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TRACO POWER

DC/DC Converter

TMR 12WI Series, 12 Watt

- **Ultra compact 12 Watt converter in SIP-8 metal casing**
- **Highest power density of 4,73W/cm³**
- **Wide 4:1 input voltage ranges**
- **I/O-isolation 1600 VDC**
- **High efficiency (up to 90%) for low thermal loss**
- **Operating temperature range -40°C to +85°C**
- **Fully regulated outputs**
- **Remote On/Off control**
- **Indefinite short circuit protection**
- **3-year product warranty**



UL 62368-1 IEC 62368-1

The TMR 12WI series is a family of isolated 12W DC/DC converter modules with regulated output, featuring wide 4:1 input voltage ranges. The product offers a very high power density of 4.73W/cm³ in an ultra-compact SIP-8 metal package occupying only 2.0 cm² (0.3 square inch) of board space. An excellent efficiency of up to 90% allows for an extended operating temperature range of –40° to +65°C without derating under natural convection conditions (see recommended PCB layout). Further features include remote On/Off control, continuous short circuit protection and an I/O isolation voltage of 1600 VDC. The very 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 1		Output 2		Efficiency
		Vnom	Imax	Vnom	Imax	typ.
TMR 12-1210WI	4.5 - 18 VDC (12 VDC nom.)	3.3 VDC	3'000 mA			87 %
TMR 12-1211WI		5.1 VDC	2'400 mA			89 %
TMR 12-1212WI		12 VDC	1'000 mA			89 %
TMR 12-1213WI		15 VDC	800 mA			89 %
TMR 12-1215WI		24 VDC	500 mA			90 %
TMR 12-1221WI		+5 VDC	1'200 mA	–5 VDC	1'200 mA	86 %
TMR 12-1222WI		+12 VDC	500 mA	–12 VDC	500 mA	89 %
TMR 12-1223WI		+15 VDC	400 mA	–15 VDC	400 mA	89 %
TMR 12-2410WI	9 - 36 VDC (24 VDC nom.)	3.3 VDC	3'000 mA			87 %
TMR 12-2411WI		5.1 VDC	2'400 mA			89 %
TMR 12-2412WI		12 VDC	1'000 mA			89 %
TMR 12-2413WI		15 VDC	800 mA			89 %
TMR 12-2415WI		24 VDC	500 mA			90 %
TMR 12-2421WI		+5 VDC	1'200 mA	–5 VDC	1'200 mA	86 %
TMR 12-2422WI		+12 VDC	500 mA	–12 VDC	500 mA	89 %
TMR 12-2423WI		+15 VDC	400 mA	–15 VDC	400 mA	89 %
TMR 12-4810WI	18 - 75 VDC (48 VDC nom.)	3.3 VDC	3'000 mA			87 %
TMR 12-4811WI		5.1 VDC	2'400 mA			89 %
TMR 12-4812WI		12 VDC	1'000 mA			89 %
TMR 12-4813WI		15 VDC	800 mA			89 %
TMR 12-4815WI		24 VDC	500 mA			90 %
TMR 12-4821WI		+5 VDC	1'200 mA	–5 VDC	1'200 mA	86 %
TMR 12-4822WI		+12 VDC	500 mA	–12 VDC	500 mA	90 %
TMR 12-4823WI		+15 VDC	400 mA	–15 VDC	400 mA	89 %

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Options

on demand (backorder with MOQ non stocking item)	- Optional model with 9 VDC / 1'333 mA Output and 4.5 - 18 VDC Input - Optional model with 9 VDC / 1'333 mA Output and 9 - 36 VDC Input - Optional model with 9 VDC / 1'333 mA Output and 18 - 75 VDC Input - Optional models with 3'000 VDC I/O-Isolation

Input Specifications

Input Current	- At no load	12 Vin models:	**25 mA typ.** (3.3 Vout model)
			25 mA typ. (5.1 Vout model)
			12 mA typ. (9 Vout model)
			12 mA typ. (12 Vout model)
			12 mA typ. (15 Vout model)
			12 mA typ. (24 Vout model)
			12 mA typ. (5 / -5 Vout model)
			12 mA typ. (12 / -12 Vout model)
			12 mA typ. (15 / -15 Vout model)
		24 Vin models:	**6 mA typ.** (3.3 Vout model)
			7 mA typ. (5.1 Vout model)
			6 mA typ. (9 Vout model)
			6 mA typ. (12 Vout model)
			6 mA typ. (15 Vout model)
			6 mA typ. (24 Vout model)
			6 mA typ. (5 / -5 Vout model)
			6 mA typ. (12 / -12 Vout model)
			6 mA typ. (15 / -15 Vout model)
		48 Vin models:	**3 mA typ.** (3.3 Vout model)
			4 mA typ. (5.1 Vout model)
			3 mA typ. (9 Vout model)
			3 mA typ. (12 Vout model)
			3 mA typ. (15 Vout model)
			3 mA typ. (24 Vout model)
			3 mA typ. (5 / -5 Vout model)
			3 mA typ. (12 / -12 Vout model)
			3 mA typ. (15 / -15 Vout model)
Surge Voltage		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.)
Input Inrush Current			**50 A typ.**
Under Voltage Lockout		12 Vin models:	**2.5 VDC min. / 3.5 VDC typ. / 4.4 VDC max.**
		24 Vin models:	**6.2 VDC min. / 7.2 VDC typ. / 8.2 VDC max.**
		48 Vin models:	**12.5 VDC min. / 14.5 VDC typ. / 16.4 VDC max.**
Recommended Input Fuse		12 Vin models:	**5'000 mA** (slow blow)
		24 Vin models:	**2'500 mA** (slow blow)
		48 Vin models:	**1'250 mA** (slow blow)
			(The need of an external fuse has to be assessed in the final application.)
Input Filter			Internal Capacitor

