FP1010R

High frequency, high current power inductors

Applications

- Multi-phase and Vcore regulators
- Voltage Regulator Modules (VRMs)
  - Server and desktop
  - Central processing unit (CPU)
  - Graphics processing unit (GPU)
  - Application specific integrated circuit (ASIC)
  - High power density
- Data networking and storage systems
- Graphics cards and battery power systems
- Portable electronics
- Point-of-load modules
- DCR Sensing circuits

Product features

- High current carrying capacity
- Low core loss, magnetically shielded
- Tight tolerance DCR for sensing circuits
- Inductance range from 70 nH to 330 nH
- Current range from 20 A to 124 A
- 10 mm x 7.0 mm and 9.6 mm x 6.4 mm footprint surface mount package in 10 mm - 10.4 mm height
- Ferrite core material
- Moisture sensitivity level (MSL): 1
- Weight: FP1010R1 2.86 grams typical, FP1010R3 2.56 grams typical

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

Pb HALOGEN HF FREE RoHS

Powering Business Worldwide

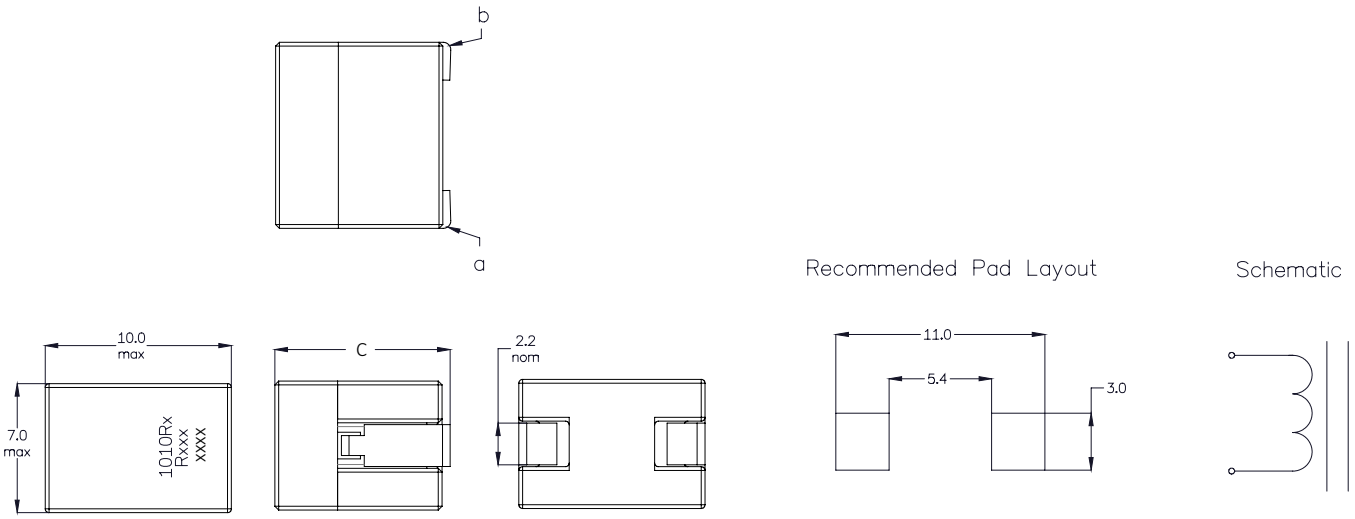
Product Specifications

Part number[9]	OCL[1] (nH)	FLL[2] (nH) minimum	I_{rms}[3] (A)	$I_{sat}1$[4] (A)	$I_{sat}2$[5] (A)	$I_{sat}3$[6] (A)	$I_{sat}3$[7] (A)	DCR (mΩ) ±5% @ 20°C	K-factor[8]	Dimension C (mm) maximum
FP1010R1-R120-R	120 ±15%	84	50	94	na	80	75	0.185	371	10
FP1010R1-R150-R	150 ±15%	105	50	80	na	68	64	0.185	371	10
FP1010R1-R330-R	330 ±15%	230	50	30	na	25	23	0.185	371	10
