

HCM0503

High current power inductors



Product features

- High current carrying capacity
- Low core losses
- Magnetically shielded, low EMI
- Frequency range up to 1 MHz
- Inductance range from 0.2 μ H to 22 μ H
- Current range from 1.9 A to 22 A
- 5.5 mm x 5.3 mm footprint surface mount package in a 3.0 mm height
- Iron powder core material
- Halogen free, lead free, RoHS compliant

Applications

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

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-020 (latest revision) compliant



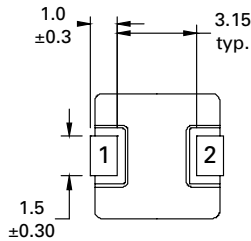
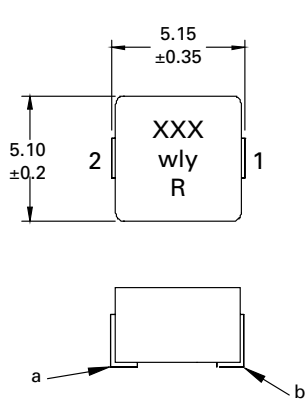
Product Specifications

| Part Number ⁶ | OCL ¹ (μH) $\pm 20\%$ | FLL ² (μH) minimum | I_{rms}^3 (A) | I_{sat}^4 (A) | DCR (m Ω) typical @ +20 °C | DCR (m Ω) maximum @ +20 °C | K-factor ⁵ |
|--------------------------|--|---|---------------------------|---------------------------|--|---------------------------------------|-----------------------|
| HCM0503-R20-R | 0.20 | 0.13 | 22.2 | 21.0 | 2 | 2.3 | 1764 |
| HCM0503-R35-R | 0.35 | 0.22 | 16.6 | 14.9 | 4 | 4.3 | 1259 |
| HCM0503-R47-R | 0.47 | 0.30 | 12.0 | 11.5 | 6 | 7.2 | 820 |
| HCM0503-R75-R | 0.75 | 0.48 | 11.3 | 9.7 | 8 | 9.4 | 801 |
| HCM0503-1R0-R | 1.0 | 0.64 | 10.1 | 8.5 | 10 | 12 | 588 |
| HCM0503-1R5-R | 1.5 | 0.96 | 7.5 | 7.0 | 17 | 19 | 393 |
| HCM0503-2R2-R | 2.2 | 1.4 | 6.8 | 6.5 | 23 | 25 | 325 |
| HCM0503-3R3-R | 3.3 | 2.1 | 5.5 | 6.0 | 36 | 41 | 273 |
| HCM0503-4R7-R | 4.7 | 3.0 | 4.5 | 5.5 | 54 | 60 | 226 |
| HCM0503-5R6-R | 5.6 | 3.6 | 4.3 | 3.5 | 63 | 71 | 206 |
| HCM0503-100-R | 10 | 6.4 | 2.8 | 2.3 | 122 | 132 | 158 |
| HCM0503-150-R | 15 | 9.6 | 2.4 | 2.1 | 138 | 166 | 127 |
| HCM0503-220-R | 22 | 14 | 1.9 | 1.9 | 260 | 270 | 106 |

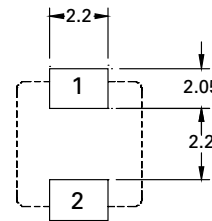
- Open Circuit Inductance (OCL) Test Parameters: 100 kHz, 0.25 Vrms, 0.0 Adc, @ +25 °C
- Full Load Inductance (FLL) Test Parameters: 100 kHz, 0.25 Vrms, @ I_{sat} @ +25 °C
- I_{rms} : DC current for an approximate temperature rise of 40 °C without core loss. Derating is necessary for AC currents. PCB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

- I_{sat} : Peak current for approximately 20% rolloff @ +25 °C
- K-factor: Used to determine B_{pp} for core loss (see graph). $B_{\text{p-p}} = K * L * \Delta I$. B_{pp} : (Gauss), K: (K-factor from table), L: (Inductance in μH), ΔI (Peak to peak ripple current in Amps).
- 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 last character equals number of zeros
 -R suffix = RoHS compliant

