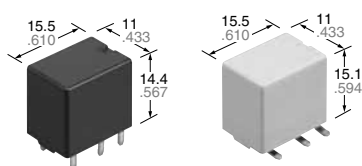


Middle Load Relay for Smart J/B

CN-M RELAYS

<Protective construction>
Sealed



(Unit: mm inch)

RoHS compliant

FEATURES

- Space saving most suitable for smart J/B
- Compact and high-capacity 30A load switching.
- Full line up (High heat-resistant type and SMD type)
- Terminals for PC board pattern designs are easily allocated.

TYPICAL APPLICATIONS

- Defogger, Seat heater, Head lamp, Fog lamp, Fan motor, etc.

ORDERING INFORMATION

ACNM

Contact arrangement**1

- 1: 1 Form C
- 3: 1 Form A
- 5: 1 Form C high heat-resistant type
- 7: 1 Form A high heat-resistant type

Operate (Set) voltage

- 1: Max. 7.2V DC

Rated coil voltage (DC)

- 12: 12V

Terminal shape

- Nil: PC board terminal type
- SA: Surface-mount terminal type

Packing style**2

- Nil: Tube packing
- X: Tape and reel packing
(Reverse N.O. terminal direction in pull-out direction)
- Z: Tape and reel packing
(Normal N.O. terminal direction in pull-out direction)

Notes: *1. Surface-mount terminal type is available in high heat-resistant type only.

- *2. Tube packing: PC board terminal type only
- Tape and reel packing: Surface-mount type only

TYPES

1. PC board terminal type

| Contact arrangement | Rated coil voltage | Part No. | | Packing | |
|---------------------|--------------------|---------------|--------------------------|---------------|------------|
| | | Standard type | High heat-resistant type | Carton (tube) | Case |
| 1 Form A | 12V DC | ACNM3112 | ACNM7112 | 50 pcs. | 1,500 pcs. |
| 1 Form C | | ACNM1112 | ACNM5112 | | |

2. Surface-mount terminal type

| Contact arrangement | Rated coil voltage | Part No. | | Packing | |
|---------------------|--------------------|--------------------------|--|---------------|----------|
| | | High heat-resistant type | | Carton (tube) | Case |
| 1 Form A | 12V DC | ACNM7112SAX | | 200 pcs. | 600 pcs. |
| 1 Form C | | ACNM7112SAZ | | | |
| | | ACNM5112SAX | | | |
| | | ACNM5112SAZ | | | |

Notes: *1. Surface-mount terminal type is available in high heat-resistant type only.

*2. An "X" at the end of the part number indicates, for tape and reel packing, reverse N.O. terminal direction in pull-out direction.

A "Z" at the end of the part number indicates, for tape and reel packing, normal N.O. terminal direction in pull-out direction.

Tape and reel packing symbol "z" or "x" are not marked on the relay.

RATING

1. Coil data

| Rated coil voltage | Operate (Set) voltage (at 20°C 68°F) (Initial) | Release (Reset) voltage (at 20°C 68°F) (Initial) | Rated operating current [±10%] (at 20°C 68°F) | Coil resistance [±10%] (at 20°C 68°F) | Rated operating power (at 20°C 68°F) | Usable voltage range |
|--------------------|--|--|---|---------------------------------------|--------------------------------------|----------------------|
| 12 V DC | Max. 7.2 V DC | Min. 1.0 V DC | 53.3 mA | 225Ω | 640 mW | 10 to 16 V DC |

