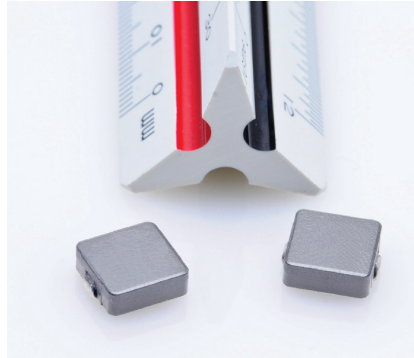


HCM1104

High current power inductors



Product features

- High current carrying capacity
- Low core losses
- Magnetically shielded, low EMI
- Frequency range up to 5 MHz
- Inductance range from 0.20 μ H to 10 μ H
- Current range from 7.5 A to 45 A
- 11.5 mm x 10.3 mm footprint surface mount package in a 4.0 mm height
- Iron powder core material

Applications

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

Environmental Data

- Storage temperature range (Component):
-55 °C to +125 °C
- Operating temperature range: -55 °C to +125 °C
(ambient plus self-temperature rise)
- Solder reflow temperature:
J-STD-020 (latest revision) compliant



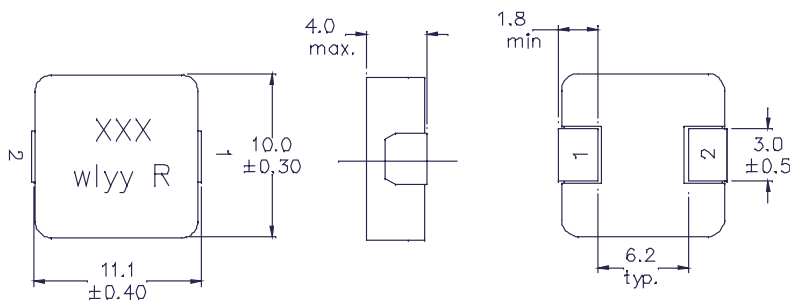
Product Specifications

Part Number ⁷	OCL ¹ (μH) $\pm 20\%$	FLL ² Min. (μH)	I_{rms} ³ (A)	I_{sat} ^{4,5} (A)	DCR (m Ω) @ +20 °C typical	DCR (m Ω) @ +20 °C maximum	K-factor ⁶
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	5.60	7.5	8.5	27.0	30.0	116

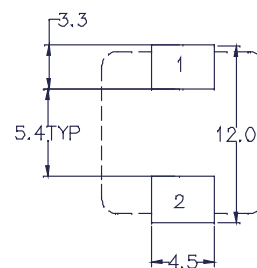
- Open Circuit Inductance (OCL) Test Parameters: 100 kHz, 0.25 V_{rms}, 0.0 Adc, +25 °C.
- Full Load Inductance (FLL) Test Parameters: 100 kHz, 0.25 V_{rms}, I_{sat}' @ +25 °C.
- I_{rms}: DC current for an approximate temperature rise of 40 °C without core loss. Derating is necessary for AC currents. 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.
- I_{sat}: Peak current for approximately 20% rolloff at +25 °C- HCM1104-R20-R to HCM1104-R90-R.

- I_{sat}: Peak current for approximately 30% rolloff at +25 °C- HCM1104-1R0-R to HCM 1104-100-R.
- K-factor: Used to determine B_{pp} for core loss (see graph). B_{pp} = K * L * Δ I. B_{pp}: (Gauss), K: (K-factor from table), L: (Inductance in μH), Δ I (Peak to peak ripple current in amps).
- Part Number Definition: HCM1104-yyy-R
- HCM1104 = Product code and size
yyy= Inductance value in μH , R = decimal point, if no R is present then third character equals number of zeros.
"-R" suffix = RoHS compliant

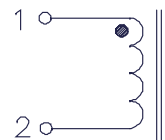
Dimensions - mm



Recommended pad layout



Schematic



Part marking: xxx = inductance value in μH , R = decimal point, if no R is present, third character equals number of zeros, wlyy = date code, R = revision level

