



### FEATURES

1. High frequency relay with the low profile of 4 mm .157 inch
2. Excellent high frequency characteristics
  - Isolation: Min. 10dB (at 1.8 GHz)
  - Insertion loss: Max. 1.0dB (at 1.8 GHz)
  - V.S.W.R.: Max. 1.3 (at 1.8 GHz)
3. High sensitivity in small size  
Size: 10.6 × 9 × 4 mm  
.417 × .354 × .157 inch  
Nominal operating power: 140 mW
4. Utilizes tube package for automatic mounting.

5. Self-clinching terminal also available

### TYPICAL APPLICATIONS

- Switching signal of measuring equipment
- All types of compact wireless devices

If you wish to use in applications with low level loads or with high frequency switching, please consult us.

Compliance with RoHS Directive

### ORDERING INFORMATION

|                                 |    |   |   |  |   |  |   |  |
|---------------------------------|----|---|---|--|---|--|---|--|
|                                 | RP | 1 | - |  | - |  | - |  |
| Contact arrangement             |    |   |   |  |   |  |   |  |
| 1: 1 Form C                     |    |   |   |  |   |  |   |  |
| Operating function              |    |   |   |  |   |  |   |  |
| Nil: Single side stable         |    |   |   |  |   |  |   |  |
| Terminal shape                  |    |   |   |  |   |  |   |  |
| Nil: Standard PC board terminal |    |   |   |  |   |  |   |  |
| H: Self-clinching terminal      |    |   |   |  |   |  |   |  |
| Coil voltage, V DC              |    |   |   |  |   |  |   |  |
| 1.5, 3, 4.5, 5, 6, 9, 12, 24 V  |    |   |   |  |   |  |   |  |

### TYPES

| Contact arrangement | Nominal coil voltage | Standard PC board terminal |  |
|---------------------|----------------------|----------------------------|--|
|                     |                      | Single side stable         | Self-clinching terminal Single side stable |
|                     |                      | Part No.                   | Part No.                                   |
| 1 Form C            | 1.5V DC              | RP1-1.5V                   | RP1-H-1.5V                                 |
|                     | 3 V DC               | RP1-3V                     | RP1-H-3V                                   |
|                     | 4.5V DC              | RP1-4.5V                   | RP1-H-4.5V                                 |
|                     | 5 V DC               | RP1-5V                     | RP1-H-5V                                   |
|                     | 6 V DC               | RP1-6V                     | RP1-H-6V                                   |
|                     | 9 V DC               | RP1-9V                     | RP1-H-9V                                   |
|                     | 12 V DC              | RP1-12V                    | RP1-H-12V                                  |
|                     | 24 V DC              | RP1-24V                    | RP1-H-24V                                  |

Standard packing: 50 pcs. in an inner package (tube); 1,000 pcs. in an outer package

### RATING

#### 1. Coil data

| 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  | 16 Ω                                  | 140mW                   | 150%V of nominal voltage            |
| 3 V DC               |  |  | 46.7mA  | 64.3Ω                                 |                         |                                     |
| 4.5V DC              |  |  | 31.0mA  | 145 Ω                                 |                         |                                     |
| 5 V DC               |  |  | 28.1mA  | 178 Ω                                 |                         |                                     |
| 6 V DC               |  |  | 23.3mA  | 257 Ω                                 |                         |                                     |
| 9 V DC               |  |  | 15.5mA  | 579 Ω                                 |                         |                                     |
| 12 V DC              |  |  | 11.7mA  | 1,028 Ω                               |                         |                                     |
| 24 V DC              |  |  | 11.3mA  | 2,133 Ω                               | 270mW                   | 120%V of nominal voltage            |

\*Pulse drive (JIS C5442)

