

TL1011V2

Trans-inductor regulator power inductor



Product features

- Operating frequency range: up to 3 MHz
- Ferrite core material
- 9.6 mm x 6.4 mm footprint surface mount package in an 11 mm height
- Inductance range: 70 nH to 170 nH
- Current range: 67 A to 163 A
- 100 Vdc insulation between windings
- Weight: 2.91 g typical
- Moisture sensitivity level (MSL): 1

Applications

- Multi-phase and Vcore regulators
- Voltage regulator modules (VRMs) and high power density VRMs
 - Server and desktop
 - Central processing unit (CPU)
 - Graphics processing unit (GPU)
 - Application specific integrated circuit (ASIC)
- Data networking and storage systems
- Graphics cards and battery power systems
- Point-of-Load modules

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 ⁹	L _{pri} ¹ (nH) ±10% (3-4)	L _{sec} ¹ (nH) ±10% (1-2)	FLL ² (nH) Minimum (1-2)	I _{ms} ³ (A)	I _{ms1} ⁴ (A)	I _{ms2} ⁵ (A)	I _{ms3} ⁶ (A)	K-factor ⁷	DCR _{pri} (mΩ) @ +20 °C ±10%	DCR _{sec} (mΩ) @ +20 °C ±10%	Kps ⁸ Typical
TL1011V2-R070-R	70	70	50	70	163	139	130	340	0.6	0.15	0.93
TL1011V2-R080-R	80	80	57	70	143	122	114	340	0.6	0.15	0.94
TL1011V2-R100-R	100	100	72	70	114	97	91	340	0.6	0.15	0.95
TL1011V2-R110-R	110	110	79	70	104	89	83	340	0.6	0.15	0.95
TL1011V2-R120-R	120	120	86	70	95	81	76	340	0.6	0.15	0.95
TL1011V2-R150-R	150	150	108	70	76	65	60	340	0.6	0.15	0.96
TL1011V2-R170-R	170	170	122	70	67	57	53	340	0.6	0.15	0.96

1. Open circuit inductance (OCL) test parameters: 100 kHz, 0.1 V_{rms}, 0.0 Adc, +25 °C

2. Full load inductance (FLL) test parameters: 100 kHz, 0.1 V_{rms}, I_{ms1}, +25 °C

3. I_{ms}: 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.

4. I_{ms1}: Peak current for approximately 20% rolloff @ +25 °C

5. I_{ms2}: Peak current for approximately 20% rolloff @ +100 °C

6. I_{ms3}: Peak current for approximately 20% rolloff @ +125 °C

7. K-factor: Used to determine Bp-p for core loss (see graph). Bp-p = K * L * ΔI * 10⁻³. Bp-p(Gauss), K: (K-factor from table), L: (Inductance in nH), ΔI (Peak to peak ripple current in Amps).

8. Kps: Coupling Coefficient

9. Part number definition: TL1011V2-Rxxx-R

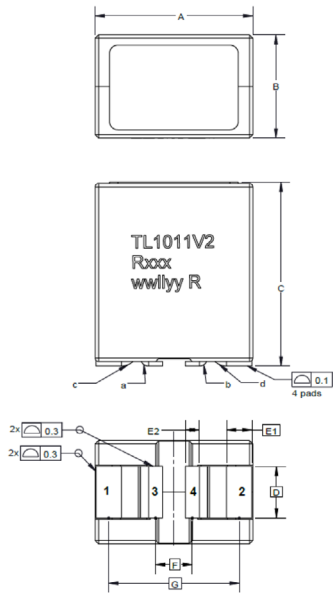
TL1011 = Product code and size

Vx= Version indicator

Rxxx=Inductance value in μH, R=decimal point

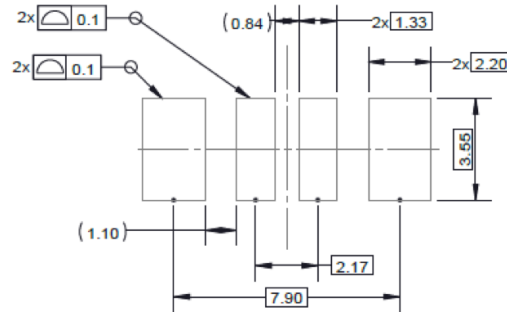
-R suffix = RoHS compliant

Dimensions-mm

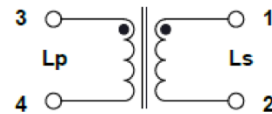


Dimension	TL1011V2-R
A	9.6 maximum
B	6.4 maximum
C	11.0 maximum
D	3.05
E1	1.5
E2	0.83
F	2.17
G	7.7

