HCM1A0703V3

Automotive grade high current power inductor

Photo is representative

Product features

- AEC-Q200
- High current carrying capacity
- Magnetically shielded, low EMI
- DC-DC converter applications up to 1 MHz
- Filtering applications up to Self resonant frequency (SRF) [See product specification table]
- Inductance range from 0.10 µH to 33 µH
- Current range from 1.6 A to 54 A
- 7.3 mm x 6.8 mm footprint surface mount package in a 3.0 mm height
- Alloy powder core material
- Moisture sensitivity level (MSL): 1

Applications

- Body electronics
  - Central body control module
  - Vehicle access control system
  - Headlamps, tail lamps and interior lighting and LED 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
  - 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 compliance and general specifications

- Storage temperature (component): -55 °C to +155 °C
- Operating temperature range: -55 °C to +155 °C (ambient plus self-temperature rise)

RoHS HALOGEN HF FREE Pb

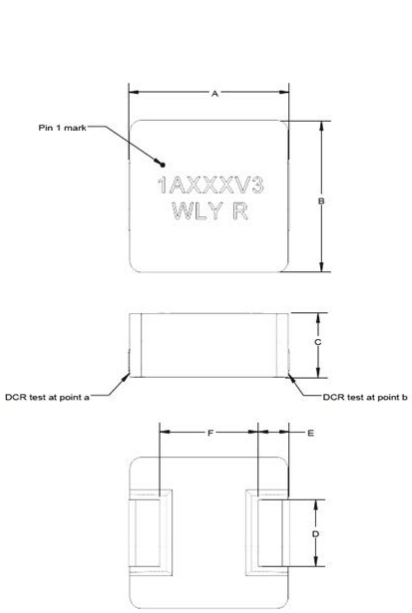
Powering Business Worldwide

Product specifications

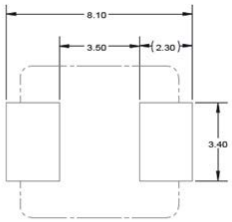
Part number[6]	OCL[1] (µH) ±20%	FLL[2] (µH) minimum	I_{rms}[3] (A)	I_{sat}[4] (A)	DCR (mΩ) typical @ +20 °C	DCR (mΩ) maximum @ +20 °C	SRF (MHz) typical	K-factor[5]
HCM1A0703V3-R10-R	0.10	0.064	29	54	0.63	0.8	350	1429
HCM1A0703V3-R15-R	0.15	0.09	24	30	1.03	1.3	195	1923
HCM1A0703V3-R22-R	0.22	0.13	18	32	1.8	2.3	150	1259
HCM1A0703V3-R33-R	0.33	0.21	15	19	2.9	3.5	95	937
HCM1A0703V3-R47-R	0.47	0.30	13	17	3.7	4.14	70	806
HCM1A0703V3-R56-R	0.56	0.35	13	12	3.8	4.5	60	690
HCM1A0703V3-R68-R	0.68	0.43	12	13	4.8	5.5	57	653
HCM1A0703V3-R82-R	0.82	0.52	10	14	5.7	6.6	55	568
HCM1A0703V3-1R0-R	1.0	0.64	10	9.0	6.5	7.8	48	524
HCM1A0703V3-1R2-R	1.2	0.76	9.0	12	8.6	9.9	35	449
HCM1A0703V3-1R5-R	1.5	0.96	8.5	10	9.5	11.5	35	411
HCM1A0703V3-2R2-R	2.2	1.4	7.0	8.5	12.5	15.5	29	373
HCM1A0703V3-3R3-R	3.3	2.1	5.0	7.5	24.5	28.5	25	305
HCM1A0703V3-4R7-R	4.7	3.0	4.0	6.8	40.3	46.5	20	254
HCM1A0703V3-6R8-R	6.8	4.3	3.6	5.6	54	65	16	215
HCM1A0703V3-8R2-R	8.2	5.2	3.5	4.8	53	64	14	193
HCM1A0703V3-100-R	10	6.4	3.3	4.4	65	75	12	228
HCM1A0703V3-150-R	15	9.6	2.6	3.6	96	110	9.5	151
HCM1A0703V3-220-R	22	14.1	2.0	2.9	135	149	7.0	136
HCM1A0703V3-330-R	33	19.8	1.6	2.3	200	242	6.5	88

1. Open circuit inductance (OCL) test parameters: 100 kHz, 0.25 Vrms, 0.0 Adc, +25 °C
2. Full load inductance (FLL) test parameters: 100 kHz, 0.25 Vrms, Isat, , +25 °C
3. Irms: 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. Isat: Peak current for approximately 20% rolloff @ +25 °C
5. K-factor: Used to determine Bp-p for core loss (see graph). Bp-p = K * L * ΔI. Bp-p: (Gauss), K: (K-factor from table), L: (Inductance in µH), ΔI (Peak to peak ripple current in Amps).
6. Part Number Definition: HCM1A0703V3-xxx-R
   HCM1A0703V3= Product code and size
   xxx= Inductance value in µH, R= decimal point, if no R is present last digit indicates number of zeros
   -R = RoHS compliant

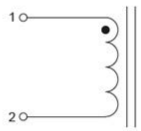
Dimensions- (mm)



Recommended pad layout



Schematic



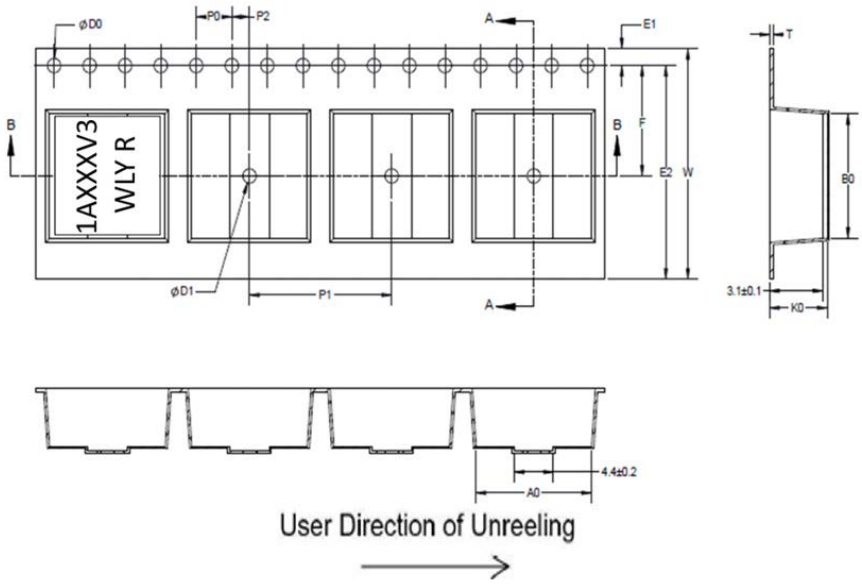
Part number	A	B	C	D	E	F
HCM1A0703V3-R	7.0 ±0.3	6.6 ±0.2	3.0 maximum	2.5 ±0.2 (R22) 2.9 ±0.2 (R10, R15, R33 to 330)	1.35 ±0.2	4.3 typ.