FP1010R3-R070-R	70 ±10%	50	78	124	120	115	107	0.145	432	10.4
FP1010R3-R100-R	100 ±10%	72	78	95	88	82	77	0.145	432	10.2
FP1010R3-R120-R	120 ±10%	86	78	78	71	67	63	0.145	432	10.1
FP1010R3-R150-R	150 ±10%	100	78	60	54	52	49	0.145	432	10
FP1010R3-R180-R	180 ±10%	129	78	49	45	43	40	0.145	432	10
FP1010R3-R220-R	220 ±10%	158	78	38	36	34	31	0.145	432	10
FP1010R3-R270-R	270 ±10%	194	78	30	29	27	24	0.145	432	10
FP1010R3-R300-R	300 ±10%	210	78	27	24	23	22	0.145	432	10
FP1010R3-R330-R	330 ±15%	237	78	20	19	17	16	0.145	432	10

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, Isat1, +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 under worst 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 @ +75 °C
6. $I_{sat}3$: Peak current for approximately 20% rolloff @ +100 °C
7. $I_{sat}4$: Peak current for approximately 20% rolloff @ +125 °C
8. 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), Symbol I (Peak to peak ripple current in Amps).
9. Part Number Definition: FP1010Rx-Rxxx-R
   FP1010R= Product code and size
   x= Version indicator
   -Rxxx= Inductance value in µH, R= decimal point
   -R suffix = RoHS compliant

Dimensions (mm)

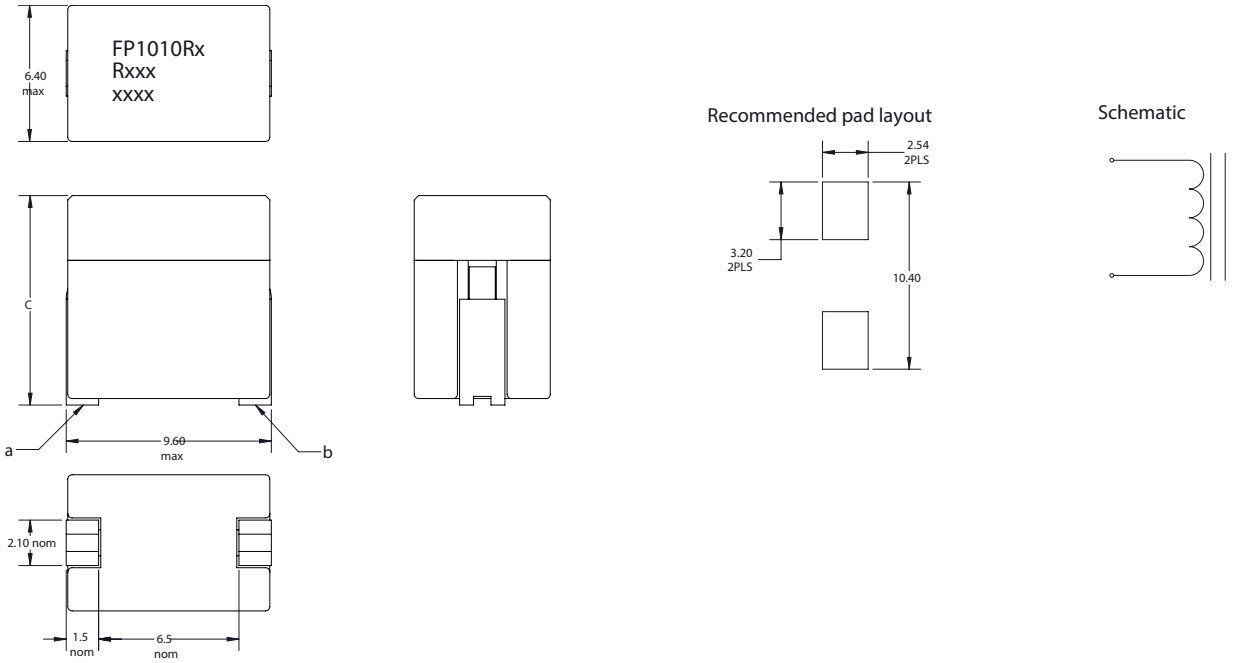
FP1010R1



Part marking: 1010Rx (x = 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 measured from point "a" to point "b"
Traces or vias underneath the inductor is not recommended

