

HCM1A1307V2

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 0.22 μ H to 56 μ H
- Current range from 4.0 A to 100 A
- 13.8 mm x 12.9 mm footprint surface mount package in a 6.5 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



Powering Business Worldwide

Product specifications

Part number ⁶	OCL ¹ (μH) $\pm$ 20%	FLL ² (μH) minimum	I_{rms} ³ (A)	I_{sat} ⁴ (A)	DCR (m Ω) typical @ +20 °C	DCR (m Ω) maximum @ +20 °C	SRF (MHz) typical	K-factor ⁵
HCM1A1307V2-R22-R	0.22	0.14	52	100	0.46	0.60	135	244
HCM1A1307V2-R33-R	0.33	0.21	47	70	0.58	0.69	80	219
HCM1A1307V2-R47-R	0.47	0.30	43	56	0.73	0.87	59	186
HCM1A1307V2-1R0-R	1.0	0.64	28	34	1.49	1.75	34	149
HCM1A1307V2-1R2-R	1.2	0.76	22.5	30	1.78	2.10	34	117
HCM1A1307V2-1R5-R	1.5	0.96	21	25	2.04	2.40	31	126
HCM1A1307V2-1R8-R	1.8	1.15	19	24	2.55	2.94	26	105
HCM1A1307V2-2R2-R	2.2	1.40	18.5	23	2.62	3.10	24	95
HCM1A1307V2-3R3-R	3.3	2.11	16.5	18	3.55	4.10	18	90
HCM1A1307V2-4R7-R	4.7	3.00	13	20	6.25	7.25	14	71
HCM1A1307V2-5R6-R	5.6	3.58	12	18	7.21	8.30	11	64
HCM1A1307V2-6R8-R	6.8	4.35	10	15	9.50	11.5	9	52
HCM1A1307V2-7R8-R	7.8	4.99	10	16	10.25	11.78	9	46
HCM1A1307V2-8R2-R	8.2	5.25	10	14	10.3	11.85	8	46
HCM1A1307V2-100-R	10	6.40	8.3	13.5	15.0	17.2	7	43
HCM1A1307V2-120-R	12	7.68	8.0	12.5	16.4	18.9	6	38
HCM1A1307V2-150-R	15	9.60	7.0	11	20.3	23.4	6	35
HCM1A1307V2-220-R	22	14.1	6.0	8	28.8	33.1	5	28
HCM1A1307V2-330-R	33	21.0	5.0	7.5	40.8	45.0	3	26
HCM1A1307V2-560-R	56	35.8	4.0	4.3	55.0	65.0	2	23

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). B_{p-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: HCM1A1307V2-xxx-R

HCM1A1307V2 = 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

Technical drawing of the 1AxxxV2 connector showing top and side views with dimensions.

Top View Dimensions:

- Overall width: 13.45 ± 0.35
- Overall height: 12.6 ± 0.3
- Internal width: 8.85 typ
- Internal height: 2.3 ± 0.35

Side View Dimensions:

- Overall height: 6.5 max

Labels:

- 1AxxxV2
xxxx
- a
- b
- A

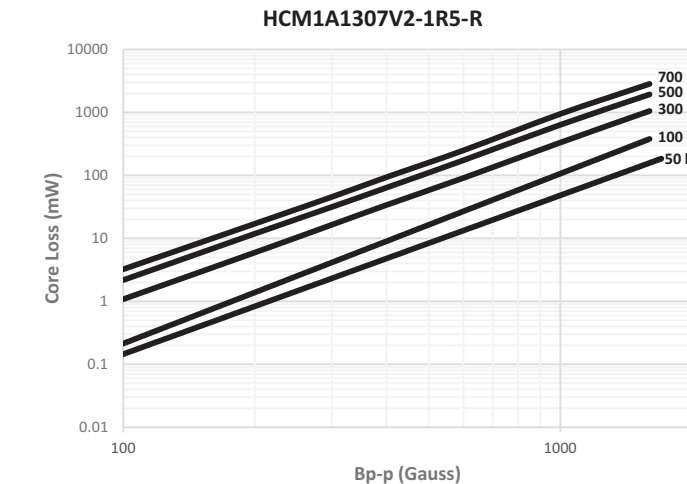
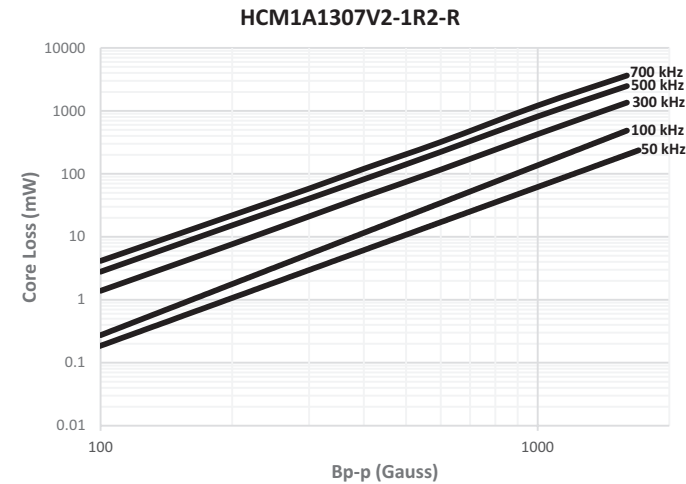
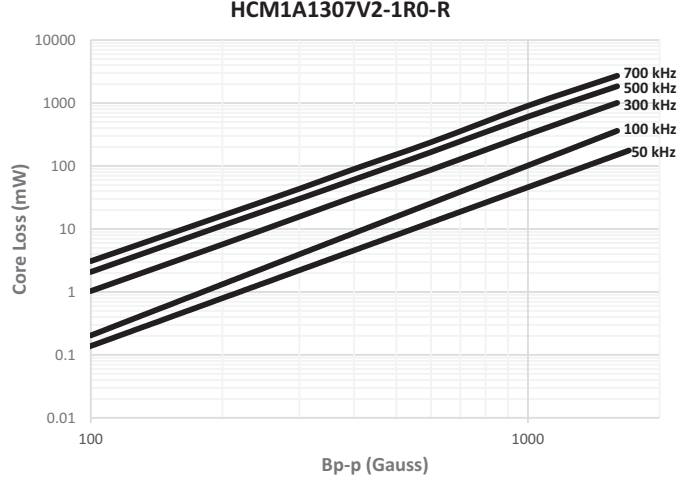
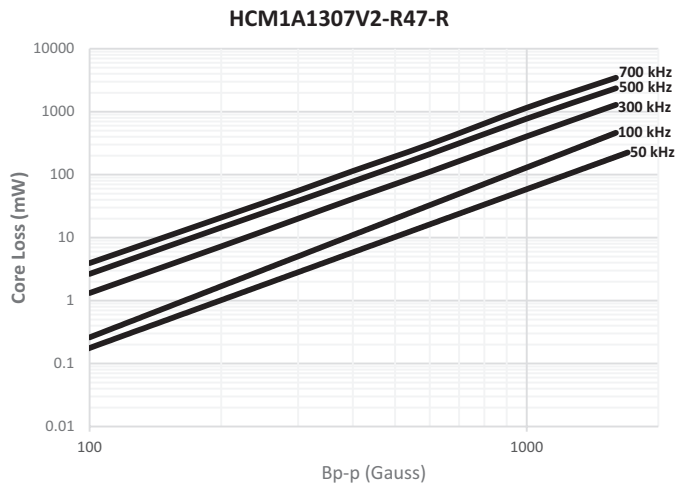
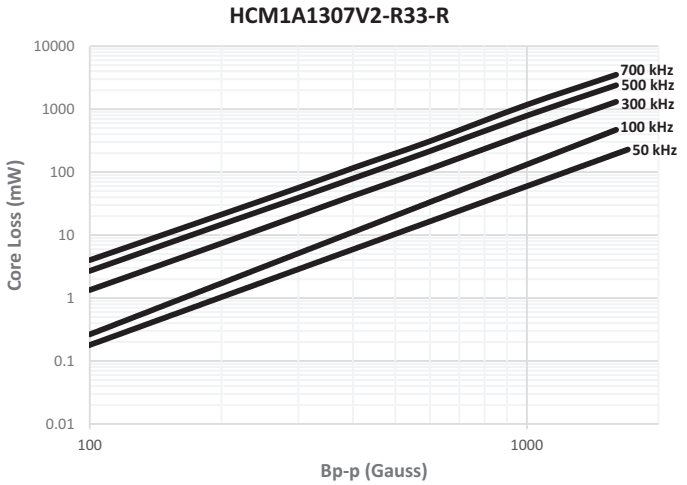
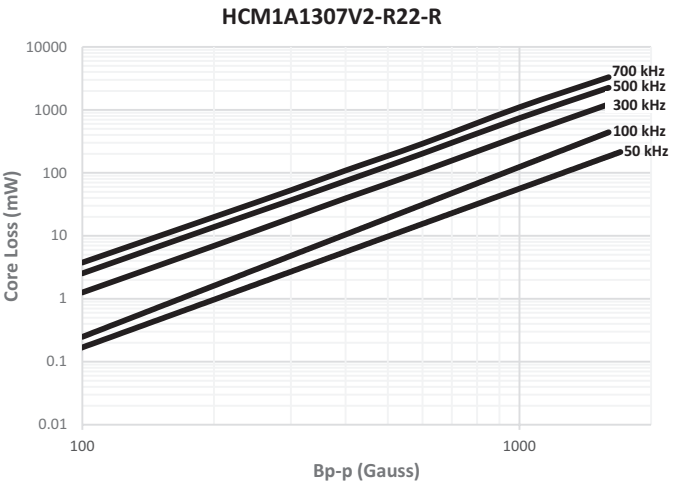
Dimension A		
HCM1A1307V2-R22 through R47-R,	HCM1A1307V2-1R0 through 3R3-R	HCM1A1307V2-4R7 through 560-R
4.4 ±0.3	3.68 ±0.3	4.7 ±0.3

Figure 1 is a mechanical drawing of the test specimen. It shows a rectangular plate with four square test cells. The overall dimensions are 16 in width and 22.25 min in height. The central height of the plate is 11.5. The diameter of the holes is 1.5. The spacing between the holes is 2.0, and the spacing between the test cells is 4.0. The drawing includes section lines A-A and B-B.

