

# HCM1A0703

## 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  $\mu$ H to 33  $\mu$ H
- Current range from 1.6 A to 36 A
- 7.4 mm x 7.0 mm footprint surface mount package in a 3.0 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
  - 77 GHz radar system
  - Adaptive cruise control (ACC)
  - Automatic parking control
  - Collision avoidance system/Car black box system
- Infotainment and cluster electronics
  - Active noise cancellation (ANC)
  - 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)
- 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



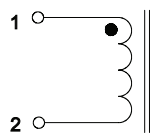
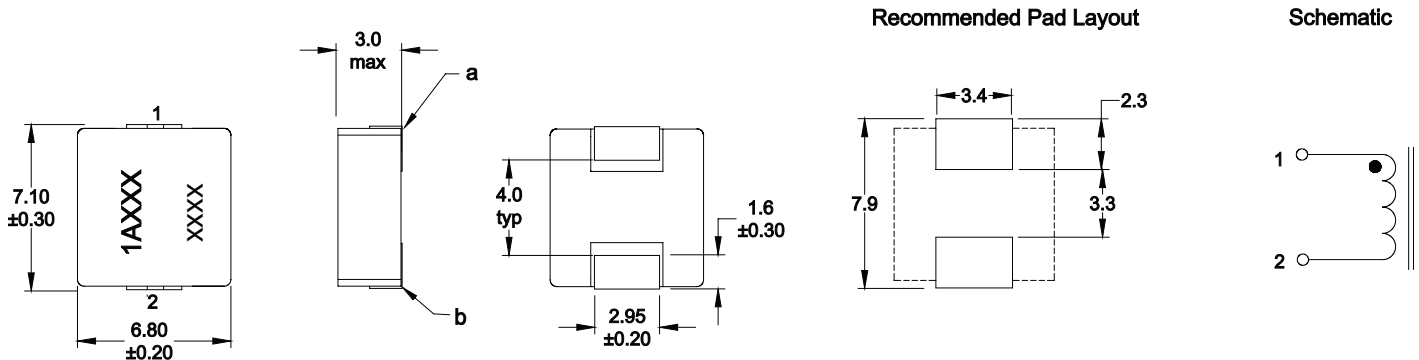
Product Specifications

Part Number <sup>6</sup>	OCL <sup>1</sup> ( $\mu\text{H}$ ) $\pm 20\%$	FLL <sup>2</sup> ( $\mu\text{H}$ ) minimum	$I_{\text{rms}}^3$ (A)	$I_{\text{sat}}^4$ (A)	DCR (m $\Omega$ ) typical @ +20 °C	DCR (m $\Omega$ ) maximum @ +20 °C	K-factor <sup>5</sup>
HCM1A0703-R10-R	0.10	0.06	22	28	1.2	1.4	2737
HCM1A0703-R15-R	0.15	0.09	18.5	36	1.5	1.8	1358
HCM1A0703-R22-R	0.22	0.13	17	24	2.3	2.7	1386
HCM1A0703-R33-R	0.33	0.21	14	19	3.5	4.0	907
HCM1A0703-R47-R	0.47	0.30	12	17	3.7	4.2	818
HCM1A0703-R56-R	0.56	0.35	10.3	14	4.7	5.2	740
HCM1A0703-R68-R	0.68	0.43	10	15	5.0	5.5	574
HCM1A0703-R82-R	0.82	0.52	8.5	14	6.7	8.0	482
HCM1A0703-1R0-R	1.0	0.64	7.9	13	9.0	10	450
HCM1A0703-1R2-R	1.2	0.76	7.8	11	9.3	10.2	446
HCM1A0703-1R5-R	1.5	1.0	6.6	11	14	15.5	353
HCM1A0703-2R2-R	2.2	1.4	5.7	10	18	20	309
HCM1A0703-3R3-R	3.3	2.1	4.9	9.0	28	30	262
HCM1A0703-4R7-R	4.7	3.0	4.1	8.8	37	40	235
HCM1A0703-6R8-R	6.8	4.3	3.5	6.4	54	60	177
HCM1A0703-8R2-R	8.2	5.2	3.1	5.6	64	68	159
HCM1A0703-100-R	10	6.4	3.0	4.4	71	77.6	153
HCM1A0703-150-R	15	9.6	2.2	4.0	118	127	127
HCM1A0703-220-R	22	14.1	2.0	3.4	135	149	121
HCM1A0703-330-R	33	19.8	1.6	2.3	220	242	81

- Open Circuit Inductance (OCL) Test Parameters: 100 kHz, 0.25 V<sub>rms</sub>, 0.0 Adc, +25 °C
- Full Load Inductance (FLL) Test Parameters: 100 kHz, 0.25 V<sub>rms</sub>, I<sub>sat</sub>, +25 °C
- I<sub>sat</sub>: 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.

- I<sub>sat</sub>: Peak current for approximately 20% rolloff @ +25 °C
- K-factor: Used to determine B<sub>pp</sub> for core loss (see graph). B<sub>p-p</sub> = K \* L \*  $\Delta I$ . B<sub>pp</sub>: (Gauss), K: (K-factor from table), L: (Inductance in  $\mu\text{H}$ ),  $\Delta I$  (Peak to peak ripple current in Amps).
- Part Number Definition: HCM1A0703-xxx-R  
HCM1A0703 = Product code and size  
xxx= inductance value in  $\mu\text{H}$ , R= decimal point,  
If no R is present then last character equals number of zeros  
-R suffix = RoHS compliant

Dimensions (mm)

