

**MINIATURE SIGNAL RELAY  
EC2 SERIES**

**COMPACT AND LIGHTWEIGHT, SMALL MOUNTING SIZE,  
HIGH BREAKDOWN VOLTAGE**

**DESCRIPTION**

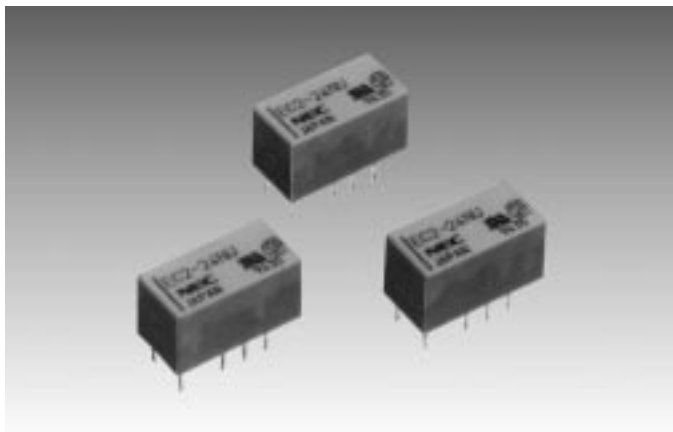
The EC2 series has reduced mounting space but sustained high-performance of NEC EA2 series. Furthermore, it complies with 2500 V surge-voltage requirement of Bellcore specification.

**FEATURES**

- Compact and light weight
- 2 form c contact arrangement
- Low power consumption
- Reduced mounting space : 15 mm × 7.5 mm
- High-breakdown voltage of coil to contacts :  
1500 Vac, 2500 V (rise time : 2  $\mu$ s, fall time : 10  $\mu$ s)
- Capable of High-power switching :  
700 Vac, 4.2 A, 4 times in case of accident
- UL recognized (E73266), CAS certified (LR46266)

**APPLICATIONS**

Electronic switching systems, PBX, terminal equipment, telephone systems.

**For Right 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, damage to related parts or cause burning.

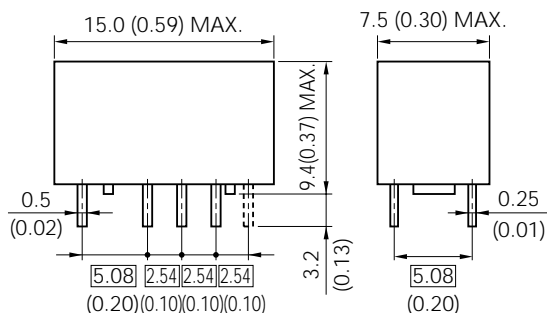
**READ CAUTIONS IN THE SELECTION GUIDE.**

Read the cautions described in NEC's "Miniature Relays" (ER0046EJ\*) when you choose relays for your application.

# OUTLINE DRAWING AND DIMENSIONS

# PAD LAYOUT (bottom view)

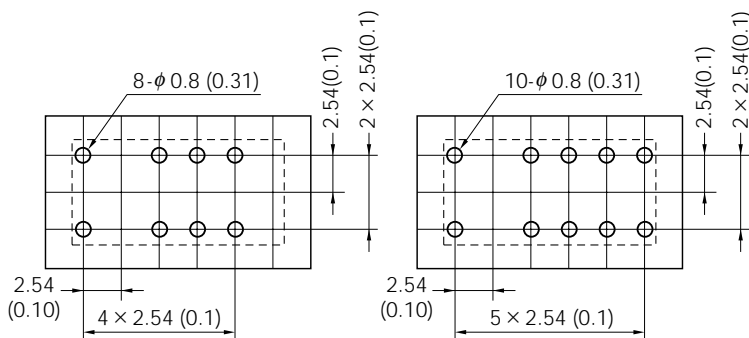
Unit : mm (inch)



