

HCMA0703

Automotive grade

High current power inductors



Description

- 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
- Halogen free, lead free, RoHS compliant

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-020D 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

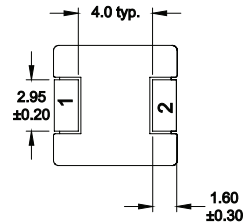
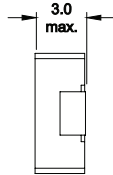
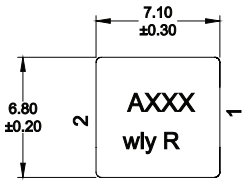
HCMA0703 = Product code and size

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

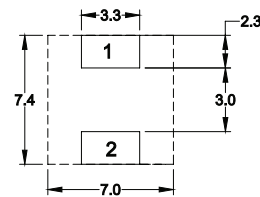
If no R is present then last character equals number of zeros

-R suffix = RoHS compliant

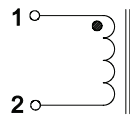
Dimensions (mm)



Recommended Pad Layout



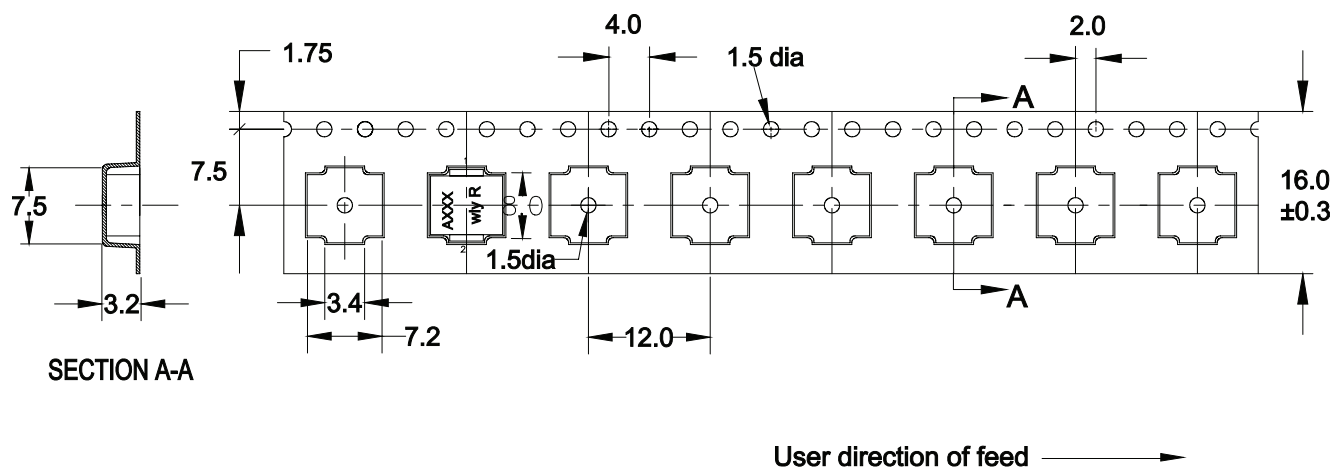
Schematic



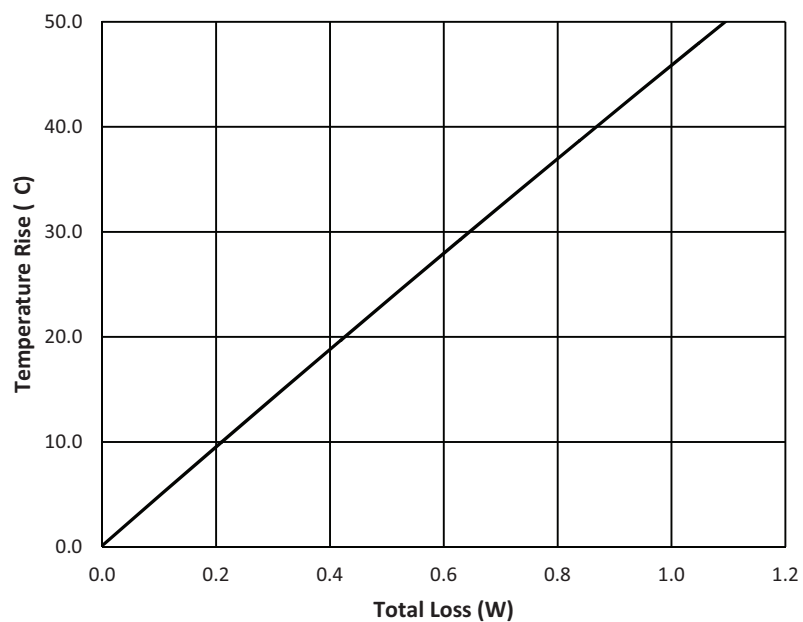
Part marking: A= Automotive grade, xxx= inductance value in μ H, R= decimal point. If no R is present then last character equals number of zeros
wly= date code, R=revision level
All soldering surfaces to be coplanar within 0.1 millimeters.
Tolerance are $\pm$ 0.3 millimeters unless stated otherwise.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

Packaging information (mm)

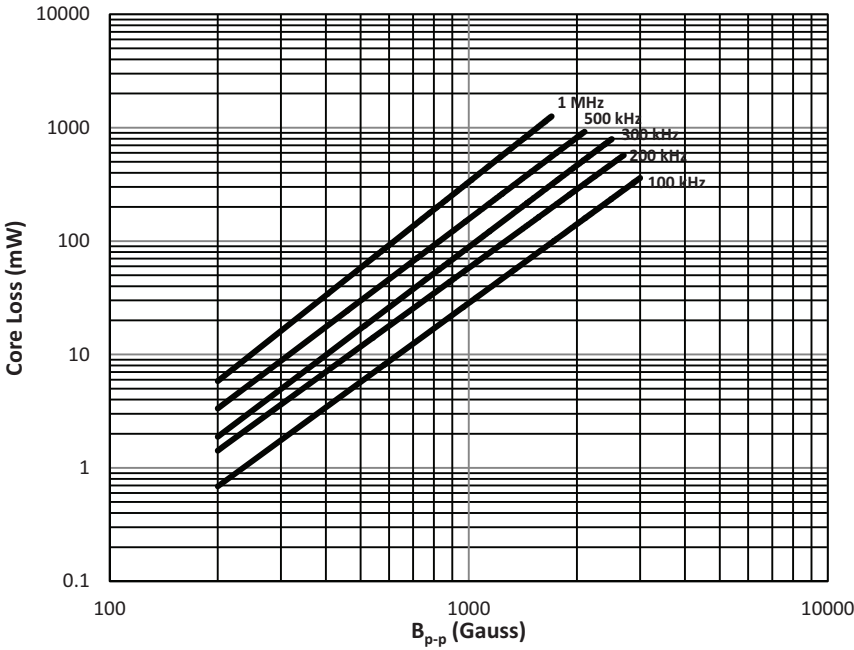
Supplied in tape and reel packaging , 1500 parts per 13" diameter reel



