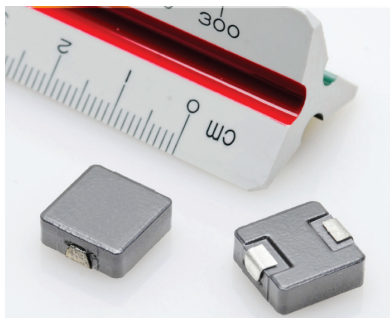


# HCM1305

## 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  $\mu\text{H}$  to 33  $\mu\text{H}$
- 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>( $\mu$ H) $\pm$ 20% | FLL <sup>2</sup> Min.<br>( $\mu$ H) | $I_{rms}^3$<br>(A) | $I_{sat}^4$<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>,  $I_{sat}^4$  @ +25 °C.

3.  $I_{rms}^3$ : 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.  $I_{sat}^4$ : Peak current for approximately 20% rolloff at +25 °C.

5. K-factor: Used to determine B<sub>p-p</sub> for core loss (see graph). B<sub>p-p</sub> = K \* L \*  $\Delta I$ .  
B<sub>p-p</sub>: (Gauss), K: (K-factor from table), L: (Inductance in  $\mu$ H),  $\Delta I$  (Peak to peak ripple current in amps).

6. Part Number Definition: HCM1305-yyy-R

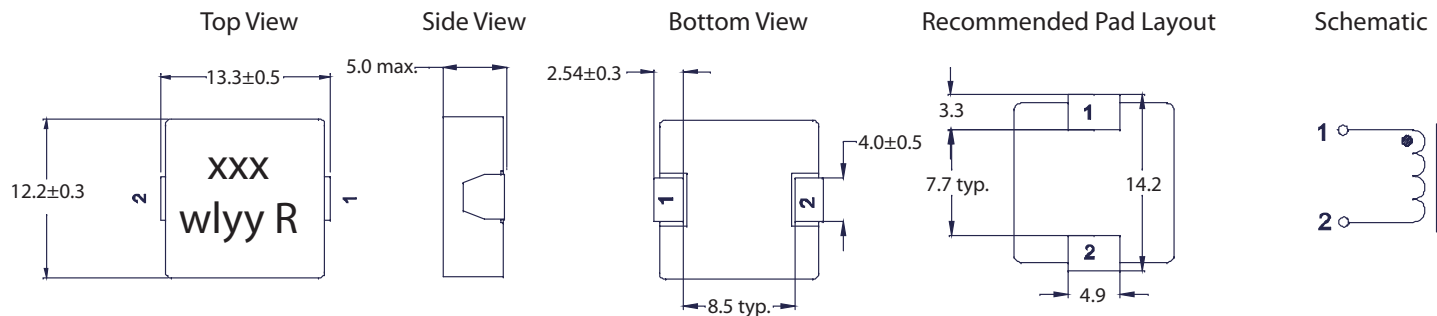
- HCM1305 = Product code and size

yyy= Inductance value in  $\mu$ 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)

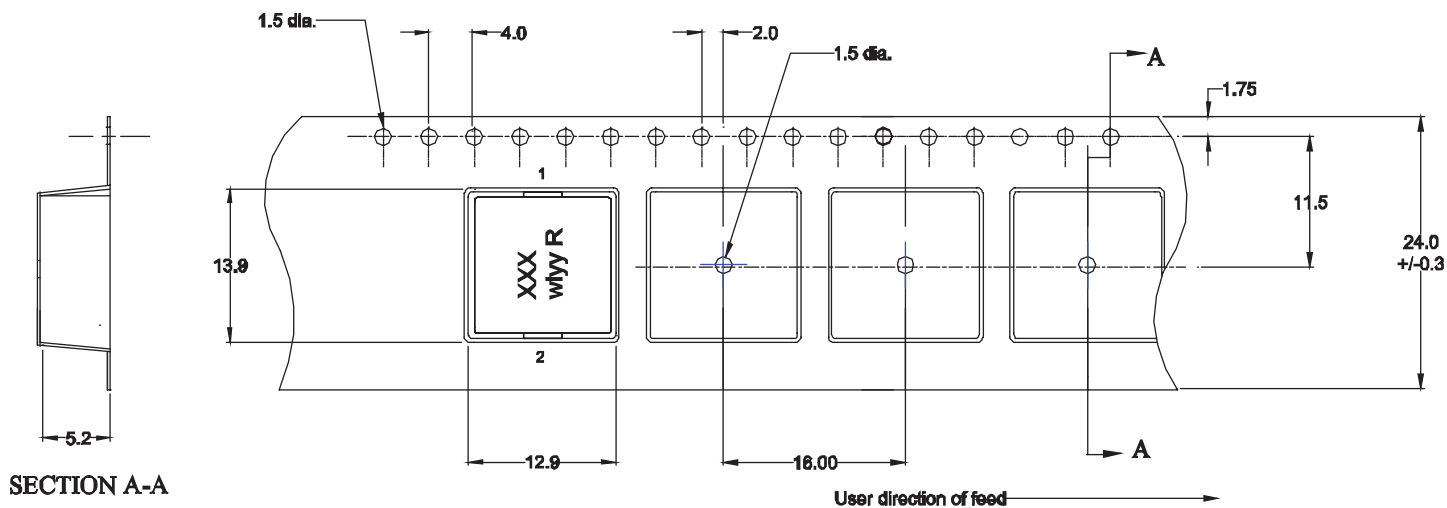
All soldering surfaces to be coplanar within 0.10 millimeters.

