

HCMA0703

Automotive grade High current power inductors



Product features

- Automotive grade 3 qualified
- High current carrying capacity, low core losses
- Magnetically shielded, low EMI
- Frequency range up to 5 MHz
- Inductance range from 0.15 μ H to 33 μ H
- Current range from 1.8 A to 52 A
- 7.4 mm x 7.0 mm footprint surface mount package in a 3.0 mm height
- Iron powder core material

Applications

- Body electronics
 - Central body control module
 - Vehicle access control system
 - Headlamps, tail lamps and interior lighting
 - Heating ventilation and air conditioning controllers (HVAC)
 - Doors, window lift and seat control
- Advanced driver assistance systems
 - 77 GHz radar systems
 - Adaptive cruise control (ACC)
 - Automatic parking control
 - Collision avoidance system
 - Car black box system
- Infotainment and cluster electronics
 - Active noise cancellation (ANC)
 - Audio subsystem: head unit and trunk amp
 - Digital instrument cluster
 - In-vehicle infotainment (IVI) and navigation
 - Port power/USB HUB for front and rear passengers
- Chassis and safety electronics
 - Airbag control unit
 - Electronic Stability Control System (ESC)

Environmental Data

- Storage temperature range (Component):
-55 °C to +125 °C
- Operating temperature range: -55 °C to +125 °C
(ambient plus self-temperature rise)
- Solder reflow temperature:
J-STD-020 (Latest revision) compliant



Product Specifications

| Part Number ⁶ | OCL ¹ (μ H) \pm 20% | FLL ² (μ H) minimum | I _{rms} ³ (A) | I _{sat} ⁴ (A) | DCR (m Ω) typical @ +20 °C | DCR (m Ω) maximum @ +20 °C | K-factor ⁵ |
|--------------------------|------------------------------------------|----------------------------------------|--------------------------------------|--------------------------------------|------------------------------------------|------------------------------------------|-----------------------|
| HCMA0703-R15-R | 0.15 | 0.09 | 26 | 52 | 1.9 | 2.5 | 1044 |
| HCMA0703-R22-R | 0.22 | 0.13 | 23 | 40 | 2.5 | 2.8 | 986 |
| HCMA0703-R47-R | 0.47 | 0.28 | 17.5 | 26 | 4.0 | 4.2 | 580 |
| HCMA0703-R68-R | 0.68 | 0.41 | 15.5 | 25 | 5.0 | 5.5 | 455 |
| HCMA0703-R82-R | 0.82 | 0.49 | 13 | 24 | 6.7 | 8.0 | 439 |
| HCMA0703-1R0-R | 1.0 | 0.60 | 11 | 22 | 9.0 | 10 | 374 |
| HCMA0703-1R5-R | 1.5 | 0.90 | 9.0 | 18 | 14 | 15 | 366 |
| HCMA0703-2R2-R | 2.2 | 1.32 | 8.0 | 14 | 18 | 20 | 281 |
| HCMA0703-3R3-R | 3.3 | 1.98 | 6.0 | 13.5 | 28 | 30 | 252 |
| HCMA0703-4R7-R | 4.7 | 2.82 | 5.5 | 10 | 37 | 40 | 210 |
| HCMA0703-6R8-R | 6.8 | 4.08 | 4.5 | 8.0 | 54 | 60 | 151 |
| HCMA0703-8R2-R | 8.2 | 4.92 | 4.0 | 7.5 | 64 | 68 | 142 |
| HCMA0703-100-R | 10 | 6.00 | 3.2 | 7.0 | 71 | 78 | 132 |
| HCMA0703-220-R | 22 | 14.1 | 2.3 | 3.0 | 135 | 149 | 83 |
| HCMA0703-330-R | 33 | 19.8 | 1.8 | 2.2 | 220 | 242 | 76 |

1. Open Circuit Inductance (OCL) Test Parameters: 100kHz, 0.25 Vrms, 0.0 Adc, +25 °C

2. Full Load Inductance (FLL) Test Parameters: 100 kHz, 0.25 Vrms, Isat, +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}: Peak current for approximately 20% rolloff @ +25 °C

5. K-factor: Used to determine Bp-p for core loss (see graph). Bp-p = K * L * Δ I. Bp-p: (Gauss), K: (K-factor from table), L: (Inductance in μ H), Δ I (Peak to peak ripple current in Amps).

