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Coiltronics HCMA1104 Series

Automotive grade
high current power inductors



Product description

- AEC-Q200 grade 3 qualified
- High current carrying capacity
- Low core losses
- Magnetically shielded, low EMI
- Frequency range up to 5MHz
- Inductance range from 0.20μH to 10μH
- Current range from 7.5A to 45A
- 11.5x10.3mm footprint surface mount package in a 4.0mm height
- Powder iron core material
- Halogen free, lead free, RoHS compliant

Applications

- Body electronics
 - Central body control module
 - Vehicle access control system
 - Headlamps, tail lamps and interior lighting
 - Heating Ventilation and Air Conditioning controllers (HVAC)
 - Doors, window lift and seat control
- Advanced driver assistance systems
 - Adaptive cruise control (ACC)
 - Automatic parking control
 - Collision avoidance system
 - Car black box system
- Infotainment and cluster electronics
 - Audio subsystem: head unit and trunk amp
 - Digital instrument cluster
 - In-Vehicle Infotainment (IVI) and navigation
- Chassis and safety electronics
 - Airbag control unit
 - Electronic Stability Control system (ESC)
 - Electric parking brake

Environmental data

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



The Coiltronics brand of magnetics (formerly of the Bussmann Division of Cooper Industries) is now part of Eaton's Electrical Group, Electronics Division.

Coiltronics is now part of Eaton
Same great products plus even more.



Powering Business Worldwide

Product specifications

| Part Number ⁷ | OCL ¹ (μH) $\pm 20\%$ | FLL ² Min. (μH) | I_{rms} ³ (amps) | I_{sat} ^{4,5} @25°C (amps) | DCR (m Ω) @ 20°C typical | DCR (m Ω) @ 20°C maximum | K-factor ⁶ |
|--------------------------|--|--|---|--|--|--|-----------------------|
| HCMA1104-R20-R | 0.20 | 0.13 | 32 | 45 | 0.63 | 0.72 | 411 |
| HCMA1104-R36-R | 0.36 | 0.23 | 30 | 42 | 1.04 | 1.20 | 269 |
| HCMA1104-R45-R | 0.45 | 0.29 | 29 | 36 | 1.07 | 1.23 | 219 |
| HCMA1104-R56-R | 0.56 | 0.36 | 25 | 32 | 1.56 | 1.80 | 230 |
| HCMA1104-R90-R | 0.90 | 0.58 | 22 | 28 | 2.17 | 2.50 | 236 |
| HCMA1104-1R0-R | 1.0 | 0.56 | 18 | 28 | 3.00 | 3.30 | 378 |
| HCMA1104-1R5-R | 1.5 | 0.84 | 16 | 32 | 3.80 | 4.20 | 310 |
| HCMA1104-2R2-R | 2.2 | 1.23 | 12 | 18 | 6.00 | 7.00 | 253 |
| HCMA1104-3R3-R | 3.3 | 1.85 | 10 | 16 | 10.8 | 11.8 | 220 |
| HCMA1104-4R7-R | 4.7 | 2.63 | 8.5 | 15 | 17.0 | 20.0 | 175 |
| HCMA1104-100-R | 10 | 5.60 | 7.5 | 8.5 | 27.0 | 30.0 | 116 |

1. Open Circuit Inductance (OCL) Test Parameters: 100kHz, 0.25V_{rms}, 0.0Adc, +25°C.

2. Full Load Inductance (FLL) Test Parameters: 100kHz, 0.25V_{rms}, I_{sat} @ +25°C.

3. 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.

4. I_{sat} : Peak current for approximately 20% rolloff at +25°C- HCMA1104-R20-R to HCMA1104-R90-R.

5. I_{sat} : Peak current for approximately 30% rolloff at +25°C- HCMA1104-1R0-R to HCMA1104-100-R.

6. K-factor: Used to determine B_{pp} for core loss (see graph). $B_{\text{pp}} = K * L * \Delta I$. B_{pp} : (Gauss), K: (K-factor from table), L: (Inductance in μH), ΔI (Peak to peak ripple current in amps).

