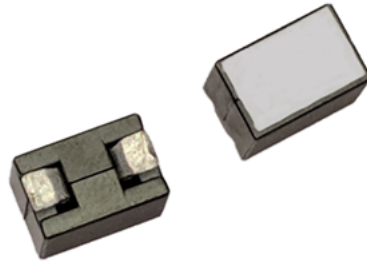


# FP1010V

## High frequency, high current power inductors



### Product features

- Vertical design utilizes less board space
- Tight tolerance DCR for sensing circuits
- High current carrying capacity
- Low core loss
- Magnetically shielded
- Inductance range from 100 nH to 470 nH
- Current range from 30 A to 117 A
- 9.6 mm x 6.4 mm and 10 mm x 7.0 mm footprint surface mount package in a 10 mm height
- Ferrite core material
- Moisture sensitivity level (MSL): 1
- Weight: FP1010V1: 2.5 g typical, FP1010V4, V6: 2.98 g typical, FP1010V5: 3.0 g typical,

### 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)
- 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



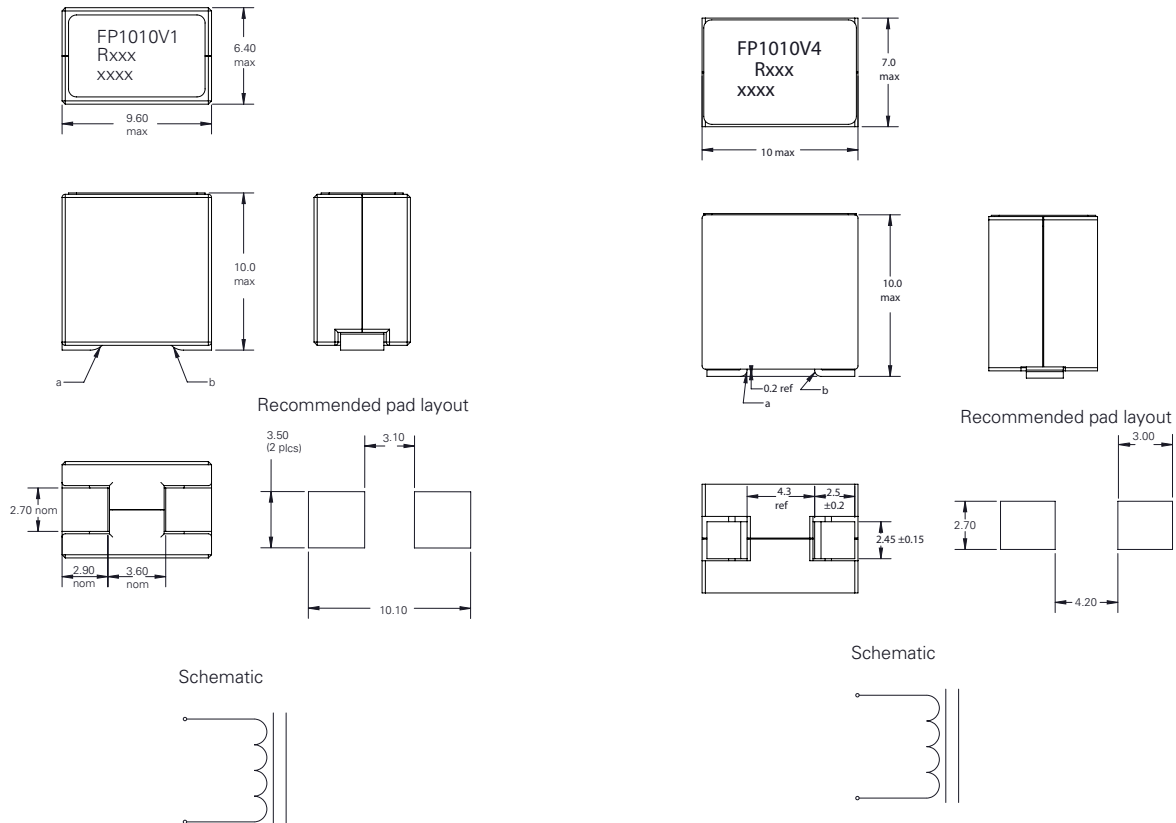
Product specifications

Part number <sup>8</sup>	OCL <sup>1</sup> (nH) ±10%	FLL <sup>2</sup> (nH) minimum	I <sub>rms</sub> <sup>3</sup> (A)	I <sub>sat</sub> 1 <sup>4</sup> (A)	I <sub>sat</sub> 2 <sup>5</sup> (A)	I <sub>sat</sub> 3 <sup>6</sup> (A)	DCR (mΩ) @ +20 °C	K-factor <sup>7</sup>
<b>V1 Version</b>								
FP1010V1-R100-R	100	72	68	97	88	85	0.145 ±5%	352
FP1010V1-R120-R	120	86	68	80	73	71	0.145 ±5%	352
FP1010V1-R150-R	150	108	68	65	59	57	0.145 ±5%	352
