

HCM1A1 104

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 0.2 μ H to 100 μ H
- Current range from 1.5 A to 40 A
- 11.5 mm x 10.3 mm footprint surface mount-package in a 4.0 mm height
- Alloy powder core material
- Moisture Sensitivity Level (MSL): 1
- Halogen free, lead free, RoHS compliant

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
 - 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
 - Port power/USB HUB for front and rear passengers
- Chassis and safety electronics
 - Airbag control unit
 - Electronic stability control system (ESC)
 - Electric parking brake
- 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	K-factor ⁵
HCM1A1104-R20-R	0.20	0.13	33	40	0.63	0.72	902
HCM1A1104-R36-R	0.36	0.23	26	33	1.04	1.20	595
HCM1A1104-R45-R	0.45	0.29	25	32	1.07	1.23	490
HCM1A1104-R47-R	0.47	0.30	28.5	35	1.10	1.27	435
HCM1A1104-R56-R	0.56	0.36	22.5	24	1.56	1.8	453
HCM1A1104-R90-R	0.90	0.58	20	22	2.17	2.5	309
HCM1A1104-1R0-R	1.0	0.64	16	20	2.95	3.3	263
HCM1A1104-1R5-R	1.5	0.96	14	17	3.80	4.2	232
HCM1A1104-2R2-R	2.2	1.41	10.5	16	6.00	7.0	170
HCM1A1104-3R3-R	3.3	2.11	8.2	11.5	10.8	11.8	163
HCM1A1104-4R7-R	4.7	3.01	6.5	9.0	15	18	138
HCM1A1104-5R6-R	5.6	3.58	6.6	9.0	14	17	116
HCM1A1104-6R8-R	6.8	4.35	6.4	9.0	16	19	112
HCM1A1104-100-R	10	6.40	5.0	6.0	27	30	74
HCM1A1104-150-R	15	9.60	3.8	6.8	45	50	69
HCM1A1104-220-R	22	14.1	3.2	6.0	58	65	64
HCM1A1104-330-R	33	21.1	2.8	4.8	92	105	44
HCM1A1104-470-R	47	30.1	1.9	3.6	165	181	36
HCM1A1104-101-R	100	64.0	1.5	2.0	270	300	26

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). B_p-p = K * L * ΔI . B_{pp}: (Gauss), K: (K-factor from table), L: (Inductance in μH), ΔI (Peak to peak ripple current in Amps).

6. Part Number Definition: HCM1A1104-xxx-R

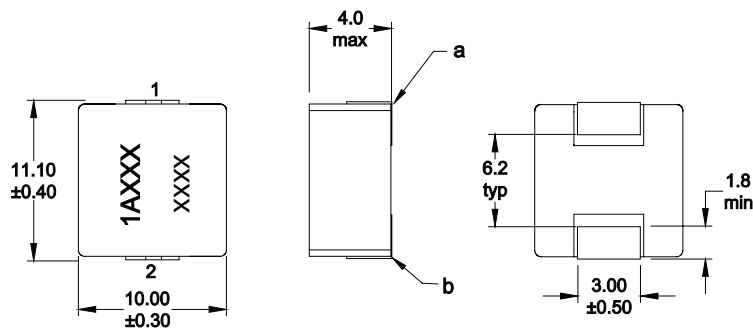
HCM1A1104 = Product code and size

xxx= inductance value in μH , R= decimal point,

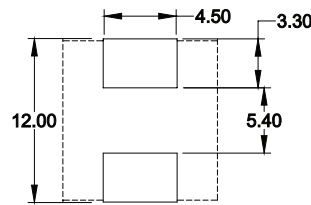
If no R is present then last character equals number of zeros

-R suffix = RoHS compliant

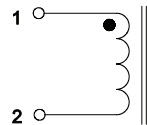
Dimensions (mm)



Recommended Pad Layout



Schematic



Part marking: 1AXXX=automotive grade, XXX=inductance value in μH , 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

DCR measured from point "a" to point "b"

