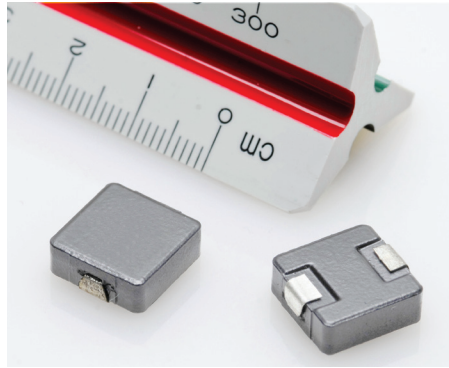


# HCMA1305

## 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  $\mu$ H to 33  $\mu$ H
- 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



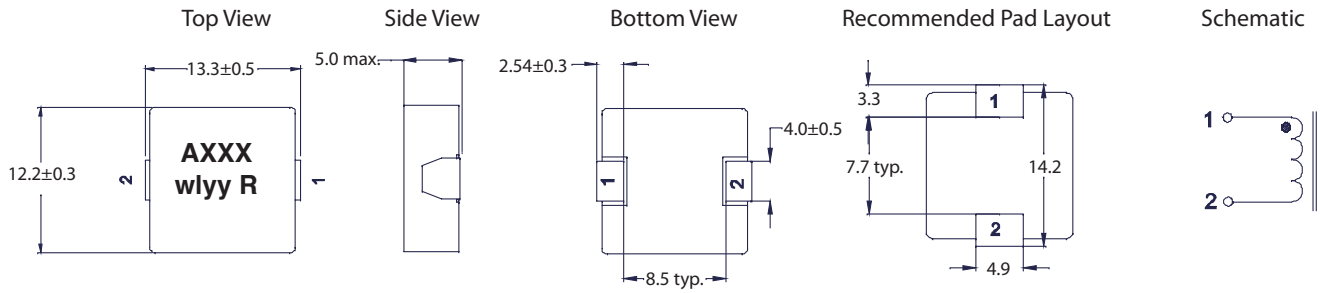
Product Specifications

Part Number <sup>6</sup>	OCL <sup>1</sup> ( $\mu\text{H}$ ) $\pm$ 20%	FLL <sup>2</sup> Min. ( $\mu\text{H}$ )	$I_{\text{rms}}^3$ (A)	$I_{\text{sat}}^4$ (A)	DCR (m $\Omega$ ) @ +20 °C nominal	DCR (m $\Omega$ ) @ +20 °C maximum	K-factor <sup>5</sup>
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  $V_{\text{rms}}$ , 0.0 Adc, +25 °C.
2. Full Load Inductance (FLL) Test Parameters: 100 kHz, 0.25  $V_{\text{rms}}$ ,  $I_{\text{sat}}$  @ +25 °C.
3.  $I_{\text{rms}}$ : 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.  $I_{\text{sat}}$ : Peak current for approximately 20% rolloff at +25 °C.
5. K-factor: Used to determine  $B_{\text{pp}}$  for core loss (see graph).  $B_{\text{pp}} = K * L * \Delta I$ .  
 $B_{\text{pp}}$ : (Gauss), K: (K-factor from table), L: (Inductance in  $\mu\text{H}$ ),  $\Delta I$  (Peak to peak ripple current in amps).
6. Part Number Definition: HCMA1305-yyy-R  
- HCMA1305 = Product code and size  
yyy= Inductance value in  $\mu\text{H}$ , R = decimal point,  
if no R is present then third character equals number of zeros.  
"-R" suffix = RoHS compliant

