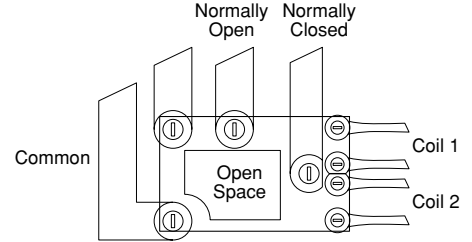


mm inch

**FEATURES**

- 7 Amp Steady/30 Amp Inrush current capability
- Simple footprint enables ease of PC board layout



RoHS Directive compatibility information  
<http://www.nais-e.com/>

**SPECIFICATIONS**

<b>Contact</b>			
Arrangement		1 Form C×2 (H bridge)	
Contact material		Ag alloy (Cadmium free)	
Initial contact resistance (Initial) (By voltage drop 6 V DC 1 A)		Typ. 6 mΩ (N.O.) Typ. 9 mΩ (N.C.)	
Initial contact voltage drop		Max. 0.2 V (at 20 A)	
Rating	Nominal switching capacity	N.O.: 20A 14 V DC N.C.: 10A 14 V DC	
	Max. carrying current	30 A (2 minutes), 20 A (1 hour) (coil applied voltage: 12 V, at 20°C) 25 A (2 minutes), 15 A (1 hour) (coil applied voltage: 12 V, at 85°C)	
	Min. switching capacity#1	1 A 12 V DC	
Expected life (min. ope.)	Mechanical (at 120 cpm)	10 <sup>6</sup>	
	Electrical	resistive load	Min.10 <sup>5</sup>
		7 A 14 V DC, Inrush 30 A (Motor load)	2×10 <sup>5</sup>
		20 A 14 V DC (Motor lock)	Min.5×10 <sup>4</sup>

<b>Coil</b>		
Nominal operating power		640 mW

#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.

**Characteristics**

Max. operating speed (at rated load)	120 cpm	
Initial insulation resistance*1	Min. 100 MΩ (at 500 V DC)	
Initial breakdown voltage*2	Between open contacts	1,000 Vrms for 1 min.
	Between contacts and coil	1,000 Vrms for 1 min.
Operate time*3 (at nominal voltage)	Max. 10 ms (initial)	
Release time*3 (at nominal voltage)	Max. 10 ms (initial)	
Shock resistance	Functional*4	Min. 100 m/s <sup>2</sup> {10 G}
	Destructive*5	Min. 1,000 m/s <sup>2</sup> {100 G}
Vibration resistance	Functional*6	Approx. 44.1 m/s <sup>2</sup> {4.5 G}, 10 Hz to 100 Hz
	Destructive*7	Approx. 44.1 m/s <sup>2</sup> {4.5 G}, 10 Hz to 500 Hz
Conditions for operation, transport and storage*8 (Not freezing and condensing at low temperature)	Ambient temp.	-40°C to +85°C -40°F to +185°F
	Humidity	5%R.H. to 85%R.H.
Mass	Standard type	Approx. 15 g .529 oz

**Remarks**

\*1 Measurement at same location as "Initial breakdown voltage" section

\*2 Detection current: 10mA

\*3 Excluding contact bounce time

\*4 Half-wave pulse of sine wave: 11ms; detection time: 10μs

\*5 Half-wave pulse of sine wave: 6ms

\*6 Detection time: 10μs

\*7 Time of vibration for each direction;

X, Y, direction: 2 hours

Z direction: 4 hours



\*8 Refer to Conditions for operation, transport and storage mentioned in AMBIENT ENVIRONMENT.

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

**TYPICAL APPLICATIONS**

- Power windows
- Auto door lock
- Electrically powered sunroof
- Electrically powered mirrors
- Powered seats
- Lift gates
- Slide door closers, etc.  
(for DC motor forward/  
reverse control circuits)

**ORDERING INFORMATION**

Ex. CF  -

Contact arrangement	Coil voltage(DC)
1 Form C × 2	12 V

Standard packing: Carton: 35pcs.; Case: 700pcs.

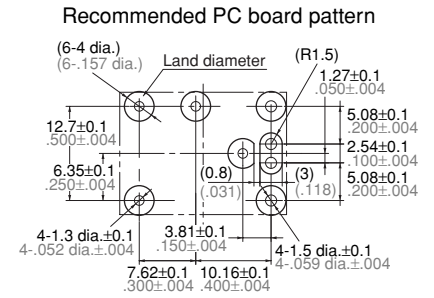
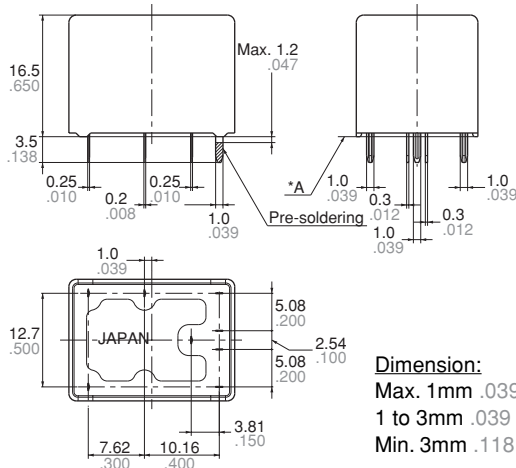
**TYPES AND COIL DATA (at 20°C 68°F)**

