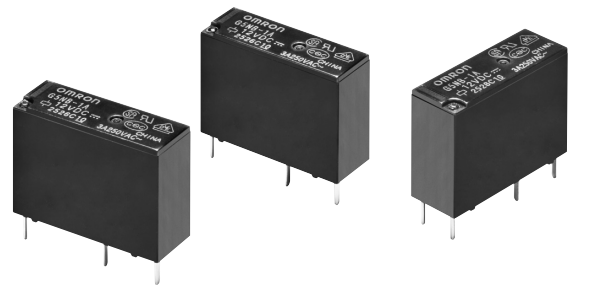


# G5NB

PCB Power Relay

## A Miniature Relay with 1-pole 3A/5A Switching Capability and 10 kV Impulse Withstand Voltage

- Highly efficient magnetic circuit for high sensitivity (200 mW).
- Standard model conforms to UL/CSA/VDE standards.
- Satisfies EN61010 reinforced insulation requirements.
- IEC/EN 60335-1 conformed. (-HA Model)
- IEC/EN 60079-15 conformed. (Only for G5NB-1A4, G5NB-1A4-E Model)
- Reduced power consumption with voltage holding and pulse width modulation (PWM) control (Only for G5NB-□-PW model)



RoHS Compliant

### Model Number Legend

G5NB-□□□-□-□-□-□-□  
1 2 3 4 5 6 7 8

#### 1. Number of Poles

1 : 1-pole

#### 2. Contact Form

A : SPST-NO (1a)

#### 3. Enclosure rating

None : Flux protection

4 : Sealed

#### 4. Classification

None : Standard

E : High-capacity

#### 5. Market Code

None : General purpose

HA : Home Appliance according to IEC/EN60335-1

#### 6. Coil Insulation Class(UL1446)

None : Class B

CF : Class F

#### 7. Special Requirement

None : Not supported

PW : Supported

#### 8. Packing

None : Tray Packing

SP : Tube Packing

### Application Examples

- Water heaters
- Air conditioners
- Small electric appliances
- Refrigerators
- Home appliances

### Ordering Information

| Terminal Shape | Market Code     | Classification | Contact form | Enclosure rating      | Model              | Rated coil voltage              | Minimum packing unit          |                    |                        |
|----------------|-----------------|----------------|--------------|-----------------------|--------------------|---------------------------------|-------------------------------|--------------------|------------------------|
| PCB terminals  | General purpose | Standard       | SPST-NO (1a) | Flux protection       | G5NB-1A(-SP)       | 5VDC<br>12VDC<br>18VDC<br>24VDC | 100 pcs/Tray<br>(50 pcs/Tube) |                    |                        |
|                |                 |                |              | Sealed                | G5NB-1A4(-SP)      |                                 |                               |                    |                        |
|                |                 |                |              | Flux protection       | G5NB-1A-CF(-SP)    | 5VDC                            |                               |                    |                        |
|                |                 |                |              |                       | G5NB-1A-CF-PW(-SP) | 12VDC                           |                               |                    |                        |
|                |                 |                |              |                       | G5NB-1A-PW(-SP)    | 24VDC                           |                               |                    |                        |
|                |                 |                |              | High-capacity         | G5NB-1A-E(-SP)     | 5VDC<br>12VDC<br>18VDC<br>24VDC |                               |                    |                        |
|                |                 | Sealed         |              |                       | G5NB-1A4-E(-SP)    |                                 |                               |                    |                        |
|                |                 | Home Appliance |              |                       | Standard           | Flux protection                 |                               | G5NB-1A-HA(-SP)    | 5VDC<br>12VDC<br>24VDC |
|                |                 |                |              |                       |                    |                                 |                               | G5NB-1A-HA-CF(-SP) |                        |
|                |                 |                |              | G5NB-1A-HA-CF-PW(-SP) |                    |                                 |                               |                    |                        |
|                | G5NB-1A-HA-PW   |                |              |                       |                    |                                 |                               |                    |                        |
|                | High-capacity   |                |              | G5NB-1A-E-HA(-SP)     | 12VDC<br>24VDC     |                                 |                               |                    |                        |

Note 1. When ordering, add the rated coil voltage to the model number.

Example: G5NB-1A DC5

Rated coil voltage

However, the notation of the coil voltage on the product case as well as on the packing will be marked as □□VDC.

Note 2. When ordering tape packing, add "-SP" to the model number.

Be sure since "-SP" is not part of the relay model number, it is not marked on the relay case.

