

HCM1A1305

Automotive grade

High current power inductors



Product features

- AEC-Q200 Grade 1 qualified
- High current carrying capacity
- Magnetically shielded, low EMI
- Frequency range up to 1 MHz
- Inductance range from 0.1 μ H to 33 μ H
- Current range from 3.5 A to 80 A
- 13.8 mm x 12.5 mm footprint surface mount package in a 5.0 mm height
- Moisture Sensitivity Level (MSL): 1
- Alloy powder core material
- Halogen free, lead free, RoHS compliant

Applications

- Body electronics
 - Central body control module
 - 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
 - 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



Product Specifications

Part Number ⁶	OCL ¹ (μ H) $\pm$ 20%	FLL ² (μ H) minimum	I _{rms} ³ (A)	I _{sat} ⁴ (A)	DCR (m Ω) typical @ +20°C	DCR (m Ω) maximum @ +20°C	K-factor ⁵
HCM1A1305-R10-R	0.10	0.064	43	80	0.52	0.59	818
HCM1A1305-R22-R	0.22	0.14	40	44	0.63	0.72	458
HCM1A1305-R33-R	0.33	0.21	35	44	0.80	0.92	379
HCM1A1305-R47-R	0.47	0.30	33	36	0.80	0.92	375
HCM1A1305-R56-R	0.56	0.36	28	36	1.15	1.33	265
HCM1A1305-R68-R	0.68	0.44	27	32	1.15	1.33	263
HCM1A1305-R82-R	0.82	0.52	26	26	1.4	1.61	262
HCM1A1305-1R0-R	1.0	0.64	22	30	2.1	2.42	214
HCM1A1305-1R5-R	1.5	0.96	18	22	2.75	3.16	177
HCM1A1305-1R8-R	1.8	1.15	16	20	4.0	4.6	154
HCM1A1305-2R2-R	2.2	1.41	15	18	4.6	5.29	153
HCM1A1305-3R3-R	3.3	2.11	12	16	7.7	9.2	134
HCM1A1305-4R7-R	4.7	3.01	9.3	15	11	12.7	102
HCM1A1305-5R6-R	5.6	3.58	8.8	15	12	13.8	89
HCM1A1305-6R0-R	6.0	3.84	8.1	12.5	12.5	14.5	90
HCM1A1305-6R8-R	6.8	4.35	8.3	13	13	15	74
HCM1A1305-7R8-R	7.8	4.99	7.6	15	16.8	19.4	70
HCM1A1305-8R2-R	8.2	5.25	7.3	13	17.5	20.1	67
HCM1A1305-100-R	10	6.40	6.8	13	19	21.9	65
HCM1A1305-120-R	12	7.68	5.5	9.0	21	24	81
HCM1A1305-150-R	15	9.6	5.8	11	29	33.4	49
HCM1A1305-220-R	22	14.1	3.5	6.8	45	51.8	43
HCM1A1305-330-R	33	21.1	4.0	7.0	74.5	85.5	32

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_{pp} for core loss (see graph). Bp-p = K * L * Δ I. B_{pp}: (Gauss), K: (K-factor from table), L: (Inductance in μ H), Δ I (Peak to peak ripple current in Amps).

6. Part Number Definition: HCM1A1305-xxx-R

HCM1A1305 = Product code and size

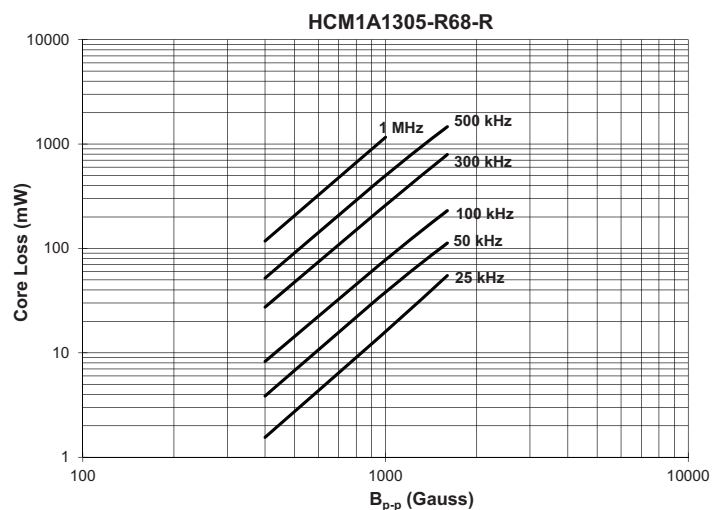
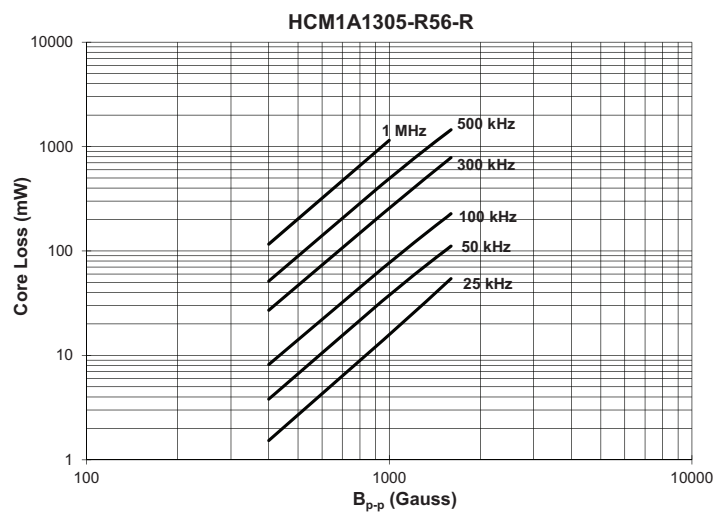
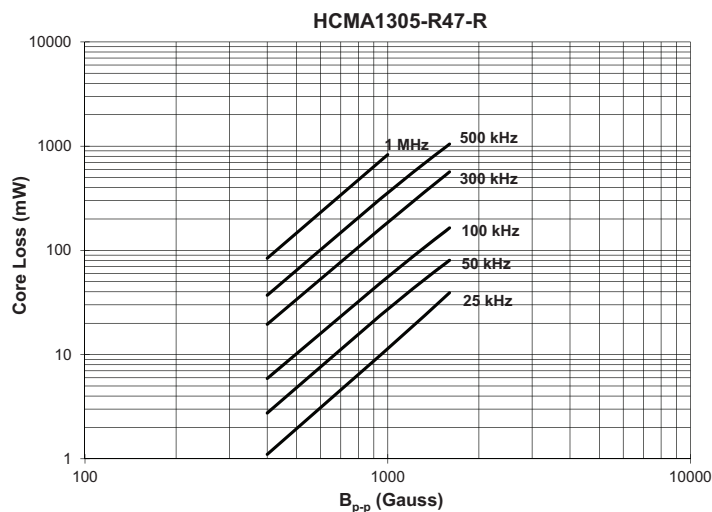
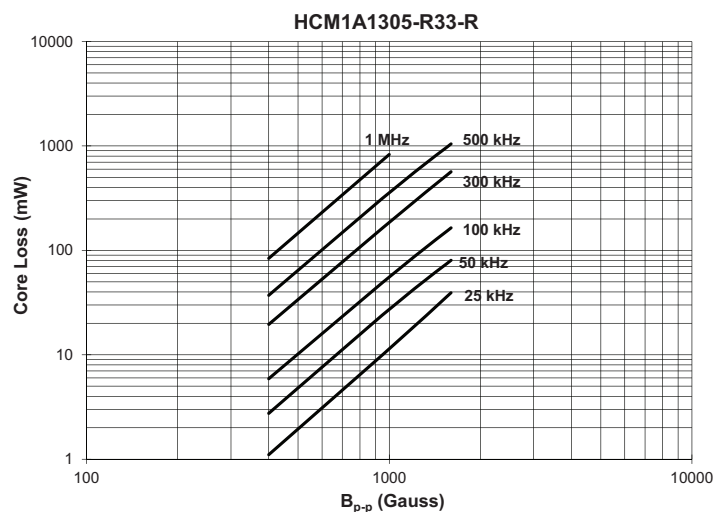
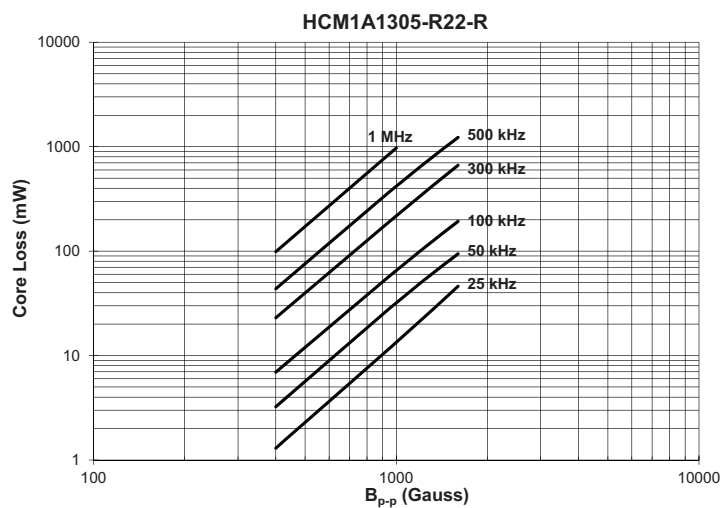
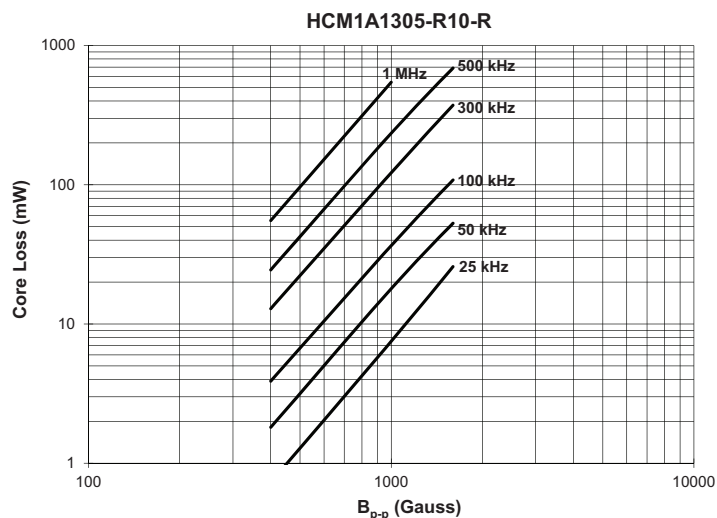
xxx= inductance value in μ H, R= decimal point,

