

# MPI5451

## High current, low profile power inductors



### Applications

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

### Environmental data

- Storage temperature range (Component): -40°C to +125°C
- Operating temperature range: -40°C to +125°C (ambient + self-temperature rise)
- Solder reflow temperature: J-STD-020D compliant

### Product description

- Halogen free, lead free, RoHS compliant
- 125°C maximum total temperature operation
- 5.74 x 5.43 footprint surface mount package with either 1.2 or 2.0mm heights
- Magnetically shielded, low EMI
- Rugged construction
- Inductance range from 0.33µH to 15µH
- Current range from 1.1 to 11.5 amps

### Packaging

- Supplied in tape and reel packaging on a 13" diameter reel



Discontinued, Effective February 1, 2016 or until inventory is depleted. No recommendation available replacement available

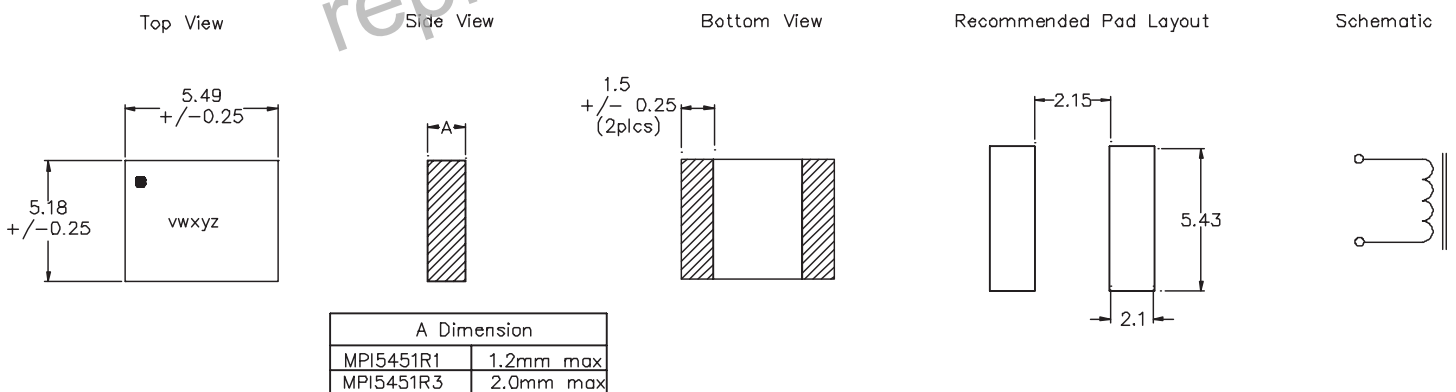
Product specifications

Part Number <sup>5</sup>	OCL <sup>1</sup> ( $\mu\text{H}$ ) $\pm 20\%$	$I_{\text{rms}}^2$ (Amps)	$I_{\text{sat}}^3$ (Amps)	DCR ( $\text{m}\Omega$ ) @ 25°C $\pm 20\%$	K-Factor <sup>4</sup>
R1 - 1.2mm height					
MPI5451R1-R33-R	0.33	6.5	11.5	13	1244
MPI5451R1-R47-R	0.47	6.1	10.9	18	995
MPI5451R1-1R0-R	1.0	4.2	7.2	30	622
MPI5451R1-1R5-R	1.5	3.4	6.1	48	498
MPI5451R1-2R2-R	2.2 $\pm 15\%$	2.6	4.8	70	452
MPI5451R1-3R3-R	3.3 $\pm 15\%$	2.3	3.8	95	355
MPI5451R1-4R7-R	4.7 $\pm 15\%$	2.1	3.5	120	293
MPI5451R1-5R6-R	5.6 $\pm 15\%$	1.9	3.1	145	249
MPI5451R1-6R8-R	6.8 $\pm 15\%$	1.7	2.8	175	237
MPI5451R1-100-R	10.0 $\pm 15\%$	1.3	2.5	290	199
MPI5451R1-150-R	15.0 $\pm 15\%$	1.1	2.2	400	155
R3 - 2.0mm height					
MPI5451R3-R47-R	0.47	6.0	9.0	8.8	1244
MPI5451R3-R68-R	0.68	5.9	8.0	9.5	995
MPI5451R3-1R0-R	1.0	5.1	6.6	14	711
MPI5451R3-1R5-R	1.5	5.0	5.8	16	553
MPI5451R3-2R2-R	2.2	4.1	5.0	24	452
MPI5451R3-3R3-R	3.3	3.7	4.2	33	383
MPI5451R3-4R7-R	4.7	3.0	3.8	50	293
MPI5451R3-6R8-R	6.8	2.6	3.0	70	249
MPI5451R3-100-R	10.0	2.1	2.4	110	207

