

# MPI20-V1

## High current, low profile, miniature power inductors



### Product features

- 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 0.47  $\mu$ H to 2.2  $\mu$ H
- Current range from 2.2 A to 5.5 A
- 2.2 mm x 1.8 mm footprint surface mount package in 1.0 mm height maximum
- Moisture Sensitivity Level (MSL): 1

### Applications

- Mobile/smart phones
- Handheld/mobile equipment
- Tablets/e-readers
- Digital cameras
- Wearable devices
- Notebook/netbook/laptop regulators
- Portable media players

### 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

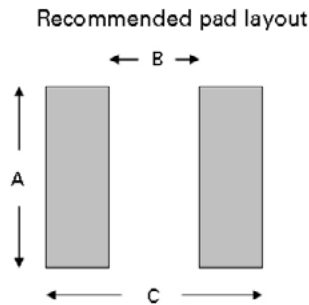
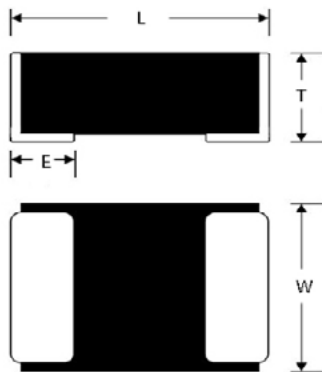


**Product specifications**

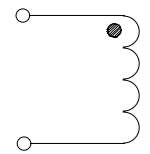
Part Number <sup>5</sup>	OCL <sup>1</sup> ( $\mu$ H) $\pm$ 20%	I <sub>rms</sub> <sup>2</sup> (A)	I <sub>sat</sub> <sup>3</sup> (A)	DCR (m $\Omega$ ) typical @ +20 °C	DCR (m $\Omega$ ) maximum @ +20 °C	SRF (MHz) typical	K-factor <sup>4</sup>
<b>1.0 mm height</b>							
MPI2010V1-R47-R	0.47	4.5	5.5	26	31	160	3822
MPI2010V1-1R0-R	1.0	3.3	3.6	54	62	100	2990
MPI2010V1-1R5-R	1.5	2.4	3.2	87	99	85	2083
MPI2010V1-2R2-R	2.2	2.2	2.6	117	135	65	1729

- Open Circuit Inductance (OCL) Test parameters: 1.0 MHz, 1.0 Vrms, 0.0 Adc, +25 °C.
- I<sub>rms</sub>: 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<sub>sat</sub>: Peak current for approximately 30% rolloff @ +25 °C.
- K-factor: Used to determine Bp-p for core loss (see graph). Bp-p = K \* L \*  $\Delta$ I. Bp-p (Gauss), K: (K-factor from table), L: (Inductance in  $\mu$ H),  $\Delta$ I (Peak to peak ripple current in Amps).
- Part Number Definition: MPI20xxV1-xxx-R  
 MPI20 = Product code  
 xx= Height indicator  
 V1=Version indicator  
 xxx= inductance value in  $\mu$ H, R= decimal point, If no R is present then last character equals number of zeros  
 -R suffix = RoHS compliant

**Dimensions (mm)**



**Schematic**

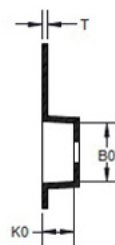
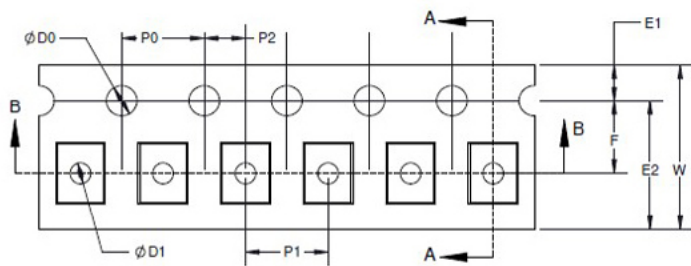


Part Number	L	W	T	E	A	B	C
MPI2010V1-xxx-R	2.0 $\pm$ 0.2	1.6 $\pm$ 0.2	1.0 maximum	0.5 $\pm$ 0.3	1.6 $\pm$ 0.10	0.9 $\pm$ 0.10	2.0 $\pm$ 0.10

