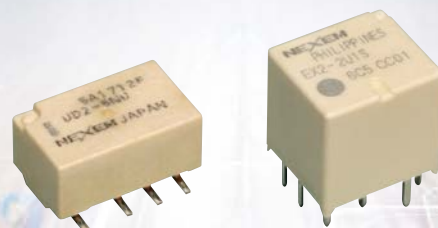


Miniature Relays

V o l . 0 2



M i n i a t u r e R e l a y s

S e l e c t i o n G u i d e



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Introduction of EM Devices Corporation

Since NEC industrialized telephone relays in Japan more than a half century ago, many technological innovations have taken place in its electromechanical devices (E.M. devices).

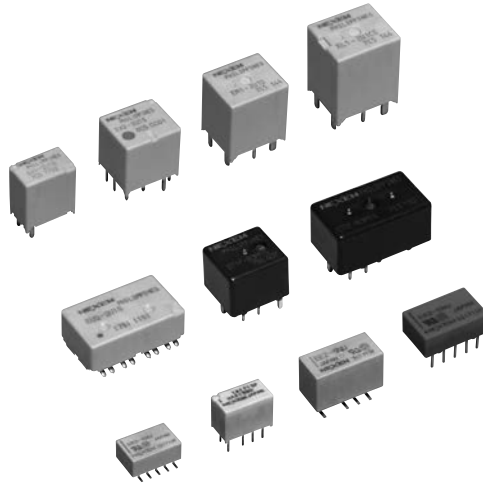
NEC's relays were designed and manufactured always on the basis of the newest technology that the company develops. Their high reliability and advanced features ensure the high reliability and high performance.

NEC divided and transferred its business of the manufacturing and sale of relays to Tokin, as of April 1, 2002. Then Tokin Corporation changed its corporate name to "NEC TOKIN Corporation." Then, on April 14, 2017, NEC TOKIN Corporation split off the EM Devices Division and created a new company, "EM Devices Corporation".



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Miniature Relay



Introduction of NEXEM's miniature relays

NEXEM is EM Devices' company brand. NEXEM miniature relays can be classified into two types. Signal relays that are mainly used by communication equipment manufacturers in the world, and power relays that satisfy the needs of automobile electronic systems.

Feature

Miniature signal relay

- Compact and lightweight for dense mounting
- Low power consumption
- Plastic-sealed package
- High withstand voltage
- Surface mounting product lineup

Miniature power relay

- High power switching capability
- Compact and lightweight with twin relay structure
- Flux tight housing
- Washable with plastic-sealed package
- Semicustom-made-product available for various applications
- Reflow soldering type available





Note

- The description in this catalog is representative characteristics and is not a guaranteed value. And the description in this catalog is subject to change without notice.
When an order is placed, please request shipping specification which can confirm still more detailed specification. In case there is a discrepancy between this catalog and shipping specification, the later shall prevail.
- The product described in this catalog is subject to change without notice. When adaption is considered or an order is placed, please confirm the newest information.
- Before using the product in this catalog, please read "NOTES ON CORRECT USE" in this catalog and other safety precautions.



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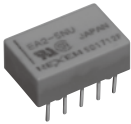

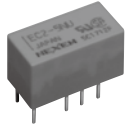

Selector Chart

| · Group | | Miniature Relay-Signal | | | |
|--|---------------------------|--|--|--|--|
| · Type of Relay | | UA2  | UB2  | UC2  | UD2  |
| · Features | | <ul style="list-style-type: none"> · Super-compact size · Dual-inline leads (Small mounting space) · 2500V surge ($2 \times 10 \mu s^*$) · Latch type available · Low power consumption type available | <ul style="list-style-type: none"> · Super-compact size · Surface mount (Small mounting space) · 2500V surge ($2 \times 10 \mu s^*$) · Latch type available · Low power consumption type available | <ul style="list-style-type: none"> · Super-compact size · Dual-inline leads (Low profile type) · 2500V surge ($2 \times 10 \mu s^*$) · Latch type available · Low power consumption type available | <ul style="list-style-type: none"> · Super-compact size · Surface mount (Low profile type) · 2500V surge ($2 \times 10 \mu s^*$) · Latch type available · Low power consumption type available |
| · Contact Form | | 2c | | | |
| · Contact Material (standard) | | Silver alloy with gold alloy overlay | | | |
| · Contact Rating (Resistive) (switching) | | 30W/37.5 VA | | | |
| | 3A | | | | |
| | 2A | | | | |
| | 1A | | | | |
| | | 1.0A | | | |
| · Coil Voltage | | 3,4,5,5,9,12,(24) VDC | | | |
| · Nominal Operate Power | | 100 to 230mW (latch type 100 to 120 mW) | | | |
| · Must Operate Voltage | | 75%(Low power consumption type of UC2/UD2=80%) | | | |
| · Must Release Voltage | | 10% | | | |
| · Operate Time (typ.) (Excluding bounce) | | 2ms | | | |
| · Release Time (typ.) (Excluding bounce Without Diode) | | 1ms | | | |
| · Running Specifications | Load | 1×10^5 (30 VDC, 1 A at 20°C, 1Hz) 1×10^5 (125 VAC, 0.3A at 20°C, 1Hz) | | | |
| | Non-load | 10×10^6 | | | |
| · Withstand Voltage | Between open contacts | 1000VAC | | | |
| | Between adjacent contacts | 1000VAC | | | |
| | Between contacts and coil | 1500VAC | | | |
| · Surge Withstand Voltage | | 1500V(FCC), 2500 V($2 \times 10 \mu s$, coil to contacts) | | | |
| · Safety Standard | | UL, CSA, TÜV | | | |
| · Option | | latch type | | | |
| · Height (mm) | | 8.3 | 8.8 | 5.6 | 5.45 |
| · Mounting Space (mm ²) | | 6.0 × 10.9 | 7.7 × 10.9 | 6.8 × 10.9 | 8.7 × 10.9 |
| · Page | | 11 to 12, 15 to 17 | 13 to 17 | 18, 19, 22 to 24 | 20 to 24 |
| · Sales status | | Active | Active | Active | Active |



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Selector Chart

| Miniature Relay-Signal | | | | · Group | |
|--|--|---|--|--|--------------------------|
| <div>EA2</div> <div></div> <div><ul style="list-style-type: none">· Low power consumption· Low magnetic interference· 1500V FCC surge· 1000VAC FCC· Compact, light weight· Latch type available</div> | <div>EB2</div> <div></div> <div><ul style="list-style-type: none">· Surface mount· Low power consumption· Low magnetic interference· 1500V FCC surge· 1000VAC FCC· Compact, light weight· Latch type available</div> | <div>EC2</div> <div></div> <div><ul style="list-style-type: none">· Low power consumption· Dual-inline leads (Small mounting space)· 2500 V surge ($2 \times 10 \mu s^*$) coil to contacts· Latch type available· High-insulation is lineup.</div> | <div>EE2</div> <div></div> <div><ul style="list-style-type: none">· Low power consumption· Surface mount (Reduced mounting space)· 2500 V surge ($2 \times 10 \mu s^*$) coil to contacts· Latch type available· High-insulation, high-voltage type is lineup.</div> | <div>· Type of Relay</div> | |
| | | | | · Features | |
| 2c | | | | · Contact Form | |
| Silver alloy with gold alloy overlay | | | | · Contact Material (standard) | |
| 30W/62.5 VA | | 60W/125 VA (UL/CSA Rating) | | · Contact Rating (Resistive) (switching) | |
| 1.0A | | 2.0A | | | |
| 3,4,5,5,12,24 VDC | | 3,4,5,5,9,12,24 VDC | | | |
| | | | | | |
| 140mW (latch type 100 ~ 200 mW) | | | | · Nominal Operate Power | |
| 75% | | | | · Must Operate Voltage | |
| 10% | | | | · Must Release Voltage | |
| 2ms | | | | · Operate Time (typ.) (Excluding bounce) | |
| 1ms | | | | · Release Time (typ.) (Excluding bounce Without Diode) | |
| 1×10^6 (50 VDC, 0.1 A at 85°C ,5Hz) 1×10^6 (10 VDC, 10 mA at 85°C ,2Hz) | | | | Load | · Running Specifications |
| 10×10^6 | | | | Non-load | |
| 1000VAC(1500VAC: NK type of EE2 at make contact) | | | | Between open contacts | · Withstand Voltage |
| 1000VAC | | | | Between adjacent contacts | |
| 1000VAC | | | | Between contacts and coil | |
| 1000VAC | | 1500VAC or 1000VAC** | | · Surge Withstand Voltage | |
| 1500V FCC | | 1500V (FCC), 2500V***(2×10 ms, coil to contacts) | | | |
| UL, CSA | | UL, CSA, TÜV | | · Safety Standard | |
| latch type | | | | · Option | |
| 5.4 | 7.5 | 9.4 | 10.0 | · Height (mm) | |
| 9.2×14.2 | $11.7(9.3) \times 14.3$ | 7.5×15.0 | 9.7×15.0 | · Mounting Space (mm ²) | |
| 25, 26, 29 to 31 | 27 to 31 | 32 to 34, 38 to 41 | 35 to 41 | · Page | |
| Active | Active | Active | Active | · Sales status | |

* $2 \mu s$ of rise time and $10 \mu s$ of decay time to half crest.



** for double coil latch type

*** 1500V for double coil latch type



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Selector Chart

| · Group | | Miniature Relay-Signal | |
|--|---------------------------|---|--|
| · Type of Relay | | ED2  | EF2  |
| · Features | | <ul style="list-style-type: none"> · Ultra-low power consumption · Dual-inline leads (small mounting space) · 2500 V surge ($2 \times 10 \mu s^*$) coil to contacts | <ul style="list-style-type: none"> · Ultra-low power consumption · Surface mount (reduced mounting space) · 2500V surge ($2 \times 10 \mu s^*$) coil to contacts |
| · Contact Form | | 2c | |
| · Contact Material (standard) | | Silver alloy with gold alloy overlay | |
| · Contact Rating (Resistive) (switching) | | 30W/62.5 VA 3A 2A 1A | |
| · Coil Voltage | | 1.5,3,4,5,9,12,24 VDC | |
| · Nominal Operate Power | | 30 to 70mW | |
| · Must Operate Voltage | | 75% | |
| · Must Release Voltage | | 10% | |
| · Operate Time (typ.) (Excluding bounce) | | 3ms | |
| · Release Time (typ.) (Excluding bounce Without Diode) | | 2ms | |
| · Running Specifications | Load | 1×10^6 (50 VDC, 0.1 A at 70°C, 5Hz) 1×10^6 (10 VDC, 10 mA at 70°C, 2Hz) | |
| | Non-load | 10×10^6 | |
| · Withstand Voltage | Between open contacts | 1000VAC | |
| | Between adjacent contacts | 1000VAC | |
| | Between contacts and coil | 1500VAC | |
| · Surge Withstand Voltage | | 1500V(FCC), 2500 V($2 \times 10 \mu s$, coil to contacts) | |
| · Safety Standard | | UL, CSA, TÜV | |
| · Option | | — | |
| · Height (mm) | | 9.4 | 10.0 |
| · Mounting Space (mm ²) | | 7.5×15.0 | 9.5×15.0 |
| · Page | | 42, 43, 46 to 48 | 44 to 48 |
| · Sales status | | Active | Active |





* $2 \mu s$ of rise time and $10 \mu s$ of decay time to half crest.

#FCC surge between coil and contacts and between adjacent contacts



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Selector Chart

| Miniature Relay-Power | | | · Group |
|---|--|---|--|
| <div></div> <div>EU2</div> | <div></div> <div>EX2</div> | <div></div> <div>EX1</div> | <div>· Type of Relay</div> |
| <div>· Ultra low profile SMD twin relay for motor reversible control</div> <div>· Light weight</div> <div>· PC board mounting</div> <div>· Reflow soldering available</div> <div>· 77% lower mounting height than ET2</div> <div>· 60% lower mounting height than EX2</div> | <div>· Ultra miniature twin relay for motor reversible control</div> <div>· Light weight</div> <div>· Small footprint</div> <div>· Small mounting area</div> <div>· PC board mounting</div> <div>· Flux tight housing</div> <div>· 75% less relay volume than ET2</div> <div>· 60% less relay space than ET2</div> | <div>· Ultra miniature single relay for motor control</div> <div>· Small footprint</div> <div>· Small mounting area</div> <div>· Light weight</div> <div>· PC board mounting</div> <div>· Flux tight housing</div> <div>· 65% less relay volume than ET1</div> <div>· 50% less relay space than ET1</div> | <div>· Features</div> |
| 1c × 2 | 1c × 2 | 1c | <div>· Contact Form</div> |
| Silver oxide complex alloy | | | <div>· Contact Material (standard)</div> |
| <div>25A(14VDC)</div> <div></div> | | | <div>30A</div> <div>25A</div> <div>20A</div> <div>15A</div> <div>10A</div> <div>5A</div> <div>1A</div> <div>· Contact Rating (Resistive) (switching)</div> |
| 12 VDC | | | <div>· Coil Voltage</div> |
| 960mW | 900mW | | <div>· Nominal Operate Power</div> |
| 6.5VDC | | | <div>· Must Operate Voltage</div> |
| 0.6 VDC | 0.9 VDC | | <div>· Must Release Voltage</div> |
| Approx. 2.5ms | | | <div>· Operate Time (typ.) (Excluding bounce)</div> |
| Approx. 3ms | | | <div>· Release Time (typ.) (Excluding bounce)</div> |
| 100 × 10 ³ motor load 14VDC 25A / 5A | | | <div>Load</div> <div>· Running Specifications</div> |
| 1 × 10 ⁶ | | | <div>Non-load</div> |
| 500VAC | | | <div>Between open contacts</div> <div>· Withstand Voltage</div> |
| — | | | <div>Between adjacent contacts</div> |
| 500VAC | | | <div>Between contacts and coil</div> |
| — | | | <div>· Surge Withstand Voltage</div> |
| — | | | <div>· Safety Standard</div> |
| — | | | <div>· Option</div> |
| 8.5 | 14.2 | | <div>· Height (mm)</div> |
| 14.5(12.2) × 21 | 12.6 × 14.1 | 8.0 × 12.6 | <div>· Mounting Space (mm²)</div> |
| 49 to 50 | 51 to 52 | 53to 54 | <div>· Page</div> |
| Active | Active | Active | <div>· Sales status</div> |



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Selector Chart

| · Group | | Miniature Relay-Power | |
|--|---------------------------|--|---|
| · Type of Relay | | ET2  | ET1  |
| · Features | | <ul style="list-style-type: none"> · Miniature twin relay for motor reversible control · Low profile · Light weight · PC board mounting · Flux tight housing · 50% less relay volume than EP2 · 50% less relay weight than EP2 *ET2F:High heat resistivity | <ul style="list-style-type: none"> · Miniature single relay · Motor, heater & solenoid control · Low profile · Light weight · PC board mounting · Flux tight housing · 45% less relay volume than EP1 · 56% less relay weight than EP1 *ET1F:High heat resistivity |
| · Contact Form | | 1c × 2 | 1c |
| · Contact Material (standard) | | Silver oxide complex alloy | |
| · Contact Rating (Resistive) (switching) | | 30A 25A 20A 20A(14VDC) 15A 10A 5A 1A | |
| · Coil Voltage | | 12 VDC | |
| · Nominal Operate Power | | 640mW | |
| · Must Operate Voltage | | 6.5VDC | |
| · Must Release Voltage | | 0.9 VDC | |
| · Operate Time (typ.) (Excluding bounce) | | Approx. 2.5ms | |
| · Release Time (typ.) (Excluding bounce Without Diode) | | Approx. 3ms | |
| · Running Specifications | Load | 100×10^3 motor load 14VDC 20A / 3A | |
| | Non-load | 1×10^6 | |
| · Withstand Voltage | Between open contacts | 500VAC | |
| | Between adjacent contacts | — | |
| | Between contacts and coil | 500VAC | |
| · Surge Withstand Voltage | | — | |
| · Safety Standard | | — | |
| · Option | | — | |
| · Height (mm) | | 11.0 | |
| · Mounting Space (mm ²) | | 13.3 × 22.5 | 13.3 × 14.5 |
| · Page | | 55 to 56 | 57 to 58 |
| · Sales status | | Active | Active |



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Selector Chart



| Miniature Relay-Power | | | · Group |
|--|---|---|---|
|  EP2 |  EP1 |  EP1K | · Type of Relay |
| <ul style="list-style-type: none"> · Twin relay for motor reversible control · PC board mounting · Flux tight housing · Symmetrical structure *EP2F:High heat resistivity | <ul style="list-style-type: none"> · Single relay · For motor control · PC board mounting · Flux tight housing *EP1F:High heat resistivity | <ul style="list-style-type: none"> · Large capacity single relay for motor, heater & solenoid control · High heat resistance · PC board mounting · Flux tight housing · Through-hole reflow soldering available · About 10A larger current than EP1 | · Features |
| 1c × 2 | 1c | 1c | · Contact Form |
| Silver oxide complex alloy | | | · Contact Material (standard) |
| <div> <div>25A(14VDC)</div> <div></div> </div> | | | 30A 25A 20A 15A 10A 5A 1A · Contact Rating (Resistive) (switching) |
| 12 VDC | | | · Coil Voltage |
| 640mW | | | · Nominal Operate Power |
| 6.5VDC | | | · Must Operate Voltage |
| 0.9 VDC | | | · Must Release Voltage |
| Approx. 5ms | | | · Operate Time (typ.) (Excluding bounce) |
| Approx. 2ms | | | · Release Time (typ.) (Excluding bounce Without Diode) |
| 100×10^3 motor load 14VDC, 25A / 5A | | | Load |
| 1×10^6 | | | Non-load |
| 500VAC | | | Between open contacts |
| — | | | Between adjacent contacts |
| 500VAC | | | Between contacts and coil |
| — | | | · Surge Withstand Voltage |
| — | | | · Safety Standard |
| Separate type | — | | · Option |
| 16.5 | 17.5 | | · Height (mm) |
| 16.7 × 24.3 | 16.7 × 15.1 | | · Mounting Space (mm ²) |
| 59 to 61 | 62 to 64 | 65 to 66 | · Page |
| Non-promotion*1 | | | · Sales status |

*1 Now, this product s are corresponding only to specific customers.



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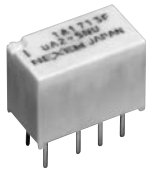
Selector Chart

| | | |
|--|---|---|
| • Group | Miniature Relay-Power | |
| • Type of Relay |  EM1 |  EL1 |
| • Features | <ul style="list-style-type: none"> • Large capacity single relay for lamp, condenser & motor control • High heat resistance • PC board mounting • Flux tight housing • Through-hole reflow soldering available • The smallest 40A class relay | <ul style="list-style-type: none"> • Large capacity single relay for motor & solenoidal coil • High heat resistance • PC board mounting • Flux tight housing • Through-hole reflow soldering available • The smallest 40A class relay |
| • Contact Form | 1u | 1c |
| • Contact Material (standard) | Silver oxide complex alloy | |
| • Contact Rating (Resistive) (switching) | 35A 30A 25A 20A 15A 10A 5A 1A | 40A(14VDC) |
| • Coil Voltage | 12 VDC | |
| • Nominal Operate Power | 640mW | |
| • Must Operate Voltage | 6.5VDC | |
| • Must Release Voltage | 0.9VDC | |
| • Operate Time (typ.) (Excluding bounce) | Approx. 4ms | |
| • Release Time (typ.) (Excluding bounce Without Diode) | Approx. 1ms | |
| • Running Specifications | Load | 100×10^3 resistive load, 40A |
| | Non-load | 1×10^6 |
| • Withstand Voltage | Between open contacts | 500VAC |
| | Between adjacent contacts | — |
| | Between contacts and coil | 500VAC |
| • Surge Withstand Voltage | — | |
| • Safety Standard | — | |
| • Option | — | |
| • Height (mm) | 16.8 | 17.8 |
| • Mounting Space (mm ²) | 12.9 × 14.9 | |
| • Page | 67 to 68 | 69 to 70 |
| • Sales status | Active | Active |



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UA2 Series



NEXEM's UA2 relay is a new generation Miniature Signal Relay of super-compact size and slim-package.

FEATURES

- Small mounting size of slim package for dense mounting.
- Telcordia (2500 V) and FCC (1500 V) surge capability.
- IEC60950 / UL1950 / EN60950 spacing and high breakdown voltage.
(Basic insulation class on 200 V working voltage)
- Power consumption 140mW, Low power consumption 100mW type is available
- UL recognized (E73266), CSA certified (LR46266), TÜV certified (R2050596)

SPECIFICATIONS

| | | | |
|---------------------------------|---------------------------|---|-------------------------------------|
| Contact Form | | 2 Form C | |
| Contact Material | | Silver alloy with gold alloy overlay | |
| Contact Ratings | Maximum Switching Power | 30 W, 37.5 VA | |
| | Maximum Switching Voltage | 220 VDC, 250 VAC | |
| | Maximum Switching Current | 1 A | |
| | Maximum Carrying Current | 1 A | |
| Minimum Contact Ratings | | 10 mVDC, 10 μA ^{*1} | |
| Initial Contact Resistance | | 100 mΩ max. (Initial) | |
| Nominal Operating Power | Non-latch type | 140 mW (1.5 to 12 V), 230 mW (24 V) | 100 mW (low power consumption type) |
| | Single coil latch type | 100 mW (1.5 to 12 V) | |
| Operate Time (Excluding bounce) | | Approx. 2 ms | |
| Release Time (Excluding bounce) | | Approx. 1 ms | |
| Insulation Resistance | | 1000 MΩ at 500 VDC | |
| Withstand Voltage | Between open contacts | 1000 VAC (for one minute) | |
| | Between adjacent contacts | 1500 V surge (10 × 160 μs ^{*2}) | |
| | Between coil to contacts | 1500 VAC (for one minute) 2500 V surge (2 × 10 μs ^{*3}) | |
| Shock Resistance | | 735 m/s ² (misoperation) 980 m/s ² (destructive failure) | |
| Vibration Resistance | | 10 to 55 Hz, double amplitude 3 mm (misoperation) 10 to 55 Hz, double amplitude 5 mm (destructive failure) | |
| Ambient Temperature | | − 40 to + 85°C | |
| Coil Temperature Rise | | 18 degrees at nominal coil voltage (140 mW) | |
| Running Specifications | Non-load | 5 × 10 ⁷ ^{*4} operations (Non-latch type) | |
| | Load | 30 VDC, 1 A (resistive), 1 × 10 ⁵ operations at 20°C, 1 Hz | |
| | | 125 VAC, 0.3 A (resistive), 1 × 10 ⁵ operations at 20°C, 1 Hz | |
| Weight | | Approx. 1 g | |

*1 This value is a reference value in the resistive load.

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

*2 Rise time : 10 μs, decay time to half crest : 160 μs

*3 Rise time : 2 μs, decay time to half crest : 10 μs

*4 This shows a number of operation where it can be runnin by which a fatal defect is not caused, and a number of operation by which a steady characteristic is maintained is 1×10^7 operations.

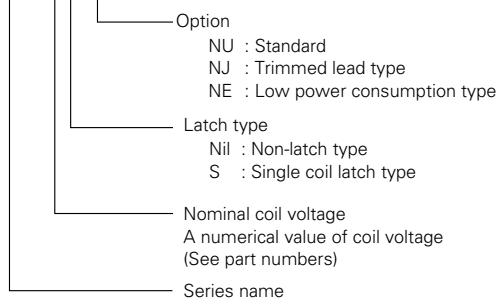


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UA2 Series

■ PART NUMBER SYSTEM

UA2-3SNU



■ SAFETY STANDARD AND RATING

| | |
|---|--|
| UL Recognized (UL508)* File No. E73266 | CSA Certified (CSA C22.2 No14)* File No. LR46266 |
| 30 VDC, 1 A 110 VDC, 0.3 A 125 VAC, 0.3 A | (Resistive) (Resistive) (Resistive) |

* Spacing : UL840

+ Spacing : CSA std950

| |
|--|
| TÜV Certified (EN61810) |
| No. R 2050596 |
| Creepage and clearance of coil to contact is over than 2 mm. (According to EN60950) |
| Basic insulation class |

■ COIL SPECIFICATIONS

• Non-latch Type

at 20°C

| Nominal Coil Voltage (VDC) | Coil Resistance (Ω) ± 10% | Must Operate Voltage* (VDC) | Must Release Voltage* (VDC) | Nominal Operating Power (mW) |
|-------------------------------|------------------------------|--------------------------------|--------------------------------|---------------------------------|
| 3 | 64.3 | 2.25 | 0.3 | 140 |
| 4.5 | 145 | 3.38 | 0.45 | 140 |
| 5 | 178 | 3.75 | 0.5 | 140 |
| 9 | 579 | 6.75 | 0.9 | 140 |
| 12 | 1028 | 9.0 | 1.2 | 140 |
| 24 | 2504 | 18.0 | 2.4 | 230 |

• Single Coil Latch Type

at 20°C

| Nominal Coil Voltage (VDC) | Coil Resistance (Ω) ± 10% | Set Voltage* (VDC) | Reset Voltage* (VDC) | Nominal Operating Power (mW) |
|-------------------------------|------------------------------|-----------------------|-------------------------|---------------------------------|
| 3 | 90 | 2.25 | 2.25 | 100 |
| 4.5 | 202.5 | 3.38 | 3.38 | 100 |
| 5 | 250 | 3.75 | 3.75 | 100 |
| 9 | 810 | 6.75 | 6.75 | 100 |
| 12 | 1440 | 9.0 | 9.0 | 100 |

• Non-latch Low Power Consumption Type

at 20°C

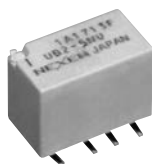
| Nominal Coil Voltage (VDC) | Coil Resistance (Ω) ± 10% | Must Operate Voltage* (VDC) | Must Release Voltage* (VDC) | Nominal Operating Power (mW) |
|-------------------------------|------------------------------|--------------------------------|--------------------------------|---------------------------------|
| 3 | 90 | 2.25 | 0.3 | 100 |
| 4.5 | 202.5 | 3.38 | 0.45 | 100 |
| 5 | 250 | 3.75 | 0.5 | 100 |

* Test by pulse voltage



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UB2 Series



NEXEM's UB2 relay is a new generation Miniature Signal Relay of super-compact size and slim-package for surface mounting.

FEATURES

- Small mounting size of slim package for dense mounting.
- Telcordia (2500 V) and FCC (1500 V) surge capability.
- IEC60950 / UL1950 / EN60950 spacing and high breakdown voltage.
(Basic insulation class on 200 V working voltage)
- Power consumption 140 mW, Low power consumption 100 mW type is available.
- UL recognized (E73266), CSA certified (LR46266), TÜV certified (R2050596)
- Tube or embossed tape packaging.

SPECIFICATIONS

| | | | |
|---------------------------------|---------------------------|---|-------------------------------------|
| Contact Form | | 2 Form C | |
| Contact Material | | Silver alloy with gold alloy overlay | |
| Contact Ratings | Maximum Switching Power | 30 W, 37.5 VA | |
| | Maximum Switching Voltage | 220 VDC, 250 VAC | |
| | Maximum Switching Current | 1 A | |
| | Maximum Carrying Current | 1 A | |
| Minimum Contact Ratings | | 10 mVDC, 10 μ A ⁺¹ | |
| Initial Contact Resistance | | 100 m Ω max. (Initial) | |
| Nominal Operating Power | Non-latch type | 140 mW (1.5 to 12 V), 230 mW (24 V) | 100 mW (low power consumption type) |
| | Single coil latch type | 100 mW (1.5 to 12 V) | |
| Operate Time (Excluding bounce) | | Approx. 2 ms | |
| Release Time (Excluding bounce) | | Approx. 1 ms | |
| Insulation Resistance | | 1000 M Ω at 500 VDC | |
| Withstand Voltage | Between open contacts | 1000 VAC (for one minute) | |
| | Between adjacent contacts | 1500 V surge (10 \times 160 μ s ⁺²) | |
| | Between coil to contacts | 1500 VAC (for one minute) 2500 V surge (2 \times 10 μ s ⁺³) | |
| Shock Resistance | | 735 m/s ² (misoperation) 980 m/s ² (destructive failure) | |
| Vibration Resistance | | 10 to 55 Hz, double amplitude 3 mm (misoperation) 10 to 55 Hz, double amplitude 5 mm (destructive failure) | |
| Ambient Temperature | | − 40 to + 85°C | |
| Coil Temperature Rise | | 18 degrees at nominal coil voltage (140 mW) | |
| Running Specifications | Non-load | 5 \times 10 ⁷ ⁺⁴ operations (Non-latch type) | |
| | Load | 30 VDC, 1 A (resistive), 1 \times 10 ⁵ operations at 20°C, 1 Hz | |
| | | 125 VAC, 0.3 A (resistive), 1 \times 10 ⁵ operations at 20°C, 1 Hz | |
| Weight | | Approx. 1 g | |

*1 This value is a reference value in the resistive load.

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

*2 Rise time : 10 μs , decay time to half crest : 160 μs

*3 Rise time : 2 μs , decay time to half crest : 10 μs

*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 1×10^7 operations.

