

# High Current Power Inductors

## HCM1305 Series



SMD Device

### Description

- Halogen free
- 125°C maximum total operating temperature
- 13.8x 12.5 x 5.0mm maximum surface mount package
- Powder Iron core material
- Magnetically shielded, low EMI
- High current carrying capacity, low core losses
- Inductance range 0.22μH to 2.2μH
- Current range from 20 to 110 Amps
- Frequency range up to 5MHz
- RoHS compliant

### Applications

- Voltage Regulator Module (VRM)
- Multi-phase regulators
- Desktop and server VRMs and EVRDs
- Data networking and storage systems
- Notebook regulators
- Point-of-load modules
- Base station equipment
- Battery power systems
- Graphics cards

### Environmental Data

- Storage temperature range: -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

### Packaging

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

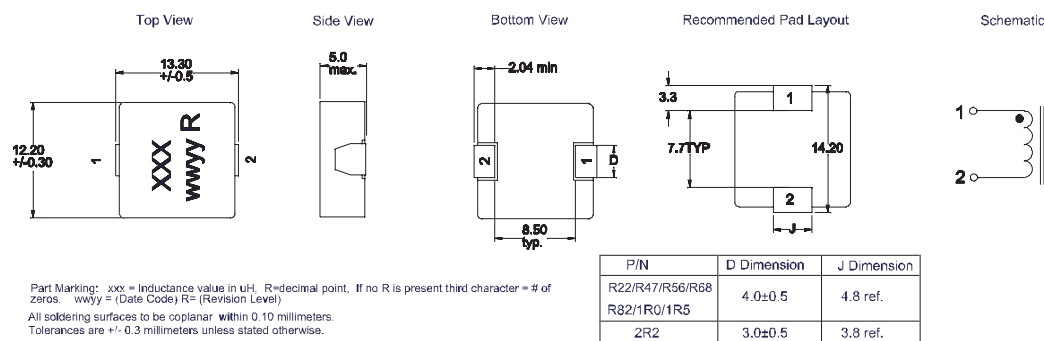
### Product Specifications

| Part Number <sup>6</sup> | OCL <sup>1</sup><br>± 20% (μH) | FLL <sup>2</sup> Min<br>(μH) | I <sub>rms</sub> <sup>3</sup><br>(Amps) | I <sub>sat</sub> <sup>4</sup><br>@25°C (Amps) | DCR (mΩ)<br>@20°C Nominal | DCR (mΩ)<br>@20°C Maximum | K-factor <sup>5</sup> |
|--------------------------|--------------------------------|------------------------------|-----------------------------------------|-----------------------------------------------|---------------------------|---------------------------|-----------------------|
| HCM1305-R22-R            | 0.22                           | 0.14                         | 51                                      | 110                                           | 0.63                      | 0.72                      | 367                   |
| HCM1305-R47-R            | 0.47                           | 0.30                         | 38                                      | 65                                            | 0.80                      | 0.92                      | 174                   |
| HCM1305-R56-R            | 0.56                           | 0.36                         | 36                                      | 55                                            | 1.15                      | 1.33                      | 110                   |
| HCM1305-R68-R            | 0.68                           | 0.44                         | 34                                      | 53                                            | 1.15                      | 1.33                      | 110                   |
| HCM1305-R82-R            | 0.82                           | 0.52                         | 31                                      | 52                                            | 1.40                      | 1.61                      | 140                   |
| HCM1305-1R0-R            | 1.00                           | 0.64                         | 29                                      | 50                                            | 2.10                      | 2.42                      | 117                   |
| HCM1305-1R5-R            | 1.50                           | 0.96                         | 23                                      | 48                                            | 2.75                      | 3.16                      | 120                   |
| HCM1305-2R2-R            | 2.20                           | 1.41                         | 20                                      | 32                                            | 4.60                      | 5.29                      | 110                   |