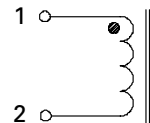
Dimensions (mm)



Recommended Pad Layout



Schematic



Part marking: xxx=inductance value in uH, 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

Tolerances are ± 0.2 millimeters unless stated otherwise

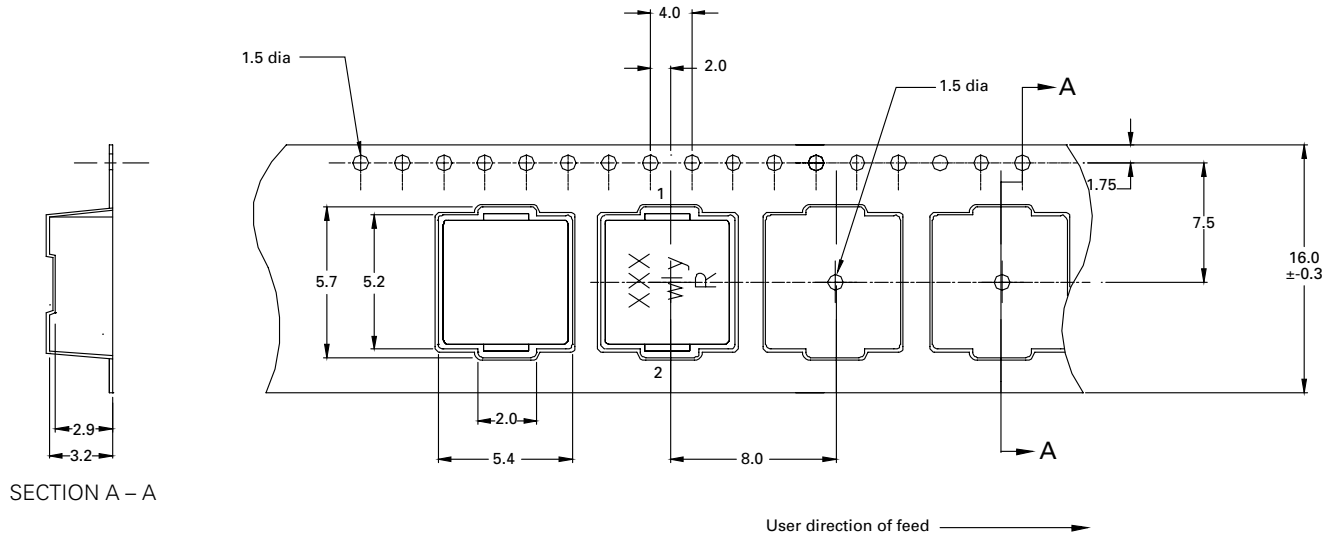
DCR measured from point "a" to point "b"

Color: Grey

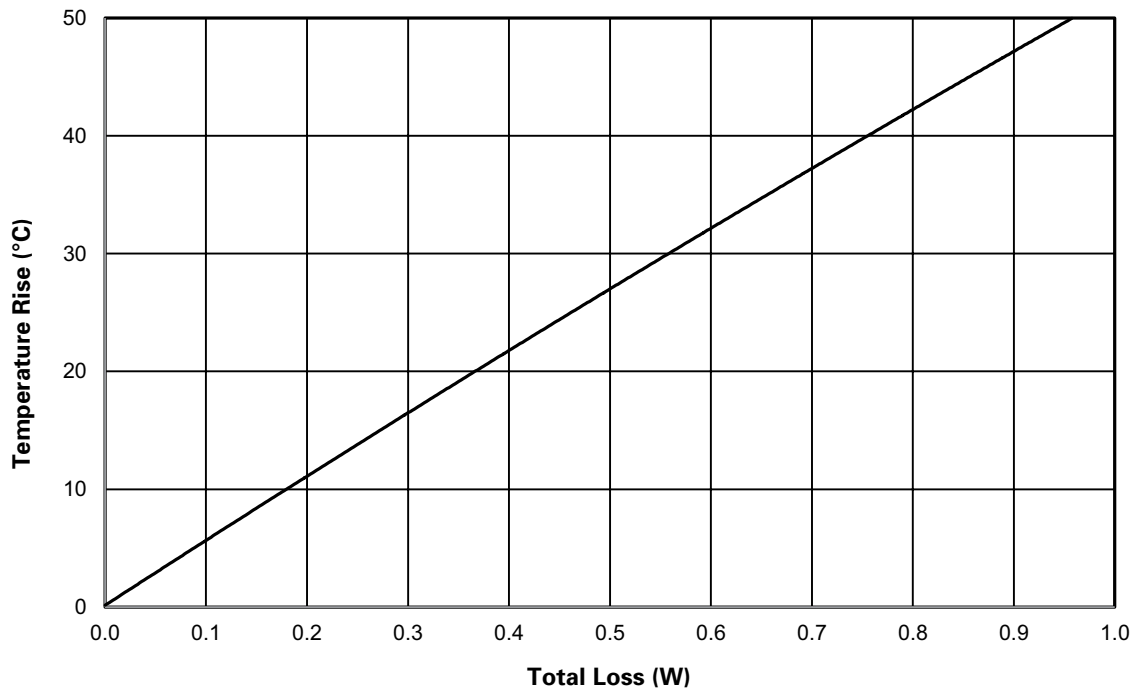
Do not route traces or vias underneath the inductor

