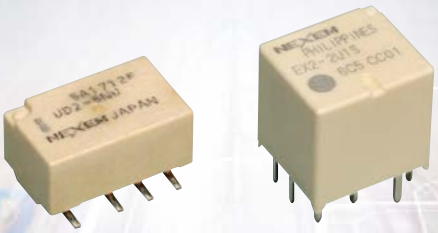
NEXEM Electro Mechanical Devices for Next

Miniature Relays

Vol.02



Miniature Relays

Selection Guide

⚠

●All specifications in this catalog and production status of products are subject to change without notice. Prior to the purchase, please contact EM Devices for updated product data.
●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.

2017.09.30 9690RSGV0L02E1709H1

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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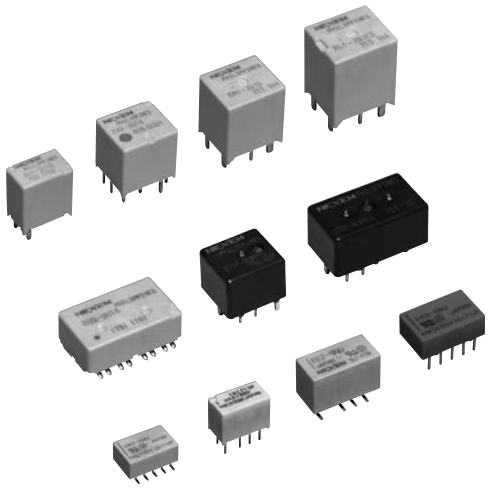
Miniature Relay



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.

2017.09.30 9690RSGV0L02E1709H1

Selector Chart

· Group		Miniature Relay-Signal			
· Type of Relay		***UA2*** 	***UB2*** 	***UC2*** 	***UD2*** 
· Features		· Super-compact size · Dual-inline leads (Small mounting space) · 2500V surge (2 × 10 μs*) · Latch type available · Low power consumption type available	· Super-compact size · Surface mount (Small mounting space) · 2500V surge (2 × 10 μs*) · Latch type available · Low power consumption type available	· Super-compact size · Dual-inline leads (Low profile type) · 2500V surge (2 × 10 μs*) · Latch type available · Low power consumption type available	· Super-compact size · Surface mount (Low profile type) · 2500V surge (2 × 10 μs*) · 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℃ , 1Hz) 1×10^5 (125 VAC, 0.3A at 20℃ , 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 × 10 μs, 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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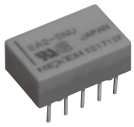
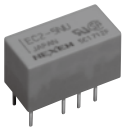
Selector Chart

Miniature Relay-Signal				・Group
EA2 	***EB2*** 	***EC2*** 	***EE2*** 	・Type of Relay
・Low power consumption ・Low magnetic interference ・1500V FCC surge 1000VAC FCC ・Compact, light weight ・Latch type available	・Surface mount ・Low power consumption ・Low magnetic interference ・1500V FCC surge 1000VAC FCC ・Compact, light weight ・Latch type available	・Low power consumption ・Dual-inline leads (Small mounting space) ・2500 V surge (2 × 10 μs*) coil to contacts ・Latch type available ・High-insulation is lineup.	・Low power consumption ・Surface mount (Reduced mounting space) ・2500 V surge (2 × 10 μs*) coil to contacts ・Latch type available ・High-insulation, high-voltage type is lineup.	・Features
2c				・Contact Form
Silver alloy with gold alloy overlay				・Contact Material (standard)
30W/62.5 VA 1.0A		60W/125 VA (UL/CSA Rating) 2.0A		・Contact Rating (Resistive) (switching) 3A 2A 1A
3,4.5,5,12,24 VDC		3,4.5,5,9,12,24 VDC		・Coil Voltage
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℃ ,5Hz) 1×10^6 (10 VDC, 10 mA at 85℃ ,2Hz)				Load / ・Running Specifications
10×10^6				Non-load / ・Running Specifications
1000VAC(1500VAC: NK type of EE2 at make contact)				Between open contacts / ・Withstand Voltage
1000VAC				Between adjacent contacts / ・Withstand Voltage
1000VAC		1500VAC or 1000VAC**		Between contacts and coil / ・Withstand Voltage
1500V FCC		1500V (FCC), 2500V***(2 × 10ms, coil to contacts)		・Surge Withstand Voltage
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) × 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 μs of rise time and 10 μs of decay time to half crest.
** for double coil latch type
*** 1500V for double coil latch type

Selector Chart

· Group		Miniature Relay-Signal	
· Type of Relay		***ED2*** 	***EF2*** 
· Features		· Ultra-low power consumption · Dual-inline leads (small mounting space) · 2500 V surge (2 × 10 μs*)coil to contacts	· Ultra-low power consumption · Surface mount (reduced mounting space) · 2500V surge (2 × 10 μs*)coil to contacts
· Contact Form		2c	
· Contact Material (standard)		Silver alloy with gold alloy overlay	
· Contact Rating (Resistive) (switching)	3A 2A 1A	30W/62.5 VA 1.0A	
· Coil Voltage		1.5,3,4.5,5,9,12,24 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℃ ,5Hz) 1×10^6 (10 VDC, 10 mA at 70℃ ,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 × 10 μs, 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 μs of rise time and 10 μs of decay time to half crest.

#FCC surge between coil and contacts and between adjacent contacts

Selector Chart

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

Selector Chart

· Group		Miniature Relay-Power	
· Type of Relay		***ET2*** 	***ET1*** 
· Features		· 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	· 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 15A 10A 5A 1A	20A(14VDC)	
· 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

Selector Chart

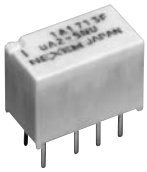
Miniature Relay-Power			· Group
EP2 	***EP1*** 	***EP1K*** 	· Type of Relay
· Twin relay for motor reversible control · PC board mounting · Flux tight housing · Symmetrical structure *EP2F:High heat resistivity	· Single relay · For motor control · PC board mounting · Flux tight housing *EP1F:High heat resistivity	· 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)
25A(14VDC)			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 · Running Specifications
1×10^6			Non-load · Running Specifications
500VAC			Between open contacts · Withstand Voltage
——			Between adjacent contacts · Withstand Voltage
500VAC			Between contacts and coil · Withstand Voltage
——			· 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.

Selector Chart

· Group		Miniature Relay-Power	
· Type of Relay		***EM1*** 	***EL1*** 
· Features		· 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	· 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

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) 1500 V surge (10 × 160 μs[*2])	
	Between adjacent contacts		
	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.

UA2 Series

■ PART NUMBER SYSTEM

UA2-3SNU

- Option
  - NU : Standard
  - NJ : Trimmed lead type
  - NE : Low power consumption type
- Latch type
  - Nil : Non-latch type
  - S : Single coil latch type
- Nominal coil voltage
  A numerical value of coil voltage
  (See part numbers)
- Series name

■ SAFETY STANDARD AND RATING

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

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℃

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℃

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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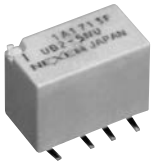
UB2 Series



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 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) 1500 V surge (10 × 160 μs[*2])	
	Between adjacent contacts		
	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 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.

UB2 Series

■ PART NUMBER SYSTEM

UB2-3SNU - L

- Packing
  - Nil : Tube
  - L : Embossed carrying tape of L type
- Option
  - NU : Standard
  - NUN : Minimum footprint type
  - NE : Low power consumption type
  - NEN : Low power consumption type with minimum footprint
- Latch type
  - Nil : Non-latch type
  - S : Single coil latch type
- Nominal coil voltage
  A numerical value of coil voltage
  (See part numbers)
- Series name

■ SAFETY STANDARD AND RATING

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

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℃

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℃

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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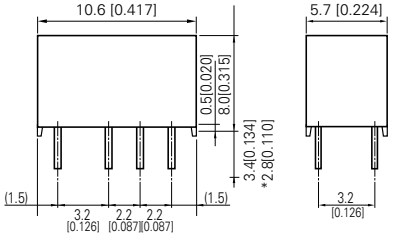
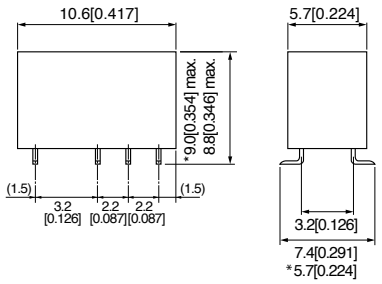
■ DIMENSIONS mm(inch)

UA2



Tolerance of lead pitch is ±0.15 mm[0.006 inch]
Another tolerance is ±0.3 mm [0.012inch]
() is reference.
*Value of trimmed lead type (NJ type)

UB2

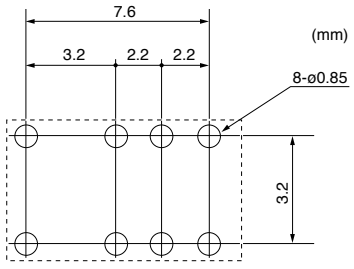


Tolerance of lead pitch is ±0.15 mm[0.006 inch]
Another tolerance is ±0.3 mm [0.012inch]
() is reference.
*Value of minimum footprint type (NUN type)

■ RECOMMENDED PAD LAYOUT

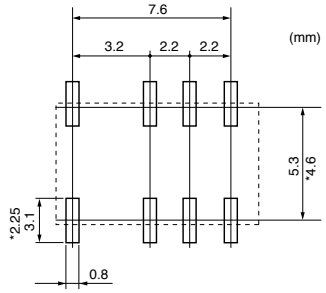
(bottom view)

UA2



Note. General tolerance : ±0.1

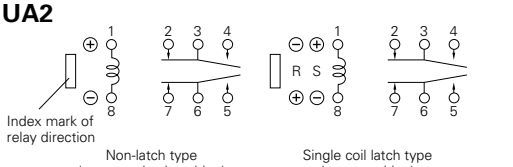
UB2



*Value of minimum footprint type (NUN type)
Note. General tolerance : ±0.1

■ SCHEMATICS (bottom view)

UA2

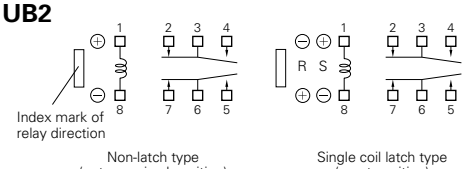


Non-latch type (not energized position)

Single coil latch type (reset position)

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

UB2

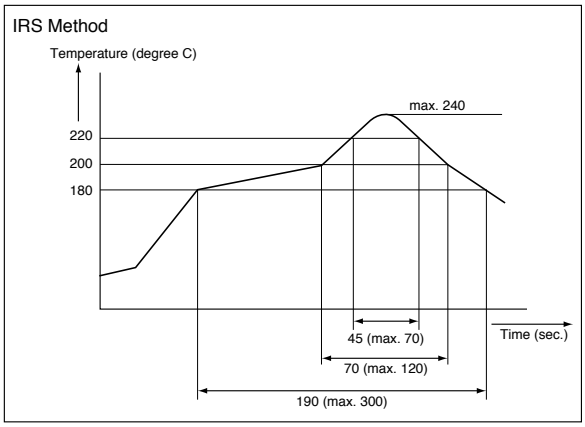


Non-latch type (not energized position)

Single coil latch type (reset position)

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

■ 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 ±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 ±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

■ 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	-
		24	UB2-24NU-L	-	-
Minimum footprint	Tube	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	-
		24	UB2-24NUN	-	-
	Taping	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	UB-12NUN-L	UB2-12SNUN-L	-
		24	UB2-24NUN-L	-	-

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 μA[*1]	
Initial Contact Resistance		100 mΩ 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 MΩ at 500 VDC	
Withstand Voltage	Between open contacts	1000 VAC (for one minute) 1500 V surge (10 × 160 μs[*2])	
	Between adjacent contacts		
	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 (Low power consumption type: −40 to +70°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. 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

- Option
  - NU : Standard
  - NJ : Trimmed lead type
  - NE : Low power consumption type
- Latch type
  - Nil : Non-latch type
  - S : Single coil latch type
- Nominal coil voltage
  A numerical value of coil voltage
  (See part numbers)
- Series name

■ SAFETY STANDARD AND RATING

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

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℃

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℃

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

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.

