TRACO POWER

DC/DC Converter

TMR 1SM Series, 1 Watt

- **Wide 2:1 input voltage range**
- **Compact SMD package**
- **Fully regulated outputs**
- **Cost optimised design**
- **No minimum load required**
- **Continuous short circuit protection**
- **Temperature range –40°C to +85°C**
- **I/O isolation 1500 VDC**
- **Remote On/Off control**
- **3-year product warranty**

UL 62368-1 IEC 62368-1

The TMR 1SM series is a family of isolated 1 W DC/DC converter modules with regulated output, featuring wide 2:1 input voltage ranges. These products come in a compact SMD package with small footprint.
An excellent efficiency allows –40°C to +85°C operation temperature. Further features include remote On/Off control and continuous short circuit protection. The compact dimensions and cost optimised design make this converters an ideal solution for applications in communication equipment, instrumentation and industrial electronics.

Models

Order Code	Input Voltage Range	Output 1		Output 2		Efficiency
		Vnom	Imax	Vnom	Imax	typ.
TMR 1-0511SM	4.5 - 9 VDC (5 VDC nom.)	5 VDC	200 mA			78 %
TMR 1-0512SM		12 VDC	83 mA			79 %
TMR 1-0513SM		15 VDC	67 mA			81 %
TMR 1-0522SM		+12 VDC	42 mA	–12 VDC	42 mA	79 %
TMR 1-0523SM		+15 VDC	33 mA	–15 VDC	33 mA	80 %
TMR 1-1211SM	9 - 18 VDC (12 VDC nom.)	5 VDC	200 mA			79 %
TMR 1-1212SM		12 VDC	83 mA			79 %
TMR 1-1213SM		15 VDC	67 mA			82 %
TMR 1-1222SM		+12 VDC	42 mA	–12 VDC	42 mA	81 %
TMR 1-1223SM		+15 VDC	33 mA	–15 VDC	33 mA	80 %
TMR 1-2411SM	18 - 36 VDC (24 VDC nom.)	5 VDC	200 mA			79 %
TMR 1-2412SM		12 VDC	83 mA			82 %
TMR 1-2413SM		15 VDC	67 mA			82 %
TMR 1-2422SM		+12 VDC	42 mA	–12 VDC	42 mA	82 %
TMR 1-2423SM		+15 VDC	33 mA	–15 VDC	33 mA	82 %
TMR 1-4811SM	36 - 75 VDC (48 VDC nom.)	5 VDC	200 mA			79 %
TMR 1-4812SM		12 VDC	83 mA			80 %
TMR 1-4813SM		15 VDC	67 mA			80 %
TMR 1-4822SM		+12 VDC	42 mA	–12 VDC	42 mA	81 %
TMR 1-4823SM		+15 VDC	33 mA	–15 VDC	33 mA	81 %

Input Specifications

Input Current	- At no load	5 Vin models:	40 mA typ.
		12 Vin models:	20 mA typ.
		24 Vin models:	10 mA typ.
		48 Vin models:	7 mA typ.
Surge Voltage		5 Vin models:	15 VDC max. (1 s max.)
		12 Vin models:	25 VDC max. (1 s max.)
		24 Vin models:	50 VDC max. (1 s max.)
		48 Vin models:	100 VDC max. (1 s max.)
Reflected Ripple Current		5 Vin models:	80 mAp-p typ.
		12 Vin models:	40 mAp-p typ.
		24 Vin models:	30 mAp-p typ.
		48 Vin models:	20 mAp-p typ.
Recommended Input Fuse		5 Vin models:	500 mA (slow blow)
		12 Vin models:	250 mA (slow blow)
		24 Vin models:	120 mA (slow blow)
		48 Vin models:	60 mA (slow blow)
			(The need of an external fuse has to be assessed in the final application.)

Output Specifications

Voltage Set Accuracy			±1% max.
Regulation	- Input Variation (Vmin - Vmax)	single output models:	0.2% max.
		dual output models:	0.2% max.
	- Load Variation (10 - 90%)	single output models:	0.5% max.
		dual output models:	0.8% max. (Output 1)
			0.8% max. (Output 2)
Ripple and Noise	- 20 MHz Bandwidth		75 mVp-p max.
Capacitive Load	- single output	5 Vout models:	1'680 µF max.
		12 Vout models:	820 µF max.
		15 Vout models:	680 µF max.
	- dual output	12 / -12 Vout models:	470 / 470 µF max.
		15 / -15 Vout models:	330 / 330 µF max.
Minimum Load			Not required
Temperature Coefficient			±0.02 %/K max.
Short Circuit Protection			Automatic recovery
Overload Protection			Foldback Mode
Output Current Limitation			120% min. of Iout max.
			130% typ. of Iout max.
Transient Response	- Response Deviation		5% max. (25% Load Step)
	- Response Time		250 µs typ. (25% Load Step)

