

HCM1A1707

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 1.0 μ H to 68 μ H
- Current range from 5.2 A to 48 A
- 17.5 mm x 17.2 mm footprint surface mount package in a 7.0 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)/ Anti-locking braking system (ABS)
- 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



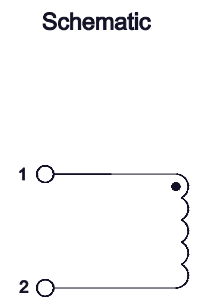
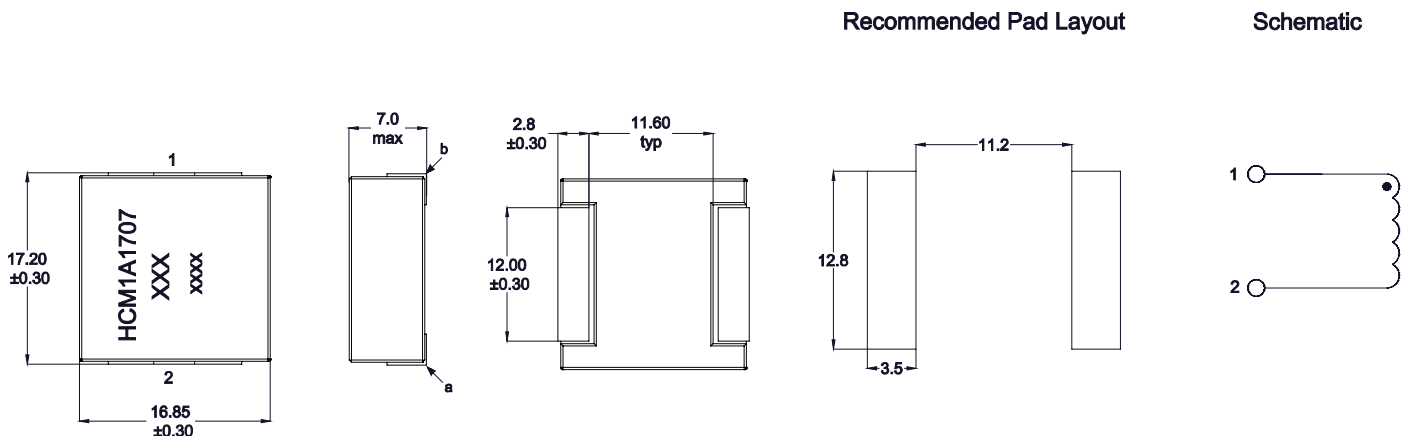
Product Specifications

Part Number ⁶	OCL ¹ (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
HCM1A1707-1R0-R	1.0	0.64	33	48	1.4	1.55	133
HCM1A1707-1R5-R	1.5	0.96	25.5	46	2.05	2.25	94
HCM1A1707-2R2-R	2.2	1.41	24	28	2.4	2.65	105
HCM1A1707-3R3-R	3.3	2.11	21	22	3.1	3.40	103
HCM1A1707-4R7-R	4.7	3.01	18	20	4.4	4.72	85
HCM1A1707-6R8-R	6.8	4.35	12	18	6.55	7.55	79
HCM1A1707-8R2-R	8.2	5.25	12	16	8.1	8.70	45
HCM1A1707-100-R	10	6.4	12	14	9.3	10	49
HCM1A1707-150-R	15	9.6	9.0	14	14.5	15.5	30
HCM1A1707-220-R	22	14.1	8.0	11	20.5	23	27
HCM1A1707-330-R	33	21.1	6.0	9.0	35.1	37	20
HCM1A1707-470-R	47	30.1	5.5	8.0	41	47	17
HCM1A1707-680-R	68	43.5	5.2	6.0	51	60	17

- Open Circuit Inductance (OCL) Test Parameters: 100 kHz, 0.25 V_{rms}, 0.0 Adc, +25 °C
- Full Load Inductance (FLL) Test Parameters: 100 kHz, 0.25 V_{rms}, I_{sat}, +25 °C
- 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.