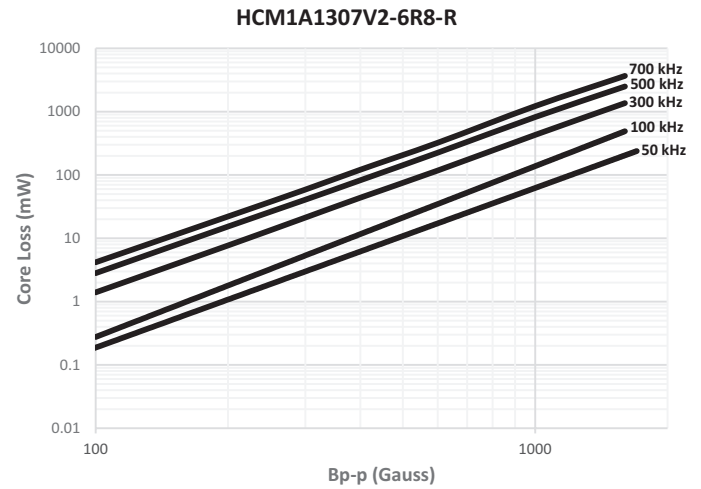
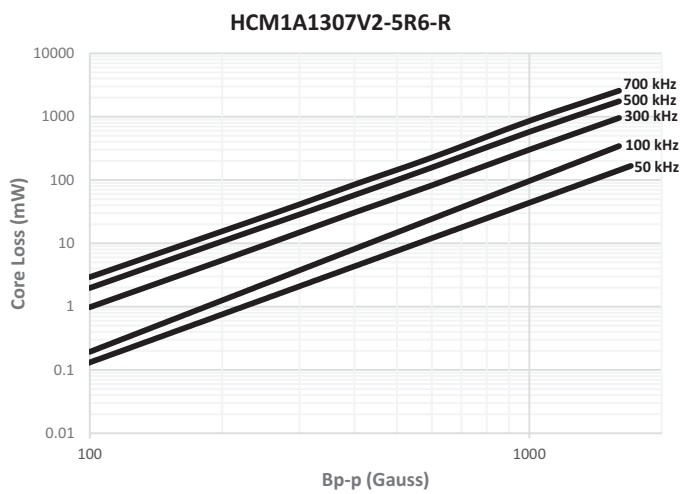
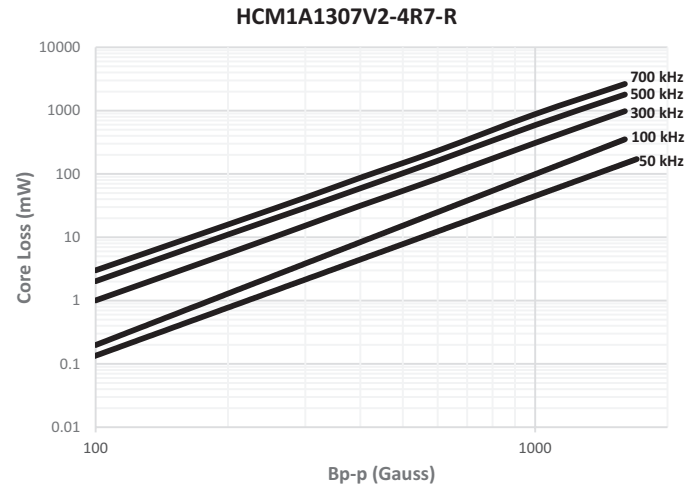
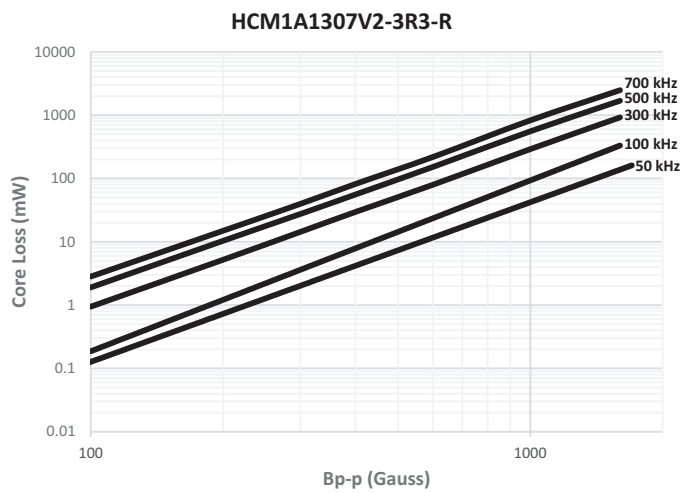
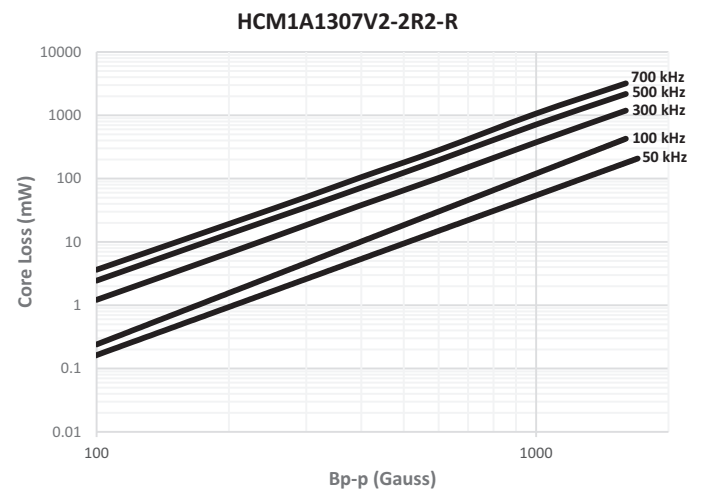
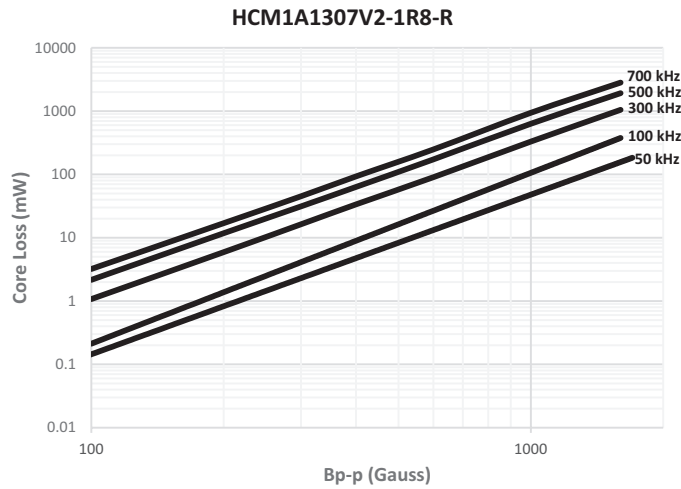
Section B-B