Output Specifications

Voltage Set Accuracy	±1% max.

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

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Regulation	- Input Variation (Vmin - Vmax)	single output models:	0.2% max.
		dual output models:	0.2% max.
	- Load Variation (0 - 100%)	single output models:	0.5% max.
		dual output models:	1% max. (Output 1)
			1% max. (Output 2)
	- Voltage Balance (symmetrical load)	dual output models:	5% max.
	- Cross Regulation (25% / 100% asym. load)	dual output models:	5% max.
Ripple and Noise (20 MHz Bandwidth)	- single output	3.3 Vout models:	50 mVp-p typ. (w/ 1 µF)
		5.1 Vout models:	50 mVp-p typ. (w/ 1 µF)
		9 Vout models:	75 mVp-p typ. (w/ 1 µF)
		12 Vout models:	75 mVp-p typ. (w/ 1 µF)
		15 Vout models:	75 mVp-p typ. (w/ 1 µF)
		24 Vout models:	75 mVp-p typ. (w/ 1 µF)
	- dual output	5 / -5 Vout models:	50 / 50 mVp-p typ. (w/ 1 µF)
		12 / -12 Vout models:	75 / 75 mVp-p typ. (w/ 1 µF)
		15 / -15 Vout models:	75 / 75 mVp-p typ. (w/ 1 µF)
Capacitive Load	- single output	3.3 Vout models:	3'500 µF max.
		5.1 Vout models:	1'800 µF max.
		9 Vout models:	1'100 µF max.
		12 Vout models:	680 µF max.
		15 Vout models:	680 µF max.
		24 Vout models:	300 µF max.
	- dual output	5 / -5 Vout models:	1'100 / 1'100 µF max.
		12 / -12 Vout models:	560 / 560 µF max.
		15 / -15 Vout models:	300 / 300 µF max.
Minimum Load			Not required
Temperature Coefficient			±0.02 %/K max.
Hold-up Time			30 µs min.
Start-up Time			50 ms typ. / 75 ms max.
Short Circuit Protection			Continuous, Automatic recovery
Output Current Limitation			160% typ. of Iout max.
Transient Response	- Response Deviation		5% typ. / 7% max. (25% Load Step)
	- Response Time		250 µs typ. / 400 µs max. (25% Load Step)

Safety Specifications

Safety Standards	- IT / Multimedia Equipment	EN 62368-1 IEC 62368-1 UL 62368-1
	- Certification Documents	www.tracopower.com/overview/tmr12wi
Pollution Degree		PD 2
Over Voltage Category		OVC II

EMC Specifications

EMI Emissions	- Conducted Emissions		EN 55032 class A (with external filter)
			EN 55032 class B (with external filter)
	- Radiated Emissions		EN 55032 class A (with external filter)
			EN 55032 class B (with external filter)
		External filter proposal:	www.tracopower.com/overview/tmr12wi

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EMS Immunity			EN 55024 (IT Equipment)
			EN 55035 (Multimedia)
	- Electrostatic Discharge	Air:	EN 61000-4-2, ±8 kV, perf. criteria A
		Contact:	EN 61000-4-2, ±6 kV, perf. criteria A
	- RF Electromagnetic Field		EN 61000-4-3, 10 V/m, perf. criteria A
	- EFT (Burst) / Surge		EN 61000-4-4, ±2 kV, perf. criteria A
			EN 61000-4-5, ±2 kV, perf. criteria A
		Ext. input component:	12 Vin models: KZN 3300 µF || TVS SMDJ30A 24 Vin models: KZN 1200 µF || TVS SMDJ70A 48 Vin models: KZN 390 µF || TVS SMDJ120A
	- Conducted RF Disturbances		EN 61000-4-6, 10 Vrms, perf. criteria A
	- PF Magnetic Field	Continuous:	EN 61000-4-8, 100 A/m, perf. criteria A
		1 s:	EN 61000-4-8, 1000 A/m, perf. criteria A