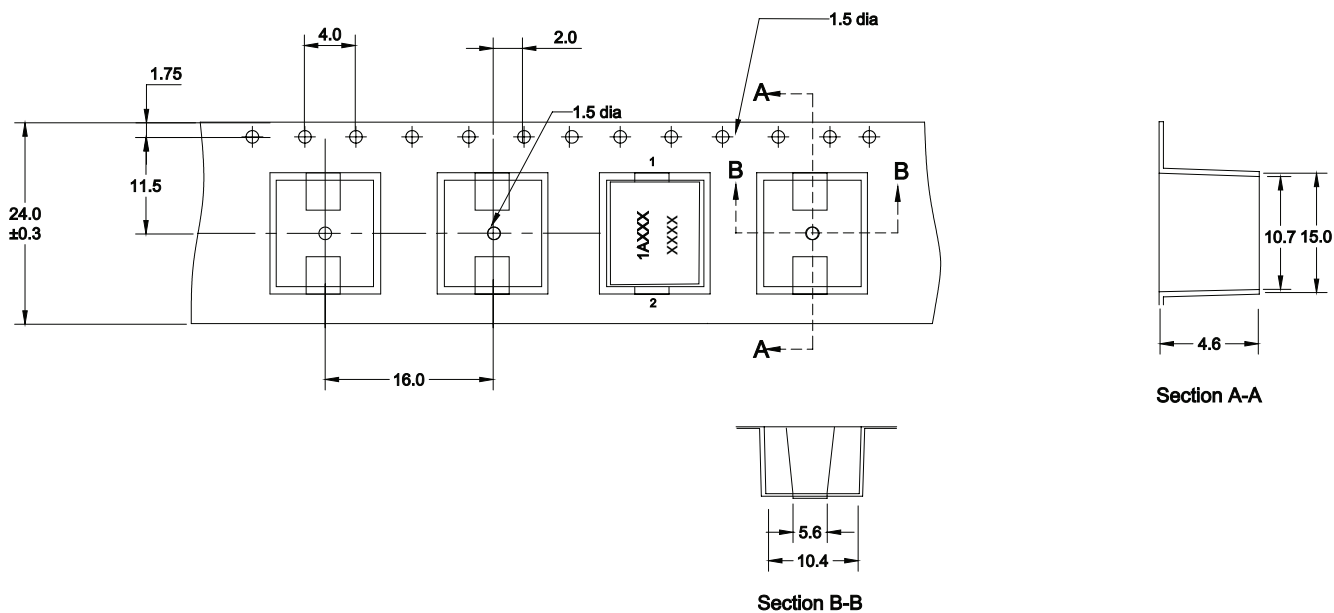
Color: Grey

Do not route traces or vias underneath the inductor

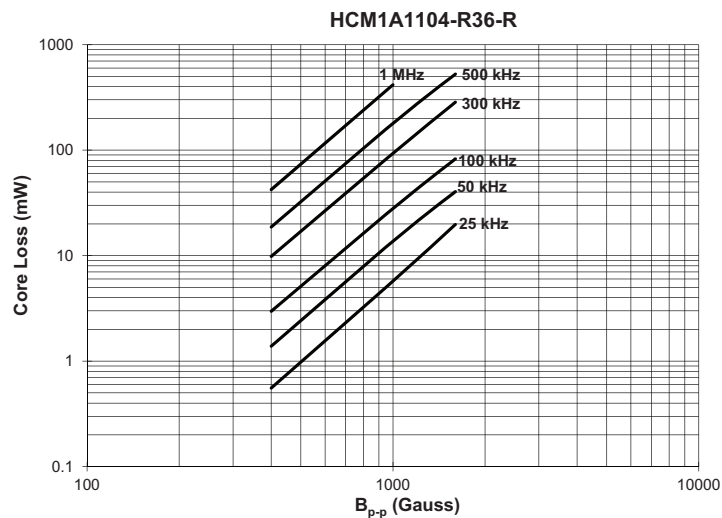
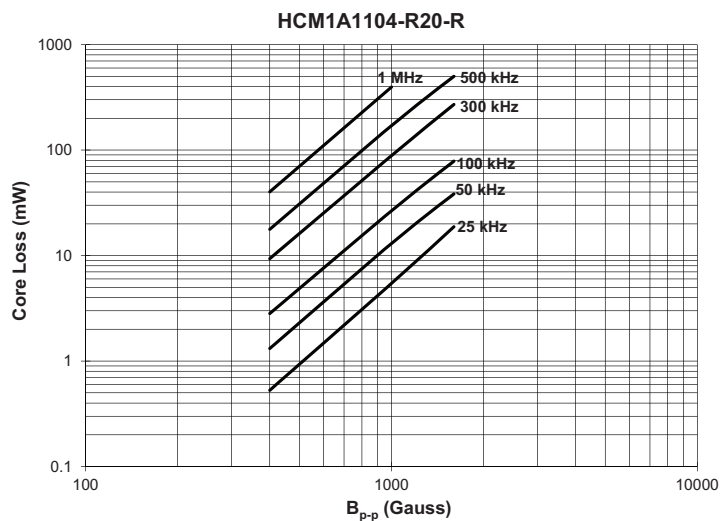
Packaging information (mm)

Drawing not to scale

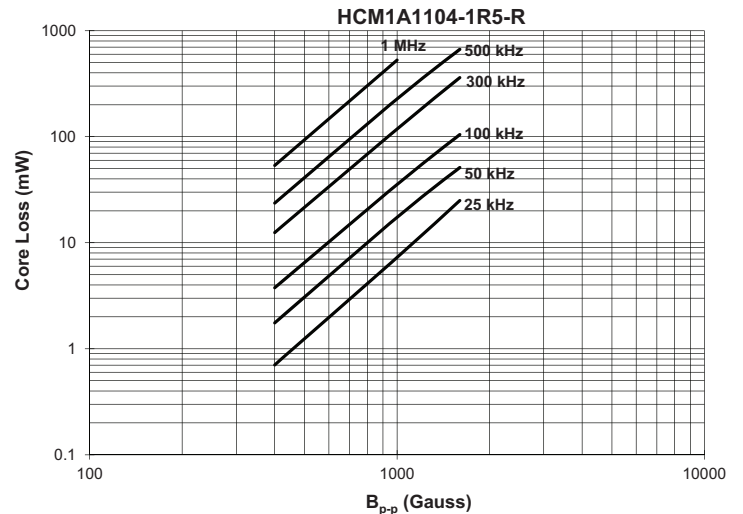
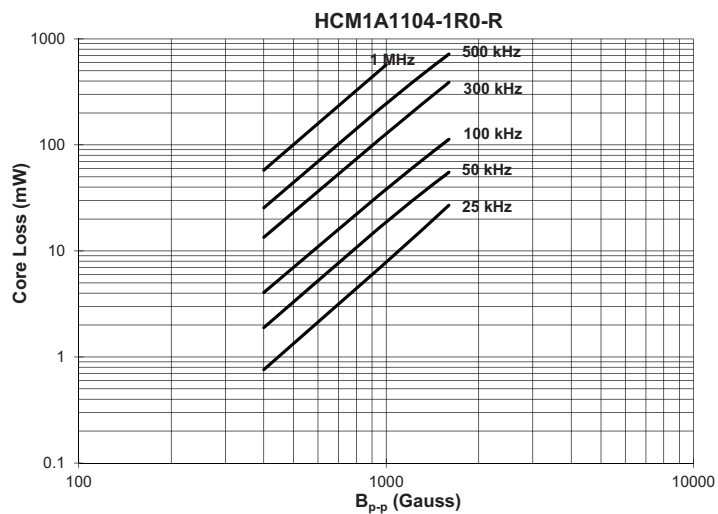
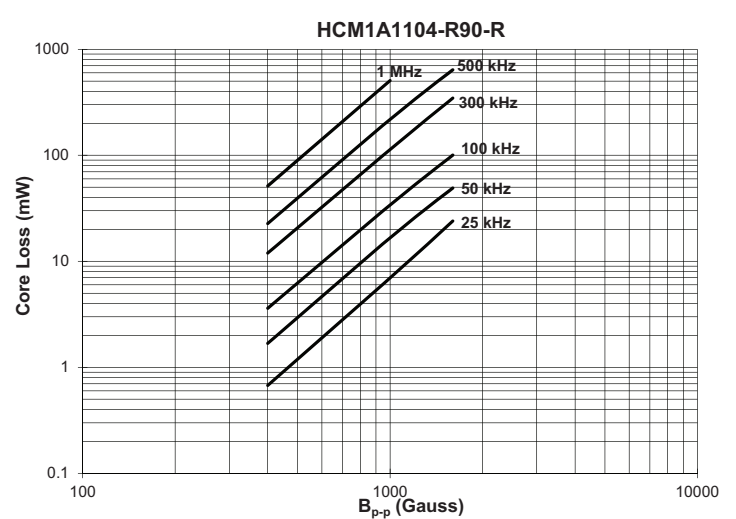
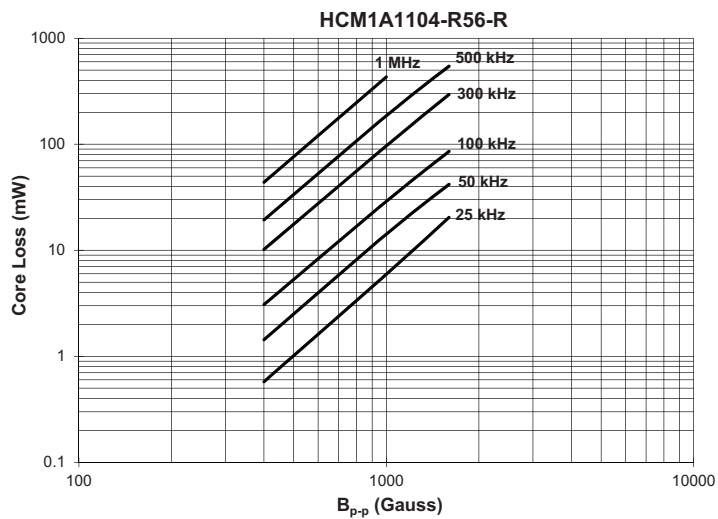
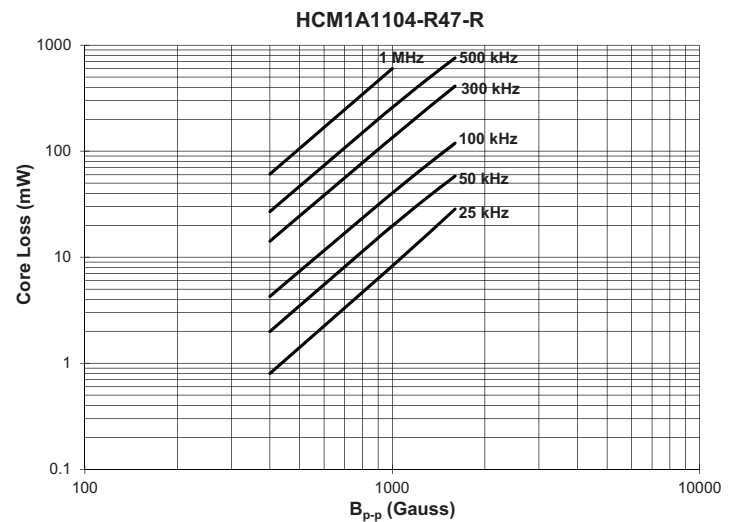
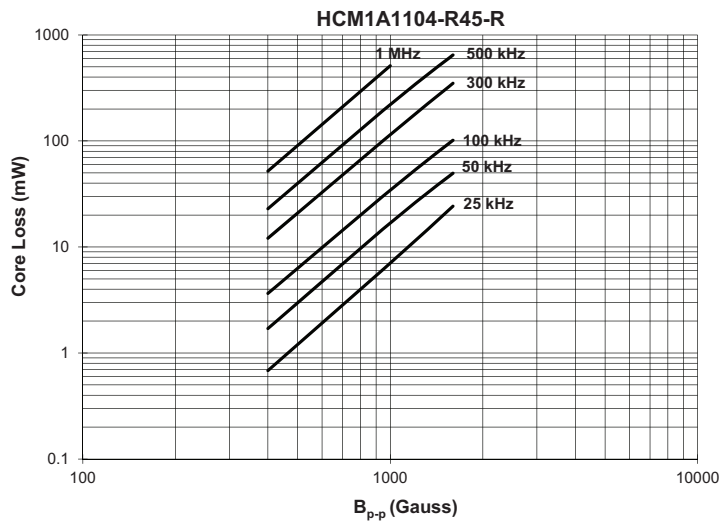
Supplied in tape and reel packaging, 500 parts per 13" diameter reel



