FEATURES

1. 2,000 V breakdown voltage between contact and coil
The body block construction of the coil that is sealed at formation offers a high breakdown voltage of 2,000 V between contact and coil, and 1,000 V between open contacts.

2. Outstanding surge resistance.
Surge breakdown voltage between open contacts:
1,500 V 10×160μpsec. (FCC part 68)
Surge breakdown voltage between contact and coil:
2,500 V 2×10μpsec. (Bellcore)

3. Nominal operating power: High sensitivity of 140mW
By using the highly efficient polar magnetic circuit "seesaw balance mechanism", a nominal operating power of 140 mW (minimum operating power of 79 mW) has been achieved.

4. High contact capacity: 2 A 30 V DC

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

6. The use of gold-clad twin crossbar contacts ensures high contact reliability.
*We also offer a range of products with AgPd contacts suitable for use in low level load analog circuits (Max. 10V DC 10 mA).
*SX relays designed for low level loads are also available.

7. Outstanding vibration and shock resistance.
Functional shock resistance: 750 m/s^2
Destructive shock resistance: 1,000 m/s^2
Functional vibration resistance: 10 to 55 Hz (at double amplitude of 3.3 mm .130 inch)

Destructive vibration resistance: 10 to 55 Hz (at double amplitude of 5 mm .197 inch)

8. Sealed construction allows automatic washing.

9. A range of surface-mount types is also available
SA: Low-profile surface-mount terminal type
SL: High connection reliability surface-mount terminal type
SS: Space saving surface-mount terminal type

TYPICAL APPLICATIONS

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

ORDERING INFORMATION

TX [2] □ - □ - □ - □ - □ - □

Contact arrangement
2: 2 Form C

Surface-mount availability
Nil: Standard PC board terminal type or self-clinching terminal type
SA: SA type
SL: SL type
SS: SS type

Operating function
Nil: Single side stable
L: 1 coil latching
L2: 2 coil latching

Terminal shape
Nil: Standard PC board terminal or surface-mount terminal
H: Self-clinching terminal

Coil voltage (DC)*
1.5, 3, 4.5, 5, 6, 9, 12, 24, 48V

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)

Notes: 1. *48 V coil type: Single side stable only
       2. In case of 5 V transistor drive circuit, it is recommended to use 4.5 V type relay.

TX

TYPES

1. Standard PC board terminal

Contact arrangement	Nominal coil voltage	Single side stable	1 coil latching	2 coil latching
		Part No.	Part No.	Part No.
2 Form C	1.5V DC	TX2-1.5V	TX2-L-1.5V	TX2-L2-1.5V
	3V DC	TX2-3V	TX2-L-3V	TX2-L2-3V
	4.5V DC	TX2-4.5V	TX2-L-4.5V	TX2-L2-4.5V
	5V DC	TX2-5V	TX2-L-5V	TX2-L2-5V
	6V DC	TX2-6V	TX2-L-6V	TX2-L2-6V
	9V DC	TX2-9V	TX2-L-9V	TX2-L2-9V
	12V DC	TX2-12V	TX2-L-12V	TX2-L2-12V
	24V DC	TX2-24V	TX2-L-24V	TX2-L2-24V
	48V DC	TX2-48V	—	—

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. self-clinching terminal

Contact arrangement	Nominal coil voltage	Single side stable	1 coil latching	2 coil latching
		Part No.	Part No.	Part No.
2 Fom C	1.5V DC	TX2-H-1.5V	TX2-L-H-1.5V	TX2-L2-H-1.5V
	3V DC	TX2-H-3V	TX2-L-H-3V	TX2-L2-H-3V
	4.5V DC	TX2-H-4.5V	TX2-L-H-4.5V	TX2-L2-H-4.5V
	5V DC	TX2-H-5V	TX2-L-H-5V	TX2-L2-H-5V
	6V DC	TX2-H-6V	TX2-L-H-6V	TX2-L2-H-6V
	9V DC	TX2-H-9V	TX2-L-H-9V	TX2-L2-H-9V
	12V DC	TX2-H-12V	TX2-L-H-12V	TX2-L2-H-12V
	24V DC	TX2-H-24V	TX2-L-H-24V	TX2-L2-H-24V
	48V DC	TX2-H-48V	—	—

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).

