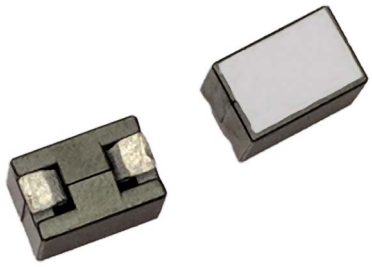
FP1010V

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 330 nH
- Current range from 35 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
- Moisture Sensitivity Level: 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 (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
- Halogen free, lead free, RoHS compliant

Pb HALOGEN HF FREE RoHS

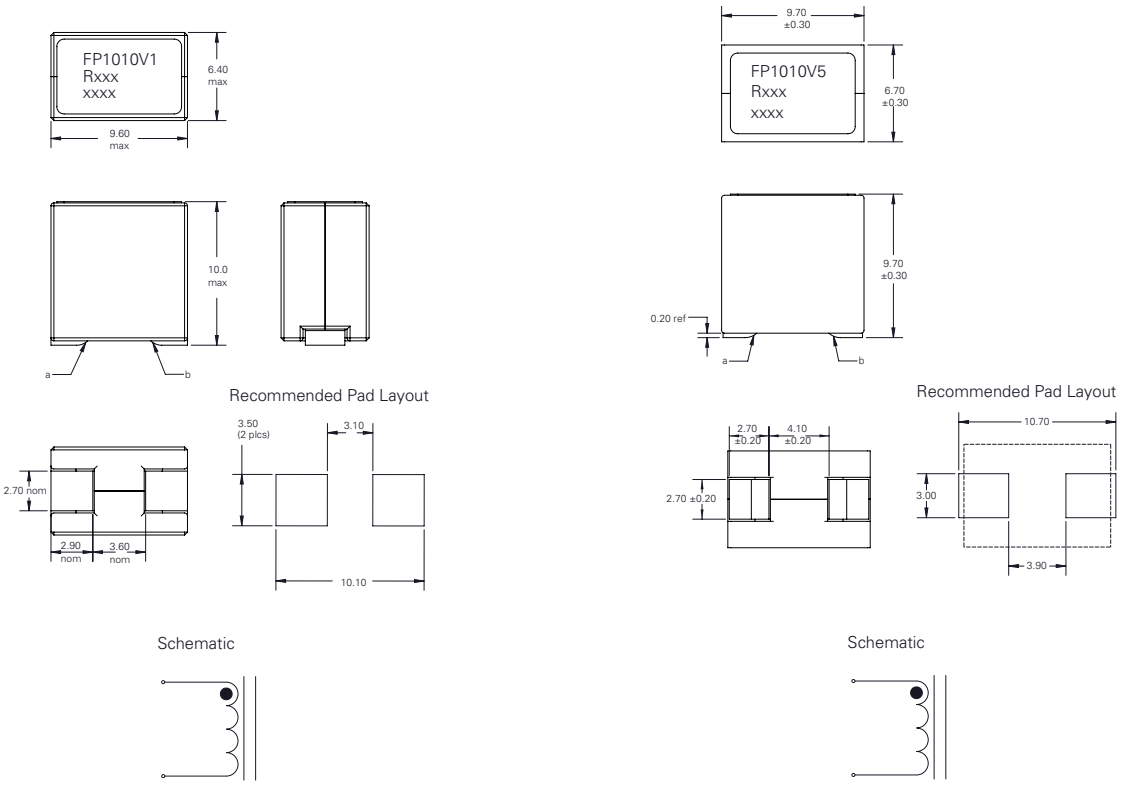
Powering Business Worldwide

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) @ +20 °C	K-factor[7]
V1 Version								
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
V5 Version								
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

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, $I_{sat}1$, +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 (FP1010V1), @ +100 °C (FP1010V5)
6. $I_{sat}3$: Peak current for approximately 20% rolloff @ +100 °C (FP1010V1), @ +125 °C (FP1010V5)
7. K-factor: Used to determine B_{p-p} for core loss (see graph).
   Bp-p = K * L * ΔI * 10^{-3} B_{p-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
   FP1010V= Product code and size
   x= Version indicator
   Rxxx= Inductance value in µH, R= decimal point
   -R suffix = RoHS compliant

