HCM1A1305V2

Automotive grade high current power inductors

Product features

- AEC-Q200 qualified
- High current carrying capacity
- Magnetically shielded, low EMI
- DC-DC converter applications up to 1 MHz
- Filtering applications up to Self Resonant Frequency (SRF) [See product specification table]
- Inductance range from 0.10 μH to 33 μH
- Current range from 4.5 A to 80 A
- 13.8 mm x 12.9 mm footprint surface mount package in a 5.0 mm height
- Moisture Sensitivity Level (MSL): 1
- Alloy powder core material

Applications

- Body electronics
  - Central body control module
  - Headlamps, tail lamps and interior lighting and LED 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
  - Electronic power steering (EPS)
- Engine and Powertrain Systems
  - Electric pumps, motor control and auxiliaries
  - Powertrain control module (PCU)/ Engine Control unit (ECU)
  - Transmission Control Unit (TCU)

Environmental data

- Storage temperature range (Component): -55 °C to +155 °C
- Operating temperature range: -55 °C to +155 °C (ambient plus self-temperature rise)
- Solder reflow temperature: J-STD-020 (latest revision) compliant

Pb HALOGEN HF FREE RoHS

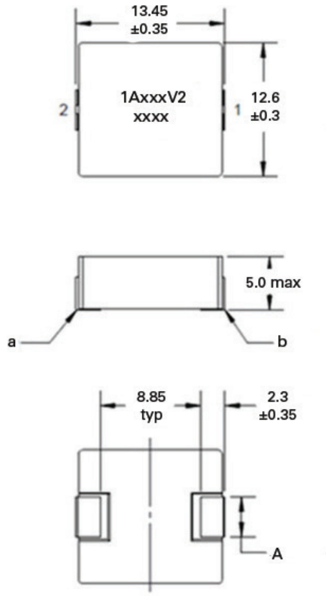
EATON
Powering Business Worldwide

Product specifications

Part number[6]	OCL[1] (μH) ± 20%	FLL[2] (μH) minimum	I_{rms}[3] (A)	I_{sat}[4] (A)	DCR (mΩ) typical @ +20 °C	DCR (mΩ) maximum @ +20 °C	SRF (MHz) typical	K-factor[5]
HCM1A1305V2-R10-R	0.10	0.064	43	80	0.33	0.59	234	908
HCM1A1305V2-R22-R	0.22	0.14	48	60	0.53	0.61	107	449
HCM1A1305V2-R33-R	0.33	0.21	46	50	0.59	0.69	70	345
HCM1A1305V2-R47-R	0.47	0.30	44	50	0.70	0.85	58	266
HCM1A1305V2-R56-R	0.56	0.36	29.5	50	1.15	1.33	57	202
HCM1A1305V2-R68-R	0.68	0.44	30	45	1.15	1.33	46	191
HCM1A1305V2-R82-R	0.82	0.52	27	36	1.40	1.61	45	197
HCM1A1305V2-1R0-R	1.0	0.64	24	35	1.78	2.05	40	165
HCM1A1305V2-1R5-R	1.5	0.96	19	27	2.60	3.00	30	156
HCM1A1305V2-1R8-R	1.8	1.15	17	26	3.25	3.74	30	132
HCM1A1305V2-2R2-R	2.2	1.41	15	25	4.04	4.65	25	118
HCM1A1305V2-3R3-R	3.3	2.11	12	19	5.75	9.20	16	95
HCM1A1305V2-4R7-R	4.7	3.01	11	18	8.15	9.38	13	93
HCM1A1305V2-5R6-R	5.6	3.58	10	17	11	12.7	11	72
HCM1A1305V2-6R0-R	6.0	3.84	9.7	16	11	12.7	11	73
HCM1A1305V2-6R8-R	6.8	4.35	9.5	15	12.1	14.0	11	82
HCM1A1305V2-7R8-R	7.8	4.99	7.6	15	15	17.3	10	62
HCM1A1305V2-8R2-R	8.2	5.25	7.5	13	16	18.5	9	59
HCM1A1305V2-100-R	10	6.40	7.5	13	18.17	20.9	8	54
HCM1A1305V2-120-R	12	7.68	7.0	9.0	19.5	23.0	6	59
HCM1A1305V2-150-R	15	9.60	6.5	9.5	23.5	27.1	6	50
HCM1A1305V2-220-R	22	14.1	5.0	7.0	34.7	40.0	5	50
HCM1A1305V2-330-R	33	21.1	4.5	5.2	49.2	58.0	3	37

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 30 °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 +155 °C under worst case operating conditions verified in the end application.
4. I_{sat}: Peak current for approximately 20% rolloff @ +25 °C
5. K-factor: Used to determine B_{p-p} for core loss (see graph). Bp-p = K * L * ΔI. B_{p-p}: (Gauss), K: (K-factor from table), L: (Inductance in μH), ΔI (Peak to peak ripple current in Amps).
6. Part Number Definition: HCM1A1305V2-xxx-R
   HCM1A1305V2 = Product code and size
   xxx= inductance value in μH, R= decimal point,
   If no R is present then last character equals number of zeros
   -R suffix = RoHS compliant

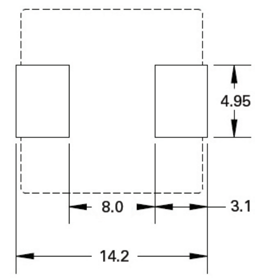
Dimensions (mm)



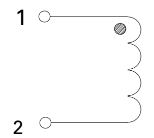
Dimension A

HCM1A1305V2-R10 through R47-R,	HCM1A1305V2-R56 through 2R2-R	HCM1A1305V2-3R3 through 330-R
4.4 ±0.3	3.68 ±0.3	4.7 ±0.3

Recommended pad layout



Schematic

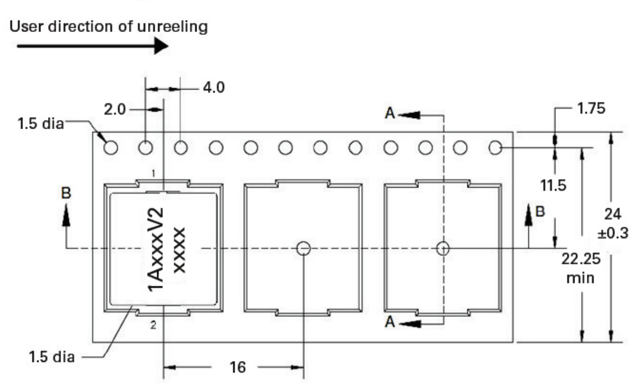


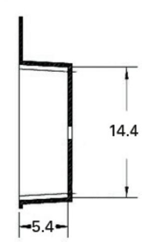
Part marking: 1AxxxV2, xxx=inductance value in uH, R=decimal point. If no R is present then last character equals number of zeros. xxxx=Lot code
All soldering surfaces to be coplanar within 0.1 millimeters
Tolerances are ±0.3 millimeters unless stated otherwise
Pad layout tolerances are ±0.1 millimeters unless stated otherwise
DCR measured from point “a” to point “b”
Do not route traces or vias underneath the inductor

Packaging information (mm)

