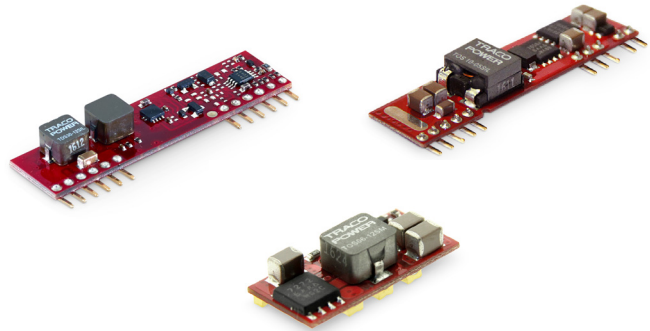


### Features

- ◆ Small size, low profile
- ◆ SMT package or SIP version
- ◆ Cost-efficient open frame design
- ◆ Wide input voltage ranges
- ◆ Output voltages trim from 0.75 VDC to 5.5 VDC
- ◆ Delivers up to 30 A with minimal derating
- ◆ Ultra high efficiency to 96 %
- ◆ Fast transient response
- ◆ Remote On/Off control
- ◆ Wide temperature range -40°C to +85°C
- ◆ SMT package fully DOSA compatible
- ◆ Lead free design – RoHS compliant



The TOS series is a range of high performance non-isolated dc-dc converters With very high efficiency that can supply up to 30A 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 5.5 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, over temperature and over current protection. These products have an open-frame construction with very small footprint and are available in an industry standard SIP or in a SMT package. The TOS 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<br>SMT-version | Input voltage<br>range | Output voltage<br>range      | Output current max. | Efficiency typ. |
|---------------------------|------------------------|------------------------------|---------------------|-----------------|
| TOS 06-05SM               | 2.4 – 5.5 VDC          | 0.75 – 3.3 VDC <sup>3)</sup> | 6 A                 | 94 %            |
| TOS 10-05SM               |                        |                              | 10 A                | 95 %            |
| TOS 16-05SM               |                        |                              | 16 A                | 95 %            |
| TOS 06-12SM               | 8.3 – 14.0 VDC         | 0.75 – 5.0 VDC               | 6 A                 | 89 %            |
| TOS 10-12SM               |                        |                              | 10 A                | 93 %            |
| TOS 16-12SM               |                        |                              | 16 A                | 92 %            |
| SIL-version               |                        |                              |                     |                 |
| TOS 06-05SIL              | 2.4 – 5.5 VDC          | 0.75 – 3.3 VDC <sup>2)</sup> | 6 A                 | 94 %            |
| TOS 10-05SIL              |                        |                              | 10 A                | 95 %            |
| TOS 16-05SIL              |                        |                              | 16 A                | 95 %            |
| TOS 06-12SIL              | 8.3 – 14 VDC           | 0.75 – 5.0 VDC               | 6 A                 | 89 %            |
| TOS 10-12SIL              |                        |                              | 10 A                | 93 %            |
| TOS 16-12SIL              |                        |                              | 16 A                | 92 %            |

### Models

Datasheet for 30 A Models see: [www.tracopower.com/products/tos30.pdf](http://www.tracopower.com/products/tos30.pdf)

| Order code <sup>1)</sup><br>SMT-version | Input voltage<br>range | Output voltage<br>range | Output current max. | Efficiency typ. |
|-----------------------------------------|------------------------|-------------------------|---------------------|-----------------|
| TOS 30-05SM                             | 4.5 – 5.5 VDC          | 0.80 – 3.6 VDC          | 30 A                | 93 %            |
| TOS 30-12SM                             | 6.0 – 14.0 VDC         | 0.80 – 3.6 VDC          | 30 A <sup>4)</sup>  | 92 %            |
| SIL-version                             |                        |                         |                     |                 |
| TOS 30-05SIL                            | 4.5 – 5.5 VDC          | 0.80 – 5.5 VDC          | 30 A                | 93 %            |
| TOS 30-12SIL                            | 6.0 – 14.0 VDC         | 0.80 – 5.5 VDC          | 30 A <sup>2)</sup>  | 92 %            |

