HCM1A0503

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 µH to 10 µH
- Current range from 2.3 A to 24 A
- 5.5 mm x 5.3 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
  - Basic and smart surround, and rear and front view camera
  - 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
- Chassis and safety electronics
  - Airbag control unit
- Engine and Powertrain Systems
  - 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

Pb HALOGEN HF FREE RoHS

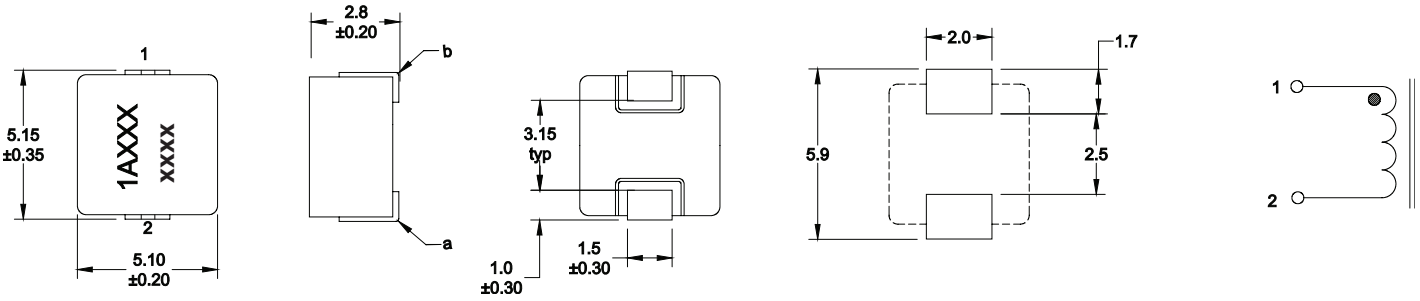
Powering Business Worldwide

Product Specifications

Part Number[6]	OCL[1] (µH) ± 20%	FLL[2] (µH) minimum	I_{rms}[3] (A)	I_{sat}[4] (A)	DCR (mΩ) typical @ +20 °C	DCR (mΩ) maximum @ +20 °C	K-factor[5]
HCM1A0503-R20-R	0.20	0.128	15.8	18	2.1	2.3	1601
HCM1A0503-R22-R	0.22	0.141	15.8	24	2.1	2.3	1004
HCM1A0503-R33-R	0.33	0.211	11.8	16	3.9	4.3	918
HCM1A0503-R35-R	0.35	0.224	11.8	15	3.9	4.3	914
HCM1A0503-R47-R	0.47	0.300	9.2	12	6.5	7.2	835
HCM1A0503-R68-R	0.68	0.435	8.0	12	8.2	9.1	713
HCM1A0503-R75-R	0.75	0.48	7.8	12	8.5	9.4	590
HCM1A0503-1R0-R	1.0	0.64	7.1	8.5	10.4	11.4	569
HCM1A0503-1R5-R	1.5	0.96	5.2	6.8	17.1	18.5	450
HCM1A0503-2R2-R	2.2	1.4	4.5	6.4	22.5	25.0	411
HCM1A0503-3R3-R	3.3	2.1	3.8	5.6	36.4	40.4	332
HCM1A0503-4R7-R	4.7	3.0	3.1	4.2	54	60.0	239
HCM1A0503-5R6-R	5.6	3.6	2.8	4.0	63	70.6	235
HCM1A0503-6R8-R	6.8	4.4	2.3	3.8	81	97.2	212
HCM1A0503-100-R	10	6.4	2.4	2.3	90	108	191

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). Bp-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: HCM1A0503-xxx-R
   HCM1A0503 = 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)

