

# 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  $\mu\text{H}$  to 33  $\mu\text{H}$
- 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



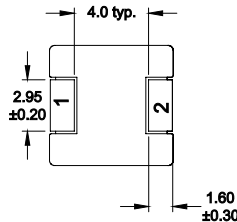
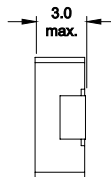
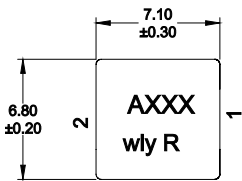
Product Specifications

Part Number <sup>6</sup>	OCL <sup>1</sup> ( $\mu\text{H}$ ) $\pm 20\%$	FLL <sup>2</sup> ( $\mu\text{H}$ ) minimum	$I_{\text{rms}}^3$ (A)	$I_{\text{sat}}^4$ (A)	DCR (m $\Omega$ ) typical @ +20 °C	DCR (m $\Omega$ ) maximum @ +20 °C	K-factor <sup>5</sup>
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

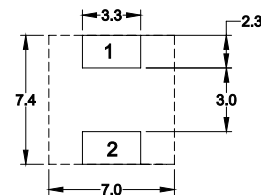
- Open Circuit Inductance (OCL) Test Parameters: 100kHz, 0.25 Vrms, 0.0 Adc, +25 °C
- Full Load Inductance (FLL) Test Parameters: 100 kHz, 0.25 Vrms, Isat, +25 °C
- $I_{\text{rms}}$ : DC current for an approximate temperature rise of 40 °C without core loss. Derating is necessary for AC currents. PCB 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.

- $I_{\text{sat}}$ : Peak current for approximately 20% rolloff @ +25 °C
- K-factor: Used to determine Bp-p for core loss (see graph).  $Bp-p = K * L * \Delta I$ . Bp-p: (Gauss), K: (K-factor from table), L: (Inductance in  $\mu\text{H}$ ),  $\Delta I$  (Peak to peak ripple current in Amps).
- Part Number Definition: HCMA0703-xxx-R  
HCMA0703 = Product code and size  
-xxx= inductance value in  $\mu\text{H}$ , R= decimal point,  
If no R is present then last character equals number of zeros  
-R suffix = RoHS compliant

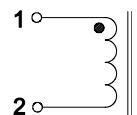
Dimensions (mm)