Recommended pad layout



Schematic



Part marking: TL1011=Product code and size, Vx=Version indicator, Rxxx= inductance value in μH, R=decimal point, xxxx= lot code

Tolerances are ±0.15 millimeters unless stated otherwise

All soldering surfaces to be coplanar within 0.1 millimeters

Pad layout tolerances are ±0.1 millimeters unless stated otherwise

DCR_{pri} is measured from point "a" to point "b"

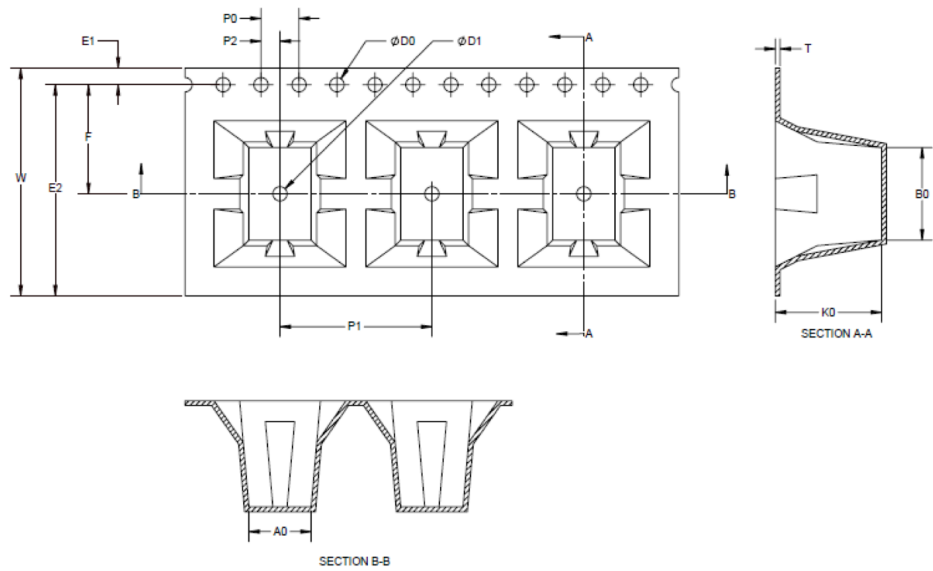
DCR_{sec} is measured from point "a" to point "b"

Traces or vias underneath the inductor is not recommended

Add 0.4 mm gap of pad 3 & 4 to avoid short cut issue

Packaging information- mm

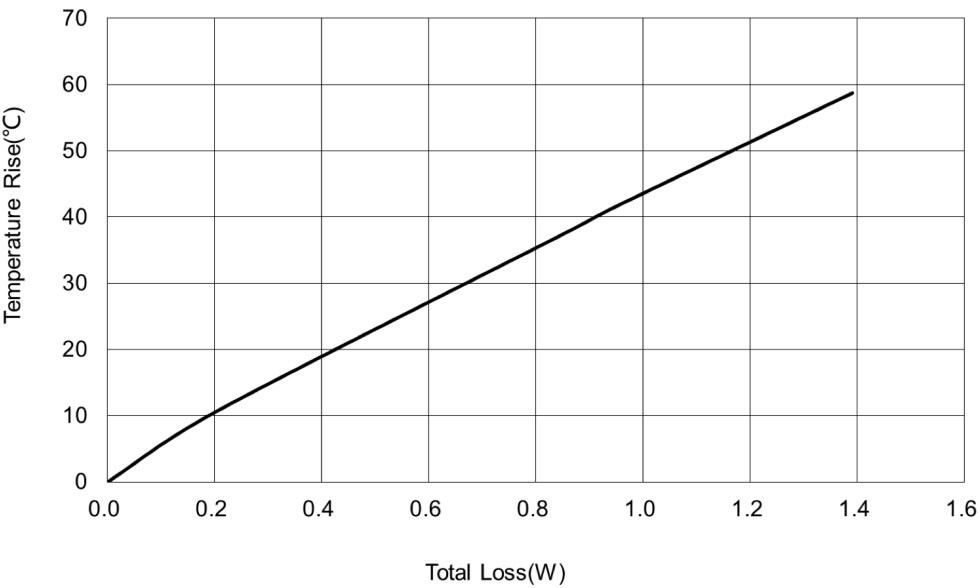
Supplied in tape and reel packaging, 350 parts per 13" diameter reel (EIA-481 compliant)



