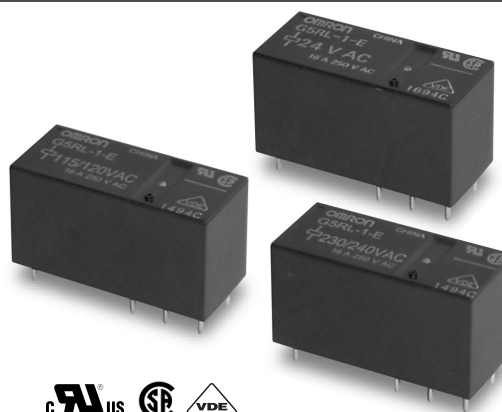


# PCB Relay G5RL

## Low-profile Relay with Various Models

- Low profile: 15.7 mm in height
- Creepage distance 8mm between coil and contacts
- 10 kV Impulse withstand voltage
- Models with AC coil available.
- High-Inrush model available (Inrush peak currents up to 100 A)
- Low Noise model available (Approx. 10 to 20 dB less sound pressure than standard G5RL-Series Relays)
- RoHS Compliant



## Ordering Information

| Classification       |                  | Enclosure ratings | Contact form |             |
|----------------------|------------------|-------------------|--------------|-------------|
| Contact ratings      | Special function |                   | SPST-NO      | SPDT        |
| 16 A (high capacity) | AC coil          | Flux protection   | —            | G5RL-1-E    |
|                      | High inrush      |                   | G5RL-1A-E-HR | G5RL-1-E-HR |
|                      | Low noise        |                   | G5RL-1A-E-LN |             |
| 12 A                 |                  |                   | G5RL-1A-LN   |             |

**Note:** When ordering, add the rated coil voltage to the model number. Example: G5RL-1A-LN DC12

## Model Number Legend:

G5RL-       -       DC (AC)   

1   2   3   4   5

### 1. Number of Poles

1: 1 pole

### 2. Contact Form/Contact Construction

None: SPDT

A: SPST-NO

### 3. Classification

None: 12 A

E: 16 A (high capacity)

### 4. Special Function

None: Standard

HR: High-inrush

LN: Low Noise

### 5. Rated Coil Voltage

Coil ratings are listed in each section (AC coil, High inrush, and Low noise).

# Models with AC Coil: G5RL-1-E

## ■ Specifications

### Coil Ratings

| Rated voltage          | 24 VAC                 | 100 VAC | 115 VAC/120 VAC |         | 200 VAC  | 230 VAC/240 VAC |         |
|------------------------|------------------------|---------|-----------------|---------|----------|-----------------|---------|
| Rated current at 50 Hz | 31.30 mA               | 7.50 mA | 5.85 mA         | 6.25 mA | 3.75 mA  | 3.00 mA         | 3.13 mA |
| Rated current at 60 Hz | 28.30 mA               | 6.88 mA | 5.35 mA         | 5.70 mA | 3.45 mA  | 2.76 mA         | 2.88 mA |
| Coil resistance        | 443 Ω                  | 8,220 Ω | 11,600 Ω        |         | 33,000 Ω | 47,600 Ω        |         |
| Must operate voltage   | 75% max. rated voltage |         |                 |         |          |                 |         |
| Must release voltage   | 15% min. rated voltage |         |                 |         |          |                 |         |
| Max. voltage           | 110% of rated voltage  |         |                 |         |          |                 |         |
| Power consumption      | Approx. 0.75 VA        |         |                 |         |          |                 |         |

**Note:** 1. The rated current tolerance is +15%/–20%. All above data is based on coil temperature of 23°C.  
2. Coil resistances are provided as reference values.

