

# SOLID STATE RELAY (I/O MODULE) MAXIMUM LOAD CURRENT 1A

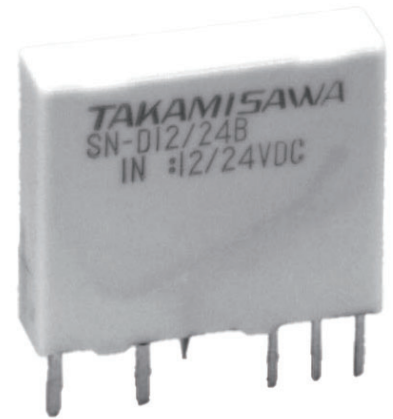
This datasheet provides information of not-for-new-design products. Please refer to the latest datasheets for active products.

## SN Series

**RoHS Compliant**

### ■ FEATURES

- I/O modules for interface between CPU and external input devices or loads
- Ultra slim and light weight, SIL terminals type I/O modules for high density mounting
  - Size: 5 (W) × 20 (L) × 17 (H) mm
  - Weight: Approximately 3.0 to 3.5 g
- High isolation by employing photo-coupled devices (between input and output: 2,500Vrms)
- Long life and maintenance free
- All solid state I/O module
- Compatible with NY relay size and terminals arrangement (only output module type)
- RoHS compliant since date code: 6703 (except 204-207)  
The piece-parts used in this relay contains lead but it is excluded from controlled substances.



### ■ APPLICATIONS

PLC etc.

## ■ PART NUMBERS

### ● Input Module

[Example] SN - A 100 B E

(a) (b) (c) (d) (e)

|     |                              |                     |           |                                    |
|-----|------------------------------|---------------------|-----------|------------------------------------|
| (a) | Relay type                   |                     | SN series |                                    |
| (b) | Input voltage                |                     | A         | : AC type                          |
|     |                              |                     | D         | : DC type                          |
| (c) | Nominal voltage (input side) |                     | 100       | : 100VAC                           |
|     |                              |                     | 200       | : 200VAC                           |
|     |                              |                     | 12/24     | : 12/24VDC                         |
| (d) | Output                       | AC type             | Nil       | : Without buffer                   |
|     |                              |                     | B         | : With buffer                      |
|     |                              | DC type             | B         | : With buffer                      |
| (e) | Enclosure                    | AC type with buffer | Nil       | : Plastic sealed (only for 100VAC) |
|     |                              |                     | F         | : Flux free                        |
|     |                              | DC type with buffer | Nil       | : Plastic sealed                   |

### ● Output Module

[Example] SN - 12 D 01 HZ - C R I - S

(a) (b) (c) (d) (e) (f) (g) (h) (i)

|     |   |         |           |                        |
|-----|---|---------|-----------|------------------------|
| (a) | Relay type                                    |         | SN series |                        |
| (b) | Nominal voltage (input side)                  |         | 3         | : 3VDC (only AC type)  |
|     |   |         | 5         | : 5VDC                 |
|     |   |         | 12        | : 12VDC                |
|     |   |         | 24        | : 24VDC                |
| (c) | Load voltage                                  |         | A         | : AC type              |
|     |   |         | D         | : DC type              |
| (d) | Load current                                  |         | 01        | : 1A                   |
| (e) | Kind of inverse connection protecting element | AC type | Nil       | : With varistor        |
|     |   |         | NV        | : Without varistor     |
|     |   | DC type | Nil       | : Diode                |
|     |   |         | HZ        | : Zener diode          |
| (g) | Output polarity (DC type)                     |         | Nil       | : Standard polarity    |
|     |   |         | R         | : Reverse polarity     |
| (h) | Switching speed (DC type)                     |         | Nil       | : Standard             |
|     |   |         | T         | : High speed type      |
| (i) | Mounting                                      |         | Nil       | : PCB mounting type    |
|     |   |         | S         | : Socket mounting type |

