

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_{sat} : 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

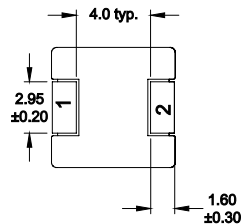
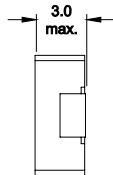
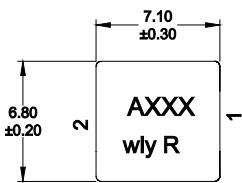
HCMA0703 = Product code and size

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

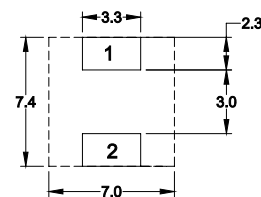
If no R is present then last character equals number of zeros

-R suffix = RoHS compliant

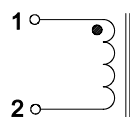
Dimensions (mm)



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

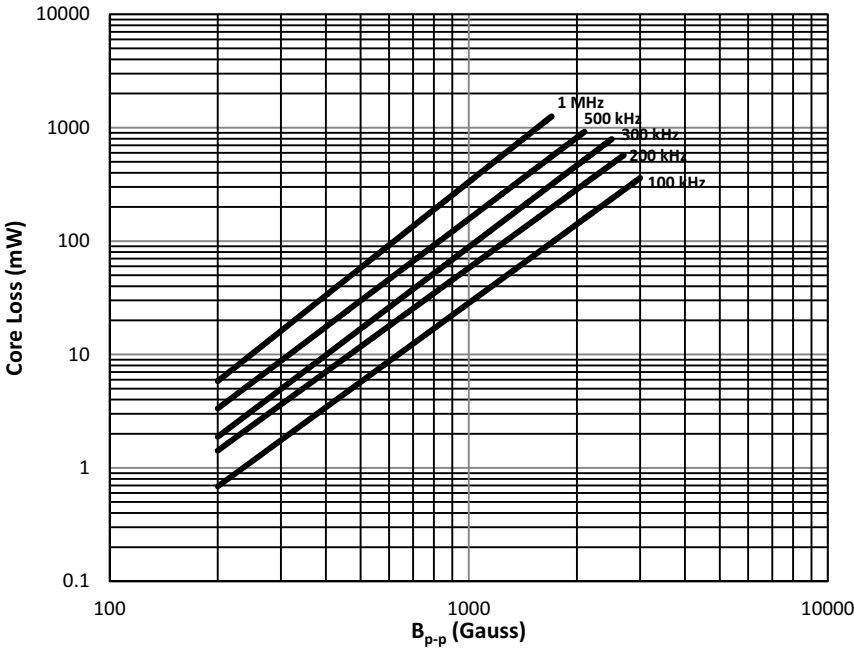
All soldering surfaces to be coplanar within 0.1 millimeters.

Tolerance are \pm 0.3 millimeters unless stated otherwise.