Recommended Pad Layout



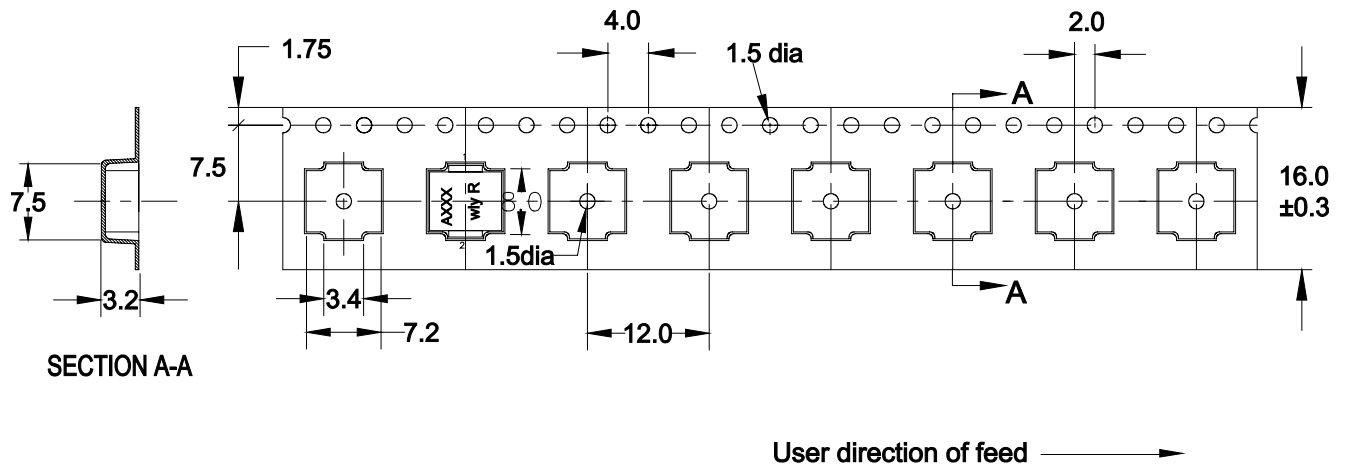
Schematic



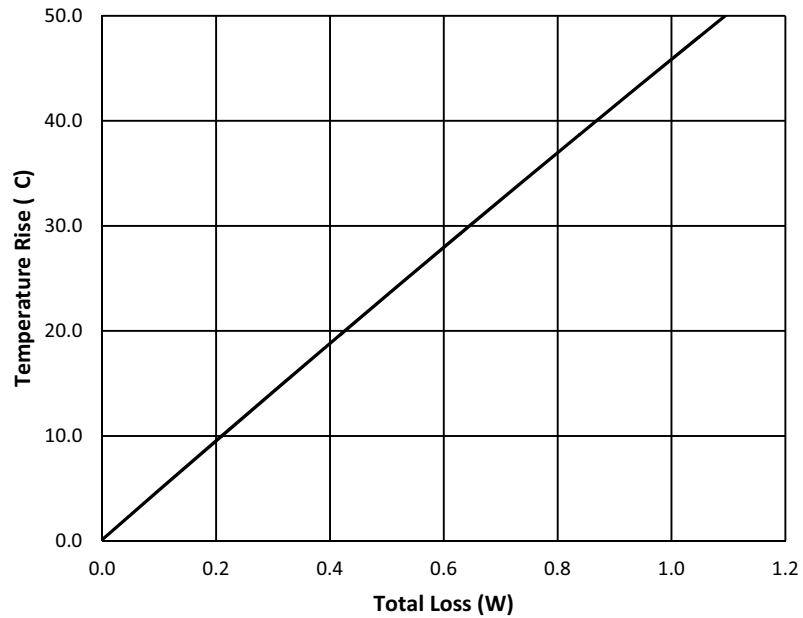
Part marking: A= Automotive grade, xxx= inductance value in  $\mu\text{H}$ , R= decimal point. If no R is present then last character equals number of zeros  
wly= date code, R=revision level  
All soldering surfaces to be coplanar within 0.1 millimeters.  
Tolerance are  $\pm 0.3$  millimeters unless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

**Packaging information (mm)**

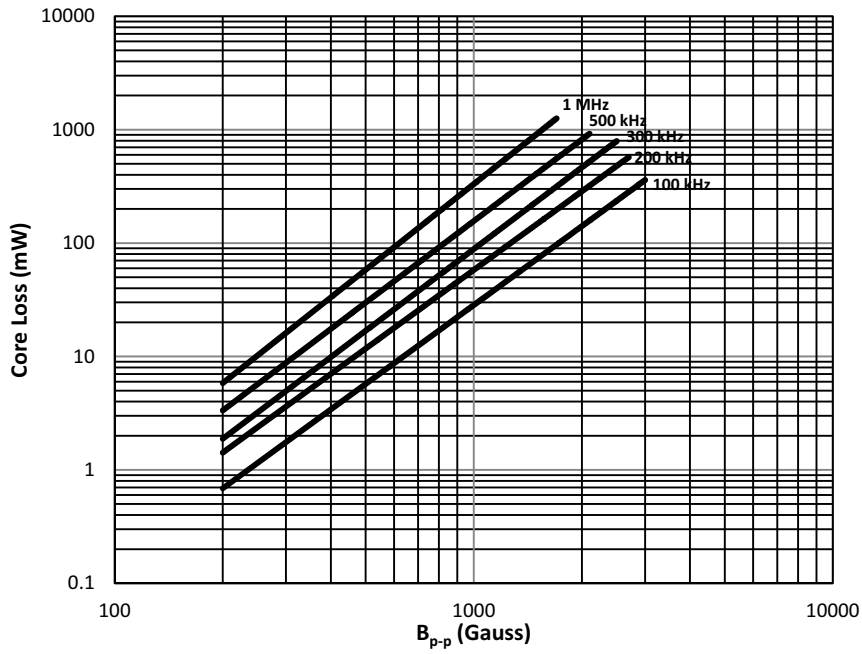
Supplied in tape and reel packaging , 1500 parts per 13" diameter reel