FP1010V1-R180-R	180	130	68	53	48	46	0.145 ±5%	352
<b>V4 Version</b>								
FP1010V4-R330-R	330	230	34	35	33	30	0.40 ±5%	216
<b>V5 Version</b>								
FP1010V5-R100-R	100	72	68	117	97	94	0.185 ±10%	308
FP1010V5-R120-R	120	86	68	98	82	79	0.185 ±10%	308
FP1010V5-R150-R	150	108	68	85	75	73	0.185 ±10%	308
FP1010V5-R330-R	330	237	68	35	29	27	0.185 ±10%	308
<b>V6 Version</b>								
FP1010V6-R330-R	330	231	54	40	32	30	0.40 ±5%	216
FP1010V6-R470-R	470	329	54	30	22	21	0.40 ±5%	216

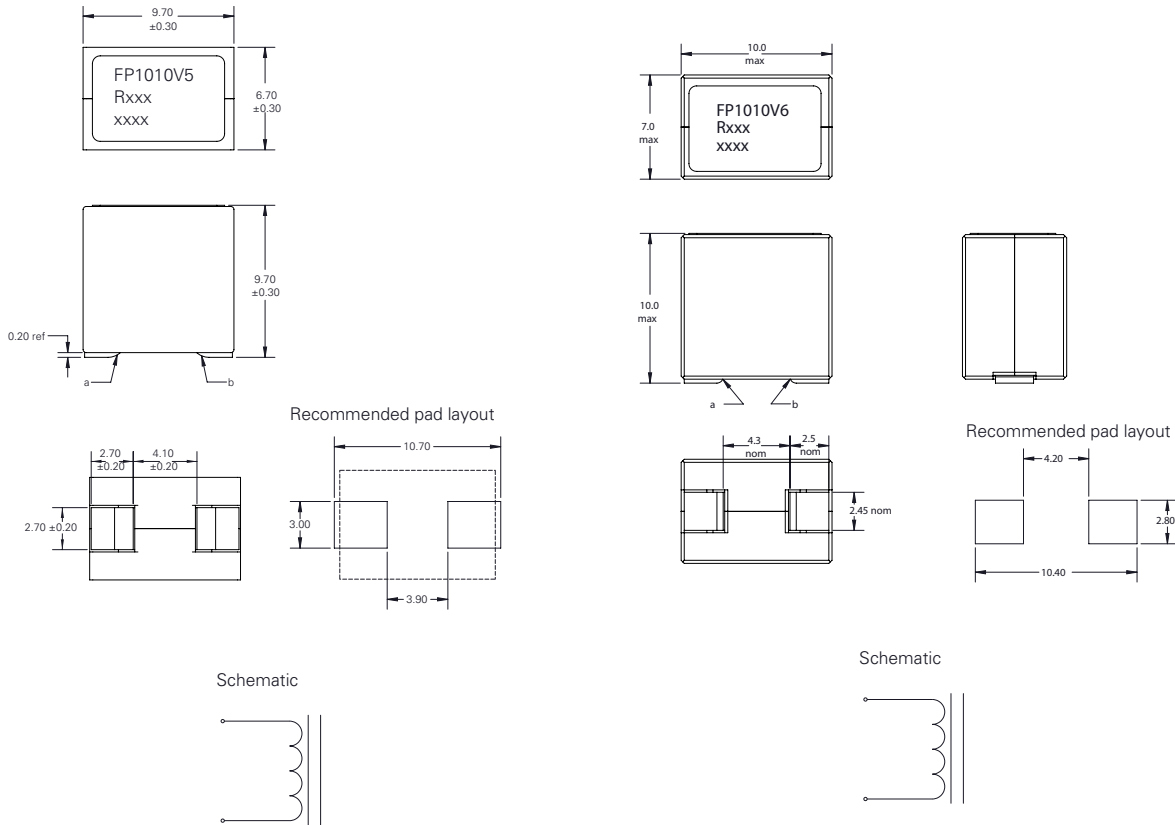
- Open circuit inductance (OCL) Test parameters: 100 kHz, 0.1 Vrms, 0.0 Adc, +25 °C
- Full load inductance (FLL) Test parameters: 100 kHz, 0.1 Vrms, I<sub>sat</sub>1, +25 °C
- I<sub>rms</sub>: DC current for an approximate temperature rise of 40 °C without core loss. Derating is necessary for AC currents. 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.
- I<sub>sat</sub>1: Peak current for approximately 20% rolloff @ +25 °C
- I<sub>sat</sub>2: Peak current for approximately 20% rolloff @ +75 °C (FP1010V1), @ +100 °C (FP1010V4, V5, V6)
- I<sub>sat</sub>3: Peak current for approximately 20% rolloff @ +100 °C (FP1010V1), @ +125 °C (FP1010V4, V5, V6)

