

# HC7

## High current power inductors



### Applications

- Multi-phase regulators
- Voltage Regulator Modules (VRMs)
- Distributed power systems DC-DC converters
- Desktop and server VRMs and EVRDs
- Point-of-Load (POL) modules
- Field Programmable Gate Array (FPGA) DC-DC converters
- Battery power systems
- High current power supplies
- Data networking and storage systems

### Product description

- Surface mount inductors designed for higher speed switch mode applications requiring lower inductance, low voltage and high current
- Design utilizes high temperature powder iron material with a non-organic binder to eliminate thermal aging
- Inductance range from 0.22  $\mu$ H to 4.81  $\mu$ H
- Current range from 9.2 to 86.5 Amps
- Frequency range 1kHz to 500kHz

### 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-020D compliant



Part number <sup>6</sup>	OCL <sup>1</sup> (μH) ±20%	I <sub>rms</sub> <sup>2</sup> (amps)	I <sub>sat</sub> <sup>3</sup> (amps) 15% rolloff	I <sub>sat</sub> <sup>4</sup> (amps) 30% rolloff	DCR (mΩ) maximum @ 20°C	Volt-μsec <sup>5</sup> (V-μs)
HC7-R20-R	0.22	35.8	45.8	86.5	0.67	2.27
HC7-R47-R	0.53	23.4	27.5	51.9	1.60	3.83
HC7-1R0-R	1.05	20.3	19.6	37.1	2.10	5.36
HC7-1R5-R	1.73	14.2	15.3	28.8	4.30	6.90
HC7-2R2-R	2.58	13.0	12.5	23.6	5.20	8.40
HC7-3R9-R	3.61	10.4	10.6	20.0	7.90	10.0
HC7-4R7-R	4.81	9.8	9.2	17.3	9.00	12.6

1. Open Circuit Inductance (OCL) Test Parameters: 100kHz, 1.0Vrms, 0.0A<sub>dc</sub>, @ +25°C
2. Irms: DC current for an approximately ΔT of 40°C without core loss. Derating is necessary for AC currents. Pad layout, trace thickness and width, airflow, and proximity of other heat generating components will affect the temperature rise. It is recommended that the temperature of the part not exceed 155°C under worst case conditions verified in the end application.
3. Peak current for approximately 15% rolloff @+20°C
4. Peak current for approximately 30% rolloff @+20°C
5. Applied Volt-Time product (V-μs) across the inductor. This value represents the applied V-μs at operating frequency necessary to generate additional core loss which contributes to the 40°C temperature rise. De-rating of the Irms is required to prevent excessive temperature rise. The 100% V-us rating is equivalent to a ripple current I<sub>p-p</sub> of 20% of I<sub>sat</sub> (30% rolloff option).
6. Part number definition: HC7-XXX-R  
HC7 = Product code and size  
XXX = Inductance value in uH. R = Decimal point. If no R is present, then last character equals the number of zeros  
-R suffix indicates RoHS compliant

**TOP VIEW**

HC7-XXX  
wwlly R

Length Max

13.0 Max

**FRONT VIEW**

5.10 ±0.40

2.60 max

Height Max

**SIDE VIEW**

3.0 ± 0.25 (2x)

**RECOMMENDED PAD LAYOUT**

3.50 typ 2plcs

3.50 typ 2plcs

6.50 typ

**SCHEMATIC**

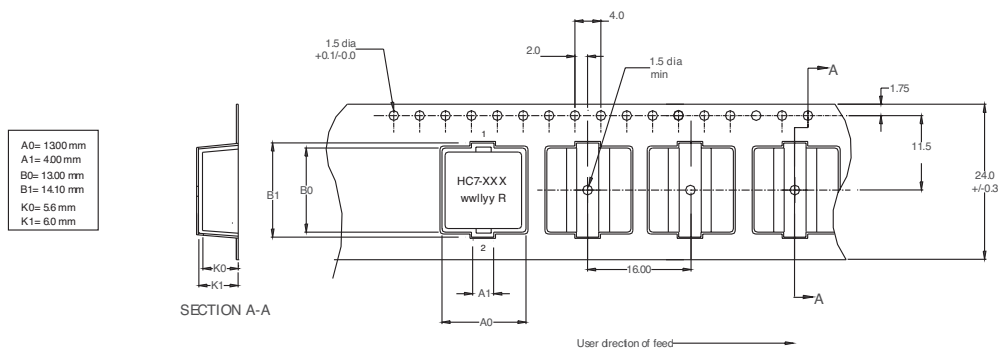
1

2

Part number	Height mm	Length mm
HC7-R20-R	6.0	14.25
HC7-R47-R	5.5	13.8
HC7-1R0-R	5.5	13.8
HC7-1R5-R	5.5	13.8
HC7-2R2-R	5.5	13.8
HC7-3R9-R	5.5	13.8
HC7-4R7-R	5.5	13.8

