

# Coiltronics HCMA0503 Series

## Automotive grade High current power inductors



### Product description

- AEC-Q200 Grade 3 qualified
- High current carrying capacity, low core losses
- Magnetically shielded, low EMI
- Frequency range up to 1MHz
- Inductance range from 0.20 $\mu$ H to 15 $\mu$ H
- Current range from 2.1 to 22.2 amps
- 5.5 x 5.3mm surface mount package in a 3mm height
- Powder Iron 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
  - 77GHz radar systems
  - Basic and smart surround, and rear and front view camera
  - 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
- Chassis and safety electronics
  - Airbag control unit

### Environmental data

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



The Coiltronics brand of magnetics (formerly of the Bussmann Division of Cooper Industries) is now part of Eaton's Electrical Group, Electronics Division.

**Coiltronics is now part of Eaton**  
**Same great products plus even more.**



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**Product specifications**

Part Number <sup>6</sup>	OCL <sup>1</sup> ( $\mu\text{H}$ ) $\pm$ 20%	FLL min. <sup>2</sup> ( $\mu\text{H}$ )	$I_{\text{rms}}$ <sup>3</sup> (Amps)	$I_{\text{sat}}$ <sup>4</sup> (Amps)	DCR (m $\Omega$ ) @ 20°C (Typ.)	DCR (m $\Omega$ ) @ 20°C (Max.)	K-factor <sup>5</sup>
HCMA0503-R20-R	0.20	0.128	22.2	21.0	2.10	2.31	1764
HCMA0503-R35-R	0.35	0.224	16.6	14.9	3.90	4.29	1259
HCMA0503-R47-R	0.47	0.300	12.0	11.5	6.50	7.15	820
HCMA0503-R75-R	0.75	0.480	11.3	9.7	8.50	9.35	801
HCMA0503-1R0-R	1.00	0.640	10.1	8.5	10.4	11.4	588
HCMA0503-1R5-R	1.50	0.960	7.5	7.0	17.1	18.5	393
HCMA0503-2R2-R	2.20	1.40	6.8	6.5	22.5	25.0	325
HCMA0503-3R3-R	3.30	2.10	5.5	6.0	36.4	40.4	273
HCMA0503-4R7-R	4.70	3.00	4.5	5.5	54.0	60.0	226
HCMA0503-5R6-R	5.60	3.60	4.3	3.5	63.0	70.6	206
HCMA0503-100-R	10.0	6.40	2.8	2.3	122	132	158
HCMA0503-150-R	15.0	9.60	2.4	2.1	138	166	127