13.4

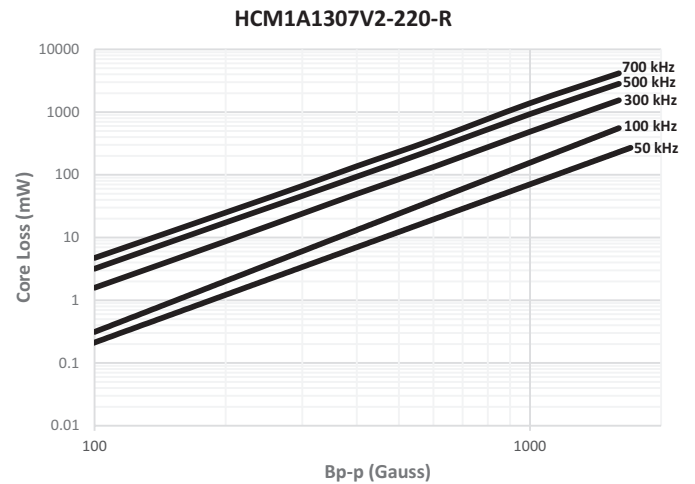
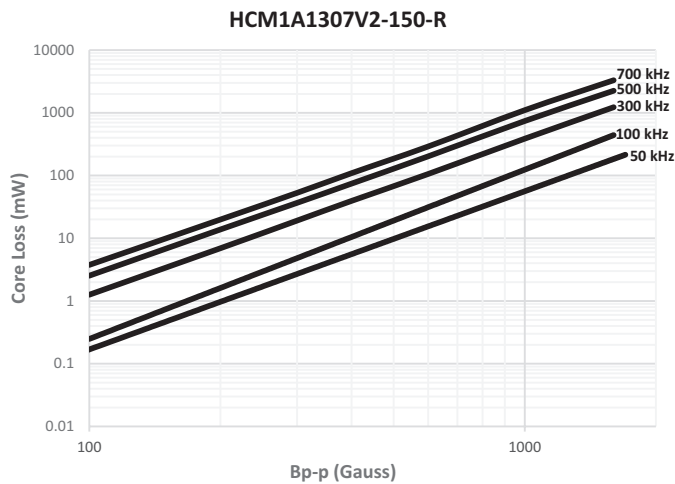
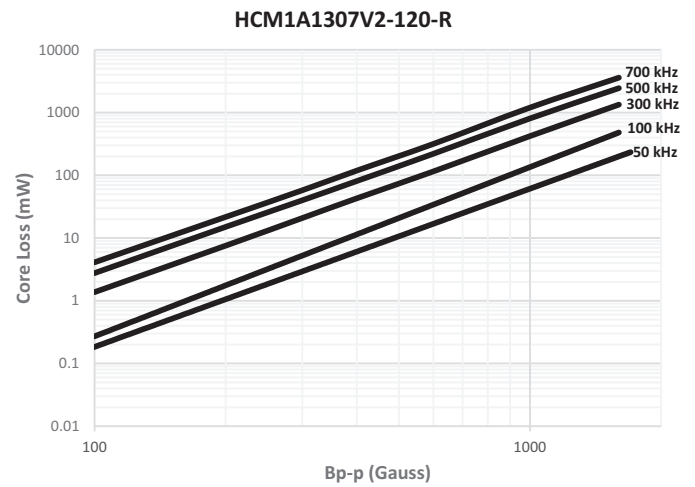
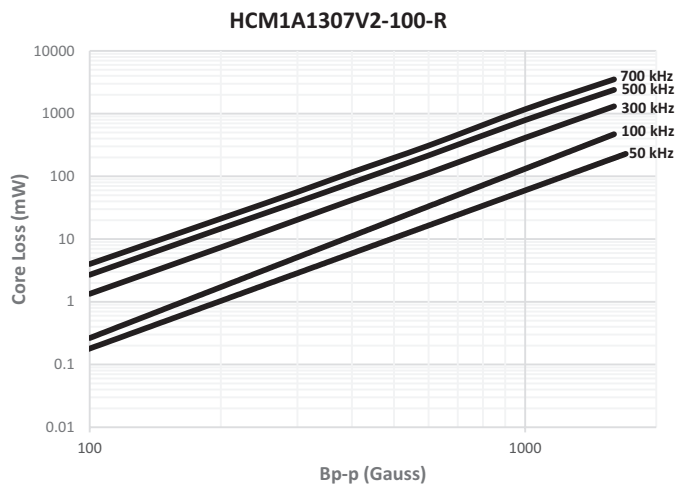
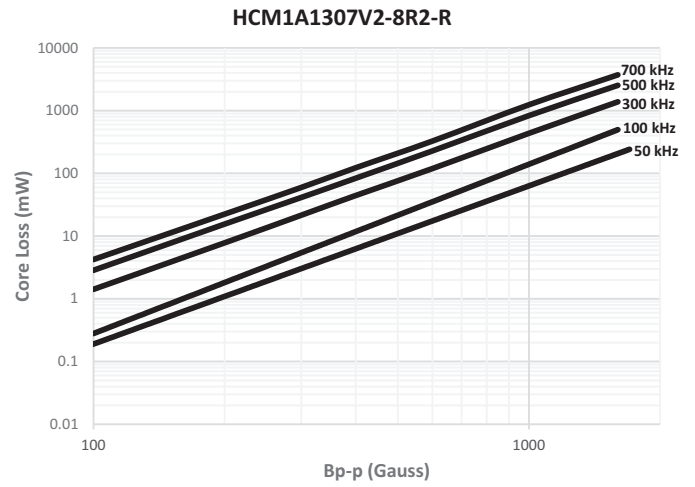
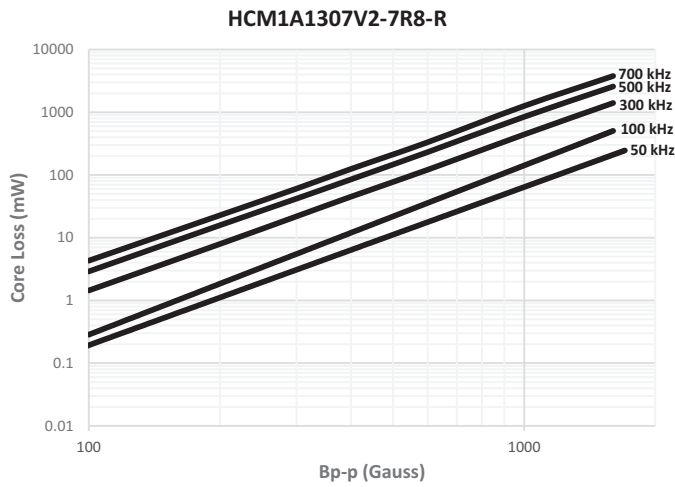
Core loss vs B_{p-p}



