

# High Current, Power Inductors

## HCP0605 Series



### Description

- Halogen free
- 125°C maximum total temperature operation
- 5.3 x 6.1 x 4.95mm surface mount package
- Powder Iron core material
- High current carrying capacity, high permeability
- Frequency range up to 1MHz
- RoHS compliant

### Applications

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

### Environmental Data

- Storage temperature range: -40°C to +125°C
- Operating temperature range: -40°C to +125°C (with derated current)
- Solder reflow temperature: J-STD-020D compliant

### Packaging

- Supplied in tape and reel packaging, 1,000 parts per reel, 13" diameter reel

### Product Specifications

| Part Number <sup>6</sup> | OCL <sup>1</sup><br>μH ± 15% | FLL <sup>2</sup><br>μH Minimum | I <sub>rms</sub> <sup>3</sup><br>Amps | I <sub>sat</sub> <sup>4</sup><br>Amps@25°C | DCR mΩ@20°C<br>Maximum | K-factor <sup>5</sup> |
|--------------------------|------------------------------|--------------------------------|---------------------------------------|--------------------------------------------|------------------------|-----------------------|
| HCP0605-R10-R            | 0.095                        | 0.06                           | 53                                    | 20                                         | 0.40                   | 120.5                 |

1 Open Circuit Inductance (OCL) Test Parameters: 100kHz, 0.10V<sub>rms</sub>, 0.0Adc

2 Full Load Inductance (FLL) Test Parameters: 100kHz, 0.1V<sub>rms</sub>, I<sub>sat</sub>

3 I<sub>rms</sub>: DC current for an approximate ΔT 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 the part temperature not exceed 125°C under worst case operating conditions verified in the end application.

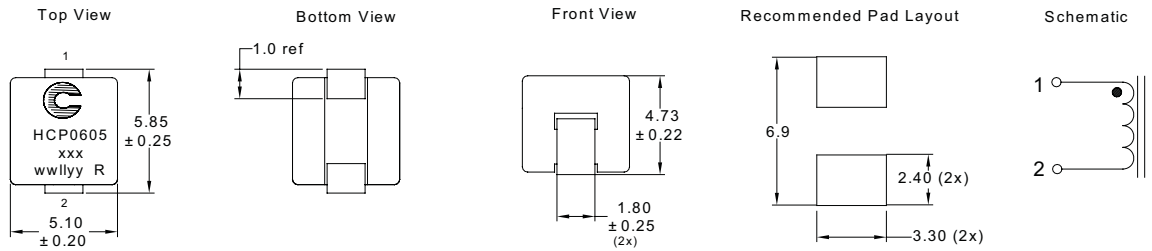
4 I<sub>sat</sub>: Peak current for approximately 30% rolloff at 25°C.

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: HCP0605-xxx-R

- HCP0605 = Product code and size
- xxx= Inductance value in μH, R = decimal point.
- "-R" suffix = RoHS compliant

## Dimensions - mm



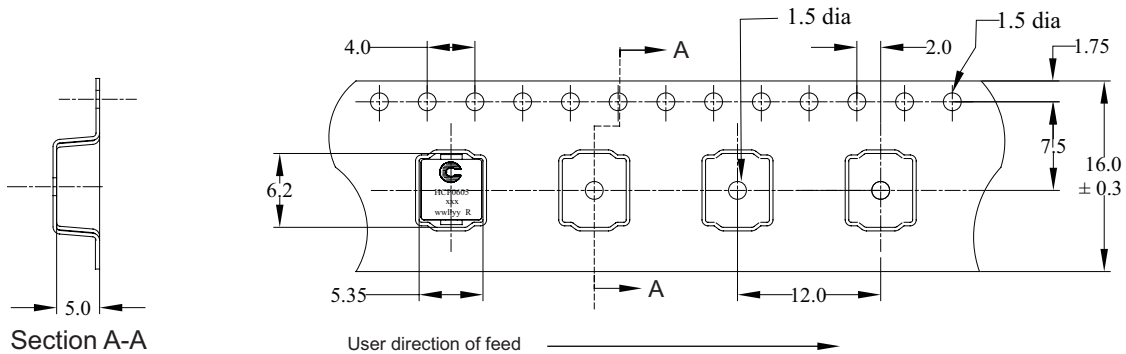
Part Marking: HCP0605

xxx = Inductance value in  $\mu\text{H}$ . (R = Decimal point)

