



## FEATURES

1. Excellent high frequency characteristics (SPDT, transfer) up to 26.5 GHz.
2. SPDT, transfer and SPST type is available
3. High sensitivity  
Nominal operating power:  
840 mW (SPDT, Failsafe type)  
1540 mW (Transfer, Failsafe type)
4. Long life:  $5 \times 10^6$  (SPDT, transfer)
5. Latching type is also available

## TYPICAL APPLICATIONS

- Wireless and mobile communication**
- Cellular phone base stations
  - Amplifier switching
- Digital broadcasting**
- Broadcasting equipment
- Measurement instruments**
- All types of inspection equipment

## SPECIFICATIONS

| Contact   |  | SPDT  |        | Transfer |               |            |              | SPST  |
|---|--|---|--------|----------|---------------|------------|--------------|---|
| Arrangement                                       |  |   |        |          |               |            |              |   |
| Contact material                                  |  | Gold plating  |        |          |               |            |              |   |
| Initial contact resistance                        |  | Max. 100mΩ  |        |          |               |            |              |   |
| Rating  | Contact input power*1                                | 120W 3GHz<br>(V.S.W.R. 1.15 or less, no contact switching,<br>ambient temperature 40°C [SPDT], 25°C [Transfer])#1 |        |          |               |            |              | 120W 2.2GHz<br>(V.S.W.R. 1.2 or less, no contact switching)<br>150W 2.2GHz<br>(V.S.W.R. 1.2 or less, no contact switching when cooling fan is used) |
| Indicator rating                                  | Contact rating                                       | Max. 30V 100mA  |        |          | Max. 5V 100mA |            |              | —   |
|   | Initial contact resistance<br>(Measured by 5V 100mA) | Max. 1Ω   |        |          |               |            |              | —   |
| High frequency characteristics<br>(Impedance 50Ω) |  | to 1 GHz  | 1 to 4 | 4 to 8   | 8 to 12.4     | 12.4 to 18 | 18 to 26.5#2 | —   |
|   | V.S.W.R. (max.)                                      | 1.1   | 1.15   | 1.25     | 1.35          | 1.5        | 1.7          | See "REFERENCE DATA"  |
|   | Insertion loss (dB, max.)                            | 0.2   |        | 0.3      | 0.4           | 0.5        | 0.8          |   |
| Isolation (dB, min.)                              | 85   | 80  | 70     | 65       | 60            | 55         |              |   |
| Expected life<br>(min. operation)                 | Mechanical (at 180 cpm)                              | $5 \times 10^6$   |        |          |               |            |              | $10^4$  |
|   | Electrical (at 20 cpm)                               | $5 \times 10^6$ (5W, to 3GHz, impedance 50Ω,<br>V.S.W.R.; max. 1.2)   |        |          |               |            |              | $10^4$ (80W, to 2.2GHz, impedance 50Ω,<br>V.S.W.R.; max. 1.2, ambient temperature; max. 40°C 104°F)   |

#1 Factors such as heating of the connected connector in uence the high frequency characteristics; therefore, please verify under actual conditions of use.

#2 18 to 26.5 GHz characteristics apply to the 26.5 GHz type only.

## Characteristics

|   |                                    | SPDT                                   | Transfer    | SPST                            |
|---|------------------------------------|--|-------------|---------------------------------|
| Initial insulation resistance*2   |                                    | Min. 1,000 MΩ (at 500 V DC)            |             |                                 |
| Initial breakdown voltage*3   | Between open contacts              | 500 Vrms for 1 min.                    |             |                                 |
|   | Between contact and coil           | 500 Vrms for 1 min.                    |             |                                 |
|   | Between contact and earth terminal | 500 Vrms for 1 min.                    |             |                                 |
|   | Between coil and earth terminal    | 500 Vrms for 1 min.                    |             |                                 |
| Operate time*4 (at 20°C)  |                                    | Max. 15ms                              | Max. 20ms   | Max. 15ms                       |
| Shock resistance  | Functional*5                       | Min. 500 m/s <sup>2</sup> {50G}        |             | Min. 200 m/s <sup>2</sup> {20G} |
|   | Destructive*6                      | Min. 1,000 m/s <sup>2</sup> {100G}     |             |                                 |
| 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<br>(Not freezing and condensing at low temperature) | Ambient temp                       | -55°C to +85°C -67°F to +185°F         |             |                                 |
|   | Humidity                           | 5 to 85% R.H.                          |             |                                 |
| Unit weight (Approx.)   |                                    | 50g 1.76oz                             | 110g 3.88oz | 20g .71oz                       |

## Remarks

\*1 Please verify the usability of input power under actual conditions because heat generated from connectors can in uence connection.

