

FP1008R5 and FP1008R6

High frequency, high current power inductors



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

Product features

- High current carrying capacity
- Low core loss
- Magnetically shielded
- Tight tolerance DCR for sensing circuits
- Inductance Range from 100 nH to 300 nH
- Current range from 36 A to 103 A
- 10.8 mm x 8.0 mm footprint surface mount package in an 8.0 mm height
- Moisture Sensitivity Level: 1
- Ferrite core material

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
- Halogen free, lead free, RoHS compliant



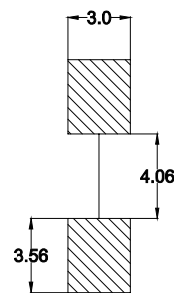
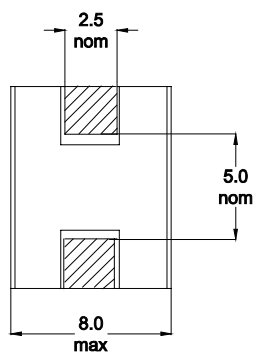
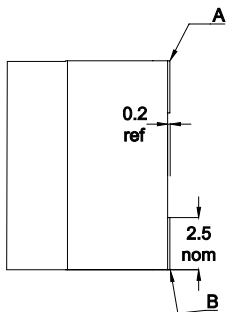
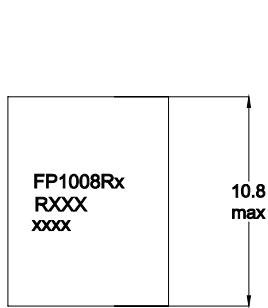
Product specifications

| Part Number ⁸ | OCL ¹ (nH) ±10% | FLL ² (nH) minimum | I _{rms} ³ (A) | I _{sat} 1 ⁴ (A) | I _{sat} 2 ⁵ (A) | I _{sat} 3 ⁶ (A) | DCR (mΩ) ±5% @ 20 °C | K-factor ⁷ |
|--------------------------|-------------------------------|----------------------------------|--------------------------------------|--|--|--|-------------------------|-----------------------|
| R5 version | | | | | | | | |
| FP1008R5-R120-R | 120 | 86 | 79 | 103 | 90 | 84 | 0.170 | 342 |
| FP1008R5-R150-R | 150 | 108 | 79 | 85 | 68 | 64 | 0.170 | 342 |
| FP1008R5-R180-R | 180 | 130 | 79 | 70 | 56 | 53 | 0.170 | 342 |
| FP1008R5-R220-R | 220 | 158 | 79 | 58 | 44 | 42 | 0.170 | 342 |
| FP1008R5-R270-R | 270 | 194 | 79 | 44 | 34 | 32 | 0.170 | 342 |
| FP1008R5-R300-R | 300 | 216 | 79 | 36 | 28 | 26 | 0.170 | 342 |
| R6 version | | | | | | | | |
| FP1008R6-R100-R | 100 | 72 | 74 | 103 | 86 | 81 | 0.180 | 342 |
| FP1008R6-R120-R | 120 | 86 | 74 | 103 | 90 | 84 | 0.180 | 342 |
| FP1008R6-R150-R | 150 | 108 | 74 | 85 | 68 | 64 | 0.180 | 342 |
| FP1008R6-R180-R | 180 | 130 | 74 | 70 | 56 | 53 | 0.180 | 342 |
| FP1008R6-R220-R | 220 | 158 | 74 | 58 | 44 | 42 | 0.180 | 342 |
| FP1008R6-R270-R | 270 | 194 | 74 | 44 | 34 | 32 | 0.180 | 342 |
| FP1008R6-R300-R | 300 | 216 | 74 | 36 | 28 | 26 | 0.180 | 342 |

