# **PCB Power Relay**

# Low profile power relay with 15.7 mm height, ideal for incorporation in miniature equipments

- A wide variety of single pole, double pole, high-capacity (16 A) type and high-sensitivity type (250 mW) relays are available.
- IEC/EN 60335-1 conformed. (-HA Model)
- Satisfies ambient operating temperature requirement of 85°C and 105°C (-CV Model).
- Clearance and creepage distance: 8 mm / 8 mm min.
- G2RL-1(A)-E-ASI: TV3 rating models available.
- IEC/EN 60079-15 conformed (Except G2RL-1(A)-H, G2RL-1A-E-CV(-HA) Models).
- Reduced power consumption with voltage holding and pulse width modulation (PWM) control (only for G2RL-\(\bigcup -PW1\) model).



# **■**Application Examples

- Home appliances
- OA equipment
- · Industrial machinery

# ■Model Number Legend

<u>123 4 5 6 7 8</u>

1. Number of Poles

1 : 1 pole 2 : 2 pole

2. Contact Form None: SPDT (1c)

A : SPST-NO (1a)

3. Enclosure Rating

None : Flux protection

4 : Sealed 4. Classification

None: Standard

E: High-capacity H : High-sensitivity 5. Contact Material

None: Standard (Ag-alloy, Cd free)

ASI: AgSnIn

6. Special Requirement 1

None: Standard

CV: 16 A, pinning 5 mm, switching at 105°C

7. Market Code

None: General purpose

HA: Home Appliance according

to IEC/EN60335-1

8. Special Requirement 2

None: Standard

PW1 :Coil holding voltage and PWM control type

# **■**Ordering Information

Terminal Shape	Market Code	Classification	Contact Form	Enclosure Rating	Model	Rated Coil Voltage	Minimum Packing Unit
			SPST-NO (1a)	Flux protection	G2RL-1A	5, 12, 24, 48 VDC	
				l lux protection	G2RL-1A-PW1	5, 12, 24 VDC	
				Sealed	G2RL-1A4	5, 12, 24, 48 VDC	
			SPDT (1c)	Flux protection	G2RL-1	5, 12, 24, 46 VDC	
				riux protection	G2RL-1-PW1	5, 12, 24 VDC	
				Sealed	G2RL-14	5 12 24 49 VDC	
		Standard		Flux protection	G2RL-2A	5, 12, 24, 46 VDC	
			DPST-NO (2a)	r lux protection	G2RL-2A-PW1	5, 12, 24 VDC	
				Sealed	G2RL-2A4		
					G2RL-2	5, 12, 24, 48 VDC	
			DPDT (2c)	Flux protection	G2RL-2-ASI		
	General		DI DI (20)		G2RL-2-PW1	5, 12, 24 VDC	
	Purpose			Sealed	G2RL-24	5, 12, 24, 48 VDC	20 pcs/tube
		High-capacity	SPST-NO (1a)	Flux protection	G2RL-1A-E		
PCB terminals					G2RL-1A-E-ASI		
1 OD terminais					G2RL-1A-E-CV	5, 12, 24 VDC 5, 12, 24, 48 VDC	
					G2RL-1A-E-PW1		
				Sealed	G2RL-1A4-E		
			SPDT (1c)		G2RL-1-E		
				Flux protection	G2RL-1-E-ASI		
			31 01 (10)		G2RL-1-E-PW1	5, 12, 24 VDC	
				Sealed	G2RL-14-E	5, 12, 24, 48 VDC  5, 12, 24 VDC  5, 12, 24, 48 VDC  5, 12, 24 VDC  5, 12, 24, 48 VDC  20 pcs/tube  5, 12, 24, 48 VDC	
		High-sensitivity	SPST-NO (1a)		G2RL-1A-H		
		r light-sensitivity	SPDT (1c)		G2RL-1-H		
			SPDT (1c)		G2RL-1-HA		
			DPST-NO (2a)	Flux protection	G2RL-2A-HA	5, 12, 24 VDC	
	Home		DPDT (2c)		G2RL-2-HA		
	Application		SPST-NO (1a)		G2RL-1A-E-HA		
					G2RL-1A-E-CV-HA		
			SPDT (1c)		G2RL-1-E-HA		

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

Example: G2RL-1A DC5

Rated coil voltage

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

Note 2. Place your order in tube (20 pcs/tube) units.

