

# Very High Sensitivity, 50 mW (nominal operating) Rely with LT style pin layout

# TX-S RELAYS



# **FEATURES**

1. Nominal operating power: High sensitivity of 50 mW

By using the highly efficient polar magnetic circuit "seesaw balance mechanism", a nominal operating power of 50 mW (minimum operating power of 32 mW) has been achieved.

2. Compact size

15.0(L) × 7.4(W) × 8.2(H) .591(L) × .291(W) × .323(H)

### 3. High contact reliability

High contact reliability is achieved by the use of gold-clad twin crossbar contacts, low-gas formation materials, mold sealing the coil section, and by controlling organic gas in the coil.

\*We also offer a range of products with AgPd contacts suitable for use

\*We also offer a range of products with AgPd contacts suitable for use in low level load analog circuits (max. 10V DC 10 mA).

4. Outstanding surge resistance

Surge breakdown voltage between open contacts:

1,500 V 10×160  $\mu$ sec. (FCC part 68) Surge breakdown voltage between contact and coil:

2,500 V 2×10 µsec. (Telcordia)

5. Low thermal electromotive force (approx. 0.3  $\mu$ V)

The structure of the mold-sealed body block of the coil section achieves nominal operating power of 50 mW and high sensitivity, along with low thermal electromotive force, reduced to approximately  $0.3\ \mu V.$ 

# 6. A range of surface-mount types is also available.

SA: Low-profile surface-mount terminal type

SS: Space saving surface-mount terminal type

7. Sealed construction allows automatic washing.

# TYPICAL APPLICATIONS

- 1. Communications (XDSL, Transmission)
- 2. Measurement
- 3. Security
- 4. Home appliances, and audio/visual equipment
- 5. Automotive equipment
- 6. Medical equipment

# ORDERING INFORMATION

	TXS	2		 	 	
Contact arrangement 2: 2 Form C						
Surface-mount availability Nil: Standard PC board terminal type SA: SA type SS: SS type						
Operating function  Nil: Single side stable  L: 1 coil latching  L2: 2 coil latching  LT: 2 coil latching						
Terminal shape Nil: Standard PC board terminal or surface-mount terminal						
Nominal coil voltage (DC) 1.5, 3, 4.5, 6, 9, 12, 24V						
Contact material Nil: Standard contact (Ag+Au clad) 1: AgPd contact (low level load); AgPd+Au clad (stationary), AgPd (movable)					_	
Packing style  Nil: Tube packing  X: Tape and reel (picked from 1/3/4/5-pin side)  Z: Tape and reel packing (picked from the 8/9/10/12-pin side)						

# **TYPES**

## 1. Standard PC board terminal

Contact	Nominal coil	Single side stable	1 coil latching	2 coil latching (L2)	2 coil latching (LT)	
arrangement	voltage	Part No.	Part No.	Part No.	Part No.	
	1.5V DC	TXS2-1.5V	TXS2-L-1.5V	TXS2-L2-1.5V	TXS2-LT-1.5V	
	3V DC	TXS2-3V	TXS2-L-3V	TXS2-L2-3V	TXS2-LT-3V	
	4.5V DC	TXS2-4.5V	TXS2-L-4.5V	TXS2-L2-4.5V	TXS2-LT-4.5V	
2 Form C	6V DC	TXS2-6V	TXS2-L-6V	TXS2-L2-6V	TXS2-LT-6V	
	9V DC	TXS2-9V	TXS2-L-9V	TXS2-L2-9V	TXS2-LT-9V	
	12V DC	TXS2-12V	TXS2-L-12V	TXS2-L2-12V	TXS2-LT-12V	
	24V DC	TXS2-24V	TXS2-L-24V	TXS2-L2-24V	TXS2-LT-24V	

Standard packing: Tube: 40 pcs.; Case: 1,000 pcs.

Note: Please add "-1" to the end of the part number for AgPd contacts (low level load).

