

### Features

- Step-down Converter with very high Efficiency (> 91%)
- 3.3 VDC or 5.0 VDC Output, up to 6.0 A
- Fast Transient Response
- Remote ON/OFF
- Overload Protection
- Low Output Noise
- Standby Current only 100  $\mu$ A
- Small SIL- or DIP-Package
- 2 Year Product Warranty



This new generation of step-down converters provides designers with a cost-effective solution for converting a 5 VDC resp. 12 VDC voltage down to 3.3 VDC or to 5 VDC. To achieve highest efficiency, these dc/dc converters are using advanced circuit techniques, as amorphous ferrite, solid aluminum capacitors and a synchronous commutation IC.

The TSI-20 series needs no further external components to operate within its specifications. A very high efficiency allows operation without additional heatsink. This product finds many applications in distributed powersystems where voltage conversion at the point of load is required.

### Models

Ordercode	Input voltage range	Output voltage	Output current max.	Efficiency typ.	Package
TSI-3.3S3R0 TSI-3.3S3R0F	4.8 – 13.6 VDC	* + 3.3 VDC	3000 mA	91.0 %	SIP DIP
TSI-5.0S3R0 TSI-5.0S3R0F	6.0 – 16.5 VDC	+ 5.0 VDC	3000 mA	95.0 %	SIP DIP
TSI-3.3S6R0P TSI-3.3S6R0FP	4.8 – 7.5 VDC	* + 3.3 VDC	6000 mA	88.0 %	SIP DIP
TSI-5.0S4R0P TSI-5.0S4R0FP	6.0 – 16.5 VDC	+ 5.0 VDC	4000 mA	92.0 %	SIP DIP

\* Output adjustable 2.8 to 3.3 VDC

**Input Specifications**

Input current (no load)	15 Watt models 20 Watt models	1 mA max. 1 mA max.
Input current (at full load)	15 Watt models 20 Watt models	1350 mA max. (12 Vin) 1800 mA max. (12 Vin)
Stand-by current		100 µA typ

**Output Specifications**

Output voltage tolerance		± 3.0 %
Output voltage adjustment (TSI-3.3S only)		+2.8 VDC to +3.3 VDC
Regulation – Input variation – Load variation 0 – 100 %		± 0.5 % < 2.0 %
Ripple and noise (20 MHz Bandwidth)		50 mVpk-pk typ.
Transient response time 15 Watt models (with 220 µF output cap.) 20 Watt models (with 2 x 220 µF output cap.)	50 % Load change: Vout over-/undershoot: 50 % Load change: Vout over-/undershoot:	80 µsec typ. 70 mV typ. 100 µsec typ. 130 mV typ.
Temperature coefficient		± 0.01 % / °C
Short circuit protection		constant current >105%
Capacitive load		20'000 µF
Remote ON/OFF control	ON = Pin 5 (ON/OFF Pin) to pin 4 (GND) open OFF = Pin 5 (ON/OFF Pin) to pin 4 (GND) short	

**General Specifications**

Temperature ranges – Operating – Storage Derating above 50 °C		– 10 °C ... +70 °C – 25 °C ... +85 °C 3 % / °C
Humidity (non condensing)		95 % rel H max.
Reliability, calculated MTBF (MIL-HDBK-217 E)	15 Watt models 20 Watt models	>400'000 h @ 40 °C >350'000 h @ 40 °C
Isolation Input/Output		none
Switching frequency		190 kHz typ. (PWM modulation)

