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MINI-ISO AUTOMOTIVE RELAY

CB RELAYS

FEATURES

• This relay has an Mini-ISO (International Organization for Standardization) terminal arrangement.

• Relay is compact and high capacity (40 A).

Compact form factor realized with space saving 22 × 26 mm .866 × 1.024 inch small base area thanks to integrated bobbin and base construction. Features high switching capacity of 40 A

• Features high thermal resistance of 125°C 257°F (heat resistant type).

Heat resistant type is available that can withstand use near engines. (40 A switching capacity)

• Built-in resistor type is also available.

TYPICAL APPLICATIONS

• Automobiles

Headlights, Cell motors, Air conditioners, ABS, EPS, etc.

• Construction equipment

• Agricultural equipment, Conveyor, etc.

ORDERING INFORMATION

CB □ □ □ □ - □ □ - □ - □

Contact arrangement
1a: 1 Form A
1: 1 Form C

Contact rating
Nil: Standard type
H: High contact capacity type

Protective construction
Nil: Sealed type
F: Flux-resistant type

Heat resistant of types
Nil: Standard type
T: Heat resistant type

Protective element
Nil: None
R: with resistor inside

Mounting classification
Nil: Plug-in type
P: PC board type
M: Bracket type

Coil voltage (DC)
12V, 24 V

TYPES

1. Standard type

Contact arrangement	Mounting classification	Nominal coil voltage	Sealed type	Flux-resistant type
			Part No.	Part No.
1 Form A	PC board type	12V DC	CB1a-P-12V	CB1aF-P-12V
		24V DC	CB1a-P-24V	CB1aF-P-24V
	Plug-in type	12V DC	CB1a-12V	CB1aF-12V
		24V DC	CB1a-24V	CB1aF-24V
	Bracket type	12V DC	CB1a-M-12V	CB1aF-M-12V
		24V DC	CB1a-M-24V	CB1aF-M-24V
1 Form C	PC board type	12V DC	CB1-P-12V	CB1F-P-12V
		24V DC	CB1-P-24V	CB1F-P-24V
	Plug-in type	12V DC	CB1-12V	CB1F-12V
		24V DC	CB1-24V	CB1F-24V
	Bracket type	12V DC	CB1-M-12V	CB1F-M-12V
		24V DC	CB1-M-24V	CB1F-M-24V
High contact capacity (1 Form A)	PC board type*	12V DC	CB1aH-P-12V	CB1aHF-P-12V
		24V DC	CB1aH-P-24V	CB1aHF-P-24V
	Plug-in type	12V DC	CB1aH-12V	CB1aHF-12V
		24V DC	CB1aH-24V	CB1aHF-24V
	Bracket type	12V DC	CB1aH-M-12V	CB1aHF-M-12V
		24V DC	CB1aH-M-24V	CB1aHF-M-24V

Standard packing; Carton: 50 pcs. Case: 200 pcs.
Note: Please use “CB∗∗∗R∗∗” to order with resistor inside type. (Asterisks “∗” should be filled in from ORDERING INFORMATION.)

