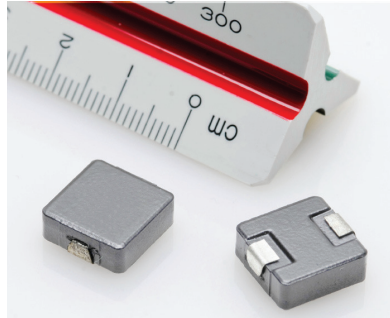


# HCM1305

## High current power inductors



### Product features

- High current carrying capacity
- Low core losses
- Magnetically shielded, low EMI
- Frequency range up to 5 MHz
- Inductance range from 0.10  $\mu$ H to 33  $\mu$ H
- Current range from 5.2 A to 118 A
- 13.8 mm x 12.5 mm footprint surface mount package in a 5.0 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 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-020 (latest revision) compliant



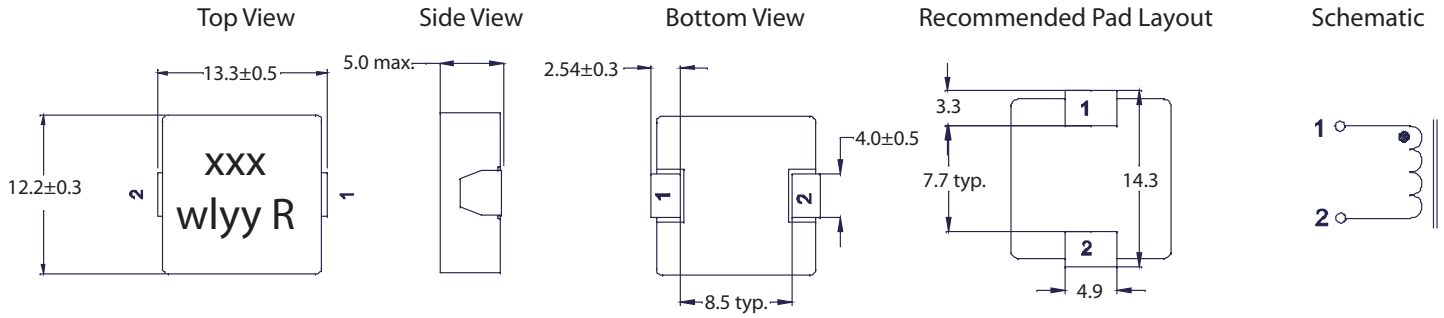
**Product specifications**

| Part Number <sup>6</sup> | OCL <sup>1</sup><br>( $\mu\text{H}$ ) $\pm$ 20% | FLL <sup>2</sup> Min.<br>( $\mu\text{H}$ ) | $I_{\text{rms}}^3$<br>(A) | $I_{\text{sat}}^4$<br>(A) | DCR (m $\Omega$ )<br>@ +20 °C $\pm$<br>nominal | DCR (m $\Omega$ )<br>@ +20 °C<br>maximum | K-factor <sup>5</sup> |
|--------------------------|---|--|---------------------------|---------------------------|--|--|-----------------------|
| HCM1305-R10-R            | 0.10  | 0.064                                      | 55                        | 118                       | 0.52   | 0.59                                     | 848                   |
| HCM1305-R22-R            | 0.22  | 0.14                                       | 51                        | 110                       | 0.63   | 0.72                                     | 843                   |
| HCM1305-R33-R            | 0.33  | 0.21                                       | 42                        | 80                        | 0.80   | 0.92                                     | 506                   |
| HCM1305-R47-R            | 0.47  | 0.30                                       | 38                        | 65                        | 0.80   | 0.92                                     | 506                   |
| HCM1305-R56-R            | 0.56  | 0.36                                       | 36                        | 55                        | 1.15   | 1.33                                     | 500                   |
| HCM1305-R68-R            | 0.68  | 0.44                                       | 34                        | 54                        | 1.15   | 1.33                                     | 500                   |
| HCM1305-R82-R            | 0.82  | 0.52                                       | 31                        | 53                        | 1.40   | 1.61                                     | 358                   |
| HCM1305-1R0-R            | 1.00  | 0.64                                       | 29                        | 50                        | 2.10   | 2.42                                     | 275                   |
| HCM1305-1R5-R            | 1.50  | 0.96                                       | 23                        | 48                        | 2.75   | 3.16                                     | 225                   |
| HCM1305-1R8-R            | 1.80  | 1.15                                       | 21                        | 40                        | 4.00   | 4.60                                     | 216                   |
| HCM1305-2R2-R            | 2.20  | 1.41                                       | 20                        | 32                        | 4.60   | 5.29                                     | 191                   |
| HCM1305-3R3-R            | 3.30  | 2.11                                       | 15                        | 32                        | 7.70   | 9.20                                     | 170                   |
| HCM1305-4R7-R            | 4.70  | 3.01                                       | 12                        | 27                        | 11.0   | 12.7                                     | 161                   |
| HCM1305-5R6-R            | 5.60  | 3.58                                       | 11.5                      | 22                        | 12.0   | 13.8                                     | 142                   |
| HCM1305-6R8-R            | 6.80  | 4.35                                       | 11                        | 21                        | 13.0   | 15.0                                     | 129                   |
| HCM1305-7R8-R            | 7.80  | 4.99                                       | 10                        | 18.5                      | 16.8   | 19.4                                     | 117                   |
| HCM1305-8R2-R            | 8.20  | 5.25                                       | 9.5                       | 18                        | 17.5   | 20.1                                     | 117                   |
| HCM1305-100-R            | 10.0  | 6.40                                       | 9.0                       | 16                        | 19.0   | 21.9                                     | 90                    |
| HCM1305-150-R            | 15.0  | 9.60                                       | 7.7                       | 13                        | 29.0   | 33.4                                     | 74                    |
| HCM1305-220-R            | 22.0  | 14.1                                       | 6.2                       | 10                        | 45.0   | 51.8                                     | 63                    |
| HCM1305-330-R            | 33.0  | 21.1                                       | 5.2                       | 8                         | 74.5   | 85.5                                     | 48                    |