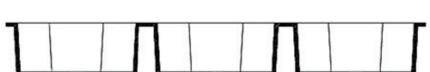
Drawing not to scale

Supplied in tape and reel packaging, 250 parts per 13” diameter reel



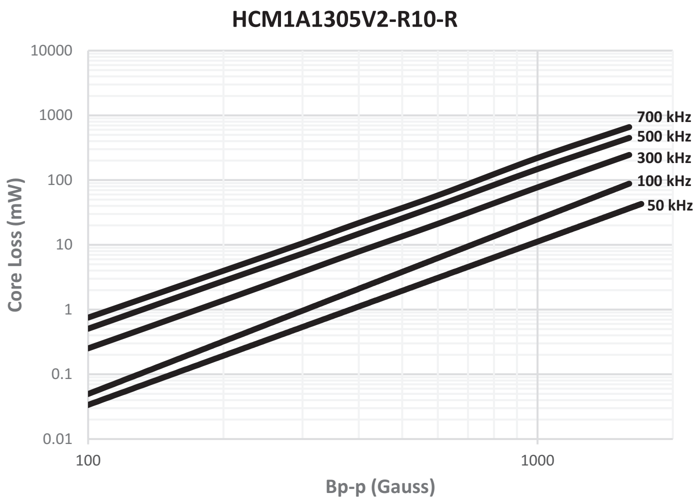


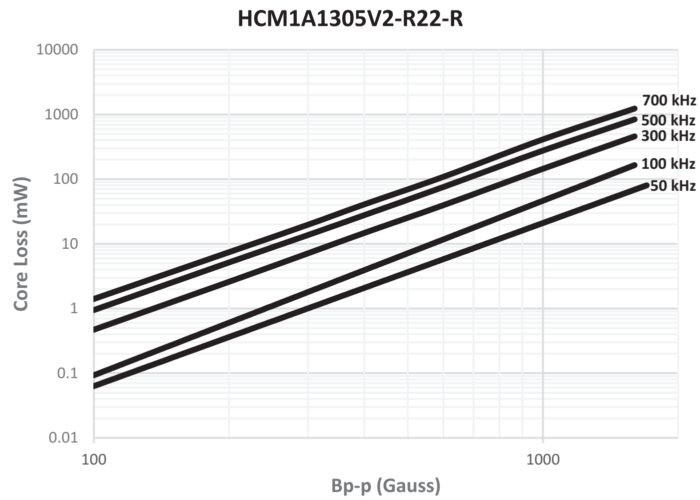
Section A-A

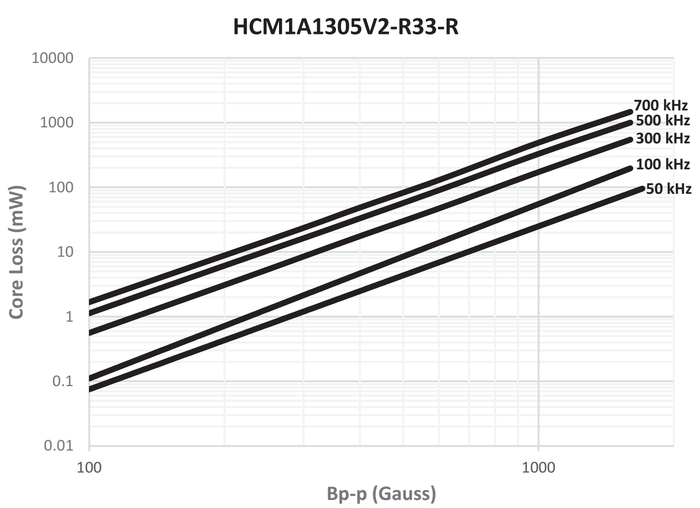


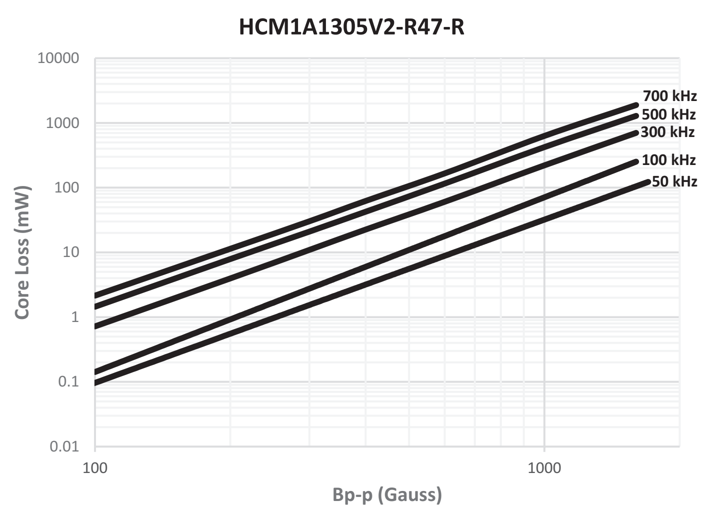
Section B-B

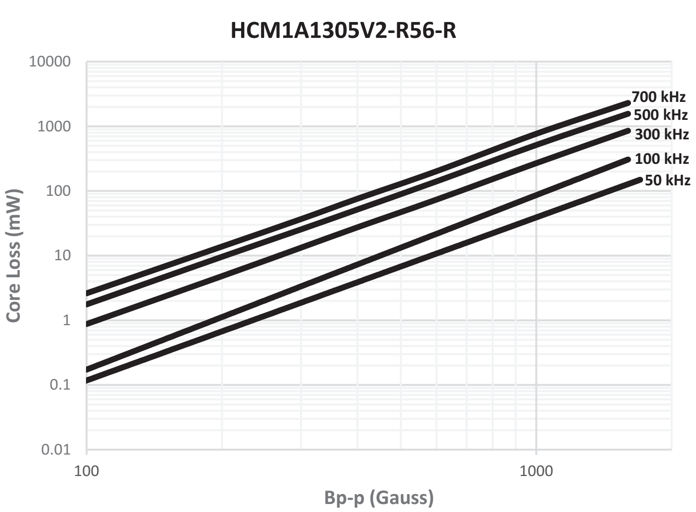
Core loss vs B_{p-p}

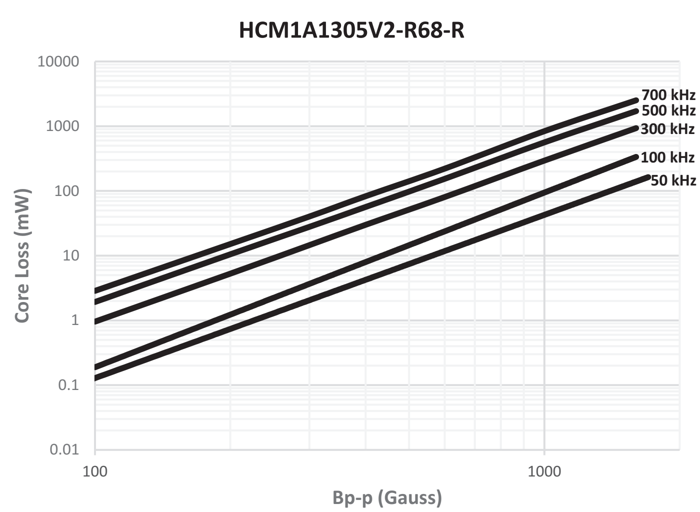




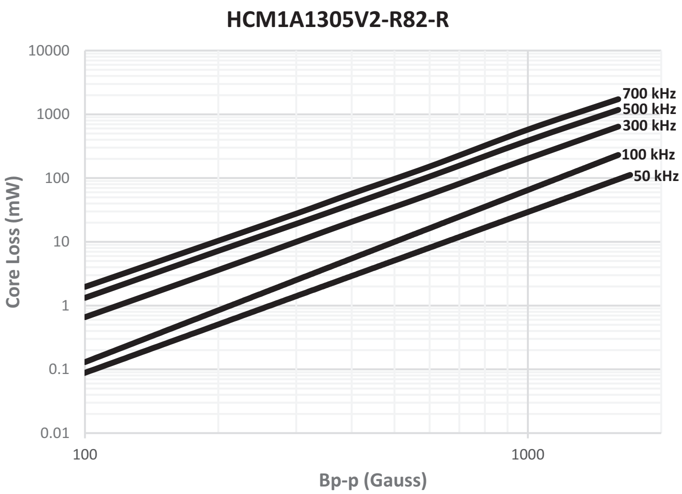


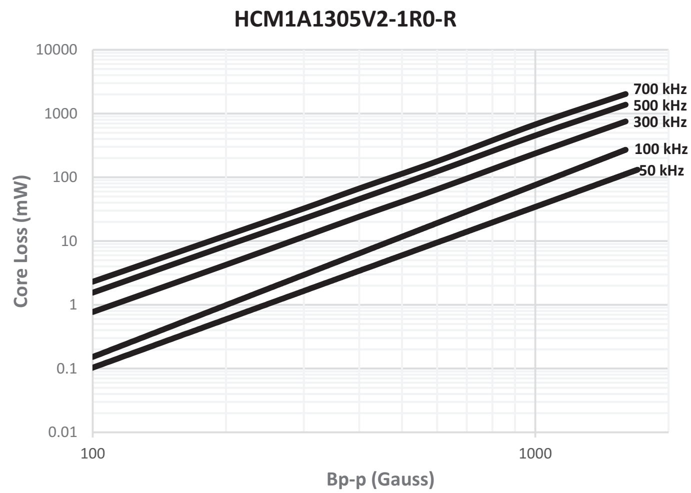


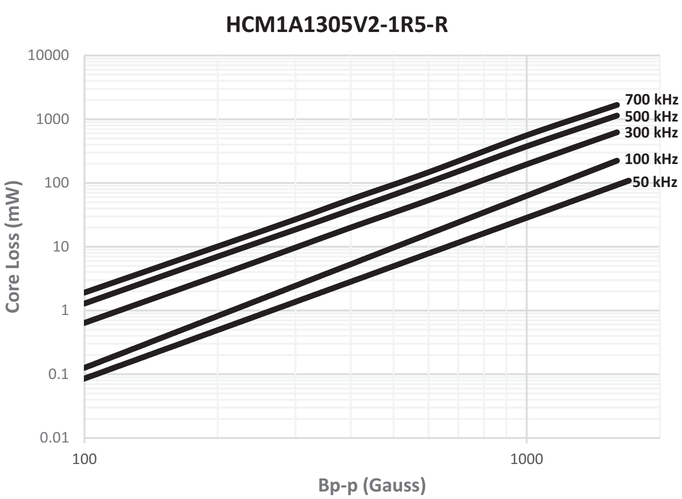


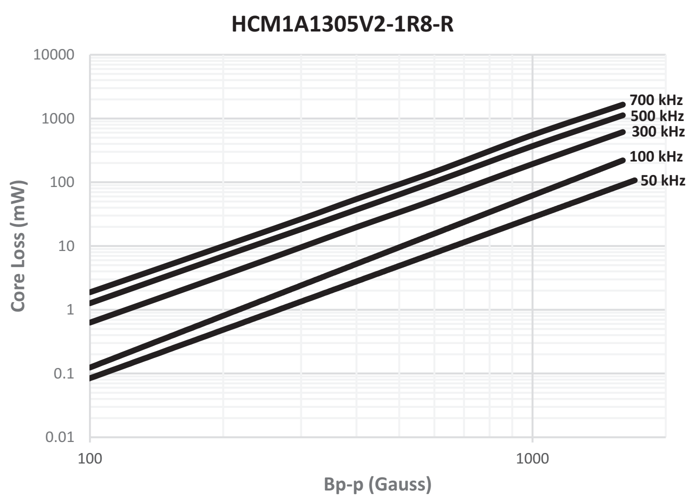


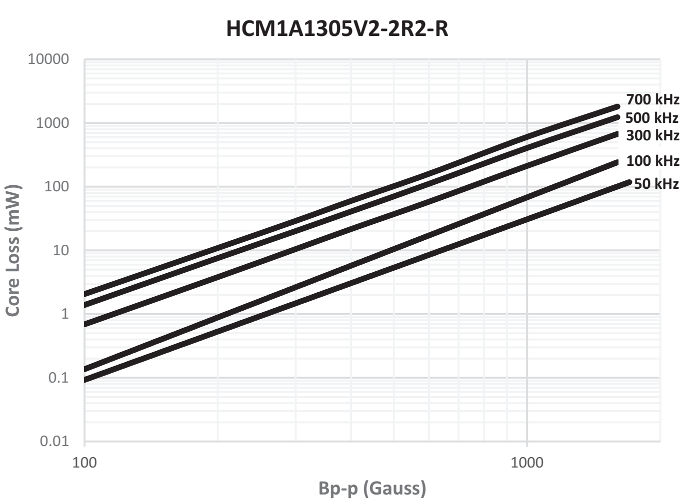