■Ratings

●Coil

| Item          | Rated current<br>(mA) | Coil resistance<br>(Ω) | Must operate voltage<br>(V) | Must release voltage<br>(V) | Max. voltage<br>(V)                                             | Power consumption<br>(mW)  |
|---------------|-----------------------|------------------------|-----------------------------|-----------------------------|-----------------------------------------------------------------|----------------------------|
| Rated voltage |                       |                        | % of rated voltage          |                             |                                                                 |                            |
| 5 VDC         | 40                    | 125                    | 75% max.                    | 10% min.<br>10 to 31%*      | Standard:<br>180% (at 23°C)<br>High-capacity:<br>170% (at 23°C) | Approx. 200<br>Approx. 32* |
| 12 VDC        | 16.7                  | 720                    |                             |                             |                                                                 |                            |
| 18 VDC        | 11.1                  | 1,620                  |                             |                             |                                                                 |                            |
| 24 VDC        | 8.3                   | 2,880                  |                             |                             |                                                                 |                            |

Note 1. The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.

Note 2. The operating characteristics are measured at a coil temperature of 23°C.

Note 3. The “Max. voltage” is the maximum voltage that can be applied to the relay coil.

\* These numbers are only for -PW type. Power consumption with Holding Voltage is 32mW. Please confirm the detail in page 6 Coil Voltage Reduction (Holding Voltage).

●Contacts

| Item                   | Load | Resistive load     |                |
|------------------------|------|--------------------|----------------|
|                        |      | Standard           | High-capacity  |
| Contact Type           |      | Single             |                |
| Contact material       |      | Ag-alloy (Cd free) |                |
| Rated load             |      | 3 A at 125 VAC     | 5 A at 250 VAC |
|                        |      | 3 A at 30 VDC      | 3 A at 30 VDC  |
| Rated carry current    |      | 3 A                | 5 A            |
| Max. switching voltage |      | 250 VAC, 30 VDC    |                |
| Max. switching current |      | 3 A                | 5 A            |

■Characteristics

|                                             |                                       |                                                                                                                                                                                                                                                                 |
|---------------------------------------------|---------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Contact resistance *1                       |                                       | 100 mΩ max.                                                                                                                                                                                                                                                     |
| Operate time                                |                                       | 10 ms max.                                                                                                                                                                                                                                                      |
| Release time                                |                                       | 10 ms max.                                                                                                                                                                                                                                                      |
| Insulation resistance *2                    |                                       | 1,000 MΩ min.                                                                                                                                                                                                                                                   |
| Dielectric strength                         | Between coil and contacts             | 4,000 VAC, 50/60 Hz for 1 min                                                                                                                                                                                                                                   |
|                                             | Between contacts of the same polarity | 750 VAC, 50/60 Hz for 1 min                                                                                                                                                                                                                                     |
| Impulse withstand voltage                   | Between coil and contacts             | 10 kV (1.2 x 50 μs)                                                                                                                                                                                                                                             |
| Vibration resistance                        | Destruction                           | 10 to 55 to 10 Hz, 0.75 mm single amplitude (1.5 mm double amplitude)                                                                                                                                                                                           |
|                                             | Malfunction                           | 10 to 55 to 10 Hz, 0.75 mm single amplitude (1.5 mm double amplitude)                                                                                                                                                                                           |
| Shock resistance                            | Destruction                           | 1,000 m/s <sup>2</sup>                                                                                                                                                                                                                                          |
|                                             | Malfunction                           | 100 m/s <sup>2</sup>                                                                                                                                                                                                                                            |
| Durability                                  | Mechanical                            | 5,000,000 operations min.                                                                                                                                                                                                                                       |
|                                             | Electrical (resistive load)           | Standard (G5NB-1A, -1A4)<br>200,000 operations at 125 VAC, 3A<br>200,000 operations at 30 VDC, 3A<br>High-capacity (G5NB-1A-E, -1A4-E)<br>100,000 operations at 250 VAC, 5A<br>200,000 operations at 30 VDC, 3A<br>(with a rated load at 1,800 operations/hour) |
| Failure rate (P level) (reference value) *3 |                                       | DC5V 10mA                                                                                                                                                                                                                                                       |
| Ambient operating temperature               |                                       | -40°C to 85°C<br>(with no icing or condensation)                                                                                                                                                                                                                |
| Ambient operating humidity                  |                                       | 5% to 85%                                                                                                                                                                                                                                                       |
| Weight                                      |                                       | Approx. 4 g                                                                                                                                                                                                                                                     |

Note. Values in the above table are the initial values at 23°C.