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

Color: Grey.

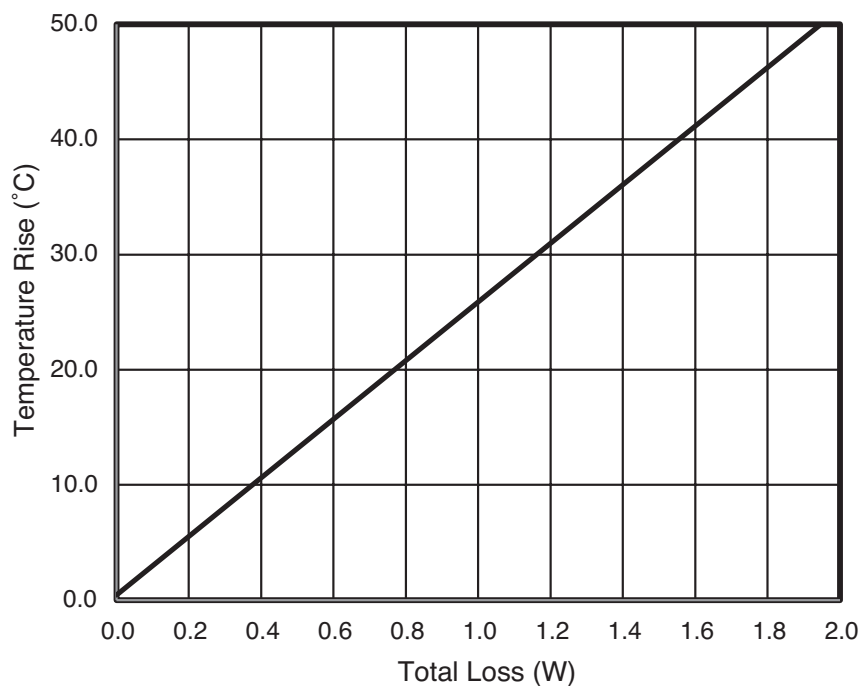
Do not route traces or vias underneath the inductor