If no R is present then last character equals number of zeros

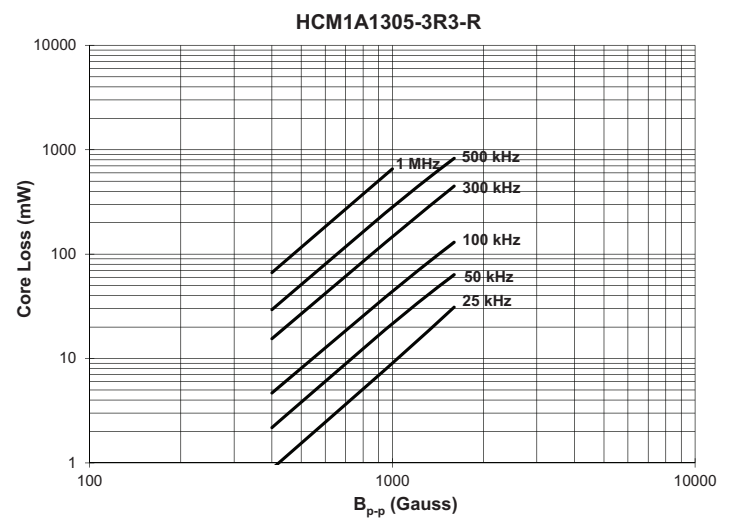
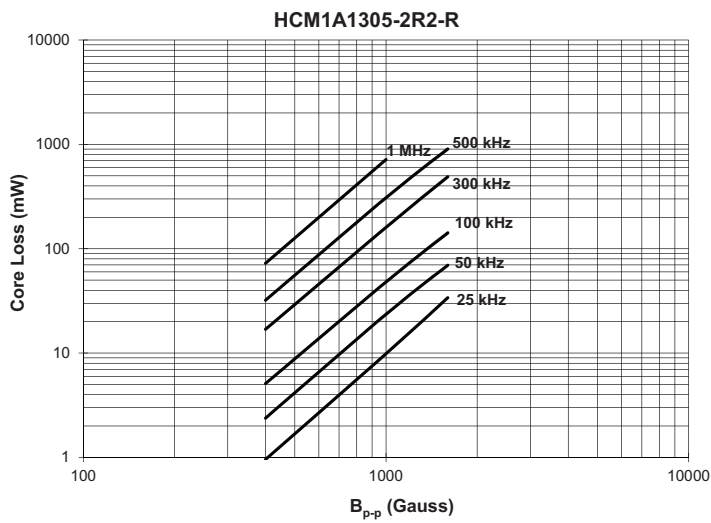
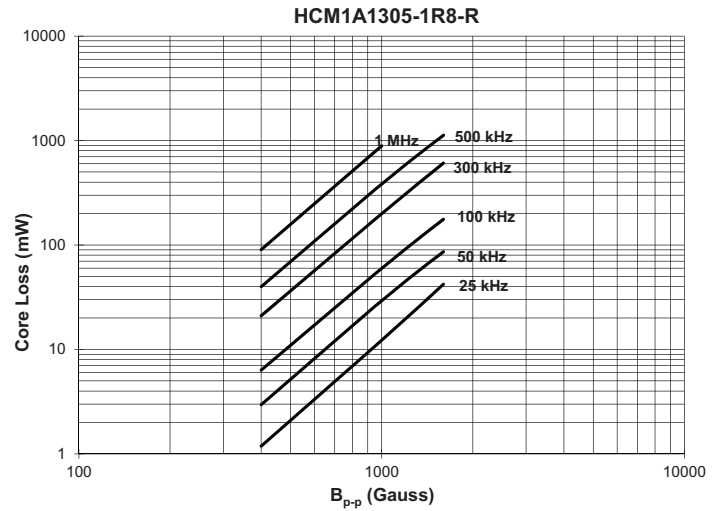
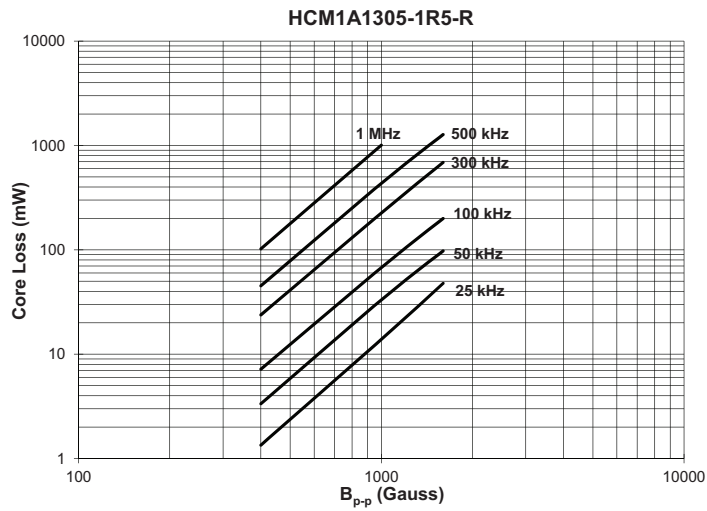
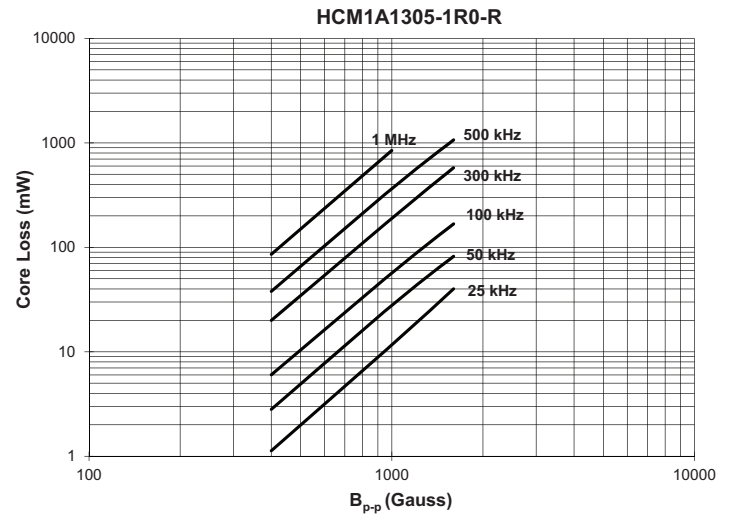
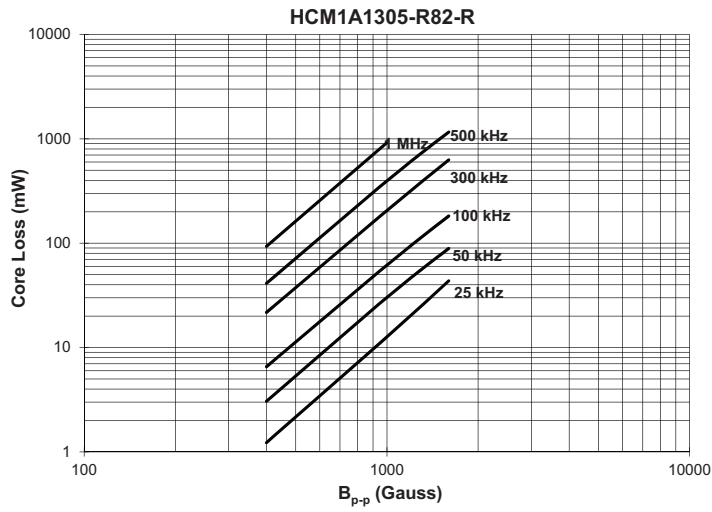
-R suffix = RoHS compliant