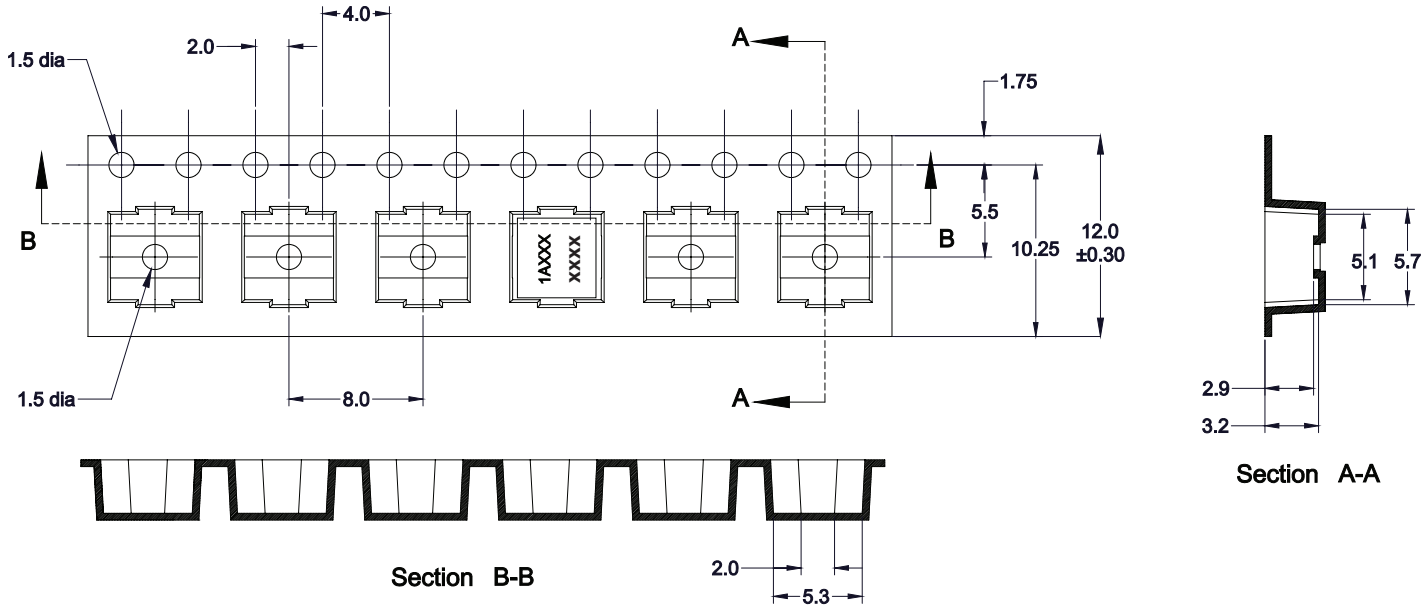


Part marking: 1AXXX=1A=Automotive grade, XXX=inductance value in uH, R=decimal point. If no R is present then last character equals number of zeros
xxxx= Lot code
All soldering surfaces to be coplanar within 0.1 millimeters
Tolerances are ±0.2 millimeters unless stated otherwise
DCR measured from point "a" to point "b"
Color: Grey
Do not route traces or vias underneath the inductor

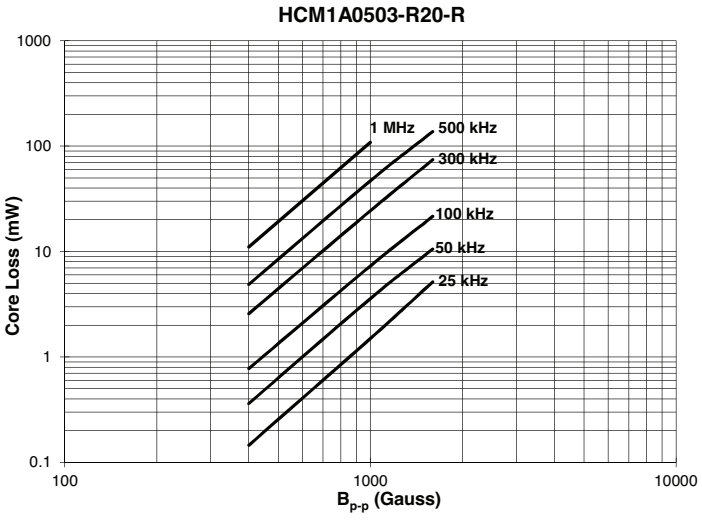
Packaging information (mm)