## Packaging information - mm

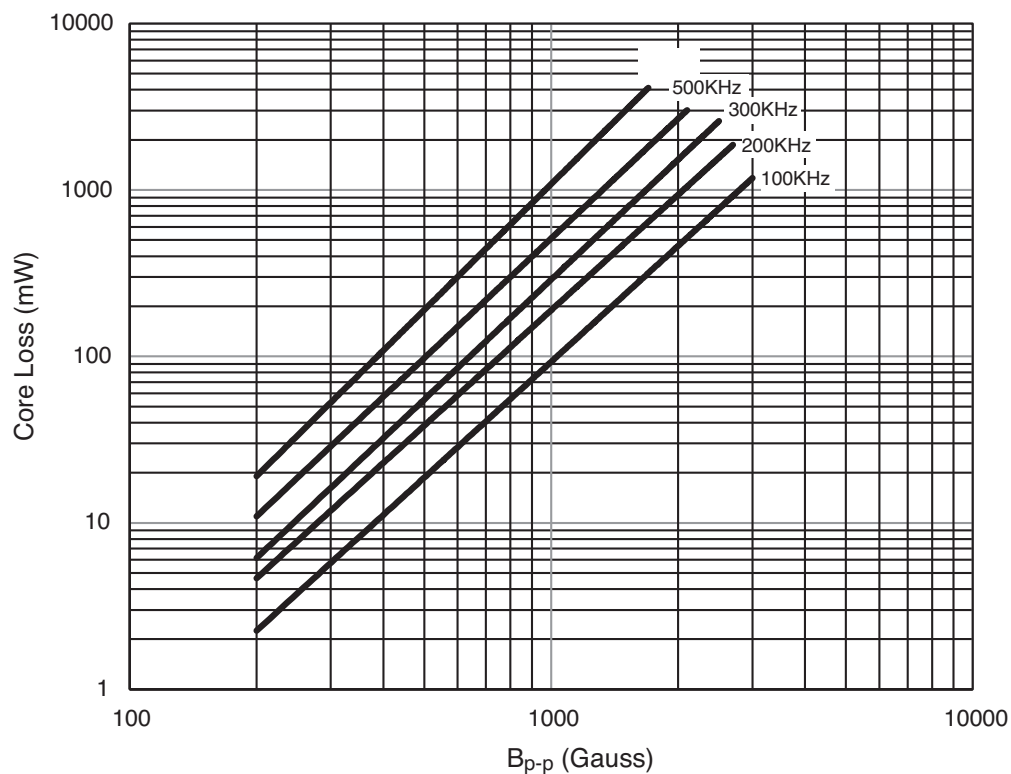


Supplied in tape and reel packaging, 400 parts per 13" diameter reel.

