

# TL1012V2

## Trans-inductor regulator power inductor



### Product features

- Operating frequency range: up to 3 MHz
- Ferrite core material
- 10 mm x 6.0 mm footprint surface mount package in a 12 mm height
- Inductance range: 70 nH to 170 nH
- Current range: 64 A to 157 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



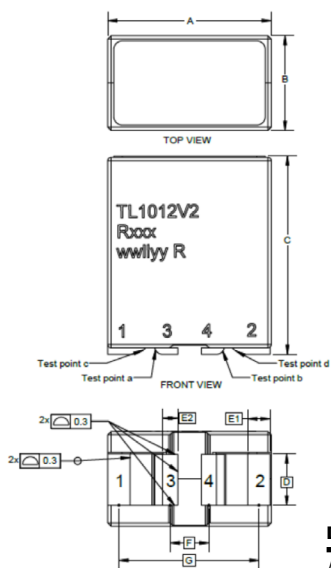
**Product specifications**

Part number <sup>9</sup>	Lpri <sup>1</sup> (nH) ±10% (3-4)	Lsec <sup>1</sup> (nH) ±10% (1-2)	FLL <sup>2</sup> (nH) Minimum	I <sub>max</sub> <sup>3</sup> (A)	I <sub>max</sub> <sup>14</sup> (A)	I <sub>max</sub> <sup>25</sup> (A)	I <sub>max</sub> <sup>36</sup> (A)	K-factor <sup>7</sup>	DCR_pri (mΩ) @ +20 °C ±10%	DCR_sec (mΩ) @ +20 °C ±10%	Kps <sup>8</sup> Typical
TL1012V2-R070-R	70	70	50	75	157	135	125	360	0.37	0.125	0.92
TL1012V2-R080-R	80	80	57	75	137	118	110	360	0.37	0.125	0.93
TL1012V2-R100-R	100	100	72	75	110	95	88	360	0.37	0.125	0.94
TL1012V2-R120-R	120	120	86	75	92	79	73	360	0.37	0.125	0.95
TL1012V2-R150-R	150	150	108	75	73	63	58	360	0.37	0.125	0.96
TL1012V2-R170-R	170	170	122	75	64	55	51	360	0.37	0.125	0.96

- Open circuit inductance (OCL) test parameters: 100 kHz, 0.1 V<sub>rms</sub>, 0.0 Adc, +25 °C
- Full load inductance (FLL) test parameters: 100 kHz, 0.1 V<sub>rms</sub>, I<sub>max</sub><sup>1</sup>, +25 °C
- I<sub>max</sub><sup>3</sup>: 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.

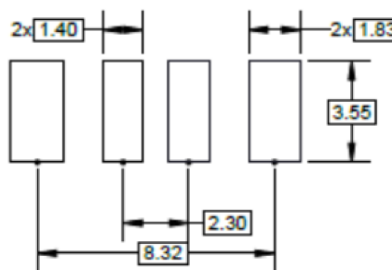
- I<sub>max</sub><sup>1</sup>: Peak current for approximately 20% rolloff @ +25 °C
- I<sub>max</sub><sup>2</sup>: Peak current for approximately 20% rolloff @ +100 °C
- I<sub>max</sub><sup>3</sup>: Peak current for approximately 20% rolloff @ +125 °C
- K-factor: Used to determine Bp-p for core loss (see graph). Bp-p = K \* L \* ΔI \* 10<sup>3</sup>. 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: TL1012V2-Rxxx-R  
TL1012 = Product code and size  
Vx= Version indicator  
Rxxx=Inductance value in μH, R=decimal point  
-R suffix = RoHS compliant

**Dimensions-mm**

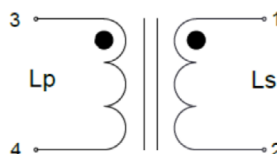


Dimension	TL1012V2-R
A	10.0 maximum
B	6.0 maximum
C	12.0 maximum
D	3.05
E1	1.33
E2	0.9
F	2.3
G	8.32

