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# HCM0703

## High current power inductors



### Description

- High current carrying capacity
- Low core losses
- Magnetically shielded, low EMI
- Frequency range up to 5 MHz
- Inductance range from 0.15  $\mu\text{H}$  to 33  $\mu\text{H}$
- Current range from 1.8 A to 52 A
- 7.4 mm x 6.8 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
- Laptop and notebook 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 plus self-temperature rise)
- Solder reflow temperature: J-STD-020D compliant



Product Specifications

| Part Number <sup>6</sup> | OCL <sup>1</sup><br>( $\mu\text{H}$ ) $\pm 20\%$ | FLL <sup>2</sup> ( $\mu\text{H}$ )<br>minimum | $I_{\text{rms}}^3$<br>(A) | $I_{\text{sat}}^4$<br>(A) | DCR ( $\text{m}\Omega$ )<br>typical @ 20 °C | DCR ( $\text{m}\Omega$ )<br>maximum @ 20 °C | K-factor <sup>5</sup> |
|--------------------------|--------------------------------------------------|-----------------------------------------------|---------------------------|---------------------------|---------------------------------------------|---------------------------------------------|-----------------------|
| HCM0703-R15-R            | 0.15                                             | 0.09                                          | 26                        | 52                        | 1.9                                         | 2.5                                         | 1044                  |
| HCM0703-R22-R            | 0.22                                             | 0.13                                          | 23                        | 40                        | 2.5                                         | 2.8                                         | 986                   |
| HCM0703-R47-R            | 0.47                                             | 0.28                                          | 17.5                      | 26                        | 4.0                                         | 4.2                                         | 580                   |
| HCM0703-R68-R            | 0.68                                             | 0.41                                          | 15.5                      | 25                        | 5.0                                         | 5.5                                         | 455                   |
| HCM0703-R82-R            | 0.82                                             | 0.49                                          | 13                        | 24                        | 6.7                                         | 8.0                                         | 439                   |
| HCM0703-1R0-R            | 1.0                                              | 0.60                                          | 11                        | 22                        | 9.0                                         | 10                                          | 374                   |
| HCM0703-1R5-R            | 1.5                                              | 0.90                                          | 9.0                       | 18                        | 14                                          | 15                                          | 366                   |
| HCM0703-2R2-R            | 2.2                                              | 1.3                                           | 8.0                       | 14                        | 18                                          | 20                                          | 281                   |
| HCM0703-3R3-R            | 3.3                                              | 2.0                                           | 6.0                       | 13.5                      | 28                                          | 30                                          | 252                   |
| HCM0703-4R7-R            | 4.7                                              | 2.8                                           | 5.5                       | 10                        | 37                                          | 40                                          | 210                   |
| HCM0703-6R8-R            | 7                                                | 4.1                                           | 4.5                       | 8.0                       | 54                                          | 60                                          | 151                   |
| HCM0703-8R2-R            | 8                                                | 4.9                                           | 4.0                       | 7.5                       | 64                                          | 68                                          | 142                   |
| HCM0703-100-R            | 10                                               | 6.0                                           | 3.2                       | 7.0                       | 71                                          | 78                                          | 132                   |
| HCM0703-150-R            | 14.9 $\pm 15\%$                                  | 10.1                                          | 2.2                       | 5.0                       | 113                                         | 127                                         | 105                   |
| HCM0703-220-R            | 22                                               | 14.1                                          | 2.3                       | 3.0                       | 135                                         | 149                                         | 83                    |
| HCM0703-330-R            | 33                                               | 19.8                                          | 1.8                       | 2.2                       | 220                                         | 242                                         | 76                    |

1. Open Circuit Inductance (OCL) Test Parameters: 100 kHz, 0.25  $V_{\text{max}}$ , 0.0 Adc, +25 °C.

2. Full Load Inductance (FLL) Test Parameters: 100 kHz, 0.25  $V_{\text{max}}$ ,  $I_{\text{sat}}$  @ +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: HCM0703-xxx-R

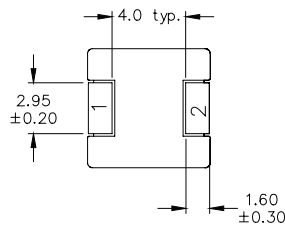
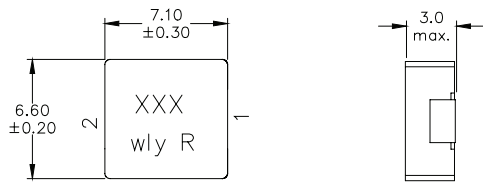
HCM0703 = Product code and size

-xxx= Inductance value in  $\mu\text{H}$ , R = decimal point,

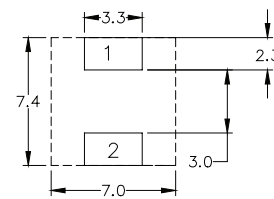
if no R is present then last character equals number of zeros.