wwllly = Date code

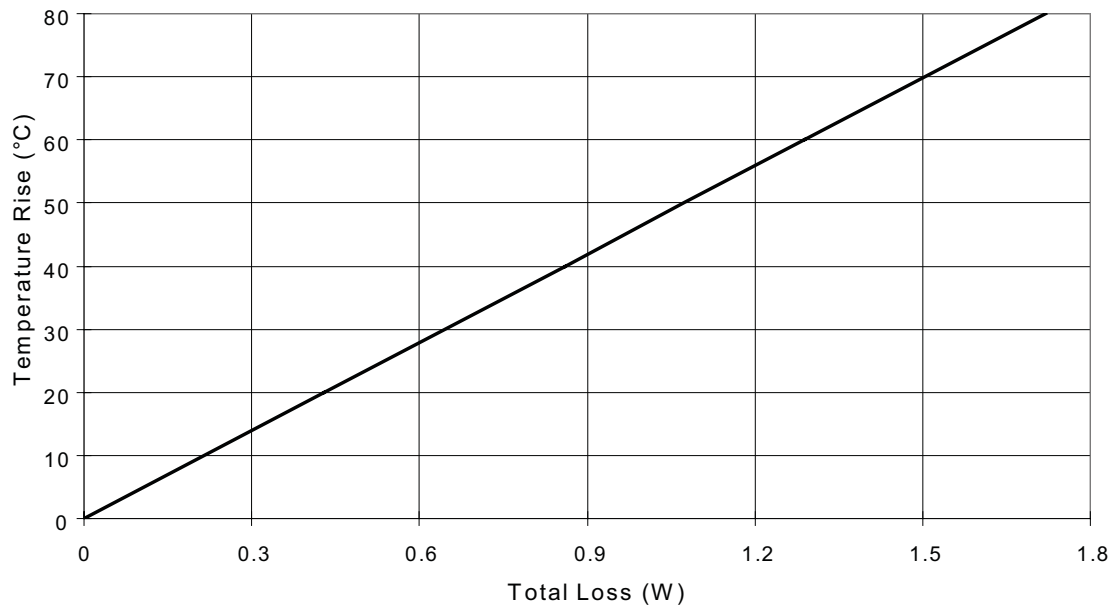
R = Revision level

## Packaging Information - mm



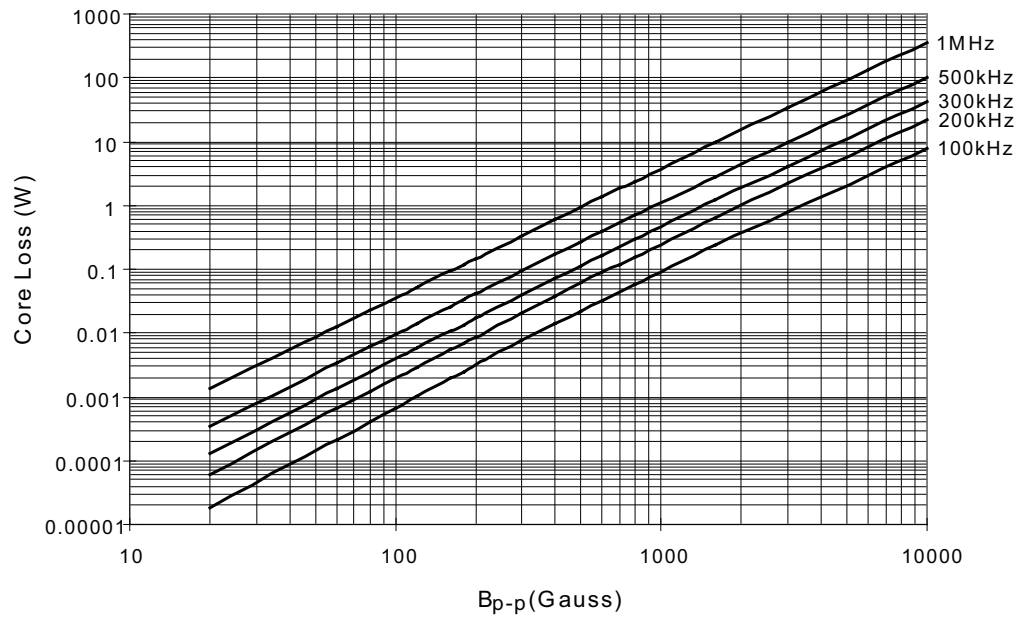
Supplied in tape-and-reel packaging, 1000 parts per reel, 13" diameter reel.