3. Surface-mount terminal

1) Tube packing

Contact arrangement	Nominal coil voltage	Single side stable	1 coil latching	2 coil latching
		Part No.	Part No.	Part No.
2c	1.5V DC	TX2S□-1.5V	TX2S□-L-1.5V	TX2S□-L2-1.5V
	3V DC	TX2S□-3V	TX2S□-L-3V	TX2S□-L2-3V
	4.5V DC	TX2S□-4.5V	TX2S□-L-4.5V	TX2S□-L2-4.5V
	5V DC	TX2S□-5V	TX2S□-L-5V	TX2S□-L2-5V
	6V DC	TX2S□-6V	TX2S□-L-6V	TX2S□-L2-6V
	9V DC	TX2S□-9V	TX2S□-L-9V	TX2S□-L2-9V
	12V DC	TX2S□-12V	TX2S□-L-12V	TX2S□-L2-12V
	24V DC	TX2S□-24V	TX2S□-L-24V	TX2S□-L2-24V
	48V DC	TX2S□-48V	—	—

□: For each surface-mounted terminal identification, input the following letter. SA type: A, SL type: L, SS type: 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 arrangement	Nominal coil voltage	Single side stable	1 coil latching	2 coil latching
		Part No.	Part No.	Part No.
2 Form C	1.5V DC	TX2S□-1.5V-Z	TX2S□-L-1.5V-Z	TX2S□-L2-1.5V-Z
	3V DC	TX2S□-3V-Z	TX2S□-L-3V-Z	TX2S□-L2-3V-Z
	4.5V DC	TX2S□-4.5V-Z	TX2S□-L-4.5V-Z	TX2S□-L2-4.5V-Z
	5V DC	TX2S□-5V-Z	TX2S□-L-5V-Z	TX2S□-L2-5V-Z
	6V DC	TX2S□6V-Z	TX2S□-L-6V-Z	TX2S□-L2-6V-Z
	9V DC	TX2S□-9V-Z	TX2S□-L-9V-Z	TX2S□-L2-9V-Z
	12V DC	TX2S□-12V-Z	TX2S□-L-12V-Z	TX2S□-L2-12V-Z
	24V DC	TX2S□-24V-Z	TX2S□-L-24V-Z	TX2S□-L2-24V-Z
	48V DC	TX2S□-48V-Z	—	—

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

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. allowable voltage (at 20°C 68°F)
1.5V DC	75%V or less of nominal voltage* (Initial)	10%V or more of nominal voltage* (Initial)	93.8mA	16Ω	140mW	150%V of nominal voltage
3V DC			46.7mA	64.3Ω		
4.5V DC			31mA	145Ω		
5V DC			28.1mA	178Ω		
6V DC			23.3mA	257Ω		
9V DC			15.5mA	579Ω		
12V DC			11.7mA	1,028Ω		
24V DC			5.8mA	4,114Ω		
48V DC			5.6mA	8,533Ω	270mW	120%V of nominal voltage

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. allowable voltage (at 20°C 68°F)
1.5V DC	75%V or less of nominal voltage* (Initial)	75%V or less of nominal voltage* (Initial)	66.7mA	22.5Ω	100mW	150%V of nominal voltage
3V DC			33.3mA	90Ω		
4.5V DC			22.2mA	202.5Ω		
5V DC			20mA	250Ω		
6V DC			16.7mA	360Ω		
9V DC			11.1mA	810Ω		
12V DC			8.3mA	1,440Ω		
24V DC			4.2mA	5,760Ω		

3) 2 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. allowable voltage (at 20°C 68°F
			Set coil	Reset coil	Set coil	Reset coil	Set coil	Reset coil	
1.5V DC	75%V or less of nominal voltage* (Initial)	75%V or less of nominal voltage* (Initial)	133.9mA	133.9mA	11.2Ω	11.2Ω	200mW	200mW	150%V of nominal voltage
3V DC			66.7mA	66.7mA	45Ω	45Ω			
4.5V DC			44.5mA	44.5mA	101.2Ω	101.2Ω			
5V DC			40mA	40mA	125Ω	125Ω			
6V DC			33.3mA	33.3mA	180Ω	180Ω			
9V DC			22.2mA	22.2mA	405Ω	405Ω			
12V DC			16.7mA	16.7mA	720Ω	720Ω			
24V DC			8.3mA	8.3mA	2,880Ω	2,880Ω			