Dimensions (mm)

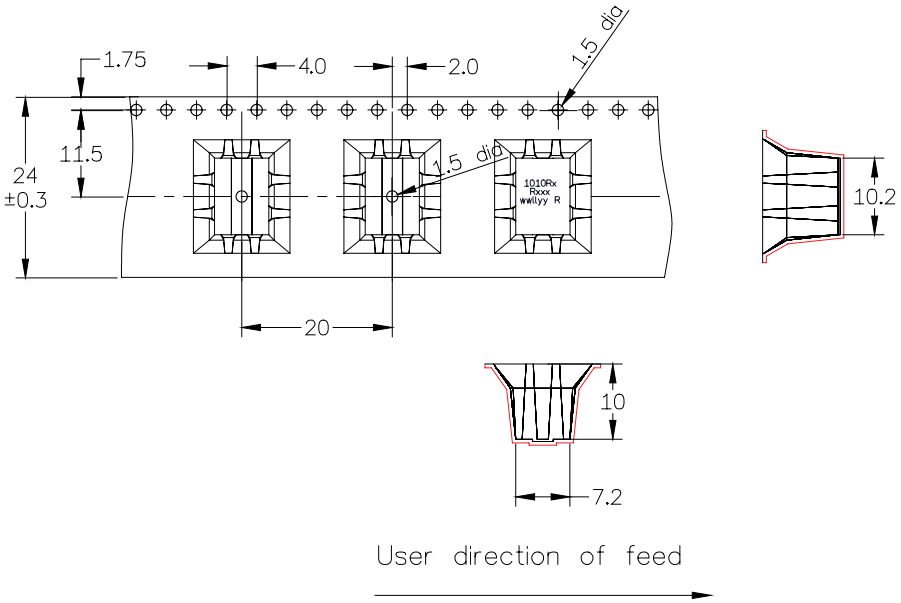
FP1010R3



Part marking: FP1010Rx (x = 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 measured from point “a” to point “b”
Traces or vias underneath the inductor is not recommended

Packaging information (mm)

FP1010R1 Supplied in tape and reel packaging , 300 parts per 13” diameter reel



Packaging information (mm)

