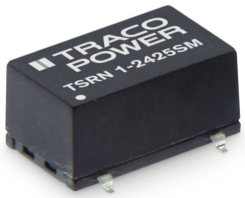
TRACO POWER

Non-Isolated DC/DC Converter (POL) — TSRN 1SM Series, 1 A

- **Compact SMD package**
- **Suitable for positive & negative output circuit**
- **Adjustable output voltage**
- **Wide input up to 42 VDC**
- **Remote On/Off input**
- **Built in filter capacitors**
- **Operation temp. range –40°C to +85°C**
- **Excellent line/load regulation**
- **Low standby current**
- **3-year product warranty**



The new TSRN-1SM series are step-down non–isolated switching regulators in compact SMD package. They are an ideal solution to replace inefficient linear regulators. The high efficiency up to 95% allows full load operation up to +55°C (+85°C with derating) ambient temperature without the need of forced air cooling.
The TSRN-1SM switching regulators provide other significant features over linear regulators, i.e. better output accuracy (±2%), lower standby current of ~4 mA and no requirement of external capacitors. They are suitable for positive or negative output circuits and offer a trim input for output voltage adjustment. The high efficiency, low standby power consumption and remote On/Off function make these regulators an ideal solution for energy sensitive applications.

Models

Order Code	Output Current max.	Input Voltage Range	Output Voltage nom. (adjustable)	Efficiency typ.
TSRN 1-0525SM	1'000 mA	3 - 5.5 VDC (5 VDC nom.)	2.5 VDC (1.2 - 3.63 VDC)	96 %
TSRN 1-2433SM		4.6 - 42 VDC (12 VDC nom.)	3.3 VDC (1.5 - 5.5 VDC)	88 %
TSRN 1-2450SM		6.5 - 42 VDC (12 VDC nom.)	5 VDC (2.5 - 8.0 VDC)	92 %
TSRN 1-2490SM		10.5 - 42 VDC (12 VDC nom.)	9 VDC (4.5 - 12.6 VDC)	95 %
TSRN 1-24120SM		13.5 - 42 VDC (24 VDC nom.)	12 VDC (4.5 - 13.5 VDC)	95 %
TSRN 1-24150SM		16.5 - 42 VDC (24 VDC nom.)	15 VDC (4.5 - 15.5 VDC)	96 %

Note - For input voltage higher 36 VDC an input capacitor 22 µF is required

Input Specifications

Input Current	- At no load	5 Vin models:	6 mA typ.
		12 Vin models:	3 mA typ.
		24 Vin models:	4 mA typ.
Reflected Ripple Current		5 Vin models:	100 mAp-p typ.
		12 Vin models:	100 mAp-p typ.
		24 Vin models:	100 mAp-p typ.
Recommended Input Fuse		5 Vin models:	2'000 mA (slow blow)
		12 Vin models:	2'500 mA (slow blow)
		24 Vin models:	1'600 mA (slow blow)
Input Filter			Internal Capacitor

Output Specifications

Output Voltage Adjustment		2.5 Vout models:	1.2 - 3.63 VDC
		3.3 Vout models:	1.5 - 5.5 VDC
		5 Vout models:	2.5 - 8.0 VDC
		9 Vout models:	4.5 - 12.6 VDC
		12 Vout models:	4.5 - 13.5 VDC
		15 Vout models:	4.5 - 15.5 VDC
			(By external trim resistor)
		See application note:	www.tracopower.com/overview/tsrn1sm
Voltage Set Accuracy			±2% max.
Regulation	- Input Variation (Vmin - Vmax)		0.2% max.
	- Load Variation (0 - 100%)		0.6% max.
Ripple and Noise (20 MHz Bandwidth)		2.5 Vout models:	50 mVp-p max.
		3.3 Vout models:	50 mVp-p max.
		5 Vout models:	50 mVp-p max.
		9 Vout models:	75 mVp-p max.
		12 Vout models:	75 mVp-p max.
		15 Vout models:	75 mVp-p max.
Capacitive Load			470 µF max.
Minimum Load			Not required
Temperature Coefficient			±0.015 %/K max.
Start-up Time			5 ms typ.
Short Circuit Protection			Continuous, Automatic recovery
Transient Response	- Peak Variation		150 mV typ. / 250 mV max. (50% Load Step)
	- Response Time		250 µs typ. / 350 µs max. (50% Load Step)

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	2.38 %/K above 58°C
Over Temperature Protection Switch Off	- Protection Mode	170°C typ. (Automatic recovery)
	- Measurement Point	Internal IC temperature
Cooling System		Natural convection (20 LFM)
Remote Control	- Voltage Controlled Remote	On: 2.0 to 5.0 VDC or open circuit Off: 0 to 0.8 VDC or short circuit Refers to 'Remote' and 'GND' Pin
	- Off Idle Input Current	1.2 mA typ.
Switching Frequency		410 kHz typ. (PWM) (2.5 Vout models) 300 kHz typ. (PWM) (3.3 Vout models) 580 kHz typ. (PWM) (other models))
Insulation System		Non-isolated

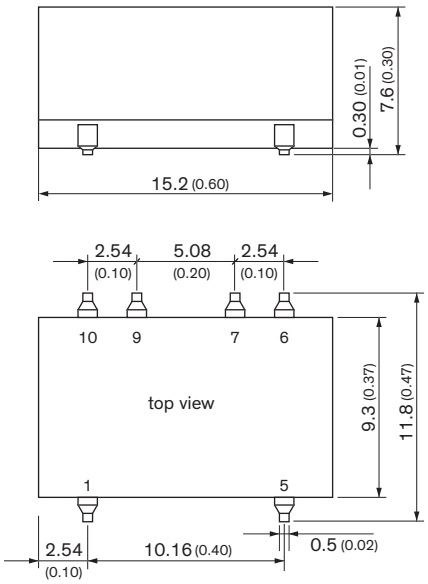
All specifications valid at nominal voltage, full load and +25°C after warm-up time unless otherwise stated.

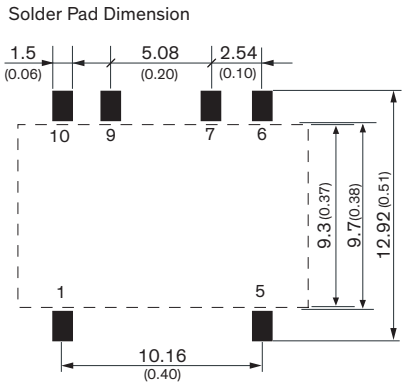
Reliability	- Calculated MTBF	14'000'000 h (MIL-HDBK-217F, ground benign)
Moisture Sensitivity (MSL)		Level 1 (J-STD-033C)
Washing Process		Baking after washing: 100°C for 30 min
Environment	- Vibration	MIL-STD-810F EN 61373
	- Thermal Shock	MIL-STD-810F EN 61373
Housing Material		Non-conductive Plastic (UL94 V-0 rated)
Base Material		Non-conductive Plastic (UL 94 V-0 rated)
Potting Material		Epoxy (UL 94 V-0 rated)
Soldering Profile		Reflow Soldering (J-STD-020E) 245°C max.
Connection Type		SMD (Surface-Mount Device)
Weight		1.7 g
Environmental Compliance	- Reach	www.tracopower.com/info/reach-declaration.pdf
	- RoHS	www.tracopower.com/info/rohs-declaration.pdf

Supporting Documents

Overview Link (for additional Documents)	www.tracopower.com/overview/tsrn1sm

Outline Dimensions





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

Pinout	
Pin	**Function**
1	+Vin
5	+Vout
6	Trim
7	GND
9	GND
10	Remote On/Off