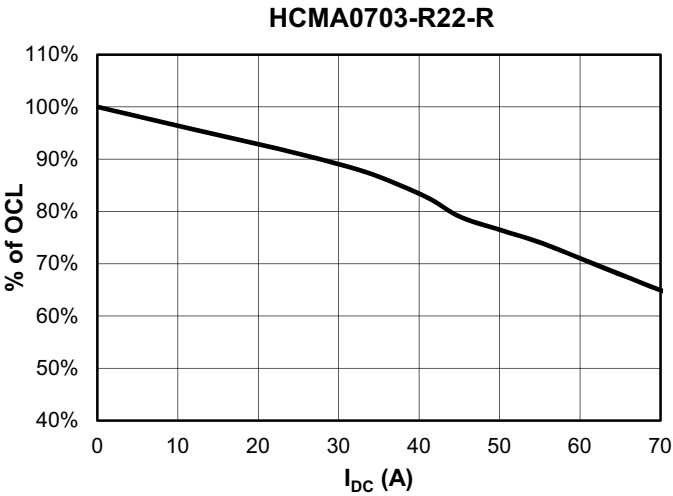
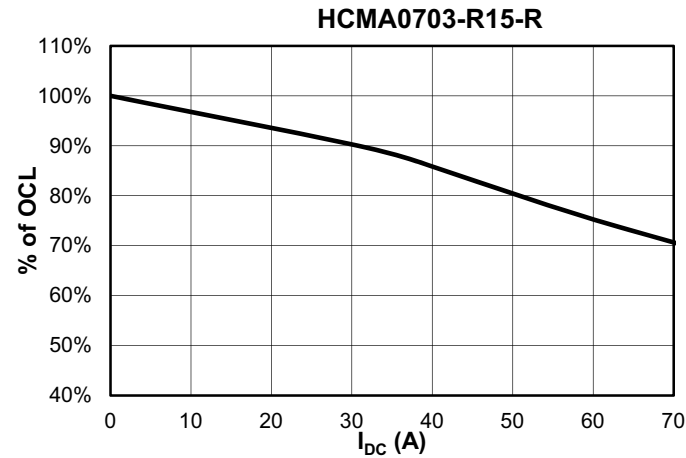
Color: Grey