- K-factor: Used to determine B<sub>pp</sub> for core loss (see graph).  
B<sub>p-p</sub> = K \* L \* ΔI \* 10<sup>-3</sup> B<sub>p-p</sub> (Gauss), K: (K-factor from table),  
L: (Inductance in nH), ΔI (Peak to peak ripple current in Amps).
- Part number definition: FP1010Vx-Rxxx-R  
FP1010V= Product code and size  
x= Version indicator  
Rxxx= Inductance value in μH, R= decimal point  
-R suffix = RoHS compliant

Dimensions (mm)



Dimensions (mm)

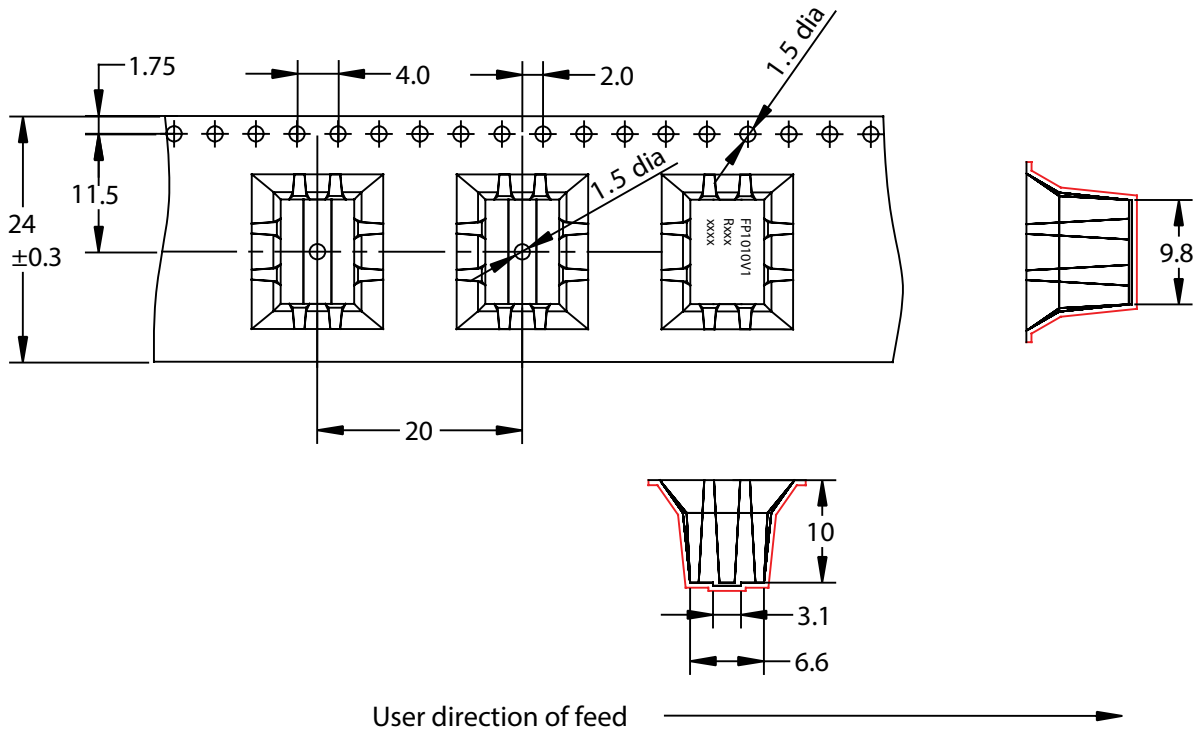


Part marking: FP1010Vx (x = Version indicator), Rxxx = Inductance value in uH, R= decimal point), xxxx=Lot code  
 Tolerances are  $\pm 0.15$  unless stated otherwise  
 Pad layout tolerances are  $\pm 0.1$  unless stated otherwise  
 Soldering surfaces to be coplanar within 0.1 millimeters  
 DCR measured from point "a" to point "b"  
 Traces or vias underneath the inductor is not recommended