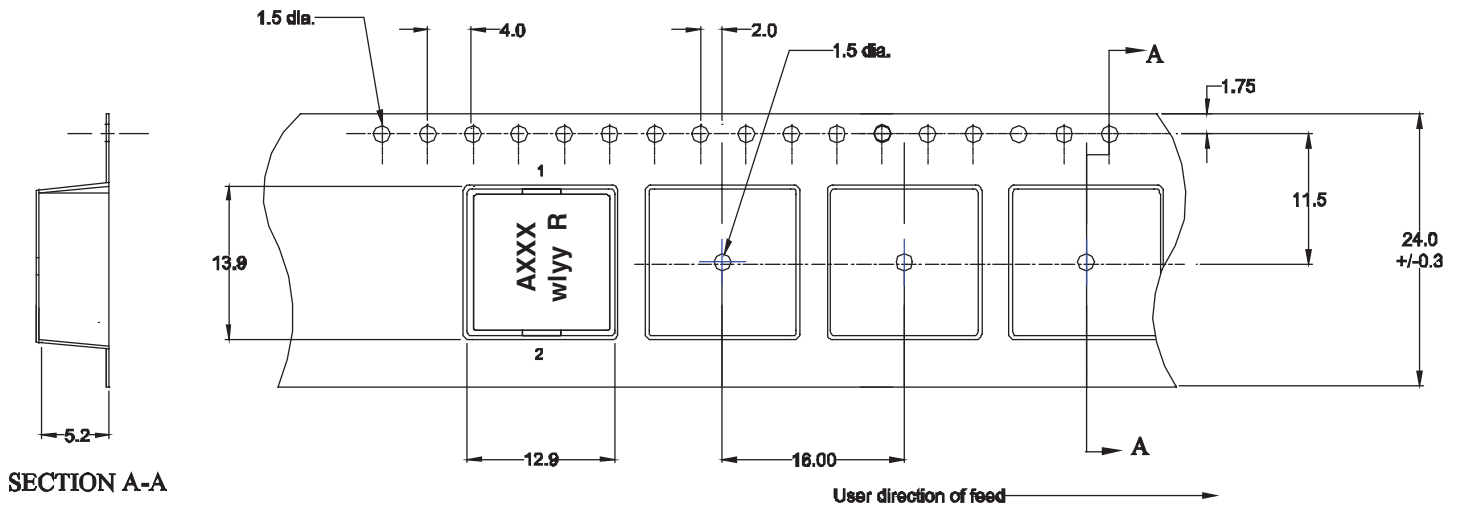
**Dimensions- mm**



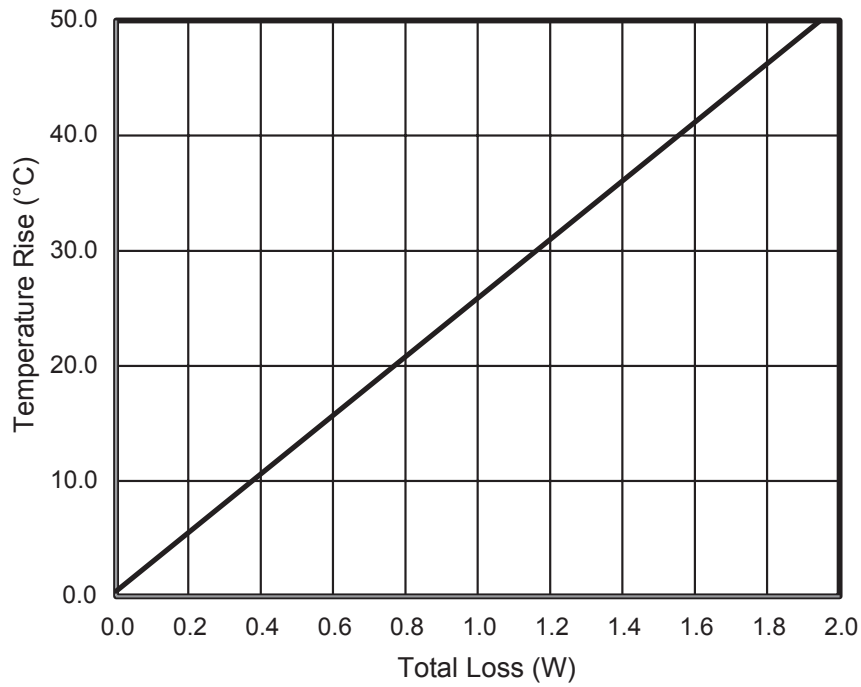
Part Marking: A = Automotive grade, xxx = Inductance value in  $\mu\text{H}$ , R = decimal point, if no R is present, third character equals number of zeros, wlyy = (Date Code), R = (Revision Level) All soldering surfaces to be coplanar within 0.10 millimeters.  
Tolerances are  $\pm 0.3$  millimeters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