#### 2. Surface-mount terminal

### 1) Tube packing

Contact	Nominal coil	Single side stable	1 coil latching	2 coil latching (L2)	2 coil latching (LT)
arrangement	voltage	Part No.	Part No.	Part No.	Part No.
	1.5V DC	TXS2S□-1.5V	TXS2S□-L-1.5V	TXS2S□-L2-1.5V	TXS2S□-LT-1.5V
	3V DC	TXS2S□-3V	TXS2S□-L-3V	TXS2S□-L2-3V	TXS2S□-LT-3V
	4.5V DC	TXS2S□-4.5V	TXS2S□-L-4.5V	TXS2S□-L2-4.5V	TXS2S□-LT-4.5V
2 Form C	6V DC	TXS2S□-6V	TXS2S□-L-6V	TXS2S□-L2-6V	TXS2S□-LT-6V
	9V DC	TXS2S□-9V	TXS2S□-L-9V	TXS2S□-L2-9V	TXS2S□-LT-9V
	12V DC	TXS2S□-12V	TXS2S□-L-12V	TXS2S□-L2-12V	TXS2S□-LT-12V
	24V DC	TXS2S□-24V	TXS2S□-L-24V	TXS2S□-L2-24V	TXS2S□-LT-24V

 $\square$ : For each surface-mounted terminal identification, input the following letter. SA type:  $\underline{A}$ , SS type:  $\underline{S}$ 

Standard packing: Tube: 40 pcs.; Case: 1,000 pcs.

Note: Please add "-1" to the end of the part number for AgPd contacts (low level load).

### 2) Tape and reel packing

Contact	Nominal coil	Single side stable	1 coil latching	2 coil latching (L2)	2 coil latching (LT)	
arrangement	voltage	Part No.	Part No.	Part No.	Part No.	
	1.5V DC	TXS2S□-1.5V-Z	TXS2S□-L-1.5V-Z	TXS2S□-L2-1.5V-Z	TXS2S□-LT-1.5V-Z	
	3V DC	TXS2S□-3V-Z	TXS2S□-L-3V-Z	TXS2S□-L2-3V-Z	TXS2S□-LT-3V-Z	
	4.5V DC	TXS2S□-4.5V-Z	TXS2S□-L-4.5V-Z	TXS2S□-L2-4.5V-Z	TXS2S□-LT-4.5V-Z	
2 Form C	6V DC	TXS2S□-6V-Z	TXS2S□-L-6V-Z	TXS2S□-L2-6V-Z	TXS2S□-LT-6V-Z	
	9V DC	TXS2S□-9V-Z	TXS2S□-L-9V-Z	TXS2S□-L2-9V-Z	TXS2S□-LT-9V-Z	
	12V DC	TXS2S□-12V-Z	TXS2S□-L-12V-Z	TXS2S□-L2-12V-Z	TXS2S□-LT-12V-Z	
	24V DC	TXS2S□-24V-Z	TXS2S□-L-24V-Z	TXS2S□-L2-24V-Z	TXS2S□-LT-24V-Z	

# **RATING**

# 1. Coil data

## 1) Single side stable

Nominal coil voltage	Pick-up voltage (at 20°C 68°F)	Drop-out voltage (at 20°C 68°F)	Nominal operating current [±10%] (at 20°C 68°F)	Coil resistance [±10%] (at 20°C 68°F)	Nominal operating power	Max. applied voltage (at 20°C 68°F)
1.5V DC				45Ω		
3V DC		10%V or more of nominal voltage*	16.7mA	180Ω	50mW	150%V of nominal voltage
4.5V DC	80%V or less of		11.1mA	405Ω		
6V DC	nominal voltage*		8.3mA	720Ω		
9V DC	(Initial)	(Initial)	5.6mA	1,620Ω		
12V DC			4.2mA	2,880Ω		
24V DC			2.9mA	8,229Ω	70mW	

## 2) 1 coil latching

Nominal coil voltage	Set voltage (at 20°C 68°F)	Reset voltage (at 20°C 68°F)	Nominal operating current [±10%] (at 20°C 68°F)	Coil resistance [±10%] (at 20°C 68°F)	Nominal operating power	Max. applied voltage (at 20°C 68°F)
1.5V DC			23.3mA	64.3Ω		150%V of nominal voltage
3V DC			11.7mA	257Ω	35mW	
4.5V DC	80%V or less of	80%V or less of	7.8mA	579Ω		
6V DC	nominal voltage*	nominal voltage*	5.8mA	1,029Ω		
9V DC	(Initial)	(Initial)	3.9mA	2,314Ω		
12V DC			2.9mA	4,114Ω		
24V DC			2.1mA	11,520Ω	50mW	

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<sup>□:</sup> For each surface-mounted terminal identification, input the following letter. SA type: A, SS type: S Standard packing: Tape and reel: 500 pcs.; Case: 1,000 pcs.

Notes: 1. Tape and reel packing symbol "-Z" is not marked on the relay. "X" type tape and reel packing (picked from 1/2/3/4-pin side) is also available.