1. Open Circuit Inductance (OCL) Test Parameters: 100 kHz, 0.25 V<sub>rms</sub>, 0.0 Adc, +25 °C.
2. Full Load Inductance (FLL) Test Parameters: 100 kHz, 0.25 V<sub>rms</sub>, I<sub>sat</sub><sup>4</sup> @ +25 °C.
3. I<sub>rms</sub><sup>3</sup>: 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><sup>4</sup>: Peak current for approximately 20% rolloff at +25 °C.
5. K-factor: Used to determine B<sub>pp</sub> for core loss (see graph). B<sub>pp</sub> = K \* L \*  $\Delta$ I.  
B<sub>pp</sub>: (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: HCM1305-yyy-R  
- HCM1305 = Product code and size  
yyy= Inductance value in  $\mu\text{H}$ , R = decimal point,  
if no R is present then third character = number of zeros.  
“-R” suffix = RoHS compliant

**Dimensions- mm**



Part Marking: xxx = Inductance value in  $\mu\text{H}$ , R = decimal point, if no R is present, third character = number of zeros, wlyy = (Date Code), R = (Revision Level)

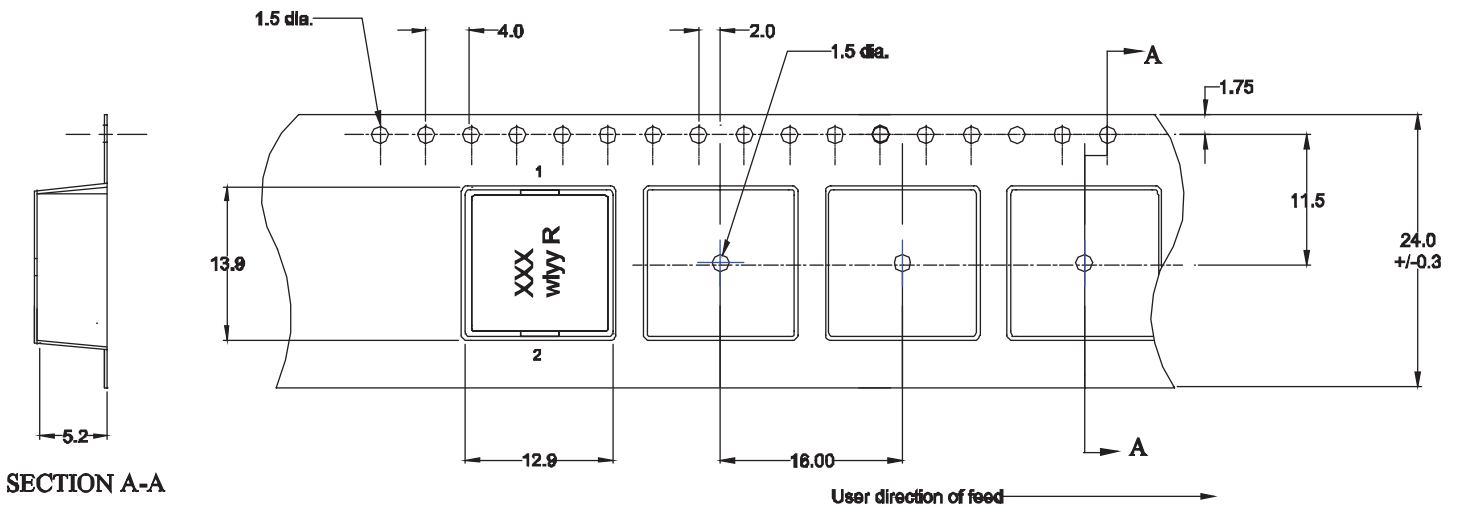
All soldering surfaces to be coplanar within 0.10 millimeters.

Tolerances are  $\pm 0.3$  millimeters unless stated otherwise.

Color: Grey.

