

# HCF1007

## High frequency, high current power inductors



### Product features

- 10.3 x 8.1 x 6.65 mm surface mount package
- Ferrite core material
- Secure 3 terminal mounting
- High current carrying capacity, low core losses
- Tight DCR tolerance for sensing circuits
- Inductance range from 0.3  $\mu$ H to 10.0  $\mu$ H
- Current range from 5.3 A to 48 A
- Frequency range up to 1 MHz

### Applications

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

### Environmental data

- Storage temperature range (component):  
-40 °C to +125 °C
- Operating temperature range: -40 °C to +125 °C  
(ambient plus self-temperature rise)
- Solder reflow temperature:  
J-STD-020 (latest revision) compliant



## Product specifications

| Part Number   | OCL <sup>1</sup><br>μH ± 20% | FLL <sup>2</sup><br>Min (μH) | I <sub>rms</sub> <sup>3</sup><br>(A) | I <sub>sat</sub> <sup>1,4</sup><br>(A) @ +25 °C | I <sub>sat</sub> <sup>2,5</sup><br>(A) @ 1+25 °C | DCR mΩ<br>@+20 °C | K-factor |
|---------------|------------------------------|------------------------------|--------------------------------------|-------------------------------------------------|--------------------------------------------------|-------------------|----------|
| HCF1007-R30-R | 0.30                         | 0.21                         | 30                                   | 48                                              | 35                                               | 0.90±10%          | 279.9    |
| HCF1007-R42-R | 0.42                         | 0.30                         | 26                                   | 45                                              | 36                                               | 1.30±7%           | 186.6    |
| HCF1007-R56-R | 0.56                         | 0.40                         | 26                                   | 36                                              | 28                                               | 1.30±7%           | 186.6    |
| HCF1007-R68-R | 0.68                         | 0.49                         | 26                                   | 29                                              | 23                                               | 1.30±7%           | 186.6    |
| HCF1007-1R0-R | 1.0                          | 0.72                         | 16                                   | 26                                              | 21                                               | 2.65±6%           | 139.9    |
| HCF1007-1R5-R | 1.5                          | 1.08                         | 13                                   | 22                                              | 17                                               | 4.15±6%           | 112.0    |
| HCF1007-2R2-R | 2.2                          | 1.57                         | 10.7                                 | 18                                              | 14                                               | 6.35±6%           | 93.30    |
| HCF1007-3R3-R | 3.3                          | 2.37                         | 10                                   | 14.5                                            | 11                                               | 7.50±6%           | 79.97    |
| HCF1007-4R7-R | 4.7                          | 3.38                         | 9.4                                  | 12                                              | 8.9                                              | 8.65±6%           | 69.97    |
| HCF1007-5R6-R | 5.6                          | 4.03                         | 9.4                                  | 9.4                                             | 7.5                                              | 8.65±6%           | 69.97    |
| HCF1007-6R8-R | 6.8                          | 4.90                         | 9.4                                  | 7.8                                             | 6.1                                              | 8.65±6%           | 69.97    |
| HCF1007-100-R | 10.0                         | 7.20                         | 9.4                                  | 5.3                                             | 4.2                                              | 8.65±6%           | 69.97    |

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

2 Full Load Inductance (FLL) Test Parameters: 100 kHz, 0.1 V<sub>rms</sub>, I<sub>sat</sub><sup>1</sup>

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><sup>1</sup>: Peak current for approximately 20% rolloff at +25 °C.

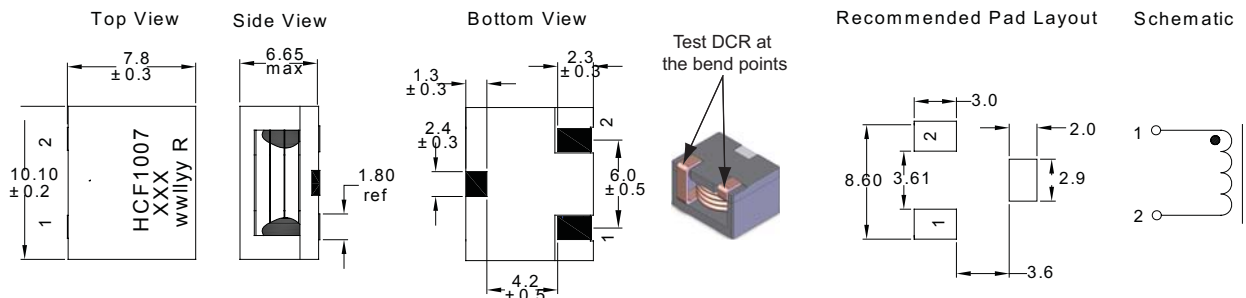
5 I<sub>sat</sub><sup>2</sup>: Peak current for approximately 20% rolloff at +125 °C.