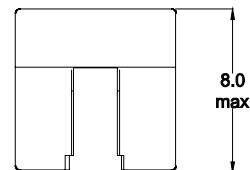
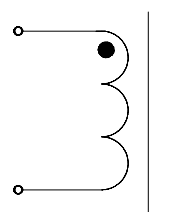
- Open Circuit Inductance (OCL) Test Parameters: 100 kHz, 0.1 Vrms, 0.0 Adc, +25 °C
- Full Load Inductance (FLL) Test Parameters: 100 kHz, 0.1 V_{rms}, I_{sat}1, +25 °C
- I_{rms}: DC current for an approximate temperature rise of 40 °C without core loss. Derating is necessary for AC currents. PCB layout, 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.
- I_{sat}1: Peak current for approximately 20% rolloff @ +25 °C
- I_{sat}2: Peak current for approximately 20% rolloff @ +100 °C

- I_{sat}3: Peak current for approximately 20% rolloff @ +125 °C
- K-factor: Used to determine B_{pp} for core loss (see graph).
B_{pp} = K * L * ΔI * 10⁻³; B_{pp}: (Gauss), K: (K-factor from table), L: (Inductance in nH), ΔI (Peak to peak ripple current in Amps).
- Part Number Definition: FP1008Rx-Rxxx-R
FP1008R= Product code and size
x= Version indicator
-Rxxx= Inductance value in uH, R= decimal point
-R suffix = RoHS compliant

Dimensions (mm)



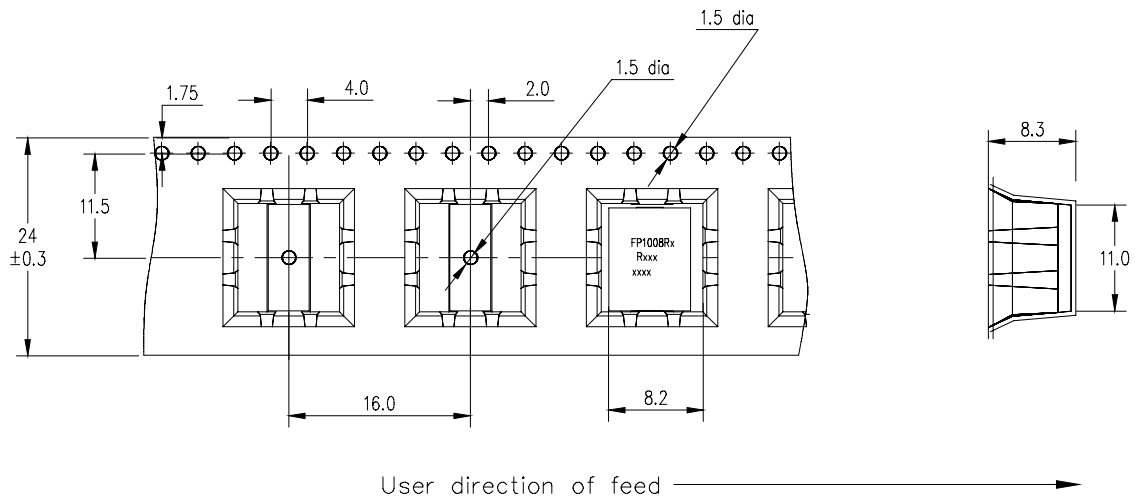
Schematic



Part marking: FP1008Rx (x = Version), Rxxx= Inductance value in uH (R= decimal point) xxxx = Lot code
Tolerances are ±0.15 millimeters unless stated otherwise
Pad layout tolerances are ±0.1 millimeters unless stated otherwise
All soldering surfaces to be coplanar within 0.1 millimeter
DCR measured from point "A" to point "B"
Do not route traces or vias underneath the inductor