Dimensions (mm)

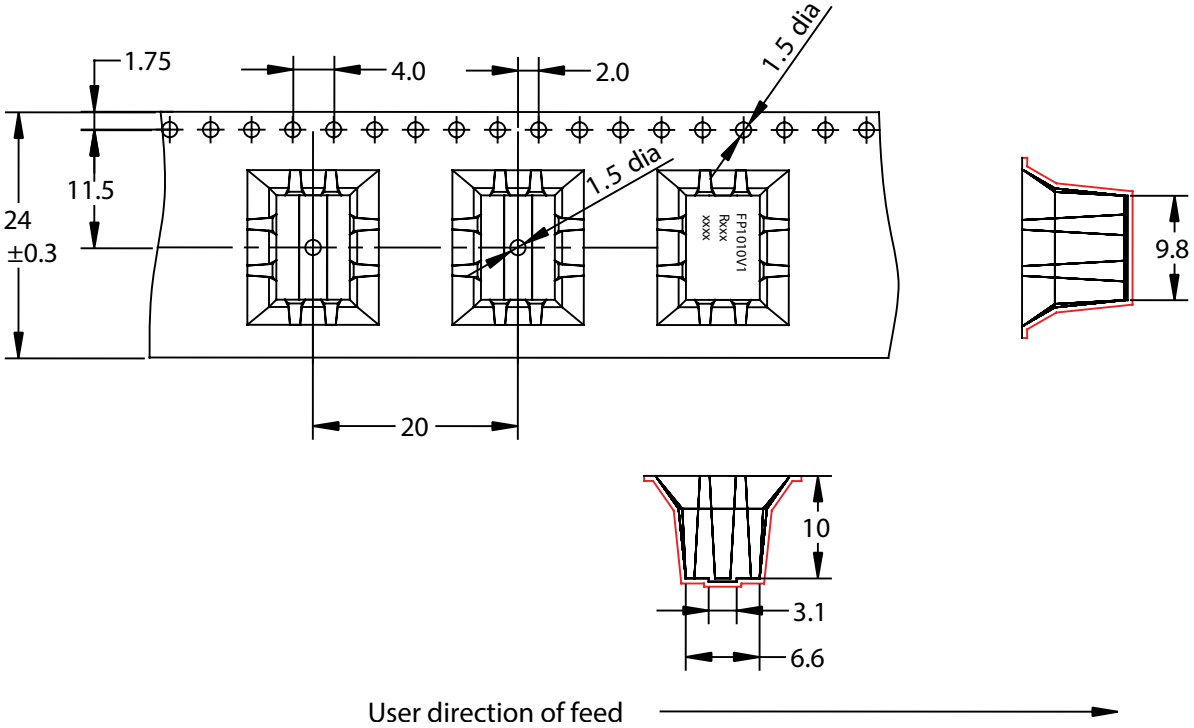


Part marking: FP1010Vx (x = Version indicator), Rxxx = Inductance value in uH, R= decimal point), xxxx=Lot code
Tolerances are ±0.15 unless stated otherwise
Pad layout tolerances are ±0.1 unless stated otherwise
Soldering surfaces to be coplanar within 0.1 millimeters
DCR measured from point "a" to point "b"
Weight: (FP1010V1) 2.5 g reference, (FP1010V5) 3.0 g reference
Termination finish: matte tin (Sn) over nickel (Ni)
Do not route traces or vias underneath the inductor

