

# TL1211V1

## Trans-inductor regulator power inductor



### Product features

- Operating frequency range: up to 3 MHz
- Ferrite core material
- 12 mm x 6.0 mm footprint surface mount package in an 11.5 mm height
- Inductance range: 70 nH to 200 nH
- Current range: 62 A to 180 A
- 100 Vdc insulation between windings
- Weight: 3.4 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



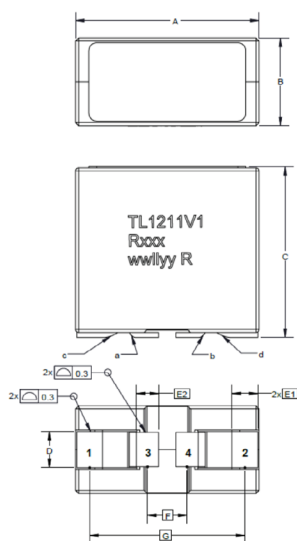
**Product specifications**

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>ms</sub> <sup>3</sup> (A)	I <sub>ms</sub> <sup>1</sup> <sup>4</sup> (A)	I <sub>ms</sub> <sup>2</sup> <sup>5</sup> (A)	I <sub>ms</sub> <sup>3</sup> <sup>6</sup> (A)	K-factor <sup>7</sup>	DCR <sub>pri</sub> (mΩ) @ +20 °C ±10%	DCR <sub>sec</sub> (mΩ) @ +20 °C ±10%	Kps <sup>8</sup> Typical
TL1211V1-R070-R	70	70	50	75	180	156	143	313	0.6	0.125	0.93
TL1211V1-R080-R	80	80	57	75	157	137	125	313	0.6	0.125	0.93
TL1211V1-R100-R	100	100	72	75	126	109	100	313	0.6	0.125	0.95
TL1211V1-R110-R	110	110	79	75	114	99	91	313	0.6	0.125	0.95
TL1211V1-R120-R	120	120	86	75	105	91	84	313	0.6	0.125	0.95
TL1211V1-R150-R	150	150	108	75	84	73	67	313	0.6	0.125	0.96
TL1211V1-R170-R	170	170	122	75	74	64	59	313	0.6	0.125	0.96
TL1211V1-R200-R	200	200	144	75	62	53	48	313	0.6	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>ms</sub><sup>1</sup>, +25 °C
- I<sub>ms</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.

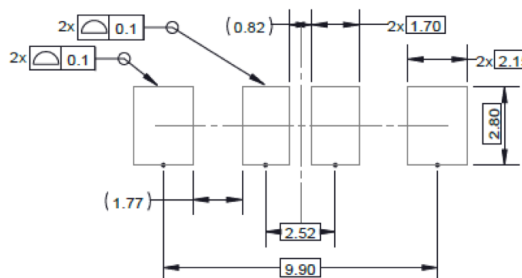
- I<sub>ms</sub><sup>1</sup>: Peak current for approximately 20% rolloff @ +25 °C
- I<sub>ms</sub><sup>2</sup>: Peak current for approximately 20% rolloff @ +100 °C
- I<sub>ms</sub><sup>3</sup>: Peak current for approximately 20% rolloff @ +125 °C
- K-factor: Used to determine Bp-p for core loss (see 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: TL1211V1-Rxxx-R  
TL1211 = Product code and size  
Vx = Version indicator  
Rxxx = Inductance value in μH, R = decimal point  
-R suffix = RoHS compliant

**Dimensions-mm**

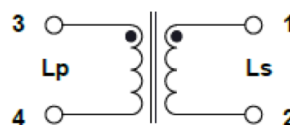


Dimension	TL1211V1-R
A	12.0 maximum
B	6.0 maximum
C	11.05 maximum
D	2.30
E1	1.65
E2	1.42
F	2.52
G	9.9