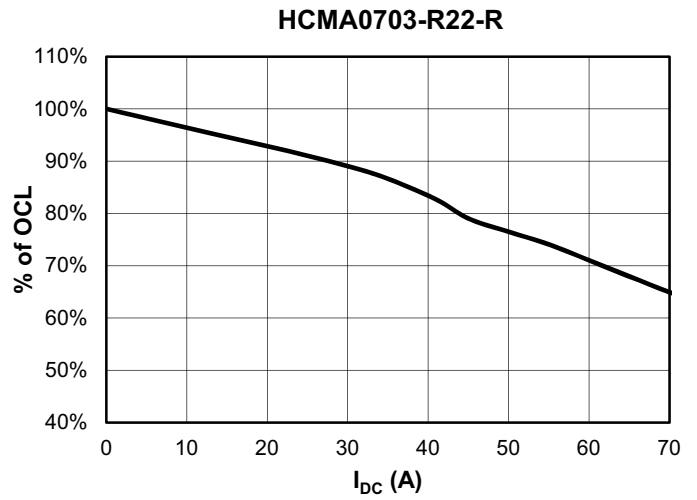
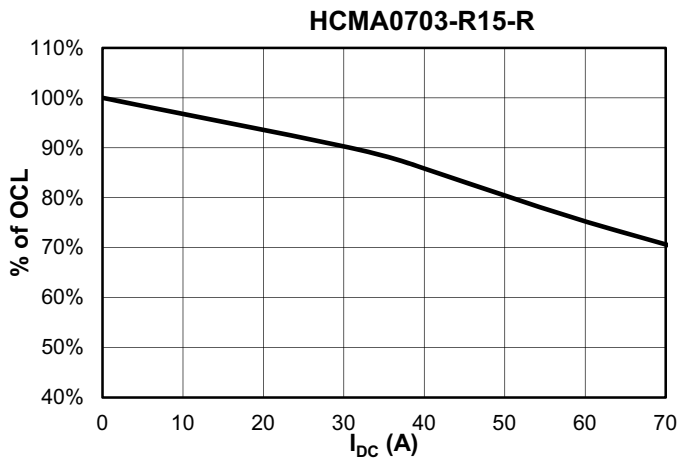
**Temperature rise vs. total loss**



