

# High Current, Power Inductors

## HCM0503 Series



SMD Device

### Description

- Halogen Free, lead free, RoHS compliant
- 125°C maximum total temperature operation
- 5.5 x 5.3 x 3.0mm maximum surface mount package
- Powder iron core material
- Magnetically shielded, low EMI
- High current carrying capacity, low core losses
- Inductance range from 0.20μH to 1.0μH
- Current range from 8.5 to 22.2 Amps
- Frequency range up to 1MHz

### Applications

- Voltage Regulator Module (VRM)
- Multi-phase regulators
- Point-of-load modules
- Desktop and server VRMs and EVRDs
- Base station equipment
- Notebook regulators
- Battery power systems
- Graphics cards
- Data networking and storage systems

### Environmental Data

- Storage temperature range: -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

### Packaging

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

### Product Specifications

Part Number <sup>6</sup>	OCL <sup>1</sup> (μH) ±20%	FLL min, <sup>2</sup> (μH)	I <sub>rms</sub> <sup>3</sup> (Amps)	I <sub>sat</sub> <sup>4</sup> @ 25°C (Amps)	DCR (mΩ) @ 20°C (Typical)	DCR (mΩ) @ 20°C (Maximum)	K-factor <sup>5</sup>
HCM0503-R20-R	0.20	0.128	22.2	21.0	2.10	2.31	1764
HCM0503-R35-R	0.35	0.224	16.6	14.9	3.90	4.29	1259
HCM0503-R75-R	0.75	0.480	11.3	9.7	8.50	9.35	801
HCM0503-1R0-R	1.00	0.640	10.1	8.5	10.40	11.44	588

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

2 Full Load Inductance (FLL) Test Parameters: 100kHz, 0.25V<sub>rms</sub>, I<sub>sat</sub> @ +25°C.

3 I<sub>rms</sub>: 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.

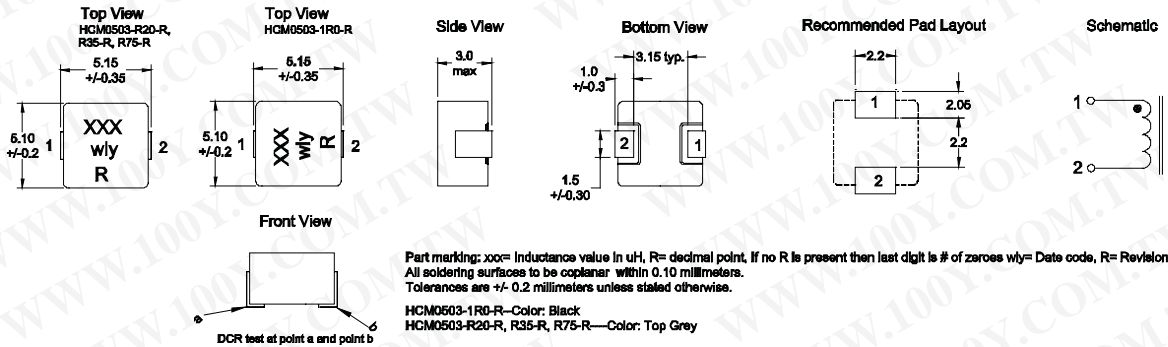
4 I<sub>sat</sub>: Peak current for approximately 20% rolloff at +25°C.

5 K-factor: Used to determine B<sub>p-p</sub> for core loss (see graph). B<sub>p-p</sub> = K \* L \* ΔI. B<sub>p-p</sub> (Gauss), K: (K-factor from table), L: (inductance in μH), ΔI (peak-to-peak ripple current in amps).

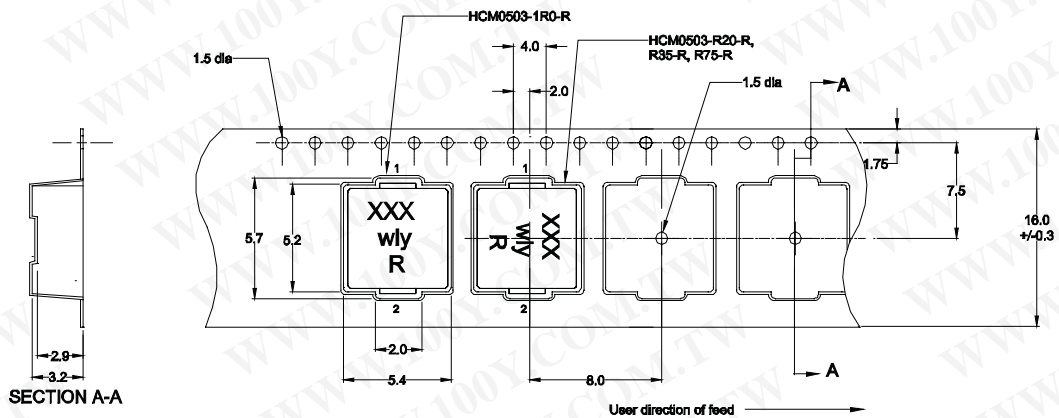
6 Part Number Definition: HCM0503-xxx-R

- HCM0503 = Product code and size
- xxx= Inductance value in μH, R = decimal point, If no R is present then 3<sup>rd</sup> digit equals number of zeros.
- "-R" suffix = RoHS compliant