7. Part Number Definition: HCMA1104-yyy-R

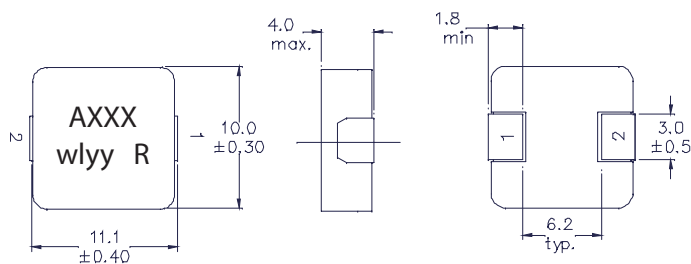
- HCMA1104 = Product code and size

- yyy= Inductance value in μH , R = decimal point,

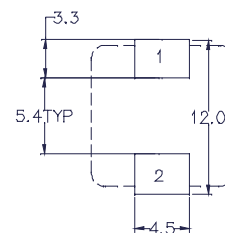
if no R is present then third character = number of zeros.

- "-R" suffix = RoHS compliant

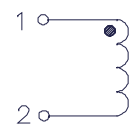
Dimensions - mm



Recommended pad layout

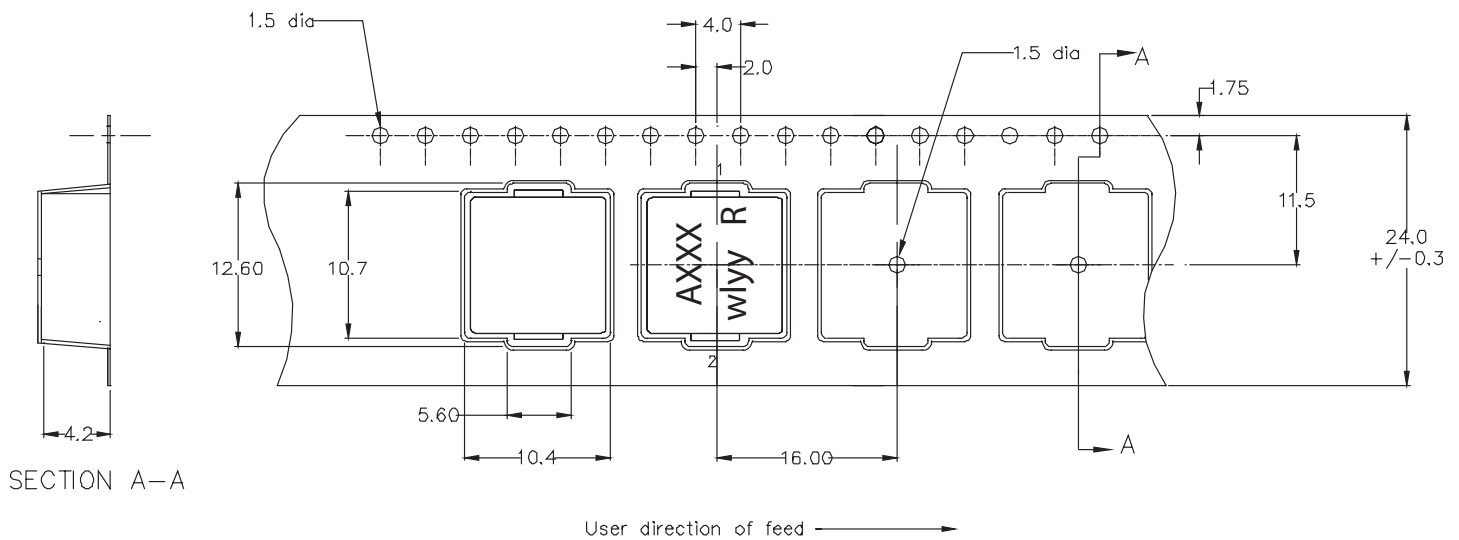


Schematic



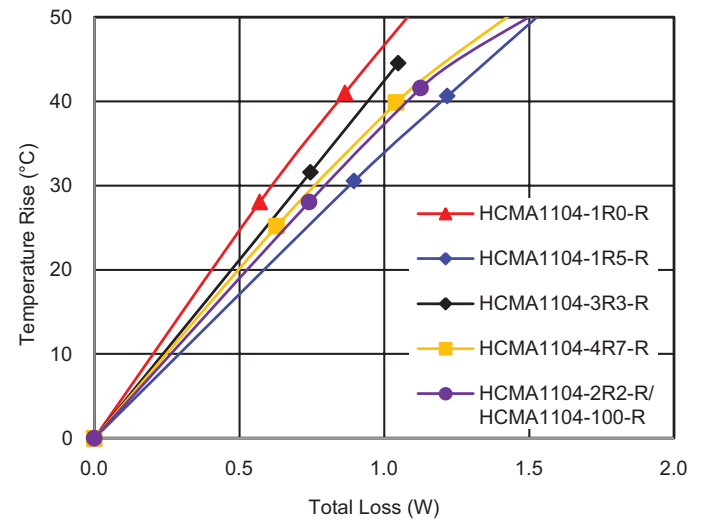
