Isolated Transmitter

TExxxxN Series

MORNSUN®

Active high precision isolated transmitter

FEATURES

- Two-port isolation (signal input and signal output)
- High accuracy (0.1% F.S.)
- High linearity (0.1% F.S.)
- Isolation voltage (2KVAC/60s)
- Low ripple & noise(≤30mVpp , 20MHz)
- Extremely low temperature coefficient (≤50PPM/℃, within -40 to +85℃)
- Compact size: DIP18 (26*9.5*12.5mm)
- ESD protection (IEC/EN61000-4-2 Contact ±4KV perf. Criteria B)

The TExxxxN series is with preceding voltage/current signal input and backward voltage signal output, and 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. Adopting electromagnetism isolation technology, therefore compared with photo-coupler isolation, it has higher accuracy and lower temperature drift. This module is two-port isolation (input and output). There are external functions for the series as zeros and full adjustment, convenient for customer to design and adjust.

Selection Guide

Model	Power Supply input Typ.(VDC)	Input Signal	Output Signal	Isolation Power Output (VDC)
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

Input Specifications

Item		Operating Conditions	Min.	Typ.	Max.	Unit
Power Input	Input voltage		Typ.-5%	Typ.	Typ.+5%	V
	Input power	No isolation power output	--	--	1.0	W
		isolation power output	--	--	1.5	W
	Power supply protection		Reverse polarity protection(The product of 5V power input is without 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
	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
Output	Output signal		See selection guide			
	Load capacity		2	--	--	KΩ
	Ripple & noise	Bandwidth 20MHz	--	--	30	mVpp

Transmission Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Zero Offset		-0.1%F.S.	--	+0.1%F.S.	--
Signal Precision		-0.1%F.S.	--	+0.1%F.S.	--
Temperature coefficient	Operating temperature range of -40 to +85℃	--	--	50	PPM/℃
Adjustable Function	Full Degree Regulation	-5%F.S.	--	+5%F.S.	--
	Zero Regulation	-5%F.S.	--	+5%F.S.	--
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 voltage	testing for 1 minute, leakage current <1mA, humidity <70%	2	--	--	KVAC
Insulation Resistance	500VDC	100	--	--	MΩ
Operating Temperature		-40	--	+85	℃
Transportation and Storage Temperature		-50	--	+105	℃
Application Environment		The presence of dust, fierce vibration, impulsion and corrosive gas may cause damage to the product			

Physical Specifications

Casing Material	Black flame-retardant heat-proof plastic
Package	DIP18
Weight	5.7g(typ.)
Cooling Method	Free air convection

EMC Specifications

EMI	Conducted Disturbance	CISPR22/EN55022	CLASS A (see Fig. 5 for recommended circuit)	
EMS	Electrostatic Discharge	IEC/EN61000-4-2	Contact ±4KV	perf. Criteria B
	EFT	IEC/EN61000-4-4	Power supply port ±2KV(see Fig. 5 for recommended circuit)	perf. Criteria B
	Surge Immunity	IEC/EN61000-4-5	Power supply ±1KV (see Fig. 5 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

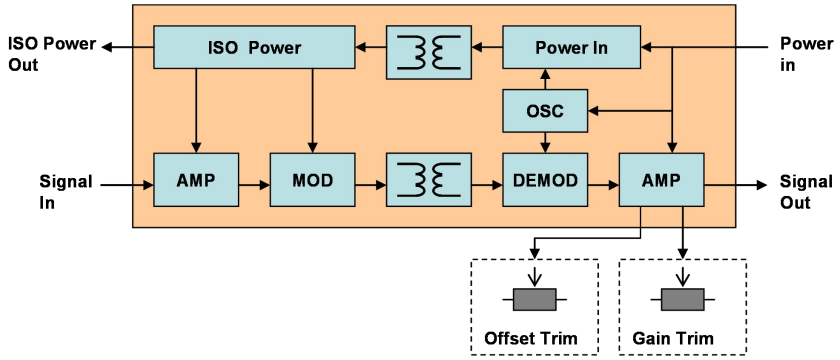


Fig. 1

2) Typical application——Multi-channel voltage signal acquisition

Application circuit for typical multi-channel voltage signal acquisition is as below:

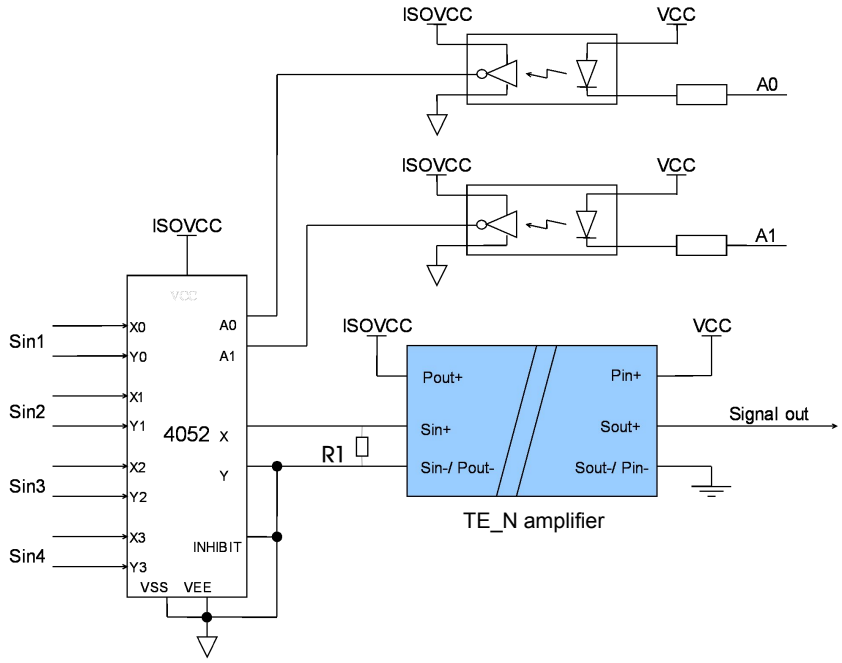


Fig. 2 Multi-channel signal acquisition application circuit

Function

In the figure 2, Sin1~Sin4 are external input voltage signal,A0~A1 are strobe signal, and signal out is an external input signal of control system to accept.

The optocoupler in the circuit implements the isolated transmission of strobe signals. Amplifier of TE-N series implements the isolated transmission of signals and isolated power supplement. The multi-channel strobe chips 4052 implements selective transmission of multiplex signals.

Working principle

When the circuit works, the control system sends out the strobe signal A0~A1. Optical coupling isolation circuit transfers strobe signal to multi-channel strobe chips 4052, and control the chip to correspond channel. External signal Sin1~Sin4 input to multi-channel strobe chips 4052. After a chip strobe, strobe signal transfers to the signal input of TE _ N transmitter. TE_ N transmitter output the isolated input signal to control system, thus it implements the control system and the external signal isolation circuit. Input power of TE_N transmitter and the input Vcc of strobe signal transmission circuit are provided by control system. After strobe signal is isolated, transmission circuit power and multi-channel strobe chips 4052 power supply ISOVCC are provided by power distribution output Pout+.

Notice

When the input signal is open, 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.

3) Typical application ——Isolated transmission for electrical signals

Typical application of isolated transmission for electrical signals is below.

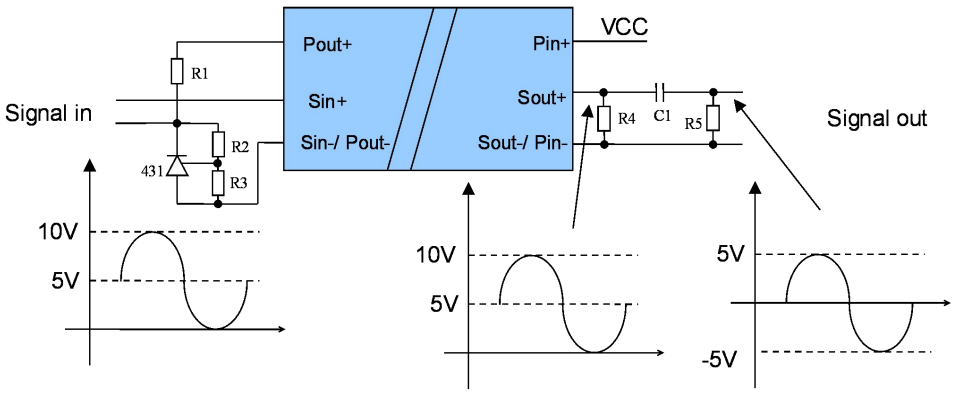


Fig. 3 Isolated transmission for electrical signals application

Function

In the figure 2, Signal in is detected electrical signals, Signal out is electrical signals for control system of isolation transmission. VCC is isolated power supply provided from control system. Typical power signal is positive and negative sine wave signal. 431 R1 R2 and R3 is voltage stabilizing circuit in the circuit, and they can achieve zero adjustment of the input signal. Amplifier of TE_N series achieve signal transmission function and power supply function of voltage stabilizing circuit. R4,R5,C1 achieve DC output signal filtering functions.

