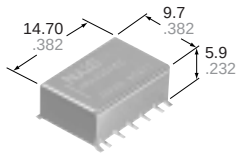
NAiS

MICROWAVE RELAY FOR ATTENUATOR CIRCUIT

RA-RELAYS



mm inch

FEATURES

1. High frequency characteristics (Impedance 50Ω, 300kHz to 1.0GHz)

- Insertion loss; Max. 0.3dB
- Isolation; Min. 20dB (Between open contacts)
  Min. 30dB (Between contact sets)
- V.S.W.R.; Max. 1.2

2. Surface mount terminal

This relay is a surface-mounted model with excellent high-frequency properties. In addition, it can use a microstrip line in the base circuit design which spares the labor of machining the base.

3. Low profile small type

9.7(W)×14.7(L)×5.9(H) mm
.382(W)×.579(L)×.232(H) inch

4. High sensitivity: 140 mW nominal operating power

5. High contact reliability

Electrical life: Min. 10^7 (10mA 10V DC)

SPECIFICATIONS

Contact

Arrangement			2 Form C
Contact material			Gold-clad silver alloy
Initial contact resistance			Max. 75mΩ
Rating	Contact rating (resistive)		10mA 10 V DC 1A 30 V DC
	Contact carrying power		Max. 3W(at 1.0GHz, impedance 50Ω, V.S.W.R. max.1.2)
	Max. switching voltage		30 V DC
	Max. switching current		1A
High frequency characteristics (300kHz to 1GHz, Impedance 50Ω)	Isolation	Between open contacts	Min. 20dB
		Between contact sets	Min. 30dB
	Insertion loss		Max. 0.3dB
	V.S.W.R.		Max. 1.2
	Input power		Max. 3W(at 1.0GHz, impedance 50Ω, V.S.W.R. max.1.2)
Nominal operating power	Single side stable		140mW (1.5 to 12V) 200mW (24V) 300mW (48V)
	1 coil latching		70 mW (1.5 to 12V) 100mW (24V)
	2 coil latching		140mW (1.5 to 12V) 200mW (24V)
Expected life (min. operation)	Mechanical (at 180 cpm)		10^8
	Electrical (at 20 cpm)	10mA 10 V DC(resistive load)	10^7
		1A 30 V DC (resistive load)	10^5

Characteristics

Initial insulation resistance *1		Min. 100 MΩ(at 500 V DC)
Initial breakdown voltage *2	Between open contacts	750 Vrms for 1 min.
	Between contact sets	1,000 Vrms for 1 min.
	Between contact and coil	1,000 Vrms for 1 min.
	Between contact and earth terminal	1,000 Vrms for 1 min.
Operate time [Set time] *3 (at 20°C)		Max. 4ms (Approx. 2ms) [Max. 4ms (Approx. 2ms)]
Release time (without diode) [Reset time] *3(at 20°C)		Max. 4ms (Approx. 1ms) [Max. 4ms (Approx. 2ms)]
Temperature rise (at 20°C) *4		Max. 60°C
Shock resistance	Functional *5	500 m/s²
	Destructive *6	1,000 m/s²
Vibration resistance	Functional *7	10 to 55 Hz at double amplitude of 3mm
	Destructive	10 to 55 Hz at double amplitude of 5mm
Conditions for operation, transport and storage *8 (Not freezing and condensing at low temperature)	Ambient temp	–40°C to +85°C –40°F to +185°F
	Humidity	5 to 85% R.H.
Unit weight		Approx. 2g .07oz

Remarks

*1 Measurement at same location as "Initial breakdown voltage" section.
*2 Detection current: 10mA
*3 Nominal operating voltage applied to the coil, excluding contact bounce time.
*4 By resistive method, nominal voltage applied to the coil: 3W contact carrying power: at 1.0GHz, Impedance 50Ω, V.S.W.R. Max.1.2
*5 Half-wave pulse of sine wave: 11ms, detection time: 10μs.
*6 Half-wave pulse of sine wave: 6ms
*7 Detection time: 10μs
*8 Refer to 6. Conditions for operation, transport and storage mentioned in NOTES.

