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# G5Q
PCB Power Relay

## A Miniature Power Relay with 1-pole 10A Switching Capacity



- Excellent switching performance for a variety of loads.
- Small, yet provides 8-kV impulse withstand voltage (between coil and contacts).
- Low coil power consumption (SPST-NO: 200 mW, SPDT: 400 mW)
- Coil insulation system: Class F (UL1446).
- IEC/EN 60335-1 conformed. (-HA Model)
- Reduced power consumption with voltage holding and pulse width modulation (PWM) control (Only for G5Q-□-PW model)

**RoHS Compliant**

## ■Model Number Legend

G5Q-□□□-□-□-□
1 2 3 4 5 6

**1. Number of Poles**
1 : 1-pole

**2. Contact Form**
None : SPDT (1c)
A : SPST-NO (1a)

**3. Enclosure Rating**
None : Flux protection
4 : Sealed

**4. Classification**
None : Standard
EU : High-capacity

**5. Market Code**
None : General purpose
HA : Home Appliance according to IEC/EN60335-1

**6. Special Requirement**
None : Not supported
PW : Supported

## ■Application Examples

- Ideal for output applications of control equipment.

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## ■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 | G5Q-1A | 5VDC<br>9VDC<br>12VDC<br>24VDC | 100 pcs/tray |
| | | | | | G5Q-1A-PW | 5VDC<br>12VDC<br>24VDC | |
| | | | | Sealed | G5Q-1A4 | 5VDC<br>9VDC<br>12VDC<br>24VDC | |
| | | | SPDT(1c) | Flux protection | G5Q-1 | 5VDC<br>9VDC<br>12VDC<br>24VDC | |
| | | | | | G5Q-1-PW | 5VDC<br>12VDC<br>24VDC | |
| | | | | Sealed | G5Q-14 | 5VDC<br>9VDC<br>12VDC<br>24VDC | |
| | | High-capacity | SPST-NO(1a) | Flux protection | G5Q-1A-EU | 5VDC<br>12VDC<br>24VDC | |
| | | | | Sealed | G5Q-1A4-EU | | |
| | | | SPDT(1c) | Flux protection | G5Q-1-EU | | |
| | | | | Sealed | G5Q-14-EU | | |
| | Home Appliance | Standard | SPST-NO(1a) | Flux protection | G5Q-1A-HA | 5VDC<br>12VDC<br>24VDC | |
| | | | | | G5Q-1A-HA-PW | | |
| | | High-capacity | | | G5Q-1A-EU-HA | 12VDC<br>24VDC | |
| | | Standard | SPDT(1c) | | G5Q-1-HA | 5VDC<br>12VDC<br>24VDC | |
| | | | | | G5Q-1-HA-PW | | |
| | | High-capacity | | | G5Q-1-EU-HA | 12VDC<br>24VDC | |

Note 1. When ordering, add the rated coil voltage to the model number.
Example: G5Q-1A DC5
Rated coil voltage

Note 2. Contact your OMRON sales representative for tube packing models (40 pcs/tube).

## ■Ratings

### ●Coil

| Contact form | Rated voltage | Rated current (mA) | Coil resistance (Ω) | Must operate voltage (V) | Must release voltage (V) | Max. voltage (V) | Power consumption (mW) |
|---|---|---|---|---|---|---|---|
| SPST-NO (1a) | 5 VDC | 40 | 125 | 75% max. | 5% min.<br>5 to 34%* | 190%<br>(at 23°C) | Approx. 200<br>Approx. 32* |
| | 9 VDC | 22.2 | 405 | | | | |
| | 12 VDC | 16.7 | 720 | | | | |
| | 24 VDC | 8.3 | 2880 | | | | |
| SPDT (1c) | 5 VDC | 80 | 63 | | 5% min.<br>5 to 25%* | | Approx. 400<br>Approx. 36* |
| | 9 VDC | 44.4 | 202 | | | | |
| | 12 VDC | 33.3 | 360 | | | | |
| | 24 VDC | 16.7 | 1440 | | | | |

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.
* Power consumption with holding voltage are Approx. 32 mW for 1a and Approx. 36 mW for 1c. Please confirm the detail on page 6 Coil Voltage Reduction (holding voltage).

