

# MPI20-V1

High current, low profile, miniature power inductors



## Applications

- Mobile/smart phones
- Handheld/mobile equipment
- Tablets/e-readers
- Digital cameras
- Wearable devices
- Notebook/netbook/laptop regulators
- Portable media players

## Environmental data

- 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 features

- High current carrying capacity in a compact 0806 (2016 metric) footprint
- Magnetically shielded, Low EMI
- Ring-core construction
- DC-DC converter applications up to 3 MHz
- Filtering applications up to Self Resonant Frequency (SRF). [See product specification table]
- Inductance range from 0.47  $\mu$ H to 2.2  $\mu$ H
- Current range from 2.2 A to 5.5 A
- 2.2 mm x 1.8 mm footprint surface mount package in 1.0 mm height maximum
- Moisture Sensitivity Level (MSL): 1



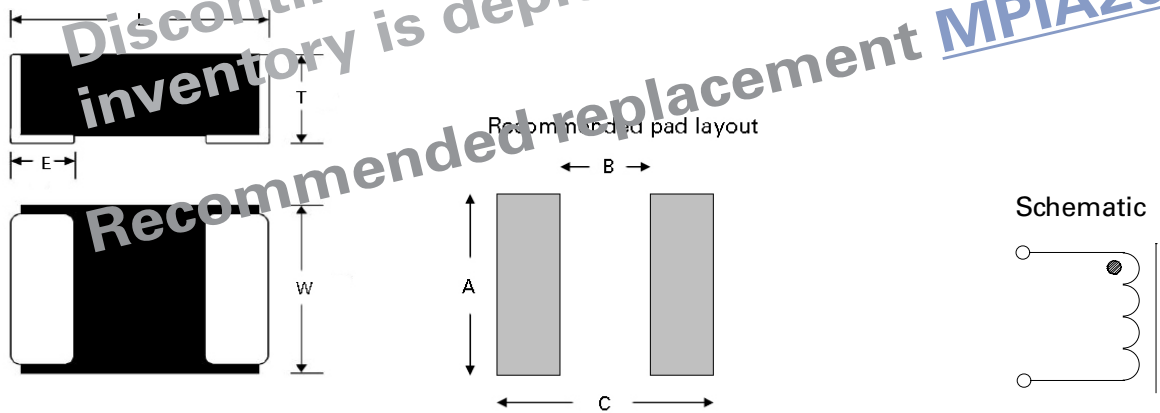
Discontinued February 1, 2022 or until inventory is depleted PCN22004  
 Recommended replacement MPI20-V1

**Product specifications**

| Part Number <sup>5</sup> | OCL <sup>1</sup><br>( $\mu$ H) $\pm$ 20% | I <sub>rms</sub> <sup>2</sup><br>(A) | I <sub>sat</sub> <sup>3</sup><br>(A) | DCR (m $\Omega$ )<br>typical @ +20 °C | DCR (m $\Omega$ )<br>maximum @ +20 °C | SRF<br>(MHz)<br>typical | K-factor <sup>4</sup> |
|--------------------------|--|--------------------------------------|--------------------------------------|---------------------------------------|---------------------------------------|-------------------------|-----------------------|
| <b>1.0 mm height</b>     |  |                                      |                                      |                                       |                                       |                         |                       |
| MPI2010V1-R47-R          | 0.47                                     | 4.5                                  | 5.5                                  | 26                                    | 31                                    | 160                     | 3822                  |
| MPI2010V1-1R0-R          | 1.0                                      | 3.3                                  | 3.6                                  | 54                                    | 62                                    | 100                     | 2990                  |
| MPI2010V1-1R5-R          | 1.5                                      | 2.4                                  | 3.2                                  | 87                                    | 99                                    | 85                      | 2083                  |
| MPI2010V1-2R2-R          | 2.2                                      | 2.2                                  | 2.6                                  | 117                                   | 135                                   | 65                      | 1729                  |