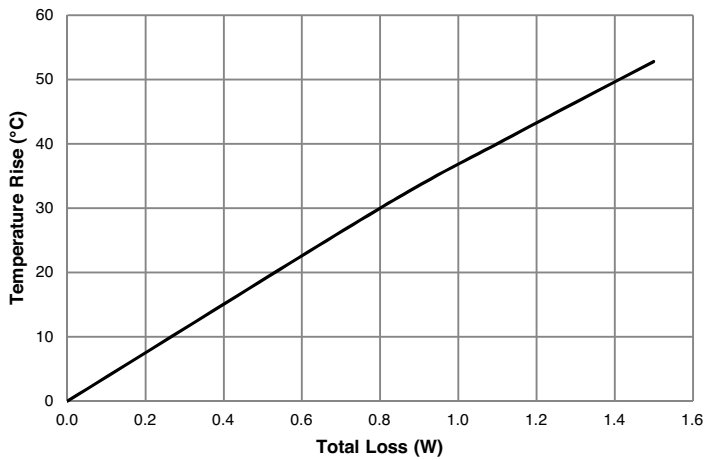
Packaging information (mm)

Supplied in tape-and-reel packaging, 500 parts on a 13" diameter reel.

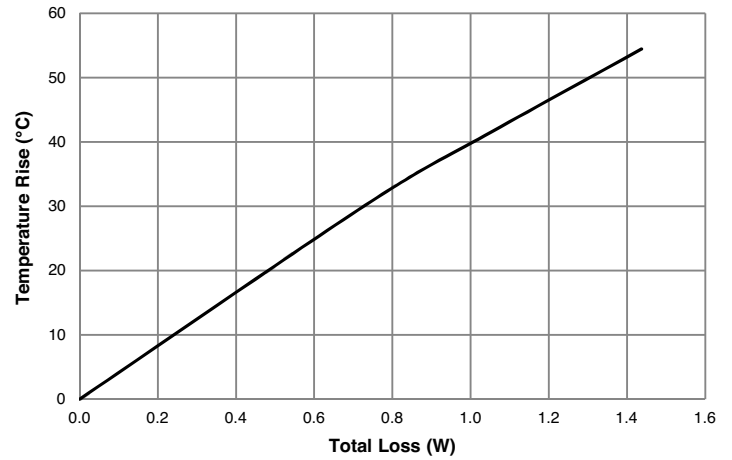


Temperature rise vs total loss

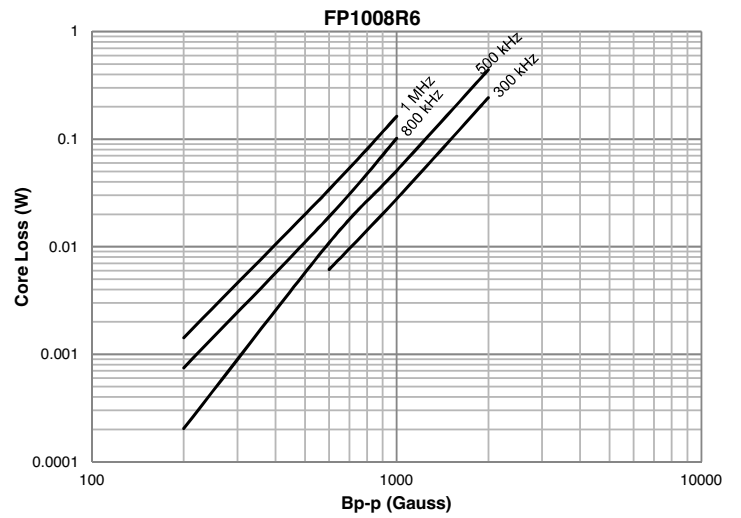
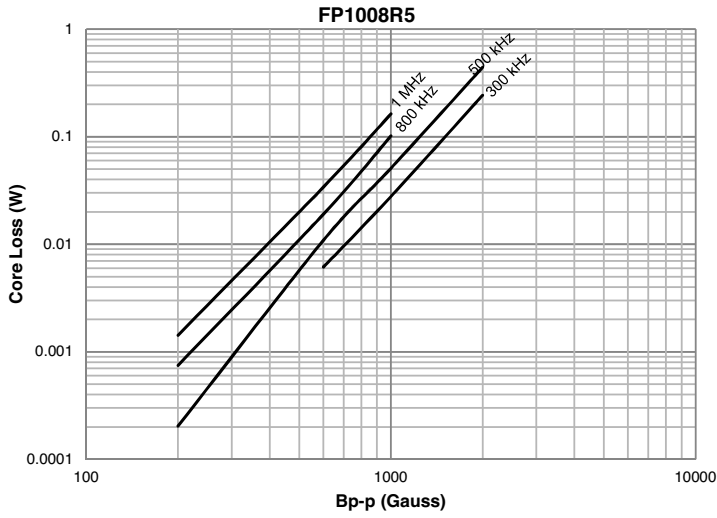
FP1008R5



