MPIA25-V2

Automotive grade

High current, low profile, miniature power inductors



Product features

- AEC-Q200 qualified
- High current carrying capacity in a compact standard 1008 (2520 metric) footprint
- Magnetically shielded, Low EMI
- Rugged construction
- Self resonant frequency (SRF) greater than 25 MHz
- Inductance range from 0.33 µH to 4.7 µH
- Current range from 1.2 A to 7.5 A
- 2.7 mm x 2.2 mm footprint surface mount package in 1.05 mm, 1.25 mm heights
- Moisture Sensitivity Level (MSL): 1

Applications

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

Environmental data

- Storage temperature range (Component): -40 °C to +125 °C
- Operating temperature range: -40 °C to +125 °C (ambient plus self-temperature rise)
- Solder reflow temperature: J-STD-020 (latest revision) compliant
- Halogen free, lead free, RoHS compliant

Pb HALOGEN HF FREE RoHS

Powering Business Worldwide

MPIA25-V2
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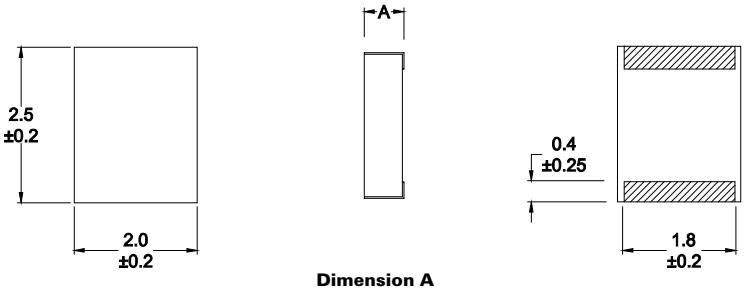
Product specifications

Part Number[5]	OCL[1] (µH) ±20%	I_{rms}[2] (A)	I_{sat}[3] (A)	DCR (mΩ) typical @ +20 °C	DCR (mΩ) maximum @ +20 °C	SRF (MHz) typical	K-factor[4]
1.0 mm height							
MPIA2510V2-R33-R	0.33	4.8	6.6	15	20	120	6336
MPIA2510V2-R47-R	0.47	4.4	6.0	19	25	100	5039
MPIA2510V2-R68-R	0.68	3.1	4.3	37	44	80	5733
MPIA2510V2-1R0-R	1.00	3.1	4.3	41	52	55	3372
MPIA2510V2-1R5-R	1.50	2.5	2.5	65	85	45	4695
MPIA2510V2-2R2-R	2.20	2.1	2.8	88	110	45	2873
MPIA2510V2-3R3-R	3.30	1.6	2.1	140	170	35	1893
MPIA2510V2-4R7-R	4.70	1.22	1.8	220	262	25	1616
1.2 mm height							
MPIA2512V2-R33-R	0.33	5.1	7.5	14	19	130	6560
MPIA2512V2-R47-R	0.47	4.9	6.7	17	23	100	3628
MPIA2512V2-R68-R	0.68	3.4	6.0	29	35	70	3633
MPIA2512V2-1R0-R	1.00	3.3	4.4	36	44	70	3083
MPIA2512V2-1R5-R	1.50	2.3	3.2	64	77	45	4850
MPIA2512V2-2R2-R	2.20	2.2	3.5	73	87	30	2924
MPIA2512V2-3R3-R	3.30	1.8	2.8	110	135	35	1965
MPIA2512V2-4R7-R	4.70	1.4	1.9	196	235	25	1580

1. Open Circuit Inductance (OCL) Test Parameters: 1.0 MHz, 0.1 Vrms, 0.0 Adc, +25 °C.
2. I_{rms}: DC current for an approximate temperature rise of 40 °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 +125 °C under worst case operating conditions verified in the end application.
3. I_{sat} : Peak current for approximately 30% rolloff @ +25 °C.
4. 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 uH), ΔI (Peak to peak ripple current in Amps).
5. Part Number Definition: MPIA25xxV2-xxx-R
   MPIA25 = Product code
   xx= Height indicator
   V2=Version indicator
   xxx= inductance value in µH, R= decimal point, If no R is present then last character equals number of zeros
   -R suffix = RoHS compliant

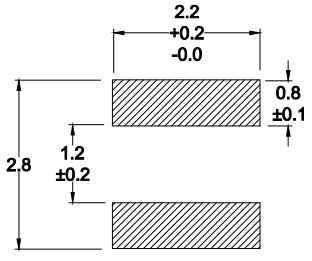
Dimensions (mm)



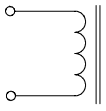
Dimension A

MPIA2510V2	1.05 maximum
MPIA2512V2	1.25 maximum,

Recommended Pad Layout



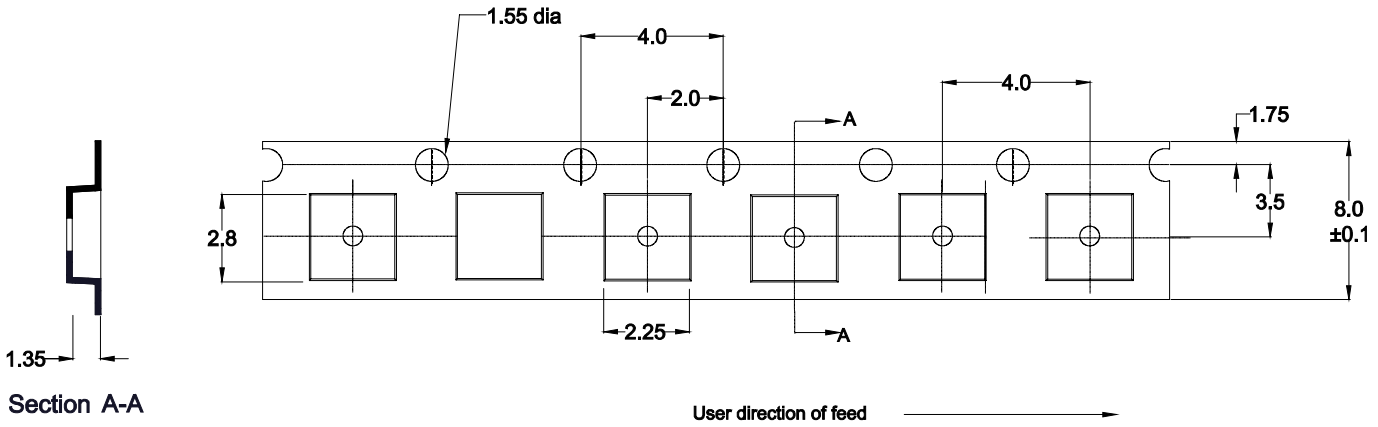
Schematic



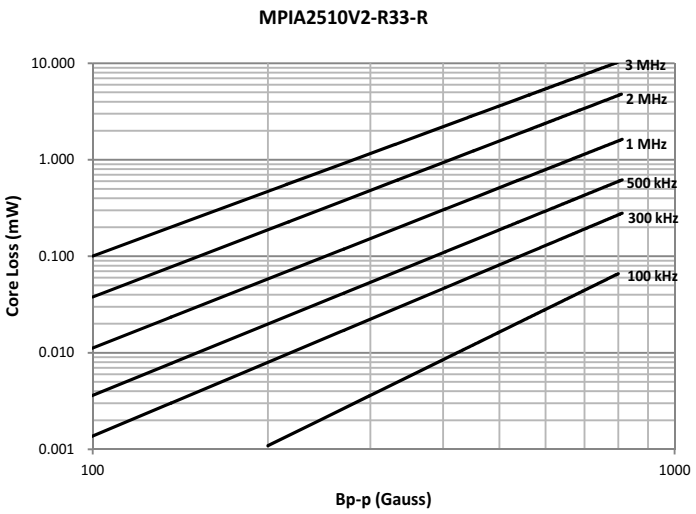
No marking
All soldering surfaces to be coplanar within 0.10 millimeters
Tolerances are ±0.2 millimeters unless stated otherwise
Pad layout tolerances are ±0.1 millimeters unless stated otherwise
Do not route traces or vias underneath the inductor