\*1. Measurement conditions: 5 VDC, 1 A, voltage drop method

\*2. Measurement conditions: Measured at the same points as the dielectric strength using a 500 VDC ohmmeter.

\*3. This value was measured at a switching frequency of 120 operations/min.

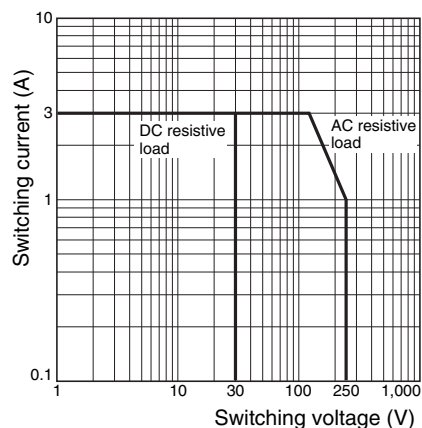
■Actual Load Life (Reference Values)

1. 120 VAC motor and lamp load
- 2.5A surge and 0.5A normal:  
250,000 operations min. (at 23°C)
2. 160 VDC valve load (with varistor)
- 0.24A:  
250,000 operations min. (at 23°C)
3. 140 VAC pump load
- Inrush: 5.4 A (o-p), Steady state: 1.6 A  
200,000 operations min. (Ambient temperature: 23°C)
4. 100 VAC motor load
- Inrush: 10.7 A (o-p), Steady state: 1.1 A  
200,000 operations min. (Ambient temperature: 23°C)