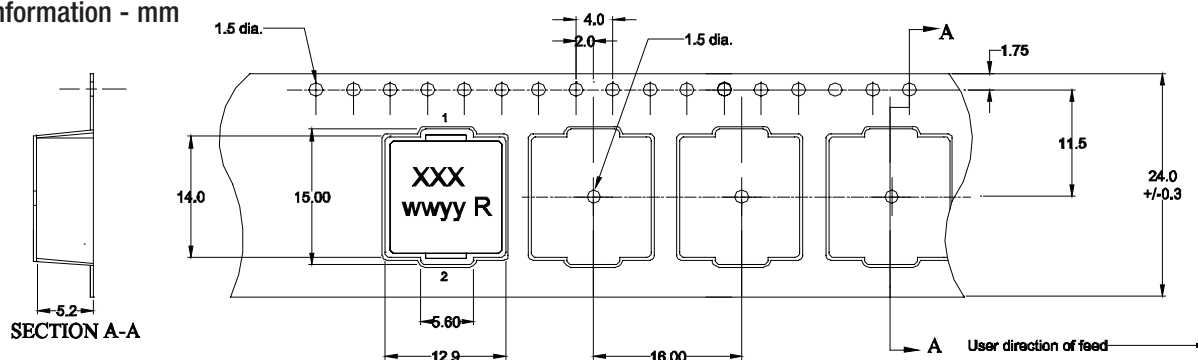
1. Open Circuit Inductance (OCL) Test Parameters: 100kHz, 0.25V<sub>rms</sub>, 0.0Adc @ 25°C.
2. Full Load Inductance (FLL) Test Parameters: 100kHz, 0.25V<sub>rms</sub>, I<sub>sat</sub> @ 25°C.
3. I<sub>rms</sub>: DC current for an approximate temperature rise of 40°C without core loss. Derating is necessary 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>: 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 \* ΔI. B<sub>p-p</sub>: (Gauss), K: (K-factor from table), L: (Inductance in μH), ΔI (Peak-to-peak ripple current in Amps).
6. Part Number Definition: HCM1305-xxx-R
  - HCM1305 = Product code and size
  - xxx= Inductance value in μH, R = decimal point
  - "-R" suffix = RoHS compliant