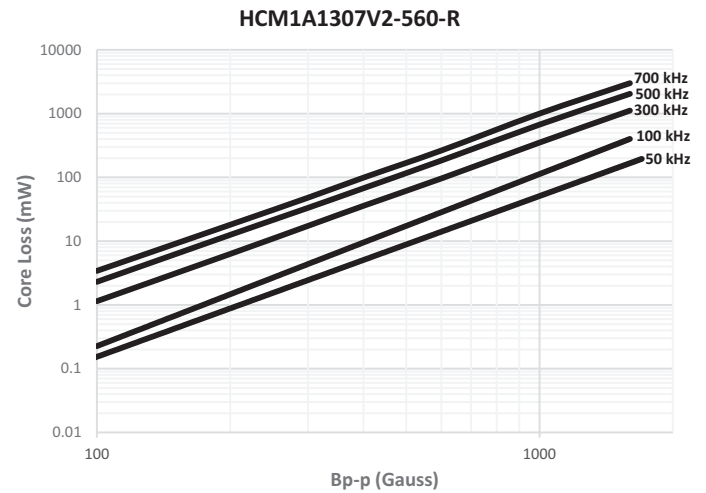
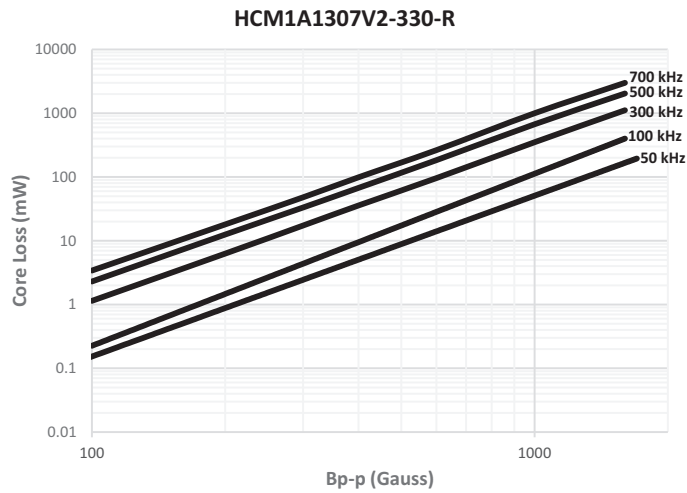
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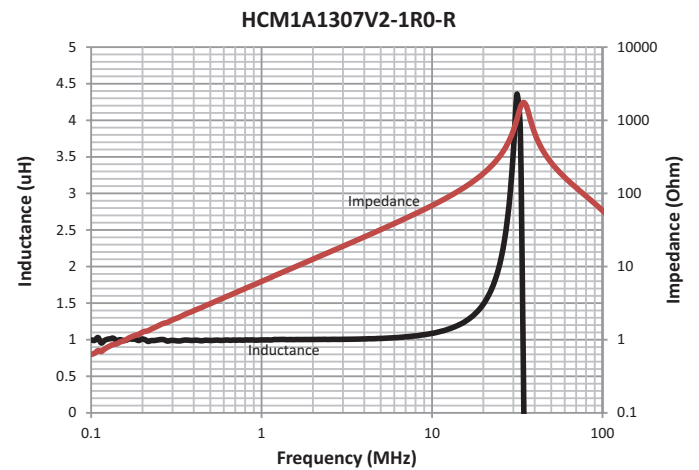
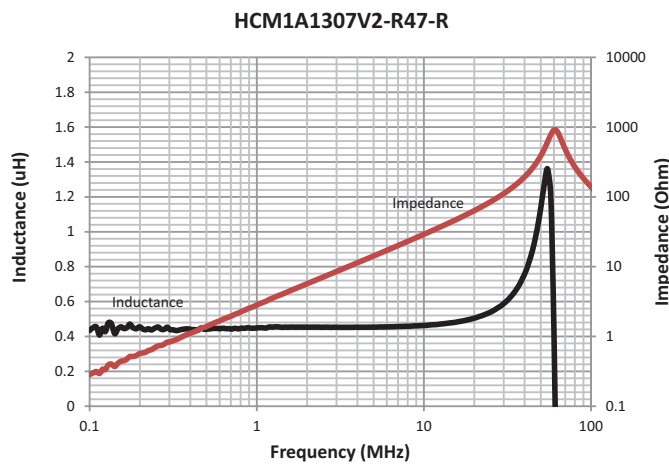
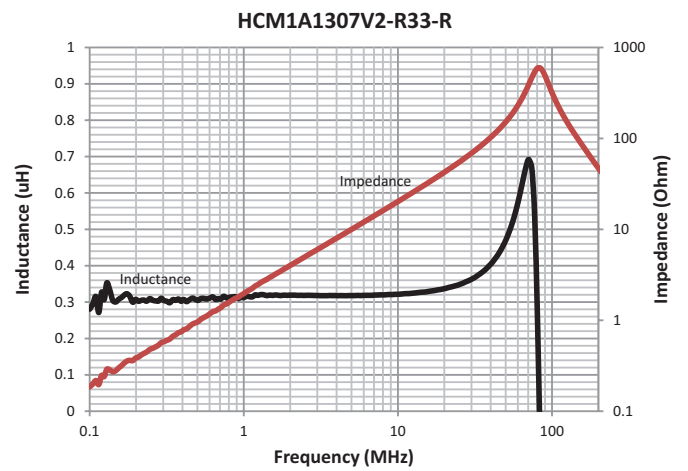
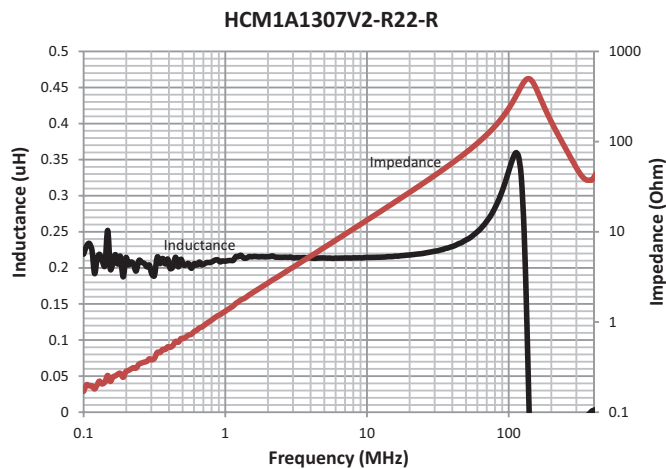
Core loss vs B_{p-p}