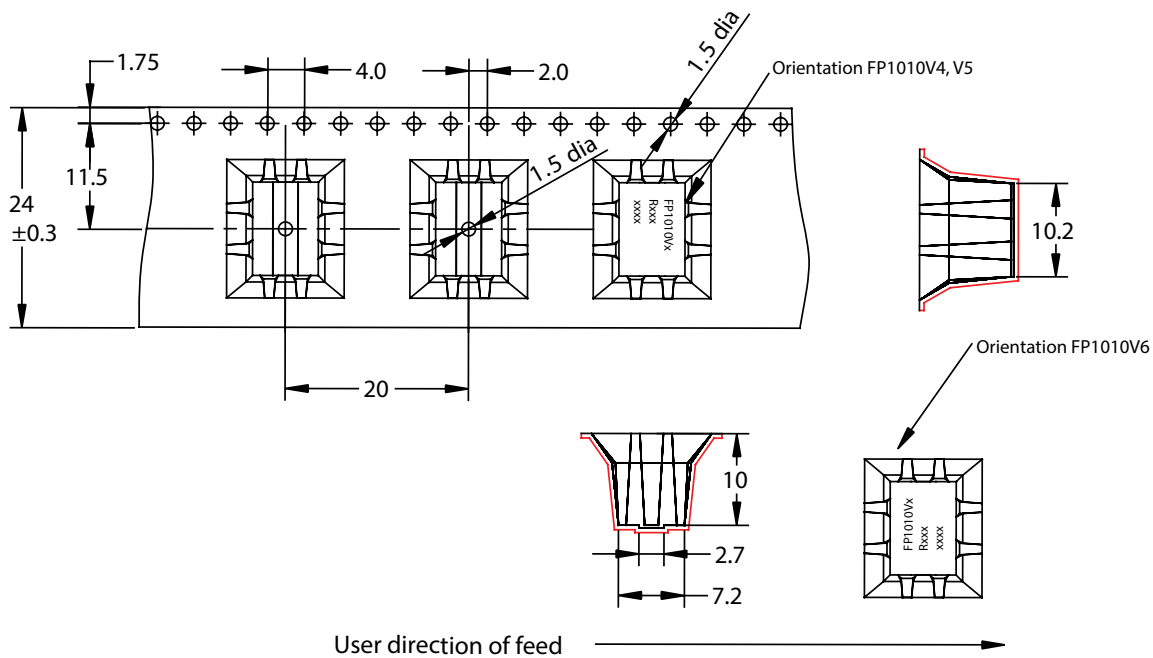
**Packaging information (mm)**

Supplied in tape and reel packaging , 300 parts per 13" diameter reel

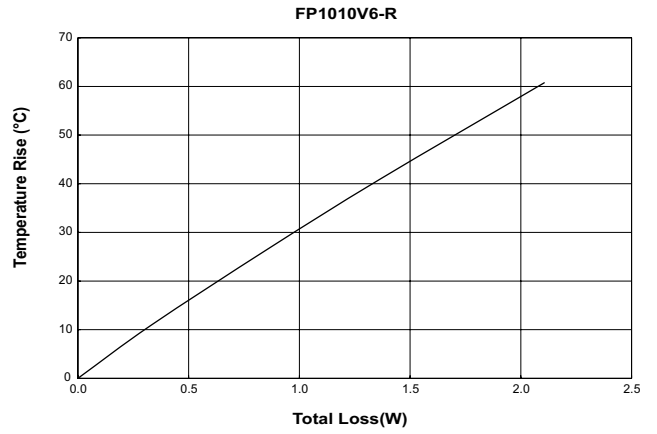
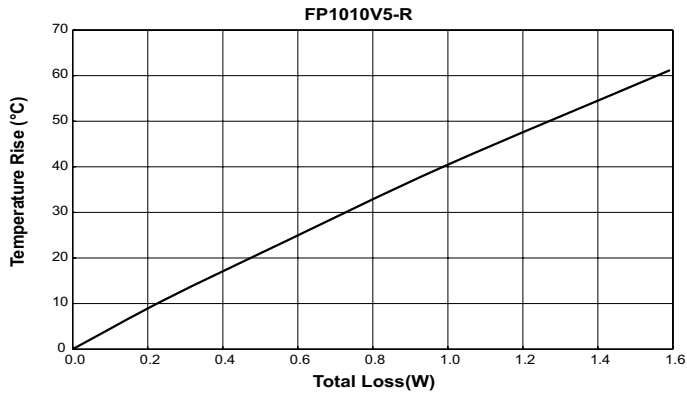
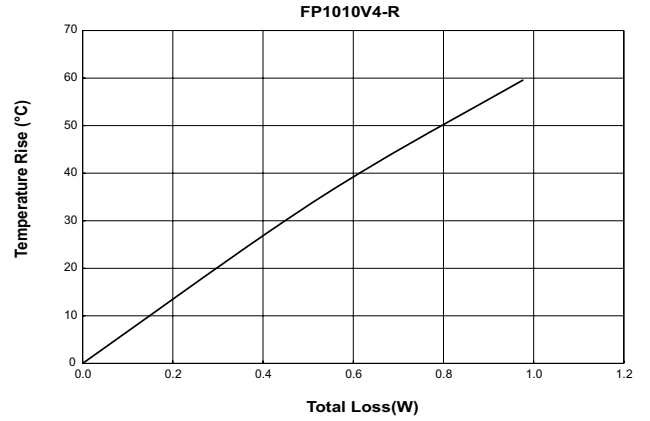
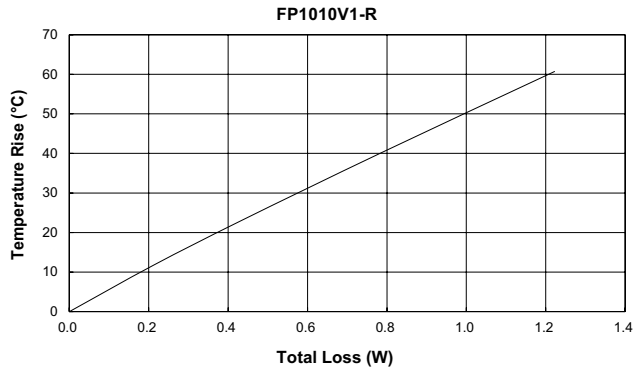
**FP1010V1**



