

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

1. Open circuit inductance (OCL) test parameters: 100 kHz, 0.25 Vrms, 0.0 Adc, @ +25 °C

2. Full load inductance (FLL) test parameters: 100 kHz, 0.25 Vrms, @ I_{sat} @ +25 °C

3. 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.

4. I_{sat} : Peak current for approximately 20% rolloff @ +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 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 ,

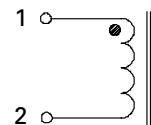
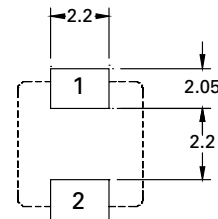
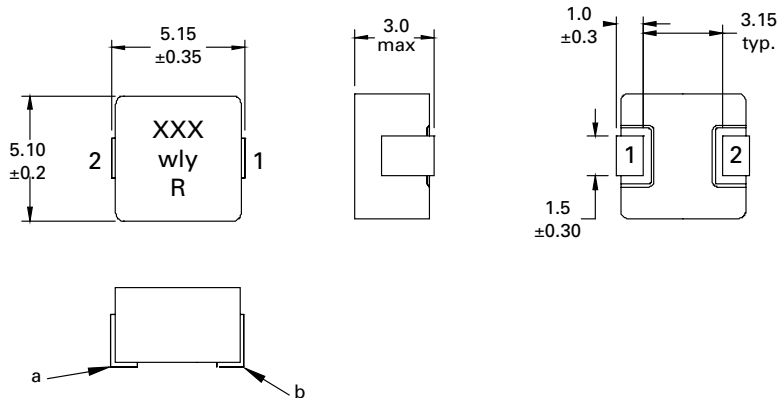
If no R is present then last character equals number of zeros

-R suffix = RoHS compliant

Dimensions (mm)

Recommended Pad Layout

Schematic



Part marking: xxx=inductance value in μH , 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

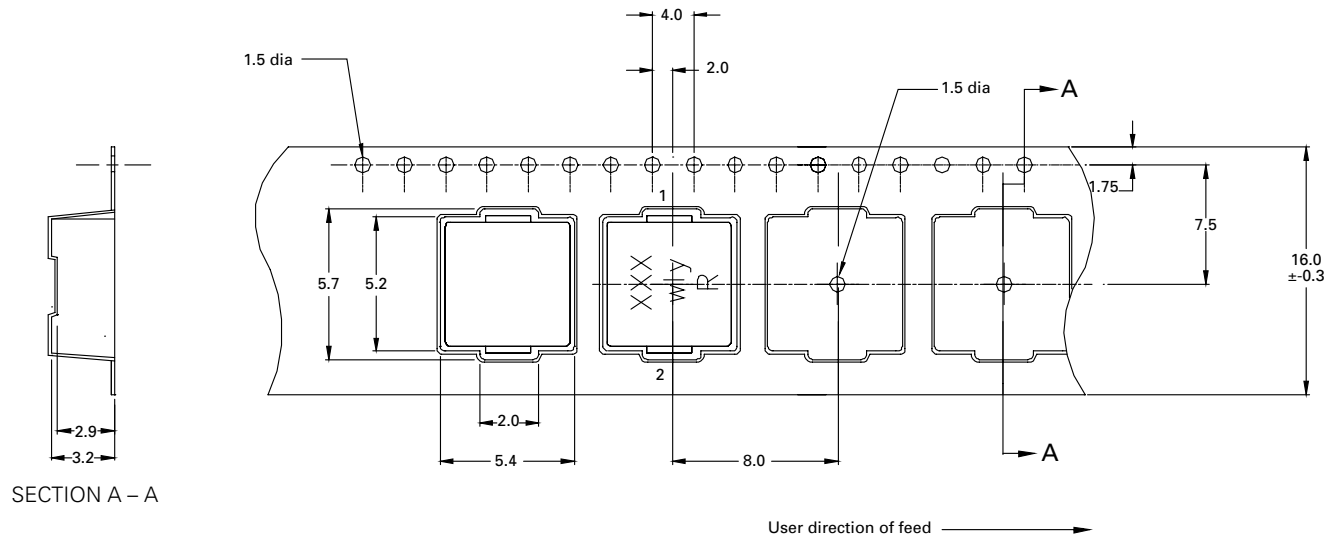
DCR measured from point "a" to point "b"