TYPICAL APPLICATIONS

• Measurement instruments

Oscilloscope attenuator circuit

ORDERING INFORMATION

Ex. A | RA | 2 | 0 | 0 | A | 03

Product name	Contact arrangement	Operating function	Type of operation	Terminal shape	Coil voltage, V DC
RA	2: 2 Form C	0: Single side stable 1: 1 coil latching 2: 2 coil latching	0: Standard type (B.B.M)	A: Surface-mount terminal	1H: 1.5 09: 9 03: 3 12: 12 4H: 4.5 24: 24 05: 5 48: 48 06: 6

Note: Standard packing; Carton: 40 pcs. Case 1,000 pcs.

TYPES ANE COIL DATA (at 20°C 68°F)

• Single side stable type

Part No.	Nominal voltage, V DC	Pick-up voltage, V DC (max.) (initial)	Drop-out voltage, V DC (min.)(initial)	Coil resistance, Ω (±10%)	Nominal operating current, mA (±10%)	Nominal operating power, mW	Max. allowable voltage, V DC
ARA200A1H	1.5	1.125	0.15	16	93.8	140	2.25
ARA200A03	3	2.25	0.3	64.3	46.7	140	4.5
ARA200A4H	4.5	3.375	0.45	145	31	140	6.75
ARA200A05	5	3.75	0.5	178	28.1	140	7.5
ARA200A06	6	4.5	0.6	257	23.3	140	9
ARA200A09	9	6.75	0.9	579	15.5	140	13.5
ARA200A12	12	9	1.2	1,028	11.7	140	18
ARA200A24	24	18	2.4	2,880	8.3	200	36
ARA200A48	48	36	4.8	7,680	6.3	300	57.6

• 1 coil latching type

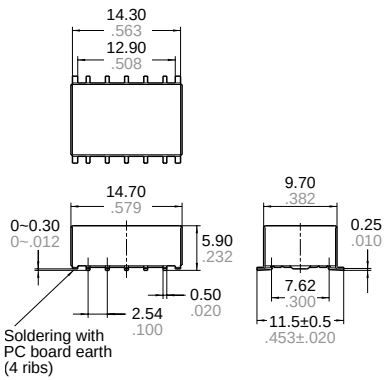
Part No.	Nominal voltage, V DC	Set voltage, V DC (max.) (initial)	Reset voltage, V DC (max.) (initial)	Coil resistance, Ω (±10%)	Nominal operating current, mA (±10%)	Nominal operating power, mW	Max. allowable voltage, V DC
ARA210A1H	1.5	1.125	1.125	32	46.9	70	2.25
ARA210A03	3	2.25	2.25	128.6	23.3	70	4.5
ARA210A4H	4.5	3.375	3.375	289.3	15.6	70	6.75
ARA210A05	5	3.75	3.75	357	14	70	7.5
ARA210A06	6	4.5	4.5	514	11.7	70	9
ARA210A09	9	6.75	6.75	1,157	7.8	70	13.5
ARA210A12	12	9	9	2,057	5.8	70	18
ARA210A24	24	18	18	5,760	4.2	100	36

• 2 coil latching type

Part No.	Nominal voltage, V DC	Set voltage, V DC (max.) (initial)	Reset voltage, V DC (max.) (initial)	Coil resistance, Ω (±10%)	Nominal operating current, mA (±10%)	Nominal operating power, mW	Max. allowable voltage, V DC
ARA220A1H	1.5	1.125	1.125	16	93.8	140	2.25
ARA220A03	3	2.25	2.25	64.3	46.7	140	4.5
ARA220A4H	4.5	3.375	3.375	145	31	140	6.75
ARA220A05	5	3.75	3.75	178	28.1	140	7.5
ARA220A06	6	4.5	4.5	257	23.3	140	9
ARA220A09	9	6.75	6.75	579	15.5	140	13.5
ARA220A12	12	9	9	1,028	11.7	140	18
ARA220A24	24	18	18	2,880	8.3	200	36

DIMENSIONS

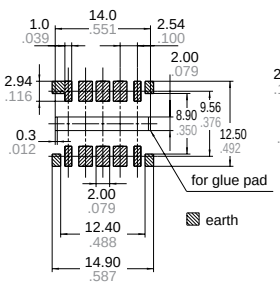
mm inch



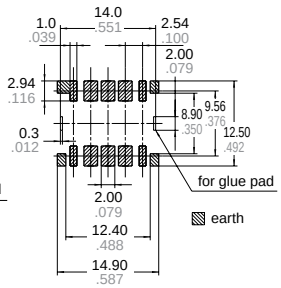
Tolerance: ±0.3 ±.012

Suggested Mounting Pads (Top view)