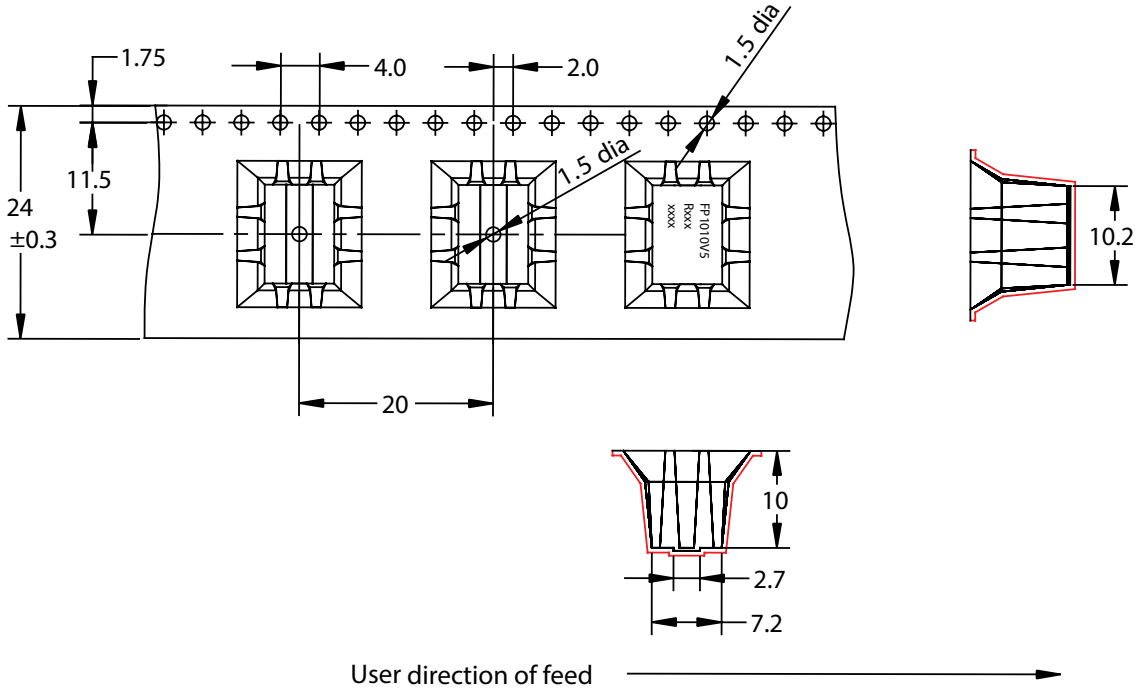
Packaging information (mm)

