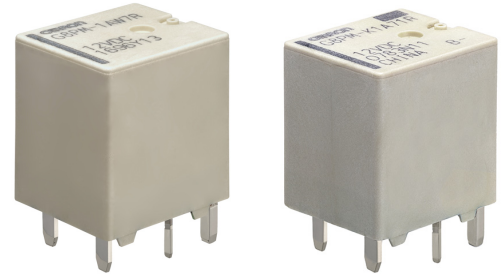


High Power PCB Relay for Automotive and DC12 V Applications

G8PM Relay

High Load Relay for Motor/Resistive/Lamp Control Applications

- Can replace Mini ISO Plug-in type relay
- Small size & High heat resistance enable for usage in engine room
- Can support 60 A Fuse
- PIP reflow compliant
- Temperature range -40°C to +125°C
- Latching model available



Model Number Legend

■Single Stable Model

G8PM-□□□□□
1 2 3 4 5

1. Number of Contact Poles

1: 1-pole

2. Contact Form

A: SPST (1 Form A)

3. Contact structure

W: Double contact

4. Protective structure

7: Flux tight (Open vent hole) (RT II IEC61810)

5. Special function

R: Pin in paste compliant type

■Latching Model

G8PM-□□□□□□□□
1 2 3 4 5 6 7

1. Functional classification

K: 2-winding latching

2. Number of Contact Poles

1: 1-pole

3. Contact Form

A: SPST (1 Form A)

4. Contact structure

Blank: Single contact

5. Protection structure

7: Flux tight (Open vent hole) (RT II IEC61810)

6. Polarity of coil

Blank: Normal polarity, positive voltage on Terminal 3 & 6

1: Reversed polarity, negative voltage on Terminal 3 & 6

7. Special function

R: Pin in paste compliant type

Application Examples

- DC motor/resistive/lamp application control
- Automotive DC applications (Smart Junction Box, Main power, Radiator fan, EPS, DC/DC converter, Head lamp, etc.)

Ordering Information

■Single Stable Model

| Classification | Contact form | Protective structure | Rated coil voltage (V) | Model | Minimum Packing unit (Tube packing) |
|----------------|------------------------------|--|------------------------|------------------------|--------------------------------------|
| Single Stable | SPST 1 Form A double contact | Flux tight (open vent hole) (RT II IEC61810) | DC12 | G8PM-1AW7R DC12 | 1200 pcs. / box (40 pcs. x 30 tubes) |

■Latching Model

| Classification | Contact form | Protective structure | Rated coil voltage (V) | Model | Minimum Packing unit (Tube packing) |
|--------------------|------------------------------|--|------------------------|-------------------------|--------------------------------------|
| 2-winding latching | SPST 1 Form A single contact | Flux tight (open vent hole) (RT II IEC61810) | DC12 | G8PM-K1A7R DC12 | 1200 pcs. / box (40 pcs. x 30 tubes) |
| | | | | G8PM-K1A71R DC12 | |

Note. Above models are not certificated for the safety standards of UL or CSA, etc.

Ratings

●Coil

| Classification | Rated voltage (V) | Rated current (mA) | | Coil resistance (Ω) | | Must-operate voltage (V) | Must-release voltage (V) | Permissible voltage Range (V) | Rated Power consumption (mW) | | Model |
|--------------------|-------------------|--------------------|---------|------------------------------|---------|--------------------------|--------------------------|-------------------------------|------------------------------|--------------|-------------------------|
| | | (Set) | (Reset) | (Set) | (Reset) | | | | (Set coil) | (Reset coil) | |
| Single Stable | DC12 | 53.3 | | 225 | | 7.2 Max. | 0.8 Min. | 10 to 16 | 640 | | G8PM-1AW7R DC12 |
| 2-winding latching | | (Set) | (Reset) | (Set) | (Reset) | (Set) | (Reset) | 10 to 16 | (Set coil) | (Reset coil) | G8PM-K1A7R DC12 |
| | | 210 | 268 | 57.2 | 44.8 | 7.2 Max. | 7.2 Max. | 10 to 16 | 2520 | 3210 | G8PM-K1A71R DC12 |

Note 1. The rated current and coil resistance are measured at a coil temperature of 20°C with a tolerance of $\pm 10\%$.