Note 3. Contact your OMRON sales representative for sealed models.

# ■Ratings

#### **●**Coil

	Item Rated voltage	Rated current (mA)	Coil resistance (Ω)	Must operate voltage (V)	Must release voltage (V) % of rated voltage	Max. voltage (V)	Power consumption (mW)
Standard,	5 VDC	80.0	62.5	- 70% max.	10% min. 10 to 41%*	130% - (at 85°C)	Approx 400
High-	12 VDC	33.3	360				Approx. 400 Approx. 120*
capacity	24 VDC	16.7	1,440				Арріох. 120
Capacity	48 VDC	8.96	5,358				Approx. 430
Lliada	5 VDC	50	96	75% max.	10%	(at 65 C)	
High- sensitivity	12 VDC	20.8	576				Approx. 250
Sensitivity	24 VDC	10.42	2,304				

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

#### **●**Contacts: Flux Protection Type

	Classification	Standard type (resistive load)		High-capacity type (resistive load)	High-sensitivity type (resistive load)		
Item	Model	1-pole	2-pole	1-pole			
Contact typ	pe		Singl	gle			
Contact material			Ag-alloy (C	Cd free)			
Rated load		12 A at 250 VAC 12 A at 24 VDC (See note)	8 A at 250 VAC 8 A at 30 VDC (See note)	16 A at 250 VAC 16 A at 24 VDC (See note)	10 A at 250 VAC (See note)		
Rated carr	ry current	12 A (See note)	8 A (70°C)/5 A (85°C) (See note)	16 A (See note)	10 A (See note)		
Max. switching voltage			440 VAC, 3	440 VAC, 300 VDC			
Max. switching current		12 A 8 A		16 A	10 A		
Failure rate (reference	,	40 mA at 24 VDC					

<sup>\*</sup> This value was measured at a switching frequency of 120 operations/min. Note: Contact your OMRON representative for the ratings on sealed models.

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.

<sup>\*</sup> These numbers are only for -PW1 type. Power consumption with holding voltage is approx.120mW. Please confirm the detail in page 8 coil voltage reduction (holding voltage).

# **■**Characteristics

# ●Flux Protection Type

	Classification Standard type		High-capacity type	High-sensitivity type				
Item	Number of poles	1-pole	2-pole	1-pole				
Contact resistance *1		100 mΩ max.						
Operate tim	ne		15 m	s max.				
Release tim	ne		5 ms	s max.				
Insulation re	esistance *2		1,000	M $\Omega$ min.				
	Between coil and contacts		5,000 VAC, 50	0/60 Hz for 1min				
Dielectric strength	Between contacts of the same polarity		1,000 VAC, 50/60 Hz for 1min					
	Between contacts of different polarity	-	2,500 VAC, 50/60 Hz for 1min		_			
Impulse with	hstand voltage	10 kV (1.2 x 50 μs)						
Vibration	Destruction			amplitude (1.5 mm double amplitude)				
resistance	Malfunction			amplitude (1.5 mm double amplitude)				
Shock	Destruction		7	0 m/s <sup>2</sup>				
resistance	Malfunction			De-energized: 100 m/s <sup>2</sup>				
	Mechanical		20,000,000 operations	(at 18,000 operations/hr)				
Durability	Electrical *3 (resistive load)	G2RL-1A, G2RL-1(-HA, -PW1): 50,000 operations at 250 VAC, 12 A 30,000 operations at 24 VDC, 12 A	G2RL-2(A)(-HA, -PW1), G2RL-2-ASI: 30,000 operations at 250 VAC, 8 A 30,000 operations at 30 VDC, 8 A	G2RL-1A-E(-ASI, -HA, -PW1), G2RL-1-E(-ASI, -HA, -PW1): 30,000 operations at 250 VAC, 16 A 30,000 operations at 24 VDC, 16 A G2RL-1A-E-CV(-HA): 50,000 operations at 250 VAC, 16 A at 105°C	G2RL-1(A)-H: 50,000 operations at 250 VAC, 10 A			
Ambient operating temperature		-40°C to 85°C (with no icing or condensation) -40°C to 105°C (with no icing or condensation) by G2RL-1A-E-CV						
Ambient op	erating humidity		5% to 85% (with no	icing or condensation)				
Weight		Approx. 12 g						