Core loss vs B_{p-p}

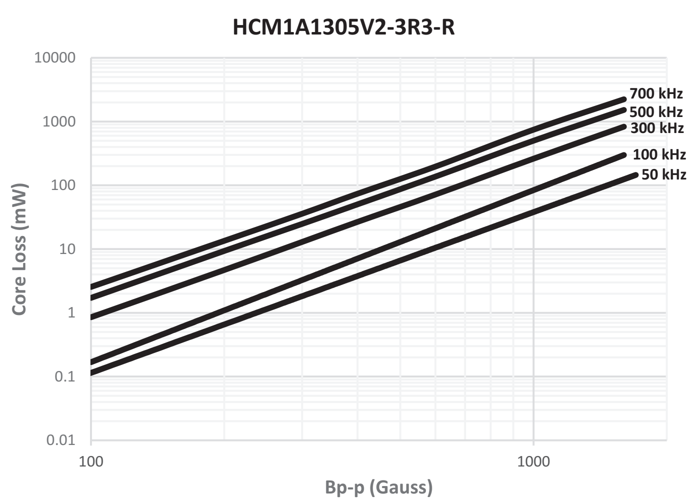




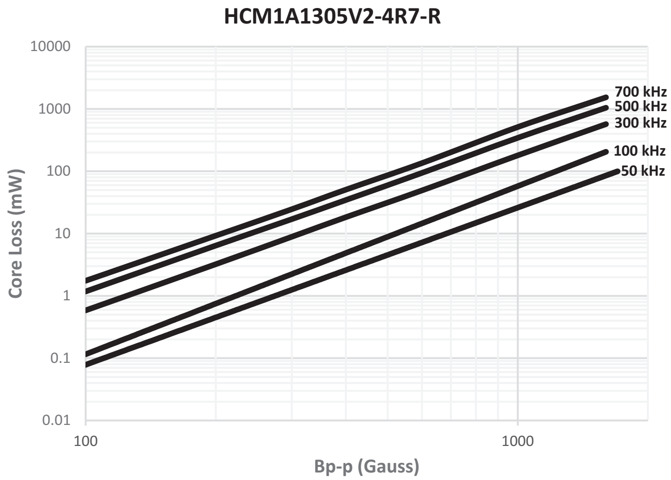


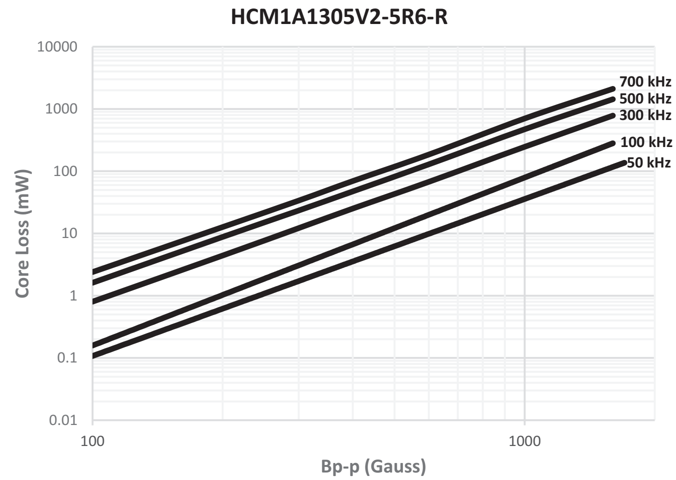


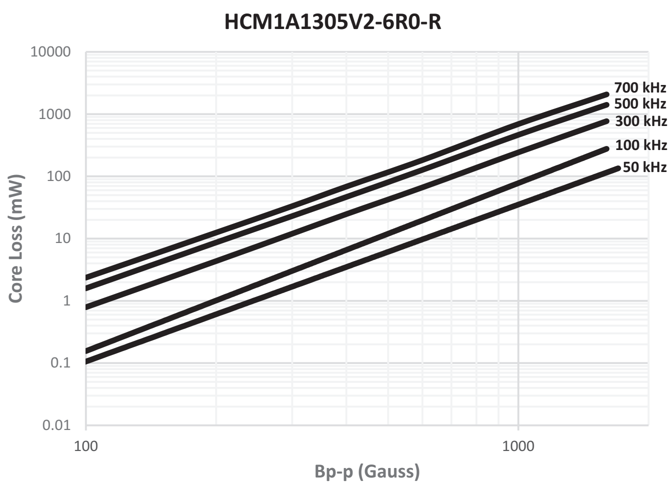


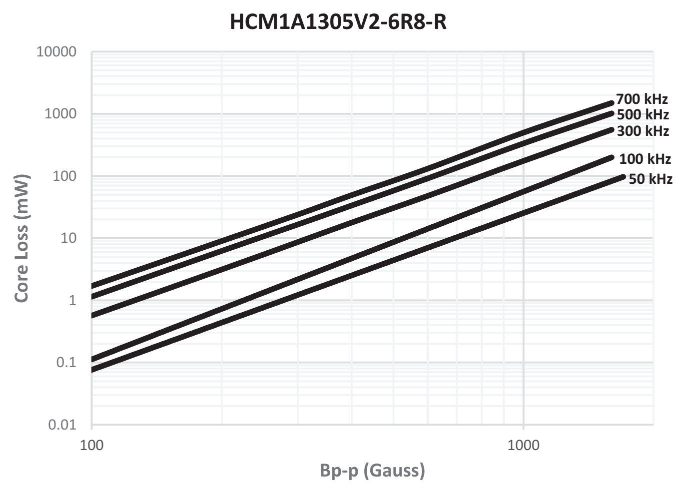


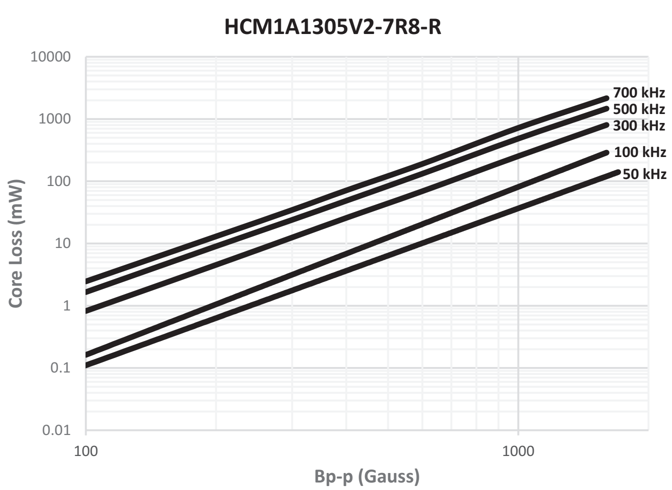
Core loss vs B_{p-p}

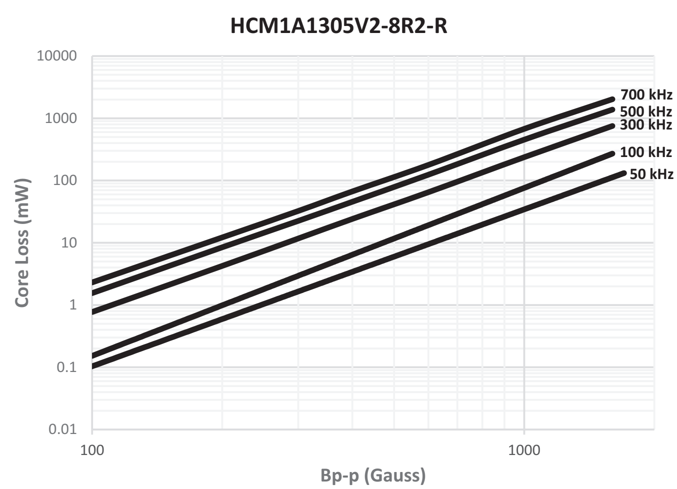












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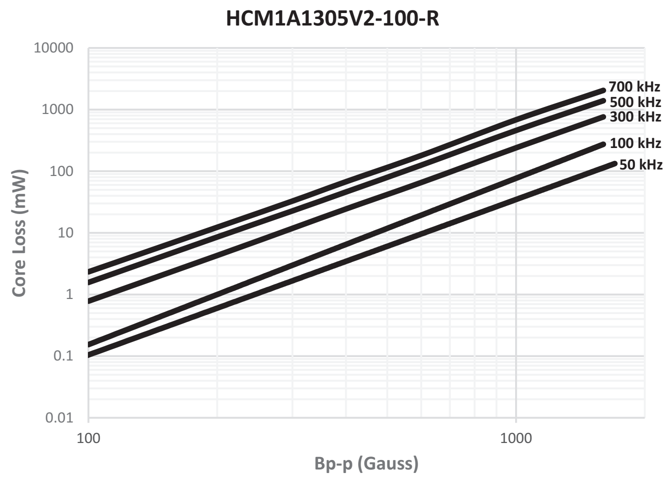
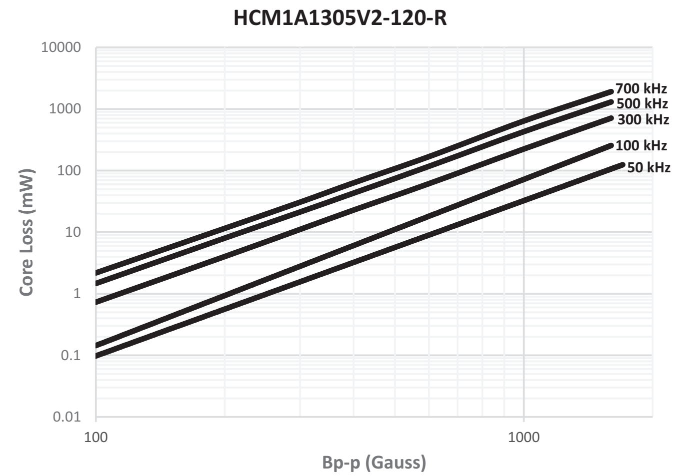
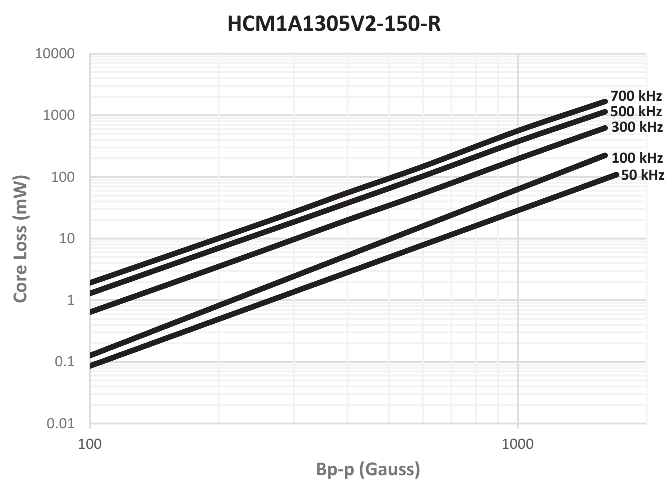
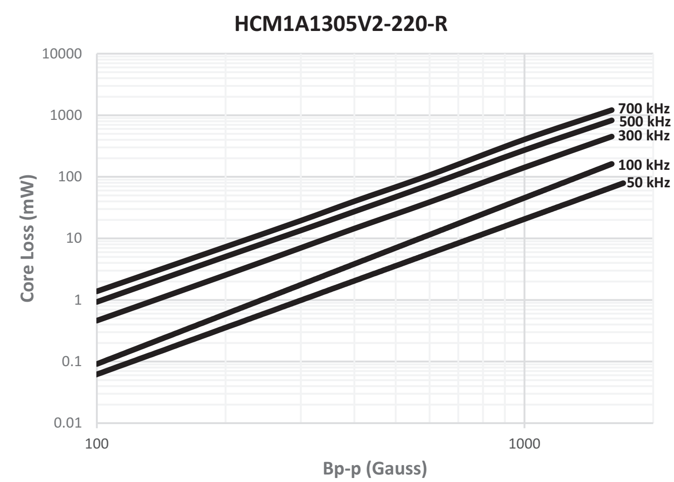
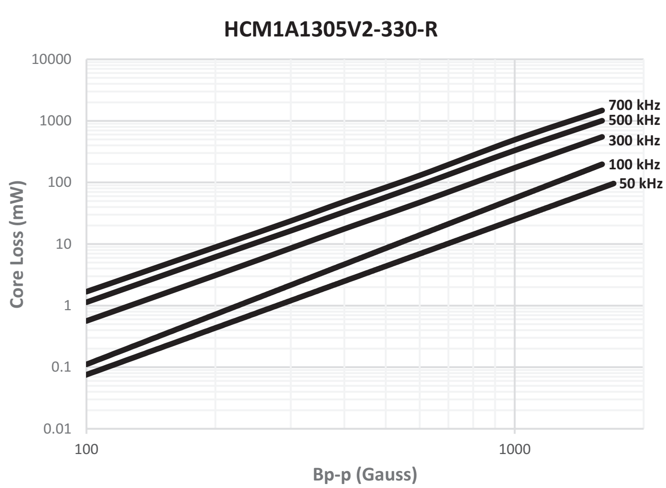


