

FP0910V3

High frequency, high current power inductors



Product features

- Vertical design utilizes less board space
- High current carrying capacity
- Tight toleranced DCR for sensing circuits
- Inductance Range from 150 nH to 470 nH
- Current range 17 A to 68 A
- 9.0 mm x 5.0 mm footprint surface mount package in 9.5 mm height
- Moisture sensitivity level (MSL): 1
- Ferrite core material
- Weight: 2.48 grams typical
- Termination finish: matte tin over nickel

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
- DCR sensing circuits

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



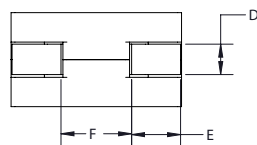
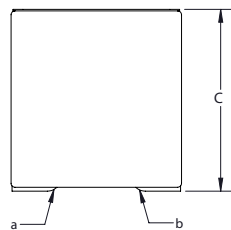
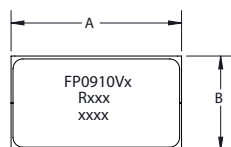
Product specifications

Part number ⁵	OCL ¹ (nH) ±10%	FLL ² (nH) minimum	I _{DC} ³ (A)	I _{pk1} ⁴ (A)	I _{pk2} ⁵ (A)	I _{pk3} ⁶ (A)	DCR (mΩ) @ +20 °C ±5%	K-factor ⁷
FP0910V3-R150-R	150	105	44	68	58	54	0.40	340
FP0910V3-R330-R	330	231	44	23	19	17	0.40	340
FP0910V3-R470-R	470	329	44	17	14	13	0.40	340

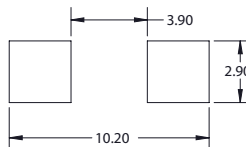
- Open Circuit Inductance (OCL) Test parameters: 100 kHz, 0.1 Vrms, 0.0 Adc, +25 °C
- Full Load Inductance (FLL) Test parameters: 100 kHz, 0.1 Vrms, I_{DC}¹, +25 °C
- I_{DC}: DC current for an approximate temperature rise of 40 °C without core loss. Derating is necessary for AC currents. PCB layout, 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.

- I_{pk1}: Peak current for approximately 20% rolloff @ +25 °C
- I_{pk2}: Peak current for approximately 20% rolloff @ +100 °C
- I_{pk3}: 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: FP0910Vx-Rxxx-R
FP0910 = Product code and size
Vx= Version indicator
Rxxx=Inductance value in μH, R=decimal point
-R suffix = RoHS compliant

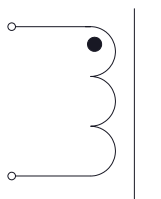
Dimensions- mm



Recommended pad layout



Schematic



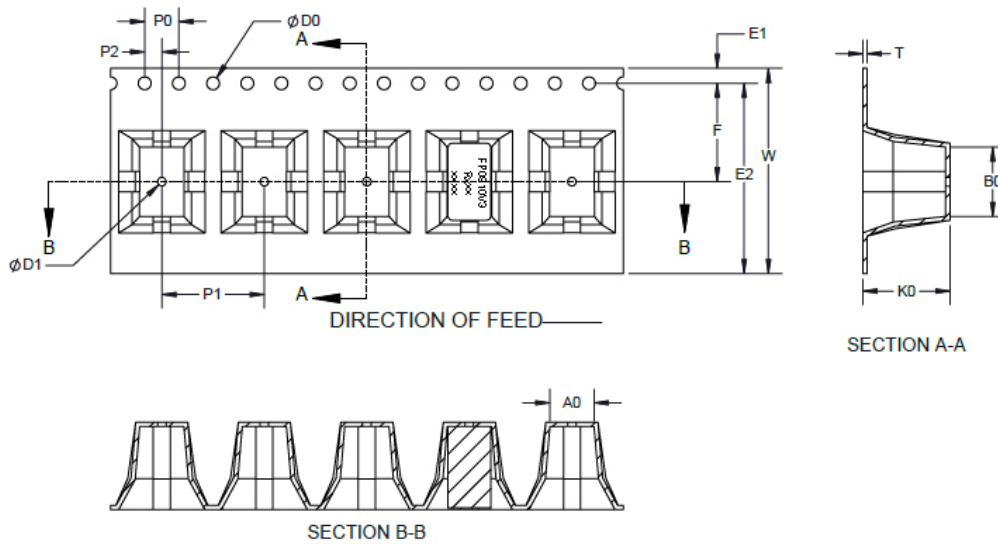
Dimension

A	9.0 maximum
B	5.0 maximum
C	9.5 maximum
D	1.55 nominal
E	2.5 nominal
F	4.0 nominal

Part marking: FP0910=Product code and size, Vx=Version indicator, Rxxx= inductance value in uH, R=decimal point, xxx= lot code
Tolerances are ±0.15 millimeters unless stated otherwise
All soldering surfaces to be coplanar within 0.1 millimeters
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