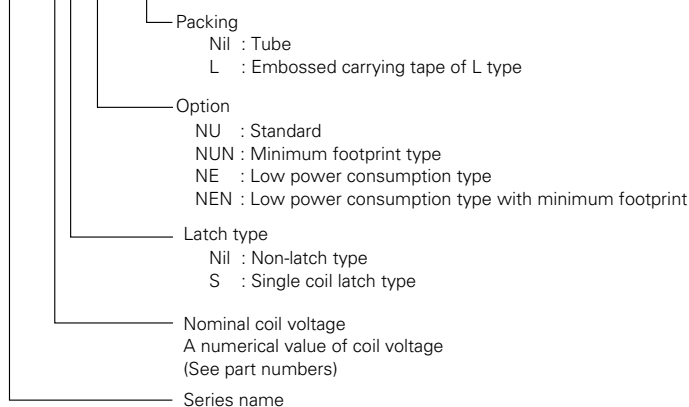


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UB2 Series

■ PART NUMBER SYSTEM

UB2-3SNU - L



■ SAFETY STANDARD AND RATING

| | |
|---|--|
| UL Recognized (UL508)* File No. E73266 | CSA Certificated (CSA C22.2 No14) + File No. LR46266 |
| 30 VDC, 1 A 110 VDC, 0.3 A 125 VAC, 0.3 A | (Resistive) (Resistive) (Resistive) |

* Spacing : UL840

+ Spacing : CSA std950

| |
|--|
| TÜV Certified (EN61810) |
| No. R 2050596 |
| Creepage and clearance of coil to contact is over than 2 mm. (According to EN60950) |
| Basic insulation class |

■ COIL SPECIFICATIONS

• Non-latch Type

at 20°C

| Nominal Coil Voltage (VDC) | Coil Resistance (Ω) ± 10% | Must Operate Voltage* (VDC) | Must Release Voltage* (VDC) | Nominal Operating Power (mW) |
|-------------------------------|------------------------------|--------------------------------|--------------------------------|---------------------------------|
| 3 | 64.3 | 2.25 | 0.3 | 140 |
| 4.5 | 145 | 3.38 | 0.45 | 140 |
| 5 | 178 | 3.75 | 0.5 | 140 |
| 9 | 579 | 6.75 | 0.9 | 140 |
| 12 | 1028 | 9.0 | 1.2 | 140 |
| 24 | 2504 | 18.0 | 2.4 | 230 |

• Single Coil Latch Type

at 20°C

| Nominal Coil Voltage (VDC) | Coil Resistance (Ω) ± 10% | Set Voltage* (VDC) | Reset Voltage* (VDC) | Nominal Operating Power (mW) |
|-------------------------------|------------------------------|-----------------------|-------------------------|---------------------------------|
| 3 | 90 | 2.25 | 2.25 | 100 |
| 4.5 | 202.5 | 3.38 | 3.38 | 100 |
| 5 | 250 | 3.75 | 3.75 | 100 |
| 9 | 810 | 6.75 | 6.75 | 100 |
| 12 | 1440 | 9.0 | 9.0 | 100 |

• Non-latch Low Power Consumption Type

at 20°C

| Nominal Coil Voltage (VDC) | Coil Resistance (Ω) ± 10% | Must Operate Voltage* (VDC) | Must Release Voltage* (VDC) | Nominal Operating Power (mW) |
|-------------------------------|------------------------------|--------------------------------|--------------------------------|---------------------------------|
| 3 | 90 | 2.25 | 0.3 | 100 |
| 4.5 | 202.5 | 3.38 | 0.45 | 100 |
| 5 | 250 | 3.75 | 0.5 | 100 |

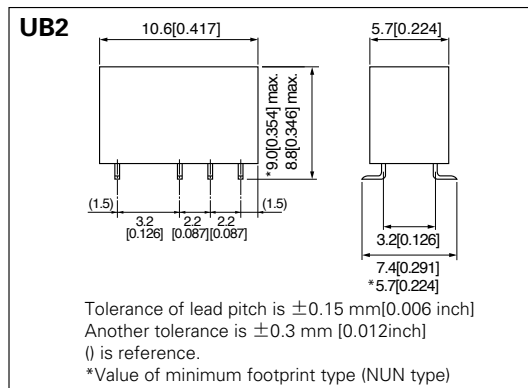
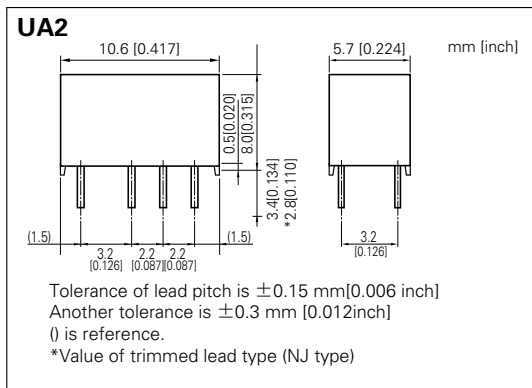
* Test by pulse voltage



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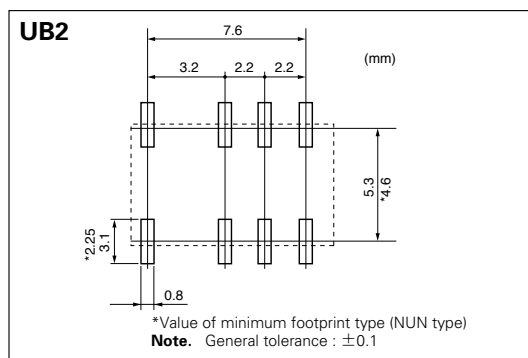
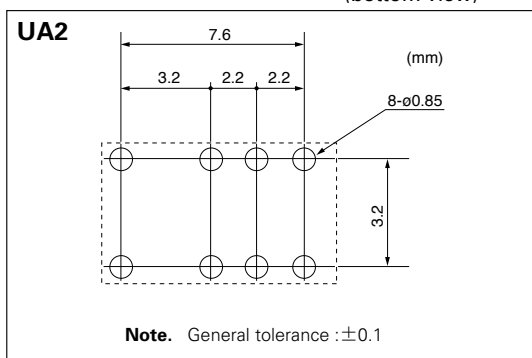
UA2/UB2 Series

■ DIMENSIONS mm(inch)

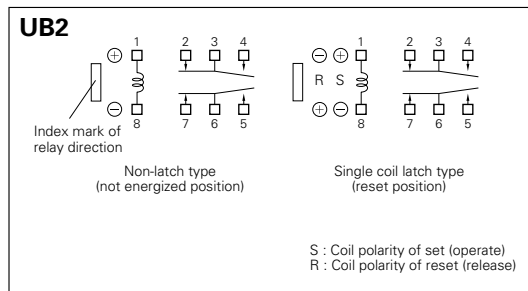
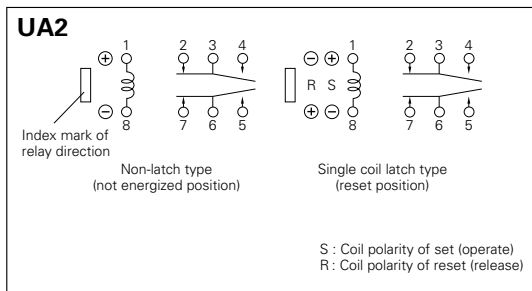


■ RECOMMENDED PAD LAYOUT

(bottom view)



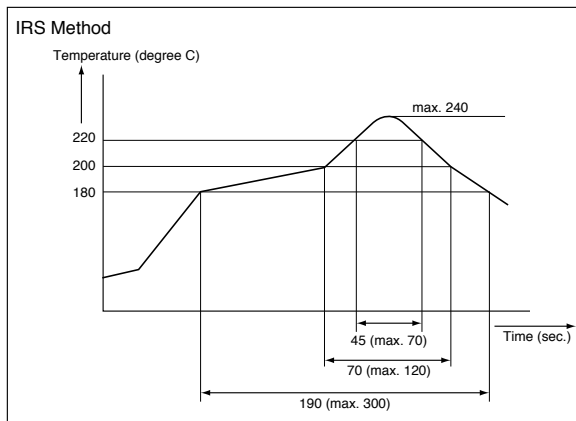
■ SCHEMATICS (bottom view)



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UA2/UB2 Series

■ SOLDERING CONDITION (UB2 Series)



Note

1. Temperature profile shows printed circuit board surface temperature on the relay terminal portion.
2. Check the actual soldering condition to use other method except above mentioned temperature profiles.

■ Recommended relay drive conditions

Drive under conditions. If it is impossible, please inquire to EM Devices.

| Non-latch type | Voltage: within $\pm 5\%$ of nominal voltage | Ambient temperature - 40 ~ + 85°C |
|--|---|--------------------------------------|
| Single coil latch type Double coil latch type | Square pulse (rise and fall time is rapidly) Pulse height: within $\pm 5\%$ of nominal voltage Pulse width: more than 10 ms | |

■ Technical document

Please confirm technical document before use.

It is able to receive a document at EM Devices' World-wide-web site.
(<http://www.em-devices.com>)

| ITEM | TITLE |
|------------------|---|
| Data sheet | UA2/UB2 series |
| Information | UA2/UB2 series technical data |
| User's manual | Function and note on correct use |
| Application note | Application circuit of miniature signal relay |



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UA2/UB2 Series

■ ORDERING PART NUMBERS

• UA2 series

| Option | | Nominal Coil Voltage (VDC) | Coil Type | | |
|--------------|---------|----------------------------|-----------|-------------------|---------------------------------|
| Terminal | Packing | | Non-latch | Single Coil Latch | Non-latch Low Power Consumption |
| Standard | Tube | 3 | UA2-3NU | UA2-3SNU | UA2-3NE |
| | | 4.5 | UA2-4.5NU | UA2-4.5SNU | UA2-4.5NE |
| | | 5 | UA2-5NU | UA2-5SNU | UA2-5NE |
| | | 9 | UA2-9NU | UA2-9SNU | - |
| | | 12 | UA2-12NU | UA2-12SNU | - |
| | | 24 | UA2-24NU | - | - |
| Trimmed lead | | 3 | UA2-3NJ | UA2-3SNJ | - |
| | | 4.5 | UA2-4.5NJ | UA2-4.5SNJ | - |
| | | 5 | UA2-5NJ | UA2-5SNJ | - |
| | | 9 | UA2-9NJ | UA2-9SNJ | - |
| | | 12 | UA2-12NJ | UA2-12SNJ | - |
| | | 24 | UA2-24NJ | - | - |

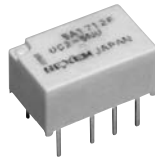
• UB2 series

| Option | | Nominal Coil Voltage (VDC) | Coil Type | | |
|-------------------|---------|----------------------------|--------------|-------------------|---------------------------------|
| Terminal | Packing | | Non-latch | Single Coil Latch | Non-latch Low Power Consumption |
| Standard | Tube | 3 | UB2-3NU | UB2-3SNU | UB2-3NE |
| | | 4.5 | UB2-4.5NU | UB2-4.5SNU | UB2-4.5NE |
| | | 5 | UB2-5NU | UB2-5SNU | UB2-5NE |
| | | 9 | UB2-9NU | UB2-9SNU | - |
| | | 12 | UB2-12NU | UB2-12SNU | - |
| | | 24 | UB2-24NU | - | - |
| | Taping | 3 | UB2-3NU-L | UB2-3SNU-L | UB2-3NE-L |
| | | 4.5 | UB2-4.5NU-L | UB2-4.5SNU-L | UB2-4.5NE-L |
| | | 5 | UB2-5NU-L | UB2-5SNU-L | UB2-5NE-L |
| | | 9 | UB2-9NU-L | UB2-9SNU-L | - |
| | | 12 | UB2-12NU-L | UB2-12SNU-L | - |
| Minimum footprint | Tube | 24 | UB2-24NU-L | - | - |
| | | 3 | UB2-3NUN | UB2-3SNUN | UB2-3NEN |
| | | 4.5 | UB2-4.5NUN | UB2-4.5SNUN | UB2-4.5NEN |
| | | 5 | UB2-5NUN | UB2-5SNUN | UB2-5NEN |
| | | 9 | UB2-9NUN | UB2-9SNUN | - |
| | | 12 | UB2-12NUN | UB2-12SNUN | - |
| | Taping | 24 | UB2-24NUN | - | - |
| | | 3 | UB2-3NUN-L | UB2-3SNUN-L | UB2-3NEN-L |
| | | 4.5 | UB2-4.5NUN-L | UB2-4.5SNUN-L | UB2-4.5NEN-L |
| | | 5 | UB2-5NUN-L | UB2-5SNUN-L | UB2-5NEN-L |
| | | 9 | UB2-9NUN-L | UB2-9SNUN-L | - |
| | | 12 | UB2-12NUN-L | UB2-12SNUN-L | - |
| | | 24 | UB2-24NUN-L | - | - |



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UC2 Series



NEXEM's UC2 relay is a new generation Miniature Signal Relay of super-compact size and flat-package.

FEATURES

- Small mounting size of flat package for dense mounting.
- Telcordia (2500 V) and FCC (1500 V) surge capability.
- IEC60950 / UL1950 / EN60950 spacing and high breakdown voltage.
(Basic insulation class on 200 V working voltage)
- Low power consumption 100mW type is available
- UL recognized (E73266), CSA certified (LR46266), TÜV certified (R2050596)

SPECIFICATIONS

| | | | |
|---------------------------------|---------------------------|---|------------------------------------|
| Contact Form | | 2 Form C | |
| Contact Material | | Silver alloy with gold alloy overlay | |
| Contact Ratings | Maximum Switching Power | 30 W, 37.5 VA | |
| | Maximum Switching Voltage | 220 VDC, 250 VAC | |
| | Maximum Switching Current | 1 A | |
| | Maximum Carrying Current | 1 A | |
| Minimum Contact Ratings | | 10 mVDC, 10 μ A ^{*1} | |
| Initial Contact Resistance | | 100 m Ω max. (Initial) | |
| Nominal Operating Power | Non-latch type | 140 mW (1.5 to 12 V) | 100mW (Low power consumption type) |
| | Single coil latch type | 100 mW (1.5 to 12 V) | |
| Operate Time (Excluding bounce) | | Approx. 2 ms | |
| Release Time (Excluding bounce) | | Approx. 1 ms | |
| Insulation Resistance | | 1000 M Ω at 500 VDC | |
| Withstand Voltage | Between open contacts | 1000 VAC (for one minute) | |
| | Between adjacent contacts | 1500 V surge (10 \times 160 μ s ^{*2}) | |
| | Between coil to contacts | 1500 VAC (for one minute) 2500 V surge (2 \times 10 μ s ^{*3}) | |
| Shock Resistance | | 735 m/s ² (misoperation) 980 m/s ² (destructive failure) | |
| Vibration Resistance | | 10 to 55 Hz, double amplitude 3 mm (misoperation) 10 to 55 Hz, double amplitude 5 mm (destructive failure) | |
| Ambient Temperature | | − 40 to + 85°C (Low power consumption type: − 40 to + 70°C) | |
| Coil Temperature Rise | | 18 degrees at nominal coil voltage (140 mW) | |
| Running Specifications | Non-load | 5 \times 10 ⁷ *4 operations (Non-latch type) | |
| | Load | 30 VDC, 1 A (resistive), 1 \times 10 ⁵ operations at 20°C, 1 Hz | |
| | | 125 VAC, 0.3 A (resistive), 1 \times 10 ⁵ operations at 20°C, 1 Hz | |
| Weight | | Approx. 0.8 g | |

*1 This value is a reference value in the resistive load.

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

*2 Rise time : 10 μs , decay time to half crest : 160 μs

*3 Rise time : 2 μs , decay time to half crest : 10 μs

*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 1×10^7 operations.

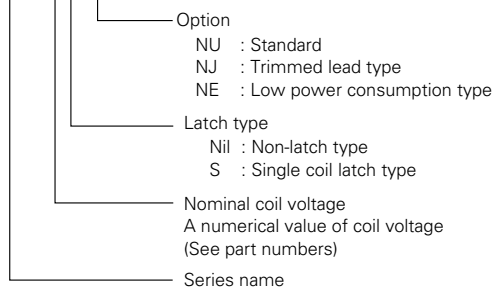


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UC2 Series

■ PART NUMBER SYSTEM

UC2-3SNU



■ SAFETY STANDARD AND RATING

| | |
|---|---|
| UL Recognized (UL508)* File No. E73266 | CSA Certified (CSA C22.2 No14) + File No. LR46266 |
| 30 VDC, 1 A 110 VDC, 0.3 A 125 VAC, 0.5 A | (Resistive) (Resistive) (Resistive) |

* Spacing : UL840

+ Spacing : CSA std950

| |
|--|
| TÜV Certified (EN61810) |
| No. R 2050596 |
| Creepage and clearance of coil to contact is over than 2 mm. (According to EN60950) |
| Basic insulation class |

■ COIL SPECIFICATIONS

• Non-latch Type

at 20°C

| Nominal Coil Voltage (VDC) | Coil Resistance (Ω) ± 10% | Must Operate Voltage* (VDC) | Must Release Voltage* (VDC) | Nominal Operating Power (mW) |
|-------------------------------|------------------------------|--------------------------------|--------------------------------|---------------------------------|
| 3 | 64.3 | 2.25 | 0.3 | 140 |
| 4.5 | 145 | 3.38 | 0.45 | 140 |
| 5 | 178 | 3.75 | 0.5 | 140 |
| 9 | 579 | 6.75 | 0.9 | 140 |
| 12 | 1028 | 9.0 | 1.2 | 140 |

• Single Coil Latch Type

at 20°C

| Nominal Coil Voltage (VDC) | Coil Resistance (Ω) ± 10% | Set Voltage* (VDC) | Reset Voltage* (VDC) | Nominal Operating Power (mW) |
|-------------------------------|------------------------------|-----------------------|-------------------------|---------------------------------|
| 3 | 90 | 2.25 | 2.25 | 100 |
| 4.5 | 202.5 | 3.38 | 3.38 | 100 |
| 5 | 250 | 3.75 | 3.75 | 100 |
| 9 | 810 | 6.75 | 6.75 | 100 |

• Non-latch Low Power Consumption Type

at 20°C

| Nominal Coil Voltage (VDC) | Coil Resistance (Ω) ± 10% | Must Operate Voltage* (VDC) | Must Release Voltage* (VDC) | Nominal Operating Power (mW) |
|-------------------------------|------------------------------|--------------------------------|--------------------------------|---------------------------------|
| 3 | 90 | 2.4 | 0.3 | 100 |
| 4.5 | 202.5 | 3.6 | 0.45 | 100 |
| 5 | 250 | 4.0 | 0.5 | 100 |

* Test by pulse voltage



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- Please request for a specification sheet for detailed product data prior to the purchase.
- Before using the product in this catalog, please read "Precautions" and other safety precautions listed in the printed version catalog.

UD2 Series



NEXEM's UD2 relay is a new generation Miniature Signal Relay of super-compact size and flat-package for surface mounting.

FEATURES

- Small mounting size of flat package for dense mounting.
- Telcordia (2500 V) and FCC (1500 V) surge capability.
- IEC60950 / UL1950 / EN60950 spacing and high breakdown voltage.
(Basic insulation class on 200 V working voltage)
- Low power consumption 100 mW type is available
- UL recognized (E73266), CSA certified (LR46266), TÜV certified (R2050596)
- Tube or embossed tape packaging.

SPECIFICATIONS

| | | | |
|---------------------------------|---------------------------|---|------------------------------------|
| Contact Form | | 2 Form C | |
| Contact Material | | Silver alloy with gold alloy overlay | |
| Contact Ratings | Maximum Switching Power | 30 W, 37.5 VA | |
| | Maximum Switching Voltage | 220 VDC, 250 VAC | |
| | Maximum Switching Current | 1 A | |
| | Maximum Carrying Current | 1 A | |
| Minimum Contact Ratings | | 10 mVDC, 10 μ A ^{*1} | |
| Initial Contact Resistance | | 100 m Ω max. (Initial) | |
| Nominal Operating Power | Non-latch type | 140 mW (1.5 to 12 V) | 100mW (Low power consumption type) |
| | Single coil latch type | 100 mW (1.5 to 12 V) | |
| Operate Time (Excluding bounce) | | Approx. 2 ms | |
| Release Time (Excluding bounce) | | Approx. 1 ms | |
| Insulation Resistance | | 1000 M Ω at 500 VDC | |
| Withstand Voltage | Between open contacts | 1000 VAC (for one minute) 1500 V surge (10 \times 160 μ s ^{*2}) | |
| | Between adjacent contacts | | |
| | Between coil to contacts | 1500 VAC (for one minute) 2500 V surge (2 \times 10 μ s ^{*3}) | |
| Shock Resistance | | 735 m/s ² (misoperation) 980 m/s ² (destructive failure) | |
| Vibration Resistance | | 10 to 55 Hz, double amplitude 3 mm (misoperation) 10 to 55 Hz, double amplitude 5 mm (destructive failure) | |
| Ambient Temperature | | − 40 to + 85°C (Low power consumption type: − 40 to + 70°C) | |
| Coil Temperature Rise | | 18 degrees at nominal coil voltage (140 mW) | |
| Running Specifications | Non-load | 5 \times 10 ⁷ ^{*4} operations (Non-latch type) | |
| | Load | 30 VDC, 1 A (resistive), 1 \times 10 ⁵ operations at 20°C, 1 Hz | |
| | | 125 VAC, 0.3 A (resistive), 1 \times 10 ⁵ operations at 20°C, 1 Hz | |
| Weight | | Approx. 0.8 g | |

*1 This value is a reference value in the resistive load.

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

*2 Rise time : 10 μs , decay time to half crest : 160 μs

*3 Rise time : 2 μs , decay time to half crest : 10 μs

*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 1×10^7 operations.

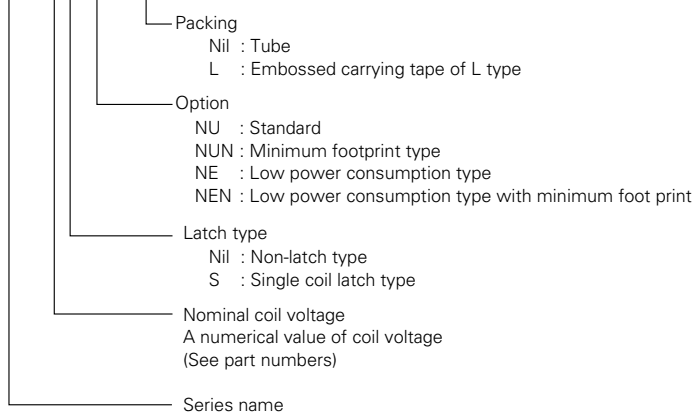


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UD2 Series

■ PART NUMBER SYSTEM

UD2-3SNU - L



■ SAFETY STANDARD AND RATING

| | |
|---|---|
| UL Recognized (UL508)* File No. E73266 | CSA Certificated (CSA C22.2 No14)* File No. LR46266 |
| 30 VDC, 1 A 110 VDC, 0.3 A 125 VAC, 0.5 A | (Resistive) (Resistive) (Resistive) |

* Spacing : UL840

+ Spacing : CSA std950

| |
|--|
| TÜV Certified (EN61810) |
| No. R 2050596 |
| Creepage and clearance of coil to contact is over than 2 mm. (According to EN60950) |
| Basic insulation class |

■ COIL SPECIFICATIONS

• Non-latch Type

at 20°C

| Nominal Coil Voltage (VDC) | Coil Resistance (Ω) ± 10% | Must Operate Voltage* (VDC) | Must Release Voltage* (VDC) | Nominal Operating Power (mW) |
|-------------------------------|------------------------------|--------------------------------|--------------------------------|---------------------------------|
| 3 | 64.3 | 2.25 | 0.3 | 140 |
| 4.5 | 145 | 3.38 | 0.45 | 140 |
| 5 | 178 | 3.75 | 0.5 | 140 |
| 9 | 579 | 6.75 | 0.9 | 140 |
| 12 | 1028 | 9.0 | 1.2 | 140 |

• Single Coil Latch Type

at 20°C

| Nominal Coil Voltage (VDC) | Coil Resistance (Ω) ± 10% | Set Voltage* (VDC) | Reset Voltage* (VDC) | Nominal Operating Power (mW) |
|-------------------------------|------------------------------|-----------------------|-------------------------|---------------------------------|
| 3 | 90 | 2.25 | 2.25 | 100 |
| 4.5 | 202.5 | 3.38 | 3.38 | 100 |
| 5 | 250 | 3.75 | 3.75 | 100 |
| 9 | 810 | 6.75 | 6.75 | 100 |

• Non-latch Low Power Consumption Type

at 20°C

| Nominal Coil Voltage (VDC) | Coil Resistance (Ω) ± 10% | Must Operate Voltage* (VDC) | Must Release Voltage* (VDC) | Nominal Operating Power (mW) |
|-------------------------------|------------------------------|--------------------------------|--------------------------------|---------------------------------|
| 3 | 90 | 2.4 | 0.3 | 100 |
| 4.5 | 202.5 | 3.6 | 0.45 | 100 |
| 5 | 250 | 4.0 | 0.5 | 100 |

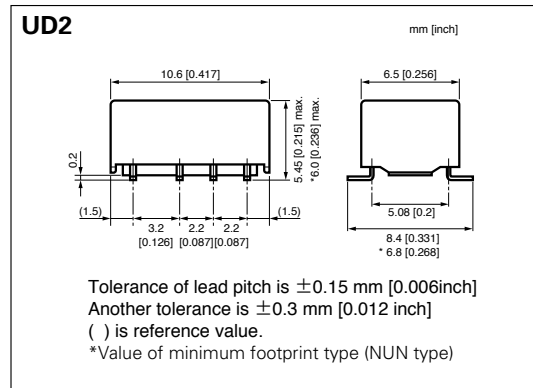
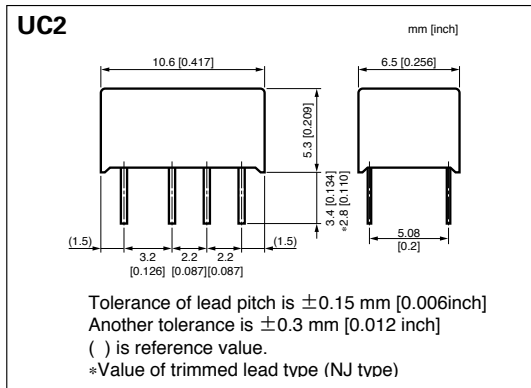
* Test by pulse voltage



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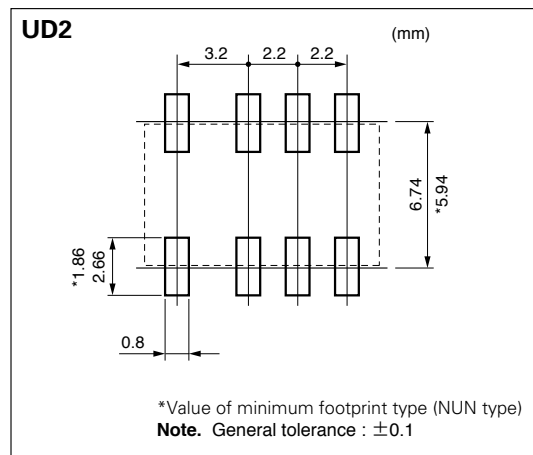
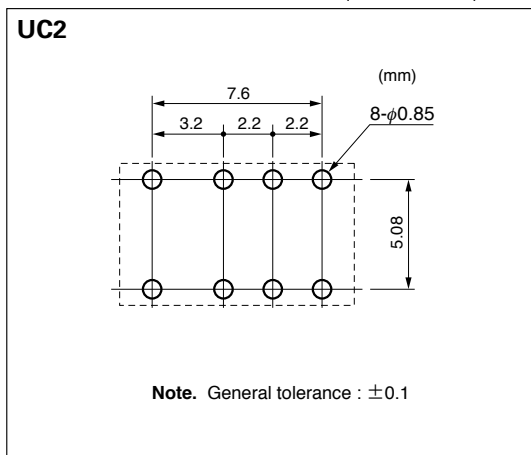
UC2/UD2 Series

■ DIMENSIONS mm(inch)

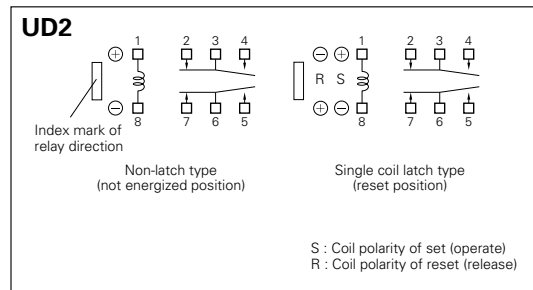
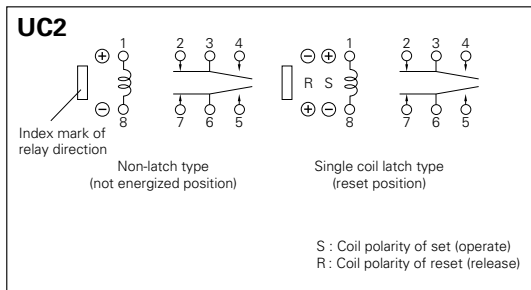


■ RECOMMENDED PAD LAYOUT

(bottom view)

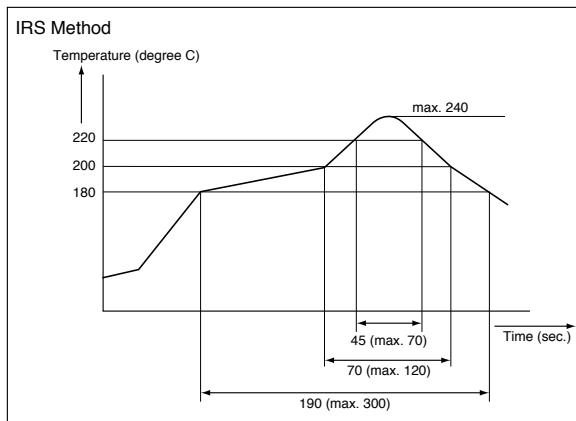


■ SCHEMATICS (bottom view)



UC2/UD2 Series

■ SOLDERING CONDITION (UD2 Series)



Note

1. Temperature profile shows printed circuit board surface temperature on the relay terminal portion.
2. Check the actual soldering condition to use other method except above mentioned temperature profiles.