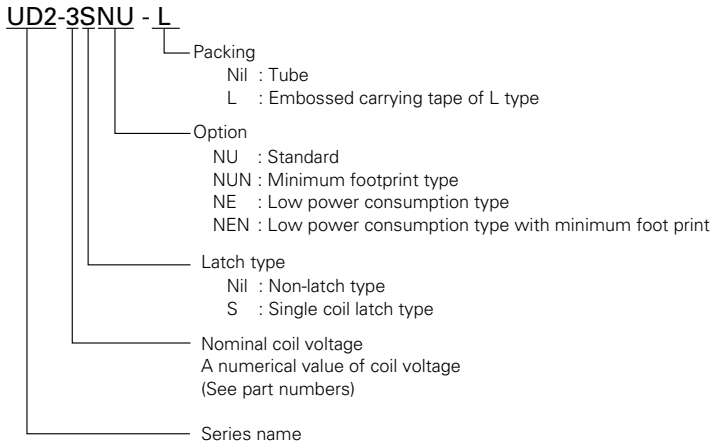
■ SPECIFICATIONS

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 μA[*1]	
Initial Contact Resistance		100 mΩ 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 MΩ at 500 VDC	
Withstand Voltage	Between open contacts	1000 VAC (for one minute) 1500 V surge (10 × 160 μs[*2])	
	Between adjacent contacts		
	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 (Low power consumption type: −40 to +70°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. 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.

UD2 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 (Resistive) 110 VDC, 0.3 A (Resistive) 125 VAC, 0.5 A (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℃

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℃

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

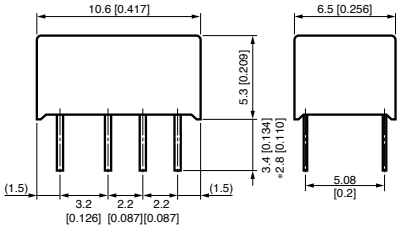
・Non-latch Low Power Consumption Type at 20℃

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

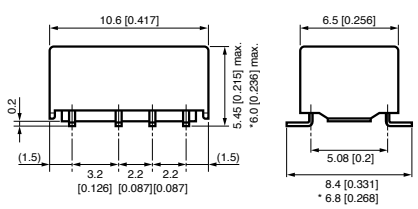
■ DIMENSIONS mm(inch)

UC2



Tolerance of lead pitch is ±0.15 mm [0.006inch]
Another tolerance is ±0.3 mm [0.012 inch]
( ) is reference value.
*Value of trimmed lead type (NJ type)

UD2

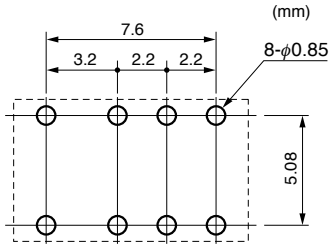


Tolerance of lead pitch is ±0.15 mm [0.006inch]
Another tolerance is ±0.3 mm [0.012 inch]
( ) is reference value.
*Value of minimum footprint type (NUN type)

■ RECOMMENDED PAD LAYOUT

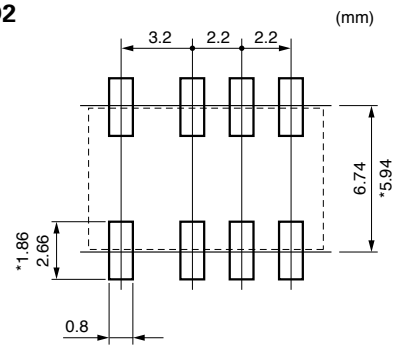
(bottom view)

UC2



Note. General tolerance : ±0.1

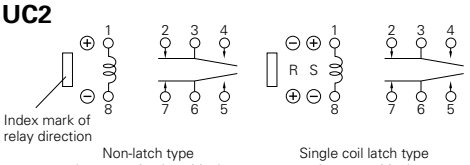
UD2



*Value of minimum footprint type (NUN type)
Note. General tolerance : ±0.1

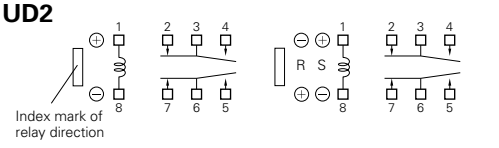
■ SCHEMATICS (bottom view)

UC2



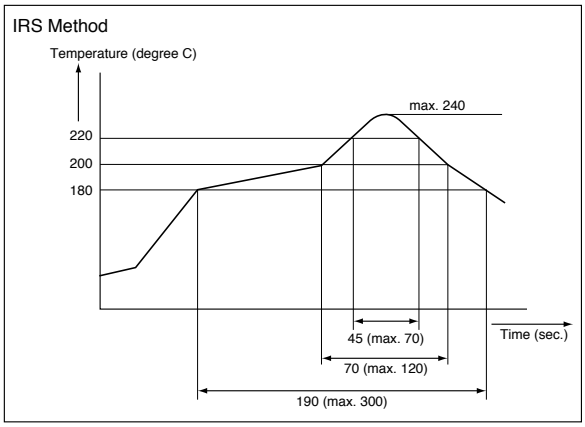
S : Coil polarity of set (operate)
R : Coil polarity of reset (release)

UD2



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

■ 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 ±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 ±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

■ 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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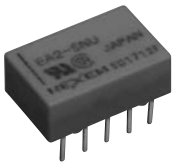
EA2 Series



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 μA *1
Initial Contact Resistance		75 mΩ 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 MΩ at 500 VDC
Withstand Voltage	Between open contacts	1000 VAC (for one minute) 1500 V surge (10 × 160 μs *2)
	Between adjacent contacts	
	Between coil to contacts	1000 VAC (for one minute) 1500 V surge (10 × 160 μs *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	1×10^8 *3 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.

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 Certificated (CSA C22.2 No14) File No. LR46266
30 VDC, 1A (Resistive) 110 VDC, 0.3A (Resistive) 125 VAC, 0.5A (Resistive)	

■ COIL SPECIFICATIONS

・Non-latch Type at 20℃

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℃

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℃

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)

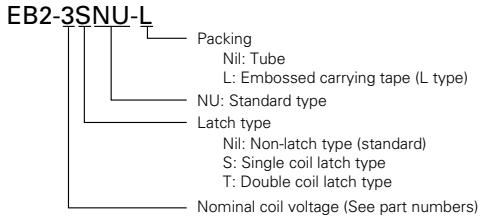
■ SPECIFICATIONS

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 μA[*1]
Initial Contact Resistance		75 mΩ 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 MΩ at 500 VDC
Withstand Voltage	Between open contacts	1000 VAC (for one minute) 1500 V surge (10 × 160 μs[*2])
	Between adjacent contacts	
	Between coil to contacts	1000 VAC (for one minute) 1500 V surge (10 × 160 μs[*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 × 10^8 [*3] 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 × 210^7 operations.

EB2 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 (Resistive) 110 VDC, 0.3 A (Resistive) 125 VAC, 0.5 A (Resistive)	

■ COIL SPECIFICATIONS

・Non-latch Type at 20℃

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℃

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℃

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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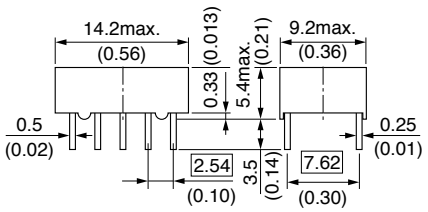
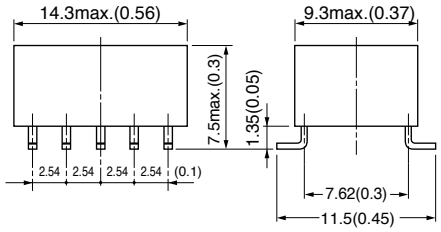
■ DIMENSIONS mm(inch)

EA2



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

EB2

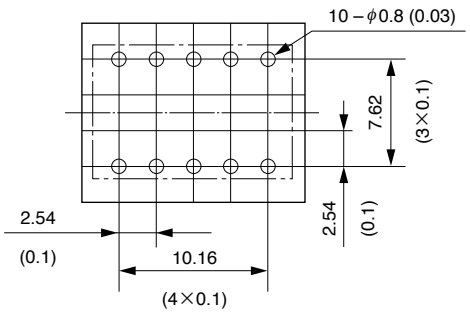


Note : Tolerance ±0.2 mm unless otherwise specified

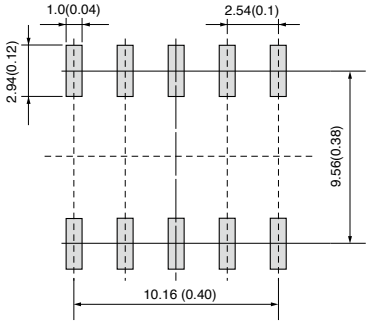
■ RECOMMENDED PAD LAYOUT

(bottom view) mm (inch)

EA2

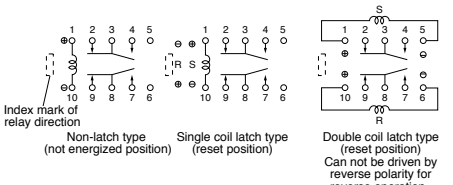


EB2

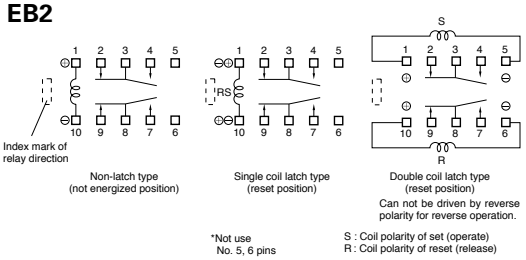


■ SCHEMATICS (bottom view)

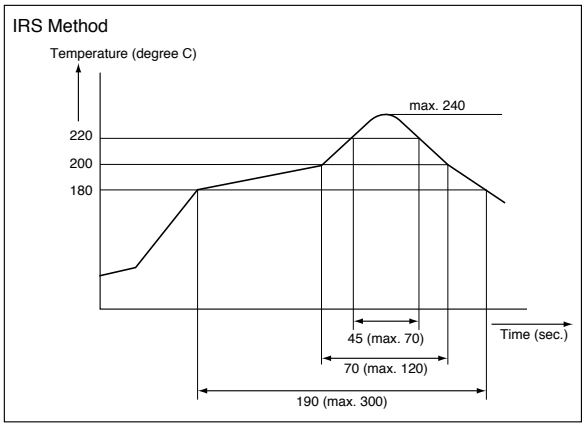
EA2



EB2



■ 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 ±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 ±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

■ 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 × 10 μs[*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 μA[*1]
Initial Contact Resistance		75 mΩ 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 MΩ at 500 VDC
Withstand Voltage	Between open contacts	1000 VAC (for one minute) 1500 V surge (10 × 160 μs[*2])
	Between adjacent contacts	1000 VAC (for one minute), 1500 V surge (10 × 160 μs[*2])
	Between coil to contacts	1500 VAC (for one minute), 2500 V surge (2 × 10 μs[*3])
		[Double coil latch type] 1000 VAC (for one minute), 1500 V surge (10 × 160 μs[*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 × 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. 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 Certificated (CSA C22.2 No14) File No. LR46266
30 VDC, 2 A (Resistive) 110 VDC, 0.3 A (Resistive) 125 VAC, 0.5 A (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℃

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℃

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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・Double Coil Latch Type (Can not be driven by reverse polarity for reverse operation) at 20℃

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	

・Non-latch High Insulation (ND) Type at 20℃

Nominal Coil Voltage (VDC)	Coil Resistance (Ω) ± 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℃

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	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.

