

#### Features

- ◆ Wide 2:1 input voltage range
- ◆ Compact SIP-8 package
- ◆ Cost optimized design
- ◆ Temperature range  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- ◆ I/O isolation 1500 VDC
- ◆ Remote On/Off control
- ◆ 3-year product warranty



The TMR-3E series is a family of isolated 3 W dc-dc converter modules with regulated output, featuring wide 2:1 input voltage ranges. The product comes in a compact SIP-8 plastic package with small footprint occupying only 2.0 cm<sup>2</sup> (0.3 square in.) of board space.

An excellent efficiency allows  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$  operation temperature. Further features include remote On/Off control and continuous short circuit protection. The compact dimensions and cost optimized design make this converters an ideal solution for applications in communication equipment, instrumentation and industrial electronics.

#### Models

| Order code  | Input voltage range                     | Output voltage | Output current max. | Efficiency typ. |
|-------------|-----------------------------------------|----------------|---------------------|-----------------|
| TMR 3-0510E | <b>4.5 – 9.0 VDC</b><br>(5 VDC nominal) | 3.3 VDC        | 700 mA              | 71 %            |
| TMR 3-0511E |                                         | 5.0 VDC        | 600 mA              | 73 %            |
| TMR 3-0512E |                                         | 12 VDC         | 250 mA              | 79 %            |
| TMR 3-0513E |                                         | 15 VDC         | 200 mA              | 79 %            |
| TMR 3-0521E |                                         | $\pm 5.0$ VDC  | $\pm 300$ mA        | 74 %            |
| TMR 3-0522E |                                         | $\pm 12$ VDC   | $\pm 125$ mA        | 79 %            |
| TMR 3-0523E |                                         | $\pm 15$ VDC   | $\pm 100$ mA        | 79 %            |
| TMR 3-1210E | <b>9.0 – 18 VDC</b><br>(12 VDC nominal) | 3.3 VDC        | 700 mA              | 75 %            |
| TMR 3-1211E |                                         | 5.0 VDC        | 600 mA              | 78 %            |
| TMR 3-1212E |                                         | 12 VDC         | 250 mA              | 83 %            |
| TMR 3-1213E |                                         | 15 VDC         | 200 mA              | 83 %            |
| TMR 3-1221E |                                         | $\pm 5.0$ VDC  | $\pm 300$ mA        | 79 %            |
| TMR 3-1222E |                                         | $\pm 12$ VDC   | $\pm 125$ mA        | 83 %            |
| TMR 3-1223E |                                         | $\pm 15$ VDC   | $\pm 100$ mA        | 83 %            |
| TMR 3-2410E | <b>18 – 36 VDC</b><br>(24 VDC nominal)  | 3.3 VDC        | 700 mA              | 75 %            |
| TMR 3-2411E |                                         | 5.0 VDC        | 600 mA              | 78 %            |
| TMR 3-2412E |                                         | 12 VDC         | 250 mA              | 83 %            |
| TMR 3-2413E |                                         | 15 VDC         | 200 mA              | 83 %            |
| TMR 3-2421E |                                         | $\pm 5.0$ VDC  | $\pm 300$ mA        | 80 %            |
| TMR 3-2422E |                                         | $\pm 12$ VDC   | $\pm 125$ mA        | 83 %            |
| TMR 3-2423E |                                         | $\pm 15$ VDC   | $\pm 100$ mA        | 83 %            |
| TMR 3-4810E | <b>36 – 75 VDC</b><br>(48 VDC nominal)  | 3.3 VDC        | 700 mA              | 75 %            |
| TMR 3-4811E |                                         | 5.0 VDC        | 600 mA              | 78 %            |
| TMR 3-4812E |                                         | 12 VDC         | 250 mA              | 83 %            |
| TMR 3-4813E |                                         | 15 VDC         | 200 mA              | 83 %            |
| TMR 3-4821E |                                         | $\pm 5.0$ VDC  | $\pm 300$ mA        | 80 %            |
| TMR 3-4822E |                                         | $\pm 12$ VDC   | $\pm 125$ mA        | 83 %            |
| TMR 3-4823E |                                         | $\pm 15$ VDC   | $\pm 100$ mA        | 83 %            |