- Open Circuit Inductance (OCL) Test parameters: 1.0 MHz, 1.0 Vrms, 0.0 Adc, +25 °C.
- I<sub>rms</sub>: 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>sat</sub>: Peak current for approximately 30% rolloff @ +25 °C.
- K-factor: Used to determine Bp-p for core loss (see graph). Bp-p = K \* L \*  $\Delta$ I. Bp-p (Gauss), K: (K-factor from table), L: (Inductance in  $\mu$ H),  $\Delta$ I (Peak to peak ripple current in Amps).
- Part Number Definition: MPI20xxV1-xxx-R  
 MPI20 = Product code  
 xx= Height indicator  
 V1=Version indicator  
 xxx= inductance value in  $\mu$ H, R= decimal point, If no R is present then last character equals number of zeros  
 -R suffix = RoHS compliant

**Dimensions (mm)**

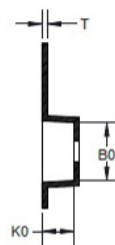
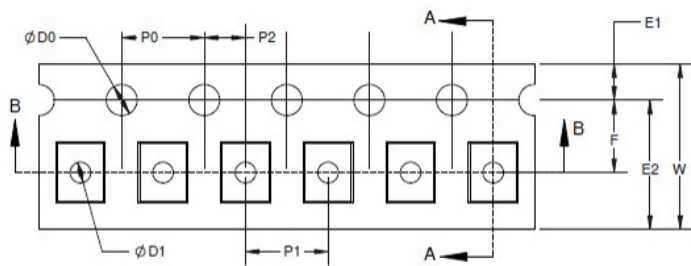


| Part Number     | L             | W             | T           | E             | A              | B              | C              |
|-----------------|---------------|---------------|-------------|---------------|----------------|----------------|----------------|
| MPI2010V1-xxx-R | 2.0 $\pm$ 0.2 | 1.6 $\pm$ 0.2 | 1.0 maximum | 0.5 $\pm$ 0.3 | 1.6 $\pm$ 0.10 | 0.9 $\pm$ 0.10 | 2.0 $\pm$ 0.10 |

No marking  
 All soldering surfaces to be coplanar within 0.10 millimeters  
 Tolerances are  $\pm$ 0.3 millimeters unless stated otherwise  
 Pad layout tolerances are  $\pm$ 0.1 millimeters unless stated otherwise  
 Do not route traces or vias underneath the inductor

**Packaging information (mm)**

Supplied in tape and reel packaging, 3000 parts per 7" diameter reel



|             |            |
|-------------|------------|
| W ±0.1      | 8.00       |
| F ±0.05     | 3.50       |
| E1 ±0.10    | 1.75       |
| E2 Min      | 6.25       |
| P0 ±0.10    | 4.00       |
| P1 ±0.1     | 4.00       |
| P2 ±0.05    | 2.00       |
| D0 +0.10/-0 | 1.50       |
| D1 +0.10/-0 | 1.00       |
| A0          | 1.9 ±0.10  |
| B0          | 2.25 ±0.10 |
| K0          | 1.1 ±0.10  |
| T ±0.05     | 0.22       |