- I_{sat}: Peak current for approximately 20% rolloff @ +25 °C
- K-factor: Used to determine B_{pp} for core loss (see graph). B_{p-p} = K * L * Δ I. B_{pp}: (Gauss), K: (K-factor from table), L: (Inductance in μH), Δ I (Peak to peak current in Amps).
- Part Number Definition: HCM1A1707-xxx-R
HCM1A1707 = 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

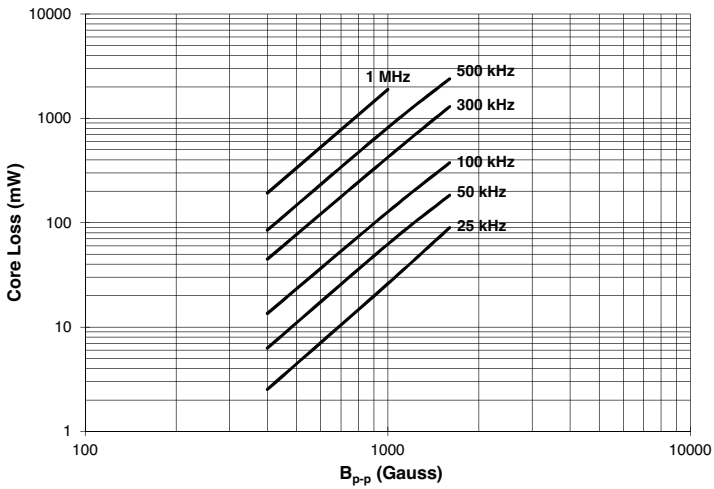
Dimensions (mm)



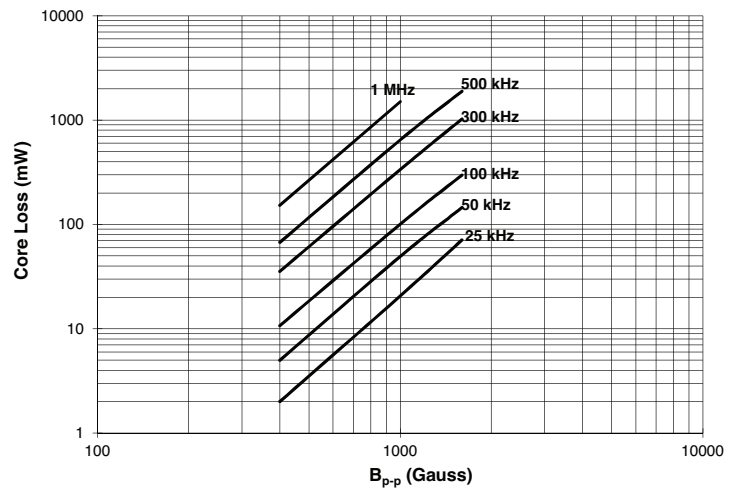
Part marking: HCM1A1707, XXX=inductance value in uH, R=decimal point. If no R is present then last character equals number of zeros.
 xxx=Lot code
 All soldering surfaces to be coplanar within 0.1 millimeters
 DCR measured from point "a" to point "b"
 Color: Grey
 Do not route traces or vias underneath the inductor

