

# FP1010V14

## High frequency, high current power inductors



### Product features

- Vertical design utilizes less board space
- High current carrying capacity
- Tight tolerance DCR for sensing circuits
- Operating frequency up to 3 MHz
- Inductance range from 70 nH to 100 nH
- Current range 68 A to 150 A
- 9.6 mm x 6.4 mm footprint surface mount package in 10 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
- DCR sensing circuits

### Environmental compliance and general specifications

- 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>8</sup>	OCL <sup>1</sup> (nH) ±10%	FLL <sup>2</sup> (nH) minimum	I <sub>sat</sub> <sup>3</sup> (A)	I <sub>sat</sub> <sup>14</sup> (A)	I <sub>sat</sub> <sup>25</sup> (A)	I <sub>sat</sub> <sup>36</sup> (A)	DCR (mΩ) @ +20 °C ±5%	K-factor <sup>7</sup>
FP1010V14-R070-R	70	55	68	150+	127	120	0.15	339
FP1010V14-R090-R	90	65	68	134	114	107	0.15	339
FP1010V14-R100-R	100	72	68	124	102	94	0.15	339

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<sub>sat</sub>1, +25 °C

3. I<sub>sat</sub>: 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.

4. I<sub>sat</sub>1 : Peak current for approximately 20% rolloff @ +25 °C

5. I<sub>sat</sub>2 : Peak current for approximately 20% rolloff @ +100 °C

6. I<sub>sat</sub>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<sup>-3</sup>. Bp-p(Gauss), K: (K-factor from table), L: (Inductance in nH), ΔI (Peak to peak ripple current in Amps).

8. Part number definition: FP1010Vx-Rxxx-R

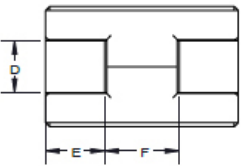
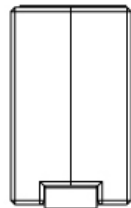
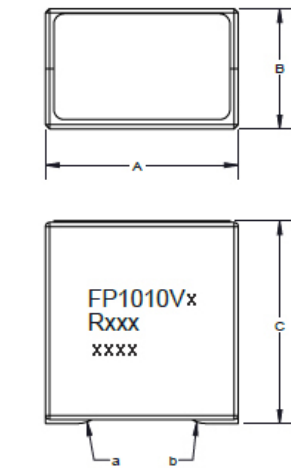
FP1010 = Product code and size

Vx= Version indicator

Rxxx=Inductance value in μH, R=decimal point

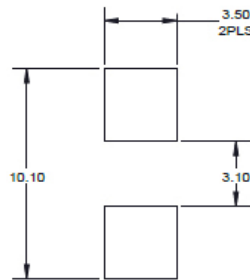
-R suffix = RoHS compliant

## Dimensions-mm

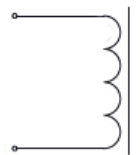


Dimension	FP1010V14
A	9.6 maximum
B	6.4 maximum
C	10 maximum
D	2.5 reference
E	2.9 reference
F	3.6 reference

## Recommended pad layout



## Schematic



Part marking: FP1010=Product code and size, Vx=Version indicator, Rxxx= inductance value in uH, R=decimal point, xxxx= lot code