### Contact Ratings

|   |   |
|---|---|
| Contact form                            | SPDT  |
| Contact material                        | Ag alloy (Cd free)  |
| Rated load (resistive)                  | 16 A at 250 VAC, 24 VDC (NO) when there is no load on (NC)<br>5 A at 250 VAC, 24 VDC (SPDT) |
| Rated carry current                     | 16 A (NO), 5 A (NC)   |
| Max. switching voltage                  | 250 VAC, 24 VDC   |
| Max. switching current                  | 16 A (NO), 5 A (NC)   |
| Max. switching capacity                 | 4,000 VA, 384 W (NO) when there is no load on (NC)<br>1,250 VA, 120 W (SPDT)                |
| Min. permissible load (reference value) | 40 mA at 24 VDC: P level: $\lambda_{60} = 0.1 \times 10^{-6}$ operations                    |

### Characteristics


|                           |   |
|---------------------------|---|
| Contact resistance        | 100 mΩ max.   |
| Operate time              | 20 ms max.  |
| Release time              | 20 ms max.  |
| Insulation resistance     | 1,000 MΩ min. (at 500 VDC)  |
| Dielectric strength       | 6,000 VAC, 50/60 Hz for 1 min between coil and contacts<br>1,000 VAC, 50/60 Hz for 1 min between contacts of same polarity  |
| Impulse withstand voltage | 10 kV between coil and contacts (1.2 × 50 μs)   |
| Vibration resistance      | Destruction: 10 to 55 Hz, 1.5-mm double amplitude<br>Malfunction: 10 to 55 Hz, 1.5-mm double amplitude  |
| Shock resistance          | Destruction: 1,000 m/s <sup>2</sup> (approx. 100G)<br>Malfunction: 100 m/s <sup>2</sup> (approx. 10G)   |
| Life expectancy           | Mechanical: 10,000,000 operations min. (at 18,000 operations/hr)<br>Electrical: 100,000 operations min. (at 1,800 operations/hr)<br>(Resistive load, 12A, 250 VAC/24 VDC, NO contact)<br>50,000 operations min. (at 1,800 operations/hr)<br>(Resistive load, 16 A, 250 VAC/24 VDC, NO contact)<br>(Resistive load, 5 A, 250 VAC/24 VDC, NC contact) |
| Ambient temperature       | Operating: –40°C to 70°C (with no icing or condensation)  |
| Ambient humidity          | Operating: 5% to 85%  |
| Weight                    | Approx. 10 g  |

**Note:** 1. Values in the above table are initial values.  
2. The contact resistance is measured with 1 A applied at 5 VDC using voltage drop method.  
3. The insulation resistance is measured between coil and contacts and between contacts of the same polarity at 500 VDC.  
4. The resistive load ratings for NO contact apply when there is no load on NC contact.

## Approved Standards

 UL Recognized (File No. E41643) and  CSA Certified (File No. LR31928) -- Ambient Temp. = 40°C

| Model    | Coil rating   | Contact rating   |
|----------|---------------|--|
| G5RL-1-E | 24 to 240 VAC | 16 A, 277 VAC General, 50,000 operations - NO<br>16 A, 250 VAC General, 50,000 operations - NO<br>TV-5, 25,000 operations - NO<br>A300 Pilot Duty, 720 VA, 240 VAC, 30,000 operations - NO<br>1/2 Hp, 120 VAC, 6,000 operations - NO<br>60 LRA/10 FLA, 250 VAC, 6,000 operations - NO<br>5 A, 250 VAC General, 50,000 operations - NC<br>5 A, 24 VDC Resistive, 50,000 operations - NC |