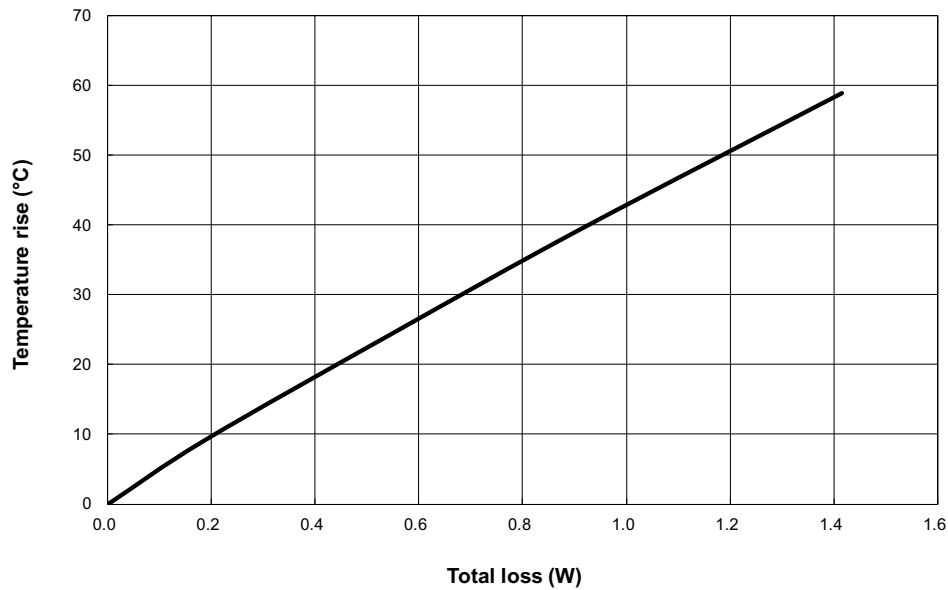
Packaging information- mm

Supplied in tape and reel packaging, 500 parts per 13" diameter reel

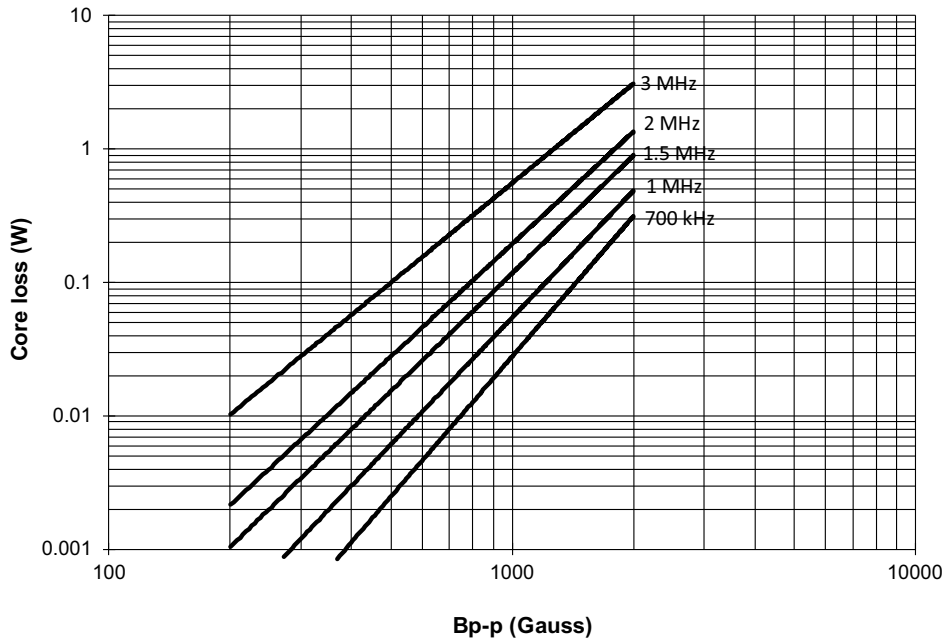


W ± 0.3	24.00
F ± 0.1	11.50
E1 ± 0.10	1.75
E2 min	22.25
P0 ± 0.10	4.00
P1 ± 0.10	12.00
P2 ± 0.1	2.00
D0 +0.10/-0	1.50
D1 min	1.50
A0	5.2 ± 0.10
B0	9.2 ± 0.10
K0	9.7 ± 0.10
T ± 0.05	0.5