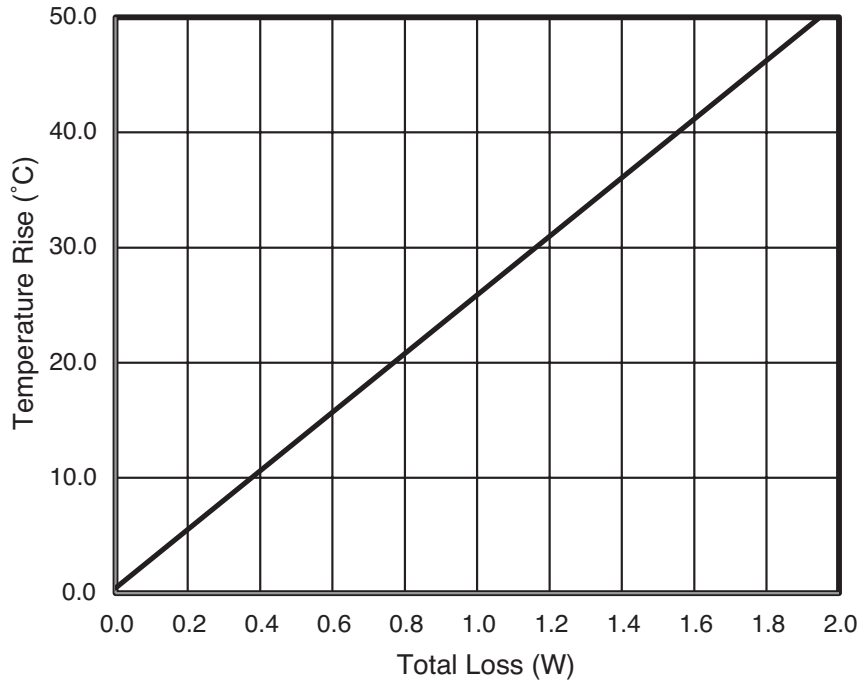
Do not route traces or vias underneath the inductor

**Packaging information - mm**

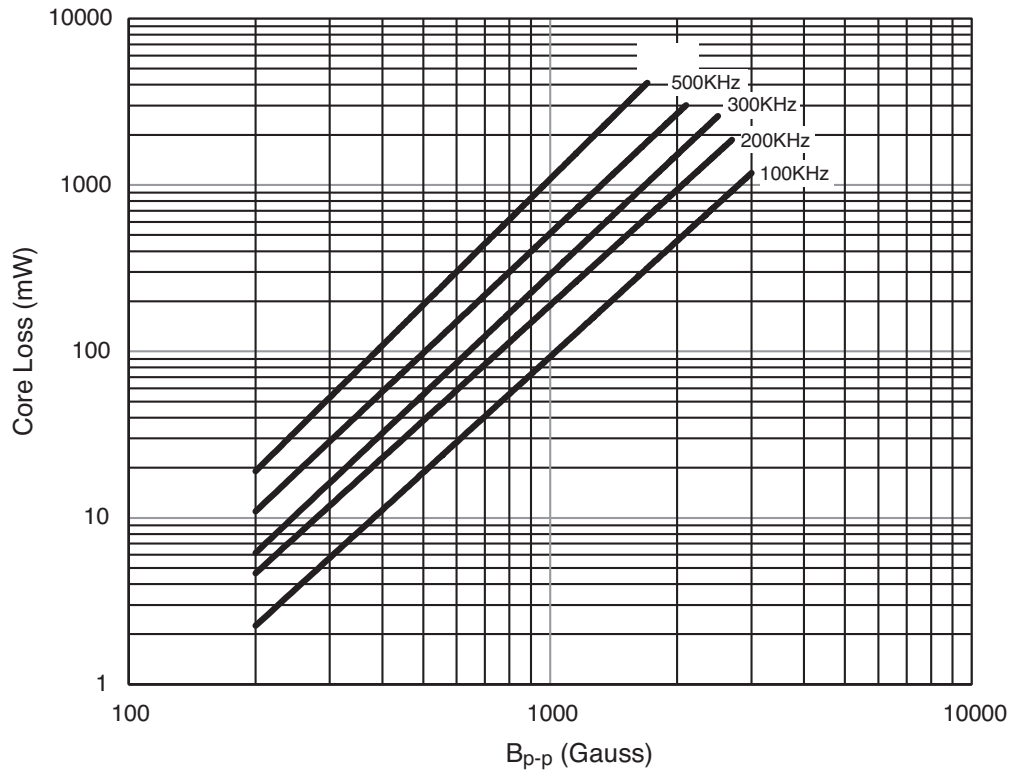


Supplied in tape and reel packaging, 400 parts per 13" diameter reel.

