Panasonic
ideas for life

GENERAL CATALOG

MICROWAVE DEVICES

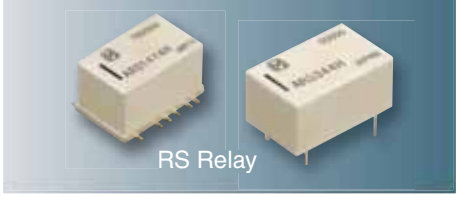
Product lineup

MICROWAVE DEVICES

Terminal type for PC board

HIGH FREQUENCY RELAYS

RA Relay | RE Relay | RS Relay
RN Relay | RJ Relay



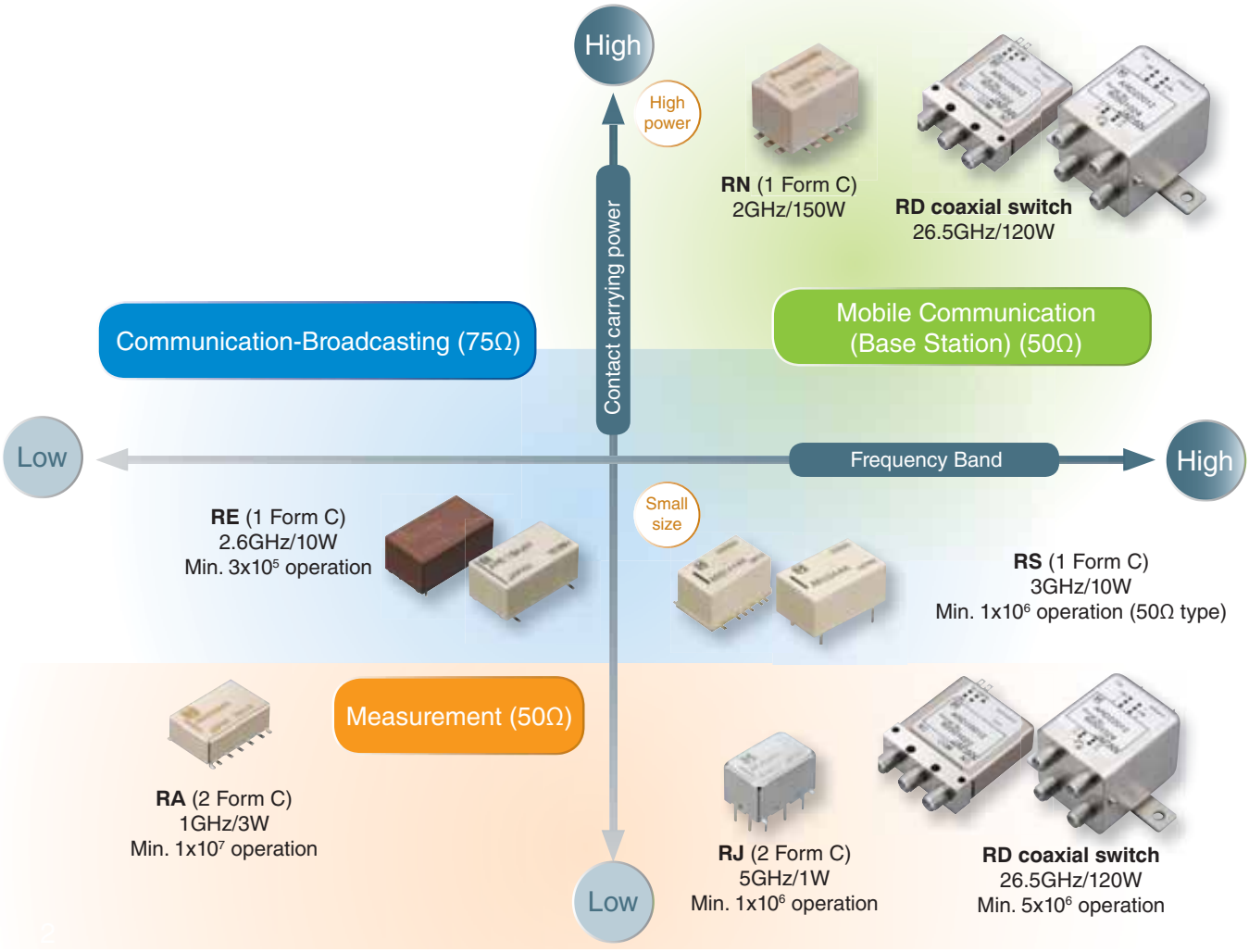
Coaxial connector contact terminal

COAXIAL SWITCHES

RD Coaxial Switch (SPDT, Transfer, SP6T)
- Frequency 13 GHz (SP6T) (~26.5GHz, SPDT/Transfer)
- High capacity load (120W)

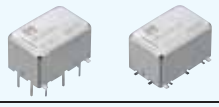
RV Coaxial Switch (SPDT)
- Frequency ~26.5GHz
- Small size

Types — Applications



Contents

Support for wide range of frequencies

Product lineup	Features	Impe-dance	Contact arrange-ments	Frequency range (GHz) 1 2 3 8 13 18 26.5
RJ 	Up to 8GHz* SMD terminal available	50Ω	2 Form C	
RN 	Up to 8GHz 150W contact carry-ing power available	50Ω	1 Form C	
RS 	Miniature design Reversed contact/E/Y layout available	50/75Ω	1 Form C	
RE 	SMD and THT terminal available 50Ω and 75Ω type available	50/75Ω	1 Form C	
RA 	10 million operations for measurement market	50Ω	2 Form C	
RV 	Up to 26.5GHz small size coaxial switch	50Ω	SPDT	
RD  	Long life and high sensitivity coaxial switch	50Ω	SPDT Transfer SP6T	

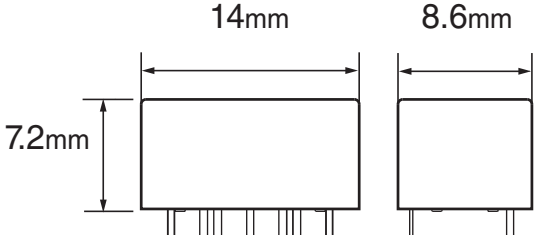
*Ratings are 5GHz

Expanding design possibilities with miniature microwave relays

Presenting the new RS relay with excellent high-frequency characteristics for communications and measurement applications.

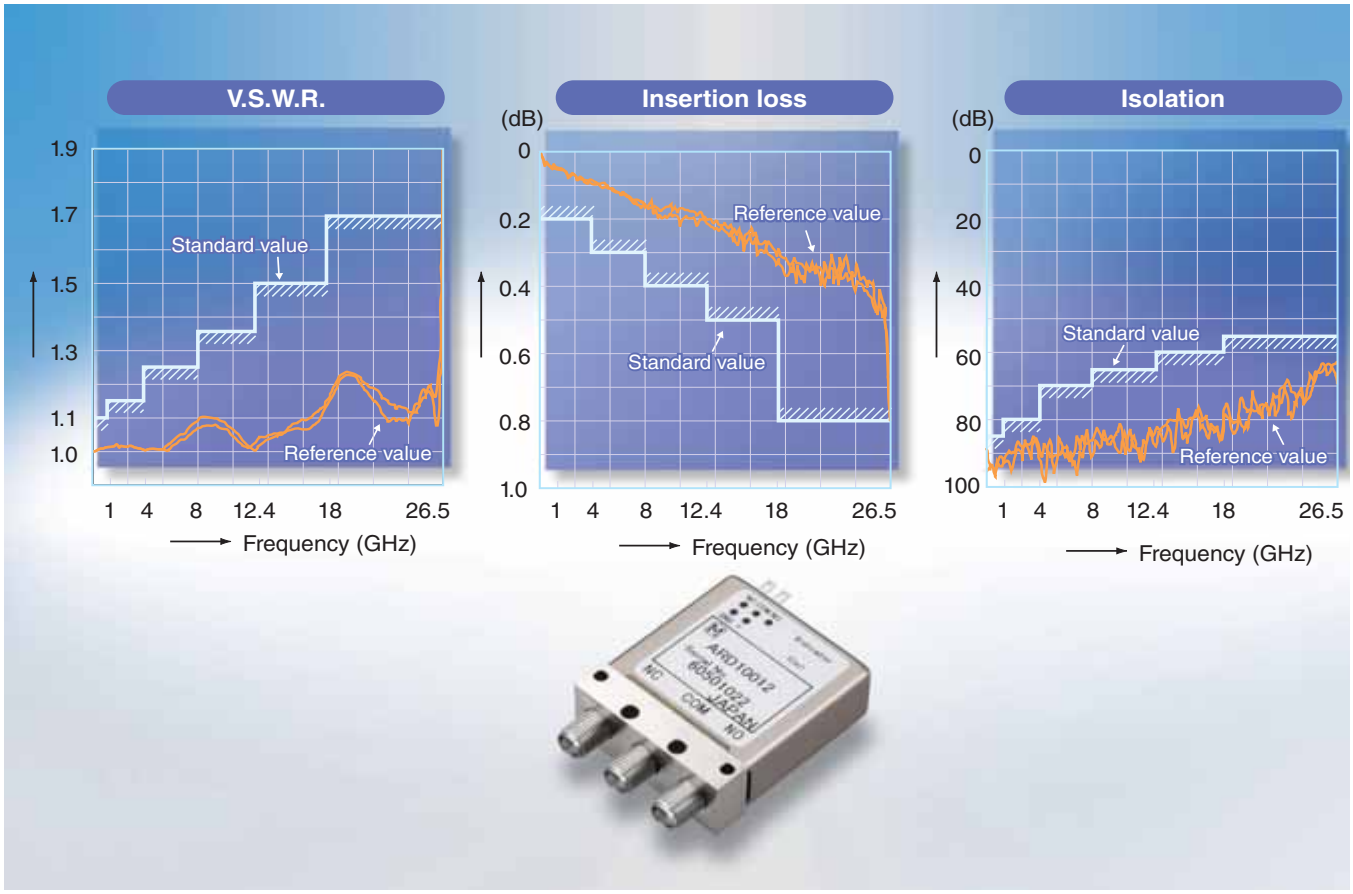
A new 50Ω type (up to 3GHz) is now available for applications demanding high quality such as mobile phone base stations, wireless devices, and measurement equipment. While maintaining excellent high-frequency characteristics this model is 60% smaller than its predecessor*.
A 75Ω type is also available for broadcasting equipment.

*Compared to RK relay.



Rich lineup of coaxial switches with excellent HF characteristics

High quality to bolster device reliability. The RD coaxial switch is available in SPDT, Transfer and SP6T types.



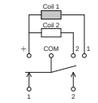
These coaxial switches are ideal for applications that require high quality and reliability such as base stations, wireless devices, and measurement instruments. With excellent high-frequency characteristics extending into the high-frequency band, these switches achieve a long working life of 5 million switchings.
A rich lineup is offered that includes a with-termination-type (SP6T) and a coil drive (+COM type) type to suit many different applications.

SPDT Transfer SP6T

High-Frequency Relays

Type ★ = Popular Type (Picture scale: DIN A4)	Features	Switching current	Max. switching voltage	Contact arrangement	Coil voltage
RV SPDT 1:1  15.9 x 15.9 x 11.2mm	• Ultra small coaxial switch • Up to 26.5 GHz • Impedance 50Ω • PIN and SMA terminals available • Latching types available • 2-coil latching type helps reduce power consumption • Failsafe type available • Reverse type available • Surge withstand voltage: 500Vrms HF Characteristics at 18GHz/ SMA type: • Isolation min. 40dB • Insertion loss max. 0.7dB • V.S.W.R. max. 1.7	**HF:** 50W (3GHz)	—	SPDT	(DC) 4.5, 12, 24V
★**RD SPDT** 1:2  34 x 13.2 x 39mm	• Coaxial relay • Up to 26.5GHz (18GHz) • Impedance 50Ω • Latching types available • TTL Version available HF Characteristics at 18GHz: • Isolation min. 60dB • Insertion loss max. 0.5dB • V.S.W.R. max. 1.5	**DC:** 100mA (indicator) **HF:** 120W (3GHz)	• 30V DC (indicator)	SPDT	(DC) 4.5, 5, 12, 24V
★**RD TRANSFER** 1:2  32 x 32 x 39mm	• Coaxial relay • Up to 26.5GHz (18GHz) • Impedance 50Ω • Latching types available • TTL Version available HF Characteristics at 18GHz: • Isolation min. 60dB • Insertion loss max. 0.5dB • V.S.W.R. max. 1.5	**DC:** 100mA (indicator) **HF:** 120W (3GHz)	• 30V DC (indicator)	DPDT	(DC) 4.5, 5, 12, 24V
★**RD SP6T** 1:4  80 x 80 x 39.5mm	• Coaxial relay • Up to 13GHz (18GHz) • Terminated type available • Impedance 50Ω • Latching types available HF Characteristics at 13GHz: • Isolation min. 65dB • Insertion loss max. 0.4dB • V.S.W.R. max. 1.5	**DC:** 100mA (indicator) **HF:** 120W (3GHz)	• 30V DC (indicator)	SP6T	(DC) 4.5, 5, 12, 24V

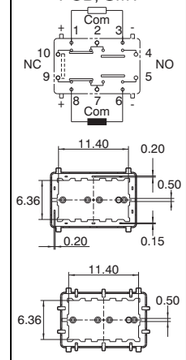
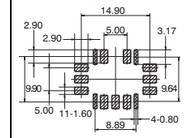
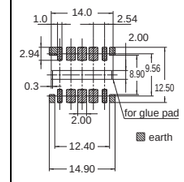
Mechanical Relays Selector Chart

Coil power	Breakdown voltage				Life (min. operations)		Mounting method (bottom view)	Page Approvals
	Between open contacts	Between contact sets	Contacts to coil	Between live parts and ground	Electrical	Mechanical		
700mW	500Vrms	500Vrms	500Vrms	500Vrms	3×10^5	10^6	PIN, SMA 	44 —
Single side stable: 840-970mW (4.5, 12, 24V) **2 coil latching:** 700-900mW (4.5, 12, 24V) **Latching with TTL driver (self cut-off function):** 5, 12, 24V	500Vrms	500Vrms	500Vrms	500Vrms	5×10^6	5×10^6	Coax	50 —
Single side stable: 1540-1670mW (4.5, 12, 24V) **2 coil latching:** 1200-1400mW (4.5, 12, 24V) **Latching with TTL driver (self cut-off function):** 5, 12, 24V	500Vrms	500Vrms	500Vrms	500Vrms	5×10^6	5×10^6	Coax	50 —
Single side stable: 840mW (4.5, 12V) 970mW (24V) **Latching:** 700mW (SET 4.5V) 750mW (SET 12V) 900mW (SET 24V)	500Vrms	500Vrms	500Vrms	500Vrms	5×10^6	5×10^6	Coax	50 —

High-Frequency Relays

Type ★ = Popular Type (Picture scale: DIN A4)	Features	Switching current	Max. switching voltage	Contact arrangement	Coil voltage
★**RJ** 1:1  14 x 9 x 8.2mm	• Shielded HF relay • Up to 8GHz • Impedance 50Ω • Latching types available • SMD and PCB version available HF Characteristics at 5GHz: • Isolation min. 35dB • Isolation min. 30dB between contact sets • Insertion loss max. 0.5dB • V.S.W.R. max.1.25	**DC:** 0.3A **HF:** 1W (5GHz)	• 30V DC	2c	(DC) 3, 4.5, 12, 24V
★**RN** 1:1  14.6 x 9.6 x 10.0mm	• High hot switching capability up to 80W at 2GHz, contact rating up to 150W at 2GHz • High frequency capability up to 6GHz • 1 changeover contact, impedance 50Ω • Reversed contact type available • Single side stable or 2 coil latching types available • SMT version available • Very good HF characteristics HF Characteristics at 2GHz: • Isolation min. 55dB • Insertion loss max. 0.12dB • V.S.W.R. max. 1.15	**DC:** 0.5A **HF:** 80W	• 30V DC	1c SPDT	(DC) 4.5, 12, 24V
RA 1:1  14.7 x 9.7 x 5.9mm	• HF relay in SMT version • Up to 1GHz • Impedance 50Ω • Latching types available HF Characteristics at 1GHz: • Isolation min. 20dB • Isolation min. 30dB between contact sets • Insertion loss max. 0.3dB • V.S.W.R. max. 1.2	**DC:** 1A **HF:** 3W (1GHz, carrying point to carrying current)	• 30V DC	2c	(DC) 1.5, 3, 4.5, 5, 6, 9, 12, 24, 48V

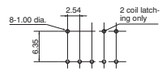
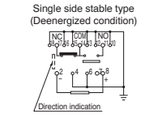
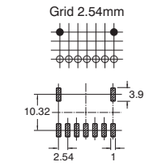
Mechanical Relays Selector Chart

