ACTIVE HIGH PRECISION AMPLIFIER
——Detection type TExxxxN series

PART NUMBER SYSTEM

| Package | Isolation power output | Power supply | Signal output | Signal input | Double isolation detection type | Isolation amplifier |

FEATURES
- 2-port isolation (input and output)
- High accuracy (0.1% F.S.)
- High linearity (0.1% F.S.)
- High isolation voltage (2KVC/60s)
- Low ripple & noise: ≤30mVpp (20MHz)
- Extremely low temperature drift
  (-25~+71℃ ≤35PPM/℃)
- Small size: DIP18 (26*9.5*12.5mm)
- ESD protection (IEC/EN61000-4-2 contact ±4KV perf. Criteria B)
- With load ability:
  ≥2KΩ (@MAX SIGNAL OUTPUT @10V)

GENERAL DESCRIPTION
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.

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<td>TE5534N</td>
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<td>TE5544N</td>
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<td>TE5554N</td>
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<td>TE6654N</td>
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<td>TE6664N</td>
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<td>TE1533N</td>
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<td>TE1660N</td>
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ELECTRICAL SPECIFICATIONS

<table>
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<tr>
<th>Power Supply</th>
<th>Power Supply</th>
<th>Input Power</th>
<th>Power Protection</th>
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<tbody>
<tr>
<td>(Nominal power supply) ±5%</td>
<td>≤1.0W (No isolation power output)</td>
<td>Reverse protection (The product of 5V power input is without this function)</td>
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<tr>
<th>Isolation Power Output</th>
<th>Output Voltage</th>
<th>Output Current</th>
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<tr>
<td>(Nominal) ±10%</td>
<td>≤25mA</td>
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Input | Input Signal
---|---
Refer to the above selection guide
Input Impedance  ≥10MΩ (Max. voltage signal input)
≤250mV (Max. current signal input)

Over-load  ≤30V (Voltage signal input)
≤50mA (Current signal input)

Output Signal  Refer to the above selection guide
With Load Ability  ≥2kΩ
Ripple & Noise  ≤30mVpp (20MHz bandwidth)

TRANSMISSION SPECIFICATIONS

Zero Offset  0.1%FS.
Accuracy  0.1%FS.
Temperature Drift  35PPM/℃ (-25~+71℃) - 50PPM/℃ (-40~+85℃)

Adjustable Function  Full Degree Regulation
Can be adjusted within ±5% output signal range
Zero Regulation
Can be adjusted within ±5% output signal range

Frequency Response  Bandwidth
≥2kHz
Response Time  ≤1mS

ISOLATION SPECIFICATIONS

Electrical Isolation  Power input and the signal output are on the common ground. Power output and the signal input are on the common ground. Isolated between power input and the signal output or power input and power distribution output.

Isolation voltage  2.0KVAC (Tested for 1 minute, leakage current < 1mA, humidity < 70%)
Insulation Resistance  100MΩ (500VDC)

EMC SPECIFICATIONS

EMI  CE CISPR22/EN55022 - CLASS A (Recommended Circuit Refer to Figure 1)
     RE CISPR22/EN55022 - CLASS A

     ESD  IEC/EN61000-4-2 Contact ±4kV
         IEC/EN61000-4-3  10V/m

     EMS  IEC/EN61000-4-4 Power port ±2kV (Recommended Circuit Refer to Figure 1)
         IEC/EN61000-4-5 Power port ±1KV/±2KV (Recommended Circuit Refer to Figure 1)
         IEC/EN61000-4-6 3 Vrms

EMS  CS IEC/EN61000-4-6 3 Vrms

OTHER SPECIFICATIONS

Operating temperature: -40~+85℃
Transport and storage temperature: -50~+105℃
Package  DIP18
Weight  8g (typ.)
Application Environment  Dust-free, fierce shocking, impulsion and corrosive gas

APPLICATION CIRCUIT DIAGRAM

(Figure 1)

Note:
① Adjustment resistance is chosen according to the requirement.
② R5 is only used for regulation of 24V input product.
1. Schematic diagram

2. Typical application — Multi-channel signal acquisition

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

Function
In the figure, Sin1~Sin4 are external input signals, A0~A1 are strobe signals, and signal out is an external input signal of the control system to accept. The optocoupler in the circuit implements the isolated transmission of the 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+. Isolated transmission for electrical signals application

3. Typical application — Isolated transmission for electrical signals

Typical application of isolated transmission for electrical signals is below.
Function
In the figure, 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 output signal is negative. R4 should choose a smaller value in order to reduce the influence of the return-irrigation current. C1 should be chosen suitable low internal resistance capacitance. Normally ceramic capacitor with volume more than 10μF 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

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, 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, 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.

NOTICE
1. Please read the user manual carefully before using. If any question please contact our FAE.
2. Please do not use this product in hazardous area.
3. The power supply of this product should be 24VDC power source. It is forbidden to use 220VAC power supply.
4. To avoid invalid explosion protection function, or any failure, disassembling this product is forbidden.
AFTER-SALES SERVICE
1. Products are carefully inspected and quality controlled during production and before shipment. If they operated abnormally or there was anything wrong, please contact our agent from which you purchased or MORNSUN FAE as soon as possible.
2. MORNSUN warranty our product for 3 years from manufacturing date. During this period, MORNSUN will repair or replace the product if product was found to have manufacturing defect.

APPLICATION CIRCUIT
Please check “A APPLICATION GUIDE TO ISOLATION TRANSMITTER”

DIMENSIONS, RECOMMENDED FOOTPRINT & PACKAGING

Note:
1. All specifications measured at Ta=25°C, humidity<75%, nominal input voltage and rated output load unless otherwise specified.
2. In this datasheet, all the test setup and methods are based on our corporate standards.
3. All characteristics are for listed models, and non-standard models may perform differently. Please contact our technical support for more details.
4. Contact us for your specific requirement.
5. Specifications of this product are subject to changes without prior notice.

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