

## Overview

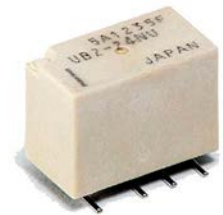
The KEMET UA2/UB2 miniature signal relays offer a super compact case size in a slim package. Minimal board space is consumed with either a through-hole or surface mount configuration. These relays are recognized by UL and CSA, while also being compliant with Part 68 of the FCC's 1,500 V surge capacity.

## Applications

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

## Benefits

- Low power consumption (< 140 mW)
- Super compact and lightweight
- Slim package for dense mounting
- Low magnetic interference
- Tube or embossed tape and reel packaging
- UL recognized (E73266) and CSA certified (LR46266)
- Surface mount and through-hole options

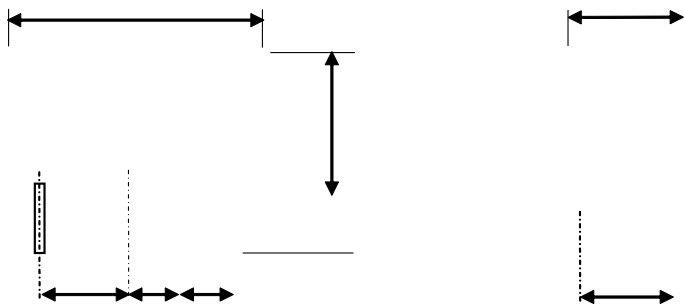


## Part Number System

<b>UB2-</b>	<b>3</b>	<b>S</b>	<b>NU</b>	<b>-L</b>
Series	Coil Voltage	Latch Type	Lead Type	Packaging
UA2- = Through-hole mount UB2- = 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	NU = Standard NE = Low power consumption (Non-latch) NUN = Minimum footprint NEN = Low power consumption (Non-latch), Minimum footprint	Blank = Tube -L = Embossed tape on reel

## Dimensions – Millimeters

### UA2 Series



## Pin Configurations

Bottom view

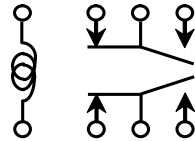


Table 1 – Ratings &amp; Part Number Reference

Part Number	Nominal Coil Voltage (VDC)	Lead Type	Packaging
UA2-3(1)NU	3	Radial	Tube
UA2-4.5(1)NU	4.5	Radial	Tube
UA2-5(1)NU	5	Radial	Tube
UA2-12(1)NU	12	Radial	Tube
UA2-24NU <sup>1</sup>	24	Radial	Tube
UA2-3NE <sup>1</sup>	3	Radial, Low power consumption	Tube
UA2-4.5NE <sup>1</sup>	4.5	Radial, Low power consumption	Tube
UA2-5NE <sup>1</sup>	5	Radial, Low power consumption	Tube
UB2-3(1)NU	3	Surface mount	Tube
UB2-4.5(1)NU	4.5	Surface mount	Tube
UB2-5(1)NU	5	Surface mount	Tube
UB2-12(1)NU	12	Surface mount	Tube
UB2-24NU <sup>1</sup>	24	Surface mount	Tube
UB2-3NE <sup>1</sup>	3	Surface mount, Low power consumption	Tube
UB2-4.5NE <sup>1</sup>	4.5	Surface mount, Low power consumption	Tube
UB2-5NE <sup>1</sup>	5	Surface mount, Low power consumption	Tube
UB2-3(1)NU-L	3	Surface mount	Tape on Reel
UB2-4.5(1)NU-L	4.5	Surface mount	Tape on Reel
UB2-5(1)NU-L	5	Surface mount	Tape on Reel
UB2-12(1)NU-L	12	Surface mount	Tape on Reel
UB2-24NU-L <sup>1</sup>	24	Surface mount	Tape on Reel
UB2-3NE-L <sup>1</sup>	3	Surface mount, Low power consumption	Tape on Reel
UB2-4.5NE-L <sup>1</sup>	4.5	Surface mount, Low power consumption	Tape on Reel
UB2-5NE-L <sup>1</sup>	5	Surface mount, Low power consumption	Tape on Reel
UB2-3(1)NUN	3	Surface mount, Minimum footprint	Tube
UB2-4.5(1)NUN	4.5	Surface mount, Minimum footprint	Tube
UB2-5(1)NUN	5	Surface mount, Minimum footprint	Tube
UB2-12(1)NUN	12	Surface mount, Minimum footprint	Tube
UB2-24NUN <sup>1</sup>	24	Surface mount, Minimum footprint	Tube
UB2-3NEN <sup>1</sup>	3	Surface mount, Low power consumption, Minimum Footprint	Tube
UB2-4.5NEN <sup>1</sup>	4.5	Surface mount, Low power consumption, Minimum Footprint	Tube
UB2-5NEN <sup>1</sup>	5	Surface mount, Low power consumption, Minimum Footprint	Tube
UB2-3(1)NUN-L	3	Surface mount, Minimum footprint	Tape on Reel
UB2-4.5(1)NUN-L	4.5	Surface mount, Minimum footprint	Tape on Reel
UB2-5(1)NUN-L	5	Surface mount, Minimum footprint	Tape on Reel
UB2-12(1)NUN-L	12	Surface mount, Minimum footprint	Tape on Reel
UB2-24NUN-L <sup>1</sup>	24	Surface mount, Minimum footprint	Tape on Reel
UB2-3NEN-L <sup>1</sup>	3	Surface mount, Low power consumption, Minimum Footprint	Tape on Reel
UB2-4.5NEN-L <sup>1</sup>	4.5	Surface mount, Low power consumption, Minimum Footprint	Tape on Reel
UB2-5NEN-L <sup>1</sup>	5	Surface mount, Low power consumption, Minimum Footprint	Tape on Reel

