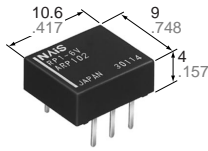


<h1>NAIS</h1>	<h2>LOW PROFILE HIGH FREQUENCY RELAY</h2>	<h1>RP-RELAYS</h1>
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mm inch

- 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)	<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td>Isolation</td> <td>Min. 15 dB (at 1 GHz) Min. 10 dB (at 1.8 GHz)</td> </tr> <tr> <td>Insertion loss</td> <td>Max. 0.5 dB (at 1 GHz) Max. 1 dB (at 1.8 GHz)</td> </tr> <tr> <td>V.S.W.R.</td> <td>Max. 1.2 (at 1 GHz) Max. 1.3 (at 1.8 GHz)</td> </tr> </table>	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.
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 <sup>6</sup>					
	Electrical (at 20 cpm)	10 <sup>5</sup> (0.1 A 30 V DC) 10 <sup>5</sup> (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* <sup>1</sup>		Min. 1,000 MΩ at 500 V DC
Initial breakdown voltage* <sup>2</sup>	Between open contacts	750 Vrms for 1 min.
	Between contacts and coil	1,500 Vrms for 1 min.
Operate time* <sup>3</sup> (at nominal voltage)		Max. 3 ms (Approx. 1.5 ms)
Release time(without diode)* <sup>3</sup> (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* <sup>4</sup>	Min. 500 m/s <sup>2</sup> {50 G}
	Destructive* <sup>5</sup>	Min. 1,000 m/s <sup>2</sup> {100 G}
Vibration resistance	Functional* <sup>6</sup>	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.
- \*<sup>1</sup> Measurement at same location as "Initial breakdown voltage" section
- \*<sup>2</sup> Detection current: 10mA
- \*<sup>3</sup> Excluding contact bounce time
- \*<sup>4</sup> Half-wave pulse of sine wave: 11ms, detection time: 10μs
- \*<sup>5</sup> Half-wave pulse of sine wave: 6ms
- \*<sup>6</sup> 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

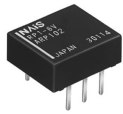
Note: Standard packing; Carton: 50 pcs. Case 1,000 pcs.

# RP

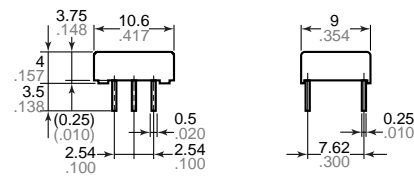
## TYPES ANE COIL DATA (at 20°C 68°F)

Part No.		Nominal voltage, V DC	Pick-up voltage, max. V DC	Drop-out voltage, min. V DC	Coil resistance, Ω (±10%)	Nominal operating current, mA (±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

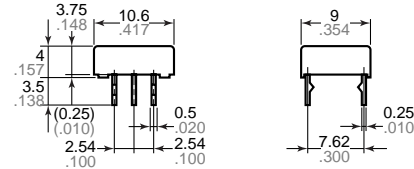
## DIMENSIONS



Standard PC board terminal

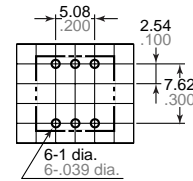


Self-clinching terminal



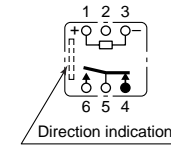
General tolerance: ±0.3 ±.012

PC board pattern (Copper-side view)



Tolerance: ±0.1 ±.004

Schematic (Bottom view)



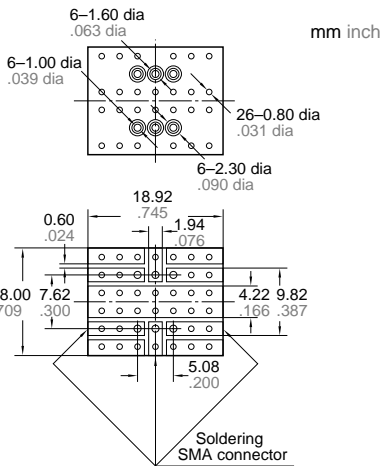
Deenergized condition

## REFERENCE DATA

Sample: RP1-6V

Measuring method: Impedance 50Ω

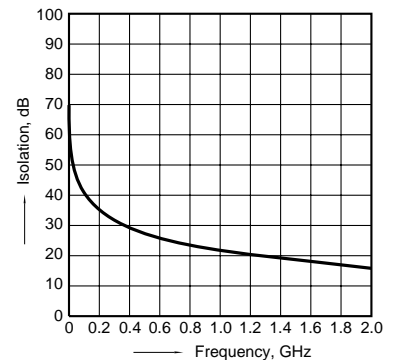
Measuring tool:



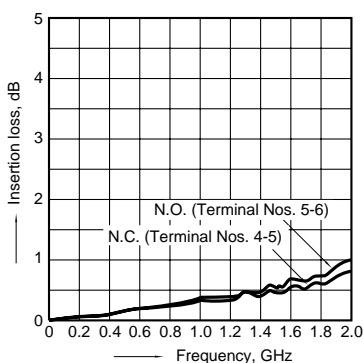
- PC board
- Double-sided through hole
  - Material: Glass-epoxy resin
  - t = 1.0mm .039 inch
  - Copper plated thickness: 35 μm

### 1. High frequency characteristics

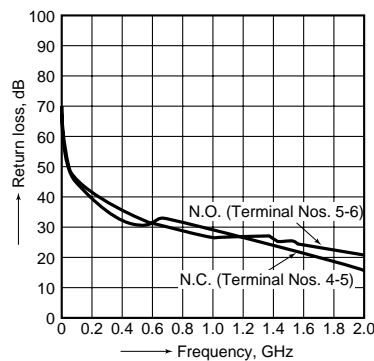
#### • Isolation



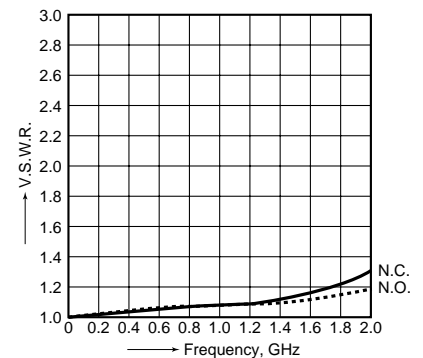
#### • Insertion loss



#### • Return loss

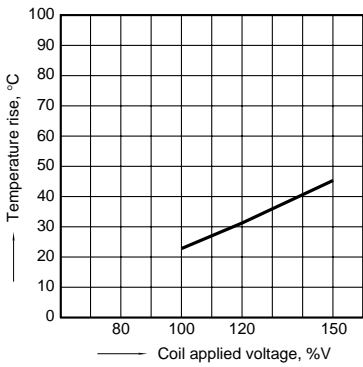


#### • V.S.W.R.



2. Coil temperature rise

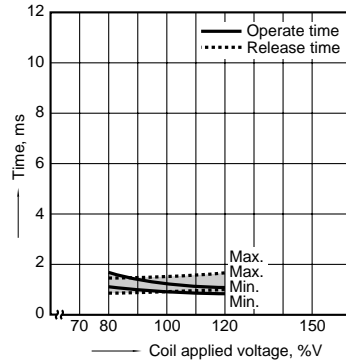
Sample: RP1-6V; No. of samples: n = 5  
 Carrying current: 0.1 A  
 Ambient temperature: 25°C 77°F



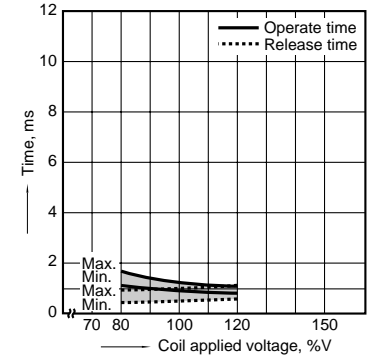
3. Operate/release time

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

• With diode



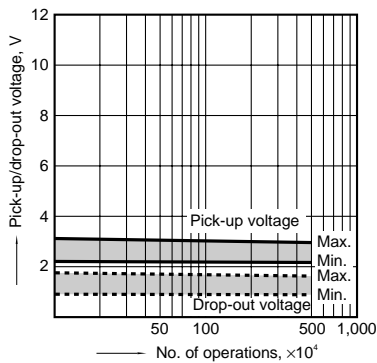
• Without diode



4. Mechanical life

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

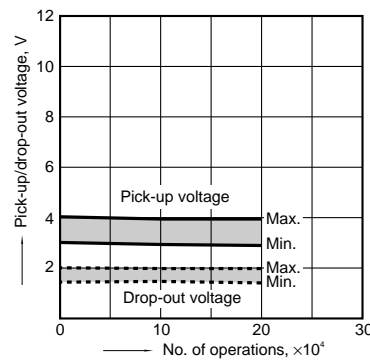
• Change of pick-up, drop-out voltage



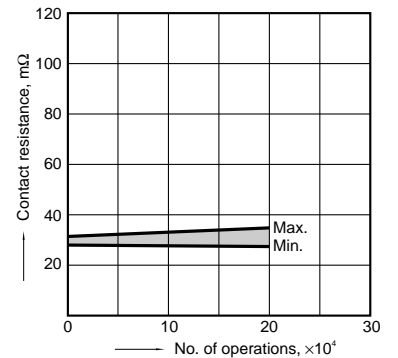
5. Electrical life (0.1 A 30 V DC)