\*2 Measurement at same location as "Initial breakdown voltage" section.

\*3 Detection current: 10mA

\*4 Nominal operating voltage applied to the coil, excluding contact bounce time.

\*5 Half-wave pulse of sine wave: 11ms, detection time: 10μs.

\*6 Half-wave pulse of sine wave: 11ms

\*7 Detection time: 10μs

\*8 Refer to 6. Conditions for operation, transport and storage mentioned in AMBIENT ENVIRONMENT

## ORDERING INFORMATION

Ex. A RD

| Product name | Frequency   | Operating function   | Nominal operating voltage, V DC  | Operation terminal   | HF data attached (SPDT, Transfer)                         |
|--------------|---|--|--|--|---|
| RD           | 0: to 3GHz (SPST)<br>1: to 18GHz (SPDT)<br>2: to 18GHz (Transfer)<br>5: to 26.5GHz (SPDT)<br>6: to 26.5GHz (Transfer) | 00: Failsafe<br>10: Latching (SPST)<br>20: Latching (SPDT, Transfer)<br>51: Latching with TTL driver (with self cut-off function) (SPDT, Transfer) | 4H: 4.5V (Failsafe, Latching type only)<br>05: 5V (Latching with TTL driver type only)<br>12: 12V<br>24: 24V | Nil: Solder terminal (SPDT, Transfer), Lead wire (SPST)<br>C: Connector cable (SPDT type only) | Nil: No HF test data attached<br>Q: HF test data attached |

Note: Sealed types are also available. (SPDT type only)

## TYPES

## 1. SPDT

## 1) Solder terminal

| 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 |
| Failsafe  | 4.5                             | ARD1004H                 | ARD1004HQ             | ARD5004H                 | ARD5004HQ             |
|   | 12                              | ARD10012                 | ARD10012Q             | ARD50012                 | ARD50012Q             |
|   | 24                              | ARD10024                 | ARD10024Q             | ARD50024                 | ARD50024Q             |
| Latching  | 4.5                             | ARD1204H                 | ARD1204HQ             | ARD5204H                 | ARD5204HQ             |
|   | 12                              | ARD12012                 | ARD12012Q             | ARD52012                 | ARD52012Q             |
|   | 24                              | ARD12024                 | ARD12024Q             | ARD52024                 | ARD52024Q             |
| Latching with TTL driver (with self cut-off function) | 5                               | ARD15105                 | ARD15105Q             | ARD55105                 | ARD55105Q             |
|   | 12                              | ARD15112                 | ARD15112Q             | ARD55112                 | ARD55112Q             |
|   | 24                              | ARD15124                 | ARD15124Q             | ARD55124                 | ARD55124Q             |

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 |
| Failsafe  | 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

## 1) Solder terminal

| 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 |
| Failsafe  | 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.

# RD (ARD)

## 3. SPST

| Operating function | Nominal operating voltage, V DC | Part No. |
|--------------------|---------------------------------|----------|
| Failsafe           | 4.5                             | ARD0004H |
|                    | 12                              | ARD00012 |
|                    | 24                              | ARD00024 |
| Latching           | 4.5                             | ARD0104H |
|                    | 12                              | ARD01012 |
|                    | 24                              | ARD01024 |

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

## COIL DATA (at 20°C 68°F)

### 1. SPDT

#### 1) Failsafe type

| Nominal operating voltage, V DC | Nominal operating current, mA (+10%/–15%) | Nominal power consumption, mW |
|---------------------------------|---|-------------------------------|
| 4.5                             | 186.7                                     | 840                           |
| 12                              | 70.0                                      | 840                           |
| 24                              | 40.4                                      | 970                           |

#### 2) Latching type

| Nominal operating voltage, V DC | Nominal operating current, mA (+10%/–15%) | Nominal power consumption, mW |
|---------------------------------|---|-------------------------------|
| 4.5                             | 155.6                                     | 700                           |
| 12                              | 62.5                                      | 750                           |
| 24                              | 37.5                                      | 900                           |

