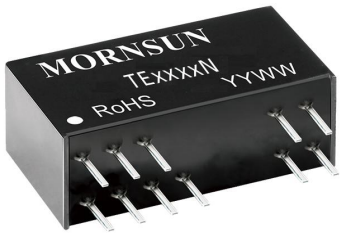
Active high precision isolated transmitter



CE Report RoHS
EN 62368-1

FEATURES

- Two-port isolation (signal input and signal output)
- High accuracy of 0.1% Full Scale
- High linearity of 0.1% Full Scale
- Isolation test voltage 2kVAC for 60s
- Low ripple & noise: ≤30mVpp, 20MHz
- Extremely low temperature coefficient of ≤50PPM/℃ over entire range from -40℃ to +85℃
- Compact DIP18 package, size 26 x 9.5 x 12.5mm

The TExxxxN series is a high precision isolated transmitter with an inner high efficiency isolated micro-power source. It can provide isolation power to peripheral circuit at the same time of 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

Certification	Model	Power Supply input Typ.(VDC)	Input Signal	Output Signal	Isolated Power Output (VDC)
EN	TE5534N	24V	0-10V	0-10V	15V
	TE5544N	15V	0-10V	0-10V	15V
	TE5554N	12V	0-10V	0-10V	15V
	TE5634N	24V	0-10V	0-5V	15V
	TE6634N	24V	0-5V	0-5V	15V
	TE6644N	15V	0-5V	0-5V	15V
	TE6650N	12V	0-5V	0-5V	None
	TE6654N	12V	0-5V	0-5V	15V
	TE6664N	5V	0-5V	0-5V	15V
	TE1533N	24V	4-20mA	0-10V	24V
	TE1530N	24V	4-20mA	0-10V	None
	TE1550N	12V	4-20mA	0-10V	None
	TE1633N	24V	4-20mA	0-5V	24V
	TE1630N	24V	4-20mA	0-5V	None
	TE1650N	12V	4-20mA	0-5V	None
	TE1660N	5V	4-20mA	0-5V	None
	TE1430N	24V	4-20mA	1-5V	None
	TE1433N	24V	4-20mA	1-5V	24V
	TE1450N	12V	4-20mA	1-5V	None
	TE1S34N-2.5	24V	4-20mA	0-2.5V	15V
	TE1S60N-2.5	5V	4-20mA	0-2.5V	None
	TE1S60N-3.3	5V	4-20mA	0-3.3V	None
	TE1S65N-3.3	5V	4-20mA	0-3.3V	12V
	TESS64N-1-1	5V	0-1V	0-1V	15V
	TE2530N	24V	0-20mA	0-10V	None
	TE2650N	12V	0-20mA	0-5V	None
	TE6S6SN-3.3-9	5V	0-5V	0-3.3V	9V
--	TE6660N-HK	5V	0-5V	0-5V	None
--	TE6664N-G	5V	0-5V	0-5V	15V

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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
		Isolation power output	--	--	1.5	W
	Power Supply Protection		Input reverse polarity protection (Models with 5V power input do NOT provide this function)			
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	--	--	MΩ
	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
Isolation Power Output	Output Voltage	Isolation power output at full load	Typ.-10%	Typ.	Typ.+10%	V
	Output Current		--	--	25	mA
Signal Output	Output Signal		See selection guide			
	Load Capacity		2	--	--	kΩ
	Ripple & Noise	20MHz Bandwidth	--	--	30	mVpp

Transmission Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Zero Offset		-0.1%FS	--	+0.1%FS	--
Signal Precision		-0.1%FS	--	+0.1%FS	--
Temperature Coefficient	Operating temperature from -40℃ to +85℃	--	--	50	PPM/℃
Adjustable Function	Full Degree Regulation	-5%FS	--	+5%FS	--
	Zero Regulation	-5%FS	--	+5%FS	--
Bandwidth		2	--	--	kHz
Response Time		--	--	1	ms

General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Electric Isolation		Isolated between the signal input and the signal output.			
Isolation Test	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	℃
Safety Standard		EN62368-1 (Report)			
Safety Class		CLASS III			
Application Environment		The presence of dust, severe vibration, shock and corrosive gas may cause damage to the product			

Mechanical Specifications

Case Material	Black plastic, flame-retardant heat- resistant
Package	DIP18
Weight	5.5g(typ.)
Cooling Method	Free air convection

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Electromagnetic Compatibility (EMC)