## ■ SPECIFICATIONS

### ● AC Input Module (SN-A( )B type)

| Item        |   | Specifications                              |                            |                              |                            |
|-------------|---|---|----------------------------|------------------------------|----------------------------|
|             |   | 100VAC Type                                 |                            | 200VAC Type                  |                            |
|             |   | Without Buffer                              | With Buffer                | Without Buffer               | With Buffer                |
|             |   | Plastic Sealed                              | Flux Free                  | Plastic Sealed               | Flux Free                  |
| Input side  | Input voltage range                       | 80 to 132VACrms                             |                            | 160 to 265VACrms             |                            |
|             | Rating input current                      | Approx. 8.4mA <sub>rms</sub>                | Approx. 7mA <sub>rms</sub> | Approx. 7.8mA <sub>rms</sub> | Approx. 7mA <sub>rms</sub> |
|             | Power frequency range                     | 47 to 63Hz                                  |                            |                              |                            |
|             | Must operate voltage                      | Max. 70VACrms                               | Max. 80VACrms              | Max. 150VACrms               | Max. 160VACrms             |
|             | Must release voltage                      | Min. 25VACrms                               | Min. 30VACrms              | Min. 60VACrms                | Min. 60VACrms              |
|             | Must release current                      | Min. 2mA <sub>rms</sub>                     |                            |                              |                            |
| Output side | DC supply voltage (V <sub>DD</sub> )      | -   | 4 to 6VDC                  | -                            | 4 to 6VDC                  |
|             | Max. output current (V <sub>DD</sub> =5V) | Max. 0.5mA                                  | ±4mA                       | Max. 0.5mA                   | ±4mA                       |
|             | Output logic                              | -   | Negative logic             | -                            | Negative logic             |
| Temperature | Storage temperature range                 | -40°C to +100°C (no frost)                  |                            |                              |                            |
|             | Operating temperature range               | -30°C to +85°C (no frost)                   |                            |                              |                            |
| Time        | Max. operate time                         | Max. 20ms                                   | Max. 25ms                  | Max. 20ms                    | Max. 25ms                  |
|             | Max. release time                         | Max. 20ms                                   | Max. 30ms                  | Max. 20ms                    | Max. 30ms                  |
| Buffer      |   | Absence                                     | Presense                   | Absence                      | Presense                   |
| Insulation  | Insulation resistance                     | Min. 1,000 MΩ (at 500VDC, for input-output) |                            |                              |                            |
|             | Dielectric strength                       | 2,500Vrms, 1 minute (for input-output)      |                            |                              |                            |
| Others      | Case color                                | Yellow                                      | Ivory                      | Yellow                       | Ivory                      |
|             | Weight (approx.)                          | 3.2g  | 3.2g                       | 3.2g                         | 2g                         |
|             | Dimensions                                | 5.0×20.0×17.0 mm                            |                            |                              |                            |

## ■ SPECIFICATIONS

### ● DC Input Module (SN-D( )B type)

| Item        |                                     | Specifications                                   |
|-------------|-------------------------------------|--|
|             |                                     | 12/24VDC, with Buffer, Plastic Sealed            |
| Input       | Input voltage range                 | 9.6 to 28.8VDC                                   |
|             | Rating input current                | Approx. 5mA (at 12VDC) / Approx. 10mA (at 24VDC) |
|             | Must operate voltage                | Max. 9.6VDC                                      |
|             | Must release voltage                | Min. 5.0VDC                                      |
|             | Must release current                | Min. 1.5mA                                       |
| Output      | DC supply voltage ( $V_{DD}$ )      | 4 to 6VDC  |
|             | Max. output current ( $V_{DD}=5V$ ) | $\pm 0.4mA$                                      |
|             | Output logic                        | Negative logic                                   |
| Temperature | Storage temperature range           | -40°C to +100°C (no frost)                       |
|             | Operating temperature range         | -30°C to +85°C (no frost)                        |
| Time        | Operate time                        | 10ms max.  |
|             | Release time                        | 10ms max.  |
| Buffer      |                                     | Presense   |
| Insulation  | Insulation resistance (initial)     | 1,000M $\Omega$ (at 500VDC, for input-output)    |
|             | Dielectric strength                 | 2,500Vrms, 1 minute (for input-output)           |
| Others      | Case color                          | White  |
|             | Weight                              | Approx. 3.3g                                     |
|             | Dimensions                          | 5.0×20.0×17.0 mm                                 |

