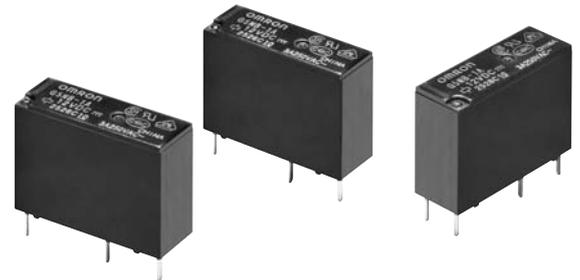


G5NB

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)
- IEC60079-1, IEC60079-15 conformed.
- Reduced power consumption with voltage holding and pulse width modulation (PWM) control (Only for G5NB-□-PW model)

Model Number Legend

G5NB-□□□-□-□-□-□-□
1 2 3 4 5 6 7 8

- | | | | |
|--|--|---|--|
| <p>1. Number of Poles 1 : 1-pole</p> <p>2. Contact Form A : SPST-NO (1a)</p> <p>3. Enclosure rating None : Flux protection 4 : Sealed</p> | <p>4. Classification None : Standard E : High-capacity</p> <p>5. Market Code None : General purpose HA : Home Appliance according to IEC/EN60335-1</p> | <p>6. Coil Insulation Class(UL1446) None : Class B CF : Class F</p> <p>7. Special Requirement None : Not supported PW : Supported</p> | <p>8. Packing None : Tray Packing SP : Tube Packing</p> |
|--|--|---|--|

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 | 100 pcs/Tray (50 pcs/Tube) |
| | | | | Sealed | G5NB-1A4(-SP) | 12VDC 18VDC 24VDC | |
| | | | | Flux protection | G5NB-1A-CF(-SP) | 5VDC | |
| | | G5NB-1A-CF-PW(-SP) | | | 12VDC | | |
| | | G5NB-1A-PW(-SP) | | | 24VDC | | |
| | | Sealed | | G5NB-1A-E(-SP) | 5VDC | | |
| | G5NB-1A-E(-SP) | | 12VDC | | | | |
| | G5NB-1A4-E(-SP) | | 18VDC 24VDC | | | | |
| | Home Appliance | Standard | High-capacity | Flux protection | G5NB-1A-HA(-SP) | 5VDC | |
| | | | | | G5NB-1A-HA-CF(-SP) | 12VDC | |
| | | G5NB-1A-HA-CF-PW(-SP) | | | 24VDC | | |
| | | G5NB-1A-HA-PW | | | | | |
| | | | | G5NB-1A-E-HA(-SP) | 12VDC 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 (mA) | Coil resistance (Ω) | Must operate voltage (V) | Must release voltage (V) | Max. voltage (V) | Power consumption (mW) |
|---------------|--------------------|---------------------|--------------------------|--------------------------|---|----------------------------|
| | | | % of rated voltage | | | |
| Rated voltage | | | | | | |
| 5 VDC | 40 | 125 | 75% max. | 10% min. 10 to 31%* | Standard: 180% (at 23°C) High-capacity: 170% (at 23°C) | Approx. 200 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) |
| | Malfunсtion | 10 to 55 to 10 Hz, 0.75 mm single amplitude (1.5 mm double amplitude) |
| Shock resistance | Destruction | 1,000 m/s ² |
| | Malfunсtion | 100 m/s ² |
| Durability | Mechanical | 5,000,000 operations min. |
| | Electrical (resistive load) | Standard (G5NB-1A, -1A4) 200,000 operations at 125 VAC, 3A 200,000 operations at 30 VDC, 3A High-capacity (G5NB-1A-E, -1A4-E) 100,000 operations at 250 VAC, 5A 200,000 operations at 30 VDC, 3A (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 (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.