*Pulse drive (JIS C 5442-1986)

TX

2. Specifications

| Characteristics	Item		Specifications
Contact	Arrangement		2 Form C
	Initial contact resistance, max.		Max. 100 mΩ (By voltage drop 6 V DC 1A)
	Contact material		Standard contact: Ag+Au clad, AgPd contact (low level load): AgPd+Au clad (stationary), AgPd (movable)
Rating	Nominal switching capacity (resistive load)		Standard contact: 2 A 30 V DC, AgPd contact: 1 A 30 V DC
	Max. switching power (resistive load)		Standard contact: 60 W (DC), AgPd contact: 30 W (DC)
	Max. switching voltage		220V DC
	Max. switching current		Standard contact: 2 A, AgPd contact: 1 A
	Min. switching capacity (Reference value)[*1]		10μA 10mV DC
	Nominal operating power	Single side stable	140 mW (1.5 to 24 V DC), 270 mW (48 V DC)
		1 coil latching	100 mW (1.5 to 24 V DC)
		2 coil latching	200 mW (1.5 to 24 V DC)
Electrical characteristics	Insulation resistance (Initial)		Min. 1,000MΩ (at 500V DC) Measurement at same location as "Initial breakdown voltage" section.
	Breakdown voltage (Initial)	Between open contacts	1,000 Vrms for 1min. (Detection current: 10mA)
		Between contact and coil	2,000 Vrms for 1min. (Detection current: 10mA)
		Between contact sets	1,000 Vrms for 1min. (Detection current: 10mA)
	Surge breakdown voltage (Initial)	Between open contacts	1,500 V (10×160μs) (FCC Part 68)
		Between contacts and coil	2,500 V (2×10μs) (Telcordia)
	Temperature rise (at 20°C 68°F)		Max. 50°C (By resistive method, nominal voltage applied to the coil; contact carrying current: 2A.)
	Operate time [Set time] (at 20°C 68°F)		Max. 4 ms [Max. 4 ms] (Nominal voltage applied to the coil, excluding contact bounce time.)
	Release time [Reset time] (at 20°C 68°F)		Max. 4 ms [Max. 4 ms] (Nominal voltage applied to the coil, excluding contact bounce time.) (without diode)
Mechanical characteristics	Shock resistance	Functional	Min. 750 m/s² (Half-wave pulse of sine wave: 6 ms; detection time: 10μs.)
		Destructive	Min. 1,000 m/s² (Half-wave pulse of sine wave: 6 ms.)
	Vibration resistance	Functional	10 to 55 Hz at double amplitude of 3.3 mm (Detection time: 10μs.)
		Destructive	10 to 55 Hz at double amplitude of 5 mm
Expected life	Mechanical		Min. 10⁸ (at 180 cpm)
	Electrical		Min. 10⁵ (2 A 30 V DC resistive), 5×10⁵ (1 A 30 V DC resistive) (at 20 cpm)
Conditions	Conditions for operation, transport and storage[*2]		Ambient temperature: −40°C to +85°C (up to 24 V coil) −40°F to +185°F (up to 24 V coil) [−40°C to +70°C (48 V coil) −40°F to +158°F (48 V coil)]; Humidity: 5 to 85% R.H. (Not freezing and condensing at low temperature)
	Max. operating speed (at rated load)		20 cpm
Unit weight			Approx. 2 g .071 oz

Notes:

*1 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 or SX relays are available for low level load switching [10V DC, 10mA max. level])
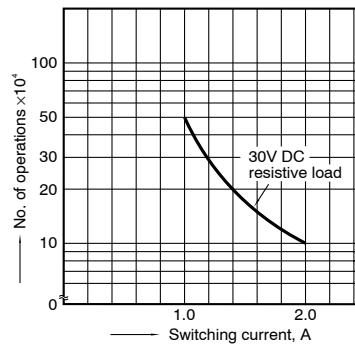
*2 Refer to 6. Conditions for operation, transport and storage mentioned in AMBIENT ENVIRONMENT (p. 19, Relay Technical Information).
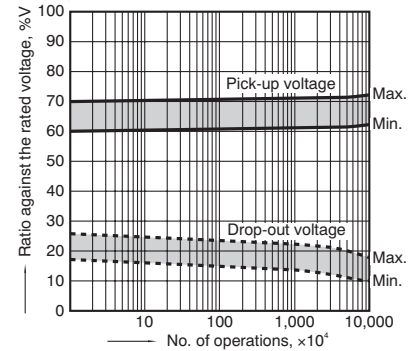
REFERENCE DATA

1. Maximum switching capacity
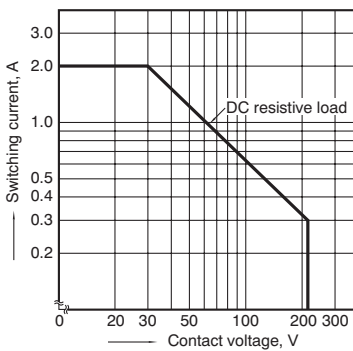
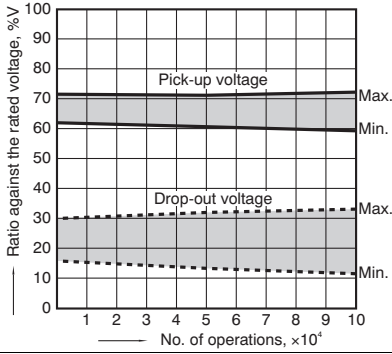### 2. Life curve

3. Mechanical life
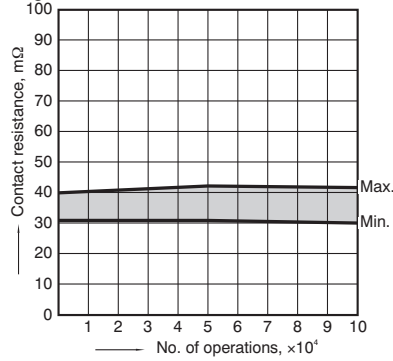
Tested sample: TX2-5V, 10 pcs.
Operating speed: 180 cpm

4. Electrical life (2A 30V DC resistive load)

Tested sample: TX2-5V, 6 pcs.
Operating speed: 20 cpm
Change of pick-up and drop-out voltage

Ratio against the rated voltage, %V

Pick-up voltage — Max.
Min.

Drop-out voltage — Max.
Min.

No. of operations, ×10⁴

Change of contact resistance

Contact resistance, mΩ

Max.
Min.

No. of operations, ×10⁴

5-(1). Coil temperature rise

Tested sample: TX2-5V, 6 pcs.
Point measured: Inside the coil
Ambient temperature: 25°C 77°F, 85°C 185°F

Temperature rise, °C

+25°C +77°F
+85°C +185°F

2A
2A
0A
0A

Coil applied voltage, %
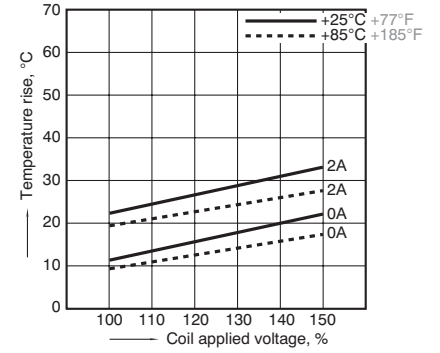
5-(2). Coil temperature rise

Tested sample: TX2-48V, 6 pcs.
Point measured: Inside the coil
Ambient temperature: 25°C 77°F, 70°C 158°F

Temperature rise, °C

+25°C +77°F
+70°C +158°F

2A
2A
0A
0A

Coil applied voltage, %
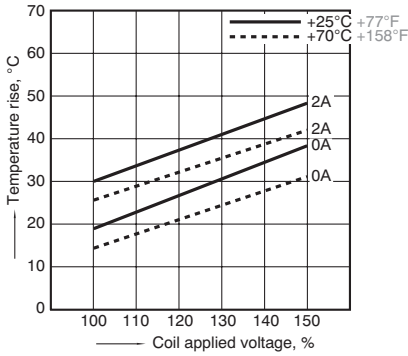
6-(1). Operate and release time (with diode)

Tested sample: TX2-5V, 10 pcs.

