

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

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 compliance and general specifications

- 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	2.1	2.31	1764
HCM0503-R35-R	0.35	0.22	16.6	14.9	3.9	4.29	1259
HCM0503-R47-R	0.47	0.30	12.0	11.5	6.5	7.15	820
HCM0503-R75-R	0.75	0.48	11.3	9.7	8.5	9.35	801
HCM0503-1R0-R	1.0	0.64	10.1	8.5	10.4	11.44	588
HCM0503-1R5-R	1.5	0.96	7.5	7.0	17.1	18.5	393
HCM0503-2R2-R	2.2	1.4	6.8	6.5	22.5	25	325
HCM0503-3R3-R	3.3	2.1	5.5	6.0	36.4	40.4	273
HCM0503-4R7-R	4.7	3.0	4.5	5.5	54	60.0	226
HCM0503-5R6-R	5.6	3.6	4.3	3.5	63	70.6	206
HCM0503-100-R	10	6.4	2.8	2.3	122.1	131.9	158
HCM0503-150-R	15	9.6	2.4	2.1	138.4	166.2	127
HCM0503-220-R	22	14	1.9	1.9	260	270	106

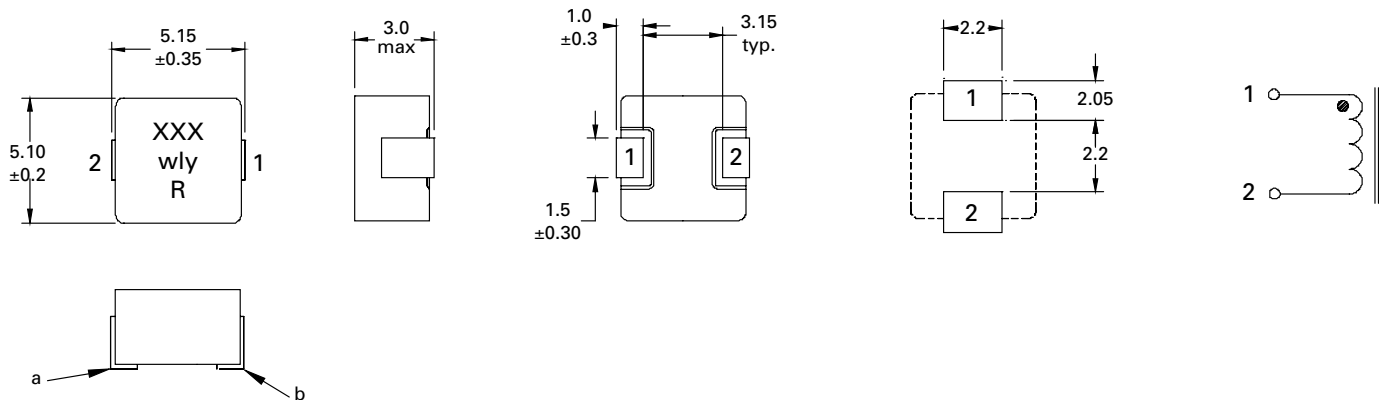
- Open circuit inductance (OCL) test parameters: 100 kHz, 0.25 Vrms, 0.0 Adc, @ +25 °C
- Full load inductance (FLL) test parameters: 100 kHz, 0.25 Vrms, @ I_{sat} @ +25 °C
- I_{rms} : DC current for an approximate temperature rise of 40 °C without core loss. Derating is necessary for AC currents. PCB 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 $B_{\text{p-p}}$ 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 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