Coil power	Breakdown voltage: Between open contacts	Breakdown voltage: Between contact sets	Breakdown voltage: Contacts to coil	Breakdown voltage: Between live parts and ground	Life (min. operations): Electrical	Life (min. operations): Mechanical	Mounting method (bottom view)	Page Approvals
Single side stable: 200mW **2 coil latching:** 150mW	500Vrms	500Vrms	500Vrms	500Vrms	10^6	10^7	PCB, SMT 	17 —
Single side stable: 320mW **2 coil latching:** 400mW	500Vrms	—	500Vrms	500Vrms	10^5	10^6	SMT 	37 —
Single side stable: 140mW (1.5 - 12V) 200mW (24V) 300mW (48V) **1 coil latching:** 70mW (1.5 - 12V) 100mW (24V) **2 coil latching:** 140mW (1.5 - 12V) 200mW (24V)	750Vrms	1000Vrms	1000Vrms	1000Vrms	10^7	10^8	SMT Suggested mounting pads (Top view) 	12 —

High-Frequency Relays

Type ★ = Popular Type (Picture scale: DIN A4)	Features	Switching current	Max. switching voltage	Contact arrangement	Coil voltage
★**RS** 1:1  14 x 8.6 x 7/8mm	• HF relay • Up to 3GHz • Impedance 50/75Ω • Silent type available • Latching types available • SMT and PCB version available • 10W at 3GHz contact carrying power HF Characteristics at 3GHz (50Ω PCB type): • Isolation min. 35dB • Insertion loss max. 0.35dB • V.S.W.R. max. 1.4	**DC:** 0.5A **HF:** 1W (3GHz)	• 30V DC	1c	(DC) 3, 4.5, 9, 12, 24V
RE 1:1  20.2 x 11.2 x 8.9/9.6mm	• HF relay • Up to 2.6GHz • Impedance 50/75Ω • SMT and PCB version available HF Characteristics at 2.6GHz (75Ω PCB type): • Isolation min. 30dB • Insertion loss max. 0.5dB • V.S.W.R. max. 1.5	**DC:** 0.5A **HF:** 1W (2.6GHz)	• 30V DC	1c	(DC) 3, 4.5, 6, 9, 12, 24V

Mechanical Relays Selector Chart

Coil power	Breakdown voltage				Life (min. operations)		Mounting method (bottom view)	Page Approvals
	Between open contacts	Between contact sets	Contacts to coil	Between live parts and ground	Electrical	Mechanical		
Single side stable: 200mW **1 coil latching:** 200mW **2 coil latching:** 400mW	500Vrms	—	1000Vrms	500Vrms	3×10^5	5×10^6	PCB, SMT  50Ω PCB type Single side stable type (Deenergized condition)  50Ω SMT type	22 —
Single side stable: 200mW	500Vrms	—	1000Vrms	500Vrms	3×10^5	10^6	PCB, SMT Grid 2.54mm  	33 —

Panasonic
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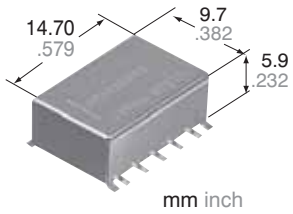
1.0 GHz 2 Form C relay

RA RELAYS (ARA)



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

5. High contact reliability
Electrical life: Min. 10^7 (10mA 10V DC)

TYPICAL APPLICATIONS

- **Measurement instruments**
  Oscilloscope attenuator circuit

SPECIFICATIONS

Contact

Arrangement			2 Form C
Contact material		Stationary	AgPd + Au clad
		Movable	AgPd
Initial contact resistance (By voltage 6V DC 1A)			Max. 75m¾
Rating	Contact rating (resistive)		10mA 10 V DC 1A 30 V DC
	Contact carrying power		Max. 3W (at 1.0GHz, impedance 50¾, V.S.W.R. max.1.2)
	Max. switching voltage		30 V DC
	Max. switching current		1A
High frequency characteristics (~1GHz, Impedance 50¾) (Initial)	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 50¾, 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	Min. 500 m/s²
	Destructive *6	Min. 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
* Specifications will vary with foreign standards certification ratings.
*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 conditions in NOTES (Page 16).

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	Packing style
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	Nil: Tube packing X: Tape and reel packing (picked from 1/2/3 pin side) Z: Tape and reel packing (picked from 8/9/10 pin side)

Note: Packing style; Nil: Tube packing 40 pcs. in an inner package, 1,000 pcs. in an outer package
Z: Tape and reel packing 500 pcs. in an inner package, 1,000 pcs. in an outer package

TYPES AND 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(Z)	1.5	1.125	0.15	16	93.8	140	2.25
ARA200A03(Z)	3	2.25	0.3	64.3	46.7	140	4.5
ARA200A4H(Z)	4.5	3.375	0.45	145	31	140	6.75
ARA200A05(Z)	5	3.75	0.5	178	28.1	140	7.5
ARA200A06(Z)	6	4.5	0.6	257	23.3	140	9
ARA200A09(Z)	9	6.75	0.9	579	15.5	140	13.5
ARA200A12(Z)	12	9	1.2	1,028	11.7	140	18
ARA200A24(Z)	24	18	2.4	2,880	8.3	200	36
ARA200A48(Z)	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(Z)	1.5	1.125	1.125	32	46.9	70	2.25
ARA210A03(Z)	3	2.25	2.25	128.6	23.3	70	4.5
ARA210A4H(Z)	4.5	3.375	3.375	289.3	15.6	70	6.75
ARA210A05(Z)	5	3.75	3.75	357	14	70	7.5
ARA210A06(Z)	6	4.5	4.5	514	11.7	70	9
ARA210A09(Z)	9	6.75	6.75	1,157	7.8	70	13.5
ARA210A12(Z)	12	9	9	2,057	5.8	70	18
ARA210A24(Z)	24	18	18	5,760	4.2	100	36

• 2 coil latching type

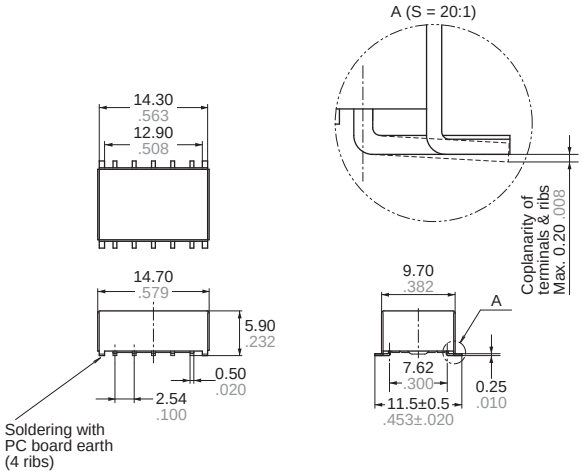
Part No.	Nominal voltage, V DC	Set voltage, V DC (max.) (initial)	Reset voltage, V DC (max.) (initial)	Coil resistance, Ω (±10%)	Nominal operating current, mA (±10%)	Nominal operating power, mW	Max. allowable voltage, V DC
ARA220A1H(Z)	1.5	1.125	1.125	16	93.8	140	2.25
ARA220A03(Z)	3	2.25	2.25	64.3	46.7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

RA (ARA)

DIMENSIONS mm inch

Download CAD Data from our Web site.

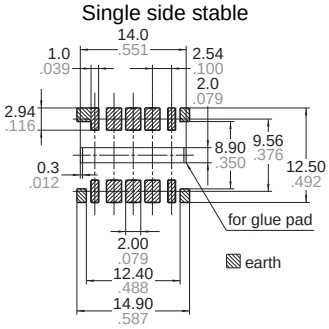
CAD Data



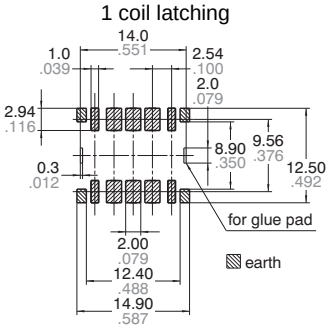
Tolerance: ±0.3 ±.012

Suggested Mounting Pads (Top view)

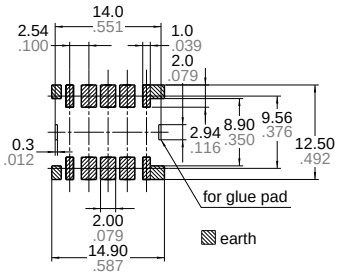
Single side stable



1 coil latching



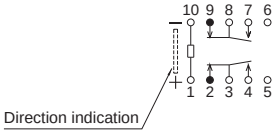
2 coil latching



Tolerance: ±0.1 ±.004

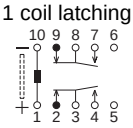
Schematic (Top view)

Single side stable



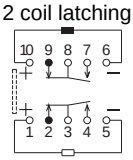
(Deenergized condition)

1 coil latching



(Reset condition)

2 coil latching



(Reset condition)

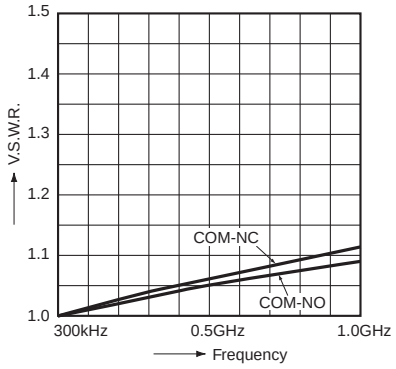
REFERENCE DATA

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

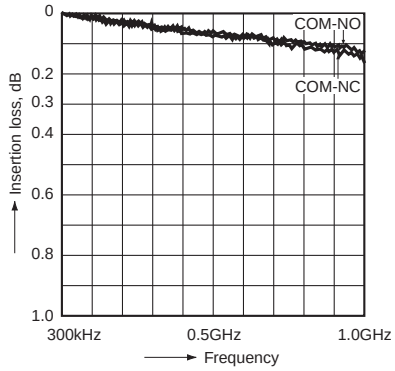
Sample: ARA200A12

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

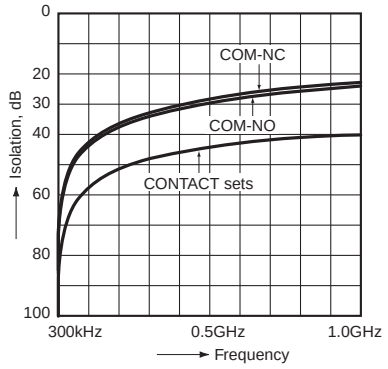
• V.S.W.R.



• Insertion loss



• Isolation

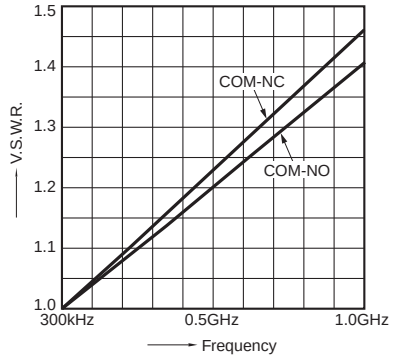


1-(2). High frequency characteristics (Impedance 75Ω

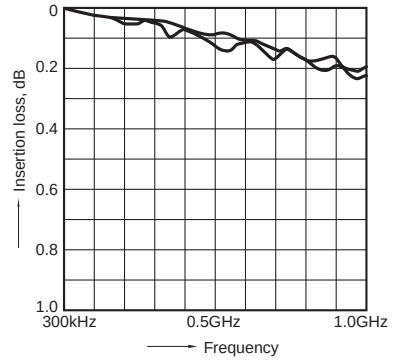
Sample: ARA200A12

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

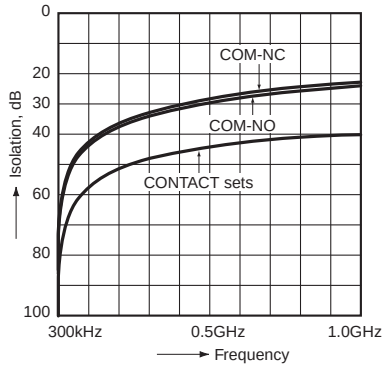
• V.S.W.R.



• Insertion loss



• Isolation



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.

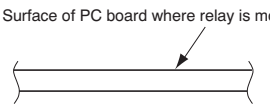
Tip temperature: 280°C to 300°C 536°F to 572°F.

Wattage: 30 to 60W

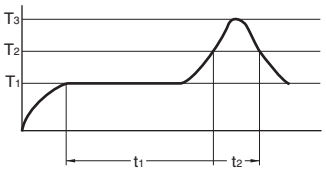
Soldering time: within 5s

In case of automatic soldering, the following conditions should be observed

1) Position of measuring temperature



2) IR (infrared reflow) soldering method



T_1 = 150 to 180C 302 to 356F t_1 = 60 to 120 sec.
T_2 = 230C 446F and higher t_2 = Within 30 sec.
T_3 = Within 250C 482F

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. 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

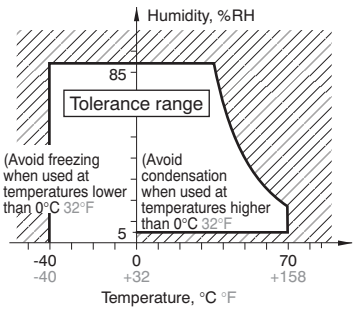
(2) Humidity: 5 to 85% RH

(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

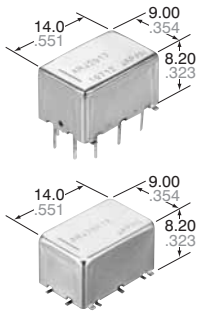
The plastic becomes brittle if the relay is exposed to a low temperature, low humidity environment for long periods of time.

For complete “Cautions for Use”, please download the “Relay Technical Information” from our Web site. For instructions on soldering, see page 66. For information on reliability, see page 64.

Panasonic
ideas for life

Up to 8 GHz small microwave relays

RJ RELAYS (ARJ)



FEATURES

• Excellent high frequency characteristics (50Ω, at 5GHz)
V.S.W.R.: Max. 1.25
Insertion loss: Max. 0.5dB
Isolation: Min. 35dB
(Between open contacts)
Min. 30dB
(Between contact sets)

• Surface mount terminal
Surface mount terminals are now standard so there is much less work in designing PC boards.

• Small size
Size: 14.00 (L)×9.00 (W)×8.20 (H) mm
.551 (L)×.354 (W)×.323 (H) inch

TYPICAL APPLICATIONS

Measuring equipment market
Attenuator circuits, spectrum analyzer, oscilloscope

Mobile telecommunication market
IMT2000, microwave communication

Medical instrument market

SPECIFICATIONS

Contact

Arrangement			2 Form C
Contact material			Gold plating
Initial contact resistance (By voltage drop 10V DC 10mA)			Max. 150mΩ
Rating	Contact rating		1W (at 5 GHz, Impedance 50 Ω, V.S.W.R. &1.25) 10mA 10V DC (resistive load)
	Contact carrying power		1W (at 5 GHz, Impedance 50 Ω, V.S.W.R. &1.25)
	Max. switching voltage		30 V DC
	Max. switching current		0.3 A DC
High frequency characteristics (Initial) (~5GHz, Impedance 50Ω)	V.S.W.R.		Max. 1.25
	Insertion loss (without D.U.T. board's loss)		Max. 0.5dB
	Isolation	Between open contacts	Min. 35dB
		Between contact sets	Min. 30dB
	Input power		1W (at 5GHz, impedance 50Ω, V.S.W.R. &1.25, at 20°C)
Expected life (min. operations)	Mechanical (at 180 cpm)		10^7
	Electrical (at 20cpm)	1W, at 5GHz, V.S.W.R. & 1.25	10^6
		10mA 10V DC (resistive load)	10^6

Coil (at 20°C, 68°F)

	Nominal operating power
Single side stable	200 mW
2 coil latching	150 mW

Characteristics

Initial insulation resistance*1		Min. 500 MΩ (at 500 V DC)
Initial breakdown voltage*2 for 1 min.	Between open contacts	500 Vrms
	Between contact sets	500 Vrms
	Between contact and coil	500 Vrms
	Between coil and earth terminal	500 Vrms
	Between contact and earth terminal	500 Vrms
Operate time [Set time]*3 (at 20°C)		Max. 5ms [Max. 5 ms]
Release time (without diode)[Reset time]*3 (at 20°C)		Max. 5ms [Max. 5 ms]
Temperature rise (at 20°C)*4		Max. 50°C
Shock resistance	Functional*5	Min. 500 m/s²
	Destructive*6	Min. 1,000 m/s²
Vibration resistance	Functional*7	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*8 (Not freezing and condensing at low temperature)	Ambient temp.	–30°C to 70°C –22°F to 158°F
	Humidity	5 to 85% R.H.
Unit weight		Approx. 3 g .11 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 Nominal operating voltage applied to the coil, excluding contact bounce time.
*4 By resistive method, nominal voltage applied to the coil, 5GHz, V.S.W.R. & 1.25
*5 Half-wave pulse of sine wave: 6ms, detection time: 10μs.
*6 Pulse of sine wave: 11ms.
*7 Detection time: 10μs
*8 Refer to 6. Conditions for operation, transport and storage conditions in NOTES (Page 20).