## Temperature Rise vs. Total Loss



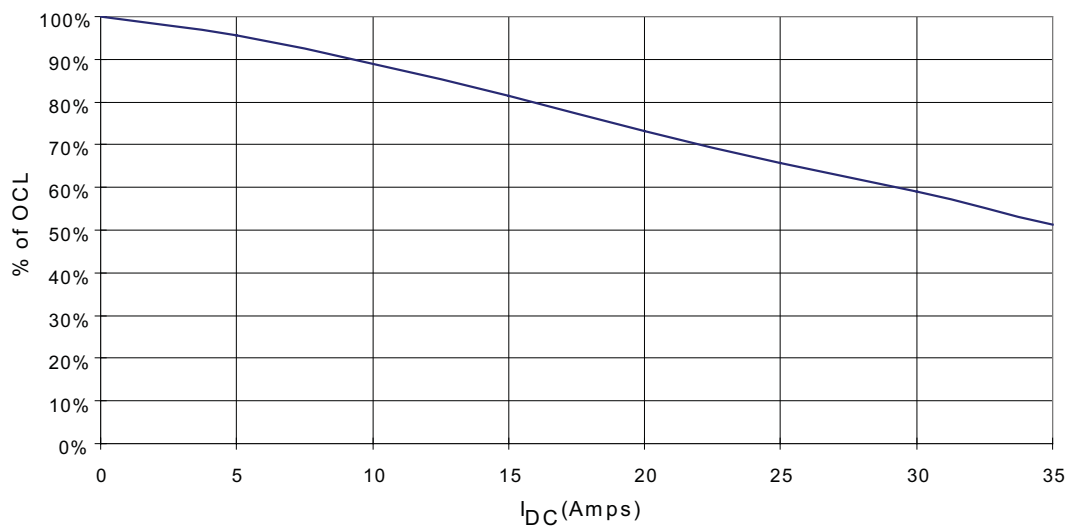
## Core Loss

Core Loss vs  $B_{p-p}$



## Inductance Characteristics

% of OCL vs  $I_{DC}$



## Solder Reflow Profile

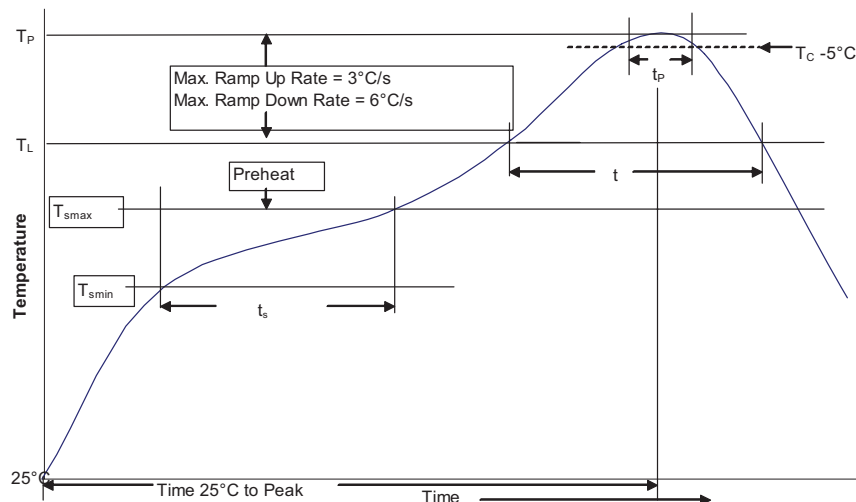


Table 1 - Standard SnPb Solder ( $T_C$ )

| 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-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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