Note 2. The operating characteristics are measured at a coil temperature of 20°C.

●Contacts

| Item | Classification | Single Stable | Latching |
|-----------------------------|----------------|---|--|
| | Model | G8PM-1AW7R DC12 | G8PM-K1A7R DC12 G8PM-K1A71R DC12 |
| Contact type | | Double | Single |
| Contact material | | Ag-alloy (Cd-free) | |
| Maximum carrying current *1 | 20°C | 60 A, DC14 V, Continuous/ 81 A, DC14 V, 1 Hour/ 120 A, DC14 V, 2 Min. | 40 A, DC14 V, Continuous/ 54 A, DC14 V, 1 Hour/ 81 A, DC14 V, 2 Min. |
| | 125°C | 40 A, DC14 V, Continuous/ 70 A, DC14 V, 30 Min. | 20 A, DC14 V, Continuous/ 46 A, DC14 V, 30 Min. |
| Max. switching current *2 | | 150 A Inrush, 80 A break | 100 A Inrush, 40 A Break |
| Min. switching current | | DC12 V, 0.1 A | DC12 V, 1 A |

*1. Measured with reference connection conditions as below,
T1.6 mm FR4 epoxy PCB (Double-sided), Trace: T140 μ m x L50 mm x W13.2 mm, Cable: 6 mm²

The time limitation doesn't guarantee the repeated current carrying. Please confirm the performance with the specific conditions.

*2. Measured 100 operations with the resistive load at room temperature.

Characteristics

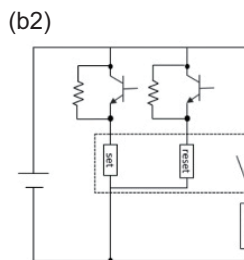
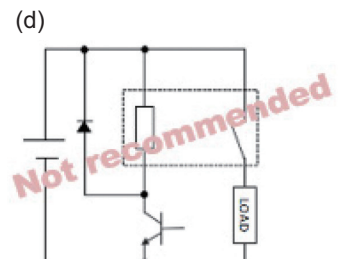
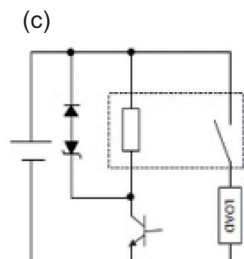
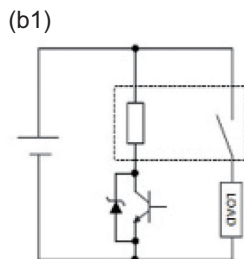
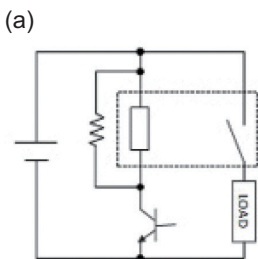
| Classification | | Single Stable | Latching |
|------------------------------------|---------------------------------------|---|--|
| Item | | G8PM-1AW | G8PM-K1A7R/G8PM-K1A71R |
| Contact resistance (See *1.) | | Typ. 2.5 mΩ, max. 50 mΩ | Typ. 3.0 mΩ, max. 50 mΩ |
| Operate time | | 10 ms max. (DC12 V, not including bounce time) | 15 ms max. (DC12 V, not including bounce time) |
| Release time | | 5 ms max. (DC12 V) | 15 ms max. (DC12 V) |
| Insulation resistance (See *2.) | Between coil and contacts | 100 MΩ min. | |
| | Between contacts of the same polarity | 100 MΩ min. | |
| Dielectric strength | Between coil and contacts | AC500 V 1 min | |
| | Between contacts of the same polarity | AC500 V 1 min | |
| Vibration resistance | Destruction | 33 Hz, 45 m/s ² | |
| | Malfunction | 10 to 500 Hz, 45 m/s ² (detection time 10 μs min) | |
| Shock resistance | Destruction | 1,000 m/s ² (pulse duration: 6 ms) | |
| | Malfunction | 100 m/s ² (pulse duration: 11 ms, detection time: 10 μs) | |
| Mechanical endurance (See *3.) | | 1,000,000 ops. min. | |
| Electrical endurance (See *4.) | Resistive Load | 45 A, DC14 V, 100,000 operations min. (1 s ON/1 s OFF) | 40 A, DC14 V, 100,000 operations min. (1 s ON/1 s OFF) |
| | Lamp Load | 100 A Inrush/ 20 A break, DC14 V, 100,000 operations min. (1 s ON/9 s OFF) | 60 A Inrush/ 12 A break, DC14 V, 100,000 operations min. (1 s ON/9 s OFF) |
| Ambient operating temperature | | -40 to 125°C (without freezing or condensation) | |
| Ambient operating humidity | | 35% to 85%RH | |
| Weight | | Approx. 7.6 g | Approx. 7.0 g |