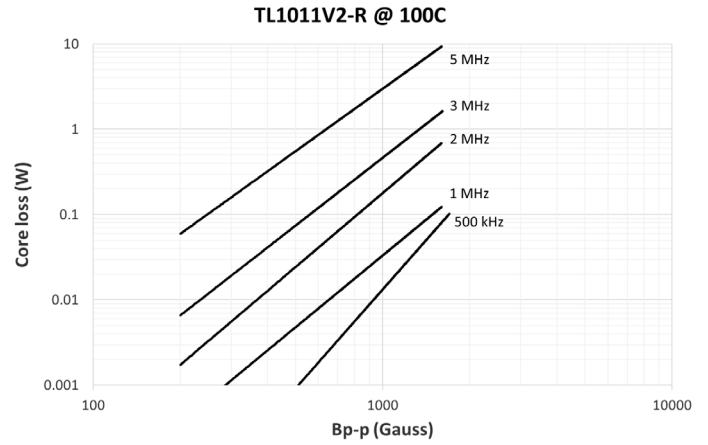
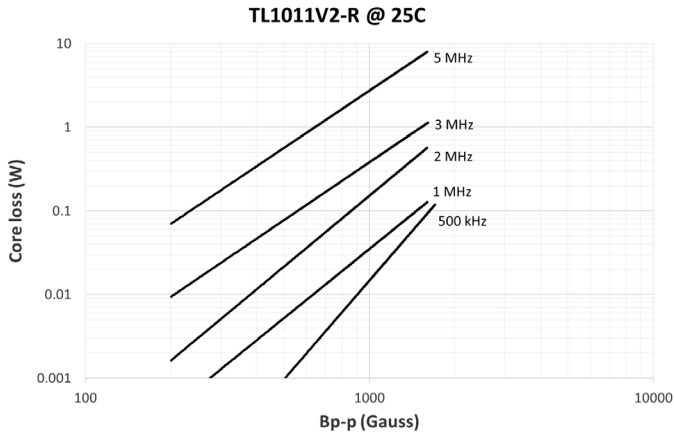
Item	Dimensions
W ± 0.30	24.00
F ± 0.10	11.50
E1 ± 0.10	1.75
E2 minimum	22.25
P0 ± 0.10	4.00
P1 ± 0.10	16.00
P2 ± 0.10	2.00
D0 + 0.10/-0	1.50
D1 minimum	1.50
A0 ± 0.10	6.55
B0 ± 0.10	9.75
K0 ± 0.10	11.20
T ± 0.05	0.50

