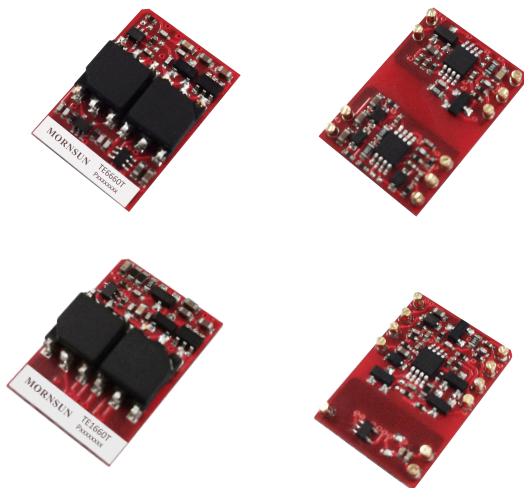


Signal conditioning modules



RoHS



FEATURES

- Two-port isolation (signal input and signal output)
- High linearity of 0.1% Full Scale
- Isolation test voltage 2kVAC for 60s
- Low ripple & noise: $\leq 30\text{mVpp}$, 20MHz
- Extremely low temperature coefficient of $\leq 50\text{PPM}/^\circ\text{C}$ over entire range from -40°C to $+85^\circ\text{C}$
- Compact size: SMD16 Package (21.00x14.50x6.40mm)
- Full and zeros adjustment functions
- ESD protection (IEC/EN61000-4-2 Contact $\pm 4\text{kV}$ with performance perf. Criteria B)

The TExxxT series is a compact size and high precision isolated transmitter with an inner high efficiency isolated micro-power source. It can providing power to internal signal processing circuit. The adopted electromagnetic isolation technology has a much higher accuracy and a lower temperature drift in comparison with photo/opto-coupler isolators. They have a two-terminal isolation from signal input/power output to signal output/power input. The series with external functions for zeros and full adjustment via potentiometers (Offset/Gain) offers a convenient way for design and adjustment to our customers.

Selection Guide

Model	Power Supply Input Typ.(VDC)	Input Signal	Output Signal	Isolated Power Output (VDC)
TE1660T	5V	4-20mA	0-5V	None
TE6660T	5V	0-5V	0-5V	None

Input Specifications

Item		Operating Conditions	Min.	Typ.	Max.	Unit
Power Input	Input Voltage		Typ.-5%	Typ.	Typ.+5%	V
	Input Power	Non-isolation power output	--	--	1.0	W
	Power Supply Protection		None			
Signal Input	Input Signal		See selection guide			
	Input Impedance	In case of max. input of current signal	--	--	250	mV
		In case of max. input of voltage signal	10	--	--	M Ω
	Maximum Continuous Over Range	In case of input of current signal	--	--	50	mA
		In case of input of voltage signal	--	--	30	V

Output Specifications

Item		Operating Conditions	Min.	Typ.	Max.	Unit
Output	Output Signal		See selection guide			
	Load Capacity		2	--	--	k Ω
	Ripple & Noise	Bandwidth 20MHz	--	--	30	mVpp

Transmission Specifications

Item		Operating Conditions	Min.	Typ.	Max.	Unit
Zero Offset			-2.0	--	+2.0	%FS
Linearity			-0.1	--	+0.1	%FS

Temperature Coefficient	Operating temperature from -40℃ to +85℃	--	--	50	PPM/℃
Adjustable Function	Full Degree Regulation	-5	--	+5	%FS
	Zero Regulation	-5	--	+5	%FS
Bandwidth		2	--	--	kHz
Response Time		--	--	1	ms

Note: The series of products has no internal calibration with external functions for zeros and full adjustment via potentiometers (Offset/Gain) offers a convenient way for design and adjustment to our customers.