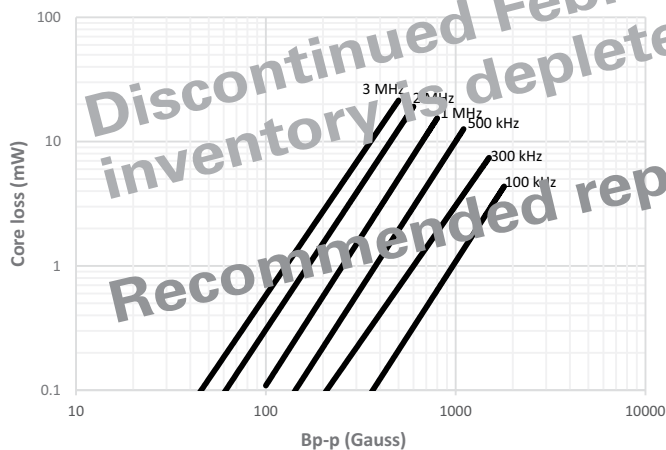


User direction of unreeling →

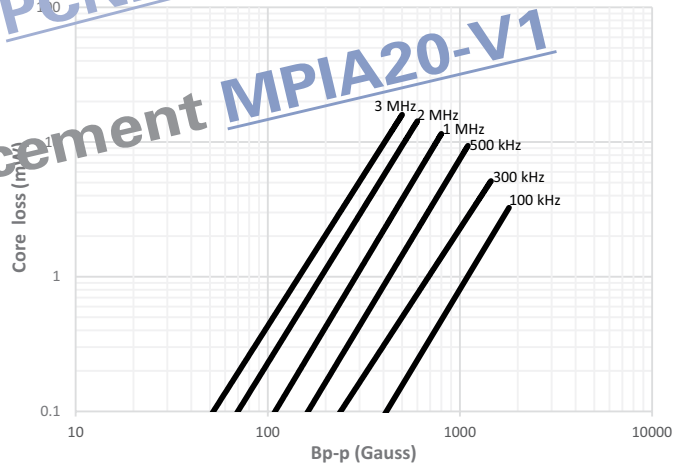
**Core loss vs. Bp-p (+25 °C)**

Discontinued February 1, 2022 or until inventory is depleted PCN22004  
Recommended replacement MPIA20-V1