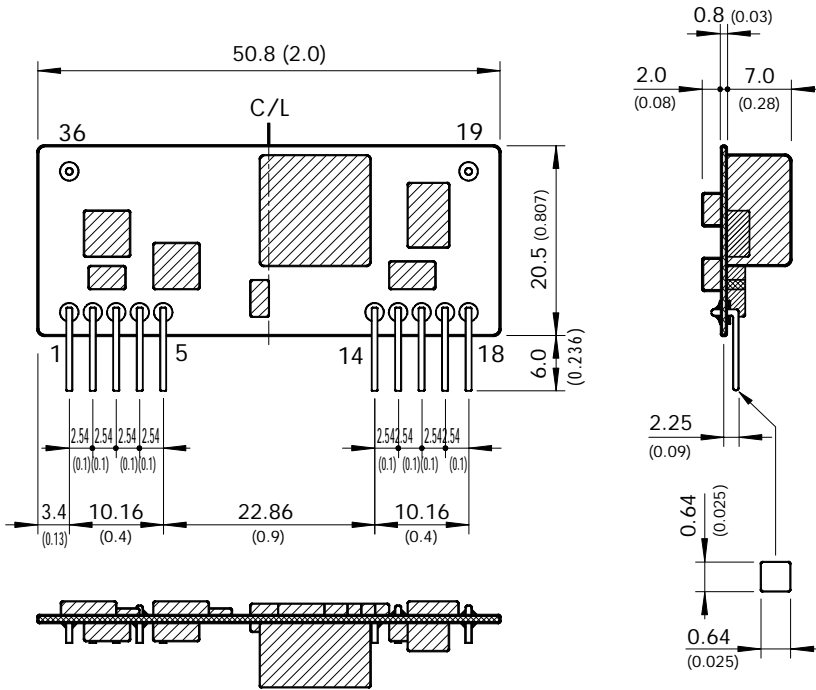
**Physical Specifications**

Vibration		5 to 10 Hz amplitude 10 mm pk-pk 10 to 55 Hz acceleration 2 G
Shock		acceleration 20 G max. time 11 ms
Package weight 15 Watt models 20 Watt models		10 g (0.35 oz) 13 g (0.46 oz)
Soldering temperature		max. 230°C max. / 10 sec.

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

**Outline Dimensions mm (inches)**

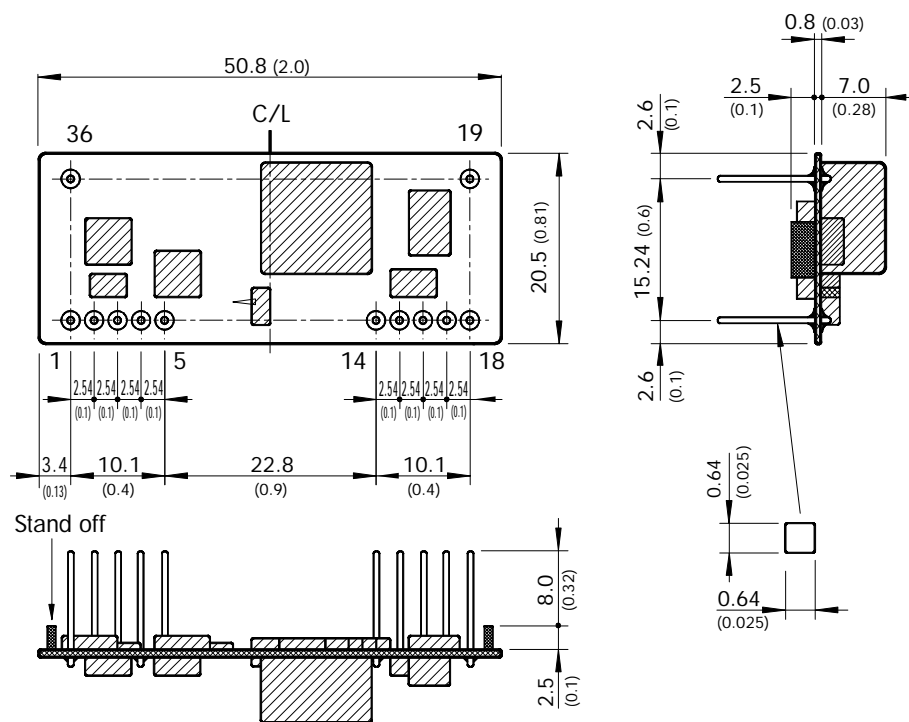
**SIP package**



**Pin-Out**

Pin	DIP	SIP
1	+V Input (Vcc)	+V Input (Vcc)
2	+V Input (Vcc)	+V Input (Vcc)
3	-V Input (GND)	-V Input (GND)
4	-V Input (GND)	-V Input (GND)
5	Remote on/off	Remote on/off
14	V Output adj	V Output adj
15	-V Output	-V Output
16	-V Output	-V Output
17	+V Output	+V Output
18	+V Output	+V Output
19	No function	No pin
36	No function	No pin