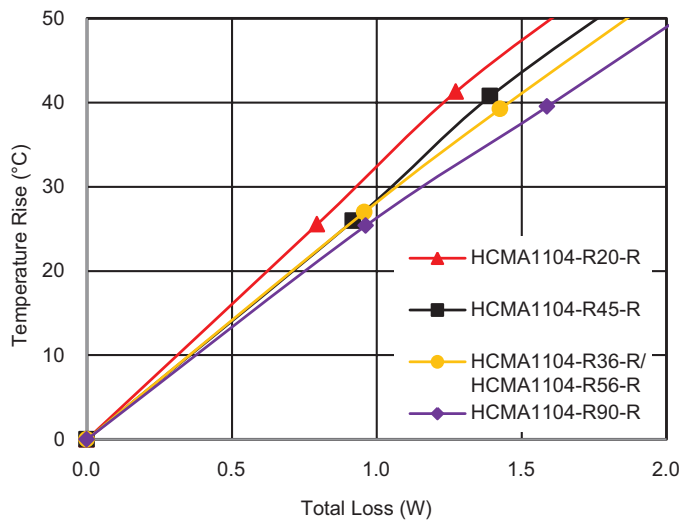
Part marking: A = automotive grade, xxx = inductance value in μH , R = decimal point, if no R is present, third character = number of zeros, wlyy = date code, R = revision level
All soldering surfaces to be coplanar within 0.10 millimeters
Tolerances are ± 0.3 millimeters unless stated otherwise
Color: Grey

Packaging information - mm



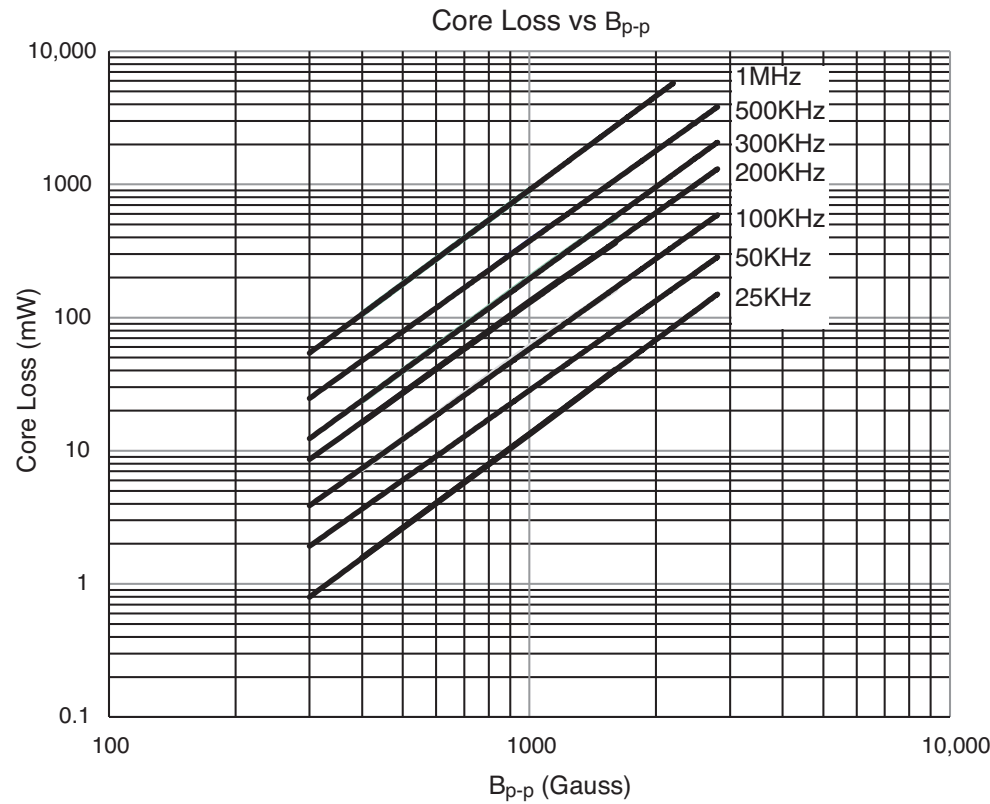
Supplied in tape and reel packaging, 850 parts per 13" diameter reel.