Technical drawing of a multi-hole punch tool. The main view shows a side profile with dimensions: 1.5 dia (hole diameter), 2.0 (hole spacing), 4.0 (hole diameter), 1.5 dia (hole diameter), 1.75 (hole diameter), 11.5 (hole diameter), 22.25 (hole diameter), 24.0 ±0.3 (total length), 16.00 (distance from center to first hole), and 5.2 (width). The tool has a central slot labeled '1AXXX' and 'XXX'. Section A-A shows a cross-section with dimensions 14.0 and 15.0. Section B-B shows a cross-section with dimensions 5.6 and 12.9. The user direction of feed is indicated by an arrow pointing right.

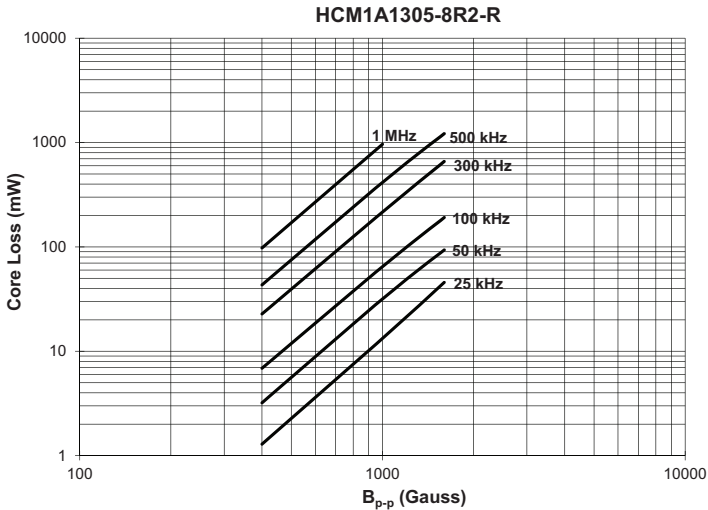
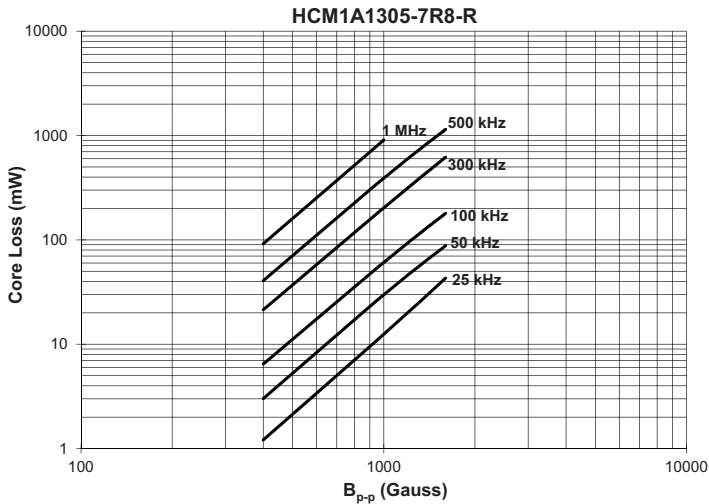
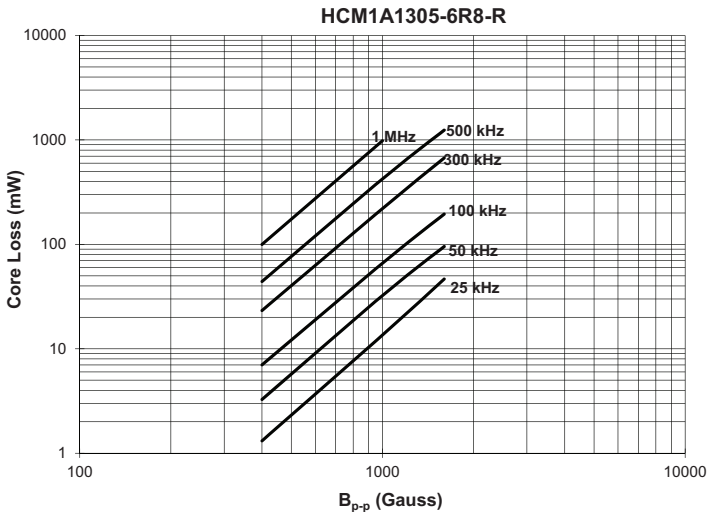
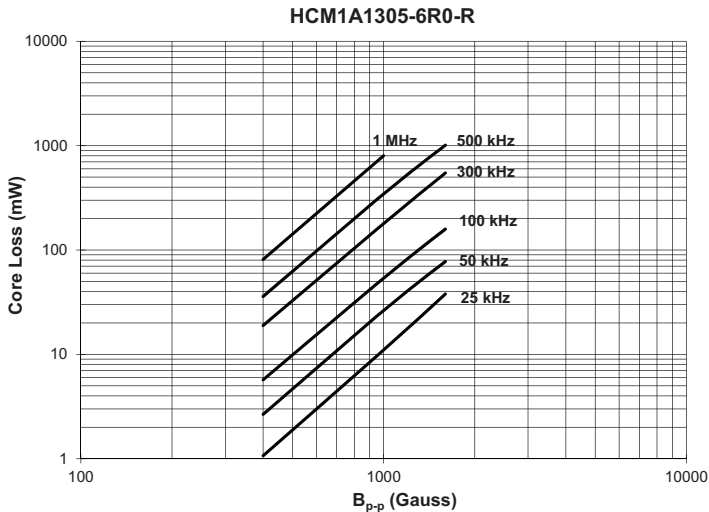
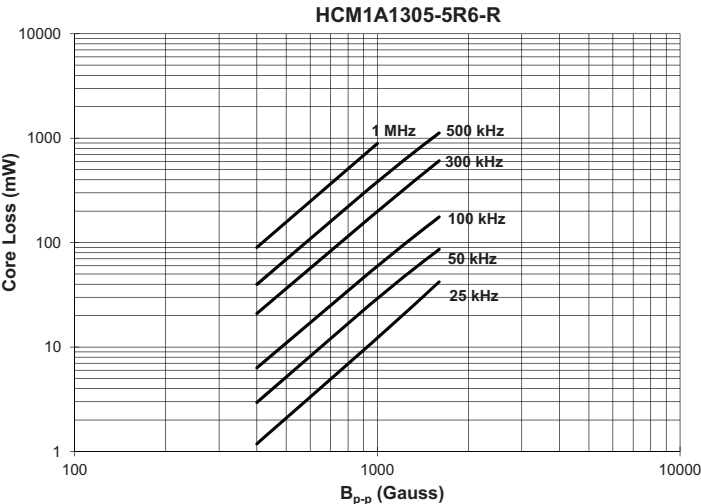
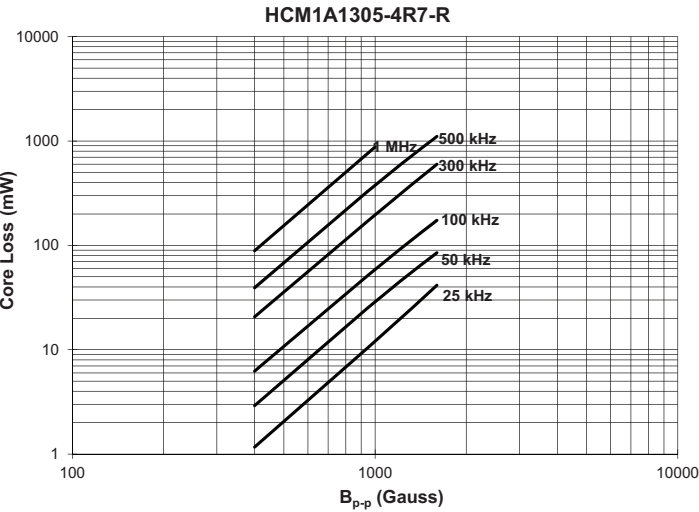
Core loss vs B_{p-p}