Color: Grey

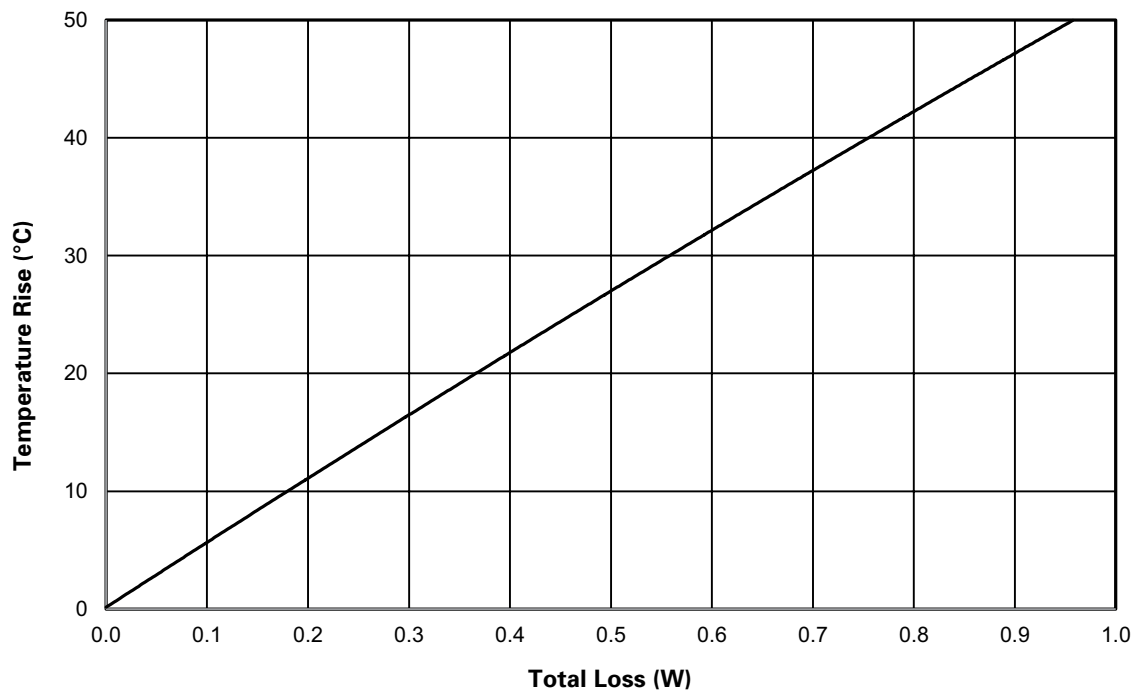
Traces or vias underneath the inductor is not recommended

Packaging information (mm)

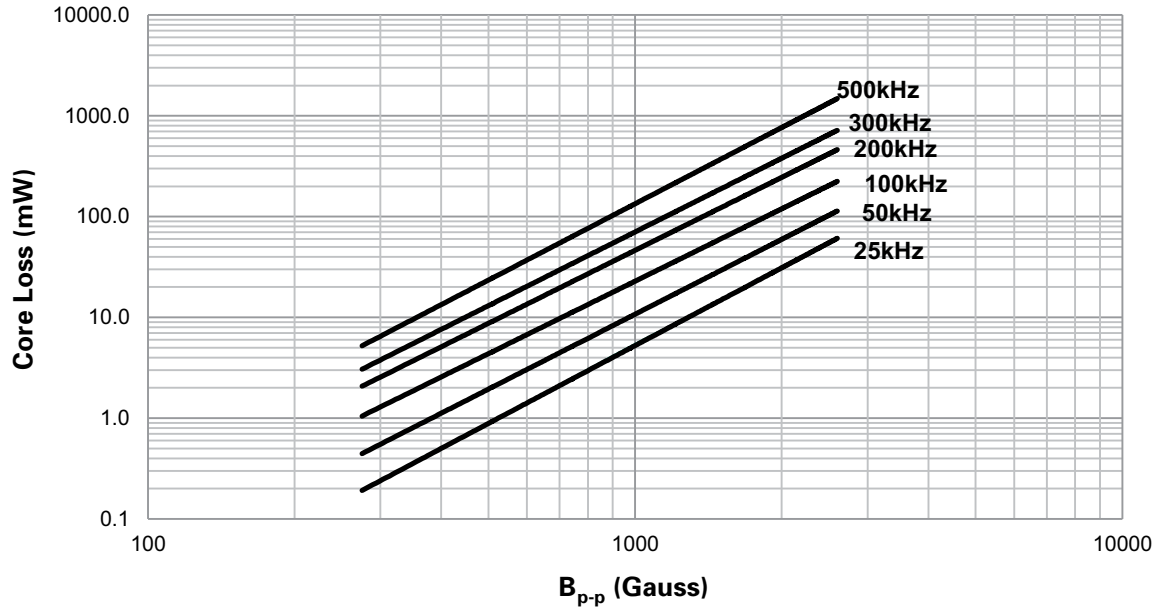
Supplied in tape and reel packaging, 2,000 parts per 13" diameter reel (EIA-481 compliant)