RJ (ARJ)

ORDERING INFORMATION

Ex. ARJ [2] [ ] [ ] [ ] [ ]

Contact arrangement	Operating function	Terminal shape	Coil voltage (DC)	Packing style
2: 2 Form C	0: Single side stable 2: 2 coil latching	Nil: Standard PC board terminal A: Surface-mount terminal	03 : 3V 4H: 4.5V 12 : 12V 24 : 24V	Nil: Carton packing X: Tape end reel packing (picked from 1/2/3-pin side) Z: Tape and reel packing (picked from 6/7/8-pin side)

Note: Tape and reel packing symbol "-Z" is not marked on the relay. "X" type tape and reel packing (picked from 1/2/3-pin side) is also available. Suffix "X" instead of "Z".

TYPES AND COIL DATA (at 20°C 68°F)

1. Standard PC board terminal

• Packing of standard PC board terminal: 50 pcs. in an inner package (carton); 500 pcs. in an outer package

Operating function	Coil Rating, V DC	Part No.	Pick-up voltage, V DC (max.) (initial)	Drop-out voltage, V DC (min.) (initial)	Nominal operating current, mA (±10%)	Coil resistance, Ω (±10%)	Nominal operating power, mW	Max. allowable voltage, V DC (at 70°C 158°F)
		Standard PC board terminal						
Single side stable	3	ARJ2003	2.25	0.3	66.6	45	200	3.3
	4.5	ARJ204H	3.375	0.45	44.4	101.2	200	4.95
	12	ARJ2012	9	1.2	16.6	720	200	13.2
	24	ARJ2024	18	2.4	8.3	2,880	200	26.4

Operating function	Coil Rating, V DC	Part No.	Set voltage, V DC (max.) (initial)	Reset voltage, V DC (min.) (initial)	Nominal operating current, mA (±10%)	Coil resistance, Ω (±10%)	Nominal operating power, mW	Max. allowable voltage, V DC (at 70°C 158°F)
		Standard PC board terminal						
2 coil latching	3	ARJ2203	2.25	2.25	50	60	150	3.3
	4.5	ARJ224H	3.375	3.375	33.3	135	150	4.95
	12	ARJ2212	9	9	12.5	960	150	13.2
	24	ARJ2224	18	18	6.3	3,840	150	26.4

2. Surface-mount terminal

• Packing of surface-mount terminal: 50 pcs. in an inner package (carton); 500 pcs. in an outer package

• Packing of surface-mount terminal: 500 pcs. in an inner package (tape and reel); 500 pcs. in an outer package

Operating function	Coil Rating, V DC	Part No.		Pick-up voltage, V DC (max.) (initial)	Drop-out voltage, V DC (min.) (initial)	Nominal operating current, mA (±10%)	Coil resistance, Ω (±10%)	Nominal operating power, mW	Max. allowable voltage, V DC (at 70°C 158°F)
		Carton packing	Tape and reel packing						
Single side stable	3	ARJ20A03	ARJ20A03Z	2.25	0.3	66.6	45	200	3.3
	4.5	ARJ20A4H	ARJ20A4HZ	3.375	0.45	44.4	101.2	200	4.95
	12	ARJ20A12	ARJ20A12Z	9	1.2	16.6	720	200	13.2
	24	ARJ20A24	ARJ20A24Z	18	2.4	8.3	2,880	200	26.4

Operating function	Coil Rating, V DC	Part No.		Set voltage, V DC (max.) (initial)	Reset voltage, V DC (min.) (initial)	Nominal operating current, mA (±10%)	Coil resistance, Ω (±10%)	Nominal operating power, mW	Max. allowable voltage, V DC (at 70°C 158°F)
		Carton packing	Tape and reel packing						
2 coil latching	3	ARJ22A03	ARJ22A03Z	2.25	2.25	50	60	150	3.3
	4.5	ARJ22A4H	ARJ22A4HZ	3.375	3.375	33.3	135	150	4.95
	12	ARJ22A12	ARJ22A12Z	9	9	12.5	960	150	13.2
	24	ARJ22A24	ARJ22A24Z	18	18	6.3	3,840	150	26.4

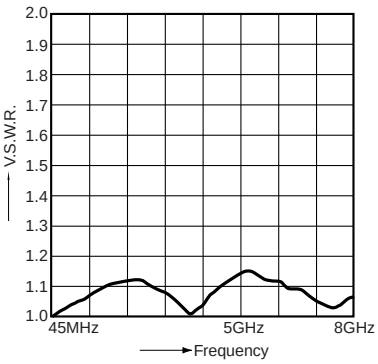
REFERENCE DATA

1. High frequency characteristics

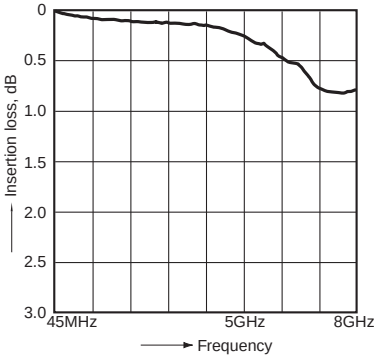
Sample: ARJ20A12

Measuring method: Measured with MEW PC board by HP network analyzer (HP8510C).

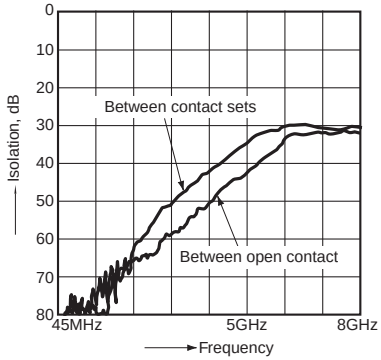
• V.S.W.R. characteristics



• Insertion loss characteristics (without D.U.T. board's loss)



• Isolation characteristics

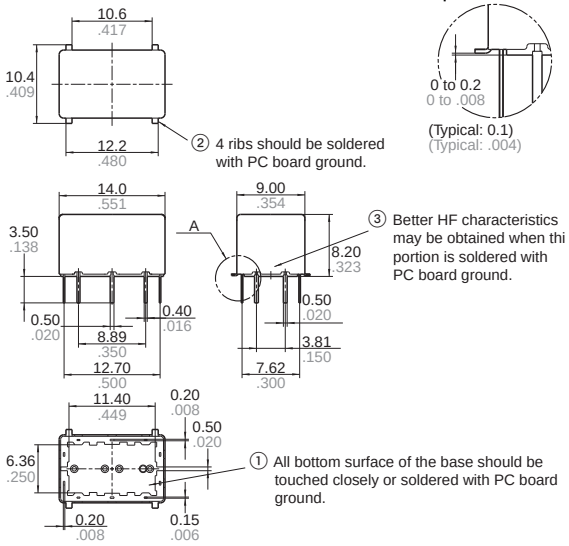


DIMENSIONS mm inch

Download CAD Data from our Web site.

1. Standard PC board terminal

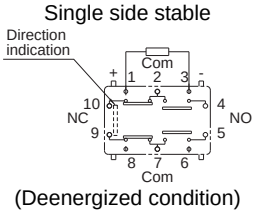
CAD Data



Expansion of A

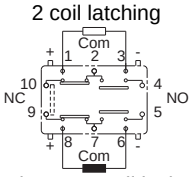
Schematic (Bottom view)

Single side stable



(Deenergized condition)

2 coil latching

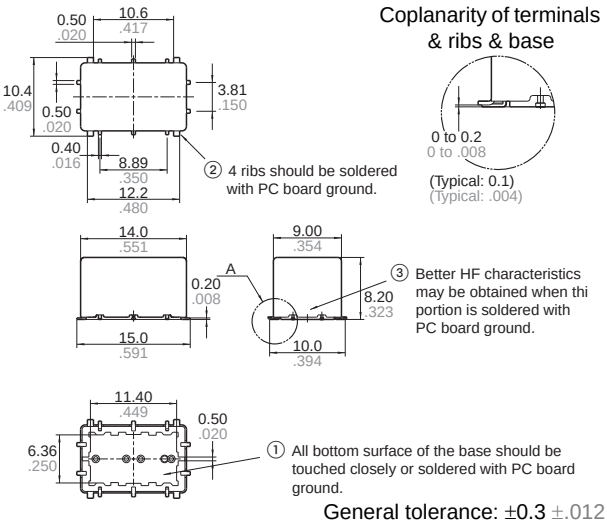


(Reset condition)

General tolerance: ±0.3 ±.012

2. Surface mount terminal

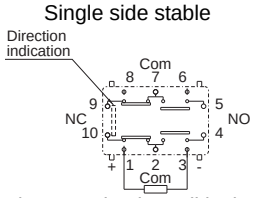
CAD Data



Expansion of A: Coplanarity of terminals & ribs & base

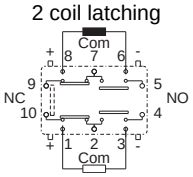
Schematic (Top view)

Single side stable



(Deenergized condition)

2 coil latching



(Reset condition)

General tolerance: ±0.3 ±.012

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 20 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

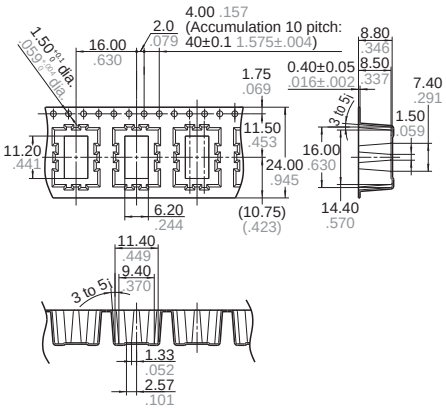
Since RJ relays are highly sensitive polarized relays, their characteristics will be affected by a strong external magnetic field. Avoid using the relay under that condition.

4. Cleaning

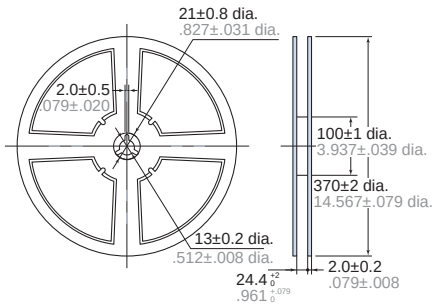
For automatic cleaning, the boiling method is recommended. Avoid ultrasonic cleaning which subjects the relays to high frequency vibrations, which may cause the contacts to stick.
It is recommended that alcoholic solvents be used.

5. Tape and reel packing

1) Tape dimensions

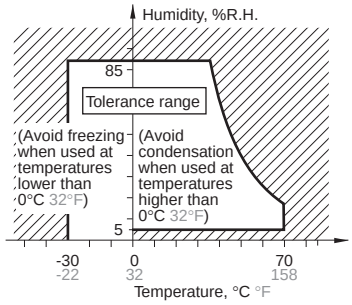


2) Dimensions of plastic reel



6. Conditions for operation, transport and storage conditions

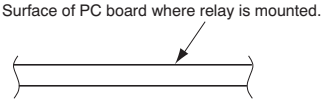
1) Ambient temperature, humidity, and atmospheric pressure during usage, transport, and storage of the relay:
(1) Temperature:
–30 to +70°C –22 to +158°F
(However, tolerance range is –30 to +60°C –22 to +140°F if package is carried as is.)
(2) Humidity: 5 to 85% RH
(Avoid freezing and condensation.)
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:



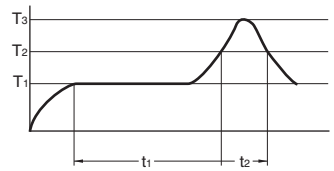
2) Condensation
Condensation forms when there is a sudden change in temperature under high temperature and high humidity conditions. Condensation will cause deterioration of the relay insulation.
3) Freezing
Condensation or other moisture may freeze on the relay when the temperature is lower than 0°C 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. Soldering

1) Surface-mount terminal
In case of automatic soldering, the following conditions should be observed
(1) Position of measuring temperature



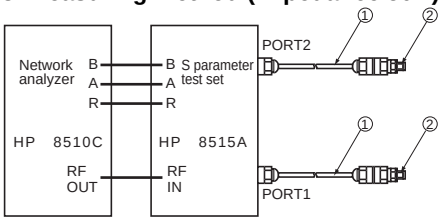
(2) IR (infrared reflow) soldering method



T_1 = 150 to 180C 302 to 356F t_1 = 60 to 120 sec.
T_2 = 230C 446F and higher t_2 = Within 30 sec.
T_3 = Within 250C 482F

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.
2) Standard PC board terminal
Please meet the following conditions if this relay is to be automatically soldered.
(1) Preheating: Max. 120°C 248°F (terminal solder surface) for max. 120 seconds
(2) Soldering: Max. 260±5°C 500±9°F for max. 6 seconds
The effect on the relay depends on the actual substrate used. Please verify the substrate to be used.
Moisture-proof packaging enables RJ relay's standard PCB type capable for reflow soldering.
Please contact us in the case of reflow soldering considerations.
3) Hand soldering
Please meet the following conditions if this relay is to be soldered by hand.
(1) Wattage: 30 to 60 W
(2) Tip temperature/time: 280 to 300°C 536 to 572°F for max. 5 seconds
The effect on the relay depends on the actual substrate used. Please verify the substrate to be used.
4) Avoid high frequency cleaning since this may adversely affect relay characteristics. Use alcohol-based cleaning solutions when cleaning relays.

8. Measuring method (Impedance 50Ω)



Connector

No.	Product name	Contents
1	HP 85131-60013	3.5 mm testport, Extension cable
2	HP 83059	3.5 mm coaxial adaptor

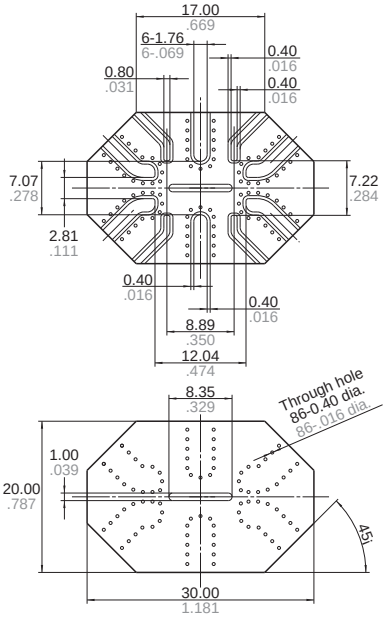
(Step 1) Calibrate the test system with HP calibration kit [HP85052B]
(Step 2) After calibration, connect the D.U.T. board and measure. Connect 50 Ω terminals on connectors other than those for measurement.

Notes)
1. All bottom surface of the base should be touched closely or soldered with PC board ground.
2. 4 ribs should be soldered with PC board ground.

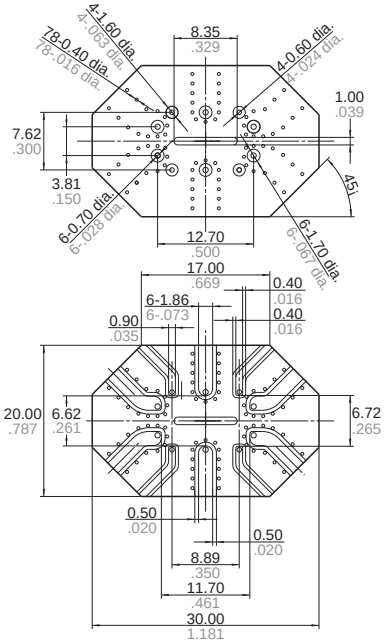
Measuring board

1) Dimensions

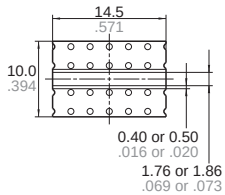
<Surface mount terminal>



<Standard PC board terminal>



<Calibration board>



2) Material: Glass PTFE double-sided through hole PC board R-4737 (Matsushita Electric Works)
3) Board thickness: t = 0.8 mm
4) Copper plating: 18μm
• Connector (SMA type receptacle)
Product name: R125 510 (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)

9. Others

1) The switching lifetime is defined under the standard test condition specified in the JIS* C 5442-1996 standard (temperature 15 to 35°C 59 to 95°F, humidity 25 to 75%). 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.
• When used for AC load-operating and the operating phase is synchronous.
Rocking and fusing can easily occur due to contact shifting.
• 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.
(1) Incorporate an arc-extinguishing circuit.
(2) Lower the operating frequency
(3) Lower the ambient humidity
2) Use the relay within specifications such as coil rating, contact rating and on/off service life. If used beyond limits, the relay may overheat, generate smoke or catch fire.
3) Be careful not to drop the relay. If accidentally dropped, carefully check its appearance and characteristics before use.
4) Be careful to wire the relay correctly. Otherwise, malfunction, overheat, fire or other trouble may occur.
5) If a relay stays on in a circuit for many months or years at a time without being activated, circuit design should be reviewed so that the relay can remain non-excited. A coil that receives current all the time heats, which degrades insulation earlier than expected. A latching type relay is recommended for such circuits.
6) The latching type relay is shipped in the reset position. But jolts during transport or impacts during installation can change the reset position. It is, therefore, advisable to build a circuit in which the relay can be initialized (set and reset) just after turning on the power.
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.
8) We recommend latching type when using in applications which involve lengthy duty cycles.