Core loss vs.  $B_{p-p}$

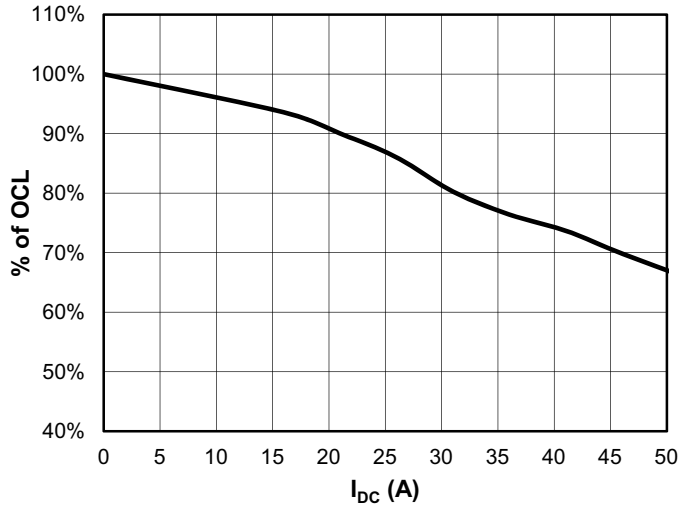


Inductance characteristics

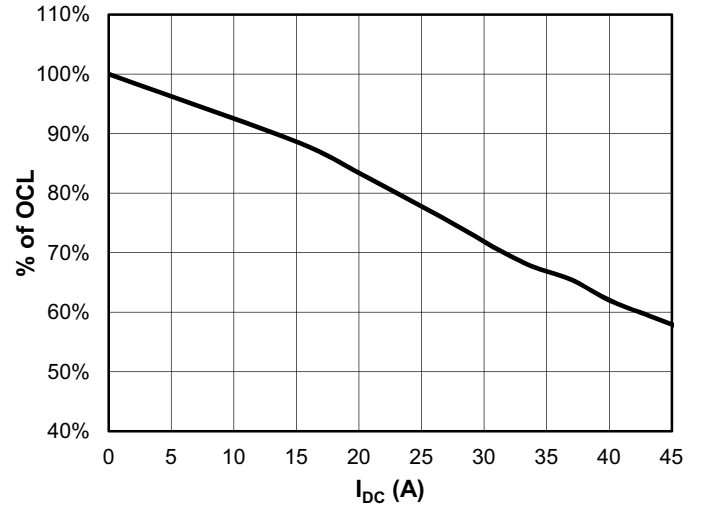


Inductance characteristics

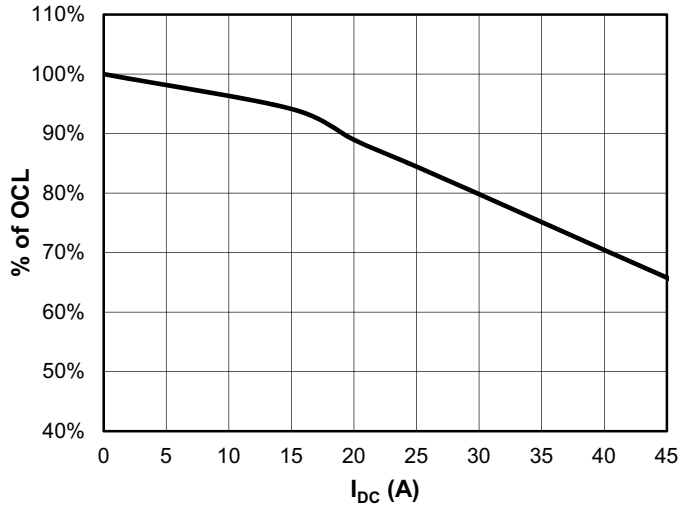
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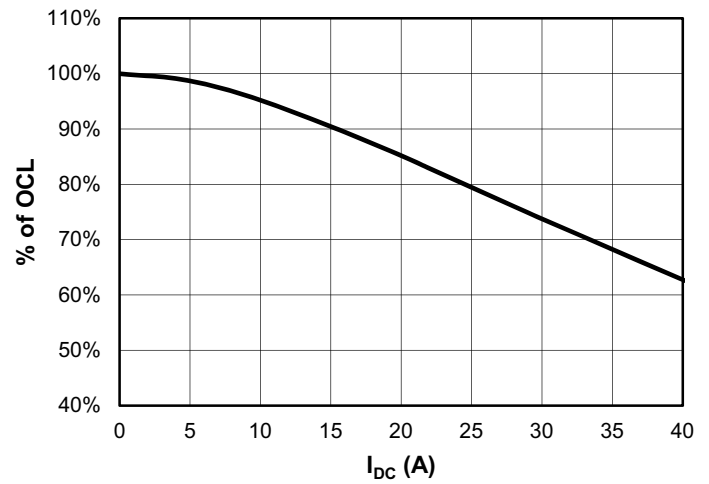
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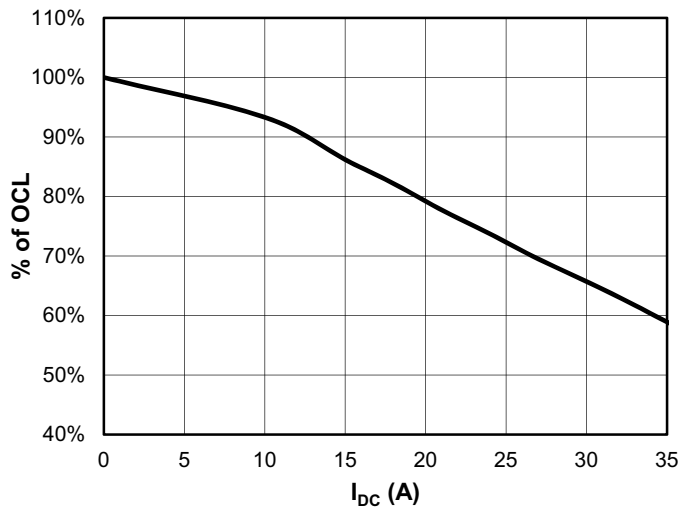
HCMA0703-R82-R



