Panasonic
ideas for life

GENERAL CATALOG

MICROWAVE DEVICES

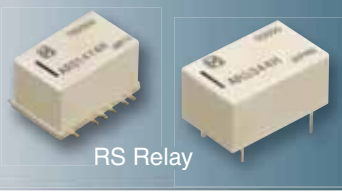
Product lineup

MICROWAVE DEVICES

Terminal type for PC board

HIGH FREQUENCY RELAYS

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



RS 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)

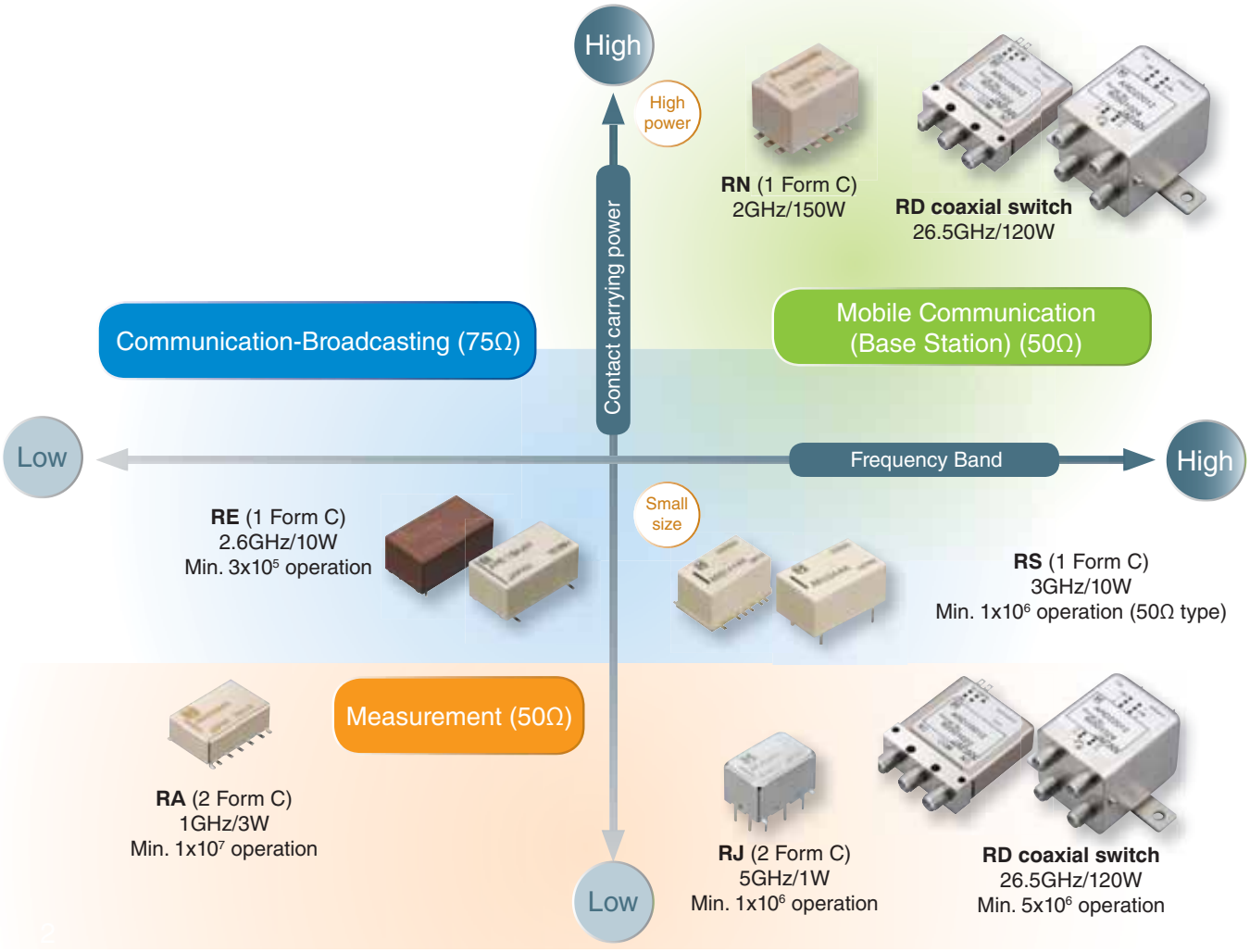
SPDT

RV Coaxial Switch (SPDT)

- Frequency ~26.5GHz
- Small size

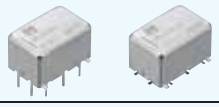
SMA

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	

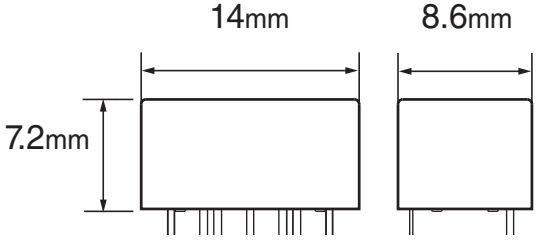
*Ratings are 5GHz

Expanding design possibilities with miniature microwave relays

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

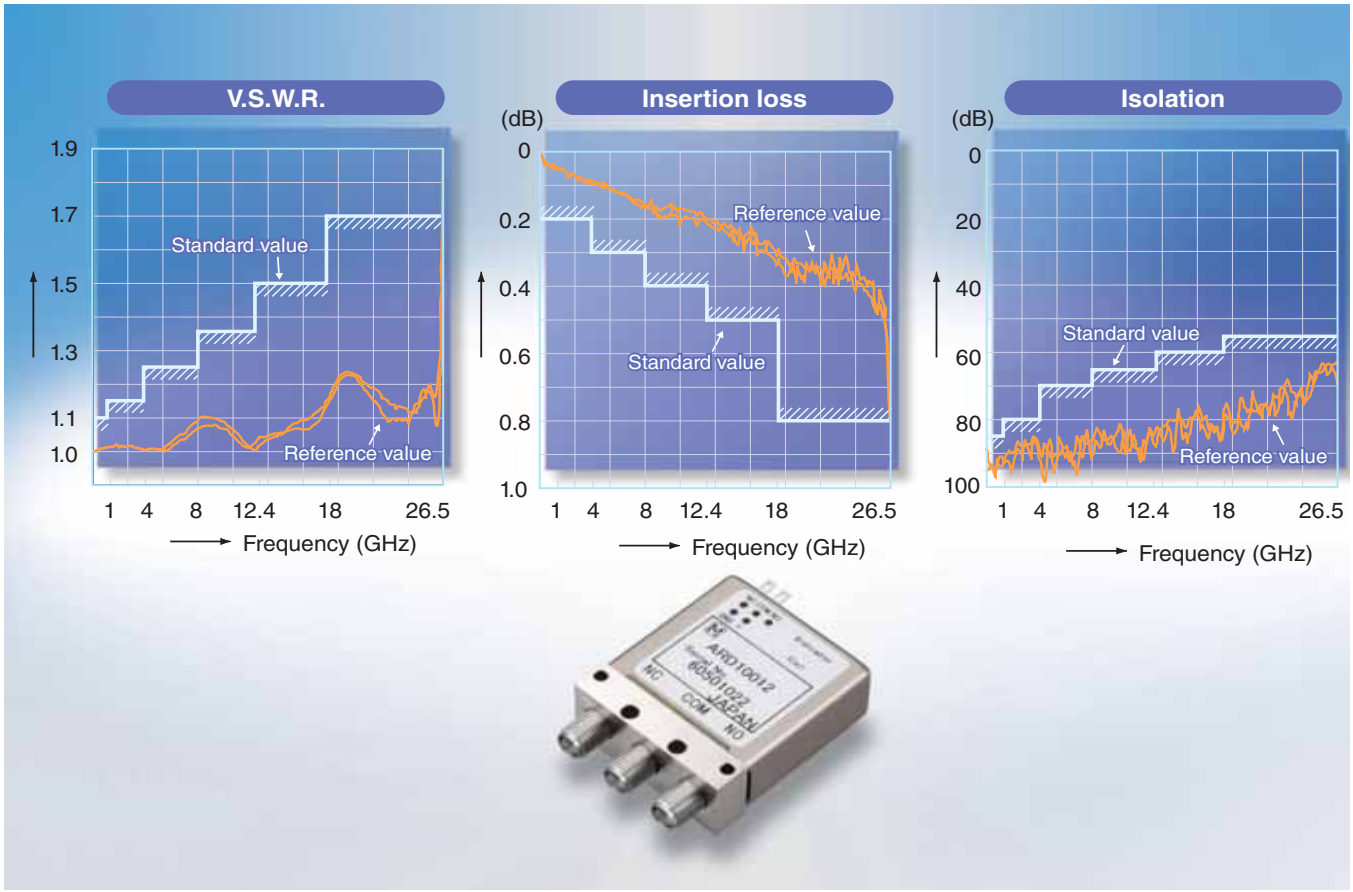
A new 50Ω type (up to 3GHz) is now available for applications demanding high quality such as mobile phone base stations, wireless devices, and measurement equipment. While maintaining excellent high-frequency characteristics this model is 60% smaller than its predecessor*.
A 75Ω type is also available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

*Compared to RK relay.

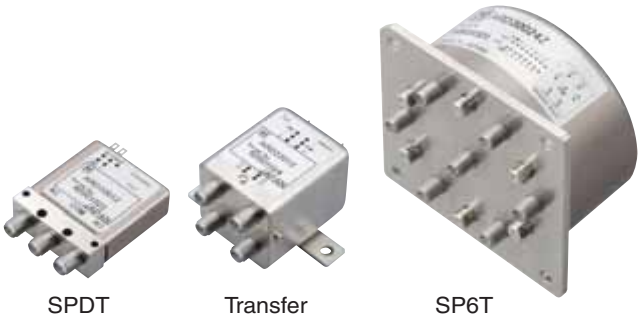


Rich lineup of coaxial switches with excellent HF characteristics

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

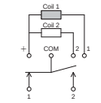


These coaxial switches are ideal for applications that require high quality and reliability such as base stations, wireless devices, and measurement instruments. With excellent high-frequency characteristics extending into the high-frequency band, these switches achieve a long working life of 5 million 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.

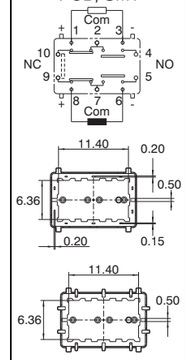
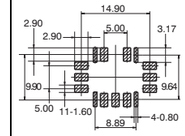
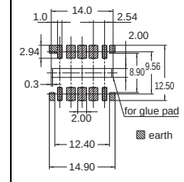


SPDT Transfer SP6T

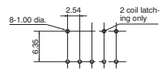
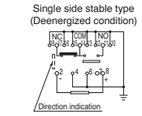
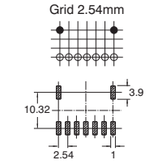
Type ★ = Popular Type (Picture scale: DIN A4)	Features	Switching current	Max. switching voltage	Contact arrangement	Coil voltage
RV SPDT 1:1  15.9 x 15.9 x 11.2mm	• Ultra small coaxial switch • Up to 26.5 GHz • Impedance 50Ω • PIN and SMA terminals available • Latching types available • 2-coil latching 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

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 —

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

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 **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 —

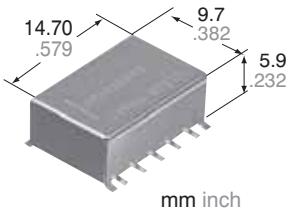
Type ★ = Popular Type (Picture scale: DIN A4)	Features	Switching current	Max. switching voltage	Contact arrangement	Coil voltage
★**RS** 1:1  14 x 8.6 x 7/8mm	• HF relay • Up to 3GHz • Impedance 50/75Ω • Silent type available • Latching types available • SMT and PCB version available • 10W at 3GHz contact 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

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 x 10^5	5 x 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 x 10^5	10^6	PCB, SMT Grid 2.54mm  	33 —

Panasonic
ideas for life

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

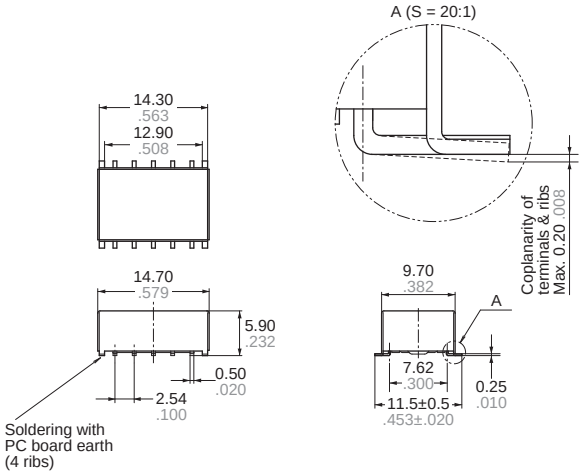
• 2 coil latching type

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

DIMENSIONS mm inch

Download CAD Data from our Web site.

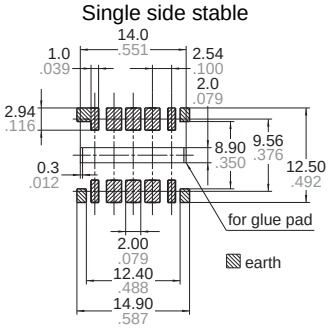
CAD Data



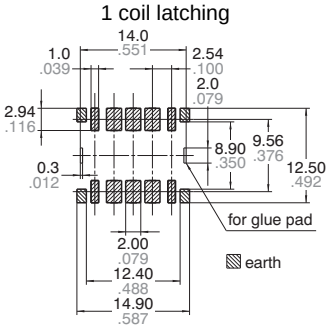
Tolerance: ±0.3 ±.012

Suggested Mounting Pads (Top view)

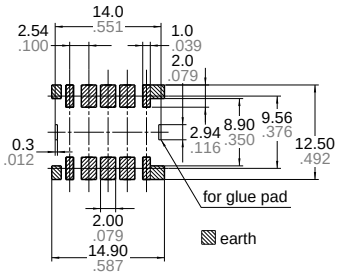
Single side stable



1 coil latching



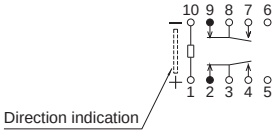
2 coil latching



Tolerance: ±0.1 ±.004

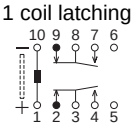
Schematic (Top view)

Single side stable



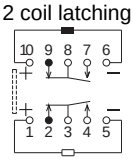
(Deenergized condition)

1 coil latching



(Reset condition)

2 coil latching



(Reset condition)

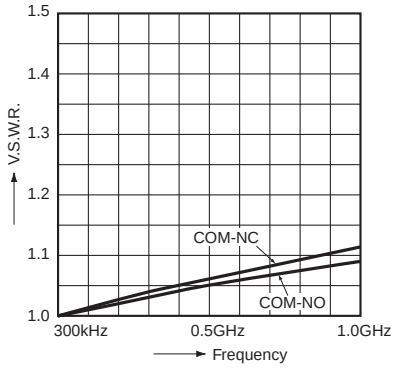
REFERENCE DATA

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

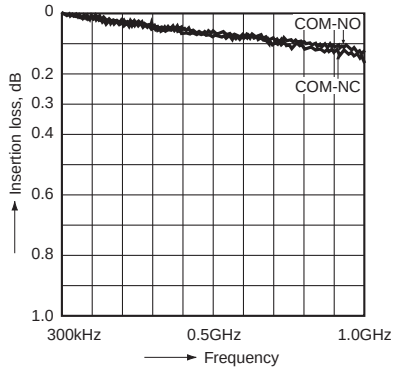
Sample: ARA200A12

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

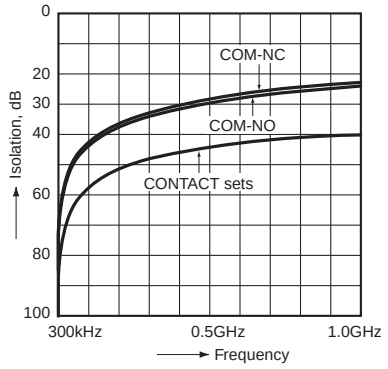
• V.S.W.R.



• Insertion loss



• Isolation

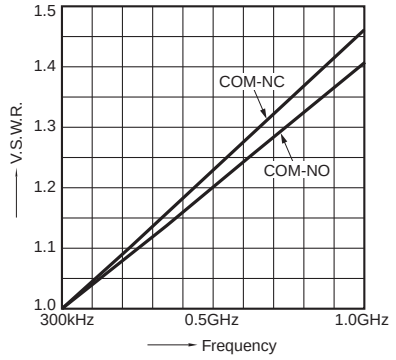


1-(2). High frequency characteristics (Impedance 75Ω)

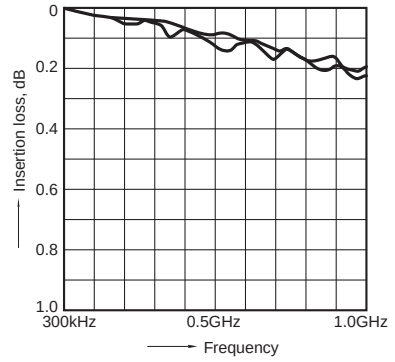
Sample: ARA200A12

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

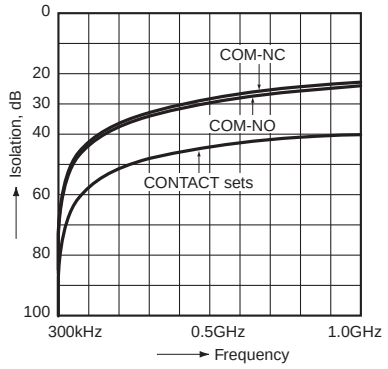
• V.S.W.R.



• 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.

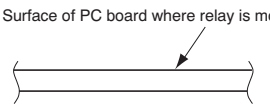
4. Cleaning

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.

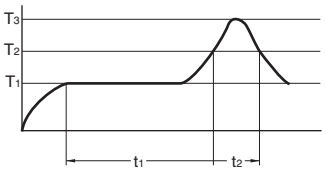
5. Soldering

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



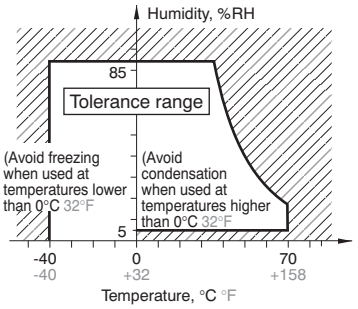
T_1 = 150 to 180C 302 to 356F
T_2 = 230C 446F and higher
T_3 = Within 250C 482F
t_1 = 60 to 120 sec.
t_2 = Within 30 sec.

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

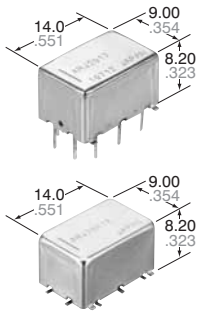
The plastic becomes brittle if the relay is exposed to a low temperature, low humidity environment for long periods of time.

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).

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

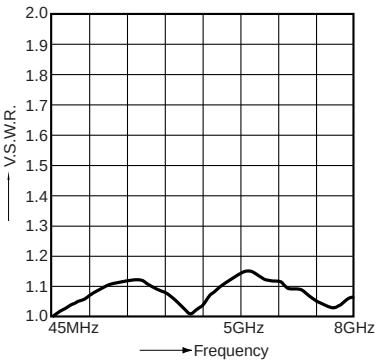
REFERENCE DATA

1. High frequency characteristics

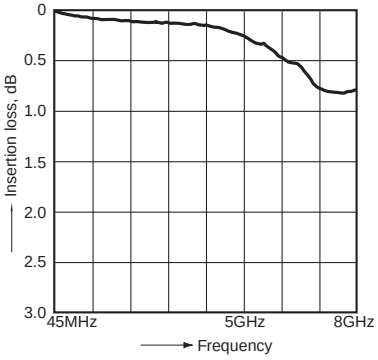
Sample: ARJ20A12

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

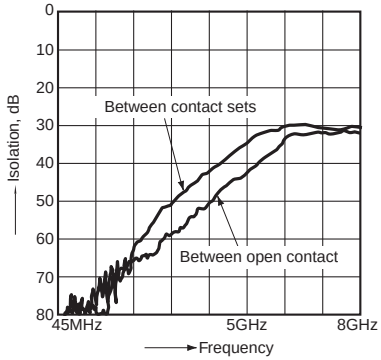
• V.S.W.R. characteristics



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



• Isolation characteristics

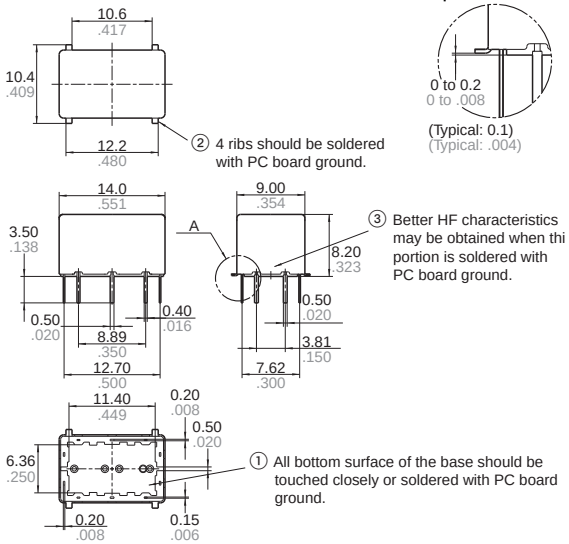


DIMENSIONS mm inch

Download CAD Data from our Web site.

1. Standard PC board terminal

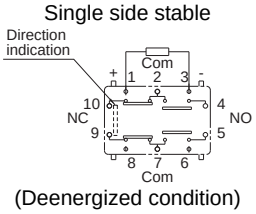
CAD Data



Expansion of A

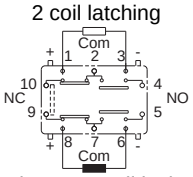
Schematic (Bottom view)

Single side stable



(Deenergized condition)

2 coil latching

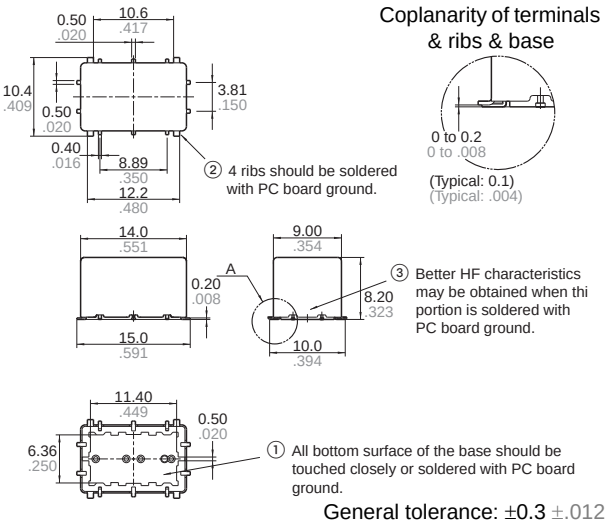


(Reset condition)

General tolerance: ±0.3 ±.012

2. Surface mount terminal

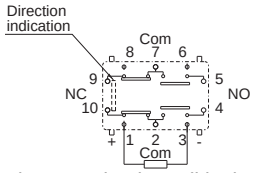
CAD Data



Expansion of A: Coplanarity of terminals & ribs & base

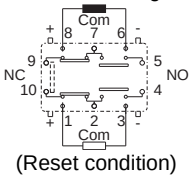
Schematic (Top view)

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

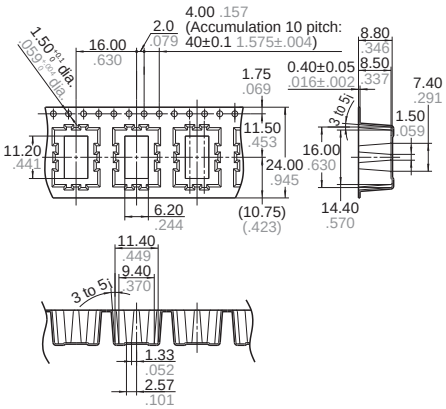
Since RJ relays are highly sensitive polarized relays, their characteristics will be affected by a strong external magnetic field. Avoid using the relay under that condition.

