

- Fully encapsulated low profile plastic case
- Ultra wide 4:1 input voltage range
- Operating temperature range  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- I/O isolation 2500 VDC
- Excellent efficiency up to 92 %
- Input filter to meet EN 55022, class A
- Optional DIN-Rail mount adapter
- Power good LED indicator
- Remote on/off function
- 3-year product warranty



The TMDC 60 Series is a range of encapsulated high performance DC/DC converter modules with ultra wide input voltage ranges. With a very high efficiency of up to 92% and the use of highest grade components these 60 W converters can be operated in an ambient temperature range of  $-40^{\circ}\text{C}$  up to  $70^{\circ}\text{C}$  with full load and up to  $85^{\circ}\text{C}$  with 50% load reduction. The EMC immunity is aligned for industrial applications and DIN-rail mount adapters are available as option. Remote On/Off function and power good LED indicator makes this unit a practical and reliable DC source for any application - Fit and forget!

| Models       |                              |                     |                     |                 |
|--------------|------------------------------|---------------------|---------------------|-----------------|
| Order Code   | Input Voltage Range          | Output Voltage nom. | Output Current max. | Efficiency typ. |
| TMDC 60-2411 | 9 - 36 VDC<br>(24 VDC nom.)  | 5.1 VDC             | 12'000 mA           | 90 %            |
| TMDC 60-2412 |                              | 12 VDC              | 5'000 mA            | 91 %            |
| TMDC 60-2415 |                              | 24 VDC              | 2'500 mA            | 91 %            |
| TMDC 60-2418 |                              | 48 VDC              | 1'250 mA            | 91 %            |
| TMDC 60-4811 | 18 - 75 VDC<br>(48 VDC nom.) | 5.1 VDC             | 12'000 mA           | 91 %            |
| TMDC 60-4812 |                              | 12 VDC              | 5'000 mA            | 92 %            |
| TMDC 60-4815 |                              | 24 VDC              | 2'500 mA            | 91 %            |
| TMDC 60-4818 |                              | 48 VDC              | 1'250 mA            | 91 %            |

| Options |  |
|---------|--|
| TMP-MK2 | - Optional DIN-Rail Mounting Kit: <a href="http://www.tracopower.com/overview/tmp-mk2">www.tracopower.com/overview/tmp-mk2</a> |

### Input Specifications

|                        |                |   |
|------------------------|----------------|---|
| Input Current          | - At no load   | 24 Vin models: 100 mA typ.<br>48 Vin models: 50 mA typ.                               |
|                        | - At full load | 24 Vin models: 2'770 mA typ.<br>48 Vin models: 1'380 mA typ.                          |
| Surge Voltage          |                | 24 Vin models: 50 VDC max. (100 ms max.)<br>48 Vin models: 100 VDC max. (100 ms max.) |
| Under Voltage Lockout  |                | 24 Vin models: 7.5 VDC typ.<br>48 Vin models: 16 VDC typ.                             |
| Recommended Input Fuse |                | (The need of an external fuse has to be assessed in the final application.)           |
| Input Filter           |                | Internal Pi-Type  |

### Output Specifications

|  |                                 |   |
|--|---------------------------------|---|
| Voltage Set Accuracy                   |                                 | ±2% max.                                |
| Regulation                             | - Input Variation (Vmin - Vmax) | 1.5% max.                               |
|  | - Load Variation (0 - 100%)     | 1% max.                                 |
| Ripple and Noise<br>(20 MHz Bandwidth) | 5.1 Vout models:                | 100 mVp-p max.                          |
|  | 12 Vout models:                 | 150 mVp-p max.                          |
|  | 24 Vout models:                 | 150 mVp-p max.                          |
|  | 48 Vout models:                 | 200 mVp-p max.                          |
| Capacitive Load                        | 5.1 Vout models:                | 20'400 µF max.                          |
|  | 12 Vout models:                 | 3'540 µF max.                           |
|  | 24 Vout models:                 | 890 µF max.                             |
|  | 48 Vout models:                 | 220 µF max.                             |
| Minimum Load                           |                                 | Not required                            |
| Temperature Coefficient                |                                 | ±0.02 %/K max.                          |
| Start-up Time                          |                                 | 50 ms max.                              |
| Short Circuit Protection               |                                 | Continuous, Automatic recovery          |
| Output Current Limitation              |                                 | 150% typ. of Iout max.                  |
| Overvoltage Protection                 |                                 | 120% typ. of Vout nom. (By Zener diode) |
| Transient Response                     | - Response Deviation            | 5% max. (75% to 100% Load Step)         |
|  | - Response Time                 | 250 µs typ. (75% to 100% Load Step)     |