1. Open Circuit Inductance (OCL) Test Parameters: 100kHz, 0.25V<sub>rms</sub>, 0.0Adc, +25°C.

2. Full Load Inductance (FLL) Test Parameters: 100kHz, 0.25V<sub>rms</sub>,  $I_{\text{sat}}$  @ +25°C.

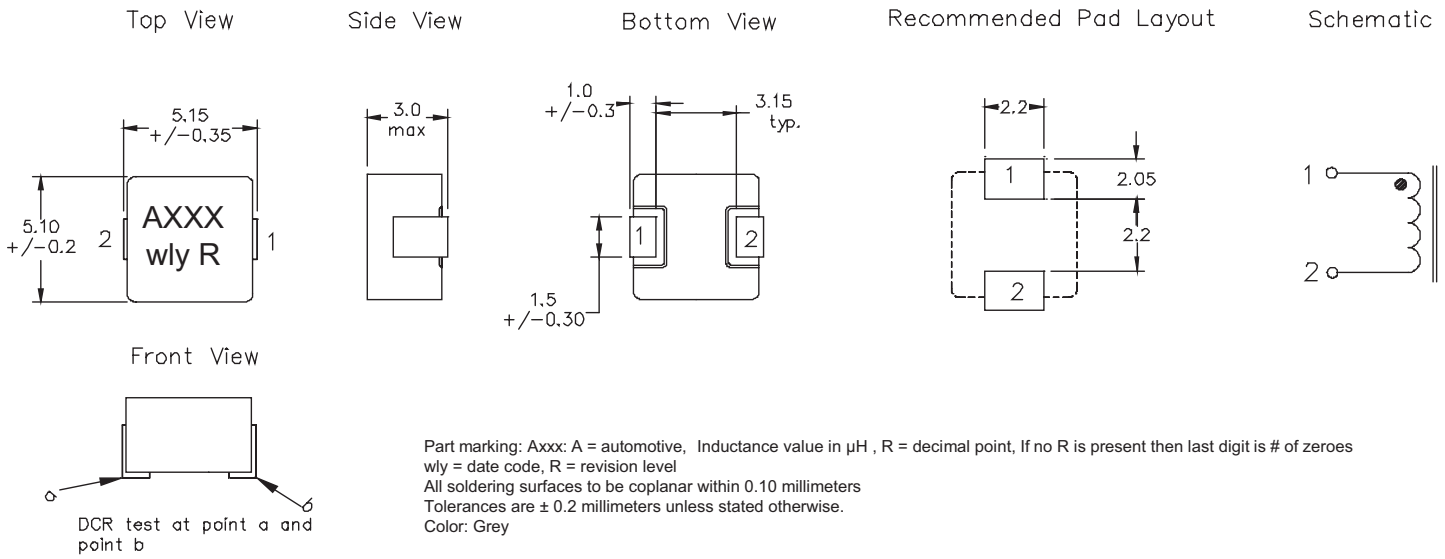
3.  $I_{\text{rms}}$ : DC current for an approximate temperature rise of 40°C without core loss. Derating is necessary for AC currents. PCB layout, trace thickness and width, air-flow, and proximity of other heat generating components will affect the temperature rise. It is recommended that the temperature of the part not exceed 125°C under worst case operating conditions verified in the end application.

4.  $I_{\text{sat}}$ : Peak current for approximately 20% rolloff at +25°C.

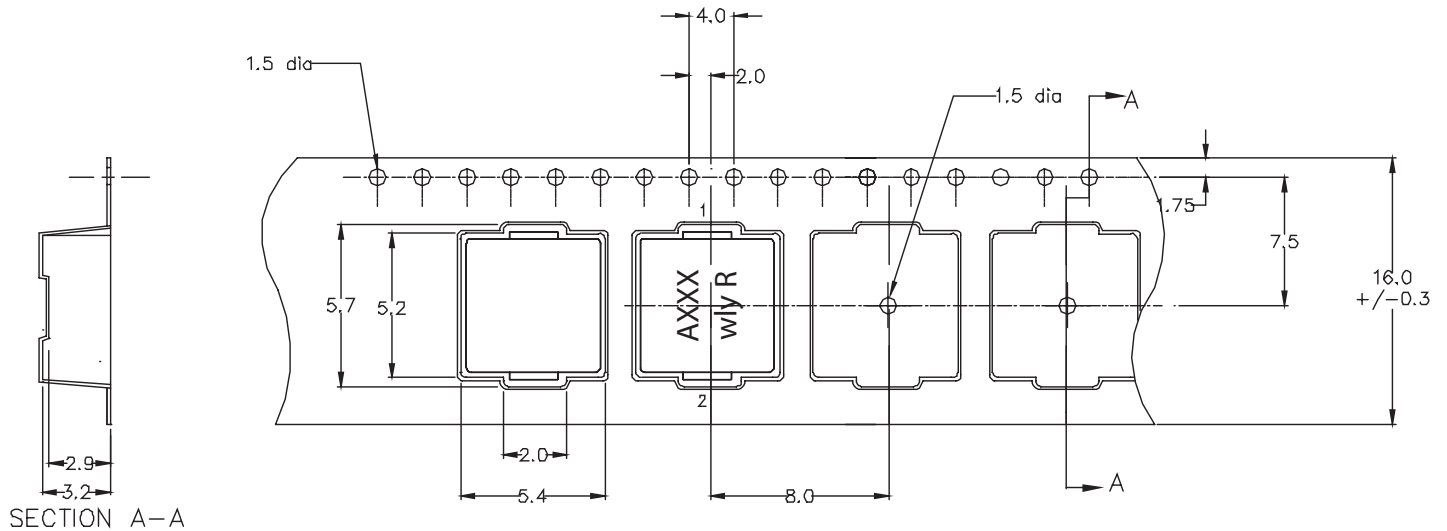
5. K-factor: Used to determine  $B_{\text{p-p}}$  for core loss (see graph).  $B_{\text{p-p}} = K * L * \Delta I$ .  $B_{\text{p-p}}$ : (Gauss), K: (K-factor from table), L: (Inductance in  $\mu\text{H}$ ),  $\Delta I$  (Peak to peak ripple current in Amps).