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

| Nominal operating voltage, V DC | TTL logic level (see TTL logic level range) |           | Switching frequency                          |
|---------------------------------|---|-----------|--|
|                                 | ON  | OFF       |  |
| 5                               | 2.4 to 5.5V                                 | 0 to 0.5V | Max. 180 cpm<br>(ON time : OFF time = 1 : 1) |
| 12                              |   |           |  |
| 24                              |   |           |  |

### 2. Transfer

#### 1) Failsafe type

| Nominal operating voltage, V DC | Nominal operating current, mA (+10%/–15%) | Nominal power consumption, mW |
|---------------------------------|---|-------------------------------|
| 4.5                             | 342.2                                     | 1540                          |
| 12                              | 128.3                                     | 1540                          |
| 24                              | 69.6                                      | 1670                          |

#### 2) Latching type

| Nominal operating voltage, V DC | Nominal operating current, mA (+10%/–15%) | 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) |           | Switching frequency                          |
|---------------------------------|---|-----------|--|
|                                 | ON  | OFF       |  |
| 5                               | 2.4 to 5.5V                                 | 0 to 0.5V | Max. 180 cpm<br>(ON time : OFF time = 1 : 1) |
| 12                              |   |           |  |
| 24                              |   |           |  |

### 3. SPST

#### 1) Failsafe type

| Nominal operating voltage, V DC | Nominal operating current, mA (+10%/–15%) | Nominal power consumption, mW |
|---------------------------------|---|-------------------------------|
| 4.5                             | 400                                       | 1800                          |
| 12                              | 150                                       |                               |
| 24                              | 75  |                               |

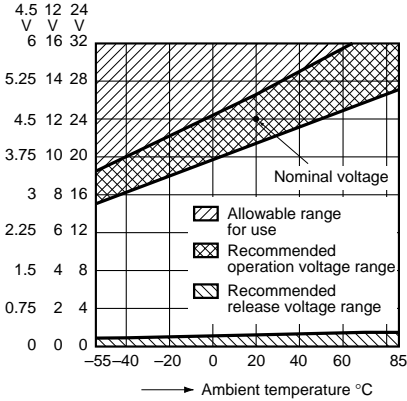
2) Latching type

| Nominal operating voltage, V DC | Nominal operating current, mA (+10%/−15%) | Nominal power consumption, mW |
|---------------------------------|---|-------------------------------|
| 4.5                             | 400                                       | 1800                          |
| 12                              | 150                                       |                               |
| 24                              | 75  |                               |