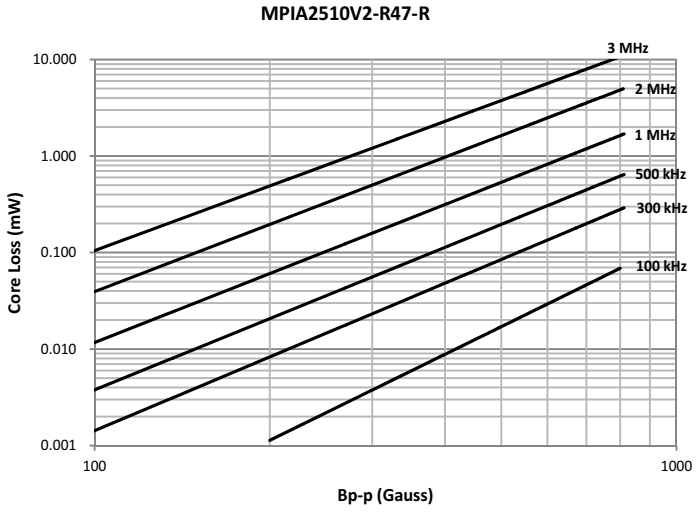
Packaging information (mm)

Supplied in tape and reel packaging, 3000 parts per 7" diameter reel



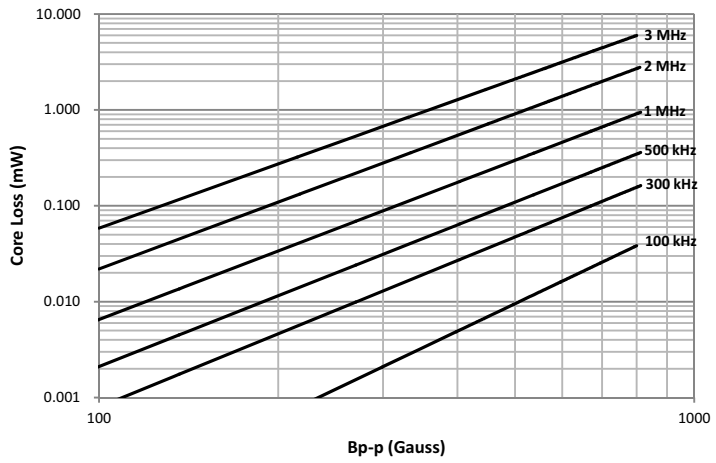
Core loss vs. Bp-p (+25 °C)





Core loss vs. Bp-p (+25 °C)

MPIA2510V2-R68-R



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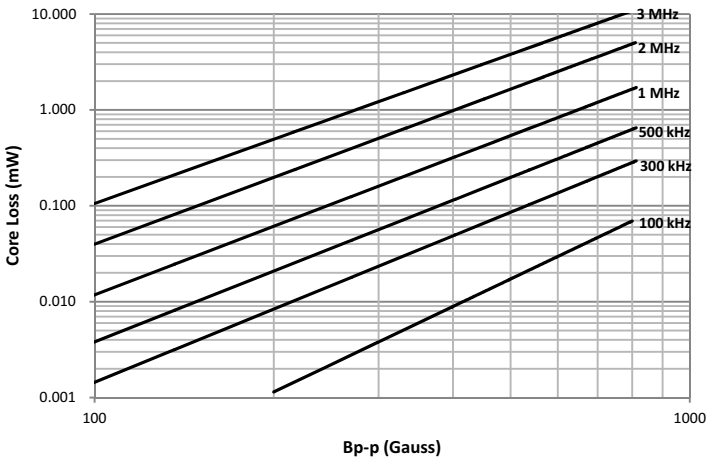
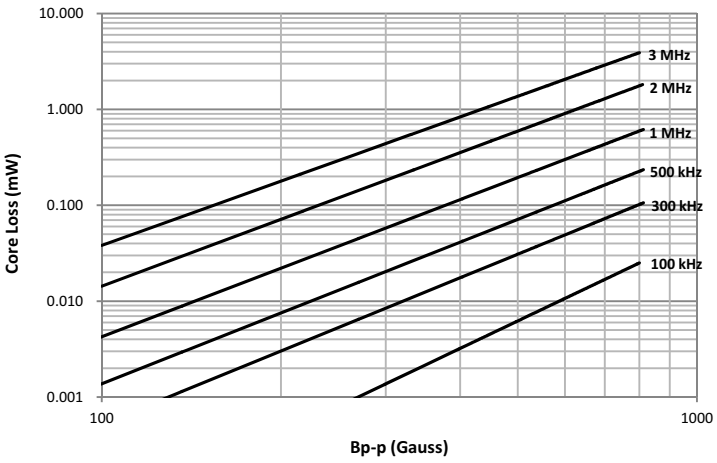


MPIA2510V2-1R5-R



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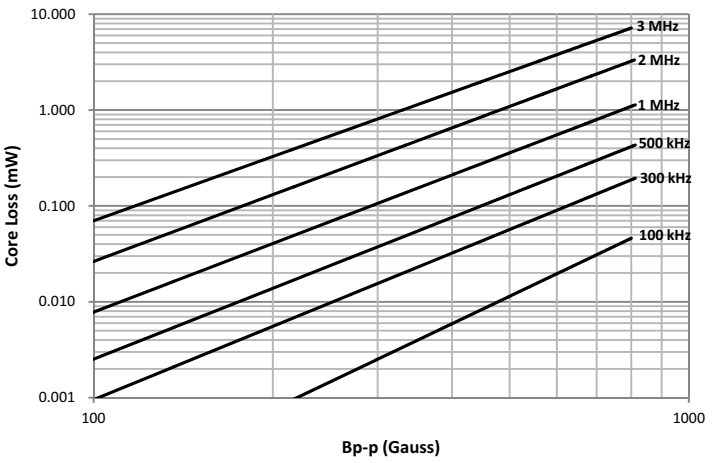
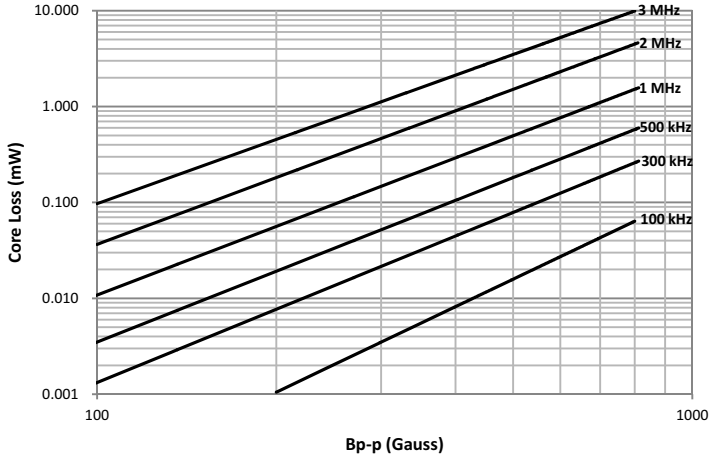


