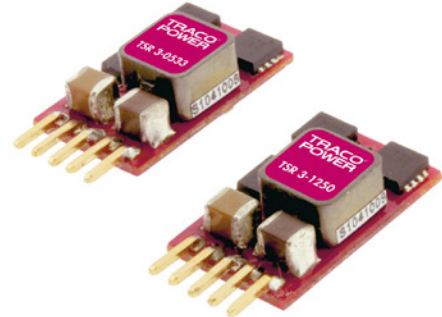


Features

- ◆ High performance 3 Amp. switching regulator
- ◆ Suitable for positive & negative output circuit
- ◆ High efficiency up to 95 %
- ◆ Adjustable output voltages
- ◆ Wide input voltage ranges 2.5–5.5, 4.5–14 and 10–30 VDC
- ◆ Over-temperature protection
- ◆ Short circuit protection
- ◆ Remote On/Off input
- ◆ Low output ripple & noise
- ◆ 3-year product warranty



The TSR 3 models are non isolated step down switching regulators. Since production May 2013 they can also be operated with negative output voltage.

They come in a very compact open frame package of 15.5 x 9.4 x 6.2mm. The high efficiency of up to 95% admits a full load operation up to 50°C and up to 85°C with 50% current reduction. A low standby current, a very wider input range and no requirement for heatsink give these switching regulators a significant advantage over linear regulators.

Together with a remote On/Off input and protection against short circuit and over temperature the TSR 3 Series models are ideal point of load regulators for high reliable and energy critical applications.

Models				
Order code *	Input voltage range	Output voltage adjustable ⁶⁾	Output current max.	Efficiency typ.
TSR 3-0533 TSR 3-1250 TSR 3-2450 TSR 3-24150	Positive output circuit			
	2.5 – 5,5 VDC ¹⁾	0.6 – 3.3 VDC	3 A	95 % at 2.5 VDC
	4.5 – 14 VDC ²⁾	0.59 – 6.0 VDC		93 % at 3.3 VDC
	10 – 30 VDC ³⁾	3.0 – 6.0 VDC		91 % at 5.0 VDC
	10 – 30 VDC ³⁾	5.0 – 15 VDC		95 % at 12 VDC
TSR 3-1250 TSR 3-2450 TSR 3-24150	Negative output circuit			
	4.7 – 13 VDC ⁴⁾	-0.59 – -6.0 VDC	1.5 A at Vout >3.3 VDC 2.2 A at Vout <3.3 VDC	90 % at -3.3 VDC
	10 – 27 VDC ⁵⁾	-3.0 – -6.0 VDC	2.2 A	90 % at -5.0 VDC
	10 – 25 VDC ⁵⁾	-5.0 – -15 VDC	1.2 A	91 % at -12 VDC

* Suffix A for models with angular pins (see dimensions), availability on demand, no stocking item.

1) input voltage must be at least 0.5 V higher than output voltage

2) input voltage must be at least 2.0 V higher than output voltage, max. 9 VDC if output is <0.9 VDC

3) input voltage must be at least 3.0 V higher than output voltage

4) max. input voltage = 14-|Vout|

5) max. input voltage = 30-|Vout|

6) open trim input = min. output voltage

Input Specifications

Maximum input current (@ Vin min. and 3 A output current)	TSR 3-0533: 3.0 A TSR 3-1250: 2.6 A TSR 3-2450: 2.2 A TSR 3-24150: 3.0 A
No load input current	– positive output circuit: 25 mA typ. – negative output circuit: 35 mA typ., 60 mA typ. for TSR 3-24150
Reflected ripple current	– positive output circuit: TSR 3-0533 and TSR 3-1250: 30 mA typ. TSR 3-2450 & TSR 3-24150: 30 mA typ. with ext. filter, see fig. 1 page 3 – negative output circuit: all models: 30 mA typ. with ext. filter, see fig. 2 page 3
Input filter	internal capacitors

Output Specifications

Voltage set accuracy	±2 % (at full load)
Output voltage adjustment	see application note page 3
Regulation	– Input variation: >2.5 Vout: 0.2 %, <2.5 Vout: 5 mV – Load variation 0 – 100 %: >2.5 Vout: 0.8 %, <2.5 Vout: 20 mV – Load variation 10 – 90 %: >2.5 Vout: 0.6 %, <2.5 Vout: 15 mV
Temperature coefficient	±0.015 %/°C max.
Overshoot startup voltage	1.0 % max.
Minimum load	not required
Ripple and noise (20 MHz Bandwidth)	TSR 3-0533: 30 mVp-p TSR 3-1250: 60 mVp-p TSR 3-2450: 75 mVp-p TSR 3-24150: 150 mVp-p
Dynamic load response 50 % load change (upper half)	150 mV max. peak variation (250 mV max. for TSR 3-24150) 250 µs max. response time
Startup rise time 10 % to 90 % Vout	TSR 3-0533 & TSR 3-1250: 7 mS TSR 3-2450 & TSR 3-24150: 10 mS
Short circuit protection	indefinite, automatic recovery
Current limitation	TSR 3-0533: 280 % typ. other models: 220 % typ.
Capacitive load	– ESR > 1 mOhm: TSR 3-24150: 500 µF max. other models: 1000 µF max. – ESR > 10 mOhm: TSR 3-24150: 1200 µF max. other models: 3000 µF max.

