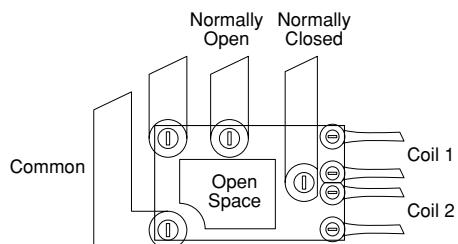


FEATURES

- 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

Contact

Arrangement	1 Form Cx2 (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 ⁶	
	Electrical	resistive load	Min.10 ⁵
		7 A 14 V DC, Inrush 30 A (Motor load)	2×10 ⁵
		20 A 14 V DC (Motor lock)	Min.5×10 ⁴

Coil

Nominal operating power	640 mW
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#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 ² {100 G}
	Destructive ^{*5}	Min. 1,000 m/s ² {100 G}
Vibration resistance	Functional ^{*6}	Approx. 44.1 m/s ² {4.5 G}, 10 Hz to 100 Hz
	Destructive ^{*7}	Approx. 44.1 m/s ² {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

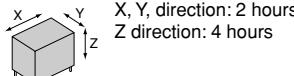
^{*3} Excluding contact bounce time

^{*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;



^{*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	2	-	12 V
Contact arrangement		Coil voltage(DC)	
1 Form C × 2		12 V	

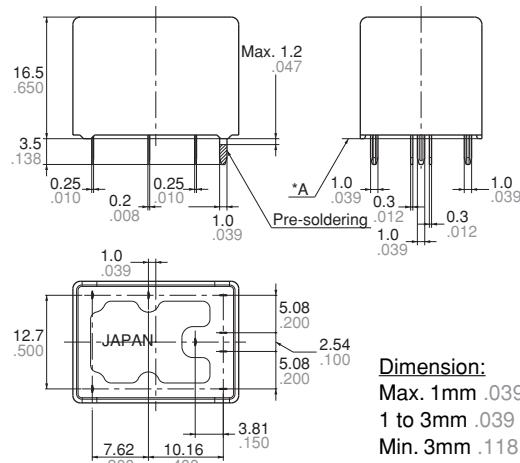
Standard packing: Carton: 35pcs.; Case: 700pcs.

TYPES AND COIL DATA (at 20°C 68°F)

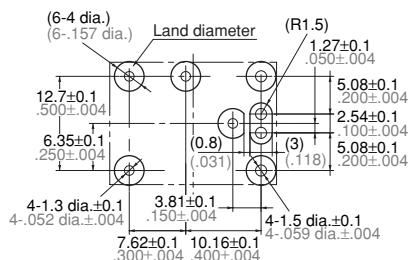
Part No.	Nominal voltage, V DC	Pick-up voltage, V DC (Initial)	Drop-out voltage, V DC (Initial)	Coil resistance, Ω	Nominal operating current, mA	Nominal operating Power, mW	Usable voltage range, VDC
CF2-12V	12	Max. 7.2	Min. 1.0	225±10%	53.3±10%	640	10 to 16

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

DIMENSIONS



Recommended PC board pattern

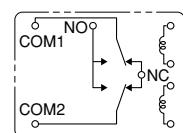


Dimension:

Max. 1mm .039 inch: $\pm 0.1 \pm 0.004$
 1 to 3mm .039 to .118 inch: $\pm 0.2 \pm 0.008$
 Min. 3mm .118 inch: $\pm 0.3 \pm 0.012$

General tolerance

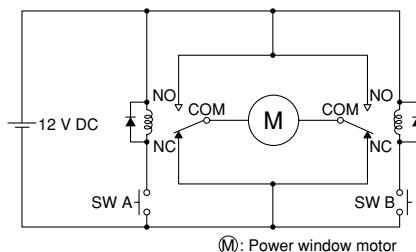
Schematic



* 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

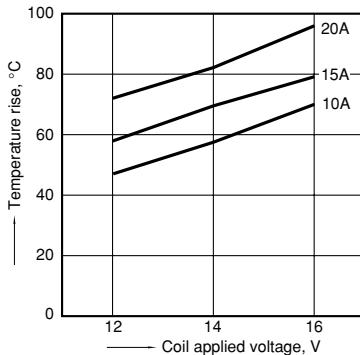
1-(1). Coil temperature rise (at room temperature)

Sample: CF2-12V, 6pcs.

