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

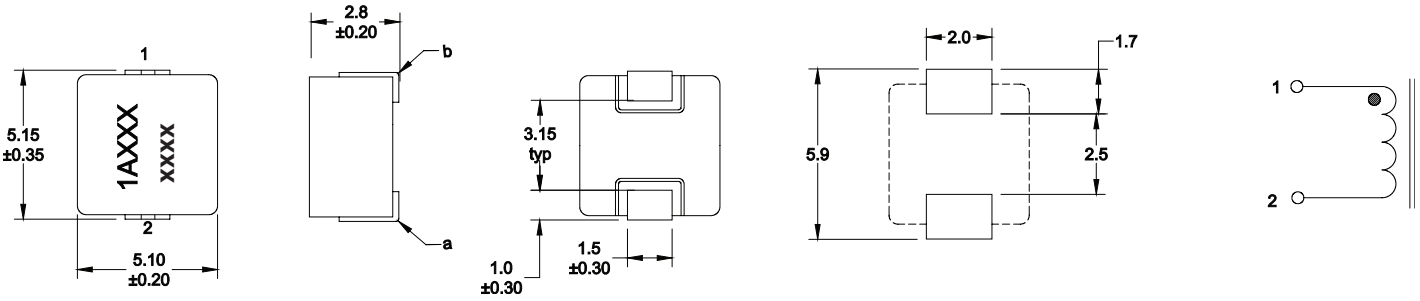
Powering Business Worldwide

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)

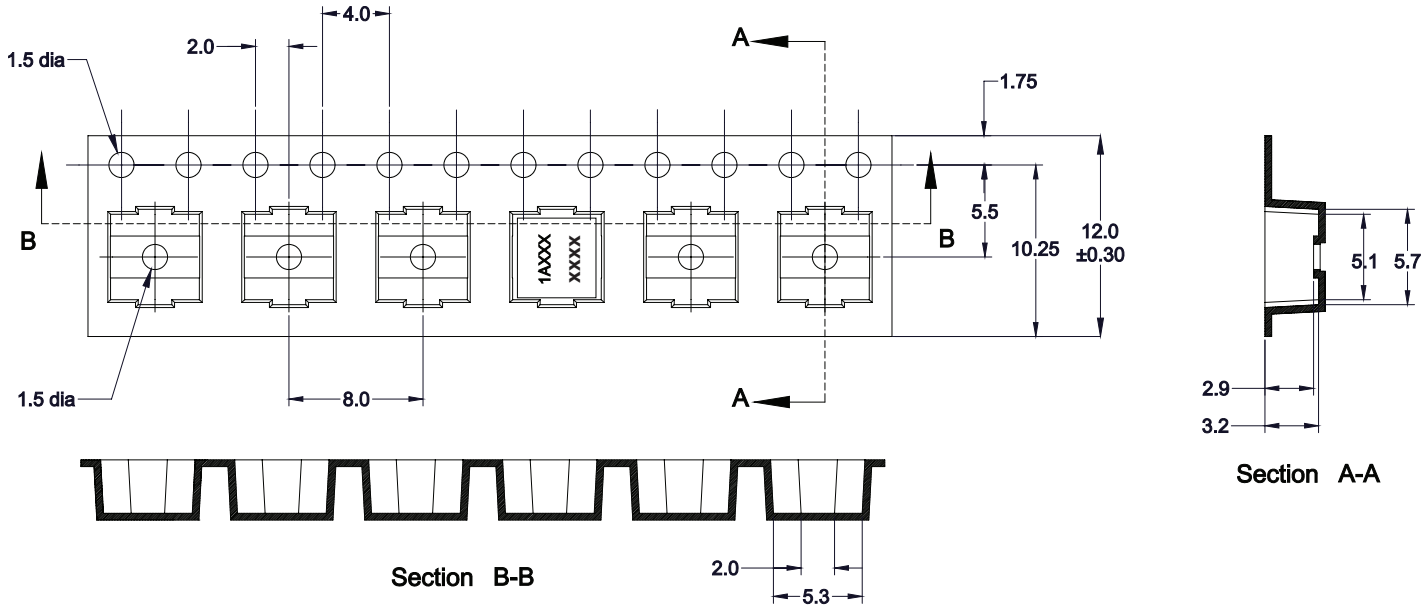


Part marking: 1AXXX=1A=Automotive grade, XXX=inductance value in uH, R=decimal point. If no R is present then last character equals number of zeros
xxxx= Lot code
All soldering surfaces to be coplanar within 0.1 millimeters
Tolerances are ±0.2 millimeters unless stated otherwise
DCR measured from point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

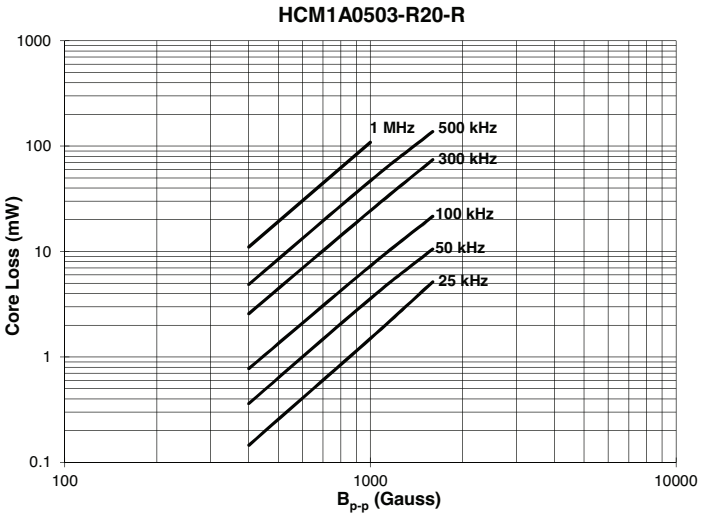
Packaging information (mm)

