MPI5451

High current, low profile power inductors

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

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

Packaging

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

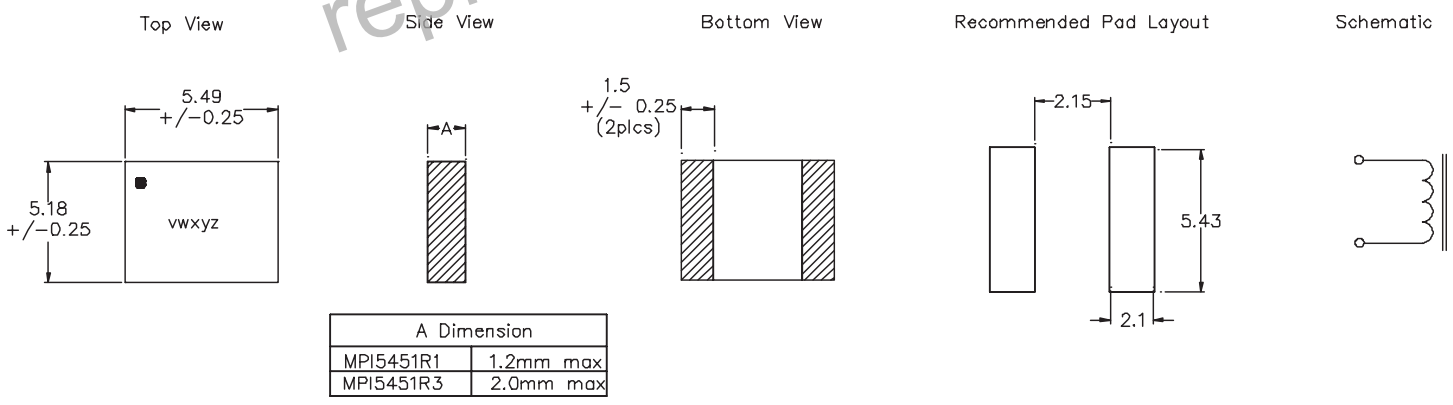
Powering Business Worldwide

Product specifications

Part Number[5]	OCL[1] (µH) ± 20%	I_{rms}[2] (Amps)	I_{sat}[3] (Amps)	DCR (mΩ) @ 25°C ± 20%	K-Factor[4]
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 ± 15%	2.6	4.8	70	452
MPI5451R1-3R3-R	3.3 ± 15%	2.3	3.8	95	355
MPI5451R1-4R7-R	4.7 ± 15%	2.1	3.5	120	293
MPI5451R1-5R6-R	5.6 ± 15%	1.9	3.1	145	249
MPI5451R1-6R8-R	6.8 ± 15%	1.7	2.8	175	237
MPI5451R1-100-R	10.0 ± 15%	1.3	2.5	290	199
MPI5451R1-150-R	15.0 ± 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	5.3	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

1. Open Circuit Inductance (OCL) Test Parameters: 100kHz, 0.1V_{rms}, 0.0Adc, 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 20% rolloff at +25°C
4. K-factor: Used to determine B_{p-p} for core loss (see graph). B_{p-p} = K * L * ΔI. 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: MPI5451Rx-yyy-R
   - MPI5451Rx = Product code and size
   - yyy= Inductance value in uH, R = decimal point, if no R is present then third character = number of zeros
   - "-R" suffix = RoHS compliant