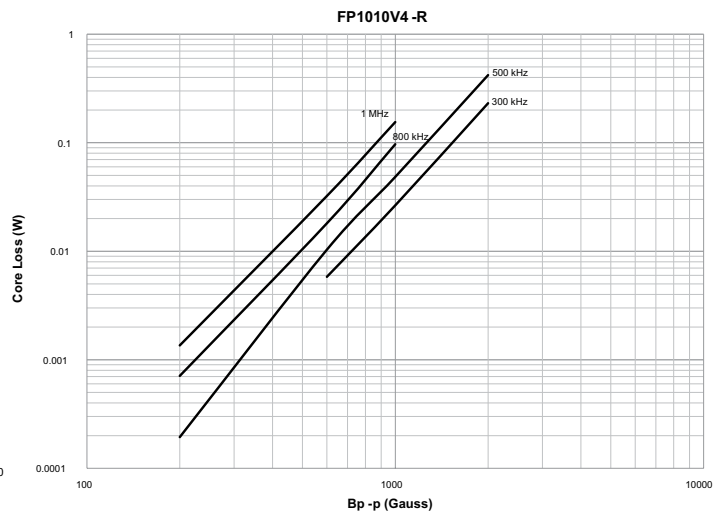
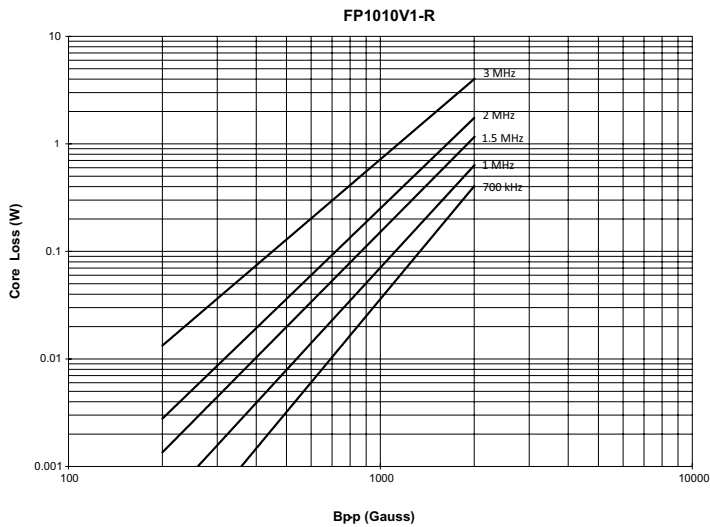
**FP1010V4, V5, V6**



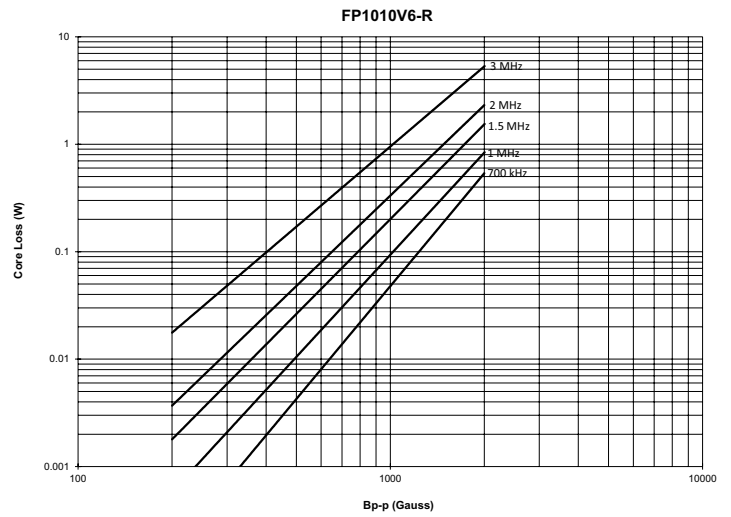
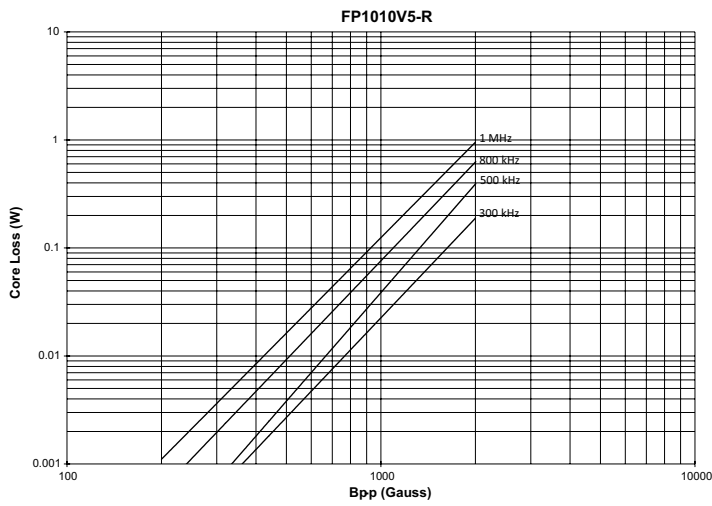
Temperature rise vs. total loss