2. Heat resistant type

Contact arrangement	Mounting classification	Nominal coil voltage	Sealed type	Flux-resistant type
			Part No.	Part No.
1 Form A	PC board type	12V DC	CB1a-T-P-12V	CB1aF-T-P-12V
		24V DC	CB1a-T-P-24V	CB1aF-T-P-24V
	Plug-in type	12V DC	CB1a-T-12V	CB1aF-T-12V
		24V DC	CB1a-T-24V	CB1aF-T-24V
	Bracket type	12V DC	CB1a-T-M-12V	CB1aF-T-M-12V
		24V DC	CB1a-T-M-24V	CB1aF-T-M-24V
1 Form C	PC board type	12V DC	CB1-T-P-12V	CB1F-T-P-12V
		24V DC	CB1-T-P-24V	CB1F-T-P-24V
	Plug-in type	12V DC	CB1-T-12V	CB1F-T-12V
		24V DC	CB1-T-24V	CB1F-T-24V
	Bracket type	12V DC	CB1-T-M-12V	CB1F-T-M-12V
		24V DC	CB1-T-M-24V	CB1F-T-M-24V
High contact capacity (1 Form A)	PC board type*	12V DC	CB1aH-T-P-12V	CB1aHF-T-P-12V
		24V DC	CB1aH-T-P-24V	CB1aHF-T-P-24V
	Plug-in type	12V DC	CB1aH-T-12V	CB1aHF-T-12V
		24V DC	CB1aH-T-24V	CB1aHF-T-24V
	Bracket type	12V DC	CB1aH-T-M-12V	CB1aHF-T-M-12V
		24V DC	CB1aH-T-M-24V	CB1aHF-T-M-24V

Standard packing; Carton: 50 pcs. Case: 200 pcs.
Note: Please use “CB∗∗∗R∗∗” to order with resistor inside type. (Asterisks “∗” should be filled in from ORDERING INFORMATION.)

RATING

1. Coil data

1) No protective element

Contact arrangement	Nominal coil voltage	Pick-up voltage	Drop-out voltage	Nominal operating current	Coil resistance	Nominal operating power	Usable voltage range
1 Form A, 1 Form C	12V DC	3 to 7V DC	1.2 to 4.2V DC	117mA	103Ω	1.4W	10 to 16V DC
	24V DC	6 to 14V DC	2.4 to 8.4V DC	75mA	320Ω	1.8W	20 to 32V DC
High contact capacity (1 Form A)	12V DC	3 to 7V DC	1.2 to 4.2V DC	117mA	103Ω	1.4W (PC board type)	10 to 16V DC
				150mA	80Ω	1.8W	
	24V DC	6 to 14V DC	2.4 to 8.4V DC	58mA	411Ω	1.4W (PC board type)	20 to 32V DC
				75mA	320Ω	1.8W	

Note: Other pick-up voltage types are also available. Please contact us for details.

2) With resistor inside

Contact arrangement	Nominal coil voltage	Pick-up voltage (Initial, at 20°C 68°F)	Drop-out voltage (Initial, at 20°C 68°F)	Nominal operating current (at 20°C 68°F)	Combined resistance (±10%) (at 20°C 68°F)	Nominal operating power (at 20°C 68°F)	Usable voltage range
1 Form A, 1 Form C	12V DC	3 to 7V DC	1.2 to 4.2V DC	134mA	89.5Ω	1.6W	10 to 16V DC
	24V DC	6 to 14V DC	2.4 to 8.4V DC	84mA	287.2Ω	2.0W	20 to 32V DC

2. Specifications

1) Standard type (12 V coil voltage)