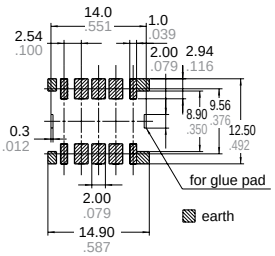
Single side stable



1 coil latching



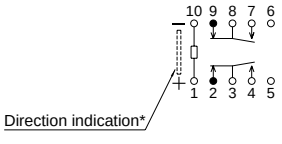
2 coil latching



Tolerance: ±0.1 ±.004

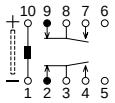
Schematic (Top view)

Single side stable



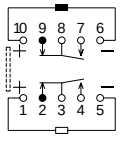
(Deenergized condition)

1 coil latching



(Reset condition)

2 coil latching



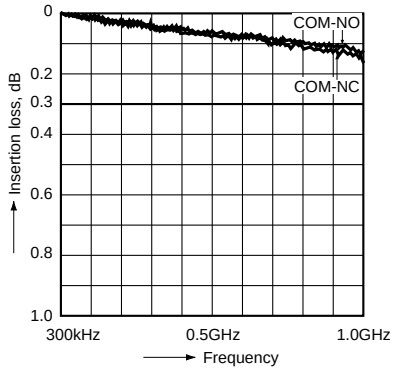
(Reset condition)

REFERENCE DATA

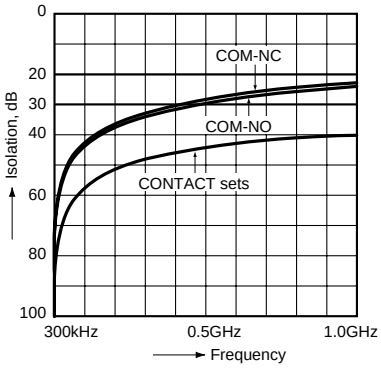
1. High frequency characteristics

Sample: ARA200A12
Measuring method: Measured with HP network analyzer (HP8753C).

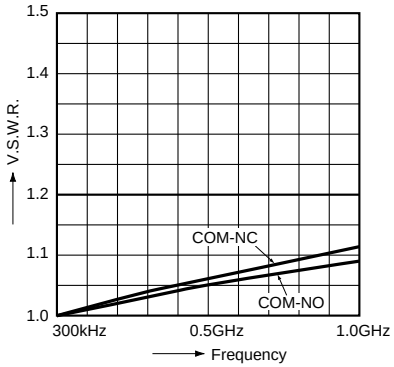
• Insertion loss



• Isolation



• V.S.W.R.



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

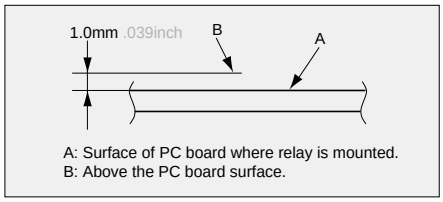
4. Cleaning

For automatic cleaning, the boiling method is recommended. Avoid ultrasonic cleaning which subjects the relays to high frequency vibrations, which may cause the contacts to stick.
It is recommended that alcoholic solvents be used.

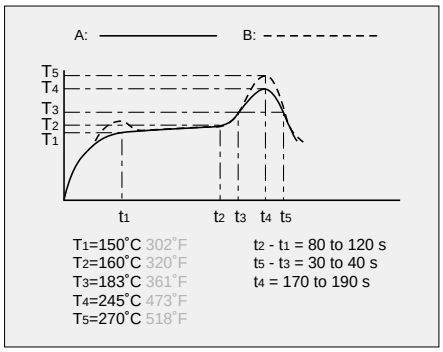
5. Soldering

Manual soldering shall be performed under following condition.
Tip temperature: 280°C to 300°C .536°F to 572°F
Wattage: 30 to 60W
Soldering time: within 5s
In case of automatic soldering, the following conditions should be observed