## 2. Specifications

| Characteristics  | Item  |                          | Specifications  |
|--|---|--------------------------|---|
| Contact  | Arrangement                                       |                          | 1 Form C  |
|  | Initial contact resistance, max.                  |                          | Max.50mΩ (By voltage drop 6V DC 0.1A)   |
|  | Contact material                                  |                          | Stationary: Ag + Au clad, Movable: AgPd   |
| Rating   | Contact rating                                    |                          | 0.1A 30V DC (resistive load); Contact carrying power: 3W (Max. 1.2GHz); 1W (Max. 1.8GHz); Contact switching power: 1W (Max. 1.8GHz) |
|  | Nominal operating power (single side stable type) |                          | 140mW (1.5 to 12V DC), 270mW (24V DC)   |
| High frequency characteristics (Initial) (Impedance 50Ω) | V.S.W.R.  |                          | Max. 1.2 (at 1GHz), Max. 1.3 (at 1.8GHz)  |
|  | Insertion loss (without D.U.T. board's loss)      |                          | Max. 0.5dB (at 1GHz), Max. 1dB (at 1.8GHz)  |
|  | Isolation   |                          | Min. 15dB (at 1GHz), Min. 10dB (at 1.8GHz)  |
| Electrical characteristics                               | Insulation resistance (Initial)                   |                          | Min. 1,000MΩ (at 500V DC)<br>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 | 1,500 Vrms for 1min. (Detection current: 10mA)  |
|  | Temperature rise (at 20°C)                        |                          | Max. 50°C (By resistive method, nominal voltage applied to the coil, contact carrying power: 1W/at 1.8GHz)                          |
|  | Operate time (at 20°C)                            |                          | Max. 3ms (Approx. 1.5ms) (Nominal operating voltage applied to the coil, excluding contact bounce time.)                            |
|  | Release time (at 20°C)                            |                          | Max. 2ms (Approx. 1ms) (Nominal operating voltage applied to the coil, excluding contact bounce time.) (without diode)              |
| Mechanical characteristics                               | Shock resistance                                  | Functional               | Min. 500 m/s <sup>2</sup> {Approx. 50G} (Half-wave pulse of sine wave: 11ms; detection time: 10μs.)                                 |
|  |   | Destructive              | Min. 1,000 m/s <sup>2</sup> {Approx. 100G} (Half-wave pulse of sine wave: 6ms.)   |
|  | Vibration resistance                              | Functional               | 10 to 55 Hz at double amplitude of 3mm (Detection time: 10μs.)  |
|  |   | Destructive              | 10 to 55 Hz at double amplitude of 5mm  |
| Expected life  | Mechanical  |                          | Min. 5×10 <sup>6</sup> (at 180 cpm)   |
|  | Electrical  |                          | Min. 10 <sup>5</sup> (0.1A 30V DC resistive load, 1W (at 1.8GHz, V.S.W.R. max. 1.3 at 20 cpm)                                       |
| Conditions   | Conditions for operation, transport and storage*  |                          | Ambient temperature: -40°C to +70°C -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 (at rated load)  |
| Unit weight  |   |                          | Approx. 1 g .04 oz  |

Note: \* The upper operation ambient temperature limit is the maximum temperature that can satisfy the coil temperature rise value. Refer to [6] AMBIENT ENVIRONMENT in GENERAL APPLICATION GUIDELINES.

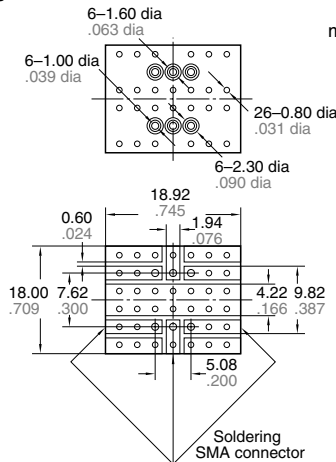
## REFERENCE DATA

### 1. High frequency characteristics

Sample: RP1-6V

Measuring method: Impedance 50Ω

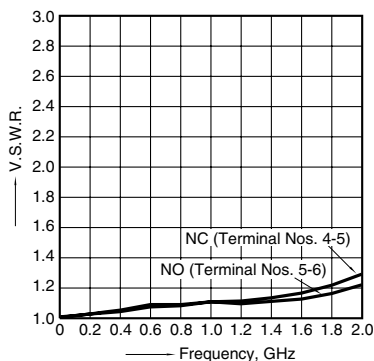
Measuring tool:



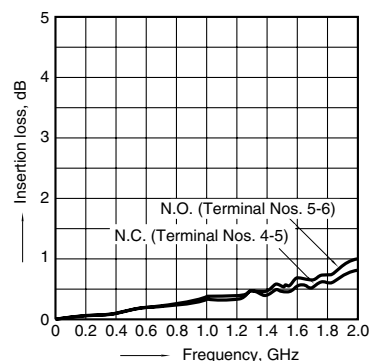
#### PC board

- Double-sided through hole
- Material: Glass-epoxy resin
- t = 1.0mm .039 inch
- Copper plated thickness: 35 μm

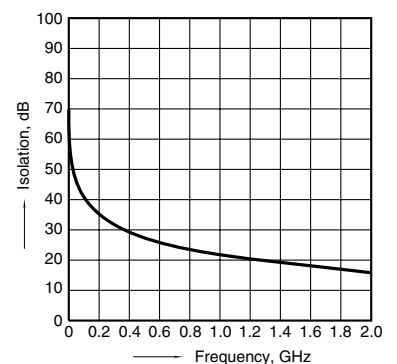
#### • V.S.W.R.



#### • Insertion loss

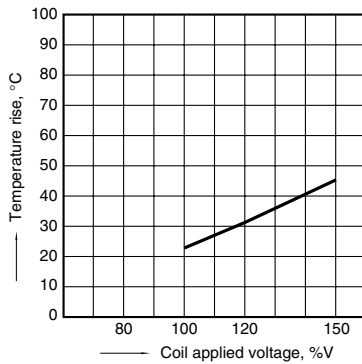


#### • Isolation



## 2. Coil temperature rise

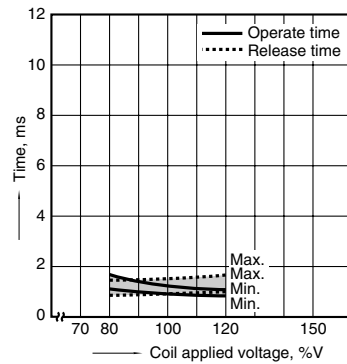
Sample: RP1-6V; No. of samples: n = 5  
 Carrying current: 0.1 A  
 Ambient temperature: 25°C 77°F