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 × 10 μs[*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 μA[*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 × 160 μs[*2])
		[NKX type] Make contact: 1500 VAC (for one minute) 2500 V surge (2 × 10 μs[*3]) Break contact: 1000 VAC (for one minute) 1500 V surge (10 × 160 μs[*2])
	Between adjacent contacts	1000 VAC (for one minute), 1500 V surge (10 × 160 μs[*2])
	Between coil to contacts	1500 VAC (for one minute), 2500 V surge (2 × 10 μs[*3])
		[Double coil latch type] 1000 VAC (for one minute), 1500 V surge (10 × 160 μs[*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℃
Coil Temperature Rise		18 degrees at nominal coil voltage (140 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℃ , 5 Hz
		10 VDC, 10 mA (resistive) 1 × 10^6 operations at 85℃ , 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.

EE2 Series

■PART NUMBER SYSTEM

EE2-3SNU-L

- Packing
  - Nil: Tube
  - L: Embossed carrying tape (L type)
- NU: Standard type
  NUH: Minimum footprint type
  NUX: High solder joint reliability type
  ND: High-insulation type (TUV certified)
  NKX: High breakdown voltage between open contacts and high solder joint reliability 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 Certificated (CSA C22.2 No14) File No. LR46266
30 VDC, 2 A (Resistive) 110 VDC, 0.3 A (Resistive) 125 VAC, 0.5 A (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℃

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℃

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℃

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.

・Non-latch High Insulation (ND) Type at 20℃

Nominal Coil Voltage (VDC)	Coil Resistance (Ω) ± 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℃

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	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℃

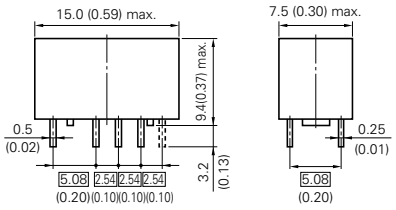
Nominal Coil Voltage (VDC)	Coil Resistance (Ω) ± 10%	Must Operate Voltage* (VDC)	Must Release Voltage* (VDC)	Nominal Operating Power (mW)
3	39.1	2.25	0.3	230
4.5	88.0	3.38	0.45	230
12	626	9.0	1.2	230

* 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.

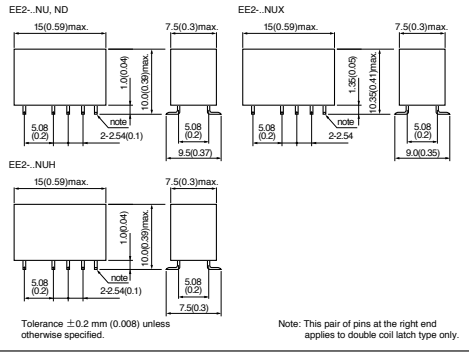
■DIMENSIONS mm(inch)

EC2



Note. General tolerance : ±0.2 (±0.008)
Dimensions in ☐ show basic size.
NJ type : Leads-2.8 mm (0.11)

EE2



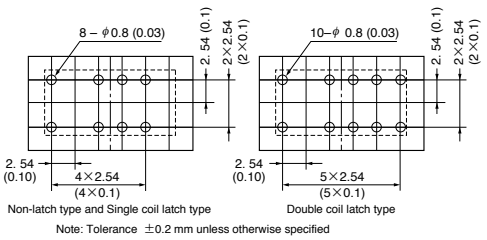
Tolerance ±0.2 mm (0.008) unless otherwise specified.

Note: This pair of pins at the right end applies to double coil latch type only.

■RECOMMENDED PAD LAYOUT

(bottom view) mm (inch)

EC2

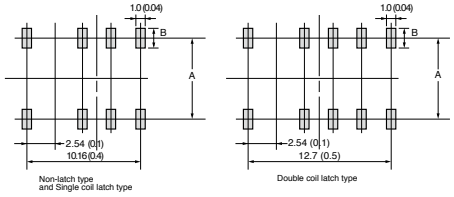


Non-latch type and Single coil latch type

Double coil latch type

Note: Tolerance ±0.2 mm unless otherwise specified

EE2



Non-latch type and Single coil latch type

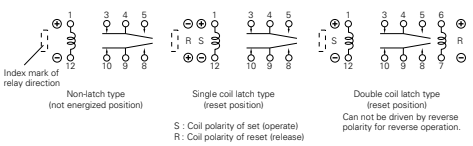
Double coil latch type

TYPE	A	B
EE2-..NU,ND	7.3 (0.287)	3.0 (0.118)
EE2-..NUX,NKX	7.02 (0.276)	2.73 (0.107)
EE2-..NUH	6.29 (0.248)	2.0 (0.079)

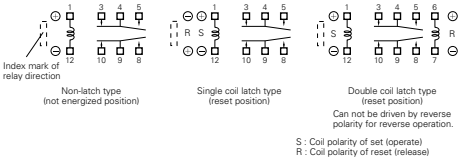
Tolerance ±0.1 mm (0.004) unless otherwise specified.

■SCHEMATICS (bottom view)

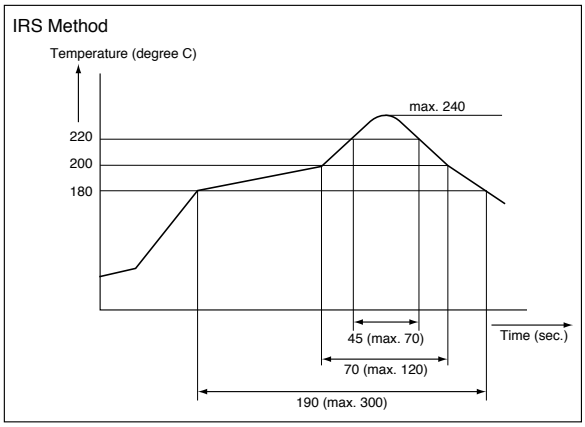
EC2



EE2



■ 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 ±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 ±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

■ 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

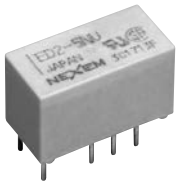
・EE2 series

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

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 × 10 μs[*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 μA[*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) 1500 V surge (10 × 160 μs[*2])
	Between adjacent contacts	
	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		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.

2017.09.30 9690RSGV0L02E1709H1

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 (Resistive) 110 VDC, 0.3 A (Resistive) 125 VAC, 0.5 A (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℃

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

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 × 10 μs[*3])
- UL recognized (E73266), CSA certified (LR46266), TÜV certified (R9950557)

■ SPECIFICATIONS

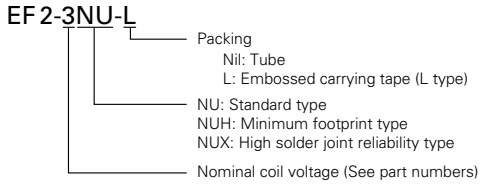
Contact Form		2 Form C
Contact Material		Silver alloy with gold alloy overlay
Contact Ratings	Maximum Switching Power	30 W, 62.5 VA
	Maximum Switching Voltage	220 VDC, 250 VAC
	Maximum Switching Current	1 A
	Maximum Carrying Current	2 A
Minimum Contact Ratings		10 mVDC, 10 μA[*1]
Initial Contact Resistance		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) 1500 V surge (10 × 160 μs[*2])
	Between adjacent contacts	
	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℃
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℃ , 5 Hz 10 VDC, 10 mA (resistive) 1 × 10^6 operations at 85℃ , 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.

2017.09.30 9690RSGV0L02E1709H1

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 (Resistive) 110 VDC, 0.3 A (Resistive) 125 VAC, 0.5 A (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

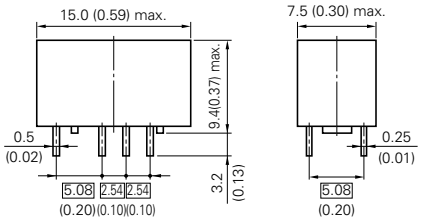
at 20℃

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

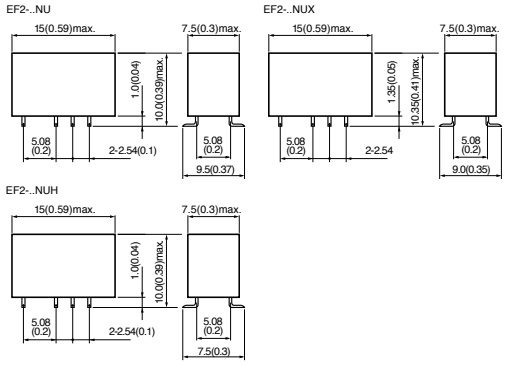
■ DIMENSIONS mm(inch)

ED2



Note. General tolerance : ± 0.2 (±0.008)
Dimensions in ☐ show basic size.
NJ type : Leads-2.8 mm (0.11)

EF2

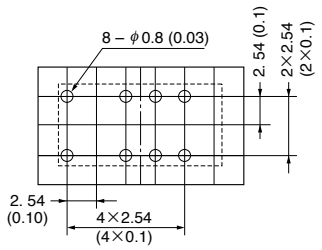


Tolerance ±0.2 mm (0.008) unless otherwise specified.

■ RECOMMENDED PAD LAYOUT

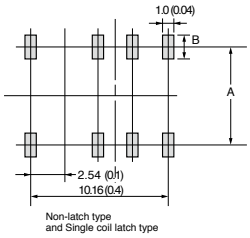
(bottom view) mm (inch)

ED2



Note: Tolerance ±0.2 mm unless otherwise specified

EF2

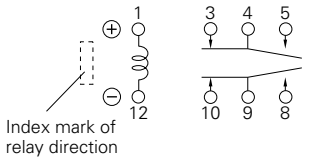


TYPE	A	B
EF2-..NU	7.3 (0.287)	3.0 (0.118)
EF2-..NUX	7.02 (0.276)	2.73 (0.107)
EF2-..NUH	6.29 (0.248)	2.0 (0.079)

Tolerance ±0.1 mm (0.004) unless otherwise specified.

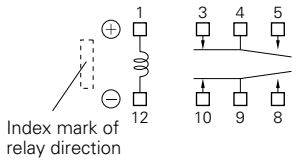
■ SCHEMATICS (bottom view)

ED2



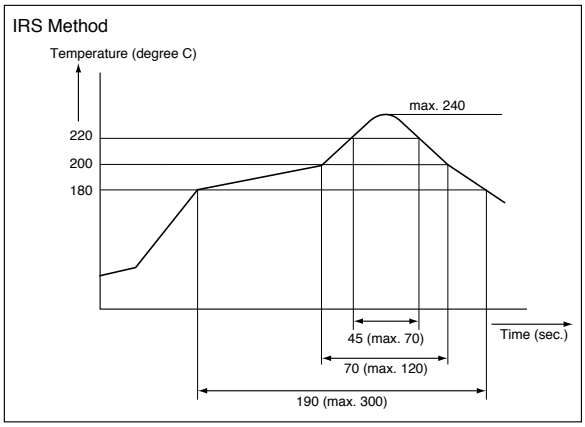
(not energized position)

EF2



(not energized position)

■ 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 ±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

■ 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		Non-latch
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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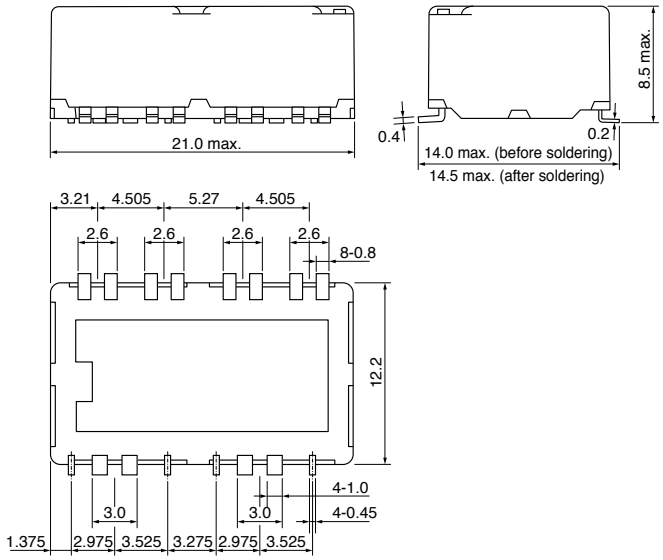
EU2 Series

