

## HIGH HEAT RESISTIVITY

### DESCRIPTION

The new NEC TOKIN ET2F/ET1F series is PC-board mount type automotive relay suitable for various motor and heater control applications that require a high quality and performance. ET2F is a twin relay type and ET1F is a single relay type. The operate temperature range for ET2F/ET1F series is  $-40^{\circ}\text{C}$  through  $+125^{\circ}\text{C}$ .

By this high heat resistivity, the contact carrying current of ET2F/ET1F series at  $25^{\circ}\text{C}$  increases 1.3 to 1.4 times compared with that of ET2/ET1 series.

### FEATURES

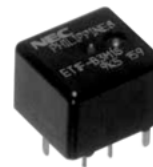
- Operating ambient temperature up to  $+125^{\circ}\text{C}$  (ET2/ET1 :  $+85^{\circ}\text{C}$ )
- Suitable for motor and solenoid reversible control
- High performance and productivity by unique structure
- Flux tight housing

### APPLICATIONS

- Motor control
- Heater control
- Solenoid control



Type ET2F



Type ET1F

#### For Proper Use of Miniature Relays

##### **DO NOT EXCEED MAXIMUM RATINGS.**

Do not use relays under exceeding conditions such as over ambient temperature, over voltage and over current. Incorrect use could result in abnormal heating and damage to relay or other parts.

##### **READ CAUTIONS IN THE SELECTION GUIDE.**

Read the cautions described in NEC/TOKIN's "Miniature Relays" (0123EMDD03VOL01E) before dose designing your relays applications.

The information in this document is subject to change without notice.

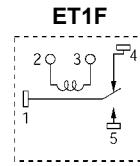
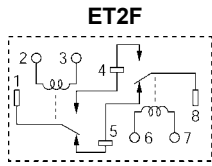
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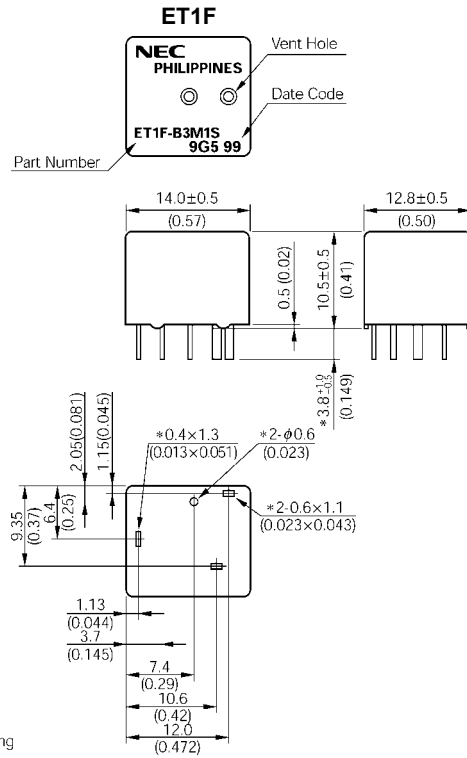
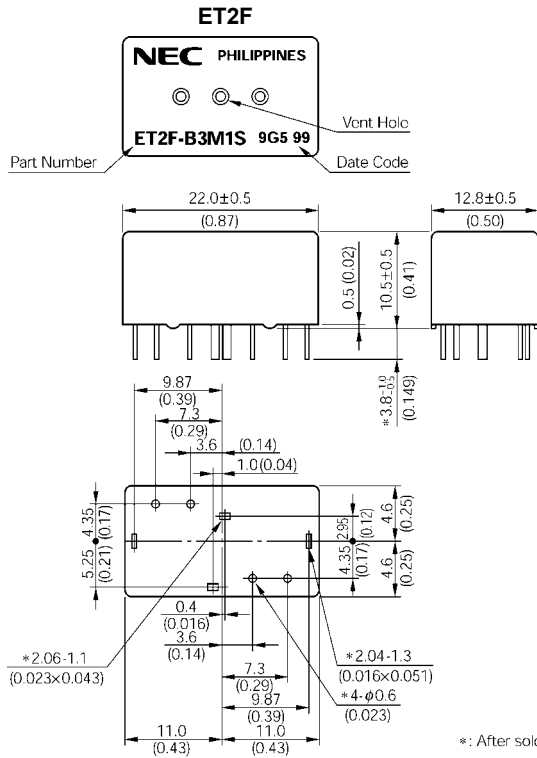