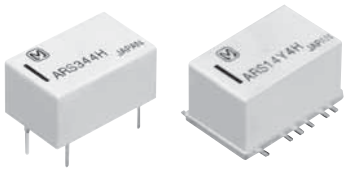
* Japanese Industrial Standards

For complete “Cautions for Use”, please download the “Relay Technical Information” from our Web site. For instructions on soldering, see page 66. For information on reliability, see page 64.

Panasonic
ideas for life

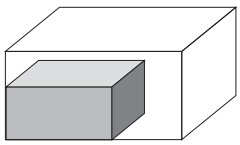
3 GHz microwave relays miniature size lineup includes 50/75 Ω type

RS RELAYS (ARS)



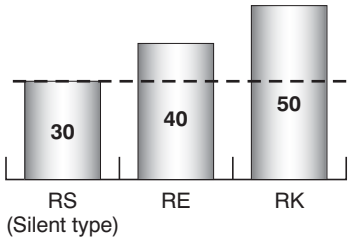
FEATURES

1. Super miniature design
14 × 8.6 × 7.2 mm .551 × .339 × .283 inch
(standard PC board terminal)



60% OFF in volume
(Compared to
RK relay)

2. Lineup includes silent type.
(75Ω type only)
Operation noise (Unit: dB)



3. Excellent high frequency characteristics

• Impedance: 50Ω
(Standard PC board terminal)

Frequency	to 900 MHz	to 3 GHz
V. S. W. R. (Max.)	1.20	1.40
Insertion loss (dB, Max.)	0.10	0.35
Isolation (dB, Min.)	60	35

• Impedance: 75Ω
(Standard PC board terminal)

Frequency	to 900 MHz	to 3 GHz
V. S. W. R. (Max.)	1.15	1.40
Insertion loss (dB, Max.)	0.10	0.30
Isolation (dB, Min.)	60	30

• Impedance: 50Ω
(Surface-mount terminal)

Frequency	to 900 MHz	to 3 GHz
V. S. W. R. (Max.)	1.20	1.40
Insertion loss (dB, Max.)	0.20	0.40
Isolation (dB, Min.)	55	30

• Impedance: 75Ω
(Surface-mount terminal)

Frequency	to 900 MHz	to 3 GHz
V. S. W. R. (Max.)	1.20	1.50
Insertion loss (dB, Max.)	0.20	0.50
Isolation (dB, Min.)	55	30

4. Lineup includes surface-mount terminal type
E and Y layouts available.

5. Lineup includes reversed contact type
Great design freedom is possible using reversed contact type in which the positions of the N.O. and N.C. contacts are switched.

TYPICAL APPLICATIONS

1. Broadcasting and video equipment markets
• Digital broadcasting equipment
• STB/tuner, etc.
2. Mobile phone base stations
3. Communications market
• Antenna switching
• All types of wireless devices
4. Measurement equipment market
• Spectrum analyzer and oscilloscope, etc.

ORDERING INFORMATION

ARS □ □ □ □ □ □

RS relays

Contact arrangement
1: Standard contact type (1 Form C)
3: Reversed contact type (1 Form C)

Operating function
0: Single side stable standard type (Impedance: 75Ω)
1: 1 coil latching type (Impedance: 75Ω)
2: 2 coil latching type (Impedance: 75Ω)
3: Single side stable silent type (Impedance: 75Ω)
4: Single side stable type (Impedance: 50Ω)
5: 1 coil latching type (Impedance: 50Ω)
6: 2 coil latching type (Impedance: 50Ω)

Nil: Standard PC board terminal
A: Surface-mount terminal, E layout
Y: Surface-mount terminal, Y layout

Coil voltage, DC
03: 3 V 4H: 4.5 V 09: 9 V 12: 12 V 24: 24 V

Packing style
Nil: Carton packing (Standard PC board terminal only)
Tube packing (Surface-mount terminal only)
X: Tape and reel packing (picked from 2-pin side) (Surface-mount terminal only)
Z: Tape and reel packing (picked from 18-pin side) (Surface-mount terminal only)

TYPES

1. Standard PC board terminal and standard contact type

Impedance	Nominal coil voltage	Part No.		
		Single side stable type	1 coil latching type	2 coil latching type
50Ω	3 V DC	ARS1403	ARS1503	ARS1603
	4.5 V DC	ARS144H	ARS154H	ARS164H
	9 V DC	ARS1409	ARS1509	ARS1609
	12 V DC	ARS1412	ARS1512	ARS1612
	24 V DC	ARS1424	ARS1524	ARS1624

Impedance	Nominal coil voltage	Part No.			
		Standard type			Silent type
		Single side stable type	1 coil latching type	2 coil latching type	Single side stable type
75Ω	3 V DC	ARS1003	ARS1103	ARS1203	ARS1303
	4.5 V DC	ARS104H	ARS114H	ARS124H	ARS134H
	9 V DC	ARS1009	ARS1109	ARS1209	ARS1309
	12 V DC	ARS1012	ARS1112	ARS1212	ARS1312
	24 V DC	ARS1024	ARS1124	ARS1224	ARS1324

Standard packing: 50 pcs. in an inner package; 500 pcs. in an outer package

2. Standard PC board terminal and reversed contact type

Impedance	Nominal coil voltage	Part No.		
		Single side stable type	1 coil latching type	2 coil latching type
50Ω	3 V DC	ARS3403	ARS3503	ARS3603
	4.5 V DC	ARS344H	ARS354H	ARS364H
	9 V DC	ARS3409	ARS3509	ARS3609
	12 V DC	ARS3412	ARS3512	ARS3612
	24 V DC	ARS3424	ARS3524	ARS3624

Impedance	Nominal coil voltage	Part No.			
		Standard type			Silent type
		Single side stable type	1 coil latching type	2 coil latching type	Single side stable type
75Ω	3 V DC	ARS3003	ARS3103	ARS3203	ARS3303
	4.5 V DC	ARS304H	ARS314H	ARS324H	ARS334H
	9 V DC	ARS3009	ARS3109	ARS3209	ARS3309
	12 V DC	ARS3012	ARS3112	ARS3212	ARS3312
	24 V DC	ARS3024	ARS3124	ARS3224	ARS3324

Standard packing: 50 pcs. in an inner package; 500 pcs. in an outer package

3. Surface-mount terminal and standard contact type, E layout

Impedance	Nominal coil voltage	Part No.		
		Single side stable type	1 coil latching type	2 coil latching type
50Ω	3 V DC	ARS14A03❑	ARS15A03❑	ARS16A03❑
	4.5 V DC	ARS14A4H❑	ARS15A4H❑	ARS16A4H❑
	9 V DC	ARS14A09❑	ARS15A09❑	ARS16A09❑
	12 V DC	ARS14A12❑	ARS15A12❑	ARS16A12❑
	24 V DC	ARS14A24❑	ARS15A24❑	ARS16A24❑
75Ω	3 V DC	ARS10A03❑	ARS11A03❑	ARS12A03❑
	4.5 V DC	ARS10A4H❑	ARS11A4H❑	ARS12A4H❑
	9 V DC	ARS10A09❑	ARS11A09❑	ARS12A09❑
	12 V DC	ARS10A12❑	ARS11A12❑	ARS12A12❑
	24 V DC	ARS10A24❑	ARS11A24❑	ARS12A24❑

Standard packing: 40 pcs. in an inner package (tube); 1,000 pcs. in an outer package
Standard packing: 500 pcs. in an inner package (tape and reel); 500 pcs. in an outer package
Note: The box at the end of a part number shows where packing type is indicated. If there is no indication, tube packing will be used.
If "X" or "Z" is added, tape and reel packing will be used. Example: ARS14A03 (tube packing), ARS14A03X (tape and reel packing)

4. Surface-mount terminal and standard contact type, Y layout

Impedance	Nominal coil voltage	Part No.		
		Single side stable type	1 coil latching type	2 coil latching type
50Ω	3 V DC	ARS14Y03❑	ARS15Y03❑	ARS16Y03❑
	4.5 V DC	ARS14Y4H❑	ARS15Y4H❑	ARS16Y4H❑
	9 V DC	ARS14Y09❑	ARS15Y09❑	ARS16Y09❑
	12 V DC	ARS14Y12❑	ARS15Y12❑	ARS16Y12❑
	24 V DC	ARS14Y24❑	ARS15Y24❑	ARS16Y24❑
75Ω	3 V DC	ARS10Y03❑	ARS11Y03❑	ARS12Y03❑
	4.5 V DC	ARS10Y4H❑	ARS11Y4H❑	ARS12Y4H❑
	9 V DC	ARS10Y09❑	ARS11Y09❑	ARS12Y09❑
	12 V DC	ARS10Y12❑	ARS11Y12❑	ARS12Y12❑
	24 V DC	ARS10Y24❑	ARS11Y24❑	ARS12Y24❑

Standard packing: 40 pcs. in an inner package (tube); 1,000 pcs. in an outer package
Standard packing: 500 pcs. in an inner package (tape and reel); 500 pcs. in an outer package
Note: The box at the end of a part number shows where packing type is indicated. If there is no indication, tube packing will be used.
If "X" or "Z" is added, tape and reel packing will be used. Example: ARS14Y03 (tube packing), ARS14Y03X (tape and reel packing)

5. Surface-mount terminal and reversed contact type, E layout

Impedance	Nominal coil voltage	Part No.		
		Single side stable type	1 coil latching type	2 coil latching type
50Ω	3 V DC	ARS34A03❑	ARS35A03❑	ARS36A03❑
	4.5 V DC	ARS34A4H❑	ARS35A4H❑	ARS36A4H❑
	9 V DC	ARS34A09❑	ARS35A09❑	ARS36A09❑
	12 V DC	ARS34A12❑	ARS35A12❑	ARS36A12❑
	24 V DC	ARS34A24❑	ARS35A24❑	ARS36A24❑
75Ω	3 V DC	ARS30A03❑	ARS31A03❑	ARS32A03❑
	4.5 V DC	ARS30A4H❑	ARS31A4H❑	ARS32A4H❑
	9 V DC	ARS30A09❑	ARS31A09❑	ARS32A09❑
	12 V DC	ARS30A12❑	ARS31A12❑	ARS32A12❑
	24 V DC	ARS30A24❑	ARS31A24❑	ARS32A24❑

Standard packing: 40 pcs. in an inner package (tube); 1,000 pcs. in an outer package
Standard packing: 500 pcs. in an inner package (tape and reel); 500 pcs. in an outer package
Note: The box at the end of a part number shows where packing type is indicated. If there is no indication, tube packing will be used.
If "X" or "Z" is added, tape and reel packing will be used. Example: ARS34A03 (tube packing), ARS34A03X (tape and reel packing)

6. Surface-mount terminal and reversed contact type, Y layout

Impedance	Nominal coil voltage	Part No.		
		Single side stable type	1 coil latching type	2 coil latching type
50Ω	3 V DC	ARS34Y03❑	ARS35Y03❑	ARS36Y03❑
	4.5 V DC	ARS34Y4H❑	ARS35Y4H❑	ARS36Y4H❑
	9 V DC	ARS34Y09❑	ARS35Y09❑	ARS36Y09❑
	12 V DC	ARS34Y12❑	ARS35Y12❑	ARS36Y12❑
	24 V DC	ARS34Y24❑	ARS35Y24❑	ARS36Y24❑
75Ω	3 V DC	ARS30Y03❑	ARS31Y03❑	ARS32Y03❑
	4.5 V DC	ARS30Y4H❑	ARS31Y4H❑	ARS32Y4H❑
	9 V DC	ARS30Y09❑	ARS31Y09❑	ARS32Y09❑
	12 V DC	ARS30Y12❑	ARS31Y12❑	ARS32Y12❑
	24 V DC	ARS30Y24❑	ARS31Y24❑	ARS32Y24❑

Standard packing: 40 pcs. in an inner package (tube); 1,000 pcs. in an outer package
Standard packing: 500 pcs. in an inner package (tape and reel); 500 pcs. in an outer package
Note: The box at the end of a part number shows where packing type is indicated. If there is no indication, tube packing will be used.
If "X" or "Z" is added, tape and reel packing will be used. Example: ARS34Y03 (tube packing), ARS34Y03X (tape and reel packing)

RATING

1. Coil data

1) Single side stable type

Nominal coil voltage	Pick-up voltage (at 20°C 68°F)	Drop-out voltage (at 20°C 68°F)	Nominal operating current [±10%] (at 20°C 68°F)	Coil resistance [±10%] (at 20°C 68°F)	Nominal operating power	Max. allowable voltage (at 60°C 140°F)
3 V DC	75%V or less of nominal voltage (Initial)	10%V or more of nominal voltage (Initial)	66.7 mA	45 Ω	200 mW	110%V or less of nominal voltage
4.5 V DC			44.4 mA	101.3Ω		
9 V DC			22.2 mA	405 Ω		
12 V DC			16.7 mA	720 Ω		
24 V DC			8.3 mA	2,880 Ω		

2) 1 coil latching type

Nominal coil voltage	Set voltage (at 20°C 68°F)	Reset voltage (at 20°C 68°F)	Nominal operating current [±10%] (at 20°C 68°F)	Coil resistance [±10%] (at 20°C 68°F)	Nominal operating power	Max. allowable voltage (at 60°C 140°F)
3 V DC	75%V or less of nominal voltage (Initial)	75%V or less of nominal voltage (Initial)	66.7 mA	45 Ω	200 mW	110%V or less of nominal voltage
4.5 V DC			44.4 mA	101.3Ω		
9 V DC			22.2 mA	405 Ω		
12 V DC			16.7 mA	720 Ω		
24 V DC			8.3 mA	2,880 Ω		

3) 2 coil latching type

Nominal coil voltage	Set voltage (at 20°C 68°F)	Reset voltage (at 20°C 68°F)	Nominal operating current [±10%] (at 20°C 68°F)	Coil resistance [±10%] (at 20°C 68°F)	Nominal operating power	Max. allowable voltage (at 60°C 140°F)
3 V DC	75%V or less of nominal voltage (Initial)	75%V or less of nominal voltage (Initial)	133.3 mA	22.5Ω	400 mW	110%V or less of nominal voltage
4.5 V DC			88.9 mA	50.6Ω		
9 V DC			44.4 mA	202.5Ω		
12 V DC			33.3 mA	360 Ω		
24 V DC			16.7 mA	1,440 Ω		