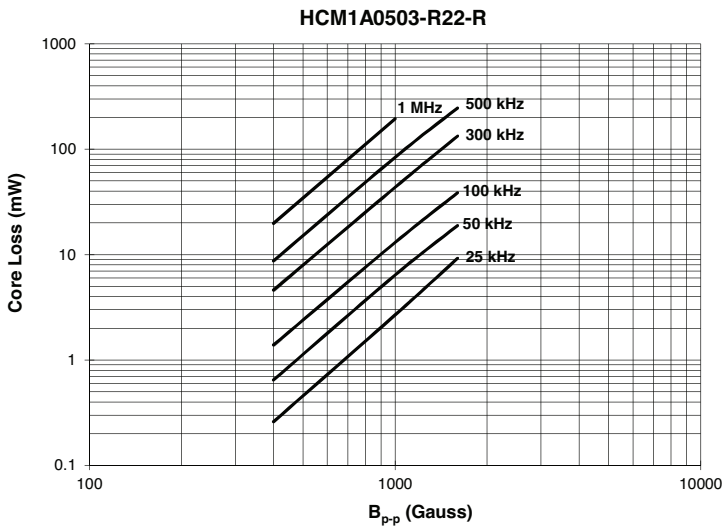
Drawing not to scale

Supplied in tape and reel packaging , 2000 parts per 13" diameter reel



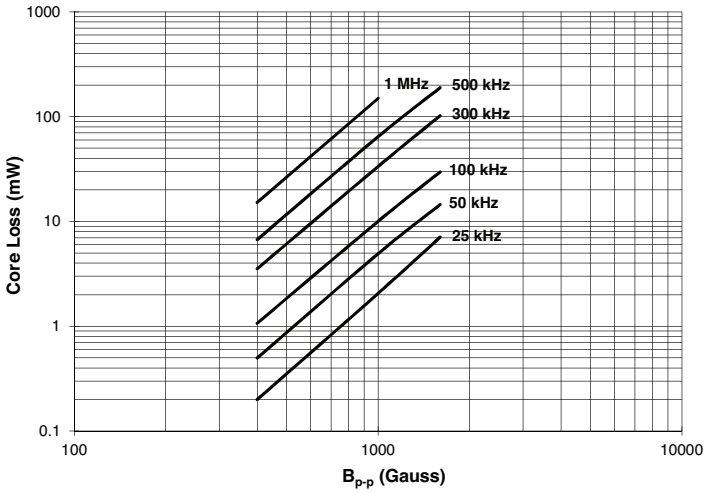
Core loss vs B_{p-p}





Core loss vs B_{p-p}

HCM1A0503-R33-R



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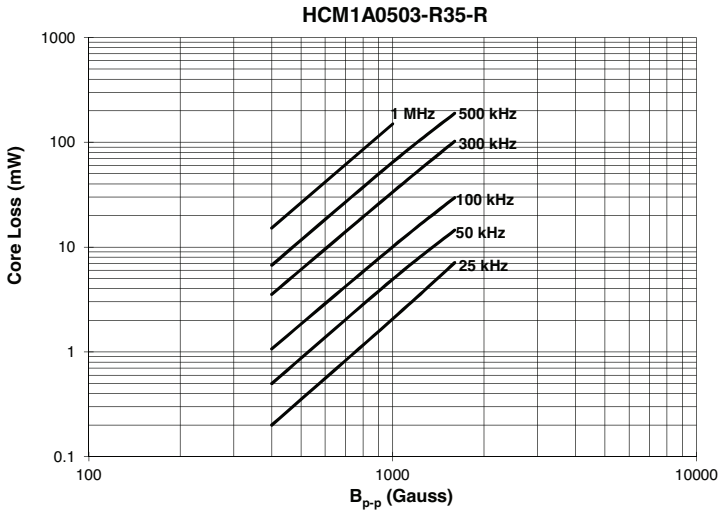

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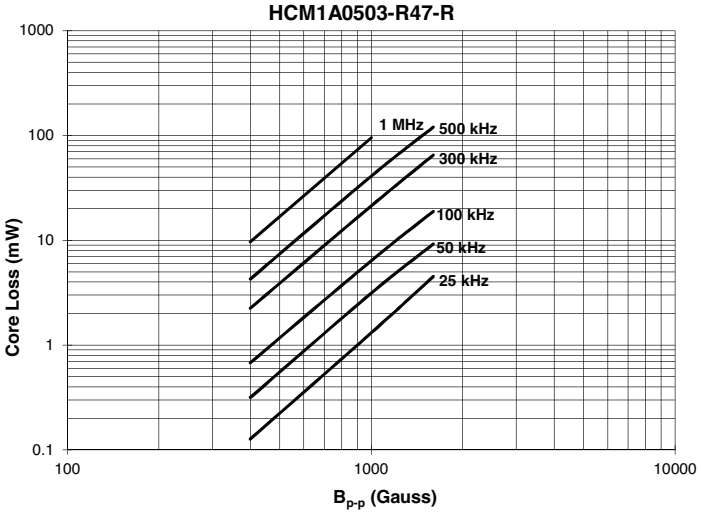

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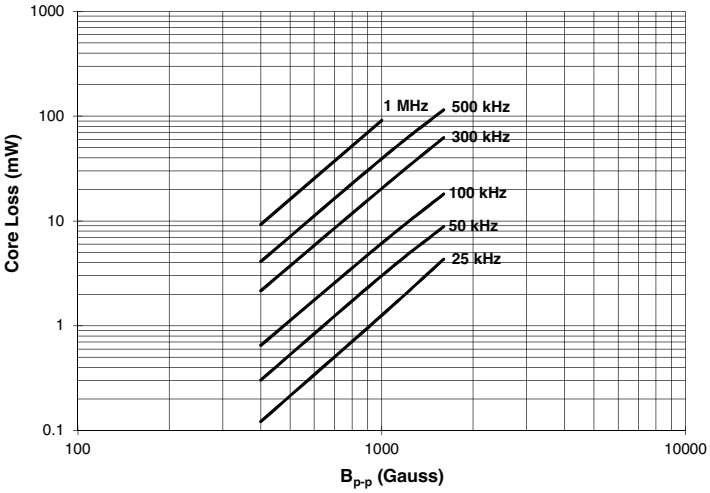

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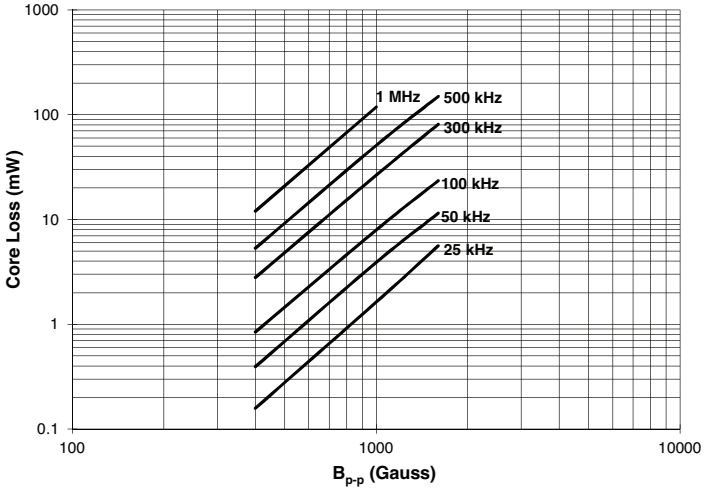