4. Cleaning

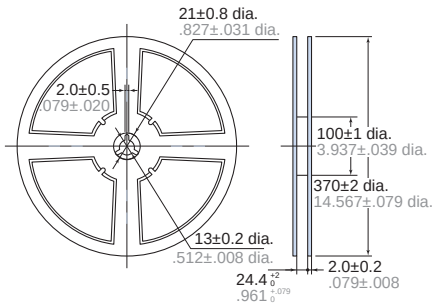
For automatic cleaning, the boiling method is recommended. Avoid ultrasonic cleaning which subjects the relays to high frequency vibrations, which may cause the contacts to stick.
It is recommended that alcoholic solvents be used.

5. Tape and reel packing

1) Tape dimensions

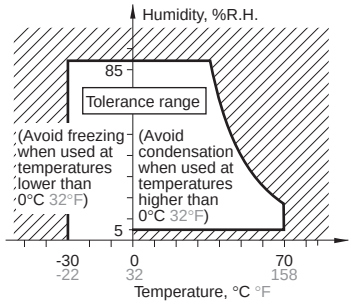


2) Dimensions of plastic reel



6. Conditions for operation, transport and storage conditions

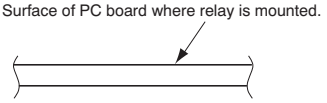
1) Ambient temperature, humidity, and atmospheric pressure during usage, transport, and storage of the relay:
(1) Temperature:
–30 to +70°C –22 to +158°F
(However, tolerance range is –30 to +60°C –22 to +140°F if package is carried as is.)
(2) Humidity: 5 to 85% RH
(Avoid freezing and condensation.)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



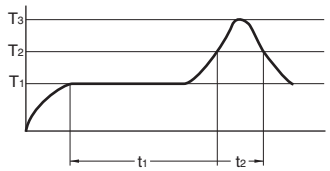
2) Condensation
Condensation forms when there is a sudden change in temperature under high temperature and high humidity conditions. Condensation will cause deterioration of the relay insulation.
3) Freezing
Condensation or other moisture may freeze on the relay when the temperature is lower than 0°C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



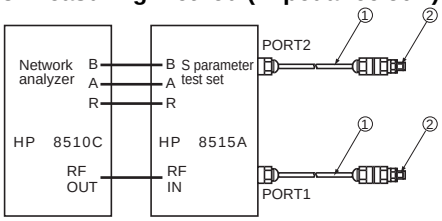
(2) IR (infrared reflow) soldering method



T1 = 150 to 180C 302 to 356F
T2 = 230C 446F and higher
T3 = Within 250C 482F
t1 = 60 to 120 sec.
t2 = Within 30 sec.

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

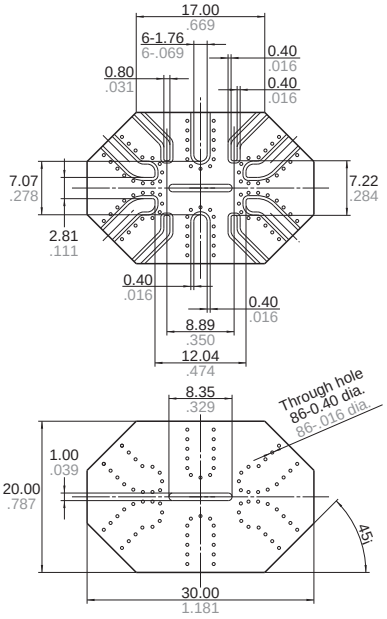
(Step 1) Calibrate the test system with HP calibration kit [HP85052B]
(Step 2) After calibration, connect the D.U.T. board and measure. Connect 50 Ω terminals on connectors other than those for measurement.

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.

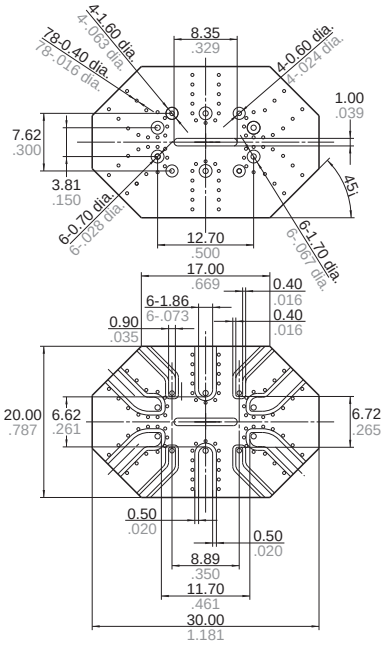
Measuring board

1) Dimensions

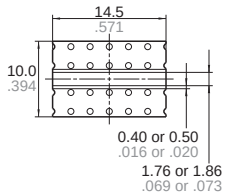
<Surface mount terminal>



<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

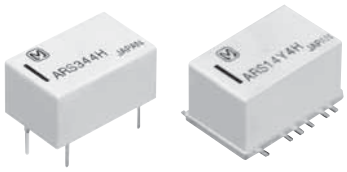
1) The switching lifetime is defined under the standard test condition specified in the JIS* C 5442-1996 standard (temperature 15 to 35°C 59 to 95°F, humidity 25 to 75%). Check this with the real device as it is affected by coil driving circuit, load type, activation frequency, activation phase, ambient 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

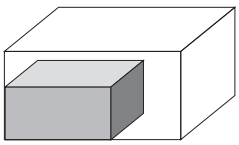
3 GHz microwave relays miniature size lineup includes 50/75 Ω type

RS RELAYS (ARS)



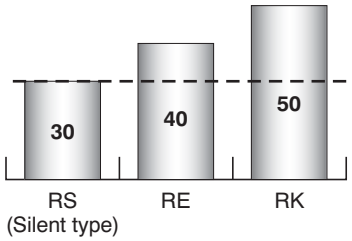
FEATURES

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

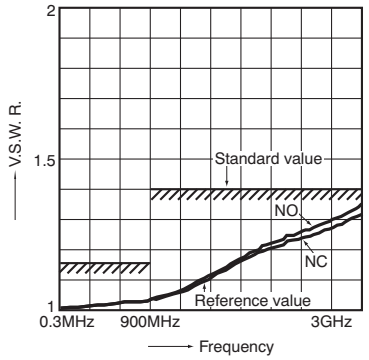
* Measured the operation noise of the relay alone (with diodes at both ends of the coil) 30cm away from top side, by the A-weighted, FAST method while applying the rated voltage.
(Reference) Operation noise of RK relay (existing model): Approx. 50dB

REFERENCE DATA

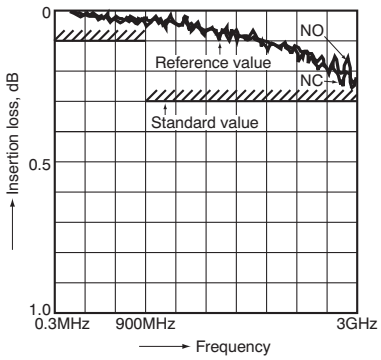
1.-(1) High frequency characteristics (Impedance: 50Ω, Standard PC board terminal)

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

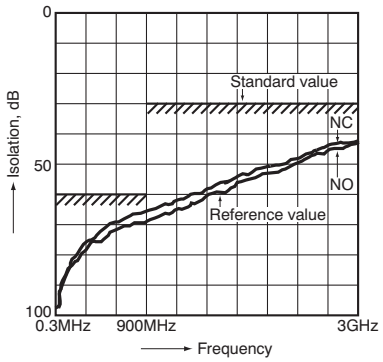
• V.S.W.R. characteristics



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



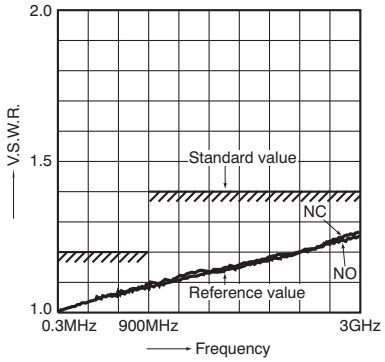
• Isolation characteristics



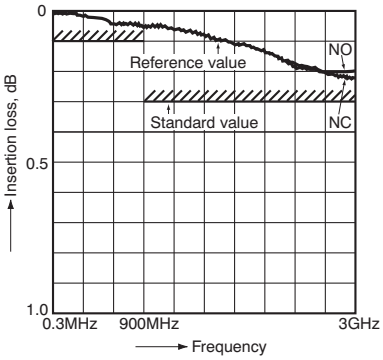
1.-(2) High frequency characteristics (Impedance: 75Ω, Standard PC board terminal)

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

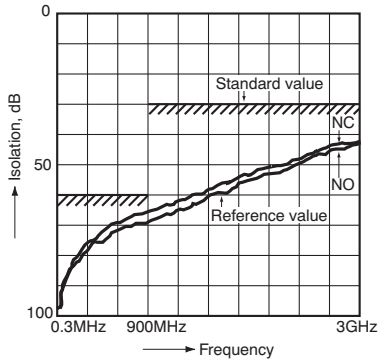
• V.S.W.R. characteristics



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



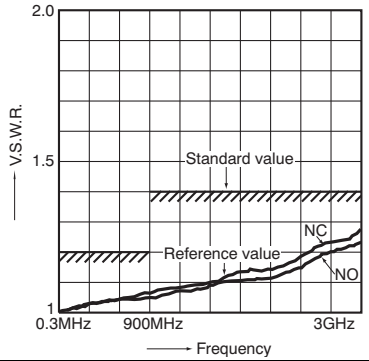
• Isolation characteristics



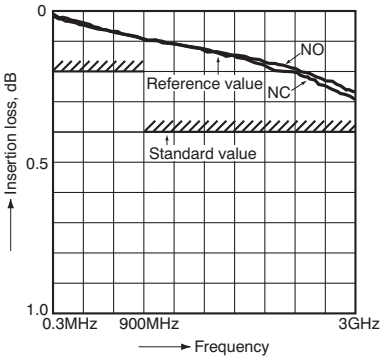
1.-(3) High frequency characteristics (Impedance: 50Ω, Surface-mount terminal)

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

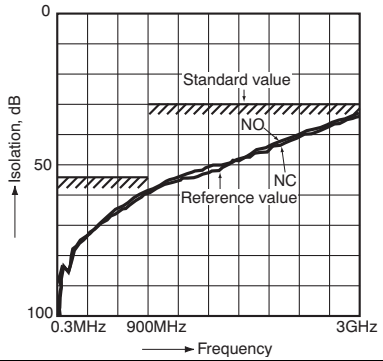
• V.S.W.R. characteristics



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



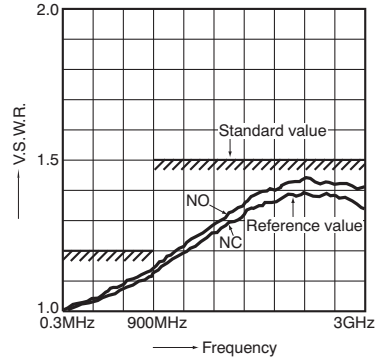
• Isolation characteristics



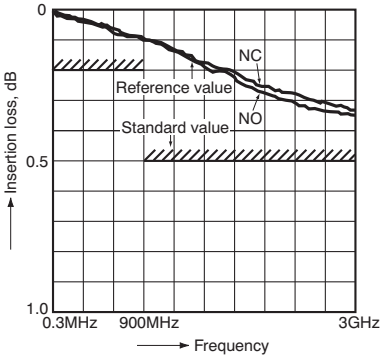
1.-(4) High frequency characteristics (Impedance: 75Ω, Surface-mount terminal)

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

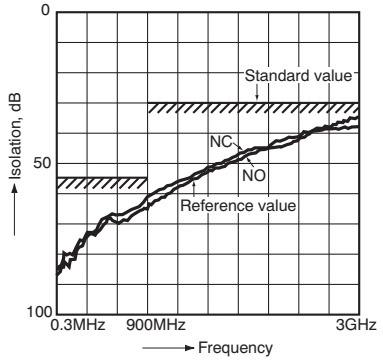
• V.S.W.R. characteristics



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

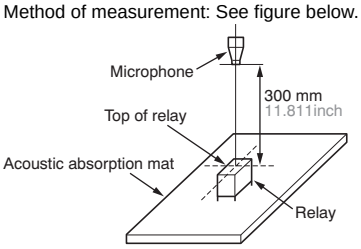


• Isolation characteristics

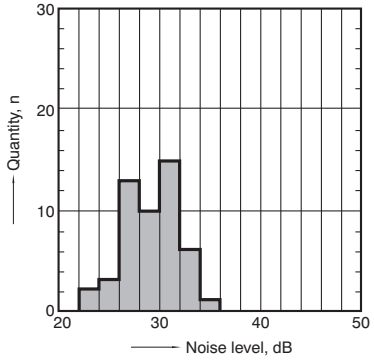


2.-(1) Operation noise distribution

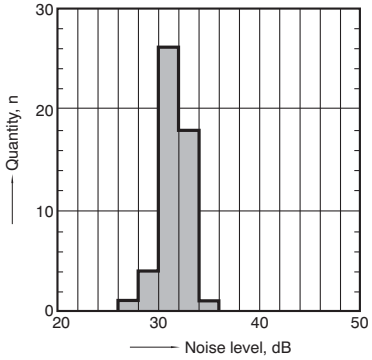
Sample: ARS134H (single side stable silent type), 50 pcs.
Coil voltage: rated voltage applied (with diode)
Equipment setting: A weighted sound pressure level, FAST.
Background noise: approx. 20 dB
Method of measurement: See figure below.



When operated

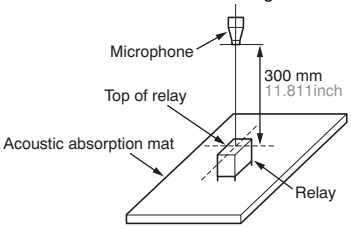


When released

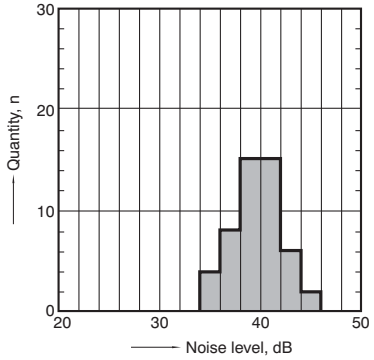


2.-(2) Operation noise distribution

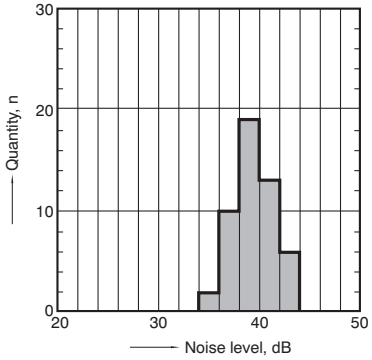
Sample: ARS104H (single side stable standard type), 50 pcs.
Coil voltage: rated voltage applied (with diode)
Equipment setting: A weighted sound pressure level, FAST.
Background noise: approx. 20 dB
Method of measurement: See figure below.



When operated

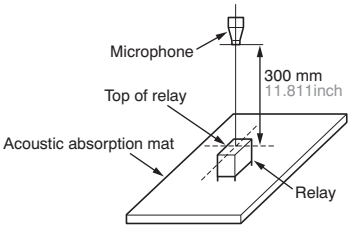


When released

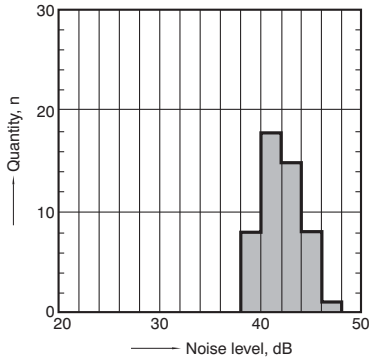


2.-(3) Operation noise distribution

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)

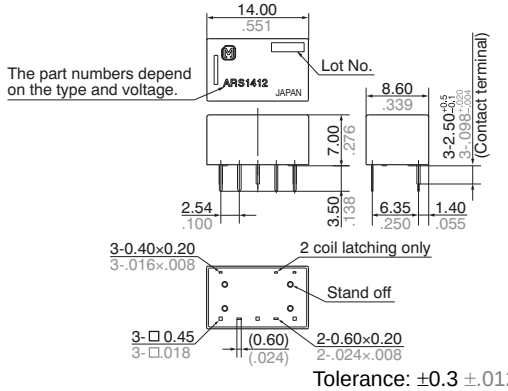
Download CAD Data from our Web site.

<Standard PC board terminal>

1. 50Ω type

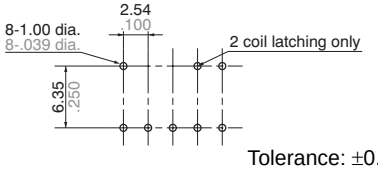
CAD Data

External dimensions



Tolerance: ±0.3 ±.012

PC board pattern (Bottom view)

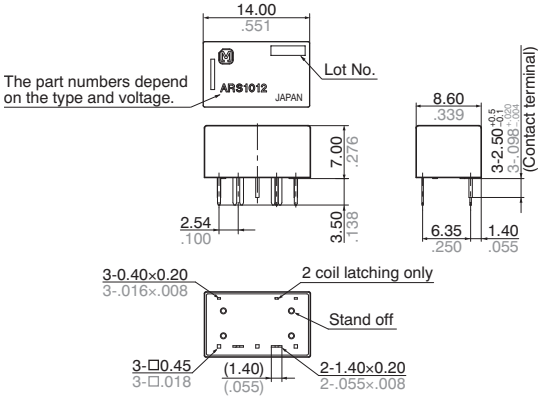


Tolerance: ±0.1 ±.004

2. 75Ω type

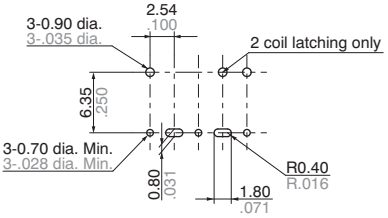
CAD Data

External dimensions



Tolerance: ±0.3 ±.012

PC board pattern (Bottom view)

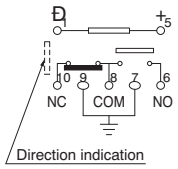


Tolerance: ±0.1 ±.004

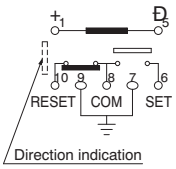
Schematic (Bottom view)

1. Standard contact type

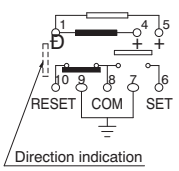
Single side stable type (Deenergized condition)



1 coil latching type (Reset condition)

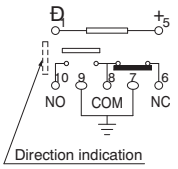


2 coil latching type (Reset condition)

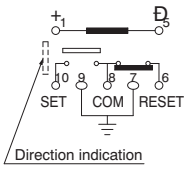


2. Reversed contact type

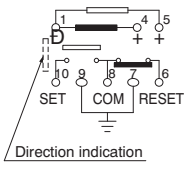
Single side stable type (Deenergized condition)



1 coil latching type (Reset condition)



2 coil latching type (Reset condition)



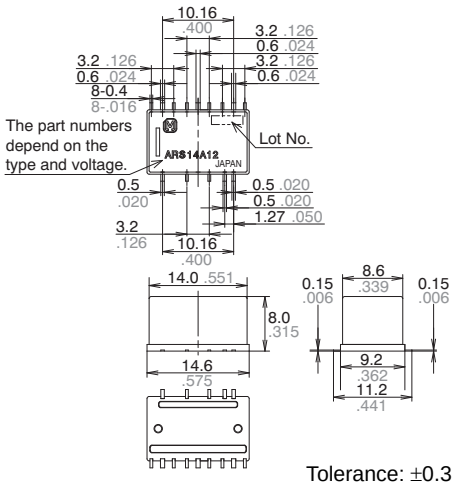
<Surface-mount terminal>

1. Impedance: 50Ω type

1) E layout

CAD Data

External dimensions

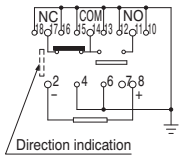


Tolerance: ±0.3 ±.012

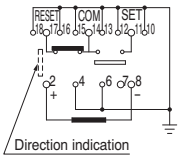
Schematic (Top view)

<Standard contact type>

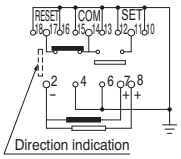
Single side stable type (Deenergized condition)



1 coil latching type (Reset condition)

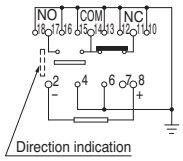


2-coil latching type (Reset condition)

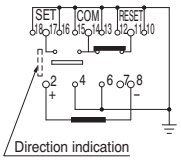


<Reversed contact type>

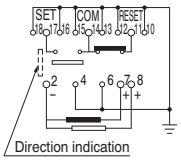
Single side stable type (Deenergized condition)



1 coil latching type (Reset condition)



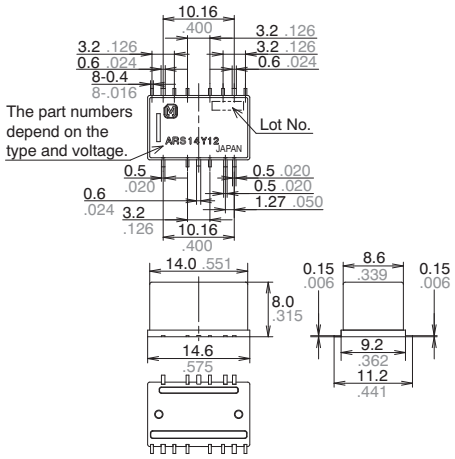
2-coil latching type (Reset condition)



2) Y layout

CAD Data

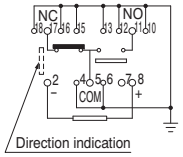
External dimensions



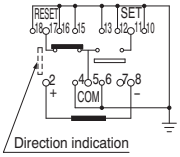
Schematic (Top view)