6. Part Number Definition: HCMA0703-xxx-R

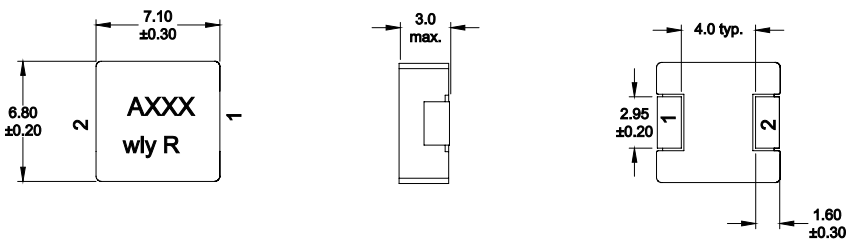
HCMA0703 = Product code and size

-xxx= inductance value in μ H, R= decimal point,

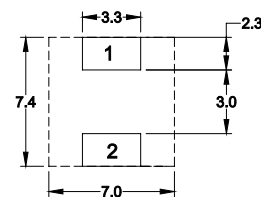
If no R is present then last character equals number of zeros

-R suffix = RoHS compliant

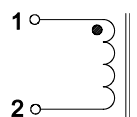
Dimensions (mm)



Recommended Pad Layout

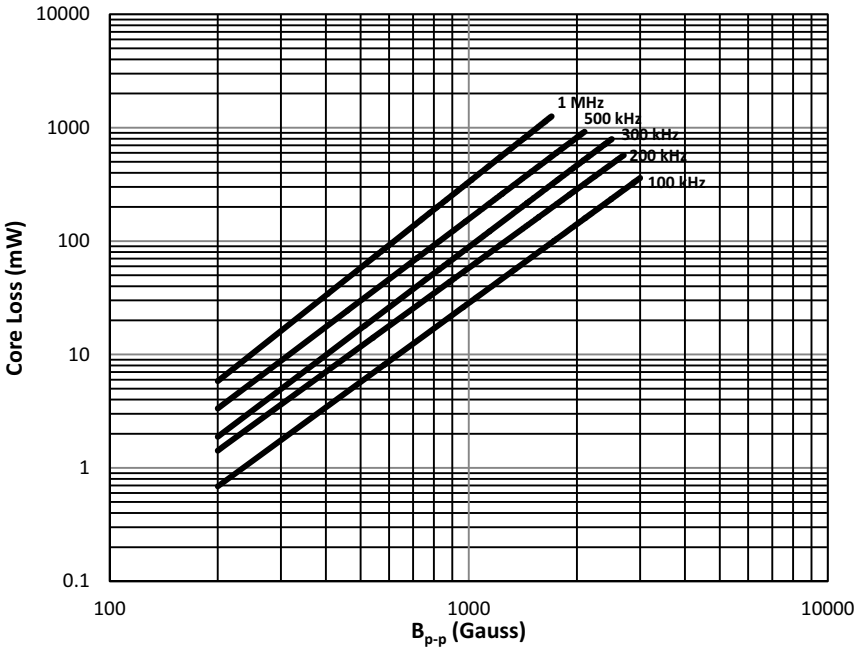


Schematic

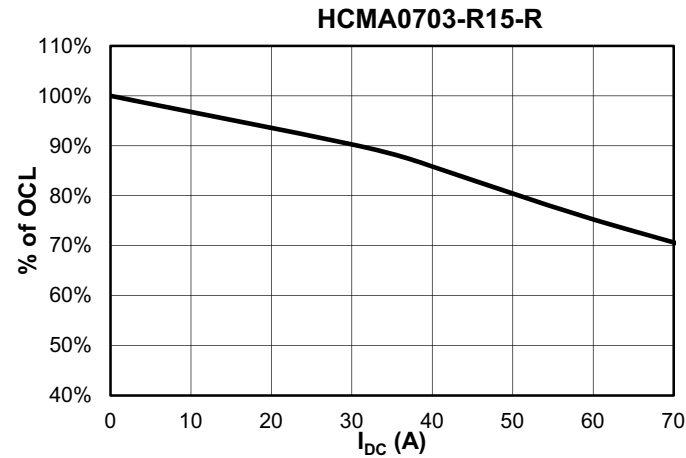


Part marking: A= Automotive grade, xxx= inductance value in μ H, R= decimal point. If no R is present then last character equals number of zeros
wly= date code, R=revision level
All soldering surfaces to be coplanar within 0.1 millimeters.
Tolerance are \pm 0.3 millimeters unless stated otherwise.
Color: Grey
Do not route traces or vias underneath the inductor

