

Overview

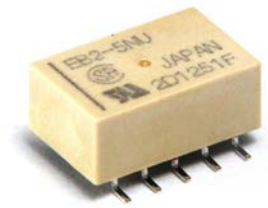
The KEMET EA2/EB2 miniature signal relays offer a compact case size in a fat package. Minimal board space is consumed with either a through-hole or surface mount configuration. These relays are recognized by UL and CSA, while also being compliant with Part 68 of the FCC's 1,500 V surge capacity.

Applications

- Electronic switching systems
- PBX
- Terminal equipment
- Telephone systems

Benefits

- Low power consumption (< 200 mW)
- Compact and lightweight
- Low magnetic interference
- Breakdown voltage: 1,000 VAC (1,500 VAC surge), FCC Part 68 compliant
- Tube or embossed tape and reel packaging
- UL recognized (E73266) and CSA certified (LR46266)
- Surface mount and through-hole options

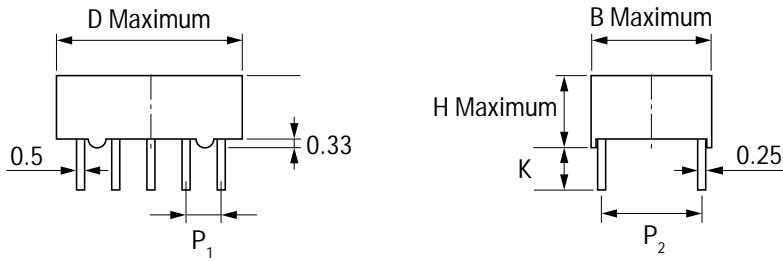


Part Number System

EB2-	3	S	NU	-L
Series	Coil Voltage	Latch Type	Lead Type	Packaging
EA2- = Through-hole mount EB2- = Surface mount	3 = 3 VDC 4.5 = 4.5 VDC 5 = 5 VDC 12 = 12 VDC 24 = 24 VDC	Blank = Non-latch type S = Single coil latch type T = Double coil latch type	NU = Standard	Blank = Tube -L = Embossed tape on reel

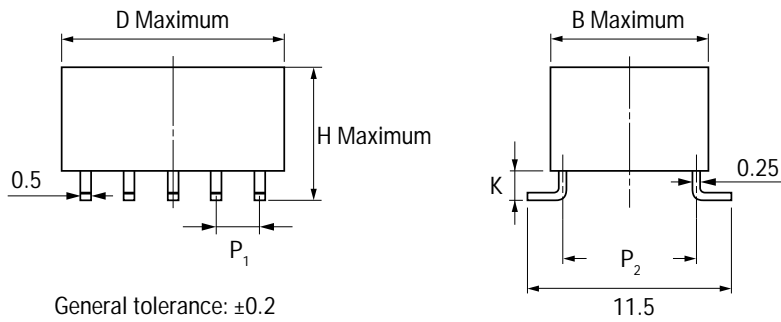
Dimensions – Millimeters

EA2 Series



General tolerance: ± 0.2

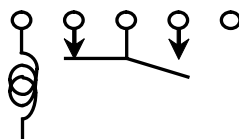
EB2 Series





General tolerance: ± 0.2

Pin Configurations

Bottom view



Safety Standards and Ratings

Certification Body	Mark	Specification	File Number	Rating
UL		UL Recognized (UL508) ¹	E73266	30 VDC, 1 A (resistive) 110 VDC, 0.3 A (resistive) 125 VAC, 0.5 A (resistive)
CSA		CSA Certified (CSA 22.2 #14)	LR46266	

¹ Spacing: UL114, UL478

Environmental Compliance

All KEMET relays are RoHS Compliant.