Temperature rise vs. total loss

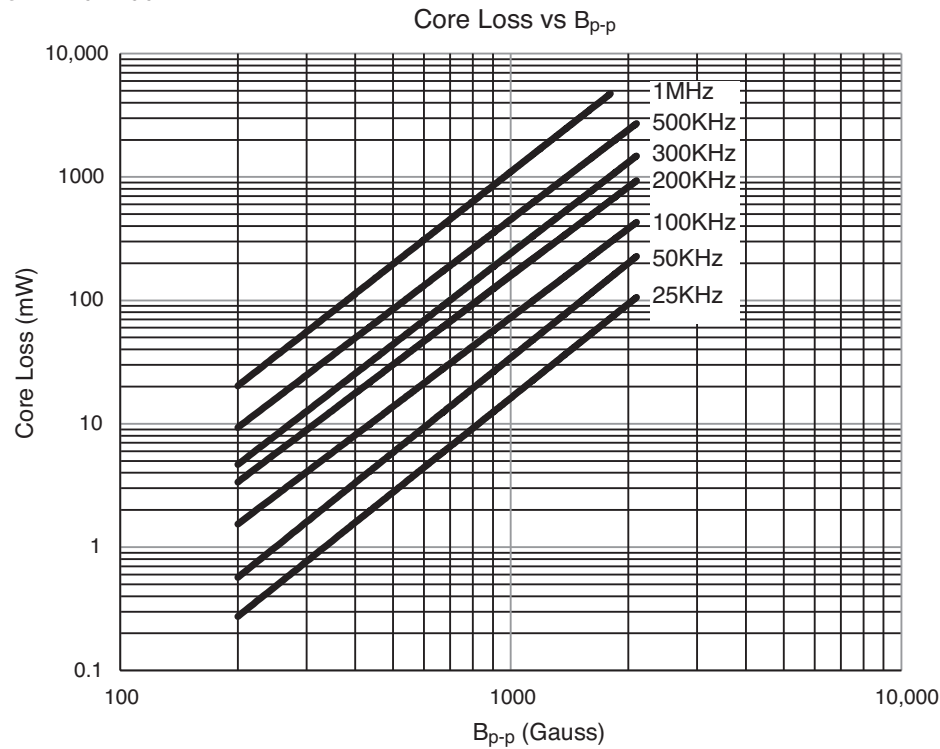


Core loss

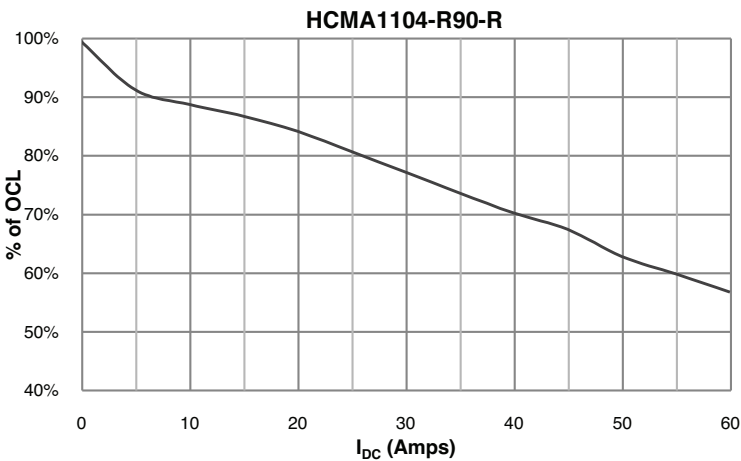
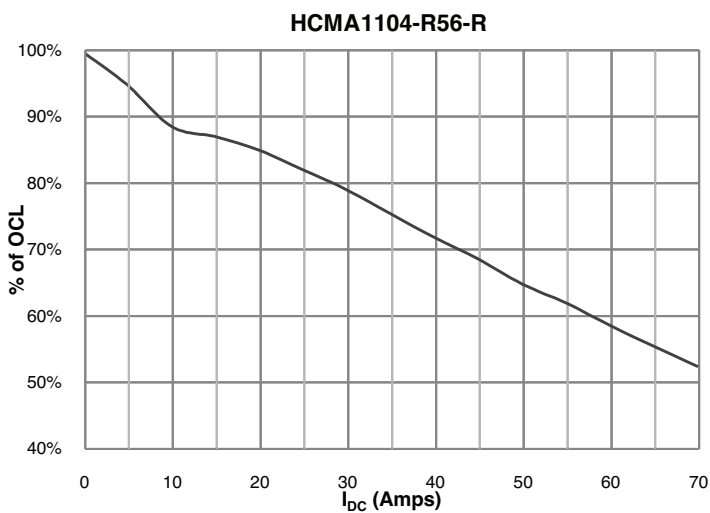
