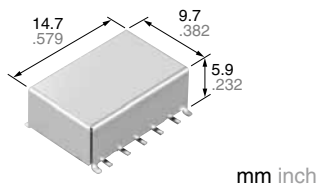


**1 GHz capable,
3 W carrying power
(at 1 GHz), 50Ω impedance
and 2 Form C relays**

RA RELAYS (ARA)



RoHS compliant

Protective construction: Sealed type

FEATURES

1. High frequency characteristics (Impedance 50Ω, ~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 (Single side stable, 2 coil latching)

5. High contact reliability

Electrical life: Min. 10⁷ (10mA 10V DC)

TYPICAL APPLICATIONS

• **Measurement market**

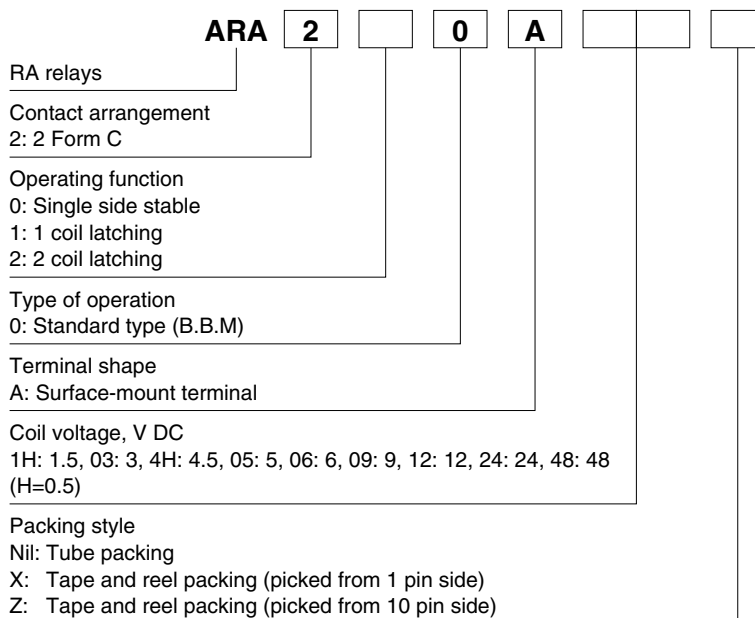
Oscilloscope attenuator circuit

• **Communication market**

Antenna switching, All types of wireless devices

If you consider using applications with low level loads or with high frequency switching, please consult us.

ORDERING INFORMATION



TYPES

1. Tube packing

Contact arrangement	Rated voltage	Part No.			Standard packing	
		Single side stable	1 coil latching	2 coil latching	Tube	Case
2 Form C	1.5 V DC	ARA200A1H	ARA210A1H	ARA220A1H	40 pcs.	1,000 pcs.
	3 V DC	ARA200A03	ARA210A03	ARA220A03		
	4.5 V DC	ARA200A4H	ARA210A4H	ARA220A4H		
	5 V DC	ARA200A05	ARA210A05	ARA220A05		
	6 V DC	ARA200A06	ARA210A06	ARA220A06		
	9 V DC	ARA200A09	ARA210A09	ARA220A09		
	12 V DC	ARA200A12	ARA210A12	ARA220A12		
	24 V DC	ARA200A24	ARA210A24	ARA220A24		
	48 V DC	ARA200A48	—	—		

2. Tape and reel packing

Contact arrangement	Rated voltage	Part No.			Standard packing	
		Single side stable	1 coil latching	2 coil latching	Tape and reel	Case
2 Form C	1.5 V DC	ARA200A1HZ	ARA210A1HZ	ARA220A1HZ	500 pcs.	1,000 pcs.
	3 V DC	ARA200A03Z	ARA210A03Z	ARA220A03Z		
	4.5 V DC	ARA200A4HZ	ARA210A4HZ	ARA220A4HZ		
	5 V DC	ARA200A05Z	ARA210A05Z	ARA220A05Z		
	6 V DC	ARA200A06Z	ARA210A06Z	ARA220A06Z		
	9 V DC	ARA200A09Z	ARA210A09Z	ARA220A09Z		
	12 V DC	ARA200A12Z	ARA210A12Z	ARA220A12Z		
	24 V DC	ARA200A24Z	ARA210A24Z	ARA220A24Z		
	48 V DC	ARA200A48Z	—	—		

Note: Tape and reel packing symbol "Z" is not marked on the relay. "X" type tape and reel packing (picked from 1-pin side) is also available.