**Recommended pad layout**



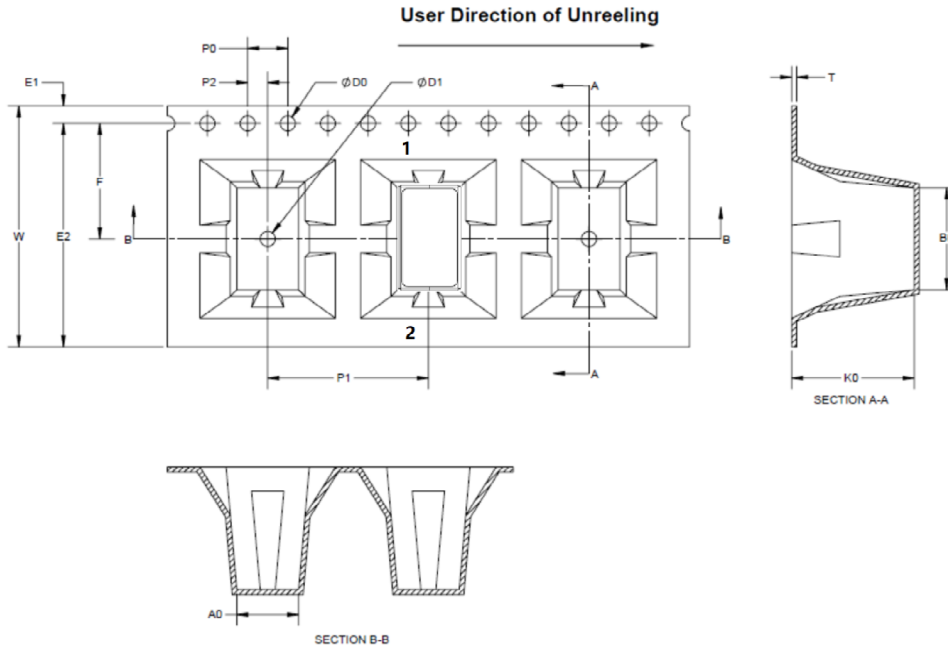
**Schematic**



Part marking: TL1012=Product code and size, Vx=Version indicator, Rxxx= inductance value in uH, 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  
Dimensions of recommended PCB layout are reference only  
Add 0.4 mm gap of pad 3 & 4 to avoid short cut issue

**Packaging information- mm**

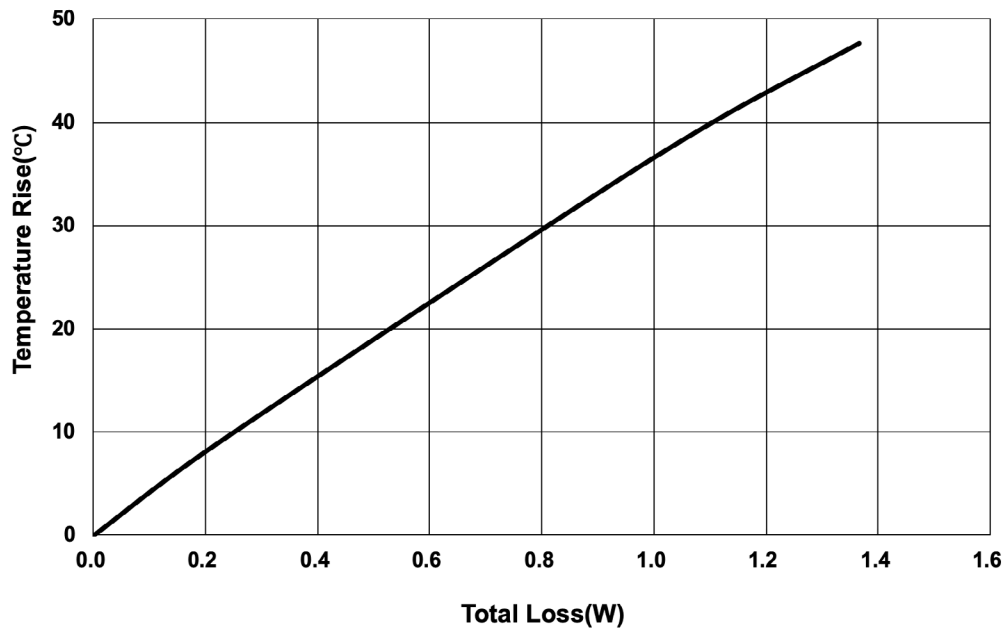
Supplied in tape and reel packaging, 300 parts per 13" diameter reel (EIA-481 compliant)