Temperature rise vs. total loss

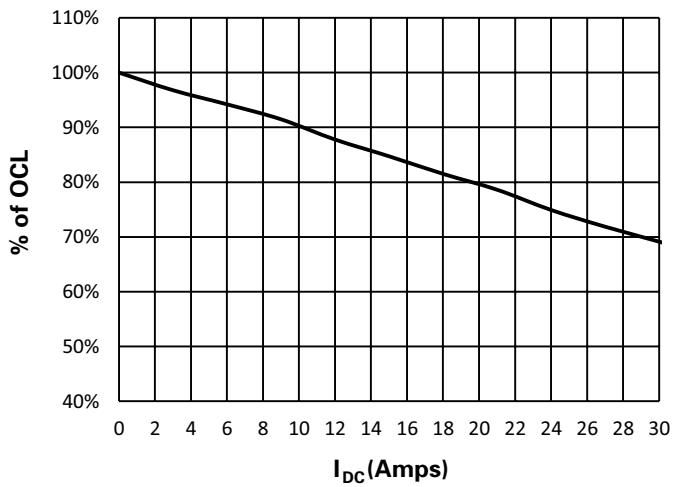


Core loss vs. B_{p-p}

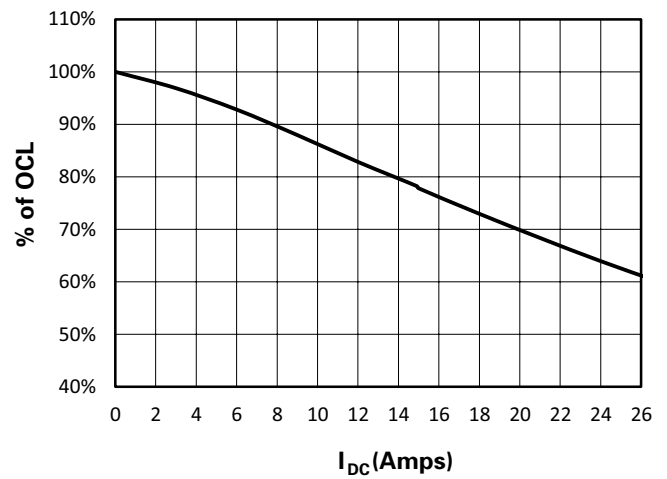


Inductance characteristics

HCM0503-R20-R

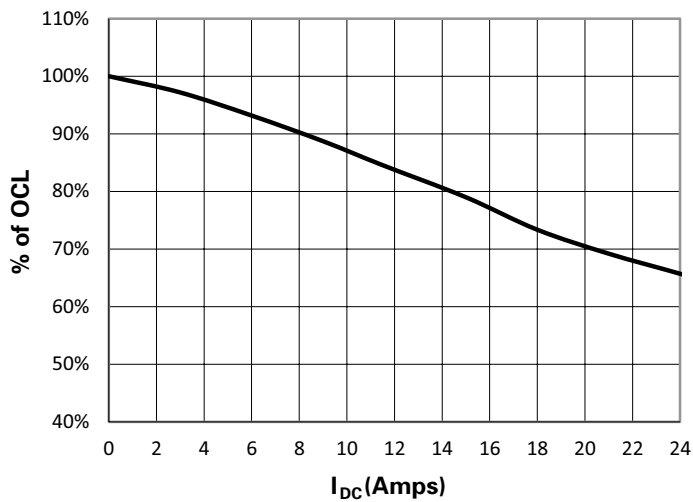


HCM0503-R35-R

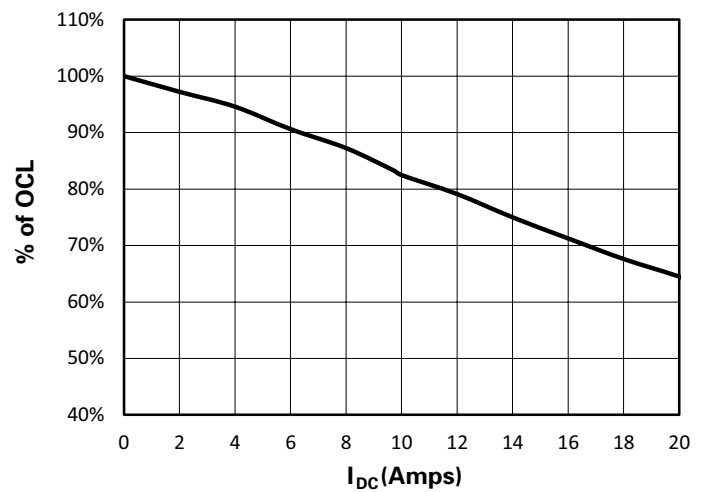