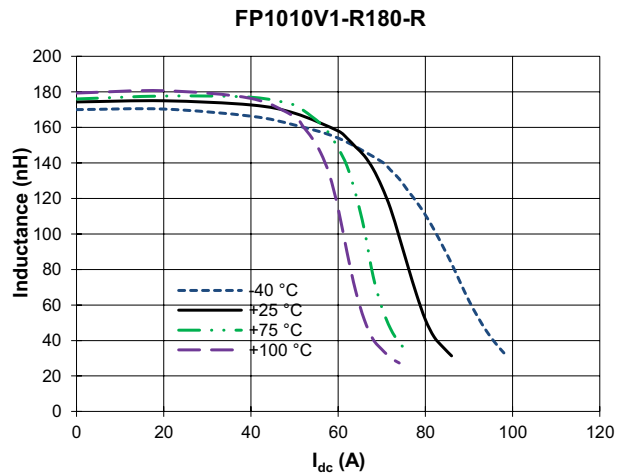
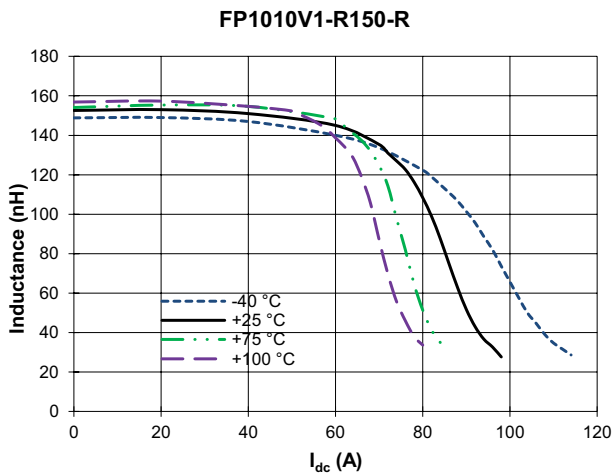
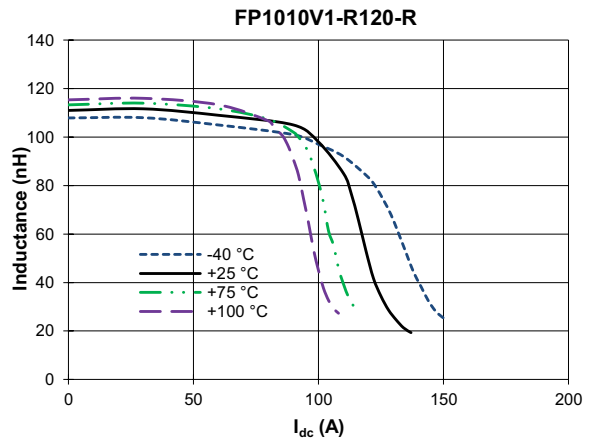
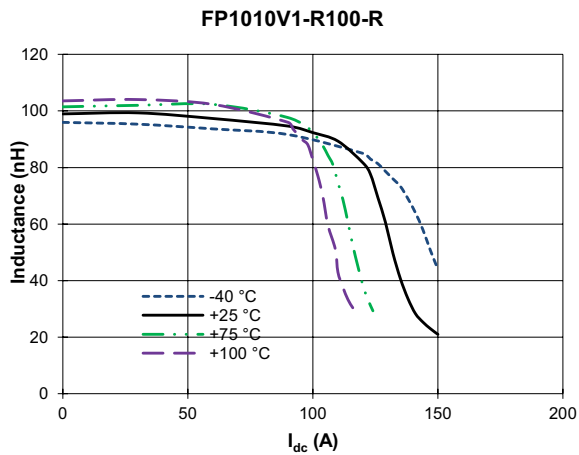
Core loss vs. B<sub>p</sub>-p