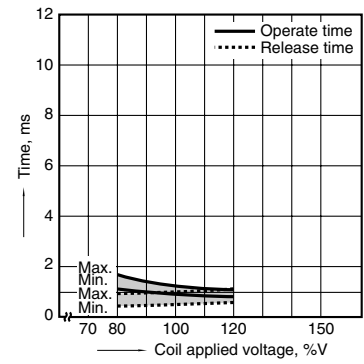
## 3. Operate/release time

Sample: RP1-9V; No. of samples: n = 50

• With diode



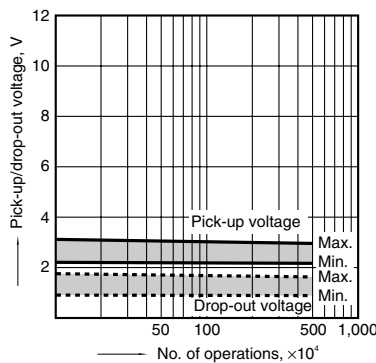
• Without diode



## 4. Mechanical life

Sample: RP1-5V; No. of samples: n = 8

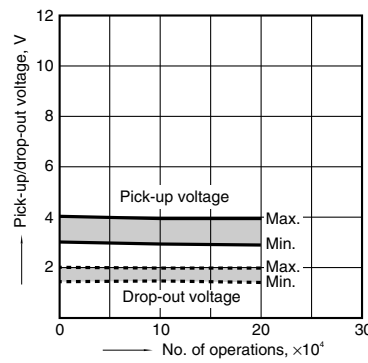
• Change of pick-up, drop-out voltage



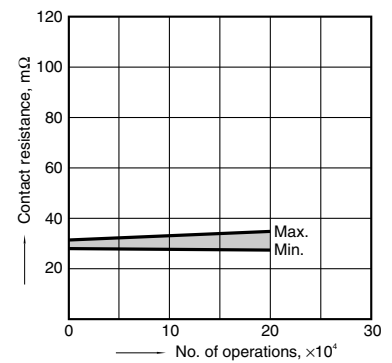
## 5. Electrical life (0.1 A 30 V DC)

Sample: RP1-6V; No. of samples: n = 6

• Change of pick-up/drop-out voltage

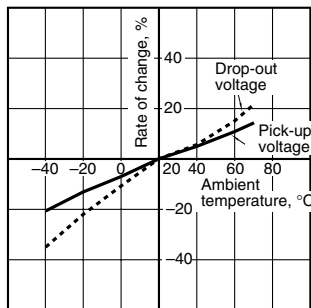


• Change of contact resistance



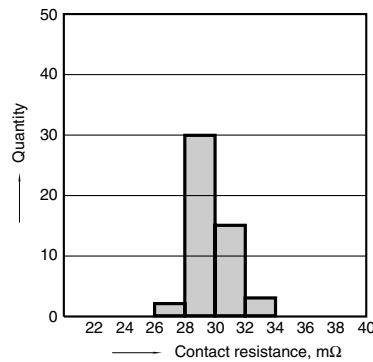
## 6. Ambient temperature characteristics

Sample: RP1-6V; No. of samples: n = 5



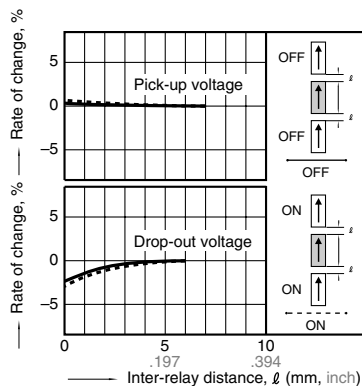
## 7. Contact resistance distribution (initial)

Sample: RP1-12V; No. of samples: n = 25



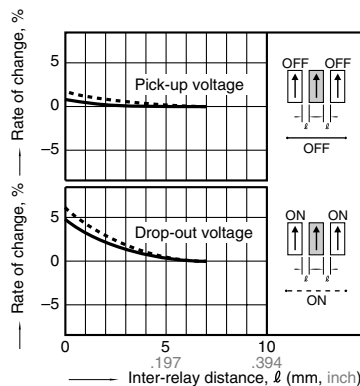
## 8.-(1) Influence of adjacent mounting

Sample: RP1-12V; No. of samples: n = 6



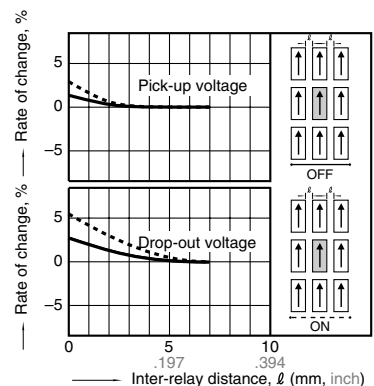
## 8.-(2) Influence of adjacent mounting