## ■ SPECIFICATIONS

### ● Output Module (Standard)

| Item        |   |            | Specifications   |                      |                          |
|-------------|---|------------|--|----------------------|--------------------------|
|             |   |            | AC Output Module   |                      | DC Output Module         |
|             |   |            | Without Zero Cross   | With Zero Cross      |                          |
| Input       | Nominal voltage   |            | 3, 5, 12, 24VDC  |                      | 5, 12, 24VDC             |
|             | Operate voltage range   |            | ±20% of nominal voltage  |                      |                          |
|             | Must operate voltage  |            | Max. 80% of nominal voltage  |                      |                          |
|             | Must release voltage  |            | Min.0.5VDC (3, 5VDC type)  | Min. 1VDC            |                          |
|             |   |            | Min.1VDC (12, 24VDC type)  |                      |                          |
|             | Input impedance   | 3VDC type  | 130Ω±10%   | 180Ω±10%             | -                        |
|             |   | 5VDC type  | 330Ω±10%   | 470Ω±10%             | 390Ω±10%                 |
|             |   | 12VDC type | 1,000Ω±10%   | 1,500Ω±10%           | 1,200Ω±10%               |
|             |   | 24VDC type | 2,200Ω±10%   | 3,000Ω±10%           | 2,500Ω±10%               |
| Output      | Load voltage range  |            | 24 to 265VACrms  |                      | 3 to 30VDC               |
|             | Maximum load current<br>(Please refer to characteristic data) |            | 1.0Arms  |                      | 1.0A                     |
|             | Minimum load current  |            | 10mArms  |                      | 1mA                      |
|             | Switching current   |            | 50A (60Hz, 1 cycle)  |                      | 3A (10ms)                |
|             | OFF-state leakage current                                     |            | Max. 1.5mArms (100VACrms, at 60Hz)<br>Max. 3.0mArms (200VACrms, at 60Hz) |                      | Max. 0.1mA<br>(at 30VDC) |
|             | ON-state voltage drop<br>(at max. load current)               |            | Max. 1.2Vrms   |                      | Max.1.2V                 |
|             | Storage temperature range                                     |            | -40°C to +100°C (no frost)   |                      |                          |
| Temperature | Operate temperature range                                     |            | -30°C to +85°C (no frost)  |                      |                          |
| Time        | Operate time  |            | Max. 1ms   | Max. 1/2 cycle + 1ms | Max. 1ms                 |
|             | Release time  |            | Max. 1/2 cycle + 1ms   |                      | Max. 1ms                 |
| Others      | Color   |            | Black  |                      | Red                      |
|             | Weight  |            | Approx.3.5g  |                      | Approx. 2.9g             |
|             | Dimensions  |            | 5.0×20.0×17.0 mm (except protrusion)                                     |                      |                          |

## ■ SPECIFICATIONS

### ● Output Module (High Speed Switching Type)

| Item        |  |            | Specification                        |
|-------------|--|------------|--------------------------------------|
|             |  |            | DC Output Module                     |
| Input       | Nominal voltage  |            | 5, 12, 24VDC                         |
|             | Operate voltage range                                      |            | ±20% of nominal voltage              |
|             | Must operate voltage                                       |            | 80% of nominal voltage               |
|             | Must release voltage                                       |            | Min. 1VDC                            |
|             | Input impedance  | 5VDC type  | 330Ω±10%                             |
|             |  | 12VDC type | 1,000Ω±10%                           |
|             |  | 24VDC type | 2,000Ω±10%                           |
| Output      | Load voltage   |            | 3 to 30VDC                           |
|             | Max. load current<br>(Please refer to characteristic data) |            | 1.0A                                 |
|             | Min. load current  |            | 1mA                                  |
|             | Switching current  |            | 3A (10ms)                            |
|             | OFF-state leakage current                                  |            | Max. 0.1mA (at 30VDC)                |
|             | ON-state voltage drop (at max. load current)               |            | Max. 1.2V                            |
| Temperature | Storage temperature range                                  |            | -40°C to +100°C (no frost)           |
|             | Operage temperature range                                  |            | -30°C to +85°C (no frost)            |
| Time        | Operate time   |            | Max. 5μs (at 0.1A, 5VDC)             |
|             | Release time   |            | Max. 25μs (at 0.1A, 5VDC)            |
| Others      | Color  |            | Red                                  |
|             | Weight   |            | Approx.2.9g                          |
|             | Dimensions   |            | 5.0×20.0×17.0 mm (except protrusion) |