No marking  
 All soldering surfaces to be coplanar within 0.10 millimeters  
 Tolerances are  $\pm$ 0.3 millimeters unless stated otherwise  
 Pad layout tolerances are  $\pm$ 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



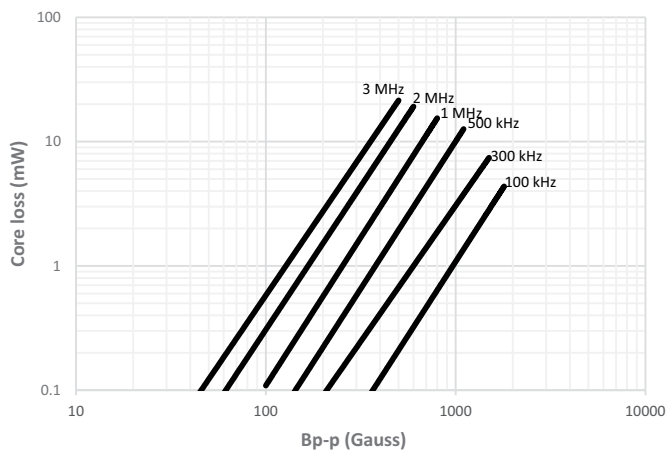
W ±0.1	8.00
F ±0.05	3.50
E1 ±0.10	1.75
E2 Min	6.25
P0 ±0.10	4.00
P1 ±0.1	4.00
P2 ±0.05	2.00
D0 +0.10/-0	1.50
D1 +0.10/-0	1.00
A0	1.9 ±0.10
B0	2.25 ±0.10
K0	1.1 ±0.10
T ±0.05	0.22



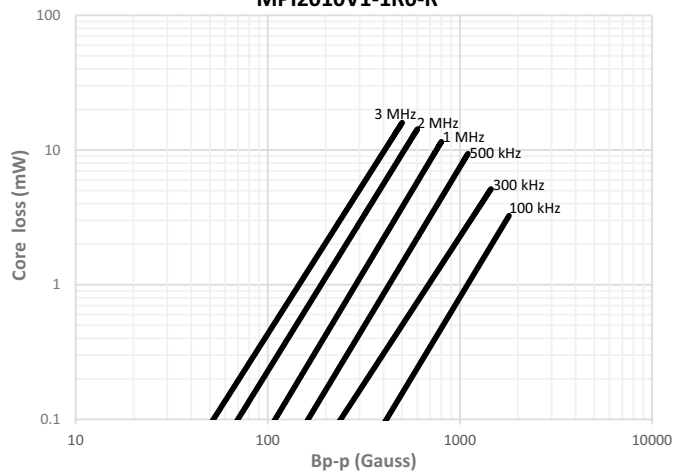
User direction of unreeling →

**Core loss vs. Bp-p (+25 °C)**

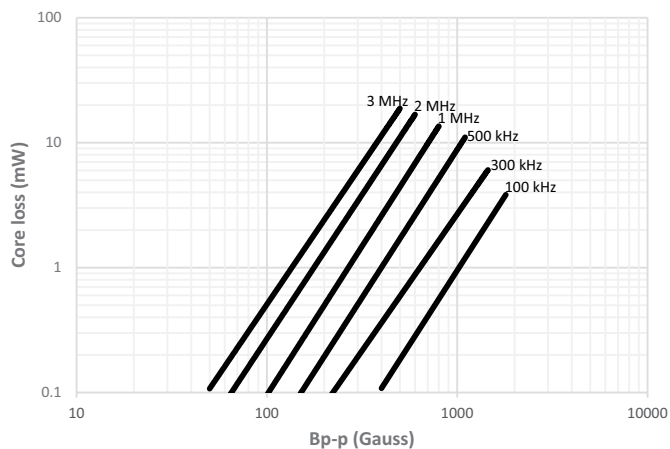
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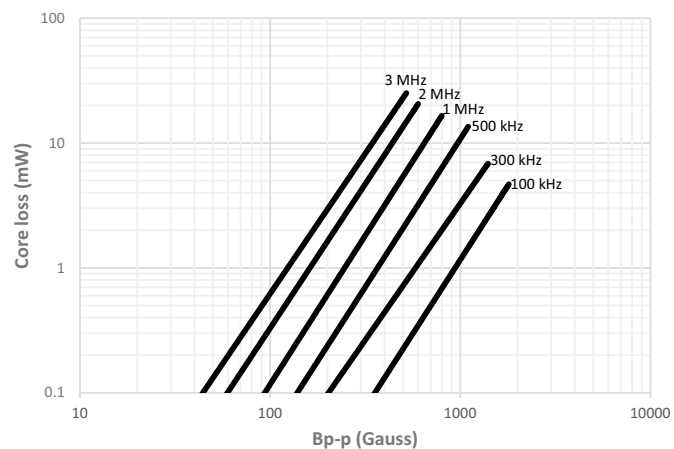
**MPI2010V1-1R0-R**