Part marking: Pin 1 indicator dot, 1AxxxV3 xxx= inductance value in µH, R= decimal point, if no R is present then last digit is the number of zeros, wly R= 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
Traces or vias underneath the inductor is not recommended

Packaging information (mm)

Drawing not to scale

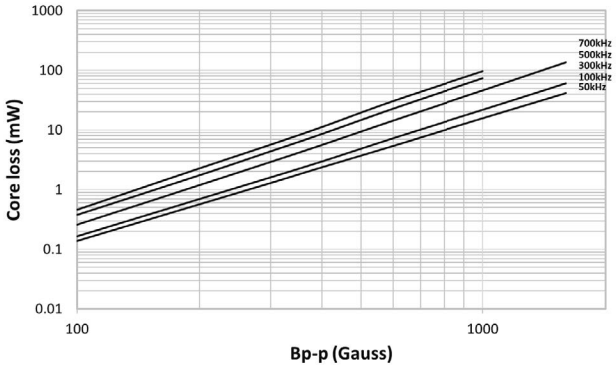
Supplied in tape and reel packaging, 2000 parts per 13" diameter reel



Dimension	Value
W ±0.30	16.0
F ±0.10	7.5
E1 ±0.10	1.75
E2 Min	14.25
P0 ±0.10	4.0
P1 ±0.10	8.0
P2 ±0.05	2.0
D0 +0.10/-0	1.5
D1 +0.10/-0	1.5
A0	7.10±0.15
B0	7.50±0.10
K0	3.60±0.15
T	0.35±0.05

Core loss vs. Bp-p

HCM1A0703V3-R10-R



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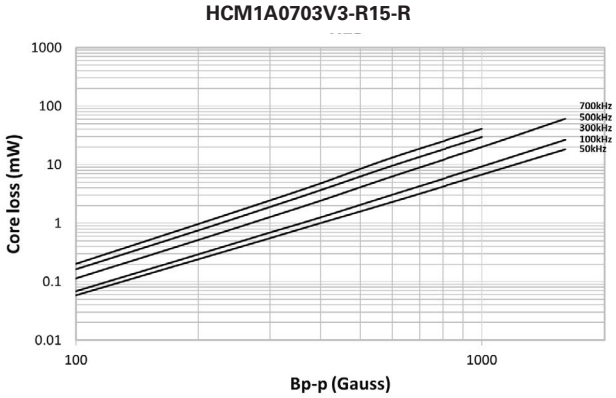

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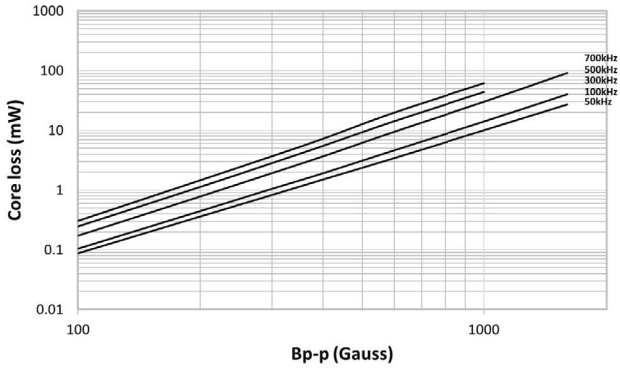
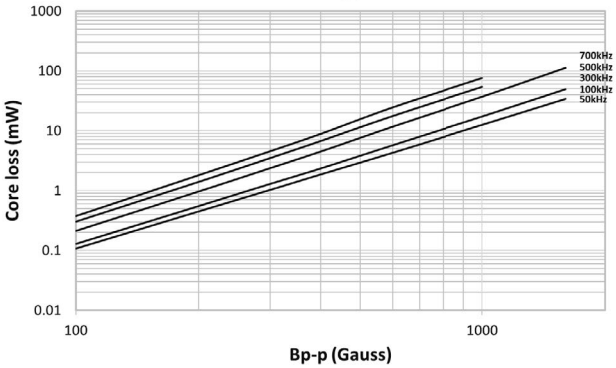


HCM1A0703V3-R33-R



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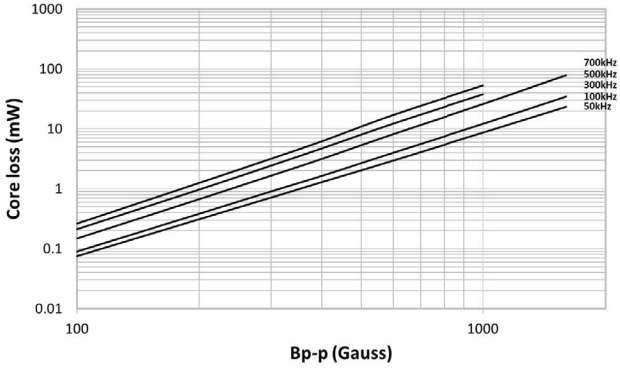
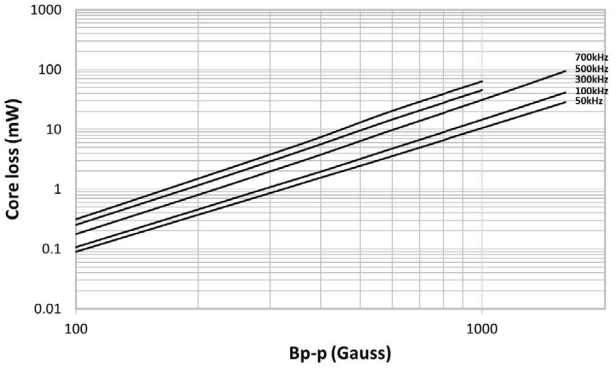
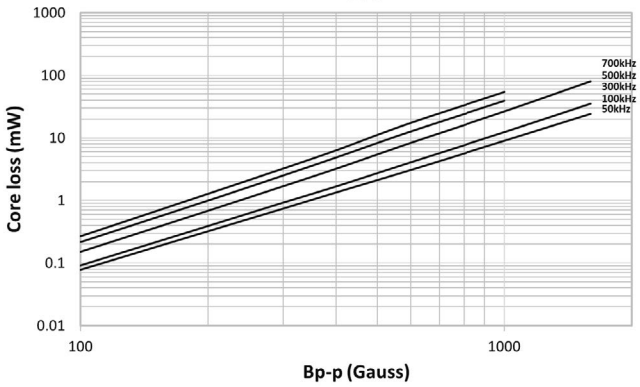