Emissions	CE		CISPR32/EN55032	CLASS A (see Fig. 6 for recommended circuit)	
Immunity	ESD	TE6664N-G	IEC/EN61000-4-2	Contact ±2kV	perf. Criteria B
		TESS64N-1-1 TE6S6SN-3.3-9 TE6660N-HK	IEC/EN61000-4-2	Contact ±4kV	perf. Criteria B
		Others	ANSI/ESDA/JEDEC JS-001	HBM ±4kV	
	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 port ±1kV (see Fig. 6 for recommended circuit)	perf. Criteria B

Note：The electrostatic discharge of TE6664N-G is HBM ±2kV

Application Precautions

1. Carefully read and follow the instructions before use; contact our technical support if you have any question;
2. Do not use the product in hazardous areas;
3. Use only DC power supply source for this product. 220VAC power supply is prohibited;
4. It is strictly forbidden to disassemble the product privately in order to avoid product failure or malfunction;
5. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25℃, humidity<75%RH with nominal input voltage and rated output load.

After-sales service

1. Factory inspection and quality control are strictly enforced before shipping any product; please contact your local representative or our technical support if you experience any abnormal operation or possible failure of the module;
2. The products have a 3-year warranty period, from the date of shipment. The product will be repaired or exchanged free of charge within the warranty period for any quality problem that occurs under normal use.

Applied circuit

Please refer to Isolated Transmitter Application Notes.

Design Reference

1. Typical application

1) Schematic diagram

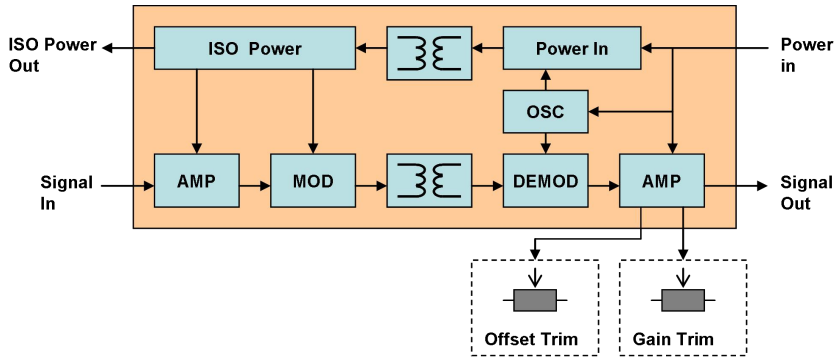


Fig. 1

2) Schematic diagram of signal input and signal output

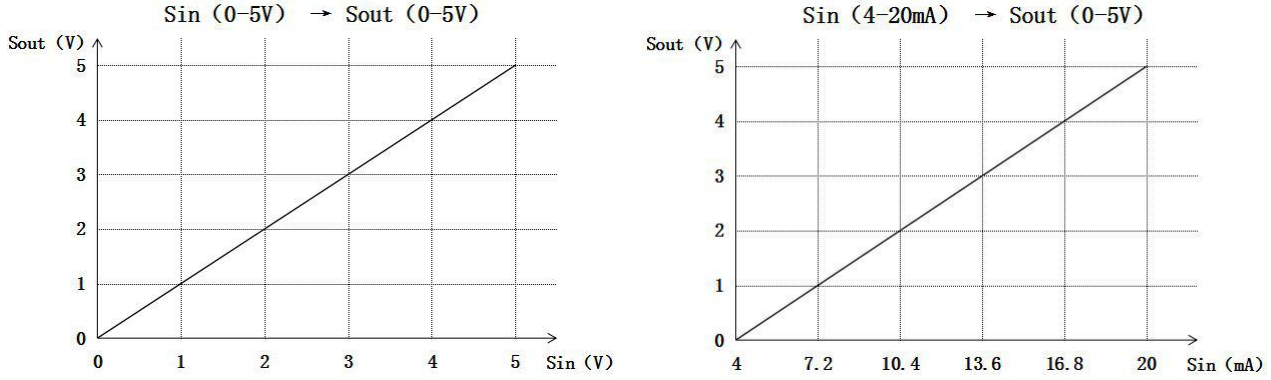


Fig. 2

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3) Multi-channel voltage signal acquisition block diagram