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

<sup>1</sup> Only available as Non-latch.

## Land Pattern – Millimeters

## Soldering Process

### UA2 – 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.*

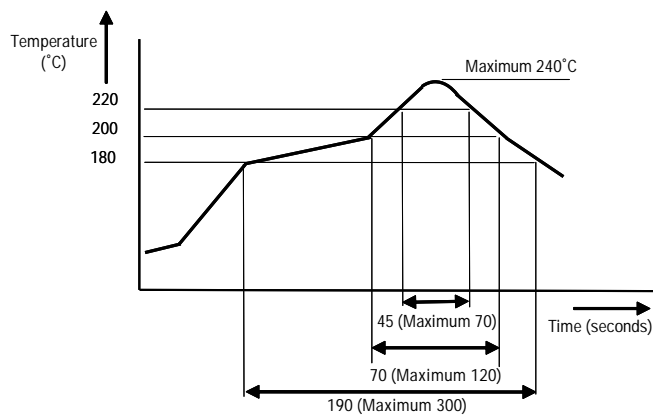
#### Manual Soldering

Solder temperature: 350°C maximum

Solder time: 3 seconds maximum

### UB2 – 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		UA2/UB2
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 $\mu$ A <sup>1</sup>
Initial Contact Resistance		100 m $\Omega$ maximum (initial)
Operating Time (excluding bounce)		Approximately 2 milliseconds
Release Time (excluding bounce)		Approximately 1 milliseconds
Insulation Resistance		1,000 M $\Omega$ at 500 VDC
Withstand Voltage	Between Open Contacts	1,000 VAC (for one minute), 1,500 V surge (10 x 160 $\mu$ s) <sup>2</sup>
	Between Adjacent Contacts	1,000 VAC (for one minute), 1,500 V surge (10 x 160 $\mu$ s) <sup>2</sup>
	Between Coil and Contacts	1,500 VAC (for one minute), 2,500 V surge (2 x 10 $\mu$ s) <sup>3</sup>
Shock Resistance		735 m/s <sup>2</sup> (75 G) – misoperation 980 m/s <sup>2</sup> (100 G) – destructive failure
Vibration Resistance		10 to 55 Hz, double amplitude 3 mm (20 G) – misoperation 10 to 55 Hz, double amplitude 5 mm (30 G) – destructive failure
Ambient Temperature		-40 to +85°C
Coil Temperature Rise		18°C at nominal coil voltage (140 mW)
Running Specifications	Non-load	5 x 10 <sup>7</sup> operations (Non-latch type) <sup>4</sup> 1 x 10 <sup>7</sup> operations (Latch type)
	Load	30 VDC 1 A (resistive), 1 x 10 <sup>5</sup> operations at 20°C, 1 Hz 125 VAC 0.3 A (resistive), 1 x 10 <sup>5</sup> operations at 20°C, 1 Hz
Weight		Approximately 1 g

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

<sup>2</sup> Rise time: 10  $\mu$ s; decay time to half crest: 160  $\mu$ s.

<sup>3</sup> Rise time: 2  $\mu$ s; decay time to half crest: 10  $\mu$ s.

<sup>4</sup> This shows the number of operations with fatal defects. Stable characteristics are maintained for 1 x 10<sup>7</sup> operations.

