

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



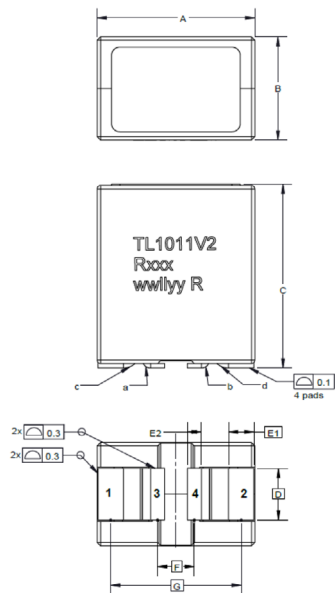
Product specifications

Part number ⁹	Lpri ¹ (nH) ±10% (3-4)	Lsec ¹ (nH) ±10% (1-2)	FLL ² (nH) Minimum (1-2)	I _{max,sec} ³ (A)	I _{max,1} ⁴ (A)	I _{max,2} ⁵ (A)	I _{max,3} 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

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

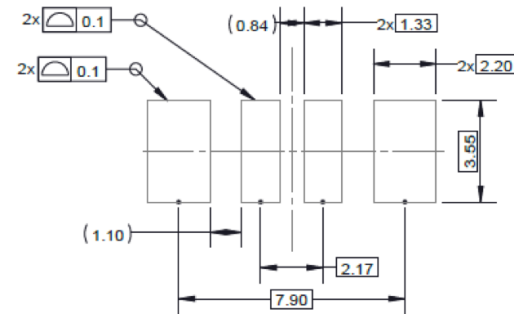
- I_{max,1}: Peak current for approximately 20% rolloff @ +25 °C
- I_{max,2}: Peak current for approximately 20% rolloff @ +100 °C
- I_{max,3}: Peak current for approximately 20% rolloff @ +125 °C
- K-factor: Used to determine Bp-p for core loss (see graph). Bp-p = K * L * ΔI * 10³. Bp-p(Gauss), K: (K-factor from table), L: (Inductance in nH), ΔI (Peak to peak ripple current in Amps).
- Kps: Coupling Coefficient
- 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

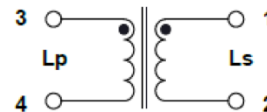


Dimension	TL1011V2-R
A	9.6 maximum
B	6.4 maximum
C	11.0 maximum
D	3.05
E1	1.5
E2	0.83
F	2.17
G	7.7