### Safety Specifications

|                  |                             |  |
|------------------|-----------------------------|--|
| Standards        | - IT / Multimedia Equipment | CSA-C22.2, No. 60950-1<br>EN 60950-1<br>EN 62368-1<br>IEC 60950-1<br>IEC 62368-1<br>UL 60950-1<br>UL 62368-1 |
|                  | - Certification Documents   | <a href="http://www.tracopower.com/overview/tmdc60">www.tracopower.com/overview/tmdc60</a>                   |
| Pollution Degree |                             | PD 2   |

### EMC Specifications

|                 |                           |  |
|-----------------|---------------------------|--|
| EMI (Emissions) | - Conducted Emissions     | EN 61000-6-4 (Generic Industrial)<br>EN 61204-3 (Low Voltage Power Supplies)<br>EN 55032 class A (internal filter)<br>FCC 47 Part 15 class A (internal filter) |
|                 | - Radiated Emissions      | EN 55032 class A (with external filter)<br>FCC 47 Part 15 class A (with external filter)   |
|                 | External filter proposal: | <a href="http://www.tracopower.com/overview/tmdc60">www.tracopower.com/overview/tmdc60</a>   |

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

|                     |  |   |
|---------------------|--|---|
| EMS (Immunity)      | <ul style="list-style-type: none"> <li>- Electrostatic Discharge</li> <li>- RF Electromagnetic Field</li> <li>- EFT (Burst) / Surge</li> <li>- Conducted RF Disturbances</li> <li>- PF Magnetic Field</li> </ul> | EN 55024 (IT Equipment)<br>EN 55035 (Multimedia)<br>Air: EN 61000-4-2, $\pm 8$ kV, perf. criteria A<br>Contact: EN 61000-4-2, $\pm 4$ kV, perf. criteria A<br>EN 61000-4-3, 10 V/m, perf. criteria A<br>EN 61000-4-4, $\pm 2$ kV, perf. criteria A<br>EN 61000-4-5, $\pm 2$ kV, perf. criteria A<br>EN 61000-4-6, 10 Vrms, perf. criteria A<br>Continuous: EN 61000-4-8, 30 A/m, perf. criteria A |
| EMC / Environmental | - Certification Documents  | <a href="http://www.tracopower.com/overview/tmdc60">www.tracopower.com/overview/tmdc60</a>  |