Core loss vs B_{p-p}

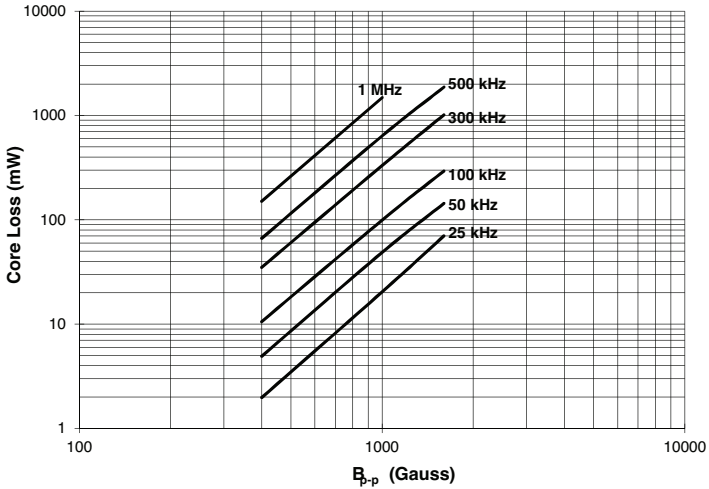
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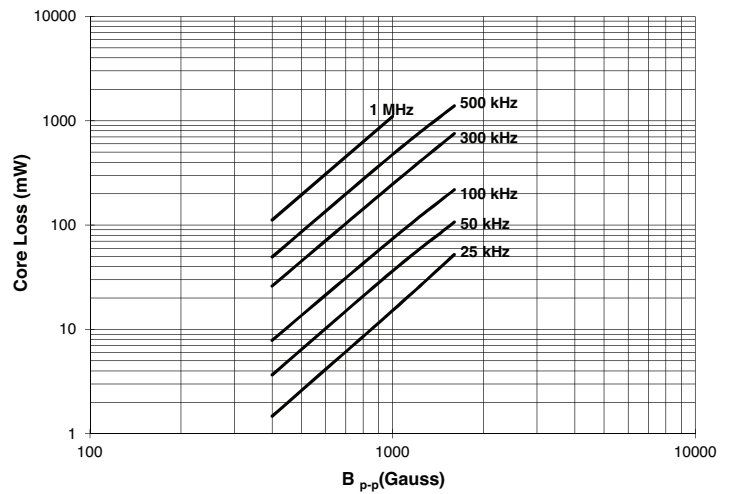
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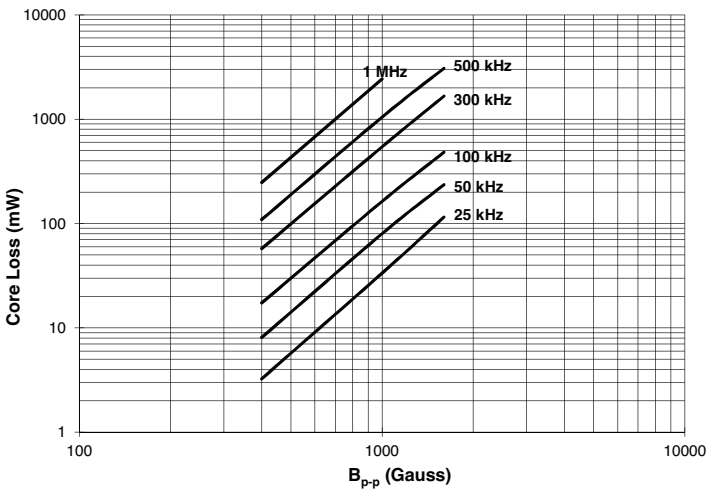
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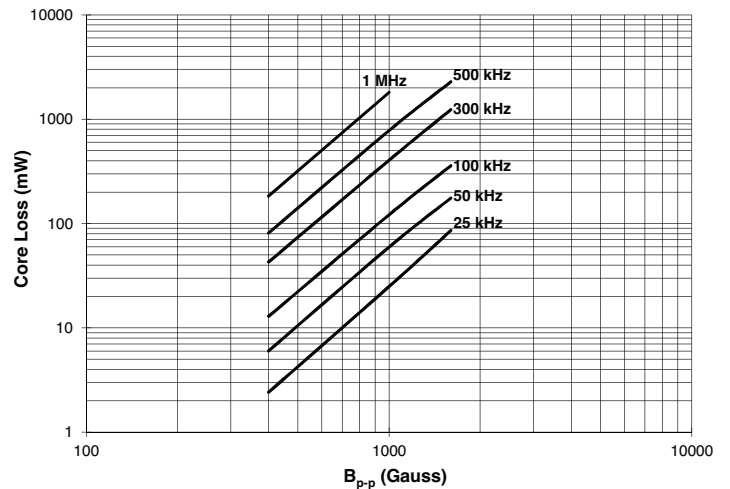