- Open Circuit Inductance (OCL) Test Parameters: 100kHz, 0.1V<sub>rms</sub>, 0.0Adc, 25°C
- $I_{\text{rms}}$ : 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.
- $I_{\text{sat}}$ : Peak current for approximately 20% rolloff at +25°C

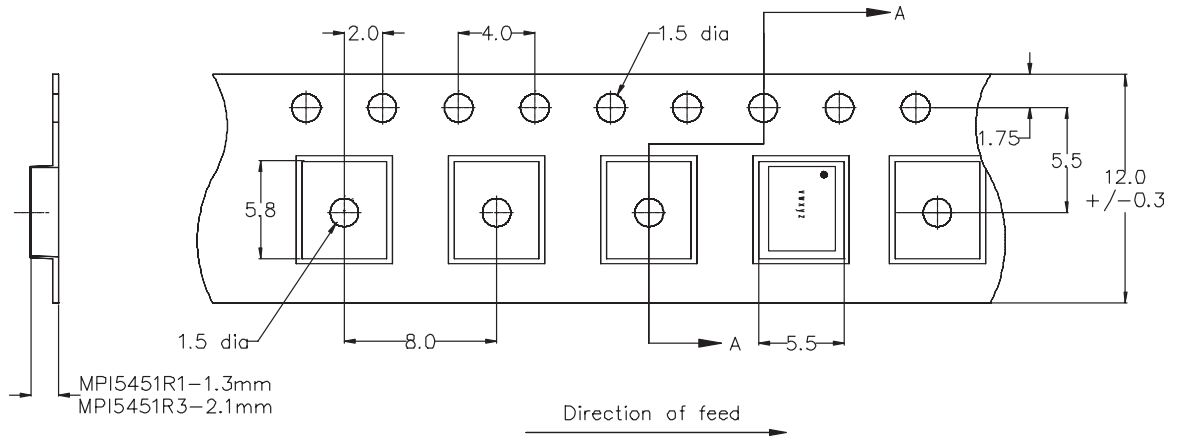
- K-factor: Used to determine  $B_{\text{pp}}$  for core loss (see graph).  $B_{\text{pp}} = K * L * \Delta I$ .  $B_{\text{pp}}$ : (Gauss), K: (K-factor from table), L: (Inductance in  $\mu\text{H}$ ),  $\Delta I$  (Peak to peak ripple current in Amps).
- Part Number Definition: MPI5451Rx-yyy-R  
 - MPI5451Rx = Product code and size  
 - yyy= Inductance value in  $\mu\text{H}$ , R = decimal point, if no R is present then third character = number of zeros  
 - "R" suffix = RoHS compliant

Dimensions - mm



Part Marking : wxyz  
 v = height: 1 = R1 (1.2mm), 3 = R3 (2.0mm)  
 w = inductance value per the "Part Marking Designator" letter code in table above  
 x = Bi-weekly date code  
 y = Last digit of year manufactured  
 z = Revision level