### ●Contacts

| Item \ Load | Resistive load | | | |
|---|---|---|---|---|
| | SPST-NO (1a) | | SPDT (1c) | |
| | Standard | High-capacity | Standard | High-capacity |
| Contact type | Single | | | |
| Contact material | Ag-Alloy (Cd free) | | | |
| Rated load (resistive) | 10 A at 125 VAC<br>3 A at 125 VAC<br>5 A at 250 VAC<br>3 A at 250 VAC<br>5 A at 30 VDC | 10 A at 250 VAC<br>3 A at 125 VAC<br>5 A at 250 VAC<br>3 A at 250 VAC<br>5 A at 30 VDC | 10 A at 125 VAC (NO)<br>3 A at 125 VAC (NO)<br>5 A at 250 VAC (NO)<br>3 A at 250 VAC (NO)<br>5 A at 30 VDC (NO)<br>3 A at 125 VAC (NC)<br>3 A at 250 VAC (NC)<br>3 A at 30 VDC (NC) | 10 A at 250 VAC (NO)<br>3 A at 125 VAC (NO)<br>5 A at 250 VAC (NO)<br>3 A at 250 VAC (NO)<br>5 A at 30 VDC (NO)<br>3 A at 125 VAC (NC)<br>3 A at 250 VAC (NC)<br>3 A at 30 VDC (NC) |
| Rated carry current | 10 A (NO)/3 A (NC) | | | |
| Max. switching voltage | 277 VAC, 30 VDC | | | |
| Max. switching current | AC: 10 A (NO)/3 A (NC)<br>DC: 5 A (NO)/3 A (NC) | | | |

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## ■Characteristics

| Item | Classification | Standard model |
|---|---|---|
| Contact resistance *1 | | 100 mΩ max. |
| Operate time | | 10 ms max. |
| Release time | | 5 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 | 1,000 VAC, 50/60 Hz for 1 min |
| Impulse withstand voltage (between coil and contacts) | | 8 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/s² |
| | Malfunction | 100 m/s² |
| Durability | Mechanical | 10,000,000 operations (18,000 operations per hour) |
| | Electrical | • NO<br>25,000 operations: 10 A at 250 VAC resistive load<br>(operation: ON for 1 sec, OFF for 3 sec) <High-capacity type><br>50,000 operations: 10 A at 125 VAC resistive load<br>(operation: ON for 1 sec, OFF for 3 sec)<br>200,000 operations: 3 A at 125 VAC resistive load<br>(operation: ON for 1 sec, OFF for 1 sec)<br>50,000 operations: 5 A at 250 VAC resistive load<br>(operation: ON for 1 sec, OFF for 1 sec)<br>100,000 operations: 3 A at 250 VAC resistive load<br>(operation: ON for 1 sec, OFF for 1 sec)<br>100,000 operations: 5 A at 30 VDC resistive load<br>(operation: ON for 1 sec, OFF for 1 sec)<br>• NC<br>200,000 operations: 3 A at 125 VAC resistive load<br>(operation: ON for 1 sec, OFF for 1 sec)<br>100,000 operations: 3 A at 250 VAC resistive load<br>(operation: ON for 1 sec, OFF for 1 sec)<br>100,000 operations: 3 A at 30 VDC resistive load<br>(operation: ON for 1 sec, OFF for 1 sec) |
| Failure rate (P level) (reference *3) | | 10 mA at 5 VDC |
| Ambient operating temperature | | -40°C to 105°C (with no icing or condensation)<br>-40°C to 85°C (with no icing or condensation) <High-capacity type> |
| Ambient operating humidity | | 5% to 85% |
| Weight | | Approx. 6.5 g |

Note. Note. Values in the above table are the initial values at 23°C.
*1. The contact resistance is possible with 1 A applied at 5 VDC using a fall-of-potential method.
*2. Testing conditions: The insulation resistance was measured with a 500 VDC megohmmeter at the same locations as the dielectric strength was measured.
*3. This value was measured at a switching frequency of 120 operations/min.

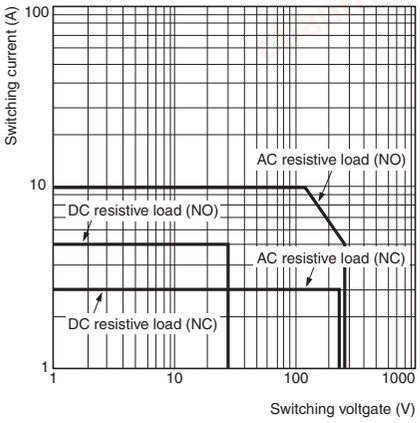
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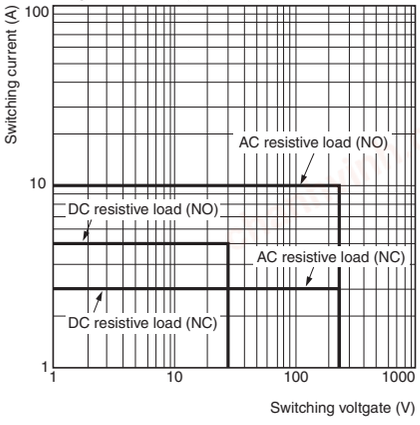
# ■Engineering Data

