

mm inch

- High frequency relay with the low profile of 4 mm .157 inch
- 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)
- High sensitivity in small size
 - Size: 10.6 × 9 × 4 mm .417 × .354 × .157 inch
 - Nominal operating power: 140 mW

SPECIFICATIONS

Contact

Arrangement		1 Form C
Contact material	Movable	Silver alloy
	Stationary	Gold-clad silver
Initial contact resistance, max. (By voltage drop 6 V DC 0.1 A)		50 mΩ
Rating	Nominal switching capacity	0.1 A 30 V DC Contact switching power: 1 W (Max. 1.8 GHz); Contact carrying power: 3 W (Max. 1.2 GHz) 1 W (Max. 1.8 GHz)
High frequency characteristics (Impedance 50Ω)	Isolation	Min. 15 dB (at 1 GHz) Min. 10 dB (at 1.8 GHz)
	Insertion loss	Max. 0.5 dB (at 1 GHz) Max. 1 dB (at 1.8 GHz)
	V.S.W.R.	Max. 1.2 (at 1 GHz) Max. 1.3 (at 1.8 GHz)
Expected life (min. operations)	Mechanical (at 180 cpm)	5×10 ⁶
	Electrical (at 20 cpm)	10 ⁵ (0.1 A 30 V DC) 10 ⁵ (1 W at 1.8 GHz; V.S.W.R.: max. 1.3)

Coil (at 25°C, 68°F)

Voltage type	Nominal operating power
1.5 to 12 V DC	140 mW
24 V DC	270 mW

Characteristics

Max. operating speed (at rated load)		20 cpm
Initial insulation resistance* ¹		Min. 1,000 MΩ at 500 V DC
Initial breakdown voltage* ²	Between open contacts	750 Vrms for 1 min.
	Between contacts and coil	1,500 Vrms for 1 min.
Operate time* ³ (at nominal voltage)		Max. 3 ms (Approx. 1.5 ms)
Release time(without diode)* ³ (at nominal voltage)		Max. 2 ms (Approx. 1 ms)
Temperature rise		Max. 50°C with nominal coil voltage across coil and at nominal switching capacity
Shock resistance	Functional* ⁴	Min. 500 m/s ² {50 G}
	Destructive* ⁵	Min. 1,000 m/s ² {100 G}
Vibration resistance	Functional* ⁶	10 to 55 Hz at double amplitude of 3 mm
	Destructive	10 to 55 Hz at double amplitude of 5 mm
Conditions for operation, transport and storage (Not freezing and condensing at low temperature)	Ambient temp.	−40°C to 70°C −40°F to 158°F
	Humidity	5 to 85% R.H.
Unit weight		Approx. 1 g .04 oz

Remarks

- * Specifications will vary with foreign standards certification ratings.
^{*1} Measurement at same location as "Initial breakdown voltage" section
^{*2} Detection current: 10mA
^{*3} Excluding contact bounce time
^{*4} Half-wave pulse of sine wave: 11ms, detection time: 10μs
^{*5} Half-wave pulse of sine wave: 6ms
^{*6} Detection time: 10μs

TYPICAL APPLICATIONS

- Antenna switching of mobile phone
- Switching signal of measuring equipment

ORDERING INFORMATION

Ex. RP 1 H 3V

Contact arrangement	Terminal shape	Coil voltage (DC)
1:1 Form C	Nil: Standard PC board terminal H: Self-clinching terminal	1.5, 3, 4.5, 5, 6, 9, 12, 24 V

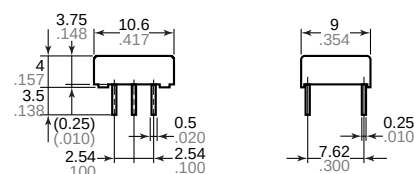
Note: Standard packing; Carton: 50 pcs. Case 1,000 pcs.

