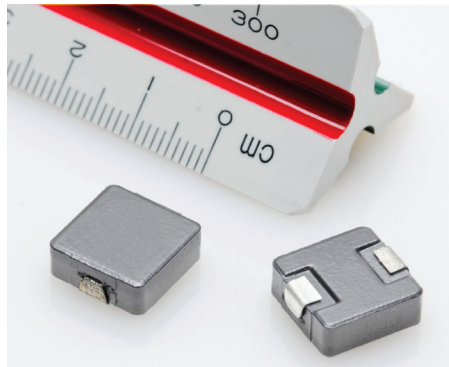


HCMA1305

Automotive grade High current power inductors



Product features

- AEC-Q200 qualified
- High current carrying capacity
- Low core losses
- Magnetically shielded, low EMI
- Frequency range up to 5 MHz
- Inductance range from 0.1 μH to 33 μH
- Current range from 5.2 A to 118 A
- 13.8 mm x 12.5 mm footprint surface mount package in a 5.0 mm height
- Iron powder core material

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
 - Basic and smart surround, and rear and front view camera
 - 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
 - Electronic Power Steering (EPS)

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



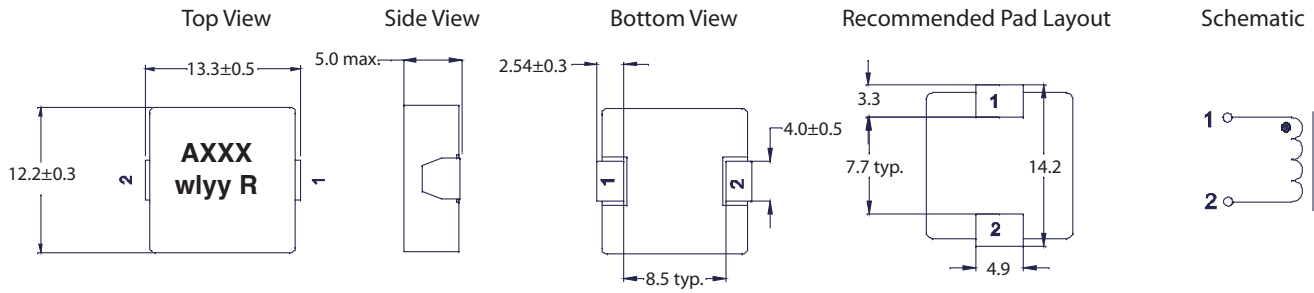
Product Specifications

| Part Number ⁶ | OCL ¹ (μH) \pm 20% | FLL ² Min. (μH) | I_{rms}^3 (A) | I_{sat}^4 (A) | DCR (m Ω) @ +20 °C nominal | DCR (m Ω) @ +20 °C maximum | K-factor ⁵ |
|--------------------------|---|--|---------------------------|---------------------------|--|--|-----------------------|
| HCMA1305-R10-R | 0.10 | 0.064 | 55 | 118 | 0.52 | 0.59 | 848 |
| HCMA1305-R22-R | 0.22 | 0.14 | 51 | 110 | 0.63 | 0.72 | 843 |
| HCMA1305-R33-R | 0.33 | 0.21 | 42 | 80 | 0.80 | 0.92 | 506 |
| HCMA1305-R47-R | 0.47 | 0.30 | 38 | 65 | 0.80 | 0.92 | 506 |
| HCMA1305-R56-R | 0.56 | 0.36 | 36 | 55 | 1.15 | 1.33 | 500 |
| HCMA1305-R68-R | 0.68 | 0.44 | 34 | 54 | 1.15 | 1.33 | 500 |
| HCMA1305-R82-R | 0.82 | 0.52 | 31 | 53 | 1.40 | 1.61 | 358 |
| HCMA1305-1R0-R | 1.00 | 0.64 | 29 | 50 | 2.10 | 2.42 | 275 |
| HCMA1305-1R5-R | 1.50 | 0.96 | 23 | 48 | 2.75 | 3.16 | 225 |
| HCMA1305-1R8-R | 1.80 | 1.15 | 21 | 40 | 4.00 | 4.60 | 216 |
| HCMA1305-2R2-R | 2.20 | 1.41 | 20 | 32 | 4.60 | 5.29 | 191 |
| HCMA1305-3R3-R | 3.30 | 2.11 | 15 | 32 | 7.70 | 9.20 | 170 |
| HCMA1305-4R7-R | 4.70 | 3.01 | 12 | 27 | 11.0 | 12.7 | 161 |
| HCMA1305-5R6-R | 5.60 | 3.58 | 11.5 | 22 | 12.0 | 13.8 | 142 |
| HCMA1305-6R8-R | 6.80 | 4.35 | 11 | 21 | 13.0 | 15.0 | 129 |
| HCMA1305-7R8-R | 7.80 | 4.99 | 10 | 18.5 | 16.8 | 19.4 | 117 |
| HCMA1305-8R2-R | 8.20 | 5.25 | 9.5 | 18 | 17.5 | 20.1 | 117 |
| HCMA1305-100-R | 10.0 | 6.40 | 9.0 | 16 | 19.0 | 21.9 | 90 |
| HCMA1305-150-R | 15.0 | 9.60 | 7.7 | 13 | 29.0 | 33.4 | 74 |
| HCMA1305-220-R | 22.0 | 14.1 | 6.2 | 10 | 45.0 | 51.8 | 63 |
| HCMA1305-330-R | 33.0 | 21.1 | 5.2 | 8 | 74.5 | 85.5 | 48 |