Characteristics	Item		Specification		
Contact	Arrangement		1 Form A	1 Form C	High contact capacity (1 Form A)
	Contact resistance (Initial)		Typ2mΩ (By voltage drop 6 V DC 1 A)		
	Contact material		Ag alloy (Cadmium free)		
Rating	Nominal switching capacity (Initial)		40A 14V DC	N.O.: 40A 14V DC N.C.: 30A 14V DC	70A 14V DC (at 20°C 68°F) 50A 14V DC (at 85°C 185°F)
	Max. carrying current (Initial) (14V DC, at 85°C 185°F, continuous)		N.O.: 40A	N.O.: 40A, N.C.: 30A	N.O.: 40A
	Nominal operating power		1.4W	1.4W	1.8W (1.4W: PC board type)
	Min. switching capacity (resistive load)*1		1A 14V DC		
Electrical characteristics	Insulation resistance (Initial)		Min. 20 MΩ (at 500V DC, Measurement at same location as “Breakdown voltage” section.)		
	Breakdown voltage (Initial)	Between open contacts	500 Vrms for 1 min. (Detection current: 10mA)		
		Between contacts and coil	500 Vrms for 1 min. (Detection current: 10mA)		
	Operate time (at nominal coil voltage) (at 20°C 68°F)		Max. 15ms (excluding contact bounce time) (Initial)		
	Release time (at nominal coil voltage) (at 20°C 68°F)		Max. 15ms (excluding contact bounce time) (Initial)		
Mechanical characteristics	Shock resistance	Functional	Min. 200 m/s² {20G}		
		Destructive	Min. 1,000 m/s² {100G}		
	Vibration resistance	Functional	10 Hz to 500 Hz, Min. 44.1m/s² {4.5G}		
		Destructive	10 Hz to 2,000 Hz, Min. 44.1m/s² {4.5G} Time of vibration for each direction; X. Y. Z direction: 4 hours		
Expected life	Electrical (at nominal switching capacity)		Flux-resistant type: Min. 10^5, Sealed type: Min. 5×10^4 (Operating frequency: 2s ON, 2s OFF)		
	Mechanical		Min. 10^6 (at 120 cpm)		
Conditions	Conditions for operation, transport and storage*2		Standard type; Ambient temperature: –40 to +85°C –40 to +185°F, Humidity: 5 to 85% R.H. (Not freezing and condensing at low temperature)		
			Heat resistant type; Ambient temperature: –40 to +125°C –40 to +257°F, Humidity: 5 to 85% R.H. (Not freezing and condensing at low temperature)		
	Max. operating speed		15 cpm (at nominal switching capacity)		
Mass			Approx. 33 g 1.16 oz		

Notes:
*1. 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.
*2. The upper operation ambient temperature limit is the maximum temperature that can satisfy the coil temperature rise value. Refer to “6. Usage, Storage and Transport Conditions“ in AMBIENT ENVIRONMENT section in Relay Technical Information.

2) Standard type (24 V coil voltage)

Characteristics	Item	Specifications		
Contact	Arrangement	1 Form A	1 Form C	High contact capacity (1 Form A)
	Contact resistance (Initial)	Max. 15mΩ (By voltage drop 6 V DC 1 A)		
	Contact material	Ag alloy (Cadmium free)		
Rating	Nominal switching capacity (Initial)	20A 28V DC	N.O.: 20A 28V DC N.C.: 10A 28V DC	20A 28V DC
	Max. carrying current (Initial) (28V DC, at 85°C 185°F, continuous)	20A	N.O.: 20A, N.C.: 10A	20A
	Nominal operating power	1.8W	1.8W	1.8W, 1.4W (PC board type)

Note: All other specifications are the same as those of standard type (12 V coil voltage)

3) Heat resistant type (12 V and 24 V coil voltage)

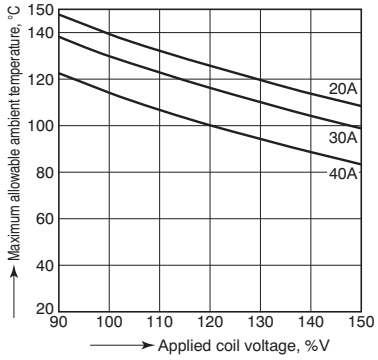
Characteristics	Item	Specifications					
		12V			24V		
Contact	Arrangement	1 Form A	1 Form C	High contact capacity (1 Form A)	1 Form A	1 Form C	High contact capacity (1 Form A)
	Contact resistance (Initial)	Max. 15mΩ (By voltage drop 6 V DC 1 A)					
	Contact material	Ag alloy (Cadmium free)					
Rating	Nominal switching capacity (Initial)	40A 14V DC	N.O.: 40A 14V DC N.C.: 30A 14V DC	40A 14V DC	20A 28V DC	N.O.: 20A 28V DC N.C.: 10A 28V DC	20A 28V DC
	Max. carrying current (Initial) (at 85°C 185°F, continuous)*	50A 14V DC	N.O.: 50A 14V DC N.C.: 30A 14V DC	45A 14V DC / 50A 14V DC	25A 28V DC	N.O.: 25A 28V DC N.C.: 10A 28V DC	25A 28V DC
	Nominal operating power	1.4W	1.4W	1.8W / 1.4W (PC board type)	1.8W	1.8W	1.8W, 1.4W (PC board type)

