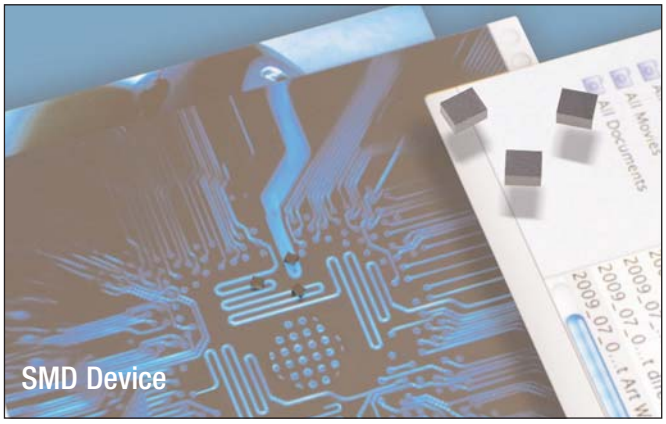
COILTRONICS®

High Frequency, High Current Miniature Power Inductors

MPI4040 Series



Description

- Halogen free
- 125°C maximum total temperature operation
- 4.7x4.31x1.2, 1.5mm maximum surface mount package
- Magnetically shielded
- Handles high transient inrush current spikes
- Inductance range from 0.09µH to 4.7µH
- Current range from 0.78A to 32.0A
- Frequency range 20kHz to 10MHz
- RoHS compliant

Applications

- Handheld/mobile devices
- Portable media players
- GPS/PDAs
- MP3 Players
- Battery operated devices
- Notebook/netbook
- Tablets/smartbooks
- LCD Displays
- LED Drivers
- POL Converters

Environmental Data

- Storage temperature range: -40°C to +125 °C
- Operating temperature range: -40°C to +125°C (Range is application specific)
- Solder reflow temperature: J-STD-020D compliant

Packaging

- Supplied in tape and reel packaging:
  - MPI4040R1= 5500 parts per 13" diameter reel
  - MPI4040R2= 4500 parts per13" diameter reel

Product Specifications

Part Number[5]	OCL[1] ± 15% (µH)	Part Marking Designator	I_{rms}[2] (Amps)	I_{sat}[3] (Amps)	DCR (mΩ) @ 20°C ± 15%	K-factor[4]
R1 Version						
MPI4040R1-R10-R	0.09	A	7.40	32†	8.5	2372
MPI4040R1-R15-R	0.15	B	6.50	26†	11.0	1694
MPI4040R1-R22-R	0.23	C	5.10	21	18.0	1318
MPI4040R1-R33-R	0.33	D	4.08	17	28.0	1130
MPI4040R1-R47-R	0.47	E	3.75	11	35.0	912
MPI4040R1-R68-R	0.68	F	3.10	9.0	51.0	790
R2 Version						
MPI4040R2-R47-R	0.47	G	4.30	13	28.0	912
MPI4040R2-1R0-R	1.0	H	3.80	2.25	38.0	760
MPI4040R2-1R5-R	1.5	I	2.75	1.80	60.0	600
MPI4040R2-2R2-R	2.2	J	2.30	1.50	82.0	506
MPI4040R2-3R3-R	3.3	K	1.96	1.25	113	430
MPI4040R2-4R7-R	4.7	L	1.60	1.10	175	368

1 Open Circuit Inductance (OCL) Test Parameters: 100kHz, 0.10V_{rms}, 0.0Adc

2 I_{rms}: DC current for an approximate temperature rise of 40°C without core loss. Derating is necessary for AC currents. PCB pad layout, trace thickness and width, air-flow and proximity of other heat generating components will affect the temperature rise. It is recommended the part temperature not exceed 125°C under worst case operating conditions verified in the end use application.