**Recommended pad layout**



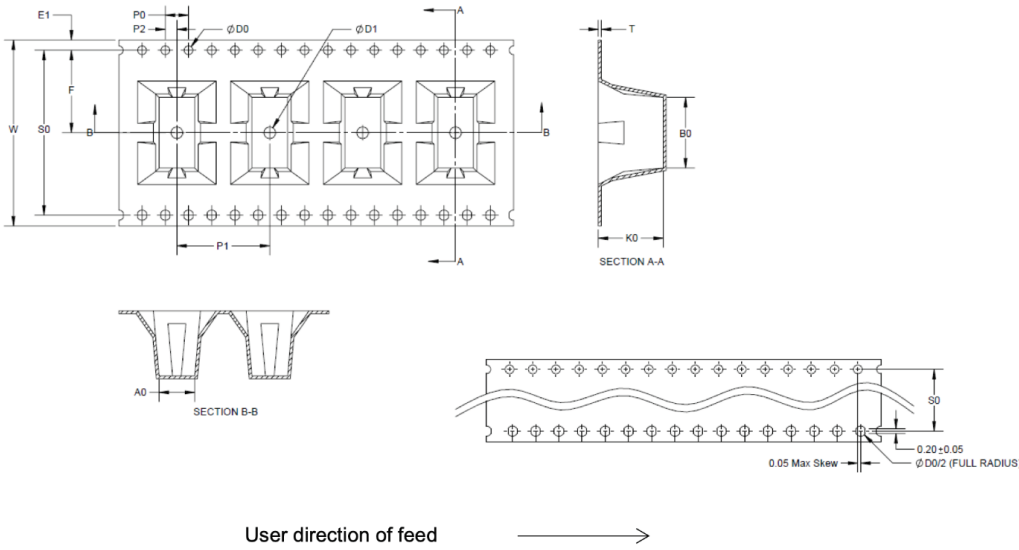
**Schematic**



Part marking: TL1211=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<sub>pri</sub> is measured from point "a" to point "b"  
DCR<sub>sec</sub> 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