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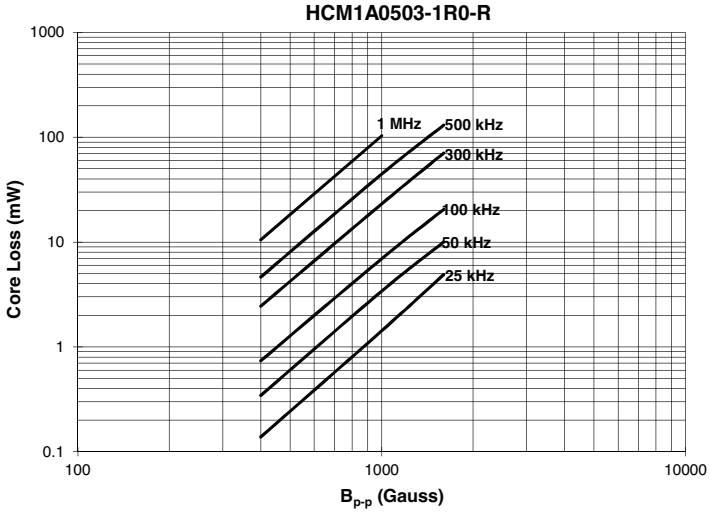
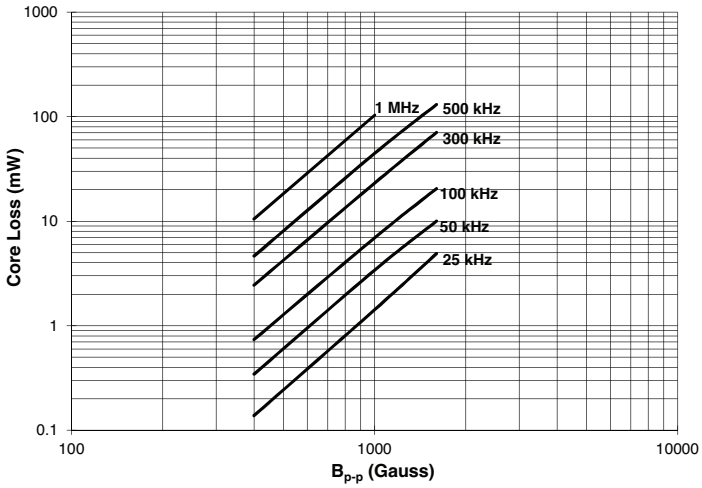


Core loss vs B_{p-p}

HCM1A0503-1R5-R



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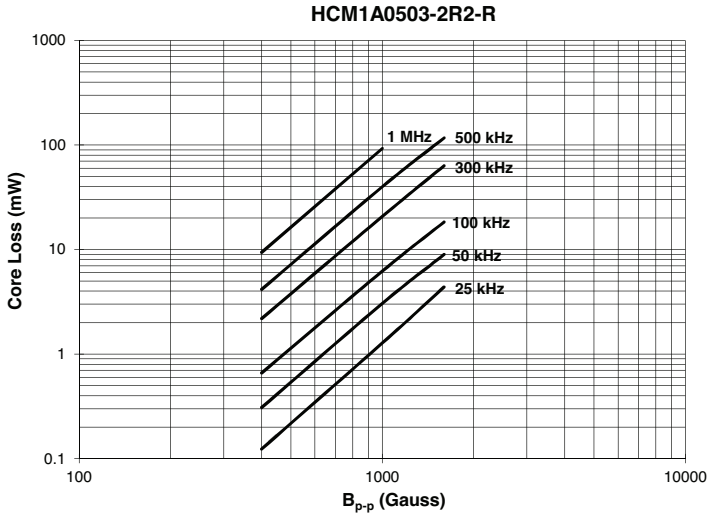

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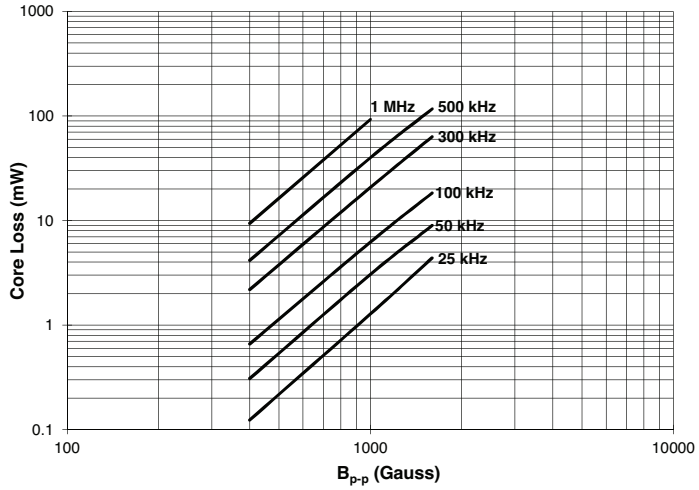

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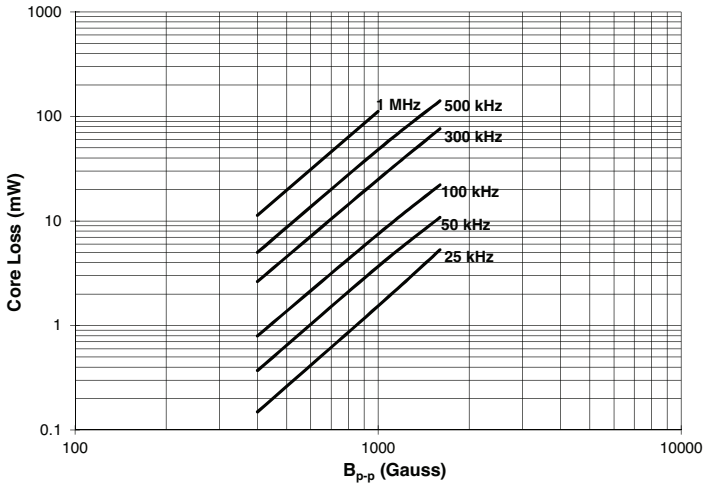

