



# High Current Power Inductors

## HCM1104 Series



### Description

- Halogen free, lead free, RoHS compliant
- 125°C maximum total operating temperature
- 11.5x 10.3 x 4.0mm maximum surface mount package
- Powder Iron core material
- Magnetically shielded, low EMI
- High current carrying capacity, low core losses
- Inductance range 0.20µH to 10.0µH
- Current range from 7.5 to 45 Amps
- Frequency range up to 5MHz

### Applications

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

### 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, 850 parts per 13" reel

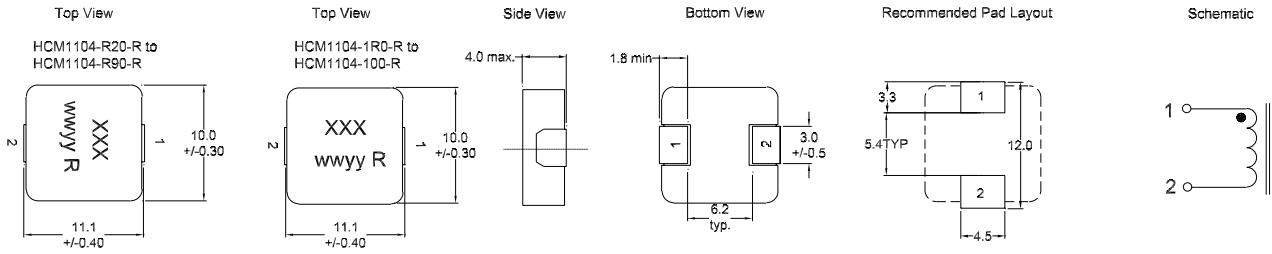
### Product Specifications

Part Number <sup>7</sup>	OCL <sup>1</sup> ± 20% (µH)	FLL <sup>2</sup> Min (µH)	I <sub>rms</sub> <sup>3</sup> (Amps)	I <sub>sat</sub> <sup>4,5</sup> @25°C (Amps)	DCR (mΩ) @20°C Nominal	DCR (mΩ) @20°C Maximum	K-factor <sup>6</sup>
HCM1104-R20-R	0.20	0.13	32	45	0.63	0.72	411
HCM1104-R36-R	0.36	0.23	30	42	1.04	1.20	269
HCM1104-R45-R	0.45	0.29	29	36	1.07	1.23	219
HCM1104-R56-R	0.56	0.36	25	32	1.56	1.80	230
HCM1104-R90-R	0.90	0.58	22	28	2.17	2.50	236
HCM1104-1R0-R	1.0	0.56	18	28	3.00	3.30	378
HCM1104-1R5-R	1.5	0.84	16	32	3.80	4.20	310
HCM1104-2R2-R	2.2	1.23	12	18	6.00	7.00	253
HCM1104-3R3-R	3.3	1.85	10	16	10.8	11.8	220
HCM1104-4R7-R	4.7	2.63	8.5	15	17.0	20.0	175
HCM1104-100-R	10.0	5.60	7.5	8.5	27.0	30.0	116

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.