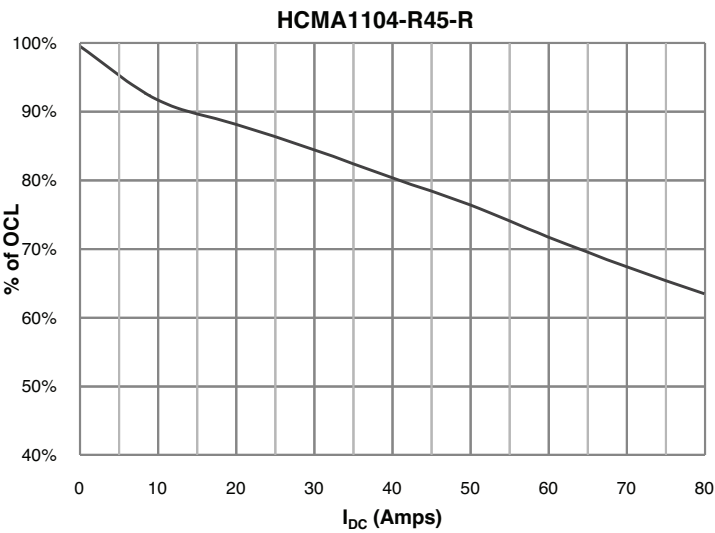
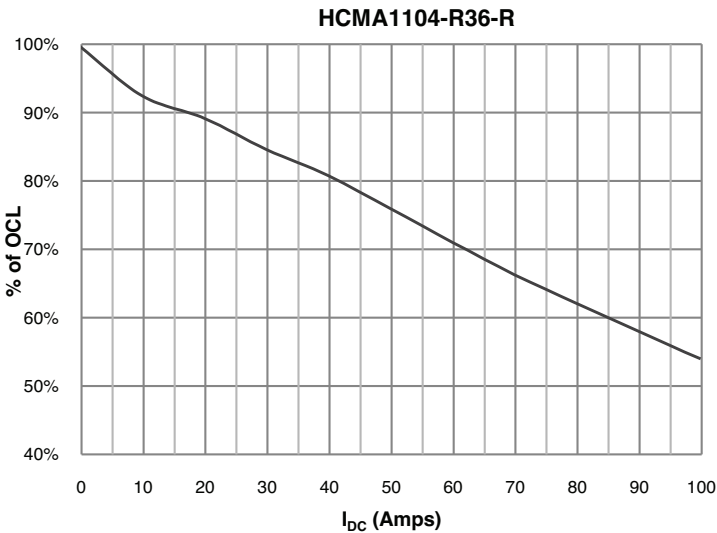
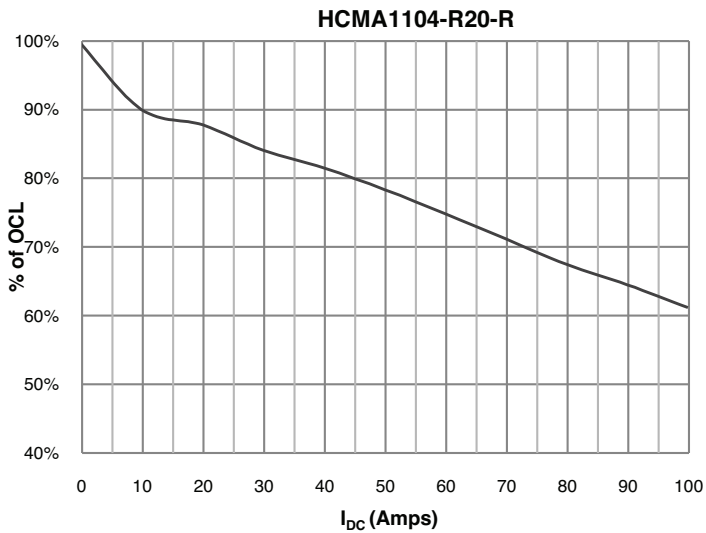
HCMA1104-R20-R to HCMA1104-R90-R