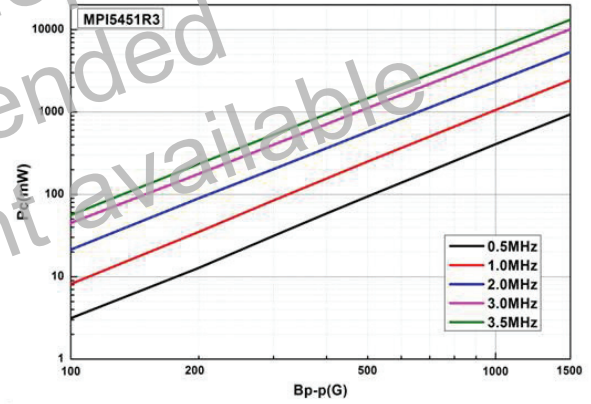
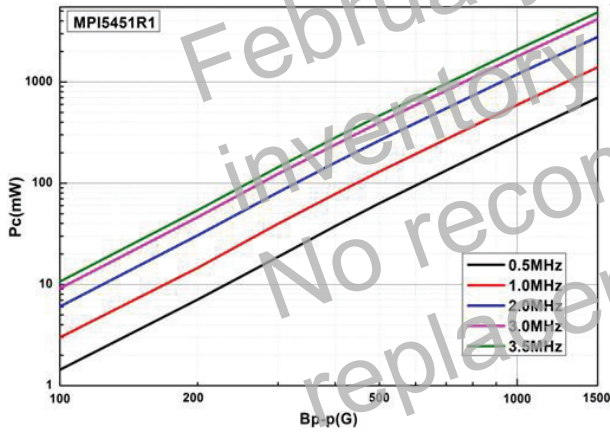
Packaging information - mm



