OCL) Test parameters: 100 kHz, 0.1 Vrms, 0.0 Adc, +25 °C
2. Full Load Inductance (FLL) Test parameters: 100 kHz, 0.1 Vrms, $I_{sat}1$, +25 °C
3. 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 underworst case operating conditions verified in the end application.
4. $I_{sat}1$: Peak current for approximately 20% rolloff @ +25 °C
5. $I_{sat}2$: Peak current for approximately 20% rolloff @ +100 °C
6. $I_{sat}3$: 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^{-3}. Bp-p:(Gauss), K: (K-factor from table), L: (Inductance in nH), ΔI (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

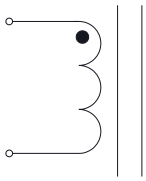
Dimensions (mm)



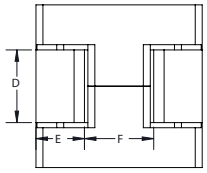




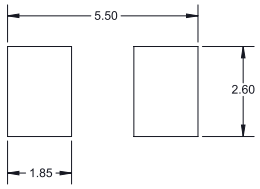
Schematic



Dimension	
A	5.2 maximum
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

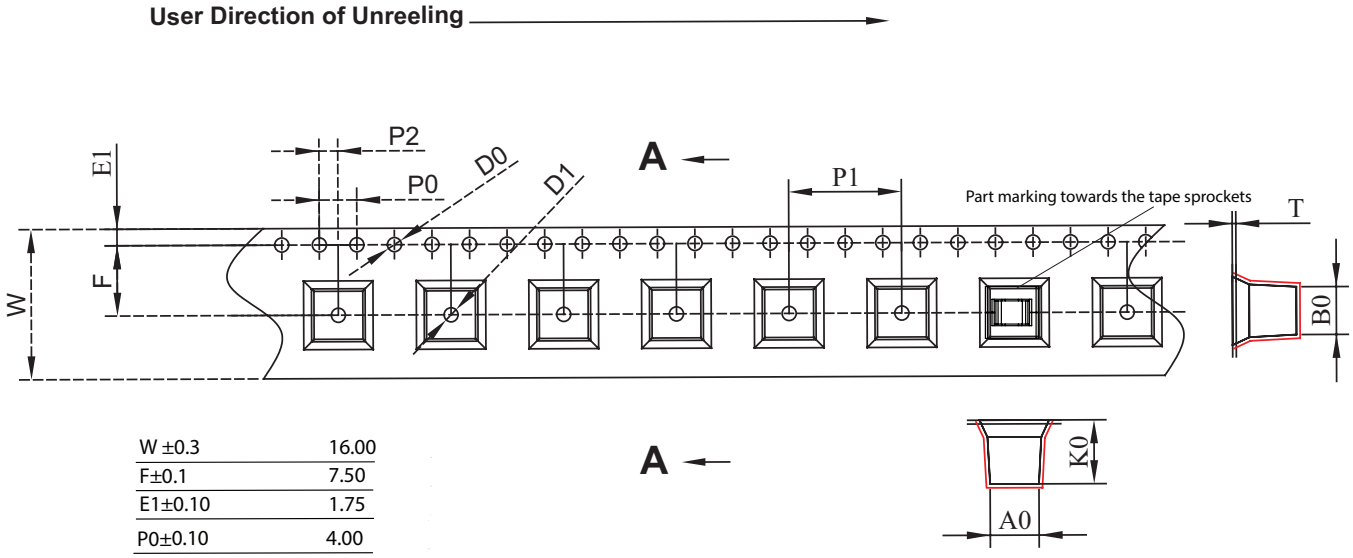


Part marking: 0507Vx=Version indicator Rxxx= inductance value in uH, R=decimal point, xxxx= lot code
All soldering surfaces to be coplanar within 0.1 millimeters
Tolerances are +/- 0.15 millimeters unless stated otherwise
Pad layout tolerances are +/-0.1 millimeters unless stated otherwise
DCR is measured from point “a” to point “b”
Do not route traces or vias underneath the inductor

Packaging information (mm)