### Dimensions - mm

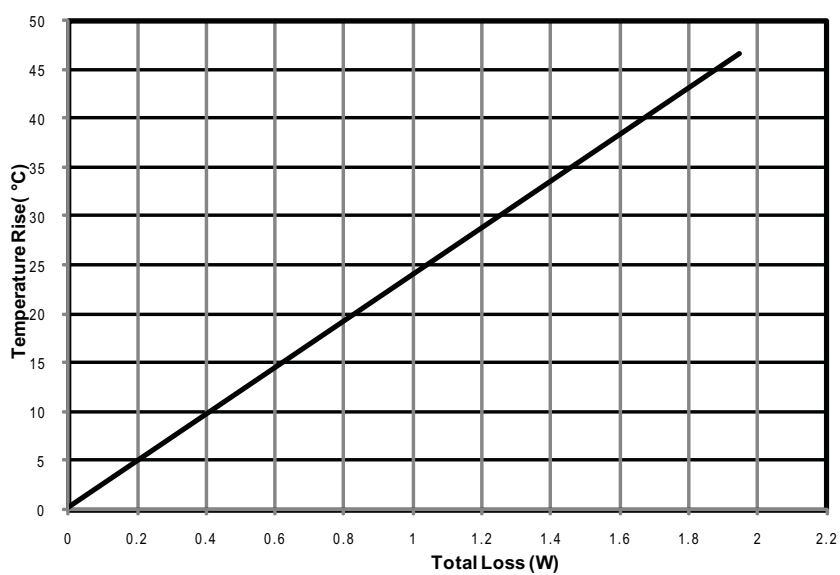


## Packaging Information - mm

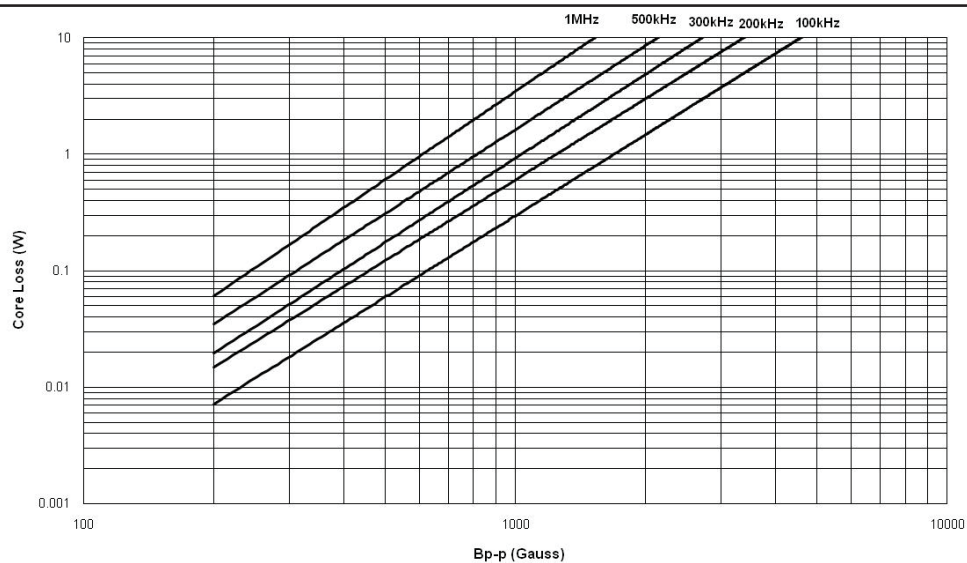


Supplied in tape and reel packaging, 400 parts per 13" diameter reel.

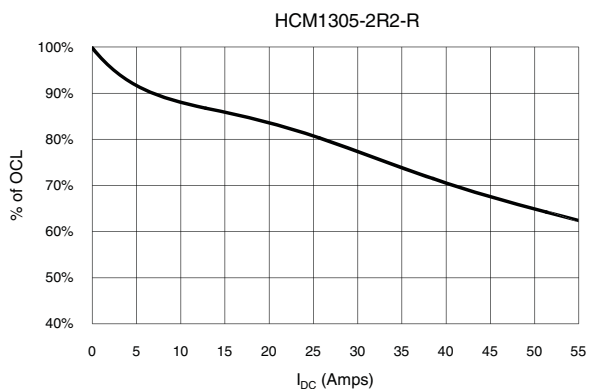
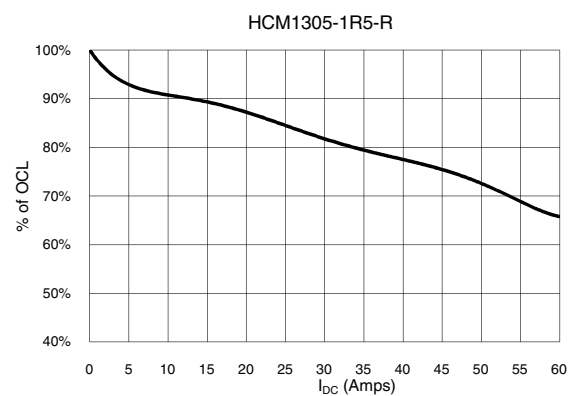
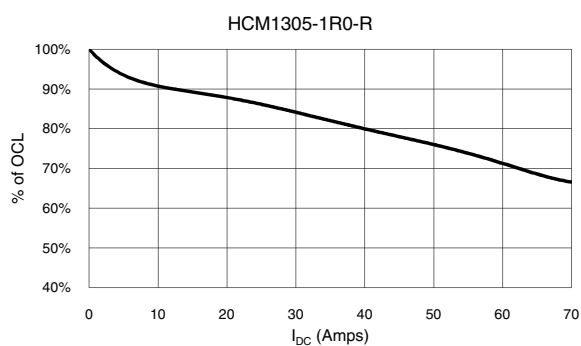
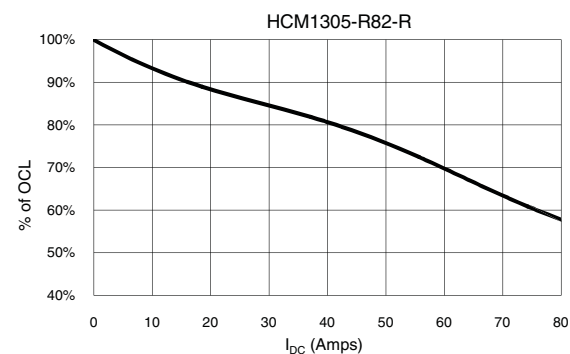
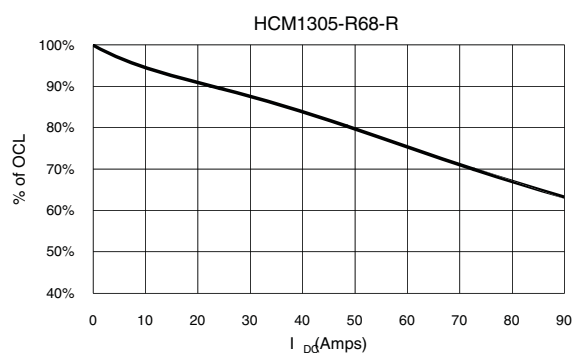
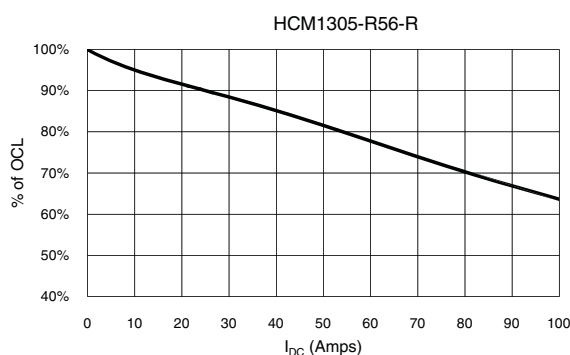
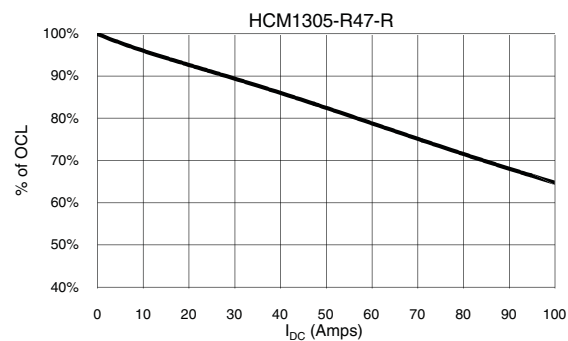
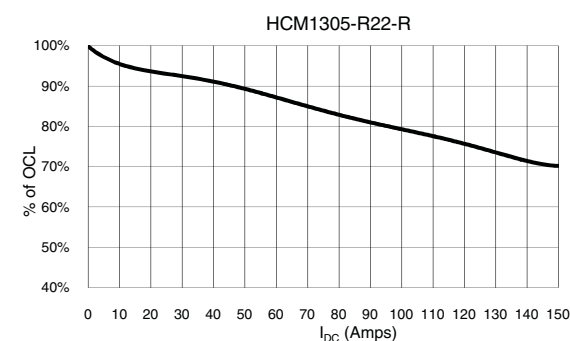
## Temperature Rise vs. Total Loss