MPIA2510V2-3R3-R



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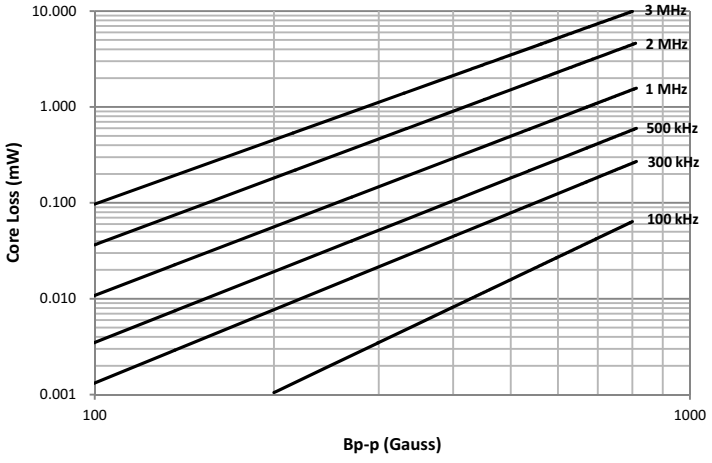
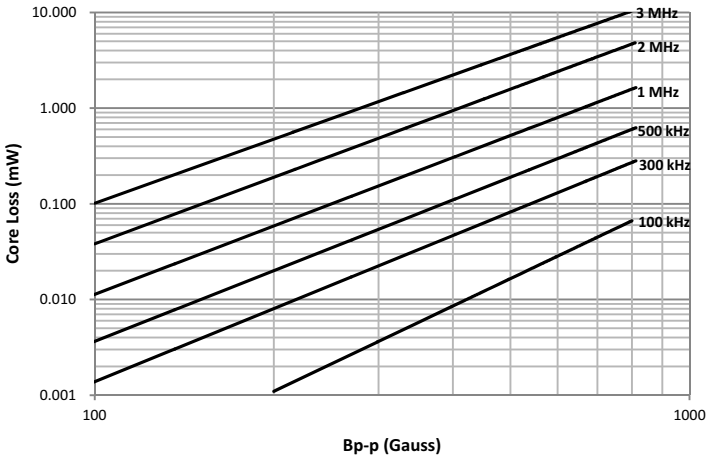


Core loss vs. Bp-p (+25 °C)

MPIA2512V2-R33-R



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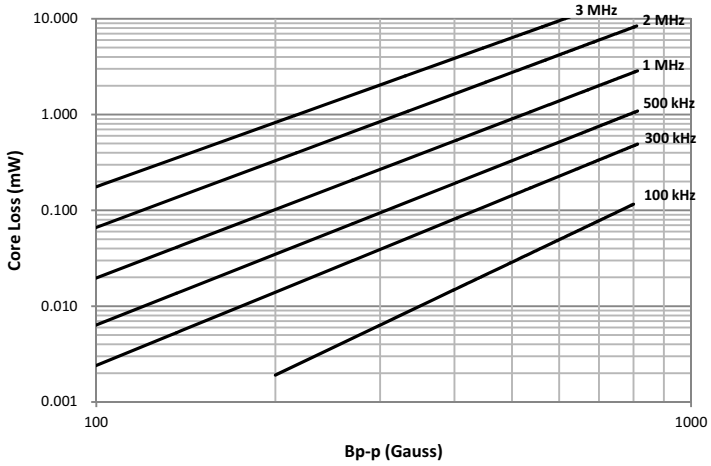

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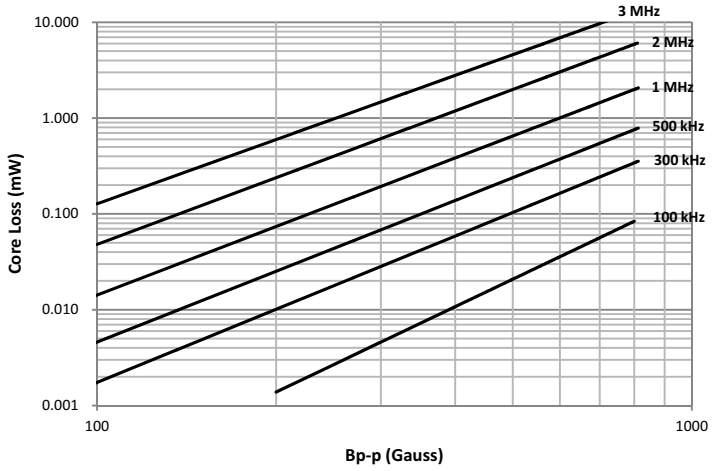

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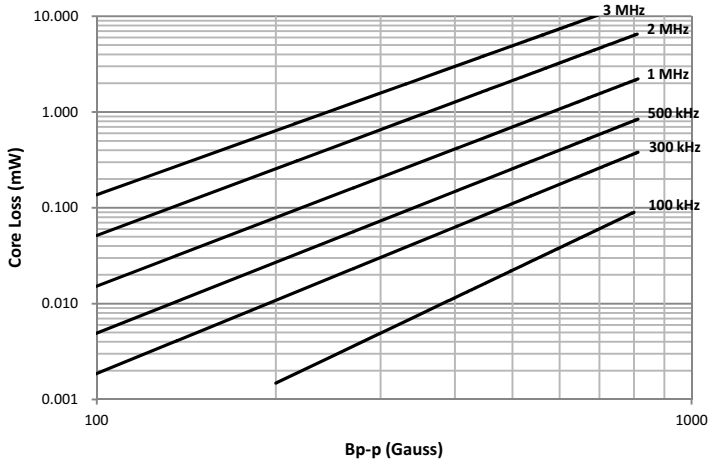

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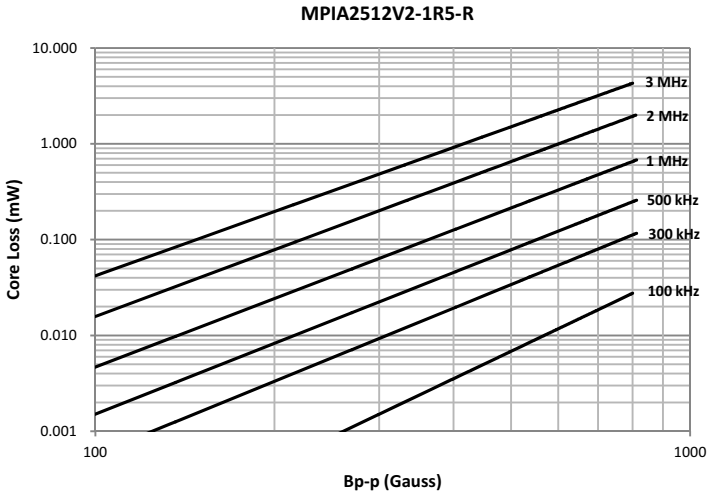

