

MPIA20-V1

Automotive grade high current low profile miniature power inductor



Product features

- AEC-Q200 qualified
- High current carrying capacity in a compact 0806 (2016 metric) footprint
- Magnetically shielded, low EMI
- Rugged construction
- DC-DC converter applications up to 3 MHz
- Filtering applications up to Self resonant frequency (SRF) [See product specification table]
- Inductance range from 0.33 μ H to 2.2 μ H
- Current range from 2.0 A to 5.5 A
- 2.2 mm x 1.8 mm footprint surface mount package in a 1.0 mm height
- Moisture sensitivity level (MSL): 1
- Alloy powder core material

Applications

- Body electronics
 - Central body control module
 - Vehicle access control system
 - Headlamps, tail lamps and 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
 - Port power/USB HUB for front and rear passengers

Environmental compliance and general specifications

- 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



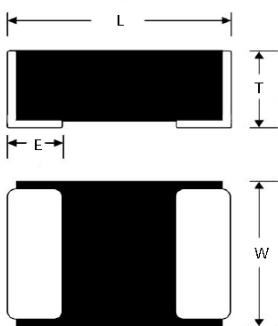
Product specifications

Part number ⁶	OCL ¹ (μH) $\pm 20\%$	FLL ² (μH) minimum	I_{rms}^3 (A) maximum	I_{sat}^4 (A) maximum	DCR (m Ω) typical @ +20 °C	DCR (m Ω) maximum @ +20 °C	SRF (MHz) typical	K-factor ⁵
MPIA2010V1-R33-R	0.33	0.19	4.0	5.5	21	26	120+	4368
MPIA2010V1-R47-R	0.47	0.26	4.0	4.8	27	33	120+	3574
MPIA2010V1-1R0-R	1.0	0.56	3.0	3.0	56	65	100	2771
MPIA2010V1-1R5-R	1.5	0.84	2.2	2.8	86	99	80	2069
MPIA2010V1-2R2-R	2.2	1.23	2.0	2.2	117	140	60	1487

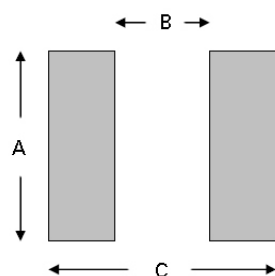
- Open Circuit Inductance (OCL) Test Parameters: 1.0 MHz, 1.0 V_{rms}, 0.0 Adc, +25 °C
- Full Load Inductance (FLL) Test Parameters: 1.0 MHz, 1.0 V_{rms}, I_{sat}, +25 °C
- I_{rms}: DC current for an approximate temperature rise of 40 °C without core loss. Derating is necessary for AC currents. PCB layout, 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.

- I_{sat}: Peak current for approximately 30% rolloff @ +25 °C
- K-factor: Used to determine B_{pp} for core loss (see graph). B_{p-p} = K * L * ΔI . B_{pp}: (Gauss), K: (K-factor from table), L: (Inductance in μH), ΔI (Peak to peak ripple current in Amps).
- Part Number Definition: MPIA2010V1-xxx-R
MPIA2010V1 = 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

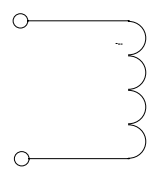
Dimensions- mm



Recommended pad layout



Schematic

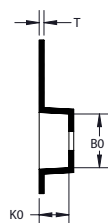
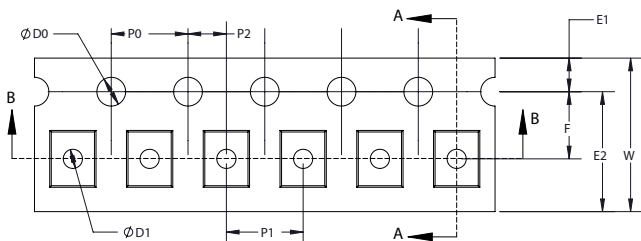