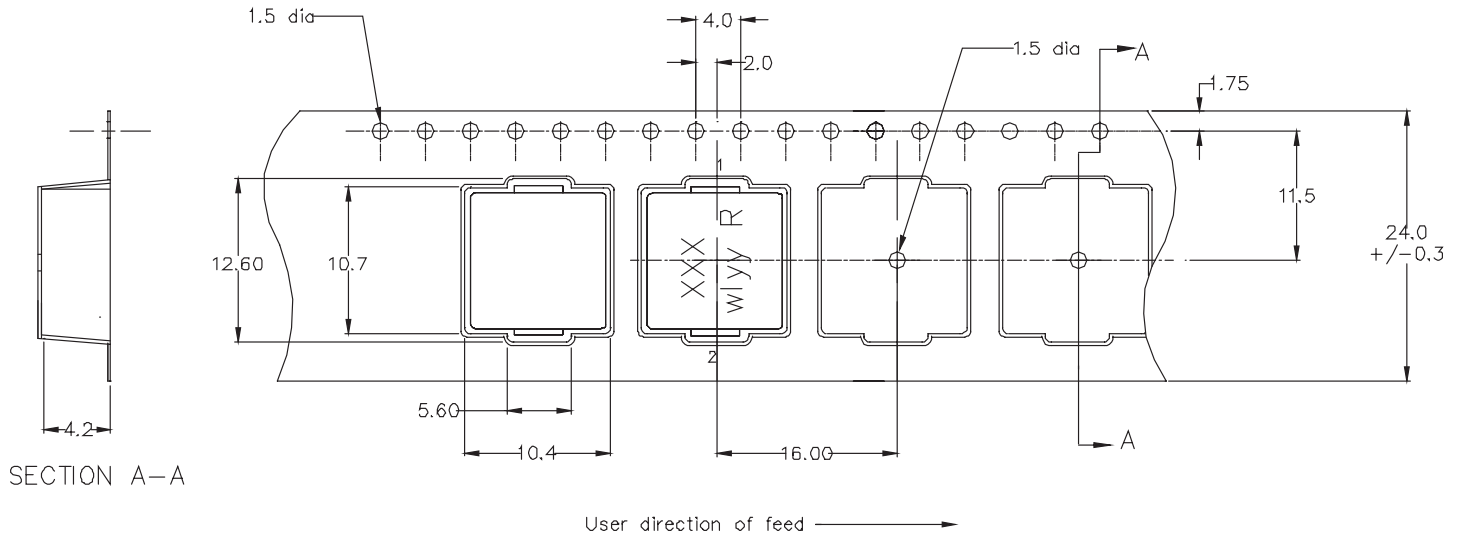
All soldering surfaces to be coplanar within 0.10 millimeters

Tolerances are ± 0.3 millimeters unless stated otherwise

Color: Grey

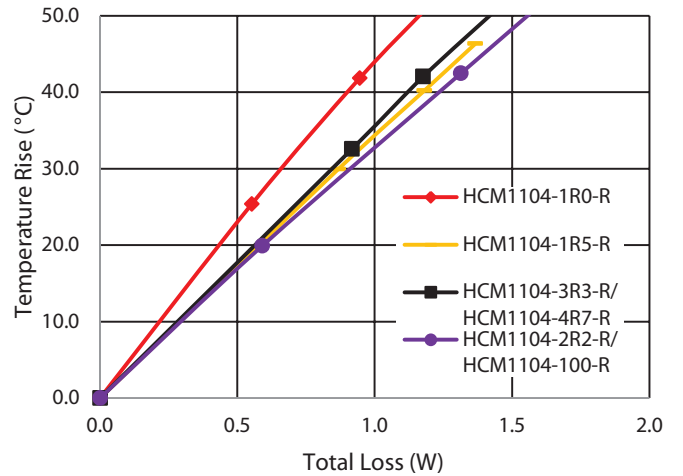
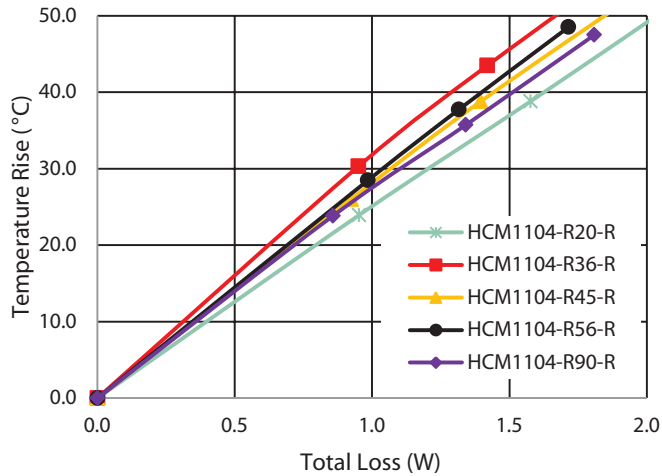
Do not route traces or vias underneath the inductor