Notes: 1. All other specifications are the same as those of standard type (12 V coil voltage)
2. *Current value in which carry current is possible when the coil temperature is 180°C 356°F

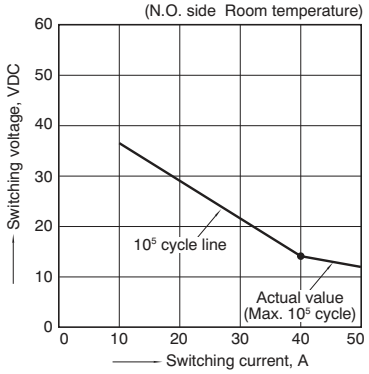
REFERENCE DATA

CB RELAYS (Standard type)

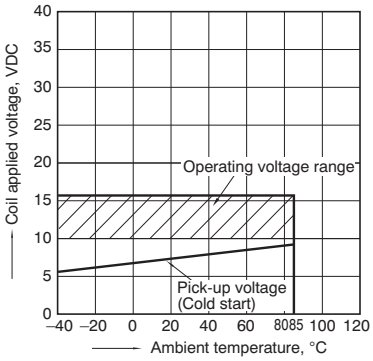
1. Allowable ambient temperature
(Heat resistant standard type)



2. Max. switching capability (Resistive load)
(Standard type)

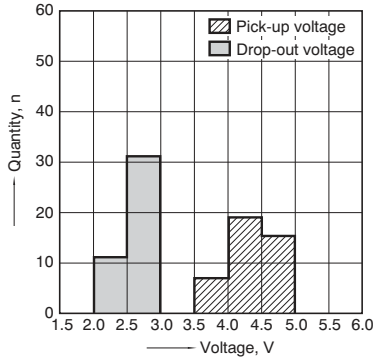


3. Ambient temperature and operating voltage range
(Standard type)

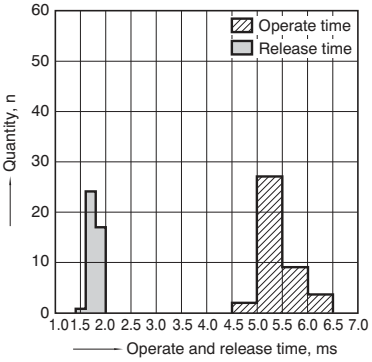


Assumption:
- Maximum mean coil temperature: 180°C
- Curves are based on 1.4W (Nominal power consumption of the unsupprressed coil at nominal voltage)

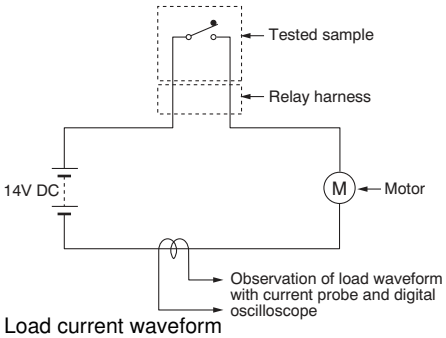
4. Distribution of pick-up and drop-out voltage
Sample: CB1-P-12V, 42pcs.



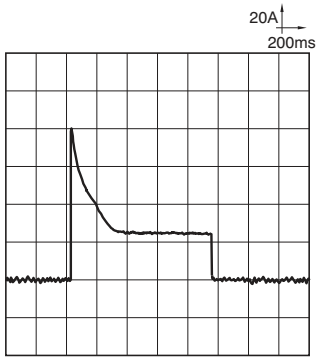
5. Distribution of operate and release time
Sample: CB1-P-12V, 42pcs.