Sample: RP1-12V; No. of samples: n = 6



## 8.-(3) Influence of adjacent mounting

Sample: RP1-12V; No. of samples: n = 6

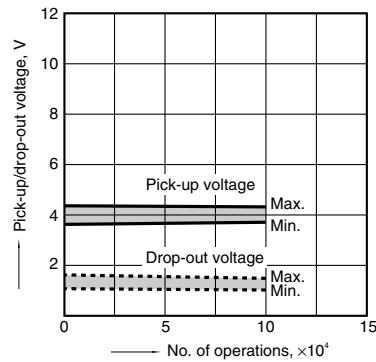
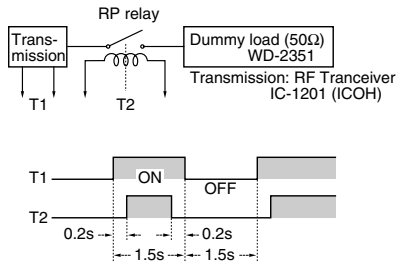


## 9. High frequency switching test (1.2 GHz, 1 W)

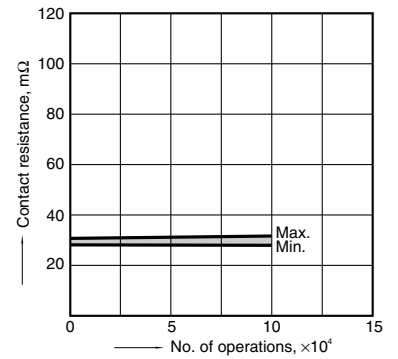
Sample: RP1-6V; No. of samples: n = 6

Ambient temperature: 20°C 68°F

### • Change of pick-up/drop-out voltage



### • Change of contact resistance



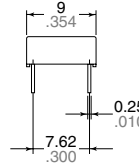
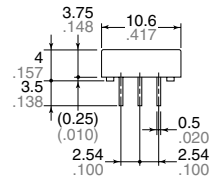
## DIMENSIONS (mm inch)

The CAD data of the products with a **CAD Data** mark can be downloaded from: <http://panasonic-electric-works.net/ac>

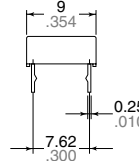
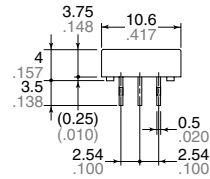
### CAD Data



### Standard PC board terminal

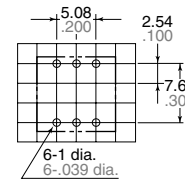


### Self-clinching terminal



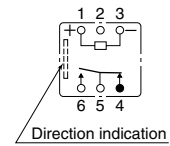
General tolerance:  $\pm 0.3 \pm 0.012$

### PC board pattern (Bottom view)



Tolerance:  $\pm 0.1 \pm 0.004$

### Schematic (Bottom view)



Deenergized condition

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 20 ms to set/reset the latching type relay.

2. Coil connection

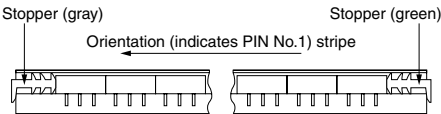
When connecting coils, refer to the wiring diagram to prevent mis-operation or malfunction.

3. External magnetic field


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

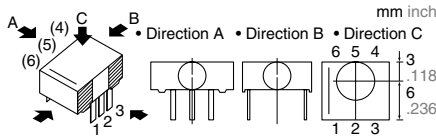
4. Packing direction

Relays are packed in a tube with the orientation stripe (PIN NO. 1) toward the green stopper.



5. Automatic mounting

To maintain the internal function of the relay, the chucking pressure should not exceed the values below.  
Chuckling pressure\* in the direction A:  
4.9 N {500 gf} or less  
Chuckling pressure\* in the direction B:  
9.8 N {1 kgf} or less  
Chuckling 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.



\*Value of chucking pressure is shown by the value of weight pressed on the portion (4 mm .157 inch dia.).

6. Soldering

Preheat according to the following conditions.

|             |                     |
|-------------|---------------------|
| Temperature | 120°C 248°F or less |
| Time        | Within 2 minute     |

Soldering should be done at 260±5°C  
500±9°F within 6 s.

For general cautions for use, please refer to the “General Application Guidelines”.