6. Part Number Definition: HCMA0503-yyy-R  
 - HCMA0503 = Product code and size  
 - yyy= Inductance value in  $\mu\text{H}$ , R = decimal point,  
 if no R is present then third character = number of zeros.  
 - "-R" suffix = RoHS compliant

**Dimensions - mm**



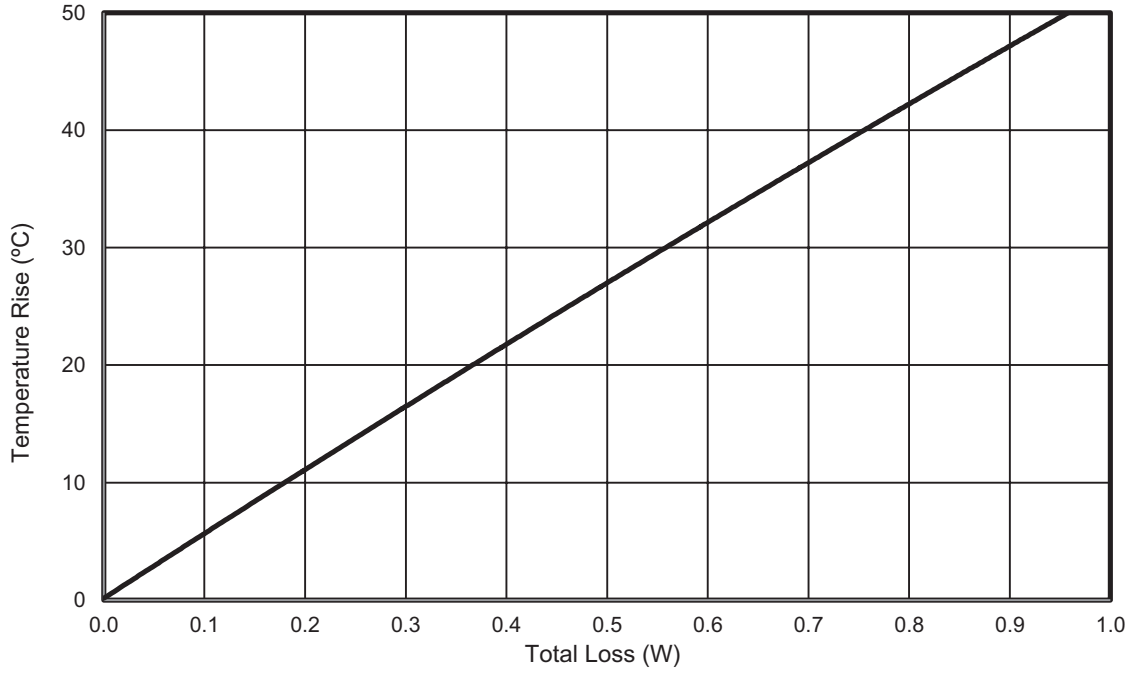
**Packaging information - mm**



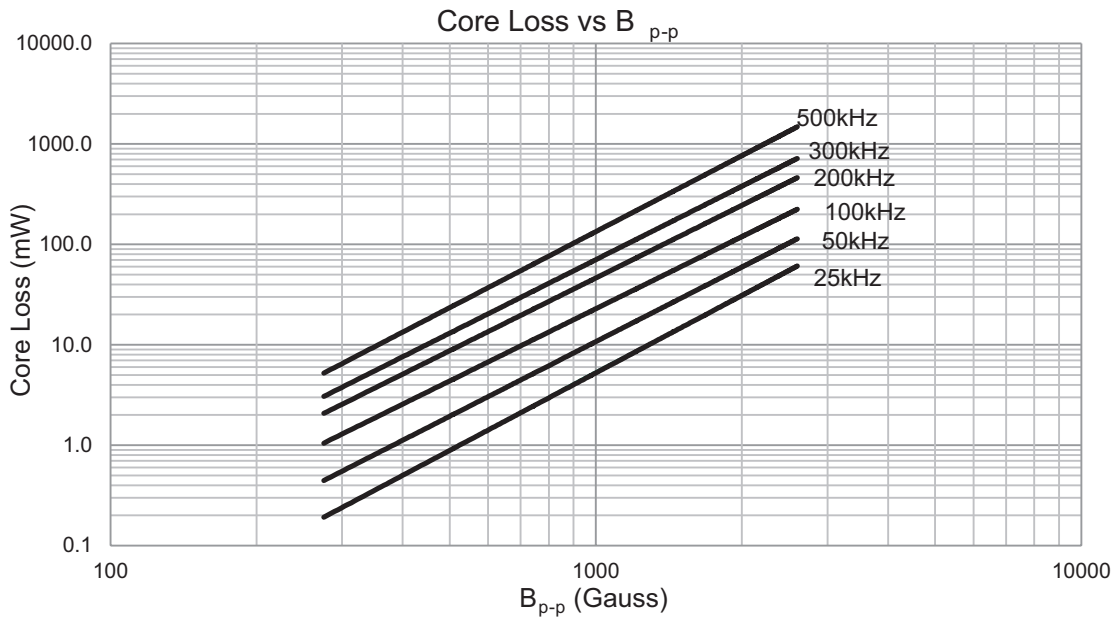
Supplied in tape and reel packaging, 2000 parts per 13" diameter reel.