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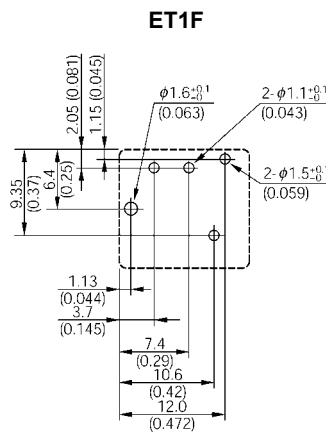
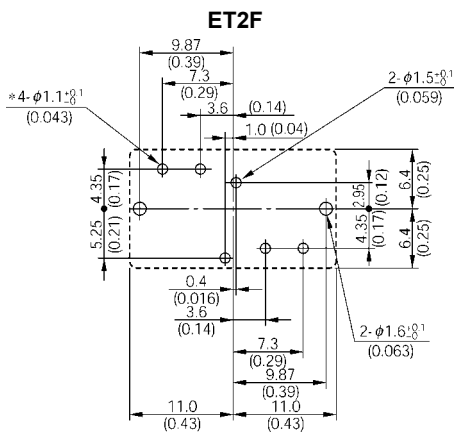
**SCHEMATIC (BOTTOM VIEW)**



**DIMENSIONS mm (inch)**



**PCB PAD LAYOUT mm (inch) (BOTTOM VIEW)**



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**SPECIFICATIONS**

(at 20°C)

Items		Type	Twin	Single	
			ET2F-B3M1/ET2F-B3M1S	ET1F-B3M1/ET1F-B3M1S	
Contact Form			1 Form c × 2 (H Bridge)	1 Form c	
Contact Ratings	Max. Switching Voltage	16 V dc			
	Max. Switching Current	25 A (at 16 Vdc)			
	Max. Carrying Current	25 A (2 minutes 12 Vdc at 125°C) 30 A (2 minutes 12 Vdc at 85°C) 35 A (2 minutes 12 Vdc at 20°C)	30 A (2 minutes 12 Vdc at 125°C) 35 A (2 minutes 12 Vdc at 85°C) 40 A (2 minutes 12 Vdc at 20°C)		
	Min. Switching Current	1 A (at 5 Vdc)			
	Contact Resistance	4 mΩ typical (measured at 7 A) Initial			
Contact Material		Silver oxide complex alloy			
Operate Time (Excluding Bounce)		2.5 ms typical (at Nominal Voltage)			
Release Time (Excluding Bounce)		3 ms typical (at Nominal Voltage, with diode) Initial			
Nominal Operating Power		640 mW			
Insulation Resistance		100 MΩ at 500 Vdc			
Breakdown Voltage	Between Open Contacts	500 Vdc min. (for 1 minute)			
	Between Coil and Contacts	500 Vdc min. (for 1 minute)			
Shock Resistance	Misoperation	98 m/s <sup>2</sup> (10 G)			
	Destructive Failure	980 m/s <sup>2</sup> (100 G)			
Vibration Resistance	Misoperation	10 to 300 Hz, 43 m/s <sup>2</sup> (4.4 G)			
	Destructive Failure	10 to 500 Hz, 43 m/s <sup>2</sup> (4.4 G) 200 hour			
Ambient Temperature		-40 to +125°C (-40 to +257°F)			
Coil Temperature Rise		70°C (158°F) / W (without contact carrying current)			
Life Expectancy	Mechanical		1 × 10 <sup>6</sup> operations		
	Electrical	Power Window Motor (14 V, 20 A locked)	100 × 10 <sup>3</sup> operations		
		Power Window Motor (14 V, 20 A / 3 A, Unlocked)	100 × 10 <sup>3</sup> operations		
Weight		Approx. 7.5 g (0.26 oz)	Approx. 4.5 g (0.16 oz)		