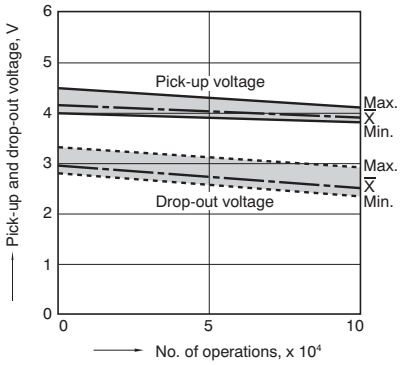
6. Electrical life test (Motor free)
Sample: CB1F-12V, 5pcs.
Load: 25A 14V DC, motor free actual load
Operating frequency: ON 1s, OFF 9s
Ambient temperature: Room temperature
Circuit



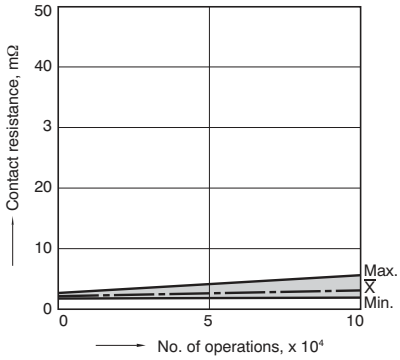
Load current waveform
Inrush current: 80A, Steady current: 25A



Change of pick-up and drop-out voltage

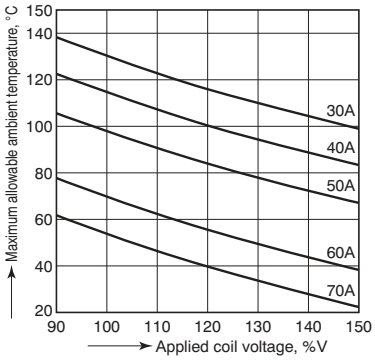


Change of contact resistance

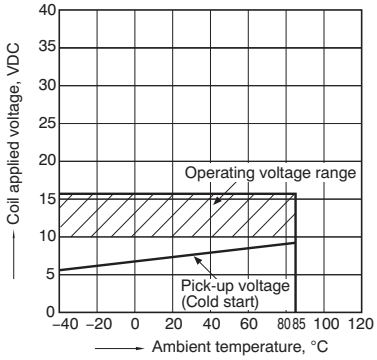


CB RELAYS (High contact capacity type)

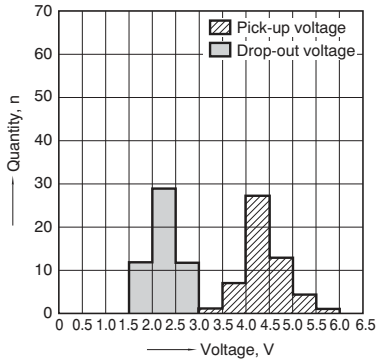
1. Allowable ambient temperature
(High resistant/high contact capacity type)



2. Ambient temperature and operating voltage range
(High contact capacity/standard type)

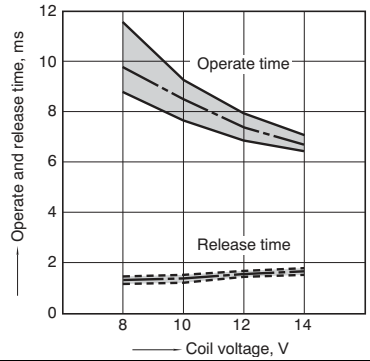


3. Distribution of pick-up and drop-out voltage
Sample: CB1aHF-12V, 53pcs.

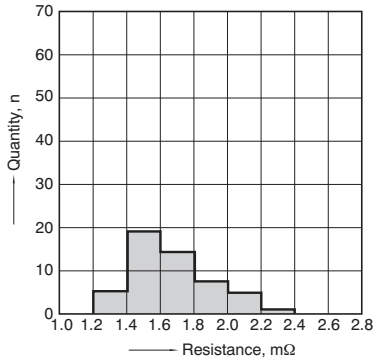


Assumption:
- Maximum mean coil temperature: 180°C
- Curves are based on 1.4W (Nominal power consumption of the unsupprressed coil at nominal voltage)