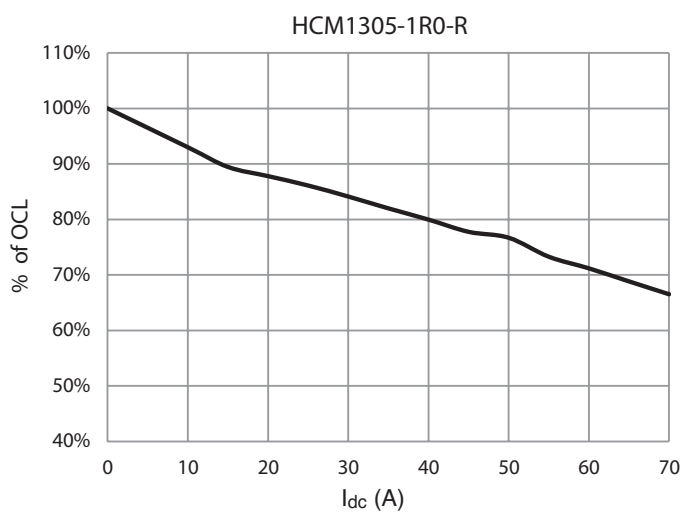
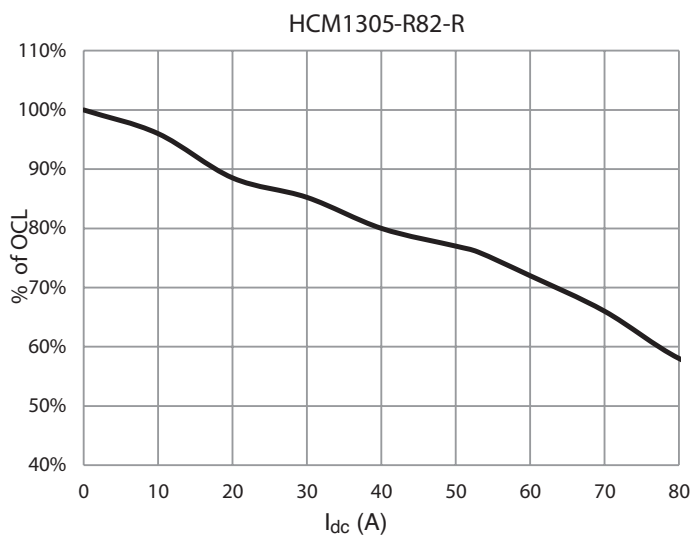
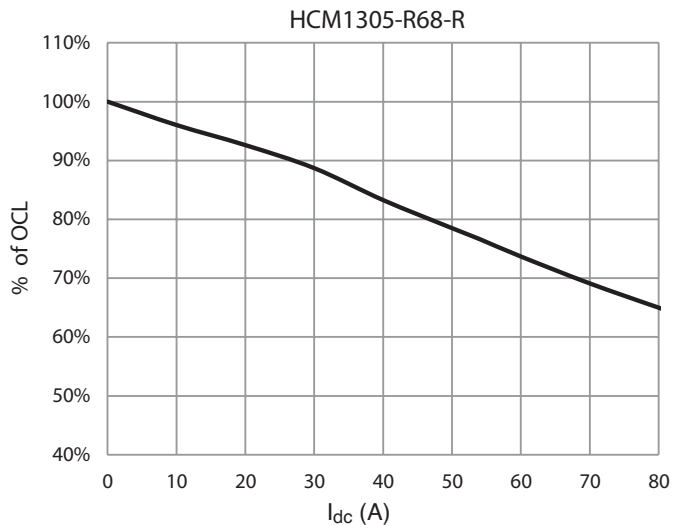
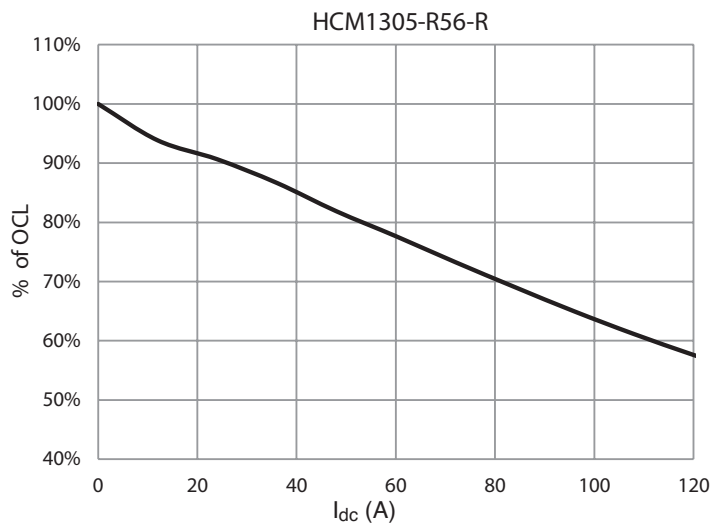
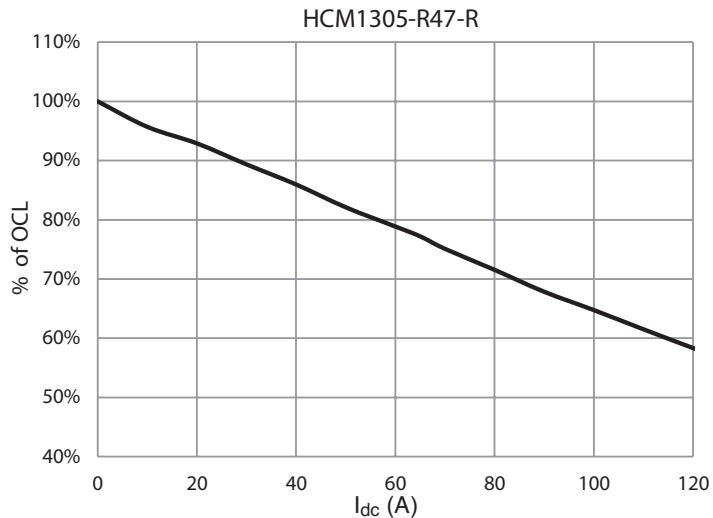
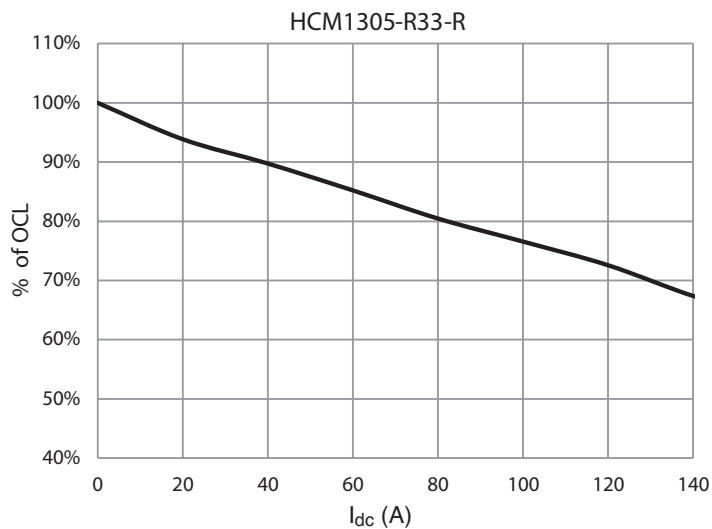
### Temperature rise vs. total loss



