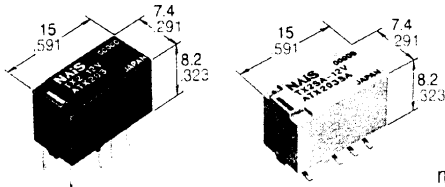


**NAIS**

**2 AMP. HIGH CAPACITY  
RELAY WITH HIGH SURGE  
VOLTAGE & HIGH BREAK-  
DOWN VOLTAGE**

**TX-RELAYS**

UL File No.: E43149 CSA File No.: LR26550

- Breakdown voltage between contacts and coil: 2,000 V
- Surge withstand between contacts and coil: 2,500 V
- High contact capacity: 2 A 30 V DC
- Surface-mount type available

**SPECIFICATIONS****Contact**

Arrangement	2 Form C		
Initial contact resistance, max. (By voltage drop 6 V DC 1 A)	100 mΩ		
Contact material	Gold-clad silver alloy		
Rating	Nominal switching capacity (resistive)	2 A 30 V DC	
	Max. switching power (resistive)	60 W	
	Max. switching voltage	220 V DC	
	Max. switching current	2 A	
	Min. switching capability	10 μA 10 mV DC	
UL/CSA rating	2 A 30 V DC 0.3 A 110 V DC 0.5 A 125 V AC		
Expected life (min. operations)	Mechanical (at 180 cpm)	10 <sup>8</sup>	
	Electrical (at 20 cpm)	2 A 30 V DC resistive	10 <sup>5</sup>
		1 A 30 V DC resistive	5×10 <sup>5</sup>

**Characteristics**

Max. operating speed (at rated load)	20 cpm	
Operate time* <sup>1</sup> (at nominal voltage)	Max. 4 msec. (Approx. 2 msec.)	
Release time* <sup>1</sup> (at nominal voltage)	Max. 4 msec. (Approx. 1 msec.)	
Set time* <sup>1</sup> (latching) (at nominal voltage)	Max. 4 msec. (Approx. 2 msec.)	
Reset time* <sup>1</sup> (latching) (at nominal voltage)	Max. 4 msec. (Approx. 2 msec.)	
Initial breakdown voltage	Between open contacts	1,000 Vrms for 1 min.
	Between contact sets	1,000 Vrms for 1 min.
	Between contact and coil	2,000 Vrms for 1 min.
Surge voltage	Between open contacts (10×160 μsec)	1,500 V (FCC Part 68)
	Between contacts and coil (2×10 μsec)	2,500 V (Bellcore)
Initial insulation resistance	Min. 1,000 MΩ (at 500 V DC)	
Temperature rise* <sup>2</sup>	Max. 50°C	
Ambient temperature	-40°C to +85°C -40°F to +185°F (up to 24 V coil)	
	-40°C to +70°C -40°F to +158°F (48 V coil) (Not freezing and condensing at low temperature)	
Shock resistance	Functional	Min. 750 m/sec <sup>2</sup> (75 G)
	Destructive	Min. 1,000 m/s <sup>2</sup> (100 G)
Vibration resistance	Functional	196 m/s <sup>2</sup> (20 G), 10 to 55 Hz at double amplitude of 3.3 mm
	Destructive	294 m/s <sup>2</sup> (30 G), 10 to 55 Hz at double amplitude of 5 mm
Unit weight	Approx. 2 g .071 oz	

\*<sup>1</sup> Excluding contact bouncing time\*<sup>2</sup> Measured under the flow of nominal operating current at nominal voltage**ORDERING INFORMATION**

Ex. TX 2 SA — L — H — 3V

Contact arrangement	Surface-mount availability	Operating function	Terminal shape	Coil voltage (DC)
2: 2 Form C	Nil: Standard PC board terminal type or self-clinching terminal type SA: Surface-mount terminal type	Nil: Single side stable L: 1 coil latching L2: 2 coil latching	Nil: Standard PC board terminal or surface-mount terminal H: Self-clinching terminal	1.5, 3, 4.5, 5, 6, 9, 12, 24, 48 V

Notes: 1. 48 V coil type is available only for single side stable type.

2. Tape and reel packing is also available for surface-mount type by request. Part number suffix "-X" or "-Z" is needed when ordering. In this case, "X" or "Z" are not marked on the relay. Quantity in tape and reel: 500 pcs.