BLOCKING DIAGRAM

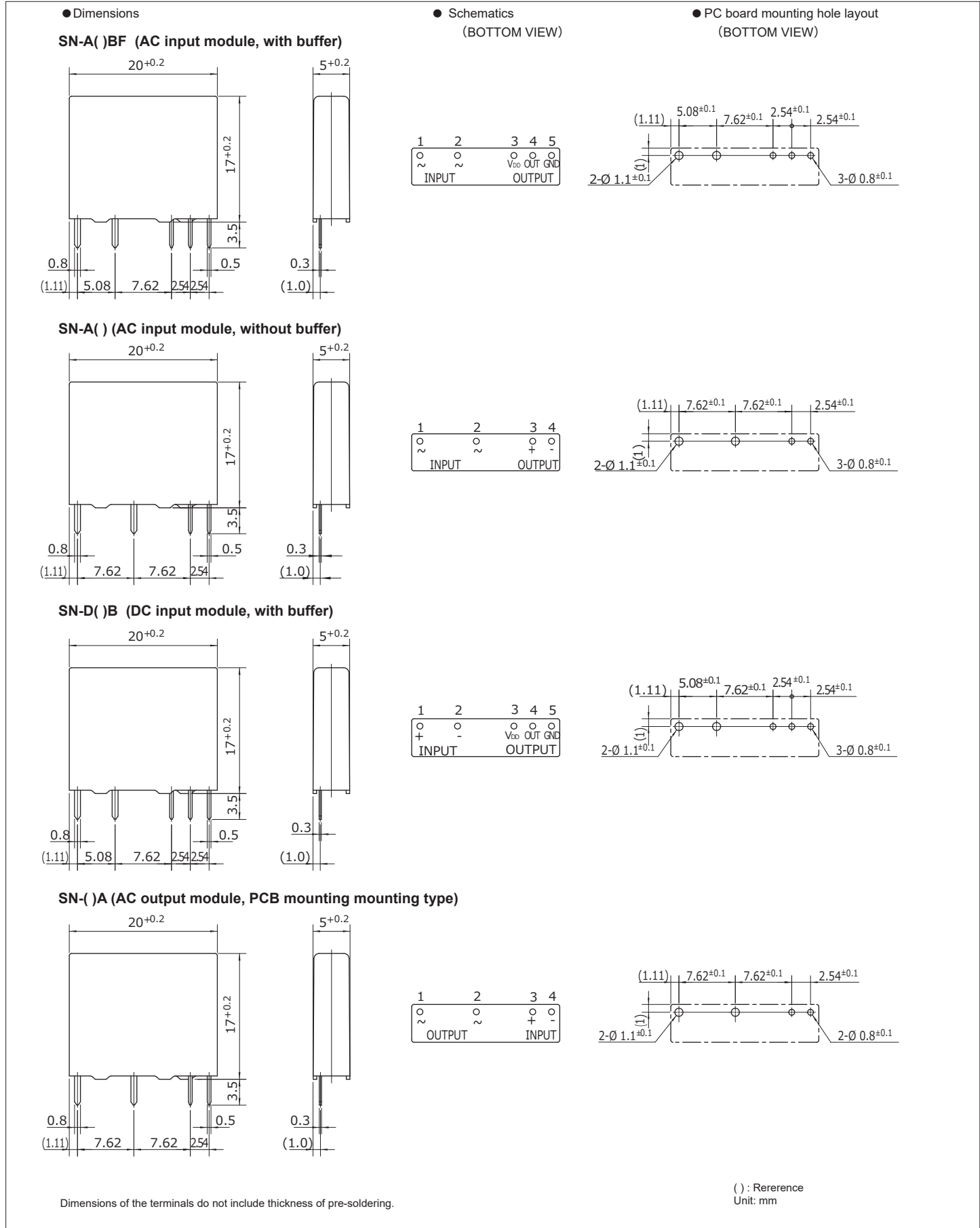
Input Module

| Load | Insulation Method        | Insulation Circuits  | Input/Output Waveform (Resistive load)                                     |
|------|--------------------------|--|--|
| AC   | Photo-transistor coupler | DC logic output<br>1 (~) AC input circuit (Condenser input) → Photo-transistor coupler → Buffer circuit → 3 V DD, 4 OUT, 5 GND<br>Output terminal    | Input signal: ON (high), OFF (low)<br>Output signal: "H" (high), "L" (low) |
|      |                          | DC transistor output<br>1 (~) Input circuit (Condenser input) → Photo-transistor coupler → 3 +, 4 -<br>Output terminal                               | Input signal: ON (high), OFF (low)<br>Output signal: "H" (high), "L" (low) |
| DC   | Photo-transistor coupler | DC logic output<br>1 +/- Input circuit → Photo-transistor coupler → Buffer circuit → 3 V DD, 4 OUT, 5 GND<br>Input terminal 2 -/+<br>Output terminal | Input signal: ON (high), OFF (low)<br>Output signal: "H" (high), "L" (low) |