User direction of feed  $\longrightarrow$

Temperature rise vs. total loss

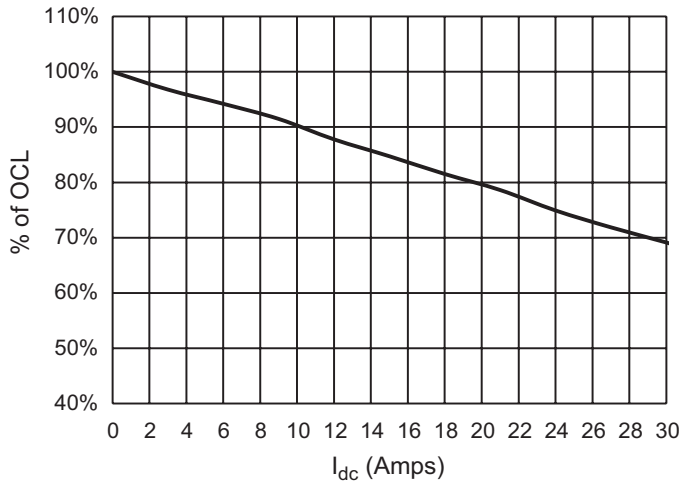


Core loss

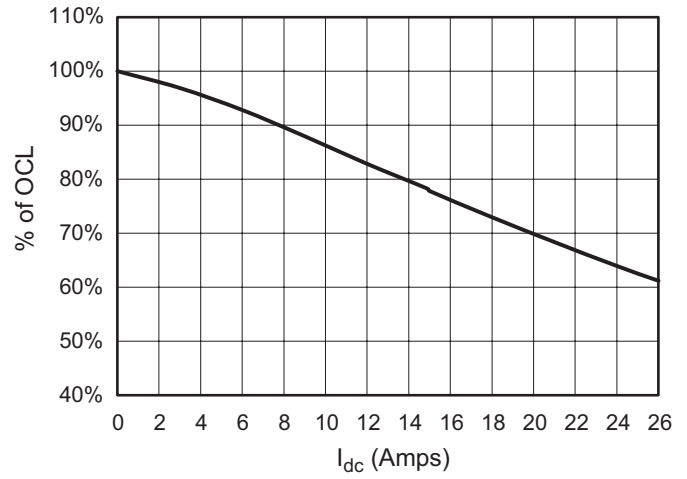