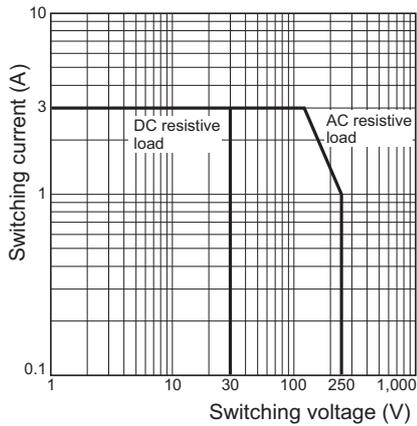
■ Actual Load Life (Reference Values)

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

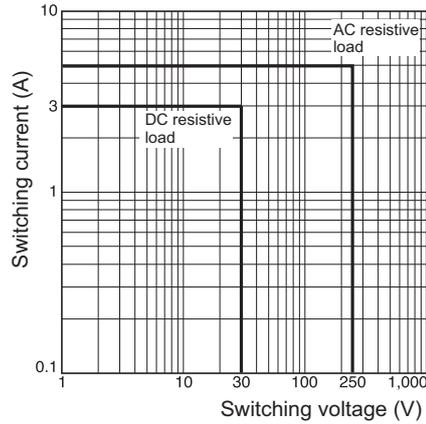
Engineering Data

Maximum Switching Capacity

Standard models

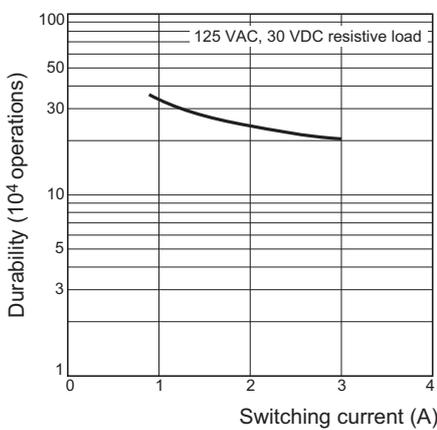


High-capacity models

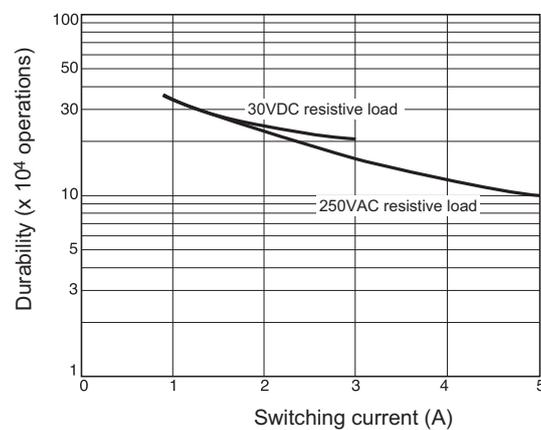


Durability

Standard models

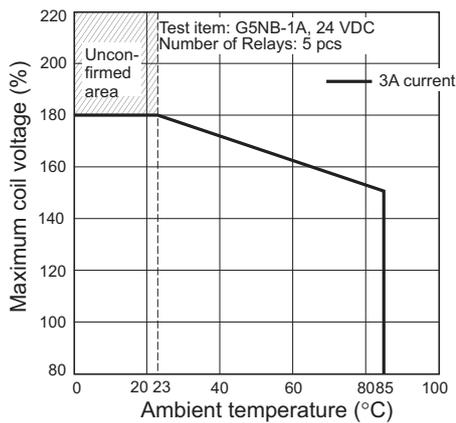


High-capacity models

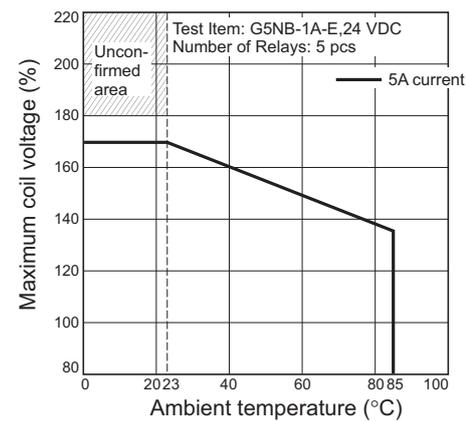


Ambient Temperature vs. Maximum Coil Voltage

Standard models



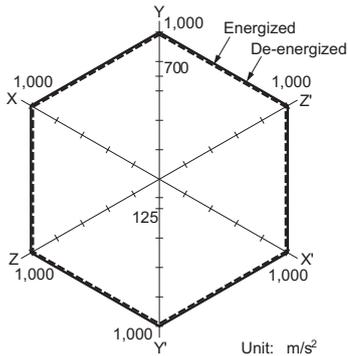
High-capacity models



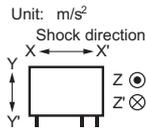
Note: The maximum coil voltage refers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

● Shock malfunction

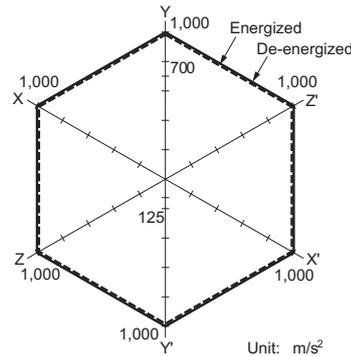
Standard models



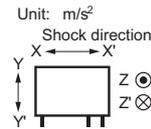
Test Item: G5NB-1A, 24VDC
Number of Relays: 5 pcs
Test Method: Shock is applied 3 times in 6 directions along 3 axes and the level at which shock caused malfunction is measured. The energized voltage is 100% of the rated voltage.
Rating: 100 m/s²



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/s²



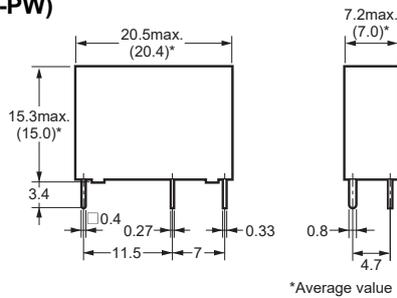
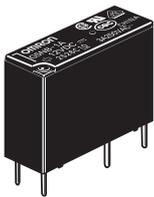
■ Dimensions

CAD Data marked products, 2D drawings and 3D CAD models are available.
For CAD information, please visit our website, which is noted on the last page.

(Unit: mm)

G5NB