Part number	L	W	T	E	A	B	C
MPIA2010V1-xxx-R	2.0 ± 0.2	1.6 ± 0.2	1.0 maximum	0.5 ± 0.3	1.6	0.9	2.3

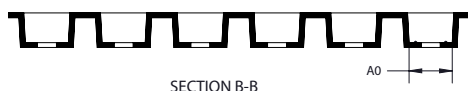
Part marking: No marking
All soldering surfaces to be coplanar within 0.1 millimeters
Tolerances are ± 0.3 millimeters unless stated otherwise
Pad layout tolerances are ± 0.1 millimeters unless stated otherwise
Traces or vias underneath the inductor is not recommended

Packaging information- mm

Drawing not to scale
Supplied in tape and reel packaging, 3000 parts per 7.0" diameter reel (EIA-481 compliant)



SECTION A-A

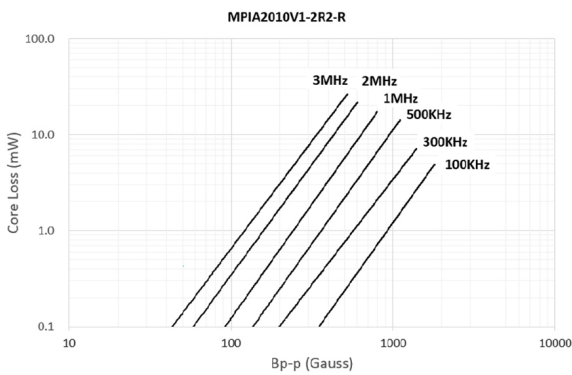
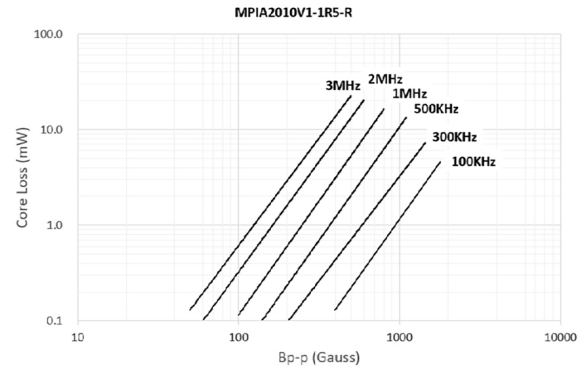
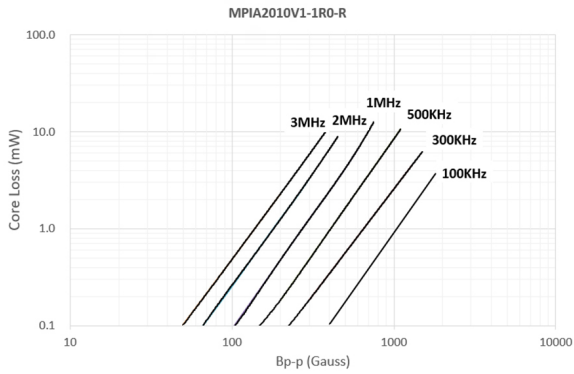
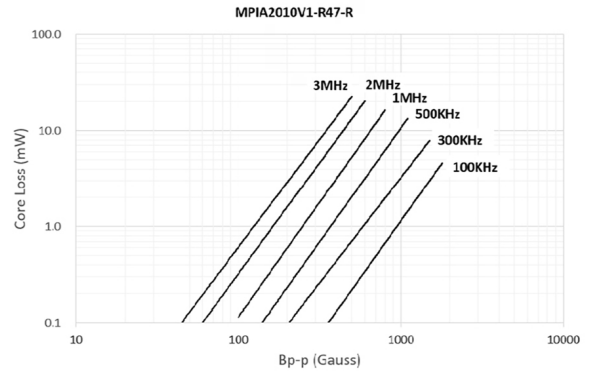
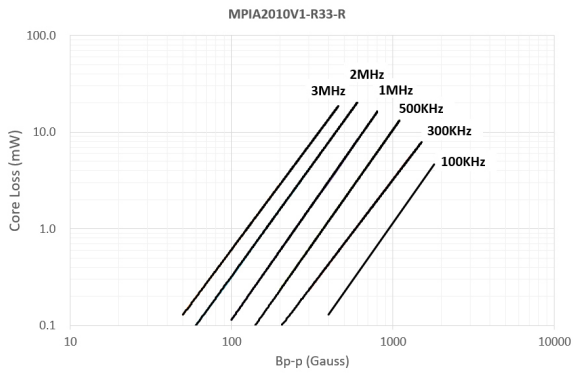