General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Electric Isolation		Isolated between the signal input and the signal output.			
Isolation Voltage	Electric strength test for 1 minute with a leakage current <1mA, humidity <70%RH	2	--	--	kVAC
Insulation Resistance	At 500VDC	100	--	--	MΩ
Operating Temperature		-40	--	+85	℃
Transportation and Storage Temperature		-50	--	+105	℃
Soldering Temperature	Reflow-soldering	Peak temp. ≤245℃, maximum duration ≤60s at 217℃. Please also refer to IPC/JEDEC J-STD-020D.1.			
Application Environment		The presence of dust, severe vibration, shock and corrosive gas may cause damage to the product			
Moisture Sensitivity Level (MSL)	IPC/JEDEC J-STD-020D.1	Level 1			

Mechanical Specifications

Package	SMD16
Weight	1.7g (typ.)
Cooling Method	Free air convection

Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032	CLASS A (see Fig. 6 for recommended circuit)	
Immunity	ESD	IEC/EN61000-4-2	Contact ±4kV	perf. Criteria B
	EFT	IEC/EN61000-4-4	Power supply port ±2kV (see Fig. 6 for recommended circuit)	perf. Criteria B
	Surge	IEC/EN61000-4-5	Power supply ±1kV (see Fig. 6 for recommended circuit)	perf. Criteria B

Application Precautions

1. Please read the instructions carefully before use; contact our technical support if you have any problem;
2. Do not use the product in hazardous areas;
3. Use DC power supply for the product and 220V AC power supply is prohibited;
4. Do not dismount and assemble the product without permission to avoid failure or malfunction of equipment;
5. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25℃, humidity<75% with power input nominal voltage and rated signal output full load.

After-sales service

1. Ex-factory inspection and quality control have been strictly conducted for the product; if there occurs abnormal operation or possibility of failure of internal module, please contact the local representative or our technical support;
2. The warranty period for the product is 3 years as calculated from the date of delivery. If any quality problem occurs under normal use within the warranty period, the product can be repaired or changed for free.

Applied circuit

See *Application Notes for Isolated Transmitter* for details.

Design Reference

1. Typical application

1) Schematic diagram

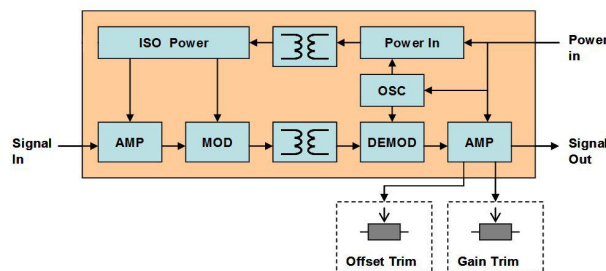


Fig. 1

2) Signal input and output correspondence diagram(Ideal state)