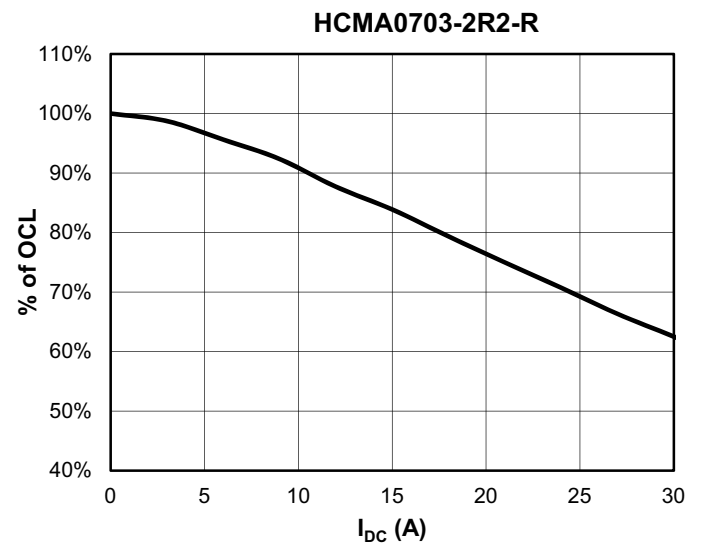
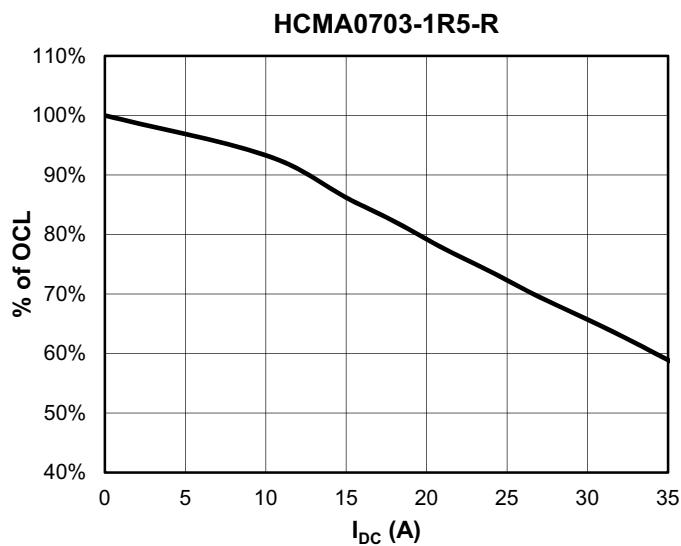
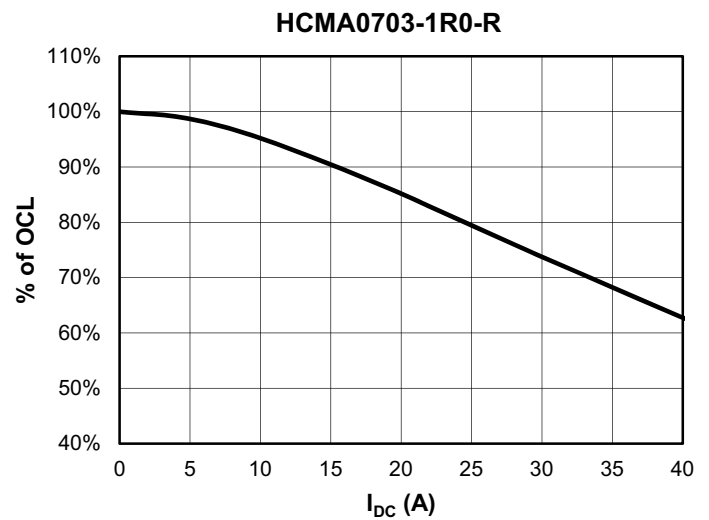