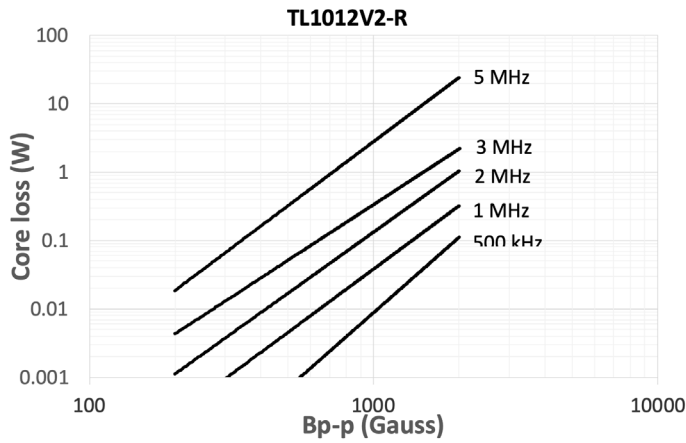
Item	Dimensions
$W \pm 0.30$	24.00
$F \pm 0.10$	11.50
$E1 \pm 0.10$	1.75
$E2$ minimum	22.25
$P0 \pm 0.10$	4.00
$P1 \pm 0.10$	16.00
$P2 \pm 0.10$	2.00
$D0 + 0.10/-0$	1.50
$D1$ minimum	1.50
$A0 \pm 0.10$	6.15
$B0 \pm 0.10$	10.15
$K0 \pm 0.10$	12.20
$T \pm 0.05$	0.50