6 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).

7 Part Number Definition: HCF1007-xxx-R

- HCF1007 = Product code and size
- xxx= Inductance value in μH, R = decimal point. If no "R" is present then third character =# of zeros
- -R suffix = RoHS compliant

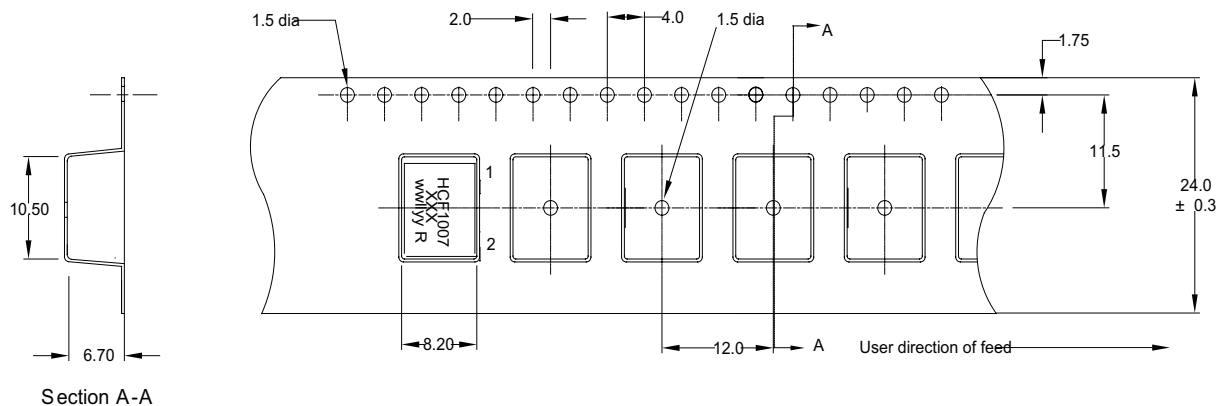
## Dimensions- mm



Part Marking: HCF1007 xxx = Inductance value in μH. (R = Decimal point). If no "R" is present, then last character is # of zeros yllww = Date code R = Revision level

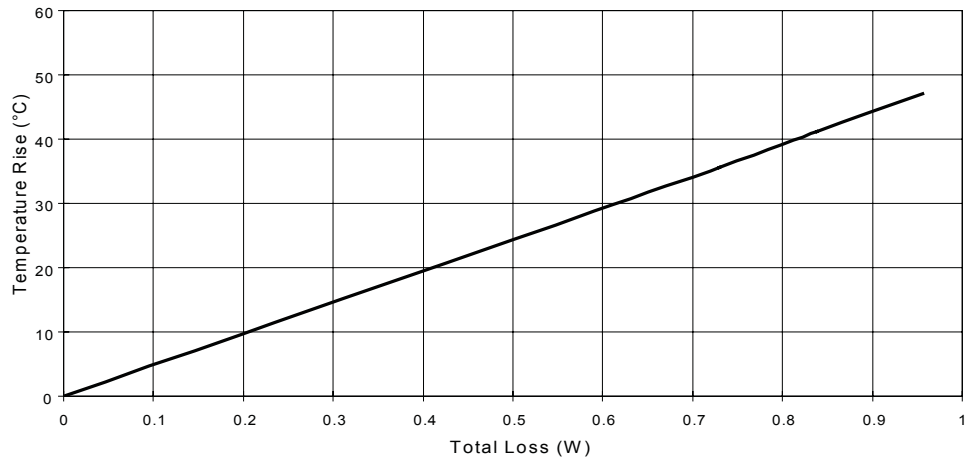
Do not route traces or vias underneath the inductor