Section A-A

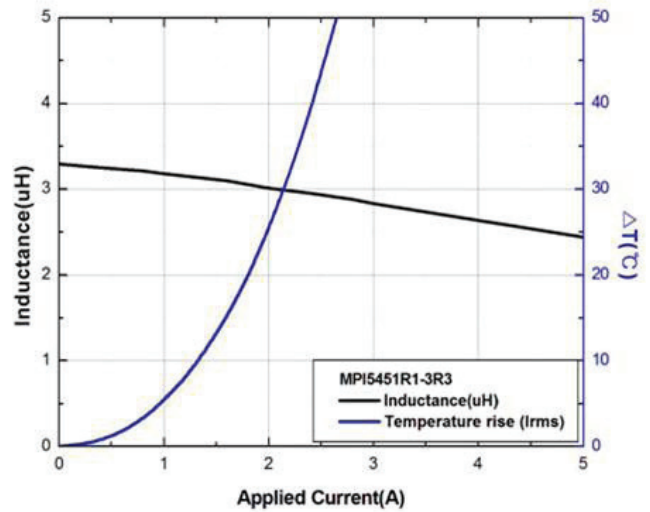
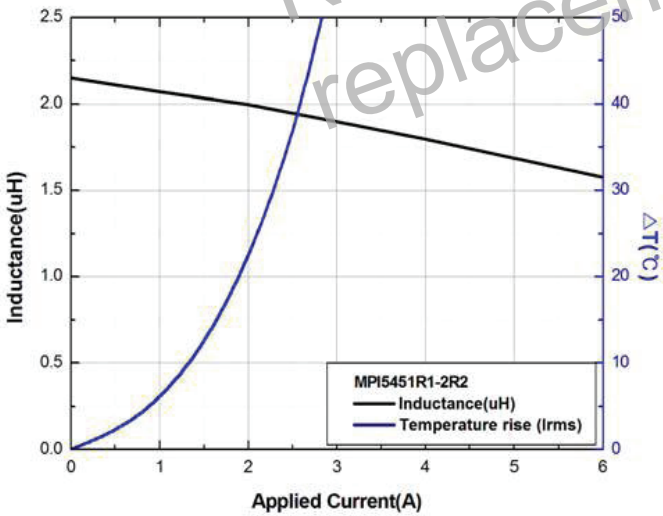
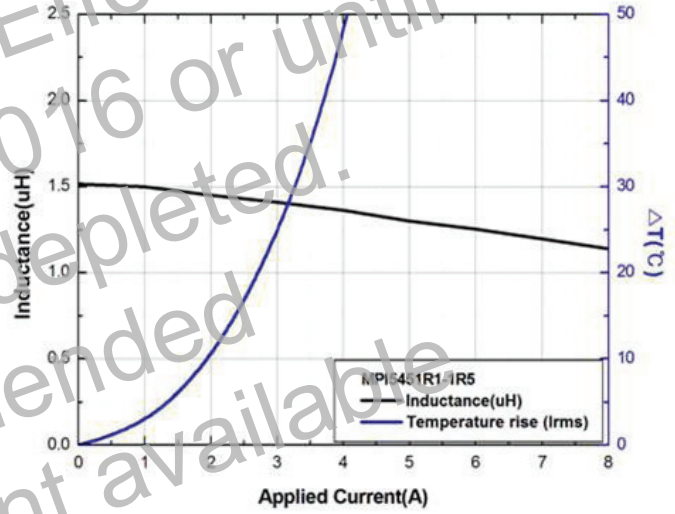
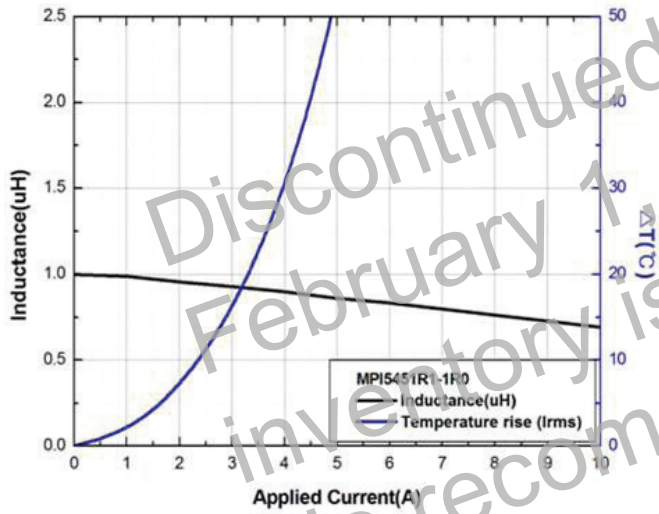