■ Recommended relay drive conditions

Drive under conditions. If it is impossible, please inquire to EM Devices.

| | | |
|------------------------|---|--------------------------------------|
| Non-latch type | Voltage: within $\pm 5\%$ of nominal voltage | Ambient temperature - 40 ~ + 85°C |
| Non-latch NE type | | Ambient temperature - 40 ~ + 70°C |
| Single coil latch type | Square pulse (rise and fall time is rapidly) Pulse height: within $\pm 5\%$ of nominal voltage Pulse width: more than 10 ms | Ambient temperature - 40 ~ + 85°C |

■ Technical document

Please confirm technical document before use.

It is able to receive a document at EM Devices' World-wide-web site.
(<http://www.em-devices.com>)

| ITEM | TITLE |
|------------------|---|
| Data sheet | UC2/UD2 series |
| Information | UC2/UD2 series technical data |
| User's manual | Function and note on correct use |
| Application note | Application circuit of miniature signal relay |



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- Before using the product in this catalog, please read "Precautions" and other safety precautions listed in the printed version catalog.

UC2/UD2 Series

■ ORDERING PART NUMBERS

• UC2 series

| Option | | Nominal Coil Voltage (VDC) | Coil Type | | |
|--------------|---------|----------------------------|-----------|-------------------|---------------------------------|
| Terminal | Packing | | Non-latch | Single Coil Latch | Non-latch Low Power Consumption |
| Standard | Tube | 3 | UC2-3NU | UC2-3SNU | UC2-3NE |
| | | 4.5 | UC2-4.5NU | UC2-4.5SNU | UC2-4.5NE |
| | | 5 | UC2-5NU | UC2-5SNU | UC2-5NE |
| | | 9 | UC2-9NU | UC2-9SNU | - |
| | | 12 | UC2-12NU | - | - |
| Trimmed lead | | 3 | UC2-3NJ | UC2-3SNJ | - |
| | | 4.5 | UC2-4.5NJ | UC2-4.5SNJ | - |
| | | 5 | UC2-5NJ | UC2-5SNJ | - |
| | | 9 | UC2-9NJ | UC2-9SNJ | - |
| | | 12 | UC2-12NJ | - | - |

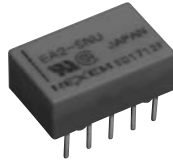
• UD2 series

| Option | | Nominal Coil Voltage (VDC) | Coil Type | | |
|-------------------|---------|----------------------------|--------------|-------------------|---------------------------------|
| Terminal | Packing | | Non-latch | Single Coil Latch | Non-latch Low Power Consumption |
| Standard | Tube | 3 | UD2-3NU | UD2-3SNU | UD2-3NE |
| | | 4.5 | UD2-4.5NU | UD2-4.5SNU | UD2-4.5NE |
| | | 5 | UD2-5NU | UD2-5SNU | UD2-5NE |
| | | 9 | UD2-9NU | UD2-9SNU | - |
| | | 12 | UD2-12NU | - | - |
| | Taping | 3 | UD2-3NU-L | UD2-3SNU-L | UD2-3NE-L |
| | | 4.5 | UD2-4.5NU-L | UD2-4.5SNU-L | UD2-4.5NE-L |
| | | 5 | UD2-5NU-L | UD2-5SNU-L | UD2-5NE-L |
| | | 9 | UD2-9NU-L | UD2-9SNU-L | - |
| | | 12 | UD2-12NU-L | - | - |
| Minimum footprint | Tube | 3 | UD2-3NUN | UD2-3SNUN | UD2-3NEN |
| | | 4.5 | UD2-4.5NUN | UD2-4.5SNUN | UD2-4.5NEN |
| | | 5 | UD2-5NUN | UD2-5SNUN | UD2-5NEN |
| | | 9 | UD2-9NUN | UD2-9SNUN | - |
| | | 12 | UD2-12NUN | - | - |
| | Taping | 3 | UD2-3NUN-L | UD2-3SNUN-L | UD2-3NEN-L |
| | | 4.5 | UD2-4.5NUN-L | UD2-4.5SNUN-L | UD2-4.5NEN-L |
| | | 5 | UD2-5NUN-L | UD2-5SNUN-L | UD2-5NEN-L |
| | | 9 | UD2-9NUN-L | UD2-9SNUN-L | - |
| | | 12 | UD2-12NUN-L | - | - |



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EA2 Series



The EA2 series has reduced package size and power consumption compared to other NEXEM conventional relays. Furthermore, it complies with 1500 V surge-voltage requirement of FCC Part 68 by the unique structure and the efficient magnetic circuit.

FEATURES

- Low power consumption
- Compact and light weight
- 2 Form C contact arrangement
- Low magnetic interference
- Breakdown voltage : 1000 VAC (surge voltage 1500 V), FCC Part 68 compliant
- Tube packaging
- UL recognized (E73266), CSA certified (LR46266)

SPECIFICATIONS

| | | |
|---------------------------------|---------------------------|--|
| Contact Form | | 2 Form C |
| Contact Material | | Silver alloy with gold alloy overlay |
| Contact Ratings | Maximum Switching Power | 30 W, 62.5 VA |
| | Maximum Switching Voltage | 220 VDC, 250 VAC |
| | Maximum Switching Current | 1 A |
| | Maximum Carrying Current | 2 A |
| Minimum Contact Ratings | | 10 mVDC, $10 \mu A^{*1}$ |
| Initial Contact Resistance | | 75 m Ω max. (Initial) |
| Nominal Operating Power | Non-latch type | 140 mW (3 to 12 V), 200 mW (24 V) |
| | Single coil latch type | 100 mW (3 to 12 V), 150 mW (24 V) |
| | Double coil latch type | 140 mW (3 to 12 V), 200 mW (24 V) |
| Operate Time (Excluding bounce) | | Approx. 2 ms |
| Release Time (Excluding bounce) | | Approx. 1 ms (without diode) |
| Insulation Resistance | | 1000 M Ω at 500 VDC |
| Withstand Voltage | Between open contacts | 1000 VAC (for one minute) |
| | Between adjacent contacts | 1500 V surge ($10 \times 160 \mu s^{*2}$) |
| | Between coil to contacts | 1000 VAC (for one minute) 1500 V surge ($10 \times 160 \mu s^{*2}$) |
| Shock Resistance | | 735 m/s ² (misoperation) 980 m/s ² (destructive failure) |
| Vibration Resistance | | 10 to 55 Hz, double amplitude 3 mm (misoperation) 10 to 55 Hz, double amplitude 5 mm (destructive failure) |
| Ambient Temperature | | - 40 to + 85°C |
| Coil Temperature Rise | | 18 degrees at nominal coil voltage (140 mW) |
| Running Specifications | Non-load | $1 \times 10^{8-9}$ operations (Non-latch type) 1×10^7 operations (latch type) |
| | Load | 50 VDC, 0.1 A (resistive) 1×10^6 operations at 85°C, 5 Hz 10 VDC, 10 mA (resistive) 1×10^6 operations at 85°C, 2 Hz |
| Weight | | Approx. 1.5 g |

*1 This value is a reference value in the resistive load.

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

*2 Rise time : 10 μs , decay time to half crest : 160 μs

*3 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 1×10^7 operations.



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EA2 Series

■ PART NUMBER SYSTEM

EA2-3SNU

NU : Standard type
 NJ : Trimmed leads type
 Latch type
 Nil : Non-latch type (standard)
 S : Single coil latch type
 T : Double coil latch type
 Nominal coil voltage (See part numbers)

■ SAFETY STANDARD AND RATING

| | |
|--|---|
| UL Recognized (UL508) File No. E73266 | CSA Certified (CSA C22.2 No14) File No. LR46266 |
| 30 VDC, 1A 110 VDC, 0.3A 125 VAC, 0.5A | (Resistive) (Resistive) (Resistive) |

■ COIL SPECIFICATIONS

• Non-latch Type

at 20°C

| Nominal Coil Voltage (VDC) | Coil Resistance (Ω) ± 10% | Must Operate Voltage* (VDC) | Must Release Voltage* (VDC) | Nominal Operating Power (mW) |
|-------------------------------|------------------------------|--------------------------------|--------------------------------|---------------------------------|
| 3 | 64.3 | 2.25 | 0.3 | 140 |
| 4.5 | 145 | 3.38 | 0.45 | 140 |
| 5 | 178 | 3.75 | 0.5 | 140 |
| 12 | 1028 | 9.0 | 1.2 | 140 |
| 24 | 2880 | 18.0 | 2.4 | 200 |

• Single Coil Latch Type

at 20°C

| Nominal Coil Voltage (VDC) | Coil Resistance (Ω) ± 10% | Set Voltage* (VDC) | Reset Voltage* (VDC) | Nominal Operating Power (mW) |
|-------------------------------|------------------------------|-----------------------|-------------------------|---------------------------------|
| 3 | 90 | 2.25 | 2.25 | 100 |
| 4.5 | 202.5 | 3.38 | 3.38 | 100 |
| 5 | 250 | 3.75 | 3.75 | 100 |
| 12 | 1440 | 9.0 | 9.0 | 100 |
| 24 | 3840 | 18.0 | 18.0 | 150 |

• Double Coil Latch Type (Can not be driven by reverse polarity for reverse operation)

at 20°C

| Nominal Coil Voltage (VDC) | Coil Resistance (Ω) ± 10% | | Set Voltage** (VDC) | Reset Voltage** (VDC) | Nominal Operating Power (mW) |
|-------------------------------|------------------------------|------|------------------------|--------------------------|---------------------------------|
| 3 | S | 64.3 | 2.25 | - | 140 |
| | R | 64.3 | - | 2.25 | |
| 4.5 | S | 145 | 3.38 | - | 140 |
| | R | 145 | - | 3.38 | |
| 5 | S | 178 | 3.75 | - | 140 |
| | R | 178 | - | 3.75 | |
| 12 | S | 1028 | 9.0 | - | 140 |
| | R | 1028 | - | 9.0 | |
| 24 | S | 2880 | 18.0 | - | 200 |
| | R | 2880 | - | 18.0 | |

* 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 above polarity to avoid wrong operation.
Any special coil requirement, please contact EM Devices for availability.



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EB2 Series



The EB2 series has adapted IRS, VPS surface mounting technique, and sustained the high-performance of EA2 series.

FEATURES

- Compact and light weight
- 2 Form C contact arrangement
- Low power consumption
- Low magnetic interference
- Breakdown voltage : 1000 VAC (surge voltage 1500 V), FCC Part 68 compliant
- Tube or Embossed tape packaging
- UL recognized (E73266), CSA certified (LR46266)

SPECIFICATIONS

| | | |
|---------------------------------|---------------------------|---|
| Contact Form | | 2 Form C |
| Contact Material | | Silver alloy with gold alloy overlay |
| Contact Ratings | Maximum Switching Power | 30 W, 62.5 VA |
| | Maximum Switching Voltage | 220 VDC, 250 VAC |
| | Maximum Switching Current | 1 A |
| | Maximum Carrying Current | 2 A |
| Minimum Contact Ratings | | 10 mVDC, 10 μ A ^{*1} |
| Initial Contact Resistance | | 75 m Ω max. (Initial) |
| Nominal Operating Power | Non-latch type | 140 mW (3 to 12 V), 200 mW (24 V) |
| | Single coil latch type | 100 mW (3 to 12 V), 150 mW (24 V) |
| | Double coil latch type | 140 mW (3 to 12 V), 200 mW (24 V) |
| Operate Time (Excluding bounce) | | Approx. 2 ms |
| Release Time (Excluding bounce) | | Approx. 1 ms (without diode) |
| Insulation Resistance | | 1000 M Ω at 500 VDC |
| Withstand Voltage | Between open contacts | 1000 VAC (for one minute) |
| | Between adjacent contacts | 1500 V surge (10 \times 160 μ s ^{*2}) |
| | Between coil to contacts | 1000 VAC (for one minute) 1500 V surge (10 \times 160 μ s ^{*2}) |
| Shock Resistance | | 735 m/s ² (misoperation) 980 m/s ² (destructive failure) |
| Vibration Resistance | | 10 to 55 Hz, double amplitude 3 mm (misoperation) 10 to 55 Hz, double amplitude 5 mm (destructive failure) |
| Ambient Temperature | | − 40 to + 85°C |
| Coil Temperature Rise | | 18 degrees at nominal coil voltage (140 mW) |
| Running Specifications | Non-load | 1 \times 10 ⁸⁺³ operations (Non-latch type) 1 \times 10 ⁷ operations (latch type) |
| | Load | 50 VDC, 0.1 A (resistive) 1 \times 10 ⁶ operations at 85°C, 5 Hz |
| | | 10 VDC, 10 mA (resistive) 1 \times 10 ⁶ operations at 85°C, 2 Hz |
| Weight | | Approx. 1.5 g |

*1 This value is a reference value in the resistive load.

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

*2 Rise time : 10 μs , decay time to half crest : 160 μs

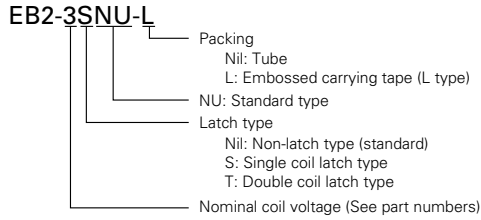
*3 This shows a number of operation where it can be running by which a fatal defect is not caused, and a number of operation by which a steady characteristic is maintained is 1×10^7 operations.



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EB2 Series

■ PART NUMBER SYSTEM



■ SAFETY STANDARD AND RATING

| | |
|---|---|
| UL Recognized (UL508) File No. E73266 | CSA Certified (CSA C22.2 No14) File No. LR46266 |
| 30 VDC, 1 A 110 VDC, 0.3 A 125 VAC, 0.5 A | (Resistive) (Resistive) (Resistive) |

■ COIL SPECIFICATIONS

• Non-latch Type

at 20°C

| Nominal Coil Voltage (VDC) | Coil Resistance (Ω) $\pm 10\%$ | Must Operate Voltage* (VDC) | Must Release Voltage* (VDC) | Nominal Operating Power (mW) |
|-------------------------------|--|--------------------------------|--------------------------------|---------------------------------|
| 3 | 64.3 | 2.25 | 0.3 | 140 |
| 4.5 | 145 | 3.38 | 0.45 | 140 |
| 5 | 178 | 3.75 | 0.5 | 140 |
| 12 | 1028 | 9.0 | 1.2 | 140 |
| 24 | 2880 | 18.0 | 2.4 | 200 |

• Single Coil Latch Type

at 20°C

| Nominal Coil Voltage (VDC) | Coil Resistance (Ω) $\pm 10\%$ | Set Voltage* (VDC) | Reset Voltage* (VDC) | Nominal Operating Power (mW) |
|-------------------------------|--|-----------------------|-------------------------|---------------------------------|
| 3 | 90 | 2.25 | 2.25 | 100 |
| 4.5 | 202.5 | 3.38 | 3.38 | 100 |
| 5 | 250 | 3.75 | 3.75 | 100 |
| 12 | 1440 | 9.0 | 9.0 | 100 |
| 24 | 3840 | 18.0 | 18.0 | 150 |

• Double Coil Latch Type (Can not be driven by reverse polarity for reverse operation)

at 20°C

| Nominal Coil Voltage (VDC) | Coil Resistance (Ω) $\pm 10\%$ | | Set Voltage** (VDC) | Reset Voltage** (VDC) | Nominal Operating Power (mW) |
|-------------------------------|--|------|------------------------|--------------------------|---------------------------------|
| 3 | S | 64.3 | 2.25 | - | 140 |
| | R | 64.3 | - | 2.25 | |
| 4.5 | S | 145 | 3.38 | - | 140 |
| | R | 145 | - | 3.38 | |
| 5 | S | 178 | 3.75 | - | 140 |
| | R | 178 | - | 3.75 | |
| 12 | S | 1028 | 9.0 | - | 140 |
| | R | 1028 | - | 9.0 | |
| 24 | S | 2880 | 18.0 | - | 200 |
| | R | 2880 | - | 18.0 | |

* 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 above polarity to avoid wrong operation.
Any special coil requirement, please contact EM Devices for availability.

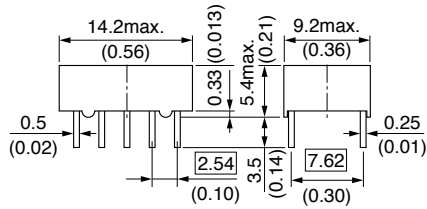


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- Please request for a specification sheet for detailed product data prior to the purchase.
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EA2/EB2 Series

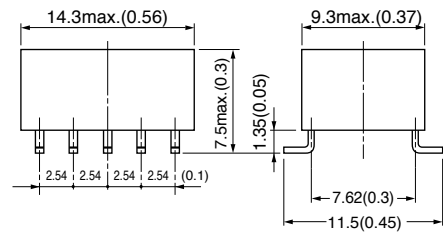
■ DIMENSIONS mm(inch)

EA2



Note: Tolerance ± 0.2 unless otherwise specified
 NJ: Cover height — 6.3mm, Lead — 2.8mm

EB2

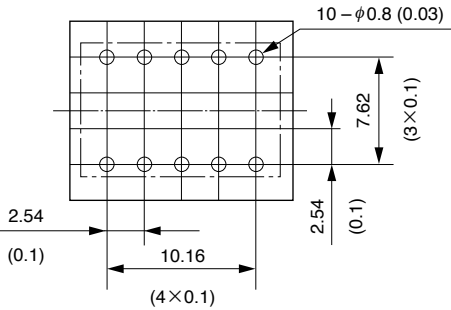


Note: Tolerance ± 0.2 mm unless otherwise specified

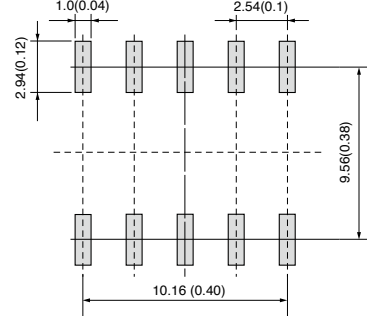
■ RECOMMENDED PAD LAYOUT

(bottom view) mm (inch)

EA2

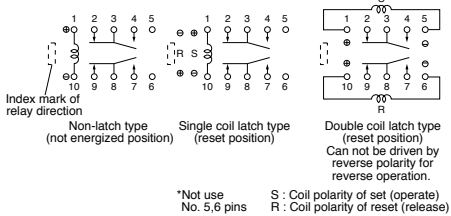


EB2

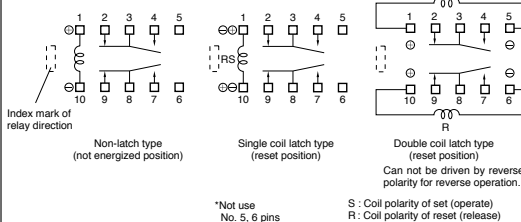


■ SCHEMATICS (bottom view)

EA2



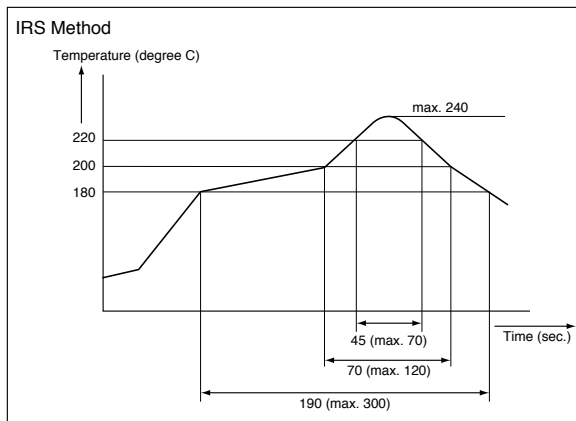
EB2



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- Please request for a specification sheet for detailed product data prior to the purchase.
- Before using the product in this catalog, please read "Precautions" and other safety precautions listed in the printed version catalog.

EA2/EB2 Series

■ SOLDERING CONDITION (EB2 Series)



Note

1. Temperature profile shows printed circuit board surface temperature on the relay terminal portion.
2. Please check the actual soldering condition to use other method except above mentioned temperature profiles.

■ Recommended relay drive conditions

Drive under conditions. If it is impossible, please inquire to EM Devices.

| Non-latch type | Voltage: within $\pm 5\%$ of nominal voltage | Ambient temperature - 40 ~ + 85°C |
|--|---|--------------------------------------|
| Single coil latch type Double coil latch type | Square pulse (rise and fall time is rapidly) Pulse height: within $\pm 5\%$ of nominal voltage Pulse width: more than 10 ms | |

■ Technical document

Please confirm technical document before use.

It is able to receive a document at EM Devices' World-wide-web site.
(<http://www.em-devices.com>)

| ITEM | TITLE |
|------------------|---|
| Data sheet | EA2/EB2 series |
| Information | EA2 series technical data |
| | EB2 series technical data |
| User's manual | Function and note on correct use |
| Application note | Application circuit of miniature signal relay |



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- Please request for a specification sheet for detailed product data prior to the purchase.
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EA2/EB2 Series

■ ORDERING PART NUMBERS

• EA2 series

| Option | | Nominal Coil Voltage (VDC) | Coil Type | | |
|--------------|---------|----------------------------|-----------|-------------------|-------------------|
| Terminal | Packing | | Non-latch | Single Coil Latch | Double Coil Latch |
| Standard | Tube | 3 | EA2-3NU | EA2-3SNU | EA2-3TNU |
| | | 4.5 | EA2-4.5NU | EA2-4.5SNU | EA2-4.5TNU |
| | | 5 | EA2-5NU | EA2-5SNU | EA2-5TNU |
| | | 12 | EA2-12NU | EA2-12SNU | EA2-12TNU |
| | | 24 | EA2-24NU | EA2-24SNU | EA2-24TNU |
| Trimmed lead | | 3 | EA2-3NJ | EA2-3SNJ | EA2-3TNJ |
| | | 4.5 | EA2-4.5NJ | EA2-4.5SNJ | EA2-4.5TNJ |
| | | 5 | EA2-5NJ | EA2-5SNJ | EA2-5TNJ |
| | | 12 | EA2-12NJ | EA2-12SNJ | EA2-12TNJ |
| | | 24 | EA2-24NJ | EA2-24SNJ | EA2-24TNJ |

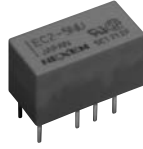
• EB2 series

| Option | | Nominal Coil Voltage (VDC) | Coil Type | | |
|----------|---------|----------------------------|-------------|-------------------|-------------------|
| Terminal | Packing | | Non-latch | Single Coil Latch | Double Coil Latch |
| Standard | Tube | 3 | EB2-3NU | EB2-3SNU | EB2-3TNU |
| | | 4.5 | EB2-4.5NU | EB2-4.5SNU | EB2-4.5TNU |
| | | 5 | EB2-5NU | EB2-5SNU | EB2-5TNU |
| | | 12 | EB2-12NU | EB2-12SNU | EB2-12TNU |
| | | 24 | EB2-24NU | EB2-24SNU | EB2-24TNU |
| | Taping | 3 | EB2-3NU-L | EB2-3SNU-L | EB2-3TNU-L |
| | | 4.5 | EB2-4.5NU-L | EB2-4.5SNU-L | EB2-4.5TNU-L |
| | | 5 | EB2-5NU-L | EB2-5SNU-L | EB2-5TNU-L |
| | | 12 | EB2-12NU-L | EB2-12SNU-L | EB2-12TNU-L |
| | | 24 | EB2-24NU-L | EB2-24SNU-L | EB2-24TNU-L |



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EC2 Series



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

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, ($2 \times 10 \mu s^3$)
- Capable of High-power switching: 700 VAC, 4.2A, 4 times in case of accident
- ND type (High-insulation type) conform to supplementary insulation for EN60950 (TÜV certified)

SPECIFICATIONS

| | | |
|---------------------------------|---------------------------|---|
| Contact Form | | 2 Form C |
| Contact Material | | Silver alloy with gold alloy overlay |
| Contact Ratings | Maximum Switching Power | 60 W, 125 VA |
| | Maximum Switching Voltage | 220 VDC, 250 VAC |
| | Maximum Switching Current | 2A |
| | Maximum Carrying Current | 2A |
| Minimum Contact Ratings | | 10 mVDC, 10 μ A ^{*1} |
| Initial Contact Resistance | | 75 m Ω max. (Initial) |
| Nominal Operating Power | Non-latch type | 140 mW (3 to 12 V), 200 mW (24 V) (ND type: 200 to 230 mW) |
| | Single coil latch type | 100 mW (ND type: 100 to 170 mW) |
| | Double 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 Ω at 500 VDC |
| Withstand Voltage | Between open contacts | 1000 VAC (for one minute) 1500 V surge (10 \times 160 μ s ^{*2}) |
| | Between adjacent contacts | 1000 VAC (for one minute), 1500 V surge (10 \times 160 μ s ^{*2}) |
| | Between coil to contacts | 1500 VAC (for one minute), 2500 V surge (2 \times 10 μ s ^{*3}) |
| | | [Double coil latch type] 1000 VAC (for one minute), 1500 V surge (10 \times 160 μ s ^{*2}) |
| Shock Resistance | | 735 m/s ² (misoperation) 980 m/s ² (destructive failure) |
| Vibration Resistance | | 10 to 55 Hz, double amplitude 3 mm (misoperation) 10 to 55 Hz, double amplitude 5 mm (destructive failure) |
| Ambient Temperature | | − 40 to 85°C |
| Coil Temperature Rise | | 18 degrees at nominal coil voltage (140 mW) |
| Running Specifications | Non-load | 1 \times 10 ⁸ ^{*4} operations (Non-latch type) 1 \times 10 ⁷ operations (latch type) |
| | Load | 50 VDC, 0.1 A (resistive) 1 \times 10 ⁶ operations at 85°C, 5 Hz |
| | | 10 VDC, 10 mA (resistive) 1 \times 10 ⁶ operations at 85°C, 2 Hz |
| Weight | | Approx. 1.9 g |

*1 This value is a reference value in the resistive load.

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

*2 Rise time : 10 μs, decay time to half crest : 160 μs

*3 Rise time : 2 μs, decay time to half crest : 10 μs

*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 1×10^7 operations.