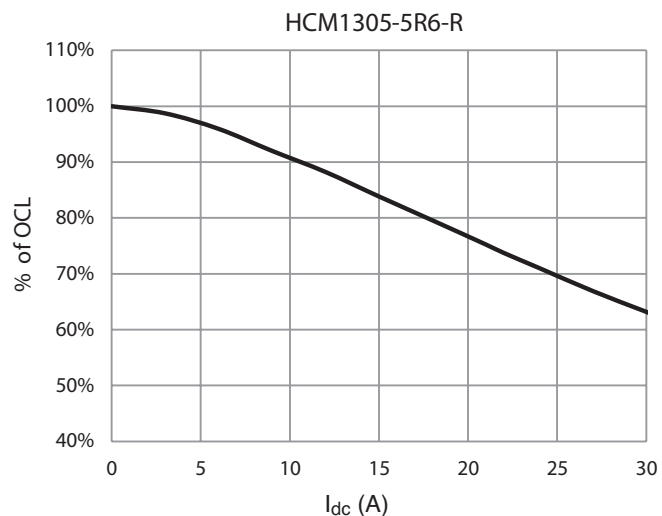
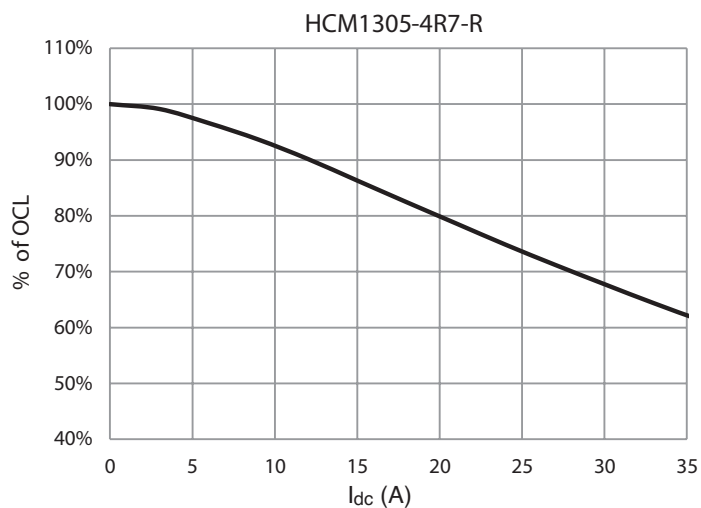
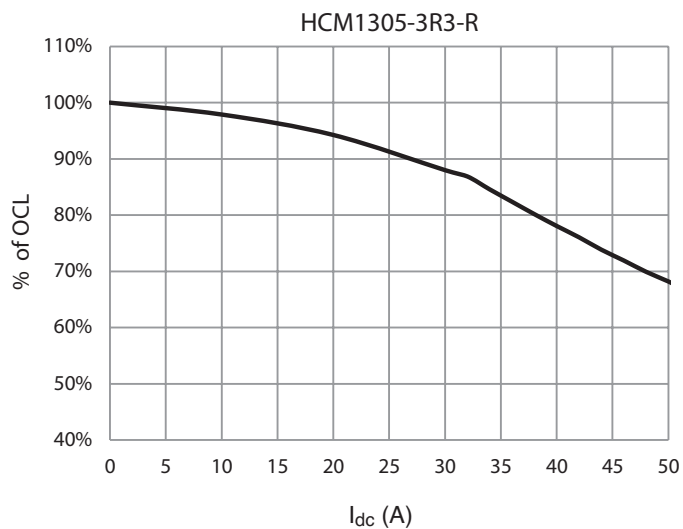
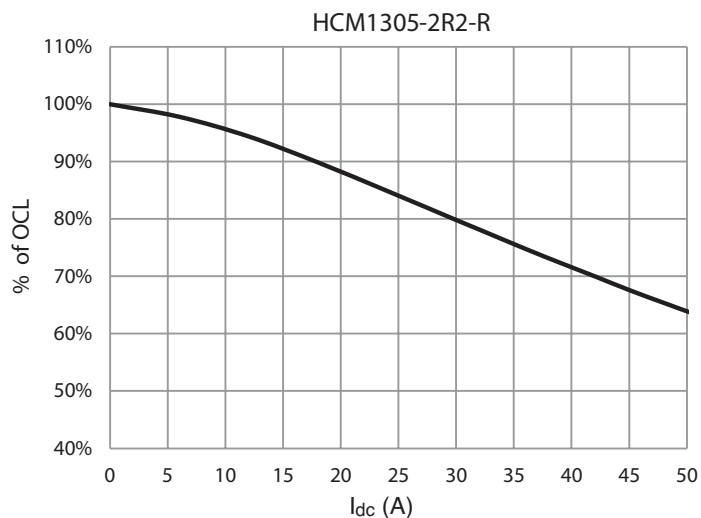
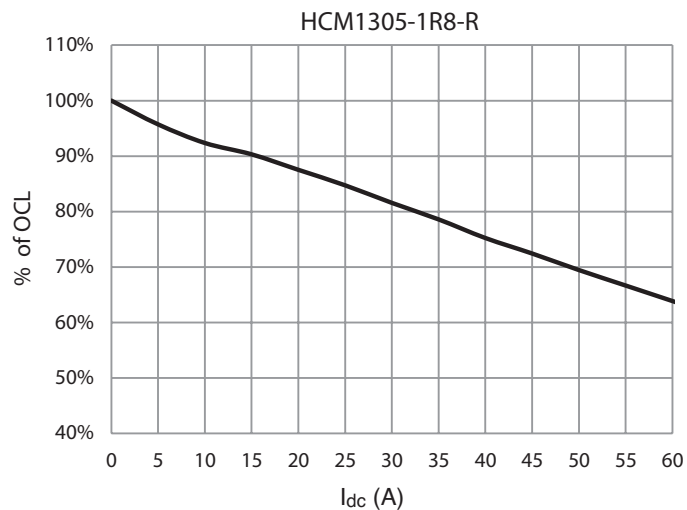
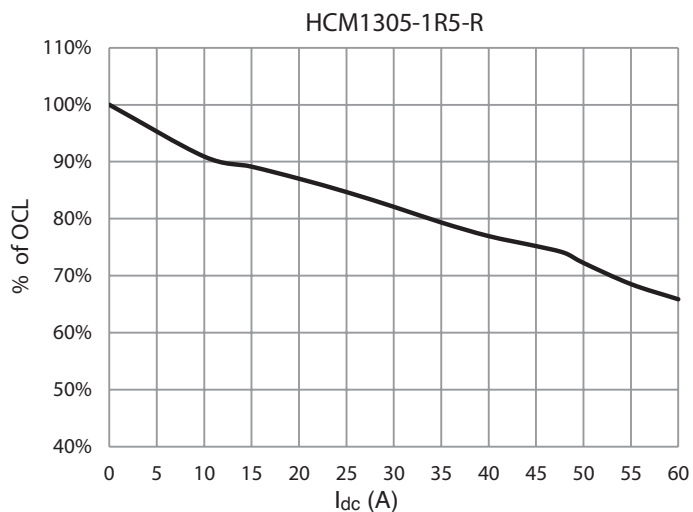
### Core loss vs. B<sub>p-p</sub>