Packaging information (mm)

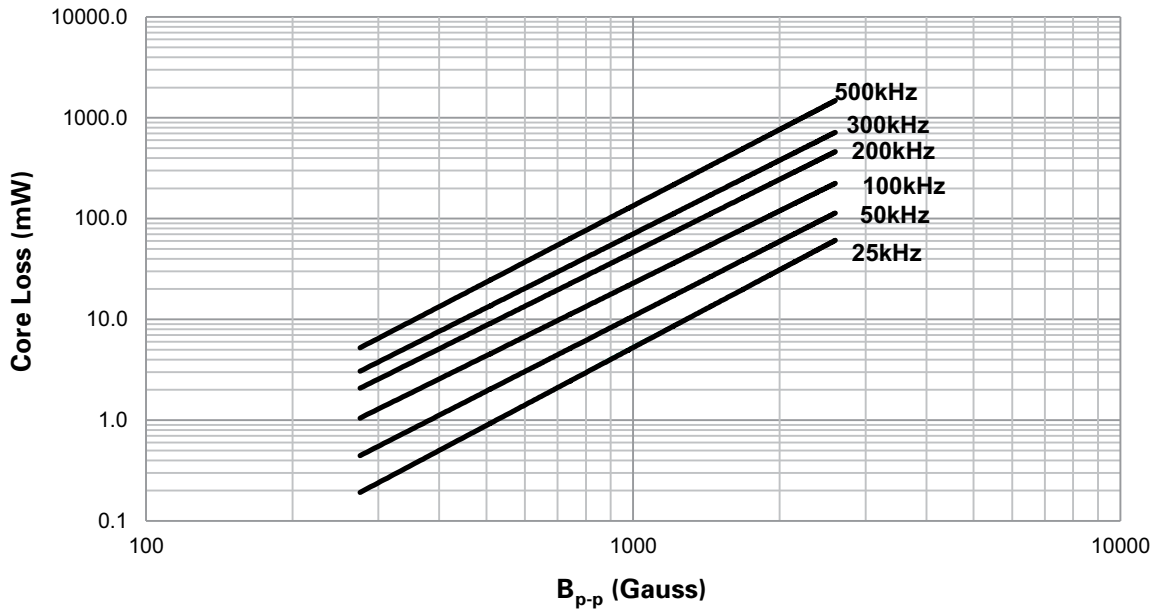
Supplied in tape and reel packaging, 2,000 parts per 13" diameter reel