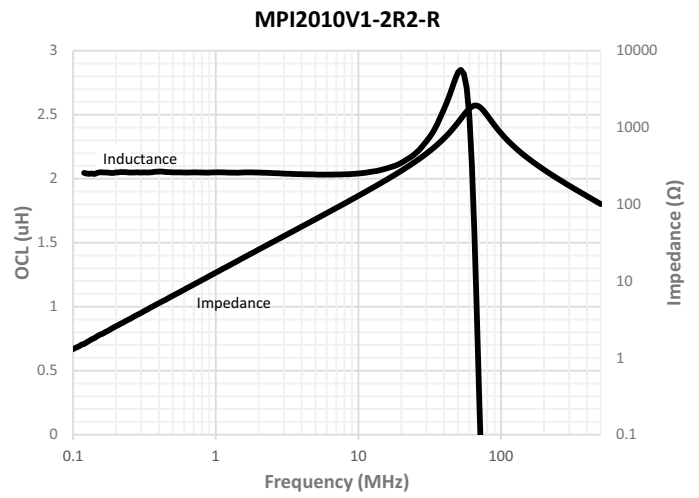
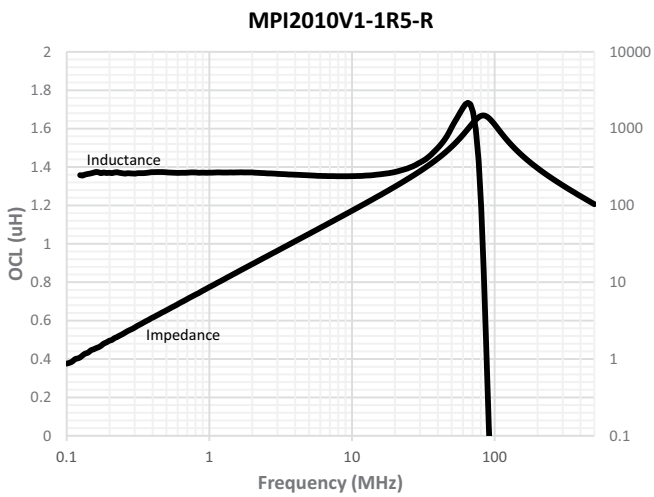
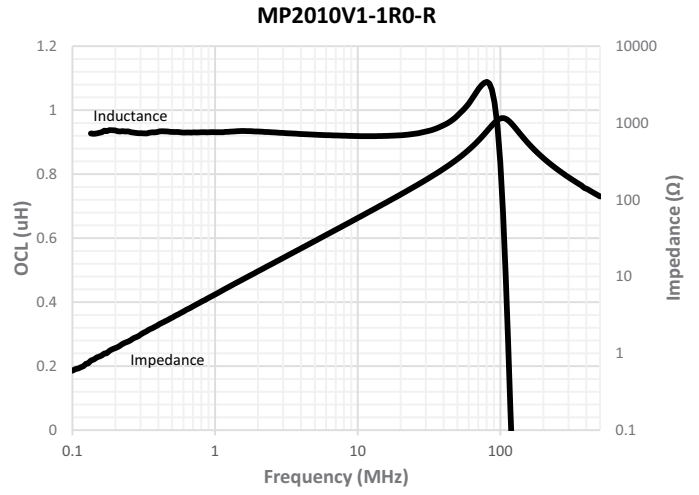
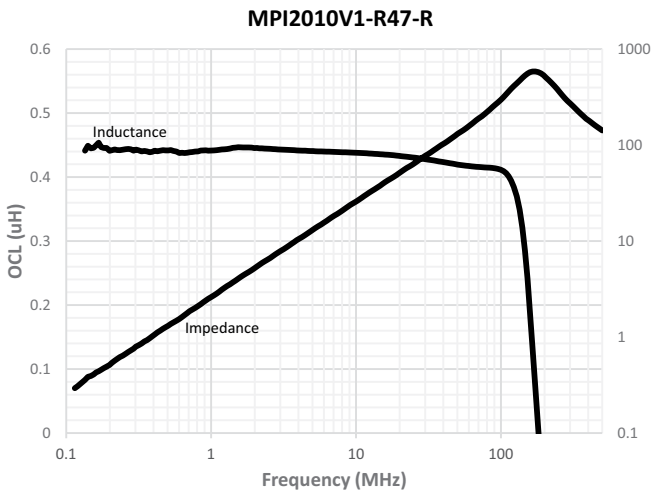
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