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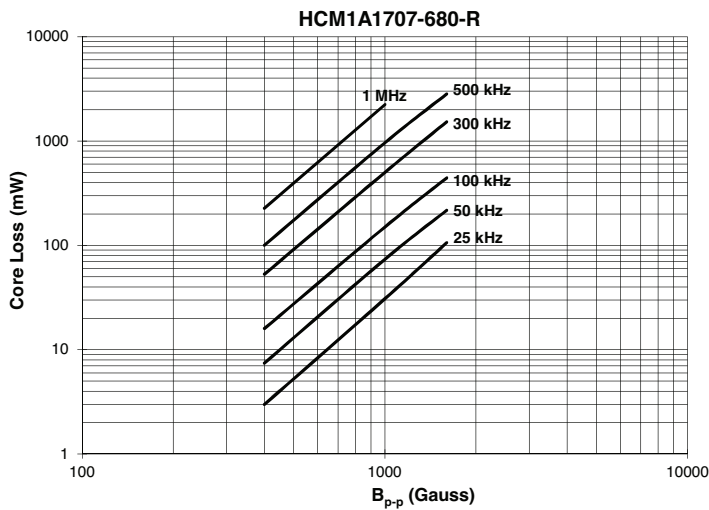
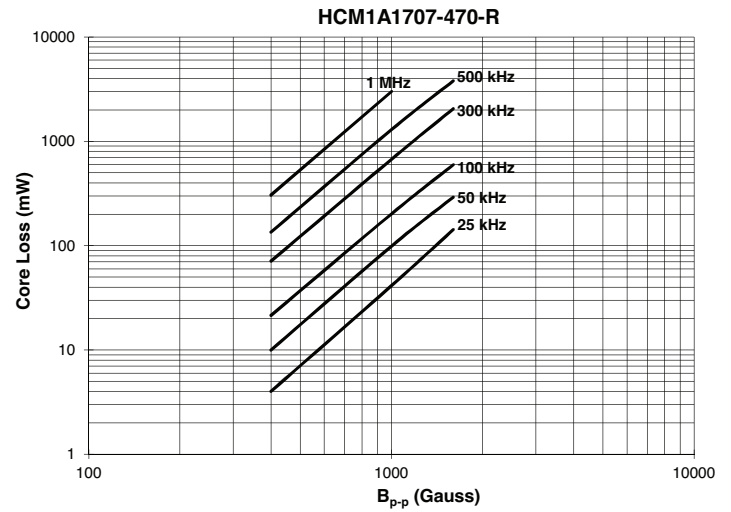
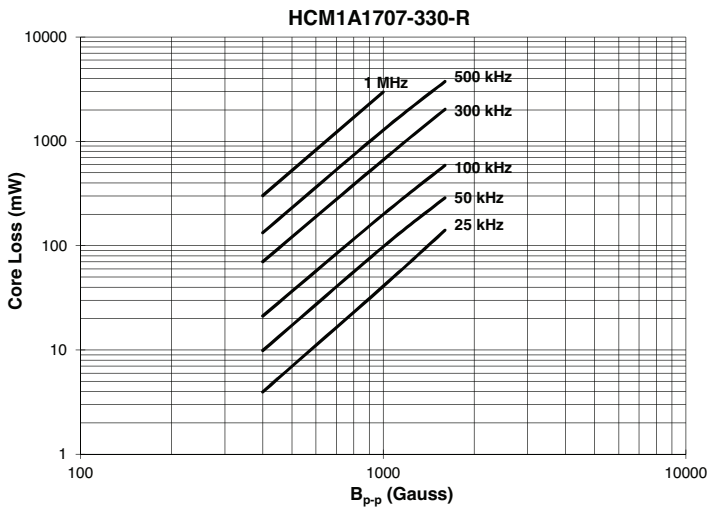
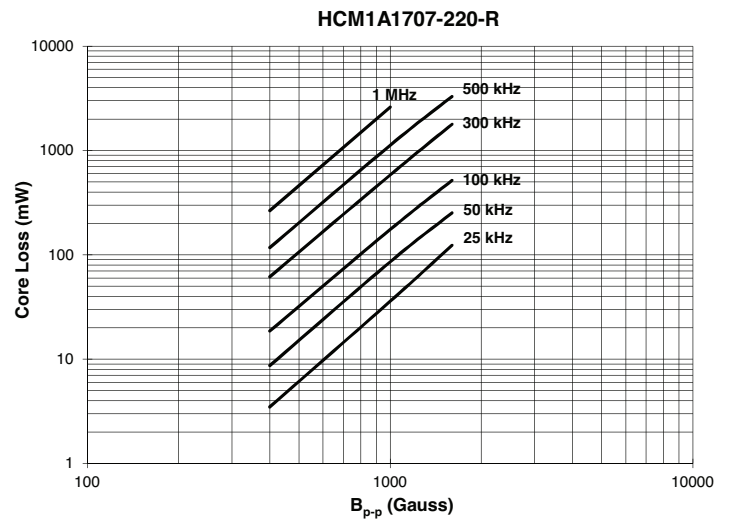
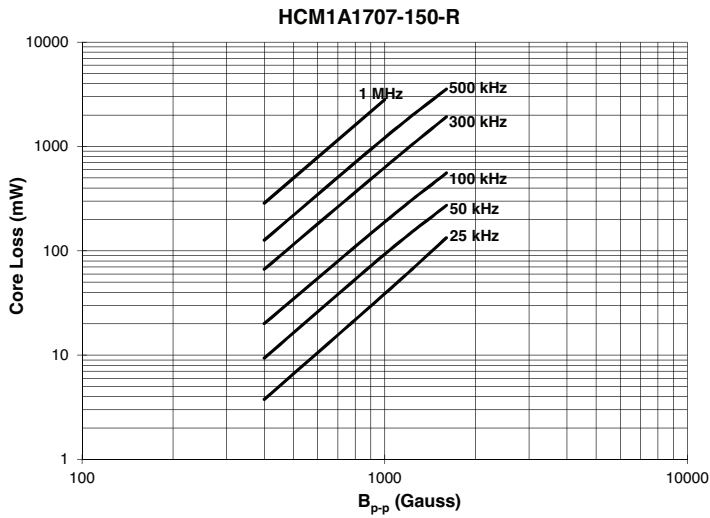