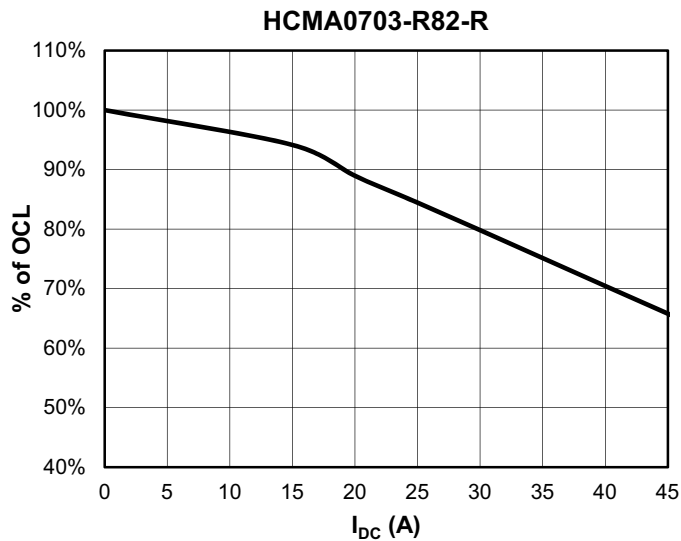
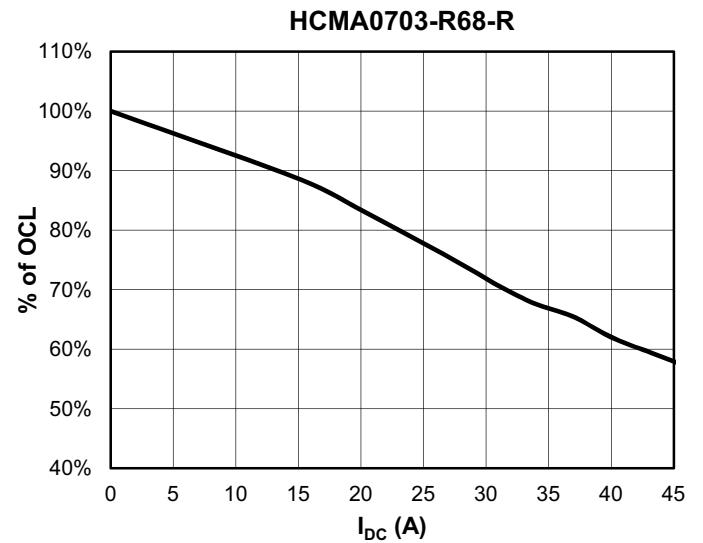
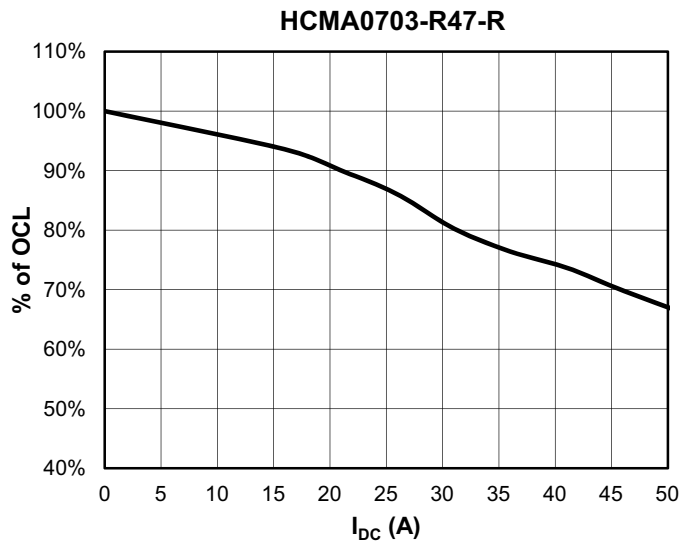
Core loss vs. B_{p-p}