Output Module

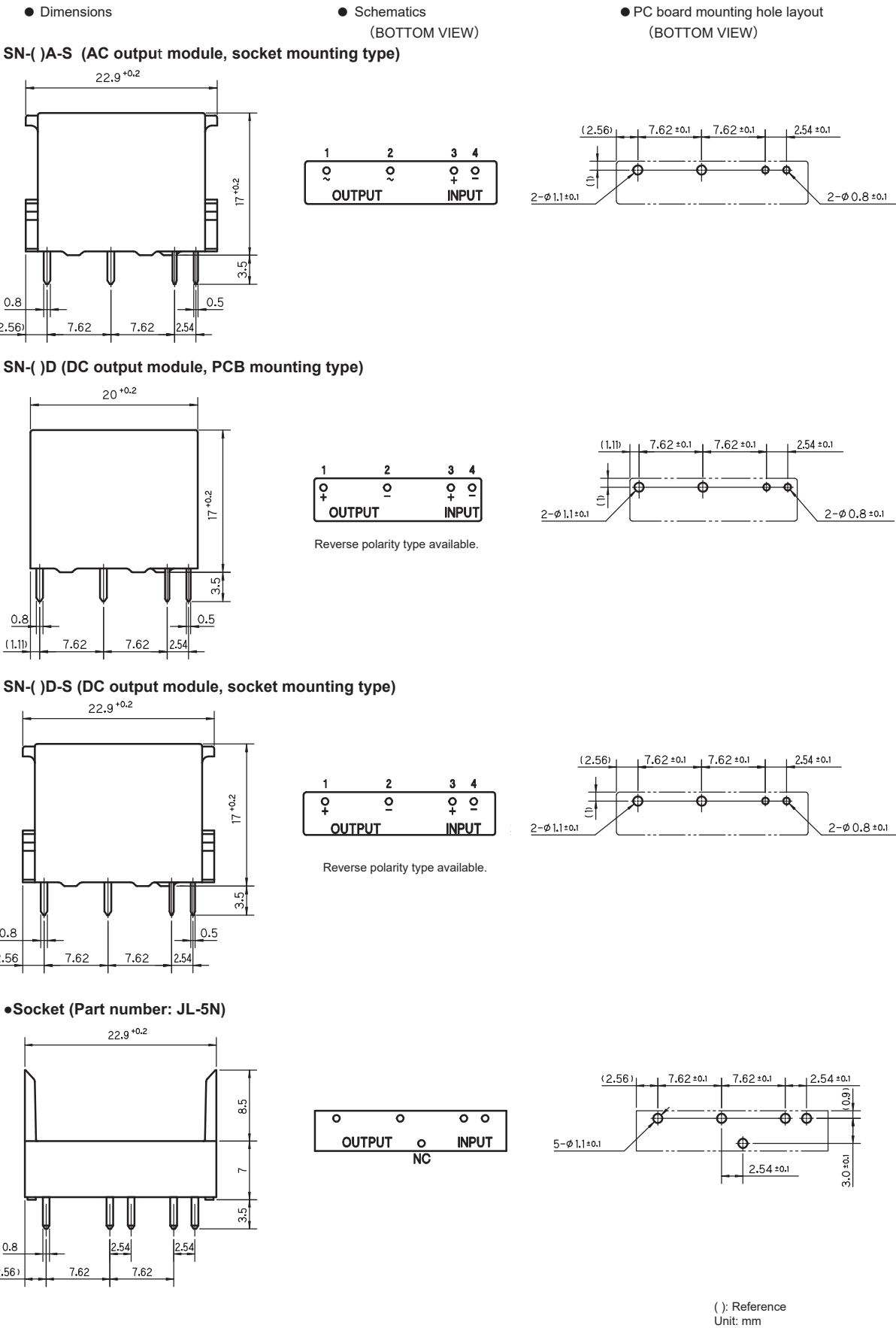
| Load | Insulation Method        | Insulation Circuits   | Input/Output Waveform (Resistive load)  |
|------|--------------------------|---|---|
| AC   | Photo-triac coupler      | 3 + Input circuit → Photo-triac coupler → Trigger circuit → Snubber circuit → Varistor → 1 ~, 2 ~<br>Input terminal 4 -                                   | Source voltage of load: AC sine wave<br>Input signal: OFF (low)<br>Load current: AC sine wave |
| DC   | Photo-transistor coupler | 3 + Input circuit → Photo-transistor coupler → Trigger circuit → Output transistor → Inverse connection protecting diode → 1 +, 2 +<br>Input terminal 4 - | Input signal: ON (high), OFF (low)<br>Load current: DC pulse                                  |

DIMENSIONS





DIMENSIONS



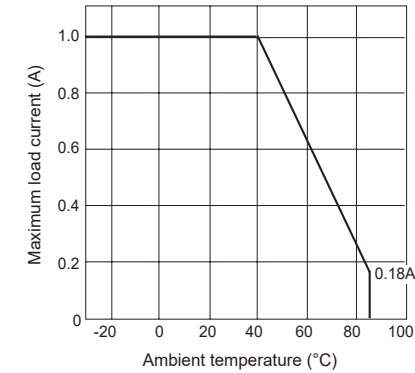
Dimensions of the terminals do not include thickness of pre-soldering.