2. Specifications

| Item | Specifications | |
|-----------------------------------|---|--|
| Contact data | Contact arrangement | 1 Form A, 1 Form C |
| | Contact resistance (initial) | Max. 30mΩ (Typ. 5mΩ) (By voltage drop 1A 6V DC) |
| | Contact material | Ag alloy |
| | Rated switching capacity (resistive) | N.O. side: 30A 14V DC, N.C. side: 15A 14V DC |
| | Max. carrying current*1 | N.O. side 30A/1 hour, 40A/2 min. (Coil applied voltage 16V DC, at 20°C 68°F) 25A/1 hour, 35A/2 min. (Coil applied voltage 16V DC, at 85°C 185°F) 20A/1 hour, 30A/2 min. (Coil applied voltage 16V DC, at 110°C 230°F) (High heat-resistant type) |
| Min. switching load (resistive)*2 | 1A 14V DC (at 20°C 68°F) | |
| Insulated resistance (initial) | Min. 100 MΩ (at 500V DC, Measurement at same location as "Dielectric strength" section.) | |
| Dielectric strength (Initial) | Between open contacts | 500 Vrms for 1 min. (Detection current: 10mA) |
| | Between contacts and coil | 500 Vrms for 1 min. (Detection current: 10mA) |
| Time characteristics (initial) | Operate (Set) time (at Rated voltage) | Max. 10ms (at 20°C 68°F, without bounce time) |
| | Release (Reset) time (at Rated voltage) | Max. 10ms (at 20°C 68°F, without bounce time) (without diode) |
| Shock resistance | Functional | Min. 100 m/s ² {approx. 10G} (Half-wave pulse of sine wave: 11ms; detection time: 10μs) |
| | Destructive | Min. 1,000 m/s ² {approx. 100G} (Half-wave pulse of sine wave: 6ms) |
| Vibration resistance | Functional | 10 to 100 Hz, Min. 44.1m/s ² {approx. 4.5G} (Detection time: 10μs) |
| | Destructive | 10 to 500 Hz, Min. 44.1m/s ² {approx. 4.5G} Time of vibration for each direction; X, Y direction: 2 hours, Z direction: 4 hours |
| Expected life | Mechanical | Min. 10 ⁷ (at 120 cpm) |
| | Electrical | <Resistive load> Min. 10 ⁵ (At rated switching capacity, operating frequency: ON 1s, OFF 9s) <Motor load> Min. 2×10 ⁵ (motor free): at 80 A (inrush), 16 A (steady), 14 V DC (Operating frequency: ON 2s, OFF 6s) <Lamp load> Min. 10 ⁵ : at 84 A (inrush), 12 A (steady), 14 V DC (Operating frequency: ON 1s, OFF 14s) |
| Conditions | Conditions for usage, transport and storage*3 Standard type; Ambient temperature: -40 to +85°C -40 to +185°F, Humidity: 5 to 85% R.H. High heat-resistant type; Ambient temperature: -40 to +110°C -40 to +230°F, Humidity: 2 to 85% R.H. (Please avoid icing or condensation) | |
| Weight | Approx. 5.5 g .19 oz | |

Notes: *1. Depends on connection conditions. Also, this does not guarantee repeated switching. We recommend that you confirm operation under actual conditions.

*2. This value can change due to the switching frequency, environmental conditions, and desired reliability level, therefore it is recommended to check this with the actual load.

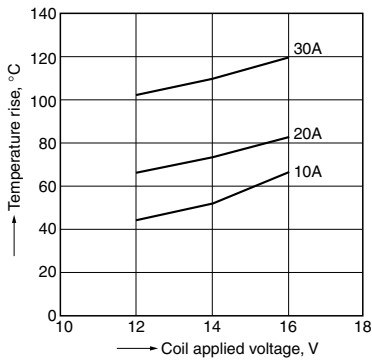
*3. The upper operation ambient temperature limit is the maximum temperature that can satisfy the coil temperature rise value. For details, please refer to the "Automotive Relay Users Guide".

Please inquire our sales representative if you will be using the relay in a high temperature atmosphere (110°C 230°F).

REFERENCE DATA

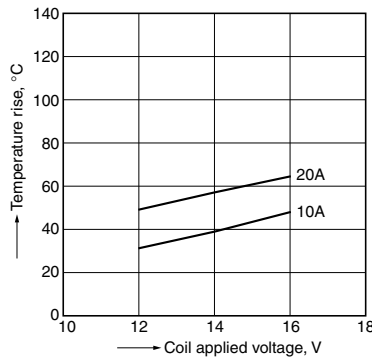
1-(1). Coil temperature rise (at room temperature)

Sample: ACNM1112, 3pcs
 Measured portion: Inside the coil
 Carrying current: 10A, 20A, 30A
 Ambient temperature: 26°C 78.8°F

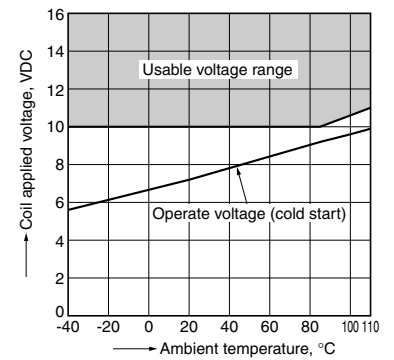


1-(2). Coil temperature rise (at 110°C 230°F)

Sample: ACNM7112, 3pcs
 Measured portion: Inside the coil
 Carrying current: 10A, 20A
 Ambient temperature: 110°C 230°F