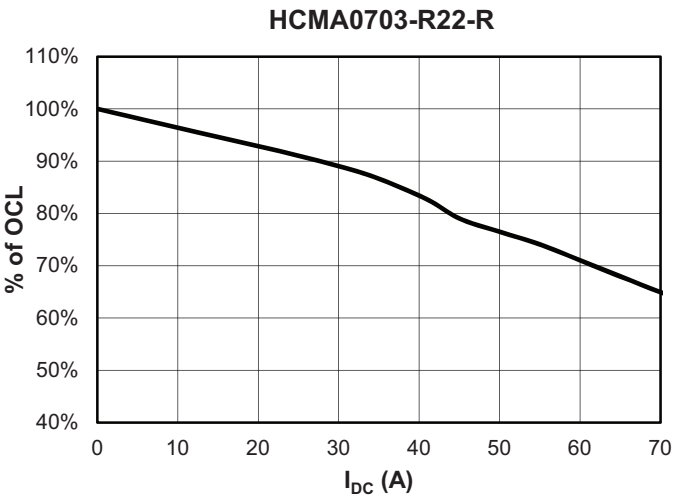
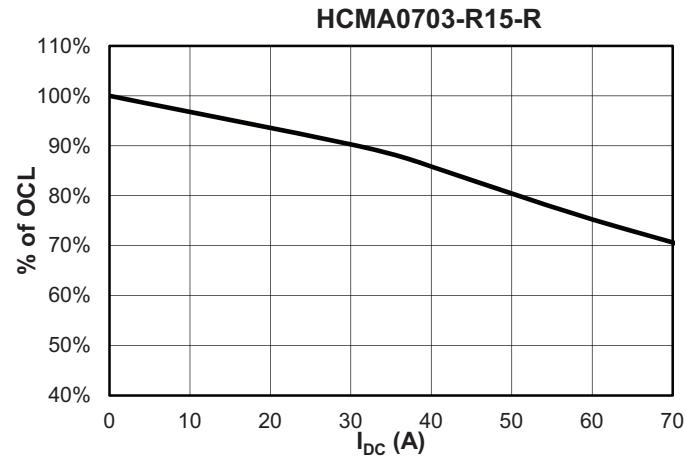
Temperature rise vs. total loss