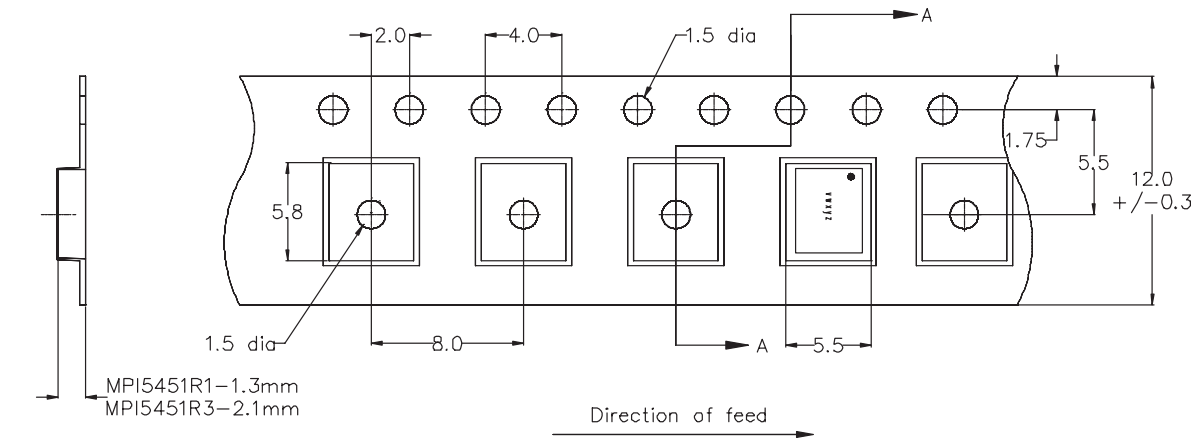
Dimensions - mm



A Dimension	
MPI5451R1	1.2mm max
MPI5451R3	2.0mm max

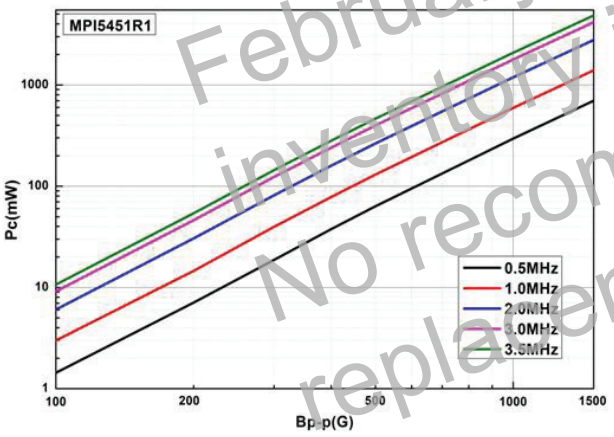
Part Marking : vwxyz
v = height: 1 = R1 (1.2mm), 3 = R3 (2.0mm)
w = inductance value per the "Part Marking Designator" letter code in table above
x = Bi-weekly date code
y = Last digit of year manufactured
z = Revision level

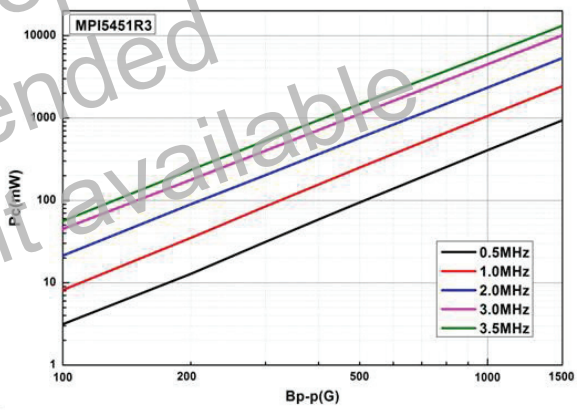
Packaging information - mm



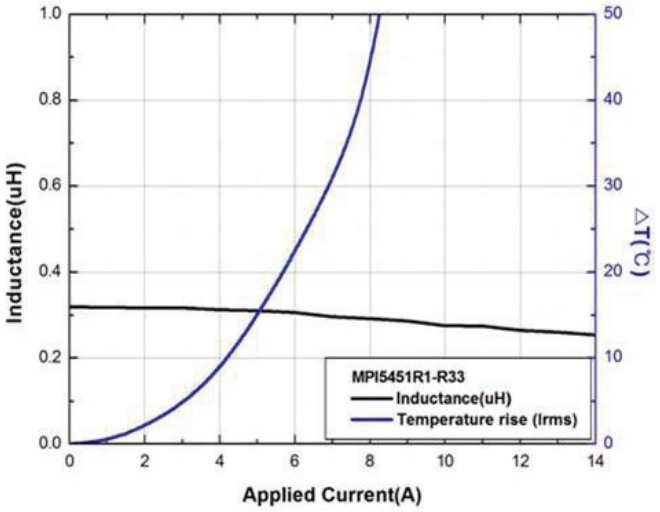
Supplied in tape and reel packaging,
MPI5451R1 4000 parts per 13” diameter reel
MPI5451R3 3000 parts per 13” diameter reel