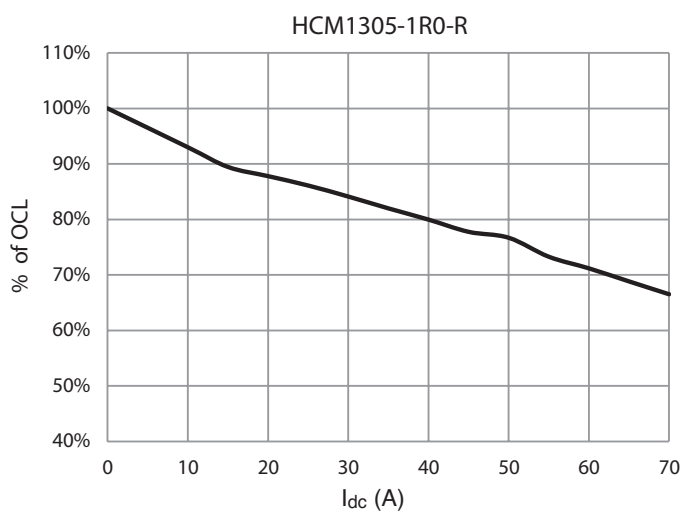
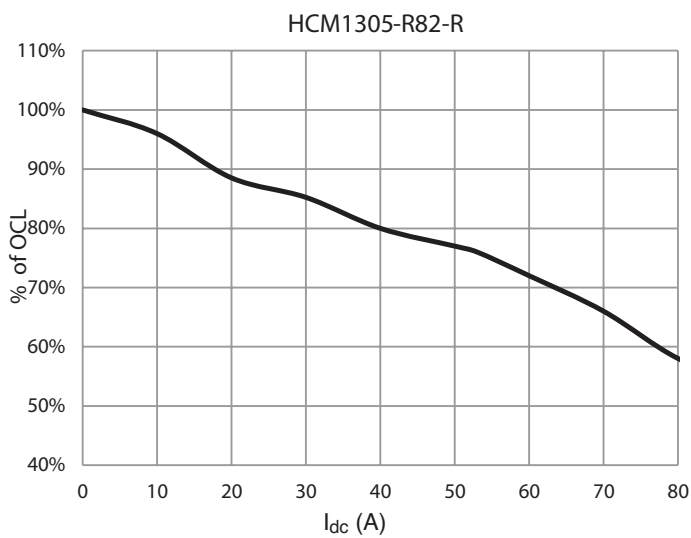
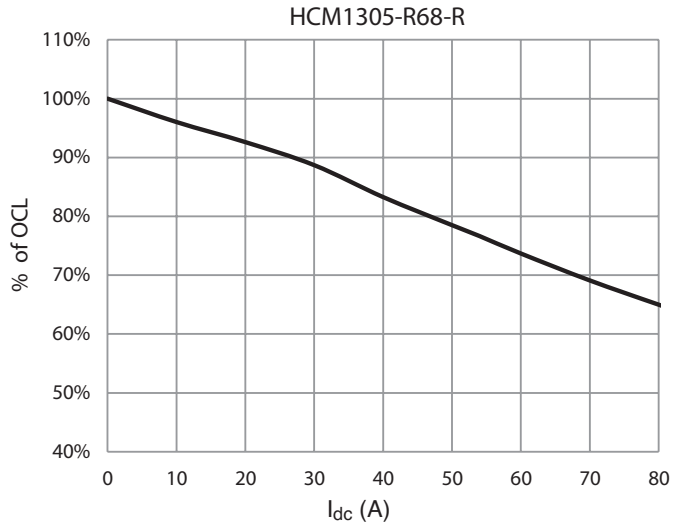
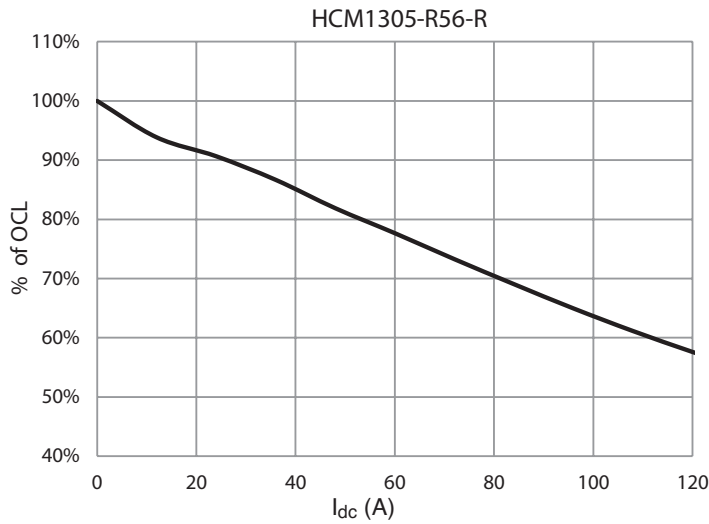
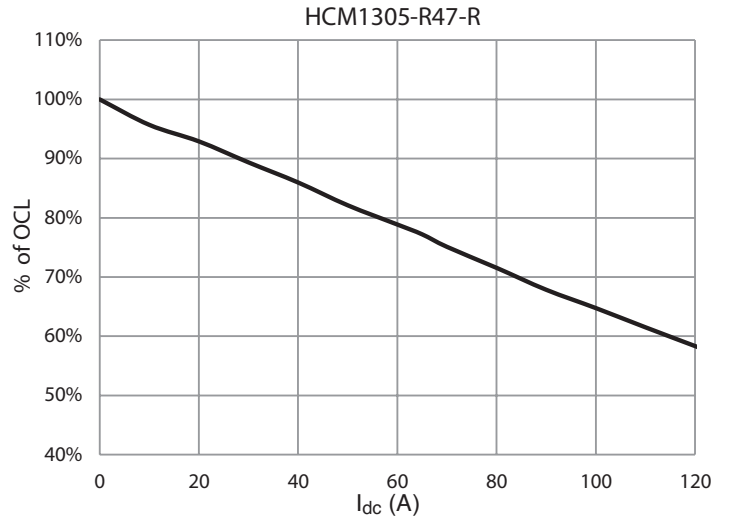
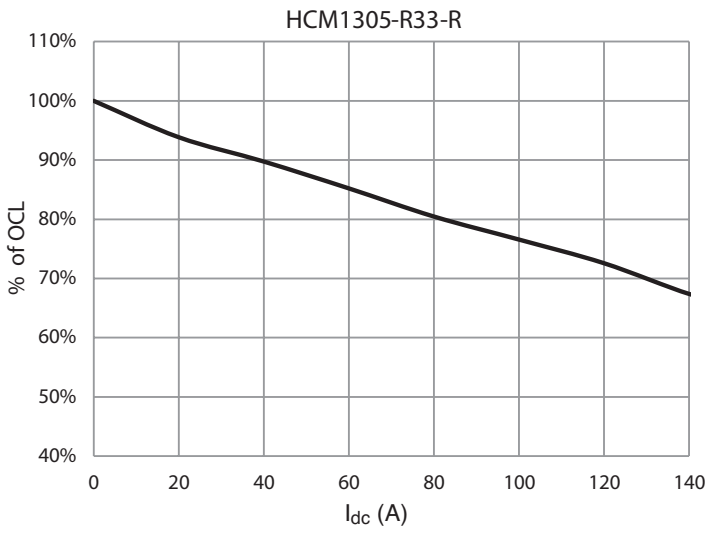
**Temperature rise vs. total loss**