Operate and release time, ms

Operate time
Release time

Max.
Min.
Max.
Min.

Coil applied voltage, %V
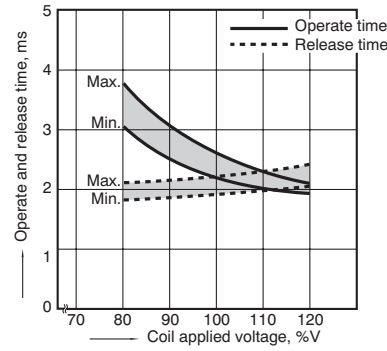
6-(2). Operate and release time (without diode)

Tested sample: TX2-5V, 10 pcs.

Operate and release time, ms

Operate time
Release time

Max.
Min.
Max.
Min.

Coil applied voltage, %V
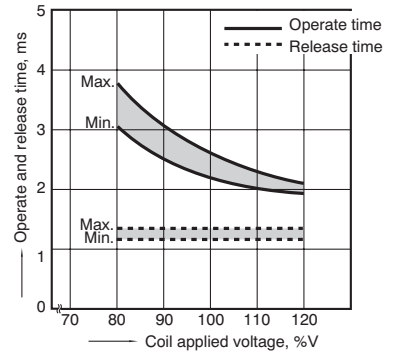
7. Ambient temperature characteristics

Tested sample: TX2-5V, 5 pcs.

Rate of change, %

Drop-out voltage x̄
x̄
Pick-up voltage

Ambient temperature, °C
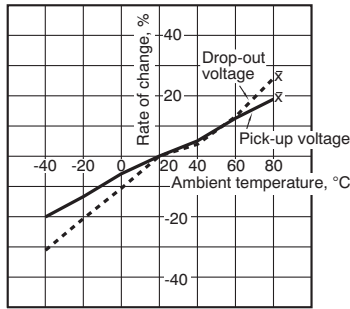
8-(1). High frequency characteristics (Isolation)

Tested sample: TX2-12V, 2 pcs.

Isolation, dB
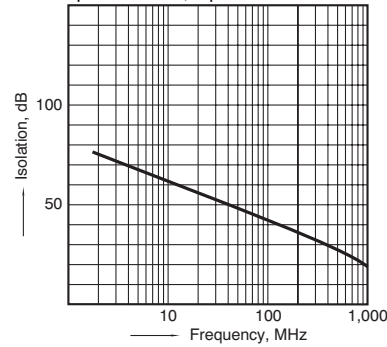
Frequency, MHz

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

Tested sample: TX2-12V, 2 pcs.

Insertion loss, dB

Frequency, MHz
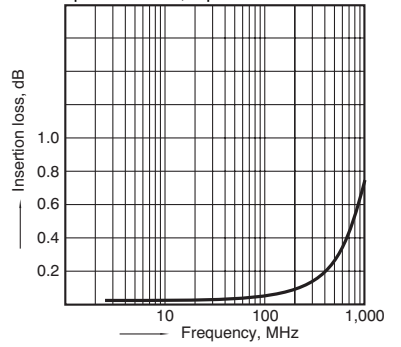
9 Malfunctional shock (single side stable)

Tested sample: TX2-5V, 6 pcs.
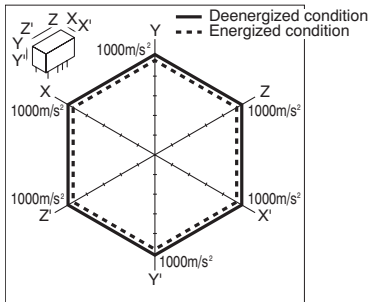
Deenergized condition
Energized condition

1000m/s²
1000m/s²
1000m/s²
1000m/s²
1000m/s²
1000m/s²

10-(1). Influence of adjacent mounting

Tested sample: TX2-12V, 6 pcs.