**COIL RATING**

◆ **SEALED TYPE**

(at 20°C)

Contact Form		Part Number	Nominal Voltage (Vdc)	Coil Resistance (Ω ±10%)	Must Operate Voltage (Vdc)	Must Release Voltage (Vdc)
Twin	1 Form c × 2	ET2F-B3M1S	12	225	6.5	0.9
Single	1 Form c	ET1F-B3M1S				

◆ **UNSEALED TYPE**

(at 20°C)

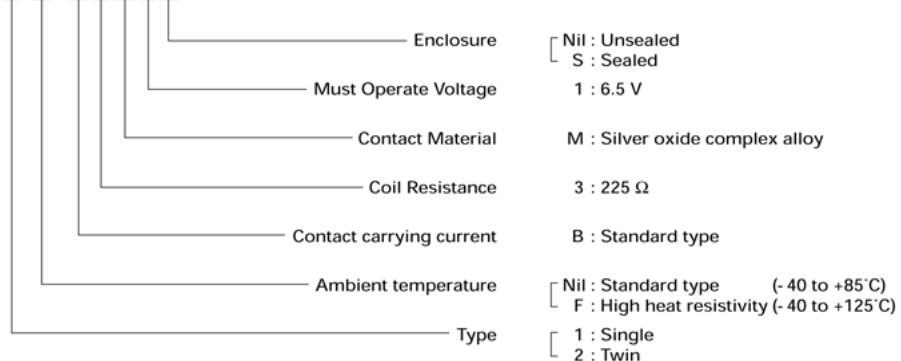
Contact Form		Part Number	Nominal Voltage (Vdc)	Coil Resistance (Ω ±10%)	Must Operate Voltage (Vdc)	Must Release Voltage (Vdc)
Twin	1 Form c × 2	ET2F-B3M1	12	225	6.5	0.9
Single	1 Form c	ET1F-B3M1				



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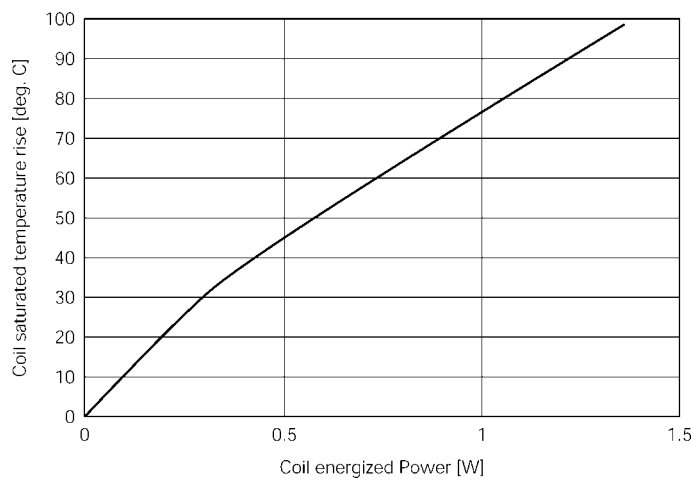
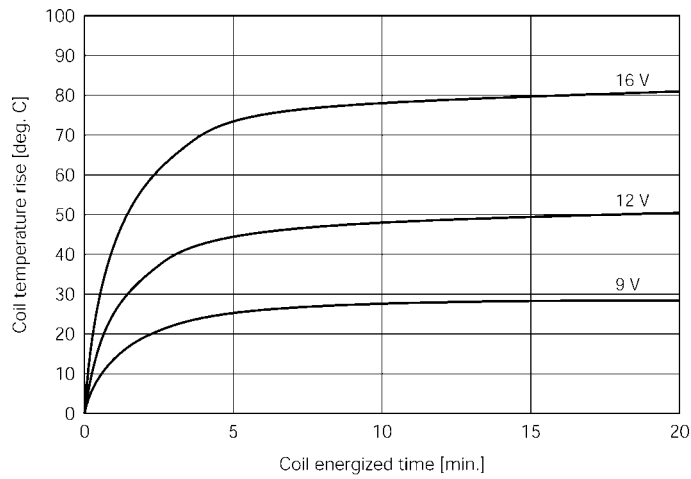
NUMBERING SYSTEM