RATING

1. Coil data

1) Single side stable

Rated voltage	Pick-up voltage* (at 20°C 68°F)	Drop-out voltage* (at 20°C 68°F)	Rated operating current [±10%] (at 20°C 68°F)	Coil resistance [±10%] (at 20°C 68°F)	Rated operating power	Max. allowable voltage (at 20°C 68°F)
1.5 V DC	75%V or less of rated voltage (initial)	10%V or more of rated voltage (initial)	93.8 mA	16 Ω	140 mW	150%V of rated voltage
3 V DC			46.7 mA	64.3 Ω		
4.5 V DC			31 mA	145 Ω		
5 V DC			28.1 mA	178 Ω		
6 V DC			23.3 mA	257 Ω		
9 V DC			15.5 mA	579 Ω		
12 V DC			11.7 mA	1,028 Ω	200 mW	
24 V DC			8.3 mA	2,880 Ω	300 mW	120%V of rated voltage
48 V DC			6.3 mA	7,680 Ω		

* Square, pulse drive (JIS C5442-1996)

2) 1 coil latching

Rated voltage	Set voltage* (at 20°C 68°F)	Reset voltage* (at 20°C 68°F)	Rated operating current [±10%] (at 20°C 68°F)	Coil resistance [±10%] (at 20°C 68°F)	Rated operating power	Max. allowable voltage (at 20°C 68°F)
1.5 V DC	75%V or less of rated voltage (initial)	75%V or less of rated voltage (initial)	46.9 mA	32 Ω	70 mW	150%V of rated voltage
3 V DC			23.3 mA	128.6 Ω		
4.5 V DC			15.6 mA	289.3 Ω		
5 V DC			14 mA	357 Ω		
6 V DC			11.7 mA	514 Ω		
9 V DC			7.8 mA	1,157 Ω		
12 V DC			5.8 mA	2,057 Ω	100 mW	
24 V DC			4.2 mA	5,760 Ω		

* Square, pulse drive (JIS C5442-1996)

3) 2 coil latching

Rated voltage	Set voltage* (at 20°C 68°F)	Reset voltage* (at 20°C 68°F)	Rated operating current [±10%] (at 20°C 68°F)	Coil resistance [±10%] (at 20°C 68°F)	Rated operating power	Max. allowable voltage (at 20°C 68°F)
1.5 V DC	75%V or less of rated voltage (initial)	75%V or less of rated voltage (initial)	93.8 mA	16 Ω	140 mW	150%V of rated voltage
3 V DC			46.7 mA	64.3 Ω		
4.5 V DC			31 mA	145 Ω		
5 V DC			28.1 mA	178 Ω		
6 V DC			23.3 mA	257 Ω		
9 V DC			15.5 mA	579 Ω		
12 V DC			11.7 mA	1,028 Ω	200 mW	
24 V DC			8.3 mA	2,880 Ω		

* Square, pulse drive (JIS C5442-1996)

