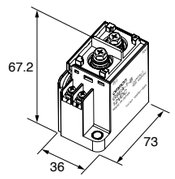
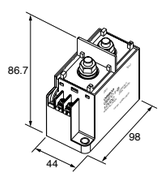
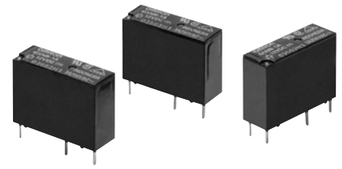
Selection Guide – DC Power Relays

Model		G9EA		G9EC
		G9EA-1(-B)	G9EA-1(-B)-CA	G9EC-1(-B)
Classification		Switching/current conduction	High-current conduction	Switching/current conduction
Appearance				
Features		**Standard model** Compact, carries/switches 400 V, 60 A loads	**Carries 100 A** Low contact resistance when carrying current	**Largest capacity in series** Carries/switches 400 V, 200 A loads
Insulation resistance (see note 1)	Between Coil and Contacts	1,000 MΩ min		1,000 MΩ min
	Between contacts of the same polarity	1,000 MΩ min		1,000 MΩ min
Dielectric strength	Between Coil and Contacts	2,500 VAC, 1 min		2,500 VAC, 1 min
	Between contacts of the same polarity	2,500 VAC, 1 min		2,500 VAC, 1 min
Impulse withstand voltage (see note 2)		4,500 V		4,500 V
Ambient operating temperature		-40 to 70°C (with no icing or condensation)		-40 to 50°C (with no icing or condensation)
Ambient operating humidity		5% to 85%		5% to 85%
Terminals	Screw terminals	Yes		Yes
	Lead wire output	Yes		Yes
Page		161		168

Note: 1. The insulation resistance was measured with a 500 VDC megohmmeter.
2. The impulse withstand voltage was measured with a JEC-212 (1981) standard impulse voltage waveform (1.2 x 50 μs).

PCB Power Relay – G5NB-E

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



- ROHS compliant.
- Highly efficient magnetic circuit for high sensitivity (200 mW).
- Compact, slim, yet provides 10 kV impulse withstand voltage (between coil and contacts).
- Standard model conforms to UL, CSA and EN standards.
- Tracking resistance: CTI>250

Ordering Information

Classification	Contact form	Enclosure ratings	Model
Standard	SPST-NO	Flux protection	G5NB-1A-E

Model Number Legend

G5NB- □ □**-E** □**VDC**
1 2 3

1. Number of Poles
1: 1 pole

2. Contact Form
A: SPST-NO

3. Rated Coil Voltage
5, 12, 18, 24 VDC

Application Examples

Water heaters, refrigerators, air conditioners, and small electric appliances

Specifications

■ Coil Ratings

Rated voltage	5 VDC	12 VDC	18 VDC	24 VDC
Rated current	40.0 mA	16.7 mA	11.1 mA	8.3 mA
Coil resistance	125 Ω	720 Ω	1,620 Ω	2,880 Ω
Must operate voltage	75% max. of rated voltage			
Must release voltage	10% min. of rated voltage			
Max. voltage	170% of rated voltage (at 23°C)			
Power consumption	Approx. 200 mW			

Note: The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.
The operating characteristics are measured at a coil temperature of 23°C.
The "Max. voltage" is the maximum voltage that can be applied to the relay coil.

■ Contact Ratings

Load	Resistive load (cosϕ = 1)
Rated load	5 A at 250 VAC, 3 A at 30 VDC
Contact material	AgNi
Max. switching voltage	250 VAC, 30 VDC
Max. switching current	5 A
Max. switching power	1250 VA, 90 W
Failure rate (reference value)	10 mA at 5 VDC

Note: P level: λ_{60} = 0.1 x 10^{-6}/operation (with an operating frequency of 120 operations/min)

■ Characteristics

Contact resistance (See note 2.)		100 mΩ max.
Operate time		10 ms max.
Release time		10 ms max.
Insulation resistance (See note 3.)		1,000 MΩ min. (at 500 VDC)
Dielectric strength		4,000 VAC, 50/60 Hz for 1 min between coil and contacts 750 VAC, 50/60 Hz for 1 min between contacts of same polarity
Impulse withstand voltage		10,000 V (1.2 x 50 ms) between coil and contacts
Insulation Distance	**Creepage (Typ)**	7.2 mm
	Clearance (Typ)	7.1 mm
Tracking Resistance CTI)		250 V
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^2 Malfunction: 100 m/s^2
Endurance		Mechanical: 5,000,000 operations min. Electrical: 100,000 operations min (5 A at 250 VAC), 200,000 operations min. (3 A at 30 VDC)
Ambient temperature		Operating: -40°C to 85°C (with no icing or condensation)
Ambient humidity		Operating: 5% to 85%
Weight		Approx. 4 g

Note: 1. The data shown above are initial value.
2. Measurement conditions: 5 VDC, 1 A, voltage drop method.
3. Measurement conditions: Measured at the same points as the dielectric strength using a 500-VDC ohmmeter.