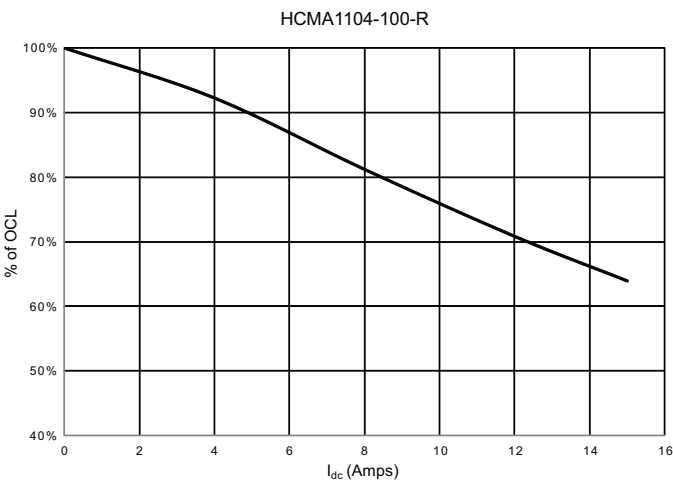
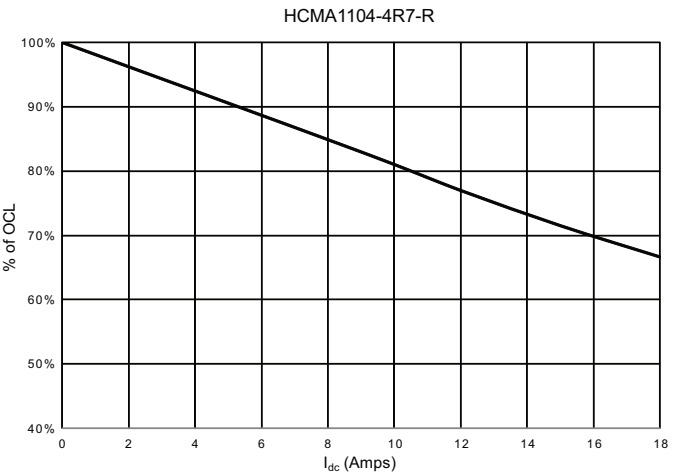
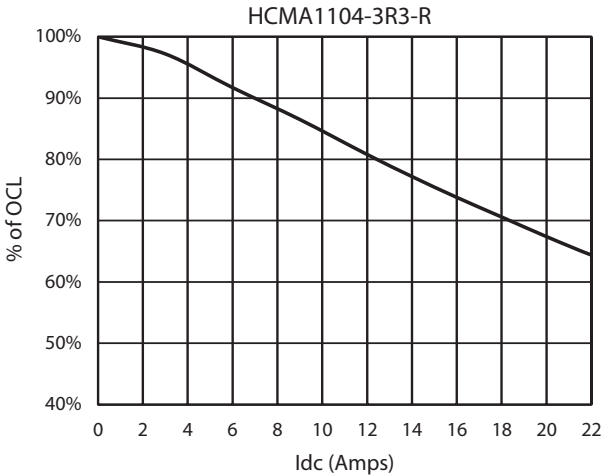
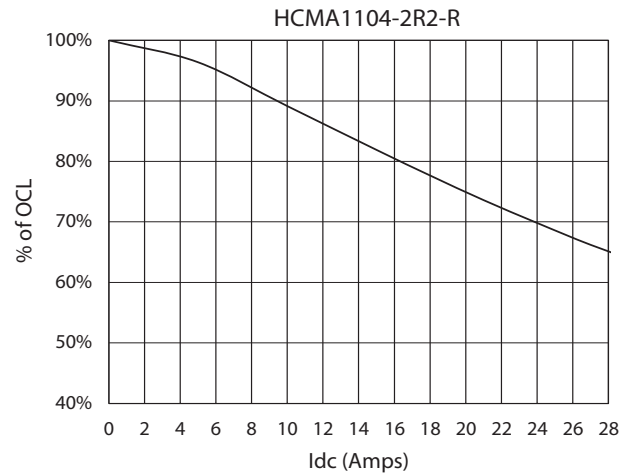
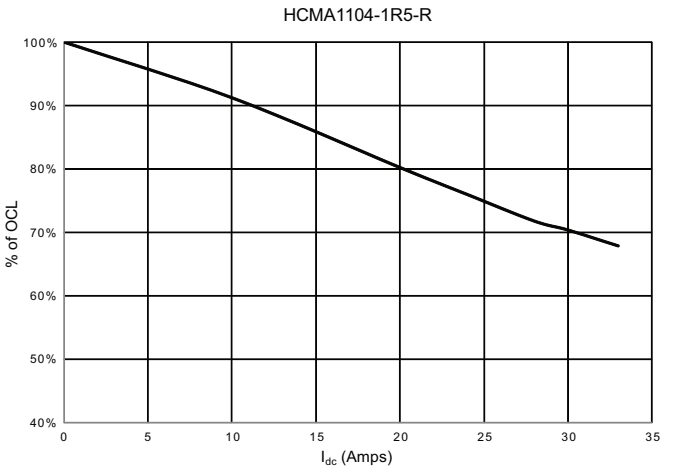
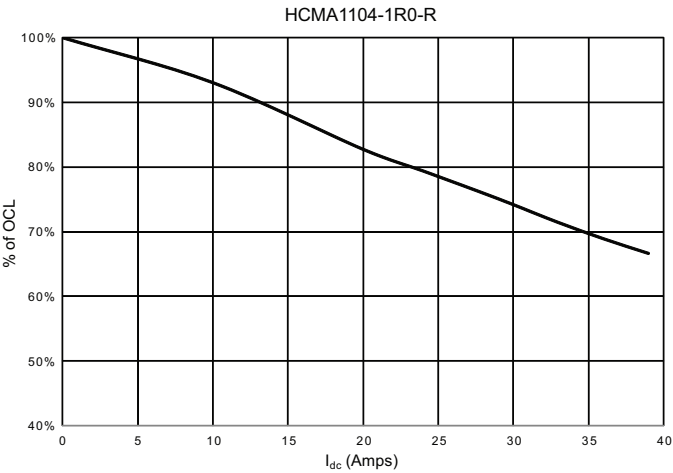
HCMA1104-1R0-R to HCMA1104-100-R