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EC2 Series

■ PART NUMBER SYSTEM

EC2-3SNU

- NU : Standard type
- NJ : Trimmed leads type
- ND : High insulation type (TUV certified)
- Latch type
 - Nil : Non-latch type (standard)
 - S : Single coil latch type
 - T : Double coil latch type
- Nominal coil voltage (See part numbers)

■ SAFETY STANDARD AND RATING

| | |
|---|---|
| UL Recognized (UL508) File No. E73266 | CSA Certified (CSA C22.2 No14) File No. LR46266 |
| 30 VDC, 2 A 110 VDC, 0.3 A 125 VAC, 0.5 A | (Resistive) (Resistive) (Resistive) |

| TÜV Certificate | |
|--|--|
| (IEC61810/EN61810) | (EN61810) |
| No. R 9750561 | No. R 9751153 |
| ND Type (Non-latch and Single coil latch) | NU, NJ Type (Non-latch and Single coil latch) |
| Creepage and clearance of coil to contact is more than 2 mm. (According to EN60950) | |
| Supplementary insulation class | Basic insulation class |

■ COIL SPECIFICATIONS

• Non-latch Type

at 20°C

| Nominal Coil Voltage (VDC) | Coil Resistance (Ω) ± 10% | Must Operate Voltage* (VDC) | Must Release Voltage* (VDC) | Nominal Operating Power (mW) |
|-------------------------------|------------------------------|--------------------------------|--------------------------------|---------------------------------|
| 3 | 64.3 | 2.25 | 0.3 | 140 |
| 4.5 | 145 | 3.38 | 0.45 | 140 |
| 5 | 178 | 3.75 | 0.5 | 140 |
| 9 | 579 | 6.75 | 0.9 | 140 |
| 12 | 1028 | 9.0 | 1.2 | 140 |
| 24 | 2880 | 18.0 | 2.4 | 200 |

• Single Coil Latch Type

at 20°C

| Nominal Coil Voltage (VDC) | Coil Resistance (Ω) ± 10% | Set Voltage* (VDC) | Reset Voltage* (VDC) | Nominal Operating Power (mW) |
|-------------------------------|------------------------------|-----------------------|-------------------------|---------------------------------|
| 3 | 90 | 2.25 | 2.25 | 100 |
| 4.5 | 202.5 | 3.38 | 3.38 | 100 |
| 5 | 250 | 3.75 | 3.75 | 100 |
| 9 | 810 | 6.75 | 6.75 | 100 |
| 12 | 1440 | 9.0 | 9.0 | 100 |
| 24 | 5760 | 18.0 | 18.0 | 100 |



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EC2 Series

• Double Coil Latch Type (Can not be driven by reverse polarity for reverse operation)

at 20°C

| Nominal Coil Voltage (VDC) | Coil Resistance (Ω) \pm 10% | | Set Voltage** (VDC) | Reset Voltage** (VDC) | Nominal Operating Power (mW) |
|----------------------------|--|------|---------------------|-----------------------|------------------------------|
| 3 | S | 64.3 | 2.25 | - | 140 |
| | R | 64.3 | - | 2.25 | |
| 4.5 | S | 145 | 3.38 | - | 140 |
| | R | 145 | - | 3.38 | |
| 5 | S | 178 | 3.75 | - | 140 |
| | R | 178 | - | 3.75 | |
| 9 | S | 579 | 6.75 | - | 140 |
| | R | 579 | - | 6.75 | |
| 12 | S | 1028 | 9.0 | - | 140 |
| | R | 1028 | - | 9.0 | |
| 24 | S | 4114 | 18.0 | - | 140 |
| | R | 4114 | - | 18.0 | |

• Non-latch High Insulation (ND) Type

at 20°C

| Nominal Coil Voltage (VDC) | Coil Resistance (Ω) \pm 10% | Must Operate Voltage* (VDC) | Must Release Voltage* (VDC) | Nominal Operating Power (mW) |
|----------------------------|--|-----------------------------|-----------------------------|------------------------------|
| 3 | 45 | 2.25 | 0.3 | 200 |
| 4.5 | 101 | 3.38 | 0.45 | 200 |
| 5 | 125 | 3.75 | 0.5 | 200 |
| 9 | 405 | 6.75 | 0.9 | 200 |
| 12 | 720 | 9.0 | 1.2 | 200 |
| 24 | 2504 | 18.0 | 2.4 | 230 |

• Single Coil Latch High Insulation (ND) Type

at 20°C

| Nominal Coil Voltage (VDC) | Coil Resistance (Ω) \pm 10% | Set Voltage* (VDC) | Reset Voltage* (VDC) | Nominal Operating Power (mW) |
|----------------------------|--|--------------------|----------------------|------------------------------|
| 3 | 90 | 2.25 | 2.25 | 100 |
| 4.5 | 203 | 3.38 | 3.38 | 100 |
| 5 | 250 | 3.75 | 3.75 | 100 |
| 9 | 810 | 6.75 | 6.75 | 100 |
| 12 | 960 | 9.0 | 9.0 | 150 |
| 24 | 3388 | 18.0 | 18.0 | 170 |

* Test by pulse voltage

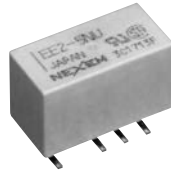
** S : Set coil (pin No.1...(+) , pin No.12...(-)) R : Reset coil (pin No.6...(+) , pin No.7...(-))

The latch type relays should be initialized at appointed position before using, and should be energized to specific polarity by above polarity to avoid wrong operation. Any special coil requirement, please contact EM Devices for availability.



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EE2 Series



The EE2 series is surface-mounting type sustaining high-performance of NEXEM EC2 series.

FEATURES

- Compact and light weight
- 2 Form C contact arrangement
- Low power consumption
- Reduced mounting space: 15 mm × 9.5 mm
- High-breakdown voltage of coil to contacts: 1500 VAC, 2500 V, ($2 \times 10 \mu s^{-3}$)
- Capable of High-power switching : 700 VAC, 4.2 A ,4 times in case of accident
- NKX type guarantee 1500VAC over withstand voltage at open contact.
(Only make contact)
- ND type (High-insulation type) conform to supplementary insulation for EN60950 (TÜV certified)

SPECIFICATIONS

| | | |
|---------------------------------|---------------------------|---|
| Contact Form | | 2 Form C |
| Contact Material | | Silver alloy with gold alloy overlay |
| Contact Ratings | 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 | | 75 mΩ max. (Initial) |
| Nominal Operating Power | Non-latch type | 140 mW (3 to 12 V), 200mW (24 V) (ND type: 200 to 230 mW) (NKX type: 230 mW) |
| | Single coil latch type | 100 mW (ND type: 100 to 170 mW) |
| | Double coil latch type | 140 mW |
| Operate Time (Excluding bounce) | | Approx. 2 ms |
| Release Time (Excluding bounce) | | Approx. 1 ms (without diode) |
| Insulation Resistance | | 1000 MΩ at 500 VDC |
| Withstand Voltage | Between open contacts | 1000 VAC (for one minute) 1500 V surge ($10 \times 160 \mu s^{-2}$) |
| | | [NKX type] Make contact: 1500 VAC (for one minute) 2500 V surge ($2 \times 10 \mu s^{-3}$) Break contact: 1000 VAC (for one minute) 1500 V surge ($10 \times 160 \mu s^{-2}$) |
| | Between adjacent contacts | 1000 VAC (for one minute), 1500 V surge ($10 \times 160 \mu s^{-2}$) |
| | Between coil to contacts | 1500 VAC (for one minute), 2500 V surge ($2 \times 10 \mu s^{-3}$) [Double coil latch type] 1000 VAC (for one minute), 1500 V surge ($10 \times 160 \mu s^{-2}$) |
| Shock Resistance | | 735 m/s ² (misoperation) 980 m/s ² (destructive failure) |
| Vibration Resistance | | 10 to 55 Hz, double amplitude 3 mm (misoperation) 10 to 55 Hz, double amplitude 5 mm (destructive failure) |
| Ambient Temperature | | − 40 to + 85°C |
| Coil Temperature Rise | | 18 degrees at nominal coil voltage (140 mW) |
| Running Specifications | Non-load | $1 \times 10^{8-14}$ operations (Non-latch type) 1×10^7 operations (latch type) |
| | Load | 50 VDC, 0.1 A (resistive) 1×10^6 operations at 85°C , 5 Hz 10 VDC, 10 mA (resistive) 1×10^6 operations at 85°C , 2 Hz |
| Weight | | Approx. 1.9 g |

*1 This value is a reference value in the resistive load.

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

*2 Rise time : $10 \mu s$, decay time to half crest : $160 \mu s$

*3 Rise time : $2 \mu s$, decay time to half crest : $10 \mu s$

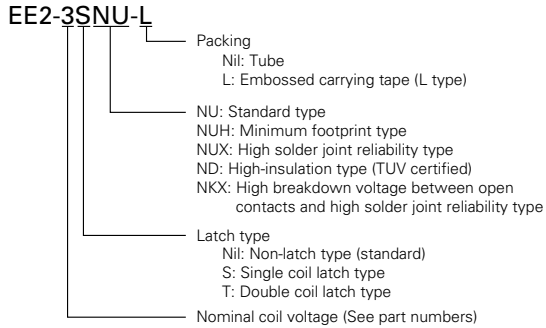
*4 This shows a number of operation where it can be running by which a fatal defect is not caused, and a number of operation by which a steady characteristic is maintained is 1×10^7 operations.



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EE2 Series

■ PART NUMBER SYSTEM



■ SAFETY STANDARD AND RATING

| | |
|---|---|
| UL Recognized (UL508) File No. E73266 | CSA Certified (CSA C22.2 No14) File No. LR46266 |
| 30 VDC, 2 A 110 VDC, 0.3 A 125 VAC, 0.5 A | (Resistive) (Resistive) (Resistive) |

| TÜV Certificate | |
|--|--|
| (IEC61810/EN61810) | (EN61810) |
| No. R 9750561 | No. R 9751153 |
| ND Type (Non-latch and Single coil latch) | NU, NUH, NUX Type (Non-latch and Single coil latch) |
| Creepage and clearance of coil to contact is more than 2 mm. (According to EN60950) | |
| Supplementary insulation class | Basic insulation class |

■ COIL SPECIFICATIONS

• Non-latch Type

at 20°C

| Nominal Coil Voltage (VDC) | Coil Resistance (Ω) ± 10% | Must Operate Voltage* (VDC) | Must Release Voltage* (VDC) | Nominal Operating Power (mW) |
|-------------------------------|------------------------------|--------------------------------|--------------------------------|---------------------------------|
| 3 | 64.3 | 2.25 | 0.3 | 140 |
| 4.5 | 145 | 3.38 | 0.45 | 140 |
| 5 | 178 | 3.75 | 0.5 | 140 |
| 9 | 579 | 6.75 | 0.9 | 140 |
| 12 | 1028 | 9.0 | 1.2 | 140 |
| 24 | 2880 | 18.0 | 2.4 | 200 |

• Single Coil Latch Type

at 20°C

| Nominal Coil Voltage (VDC) | Coil Resistance (Ω) ± 10% | Set Voltage* (VDC) | Reset Voltage* (VDC) | Nominal Operating Power (mW) |
|-------------------------------|------------------------------|-----------------------|-------------------------|---------------------------------|
| 3 | 90 | 2.25 | 2.25 | 100 |
| 4.5 | 202.5 | 3.38 | 3.38 | 100 |
| 5 | 250 | 3.75 | 3.75 | 100 |
| 9 | 810 | 6.75 | 6.75 | 100 |
| 12 | 1440 | 9.0 | 9.0 | 100 |
| 24 | 5760 | 18.0 | 18.0 | 100 |

• Double Coil Latch Type (Can not be driven by reverse polarity for reverse operation)

at 20°C

| Nominal Coil Voltage (VDC) | Coil Resistance (Ω) ± 10% | | Set Voltage** (VDC) | Reset Voltage** (VDC) | Nominal Operating Power (mW) |
|-------------------------------|------------------------------|------|------------------------|--------------------------|---------------------------------|
| 3 | S | 64.3 | 2.25 | - | 140 |
| | R | 64.3 | - | 2.25 | |
| 4.5 | S | 145 | 3.38 | - | 140 |
| | R | 145 | - | 3.38 | |
| 5 | S | 178 | 3.75 | - | 140 |
| | R | 178 | - | 3.75 | |
| 9 | S | 579 | 6.75 | - | 140 |
| | R | 579 | - | 6.75 | |
| 12 | S | 1028 | 9.0 | - | 140 |
| | R | 1028 | - | 9.0 | |
| 24 | S | 4114 | 18.0 | - | 140 |
| | R | 4114 | - | 18.0 | |

* Test by pulse voltage

** S : Set coil (pin No.1...(+) , pin No.12...(-)) R : Reset coil (pin No.6...(+) , pin No.7...(-))

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

Any special coil requirement, please contact EM Devices for availability.



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EE2 Series

• Non-latch High Insulation (ND) Type

at 20°C

| Nominal Coil Voltage (VDC) | Coil Resistance (Ω) $\pm 10\%$ | Must Operate Voltage* (VDC) | Must Release Voltage* (VDC) | Nominal Operating Power (mW) |
|----------------------------|---|-----------------------------|-----------------------------|------------------------------|
| 3 | 45 | 2.25 | 0.3 | 200 |
| 4.5 | 101 | 3.38 | 0.45 | 200 |
| 5 | 125 | 3.75 | 0.5 | 200 |
| 9 | 405 | 6.75 | 0.9 | 200 |
| 12 | 720 | 9.0 | 1.2 | 200 |
| 24 | 2504 | 18.0 | 2.4 | 230 |

• Single Coil Latch High Insulation (ND) Type

at 20°C

| Nominal Coil Voltage (VDC) | Coil Resistance (Ω) $\pm 10\%$ | Set Voltage* (VDC) | Reset Voltage* (VDC) | Nominal Operating Power (mW) |
|----------------------------|---|--------------------|----------------------|------------------------------|
| 3 | 90 | 2.25 | 2.25 | 100 |
| 4.5 | 203 | 3.38 | 3.38 | 100 |
| 5 | 250 | 3.75 | 3.75 | 100 |
| 9 | 810 | 6.75 | 6.75 | 100 |
| 12 | 960 | 9.0 | 9.0 | 150 |
| 24 | 3388 | 18.0 | 18.0 | 170 |

• Non-latch High Breakdown Voltage (NKX) Type

at 20°C

| Nominal Coil Voltage (VDC) | Coil Resistance (Ω) $\pm 10\%$ | Must Operate Voltage* (VDC) | Must Release Voltage* (VDC) | Nominal Operating Power (mW) |
|----------------------------|---|-----------------------------|-----------------------------|------------------------------|
| 3 | 39.1 | 2.25 | 0.3 | 230 |
| 4.5 | 88.0 | 3.38 | 0.45 | 230 |
| 12 | 626 | 9.0 | 1.2 | 230 |

* Test by pulse voltage

** S : Set coil (pin No.1...(+) , pin No.12...(-)) R : Reset coil (pin No.6...(+) , pin No.7...(-))

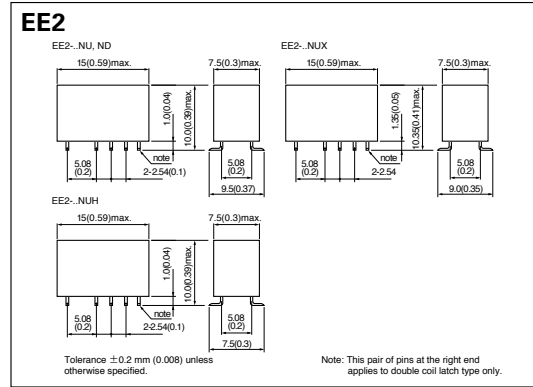
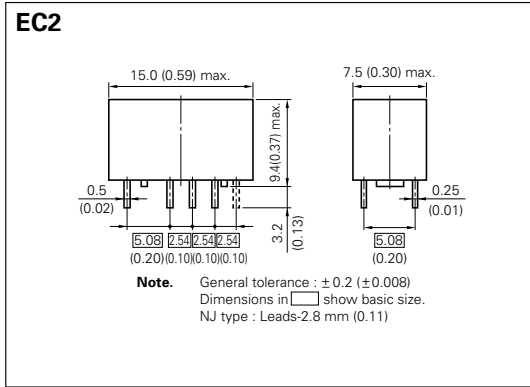
The latch type relays should be initialized at appointed position before using, and should be energized to specific polarity by above polarity to avoid wrong operation.
Any special coil requirement, please contact EM Devices for availability.



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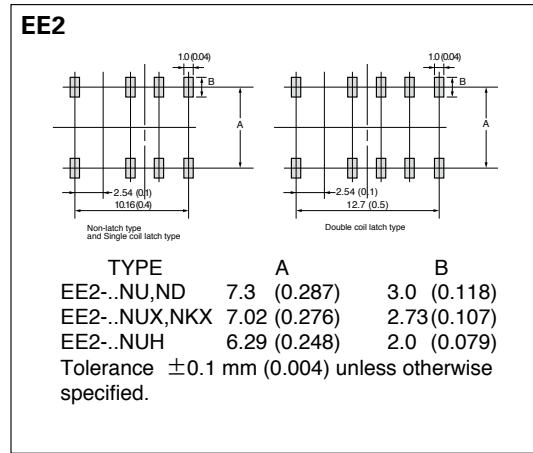
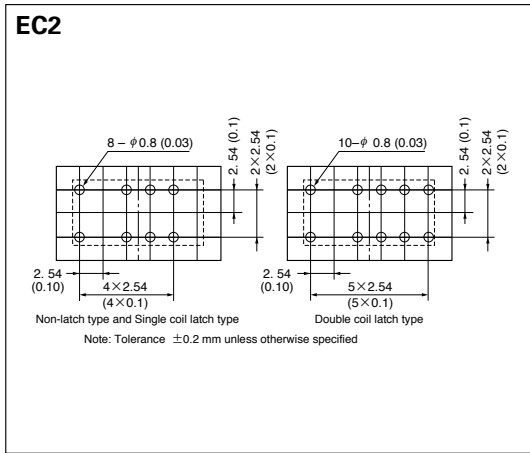
EC2/EE2 Series

■ DIMENSIONS mm(inch)

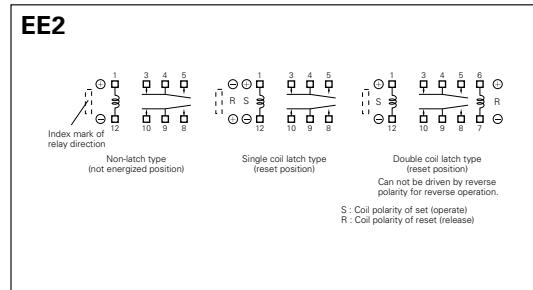
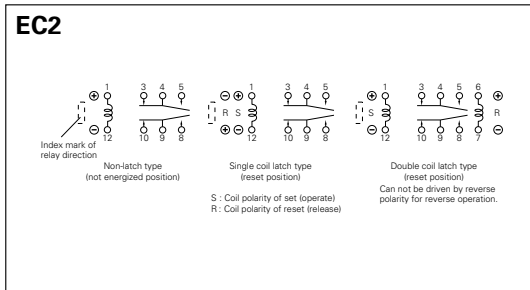


■ RECOMMENDED PAD LAYOUT

(bottom view) mm (inch)



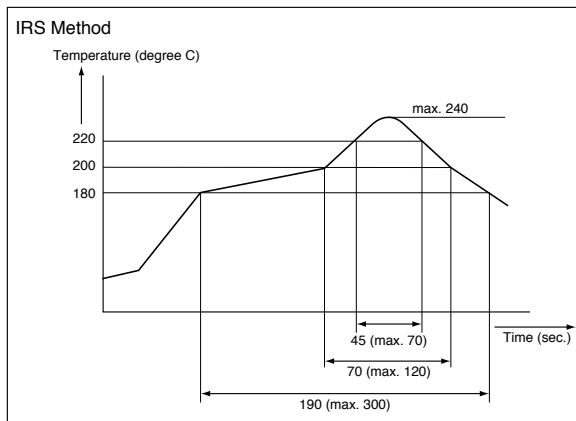
■ SCHEMATICS (bottom view)



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EC2/EE2 Series

■ SOLDERING CONDITION (EE2 Series)



Note

1. Temperature profile shows printed circuit board surface temperature on the relay terminal portion.
2. Please check the actual soldering condition to use other method except above mentioned temperature profiles.

■ Recommended relay drive conditions

Drive under conditions. If it is impossible, please inquire to EM Devices.

| Non-latch type | Voltage: within $\pm 5\%$ of nominal voltage | Ambient temperature - 40 ~ + 85°C |
|--|---|--------------------------------------|
| Single coil latch type Double coil latch type | Square pulse (rise and fall time is rapidly) Pulse height: within $\pm 5\%$ of nominal voltage Pulse width: more than 10 ms | |

■ Technical document

Please confirm technical document before use.

It is able to receive a document at EM Devices' World-wide-web site.

(<http://www.em-devices.com>)

| ITEM | TITLE |
|------------------|---|
| Data sheet | EC2/EE2 series |
| Information | EC2/EE2 series technical data |
| User's manual | Function and note on correct use |
| Application note | Application circuit of miniature signal relay |



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EC2/EE2 Series

■ ORDERING PART NUMBERS

• EC2 series

| Option | | Nominal Coil Voltage (VDC) | Coil Type | | |
|--------------|---------|----------------------------|-----------|-------------------|-------------------|
| Terminal | Packing | | Non-latch | Single Coil Latch | Double Coil Latch |
| Standard | Tube | 3 | EC2-3NU | EC2-3SNU | EC2-3TNU |
| | | 4.5 | EC2-4.5NU | EC2-4.5SNU | EC2-4.5TNU |
| | | 5 | EC2-5NU | EC2-5SNU | EC2-5TNU |
| | | 9 | EC2-9NU | EC2-9SNU | EC2-9TNU |
| | | 12 | EC2-12NU | EC2-12SNU | EC2-12TNU |
| | | 24 | EC2-24NU | EC2-24SNU | EC2-24TNU |
| Trimmed lead | | 3 | EC2-3NJ | EC2-3SNJ | EC2-3TNJ |
| | | 4.5 | EC2-4.5NJ | EC2-4.5SNJ | EC2-4.5TNJ |
| | | 5 | EC2-5NJ | EC2-5SNJ | EC2-5TNJ |
| | | 9 | EC2-9NJ | EC2-9SNJ | EC2-9TNJ |
| | | 12 | EC2-12NJ | EC2-12SNJ | EC2-12TNJ |
| | | 24 | EC2-24NJ | EC2-24SNJ | EC2-24TNJ |

• EC2 series High Insulation Type (ND Type)

| Option | | Nominal Coil Voltage (VDC) | Coil Type | |
|----------|---------|----------------------------|-----------|-------------------|
| Terminal | Packing | | Non-latch | Single Coil Latch |
| Standard | Tube | 3 | EC2-3ND | EC2-3SND |
| | | 4.5 | EC2-4.5ND | EC2-4.5SND |
| | | 5 | EC2-5ND | EC2-5SND |
| | | 9 | EC2-9ND | EC2-9SND |
| | | 12 | EC2-12ND | EC2-12SND |
| | | 24 | EC2-24ND | EC2-24SND |



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EC2/EE2 Series

• EE2 series

| Option | | Nominal Coil Voltage (VDC) | Coil Type | | |
|-------------------------------|---------|----------------------------|--------------|-------------------|-------------------|
| Terminal | Packing | | Non-latch | Single Coil Latch | Double Coil Latch |
| Standard | Tube | 3 | EE2-3NU | EE2-3SNU | EE2-3TNU |
| | | 4.5 | EE2-4.5NU | EE2-4.5SNU | EE2-4.5TNU |
| | | 5 | EE2-5NU | EE2-5SNU | EE2-5TNU |
| | | 9 | EE2-9NU | EE2-9SNU | EE2-9TNU |
| | | 12 | EE2-12NU | EE2-12SNU | EE2-12TNU |
| | | 24 | EE2-24NU | EE2-24SNU | EE2-24TNU |
| | Taping | 3 | EE2-3NU-L | EE2-3SNU-L | EE2-3TNU-L |
| | | 4.5 | EE2-4.5NU-L | EE2-4.5SNU-L | EE2-4.5TNU-L |
| | | 5 | EE2-5NU-L | EE2-5SNU-L | EE2-5TNU-L |
| | | 9 | EE2-9NU-L | EE2-9SNU-L | EE2-9TNU-L |
| | | 12 | EE2-12NU-L | EE2-12SNU-L | EE2-12TNU-L |
| | | 24 | EE2-24NU-L | EE2-24SNU-L | EE2-24TNU-L |
| Minimum footprint | Tube | 3 | EE2-3NUH | EE2-3SNUH | EE2-3TNUH |
| | | 4.5 | EE2-4.5NUH | EE2-4.5SNUH | EE2-4.5TNUH |
| | | 5 | EE2-5NUH | EE2-5SNUH | EE2-5TNUH |
| | | 9 | EE2-9NUH | EE2-9SNUH | EE2-9TNUH |
| | | 12 | EE2-12NUH | EE2-12SNUH | EE2-12TNUH |
| | | 24 | EE2-24NUH | EE2-24SNUH | EE2-24TNUH |
| | Taping | 3 | EE2-3NUH-L | EE2-3SNUH-L | EE2-3TNUH-L |
| | | 4.5 | EE2-4.5NUH-L | EE2-4.5SNUH-L | EE2-4.5TNUH-L |
| | | 5 | EE2-5NUH-L | EE2-5SNUH-L | EE2-5TNUH-L |
| | | 9 | EE2-9NUH-L | EE2-9SNUH-L | EE2-9TNUH-L |
| | | 12 | EE2-12NUH-L | EE2-12SNUH-L | EE2-12TNUH-L |
| | | 24 | EE2-24NUH-L | EE2-24SNUH-L | EE2-24TNUH-L |
| High solder joint reliability | Tube | 3 | EE2-3NUX | EE2-3SNUX | EE2-3TNUX |
| | | 4.5 | EE2-4.5NUX | EE2-4.5SNUX | EE2-4.5TNUX |
| | | 5 | EE2-5NUX | EE2-5SNUX | EE2-5TNUX |
| | | 9 | EE2-9NUX | EE2-9SNUX | EE2-9TNUX |
| | | 12 | EE2-12NUX | EE2-12SNUX | EE2-12TNUX |
| | | 24 | EE2-24NUX | EE2-24SNUX | EE2-24TNUX |
| | Taping | 3 | EE2-3NUX-L | EE2-3SNUX-L | EE2-3TNUX-L |
| | | 4.5 | EE2-4.5NUX-L | EE2-4.5SNUX-L | EE2-4.5TNUX-L |
| | | 5 | EE2-5NUX-L | EE2-5SNUX-L | EE2-5TNUX-L |
| | | 9 | EE2-9NUX-L | EE2-9SNUX-L | EE2-9TNUX-L |
| | | 12 | EE2-12NUX-L | EE2-12SNUX-L | EE2-12TNUX-L |
| | | 24 | EE2-24NUX-L | EE2-24SNUX-L | EE2-24TNUX-L |

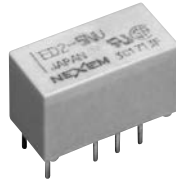
• EE2 series High Insulation Type (ND Type)

| Option | | Nominal Coil Voltage (VDC) | Coil Type | |
|----------|---------|----------------------------|-------------|-------------------|
| Terminal | Packing | | Non-latch | Single Coil Latch |
| Standard | Tube | 3 | EE2-3ND | EE2-3SND |
| | | 4.5 | EE2-4.5ND | EE2-4.5SND |
| | | 5 | EE2-5ND | EE2-5SND |
| | | 9 | EE2-9ND | EE2-9SND |
| | | 12 | EE2-12ND | EE2-12SND |
| | | 24 | EE2-24ND | EE2-24SND |
| | Taping | 3 | EE2-3ND-L | EE2-3SND-L |
| | | 4.5 | EE2-4.5ND-L | EE2-4.5SND-L |
| | | 5 | EE2-5ND-L | EE2-5SND-L |
| | | 9 | EE2-9ND-L | EE2-9SND-L |
| | | 12 | EE2-12ND-L | EE2-12SND-L |
| | | 24 | EE2-24ND-L | EE2-24SND-L |



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ED2 Series



The ED2 series has reduced coil power consumption but sustained high-performance of NEXEM SIGNAL RELAYS. Furthermore, it complies with 2500 V surge-voltage requirement of Telcordia specifications.

FEATURES

- Low power consumption (50 to 70 mW)
- Compact and light weight
- 2 Form C contact arrangement
- Reduced mounting space: 15 mm × 7.5 mm
- High-breakdown voltage of coil to contacts:
1500 VAC, 2500 V ($2 \times 10 \mu s^{-3}$)
- UL recognized (E73266), CSA certified (LR46266), TÜV certified (R9950557)

SPECIFICATIONS

| | | |
|---------------------------------|---------------------------|--|
| Contact Form | | 2 Form C |
| Contact Material | | Silver alloy with gold alloy overlay |
| Contact Ratings | Maximum Switching Power | 30 W, 62.5VA |
| | Maximum Switching Voltage | 220 VDC, 250 VAC |
| | Maximum Switching Current | 1 A |
| | Maximum Carrying Current | 2 A |
| Minimum Contact Ratings | | 10 mVDC, $10 \mu A^{*1}$ |
| Initial Contact Resistance | | 75 mΩ max. (Initial) |
| Nominal Operating Power | Non-latch type | 50 mW (1.5 to 5 V), 55 mW (9 V), 60 mW (12 V), 70 mW (24 V) |
| Operate Time (Excluding bounce) | | Approx. 3 ms |
| Release Time (Excluding bounce) | | Approx. 2 ms (without diode) |
| Insulation Resistance | | 1000 MΩ at 500 VDC |
| Withstand Voltage | Between open contacts | 1000 VAC (for one minute) |
| | Between adjacent contacts | 1500 V surge ($10 \times 160 \mu s^{-2}$) |
| | Between coil to contacts | 1500 VAC (for one minute) 2500 V surge ($2 \times 10 \mu s^{-3}$) |
| Shock Resistance | | 735 m/s ² (misoperation), 980 m/s ² (destructive failure) |
| Vibration Resistance | | 10 to 55 Hz, double amplitude 3 mm (misoperation) 10 to 55 Hz, double amplitude 5 mm (destructive failure) |
| Ambient Temperature | | − 40 to + 85°C |
| Coil Temperature Rise | | 7 degrees at nominal coil voltage (50 mW) |
| Running Specifications | Non-load | 1×10^8 operations (Non-latch type) 1×10^7 operations (latch type) |
| | Load | 50 VDC, 0.1 A (resistive) 1×10^6 operations at 85°C, 5 Hz 10 VDC, 10 mA (resistive) 1×10^8 operations at 85°C, 2 Hz |
| Weight | | Approx. 2.2 g |

*1 This value is a reference value in the resistive load.

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

*2 Rise time : $10 \mu s$, decay time to half crest : $160 \mu s$

*3 Rise time : $2 \mu s$, decay time to half crest : $10 \mu s$

*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 1×10^7 operations.