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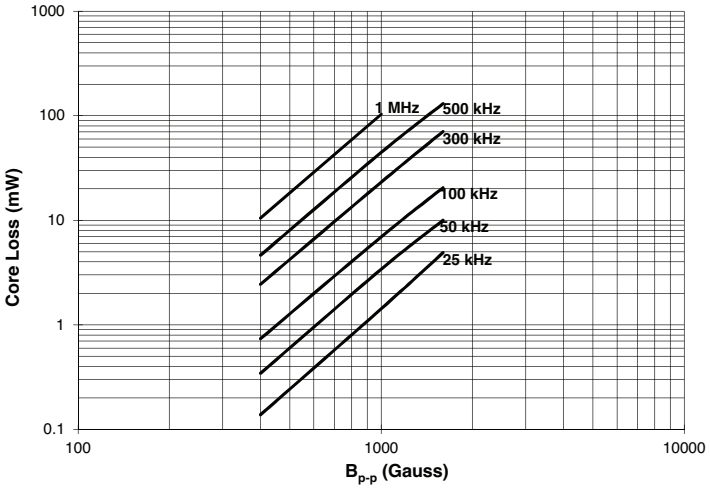

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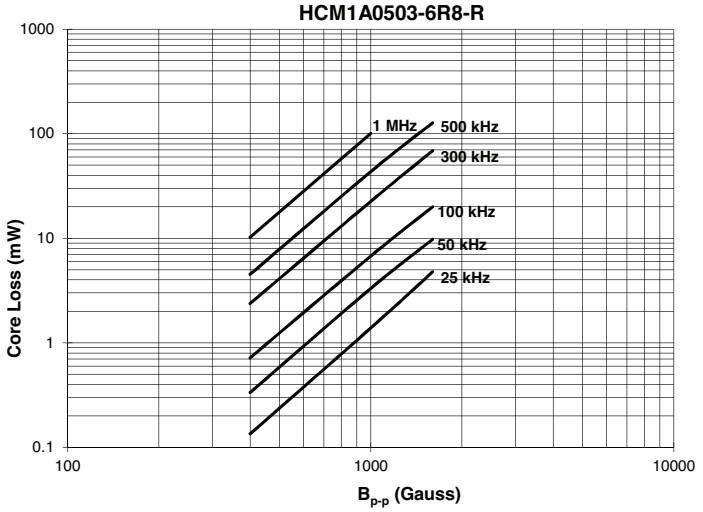
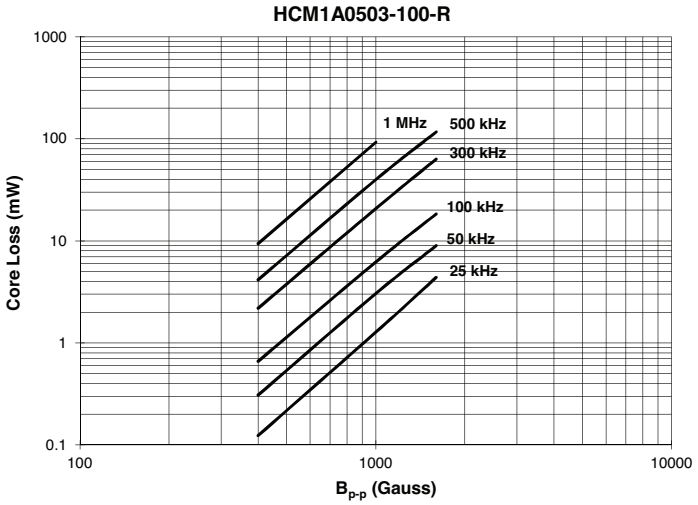
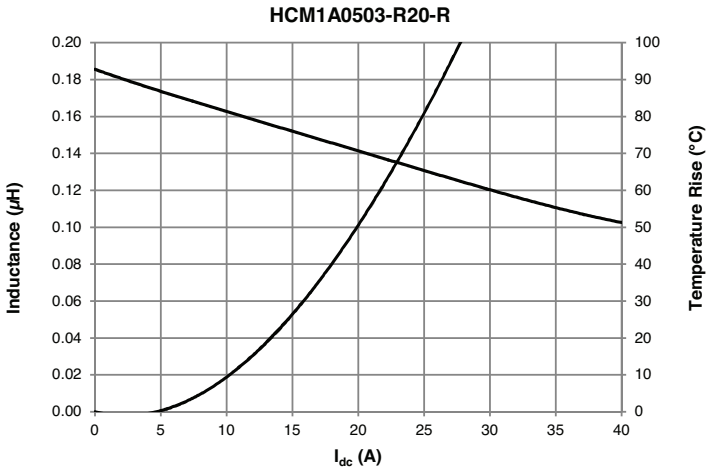