TYPES ANE COIL DATA (at 20°C 68°F)

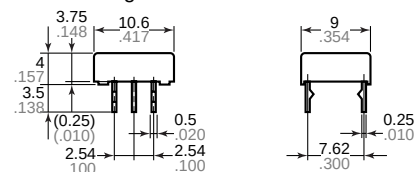
Part No.		Nominal voltage, V DC	Pick-up voltage, max. V DC	Drop-out voltage, min. V DC	Coil resistance, Ω ($\pm 10\%$)	Nominal operating current, mA ($\pm 10\%$)	Nominal operating power, mW	Maximum allowable voltage, V DC
Standard PC board terminal	Self-clinching terminal							
RP1-1.5V	RP1-H-1.5V	1.5	1.125	0.15	16	93.8	140	2.25
RP1-3V	RP1-H-3V	3	2.25	0.3	64.3	46.7	140	4.5
RP1-4.5V	RP1-H-4.5V	4.5	3.375	0.45	145	31.1	140	6.75
RP1-5V	RP1-H-5V	5	3.75	0.5	178	28	140	7.5
RP1-6V	RP1-H-6V	6	4.5	0.6	257	23.3	140	9
RP1-9V	RP1-H-9V	9	6.75	0.9	579	15.6	140	13.5
RP1-12V	RP1-H-12V	12	9	1.2	1,028	11.7	140	18
RP1-24V	RP1-H-24V	24	18	2.4	2,133	11.3	270	28.8

DIMENSIONS

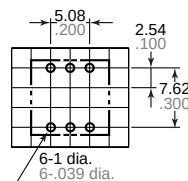
Standard PC board terminal



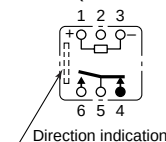
Self-clinching terminal

General tolerance: $\pm 0.3 \pm .012$

PC board pattern (Copper-side view)

Tolerance: $\pm 0.1 \pm .004$

Schematic (Bottom view)



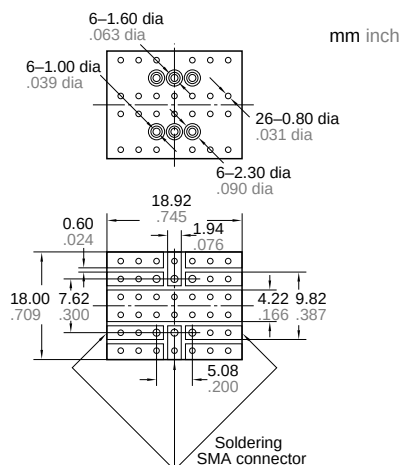
Deenergized condition

REFERENCE DATA

Sample: RP1-6V

Measuring method: Impedance 50 Ω

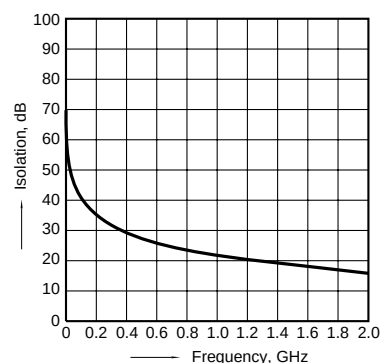
Measuring tool:



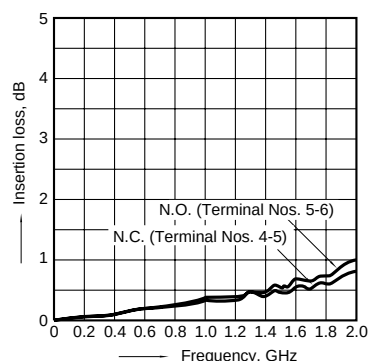
- PC board
- Double-sided through hole
 - Material: Glass-epoxy resin
 - $t = 1.0\text{mm}$.039 inch
 - Copper plated thickness: 35 μm