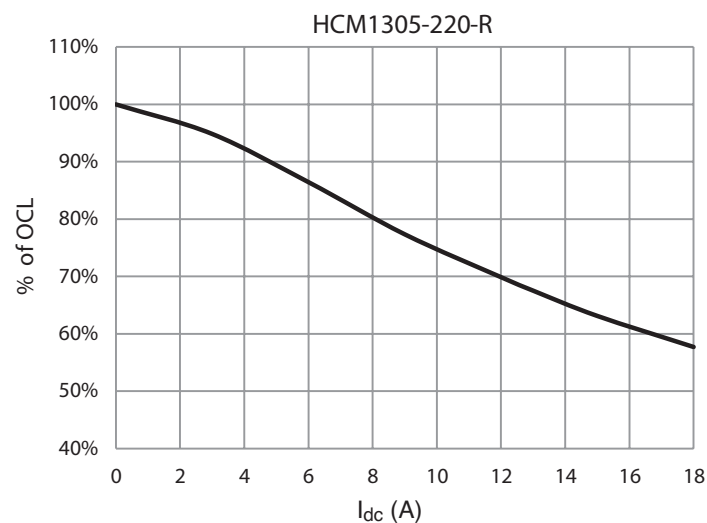
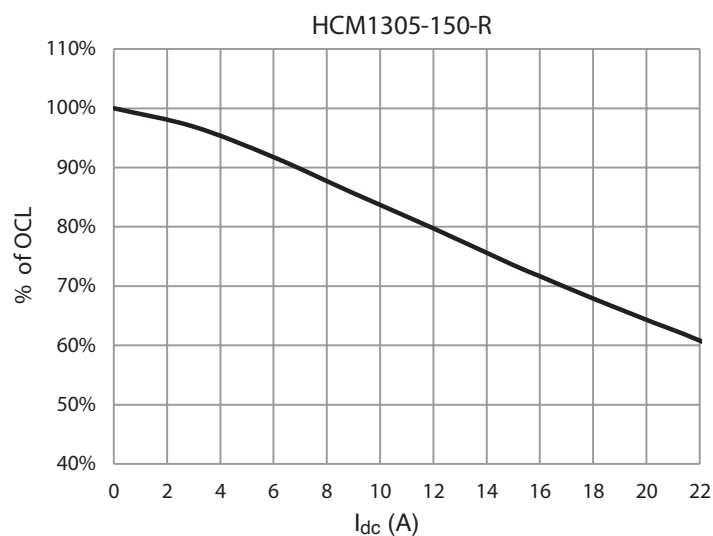
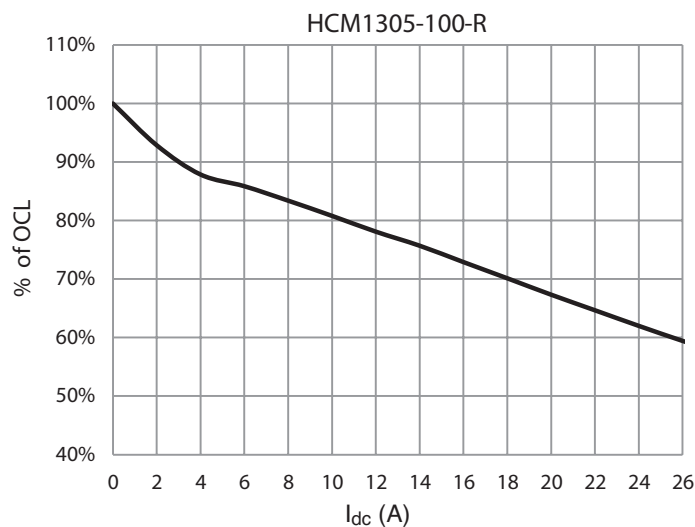