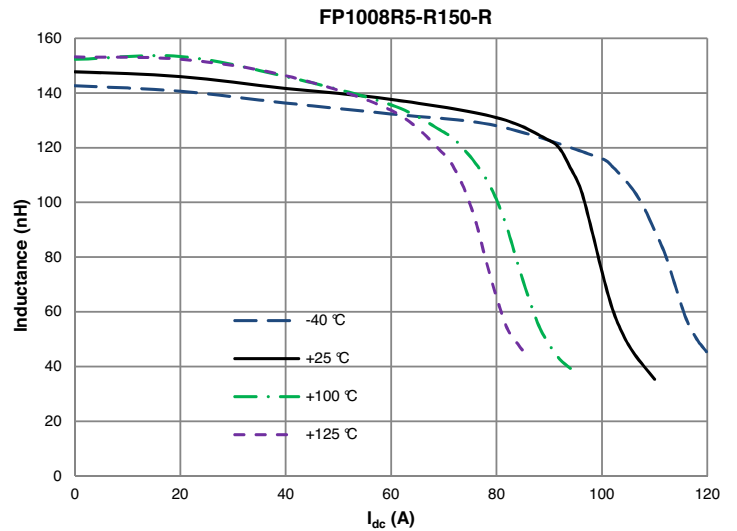
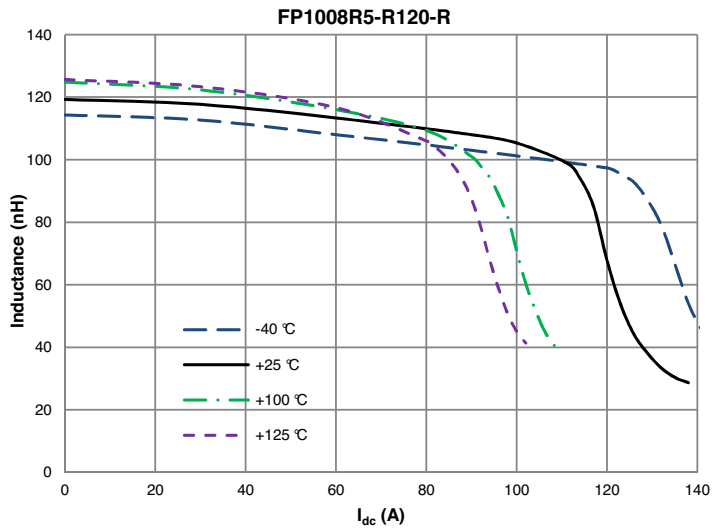
FP1008R6