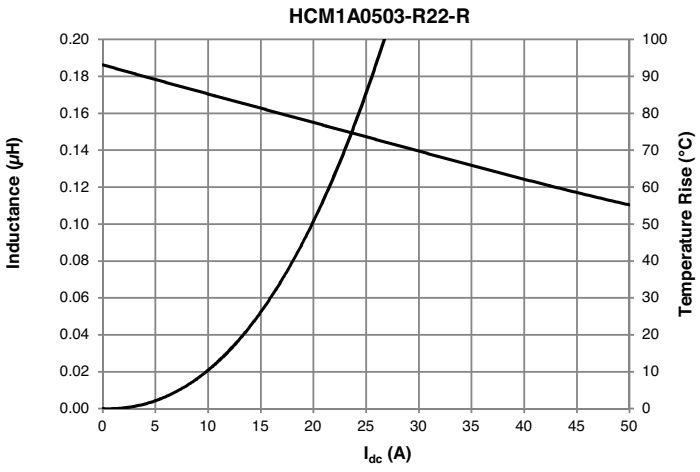
Core loss vs B_{p-p}

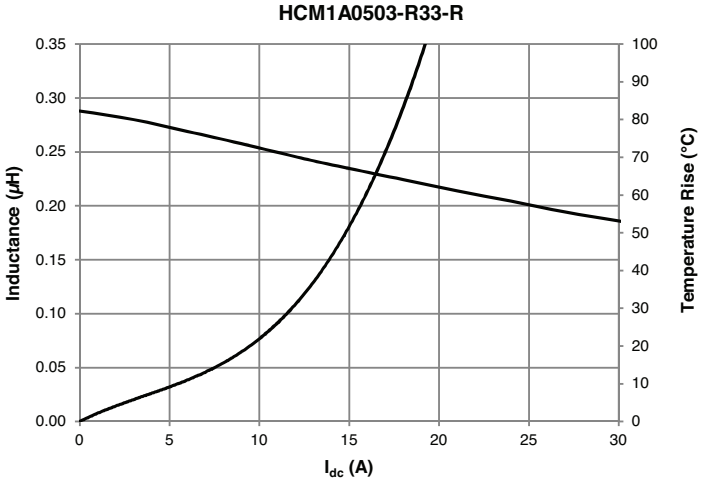


Inductance and temperature rise vs. current



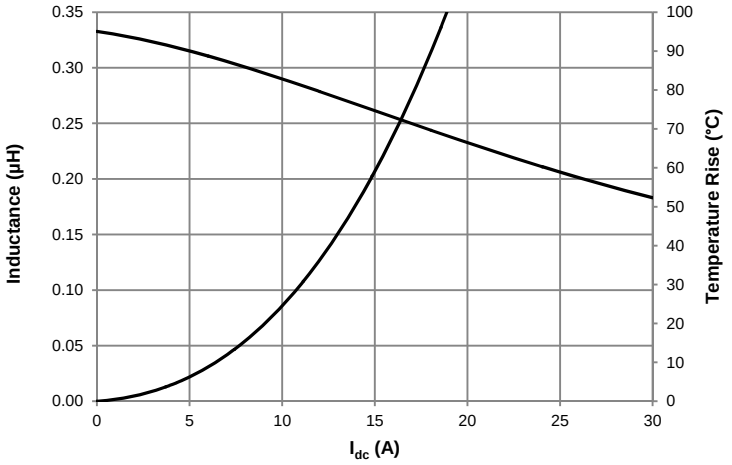
Inductance and temperature rise vs. current





Inductance and temperature rise vs. current

HCM1A0503-R35-R



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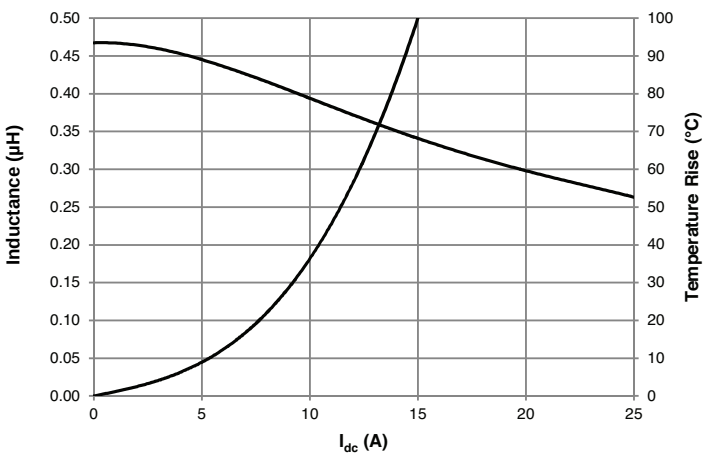

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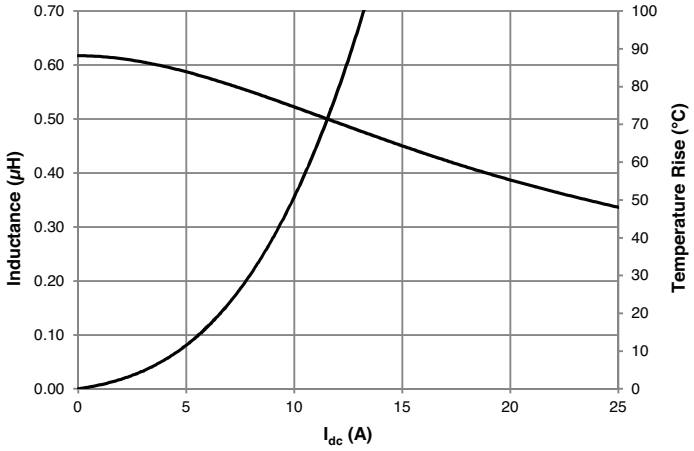

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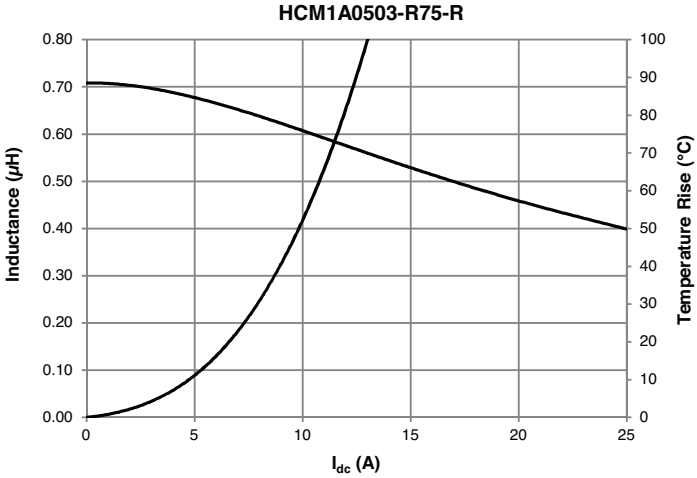