Working principle

Supposing detected signal is 5V sine wave signal. When the input signal is passed through stabilizing circuit which is composed of 431,R1,R2 and R3, input signal of TE_N transmitter become 0~10V sine wave signal. If the amplifier is the one which has 0~10V input and 0~10V output, TE_N transmitter output would be output 0~10 v sine wave signal at this time. After passed through filter circuit which is composed of R4,R5 and C1, the DC component of 0~10V sine wave signal is filtered, and the output only have ±5V sine wave signal.

Parameter

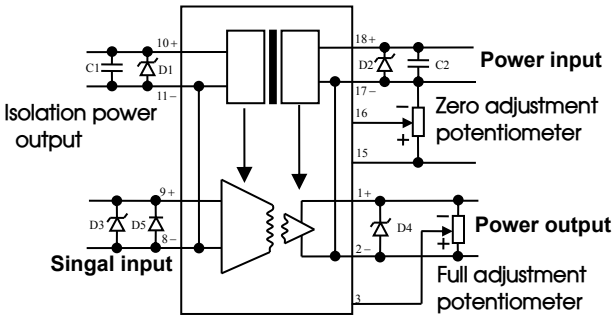
In the application, typical values of R1, R2 and R3 are 10KΩ, and reference Voltage of 413 is 2.5V. Component regulated voltage is 5V. Voltage accuracy can achieve a variety of application requirements of high precision according to the resistance tolerance precision. Typical application range of R4 is 2KΩ~5KΩ. Because signal output voltage is positive and negative, there will be a transmitter output signal current return-irrigation phenomenon when the voltage signal output is negative.R4 should choose a smaller value in order to reduce the influence of the return-irrigation current. C1 should be chosen low internal resistance capacitance. Normally ceramic capacitor with volume more than 10uF will be suitable. Because C1 achieves the function of getting through AC and preventing DC. Large capacitance resistance and small capacitance value can make AC signal distorted. The recommended value of R5 should be more than 100KΩ, and implements a DC signal to zero in the circuit. The increase of value of R5 can make the time of DC signal to zero longer, and make the startup time longer. If load in circuit is too small, then the load for AC will be increased, so that AC signal will be distorted.

Notice

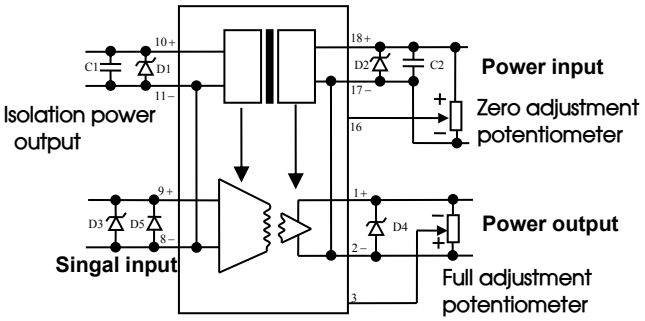
Because the transmitter of TE_N series can not input negative voltage signal, it need to pay attention to narrow signal voltage amplitude and have the necessary margin in the design. It can guarantee the normal work of the circuit and reduce the risk of signal distortion.

4) Application—Zero and full adjustment function

Zero and full adjustment recommended setting circuit is as shown



Routine zero and full adjustment circuit



24 V power input zero and full adjustment circuit

Fig. 4

Function

Zero adjustment function by setting up adjustment resistor at the zero point can change the zero signal transmission, which makes the output signal overall migration. Full adjustment function is also called the gain adjustment function, and it can change the ratio of signal transmission through the set up corresponding adjust resistance at the full adjustment, and the isolation transmission proportion of input and output signal value would be changed.