## ●Maximum Switching Capacity

Standard

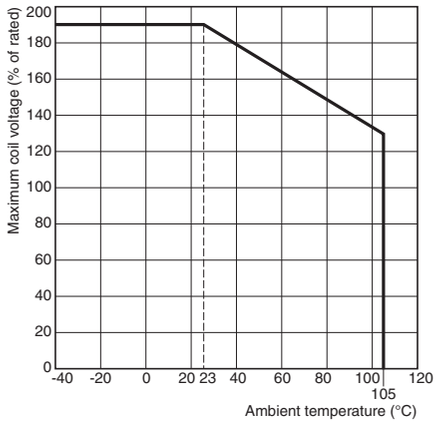



High-capacity(-EU)

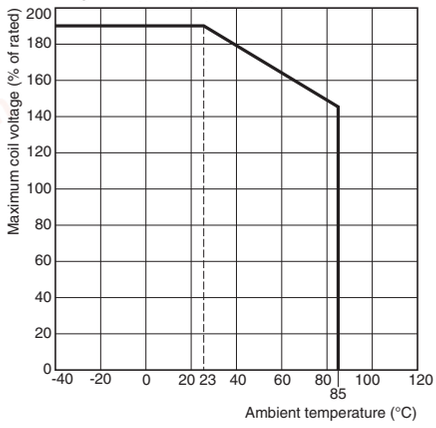



## ●Ambient Temperature VS. Maximum Coil Voltage

Standard

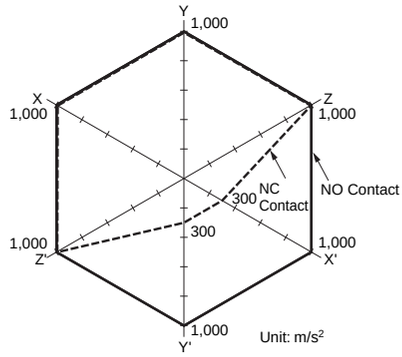



High-capacity(-EU)

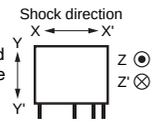



Note. The Maximum coil voltage refers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

## ●Shock Malfunction



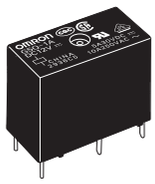

Sample: G5Q-14 12 VDC
Number of Relays: 5 pcs
Test conditions: Shock is applied in ±X, ±Y, and ±Z directions three times each with and without energizing the Relays to check the number of malfunctions.
The energized voltage is 100% of the rated voltage.
Requirement: None malfuction
100 m/s²

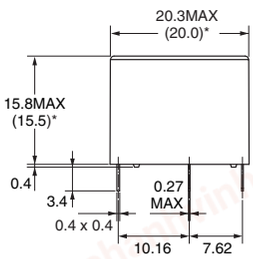



# ■Dimensions

(Unit: mm)

## G5Q-1A(4)(-EU)(-HA)(-PW)



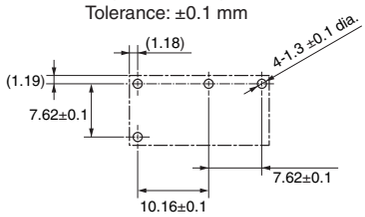






* Average value

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

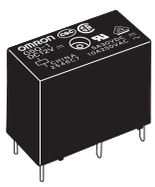


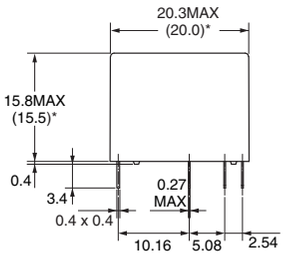

**Terminal Arrangement/ Internal Connections**
(Bottom View)

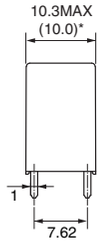



(No coil polarity)

## G5Q-1(4)(-EU)(-HA)(-PW)

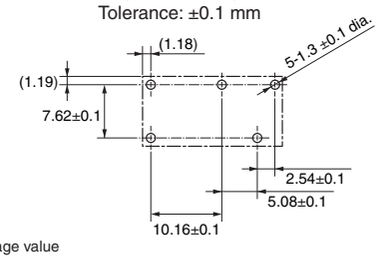




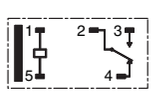




* Average value

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




**Terminal Arrangement/ Internal Connections**
(Bottom View)




(No coil polarity)