RoHS Compliant

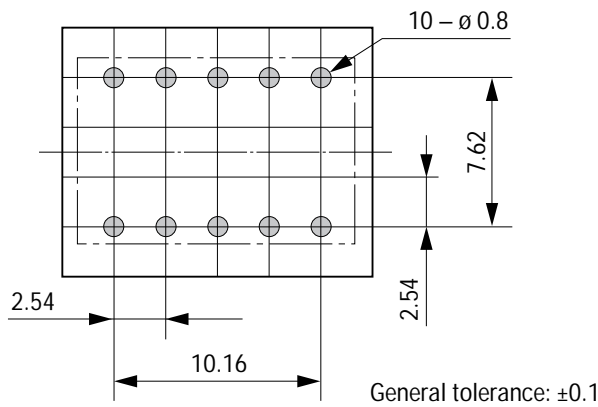
Table 1 – Ratings & Part Number Reference

Part Number	Nominal Coil Voltage (VDC)	Lead Type	Packaging
EA2-3(1)NU	3	Radial	Tube
EA2-4.5(1)NU	4.5	Radial	Tube
EA2-5(1)NU	5	Radial	Tube
EA2-12(1)NU	12	Radial	Tube
EA2-24(1)NU	24	Radial	Tube
EB2-3(1)NU	3	Surface Mount	Tube
EB2-4.5(1)NU	4.5	Surface Mount	Tube
EB2-5(1)NU	5	Surface Mount	Tube
EB2-12(1)NU	12	Surface Mount	Tube
EB2-24(1)NU	24	Surface Mount	Tube
EB2-3(1)NU-L	3	Surface Mount	Tape on Reel
EB2-4.5(1)NU-L	4.5	Surface Mount	Tape on Reel
EB2-5(1)NU-L	5	Surface Mount	Tape on Reel
EB2-12(1)NU-L	12	Surface Mount	Tape on Reel
EB2-24(1)NU-L	24	Surface Mount	Tape on Reel

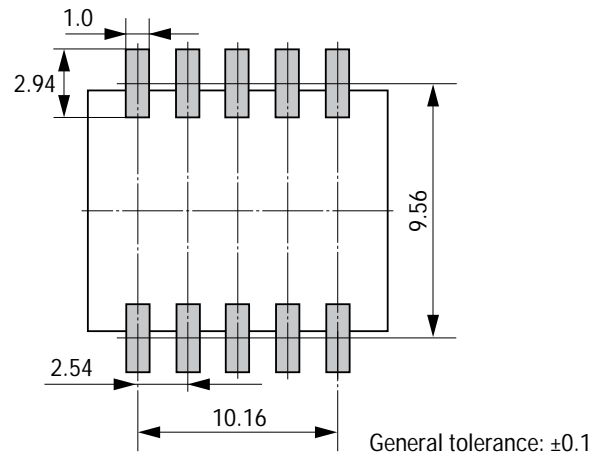
(1) To complete KEMET part number, leave blank for Non-latch, insert S for Single coil, or T for Double coil. Designates latch type.

Land Pattern – Millimeters

EA2 (bottom view)



EB2 (bottom view)



Soldering Process

EA2 – Through-hole Mounting

Automatic Soldering

Preheating: 110–120°C/110 seconds (maximum)

Solder temperature: 260°C maximum

Solder time: 5 seconds maximum

Note: KEMET recommends cooling down a printed circuit board to less than 110°C within 40 seconds after soldering.

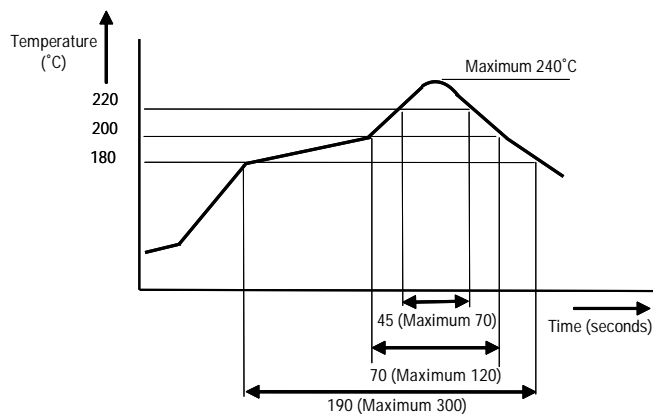
Manual Soldering

Solder temperature: 350°C maximum

Solder time: 3 seconds maximum

EB2 – Surface Mounting

IRS Method



Note: Temperature profile shows printed circuit board surface temperature on the relay terminal portion. Please consult KEMET if you wish to use a temperature profile other than above.

