

# FP1 110V

## High frequency, high current power inductors



### Product features

- Vertical design utilizes less board space
- Tight tolerance DCR for sensing circuits
- Inductance Range from 150 nH to 320 nH
- Current range from 42 A to 90 A
- 10.7 mm x 7.5 mm and 10.5 mm x 6.2 mm footprint surface mount package in a 9.5 mm height
- Ferrite core material
- Moisture sensitivity level (MSL): 1

### 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

### 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>7</sup>	OCL <sup>1</sup> (nH) ±10%	FLL <sup>2</sup> (nH) minimum	I <sub>rms</sub> <sup>3</sup> (A)	I <sub>sat1</sub> <sup>4</sup> (A)	I <sub>sat2</sub> <sup>5</sup> (A)	DCR (mΩ) ±5% @ +20°C	K-factor <sup>6</sup>
<b>V1 version</b>							
FP1110V1-R15-R	150	108	61	90	72	0.23	278
FP1110V1-R20-R	195	140	61	70	58	0.23	278
FP1110V1-R22-R	220	158	61	64	51	0.23	278
FP1110V1-R27-R	270	173	61	55	44	0.23	278
FP1110V1-R32-R	320	230	61	42	34	0.23	278
<b>V2 version</b>							
FP1110V2-R150-R	150	108	61	89	70	0.18	328
FP1110V2-R180-R	180	130	61	72	57.5	0.18	328
FP1110V2-R200-R	200	144	61	65	52	0.18	328
FP1110V2-R220-R	220	159	61	59	47	0.18	328
FP1110V2-R270-R	270	195	61	48	38.5	0.18	328
FP1110V2-R320-R	320	230	61	40.5	32.5	0.18	328

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>sat1</sub>, @ +25 °C

3. 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.

4. I<sub>sat1</sub>: Peak current for approximately 20% rolloff @ +25 °C

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

6. K-factor: Used to determine B<sub>pp</sub> for core loss (see graph). B<sub>pp</sub> = K \* L \* ΔI \* 10<sup>3</sup>.

B<sub>pp</sub>: (Gauss), K: (K-factor from table), L: (Inductance in nH), ΔI (Peak to peak ripple current in Amps).

7. Part Number Definition: FP1110Vx-Rxx(x)-R

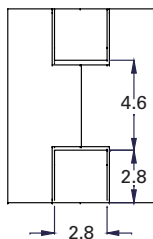
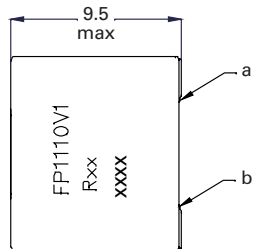
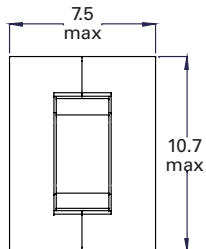
FP1110V = Product code

x= Version indicator

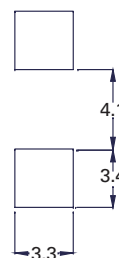
Rxx(x)= Inductance value in uH, R= decimal point

-R suffix = RoHS compliant

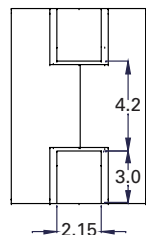
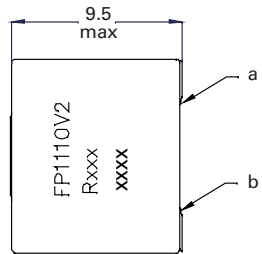
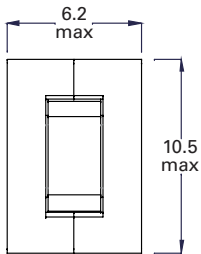
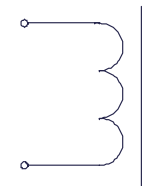
Dimensions- mm