**Note.** General tolerance :  $\pm 0.2$  ( $\pm 0.008$ )  
Dimensions in    show basic size.  
NJ type : Leads-2.8 mm (0.11)

Non-latch and Single coil latch

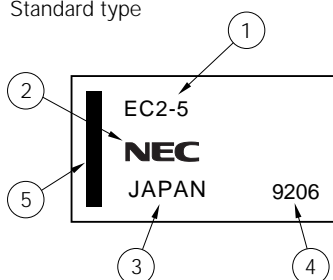
Double coil latch



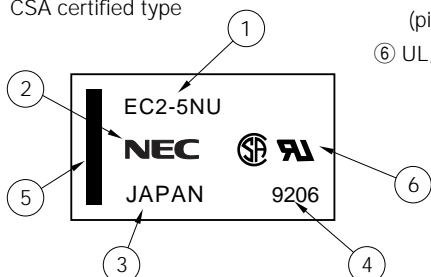
**Note.** General tolerance :  $\pm 0.1$  ( $\pm 0.004$ )

## MARKINGS

Standard type



UL recognized,  
CSA certified type



- ① Part number
- ② Manufacturer
- ③ Country of origin
- ④ Date code
- ⑤ Index mark of relay direction  
(pin No. 1, 12)
- ⑥ UL, CSA Marking

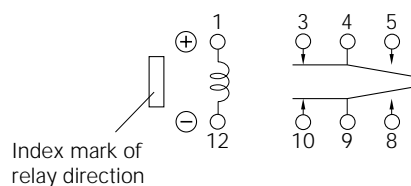
## SAFETY STANDARD AND RATING

| UL Recognized<br>(UL508)*<br>File No E73266 | CSA Certified<br>(CSA C22.2 No 14)<br>File No LR46266 |
|---|---|
| 30 Vdc, 2A (Resistive)                      |   |
| 110 Vdc, 0.3A (Resistive)                   |   |
| 125 Vdc, 0.5A (Resistive)                   |   |

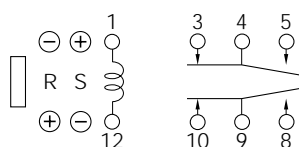
\* Spacing : UL114, UL478

|  |
|--|
| TUV Certificate<br>(EN60255 / IEC60255)  |
| No. R 9751153<br>(Nonlatch and Single-coil-latch)                                      |
| Creepage and clearance of<br>coil to contact is more than 2 mm.<br>(According EN60950) |
| Basic insulation class   |

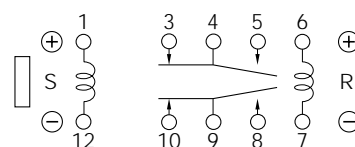
## PIN CONFIGURATIONS (bottom view)



Non-latch type  
(not energized position)



Single coil latch type  
(reset position)



Double coil latch type  
(reset position)

S : Coil polarity of set (operate)  
R : Coil polarity of reset (release)

## PART NUMBER SYSTEM

EC2 - 9 S NU

- Nil : Standard type
- NU : UL recognized, CSA certified type
- NJ : Trimmed leads type \*
- NP : Silver-palladium alloy contact (with gold alloy overlay) \*
- \* UL recognized, CSA certified type
- Latch type
  - Nil : Non-latch type
  - S : Single coil latch type
  - T : Double coil latch type
- Nominal coil voltage
  - 3, 4.5, 5, 6, 9, 12, 24 V
- EC2 series