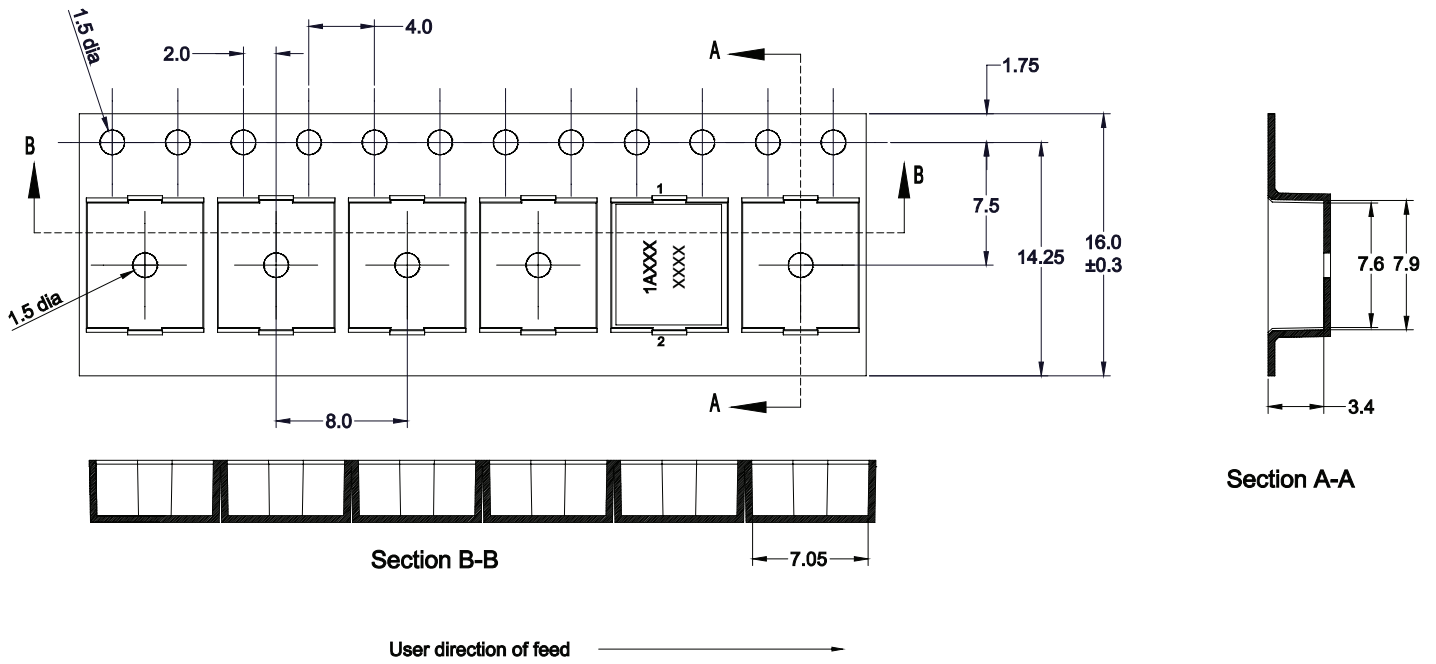


Part marking: 1AXXX=automotive grade, XXX=inductance value in  $\mu\text{H}$ , R=decimal point. If no R is present then last character equals number of zeros. xxxx= Lot code  
All soldering surfaces to be coplanar within 0.1 millimeters  
Tolerances are  $\pm 0.3$  millimeters unless stated otherwise  
DCR measured from point "a" to point "b"  
Color: Grey  
Do not route traces or vias underneath the inductor

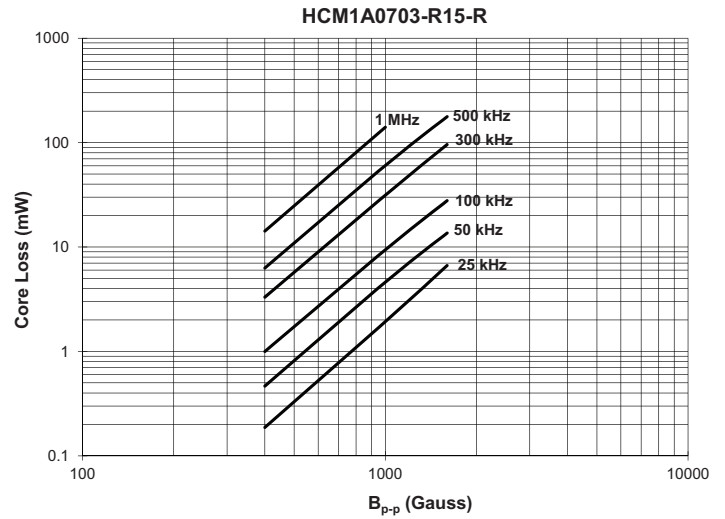
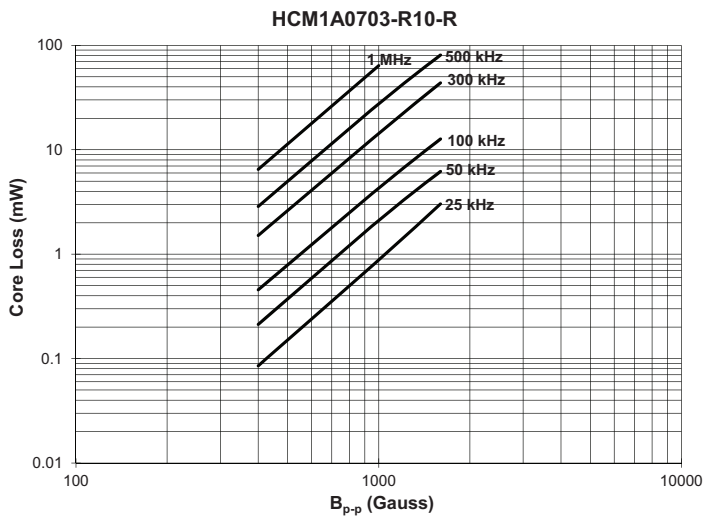
**Packaging information (mm)**