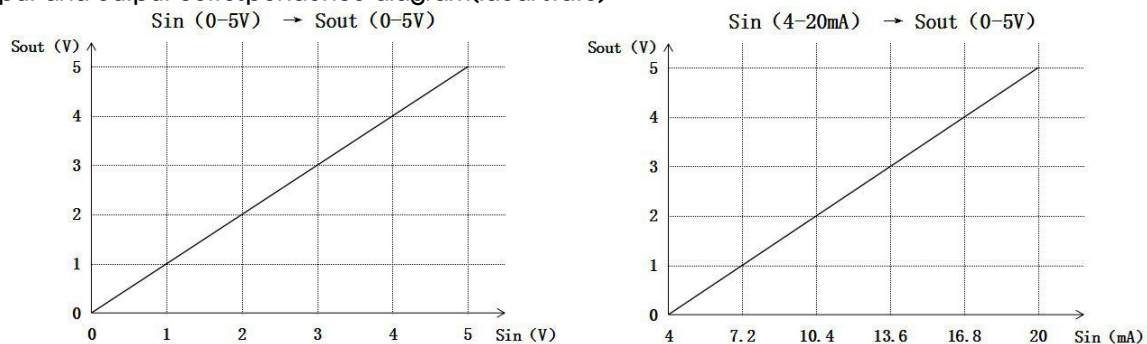


Fig. 2

3) Multi-channel voltage signal acquisition block diagram

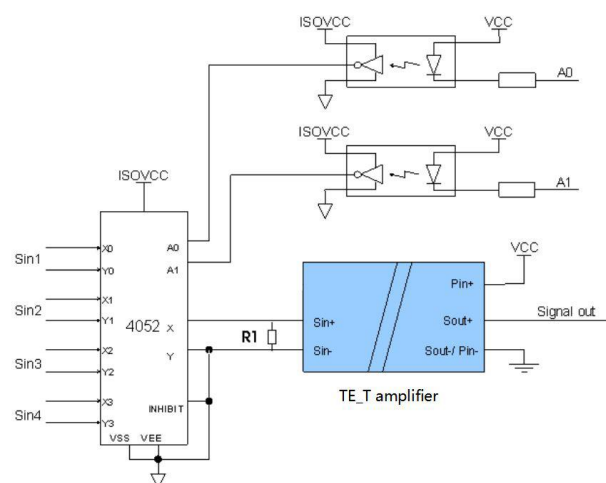


Fig. 3 Multi-channel signal acquisition circuit

Functional Description

In figure 3, "Sin1" to "Sin4" are external input voltage signals, "A0" and "A1" are strobe signals and signal out is an isolated, external

input signal sent to the control system. The optocouplers in the circuit realize the isolated transmission of the strobe signals. The TExxxT series amplifier isolates the transmitted signals as well as the power supplement from the 4052 multi-channel strobe chip, which carries out the selective transmission of multiplex signals.

How it Works

The control system sends out the strobe signal A0-A1. Optocouplers transfer isolated strobe signal to the multi-channel 4052 strobe chip, and control the chip's corresponding channels with the external Sin1-Sin4 signal input of the multi-channel 4052 strobe chip. After each strobe, the chip transfers the corresponding signal to the signal input of TExxxT transmitter. TExxxT transmitter outputs the isolated input signal to the control system, thus implementing the control system and the external signal isolation circuit. Input power to the TExxxT transmitter and the input Vcc of strobe signal transmission circuit are both provided by the control system.

Note

When the input signal port is open circuit, if the output signal value need near 0, please connect a resistor R1 ($R1 < 100k\Omega$) in parallel at the signal input port of the model.

4) Typical application ——Isolated transmission for electrical signals

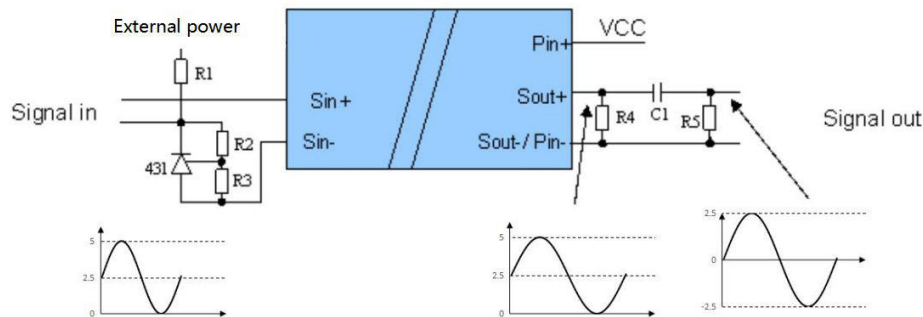


Fig. 4 Isolated transmission for electrical signals application

Functional Description

Per figure 4, "Signal in" (Sin+, Sin-) is detecting the electrical signal and "Signal out" (Sout+, Sout-) sends and transmits the now isolated electrical signal to the control system. VCC is the isolated power supply source provided from the control system. The typical power signal is a sine wave signal with positive and negative amplitude. Reference 431 combined with R1, R2 and R3 form the voltage stabilizing circuit of the system, which can realize the zero adjustment of the input signal. The amplifier of TExxxT series module does the signal transmission function. Resistor network R4 and R5 with C1 are filtering the DC output signal.

How it Works

Supposing the detected signal is a 2.5V sine wave signal: When the input signal is passed through the stabilizing circuit which is composed of 431, R1, R2 and R3 network, the input signal of TExxxT transmitter becomes a 0-5V sine wave signal. If the amplifier has 0-5V input and 0-5V output, the TExxxT module transmitter output would be 0-5V sine wave signal at this time as well. After passing through the filter circuit that is realized by R4, R5 and C1, the DC component of 0-5V sine wave signal is filtered, and the resulting output is now a $\pm 2.5V$ sine wave signal.