■ Approved Standards

UL508 (File No. 41515)

Coil ratings	Contact ratings
5 to 24 VDC	5 A, 30 VDC (resistive) 5 A, 125 VAC (resistive) 5 A, 250 VAC (general use)

CSA C22.2 (No. 0, No. 1, No. 14) (File No. LR31928)

Coil ratings	Contact ratings
5 to 24 VDC	5 A, 30 VDC (resistive) 5 A, 125 VAC (resistive) 5 A, 250 VAC (general use)

EN 61810-1 (VDE Reg No 137575)

Coil ratings	Contact ratings
5 to 24VDC	5 A, 30 VDC (resistive) 5 A, 250 VAC (general use)

■ Actual Load Life (Reference Values)

1. 120-VAC motor and lamp load (2.5-A surge and 0.5-A normal): 250,000 operations min.(at 23°C)
2. 160-VDC valve load (with varistor) (0.24-A): 250,000 operations min.(at 23°C)

Specifications

■ Coil Ratings

Rated voltage	5 VDC	12 VDC	18 VDC	24 VDC
Rated current	40.0 mA	16.7 mA	11.1 mA	8.3 mA
Coil resistance	125 Ω	720 Ω	1,620 Ω	2,880 Ω
Must operate voltage	75% max. of rated voltage			
Must release voltage	10% min. of rated voltage			
Max. voltage	170% of rated voltage (at 23°C)			
Power consumption	Approx. 200 mW			

Note: The rated current and coil resistance are measured at a coil temperature of 23°C with a tolerance of ±10%.
The operating characteristics are measured at a coil temperature of 23°C.
The "Max. voltage" is the maximum voltage that can be applied to the relay coil.

■ Contact Ratings

Load	Resistive load (cosϕ = 1)
Rated load	5 A at 250 VAC, 3 A at 30 VDC
Contact material	AgNi
Max. switching voltage	250 VAC, 30 VDC
Max. switching current	5 A
Max. switching power	1250 VA, 90 W
Failure rate (reference value)	10 mA at 5 VDC

Note: P level: λ_{60} = 0.1 x 10^{-6}/operation (with an operating frequency of 120 operations/min)

■ Characteristics

Contact resistance (See note 2.)		100 mΩ max.
Operate time		10 ms max.
Release time		10 ms max.
Insulation resistance (See note 3.)		1,000 MΩ min. (at 500 VDC)
Dielectric strength		4,000 VAC, 50/60 Hz for 1 min between coil and contacts 750 VAC, 50/60 Hz for 1 min between contacts of same polarity
Impulse withstand voltage		10,000 V (1.2 x 50 ms) between coil and contacts
Insulation Distance	**Creepage (Typ)**	7.2 mm
	Clearance (Typ)	7.1 mm
Tracking Resistance CTI)		250 V
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^2 Malfunction: 100 m/s^2
Endurance		Mechanical: 5,000,000 operations min. Electrical: 100,000 operations min (5 A at 250 VAC), 200,000 operations min. (3 A at 30 VDC)
Ambient temperature		Operating: -40°C to 85°C (with no icing or condensation)
Ambient humidity		Operating: 5% to 85%
Weight		Approx. 4 g

Note: 1. The data shown above are initial value.
2. Measurement conditions: 5 VDC, 1 A, voltage drop method.
3. Measurement conditions: Measured at the same points as the dielectric strength using a 500-VDC ohmmeter.