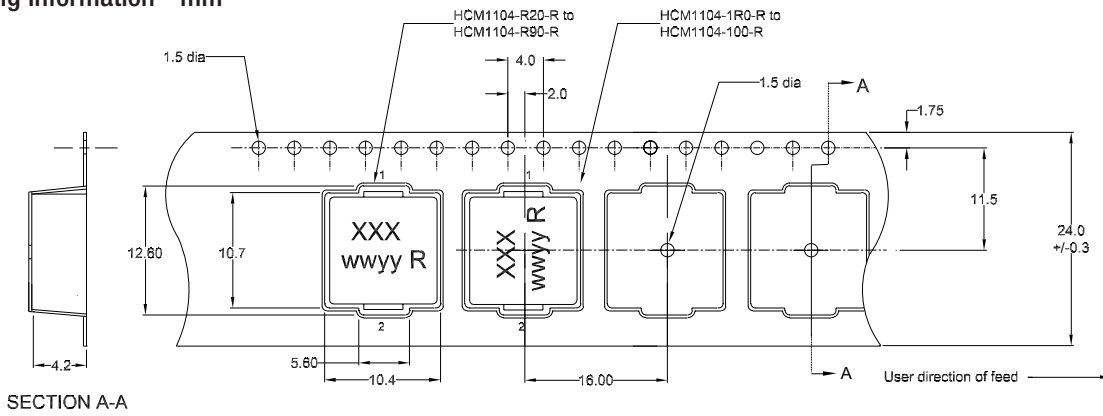
4. I<sub>sat</sub>: Peak current for approx. 20% rolloff at +25°C - HCM1104-R20-R to HCM1104-R90-R.  
 5. I<sub>sat</sub>: Peak current for approx. 30% rolloff at +25°C - HCM1104-1R0-R to HCM 1104-100-R.  
 6. K-factor: Used to determine B<sub>p-p</sub> for core loss (see graph). B<sub>p-p</sub> = K \* 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: HCM1104-xxx-R  
 - HCM1104 = Product code and size  
 - xxx= Inductance value in µH, R = decimal point  
 - "-R" suffix = RoHS compliant

### Dimensions - mm



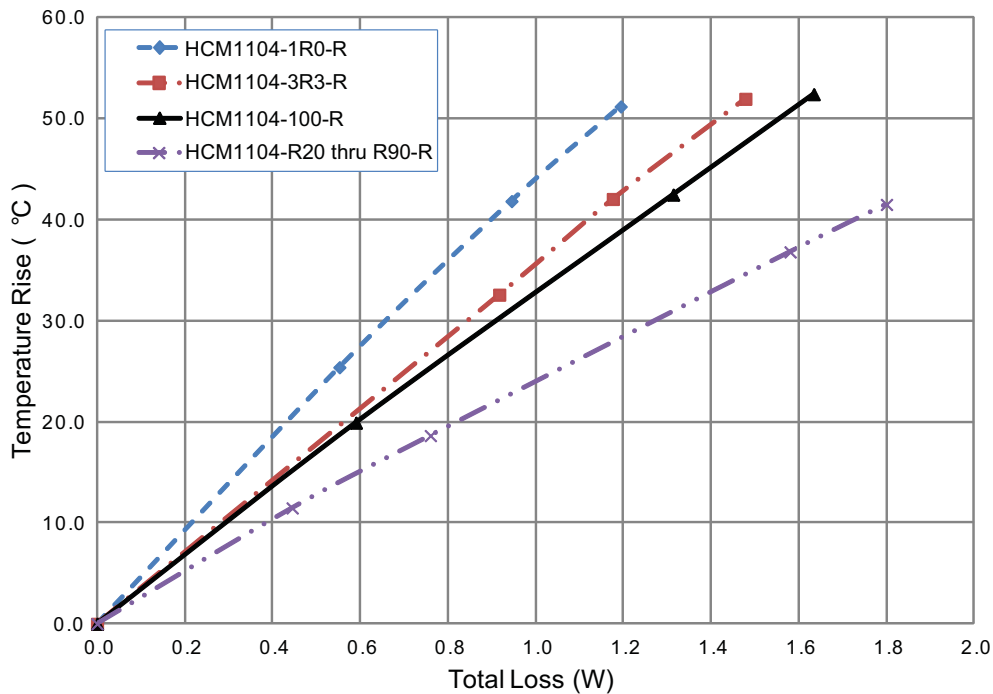
Part Marking: xxx = Inductance value in uH, R=decimal point, If no R is present third character = # of zeros. wwyy = (Date Code) R= (Revision Level)  
 All soldering surfaces to be coplanar within 0.10 millimeters.  
 Tolerances are +/- 0.3 millimeters unless stated otherwise.  
 HCM1104-R20-R to HCM1104-R90-R Color: Black  
 HCM1104-R20-R to HCM1104-R90-R Color: Top Grey