**Temperature rise vs. total loss**

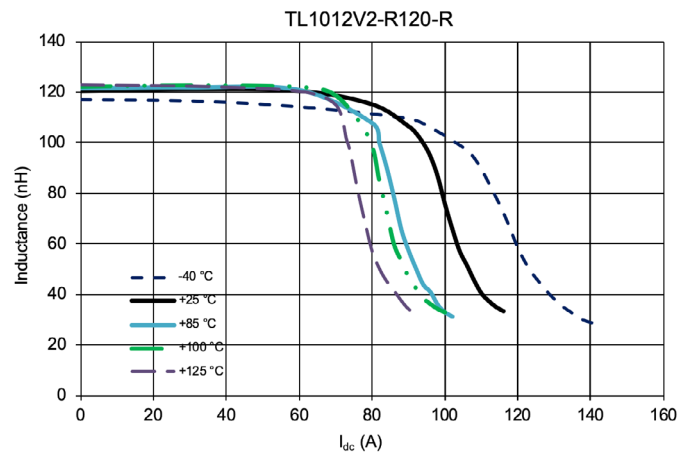
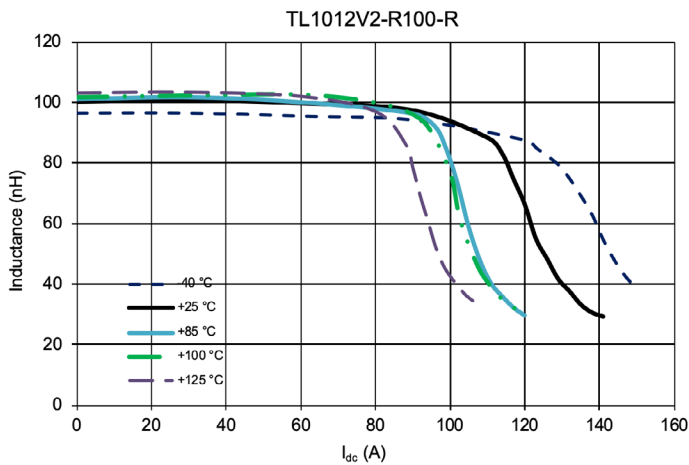
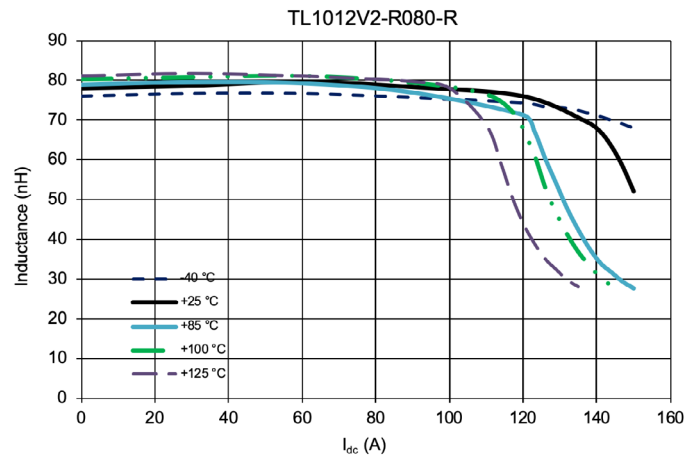
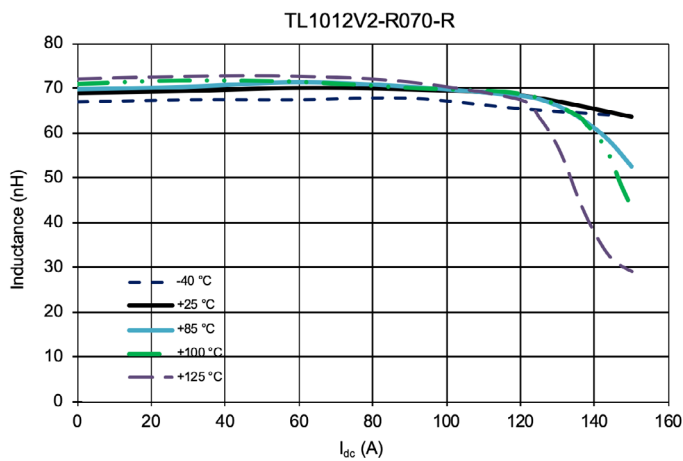
TL1012V2-R



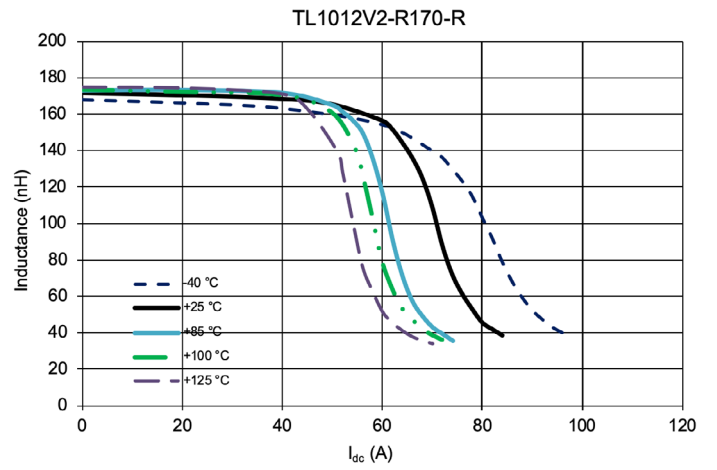
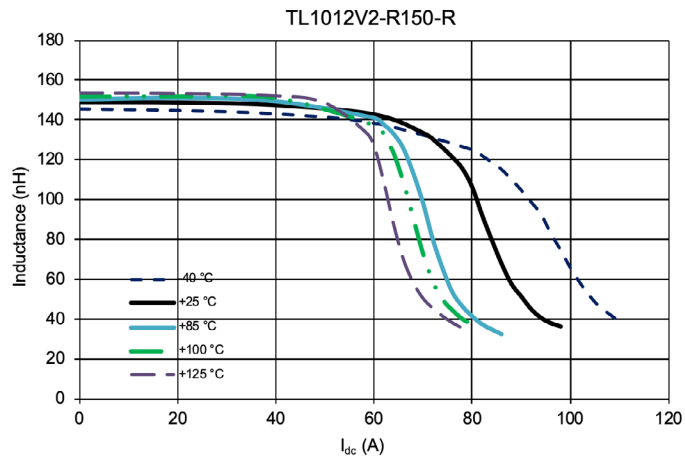
Core loss vs Bp-p