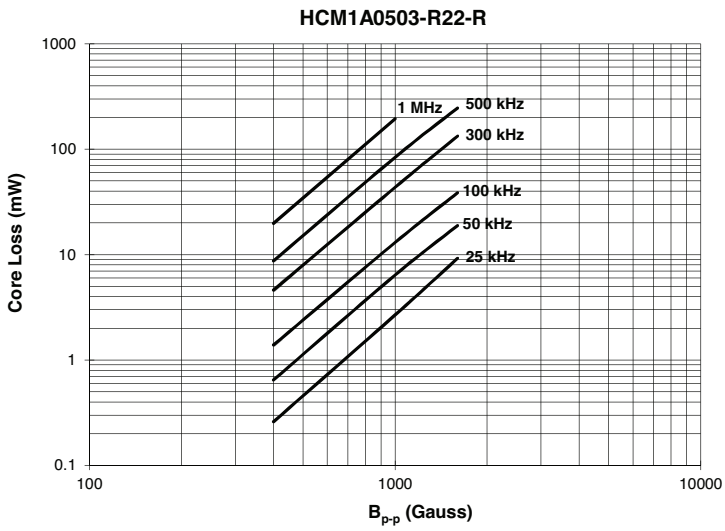
Drawing not to scale

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



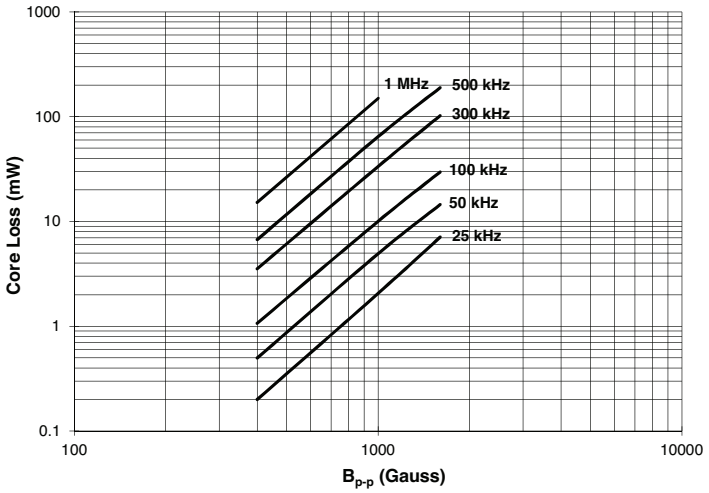
Core loss vs B_{p-p}



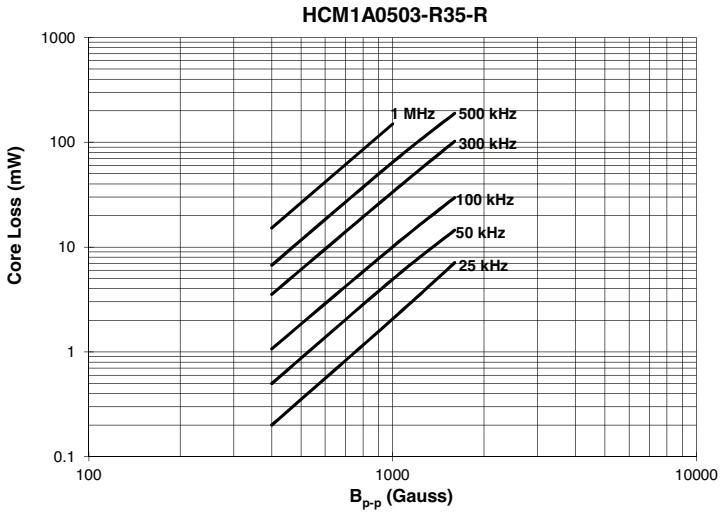


Core loss vs B_{p-p}

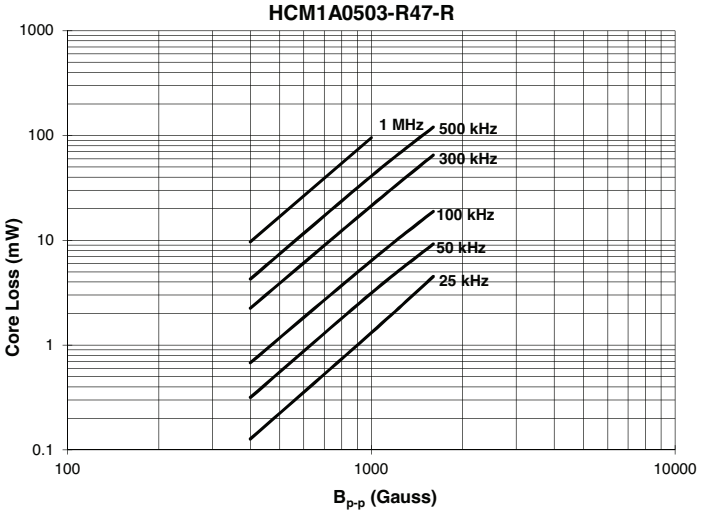
HCM1A0503-R33-R