Tolerances are ±0.15 millimeters unless stated otherwise

All soldering surfaces to be coplanar within 0.1 millimeters

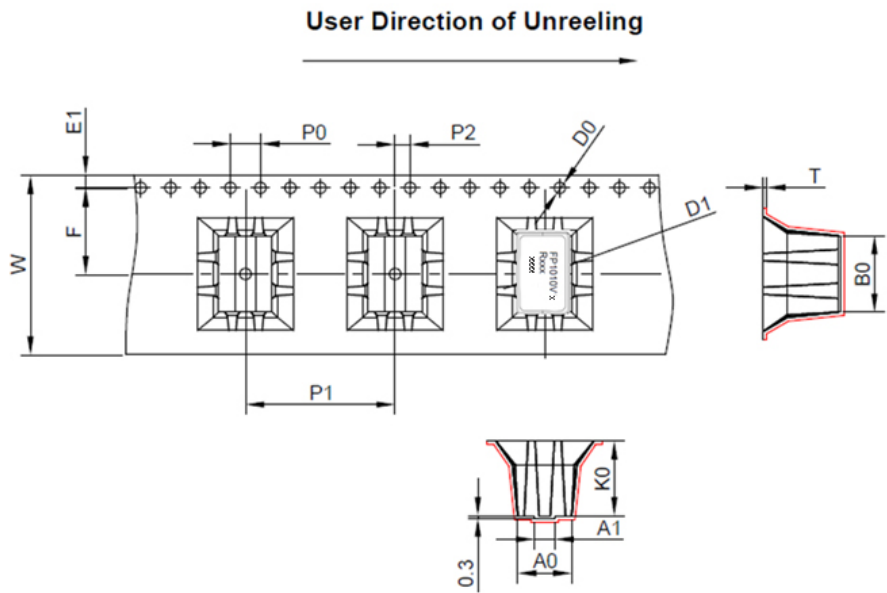
Pad layout tolerances are ±0.1 millimeters unless stated otherwise

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

Traces or vias underneath the inductor is not recommended

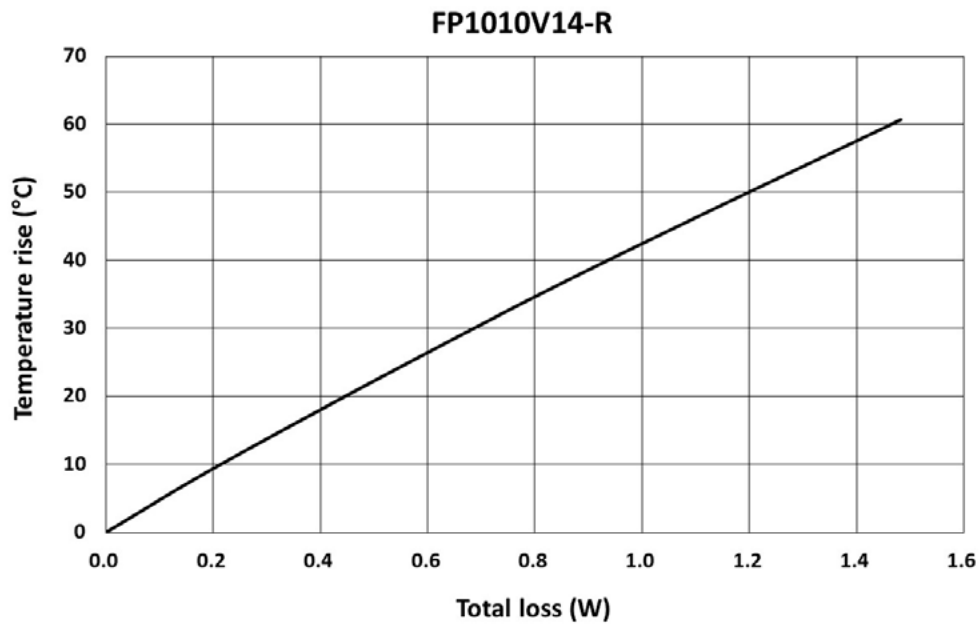
Packaging information- mm

Supplied in tape and reel packaging, 300 parts per 13" diameter reel (EIA-481 compliant)