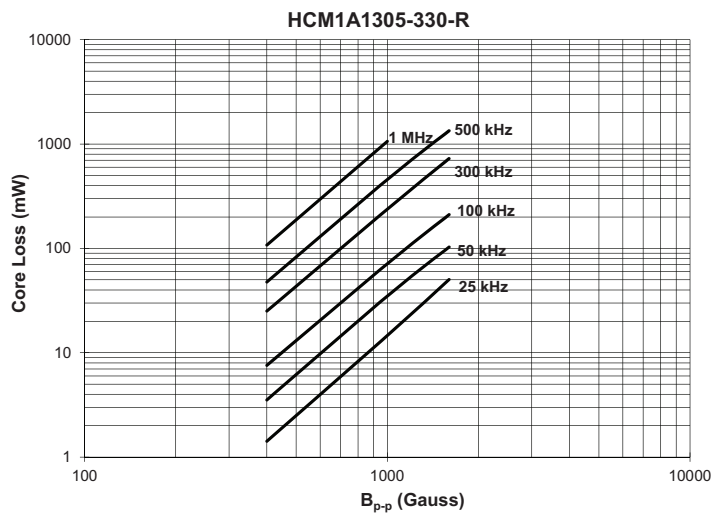
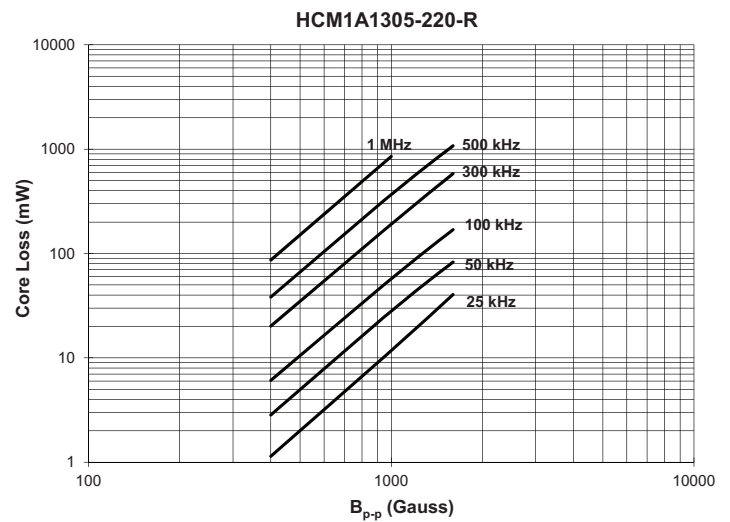
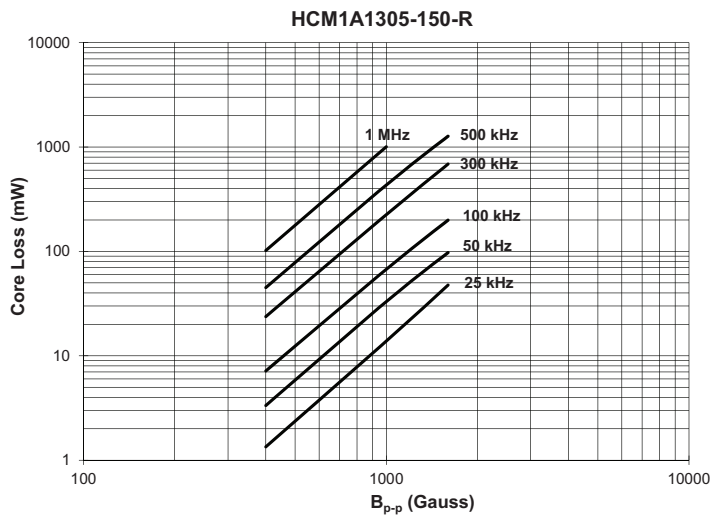
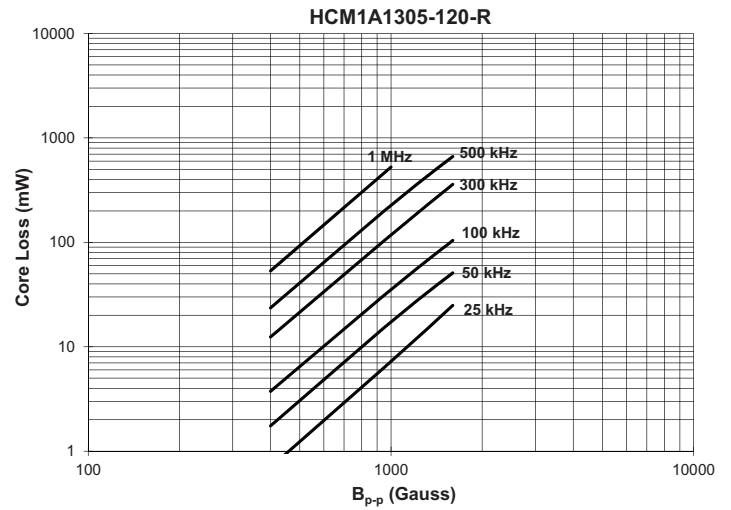
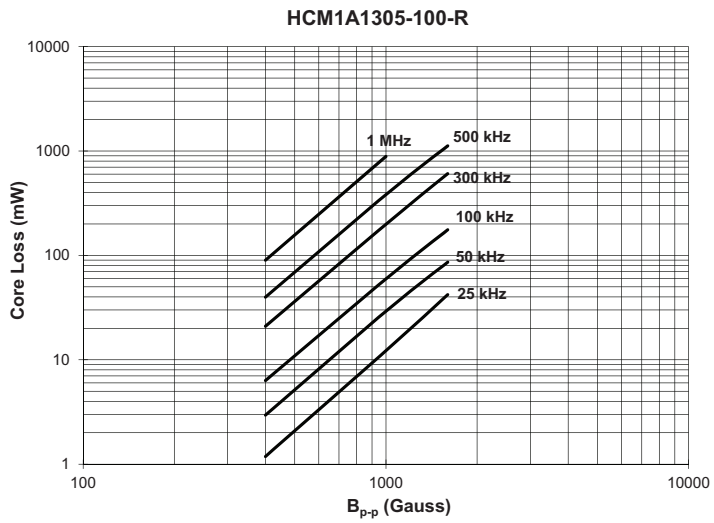
Core loss vs B_{p-p}