General Specifications

Relative Humidity		95% max. (non condensing)
Temperature Ranges	- Operating Temperature	–40°C to +85°C
	- Case Temperature	+105°C max.
	- Storage Temperature	–55°C to +125°C
Power Derating	- High Temperature	Depending on model (1 layer PCB layout: ca. up to 55°C w/o derating 2 layer PCB layout: ca. up to 65°C w/o derating --> For ideal temperature behaviour, use suggested PCB layout from application note.)
	See application note:	www.tracopower.com/overview/tmr12wi
Cooling System		Natural convection (20 LFM)
Remote Control	- Voltage Controlled Remote	On: 0 to 1.2 VDC or open circuit Off: 3 to 12 VDC Refers to 'Remote' and '-Vin' Pin
	- Off Idle Input Current	2.5 mA typ.
	- Remote Pin Input Current	0.5 to 1.0 mA
Altitude During Operation		5'000 m max.
Switching Frequency		290 - 460 kHz (PWM) (all models) 290 kHz typ. (PWM) (3.3 Vout) 390 kHz typ. (PWM) (5.1 Vout) 460 kHz typ. (PWM) (12, 15, 24 Vout) 460 kHz typ. (PWM) (dual models)
Insulation System		Functional Insulation
Isolation Test Voltage	- Input to Output, 60 s	1'600 VDC
	- Input to Output, 1 s	1'920 VDC
	- Input to Case, 60 s	1'000 VDC
	- Output to Case, 60 s	1'000 VDC
Isolation Resistance	- Input to Output, 500 VDC	1'000 MΩ min.
Isolation Capacitance	- Input to Output, 100 kHz, 1 V	600 pF max.
Reliability	- Calculated MTBF	906'000 h (MIL-HDBK-217F, ground benign)
Washing Process		According to Cleaning Guideline www.tracopower.com/info/cleaning.pdf
Environment	- Vibration	MIL-STD-810F
	- Mechanical Shock	MIL-STD-810F
	- Thermal Shock	MIL-STD-810F
Housing Material		Copper
Potting Material		Silicone (UL 94 V-0 rated)
Pin Material		Tinned Copper
Pin Foundation Plating		Nickel (1 - 2 µm)
Pin Surface Plating		Tin (3 - 5 µm), matte
Housing Type		Metal Case
Mounting Type		PCB Mount

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

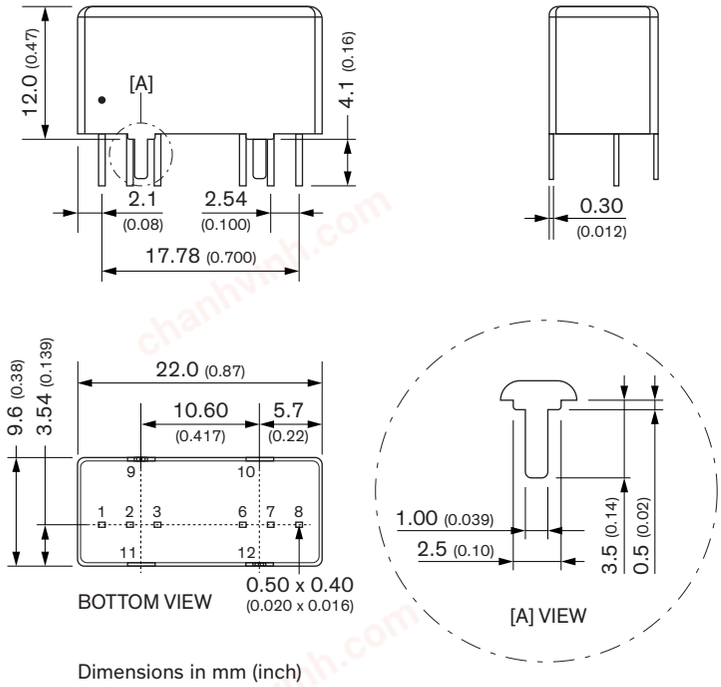
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Connection Type		THD (Through-Hole Device)
Footprint Type		SIP8
Soldering Profile		Wave Soldering 260°C / 6 s max.
Weight		7.2 g
Thermal Impedance	- Case to Ambient	24 K/W typ.
Environmental Compliance	- REACH Declaration	www.tracopower.com/info/reach-declaration.pdf REACH SVHC list compliant REACH Annex XVII compliant
	- RoHS Declaration	www.tracopower.com/info/rohs-declaration.pdf Exemptions: 7a, 7c-I (RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule).)
	- SCIP Reference Number	3905caa9-be39-4d56-952d-961e779f546a

Supporting Documents

Overview Link (for additional Documents)	www.tracopower.com/overview/tmr12wi

Outline Dimensions



Dimensions in mm (inch)
Tolerances: x.x ±0.5 (x.xx ±0.02)
x.xx ±0.25 (x.xxx ±0.01)
Pin dimension tolerances: ±0.1 (±0.004)

Pinout

Pin	Single	Dual
1	–Vin	–Vin
2	+Vin	+Vin
3	Remote	Remote
6	+Vout	+Vout
7	–Vout	Common
8	NC	–Vout
9	Case	Case
10	Stand off	Stand off
11	Stand off	Stand off
12	Case	Case

NC: Not connected

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