### Packaging Information - mm

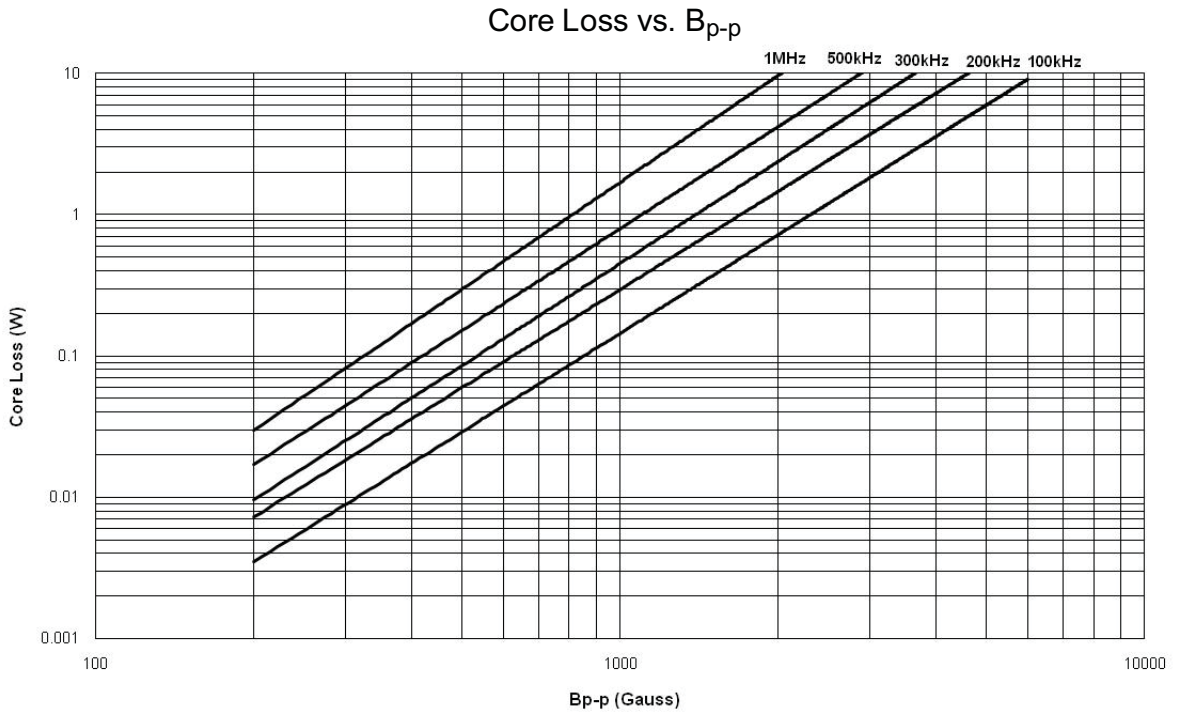


Supplied in tape and reel packaging, 850 parts per 13" diameter reel.