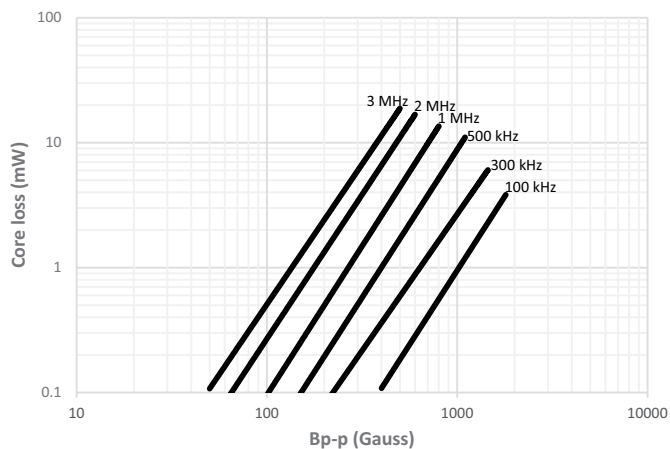
MPI2010V1-R47-R



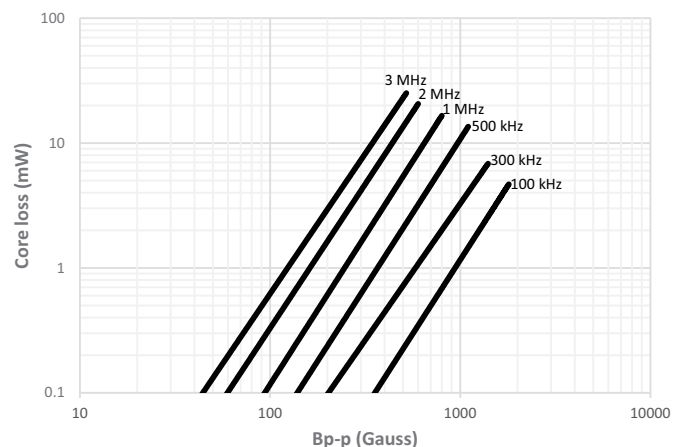
MPI2010V1-1R0-R



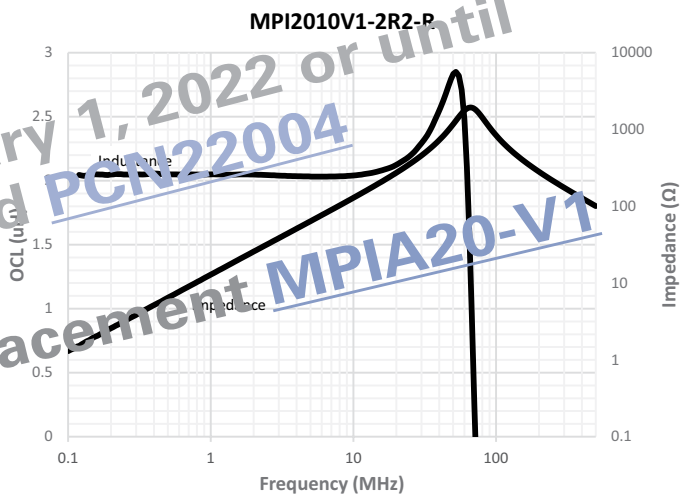
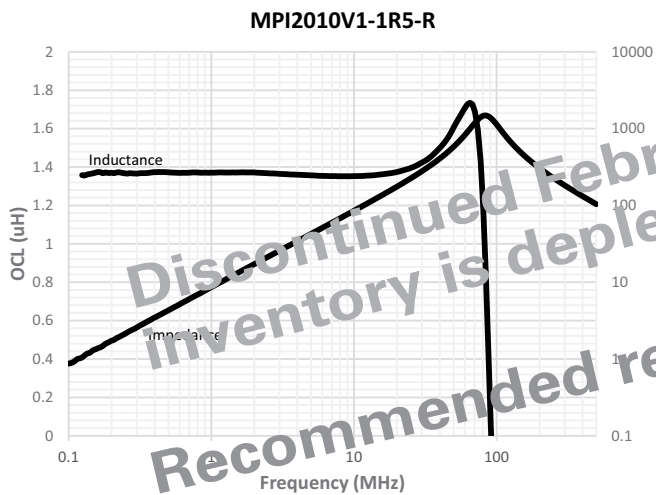
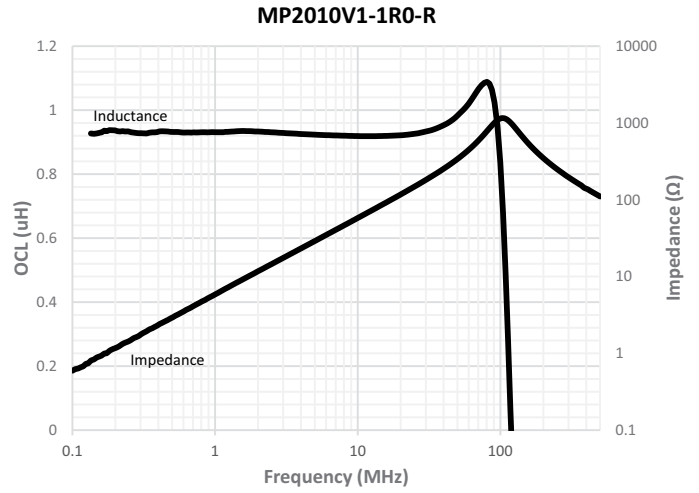
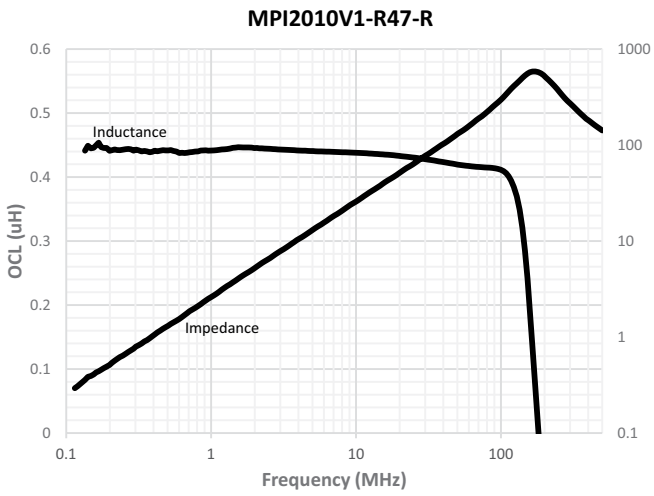
MPI2010V1-1R5-R