2. Specifications

Item			Specifications
Contact	Arrangement		1 Form C
	Contact material		Gold plating
	Contact resistance (Initial)		Max. 100 mΩ (By voltage drop 10 V AC 10mA)
Rating	Nominal switching capacity		1W (at 3 GHz, Impedance: 50/75Ω, V.S.W.R.: Max. 1.4), 10 mA 24 V DC (resistive load)
	Contact carrying power		Max. 10W (at 3GHz, Impedance: 50/75Ω, V.S.W.R.: Max. 1.4)
	Max. switching voltage		30 V DC
	Max. switching current		0.5 A DC
	Nominal operating power	Single side stable type	200mW
		1 coil latching type	200mW
		2 coil latching type	400mW
High frequency characteristics, Impedance: 50Ω (Initial)	V.S.W.R.		Max. 1.20/900MHz, Max. 1.40/3GHz (Standard PC board terminal) Max. 1.20/900MHz, Max. 1.40/3GHz (Surface-mount terminal)
	Insertion loss (without D.U.T. board's loss)		Max. 0.10dB/900MHz, Max. 0.35dB/3GHz (Standard PC board terminal) Max. 0.20dB/900MHz, Max. 0.40dB/3GHz (Surface-mount terminal)
	Isolation		Min. 60dB/900MHz, Min. 35dB/3GHz (Standard PC board terminal) Min. 55dB/900MHz, Min. 30dB/3GHz (Surface-mount terminal)
High frequency characteristics, Impedance: 75Ω (Initial)	V.S.W.R.		Max. 1.15/900MHz, Max. 1.40/3GHz (Standard PC board terminal) Max. 1.20/900MHz, Max. 1.50/3GHz (Surface-mount terminal)
	Insertion loss (without D.U.T. board's loss)		Max. 0.10dB/900MHz, Max. 0.30dB/3GHz (Standard PC board terminal) Max. 0.20dB/900MHz, Max. 0.50dB/3GHz (Surface-mount terminal)
	Isolation		Min. 60dB/900MHz, Min. 30dB/3GHz (Standard PC board terminal) Min. 55dB/900MHz, Min. 30dB/3GHz (Surface-mount terminal)
Electrical characteristics	Insulation resistance (Initial)		Min. 100MΩ (at 500V DC, Measurement at same location as "Breakdown voltage" section.)
	Breakdown voltage (Initial)	Between open contacts	500 Vrms for 1min. (Detection current: 10mA)
		Between contact and earth terminal	500 Vrms for 1min. (Detection current: 10mA)
		Between contact and coil	1,000 Vrms for 1min. (Detection current: 10mA)
	Temperature rise (at 20°C 68°F)		Max. 60°C 140°F (By resistive method, nominal voltage applied to the coil, contact carrying current: 10mA)
	Operate time (at 20°C 68°F)		Max. 10 ms (Nominal voltage applied to the coil, excluding contact bounce time)
	Release time (at 20°C 68°F)		Max. 6 ms (Nominal voltage applied to the coil, excluding contact bounce time) (without diode)
	Set time and Reset time (at 20°C 68°F)		Max. 10 ms (Nominal voltage applied to the coil, excluding contact bounce time)
Mechanical characteristics	Shock resistance	Functional	Min. 196 m/s² (Half-wave pulse of sine wave: 11 ms, detection time: 10μs)
		Destructive	Min. 980 m/s² (Half-wave pulse of sine wave: 6 ms)
	Vibration resistance	Functional	10 to 55 Hz at double amplitude of 3 mm (Detection time: 10μs)
		Destructive	10 to 55 Hz at double amplitude of 5 mm
Operation noise*	Standard type		Approx. 40dB
	Silent type (75Ω, PC board terminal type only)		Approx. 30dB
Expected life	Mechanical life	Single side stable standard type	Min. 5×10^6 (at 180 cpm)
		Single side stable silent type	Min. 10^6 (at 180 cpm)
		Latching type	Min. 10^6 (at 180 cpm)
	Electrical life	50Ω type	Min. 10^6 (Standard PC board terminal), Min. 3×10^5 (Surface-mount terminal) (10V DC 10mA resistive load)/Min. 3×10^5 (24V DC 10mA resistive load) Min. 10^6 (Standard PC board terminal), Min. 3×10^5 (Surface-mount terminal) (1W, at 3GHz, Impedance: 50Ω, V.S.W.R: Max. 1.4) (at 20 cpm)
		75Ω type	Min. 3×10^5 (10mA 24V DC resistive load) Min. 3×10^5 (1W, at 3GHz, Impedance: 75Ω, V.S.W.R: Max. 1.4) (at 20 cpm)
Conditions	Conditions for operation, transport and storage		Ambient temperature: –40 to 70°C –40°F to 158°F (Single side stable standard and Latching type) Ambient temperature: –40 to 60°C –40°F to 140°F (Single side stable silent type) Humidity: 5 to 85% R.H. (Not freezing and condensing at low temperature)
Unit weight			Approx. 2 g .071 oz

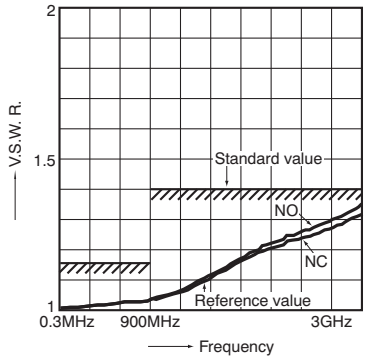
* Measured the operation noise of the relay alone (with diodes at both ends of the coil) 30cm away from top side, by the A-weighted, FAST method while applying the rated voltage.
(Reference) Operation noise of RK relay (existing model): Approx. 50dB

REFERENCE DATA

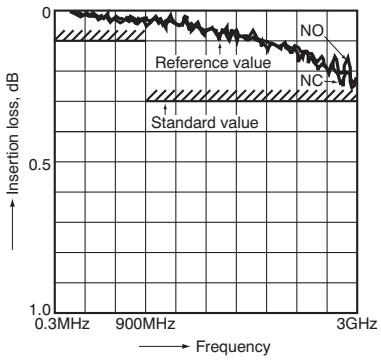
1.-(1) High frequency characteristics (Impedance: 50Ω, Standard PC board terminal)

Sample: ARS144H; Measuring method: Measured with Agilent Technologies network analyzer (E8363B). *For details see No. 7 under “NOTES”.

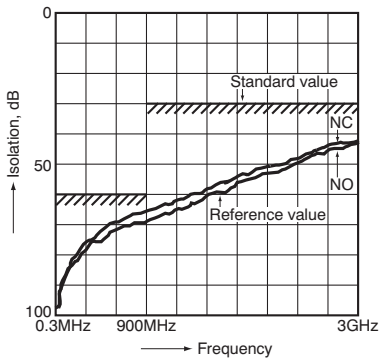
• V.S.W.R. characteristics



• Insertion loss characteristics (without D.U.T. board’s loss)



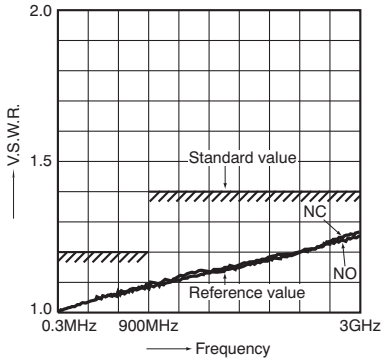
• Isolation characteristics



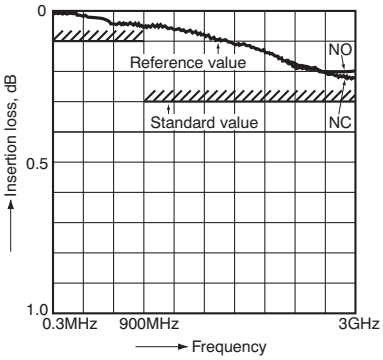
1.-(2) High frequency characteristics (Impedance: 75Ω, Standard PC board terminal)

Sample: ARS104H; Measuring method: Measured with Agilent Technologies network analyzer (E8363B). *For details see No. 7 under “NOTES”.

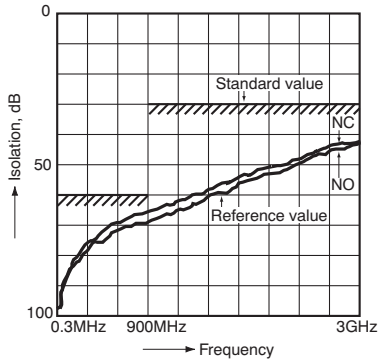
• V.S.W.R. characteristics



• Insertion loss characteristics (without D.U.T. board’s loss)



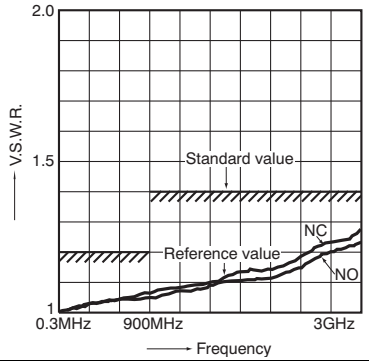
• Isolation characteristics



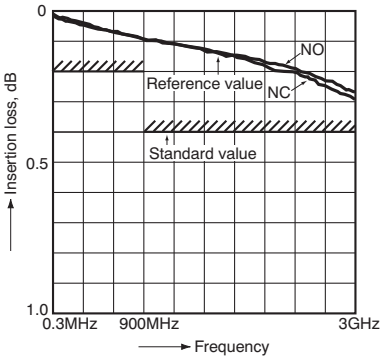
1.-(3) High frequency characteristics (Impedance: 50Ω, Surface-mount terminal)

Sample: ARS14A4H; Measuring method: Measured with Agilent Technologies network analyzer (E8363B). *For details see No. 7 under “NOTES”.

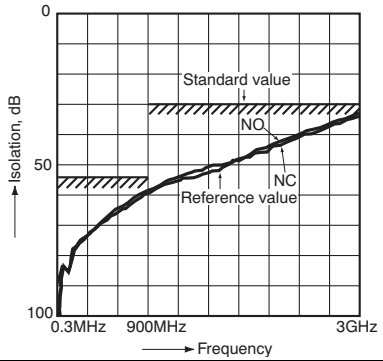
• V.S.W.R. characteristics



• Insertion loss characteristics (without D.U.T. board’s loss)



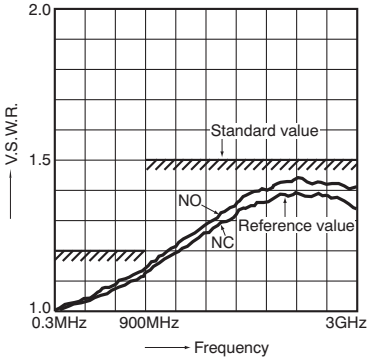
• Isolation characteristics



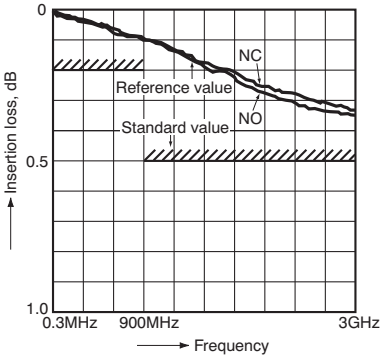
1.-(4) High frequency characteristics (Impedance: 75Ω, Surface-mount terminal)

Sample: ARS10A4H; Measuring method: Measured with Agilent Technologies network analyzer (E8363B). *For details see No. 7 under “NOTES”.

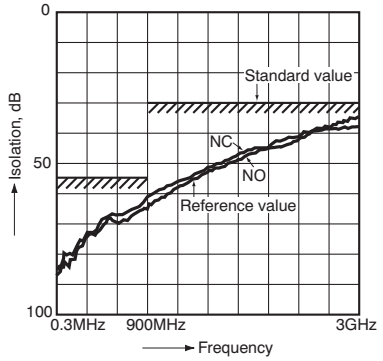
• V.S.W.R. characteristics



• Insertion loss characteristics (without D.U.T. board’s loss)

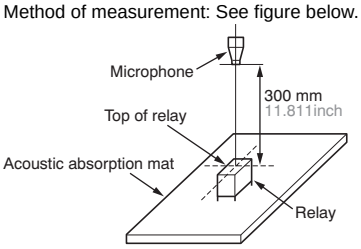


• Isolation characteristics

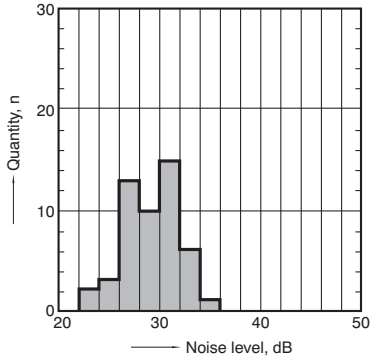


2.-(1) Operation noise distribution

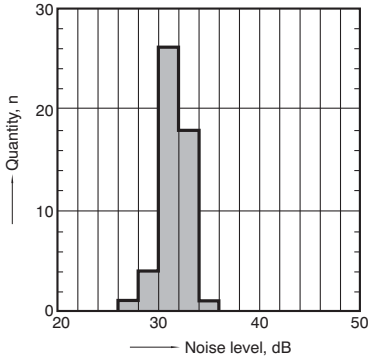
Sample: ARS134H (single side stable silent type), 50 pcs.
Coil voltage: rated voltage applied (with diode)
Equipment setting: A weighted sound pressure level, FAST.
Background noise: approx. 20 dB
Method of measurement: See figure below.



When operated

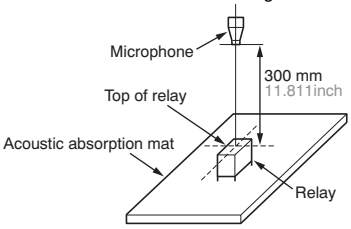


When released

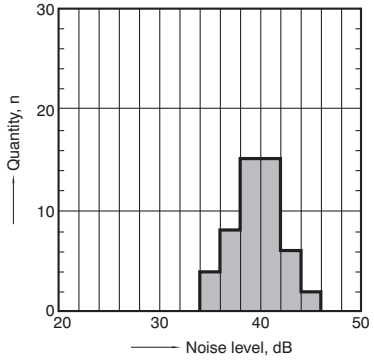


2.-(2) Operation noise distribution

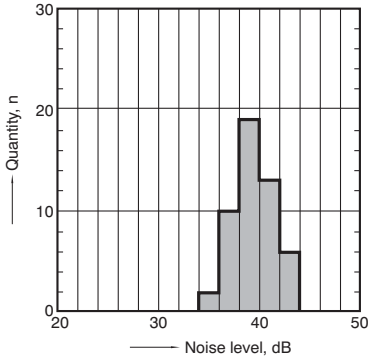
Sample: ARS104H (single side stable standard type), 50 pcs.
Coil voltage: rated voltage applied (with diode)
Equipment setting: A weighted sound pressure level, FAST.
Background noise: approx. 20 dB
Method of measurement: See figure below.



When operated

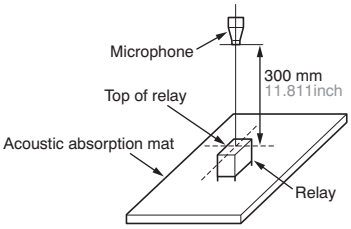


When released

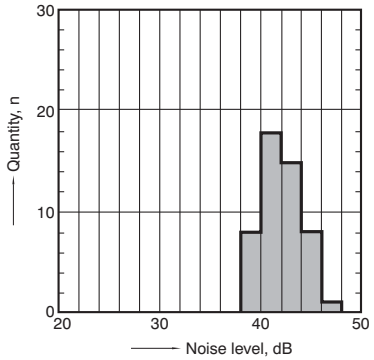


2.-(3) Operation noise distribution

Sample: ARS114H (latching type), 50 pcs.
Coil voltage: rated voltage applied (with diode)
Equipment setting: A weighted sound pressure level, FAST.
Background noise: approx. 20 dB
Method of measurement: See figure below.



When set and reset



DIMENSIONS (mm inch)

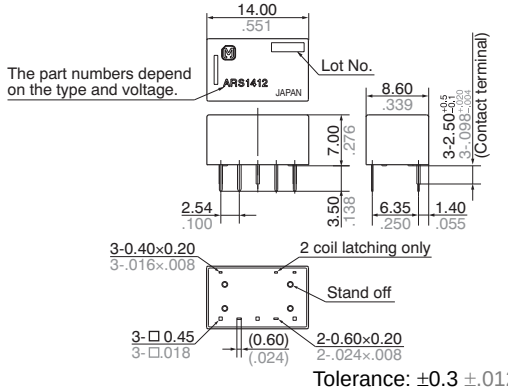
Download CAD Data from our Web site.