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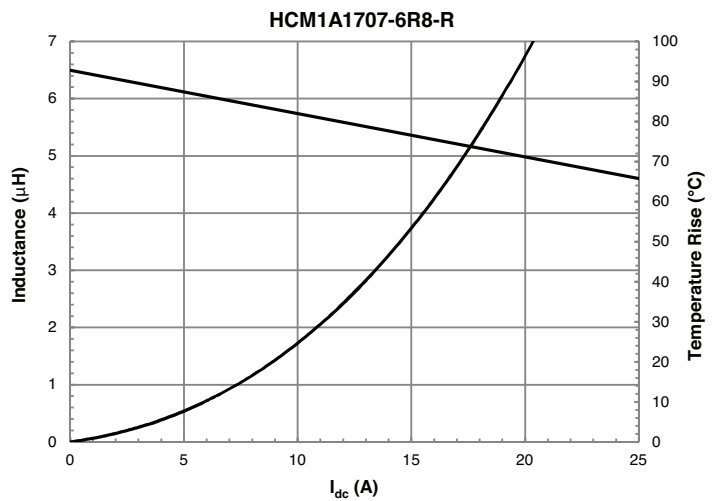
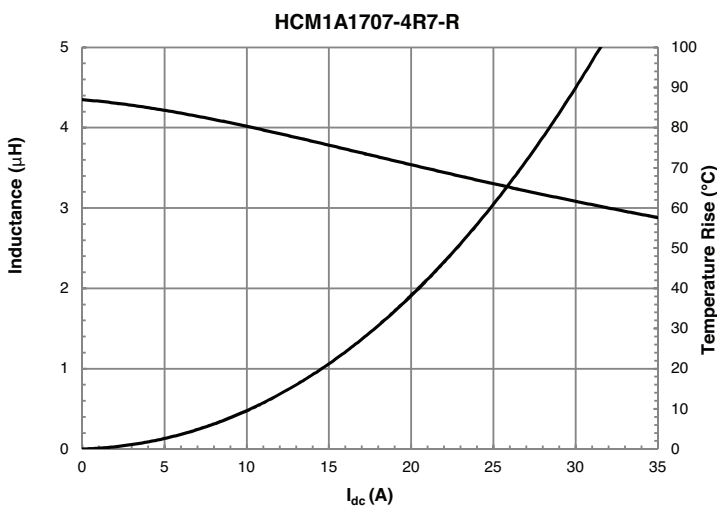
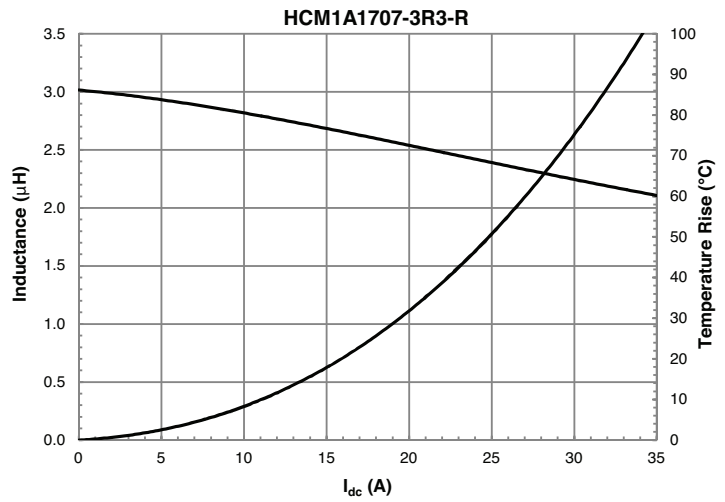
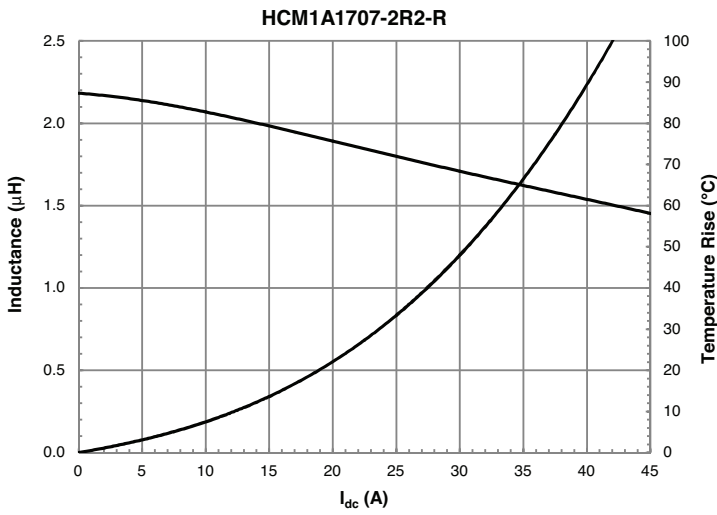
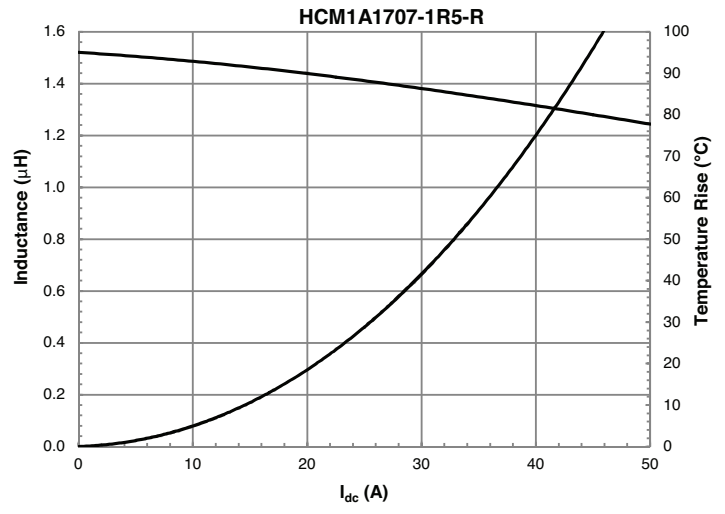
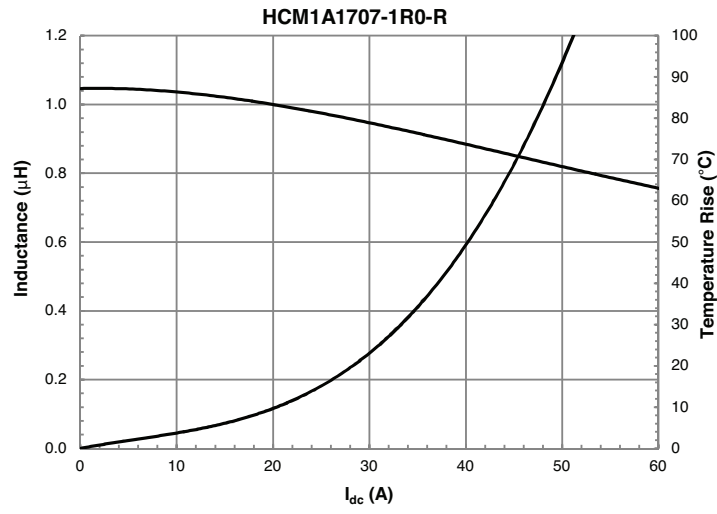
HCM1A1707-100-R