1. Open Circuit Inductance (OCL) Test Parameters: 100 kHz, 0.25 V_{rms} , 0.0 Adc, +25 °C.
2. Full Load Inductance (FLL) Test Parameters: 100 kHz, 0.25 V_{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.
5. 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).
6. Part Number Definition: HCMA1305-yyy-R
- HCMA1305 = 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

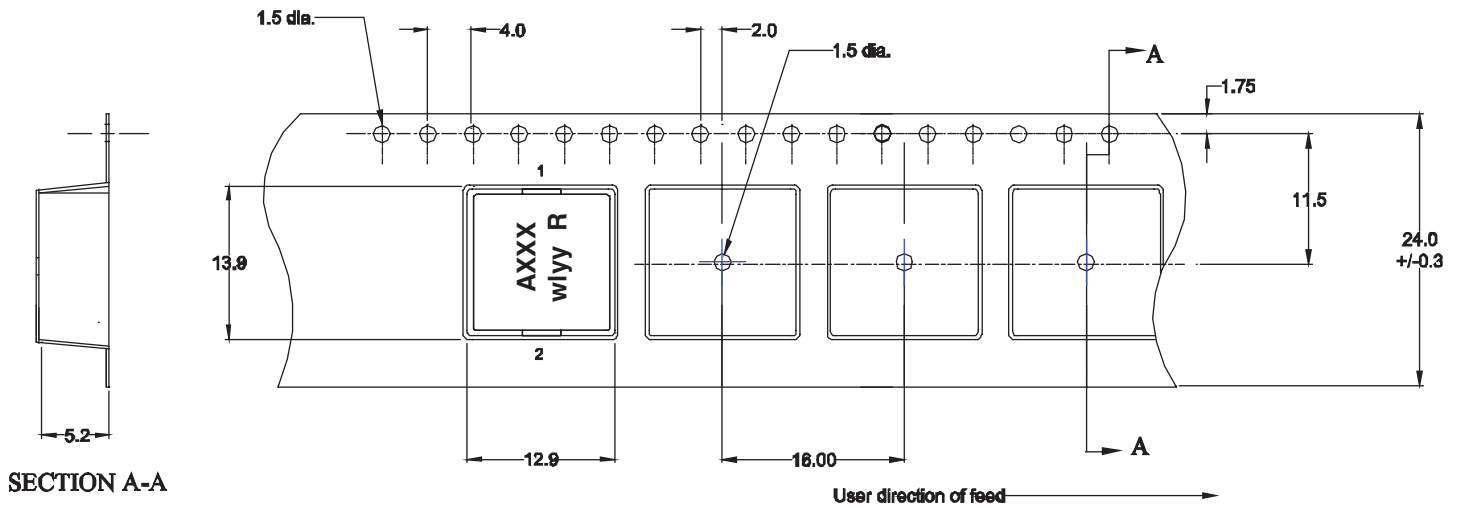
Dimensions- mm



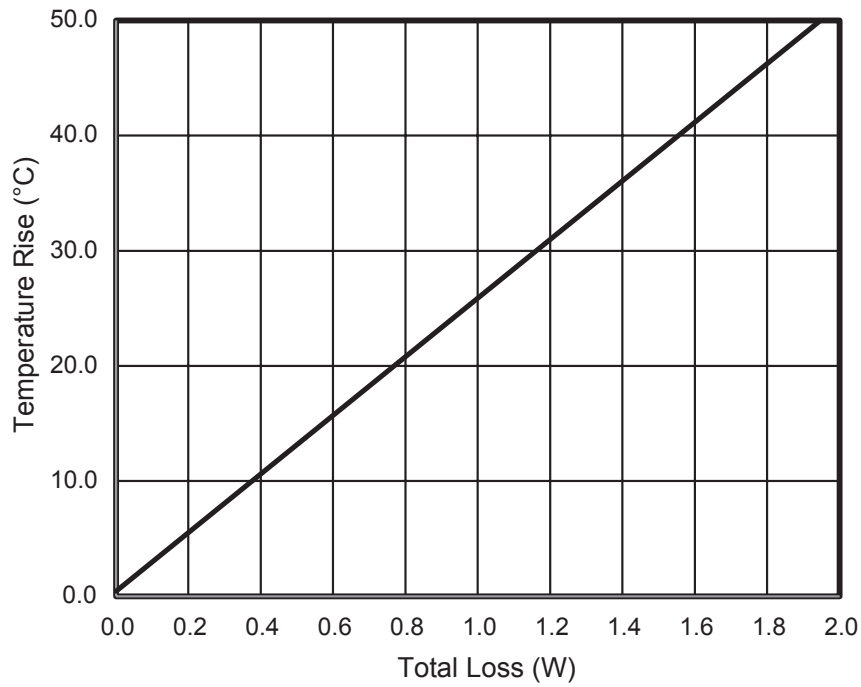
Part Marking: A = Automotive grade, xxx = Inductance value in μH , R = decimal point, if no R is present, third character equals number of zeros, wlyy = (Date Code), R = (Revision Level) All soldering surfaces to be coplanar within 0.10 millimeters.
Tolerances are ± 0.3 millimeters unless stated otherwise.
Color: Grey.
Do not route traces or vias underneath the inductor