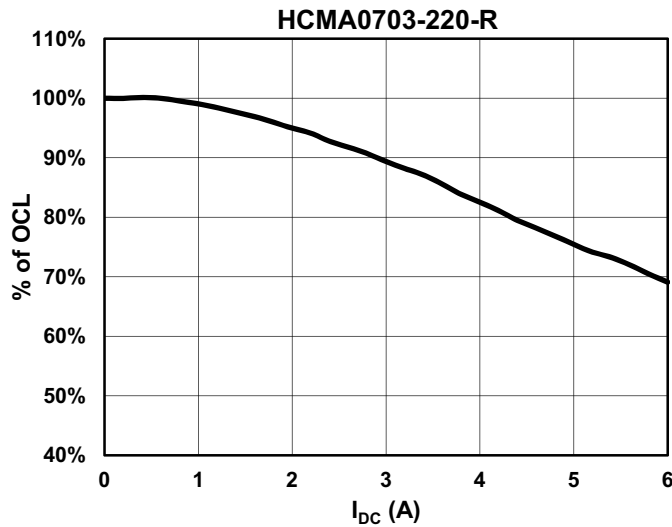
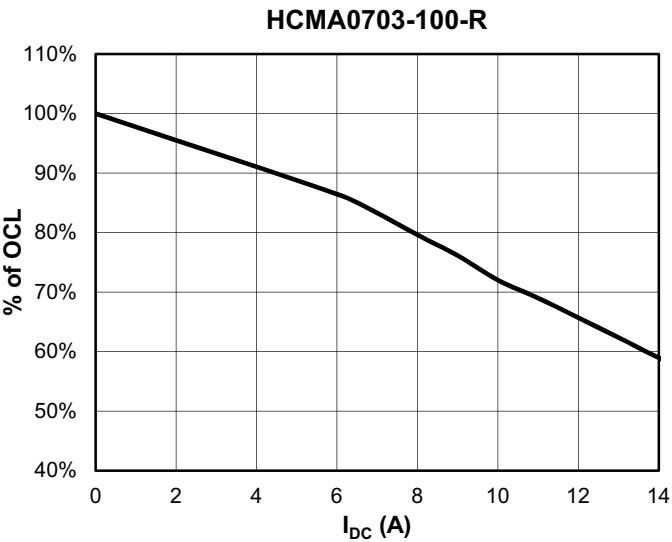
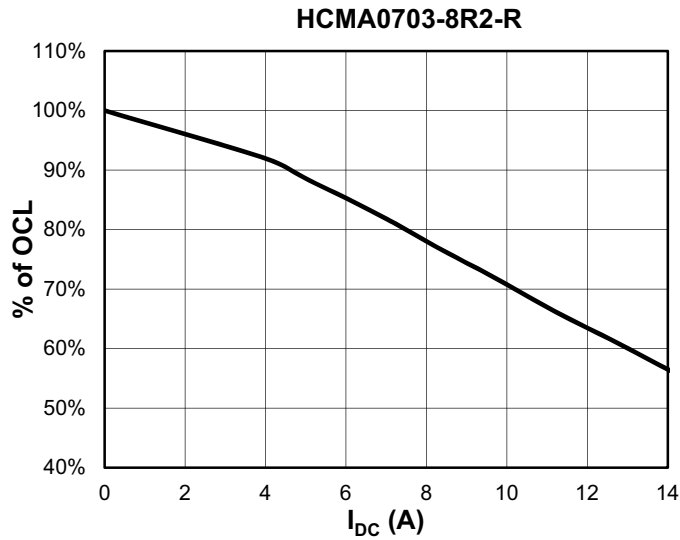