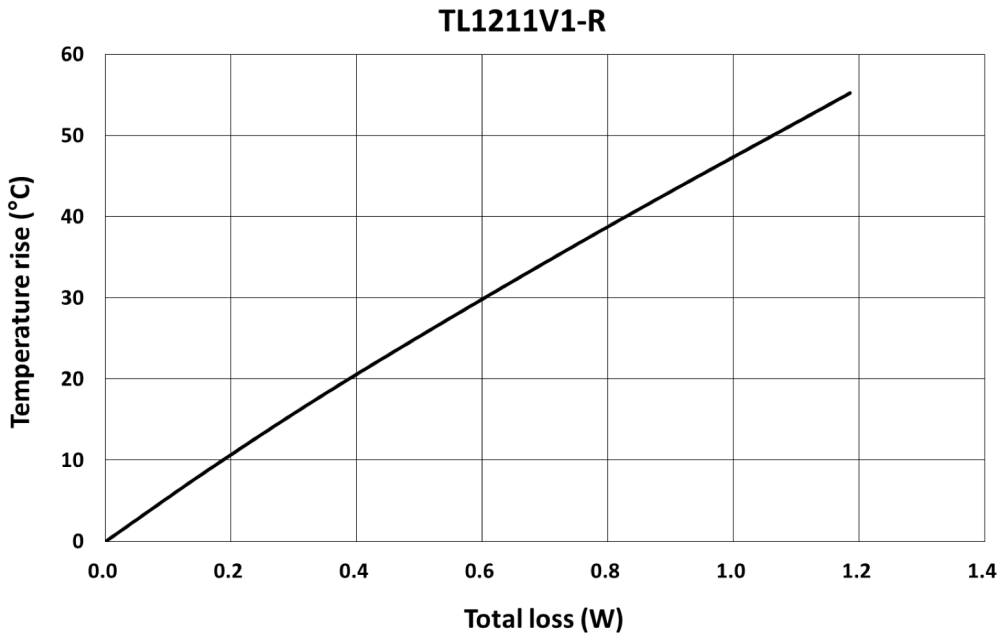
**Packaging information- mm**

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

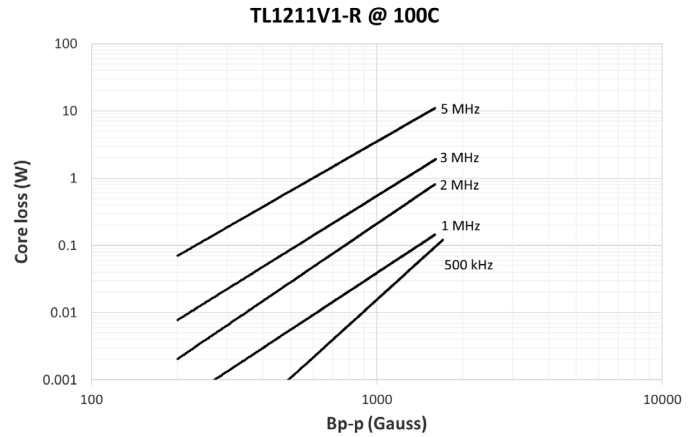
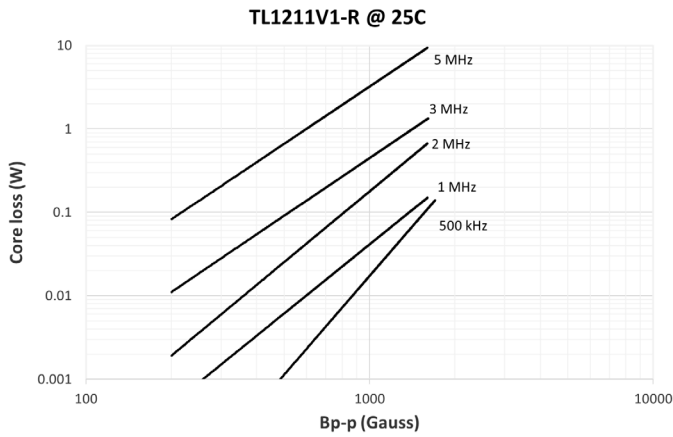


Item	Dimensions
W $\pm$ 0.30	32.00
F $\pm$ 0.10	14.20
E1 $\pm$ 0.10	1.75
E2 minimum	28.40
P0 $\pm$ 0.10	4.00
P1 $\pm$ 0.10	16.00
P2 $\pm$ 0.10	2.00
D0 + 0.10/-0	1.50
D1 minimum	2.00
A0 $\pm$ 0.10	6.15
B0 $\pm$ 0.10	12.15
K0 $\pm$ 0.10	11.20
T $\pm$ 0.05	0.50

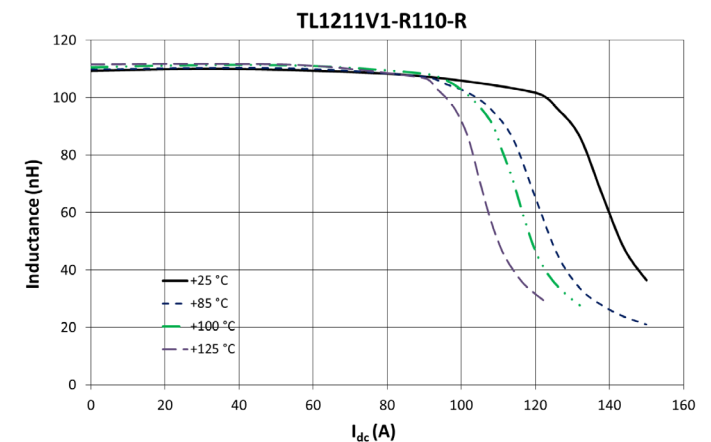
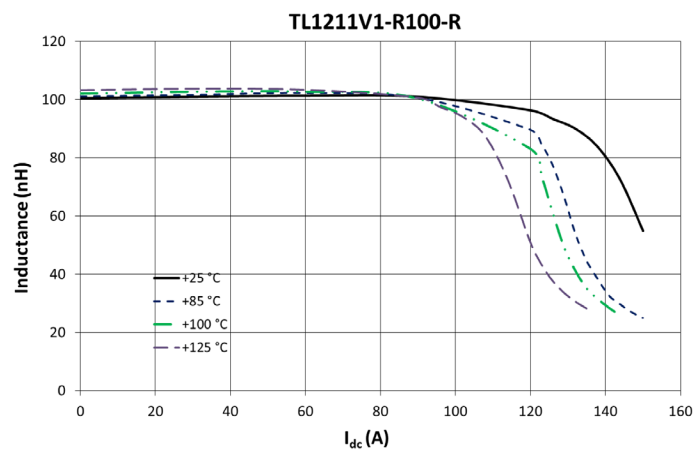
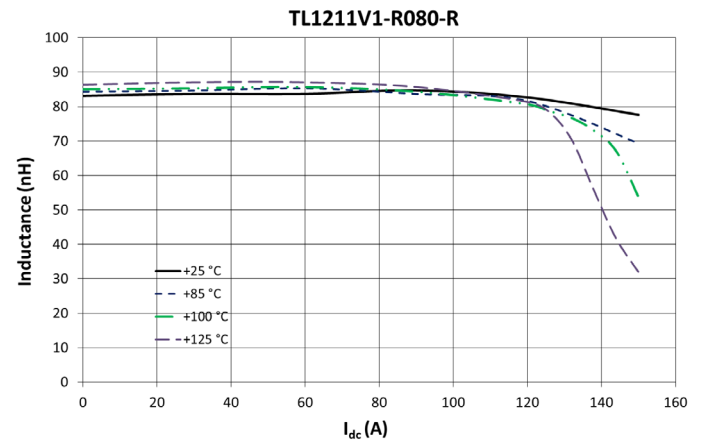
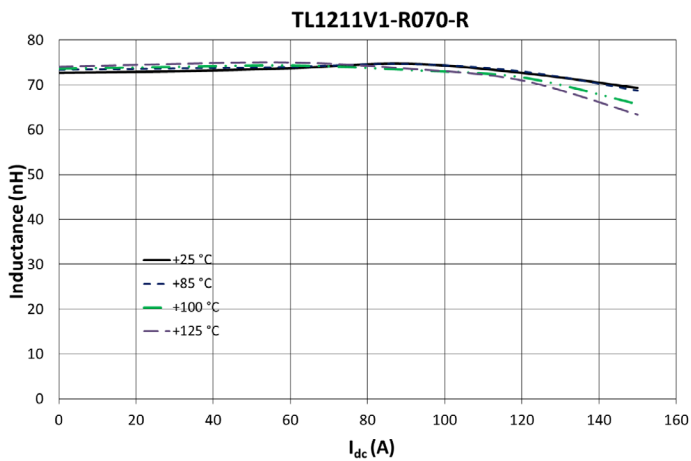
**Temperature rise vs. total loss**