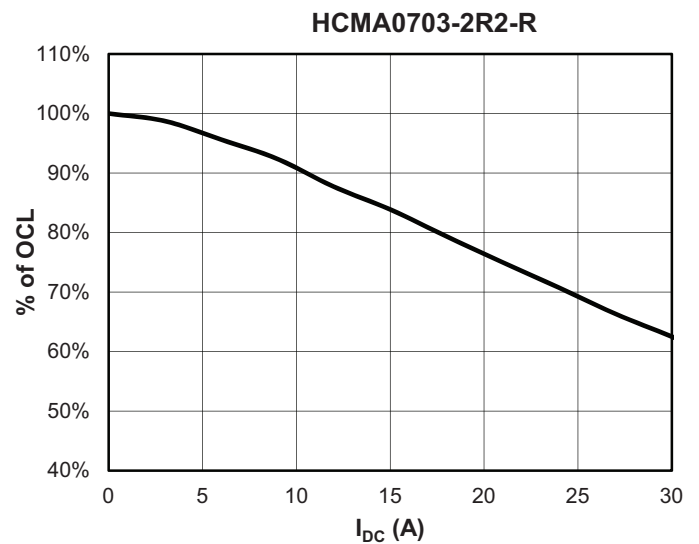
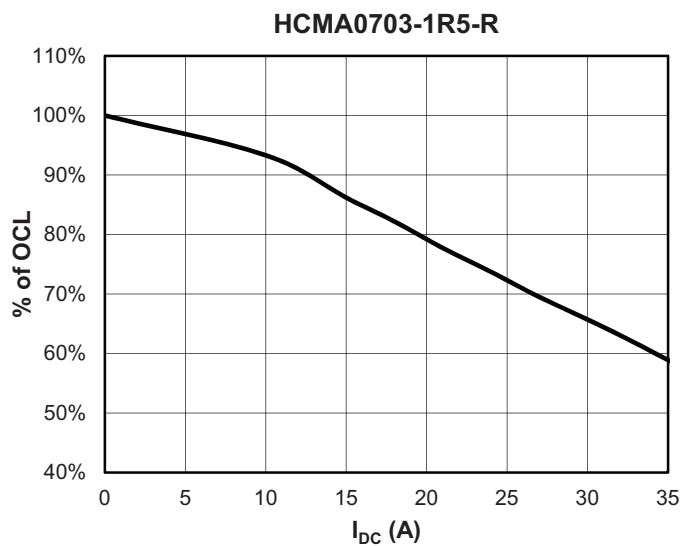
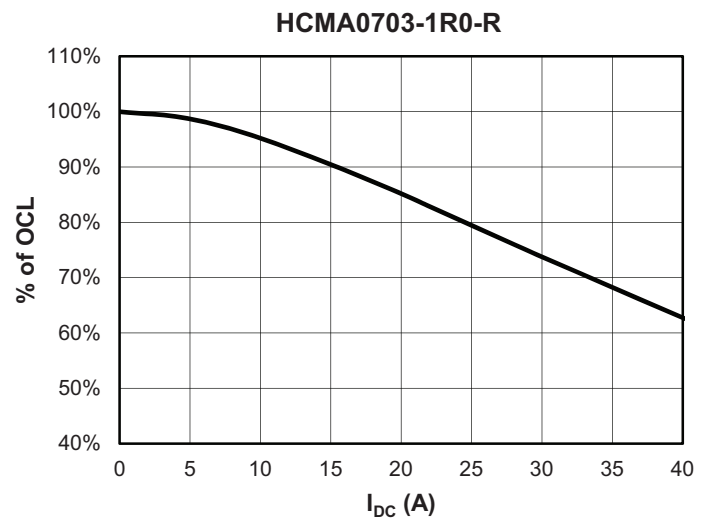