## PERFORMANCE CHARACTERISTICS

|                                      |                           |  |   |
|--------------------------------------|---------------------------|--|---|
| Contact Form                         |                           | 2 Form c   |   |
| Contact Material                     |                           | Silver alloy with gold alloy overlay   |   |
| Contact Ratings<br>(UL / CSA Rating) | Maximum Switching Power   | 60 W, 125 VA   |   |
|                                      | Maximum Switching Voltage | 220 Vdc, 250 Vac   |   |
|                                      | Maximum Switching Current | 2 A  |   |
|                                      | Maximum Carrying Current  | 2 A  |   |
| Minimum Contact Ratings              |                           | 10 mVdc, 10 $\mu$ A *1   |   |
| Initial Contact Resistance           |                           | 50 m $\Omega$ typ. (Initial)   |   |
| Nominal Operating Power              | Non-Latch Type            | 140 mW (3 to 12 V), 200 mW (24 V)  |   |
|                                      | Single Coil Latch Type    | 100 mW   |   |
|                                      | Single Coil Latch Type    | 140 mW   |   |
| Operate Time (Excluding Bounce)      |                           | Approx. 2 ms   |   |
| Release Time (Excluding Bounce)      |                           | Approx. 1 ms without diode   |   |
| Insulation Resistance                |                           | 1000 M $\Omega$ at 500 Vdc   |   |
| Breakdown Voltage                    | Between Open Contacts     | 1000 Vac (for one minute)  |   |
|                                      | Between Adjacent Contacts | 1500 V surge (10 $\times$ 160 $\mu$ s *2)  |   |
|                                      | Between Coil and Contact  | 1500 Vac (for one minute)<br>2500 V surge, (2 $\times$ 10 $\mu$ s *3)  | Double Coil 1000 Vac (for one minute)<br>Latch type 1500 V surge (10 $\times$ 160 $\mu$ s *2) |
| Shock Resistance                     |                           | 735 m / s <sup>2</sup> (75 G) (misoperating)<br>980 m / s <sup>2</sup> (100 G) (destructive failure)                             |   |
| Vibration Resistance                 |                           | 10 to 55 Hz double amplitude of 3 mm (20 G) (misoperating)<br>10 to 55 Hz, double amplitude of 5 mm (30 G) (Destructive failure) |   |
| Ambient Temperature                  |                           | -40 to 85°C  |   |
| Coil Temperature Rise                |                           | 18 degrees at nominal coil voltage (140 mW)  |   |
| Running specifications               | No-load                   | 1 $\times$ 10 <sup>8</sup> *4 operations (Non-latch type) 1 $\times$ 10 <sup>7</sup> operations (latch type)                     |   |
|                                      | Load                      | 50 Vdc, 0.1 A (resistive) 1 $\times$ 10 <sup>6</sup> operations at 85°C, 2 Hz  |   |
|                                      |                           | 10 Vdc, 10 mA (resistive) 1 $\times$ 10 <sup>6</sup> operations at 85°C, 2 Hz  |   |
| Weight                               |                           | Approx. 1.9 g  |   |

\*1 This value is reference value in the resistance load.

Minimum capacity changes depending on switching frequency and environment temperatur and the load.

\*2 rise time : 10  $\mu$ s, fall time : 160  $\mu$ s

\*3 rise time : 2  $\mu$ s, fall time : 10  $\mu$ s

\*4 This shows a number of operation where it can be running by which a fatal defect is not caused, and a number of operation by which a steady characteristic is maintained is 1  $\times$  10<sup>7</sup> times.

PRODUCT LINEUP

Non-latch Type

at 20°C

| Nominal Coil Voltage (Vdc) | Coil Resistance ( $\Omega$ ) $\pm 10\%$ | Must Operate Voltage (Vdc) | Must Release Voltage (Vdc) |
|----------------------------|---|----------------------------|----------------------------|
| 3                          | 64.3                                    | 2.25                       | 0.3                        |
| 4.5                        | 145                                     | 3.38                       | 0.45                       |
| 5                          | 178                                     | 3.75                       | 0.5                        |
| 6                          | 257                                     | 4.5                        | 0.6                        |
| 9                          | 579                                     | 6.75                       | 0.9                        |
| 12                         | 1028                                    | 9                          | 1.2                        |
| 24                         | 2880                                    | 18                         | 2.4                        |