**Core loss vs. B<sub>p-p</sub>**

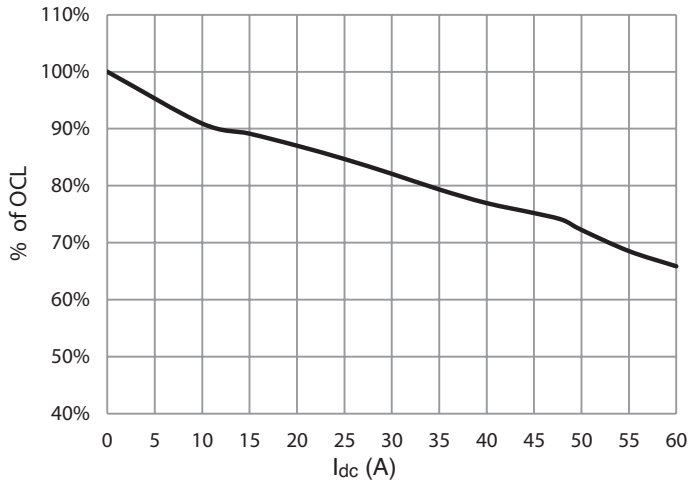


Inductance characteristics

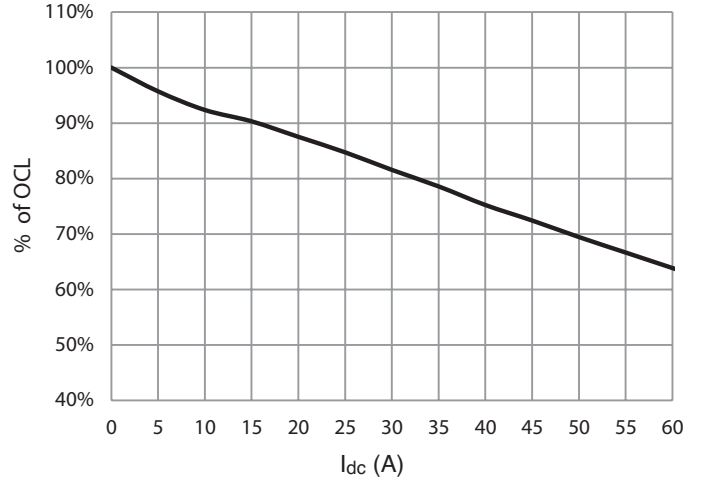


**Inductance characteristics**

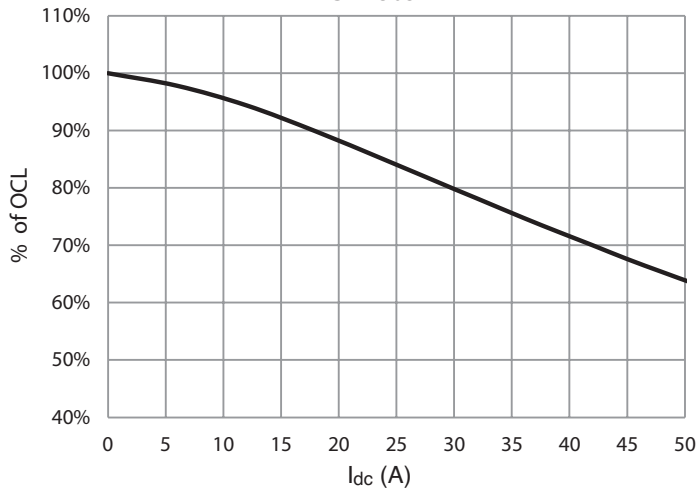