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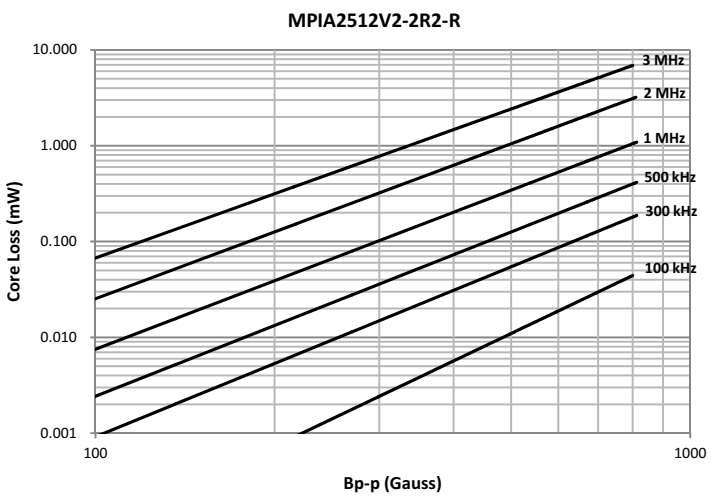
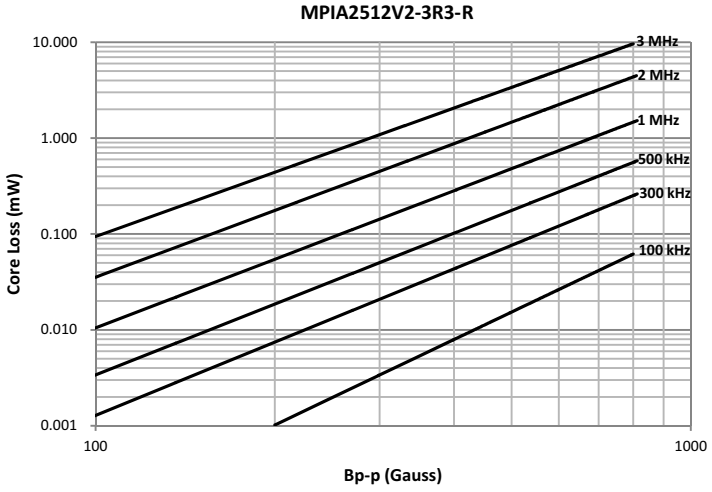
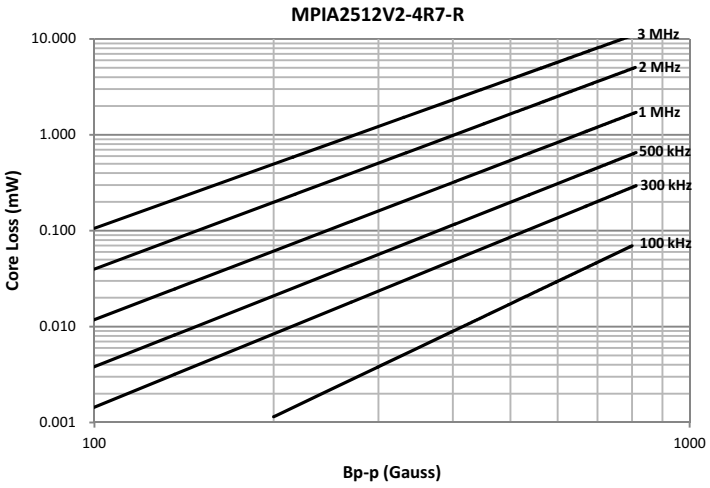
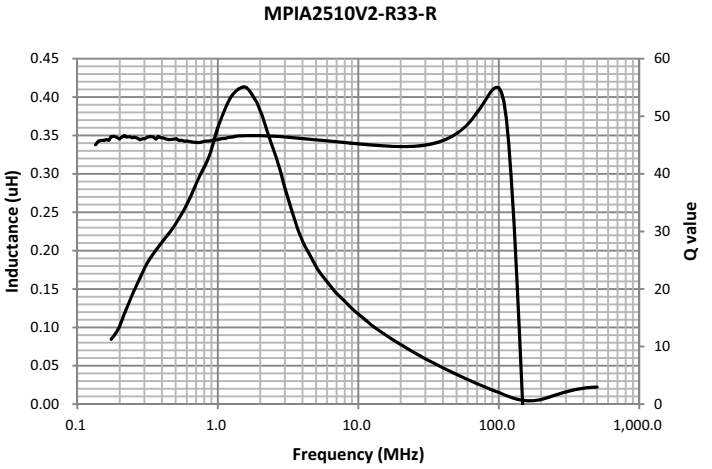


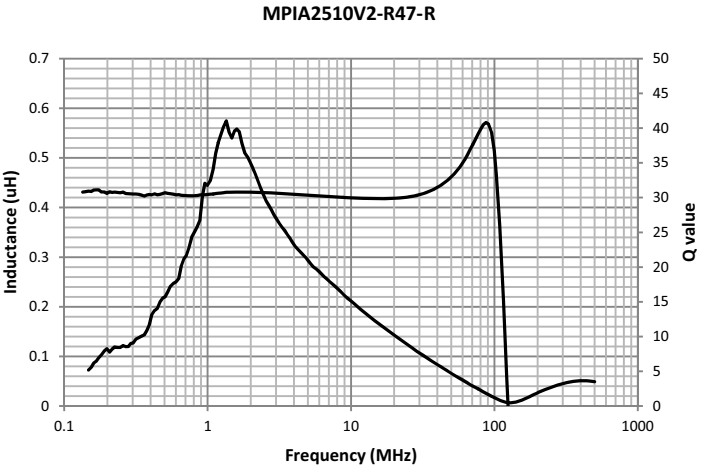
Core loss vs. Bp-p (+25 °C)