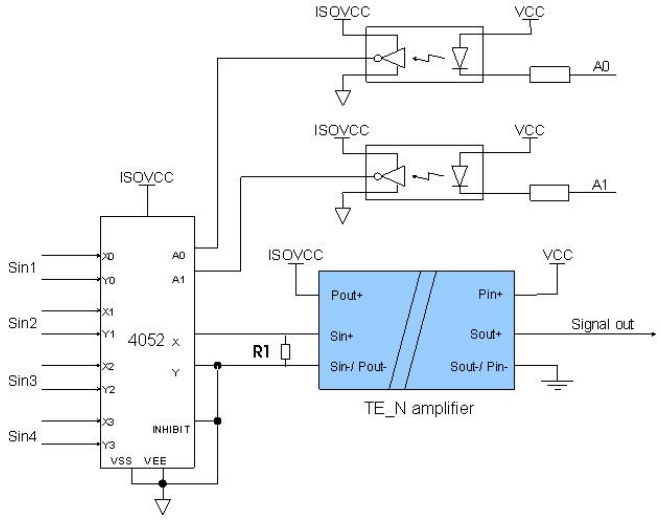


Fig. 3 Multi-channel signal acquisition circuit

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 TExxxxN 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 TExxxxN transmitter. TExxxxN 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 TExxxxN transmitter and the input Vcc of strobe signal transmission circuit are both provided by the control system. Once the strobe signal is isolated, the transmission circuit and the multi-channel 4052 strobe chip power ports ISOVCC, both receive their power source from the power distribution output Pout+.

Note

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

4) Typical application ——Isolated transmission for electrical signals

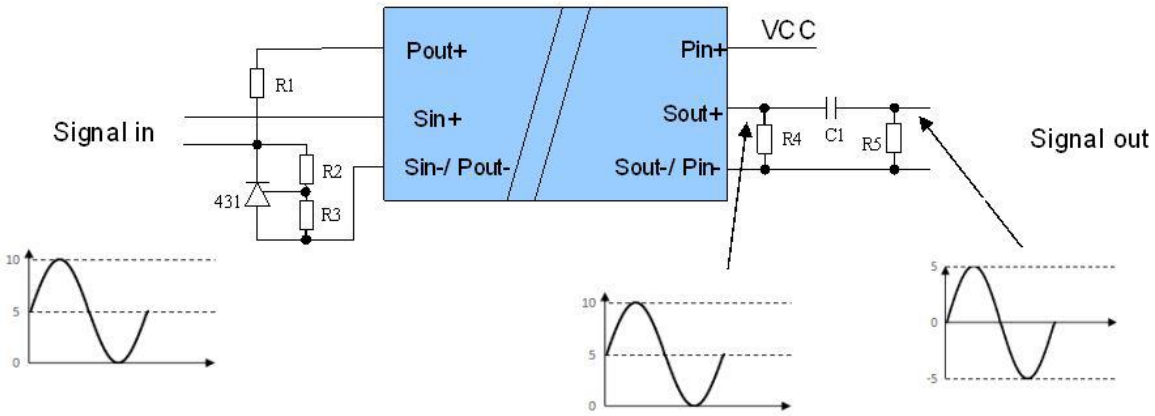


Fig. 4 Isolated transmission for electrical signals application

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 TExxxxN series module does the signal transmission function and the power supply function of voltage stabilizing circuit. Resistor network R4 and R5 with C1 are filtering the DC output signal.

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How it Works

Supposing the detected signal is a ±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 TExxxxN transmitter becomes a 0-10V sine wave signal. If the amplifier has 0-10V input and 0-10V output, the TExxxxN module transmitter output would be 0-10V 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 0-10V sine wave signal is filtered, and the resulting output is now a ±5V sine wave signal.

Parameter

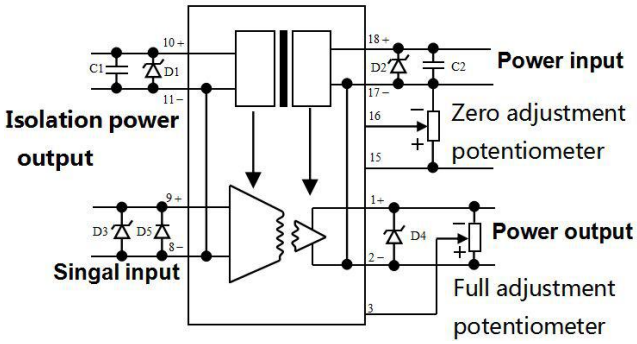
In the application, the typical value of R2 and R3 is 10KΩ, and the reference voltage of 431 is 2.5V. The stable voltage of the composition is 5V, and the voltage accuracy can achieve various high-precision application requirements according to the accuracy of the resistance value. The typical resistor value range of R4 is between 2kΩ and 5kΩ. 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 100kΩ, 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