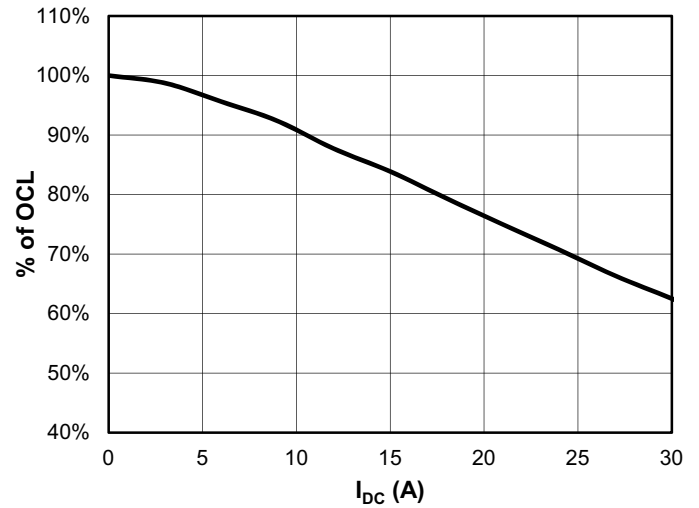
HCMA0703-1R0-R



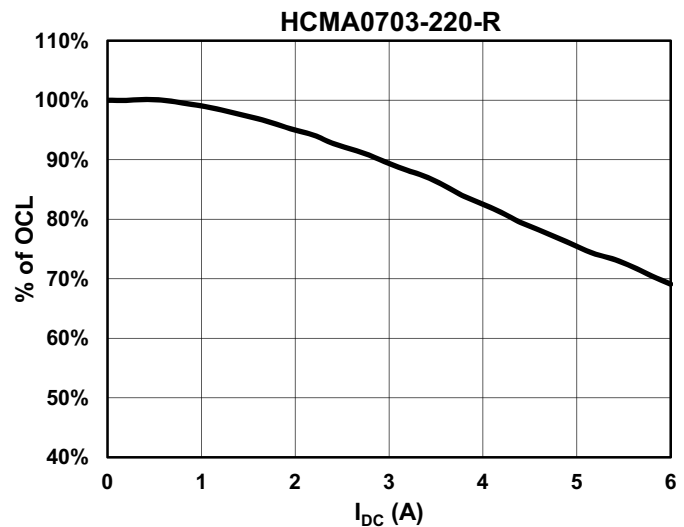
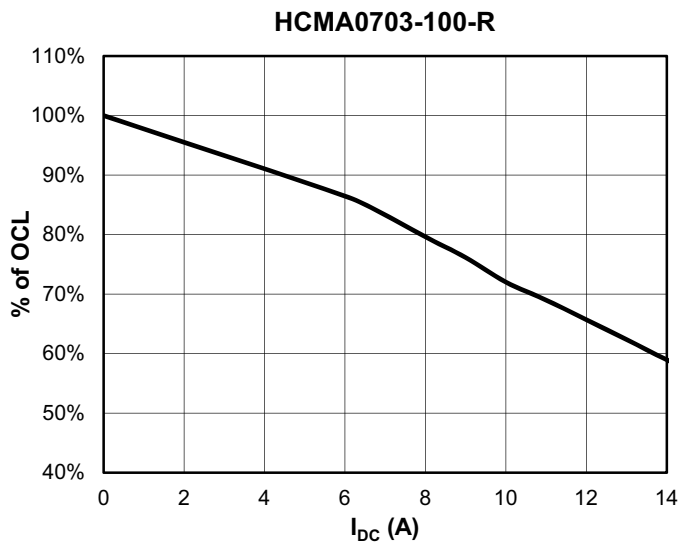