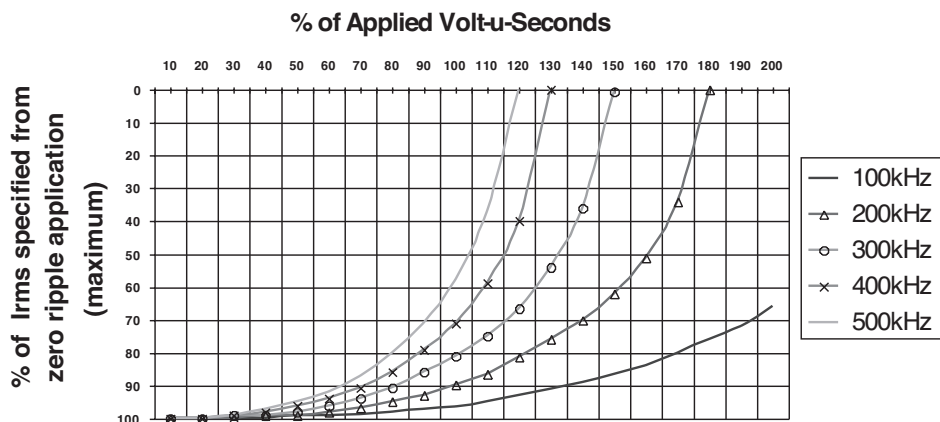
Part marking: HC7= (Product code and size)-xxx=(inductance value in uH, R= decimal point. If no R is present then last character equals number of zeros. wwlyly=date code, R=revision level  
Tolerances are  $\pm 0.2$  millimeters unless stated otherwise  
All soldering surfaces to be coplanar within 0.15 millimeter  
Do not route traces or vias underneath the inductor

Supplied in tape and reel packaging, 610 parts per reel, 13" diameter reel.

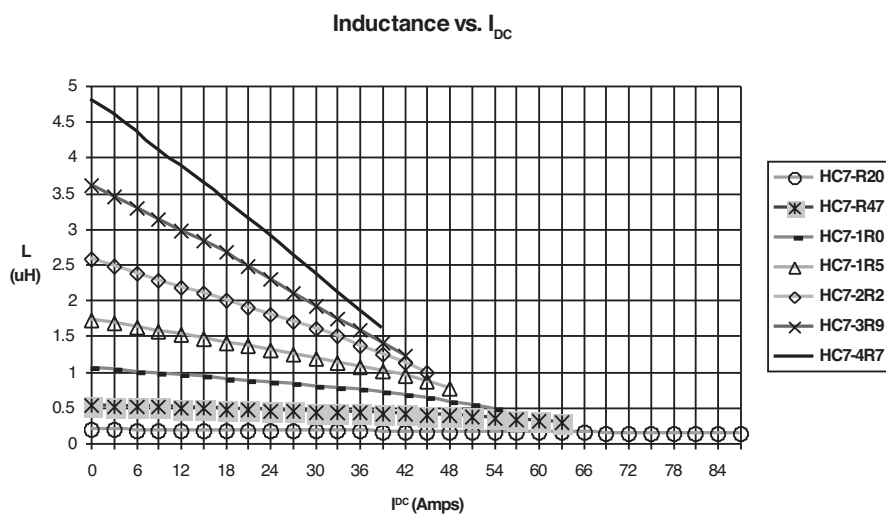


Core loss

**I<sub>rms</sub> DERATING WITH CORE LOSS**



Inductance characteristics



## Solder reflow profile

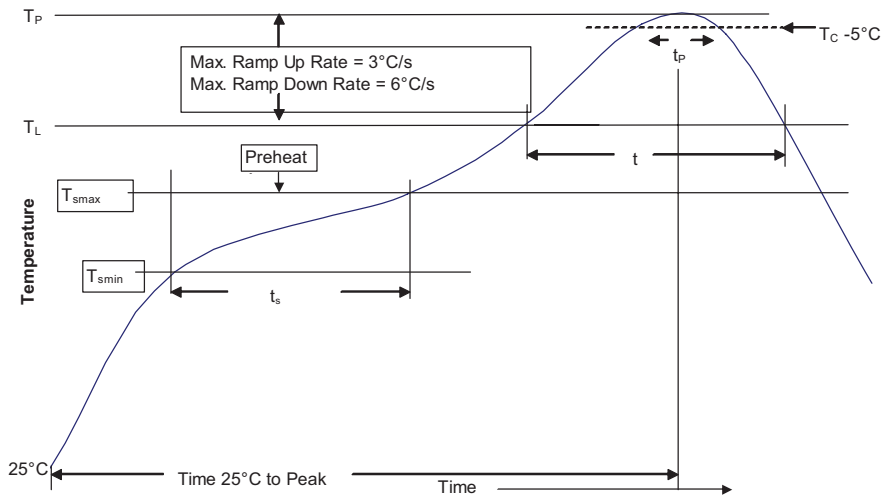


Table 1 - Standard SnPb Solder ( $T_C$ )

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-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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