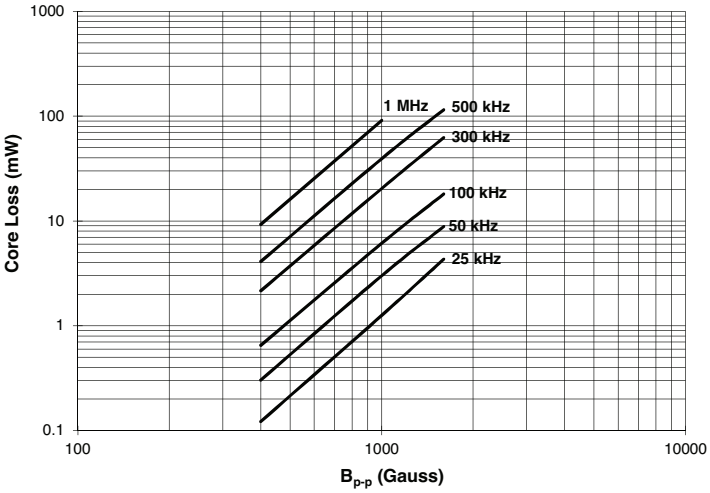
HCM1A0503-R35-R



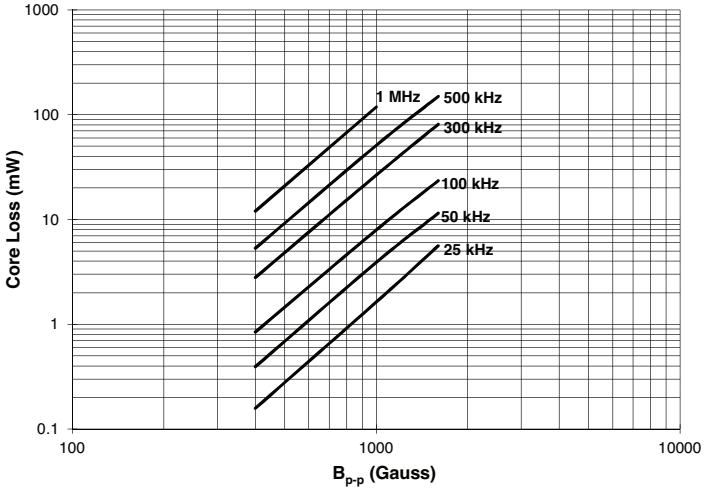
HCM1A0503-R47-R



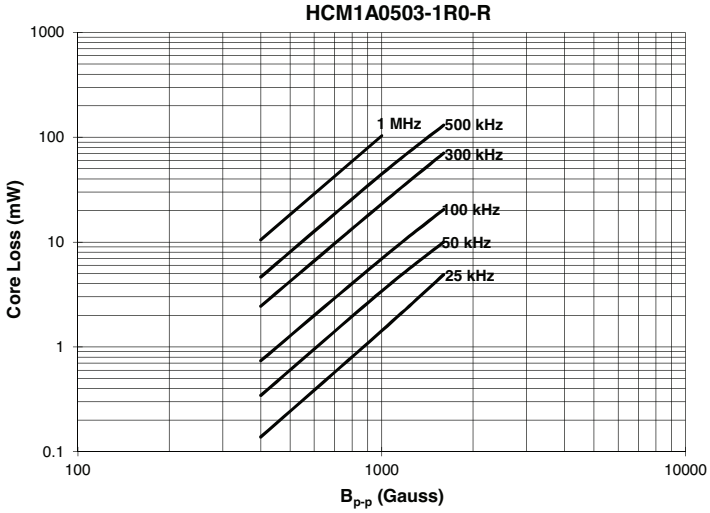
HCM1A0503-R68-R



HCM1A0503-R75-R

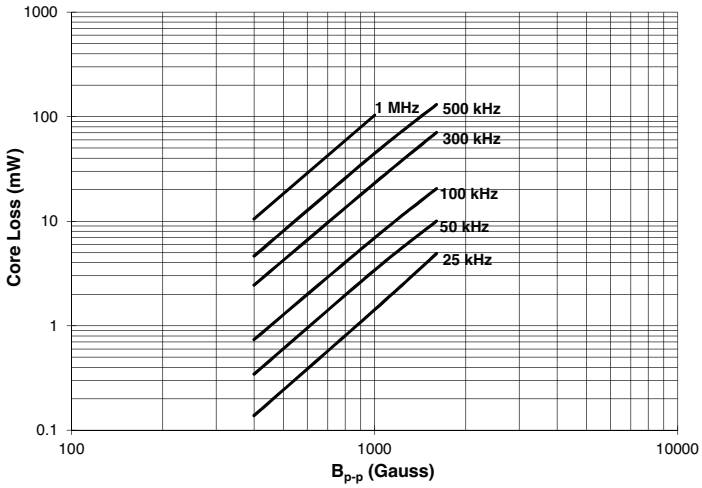


HCM1A0503-1R0-R

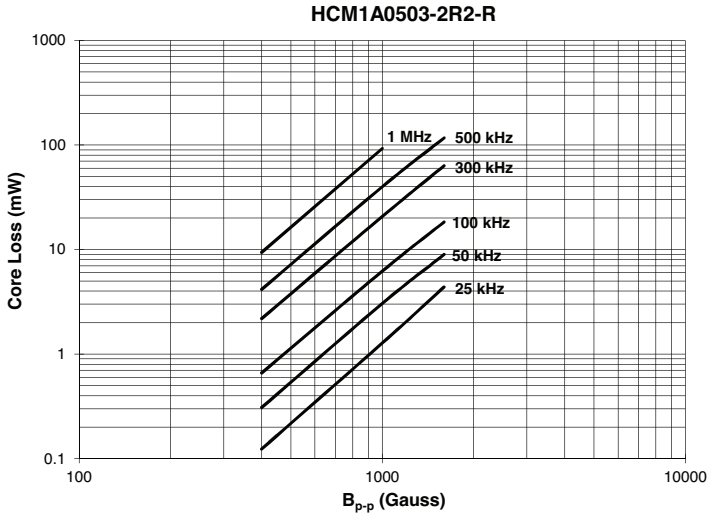