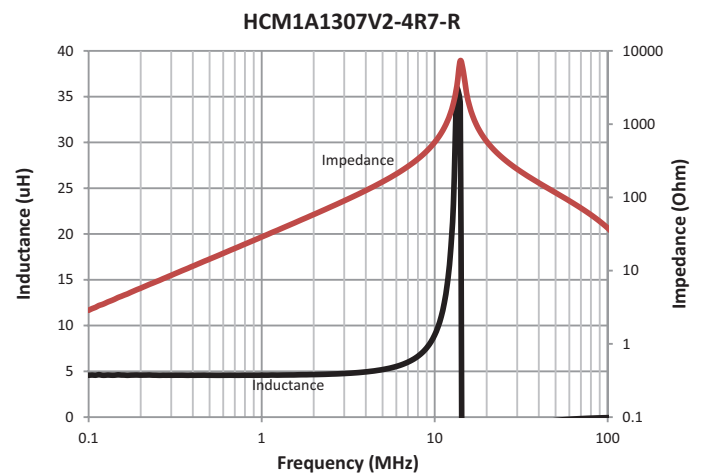
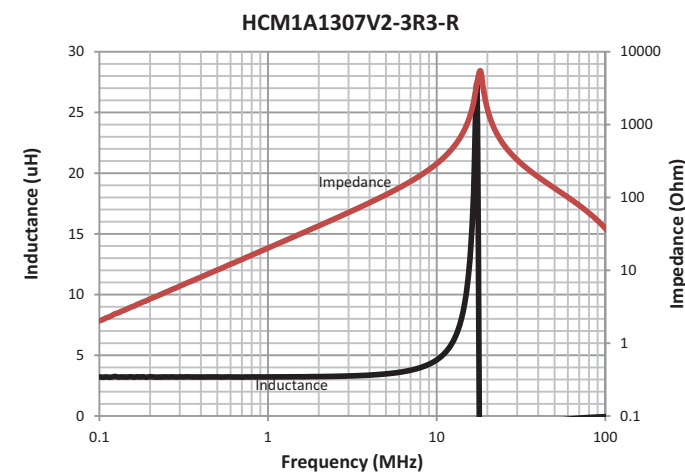
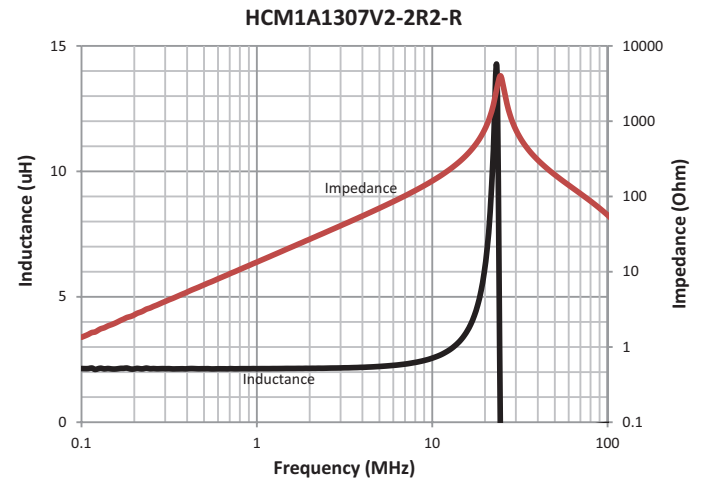
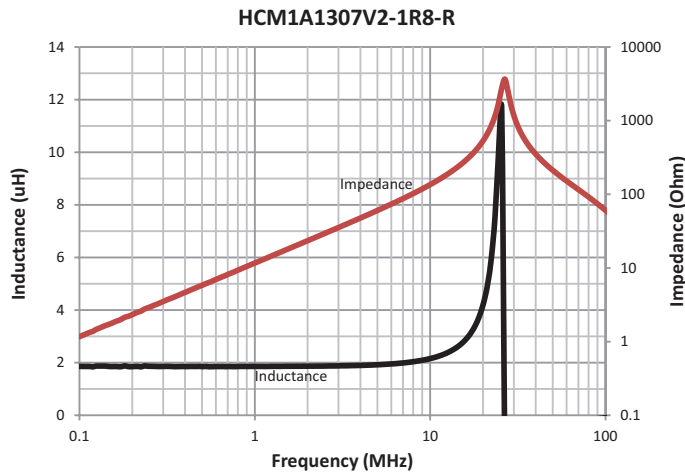
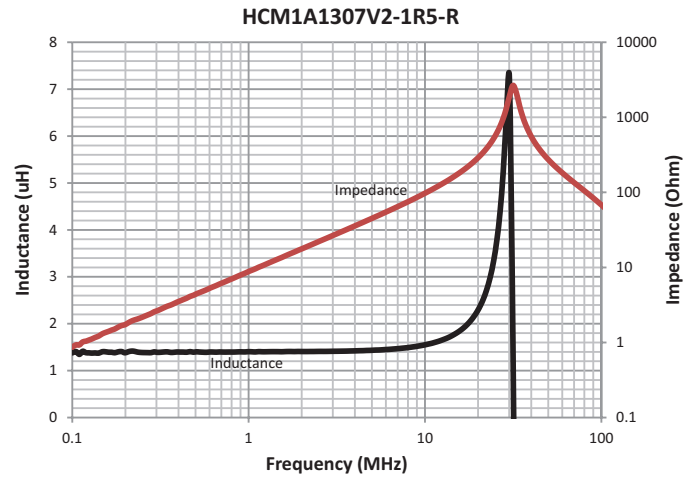
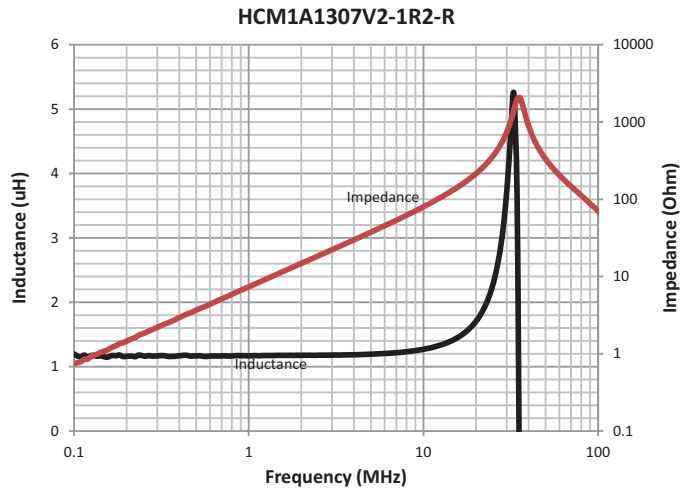
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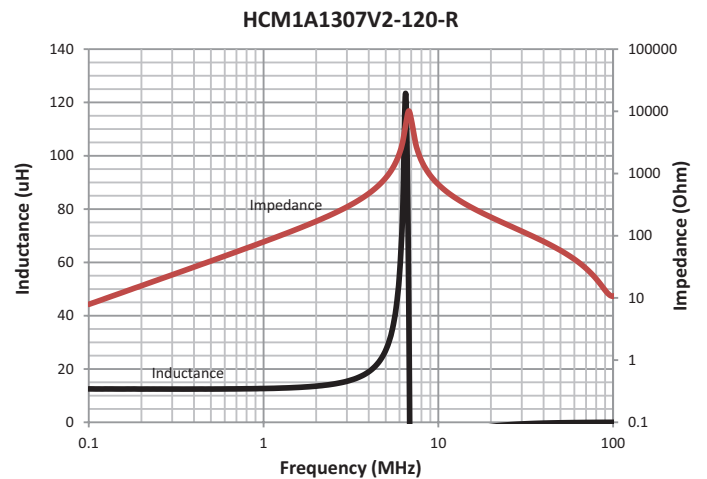
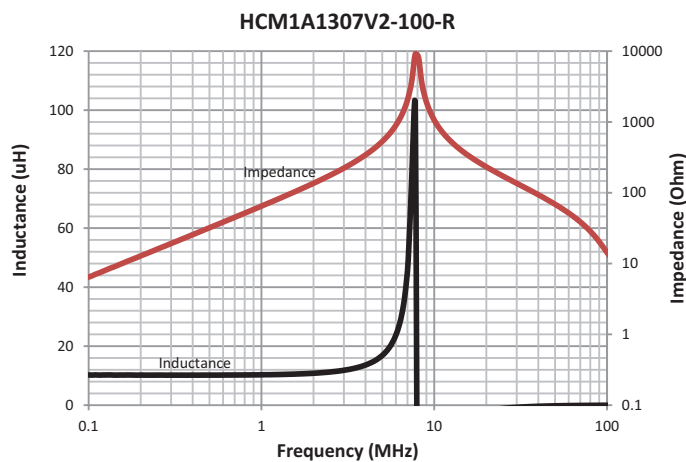
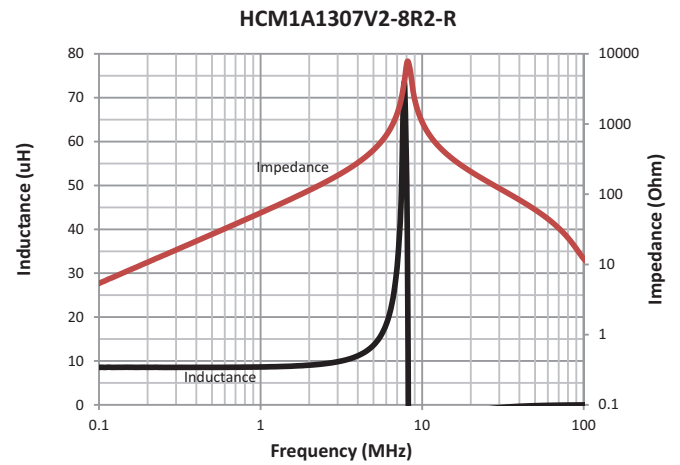
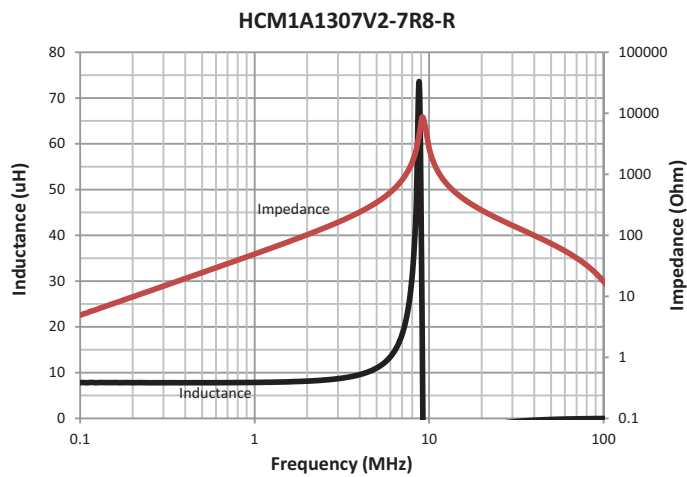
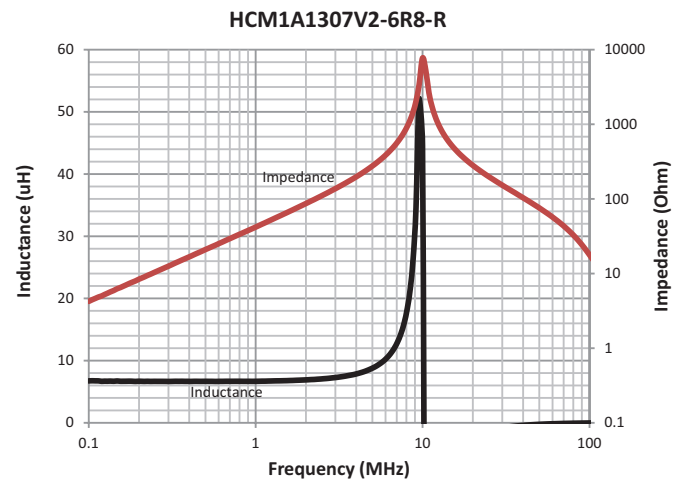
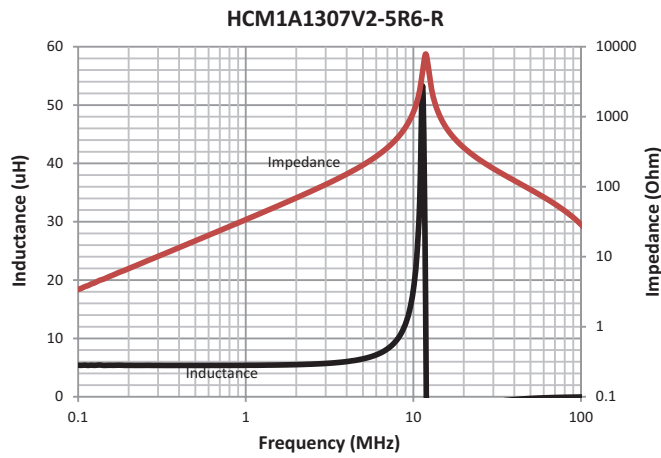
Inductance and impedance vs. frequency