**Packaging information- mm**

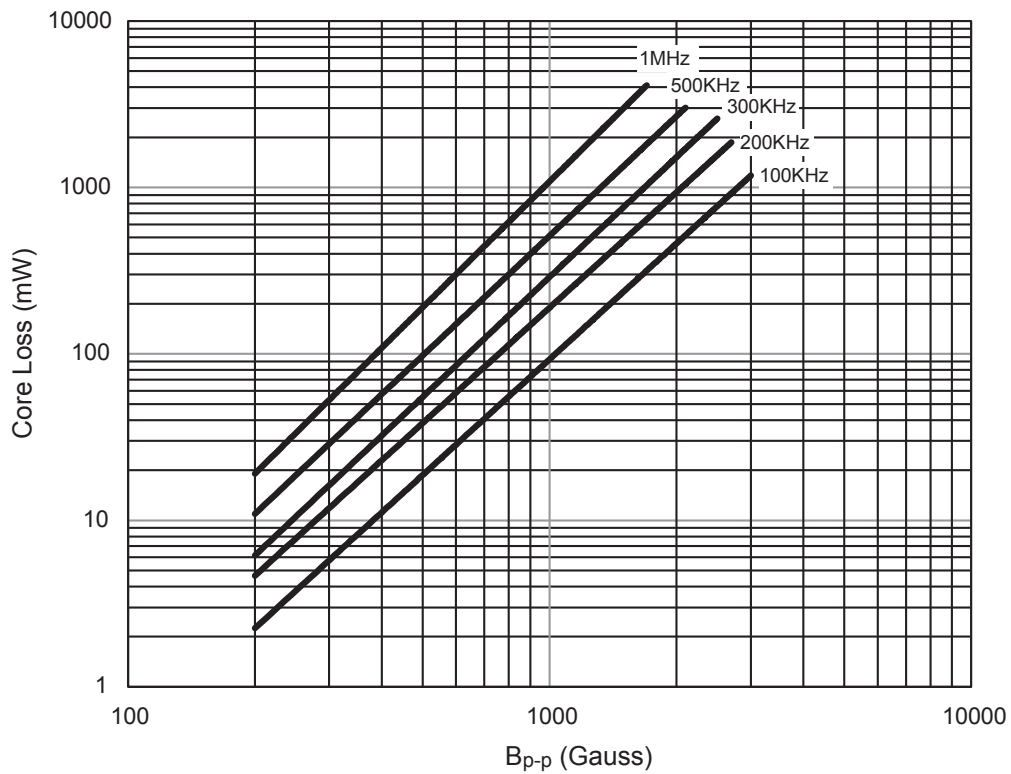
Drawing not to scale  
Supplied in tape and reel packaging , 400 parts per 13" diameter reel