<Standard PC board terminal>

1. 50Ω type

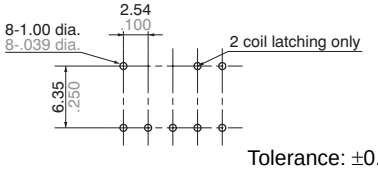
CAD Data

External dimensions



Tolerance: ±0.3 ±.012

PC board pattern (Bottom view)



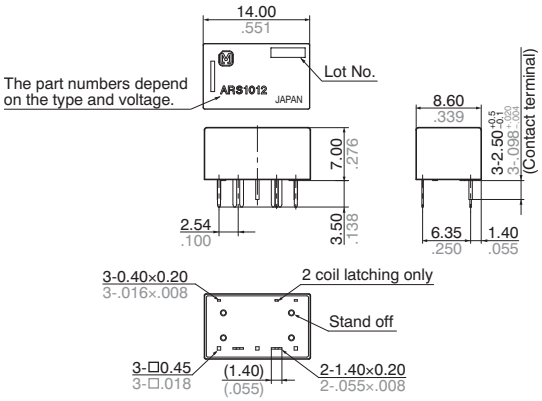
Tolerance: ±0.1 ±.004

RS

2. 75Ω type

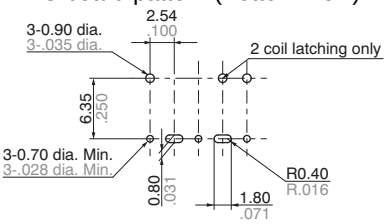
CAD Data

External dimensions



Tolerance: ±0.3 ±.012

PC board pattern (Bottom view)

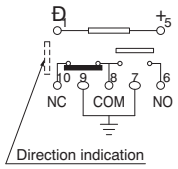


Tolerance: ±0.1 ±.004

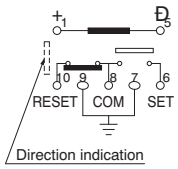
Schematic (Bottom view)

1. Standard contact type

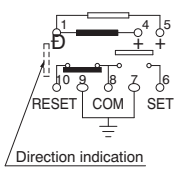
Single side stable type (Deenergized condition)



1 coil latching type (Reset condition)

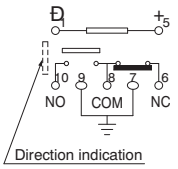


2 coil latching type (Reset condition)

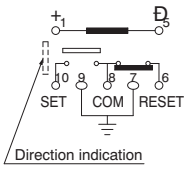


2. Reversed contact type

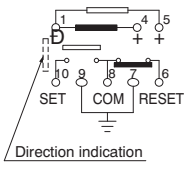
Single side stable type (Deenergized condition)



1 coil latching type (Reset condition)



2 coil latching type (Reset condition)



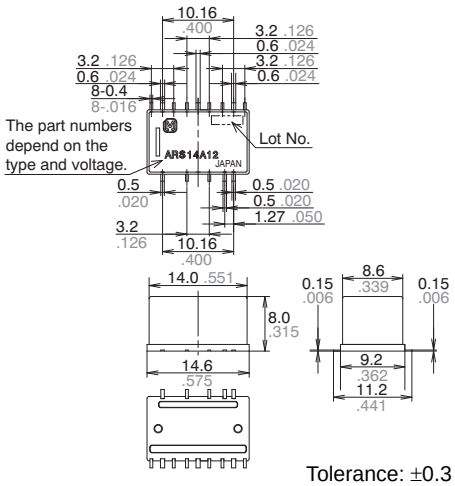
<Surface-mount terminal>

1. Impedance: 50Ω type

1) E layout

CAD Data

External dimensions

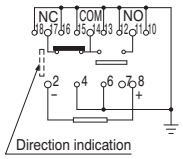


Tolerance: ±0.3 ±.012

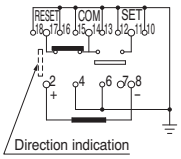
Schematic (Top view)

<Standard contact type>

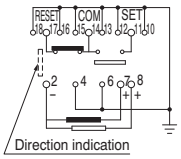
Single side stable type (Deenergized condition)



1 coil latching type (Reset condition)

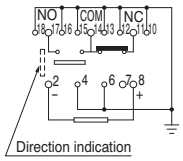


2-coil latching type (Reset condition)

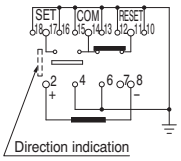


<Reversed contact type>

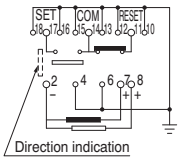
Single side stable type (Deenergized condition)



1 coil latching type (Reset condition)



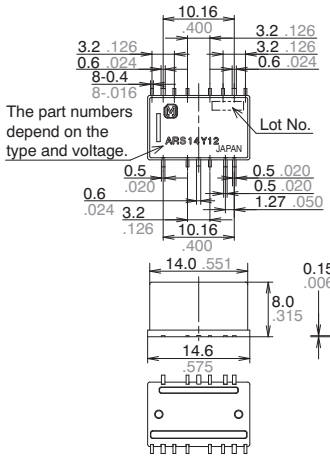
2-coil latching type (Reset condition)



2) Y layout

CAD Data

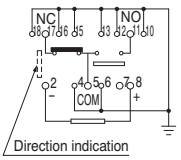
External dimensions



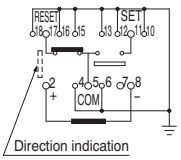
Schematic (Top view)

<Standard contact type>

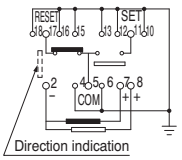
Single side stable type (Deenergized condition)



1 coil latching type (Reset condition)

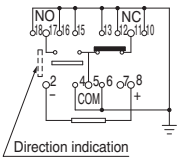


2-coil latching type (Reset condition)

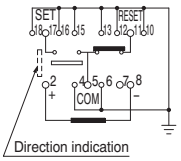


<Reversed contact type>

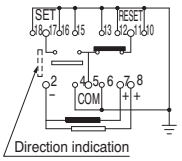
Single side stable type (Deenergized condition)



1 coil latching type (Reset condition)



2-coil latching type (Reset condition)



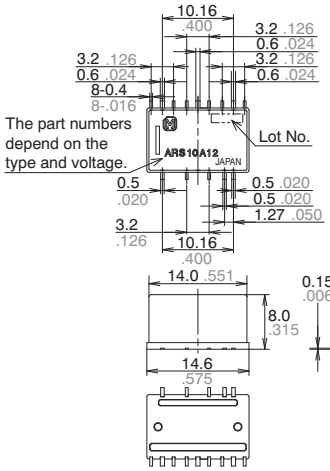
Tolerance: ±0.3 ±.012

2. Impedance: 75Ω type

1) E layout

CAD Data

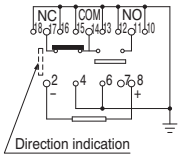
External dimensions



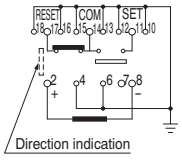
Schematic (Top view)

<Standard contact type>

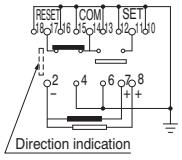
Single side stable type (Deenergized condition)



1 coil latching type (Reset condition)

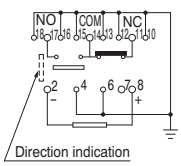


2-coil latching type (Reset condition)

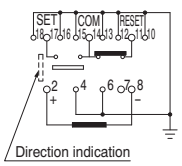


<Reversed contact type>

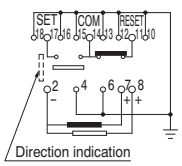
Single side stable type (Deenergized condition)



1 coil latching type (Reset condition)



2-coil latching type (Reset condition)

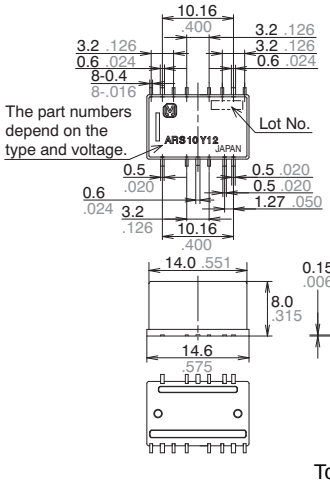


Tolerance: ±0.3 ±.012

2) Y layout

CAD Data

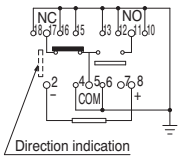
External dimensions



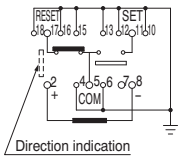
Schematic (Top view)

<Standard contact type>

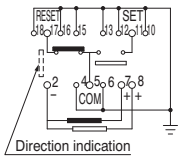
Single side stable type (Deenergized condition)



1 coil latching type (Reset condition)

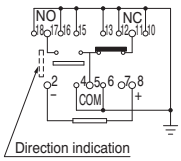


2-coil latching type (Reset condition)

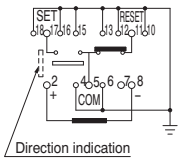


<Reversed contact type>

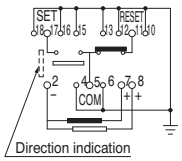
Single side stable type (Deenergized condition)



1 coil latching type (Reset condition)



2-coil latching type (Reset condition)



Tolerance: ±0.3 ±.012

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 30 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 RS 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

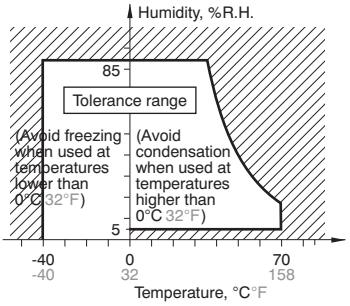
For automatic cleaning, the boiling method is recommended. Avoid ultrasonic cleaning which subjects the relays to high frequency vibrations, which may cause the contacts to stick.
It is recommended that alcoholic solvents be used.

5. Conditions for operation, transport and storage conditions

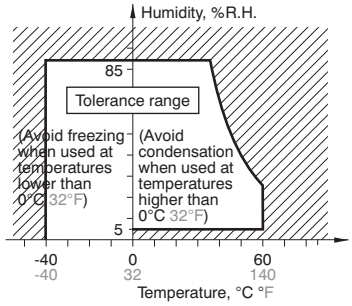
1) Temperature
- Single side stable standard and latching type: –40 to 70°C –40 to 158°F
- Single side stable silent type: –40 to 60°C –40 to 140°F

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:
Single side stable standard and latching type



Single side stable silent type



4) 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.

5) 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.

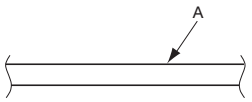
6) Low temperature, low humidity environments
The plastic becomes brittle if the relay is exposed to a low temperature, low humidity environment for long periods of time.

7) Storage requirements
Since the relay is sensitive to humidity, the surface-mount type is packaged with tightly sealed anti-humidity packaging. However, when storing, please be careful of the following.
(1) Please use promptly once the anti-humidity pack is opened.
If relays are left as is after unpacking, they will absorb moisture which will result in loss of air tightness as a result of case expansion due to thermal stress when reflow soldering during the mounting process. (within one day, 30°C and 60%R.H or less)
(2) When storing for a log period after opening the anti-humidity pack, storage in anti-humidity packaging with an anti-humidity bag to which silica gel has been added, is recommended.
*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.

6. Soldering

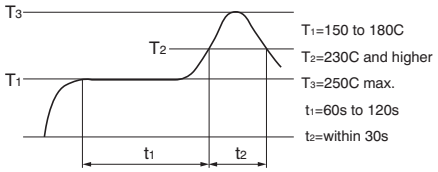
1) Please meet the following conditions if this relay is to be automatically soldered.
(1) Preheating: Max. 120°C 248°F (terminal solder surface) for max. 120 seconds
(2) Soldering: Max. 260±5°C 500±9°F for max. 6 seconds
*Relays are influenced by the type of PC board used. Please confirm with the actual PC board you plan to use.
*Please avoid reflow soldering.

2) Surface-mount terminal
In case of automatic soldering, the following conditions should be observed
(1) Position of measuring temperature



A: Surface of PC board where relay is mounted.

(2) IR (infrared reflow) soldering method

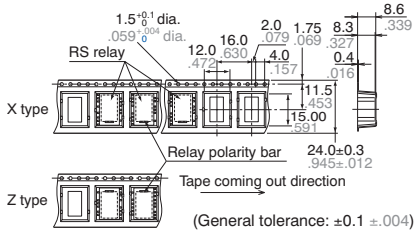


• Mounting cautions
Rise in relay temperature depends greatly on the component mix on a given PC board and the heating method of the reflow equipment. Therefore, please test beforehand using actual equipment to ensure that the temperature where the relay terminals are soldered and the temperature at the top of the relay case are within the conditions given above.

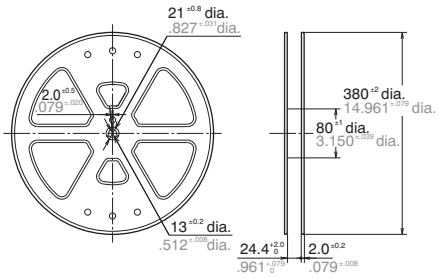
3) Please meet the following conditions if this relay is to be soldered by hand.
(1) 260°C 500°F for max. 10 seconds
(2) 350°C 662°F for max. 3 seconds
The effect on the relay depends on the actual substrate used. Please verify the substrate to be used.
(3) Avoid ultrasonic cleaning. Doing so will adversely affect relay characteristics. Please use alcohol-based cleaning solvents when cleaning relays.

7. Tape and reel packing

1) Tape dimensions

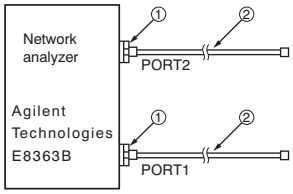


2) Dimensions of plastic reel



8. Measuring method

1) 50Ω type



Connect connectors 1 and 2 respectively to PORT 1 and PORT 2. Perform calibration using the 3.5 mm calibration kit (HP85052B).

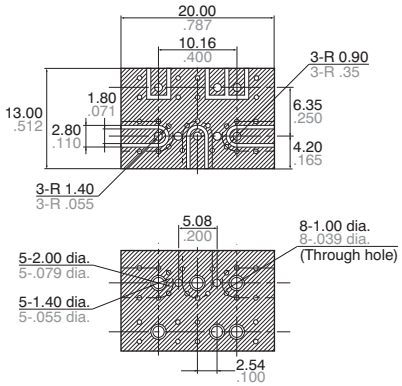
No.	Product name	Contents
1	Agilent 85130-60011	Adapter 2.4mm-3.5mm female .095inch-.138inch female
2	SUHNER SUCOFLEX104	Cable 3.5mm-3.5mm male .138inch-.138inch male

After calibration, connect the D.U.T. board and measure. However, connectors other than those for measurement should be connected with a 50Ω termination resistor.

<Standard PC board terminal>

PC board

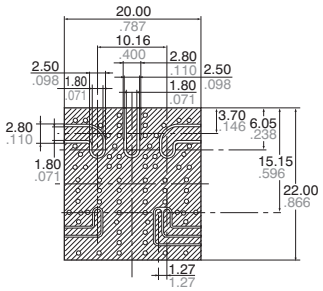
Dimensions (mm inch)



<Surface-mount terminal and E layout>

PC board

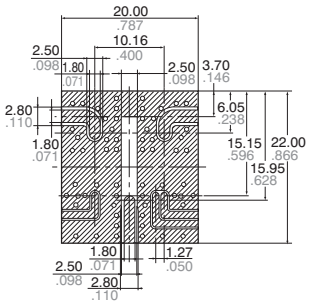
Dimensions (mm inch)



<Surface-mount terminal and Y layout>

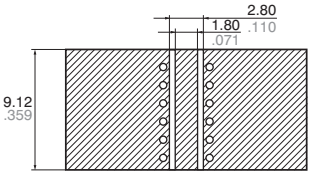
PC board

Dimensions (mm inch)



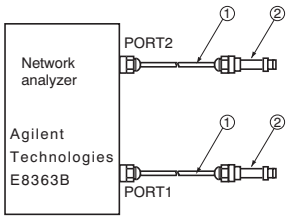
PC board for correction

Dimensions (mm inch)



Material: Glass PTFE double-sided through hole PC board R-4737 (Matsushita Electric Works)
Board thickness: t = 0.8 mm .031 inch
Copper plating: 18 μm
Connector (SMA type receptacle)
Product name: 01K1808-00 (Waka Manufacturing Co., Ltd.)
Insertion loss compensation
The insertion loss of relay itself is given by subtracting the insertion loss of shortcircuit the Com and the NC (or NO). (signal path and two connectors)

2) 75Ω type



Connect connectors 1 and 2 respectively to PORT 1 and PORT 2, and then perform calibration using the 75Ω F type.

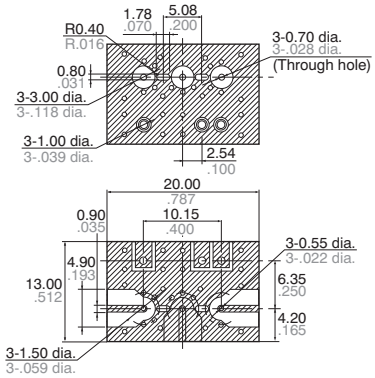
No.	Product name	Contents
1	85134-60003	Test port cable
2	11852B	Conversion adapter; 50Ω N type (female) to 75Ω N type (male)
2	85039-60011	Conversion adapter; 75Ω N type (female) to 75Ω F type (male)

After calibration, connect the D.U.T. board and measure. However, connectors other than those for measurement should be connected with a 75Ω termination resistor.