Part No.	Nominal voltage, V DC	Pick-up voltage, V DC (Initial)	Drop-out voltage, V DC (Initial)	Coil resistance, Ω	Nominal operating current, mA	Nominal operating Power, mW	Usable voltage range, VDC
CF2-12V	12	Max. 7.2	Min. 1.0	225±10%	53.3±10%	640	10 to 16

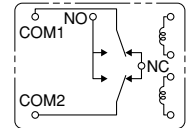
\* Other pick-up voltage types are also available. Please contact us for details.

**DIMENSIONS**

mm inch



**Schematic**

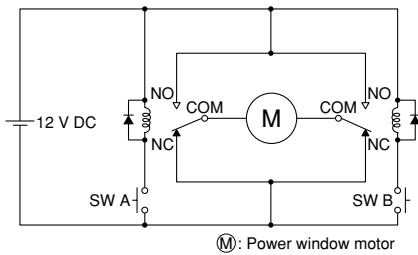


Dimension:	General tolerance
Max. 1mm .039 inch:	±0.1 ±.004
1 to 3mm .039 to .118 inch:	±0.2 ±.008
Min. 3mm .118 inch:	±0.3 ±.012

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

**EXAMPLE OF CIRCUITS**

Forward/reverse control circuits of DC motor for power window

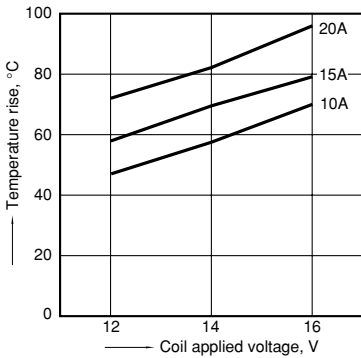


SW A	SW B	Motor
OFF	OFF	Stop
ON	OFF	Forward
OFF	ON	Reverse

**REFERENCE DATA**

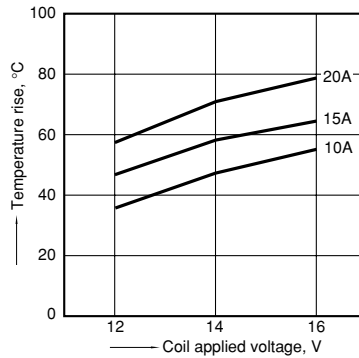
1-(1). Coil temperature rise (at room temperature)

Sample: CF2-12V, 6pcs.  
Measured portion: Inside the coil  
Contact carrying current: 10A, 15A, 20A  
Ambient temperature: Room temperature

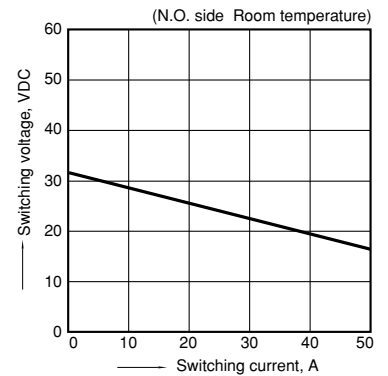


1-(2). Coil temperature rise (at 85°C 185°F)

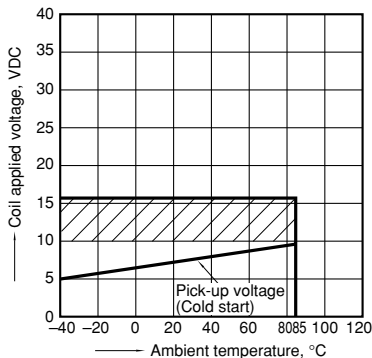
Sample: CF2-12V, 6pcs.  
Measured portion: Inside the coil  
Contact carrying current: 10A, 15A, 20A  
Ambient temperature: 85°C 185°F



2. Max. switching capability (Resistive load, initial)

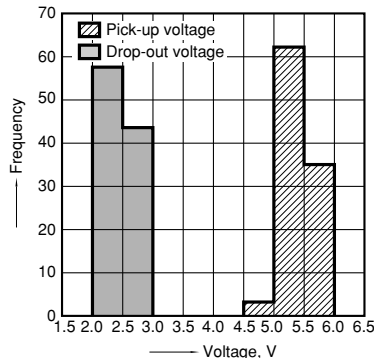


3. Ambient temperature and operating temperature range



4. Distribution of pick-up and drop-out voltage

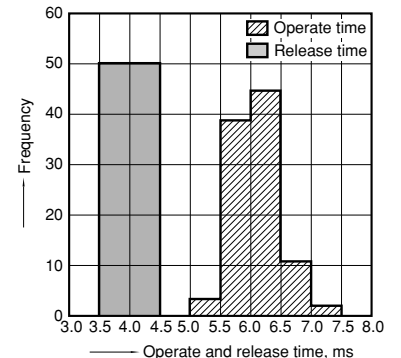
Sample: CF2-12V, 100pcs.