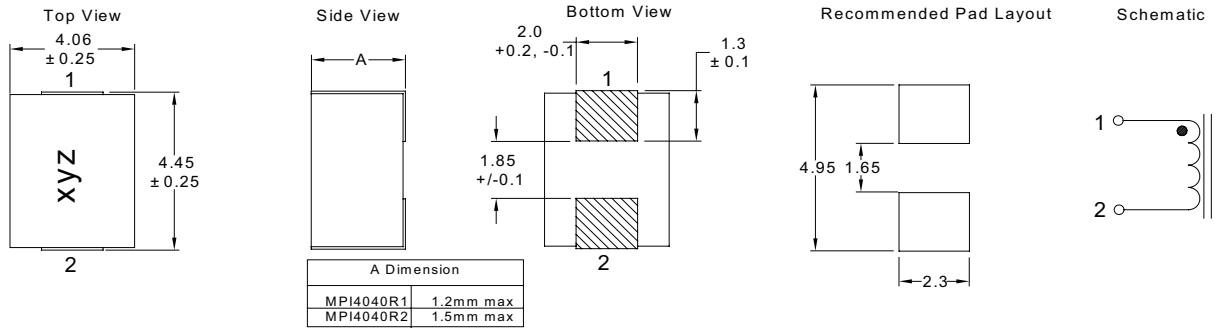
3 I_{sat}: Peak current for approximately 30% rolloff at +25°C.

4 K-factor: Used to determine B_{p-p} for core loss (see graph). $B_{p-p} = K * L * \Delta I$. B_{p-p} : (Gauss), K: (K-factor from table), L: (inductance in µH), ΔI (peak-to-peak ripple current in amps).

5 Part Number Definition: MPI4040RX-xxx-R
- MPI4040Rx = Product code and size
- xxx= Inductance value in µH, R = decimal point. If no "R" is present, then 3rd digit equals number of zeros.
- "-R" suffix = RoHS compliant

† Transient pulse not to exceed 1 millisecond.

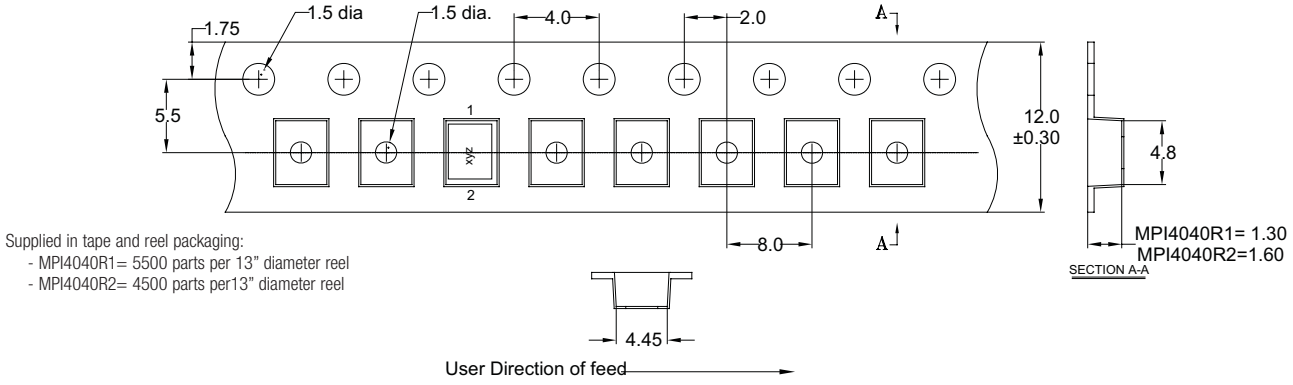
Dimensions - mm



A Dimension	
MPI4040R1	1.2mm max
MPI4040R2	1.5mm max

Part marking: x= Inductance and size per part marking designator table, y= Year of manufacture (i.e. A=2009, B=2010 etc.), z= Revision Level
Soldering surfaces to be coplanar within 0.1016 millimeters