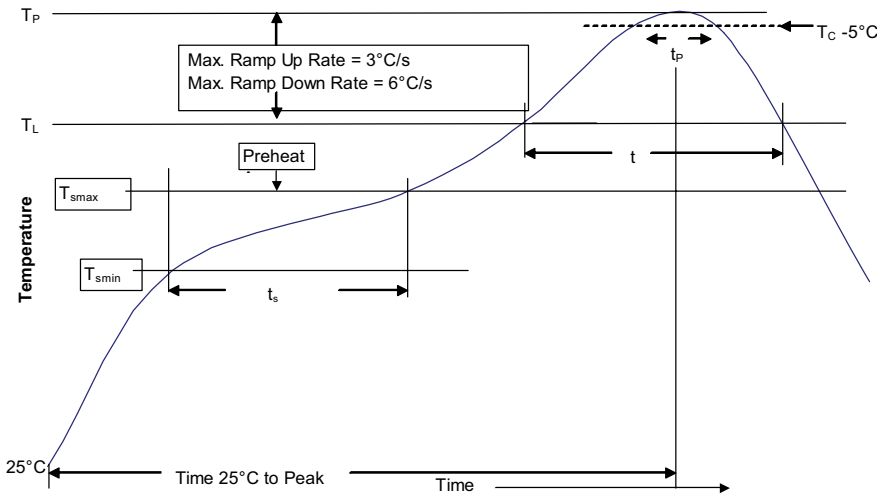
Inductance characteristics



Inductance characteristics



**Solder reflow profile**



**Table 1 - Standard SnPb solder (T<sub>C</sub>)**

Package thickness	Volume mm <sup>3</sup> <350	Volume mm <sup>3</sup> ≥350
<2.5 mm	235 °C	220 °C
≥2.5 mm	220 °C	220 °C

**Table 2 - Lead (Pb) free solder (T<sub>C</sub>)**

Package thickness	Volume mm <sup>3</sup> <350	Volume mm <sup>3</sup> 350 - 2000	Volume mm <sup>3</sup> >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 <sub>smin</sub> )	100 °C	150 °C
• Temperature max. (T <sub>smax</sub> )	150 °C	200 °C
• Time (T <sub>smin</sub> to T <sub>smax</sub> ) (t <sub>s</sub> )	60-120 seconds	60-120 seconds
Ramp up rate T <sub>L</sub> to T <sub>p</sub>	3 °C/ second max.	3 °C/ second max.
Liquidous temperature (T <sub>L</sub> )	183 °C	217 °C
Time (t <sub>L</sub> ) maintained above T <sub>L</sub>	60-150 seconds	60-150 seconds
Peak package body temperature (T <sub>p</sub> )*	Table 1	Table 2
Time (t <sub>p</sub> )* within 5 °C of the specified classification temperature (T <sub>C</sub> )	20 seconds*	30 seconds*
Ramp-down rate (T <sub>p</sub> to T <sub>L</sub> )	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<sub>p</sub>) is defined as a supplier minimum and a user maximum.

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

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