

- Compact 3 Watt converter in SIP-4 package
- Continuous short circuit protection
- Unregulated outputs
- Operating temperature range -40 to +75 °C without derating
- I/O isolation: 1'500 VDC
- Input voltage ranges ( $\pm 10\%$ ): 5, 12, 24 VDC
- High efficiency up to 86%
- 3-year product warranty



The TMU 3 series consists of a set of isolated 3 Watt DC/DC converters with unregulated outputs in a standard SIP-4 package. They are designed to offer a compact low-cost alternative to regulated series with no concession on quality and lifetime. They feature a continuous short circuit protection circuit, I/O-isolation of 1500 VDC and an operating temperature range from -40°C to 75°C without derating. The compact dimensions of these converters make them an ideal solution for many space critical applications in communication equipment, instrumentation and industrial electronics.

Models				
Order Code	Input Voltage Range	Output Voltage nom.	Output Current max.	Efficiency typ.
TMU 3-0511	4.5 - 5.5 VDC (5 VDC nom.)	5 VDC	600 mA	79 %
TMU 3-0512		12 VDC	250 mA	83 %
TMU 3-0513		15 VDC	200 mA	84 %
TMU 3-1211	10.8 - 13.2 VDC (12 VDC nom.)	5 VDC	600 mA	81 %
TMU 3-1212		12 VDC	250 mA	85 %
TMU 3-1213		15 VDC	200 mA	85 %
TMU 3-2411	21.6 - 26.4 VDC (24 VDC nom.)	5 VDC	600 mA	82 %
TMU 3-2412		12 VDC	250 mA	86 %
TMU 3-2413		15 VDC	200 mA	86 %

### Input Specifications

Input Current	- At no load	5 Vin models: <b>85 mA typ.</b> 12 Vin models: <b>45 mA typ.</b> 24 Vin models: <b>18 mA typ.</b>
	- At full load	5 Vin models: <b>759 mA typ.</b> (5 Vout model) <b>723 mA typ.</b> (12 Vout model) <b>714 mA typ.</b> (15 Vout model) 12 Vin models: <b>309 mA typ.</b> (5 Vout model) <b>294 mA typ.</b> (12 Vout model) <b>294 mA typ.</b> (15 Vout model) 24 Vin models: <b>152 mA typ.</b> (5 Vout model) <b>145 mA typ.</b> (12 Vout model) <b>145 mA typ.</b> (15 Vout model)
Surge Voltage		5 Vin models: <b>9 VDC max.</b> (1 s max.) 12 Vin models: <b>18 VDC max.</b> (1 s max.) 24 Vin models: <b>30 VDC max.</b> (1 s max.)
Recommended Input Fuse		5 Vin models: <b>1'500 mA</b> (slow blow) 12 Vin models: <b>1'000 mA</b> (slow blow) 24 Vin models: <b>500 mA</b> (slow blow) (The need of an external fuse has to be assessed in the final application.)
Input Filter		<b>Internal Capacitor</b>

### Output Specifications

Voltage Set Accuracy		<b>±3.5% max.</b> (60% load: 5 Vout models) <b>±3.5% max.</b> (80% load: 12 & 15 Vout models)
Regulation	- Input Variation (1% Vin step) - Load Variation	<b>1.5% max.</b> See application note: <a href="http://www.tracopower.com/overview/tmu3">www.tracopower.com/overview/tmu3</a>
Ripple and Noise	- 20 MHz Bandwidth	<b>100 mVp-p typ.</b>
Capacitive Load		12 Vout models: <b>1'000 µF max.</b> 15 Vout models: <b>820 µF max.</b> - 5 Vin input: 5 Vout models: <b>2'200 µF max.</b> - 12 Vin input: 5 Vout models: <b>2'000 µF max.</b> - 24 Vin input: 5 Vout models: <b>2'000 µF max.</b>
Minimum Load		<b>Not required</b>
Temperature Coefficient		<b>±0.02 %/K max.</b>
Start-up Time		<b>5 ms max.</b>
Short Circuit Protection		<b>Continuous, Automatic recovery</b>
Output Current Limitation		<b>250% max. of Iout max.</b>

### EMC Specifications

EMI Emissions	- Conducted Emissions	<b>EN 55032 class A</b> (with external filter)
	- Radiated Emissions	<b>EN 55032 class A</b> (with external filter) External filter proposal: <a href="http://www.tracopower.com/overview/tmu3">www.tracopower.com/overview/tmu3</a>
EMS Immunity		<b>EN 55024</b> (IT Equipment) <b>EN 55035</b> (Multimedia)
	- Electrostatic Discharge	Air: <b>EN 61000-4-2, ±8 kV, perf. criteria A</b> Contact: <b>EN 61000-4-2, ±6 kV, perf. criteria A</b>
	- RF Electromagnetic Field	<b>EN 61000-4-3, 10 V/m, perf. criteria A</b>
	- EFT (Burst) / Surge	<b>EN 61000-4-4, ±2 kV, perf. criteria A</b> <b>EN 61000-4-5, ±1 kV, perf. criteria A</b>
		External filter proposal: <a href="http://www.tracopower.com/overview/tmu3">www.tracopower.com/overview/tmu3</a>
	- Conducted RF Disturbances - PF Magnetic Field	<b>EN 61000-4-6, 10 Vrms, perf. criteria A</b> Continuous: <b>EN 61000-4-8, 30 A/m, perf. criteria A</b>