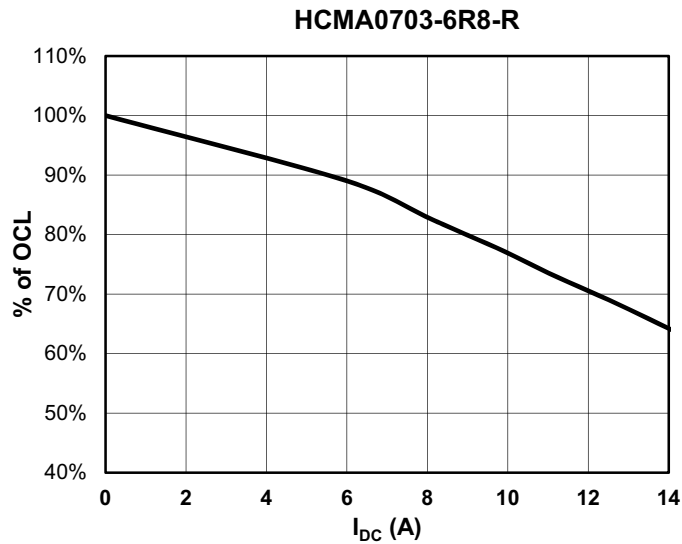
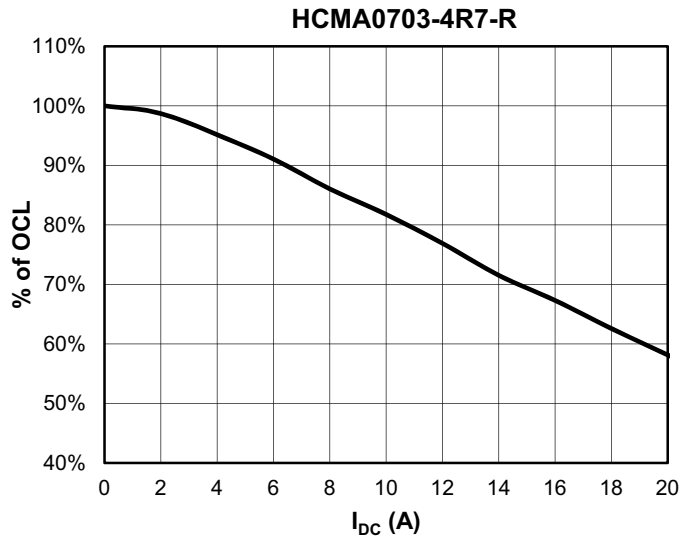
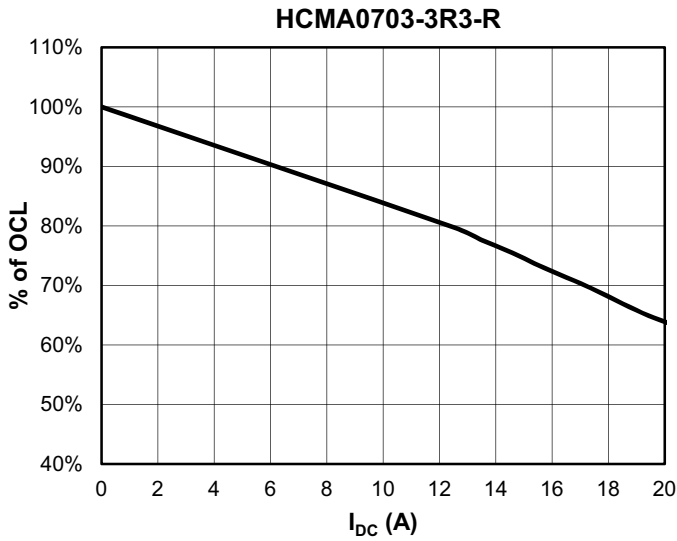
Inductance characteristics