Temperature rise vs. total loss

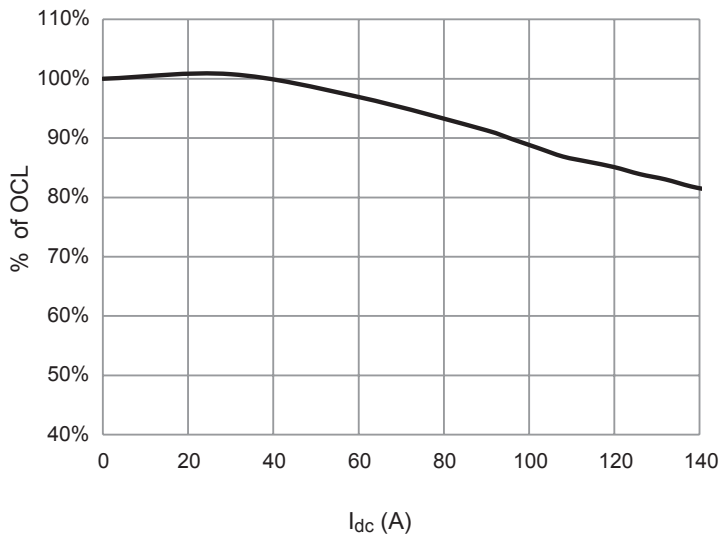


Core loss vs  $B_{p-p}$

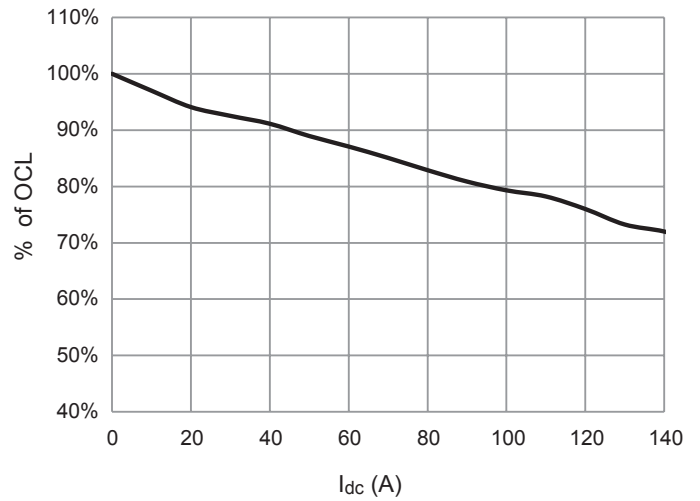


**Inductance characteristics**

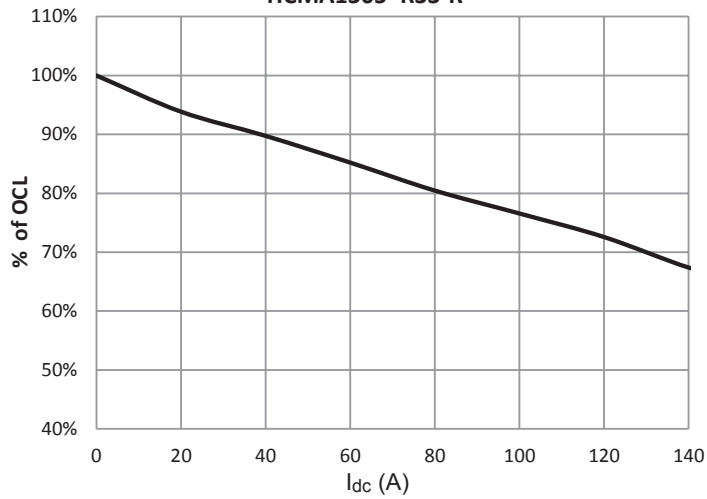
HCMA1305-R10-R



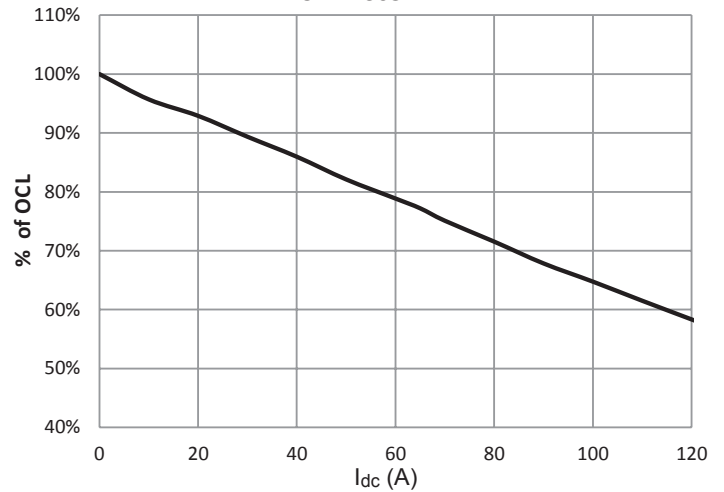
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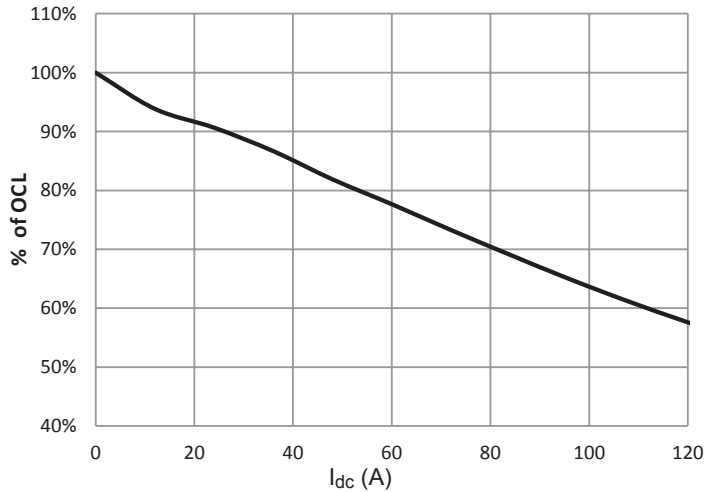
HCMA1305-R33-R