Inductance characteristics

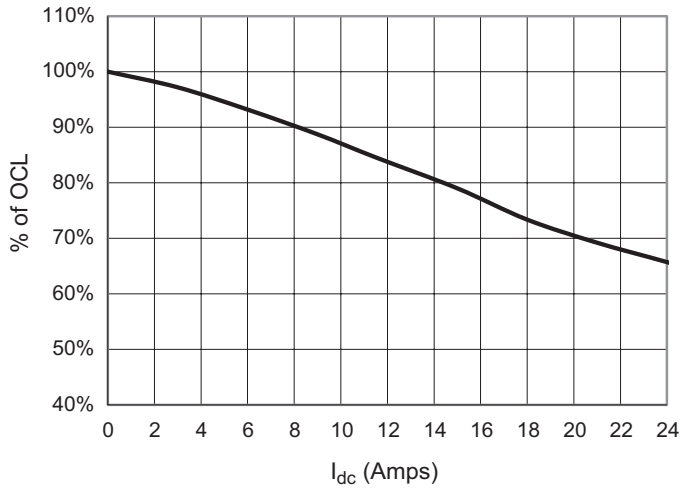
HCMA0503-R20-R



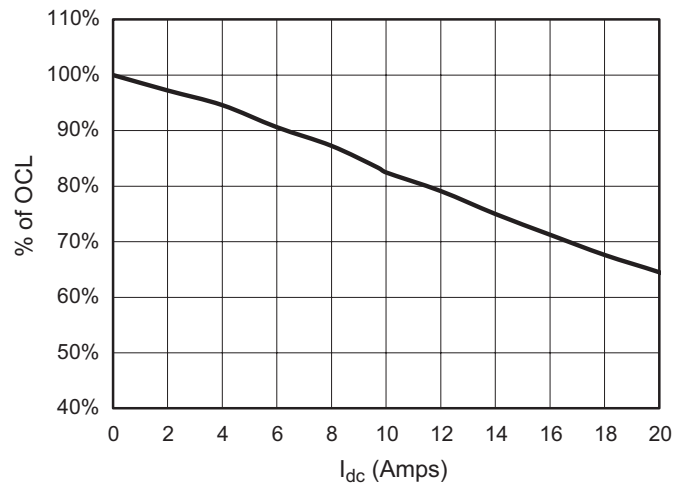
HCMA0503-R35-R



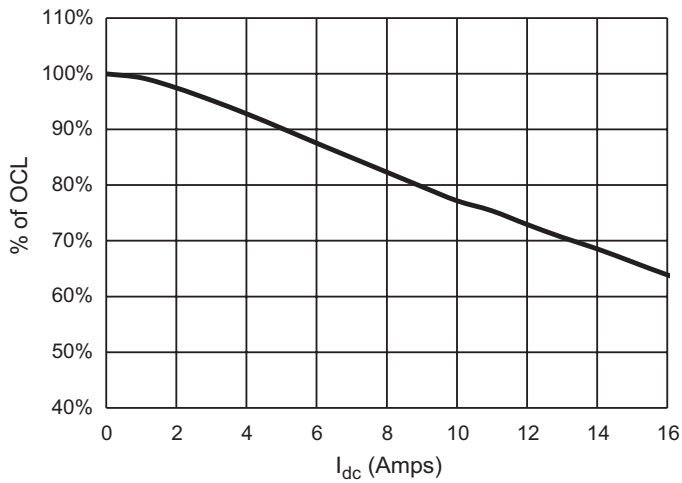