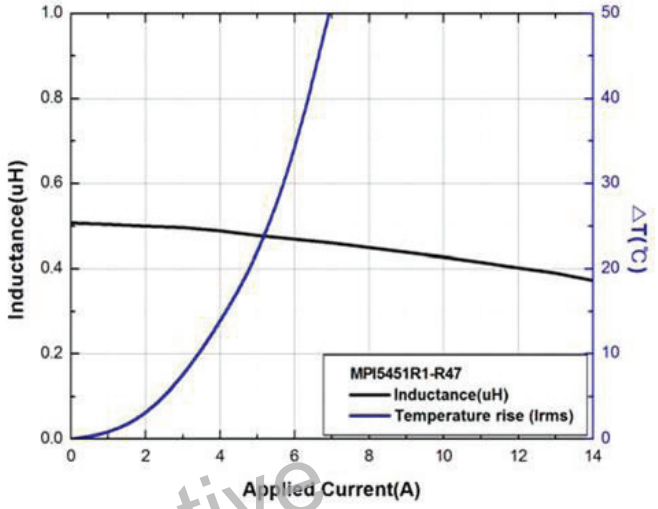
Core loss

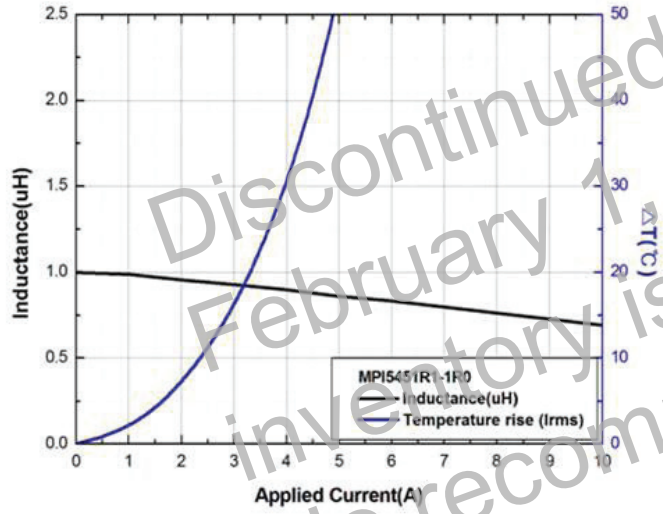


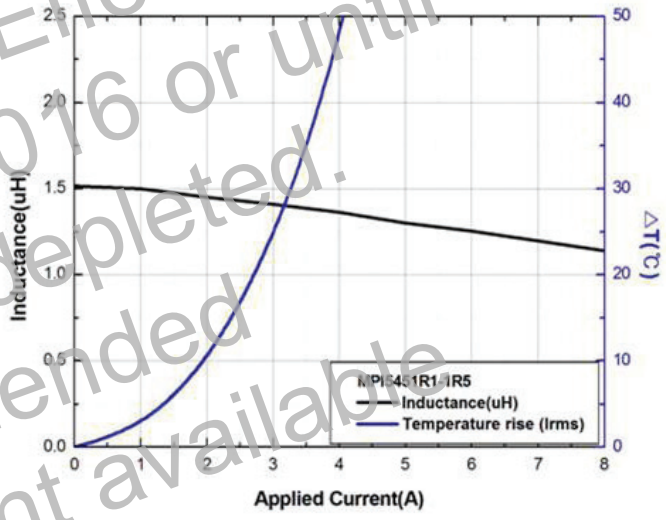


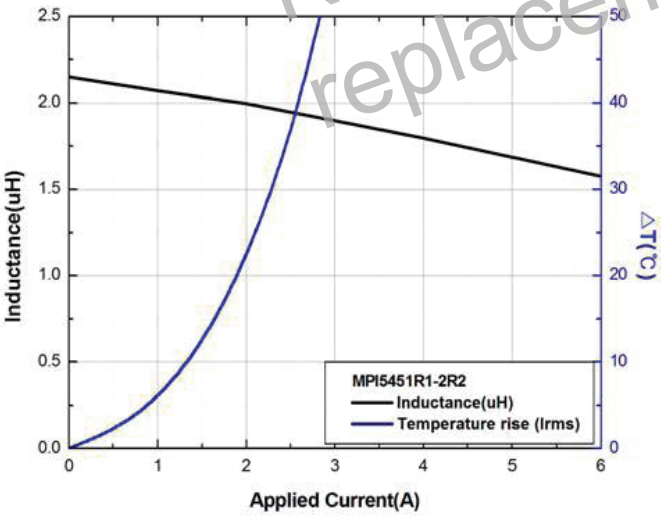
Inductance characteristics / temperature rise