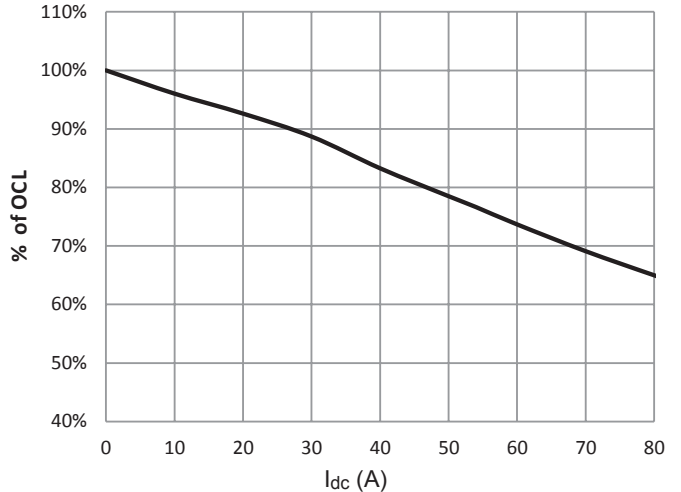
HCMA1305-R47-R



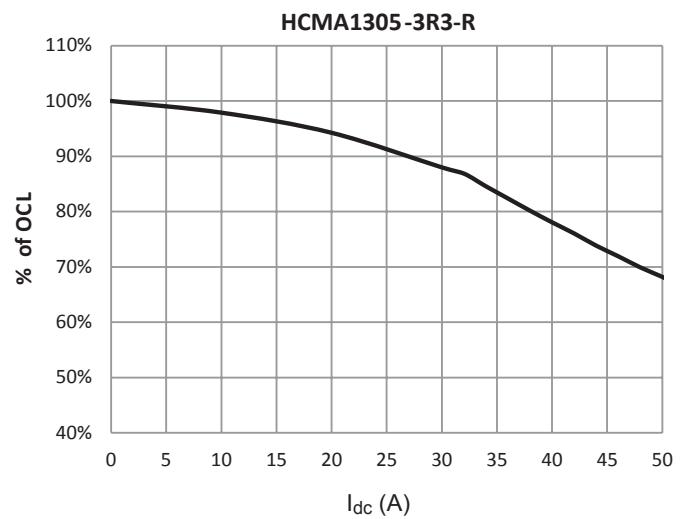
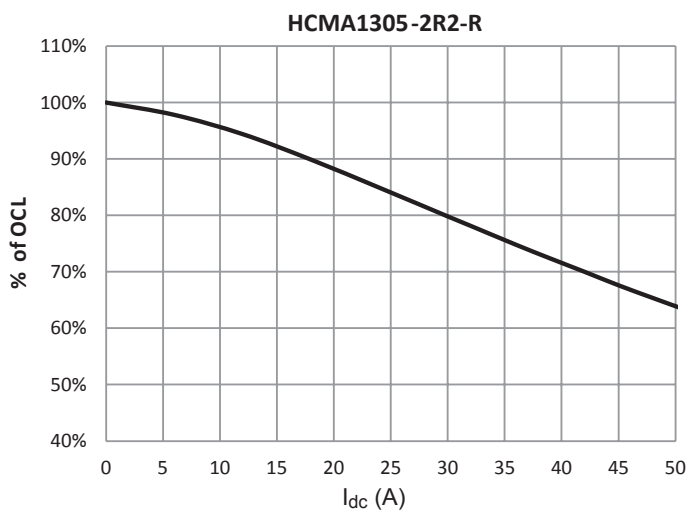
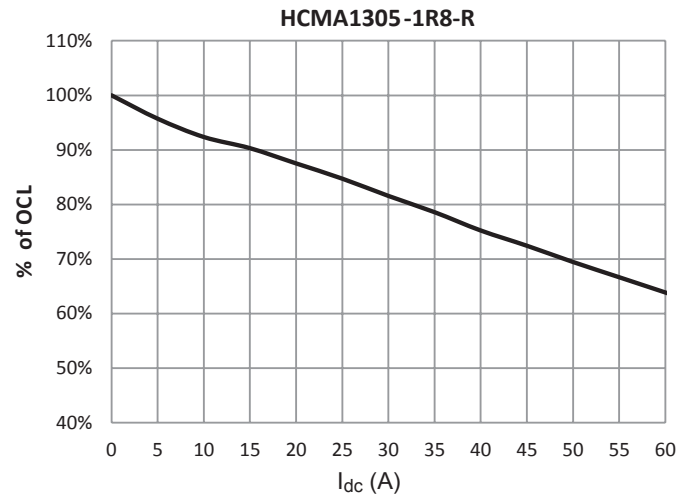
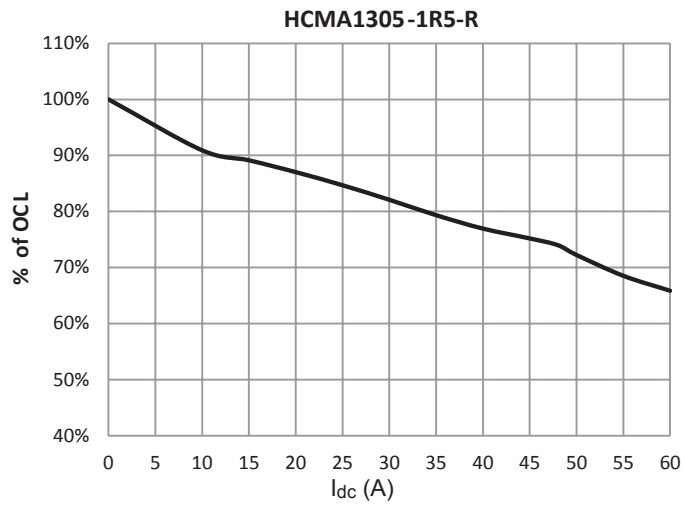
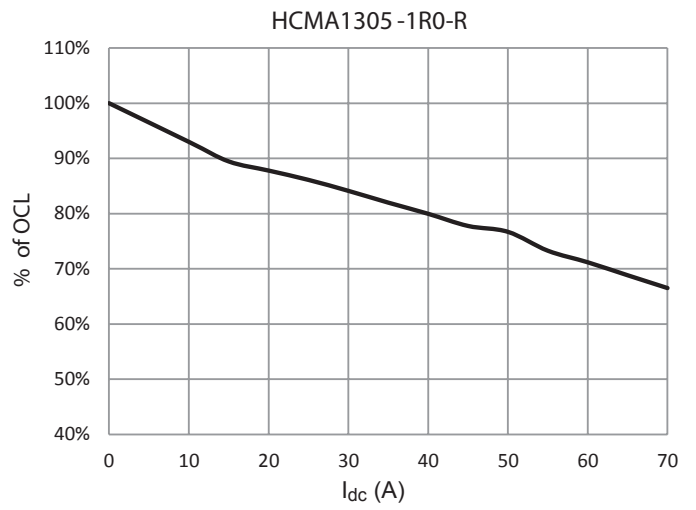
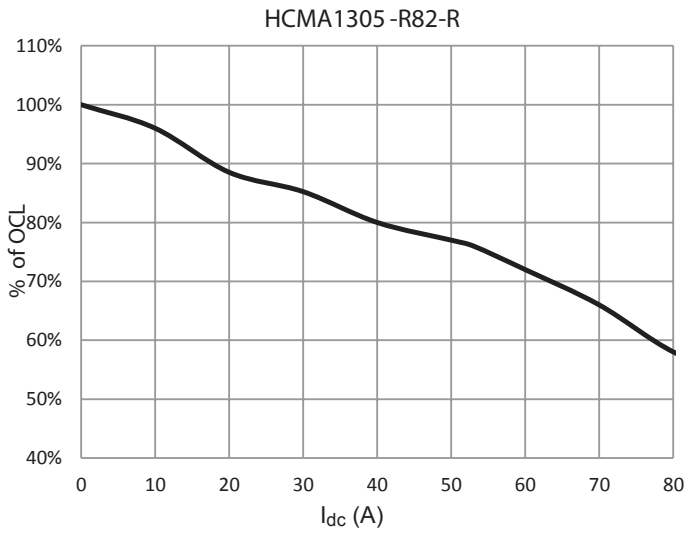
HCMA1305-R56-R