"-R" suffix = RoHS compliant

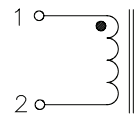
Dimensions (mm)



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

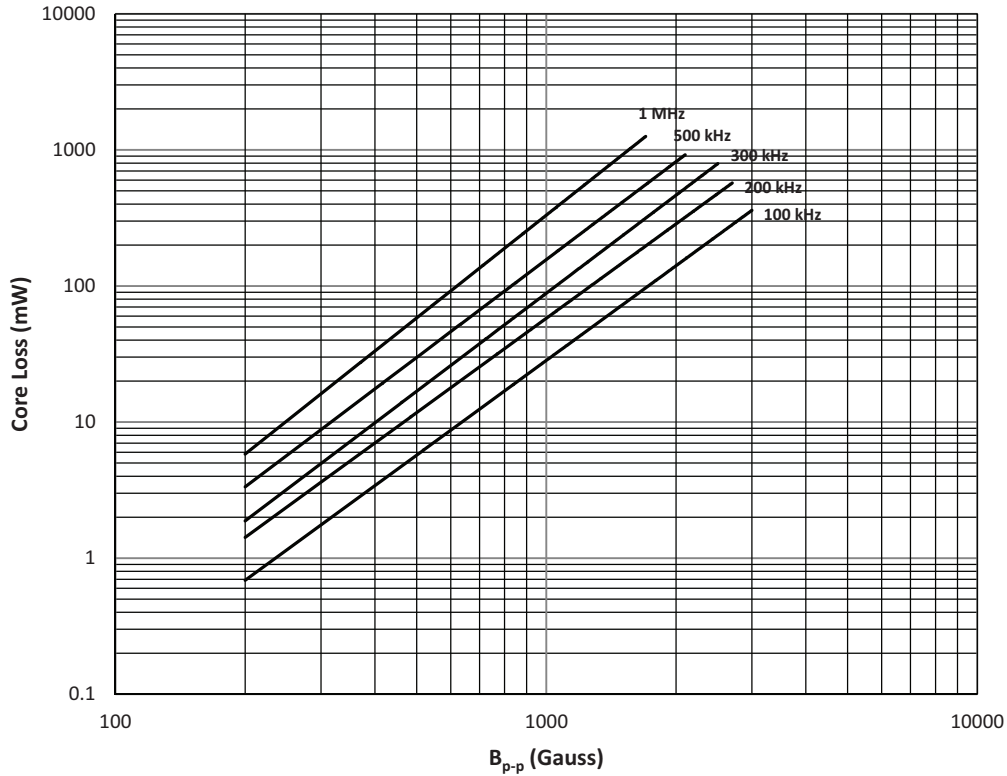
All soldering surfaces to be coplanar within 0.10 millimeters