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

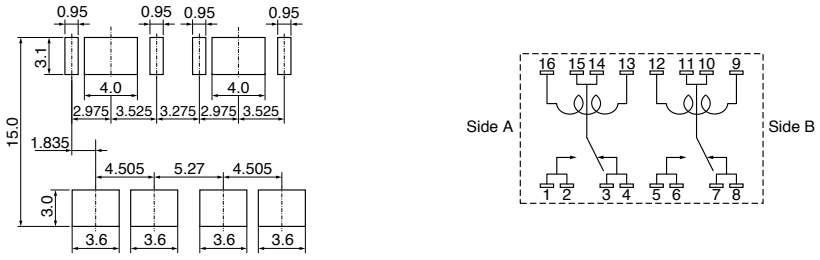
- Ultra miniature twin relay
- Low profile SMD relay
- Approx. 77% relay height of ET2
- Approx. 60% relay height of EX2

■ DIMENSIONS mm



■ RECOMMENDED PCB PAD LAYOUT and SCHEMATICS

(top view) mm



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

EU2- 2 U 1 SN - T

- Type
- Packing — T : Embossed carrying tape
- Enclosure — SN : Sealed
- Must Operate Voltage — 1 : 6.5VDC
- Contact Material — U : Silver oxide complex alloy
- Coil Resistance — 2 : 150 Ω

2017.09.30 9690RSGV0L02E1709H1

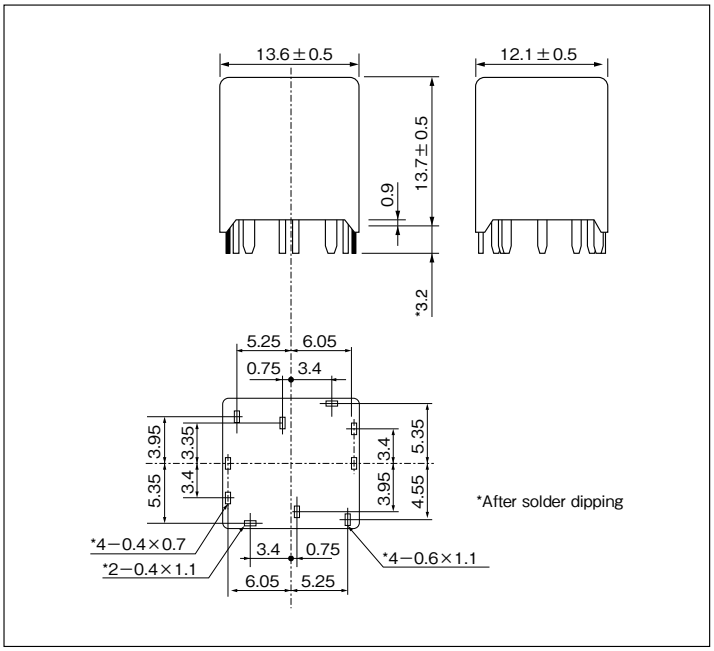
EX2 Series

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

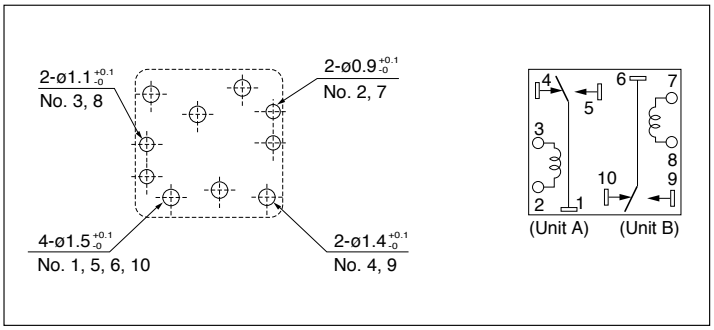
- Ultra miniature twin relay
- Flux tight housing
- Approx. 75% relay volume of ET2
- Approx. 60% relay space of ET2
- Approx. 88% relay weight of ET2

■ 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.

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℃
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℃

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

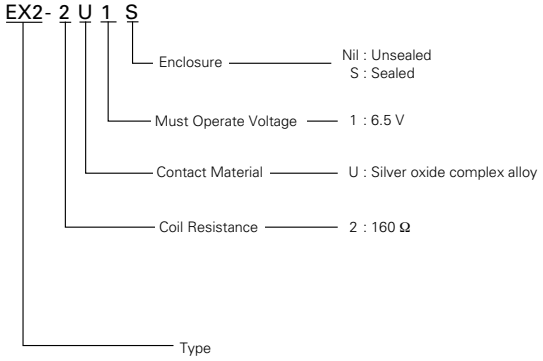
* Test by pulse voltage

・Unsealed Type at 20℃

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



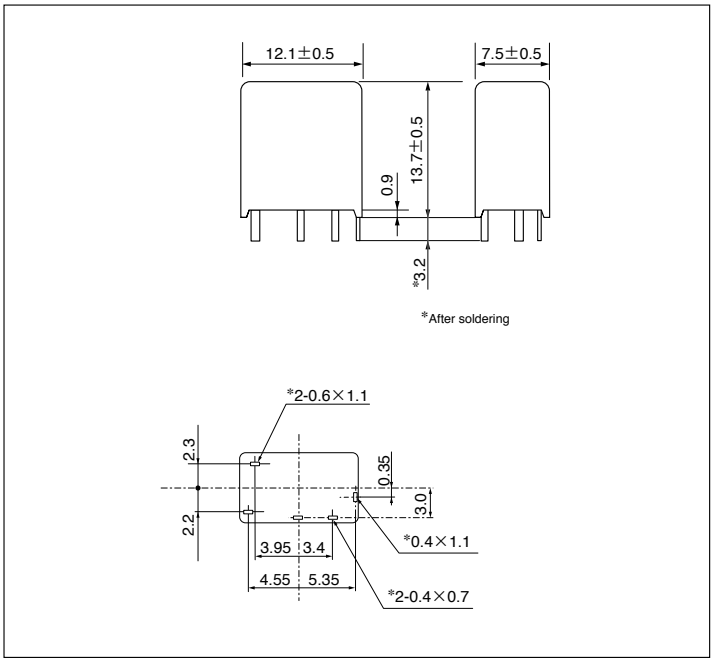
EX1 Series

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

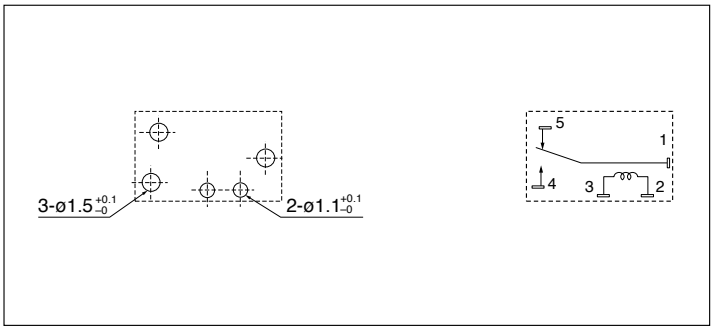
- Ultra miniature single relay
- Flux tight housing
- Approx. 65% relay volume of ET1
- Approx. 50% relay space of ET1
- Approx. 78% relay weight of ET1

■ DIMENSIONS mm



■ RECOMMENDED PCB PAD LAYOUT and SCHEMATICS

(bottom view) mm



■ 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℃
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℃

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

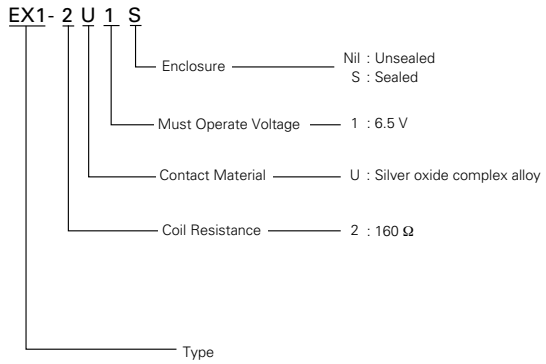
* Test by pulse voltage

・Unsealed Type at 20℃

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



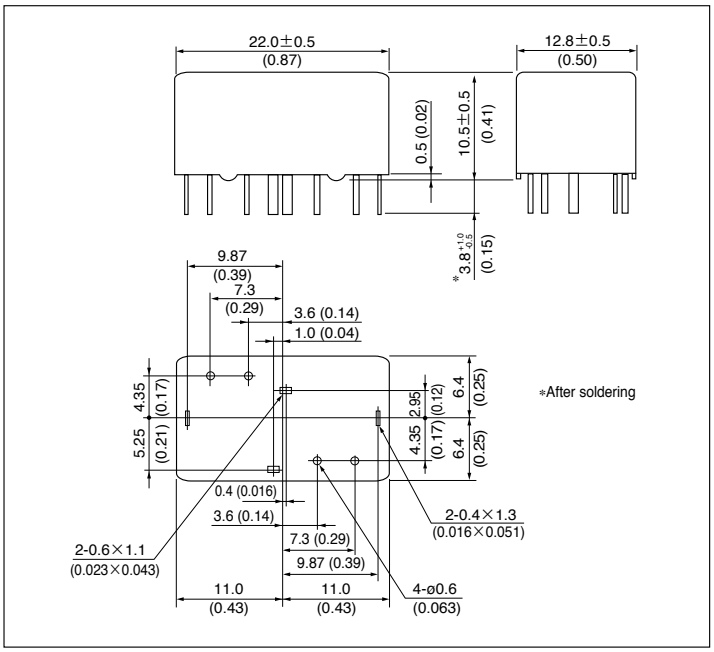
ET2 Series

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

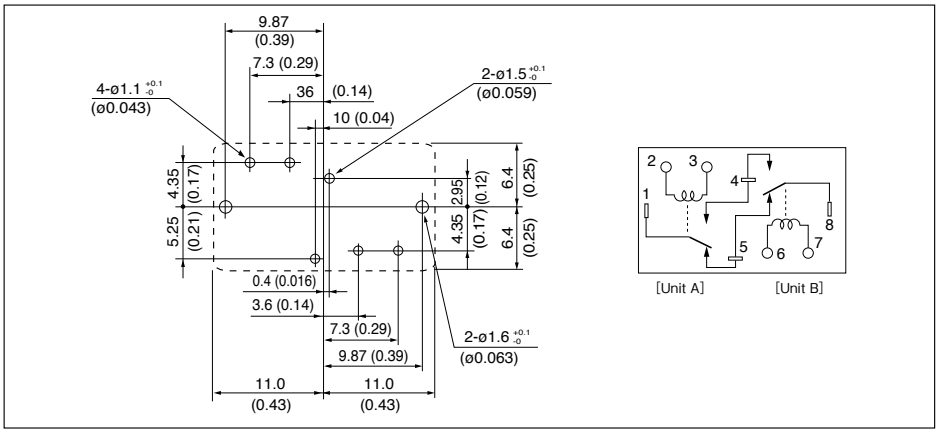
- Miniature twin relay
- Flux tight housing
- Approx. 50% relay volume of EP2
- Approx. 74% relay space of EP2
- Approx. 67% relay height of EP2
- Approx. 50% relay weight of EP2

■ DIMENSIONS mm (inch)



■ RECOMMENDED PCB PAD LAYOUT and SCHEMATICS

(bottom view) mm (inch)



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℃) 30 A (2 minutes 12 VDC at 20℃)	25 A (2 minutes 12 VDC at 125℃) 30 A (2 minutes 12 VDC at 85℃) 35 A (2 minutes 12 VDC at 20℃)
	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℃	−40 to +125℃
Coil Temperature Rise		70℃ / 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℃

