

# SOLID STATE RELAY (I/O Module)

## MAXIMUM LOAD CURRENT 1 A

### 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: 2,500 V rms)
- 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)



#### ■ ORDERING INFORMATION

- Input module

[Example]       $\frac{SN}{(a)}$     -     $\frac{A}{(b)}$      $\frac{100 BF}{(c)}$

(a)	Series Name	SN : SN Series
(b)	Input Voltage	A: AC type D: DC type
(c)	Nominal Voltage	100 BF: 100 VAC 200 BF: 200 VAC 12/24 B: 12/24 VDC

# SN SERIES

● Output module

[Example]  $\frac{SN}{(a)} - \frac{12}{(b)} \frac{D}{(c)} \frac{01}{(d)} \frac{HZ}{(e)} - \frac{C}{(f)} \frac{R}{(g)} \frac{T}{(h)}$

(a)	Series Name	SN : SN Series	
(b)	Nominal Voltage (Input side)	3: 3 VDC (only AC type) 5: 5 VDC 12: 12 VDC 24: 24 VDC	
(c)	Load Voltage	A: AC type D: DC type	
(d)	Load Current	01 : 1 A	
(e)	Kinds of Inverse Connection Protecting Element	AC type	Nil : with varistor NV: without varistor
		DC type	Nil : Diode HZ: Zener diode
(f)	Zero Cross function (AC type)	F : without zero cross function C : with zero cross function	
(g)	Output Polarity (DC type)	Nil : Standard polarity R : Reverse polarity	
(h)	Switching Speed (DC type)	Nil : Standard T : High speed type	

## ■ SPECIFICATIONS

### ● INPUT MODULE (SN-( ) B Type)

Item		AC Input Module		DC Input module	
		100 VAC type	200 VAC type	12/24 VDC type	
INPUT side	Input voltage range	80 to 132 Vrms	160 to 265 Vrms	9.6 to 28.8 VDC	
	Rating input current	Approximately 7 mArms		Approx. 5 mA at 12 VDC	Approx. 10 mA at 24 VDC
	Power frequency range	47 to 63 Hz		-	-
	Must operate voltage (max.)	80 Vrms	160 Vrms	9.6 VDC	
	Must release voltage (max.)	30 Vrms	60 Vrms	5.0 VDC	
	Must release current (max.)	2 mArms		1.5 mA	
OUTPUT side	DC supply voltage (VDD)	4 to 6 VDC			
	Max. output current (VDD=5V)	±4 mA		±0.4 mA	
	Output logic	Operate with negative true logic (active flow)			
Maximum operate time (max.)		25 ms		10ms	
Maximum release time (max.)		30 ms		10ms	
Insulation resistance (initial value)		Minimum 1,000 MΩ (at 500VDC) (for input-output)			
Dielectric strength		2,500 Vrms 1 minute (for input-output)			
Operating temperature range (no frost)		-30°C to +85°C			
Storage temperature range (no frost)		-40°C to +100°C			
Case color		Yellow		White	
Weight		Approximately 2.0 g		Approximately 3.3 g	

# SN SERIES

## • OUTPUT MODULE Standard Type

Item Remarks		AC Output module		DC Output module		
		with zero cross	without zero cross			
INPUT side	Nominal Voltage (DC)	3 V, 5 V, 12 V, 24 V		5 V, 12 V, 24 V		
	Operate Voltage Range	±20% of nominal voltage				
	Must Operate Voltage	max.80% of nominal voltage				
	Must Release Voltage	Minimum 1 VDC (minimum 0.5 V*)				*3 VDC type
	Input Impedance (±10%)	3 VDC Type	130 Ω	180 Ω	—	
5 VDC Type		330 Ω	470 Ω	390 Ω		
12 VDC Type		1,0k Ω	1,5k Ω	1,2k Ω		
24 VDC Type		2,2k Ω	3,0k Ω	2.4k Ω		
OUTPUT side	Load Voltage Range	24 to 265 Vrms		3 to 30 VDC		
	Maximum Load Current	1.0 Arms		1.0 A	see CHARACTERISTIC DATA	
	Minimum Load Current	10 mArms		1 mA		
	Switching Current	50 A (60 Hz)		3 A (10 ms)		
	Max. Off-State	Leakage Current	1.5 mArms (at 100 Vrms 60 Hz) 3.0 mArms (at 200 Vrms 60 Hz)		0.1 mA (at 30 VDC)	
		Max. On-State Voltage Drop	1.2 Vrms		1.2 V	at max. load current
Maximum Operate Time (max.)		1 ms	1/2 cycle ±1 ms	1 ms		
Maximum Release Time		1/2 cycle + 1ms		1 ms		
Insulation Resistance		Minimum 1,000 M Ω (at 500 VDC)			for input-output	
Dielectric Strength		2,500 Vrms 1 minute				
Operating Temperature Range		-30°C to + 85°C			no	
Storage Temperature Range		-40°C to +100°C			frost	
Case Color		Black		Red		
Weight		Approximately 3.5 g		Approximately 2.9 g		