Packaging information- mm

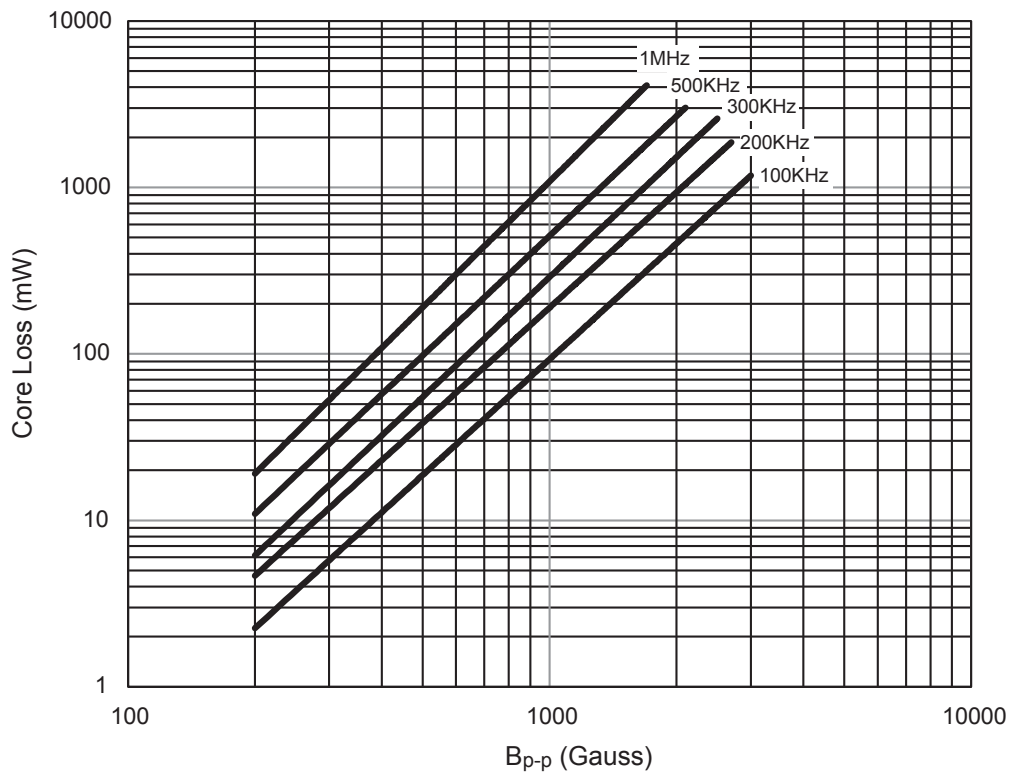
Drawing not to scale
Supplied in tape and reel packaging , 400 parts per 13" diameter reel