Packaging Information - mm



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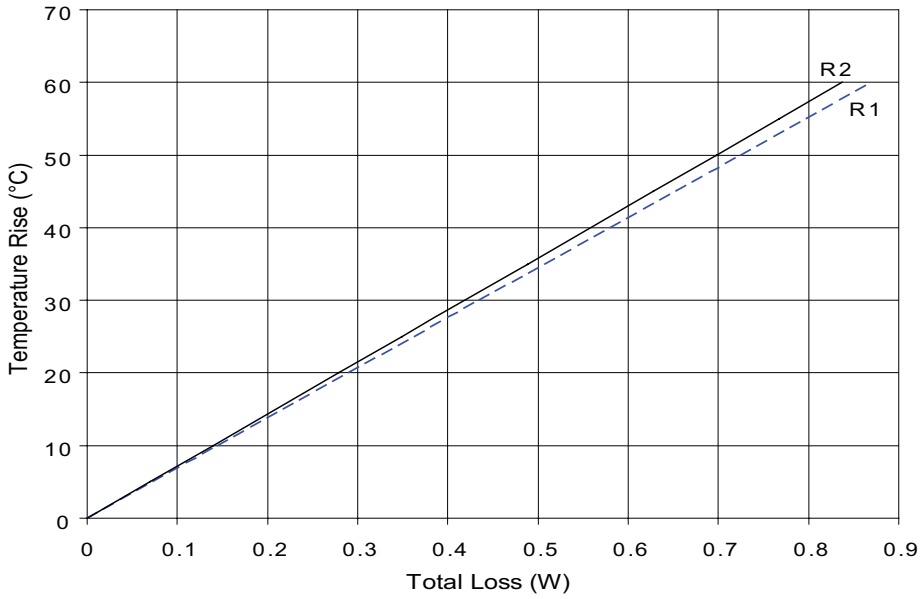
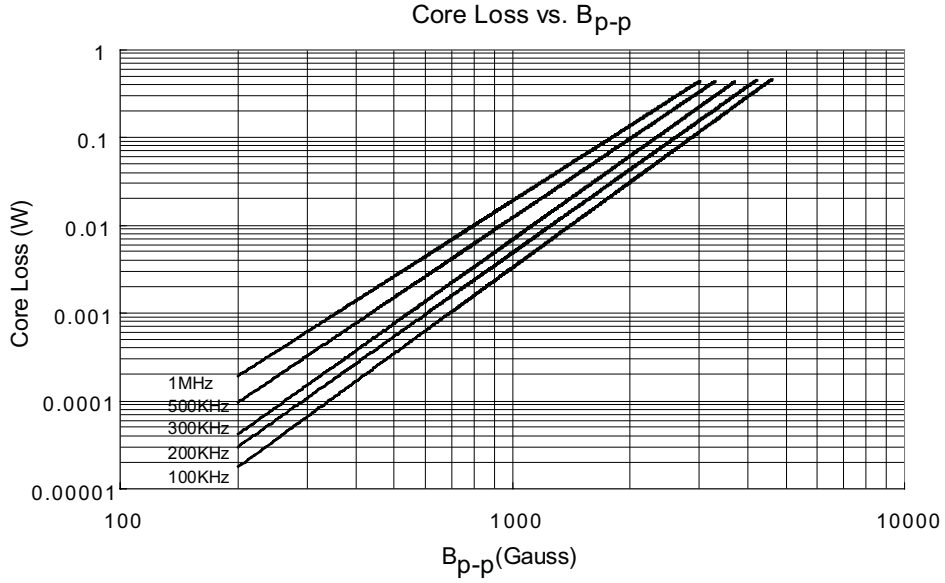
Temperature Rise vs.Total Loss