User direction of feed →

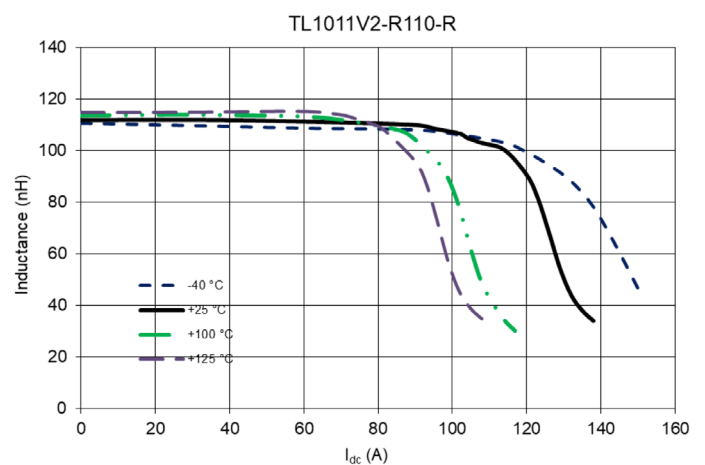
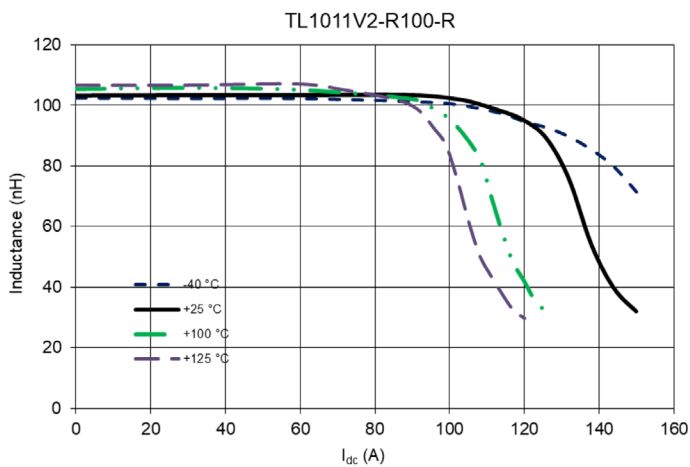
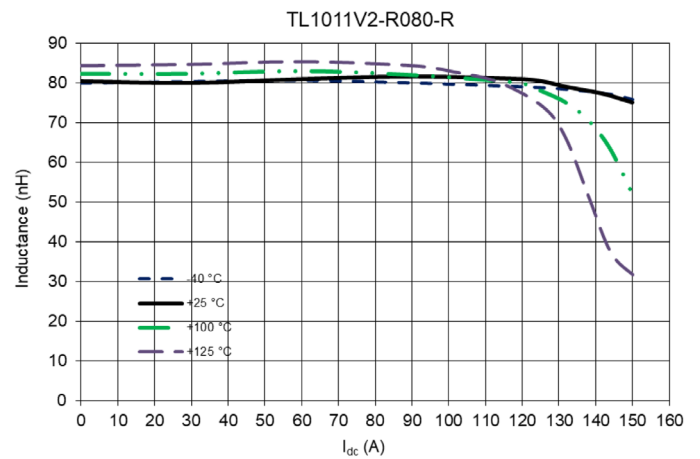
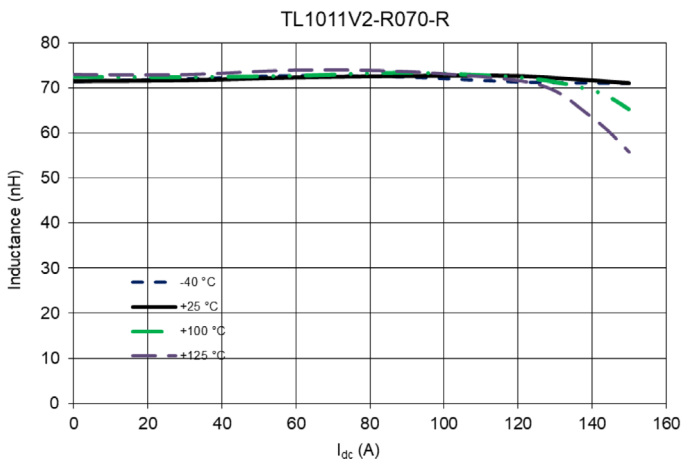
Temperature rise vs. total loss