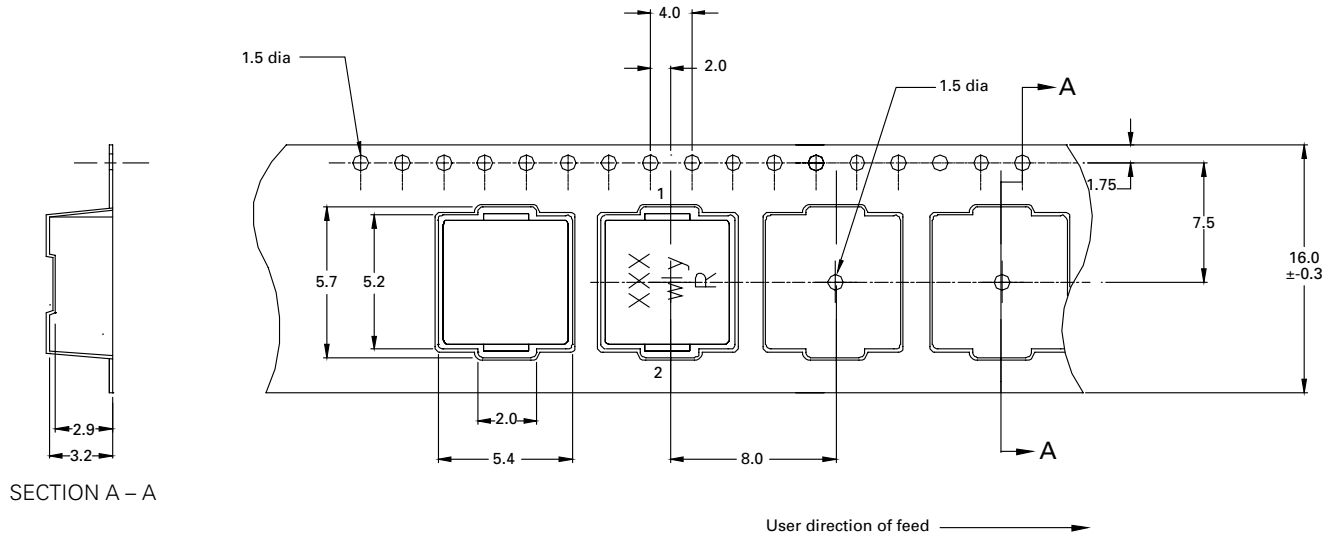
DCR measured from point "a" to point "b"

Color: Grey

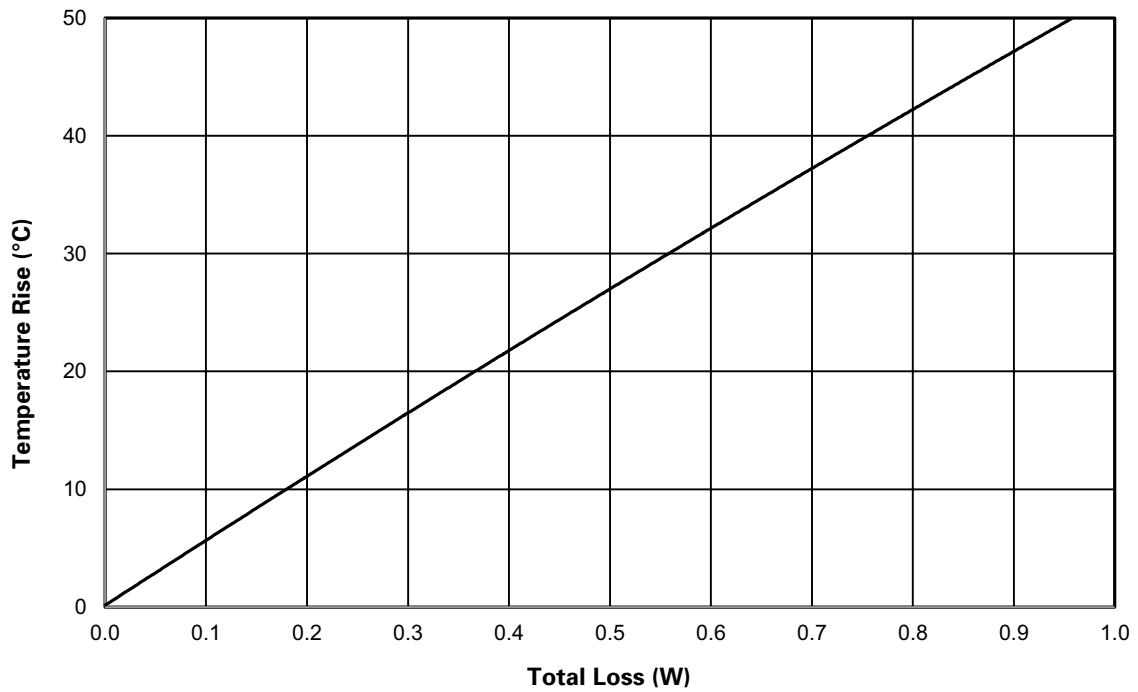
Traces or vias underneath the inductor is not recommended