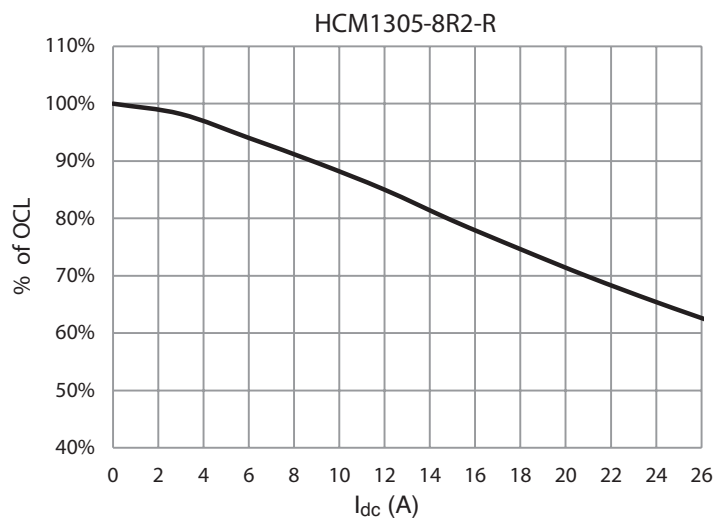
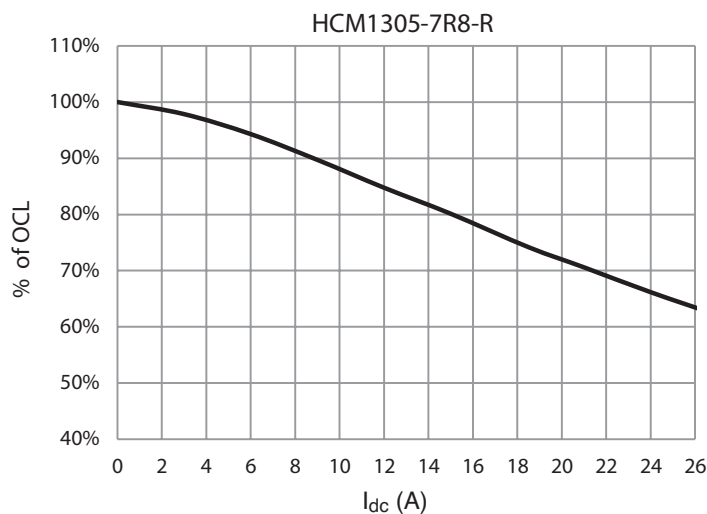
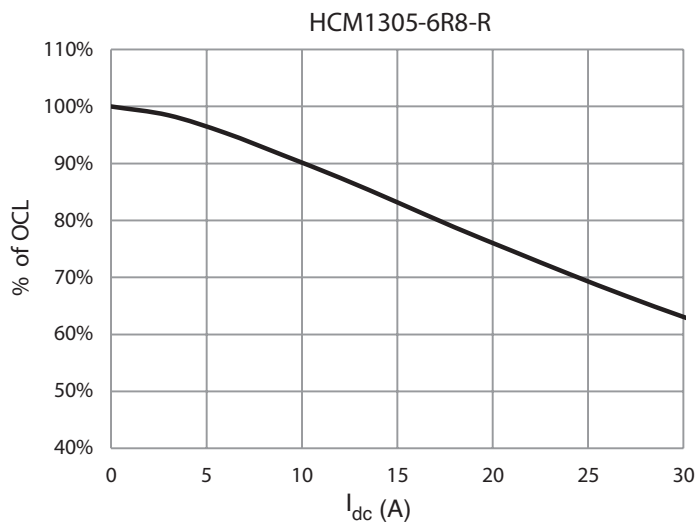
## Inductance characteristics