Drawing not to scale

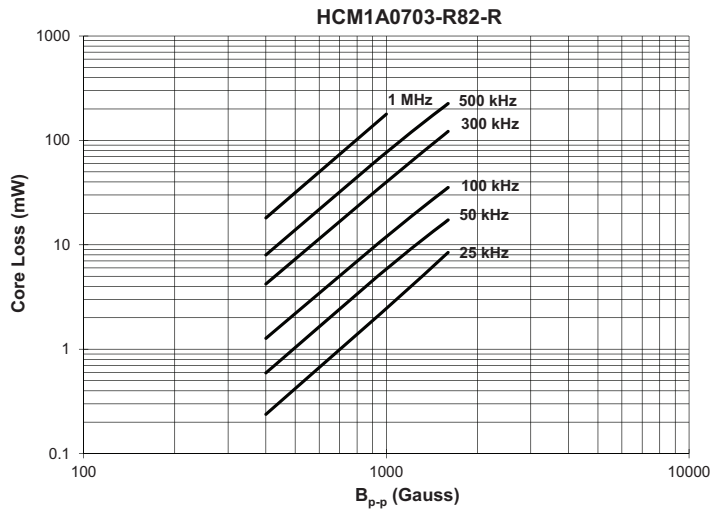
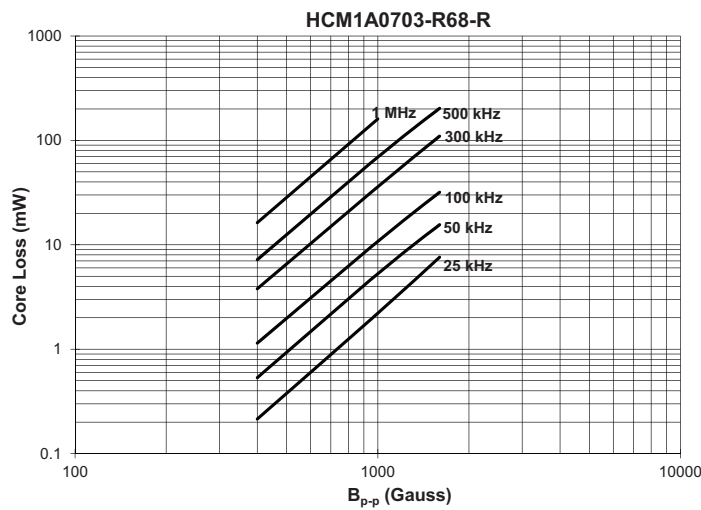
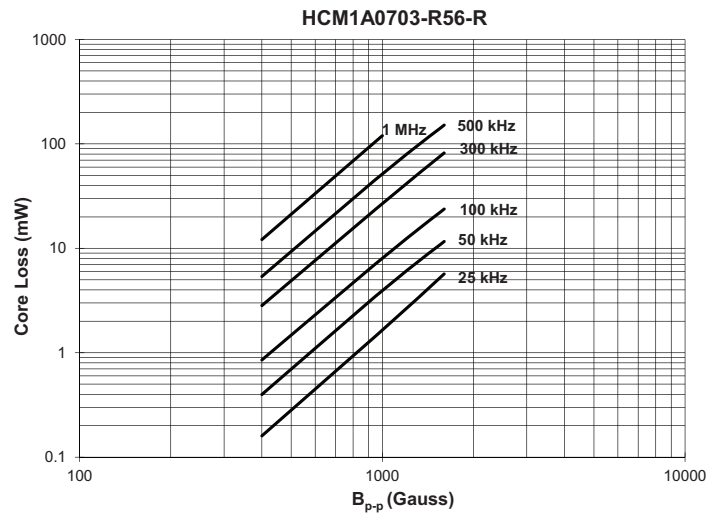
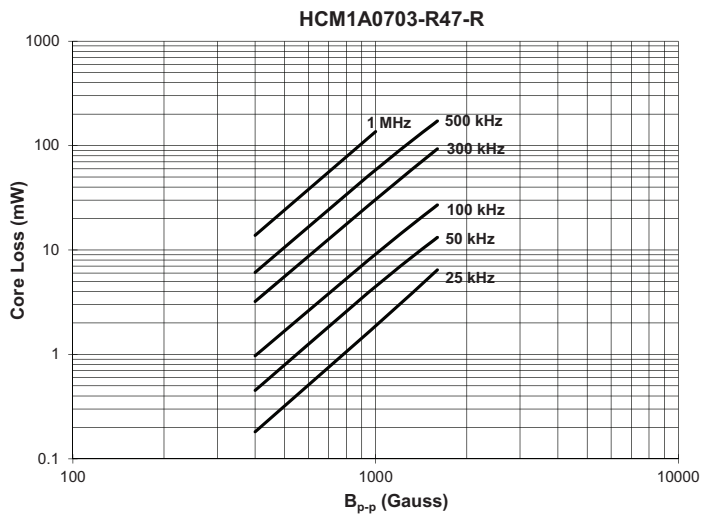
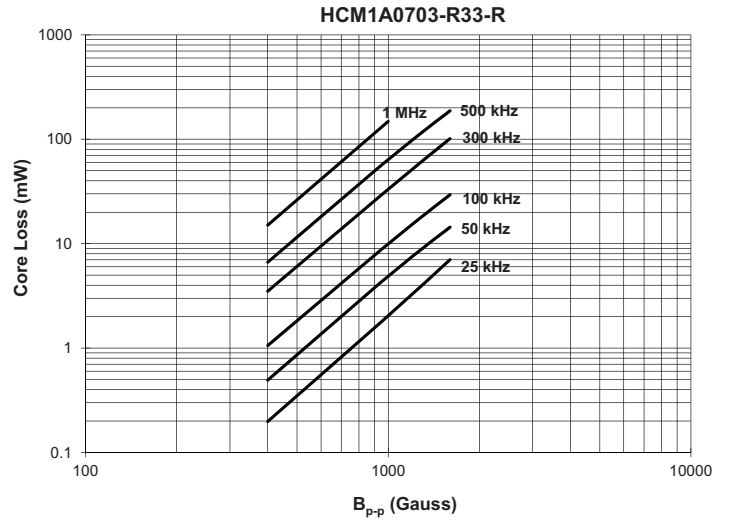
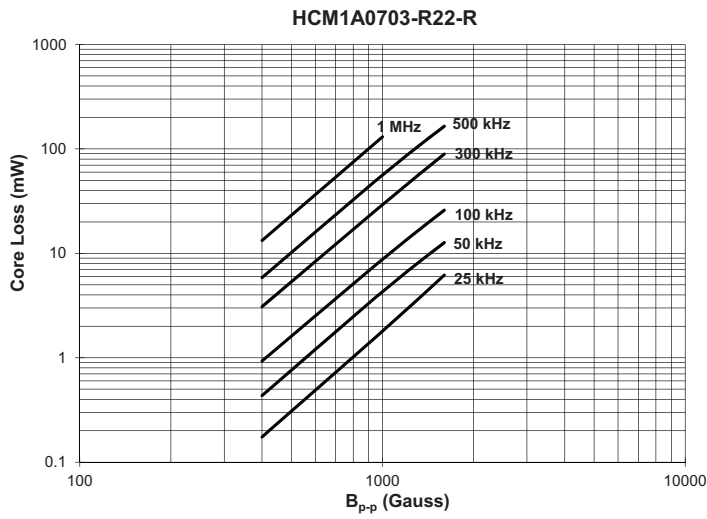
Supplied in tape and reel packaging, 2,000 parts per 13" diameter reel