Core loss vs B_{p-p}

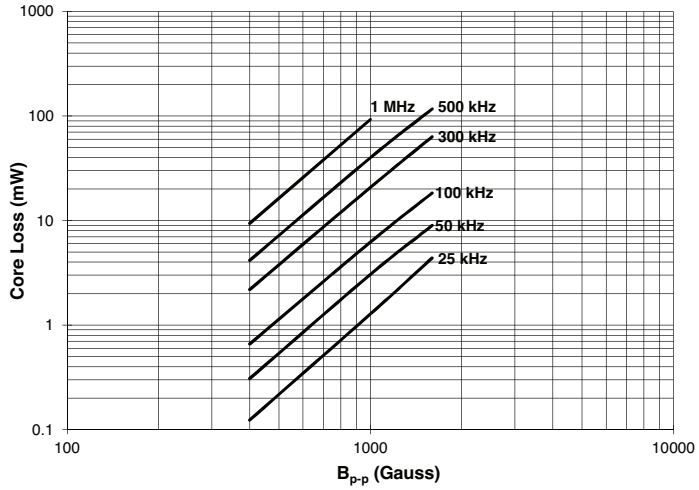
HCM1A0503-1R5-R



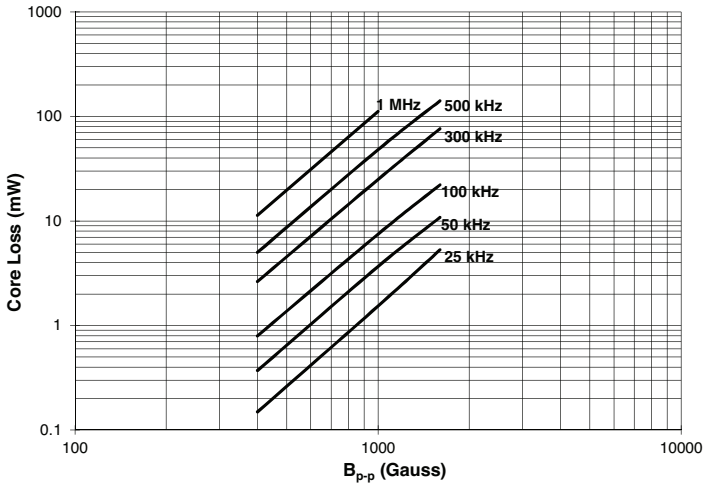
HCM1A0503-2R2-R



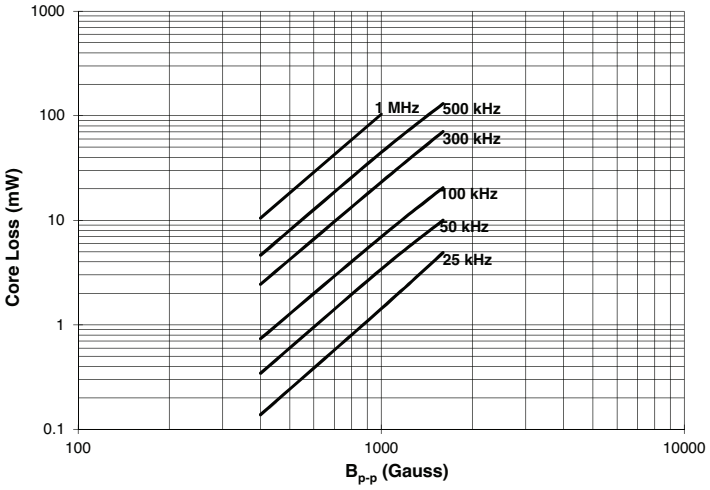
HCM1A0503-3R3-R



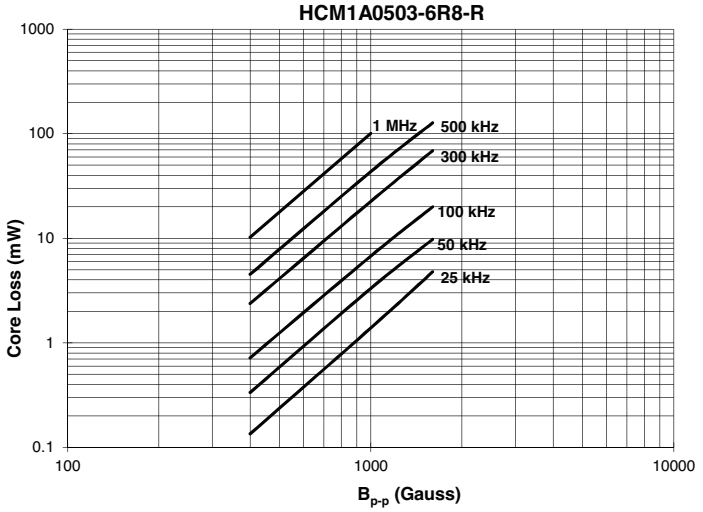
HCM1A0503-4R7-R



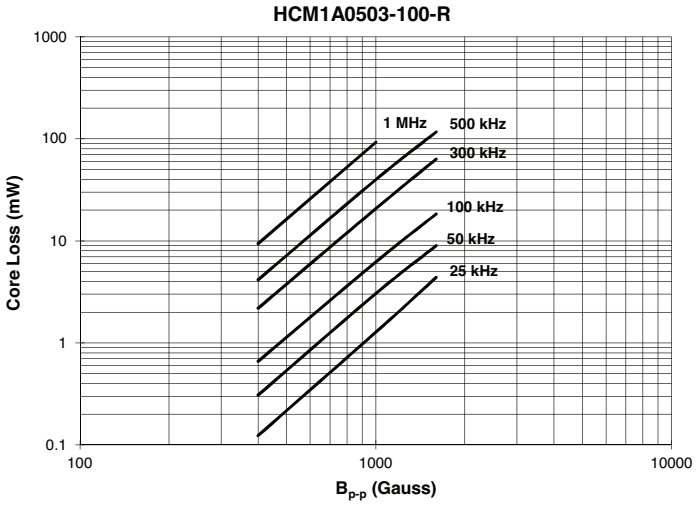
HCM1A0503-5R6-R