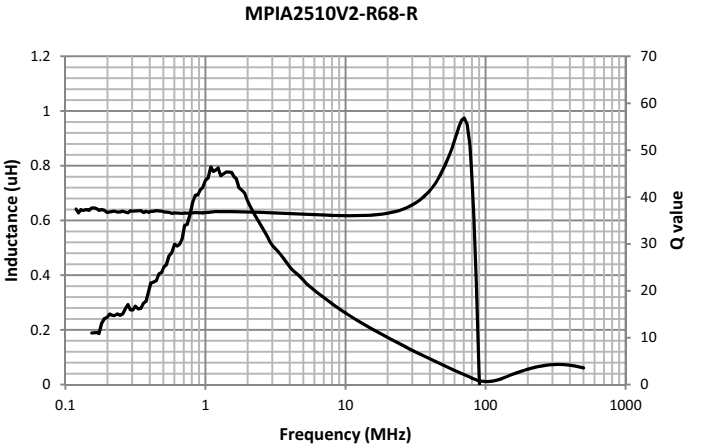


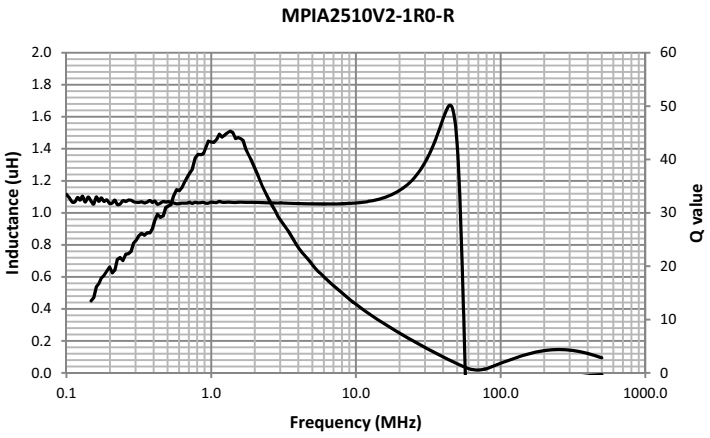


Inductance and Q vs. Frequency



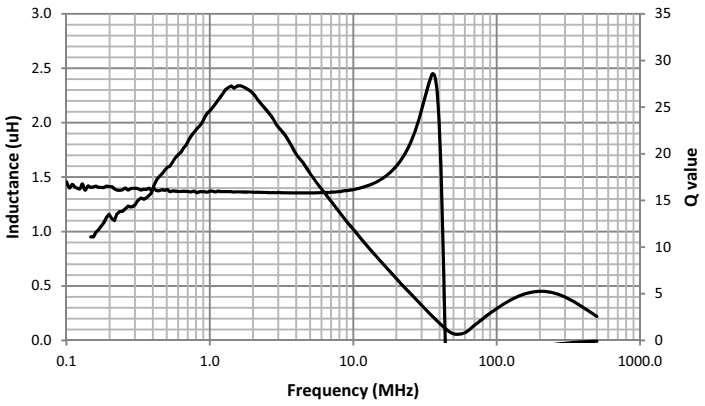




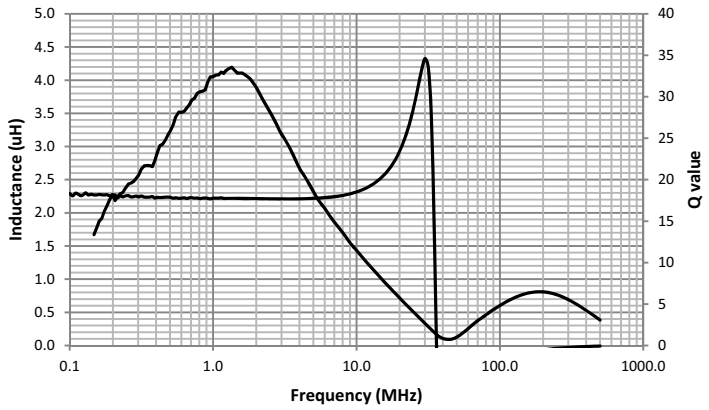


Inductance and Q vs. Frequency

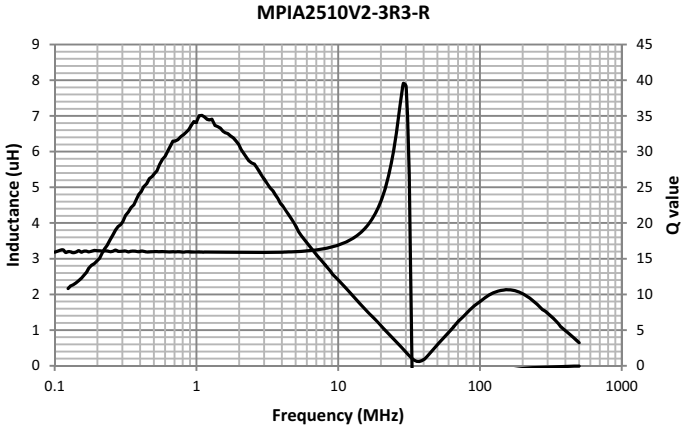
MPIA2510V2-1R5-R



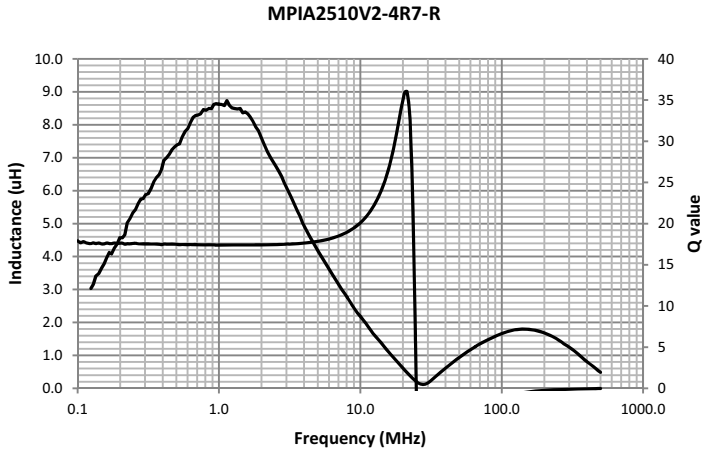
MPIA2510V2-2R2-R



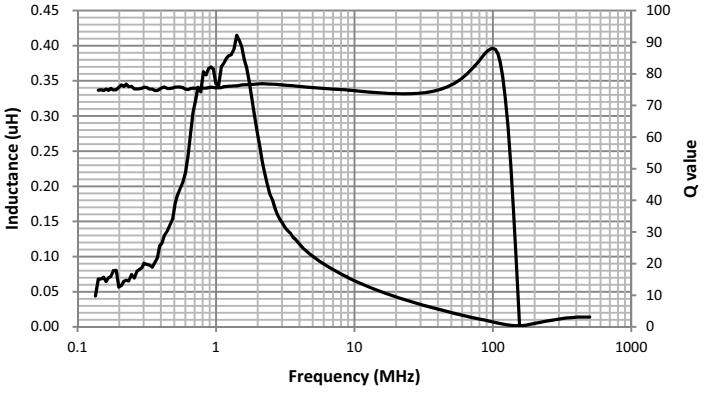
MPIA2510V2-3R3-R



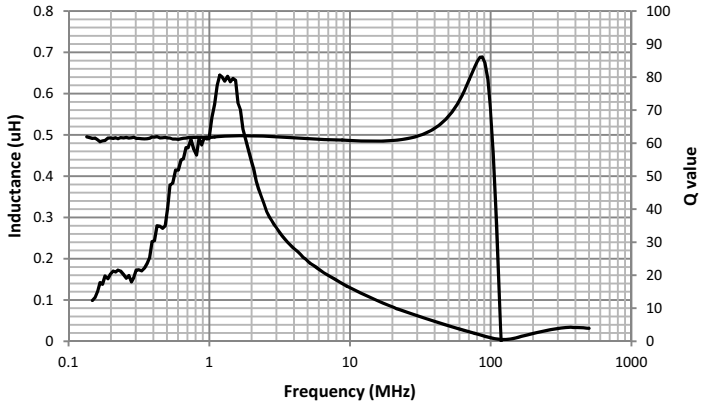
MPIA2510V2-4R7-R



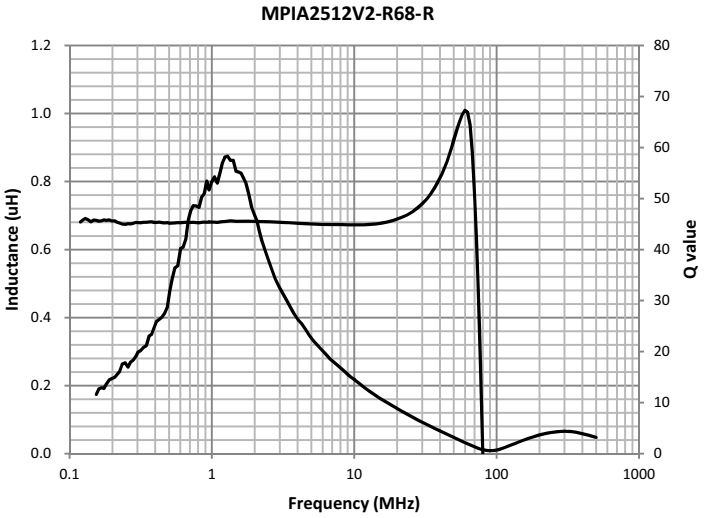