**ET2 F-B3M1S**



COIL TEMPERATURE RISE

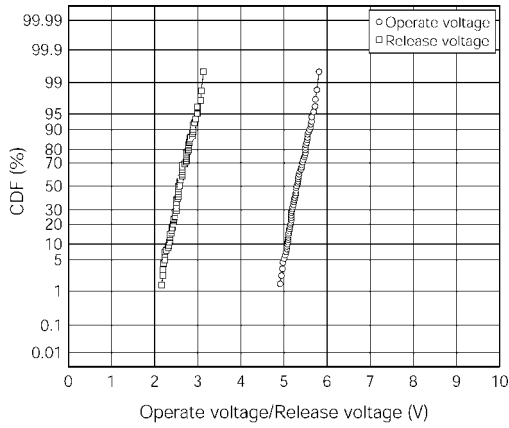
Test piece : ET1F-B3M1S



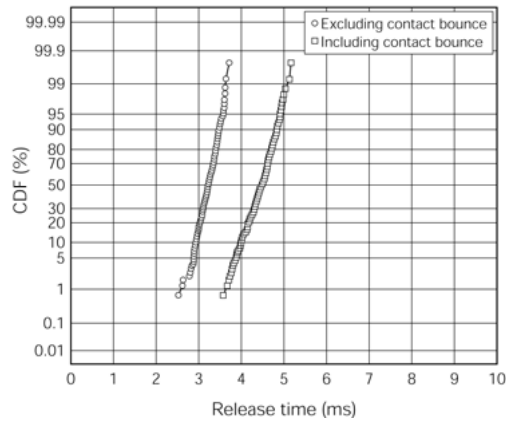
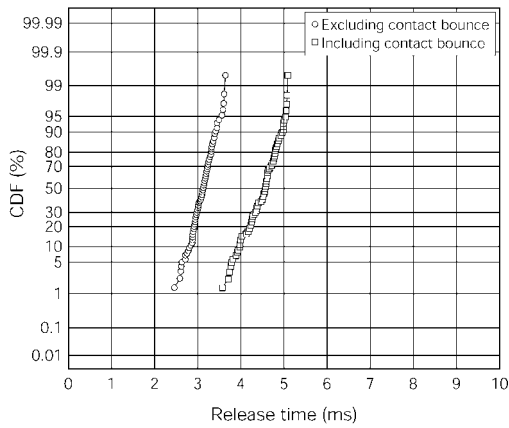
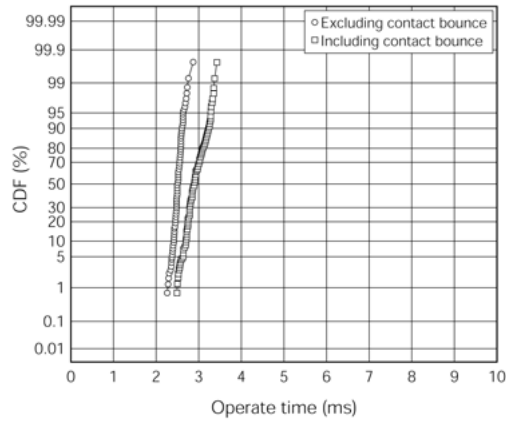
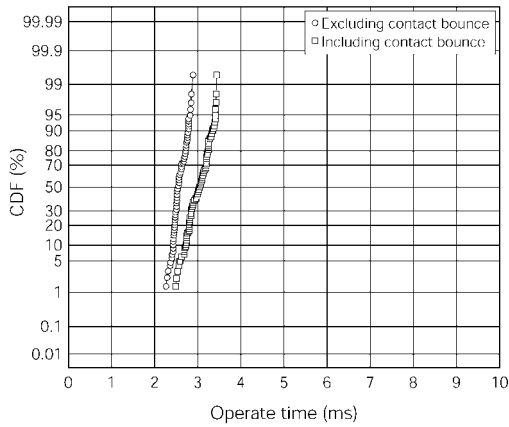
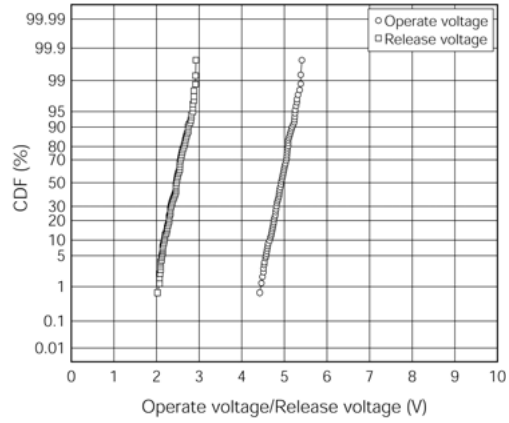
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RELAY CHARACTERISTICS DISTRIBUTION (INITIAL)