CHARACTERISTIC DATA

(Characteristic data is not guaranteed value but measured values of samples from production line.)

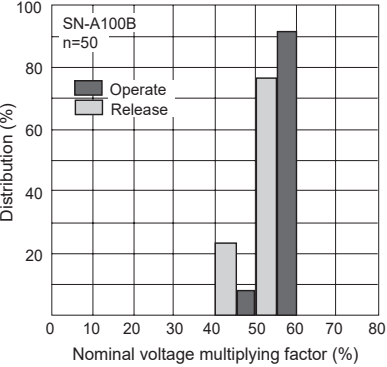
OUTPUT MODULE

Ambient temperature vs max. load current

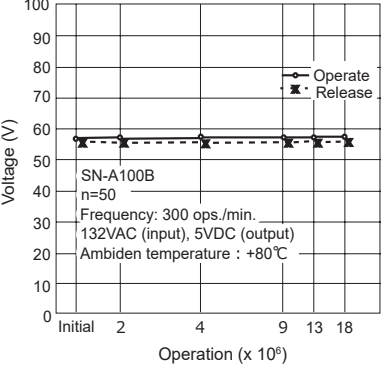


INPUT MODULE

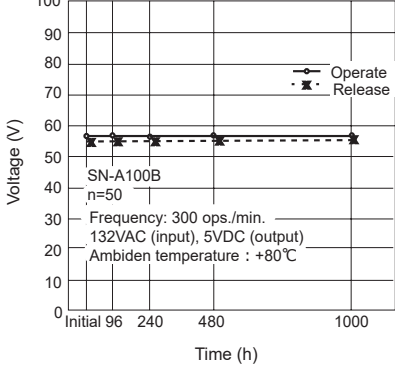
Distribution of Operate & Release voltage (AC type)



High temperature switching test (AC type)

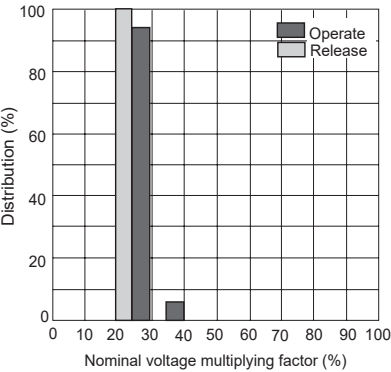


High temperature continuous operating test (AC type)

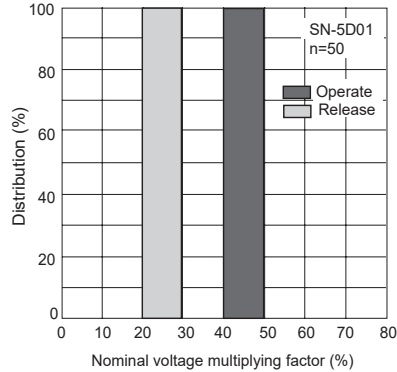


OUTPUT MODULE

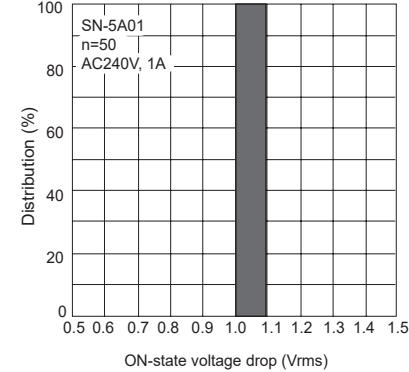
Distribution of operate & release voltage (AC type)



Distribution of operate & release voltage (DC type)



Distribution of ON-state voltage drop (AC type)



## ■ PART NUMBER LIST

### ● Input Module

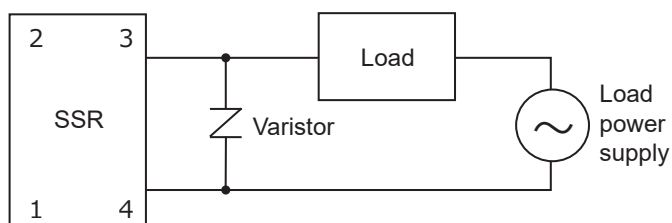
| Part Number | Input Voltage | Output         | Enclosure | Note        |
|-------------|---------------|----------------|-----------|-------------|
| SN-A( )     | AC            | Without buffer | Washable  | -           |
| SN-A( )B    |               | With buffer    |           | 100VAC only |
| SN-A( )BF   |               | Without buffer | Flux free | -           |
| SN-D( )B    | DC            | With buffer    | Washable  | -           |