(ex.) • TX2SA-3V-X

└ Picked from the 1/3/4/5-pin side

• TX2SA-L-3V-Z

└ Picked from the 8/9/10/12-pin side

## TYPES AND COIL DATA (at 20°C 68 F)

1) Standard PC board terminal type and self-clinching terminal type

Operating function	Part No.		Nominal voltage, V DC	Pick-up voltage, V DC (max.)	Drop-out voltage, V DC (min.)	Nominal operating current, mA ( $\pm 10\%$ )	Coil resistance, $\Omega$ ( $\pm 10\%$ )	Nominal operating power, mW	Max. allowable voltage, V DC
	Standard PC board terminal	Self-clinching terminal							
Single side stable	TX2-1.5V	TX2-H-1.5V	1.5	1.13	0.15	93.8	16	140	2.2
	TX2-3V	TX2-H-3V	3	2.25	0.3	46.7	64.3	140	4.5
	TX2-4.5V	TX2-H-4.5V	4.5	3.38	0.45	31	145	140	6.7
	TX2-5V	TX2-H-5V	5	3.75	0.5	28.1	178	140	7.5
	TX2-6V	TX2-H-6V	6	4.5	0.6	23.3	257	140	9
	TX2-9V	TX2-H-9V	9	6.75	0.9	15.5	579	140	13.5
	TX2-12V	TX2-H-12V	12	9	1.2	11.7	1,028	140	18
	TX2-24V	TX2-H-24V	24	18	2.4	5.8	4,114	140	36
	TX2-48V	TX2-H-48V	48	36	4.8	5.6	8,533	270	57.6

Operating function	Part No.		Nominal voltage, V DC	Set voltage, V DC (max.)	Reset voltage, V DC (max.)	Nominal operating current, mA ( $\pm 10\%$ )	Coil resistance, $\Omega$ ( $\pm 10\%$ )	Nominal operating power, mW	Max. allowable voltage, V DC
	Standard PC board terminal	Self-clinching terminal							
1 coil latching	TX2-L-1.5V	TX2-L-H-1.5V	1.5	1.13	1.13	66.7	22.5	100	2.2
	TX2-L-3V	TX2-L-H-3V	3	2.25	2.25	33.3	90	100	4.5
	TX2-L-4.5V	TX2-L-H-4.5V	4.5	3.38	3.38	22.2	202.5	100	6.7
	TX2-L-5V	TX2-L-H-5V	5	3.75	3.75	20	250	100	7.5
	TX2-L-6V	TX2-L-H-6V	6	4.5	4.5	16.7	360	100	9
	TX2-L-9V	TX2-L-H-9V	9	6.75	6.75	11.1	810	100	13.5
	TX2-L-12V	TX2-L-H-12V	12	9	9	8.3	1,440	100	18
	TX2-L-24V	TX2-L-H-24V	24	18	18	4.2	5,760	100	36
2 coil latching	TX2-L2-1.5V	TX2-L2-H-1.5V	1.5	1.13	1.13	133.9	11.2	200	2.2
	TX2-L2-3V	TX2-L2-H-3V	3	2.25	2.25	66.7	45	200	4.5
	TX2-L2-4.5V	TX2-L2-H-4.5V	4.5	3.38	3.38	44.5	101.2	200	6.7
	TX2-L2-5V	TX2-L2-H-5V	5	3.75	3.75	40	125	200	7.5
	TX2-L2-6V	TX2-L2-H-6V	6	4.5	4.5	33.3	180	200	9
	TX2-L2-9V	TX2-L2-H-9V	9	6.75	6.75	22.2	405	200	13.5
	TX2-L2-12V	TX2-L2-H-12V	12	9	9	16.7	720	200	18
	TX2-L2-24V	TX2-L2-H-24V	24	18	18	8.3	2,880	200	36

Notes: 1. Specified value of pick-up, drop-out, set and reset voltage is with the condition of square wave coil pulse.