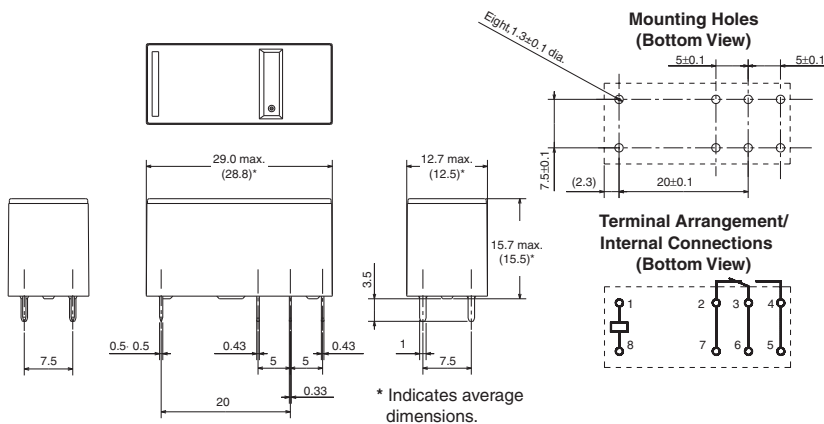
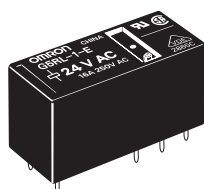
 VDE (EN61810-1) (License No. A282)

| Model    | Coil Rating                                | Contact rating                       |
|----------|--|--------------------------------------|
| G5RL-1-E | 24, 100, 115/120, 200, 230/240 VAC (50 Hz) | 16 A, 250 VAC 15,000 operations - NO |

## Dimensions

Note: All units are in millimeters unless otherwise indicated.

### G5RL-1-E



## Precautions

### Wiring

High-capacity models (-E) have a structure that connects two terminals from one contact. When designing the circuit, use both terminals. If you use only one terminal, the relay may be unable to satisfy specified performance.

# High-Inrush Models: G5RL-1(A)-E-HR

## ■ Specifications

### Coil Ratings

| Rated voltage        | 5 VDC                  | 12 VDC  | 24 VDC  | 48 VDC         |
|----------------------|------------------------|---------|---------|----------------|
| Rated current        | 80.0 mA                | 33.3 mA | 16.7 mA | 8.96 mA        |
| Coil resistance      | 62.5 Ω                 | 360 Ω   | 1,440 Ω | 5,358 Ω        |
| Must operate voltage | 70% max. rated voltage |         |         |                |
| Must release voltage | 10% min. rated voltage |         |         |                |
| Max. voltage         | 130% of rated voltage  |         |         |                |
| Power consumption    | Approx. 400 mW         |         |         | Approx. 430 mW |

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

### Contact Ratings

|   |  |  |
|---|--|--|
| Contact form                            | SPST-NO  | SPDT   |
| Contact material                        | Ag alloy (Cd free)   |  |
| Rated load (resistive)                  | 16 A at 250 VAC<br>16 A at 24 VDC  | 16 A at 250 VAC, 24 VDC (NO)<br>when there is no load on (NC)<br>5 A at 250 VAC, 24 VDC (SPDT) |
| Rated carry current                     | 16 A   | 16 A (NO), 5 A (NC)  |
| Max. switching voltage                  | 250 VAC, 24 VDC  |  |
| Max. switching current                  | 16 A   | 16 A (NO), 5 A (NC)  |
| Max. switching capacity                 | 4,000 VA, 384 W  | 4,000 VA, 384 W (NO)<br>when there is no load on (NC)<br>1,250 VA, 120 W (SPDT)                |
| Min. permissible load (reference value) | 100 mA at 5 VDC: P level: $\lambda_{60} = 0.1 \times 10^{-6}$ operations |  |