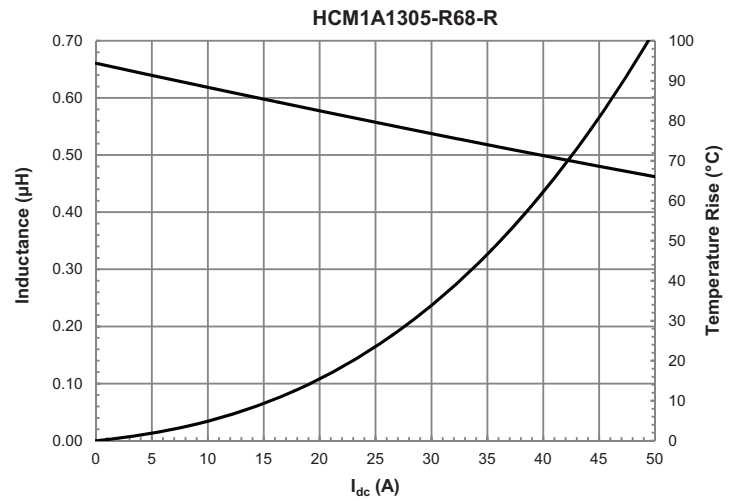
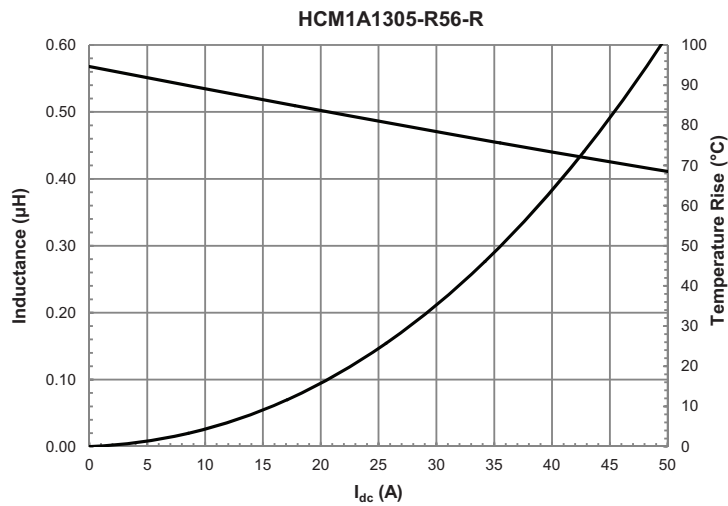
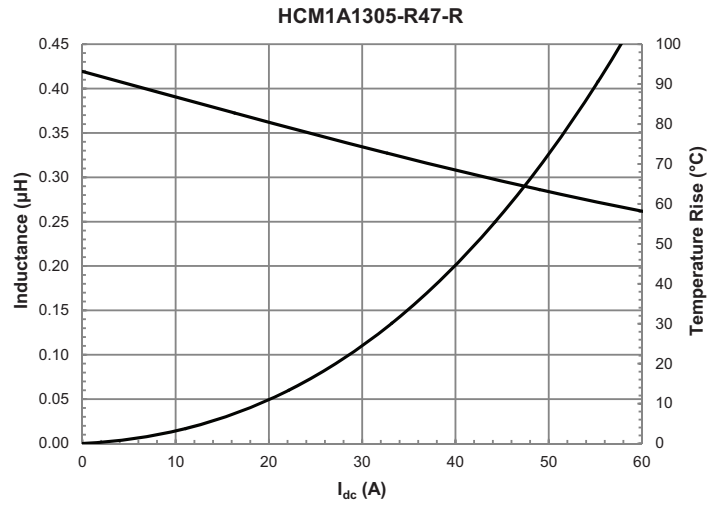
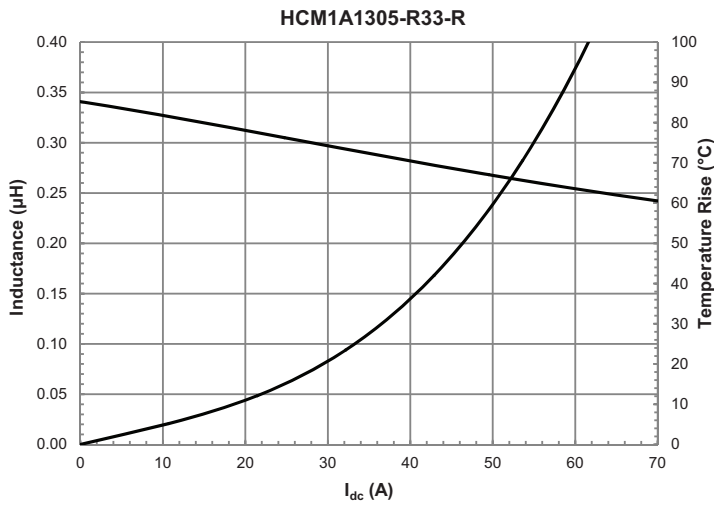
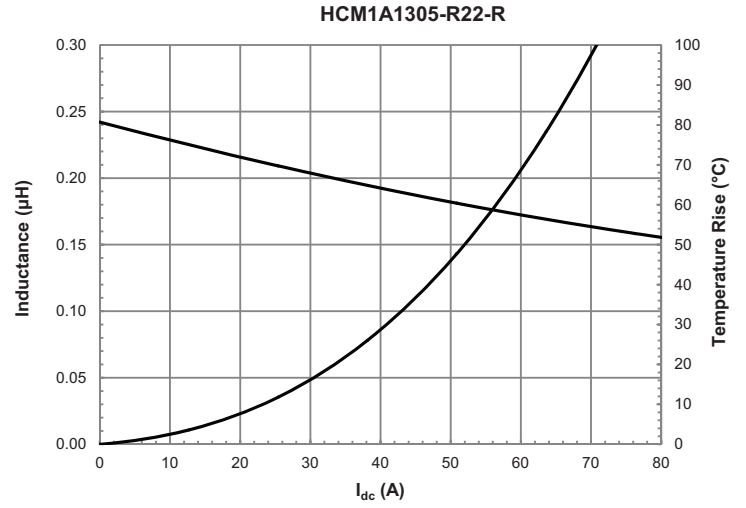
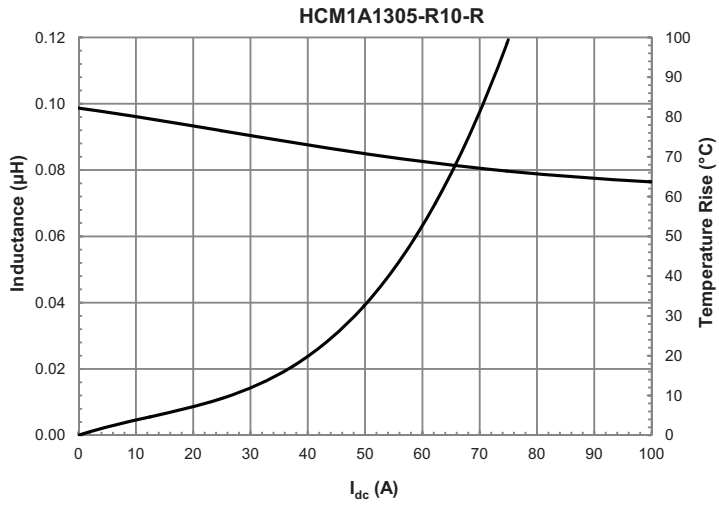
Core loss vs B_{p-p}