• **OUTPUT MODULE High Speed Switching Type**

Item		AC Output module	Remarks
INPUT side	Nominal Voltage (DC)	5 V, 12 V, 24 V	
	Operate Voltage Range	±20% of nominal voltage	
	Must Operate Voltage	80% of nominal voltage	
	Must Release Voltage	Minimum 1 V	
Input Impedance	5 VDC Type	330 Ω ±10%	
	12 VDC Type	1,0 k Ω ±10%	
	24 VDC Type	2,0 k Ω ±10%	
OUTPUT side	Load Voltage	DC3 to 30V	
	Maximum Load Current	1.0 A	see CHARACTERISTIC DATA
	Minimum Load Current	1 mA	
	Switching Current	3 A (10 ms)	
	Max. Off-State Leakage Current	0.1 mA (at 30 VDC)	
	Max. On-State Voltage Drop	1.2 V	at max. load current
Maximum Operate Time	max. 5 μs	at DC 5 V 0.1A	
Maximum Release Time	max. 25 μs		
Insulation Resistance	Minimum 1,000 M Ω (at 500 VDC)	for input-output	
Dielectric Strength	2,500 V rms 1 minute		
Operating Temperature Range	-40°C to + 100°C		
Storage Temperature Range	-30°C to + 85°C		
Case Color	Red		
Weight	Approximately 2.9 g		

■ **INSULATION**

Item	Input module	Output module	Note
Resistance (initial)	Minimum 1,000 MΩ (500VDC)		Input-output
Surge Voltage	2,500V rms 1 min.		

## ■ BLOCK DIAGRAM

### • INPUT MODULE

LOAD		INSULATION CIRCUITS	Input/Output waveform (resistive load)
DC Logic output	Photo-transistor coupler		Input signal: ON (sine wave), OFF (dashed line) Output signal: "H" (high), "L" (low)
	Photo-transistor coupler		Input signal: ON (high pulse), OFF (low pulse) Output signal: "H" (high pulse), "L" (low pulse)

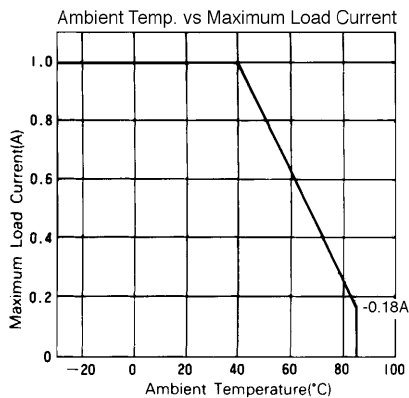
### • OUTPUT MODULE

LOAD		INSULATION CIRCUITS	Input/Output waveform (resistive load)
AC	Photo-triac coupler		Source voltage of load: sine wave Input signal: ON (high pulse), OFF (low pulse) Load current: sine wave
DC	Photo-transistor coupler		Input signal: ON (high pulse), OFF (low pulse) Load current: high pulse

\* AC type without varistor / DC type with zener diode available.

