

# Panasonic

ideas for life

**Small size, controlled 7.5A inrush current possible**

## TX RELAYS TH types



RoHS compliant

### FEATURES

- 1. Small size, controlled 7.5A inrush current possible**
- 2. 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.

- 3. Outstanding surge resistance.**  
Surge breakdown voltage between open contacts:  
1,500 V 10×160μ sec. (FCC part 68)  
Surge breakdown voltage between contact and coil:  
2,500 V 2×10μ sec. (Bellcore)
- 4. 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.
- 5. High contact capacity: 2 A 30 V DC**
- 6. Compact size**  
15.0(L) × 7.4(W) × 8.2(H) .591(L) × .291(W) × .323(H)
- 7. Outstanding vibration and shock resistance.**  
Functional shock resistance: 750 m/s<sup>2</sup>  
Destructive shock resistance:  
1,000 m/s<sup>2</sup>  
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  
SS: Space saving surface-mount terminal type

### TYPICAL APPLICATIONS

- 1. Air-conditioning control (solenoid load)**
- 2. Others, High-capacity control etc.**

### ORDERING INFORMATION

TX **2** - - - - TH -

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, 5, 6, 9, 12, 24, 48V

Contact material  
TH: Power type (Ag+Au clad/stationary, 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.

## TYPES

### 1. Standard PC board terminal

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

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

### 2. Surface-mount terminal

#### 1) Tube packing

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

□: For each surface-mounted terminal identification, input the following letter. SA type: A, SS type: S

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

#### 2) Tape and reel packing

| Contact arrangement | Nominal coil voltage | Single side stable | 1 coil latching   | 2 coil latching (L2) | 2 coil latching (LT) |
|---------------------|----------------------|--------------------|-------------------|----------------------|----------------------|
|                     |                      | Part No.           | Part No.          | Part No.             | Part No.             |
| 2 Form C            | 1.5V DC              | TX2S□-1.5V-TH-Z    | TX2S□-L-1.5V-TH-Z | TX2S□-L2-1.5V-TH-Z   | TX2S□-LT-1.5V-TH-Z   |
|                     | 3V DC                | TX2S□-3V-TH-Z      | TX2S□-L-3V-TH-Z   | TX2S□-L2-3V-TH-Z     | TX2S□-LT-3V-TH-Z     |
|                     | 4.5V DC              | TX2S□-4.5V-TH-Z    | TX2S□-L-4.5V-TH-Z | TX2S□-L2-4.5V-TH-Z   | TX2S□-LT-4.5V-TH-Z   |
|                     | 5V DC                | TX2S□-5V-TH-Z      | TX2S□-L-5V-TH-Z   | TX2S□-L2-5V-TH-Z     | TX2S□-LT-5V-TH-Z     |
|                     | 6V DC                | TX2S□-6V-TH-Z      | TX2S□-L-6V-TH-Z   | TX2S□-L2-6V-TH-Z     | TX2S□-LT-6V-TH-Z     |
|                     | 9V DC                | TX2S□-9V-TH-Z      | TX2S□-L-9V-TH-Z   | TX2S□-L2-9V-TH-Z     | TX2S□-LT-9V-TH-Z     |
|                     | 12V DC               | TX2S□-12V-TH-Z     | TX2S□-L-12V-TH-Z  | TX2S□-L2-12V-TH-Z    | TX2S□-LT-12V-TH-Z    |
|                     | 24V DC               | TX2S□-24V-TH-Z     | TX2S□-L-24V-TH-Z  | TX2S□-L2-24V-TH-Z    | TX2S□-LT-24V-TH-Z    |
|                     | 48V DC               | TX2S□-48V-TH-Z     | —                 | —                    | —                    |

□: 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.

Note: 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.

## 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              | 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            |

# TX-TH

## 2) 1 coil latching

| Nominal coil voltage | Set voltage (at 20°C 68°F)                 | Reset voltage (at 20°C 68°F)               | Nominal operating current [ $\pm 10\%$ ] (at 20°C 68°F) | Coil resistance [ $\pm 10\%$ ] (at 20°C 68°F) | Nominal operating power | Max. applied 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  | 22.5 $\Omega$                                 | 100mW                   | 150%V of nominal voltage            |
| 3V DC                |  |  | 33.3mA  | 90 $\Omega$                                   |                         |                                     |
| 4.5V DC              |  |  | 22.2mA  | 202.5 $\Omega$                                |                         |                                     |
| 5V DC                |  |  | 20mA  | 250 $\Omega$                                  |                         |                                     |
| 6V DC                |  |  | 16.7mA  | 360 $\Omega$                                  |                         |                                     |
| 9V DC                |  |  | 11.1mA  | 810 $\Omega$                                  |                         |                                     |
| 12V DC               |  |  | 8.3mA   | 1,440 $\Omega$                                |                         |                                     |
| 24V DC               |  |  | 4.2mA   | 5,760 $\Omega$                                |                         |                                     |