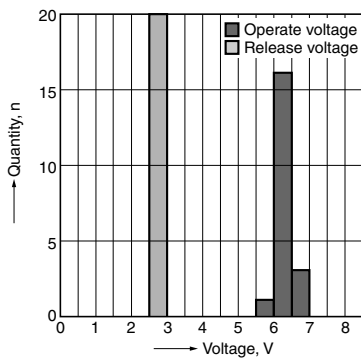


2. Ambient temperature and usable voltage range



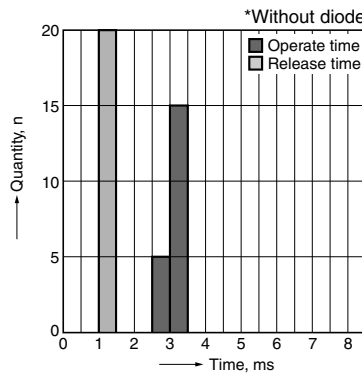
3. Distribution of operate (set) and release (reset) voltage

Sample: ACNM1112, 20pcs.



4. Distribution of operate (set) and release (reset) time

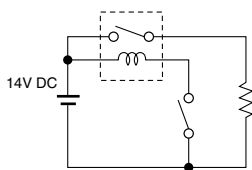
Sample: ACNM1112, 20pcs.



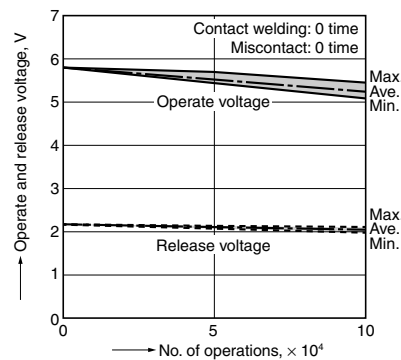
5-(1). Electrical life test (Resistive load)

Sample: ACNM1112, 3pcs.
 Load: Resistive load (N.O. side: 30A 14V DC)
 Operating frequency: ON 1s, OFF 9s
 Ambient temperature: Room temperature

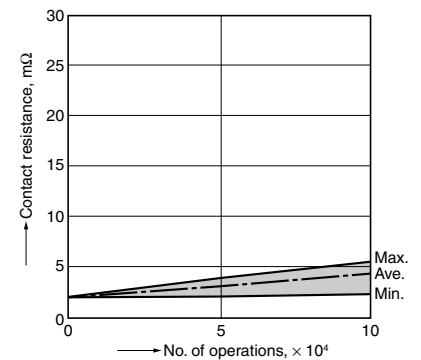
Circuit:



Change of operate (set) and release (reset) voltage



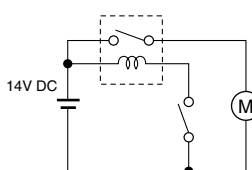
Change of contact resistance



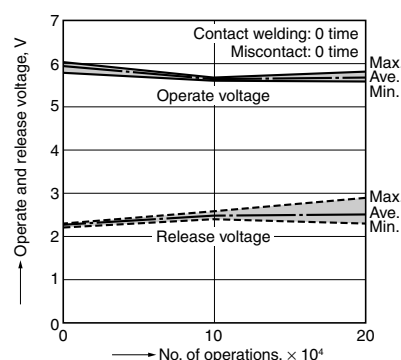
5-(2). Electrical life test (Motor load)

Sample: ACNM7112, 3pcs.
 Load: inrush: 80A/steady: 16A (motor free)
 Operating frequency: ON 2s, OFF 6s
 Ambient temperature: 110°C 230°F

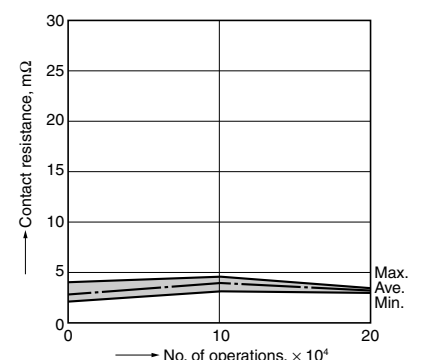
Circuit:



Change of operate (set) and release (reset) voltage



Change of contact resistance

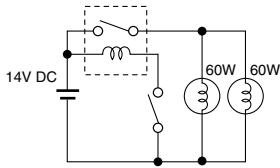


CN-M (ACNM)

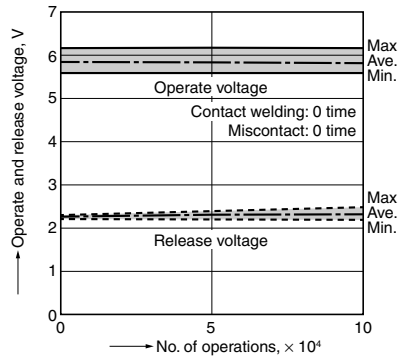
5-(3). Electrical life test (Lamp load)