### Characteristics

|                           |   |
|---------------------------|---|
| Contact resistance        | 100 mΩ max.   |
| Operate time              | 15 ms max.  |
| Release time              | 5 ms max.   |
| Insulation resistance     | 1,000 MΩ min. (at 500 VDC)  |
| Dielectric strength       | 6,000 VAC, 50/60 Hz for 1 min between coil and contacts<br>1,000 VAC, 50/60 Hz for 1 min between contacts of same polarity  |
| Impulse withstand voltage | 10 kV between coil and contacts (1.2 × 50 μs)   |
| Vibration resistance      | Destruction: 10 to 55 Hz, 1.5-mm double amplitude<br>Malfunction: 10 to 55 Hz, 1.5-mm double amplitude  |
| Shock resistance          | Destruction: 1,000 m/s <sup>2</sup> (approx. 100G)<br>Malfunction: 100 m/s <sup>2</sup> (approx. 10G)   |
| Life expectancy           | Mechanical: 10,000,000 operations min. (at 18,000 operations/hr)<br>Electrical: 100,000 operations min. (at 1,800 operations/hr)<br>(Resistive load, 12A, 250 VAC/24 VDC, NO contact)<br>50,000 operations min. (at 1,800 operations/hr)<br>(Resistive load, 16 A, 250 VAC/24 VDC, NO contact)<br>(Resistive load, 5 A, 250 VAC/24 VDC, NC contact) |
| Ambient temperature       | Operating: -40°C to 85°C (with no icing or condensation)  |
| Ambient humidity          | Operating: 5% to 85%  |
| Weight                    | Approx. 10 g  |


Note: 1. Values in the above table are initial values.

2. The contact resistance is measured with 1 A applied at 5 VDC using voltage drop method.
3. The insulation resistance is measured between coil and contacts and between contacts of the same polarity at 500 VDC.
4. The resistive load ratings for NO contact apply when there is no load on NC contact.

## Approved Standards

 UL Recognized (File No. E41643) and  CSA Certified (File No. LR31928) - - Ambient Temp. = 40°C

| Model          | Coil rating | Contact rating  |
|----------------|-------------|---|
| G5RL-1(A)-E-HR | 5 to 48 VAC | 16 A, 277 VAC General, 50,000 operations - NO<br>16 A, 250 VAC General, 50,000 operations - NO<br>TV-5, 25,000 operations - NO<br>A300 Pilot Duty, 720 VA, 240 VAC, 30,000 operations - NO<br>1/2 Hp, 120 VAC, 6,000 operations - NO<br>60 LRA/10 FLA, 250 VAC, 6,000 operations - NO<br>5 A, 250 VAC General, 50,000 operations - NC<br>5 A, 24 VDC Resistive, 50,000 operations - NC<br>) |

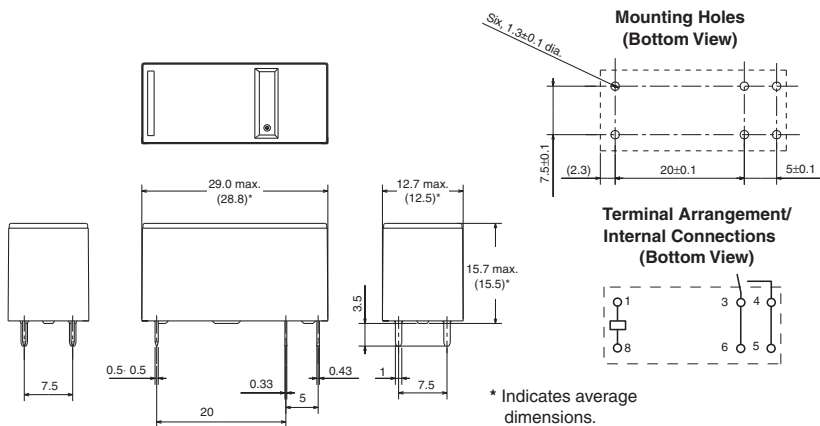
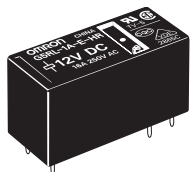
 VDE (EN61810-1) (License No. A282)

| Model          | Coil Rating       | Contact rating  |
|----------------|-------------------|---|
| G5RL-1(A)-E-HR | 5, 12, 24, 48 VDC | 16 A, 250 VAC $\cos \phi = 1$ 15,000 operations - NO<br>240 VAC 100 A (0-P) Steady 10 A (rms) 50,000 operations - NO<br>240 VAC 50 A (0-P) Steady 5 A (rms) 100,000 operations - NO |