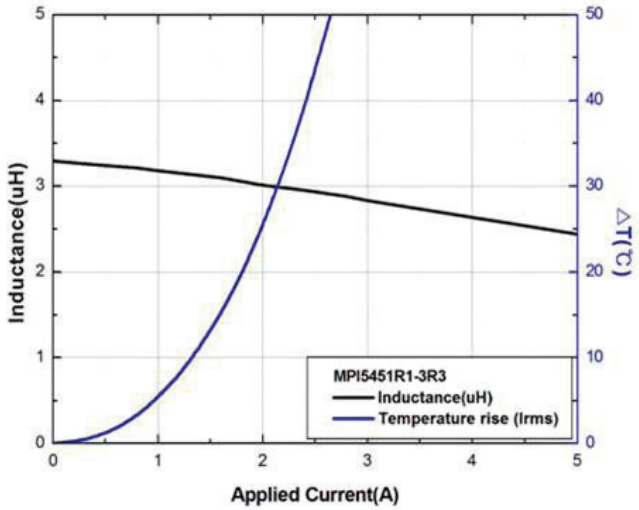












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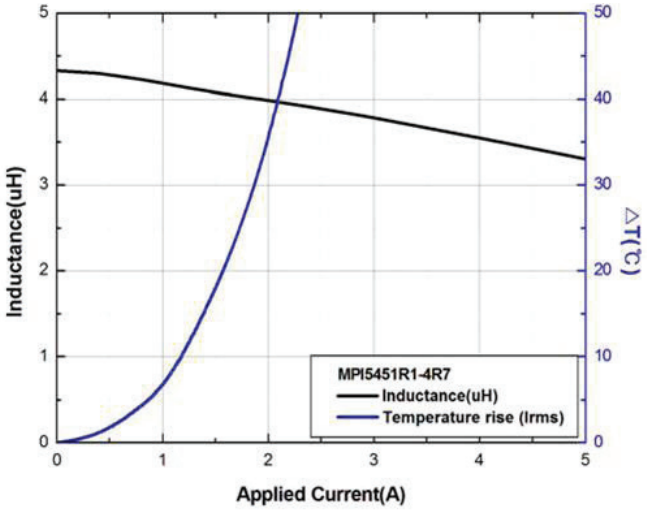
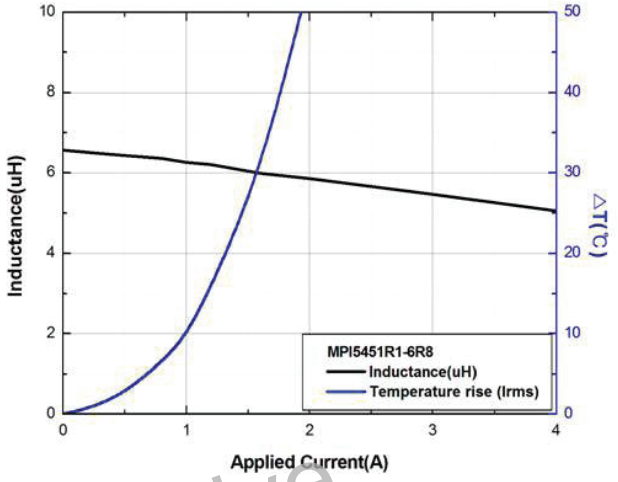