Measured portion: Inside the coil

Contact carrying current: 10A, 15A, 20A

Ambient temperature: Room temperature



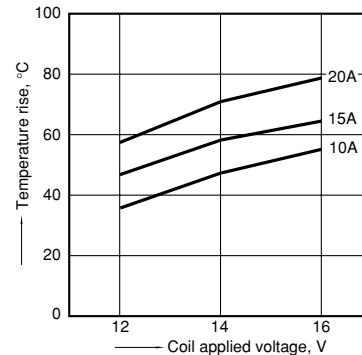
1-(2). Coil temperature rise (at 85°C 185°F)

Sample: CF2-12V, 6pcs.

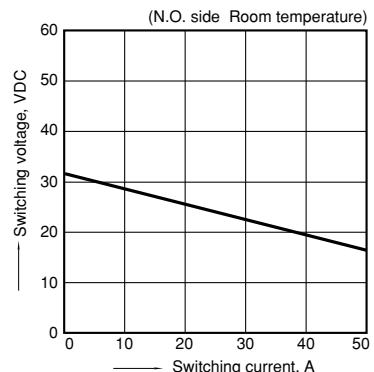
Measured portion: Inside the coil

Contact carrying current: 10A, 15A, 20A

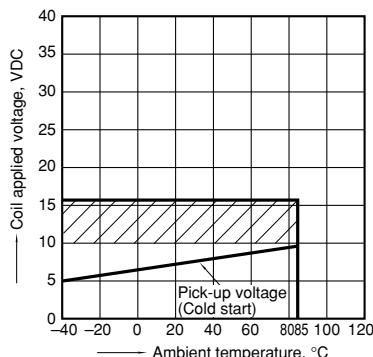
Ambient temperature: 85°C 185°F



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

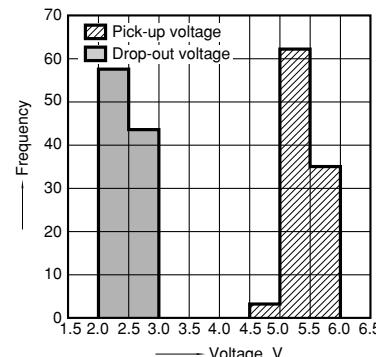


3. Ambient temperature and operating temperature range



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

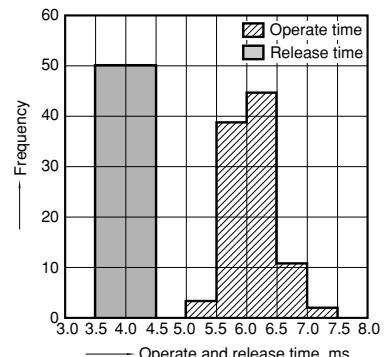
Sample: CF2-12V, 100pcs.



5. Distribution of operate and release time

Sample: CF2-12V, 100pcs.

* With diode



CF

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

Sample: CF2-12V, 3pcs.

