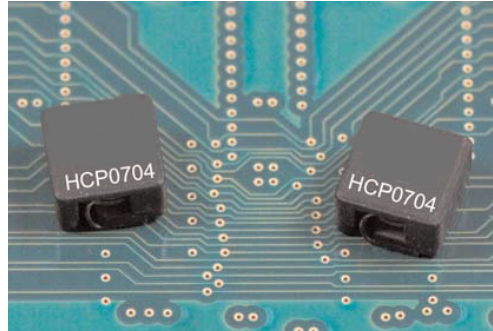


# HCP0704

## High current power inductors



### Product features

- 6.8 x 6.8 x 4.2 mm surface mount package
- Iron powder core material
- Magnetically shielded, low EMI
- High temperature core material eliminates thermal aging issues
- High current carrying capacity, low core losses
- Tight DCR tolerance for sensing circuits
- Inductance range from 0.40  $\mu$ H to 4.7  $\mu$ H
- Current range from 5.0 A to 27 A
- Frequency range up to 2 MHz
- Halogen free, lead free, RoHS compliant

### Applications

- Voltage Regulator Module (VRM)
- Multi-phase regulators
- Desktop and servers
- Base station equipment
- Notebook and laptop regulators
- Data networking and storage systems
- Point-of-load modules (POL)
- Battery power systems
- DCR sensing circuits

### Environmental Data

- Storage temperature range (Component): -40 °C to +155 °C
- Operating temperature range: -40 °C to +155 °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> ± 25% (μH)	FLL <sup>2</sup> Min. (μH)	I <sub>rms</sub> <sup>3</sup> (A)	I <sub>sat</sub> <sup>4</sup> @ +25 °C (A)	DCR (mΩ) @ +20 °C	K-factor <sup>5</sup>
HCP0704-R40-R	0.40	0.28	17	27	3.2 ±10%	383.1
HCP0704-R60-R	0.60	0.42	14	21	4.5 ±10%	313.5
HCP0704-1R0-R	1.00	0.7	12	17	6.2 ±10%	265.3
HCP0704-1R8-R	1.80	1.26	8.5	13	11.0 ±10%	202.8
HCP0704-2R3-R	2.30	1.56	7.5	11.5	16.5 ±10%	164.2
HCP0704-3R3-R	3.30	2.31	6.0	9.5	25.0 ±10%	149.9
HCP0704-4R7-R	4.70	3.29	5.0	8.0	29.5 ±10%	127.7

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

<sup>is</sup> necessary for AC currents. PCB pad 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.

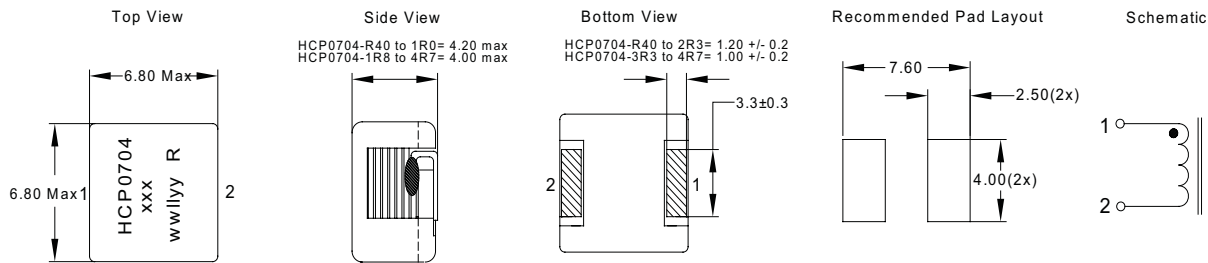
4 I<sub>sat</sub>: Peak current for approximately 20% rolloff at +25 °C.

5 K-factor: Used to determine B<sub>p-p</sub> for core loss (see graph). B<sub>p-p</sub> = K \* L \* ΔI : (Gauss), K: (K-factor from table), L: (inductance in μH), ΔI (peak-to-peak ripple current in amps).