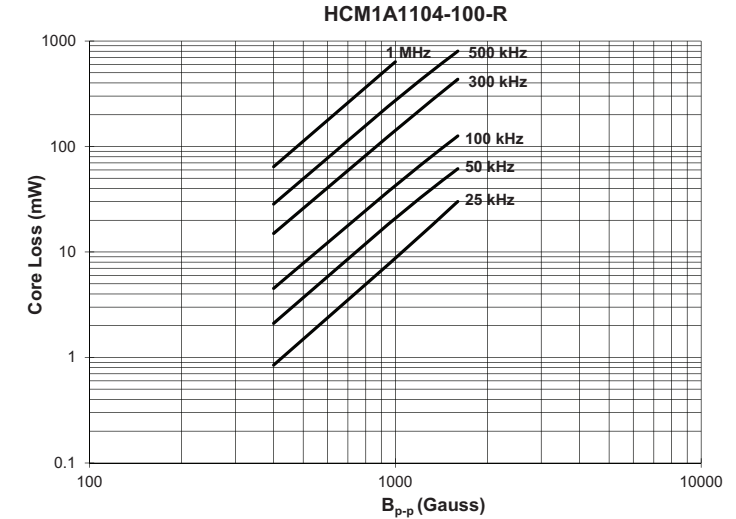
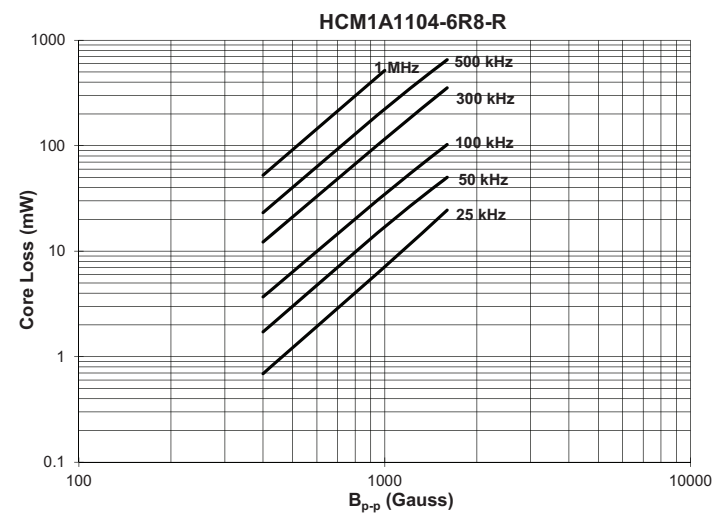
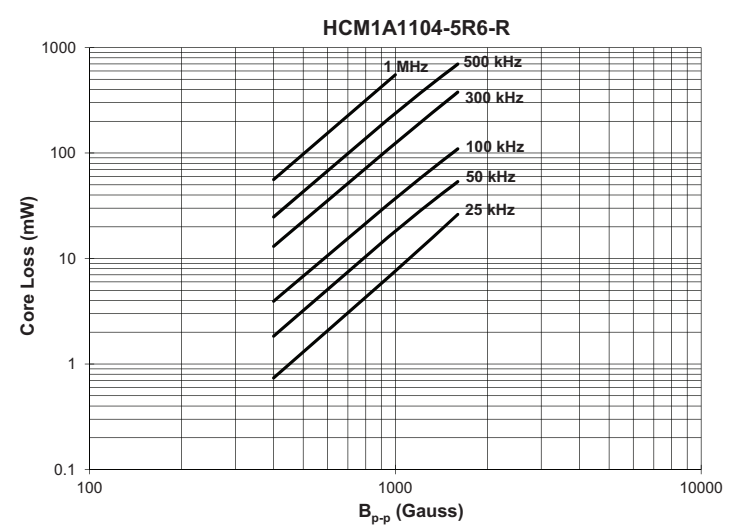
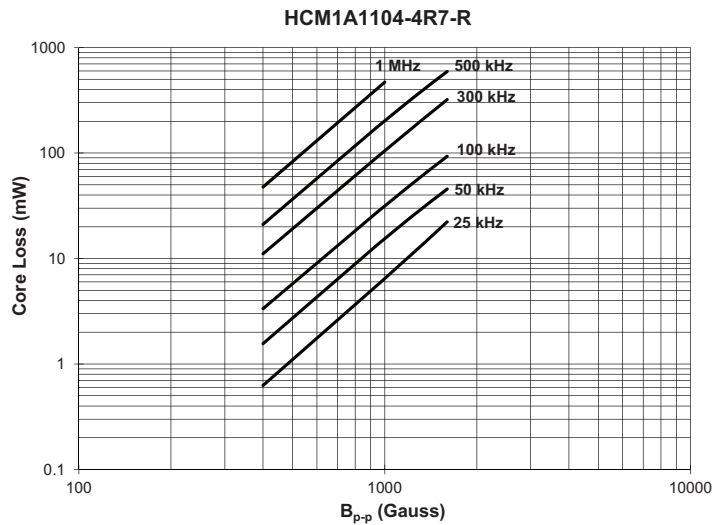
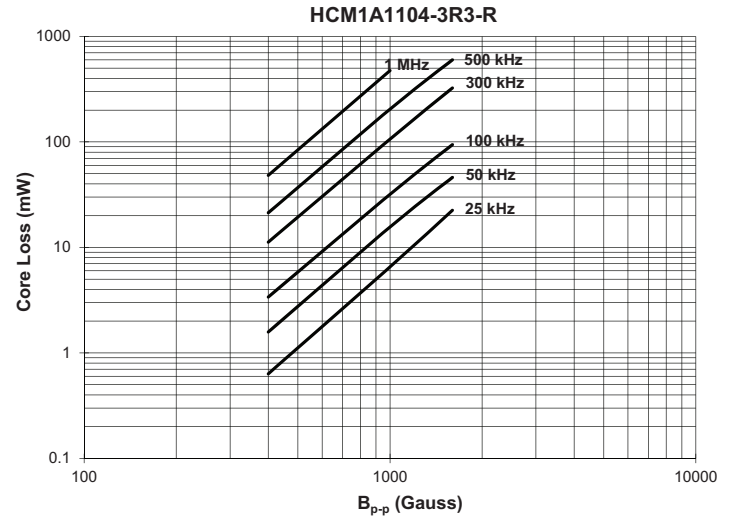
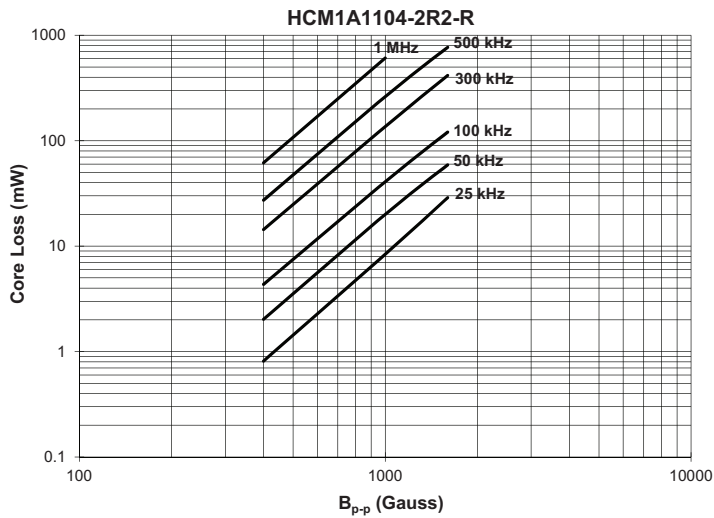
Core loss vs B_{p-p}