<sup>2.</sup> Please add "-1" to the end of the part number for AgPd contacts (low level load). (Ex. TXS2SA-1.5V-1-Z)

# 3) 2 coil latching (L2, LT)

Nominal coil voltage	Set voltage (at 20°C 68°F)	Reset voltage (at 20°C 68°F)	cur	operating rent 20°C 68°F)	L+10%1 (at 20°C 68		[+10%] (at 20%) 68		Nominal operating power		Max. applied voltage (at 20°C 68°F)
	,	,	Set coil	Reset coil	Set coil	Reset coil	Set coil	Reset coil	,		
1.5V DC			46.7mA	46.7mA	32.1Ω	32.1Ω	70mW	70mW			
3V DC		80%V or less of	23.3mA	23.3mA	129Ω	129Ω					
4.5V DC	80%V or less of		15.6mA	15.6mA	289Ω	289Ω					
6V DC	nominal voltage*	nominal voltage*	11.7mA	11.7mA	514Ω	514Ω	7011100		150%V of nominal voltage		
9V DC	(Initial)	(Initial)	7.8mA	7.8mA	1,157Ω	1,157Ω			nominal voltage		
12V DC			5.8mA	5.8mA	2,057Ω	2,057Ω					
24V DC			6.3mA	6.3mA	3,840Ω	3,840Ω	150mW	150mW			

<sup>\*</sup>Pulse drive (JIS C 5442-1986)

### 2. Specifications

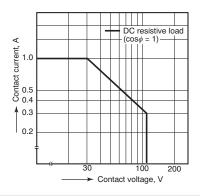
Characteristics		Item	Specifications			
	Arrangement		2 Form C			
Contact	Initial contact resista	nce, max.	Max. 100 mΩ (By voltage drop 6 V DC 1A)			
Comuci	Contact material		Standard contact: Ag+Au clad, AgPd contact (low level load): AgPd+Au clad (stationary AgPd (movable)			
	Nominal switching ca	apacity	1 A 30 V DC (resistive load)			
	Max. switching powe	١٢	30 W (DC) (resistive load)			
	Max. switching voltage	ge	110V DC			
Rating	Max. switching curre	nt	1 A			
Kallily	Min. switching capac	city (Reference value)*1	10μA 10mV DC			
		Single side stable	50 mW (1.5 to 12 V DC), 70 mW (24 V DC)			
	Nominal operating power	1 coil latching	35 mW (1.5 to 12 V DC), 50 mW (24 V DC)			
	power	2 coil latching	70 mW (1.5 to 12 V DC), 150 mW (24 V DC)			
	Insulation resistance (Initial)		Min. 1,000MΩ (at 500V DC) Measurement at same location as "Initial breakdown voltage" section.			
	Breakdown voltage (Initial)	Between open contacts	750 Vrms for 1min. (Detection current: 10mA)			
		Between contact and coil	1,800 Vrms for 1min. (Detection current: 10mA)			
		Between contact sets	1,000 Vrms for 1min. (Detection current: 10mA)			
Electrical	Surge breakdown	Between open contacts	1,500 V (10×160μs) (FCC Part 68)			
characteristics	voltage (Initial)	Between contacts and coil	2,500 V (2×10μs) (Telcordia)			
	Temperature rise (at 20°C 68°F)		Max. 50°C (By resistive method, nominal coil voltage applied to the coil; contact carrying current: 1A			
	Operate time [Set time] (at 20°C 68°F)		Max. 5 ms [Max. 5 ms] (Nominal coil voltage applied to the coil, excluding contact bou time.)			
	Release time [Reset	time] (at 20°C 68°F)	Max. 5 ms [Max. 5 ms] (Nominal coil voltage applied to the coil, excluding contact bounce time.) (without diode)			
	Shock resistance	Functional	Min. 750 m/s² (Half-wave pulse of sine wave: 6 ms; detection time: 10μs.)			
Mechanical	Shock resistance	Destructive	Min. 1,000 m/s <sup>2</sup> (Half-wave pulse of sine wave: 6 ms.)			
characteristics	Vibration resistance	Functional	10 to 55 Hz at double amplitude of 3.3 mm (Detection time: 10μs.)			
	VIDIALION TESISLANCE	Destructive	10 to 55 Hz at double amplitude of 5 mm			
Exported life	Mechanical		Min. 5×10 <sup>7</sup> (at 180 cpm)			
Expected life	Electrical		Min. 2×10 <sup>5</sup> (1 A 30 V DC resistive) (at 20 cpm)			
Conditions	Conditions for operate	tion, transport and storage*2	Ambient temperature: -40°C to +70°C -40°F to +158°F; Humidity: 5 to 85% R.H. (Not freezing and condensing at low temperature)			
	Max. operating spee	d (at rated load)	20 cpm			
Unit weight			Approx. 2 g .071 oz			

 <sup>\*1</sup> This value can change due to the switching frequency, environmental conditions, and desired reliability level, therefore it is recommended to check this with the actual load. (AgPd contact type is available for low level load switching [10V DC, 10mA max. level].)
 \*2 Refer to "6. Usage, Storage and Transport Conditions" in AMBIENT ENVIRONMENT section in Relay Technical Information.