MPI2010V1-2R2-R

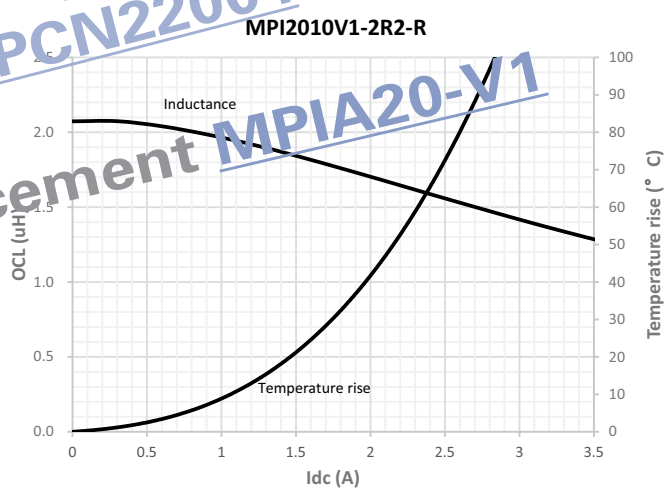
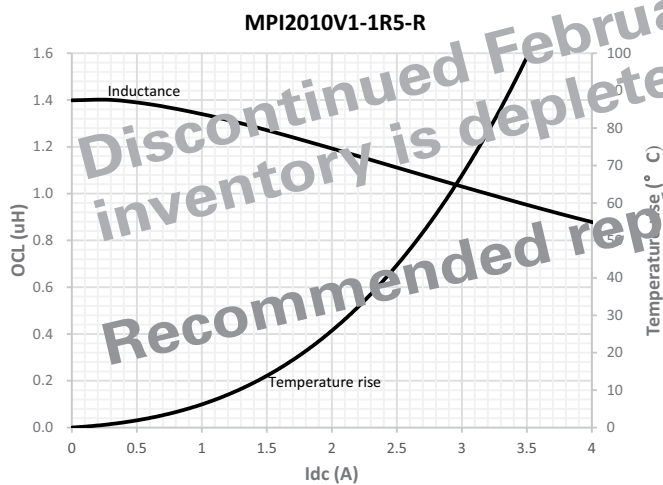
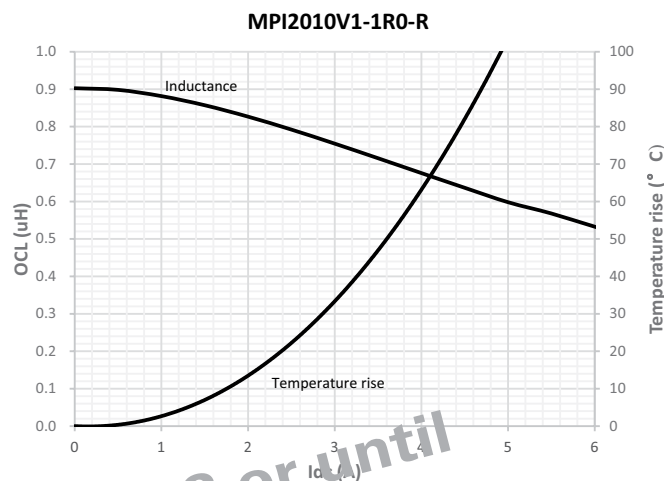
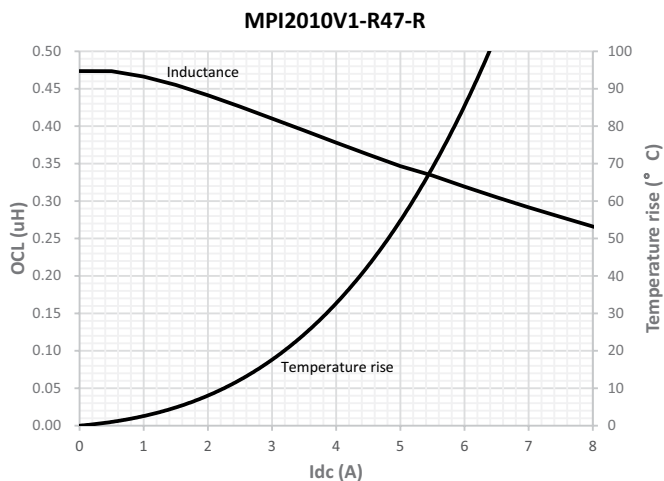