Do not route traces or vias underneath the inductor

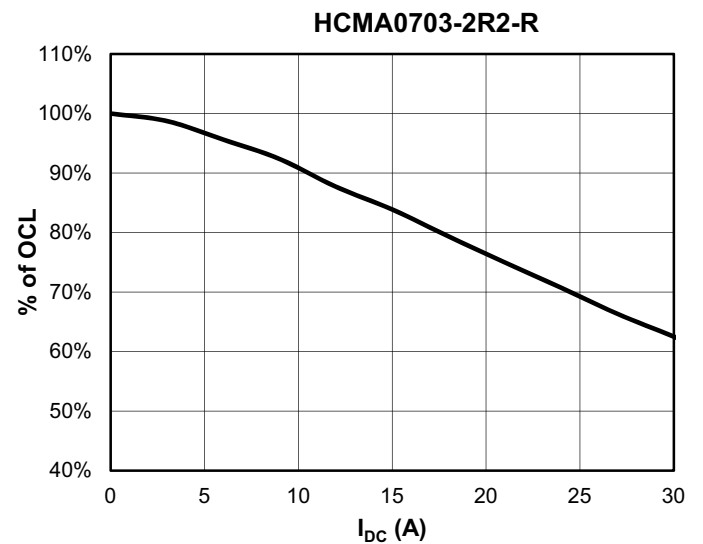
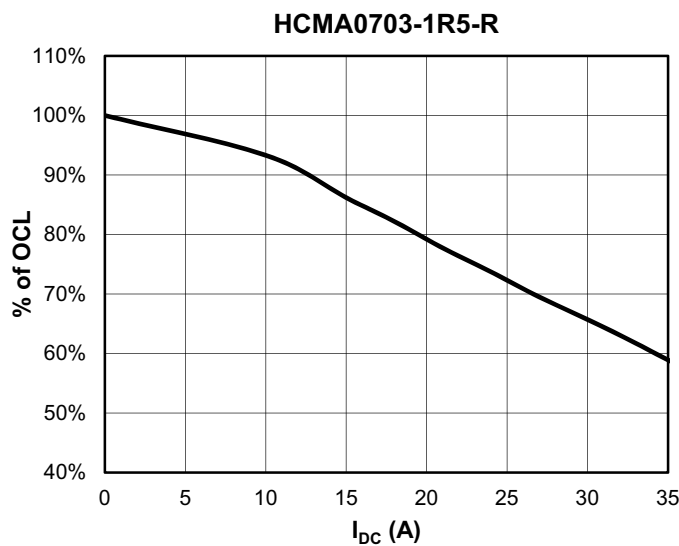
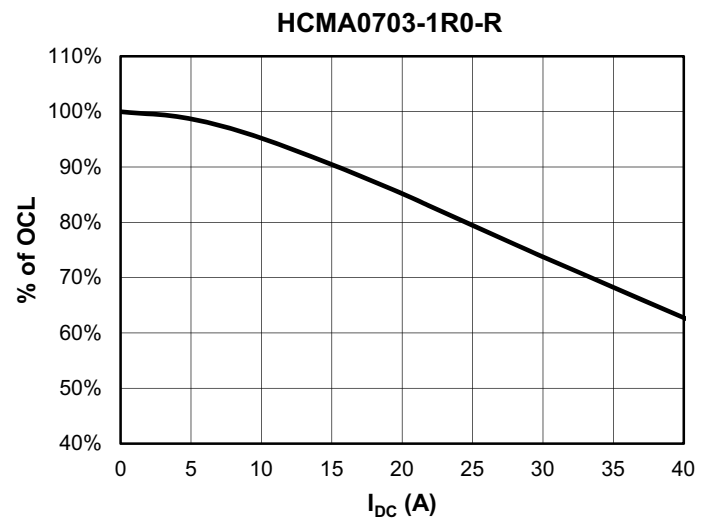