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

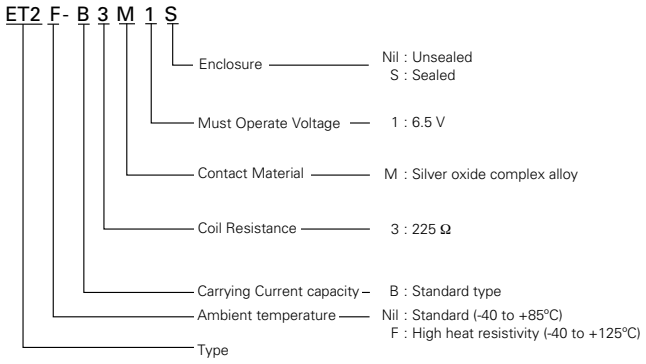
* Test by pulse voltage

・Unsealed Type at 20℃

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



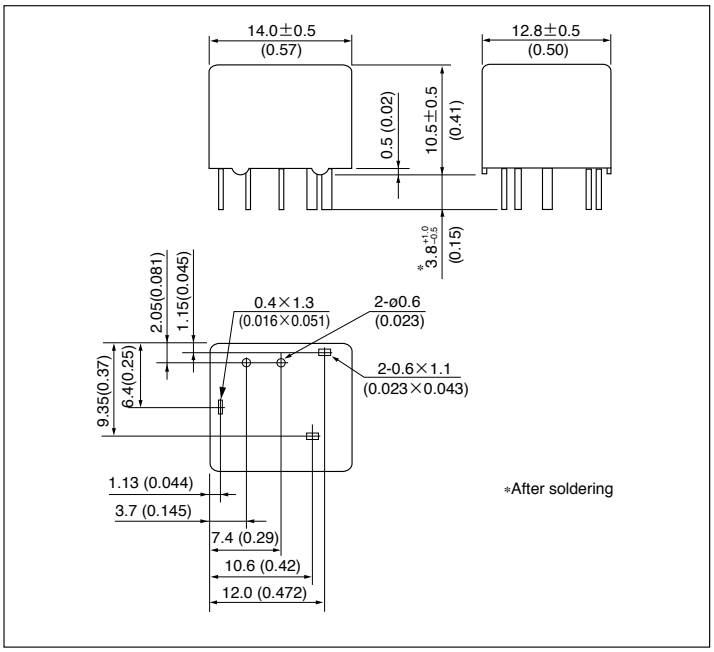
ET1 Series

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

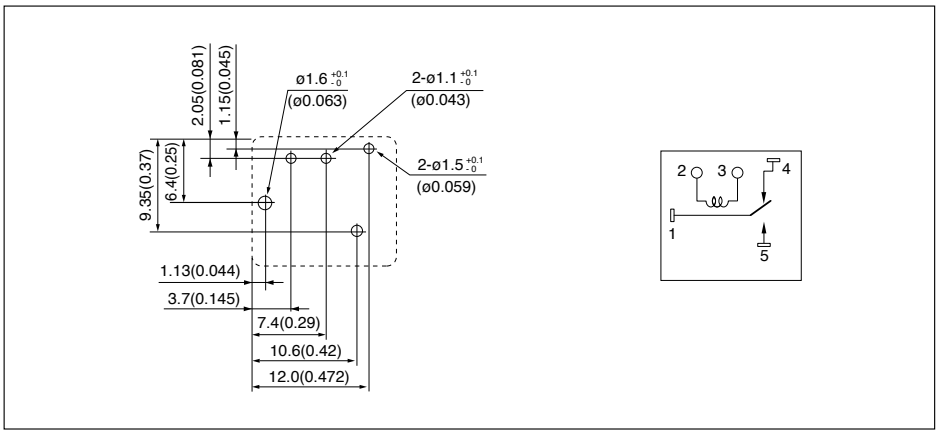
- Miniature single relay
- Flux tight housing
- Approx. 50% relay volume of EP1
- Approx. 76% relay space of EP1
- Approx. 67% relay height of EP1
- Approx. 56% relay weight of EP1

■ DIMENSIONS mm (inch)



■ RECOMMENDED PCB PAD LAYOUT and SCHEMATICS

(bottom view) mm



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℃) 35 A (2 minutes 12 VDC at 20℃)	30 A (2 minutes 12 VDC at 125℃) 35 A (2 minutes 12 VDC at 85℃) 40 A (2 minutes 12 VDC at 20℃)
	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℃	−40 to +125℃
Coil Temperature Rise		70℃ / 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. 4.5 g (0.16 oz)	

■ COIL RATING

・Sealed Type at 20℃

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

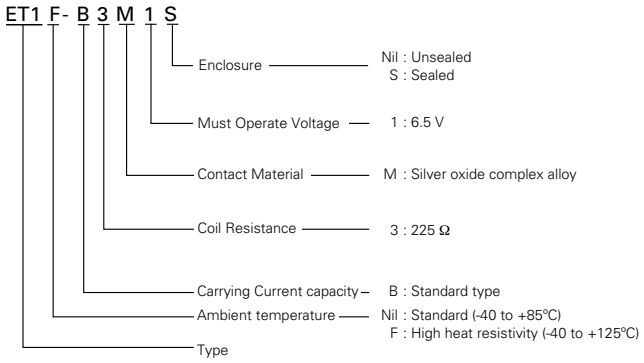
* Test by pulse voltage

・Unsealed Type at 20℃

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



EP2 Series

Non-promotion

Now, these products are corresponding only to specific customers.

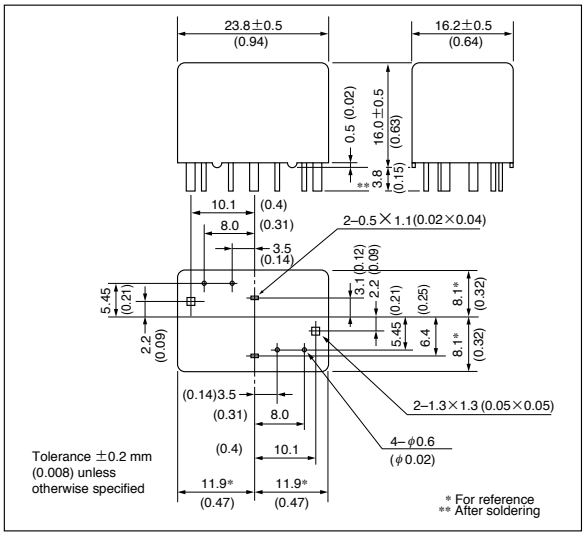
EP2 series is printed circuit board mount type and the most suitable for various motor controls in the automotive which require high-quality and high-performance.
EP2 series has two types for different applications. One is H bridge type which is designed for forward and reverse control of the motor. The other is separate type which contains two separated relays in one package.
*EP2F:High heat resistivity

■ FEATURES

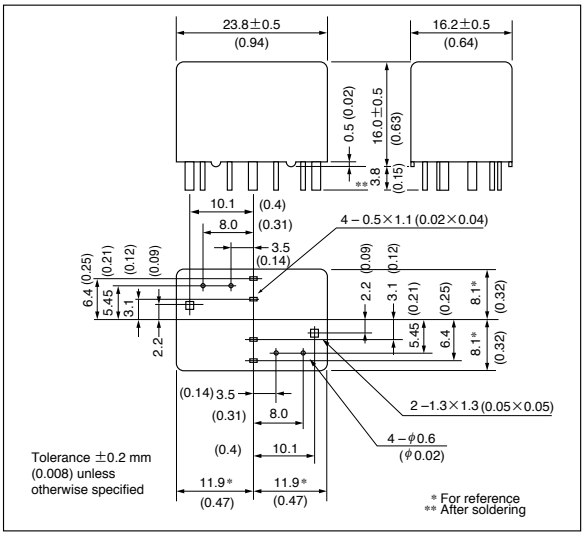
- Twin relay for motor reversible control
- High performance & productivity by unique symmetrical structure
- PC board mounting
- Flux tight housing

■ DIMENSIONS mm (inch)

[H Bridge Type]



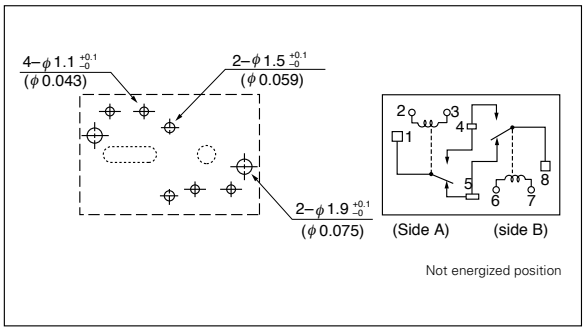
[Separate (T) Type]



■ RECOMMENDED PCB PAD LAYOUT and SCHEMATICS

(bottom view) mm (inch)

[H Bridge Type]



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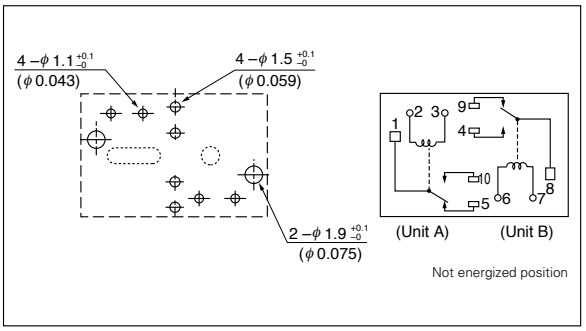


EP2 Series

■ SPECIFICATIONS

at 20℃

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℃ (−40 to +185℉)	
Coil Temperature Rise		50℃ / W (90 ℉ /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℃

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

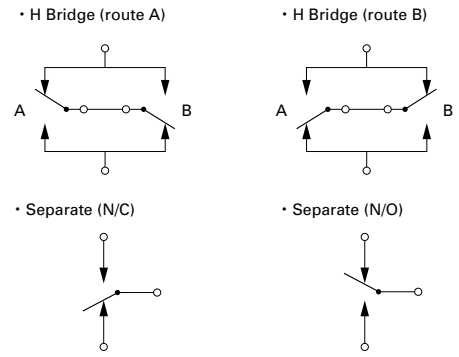
* Test by pulse voltage

■ 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℃) / F : High heat resistivity (-40 to +125℃)
- Type

*Contact Resistance (figure 1)



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*EP2F:High heat resistivity

■ SPECIFICATIONS

at 20℃

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 mΩ 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 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˚C to +125˚C (−40℉ to +257℉)
Coil Temperature Rise			50˚C / W (90℉ / 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			Approx. 15 g (0.53 oz)

■ COIL RATING

・EP2F

at 20℃

	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

EP1 Series

Non-promotion

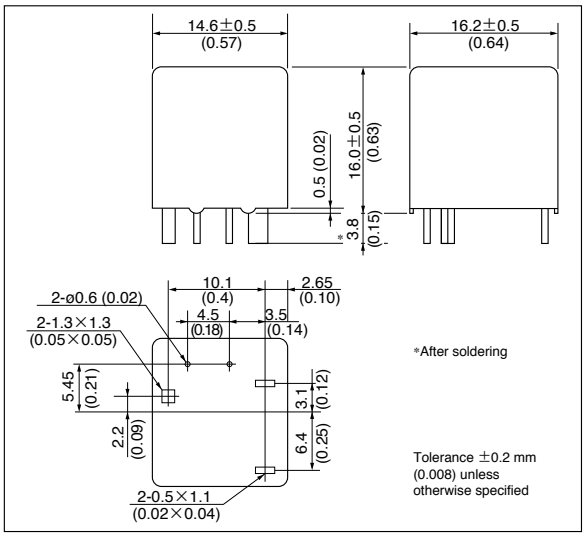
Now, these products are corresponding only to specific customers.