Inductance and impedance vs. frequency



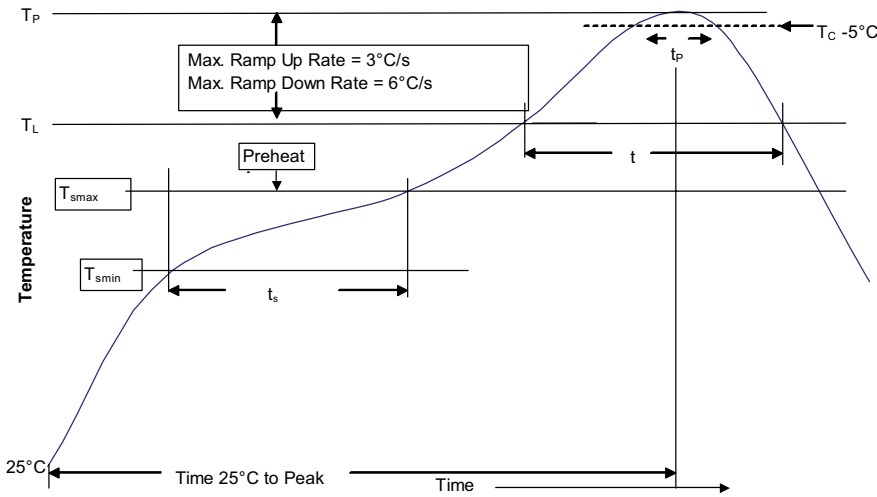
Discontinued February 1, 2022 or until  
Inventory is depleted PCN22004  
Recommended replacement MPIA20-V1

Inductance and temperature rise vs. current



Discontinued February 1, 2022 or until  
 inventory is depleted PCN22004  
 Recommended replacement **MPIA20-V1**

**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   | <ul style="list-style-type: none"> <li>Temperature min. (T<sub>smmin</sub>)</li> <li>Temperature max. (T<sub>smmax</sub>)</li> </ul> | <ul style="list-style-type: none"> <li>150 °C</li> <li>200 °C</li> </ul> |
| Time (T <sub>smmin</sub> to T <sub>smmax</sub> ) (t <sub>s</sub> )                         | 60-120 seconds   | 60-120 seconds   |
| Average ramp up rate (T <sub>smmax</sub> to T <sub>D</sub> )                               | 3 °C/ second max.  | 3 °C/ second max.  |
| Liquidous temperature (T <sub>L</sub> )  | 183 °C   | 217 °C   |
| Time at liquidous (t <sub>L</sub> )  | 30-150 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 reflow temperature (T <sub>C</sub> ) | 20 seconds**   | 30 seconds**   |
| Average ramp-down rate (T <sub>p</sub> to T <sub>smmax</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.

\*\* Tolerance for time at peak profile temperature (t<sub>p</sub>) 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  
www.eaton.com/electronics

© 2019 Eaton  
All Rights Reserved  
Printed in USA  
Publication No. 10938 BU-MC19068  
July 2019

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.