SECTION B-B

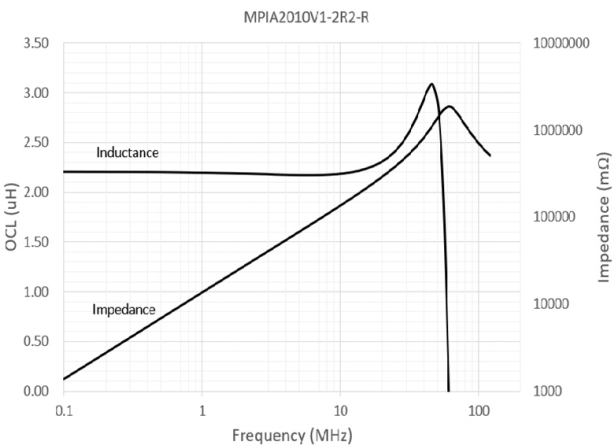
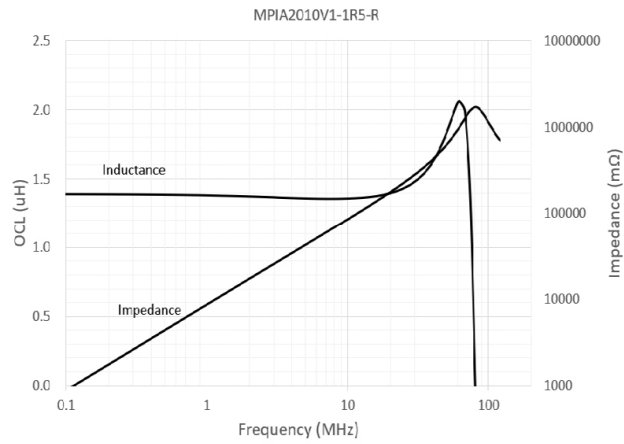
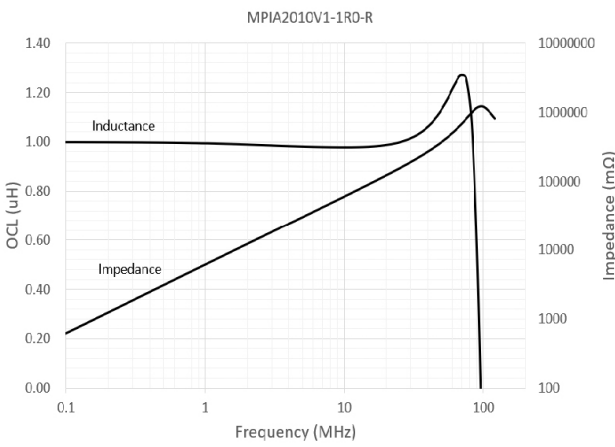
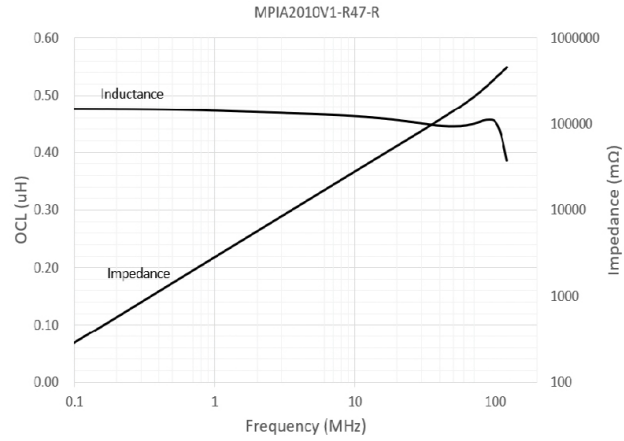
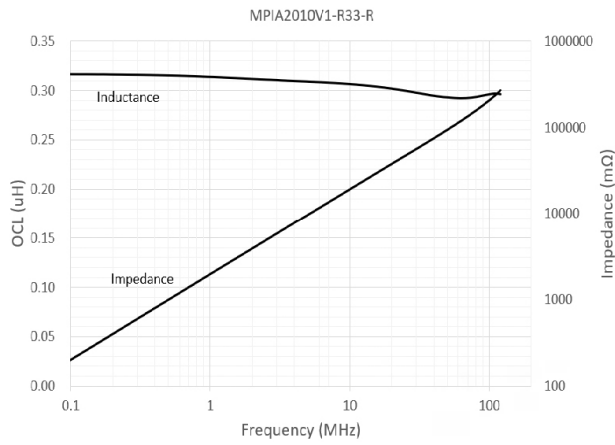
Dimension	Value
W	8.0 ± 0.1
F	3.50 ± 0.05
E1	1.75 ± 0.1
E2	6.25 min
P0	4.0 ± 0.1
P1	4.0 ± 0.1
P2	2.0 ± 0.05
D0	1.5 +0.1 -0
D1	1.0 +0.1 -0
A0	1.90 ± 0.1
B0	2.25 ± 0.1
K0	1.10 ± 0.1
T	0.22 ± 0.05

