

## Non-Isolated DC/DC Converter (POL)

## TOS 10SM Series, 10 A

End of life

- Small size, low profile
- SMT package
- Cost-efficient open frame design
- Wide input voltage ranges
- Output voltages trim from 0.75 VDC to 5.0 VDC
- Delivers up to 10 A with minimal derating
- Ultra high efficiency to 95 %
- Fast transient response
- Remote On/Off control
- Wide temperature range  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- 3-year product warranty



UL 62368-1

The TOS 10SM series is a range of high performance non-isolated DC/DC converters with very high efficiency that can supply up to 10 A of output current. These modules provide precisely regulated output voltages which can be set via an external resistor to a value from 0.75 VDC to 5.0 VDC. These converters work over a wide input voltage range of 2.4 to 5.5 VDC or 8.3 to 14.0 VDC. Further features include remote On/Off, under voltage lockout and over current protection. These products have an open-frame construction with very small footprint and are available in a SMT package. The TOS 10SM series is fully RoHS compliant and can withstand industry standard handling, cleaning and the high temperatures of lead-free reflow solder processes.

### Models

Order Code	Output Current max.	Input Voltage Range	Output Voltage nom. (adjustable)	Efficiency typ.
TOS 10-05SM *	10'000 mA	2.4 - 5.5 VDC (5 VDC nom.)	0.75 VDC (0.75 - 3.3 VDC)	95 %
TOS 10-12SM *		8.3 - 14 VDC (12 VDC nom.)	0.75 VDC (0.75 - 5.0 VDC)	93 %

Note \* End of life

## Input Specifications

Input Current	- At no load	5 Vin models: 130 mA typ. 12 Vin models: 100 mA typ. (at Vout max.)
Start-up Voltage		5 Vin models: 2.2 VDC typ. / 2.4 VDC max. 12 Vin models: 7.9 VDC typ. / 8.3 VDC max.
Under Voltage Lockout		5 Vin models: 1.6 VDC min. / 2 VDC typ. / 2.2 VDC max. 12 Vin models: 6.5 VDC min. / 7.5 VDC typ. / 8 VDC max.
Reflected Ripple Current		5 Vin models: 100 mA p-p typ. 12 Vin models: 20 mA p-p typ. (with input filter, see application note)
Recommended Input Fuse		5 Vin models: 15'000 mA (fast acting) 12 Vin models: 10'000 mA (fast acting) (The need of an external fuse has to be assessed in the final application.)
Input Filter		See application note: <a href="http://www.tracopower.com/overview/tos10sm">www.tracopower.com/overview/tos10sm</a>

## Output Specifications

Output Voltage Adjustment	0.75 Vout models: 0.75 - 3.3 VDC 0.75 - 5.0 VDC (By external trim resistor)
See application note: <a href="http://www.tracopower.com/overview/tos10sm">www.tracopower.com/overview/tos10sm</a>	(Vin must be at least 0.5 V higher than Vout)
Voltage Set Accuracy	±2% max.
Regulation	- Input Variation (Vmin - Vmax) - Load Variation (0 - 100%)
0.3% max. 0.4% max.	
Ripple and Noise	- 20 MHz Bandwidth
50 mVp-p max.	
Capacitive Load	5'000 µF max. (ESR >10 mOhm)
Minimum Load	Not required
Temperature Coefficient	±0.4 %/K max.
Start-up Time	8 ms typ.
Start-up Overshoot Voltage	3% max.
Short Circuit Protection	Continuous, Automatic recovery
Output Current Limitation	200% typ. of Iout max.
Transient Response	- Peak Variation  - Response Time
	200 mV typ. (50% Load Step) (5 Vin model) 200 mV typ. (50 % Load Step) (12 Vin model) 25 µs typ. (50% Load Step) (with 1 µF MLCC    10 µF TC)

## Safety Specifications

Standards	- IT / Multimedia Equipment	UL 60950-1 UL 62368-1
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## General Specifications