1) No stocking item, availability may be subject to MOQ

2) 25 A output voltage higher than 2.75 VDC

3) Max output voltage to be adjusted min. 0.5 VDC below impressed input voltage

4) 20 A output voltage higher than 2.75 VDC

## Input Specifications

|                                                 |                                       |                     |                                                                           |
|-------------------------------------------------|---------------------------------------|---------------------|---------------------------------------------------------------------------|
| Input current no load                           | – Vin 5 VDC (at Vout min./Vout max.)  | 6 A models:         | 20 mA / 45 mA typ.                                                        |
|                                                 |                                       | 10 A / 16 A models: | 100 mA / 130 mA typ.                                                      |
|                                                 | – Vin 12 VDC (at Vout min./Vout max.) | 6 A models:         | 17 mA / 100 mA typ.                                                       |
|                                                 |                                       | 10 A models:        | 40 mA / 100 mA typ.                                                       |
|                                                 |                                       | 16 A models:        | 40 mA / 100 mA typ.                                                       |
| Stand by input current (at remote Off)          |                                       | 6 A models:         | 1 mA typ.                                                                 |
|                                                 | 10 A / 16 A models:                   |                     | 2 mA typ.                                                                 |
| Max. input current                              | – Vin 5 VDC                           | 6 A models:         | 6 A                                                                       |
|                                                 |                                       | 10 A models:        | 10 A                                                                      |
|                                                 |                                       | 16 A models:        | 16 A                                                                      |
|                                                 | – Vin 12 VDC                          | 6 A models:         | 4.5 A                                                                     |
|                                                 |                                       | 10 A models:        | 7 A                                                                       |
|                                                 |                                       | 16 A models:        | 10 A                                                                      |
| Start up voltage / under voltage lockout        |                                       | 5 Vin models:       | 2.2 VDC / 2.0 VDC typ.                                                    |
|                                                 |                                       | 12 Vin models:      | 7.9 VDC / 7.8 VDC typ.                                                    |
| Start up time (power / remote On till Vout set) |                                       |                     | 8 ms typ.                                                                 |
| Reflected ripple current<br>(with input filter) | – Vin 5 VDC                           | 6 A models:         | 35 mAp-p typ.                                                             |
|                                                 |                                       | 10 A / 16 A models: | 100 mAp-p typ.                                                            |
|                                                 | – Vin 12 VDC                          | 6 A models:         | 30 mAp-p typ.                                                             |
|                                                 |                                       | 10 A models:        | 20 mAp-p typ.                                                             |
|                                                 |                                       | 16 A models:        | 30 mAp-p typ.                                                             |
|                                                 |                                       |                     |                                                                           |
| Input filter external (recommended)             |                                       |                     | 2 x 150 µF low ESR polymer capacitors and<br>2 x 47 µF ceramic capacitors |

## Output Specifications

|                                                              |                                                                                                     |                                        |
|--------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|----------------------------------------|
| Voltage set accuracy                                         |                                                                                                     | $\pm 2$ % max. (see page 3 for set up) |
| Voltage balance (dual output models)                         |                                                                                                     | $\pm 1$ % max.                         |
| Regulation                                                   | – Input variation                                                                                   | $\pm 0.3$ % max.                       |
|                                                              | – Load variation 0 – 100 %                                                                          | $\pm 0.4$ % max.                       |
| Dynamic load response<br>max. peak variation / response time | – 50 % load change (upper half) with external 1 $\mu$ F ceramic- and 10 $\mu$ F tantalum capacitors |                                        |
|                                                              | Vin 5 VDC, 6 A models:                                                                              | 130 mV / 25 $\mu$ s typ.               |
|                                                              | Vin 12 VDC, 6 A models:                                                                             | 200 mV / 25 $\mu$ s typ.               |
|                                                              | Vin 5 VDC, 10 A models:                                                                             | 200 mV / 25 $\mu$ s typ.               |
|                                                              | Vin 12 VDC, 10 A models:                                                                            | 200 mV / 25 $\mu$ s typ.               |
|                                                              | Vin 5 VDC, 16 A models:                                                                             | 300 mV / 25 $\mu$ s typ.               |
|                                                              | Vin 12 VDC, 16 A models:                                                                            | 200 mV / 25 $\mu$ s typ.               |
|                                                              | – 50 % load change (upper half) with external 2 x 150 $\mu$ F polymer capacitors                    |                                        |
|                                                              | Vin 5 VDC, 6 A models:                                                                              | 50 mV / 50 $\mu$ s typ.                |
|                                                              | Vin 12 VDC, 6 A models:                                                                             | 50 mV / 50 $\mu$ s typ.                |
|                                                              | Vin 5 VDC, 10 A models:                                                                             | 100 mV / 100 $\mu$ s typ.              |
|                                                              | Vin 12 VDC, 10 A models:                                                                            | 100 mV / 25 $\mu$ s typ.               |
|                                                              | Vin 5 VDC, 16 A models:                                                                             | 150 mV / 100 $\mu$ s typ.              |
|                                                              | Vin 12 VDC, 16 A models:                                                                            | 100 mV / 50 $\mu$ s typ.               |
| Ripple and noise (20 MHz Bandwidth)                          | 5 Vin models:                                                                                       | 50 mVp-p max.                          |
|                                                              | 12 Vin models:                                                                                      | 50 mVp-p max.                          |
| Temperature coefficient                                      |                                                                                                     | $\pm 0.4$ % typ.                       |
| Over current protection                                      |                                                                                                     | at +200 % of Iout max. typ.            |
| Short circuit protection                                     |                                                                                                     | indefinite, automatic recovery         |
| Capacitive load                                              | – ESR < 1 mOhm                                                                                      | 1000 $\mu$ F max.                      |
|                                                              | – ESR < 10 mOhm                                                                                     | 6 A models: 3000 $\mu$ F max.          |
|                                                              | 10 A / 16 A models:                                                                                 | 5000 $\mu$ F max.                      |