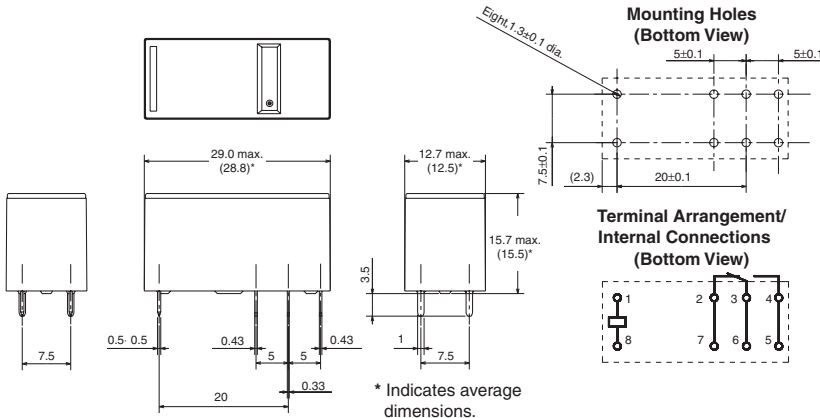
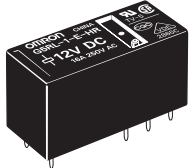
## Dimensions

Note: All units are in millimeters unless otherwise indicated.

### G5RL-1(A)-E-HR



### G5RL-1-E-HR



## Precautions

### Wiring

High-capacity models (-E) have a structure that connects two terminals from one contact. When designing the circuit, use both terminals. If you use only one terminal, the relay may be unable to satisfy specified performance.

# Low Noise Models: G5RL-1A(-E)-LN

## ■ Specifications

### Coil Ratings

| Rated voltage        | 5 VDC                  | 12 VDC  | 24 VDC  |
|----------------------|------------------------|---------|---------|
| Rated current        | 106.0 mA               | 44.2 mA | 22.1 mA |
| Coil resistance      | 47.2 Ω                 | 272 Ω   | 1,086 Ω |
| Must operate voltage | 70% max. rated voltage |         |         |
| Must release voltage | 10% min. rated voltage |         |         |
| Max. voltage         | 110% of rated voltage  |         |         |
| Power consumption    | Approx. 530 mW         |         |         |

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

### Contact Ratings

| Item                                    | Standard   | High capacity                     |
|---|--|-----------------------------------|
| Contact form                            | SPST-NO  |                                   |
| Contact material                        | Ag alloy (Cd free)   |                                   |
| Rated load (resistive)                  | 12 A at 250 VAC<br>12 A at 24 VDC  | 16 A at 250 VAC<br>16 A at 24 VDC |
| Rated carry current                     | 12 A   | 16 A                              |
| Max. switching voltage                  | 250 VAC, 24 VDC  |                                   |
| Max. switching current                  | 12 A   | 16 A                              |
| Max. switching capacity                 | 3,000 VA, 288 W  | 4,000 VA, 384 W                   |
| Min. permissible load (reference value) | 100 mA at 5 VDC; P level: $\lambda_{60} = 0.1 \times 10^{-6}$ operations |                                   |