Single-Coil Latch Type

at 20°C

| Nominal Coil Voltage (Vdc) | Coil Resistance ( $\Omega$ ) $\pm 10\%$ | Must Operate Voltage (Vdc) | Must Release Voltage (Vdc) |
|----------------------------|---|----------------------------|----------------------------|
| 3                          | 90                                      | 2.25                       | 2.25                       |
| 4.5                        | 202.5                                   | 3.38                       | 3.38                       |
| 5                          | 250                                     | 3.75                       | 3.75                       |
| 6                          | 360                                     | 4.5                        | 4.5                        |
| 9                          | 810                                     | 6.75                       | 6.75                       |
| 12                         | 1440                                    | 9                          | 9                          |
| 24                         | 5760                                    | 18                         | 18                         |

Double-Coil Latch Type \*\* (Can not be driven by reverse polarity for reverse operation.)

at 20°C

| Nominal Coil Voltage (Vdc) | Coil Resistance ( $\Omega$ ) $\pm 10\%$ |      | Must Operate Voltage (Vdc) | Must Release Voltage (Vdc) |
|----------------------------|---|------|----------------------------|----------------------------|
| 3                          | S                                       | 64.3 | 2.25                       | –                          |
|                            | R                                       | 64.3 | –                          | 2.25                       |
| 4.5                        | S                                       | 145  | 3.38                       | –                          |
|                            | R                                       | 145  | –                          | 3.38                       |
| 5                          | S                                       | 178  | 3.75                       | –                          |
|                            | R                                       | 178  | –                          | 3.75                       |
| 6                          | S                                       | 257  | 4.5                        | –                          |
|                            | R                                       | 257  | –                          | 4.5                        |
| 9                          | S                                       | 579  | 6.75                       | –                          |
|                            | R                                       | 579  | –                          | 6.75                       |
| 12                         | S                                       | 1028 | 9                          | –                          |
|                            | R                                       | 1028 | –                          | 9                          |
| 24                         | S                                       | 4114 | 18                         | –                          |
|                            | R                                       | 4114 | –                          | 18                         |