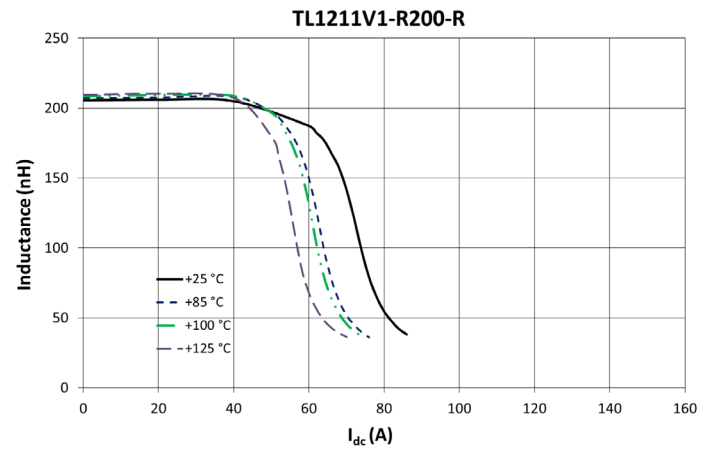
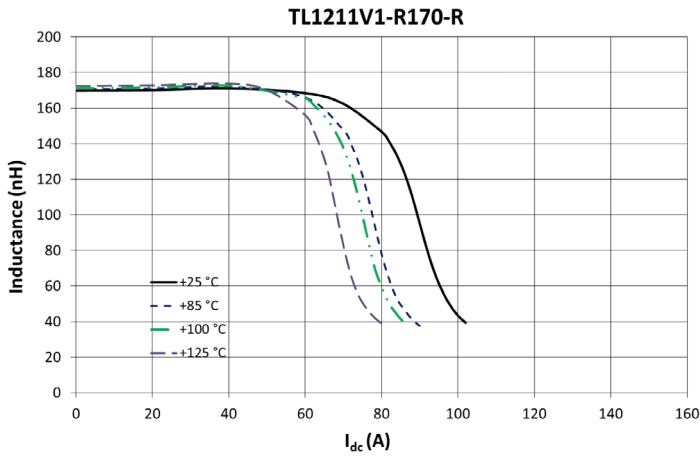
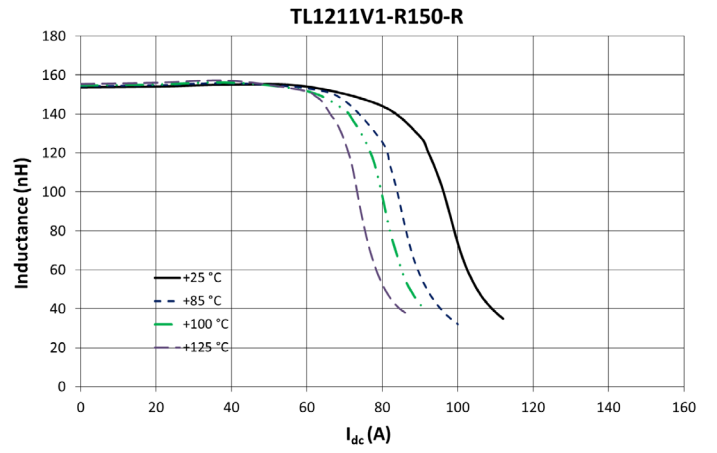
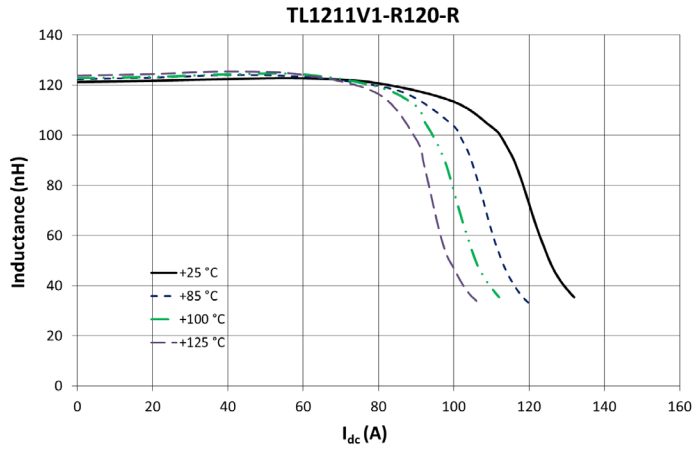
Core loss vs Bp-p