## Coil Specifications

Non-latch Type (at 20°C)				
Nominal Coil Voltage (VDC)	Coil Resistance ( $\Omega$ $\pm$ 10%)	Operating Voltage <sup>1</sup> (VDC)	Release Voltage <sup>1</sup> (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	2504	18.0	2.4	230

<sup>1</sup> Test by pulse voltage.

## Coil Specifications cont'd

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

<sup>1</sup> Test by pulse voltage.

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

Non-latch, Low Power Consumption (NE, NEN) Type (at 20°C)				
Nominal Coil Voltage (VDC)	Coil Resistance (Ω) ±10%	Operating Voltage <sup>1</sup> (VDC)	Release Voltage <sup>1</sup> (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

<sup>1</sup> Test by pulse voltage.

## Recommended Relay Drive Conditions

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

## Marking

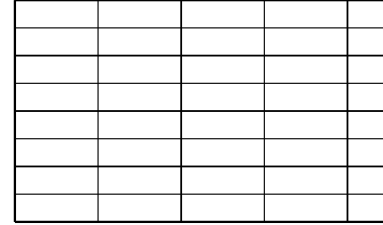
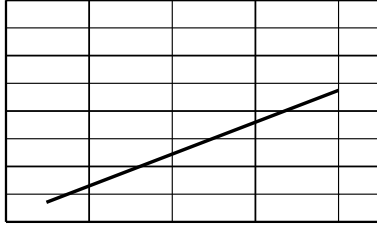
Top view



## 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: UA2–5NU)

## 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)

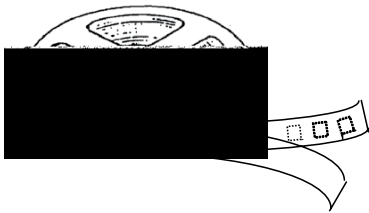
(Load: none; Drive: 5 VDC, 50 Hz, 50% duty; Ambient Temperature: room temperature; Sample: UA2–5NU, 20 pieces)

### Running Test (Load)

(Load: 50 VDC, 0.1 A resistive; Drive: 5 VDC, 5 Hz, 50% duty; Ambient Temperature: 85°C; Sample: UA2–5NU, 10 pieces)



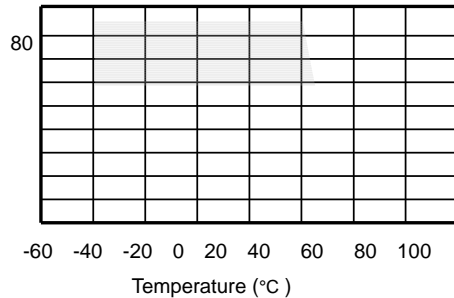
800 pieces/Reel  
Reel diameter: 380mm





## 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 condensation.



- The relay maintains constant sealability under normal atmospheric pressure (810 to 1,200 hpa). Its sealability may be degraded or the relay may be deformed and malfunction if it is used under barometric conditions exceeding the specified range.
- The same applies when the relay is stored or transported. Keep the upper-limit value of the temperature to which the relay is exposed after it is removed from the carton box to within 50°C.
- Permanent magnets are used in polarized relays. For this reason, when magnets, transformers, or speakers are located nearby the relay characteristics may change and faulty operations may result.
- If excessive vibration or shock is applied to the relay, it may malfunction and the contacts remain closed. Vibration or shock applied to the relay during operation may cause considerable damage to or wearing of the contacts. Note that operation of a snap switch mounted close to the relay or shock due to the operation of magnetic solenoid may also cause malfunctioning.

### 4. Mounting

- When mounting a relay onto a PC board using an automatic chip moulder, if excessive force is applied to the cover of the relay when the relay is chucked or inserted, the cover may be damaged or the characteristics of the relay degraded. Keep the force applied to the relay to within 1 kg.
- Avoid bending the pins to temporarily secure the relay to the PC board. Bending the pins may degrade sealability or adversely affect the internal mechanism.
- Ventilation immediately after soldering is recommended. Avoid immersing the relay in cleaning solvent immediately after soldering due to the danger of thermal shock being applied to the relay.
- Use an alcohol-based or water-based cleaning solvent. Never use thinner and benzene because they may damage the relay housing.
- Do not use ultrasonic cleaning because the vibration energy generated by the ultrasonic waves may cause the contacts to remain closed.

## 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 m/s<sup>2</sup> (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 ±5°C, 200–300 hours.
  - Simple Relay: 85 ±5°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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