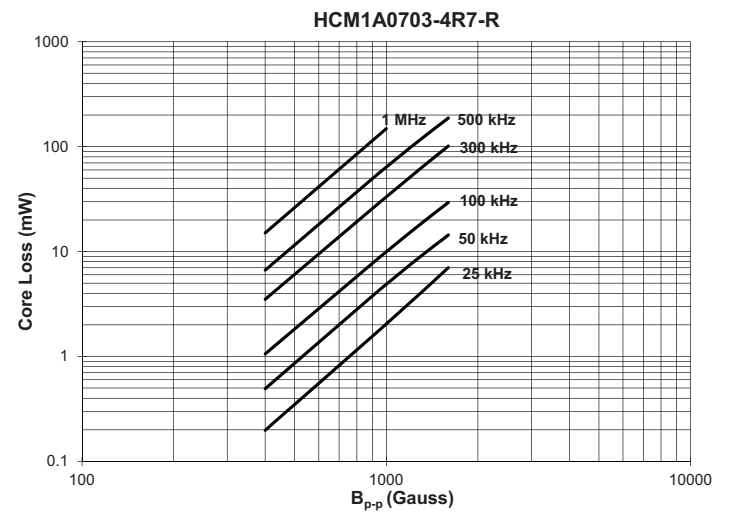
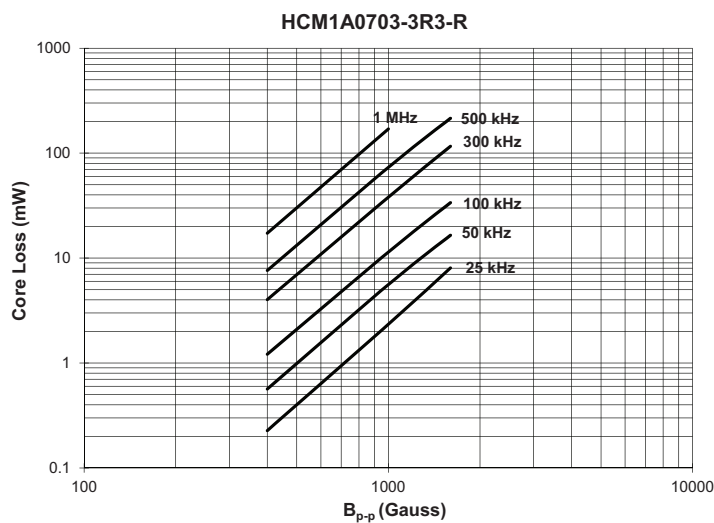
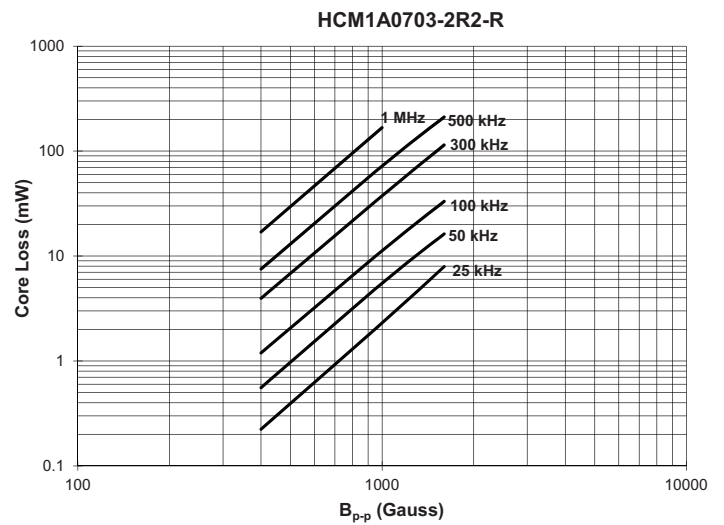
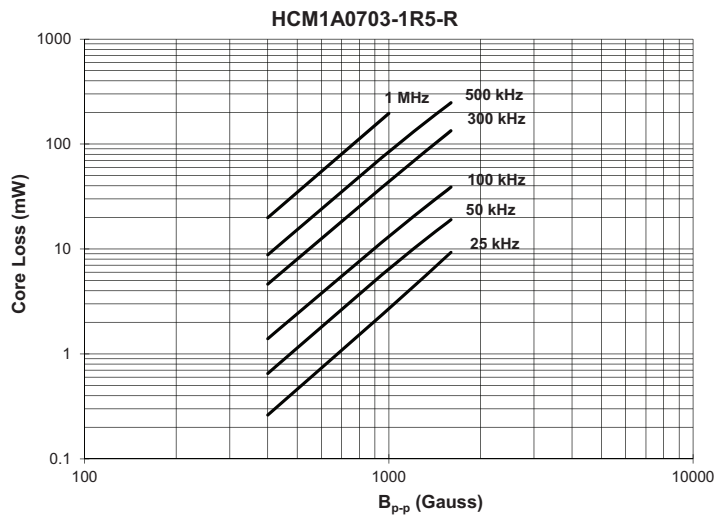
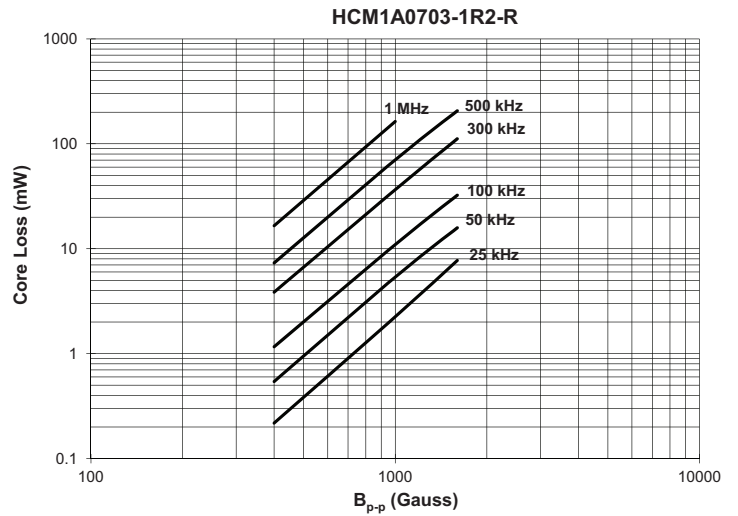
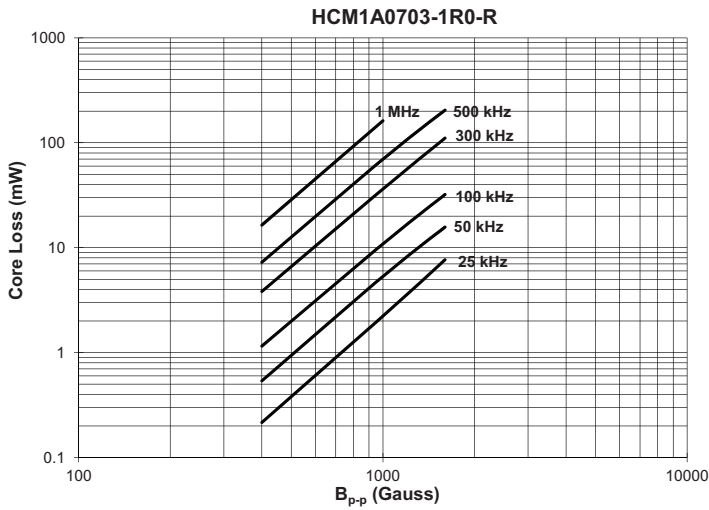
**Core loss vs Bp-p**