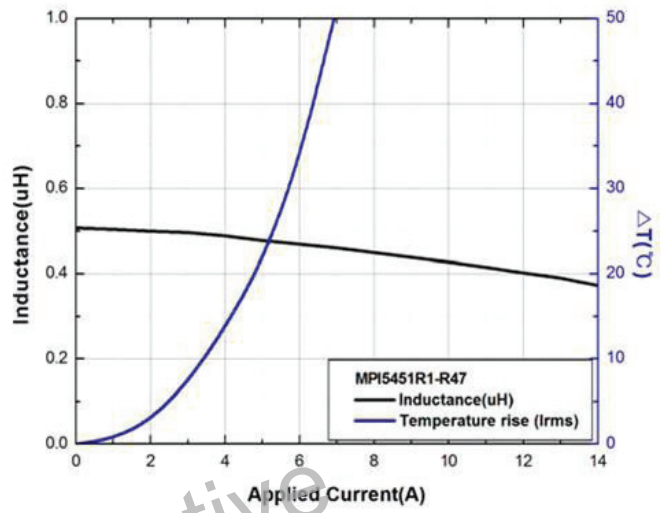
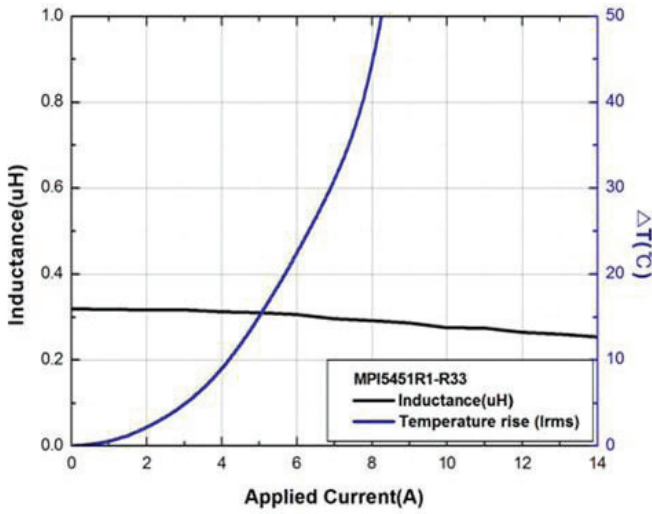
Supplied in tape and reel packaging.  
MPI5451R1 4000 parts per 13" diameter reel  
MPI5451R3 3000 parts per 13" diameter reel