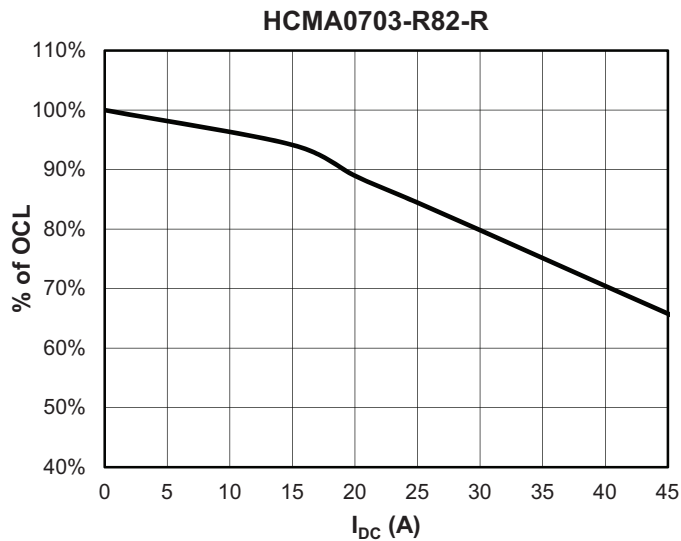
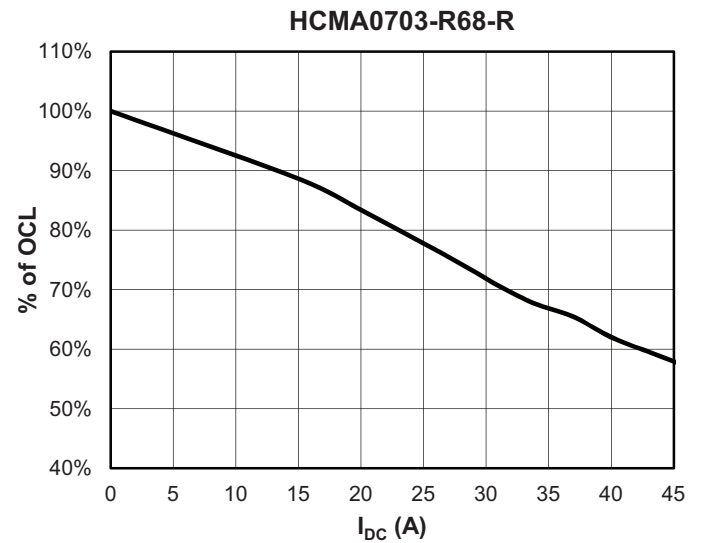
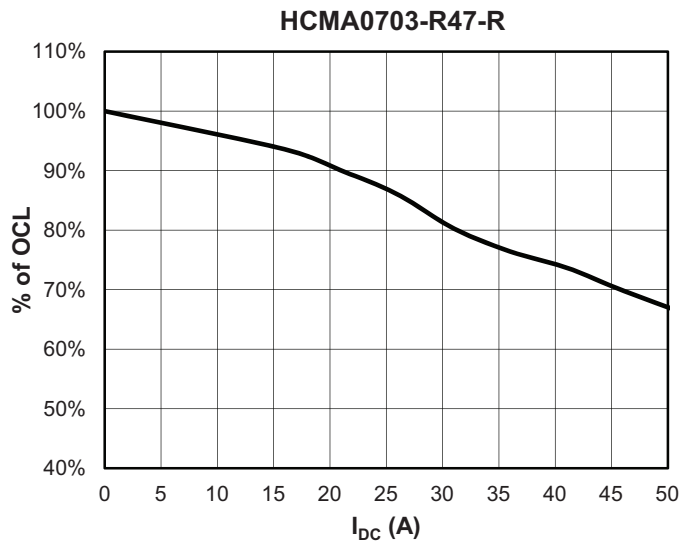
Core loss vs. B_{p-p}