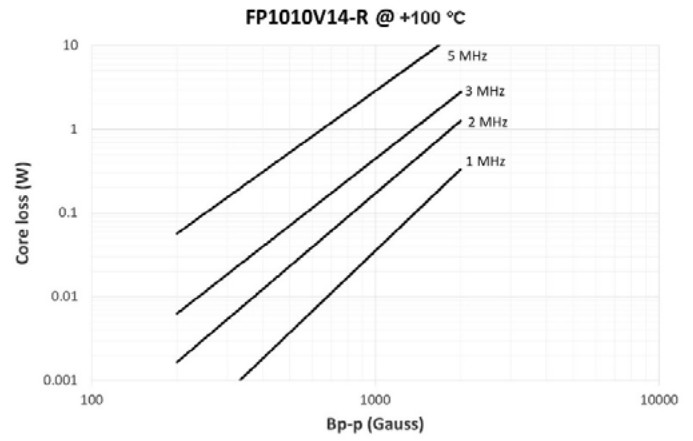
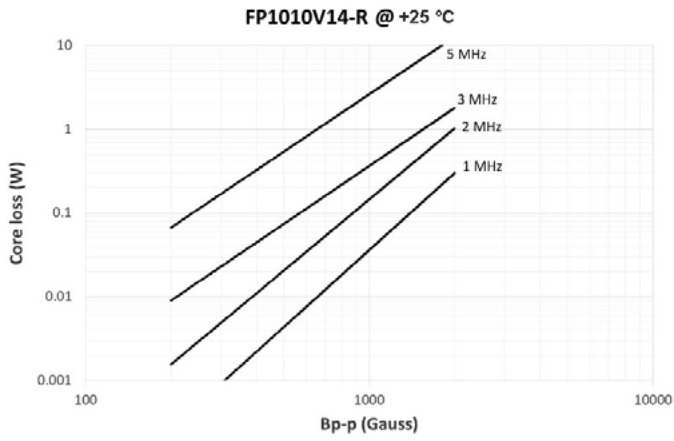


W ±0.3	24.00
F ±0.1	11.50
E1 ±0.10	1.75
P0 ±0.10	4.00
P1 ±0.10	20.00
P2 ±0.1	2.00
D0 +0.10/-0	1.50
D1 +min	1.50
A0	6.6 ±0.10
A1	3.1 ±0.20
B0	9.8 ±0.10
K0	10.3 ±0.10
T ±0.05	0.5

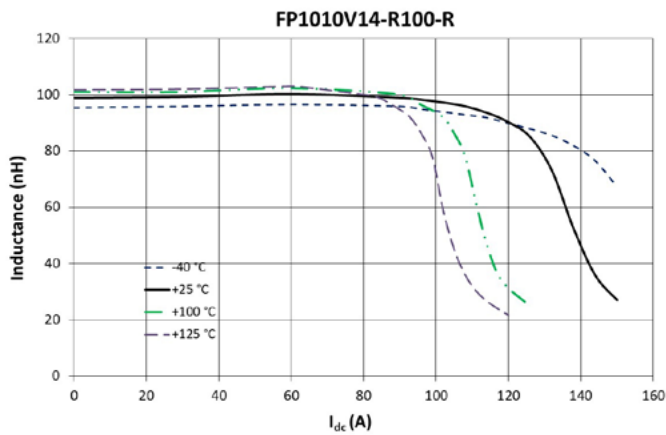
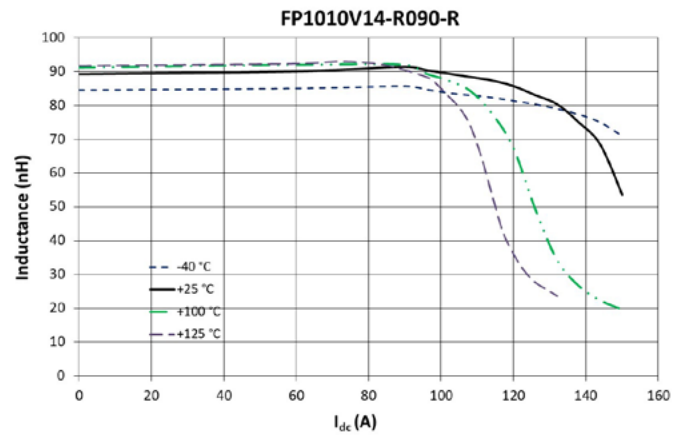
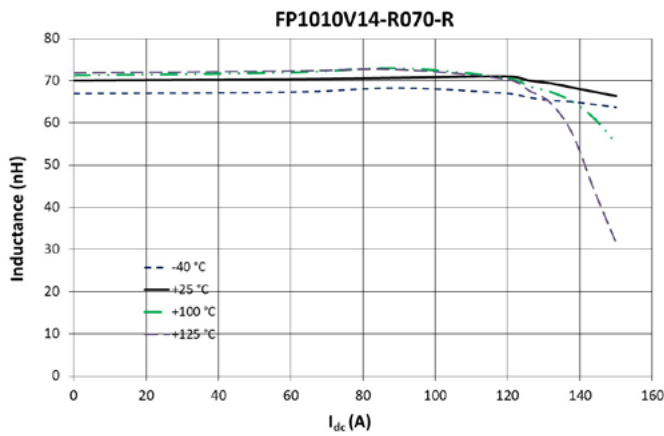
Temperature rise vs. total loss