Inductance characteristics

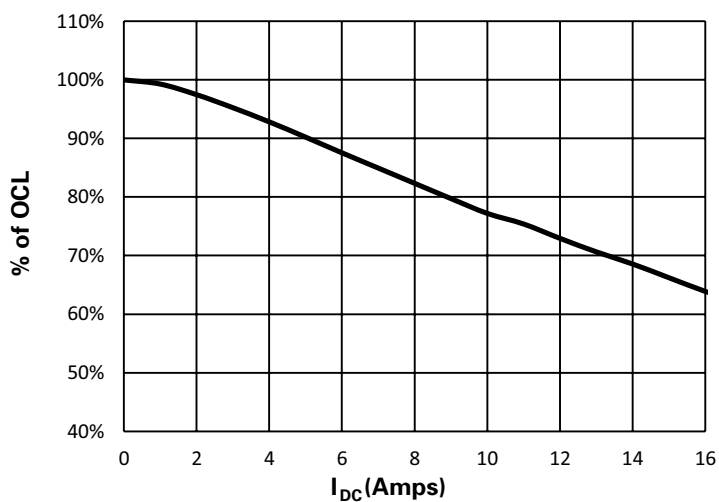
HCM0503-R47-R



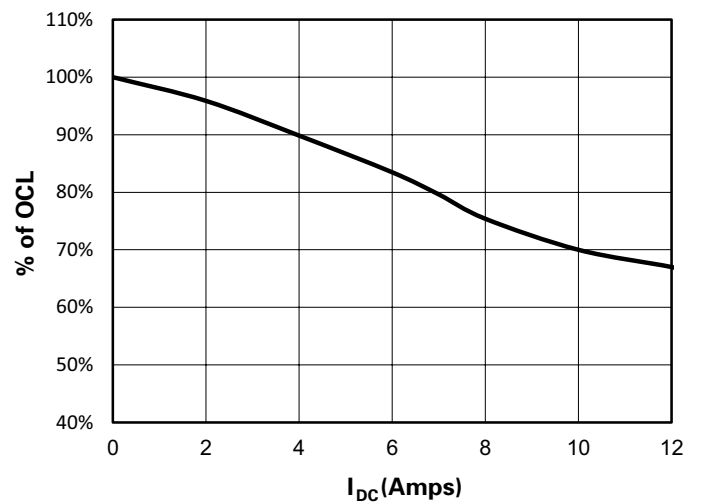
HCM0503-R75-R



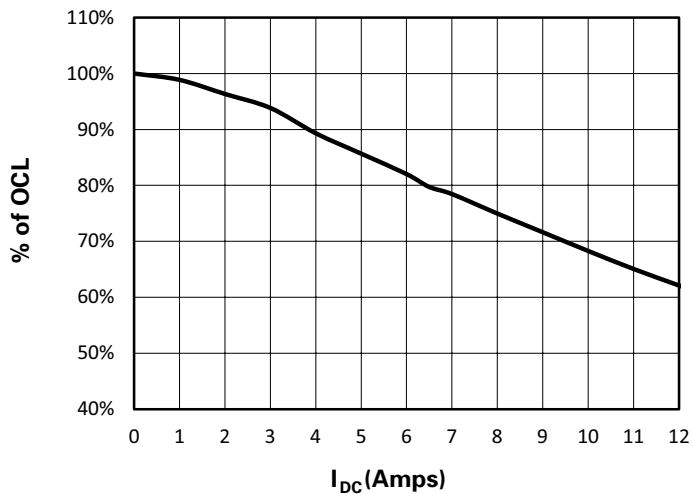
HCM0503-1R0-R



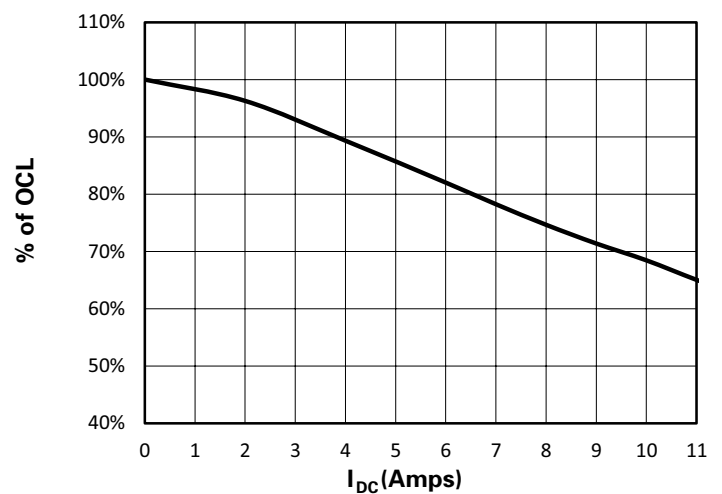
HCM0503-1R5-R



HCM0503-2R2-R