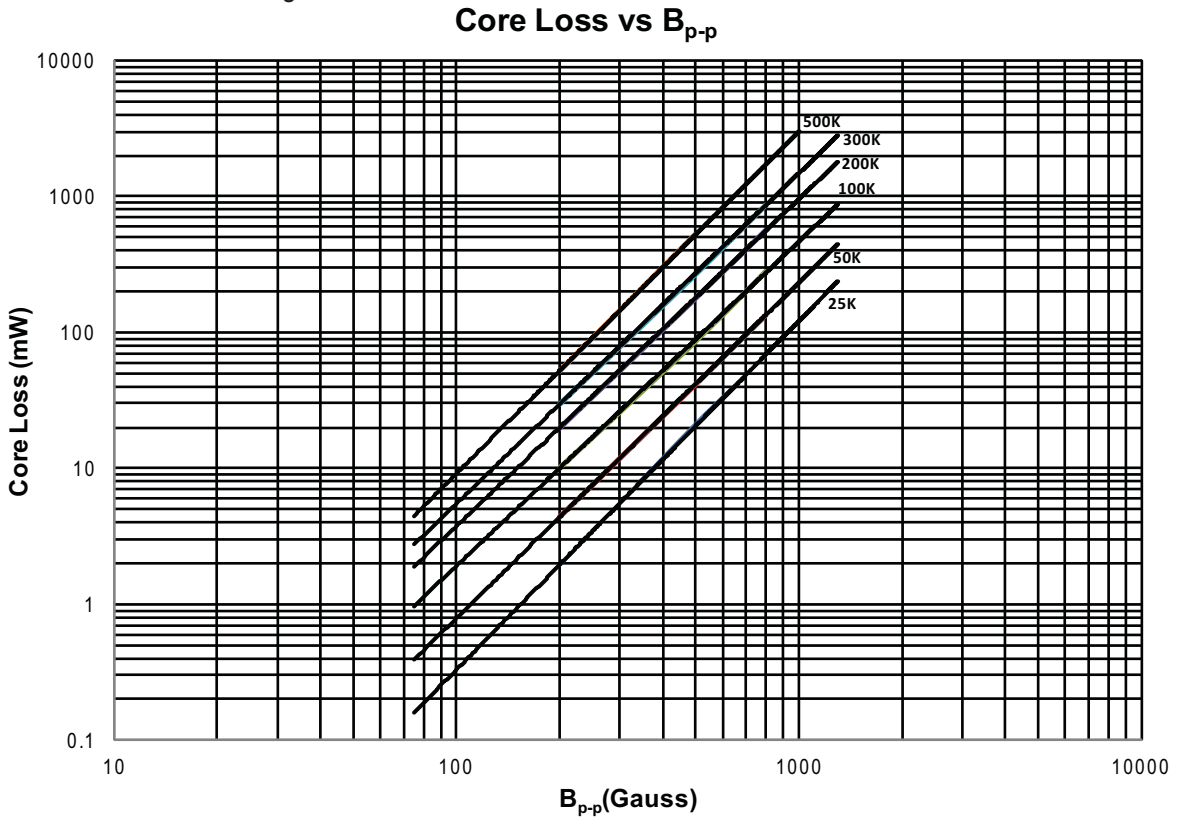
### Temperature Rise vs. Total Loss



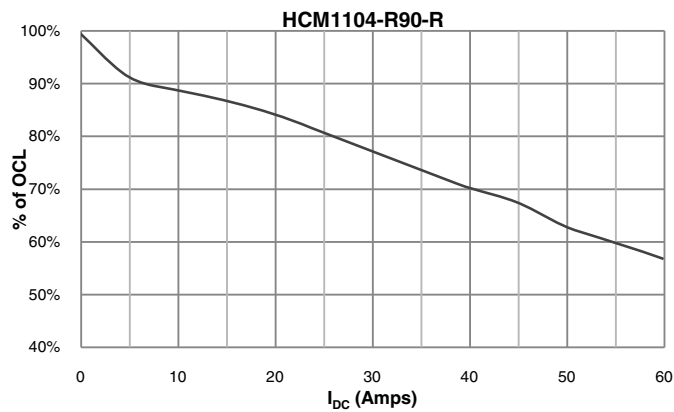
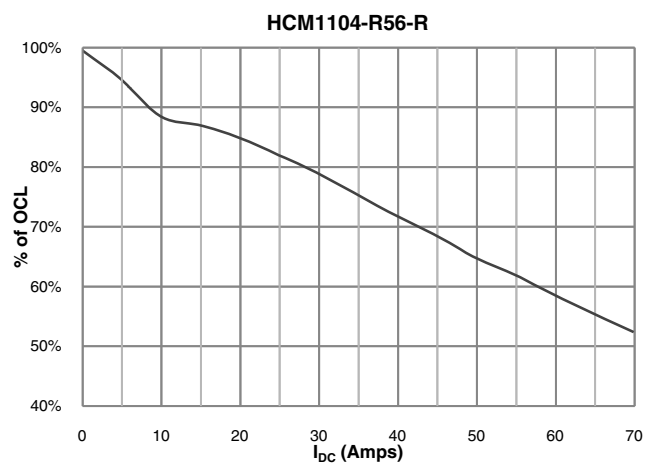