HCMA0503-R47-R



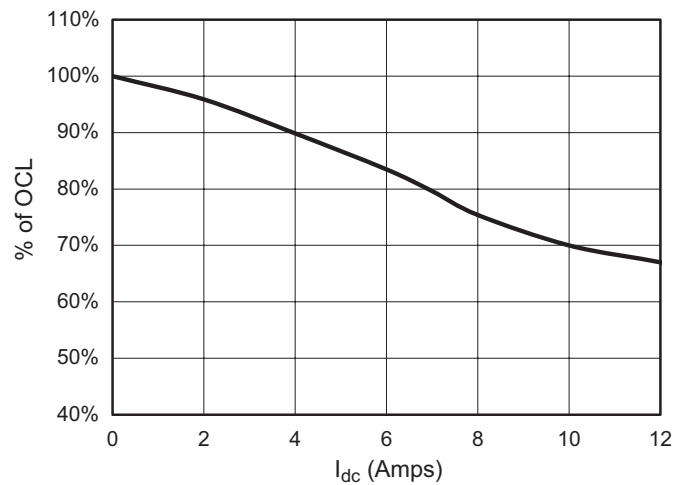
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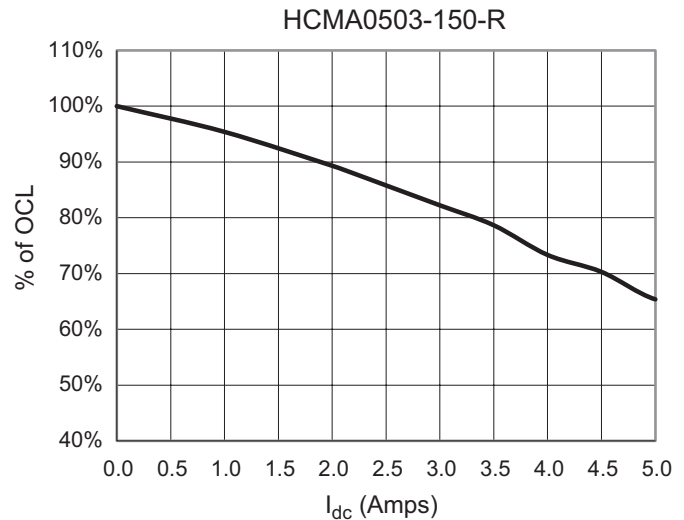
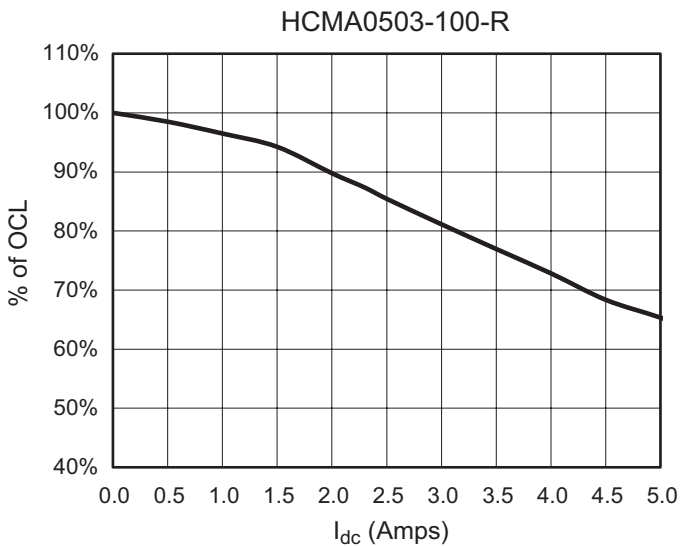