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

3. In case of 5 V drive circuit, it is recommended to use 4.5 V type relay.

## 2) Surface-mount terminal type

Operating function	Part No.	Nominal voltage, V DC	Pick-up voltage, V DC (max.)	Drop-out voltage, V DC (min.)	Nominal operating current, mA ( $\pm 10\%$ )	Coil resistance, $\Omega$ ( $\pm 10\%$ )	Nominal operating power, mW	Max. allowable voltage, V DC
Single side stable	TX2SA-1.5V	1.5	1.13	0.15	93.8	16	140	2.2
	TX2SA-3V	3	2.25	0.3	46.7	64.3	140	4.5
	TX2SA-4.5V	4.5	3.38	0.45	31	145	140	6.7
	TX2SA-5V	5	3.75	0.5	28.1	178	140	7.5
	TX2SA-6V	6	4.5	0.6	23.3	257	140	9
	TX2SA-9V	9	6.75	0.9	15.5	579	140	13.5
	TX2SA-12V	12	9	1.2	11.7	1,028	140	18
	TX2SA-24V	24	18	2.4	5.8	4,114	140	36
	TX2SA-48V	48	36	4.8	5.6	8,533	270	57.6

Operating function	Part No.	Nominal voltage, V DC	Set voltage, V DC (max.)	Reset voltage, V DC (max.)	Nominal operating current, mA ( $\pm 10\%$ )	Coil resistance, $\Omega$ ( $\pm 10\%$ )	Nominal operating power, mW	Max. allowable voltage, V DC
1 coil latching	TX2SA-L-1.5V	1.5	1.13	1.13	66.7	22.5	100	2.2
	TX2SA-L-3V	3	2.25	2.25	33.3	90	100	4.5
	TX2SA-L-4.5V	4.5	3.38	3.38	22.2	202.5	100	6.7
	TX2SA-L-5V	5	3.75	3.75	20	250	100	7.5
	TX2SA-L-6V	6	4.5	4.5	16.7	360	100	9
	TX2SA-L-9V	9	6.75	6.75	11.1	810	100	13.5
	TX2SA-L-12V	12	9	9	8.3	1,440	100	18
	TX2SA-L-24V	24	18	18	4.2	5,760	100	36
2 coil latching	TX2SA-L2-1.5V	1.5	1.13	1.13	133.9	11.2	200	2.2
	TX2SA-L2-3V	3	2.25	2.25	66.7	45	200	4.5
	TX2SA-L2-4.5V	4.5	3.38	3.38	44.5	101.2	200	6.7
	TX2SA-L2-5V	5	3.75	3.75	40	125	200	7.5
	TX2SA-L2-6V	6	4.5	4.5	33.3	180	200	9
	TX2SA-L2-9V	9	6.75	6.75	22.2	405	200	13.5
	TX2SA-L2-12V	12	9	9	16.7	720	200	18
	TX2SA-L2-24V	24	18	18	8.3	2,880	200	36

- Notes: 1. Specified value of pick-up, drop-out, set and reset voltage is with the condition of square wave coil pulse.  
 2. Standard packing: Tube: 40 pcs.; Case: 1,000 pcs.  
 3. Tape and reel packing is also available for surface-mount type by request. Part number suffix "-X" or "-Z" is needed when ordering. In this case, "X" or "Z" are not marked on the relay.  
 Quantity in tape and reel: 500 pcs.

(ex.) • TX2SA-3V-X

• TX2SA-L-3V-Z

└ Picked from the 1/3/4/5-pin side

└ Picked from the 8/9/10/12-pin side

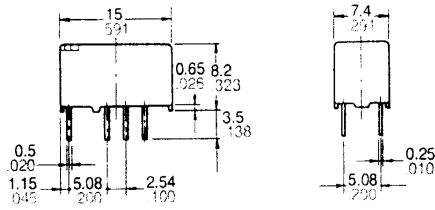
4. In case of 5 V drive circuit, it is recommended to use 4.5 V type relay.

# DIMENSIONS

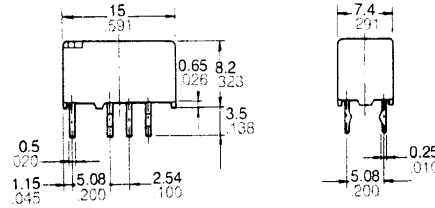
## Single side stable and 1 coil latching type



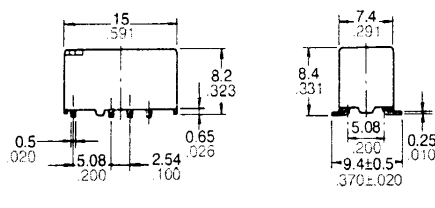
Standard PC board terminal



Self clinching terminal

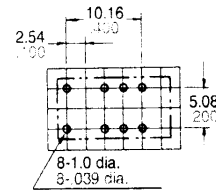


Surface-mount terminal



General tolerance:  $\pm 0.3 \pm 0.12$

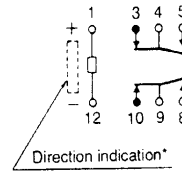
PC board pattern (Copper side view)