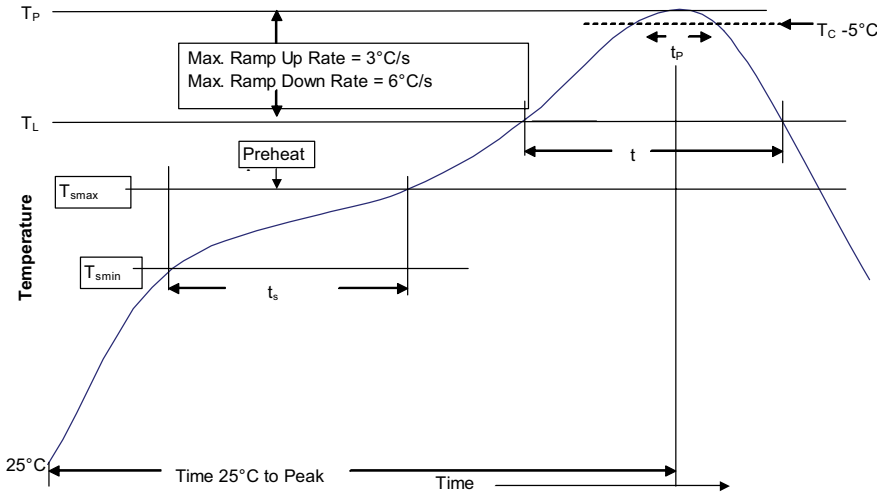
Inductance characteristics



Inductance characteristics



**Solder reflow profile**



**Table 1 - Standard SnPb solder ( $T_C$ )**

Package thickness	Volume $\text{mm}^3$ <350	Volume $\text{mm}^3$ $\geq$ 350
<2.5 mm	235 °C	220 °C
$\geq$ 2.5 mm	220 °C	220 °C

**Table 2 - Lead (Pb) free solder ( $T_C$ )**

Package thickness	Volume $\text{mm}^3$ <350	Volume $\text{mm}^3$ 350 - 2000	Volume $\text{mm}^3$ >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.

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. ELX1156 BU-ELX22015  
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.