Rate of change, %

Pick-up voltage

ON ON
ON

Rate of change, %

Drop-out voltage

OFF OFF
OFF

Inter-relay distance ℓ, mm inch
.079 .157 .236 .315 .394

10-(2). Influence of adjacent mounting

Tested sample: TX2-12V, 6 pcs.

Rate of change, %

Pick-up voltage

ON
ON

Rate of change, %

Drop-out voltage

OFF
OFF

Inter-relay distance ℓ, mm inch
.079 .157 .236 .315 .394

TX
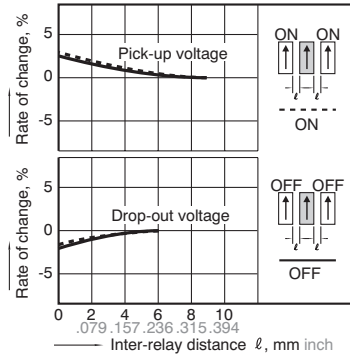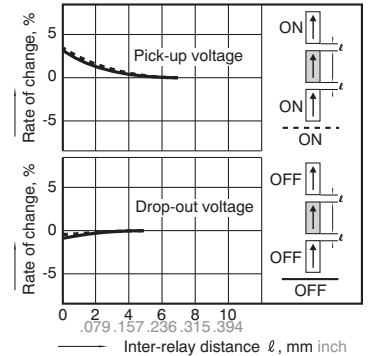
11. Pulse dialing test

Tested sample: TX2-5V, 6 pcs.
(35 mA 48 V DC wire spring relay load)

Circuit

458 Ω
0.08 µF   0.08 µF
48V DC
458 Ω
Wire spring relay
4
3 TX

Change of pick-up and drop-out voltage

Ratio against the rated voltage, %V

Pick-up voltage — Max. / Min.

Drop-out voltage — Max. / Min.

No. of operation, ×10⁴

Change of contact resistance

Contact resistance, mΩ

Max. / Min.

No. of operations, ×10⁴
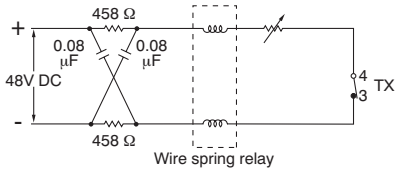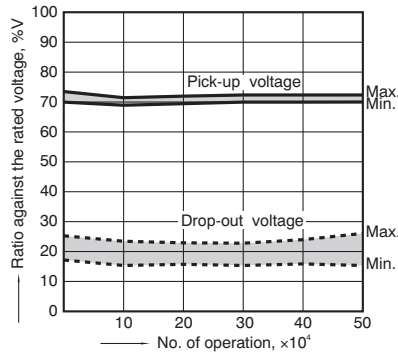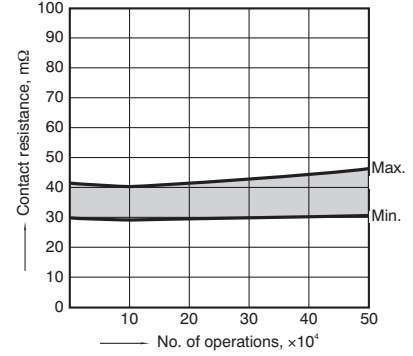
Note: Data of surface-mount type are the same as those of PC board terminal type.

DIMENSIONS (Unit: mm inch)
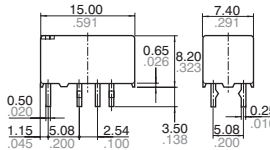
1. Standard PC board terminal and Self clinching terminal

Single side stable and 1 coil latching type
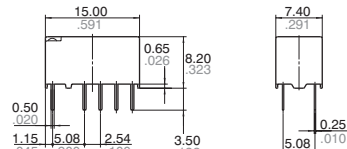**External dimensions**
Standard PC board terminal