Tolerances are  $\pm 0.3$  millimeters unless stated otherwise

Color: Grey

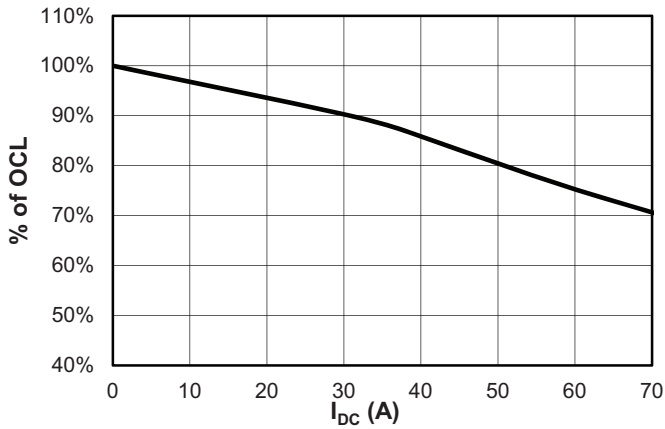


Core loss vs.  $B_{p-p}$

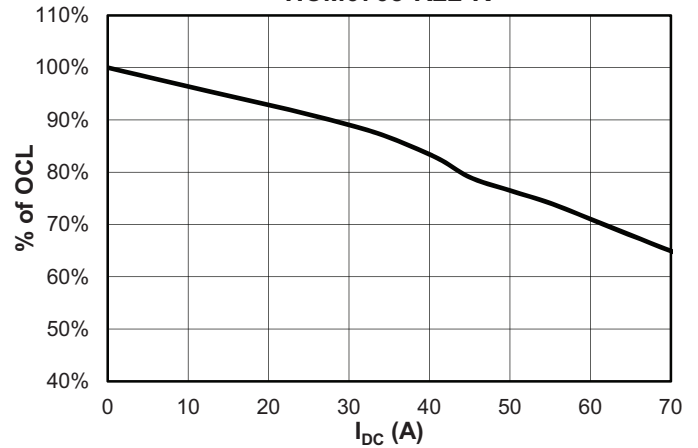


Inductance characteristics

HCM0703-R15-R

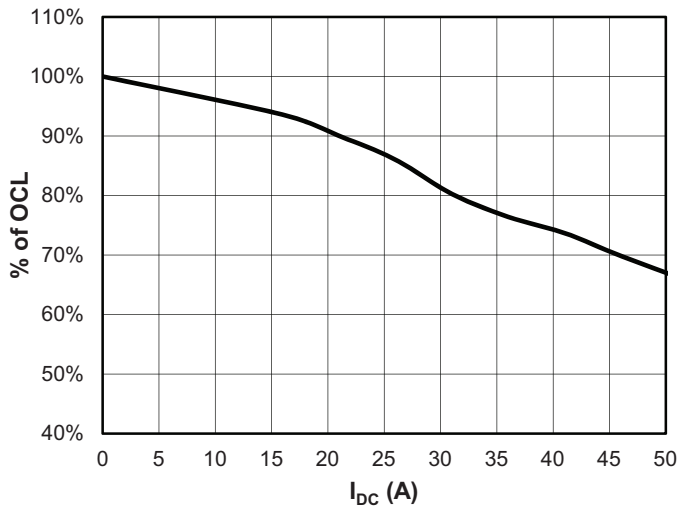


HCM0703-R22-R

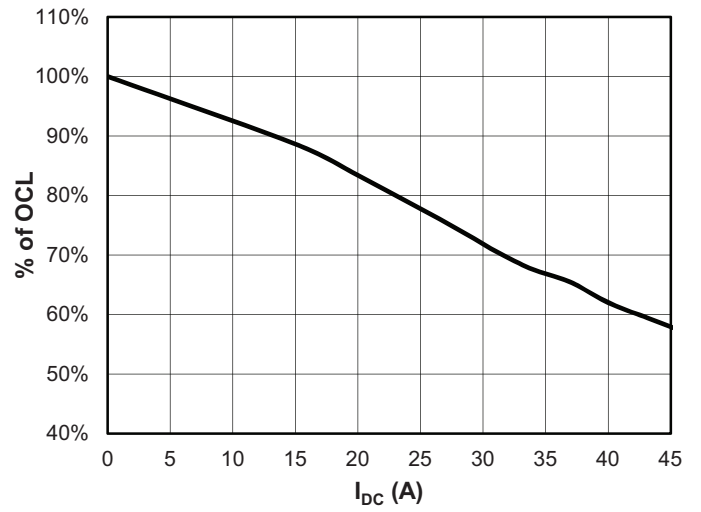


Inductance characteristics

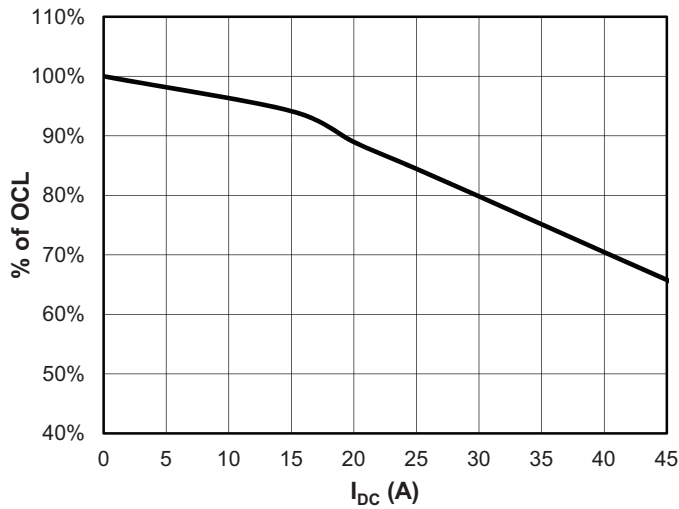
HCM0703-R47-R



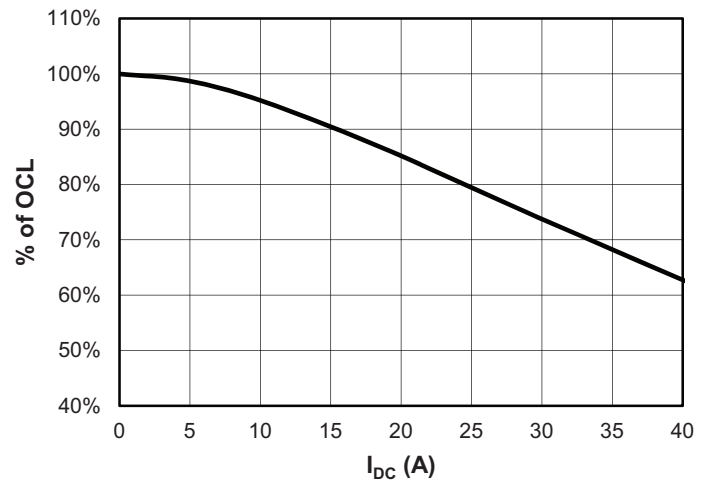
HCM0703-R68-R



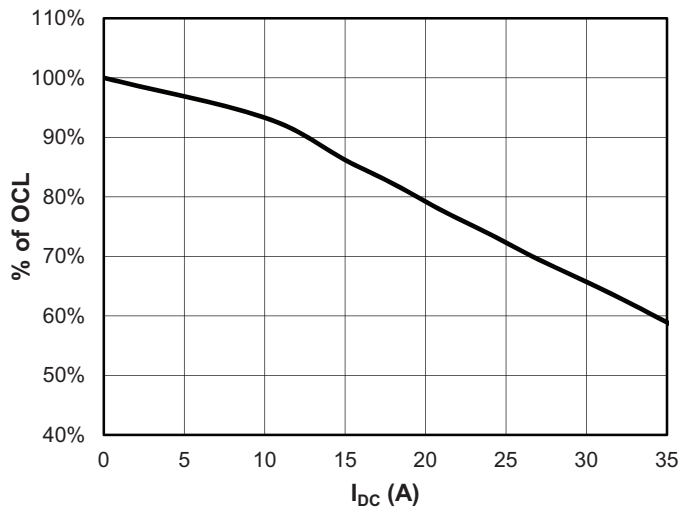
HCM0703-R82-R



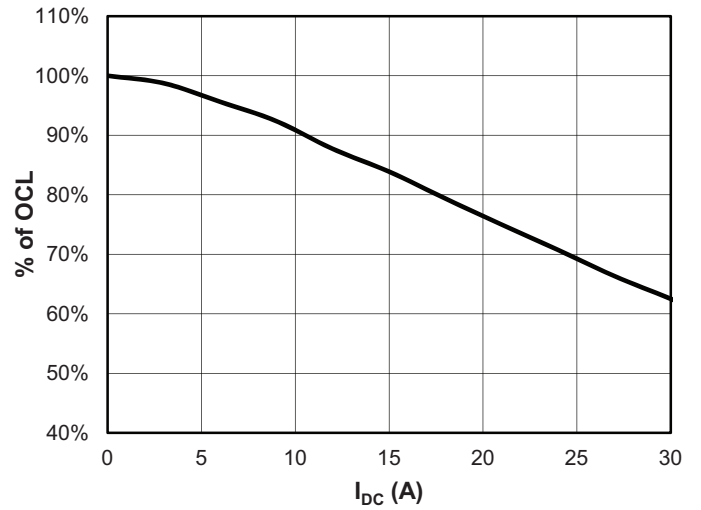
HCM0703-1R0-R



HCM0703-1R5-R

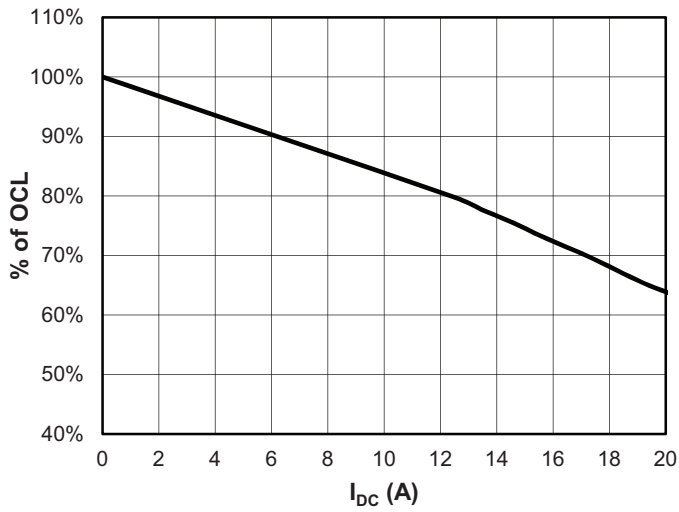


HCM0703-2R2-R

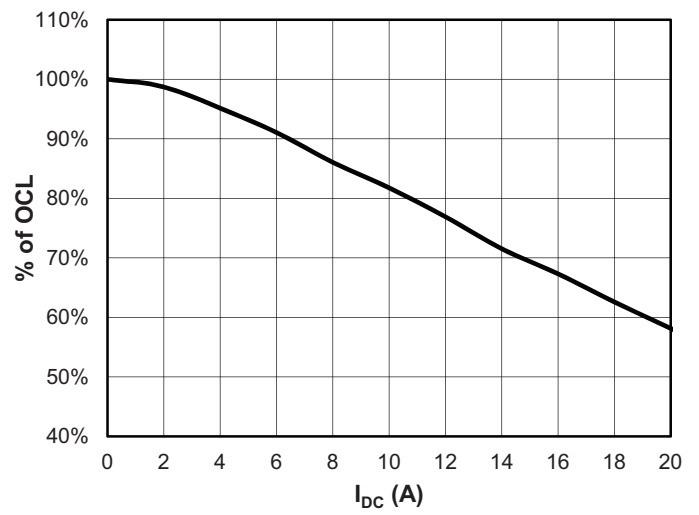