Temperature rise vs. total loss

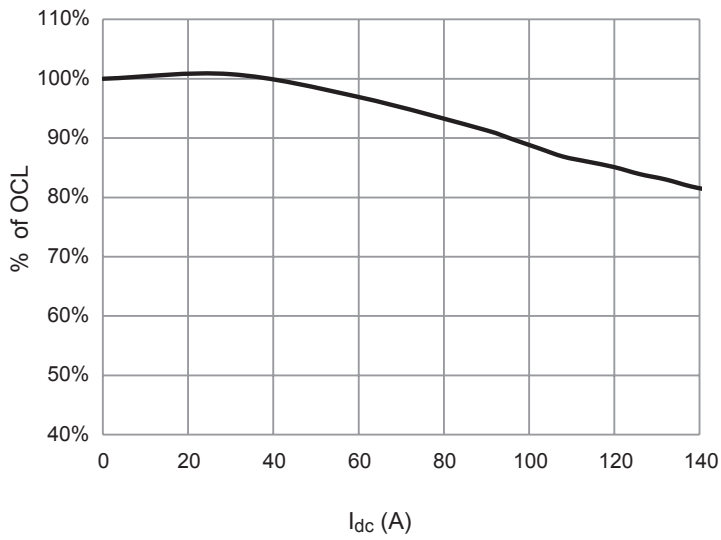


Core loss vs B_{p-p}

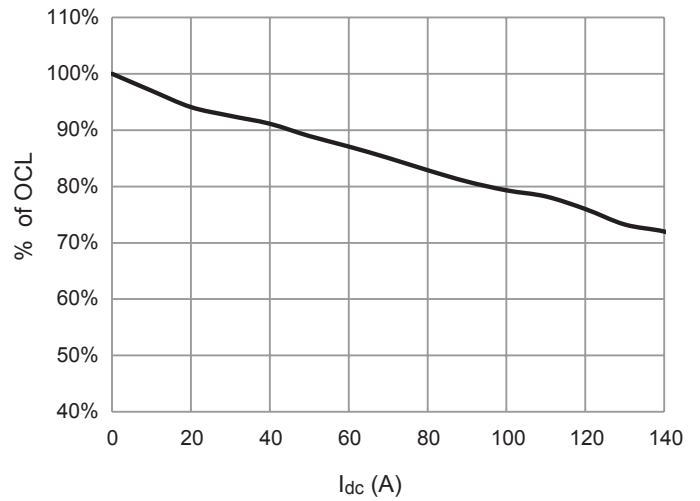


Inductance characteristics

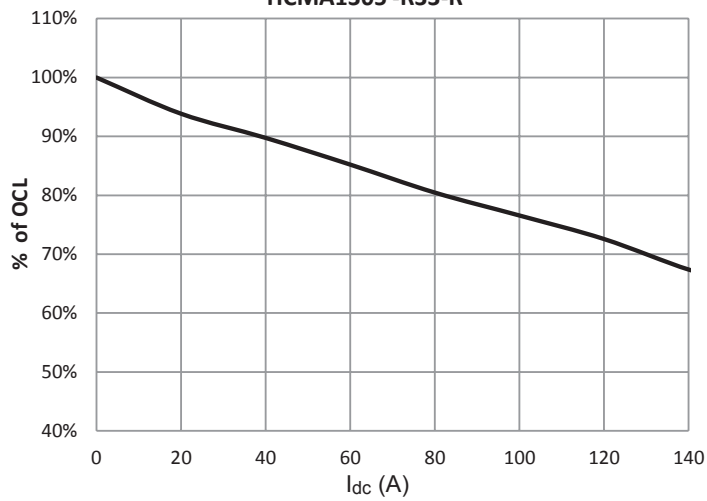
HCMA1305-R10-R



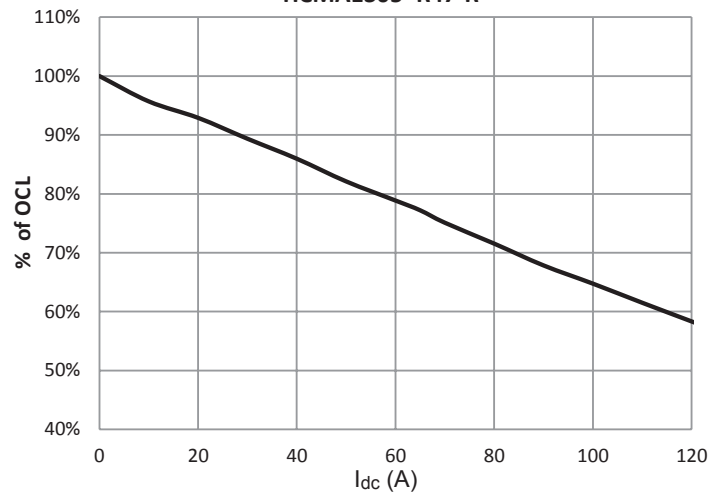
HCMA1305-R22-R



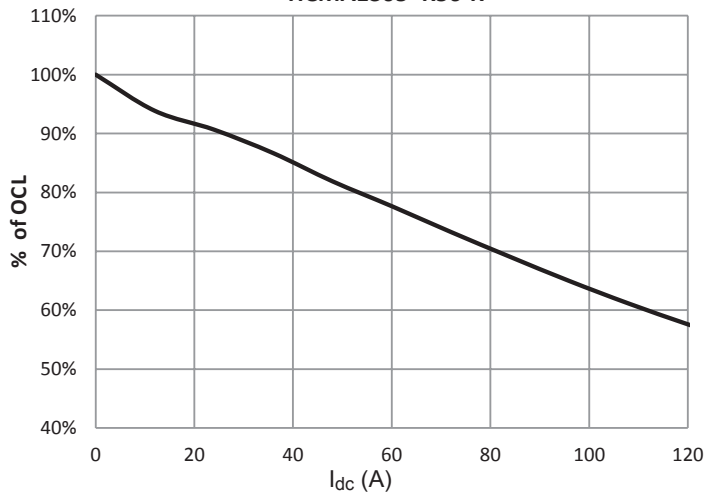