Core loss

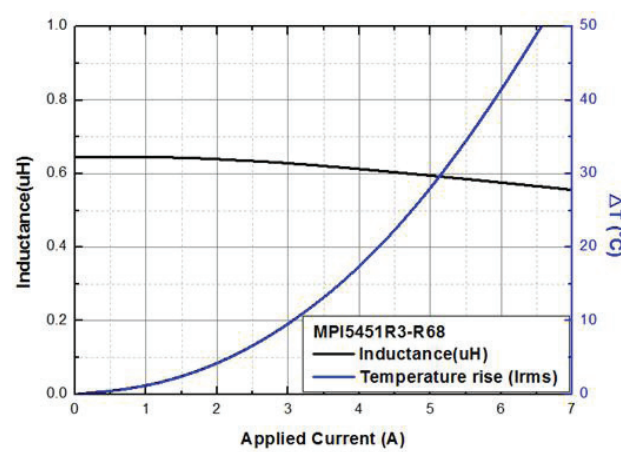
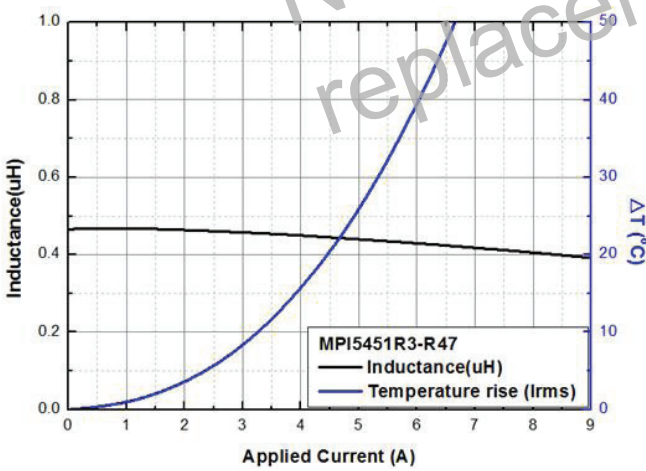
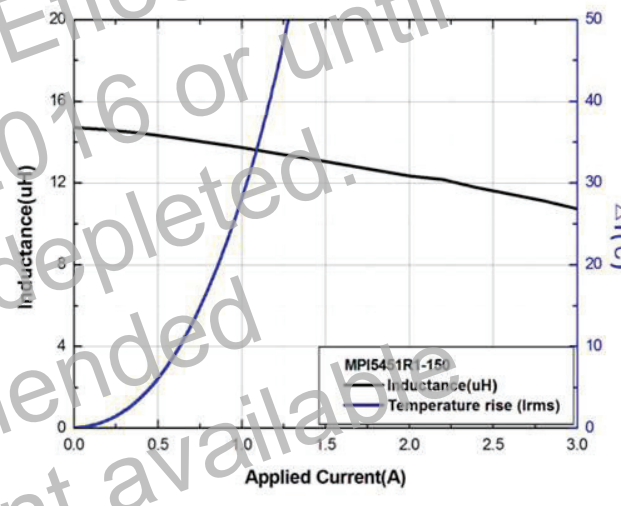
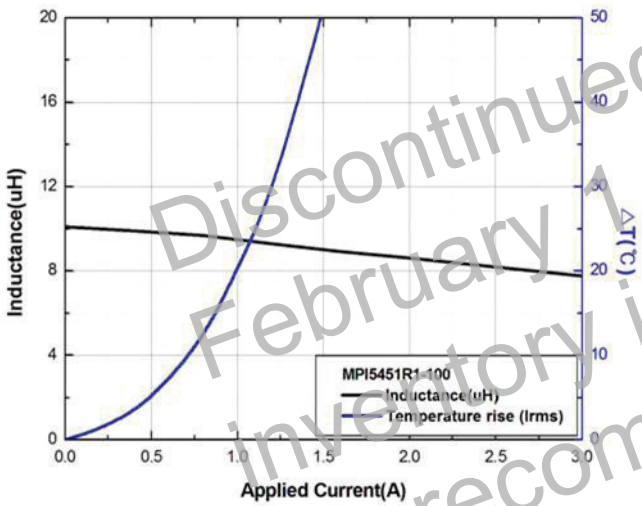
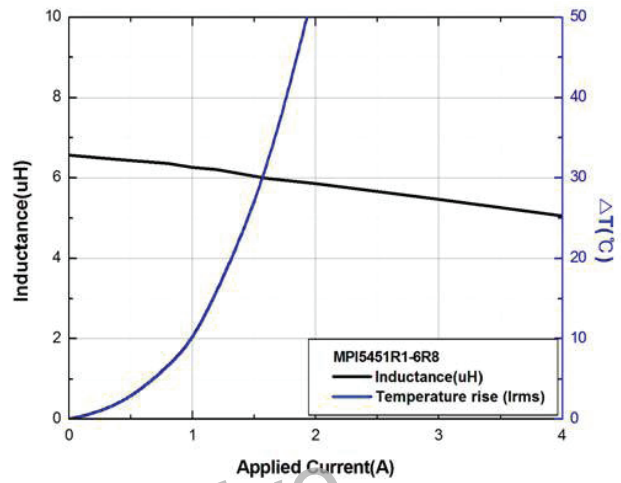
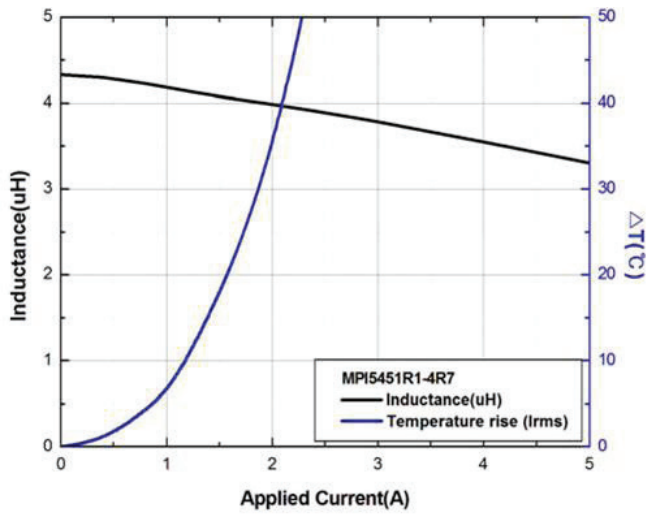