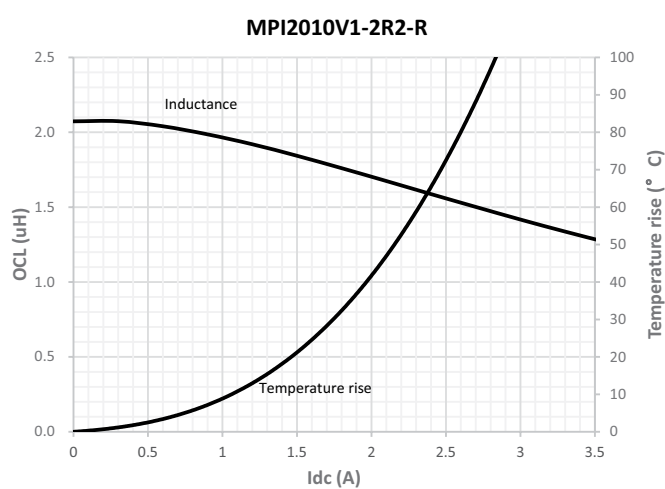
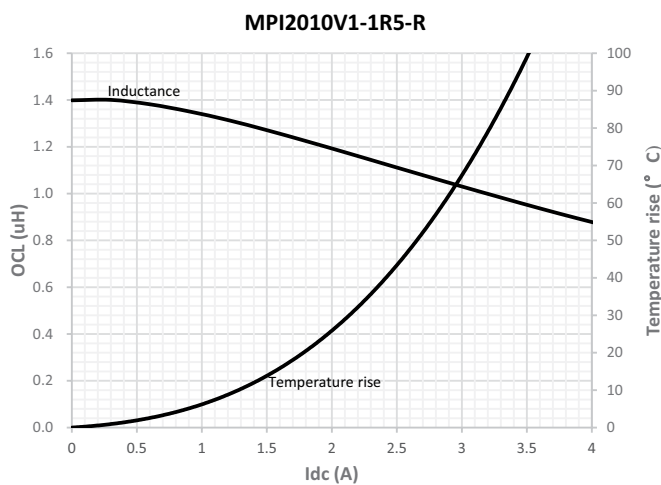
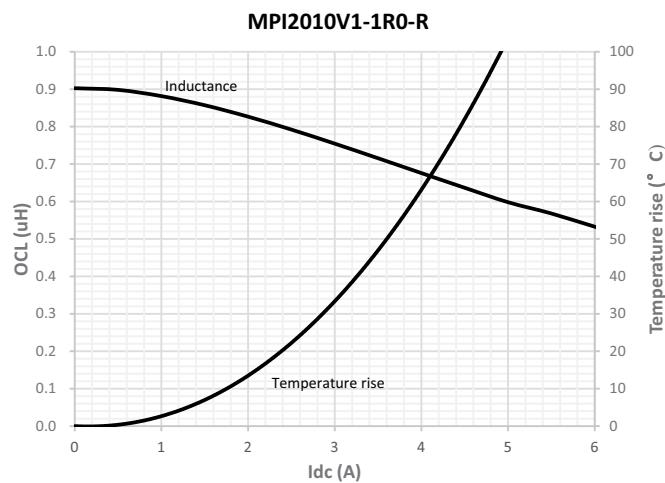
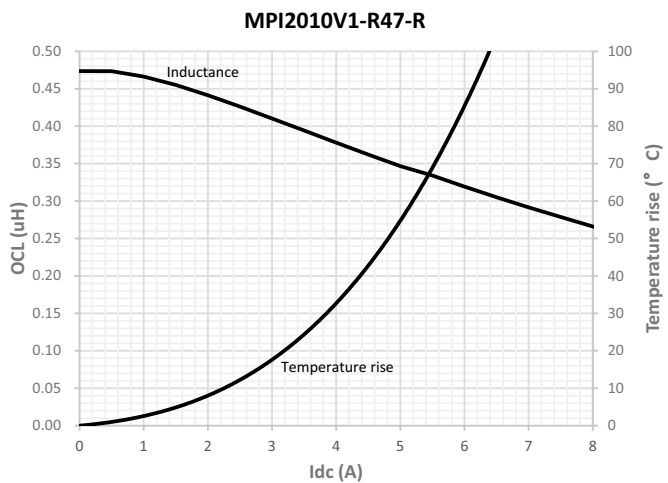
**MPI2010V1-2R2-R**