## Input Specifications

|                                                    |                                                                                                                                                                                                                                     |
|----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input current at no load (nominal input voltage)   | 5.0 V models: 70 mA typ.<br>12 V models: 20 mA typ.<br>24 V models: 10 mA typ.<br>48 V models: 8 mA typ.                                                                                                                            |
| Input current at full load (nominal input voltage) | 5.0 V models: 760 mA typ.<br>12 V models: 300 mA typ.<br>24 V models: 150 mA typ.<br>48 V models: 75 mA typ.                                                                                                                        |
| Surge voltage (1000 msec. max.)                    | 5.0 V models: 11 V max.<br>12 V models: 25 V max.<br>24 V models: 50 V max.<br>48 V models: 100 V max.                                                                                                                              |
| Start-up voltage / under voltage lockout           | 5.0 V models: 4.5 VDC / 4 VDC or lower<br>12 V models: 9 VDC / 8.5 VDC or lower<br>24 V models: 18 VDC / 17 VDC or lower<br>48 V models: 36 VDC / 34 VDC or lower<br>long term operation at undervoltage will damage the converter! |
| Reverse polarity input current                     | 1.0 A max.                                                                                                                                                                                                                          |
| Conducted noise (input)                            | EN 55022 level A, FCC part 15, level A with external capacitor (tba)                                                                                                                                                                |
| Recommended input fuse (slow blow)                 | 5 V models: 2000 mA<br>12 V models: 1000 mA<br>24 V models: 500 mA<br>48 V models: 250 mA                                                                                                                                           |

## Output Specifications

|                                                        |                                                                                                                                                                                                                                                                                                                |
|--------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Voltage set accuracy                                   | ±1 % max.                                                                                                                                                                                                                                                                                                      |
| Regulation                                             | – Input variation $V_{in}$ min. to $V_{in}$ max.<br>– Load variation 25 – 100%<br>0.5 % max.<br>1.0 % max.                                                                                                                                                                                                     |
| Minimum load                                           | 25 % of rated max. load (operation at lower load condition is safe but a higher output ripple will be experienced)                                                                                                                                                                                             |
| Temperature coefficient                                | 0.02 %/K                                                                                                                                                                                                                                                                                                       |
| Ripple and noise (20 MHz bandwidth)                    | 75 mVp-p max.                                                                                                                                                                                                                                                                                                  |
| Transient response setting time (25% load step change) | 300 $\mu$ s typ. (PFM)                                                                                                                                                                                                                                                                                         |
| Current limitation                                     | >120 % of $I_{out}$ max.                                                                                                                                                                                                                                                                                       |
| Short circuit protection                               | continuous, automatic recovery                                                                                                                                                                                                                                                                                 |
| Capacitive load                                        | 3.3 VDC models: 1'760 $\mu$ F max.<br>5 VDC models: 1'000 $\mu$ F max.<br>12 VDC models: 170 $\mu$ F max.<br>15 VDC models: 110 $\mu$ F max.<br>$\pm$ 5 VDC models: 470 $\mu$ F max. (each output)<br>$\pm$ 12 VDC models: 100 $\mu$ F max. (each output)<br>$\pm$ 5 VDC models: 47 $\mu$ F max. (each output) |

## General Specifications

|                                                                       |                                                                                                                    |
|-----------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| Temperature ranges                                                    | – Operating<br>– Case temperature<br>– Storage<br>–40°C to +85°C (with derating)<br>+100°C max.<br>–55°C to +105°C |
| Load derating                                                         | 3.3 %/K above +70°C                                                                                                |
| Humidity (non condensing)                                             | 95 % rel. H max.                                                                                                   |
| Reliability, calculated MTBF (MIL-HDBK-217F, at +25°C, ground benign) | >1 Mio h                                                                                                           |

All specifications valid at nominal input voltage, full load and +25°C after warm-up time unless otherwise stated.