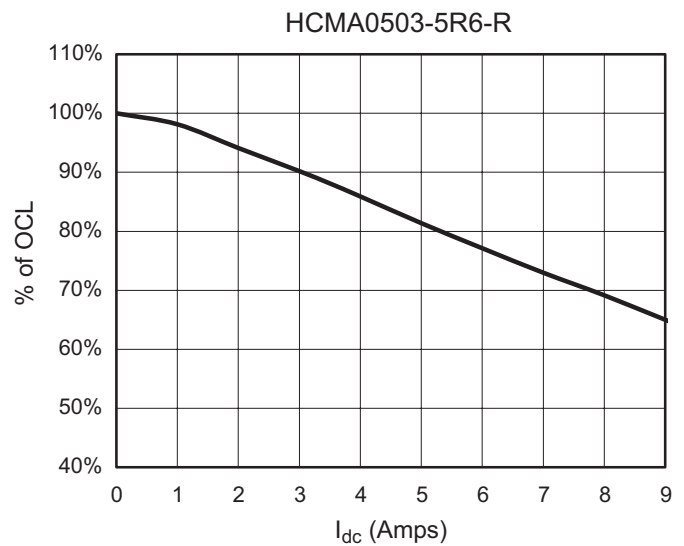
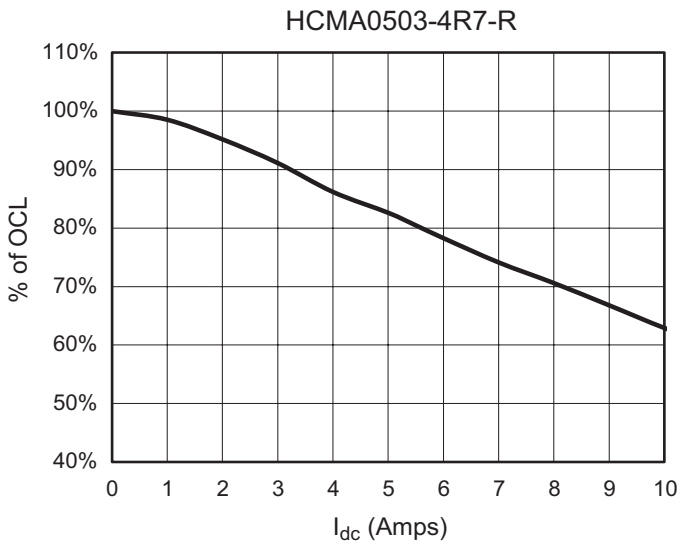
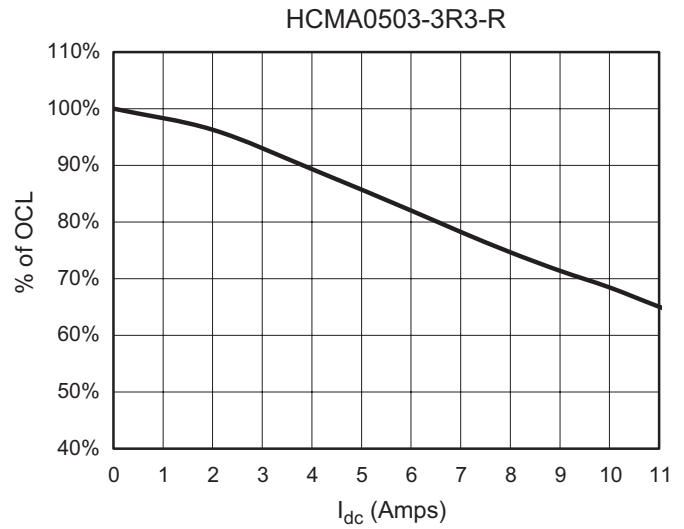
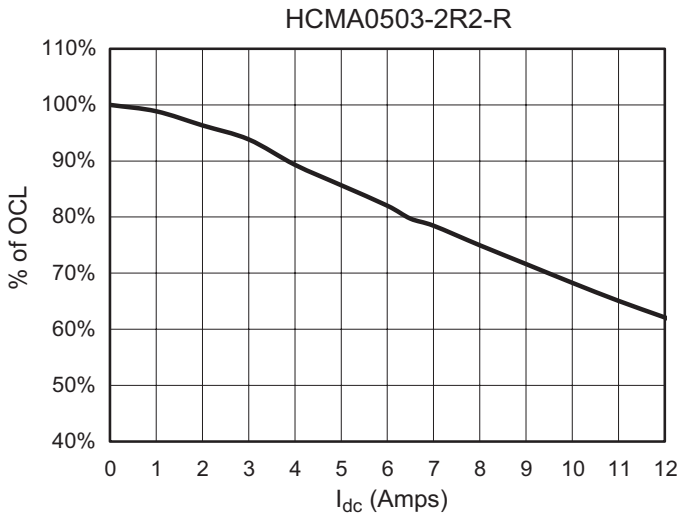
HCMA0503-1R0-R