HCM1305-1R5-R



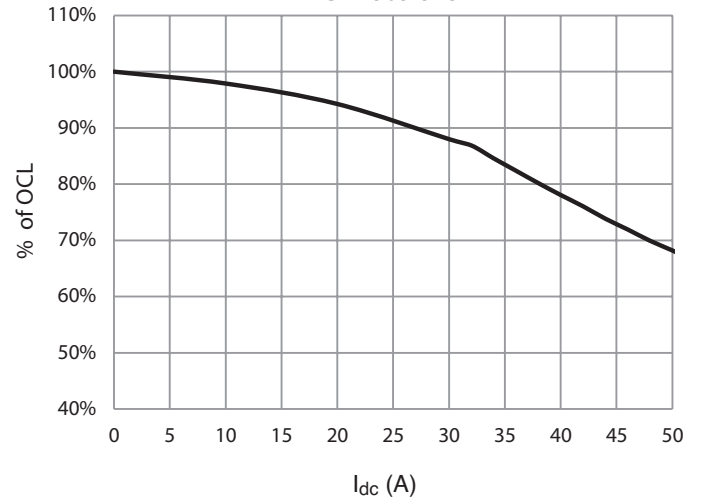
HCM1305-1R8-R



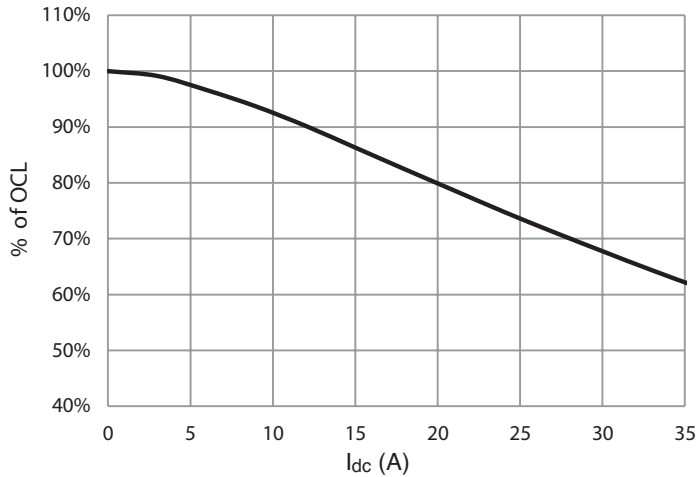
HCM1305-2R2-R



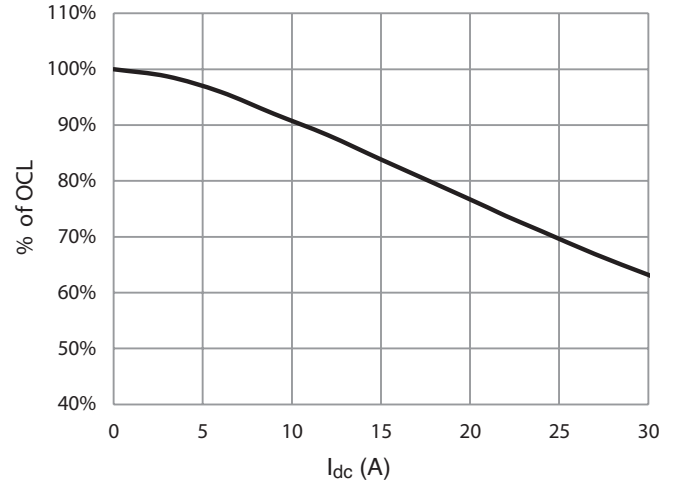
HCM1305-3R3-R



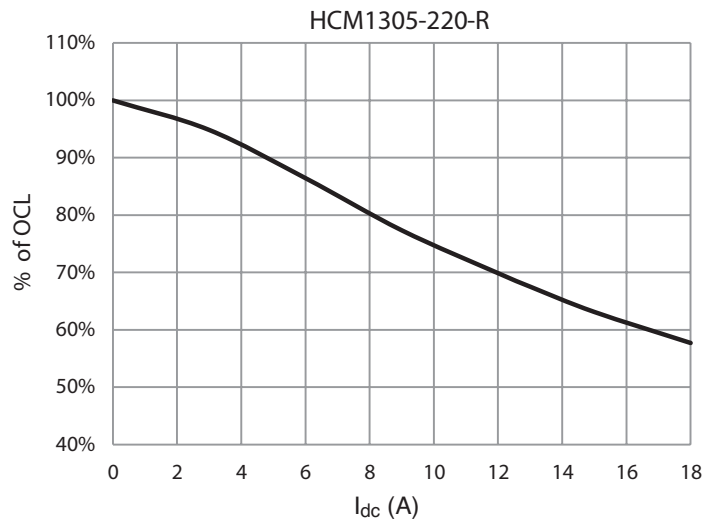