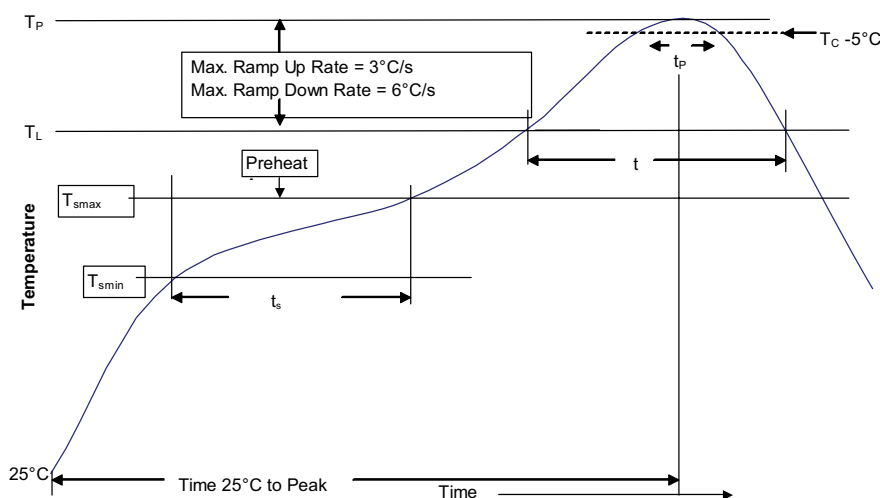
## Core loss vs Bp-p



## Inductance characteristics



## Solder reflow profile



**Table 1 - Standard SnPb solder ( $T_c$ )**

Package thickness	Volume mm <sup>3</sup> <350	Volume mm <sup>3</sup> ≥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 <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 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
Ramp up rate $T_L$ to $T_p$	3 °C/ second max.	3 °C/ second max.
Liquidous temperature ( $T_L$ )	183 °C	217 °C
Time ( $t_L$ ) maintained above $T_L$	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*
Ramp-down rate ( $T_p$ to $T_L$ )	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.

Life Support Policy: Eaton does not authorize the use of any of its products for use in life support devices or systems without the express written approval of an officer of the Company. Life support systems are devices which support or sustain life, and whose failure to perform, when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in significant injury to the user.

Eaton reserves the right, without notice, to change design or construction of any products and to discontinue or limit distribution of any products. Eaton also reserves the right to change or update, without notice, any technical information contained in this bulletin.

**Eaton**  
**Electronics Division**  
1000 Eaton Boulevard  
Cleveland, OH 44122  
United States  
Eaton.com/electronics

© 2020 Eaton  
All Rights Reserved  
Printed in USA  
Publication No. 11234 BU-MC20213  
December 2020

Eaton is a registered trademark.

All other trademarks are property of their respective owners.

Follow us on social media to get the latest product and support information.