Temperature rise vs. total loss

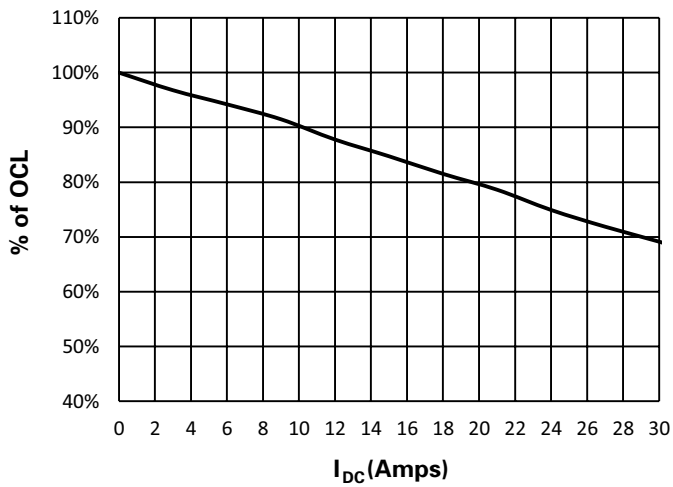


Core loss vs. B_{p-p}

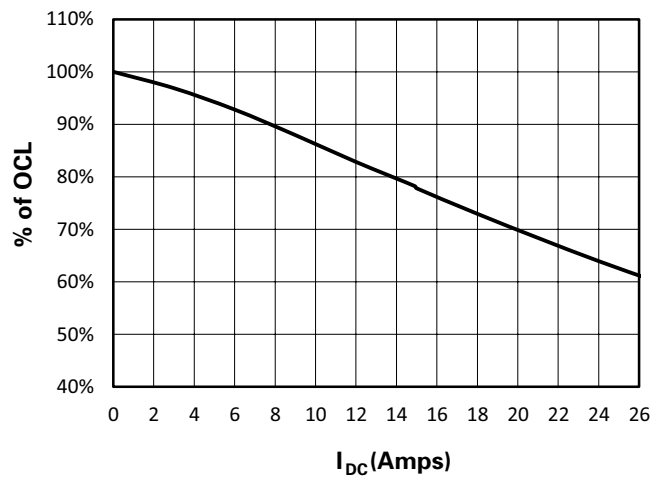


Inductance characteristics

HCM0503-R20-R

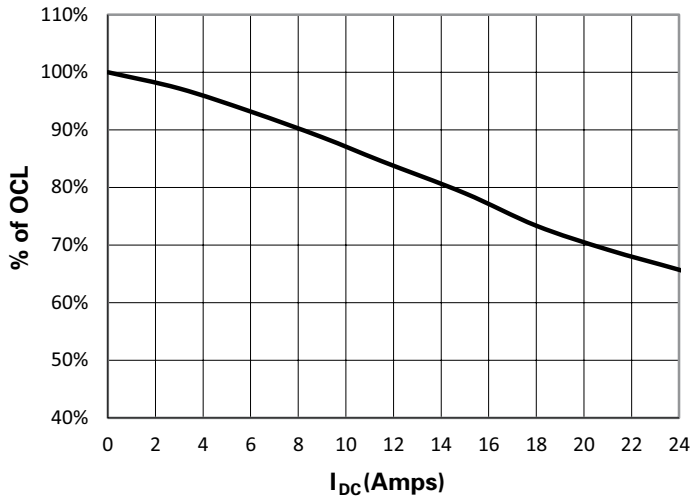


HCM0503-R35-R

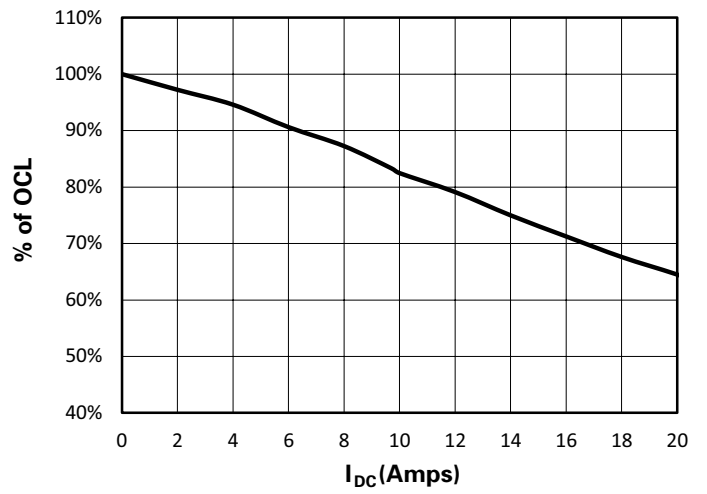