Safety Specifications

Safety Standards	- IT / Multimedia Equipment	CSA-C22.2, No. 60950-1
		EN 60950-1
		EN 62368-1
		IEC 60950-1
		IEC 62368-1
		UL 60950-1
		UL 62368-1
	- Certification Documents	www.tracopower.com/overview/tmr1sm
Pollution Degree		PD 2

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

EMC Specifications

EMI Emissions	- Conducted Emissions	EN 55032 class A (with external filter) FCC Part 15 class A (with external filter)
	External filter proposal:	www.tracopower.com/overview/tmr1sm

General Specifications

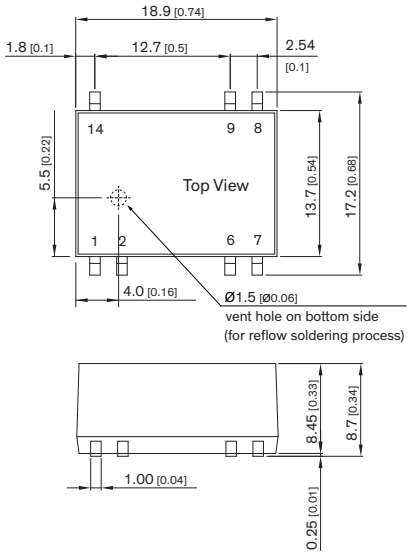
Relative Humidity		95% max. (non condensing)
Temperature Ranges	- Operating Temperature	–40°C to +85°C
	- Case Temperature	+95°C max.
	- Storage Temperature	–55°C to +125°C
Power Derating	- High Temperature	5 %/K above 75°C
Cooling System		Natural convection (20 LFM)
Remote Control	- Voltage Controlled Remote	On: < 0.6 VDC or open circuit Off: 3 to 15 VDC Refers to 'Remote' and '-Vin' Pin
	- Current Controlled Remote	On: open circuit Off: 2 to 4 mA current
	- Off Idle Input Current	3 mA max.
Altitude During Operation		6'000 m max.
Switching Frequency		220 kHz typ. (PFM)
Insulation System		Functional Insulation
Isolation Test Voltage	- Input to Output, 60 s	1'500 VDC
Isolation Resistance	- Input to Output, 500 VDC	1'000 MΩ min.
Isolation Capacitance	- Input to Output, 100 kHz, 1 V	50 pF max.
Reliability	- Calculated MTBF	2'800'000 h (MIL-HDBK-217F, ground benign)
Moisture Sensitivity (MSL)		Level 2 (J-STD-033C)
Washing Process		Not allowed (vent-hole without membrane)
Housing Material		Non-conductive Plastic (UL 94 V-0 rated)
Pin Material		Phosphor Bronze (C5191)
Pin Foundation Plating		Copper (1 - 3 µm)
Pin Surface Plating		Tin (7.5 µm min.), matte
Housing Type		Plastic Case
Mounting Type		PCB Mount
Connection Type		SMD (Surface-Mount Device)
Footprint Type		SMD14
Soldering Profile		Reflow Soldering (J-STD-020E)
Weight		2.9 g
Environmental Compliance	- REACH Declaration	www.tracopower.com/info/reach-declaration.pdf REACH SVHC list compliant REACH Annex XVII compliant
	- RoHS Declaration	www.tracopower.com/info/rohs-declaration.pdf 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.)

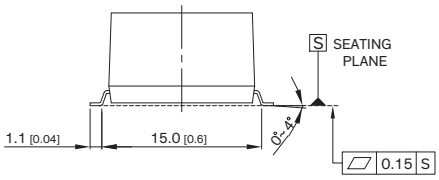
Supporting Documents

Overview Link (for additional Documents)	www.tracopower.com/overview/tmr1sm

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

Outline Dimensions



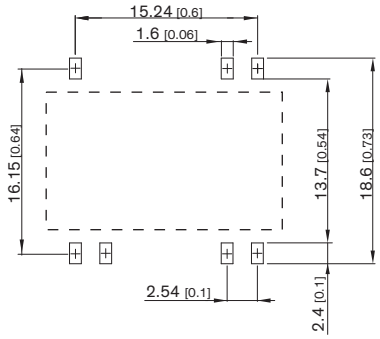


Dimensions in mm [inch]
Tolerances: ±0.5 [±0.02]
Pin pitch tolerances: ±0.25 [±0.01]

Pinout		
Pin	**Single Output**	**Dual Output**
1	–Vin (GND)	–Vin (GND)
2	Remote	Remote
6	NC	Common
7	NC	–Vout
8	+Vout	+Vout
9	–Vout	Common
14	+Vin	+Vin

NTC: Not connected

Recommended Solder Pad Layout



Dimensions in mm [inch]