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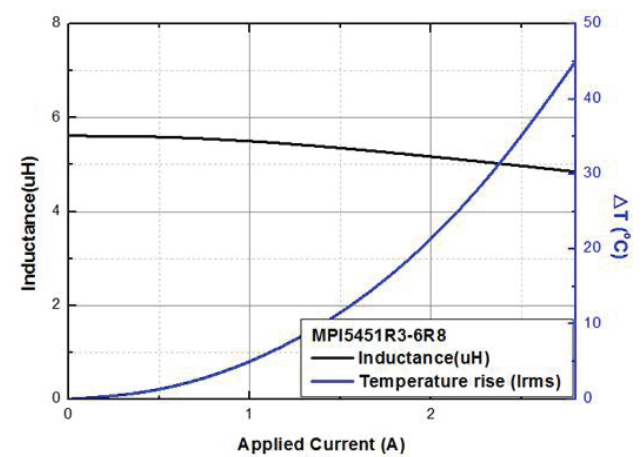
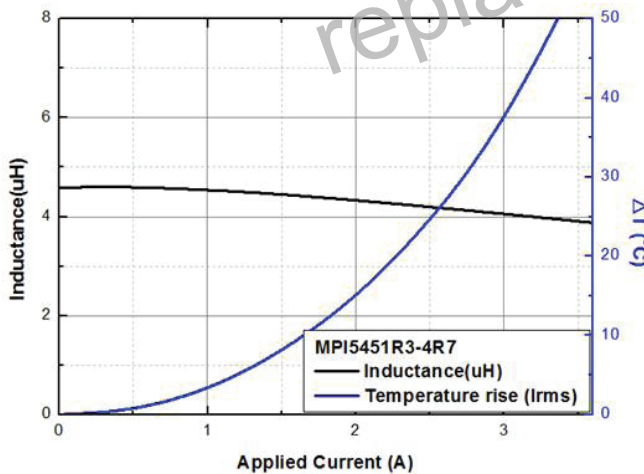
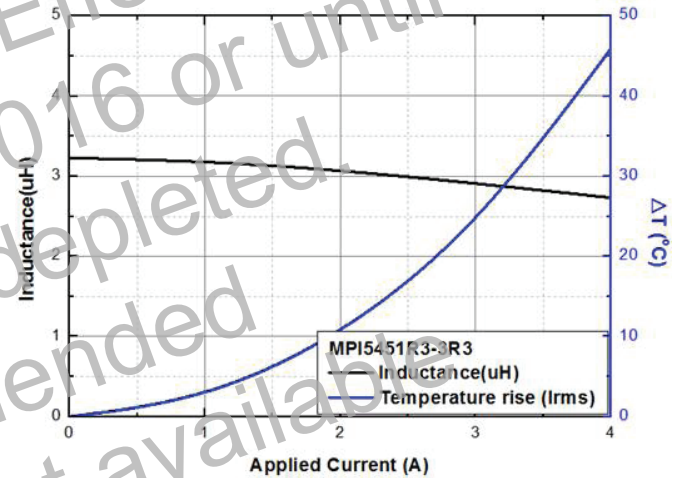
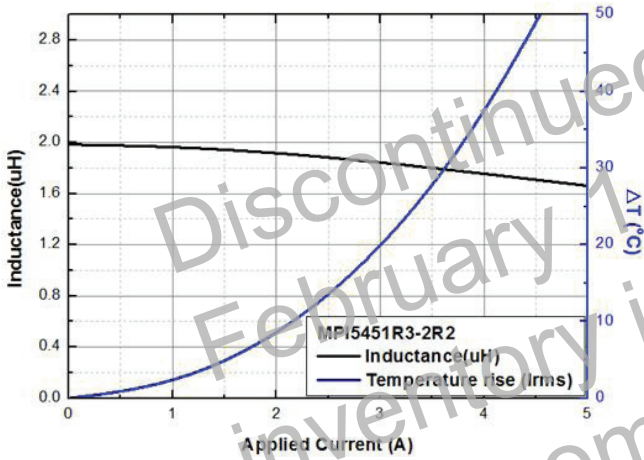
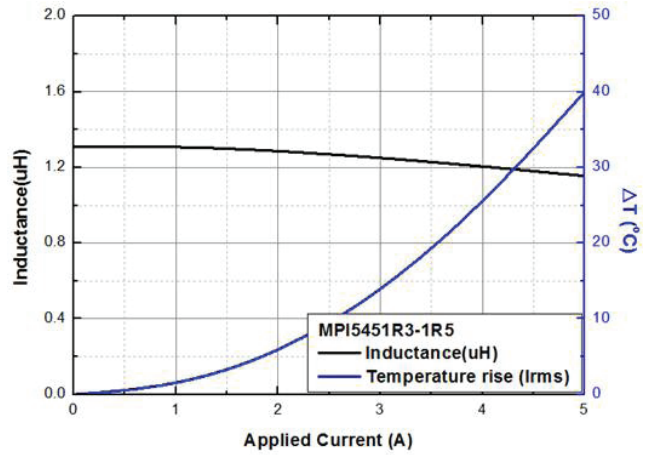
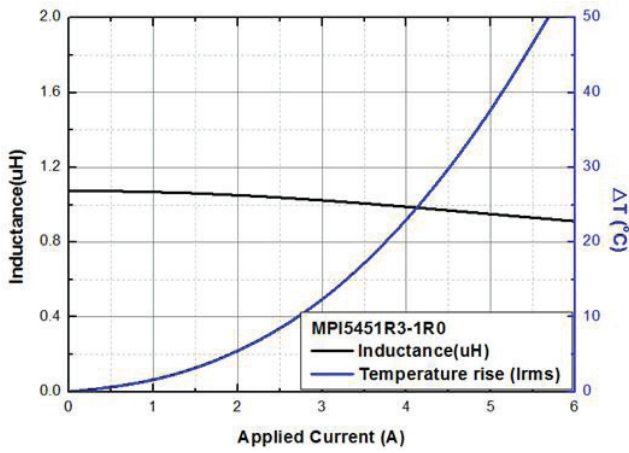
Inductance characteristics / temperature rise