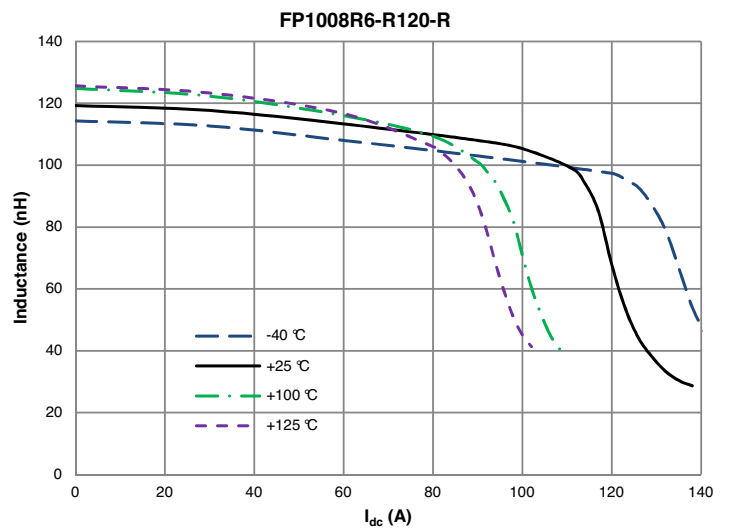
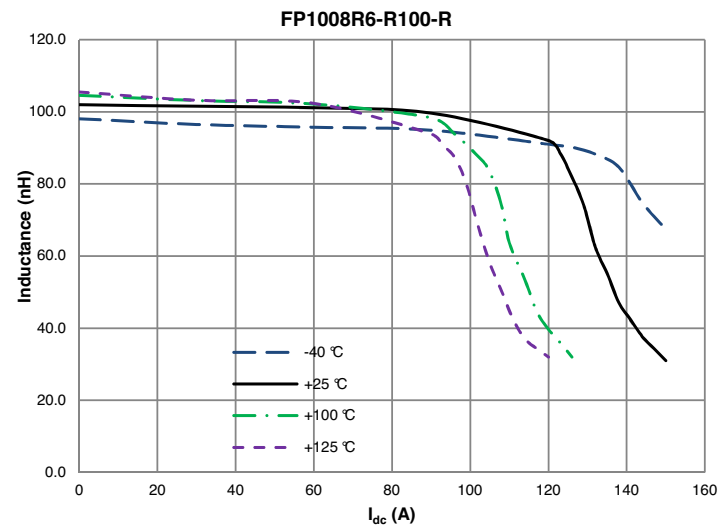
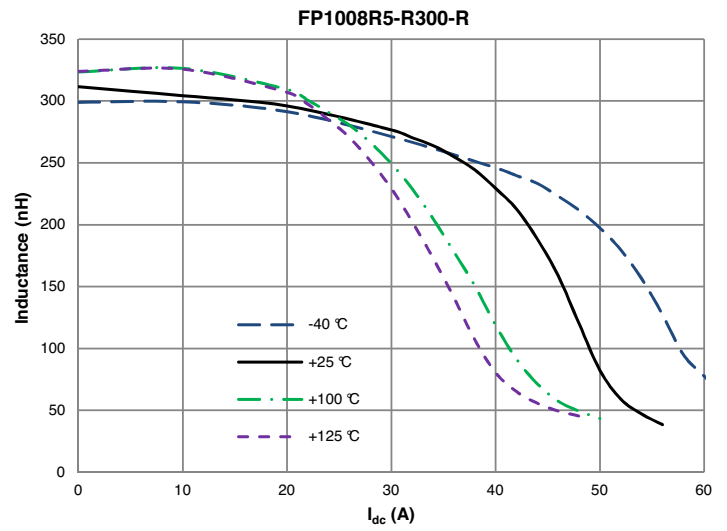