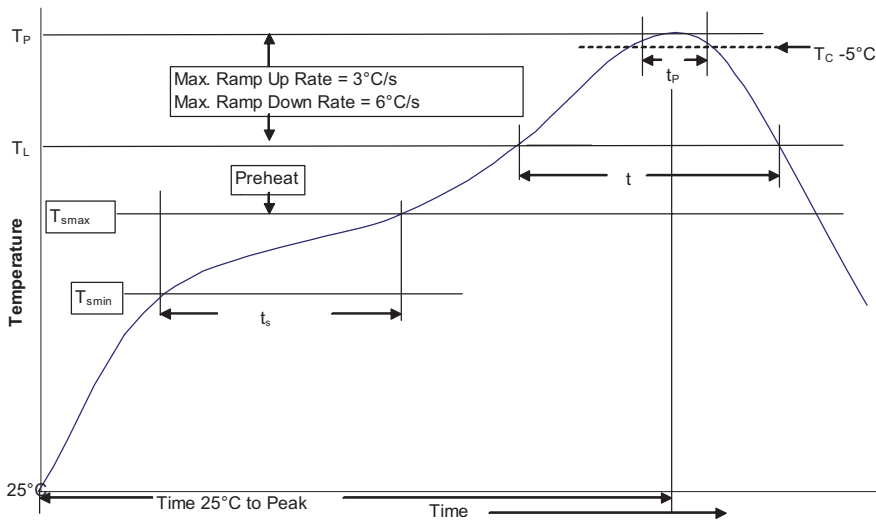
HCMA0503-1R5-R



Inductance characteristics



**Solder reflow profile**



**Table 1 - Standard SnPb Solder ( $T_c$ )**

Package Thickness	Volume $\leq 350$ mm <sup>3</sup>	Volume $\geq 350$ mm <sup>3</sup>
<2.5mm	235°C	220°C
$\geq 2.5$ mm	220°C	220°C

**Table 2 - Lead (Pb) Free Solder ( $T_c$ )**

Package Thickness	Volume $\leq 350$ mm <sup>3</sup>	Volume 350 - 2000 mm <sup>3</sup>	Volume $> 2000$ mm <sup>3</sup>
<1.6mm	260°C	260°C	260°C
1.6 – 2.5mm	260°C	250°C	245°C
$> 2.5$ mm	250°C	245°C	245°C

**Reference JDEC J-STD-020D**

Profile Feature	Standard SnPb Solder	Lead (Pb) Free Solder
Preheat and Soak	<ul style="list-style-type: none"> <li>Temperature min. (<math>T_{smin}</math>)</li> <li>Temperature max. (<math>T_{smax}</math>)</li> <li>Time (<math>T_{smin}</math> to <math>T_{smax}</math>) (<math>t_s</math>)</li> </ul>	<ul style="list-style-type: none"> <li>150°C</li> <li>200°C</li> <li>60-120 Seconds</li> </ul>
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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Publication No. 10248 — BU-SB14565  
August 2014

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