Note. The above values are initial values at an ambient temperature of +20°C unless otherwise specified.

- *1. The contact resistance was measured with 10 A at DC12 V using the voltage drop method.
- *2. The insulation resistance was measured with a DC500 V megohmmeter.
- *3. The mechanical endurance was measured at a switching frequency of 18,000 operations/hr.
- *4. Please connect N.O. terminal to the +BATT side on Electrical use and connect surge suppression element in parallel with between coil based on recommended circuit.

Recommended circuit: (a), (b), (c)

Not-recommended circuit: (d)



Note 1.

OMRON recommends coil driver circuit (b) and (c) for coil surge suppression. However the circuit (d) is not recommended because it may negatively affect the durability performance.

Note 2.

OMRON recommends to install a surge voltage protection on both of set coil and reset coil of the latching relay, due to the large coil current (Reference components: Resistor withstanding 10 W or Zener diode cutting over 30 V.)

Reference Technical Data

Single Stable Model

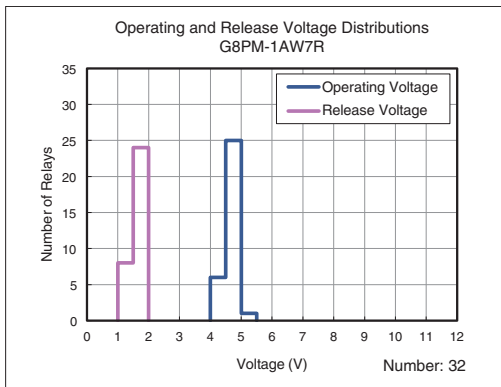
Actual Electrical performance (reference)

| Model | Application | Load voltage | Inrush current | Steady current | Break current | Inductance | Ambient temperature | Switching frequency | | Required cycles (min.) |
|-----------------|---------------|--------------|----------------|----------------|---------------|------------|---------------------|---------------------|------|------------------------|
| | | (V) | (A) | (A) | (A) | | | (mH) | (°C) | |
| G8PM-1AW7R DC12 | Radiator Fan | 13.5 | 80 | 30 | 30 | | -40 to 110 | 3.0 | 8.0 | 156,000 |
| G8PM-1AW7R DC12 | Lamp | 14.0 | 100 | 20 | 20 | - | -40 to 110 | 0.5 | 5.5 | 156,000 |
| G8PM-1AW7R DC12 | Resistive | 14.0 | 50 | 10 | 10 | - | 25 | 2.0 | 5.0 | 1,000,000 |
| G8PM-1AW7R DC12 | Fuel pump | 14.7 | 50 | 10 | 10 | - | 25 | 2.0 | 5.0 | 1,000,000 |
| G8PM-1AW7R DC12 | Starter Motor | 14.5 | 150 | 50 | 50 | 0.16 | -40 to 110 | 3.0 | 9.0 | 156,000 |