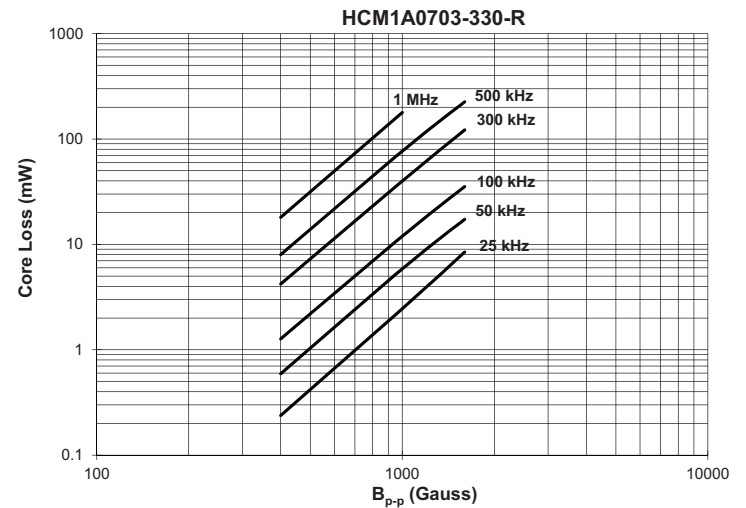
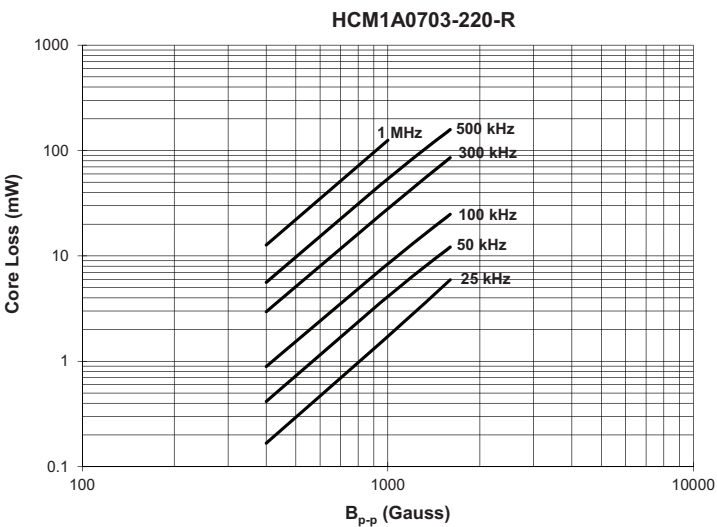
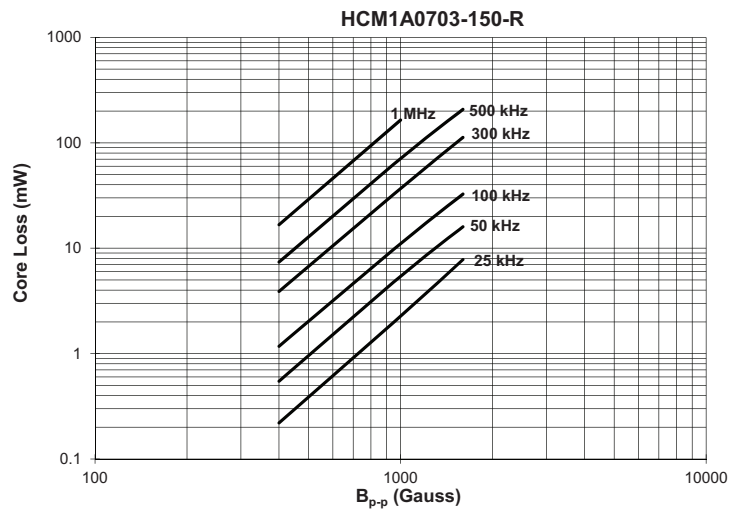
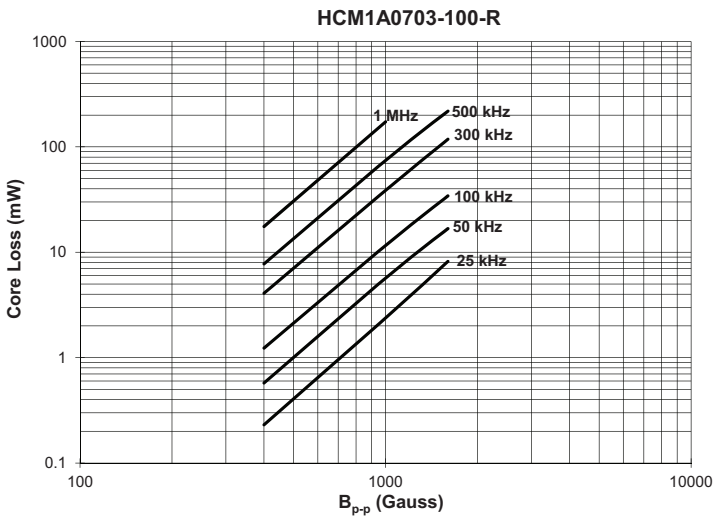
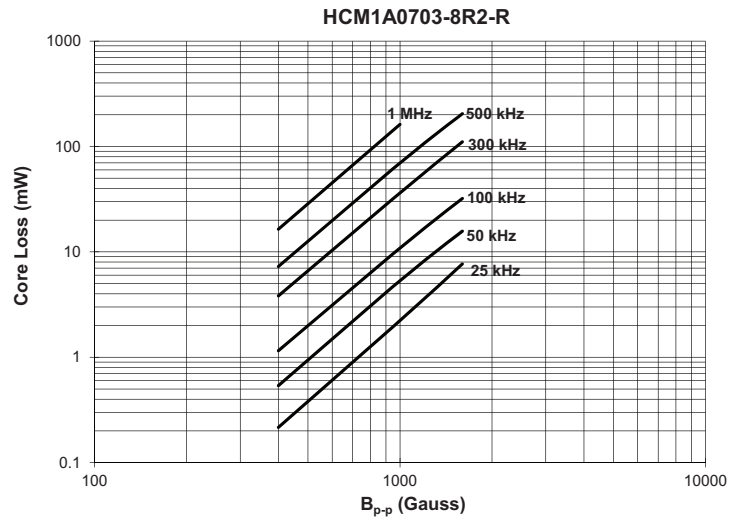
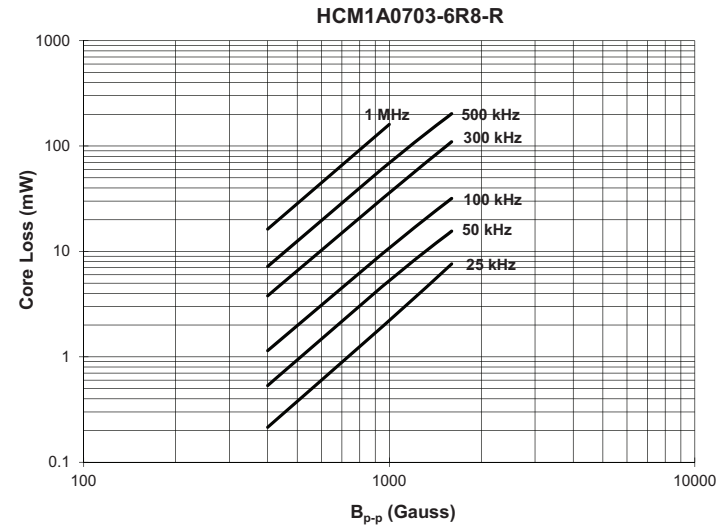
Core loss vs Bp-p