### ● Output Module

| Part Number     | Load Voltage | Load Current | Kinds of Inverse Connectin Protecting Element | Zero Cross Function | Output Polarity   | Switching Speed | Mounting                 | Note                                |                                     |
|-----------------|--------------|--------------|---|---------------------|-------------------|-----------------|--------------------------|-------------------------------------|-------------------------------------|
| SN-( )A01F      | AC           | 1.0A         | With varistor                                 | Absence             | -                 | -               | PCB                      | -                                   |                                     |
| SN-( )A01C      |              |              |   | Presence            |                   |                 |                          |                                     |                                     |
| SN-( )A01NVF    |              |              | Without varistor                              | Absence             |                   |                 |                          |                                     | Socket                              |
| SN-( )A01NVC    |              |              |   | Presence            |                   |                 |                          |                                     |                                     |
| SN-( )A01F-S    |              |              | With varistor                                 | Absence             |                   |                 | Socket part number:JL-5N |                                     |                                     |
| SN-( )A01C-S    |              |              |   | Presence            |                   |                 |                          |                                     |                                     |
| SN-( )A01NVF-S  |              |              | Without varistor                              | Absence             |                   |                 |                          |                                     |                                     |
| SN-( )A01NVC-S  |              |              |   | Presence            |                   |                 |                          |                                     |                                     |
| SN-( )D01       | DC           | 1.0A         | Diode   | -                   | Standard polarity | Standard        | PCB                      | Input voltage 3VDC is not available |                                     |
| SN-( )D01T      |              |              |   |                     |                   | High speed      |                          |                                     |                                     |
| SN-( )D01R      |              |              |   |                     | Reverse polarity  | Standard        |                          |                                     |                                     |
| SN-( )D01RT     |              |              |   |                     |                   | High speed      |                          |                                     |                                     |
| SN-( )D01HZ     |              |              | Zener diode                                   | -                   | Standard polarity | Standard        |                          |                                     |                                     |
| SN-( )D01HZT    |              |              |   |                     |                   | High speed      |                          |                                     |                                     |
| SN-( )D01HZR    |              |              |   |                     | Reverse polarity  | Standard        |                          |                                     |                                     |
| SN-( )D01HZRT   |              |              |   |                     |                   | High speed      |                          |                                     |                                     |
| SN-( )D01-S     |              |              | Diode   | -                   | Standard polarity | Standard        | Socket                   | Socket part number: JL-5N           |                                     |
| SN-( )D01T-S    |              |              |   |                     |                   | High speed      |                          |                                     |                                     |
| SN-( )D01R-S    |              |              |   |                     | Reverse polarity  | Standard        |                          |                                     |                                     |
| SN-( )D01RT-S   |              |              |   |                     |                   | High speed      |                          |                                     |                                     |
| SN-( )D01HZ-S   |              |              | Zener diode                                   | -                   | Standard polarity | Standard        |                          |                                     | Input voltage 3VDC is not available |
| SN-( )D01HZT-S  |              |              |   |                     |                   | High speed      |                          |                                     |                                     |
| SN-( )D01HZR-S  |              |              |   |                     | Reverse polarity  | Standard        |                          |                                     |                                     |
| SN-( )D01HZRT-S |              |              |   |                     |                   | High speed      |                          |                                     |                                     |

## ■ NOTES

1. Polarity of terminals is pre-determined. Please design your circuit accordingly.
2. Socket ordering code: JL-5N
3. Standard IC socket is not recommended. Please use socket "JL-5N".
4. When switching inductive load by AC output module without varistor, please connect a varistor as shown in drawing below.
5. AC input module has inside logic IC. Please connect bypass condenser (approx.  $0.01\mu$ ) at pivotal points between VDD and GND. (Conform to general handling instructions for logic IC.)



## CAUTIONS

- All values mentioned in this datasheet are provided under ideal conditions. Please perform the confirmation test before actual use.
- Reflow soldering is prohibited.
- Do not use relays in the atmosphere with sulfide gas, chloride gas or nitric oxide. Contact resistance may increase.
- Do not use silicon or silicon-containing product or materials near relays. It may cause contact failure.

## GENERAL INFORMATION

### 1. ROHS Compliance

- All relays produced by FCL Components are compliant with RoHS directive 2011/65/EU, including commission delegated directive 2015/863.