Packaging information (mm)

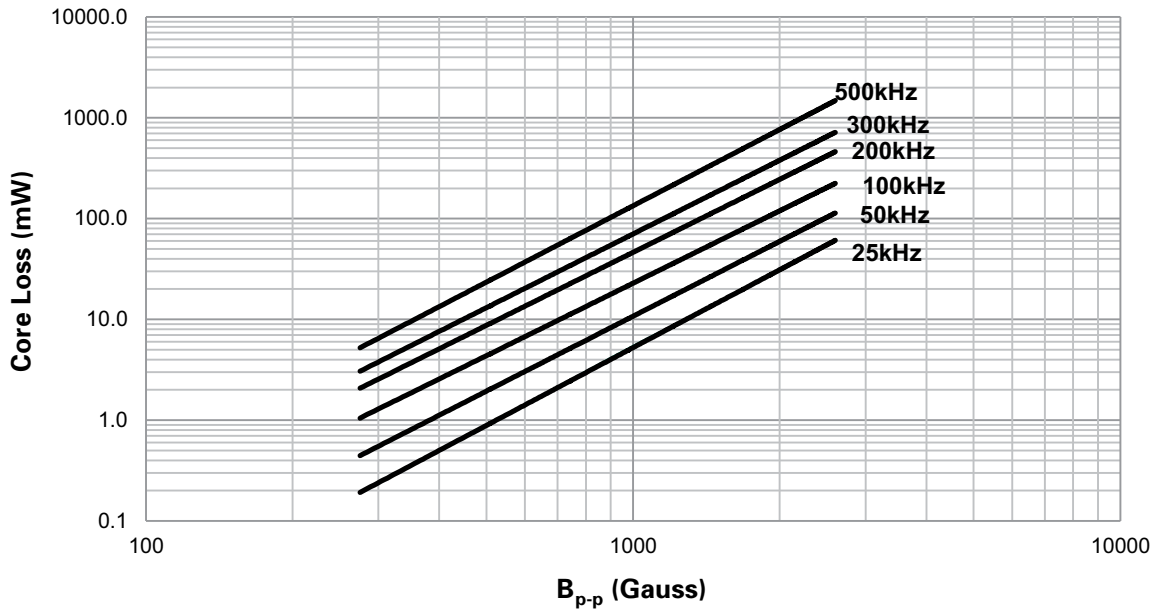
Supplied in tape and reel packaging, 2,000 parts per 13" diameter reel (EIA-481 compliant)