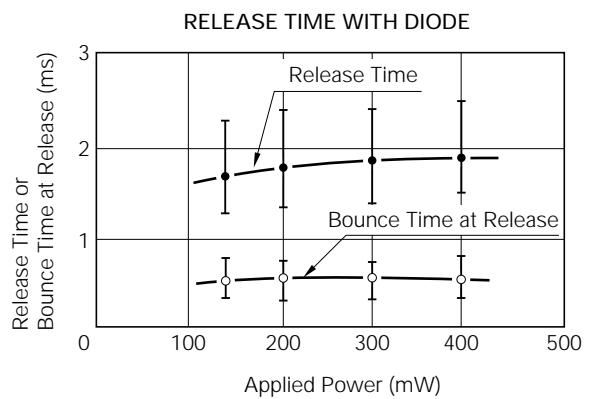
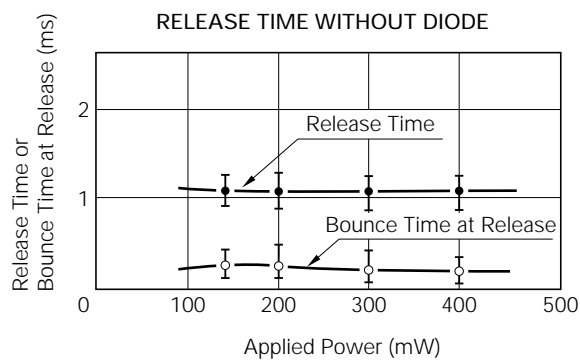
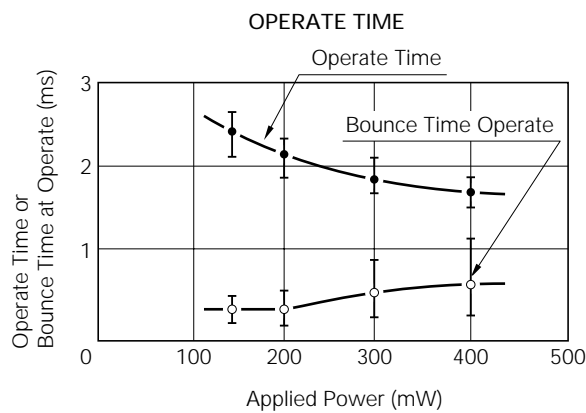
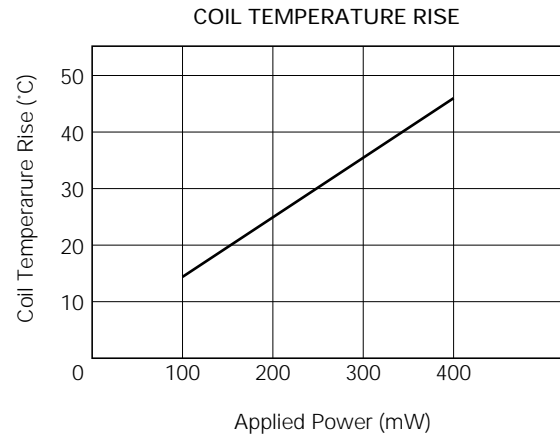
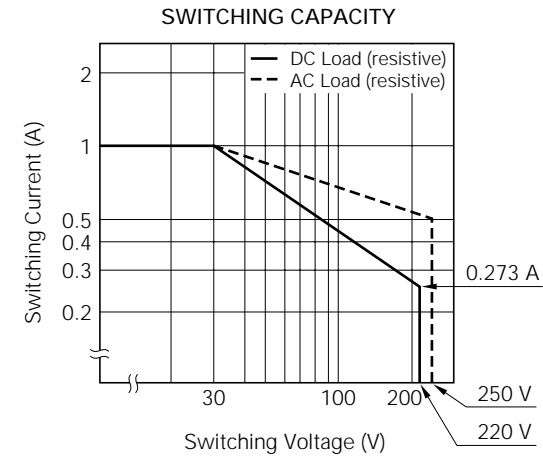
**Note** \* Test by pulse voltage

\*\* S : Set coil (pin No.1...⊕, pin No.5...⊖) R: Reset coil (pin No.10...⊕, pin No.6...⊖)

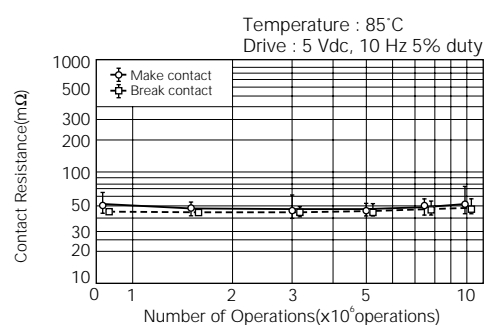
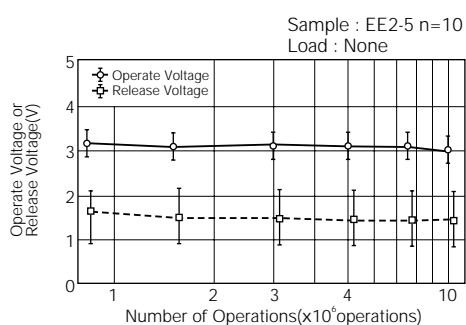
The latch type relays should be initialized at appointed position before using, and should be energized to specific polarity by a bone polarity to avoid wrong operation.

Any special coil requirement, please contact NEC for availability.