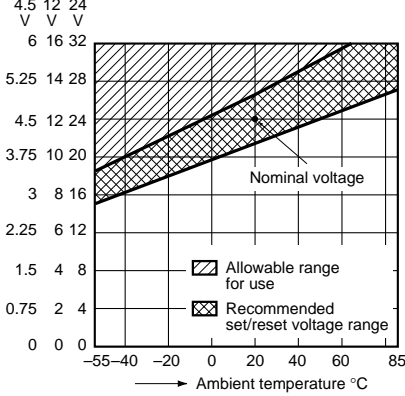
• Operating voltage range

(1) SPDT, Transfer type

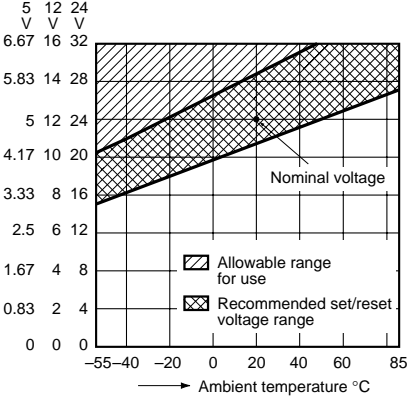
1) Failsafe type



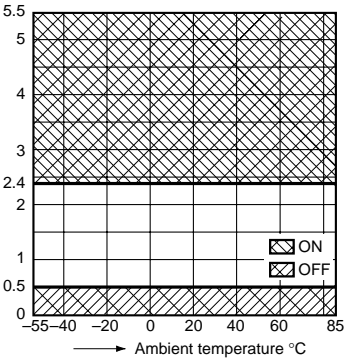
2) Latching type



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



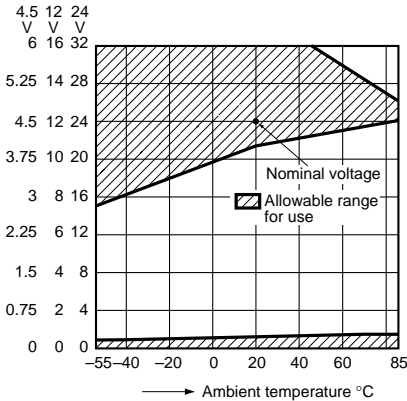
4) TTL Logic level range



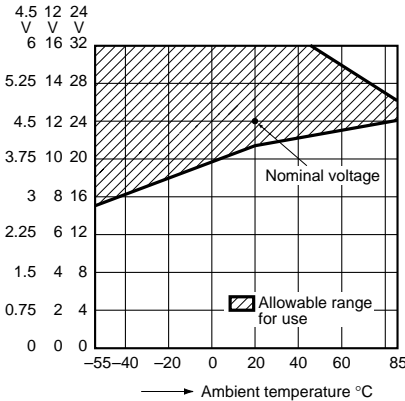
Note) Please consult us for use that is outside this range.

(2) SPST type

1) Failsafe type



2) Latching type



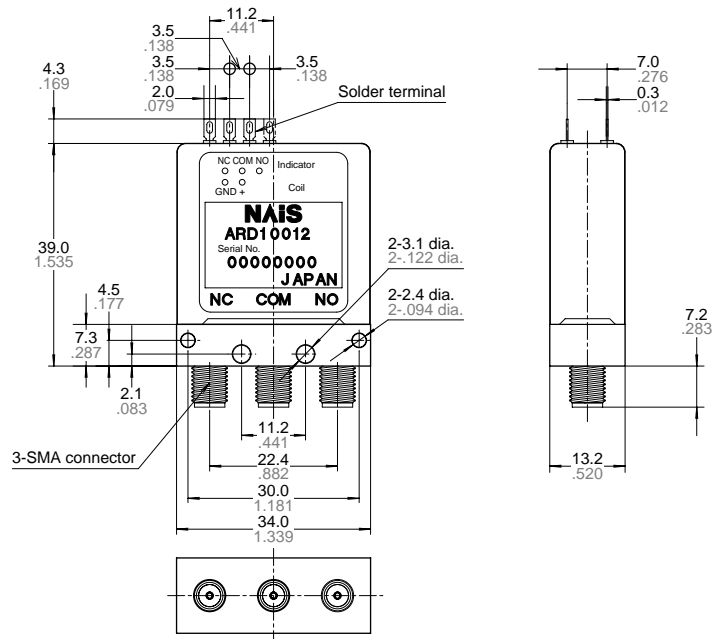
# RD (ARD)