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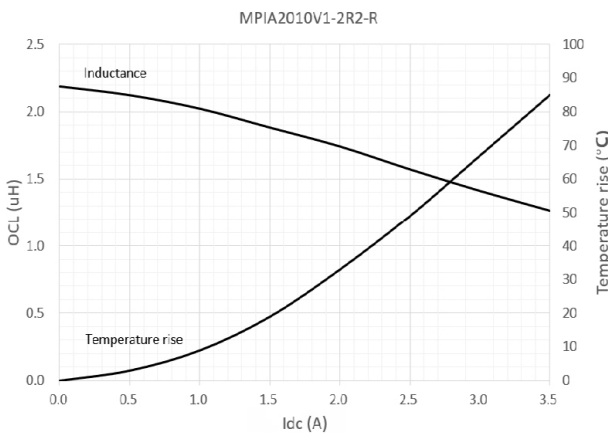
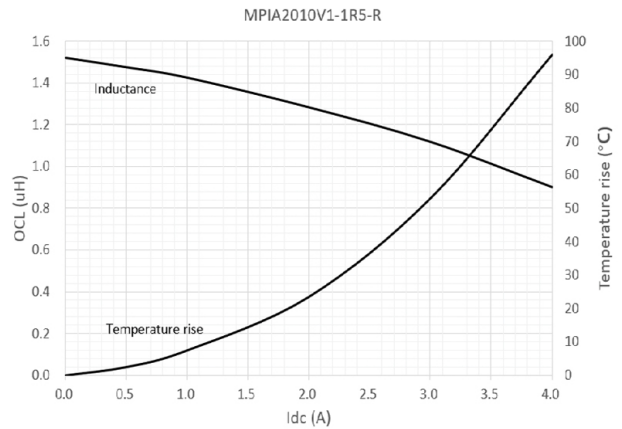
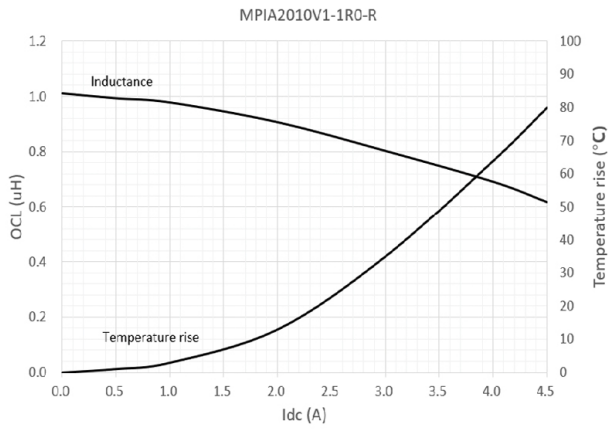
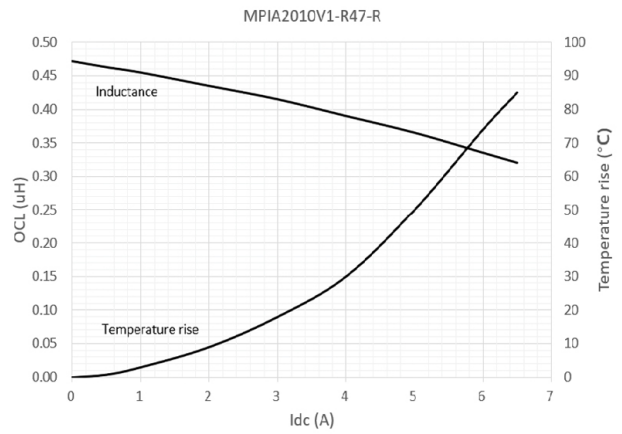
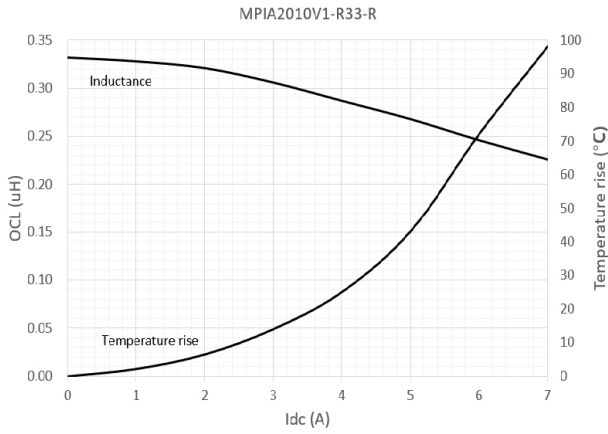
Core loss vs B_{p-p}