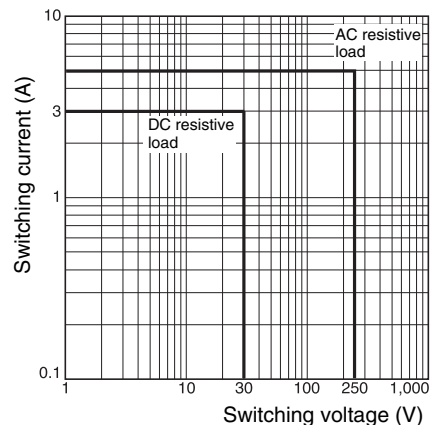
## Engineering Data

### Maximum Switching Capacity

#### Standard models

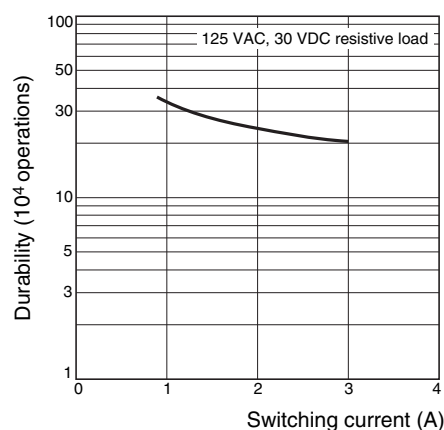


#### High-capacity models

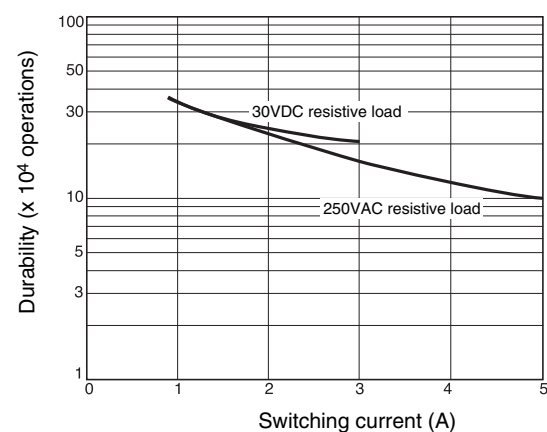


### Durability

#### Standard models

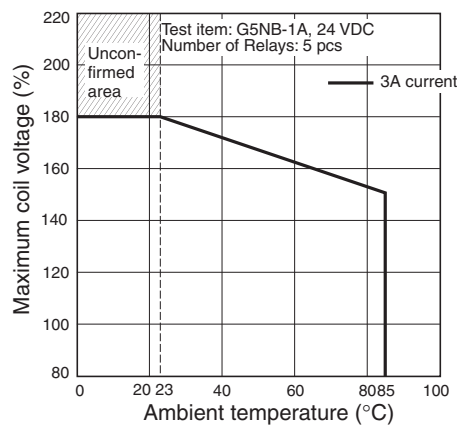


#### High-capacity models

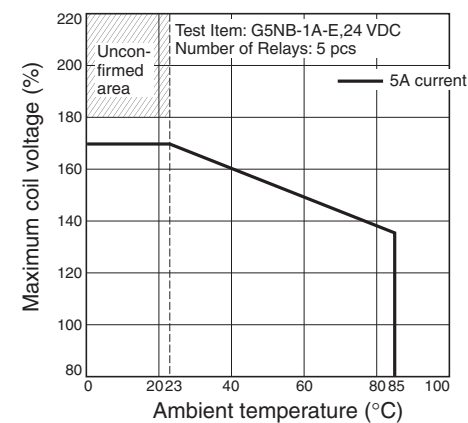


### Ambient Temperature vs. Maximum Coil Voltage

#### Standard models



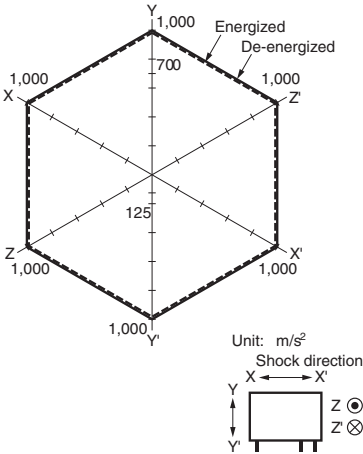
#### High-capacity models



**Note:** The maximum coil voltage refers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

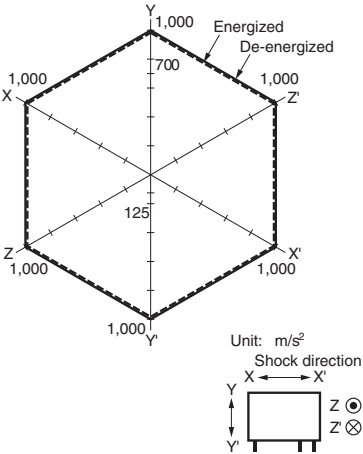
●Shock malfunction

Standard models



Test Item: G5NB-1A, 24VDC  
Number of Relays: 5 pcs  
Test Method: Shock is applied 3 times in 6 directions along 3 axes and the level at which shock caused malfunction is measured.  
The energized voltage is 100% of the rated voltage.  
Rating: 100 m/s<sup>2</sup>

High-capacity models

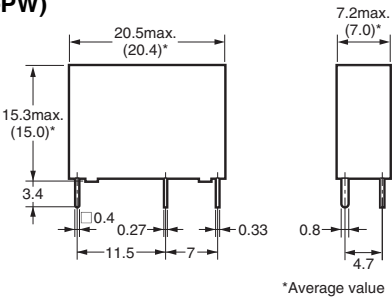
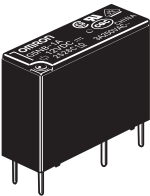


Test Item: G5NB-1A-E, 24VDC  
Number of Relays: 5 pcs  
Test Method: Shock is applied 3 times in 6 directions along 3 axes and the level at which shock caused malfunction is measured.  
The energized voltage is 100% of the rated voltage.  
Rating: 100 m/s<sup>2</sup>

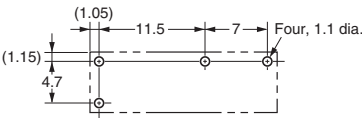
■Dimensions

(Unit: mm)

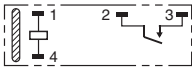
G5NB-1A(4)(-E)(-HA)(-CF)(-PW)



PCB Mounting Holes  
(Bottom View)  
Tolerance: ±0.1 mm



Terminal Arrangement/  
Internal Connections  
(Bottom View)



(No coil polarity)

## ■Approved Standards

The approval rating values for overseas standards are different from the performance values determined individually. Confirm the values before use.