Inductance characteristics

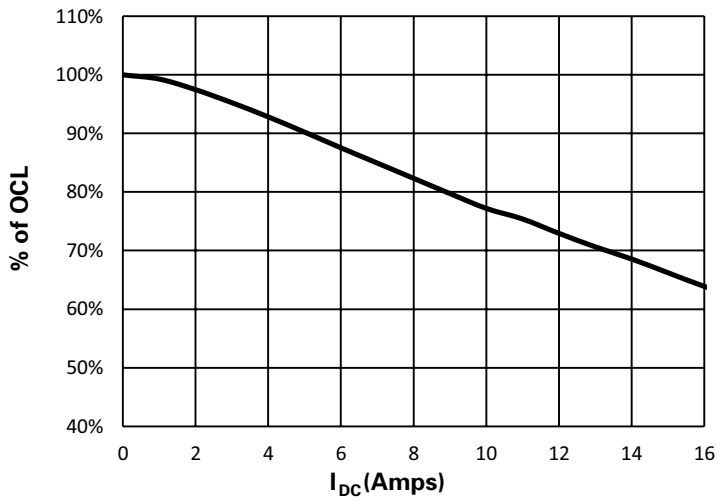
HCM0503-R47-R



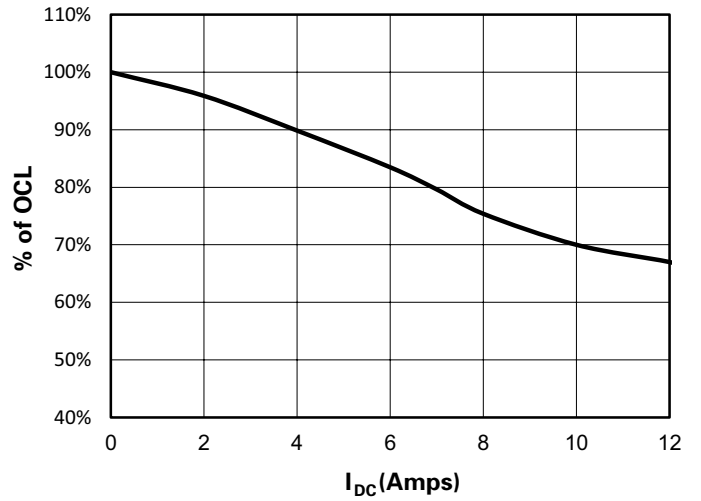
HCM0503-R75-R



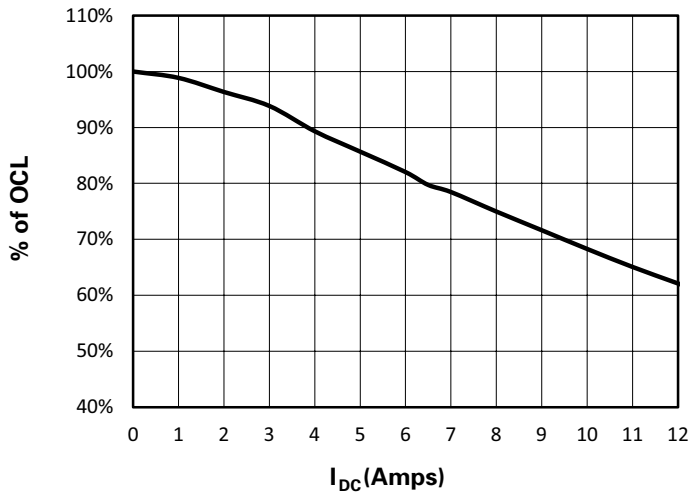
HCM0503-1R0-R



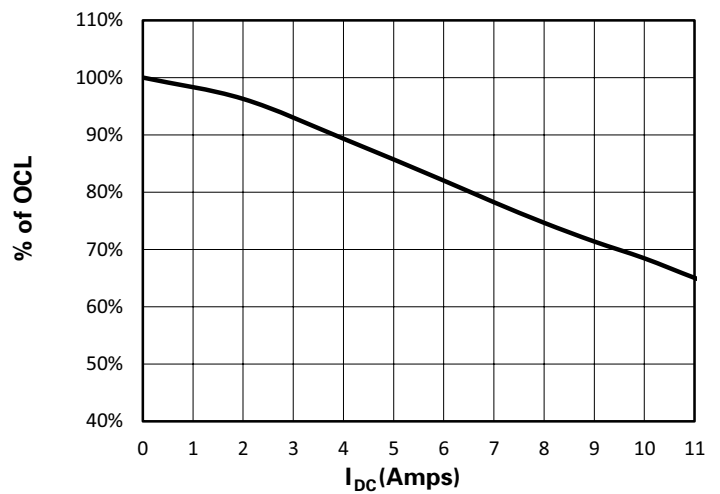
HCM0503-1R5-R



HCM0503-2R2-R