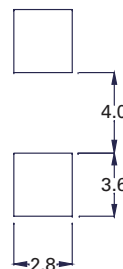
Recommended pad layout



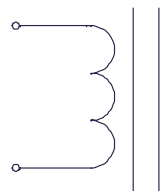
Schematic



Recommended pad layout



Schematic



Part marking: FP1110Vx (x=Version indicator), Rxx(x)=inductance value in μH, R=decimal point

xxxx= lot code

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

Soldering surfaces to be coplanar within 0.10 millimeters

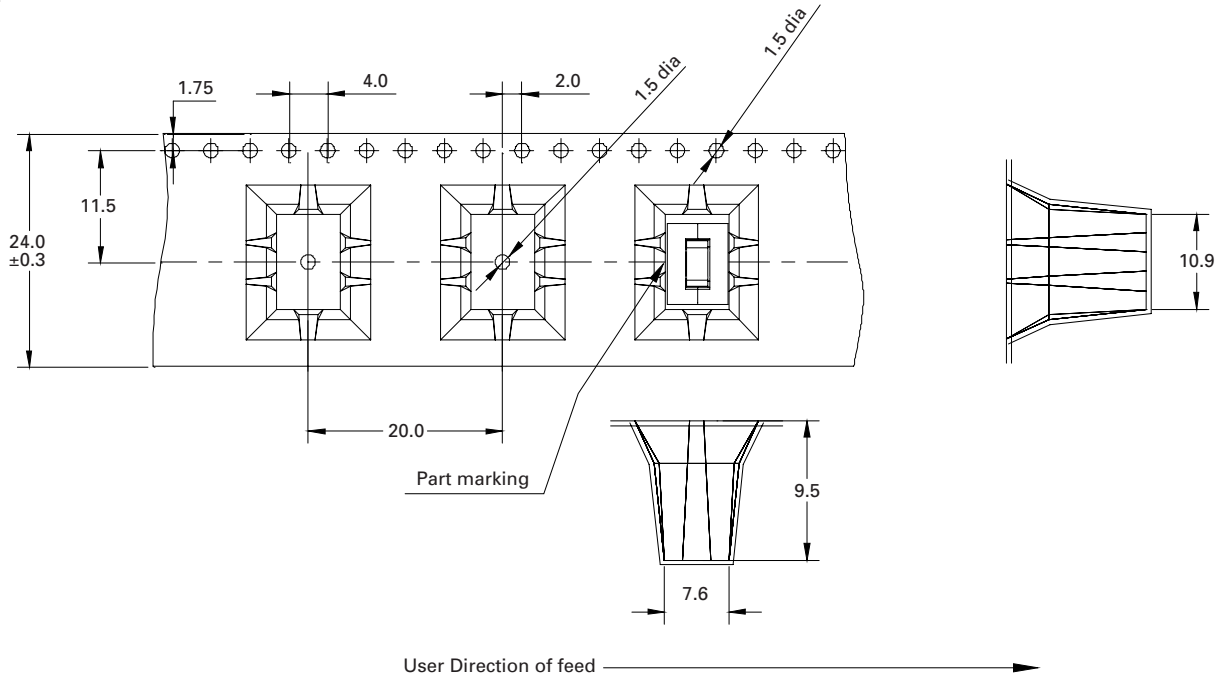
Traces or vias underneath the inductor is not recommended.