Usage

Adding and reducing negative zero resistance can reduce the zero of signal output. Adding and reducing positive zero resistance can increase the zero of signal output. Adding and reducing negative full adjustable resistance can reduce the ratio of signal transmission, Adding and reducing negative full adjustable resistance can increase the ratio of signal transmission. You can use potentiometer to adjust the output signal of zero and full in practical application. As shown in the figure 4, the terminal of full or zero adjustment is connected to the sliding of potentiometer, and the both ends of potentiometer is to the zero or full reference of positive and negative regulating reference . 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 4, zero positive reference adjusting is different between 24V input product and other power input products, so the zero adjustment circuit is also different. Adjusting the potentiometer to positive can increase zero or full of the corresponding signal. Adjusting the potentiometer to negative can reduce zero or full of the corresponding signal. The maximum recommended range of potentiometer is 10KΩ~1MΩ, detail resistance selection according to the adjustment accuracy. Choose larger resistance potentiometer for high precision fine-tuning. Choose smaller resistance potentiometer for a wide range of rough adjustment.

Notice

The accuracy of transmitter of TE_N series is already 0.1%FS during production and before shipment, using the function of zero and full adjustment will affect original accuracy. Due to the effect on temperature drift of external adjustment resistor and the stability of the potentiometer, temperature drift of product will be changed, too.

The 1:1 ratio for positive resistance and negative resistance of full adjustment potentiometer is desired full adjustment. For the zero adjustment potentiometer, the ratio between positive resistance and negative resistance, which makes the zero point of different products predetermined Zero point is diverse. Please set the value of potentiometer according to actual situation.

2. Recommended EMC circuit

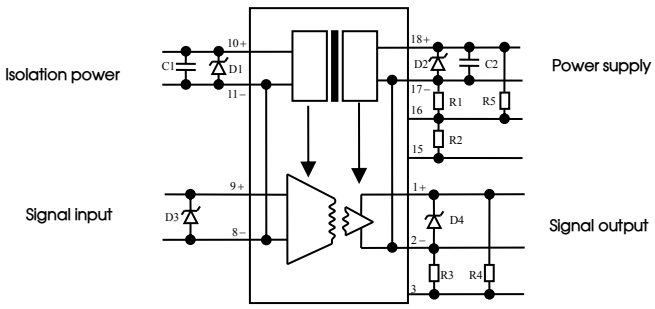
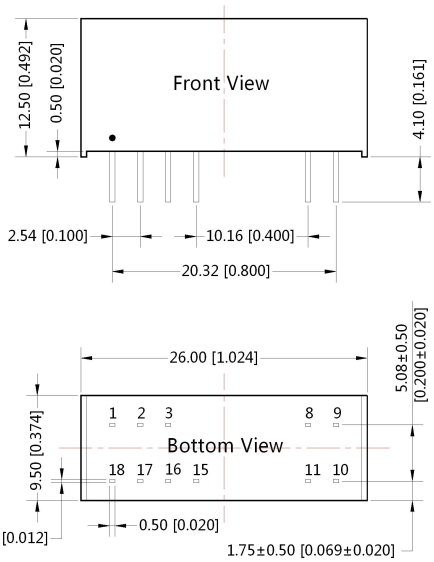


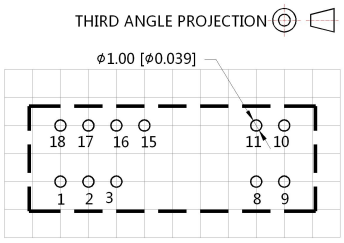
Fig. 5

C1	4.7uF/35V
C2	220uF/35V
R1	Negative zero adjustment resistance
R2	Positive zero adjustment resistance
R3	Positive gain adjustment resistance
R4	Negative gain adjustment resistance
R5	Positive zero adjustment resistance
D1	SMCJ30A
D2	SMCJ28A
D3	SMBJ15A
D4	SMBJ15A

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

Dimensions and Recommended Layout





Note : Grid 2.54*2.54mm

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		

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

Notes:

1. Packing Information please refer to 'Product Packing Information'. Packing bag number: 58240002;
2. All index testing methods in this datasheet are based on our Company's corporate standards;
3. The performance indexes of the product models listed in this datasheet are as above, but some indexes of non-standard model products will exceed the above-mentioned requirements, and please directly contact our technician for specific information;
4. We can provide product customization service;
5. Specifications of this product are subject to changes without prior notice.

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