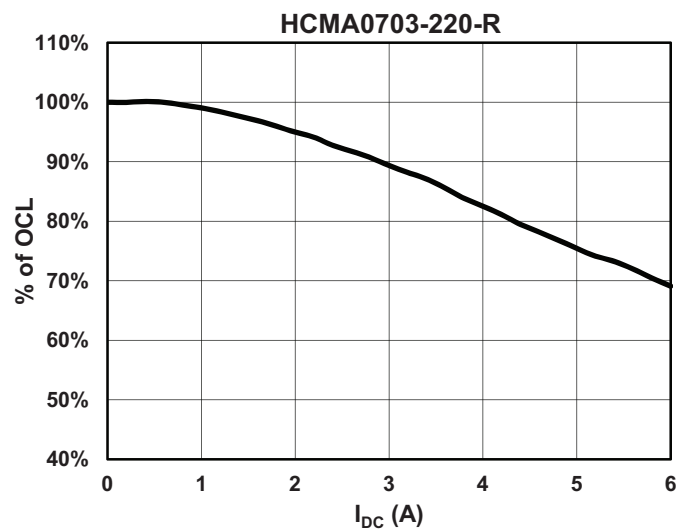
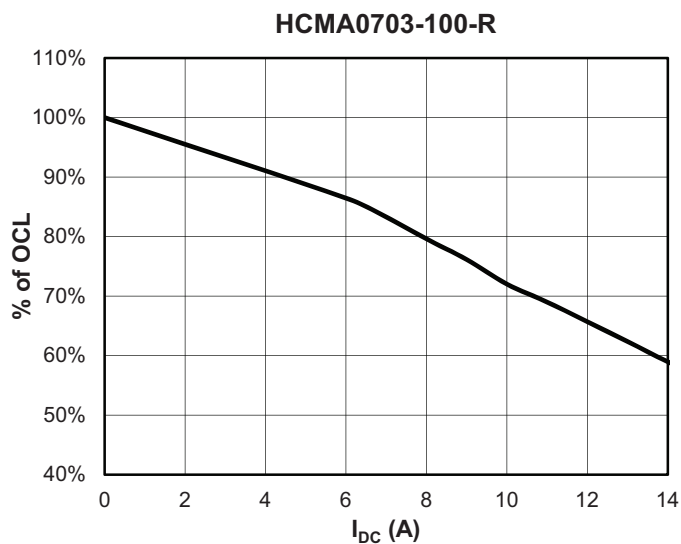
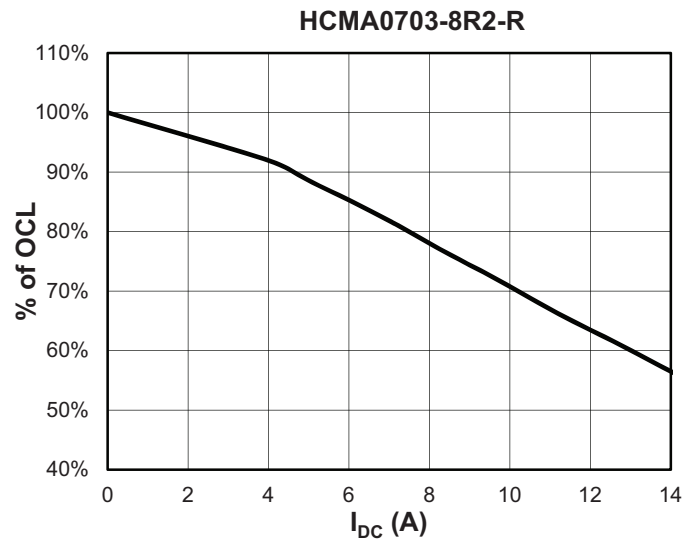