**Packaging information- mm**

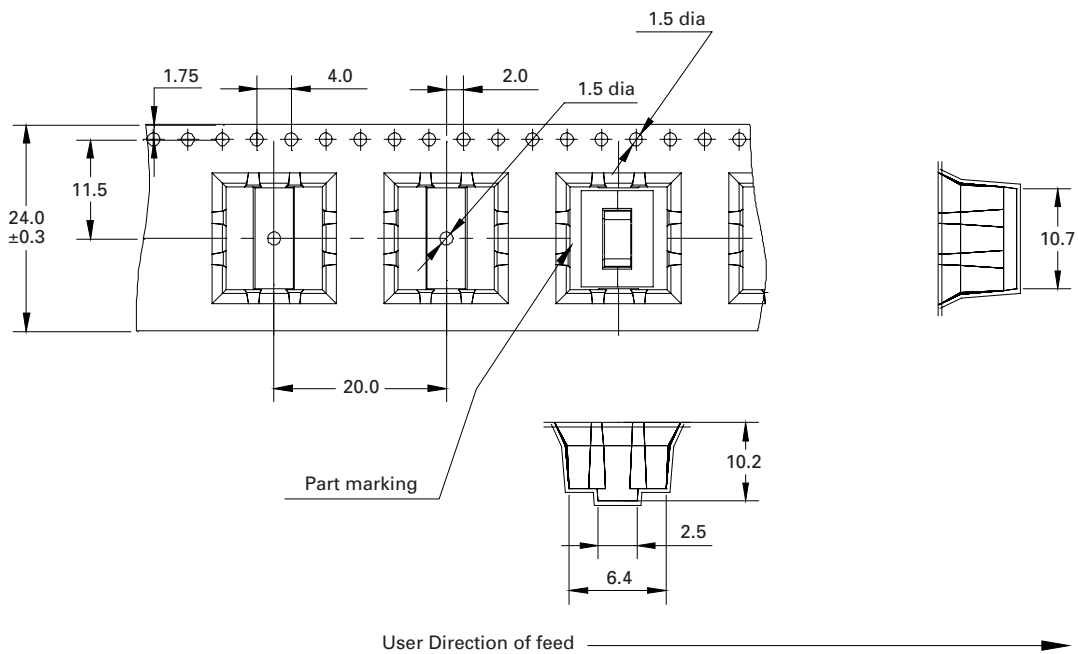
(Drawing not to scale)