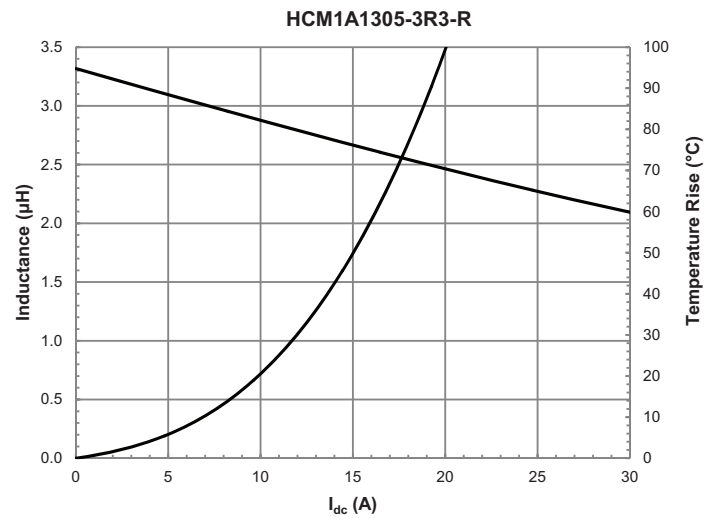
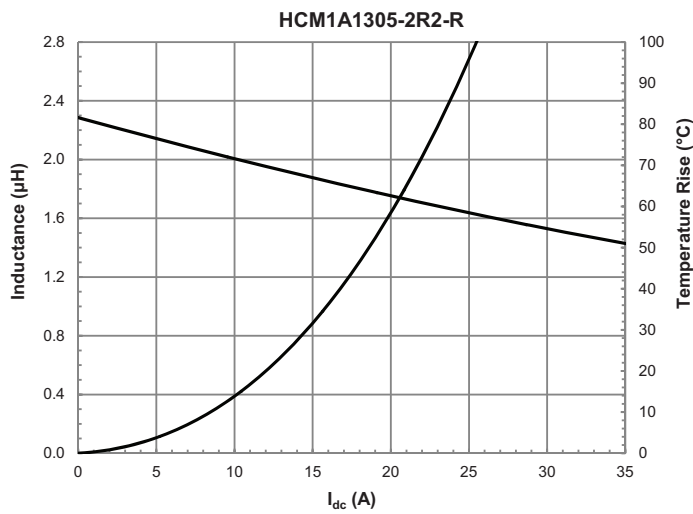
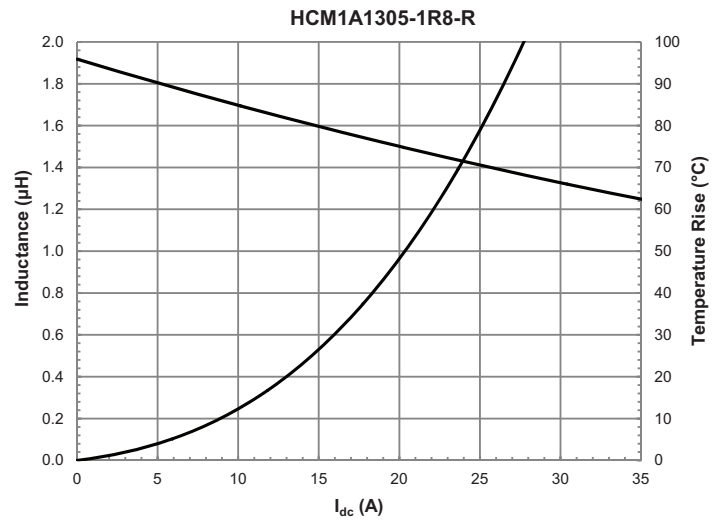
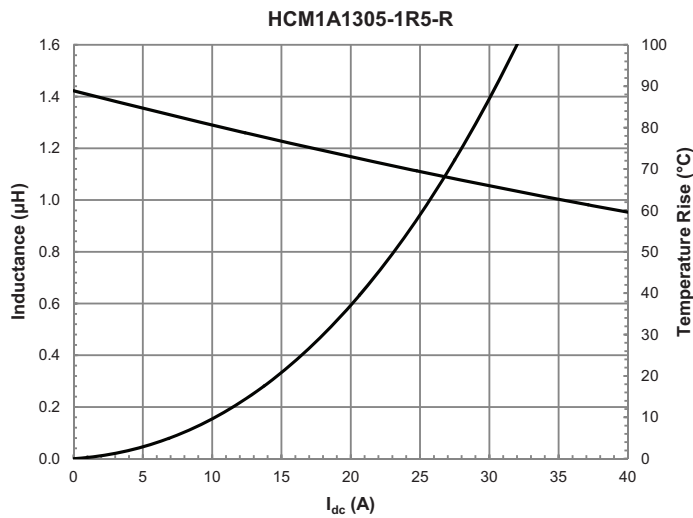
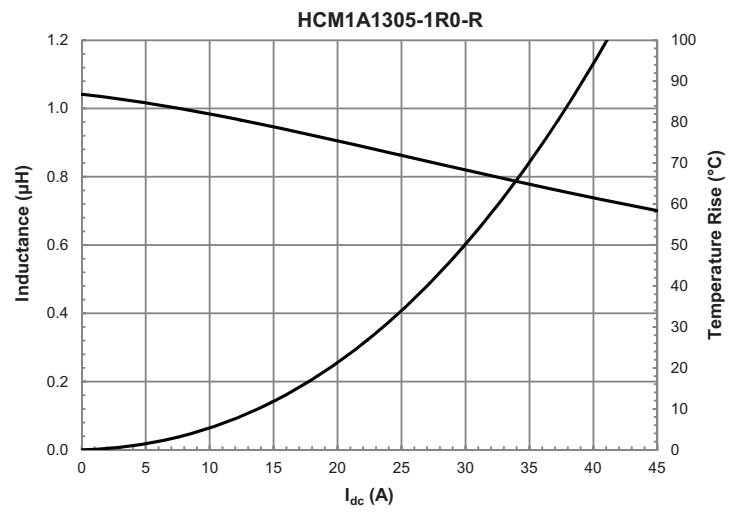
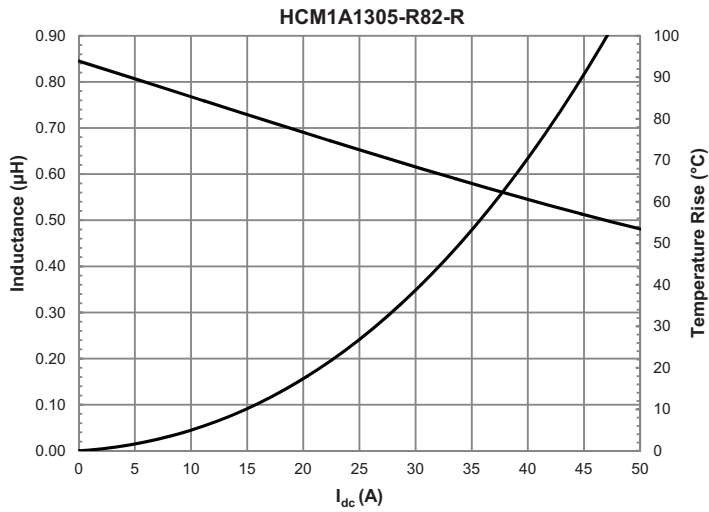
Core loss vs B_{p-p}