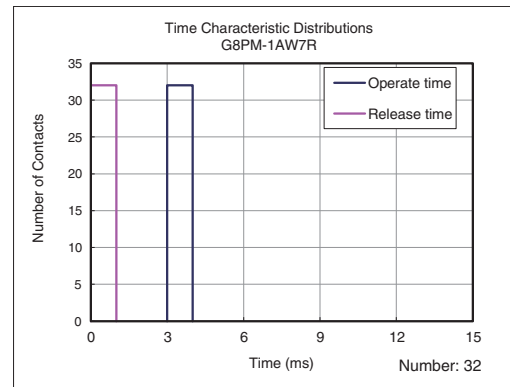
Overcurrent (reference)

| Model | Load & Coil voltage | Current | Fuse rating | Type | Ambient temperature | Overcurrent time | Result |
|-----------------|---------------------|---------|-------------|-----------|---------------------|------------------|--------|
| | (V) | (A) | (A) | | (°C) | (s) | |
| G8PM-1AW7R DC12 | 14 | 81.0 | 60 | Micro | 25 | 3,600 | Passed |
| G8PM-1AW7R DC12 | 14 | 120.0 | 60 | Micro | 25 | 120 | Passed |
| G8PM-1AW7R DC12 | 14 | 75.0 | 60 | Case Fuse | 85 | 1,800 | Passed |
| G8PM-1AW7R DC12 | 14 | 111.0 | 60 | Case Fuse | 85 | 60 | Passed |
| G8PM-1AW7R DC12 | 14 | 333.0 | 60 | Case Fuse | 85 | 1 | Passed |

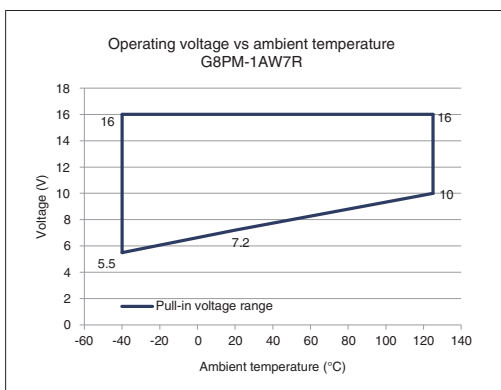
Operating Voltage and Release Voltage Distributions (Number of Relays × Voltage)



Time Characteristic Distributions (Number of Contacts × Time (ms))

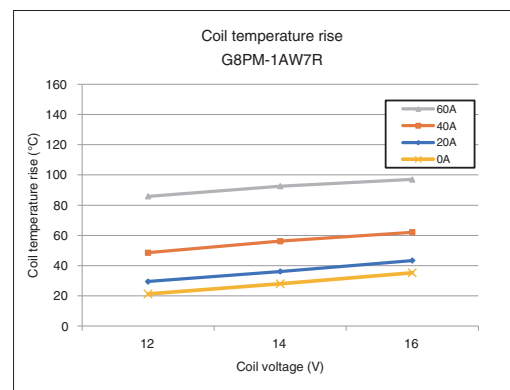


Operating voltage vs ambient temperature (Cold start)

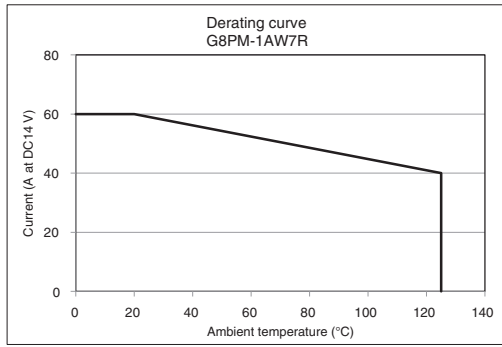


Coil temperature rise [degC] at 20°C

(For using under a higher ambient temperature, please select the proper current carrying condition to avoid a possible excessive temperature rising.)