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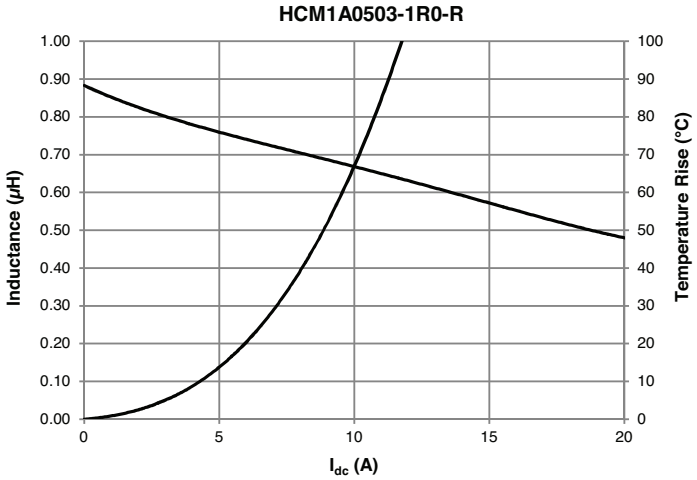

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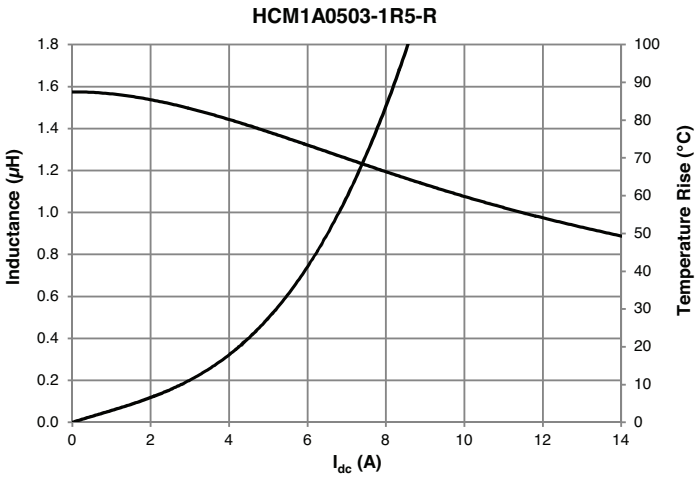
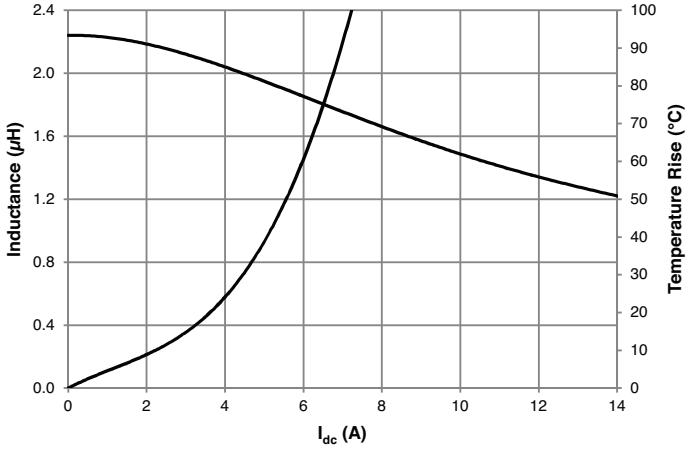


Inductance and temperature rise vs. current

HCM1A0503-2R2-R



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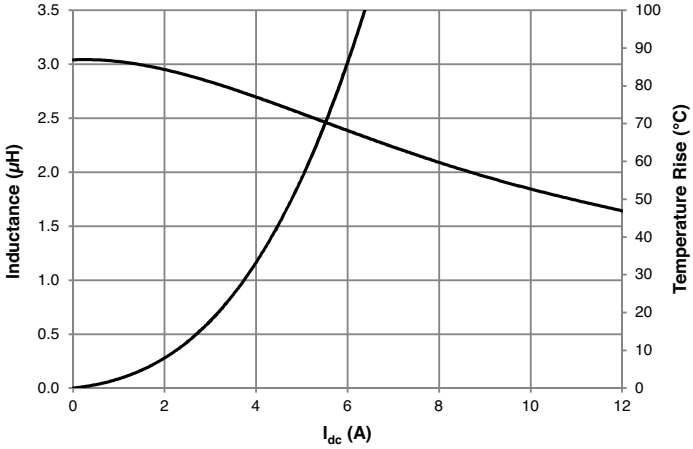

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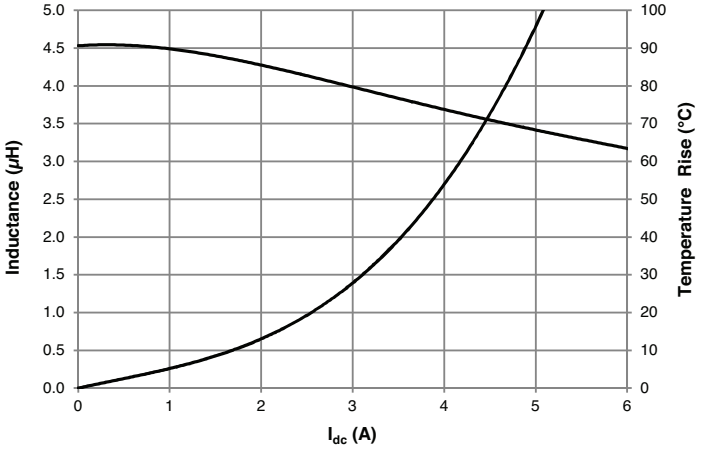