Contact Specifications

Item		EA2/EB2
Contact Form		2 Form C
Contact Material		Silver alloy with gold alloy overlay
Contact Ratings	Maximum Switching Power	30 W, 62.5 VA
	Maximum Switching Voltage	220 VDC, 250 VAC
	Maximum Switching Current	1 A
	Maximum Carrying Current	2 A
Minimum Contact Ratings		10 mVDC, 10 μ A ¹
Initial Contact Resistance		75 m Ω maximum (initial)
Operating Time (excluding bounce)		Approximately 2 milliseconds
Release Time (excluding bounce)		Approximately 1 millisecond
Insulation Resistance		1,000 M Ω at 500 VDC
Withstand Voltage	Between Open Contacts at 14.7e-4.8()-10.(in)14.45 ET64(t)-9.3(e)-19.7(l)-19.8(y 1 m)-81 Tm <0045>Tj 8f3(e)11.7(t)7.2(a)6.	

¹ This value is a reference value in the resistance load. Minimum capacity changes depending on the switching frequency, environment temperature, and load.

² Rise time: 10 μ s; decay time to half crest: 160 μ s.

³ This shows the number of operations with fatal defects. Stable characteristics are maintained for 1 x 10⁷ operations.

Coil Specifications

Non-latch Type (at 20°C)				
Nominal Coil Voltage (VDC)	Coil Resistance (Ω \pm 10%)	Operating Voltage ¹ (VDC)	Release Voltage ¹ (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

¹ Test by pulse voltage.

Coil Specifications cont'd

Single Coil Latch Type (at 20°C) ²				
Nominal Coil Voltage (VDC)	Coil Resistance (Ω) ±10%	Set Voltage ¹ (VDC)	Reset Voltage ¹ (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

¹ Test by pulse voltage.

² Latch type relays should be initialized to a known position before using. Only the specified polarity should be used to energize the coil.

Double Coil Latch Type (at 20°C) ^{2,3}					
Nominal Coil Voltage (VDC)	Coil Resistance (Ω) ±10%		Set Voltage ⁴ (VDC)	Release Voltage ⁴ (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	

² Latch type relays should be initialized to a known position before using. Only the specified polarity should be used to energize the coil.

³ Can not be driven by reverse polarity for reverse operation.

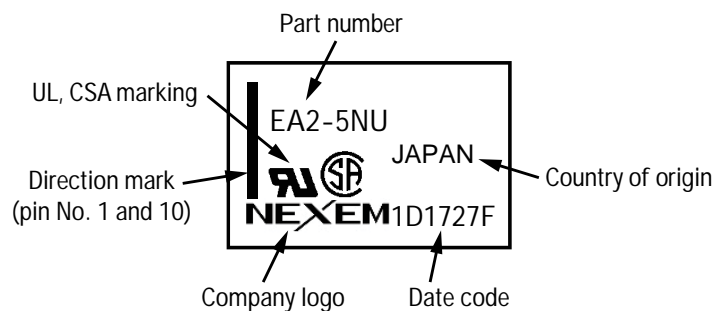
⁴ S = Set coil [pin #1 (+), pin #5 (-)], R = Reset coil [pin #10 (+), pin #6 (-)].

Recommended Relay Drive Conditions

Coil Type	Rating	Ambient Temperature
Non-latch	Voltage: $\leq \pm 5\%$ of nominal voltage	-40 to +85°C
Single Coil Double Coil	Square pulse (rise and fall time is rapid) Pulse height: $\leq \pm 5\%$ of nominal voltage Pulse Width: > 10 ms	

Marking

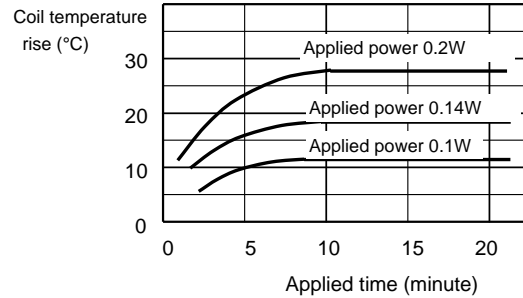
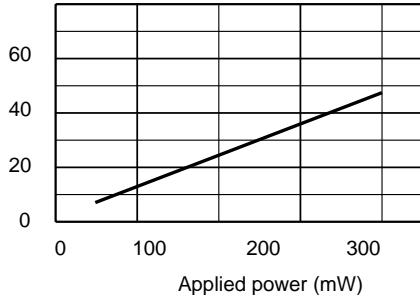
Top view