FP1010R3 Supplied in tape and reel packaging , 500 parts per 13" diameter reel

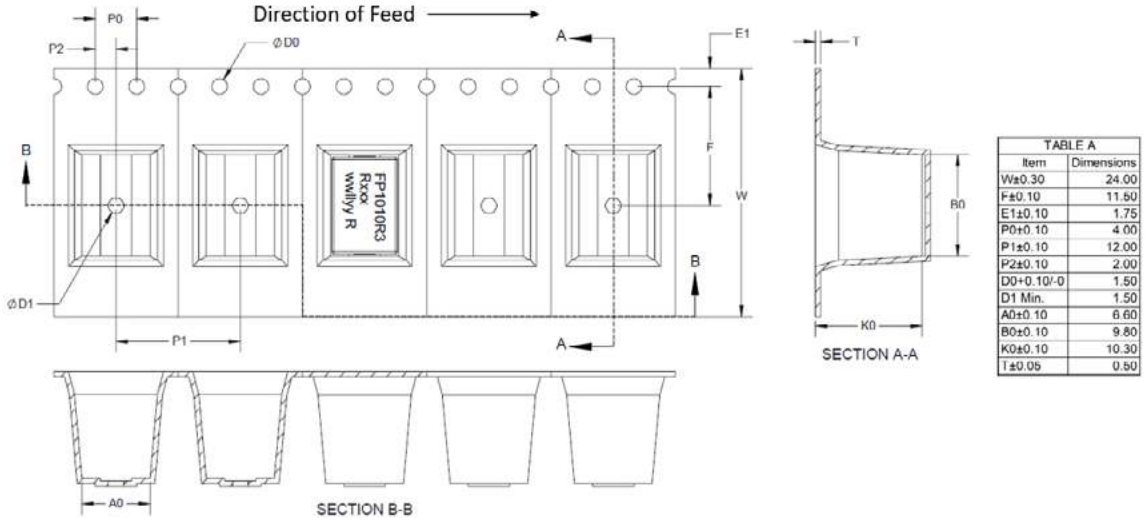
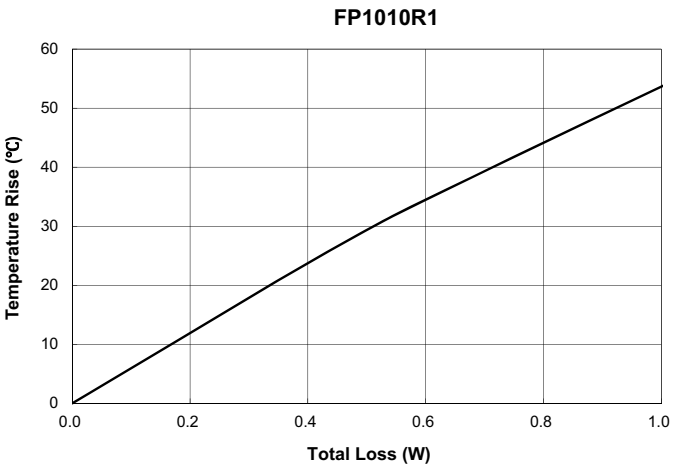
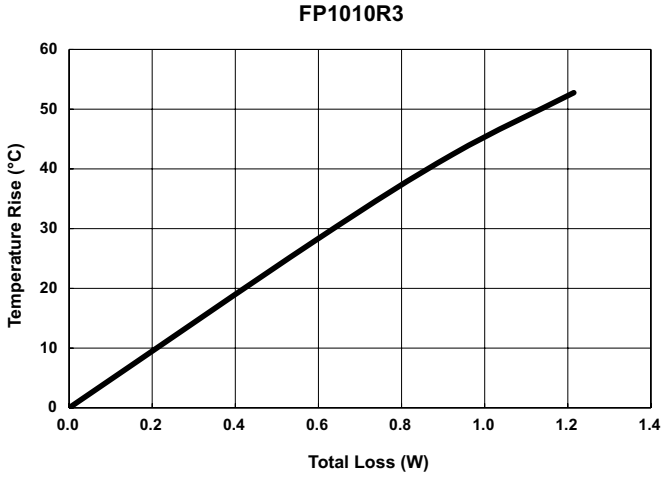


TABLE A	
Item	Dimensions
W±0.30	24.00
F±0.10	11.50
E1±0.10	1.75
P0±0.10	4.00
P1±0.10	12.00
P2±0.10	2.00
D0+0.10/-0	1.50
D1 Min.	1.50
A0±0.10	6.60
B0±0.10	9.80
K0±0.10	10.30
T±0.05	0.50