Temperature rise vs. total loss

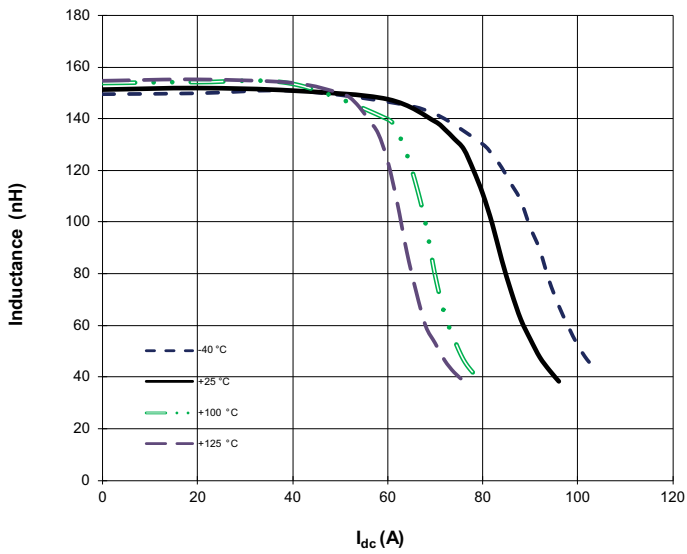


Core loss vs Bp-p

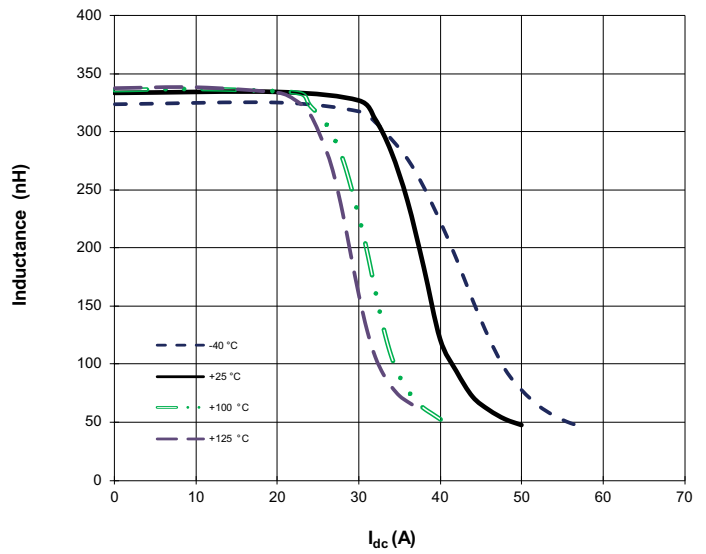


Inductance characteristics

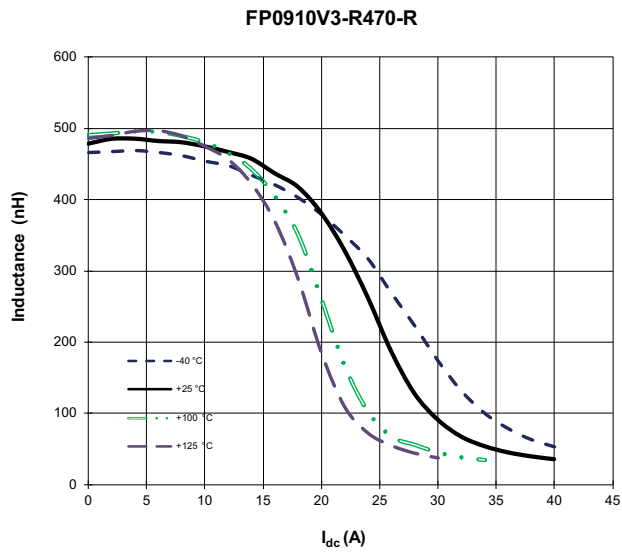
FP0910V3-R150-R



FP0910V3-R330-R



Inductance characteristics



Solder reflow profile

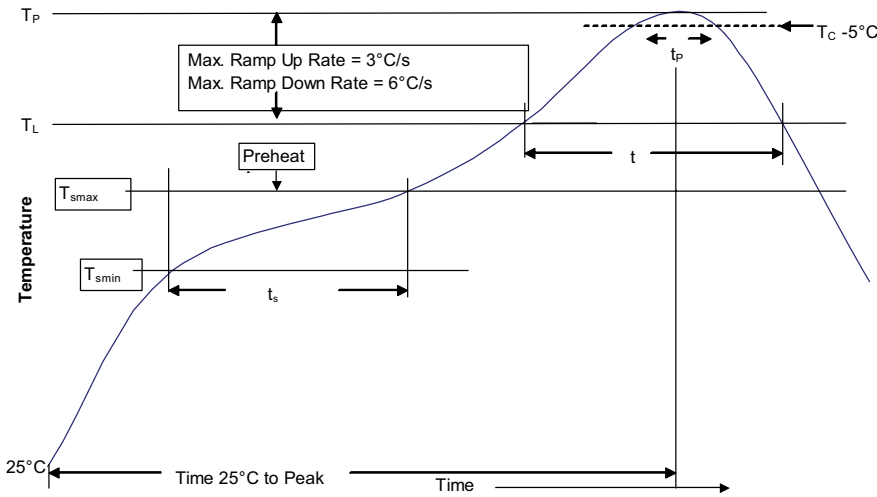


Table 1 - Standard SnPb solder (T_c)

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 J-STD-020

Profile feature	Standard SnPb solder	Lead (Pb) free solder
Preheat and soak		
• Temperature min. (T _{smmin})	100 °C	150 °C
• Temperature max. (T _{smmax})	150 °C	200 °C
• Time (T _{smmin} to T _{smmax}) (t _s)	60-120 seconds	60-120 seconds
Average ramp up rate T _{smmax} 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 _{smmax})	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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