General Specifications

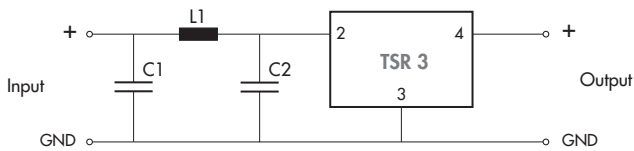
Temperature ranges	– Operating (natural convection cooling 20 LFM): –40°C to +85°C – Storage: –55°C to +125°C
Derating	1.5 %/K above +50°C
Thermal shock	acc. MIL-STD-810F
Humidity (non condensing)	95 % rel H max.
Reliability, calculated MTBF (MIL-HDBK-217F, at +25°C, ground benign)	>1'630'000 h
Isolation voltage	none
Switching frequency	TSR 3-0533 & TSR 3-1250: 600 kHz typ. TSR 3-2450 & TSR 3-24150: 300 kHz typ.
Remote On/Off (pin 1 ref. to GND)	– On: TSR 3-0533: open or Vin other models: open or 1 to 12 VDC – Off: 0 to 0.3 VDC – Off idle current: TSR 3-0533 & TSR 3-1250: 1.5 mA typ. TSR 3-2450 & TSR 3-24150: 6 mA typ.
Environmental compliance	– Reach: www.tracopower.com/overview/tsr3 – RoHS: RoHS directive 2011/65/EU

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

Applications notes

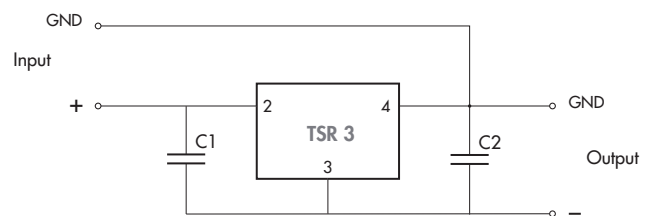
Input filter to reduce reflected ripple current

fig. 1 Positive output circuit



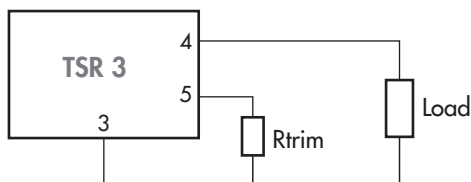
$C1 = 220 \mu\text{F}$, ESR < 0.1 Ohm
 $C2 = 150 \mu\text{F}$
 $L1 = 8.2 \mu\text{H}$

fig. 2 Negative output circuit



$C1, C2 = 10 \mu\text{F}$, MLCC

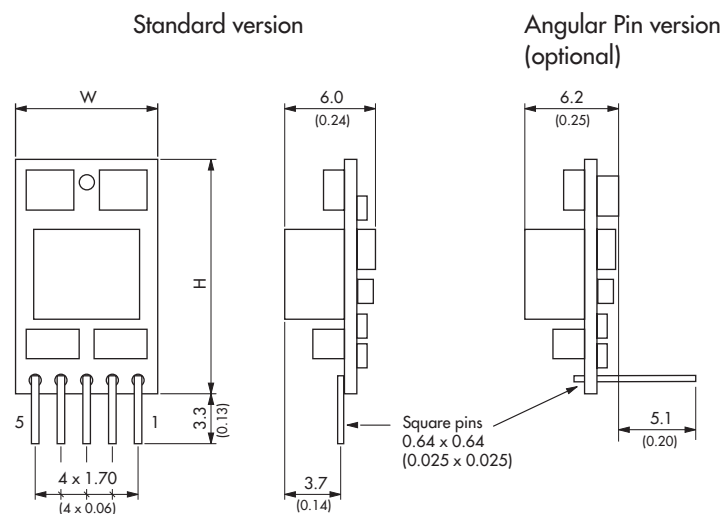
Output voltage adjustment (for negative and positive circuit)



Model	R trim [KOhm] 1/16 W
TSR 3-0533	$1.2/(V_{out} - 0.6) - 0.01$
TSR 3-1250	$1.18/(V_{out} - 0.59)$
TSR 3-2450	$11.2/(V_{out} - 3)$
TSR 3-24150	$8.4/(V_{out} - 5)$

($|V_{out}|$ = absolute value)

Outline Dimensions



TSR 3-0533 & TSR 3-1250: W=9.4 (0.37) H=15.5 (0.61)
 TSR 3-2450 & TSR 3-24150: W=10.4 (0.41) H=16.5 (0.65)

Weight TSR 3-0533 & TSR 3-1250: 1.7 g
 TSR 3-2450 & TSR 3-24150: 2.1 g

Pin-Out

	positive	negative
1	Remote On/Off	
2	+Vin (Vcc)	
3	GND	-Vout
4	+Vout	GND
5	Trim	

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! Make sure you are using the latest documentation, downloadable at www.tracopower.com



Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



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