Sample: ACNM3112, 3pcs.
 Load: Inrush: 84A/steady: 12A
 Operating frequency: ON 1s, OFF 14s
 Ambient temperature: Room temperature

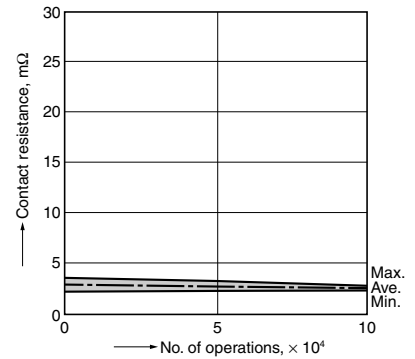
Circuit:



Change of operate (set) and release (reset) voltage



Change of contact resistance



DIMENSIONS (mm inch)

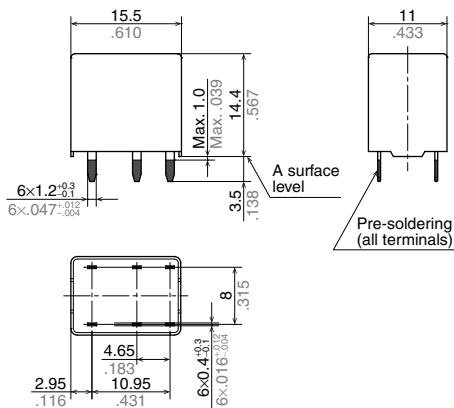
The CAD data of the products with a **CAD** mark can be downloaded from: <http://industrial.panasonic.com/ac/e/>

1. PC board terminal type

CAD



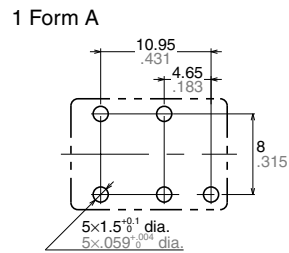
External dimensions



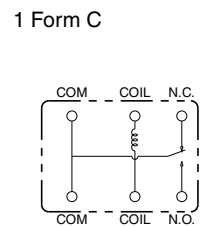
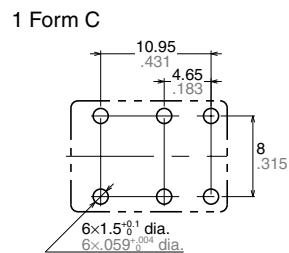
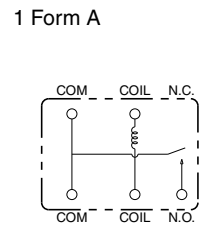
| Dimension: | Tolerance |
|-----------------------------|-------------|
| Max. 1mm .039 inch: | ±0.1 ±0.004 |
| 1 to 3mm .039 to .118 inch: | ±0.2 ±0.008 |
| Min. 3mm .118 inch: | ±0.3 ±0.012 |

* Dimensions (thickness and width) of terminal is measured before pre-soldering. Intervals between terminals is measured at A surface level.

PC board pattern (Bottom view)



Schematic (Bottom view)



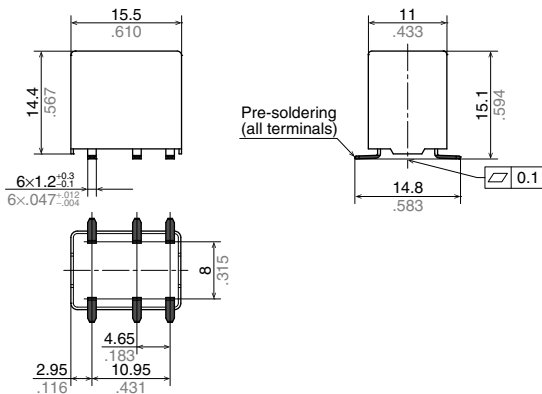
Tolerance: ±0.1 ±0.004

2. Surface-mount terminal type

CAD

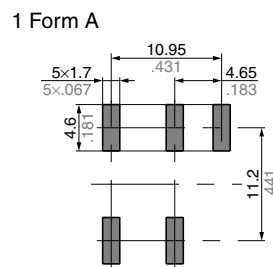


External dimensions

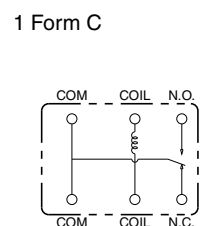
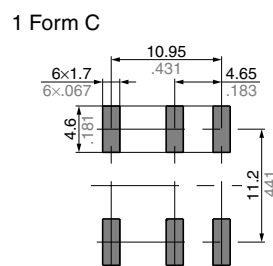
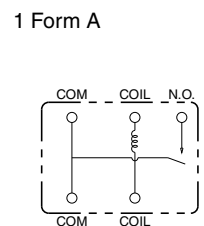