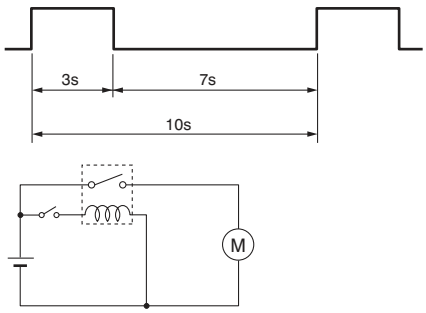
4. Distribution of operate and release time
Sample: CB1aHF-12V, 53pcs.



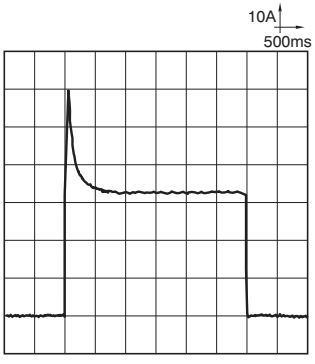
5. Contact resistance
Sample: CB1aHF-12V, 53pcs.
(By voltage drop 6V DC 1A)



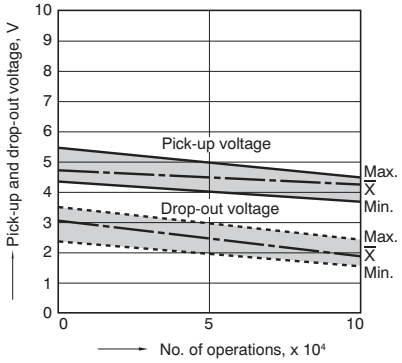
6. Electrical life test (Motor free)
Sample: CB1aH-12V, 3pcs.
Load: Inrush current: 64A/Steady current: 35A
Fan motor actual load (motor free) 12V DC
Operating frequency: ON 3s, OFF 7s
Ambient temperature: Room temperature
Circuit



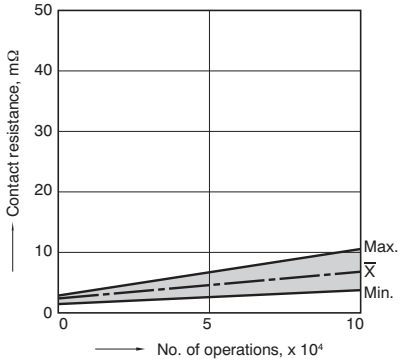
Load current waveform
Inrush current: 64A, Steady current: 35A



Change of pick-up and drop-out voltage



Change of contact resistance



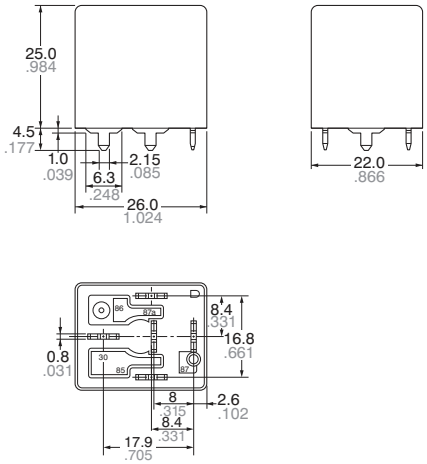
DIMENSIONS (mm inch)

Download CAD Data from our Web site.