Parameter

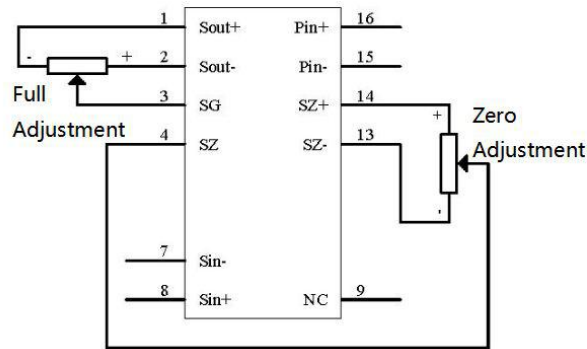
In the application, the typical value of R2 and R3 is $10k\Omega$, and the reference voltage of 431 is 1.25V. The stable voltage of the composition is 2.5V, and the voltage accuracy can achieve various high-precision application requirements according to the accuracy of the resistance value. The typical resistor value range of R4 is between $2k\Omega$ and $5k\Omega$. Because of the signal output voltage being positive and negative, there will be a transmitter output signal reverse current phenomenon when the voltage signal output is negative. Therefore the value of R4 should be chosen as small as possible in order to reduce the influence of the reverse current, and C1 should have a low ESR (equivalent series resistor). Because C1 only passes through the AC and not the DC component of the signal, a ceramic capacitor with value of about 10uF or slightly more will normally suite the application. Capacitors with large a resistance and a small capacitance may distort the AC signal. The recommended value for R5 should be higher than $100k\Omega$, and it implements a DC signal to zero in the circuit. Increasing the value of R5 can make the time of the DC signal to zero longer, which also increases the startup time.

Note

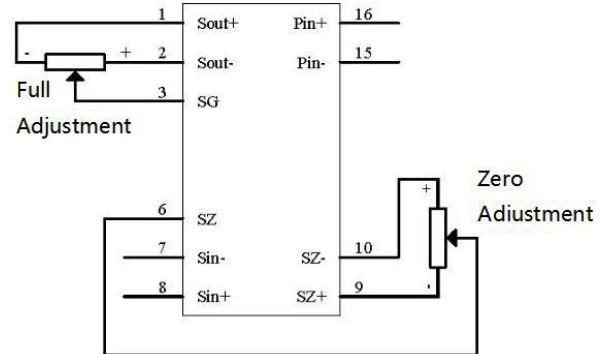
Because the transmitter of TExxxT series cannot be used with negative input voltage signals, the narrow signal voltage amplitude needs specific attention in order to have the necessary design margin. This way the signal distortion is minimized and the circuit can be working normally.

5) Application—Zero and full adjustment function

Circuit for Zero and full adjustment recommended setting is shown below



TE1660T zero and full adjustment circuit



TE6660T zero and full adjustment circuit

Fig. 5

Functional Description

The Zero adjustment function can change the zero-signal transmission by setting the adjustment resistor to zero point, which makes the output signal overall migration. The Full adjustment function, also called gain adjustment, changes the signal transmission ratio by setting up the corresponding adjustment resistance for the full range. This changes the isolation transmission proportion of input and output signal value.

How it Works

As shown in the figure, when the potentiometer slides to the negative end, the zero or full degree of the corresponding signal can be reduced; sliding to the positive end can increase the zero or fullness of the corresponding signal. The maximum resistance of the potentiometer is recommended to be in the range of $10k\Omega$ - $1M\Omega$. The choice of specific resistance is determined based on the required adjustment accuracy. A potentiometer with a large resistance value is required when high-precision fine adjustment is required. A potentiometer with a small resistance value is recommended when a large range of coarse adjustment is required.