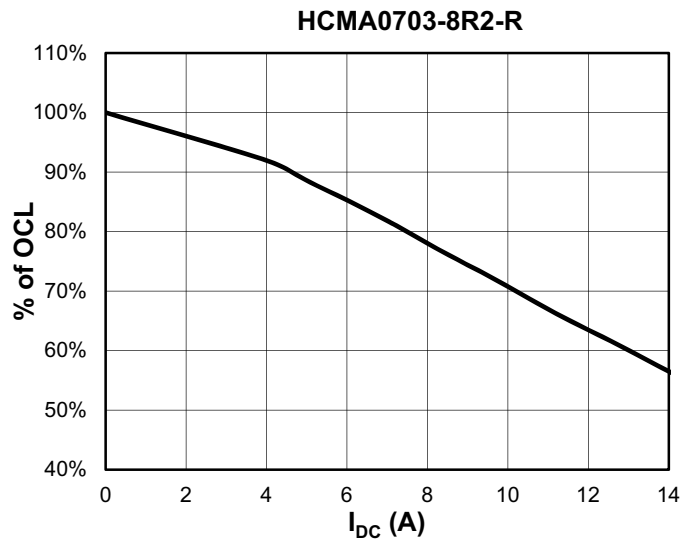
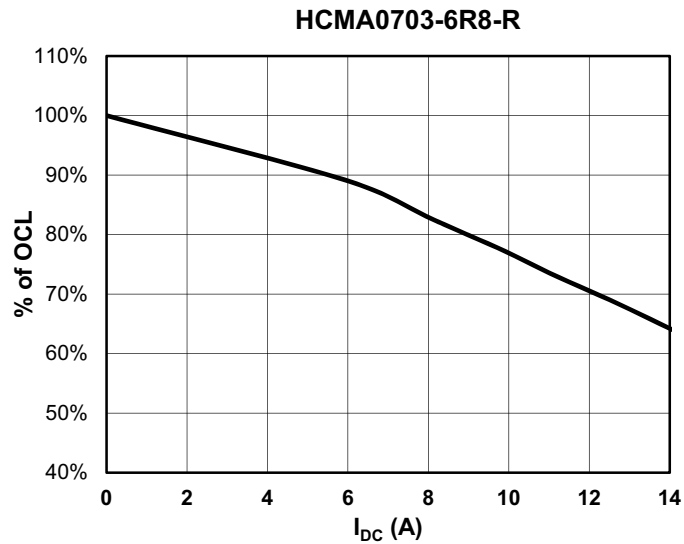
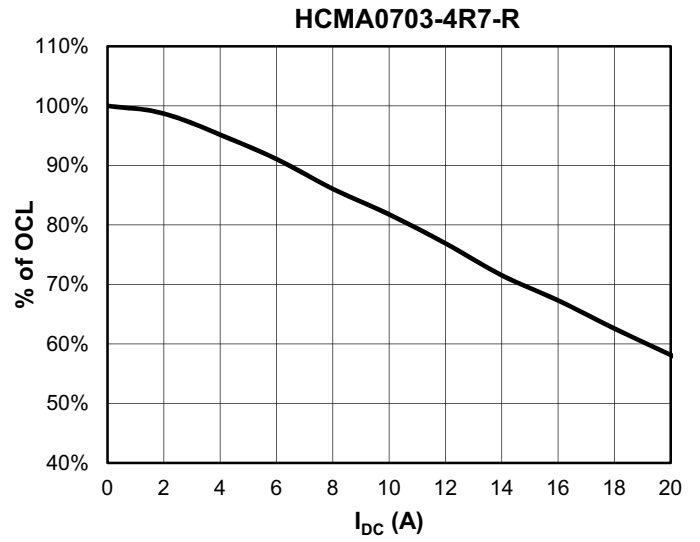
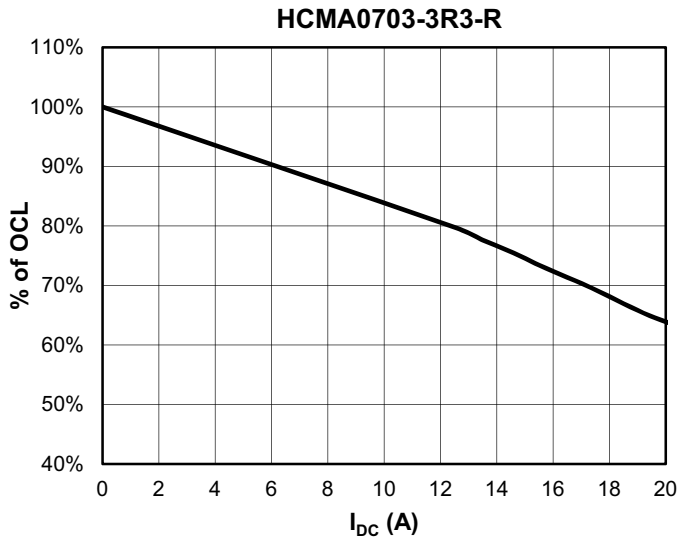
HCMA0703-1R5-R