Note 1. Values in the above table are the initial values at 23°C.

Note 2. Contact your OMRON sales representative for sealed models.

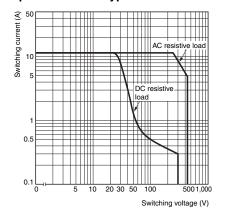
\*1. Measurement conditions: 5 VDC, 1 A, voltage drop method

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

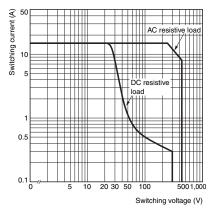
\*3. 1,800 operations per hour.

# **■**Engineering Data

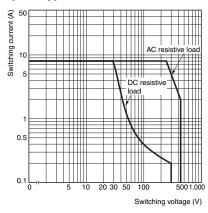
# ●Maximum Switching Capacity 1-pole Standard Type



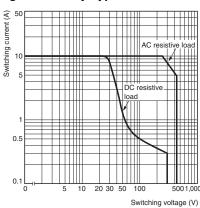
## 1-pole High-capacity Type



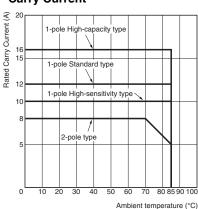
## 2-pole Type



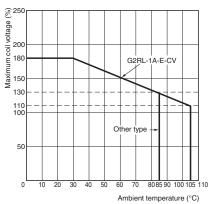
## **High-sensitibity Type**



#### Ambient Temperature vs. Rated Carry Current

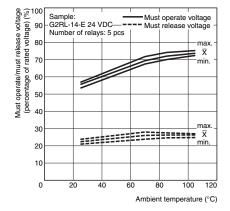


# ● Ambient Temperature vs. Maximum Coil Voltage



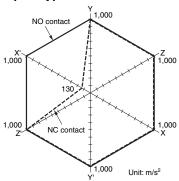
Note. The maximum coil voltage refers to the maximum value in a varying range of operating power voltage, not a continuous voltage.

## ●Ambient Temperature vs. Must Operate and Must Release Voltages



#### ●Shock Malfunction

#### 1-pole type

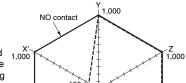


Sample: G2RL-14 12 VDC Number of relays: 5 pcs Test conditions: Shock is applied in ±X. ±Y. and ±Z directions three

in ±X, ±Y, and ±Z directions three times each with without energizing the relays to check the number of malfunctions.

Requirement: None malfuction 100 m/s<sup>2</sup>



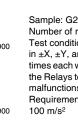


1,000

Unit: m/s

NC contact

2-pole type



Sample: G2RL-24 12 VDC Number of relays: 5 pcs
Test conditions: Shock is applied in ±X, ±Y, and ±Z directions three times each with without energizing the Relays to check the number of malfunctions.