Core loss vs.  $B_{p-p}$

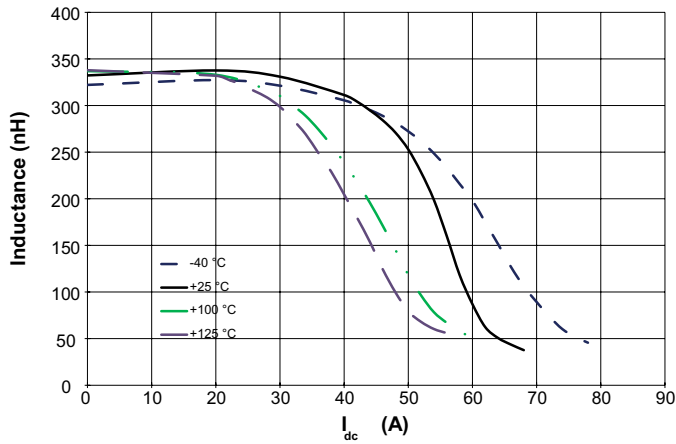


Inductance characteristics

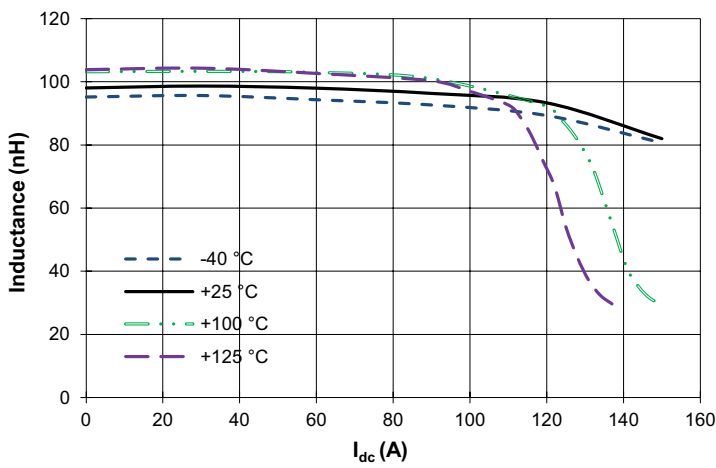


Inductance characteristics

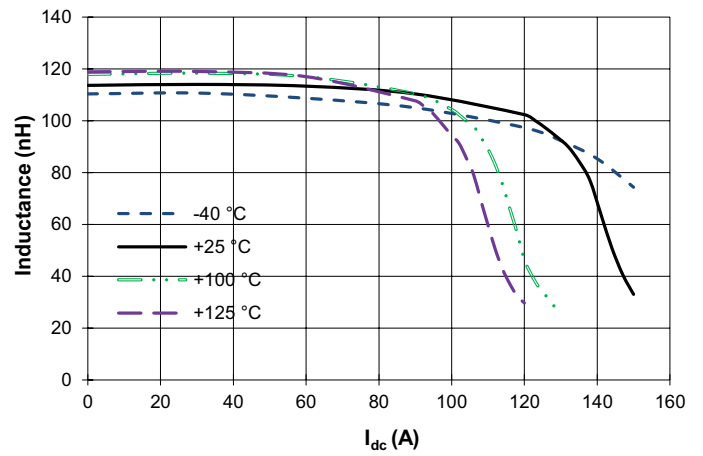
FP1010V4-R330-R



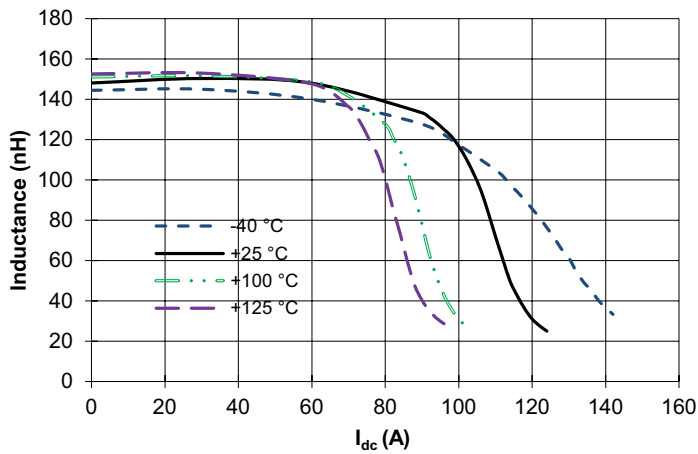
FP1010V5-R100-R



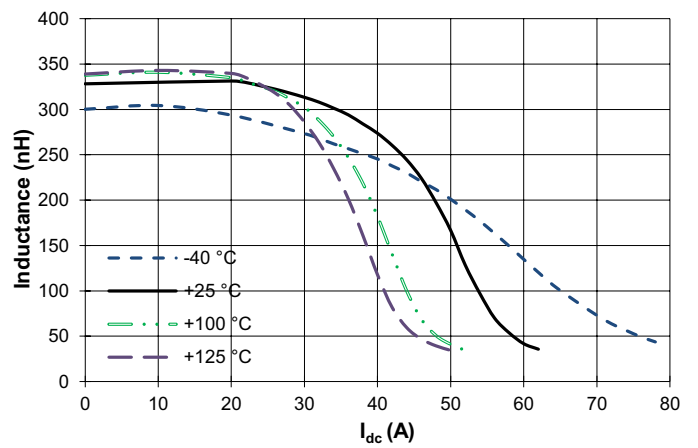
FP1010V5-R120-R



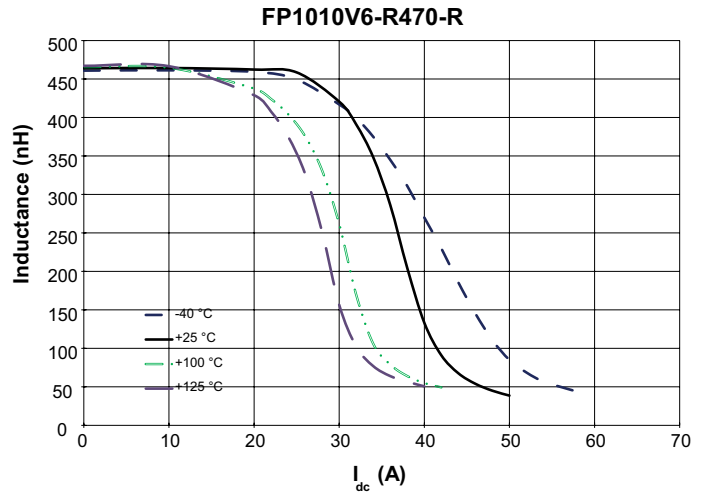
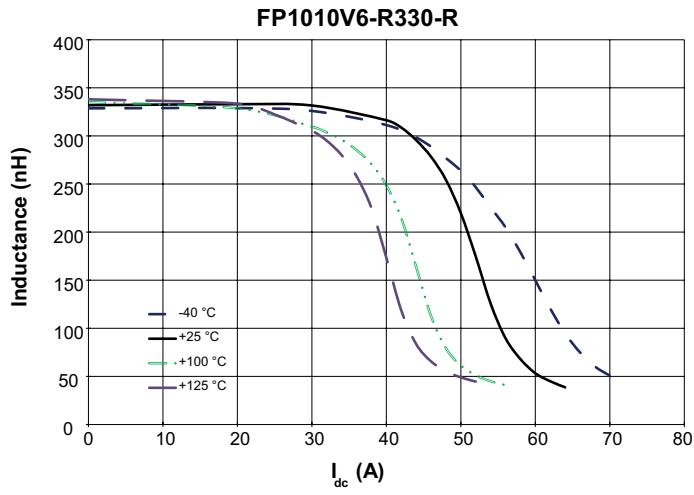
FP1010V5-R150-R



FP1010V5-R330-R

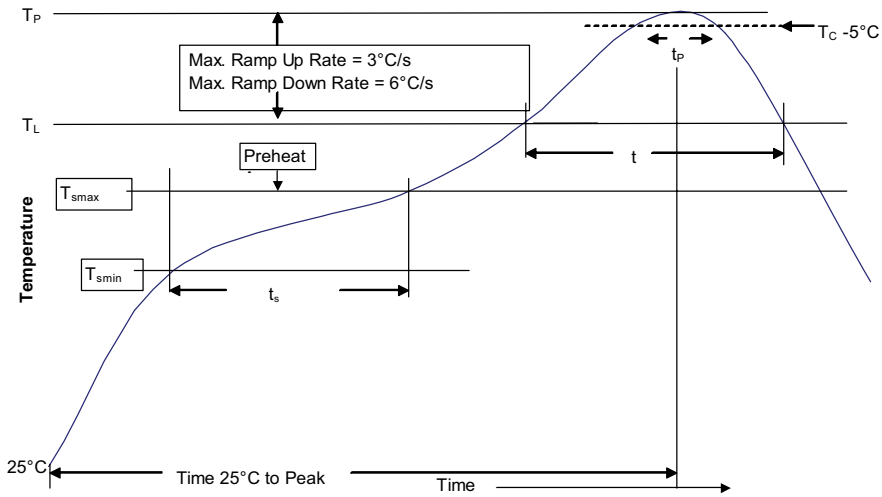


Inductance characteristics





**Solder reflow profile**



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

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<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 J-STD-020**

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
Ramp up rate T <sub>L</sub> to T <sub>p</sub>	3 °C/ second max.	3 °C/ second max.
Liquidous temperature (T <sub>L</sub> )	183 °C	217 °C
Time (t <sub>L</sub> ) maintained above T <sub>L</sub>	60-150 seconds	60-150 seconds
Peak package body temperature (T <sub>p</sub> )*	Table 1	Table 2
Time (t <sub>p</sub> )* within 5 °C of the specified classification temperature (T <sub>c</sub> )	20 seconds*	30 seconds*
Ramp-down rate (T <sub>p</sub> to T <sub>L</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<sub>p</sub>) is defined as a supplier minimum and a user maximum.

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**Eaton**  
**Electronics Division**  
1000 Eaton Boulevard  
Cleveland, OH 44122  
United States  
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