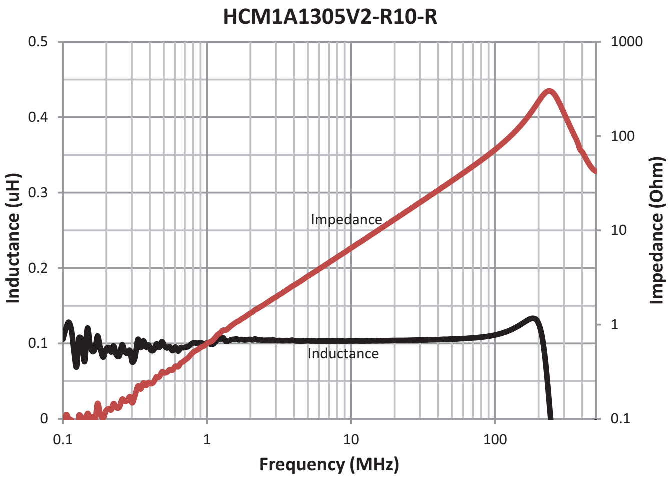


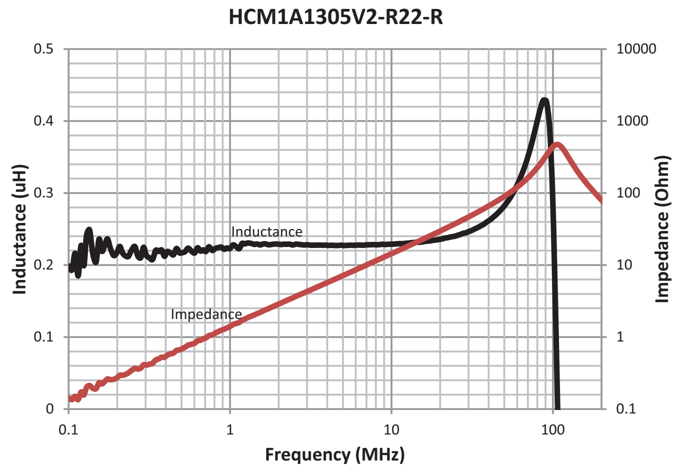


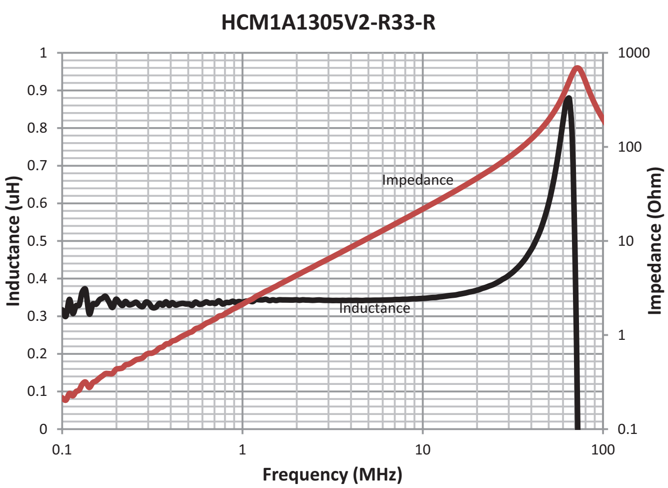


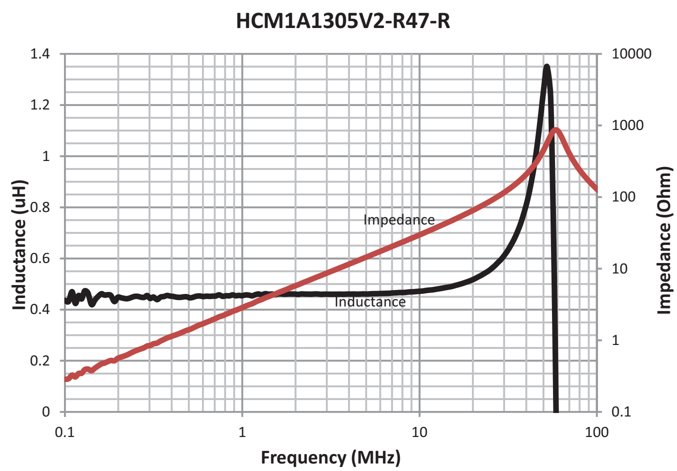


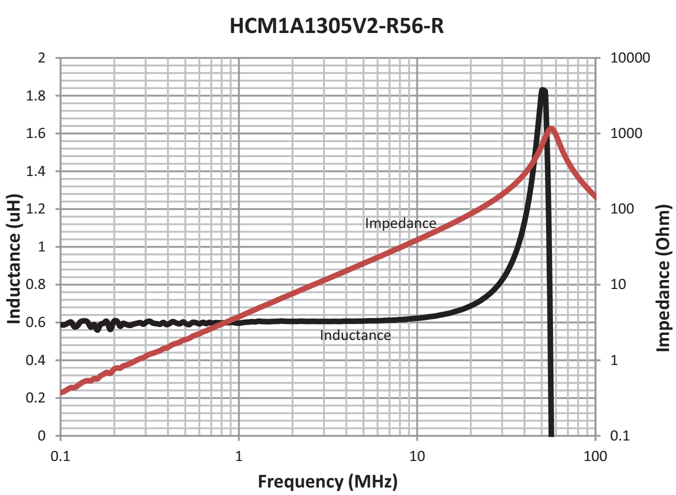
Inductance and impedance vs. frequency

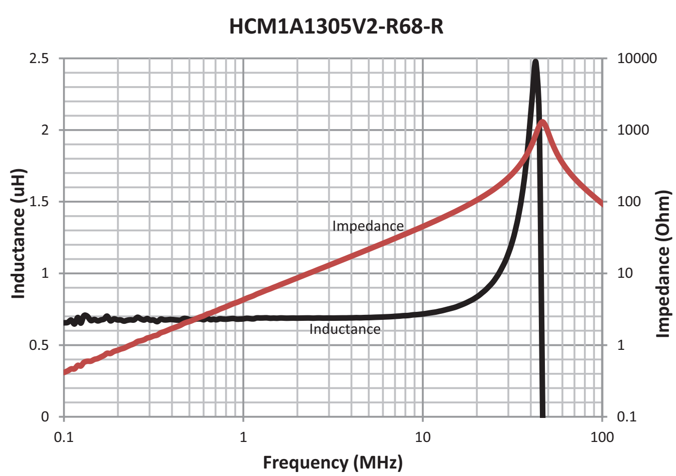




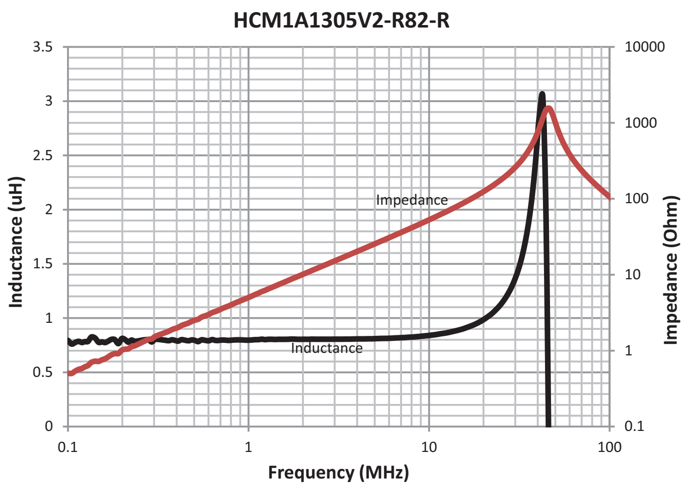


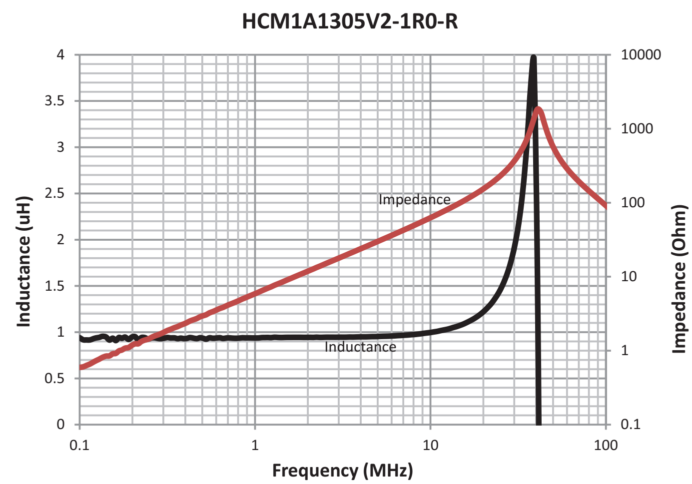


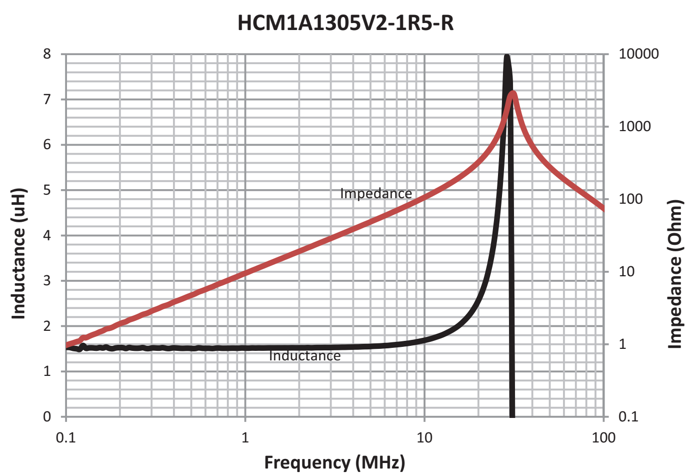


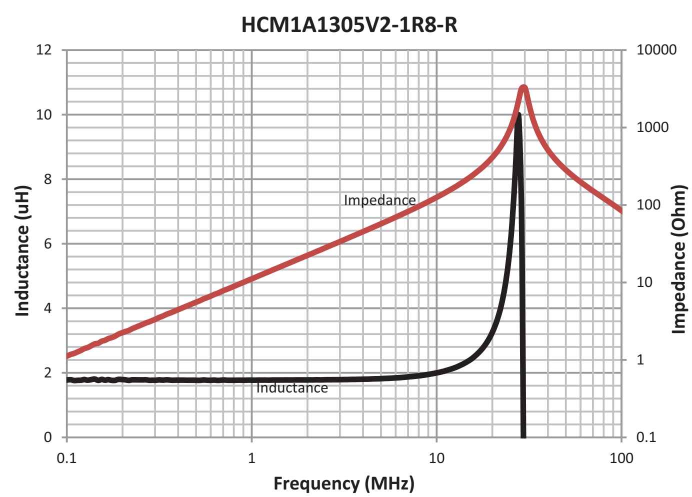