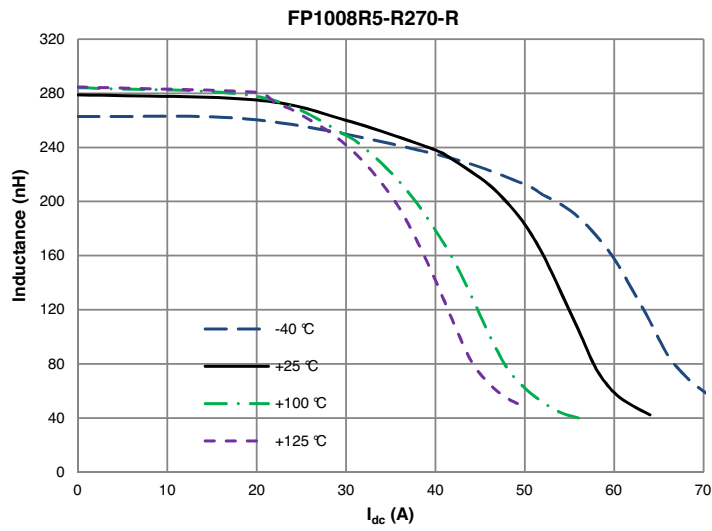
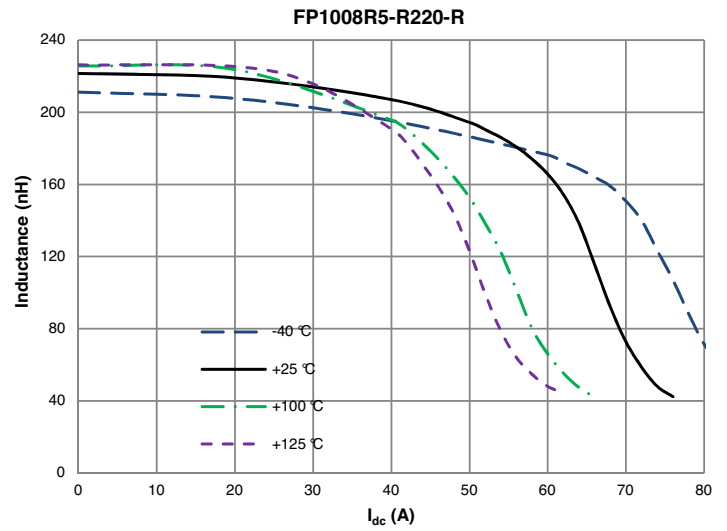
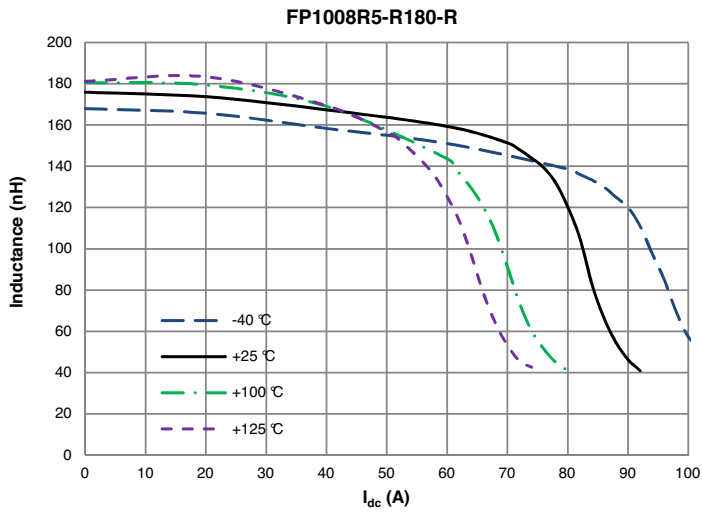
Core loss vs. B_{p-p}