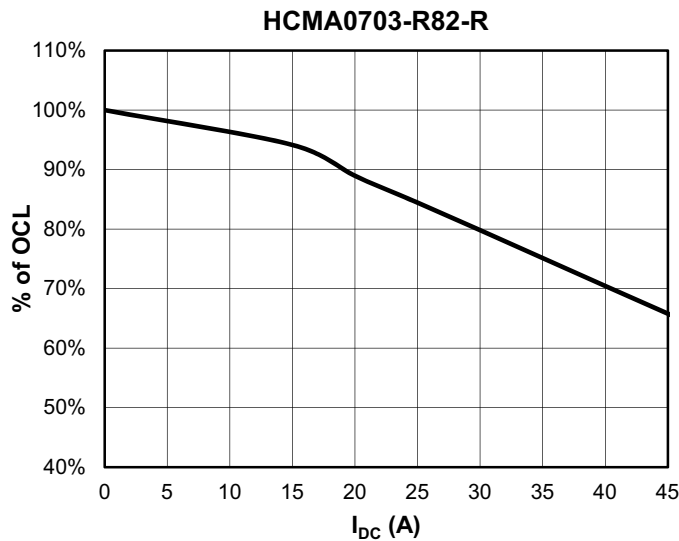
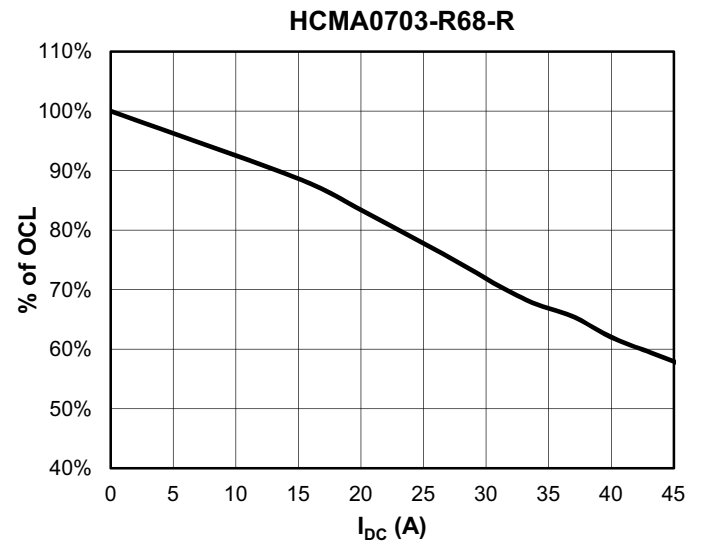
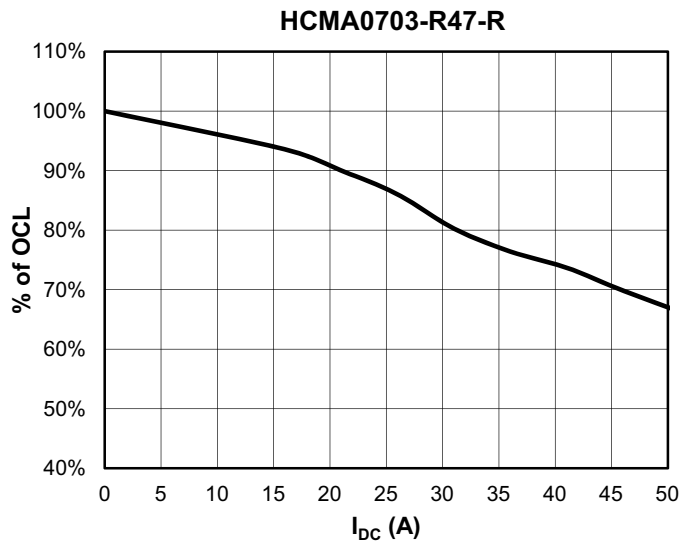
Core loss vs. B_{p-p}