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ED2 Series

■ PART NUMBER SYSTEM

ED2-3NU

NU: Standard type
NJ: Trimmed leads type
Nominal coil voltage (See part numbers)

■ SAFETY STANDARD AND RATING

| | |
|---|--|
| UL Recognized (UL508) File No. E73266 | CSA Certificated (CSA C22.2 No14) File No. LR46266 |
| 30 VDC, 1 A 110 VDC, 0.3 A 125 VAC, 0.5 A | (Resistive) (Resistive) (Resistive) |

| |
|--|
| TÜV Certified (EN61810) |
| No. R9950557 |
| Non-latch and Single-coil-latch |
| Creepage and clearance of coil to contact is over than 2 mm. (According to EN60950) |
| Basic insulation class |

■ COIL SPECIFICATIONS

• Non-latch Type

at 20°C

| Nominal Coil Voltage (VDC) | Coil Resistance (Ω) $\pm 10\%$ | Must Operate Voltage* (VDC) | Must Release Voltage* (VDC) | Nominal Operating Power (mW) |
|-------------------------------|--|--------------------------------|--------------------------------|---------------------------------|
| 1.5 | 45 | 1.13 | 0.15 | 50 |
| 3 | 180 | 2.25 | 0.3 | 50 |
| 4.5 | 405 | 3.38 | 0.45 | 50 |
| 5 | 500 | 3.75 | 0.5 | 50 |
| 9 | 1473 | 6.75 | 0.9 | 55 |
| 12 | 2400 | 9.0 | 1.2 | 60 |
| 24 | 8229 | 18.0 | 2.4 | 70 |

* Test by pulse voltage



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EF2 Series



The EF2 series is surface-mounting type sustaining high-performance of NEXEM ED2 series.

FEATURES

- Low power consumption(50 to 70 mW)
- Compact and light weight
- 2 Form C contact arrangement
- Reduced mounting space: 15 mm × 9.5 mm
- High-breakdown voltage of coil to contacts: 1500 VAC, 2500 V, ($2 \times 10 \mu s^{*3}$)
- UL recognized (E73266), CSA certified (LR46266), TÜV certified (R9950557)

SPECIFICATIONS

| | | |
|---------------------------------|---------------------------|--|
| Contact Form | | 2 Form C |
| Contact Material | | Silver alloy with gold alloy overlay |
| Contact Ratings | Maximum Switching Power | 30 W, 62.5 VA |
| | Maximum Switching Voltage | 220 VDC, 250 VAC |
| | Maximum Switching Current | 1 A |
| | Maximum Carrying Current | 2 A |
| Minimum Contact Ratings | | 10 mVDC, $10 \mu A^{*1}$ |
| Initial Contact Resistance | | 75 mΩ max. (Initial) |
| Nominal Operating Power | Non-latch type | 50 mW (1.5 to 5 V), 55 mW (9 V), 60 mW (12 V), 70 mW (24 V) |
| Operate Time (Excluding bounce) | | Approx. 2 ms |
| Release Time (Excluding bounce) | | Approx. 1 ms (without diode) |
| Insulation Resistance | | 1000 MΩ at 500 VDC |
| Withstand Voltage | Between open contacts | 1000 VAC (for one minute) |
| | Between adjacent contacts | 1500 V surge ($10 \times 160 \mu s^{*2}$) |
| | Between coil to contacts | 1500 VAC (for one minute) 2500 V surge ($2 \times 10 \mu s^{*3}$) |
| Shock Resistance | | 735 m/s ² (misoperation), 980 m/s ² (destructive failure) |
| Vibration Resistance | | 10 to 55 Hz, double amplitude 3 mm (misoperation) 10 to 55 Hz, double amplitude 5 mm (destructive failure) |
| Ambient Temperature | | − 40 to + 85°C |
| Coil Temperature Rise | | 7 degrees at nominal coil voltage (50 mW) |
| Running Specifications | Non-load | 1×10^8 ^{*4} operations (Non-latch type) 1×10^7 operations (latch type) |
| | Load | 50 VDC, 0.1 A (resistive) 1×10^6 operations at 85°C, 5 Hz 10 VDC, 10 mA (resistive) 1×10^6 operations at 85°C, 2 Hz |
| Weight | | Approx. 2.2 g |

*1 This value is a reference value in the resistive load.

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

*2 Rise time : 10 μs, decay time to half crest : 160 μs

*3 Rise time : 2 μs, decay time to half crest : 10 μs

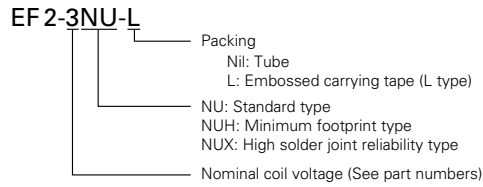
*4 This shows a number of operation where it can be running by which a fatal defect is not caused, and a number of operation by which a steady characteristic is maintained is 1×10^7 operations.



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EF2 Series

■ PART NUMBER SYSTEM



■ SAFETY STANDARD AND RATING

| | |
|---|--|
| UL Recognized (UL508) File No. E73266 | CSA Certificated (CSA C22.2 No14) File No. LR46266 |
| 30 VDC, 1 A 110 VDC, 0.3 A 125 VAC, 0.5 A | (Resistive) (Resistive) (Resistive) |

| |
|--|
| TÜV Certified (EN61810) |
| No. R9950557 |
| Non-latch and Single-coil-latch |
| Creepage and clearance of coil to contact is over than 2 mm. (According to EN60950) |
| Basic insulation class |

■ COIL SPECIFICATIONS

• Non-latch Type

at 20°C

| Nominal Coil Voltage (VDC) | Coil Resistance (Ω) ± 10% | Must Operate Voltage* (VDC) | Must Release Voltage* (VDC) | Nominal Operating Power (mW) |
|-------------------------------|------------------------------|--------------------------------|--------------------------------|---------------------------------|
| 1.5 | 45 | 1.13 | 0.15 | 50 |
| 3 | 180 | 2.25 | 0.3 | 50 |
| 4.5 | 405 | 3.38 | 0.45 | 50 |
| 5 | 500 | 3.75 | 0.5 | 50 |
| 9 | 1473 | 6.75 | 0.9 | 55 |
| 12 | 2400 | 9.0 | 1.2 | 60 |
| 24 | 8229 | 18.0 | 2.4 | 70 |

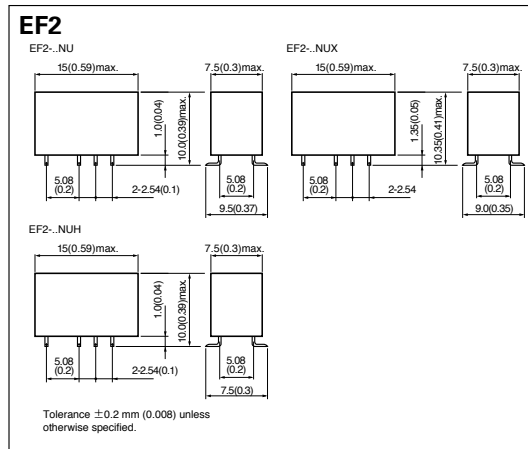
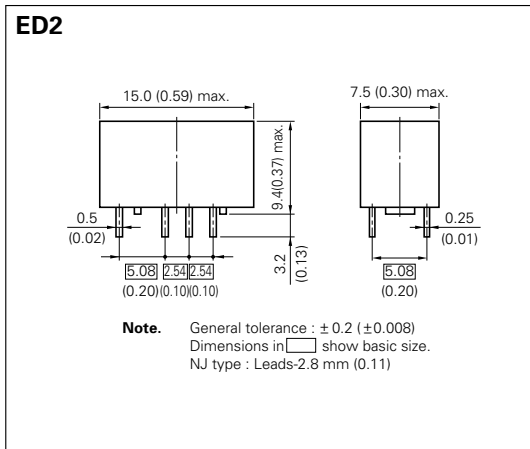
* Test by pulse voltage



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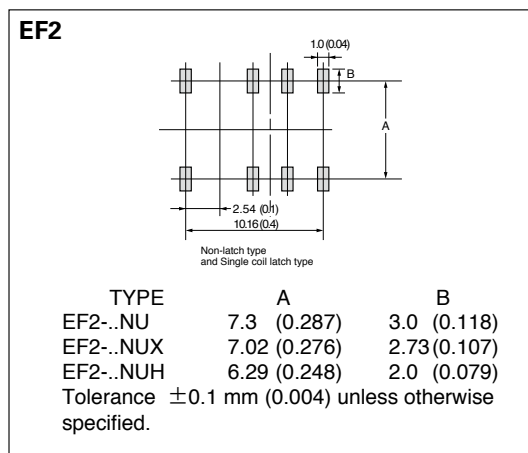
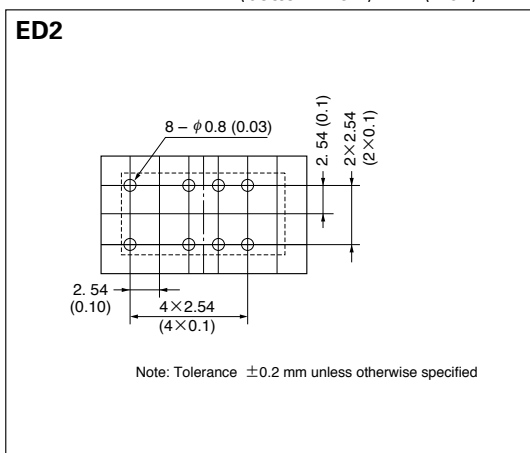
ED2/EF2 Series

DIMENSIONS mm(inch)

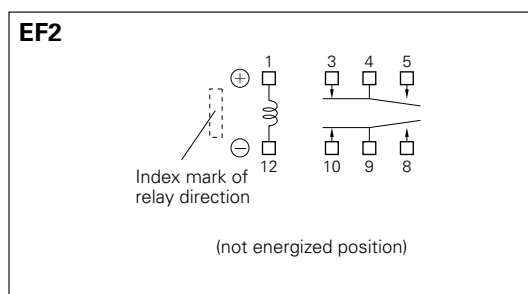
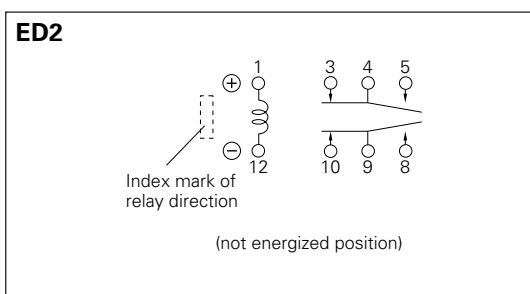


RECOMMENDED PAD LAYOUT

(bottom view) mm (inch)



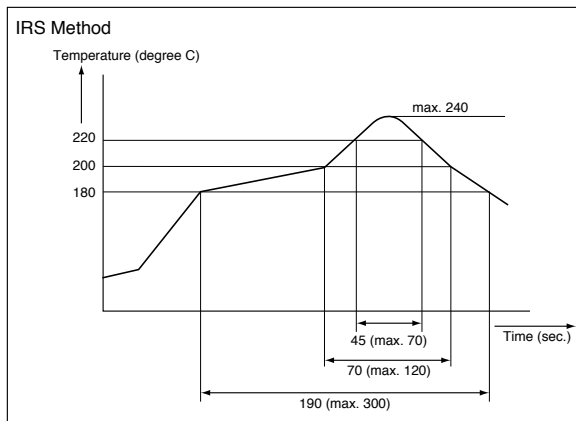
SCHEMATICS (bottom view)



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ED2/EF2 Series

■ SOLDERING CONDITION (EF2 Series)



Note

1. Temperature profile shows printed circuit board surface temperature on the relay terminal portion.
2. Please check the actual soldering condition to use other method except above mentioned temperature profiles.

■ Recommended relay drive conditions

Drive under conditions. If it is impossible, please inquire to EM Devices.

| | | |
|----------------|--|--------------------------------------|
| Non-latch type | Voltage: within $\pm 5\%$ of nominal voltage | Ambient temperature - 40 ~ + 85°C |
|----------------|--|--------------------------------------|

■ Technical document

Please confirm technical document before use.

It is able to receive a document at EM Devices' World-wide-web site.

(<http://www.em-devices.com>)

| ITEM | TITLE |
|------------------|---|
| Data sheet | ED2/EF2 series |
| Information | ED2/EF2 series technical data |
| User's manual | Function and note on correct use |
| Application note | Application circuit of miniature signal relay |



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ED2/EF2 Series

■ ORDERING PART NUMBERS

• ED2 series

| Option | | Nominal Coil Voltage (VDC) | Coil Type |
|--------------|---------|----------------------------|-----------|
| Terminal | Packing | | Non-latch |
| Standard | Tube | 1.5 | ED2-1.5NU |
| | | 3 | ED2-3NU |
| | | 4.5 | ED2-4.5NU |
| | | 5 | ED2-5NU |
| | | 9 | ED2-9NU |
| | | 12 | ED2-12NU |
| | | 24 | ED2-24NU |
| Trimmed lead | | 1.5 | ED2-1.5NJ |
| | | 3 | ED2-3NJ |
| | | 4.5 | ED2-4.5NJ |
| | | 5 | ED2-5NJ |
| | | 9 | ED2-9NJ |
| | | 12 | ED2-12NJ |
| | | 24 | ED2-24NJ |

• EF2 series

| Option | | Nominal Coil Voltage (VDC) | Coil Type |
|-------------------------------|---------|----------------------------|--------------|
| Terminal | Packing | | |
| Standard | Tube | 1.5 | EF2-1.5NU |
| | | 3 | EF2-3NU |
| | | 4.5 | EF2-4.5NU |
| | | 5 | EF2-5NU |
| | | 9 | EF2-9NU |
| | | 12 | EF2-12NU |
| | | 24 | EF2-24NU |
| | Taping | 1.5 | EF2-1.5NU-L |
| | | 3 | EF2-3NU-L |
| | | 4.5 | EF2-4.5NU-L |
| | | 5 | EF2-5NU-L |
| | | 9 | EF2-9NU-L |
| | | 12 | EF2-12NU-L |
| | | 24 | EF2-24NU-L |
| Minimum footprint | Tube | 1.5 | EF2-1.5NUH |
| | | 3 | EF2-3NUH |
| | | 4.5 | EF2-4.5NUH |
| | | 5 | EF2-5NUH |
| | | 9 | EF2-9NUH |
| | | 12 | EF2-12NUH |
| | | 24 | EF2-24NUH |
| | Taping | 1.5 | EF2-1.5NUH-L |
| | | 3 | EF2-3NUH-L |
| | | 4.5 | EF2-4.5NUH-L |
| | | 5 | EF2-5NUH-L |
| | | 9 | EF2-9NUH-L |
| | | 12 | EF2-12NUH-L |
| | | 24 | EF2-24NUH-L |
| High solder joint reliability | Tube | 1.5 | EF2-1.5NUX |
| | | 3 | EF2-3NUX |
| | | 4.5 | EF2-4.5NUX |
| | | 5 | EF2-5NUX |
| | | 9 | EF2-9NUX |
| | | 12 | EF2-12NUX |
| | | 24 | EF2-24NUX |
| | Taping | 1.5 | EF2-1.5NUX-L |
| | | 3 | EF2-3NUX-L |
| | | 4.5 | EF2-4.5NUX-L |
| | | 5 | EF2-5NUX-L |
| | | 9 | EF2-9NUX-L |
| | | 12 | EF2-12NUX-L |
| | | 24 | EF2-24NUX-L |



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EU2 Series

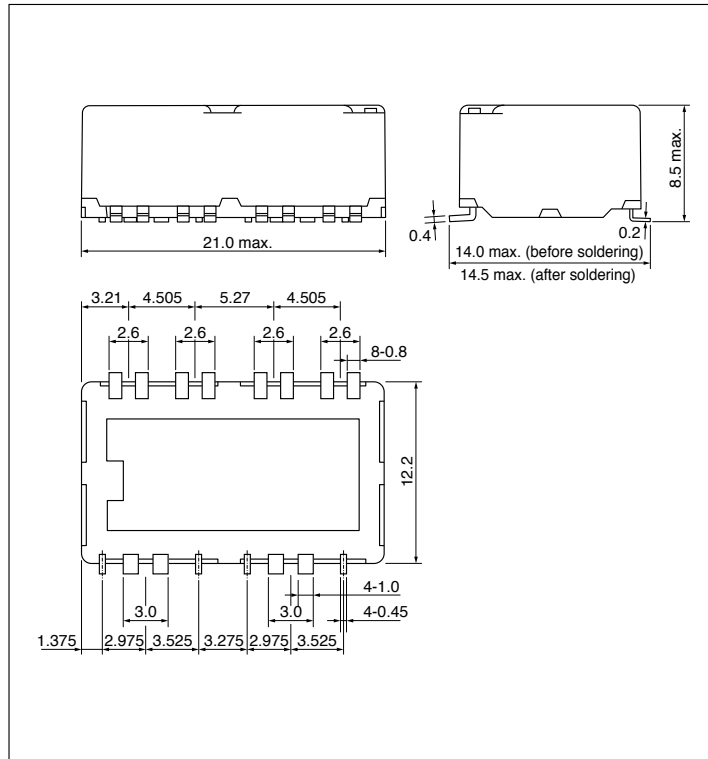


The new NEXEM EU2 series is PC-board mount automotive relay suitable for various motor and solenoid control application. The EU2 series is ultra low profile SMD relays. The EU2 series is succeeding in about 77% of low profiling in comparison with the ET2 series.

FEATURES

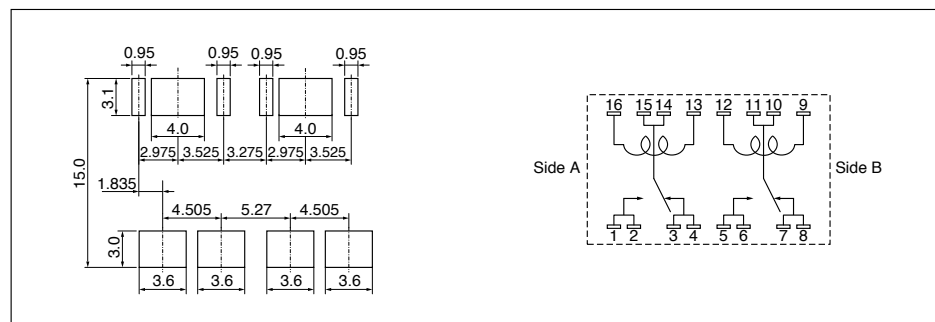
- Ultra miniature twin relay
- Low profile SMD relay
- Approx. 77% relay height of ET2
- Approx. 60% relay height of EX2

DIMENSIONS mm



RECOMMENDED PCB PAD LAYOUT and SCHEMATICS

(top view) mm



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EU2 Series

■ SPECIFICATIONS

| Items | | Specifications |
|---------------------------------|---------------------------|--|
| Contact Form | | 1 Form C × 2 (separate) |
| Contact Ratings | Contact Rating Power | 14 VDC, 25A |
| | Maximum Switching Current | 30 A |
| | Minimum Switching Current | 1 A (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) |
| Nominal Operating Power | | 960 mW |
| Insulation Resistance | | 100 MΩ at 500 VDC |
| Withstand Voltage | Between open contacts | 500 VAC min. (for 1 minute) |
| | Between coil and contacts | 500 VAC min. (for 1 minute) |
| Shock Resistance | Misoperation | 98 m/s ² |
| | Destructive Failure | 980 m/s ² |
| Vibration Resistance | Misoperation | 10 to 300 Hz, 43 m/s ² |
| | Destructive Failure | 10 to 500 Hz, 43 m/s ² , 200 hours |
| Ambient Temperature | | -40 to +85°C |
| Running Specifications | Non-load | 1 × 10 ⁶ operations |
| | Load | 100 × 10 ³ operations (at 14 VDC, Motor Load 25 A) 100 × 10 ³ operations (at 14 VDC, Motor Load 25 A/5 A) |
| Weight | | Approx. 6 g |

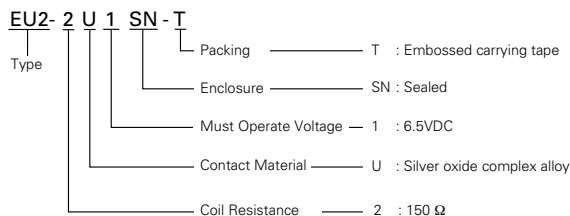
■ COIL RATING

at 20°C

| Part Numbers | Nominal Voltage (VDC) | Coil Resistance (Ω) ± 10 % | Must Operate Voltage (VDC) | Must Release Voltage (VDC) |
|--------------|-----------------------|----------------------------|----------------------------|----------------------------|
| EU2-2U1SN | 12 | 150 | 6.5 | 0.6 |

* Test by pulse voltage

■ PART NUMBER SYSTEM



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EX2 Series

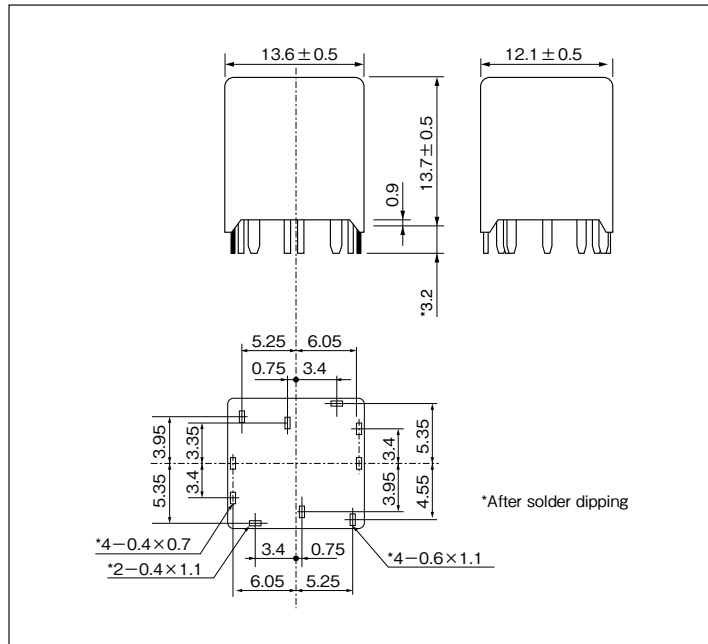


The NEXEM EX2 series is PC-board mount automotive relay suitable for various motor control applications that require a high quality and performance. The EX2 series is succeeding in about 75% of miniaturization in comparison with the ET2 series.

FEATURES

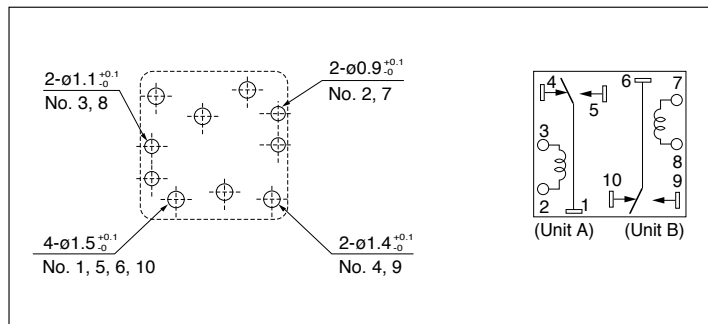
- Ultra miniature twin relay
- Flux tight housing
- Approx. 75% relay volume of ET2
- Approx. 60% relay space of ET2
- Approx. 88% relay weight of ET2

DIMENSIONS mm



RECOMMENDED PCB PAD LAYOUT and SCHEMATICS

(bottom view) mm



These hole dimensions are recommended value for prevention from reverse insertion at manual mounting.



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EX2 Series

■ SPECIFICATIONS

| Items | | Specifications |
|---------------------------------|---------------------------|--|
| Contact Form | | 1 Form C × 2 (separate) |
| Contact Ratings | Contact Rating Power | 14 VDC, 25A |
| | Maximum Switching Current | 30 A (at 16 VDC, Resistive load) |
| | Minimum Switching Current | 1A (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) |
| Nominal Operating Power | | 900 mW |
| Insulation Resistance | | 100 MΩ at 500 VDC |
| Withstand Voltage | Between open contacts | 500 VAC min. (for 1 minute) |
| | Between coil and contacts | 500 VAC min. (for 1 minute) |
| Shock Resistance | Misoperation | 98 m/s ² |
| | Destructive Failure | 980 m/s ² |
| Vibration Resistance | Misoperation | 10 to 300 Hz, 43 m/s ² |
| | Destructive Failure | 10 to 500 Hz, 43 m/s ² , 200 hour |
| Ambient Temperature | | − 40 to + 125°C |
| Running Specifications | Non-load | 1 × 10 ⁶ operations |
| | Load | 100 × 10 ³ operations (at 14 VDC, Motor Load 25 A) 100 × 10 ³ operations (at 14 VDC, Motor Load 25 A/5 A) |
| Weight | | Approx. 6.5 g |

■ COIL RATING

• Sealed Type

at 20°C

| Part Numbers | Nominal Voltage (VDC) | Coil Resistance (Ω) ± 10 % | Must Operate Voltage (VDC) | Must Release Voltage (VDC) |
|--------------|-----------------------|----------------------------|----------------------------|----------------------------|
| EX2-2U1S | 12 | 160 | 6.5 | 0.9 |

* Test by pulse voltage

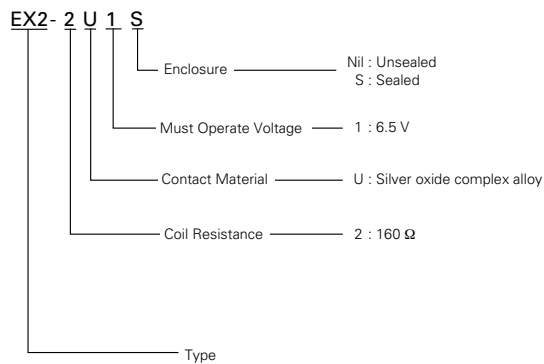
• Unsealed Type

at 20°C

| Part Numbers | Nominal Voltage (VDC) | Coil Resistance (Ω) ± 10 % | Must Operate Voltage (VDC) | Must Release Voltage (VDC) |
|--------------|-----------------------|----------------------------|----------------------------|----------------------------|
| EX2-2U1 | 12 | 160 | 6.5 | 0.9 |

* Test by pulse voltage

■ PART NUMBER SYSTEM



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EX1 Series

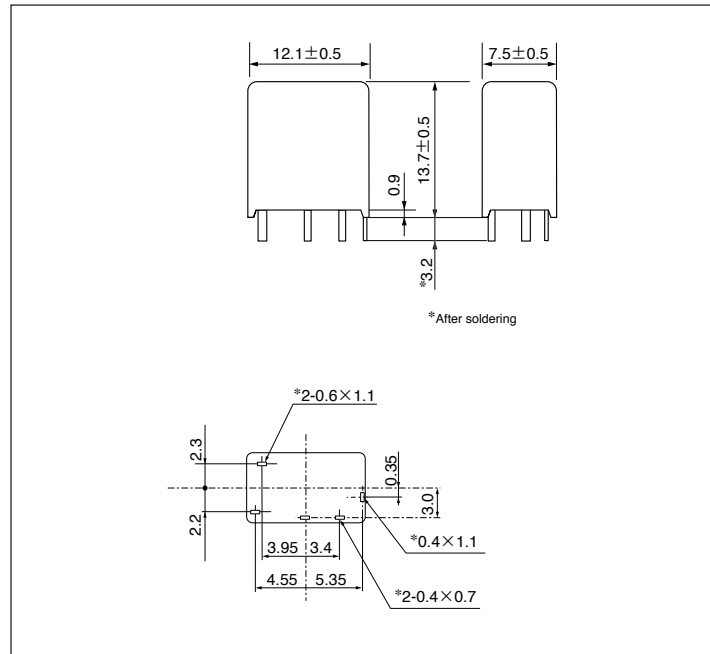


The NEXEM EX1 series is PC-board mount automotive relay suitable for various motor control applications that require a high quality and performance. The EX1 series is succeeding in about 65% of miniaturization in comparison with the ET1 series.