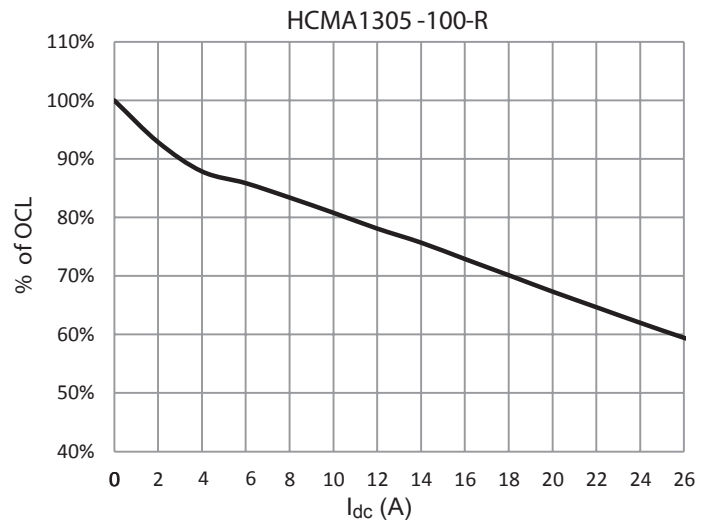
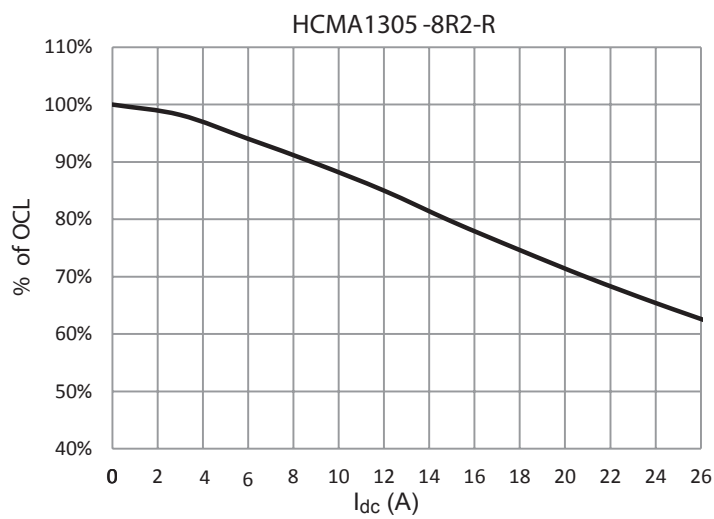
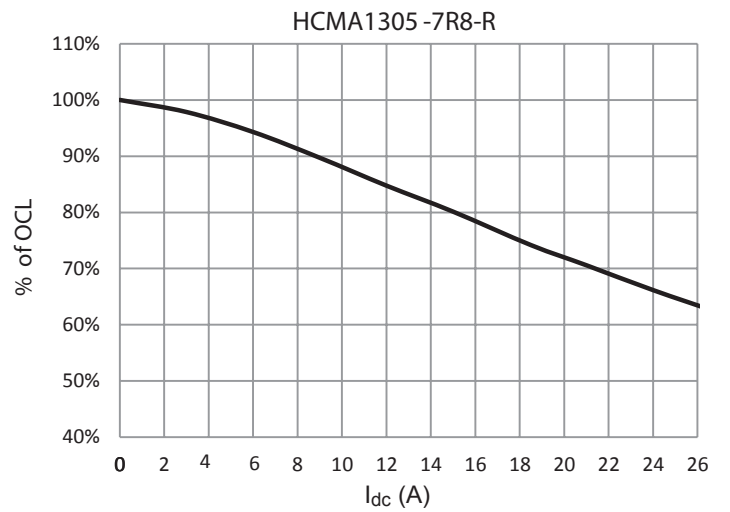
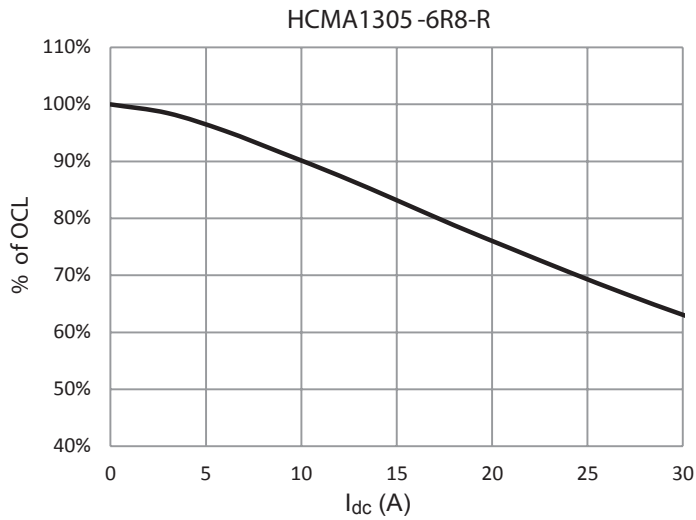
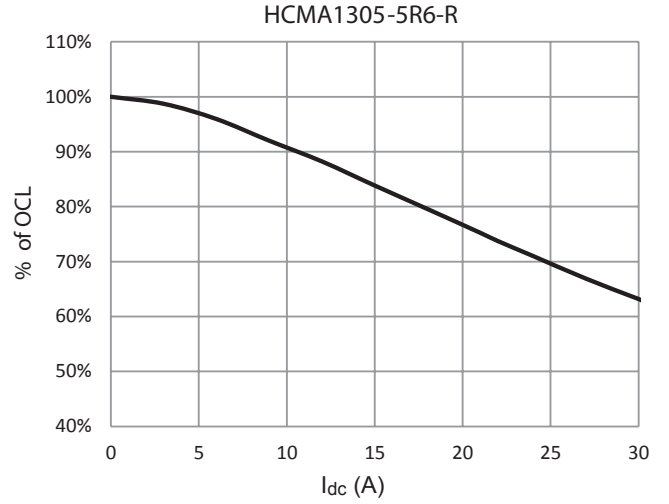
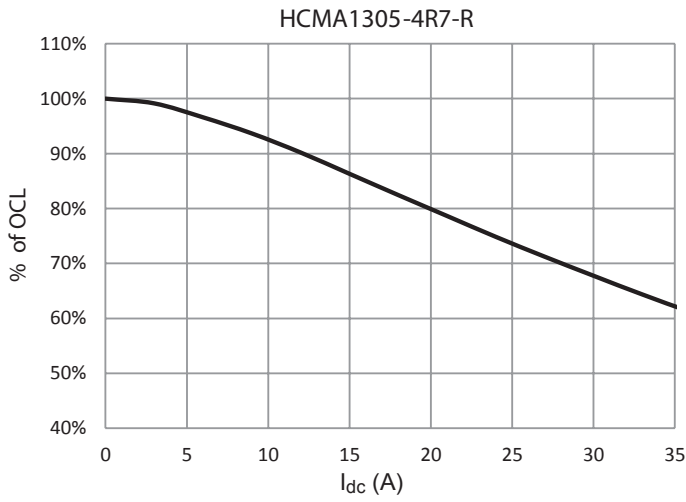
HCMA1305-R68-R