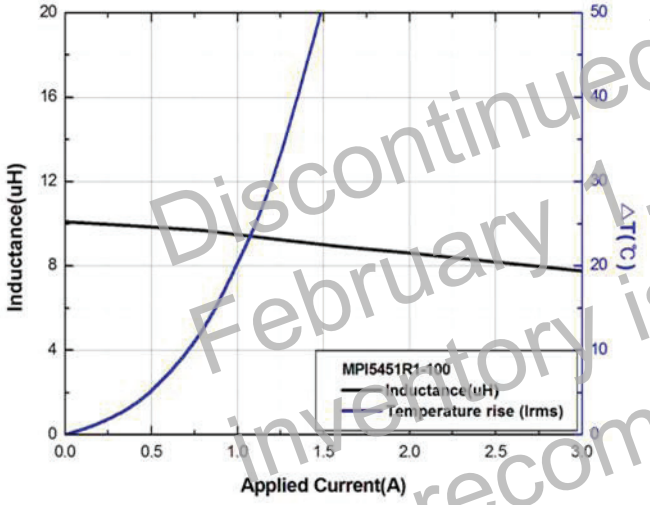
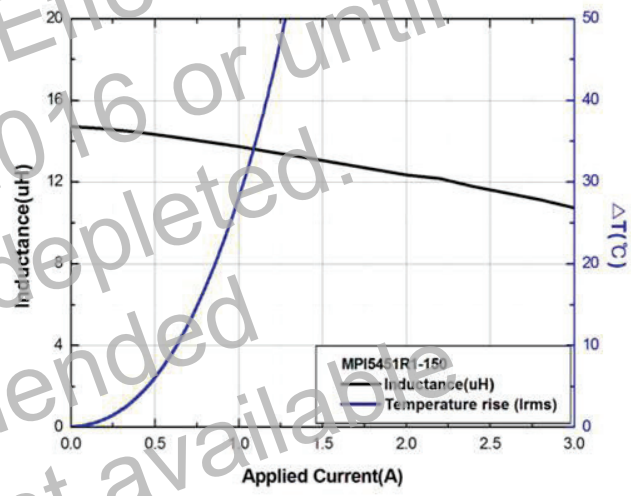
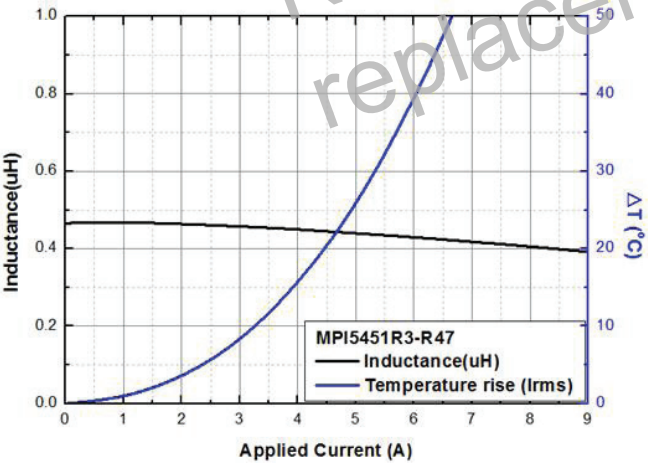
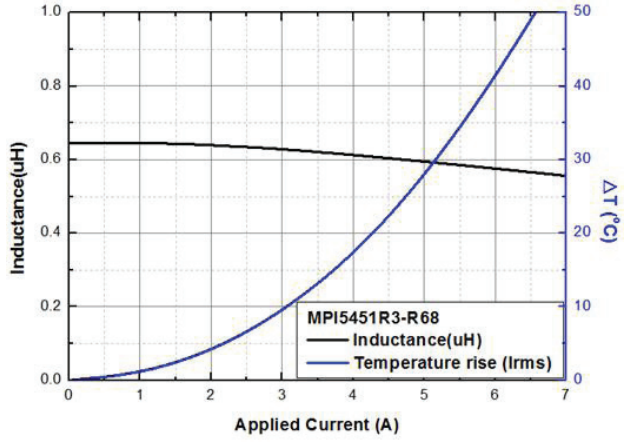