●Derating curve



■Latching Model

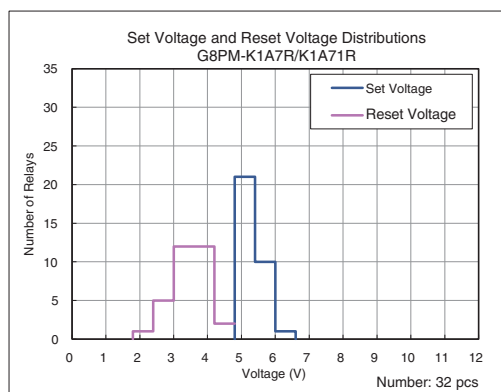
●Actual Electrical performance (reference)

| Model | Application | Load voltage | Inrush current | Steady current | Break current | Inductance | Ambient temperature | Switching frequency | | Required cycles (Min.) |
|-----------------|---------------|--------------|----------------|----------------|---------------|------------|---------------------|---------------------|---------|------------------------|
| | | (V) | (A) | (A) | (A) | | | On (s) | Off (s) | |
| G8PM-K1A7R DC12 | Resistor | 14.0 | 40 | 40 | 40 | - | 20 | 1.0 | 1.0 | 100,000 |
| G8PM-K1A7R DC12 | Lamp | 14.0 | 60 | 12 | 12 | - | 20 | 1.0 | 9.0 | 100,000 |
| G8PM-K1A7R DC12 | Radioator fan | 14.0 | 50 | 20 | 20 | 0.4 | 20 | 2.0 | 6.0 | 100,000 |

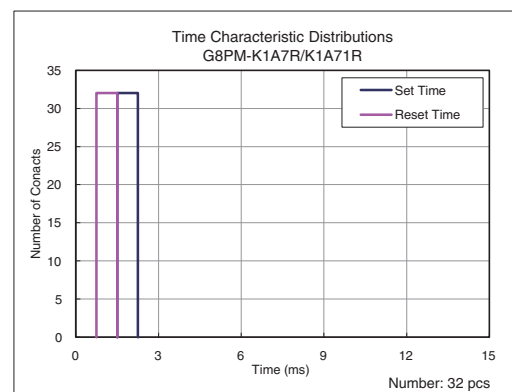
●Overcurrent (reference)

| Model | Load & Coil voltage | Current | Fuse rating | Type | Ambient temperature | Overcurrent time | Result |
|-----------------|---------------------|---------|-------------|-------|---------------------|------------------|--------|
| | (V) | (A) | (A) | | (°C) | (s) | |
| G8PM-K1A7R DC12 | 14 | 54.0 | 40 | Micro | 23 | 3,600 | Go |
| G8PM-K1A7R DC12 | 14 | 240.0 | 40 | Micro | 23 | 1 | Go |
| G8PM-K1A7R DC12 | 14 | 46.0 | 40 | Micro | 125 | 1,800 | Go |
| G8PM-K1A7R DC12 | 14 | 70.0 | 40 | Micro | 125 | 60 | Go |
| G8PM-K1A7R DC12 | 14 | 206.0 | 40 | Micro | 125 | 1 | Go |

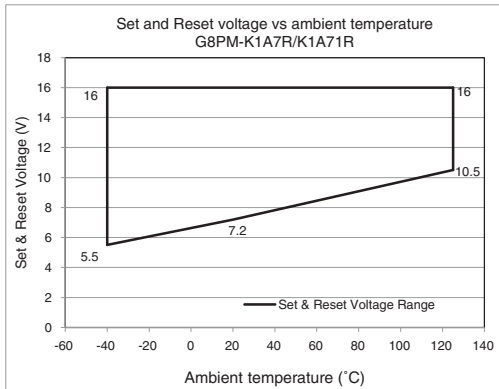
●Set Voltage and Reset Voltage Distributions
(Number of Relays × Voltage)