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

• Change of pick-up/drop-out voltage

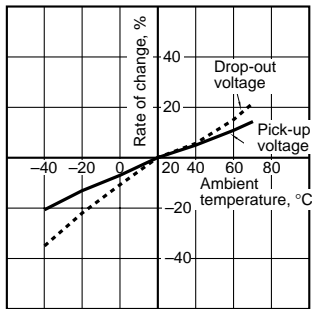


• Change of contact resistance



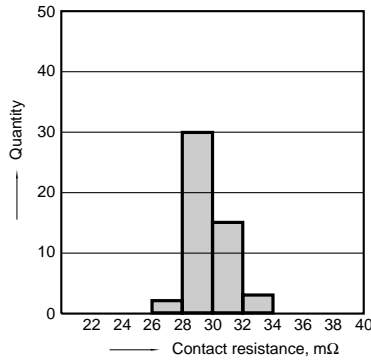
6. Ambient temperature characteristics

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



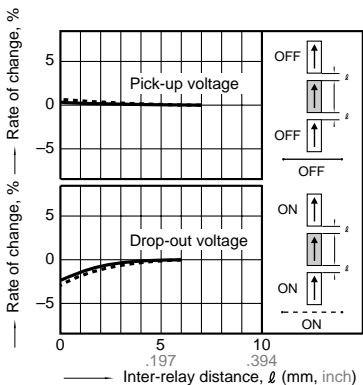
7. Contact resistance distribution (initial)

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



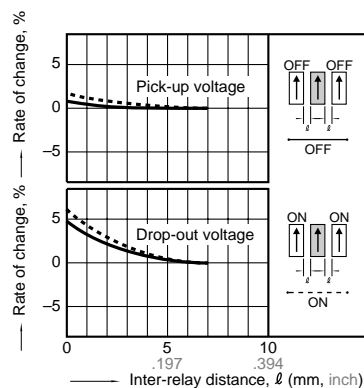
8.-(1) Influence of adjacent mounting

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



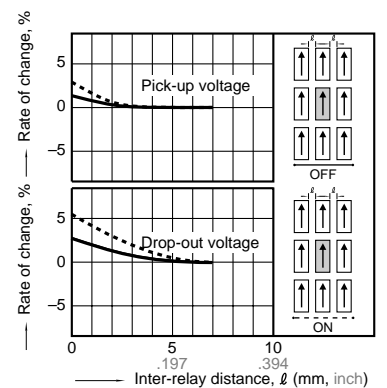
8.-(2) Influence of adjacent mounting

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



8.-(3) Influence of adjacent mounting

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



# RP

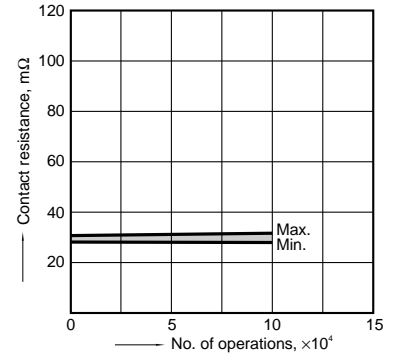
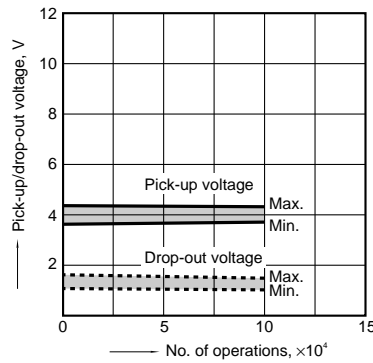
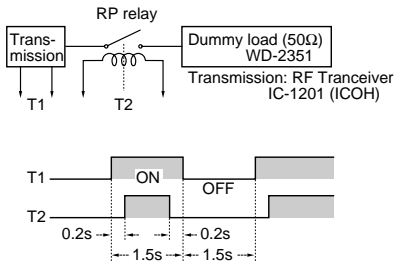
## 9. High frequency switching test (1.2 GHz, 1 W)

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

Ambient temperature: 20°C 68°F

• Change of pick-up/drop-out voltage

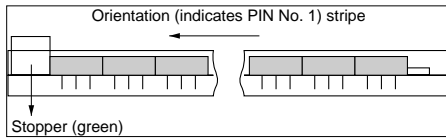
• Change of contact resistance



## 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:

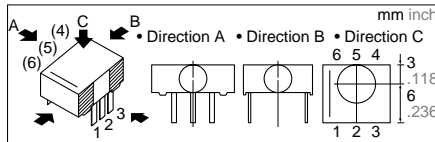
9.8 N {1 kgf} or less

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).**