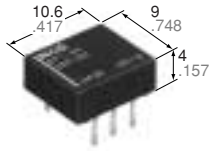


# NAIS

## LOW PROFILE HIGH FREQUENCY RELAY

# RP RELAYS



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**
- Utilizes tube package for automatic mounting.
- Self-clinching terminal also available

## 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)
	V.S.W.R.	Max. 1.2 (at 1 GHz) Max. 1.3 (at 1.8 GHz)
High frequency characteristics (Impedance 50Ω)	Insertion loss	Max. 0.5 dB (at 1 GHz) Max. 1 dB (at 1.8 GHz)
	Isolation	Min. 15 dB (at 1 GHz) Min. 10 dB (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 resistive load) 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
- All types of compact wireless devices

## ORDERING INFORMATION

Ex. RP 1 —   —   —  

Contact arrangement	Operating function	Terminal shape	Coil voltage (DC)
1: 1 Form C	Nil: Single side stable	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)

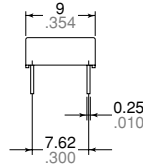
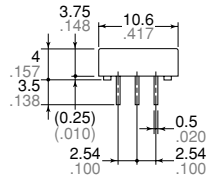
Part No.		Nominal voltage, V DC	Pick-up voltage, max. V DC	Drop-out voltage, min. V DC	Coil resistance, $\Omega$ ( $\pm 10\%$ )	Nominal operating current, mA ( $\pm 10\%$ )	Nominal operating power, mW	Maximum allowable voltage, V DC
Standard PC board terminal	Self-clinching terminal							
RP1-1.5V	RP1-H-1.5V	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**

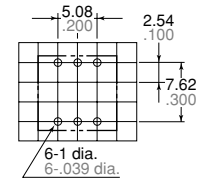
mm inch



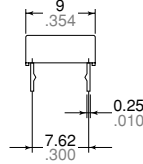
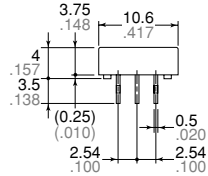
Standard PC board terminal



PC board pattern (Bottom view)

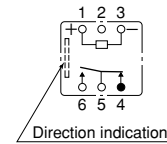


Self-clinching terminal



Tolerance:  $\pm 0.1 \pm 0.04$

Schematic (Bottom view)

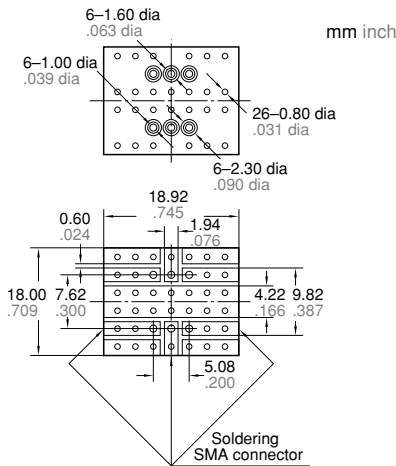


General tolerance:  $\pm 0.3 \pm 0.012$

Deenergized condition

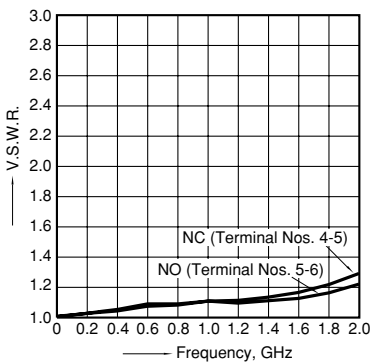
**REFERENCE DATA**

1. High frequency characteristics  
 Sample: RP1-6V  
 Measuring method: Impedance 50 $\Omega$   
 Measuring tool:

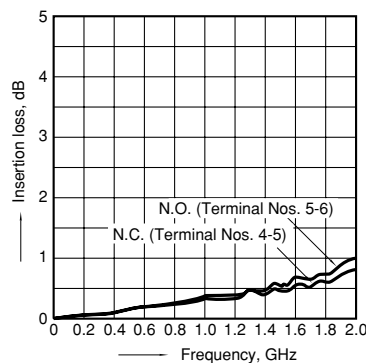


- PC board
- Double-sided through hole
  - Material: Glass-epoxy resin
  - $t = 1.0\text{mm } .039\text{ inch}$
  - Copper plated thickness: 35  $\mu\text{m}$