HCMA1305 -R33-R



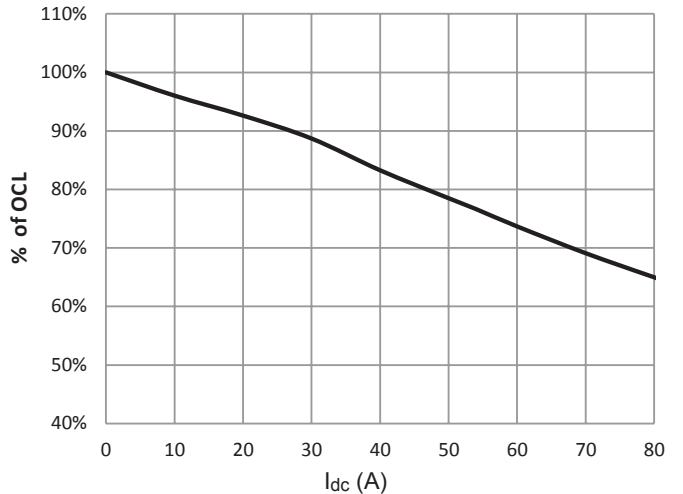
HCMA1305 -R47-R



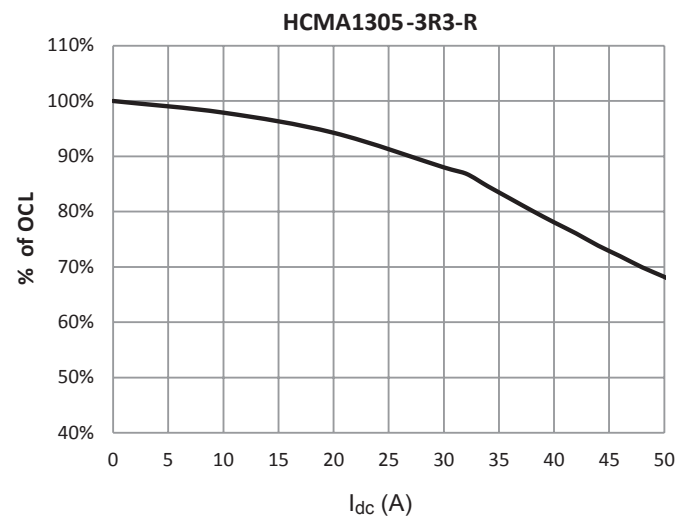
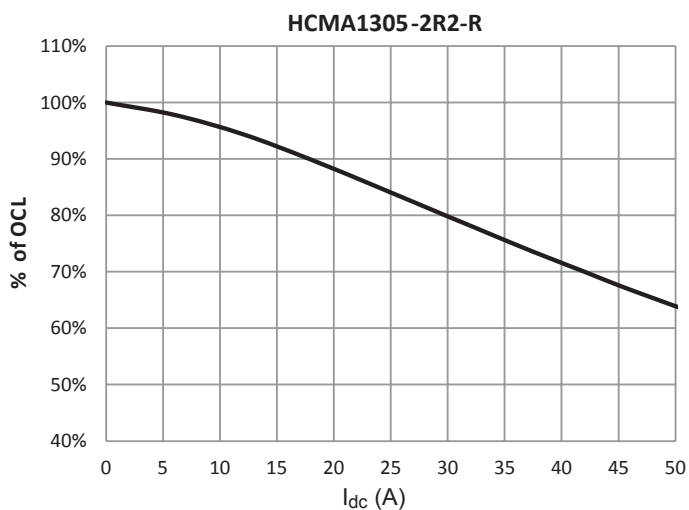
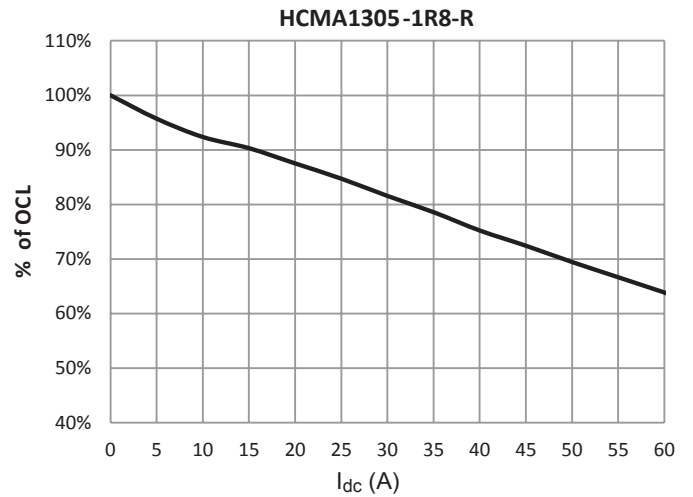
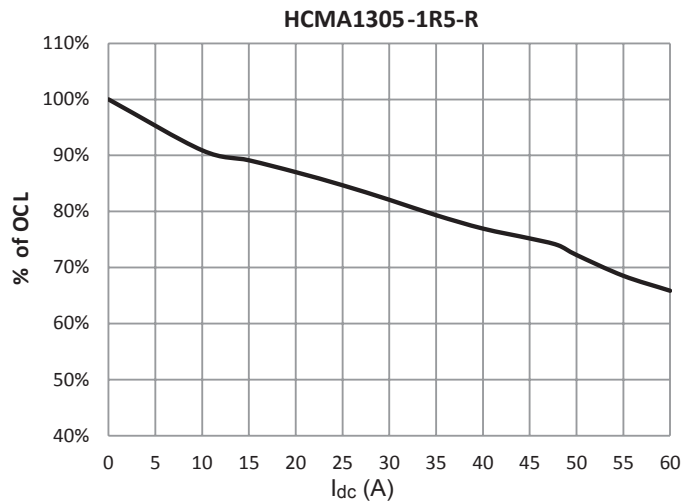
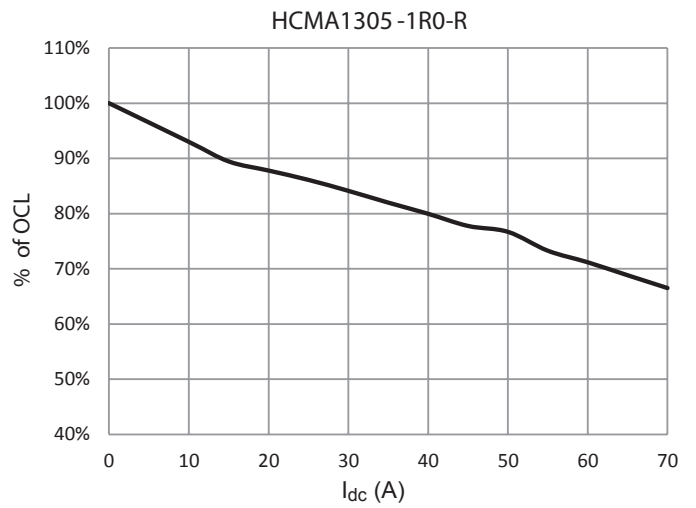
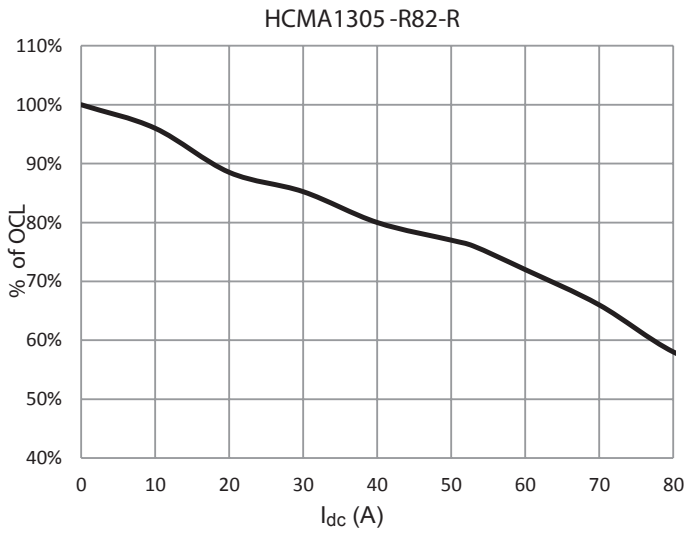
HCMA1305 -R56-R