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

■ FEATURES

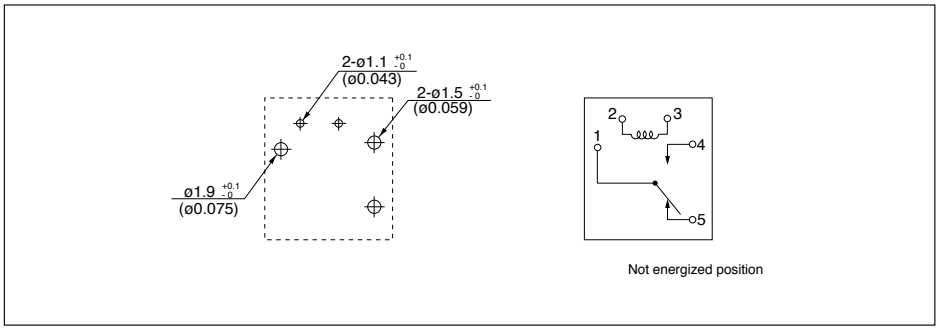
- For motor reversible control
- Two types of contact according to switching current
  (Standard type: 25 A max, High current type: 30 A max.)
- PC board mounting
- Flux tight housing

■ DIMENSIONS mm (inch)



■ RECOMMENDED PCB PAD LAYOUT and SCHEMATICS

(bottom view) mm (inch)



EP1 Series

■ SPECIFICATIONS

at 20℃

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℃ (−40 to +185℉)	
Coil Temperature Rise		50℃ / W (90 ℉ /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℃

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℃

Items			EP1F
Contact Form			1 Form C
Contact Material			Silver oxide complex alloy (Special type available)
Initial Contact Resistance			50 mΩ 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 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˚C to +125˚C (−40℉ to +257℉)
Coil Temperature Rise			50˚C / W (90℉ / 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			Approx. 8 g (0.28 oz)

■ COIL RATING

・EP1F

at 20℃

	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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EP1K Series

Non-promotion

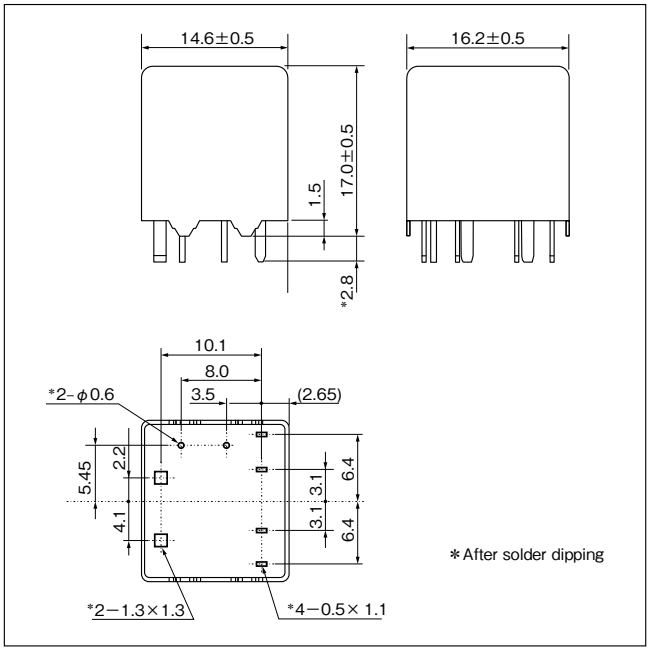
Now, these products are corresponding only to specific customers.

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.

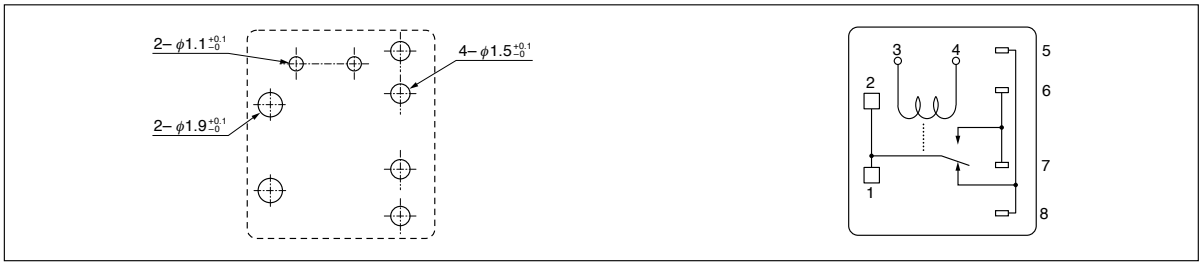
■ FEATURES

- 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



EP1K Series

■ SPECIFICATIONS

Items		Specifications
Contact Form		1 Form C
Contact Material		Silver oxide complex alloy
Contact Resistance		4 m Ω 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 M Ω 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 μ m, Width: 15mm, Length: 50mm)
This value is allowable value at abnormal case such as fuse blow. And cyclical current is not guaranteed.

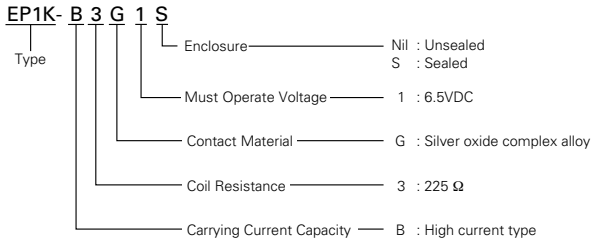
■ COIL RATING

at 20℃

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



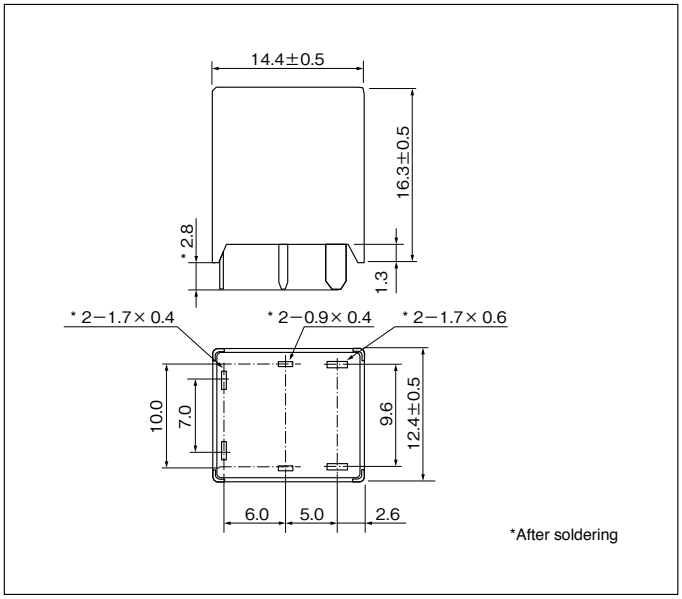
EM1 Series

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.

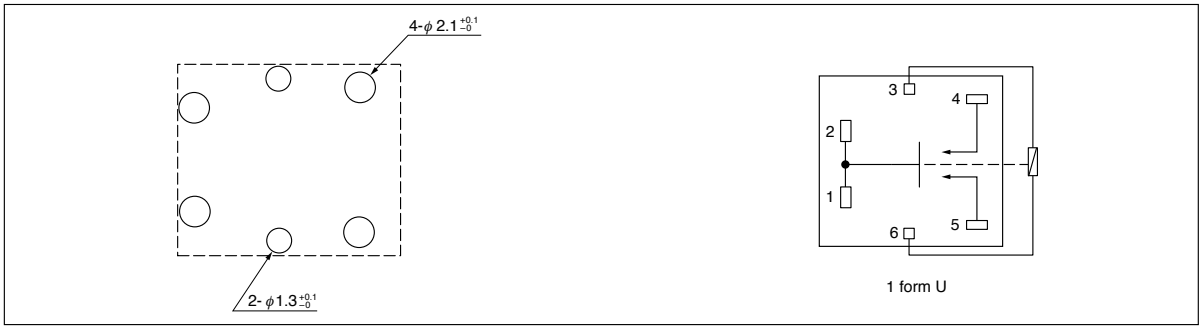
■ FEATURES

- 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



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℃ *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℃
Running Specifications	Non-load		1×10^6 operations
	Load	Resistive	100×10^3 operations (at 14VDC, 40A) at 20℃
		Lamp	100×10^3 operations (at 14VDC, Inrush 120A/ Steady 14A) at 20℃
Weight			Approx. 7 g

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

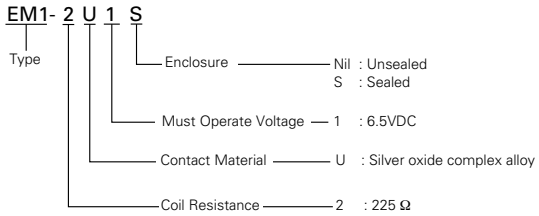
■ COIL RATING

at 20℃

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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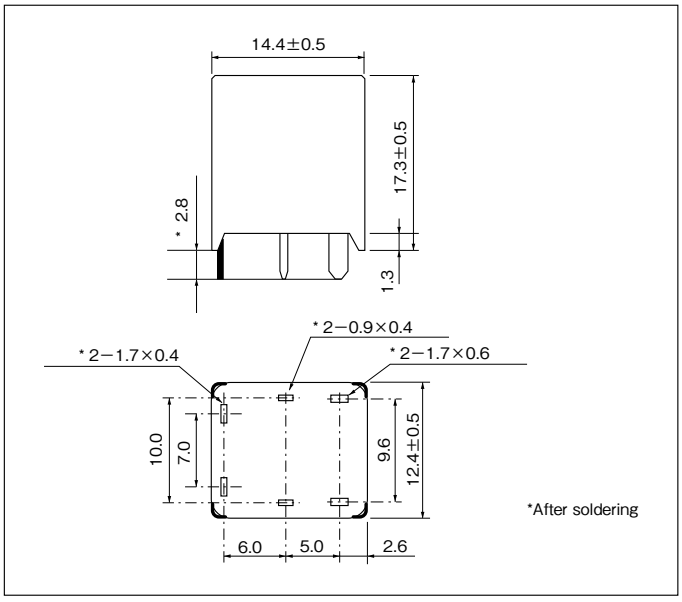
EL1 Series

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.

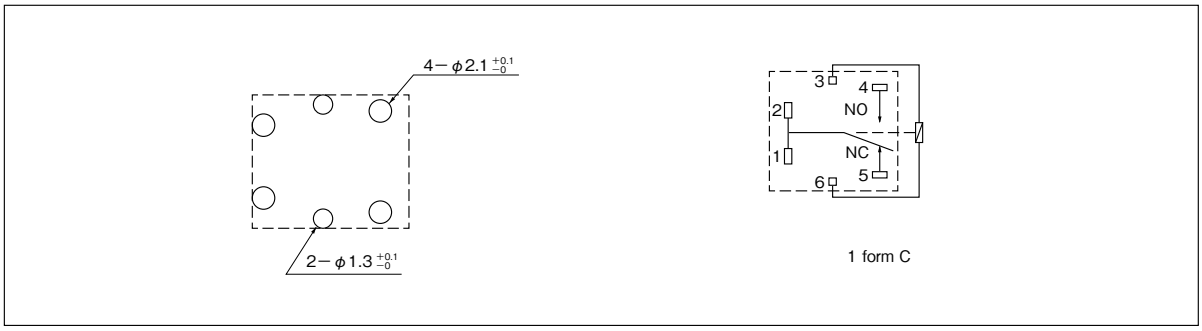
■ FEATURES

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

■ DIMENSIONS mm



■ RECOMMENDED PCB PAD LAYOUT and SCHEMATICS (bottom view) mm



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℃ *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℃
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: 105μm, Width: 15mm)
This value is allowable value at abnormal case such as fuse blow. And cyclical current is not guaranteed.

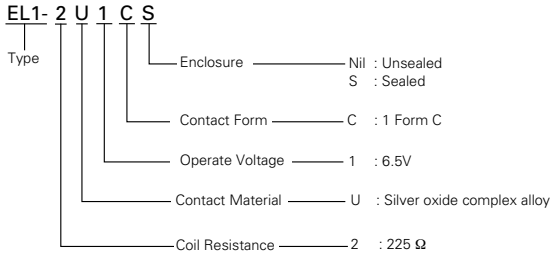
■ COIL RATING

at 20℃

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



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]

Current range	10 μA to 1 mA	1 mA to 0.5 A	0.5 A to 2 A
	GOOD	VERY GOOD	NOT SO GOOD for some cases
Application	・Contacts may be unstable. ・Thermal electromotive force and contact noise should be taken into consideration.	・Contacts are stable and highly reliable.	・Infrequent operation poses no problem, but frequent operation deteriorates contact stability. ・Use of a power relay is preferred for 1 A or higher.