Relative Humidity		95% max. (non condensing)
Temperature Ranges	- Operating Temperature - Case Temperature - Storage Temperature	-40°C to +85°C +115°C max. -55°C to +125°C
Power Derating	- High Temperature	Depending on model
		See application note: <a href="http://www.tracopower.com/overview/tos10sm">www.tracopower.com/overview/tos10sm</a>
Cooling System		Natural convection (20 LFM)

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

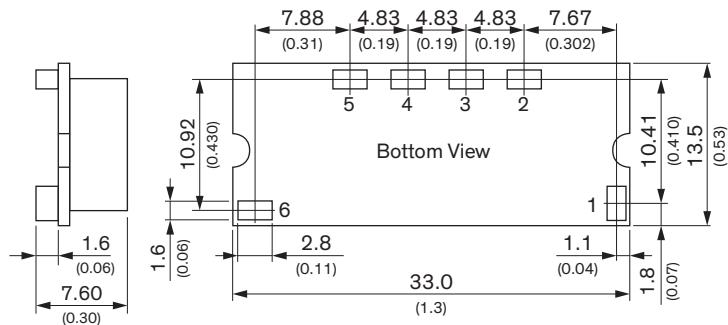
Remote Control	- Voltage Controlled Remote (passive = on)	On: open circuit or Vin max. Off: 0 to 0.3 VDC or short circuit Refers to 'Remote' and 'GND' Pin 2 mA typ. (12 Vin model: Open circuit or (Vin – 4 V) to Vin max. for on state)
Regulator Topology		Buck Converter
Switching Frequency		270 - 330 kHz (PWM) 300 kHz typ. (PWM)
Insulation System		Non-isolated
Reliability	- Calculated MTBF	3'300'000 h (MIL-HDBK-217F, ground benign)
Moisture Sensitivity (MSL)		Level 2a (J-STD-033C)
Washing Process		According to Cleaning Guideline <a href="http://www.tracopower.com/info/cleaning.pdf">www.tracopower.com/info/cleaning.pdf</a>
Environment	- Vibration - Thermal Shock	MIL-STD-810F MIL-STD-810F
Pin Material		Copper
Pin Foundation Plating		Nickel (3 - 5 µm)
Pin Surface Plating		Gold (50 - 75 nm), matte
Housing Type		Open Frame
Mounting Type		PCB Mount
Connection Type		SMD (Surface-Mount Device)
Soldering Profile		Lead-Free Reflow Soldering (acc. J-STD-020E) 245°C max. (Tp) 30 s max. (tp, at Tp - 5°C) 100 s max. (tL, time above 217°C ) See application note: <a href="http://www.tracopower.com/info/reflow-soldering.pdf">www.tracopower.com/info/reflow-soldering.pdf</a>
Weight		6 g
Environmental Compliance	- REACH Declaration  - RoHS Declaration  - SCIP Reference Number	<a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a> REACH SVHC list compliant REACH Annex XVII compliant <a href="http://www.tracopower.com/info/rohs-declaration.pdf">www.tracopower.com/info/rohs-declaration.pdf</a> Exemptions: 7(a), 7(c)-I (RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (Q5A rule).) f147a63a-0b3d-42a6-ad2e-442f5f7dd30b

## Additional Information

Supporting Documents	<a href="http://www.tracopower.com/overview/tos10sm">www.tracopower.com/overview/tos10sm</a>
Frequently Asked Questions	<a href="http://www.tracopower.com/glossary-faq">www.tracopower.com/glossary-faq</a>
Glossary	<a href="http://www.tracopower.com/info/glossary.pdf">www.tracopower.com/info/glossary.pdf</a>

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**Outline Dimensions**



Dimensions in mm (inch)

Tolerances x.x ±0.5 (x.xx ±0.02)

Tolerances x.xx ±0.25 (x.xxx ±0.01)

Pin dimension tolerance ±0.1 (±0.004)

<b>Pinout</b>	
<b>Pin</b>	<b>Function</b>
<b>1</b>	Remote On/Off
<b>2</b>	+Sense
<b>3</b>	Trim
<b>4</b>	+Vout
<b>5</b>	GND
<b>6</b>	+Vin

**Recommended Solder Pad Layout**

