PANASONIC 12VDC PCB TYPE TWIN RELAY FOR AUTOMOTIVE APPLICATION

ACTE3C5V01C RELAY

MECHANICAL POWER RELAY FOR MOTOR CONTROL

ACTE3C5V01C relay is consist of 8pin H-Bridged contact circuit, and 12VDC PCB type twin relay for automotive application

FEATURES

- Minimum size class of PCB type twin relay
  (in Panasonic products for automotive market.)
- Plastic sealing design
  which has better performance for environmental resistance
- Dedicated for motor control use with H-Bridge contact circuit
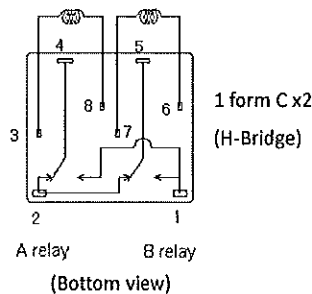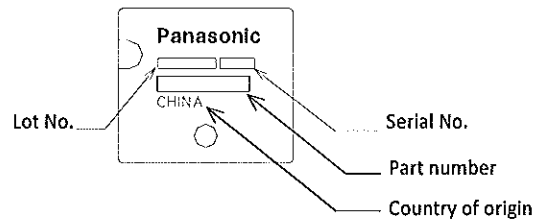
ACTE3C5V01C
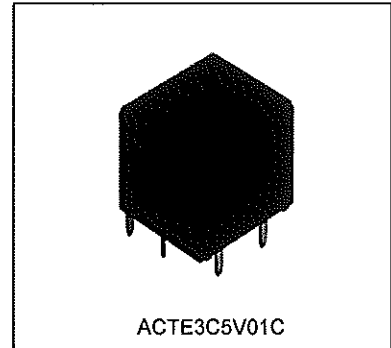
Wight :6.3g (Typical)

APPLICATION

Electrical Power Window motor controller, Auto Door Locking motor controller,
Electrical Sun roof motor controller, Power sliding door motor controller
for vehicles with 12VDC battery

* Please contact Panasonic sales for any other application.

SCHEMATIC

1 form C x2
(H-Bridge)

A relay   B relay
(Bottom view)

MARKING

Panasonic

Lot No.   CHINA   Serial No.
Part number
Country of origin

* Last letter 'C' which means country of origin is not printed
on marking because it's shown in next line.

CONNECTION DIAGRAM

COM(A) COM(B)

COIL(A) (8)   (6) COIL(B)
COIL(A) (3)   (7) COIL(B)

(2)   (1)
N.C.   N.O.

(Bottom view)
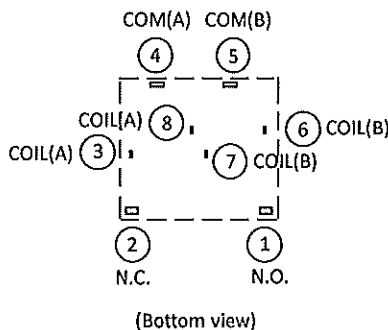
PIN DEFINITION AND FUNCTION

| No	Name	Function
1	N.O.	Normally Opened Contact Output terminal (Common terminal for both A relay and B relay)
2	N.C.	Normally Closed Contact Output terminal (Common terminal for both A relay and B relay)
3,8	COIL(A)	Coil terminal for A relay One of two terminals must be connected to battery plus side and other terminal must be connected to GND side. (No polarity)
4	COM(A)	Common terminal of A relay
5	COM(B)	Common terminal of B relay
6,7	COIL(B)	Coil terminal for B relay One of two terminals must be connected to battery plus side and other terminal must be connected to GND side. (No polarity)

	DESIGNED	S. Nishimura	DATE : July 11, '13
	CHECKED	N. Matsumoto	
	ENACTED	H. Funayama	

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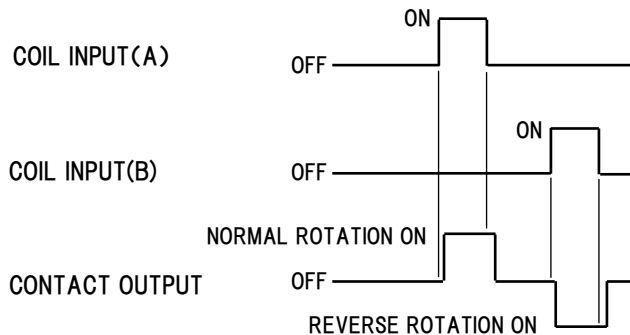
TIMING CHART
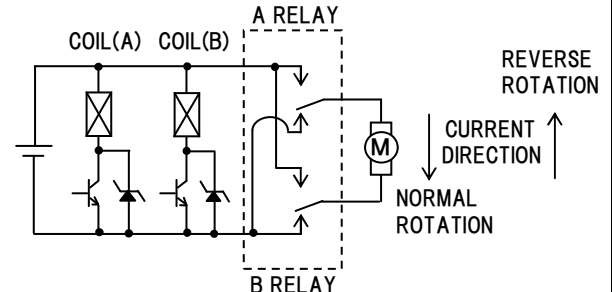
TRUTH TABLE

COIL INPUT (A)	COIL INPUT (B)	CONTACT OUTPUT	OPERATING STATE OF SYSTEM
L	L	OFF	Motor rotating is stopped
H	L	ON	Motor is rotated in normal direction
L	H	ON	Motor is rotated in reverse direction
H	H	OFF	Banning the use under this condition * Not to apply voltage to both coils together since abnormal heat generation may be caused.