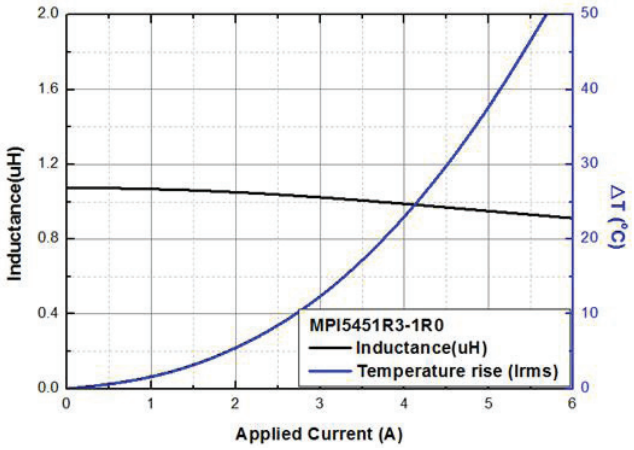


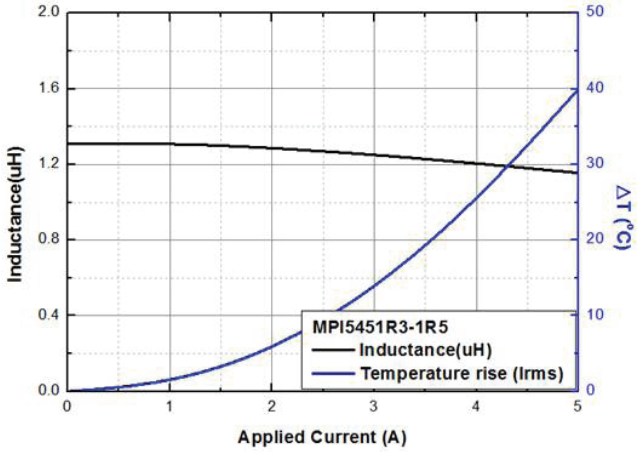


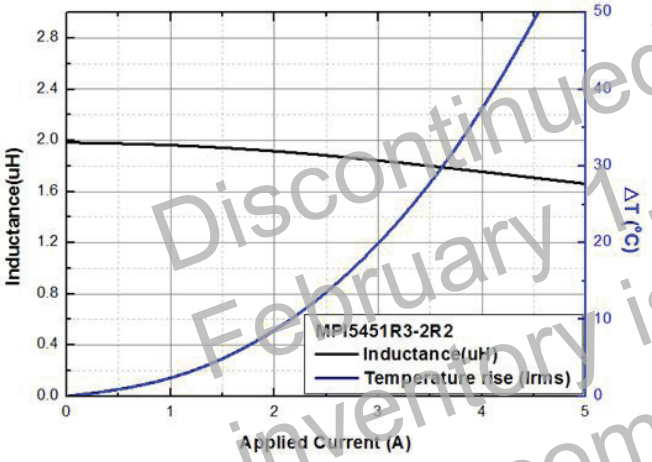


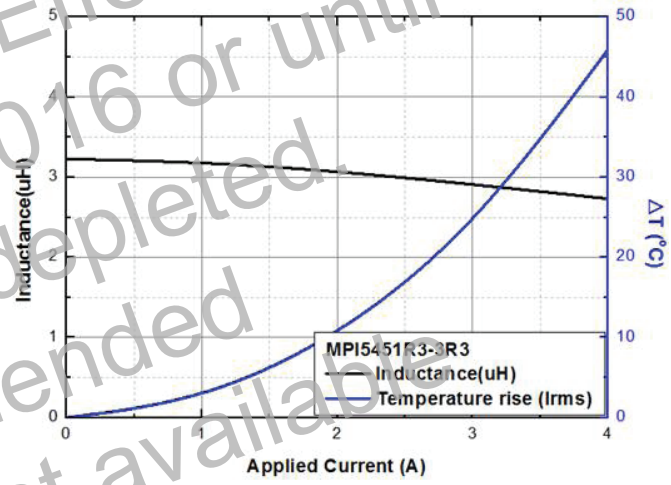


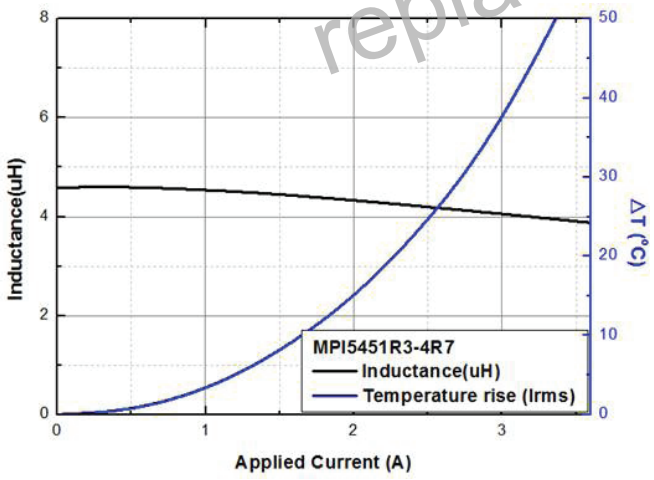
Inductance characteristics / temperature rise