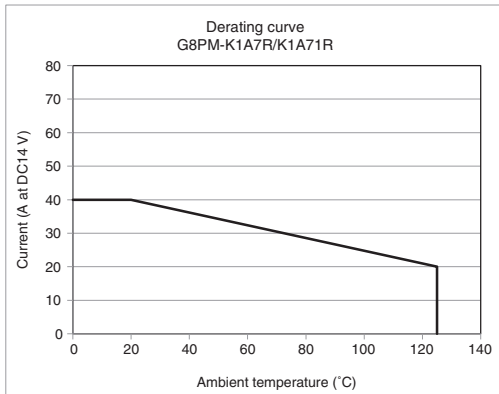
●Time Characteristic Distributions
(Number of Contacts × Time)



●Set and Reset voltage vs ambient temperature
(Cold start)



●Derating curve

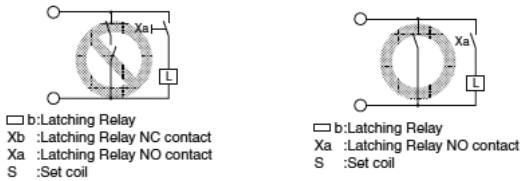


Precautions

●Please refer to “Safety Precautions for All Automotive Relays” for correct use.

Correct Use

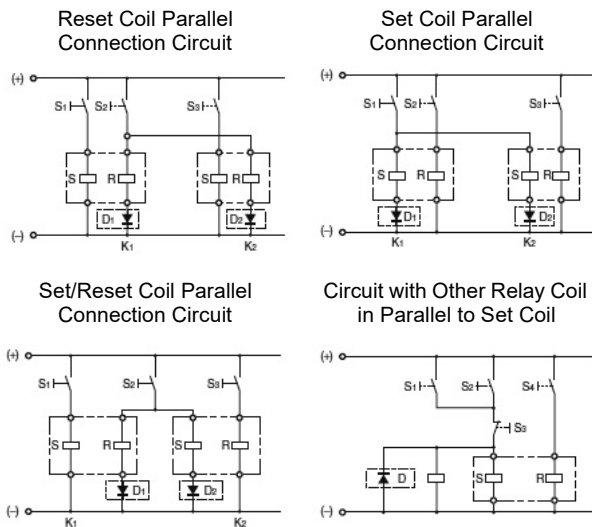
1. Coil Polarity for DC-operated Latching Relays
Check the catalog for the terminal numbers and polarity of applied power to correctly connect the Relay. Applying voltage with reversed polarity to DC-operated Latching Relays may result in malfunctions, set failure, or reset failure.
2. Drive Circuit
Energizing due to self-contact may prevent normal latching.
Do not use Latching Relays in the following type of circuit. Use the type of circuit shown in the following figure.



5. Degradation over Time of Latching Relay Holding Ability
If a Magnetic Latching Relay is used left set for an extended period, changes over time will degrade the magnetic force, and the reduction in holding ability may cause the set status to be released. This is also because of the properties of semi-hard magnetic material, and the rate of degradation over time depends on the ambient environment (e.g., temperature, humidity, vibration, and presence or absence of external magnetic fields). Perform maintenance at least once a year by resetting, applying the rated voltage again, and then setting.
6. Mounting Latching Relays
Operate the Latching Relay so that the vibration and shock from other devices (e.g., Relays) on the same panel or board generated when setting or resetting do not exceed the catalog values. Exceeding the values may cause the set or reset state to be released.
Latching Relays are shipped in the reset status, but abnormal vibration or shock may cause them to change to the set status. Be sure to apply a reset signal before using the Latching Relay.

3. Applying Voltage Simultaneously to Set and Reset Coils
Do not apply voltage at the same time to the set and reset coils. Simultaneously applying voltage to the set and reset coils for an extended period may result in abnormal coil heating, fire, or incorrect operation.
4. DC Input Circuit Design
Reverse voltage of a Relay coil or solenoid may cause operation failure if other Relay coils or solenoids are connected in parallel to the set coil or reset coil. As a countermeasure, change the circuit or connect diodes as shown in the following figures.

Circuit Precautions



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