| Dimension: | Tolerance |
|-----------------------------|-------------|
| Max. 1mm .039 inch: | ±0.1 ±0.004 |
| 1 to 3mm .039 to .118 inch: | ±0.2 ±0.008 |
| Min. 3mm .118 inch: | ±0.3 ±0.012 |

Recommended mounting pad (Top view)



Schematic (Top view)



Tolerance: ±0.1 ±0.004

NOTES

1. Usage, transport and storage conditions

1) Ambient temperature, humidity, and air pressure during usage, transport, and storage of the relay:

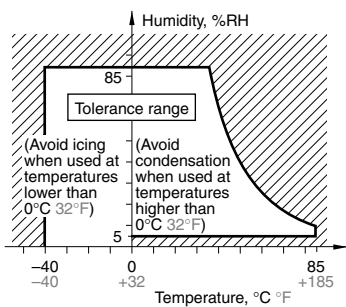
(1) Temperature:
 -40 to +85°C -40 to +185°F
 (Standard type)
 -40 to +110°C -40 to +230°F
 (High heat-resistant type)

(2) Humidity:
 5 to 85% RH (Standard type)
 2 to 85% RH (High heat-resistant type)

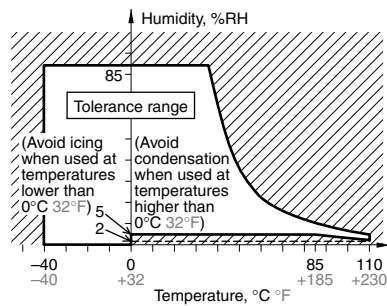
(3) Air pressure: 86 to 106 kPa
 The humidity range varies with the temperature. Use within the range indicated in the graph below.

[Temperature and humidity range for usage, transport, and storage]

Standard type



High heat-resistant type



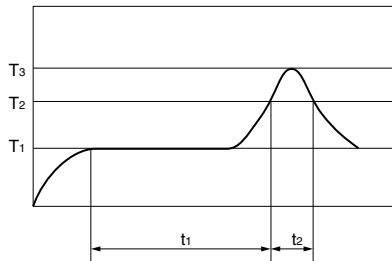
2. Storage condition after opening a moisture-prevention package

(1) After opening a moisture-prevention package, use the item as soon as possible (within 3 days under an environment of Max. 30°C 86°F, Max. 70% RH).

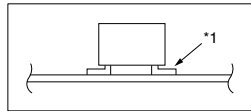
(2) If products are not used within 3 days after opening a moisture-prevention package, store them in a humidity-controlled desiccator or in a storage bag with silica gel.

3. Mounting and cleaning conditions for surface-mount terminal type relays

When soldering this relay, please observe the following conditions. (Recommended conditions: Number of reflows: 1, Measurement location: terminal temperature)



T₁ = 150 to 180°C 302 to 356°F
 T₂ = 230°C 446°F or more
 T₃ = Less than 250°C 482°F
 t₁ = 60 to 120 sec.
 t₂ = Less than 30 sec.



Temperature profile indicates the temperature of the soldered part (Note 1) of terminals on the surface of the PC board, however, for other areas such as the surface of relay case, make a setting so that you do not exceed the recommended conditions.

*The temperature of the relay exterior and interior may be extremely high depending on the component density on the board, the heating method of the reflow oven or circuit board type.

Other cautions during reflow soldering
 (1) Reflow performance may be affected if you carry out soldering in a way that exceeds the recommended conditions. If you need to exceed the recommended conditions when soldering, please inquire our sales representative before using in an application.

(2) Please confirm the heat stress of relay by using actual board because it may be changed by board condition or manufacturing process condition.

(3) Solder creepage, wettability, or soldering strength will be affected by the changing of soldering condition or used solder type. Please check them under the actual production condition in detail.

(4) Avoid cleaning (ultrasonic cleaning, boiling cleaning, etc.) and coating in order to prevent negative impacts on relay characteristics.

For general cautions for use, please refer to the “Automotive Relay Users Guide”.

Please contact

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Electromechanical Control Business Division

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industrial.panasonic.com/ac/e/

Panasonic[®]

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