## DIMENSIONS

mm inch

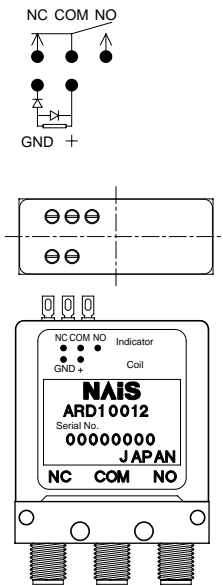
### 1. SPDT

1) Solder terminal

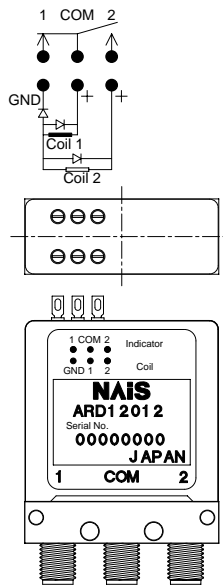


Tolerance:  $\pm 0.3 \pm 0.12$

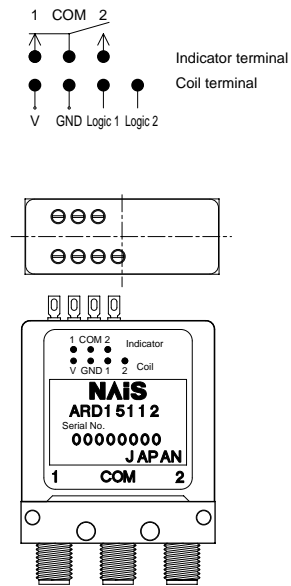
Failsafe



Latching



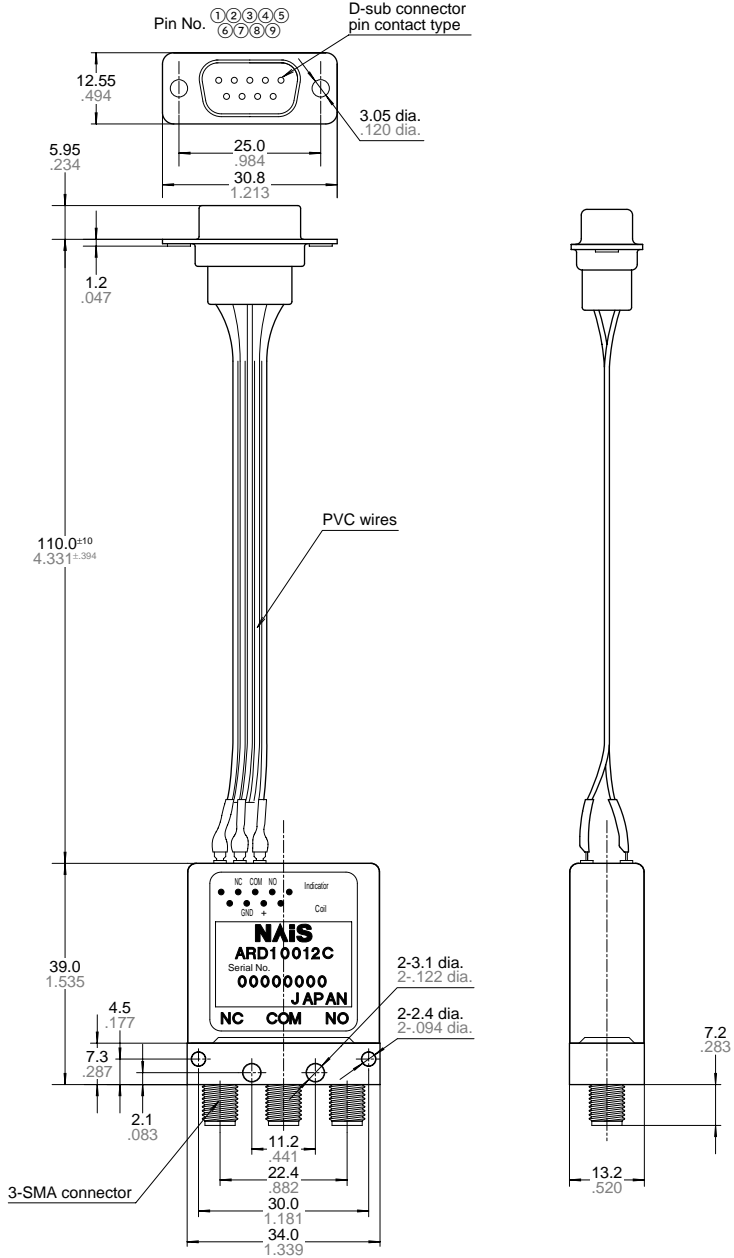
Latching with TTL driver  
(with self cut-off function)



2) Connector cable



| Pin No.                  | Indicator |    |     |    |   | Coil |     |         |         |
|--------------------------|-----------|----|-----|----|---|------|-----|---------|---------|
|                          | 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 |

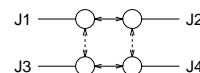
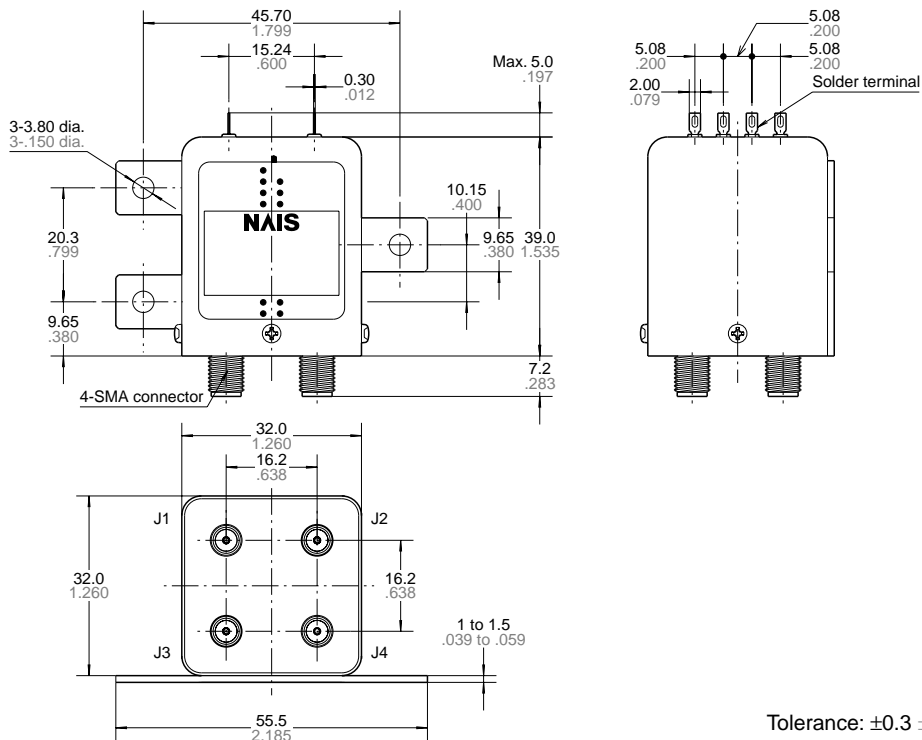