ABSOLUTE MAXIMUM RATINGS (T_{opr}=20°C)

Item		Symbol	Value	Unit
Voltage of contact load circuit		V_{DD-L}	9～16	V_{DC}
Coil input	Input voltage (ON) [Note5]	V_{ON}	9～16	V_{DC}
	Input voltage (OFF) [Note5]	V_{OFF}	0～0.6	V_{DC}
	Input pulse [Note1]	T_{ON}	0.2～60	s
	ON DUTY [Note1]	T_{ON}/T_B	Max. 25	%
	Allowable momentary stop time [Note2]		Max. 100	μs
	Allowable quick change time of rotated direction [Note3]		Min. 100	ms
Breakdown voltage	Between open contacts		500 Vrms for 1 min. (Detection current: 10mA) at normal temperature and normal humidity at 101 kPa	
	Between contacts and coil		500 Vrms for 1 min. (Detection current: 10mA) at normal temperature and normal humidity at 101 kPa	
Contact carrying current range [Note4]		I_C	1 ～30 (16VDC or less)	A
Contact switching current range			1 ～30 (16VDC or less)	A
Max. coil temperature (Coil temperature rise value + Ambient temperature)		T_{A_MAX}	155	°C
Condition for transport and storage (at packaged condition)	Temperature	T_{stg}	0 ～ +40	°C
	Humidity		85%RH or less	
Temperature/Humidity condition for operation	Temperature [Note5]	T_{opr}	-40 ～ +85	°C
	Humidity		85 or less (Not freezing and condensing at low temperature)	%RH

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ELECTRICAL CHARACTERISTICS (T_{opr}= -40～+85°C)

Item			Symbol	Measurement condition	Value			Unit
					Min	Typ	Max	
Contact resistance			R_C	N.O. (at initial)	-	4	100	mΩ
				N.C. (at initial)	-	5	100	
Contact voltage drop			V_C	N.O. (at initial) (I_C=20A)	-	80	600	mV
				N.C. (at initial) (I_C=20A)	-	100	600	
Switching time	Operate time		TS_{OP}	V_{ON}=12V, @+20°C	-	2.5	10	ms
	Release time		TS_{REL}	V_{ON}=12V, @+20°C Excluding bouncing time Without diode connection in parallel to relay coil	-	1.0	10	ms
	Bounce time	Operate	TB_{OP}	V_{ON}=12V, @+20°C	-	0.2	10	ms
		Release	TB_{REL}	V_{ON}=12V, @+20°C	-	1.5	10	
Insulation resistance			Ri	At 500VDC (at initial)	100	-	-	MΩ
Coil consumption current			I_A	V_{ON}=12V, @-40°C	-	125	140	mA
				V_{ON}=12V, @+20°C	-	95	110	
				V_{ON}=12V, @+85°C	-	75	85	
Coil resistance			R_A	@-40°C	85	95	105	Ω
				@+20°C	110	125	140	
				@+85°C	140	160	175	
Coil consumption power			W_A	V_{ON}=12V, @-40°C	1360	1520	1670	mW
				V_{ON}=12V, @+20°C	1035	1150	1270	
				V_{ON}=12V, @+85°C	820	915	1010	

MECHANICAL CHARACTERISTICS (T_{opr}=20°C)

Shock resistance	Functional	Min. 98 m/s2 {10G} (Half-wave pulse of sine wave: 11ms; detection time: 1ms)
	Destructive	Min. 980 m/s2 {100G} (Half-wave pulse of sine wave: 6ms)
Vibration resistance	Functional	10 Hz to 100 Hz, Min. 44.1 m/s2 {4.5G} (Detection time: 1ms)
	Destructive	10 Hz to 500 Hz, Min. 44.1 m/s2 {4.5G}, Time of vibration for each direction; X, Y direction: 2 hours, Z direction: 4 hours
External mechanical load		Max. 10N (Not to apply local load)

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ELECTRICAL LIFE

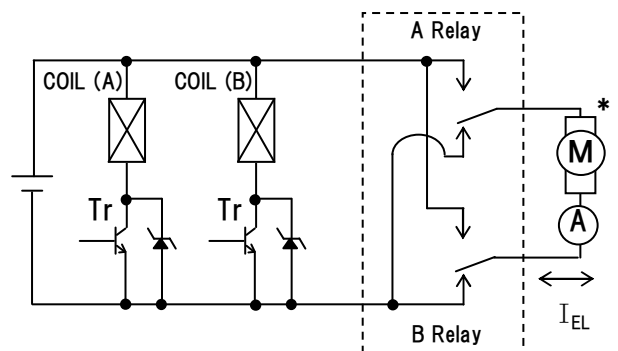1.0×10^5 Cycles (according to B(10) life)

CONDITIONS

    (1) Contact load current   : According to 'Contact load table' shown below

    (2) Applicable contact voltage   : 14VDC

    (3) Coil input voltage (ON)   : 14VDC

    (4) Ambient temperature and Humidity : +15 to +35°C, 25%RH～85%RH

    (5) Switching frequency   : 10s / Cycle (0.2～0.5s ON, 9.5～9.8s OFF) ; shown below
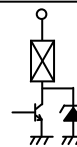
    (6) Test circuit   : Shown below

Switching frequency:
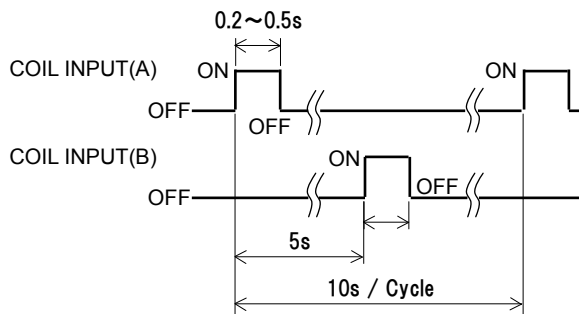
Test circuit:

* According to 'Contact load table' below

Coil circuit protection:

Recommended

Zener voltage : 24VDC or more

CONTACT LOAD TABLE

Kind of contact load	Contact load current	Motor characteristics
Power window motor		Resultant value:
Sun-roof motor	0.2～0.5s	0.35mH or less (@+20°C)
Electrical seat motor		
Power sliding door motor	I_{EL} 10 to 25A	*In case noise cancelling devices such as capacitors are connected in parallel with the contact load (or connected between the contact load and GND), above electrical life is not guaranteed. (In case it's embedded in the motor module also, above electrical life is not guaranteed.)
Auto door lock motor	0.2～0.5s I_{EL} 10 to 25A * In case of multiple motors connected in parallel, its resultant current value is used.	

* Please contact Panasonic sales for the electrical life with load current less than 10A

* In case load current condition of A relay contact is not equal to one of B relay, above electrical life is not guaranteed.
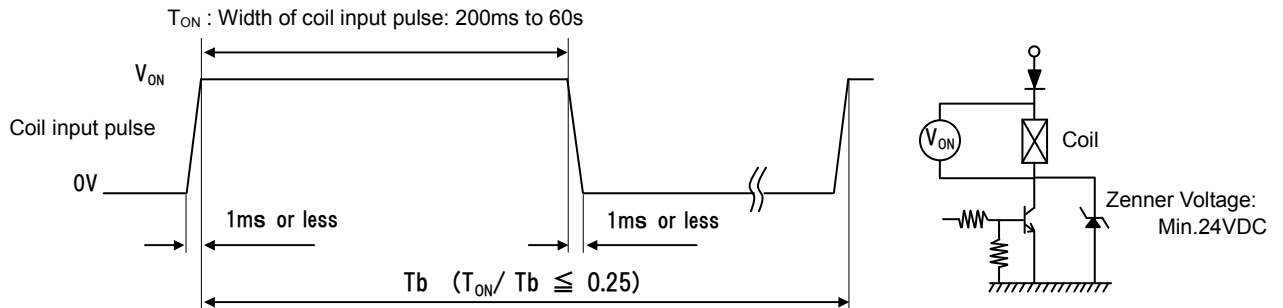
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Note1. Coil input pulse condition（Ramp-up/Ramp-down characteristics of input pulse）

In case input pulse which exceeds the specified condition is used, the electrical characteristics of the relay may be changed. Thereafter, the relay is not guaranteed.
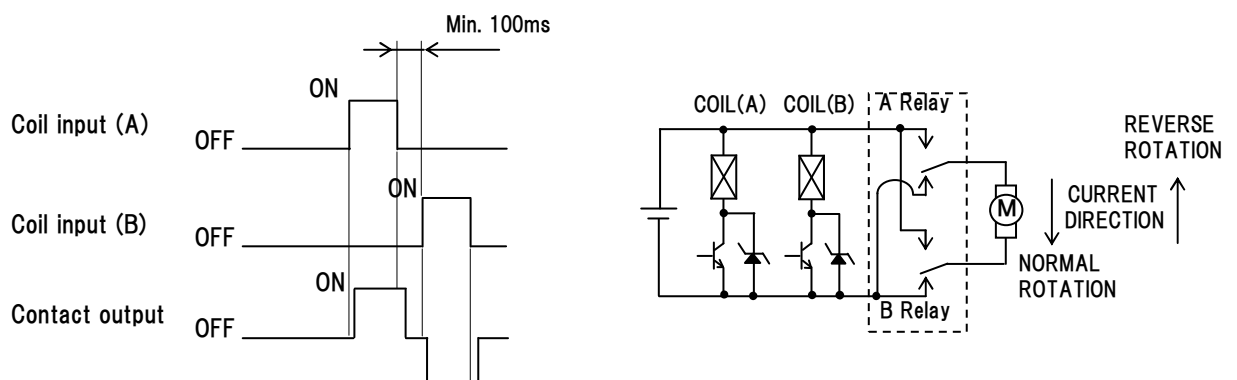
T_{ON} : Width of coil input pulse: 200ms to 60s

V_{ON}

Coil input pulse

0V

1ms or less

1ms or less

Tb $(T_{ON}/ Tb \leqq 0.25)$

V_{ON} Coil

Zenner Voltage: Min.24VDC

Note2. Allowable momentary stop time

In case input pulse exceeds the specified momentary stop time is occurred, N.O contact may be opened (N.C. contact may be closed). And in worst case the contact welding or contact dead short may be occurred. Thereafter, the relay is not guaranteed.

$100 \mu s$ or less $100 \mu s$ or more

Coil input   ON   OFF

N.O. contact output   ON   OFF
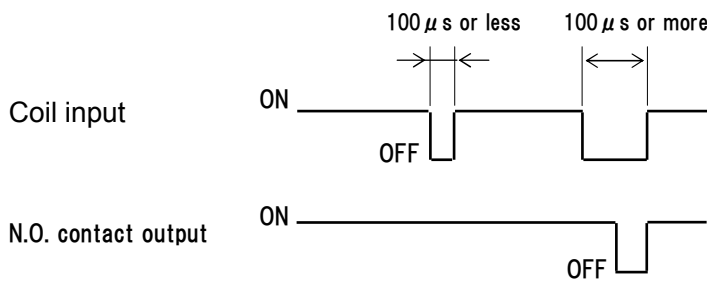
Note3. Allowable quick change time of rotated direction