Packaging information - mm



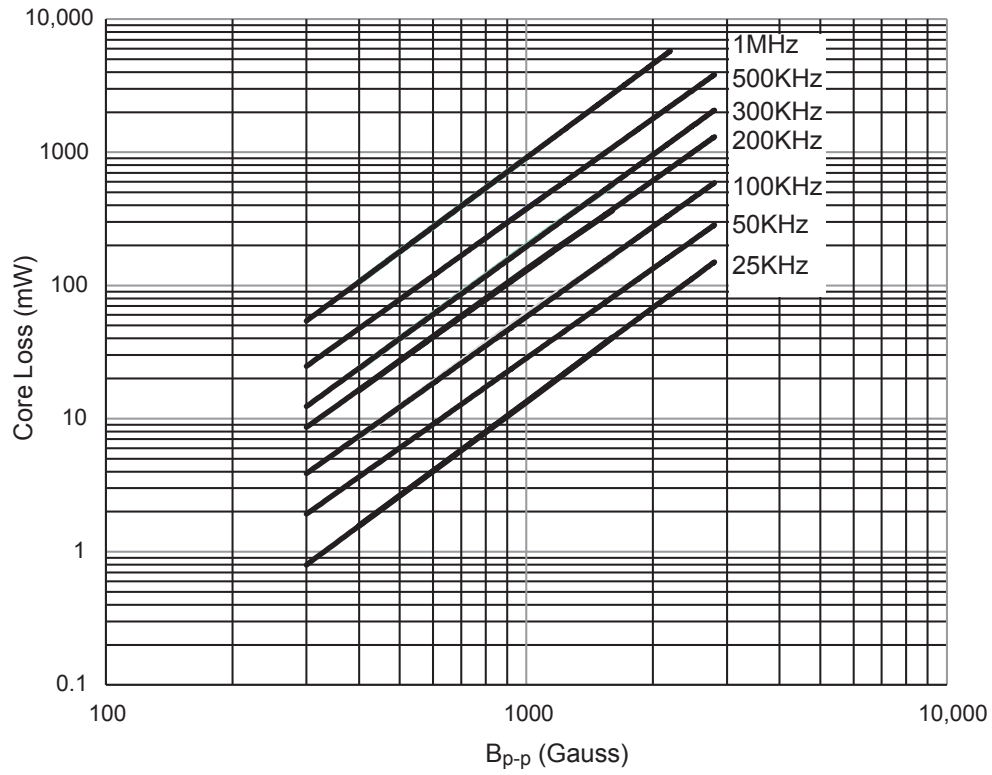
Supplied in tape and reel packaging, 850 parts per 13" diameter reel.