### Characteristics

| Item                      | Standard   | High capacity   |
|---------------------------|--|---|
| Contact resistance        | 100 mΩ max.  |   |
| Operate time              | 15 ms max.   |   |
| Release time              | 15 ms max.   |   |
| Insulation resistance     | 1,000 MΩ min. (at 500 VDC)   |   |
| Dielectric strength       | 6,000 VAC, 50/60 Hz for 1 min between coil and contacts<br>1,000 VAC, 50/60 Hz for 1 min between contacts of same polarity   |   |
| Impulse withstand voltage | 10 kV between coil and contacts (1.2 × 50 μs)  |   |
| Vibration resistance      | Destruction: 10 to 55 Hz, 1.5-mm double amplitude<br>Malfunction: 10 to 55 Hz, 1.5-mm double amplitude   |   |
| Shock resistance          | Destruction: 1,000 m/s <sup>2</sup> (approx. 100G)<br>Malfunction: 100 m/s <sup>2</sup> (approx. 10G)  |   |
| Life expectancy           | Mechanical: 1,000,000 operations min. (at 18,000 operations/hr)<br>Electrical: 100,000 operations min. Resistive load, 12 A, 250 VAC / 24 VDC (at 1,800 operations/hr) | Mechanical: 1,000,000 operations min. (at 18,000 operations/hr)<br>Electrical: 50,000 operations min. Resistive load, 16 A, 250 VAC / 24 VDC (at 1,800 operations/hr) |
| Ambient temperature       | Operating: -40°C to 85°C (with no icing or condensation)   |   |
| Ambient humidity          | Operating: 5% to 85%   |   |
| Weight                    | Approx. 10 g   |   |

- Note: 1. Values in the above table are initial values.  
 2. The contact resistance is measured with 1 A applied at 5 VDC using voltage drop method.  
 3. The insulation resistance is measured between coil and contacts and between contacts of the same polarity at 500 VDC.  
 4. The release time of 15ms max. is based on adding a diode to coil circuit.

## Approved Standards

**UL / cUL Recognized (File No. E41643) - - Ambient Temp. = 40°C**

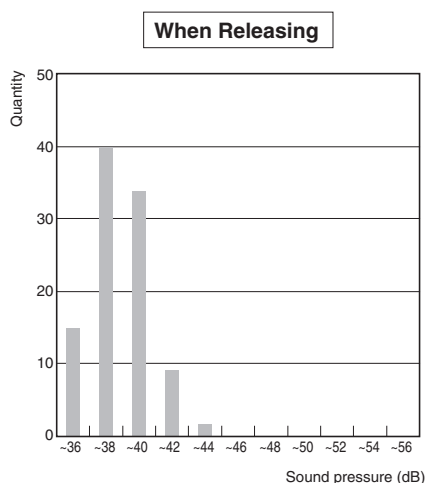
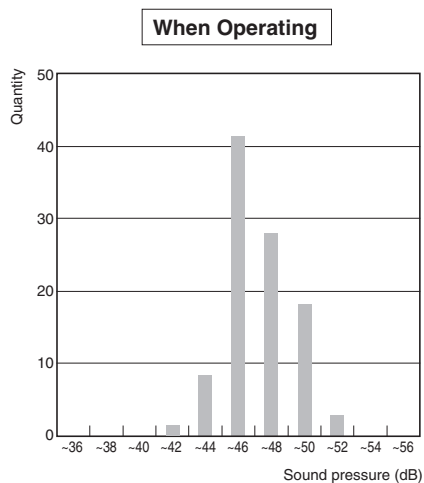
| Model        | Coil rating | Contact rating   |
|--------------|-------------|--|
| G5RL-1A-LN   | 5 to 24 VAC | 12 A, 250 VAC Resistive, 100,000 operations<br>12 A, 24 VDC Resistive, 100,000 operations<br>TV-8, 25,000 operations |
| G5RL-1A-E-LN |             | 16 A, 250 VAC Resistive, 50,000 operations<br>16 A, 24 VDC Resistive, 50,000 operations<br>TV-8, 25,000 operations   |