Inductance characteristics

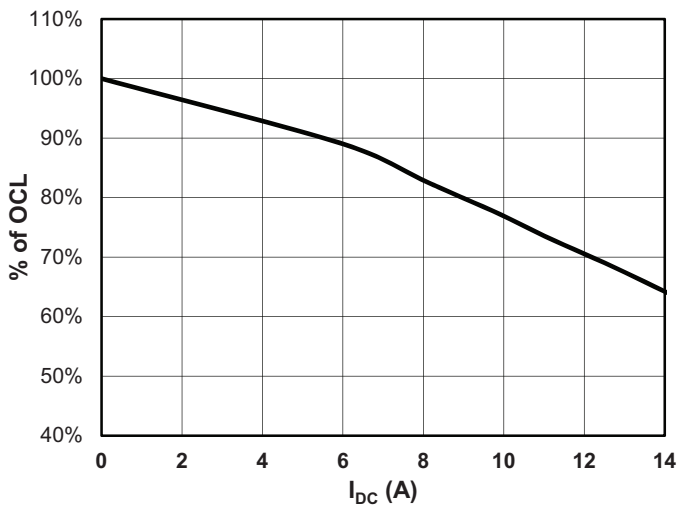
HCM0703-3R3-R



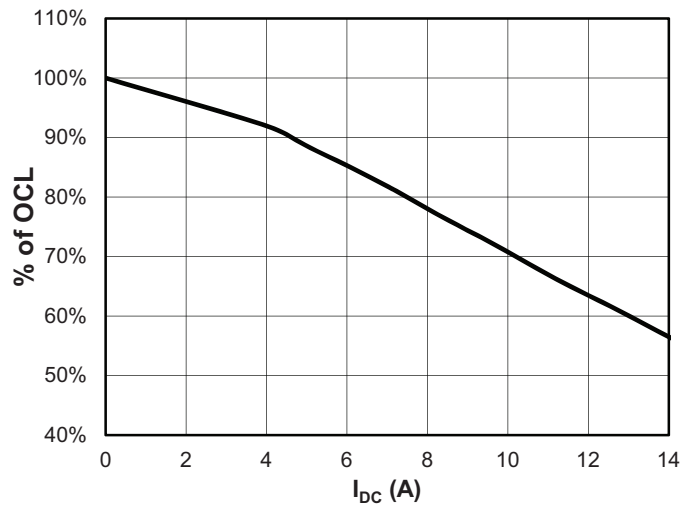
HCM0703-4R7-R



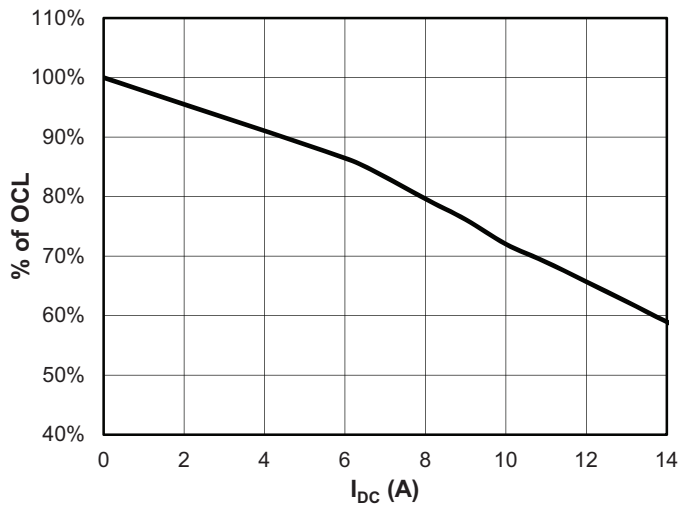
HCM0703-6R8-R



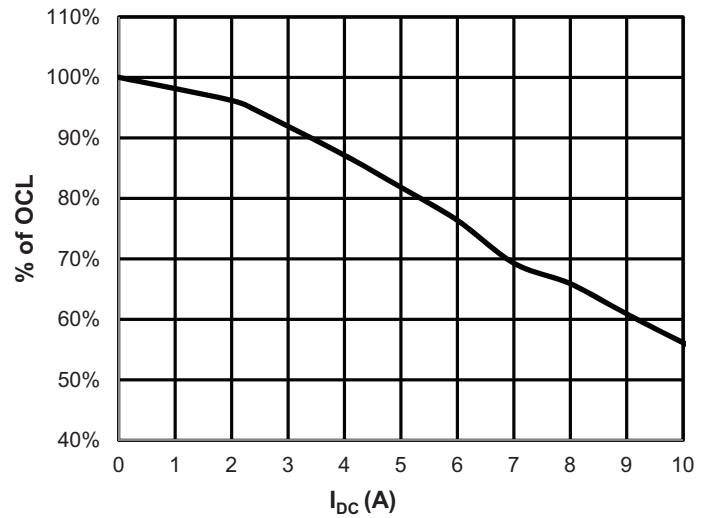
HCM0703-8R2-R



HCM0703-100-R

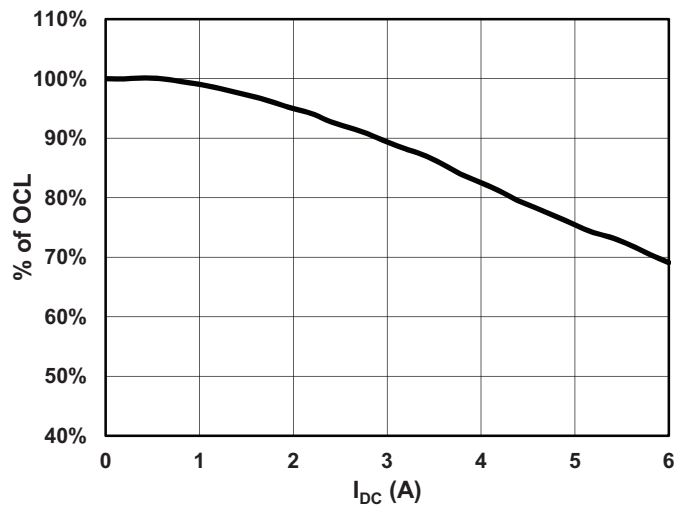


HCM0703-150-R

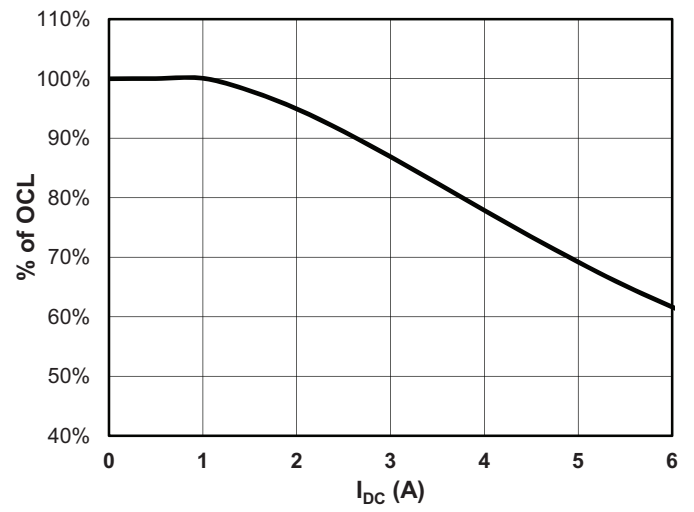


Inductance characteristics

HCM0703-220-R

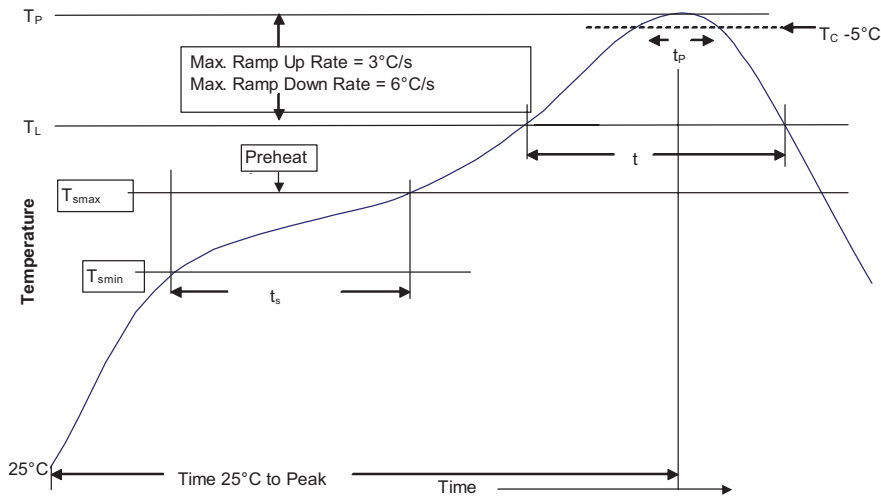


HCM0703-330-R





**Solder reflow profile**



**Table 1 - Standard SnPb Solder (T<sub>c</sub>)**

| Package Thickness | Volume mm <sup>3</sup> <350 | Volume mm <sup>3</sup> ≥350 |
|-------------------|-----------------------------|-----------------------------|