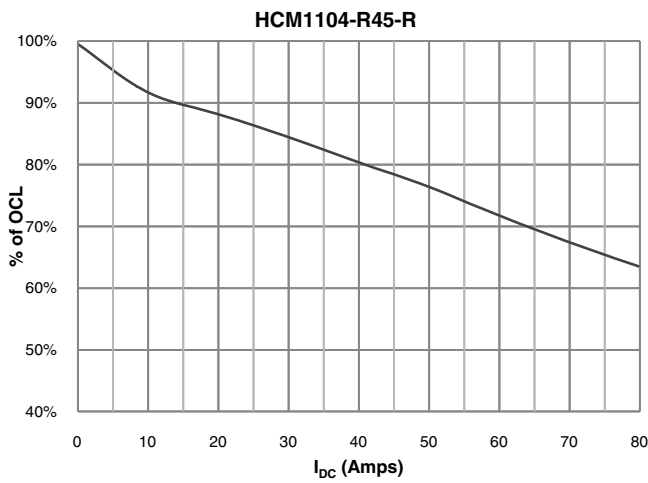
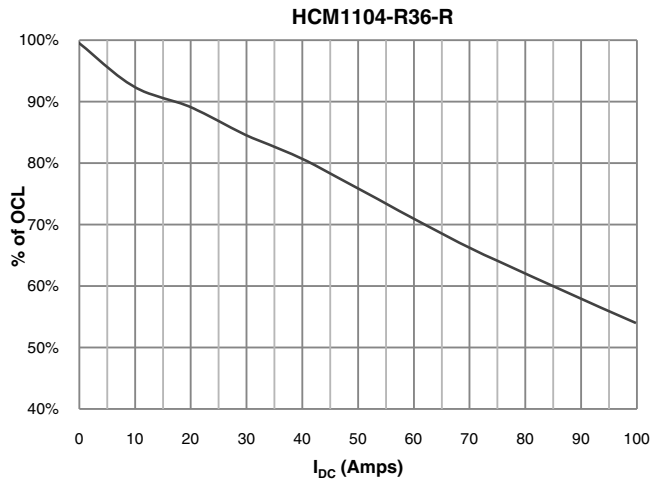
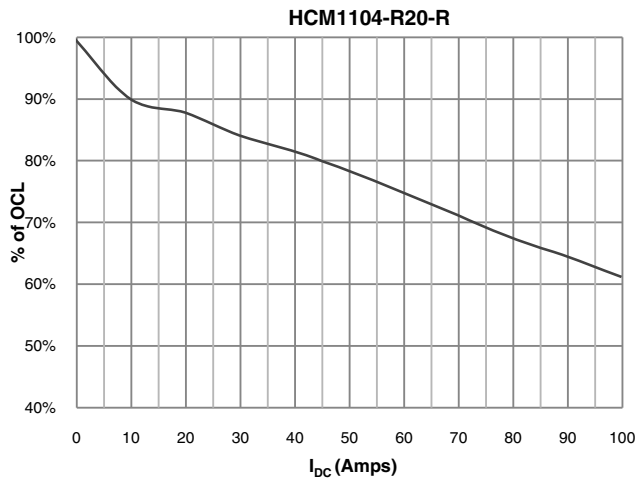
Core Loss - HCM1104-R20-R Through HCM1104-R90-R