■ FEATURES

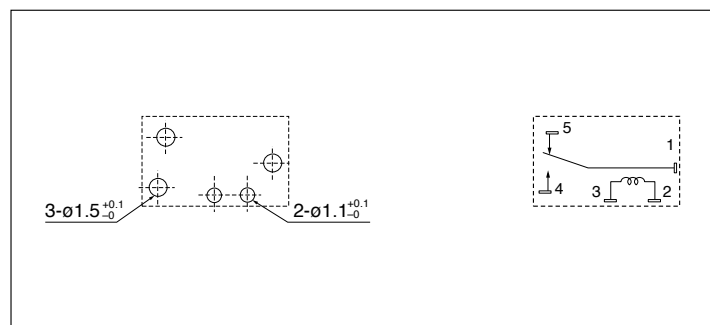
- Ultra miniature single relay
- Flux tight housing
- Approx. 65% relay volume of ET1
- Approx. 50% relay space of ET1
- Approx. 78% relay weight of ET1

■ DIMENSIONS mm



■ RECOMMENDED PCB PAD LAYOUT and SCHEMATICS

(bottom view) mm



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EX1 Series

■ SPECIFICATIONS

| Items | | Specifications |
|---------------------------------|---------------------------|--|
| Contact Form | | 1 Form C |
| Contact Ratings | Contact Rating Power | 14 VDC, 25A |
| | Maximum Switching Current | 30 A (at 16 VDC, Resistive load) |
| | Minimum Switching Current | 1A (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) |
| Nominal Operating Power | | 900 mW |
| Insulation Resistance | | 100 MΩ at 500 VDC |
| Withstand Voltage | Between open contacts | 500 VAC min. (for 1 minute) |
| | Between coil and contacts | 500 VAC min. (for 1 minute) |
| Shock Resistance | Misoperation | 98 m/s ² |
| | Destructive Failure | 980 m/s ² |
| Vibration Resistance | Misoperation | 10 to 300 Hz, 43 m/s ² |
| | Destructive Failure | 10 to 500 Hz, 43 m/s ² , 200 hour |
| Ambient Temperature | | − 40 to + 125°C |
| Running Specifications | Non-load | 1 × 10 ⁶ operations |
| | Load | 100 × 10 ³ operations (at 14 VDC, Motor Load 25 A) 100 × 10 ³ operations (at 14 VDC, Motor Load 25 A / 5 A) |
| Weight | | Approx. 3.5 g |

■ COIL RATING

• Sealed Type

at 20°C

| Part Numbers | Nominal Voltage (VDC) | Coil Resistance (Ω) ± 10 % | Must Operate Voltage (VDC) | Must Release Voltage (VDC) |
|--------------|-----------------------|----------------------------|----------------------------|----------------------------|
| EX1-2U1S | 12 | 160 | 6.5 | 0.9 |

* Test by pulse voltage

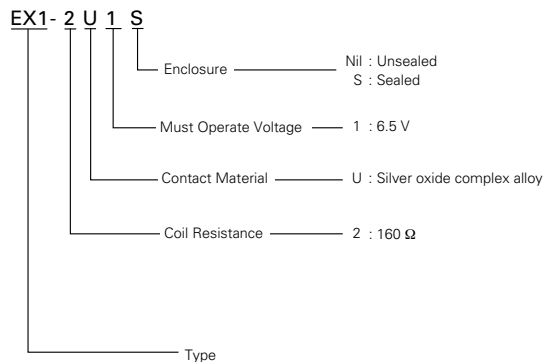
• Unsealed Type

at 20°C

| Part Numbers | Nominal Voltage (VDC) | Coil Resistance (Ω) ± 10 % | Must Operate Voltage (VDC) | Must Release Voltage (VDC) |
|--------------|-----------------------|----------------------------|----------------------------|----------------------------|
| EX1-2U1 | 12 | 160 | 6.5 | 0.9 |

* Test by pulse voltage

■ PART NUMBER SYSTEM



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ET2 Series



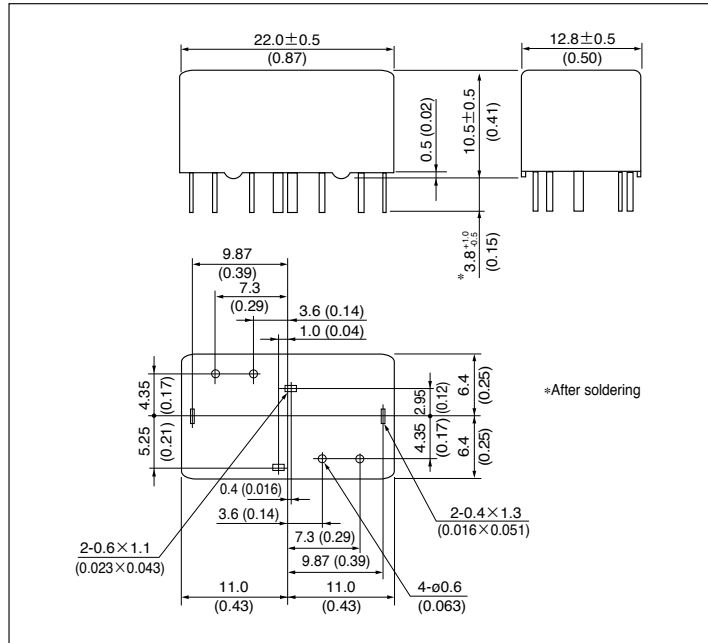
The NEXEM ET2 series is PC-board mount automotive relay suitable for various motor control applications that require a high quality and performance. The ET2 series is succeeding in about 50% of miniaturization in comparison with the EP2 series. This is H bridge type which is designed for forward and reverse control of the motor.

*ET2F:High heat resistivity

FEATURES

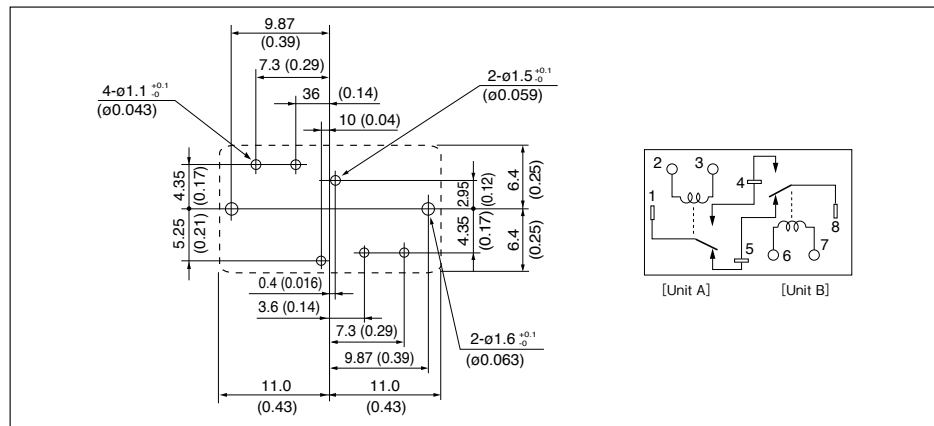
- Miniature twin relay
- Flux tight housing
- Approx. 50% relay volume of EP2
- Approx. 74% relay space of EP2
- Approx. 67% relay height of EP2
- Approx. 50% relay weight of EP2

DIMENSIONS mm (inch)



RECOMMENDED PCB PAD LAYOUT and SCHEMATICS

(bottom view) mm (inch)



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ET2 Series

■ SPECIFICATIONS

| Items | | Specifications | |
|---------------------------------|---------------------------|--|---|
| | | ET2 | ET2F |
| Contact Form | | 1 Form C × 2 (H Bridge) | 1 Form C × 2 (H Bridge) |
| Contact Ratings | Contact Rating Power | 14 VDC, 20A | |
| | Maximum Switching Current | 25 A (at 16 VDC, Resistive load) | |
| | Max. Carrying Current | 25 A (2 minutes 12 VDC at 85°C) 30 A (2 minutes 12 VDC at 20°C) | 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) |
| | Min. Switching Current | 1A (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, without diode) | |
| Nominal Operating Power | | 640 mW | |
| Insulation Resistance | | 100 MΩ at 500 VDC | |
| Withstand Voltage | Between open contacts | 500 VAC min. (for 1 minute) | |
| | Between coil and contacts | 500 VAC min. (for 1 minute) | |
| Shock Resistance | Misoperation | 98 m/s ² | |
| | Destructive Failure | 980 m/s ² | |
| Vibration Resistance | Misoperation | 10 to 300 Hz, 43 m/s ² | |
| | Destructive Failure | 10 to 500 Hz, 43 m/s ² , 200 hour | |
| Ambient Temperature | | - 40 to + 85°C | - 40 to + 125°C |
| Coil Temperature Rise | | 70°C / W | |
| Running Specifications | Non-load | 1 × 10 ⁶ operations | |
| | Load | 100 × 10 ³ operations (at 14 VDC, Motor Load 20 A) 100 × 10 ³ operations (at 14 VDC, Motor Load 20 A / 3 A) | |
| Weight | | Approx. 7.5 g (0.26 oz) | |

■ COIL RATING

• Sealed Type

at 20°C

| Part Numbers | | Nominal Voltage (VDC) | Coil Resistance (Ω) ± 10 % | Must Operate Voltage* (VDC) | Must Release Voltage* (VDC) |
|--------------|------------|-----------------------|----------------------------|-----------------------------|-----------------------------|
| ET2-B3M1S | ET2F-B3M1S | 12 | 225 | 6.5 | 0.9 |

* Test by pulse voltage

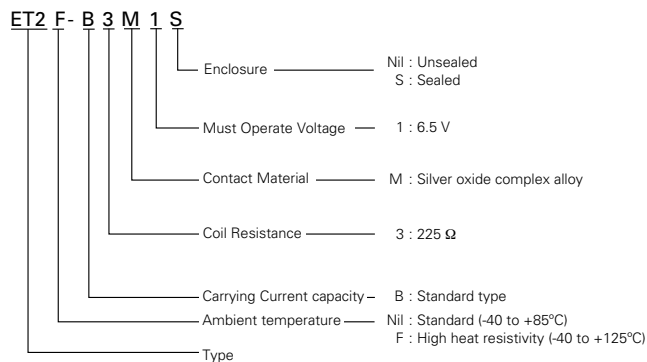
• Unsealed Type

at 20°C

| Part Numbers | | Nominal Voltage (VDC) | Coil Resistance (Ω) ± 10 % | Must Operate Voltage* (VDC) | Must Release Voltage* (VDC) |
|--------------|-----------|-----------------------|----------------------------|-----------------------------|-----------------------------|
| ET2-B3M1 | ET2F-B3M1 | 12 | 225 | 6.5 | 0.9 |

* Test by pulse voltage

■ PART NUMBER SYSTEM



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ET1 Series



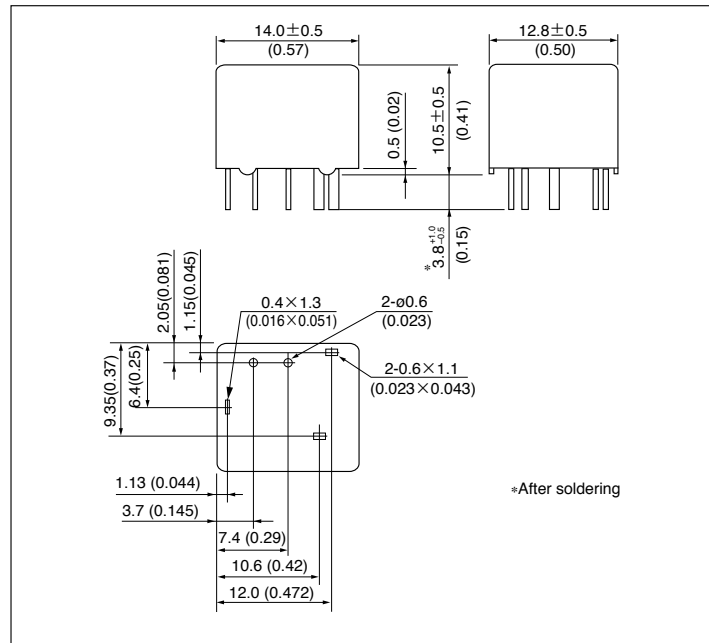
The NEXEM ET1 series is PC-board mount automotive relay suitable for various motor and heater control applications that require a high quality and performance. The ET1 series is succeeding in about 50% of miniaturization in comparison with the EP1 series.

*ET1F:High heat resistivity

FEATURES

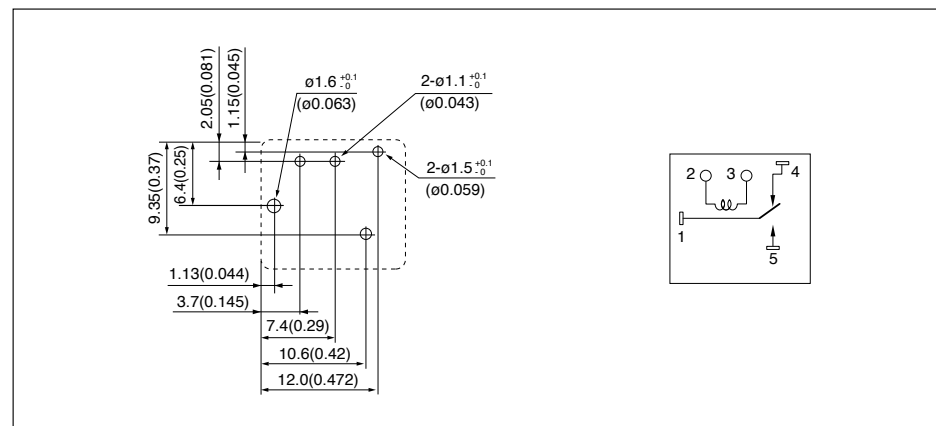
- Miniature single relay
- Flux tight housing
- Approx. 50% relay volume of EP1
- Approx. 76% relay space of EP1
- Approx. 67% relay height of EP1
- Approx. 56% relay weight of EP1

DIMENSIONS mm (inch)



RECOMMENDED PCB PAD LAYOUT and SCHEMATICS

(bottom view) mm



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ET1 Series

■ SPECIFICATIONS

| Items | | Specifications | |
|---------------------------------|---------------------------|--|---|
| | | ET1 | ET1F |
| Contact Form | | 1 Form C | |
| Contact Ratings | Contact Rating Power | 14 VDC, 20A | |
| | Maximum Switching Current | 25 A (at 16 VDC, Resistive load) | |
| | Max. Carrying Current | 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 | 1A (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, without diode) | |
| Nominal Operating Power | | 640 mW | |
| Insulation Resistance | | 100 MΩ at 500 VDC | |
| Withstand Voltage | Between open contacts | 500 VAC min. (for 1 minute) | |
| | Between coil and contacts | 500 VAC min. (for 1 minute) | |
| Shock Resistance | Misoperation | 98 m/s ² (10 G) | |
| | Destructive Failure | 980 m/s ² (100 G) | |
| Vibration Resistance | Misoperation | 10 to 300 Hz, 43 m/s ² | |
| | Destructive Failure | 10 to 500 Hz, 43 m/s ² , 200 hour | |
| Ambient Temperature | | -40 to +85°C | -40 to +125°C |
| Coil Temperature Rise | | 70°C / W | |
| Running Specifications | Non-load | 1 × 10 ⁶ operations | |
| | Load | 100 × 10 ³ operations (at 14 VDC, Motor Load 20 A) 100 × 10 ⁴ operations (at 14 VDC, Motor Load 20 A / 3 A) | |
| Weight | | Approx. 4.5 g (0.16 oz) | |

■ COIL RATING

• Sealed Type

at 20°C

| Part Numbers | | Nominal Voltage (VDC) | Coil Resistance (Ω) ± 10 % | Must Operate Voltage* (VDC) | Must Release Voltage* (VDC) |
|--------------|------------|-----------------------|----------------------------|-----------------------------|-----------------------------|
| ET1-B3M1S | ET1F-B3M1S | 12 | 225 | 6.5 | 0.9 |

* Test by pulse voltage

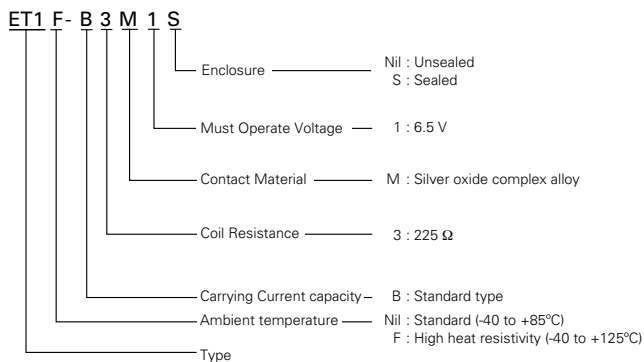
• Unsealed Type

at 20°C

| Part Numbers | | Nominal Voltage (VDC) | Coil Resistance (Ω) ± 10 % | Must Operate Voltage* (VDC) | Must Release Voltage* (VDC) |
|--------------|-----------|-----------------------|----------------------------|-----------------------------|-----------------------------|
| ET1-B3M1 | ET1F-B3M1 | 12 | 225 | 6.5 | 0.9 |

* Test by pulse voltage

■ PART NUMBER SYSTEM



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EP2 series is printed circuit board mount type and the most suitable for various motor controls in the automotive which require high-quality and high-performance.

EP2 series has two types for different applications. One is H bridge type which is designed for forward and reverse control of the motor. The other is separate type which contains two separated relays in one package.

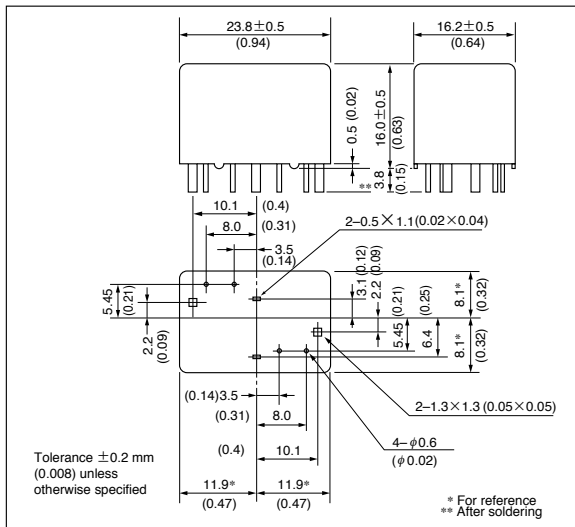
*EP2F:High heat resistivity

FEATURES

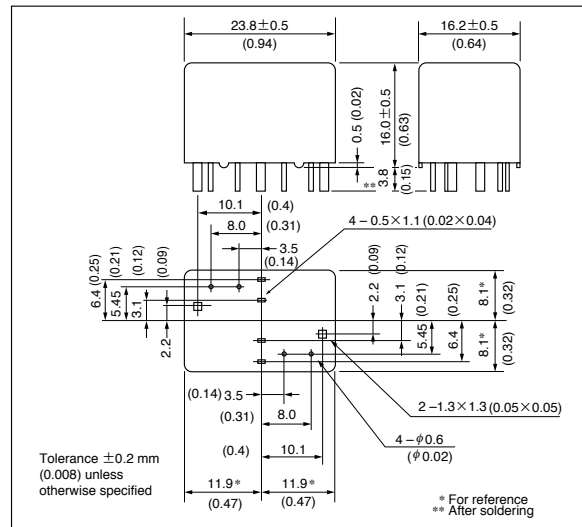
- Twin relay for motor reversible control
- High performance & productivity by unique symmetrical structure
- PC board mounting
- Flux tight housing

DIMENSIONS mm (inch)

[H Bridge Type]

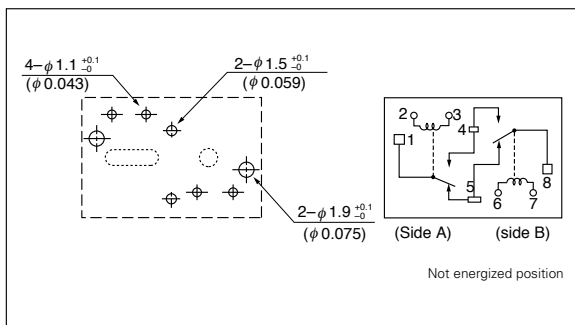


[Separate (T) Type]



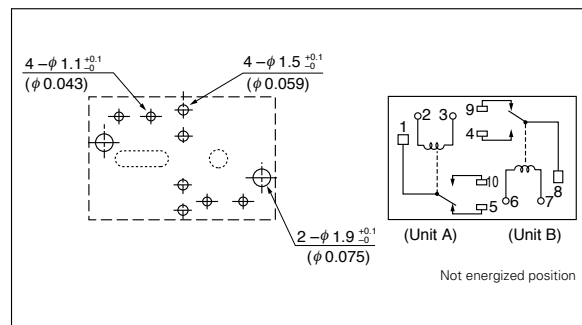
RECOMMENDED PCB PAD LAYOUT and SCHEMATICS

[H Bridge Type]



(bottom view) mm (inch)

[Separate (T) Type]



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EP2 Series

SPECIFICATIONS

at 20°C

| Items | Types (Contact Rating) | EP2 (Standard) | EP2-B (High Current) |
|--|------------------------|--|--|
| Contact Form | | 1 Form C × 2 (H Bridge Type or Separate Type) | |
| Contact Material | | Silver oxide complex alloy (Special type available) | |
| Initial Contact Resistance *figure 1. | | H Bridge (route A) : 10.7 mΩ typ. H Bridge (route B) : 10.4 mΩ typ. Separate (N/C) : 5.2 mΩ typ. Separate (N/O) : 5.2 mΩ typ. (measured by voltage drop at 6 VDC, 7 A) | H Bridge (route A) : 6.7 mΩ typ. H Bridge (route B) : 6.4 mΩ typ. Separate (N/C) : 3.2 mΩ typ. Separate (N/O) : 3.2 mΩ typ. (measured by voltage drop at 6 VDC, 7 A) |
| Contact Rating Power | | 14 VDC, 25A | |
| Contact Switching Current | | 30 A max. (at 16 VDC) | |
| Contact Carrying Current | | 20 A max. (1 hour max.) 25 A Max. (2 minutes Max.) at 12 VDC | 25 A max. (1 hour max.) 30 A Max. (2 minutes Max.) at 12 VDC |
| Operate Time (Excluding bounce) | | Approx. 5 ms (at Nominal Voltage) | |
| Release Time (Excluding bounce) | | Approx. 2 ms (at Nominal Voltage, without diode) | |
| Nominal Operate Power | | 0.48 W/ 0.64 W (at 12 VDC) | |
| Insulation Resistance | | 100 MΩ at 500 VDC | |
| Withstand Voltage | | 500 VAC (for 1 minute) | |
| Shock Resistance | | 98 m/s ² (misoperation), 980 m/s ² (destructive failure) | |
| Vibration Resistance | | 10 to 300 Hz, 43 m/s ² (misoperation), 10 to 500 Hz, 43 m/s ² , 200 hours (destructive failure) | |
| Ambient Temperature | | -40 to +85°C (-40 to +185°F) | |
| Coil Temperature Rise | | 50°C / W (90 °F /W) (Contact Carrying Current : 0 A) | |
| Running Specifications | Non-load | 1 × 10 ⁶ operations | |
| | Load | 100 × 10 ³ operations (at 14 VDC, Motor Load 25 A / 5 A) | |
| Weight | | Approx. 15 g (0.53 oz) | |

COIL RATING

at 20°C

| Part Numbers | | Nominal Voltage (VDC) | Coil Resistance (Ω) ± 10 % | Must Operate Voltage* (VDC) | Must Release Voltage* (VDC) | Nominal Operate Power (W) |
|---------------|---------------|-----------------------------|----------------------------------|-----------------------------------|-----------------------------------|---------------------------------|
| H Bridge Type | Separate Type | | | | | |
| EP2-3N1 | EP2-3N1T | 12 | 225 | 6.5 | 0.9 | 0.64 |

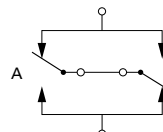
* Test by pulse voltage

PART NUMBER SYSTEM

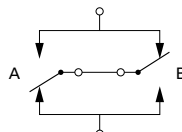
| | |
|---------------------------|--|
| EP2 F-B3L1 ST | |
| Wiring | Nil : H bridge type T : Separate type |
| Enclosure | Nil : Unsealed S : Sealed |
| Must Operate Voltage | 1 : 6.5 V |
| Contact Material | L : Silver oxide complex alloy type I N : Silver oxide complex alloy type II G : Silver oxide complex alloy type III |
| Coil Resistance | 3 : 225 Ω |
| Carrying Current Capacity | Nil : Standard type B : High current type |
| Ambient temperature | Nil : Standard (-40 to +85°C) F : High heat resistivity (-40 to +125°C) |
| Type | |

*Contact Resistance (figure 1)

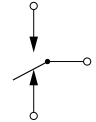
• H Bridge (route A)



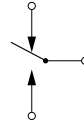
• H Bridge (route B)



• Separate (N/C)



• Separate (N/O)



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EP2 Series

*EP2F:High heat resistivity

■ SPECIFICATIONS

at 20°C

| Items | | | EP2F |
|---------------------------------|----------|----------------|---|
| Contact Form | | | 1 Form C × 2 (H bridge type and separate type) |
| Contact Material | | | Silver oxide complex alloy (Special type available) |
| Initial Contact Resistance | | | 50 m Ω max. (measured by voltage drop at 6 VDC, 7A) |
| Contact Rating Power | | | 14 VDC, 25A |
| Contact Switching Current | | | 30 A max. (at 16 VDC) |
| Contact Carrying Current | | | 25 A (2 minutes max. 12 VDC at 125°C) 30 A (2 minutes max. 12 VDC at 85°C) 35 A (2 minutes max. 12 VDC at 25°C) |
| Operate Time (Excluding bounce) | | | Approx. 5 ms (at Nominal Voltage) |
| Release Time (Excluding bounce) | | | Approx. 2 ms (at Nominal Voltage, without diode) |
| Normal Operate Power | | | 0.64 W (at 12 VDC) |
| Insulation Resistance | | | 100 M Ω at 500 VDC |
| Withstand Voltage | | | 500 VAC (for 1 minute) |
| Shock Resistance | | | 98 m / s ² (misoperation), 980 m / s ² (destructive failure) |
| Vibration Resistance | | | 10 to 300 Hz, 43 m / s ² (misoperation), 10 to 500 Hz, 43 m / s ² , 200 hours (destructive failure) |
| Ambient Temperature | | | − 40°C to + 125°C (− 40°F to + 257°F) |
| Coil Temperature Rise | | | 50°C / W (90°F / W) (Contact Carrying Current: 0 A) |
| Running Specifications | Non-load | | 1 × 10 ⁶ operations |
| | Load | Contact G | 1 × 10 ⁵ operations (at 14 VDC, Motor Load 25 A / 5 A) at 25°C 1 × 10 ⁵ operations (at 14 VDC, Motor Load 18 A / 3 A) at 125°C |
| | | Contact L or N | 1 × 10 ⁵ operations (at 14 VDC, Motor Load 20 A / 4 A) at 25°C 1 × 10 ⁵ operations (at 14 VDC, Motor Load 12 A / 2 A) at 125°C |
| | | | Weight |

■ COIL RATING

• EP2F

at 20°C

| | Part Numbers | | Nominal Voltage (VDC) | Coil Resistance (Ω) ± 10 % | Must Operate Voltage (VDC max.) | Must Release Voltage (VDC min.) | Nominal Operate Power (W) |
|-----------|---------------|---------------|-----------------------|----------------------------|---------------------------------|---------------------------------|---------------------------|
| | H Bridge Type | Separate Type | | | | | |
| Contact G | EP2F-B3G1 | EP2F-B3G1T | 12 | 225 | 6.5 | 0.9 | 0.64 |
| Contact L | EP2F-B3L1 | EP2F-B3L1T | 12 | 225 | 6.5 | 0.9 | 0.64 |
| Contact N | EP2F-B3N1 | EP2F-B3N1T | 12 | 225 | 6.5 | 0.9 | 0.64 |

* Test by pulse voltage



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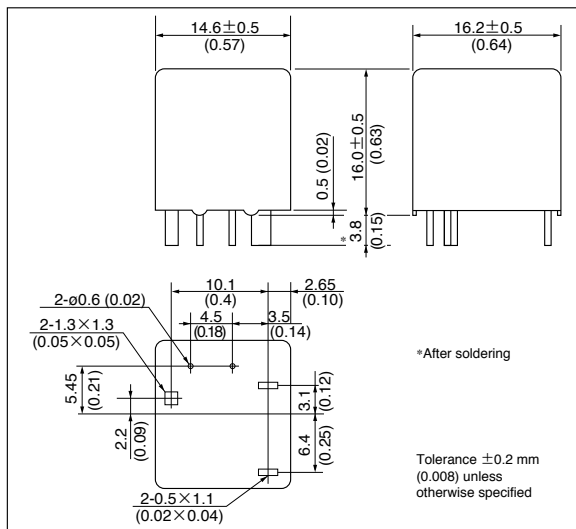
Now, these products are corresponding only to specific customers.

EP1 series is printed-circuit-board-mount-type and the most suitable for various motor controls in automotive applications pursuing quality and performance.