## Packaging information - mm

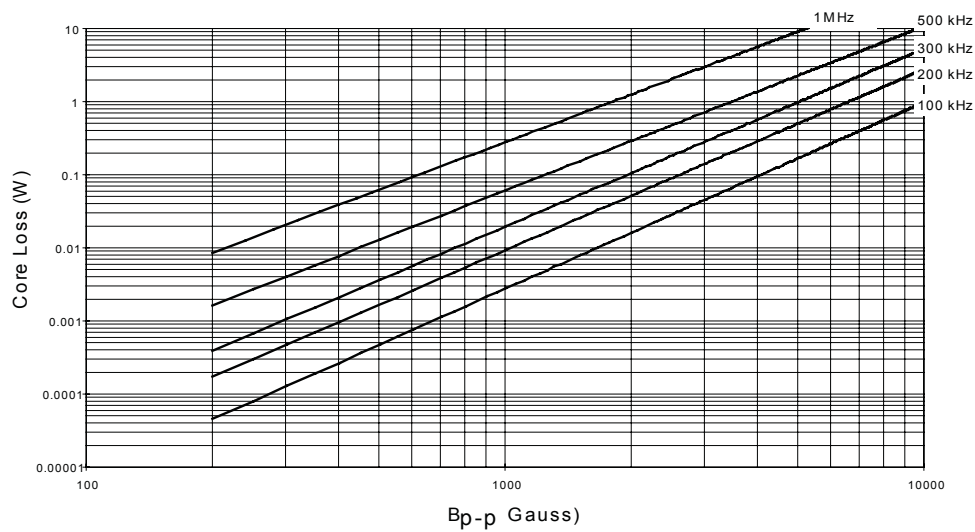


Supplied in tape-and-reel packaging, 700 parts per reel, 13" diameter reel.

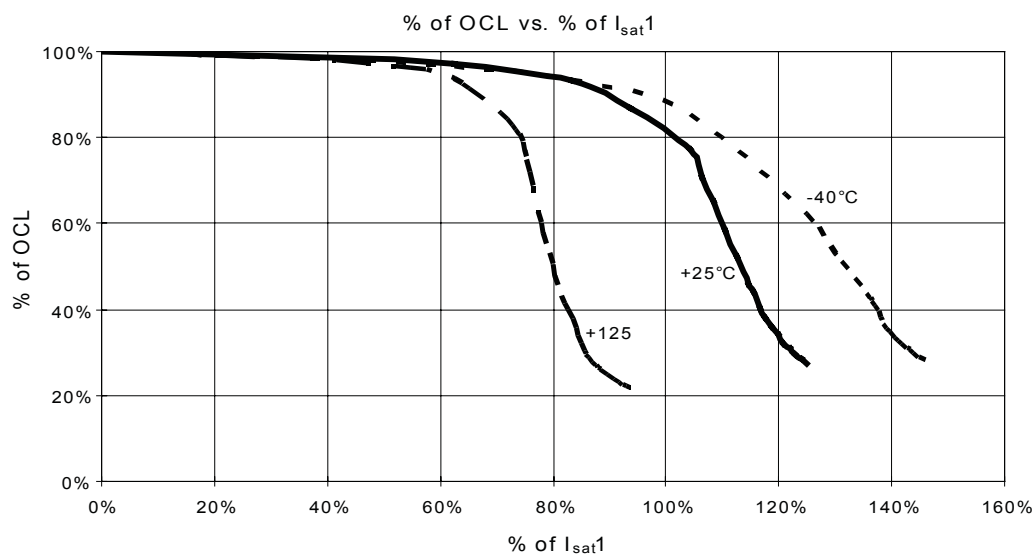
### Temperature rise vs total loss



### Core loss vs Bp-p



### Inductance characteristics



## Solder Reflow Profile

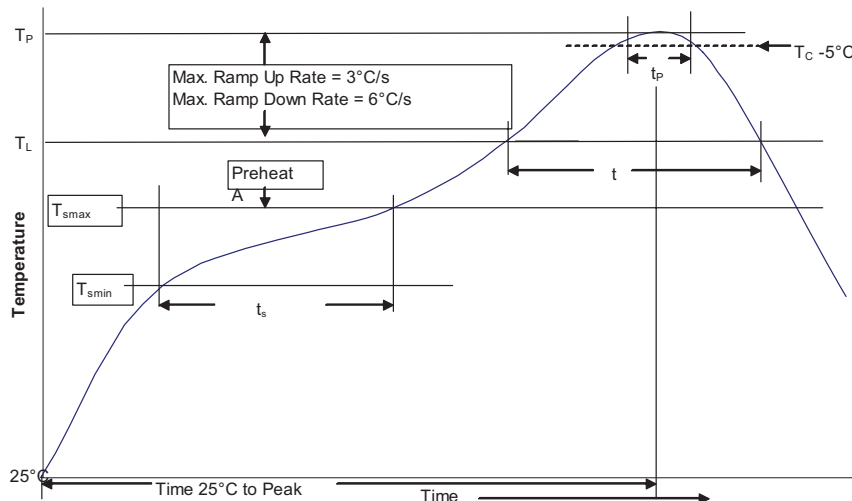


Table 1 - Standard SnPb Solder ( $T_p$ )

| 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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