1. High frequency characteristics

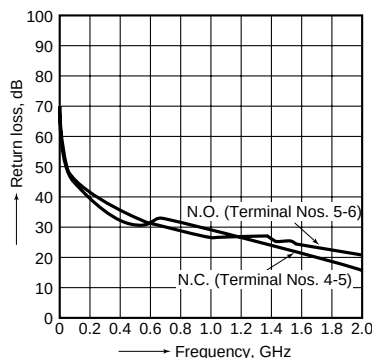
• Isolation



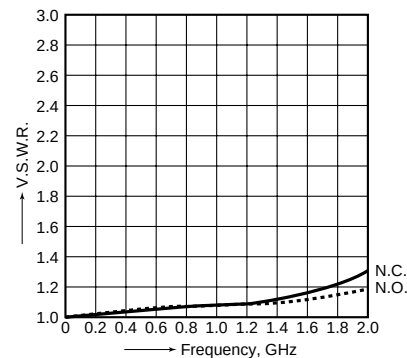
• Insertion loss



• Return loss

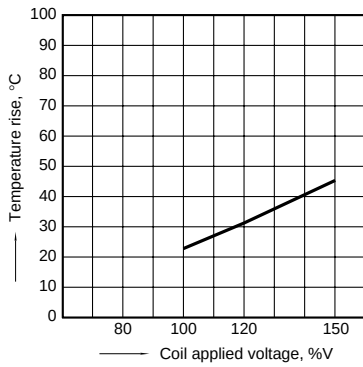


• V.S.W.R.



2. Coil temperature rise

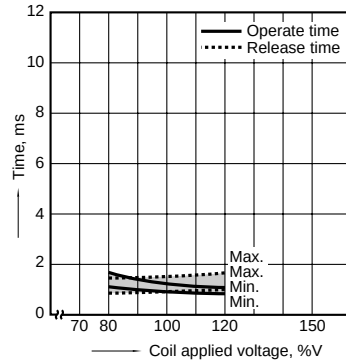
Sample: RP1-6V; No. of samples: n = 5
 Carrying current: 0.1 A
 Ambient temperature: 25°C 77°F



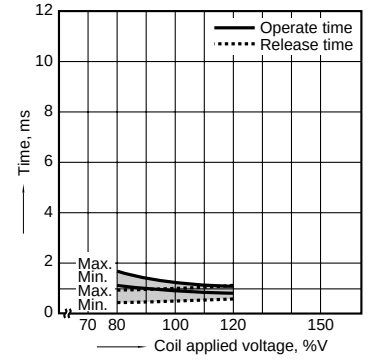
3. Operate/release time

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

• With diode



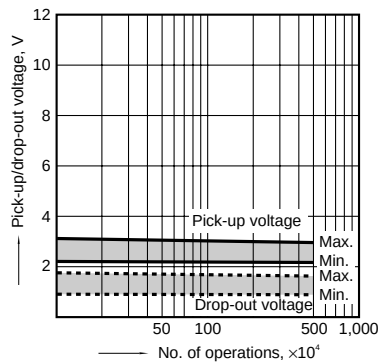
• Without diode



4. Mechanical life

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

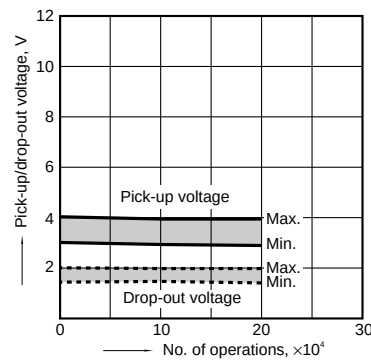
• Change of pick-up, drop-out voltage



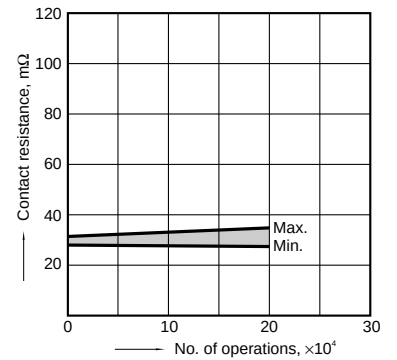
5. Electrical life (0.1 A 30 V DC)

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

• Change of pick-up/drop-out voltage

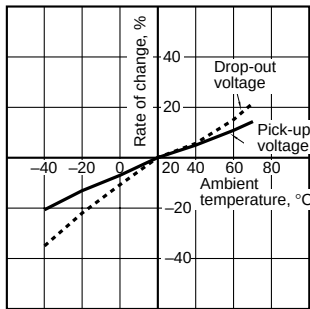


• Change of contact resistance



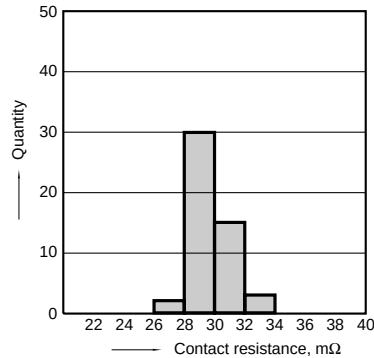
6. Ambient temperature characteristics

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



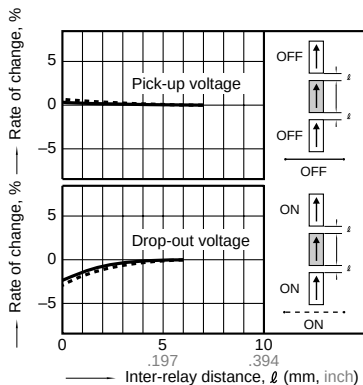
7. Contact resistance distribution (initial)