<Standard contact type>

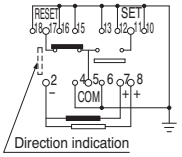
Single side stable type (Deenergized condition)



1 coil latching type (Reset condition)

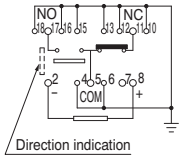


2-coil latching type (Reset condition)

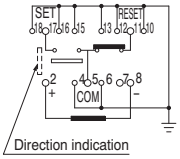


<Reversed contact type>

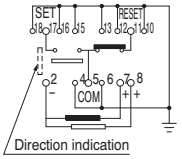
Single side stable type (Deenergized condition)



1 coil latching type (Reset condition)



2-coil latching type (Reset condition)



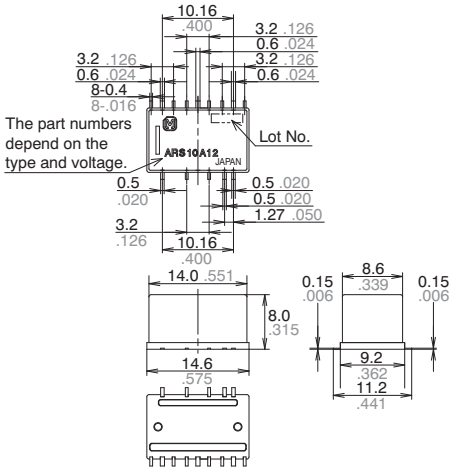
Tolerance: ±0.3 ±.012

2. Impedance: 75Ω type

1) E layout

CAD Data

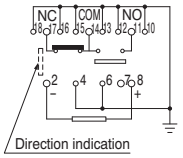
External dimensions



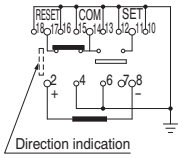
Schematic (Top view)

<Standard contact type>

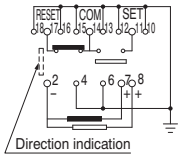
Single side stable type (Deenergized condition)



1 coil latching type (Reset condition)

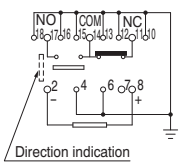


2-coil latching type (Reset condition)

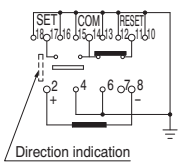


<Reversed contact type>

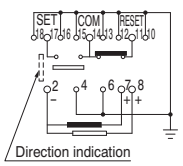
Single side stable type (Deenergized condition)



1 coil latching type (Reset condition)



2-coil latching type (Reset condition)

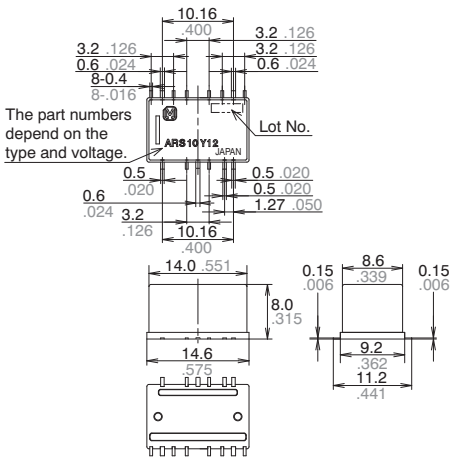


Tolerance: ±0.3 ±.012

2) Y layout

CAD Data

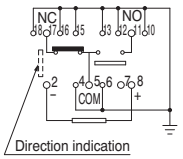
External dimensions



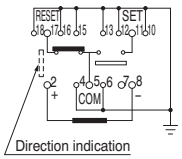
Schematic (Top view)

<Standard contact type>

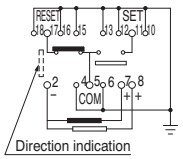
Single side stable type (Deenergized condition)



1 coil latching type (Reset condition)

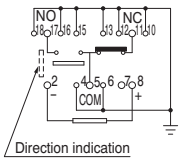


2-coil latching type (Reset condition)

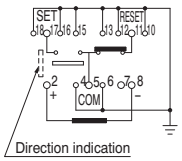


<Reversed contact type>

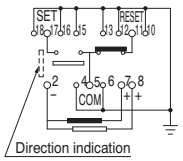
Single side stable type (Deenergized condition)



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

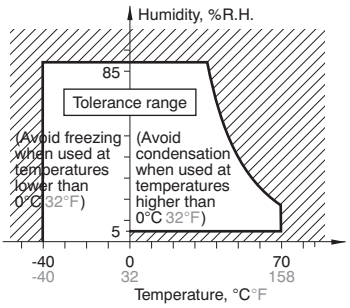
(Avoid freezing and condensation.)

The humidity range varies with the temperature. Use within the range indicated in the graph below.

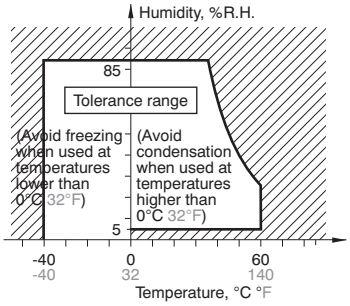
3) Atmospheric pressure: 86 to 106 kPa

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

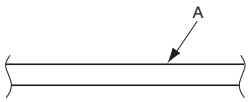
*Relays are influenced by the type of PC board used. Please confirm with the actual PC board you plan to use.

*Please avoid reflow soldering.

2) Surface-mount terminal

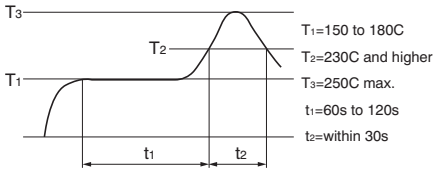
In case of automatic soldering, the following conditions should be observed

(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

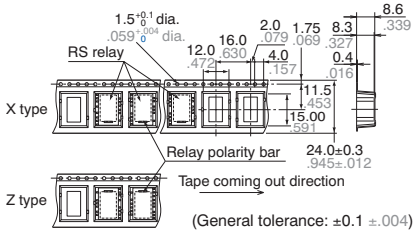
(2) 350°C 662°F for max. 3 seconds

The effect on the relay depends on the actual substrate used. Please verify the substrate to be used.

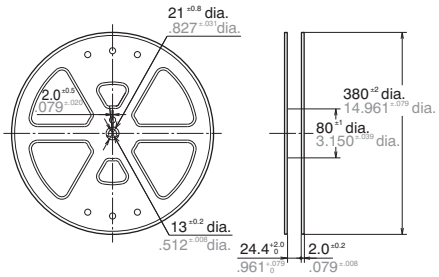
(3) Avoid ultrasonic cleaning. Doing so will adversely affect relay characteristics. Please use alcohol-based cleaning solvents when cleaning relays.

7. Tape and reel packing

1) Tape dimensions

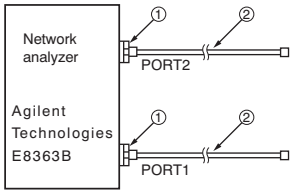


2) Dimensions of plastic reel



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).

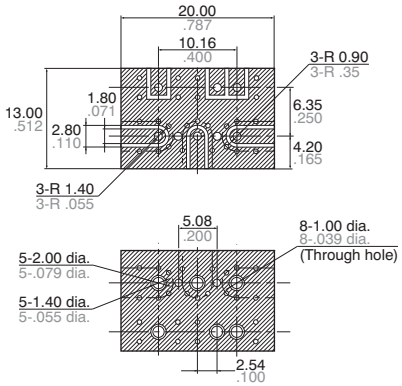
No.	Product name	Contents
1	Agilent 85130-60011	Adapter 2.4mm-3.5mm female .095inch-.138inch female
2	SUHNER SUCOFLEX104	Cable 3.5mm-3.5mm male .138inch-.138inch male

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

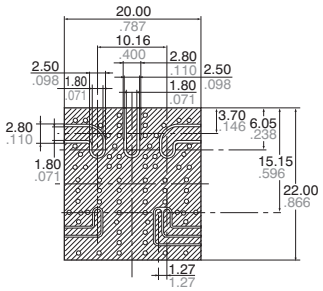
Dimensions (mm inch)



<Surface-mount terminal and E layout>

PC board

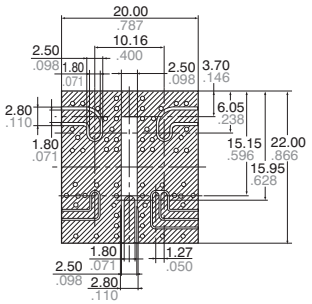
Dimensions (mm inch)



<Surface-mount terminal and Y layout>

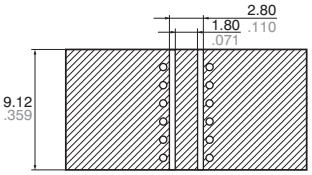
PC board

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

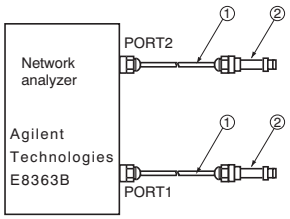
Connector (SMA type receptacle)

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.

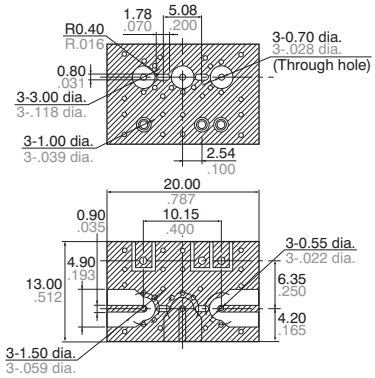
No.	Product name	Contents
1	85134-60003	Test port cable
2	11852B	Conversion adapter; 50Ω N type (female) to 75Ω N type (male)
2	85039-60011	Conversion adapter; 75Ω N type (female) to 75Ω F type (male)

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

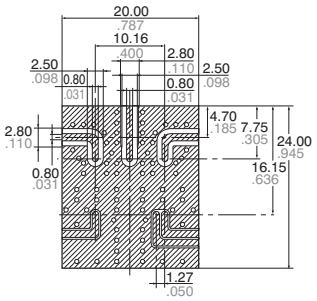
Dimensions (mm inch)



<Surface-mount terminal and E layout>

PC board

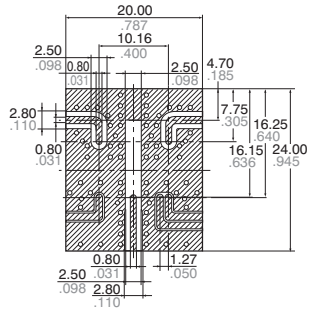
Dimensions (mm inch)



<Surface-mount terminal and Y layout>

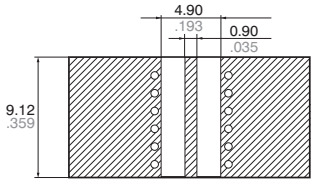
PC board

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

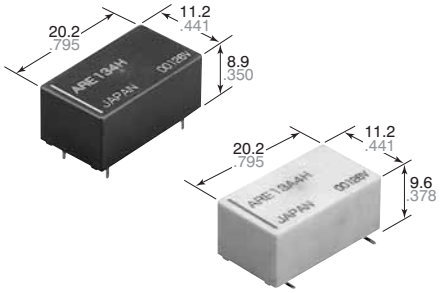
1) The switching lifetime is defined under the standard test condition specified in the JIS* C 5442 standard (temperature 15 to 35°C 59 to 95°F, humidity 25 to 75%). Check this with the real device as it is affected by coil driving circuit, load type, activation frequency, activation phase, ambient conditions 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).

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.

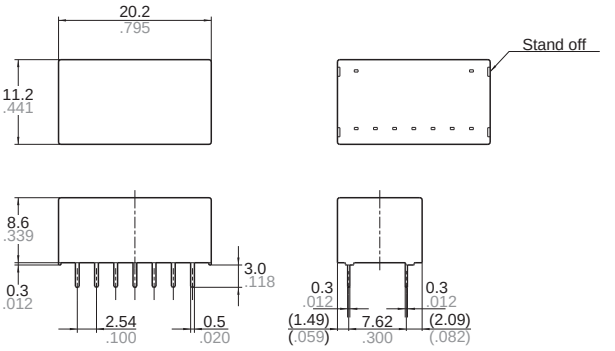
Standard PC board terminal	Surface-mount terminal	Nominal coil voltage, V DC	Pick-up voltage, V DC (max.) (initial)	Drop-out voltage, V DC (min.)(initial)	Coil resistance, Ω (±10%)	Nominal operating current, mA (±10%)	Nominal operating power, mW	Max. allowable voltage, V DC (at 60°C 140°F)
ARE1303	ARE13A03	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

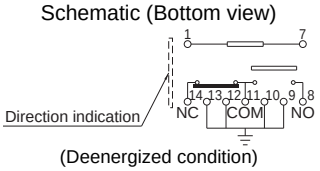
Download CAD Data from our Web site.

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

CAD Data



General tolerance: ±0.3 ±.012

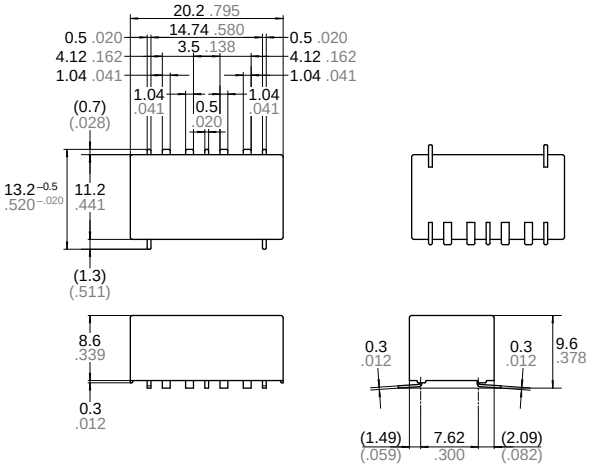


2. Surface mount terminal

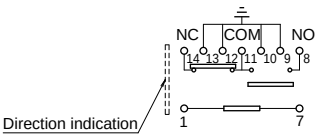
mm inch

CAD Data

• 50Ω type



Schematic (Top view)

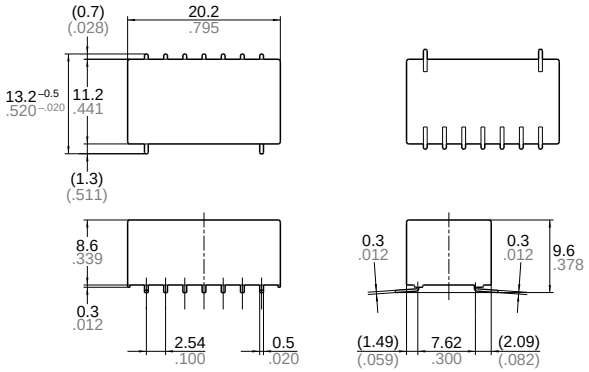


(Deenergized condition)

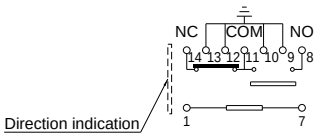
General tolerance: ±0.3 ±.012

• 75Ω type

CAD Data



Schematic (Top view)



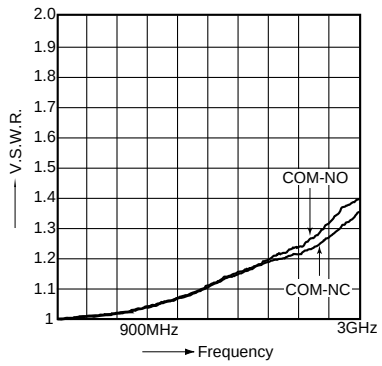
(Deenergized condition)

General tolerance: ±0.3 ±.012

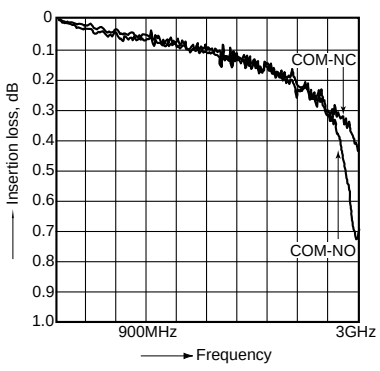
REFERENCE DATA

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

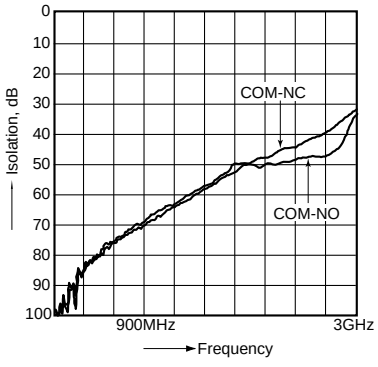
• V.S.W.R. characteristics



• Insertion loss characteristics

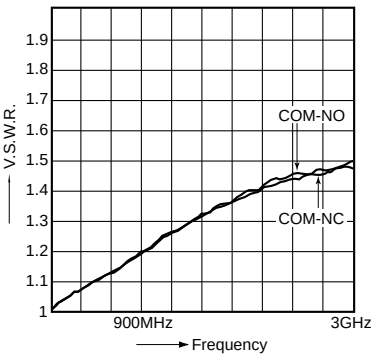


• Isolation characteristics

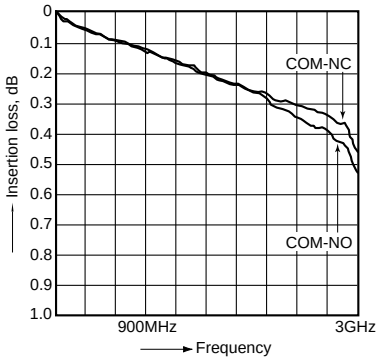


1-(2). High frequency characteristics (Impedance 50Ω) (Standard PC board terminal)

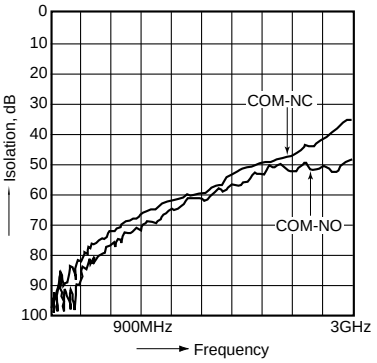
• V.S.W.R. characteristics



• 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

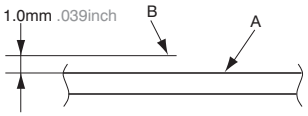
1) The manual soldering shall be performed under following condition.
Max. 260°C 500°F 10s
Max. 350°C 662°F 3s
The affect of the PCB on the relay will differ depending on the type of PCB used. Please verify the type of PCB to be used.
Preheat according to the following conditions.

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.

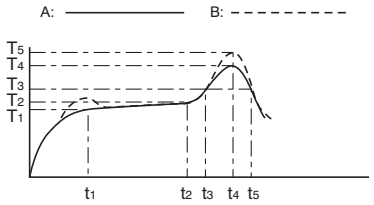
2) In case of automatic soldering, the following conditions should be observed (Surface-mount terminal)

(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



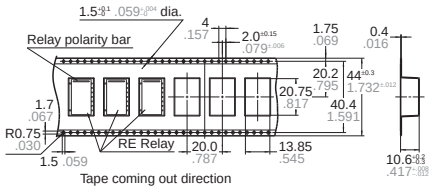
T1=150°C 302°F
T2=160°C 320°F
T3=183°C 361°F
T4=245°C 473°F
T5=270°C 518°F

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

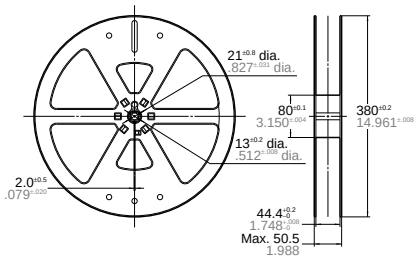
Temperature rise of relay itself may vary according to the mounting level or the heating method of reflow equipment. Therefore, please set the temperature of soldering portion of relay terminal and the top surface of the relay case not to exceed the above mentioned soldering condition.
It is recommended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

4. Packing style

1) Tape dimensions

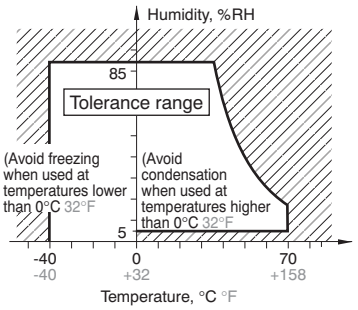


2) Dimensions of plastic reel



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)

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.

REFERENCE DATA

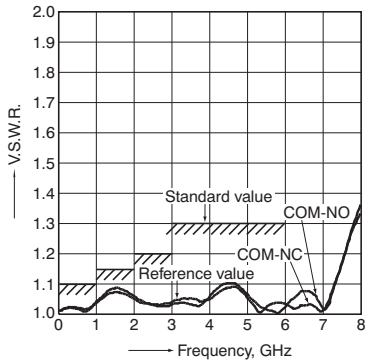
1. High frequency characteristics

Sample: ARN10A12

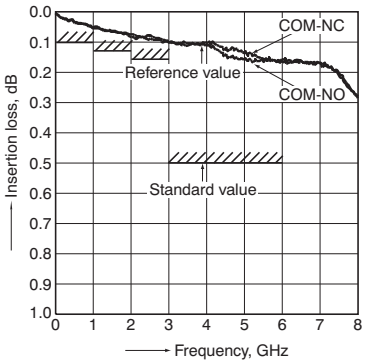
Measuring method: Measured with Agilent Technologies network analyzer (E8363B).