Temperature rise vs. total loss

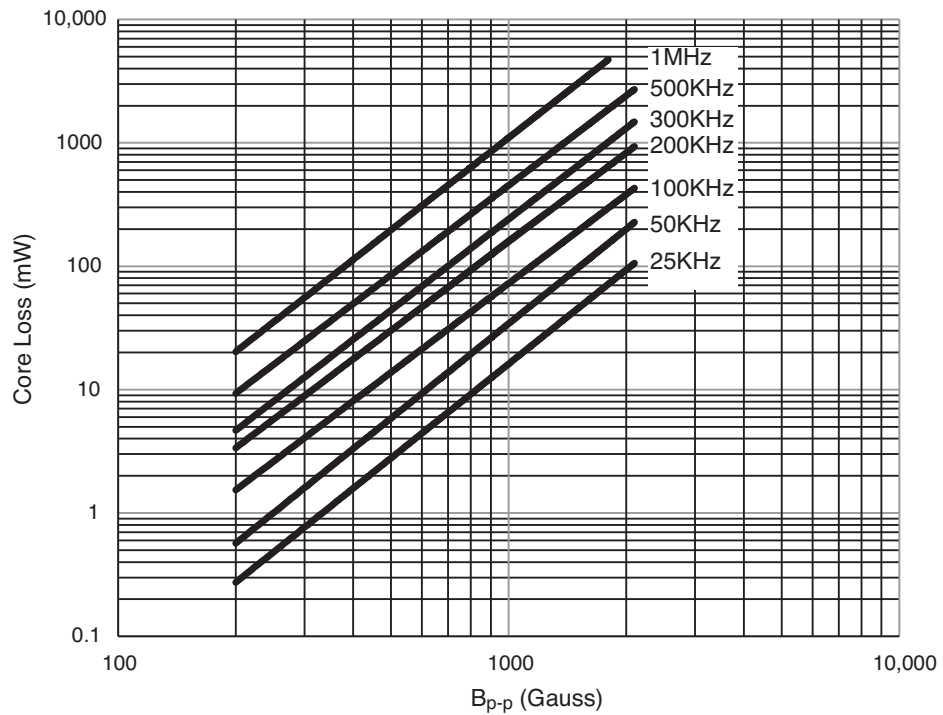


Core loss vs. B_{p-p}

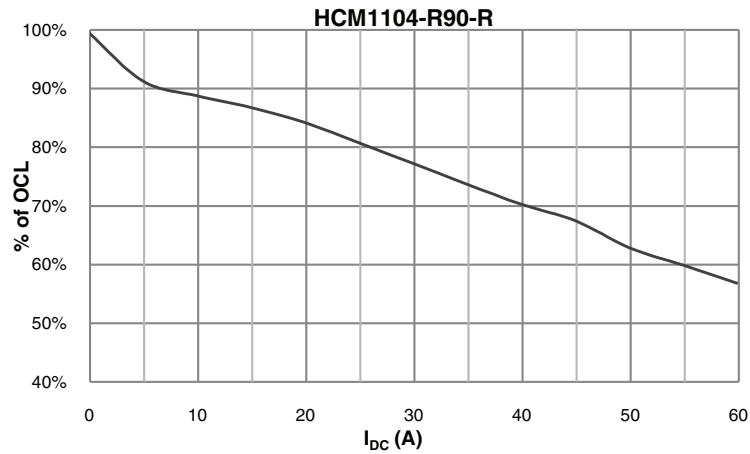
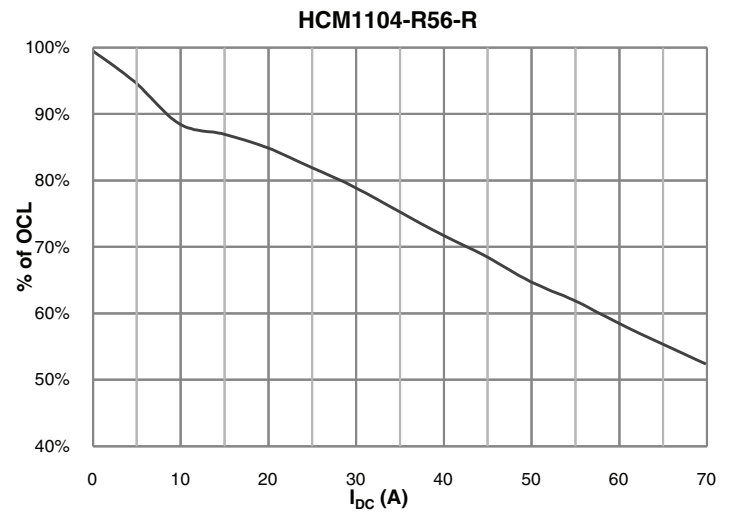