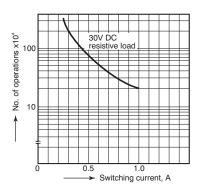
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# REFERENCE DATA

#### 1. Maximum switching capacity

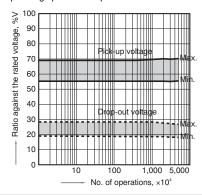


2. Life curve



3. Mechanical life

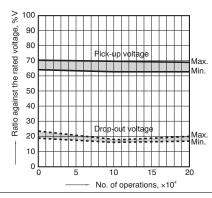
Tested sample: TXS2-4.5V, 10 pcs. Operating speed: 180 cpm



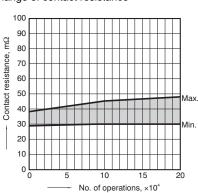
4. Electrical life (1 A 30 V DC resistive load)

Tested sample: TXS2-4.5V, 6 pcs. Operating speed: 20 cpm

Change of pick-up and drop-out voltage

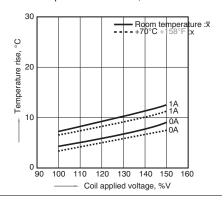


Change of contact resistance



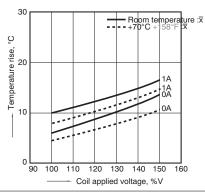
5-(1). Coil temperature rise Tested sample: TXS2-4.5V, 6 pcs. Point measured: Inside the coil

Ambient temperature: 25°C 77°F, 70°C 158°F

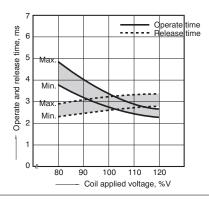


5-(2). Coil temperature rise Tested sample: TXS2-24V, 6 pcs. Point measured: Inside the coil

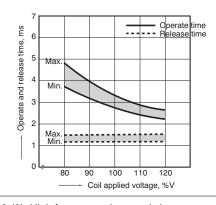
Ambient temperature: 25°C 77°F, 70°C 158°F



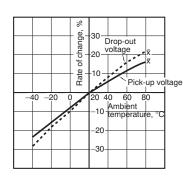
6-(1). Operate and release time (with diode) Tested sample: TXS2-4.5V, 10 pcs.



6-(2). Operate and release time (without diode) Tested sample: TXS2-4.5V, 10 pcs.

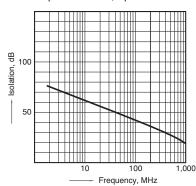


7. Ambient temperature characteristics Tested sample: TXS2-4.5V, 5 pcs.



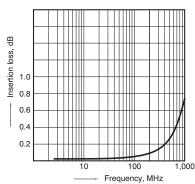
8-(1). High frequency characteristics (Isolation)

Tested sample: TXS2-4.5V, 2 pcs.



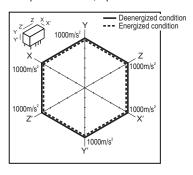
8-(2). High frequency characteristics (Insertion loss)

Tested sample: TXS2-4.5V, 2 pcs.

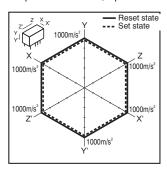


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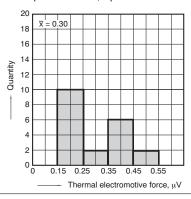
9-(1). Malfunctional shock (single side stable) Tested sample: TXS2-4.5V, 6 pcs.



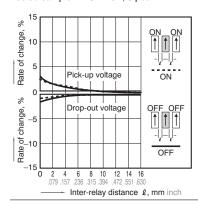
9-(2). Malfunctional shock (latching) Tested sample: TXS2-L2-4.5V, 6 pcs.



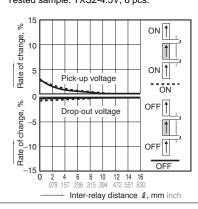
10. Thermal electromotive force Tested sample: TXS2-4.5V, 6 pcs.



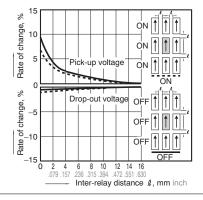
11-(1). Influence of adjacent mounting Tested sample: TXS2-4.5V, 6 pcs.