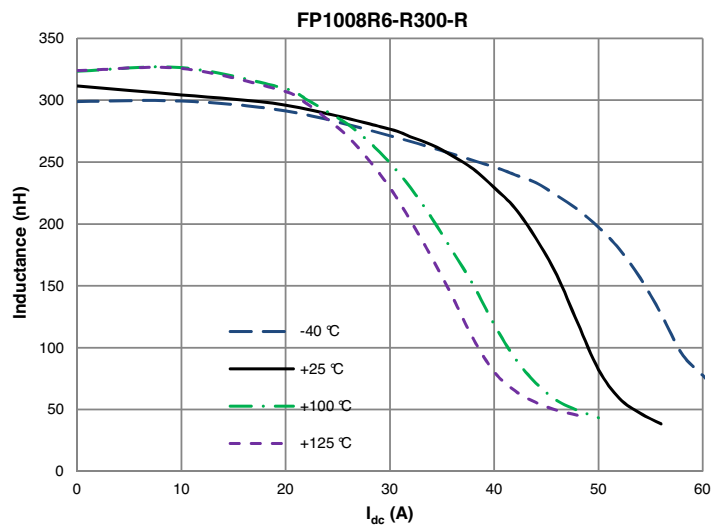
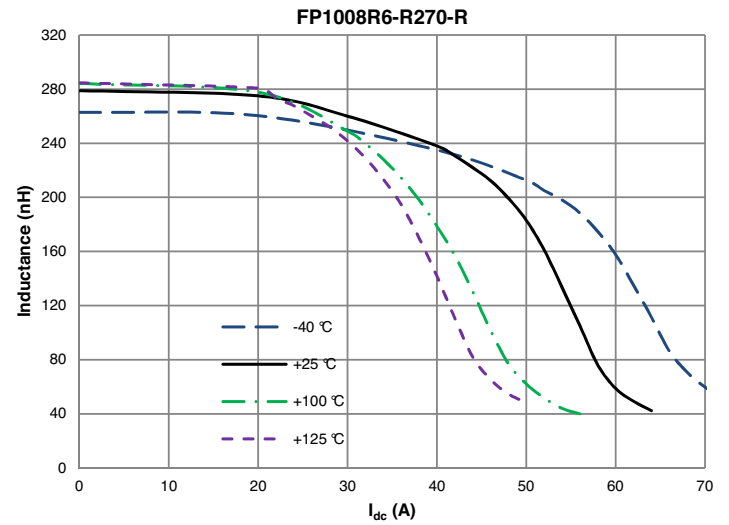
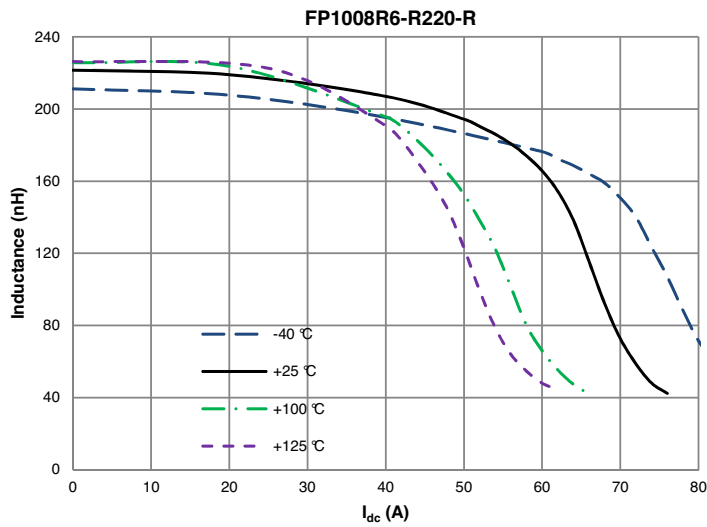
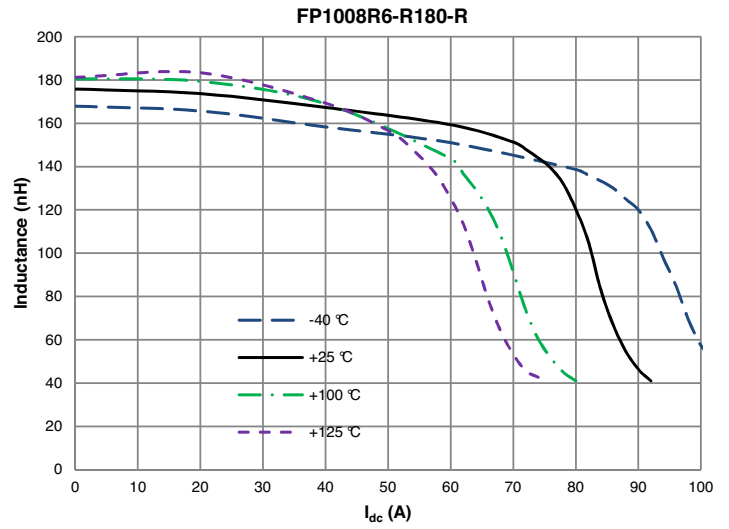
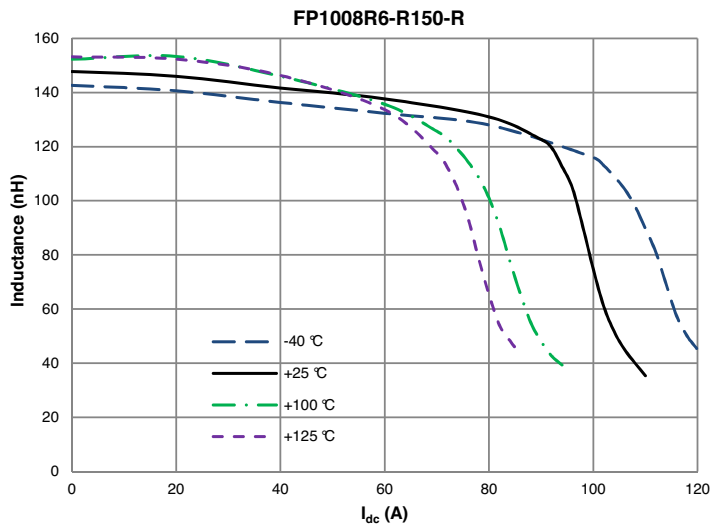
Inductance characteristics