Samples : ET1F-B3M1S 100 pieces

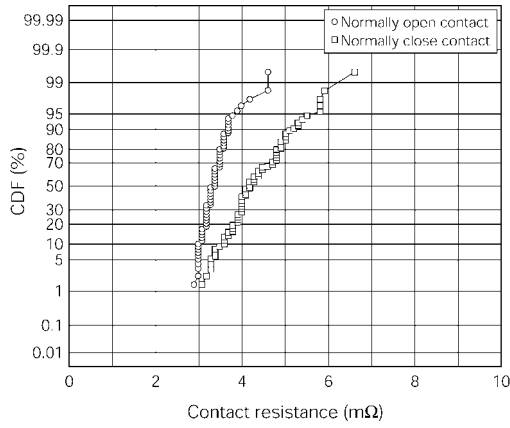


Samples : ET2F-B3M1S 100 pieces

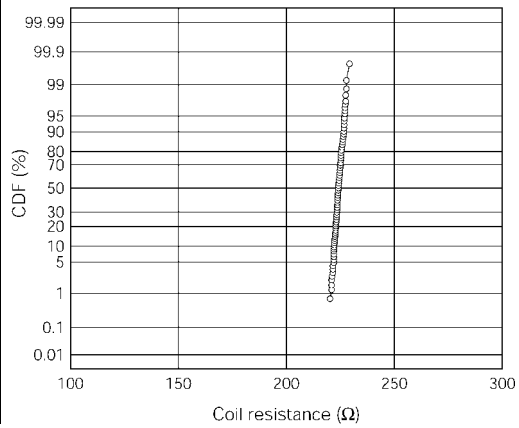
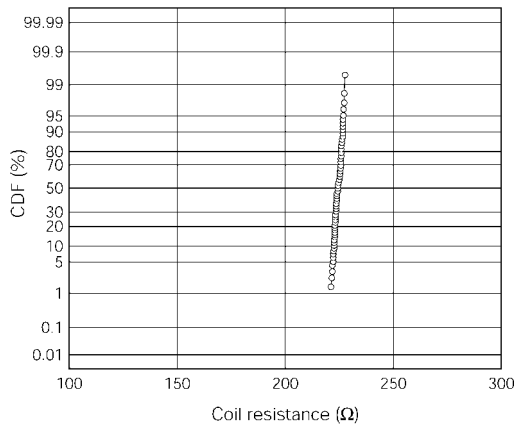
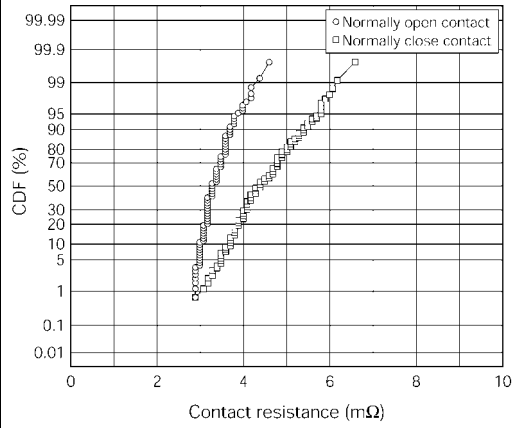