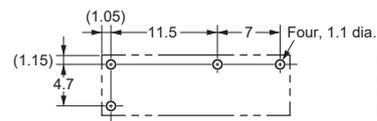
G5NB-1A(4)(-E)(-HA)(-CF)(-PW)



PCB Mounting Holes

(Bottom View)

Tolerance: ±0.1 mm



Terminal Arrangement/

Internal Connections

(Bottom View)



(No coil polarity)

CAD Data

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 (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 G5NB-1A-E-HA | | | 5A 250 V AC (Resistive) 85°C 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 (1a) | 5, 12, 18, 24V DC | 3A 250V AC (Resistive) 85°C 3A 30V DC (Resistive) 85°C | 100,000 |
| G5NB-1A(4)-E G5NB-1A-E-HA | | | 5A 250 V AC (Resistive) 85°C 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 open contact circuit | Pollution degree 2 / Reinforced (Sealed) Pollution degree 3 / Basic (Flux protection) / Reinforced (Sealed) 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> 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 |

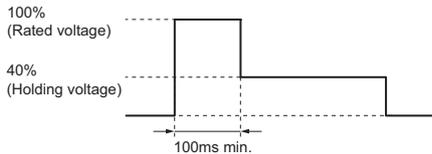
■Precautions

●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.



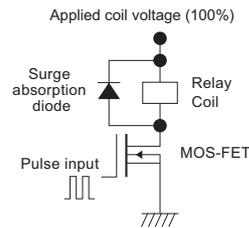
| | Applied coil voltage | Coil resistance* | Power consumption |
|-----------------|----------------------|-------------------------------|-------------------|
| Rated voltage | 100% | 125Ω (5 VDC) 720Ω (12 VDC) | Approx. 200 mW |
| Holding voltage | 40% | 2880Ω (24 VDC) | Approx. 32 mW |

* 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

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