1) Position of measuring temperature



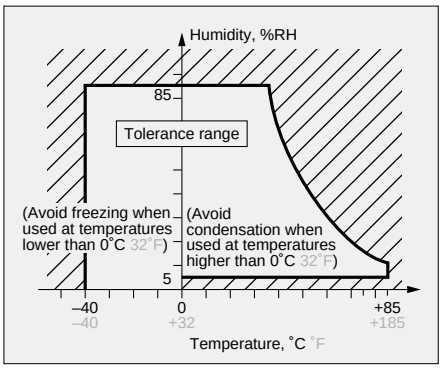
2) IR (infrared reflow) soldering method



Temperature rise of relay itself may vary according to the mounting level or the heating method of reflow equipment. Therefore, please set the temperature of soldering portion of relay terminal and the top surface of the relay case not to exceed the above mentioned soldering condition.
It is recommended to check the temperature rise of each portion under actual mounting condition before use.
The soldering earth shall be performed by manual soldering.

6. Usage, transport and storage conditions

1) Ambient temperature, humidity, and atmospheric pressure during usage, transport, and storage of the relay:
(1) Temperature:
–40 to +85°C –40 to +185°F
(2) Humidity: 5 to 85% RH
(Avoid freezing and condensation.)
The humidity range varies with the temperature. Use within the range indicated in the graph below.
(3) Atmospheric pressure: 86 to 106 kPa
Temperature and humidity range for usage, transport, and storage:



2) Condensation
Condensation forms when there is a sudden change in temperature under high temperature and high humidity conditions. Condensation will cause deterioration of the relay insulation.
3) Freezing
Condensation or other moisture may freeze on the relay when the temperature is lower than 0°C 32°F. This causes problems such as sticking of movable parts or operational time lags.
4) Low temperature, low humidity environments
The plastic becomes brittle if the relay is exposed to a low temperature, low humidity environment for long periods of time.

5) Storage procedures for surface-mount terminal types
Since the relay is very sensitive to humidity, it is packed in humidity-free, hermetically sealed packaging. When storing the relay, be careful of the following points:
(1) Be sure to use the relay immediately after removing it from its sealed package.
(2) When storing the relay for long periods of time after removing it from its sealed package, we recommend using a humidity-free bag with silica gel to prevent subjecting the relay to humidity.
Furthermore, if the relay is solder mounted when it has been subjected to excessive humidity, cracks and leaks can occur. Be sure to mount the relay under the required mounting conditions.

7. Others

1) Heat, smoke, and even a fire may occur if the relay is used in conditions outside of the allowable ranges for the coil ratings, contact ratings, operating cycle lifetime, and other specifications. Therefore, do not use the relay if these ratings are exceeded. Also, make sure that the relay is wired correctly. Incorrect wiring may cause unexpected events or the generation of heat or flames.

2)If the relay has been dropped, the appearance and characteristics should always be checked before use.

3) The cycle lifetime is defined under the standard test condition specified in the JIS* C 5442-1986 standard (temperature 15 to 35°C 59 to 95°F, humidity 25 to 85%). Check this with the real device as it is affected by coil driving circuit, load type, activation frequency, activation phase,ambient conditions and other factors. Also, be especially careful of loads such as those listed below.
(1) When used for AC load-operating and the operating phase is synchronous.
Rocking and fusing can easily occur due to contact shifting.
(2) High-frequency load-operating
When high-frequency opening and closing of the relay is performed with a load that causes arcs at the contacts, nitrogen and oxygen in the air is fused by the arc energy and HNO_3 is formed. This can corrode metal materials.
Three countermeasures for these are listed here.

- Incorporate an arc-extinguishing circuit.
- Lower the operating frequency
- Lower the ambient humidity

4) Latching relays are shipped from the factory in the reset state. A shock to the relay during shipping or installation may cause it to change to the set state. Therefore, it is recommended that the relay be used in a circuit which initializes the relay to the required state (set or reset) whenever the power is turned on.

5) Check the ambient conditions when storing or transporting the relays and devices containing the relays. Freezing or condensation may occur in the relay, causing functional damage. Avoid subjecting the relays to heavy loads, or strong vibration and shocks.

6) We recommend latching type when using in applications which involve lengthy duty cycles.

7) If silicone materials (e.g., silicone rubbers, silicone oils, silicone coating agents, silicone sealers) are used in the vicinity of the relay, the gas emitted from the silicone may adhere to the contacts of the relay during opening and closing and lead to improper contact. If this is the case, use a material other than silicone.

*Japanese Industrial Standards

Please contact .....

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