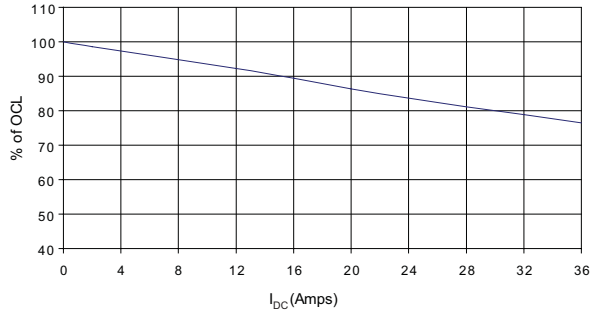


Core Loss

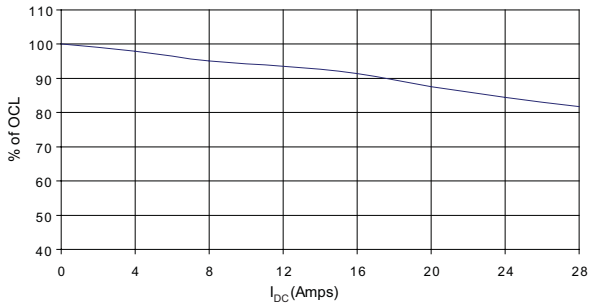


Inductance Characteristics - % of OCL vs. I_{DC}

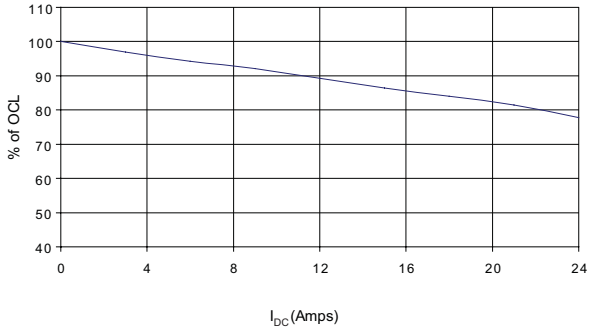
MPI4040R1-R10-R



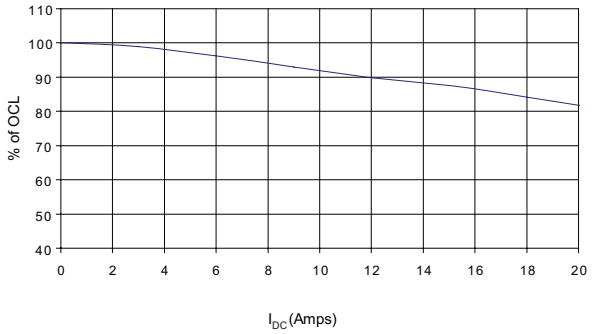
MPI4040R1-R15-R



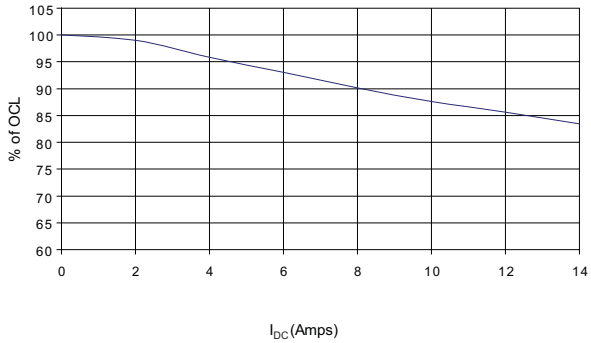
MPI4040R1-R22-R



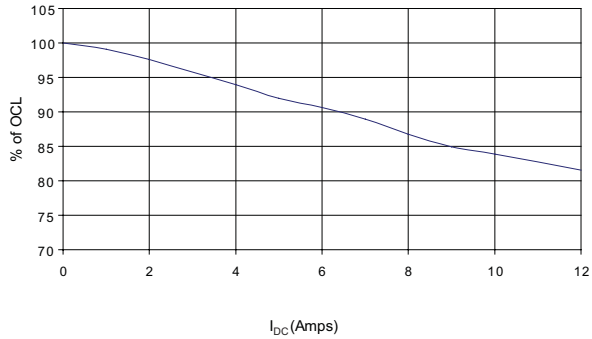
MPI4040R1-R33-R



MPI4040R1-R47-R

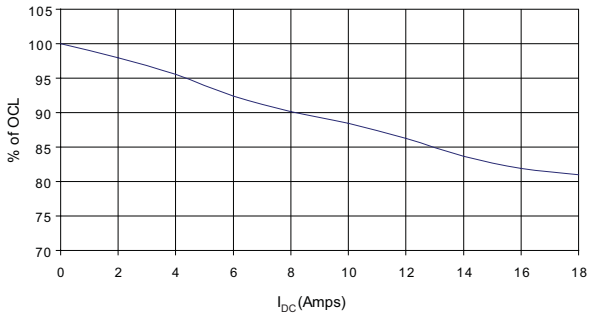


MPI4040R1-R68-R

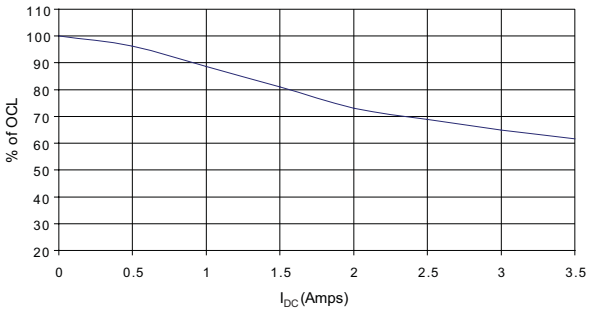


Inductance Characteristics - % of OCL vs. I_{DC}

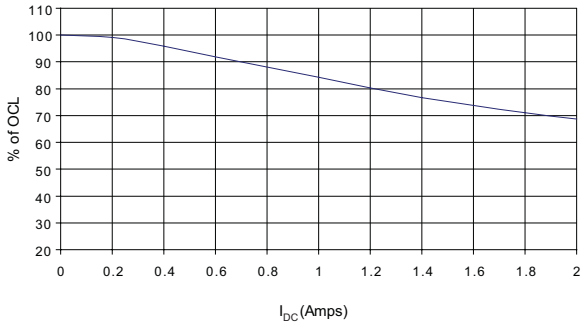