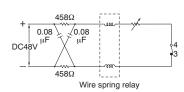
11-(2). Influence of adjacent mounting Tested sample: TXS2-4.5V, 6 pcs.



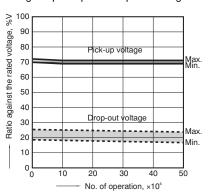
11-(3). Influence of adjacent mounting Tested sample: TXS2-4.5V, 6 pcs.



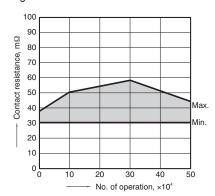
12. Pulse dialing test (35 mA 48V DC wire spring relay load) Tested sample: TXS2-4.5V, 6 pcs.



Change of pick-up and drop-out voltage



Change of contact resistance



Note: Data of surface-mount type are the same as those of PC board terminal type.

# **DIMENSIONS** (mm inch)

Download **CAD Data** from our Web site.

# 1. Standard PC board terminal

## CAD Data



	External dimensions (Gen	eral tolerance: ±0.3 ±.012)	PC board pattern (Bottom view) (Tolerance: ±0.1 ±.004)			
Туре	Single side stable and 1 coil latching type	2 coil latching type (L2, LT)	Single side stable and 1 coil latching type	2 coil latching type (L2, LT)		
Standard PC board terminal	15.00 7.40 .591 0.65 8.20 .026 3.23 0.50 1.15 5.08 2.54 1.38 5.08 0.10	15.00 7.40 .291 .0.26 8.20 .0.20 .0.20 .0.26 .0.10 .0.30 .0.25 .0.45 .0.00 .0.	2.54 - 4.00 - 1.5.08 - 1.200 -	2.54500   5.08   200   10-1.0 dia.   10-0.039 dia.		

# Schematic (Bottom view) 1 coil latching



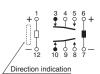
(Deenergized condition)

(Reset condition)

2 coil latching (L2)

(Reset condition)

2 coil latching (LT)



(Reset condition)

#### 2. Surface-mount terminal

### **CAD Data**



	External dimensions (Gen	eral tolerance: ±0.3 ±.012)	Suggested mounting pad (Top view) (Tolerance: ±0.1 ±.004)			
Type	Single side stable and 1 coil latching type	2 coil latching type (L2, LT)	Single side stable and 1 coil latching type	2 coil latching type (L2, LT)		
SA type	15 .591 .323 .323 .331 .025 .026 .026 .026 .020 .020 .020 .032 .033 .033 .034 .0	15 501 82 84 323 331 0.25 0.26 0.2	3.16 · 039	3.16.039 2.54 100 1.124 100 1.124 2.25 1.25		
SS type	15 7.4 - 291 - 323 Max. 10 324 - 291 - 0.25 5.08 7.04 - 291 - 0.25 5.08 7.04 - 291 ± .020 7.020	159 7.4 - 291 - 29	2.16 .039	2.16 1 220 100 100 100 100 100 100 100 100 1		

# Schematic (Top view)

Single side stable



(Deenergized condition)

1 coil latching



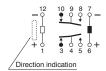
(Reset condition)

2 coil latching (L2)



(Reset condition)

2 coil latching (LT)

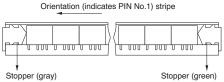


(Reset condition)

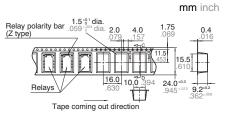
# **NOTES**

### 1. Packing style

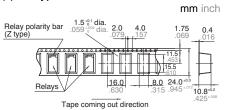
1) The relay is packed in a tube with the relay orientation mark on the left side, as shown in the figure below.



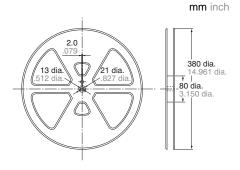
- 2) Tape and reel packing (surface-mount terminal type)
- (1) Tape dimensions
- (i) SA type



## (ii) SS type



# (2) Dimensions of plastic reel



#### 2. Automatic insertion

To maintain the internal function of the relay, the chucking pressure should not exceed the values below.

Chucking pressure in the direction A: 4.9 N {500gf} or less

Chucking pressure in the direction B:

9.8 N {1 kgf} or less

Chucking pressure in the direction C: 9.8 N {1 kgf} or less



Please chuck the portion.

Avoid chucking the center of the relay.

In addition, excessive chucking pressure to the pinpoint of the relay should be avoided.

# For Cautions for Use, see Relay Technical Information.