2. Specifications

Characteristics	Item		Specifications
Contact data	Arrangement		2 Form C
	Contact resistance (initial)		Max. 75mΩ (By voltage drop 6V DC 1A)
	Contact material		Stationary: AgPd + Au clad, Movable: AgPd
	Contact rating (resistive)		10mA 10V DC, 1A 30V DC
	Contact input power		3W (at 1GHz, impedance 50Ω, V.S.W.R. max.1.2)
	Max. switching voltage		30V DC
	Max. switching current		1A (DC)
High frequency characteristics (initial) (~1GHz, Impedance 50Ω)	Isolation	Between open contacts	Min. 20dB
		Between contact sets	Min. 30dB
	Insertion loss (without D.U.T. board's loss)		Max. 0.3dB
	V.S.W.R.		Max. 1.2
Insulation resistance (initial)			Min. 100MΩ (at 500V DC, Measured portion is the same as the case of dielectric voltage.)
Breakdown voltage (initial)	Between open contacts		750 Vrms for 1min. (detection current: 10mA)
	Between contact sets		1,000 Vrms for 1min. (detection current: 10mA)
	Between contact and coil		1,000 Vrms for 1min. (detection current: 10mA)
	Between contact and earth terminal		1,000 Vrms for 1min. (detection current: 10mA)
Time characteristics	Operate [Set] time (initial)		Max. 4ms (Approx. 2ms) [Max. 4ms (Approx. 2ms)] (at 20°C 68°F, at rated voltage, without bounce)
	Release [Reset] time (initial)		Max. 4ms (Approx. 1ms) [Max. 4ms (Approx. 2ms)] (at 20°C 68°F, at rated voltage, without bounce, without diode)
Mechanical characteristics	Shock resistance	Functional	Min. 500 m/s ² (half-sine shock pulse: 11ms; detection time: 10μs)
		Destructive	Min. 1,000 m/s ² (half-sine shock pulse: 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. 10 ⁸ (at 180 cpm)
	Electrical		Min. 10 ⁷ (at 20 cpm) (10mA 10V DC resistive) Min. 10 ⁵ (at 20 cpm) (1A 30V DC resistive)
Conditions	Conditions for operation, transport and storage*		Ambient temperature: -40°C to +85°C -40°F to +185°F Humidity: 5 to 85% R.H. (Not freezing and condensing at low temperature)
Unit weight			Approx. 2 g .07 oz

Note: * The upper operation ambient temperature limit is the maximum temperature that can satisfy the coil temperature rise value. Refer to "AMBIENT ENVIRONMENT" in GENERAL APPLICATION GUIDELINES. Allowable temperature is from -40 to 70°C -40 to 158°F at our standard packing condition.

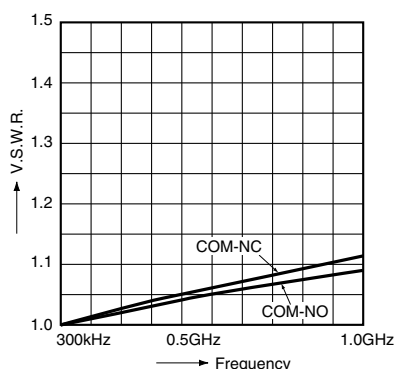
REFERENCE DATA

1-(1). High frequency characteristics (Impedance 50Ω)

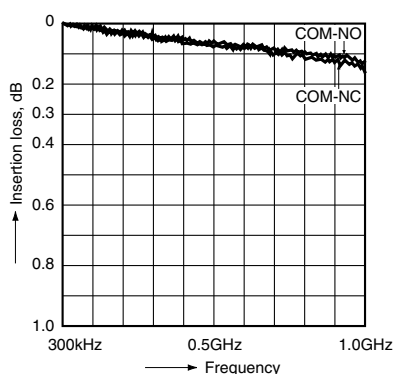
Sample: ARA200A12

Measuring method: Measured by using our PC board for measurement and HP network analyzer (HP8753C).

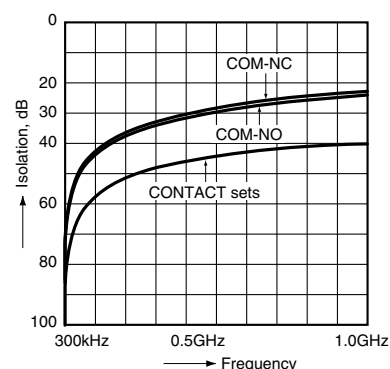
• V.S.W.R.