MPIA2512V2-R33-R

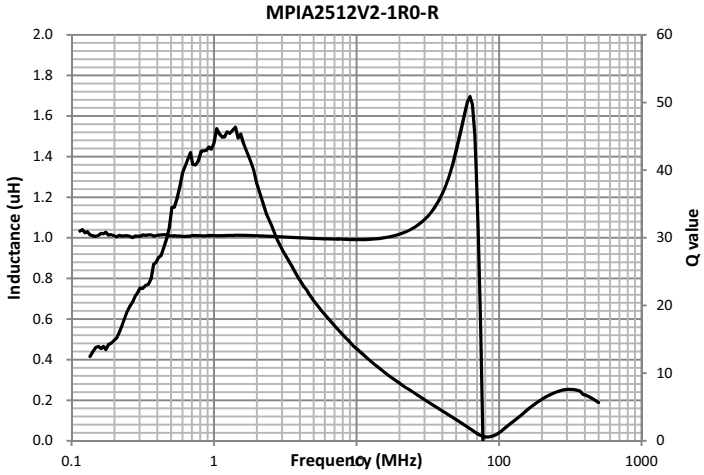


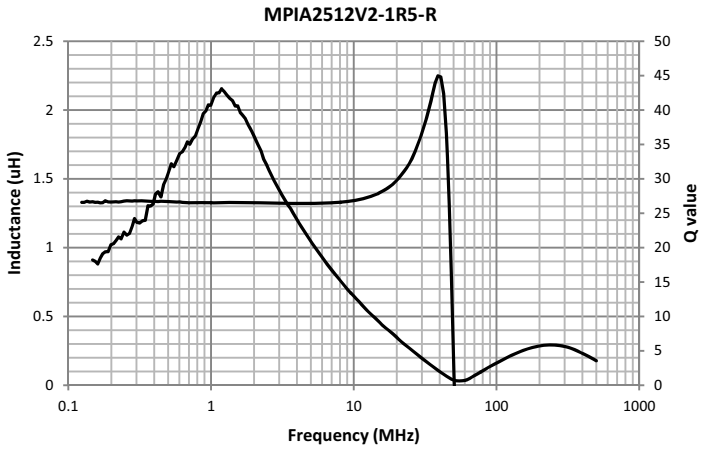
MPIA2512V2-R47-R

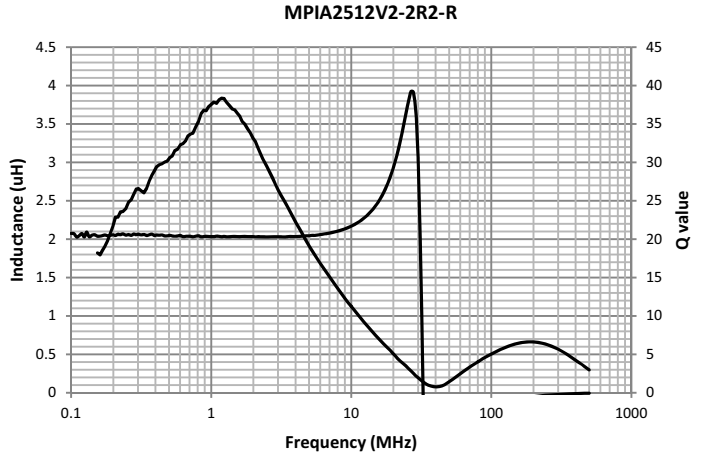


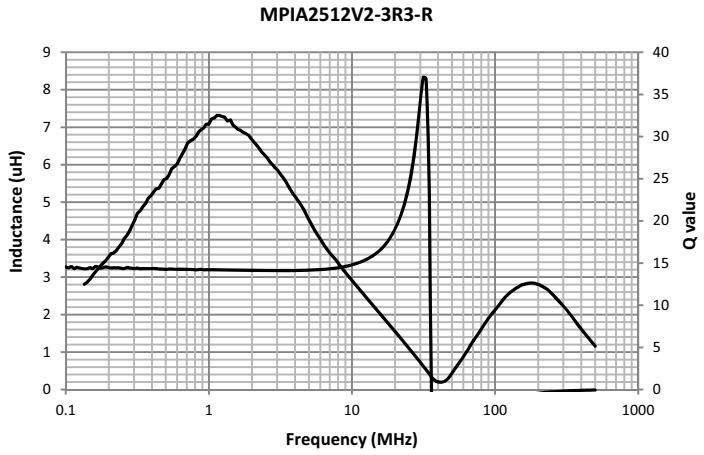
Inductance and Q vs. Frequency

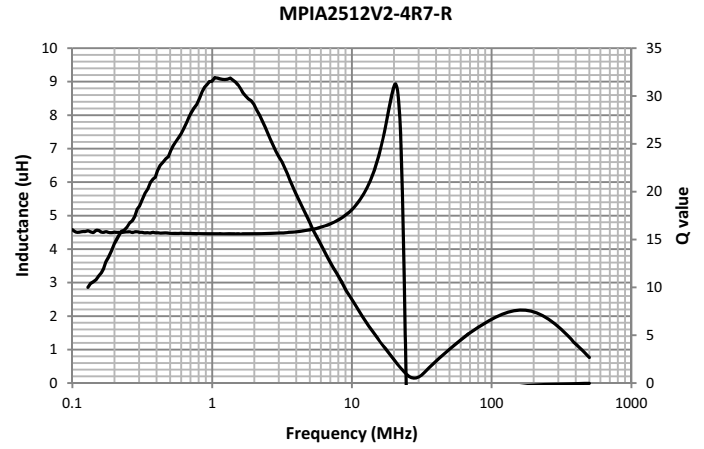






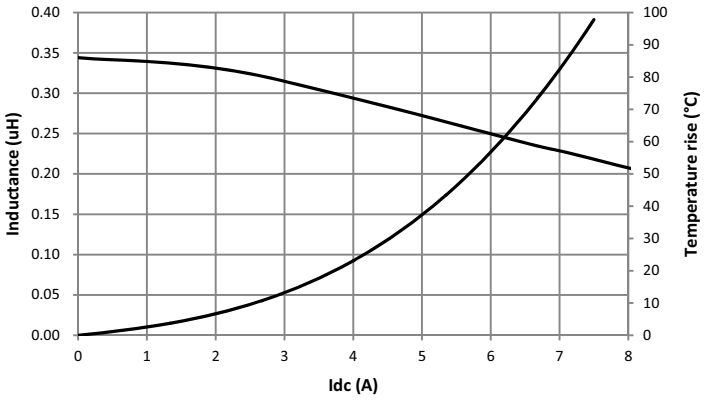






Inductance and temperature rise vs. Current

MPIA2510V2-R33-R



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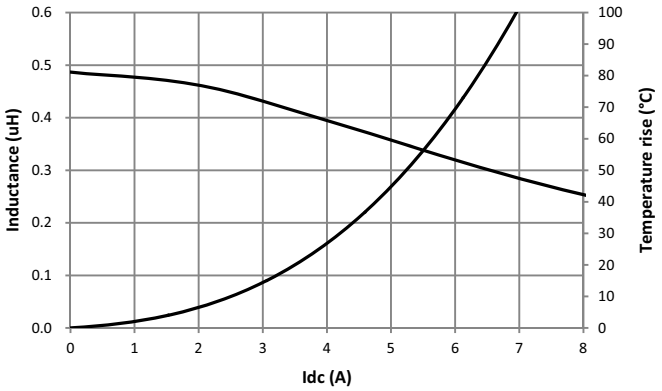