## 3) 2 coil latching (L2, LT)

| Nominal coil voltage | Set voltage (at 20°C 68°F)                 | Reset voltage (at 20°C 68°F)               | Nominal operating current [ $\pm 10\%$ ] (at 20°C 68°F) |            | Coil resistance [ $\pm 10\%$ ] (at 20°C 68°F) |                | 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              | 75%V or less of nominal voltage* (Initial) | 75%V or less of nominal voltage* (Initial) | 93.8mA  | 93.8mA     | 16 $\Omega$                                   | 16 $\Omega$    | 140mW                   | 140mW      | 150%V of nominal voltage            |
| 3V DC                |  |  | 46.7mA  | 46.7mA     | 64.3 $\Omega$                                 | 64.3 $\Omega$  |                         |            |                                     |
| 4.5V DC              |  |  | 31mA  | 31mA       | 145 $\Omega$                                  | 145 $\Omega$   |                         |            |                                     |
| 5V DC                |  |  | 28.1mA  | 28.1mA     | 178 $\Omega$                                  | 178 $\Omega$   |                         |            |                                     |
| 6V DC                |  |  | 23.3mA  | 23.3mA     | 257 $\Omega$                                  | 257 $\Omega$   |                         |            |                                     |
| 9V DC                |  |  | 15.5mA  | 15.5mA     | 579 $\Omega$                                  | 579 $\Omega$   |                         |            |                                     |
| 12V DC               |  |  | 11.7mA  | 11.7mA     | 1,028 $\Omega$                                | 1,028 $\Omega$ |                         |            |                                     |
| 24V DC               |  |  | 5.8mA   | 5.8mA      | 4,114 $\Omega$                                | 4,114 $\Omega$ |                         |            |                                     |

\*Pulse drive (JIS C 5442-1986)

## 2. Specifications

| Characteristics                          | Item   | Specifications   |   |
|--|--|--|---|
| Contact                                  | Arrangement  | 2 Form C   |   |
|  | Initial contact resistance, max.   | Max. 100 m $\Omega$ (By voltage drop 6 V DC 1A)  |   |
|  | Contact material   | Ag+Au plating  |   |
| Rating                                   | Nominal switching capacity   | 2 A 30 V DC, 0.5 A 125 V AC (resistive load)   |   |
|  | Max. switching power   | 60 W, 60 VA (resistive load)   |   |
|  | Max. switching voltage   | 220V DC, 250V AC   |   |
|  | Max. switching current   | 7.5 A (When used at 7.5 A. Regarding connection method, you must follow the precaution, below*.)   |   |
|  | Min. switching capacity (Reference value)* <sup>1</sup>  | 10 $\mu$ A 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                          |  | 140 mW (1.5 to 24 V DC)  |   |
| Electrical characteristics               | Insulation resistance (Initial)  | Min. 1,000M $\Omega$ (at 500V DC)<br>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)  |
|  | Temperature rise (at 20°C 68°F)  | Max. 50°C<br>(By resistive method, nominal coil voltage applied to the coil; contact carrying current: 2A.)  |   |
|  | Surge breakdown voltage (Initial)  | Between open contacts  | 1,500 V (10 $\times$ 160 $\mu$ s) (FCC Part 68)   |
|  |  | Between contacts and coil  | 2,500 V (2 $\times$ 10 $\mu$ s) (Telcordia)   |
| Operate time [Set time] (at 20°C 68°F)   | Max. 4 ms [Max. 4 ms] (Nominal coil 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 coil voltage applied to the coil, excluding contact bounce time.) (without diode) |  |   |
| Mechanical characteristics               | Shock resistance   | Functional   | Min. 750 m/s <sup>2</sup> (Half-wave pulse of sine wave: 6 ms; detection time: 10 $\mu$ s.) |
|  |  | Destructive  | Min. 1,000 m/s <sup>2</sup> (Half-wave pulse of sine wave: 6 ms.)                           |
|  | Vibration resistance   | Functional   | 10 to 55 Hz at double amplitude of 3.3 mm (Detection time: 10 $\mu$ s.)                     |
|  |  | Destructive  | 10 to 55 Hz at double amplitude of 5 mm   |
| Expected life                            | Mechanical   | Min. 10 <sup>8</sup> (at 180 cpm)  |   |
|  | Electrical   | Min. 10 <sup>5</sup> (2 A 30 V DC resistive), 5 $\times$ 10 <sup>5</sup> (1 A 30 V DC resistive),<br>Min. 10 <sup>5</sup> (0.5 A 125 V AC resistive) (at 20 cpm)<br>Min. 2 $\times$ 10 <sup>5</sup> (7.5 A inrush (250 ms)/1.5 A normal 30 V AC (cos $\phi$ = 0.4)) (ON/OFF = 1s/9s) |   |
| Conditions                               | Conditions for operation, transport and storage* <sup>2</sup>  | Ambient temperature: -40°C to +85°C (up to 24 V coil) -40°F to +185°F<br>[-40°C to +70°C (48 V coil) -40°F to +158°F];<br>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.

\*2 Refer to 6. Conditions for operation, transport and storage mentioned in AMBIENT ENVIRONMENT (Page 24).

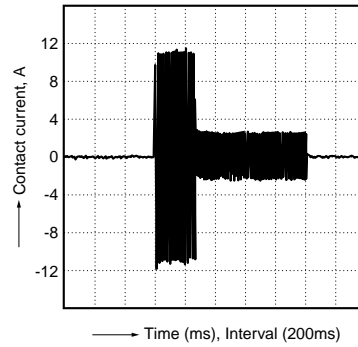
## REFERENCE DATA

1. Electrical life ( $2 \times 10^5$  operation is possible)  
 Tested sample: TX2SA-24V-TH, 6 pcs.  
 Switching frequency: ON:OFF = 1s:9s  
 Ambient temperature: 25°C 77°F  
 Circuit



Condition: 30 V AC  
 Inrush current 7.5 A (execution value),  
 inrush time 250 ms  
 Normal current 1.5 A (execution value),  
 (inductive load  $\cos\phi = 0.4$ )

Inrush current wave form vs time



**\*Precaution**

When using at 7.5 A, connection of NO (pin #5 and #8) and COM (pin #4 and #9) in the circuit is required.

Pin layout and schematic (BOTTOM VIEW)



**For general REFERENCE DATA, DIMENSIONS and NOTES, please refer to the “TX Relay”.**