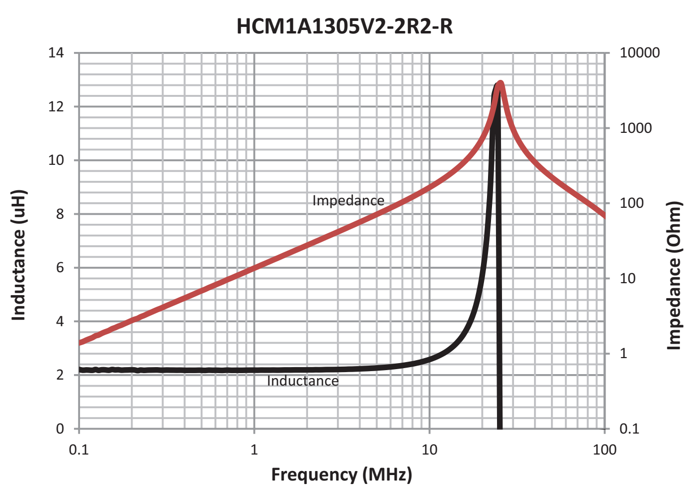
Inductance and impedance vs. frequency

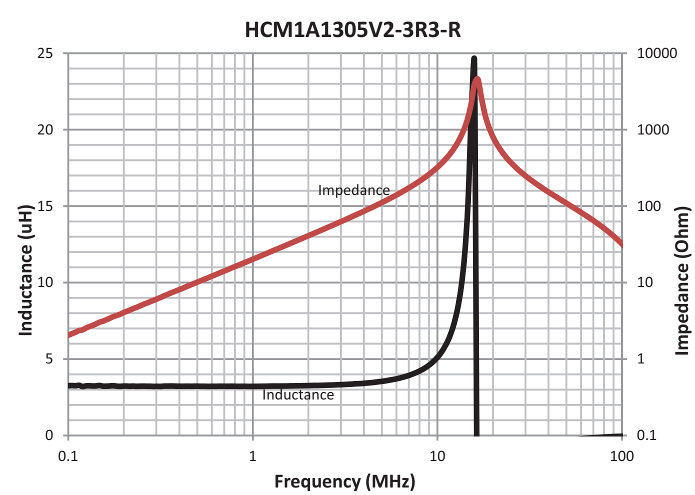




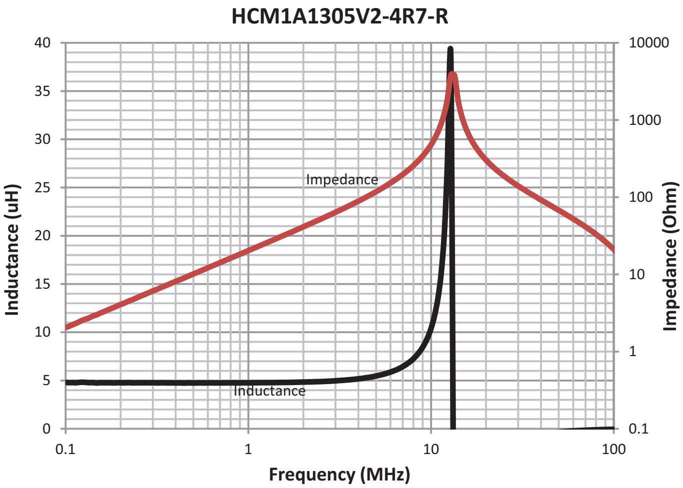


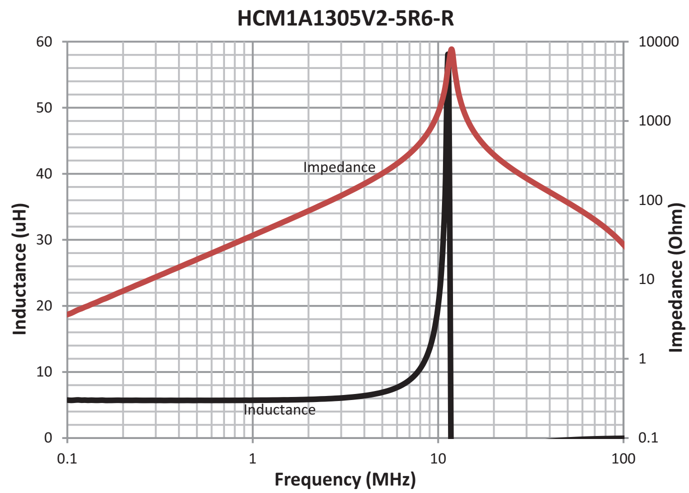


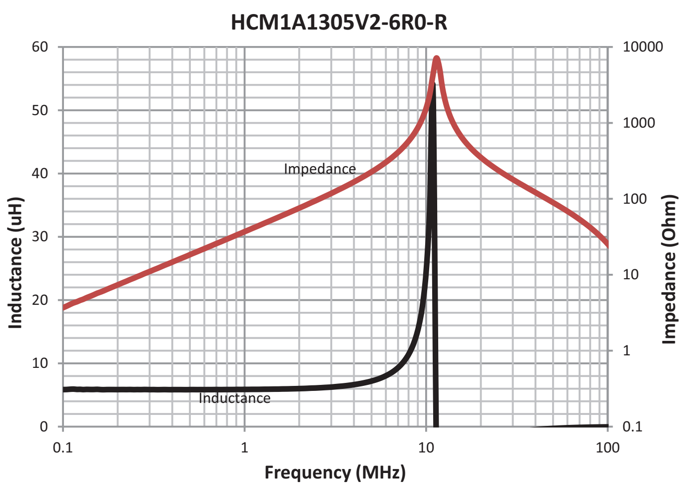


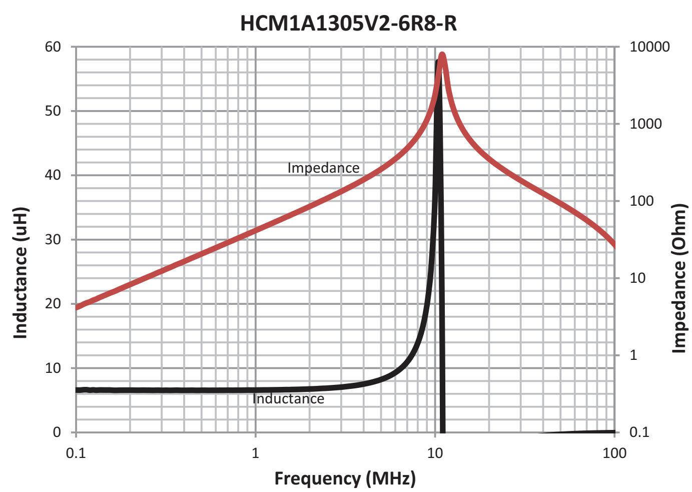


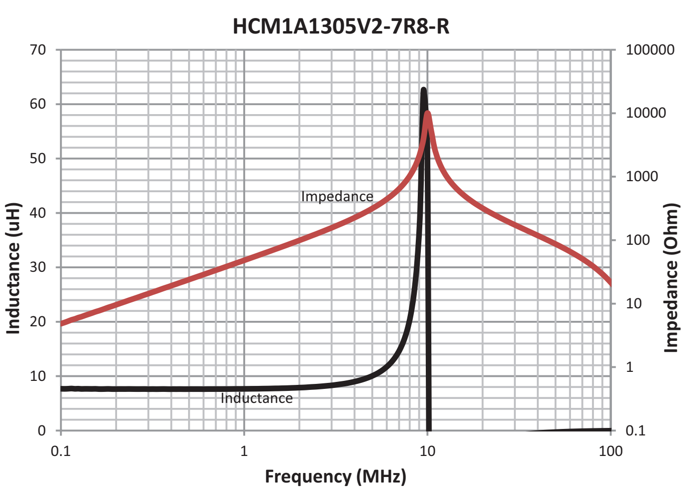
Inductance and impedance vs. frequency

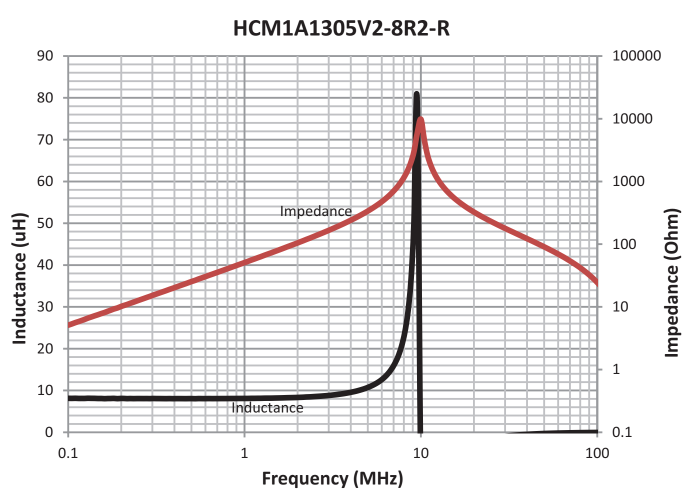




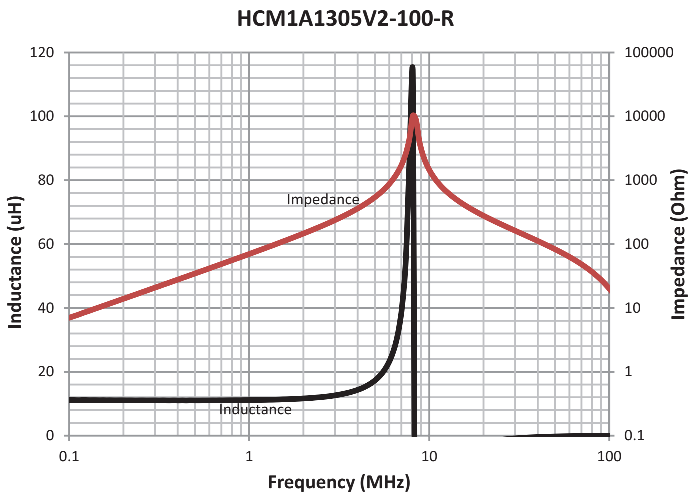