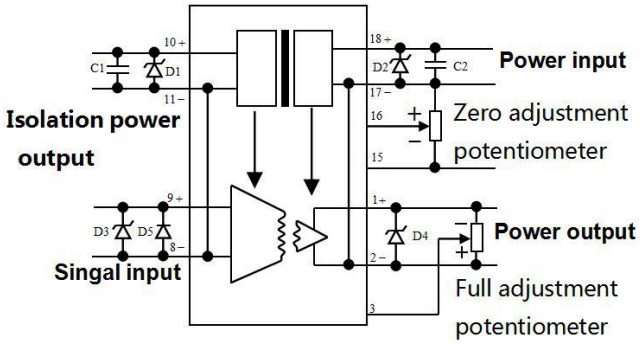
Because the transmitter of TExxxxN series cannot be used with negative input voltage signals, the narrow signal voltage amplitude needs specific attention in order to have the necessary design margin. This way the signal distortion is minimized and the circuit can be working normally.

5) Application—Zero and full adjustment function

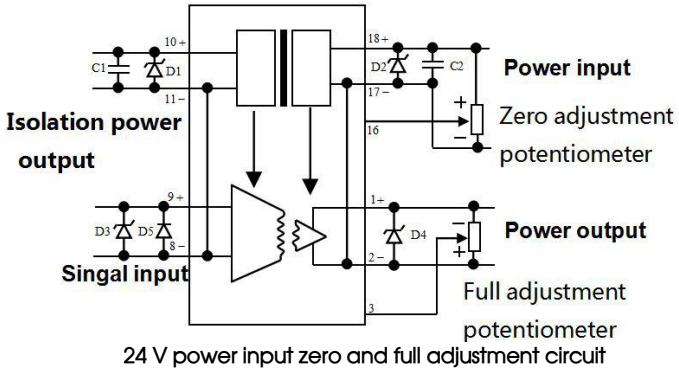
Circuit for Zero and full adjustment recommended setting is shown below



Routine zero and full adjustment circuit



TE6664N、TE6664N-G、TESS64N-1-1、TE6S6SN-3.3-9 zero and full adjustment circuit



24 V power input 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.

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How it Works

Adding and reducing negative zero resistance can lower the zero point of the signal output. Adding and reducing positive zero resistance can raise the zero point of the signal output. Adding and reducing negative full adjustable resistance can lower the ratio of signal transmission, and adding and reducing negative full adjustable resistance can raise the ratio of the signal transmission. Use the potentiometers to adjust the output signal for zero and full adjustment accordingly to suite the application. As shown in the figure 5, the terminal of full or zero adjustment is connected to the slider of the respective potentiometer, and either end of the potentiometers are the zero or full reference for positive and negative regulation. Sliding potentiometer to adjust signal full or changing the ratio of rise and fall can also adjust zero and full of the output signal.

As shown in the figure 5, the conventional products, TE6664N, TE6664N-G, TESS64N-1-1, TE6S6SN-3.3-9, and 24V power input products have different zero point and full-scale adjustment circuits, and need to be wired according to each reference circuit. As shown in the figure, sliding the potentiometer to the + end can increase the signal output zero/fullness, and sliding the potentiometer to the - end can reduce the signal output zero/fullness. The maximum resistance of the potentiometer is recommended to be in the range of 10KΩ-1MΩ. 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 small resistance potentiometer is recommended when a large range of coarse adjustment is required.

Note

TE_N series transmitter products have already met the accuracy specification of 0.1% FS at the time of ex-factory. The zero point and full scale adjustment function will affect the original accuracy of the product. Due to the influence of the temperature drift characteristics of the external adjustment resistor and the stability of the potentiometer, the temperature drift of the product will also change. When the ratio of positive regulation resistance and negative regulation resistance of the full-scale adjustment potentiometer is about 1:1, it is the product preset full scale (except TE6664N, TE6664N-G, TESS64N-1-1, TE6S6SN-3.3-9, making these three products full The ratio of the positive and negative resistances corresponding to the zero point potentiometer of the product is different. For the zero point adjustment potentiometer, the zero point of each product is the product preset zero point potentiometer corresponding to the ratio of positive resistance and negative resistance. Please set the potentiometer resistance according to the actual adjustment.