## General Specifications

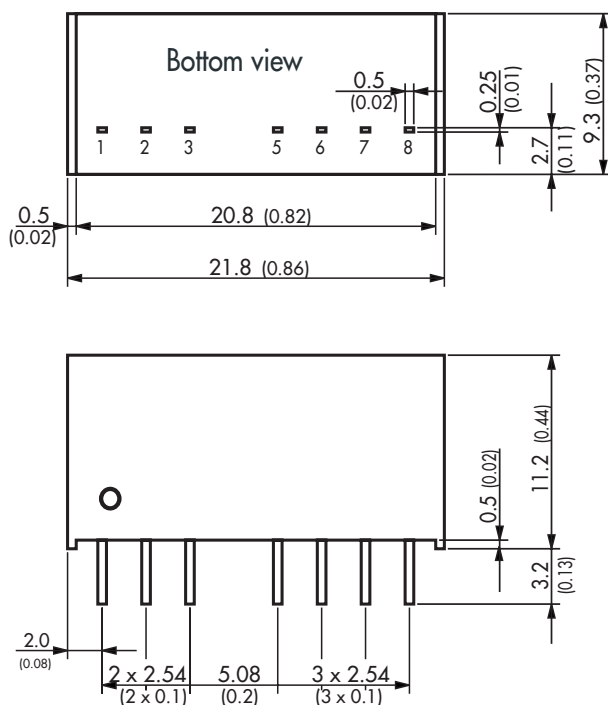
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|-----------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Isolation voltage (60 sec.) | – Input/Output                                                                      | 1'500 VDC                                                                                                                                                                                                          |
| Isolation capacitance       | – Input/Output                                                                      | 200 pF max.                                                                                                                                                                                                        |
| Isolation resistance        | – Input/Output (500 VDC)                                                            | >1 GOhm                                                                                                                                                                                                            |
| Switching frequency         |                                                                                     | 200 - 300 kHz (PFM)                                                                                                                                                                                                |
| Altitude during operation   |                                                                                     | 5'000 m max. (16'400 ft) approved                                                                                                                                                                                  |
| Safety standards            |                                                                                     | UL 60950-1, IEC/EN 60950-1                                                                                                                                                                                         |
| Safety approvals            | – CB test certificate according IEC 60950-1<br>– CSA certificate for UL/cUL 60950-1 | <a href="http://www.tracopower.com/products/tmr3e-cb.pdf">www.tracopower.com/products/tmr3e-cb.pdf</a><br><a href="http://www.tracopower.com/products/tmr3e-csa.pdf">www.tracopower.com/products/tmr3e-csa.pdf</a> |
| Remote On/Off               | – On:<br>– Off:<br>– Off standby current:<br>– Off control input current:           | < 0.6 VDC or open circuit<br>2.7 to 15 VDC (ref. to –Vin)<br>2.5 mA max.<br>1 mA max.                                                                                                                              |

## Physical Specifications

|                       |                                        |
|-----------------------|----------------------------------------|
| Casing material       | non-conductive plastic (UL94V-0 rated) |
| Potting material      | epoxy, (UL 94V-0 rated)                |
| Weight                | 4.8 g (0.17 oz)                        |
| Soldering temperature | max. 260°C / 10 sec.                   |

**Application note:** [www.tracopower.com/products/tmr3e-application.pdf](http://www.tracopower.com/products/tmr3e-application.pdf)

## Outline Dimensions



| Pinout |               |               |
|--------|---------------|---------------|
| Pin    | single output | dual output   |
| 1      | –Vin (GND)    | –Vin (GND)    |
| 2      | +Vin (Vcc)    | +Vin (Vcc)    |
| 3      | Remote On/Off | Remote On/Off |
| 5      | ntc.          | ntc.          |
| 6      | +Vout         | +Vout         |
| 7      | –Vout         | Common        |
| 8      | ntc.          | –Vout         |

ntc. = Not to connect

Dimensions in [mm], ( ) = Inch  
 Tolerances:  $\pm 0.5$  ( $\pm 0.02$ )  
 Pin pitch tolerances:  $\pm 0.25$  ( $\pm 0.01$ )

Specifications can be changed without notice! Make sure you are using the latest documentation, downloadable at [www.tracopower.com](http://www.tracopower.com)