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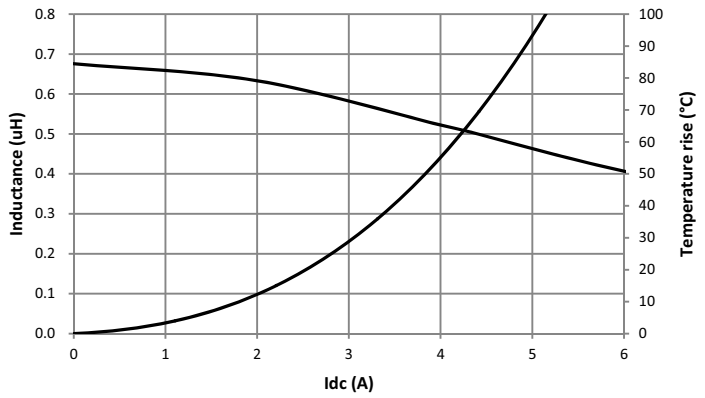

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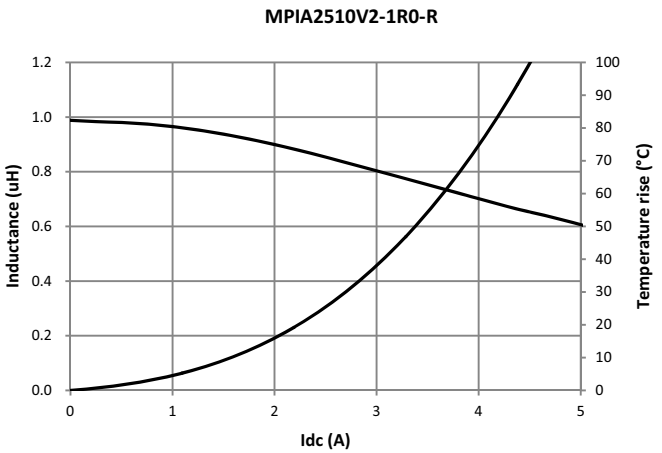

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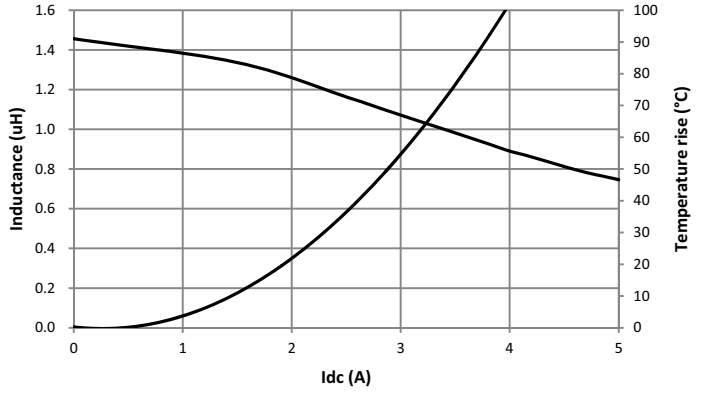
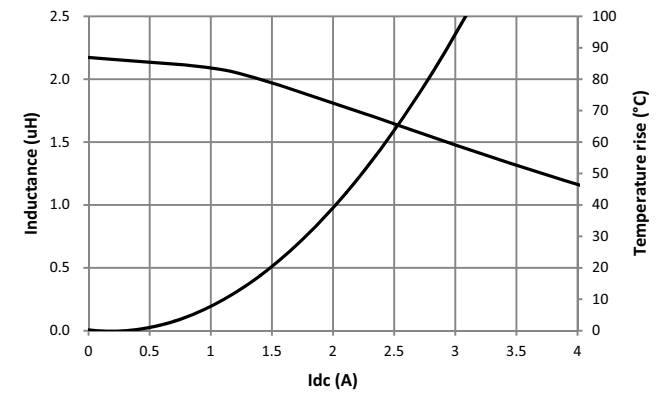
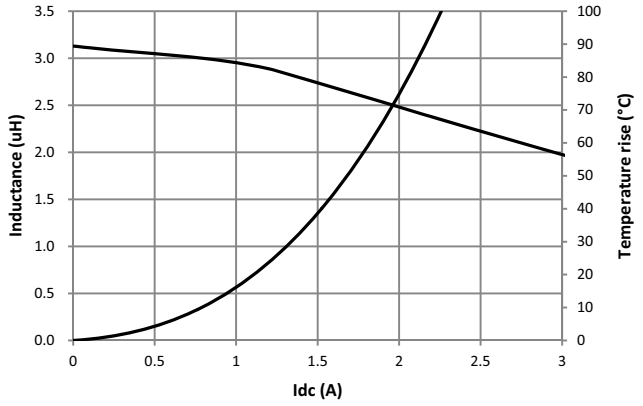


MPIA2510V2-2R2-R

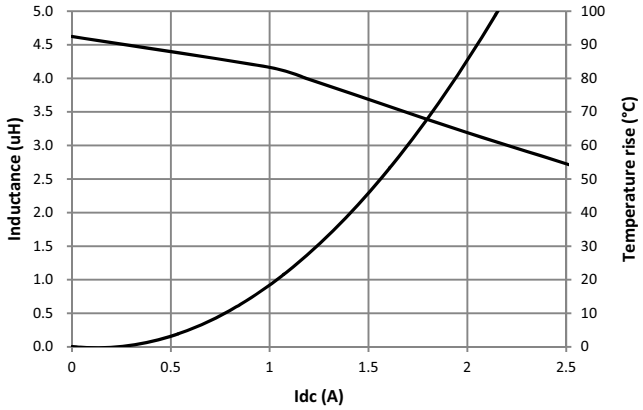


Inductance and temperature rise vs. Current

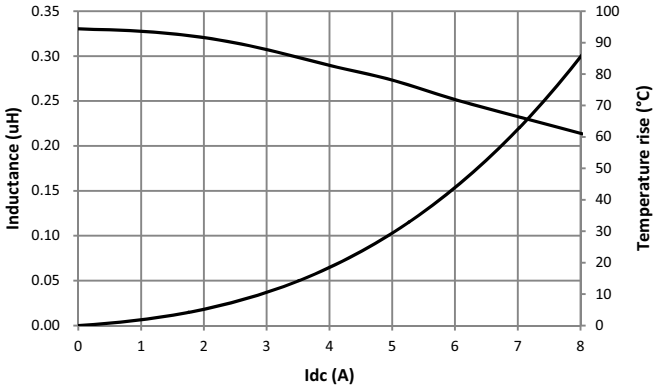
MPIA2510V2-3R3-R



MPIA2510V2-4R7-R



MPIA2512V2-R33-R



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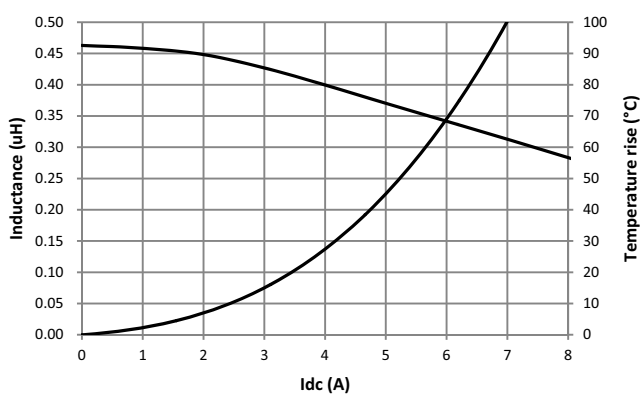