## ■ CHARACTERISTIC DATA

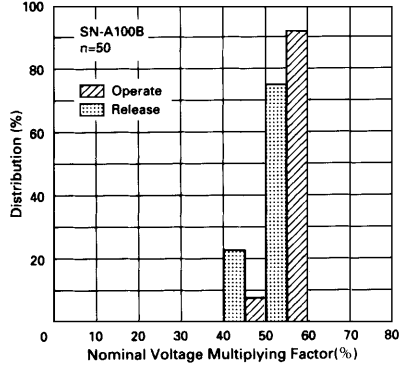
### • OUTPUT MODULE



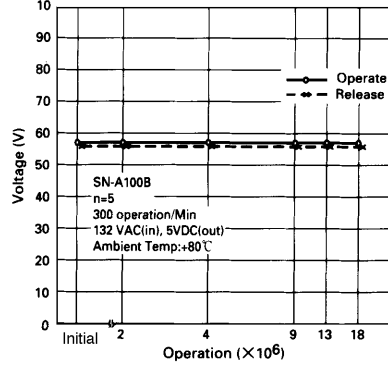
## ■ REFERENCE DATA

### ● INPUT MODULE

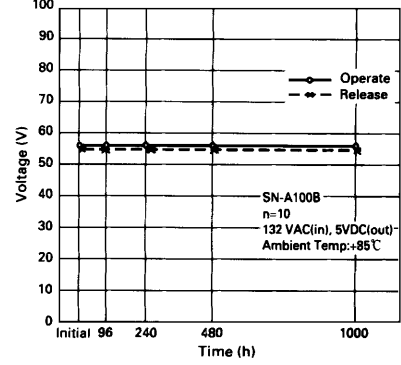
Distribution of Operate & Release Voltage  
(AC Type)



High temperature Switching Test  
(AC Type)

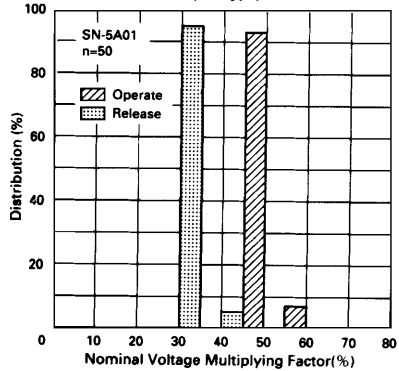


High temperature Continuous Operating Test  
(AC Type)

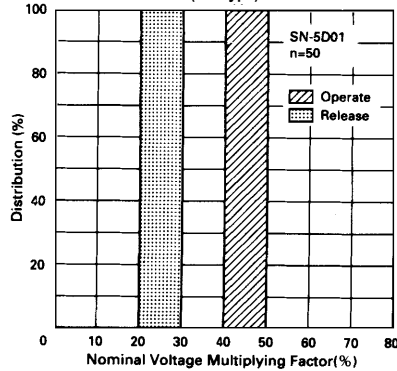


### ● OUTPUT MODULE

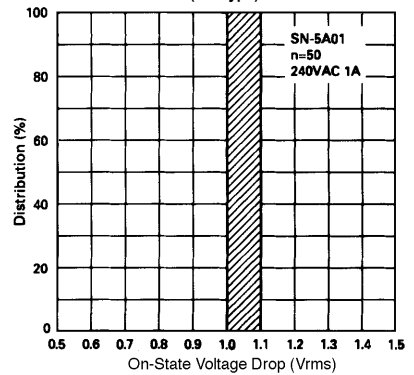
Distribution of Operate & Release Voltage  
(AC Type)



Distribution of Operate & Release Voltage  
(DC Type)



Distribution of On-State Voltage Drop  
(AC Type)

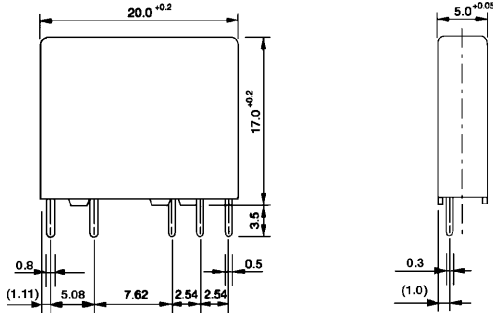


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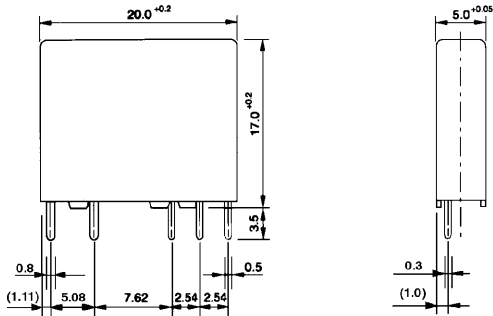
## ■ DIMENSIONS

### ● Dimensions

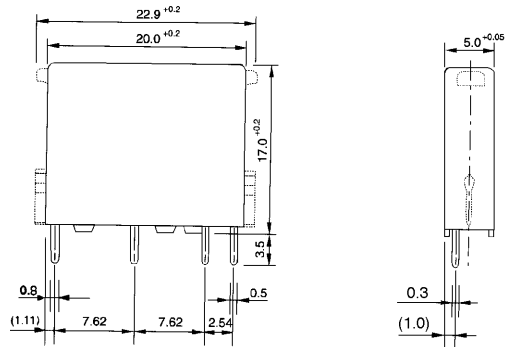
SN-A ( ) type (input module)



SN-D ( ) type (input module)