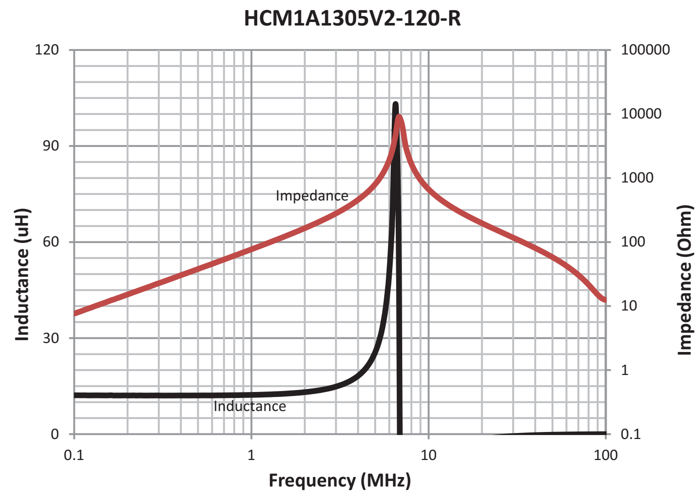


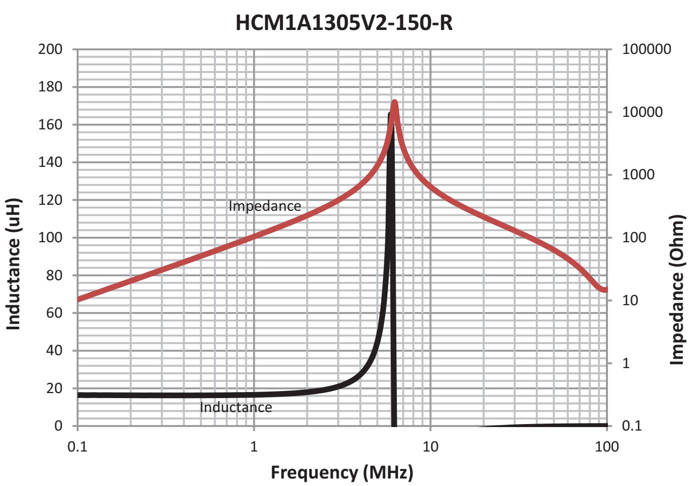


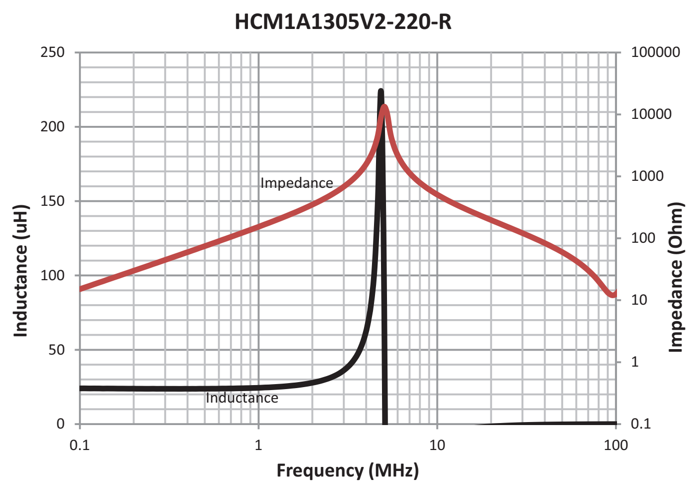


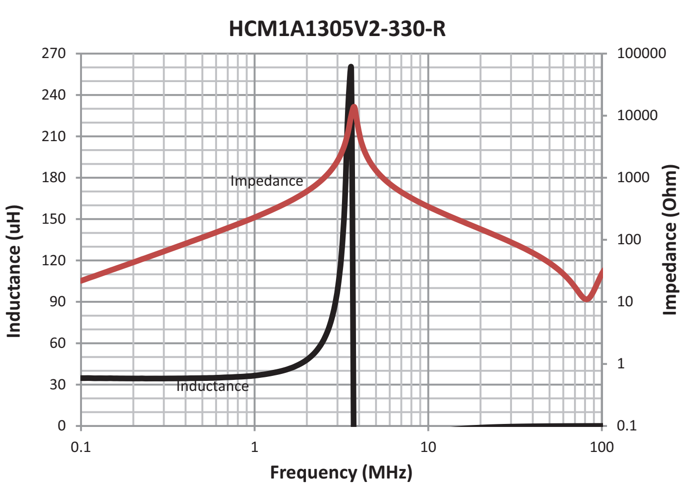
Inductance and impedance vs. frequency



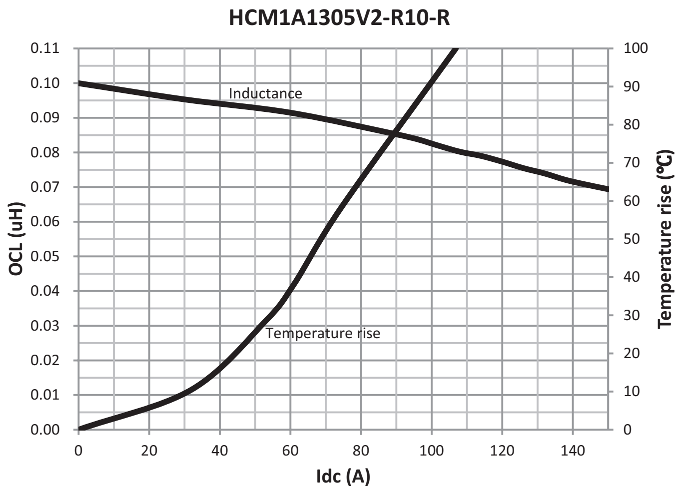


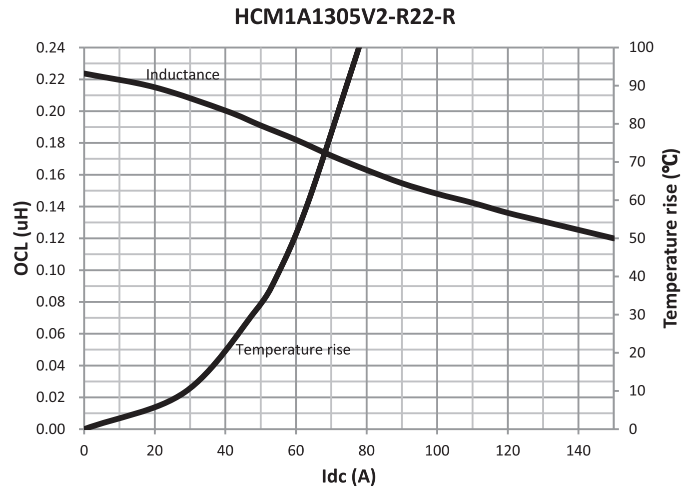


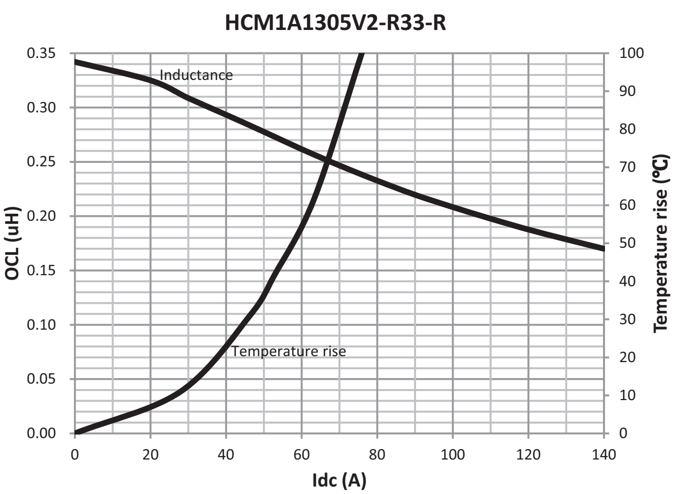


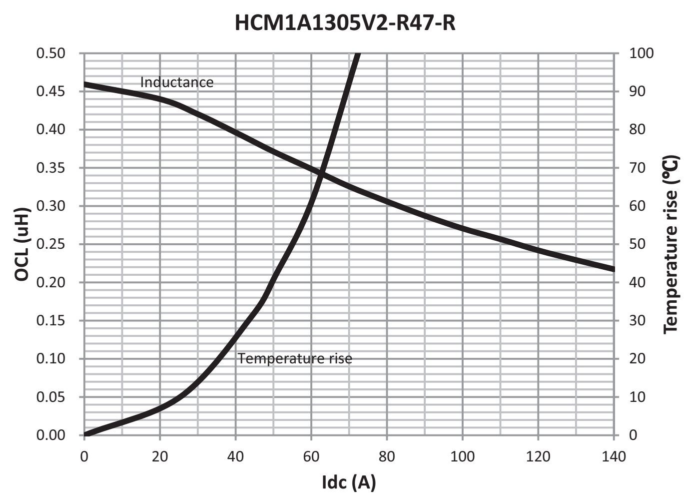


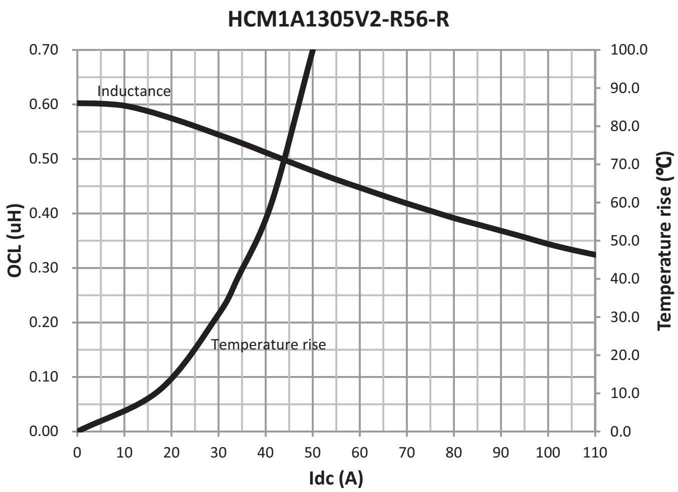
Inductance and temperature rise vs. current