Recommended pad layout



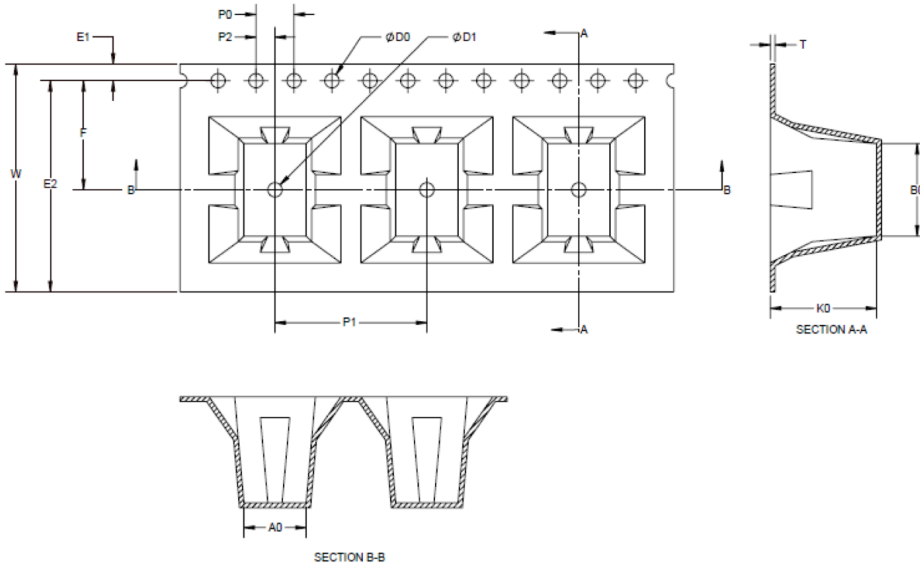
Schematic



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

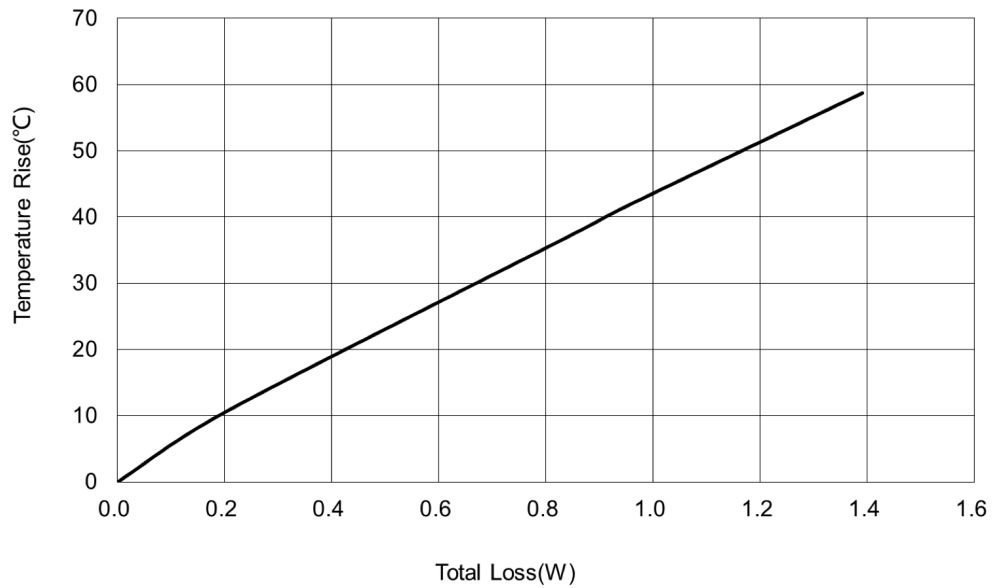
Supplied in tape and reel packaging, 350 parts per 13" diameter reel (EIA-481 compliant)



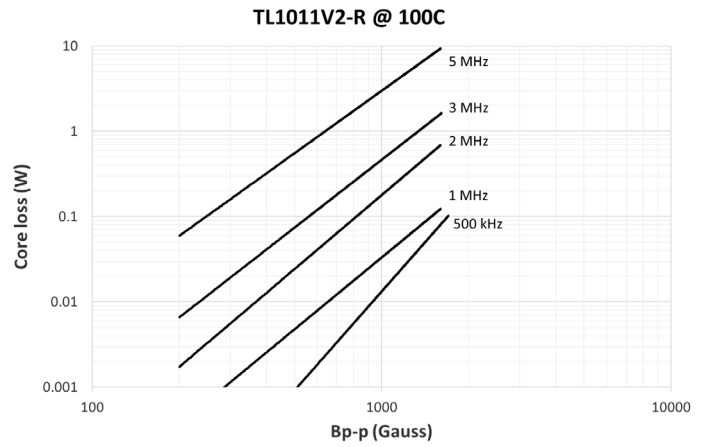
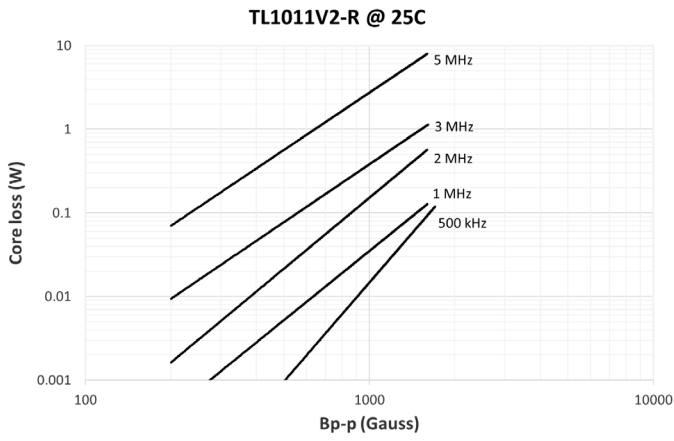
Item	Dimensions
$W \pm 0.30$	24.00
$F \pm 0.10$	11.50
$E1 \pm 0.10$	1.75
$E2$ minimum	22.25
$P0 \pm 0.10$	4.00
$P1 \pm 0.10$	16.00
$P2 \pm 0.10$	2.00
$D0 + 0.10/-0$	1.50
$D1$ minimum	1.50
$A0 \pm 0.10$	6.55
$B0 \pm 0.10$	9.75
$K0 \pm 0.10$	11.20
$T \pm 0.05$	0.50