• Insertion loss



• Isolation



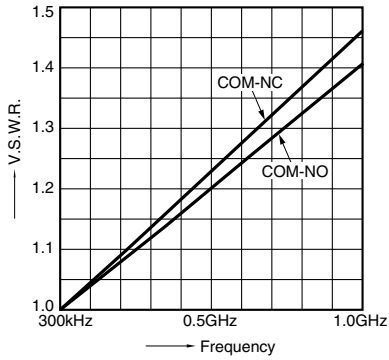
RA (ARA)

1-(2). High frequency characteristics (Impedance 75Ω)

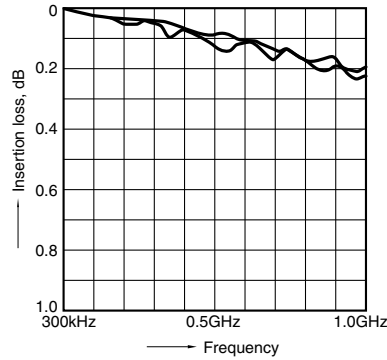
Sample: ARA200A12

Measuring method: Measured by using our PC board for measurement and HP network analyzer (HP8753C).

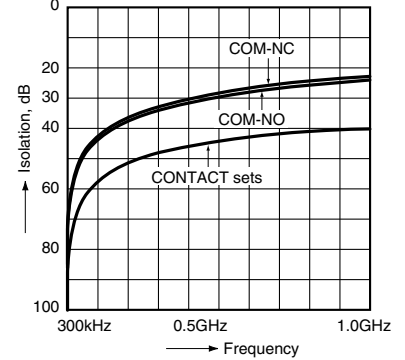
• V.S.W.R.



• Insertion loss



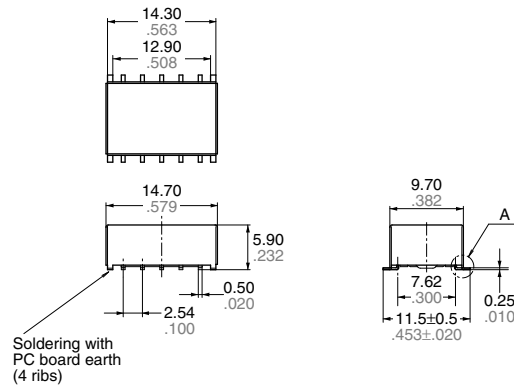
• Isolation



DIMENSIONS (mm inch)

The CAD data of the products with a **CAD** mark can be downloaded from: <http://industrial.panasonic.com/ac/e/>

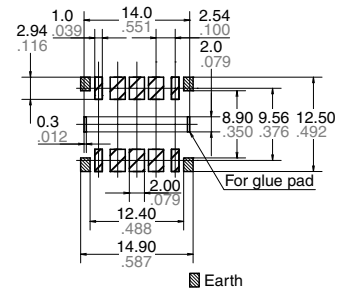
CAD



Soldering with PC board earth (4 ribs)

Tolerance: $\pm 0.3 \pm 0.12$

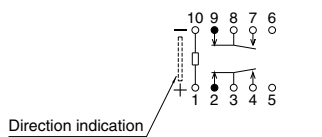
PC board pattern



Tolerance: $\pm 0.1 \pm 0.04$

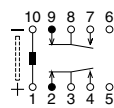
Schematic (Top view)

Single side stable



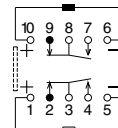
(Deenergized condition)

1 coil latching



(Reset condition)

2 coil latching



(Reset 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 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

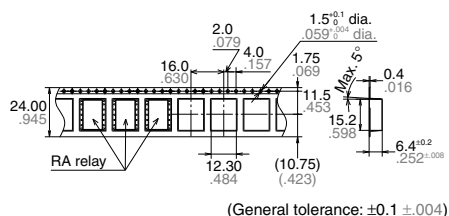
Since RA relays are highly sensitive polarized relays, their characteristics will be affected by a strong external magnetic field. Avoid using the relay under that condition.

4. Cleaning

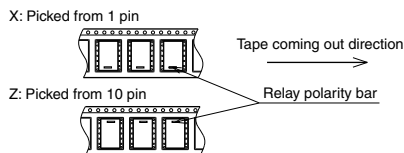
For automatic cleaning, the boiling method is recommended. Avoid ultrasonic cleaning which subjects the relays to high frequency vibrations, which may cause the contacts to stick. It is recommended that alcoholic solvents be used.