Tolerance: ±0.3 ±.012

# RD (ARD)

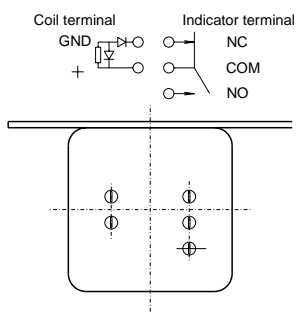
## 2. Transfer

mm inch

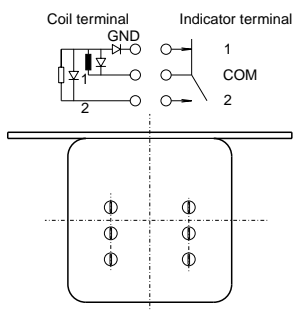


|                          |  |
|--------------------------|--|
| Fail safe                | NC: J1-J2, J3-J4<br>NO: J1-J3, J2-J4     |
| Latching                 | POS1: J1-J2, J3-J4<br>POS2: J1-J3, J2-J4 |
| Latching with TTL driver | POS1: J1-J2, J3-J4<br>POS2: J1-J3, J2-J4 |

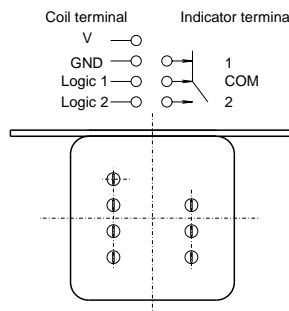
Failsafe



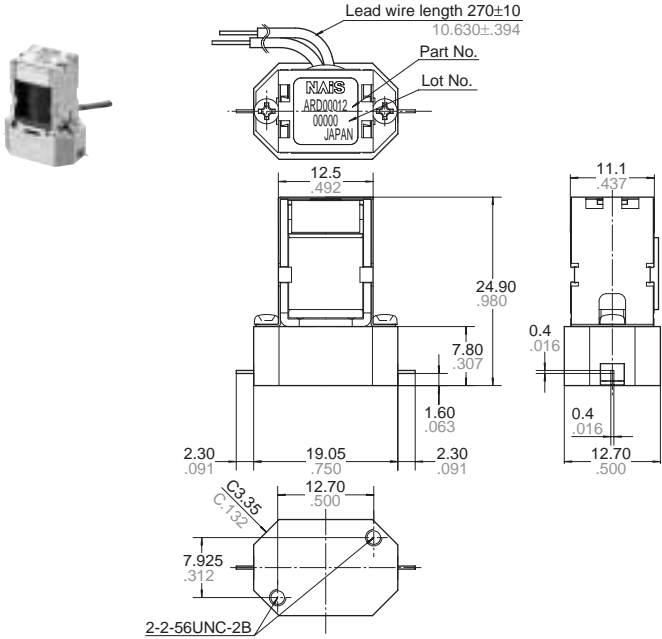
Latching



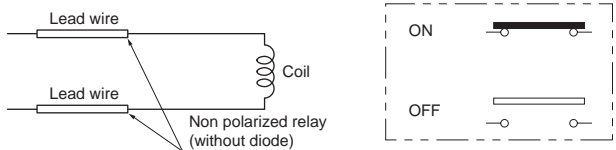
Latching with TTL driver  
(with self cut-off function)