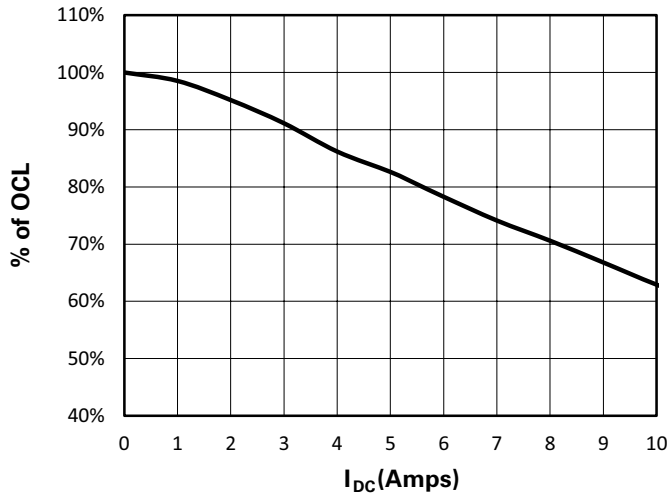


HCM0503-3R3-R

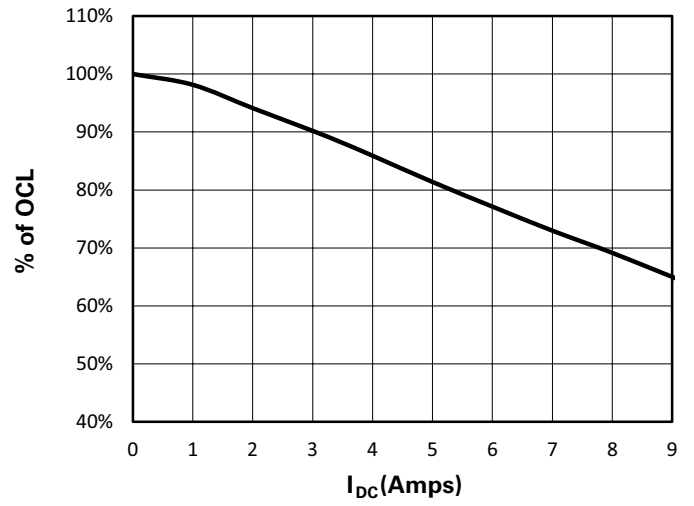


Inductance characteristics

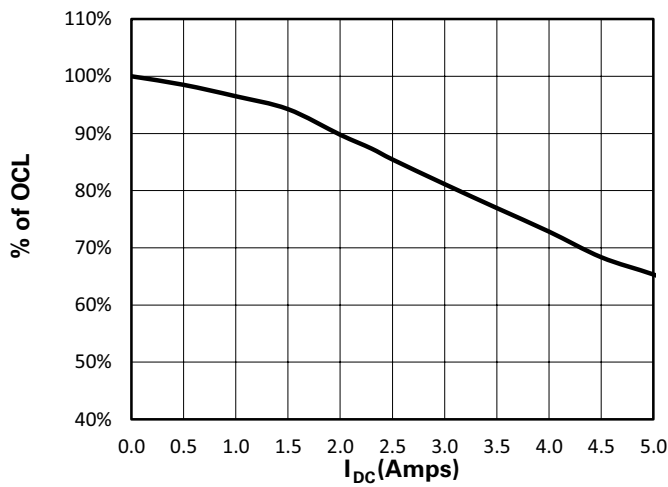
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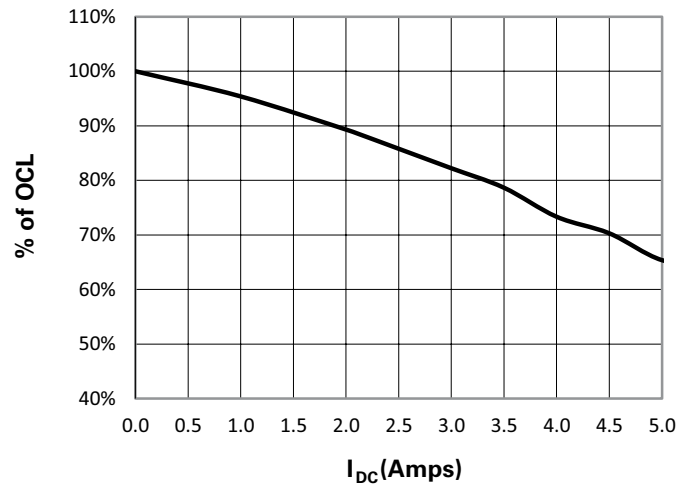
HCM0503-5R6-R