### Dimensions - mm

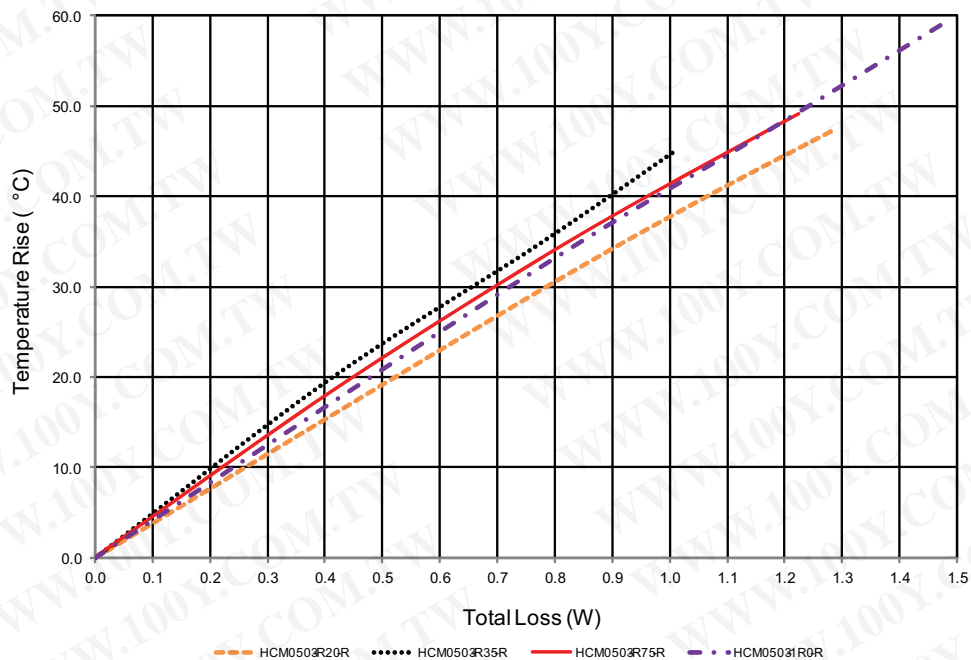


### Packaging Information - mm



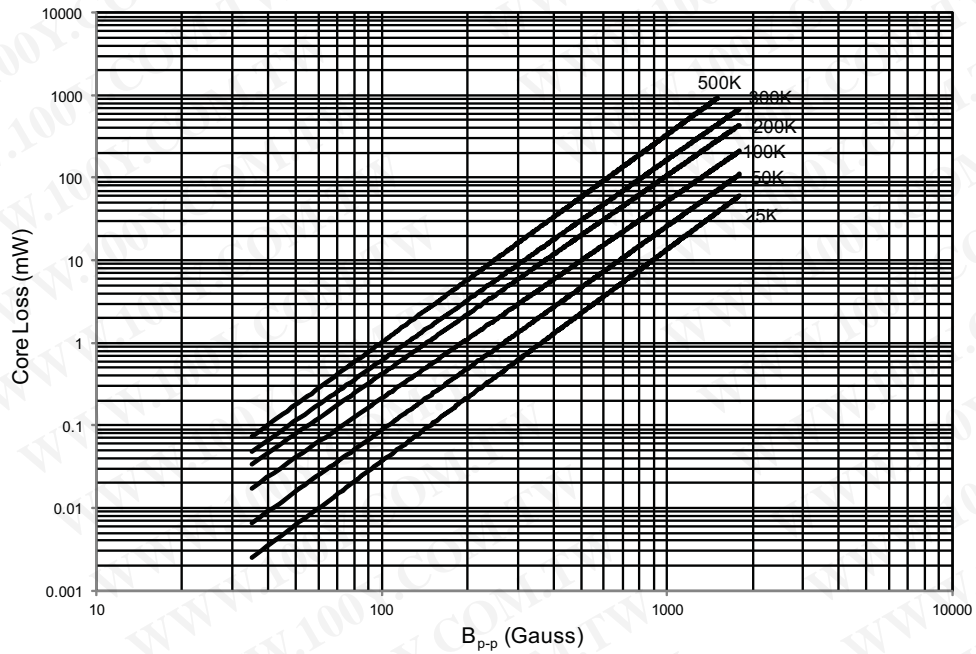
Supplied in tape-and-reel packaging, 2000 parts per 13" diameter reel.