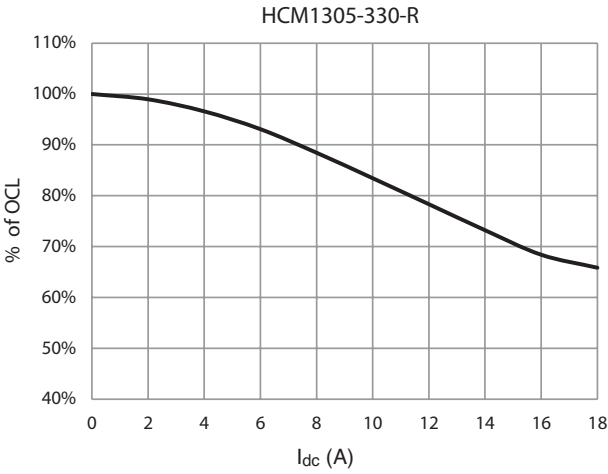
## Inductance characteristics



## Inductance characteristics



Inductance characteristics



## Solder Reflow Profile

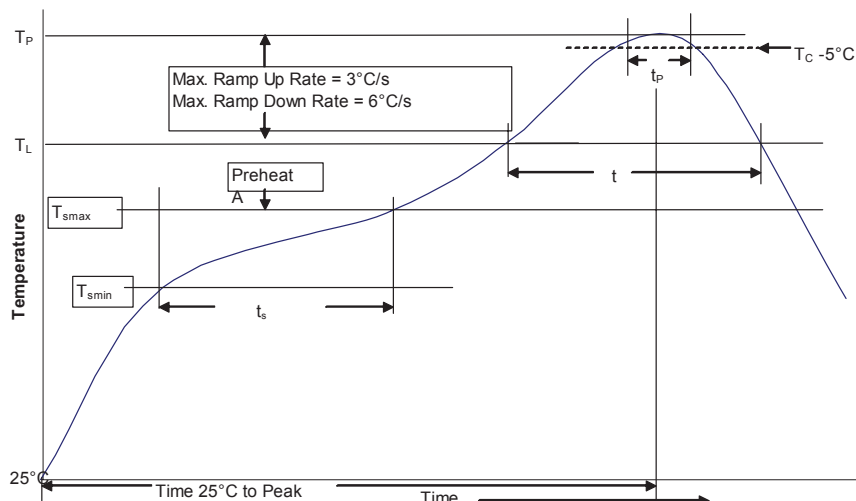


Table 1 - Standard SnPb Solder ( $T_p$ )

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

Table 2 - Lead (Pb) Free Solder ( $T_p$ )

| 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. 4371 BU-SB14459  
September 2017