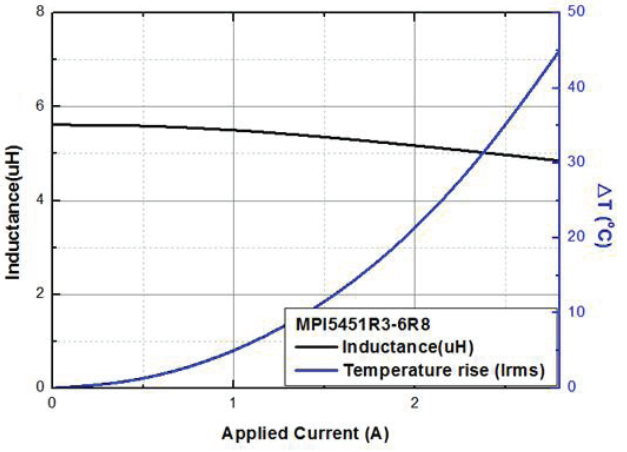












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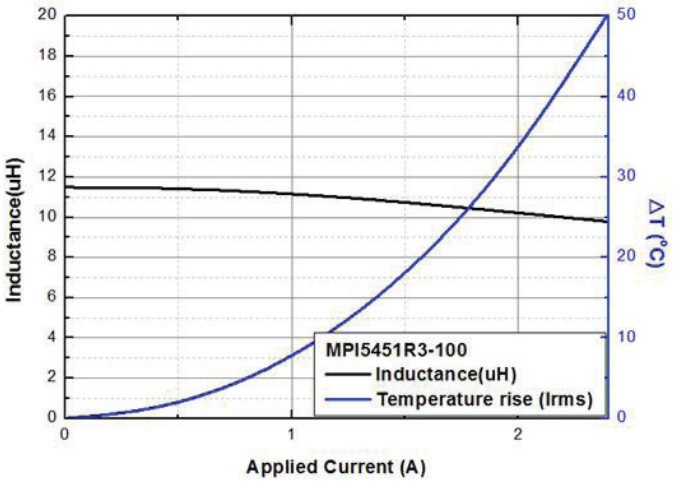

Solder reflow profile

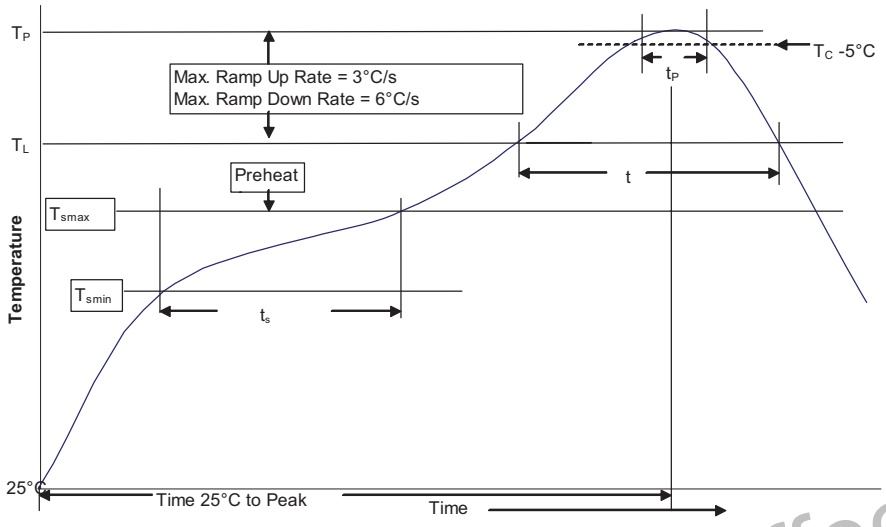

Table 1 - Standard SnPb Solder (T_C)

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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