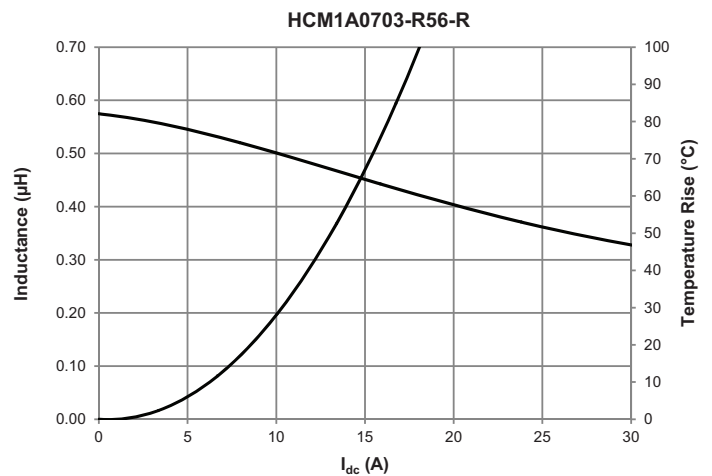
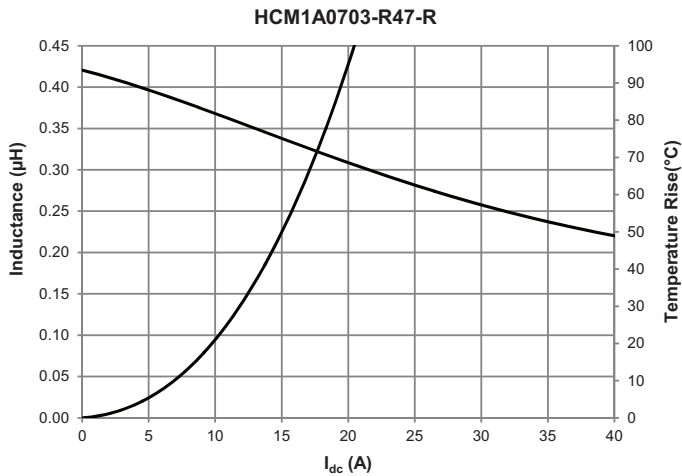
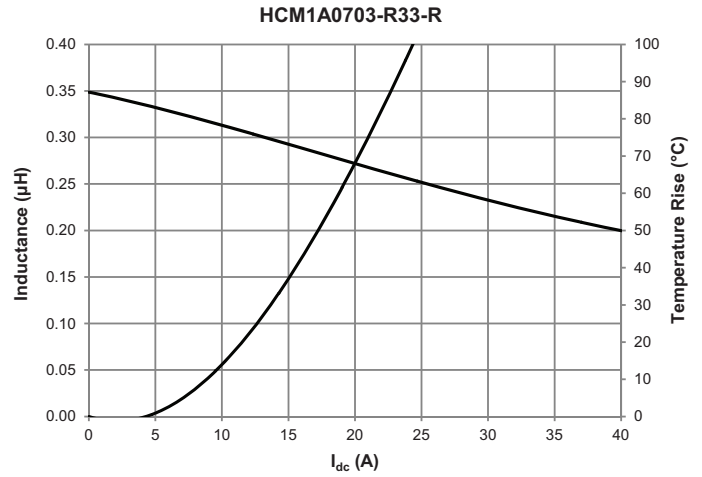
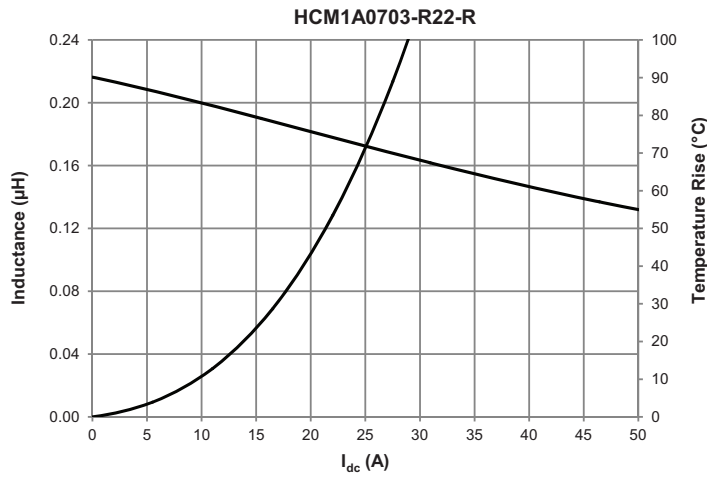
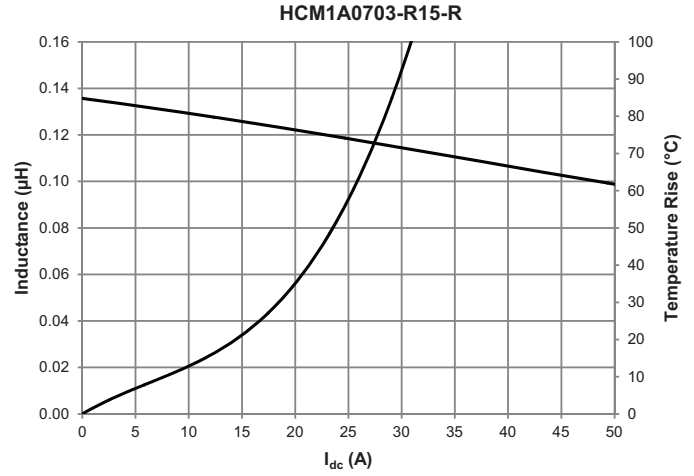
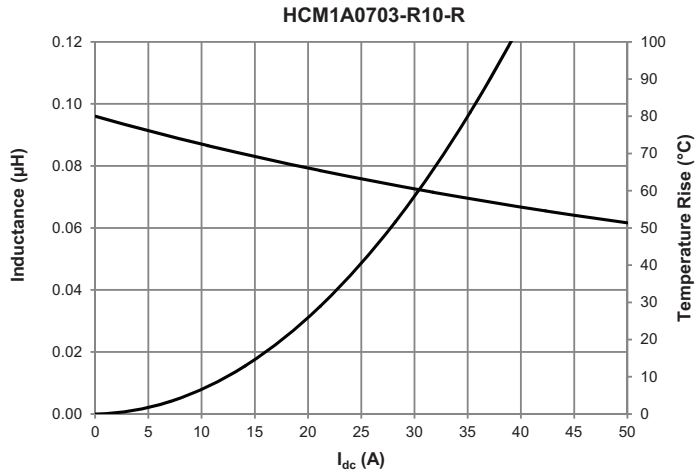
Core loss vs Bp-p