Inductance characteristics / temperature rise

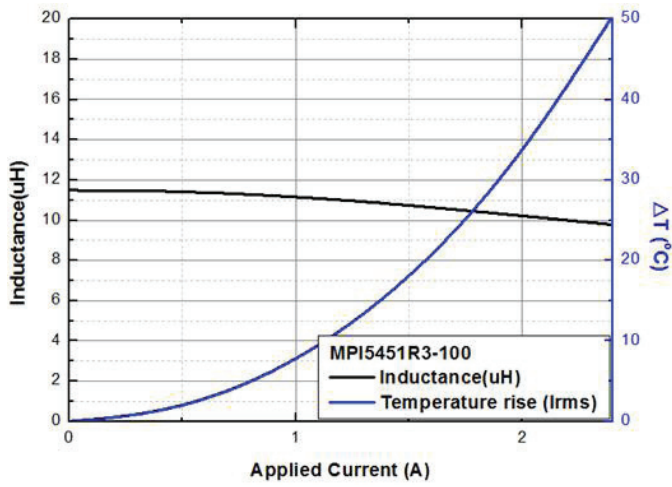


Inductance characteristics / temperature rise



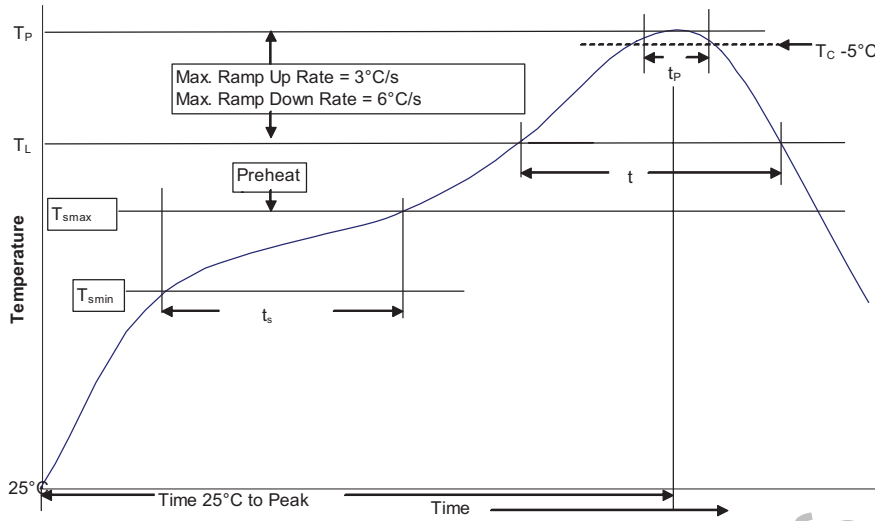
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No recommendation  
replacement available

Inductance characteristics / temperature rise



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**Solder reflow profile**



**Table 1 - Standard SnPb Solder ( $T_c$ )**

Package Thickness	Volume $\leq 350$ mm <sup>3</sup>	Volume $\geq 350$ mm <sup>3</sup>
<2.5mm	235°C	220°C
$\geq 2.5$ mm	220°C	220°C

**Table 2 - Lead (Pb) Free Solder ( $T_c$ )**

Package Thickness	Volume $\leq 350$ mm <sup>3</sup>	Volume 350 - 2000 mm <sup>3</sup>	Volume $>2000$ mm <sup>3</sup>
<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 ( $T_L$ )	183°C	217°C
Time at liquidous ( $t_L$ )	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**
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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