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

**FP1110V1**

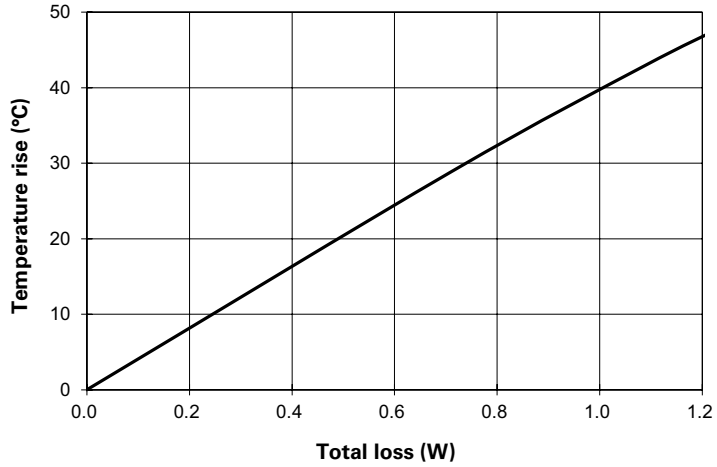


**FP1110V2**

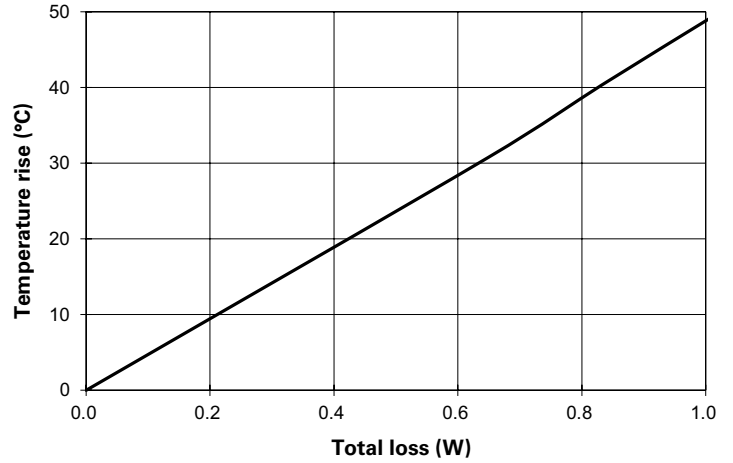


Temperature rise vs. total loss

FP1110V1

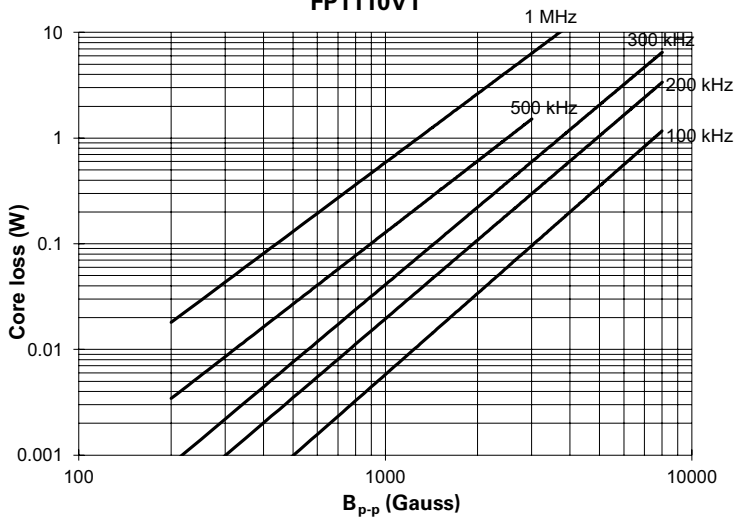


FP1110V2