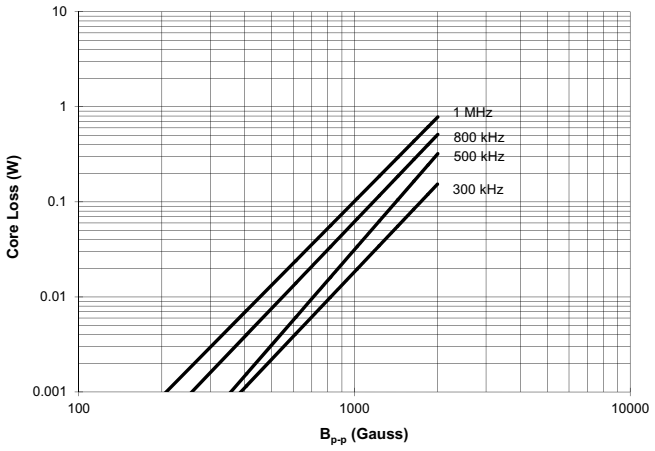
Temperature rise vs. total loss



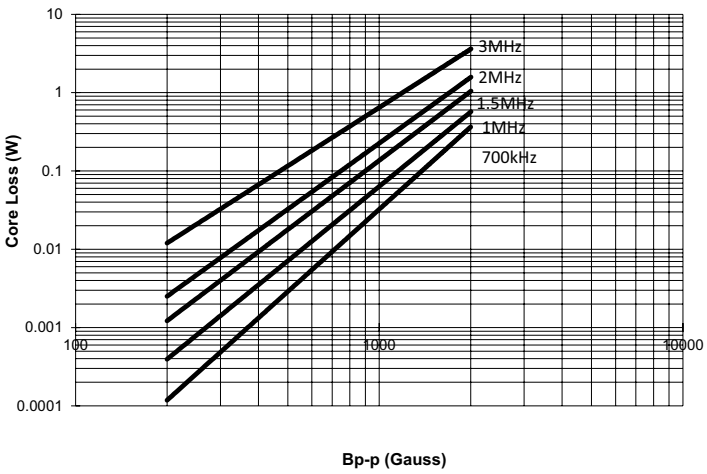


Core loss vs. B_{p-p}

FP1010R1

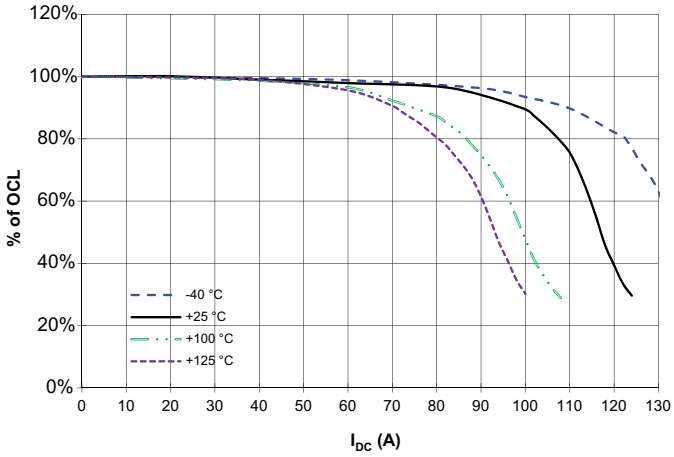


FP1010R3

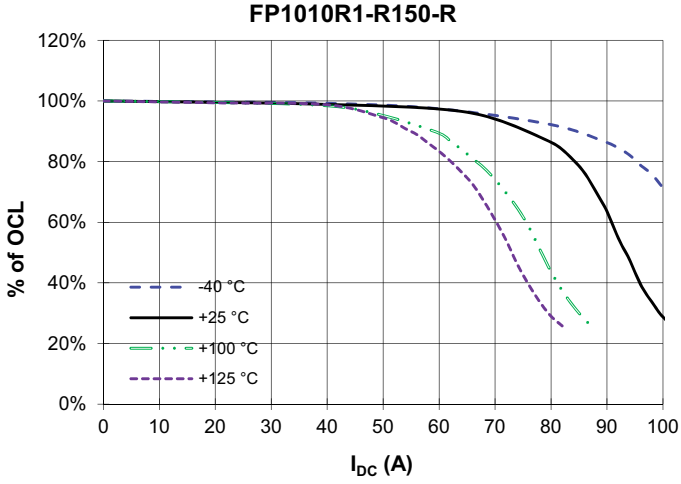


Inductance characteristics

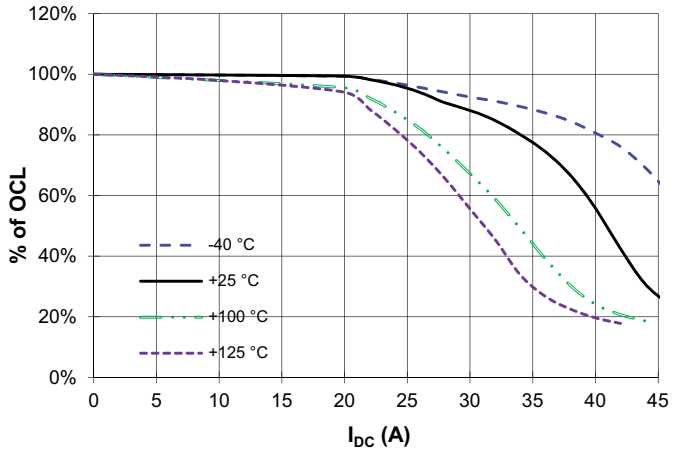
FP1010R1-R120-R