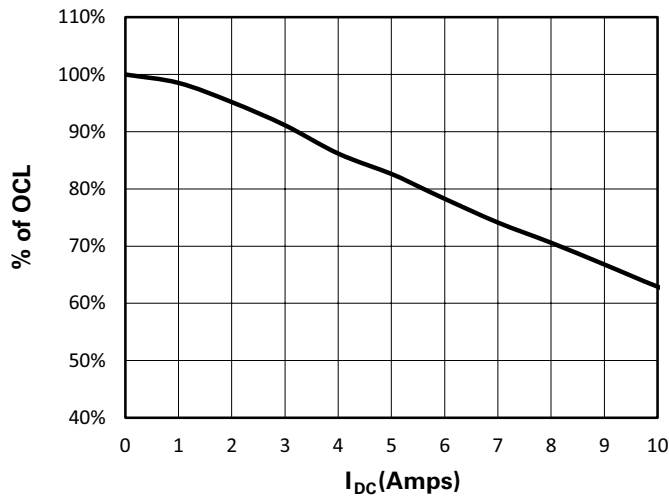


HCM0503-3R3-R

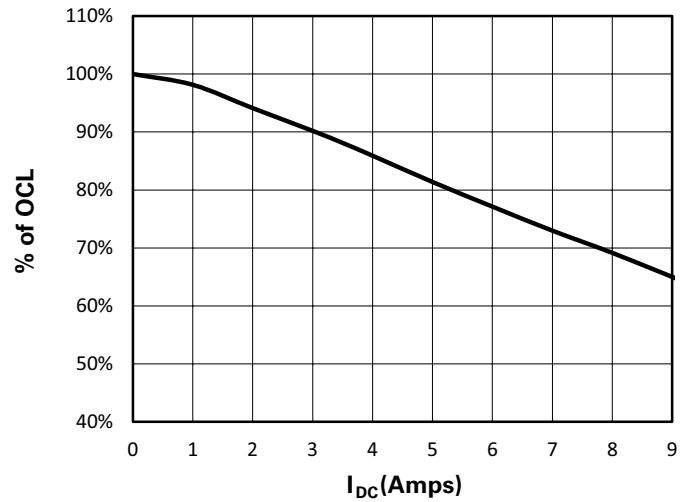


Inductance characteristics

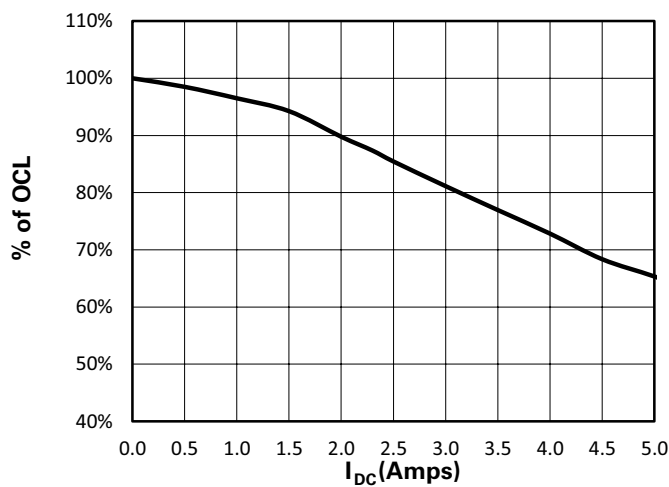
HCM0503-4R7-R



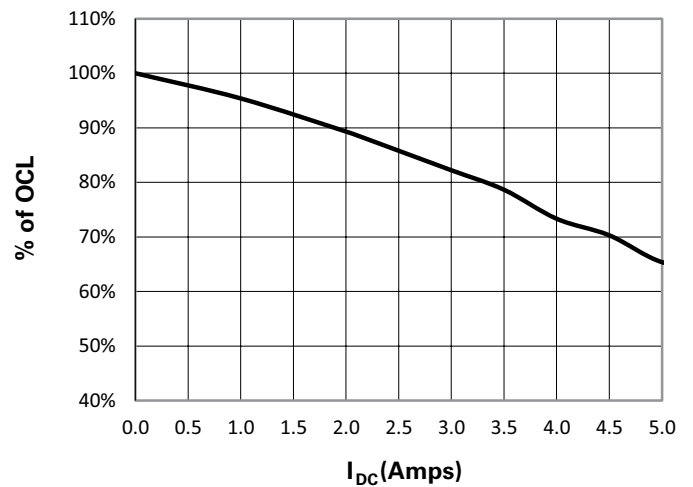
HCM0503-5R6-R



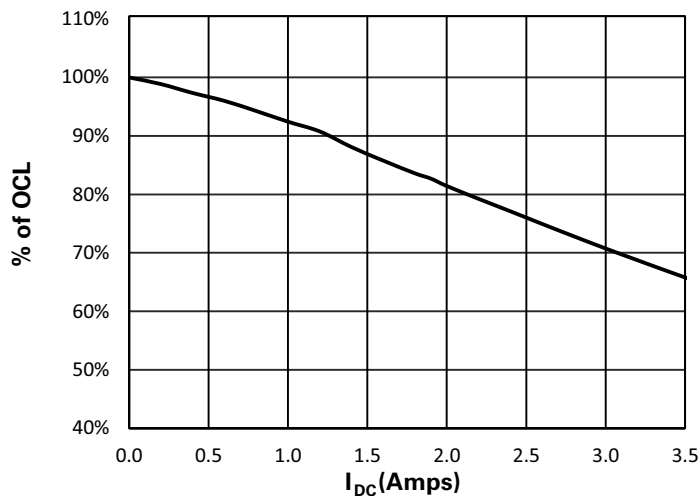