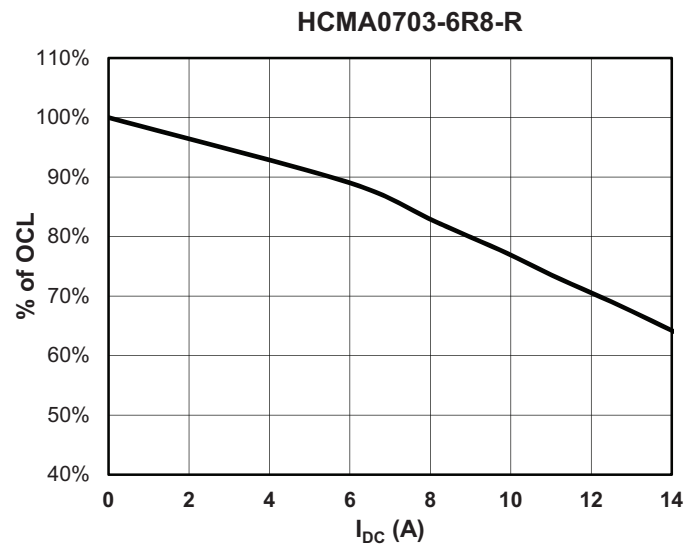
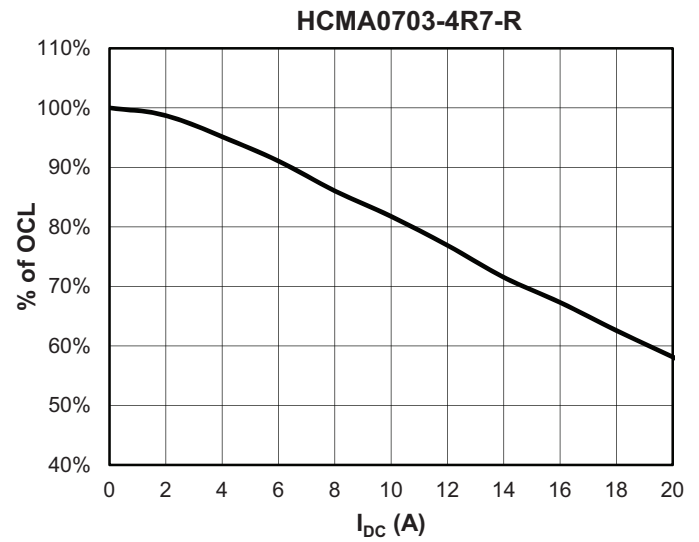
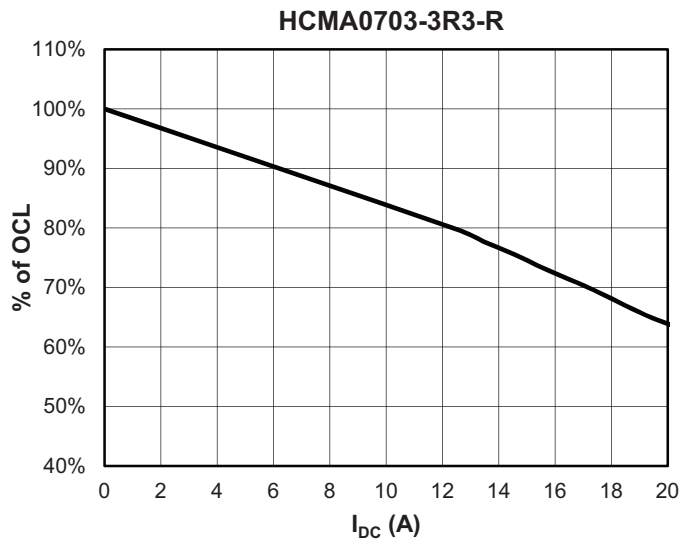
Inductance characteristics