HCM1A0703V3-R56-R

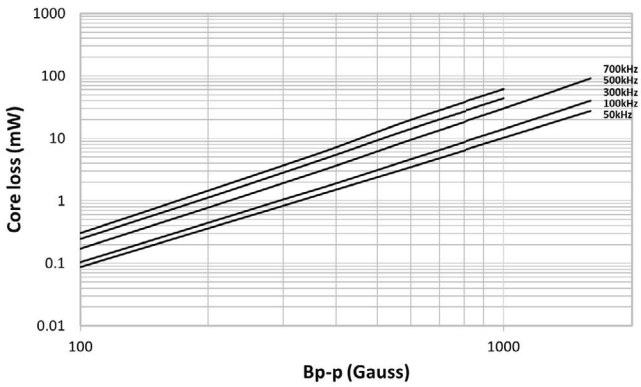


Core loss vs. Bp-p

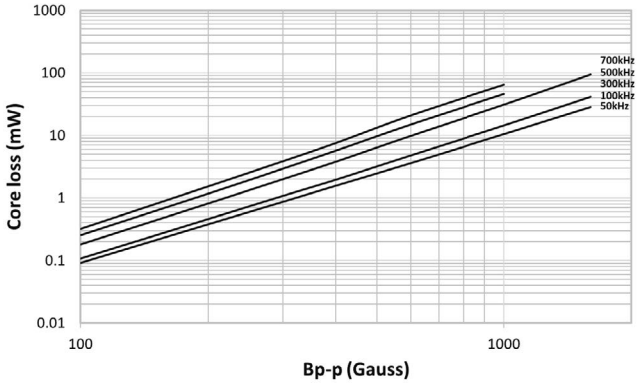
HCM1A0703V3-R68-R



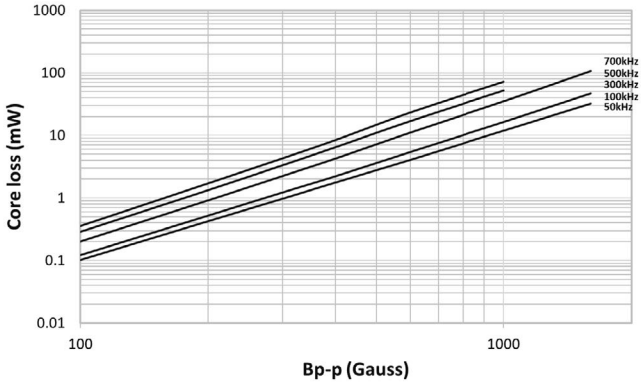
HCM1A0703V3-R82-R



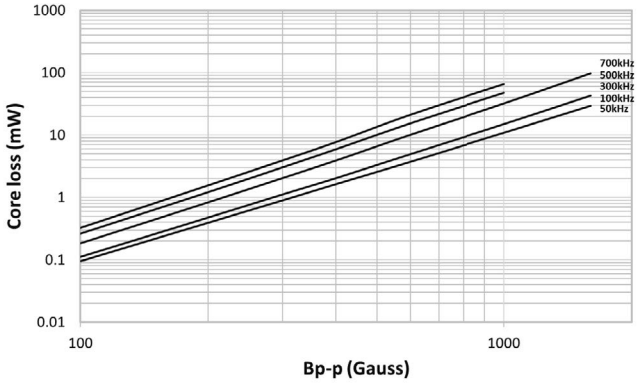
HCM1A0703V3-1R0-R



HCM1A0703V3-1R2-R



HCM1A0703V3-1R5-R



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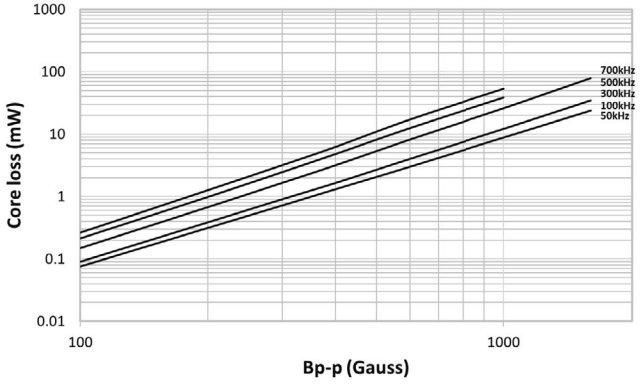
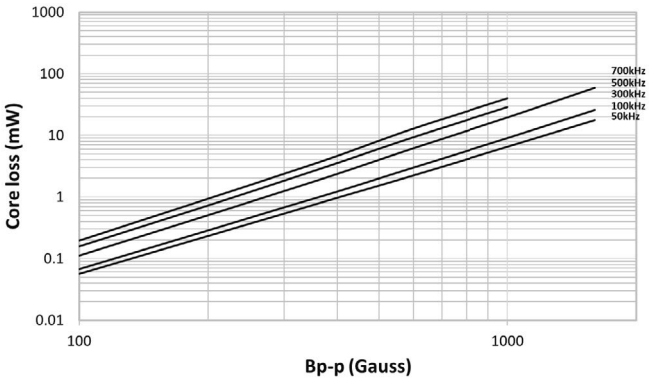
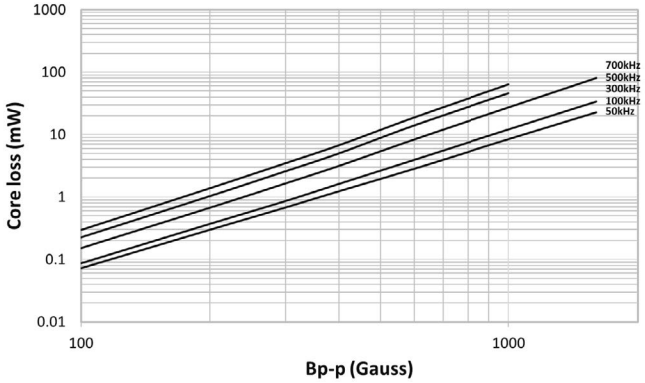


Core loss vs. Bp-p

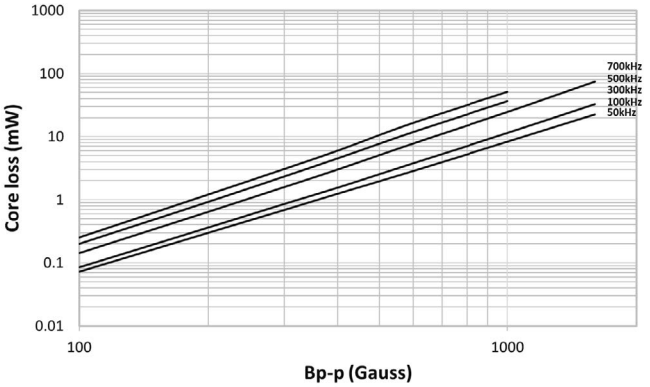
HCM1A0703V3-3R3-R



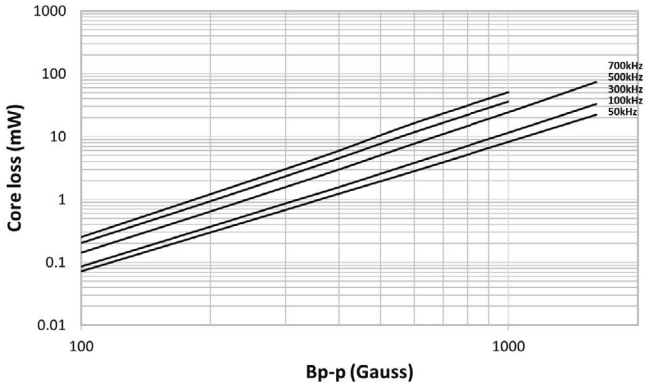
HCM1A0703V3-4R7-R



HCM1A0703V3-6R8-R



HCM1A0703V3-8R2-R



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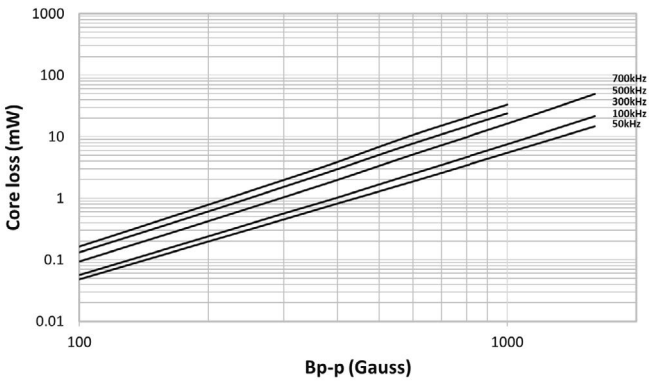
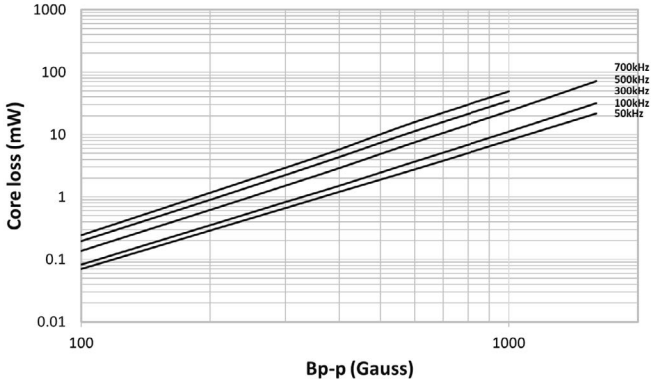
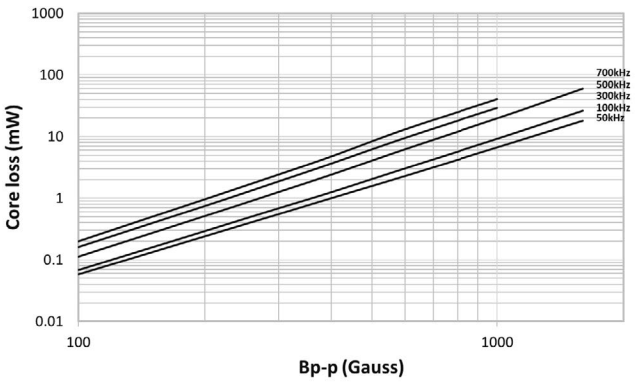