Inductance and impedance vs. frequency



Inductance and temperature rise current



Solder reflow profile

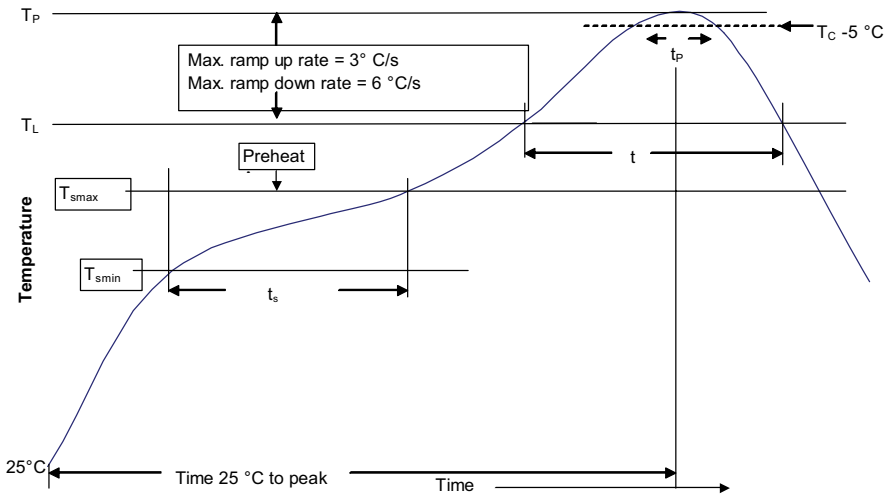


Table 1 - Standard SnPb solder (T_C)

Package thickness	Volume mm^3 <350	Volume mm^3 \geq 350
<2.5 mm)	235 °C	220 °C
\geq 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)	183 °C	217 °C
Time (t_L) maintained above 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*
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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