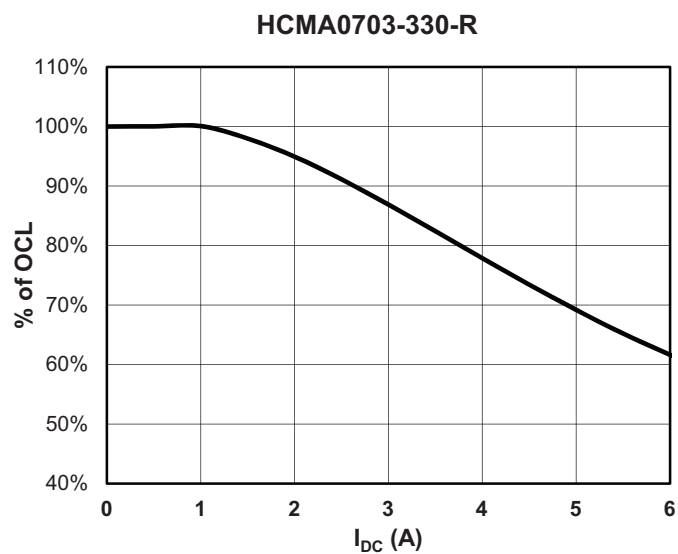
Inductance characteristics



Inductance characteristics



Inductance characteristics



Solder reflow profile

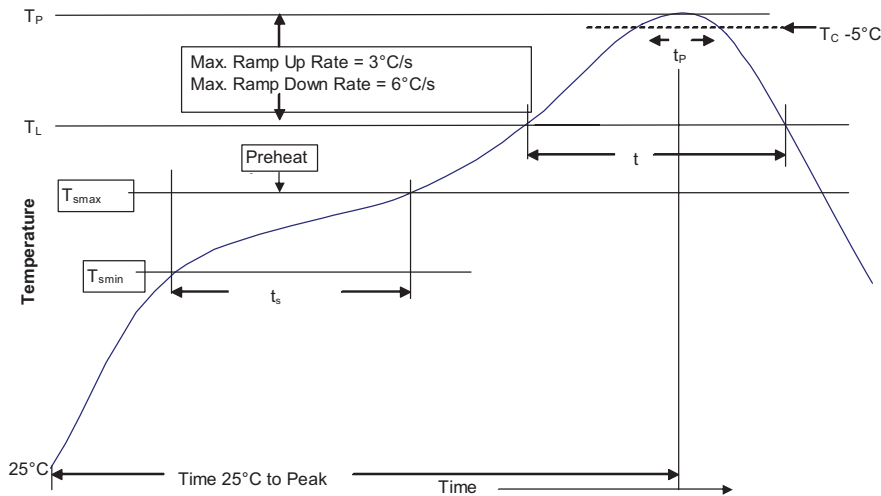


Table 1 - Standard SnPb Solder (T_C)

Package Thickness	Volume mm ³ <350	Volume mm ³ ≥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 JEDEC J-STD-020D

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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