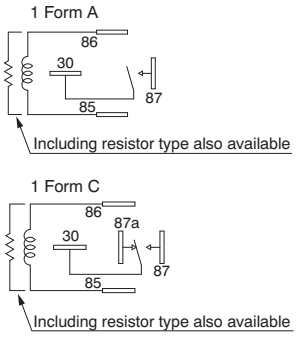
1. PC board type

CAD Data

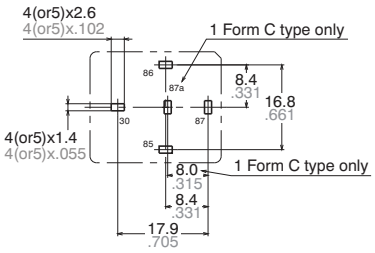
External dimensions



Schematic (Bottom view)



PC board pattern (Bottom view)



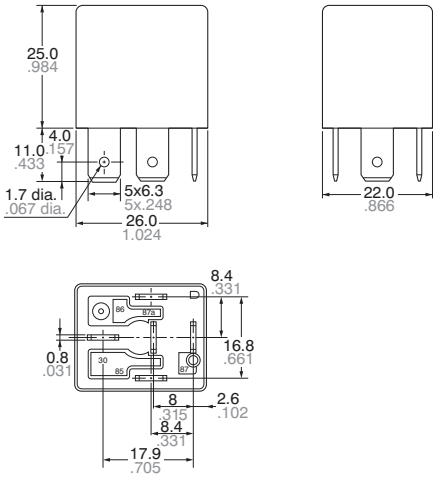
Dimension:	General tolerance
Max. 1mm .039 inch:	±0.1 ±.004
1 to 3mm .039 to .118 inch:	±0.2 ±.008
Min. 3mm .118 inch:	±0.3 ±.012

Tolerance: ±0.1 ±.004

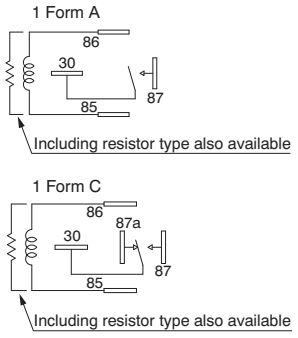
2. Plug-in type

CAD Data

External dimensions



Schematic (Bottom view)

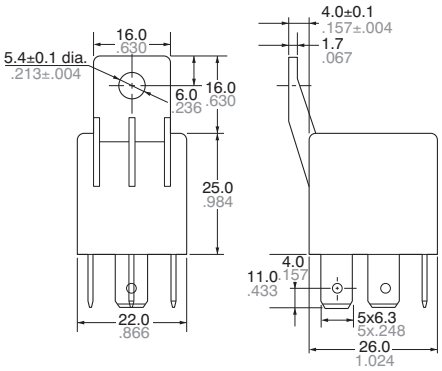


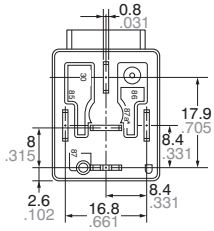
Dimension:	General tolerance
Max. 1mm .039 inch:	±0.1 ±.004
1 to 3mm .039 to .118 inch:	±0.2 ±.008
Min. 3mm .118 inch:	±0.3 ±.012

3. Bracket type

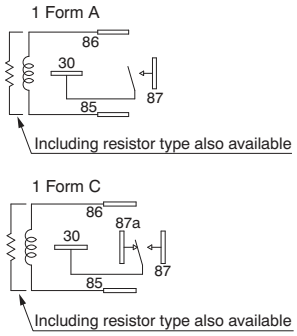
CAD Data

External dimensions





Schematic (Bottom view)