2. EMC compliance circuit

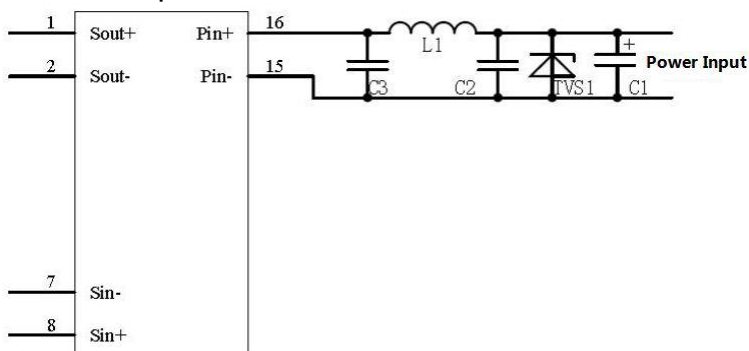


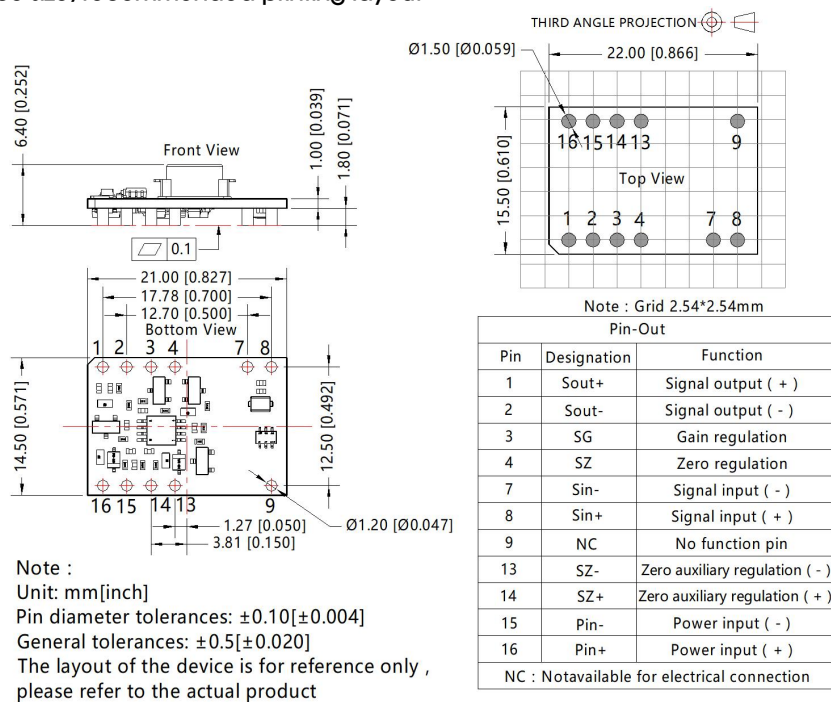
Fig. 6

C1	220uF/35V
C2	10uF/50V
C3	10uF/50V
L1	68uH
TVS1	SMCJ12A

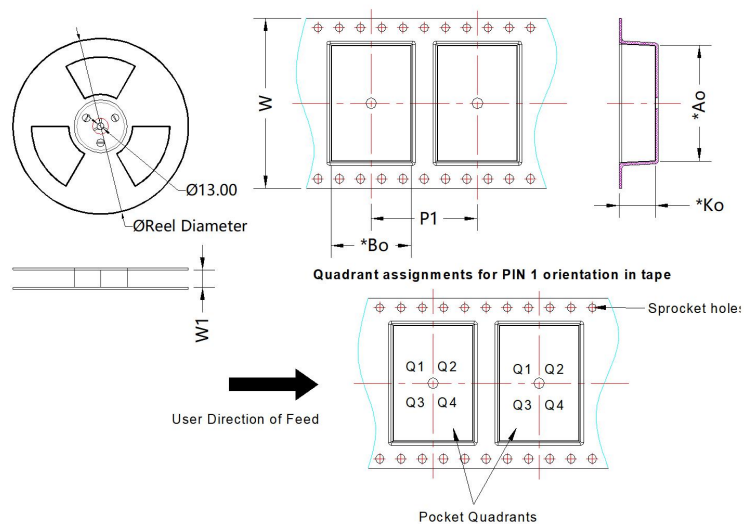
3. For additional information please find the application notes on www.mornsun-power.com