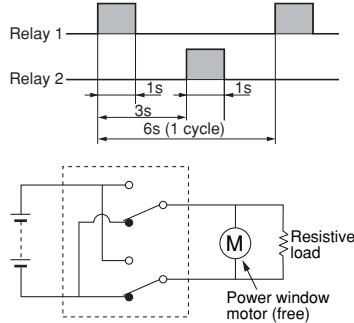
Load: Inrush current: 30A, Steady current: 7A,

Power window motor actual load (free condition)

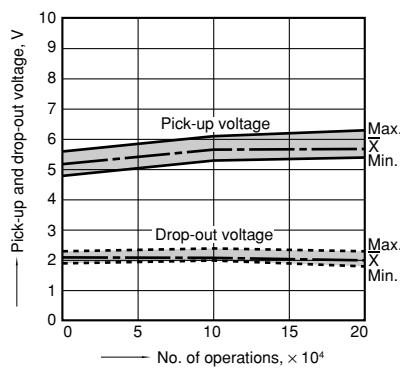
Switching frequency: (ON:OFF = 1s:5s)

Ambient temperature: Room temperature

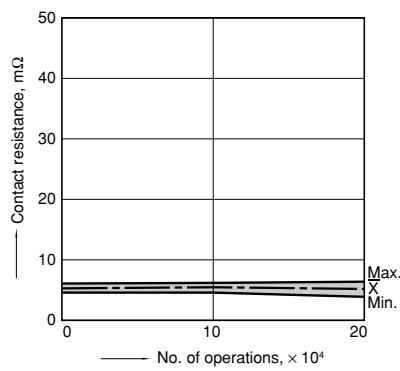
Circuit



Change of pick-up and drop-out voltage



Change of contact resistance

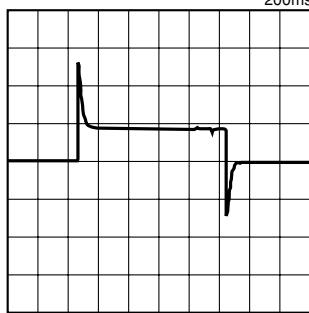


Load current waveform

Inrush current: 27A, Steady current: 8.4A

Brake current: 15A

10A
200ms



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

Sample: CF2-12V, 3pcs.

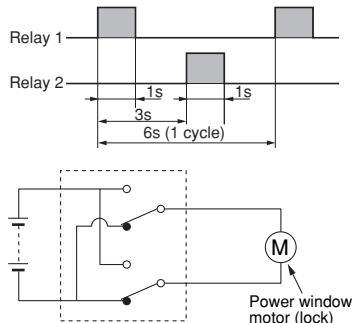
Load: 20A 14V DC,

Power window motor actual load (lock condition)

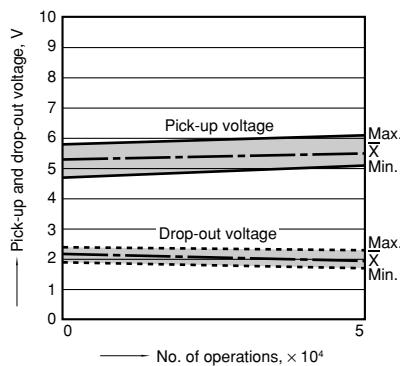
Switching frequency: (ON:OFF = 1s:5s)

Ambient temperature: Room temperature

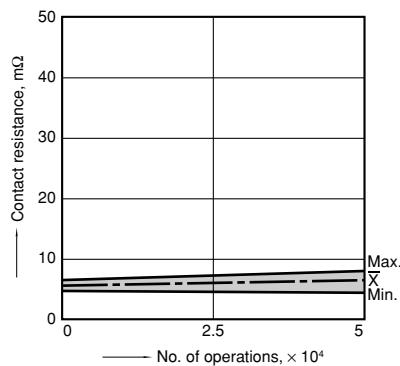
Circuit



Change of pick-up and drop-out voltage

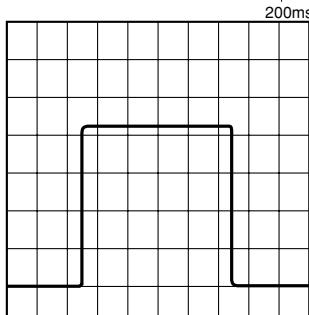


Change of contact resistance



Load current waveform

5A
200ms



For Cautions for Use, see Relay Technical Information.