## TYPICAL PERFORMANCE DATA



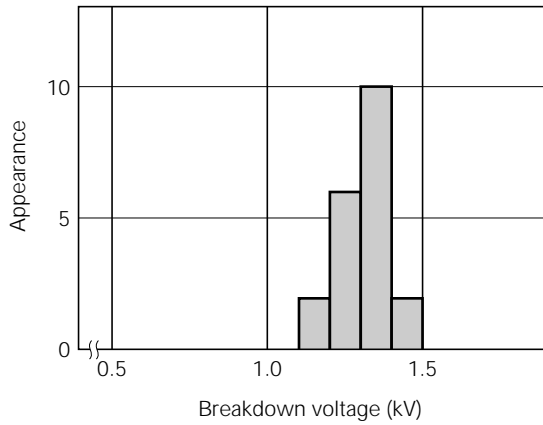
## RUNNING SPECIFICATIONS (Noload)



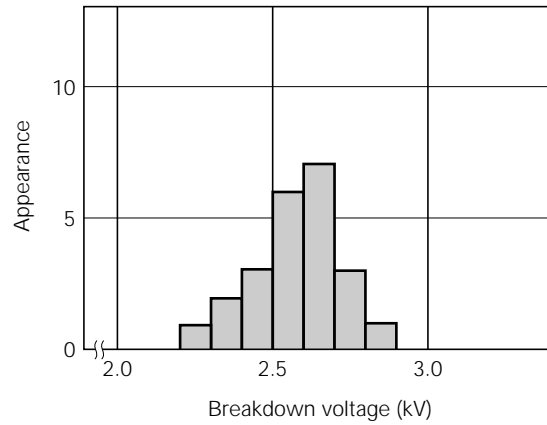
## BREAKDOWN VOLTAGE

Sample : EC2-5

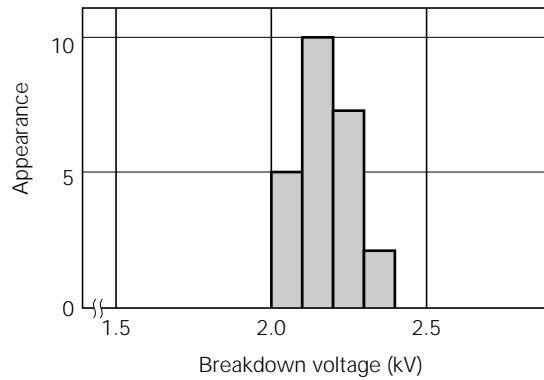
(a) Between Open Contacts (n = 10 pcs)



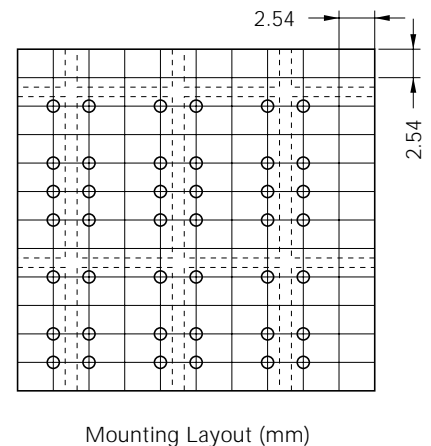
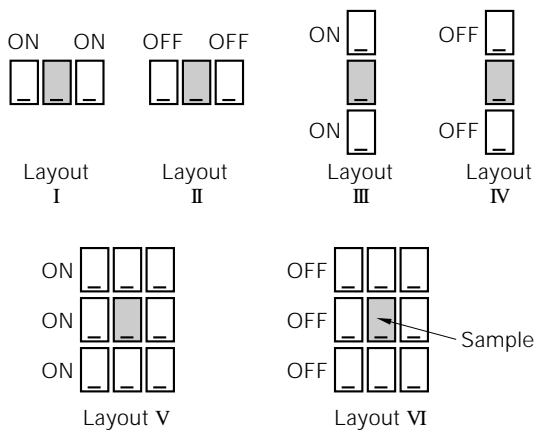
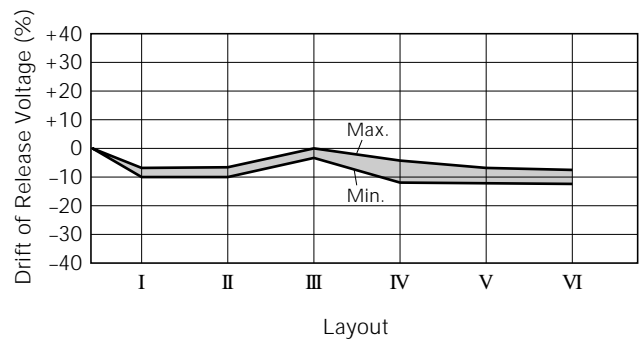
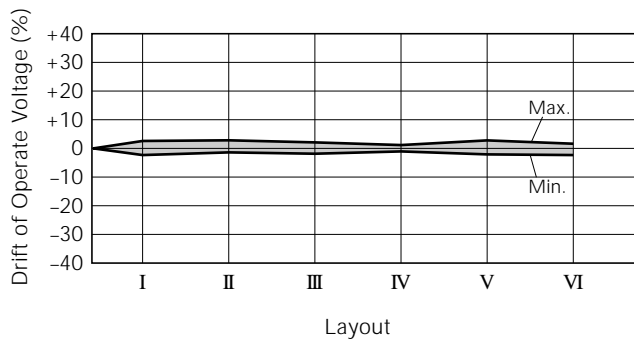
(a) Between Adjacent Contacts (n = 10 pcs)