HCM1A0703V3-150-R



Core loss vs. Bp-p

HCM1A0703V3-220-R



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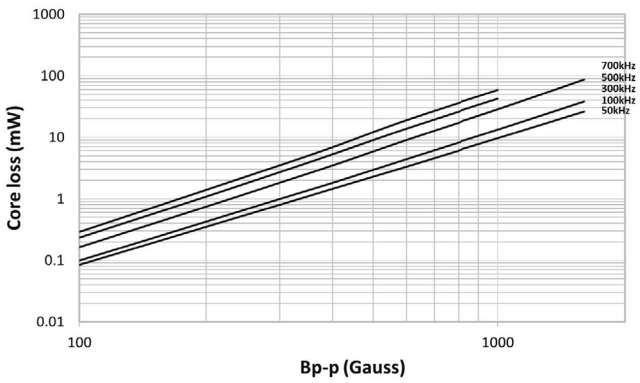
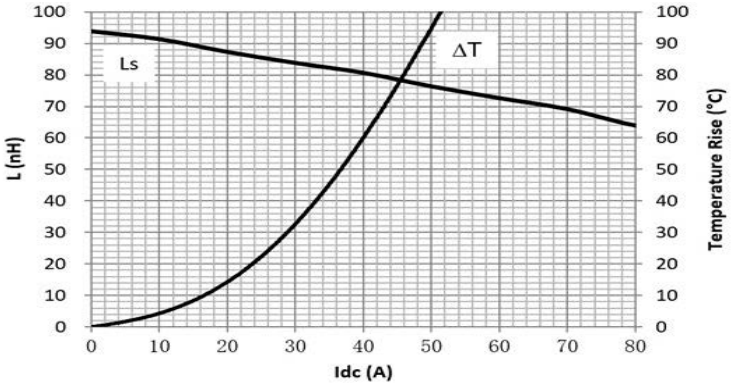
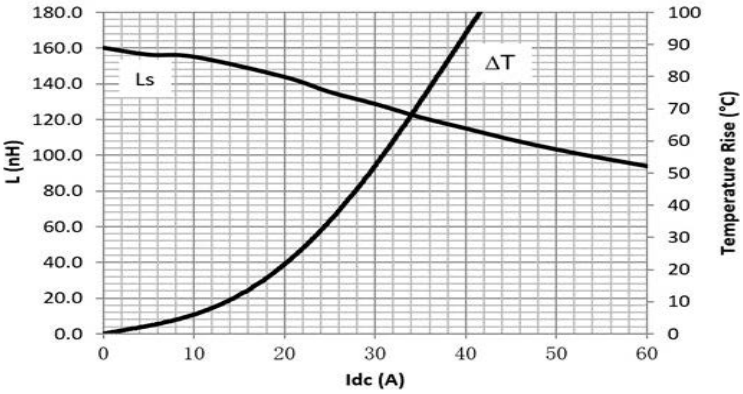


Inductance and temperature rise vs. Idc

HCM1A0703V3-R10-R



HCM1A0703V3-R15-R



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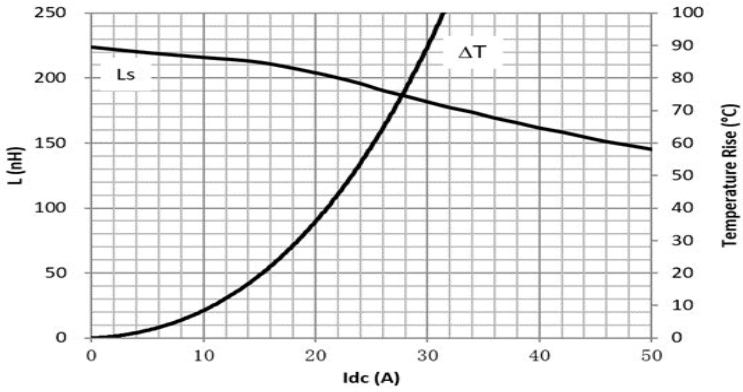

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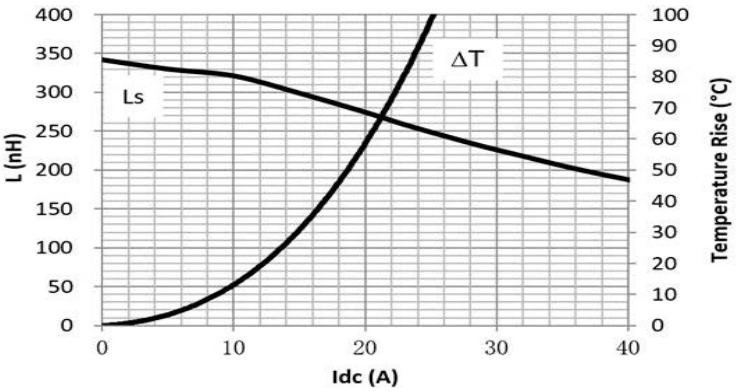

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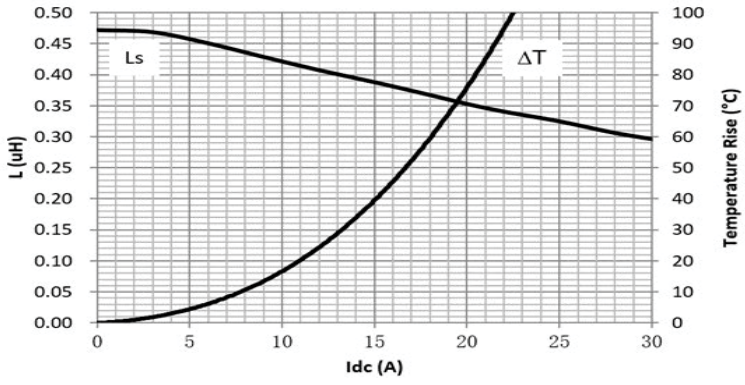

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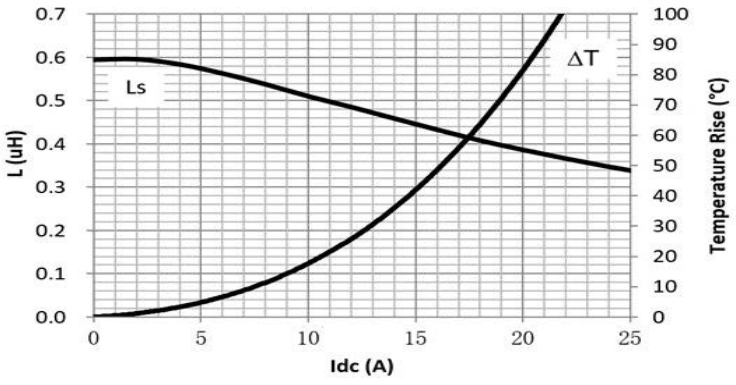
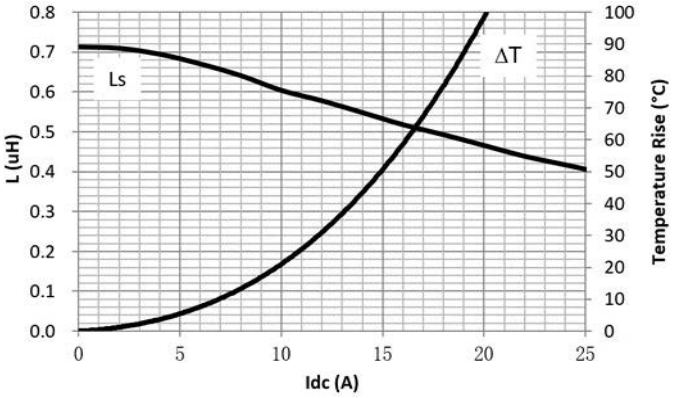