In case relay is switched less than specified 'allowable quick change time', abnormal contact consumption may be occurred due to the inrush current at the time when the direction of motor rotation is quickly changed.
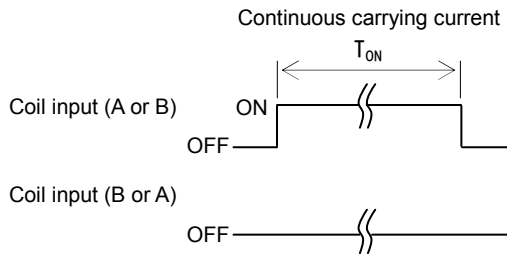
Min. 100ms

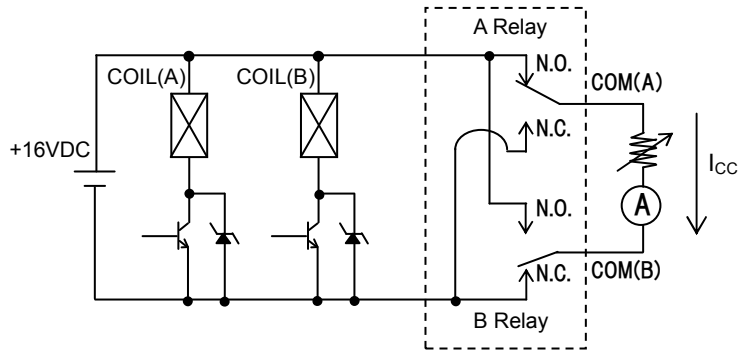Coil input (A)   ON   OFF

Coil input (B)   ON   OFF

Contact output   ON   OFF

COIL(A)   COIL(B)   A Relay

B Relay

REVERSE ROTATION

CURRENT DIRECTION

NORMAL ROTATION

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Note4. Contact carrying current

Coil activation:

Continuous carrying current
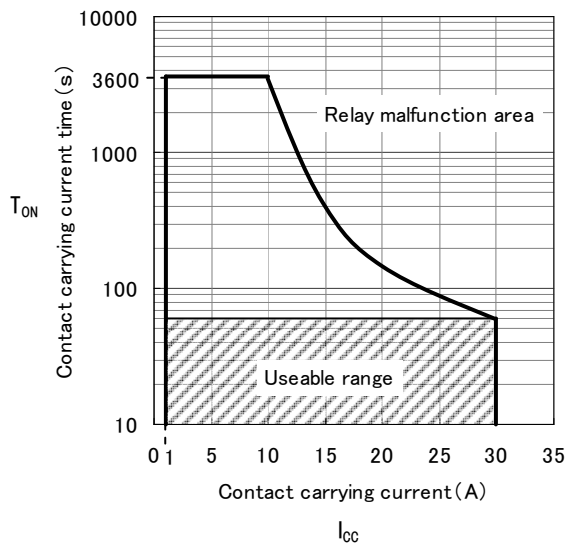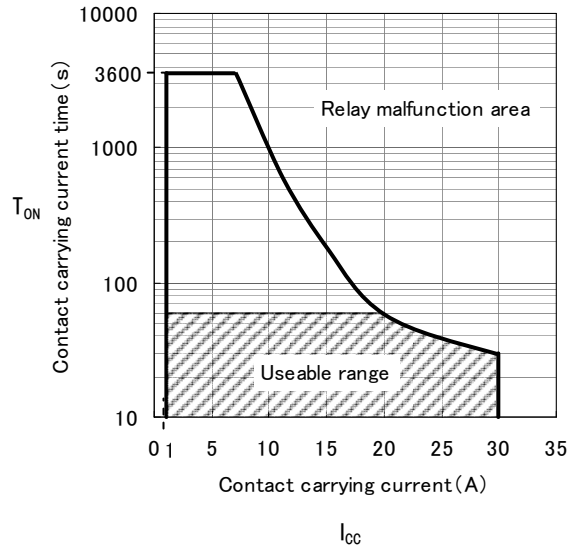

Circuit condition:

@+20℃, at 16VDC

@+85℃, at 16VDC

In case of use in 'relay malfunction area' shown in above are, following malfunction may be occurred in order. Thereafter, the relay is not guaranteed.
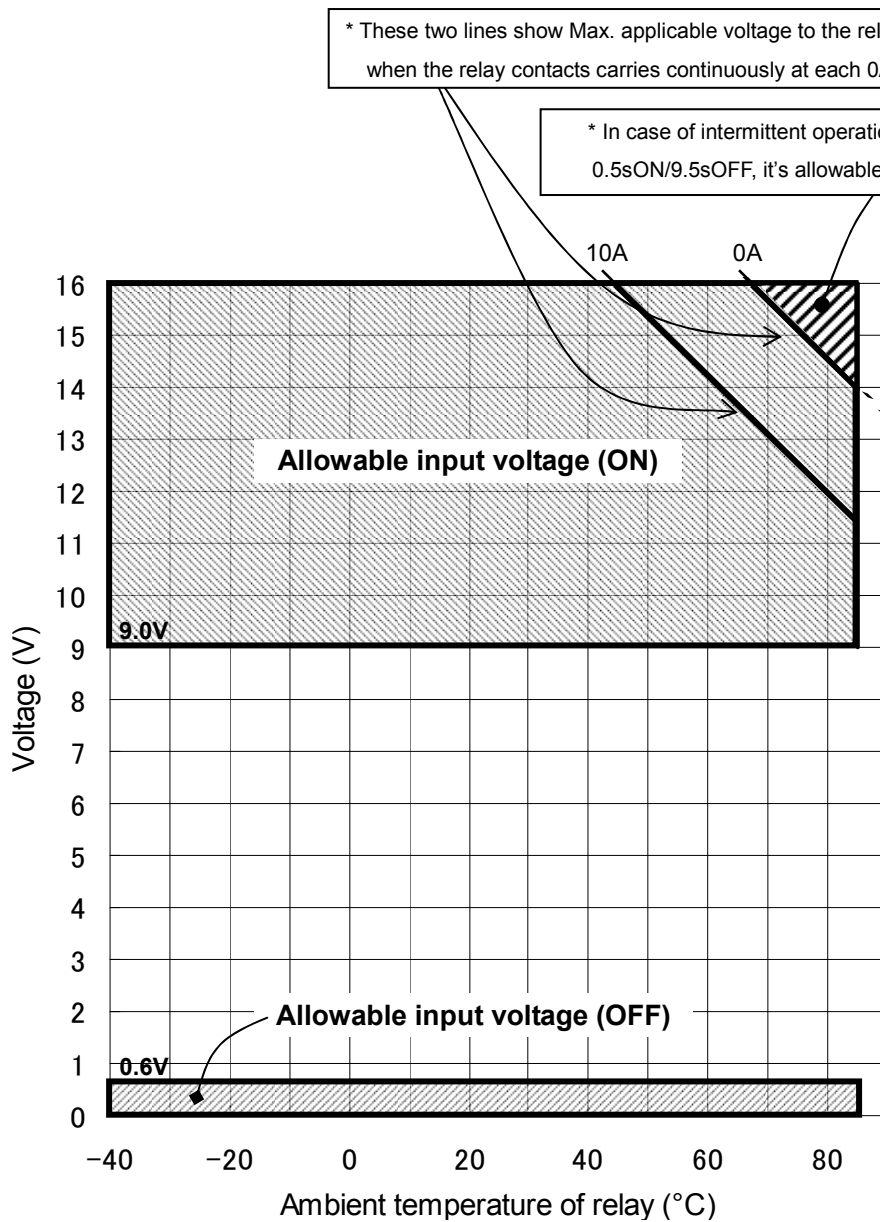
Considerable malfunction:
Change of electrical characteristics, Melting of cover material, Coil layer-short, Disconnection of coil wire

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Note5. Temperature condition for operation

* These two lines show Max. applicable voltage to the relay coil when the relay contacts carries continuously at each 0A and 10A.

* In case of intermittent operation at ON/OFF ratio less than 0.5sON/9.5sOFF, it's allowable to use in this voltage range.

* In use at high temperature, soldering at relay terminals may be affected and the joint reliability may be decreased. Therefore, you are requested to confirm the joint reliability of solder parts in the considerable overheating environment. And please use our products after you judge on criteria regulated in your company for the solder melting temperature.

Any system failure and fire and smoking from your module due to solder melting at terminal joint portion are not guaranteed by Panasonic.

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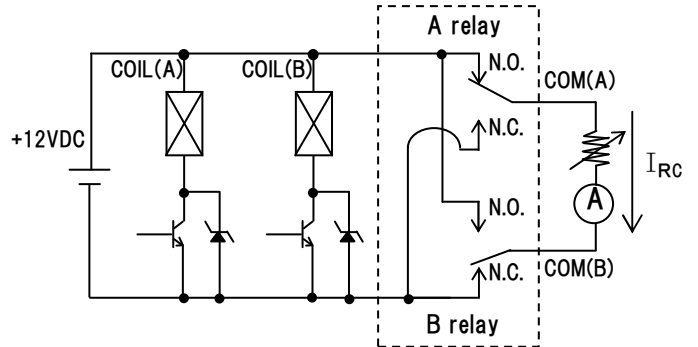Panasonic Industrial Devices Taiko Co., Ltd.

THERMAL DATA

Used P.C.Board condition:

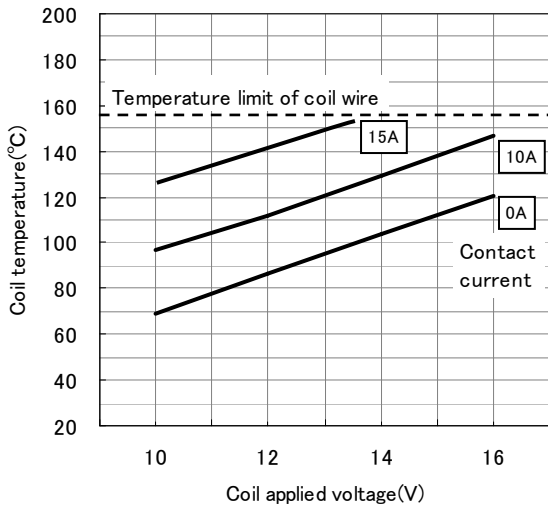Glass epoxy resin FR-4
80mm×190mm、Cu pattern 35μm
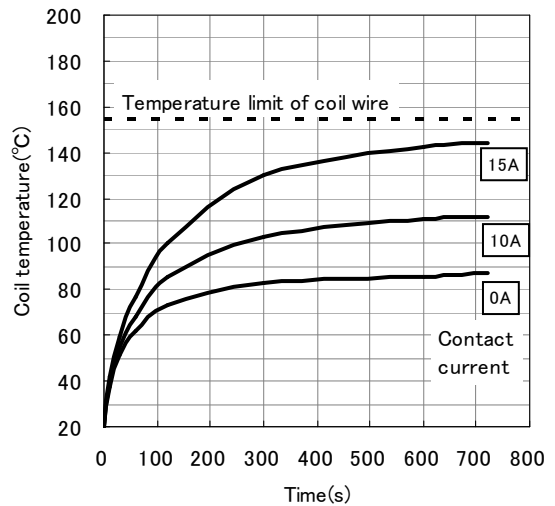
Circuit condition:

(1) Coil temperature rise of

a) Activated relay side
@20°C, (Coil temperature ; saturated)

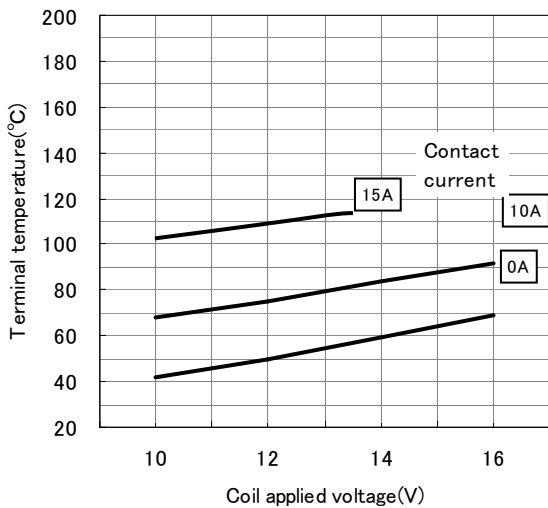b) Coil temperature rise v.s. Carrying current time
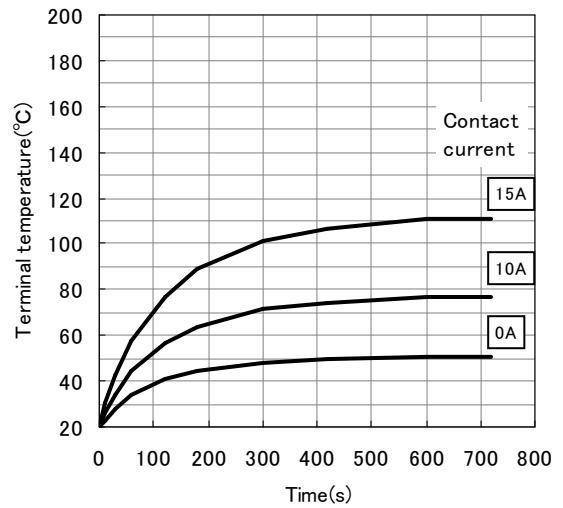@20°C,(At 12VDC applied to coil)

(2) Terminal temperature rise

a) Common terminal of activated relay side
@20°C, (terminal temperature ;saturated)

b) Terminal temperature rise v.s. Carrying current time
@20°C, (At 12VDC applied to coil)

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HANDLING OF PRODUCTS / FALLEN PRODUCTS

This product is electrical device which is consists of mechanical construction. Therefore, please take care in handling during transportation, in your warehouse and in your production line.

Please don't use fallen relay at alone or at assembled state regardless of height, even if the drop time is only once. Fallen relays are not guaranteed.

PACKING OF PRODUCTS

Products are packaged in plastic tubes.   (40pcs./ tube)

Tubes are packaged in carton box.   (50 tubes/ box)

SOLDERING CHARACTERISTICS

Applicable soldering process   : Wave soldering, Selective soldering (* Reflow soldering is not applicable.)

Soldering condition

Preheat   : Max. 100°C   Max. 120s

Soldering   : Max. 250°C   Max.   5s (specified temperature is solder bath)

*Soldering condition depends on the type of P.C.Board, so please confirm you have no problem for the soldering using actual P.C.Board.

Hand soldering reparation   ; Max. 300°C, Max. 5s, at once

CLEANING

This product shall not be cleaned by any method.

Cleaned relay is not guaranteed since its function may be affected.

CONFORMAL COATING

Conformal coating and any potting around this product should not be applied.

If it can't be avoided, it's requested to apply the process without any thermal stress to the relay,

and the relay must be kept on holding the state in vertical direction shown as below figure

during and after the process. Otherwise the relay may be damaged and it can't be guaranteed.
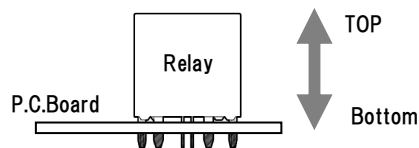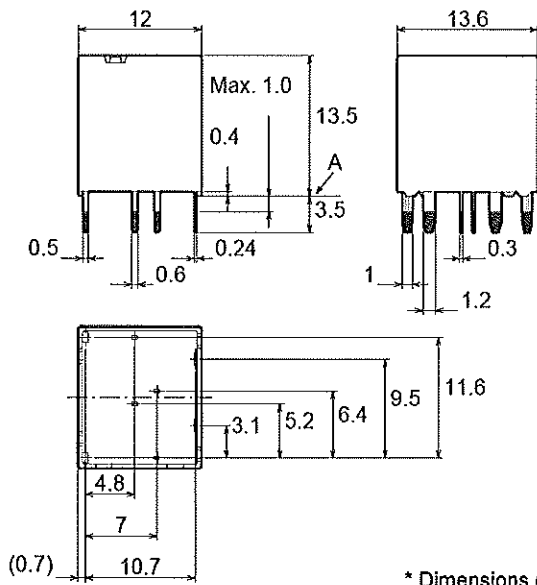

SILICONE (ORGANIC SILICON)

Substances including silicone are not to be used, since it may cause contact failure over time.