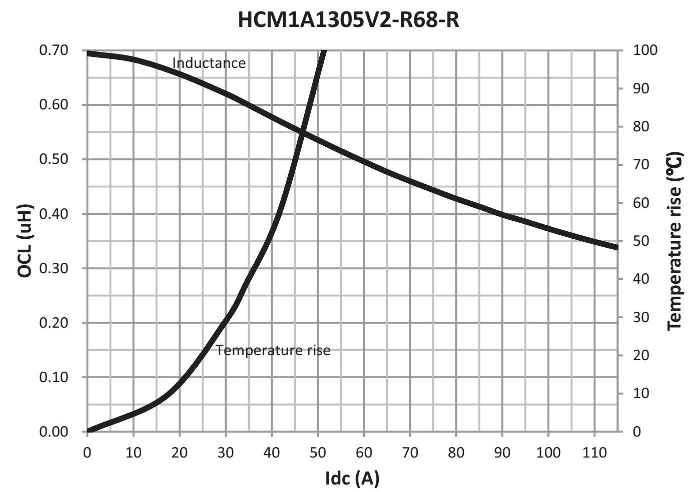






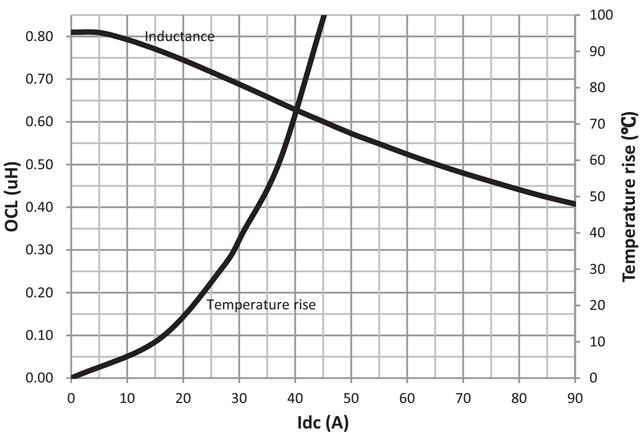






Inductance and temperature rise vs. current

HCM1A1305V2-R82-R



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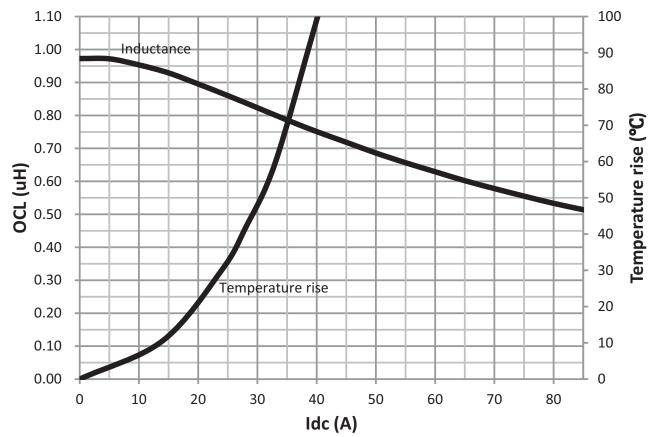

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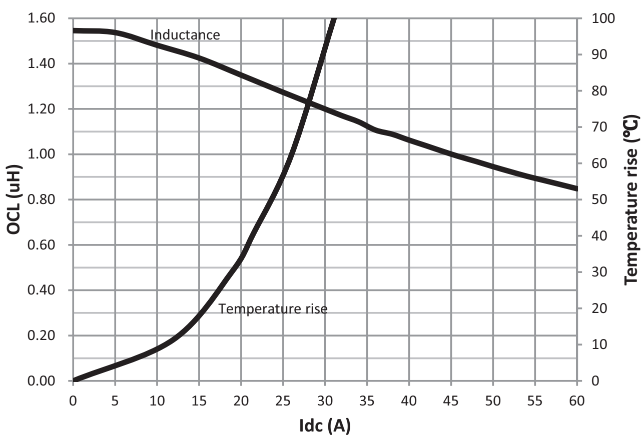

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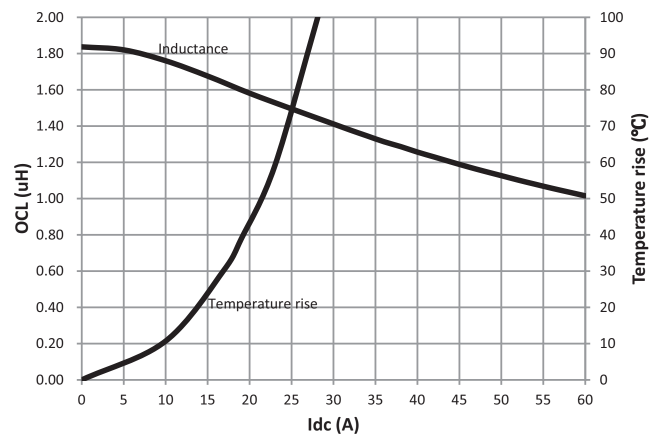

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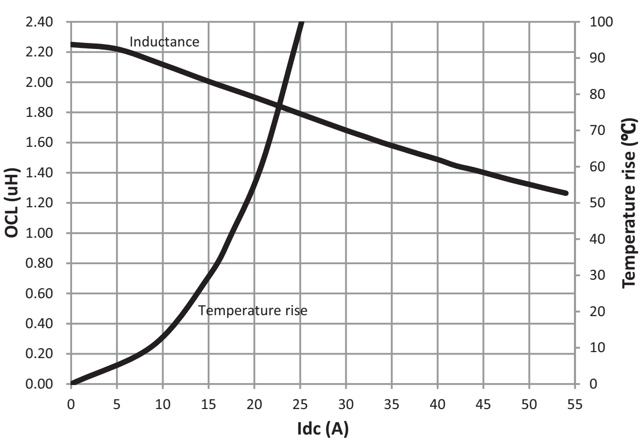

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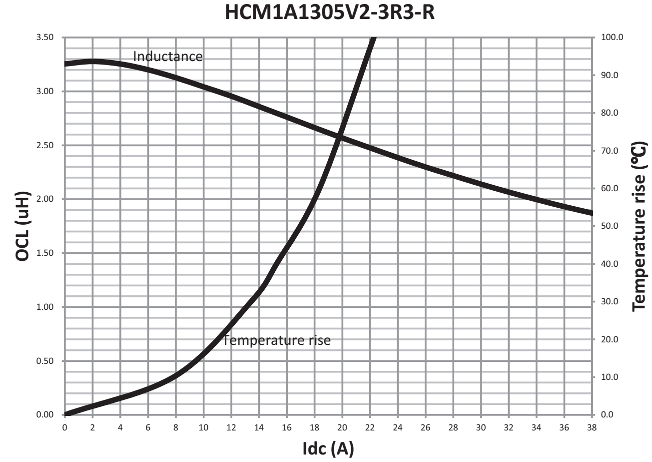
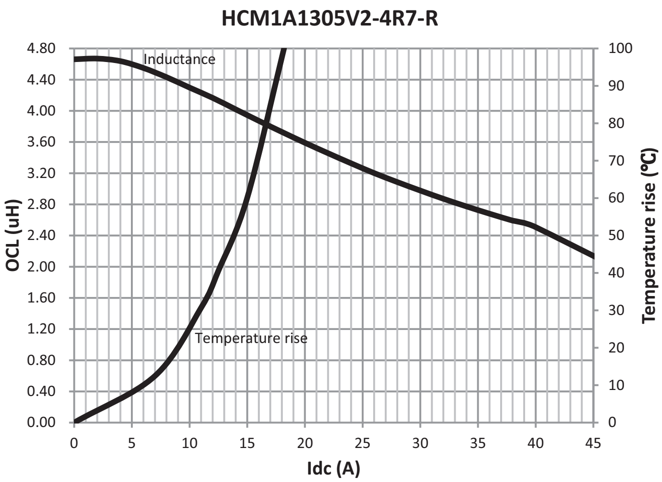
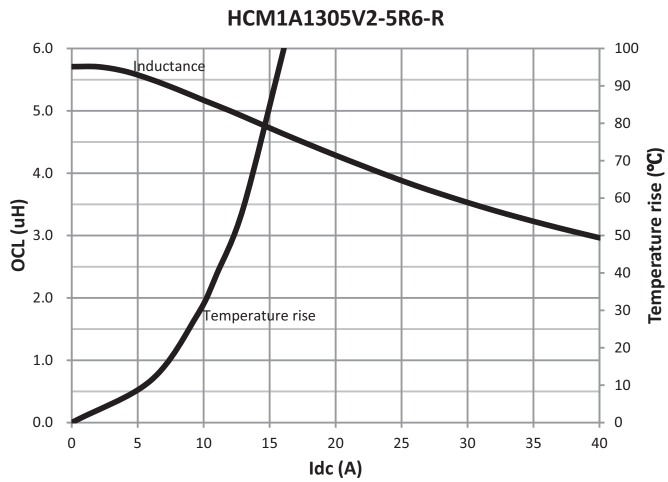
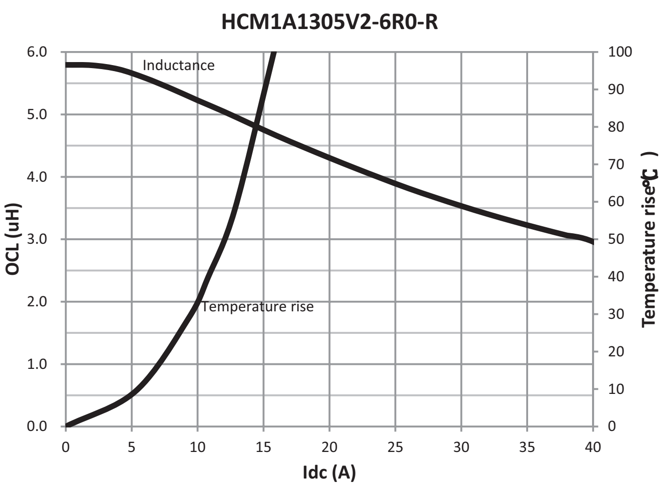
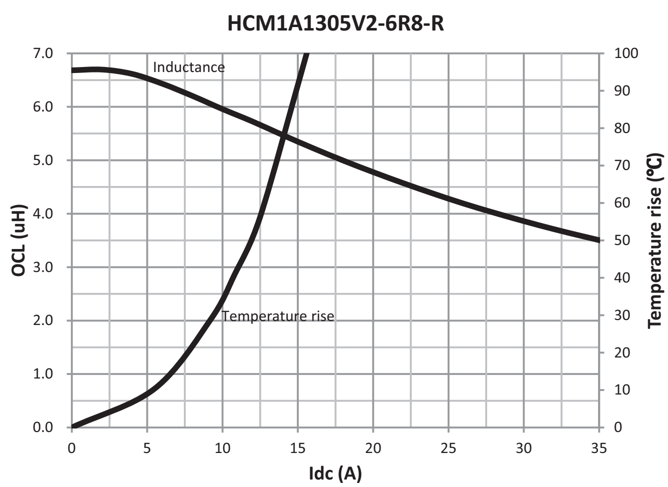