HCM0503-100-R



HCM0503-150-R



HCM0503-220-R



Solder reflow profile

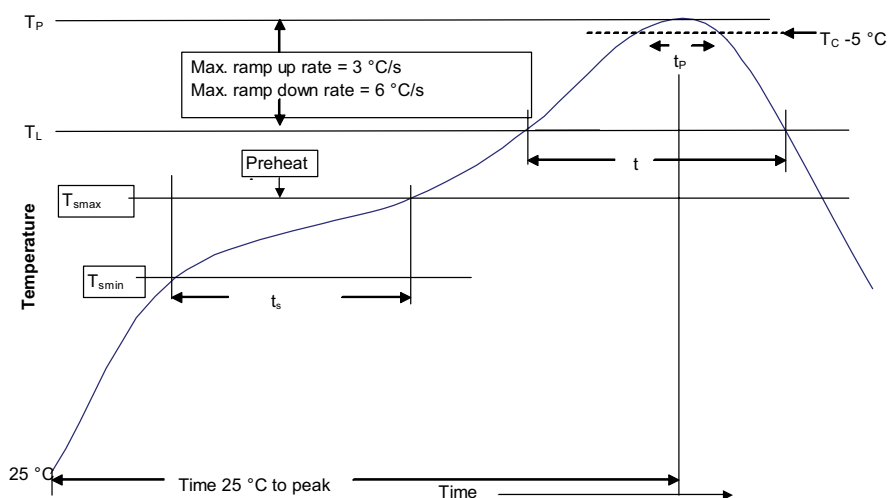


Table 1 - Standard SnPb solder (T_C)

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.

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