## General Specifications

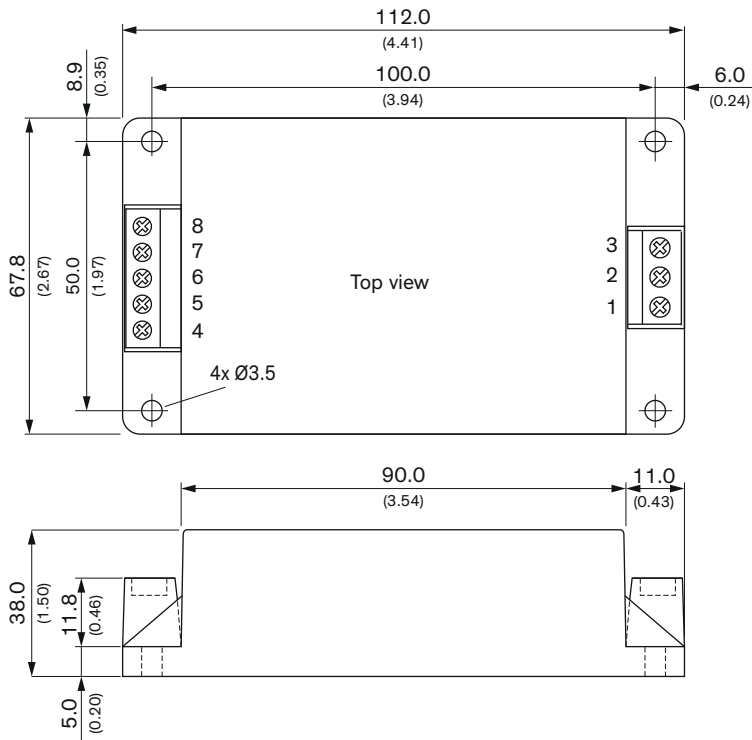
|                           |  |  |
|---------------------------|--|--|
| Relative Humidity         |  | 95% max. (non condensing)  |
| Temperature Ranges        | <ul style="list-style-type: none"> <li>- Operating Temperature</li> <li>- Approved Ambient Temp.</li> <li>- Case Temperature</li> <li>- Storage Temperature</li> </ul> | -40°C to +85°C<br>+60°C max. (for compliance to 60950-1)<br>+95°C max.<br>-50°C to +125°C  |
| Power Derating            | - High Temperature   | 3.3 %/K above 70°C (average)   |
|                           | See application note:  | <a href="http://www.tracopower.com/overview/tmdc60">www.tracopower.com/overview/tmdc60</a>   |
| Cooling System            |  | Natural convection (20 LFM)  |
| Remote Control            | <ul style="list-style-type: none"> <li>- Voltage Controlled Remote (passive = on)</li> <li>- Off Idle Input Current</li> <li>- Remote Pin Input Current</li> </ul>     | On: 3.5 to 12 VDC or open circuit<br>Off: 0 to 1.2 VDC or short circuit<br>Refers to 'Remote' and '-Vin' Pin<br>3 mA typ.<br>-0.5 to 0.5 mA  |
| Altitude During Operation |  | 6'000 m max.   |
| Switching Frequency       |  | 210 kHz typ. (PWM)   |
| Insulation System         |  | Functional Insulation  |
| Isolation Test Voltage    | - Input to Output, 60 s  | 2'500 VDC  |
| Isolation Resistance      | - Input to Output, 500 VDC   | 1'000 M $\Omega$ min.  |
| Isolation Capacitance     | - Input to Output, 100 kHz, 1 V  | 3'000 pF max.  |
| Reliability               | - Calculated MTBF  | 242'029 h (MIL-HDBK-21 7F, ground benign)  |
| Housing Material          |  | Plastic (UL 94 V-0 rated)  |
| Potting Material          |  | Silicone (UL 94 V-0 rated)   |
| Housing Type              |  | Plastic Case   |
| Mounting Type             |  | Chassis Mount  |
| Connection Type           |  | Screw Terminal   |
| Weight                    |  | 300 g  |
| Thermal Impedance         | - Case to Ambient  | 3.5 K/W typ.   |
| Environmental Compliance  | - REACH Declaration  | <a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a><br>REACH SVHC list compliant<br>REACH Annex XVII compliant  |
|                           | - RoHS Declaration   | <a href="http://www.tracopower.com/info/rohs-declaration.pdf">www.tracopower.com/info/rohs-declaration.pdf</a><br>Exemptions: 6c, 7c-I<br>(RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule.)) |
|                           | - SCIP Reference Number  | b8ea32d4-bc4d-4c30-88d6-db58d43308cc   |

## Supporting Documents

|  |  |
|--|--|
| Overview Link (for additional Documents) | <a href="http://www.tracopower.com/overview/tmdc60">www.tracopower.com/overview/tmdc60</a> |
|--|--|

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**Outline Dimensions**



Dimensions in mm (inch)  
Tolerances: x.x ±0.5 (±0.02)

Mounting screw locked torque: 0.49 Nm (5.0 kgfcm)

| Pinout |            |
|--------|------------|
| Pin*   | Function   |
| 1      | Remote     |
| 2      | -Vin (GND) |
| 3      | +Vin (Vcc) |
| 4      | NC         |
| 5      | +Vout      |
| 6      | NC         |
| 7      | -Vout      |
| 8      | NC         |

NC: Not connected  
\* Wires 1.5 mm<sup>2</sup> max.

Terminal screw locked torque:  
0.5 Nm max.