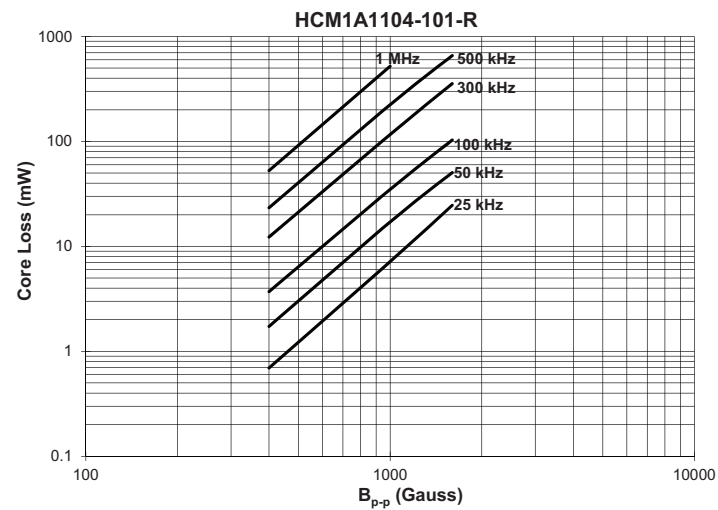
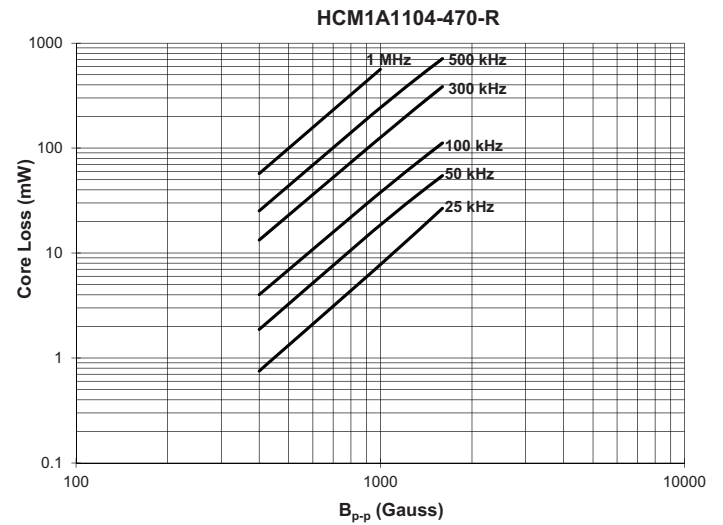
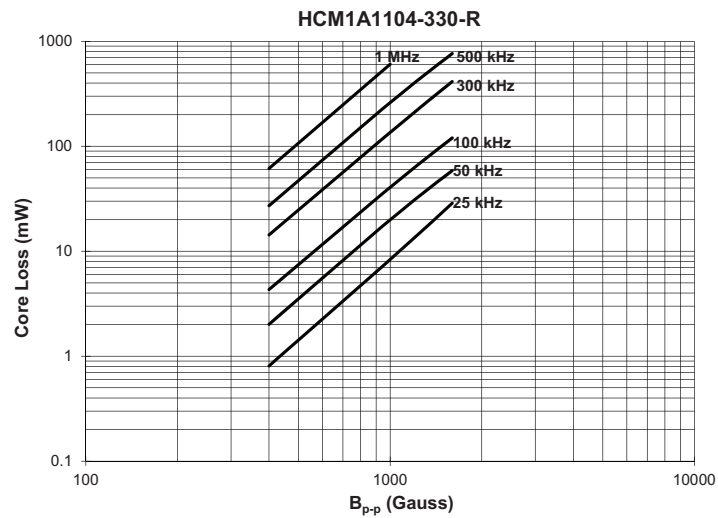
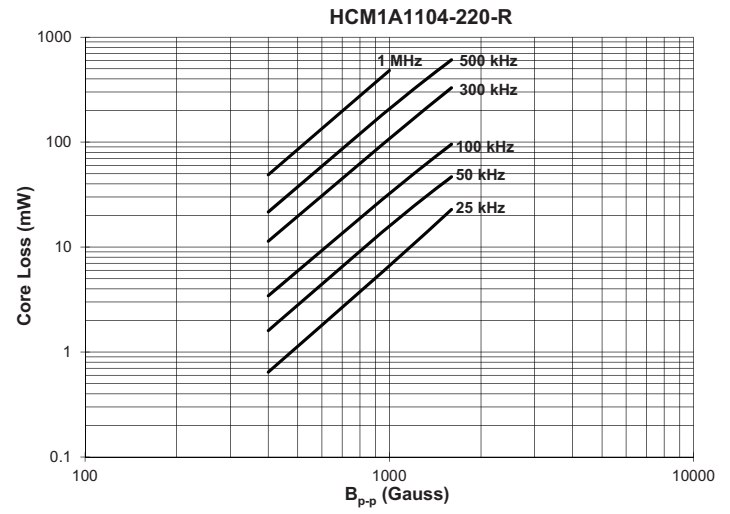
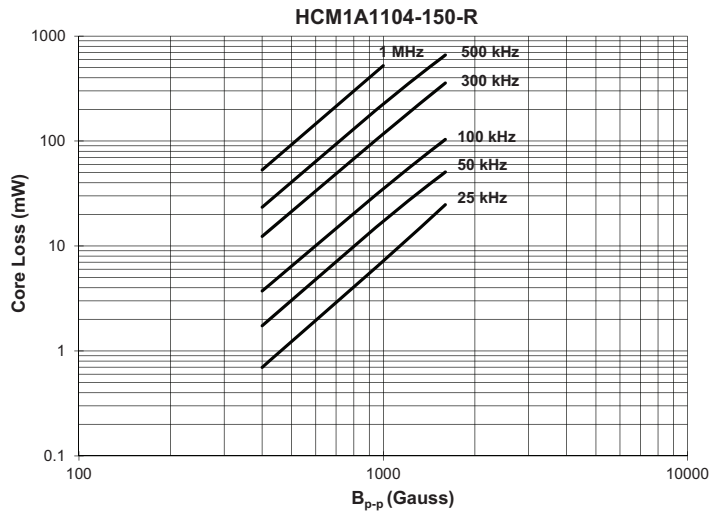
Core loss vs B_{p-p}