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

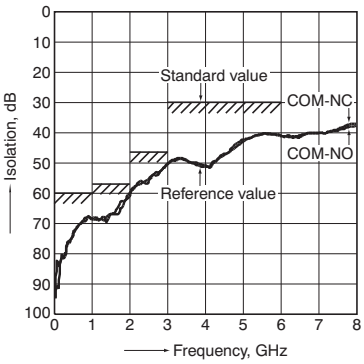
• V.S.W.R. characteristics



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



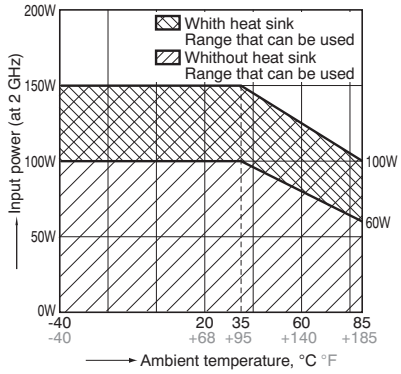
• Isolation characteristics



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)

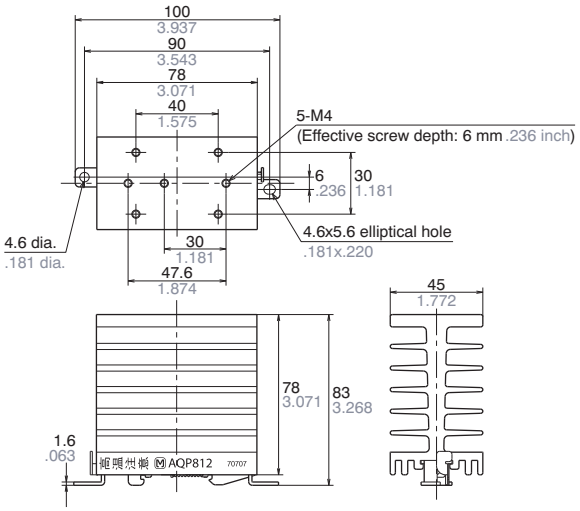


Measuring conditions:

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

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

External dimensions

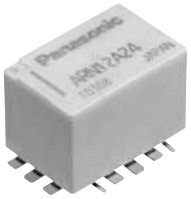


General tolerance: ±0.1 ±.004

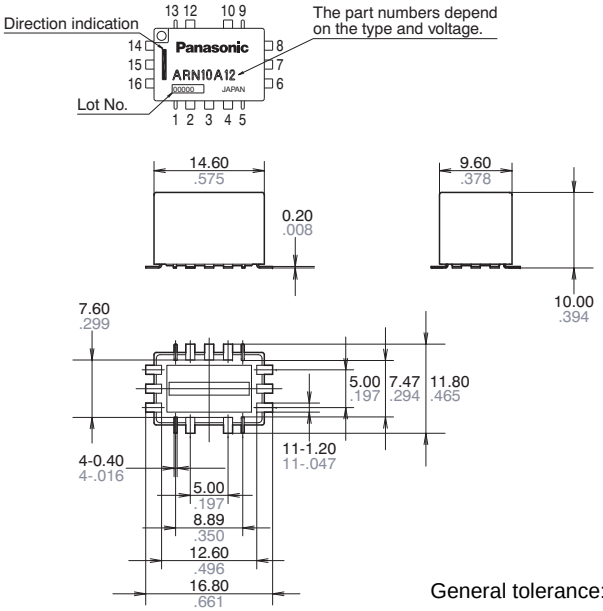
DIMENSIONS (mm inch)

Download CAD Data from our Web site.

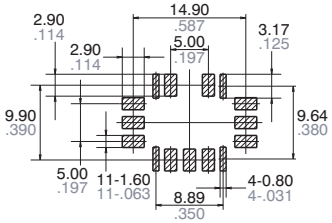
CAD Data



External dimensions



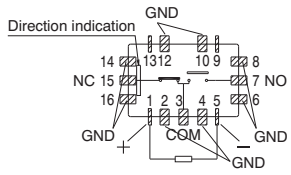
PC board pattern



General tolerance: ±0.3 ±.012

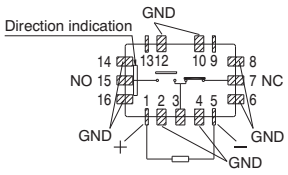
Schematic

Single side stable type/Standard contact type



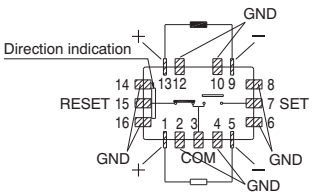
(Deenergized condition)

Single side stable type/Reversed contact type



(Deenergized condition)

2 coil latching type/Standard contact type



(Reset condition)

NOTES

1. Coil operating power

Pure DC current should be applied to the coil. 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 wave form of power should be rectangular. To ensure accurate operation, the voltage on both sides of the coil should be ±5% (at 20°C 68°F) of the nominal coil voltage. Also, please note that the pick-up and drop-out voltages (set and reset voltages) will change depending on operation temperature and conditions of use.

2. Coil connection

This relay is polarized relay, the coil voltage must be applied with correct polarity.

3. External magnetic field

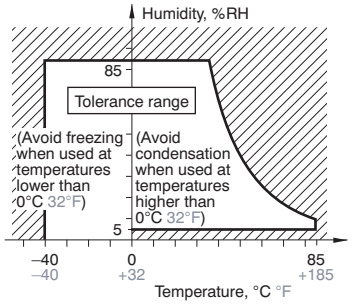
Since RN relays are highly sensitive polarized relays, their characteristics will be affected by a strong external magnetic field. Avoid using the relay under that condition

4. Cleaning

This product is not sealed type, therefore washing is not allowed.

5. Conditions for operation, transport and storage

1) Temperature: –40 to +85°C –40 to +185°F (But allowable temperature is from –40 to +60°C –40 to +140°F at our standard packing condition.)
2) Humidity: 5 to 85% R.H. (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

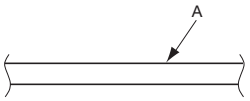


4) Condensation
Condensation forms when there is a sudden change in temperature under high temperature and high humidity conditions. Condensation will cause deterioration of the relay insulation.
5) Freezing
Condensation or other moisture may freeze on the relay when the temperature is lower than 0°C 32°F. This causes problems such as sticking of movable parts or operational time lags.
6) Low temperature and 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, it comes in sealed anti-humidity packaging. However, when storing, please be careful of the following.
(1) Please use promptly once the anti-humidity pack is opened.
(2) When storing for a log period after opening the anti-humidity pack, storage in anti-humidity packaging with an antihumidity 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.

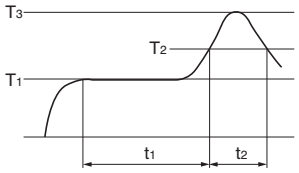
6. Soldering

Please meet the following conditions if this relay is to be automatically soldered.
1) Position of measuring temperature



A: Surface of PC board where relay is mounted.

2) IR (infrared reflow) soldering method

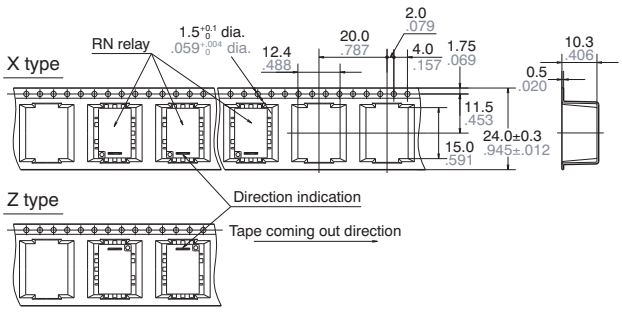


T_1 = 150 to 180°C 302 to 356°F
T_2 = 230°C 446°F and higher
T_3 = 250°C 482°F max.
t_1 = 60s to 120s
t_2 = within 30s

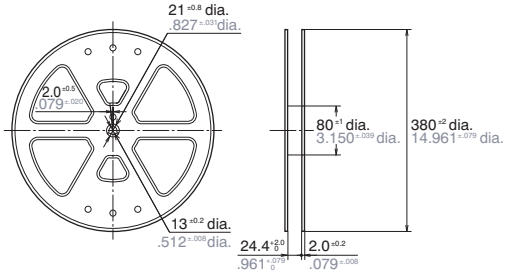
• Mounting cautions
Rise in relay temperature depends greatly on the component mix on a given PC board and the heating method of the reflow equipment. Therefore, please test beforehand using actual equipment to ensure that the temperature where the relay terminals are soldered and the temperature at 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) Max. 260°C 500°F (solder temperature), within 10 seconds (soldering time)
(2) Max. 350°C 662°F (solder temperature), within 3 seconds (soldering time)
The effect on the relay depends on the actual PC board used. Please verify the PC board to be used.

7. Tape and reel packing

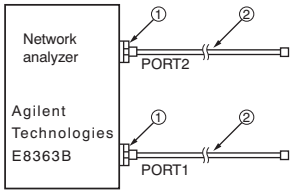
1) Tape dimensions (General tolerance: ±0.1 ±.004)



2) Dimensions of plastic reel



8. Measuring method of high frequency characteristics (Impedance 50Ω)

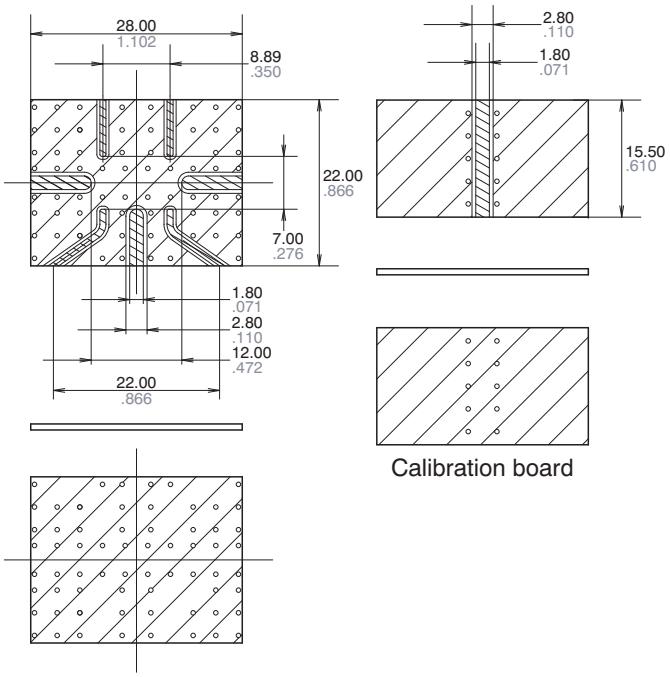


Connect connectors 1 and 2 respectively to PORT 1 and PORT 2. Perform calibration using the 3.5 mm calibration kit (HP85052B).

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.

D.U.T. board
Dimensions (mm inch)



Calibration board

Material: Glass PTFE (double-sided, through hole PC board) R-4737 (Panasonic)
Board thickness: t = 0.8 mm .031 inch
Copper plating thickness: 18 μm
Connector (SMA type)
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 calibration board.

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%RH). 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. *JIS: Japanese Industrial Standards
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

8, 18 and 26.5 GHz, compact size, coaxial switch

RV COAXIAL SWITCHES (ARV)

PIN type

SMA type

FEATURES

1. Compact size (Approx. 85% less volume compared to previous product.*)
PIN type size: L 15.9 × W 15.9 × H 11.2 mm L .626 × W .626 × H .441 inch
2. Excellent high frequency characteristics (to 8, 18, 26.5GHz, 50Ω)
3. Terminal shape options available (PIN and SMA)**
4. Contact arrangement: SPDT
5. Failsafe type and latching type (2-coil latching type) that reduces operating power are now available.

*Compared to previous product (RD coaxial switch) and PIN type RV coaxial switch.
**For SMP connector type, please contact us.

TYPICAL APPLICATIONS

Compact wireless devices
Compact measuring instrument
All types of inspection equipment
Digital broadcasting
• Broadcasting relay station
• Broadcasting equipment
Mobile communication
• Cellular phone base station

1) If you consider using applications requiring frequent switching or high number of operations, please contact us.
2) If you consider using applications with low level load, please contact us.

HIGH FREQUENCY CHARACTERISTICS (Impedance 50Ω, Initial)

1. PIN type

Frequency	to 4 GHz	4 to 8 GHz	8 to 12.4 GHz*	12.4 to 18 GHz*
V.S.W.R. (max.)	1.3	1.4	1.5	1.7
Insertion loss (dB. max.)	0.3	0.4	0.5	0.7
Isolation (dB. min.)	70	60	50	40

Note: *8 to 18GHz characteristics can be applied 18GHz type only.

2. SMA type

Frequency	to 8 GHz	8 to 12.4 GHz*	12.4 to 18 GHz*	18 to 26.5 GHz**
V.S.W.R. (max.)	1.35	1.6	1.7	1.8
Insertion loss (dB. max.)	0.3	0.5	0.7	0.8
Isolation (dB. min.)	70	60	60	50

Note: *8 to 18GHz characteristics can be applied 18GHz type and 26.5GHz type only.
**18 to 26.5GHz characteristics can be applied 26.5GHz type only.

ORDERING INFORMATION

ARV □ □ □ □ □ □ □

Frequency
1: to 8GHz
2: to 18GHz
3: to 26.5GHz (SMA type only)

Operating function
0: Failsafe type/Standard contact
2: Latching type/Standard contact
3: Failsafe type/Reverse contact

Terminal shape
N: PIN type
A: SMA type

Nominal operating voltage
4H: 4.5 V DC
12: 12 V DC
24: 24 V DC

Operation terminal
Nil: Solder terminal

HF data attached
Nil: No HF test data attached
Q: HF test data attached (Displayed only on inner and outer packaging)

*Please inquire regarding use with nominal operating voltage of 28 V DC.

TYPES

SPDT

Operating function	Contact terminal shape	Nominal operating voltage	to 8 GHz type		to 18 GHz type		to 26.5 GHz type	
			No HF datasheet attached	HF datasheet attached	No HF datasheet attached	HF datasheet attached	No HF datasheet attached	HF datasheet attached
Failsafe type/ Standard contact	PIN type	4.5 V DC	ARV10N4H	ARV10N4HQ	ARV20N4H	ARV20N4HQ	–	–
		12 V DC	ARV10N12	ARV10N12Q	ARV20N12	ARV20N12Q	–	–
		24 V DC	ARV10N24	ARV10N24Q	ARV20N24	ARV20N24Q	–	–
	SMA type	4.5 V DC	ARV10A4H	ARV10A4HQ	ARV20A4H	ARV20A4HQ	ARV30A4H	ARV30A4HQ
		12 V DC	ARV10A12	ARV10A12Q	ARV20A12	ARV20A12Q	ARV30A12	ARV30A12Q
		24 V DC	ARV10A24	ARV10A24Q	ARV20A24	ARV20A24Q	ARV30A24	ARV30A24Q
Latching type/ Standard contact	PIN type	4.5 V DC	ARV12N4H	ARV12N4HQ	ARV22N4H	ARV22N4HQ	–	–
		12 V DC	ARV12N12	ARV12N12Q	ARV22N12	ARV22N12Q	–	–
		24 V DC	ARV12N24	ARV12N24Q	ARV22N24	ARV22N24Q	–	–
	SMA type	4.5 V DC	ARV12A4H	ARV12A4HQ	ARV22A4H	ARV22A4HQ	ARV32A4H	ARV32A4HQ
		12 V DC	ARV12A12	ARV12A12Q	ARV22A12	ARV22A12Q	ARV32A12	ARV32A12Q
		24 V DC	ARV12A24	ARV12A24Q	ARV22A24	ARV22A24Q	ARV32A24	ARV32A24Q
Failsafe type/ Reverse contact	PIN type	4.5 V DC	ARV13N4H	ARV13N4HQ	ARV23N4H	ARV23N4HQ	–	–
		12 V DC	ARV13N12	ARV13N12Q	ARV23N12	ARV23N12Q	–	–
		24 V DC	ARV13N24	ARV13N24Q	ARV23N24	ARV23N24Q	–	–
	SMA type	4.5 V DC	ARV13A4H	ARV13A4HQ	ARV23A4H	ARV23A4HQ	ARV33A4H	ARV33A4HQ
		12 V DC	ARV13A12	ARV13A12Q	ARV23A12	ARV23A12Q	ARV33A12	ARV33A12Q
		24 V DC	ARV13A24	ARV13A24Q	ARV23A24	ARV23A24Q	ARV33A24	ARV33A24Q

Standard packing: Carton: 5 pcs. Case: 50 pcs.

RATING

1. Coil data

1) Failsafe type (Standard contact and Reverse contact)

Nominal operating 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*1 (Initial)	10%V or more of nominal voltage*1 (Initial)	155.7mA	28.9Ω	700mW	110%V of nominal voltage
12 V DC			58.3mA	205.7Ω		
24 V DC			29.2mA	822.9Ω		

2) Latching type (Standard contact)

Nominal operating 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*1 (Initial)	75%V or less of nominal voltage*1 (Initial)	155.7mA	28.9Ω	700mW	110%V of nominal voltage
12 V DC			58.3mA	205.7Ω		
24 V DC			29.2mA	822.9Ω		

Notes: *1. Pulse drive (JIS C5442)
*2. Please inquire regarding use with nominal operating voltage of 28 V DC.

2. Specifications

Characteristics	Item		Specifications							
Contact	Arrangement		SPDT							
	Contact material		Gold plating							
	Contact resistance (Initial)		Max. 100mΩ (By voltage drop 10V AC 10mA)							
Rating	Contact input power (CW)		Max. 50W (at 3GHz) (V.S.W.R. 1.3 or less, no contact switching, ambient temperature 20°C 68°F)*1							
	Nominal operating power		700mW							
High frequency characteristics (Impedance 50Ω)			PIN type*2				SMA type			
	Frequency		to 4 GHz	4 to 8 GHz	8 to 12.4 GHz*3	12.4 to 18 GHz*3	to 8 GHz	8 to 12.4 GHz*4	12.4 to 18 GHz*4	18 to 26.5 GHz*5
	V.S.W.R. (max.)		1.3	1.4	1.5	1.7	1.35	1.6	1.7	1.8
	Insertion loss (dB, max.)		0.3	0.4	0.5	0.7	0.3	0.5	0.7	0.8
	Isolation (dB, min.)		70	60	50	40	70	60	60	50
Electrical characteristics	Insulation resistance (Initial)		Min. 1,000 MΩ (at 500 V DC) Measurement at same location as “breakdown voltage (Initial)” section.							
	Breakdown voltage (Initial)	Between open contacts	500 Vrms for 1 min. (Detection current: 10mA)							
		Between contact and earth terminal	500 Vrms for 1 min. (Detection current: 10mA)							
		Between contact and coil	500 Vrms for 1 min. (Detection current: 10mA)							
		Between coil and earth terminal	500 Vrms for 1 min. (Detection current: 10mA)							
Time characteristics (at 20°C 68°F)	Operate time (Set time)		Max. 15ms (approx. 5ms) (Nominal operating voltage applied to the coil, excluding contact bounce time.)							
	Release time (Reset time)		Max. 15ms (approx. 5ms) (Nominal operating voltage applied to the coil, excluding contact bounce time.) (without diode, only for Release time)							
Mechanical characteristics	Shock resistance	Functional	Min. 500 m/s² (Half-wave pulse of sine wave: 11ms, detection time: 10μs.)							
		Destructive	Min. 1,000 m/s² (Half-wave pulse of sine wave: 6ms.)							
	Vibration resistance	Functional	10 to 55 Hz at double amplitude of 3mm (Detection time: 10μs.)							
		Destructive	10 to 55 Hz at double amplitude of 5mm/15 to 2,000 Hz [W0 = 2.94 (m/s²)²/Hz]							
Expected life	Mechanical		Min. 10^6 (at 180 cpm)							
	Electrical (Hot switch)		Min. 3×10^5 (1W High frequency load, at 3GHz, impedance 50Ω, V.S.W.R.; max. 1.3) (at 20 cpm)							
Conditions	Conditions for operation, transport and storage*6		Ambient temperature: –55°C to +85°C –67°F to +185°F Humidity: 5 to 85% R.H. (Not freezing and condensing at low temperature) Air pressure: 86 to 106 kPa							
Unit weight			PIN type: Approx. 12g .42oz				SMA type: Approx. 20g .71oz			

Notes: *1. Factors such as heating of the connected terminal influence the high frequency characteristics; therefore, please verify under actual conditions of use.
*2. Measuring method: After installing on dedicated inspection equipment
*3. 8 to 18GHz characteristics can be applied 18GHz type only.
*4. 8 to 18GHz characteristics can be applied 18GHz and 26.5GHz types only.
*5. 18 to 26.5GHz characteristics can be applied 26.5GHz type only.
*6. The upper operation ambient temperature limit is the maximum temperature that can satisfy the coil temperature rise value. Refer to “NOTES” on page 49.

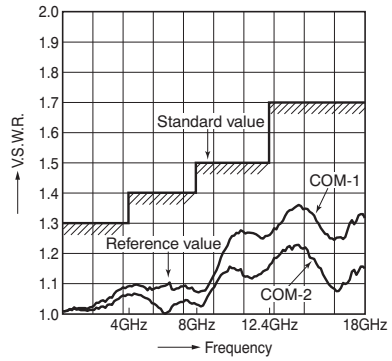
REFERENCE DATA

1-(1). High frequency characteristics (PIN type)

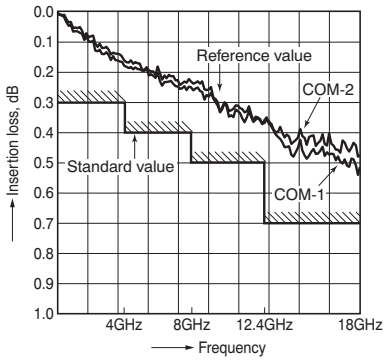
Sample: ARV22N12

Measuring method: Measured with Agilent Technologies network analyzer (E8363B) after installing on dedicated inspection equipment.

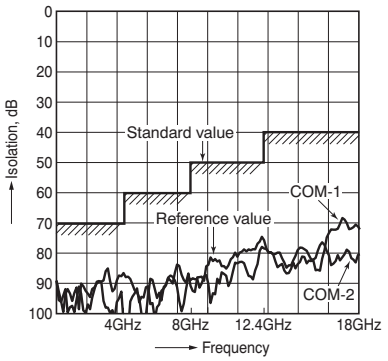
• V.S.W.R.



• Insertion loss



• Isolation

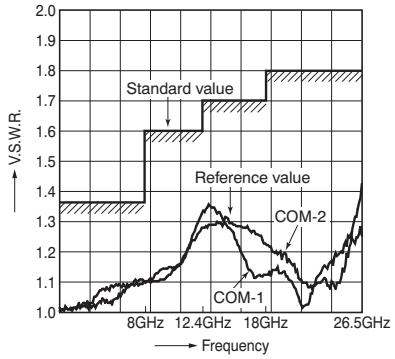


1-(2). High frequency characteristics (SMA type)

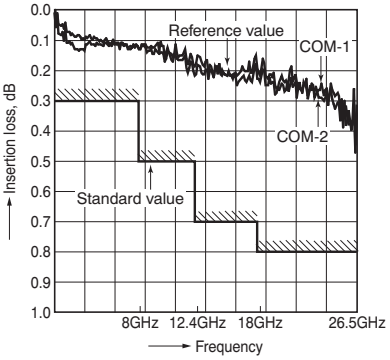
Sample: ARV32A12

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

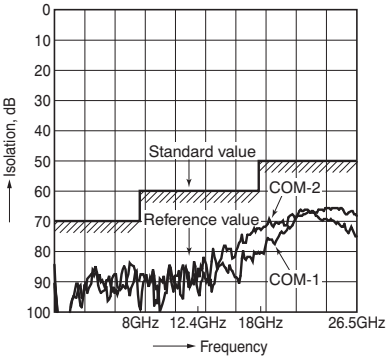
• V.S.W.R.