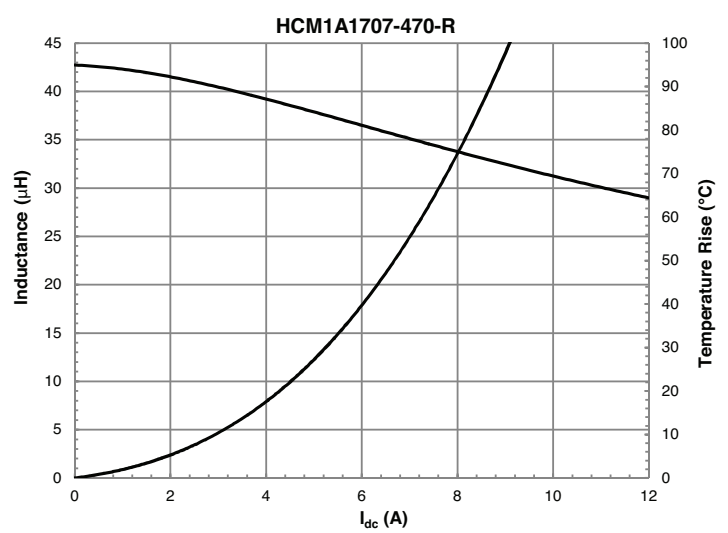
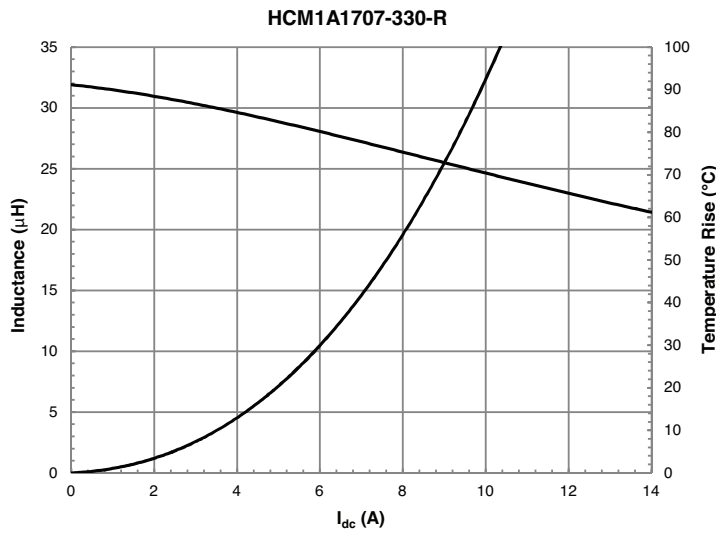
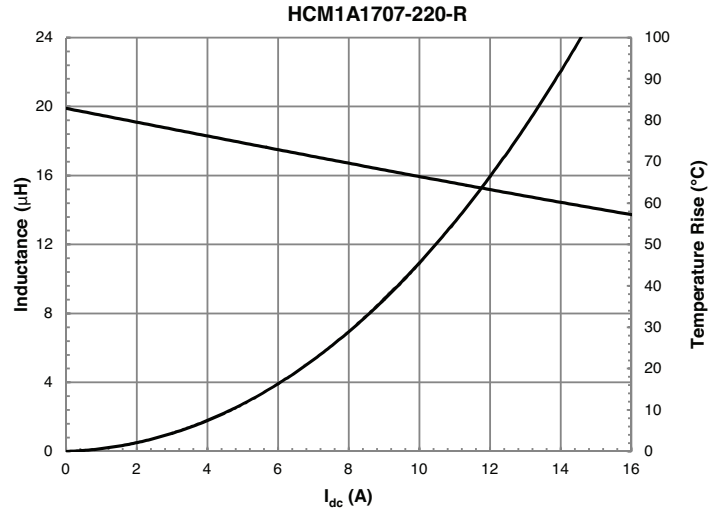
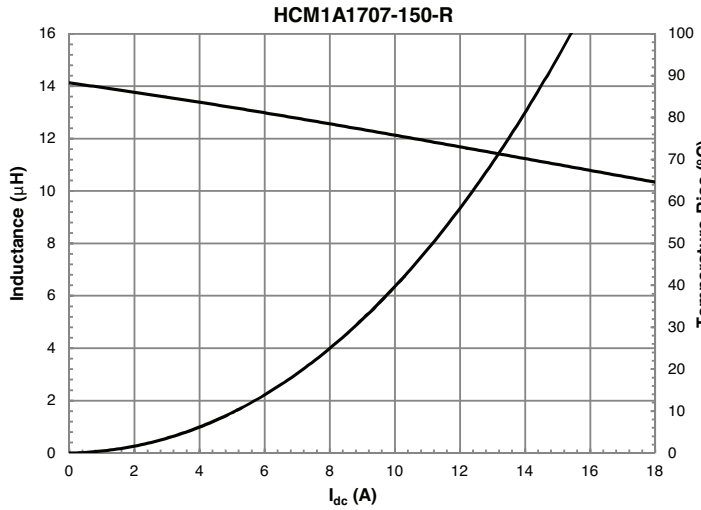
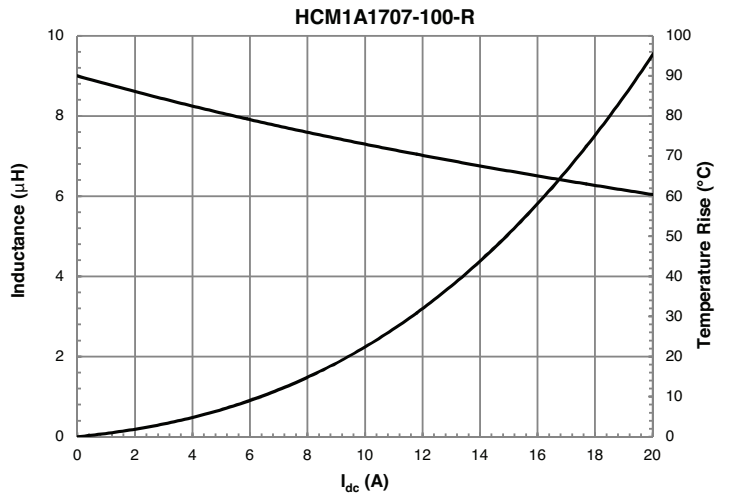
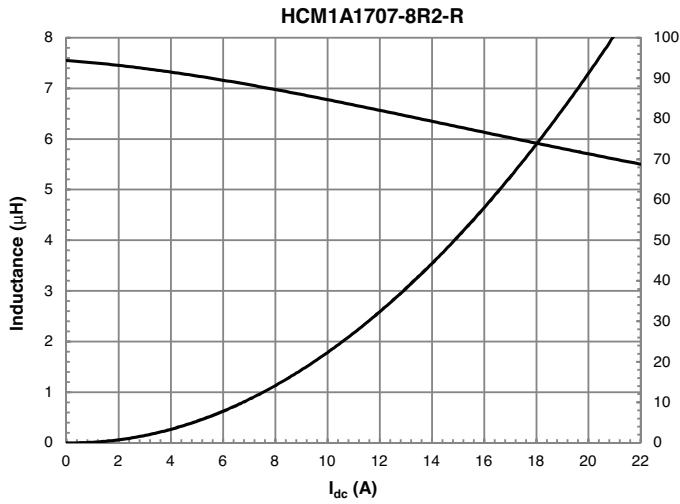
Core loss vs B_{p-p}