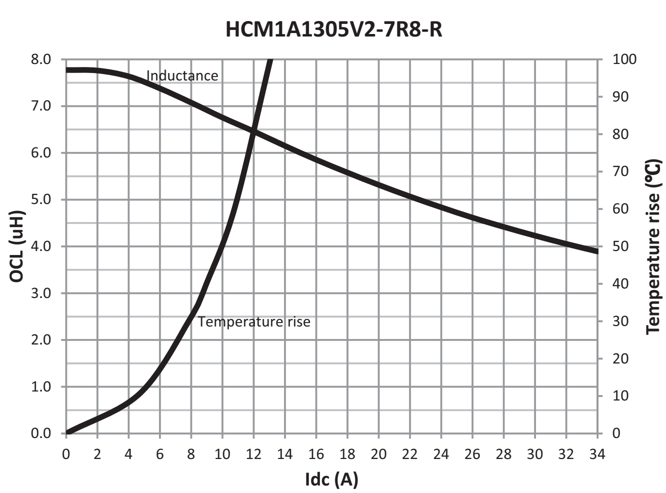
Inductance and temperature rise vs. current

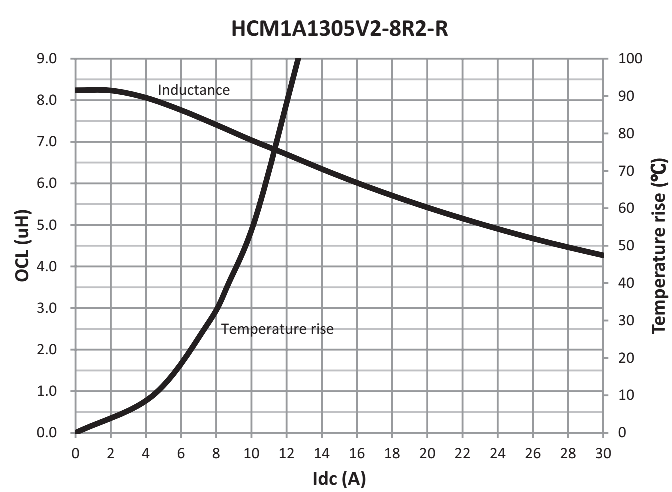




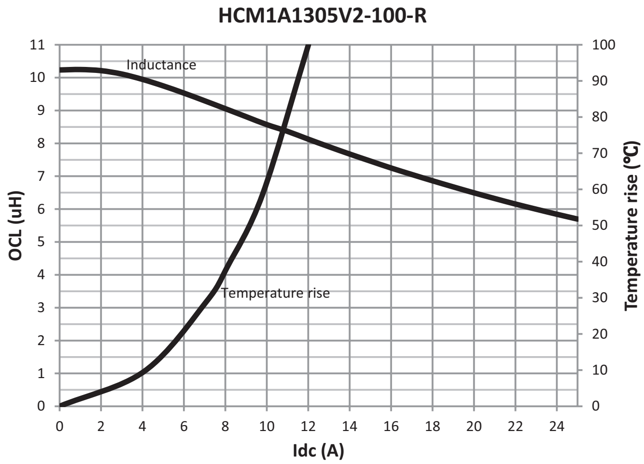


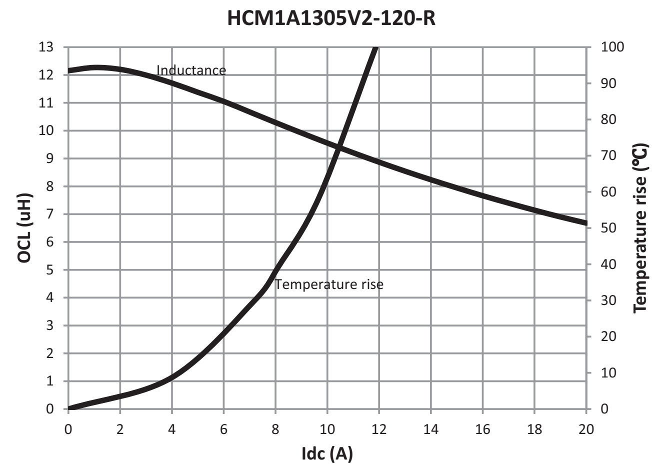


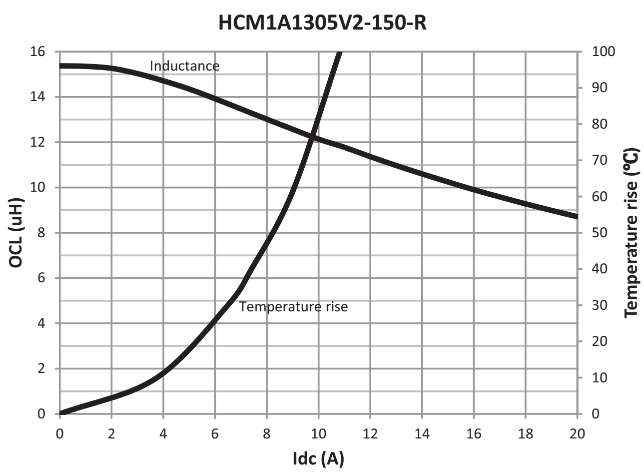


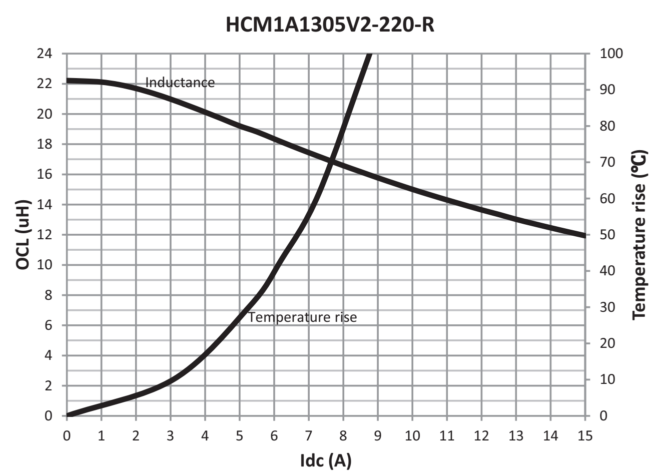


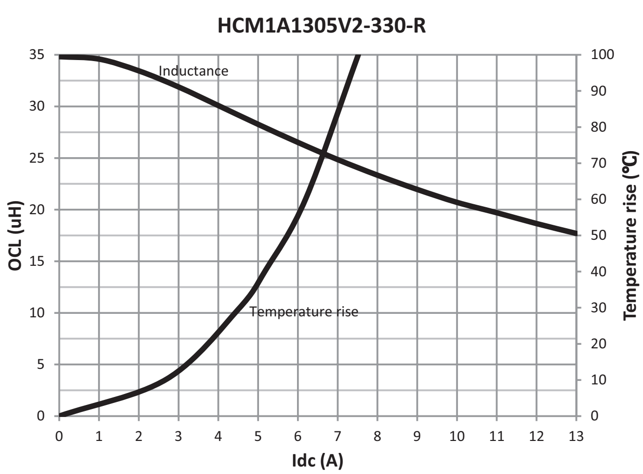
Inductance and temperature rise vs. current











Solder reflow profile

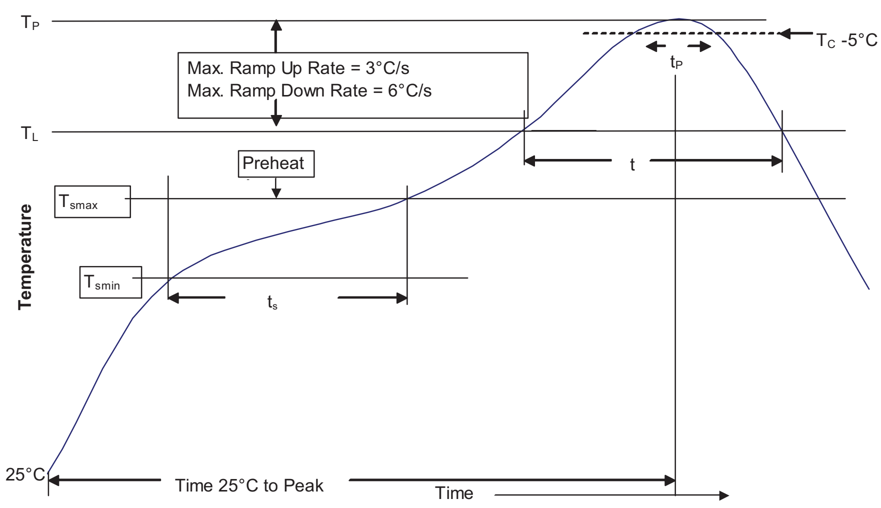


Table 1 - Standard SnPb solder (T_C)

Package thickness	Volume mm3 <350	Volume mm3 ≥350
<2.5 mm)	235 °C	220 °C
≥2.5 mm	220 °C	220 °C

Table 2 - Lead (Pb) free solder (T_C)

Package thickness	Volume mm³ <350	Volume mm³ 350 - 2000	Volume mm³ >2000
<1.6 mm	260 °C	260 °C	260 °C
1.6 – 2.5 mm	260 °C	250 °C	245 °C
>2.5 mm	250 °C	245 °C	245 °C

Reference 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) Time at liquidous (t_L)		183 °C 60-150 seconds	217 °C 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.

Eaton
Electronics Division
1000 Eaton Boulevard
Cleveland, OH 44122
United States
www.eaton.com/electronics

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