<Standard PC board terminal>

PC board

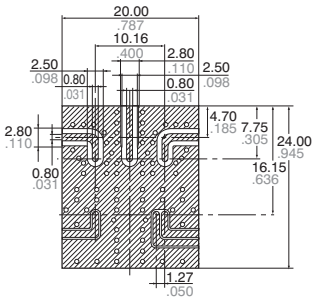
Dimensions (mm inch)



<Surface-mount terminal and E layout>

PC board

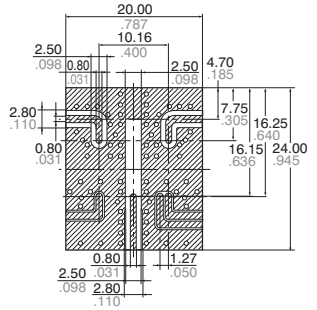
Dimensions (mm inch)



<Surface-mount terminal and Y layout>

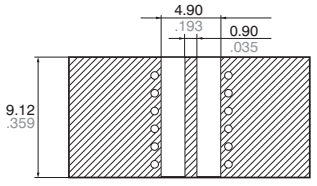
PC board

Dimensions (mm inch)



PC board for correction

Dimensions (mm inch)



Material: Glass PTFE double-sided through hole PC board R-4737 (Matsushita Electric Works)
Board thickness: t = 0.8 mm .031 inch
Copper plating: 18μm
Connector (F type receptacle)
Product name: C05-0236 (Komine Musen Electric Corporation)

Insertion loss compensation
The insertion loss of relay itself is given by subtracting the insertion loss of shortcircuit the COM and the NC (or NO). (signal path and two connectors)

9. Others

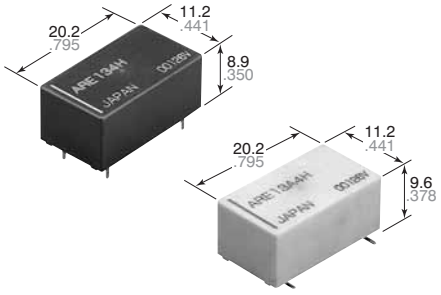
1) The switching lifetime is defined under the standard test condition specified in the JIS* C 5442 standard (temperature 15 to 35°C 59 to 95°F, humidity 25 to 75%). Check this with the real device as it is affected by coil driving circuit, load type, activation frequency, activation phase, ambient conditions and other factors.
Also, be especially careful of loads such as those listed below.
• When used for AC load-operating and the operating phase is synchronous, rocking and fusing can easily occur due to contact shifting.
• 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.
(1) Incorporate an arc-extinguishing circuit.
(2) Lower the operating frequency
(3) Lower the ambient humidity
2) Use the relay within specifications such as coil rating, contact rating and on/off service life. If used beyond limits, the relay may overheat, generate smoke or catch fire.
3) Be careful not to drop the relay. If accidentally dropped, carefully check its appearance and characteristics before use.
4) Be careful to wire the relay correctly. Otherwise, malfunction, overheat, fire or other trouble may occur.
5) If a relay stays on in a circuit for many months or years at a time without being activated, circuit design should be reviewed so that the relay can remain non-excited. A coil that receives current all the time heats, which degrades insulation earlier than expected. A latching type relay is recommended for such circuits.
6) To ensure accurate operation of the latching type amidst surrounding temperature changes and other factors that might affect the set and reset pulse times, we recommend a coil impress set and reset pulse width of at least 30 ms at the rated operation voltage.
7) The latching type relay is shipped in the reset position. But jolts during transport or impacts during installation can change the reset position. It is, therefore, advisable to build a circuit in which the relay can be initialized (set and reset) just after turning on the power.
8) 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.

For complete “Cautions for Use”, please download the “Relay Technical Information” from our Web site. For instructions on soldering, see page 66. For information on reliability, see page 64.

Panasonic
ideas for life

2.6 GHz small microwave relays

RE RELAYS (ARE)



mm inch

FEATURES

• Excellent high frequency characteristics (to 2.6GHz)

Type	Frequency	900MHz	2.6GHz
Impedance 50Ω	V.S.W.R. (Max.)	1.3	1.7
	Insertion loss (dB, Max.)	0.2	0.7
	Isolation (dB, Min.)	60	30
Impedance 75Ω	V.S.W.R. (Max.)	1.2	1.5
	Insertion loss (dB, Max.)	0.2	0.5
	Isolation (dB, Min.)	60	30

• Surface-mount type also available

• Compact and slim size

Size: 20.2(L) × 11.2(W) × 8.9(H)* mm
.795(L) × .441(W) × .350(H) inch
*The height of Surface-mount type is 9.6 mm .378 inch size.

TYPICAL APPLICATIONS

1. Broadcasting and video markets.
• Digital broadcasting market
• STB/tuner market, etc.

2. Communications market
• Antennae switching
• All types of wireless devices

SPECIFICATIONS

Contact

Arrangement			1 Form C
Contact material			Gold plating
Initial contact resistance (By voltage drop 10V DC 10mA)			Max. 100mΩ
Rating	Contact rating		1W (at 2.6 GHz [Impedance 75 Ω, V.S.W.R. Max.1.5] [Impedance 50 Ω, V.S.W.R. Max.1.7]) 10mA 24V DC (resistive load)
	Contact carrying power		10W (at 2.6GHz [Impedance 75 Ω, V.S.W.R. Max.1.5] [Impedance 50 Ω, V.S.W.R. Max.1.7])
	Max. switching voltage		30 V DC
	Max. switching current		0.5 A DC
High frequency characteristics (Impedance 75Ω) (Initial)	V.S.W.R.		Max. 1.2 (to 900MHz) Max. 1.5 (to 2.6GHz)
	Insertion loss		Max. 0.2dB (to 900MHz) Max. 0.5dB (to 2.6GHz)
	Isolation		Min. 60dB (to 900MHz) Min. 30dB (to 2.6GHz)
High frequency characteristics (Impedance 50Ω) (Initial)	V.S.W.R.		Max. 1.3 (to 900MHz) Max. 1.7 (to 2.6GHz)
	Insertion loss		Max. 0.2dB (to 900MHz) Max. 0.7dB (to 2.6GHz)
	Isolation		Min. 60dB (to 900MHz) Min. 30dB (to 2.6GHz)
Expected life (min. operations)	Mechanical (at 180 cpm)		10^6
	Electrical	1W, 2.6GHz, [Impedance 50Ω, V.S.W.R. & 1.7] [Impedance 75Ω, V.S.W.R. & 1.5]	3×10^5
		10mA 24V DC (resistive load) (at 20cpm)	3×10^5

Coil (at 20°C, 68°F)

Nominal operating power	200 mW

Characteristics

Initial insulation resistance*1		Min. 100 MΩ (at 500 V DC)
Initial breakdown voltage*2	Between open contacts	500 Vrms
	Between contact and coil	1,000 Vrms
	Between contact and ground terminal	500 Vrms
Operate time*3 (at 20°C)		Max. 10ms
Release time (without diode)*3 (at 20°C)		Max. 5ms
Temperature rise (at 20°C)*4		Max. 60°C
Shock resistance	Functional*5	Min. 500 m/s²{50 G}
	Destructive*6	Min. 1,000 m/s²{100 G}
Vibration resistance	Functional*7	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*8 (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. 5 g .18 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 Nominal operating voltage applied to the coil, excluding contact bounce time.
*4 By resistive method, nominal voltage applied to the coil: Contact carrying power: 10W, at 2.6GHz, [Impedance 75Ω, V.S.W.R. & 1.5] [Impedance 50Ω, V.S.W.R. & 1.7]
*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 5. Conditions for operation, transport and storage conditions in NOTES (Page 36).

RE (ARE)

ORDERING INFORMATION

Ex. ARE 1 ☐ ☐ ☐ ☐

Contact arrangement	Operating function	Terminal shape	Coil voltage (DC)	Packing style
1: 1 Form C	0: Single side stable type (Impedance 50Ω) 3: Single side stable type (Impedance 75Ω)	Nil: Standard PC board terminal A: Surface-mount terminal	03: 3 V 4H: 4.5 V 06: 6 V 09: 9 V 12: 12 V 24: 24 V	Nil: Carton packing (Standard PC board terminal only) Tube packing (Surface-mount terminal only) Z: Tape and reel packing (picked from 12/13/14 pin side)

Note: Tape and reel packing symbol "-Z" is not marked on the relay.
"X" type tape and reel packing (picked from 8/9/10/11/12/13/14-pin side) is also available.
Suffix "X" instead of "Z".

TYPES AND COIL DATA (at 20°C 68°F)

• Single side stable type (Impedance 50Ω)
• Packing of standard PC board terminal: 50 pcs. in an inner package (carton); 500 pcs. in an outer package.
• Packing of surface-mount terminal: 25 pcs. in an inner package (tube); 200 pcs. in an outer package.
• Packing of surface-mount terminal: 400 pcs. in an inner package (tape and reel); 800 pcs. in an outer package.

Standard PC board terminal	Surface-mount terminal	Nominal coil 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 (at 60°C 140°F)
ARE1003	ARE10A03	3	2.25	0.3	45	66.7	200	3.3
ARE104H	ARE10A4H	4.5	3.375	0.45	101	44.4	200	4.95
ARE1006	ARE10A06	6	4.5	0.6	180	33.3	200	6.6
ARE1009	ARE10A09	9	6.75	0.9	405	22.2	200	9.9
ARE1012	ARE10A12	12	9	1.2	720	16.7	200	13.2
ARE1024	ARE10A24	24	18	2.4	2,880	8.3	200	26.4

• Single side stable type (Impedance 75Ω)
• Packing of standard PC board terminal: 50 pcs. in an inner package (carton); 500 pcs. in an outer package.
• Packing of surface-mount terminal: 25 pcs. in an inner package (tube); 200 pcs. in an outer package.
• Packing of surface-mount terminal: 400 pcs. in an inner package (tape and reel); 800 pcs. in an outer package.

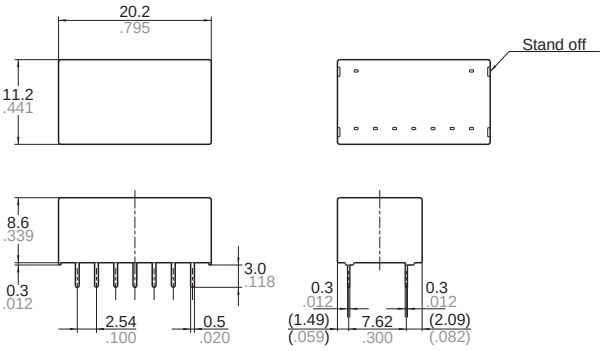
Standard PC board terminal	Surface-mount terminal	Nominal coil voltage, V DC	Pick-up voltage, V DC (max.) (initial)	Drop-out voltage, V DC (min.)(initial)	Coil resistance, Ω (±10%)	Nominal operating current, mA (±10%)	Nominal operating power, mW	Max. allowable voltage, V DC (at 60°C 140°F)
ARE1303	ARE13A03	3	2.25	0.3	45	66.7	200	3.3
ARE134H	ARE13A4H	4.5	3.375	0.45	101	44.4	200	4.95
ARE1306	ARE13A06	6	4.5	0.6	180	33.3	200	6.6
ARE1309	ARE13A09	9	6.75	0.9	405	22.2	200	9.9
ARE1312	ARE13A12	12	9	1.2	720	16.7	200	13.2
ARE1324	ARE13A24	24	18	2.4	2,880	8.3	200	26.4

DIMENSIONS mm inch

Download CAD Data from our Web site.

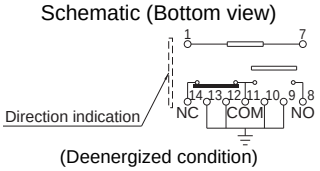
1. Standard PC board terminal (50Ω , 75Ω type)

CAD Data



General tolerance: ±0.3 ±.012

Schematic (Bottom view)



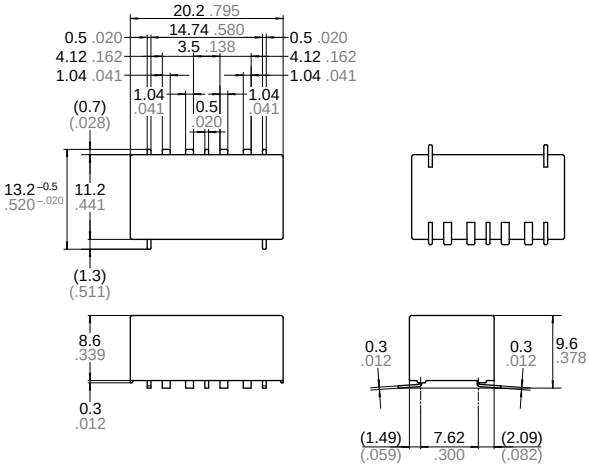
(Deenergized condition)

2. Surface mount terminal

mm inch

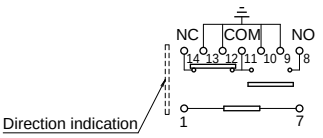
CAD Data

• 50Ω type



General tolerance: ±0.3 ±.012

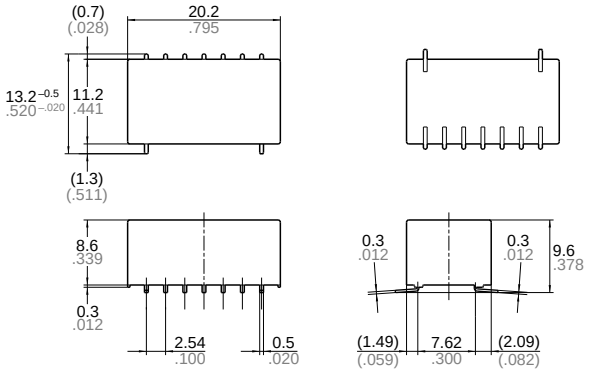
Schematic (Top view)



(Deenergized condition)

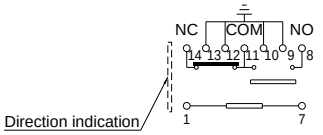
• 75Ω type

CAD Data



General tolerance: ±0.3 ±.012

Schematic (Top view)

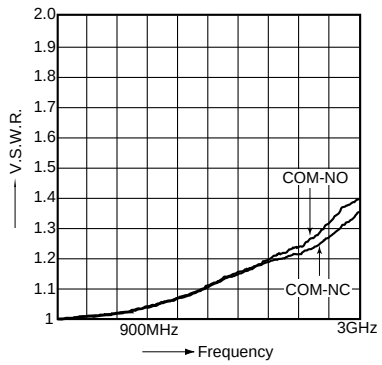


(Deenergized condition)

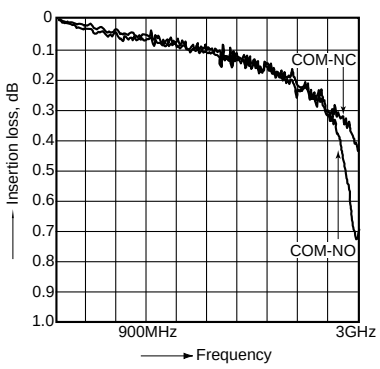
REFERENCE DATA

1-(1). High frequency characteristics (Impedance 75Ω) (Standard PC board terminal)

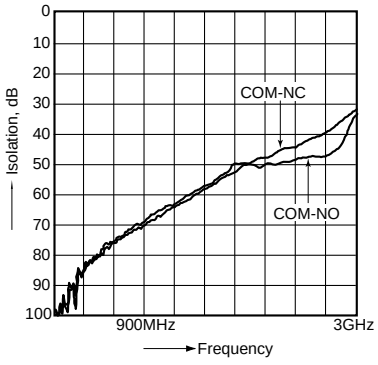
• V.S.W.R. characteristics



• Insertion loss characteristics



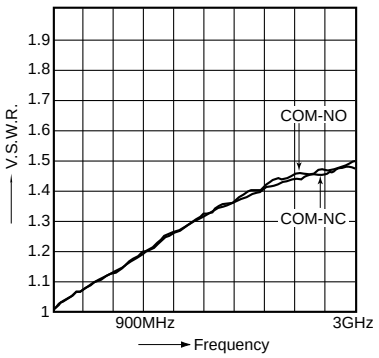
• Isolation characteristics



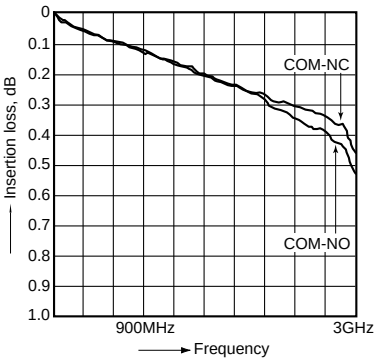
RE (ARE)

1-(2). High frequency characteristics (Impedance 50Ω) (Standard PC board terminal)

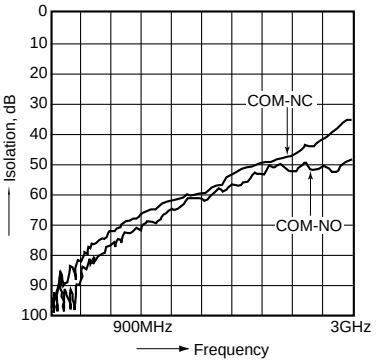
• V.S.W.R. characteristics



• Insertion loss characteristics



• Isolation characteristics



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.

2. 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.

3. Soldering

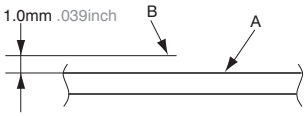
1) The manual soldering shall be performed under following condition.
Max. 260°C 500°F 10s
Max. 350°C 662°F 3s
The affect of the PCB on the relay will differ depending on the type of PCB used. Please verify the type of PCB to be used.
Preheat according to the following conditions.

Temperature	120°C 248°F or less
Time	Within 2 minute

Soldering should be done at 260±5°C 500±9°F within 6 s.

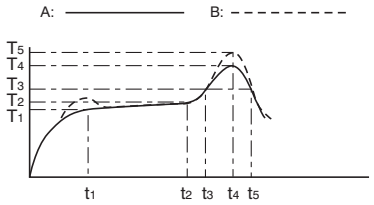
2) In case of automatic soldering, the following conditions should be observed (Surface-mount terminal)

(1) Position of measuring temperature



A: Surface of PC board where relay is mounted.
B: Above the PC board surface.