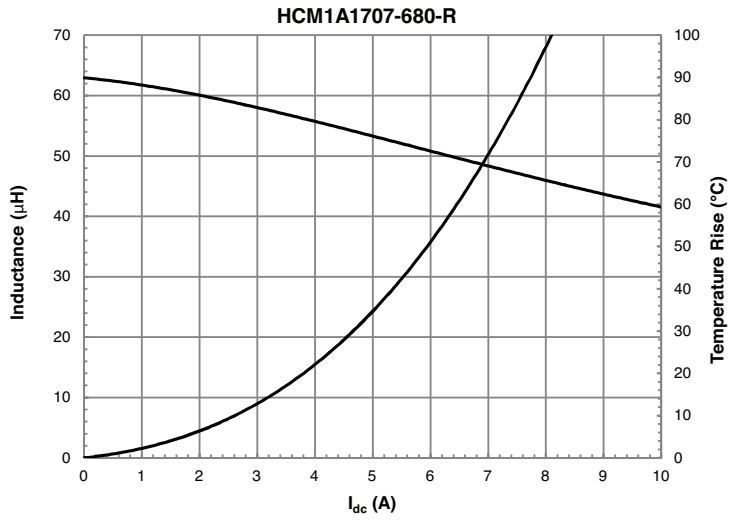
Inductance and temperature rise vs. current