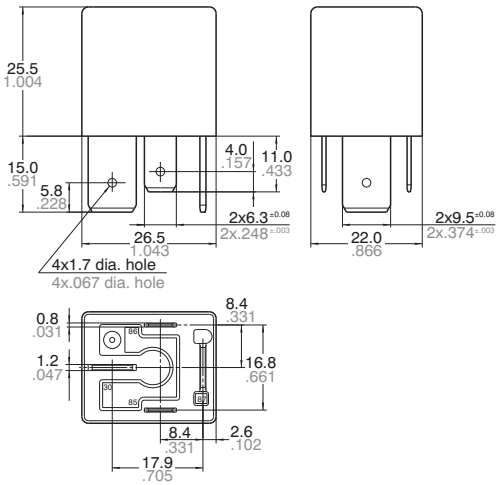


Dimension:	General tolerance
Max. 1mm .039 inch:	±0.1 ±.004
1 to 3mm .039 to .118 inch:	±0.2 ±.008
Min. 3mm .118 inch:	±0.3 ±.012

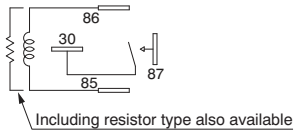
4. High contact capacity type (1 Form A) (Plug-in type)

CAD Data

External dimensions



Schematic (Bottom view)

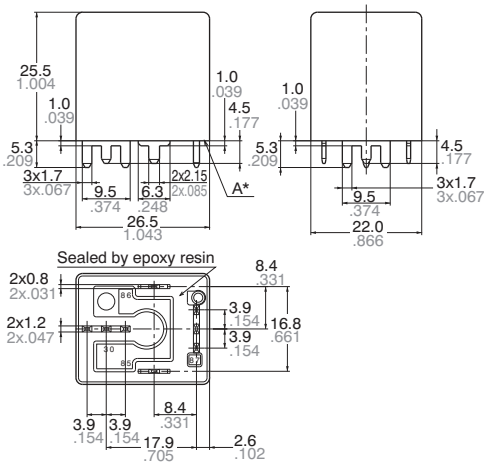


Dimension:	General tolerance
Max. 1mm .039 inch:	±0.1 ±.004
1 to 3mm .039 to .118 inch:	±0.2 ±.008
Min. 3mm .118 inch:	±0.3 ±.012

5. High contact capacity type (1 Form A) (PC board type)

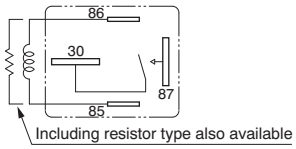
CAD Data

External dimensions

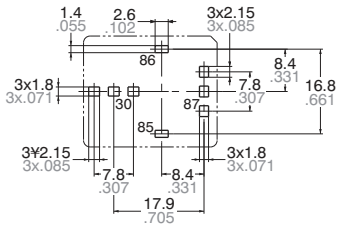


* Intervals between terminals is measured at A surface level.

Schematic (Bottom view)



PC board pattern (Bottom view)



Tolerance: ±0.1 ±.004

Dimension:	General tolerance
Max. 1mm .039 inch:	±0.1 ±.004
1 to 3mm .039 to .118 inch:	±0.2 ±.008
Min. 3mm .118 inch:	±0.3 ±.012

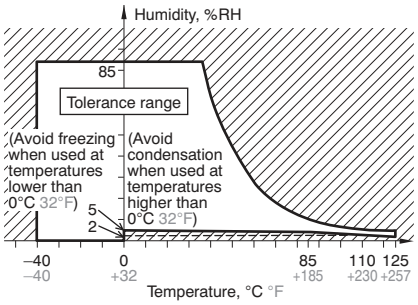
NOTES

1. Soldering

Max. 350°C 662°F (solder temperature), within 3 seconds (soldering time)
The effect on the relay depends on the actual PC board used. Please verify the PC board to be used.

2. Usage, transport and storage conditions

1) Ambient temperature, humidity, and atmospheric pressure during usage, transport, and storage of the relay:
(1) Temperature: –40 to +85°C –40 to +185°F (Standard type)
–40 to +125°C –40 to +257°F (High heat-resistant type)
(2) Humidity: 2 to 85% RH (Avoid freezing and condensation.)
(3) Atmospheric 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)



For Cautions for Use, see Relay Technical Information.