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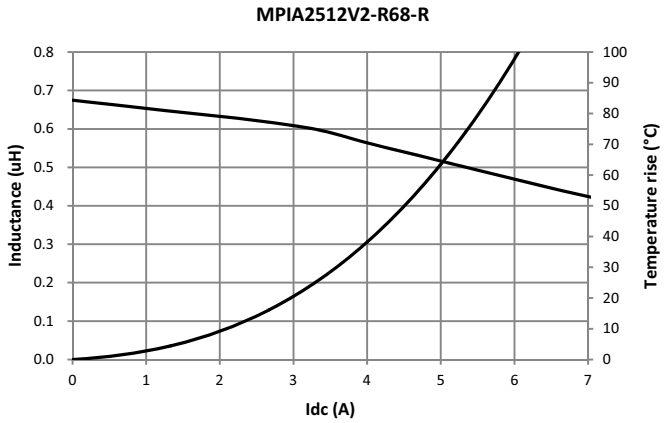
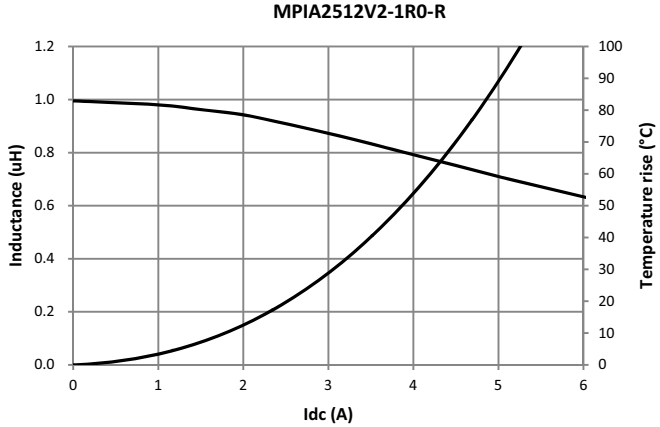
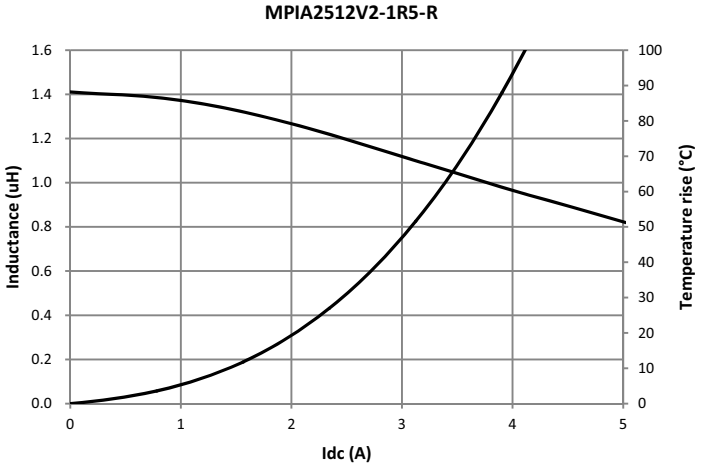
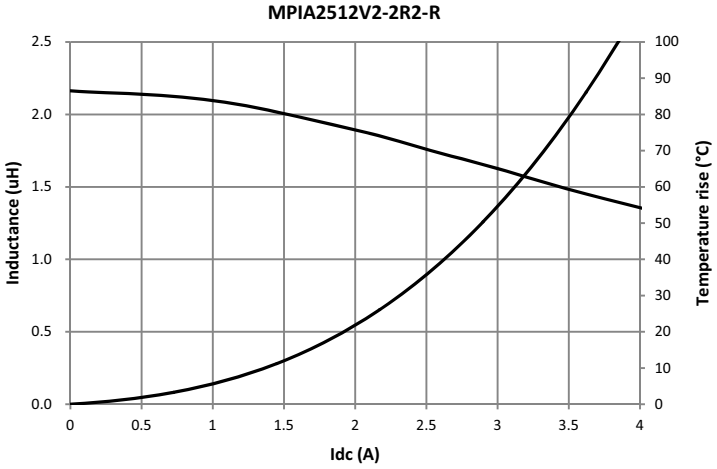


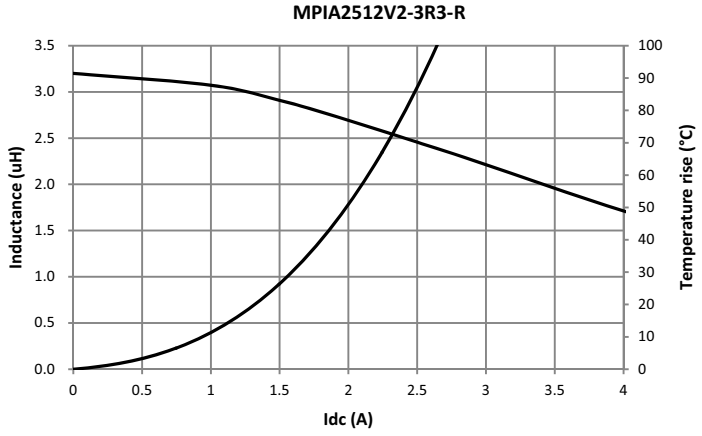
MPIA2512V2-1R0-R

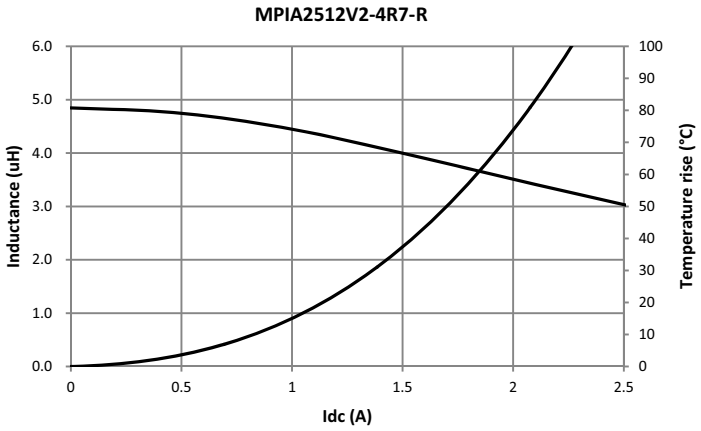


Inductance and temperature rise vs. Current









Solder reflow profile

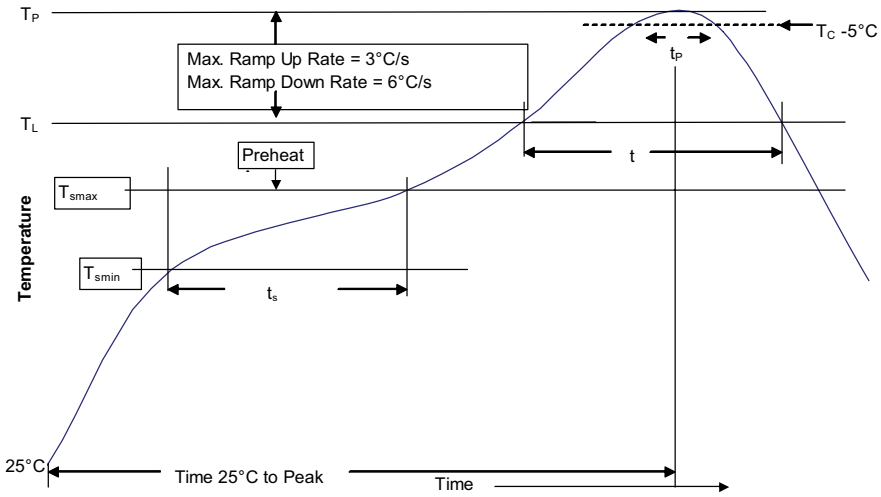


Table 1 - Standard SnPb Solder (T_C)

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 (Tp)*		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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Printed in USA
Publication No. 10650 BU-MC18046
July 2018

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