Performance Data

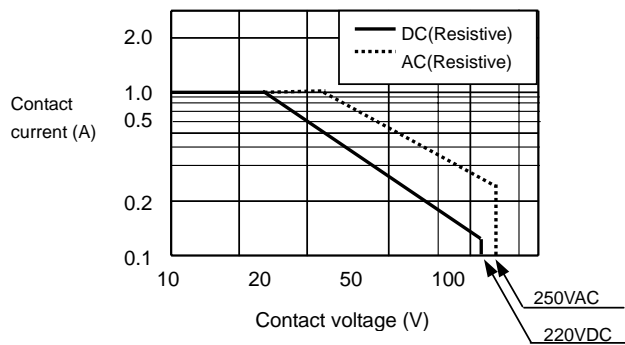
Coil Temperature Rise

Temperature is measured by coil resistance



Switching Capacity

Maximum Values



Maximum Coil Voltage

Maximum value of permissible alteration

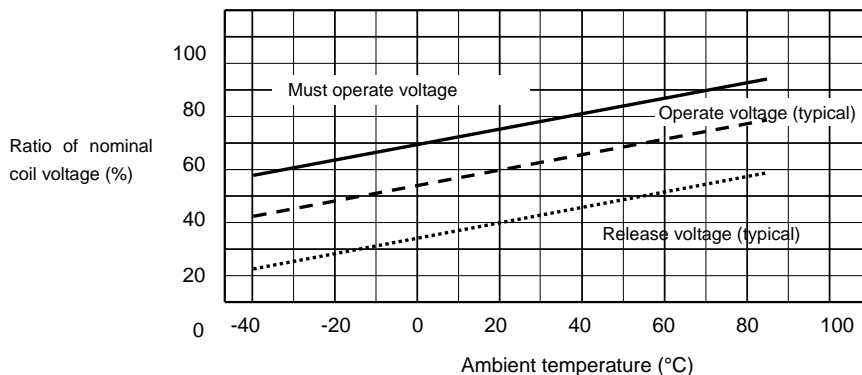
Applied Voltage vs. Timing

(Sample: EA2-5NU)

Performance Data cont'd

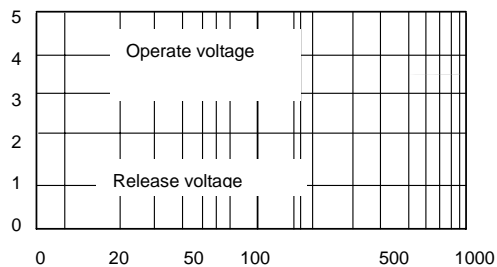
Operate and Release Voltage vs. Ambient Temperature

This shows a typical change of operate (release) voltage. The value of must operate is estimated, so coil voltage must be applied higher than this value for safe operation. For hot start operation, please inquire with KEMET.



Running Test (Non-load)

(Load: none; Drive: 5 VDC, 50 Hz, 50% duty; Ambient Temperature: room temperature; Sample: EA2-5NU, 20 pieces)



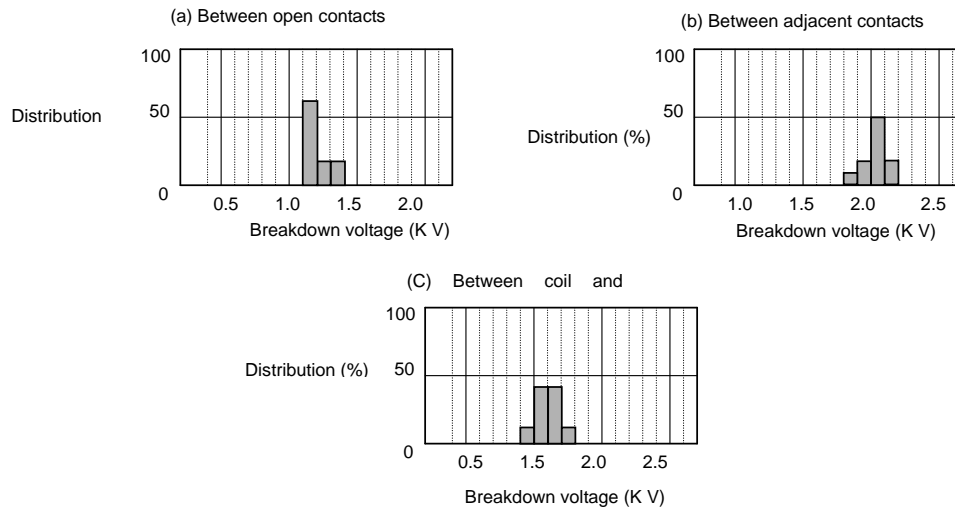
Running Test (Load)