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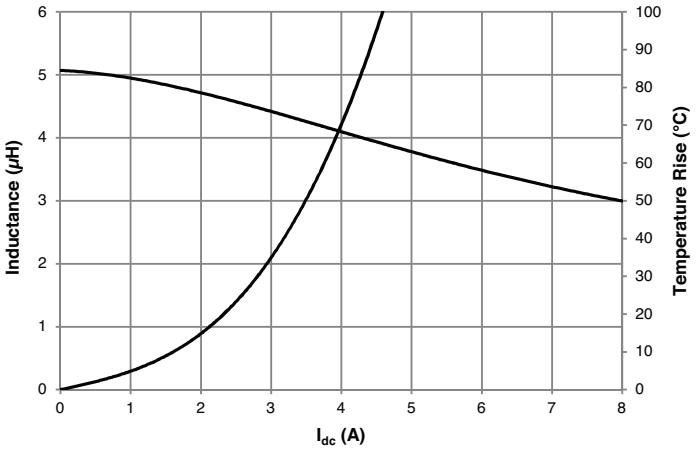

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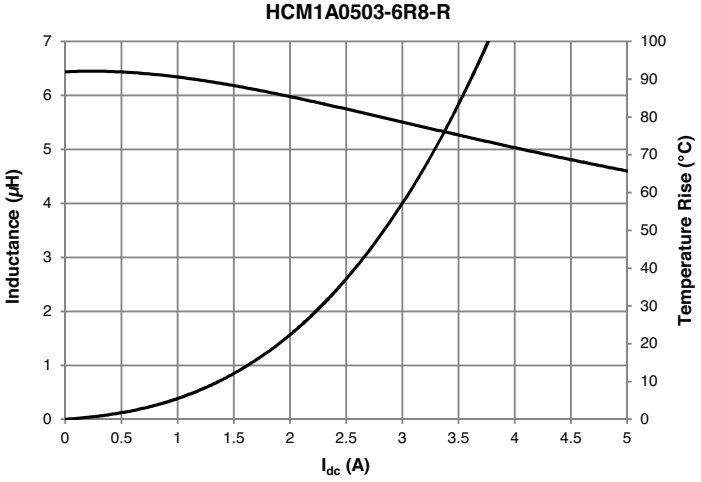

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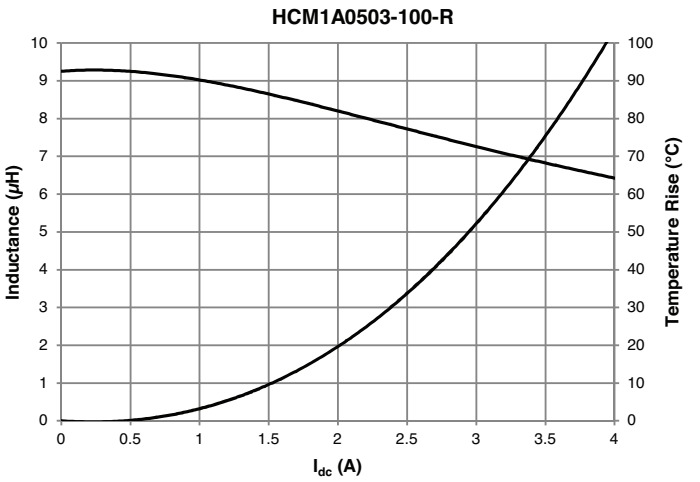

Solder reflow profile

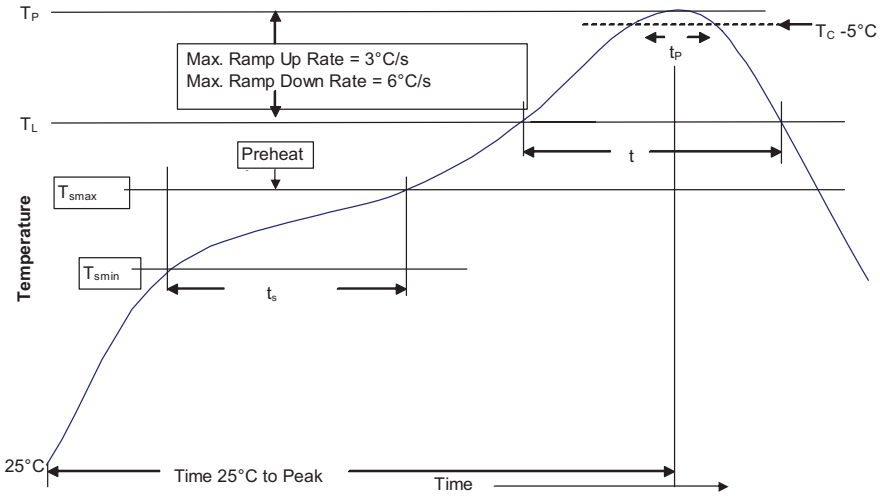

Table 1 - Standard SnPb Solder (T_C)

Package Thickness	Volume mm3 <350	Volume mm3 ≥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) Time at liquidous (t_L)		183°C 60-150 Seconds	217°C 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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