[Power relay]

Current range	to 1 A	1 A to 40 A
	NOT SO GOOD for some cases	VERY GOOD
Application	・Contacts may be unstable. ・Since a high capacitance type contact is not suitable, it is necessary to select the correct contacts.	・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 in 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℃ .

(7) When cleaning, use alcohol, or a water-based solvent. Avoid using ultrasonic cleaning.

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.

①General 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.

②Examples 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.

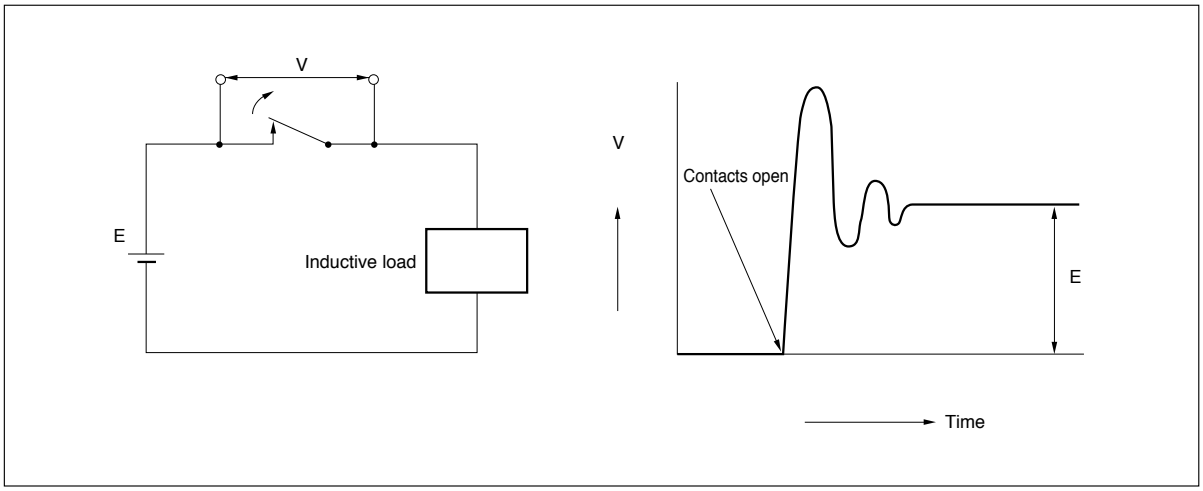


Fig.1 Inductive Load Circuit

Table 1 Inductive Load Contact Protection Circuits

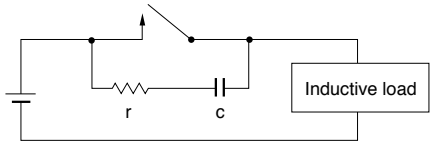
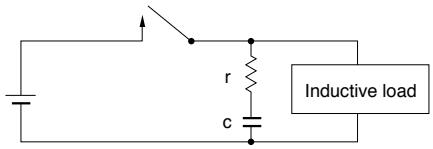
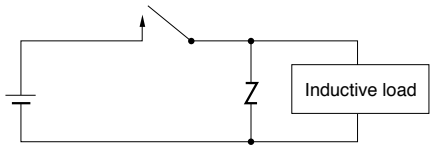
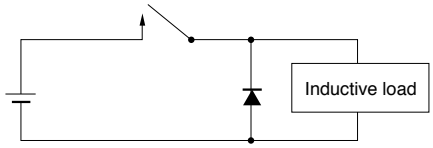
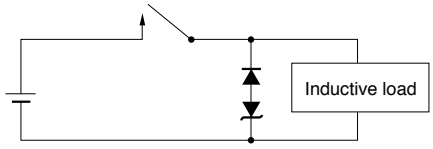
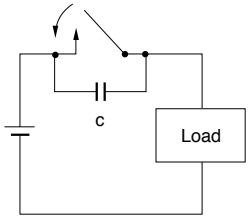
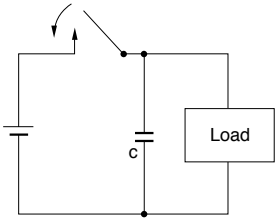
Protection element	Circuit example	Remarks
Capacitor + resistor (CR circuit)		$r\ (\Omega) = \frac{\text{contact voltage (V)}}{0.5 \text{ to } 1}$ C (μF) = (0.5 to 1) × contact current (A) The withstand voltage of a non-polar capacitor should be 300 V or higher.
		
Varistor		High voltage is suppressed 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

WRONG 	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.	**WRONG** 	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.

(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).

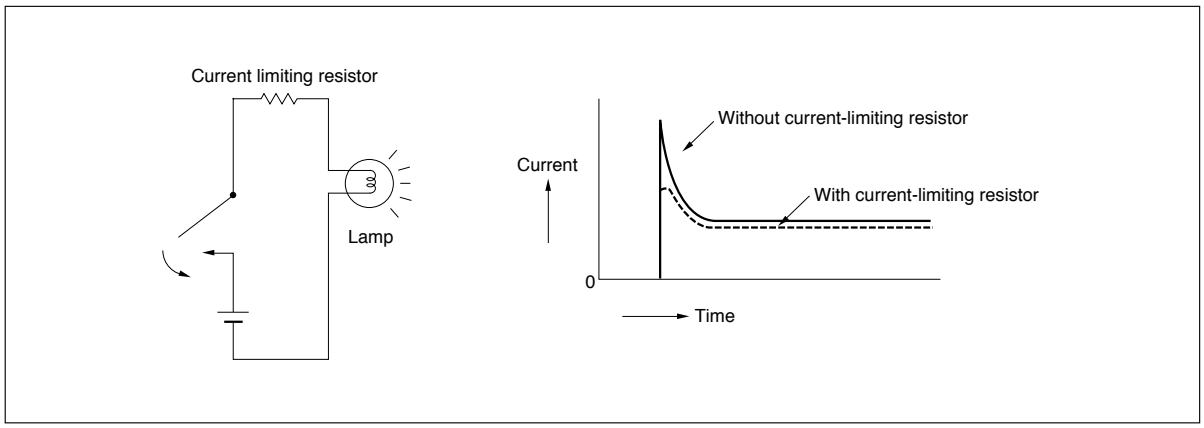


Fig.2 Example of Current-Limiting Resistor in Lamp Load Circuit

(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.

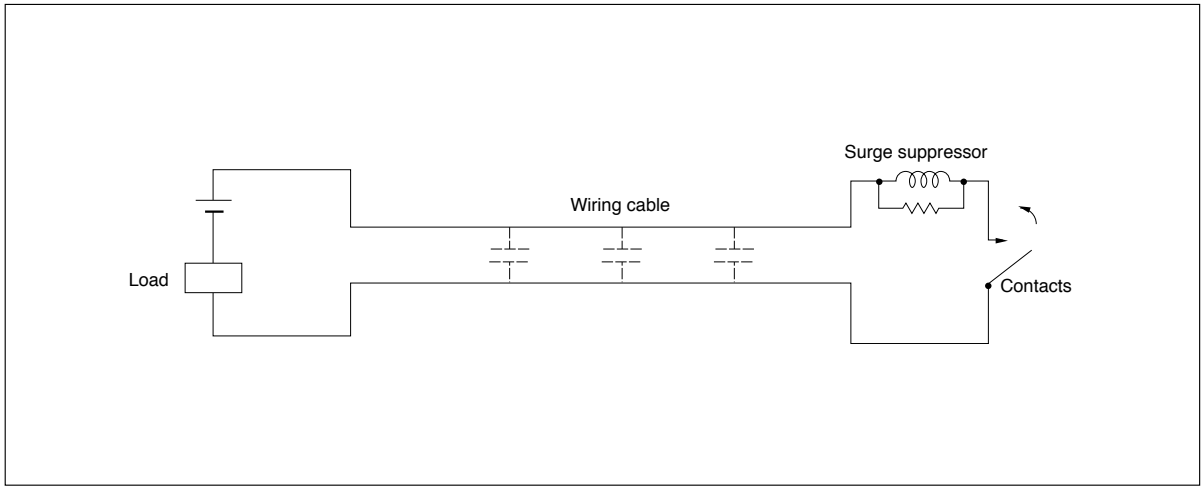


Fig.3 Example of Surge Suppression Circuit with Surge Suppressor

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.

①It 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.

②The 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.

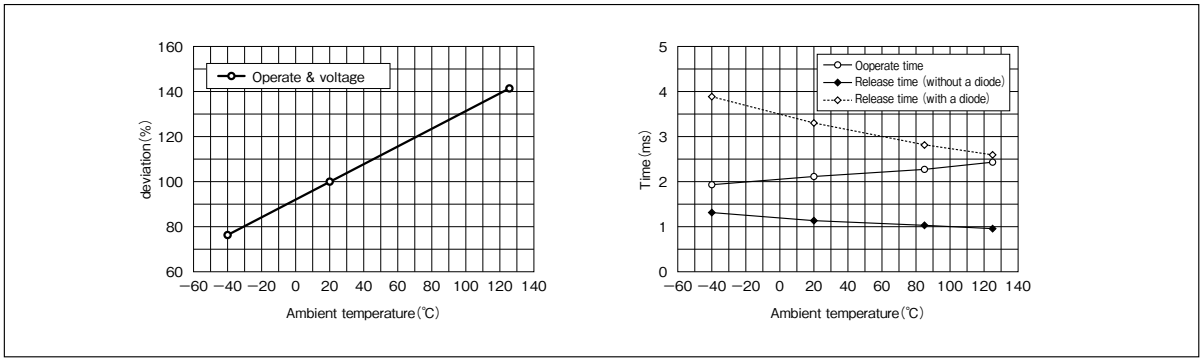


Fig.4 Temperature Characteristics of Relay (Example)

(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.

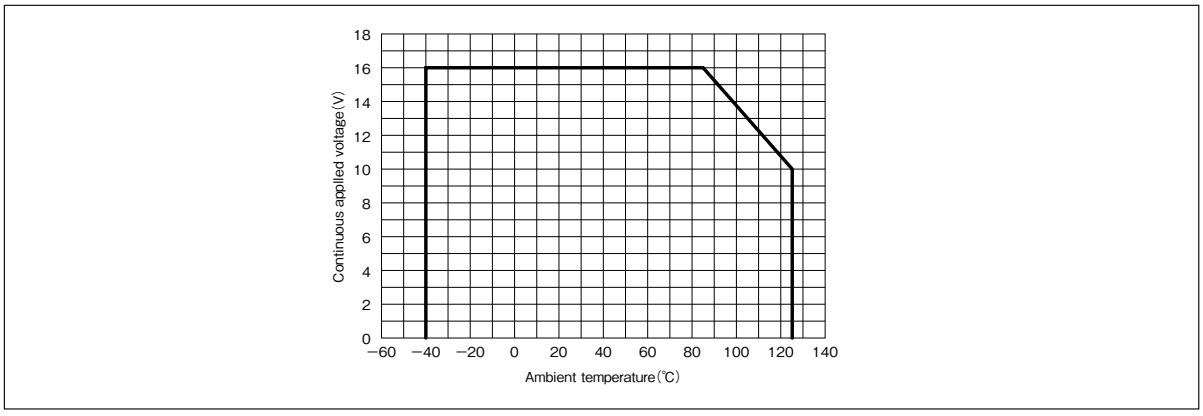


Fig.5 Coil Voltage vs. Ambient Temperature Derating Characteristics (Example of miniature power relay)

(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.