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

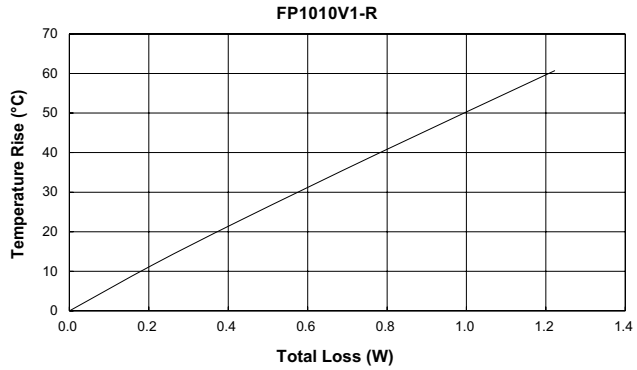
FP1010V1

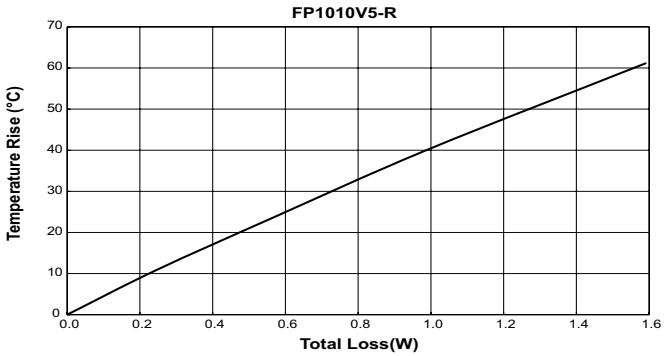


FP1010V5

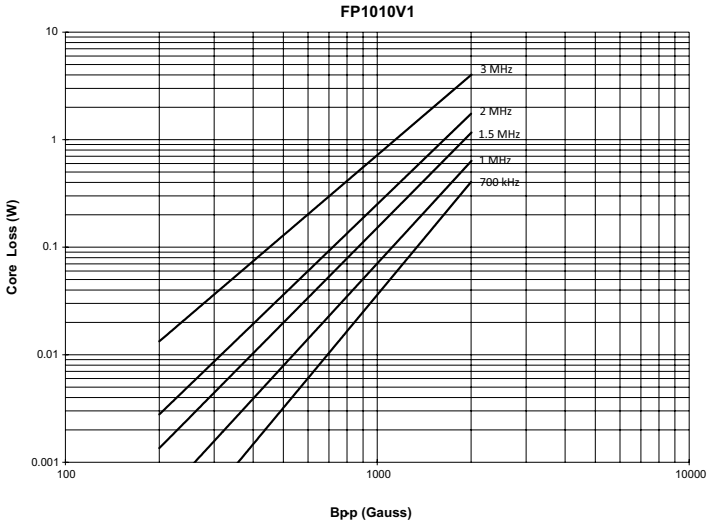


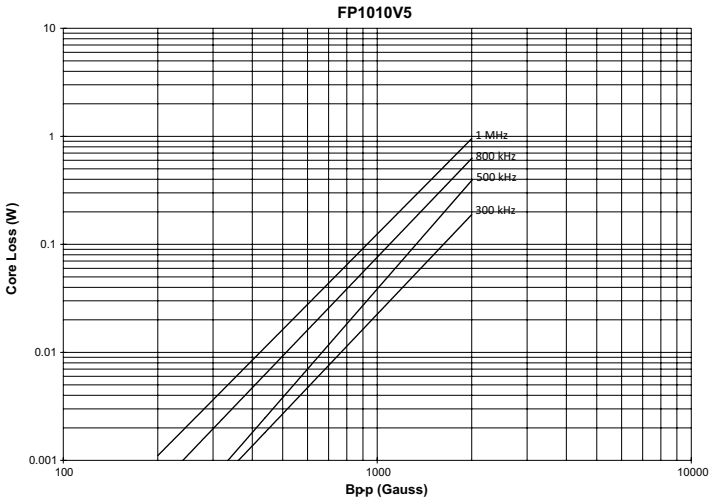
Temperature rise vs. total loss



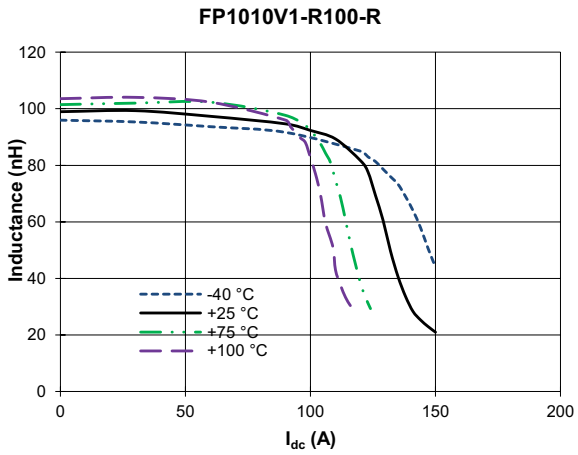


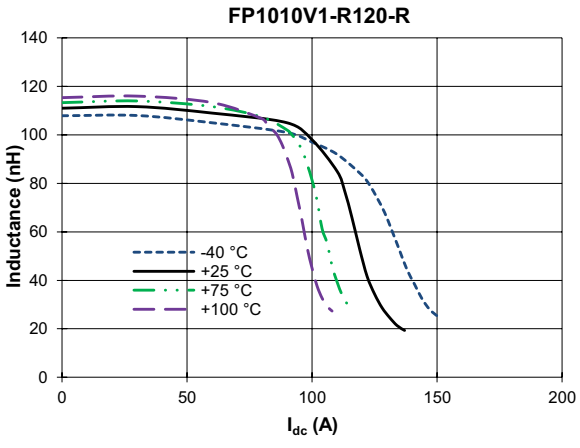
Core loss vs. B_{p-p}