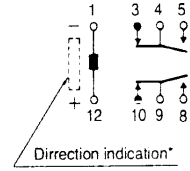
Tolerance:  $\pm 0.1 \pm 0.04$

Schematic (Bottom view)

Single side stable (Deenergized condition)

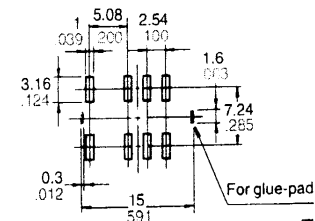


1 coil latching (Reset condition)



\*Orientation stripe located on top of relay.

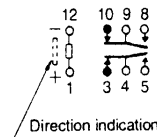
Suggested mounting pad (Top view)



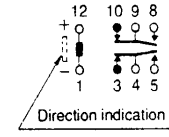
Tolerance:  $\pm 0.1 \pm 0.04$

Schematic (Top view)

Single side stable (Deenergized condition)

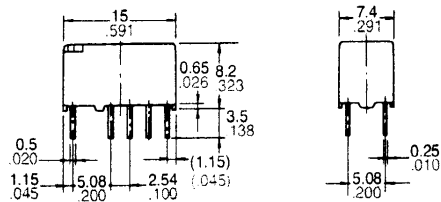


1 coil latching (Reset condition)

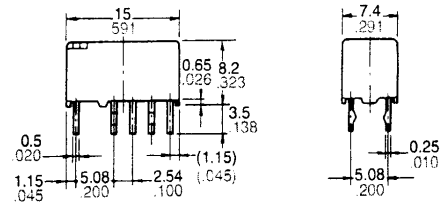


## 2 coil latching type

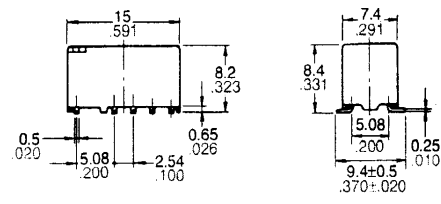
Standard PC board terminal



Self clinching terminal

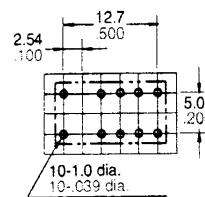


Surface-mount terminal



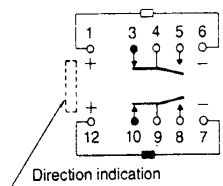
General tolerance:  $\pm 0.3 \pm 0.12$

PC board pattern (Copper side view)



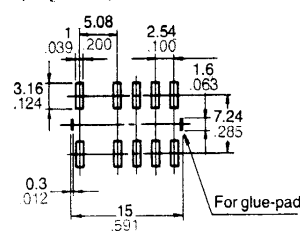
Schematic (Bottom view)

2 coil latching (Reset condition)



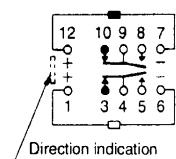
Tolerance:  $\pm 0.1 \pm 0.04$

Suggested mounting pad (Top view)



Schematic (Top view)

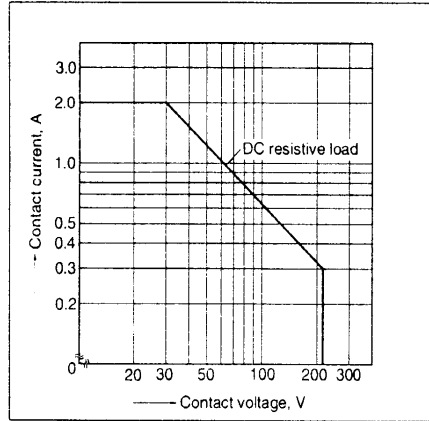
2 coil latching (Reset condition)