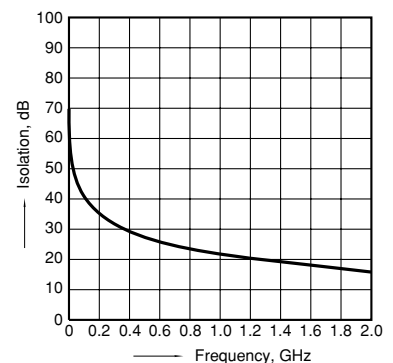
• V.S.W.R



• Insertion loss

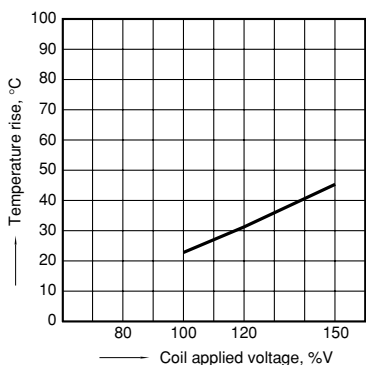


• Isolation



2. Coil temperature rise

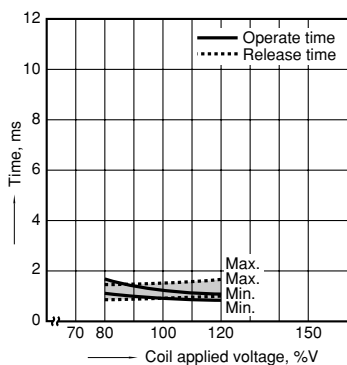
Sample: RP1-6V; No. of samples: n = 5  
 Carrying current: 0.1 A  
 Ambient temperature: 25°C 77°F



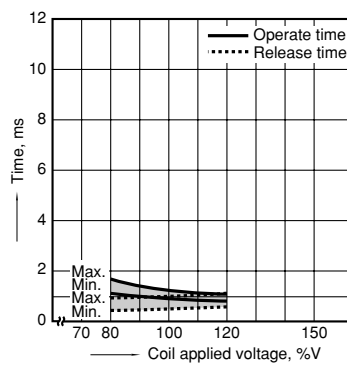
3. Operate/release time

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

• With diode



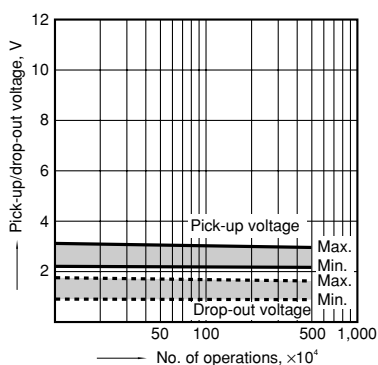
• Without diode



4. Mechanical life

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

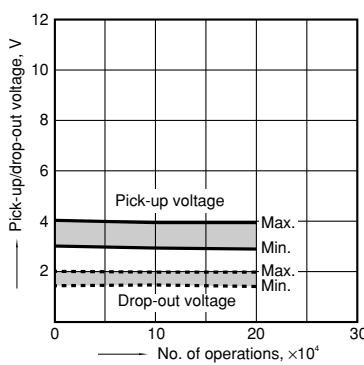
• Change of pick-up, drop-out voltage



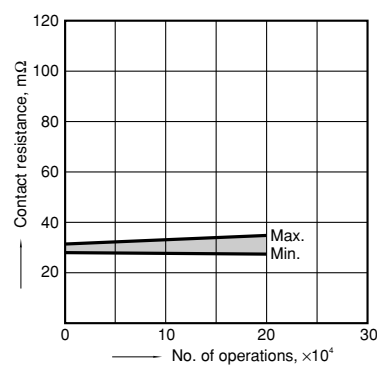
5. Electrical life (0.1 A 30 V DC)