■ FEATURES

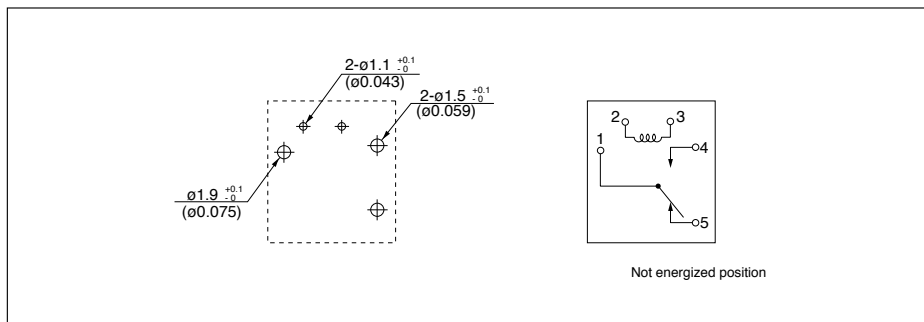
- For motor reversible control
- Two types of contact according to switching current (Standard type: 25 A max, High current type: 30 A max.)
- PC board mounting
- Flux tight housing

■ **DIMENSIONS** mm (inch)



RECOMMENDED PCB PAD LAYOUT and SCHEMATICS

(bottom view) mm (inch)



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EP1 Series

■ SPECIFICATIONS

at 20°C

| Items | | Types (Contact Rating) | EP1 (Standard) | EP1-B (High Current) |
|---------------------------------|----------|------------------------|--|---|
| Contact Form | | | 1 Form C | |
| Contact Material | | | Silver oxide complex alloy (Special type available) | |
| Initial Contact Resistance | | | 5.2 mΩ typ. (measured by voltage drop at 6 VDC, 7A) | |
| Contact Rating Power | | | 14 VDC, 25A | |
| Contact Switching Current | | | 30 A max. (at 16 VDC) | |
| Contact Carrying Current | | | 25 A max. (1 hour max.) 30 A max. (2 minutes max.) at 12 VDC | 30 A max. (1 hour max.) 35 A max. (2 minutes max.) at 12 VDC |
| Operate Time (Excluding bounce) | | | Approx. 5 ms (at Nominal Voltage) | |
| Release Time (Excluding bounce) | | | Approx. 2 ms (at Nominal Voltage, without diode) | |
| Nominal Operate Power | | | 0.48 W/ 0.64 W (at 12 VDC) | |
| Insulation Resistance | | | 100 MΩ at 500 VDC | |
| Withstand Voltage | | | 500 VAC (for 1 minute) | |
| Shock Resistance | | | 98 m/s ² (misoperation), 980 m/s ² (destructive failure) | |
| Vibration Resistance | | | 10 to 300 Hz, 43 m/s ² (misoperation), 10 to 500 Hz, 43 m/s ² , 200 hours (destructive failure) | |
| Ambient Temperature | | | - 40 to + 85°C (- 40 to + 185°F) | |
| Coil Temperature Rise | | | 50°C / W (90 °F /W)(Contact Carrying Current: 0A) | |
| Running Specifications | Non-load | | 1 × 10 ⁶ operations | |
| | Load | | 100 × 10 ³ operations (at 14 VDC, Motor Load 25 A / 5 A) | |
| Weight | | | Approx. 8 g (0.28 oz) | |

■ COIL RATING

at 20°C

| Part Numbers | | Nominal Voltage (VDC) | Coil Resistance (Ω) ± 10 % | Must Operate Voltage* (VDC) | Must Release Voltage* (VDC) | Nominal Operate Power (W) |
|---------------|-------------------|-----------------------------|----------------------------------|-----------------------------------|-----------------------------------|---------------------------------|
| Standard Type | High Current Type | | | | | |
| EP1-3L1 | EP1-B3G1 | 12 | 225 | 6.5 | 0.9 | 0.64 |

* Test by pulse voltage



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EP1 Series

*EP1F:High heat resistivity

■ SPECIFICATIONS

at 20°C

| Items | | | EP1F |
|---------------------------------|----------|----------------|---|
| Contact Form | | | 1 Form C |
| Contact Material | | | Silver oxide complex alloy (Special type available) |
| Initial Contact Resistance | | | 50 m Ω max. (measured by voltage drop at 6 VDC, 7A) |
| Contact Rating Power | | | 14 VDC, 25A |
| Contact Switching Current | | | 30 A max. (at 16 VDC) |
| Contact Carrying Current | | | 30 A (2 minutes max. 12 VDC at 125°C) 35 A (2 minutes max. 12 VDC at 85°C) 40 A (2 minutes max. 12 VDC at 25°C) |
| Operate Time (Excluding bounce) | | | Approx. 5 ms (at Nominal Voltage) |
| Release Time (Excluding bounce) | | | Approx. 2 ms (at Nominal Voltage, without diode) |
| Normal Operate Power | | | 0.64 W (at 12 VDC) |
| Insulation Resistance | | | 100 M Ω at 500 VDC |
| Withstand Voltage | | | 500 VAC (for 1 minute) |
| Shock Resistance | | | 98 m / s ² (misoperation), 980 m / s ² (destructive failure) |
| Vibration Resistance | | | 10 to 300 Hz, 43 m / s ² (misoperation), 10 to 500 Hz, 43 m / s ² , 200 hours (destructive failure) |
| Ambient Temperature | | | − 40°C to + 125°C (− 40°F to + 257°F) |
| Coil Temperature Rise | | | 50°C / W (90°F / W) (Contact Carrying Current: 0 A) |
| Running Specifications | Non-load | | 1 × 10 ⁶ operations |
| | Load | Contact G | 1 × 10 ⁵ operations (at 14 VDC, Motor Load 25 A / 5 A) at 25°C 1 × 10 ⁵ operations (at 14 VDC, Motor Load 18 A / 3 A) at 125°C |
| | | Contact L or N | 1 × 10 ⁵ operations (at 14 VDC, Motor Load 20 A / 4 A) at 25°C 1 × 10 ⁵ operations (at 14 VDC, Motor Load 12 A / 2 A) at 125°C |
| | | | Weight |

■ COIL RATING

• EP1F

at 20°C

| | Part Numbers | Nominal Voltage (VDC) | Coil Resistance (Ω) ± 10 % | Must Operate Voltage (VDC max.) | Must Release Voltage (VDC min.) | Nominal Operate Power (W) |
|-----------|--------------|-----------------------|----------------------------|---------------------------------|---------------------------------|---------------------------|
| Contact G | EP1F-B3G1 | 12 | 225 | 6.5 | 0.9 | 0.64 |
| Contact L | EP1F-B3L1 | 12 | 225 | 6.5 | 0.9 | 0.64 |
| Contact N | EP1F-B3N1 | 12 | 225 | 6.5 | 0.9 | 0.64 |

* Test by pulse voltage



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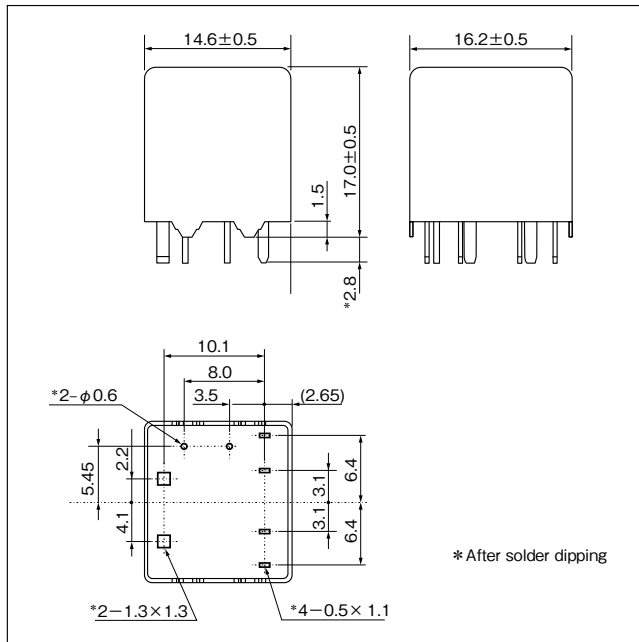


The NEXEM EP1K series is PC-board mount automotive relay suitable for control of heaters, fans and pumps, etc. The EP1K relay was developed based on the EP1 relay, and the performance of carrying current is about 10A larger than the EP1 relay.

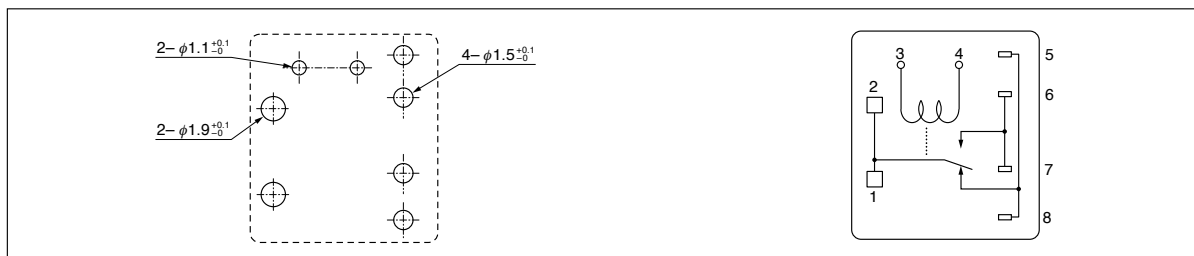
FEATURES

- The performance of carrying current is about 10A larger than the EP1 series
- High heat resistance
- Flux tight housing
- Through-hole reflow soldering available

DIMENSIONS mm



RECOMMENDED PCB PAD LAYOUT and SCHEMATICS (bottom view) mm



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EP1K Series

■ SPECIFICATIONS

| Items | | Specifications |
|---------------------------------|---------------------------|---|
| Contact Form | | 1 Form C |
| Contact Material | | Silver oxide complex alloy |
| Contact Resistance | | 4 mΩ typical (measured at 7 A), initial |
| Contact Rating Power | | 14 VDC, 25A |
| Maximum Switching Current | | 30 A |
| Minimum Switching Current | | 1A (5 VDC) |
| Contact Carrying Current | | 54 A (1hour 14 VDC at 20°C) ^{*1} |
| Operate Time (Excluding bounce) | | Approx. 5 ms typical (at Nominal Voltage) |
| Release Time (Excluding bounce) | | Approx. 2 ms typical (at Nominal Voltage without diode) |
| Nominal Operating Power | | 0.64 W |
| Insulation Resistance | | 100 MΩ at 500 VDC |
| Withstand Voltage | Between open contacts | 500 VAC min. (for 1 minute) |
| | Between coil and contacts | 500 VAC min. (for 1 minute) |
| Shock Resistance | Misoperation | 98 m/s ² |
| | Destructive Failure | 980 m/s ² |
| Vibration Resistance | Misoperation | 10 to 300 Hz, 43 m/s ² |
| | Destructive Failure | 10 to 500 Hz, 43 m/s ² , 200 hours |
| Ambient Temperature | | −40 to +125°C |
| Coil Temperature Rise | | 50°C/W (Contact Carrying Current: 0 A) |
| Running Specifications | Non-load | 1 × 10 ⁶ operations |
| | Load | 1 × 10 ⁵ operations (at 14 VDC, Motor Load 25 A / 5 A) at 25°C 1 × 10 ⁵ operations (at 14 VDC, Motor Load 18 A / 3 A) at 125°C |
| Weight | | Approx. 8 g |

*1 Mounted on PC-board: FR-4 (Thickness: 1.6mm), Copper (Thickness: 105 μm, Width: 15mm, Length: 50mm)
This value is allowable value at abnormal case such as fuse blow. And cyclical current is not guaranteed.

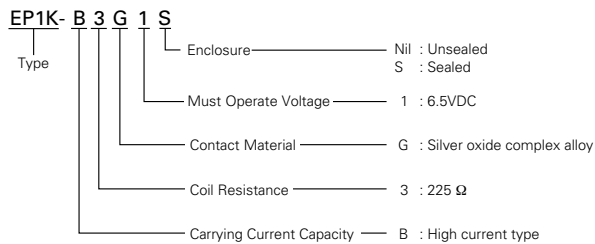
■ COIL RATING

at 20°C

| Part Numbers | Nominal Voltage (VDC) | Coil Resistance (Ω) ± 10 % | Must Operate Voltage (VDC) | Must Release Voltage (VDC) |
|--------------|-----------------------|----------------------------|----------------------------|----------------------------|
| EP1K-B3G1 | 12 | 225 | 6.5 | 0.9 |

* Test by pulse voltage

■ PART NUMBER SYSTEM



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EM1 Series

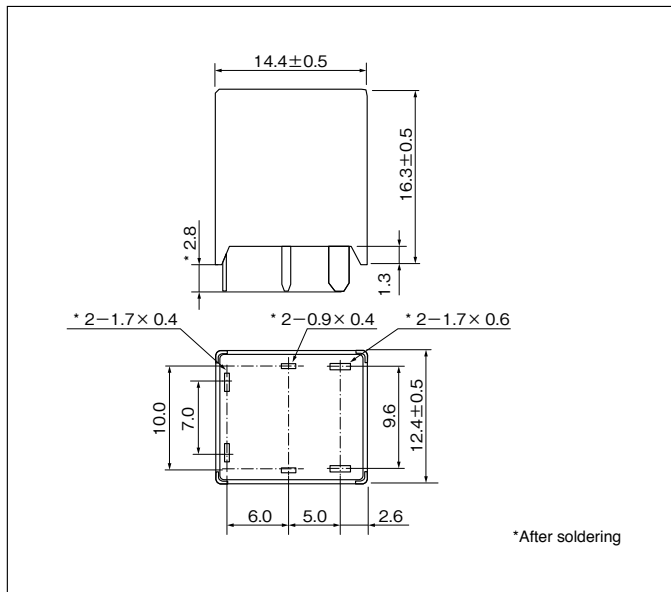


The NEXEM EM1 series is PC-board mount automotive relay suitable for control of lamps, C-R circuits, heaters, fans and pumps, etc. The EM1 series has higher switching performance than current relays; EP1, ET1, EX1 series.

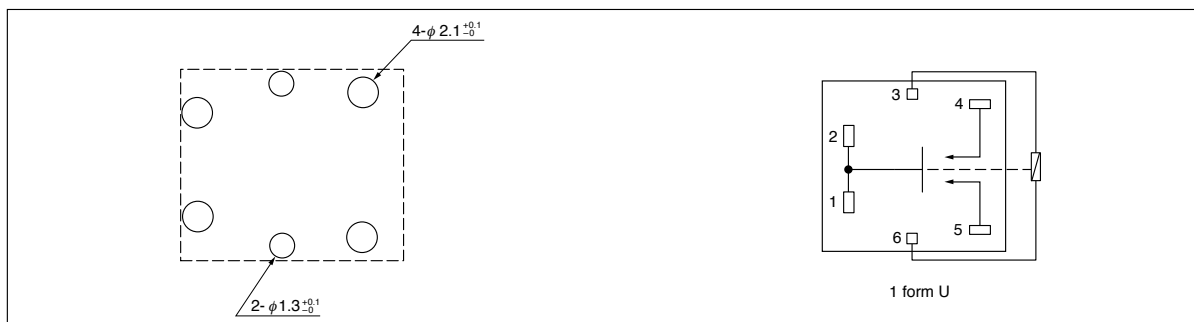
FEATURES

- Suitable for large inrush current load, such as lamps and CR-circuits, etc.
- Large current capacity (54A 1hour at 20°C)
- High heat resistance
- Flux tight housing
- Through-hole reflow soldering available

DIMENSIONS mm



RECOMMENDED PCB PAD LAYOUT and SCHEMATICS (bottom view) mm



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EM1 Series

SPECIFICATIONS

| Items | | | Specifications |
|---------------------------------|---------------------------|-----------|---|
| Contact Form | | | 1 From U |
| Contact Ratings | Contact Rating Power | | 14 VDC, 40A |
| | Maximum Switching Current | | 100 A ON / 60 A OFF at 14 VDC (Resistive, 10 operations) |
| | Maximum Carrying Current | | 54A at 14VDC for 1hour at 20°C *1 |
| | Minimum Switching Current | | 1 A (5 VDC) |
| | Contact Resistance | | 2.5 mΩ typical (measured at 7 A) initial |
| Contact Material | | | Silver oxide complex alloy |
| Operate Time (Excluding bounce) | | | 4 ms typical (at Nominal Voltage) |
| Release Time (Excluding bounce) | | | 1 ms typical (at Nominal Voltage, without diode) |
| Nominal Operating Power | | | 640 mW |
| Insulation Resistance | | | 100 MΩ at 500 VDC |
| Withstand Voltage | Between open contacts | | 500 VAC min. (for 1 minute) |
| | Between coil and contacts | | 500 VAC min. (for 1 minute) |
| Shock Resistance | Misoperation | | 98 m/s ² |
| | Destructive Failure | | 980 m/s ² |
| Vibration Resistance | Misoperation | | 10 to 300 Hz, 43 m/s ² |
| | Destructive Failure | | 10 to 500 Hz, 43 m/s ² , 200 hours |
| Ambient Temperature | | | −40 to + 125°C |
| Running Specifications | Non-load | | 1 × 10 ⁶ operations |
| | Load | Resistive | 100 × 10 ³ operations (at 14VDC, 40A) at 20°C |
| | | Lamp | 100 × 10 ³ operations (at 14VDC, Inrush 120A/ Steady 14A) at 20°C |
| Weight | | | Approx. 7 g |

*1 Mounted on PC-board: FR-4 (Thickness: 1.6mm), Copper (Thickness: 105 μm, Width: 15mm)
This value is allowable value at abnormal case such as fuse blow. And cyclical current is not guaranteed.

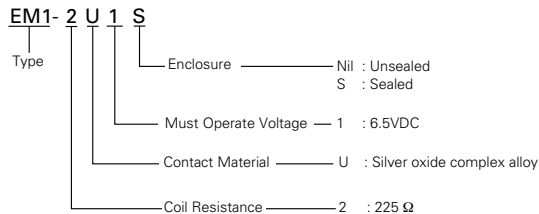
COIL RATING

at 20°C

| Part Numbers | Nominal Voltage (VDC) | Coil Resistance (Ω) ± 10 % | Must Operate Voltage (VDC) | Must Release Voltage (VDC) |
|--------------|-----------------------|----------------------------|----------------------------|----------------------------|
| EM1-2U1 | 12 | 225 | 6.5 | 0.9 |

* Test by pulse voltage

PART NUMBER SYSTEM



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EL1 Series

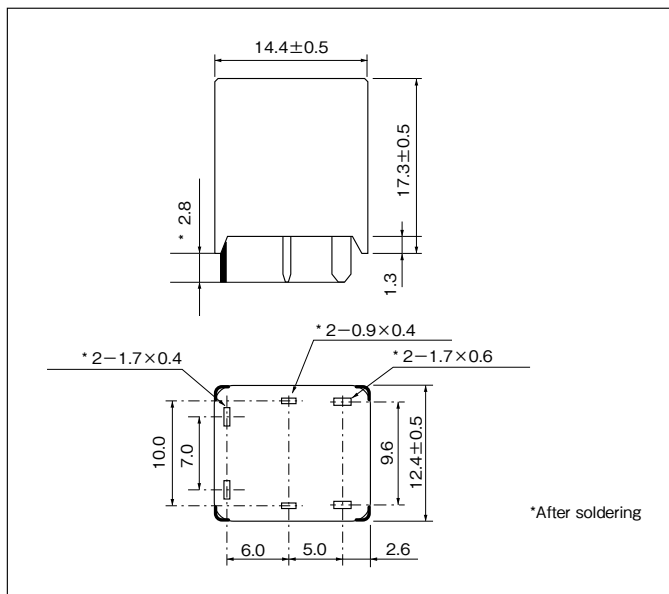


The NEXEM EL1 series is PC-board mount automotive relay suitable for control of various motor, solenoidal coil and power supply etc. The EL1 series has higher switching and carrying current performance than existing relays, EP1,ET1 and EX1 series.

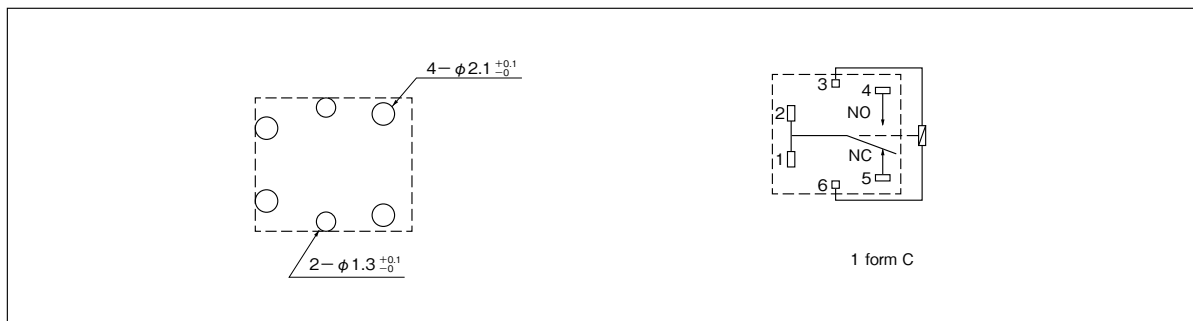
FEATURES

- Suitable for inductive load and large current interruption
- Changing-over circuit available by Form C contacts
- Large current capacity (54A 1hour at 20°C)
- High heat resistance
- Flux tight housing
- Through-hole reflow soldering available

DIMENSIONS mm



RECOMMENDED PCB PAD LAYOUT and SCHEMATICS (bottom view) mm



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EL1 Series

SPECIFICATIONS

| Items | | Specifications |
|---------------------------------|---------------------------|--|
| Contact Form | | 1 Form C |
| Contact Ratings | Contact Rating Power | NO : 40A 14VDC, NC : 20A 14VDC (Resistive load) |
| | Maximum Switching Current | 100A ON/60A OFF, 14VDC (Resistive load, 10 operations) |
| | Maximum Carrying Current | 54A at 14VDC for 1hour at 20°C ^{*1} |
| | Minimum Switching Current | 5VDC, 1A |
| | Contact Resistance | NO : 3mΩ typical, NC : 5mΩ typical (measured at 7A) initial |
| Contact Material | | Silver oxide complex alloy |
| Operate Time (Excluding bounce) | | 4ms typical at Nominal voltage |
| Release Time (Excluding bounce) | | 1ms typical (at Nominal voltage, without diode) |
| Nominal Operating Power | | 640mW |
| Insulation Resistance | | 100MΩ at 500VDC |
| Withstand Voltage | Between open contacts | 500VAC min. (for 1 minute) |
| | Between coil and contacts | 500VAC min. (for 1 minute) |
| Shock Resistance | Misoperation | 98m/s ² (10G) |
| | Destructive Failure | 980m/s ² (100G) |
| Vibration Resistance | Misoperation | 10 to 300Hz, 43m/s ² (4.4G) |
| | Destructive Failure | 10 to 500Hz, 43m/s ² (4.4G), for 200 hours |
| Ambient Temperature | | - 40 to + 125°C |
| Running Specifications | Non-load | 1 × 10 ⁶ operations |
| | Load | 100 × 10 ³ operations (NO: 14VDC, Resistive load, 40A) 100 × 10 ³ operations (NO: 14VDC, Inductive load (0.5mH), 30A) |
| Weight | | Approx. 7.5g |

*1 Mounted on PC-board: FR-4 (Thickness: 1.6mm), Copper (Thickness: 105 μm, Width: 15mm)
This value is allowable value at abnormal case such as fuse blow. And cyclical current is not guaranteed.

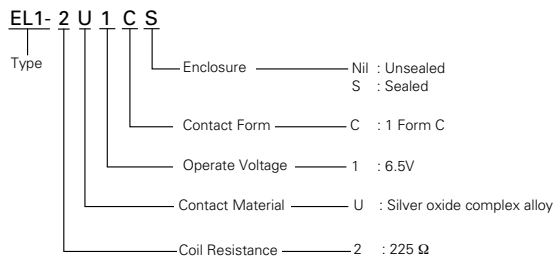
COIL RATING

at 20°C

| Part Numbers | Nominal Voltage (VDC) | Coil Resistance (Ω) | Must Operate Voltage ^{*2} (VDC) | Must Release Voltage ^{*2} (VDC) |
|--------------|-----------------------|---------------------|--|--|
| EL1-2U1C | 12 | 225 ± 10% | 6.5 | 0.9 |

*2 Test by pulse voltage

PART NUMBER SYSTEM



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NOTES ON CORRECT USE

This section provides notes on correctly using the miniature relay. Be sure to read this before using the relay.

Proper functioning of the miniature relay requires appropriate circuit design, mounting and evaluation according to the purpose of use.

Note that the responsibility for accidents caused by improper circuit design, mounting or evaluation falls on you and we cannot be responsible for them.

1. GENERAL

- (1) Never allow the contact load to exceed the maximum ratings; otherwise, the lifetime of the relay will be dramatically shortened.

The lifetime specified in the catalog is for certain load conditions, and other factors must be taken into consideration in actual circuits. Therefore, an accurate lifetime must be measured in the actual circuit.

The two tables below show load current range guidelines.

| [Signal relay] | | | | [Power relay] | | |
|----------------|--|--|---|---------------|---|--|
| Current range | 10 μ A to 1 mA | 1 mA to 0.5 A | 0.5 A to 2 A | Current range | to 1 A | 1 A to 40 A |
| Application | GOOD | VERY GOOD | NOT SO GOOD for some cases | Application | NOT SO GOOD for some cases | VERY GOOD |
| | <ul style="list-style-type: none"> Contacts may be unstable. Thermal electromotive force and contact noise should be taken into consideration. | <ul style="list-style-type: none"> Contacts are stable and highly reliable. | <ul style="list-style-type: none"> Infrequent operation poses no problem, but frequent operation deteriorates contact stability. Use of a power relay is preferred for 1 A or higher. | | <ul style="list-style-type: none"> Contacts may be unstable. Since a high capacitance type contact is not suitable, it is necessary to select the correct contacts. | <ul style="list-style-type: none"> Since different contact phenomena occur depending on the contact load, it is necessary to select the correct contacts. |

- (2) When using the relay with a high current or high capacitance load, an inrush current may cause contact dislocation or deposition; therefore check the feasibility of use in the actual circuit.
- (3) Be sure to use the relay at an ambient temperature within the maximum ratings; otherwise, the life of the relay will be radically shortened. If use outside the specified temperature range is unavoidable, consult EM Devices.
- (4) With a relay whose coil polarity is specified in its internal circuit diagram, apply the polarity of the rated voltage as specified. Note that when a rippled DC power source is used, abnormalities such as beat in the coil may occur.
- (5) Exercise care when handling the relay so as not to apply shock to it or drop it.
- (6) The flow soldering conditions are for 5 to 10 seconds at 260°C .
- (7) When cleaning, use alcohol, or a water-based solvent. Avoid using ultrasonic cleaning.



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2. NOTES ON CONTACT LOAD

(1) Minimum load

Use the relay at a voltage and current higher than the minimum load; otherwise, the contact resistance will increase and the signal cannot be correctly transmitted. This is because stabilization of the contact surface (electrically and mechanically eliminating minute substances generated on the contact surface) by opening/closing the contacts with the minimum load probably will not occur.

In addition, even if the load is within the maximum ratings, care is required to ensure that the current does not drop below the minimum load after opening/closing the contacts.

(2) Contact protection circuit

By providing a protection circuit that suppresses transient current and voltage applied to the contacts when the contacts are opened or closed, the switching life of a relay can be improved.

It is important to select a correct protection circuit suited to the load.

① General notes

(a) It is necessary to place the protection circuit close to the contacts. In principle, place it on the same printed circuit board as that for the contacts (within a distance of several tens of centimeters).

(b) It is important to confirm the effectiveness of the protection circuit in the actual circuit. In some cases, it is also necessary to conduct lifetime tests using an appropriate equivalent circuit.

② Examples of contact protection circuits

(a) Inductive load

With an inductive load, when the contacts are opened to break the circuit, a counter electromotive force as shown in Fig. 1 is generated, causing an electric discharge between the contacts. This discharge energy accelerates metal dislocation and wear on the contact surface. A protection circuit is therefore necessary to absorb this counter electromotive force. Table 1 shows guideline circuit examples and circuit constants. Never use a connection with a capacitor only as shown in Table 2.

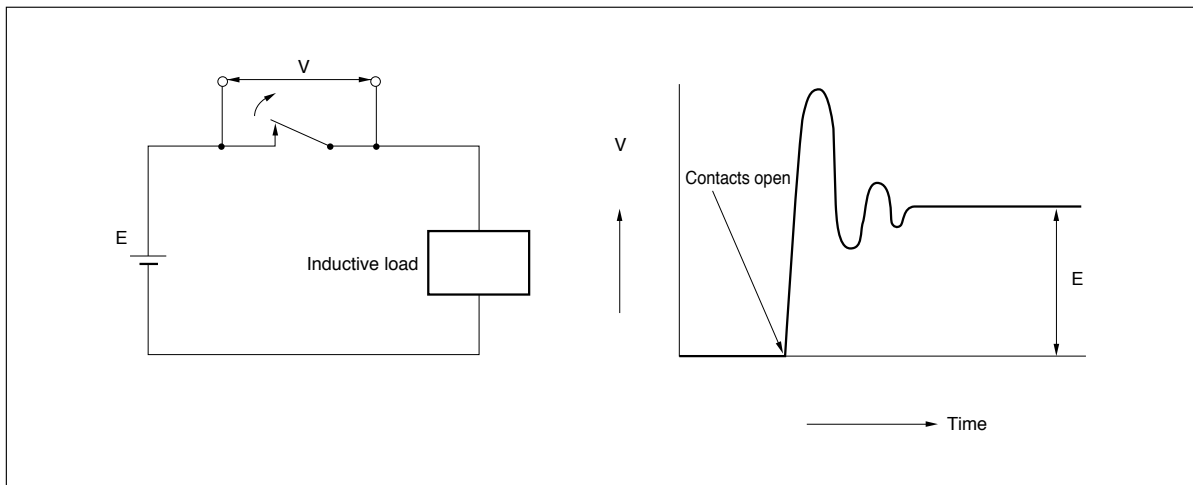


Fig.1 Inductive Load Circuit



Table 1 Inductive Load Contact Protection Circuits

| Protection element | Circuit example | Remarks |
|-----------------------------------|-----------------|--|
| Capacitor + resistor (CR circuit) | | $r (\Omega) = \frac{\text{contact voltage (V)}}{0.5 \text{ to } 1}$ $C (\mu F) = (0.5 \text{ to } 1) \times \text{contact current (A)}$ <p>The withstand voltage of a non-polar capacitor should be 300 V or higher.</p> |
| | | |
| Varistor | | High voltage is suppressed by using the voltage characteristics of the varistor. |
| Diode | | Pay attention to the reverse withstand voltage of the diode. |
| Diode + Zener diode | | Pay attention to the reverse withstand voltage of the diode. |

Table 2 Examples of Wrong Circuits Using Capacitors

| | | | |
|---------------------|--|---------------------|---|
| <p>WRONG</p> | <p>This circuit is effective for arc suppression when the contacts are opened, but when the contacts are closed a capacitor short-circuit current flows, making the contacts more susceptible to metal deposition.</p> | <p>WRONG</p> | <p>This circuit is effective for arc suppression when the contacts are opened, but when the contacts are closed a capacitor charging current flows, making the contacts more susceptible to metal deposition.</p> |
|---------------------|--|---------------------|---|



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(b) Lamp loads (inrush current), etc.