Inductance and temperature rise vs. Idc

HCM1A0703V3-R68-R



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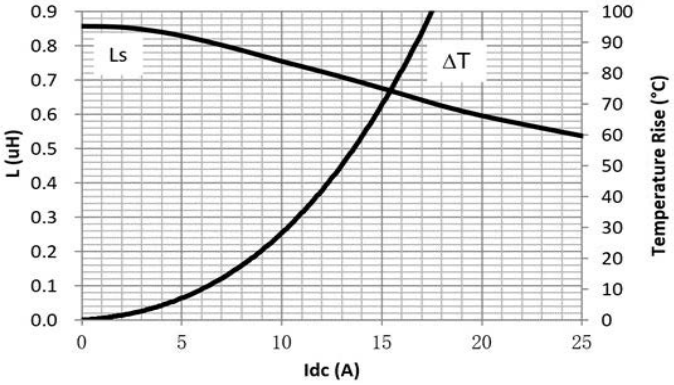
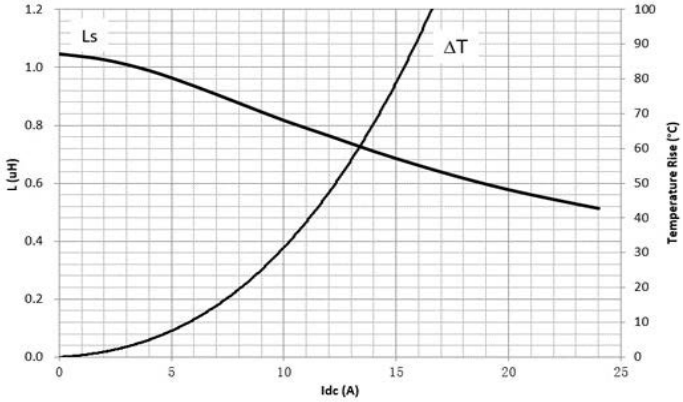
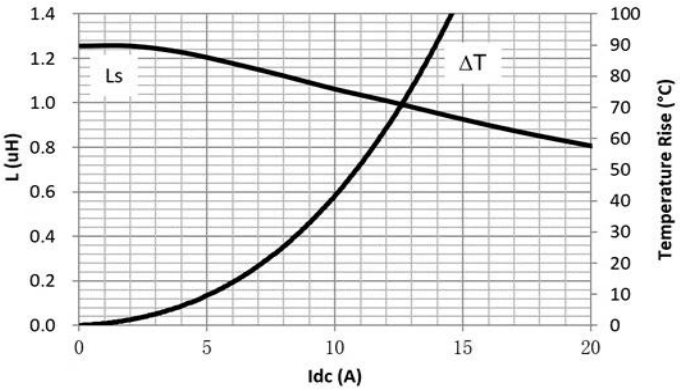


HCM1A0703V3-1R0-R



HCM1A0703V3-1R2-R



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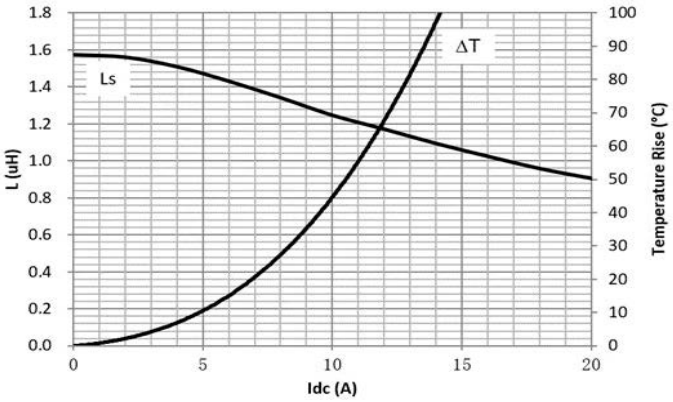

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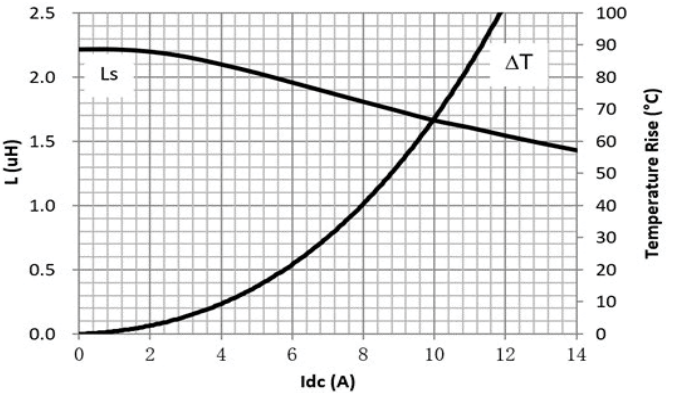
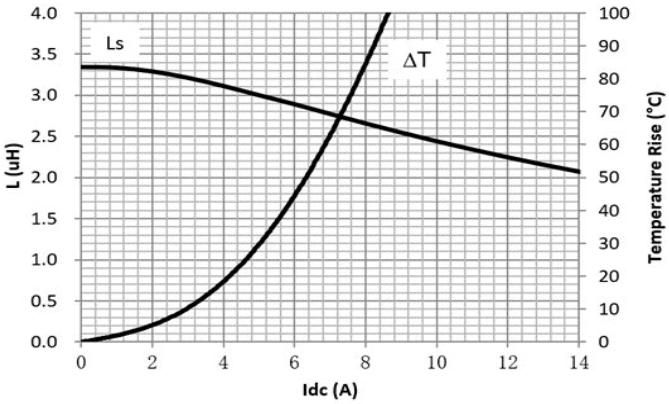


Inductance and temperature rise vs. Idc

HCM1A0703V3-3R3-R



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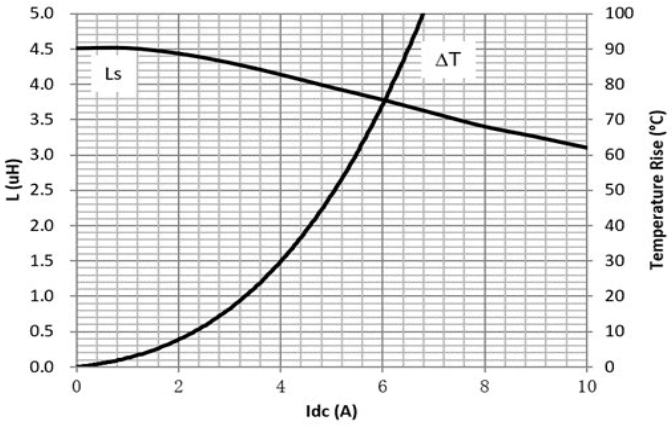
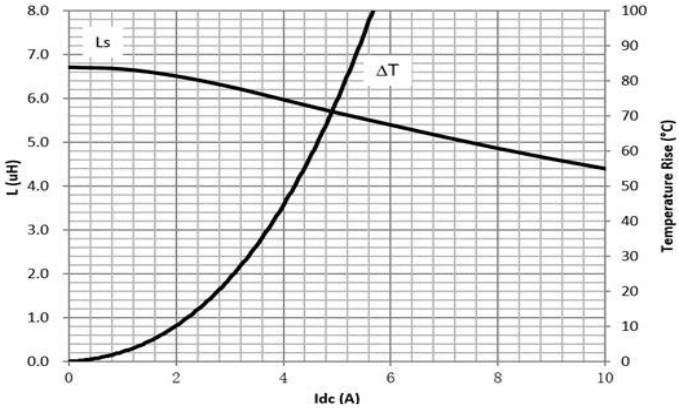
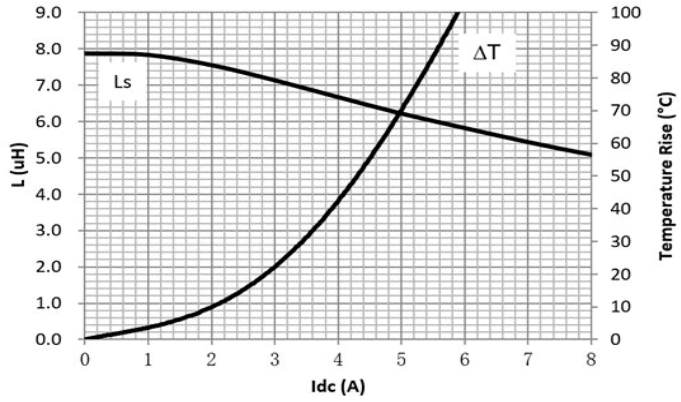