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Samples : ET1F-B3M1S 100 pieces



Samples : ET2F-B3M1S 100 pieces

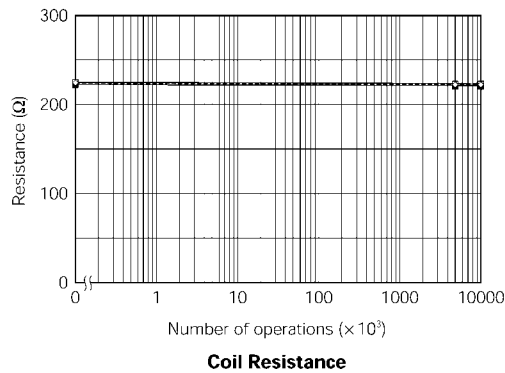
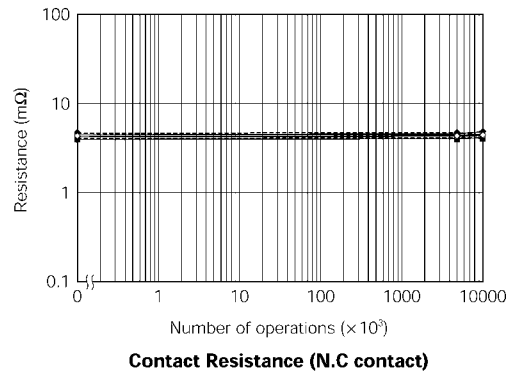
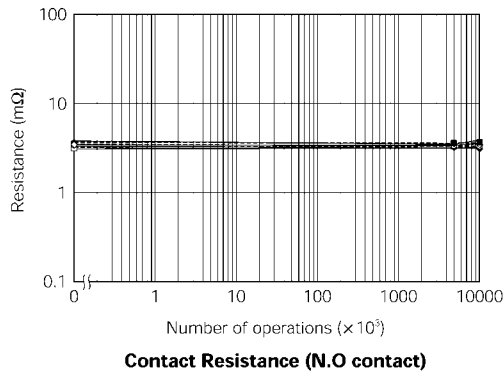
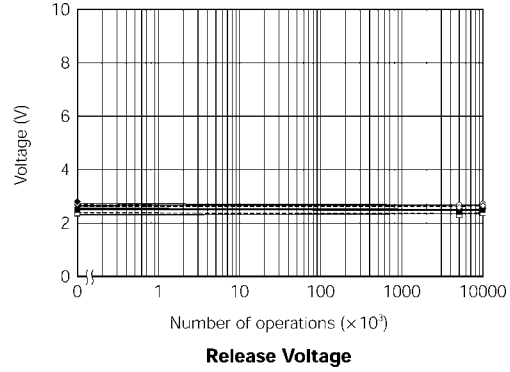
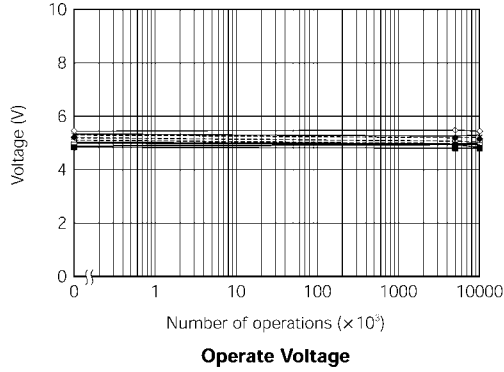


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**DURABILITY LIFE**

**Mechanical life test**

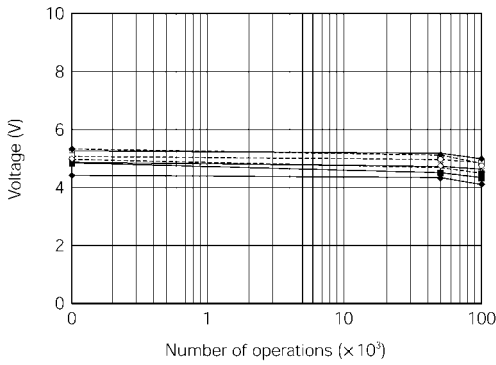
- Ambient temperature : 20°C
- Frequency : 15 Hz (50% duty)
- Contact load : No load
- Number of operations :  $10 \times 10^6$
- Samples : ET2F-B3M1S 10 pieces