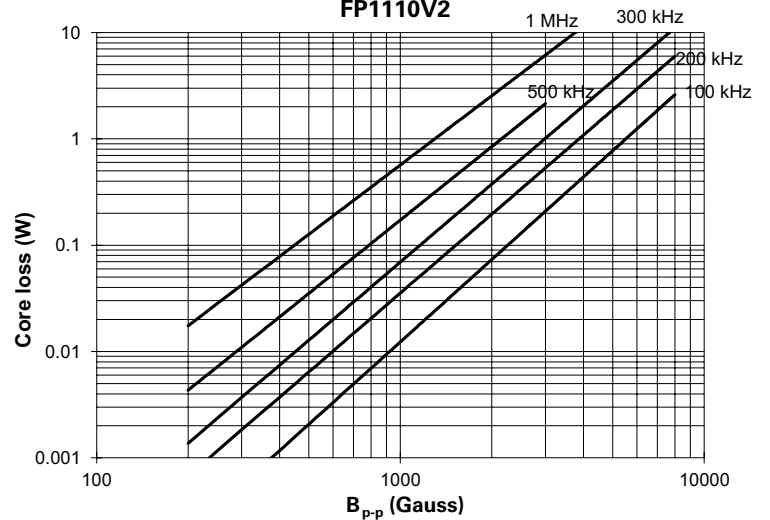


Core loss vs.  $B_{p-p}$

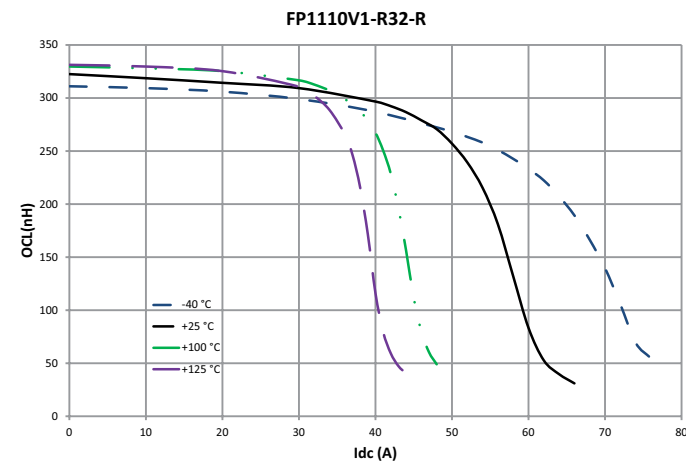
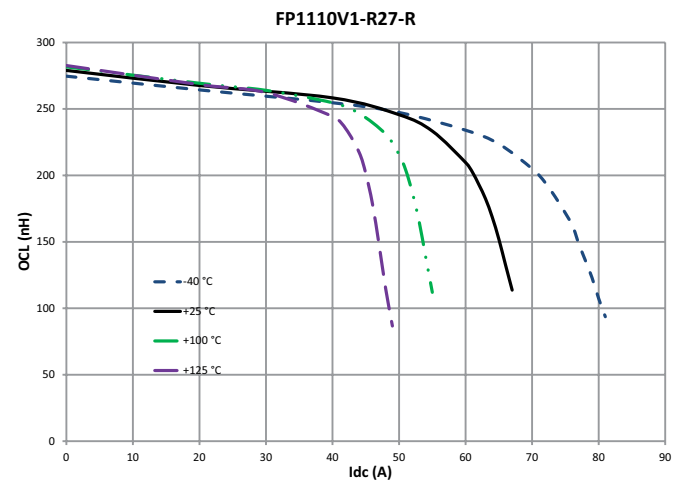
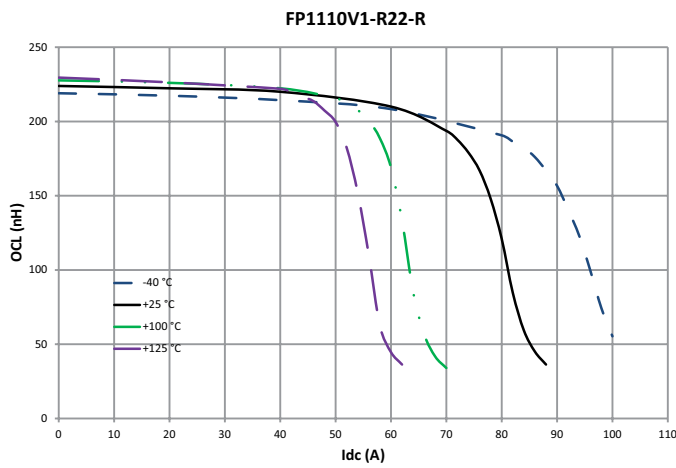
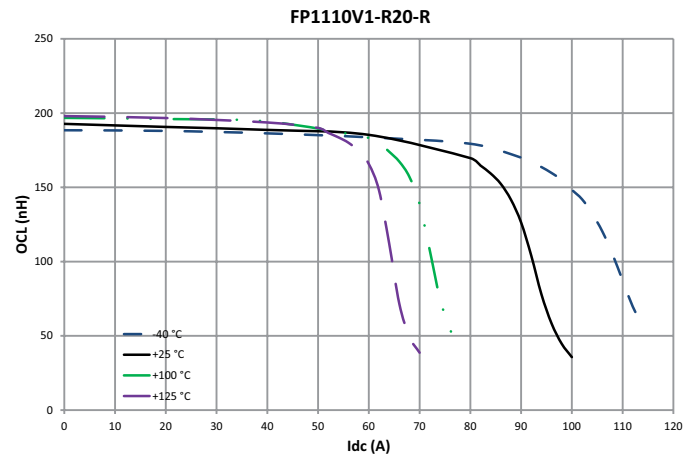
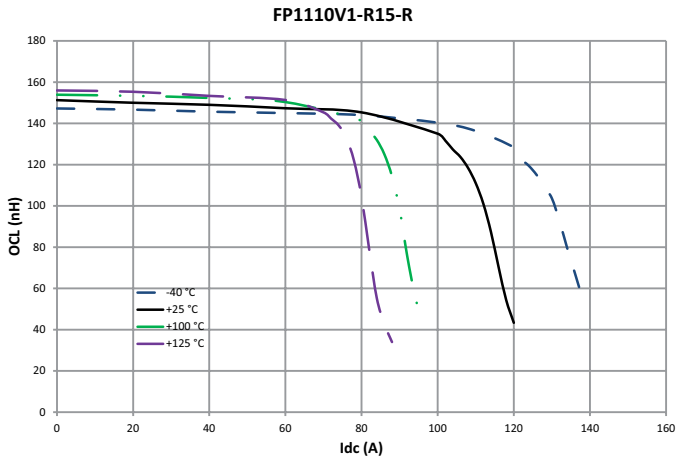
FP1110V1