MPI4040R2-R47-R



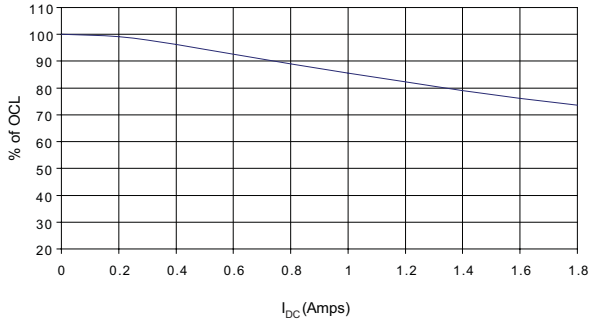
MPI4040R2-1R0-R



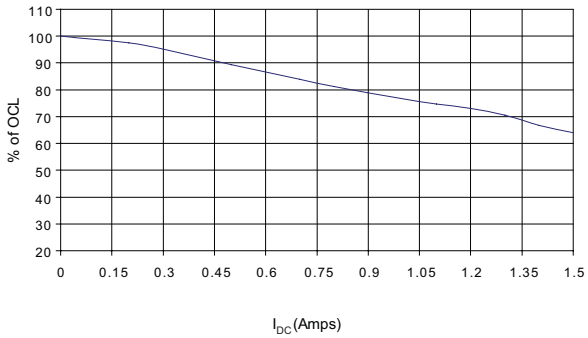
MPI4040R2-1R5-R



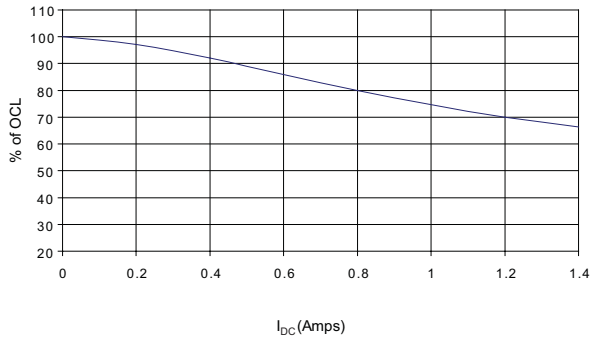
MPI4040R2-2R2-R



MPI4040R2-3R3-R



MPI4040R2-4R7-R



Solder Reflow Profile

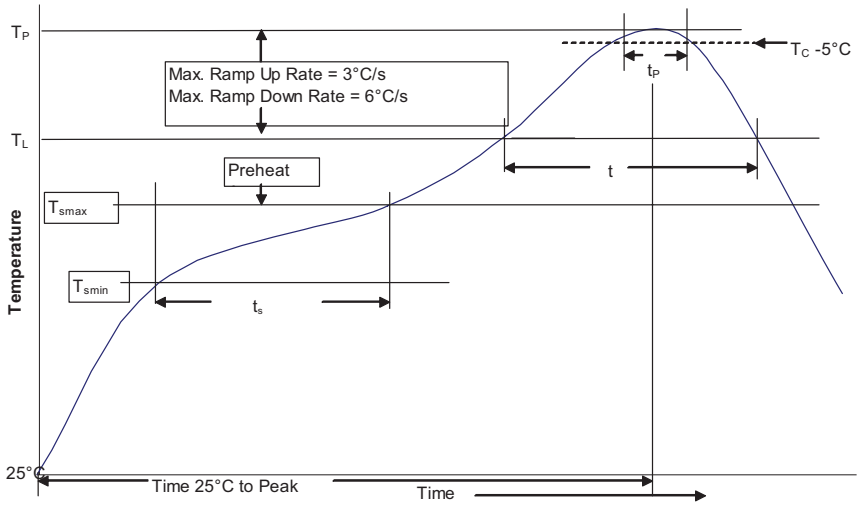


Table 1 - Standard SnPb Solder (T_C)

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 mm³ <350	Volume mm³ 350 - 2000	Volume mm³ >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-020D

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.

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