Inductance and temperature rise vs. current



Inductance and temperature rise vs. current



Solder reflow profile

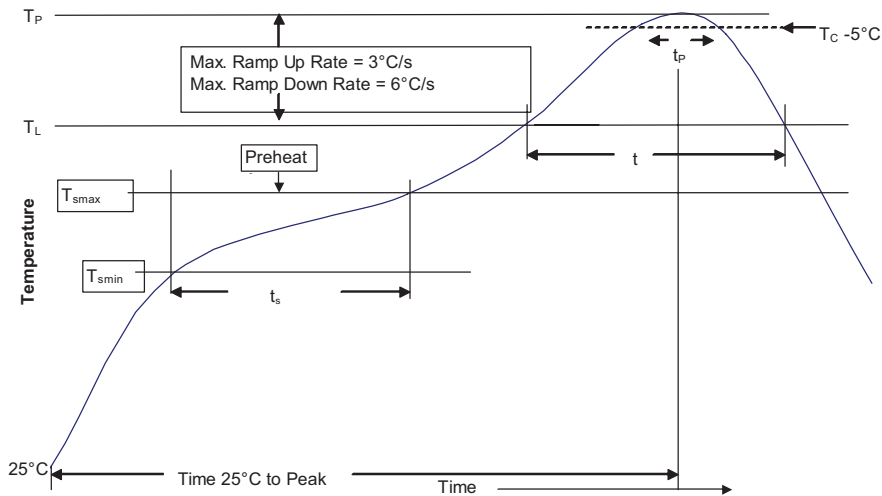


Table 1 - Standard SnPb Solder (T_c)

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 JDEC 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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