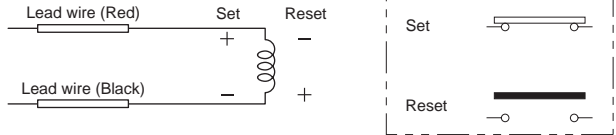
3. SPST



Fail safe type



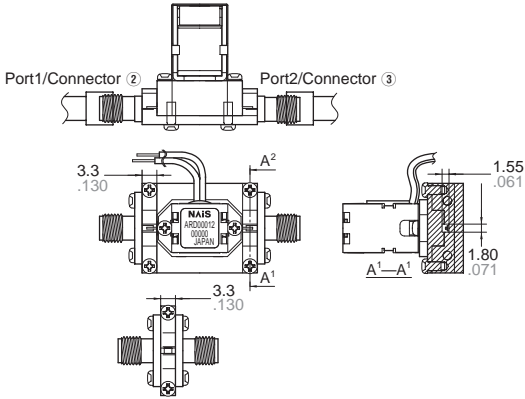
Latching type



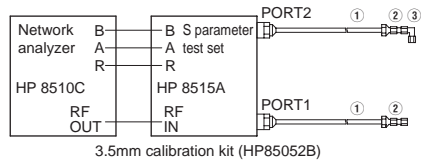
Tolerance: ±0.3 ±0.12

• Measuring method (Impedance 50Ω)

- (V.S.W.R.) The contact must be ON.
  - (Insertion loss) The contact must be ON. (without DUT board's loss)
  - (Isolation) The contact must be OFF.
- At that time, conduct measurement with an averaging of 64 times and 1% smoothing.



• Measuring equipment

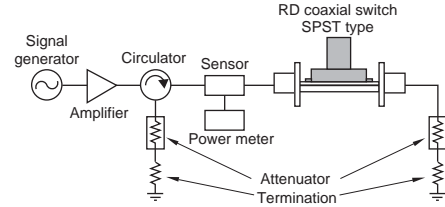


• Connector

| No. | Contents                         | Product name  |
|-----|----------------------------------|---------------|
| ①   | 3.5 mm testport, Extention cable | HP85131-60013 |
| ②   | 3.5 mm coaxial adaptor           | HP83059       |
| ③   | SMA adaptor                      | HP125.771.000 |

• Input power test

Sample: ARD01024, Quantity: n = 5  
Frequency: 2.2 GHz, Ambient temperature: Room temperature  
Test circuit:



| Sample | Cooling fan | Input power, W |    |     |     |     |     |     |     |     |     |     |     |     |  |
|--------|-------------|----------------|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
|        |             | 80             | 90 | 100 | 110 | 120 | 130 | 140 | 150 | 160 | 170 | 180 | 190 | 200 |  |
| No. 1  | Without     |                | ○  | ○   |     |     |     |     | ○   |     |     |     |     |     |  |
| No. 2  |             |                |    | ○   | →   | ○   | →   | ○   | →   |     |     |     |     |     |  |
| No. 3  |             |                |    |     |     | ○   | ○   | →   | ○   | →   |     |     |     |     |  |
| No. 4  | With        |                |    | ○   | →   | ○   | →   | ○   | →   |     |     |     |     | ○   |  |
| No. 5  |             |                |    |     |     |     |     |     | ○   | →   | ○   | ○   | ○   | ○   |  |

○: No abnormality for high frequency and operating characteristics were observed after 30 min. power carrying. (→; Test sequence)



# RD (ARD)

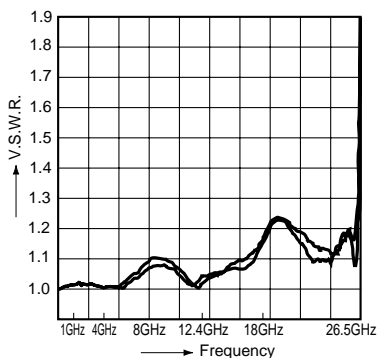
## REFERENCE DATA

### 1-(1). High frequency characteristics (SPDT)

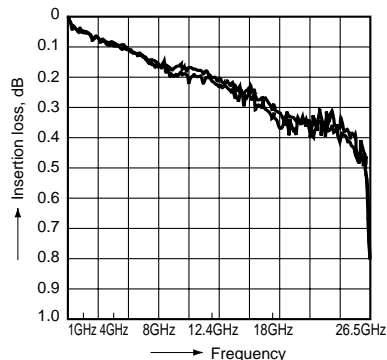
Sample: ARD10012

Measuring method: Measured with HP network analyzer (HP8510).