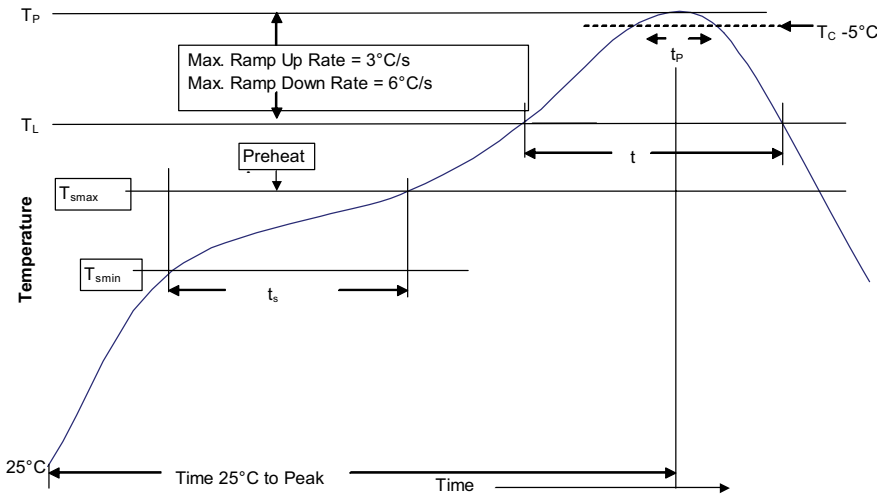
Inductance and impedance vs. frequency



**Inductance and temperature rise vs. current**



**Solder reflow profile**



**Table 1 - Standard SnPb solder (T<sub>C</sub>)**

Package thickness	Volume mm <sup>3</sup> <350	Volume mm <sup>3</sup> ≥350
<2.5 mm)	235 °C	220 °C
≥2.5 mm	220 °C	220 °C

**Table 2 - Lead (Pb) free solder (T<sub>C</sub>)**

Package thickness	Volume mm <sup>3</sup> <350	Volume mm <sup>3</sup> 350 - 2000	Volume mm <sup>3</sup> >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 <sub>Smin</sub> )	100 °C	150 °C
• Temperature max. (T <sub>Smax</sub> )	150 °C	200 °C
• Time (T <sub>Smin</sub> to T <sub>Smax</sub> ) (t <sub>s</sub> )	60-120 seconds	60-120 seconds
Average ramp up rate T <sub>Smax</sub> to T <sub>P</sub>	3 °C/ second max.	3 °C/ second max.
Liquidous temperature (T <sub>L</sub> )	183 °C	217 °C
Time at liquidous (t <sub>L</sub> )	60-150 seconds	60-150 seconds
Peak package body temperature (T <sub>P</sub> )*	Table 1	Table 2
Time (t <sub>P</sub> )** within 5 °C of the specified classification temperature (T <sub>C</sub> )	20 seconds**	30 seconds**
Average ramp-down rate (T <sub>P</sub> to T <sub>Smax</sub> )	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<sub>P</sub>) is defined as a supplier minimum and a user maximum.

\*\* Tolerance for time at peak profile temperature (t<sub>P</sub>) is defined as a supplier minimum and a user maximum.

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 Printed in USA  
 Publication No. 10938 BU-MC19068  
 July 2019

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