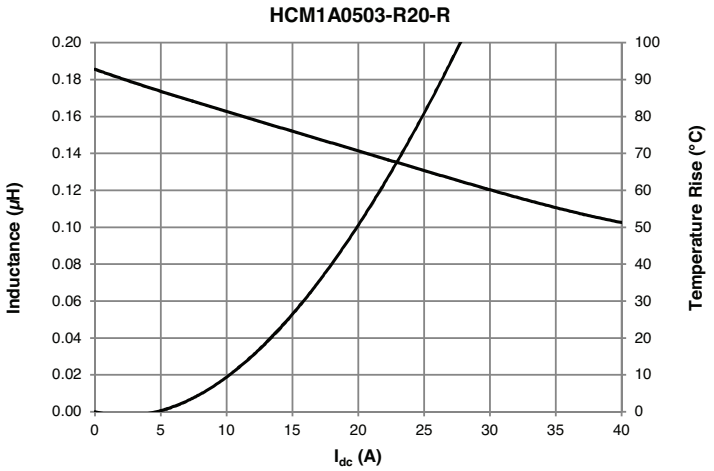
HCM1A0503-6R8-R



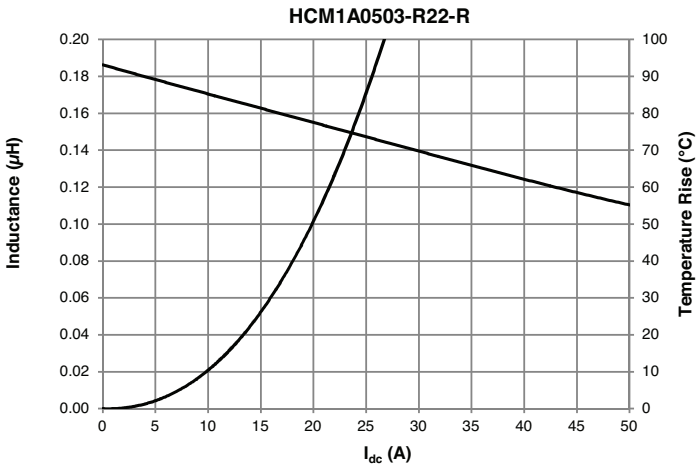
Core loss vs B_{p-p}

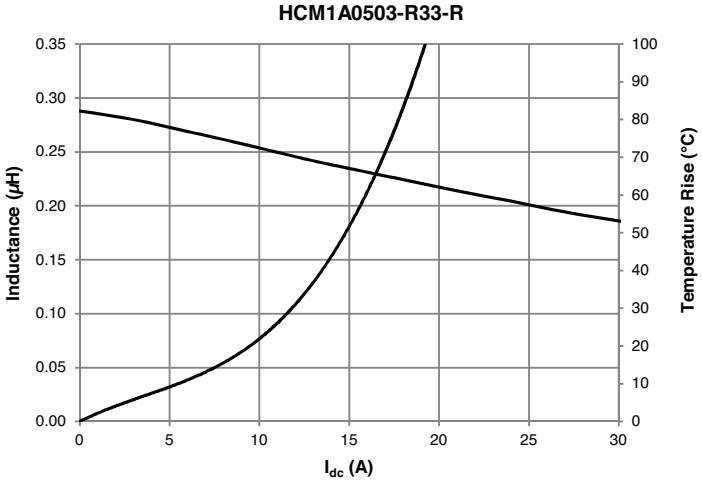


Inductance and temperature rise vs. current



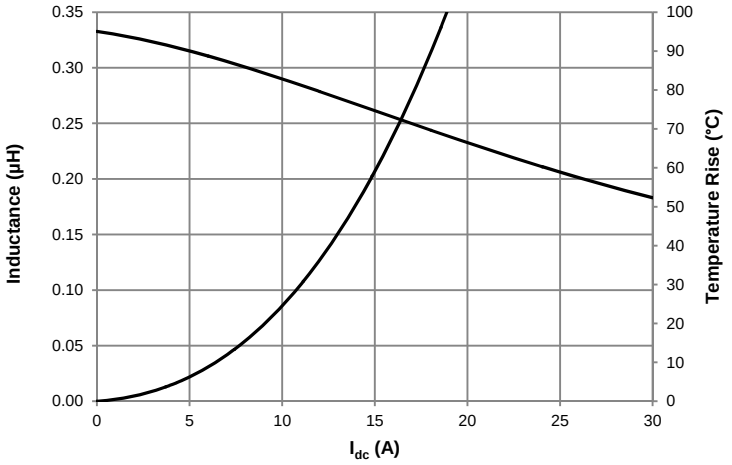
Inductance and temperature rise vs. current