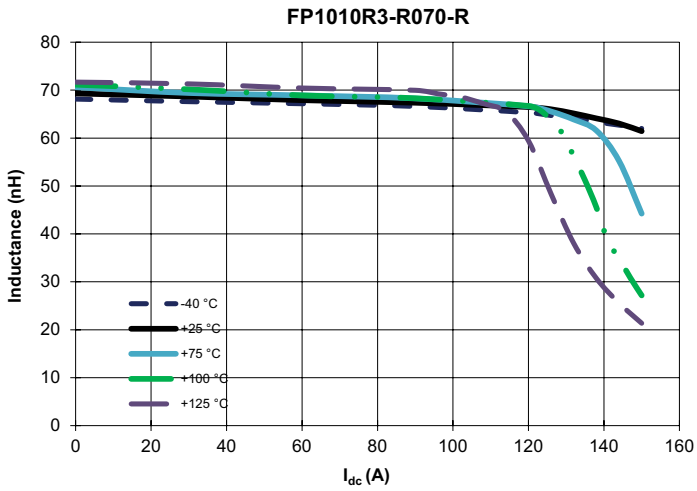
FP1010R1-R150-R

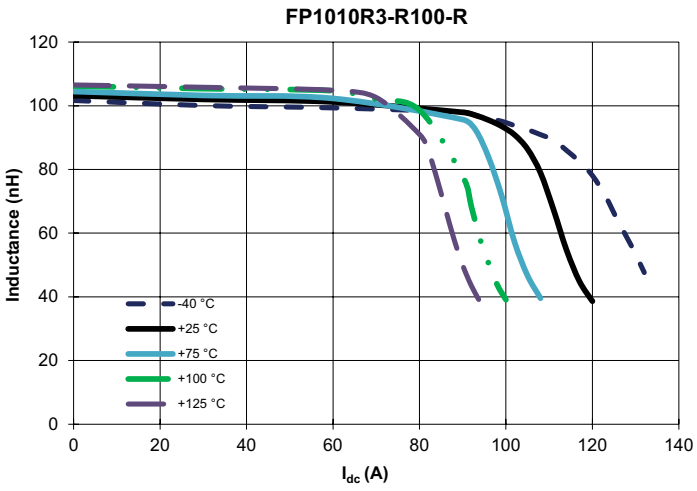


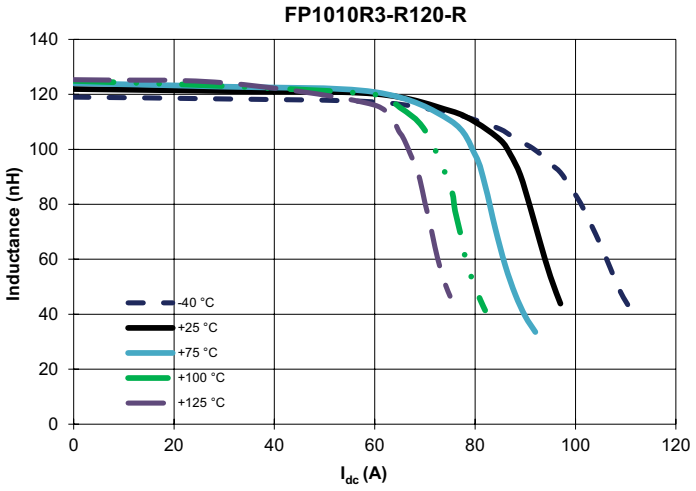
FP1010R1-R330-R

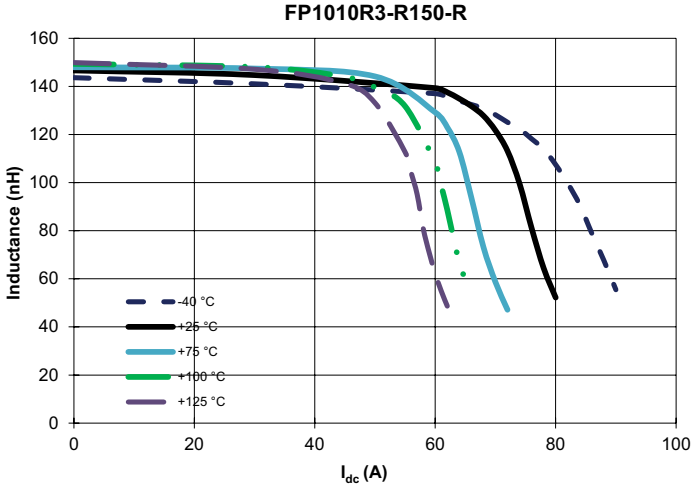


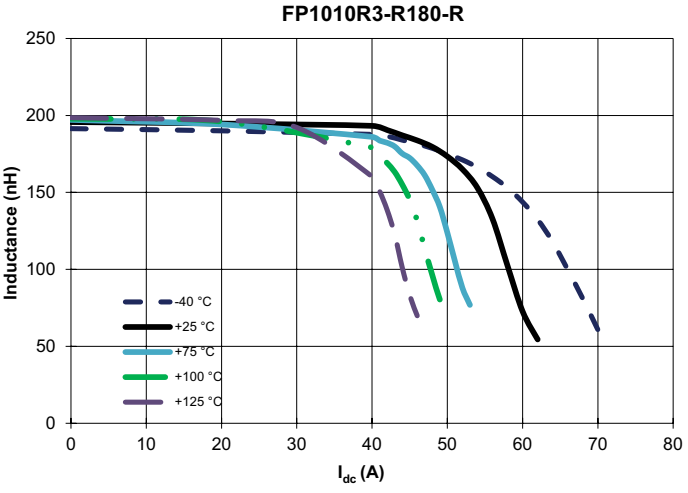
Inductance characteristics

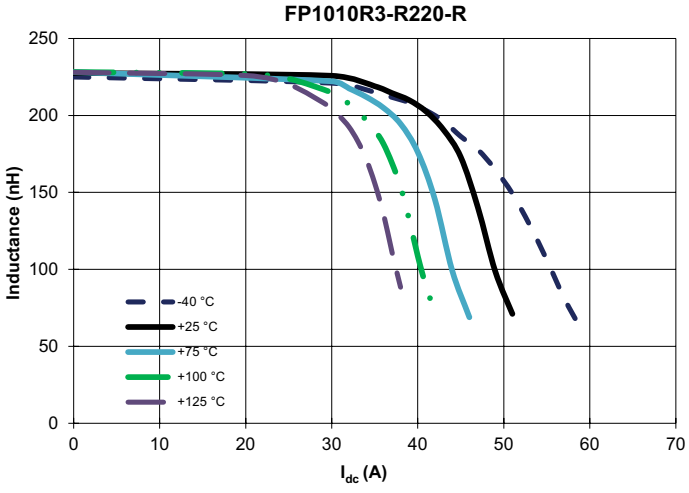