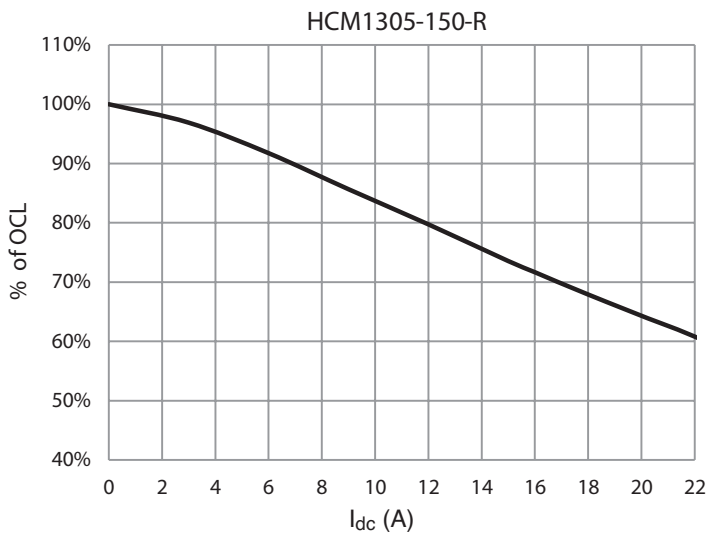
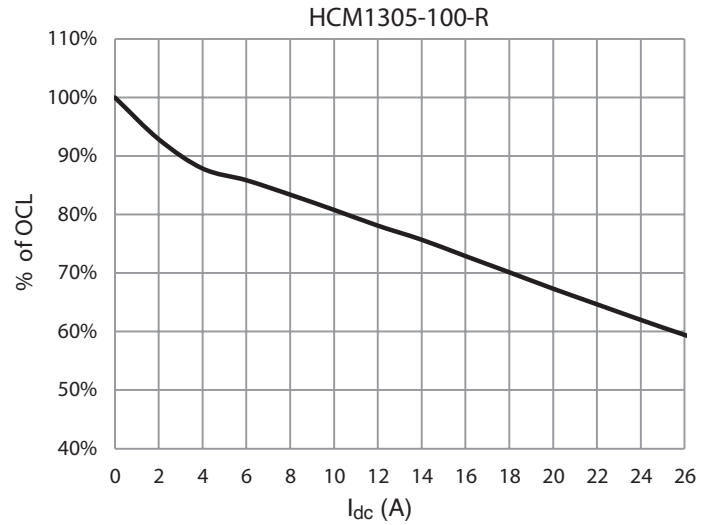
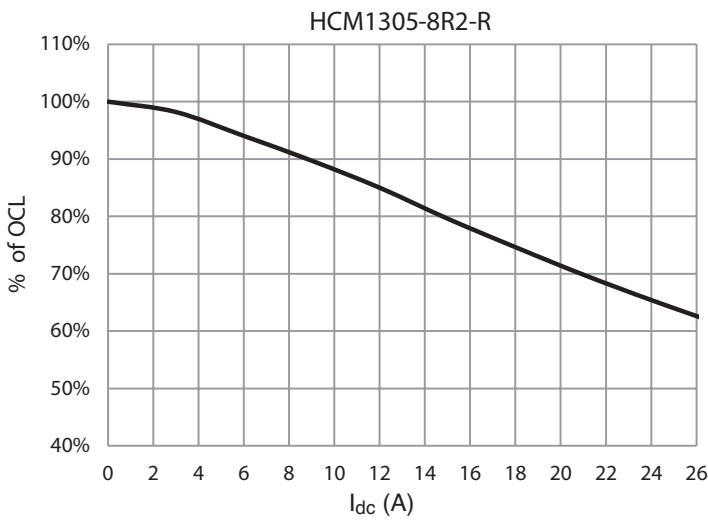
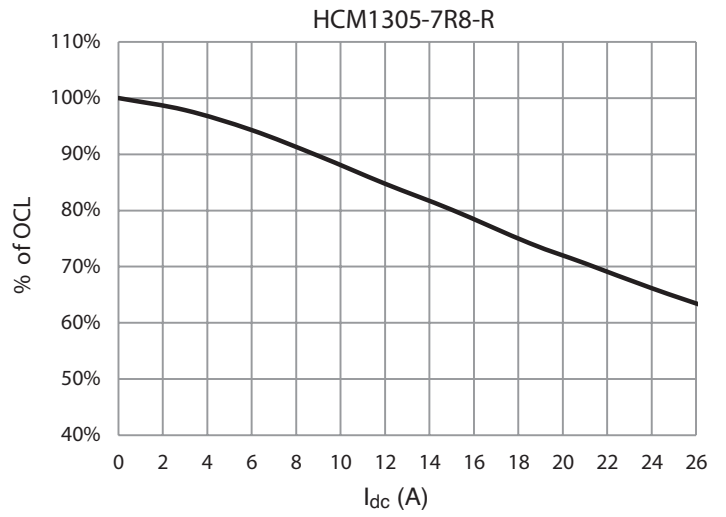
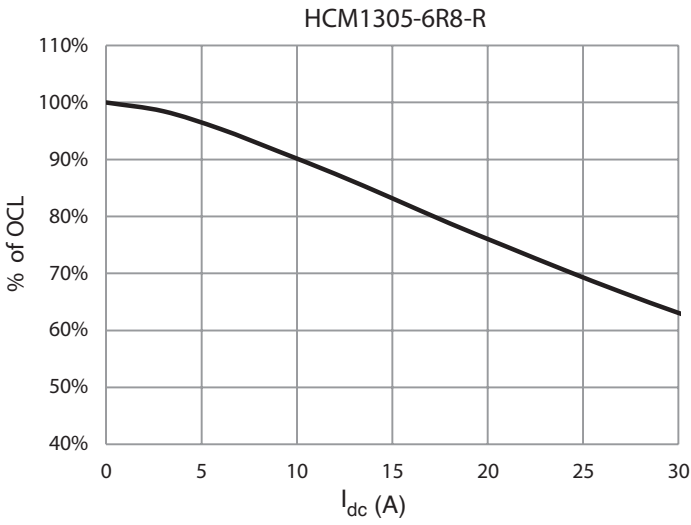
HCM1305-4R7-R