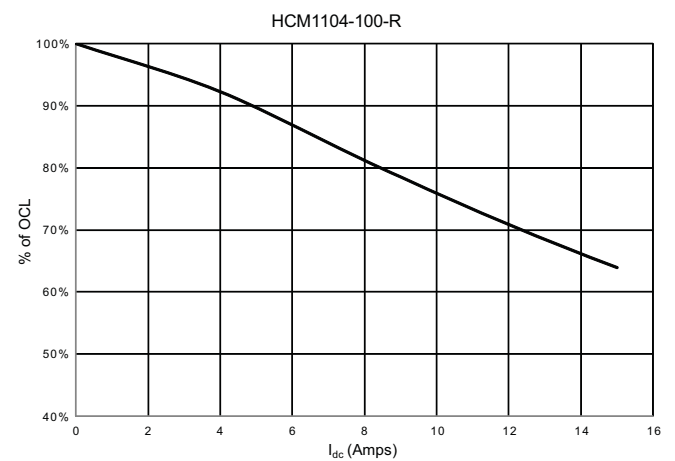
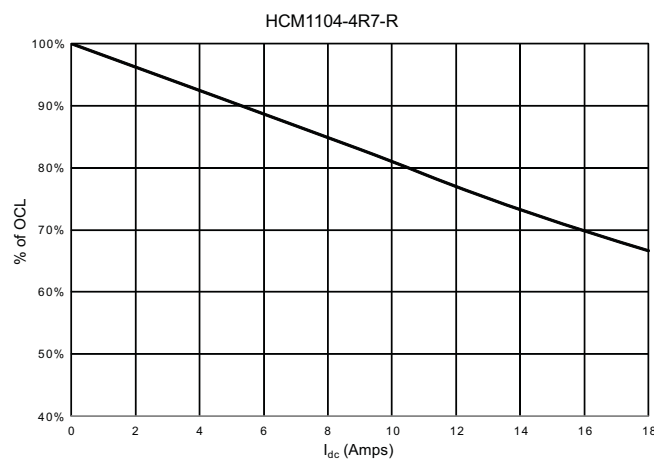
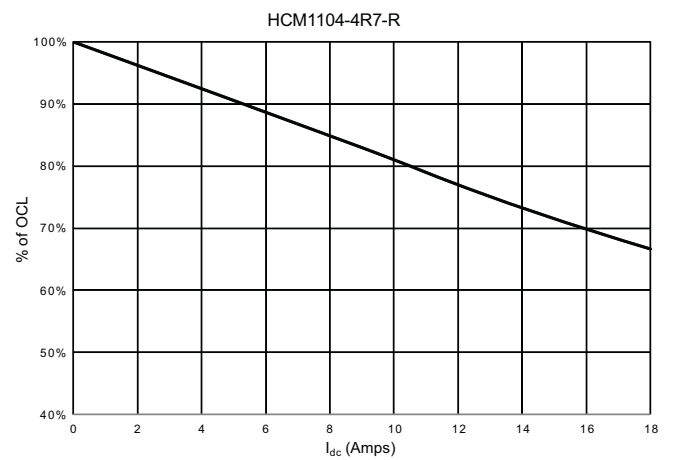
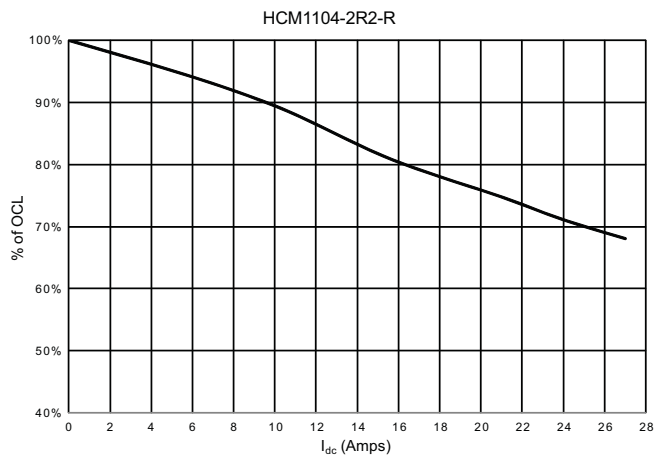
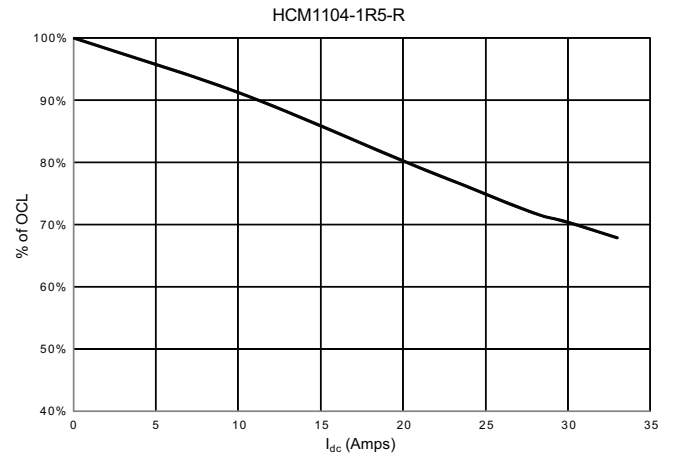
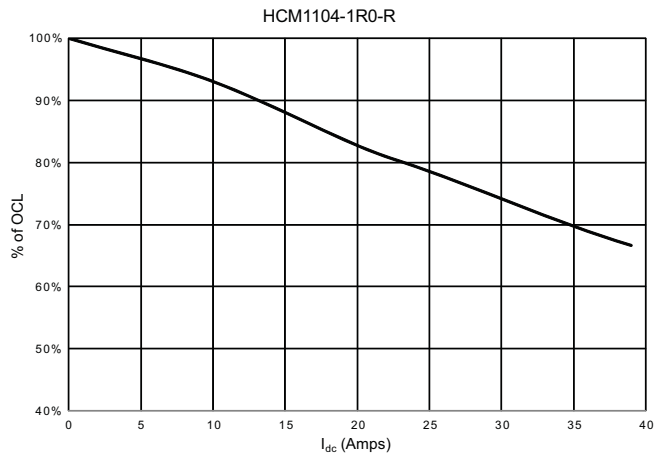
Core Loss - HCM1104-1R0-R Through HCM1104-100-R