5. Distribution of operate and release time

Sample: CF2-12V, 100pcs.

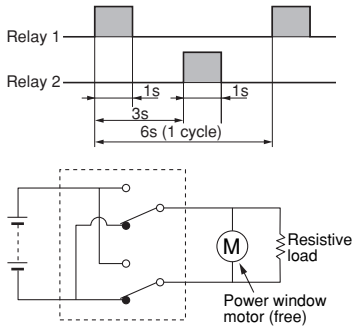
\* With diode



6-(1). Electrical life test (Motor free)

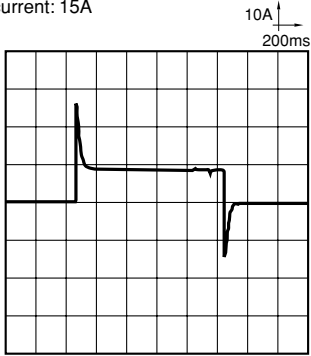
Sample: CF2-12V, 3pcs.  
 Load: Inrush current: 30A, Steady current: 7A,  
 Power window motor actual load (free condition)  
 Switching frequency: (ON:OFF = 1s:5s)  
 Ambient temperature: Room temperature

Circuit

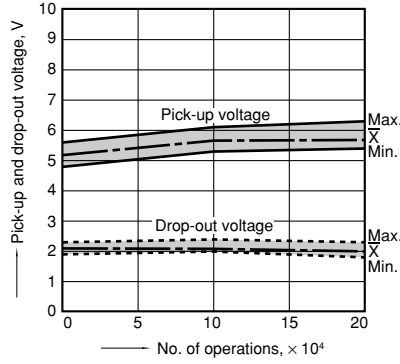


Load current waveform

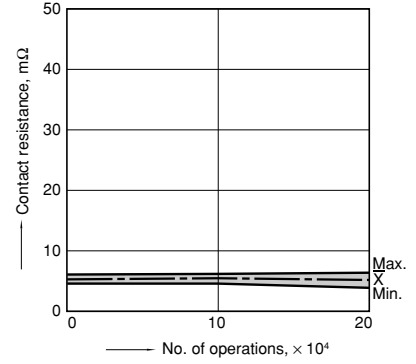
Inrush current: 27A, Steady current: 8.4A  
 Brake current: 15A



Change of pick-up and drop-out voltage



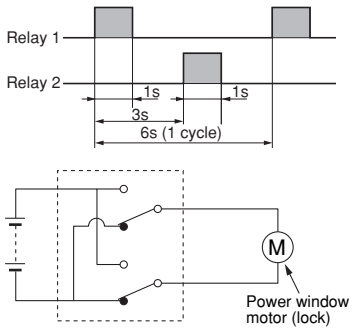
Change of contact resistance



6-(2). Electrical life test (Motor lock)

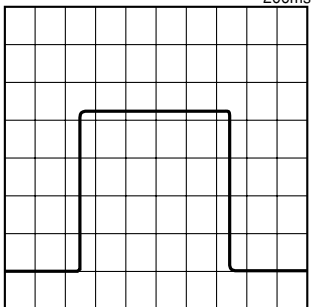
Sample: CF2-12V, 3pcs.  
 Load: 20A 14V DC,  
 Power window motor actual load (lock condition)  
 Switching frequency: (ON:OFF = 1s:5s)  
 Ambient temperature: Room temperature

Circuit

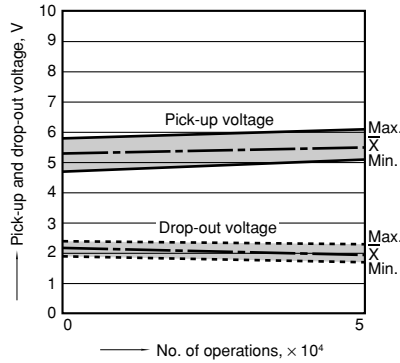


Load current waveform

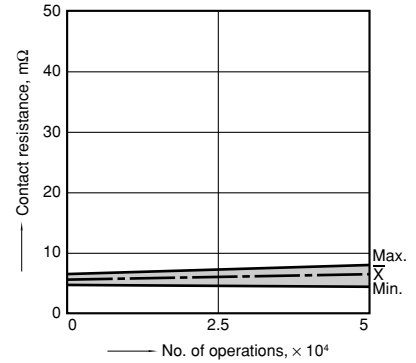
5A



Change of pick-up and drop-out voltage



Change of contact resistance



**For Cautions for Use, see Relay Technical Information.**