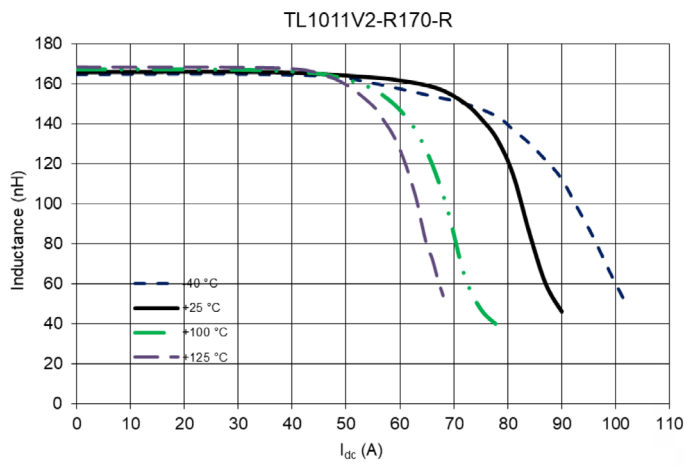
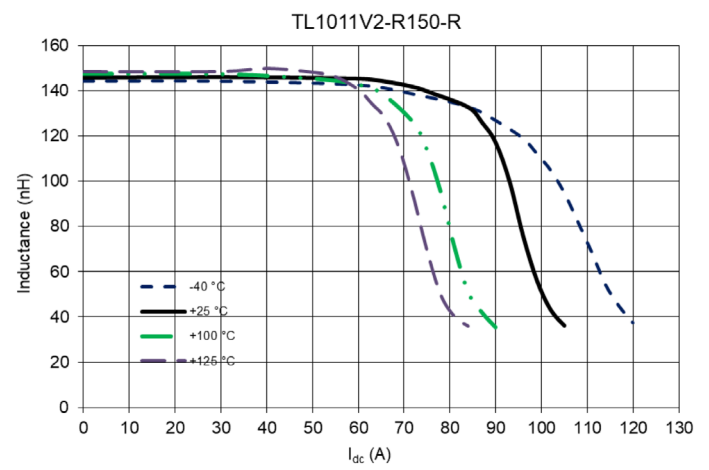
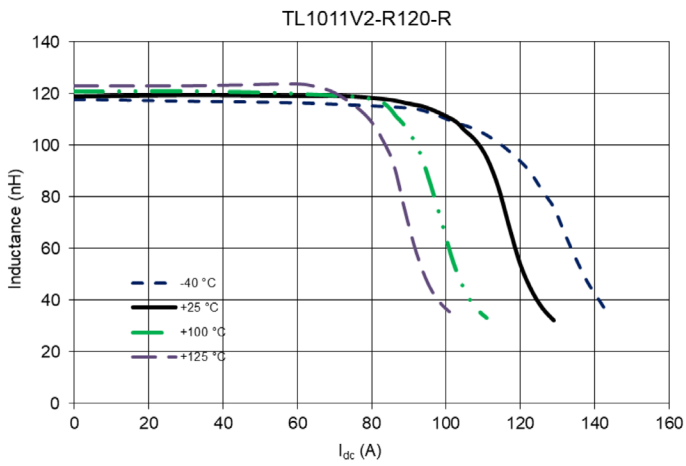
Core loss vs Bp-p



Inductance characteristics



Inductance characteristics



Solder reflow profile

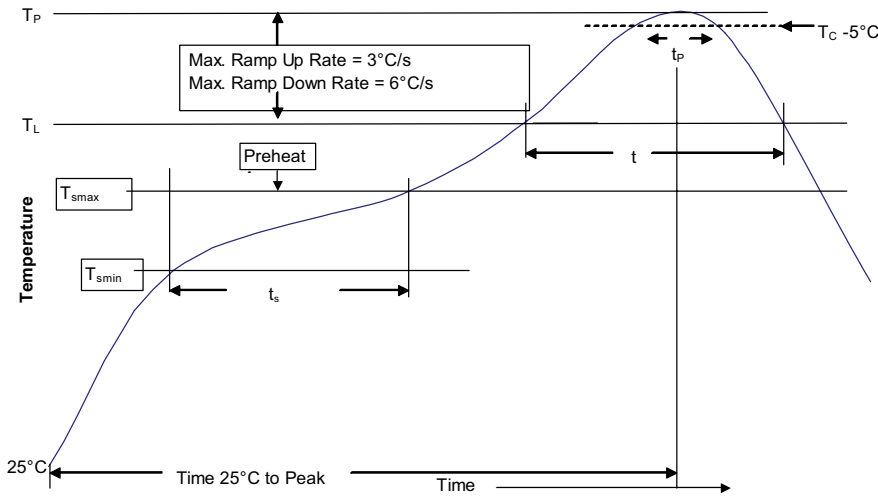


Table 1 - Standard SnPb solder (T_C)

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