2. EMC compliance circuit

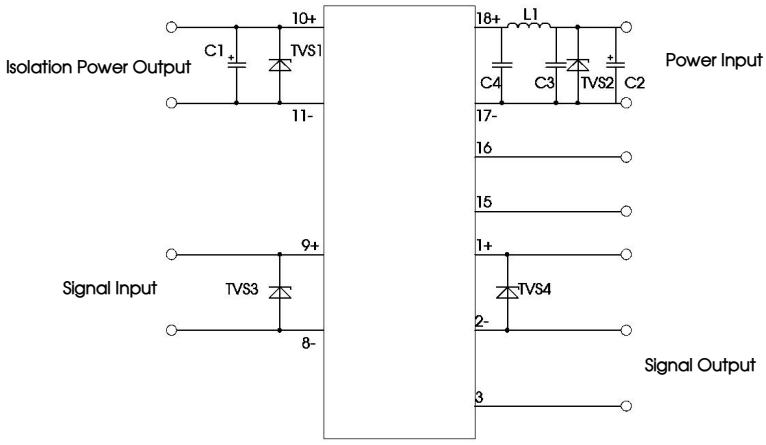


Fig. 6

Routine product：

C1	4.7uF/35V
C2	220uF/35V
C3	10uF/50V
C4	10uF/50V
L1	68uH
TVS1	SMCJ30A
TVS2	SMCJ28A
TVS3	SMBJ15A
TVS4	SMBJ15A

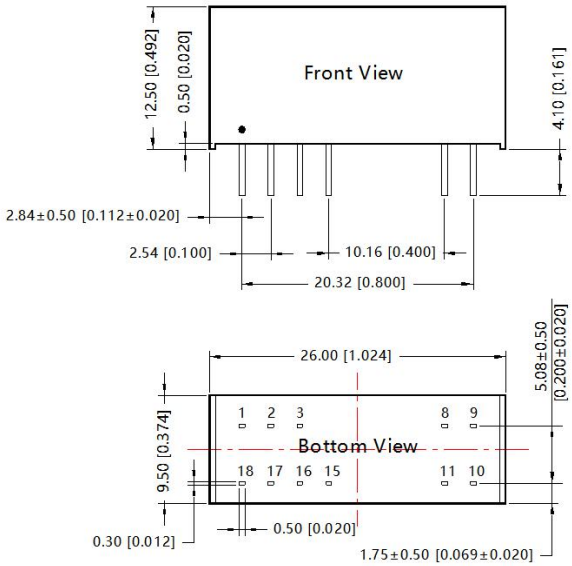
5V Power-in product：

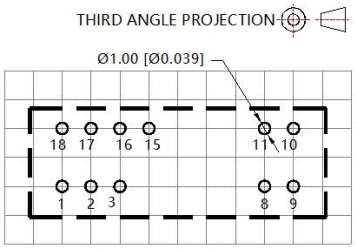
C1	4.7uF/35V
C2	220uF/35V
C3	10uF/50V
C4	10uF/50V
L1	68uH
TVS1	SMCJ30A
TVS2	SMCJ12A
TVS3	SMBJ15A
TVS4	SMBJ15A

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

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Dimensions and Recommended Layout





Note: Grid 2.54*2.54mm

Note:
Unit: mm[inch]
Pin section tolerances: ±0.10[±0.004]
General tolerances: ±0.25[±0.010]

Pin-Out					
1	Sout+	Signal output(+)	11	Pout-	Isolation power output(-)
2	Sout-	Signal output(-)	15	ZR	Zero auxiliary regulation*
3	SG	Gain regulation	16	SZ	Zero regulation
8	Sin-	Signal input(-)	17	Pin-	Power input(-)
9	Sin+	Signal input(+)	18	Pin+	Power input(+)
10	Pout+	Isolation power output(+)	* Note: the power input of 24V without 15 Pin		

Notes:

1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58240002 (Note：The Packaging bag number of TE6660N-HK is 58240055);
2. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25℃, humidity<75%RH with nominal input voltage and rated output load;
3. All index testing methods in this datasheet are based on company corporate standards;
4. 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;
5. We can provide product customization service, please contact our technicians directly for specific information;
6. Products are related to laws and regulations: see "Features" and "EMC";
7. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.

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