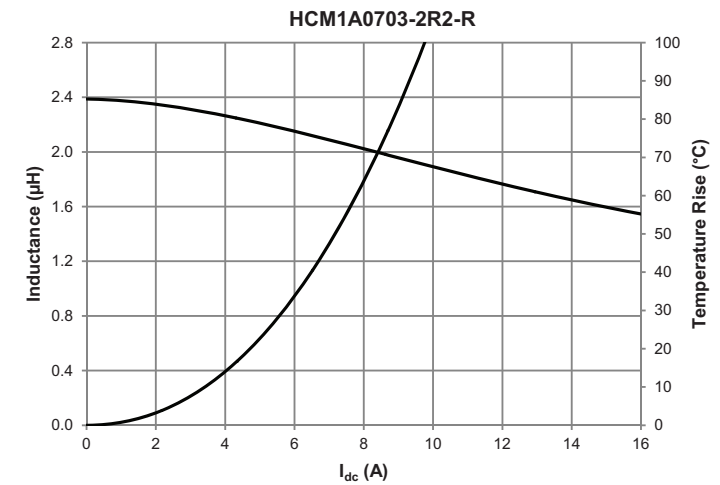
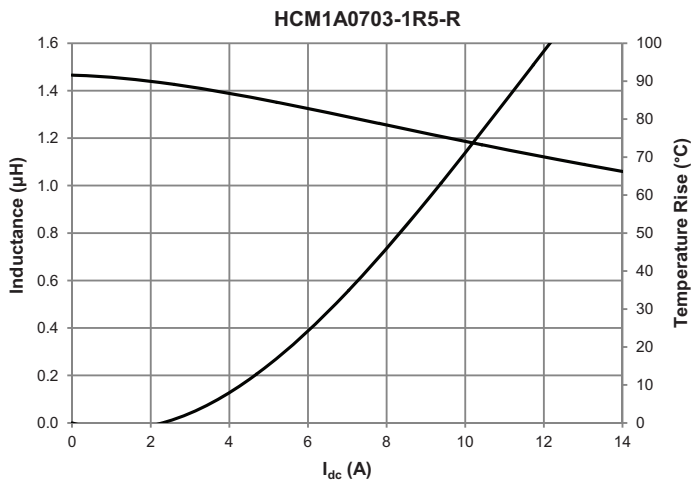
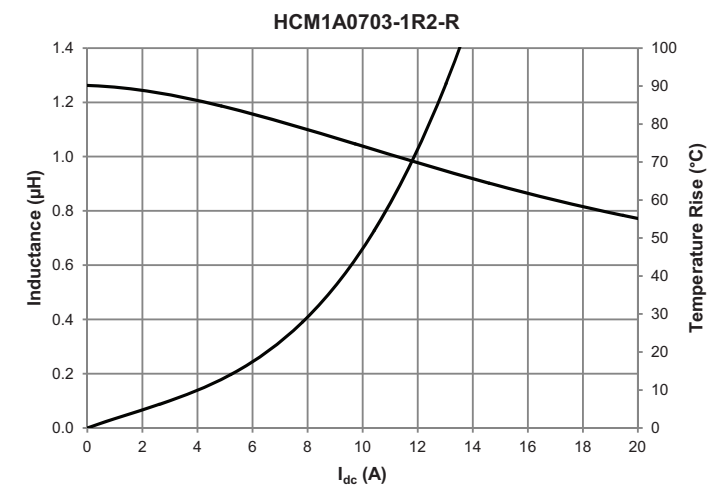
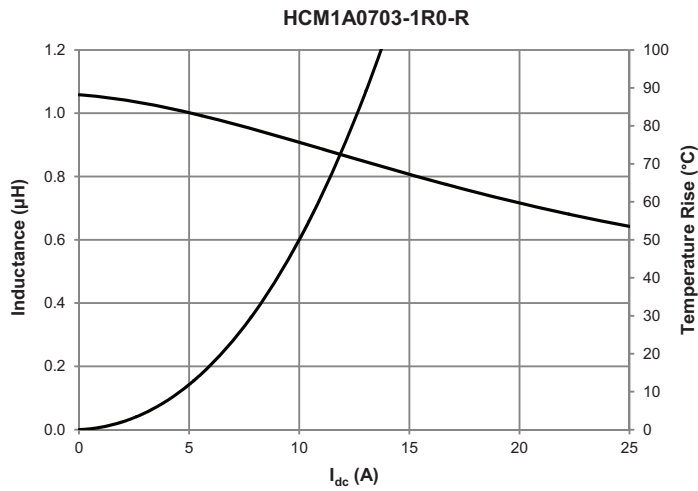
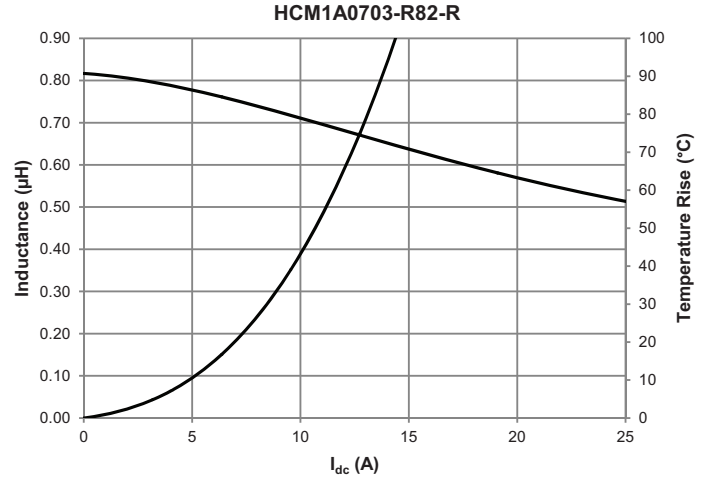
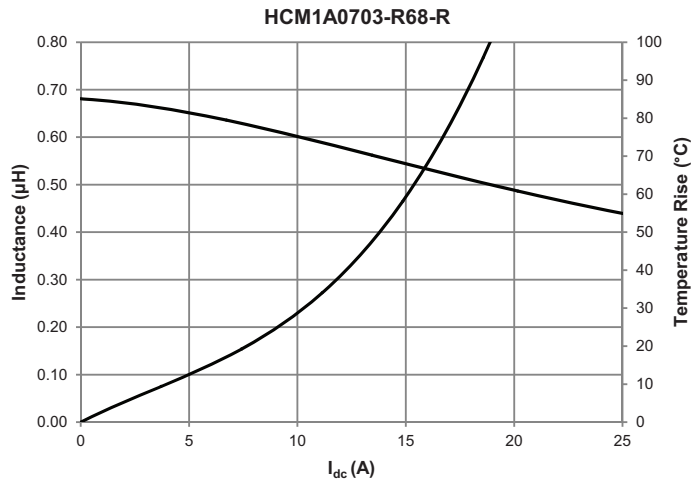
Core loss vs Bp-p



Inductance and temperature rise vs. current

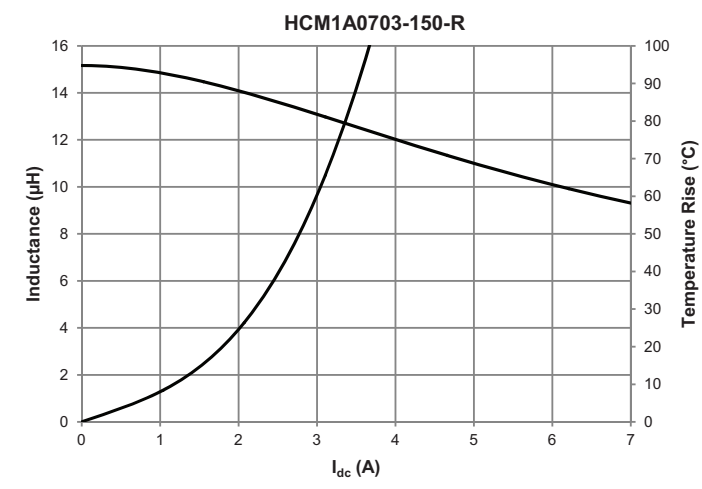
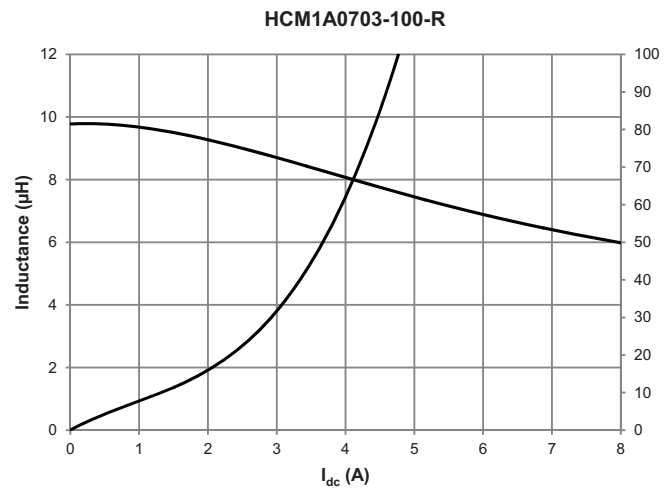
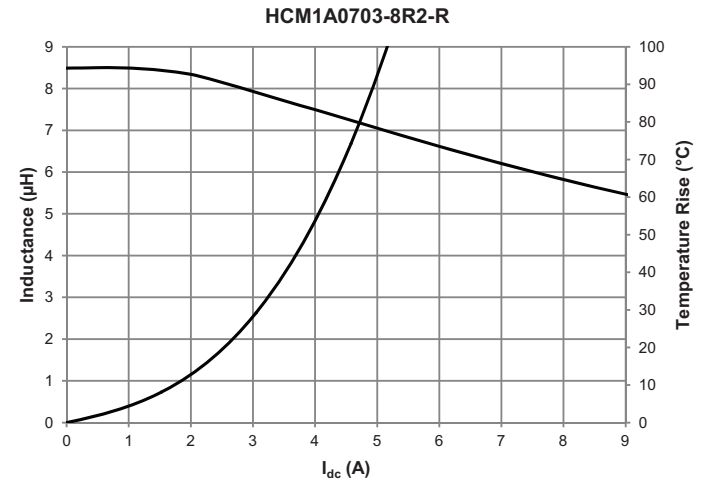
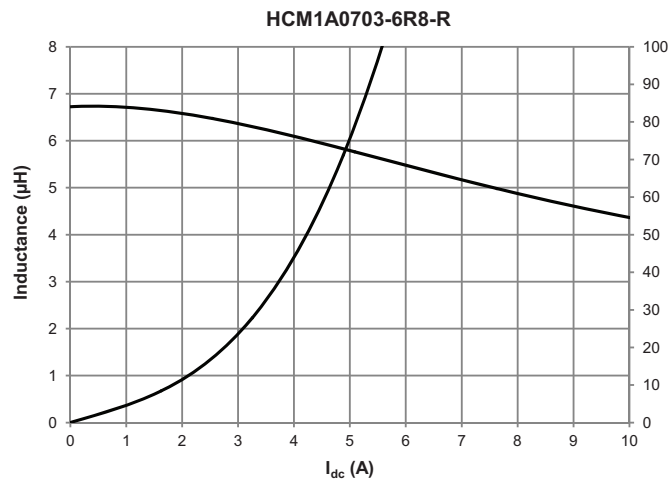
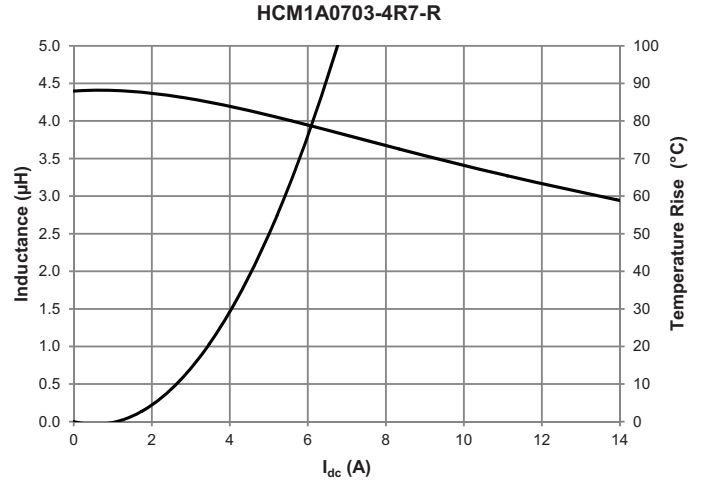
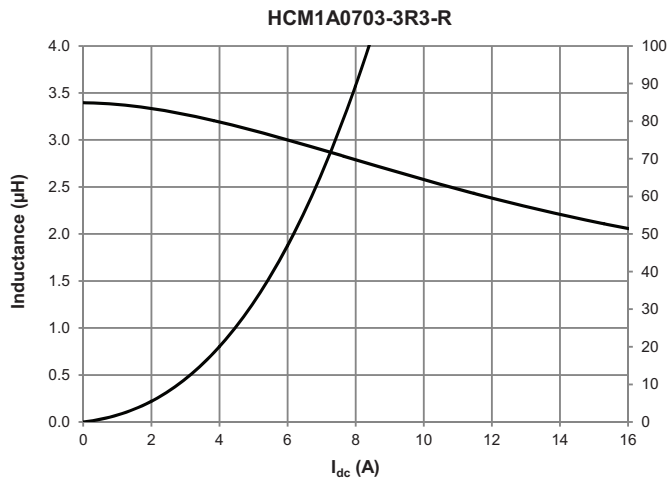