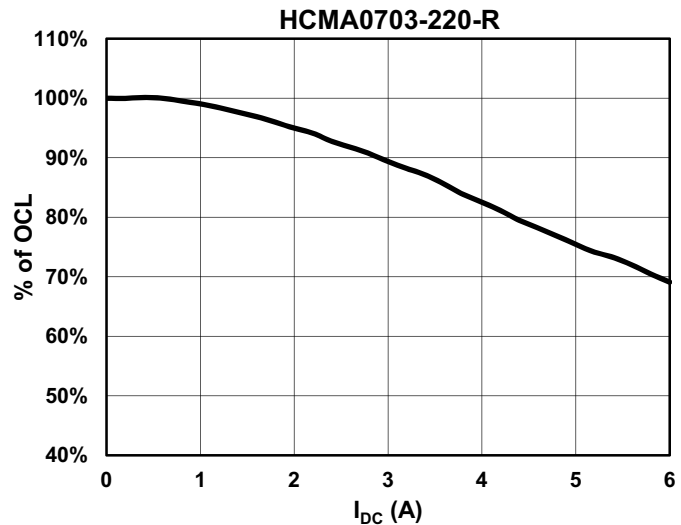
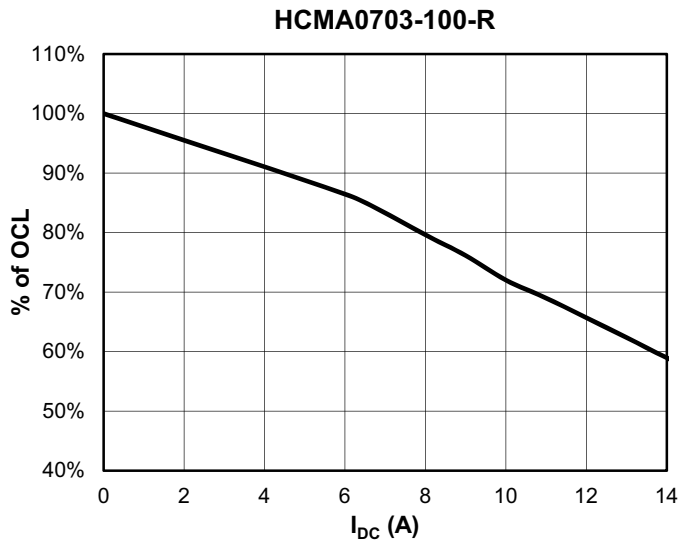
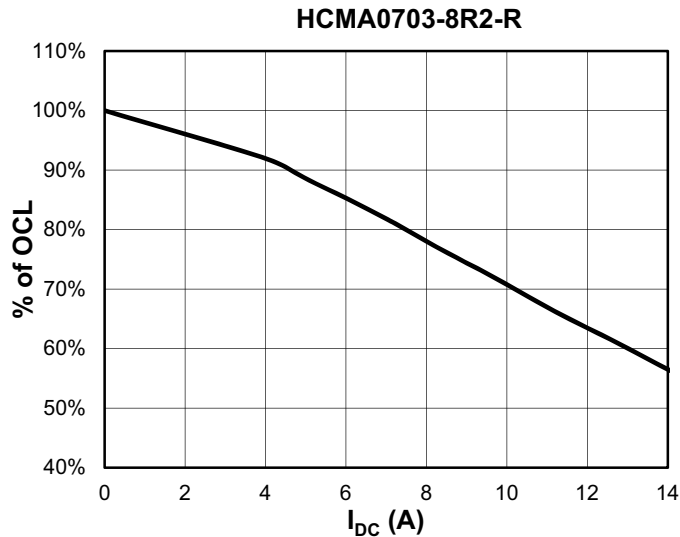
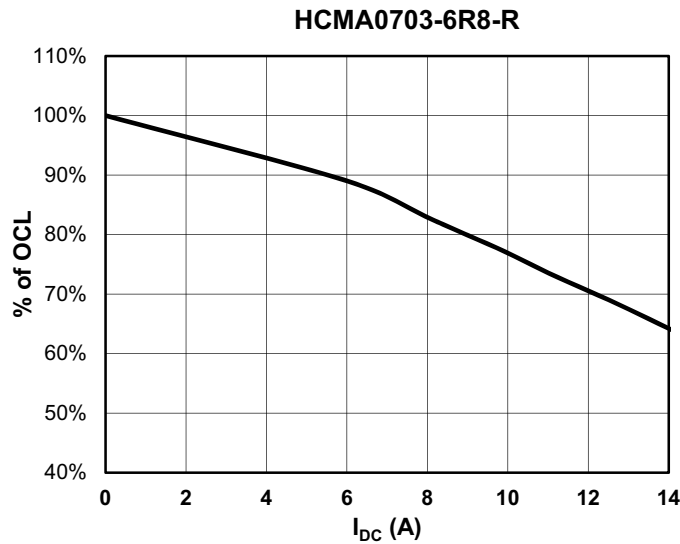
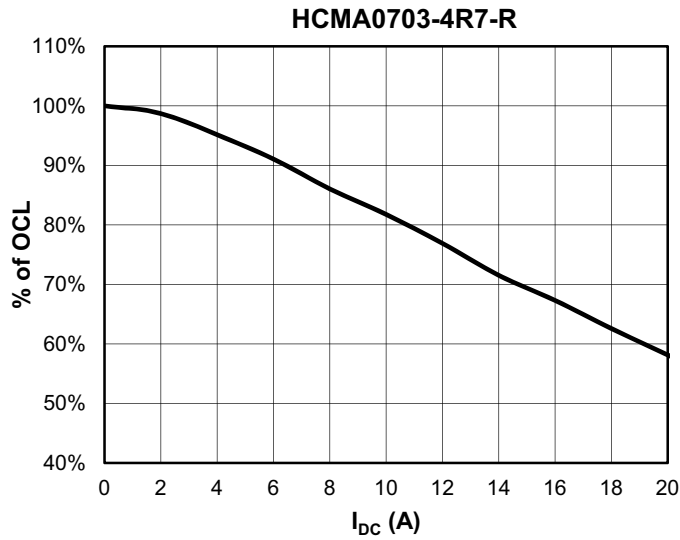
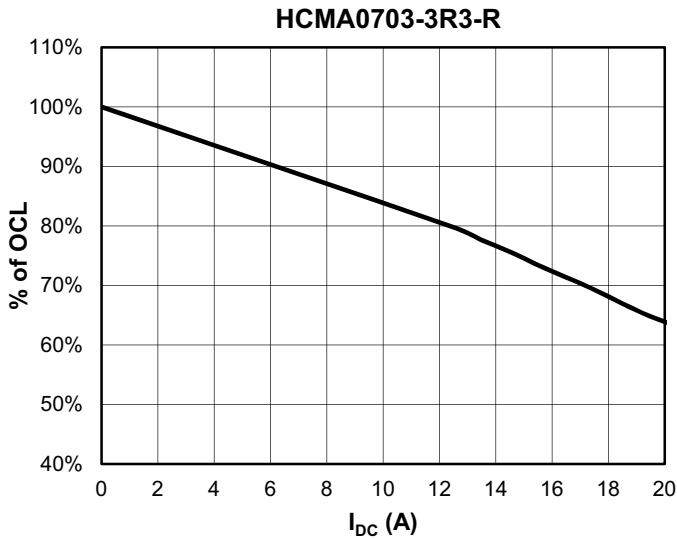
Inductance characteristics