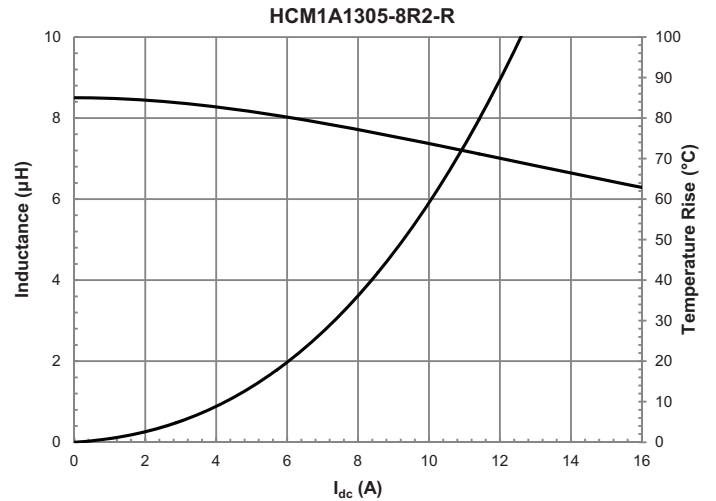
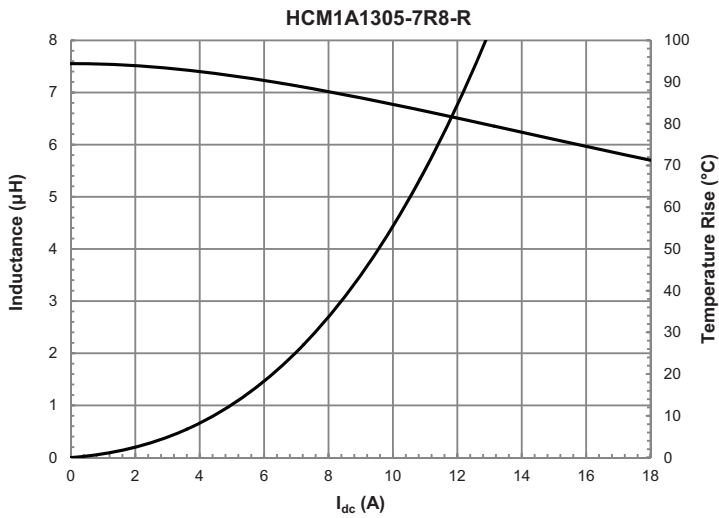
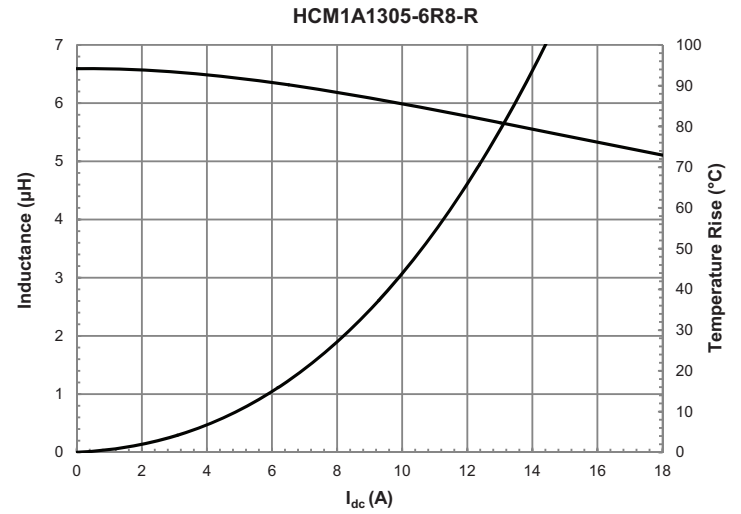
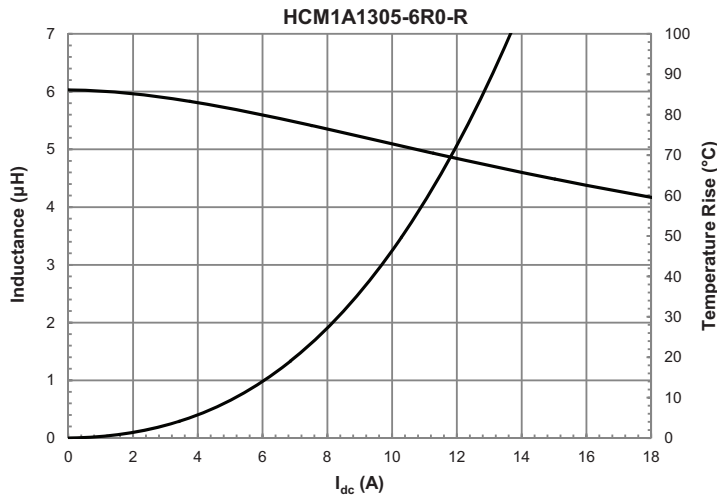
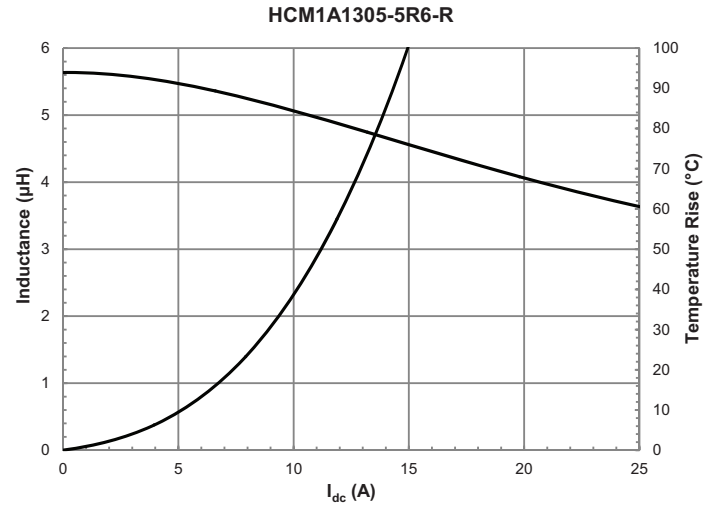
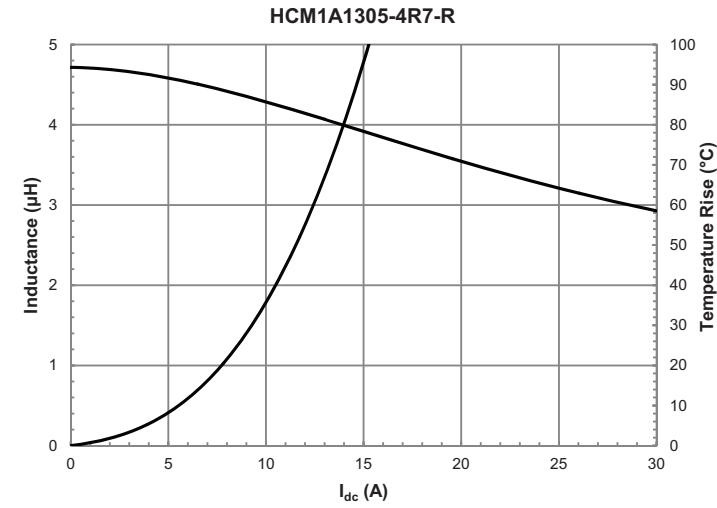
Inductance and temperature rise vs. current