Sample: RP1-6V; No. of samples: n = 25



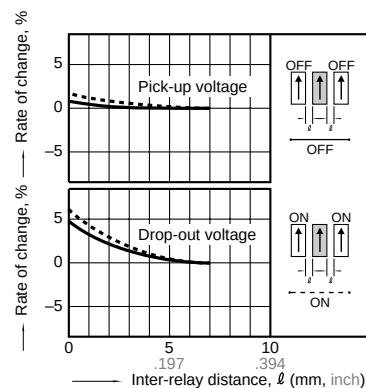
8.-(1) Influence of adjacent mounting

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



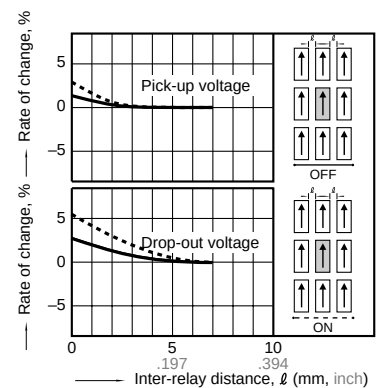
8.-(2) Influence of adjacent mounting

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



8.-(3) Influence of adjacent mounting

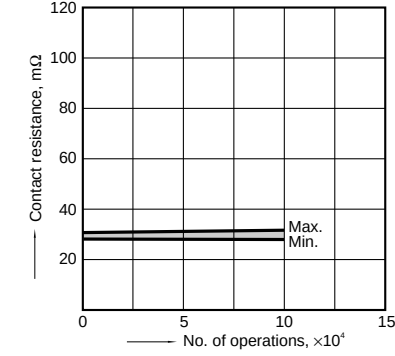
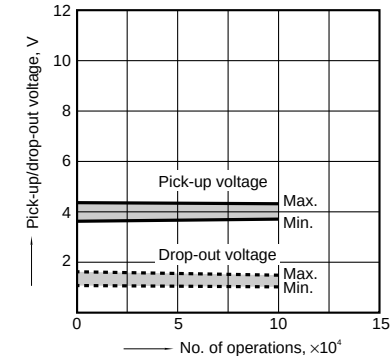
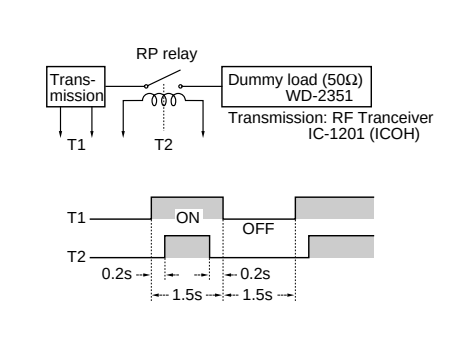
Sample: RP1-12V; No. of samples: n = 6



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

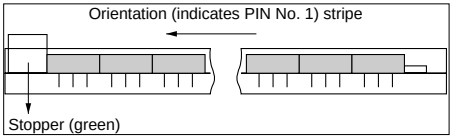
• Change of contact resistance



NOTES

1. Packing direction

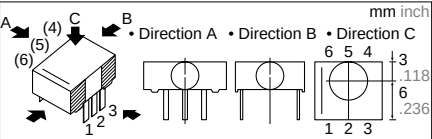
Relays are packed in a tube with the orientation stripe (PIN NO. 1) toward the green stopper.



2. Automatic mounting

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 {500 gf} 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.



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

3. Soldering

Preheat according to the following conditions.

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

Soldering should be done at 250°C 482°F within 5 s.

For Cautions for Use, see Relay Technical Information (Page 48 to 76).