■ Approved Standards

UL508 (File No. 41515)

Coil ratings	Contact ratings
5 to 24 VDC	5 A, 30 VDC (resistive) 5 A, 125 VAC (resistive) 5 A, 250 VAC (general use)

CSA C22.2 (No. 0, No. 1, No. 14) (File No. LR31928)

Coil ratings	Contact ratings
5 to 24 VDC	5 A, 30 VDC (resistive) 5 A, 125 VAC (resistive) 5 A, 250 VAC (general use)

EN 61810-1 (VDE Reg No 137575)

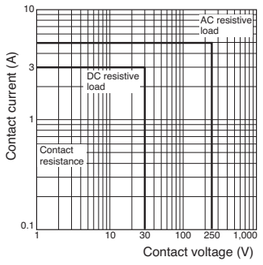
Coil ratings	Contact ratings
5 to 24VDC	5 A, 30 VDC (resistive) 5 A, 250 VAC (general use)

■ Actual Load Life (Reference Values)

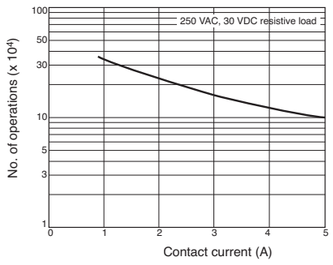
1. 120-VAC motor and lamp load (2.5-A surge and 0.5-A normal): 250,000 operations min.(at 23°C)
2. 160-VDC valve load (with varistor) (0.24-A): 250,000 operations min.(at 23°C)

Engineering Data

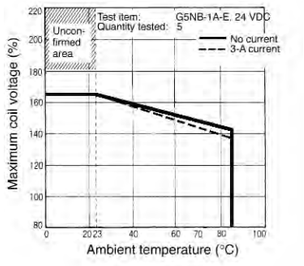
Maximum Switching Capacity



Endurance

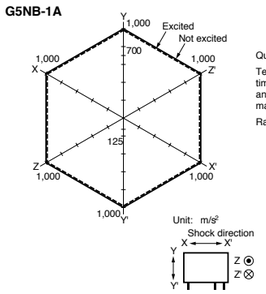


Ambient Temperature vs. Maximum Coil Voltage



Malfunctioning Shock

G5NB-1A



Quantity Tested: 5 units

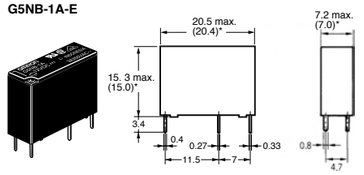
Test Method: Shock was applied 3 times in 6 directions along 3 axes and the level at which shock caused malfunction was measured.

Rating: 100 m/s²

Dimensions

Note: All units are in millimetres unless otherwise indicated.

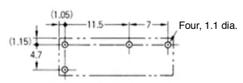
G5NB-1A-E



*Average value

PCB Mounting Holes (Bottom View)

Tolerance: ±0.1 mm



Terminal Arrangement/ Internal Connections (Bottom View)

(No coil polarity)

Precautions

■ Correct Use

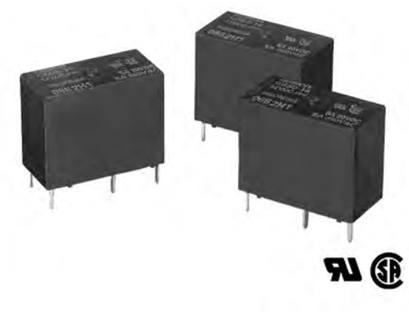
HANDLING

The enclosure rating of the G5NB is for flux protection. Do not use immersion-cleaning.

ALL DIMENSIONS SHOWN ARE IN MILLIMETRES.
To convert millimetres into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

CAT. No. J143-E2-02A-X

Compact Single-pole Relay for Switching 5 A (Normally Open Contact), Fan Control of Air Conditioners, and Heating Control of Small Appliances.



- ROHS compliant.
- Compact SPDT Relay with high insulation.
- Incorporates a normally open contact that switches 5 A max.
- Ensures a withstand impulse voltage of 8,000 V between the coil and contacts.
- Conforms to UL, CSA and EN.

Application Examples

- Fan Motor
- Refrigerator
- Air Conditioner
- Oven
- Washing Machine
- Others

Ordering Information

Classification	Contact form	Enclosure ratings	Model
Standard	SPDT	Fully sealed	G5SB-14

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

Example: G5SB-14 12 VDC
Rated coil voltage

Model Number Legend

G5SB-□□□ VDC
1 2 3

1. Number of Poles
1: 1 pole (SPDT)

2. Protective Structure
4: Fully sealed

3. Rated Coil Voltage
5, 9, 12, 24 VDC

Specifications

■ Coil Ratings

Rated voltage	5 VDC	9 VDC	12 VDC	24 VDC	48 VDC
Rated current	80 mA	44.4 mA	33.3 mA	16.7 mA	8.3mA
Coil resistance	63 Ω	202 Ω	360 Ω	1,440 Ω	5,762 Ω
Must operate voltage	75% max. of rated voltage				
Must release voltage	5% min. of rated voltage				
Max. voltage	110% of rated voltage				
Power consumption	Approx. 400 mW				

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