• Insertion loss



• Isolation

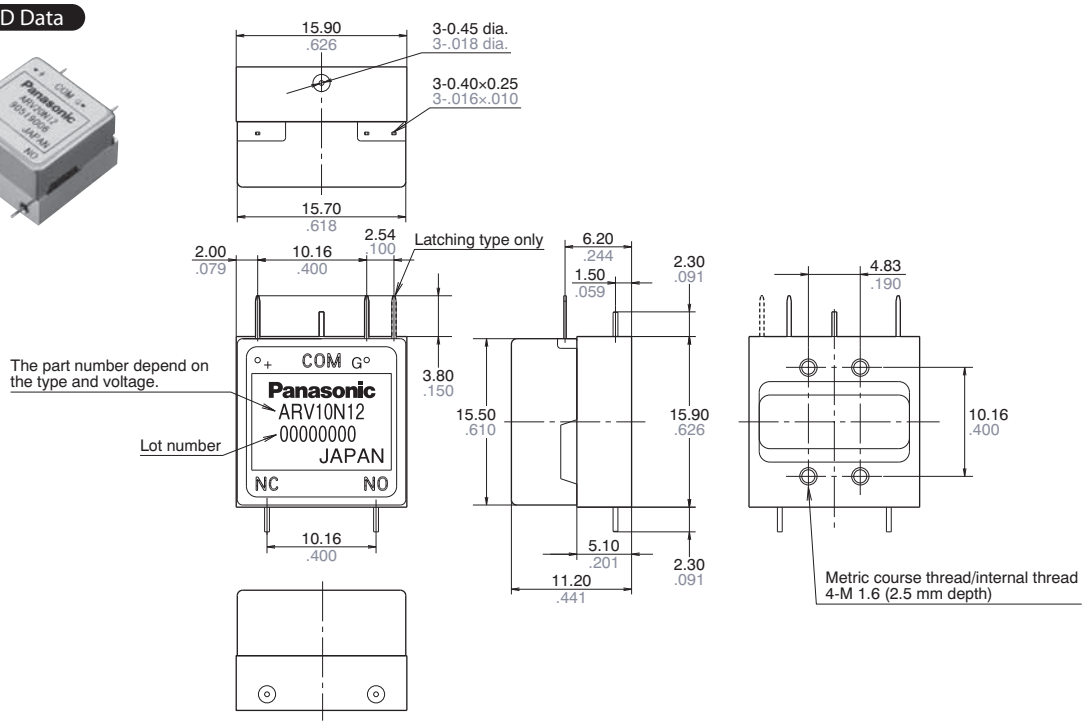


DIMENSIONS (mm inch)

Download CAD Data from our Web site.

1. PIN type

CAD Data



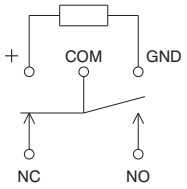
Tolerance: ±0.3 ±.012

Schematic (Top view)

<Standard contact>

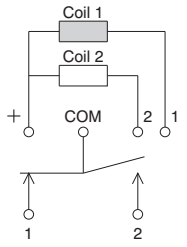
Failsafe type

(Deenergized condition)



Latching type

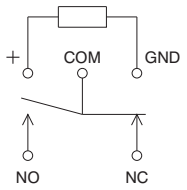
(Reset condition)



<Reverse contact>

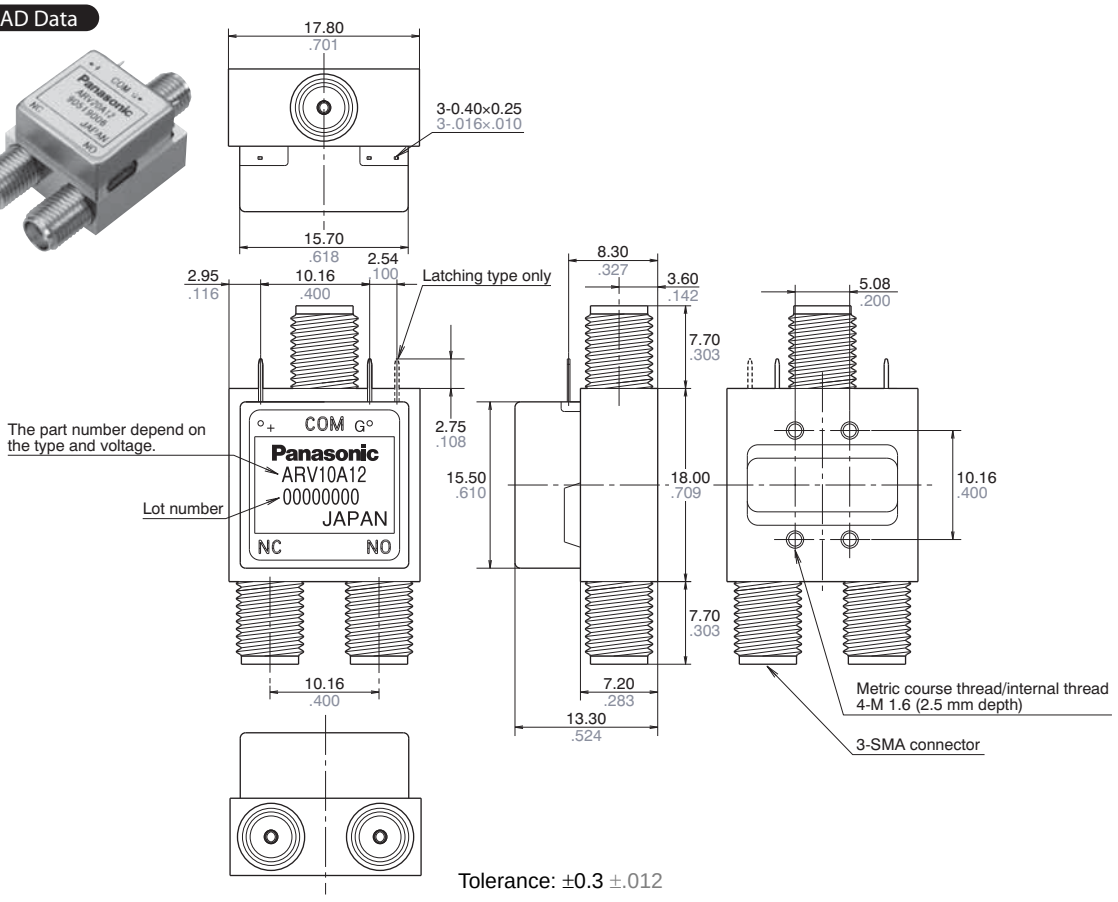
Failsafe type

(Deenergized condition)



2. SMA type

CAD Data



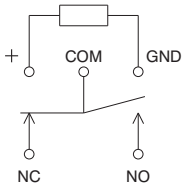
Tolerance: ±0.3 ±.012

Schematic (Top view)

<Standard contact>

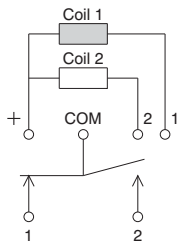
Failsafe type

(Deenergized condition)



Latching type

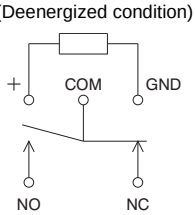
(Reset condition)



<Reverse contact>

Failsafe type

(Deenergized condition)



*For SMP connector type, please consult us.

NOTES

1. For general cautions for use, please refer to the "Cautions for Use" in the "Relay Technical Information".

2. 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 50 ms to set/reset the latching type. Please use the latching type for circuits that are continually powered for long periods of time.

3. Coil connection

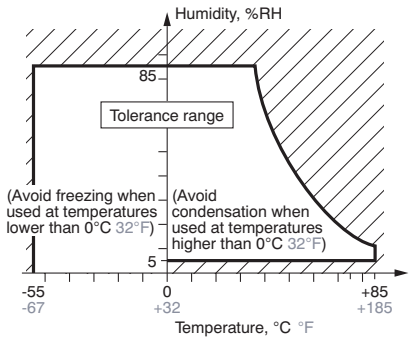
Since this product is polarized, please be aware of the plus/minus polarity of the coil.

4. Connection and washing conditions for coil and PIN type contact terminals

1) The connection of coil and PIN type contact terminals shall be done by soldering.
Soldering conditions
Max. 260°C 500°F (solder temp) within 10sec (soldering time)
Max. 350°C 662°F (solder temp) within 3sec (soldering time)
2) This product is not sealed type, therefore washing is not allowed.

5. Conditions for operation, transport and storage conditions

1) Temperature:
–55 to +85°C –67 to +185°F
2) Humidity: 5 to 85% RH
(Avoid freezing and condensation.)
The humidity range varies with the temperature. Use within the range indicated in the graph below.
3) Atmospheric pressure: 86 to 106 kPa
Temperature and humidity range for usage, transport, and storage:



4) Condensation
Condensation forms when there is a sudden change in temperature under high temperature and high humidity conditions. Condensation will cause deterioration of coaxial switch insulation.
5) Freezing
Condensation or other moisture may freeze on coaxial switch 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 may become brittle if coaxial switch is exposed to a low temperature, low humidity environment for long periods of time.

6. Other handling precautions.

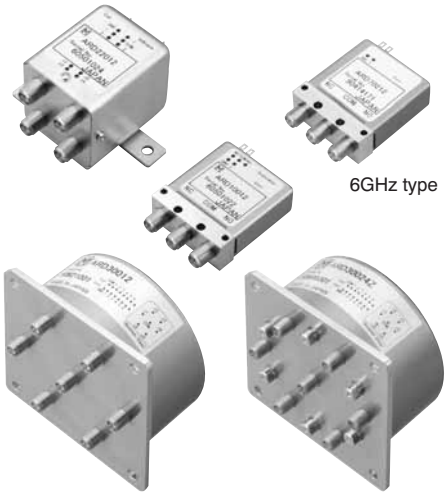
1) Coaxial switch's on/off service life is based on standard test conditions (temperature: 15 to 35°C 59 to 95°F, humidity: 25 to 75%) specified in JIS C5442-1996. Life will depend on many factors of your system: coil drive circuit, type of load, switching intervals, switching phase, ambient conditions, to name a few.
2) Use coaxial switch within specifications such as coil rating, contact rating and on/off service life. If used beyond limits, coaxial switch may overheat, generate smoke or catch fire.
3) Be careful not to drop coaxial switch. If accidentally dropped, carefully check its appearance and characteristics before use.
4) Be careful to wire coaxial switch correctly. Otherwise, malfunction, overheat, fire or other trouble may occur.
5) The latching type product is shipped in the reset position. But jolts during transport or impacts during installation can move it to the set position. It is, therefore, advisable to build a circuit in which coaxial switch can be initialized (set and reset) just after turning on the power.
6) If coaxial switch stays on in a circuit for many months or years at a time without being activated, circuit design should be reviewed so that the coaxial switch can remain deenergized. A coil that receives current all the time heats, which degrades insulation earlier than expected. A latching type is recommended for such circuits.
7) For SMA connectors (SMA type only), we recommend a torque of 0.90±0.1 N·m for installation, which falls within the prescribed torque of MIL-C-39012. Please be aware that conditions might be different depending on the connector materials and how it interacts with surrounding materials.
8) Please do not use silicon based substances such as silicon rubber, silicon oil, silicon coatings and silicon fillings, in the vicinity of the coaxial switch. Doing so may cause volatile silicon gas to form which may lead to contact failure due to the adherence of silicon on the contacts when they open and close in this atmosphere.
9) In order to ensure stable signal communication on contact, it is recommended that the monitoring of contact signal should be started from Min. 100 ms after coil rated voltage is applied.

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

Addition of 6 GHz high reliability RD coaxial switch (SPDT) for communications market

RD COAXIAL SWITCHES (ARD)


6GHz type

FEATURES

1. Excellent high frequency characteristics (50Ω, to 26.5Ghz)
2. SPDT, Transfer and SP6T types are available.
3. High sensitivity
Nominal operating power:
840 mW (SPDT/SP6T, Fail-safe type, with indicator)
1,540 mW (Transfer, Fail-safe type, with indicator)
*Without 24V type
4. Long-lasting life: min. 5 × 10^6
5. With termination type is added. (SP6T)
Thanks to the addition of termination, steady high frequency characteristics can be maintained when contacts are either open or closed and this contributes to increase system reliability.
6. + COM type is available.

TYPICAL APPLICATIONS

Wireless and mobile communication
• Cellular phone base station
• Amplifier switching
Digital broadcasting
• Broadcasting relay station
• Broadcasting equipment
Measuring instrument
All types of inspection equipment

Please inquire beforehand if you are thinking of using this product in applications that involve low level load or high frequency of switching.

HIGH FREQUENCY CHARACTERISTICS (Impedance 50Ω)

Frequency	to 1 GHz	1 to 4 GHz	4 to 8 GHz*1	8 to 12.4 GHz	12.4 to 18 GHz	18 to 26.5 GHz*2
V.S.W.R. (max.)	1.1	1.15	1.25	1.35	1.5	1.7
V.S.W.R. (SP6T With termination) (max.)	1.20		1.40	1.50	—	—
Insertion loss (dB. max.)	0.2		0.3	0.4	0.5	0.8
Isolation (dB. min.)	85	80	70	65	60	55

Notes:
*1The 6GHz type only has the above characteristics up to 6GHz.
*218 to 26.5GHz characteristics can be applied 26.5GHz type only (SPDT, Transfer)

ORDERING INFORMATION

ARD □ □□ □□ □ □ □

RD coaxial switches

Frequency
1: to 18GHz (SPDT)
2: to 18GHz (Transfer)
3: to 13GHz (SP6T)
5: to 26.5GHz (SPDT)
6: to 26.5GHz (Transfer)
7: to 6GHz (SPDT)

Operating function
00: Fail-safe (with indicator)
20: Latching (with indicator)
51: Latching with TTL driver (SPDT, Transfer) (with self cut-off function) (with indicator)
02: Fail-safe (without indicator)
22: Latching (without indicator)
53: Latching with TTL driver (SPDT) (with self cut-off function) (without indicator)

Nominal operating voltage, V DC
4H: 4.5 (Fail-safe, Latching type only)
05: 5 (Latching with TTL driver type only)
12: 12
24: 24

Operation terminal
Nil: Solder terminal
C: Connector cable (SPDT type only)

Termination (SP6T type only)
Nil: No termination
Z: With termination

HF data attached
Nil: No HF test data attached
Q: HF test data attached

Note: Sealed types also available, please consult us (SPDT only)

TYPES

1. SPDT

1) Solder terminal

Operating function	Nominal operating voltage, V DC	6GHz type	18GHz type		26.5GHz type	
		No HF datasheet attached	No HF datasheet attached	HF datasheet attached	No HF datasheet attached	HF datasheet attached
Fail-safe (with indicator)	4.5	ARD7004H	ARD1004H	ARD1004HQ	ARD5004H	ARD5004HQ
	12	ARD70012	ARD10012	ARD10012Q	ARD50012	ARD50012Q
	24	ARD70024	ARD10024	ARD10024Q	ARD50024	ARD50024Q
Latching (with indicator)	4.5	ARD7204H	ARD1204H	ARD1204HQ	ARD5204H	ARD5204HQ
	12	ARD72012	ARD12012	ARD12012Q	ARD52012	ARD52012Q
	24	ARD72024	ARD12024	ARD12024Q	ARD52024	ARD52024Q
Latching with TTL driver (with self cut-off function) (with indicator)	5	ARD75105	ARD15105	ARD15105Q	ARD55105	ARD55105Q
	12	ARD75112	ARD15112	ARD15112Q	ARD55112	ARD55112Q
	24	ARD75124	ARD15124	ARD15124Q	ARD55124	ARD55124Q
Fail-safe (without indicator)	4.5	ARD7024H	—	—	—	—
	12	ARD70212				
	24	ARD70224				
Latching (without indicator)	4.5	ARD7224H	—	—	—	—
	12	ARD72212				
	24	ARD72224				
Latching with TTL driver (with self cut-off function) (without indicator)	5	ARD75305	—	—	—	—
	12	ARD75312				
	24	ARD75324				

Note: Standard packing; Carton: 1 pc. Case: 20 pcs.

2) Connector cable

Operating function	Nominal operating voltage, V DC	18GHz type		26.5GHz type	
		No HF datasheet attached	HF datasheet attached	No HF datasheet attached	HF datasheet attached
Fail-safe	4.5	ARD1004HC	ARD1004HCQ	ARD5004HC	ARD5004HCQ
	12	ARD10012C	ARD10012CQ	ARD50012C	ARD50012CQ
	24	ARD10024C	ARD10024CQ	ARD50024C	ARD50024CQ
Latching	4.5	ARD1204HC	ARD1204HCQ	ARD5204HC	ARD5204HCQ
	12	ARD12012C	ARD12012CQ	ARD52012C	ARD52012CQ
	24	ARD12024C	ARD12024CQ	ARD52024C	ARD52024CQ
Latching with TTL driver (with self cut-off function)	5	ARD15105C	ARD15105CQ	ARD55105C	ARD55105CQ
	12	ARD15112C	ARD15112CQ	ARD55112C	ARD55112CQ
	24	ARD15124C	ARD15124CQ	ARD55124C	ARD55124CQ

Note: Standard packing; Carton: 1 pc. Case: 10 pcs.

2. Transfer

Operating function	Nominal operating voltage, V DC	18GHz type		26.5GHz type	
		No HF datasheet attached	HF datasheet attached	No HF datasheet attached	HF datasheet attached
Fail-safe	4.5	ARD2004H	ARD2004HQ	ARD6004H	ARD6004HQ
	12	ARD20012	ARD20012Q	ARD60012	ARD60012Q
	24	ARD20024	ARD20024Q	ARD60024	ARD60024Q
Latching	4.5	ARD2204H	ARD2204HQ	ARD6204H	ARD6204HQ
	12	ARD22012	ARD22012Q	ARD62012	ARD62012Q
	24	ARD22024	ARD22024Q	ARD62024	ARD62024Q
Latching with TTL driver (with self cut-off function)	5	ARD25105	ARD25105Q	ARD65105	ARD65105Q
	12	ARD25112	ARD25112Q	ARD65112	ARD65112Q
	24	ARD25124	ARD25124Q	ARD65124	ARD65124Q

Note: Standard packing; Carton: 1 pc. Case: 10 pcs.

3. SP6T

Operating function	Nominal operating voltage, V DC	13GHz type	
		No HF datasheet attached	HF datasheet attached
Fail-safe	4.5	ARD3004H	ARD3004HQ
	12	ARD30012	ARD30012Q
	24	ARD30024	ARD30024Q
Latching	4.5	ARD3204H	ARD3204HQ
	12	ARD32012	ARD32012Q
	24	ARD32024	ARD32024Q

Note: Standard packing; Carton: 1 pc. Case: 5 pcs.

4. SP6T (with termination)

Operating function	Nominal operating voltage, V DC	13GHz type	
		No HF datasheet attached	HF datasheet attached
Fail-safe	4.5	ARD3004HZ	ARD3004HZQ
	12	ARD30012Z	ARD30012ZQ
	24	ARD30024Z	ARD30024ZQ
Latching	4.5	ARD3204HZ	ARD3204HZQ
	12	ARD32012Z	ARD32012ZQ
	24	ARD32024Z	ARD32024ZQ

Note: Standard packing; Carton: 1 pc. Case: 5 pcs.

RATING

1. Coil data

(1) SPDT

1) Fail-safe type

Nominal operating voltage, V DC	Nominal operating current, mA (+10%/–15%) (at 20°C 68°F)		Nominal power consumption, mW	
	With indicator	Without indicator	With indicator	Without indicator
4.5	186.7	155.6	840	700
12	70.0	58.3		
24	40.4	29.2	970	

2) Latching type

Nominal operating voltage, V DC	Nominal operating current, mA (+10%/–15%) (at 20°C 68°F)		Nominal power consumption, mW	
	With indicator	Without indicator	With indicator	Without indicator
4.5	155.6	111.1	700	500
12	62.5	41.7	750	
24	37.5	16.7	900	

3) Latching with TTL driver type

Nominal operating voltage, V DC	TTL logic level (see TTL logic level range)		Electronic self cut-off	Switching frequency
	ON	OFF		
5	2.4 to 5.5V	0 to 0.5V	Available	Max. 180 cpm (ON time : OFF time = 1 : 1)
12				
24				

(2) Transfer

1) Fail-safe type

Nominal operating voltage, V DC	Nominal operating current, mA (+10%/–15%) (at 20°C 68°F)	Nominal power consumption, mW
4.5	342.2	1540
12	128.3	
24	69.6	1670

2) Latching type

Nominal operating voltage, V DC	Nominal operating current, mA (+10%/–15%) (at 20°C 68°F)	Nominal power consumption, mW
4.5	266.7	1200
12	104.2	1250
24	58.3	1400

3) Latching with TTL driver type (with self cut-off function)

Nominal operating voltage, V DC	TTL logic level (see TTL logic level range)		Electronic self cut-off	Switching frequency
	ON	OFF		
5	2.4 to 5.5V	0 to 0.5V	Available	Max. 180 cpm (ON time : OFF time = 1 : 1)
12				
24				

(3) SP6T and SP6T (with termination type)

1) Fail-safe type

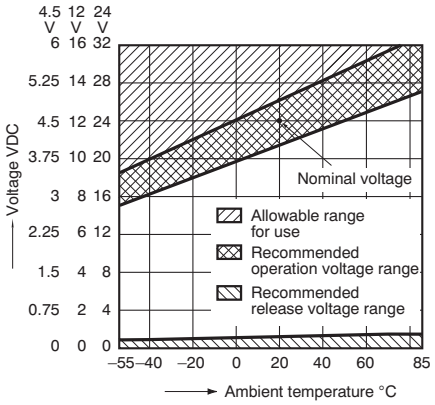
Nominal operating voltage, V DC	Nominal operating current, mA (+10%/–15%) (at 20°C 68°F)	Nominal power consumption, mW
4.5	186.7	840
12	70.0	
24	40.4	970

2) Latching type

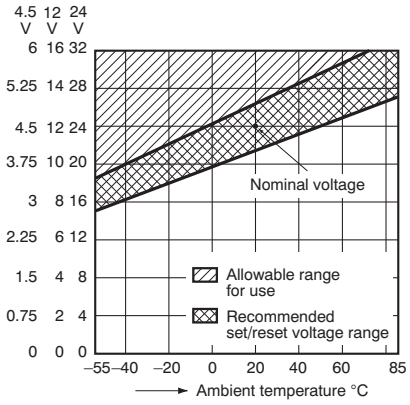
Nominal operating voltage, V DC	Nominal operating current, mA (+10%/–15%) (at 20°C 68°F)	Nominal power consumption, mW
4.5	SET: 155.6 / RESET (ALL): 933.6	SET: 700 / RESET (ALL): 4,200
12	SET: 62.5 / RESET (ALL): 375.0	SET: 750 / RESET (ALL): 4,500
24	SET: 37.5 / RESET (ALL): 225.0	SET: 900 / RESET (ALL): 5,400

• Operating voltage range

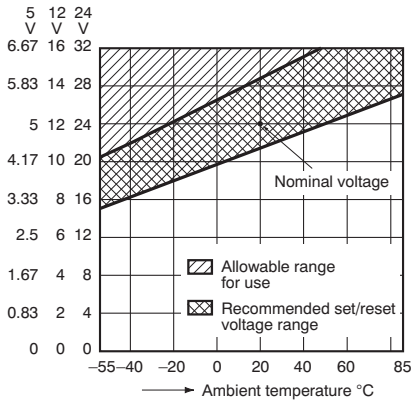
1) Fail-safe type



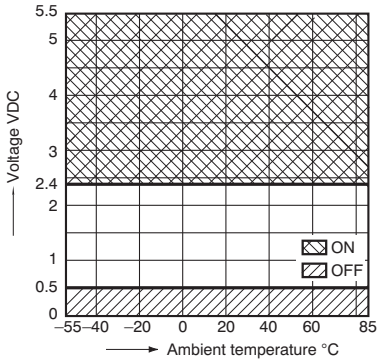
2) Latching type



3) Latching with TTL driver type (with self cut-off function)



4) TTL Logic level range



Note: Please consult us for use that is outside this range.