Dimensions and Recommended Layout

① TE1660T appearance size, recommended printing layout:

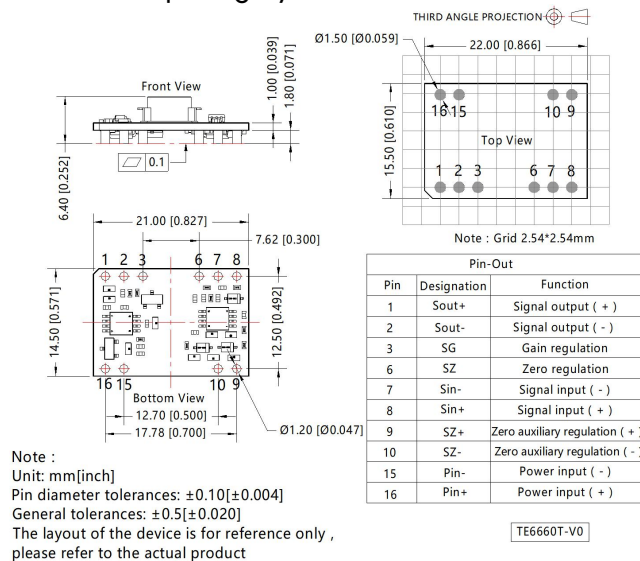


Package diagram:

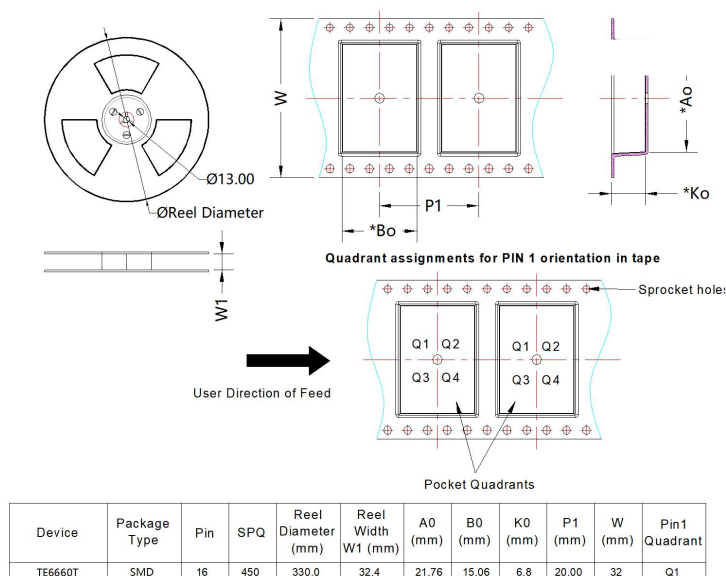


Device	Package Type	Pin	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
TE1660T	SMD	16	450	330.0	32.4	21.76	15.06	6.8	20.00	32	Q1

②TE6660T appearance size, recommended printing layout:



Package diagram:



Notes:

- For additional information on Product Packaging please refer to www.mornsun-power.com. The Packaging bag number:58040018;
- Unless otherwise specified, parameters in this datasheet were measured under the conditions of $T_a=25^{\circ}\text{C}$, humidity<75%RH with nominal input voltage and rated output load.
- All index testing methods in this datasheet are based on company corporate standards;
- The above are the performance indicators of the product models listed in this datasheet. Some indicators of non-standard models will exceed the above requirements. For details, please contact our technical staff;
- We can provide product customization service, please contact our technicians directly for specific information;
- Products are related to laws and regulations: see "Features" and "EMC";
- Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.

MORNSUN Guangzhou Science & Technology Co., Ltd.

Address: No. 5, Kehui St. 1, Kehui Development Center, Science Ave., Guangzhou Science City, Huangpu District, Guangzhou, P. R. China
Tel: 86-20-38601850 Fax: 86-20-38601272 E-mail: info@mornsun.cn www.mornsun-power.com