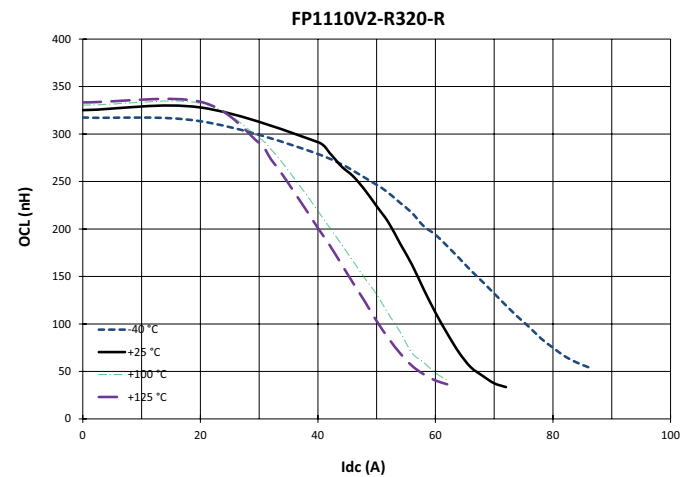
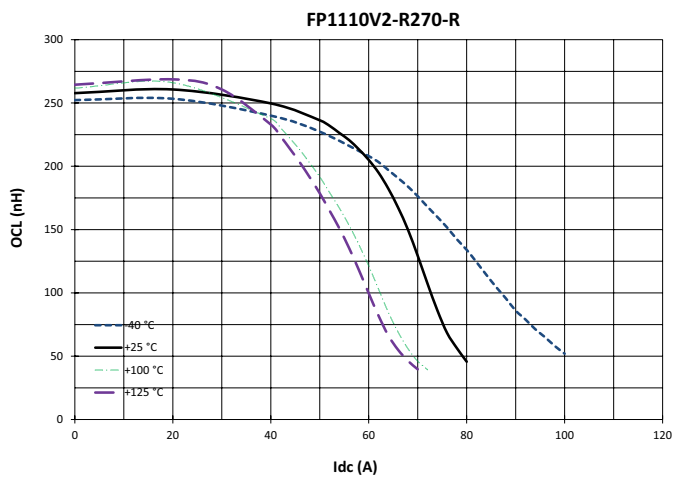
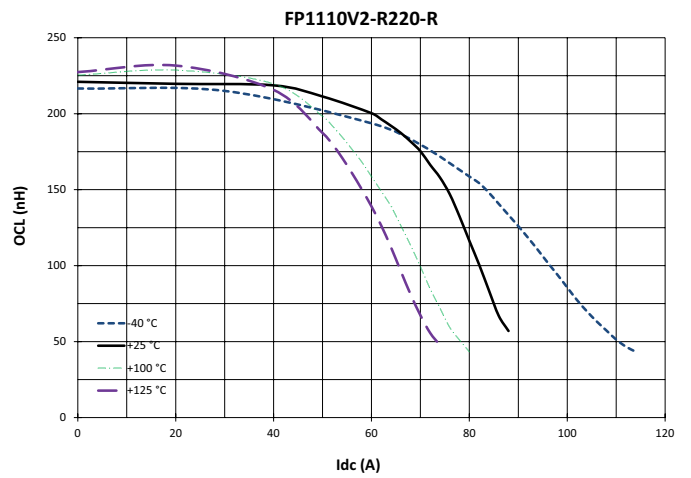
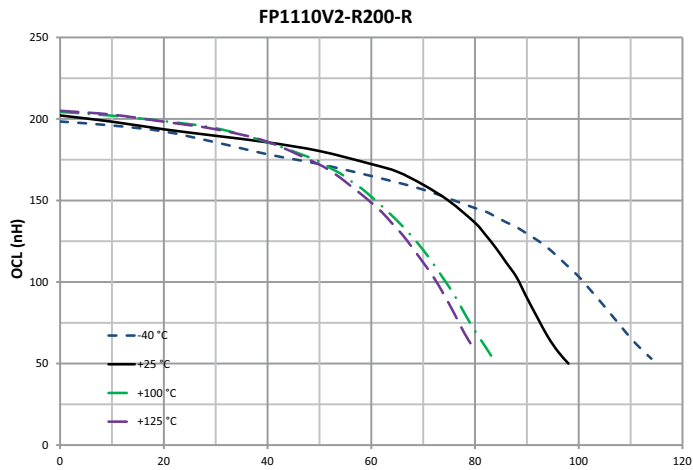
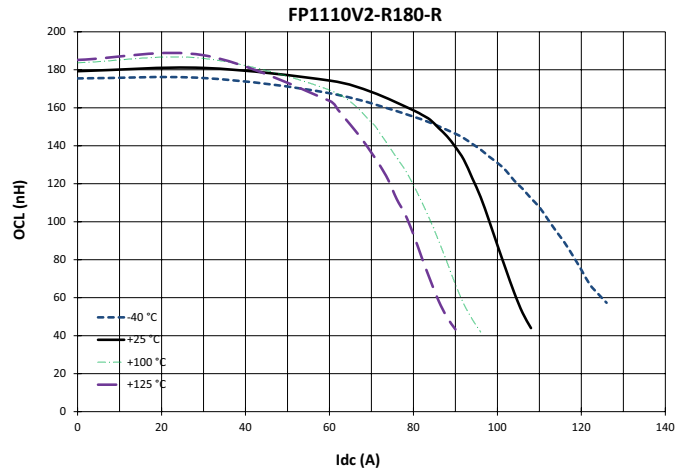
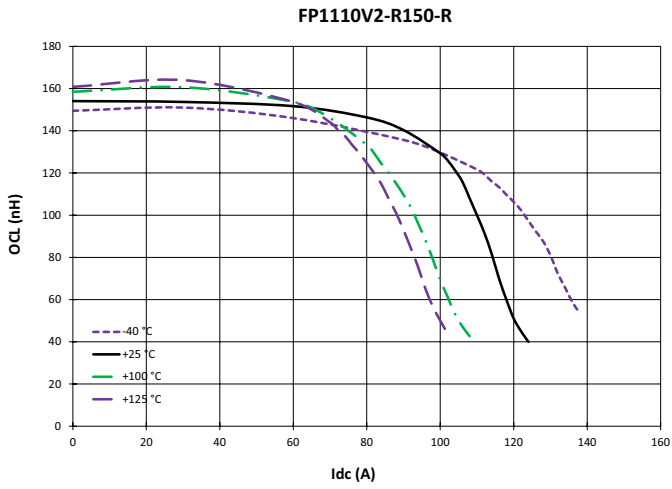
FP1110V2