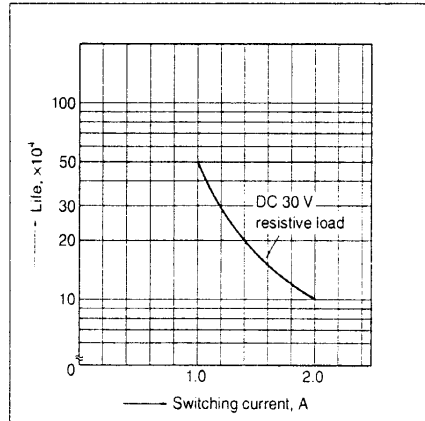
Tolerance:  $\pm 0.1 \pm 0.04$

DATA

1. Maximum switching power

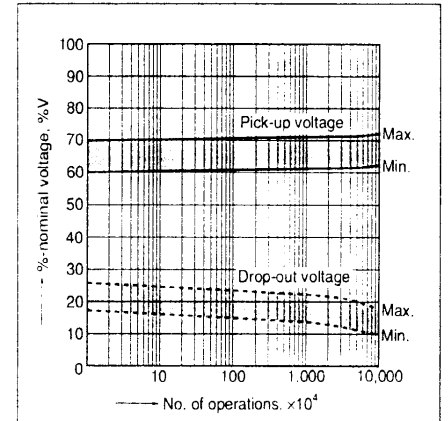


2. Life curve



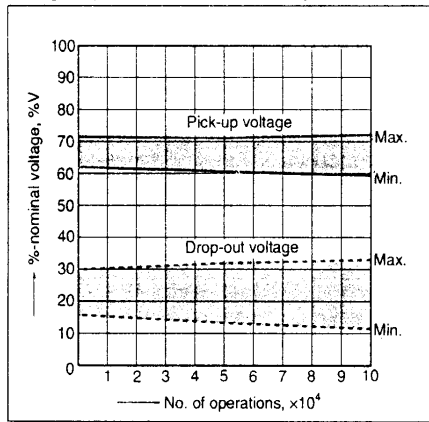
3. Mechanical life

Tested sample: TX2-5V, 10 pcs.  
Operating frequency: 180 cpm

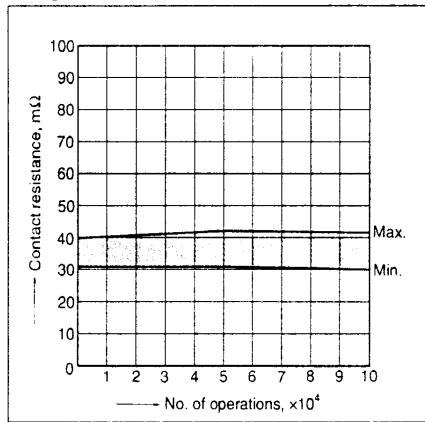


4. Electrical life

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

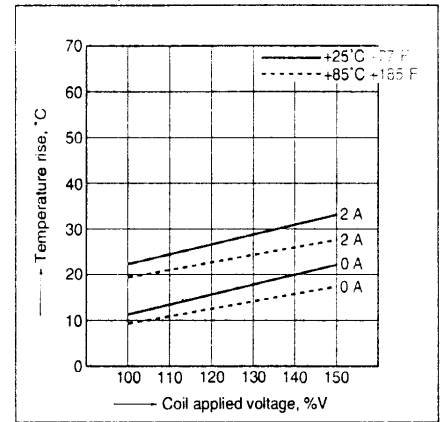


Change of contact resistance



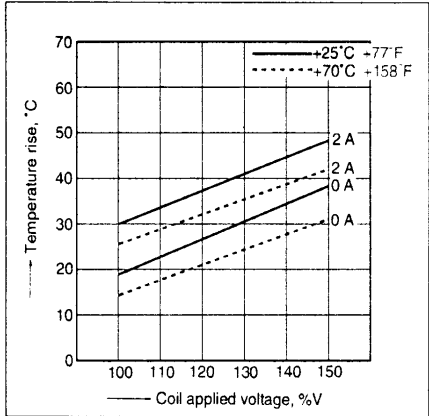
5-(1). Coil temperature rise

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



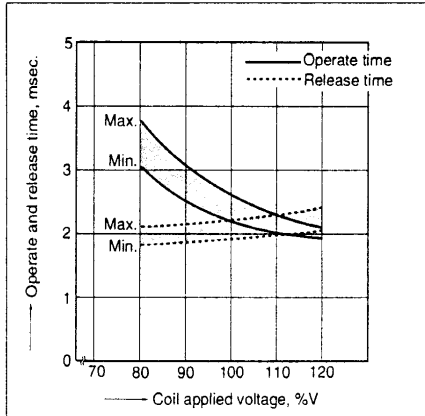
5-(2). Coil temperature rise

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

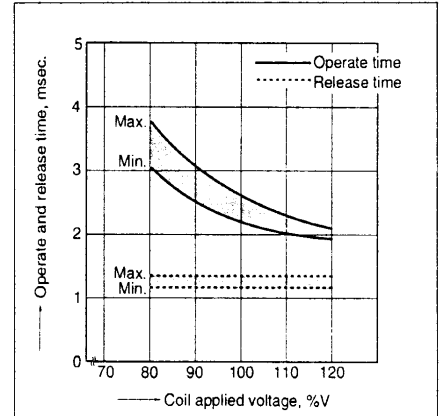


6-(1). Operate and release time (with diode)

Tested sample: TX2-5V, 10 pcs.