(a) Between Coil and Contacts (n = 25 pcs)

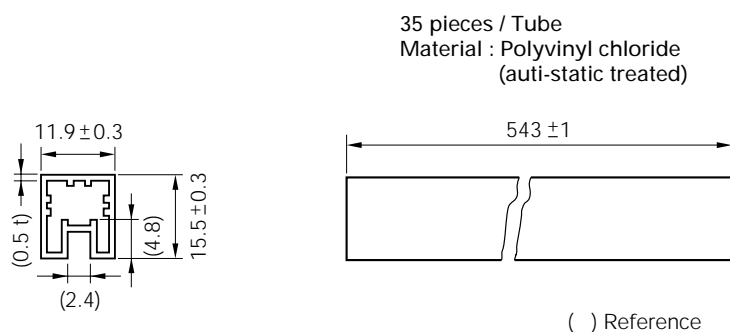


## MAGNETIC INTERFERENCE

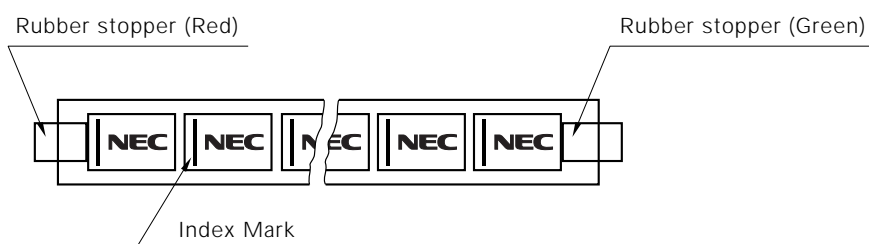


## PACKAGE

Dimensions of Relay Tube (Unit : mm)



## Outline of Package



## GUIDE TO APPLICATIONS

1. When connecting coils, refer to the pin configuration to prevent misoperation or malfunction.
2. The latch type relay should be initialized at the appointed position (set or reset position) when using, and should be energized or deenergized to the specified polarity to avoid wrong operations by reversed contact state.
3. Soldering should be done at 250 °C within 10 sec.
4. Ultrasonic cleaning is not recommended to keep reliable contact performance. Alcohol based solvents are available as proper solvents.
5. Minimum contact load of the relay is 10 mV, 10  $\mu$ A.  
This value is a reference value in the resistance load.  
Minimum capacity changes depending on switching frequency and environment temperature and the load.

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NEC devices are classified into the following three quality grades:

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

Anti-radioactive design is not implemented in this product.