Temperature rise vs. total loss

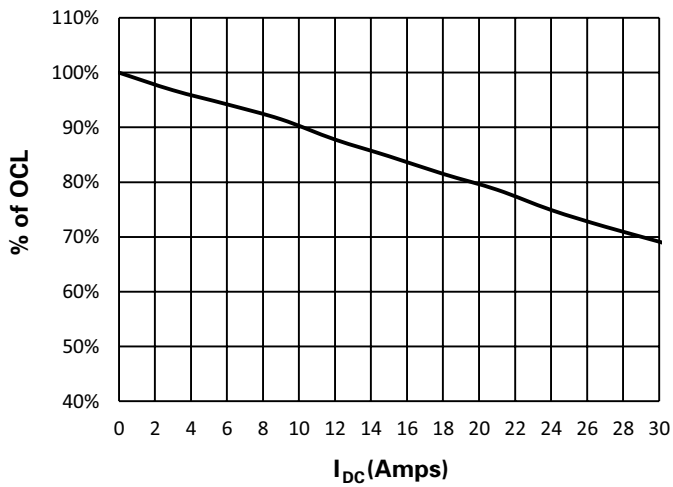


Core loss vs. B_{p-p}

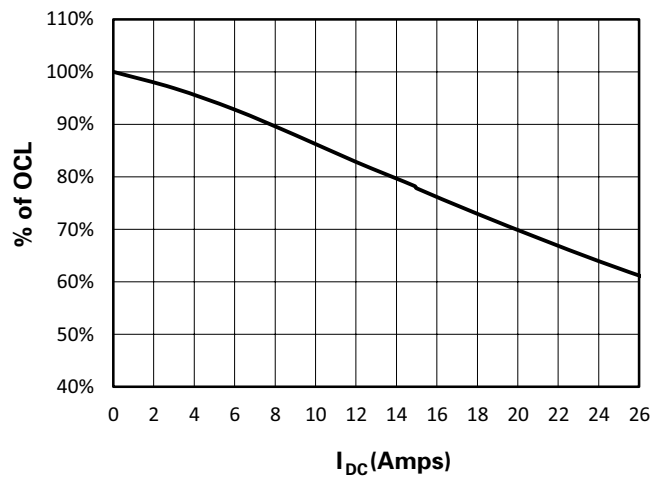


Inductance characteristics

HCM0503-R20-R

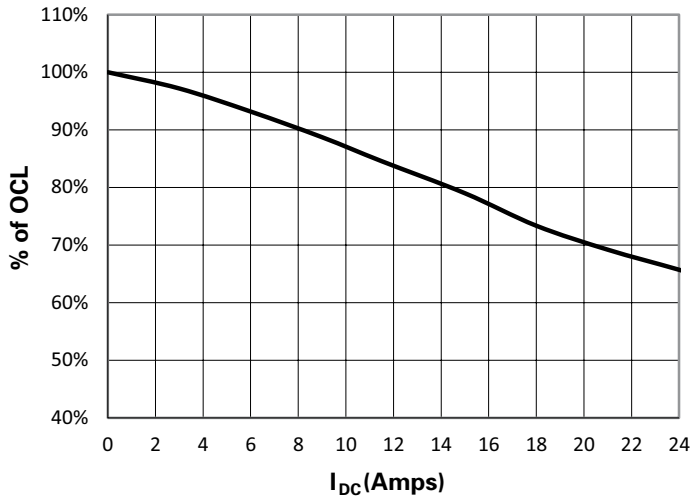


HCM0503-R35-R

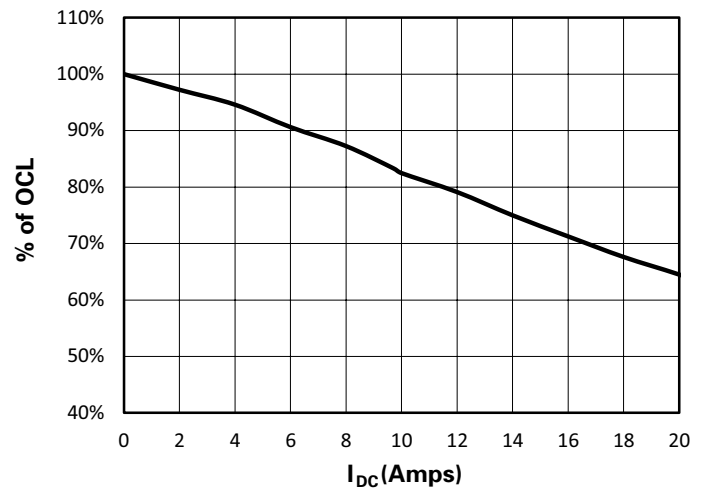


Inductance characteristics

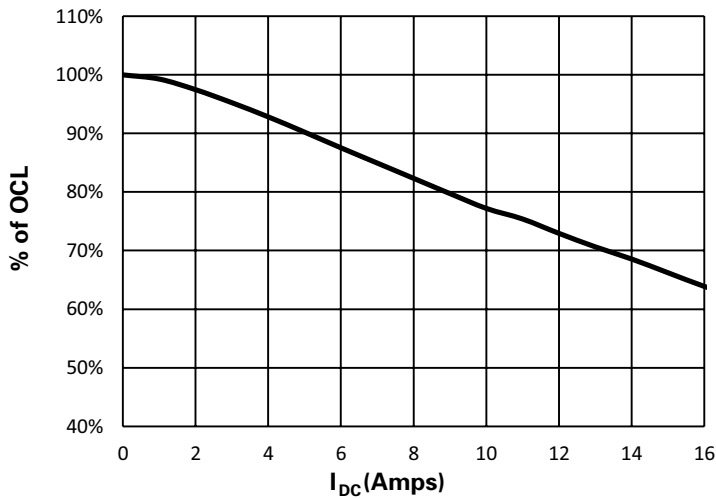
HCM0503-R47-R



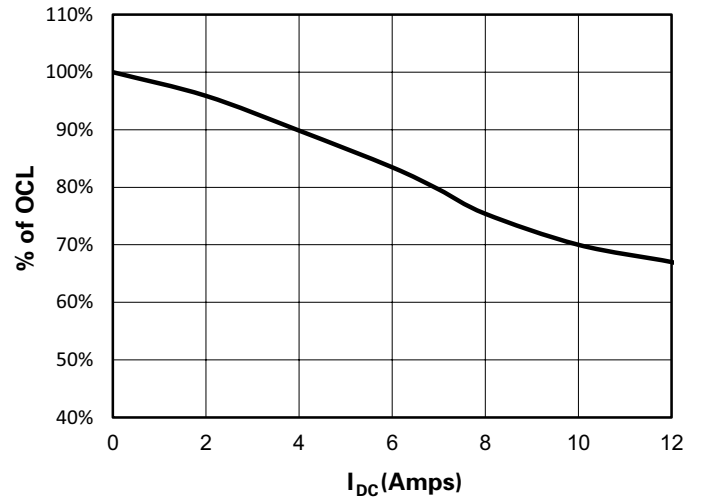
HCM0503-R75-R



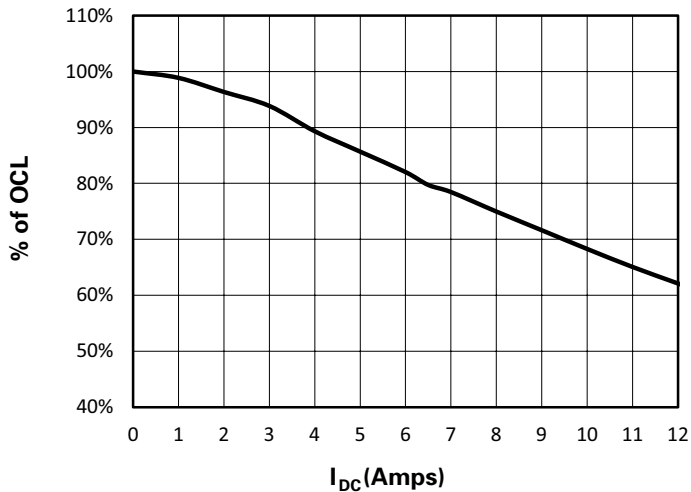
HCM0503-1R0-R



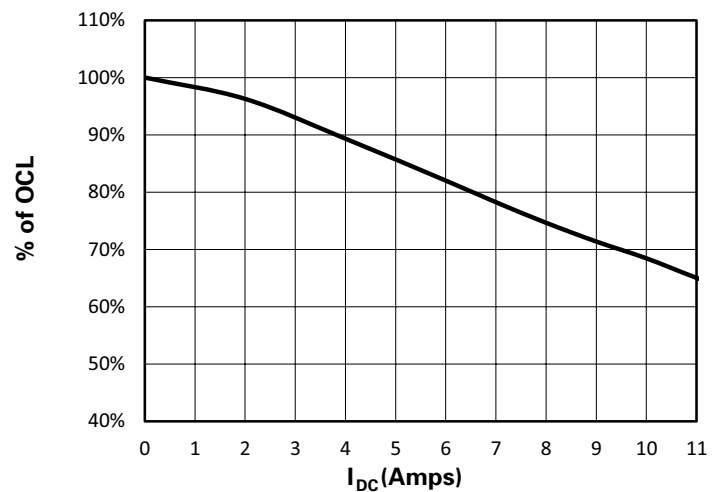
HCM0503-1R5-R



HCM0503-2R2-R

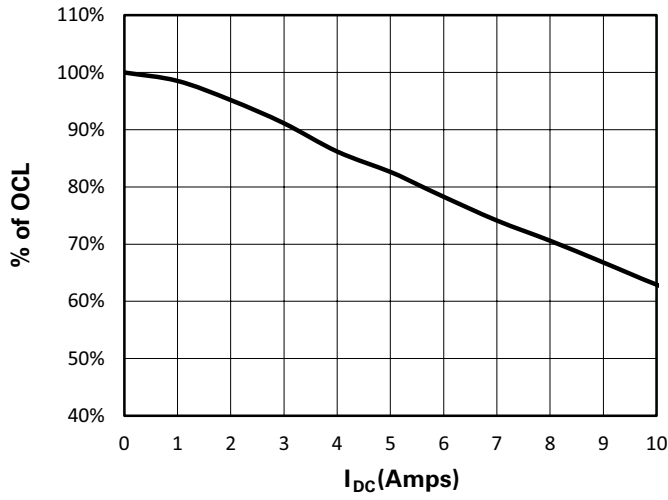


HCM0503-3R3-R