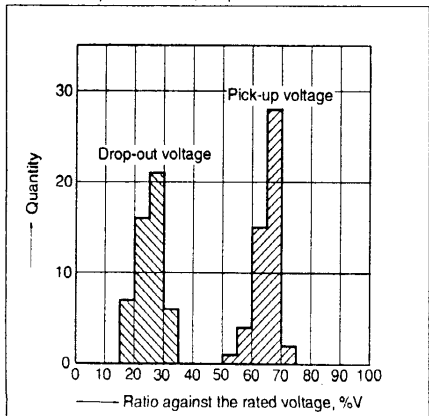


6-(2). Operate and release time (without diode)



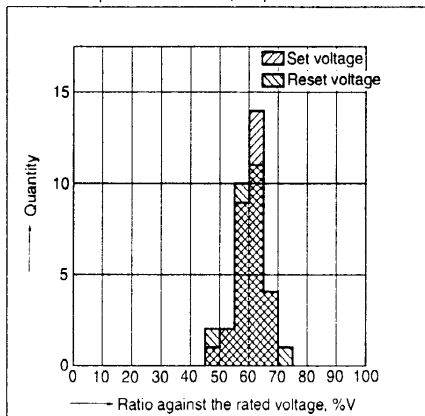
7. Distribution of pick-up and drop-out voltage

Tested sample: TX2-5V, 50 pcs.



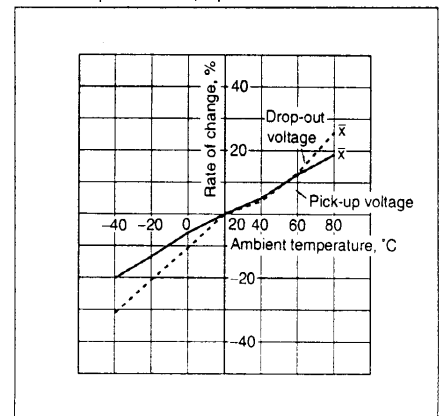
8. Distribution of set and reset voltage

Tested sample: TX2-L2-12V, 30 pcs.

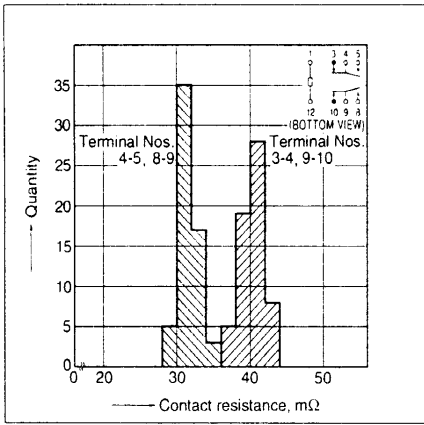


9. Ambient temperature characteristics

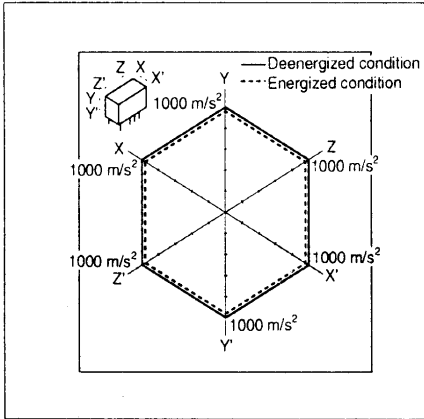
Tested sample: TX2-5V, 5 pcs.