(2) IR (infrared reflow) soldering method



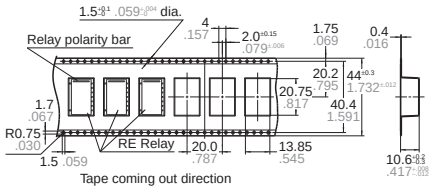
T1=150°C 302°F
T2=160°C 320°F
T3=183°C 361°F
T4=245°C 473°F
T5=270°C 518°F

t2 - t1 = 80 to 120 s
t5 - t3 = 30 to 40 s
t4 = 170 to 190 s

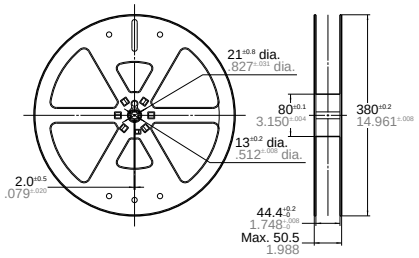
Temperature rise of relay itself may vary according to the mounting level or the heating method of reflow equipment. Therefore, please set the temperature of soldering portion of relay terminal and the top surface of the relay case not to exceed the above mentioned soldering condition.
It is recommended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

4. Packing style

1) Tape dimensions

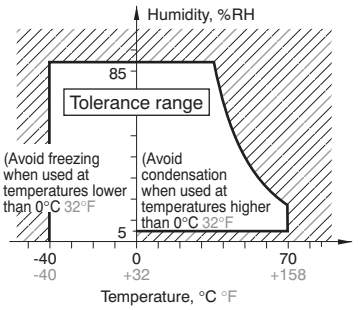


2) Dimensions of plastic reel



5. 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.

For complete "Cautions for Use", please download the "Relay Technical Information" from our Web site. For instructions on soldering, see page 66. For information on reliability, see page 64.

Panasonic
ideas for life

8 GHz*, 150 W carrying power (at 2 GHz) microwave relays

RN RELAYS (ARN)

*Rating is 6 GHz. Please refer to "REFERENCE DATA" regarding usage between 6 and 8 GHz.

Protective construction: Flux-resistant type

FEATURES

1. Miniature design and surface mount (SMD) type
L: 9.6 × W: 14.6 × H:10.0 mm
L: .378 × W: .575 × H: .394 inch

2. High capacity type
150W at 2GHz
80W at 2GHz (hot switching)

3. Excellent ambient temperature profile
up to 85°C 185°F

4. Excellent high frequency characteristics
Impedance: 50Ω

Frequency	up to 1 GHz	1 to 2 GHz	2 to 3 GHz	3 to 6 GHz
V. S. W. R. (Max.)	1.10	1.15	1.20	1.30
Insertion loss (dB, Max.)	0.10	0.12	0.15	0.50
Isolation (dB, Min.)	60	55	45	30

5. Lineup includes reversed contact type
Great design freedom is possible using reversed contact type in which the positions of the N.O. and N.C. contacts are switched.

TYPICAL APPLICATIONS

1. Broadcasting and video equipment markets
- Digital broadcasting equipment

2. Mobile phone base stations

3. Communications market
- Antenna switching
- All types of wireless devices

4. Measurement equipment market
- Spectrum analyzers
- Oscilloscopes
- High frequency amplifiers

If you wish to use in applications with low level loads or with high frequency switching, please consult us.

ORDERING INFORMATION

ARN [ ] [ ] [A] [ ] [ ]

Contact arrangement
1: 1 Form C standard contact type
3: 1 Form C reversed contact type
(single side stable type only)

Operating function
0: Single side stable type
2: 2 coil latching type

Terminal shape
A: Surface mount terminal

Coil voltage, DC*
4H: 4.5 V, 12: 12 V, 24: 24 V (H=0.5)
* For 28 V type, please consult us.

Packing style
Nil: Carton packing
X: Tape and reel packing (picked from 1 pin side)
Z: Tape and reel packing (picked from 13 pin side)

RN (ARN)

TYPES

1. Single side stable type

Contact arrangement	Nominal coil voltage	Part No.	
		Standard contact type	Reversed contact type
1 Form C	4.5 V DC	ARN10A4H	ARN30A4H
	12 V DC	ARN10A12	ARN30A12
	24 V DC	ARN10A24	ARN30A24

Standard packing: 50 pcs. in an inner package (carton); 500 pcs. in an outer package

2. 2 coil latching type

Contact arrangement	Nominal coil voltage	Part No.
		Standard contact type
1 Form C	4.5 V DC	ARN12A4H
	12 V DC	ARN12A12
	24 V DC	ARN12A24

Standard packing: 50 pcs. in an inner package (carton); 500 pcs. in an outer package

3. Single side stable type

Contact arrangement	Nominal coil voltage	Part No.	
		Standard contact type	Reversed contact type
1 Form C	4.5 V DC	ARN10A4H❑	ARN30A4H❑
	12 V DC	ARN10A12❑	ARN30A12❑
	24 V DC	ARN10A24❑	ARN30A24❑

Standard packing: 400 pcs. in an inner package (tape and reel); 800 pcs. in an outer package
* Please add an X (picked from 1 pin side) or Z (picked from 13 pin side) at the end of the part number when ordering.
* Packing style symbol “X”, “Z” is not marked on the relay.

4. 2 coil latching type

Contact arrangement	Nominal coil voltage	Part No.
		Standard contact type
1 Form C	4.5 V DC	ARN12A4H❑
	12 V DC	ARN12A12❑
	24 V DC	ARN12A24❑

Standard packing: 400 pcs. in an inner package (tape and reel); 800 pcs. in an outer package
* Please add an X (picked from 1 pin side) or Z (picked from 13 pin side) at the end of the part number when ordering.
* Packing style symbol “X”, “Z” is not marked on the relay.

RATING

1. Coil data

1) Single side stable type

Nominal coil voltage	Pick-up voltage (at 20°C 68°F)	Drop-out voltage (at 20°C 68°F)	Nominal operating current [±10%] (at 20°C 68°F)	Coil resistance [±10%] (at 20°C 68°F)	Nominal operating power	Max. applied voltage (at 85°C 185°F)
4.5 V DC	75%V or less of nominal voltage (Initial)	10%V or more of nominal voltage (Initial)	71.1 mA	63.3Ω	320 mW	110%V of nominal voltage
12 V DC			26.7 mA	450 Ω		
24 V DC			13.3 mA	1,800 Ω		

2) 2 coil latching type

Nominal coil voltage	Set voltage (at 20°C 68°F)	Reset voltage (at 20°C 68°F)	Nominal operating current [±10%] (at 20°C 68°F)	Coil resistance [±10%] (at 20°C 68°F)	Nominal operating power	Max. applied voltage (at 85°C 185°F)
4.5 V DC	75%V or less of nominal voltage (Initial)	75%V or less of nominal voltage (Initial)	88.9 mA	50.6Ω	400 mW	110%V of nominal voltage
12 V DC			33.3 mA	360 Ω		
24 V DC			16.7 mA	1,440 Ω		

2. Specifications

Characteristics	Item		Specifications			
Contact	Arrangement		1 Form C			
	Contact material		Gold plating			
	Contact resistance (Initial)		Max. 100 mΩ (By voltage drop 10 V AC 10mA)			
Rating	Nominal switching capacity		80W (at 2 GHz, Impedance 50Ω, V.S.W.R. Max.1.15)			
	Contact carrying power (CW)*1		Max.150W (at 20°C 68°F) (at 2 GHz, Impedance 50Ω, V.S.W.R. Max.1.15, with heat sink) Max.100W (at 20°C 68°F) (at 2 GHz, Impedance 50Ω, V.S.W.R. Max.1.15, without heat sink)			
	Nominal operating power		Single side stable type: 320 mW, 2 coil latching type: 400 mW			
High frequency characteristics (to 6 GHz)			to 1 GHz	1 to 2 GHz	2 to 3 GHz	3 to 6 GHz
	V.S.W.R. (Max.)		1.1	1.15	1.2	1.3
	Insertion loss (without D.U.T. board's loss, dB, Max.)		0.1	0.12	0.15	0.5
	Isolation (dB, Min.)		60	55	45	30
Electrical characteristics	Insulation resistance (Initial)		Min. 1,000 MΩ (at 500V DC, Measurement at same location as "Breakdown voltage" section.)			
	Breakdown voltage (Initial)	Between open contacts	500 AC Vrms for 1min. (Detection current: 10mA)			
		Between contact and earth terminal	500 AC Vrms for 1min. (Detection current: 10mA)			
		Between contact and coil	500 AC Vrms for 1min. (Detection current: 10mA)			
	Operate time [Set time] (at 20°C 68°F)		Max. 5 ms (Nominal voltage applied to the coil, excluding contact bounce time)			
	Release time [Reset time] (at 20°C 68°F)		Single side stable type: Max. 5 ms (Nominal voltage applied to the coil, excluding contact bounce time)*2 2 coil latching type: Max. 5 ms (Nominal voltage applied to the coil, excluding contact bounce time)			
Mechanical characteristics	Shock resistance	Functional	Min. 490 m/s² (Half-wave pulse of sine wave: 11 ms, detection time: 10 μs)			
		Destructive	Min. 980 m/s² (Half-wave pulse of sine wave: 6 ms)			
	Vibration resistance	Functional	10 to 55 Hz at double amplitude of 3 mm .118 inch (Detection time: 10 μs)			
		Destructive	10 to 55 Hz at double amplitude of 5 mm .197 inch			
Expected life	Mechanical life		Min. 1×10^6 (at 180 cpm)			
	Electrical life (at 20 cpm)		• 1×10^6 ope. at 10mA 10 VDC resistive load, • 1×10^6 ope. at 1W High frequency load (at 2 GHz, Impedance 50Ω, V.S.W.R. Max.1.15), • 1×10^3 ope. at 80 W High frequency load, operating frequency 5.0s ON, 5.0s OFF (at 2 GHz, Impedance 50Ω, V.S.W.R. Max.1.15, at 20°C 68°F, with heatsink)			
Conditions	Conditions for operation, transport and storage*3		Ambient temperature: –40 to +85°C –40 to +185°F, Humidity: 5 to 85% R.H. (Not freezing and condensing at low temperature)			
Unit weight			Approx. 2.5 g .088 oz			

Notes: *1. Since the design of the PC board and heat dispersion conditions affect contact carrying power, please verify under actual conditions.
*2. Release time will lengthen if a diode, etc., is connected in parallel to the coil. Be sure to verify operation under actual conditions.

RN (ARN)

REFERENCE DATA

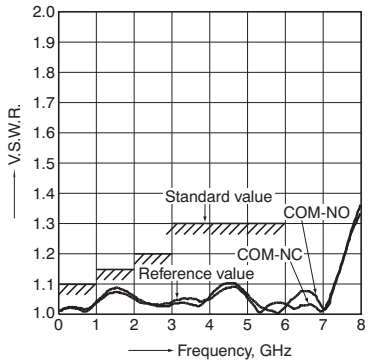
1. High frequency characteristics

Sample: ARN10A12

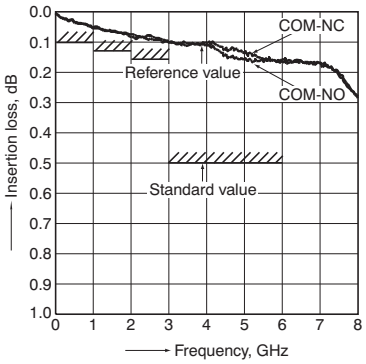
Measuring method: Measured with Agilent Technologies network analyzer (E8363B).

* For details see “8. Measuring method of high frequency characteristics (Impedance 50Ω)“ under “NOTES”.

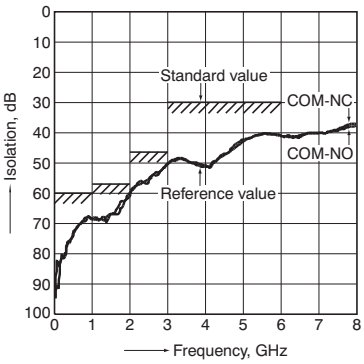
• V.S.W.R. characteristics



• Insertion loss characteristics (without D.U.T. board’s loss)



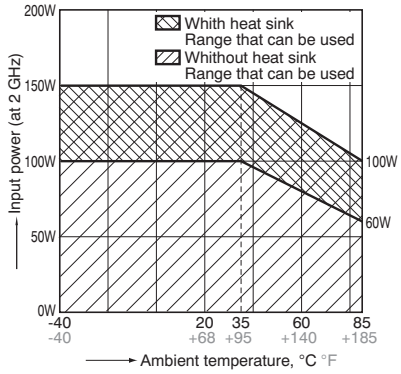
• Isolation characteristics



2. Contact carrying power (CW)

Max. 150 W (whith heat sink) (at 2 GHz, Impedance 50Ω, V.S.W.R. Max. 1.15, at 20°C 68°F)

Max. 100 W (whithout heat sink) (at 2 GHz, Impedance 50Ω, V.S.W.R. Max. 1.15, at 20°C 68°F)

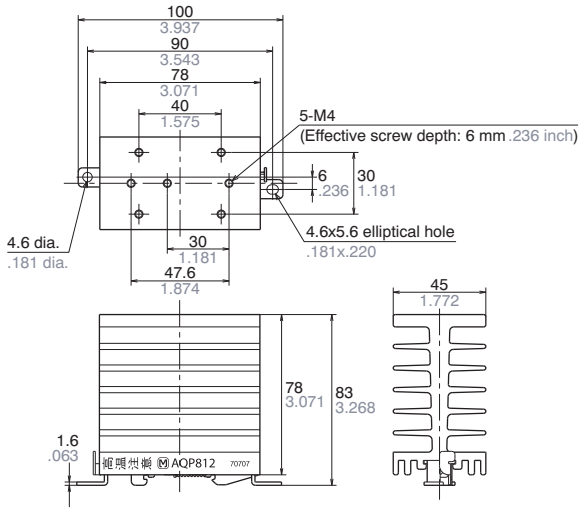


Measuring conditions:

Heat sink (AQP-HS-SJ20A) is used. (Reference: 2.9°C 37.22°F/W)

Heat sink (AQP-HS-SJ20A) (mm inch)

External dimensions

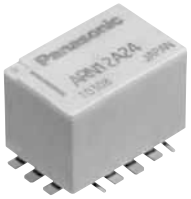


General tolerance: ±0.1 ±.004

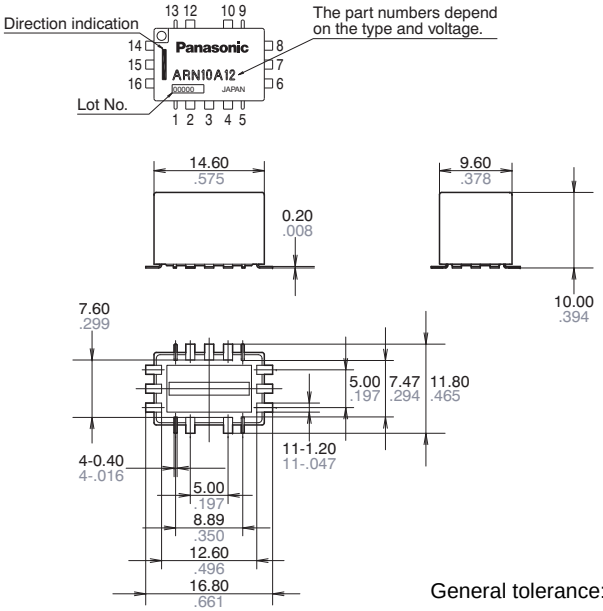
DIMENSIONS (mm inch)

Download CAD Data from our Web site.

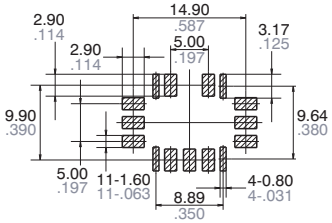
CAD Data



External dimensions



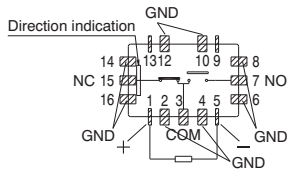
PC board pattern



General tolerance: ±0.3 ±.012

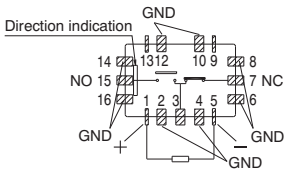
Schematic

Single side stable type/Standard contact type



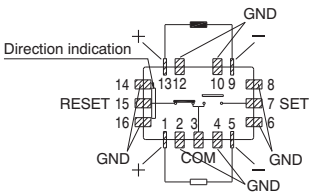
(Deenergized condition)

Single side stable type/Reversed contact type



(Deenergized condition)

2 coil latching type/Standard contact type



(Reset condition)