Inductance characteristics



Inductance characteristics



Solder reflow profile

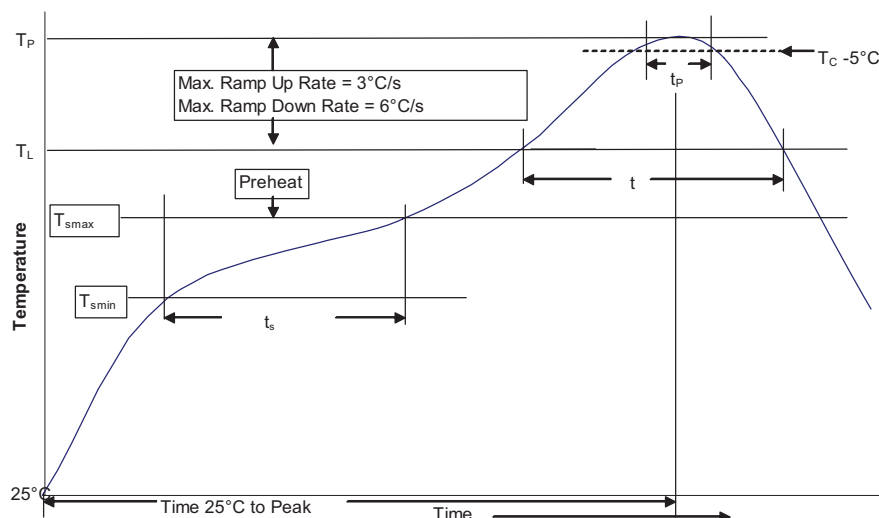


Table 1 - Standard SnPb Solder (T_c)

| Package Thickness | Volume mm^3 <350 | Volume mm^3 ≥ 350 |
|-------------------|--------------------|--------------------------|
| <2.5mm | 235°C | 220°C |
| $\geq 2.5mm$ | 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-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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Publication No. 10349 — BU-SB14815
December 2014

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