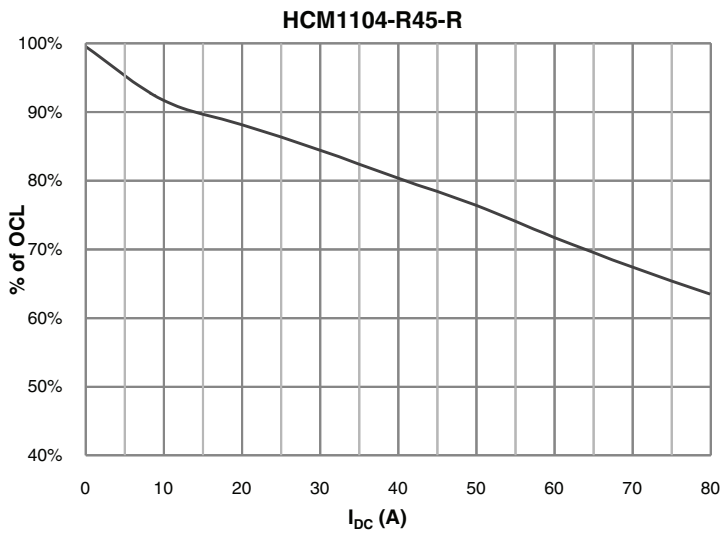
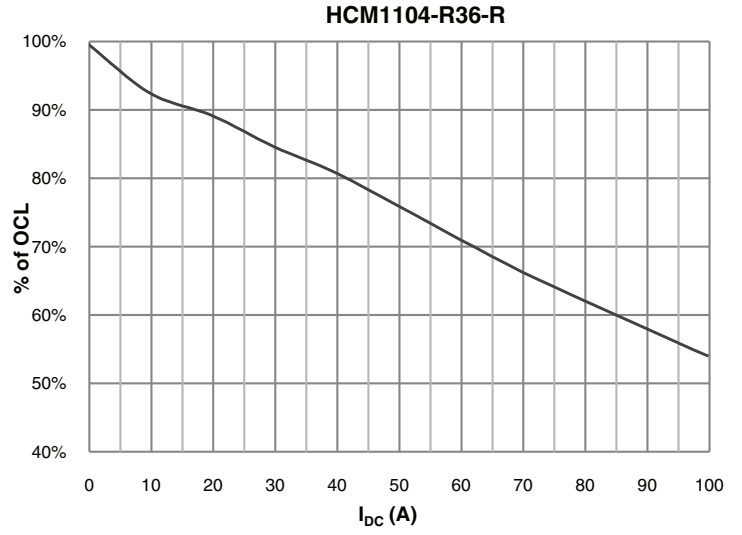
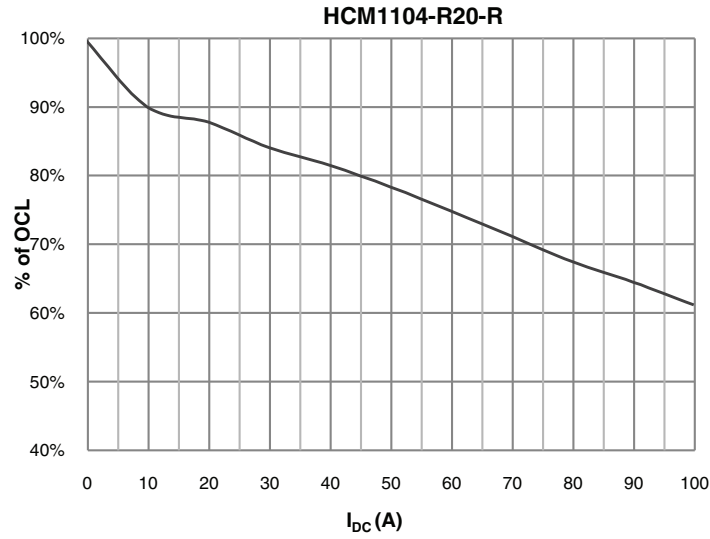
HCM1104-R20-R to HCM1104-R90-R