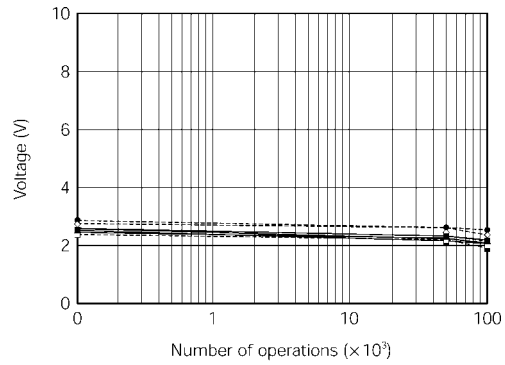
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Electrical life test (1)

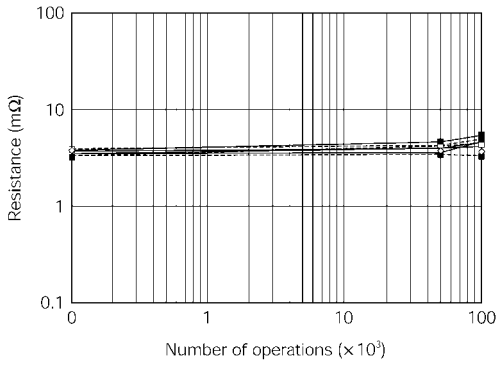
- Ambient temperature : 125°C
- Frequency : 0.2s ON/9.8s OFF, 0.1 Hz
- Contact load : 14 Vdc, 20 A, Power window motor load, locked
- Number of operations :  $100 \times 10^3$
- Samples : ET2F-B3M1S 10 pieces