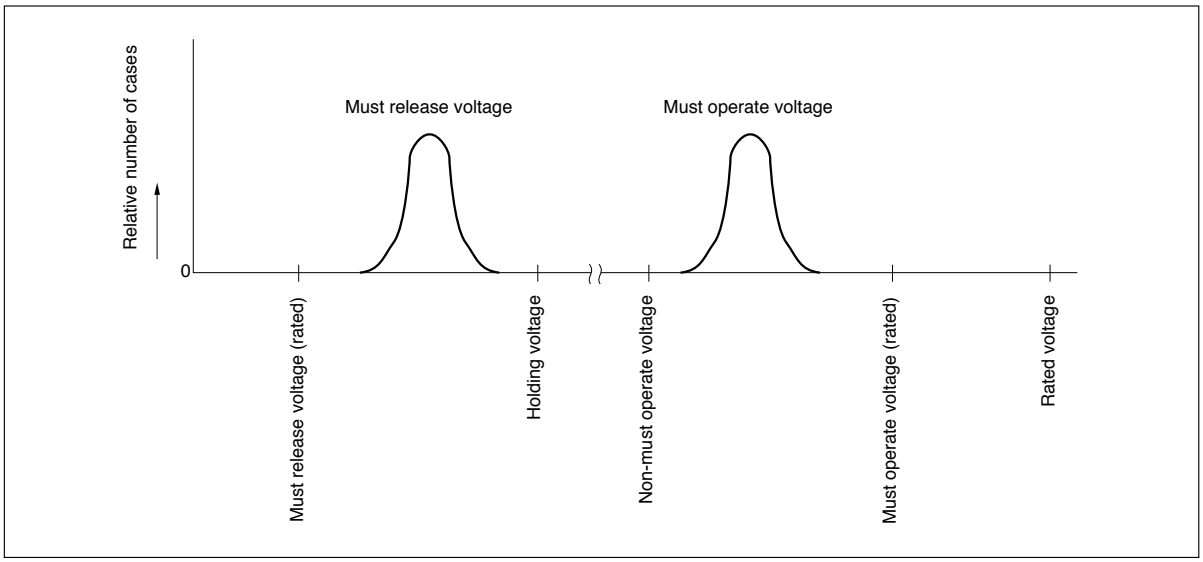


Fig.6 Example of Distribution of Relay Must Operate Voltage and Must Release Voltage

(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.

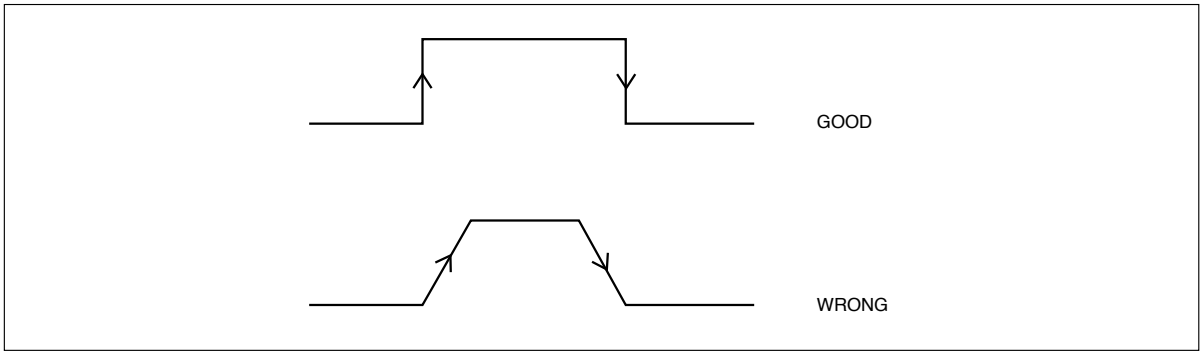


Fig.7 Relay Drive Waveform

(6) Latching relay drive circuit

①Since 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.

②A 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.

③Apply 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.)

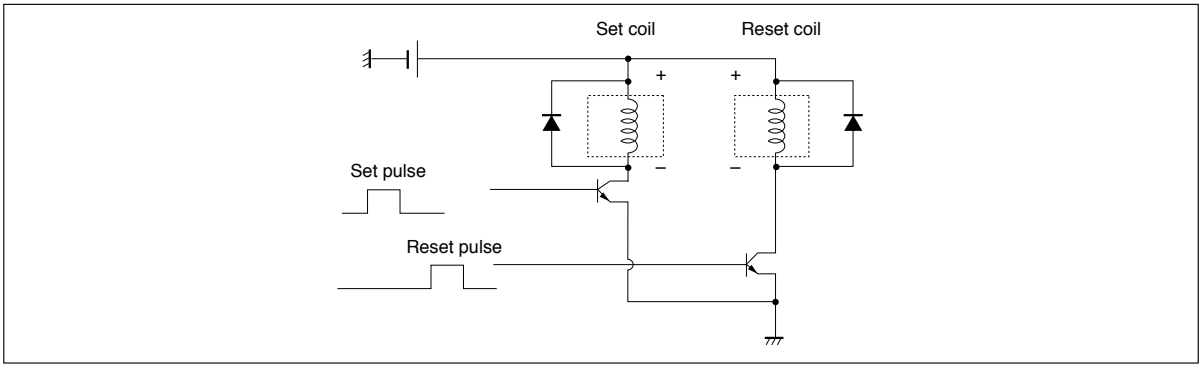


Fig.8 Drive Circuit of Latching Relay (Example of Double Coil Latching Type)

④A 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.

⑤When 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 NOx or SOx 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 (H_2S, SO_2), nitric acid gas (HNO_3), ammonia (NH_3), 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.

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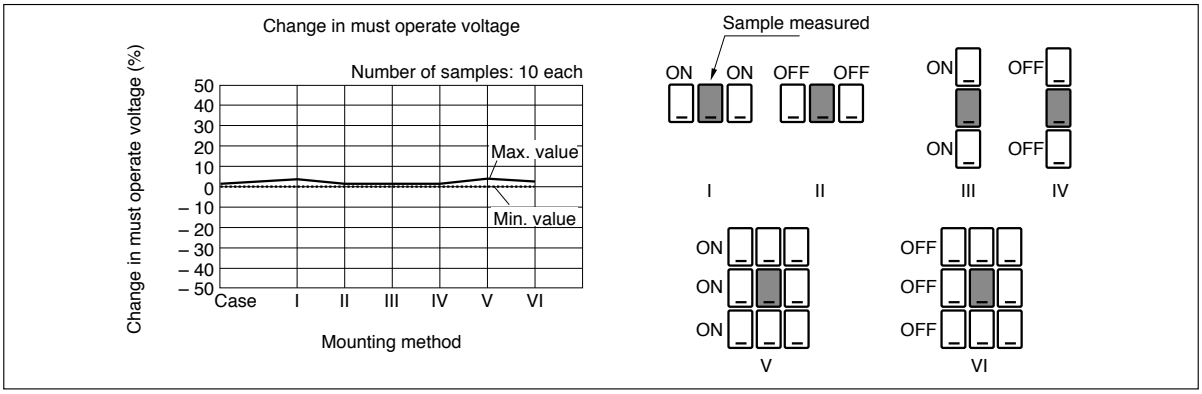

Fig.9 Change in Must Operate Voltage in Dense Mounting

5. INFLUENCE OF RELAY OPERATION ON SURROUNDINGS

(1) Electromagnetic noise

Switching the relay coil generates a high electromotive force due to induction. In general, a surge suppression circuit is connected in parallel with the relay coil to suppress generation of this electromotive force. However, if this suppression circuit is not appropriate, electronic circuits such as microcontrollers may malfunction due to the surge generated. Add an appropriate absorption circuit to prevent electronic circuits from malfunctioning due to the surge generated.

(2) Arc discharge

Connecting/disconnecting a high current at the relay contacts generates an arc discharge. This discharge may cause electronic circuits such as microcontrollers to malfunction and therefore it is necessary to take appropriate measures.

(3) Generation of leakage magnetic flux

Leakage magnetic flux exists in the vicinity of the relay in the magnetized state. Mounting a magnetic sensor, etc. close to the relay may cause malfunctioning.

6. NOTES ON MOUNTING

(1) Design of printed circuit boards

①If an electronic circuit such as a microcontroller is placed close to a relay, noise generated by the relay may cause malfunctioning.

②When designing patterns keep to the shortest possible distance in wiring.

③For the printed circuit board on which a relay is mounted, use a board of 1 mm or more in thickness. If the printed circuit board is not thick enough, it may be subject to warpage which will add tension to the relay, causing variations in the relay characteristics. Because a flexible printed circuit board is particularly thin, it is necessary to solder near the root of the relay pins. Since preliminary soldering of the pin root part is often insufficient, its solder is likely to become loose.

④If a thermal cycle is applied to the soldered part, cracks may be generated in it. Special care is required for the relay location, base material and through hole shape.

(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.

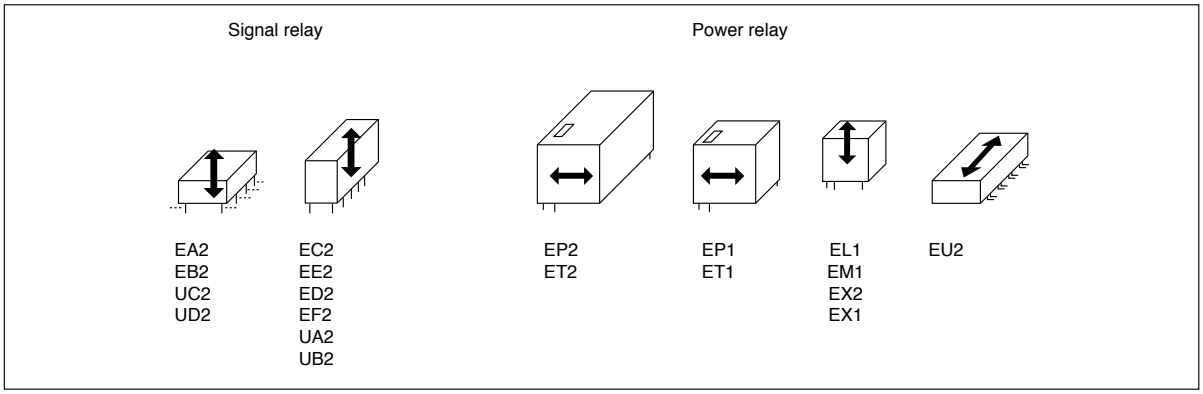

Fig.10 Direction of Armature Operation

(3) Notes on mounting

①Chucking

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.

②Temporary 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.

③Application of soldering flux

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

④Soldering 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℃ max. 1 min. max.
*Solder temperature: 260℃ max.
*Solder time: 5 to 10 seconds

(b) Manual soldering (by soldering iron):
<Recommended conditions>
*Solder temperature: 350℃ 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.

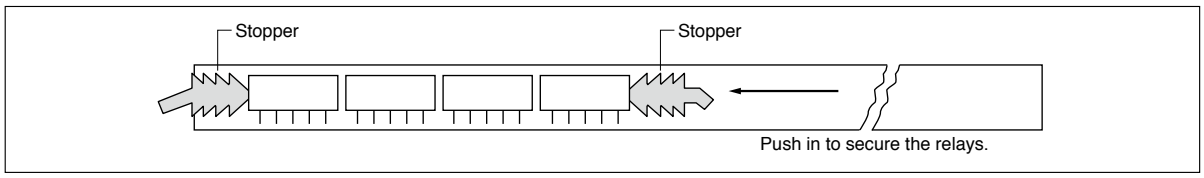

Fig.11 Storage in Magazine Case

(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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The information in this document is based on documents issued in May, 2017 at the latest.
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.

While EM Devices Corporation has been making continuous effort to enhance the reliability of its electronic components, the possibility of defects cannot be eliminated entirely. To minimize risks of damage or injury to persons of property arising from a defect in an EM Devices electronic component, customer must incorporate sufficient safety measures in its design, such as redundancy, fire-containment, and anti-failure features.
EM Devices' products are classified into the following three quality grades:
"Standard", "Special", and "Specific". The Specific quality grade applies only to devices developed based on a customer designated "Quality assurance program" for a specific application. The recommended applications of a device depend on its quality grade, as indicated below. Customers must check the quality grade for each device before using it in a particular application.

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

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

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

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⚠

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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.

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