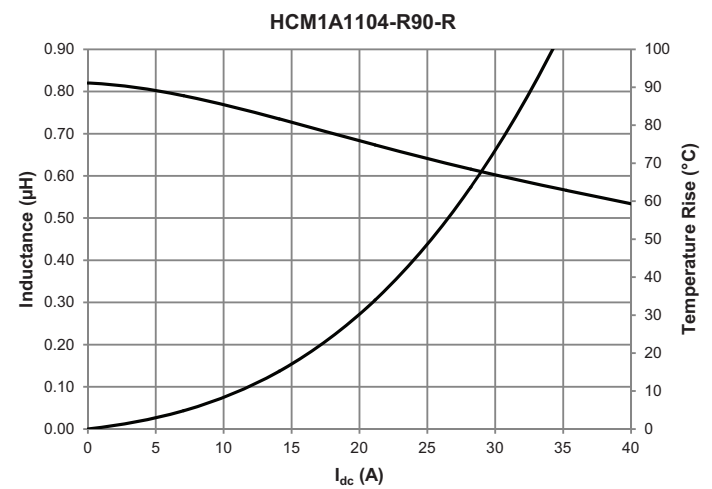
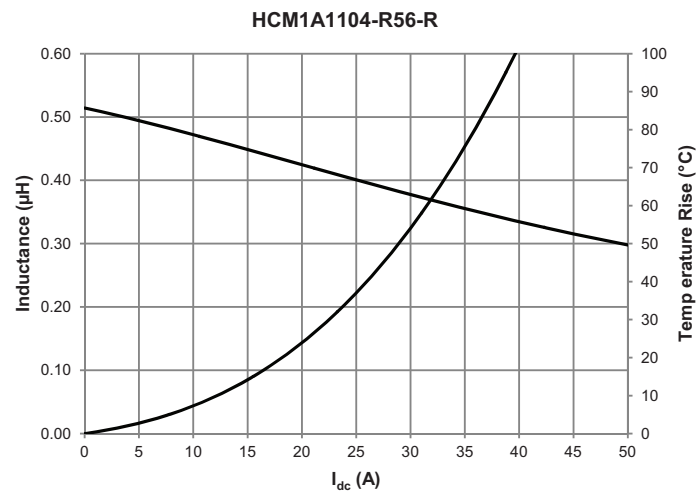
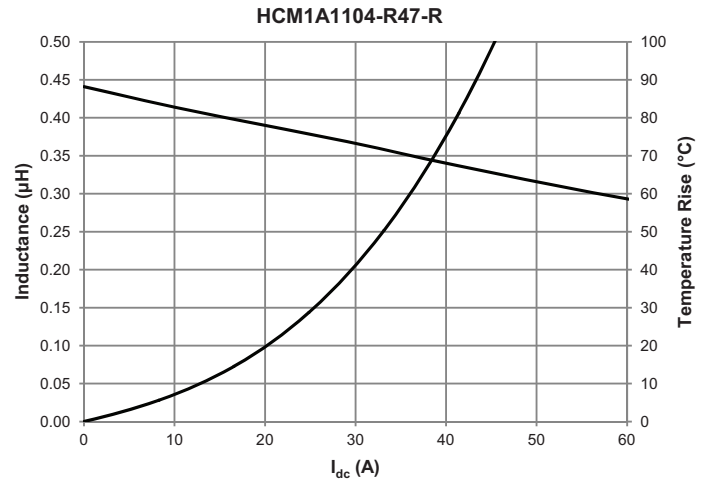
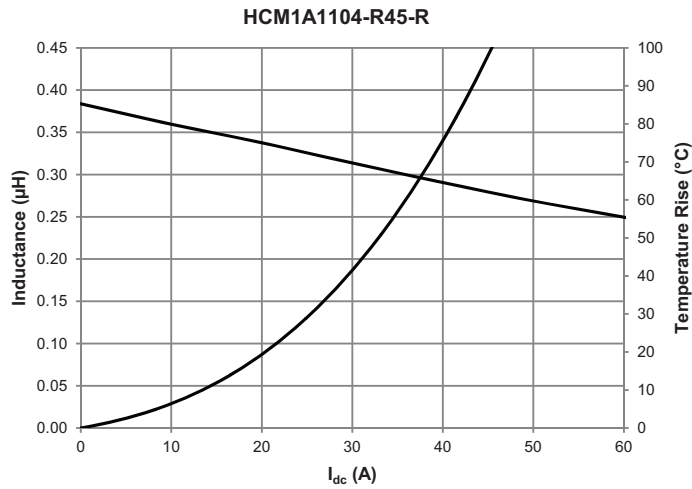
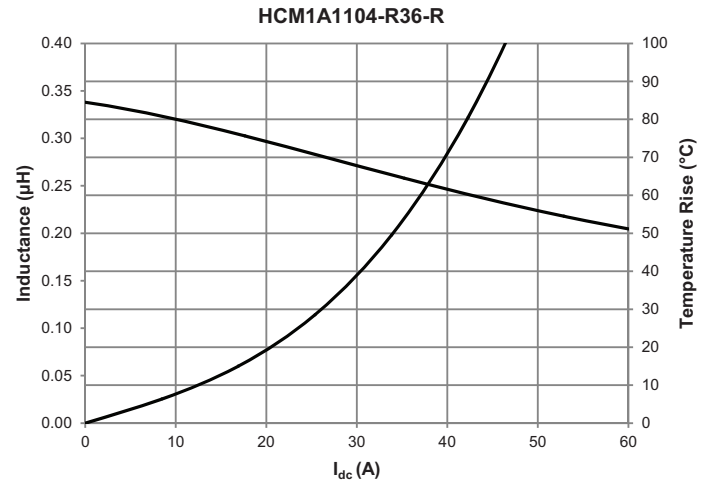
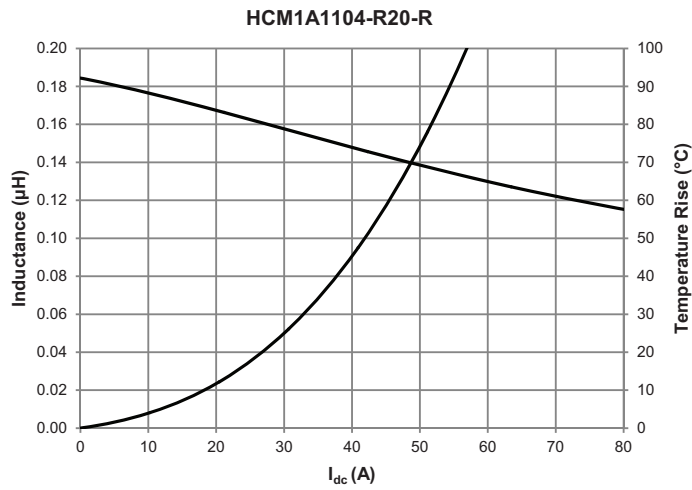
Core loss vs B_{p-p}