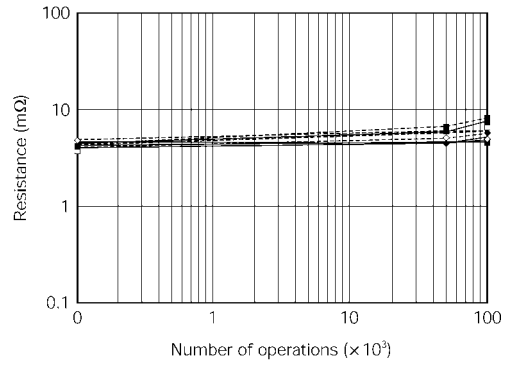
**Operate Voltage**



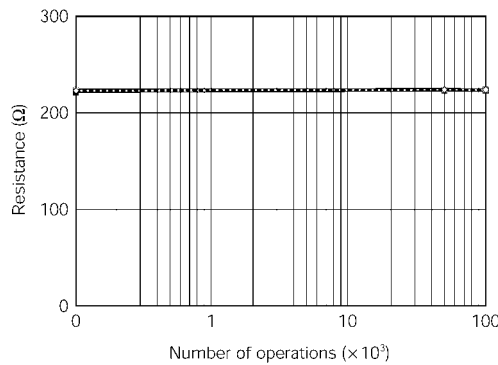
**Release Voltage**



**Contact Resistance (N.O contact)**



**Contact Resistance (N.C contact)**



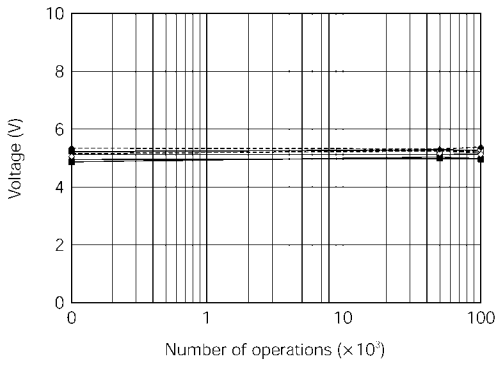
**Coil Resistance**



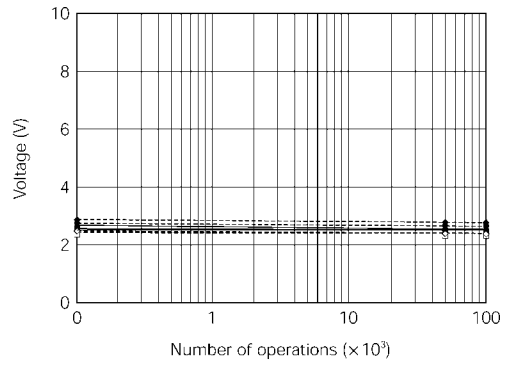
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Electrical life test (2)

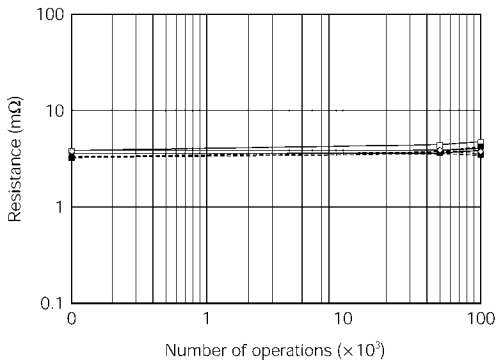
- Ambient temperature : 125°C
- Frequency : 0.2s ON/9.8s OFF, 0.1 Hz
- Contact load : 14 Vdc, 20 A, Power window motor load, unlocked
- Number of operations :  $100 \times 10^3$
- Samples : ET2F-B3M1S 10 pieces



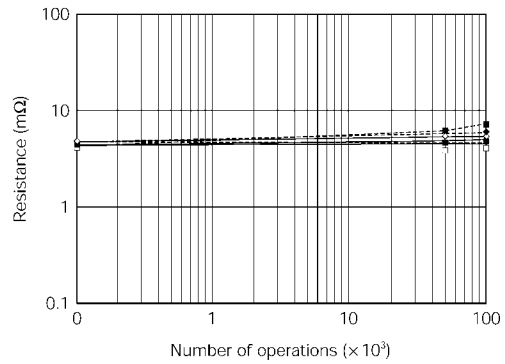
Operate Voltage



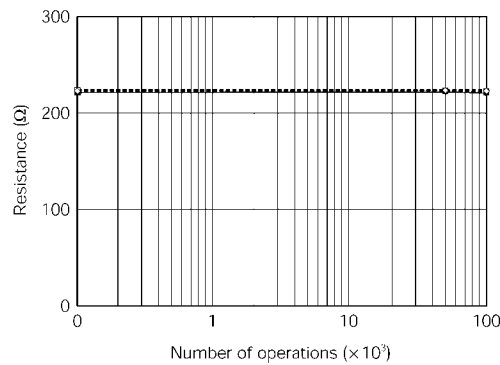
Release Voltage



Contact Resistance (N.O contact)



Contact Resistance (N.C contact)



Coil Resistance



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"Standard", "Special", and "Specific". The Specific quality grade applies only to devices developed based on a customer designated "quality assurance program" for a specific application. The recommended applications of a device depend on its quality grade, as indicated below. Customers must check the quality grade of each device before using it in a particular application.

Standard: Computers, office equipment, communications equipment, test and measurement equipment, audio and visual equipment, home electronic appliances, machine tools, personal electronic equipment and industrial robots

Special: Transportation equipment (automobiles, trains, ships, etc.), traffic control systems, anti-disaster systems, anti-crime systems, safety equipment and medical equipment (not specifically designed for life support)

Specific: Aircrafts, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems or medical equipment for life support, etc.

The quality grade of NEC/TOKIN devices is "Standard" unless otherwise specified in NEC/TOKIN's Data Sheets or Data Books. If customers intend to use NEC/TOKIN devices for applications other than those specified for Standard quality grade, they should contact an NEC/TOKIN sales representative in advance.

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DE0202

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