| <2.5mm)           | 235°C                       | 220°C                       |
| ≥2.5mm            | 220°C                       | 220°C                       |

**Table 2 - Lead (Pb) Free Solder (T<sub>c</sub>)**

| Package Thickness | Volume mm <sup>3</sup> <350 | Volume mm <sup>3</sup> 350 - 2000 | Volume mm <sup>3</sup> >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 <sub>smin</sub> )                                                            | 100°C                | 150°C                 |
| • Temperature max. (T <sub>smax</sub> )                                                            | 150°C                | 200°C                 |
| • Time (T <sub>smin</sub> to T <sub>smax</sub> ) (t <sub>s</sub> )                                 | 60-120 Seconds       | 60-120 Seconds        |
| Average ramp up rate T <sub>smax</sub> to T <sub>p</sub>                                           | 3°C/ Second Max.     | 3°C/ Second Max.      |
| Liquidous temperature (T <sub>L</sub> )                                                            | 183°C                | 217°C                 |
| Time at liquidous (t <sub>L</sub> )                                                                | 60-150 Seconds       | 60-150 Seconds        |
| Peak package body temperature (T <sub>p</sub> )*                                                   | Table 1              | Table 2               |
| Time (t <sub>p</sub> )** within 5 °C of the specified classification temperature (T <sub>c</sub> ) | 20 Seconds**         | 30 Seconds**          |
| Average ramp-down rate (T <sub>p</sub> to T <sub>smax</sub> )                                      | 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<sub>p</sub>) is defined as a supplier minimum and a user maximum.  
\*\* Tolerance for time at peak profile temperature (t<sub>p</sub>) is defined as a supplier minimum and a user maximum.

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Printed in USA  
Publication No. 4085 BU-MC16036  
March 2016

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