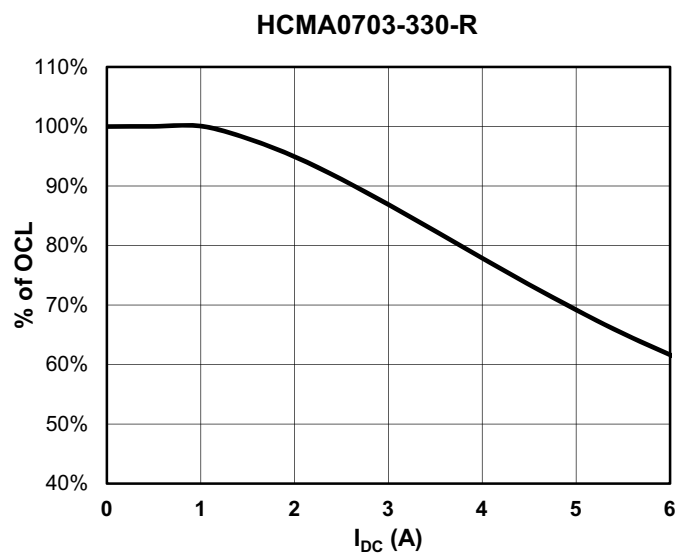
Inductance characteristics



Inductance characteristics



Inductance characteristics



Solder reflow profile

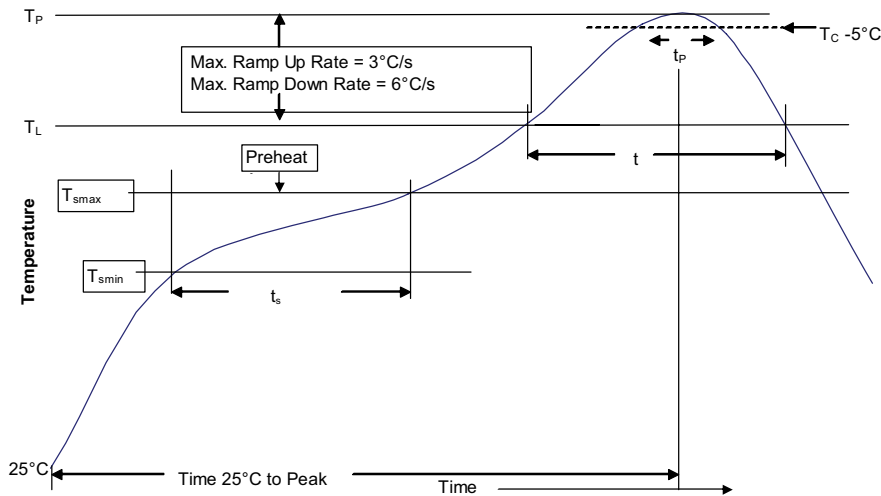


Table 1 - Standard SnPb Solder (T_C)

| Package Thickness | Volume mm^3 <350 | Volume mm^3 \geq 350 |
|-------------------|--------------------|--------------------------|
| <2.5 mm | 235 °C | 220 °C |
| \geq 2.5 mm | 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 |
|-------------------|--------------------|--------------------------|---------------------|
| <1.6 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 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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