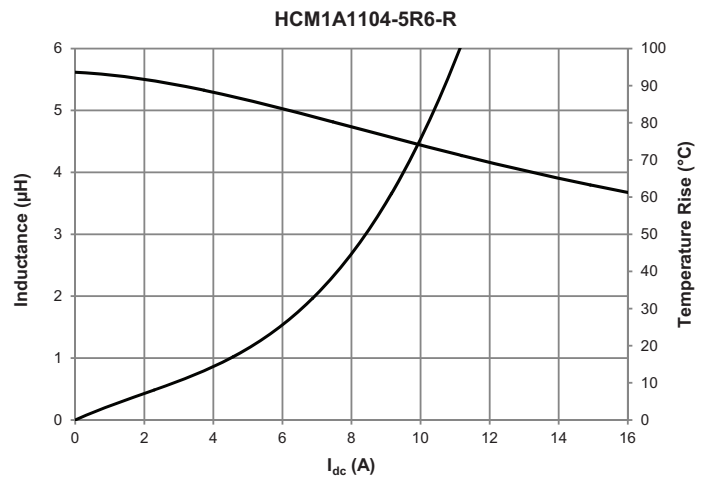
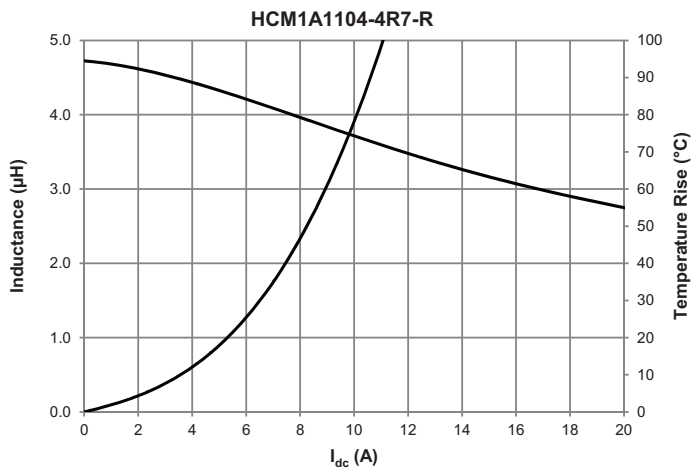
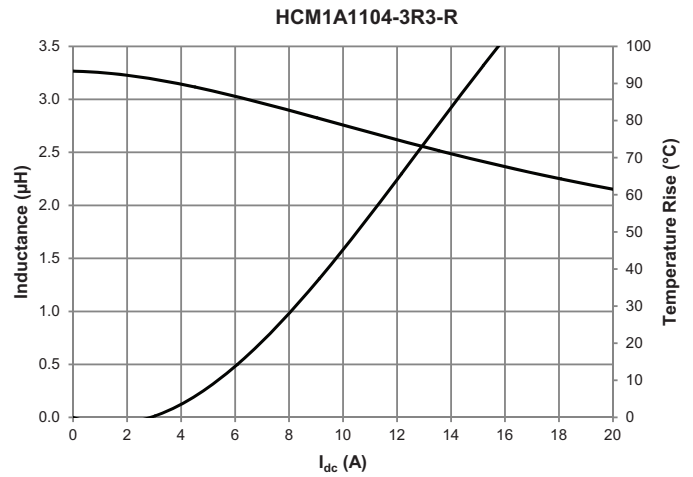
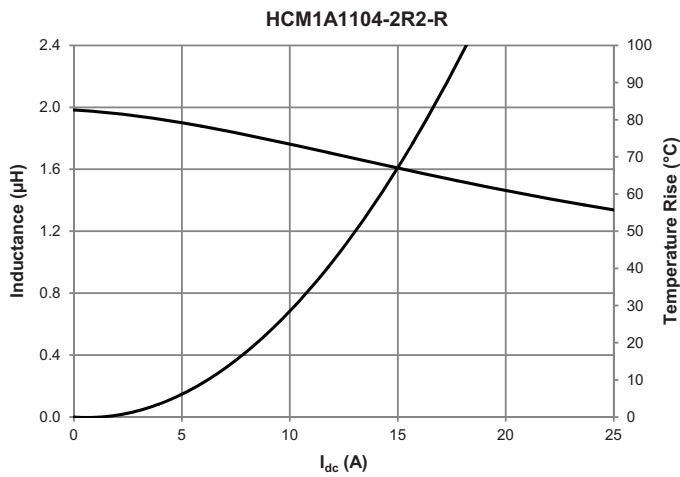
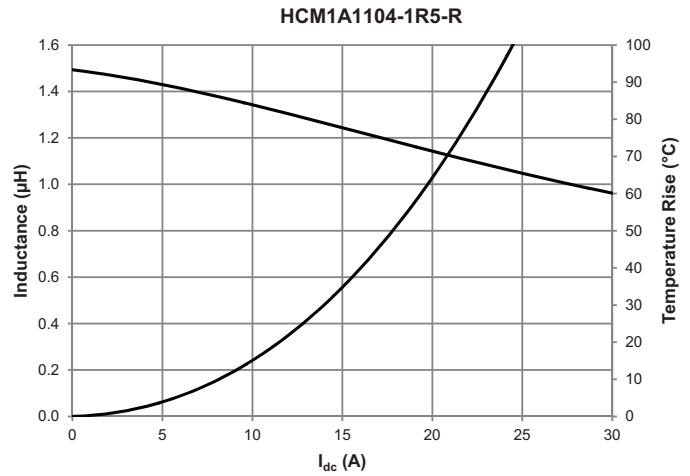
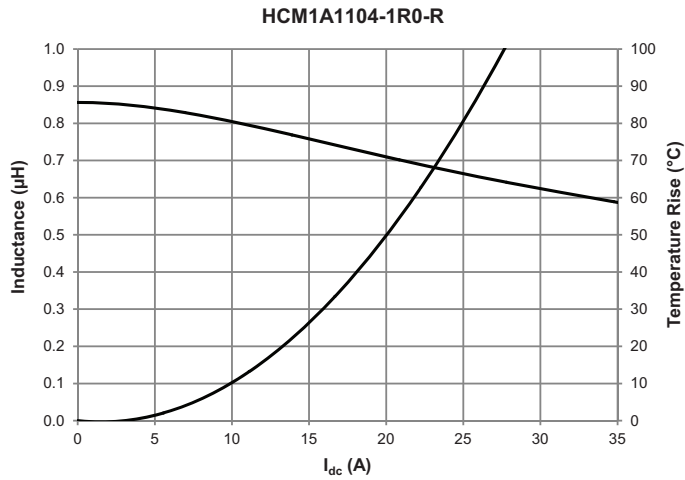
Core loss vs B_{p-p}