Inductance characteristics



Inductance characteristics



Solder reflow profile

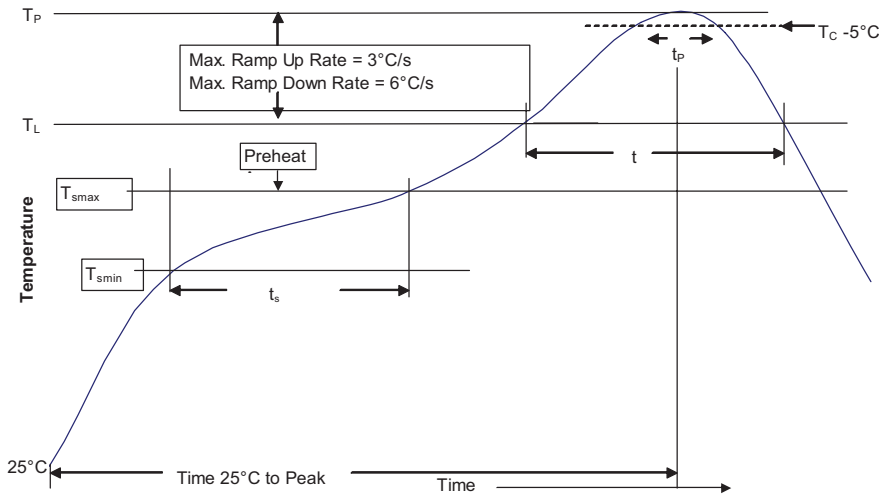


Table 1 - Standard SnPb Solder (T_C)

| Package Thickness | Volume mm ³ <350 | Volume mm ³ ≥350 |
|-------------------|-----------------------------|-----------------------------|
| <2.5mm) | 235 °C | 220 °C |
| ≥2.5mm | 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 |
|-------------------|-----------------------------|-----------------------------------|------------------------------|
| <1.6mm | 260 °C | 260 °C | 260 °C |
| 1.6 – 2.5mm | 260 °C | 250 °C | 245 °C |
| >2.5mm | 250 °C | 245 °C | 245 °C |

Reference JDEC 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 |
| Average ramp up rate T _{smax} 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 _{smax}) | 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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- Техническая поддержка проекта;
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