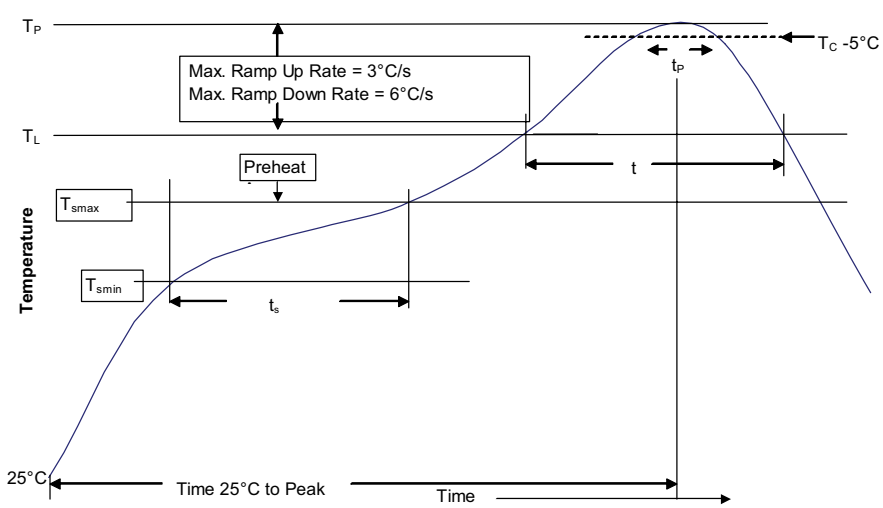
Inductance characteristics



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  
Eaton.com/electronics

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