2. Specifications

1) SPDT/Transfer

Characteristics	Item		Specifications					
Contact	Arrangement		SPDT			Transfer		
	Contact material		Gold plating					
	Initial contact resistance		Max. 100mΩ (By voltage drop 6V DC 1A)					
Rating	Contact input power		120W (at 3GHz) (V.S.W.R. 1.15 or less, no contact switching, ambient temperature 40°C 104°F [SPDT], 25°C 77°F [Transfer])*1					
	Nominal operating power	Fail-safe	840mW (4.5V, 12V DC), 970mW (24V DC)			1,540mW (4.5V, 12V DC), 1,670mW (24V DC)		
		Latching	700mW (4.5V DC), 750mW (12V DC), 900mW (24V DC)			1,200mW (4.5V DC), 1,250mW (12V DC), 1,400mW (24V DC)		
Indicator rating (with indicator type only)	Contact rating		Max. 30V 100mA					
	Initial contact resistance		Max. 1Ω (Measured by 5V 100mA)					
	Min. switching capacity (Reference value)		3V DC, 0.1mA (5×10^6, Reliability level: 10% (3kΩ))					
High frequency characteristics (Impedance 50Ω)			to 1 GHz	1 to 4 GHz	4 to 8 GHz*2	8 to 12.4 GHz	12.4 to 18 GHz	18 to 26.5 GHz*3
	V.S.W.R. (max.)		1.1	1.15	1.25	1.35	1.5	1.7
	Insertion loss (dB, max.)		0.2		0.3	0.4	0.5	0.8
	Isolation (dB, min.)		85	80	70	65	60	55
Electrical characteristics	Insulation resistance (Initial)		Min. 1,000 MΩ (at 500 V DC) Measurement at same location as “breakdown voltage (Initial)” section.					
	Breakdown voltage (Initial)	Between open contacts	500 Vrms for 1 min. (Detection current: 10mA)					
		Between contact and coil	500 Vrms for 1 min. (Detection current: 10mA)					
		Between contact and earth terminal	500 Vrms for 1 min. (Detection current: 10mA)					
		Between coil and earth terminal	500 Vrms for 1 min. (Detection current: 10mA)					
Time characteristics (at 20°C 68°F)	Operate time		Max. 15ms (Nominal operating voltage applied to the coil, excluding contact bounce time.)			Max. 20ms (Nominal operating voltage applied to the coil, excluding contact bounce time.)		
Mechanical characteristics	Shock resistance	Functional	Min. 500 m/s² (Half-wave pulse of sine wave: 11ms, detection time: 10μs.)					
		Destructive	Min. 1,000 m/s² (Half-wave pulse of sine wave: 11ms.)					
	Vibration resistance	Functional	10 to 55 Hz at double amplitude of 3mm (Detection time: 10μs.)					
		Destructive	10 to 55 Hz at double amplitude of 5mm					
Expected life	Mechanical		6GHz type: Min. 10^6 18 and 26.5GHz type: Min. 5×10^6 (All types, at 180 cpm)			Min. 5×10^6 (at 180 cpm)		
	Electrical	High frequency contact (Hot switch)	6GHz type: Min. 10^6 18 and 26.5GHz type: Min. 5×10^6 (All types, 5W to 3GHz, impedance 50Ω, V.S.W.R.; max. 1.2) (at 20 cpm)			Min. 5×10^6 (5W to 3GHz, impedance 50Ω, V.S.W.R.; max. 1.2) (at 20 cpm)		
		Indicator (with indicator type only)	5 V DC, 10 mA, Min. 10^6 (at 20 cpm)					
Conditions	Conditions for operation, transport and storage*4		Ambient temperature: –55°C to +85°C –67°F to +185°F Humidity: 5 to 85% R.H. (Not freezing and condensing at low temperature)					
Unit weight			Approx. 50g 1.76oz			Approx. 110g 3.88oz		

*1 Factors such as heating of the connected connector influence the high frequency characteristics; therefore, please verify under actual conditions of use.
*2 The 6GHz type only has the above characteristics up to 6GHz.
*3 18 to 26.5GHz characteristics can be applied 26.5GHz type only (SPDT, Transfer)
*4 The upper operation ambient temperature limit is the maximum temperature that can satisfy the coil temperature rise value.

2) SP6T

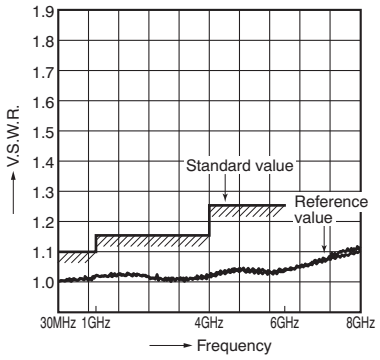
Characteristics	Item		Specifications			
Contact	Arrangement		SP6T			
	Contact material		Gold plating			
	Initial contact resistance		Max. 100mΩ (By voltage drop 6V DC 1A)			
Rating	Contact input power	No termination	120 W (at 3GHz) (V.S.W.R. 1.15 or less, no contact switching, ambient temperature 25°C 77°F)*1			
		With termination	2W (at 3GHz) (V.S.W.R. 1.15 or less, no contact switching, ambient temperature 25°C 77°F)*1			
	Nominal operating power	Fail-safe	840mW (4.5V, 12V DC), 970mW (24V DC)			
		Latching	700mW (4.5V DC), 750mW (12V DC), 900mW (24V DC)			
Indicator rating	Contact rating		Max. 30V 100mA			
	Initial contact resistance		Max. 1Ω (Measured by 5V 100mA)			
	Min. switching capacity (Reference value)		3V DC, 0.1mA (5×10^6, Reliability level: 10% (3kΩ))			
High frequency characteristics (Impedance 50Ω)			to 1 GHz	1 to 4 GHz	4 to 8 GHz	8 to 13 GHz
	V.S.W.R. (max.)	No termination	1.1	1.15	1.25	1.35
		With termination	1.20		1.40	1.50
	Insertion loss (dB, max.)		0.2		0.3	0.4
	Isolation (dB, min.)		85	80	70	65
Electrical characteristics	Insulation resistance (Initial)		Min. 1,000 MΩ (at 500 V DC) Measurement at same location as “breakdown voltage (Initial)” section.			
	Breakdown voltage (Initial)	Between open contacts	500 Vrms for 1 min. (Detection current: 10mA)			
		Between contact and coil	500 Vrms for 1 min. (Detection current: 10mA)			
		Between contact and earth terminal	500 Vrms for 1 min. (Detection current: 10mA)			
		Between coil and earth terminal	500 Vrms for 1 min. (Detection current: 10mA)			
Time characteristics (at 20°C 68°F)	Operate time		Max. 20ms (Nominal operating voltage applied to the coil, excluding contact bounce time.)			
Mechanical characteristics	Shock resistance	Functional	Min. 500 m/s² (Half-wave pulse of sine wave: 11ms, detection time: 10μs.)			
		Destructive	Min. 1,000 m/s² (Half-wave pulse of sine wave: 11ms.)			
	Vibration resistance	Functional	10 to 55 Hz at double amplitude of 3mm (Detection time: 10μs.)			
		Destructive	10 to 55 Hz at double amplitude of 5mm			
Expected life	Mechanical		Min. 5×10^6 (at 180 cpm)			
	Electrical	High frequency contact (Hot switch)	No termination	Min. 5×10^6 (5W to 3GHz, impedance 50¾, V.S.W.R.; max. 1.2) (at 20 cpm)		
			With termination	Min. 5×10^6 (2W to 3GHz, impedance 50¾, V.S.W.R.; max. 1.2) (at 20 cpm)		
		Indicator (with indicator type only)	5 VDC, 10 mA, Min. 10^6 (at 20 cpm)			
Conditions	Conditions for operation, transport and storage*2		Ambient temperature: –55°C to +85°C –67°F to +185°F Humidity: 5 to 85% R.H. (Not freezing and condensing at low temperature)			
Unit weight			Approx. 320g 11.29oz			

*1 Factors such as heating of the connected connector influence the high frequency characteristics; therefore, please verify under actual conditions of use.
*2 The upper operation ambient temperature limit is the maximum temperature that can satisfy the coil temperature rise value.

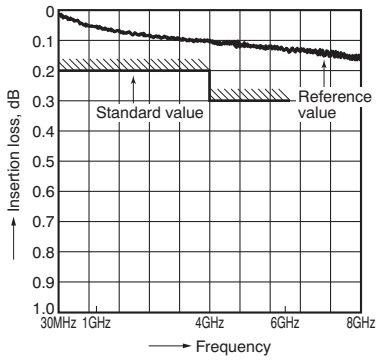
REFERENCE DATA

1-(1). High frequency characteristics (SPDT) 6GHz type
Sample: ARD70012
Measuring method: Measured with Agilent Technologies network analyzer (E8363B).

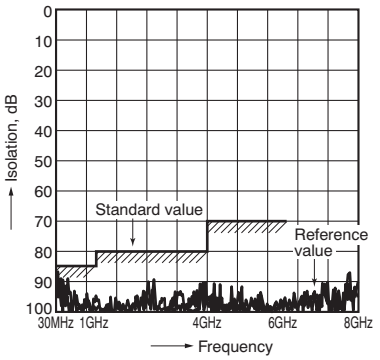
• V.S.W.R.



• Insertion loss

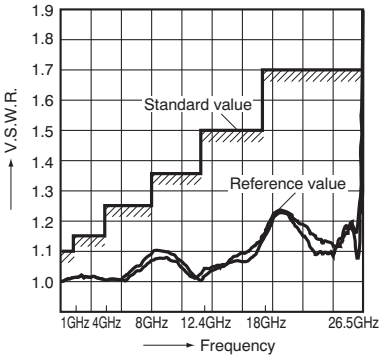


• Isolation

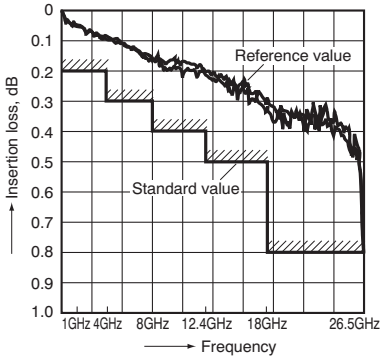


1-(2). High frequency characteristics (SPDT) 18, 26.5GHz type
Sample: ARD10012
Measuring method: Measured with Agilent Technologies network analyzer (HP8510).

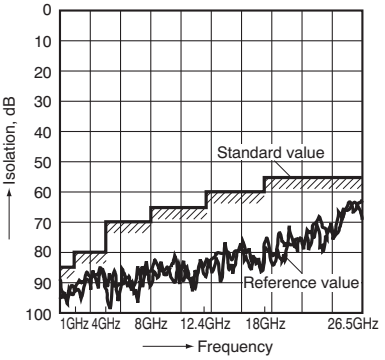
• V.S.W.R.



• Insertion loss

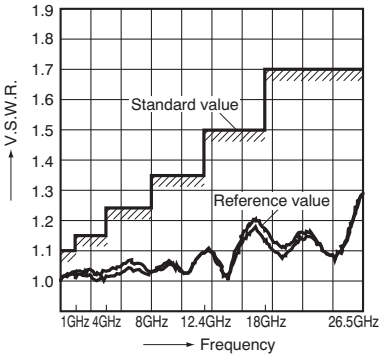


• Isolation

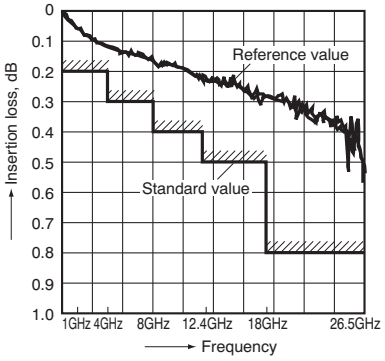


1-(3). High frequency characteristics (Transfer)
Sample: ARD60012
Measuring method: Measured with Agilent Technologies network analyzer (HP8510).

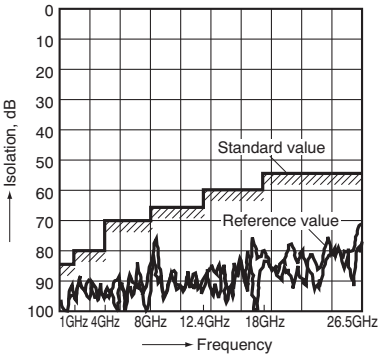
• V.S.W.R.



• Insertion loss



• Isolation

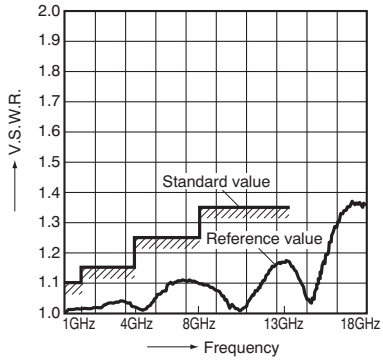


1-(4). High frequency characteristics (SP6T)

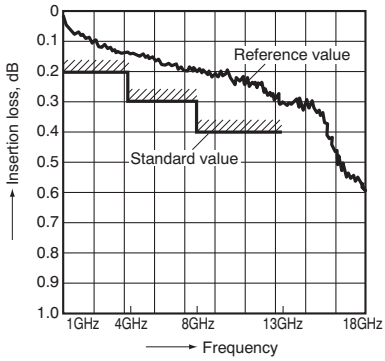
Sample: ARD30012

Measuring method: Measured with Agilent Technologies network analyzer (HP8510).

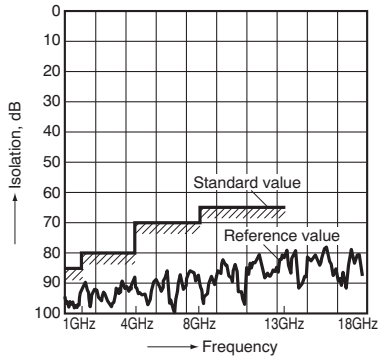
• V.S.W.R.



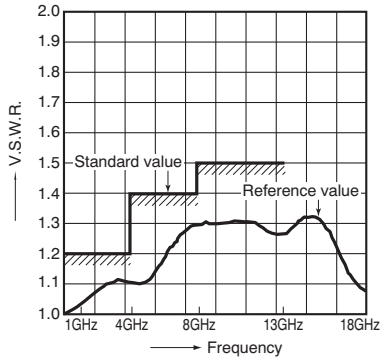
• Insertion loss



• Isolation



• Termination characteristics



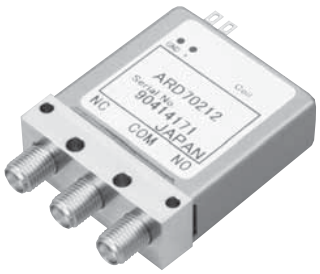
DIMENSIONS (mm inch)

Download CAD Data from our Web site.

1. SPDT

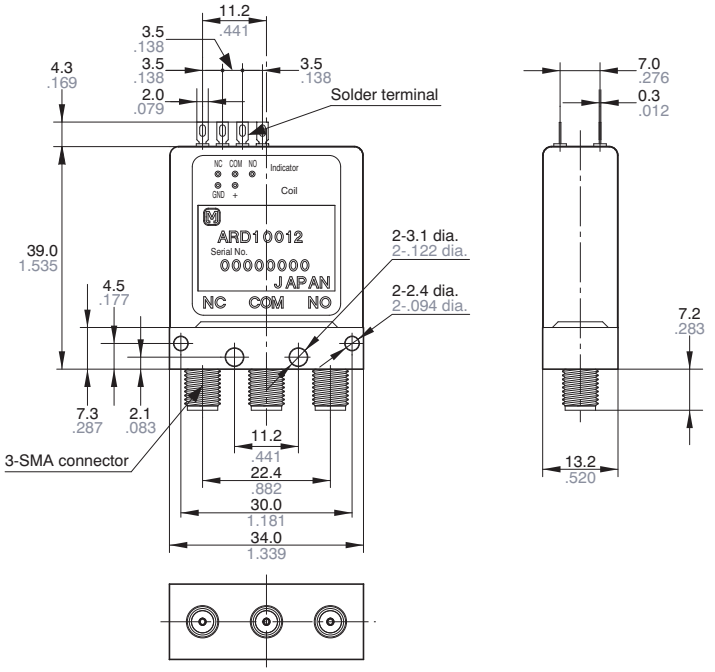
CAD Data

1) Solder terminal



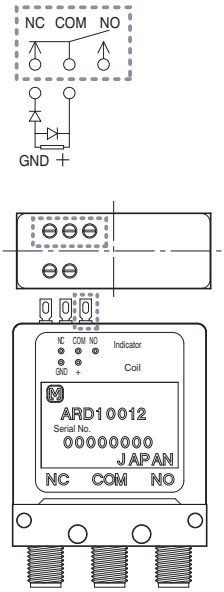
6GHz type

18 and 26.5GHz types

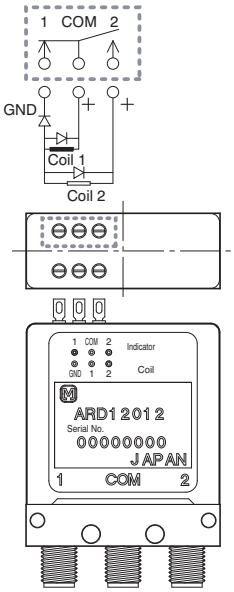


Tolerance: ±0.3 ±.012

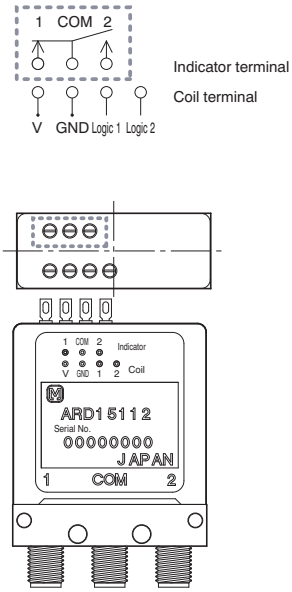
Fail-safe



Latching



Latching with TTL driver
(with self cut-off function)



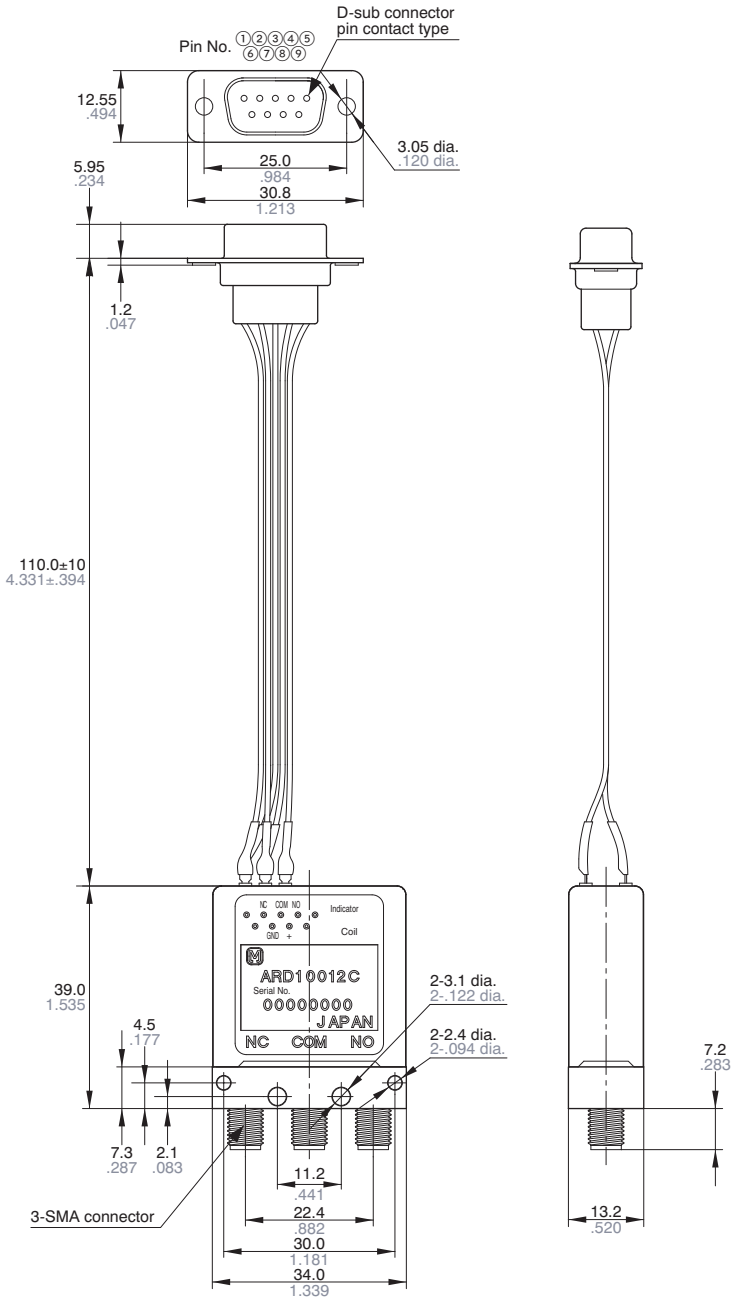
∗ + COM type is available

* The type without indicator terminals will not have the indicator terminals that are marked with the dotted box.