**VDE (EN61810-1, EN60065) (License No. A282)**

| Model        | Coil Rating   | Contact rating   |
|--------------|---------------|--|
| G5RL-1A-LN   | 5, 12, 24 VDC | 12 A, 250 VAC $\cos \phi = 1$ 60,000 operations<br>12 A, 24 VDC (0 ms) 100,000 operations<br>230 VAC 70 A (0-P) Steady 1 A (L/R=0 ms) 20,000 operations<br>250 VAC 100 A (0-P) Steady 3 A (L/R=0 ms) 10,000 operations<br>250 VAC 40 A (0-P) Steady 5 A (L/R=0 ms) 10,000 operations |
| G5RL-1A-E-LN |               | 16 A, 250 VAC $\cos \phi = 1$ 30,000 operations<br>16 A, 24 VDC (0 ms) 40,000 operations<br>230 VAC 70 A (0-P) Steady 1 A (L/R=0 ms) 20,000 operations<br>250 VAC 100 A (0-P) Steady 3 A (L/R=0 ms) 10,000 operations<br>250 VAC 40 A (0-P) Steady 5 A (L/R=0 ms) 10,000 operations  |

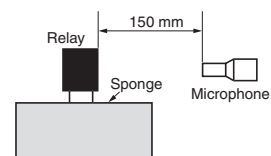
## Engineering Data

### Distribution of Sound Pressure



#### Measurement Conditions

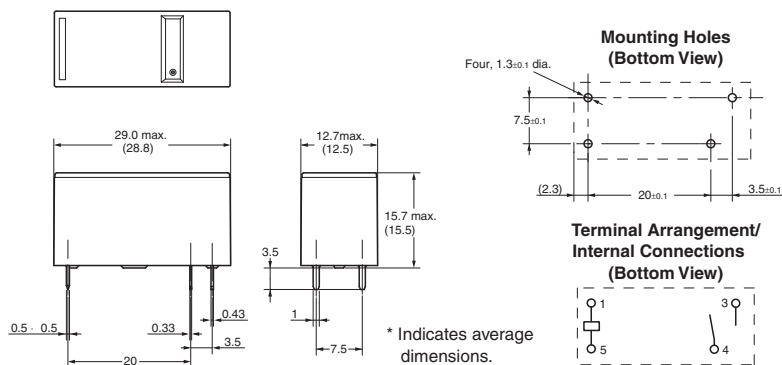
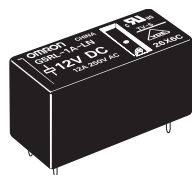
Sample: G5RL-1A-LN (N = 100)  
 Range: A weighted sound pressure level, Fast, Max. hold  
 Device connected to coil: Diode  
 Background noise: Approx. 30 dB max.



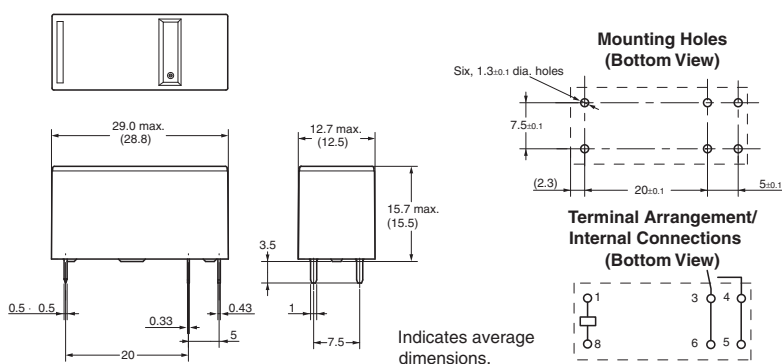
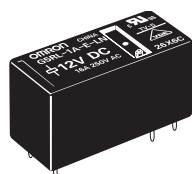
## ■ Dimensions

Note: All units are in millimeters unless otherwise indicated.

### G5RL-1A-LN



### G5RL-1A-E-LN



## ■ Precautions

### Mounting

When mounting a G5RL-LN Relay (Low Noise Relay) on a PCB, use a diode for surge absorption for the coil.

### Wiring

High-capacity models (-E) have a structure that connects two terminals from one contact. When designing the circuit, use both terminals. If you use only one terminal, the relay may be unable to satisfy specified performance.

### Others

Do not decrease coil voltage after operation and do not use a pulse wave drive.

#### Disclaimer:

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To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

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