Some loads, such as halogen lamps, have a low initial resistance so that an inrush current 10 times as high as the steady-state current may flow through the relay on power application. A high inrush current may also flow when the relay is used to switch loads such as motors and capacitors. In these cases, a current-limiting resistor is connected to the contacts in series in order to keep the inrush current to within the maximum rated value (refer to Fig. 2).

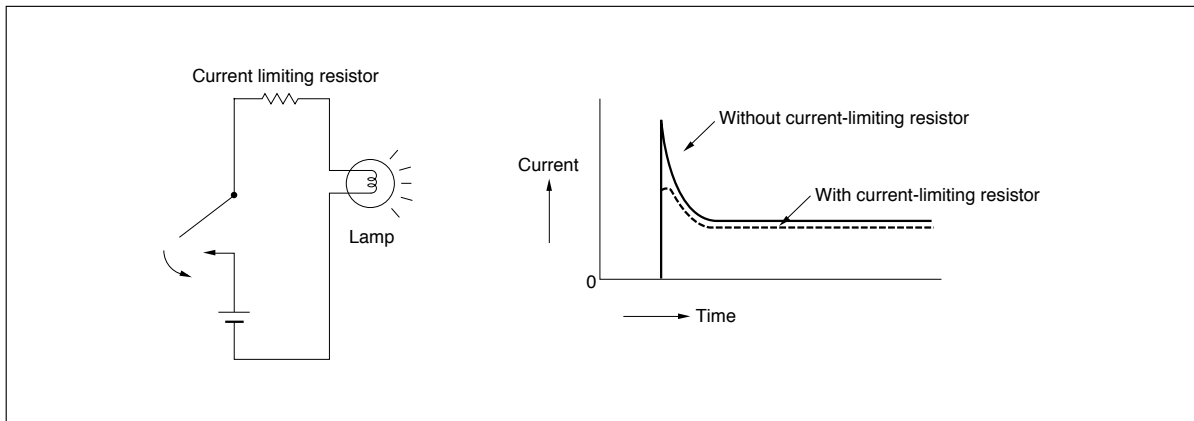


Fig.2 Example of Current-Limiting Resistor in Lamp Load Circuit

(c) Stray line capacitance

When the stray line capacitance is large, the inrush current that is generated due to the stray line capacitance poses a problem. As shown in Fig.3, the electric charge on the line capacitance is discharged directly through the contacts when the contacts are closed. The smaller the wiring cable characteristic impedance and the longer the cable, the greater wear on the contacts.

It is necessary to connect a current-limiting resistor or surge suppresser in series with the contacts as a protection circuit to suppress the inrush current.

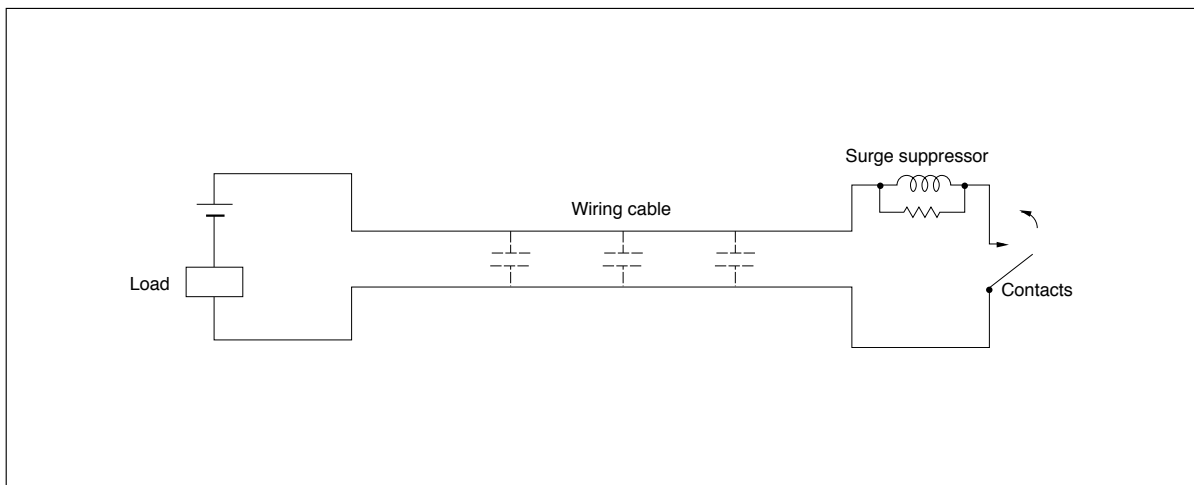


Fig.3 Example of Surge Suppression Circuit with Surge Suppressor



3. NOTES ON DRIVING RELAYS

(1) Temperature characteristics

If the relay is used at an ambient temperature exceeding the operating temperature range, the performance of the relay may be degraded and the life may be dramatically shortened.

- ① It is possible to use the relay at the rated coil voltage within the operating temperature range. Note, however, that at the upper limit of the operating temperature range the permissible voltage on the coil may be restricted, and must be confirmed before the relay is used.
- ② The must operate voltage, must release voltage, operate time and release time change with the ambient temperature. Refer to Technical Documents to confirm that the relay operates normally at a particular operating temperature. Fig.4 shows an example of the temperature characteristics of the relay.

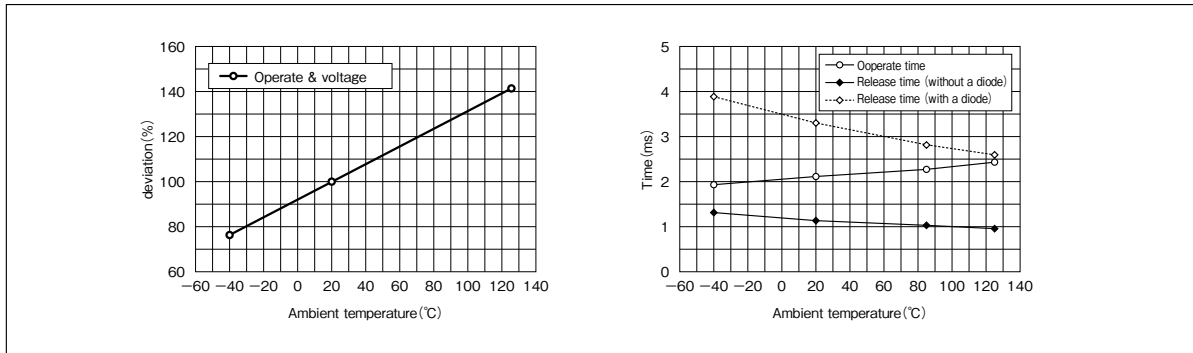


Fig.4 Temperature Characteristics of Relay (Example)

(2) Maximum applied voltage

The maximum applied voltage of the relay coil depends on the ambient temperature and the carrying load current, and the upper limit is decided on the heat resistance of the relay. It mainly depends on the permissible temperature of the coil wire and the plastic material. When the voltage applies the coil continuously, the coil generates the heat corresponding to applied voltage. Then the coil temperature rises up. The higher the ambient temperature is, the less the margin of the heat resistance temperature of the coil wire material is. Therefore, it is necessary to restrict the coil voltage at high ambient temperature. Figure 5 shows the example of permissible applied voltage. And then, the coil temperature is also affected by the load current. Please consider the permissible maximum applied voltage in use condition like ambient temperature, carrying load current and carrying duration.

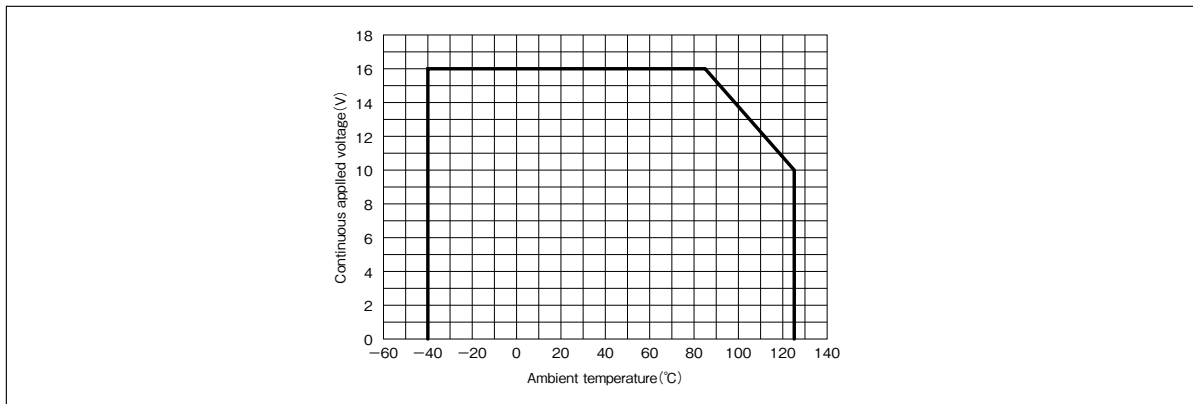


Fig.5 Coil Voltage vs. Ambient Temperature Derating Characteristics (Example of miniature power relay)



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- Before using the product in this catalog, please read "Precautions" and other safety precautions listed in the printed version catalog.

(3) Hot start

When the temperature of the relay has risen due to heat generated by the voltage applied to the coil, the relay may not operate even if the coil is energized again immediately after it has been once deenergized. This is because an increase in the coil resistance due to heat in the relay causes the current to fall even though the applied voltage remains constant. This reenergizing state is called a hot start. This problem occurs especially when the operating temperature is high and a voltage lower than the relay rated voltage is applied. It is necessary to refer to Technical Documents to know in advance the must operate voltage at the time of a hot start in order to prevent this malfunction.

(4) Non-must operate and holding voltages

In some circuits, the relay must not operate at a certain voltage or release at a certain voltage. In such cases, contact EM Devices because a special specification product with non-must operate and holding voltages specified can be provided.

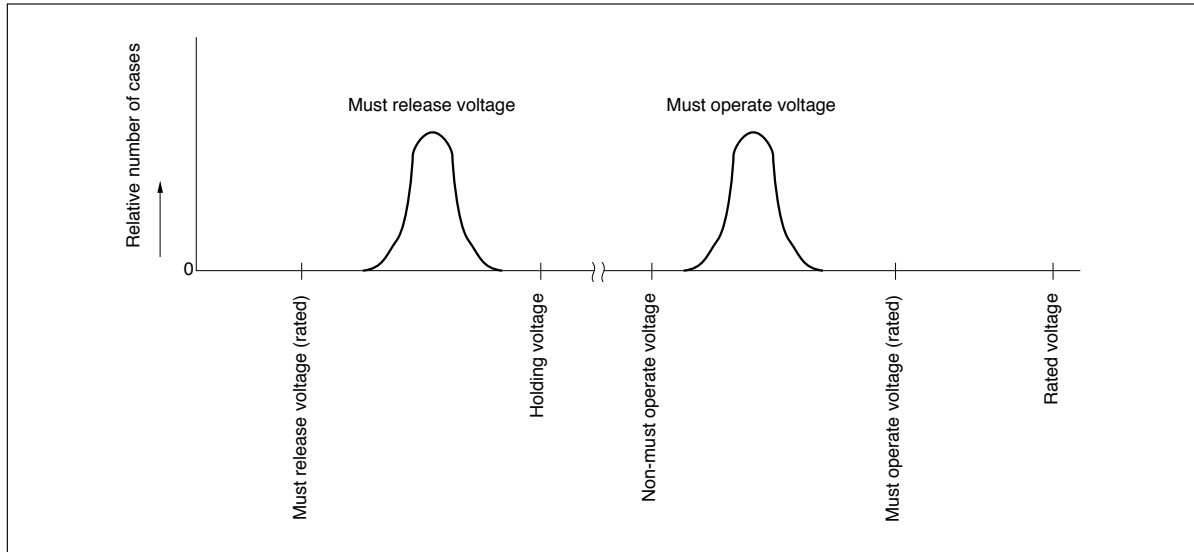


Fig.6 Example of Distribution of Relay Must Operate Voltage and Must Release Voltage

(5) Drive waveform

If the waveform of the relay coil drive voltage gradually increases and decreases, the relay may not be able to deliver its inherent performance. The voltage must instantaneously rise and fall as a pulse.

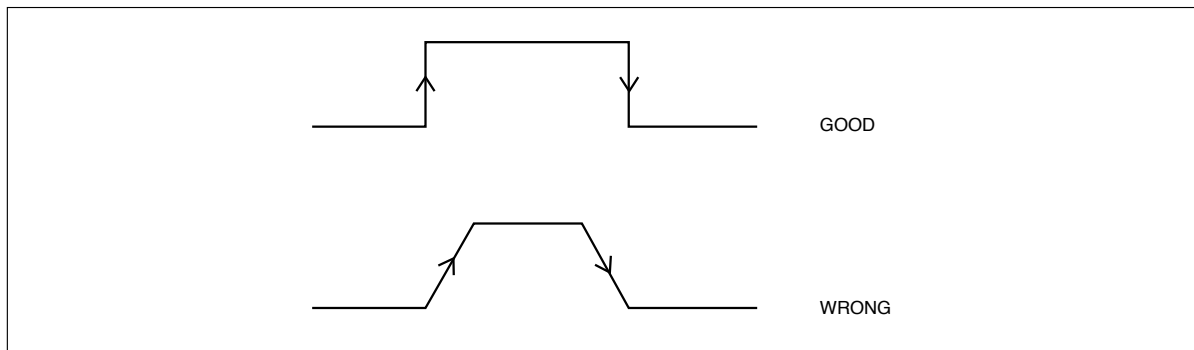


Fig.7 Relay Drive Waveform



(6) Latching relay drive circuit

- ① Since the relay coil has an inductive impedance, a counter electromotive force is generated when the circuit is opened. This voltage may damage the relay driver transistor, and therefore a diode is connected in parallel with each coil. With a single coil latching type relay, however, a diode cannot be used because the current direction of the coil is inverted. Therefore, when a single coil latching type relay is used, select a transistor with sufficient reverse breakdown voltage.
- ② A latching relay is driven by a pulsating coil voltage. The pulse width of this drive voltage must be 10 ms or wider. If the pulse is too short, the relay may not operate.
- ③ Apply a voltage to the coil in the polarity specified by the internal connection diagram of the relay. With a double coil latching type relay, do not apply voltage in a manner that both the set and reset coils are energized at the same time. (Refer to Fig. 8.)

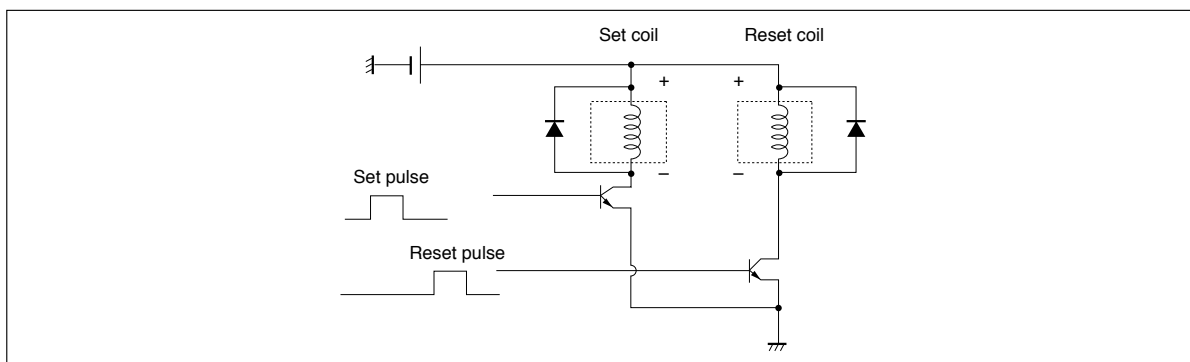


Fig.8 Drive Circuit of Latching Relay (Example of Double Coil Latching Type)

- ④ A latching relay is factory-set to the reset state for shipment. However, it may be set while being transported due to vibration or shock. Make sure that the relay is reset when its application system starts operating. When the relay is employed in a portable system, the circuit must be designed so that the relay is reset at the beginning of operation of the system because the relay may be set by unexpected vibration or shock.
 - ⑤ When configuring a self-holding circuit that uses the self-break contacts of the relay, note that the coil drive circuit is disconnected by the self-contacts, causing troubles such as self-oscillation.
- #### (7) Connection of coil diode
- In the case of loads, such as solenoid and electromagnetic clutches, that produce large discharge energy when the contacts are opened, connect a Zener diode with the drive transistor. Particularly when the diode is connected in parallel with the coil, the current in the coil diminishes gradually when the relay is released, and thus may slow down opening of the contacts, intensifying wear on the contacts. For this reason, certain products are not recommended diode connection.
- #### (8) Opening/closing frequency
- If the contacts are opened/closed frequently with a high current load, repeated electric discharges may cause contact metal deposition or damage to the contact spring. When using the relay with a high current load with frequent opening/closing of the contacts, consult EM Devices.
- #### (9) Long continuous energizing of coil
- If the coil is energized continuously for a long time, the coil temperature may rise, promoting generation of organic gas inside the relay, which is likely to cause trouble in the contacts. When using a circuit requiring constant operation, consider the possibility of using a latching relay that does not need continuous energizing of the coil.



(10) Instantaneous voltage drop of circuit

When the same power source is used for the relay drive circuit and the load circuit in a circuit such as a lamp load circuit where an inrush current flows, the moment the contacts are closed the source voltage may drop if the power source capacitance is small. In this case, the relay may be released or an oscillation phenomenon where the relay repeatedly releases and operates may occur.

Add power source capacitance or a smoothing circuit to prevent this phenomenon.

4. NOTES ON OPERATING ENVIRONMENTS

(1) Ambient temperature

Ensure that the ambient temperature of the relay mounted on the device is within the "operating temperature range" in the catalog. Use of the relay at a temperature outside this range may adversely affect insulation or contact performance. For the relationship between the ambient temperature and relay drive conditions, refer to **3. Notes on Driving Relays**.

(2) Humidity

Use of a sealed type relay in a high humidity (RH85 % or higher) environment for a long time may introduce moisture inside the relay. This moisture may combine with NO_x or SO_x generated by glow discharges to produce nitric acid or sulfuric acid. In this case, the acid produced may corrode the metal that forms the relay, causing operation troubles in the relay. If use of the relay in such a high humidity environment is unavoidable, consult EM Devices in advance.

(3) Atmosphere

Use of a relay in an atmosphere with a high concentration of sulfur gases (H₂S, SO₂), nitric acid gas (HNO₃), ammonia (NH₃), silicon vaporization gas, etc., may cause imperfect contacts and other functional trouble. Avoid use of the relay in such an atmosphere.

(4) Atmospheric pressure

A sealed type relay maintains constant sealability under normal pressures (810 to 1200 hPa). However, if it is used under other pressure conditions, its sealability may be destroyed or the relay may be deformed, causing functional trouble. Be sure to use the relay under normal pressure conditions.

(5) Vibration and shock

The vibration resistance and shock resistance of a relay are as shown in the catalog and use of the relay under conditions other than those specified may cause malfunctions or damage.

Be sure to use the relay within those vibration and shock conditions.

Even before the relay is used, repeated excessive vibration or shock load may cause malfunctioning of the relay, by causing metal deposition on the contacts and other functional trouble. Malfunctions due to vibration or shock during operation may cause considerable damage or wear of the contacts.

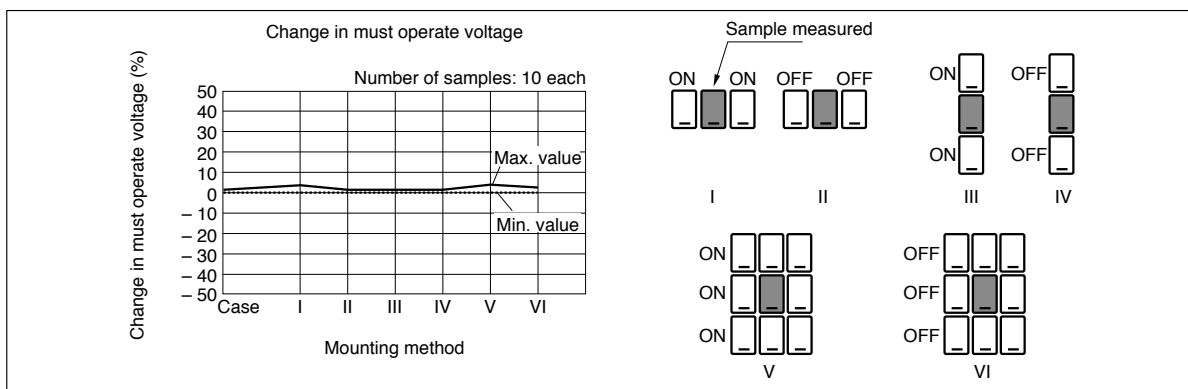
Note that operation of a snap switch mounted close to the relay or shock by operation of an electromagnet may cause malfunctioning.

(6) Influence of magnetic fields

The magnetic circuit of a NEXEM miniature relay is constructed so that the relay does not easily malfunction due to influence of external magnetic fields. However, under the influence of magnetic flux leaking from a transformer, speaker, or magnet placed in the vicinity of the relay, the must operate voltage, must release voltage, operate time, release time and other dynamic characteristics may change.

In applications where these characteristics changes pose problems, it is necessary to take measures such as magnetic shielding. Also, when many make them miniature signal relays are closely located, the magnetic flux leaking from those relays may make them interfere with each other, causing changes in the must operate voltage, must release voltage, operate time, release time and other dynamic characteristics. Fig. 9 shows examples of the mounting, magnetization, and change in the must operate voltage of signal relays in the EA2 series. In applications where these characteristics changes pose a problem, it is necessary to reduce the mounting density.





(2) Relay mounting position

The vibration resistance and shock resistance of a relay are greatly affected by its mounting position. It is particularly important to select the mounting position to prevent the break contacts from being instantaneously interruption due to vibration and shock. The vibration resistance and shock resistance are at a minimum when the direction of vibration and shock applied to the relay matches the operation direction of the armature (mobile iron piece) and contacts. Therefore, if it is possible to anticipate the direction of vibration or shocks, mount the relay so that the direction in which vibration or shocks are applied is perpendicular to the direction of the relay armature operation. Fig. 10 shows the direction of relay armature operation.

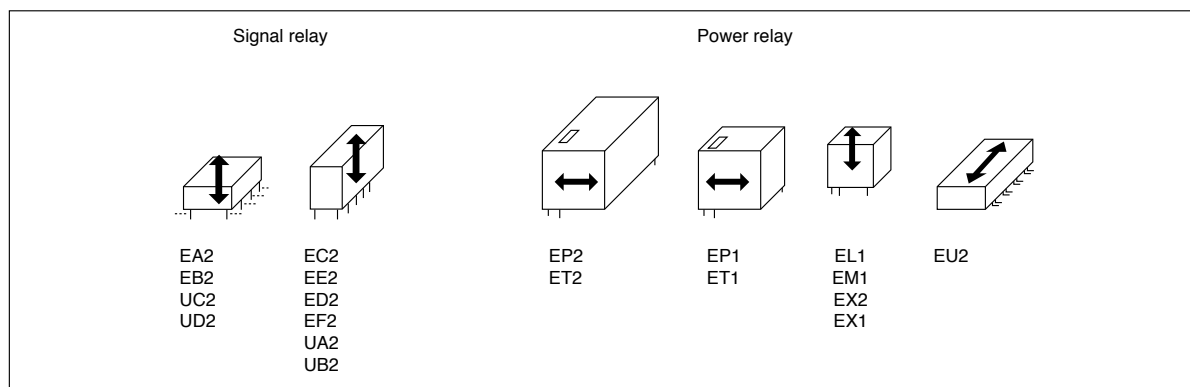


Fig.10 Direction of Armature Operation

(3) Notes on mounting

① Chucking

When a relay is mounted using an automatic machine, note that application of an excessive external force to the cover at the time of chucking or insertion of the relay may damage or change the characteristics of the cover.

② Temporary securing to printed circuit board

Avoid bending the pins to temporarily secure the relay to the printed circuit board. Bending the pins may degrade sealability or adversely influence the internal mechanism.

③ Application of soldering flux

For an unsealed type relay, do not directly apply soldering flux to the relay.

④ Soldering work

The following conditions are recommended for soldering a relay onto a printed circuit board.

(a) Automatic soldering: Flow solder is recommended.

- <Recommended conditions> *Preheating: 100°C max. 1 min. max.
*Solder temperature: 260°C max.
*Solder time: 5 to 10 seconds

(b) Manual soldering (by soldering iron):

- <Recommended conditions> *Solder temperature: 350°C max.
*Solder time: 2 to 3 seconds

Ventilation immediately after soldering is completed is recommended.

Avoid immersing the board in cleaning solvent immediately after soldering; otherwise thermal shock may be applied to it.



⑤ Pin cutting after soldering

Do not cut the pins of the relay with a revolving blade or an ultrasonic cutter, because vibration that is applied to the relay during the cutting may change the relay characteristics.

7. NOTES ON CLEANING

(1) Cleaning solvent

Use of alcohol or water-based cleaning solvents is recommended. Never use thinner or benzene because these solvents may damage the relay housing. A sealed type relay can be immerse-cleaned because solvent does not penetrate inside the relay.

(2) Avoid ultrasonic cleaning.

Ultrasonic cleaning may cause a break in the coil wire or sticking of the contacts due to the energy of vibration.

8. NOTES ON COATING

(1) Coating method

If coating the printed circuit board due to ensure electric insulation and anticorrosion of the board, EM Devices recommends to coat the board while avoiding the relay by suitable protector so that the coating agent should not adhere to the relay. If the relay is coated with the board by necessity, lower the relay and board up to room temperature after soldering and cleaning process. And then coat them. Moreover, heat them until perfectly curing in case of heat curing type agent. If the agent is not stiffened and relay sealability is broken in some causes, the agent may penetrate into the relay and the relay operation may be blocked.

(2) Avoidance of silicone

Avoid the coating agent of silicone because contact failure might be caused.

9. NOTES ON HANDLING RELAYS

(1) Use of magazine case stoppers

Relays are packaged in magazine cases for shipment.

When some relays are taken out from the case and space is freed inside the case, be sure to secure the relays in the case with a stopper. If the relays are not well secured, vibration during transportation may cause contact problems.

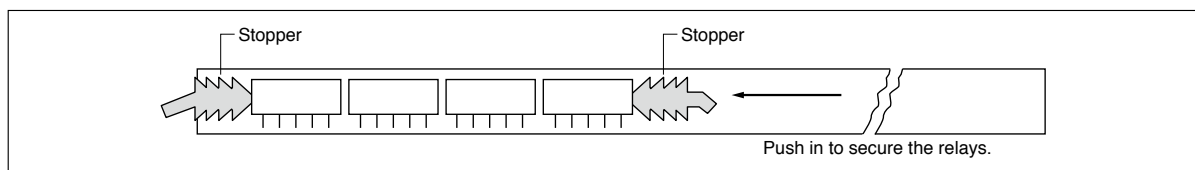


Fig.11 Storage in Magazine Case

(2) Do not use relays that have been dropped.

If an individual relay product falls from the work table, etc. a shock of 9800m/s^2 (1000G) or more is applied to the relay and its functions may be destroyed. Even if the shock is apparently weak, confirm that there is no abnormality before using the relay.



10. NOTES ON USING SMT RELAYS

(1) Mounting pads

Determine the dimensions of the mounting pads on the printed circuit board taking into consideration such factors as solderability and insulation in order to accommodate the mounting accuracy of the automatic mounter. Use the dimensions of the mounting pads in the catalog.

(2) Solder reflow

The SMT relay is highly resistant to heat. However, solder the relay under the correct temperature conditions so that the full performance of the relay can be realized. The IRS (infrared ray reflow soldering) and VPS (vapor phase soldering: reflow by using latent heat of organic solvent) methods are recommended.

In addition, air reflow soldering may also be used. Whichever soldering method is used, be sure to confirm the temperature conditions for soldering and the influence of soldering on the relay in advance before setting work standards.

(3) Storage

The sealability of a surface-mount relay may be lost if the relay absorbs moisture and is then heated during soldering . Please use relays within 12 months from the data of delivery. (Storage conditions : 30 degree C/60% RH)

(4) Baking

If there is a possibility that the relay absorbed moisture, please consider baking the relay before reflow soldering.



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