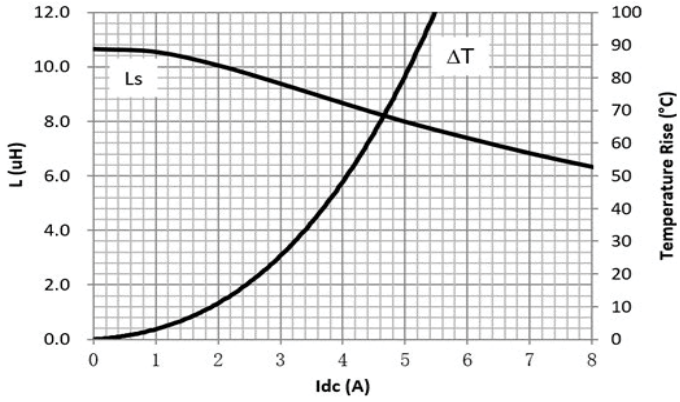
HCM1A0703V3-6R8-R



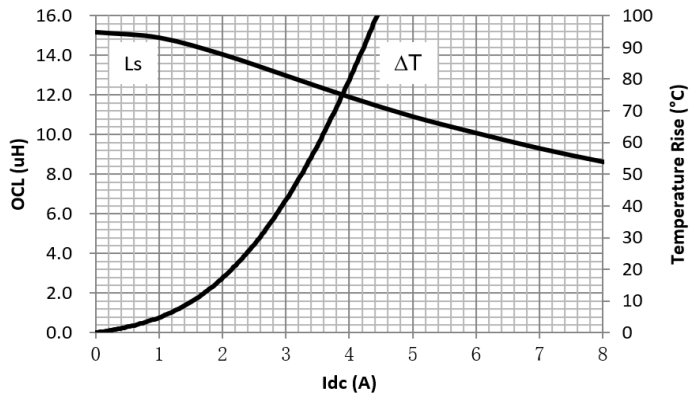
HCM1A0703V3-8R2-R



HCM1A0703V3-100-R

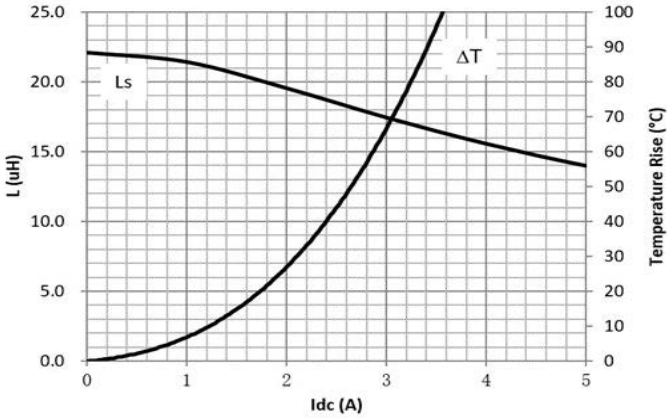


HCM1A0703V3-150-R

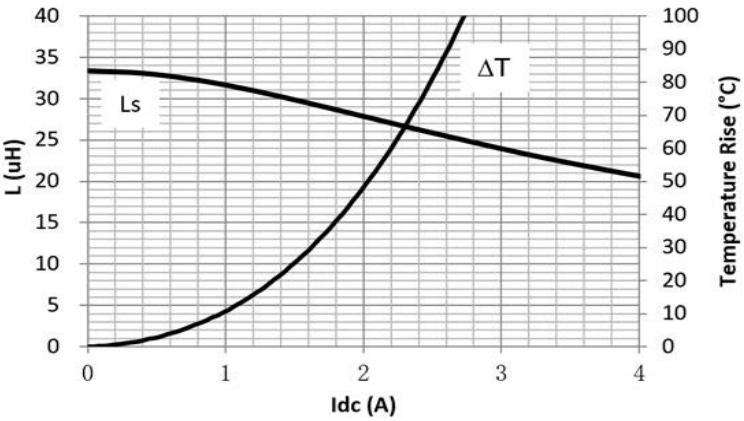


Inductance and temperature rise vs. Idc

HCM1A0703V3-220-R

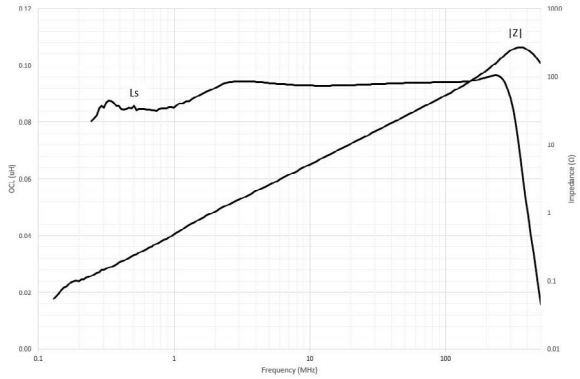


HCM1A0703V3-330-R



Inductance and impedance vs. frequency

HCM1A0703V3-R10-R



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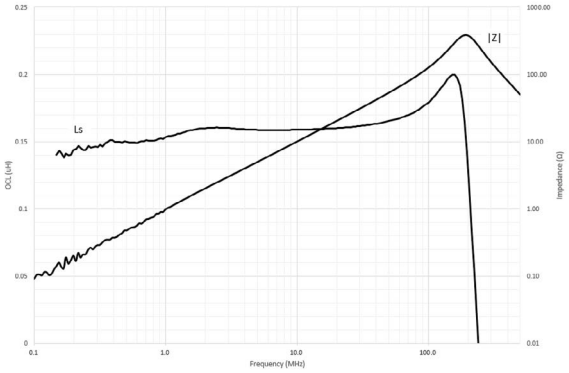

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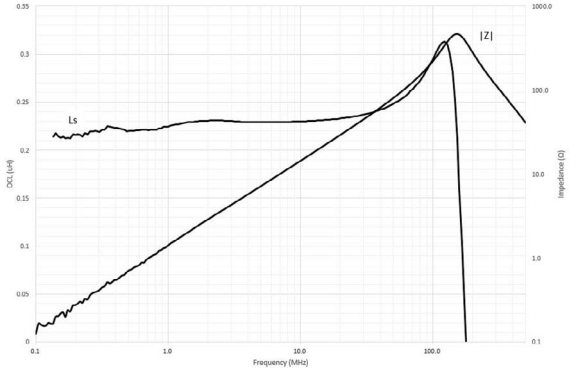

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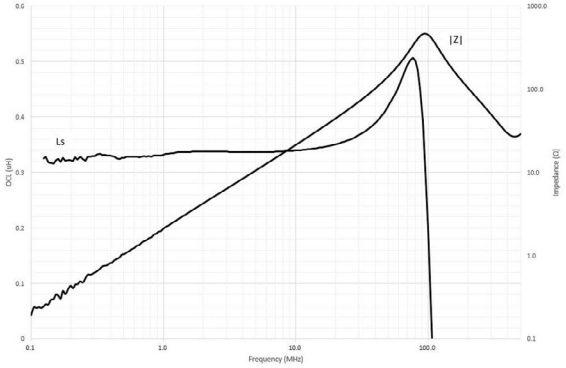

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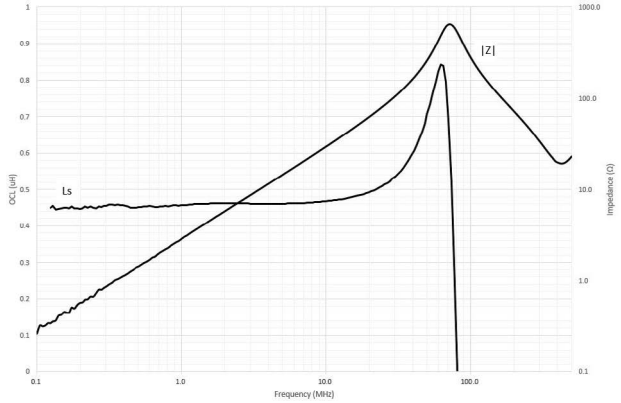