User direction of feed \longrightarrow

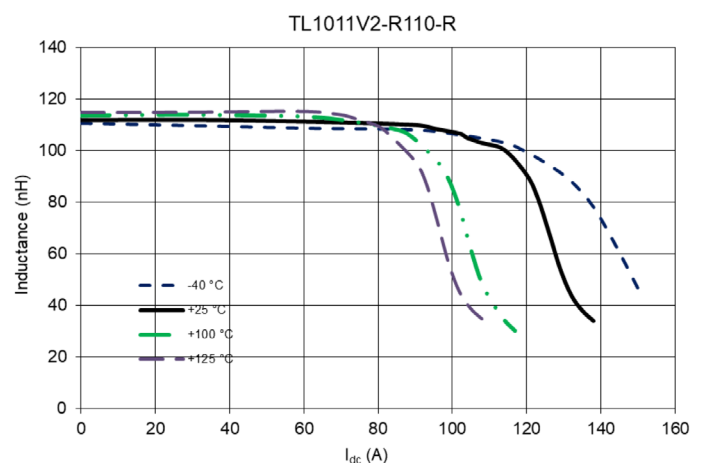
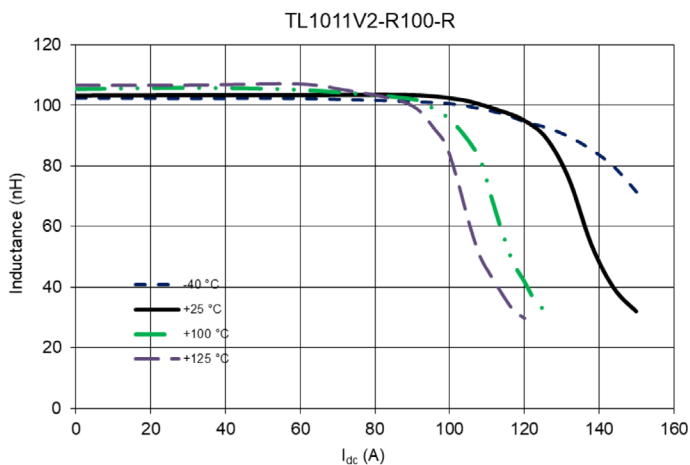
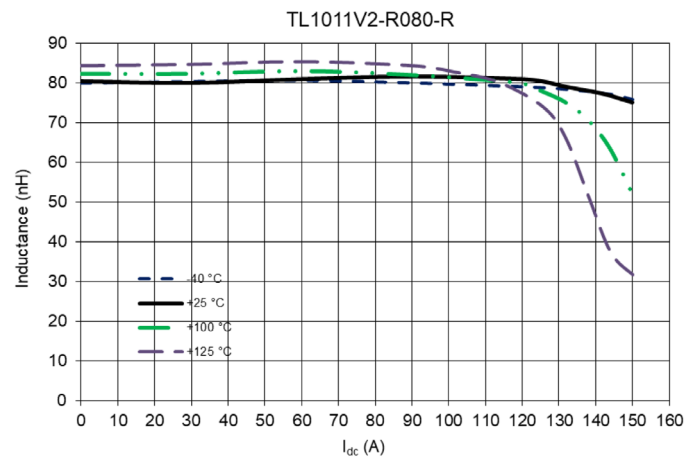
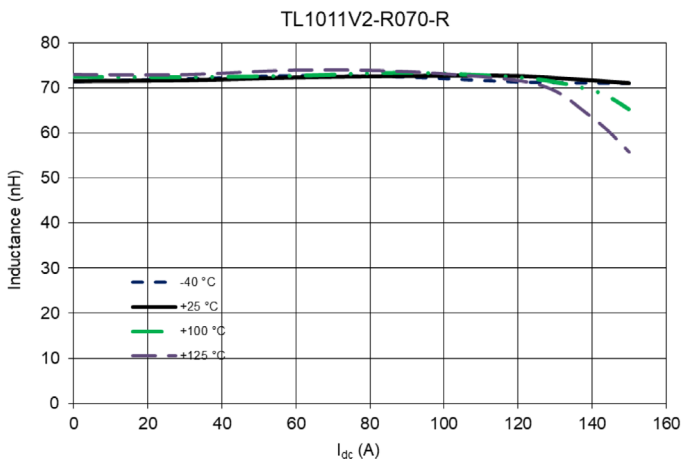
Temperature rise vs. total loss