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## ■Approved Standards

**UL Recognized: (File No. E41515)**

**CSA Certified: (File No. LR31928)**

| Model | Contact form | Coil ratings | Contact ratings | Number of test operations |
|---|---|---|---|---|
| G5Q-1A(4)(-EU)(-HA)(-PW)<br>G5Q-1(4)(-EU)(-HA)(-PW) | SPST-NO (1a)<br>SPDT (1c) | 5 to 48 VDC | 10 A 250 VAC N.O. only (Resistive) 40°C | 6,000 |
| | | | 10 A 30 VDC N.O. only (Resistive) 40°C | |
| | | | 4 A 120 VAC N.O. only (Resistive) 40°C | 100,000 |
| | | | 3 A 250 VAC N.C. only (Resistive) 40°C | 6,000 |
| | | | 3 A 30 VDC N.C. only (Resistive) 40°C | |

**EN/IEC, VDE (Certified/No.40009467)**

| Model | Contact form | Coil ratings | Contact ratings | Number of test operations |
|---|---|---|---|---|
| G5Q-1(4)(-HA)(-PW)<br>G5Q-1A(4)(-HA)(-PW) | SPST-NO (1a)<br>SPDT (1c) | 5 to 48 VDC | 10 A making and 0 A breaking, 250 VAC (cosϕ=1) 105°C<br>5 A marking and 3 A breaking, 30 VDC (0 ms) 105°C | 10,000 |
| | | | 5 A 250 VAC (cosϕ=1) (N.O.) 105°C | 75,000 |
| G5Q-1A(4)-EU(-HA)<br>G5Q-1(4)-EU(-HA) | | | 10 A 250 VAC (cosϕ=1) (N.O.) 65°C<br>5 A 30 VDC (0 ms) (N.O.) 65°C<br>3 A 30 VDC (0 ms) (N.C.) 65°C | 10,000 |
| | | | 4 A 250 VAC (cosϕ=1) (N.O.) 85°C | 100,000 |

| | |
|---|---|
| Creepage Distance | 6.4 mm min. |
| Clearance Distance | 5.5 mm min. |
| Insulation Material Group | IIIa |
| Type of Insulation Coil-contact Circuit<br>Open Contact Circuit | Basic (Rated voltage 400 V) / Reinforced (Rated voltage 250 V)<br>Micro disconnection |
| Rated Insulation Voltage | 250 V |
| Pollution Degree | 2 |
| Rated Voltage System | 250 V / 400 V (EU flux type only) |
| 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 Index of Relay Base | PTI 250 V min. (housing parts) |
| Flammability Class according to UL94 | V-0 |
| Coil Insulation System | F Class (UL 1446) |

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## ■Precautions

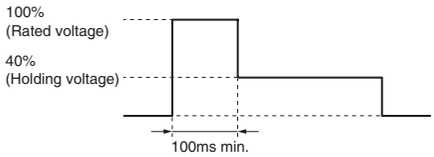
●Please refer to “PCB Relays Common Precautions” for correct use.

### Correct Use

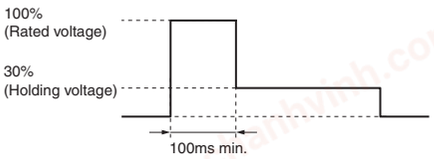
●Coil Voltage Reduction (Holding Voltage) after Relay operation

- 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% (G5Q-1A type) /30% (G5Q-1 type) 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.

**G5Q-1A**




**G5Q-1**




**G5Q-1A**

| | Applied coil voltage | Coil resistance* | Power consumption |
|---|---|---|---|
| Rated voltage | 100% | 125Ω (5 VDC)<br>720Ω (12 VDC)<br>2,880Ω (24 VDC) | Approx. 200 mW |
| Holding voltage | 40% | | Approx. 32 mW |

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

**G5Q-1**

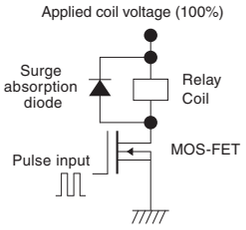
| | Applied coil voltage | Coil resistance* | Power consumption |
|---|---|---|---|
| Rated voltage | 100% | 63Ω (5 VDC)<br>360Ω (12 VDC)<br>1,440Ω (24 VDC) | Approx. 400 mW |
| Holding voltage | 30% | | Approx. 36 mW |

* 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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