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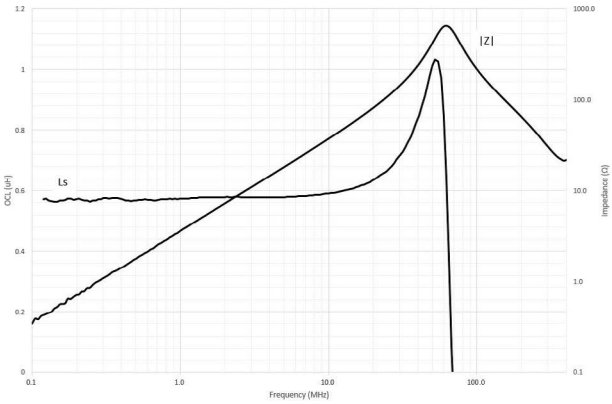
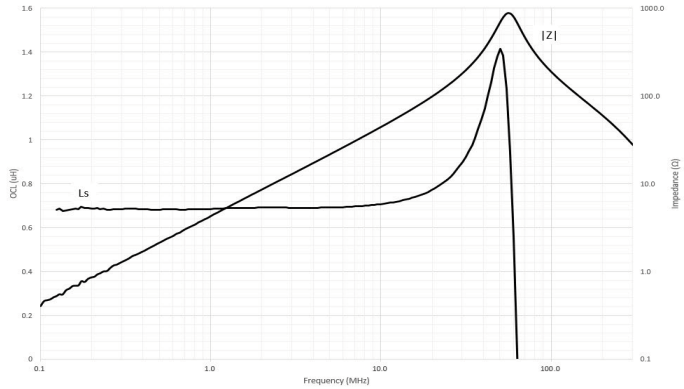


Inductance and impedance vs frequency

HCM1A0703V3-R68-R



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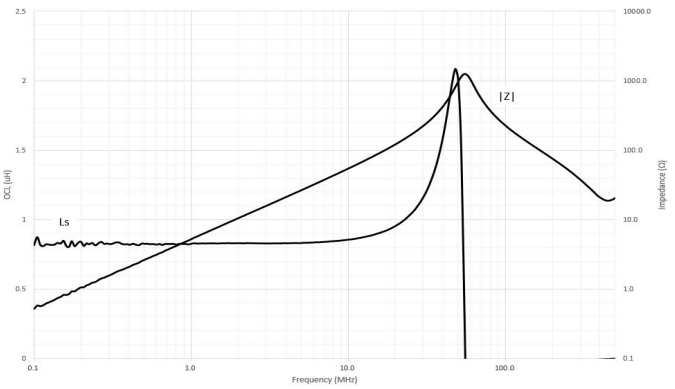

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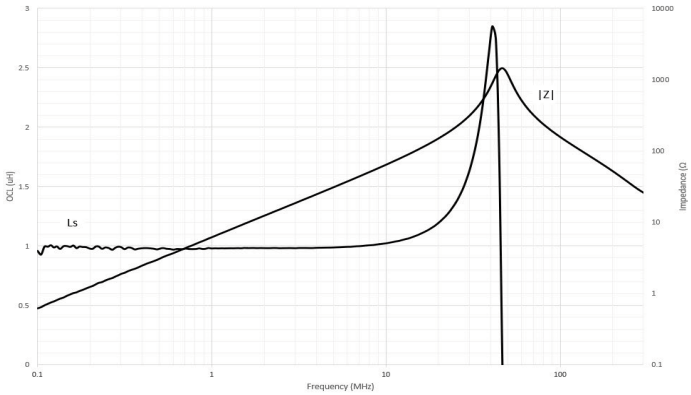
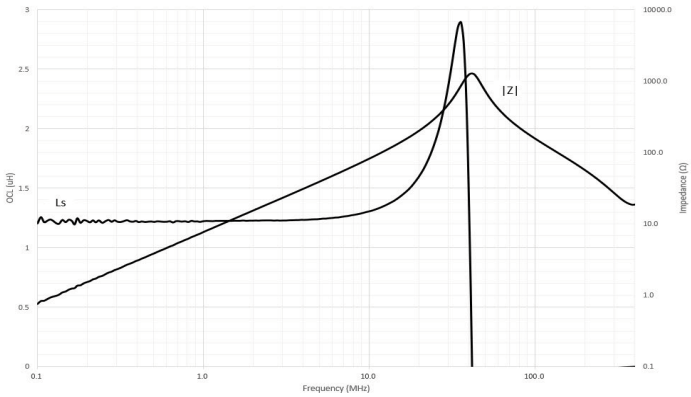


HCM1A0703V3-1R2-R



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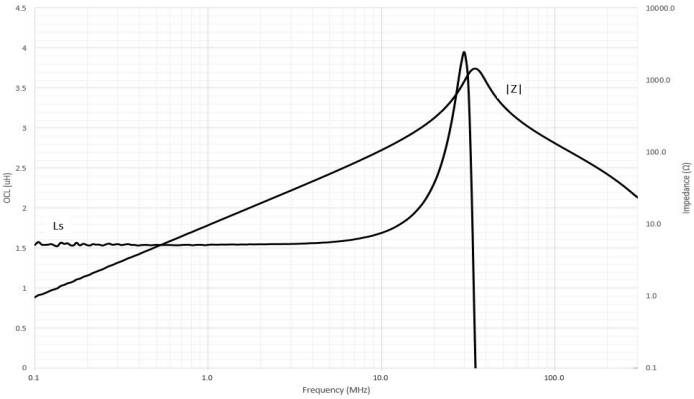

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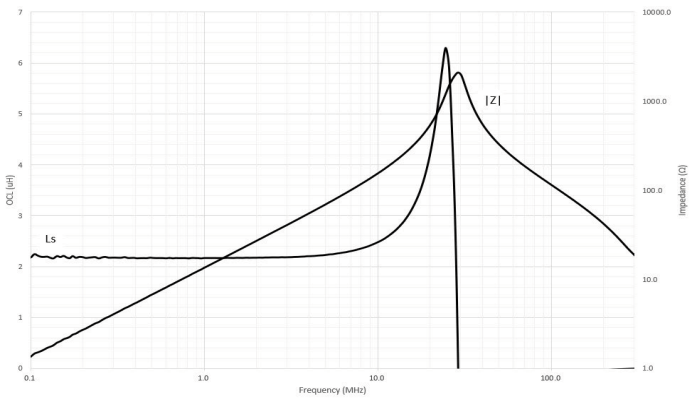
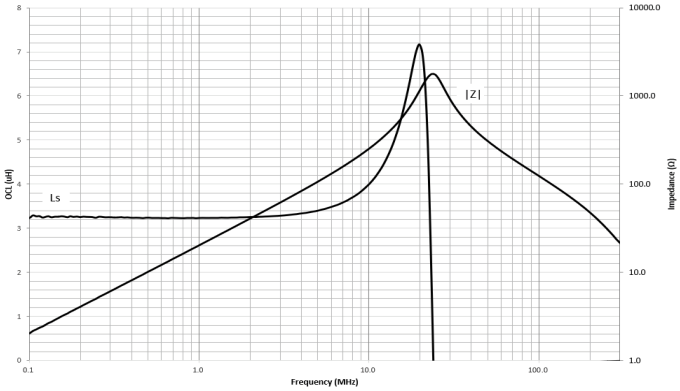


Inductance and impedance vs frequency

HCM1A0703V3-3R3-R



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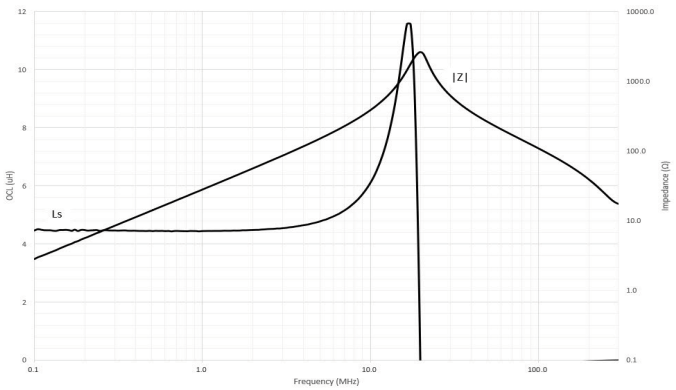