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EXTERNAL DIMENSIONS

Unit: mm

Used material:
 Contact: Ag alloy
 Plastics: PBT

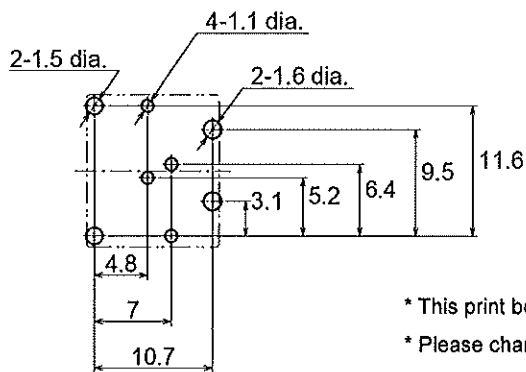| Dimension:	Tolerance:
Less than 1mm	±0.1
Min. 1mm less than 3mm	±0.2
Min. 3mm	±0.3

* Dimensions (thickness and width) of terminal is measured before pre-soldering.

* Intervals between terminals is measured at A surface level.

* Terminal sections are pre-soldered

PRINT BOARD PATTERN (REFERENCE FIGURE)

* This print board pattern is for reference only.

* Please change the design of print board pattern according to your soldering condition.

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TERMS

Absolute Maximum Ratings

Values of voltage, current, temperature, which must not be exceeded when the relay is used. The relay is not guaranteed after it's used with more than this specified value.

Input voltage (ON)

Voltage range which can make N.O contact of the relay ON state and N.C. contact of the relay OFF state.

Input voltage (OFF)

Voltage range which can make N.O contact of the relay ON state and N.C. contact of the relay ON state.

N.O. contact / N.C. contact

Normally Opened contact / Normally Closed contact

Contact resistance

This value is the combined resistance when the contacts are touching each other, the resistance of the terminals and contact spring. The contact resistance is measured using the voltage-drop method 1s later after the contacts are touching each other. The measuring circuit and conditions are shown below.

a) N.O. contact resistance

b) N.C. contact resistance
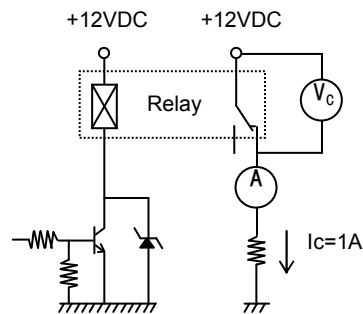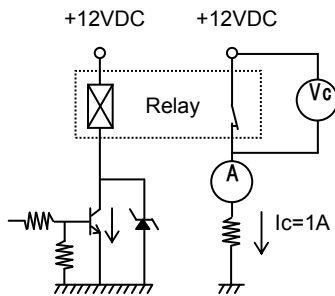
Contact voltage drop

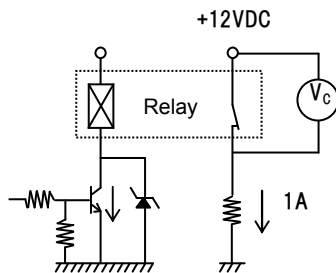This value is the combined voltage drop of the voltage drop when the contacts are touching each other, the voltage drop of the terminals and contact spring. The contact voltage drop is measured 1s later after the contacts are touching each other in the circuit shown in below figure.

a) N.O.contact voltage drop

b) N.C.contact voltage drop
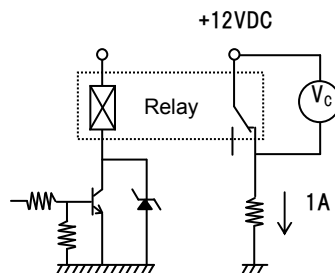
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Breakdown Voltage

The maximum voltage which can be tolerated by the relay without damage for a specified period of time, usually measured at the same points as insulation resistance. Usually the stated value is in VAC (RMS) for one minute duration.

Operate Time

The elapsed time from the initial application of power to the coil, until the closure of the normally open contacts. (With multiple pole devices the time until the last contact closes.) This time does not include any bounce time.
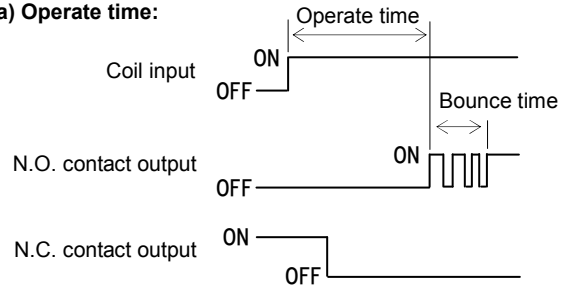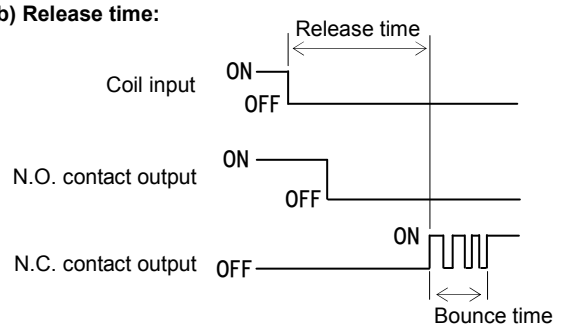
Release Time

The elapsed time from the initial removal of coil power until the reclosure of the normally closed contacts (last contact with multi-pole) this time does not include bounce.