Requirement: None malfuction 100 m/s<sup>2</sup>



# **■**Electrical Endurance Data (Reference Value)

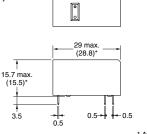
G2RL-1-E	8 A 250 VAC (cosφ=0.4) 200,000 operation min. (NO) 8 A 30 VDC (L/R=7 ms) 10,000 operation min. (NO)				
G2RL-1	5 A 250 VAC (cos  0,4) 150,000 operation min. (NO) 5 A 30 VDC (L/R=7 ms) 10,000 operation min. (NO)				
G2RL-2	8 A 250 VAC (cosφ=1) 30,000 operation min. 8 A 30 VDC 10,000 operation min.				
G2RL-1A-E	Pilot duty (A300), 250 VAC 250,000 operation min. Pilot duty (A300), 125 VAC 150,000 operation min.				

Note. The results shown reflect values at ambient temperature 23°C. Electrical endurance will vary depending on the test conditions. Contact your OMRON representative if you require more detailed information for the electrical endurance under your test condition.

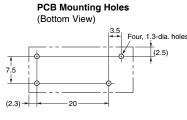
#### **■Dimensions** (Unit: mm)











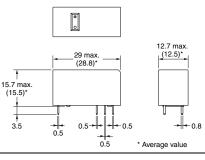


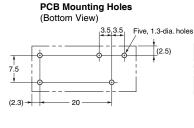
(No coil polarity)

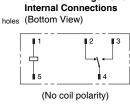
**Terminal Arrangement/** 

G2RL-1(-PW1), G2RL-14, G2RL-1-H, G2RL-1-HA



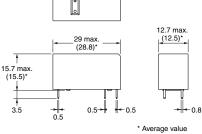


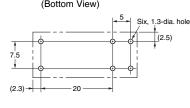




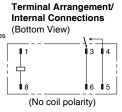


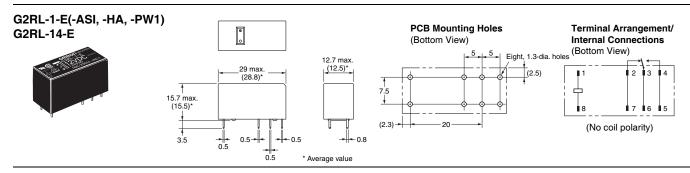


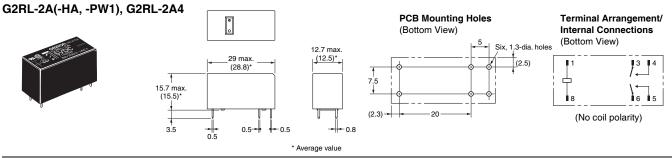


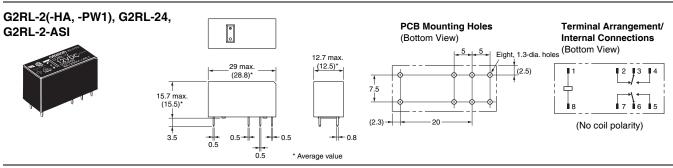


**PCB Mounting Holes** 









# ■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. 41643)
CSA Certified: (File No. LR31928)

Model	Contact form	Coil ratings	Contact ratings	Number of test operations
G2RL-1A(-PW1)	SPST-NO (1a)	3 to 48 VDC	12 A, 250 VAC (General Use) 40°C	100,000
G2RL-1(-HA, -PW1)	SPDT (1c)	3 10 40 VDC	12 A, 24 VDC (Resistive) 40°C	50,000
G2RL-1A-E(-HA, -PW1)	SPST-NO (1a)	3 to 48 VDC	16 A, 250 VAC (General Use) 40°C	100,000
G2RL-1-E(-HA, -PW1)	SPDT (1c)	3 10 46 VDC	16 A, 24 VDC (Resistive) 40°C	50,000
G2RL-1A-E-ASI	SPST-NO (1a)	3 to 48 VDC	16 A, 250 VAC (Resistive) 85°C	30,000
G2RL-1-E-ASI	SPDT (1c)	3 10 46 VDC	TV-3 40°C	25,000
G2RL-1A-E-CV(-HA)	SPST-NO (1a)	3 to 48 VDC	16 A, 250 VAC (Resistive) 105°C	100,000
G2RL-1A-H	SPST-NO (1a)	3 to 48 VDC	10 A, 250 VAC (General Use) 40°C	50.000
G2RL-1-H	SPDT (1c)	3 10 48 VDC	10 A, 24 VDC (Resistive) 40°C	50,000
G2RL-2A(-HA, -PW1)	DPST-NO (2a)	3 to 48 VDC	8 A, 277 VAC (General Use) 40°C	100.000
G2RL-2(-HA, -PW1)	DPDT (2c)	3 10 46 VDC	8 A, 30 VDC (Resistive) 40°C	100,000
G2RL-2-ASI	DPDT (2c)	2 to 49 VDC	8 A, 250 VAC (Resistive) 85°C	15,000
	DFD1 (20)	3 to 48 VDC	8 A, 30 VDC (Resistive) 85°C	15,000