●UL Recognized:  (File No. E41515)

CSA Certified:  (File No. LR31928)

| Model                        | Contact form    | Coil ratings | Contact ratings                                             | Number of test operations |
|------------------------------|-----------------|--------------|-------------------------------------------------------------|---------------------------|
| G5NB-1A(4)(-HA)(-CF)(-PW)    | SPST-NO<br>(1a) | 5 to 24V DC  | 3A 250V AC (Resistive) 85°C                                 | 100,000                   |
|                              |                 |              | 3A 30V DC (Resistive) 70°C                                  | 6,000                     |
| G5NB-1A(4)-E<br>G5NB-1A-E-HA |                 |              | 5A 250 V AC (Resistive) 85°C<br>5A 30 V DC (Resistive) 70°C | 6,000                     |

●EN/IEC, VDE Certified  (Certificate No. 137575)

| Model                        | Contact form    | Coil ratings      | Contact ratings                                             | Number of test operations |
|------------------------------|-----------------|-------------------|-------------------------------------------------------------|---------------------------|
| G5NB-1A(4)(-HA)(-CF)(-PW)    | SPST-NO<br>(1a) | 5, 12, 18, 24V DC | 3A 250V AC (Resistive) 85°C<br>3A 30V DC (Resistive) 85°C   | 100,000                   |
| G5NB-1A(4)-E<br>G5NB-1A-E-HA |                 |                   | 5A 250 V AC (Resistive) 85°C<br>5A 30 V DC (Resistive) 85°C | 10,000                    |
|                              |                 |                   | 3A 250V AC (Resistive) 85°C                                 | 100,000                   |

|                                                                 |                                                                                                                                       |
|-----------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| Creepage distance                                               | 6.0 mm min.                                                                                                                           |
| Clearance distance                                              | 6.0 mm min.                                                                                                                           |
| Insulation material group                                       | IIIa                                                                                                                                  |
| Type of insulation coil-contact circuit<br>open contact circuit | Pollution degree 2 / Reinforced (Sealed)<br>Pollution degree 3 / Basic (Flux protection) / Reinforced (Sealed)<br>Micro disconnection |
| Rated Insulation voltage                                        | 250 V                                                                                                                                 |
| Pollution degree                                                | 3                                                                                                                                     |
| Rated voltage system                                            | 250 V                                                                                                                                 |
| Over voltage category                                           | III                                                                                                                                   |
| Category of protection according to IEC 61810-1                 | RT II (Flux protection) / RT III (Sealed)                                                                                             |
| Glow wire according to IEC 60335-1                              | <HA Models only><br>GWT 750°C min. (IEC 60695-2-11) / GWFI 850°C min. (IEC 60695-2-12)                                                |
| Tracking resistance according to IEC 60112                      | PTI 250 V min. (housing parts)                                                                                                        |
| Flammability class according to UL94                            | V-0                                                                                                                                   |

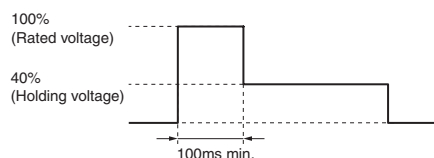
## ■Precautions

●Please refer to “PCB Relays Common Precautions” for correct use.

### Correct Use

#### ●Coil Voltage Reduction (Holding Voltage) after Relay Operation

- If the coil voltage is reduced to the holding voltage after Relay operation, first apply the rated voltage to the coil for at least 100 ms, as shown below.
- A voltage of at least 40% of the rated voltage is required for the coil holding voltage. Do not allow voltage fluctuations to cause the coil holding voltage to fall below this level.



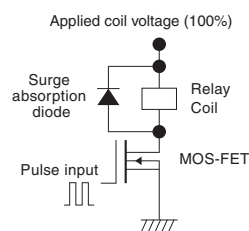
|                 | Applied coil voltage | Coil resistance*              | Power consumption |
|-----------------|----------------------|-------------------------------|-------------------|
| Rated voltage   | 100%                 | 125Ω (5 VDC)<br>720Ω (12 VDC) | Approx. 200 mW    |
| Holding voltage | 40%                  | 2880Ω (24 VDC)                | Approx. 32 mW     |

\* The coil resistance were measured at a coil temperature of 23°C with tolerances of ± 10%.

#### ●Power consumption reduction of coil with pulse width modulation (PWM)

- Models with PWM drive capability (-PW) can reduce coil holding current with PWM control. This function reduces power consumption by reducing the current held by coil.
- Apply the rated voltage for at least 100 ms at the time of relay operation.
- The following are our verification conditions. When using, it be sure to check the actual machine under the actual usage conditions.

#### ■Example of drive circuit ■ Conditions of validation carried out by OMRON



- Applied voltage: rated voltage
- Duty: 50% or more
- Frequency: 10 kHz or more
- Diode Vf: 0.4 V or less

Please check each region's Terms & Conditions by region website.

## OMRON Corporation

Electronic and Mechanical Components Company

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