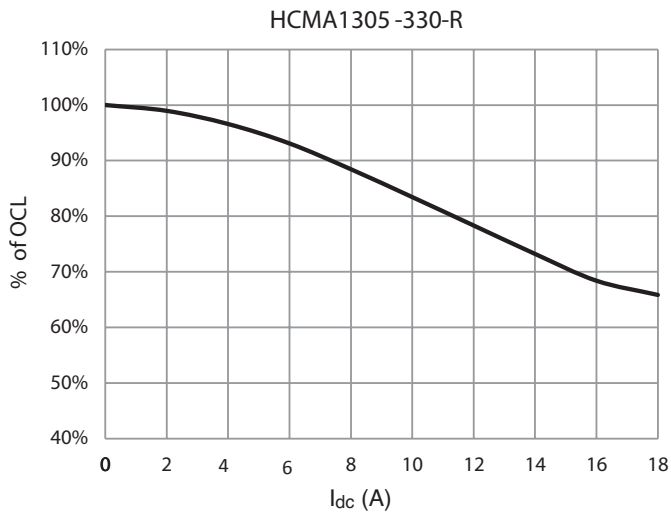
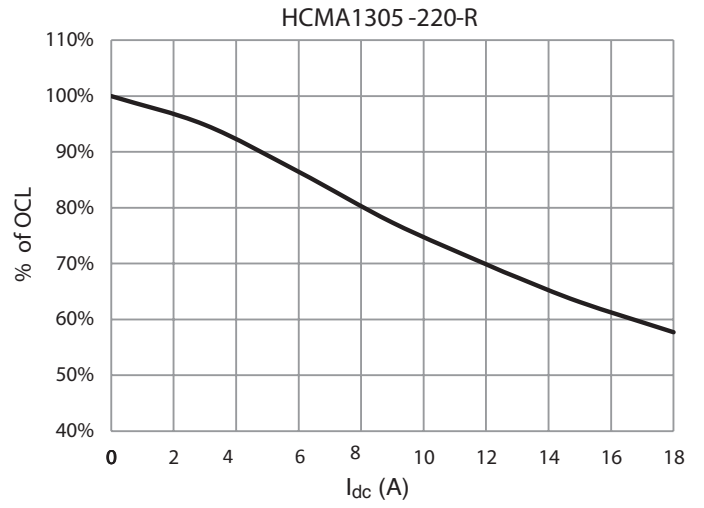
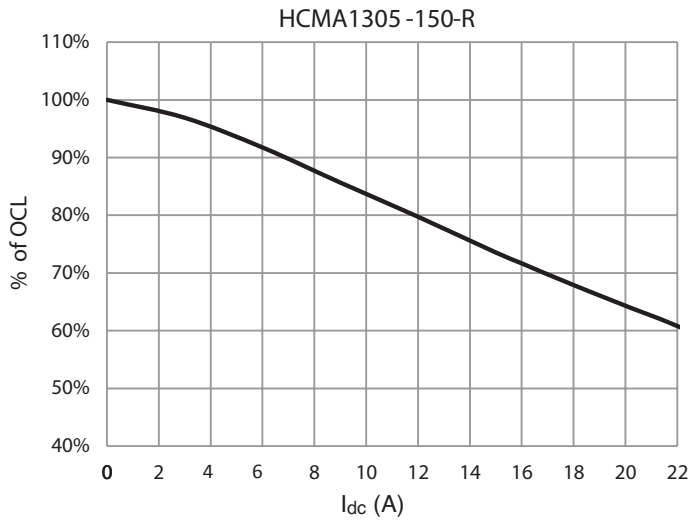
**Inductance characteristics**