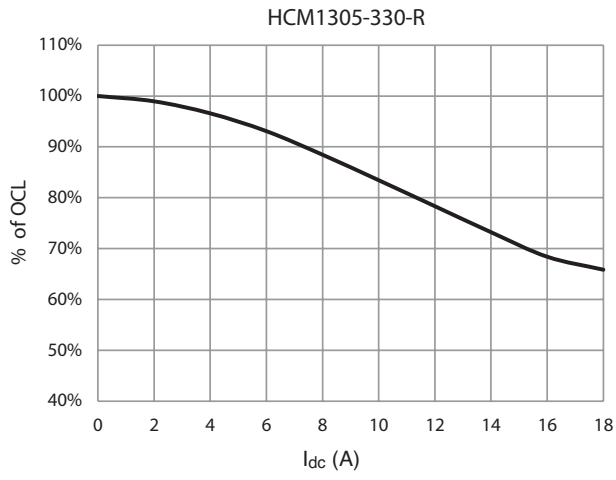
HCM1305-5R6-R



Inductance characteristics



**Inductance characteristics**





### Solder Reflow Profile

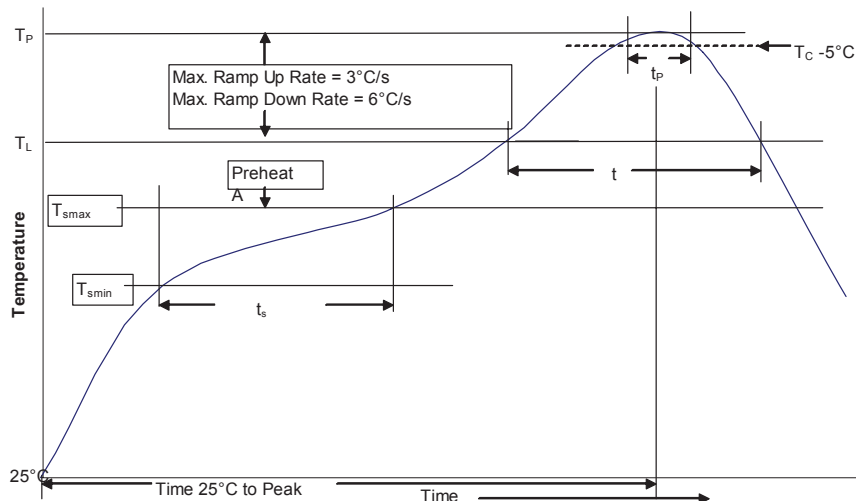


Table 1 - Standard SnPb Solder ( $T_c$ )

| Package Thickness   | Volume $\text{mm}^3$ <350 | Volume $\text{mm}^3$ $\geq 350$ |
|---------------------|---------------------------|---------------------------------|
| <2.5mm              | 235°C                     | 220°C                           |
| $\geq 2.5\text{mm}$ | 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-020

| Profile Feature  | Standard SnPb Solder                          | Lead (Pb) Free Solder |
|--|---|-----------------------|
| Preheat and Soak   | • Temperature min. ( $T_{smin}$ )             | 100°C                 |
|  | • Temperature max. ( $T_{smax}$ )             | 150°C                 |
|  | • Time ( $T_{smin}$ to $T_{smax}$ ) ( $t_s$ ) | 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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[HCM1305-R68-R](#) [HCM1305-R82-R](#) [HCM1305-6R8-R](#) [HCM1305-3R3-R](#) [HCM1305-330-R](#) [HCM1305-R10-R](#)  
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[HCM1305-100-R](#) [HCM1305-220-R](#) [HCM1305-8R2-R](#) [HCM1305V2-220-R](#) [HCM1305V2-330-R](#) [HCM1305V2-3R3-R](#)  
[HCM1305V2-5R6-R](#) [HCM1305V2-6R8-R](#) [HCM1305V2-150-R](#) [HCM1305V2-2R2-R](#) [HCM1305V2-R47-R](#) [HCM1305V2-](#)  
[8R2-R](#) [HCM1305V2-R22-R](#) [HCM1305V2-R33-R](#) [HCM1305V2-7R8-R](#) [HCM1305V2-R10-R](#) [HCM1305V2-R68-R](#)  
[HCM1305V2-1R5-R](#) [HCM1305V2-R56-R](#) [HCM1305V2-R82-R](#) [HCM1305V2-100-R](#) [HCM1305V2-120-R](#) [HCM1305V2-](#)  
[1R0-R](#) [HCM1305V2-4R7-R](#) [HCM1305V2-1R8-R](#) [HCM1305V2-6R0-R](#)