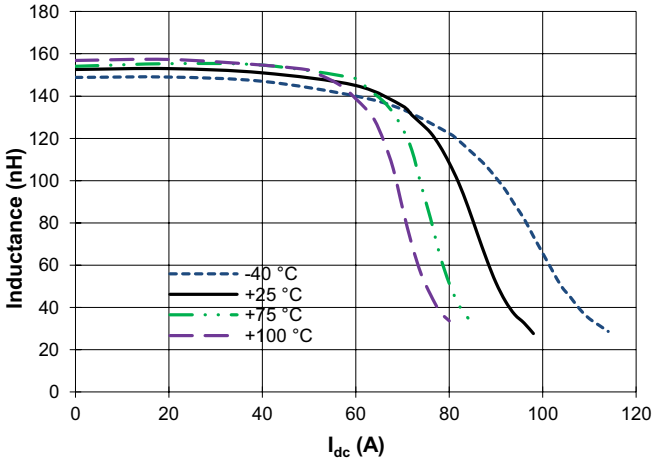
Inductance characteristics



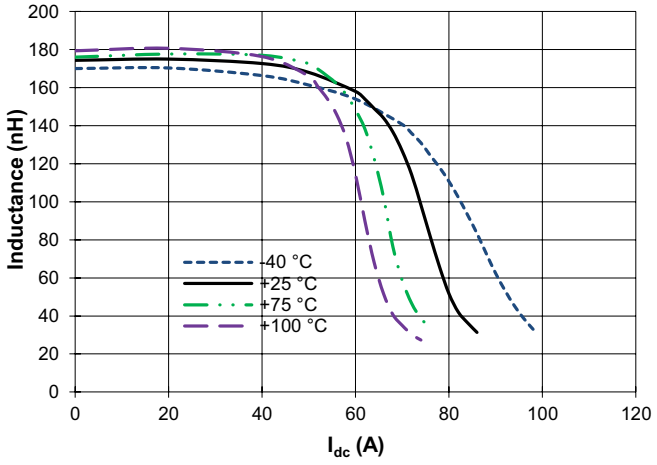


Inductance characteristics

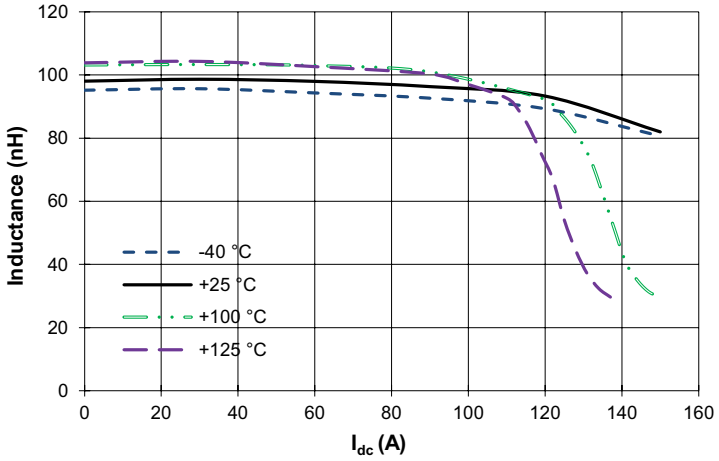
FP1010V1-R150-R



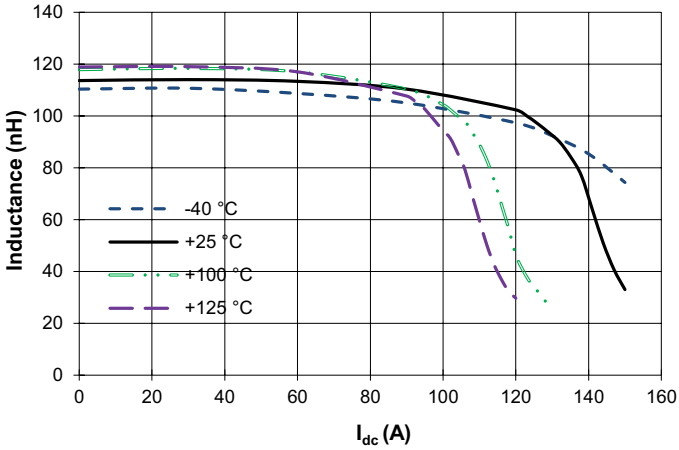
FP1010V1-R180-R



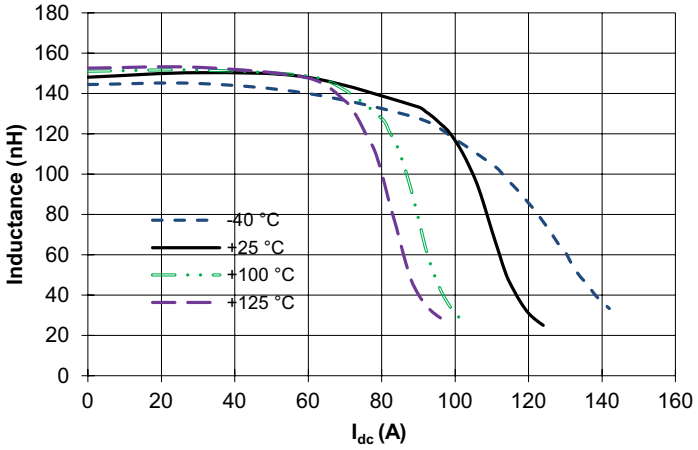
FP1010V5-R100-R



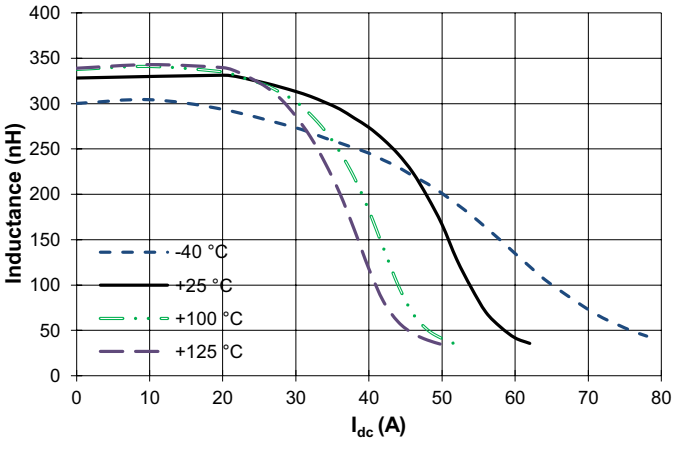
FP1010V5-R120-R



FP1010V5-R150-R