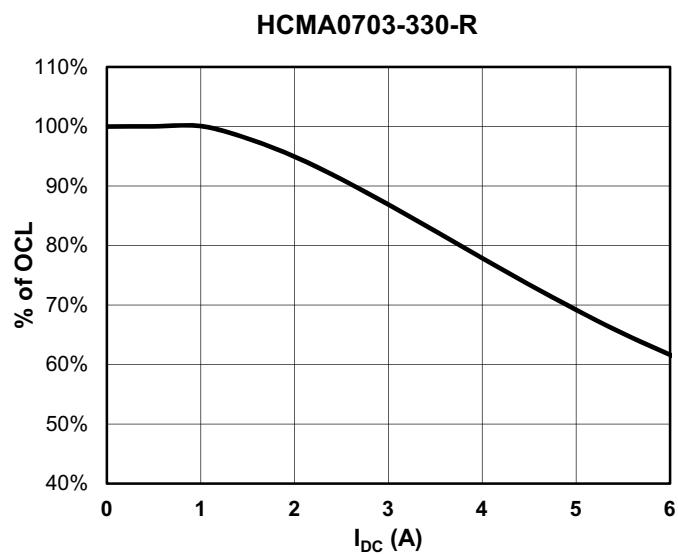
Inductance characteristics



Inductance characteristics



Inductance characteristics



Solder reflow profile

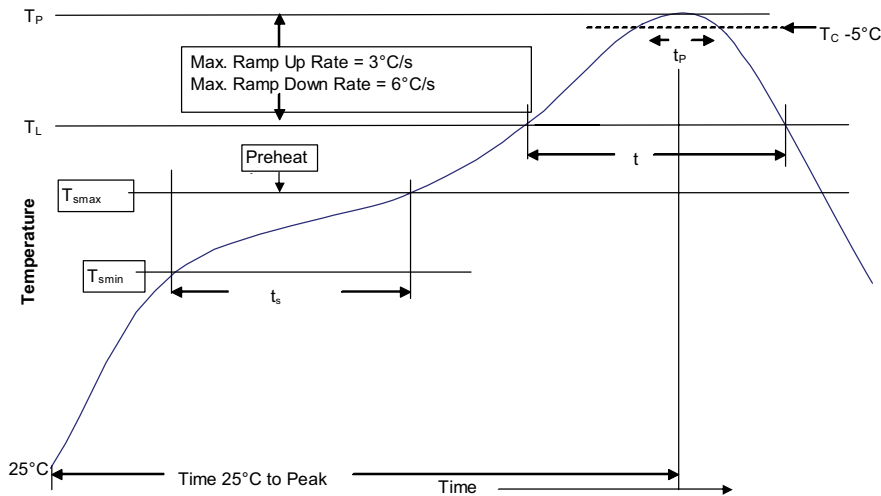


Table 1 - Standard SnPb Solder (T_C)

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 JEDEC 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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