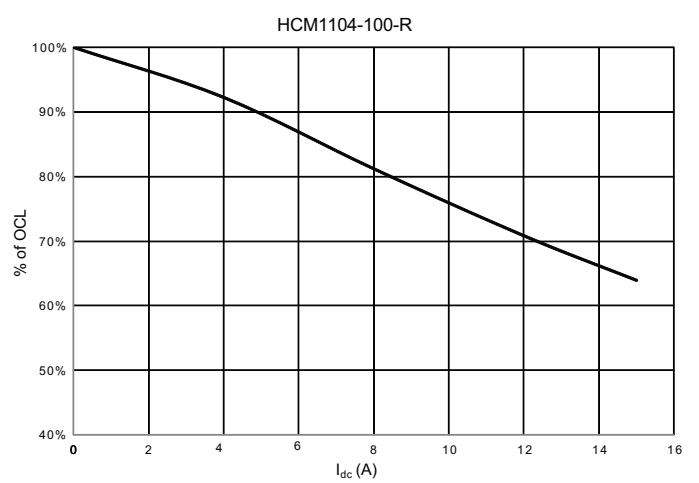
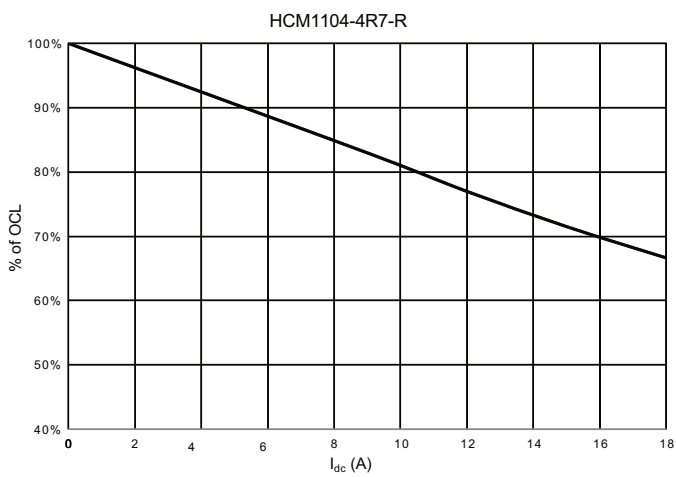
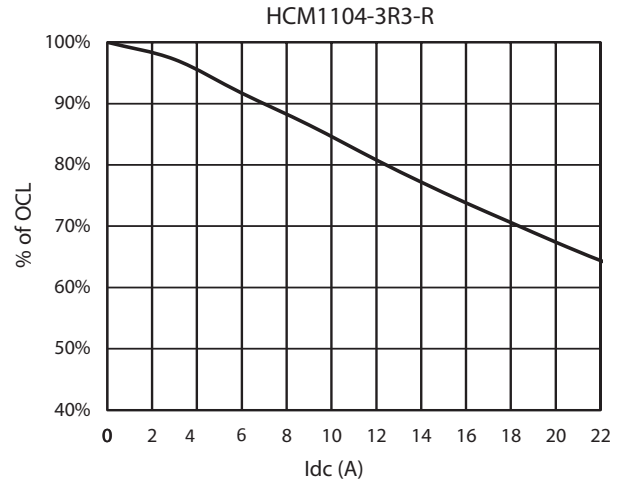
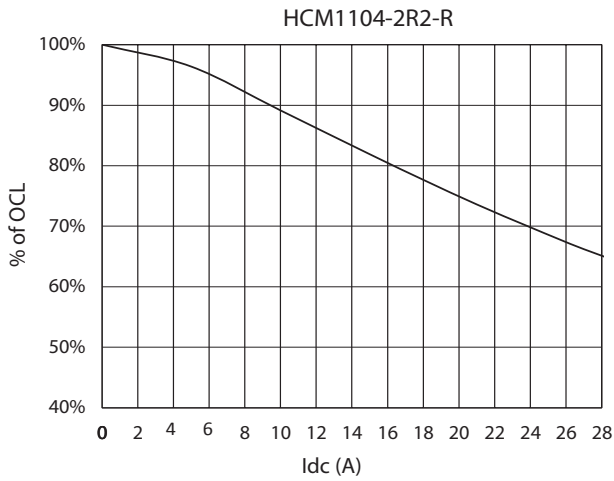
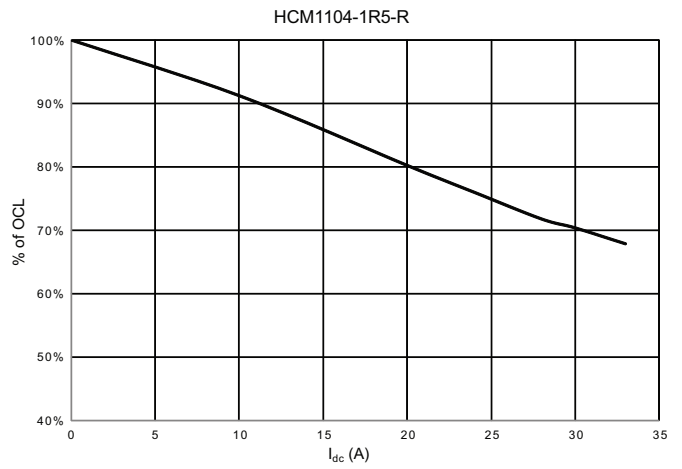
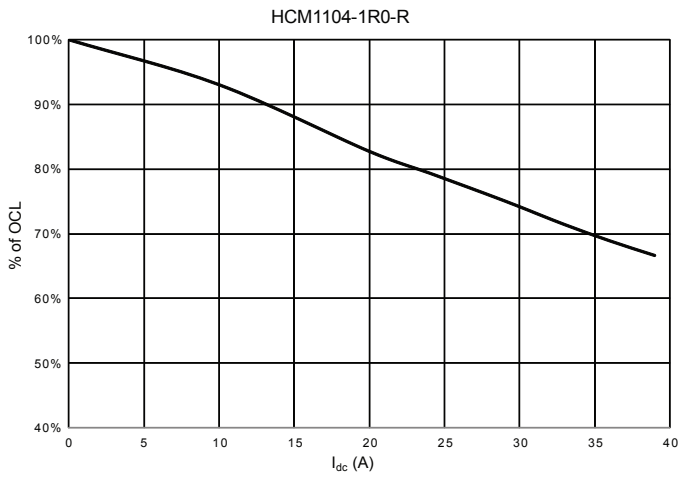
HCM1104-1R0-R to HCM1104-100-R