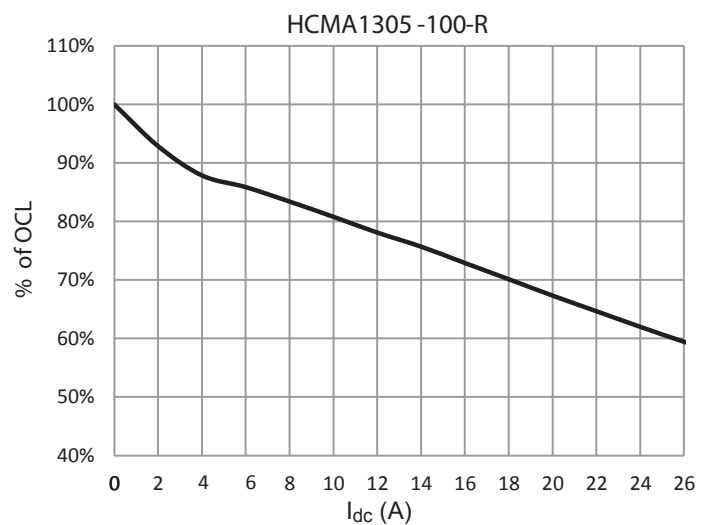
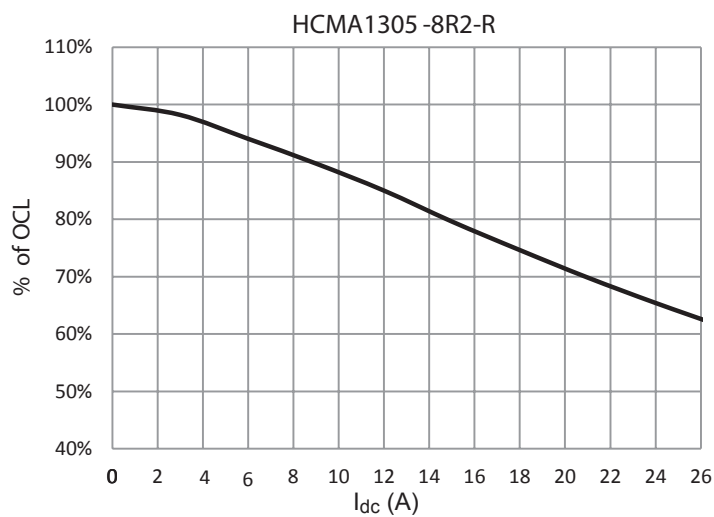
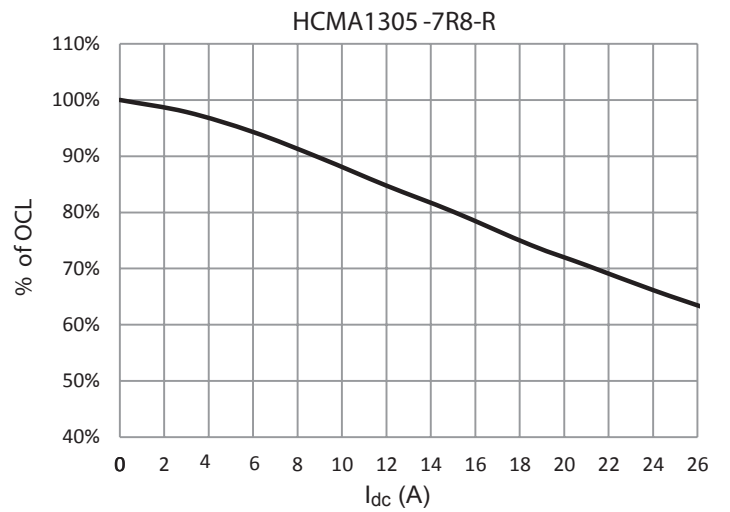
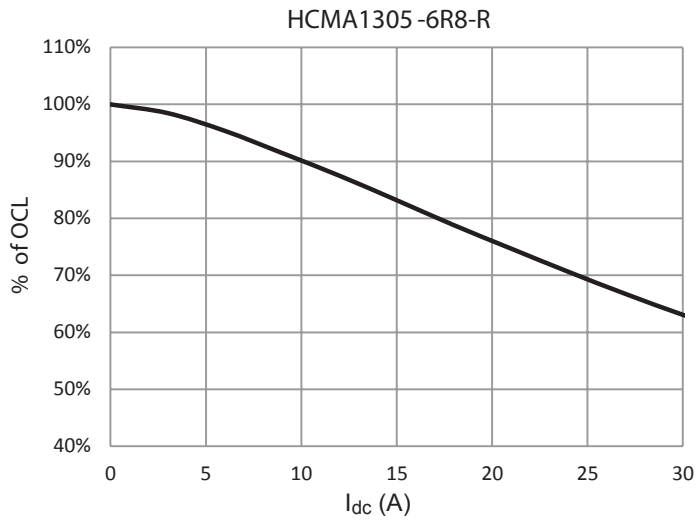
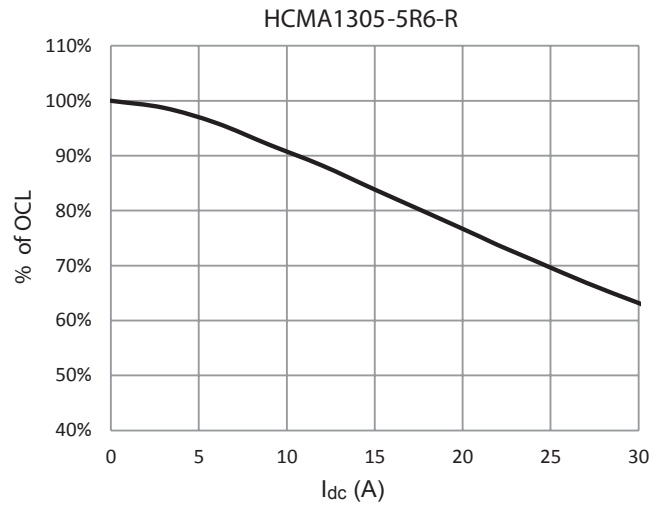
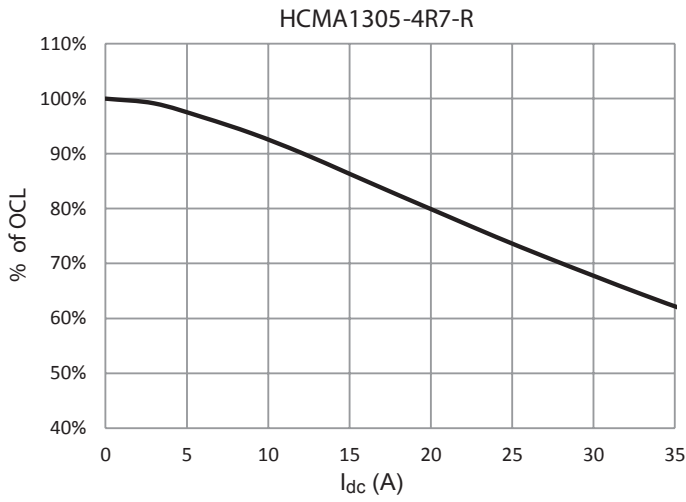
HCMA1305 -R68-R