### Temperature Rise vs. Total Loss

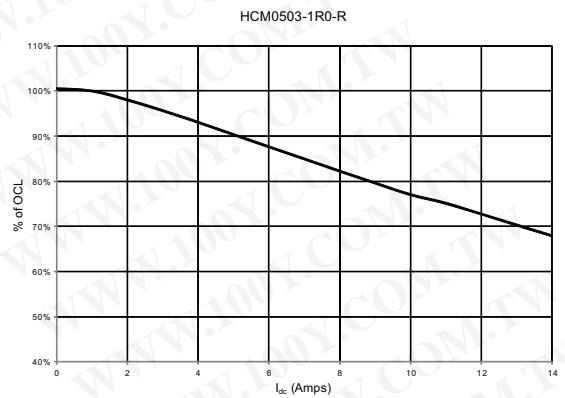
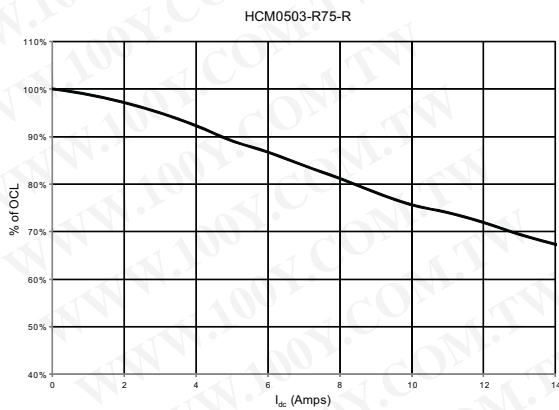
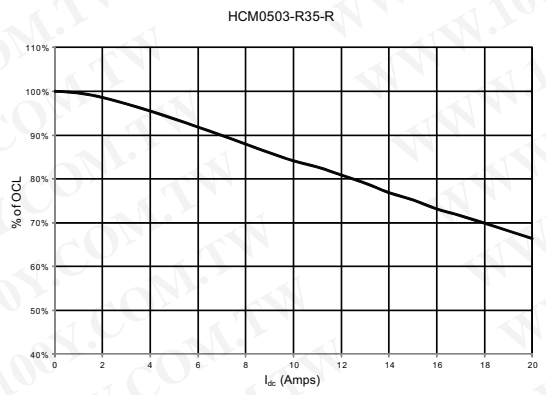
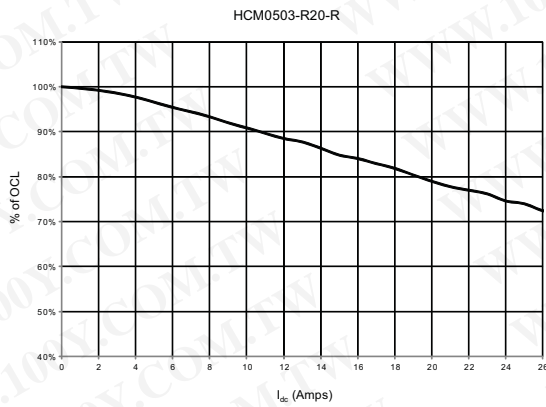


### Core Loss

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



### Inductance Characteristics



## Solder Reflow Profile

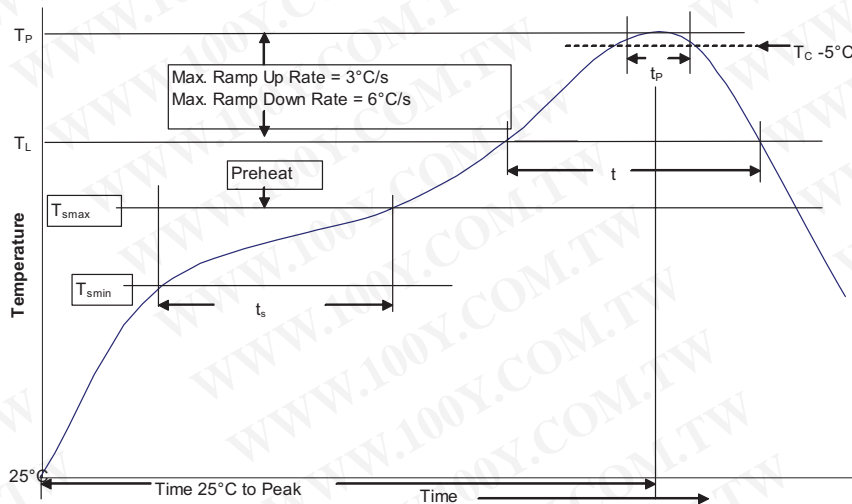


Table 1 - Standard SnPb Solder ( $T_c$ )

Package Thickness	Volume $\text{mm}^3$ <350	Volume $\text{mm}^3$ $\geq$ 350
<2.5mm	235°C	220°C
$\geq$ 2.5mm	220°C	220°C

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

Package Thickness	Volume $\text{mm}^3$ <350	Volume $\text{mm}^3$ 350 - 2000	Volume $\text{mm}^3$ >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 JDEC 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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