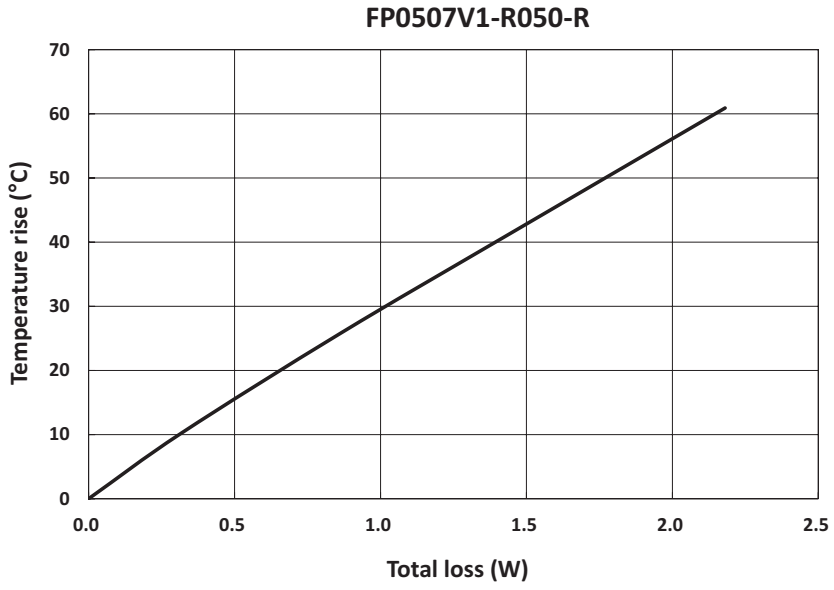
Drawing not to scale

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

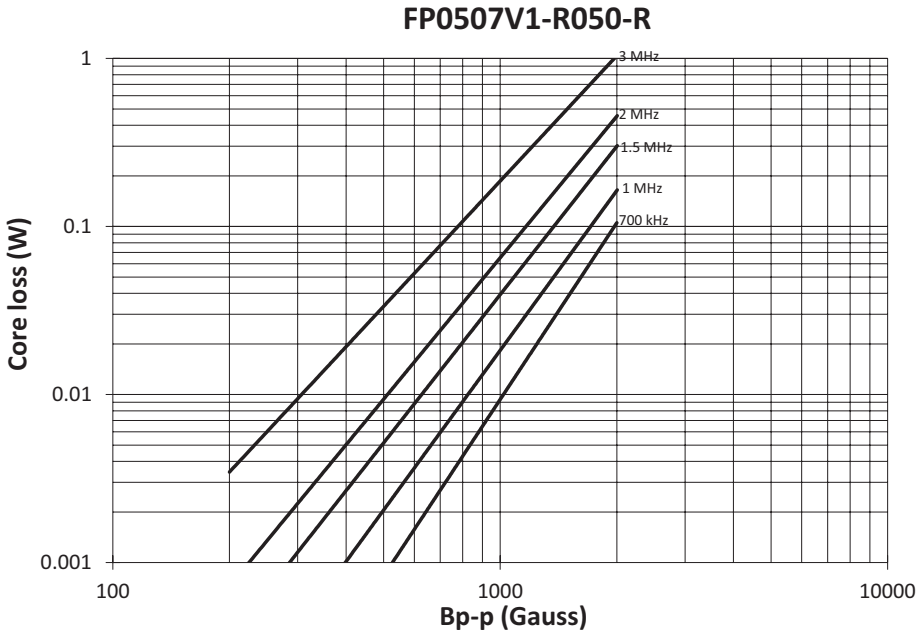


W ±0.3	16.00
F±0.1	7.50
E1±0.10	1.75
P0±0.10	4.00
P1±0.1	12.00
P2±0.1	2.00
D0+0.10/-0	1.50
D1+0.10/-0	1.50
A0	5.2±0.10
B0	5.1±0.10
Ko	6.8 ±0.10
T	0.4 ±0.05

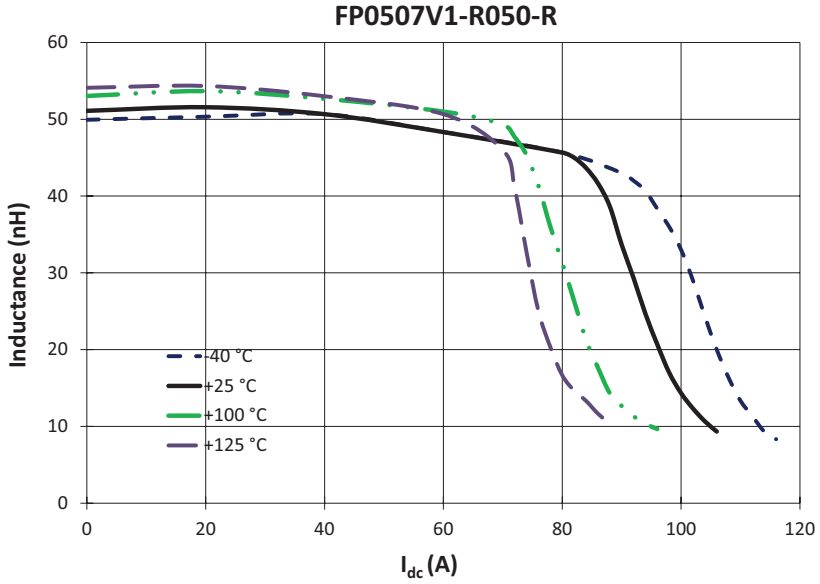
Temperature rise vs. total loss



Core loss vs Bp-p



Inductance characteristics



Solder reflow profile

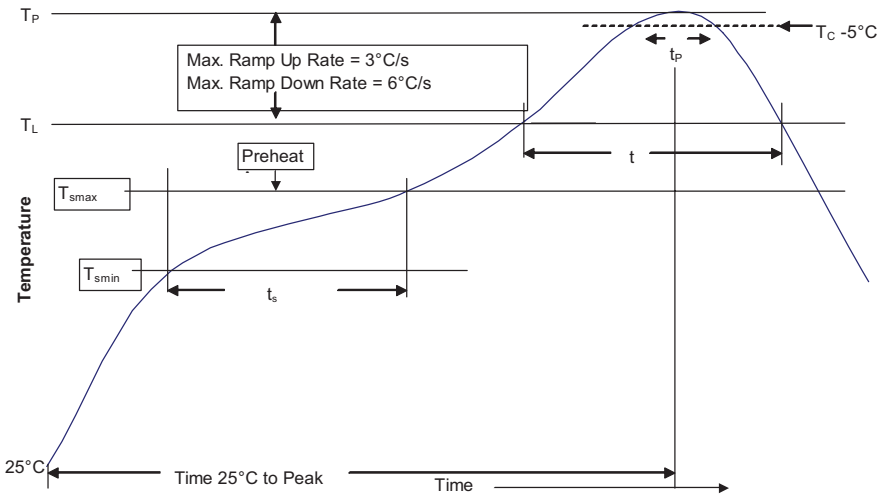


Table 1 - Standard SnPb solder (T_C)

Package Thickness	Volume 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_C)

Package thickness	Volume mm³ <350	Volume mm³ 350 - 2000	Volume mm³ >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) Time at liquidous (t_L)		183 °C 60-150 seconds	217 °C 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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Electronics Division
1000 Eaton Boulevard
Cleveland, OH 44122
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