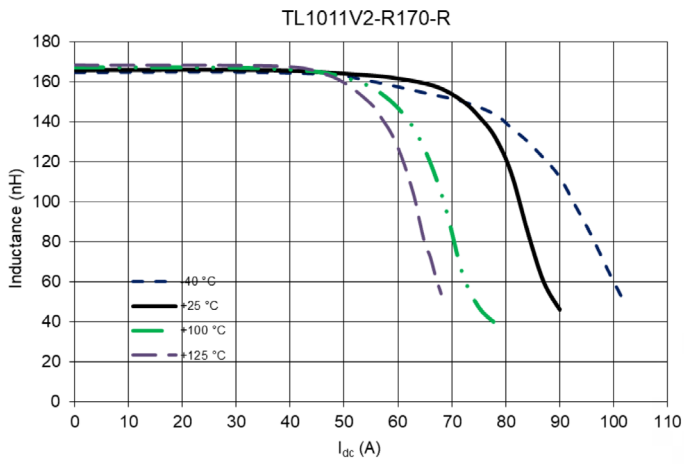
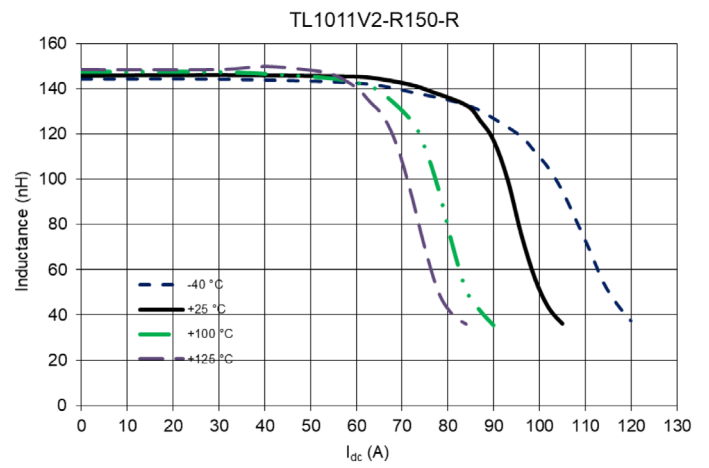
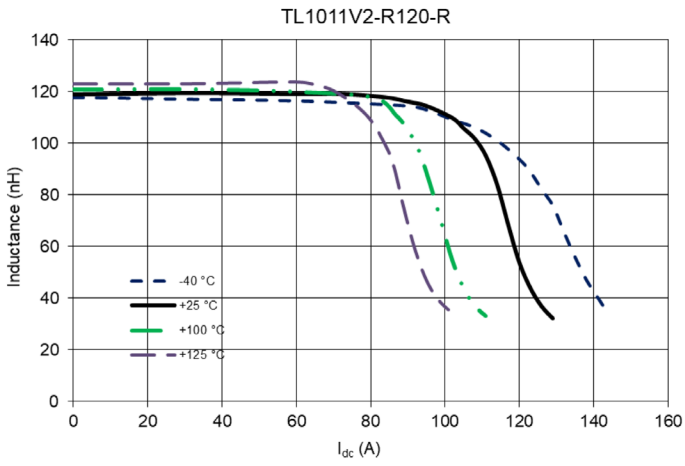
Core loss vs Bp-p



Inductance characteristics



Inductance characteristics



Solder reflow profile

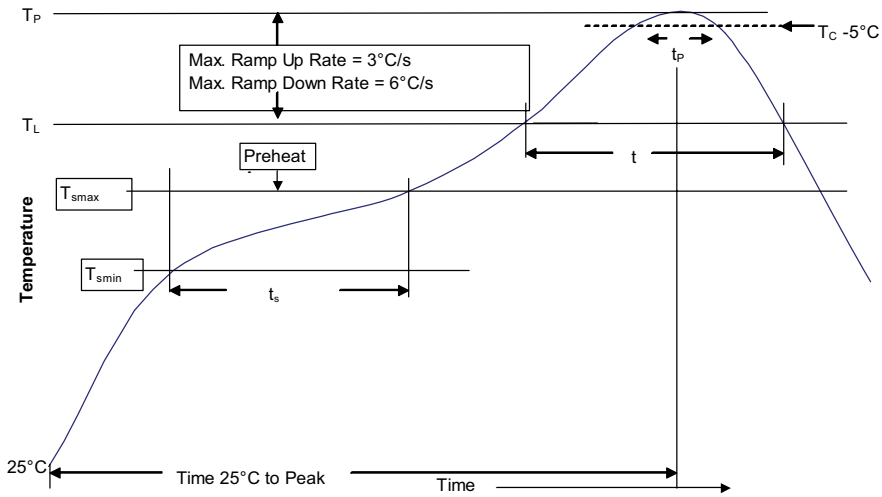


Table 1 - Standard SnPb solder (Tc)

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 (Tc)

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 _{smmin})	100 °C	150 °C
• Temperature max. (T _{smmax})	150 °C	200 °C
• Time (T _{smmin} to T _{smmax}) (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.

Life Support Policy: Eaton does not authorize the use of any of its products for use in life support devices or systems without the express written approval of an officer of the Company. Life support systems are devices which support or sustain life, and whose failure to perform, when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in significant injury to the user.

Eaton reserves the right, without notice, to change design or construction of any products and to discontinue or limit distribution of any products. Eaton also reserves the right to change or update, without notice, any technical information contained in this bulletin.

Eaton
Electronics Division
1000 Eaton Boulevard
Cleveland, OH 44122
United States
Eaton.com/electronics

© 2022 Eaton
All Rights Reserved
Printed in USA
Publication No. ELX1154 BU-ELX22013
March 2022

Eaton is a registered trademark.
All other trademarks are property of their respective owners.

Follow us on social media to get the latest product and support information.