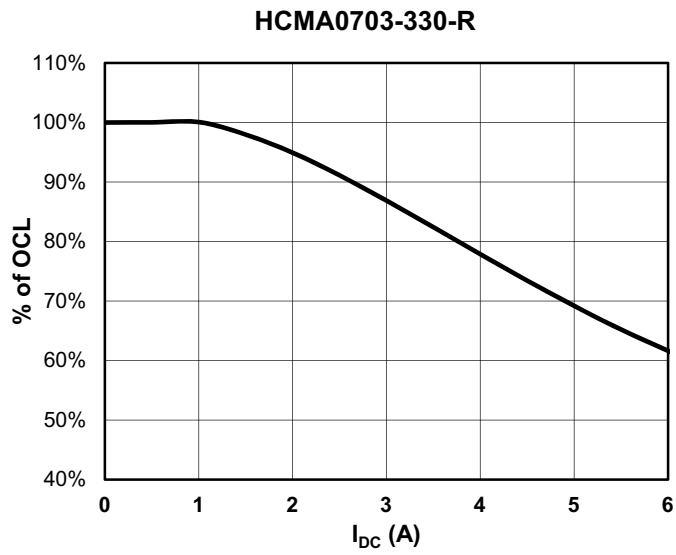
HCMA0703-2R2-R



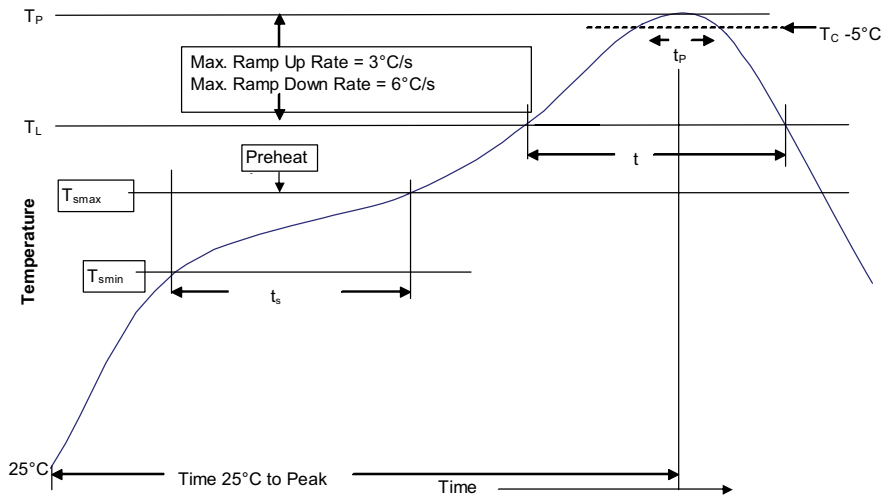
Inductance characteristics



Inductance characteristics



**Solder reflow profile**



**Table 1 - Standard SnPb Solder (T<sub>C</sub>)**

Package Thickness	Volume mm <sup>3</sup> <350	Volume mm <sup>3</sup> ≥350
<2.5 mm	235 °C	220 °C
≥2.5 mm	220 °C	220 °C

**Table 2 - Lead (Pb) Free Solder (T<sub>C</sub>)**

Package Thickness	Volume mm <sup>3</sup> <350	Volume mm <sup>3</sup> 350 - 2000	Volume mm <sup>3</sup> >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 <sub>smin</sub> )	100 °C	150 °C
• Temperature max. (T <sub>smax</sub> )	150 °C	200 °C
• Time (T <sub>smin</sub> to T <sub>smax</sub> ) (t <sub>s</sub> )	60-120 seconds	60-120 seconds
Average ramp up rate T <sub>smax</sub> to T <sub>p</sub>	3 °C/ second Max.	3 °C/ second Max.
Liquidous temperature (T <sub>L</sub> )	183 °C	217 °C
Time at liquidous (t <sub>L</sub> )	60-150 seconds	60-150 seconds
Peak package body temperature (T <sub>p</sub> )*	Table 1	Table 2
Time (t <sub>p</sub> )** within 5 °C of the specified classification temperature (T <sub>C</sub> )	20 seconds**	30 seconds**
Average ramp-down rate (T <sub>p</sub> to T <sub>smax</sub> )	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<sub>p</sub>) is defined as a supplier minimum and a user maximum.  
\*\* Tolerance for time at peak profile temperature (t<sub>p</sub>) is defined as a supplier minimum and a user maximum.

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