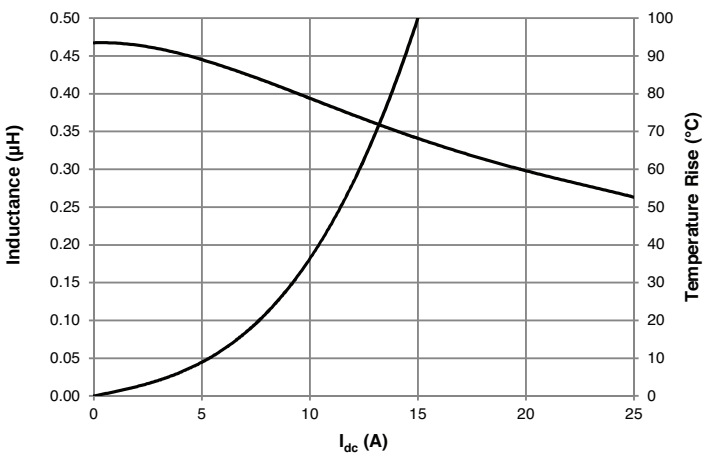


Inductance and temperature rise vs. current

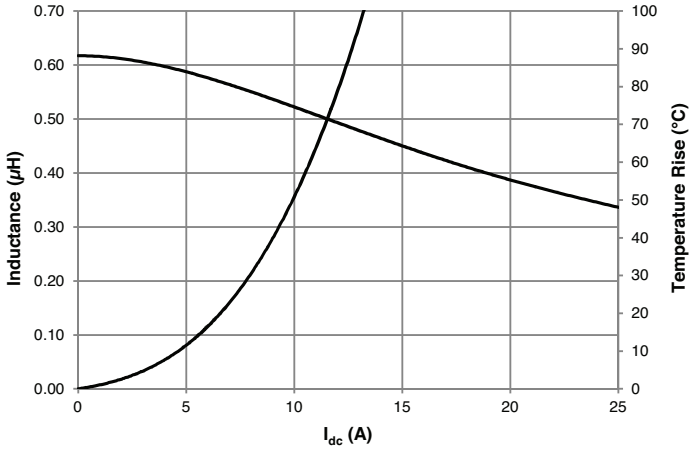
HCM1A0503-R35-R



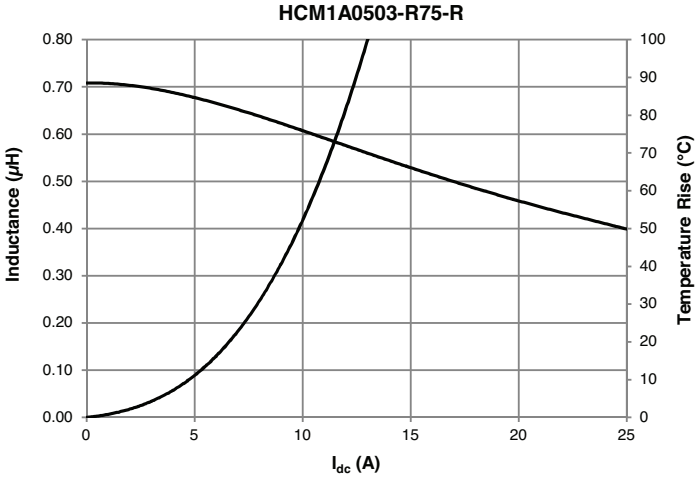
HCM1A0503-R47-R



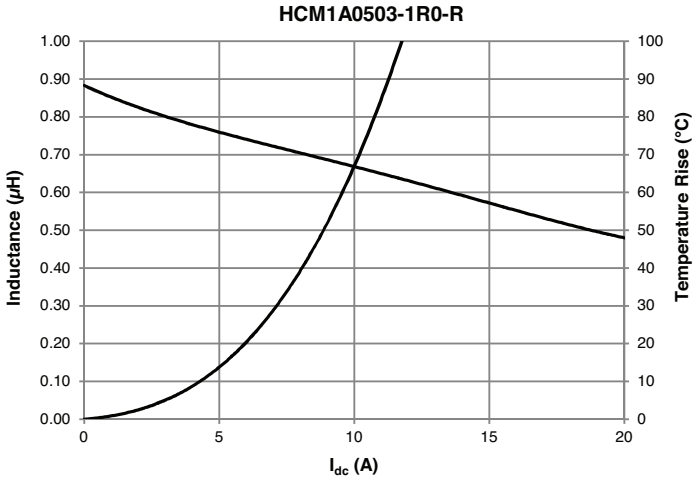
HCM1A0503-R68-R



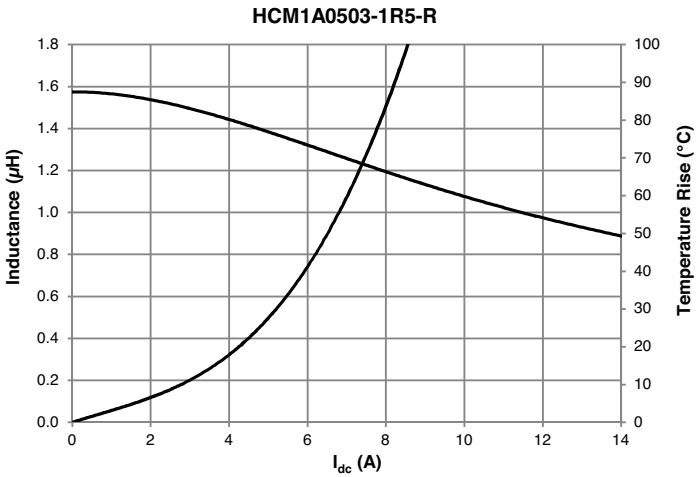
HCM1A0503-R75-R



HCM1A0503-1R0-R

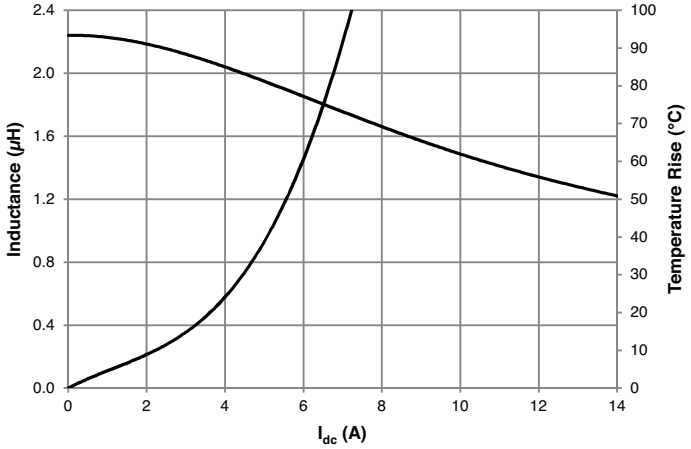


HCM1A0503-1R5-R

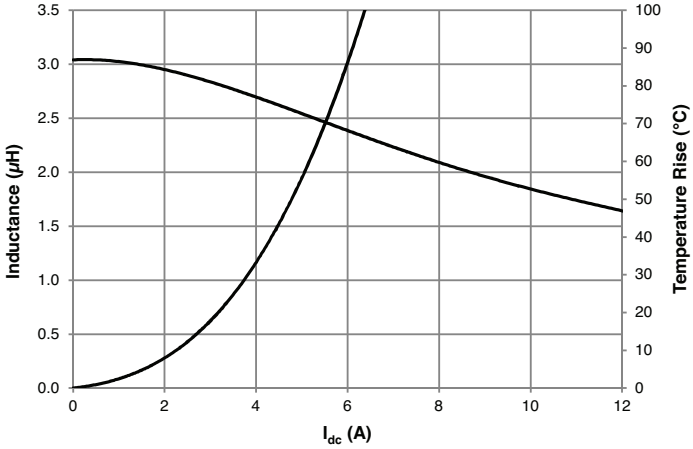


Inductance and temperature rise vs. current

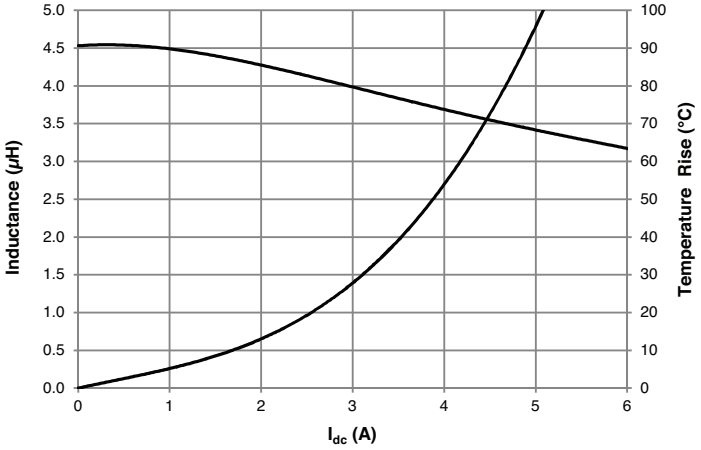
HCM1A0503-2R2-R



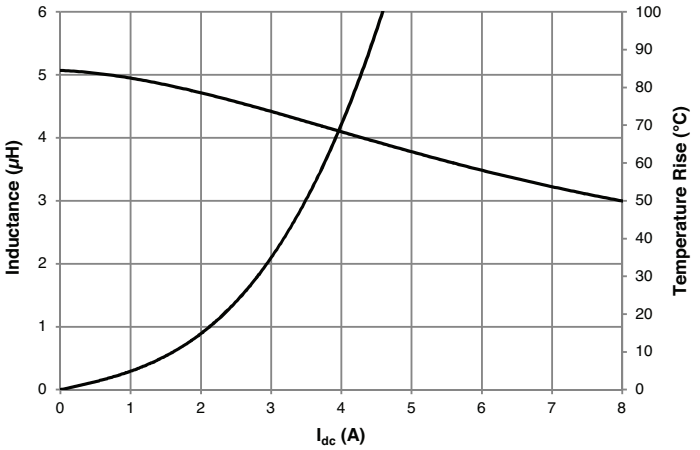
HCM1A0503-3R3-R