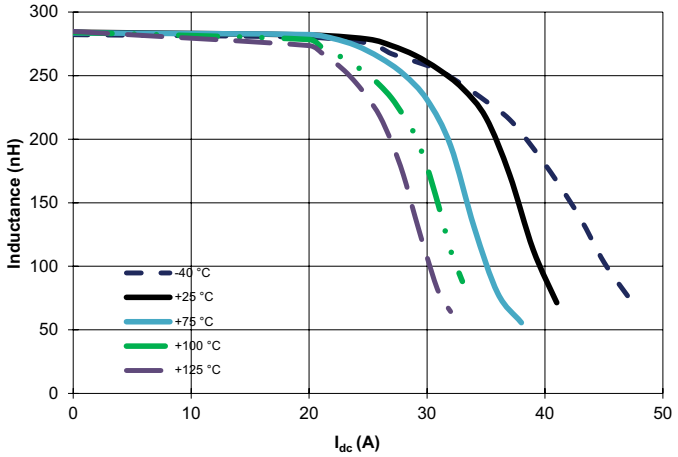




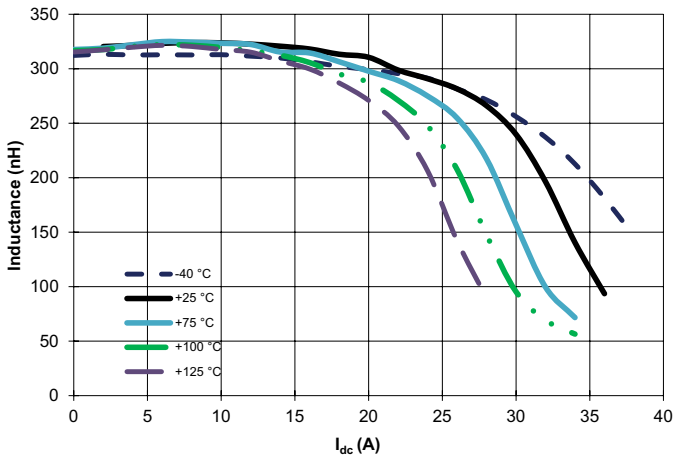


Inductance characteristics

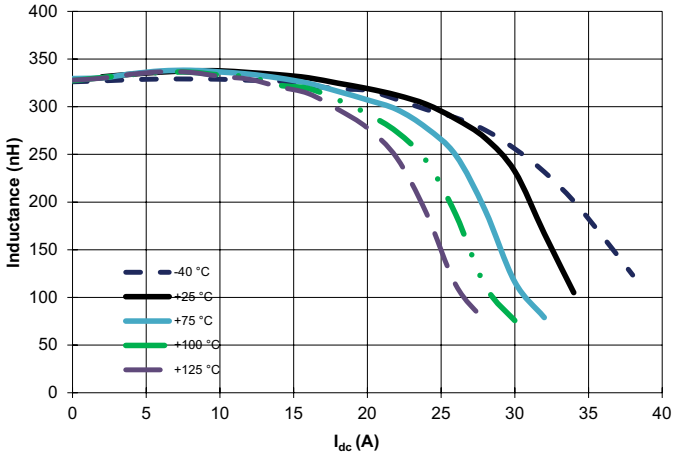
FP1010R3-R270-R



FP1010R3-R300-R



FP1010R3-R330-R



Solder reflow profile

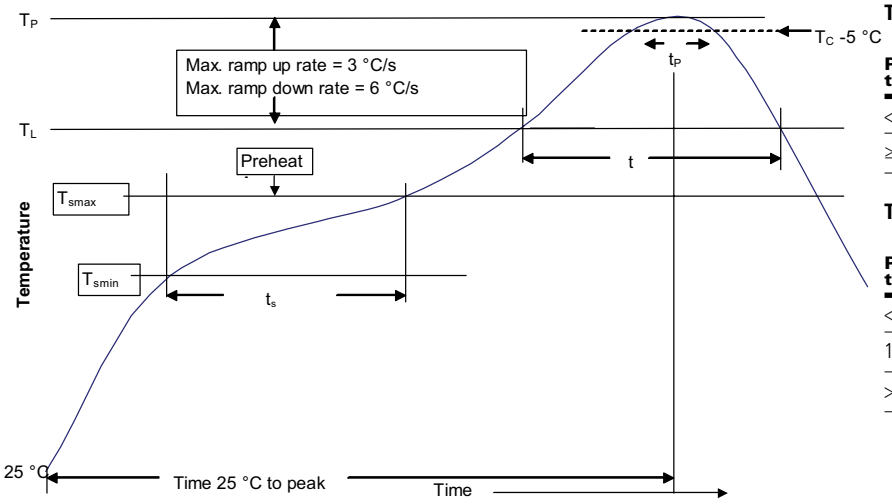


Table 1 - Standard SnPb solder (T_C)

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 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) Time (t_L) maintained above 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*
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.

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

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