6 Part Number Definition: HCP0704-xxx-R

- HCP0704 = 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)**



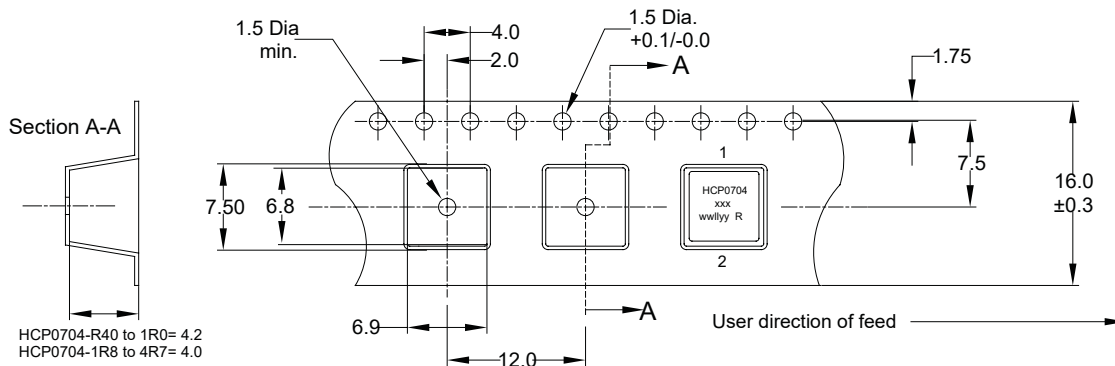
The nominal DCR test point is in the middle of the terminal

Part Marking: HCP0704 xxx = Inductance value in μH. (R = Decimal point). If no "R" is present, then last character is # of zeros wwlyy = Date code R = Revision level

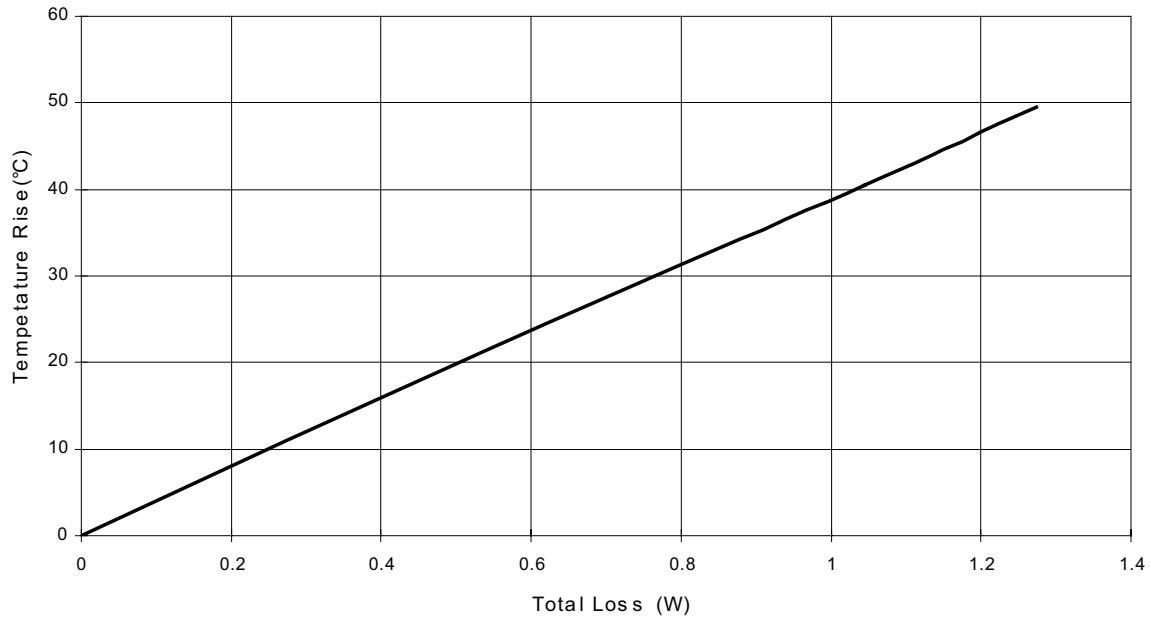
Do not route traces or vias underneath the inductor