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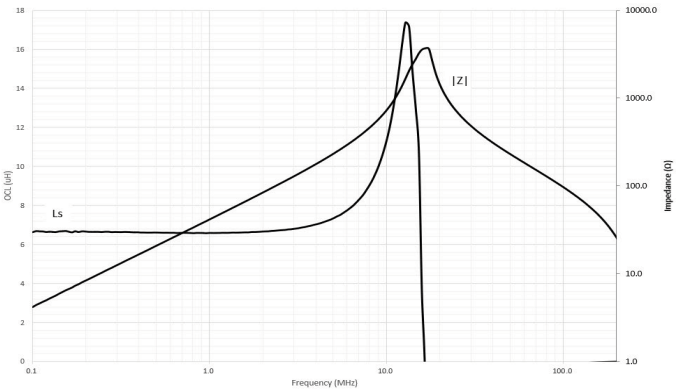

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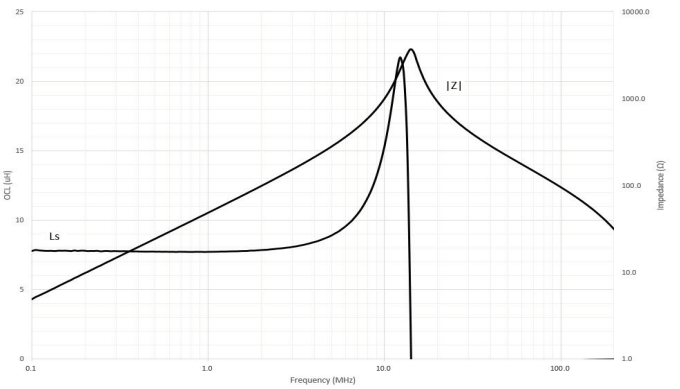
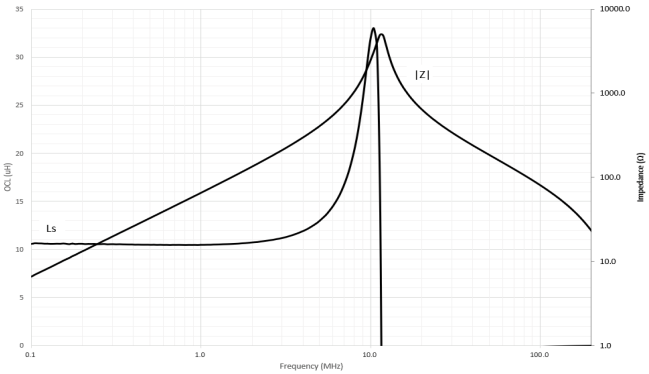


HCM1A0703V3-100-R



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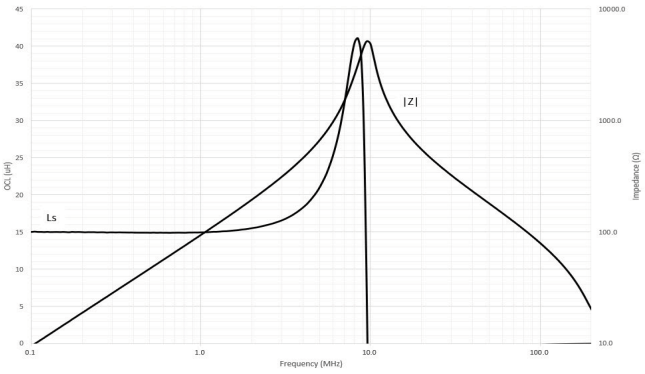
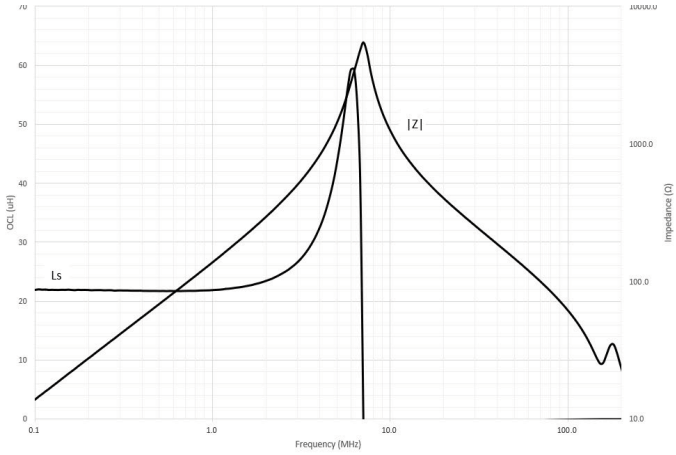
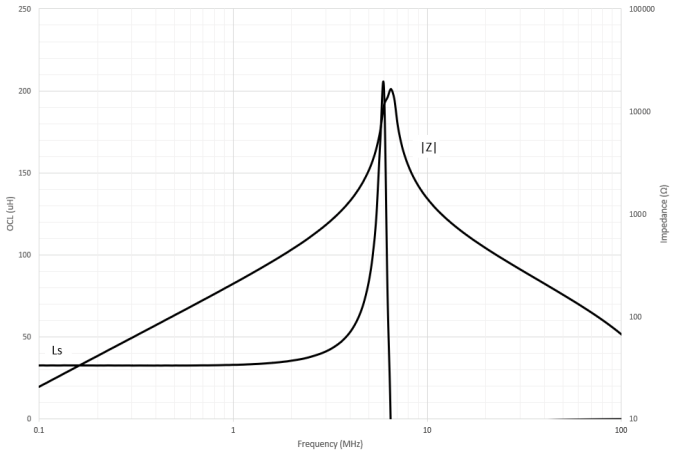


Inductance and impedance vs frequency

HCM1A0703V3-220-R



HCM1A0703V3-330-R



Solder reflow profile

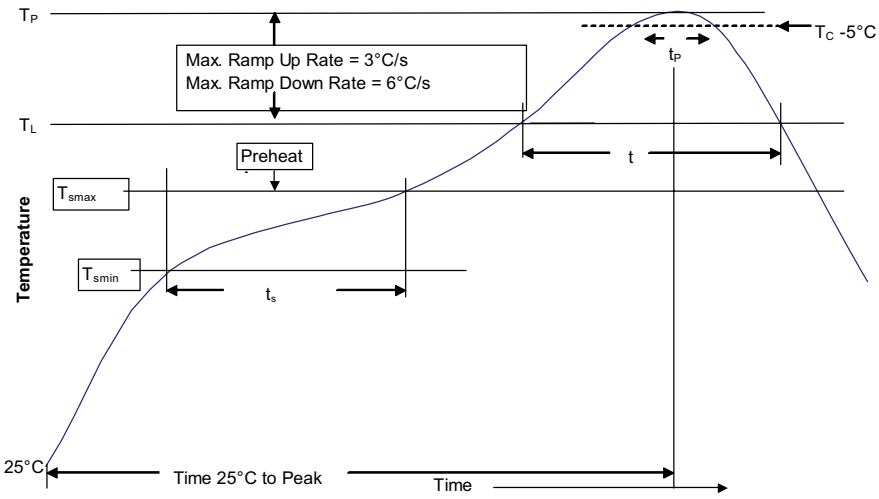


Table 1 - Standard SnPb solder (T_C)

Package thickness	Volume mm3 <350	Volume mm3 ≥350
<2.5 mm	235 °C	220 °C
≥2.5 mm	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
<1.6 mm	260 °C	260 °C	260 °C
1.6 – 2.5 mm	260 °C	250 °C	245 °C
>2.5 mm	250 °C	245 °C	245 °C

Reference 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
Ramp up rate T_L to T_p		3 °C/ second max.	3 °C/ second max.
Liquidous temperature (T_L) Time (t_L) maintained above 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*
Ramp-down rate (T_p to T_L)		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.

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