# G2RL

# EN/IEC, VDE Certified (Certificate No. 119650)

Model	Contact form	Coil ratings	Contact ratings	Number of test operations
G2RL-1A(-PW1)	SPST-NO (1a)	5, 12, 24, 48	12 A, 250 VAC (cosφ=1) 85°C 12 A, 24 VDC (L/R=0 ms) 85°C	100,000
G2RL-1(-HA, -PW1)	SPDT (1c)	VDC	AC15: 3 A at 240 VAC at room temperature DC13: 2.5 A at 24 VDC, 50ms at room temperature	6,000
			16 A, 250 VAC (cosφ=1) 85°C	30,000
G2RL-1A-E(-HA, -PW1)	SPST-NO (1a)	5, 12, 24, 48	16 A, 24 VDC (L/R=0 ms) 85°C	15,000
G2RL-1-E(-HA, -PW1)	SPDT (1c)	VDC	AC15: 3 A at 240 VAC (NO) at room temperature, 1.5 A at 240V AC (NC) at room temperature DC13: 2.5 A at 24 VDC (NO), 50ms at room temperature	6,000
G2RL-1A-E-ASI G2RL-1-E-ASI	SPST-NO (1a) SPDT (1c)	5, 12, 24, 48 VDC	16 A, 250 VAC (cosφ=1) 85°C	30,000
G2RL-1A-E-CV(-HA)	SPST-NO (1a)	5, 12, 24, 48 VDC	' 16 Δ 250 VΔC: (cosh=1) 105°C:	
G2RL-1A-H	CDCT NO (1a)		10 A, 250 VAC (cosφ=1) 85°C	50,000
G2RL-1A-H	SPST-NO (1a) SPDT (1c)	5, 12, 24 VDC	10 A, 250 VAC (cosφ=1) 40°C	100,000
GZIIL-1-II	31 11 (10)		10 A, 24 VDC (L/R=0 ms) 85°C	50,000
G2RL-2A (-HA, -PW1)	DPST-NO (2a)		8 A, 250 VAC (cosφ=1) 85°C	30,000
GZHL-2A (-11A, -F W1)	DF31-NO (2a)	5, 12, 24, 48	8 A, 30 VDC (L/R=0 ms) 85°C	15,000
G2RL-2 (-HA, -PW1)	DPDT (2c)	VDC	AC15: 1.5 A at 240VAC at room temperature DC13: 2 A at 30 VDC, 50ms at room temperature	6,000
G2RL-2-ASI	DPDT (2c)	5, 12, 24, 48	8 A, 250V AC (Resistive) 85°C	15,000
GETTE E AGI	DI DI (20)	VDC	8 A, 30V DC (Resistive) 85°C	15,000