### 2. Recommended lead free solder condition

- Lead free solder plating on relay terminals is Sn-3.0Ag-0.5Cu, unless otherwise specified. This material has been verified to be compatible with PbSn assembly process.
- Recommended solder for assembly: Sn-3.0Ag-0.5Cu.

#### Flow Solder Condition:

Pre-Heating: Maximum 120°C within 90 sec.

Soldering: Dip within 5 sec. at 255°C±5°C solder bath

Relay must be cooled by air immediately after soldering

#### Solder by Soldering Iron:

Soldering Iron: 30-60W

Temperature: Maximum 340-360°C

Duration: Maximum 3 sec.

**We highly recommend that you confirm your actual solder conditions**

### 3. Moisture Sensitivity

- Moisture Sensitivity Level standard is not applicable to electromechanical relays, unless otherwise indicated.

### 4. Tin Whiskers

- Dipped SnAgCu solder is known as presenting a low risk to tin whisker development. No considerable length whisker was found by our in house test.

## Contact

### Japan

FCL COMPONENTS LIMITED  
Shinagawa Seaside Park Tower  
12-4, Higashi-shinagawa 4-chome,  
Tokyo 140 0002, Japan  
Tel: +81-3-3450-1682  
Email: fcl-contact@cs.fcl-components.com

### North and South America

FCL COMPONENTS AMERICA, INC.  
2055 Gateway Place Suite 480,  
San Jose, CA 95110 USA  
Tel: +1-408-745-4900  
Email: contact@fcl-components.us

### Europe

FCL COMPONENTS EUROPE B.V.  
Diamantlaan 25  
2132 WV Hoofddorp, Netherlands  
Tel: +31-23-556-0910  
Email: info@fcl-components.eu

### Asia Pacific

FCL COMPONENTS ASIA PTE LTD.  
No. 20 Harbour Drive, #07-01B  
Singapore 117612  
Tel: +65-6375-8560  
Email: fcal@fcl-components.com

### China

FCL COMPONENTS (SHANGHAI) CO.,LTD.  
Unit 1105, Central Park - Jing An,  
No.329 Heng Feng Road, Shanghai  
200070, China  
Tel: +86-21-3253 0998  
Email: fcsh@fcl-components.com

### Hong Kong

FCL COMPONENTS HONG KONG CO.,  
LIMITED  
Unit 2313, Seapower Tower, Concordia  
Plaza, No.1 Science Museum Road,  
TST, Kowloon, Hong Kong  
Tel: +852-2881-8495  
Email: fcal@fcl-components.com

Web: [www.fcl-components.com/en/](http://www.fcl-components.com/en/)

© 2025 FCL Components Limited. All rights reserved. All trademarks or registered trademarks are the property of their respective owners.

FCL Components Products are intended for general use, including without limitation, in personal, household and office environments, in buildings and for ordinary use in the industry. FCL Components Products are not intended to be used in applications where extremely high safety is required ("High Safety Required Applications"), such as, but not limited to, applications in nuclear facilities, in aircraft automatic flight control, in air traffic control, in mass transit system control, in missile launch system, in weapon systems, in medical equipment for life support or any application involving a direct serious risk of physical injury or death.

Please do not use FCL Components Products without securing the sufficient safety and reliability required for the High Safety Required Applications.

In addition, FCL Components shall not be liable against the customer and/or any third party for any claims or damages arising in connection with the use of FCL Components Products in the High Safety Required Applications.

FCL Components warrants that its Products, if properly used and services, will conform to their specification and will be free from defects in material and workmanship for twelve months from delivery.

The implied warranties of merchantability and fitness for a particular purpose and all other warranties, representations and conditions, express or implied by statute, trade usage or otherwise, except as set forth in this warranty, are excluded and shall not apply to the Products delivered.

The contents, data and information in this datasheet are provided by FCL Components Limited as a service only to its user and only for general information purposes. The use of the contents, data and information provided in this datasheet is at the users' own risk.

FCL Components has assembled this datasheet with care and will endeavor to keep the contents, data and information correct, accurate, comprehensive, complete and up to date.

FCL Components Limited and affiliated companies do however not accept any responsibility or liability on their behalf, nor on behalf of its employees, for any loss or damage, direct, indirect or consequential, with respect to this datasheet, its contents, data, and information and related graphics and the correctness, reliability, accuracy, comprehensiveness, usefulness, availability and completeness thereof. Nor do FCL Components Limited and affiliated companies accept on their behalf, nor on behalf of its employees, any responsibility or liability with respect to these datasheets, its contents, data, information and related graphics and the correctness, reliability, accuracy, comprehensiveness, usefulness, availability and completeness thereof. Rev. January 21, 2025.