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

• Change of pick-up/drop-out voltage

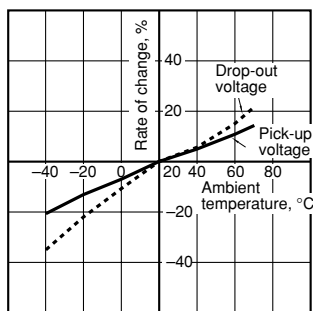


• Change of contact resistance



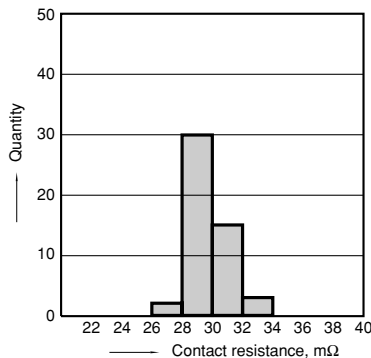
6. Ambient temperature characteristics

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



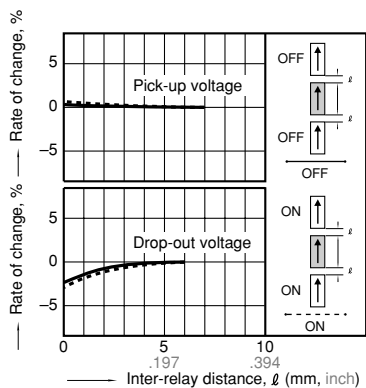
7. Contact resistance distribution (initial)

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



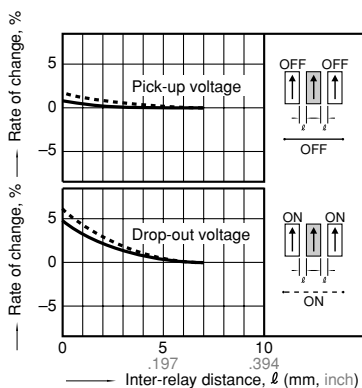
8.-(1) Influence of adjacent mounting

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



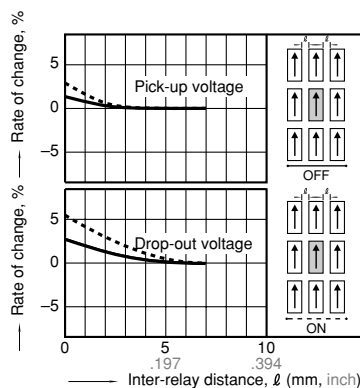
8.-(2) Influence of adjacent mounting

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



8.-(3) Influence of adjacent mounting

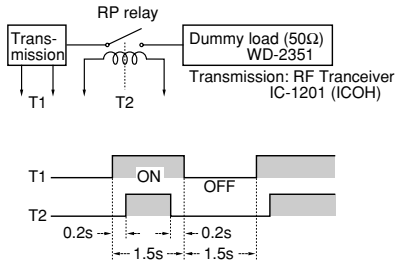
Sample: RP1-12V; No. of samples: n = 6



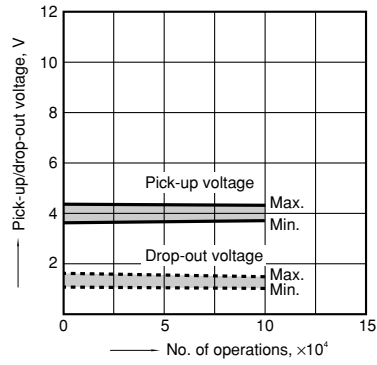
## 9. High frequency switching test (1.2 GHz, 1 W)

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

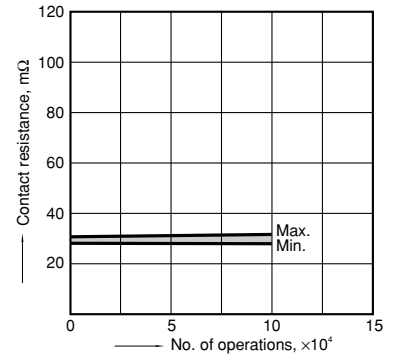
Ambient temperature: 20°C 68°F



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



### • Change of contact resistance



**For Cautions for Use, see Relay Technical Information.**