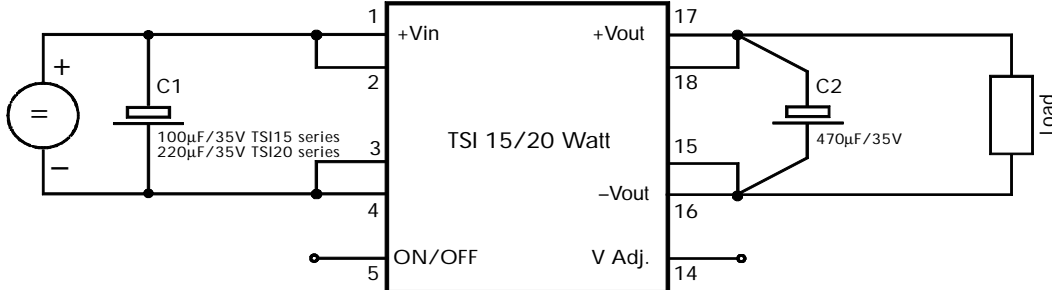
**DIP package**



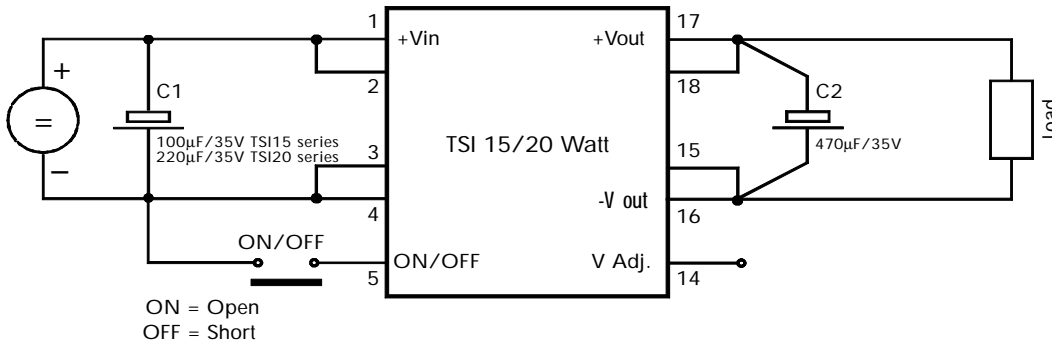
Specifications can be changed without notice

**Connections**

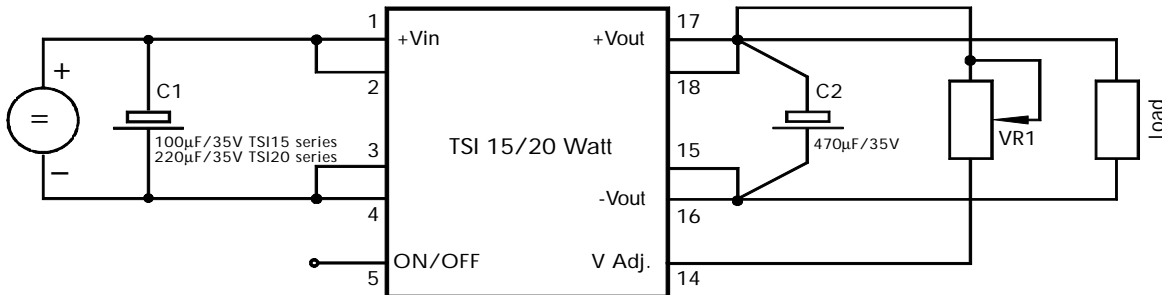
Normal Connection (Standard)



Remote ON/OFF Connection



Output Voltage Adjustment Connection (TSI-3.3S only)



Capacitors:

C1 ==> SXE series Mfg. Chemi-Con  
C2 ==> SH series Mfg. Sanyo OS-CON

VR1 = kOhm

Vout = VDC

$$VR1 = \frac{3200.83}{82.07 - 39 \cdot (Vout - 1.95)} - 10$$

Specifications can be changed without notice