5. Tape and reel packing

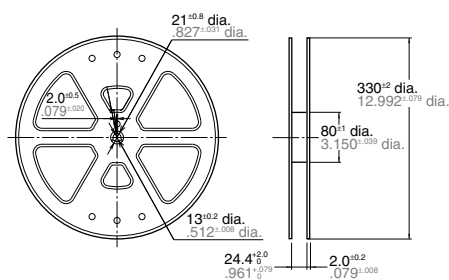
1) Tape dimensions



2) X type, Z type



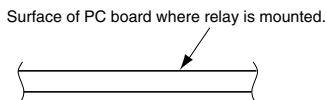
3) Dimensions of plastic reel



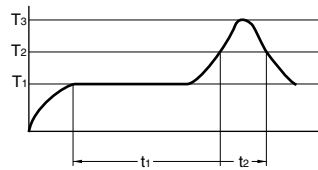
6. Soldering

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



$T_1 = 150 \text{ to } 180^\circ\text{C } 302 \text{ to } 356^\circ\text{F}$ $t_1 = 60 \text{ to } 120 \text{ sec.}$
 $T_2 = 230^\circ\text{C } 446^\circ\text{F and higher}$ $t_2 = \text{Within } 30 \text{ sec.}$
 $T_3 = \text{Within } 250^\circ\text{C } 482^\circ\text{F}$

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.

7. Conditions for operation, transport and storage conditions

1) Ambient temperature, humidity, and atmospheric pressure during usage, transport, and storage of the relay:

(1) Temperature:

−40 to +70°C −40 to +158°F

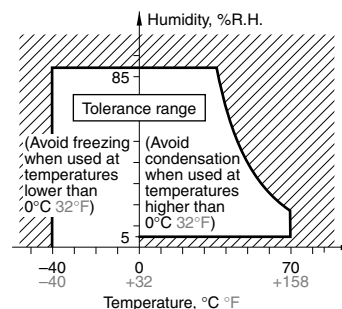
(2) Humidity: 5 to 85% RH

(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.

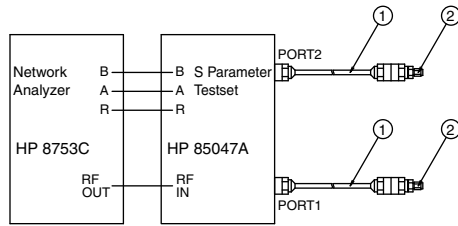
3) Freezing

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.

8. Measuring method (50Ω type)



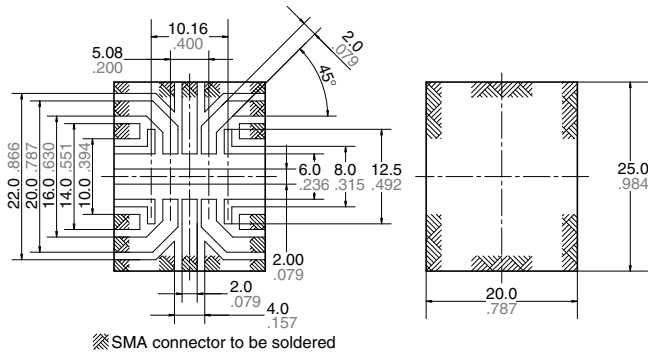
Connect connectors 1 and 2 respectively to PORT1 and PORT2. Perform calibration using the 3.5 mm .138 inch calibration kit (HP85033C).

No.	Product name	Contents
1	HP 11857D	7mm Test port, Extension cable, (APC7connector)
2	HP 11533A	Adapter, APC7-SMA (Male)

After calibration, connect the D.U.T board and measure.

D.U.T. board

Dimensions (mm inch)



Material; Glass PTFE

R-4737 (manufactured by our company)

Board thickness; $t = 0.8\text{mm}$.031inch

Copper plating thickness; $18\mu\text{m}$ (Double sided)

Connector (SMA type)

Product name; R125 403 (RADIALL)

Insertion loss compensation; The insertion loss of relay itself is given by subtracting the insertion loss of short-circuit the Com and the NC (or NO). (signal path and two connectors)

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

Please contact

Panasonic Corporation

Electromechanical Control Business Division

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industrial.panasonic.com/ac/e/

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