2) Connector cable

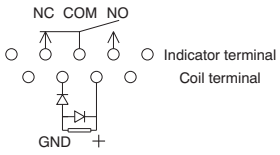
CAD Data

	Indicator					Coil			
Pin No.	1	2	3	4	5	6	7	8	9
Fail-safe	–	NC	COM	NO	–	–	GND	+	–
Latching	–	1	COM	2	–	–	GND	1	2
Latching with TTL driver	–	1	COM	2	–	V	GND	Logic 1	Logic 2

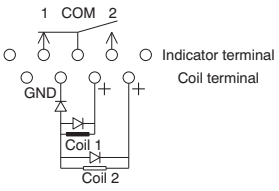


Tolerance: ±0.3 ±.012

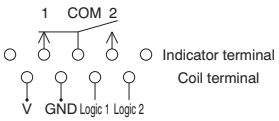
Fail-safe



Latching



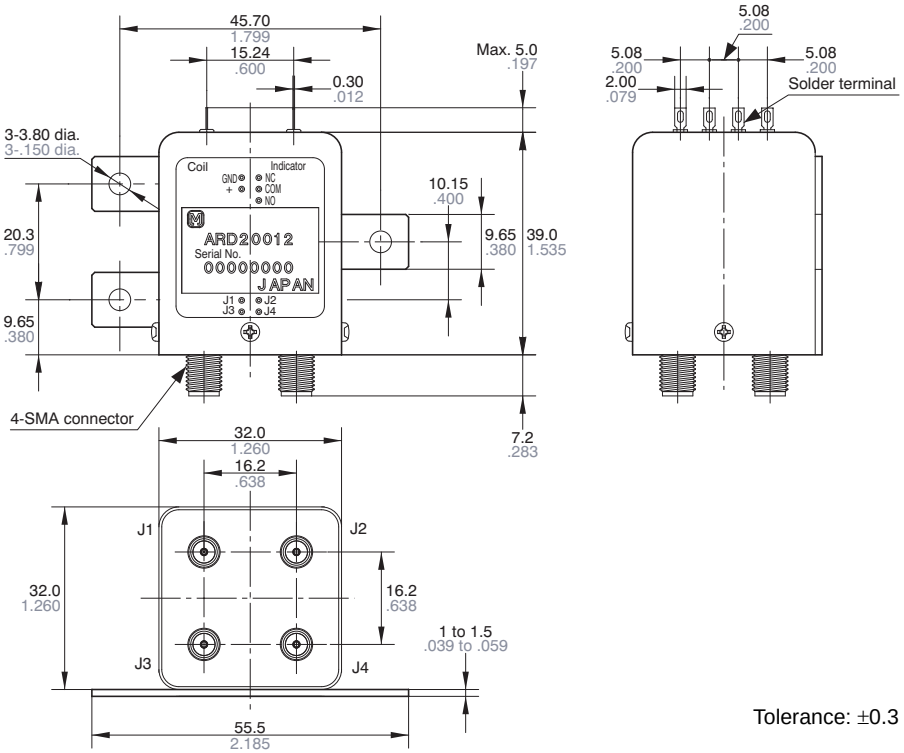
Latching with TTL driver
(with self cut-off function)



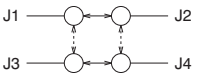
∗ + COM type is available

2. Transfer

CAD Data

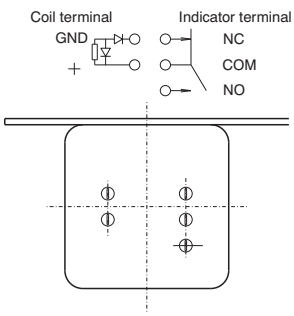


Tolerance: ±0.3 ±.012

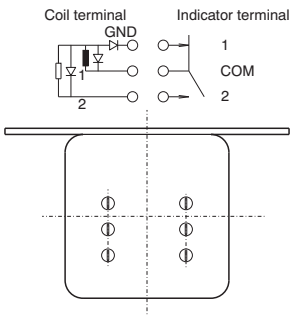


Fail-safe	NC: J1-J2, J3-J4 NO: J1-J3, J2-J4
Latching	POS1: J1-J2, J3-J4 POS2: J1-J3, J2-J4
Latching with TTL driver	POS1: J1-J2, J3-J4 POS2: J1-J3, J2-J4

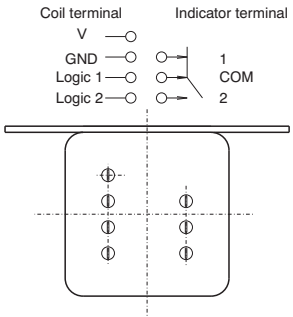
Fail-safe



Latching



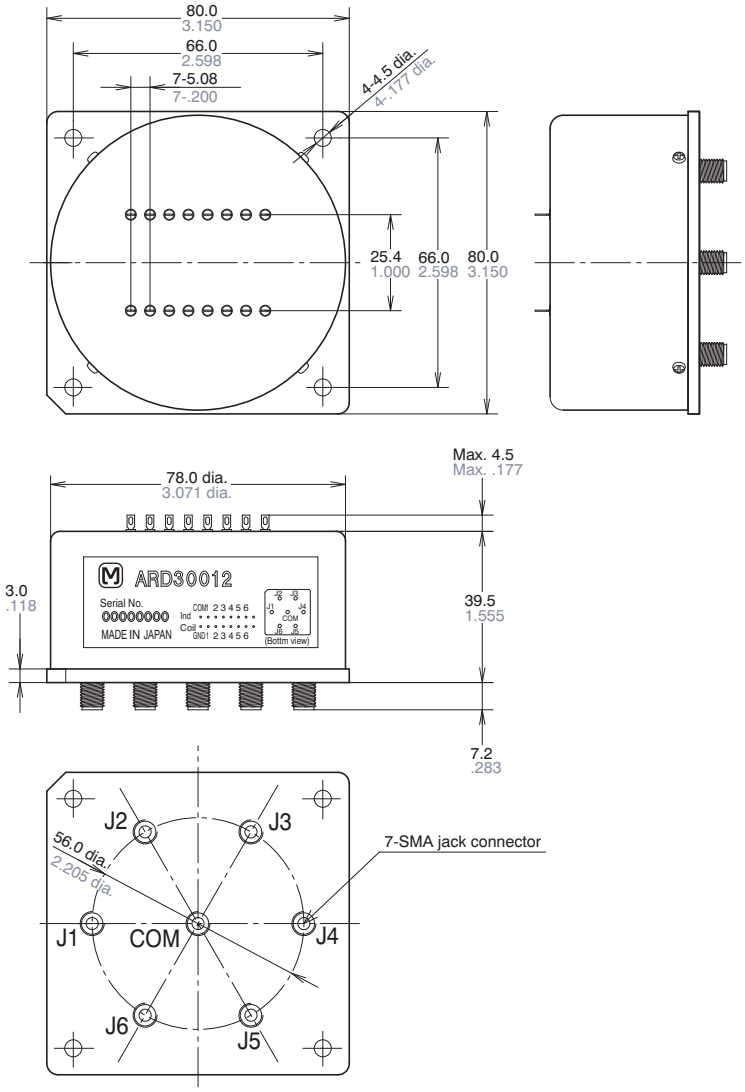
Latching with TTL driver
(with self cut-off function)



∗ + COM type is available

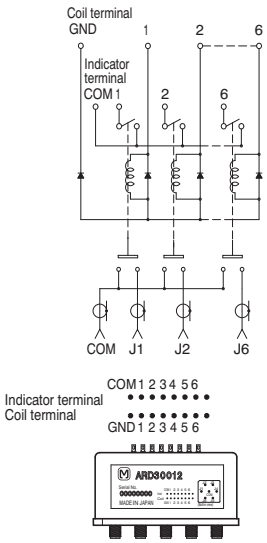
3. SP6T

CAD Data

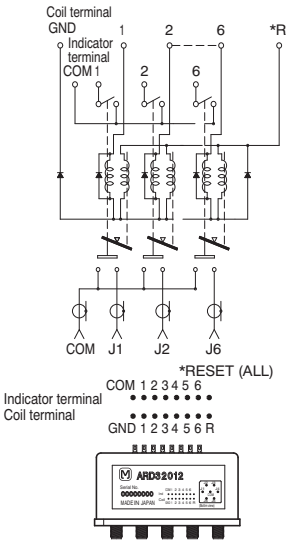


Tolerance: ±0.3 ±.012

Fail-safe type



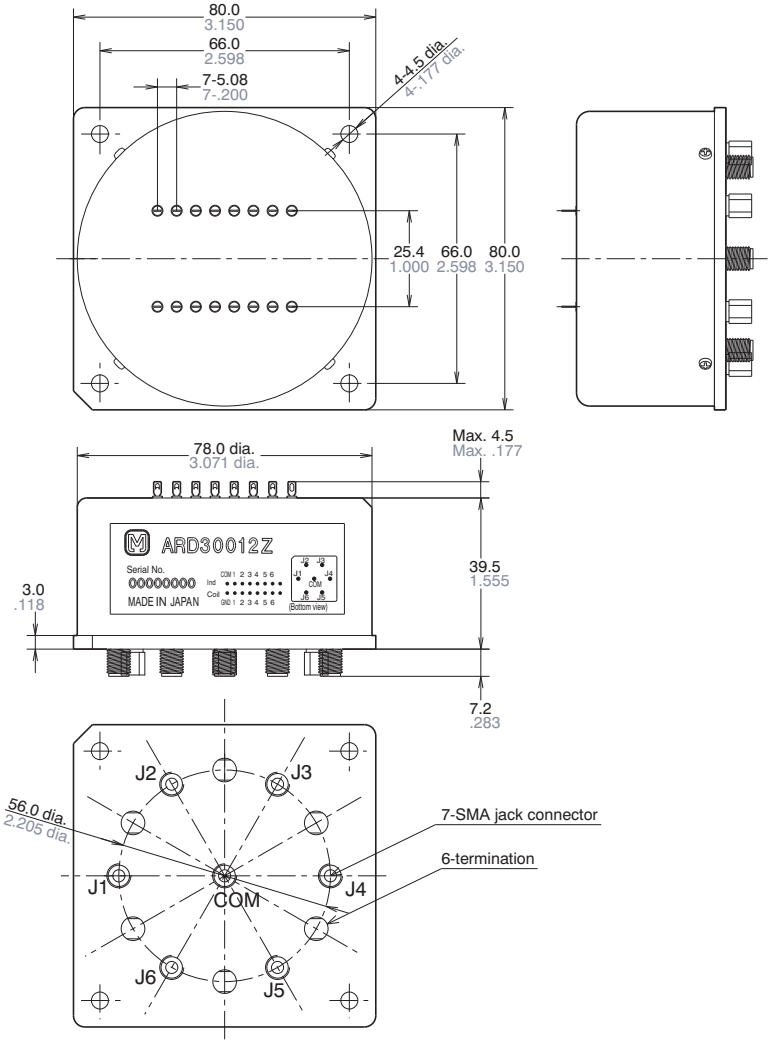
Latching type



∗ + COM type is available.

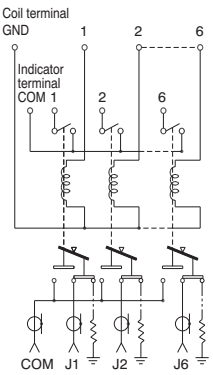
4. SP6T (with termination)

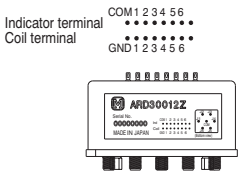
CAD Data



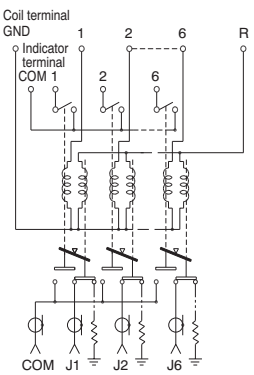
Tolerance: ±0.3 ±.012

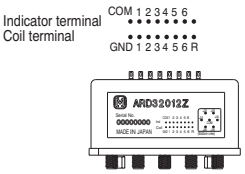
Fail-safe type





Latching type





NOTES

1. For general cautions for use, please refer to the "General Application Guidelines".

2. 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 50 ms to set/reset the latching type relay.

Please use the latching type for circuits that are continually powered for long periods of time.

3. Coil connection

When connecting coils, refer to the wiring diagram to prevent mis-operation or malfunction.

4. Connection of coil indicator and washing conditions

1) The connection of coil indicator terminal shall be done by soldering.

Soldering conditions

Max. 260°C 500°F (solder temp) within 10sec (soldering time)

Max. 350°C 662°F (solder temp) within 3sec (soldering time)

2) This product is not sealed type, therefore washing is not allowed.

5. Conditions for operation, transport and storage conditions

1) Temperature:

–55 to +85°C –67 to +185°F

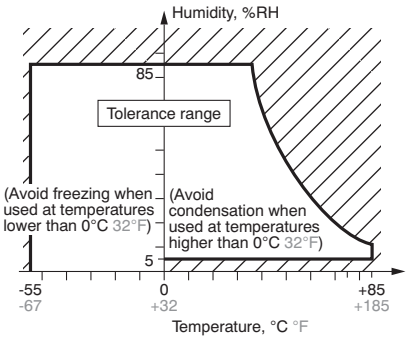
2) Humidity: 5 to 85% RH

(Avoid freezing and condensation.)

The humidity range varies with the temperature. Use within the range indicated in the graph below.

3) Atmospheric pressure: 86 to 106 kPa

Temperature and humidity range for usage, transport, and storage:



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 may become brittle if the relay is exposed to a low temperature, low humidity environment for long periods of time.

6. Other handling precautions

1) The relay's on/off service life is based on standard test conditions (temperature: 15 to 35°C 59 to 95°F, humidity: 25 to 75%) specified in JIS C5442-1996. Life will depend on many factors of your system: coil drive circuit, type of load, switching intervals, switching phase, ambient conditions, to name a few.

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) The latching type relay is shipped in the reset position. But jolts during transport or impacts during installation can move it to the set 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.

6) 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.

7) For SMA connectors, we recommend a torque of 0.90±0.1 N·m for installation, which falls within the prescribed torque of MIL-C-39012. Please be aware that conditions might be different depending on the connector materials and how it interacts with surrounding materials.

8) Please do not use silicon based substances such as silicon rubber, silicon oil, silicon coatings and silicon fillings, in the vicinity of the relay. Doing so may cause volatile silicon gas to form which may lead to contact failure due to the adherence of silicon on the contacts when they open and close in this atmosphere.

9) Please note that when switching contacts (latching type only), you must apply reset (ALL) voltage and release all contacts first. (SP6T type)

10) Do not use multiple contacts simultaneously. (SP6T type)

11) The indicator terminal is the terminal that indicates the operation status of the MAIN contact.

12) For details about the drive method of the latching with TTL driver type, please refer to the RD coaxial switch catalog on the website.

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.

RELIABILITY

[1] WHAT IS RELIABILITY?

1. Reliability in a Narrow Sense of the Term

In the industrial world, reliability is an index of how long a particular product serves without failure.

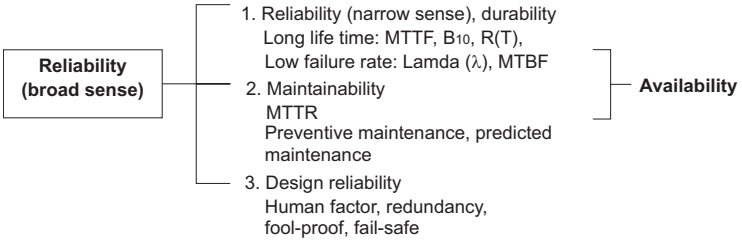
2. Reliability in a Broad Sense of the Term

Every product has a finite service lifetime. This means that no product can continue normal service infinitely. When a product has broken down, the user may throw it away or repair it. The reliability of repairable products is recognized as "reliability in a broad sense of the term". For repairable products, their serviceability or maintainability is another problem. In addition, reliability of product design is becoming a serious concern for the manufacturing industry. In short, reliability has three senses: i.e. reliability of the product itself, serviceability of the product, and reliability of product design.

3. Intrinsic Reliability and Reliability of Use

Reliability is "built" into products. This is referred to as intrinsic reliability which consists mainly of reliability in the narrow sense.

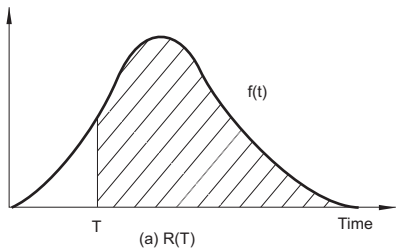
Product reliability at the user's site is called "reliability of use", which consists mainly of reliability in the broad sense. In the relay industry, reliability of use has a significance in aspects of servicing.



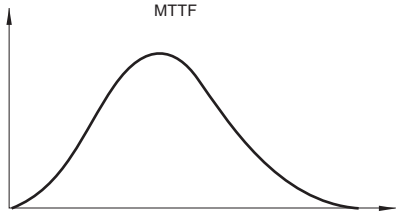
[2] RELIABILITY MEASURES

The following list contains some of the most popular reliability measures:

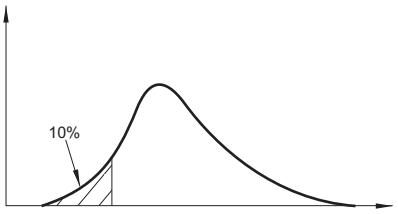
Reliability measure	Sample representation
Degree of reliability R(T)	99.9%
MTBF	100 hours
MTTF	100 hours
Failure rate λ	20 fit, 1%/hour
Safe life B_{10}	50 hours



(a) R(T)



(b) MTTF



(c) Safe life

1. Degree of Reliability

Degree of reliability represents percentage ratio of reliability. For example, if none of 10 light bulbs has failed for 100 hours, the degree of reliability defined in, 100 hours of time is 10/10 = 100%. If only three bulbs remained alive, the degree of reliability is 3/10 = 30%.

The JIS Z8115 standard defines the degree of reliability as follows:

The probability at which a system, equipment, or part provides the specified functions over the intended duration under the specified conditions.

2. MTBF

MTBF is an acronym of mean time between failures. It indicates the mean time period in which a system, equipment, or part operates normally between two incidences of repair. MTBF only applies to repairable products.

MTBF tells how long a product can be used without the need for repair.

Sometimes MTBF is used to represent the service lifetime before failure.

3. MTTF

MTTF is an acronym of mean time to failure. It indicates the mean time period until a product becomes faulty MTTF normally applies to unrepairable products such as parts and materials.

The relay is one of such objective of MTTF.

4. Failure Rate

Failure rate includes mean failure rate and momentary failure rate.

Mean failure rate is defined as follows:

Mean failure rate = Total failure count/ total operating hours

In general, failure rate refers to momentary failure rate. This represents the probability at which a system, equipment, or part, which has continued normal operation to a certain point of time, becomes faulty in the subsequent specified time period.

Failure rate is often represented in the unit of percent/hours. For parts with low failure rates, "failure unit (Fit) = 10^{-9} / hour" is often used instead of failure rate. Percent/count is normally used for relays.

5. Safe Life

Safe life is an inverse of degree of reliability. It is given as value B which makes the following equation true:

$1 - R(B) = t\ \%$

In general, "B[1 – R(B)] = 10%" is more often used. In some cases this represents a more practical value of reliability than MTTF.

[3] FAILURE

1. What is Failure?

Failure is defined as a state of system, equipment, or component in which part of all of its functions are impaired or lost.

2. Bathtub Curve

Product's failure rate throughout its lifetime is depicted as a bathtub curve, as shown below. Failure rate is high at the beginning and end of its service lifetime.

(I) Initial failure period

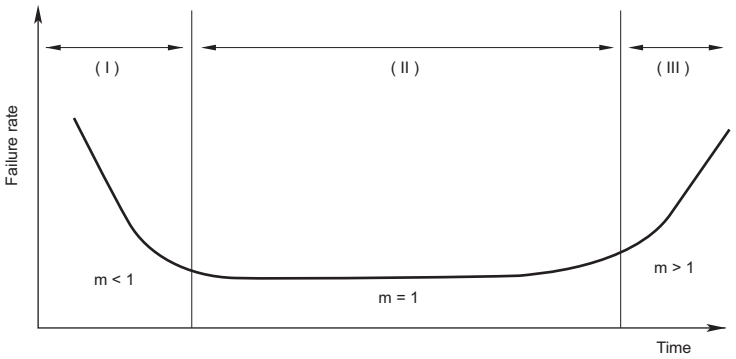
The high failure rate in the initial failure period is derived from latent design errors, process errors, and many other causes. Initial failures are screened at manufacturer's site through burn-in process. This process is called debugging, performing aging or screening.

(II) Accidental failure period

The initial failure period is followed by a long period with low, stable failure rate. In this period, called accidental failure period, failures occurs at random along the time axis. While zero accidental failure rate is desirable, this is actually not practical in the real world.

(III) Wear-out failure period

In the final stage of the product's service lifetime comes the wear-out failure period, in which the life of the product expires due to wear of fatigue. Preventive maintenance is effective for this type of failure. The timing of a relay's wear-out failure can be predicted with a certain accuracy from the past record of uses. The use of a relay is intended only in the accidental failure period, and this period virtually represents the service lifetime of the relay.



3. Weibull Analysis

Weibull analysis is often used for classifying a product's failure patterns and to determine its lifetime. Weibull distribution is expressed by the following equation:

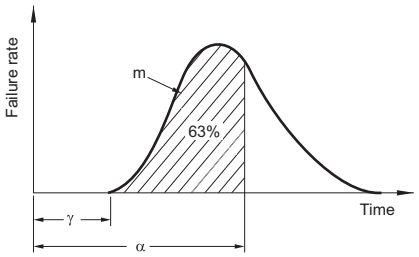
$$f(x) = \frac{m}{\alpha}(\chi-\gamma)^{m-1} e^{-\frac{(\chi-\gamma)^m}{\alpha}}$$

m : Figure parameter

α : Measurement parameter

γ : Position parameter

Weibull distribution can be adopted to the actual failure rate distribution if the three variables above are estimated.



The Weibull probability chart is a simpler alternative of complex calculation formulas. The chart provides the following advantages:

- The Weibull distribution has the closest proximity to the actual lifetime distribution.
- The Weibull probability chart is easy to use.
- Different types of failures can be identified on the chart.

The following describes the correlation with the bathtub curve. The value of the figure parameter "m" represents the type of the failure.

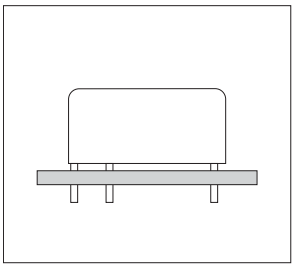
- When m < 1: Initial failures
- When m = 1: Accidental failures
- When m > 1: Wear-out failures

RELAY SOLDERING AND CLEANING GUIDELINES

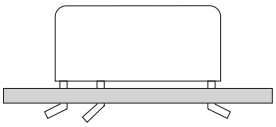
In keeping with making devices compact, it is becoming more common to weld the relay to a PC board along with the semiconductors instead of using the previous plug-in type in which relays were plugged into sockets. With this style, loss of function may occur because of seepage into the relay of flux, which is applied to the PC board. Therefore, the following precautions are provided for soldering a relay onto a PC board. Please refer to them during installation in order to avoid problems.

The type of protective structure will determine suitability for automatic soldering or automatic cleaning. Please review the parts on construction and characteristics. See “Configuration and Construction” on page 72.

1. Mounting of relay

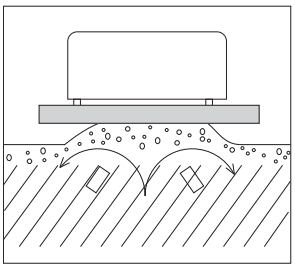


- Avoid bending the terminals to make the relay self-clinching. Relay performance cannot be guaranteed if the terminals are bent. Self-clinching terminal types are available depending on the type of relay.
- Correctly drill the PC board according to the given PC board pattern illustration.
- Stick packaging is also available for automatic mounting, depending on the type of relay. (Be sure that the relays don’t rattle.) Interference may occur internally if the gripping force of the tab of the surface mounting machine is too great. This could impair relay performance.

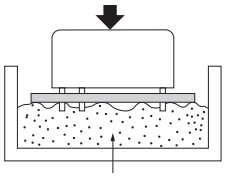


Bad example

2. Flux application

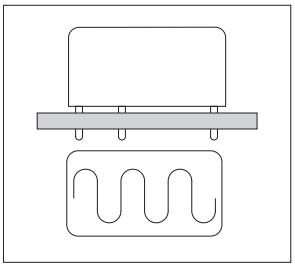


- Adjust the position of the PC board so that flux does not overflow onto the top of it. This must be observed especially for dust-cover type relays.
- Use rosin-based non-corrosive flux.
- If the PC board is pressed down into a flux-soaked sponge as shown on the right, the flux can easily penetrate a dust-cover type relay. Never use this method. Note that if the PC board is pressed down hard enough, flux may even penetrate a flux-resistant type relay.