**Packaging information (mm)**

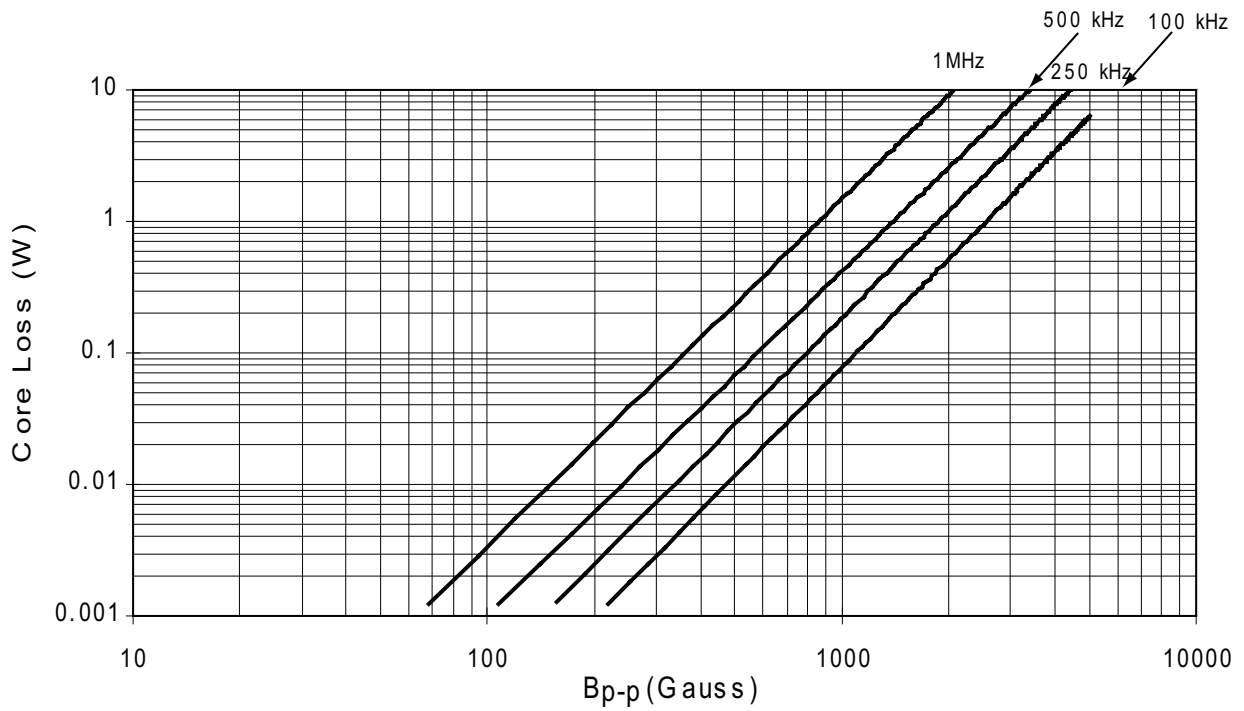
Supplied in tape and reel packaging, 1000 parts per 13" diameter reel.