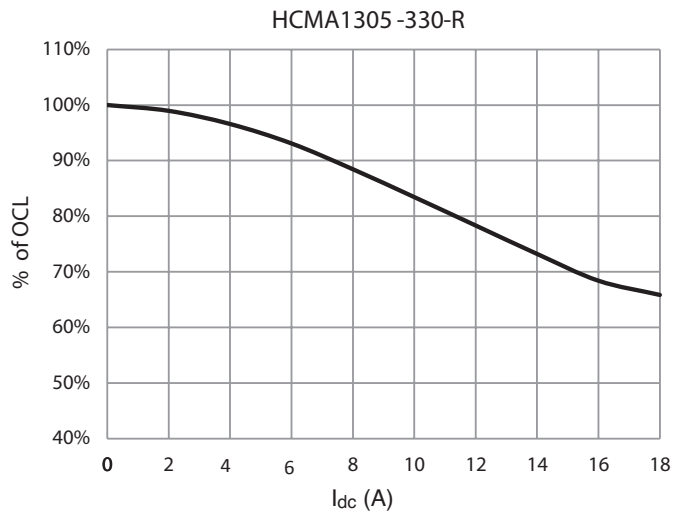
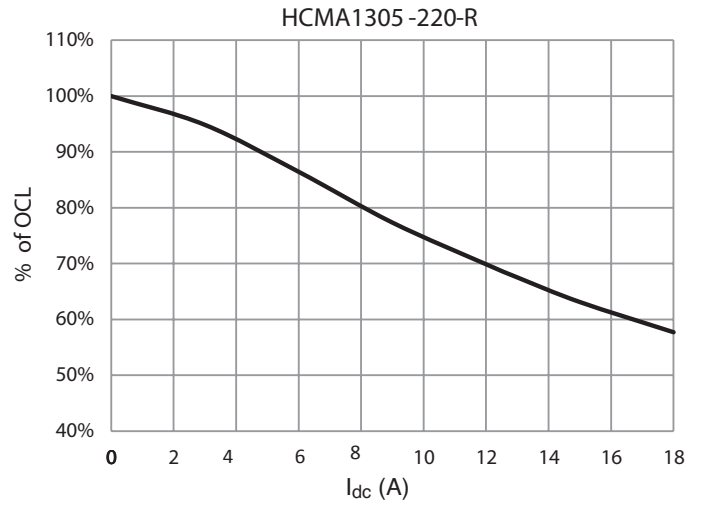
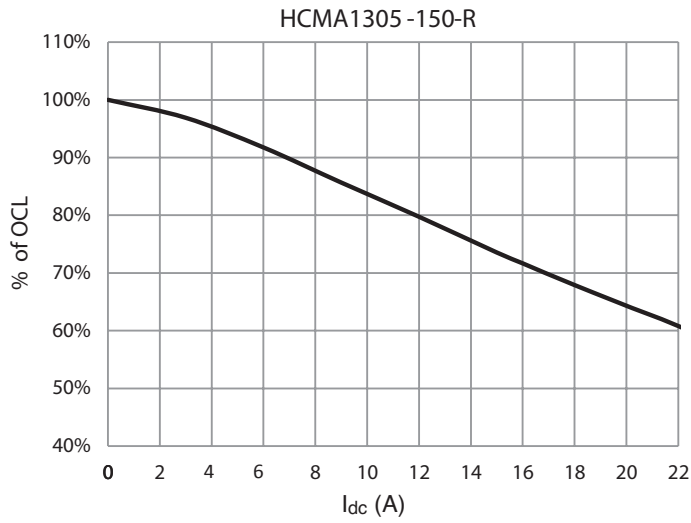
Inductance characteristics