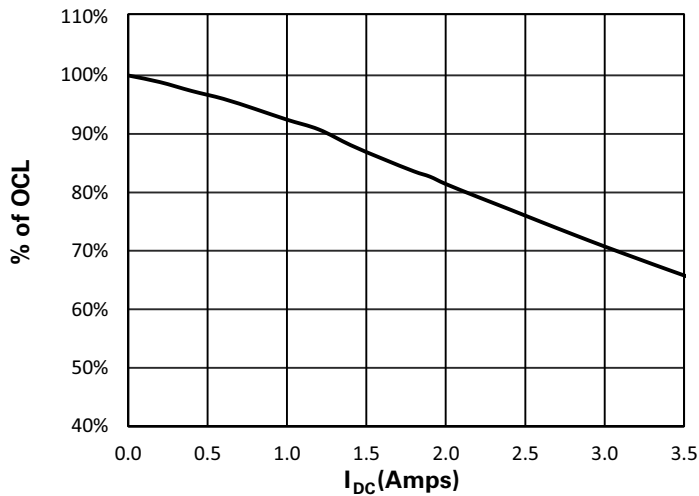
HCM0503-100-R



HCM0503-150-R



HCM0503-220-R



Solder reflow profile

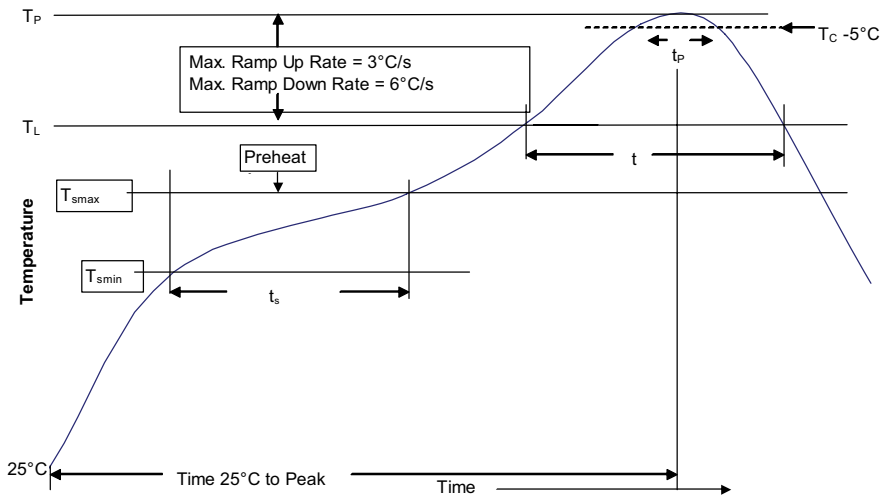


Table 1 - Standard SnPb Solder (T_C)

| 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 JDEC 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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 Printed in USA
 Publication No. 4430 BU-SB15267
 June 2015

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[HCM0503-5R6-R](#) [HCM0503-150-R](#) [HCM0503-3R3-R](#) [HCM0503-1R5-R](#) [HCM0503-4R7-R](#) [HCM0503-220-R](#)
[HCM0503-R47-R](#)