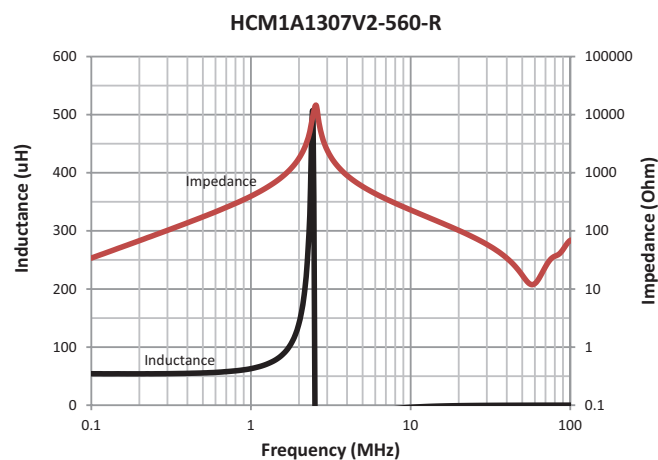
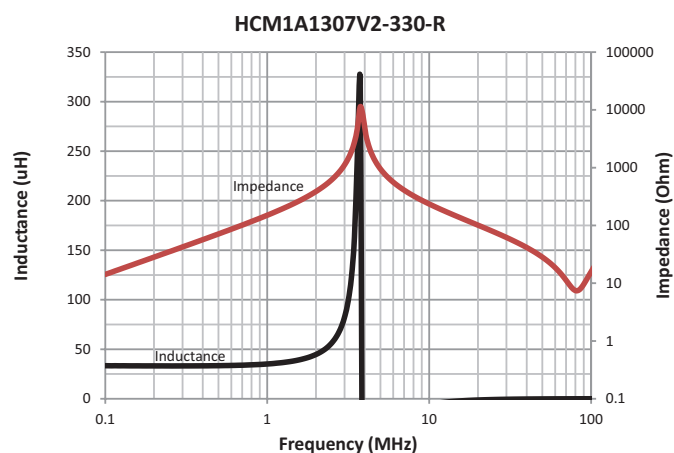
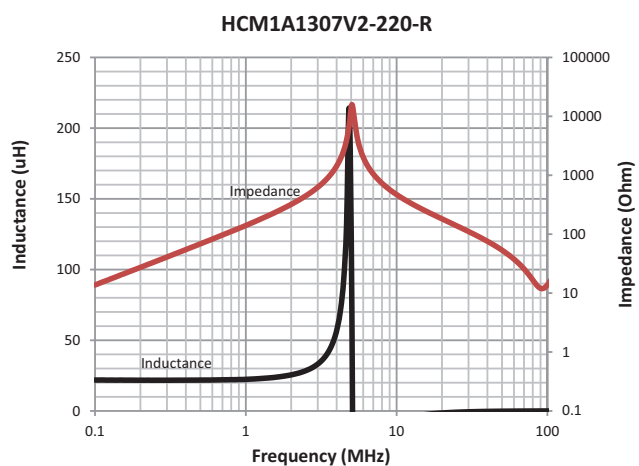
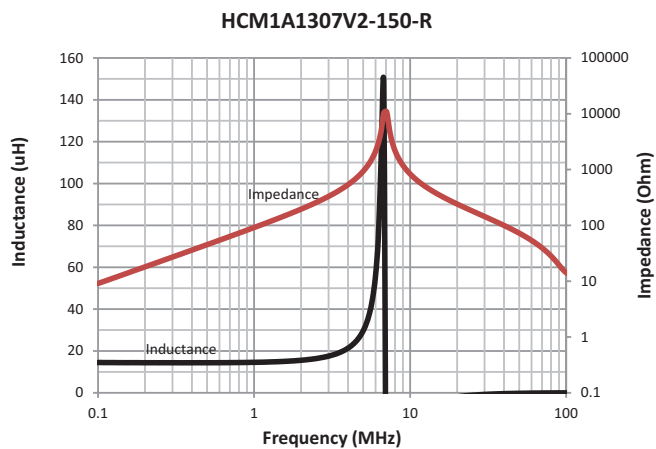
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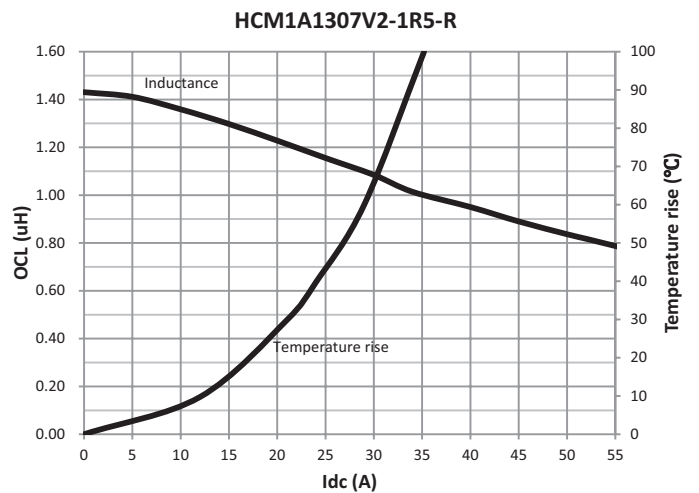
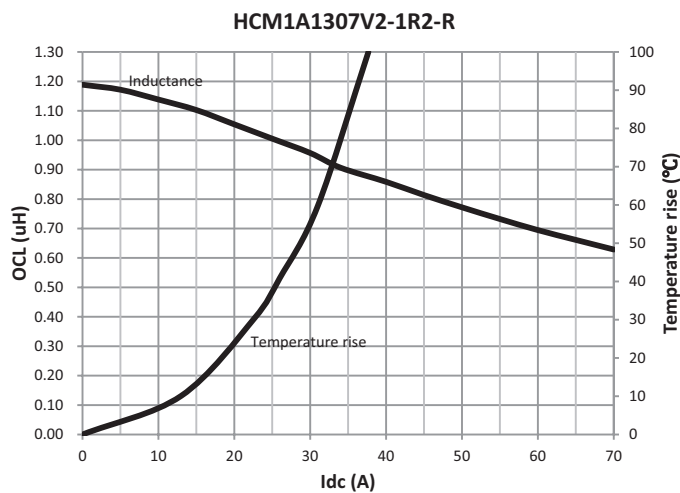
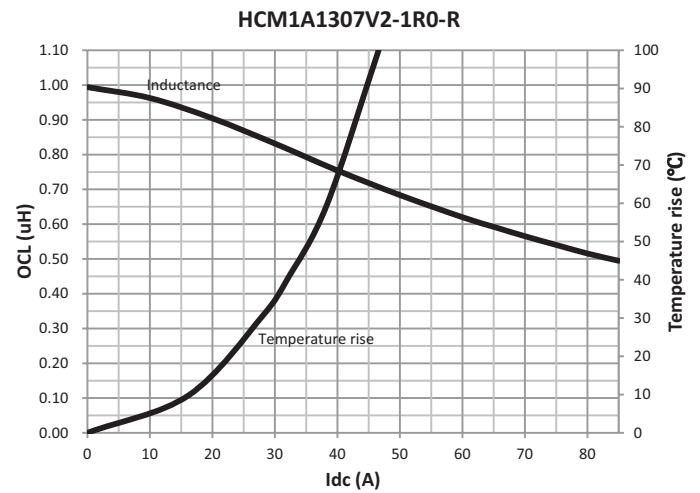
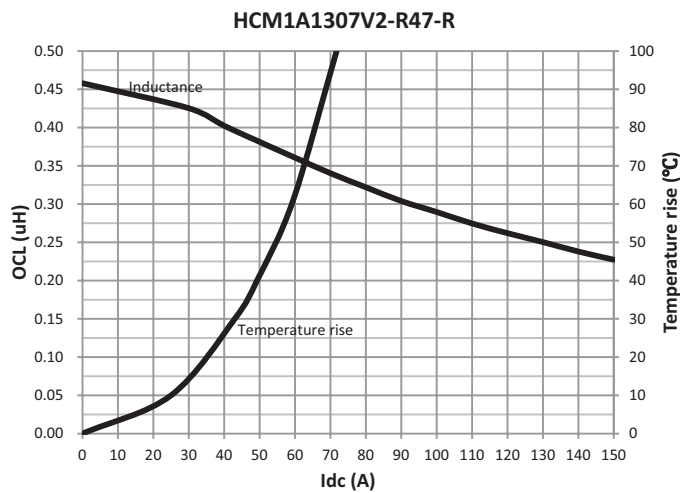
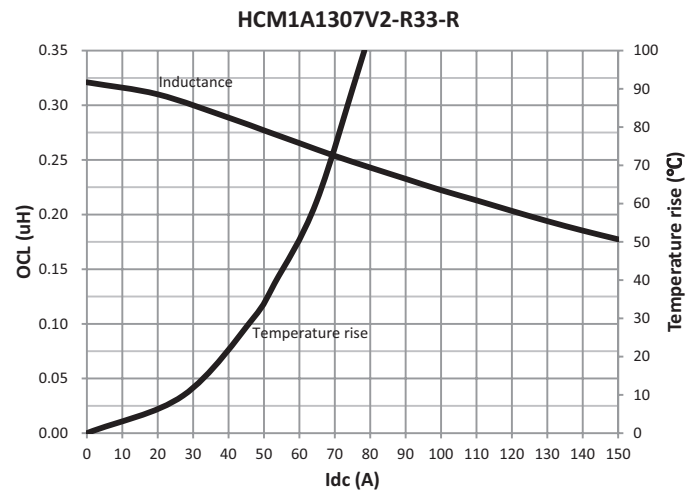
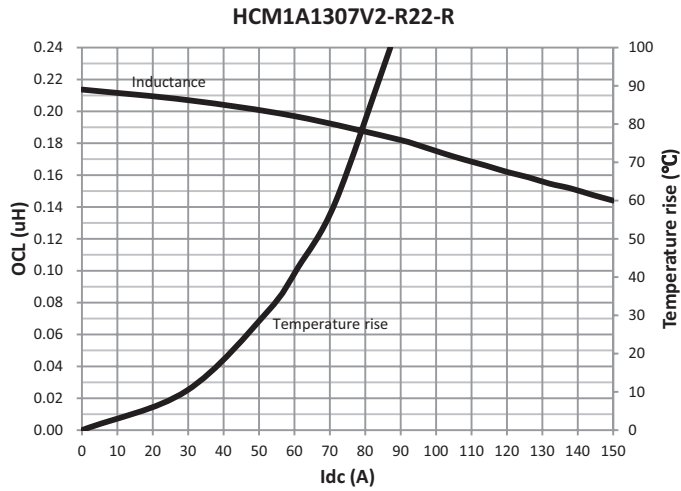
Inductance and impedance vs. frequency