## Core Loss



## Inductance Characteristics



## Solder Reflow Profile

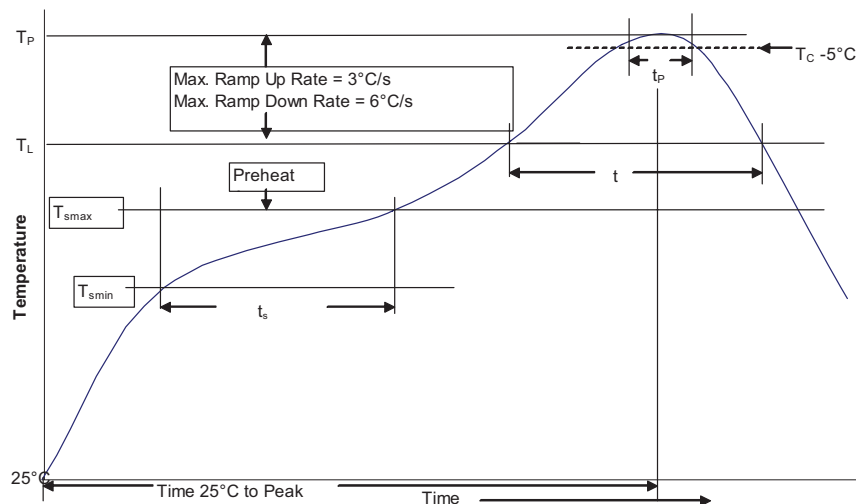


Table 1 - Standard SnPb Solder ( $T_c$ )

| Package Thickness | Volume $mm^3$ <350 | Volume $mm^3$ >350 |
|-------------------|--------------------|--------------------|
| <2.5mm            | 235°C              | 220°C              |
| ≥2.5mm            | 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 |
|-------------------|--------------------|--------------------------|---------------------|
| <1.6mm            | 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. ( $T_{smin}$ )                                                  | 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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