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With the principle of "Quality Parts,Customers Priority,Honest Operation,and Considerate Service",our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



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Features

- ◆ SMD-package
- ◆ Up to 96 % efficiency
- ◆ No thermal layer required
- ◆ Built in filter capacitors
- ◆ Operation temp. range -40°C to $+85^{\circ}\text{C}$
- ◆ Short circuit protection
- ◆ Wide input operating range
- ◆ Excellent line / load regulation
- ◆ Low standby current
- ◆ 3-year product warranty



The new TSR-1SM series models of step-down switching regulators have a high efficiency up to 96 % which allows full load operation up to $+65^{\circ}\text{C}$ ambient temperature without the need of any heat transmission layer.

Excellent output voltage accuracy ($\pm 2\%$) and low standby current ($\sim 1 \mu\text{A}$) are features that distinguish these switching regulators from linear regulators.

Models

Order code	Input voltage range	Output voltage	Output current max.	Efficiency typ.	
				@ Vin min.	@ Vin max.
TSR 1-0512SM	3.0 – 5.5 VDC	1.2 VDC	1 A	90.5 %	90.0 %
TSR 1-0515SM	3.0 – 5.5 VDC	1.5 VDC		92.0 %	91.5 %
TSR 1-0518SM	3.0 – 5.5 VDC	1.8 VDC		92.5 %	92.0 %
TSR 1-0525SM	3.8 – 5.5 VDC	2.5 VDC		94.5 %	94.0 %
TSR 1-2412SM	4.6 – 36 VDC*	1.2 VDC		74 %	62 %
TSR 1-2415SM	4.6 – 36 VDC*	1.5 VDC		79 %	67 %
TSR 1-2418SM	4.6 – 36 VDC*	1.8 VDC		82 %	70 %
TSR 1-2425SM	4.6 – 36 VDC*	2.5 VDC		87 %	75 %
TSR 1-2433SM	4.75 – 36 VDC*	3.3 VDC		91 %	80 %
TSR 1-2450SM	6.5 – 36 VDC*	5.0 VDC		94 %	84 %
TSR 1-2465SM	9.0 – 36 VDC*	6.5 VDC		94 %	89 %
TSR 1-2490SM	12 – 36 VDC*	9.0 VDC		95 %	90 %
TSR 1-24120SM	15 – 36 VDC*	12 VDC		95 %	92 %
TSR 1-24150SM	18 – 36 VDC*	15 VDC		96 %	94 %

* For input voltage higher than 32 VDC an input capacitor 22 μF / 50 V is required. See application notes (page 3)

Input Specifications

Maximum input current (at V_{in} min. and 1 A output current)	1 A
No load input current	1 mA typ.
Reflected ripple current	150 mA
Input filter	internal capacitor

Output Specifications

Voltage set accuracy	$\pm 2\%$
Regulation	<ul style="list-style-type: none"> - Input variation 0.2 % - Load variation (0 – 100 %) 0.6 % - Load variation (10 – 90 %) 0.3 %
Minimum load	not required
Ripple and noise (20 MHz Bandwidth)	<ul style="list-style-type: none"> $V_{out} < 8$ VDC: 50 mVp-p typ. $V_{out} > 8$ VDC: 75 mVp-p typ.
Temperature coefficient	$\pm 0.015\%$ / °C max.
Dynamic load response 50% load change (upper half)	<ul style="list-style-type: none"> 200 mV max. peak variation 250 μs max. response time
Startup rise time 10 % to 90 % V_{out}	5 ms
Short circuit protection	continuous, automatic recovery
Current limitation	<ul style="list-style-type: none"> TSR 1-05xxSM models: at 4.8 A typ. other models: at 2.5 A typ.
Capacitive load	470 μ F max.

General Specifications

Temperature ranges	<ul style="list-style-type: none"> - Operating -40°C to $+85^{\circ}\text{C}$ - Max. casing temperature 105°C - Storage -55°C to $+125^{\circ}\text{C}$
Derating	2.5 %/K above 65°C
Thermal shock & vibration	acc. MIL-STD-810F
Humidity (non condensing)	5 – 95 % rel H max.
Reliability, calculated MTBF (MIL-HDBK-217F, at $+25^{\circ}\text{C}$, ground benign)	>12 Mio. h
Isolation voltage	none
Switching frequency (pulse width modulation)	<ul style="list-style-type: none"> TSR 1-05xxSM models: 1200 kHz other models: 500 kHz
Environmental compliance	<ul style="list-style-type: none"> - Reach www.tracopower.com/products/reach-declaration.pdf - RoHS RoHS directive 2011/65/EU

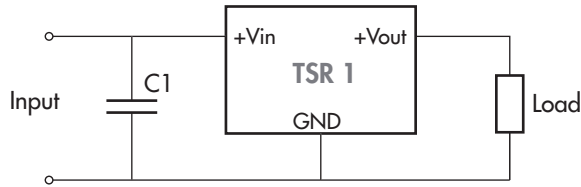
Physical Specifications

Casing material	non-conductive plastic
Package weight	1.7 g (0.06 oz)
Lead-free reflow solder process	<ul style="list-style-type: none"> as per J-STD-020D.01 (to find at: www.jedec.org - free registration required) 245°C - max. peak body temperature
Moisture sensitivity level (MSL)	level 1 as per IPC J-STD-033B.1 (to find at: www.jedec.org - free registration required)
Washing	baking after washing: 100°C for 30 min.

All specifications valid at nominal input voltage, full load and $+25^{\circ}\text{C}$ after warm-up time unless otherwise stated.

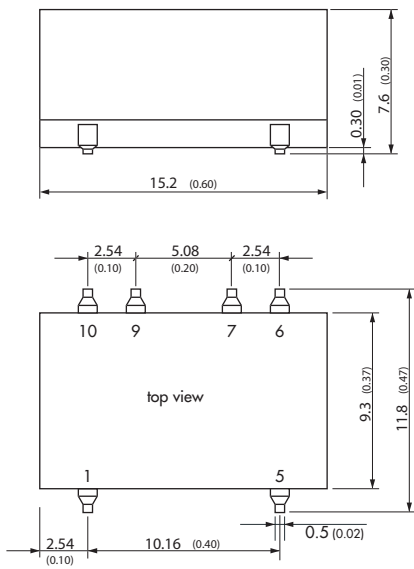
Applications notes

For input voltage higher than 32 VDC (max. 36 VDC)

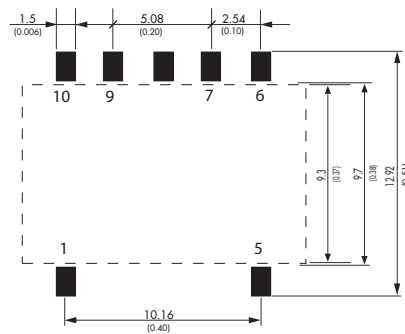


C1 = 22 μ F / 50 V

Outline Dimensions



Solder Pad Dimension



Pin-Out	
1	+Vin
5	+Vout
6	nc
7	GND
9	GND
10	nc

nc = no internal connection

Dimensions in [mm], () = Inch
Pin pitch tolerances: ± 0.25 (± 0.01)
Pin profile tolerance: ± 0.1 (± 0.004)
Other tolerances: ± 0.5 (± 0.02)

Specifications can be changed without notice