Inductance and temperature rise vs. current

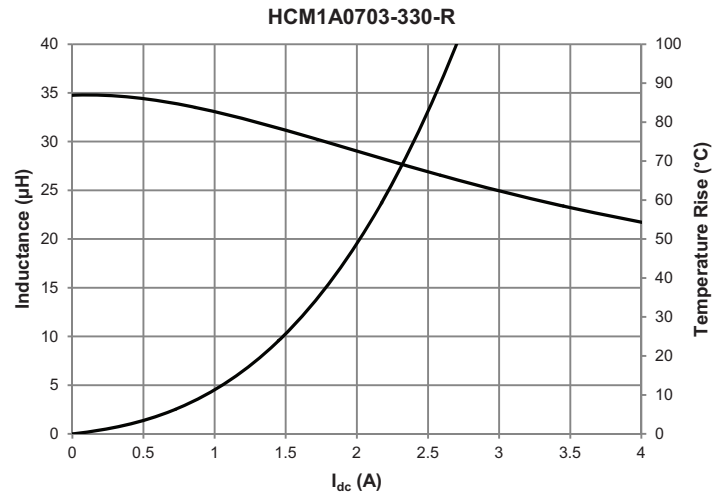
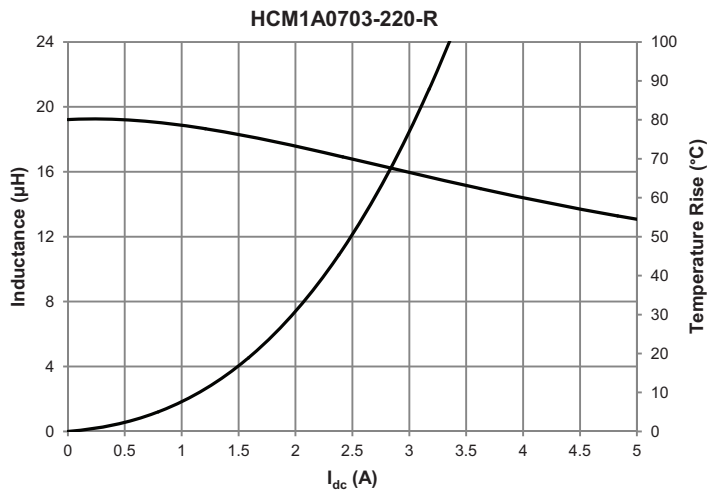




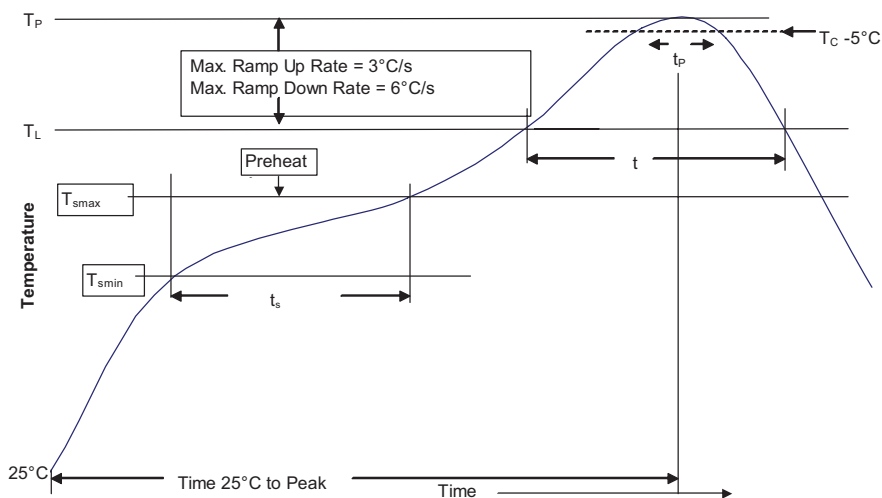
Inductance and temperature rise vs. current



Inductance and temperature rise vs. current



**Solder reflow profile**



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

Package Thickness	Volume mm <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 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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