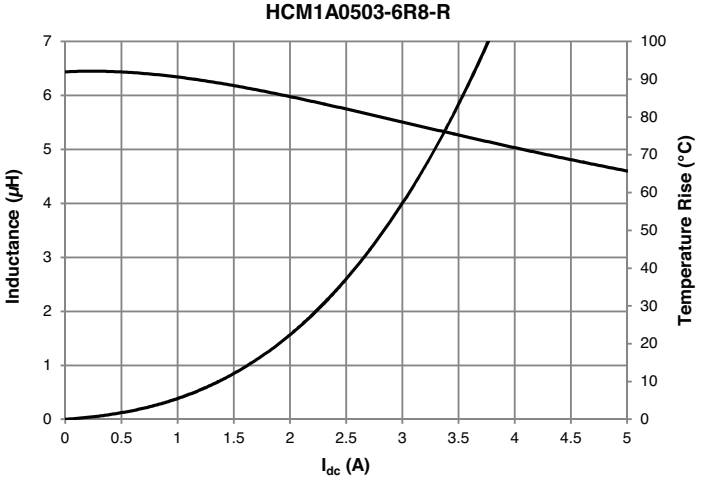
HCM1A0503-4R7-R



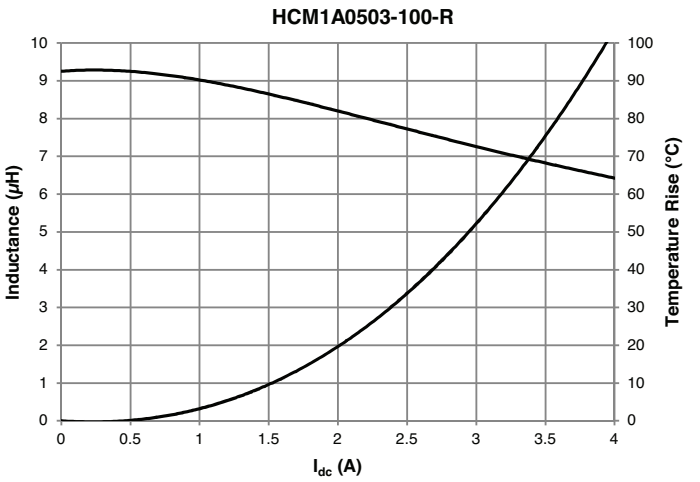
HCM1A0503-5R6-R



HCM1A0503-6R8-R



HCM1A0503-100-R



Solder reflow profile

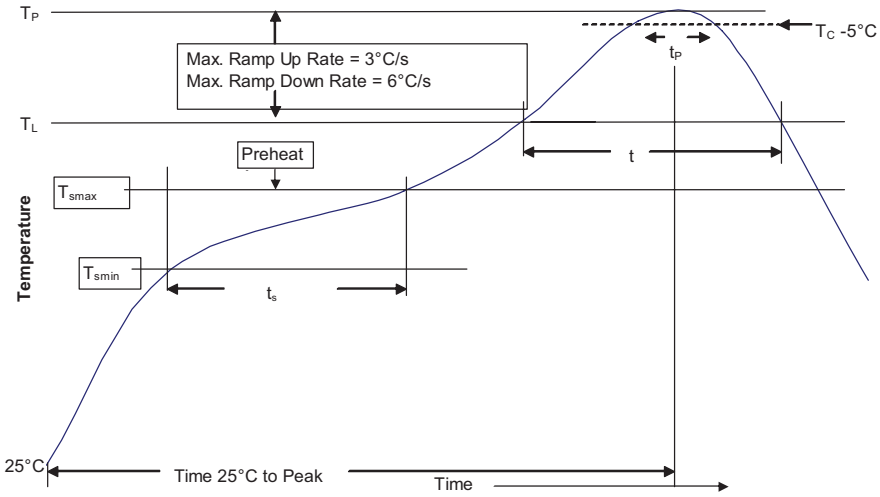


Table 1 - Standard SnPb Solder (T_C)

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.

Life Support Policy: Eaton does not authorize the use of any of its products for use in life support devices or systems without the express written approval of an officer of the Company. Life support systems are devices which support or sustain life, and whose failure to perform, when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in significant injury to the user.

Eaton reserves the right, without notice, to change design or construction of any products and to discontinue or limit distribution of any products. Eaton also reserves the right to change or update, without notice, any technical information contained in this bulletin.

Eaton
Electronics Division
1000 Eaton Boulevard
Cleveland, OH 44122
United States
www.eaton.com/electronics

© 2016 Eaton
All Rights Reserved
Publication No. 10547 MCN BU-MC16066
August 2016

Eaton is a registered trademark.

All other trademarks are property of their respective owners.

Powering Business Worldwide