## Inductance Characteristics



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## Solder Reflow Profile

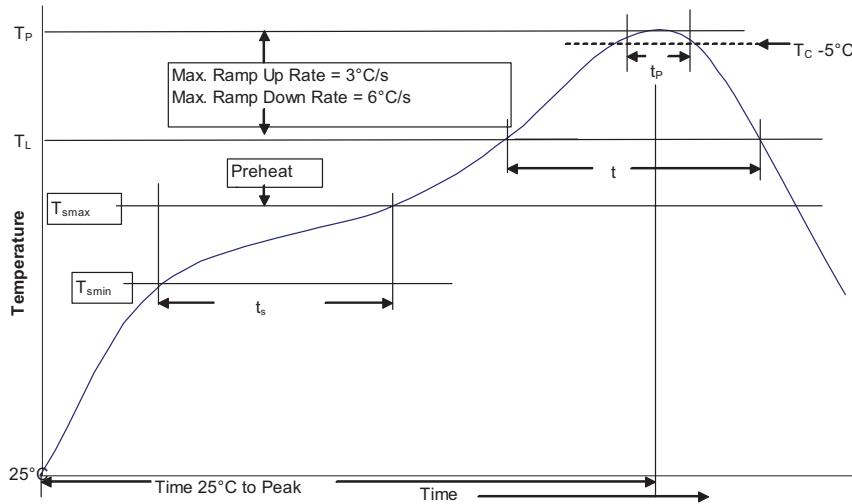


Table 1 - Standard SnPb Solder ( $T_c$ )

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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