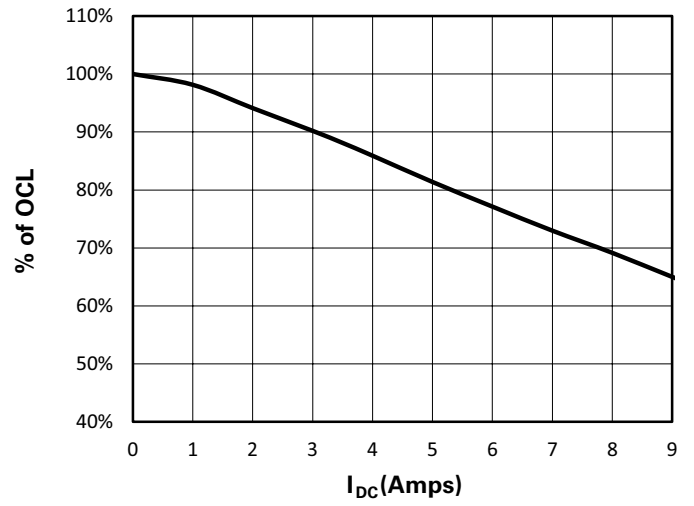


Inductance characteristics

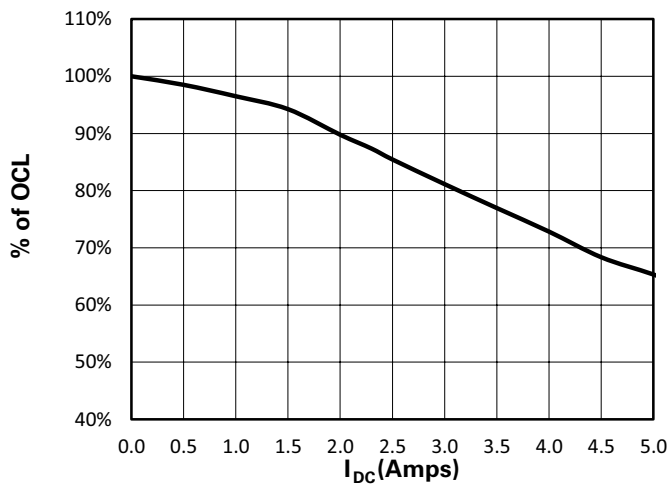
HCM0503-4R7-R



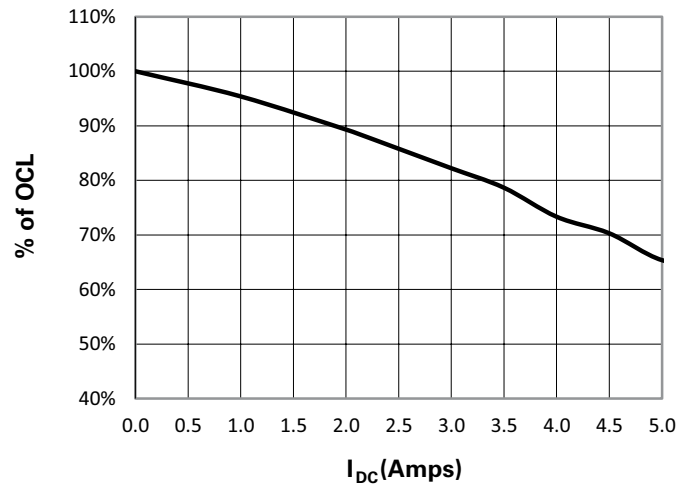
HCM0503-5R6-R



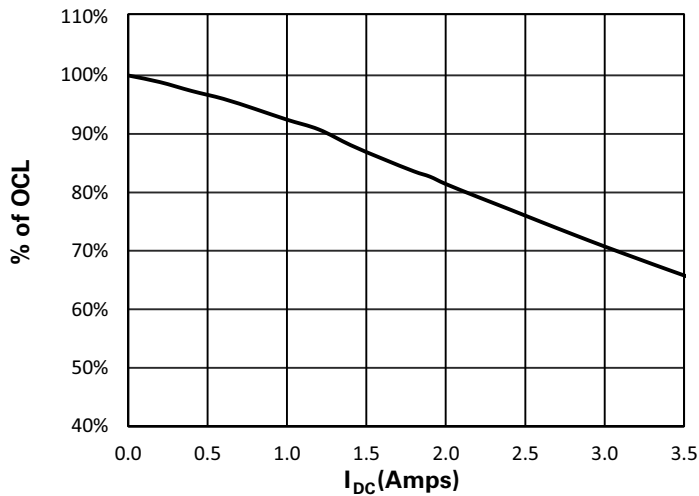
HCM0503-100-R



HCM0503-150-R



HCM0503-220-R



Solder reflow profile

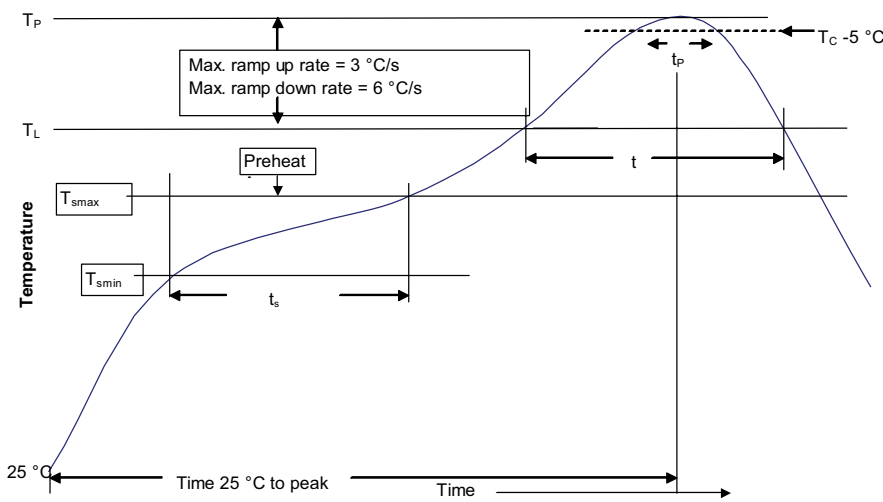


Table 1 - Standard SnPb solder (T_C)

Package thickness	Volume mm ³ <350	Volume mm ³ ≥350
<2.5 mm	235 °C	220 °C
≥2.5 mm	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
<1.6 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 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
Ramp up rate T_L to T_p	3 °C/ second max.	3 °C/ second max.
Liquidous temperature (T_L)	183 °C	217 °C
Time (t_L) maintained above 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*
Ramp-down rate (T_p to T_L)	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.

Life Support Policy: Eaton does not authorize the use of any of its products for use in life support devices or systems without the express written approval of an officer of the Company. Life support systems are devices which support or sustain life, and whose failure to perform, when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in significant injury to the user.

Eaton reserves the right, without notice, to change design or construction of any products and to discontinue or limit distribution of any products. Eaton also reserves the right to change or update, without notice, any technical information contained in this bulletin.

Eaton
Electronics Division
1000 Eaton Boulevard
Cleveland, OH 44122
United States
Eaton.com/electronics

© 2020 Eaton
All Rights Reserved
Printed in USA
Publication No. 4430
September 2020

Eaton is a registered trademark.

All other trademarks are property of their respective owners.

Follow us on social media to get the latest product and support information.