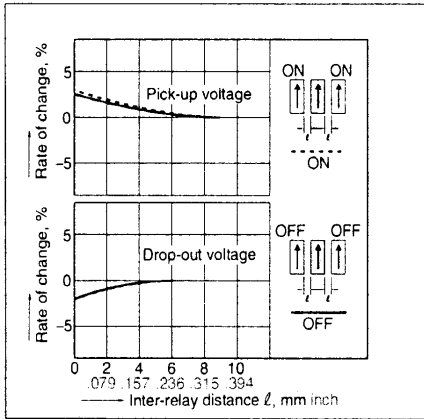
10. Distribution of contact resistance  
Tested sample: TX2-5V, 30 pcs. (30×4 contacts)



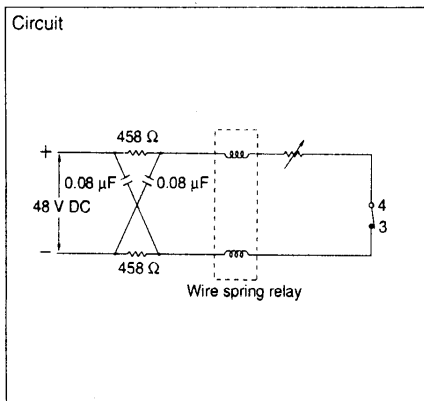
12-(1). Malfunctional shock (single side stable)  
Tested sample: TX2-5V, 6 pcs.



13-(1). Influence of adjacent mounting

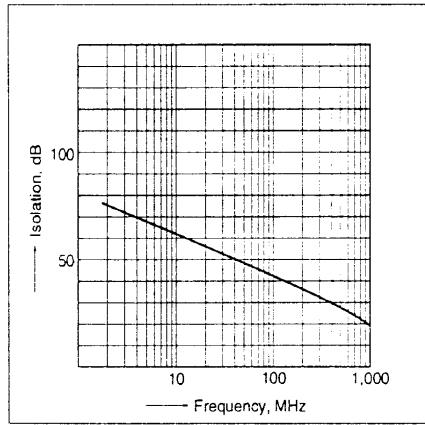


14. Pulse dialing test  
Tested sample: TX2-5V, 6 pcs.  
(35 mA 48 V DC wire spring relay load)

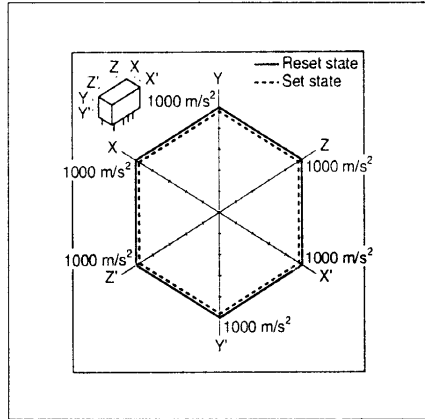


Note: Data of surface-mount type are the same as those of PC board terminal type.

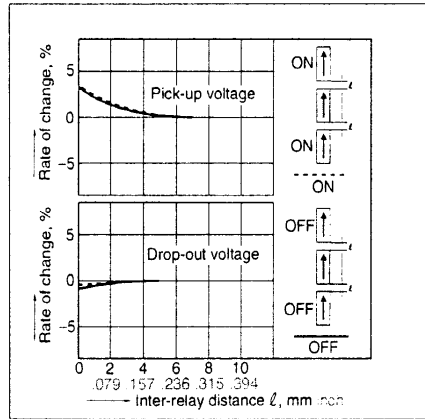
11-(1). High frequency characteristics  
Tested sample: TX2-12V, 2 pcs.  
Isolation characteristics



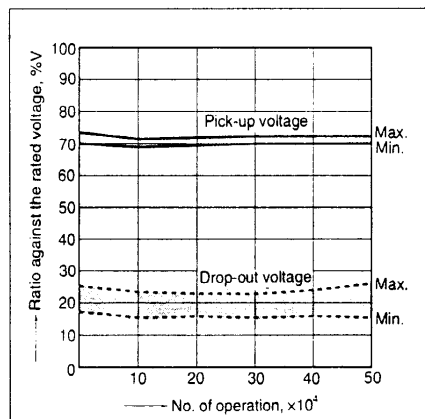
12-(2). Malfunctional shock (latching)  
Tested sample: TX2-L2-12V, 6 pcs.