15.00 .591
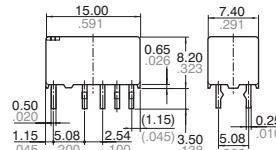0.65 .026
8.20 .323
7.40 .291
0.50 .020
1.15 .045
5.08 .200
2.54 .100
3.50 .138
5.08 .200
0.25 .010

Self clinching terminal

15.00 .591
0.65 .026
8.20 .323
7.40 .291
0.50 .020
1.15 .045
5.08 .200
2.54 .100
3.50 .138
5.08 .200
0.25 .010

2 coil latching type
External dimensions
Standard PC board terminal

15.00 .591
0.65 .026
8.20 .323
7.40 .291
0.50 .020
1.15 .045
5.08 .200
2.54 .100
3.50 .138
5.08 .200
0.25 .010

Self clinching terminal

15.00 .591
0.65 .026
8.20 .323
7.40 .291
0.50 .020
1.15 .045
5.08 .200
2.54 .100
(1.15) .045
3.50 .138
5.08 .200
0.25 .010

General tolerance: ±0.3 ±.012

General tolerance: ±0.3 ±.012

PC board pattern (Bottom view)

2.54 .100
10.16 .400
5.08 .200
8-1.0 dia.
8-.039 dia.
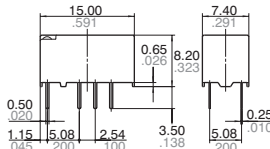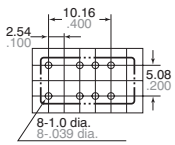
Tolerance: ±0.1 ±.004

Schematic (Bottom view)

Single side stable

1
3 4 5
12
10 9 8
+
–
Direction indication
(Deenergized condition)
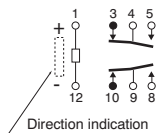
1 coil latching
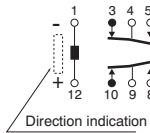
1
3 4 5
12
10 9 8
–
+
Direction indication
(Reset condition)

PC board pattern (Bottom view)

2.54 .100
12.7 .500
5.08 .200
10-1.0 dia.
10-.039 dia.
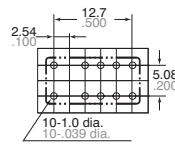
Tolerance: ±0.1 ±.004

Schematic (Bottom view)

2 coil latching
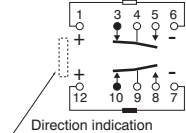
1
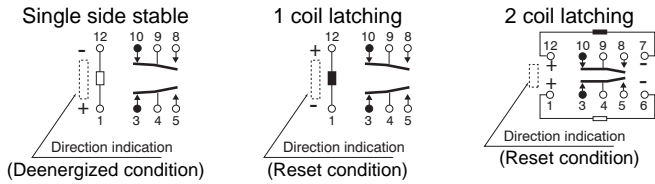3 4 5 6
12
10 9 8 7
+
–
+
–
Direction indication
(Reset condition)

2. Surface-mount terminal

Type	External dimensions (General tolerance: ±0.3 ±.012)		Suggested mounting pad (Top view) (Tolerance: ±0.1 ±.004)	
	Single side stable and 1 coil latching type	2 coil latching type	Single side stable and 1 coil latching type	2 coil latching type
SA type				
SL type				
SS type				

Schematic (Top view)

Single side stable
Direction indication
(Deenergized condition)

1 coil latching
Direction indication
(Reset condition)

2 coil latching
Direction indication
(Reset condition)

TX

NOTES

1. Coil operating power

Pure DC current should be applied to the coil. The wave form should be rectangular. If it includes ripple, the ripple factor should be less than 5%.
However, check it with the actual circuit since the characteristics may be slightly different. The nominal operating voltage should be applied to the coil for more than 10 ms to set/reset the latching type relay.
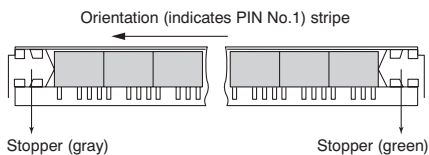
2. Coil connection

When connecting coils, refer to the wiring diagram to prevent mis-operation or malfunction.