FP1010V5-R330-R



Solder reflow profile

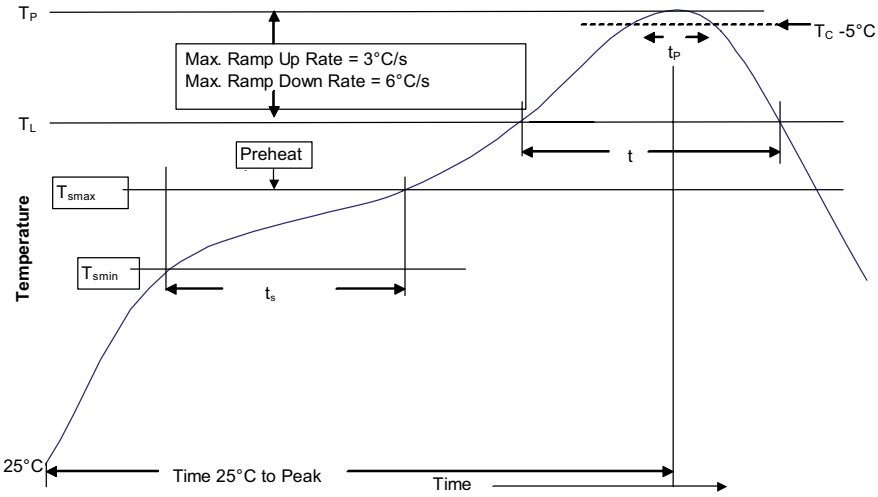


Table 1 - Standard SnPb Solder (T_C)

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) Time at liquidous (t_L)		183 °C 60-150 Seconds	217 °C 60-150 Seconds
Peak package body temperature (Tp)*		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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