Bounce time

Generally expressed in time (ms), this refers to the intermittent switching phenomenon of the contacts which occurs due to the collision between the movable metal parts or contacts, when the relay is operated or released.

a) Operate time:


b) Release time:

Shock Resistance

1) Functional

The acceleration which can be tolerated by the relay during service without causing the closed contacts to open for more than the specified time. (usually 10μs)

2) Destructive

The acceleration which can be withstood by the relay during shipping or installation without it suffering damage, and without causing a change in its operating characteristics. Usually expressed in "G"s. However, test was performed a total of 18 times, six times each in three-axis directions.
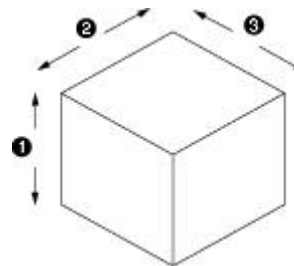
Electrical Life

The minimum number of times the relay can be operated under specified conditions with a specific load being switched by the contacts.
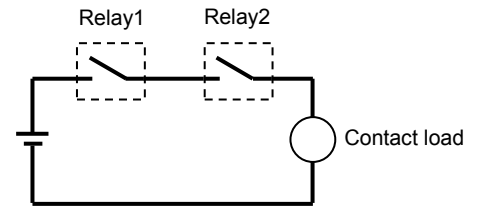
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DRY-SWITCHING

In case that 2 relay contacts are connected in series as shown in right figure and when the relays are operated with time lag as shown in the below timing chart, there is no current on the contact of one side of relays when It's switched ON/OFF. This is called as 'Dry-switching'.

This Dry-switching can reduce the contact consumption of Relay2 because of no switching current. However, in other side conductive failure may be occurred due to no cleaning action on the Relay2 contact.

Therefore, Panasonic don't recommend using our automotive relays with this dry-switching.
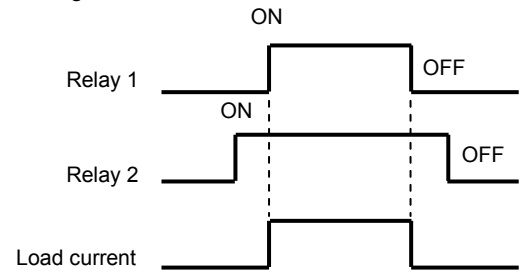
Relay1   Relay2

Contact load

Timing chart:

Relay 1

Relay 2

Load current

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CAUTION FOR USE

(1) Please check on latest "Panasonic General Catalog" too for the caution of use and terms.
Products are guaranteed in use under the condition described in this specification only.
Please check on Panasonic User's Guide' too.

(2) For secure operations, the voltage applied to coil should be value specified in 'Coil input' at 'Absolute Maximum Ratings'.

(3) Percent ripple of coil input voltage should be less than 5%.

(4) Lifetime is specified while the relay is in standard test state.
(Temperature +15～+35°C, Humidity 25%RH to 85%RH)
And it dependent on the coil driving circuit, load type, operating frequency, on/off phase and ambient conditions.
Check lifetime under the actual condition.

(5) If the relay is used while exceeding the absolute maximum ratings, contact rating or cycle lifetime, this may result in the risk of overheating, smoke or combustion.

(6) If the relay is dropped onto a hard surface, it should not be used again.

(7) This relay is not applicable to AC load.

(8) Take care to avoid cross connections as they may cause malfunctions, overheating or combustion.

(9) 'DRY-SWITCHING' control (contact switching without current) is not to be used.

SAFETY PRECAUTIONS

We are consistently striving to improve quality and reliability. However, the fact remains that electrical components and devices generally cause failures at a given statistical probability.

Furthermore, their durability varies with use environments or use conditions. In this respect, we ask you to check for actual electrical components and devices under actual conditions before use without fail.

Continuously using them in a state of degraded performance may cause deterioration in insulation performance, thus resulting in abnormal heat generation, smoke generation, or firing.

To avoid that, we ask you to carry out safety design including redundancy design, design for fire spread prevention, and design for malfunction prevention as well as periodic maintenance so that no accidents resulting in injury or death, fire accidents, or social damage will be caused as a result of our product failure or service life.

	DATE : July 11, '13

Panasonic Industrial Devices Taiko Co., Ltd.

WARRANTY

1. Panasonic Industrial Devices Taiko Co., Ltd. will do our utmost to keep our product to be free from defects. However:

    (1) To avoid uses of the product not in accordance with its specifications,
    Panasonic Industrial Devices Taiko ask the purchaser to present the purchaser's specification the final destination, application of the final product and the method of installation of the product.

    (2) If the purchaser believes that the possibility exists that the installation or anticipated use of the product may cause personal injury, death or property damage, Panasonic Industrial Devices Taiko advises the purchaser to be broad-minded about conditions and performance requirements listed on this specification and to take precautions such as applying a double-circuit.

    (3) The warranty period of this product is one year from the date of arrival of the product at the location of the purchaser, and is limited to the listed Items on this specification. If upon arrival any defect due to Panasonic Industrial Devices Taiko's failure to perform becomes apparent, Panasonic Industrial Devices Taiko will replace, exchange or repair the defective product on the site where it was received.

    The following are excluded from the warranty conditions:
    (a) Damage caused by relay problems or failure.
    (b) Relay exposure after delivery to conditions not in this specification during handling, storage or transport.
    (c) An unforeseen situation arises which was unable to be predicted by the technology level at the time of shipment.
    (d) A natural or man-made disaster which is outside of Panasonic Industrial Devices Taiko's control occurs such as earthquake, flood, fire or social strife.

2. Guarantee of products are limited in use under the condition described in this specification only.
3. This product is used for automobiles sold and used within your country.
    If this product is used for automobiles exported to outside your country, it's not included in this warranty.
4. This specification becomes effective since the date on which it's signed on the cover page.
    Panasonic's warranty shall be void if the signed specification is not returned to Panasonic within 30 days after issued date.

Quoted Standards
    (*1) General catalog; Automation Control General Catalog Latest Version

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单击下面可查看定价，库存，交付和生命周期等信息

>>Panasonic(松下)