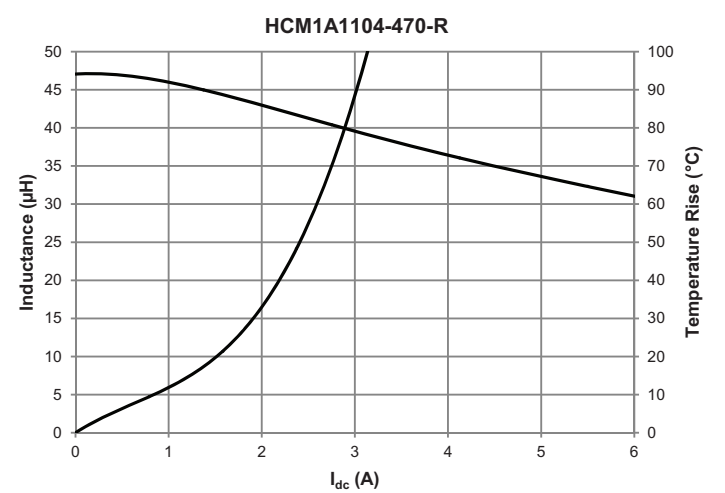
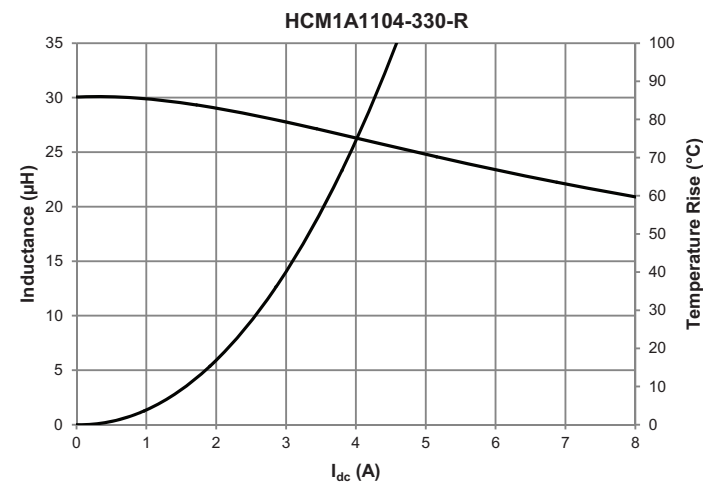
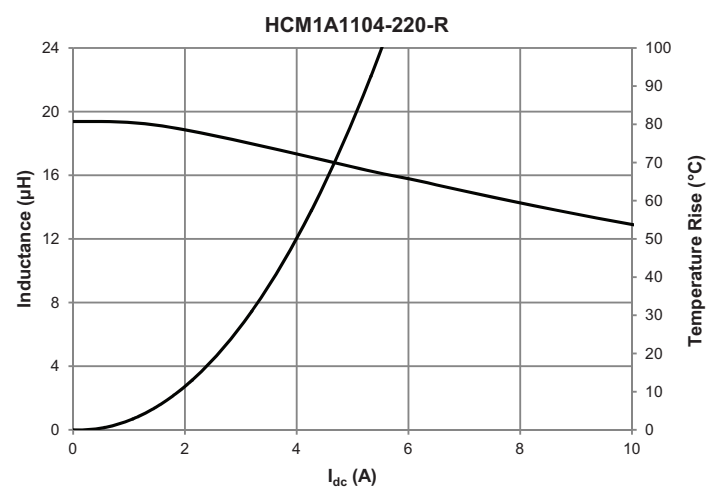
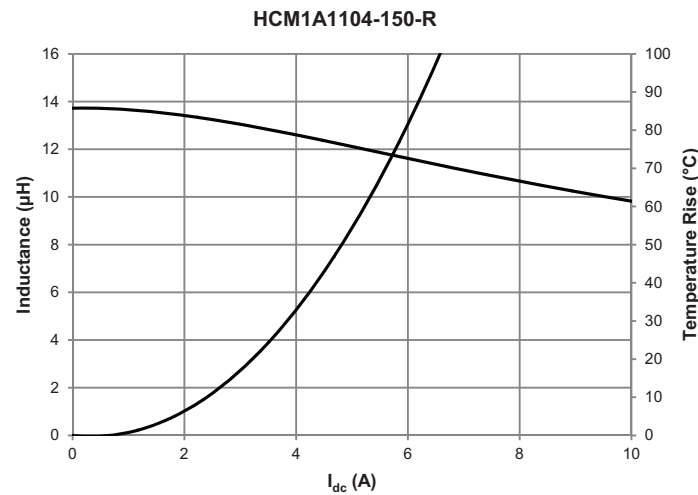
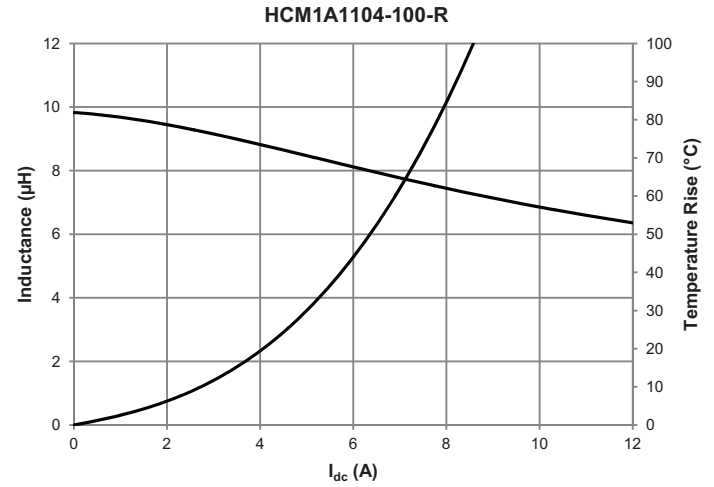
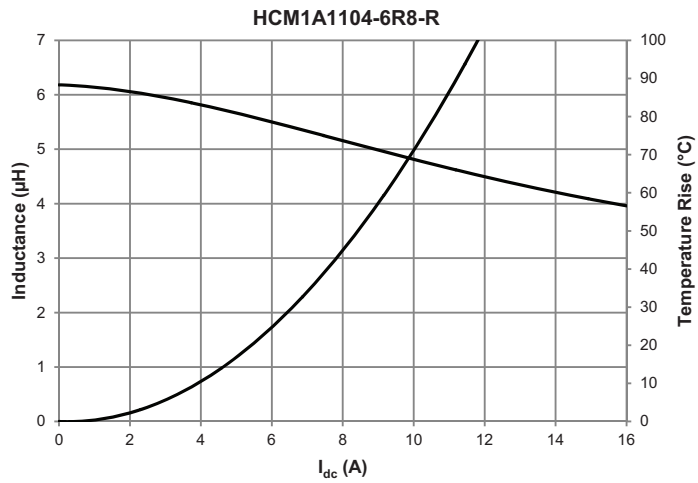
Inductance and temperature rise vs. current