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

## General Specifications

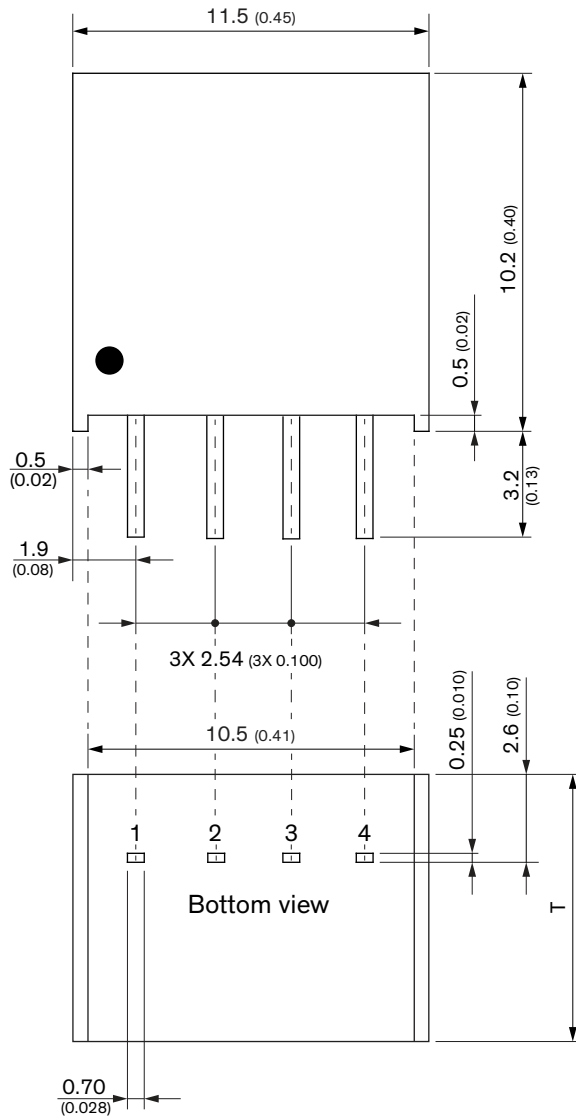
Relative Humidity		95% max. (non condensing)
Temperature Ranges	- Operating Temperature - Case Temperature - Storage Temperature	-40°C to +85°C +105°C max. -50°C to +125°C
Power Derating	- High Temperature	Depending on model See application note: <a href="http://www.tracopower.com/overview/tmu3">www.tracopower.com/overview/tmu3</a>
Cooling System		Natural convection (20 LFM)
Switching Frequency		20 - 80 kHz (Royer) 60 kHz typ. (Royer)
Insulation System		Functional Insulation
Isolation Test Voltage	- Input to Output, 60 s - Input to Output, 1 s	1'500 VDC 1'800 VDC
Isolation Resistance	- Input to Output, 500 VDC	1'000 MΩ min.
Isolation Capacitance	- Input to Output, 100 kHz, 1 V	120 pF typ. 160 pF max.
Distance Through Isolation		1.5 mm
Reliability	- Calculated MTBF	4'960'000 h (MIL-HDBK-217F, ground benign)
Washing Process		Allowed (hermetical product) See Cleaning Guideline: <a href="http://www.tracopower.com/info/cleaning.pdf">www.tracopower.com/info/cleaning.pdf</a>
Environment	- Vibration  - Mechanical Shock  - Thermal Shock	IPC-9592B 2.4 g, 3 axis, random waveform, 30 min IPC-9592B 30 g, 3 axis, half sine, 11 ms IPC-9592B -40 to +125°C, 100 cycles, 30 min each
Housing Material		Plastic (UL 94 V-0 rated)
Potting Material		Silicone (UL 94 V-0 rated)
Pin Material		Phosphor Bronze (C5191)
Pin Foundation Plating		Nickel (0.5 μm min.)
Pin Surface Plating		Tin (3 - 5 μm), matte
Housing Type		Plastic Case
Mounting Type		PCB Mount
Connection Type		THD (Through-Hole Device)
Footprint Type		SIP4
Soldering Profile		Wave Soldering 260°C / 10 s max.
Weight	5 Vin models: 12 Vin models: 24 Vin models:	3.2 g 3.2 g 3.4 g
Thermal Impedance	- Case to Ambient	52 K/W typ.
Environmental Compliance	- REACH Declaration  - RoHS Declaration	<a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a> REACH SVHC list compliant REACH Annex XVII compliant <a href="http://www.tracopower.com/info/rohs-declaration.pdf">www.tracopower.com/info/rohs-declaration.pdf</a> Exemptions: 7a (RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule). The SCIP number is provided on request.)

## Supporting Documents

Overview Link (for additional Documents) [www.tracopower.com/overview/tmu3](http://www.tracopower.com/overview/tmu3)

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

### Outline Dimensions



Pinout	
Pin	Single
1	-Vin (GND)
2	+Vin (Vcc)
3	-Vout
4	+Vout

T: 8.6 (0.34) for 5Vin & 12Vin Models  
 T: 9.6 (0.38) for 24Vin Models

Dimensions in mm (inch)  
 Tolerance: x.x ±0.5 (x.xx ±0.02)  
 x.xx ±0.25 (x.xxx ±0.01)  
 Pins: ±0.05 (±0.002)