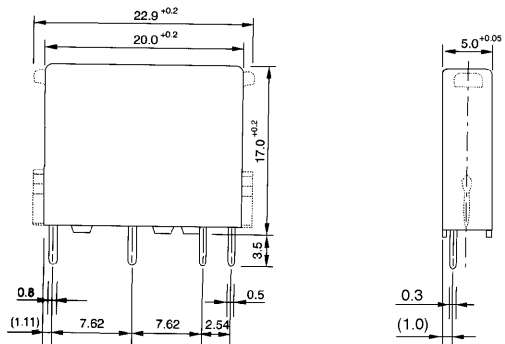


SN-A ( ) type (output module)



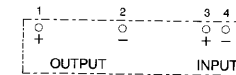
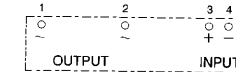
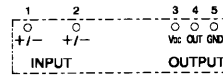
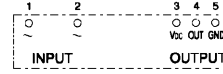
Dotted line : Socket mounting SN-( )A-S type

SN-( ) D, ( ) D ( ) R type (output module)



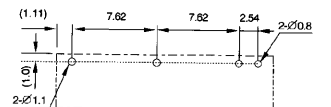
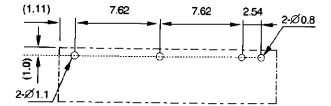
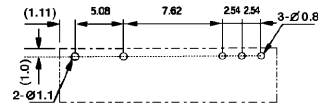
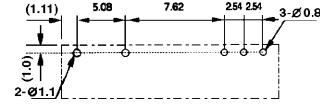
Dotted line : Socket mounting SN-( )D-S type

### ● Schematics (BOTTOM VIEW)



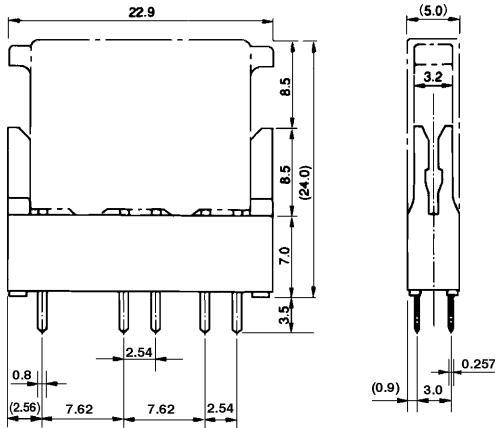
\* Reverse polarity type available

### ● PC board mounting hole layout (BOTTOM VIEW)

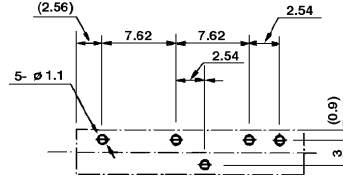


Unit: mm

## ■ Socket Dimensions



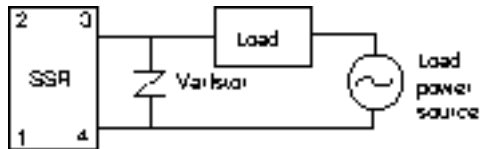
## ■ Socket PC board mounting hole layout



Unit: mm

## ■ 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.)





## RoHS Compliance and Lead Free Relay Information

### 1. General Information

- Relays produced after the specific date code that is indicated on each data sheet are lead-free now. Most of our signal and power relays are lead-free. Please refer to Lead-Free Status Info.
- Lead free solder paste currently used in relays is Sn-3.0Ag-0.5Cu.
- All signal and most power relays also comply with RoHS. Please refer to individual data sheets. Relays that are RoHS compliant do not contain the 5 hazardous materials that are restricted by RoHS directive (lead, mercury, chromium IV, PBB, PBDE).
- It has been verified that using lead-free relays in leaded assembly process will not cause any problems (compatible).
- "LF" is marked on each outer and inner carton. (No marking on individual relays).
- To avoid leaded relays (for lead-free sample, etc.) please consult with area sales office.
- We will ship leaded relays as long as the leaded relay inventory exists.

Note: Cadmium was exempted from RoHS on October 21, 2005. (Amendment to Directive 2002/95/EC)

### 2. Recommended Lead Free Solder Profile

- Recommended solder paste Sn-3.0Ag-0.5Cu.

#### Reflow Solder condition

**Flow Solder condition:**

Pre-heating: maximum 120°C  
Soldering: dip within 5 sec. at  
260°C solder bath

**Solder by Soldering Iron:**

Soldering Iron  
Temperature: maximum 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.

### 4. Tin Whisker

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

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