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

## General Specifications

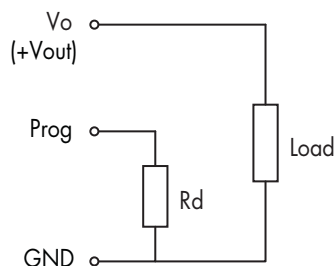
|                                                                        |                                    |                                                             |
|------------------------------------------------------------------------|------------------------------------|-------------------------------------------------------------|
| Temperature ranges                                                     | – Operating<br>– Storage           | –40°C to +85°C<br>–55°C to +125°C                           |
| Derating                                                               |                                    | see application note                                        |
| Over temperature protection                                            |                                    | at +125°C typ.                                              |
| Humidity (non condensing)                                              |                                    | 5 – 95 % rel H max.                                         |
| Reliability, calculated MTBF<br>(MIL-HDBK-217F at +25°C, ground begin) | 6 A models:<br>10 A / 16 A models: | > 9 mio. h<br>> 3.3 mio. h                                  |
| Switching frequency                                                    |                                    | 300 kHz typ. (pulse width modulation - PWM)                 |
| Remote On/Off<br>(reference to GND)                                    |                                    | On: 1 VDC to Vin max. or open circuit.<br>Off: 0 to 0.3 VDC |

## Physical Specifications

|                            |                                    |                                                                                                                                                      |
|----------------------------|------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| Weight                     | 6 A models:<br>10 A / 16 A models: | 2.8 g<br>6.0 g                                                                                                                                       |
| Soldering profile          | – SIL - Version<br>– SMT - Version | max. 265°C / 10 sec. (wave soldering)<br>peak temp. 245°C for 10 sec. max., 217°C for 90 sec. max. (Convection reflow solder process is recommended) |
| Moisture Sensitivity Level | – SMT - Version                    | 2a                                                                                                                                                   |

**Supporting documents:** [www.tracopower.com/overview/tos](http://www.tracopower.com/overview/tos)

## Output Voltage Adjustment



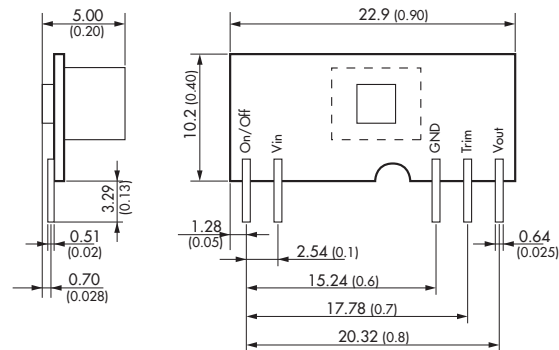
$$5 \text{ VDC input models: } R_d [\text{Ohm}] = \frac{21070}{V_o - 0.7525} - 5110$$

$$12 \text{ VDC input models: } R_d [\text{Ohm}] = \frac{10570}{V_o - 0.7525} - 1000$$

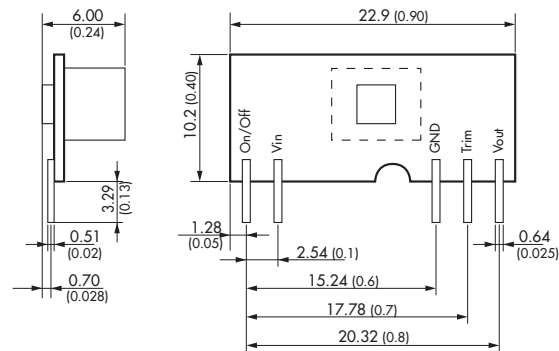
All specifications valid at nominal input voltage, full load and +25°C after warm-up time unless otherwise stated.