Inductance characteristics



Inductance characteristics



Solder Reflow Profile

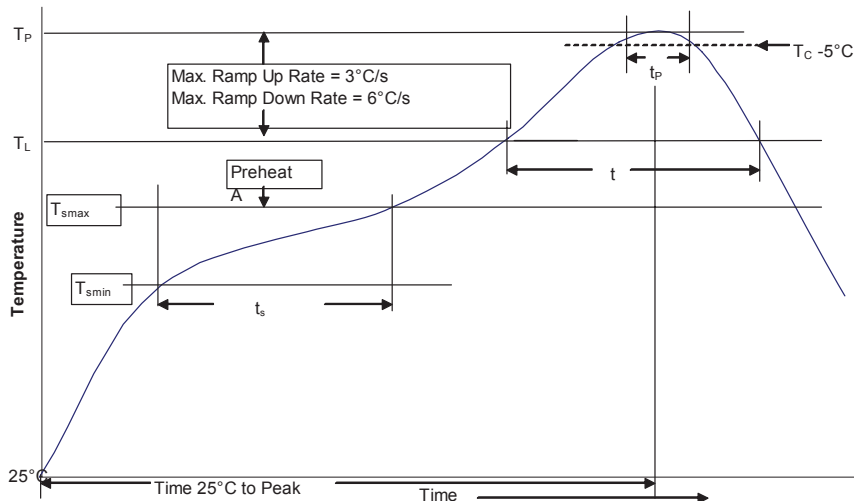


Table 1 - Standard SnPb Solder (T_C)

Package Thickness	Volume mm^3 <350	Volume mm^3 ≥ 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 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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