(Load: 50 VDC, 0.1 A resistive; Drive: 5 VDC, 5 Hz, 50% duty; Ambient Temperature: 85°C; Sample: EA2-5NU, 10 pieces)

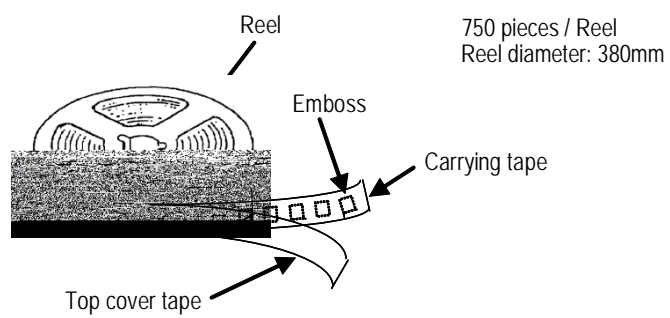
Performance Data cont'd

Breakdown Voltage

(Sample: EA2-5NU, 10 pieces)



Alteration of Voltage in Dense Mounting (magnetic interference)



Notes on Using Relays

1. Contact Load

Make sure that the contact load is within the specified range; otherwise, the lifetime of the contacts will be shortened considerably. Note that the running performance shown is an example, and that it varies depending on parameters such as the type of load, switching frequency, driver circuit, and ambient temperature under the actual operating conditions.

2. Driving Relays

- If the internal connection diagram of a relay shows + and – symbols on the coil, apply the rated voltage to the relay in the specified direction. If a rippled DC current source is used, abnormalities such as heat at the coil may occur.
- The maximum voltage that can be applied to the coil of the relay varies depending on the ambient temperature. Generally, the higher the voltage applied to the coil, the shorter the operating time. Note, however, that high voltage also increases the bounce of the contacts and the contact opening and closing frequency, which may shorten the lifetime of the contacts.
- For consistent operation, the driving voltage should have rise and fall times of less than 1 ms.
- For a latching relay, apply a voltage to the coil according to the polarity specified in the internal connection diagram of the relay.
- I

Notes on Using Relays cont'd

- Because the operating temperature range varies depending on the humidity, use the relay in the temperature range illustrated in the figure below. Prevent the relay from being frozen and avoid the generation of □

Notes on Using Relays cont'd

5. Handling and Storage

- Relays are packaged in magazine cases for shipment. If a space is created in the case after some relays have been removed, be sure to insert a stopper to secure the remaining relays in the case. If relays are not well secured, vibration during transportation may cause malfunctioning of the contacts.
- Exercise care in handling the relay so as to avoid dropping it or allowing it to fall. Do not use a relay that has been dropped. If a relay drops from a workbench to the floor, a shock of $9,800 \text{ m/s}^2$ (1,000 G) or more is applied to the relay, possibly damaging its functions. Even if a light shock has been applied to the relay, thoroughly evaluate its operation before using it.
- Latching relays are factory-set to reset state for shipment. A latching relay may be set, however, by vibration or shock applied while being transported. Be sure to forcibly reset the relay before using it in the application set. Also note that the relay may be set by unexpected vibration or shock when it is used in a portable set.
- The sealability of a surface mount (SMT) relay may be lost if the relay absorbs and is then heated during soldering. When storing relays, therefore, observe the following points:

1. For standard packing, please use relays within 12 months after delivery (storage conditions: 30°C/60% RH). If the relays have moisture absorption, dehumidify as follows:
 - Tape Packaging: $50 \pm 5^\circ\text{C}$, 200–300 hours.
 - Simple Relay: $85 \pm 5^\circ\text{C}$, 48 hours.
2. For MBB packing, please use relays within 2 years after delivery (storage conditions: 30°C/60% RH). After opening MBB packing, please use within 3 months (storage conditions: 30°C/60% RH).

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