Inductance and temperature rise vs. current



Inductance and temperature rise vs. current



Inductance and temperature rise vs. current

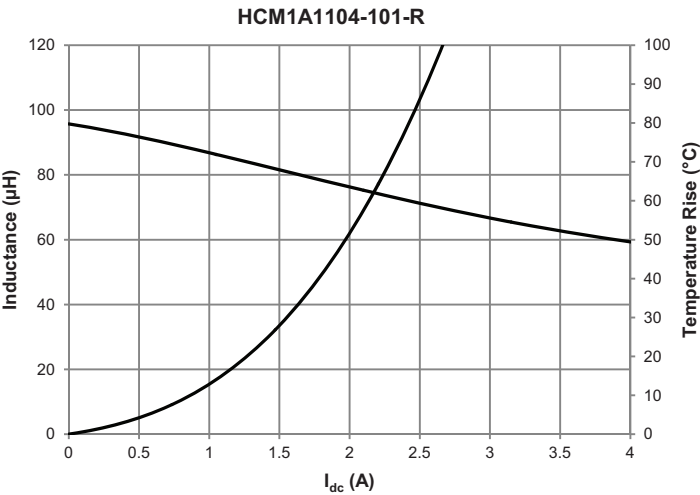


Figure 1 illustrates the temperature profile of a polymer melt during extrusion. The graph shows Temperature (°C) on the y-axis and Time on the x-axis. The profile starts at 25°C, rises through a preheat region, and then reaches a peak before cooling. Key parameters labeled include: T_P (Peak Temperature), T_L (Lower Limit Temperature), T_{smax} (Stabilization Maximum Temperature), T_{smin} (Stabilization Minimum Temperature), t_s (Stabilization Time), t_p (Peak Time), t (Time from Preheat to Peak), and $T_C - 5^\circ\text{C}$ (Cooling Limit Temperature). A box specifies: Max. Ramp Up Rate = 3°C/s and Max. Ramp Down Rate = 6°C/s .

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

Package Thickness	Volume mm³ <350	Volume mm³ 350 - 2000	Volume mm³ >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

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.

Eaton is a registered trademark.

All other trademarks are property of their respective owners.