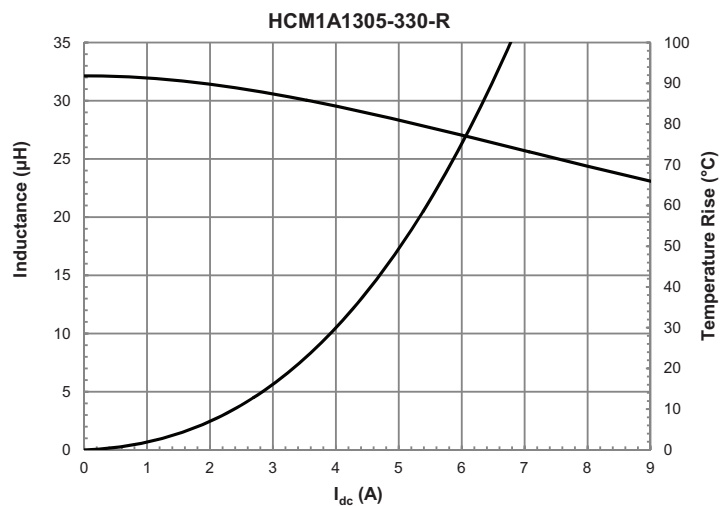
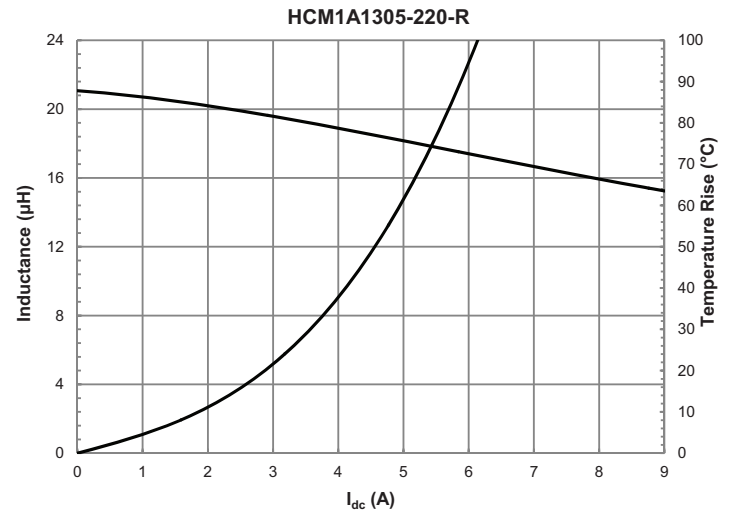
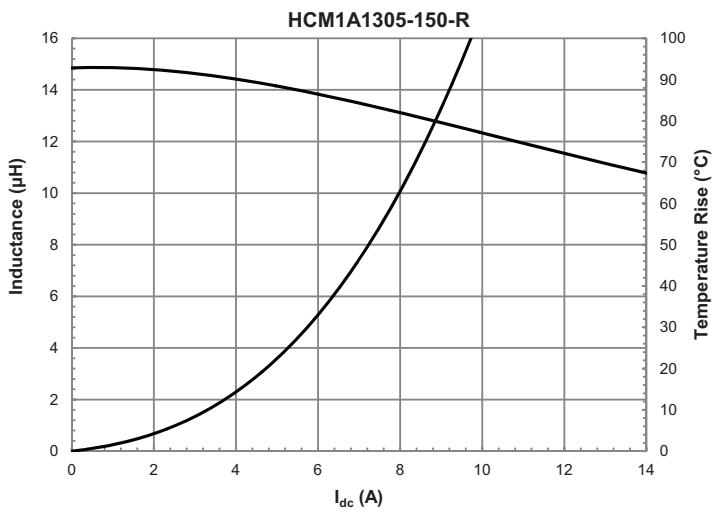
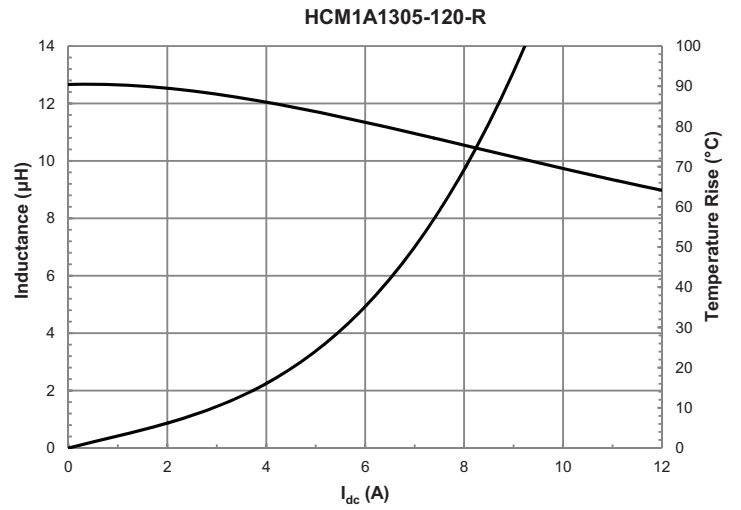
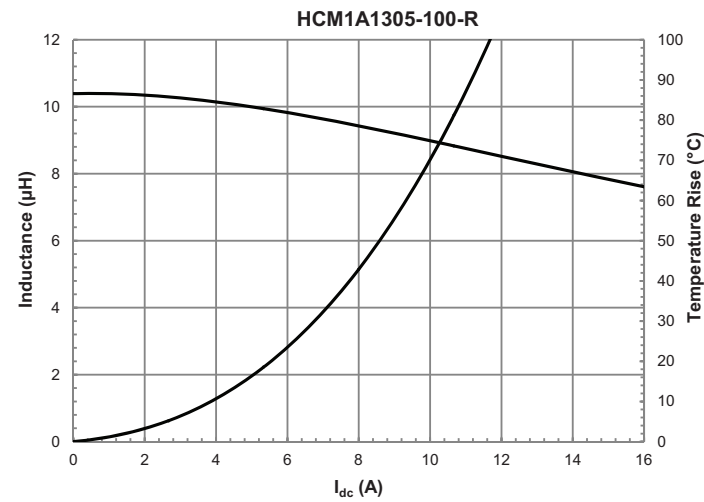
Inductance and temperature rise vs. current



Inductance and temperature rise vs. current



Inductance and temperature rise vs. current



Solder reflow profile

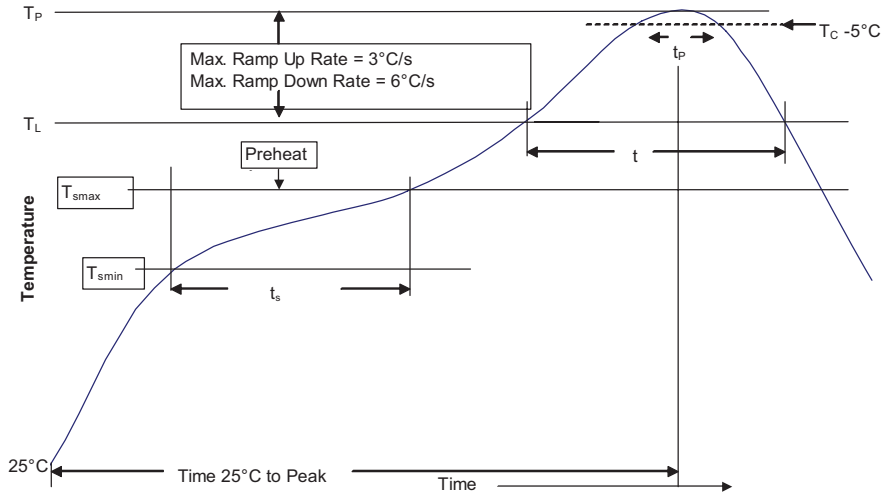


Table 1 - Standard SnPb Solder (T_C)

Package Thickness	Volume mm ³ <350	Volume mm ³ ≥350
<2.5mm)	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 JEDEC 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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