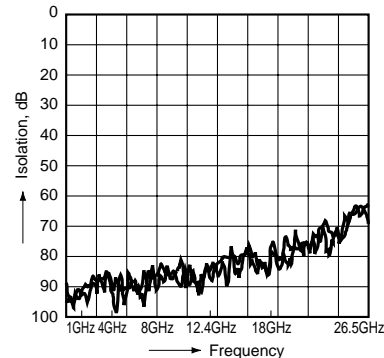
#### • V.S.W.R.



#### • Insertion loss



#### • Isolation

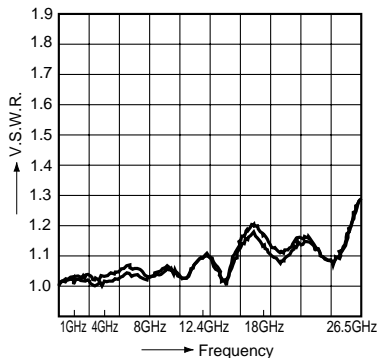


### 1-(2). High frequency characteristics (Transfer)

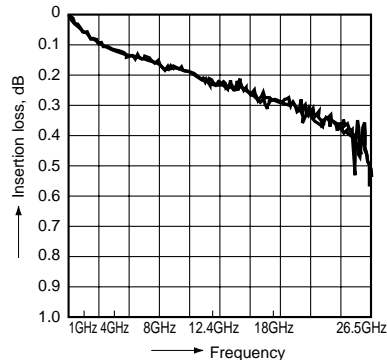
Sample: ARD60012

Measuring method: Measured with HP network analyzer (HP8510).

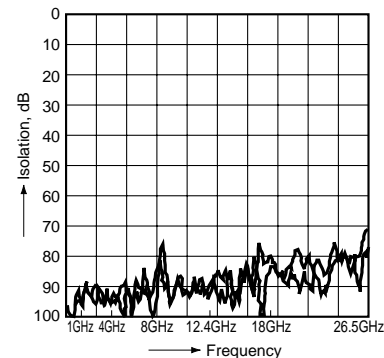
#### • V.S.W.R.



#### • Insertion loss



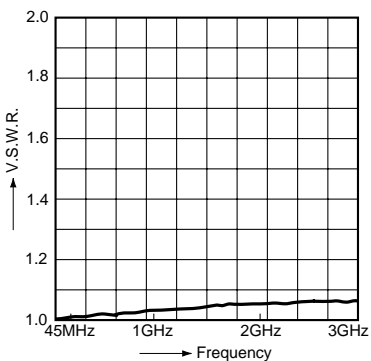
#### • Isolation



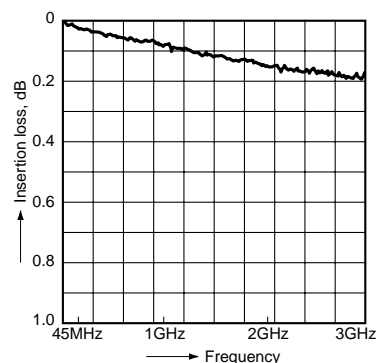
### 1-(3). High frequency characteristics (SPST)

Measuring method: Measured with HP network analyzer (HP8510).

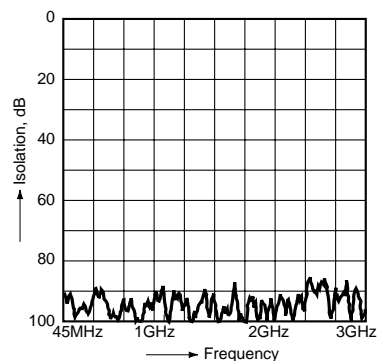
#### • V.S.W.R.



#### • Insertion loss



#### • Isolation



---

## NOTES

### 1. Coil connection

When connecting coils, refer to the wiring diagram to prevent mis-operation or malfunction. (Only SPST failsafe type is non polarized relay)

### 2. Connection of coil indicator and washing conditions (SPDT, Transfer)

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.

### 3. Other handling precautions.

For SMA connectors, we recommend a torque of  $0.90\pm 0.1$  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.