**Outline Dimensions mm (inches)**

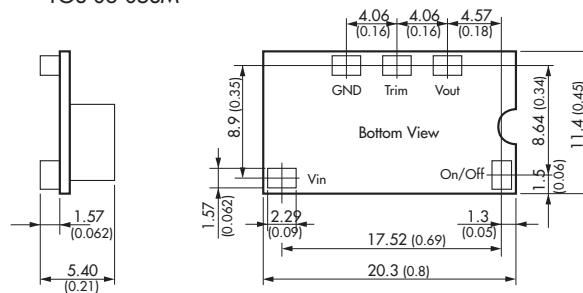
TOS 06-05SIL



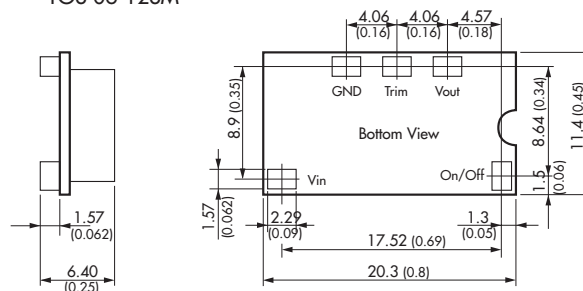
TOS 06-12SIL



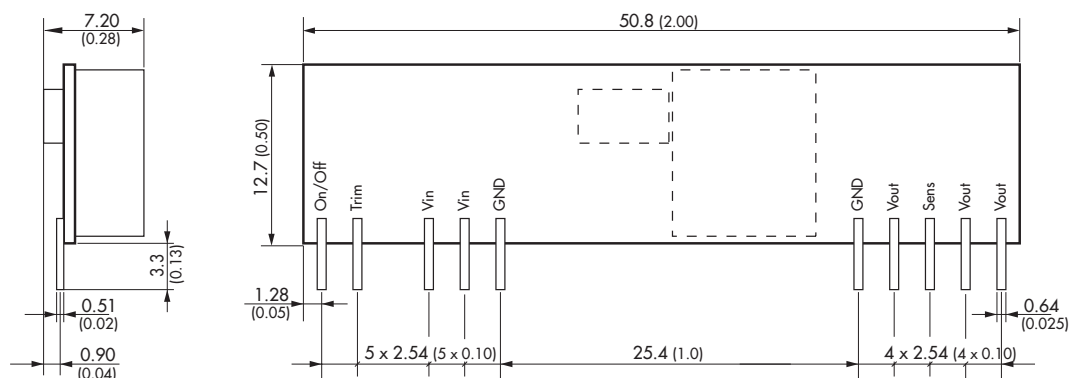
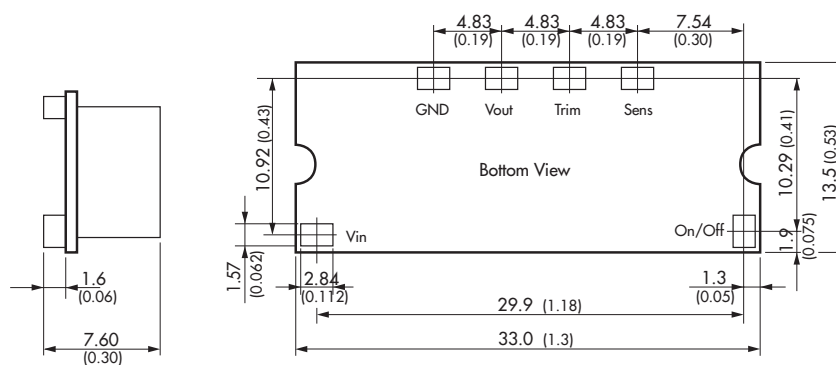
TOS 06-05SM



TOS 06-12SM



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

**Outline Dimensions mm (inches)**
**TOS 10-xxSIL & TOS 16-xxSIL**

**TOS 10-xxSM & TOS 16-xxSM**


Dimensions in [mm], ( ) = Inch  
 Tolerances x.xx ±0.5 (±0.02)  
 x.xxx ±0.25 (±0.01)  
 Pin pitch tolerances ±0.25 (±0.01)  
 Pin dimensions tolerance ±0.1 (±0.004)