3. External magnetic field

Since T series relays are highly sensitive polarized relays, their characteristics will be affected by a strong external magnetic field. Avoid using the relay under that condition.
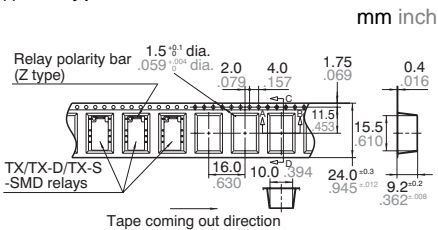
4. Packing style

1) The relay is packed in a tube with the relay orientation mark on the left side, as shown in the figure below.
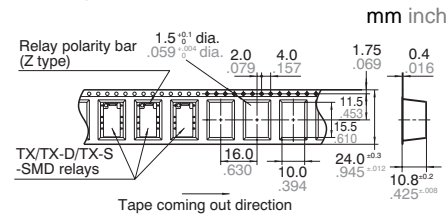
Orientation (indicates PIN No.1) stripe

Stopper (gray)   Stopper (green)

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

mm inch

Relay polarity bar (Z type)
1.5 +0.1/0 dia. .059 +.004/0 dia.
2.0 .079 4.0 .157 1.75 .069 0.4 .016
11.5 .453 15.5 .610
TX/TX-D/TX-S -SMD relays
16.0 .630 10.0 .394 24.0 ±0.3 .945 ±.012 9.2 ±0.2 .362 ±.008
Tape coming out direction

(ii) SL type

mm inch

Relay polarity bar (Z type)
1.5 +0.1/0 dia. .059 +.004/0 dia.
2.0 .079 4.0 .157 1.75 .069 0.4 .016
11.5 .453 15.5 .610
TX/TX-D/TX-S -SMD relays
16.0 .630 10.0 .394 24.0 ±0.3 .945 ±.012 10.8 ±0.2 .425 ±.008
Tape coming out direction

(iii) SS type

mm inch

Relay polarity bar (Z type)
1.5 +0.1/0 dia. .059 +.004/0 dia.
2.2 dia. .087 dia.
2.0 .079 4.0 .157 1.75 .069 0.4 .016
11.5 .453 15.5 .610
TX/TX-D/TX-S -SMD relays
16.0 .630 8.0 .315 24.0 ±0.3 .945 ±.012 10.8 ±0.2 .425 ±.008
Tape coming out direction

(2) Dimensions of plastic reel

mm inch

21 ±0.6 dia. .827 ±.024 dia.
2.0 ±0.5 .079 ±.020
*100 ±1 dia. 3.937 ±.039 dia.
*370 ±2 dia. 14.567 ±.079 dia.
13 ±0.5 dia. .512 ±.020 dia.
24.4 +2/0 .961 +.079/0
2.0 ±0.2 .079 ±.008
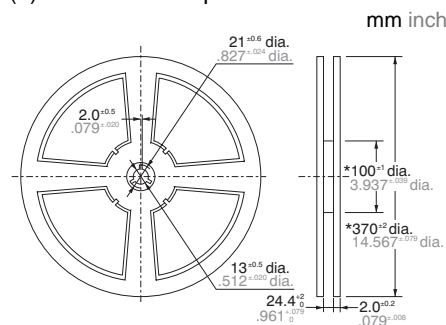
Note: Dimensions of items produced after December 2006 have changed as shown below.
100 ±1 dia. 3.937 ±.039 dia. → 80 ±1 dia. 3.150 ±.039 dia.;
370 ±2 dia. 14.567 ±.079 dia. → 380 ±2 dia. 14.961 ±.079 dia.
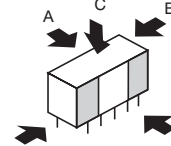
5. Automatic insertion

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

A   C   B

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.

6. Others

1) If in error the relay has been dropped, the appearance and characteristics should be checked before use without fail.
2) The cycle lifetime is defined under the standard test condition specified in the JIS* C 5442-1986 standard (temperature 15°C to 35°C 59°F to 95°F, humidity 25% to 85%). Check this with the real device as it is affected by coil driving circuit, load type, activation frequency, activation phase, ambient conditions, and other factors.

For Cautions for Use, see Relay Technical Information.