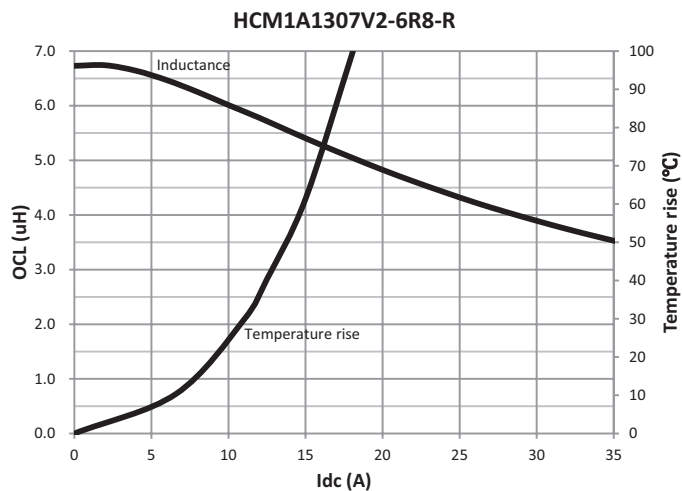
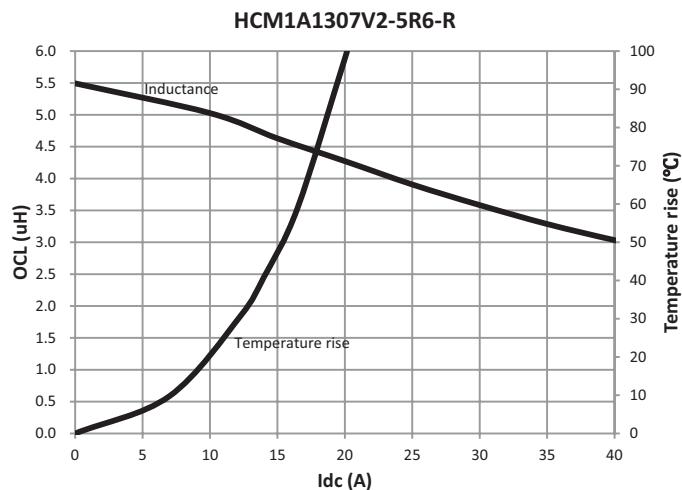
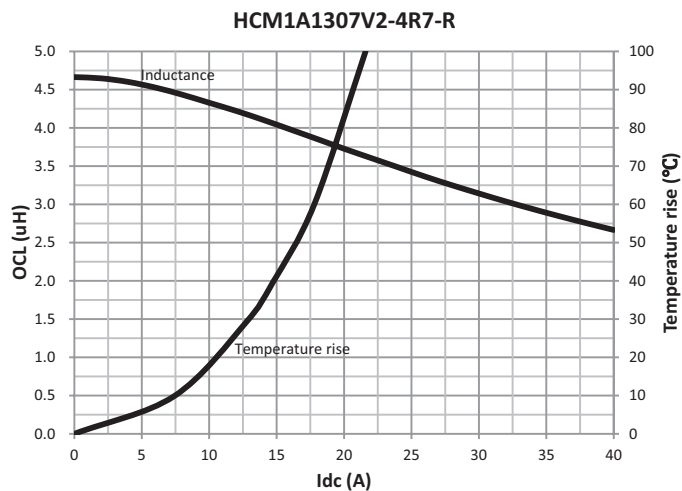
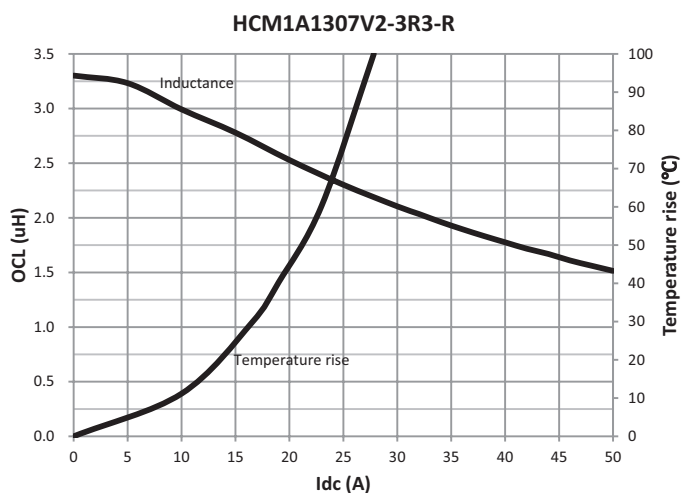
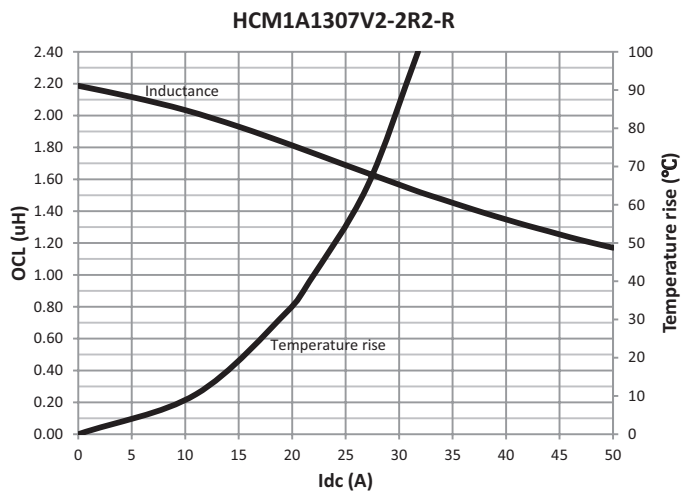
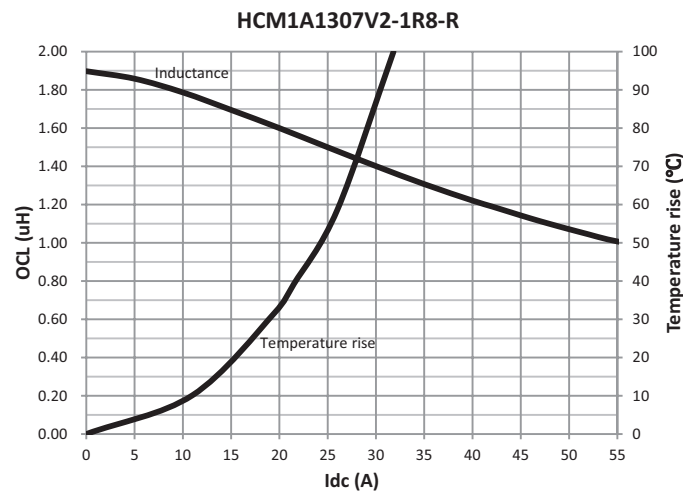
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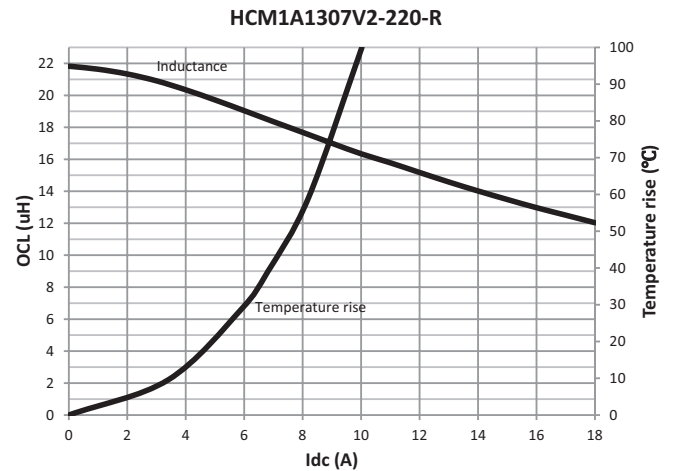
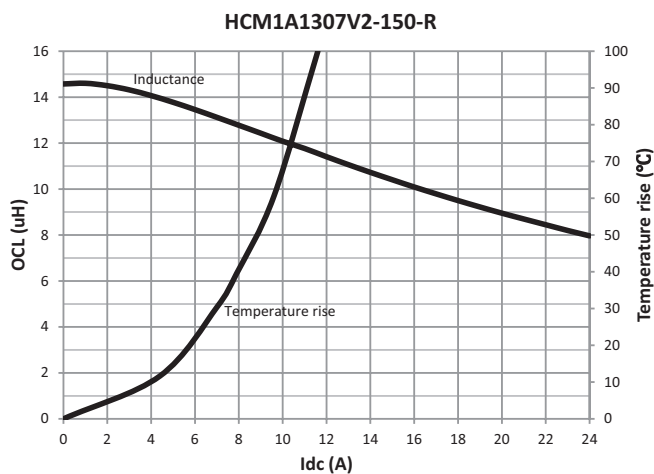
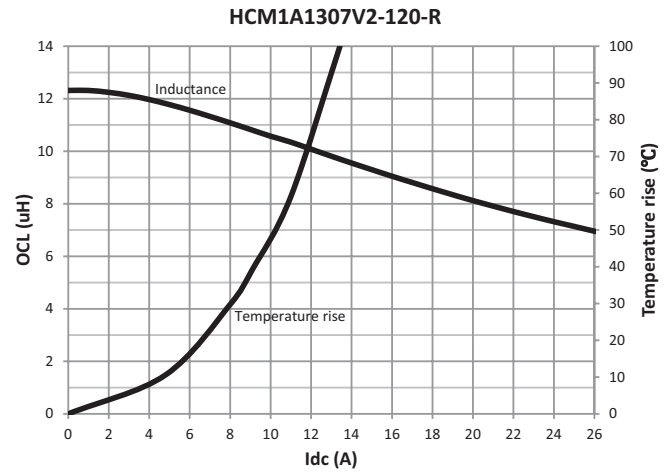
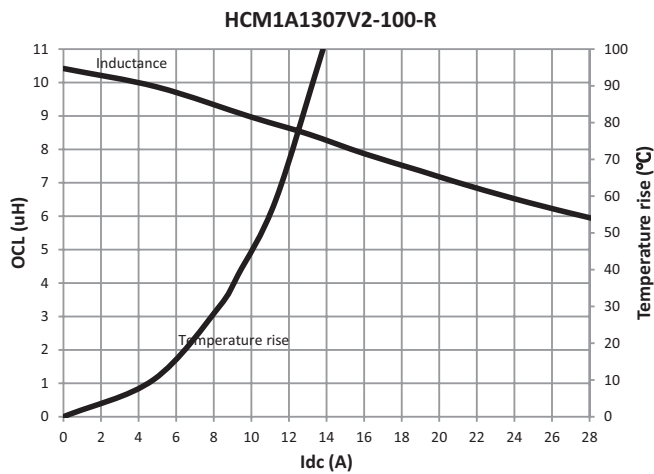
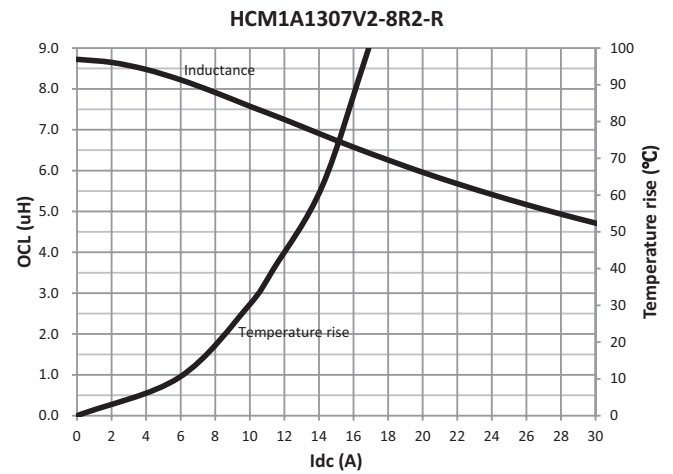
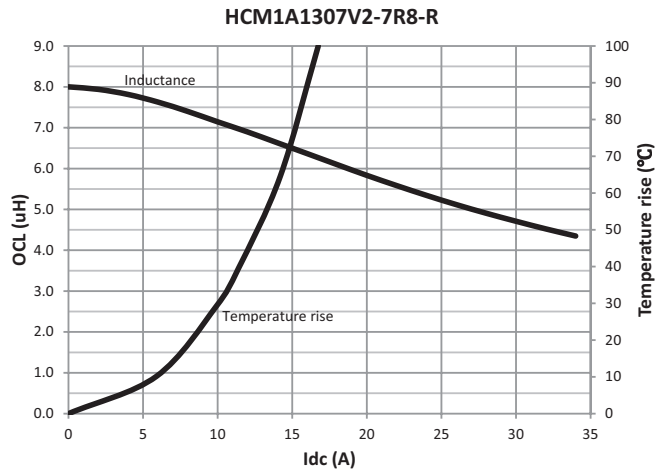
Inductance and temperature rise vs. current