# CQC Certified (Certificate No. CQC17002171904)

Contact form	Coil ratings	Contact ratings	Number of test operations
SPST NO (1a)		12 A, 250 VAC (cosφ=1) at room temperature	50,000
3F31-NO (1a)	5 to 49 V/DC	12 A, 24 VDC (L/R=0 ms) at room temperature	30,000
SPDT (1c)	3 10 46 VDC	12 A, 250 VAC (cosφ=1) at room temperature	50,000
		12 A, 24 VDC (L/R=0 ms) at room temperature	30,000
SPST-NO (1a)	5 to 48 VDC	16 A, 250 VAC (cosφ=1) at room temperature	30,000
		16 A, 24 VDC (L/R=0 ms) at room temperature	30,000
SPDT (1c)		16 A, 250 VAC (cosφ=1) at room temperature	30,000
		16 A, 24 VDC (L/R=0 ms) at room temperature	30,000
-PW1) DPST-NO (2a)	5 to 40 V/DC	8 A, 250 VAC (cosφ=1) at room temperature	30,000
		8 A, 30 VDC (L/R=0 ms) at room temperature	30,000
DPDT (2c)	5 10 46 VDC	3 A, 250 VAC (cosφ=1) at room temperature	30,000
		3 A, 30 VDC (L/R=0 ms) at room temperature	30,000
	SPST-NO (1a) SPDT (1c) SPST-NO (1a) SPDT (1c) DPST-NO (2a)	SPST-NO (1a)  SPDT (1c)  SPST-NO (1a)  SPDT (1c)  SPDT (1c)  DPST-NO (2a)  5 to 48 VDC  5 to 48 VDC	SPST-NO (1a)   5 to 48 VDC   12 A, 250 VAC (cosφ=1) at room temperature   12 A, 24 VDC (L/R=0 ms) at room temperature   12 A, 250 VAC (cosφ=1) at room temperature   12 A, 250 VAC (cosφ=1) at room temperature   12 A, 24 VDC (L/R=0 ms) at room temperature   16 A, 250 VAC (cosφ=1) at room temperature   16 A, 250 VAC (cosφ=1) at room temperature   16 A, 250 VAC (cosφ=1) at room temperature   16 A, 24 VDC (L/R=0 ms) at room temperature   16 A, 250 VAC (cosφ=1) at room t

Creepage distance	8 mm min.
Clearance distance	8 mm min.
Insulation material group	Illa
Type of insulation coil-contact circuit	Reinforced
open contact circuit	Micro disconnection
Rated Insulation voltage	250 V
Pollution degree	3 (Flux protection / Sealed)
Rated voltage system	250 V / 400 V (Flux protection)
Over voltage category	
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)</ha>
Tracking Index of relay base	PTI 250 V min. (housing parts)

## ■Precautions

• Please refer to "PCB Relays Common Precautions" for correct use.

#### Correct Use

#### Mounting Position Compared to G2R Model

 Although the G2RL model and the G2R model are both low profile relays, their characteristics such as switching capacity are different. Be sure to check operation under the actual operating conditions before use.

#### Cleaning

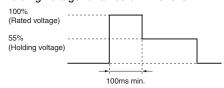
 The G2RL model is flux-resistant with two sealing holes on the case. Thus, do not clean the relay by boiling or soaking in water. Consult your Omron sales representative for sealed type relay.

#### Using Relays in an Atmosphere Containing Corrosive Gas

 Do not use relays in an atmosphere containing corrosive gas (sulfuric or organic gas). Otherwise, connection failure due to corrosion on the contact surface may lead to functional faults

# corrosion on the contact surface may lead to functional faults. 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 55% 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.

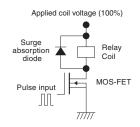


	Applied coil voltage	Coil resistance*	Power consumption
Rated voltage	100%	62.5Ω (5 VDC) 360Ω (12 VDC)	Approx. 400 mW
Holding voltage	55%	1,440Ω (24 VDC)	Approx. 120 mW

\* 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 (-PW1) 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: 60% 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

**Device & Module Solutions Company** 

## **Regional Contact**

Americas

https://components.omron.com/us

Asia-Pacific

https://components.omron.com/ap

Korea

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In the interest of product improvement, specifications are subject to change without notice.

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