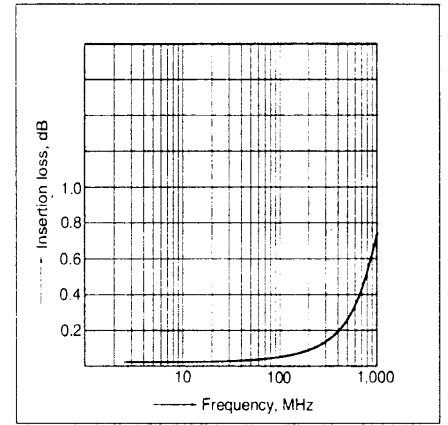
13-(2). Influence of adjacent mounting



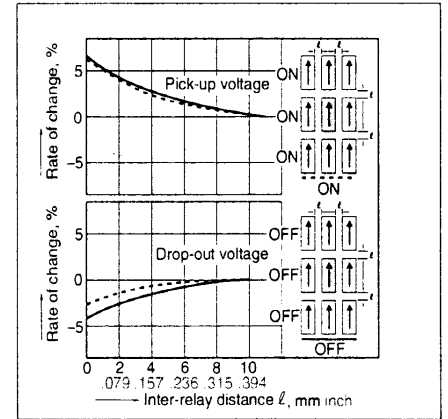
Change of pick-up and drop-out voltage



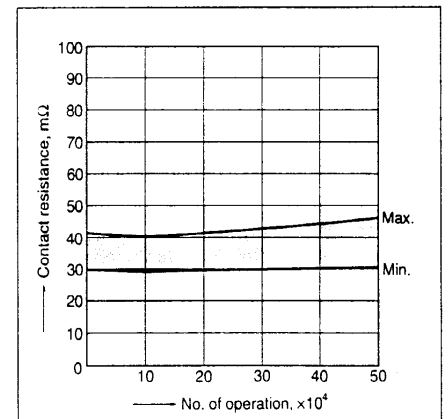
11-(2). High frequency characteristics  
Tested sample: TX2-12V, 2 pcs.  
Insertion loss characteristics



13-(3). Influence of adjacent mounting



Change of contact resistance



## NOTES

### 1. Coil operating power

Pure DC current should be applied to the coil. And 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 are slightly different.

### 2. Coil connection

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

### 3. External magnetic field

Since TX-relay is highly sensitive polarized relay, its characteristics will be affected by a strong external magnetic field. So avoid using relays under that condition.

### 4. Cleaning

In automatic cleaning, cleaning with the boiling method is recommended. Avoid ultrasonic cleaning for relays. It is recommended that a fluorinated hydrocarbon or other alcoholic solvents be used. Trichlene and chloroethene can be used for cleaning.

### 5. Soldering

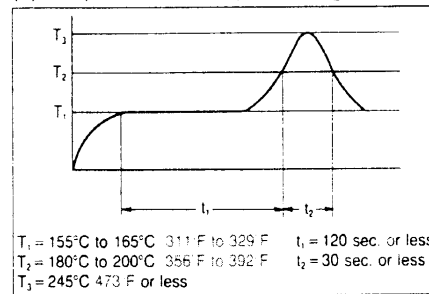
1) Preheat according to the following conditions.

Temperature	100°C 212°F or less
Time	Within approx. 1 minute

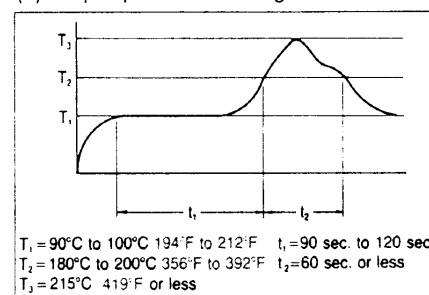
When soldering standard PC board terminals or self-clinching terminals, soldering should be done at 250°C 482°F within 5 sec.

2) When soldering surface-mount terminals, the following conditions are recommended.

(1) IR (Infrared reflow) soldering method



(2) Vapor phase soldering method



(3) Soldering iron method

Tip temperature: 280°C to 300°C  
536°F to 572°F

Wattage: 30 to 60 W

Soldering time: within 5 sec.

(4) Other soldering methods

Check mounting conditions before using other soldering methods (hot-air, hot plate, pulse heater, etc.).

- The temperature profile indicates the temperature of the soldered terminal on the surface of the PC board. The ambient temperature may increase excessively. Check the temperature under mounting conditions.

- The conditions for the Infrared reflow soldering apply when preheating using the VPS method.

### 6. Others

1) If in error the relay has been dropped, the appearance and characteristics should be checked before use without fail.

2) Set and reset pulse widths used for latching relays should be no less than 10 msec. at the rated coil voltage to ensure proper operation regardless of ambient temperature or operating condition.

3) Latching relays are shipped from the factory in the reset state. A shock to the relay during shipping or installation may cause it to change to the set state. Therefore, it is recommended that the relay be used in a circuit which initializes the relay to the required state (set or reset) whenever the power is turned on.