Bad example

3. Preheating

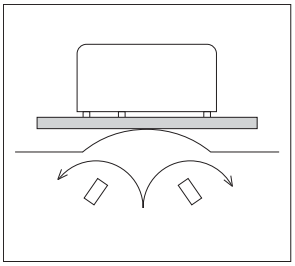


- Be sure to preheat before using automatic soldering. For dust-cover type relays and flux-resistant type relays, preheating acts to prevent the penetration of flux into the relay when soldering. Solderability also improves.
- Preheat according to the following conditions.

Temperature	120°C 248°F or less
Time	Within approx. 2 minutes

- Note that long exposure to high temperatures (e.g. due to a malfunctioning unit) may affect relay characteristics.

4. Soldering



- **Automatic soldering**
- Flow solder is the optimum method for soldering.
- Adjust the level of solder so that it does not overflow onto the top of the PC board.
- Unless otherwise specified, solder under the following conditions depending on the type of relay.

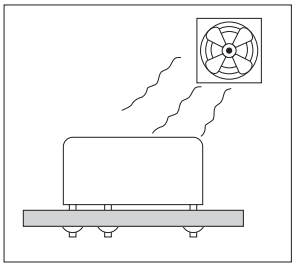
Solder temperature	260°C±5°C 500°F±41°F
Soldering time	Within approx. 6 seconds

- Please take caution with multi-layer boards. Relay performance may degrade due to the high thermal capacity of these boards.
- **Hand soldering**

Keep the tip of the soldering iron clean.

Soldering Iron	30W to 60W
Iron Tip Temperature	350°C 662°F
Soldering Time	Within approx. 3 seconds

5. Cooling

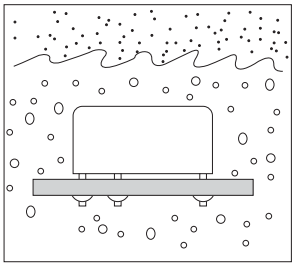


- **Automatic soldering**
- Immediate air cooling is recommend to prevent deterioration of the relay and surrounding parts due of soldering heat.
- Although the environmentally sealed type relay (plastic sealed type, etc.) can be cleaned, avoid immersing the relay into cold liquid (such as cleaning solvent) immediately after soldering. Doing so may deteriorate the sealing performance.

- **Hand soldering**

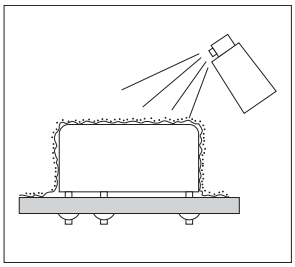
—

6. Cleaning



- Do not clean dust-cover type relays and flux-resistant type relays by immersion. Even if only the bottom surface of the PC board is cleaned (e.g. with a brush), careless cleaning may cause cleaning solvent to penetrate the relay.
- Plastic sealed type relays can be cleaned by immersion. Use a Freon- or alcohol-based cleaning solvent. Use of other cleaning solvents (e.g. Trichlene, chloroethene, thinner, benzyl alcohol, gasoline) may damage the relay case.
- Cleaning with the boiling method is recommended. Avoid ultrasonic cleaning on relays. Use of ultrasonic cleaning may cause breaks in the coil or slight sticking of the contacts due to the ultrasonic energy.
- Do not cut the terminals. When terminals are cut, breaking of coil wire and slight sticking of the contacts may occur due to vibration of the cutter.

7. Coating



- If the PC board is to be coated to prevent the insulation of the PC board from deteriorating due to corrosive gases and high temperatures, note the following.
- Do not coat dust-cover type relays and flux-resistant type relays, since the coating material may penetrate the relay and cause contact failure. Or, mount the relay after coating.
- If the relay and all components (e.g. ICs) are to be coated, be sure to carefully check the flexibility of the coating material. The solder may peel off from thermal stress.
- Depending on the type, some coating materials may have an adverse affect on relays. Furthermore, solvents (e.g. xylene, toluene, MEK, I.P.A.) may damage the case or chemically dissolve the epoxy and break the seal. Select coating materials carefully.
- If the relay and all components (e.g. ICs) are to be coated, be sure to carefully check the flexibility of the coating material. The solder may peel off from thermal stress.

Type	Suitability for Relays	Features
Epoxy-base	Good	• Good electrical insulation. • Although slightly difficult to apply, does not affect relay contacts.
Urethane-base	Care	• Good electrical insulation, easy to apply. • Solvent may damage case. Check before use.
Silicone-base	No Good	• Silicone gas becomes the cause of contact failure. Do not use the silicone-base type.

SMT SOLDERING GUIDELINES

CAUTIONS FOR SURFACE MOUNT RELAY INSTALLATION

To meet the market demand for downsizing to smaller, lighter, and thinner products, PC boards also need to proceed from Insertion mounting to surface mounting technology. To meet this need, we offer a line of surface mount relays. The following describes some cautions required for surface mount relay installation to prevent malfunction and incorrect operation.

[1] What is a Surface Mount Relay?

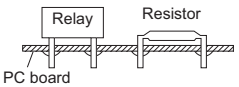
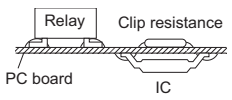
1. From IMT to SMT

Conventional insertion mount technology (IMT) with some 30 years of history is now being replaced with surface mount technology (SMT).

Solid-state components such as resistors, ICs, and diodes can withstand high heat stresses from reflow soldering because they use no mechanical parts. In contrast, the conventional electro-mechanical relays consisting of solenoid coils, springs, and armatures are very sensitive to thermal stress from reflow soldering.

We applied the experience gained from our advanced relay technologies to produce high-performance electromagnetic relays compatible with surface mount technologies such as IRS and VPS.

•Insertion Mount Technology (IMT) vs. Surface Mount Technology (SMT)

Insertion Mounting Technology (IMT)	Components' leads are inserted into lead holes drilled into the PC board and are soldered to copper pads on the other side of the board using flow-soldering techniques.	
Surface Mount Technology (SMT)	Components are placed on copper pads precoated with paste solder and the board assembly is heated to solder the components on the pads (reflow soldering).	

2. Features and Effects

Features	Effects
• Allows high density mounting • Components can be installed on both sides of a board • Ceramic PC boards can be used	System downsizing
• Compatible with automatic placement by robots • Drilling for lead holes is not required • Compact system designs are possible due to high density mounting	Overall cost reduction
• High heat resistance • Anti-gas measures	High reliability

The surface mount relay is manufactured with the following advanced technologies:

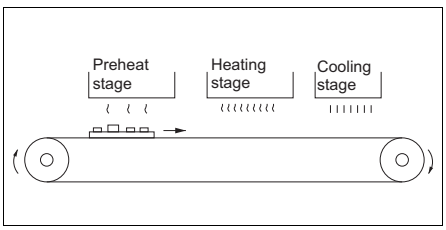
- Heat-resistance encapsulation technique
- Gas analysis
- Reliability assessment
- Precision molding technique for heat-resistant materials

3. Examples of SMT Applications

The following describes some examples of typical SMT applications:

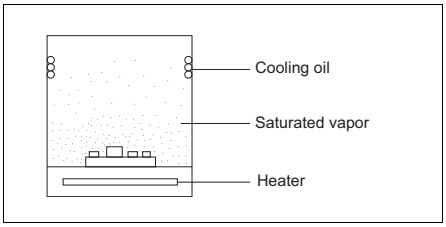
- Infrared Reflow Soldering (IRS)

IRS is the most popular reflow soldering technology now available for surface mounting. It uses a sheath heater or infrared lamp as its heat source. PC board assemblies are continuously soldered as they are transferred through a tunnel furnace comprised of a preheating, heating, and cooling-stages.



- Vapor Phase Soldering (VPS)

With VPS technology, PCB assemblies are carried through a special inactive solvent, such as Fluorinert FC-70, that has been heated to a vapor state. As the saturated vapor condenses on the PC board surface, the resulting evaporation heat provides the energy for reflow soldering.



- Belt conveyer reflow furnace

As PCB assemblies are transferred on a thin, heat-resistant belt conveyer, they are soldered by the heat from hotplates placed begeath the conveyer belt.

- Double Wave Soldering (DWS)

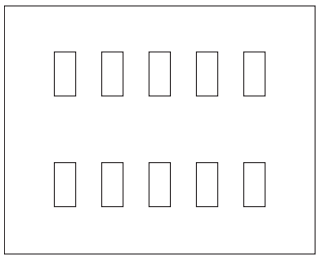
Components are glued to the PC board surface. The board assembly is transferred through a molten solder fountain (with the component side facing down), and the components are soldered to the board.

- Other Technologies

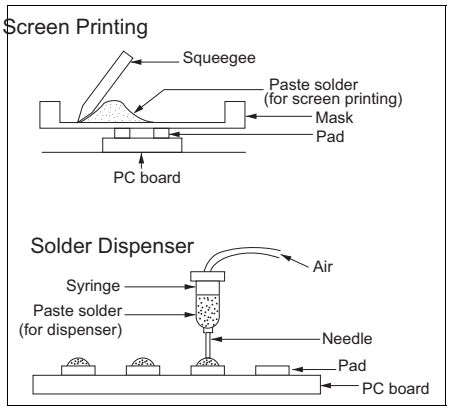
Other reflow soldering technologies include those utilizing lasers, hot air, and pulse heaters.

[2] Cautions for installation

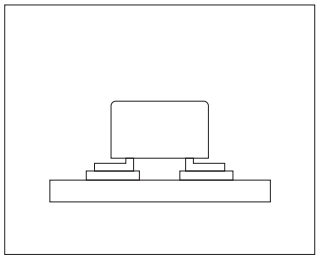
1. Paste Soldering



- Mounting pads on PC boards must be designed to absorb placement errors while taking account of solderability and insulation. Refer to the suggested mounting pad layout in the application data for the required relay product.
- Paste solder may be applied on the board with screen printing or dispenser techniques. For either method, the paste solder must be coated to appropriate thickness and shapes to achieve good solder wetting and adequate insulation.

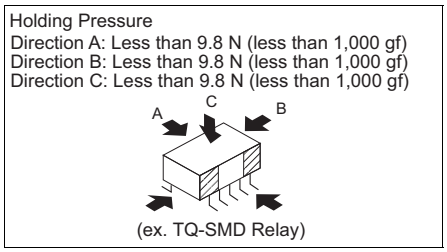


2. Relay Installation

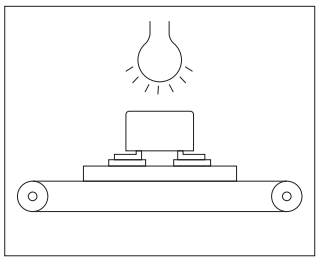


- For small, lightweight components such as chip components, a self-alignment effect can be expected if small placement errors exist. However, this effect is not as expected for electro-mechanical components such as relays, and they require precise positioning on their soldering pads.
- If SMT relays sustain excessive mechanical stress from the placement machine's pickup head, their performance cannot be guaranteed.

- Our SMT relays are supplied in stick packaging compatible with automatic placement processes. We also offer tape packaging at customer request.



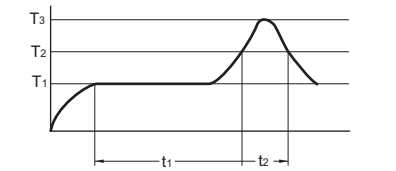
3. Reflow



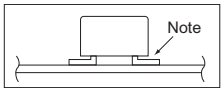
Reflow soldering under inadequate soldering conditions may result in unreliable relay performance or even physical damage to the relay (even if the relay is of surface mount type with high heat resistance).

Example of Recommended Soldering Condition for Surface Mount Relays.

- IRS technique



T_1 = 150 to 180°C 302 to 356°F t_1 = 60 to 120 sec.
T_2 = 230°C 446°F or more t_2 = Less than 30 sec.
T_3 = Less than 250°C 482°F



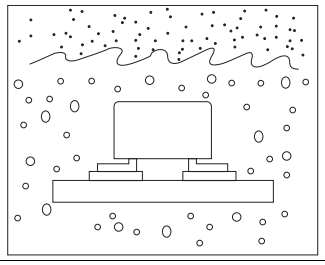
- It is recommended that the soldered pad be immediately cooled to prevent thermal damage to the relay and its associated components.
- While surface mount relays are solvent washable, do not immerse the relay in cold cleaning solvent immediately after soldering.

- Manual soldering
  - Soldering iron tip temperature: 350°C 662°F
  - Soldering iron wattage: 30 to 60 watts
  - Soldering time: Less than 3 sec.
- Others
  When a soldering technique other than above is to be used (hot air, hotplate, laser, or pulse heater technique), carefully investigate the suitability of the technique.

Note:

The soldering temperature profile indicates the pad temperature. In some cases, the ambient temperature may be greatly increased. Check for the specific mounting condition.

4. Cleaning



- The surface mount relays are solvent washable. Use alcohol or an equivalent solvent for cleaning.
- Boiled cleaning is approved for surface mount relays. Ultrasonic cleaning may cause coil damage or light contact sticking.

Notes and Guidelines

Panasonic is part of a large worldwide group selling relays and associated switching products under different brand names in different territories. The conditions of use in some territories may differ from those customary in Europe. In particular there are often major differences in regard to national and international specifications, such as UL, CSA, VDE, SEV, EVE, SEMKO, etc. Thus, when considering contact loads as stated in this catalogue (e.g. 10 A, 30 VDC for the SP relay) it should be understood that these values are not necessarily an absolute maximum but tested ratings. Mostly the stated value has been tested for a certain life expectancy as stated by the manufacturer or the respective test house. Thus, under different conditions, the stated “maximum” may, in practice, be safely exceeded.

Therefore consideration should be given to each specific application for:

- rating and type of load
- switching frequency - cycles per second (or minute)
- environmental conditions

A general statement of compliance on data sheets, publicity, etc. concerning industrial standards, approvals or certification may imply compliance to a certain standard is available. However, because of the multiplicity of types available, in general not all types within the product family are covered to the same extent by the standard. Thus, in the event of a specific query regarding a particular product and its compliance with the standard, users are asked to refer to Panasonic for detailed information.

In case of uncertainty, contact should be made with Panasonic locally to ascertain the likelihood of the relay meeting the required life expectancy in the specific planned operational circumstances. It is also pointed out that in this book, and in deviation from EN / IEC 61810-1, operational life data is given under a normal ambient temperature of about 25°C.

The features and specifications quoted have been carefully tested using modern methods and represent the values which are to be expected with a product in new condition at room temperature. They are not guaranteed values and may change during operational life or due to ambient influences. Statistical test information covering major operating features is available on request. Panasonic reserves the right to make alterations and changes to specifications without notice from time to time as may be deemed necessary.

Application of the EC Directives to All-or-Nothing Relays

1 EMC Directive

The EMC Directive concerns primarily the finished products. In applying the Directive to components, the Guidelines[1] should be consulted to determine whether the component in question has a “direct function”. Electric motors, power supply units or temperature controls represent examples of such components with “direct function”. These types of components must be provided with a CE marking.

Components which are integrated into a device, such as relays, do not have an independent function of their own. A given relay may perform differing functions in different devices. Consequently, all-or-nothing relays must be considered components without “direct function” which are not subject to the EMC Directive.

All-or-nothing - be they electro-mechanical relays or solid state relays - shall not be labeled with a CE marking nor shall a declaration of conformity be issued within the scope of the EMC Directive.

2 Low Voltage Directive

Relays with terminals for printed boards/plug-and-socket connections do not come within the purview of the Low Voltage Directive.

The Low Voltage Directive concerns electrical equipment intended for incorporation into a device as well as equipment intended for direct use. In the case of electrical equipment which is considered a basic component intended for incorporation into other electrical equipment, the properties and safety of the final product will be largely dependent on how it is integrated: as such, these components do not fall within the Low Voltage Directive and shall not be CE marked. The Guidelines[2] specifically cite electro-mechanical basic components such as connectors, relays with terminals for printed circuit boards and micro switches. They are therefore not subject to the scope of the Low Voltage Directive.

Except for larger relays which may, for example, find application in switching cabinets, the same considerations apply to common-place relays with plug-in connections available also with printed board terminals. Here again, safety is a function of the individual application. In evaluating these relays’ performance from the perspective of the Low Voltage Directive, the same conclusion is reached as with the printed board relay. As such, CE marking is not mandatory for this type of relay.

3 Machinery Directive

The Machinery Directive differentiates between machines, machine parts and safety components. Relays are not part of any of these categories. The listing of safety components in Appendix IV is conclusive and does not include relays.

Consequently, a CE marking shall not be affixed nor shall a declaration of conformity or manufacturer’s declaration be issued under the Machinery Directive.

As of this moment, none of the aforementioned directives require CE marking for all-or-nothing relays[3].

4 RoHS Directive

The substances prohibited by the RoHS Directive (Pb, Hg, Cd, Cr^{+6}, PBB, PBDE) concern 10 categories of devices that are mostly, but not entirely, intended for private use. Components such as relays are not listed in these categories. Therefore they do not directly fall within the scope of this directive. However, if the user employs relays in devices that fall within the scope of this directive, the user must also acknowledge the substances prevented. In order to adapt to this situation in good time, all Panasonic relays are generally RoHS compliant.

---

1. Guidelines (version dated March 22, 2007) for the Application of the Council Directive 2004/108/EC.
2. Guidelines (version dated August 2007) for the Application of the Council Directive 2006/95/EC.
3. This writing deals exclusively with “non-specified-time all-or-nothing relays”. The abbreviated term “all-or-nothing relay” has been introduced merely for purposes of convenience. The term includes solid state all-or-nothing relays.

Global Network

North America | Europe | Asia Pacific | China | Japan

Panasonic Electric Works

Please contact our Global Sales Companies in:

Europe

Headquarters	Panasonic Electric Works Europe AG	Rudolf-Diesel-Ring 2, 83607 Holzkirchen, Tel. +49 (0) 8024 648-0, Fax +49 (0) 8024 648-111, www.panasonic-electric-works.com
Austria	Panasonic Electric Works Austria GmbH	Josef Madersperger Str. 2, 2362 Biedermannsdorf, Tel. +43 (0) 2236-26846, Fax +43 (0) 2236-46133 www.panasonic-electric-works.at
	Panasonic Industrial Devices Materials Europe GmbH	Ennshafenstraße 30, 4470 Enns, Tel. +43 (0) 7223 883, Fax +43 (0) 7223 88333, www.panasonic-electronic-materials.com
Benelux	Panasonic Electric Works Sales Western Europe B.V.	De Rijn 4, (Postbus 211), 5684 PJ Best, (5680 AE Best), Netherlands, Tel. +31 (0) 499 372727, Fax +31 (0) 499 372185, www.panasonic-electric-works.nl
Czech Republic	Panasonic Electric Works Czech s.r.o.	Sales Office Brno, Administrative centre PLATINIUM, Veveri 111, 616 00 Brno, Tel. +420 541 217 001, Fax +420 541 217 101, www.panasonic-electric-works.cz
France	Panasonic Electric Works Sales Western Europe B.V.	Succursale française, 10, rue des petits ruisseaux, 91370 Verrières Le Buisson, Tél. +33 (0) 1 6013 5757, Fax +33 (0) 1 6013 5758, www.panasonic-electric-works.fr
Germany	Panasonic Electric Works Europe AG	Rudolf-Diesel-Ring 2, 83607 Holzkirchen, Tel. +49 (0) 8024 648-0, Fax +49 (0) 8024 648-111, www.panasonic-electric-works.de
Hungary	Panasonic Electric Works Europe AG	Magyarországi Közvetlen Kereskedelmi Képviselet, 1117 Budapest, Neumann János u. 1., Tel. +36 1 999 89 26 www.panasonic-electric-works.hu
Ireland	Panasonic Electric Works UK Ltd.	Irish Branch Office, Dublin, Tel. +353 (0) 14600969, Fax +353 (0) 14601131, www.panasonic-electric-works.co.uk
Italy	Panasonic Electric Works Italia srl	Via del Commercio 3-5 (Z.I. Ferlina), 37012 Bussolengo (VR), Tel. +39 0456752711, Fax +39 0456700444, www.panasonic-electric-works.it
Nordic Countries	Panasonic Electric Works Europe AG Panasonic Eco Solutions Nordic AB	Filial Nordic, Knarrarnäsgatan 15, 164 40 Kista, Sweden, Tel. +46 859476680, Fax +46 859476690, www.panasonic-electric-works.se Jungmansgatan 12, 21119 Malmö, Tel. +46 40 697 7000, Fax +46 40 697 7099, www.panasonic-fire-security.com
Poland	Panasonic Electric Works Polska sp. z o.o	ul. Wołoska 9A, 02-583 Warszawa, Tel. +48 (0) 22 338-11-33, Fax +48 (0) 22 338-12-00, www.panasonic-electric-works.pl
Portugal	Panasonic Electric Works España S.A.	Portuguese Branch Office, Avda Adelino Amaro da Costa 728 R/C J, 2750-277 Cascais, Tel. +351 214812520, Fax +351 214812529
Spain	Panasonic Electric Works España S.A.	Barajas Park, San Severo 20, 28042 Madrid, Tel. +34 913293875, Fax +34 913292976, www.panasonic-electric-works.es
Switzerland	Panasonic Electric Works Schweiz AG	Grundstrasse 8, 6343 Rotkreuz, Tel. +41 (0) 41 7997050, Fax +41 (0) 41 7997055, www.panasonic-electric-works.ch
United Kingdom	Panasonic Electric Works UK Ltd.	Sunrise Parkway, Linford Wood, Milton Keynes, MK14 6LF, Tel. +44 (0) 1908 231555, Fax +44 (0) 1908 231599, www.panasonic-electric-works.co.uk

North & South America

USA	PEW Corporation of America	629 Central Avenue, New Providence, N.J. 07974, Tel. 1-908-464-3550, Fax 1-908-464-8513, www.pewa.panasonic.com

Asia Pacific/China/Japan

China	Panasonic Electric Works (China) Co., Ltd.	Level 2, Tower W3, The Towers Oriental Plaza, No. 2, East Chang An Ave., Dong Cheng District, Beijing 100738, Tel. (010) 5925-5988, Fax (010) 5925-5973
Hong Kong	Panasonic Electric Works (Hong Kong) Co., Ltd.	RM1205-9, 12/F, Tower 2, The Gateway, 25 Canton Road, Tsimshatsui, Kowloon, Hong Kong, Tel. (0852) 2956-3118, Fax (0852) 2956-0398
Japan	Panasonic Corporation	1048 Kadoma, Kadoma-shi, Osaka 571-8686, Japan, Tel. (06) 6908-1050, Fax (06) 6908-5781, www.panasonic.net
Singapore	Panasonic Electric Works Asia Pacific Pte. Ltd.	101 Thomson Road, #25-03/05, United Square, Singapore 307591, Tel. (06255) 5473, Fax (06253) 5689

Panasonic®

1183 euen 04/12