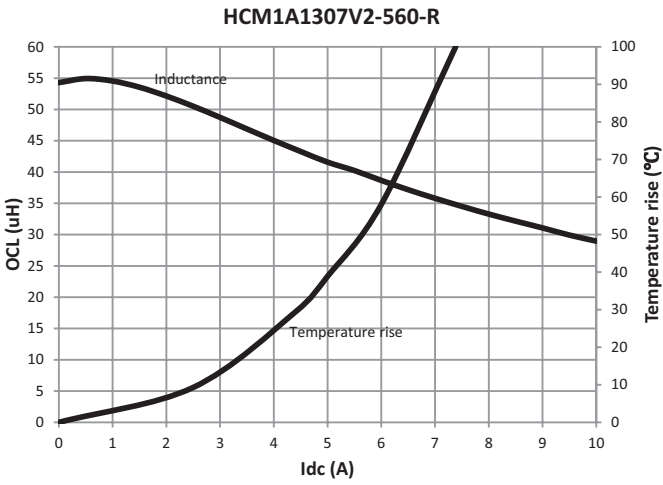
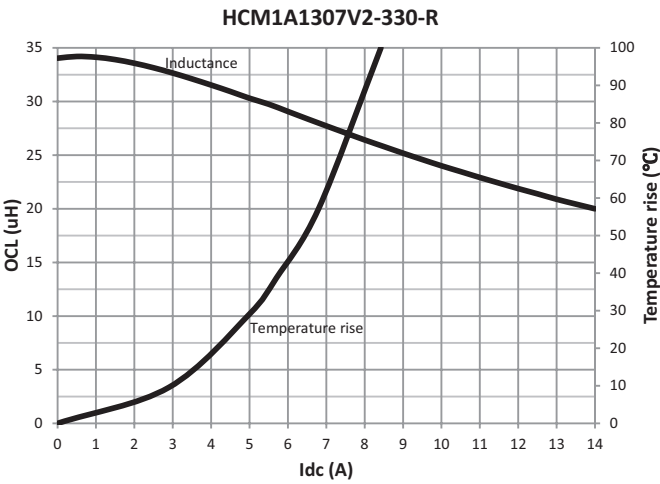
Inductance and temperature rise vs. current



Inductance and temperature rise vs. current



Inductance and temperature rise vs. current



Solder reflow profile

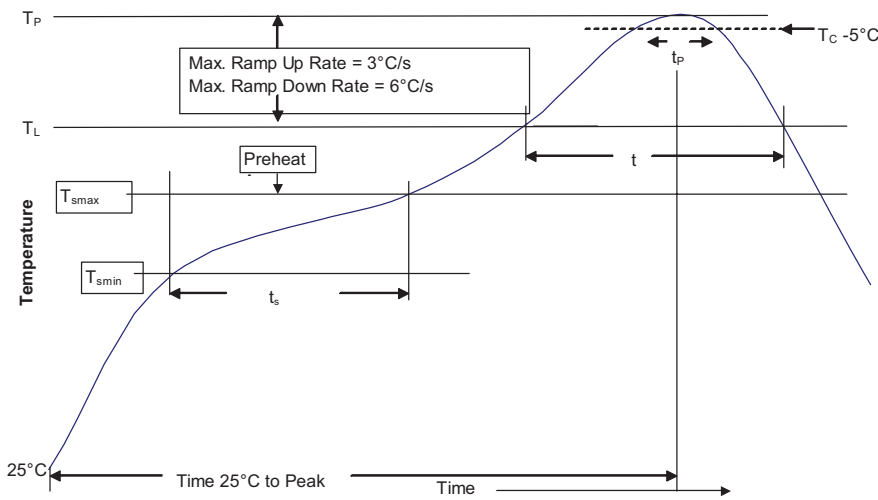


Table 1 - Standard SnPb solder (T_C)

Package thickness	Volume mm ³ <350	Volume mm ³ ≥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 mm ³ <350	Volume mm ³ 350 - 2000	Volume mm ³ >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)	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:

[HCM1A1307V2-100-R](#) [HCM1A1307V2-120-R](#) [HCM1A1307V2-150-R](#) [HCM1A1307V2-1R0-R](#) [HCM1A1307V2-1R2-R](#)
[HCM1A1307V2-1R5-R](#) [HCM1A1307V2-R33-R](#) [HCM1A1307V2-R47-R](#) [HCM1A1307V2-560-R](#) [HCM1A1307V2-5R6-](#)
[R](#) [HCM1A1307V2-6R8-R](#) [HCM1A1307V2-7R8-R](#) [HCM1A1307V2-8R2-R](#) [HCM1A1307V2-R22-R](#) [HCM1A1307V2-](#)
[1R8-R](#) [HCM1A1307V2-220-R](#) [HCM1A1307V2-2R2-R](#) [HCM1A1307V2-330-R](#) [HCM1A1307V2-3R3-R](#) [HCM1A1307V2-](#)
[4R7-R](#)