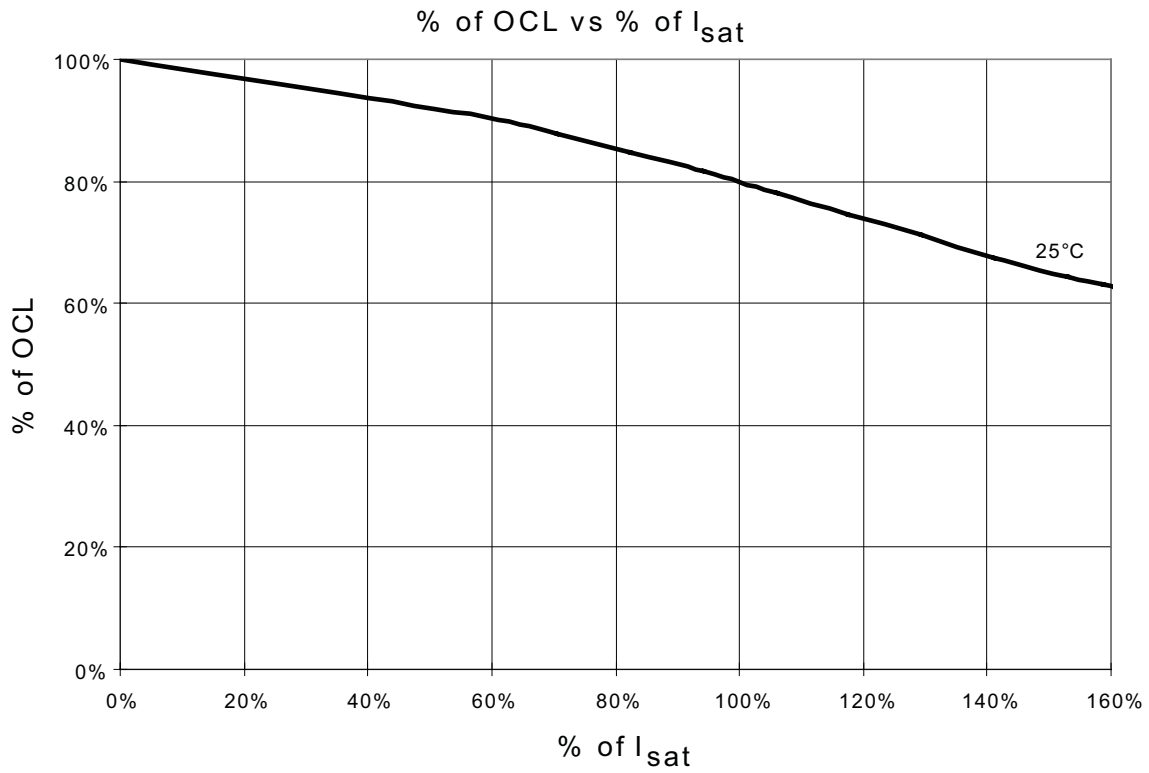
Temperature rise vs. total loss



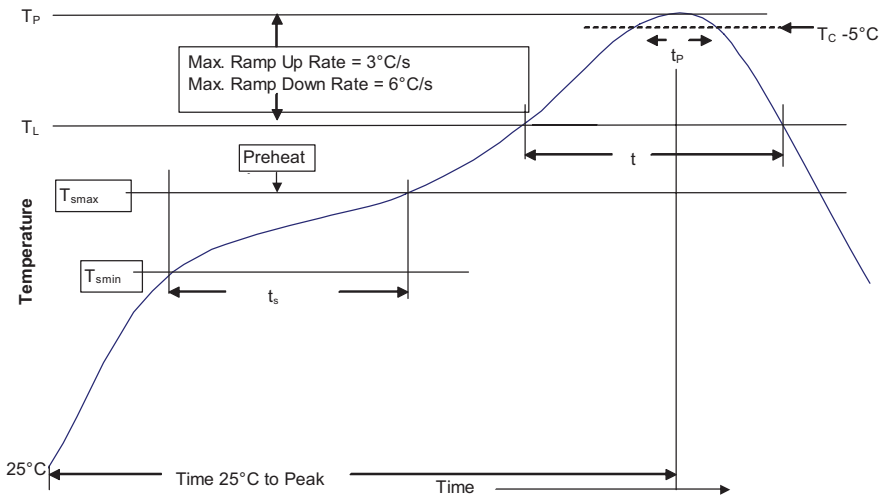
Core loss vs. B<sub>p-p</sub>



**Inductance characteristics**



**Solder reflow profile**



**Table 1 - Standard SnPb Solder ( $T_c$ )**

Package Thickness	Volume mm <sup>3</sup> <350	Volume mm <sup>3</sup> ≥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 <sup>3</sup> <350	Volume mm <sup>3</sup> 350 - 2000	Volume mm <sup>3</sup> >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 JEDEC 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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