Inductance characteristics

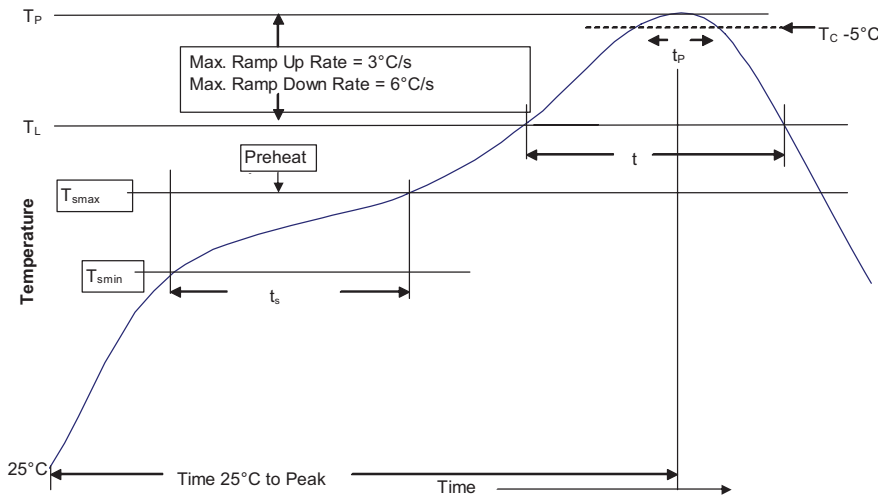


**Inductance characteristics**





**Solder reflow profile**



**Table 1 - Standard SnPb Solder ( $T_c$ )**

Package Thickness	Volume mm <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 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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