Inductance characteristics



Inductance characteristics



Solder reflow profile

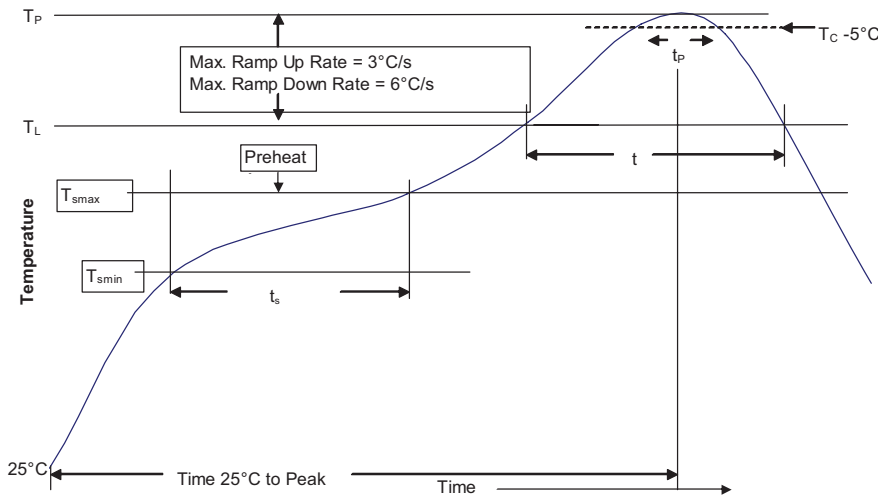


Table 1 - Standard SnPb Solder (T_c)

| Package Thickness | Volume mm ³ <350 | Volume mm ³ ≥350 |
|-------------------|-----------------------------|-----------------------------|
| <2.5mm) | 235°C | 220°C |
| ≥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-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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Eaton
Electronics Division
1000 Eaton Boulevard
Cleveland, OH 44122
United States
www.eaton.com/electronics

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