

## OUTLINE ( TYPE KVA )

The signal transmission rate of personal computer peripheral devices and digital devices as represented by USB2.0 devices is being increased year by year, and countermeasures against ESD are critical in high-frequency bands. We have developed Type KVA Surge Absorber to protect the circuits of various electronic devices sensitive to ESD.

Since the surge absorber has a low capacitance of 0.08 pF, it is applicable to high-speed signal lines.

The ecology design of Type KVA is environmentally friendly because of Lead-free and Halogen-free.

## APPRICATION

The product is suitable for elimination of ESD on high-speed signal lines that may be affected by signal waveform deformation. (USB2.0, USB3.0, IEEE1394, HDMI interfaces, SCSI ports, antenna lines, etc.)

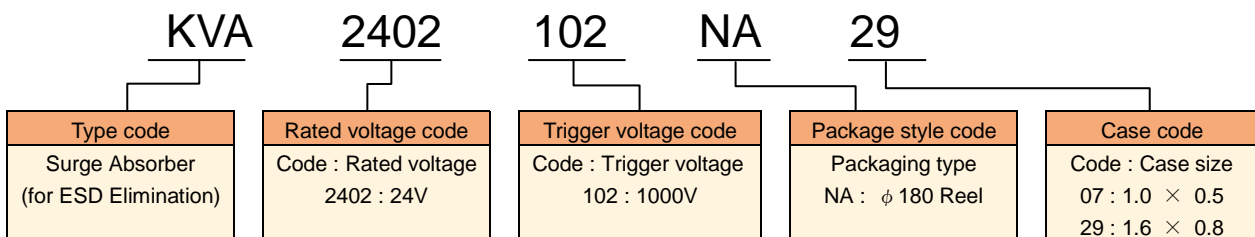
## FEATURES

1. Usable on high-speed signal lines
2. Low capacitance (size 1005 : 0.06pF typ.)
3. Large ESD endurance and high insulation resistance
4. No polarity. Protection of circuit against ESD from both directions
5. Ultra-small size : 1005 (1.0 × 0.5 × 0.35 mm), 1608 (1.6 × 0.8 × 0.5 mm)
6. Suitable for automatic mounting by chip placer
7. Precise dimensions allows high-density mounting and symmetrical construction of terminal provide "Self-Alignment".
8. Resistance to soldering heat : Reflow or flow soldering 10 seconds at 260° C
9. High accuracy carrier tape by using pressed pocket ensures excellent mounting.
10. Lead-free and RoHS Compliant

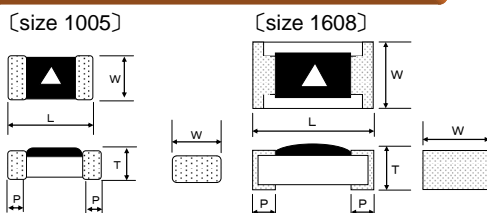
## RATING

Item	Ratings
Category Temperature Range	- 40~+125° C
Rated Voltage	24 VDC
Trigger Voltage	1000V max. (650V typ.)
Clamp Voltage	200V max. (100V typ.)
Capacitance	size 1005 : 0.1pF max. (0.06pF typ.)
	size 1608 : 0.2pF max. (0.08pF typ.)

## ORDERING INFORMATION



## DIMENSIONS



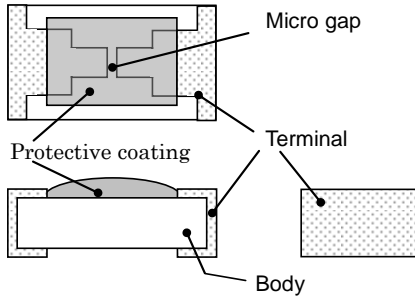
Main body : Alumina ceramic  
Terminal : Tin plating

Case size	Case code	L	W	T max	P
1005	07	1.00±0.05	0.50±0.05	0.35	0.20±0.1
1608	29	1.60±0.1	0.80±0.1	0.50	0.30±0.2

## MARKING

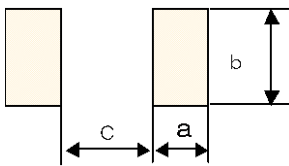
Code	Rated voltage	Trigger voltage
△	24 VDC	1000 V max.

## CONSTRUCTION



Name	Material
Micro gap	Copper
Body	Alumina ceramic
Protective coat	Silicone resin
Terminal	Tin plating

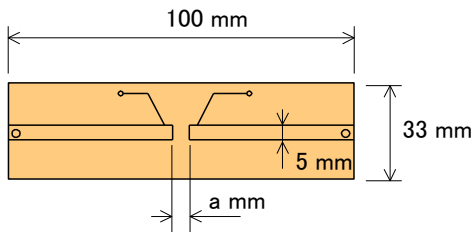
## RECOMMENDED PAD DIMENSIONS



(mm)

	Size 1005	Size 1608
a	0.4	1.0
b	0.5	1.2
c	0.6	1.0

## STANDARD TEST BOARD

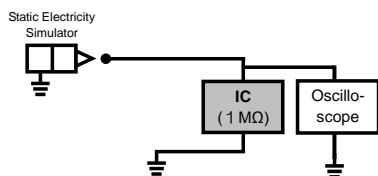
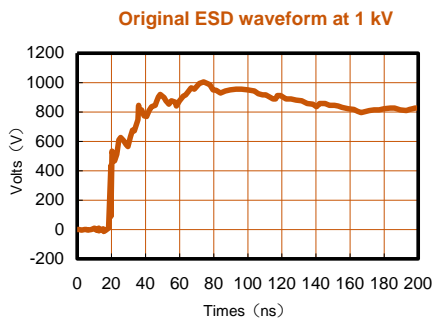


Glass epoxy on one side  
Board thickness : 1.6 mm  
Copper layer : 35 $\mu$ m

Case size	Size a
1005	0.6
1608	1.2

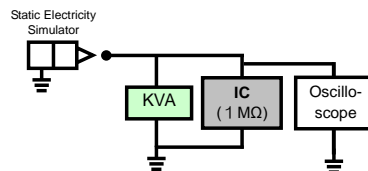
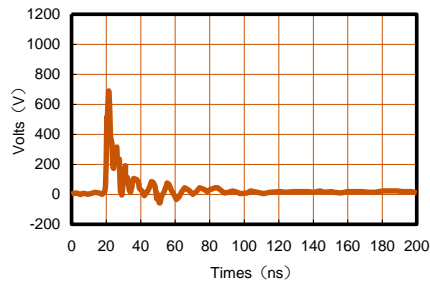
(mm)

## STATIC SUPPRESSION -Example of ESD Elimination-



### Surge Absorber absorbs and suppresses static electricity.

**Absorbed ESD waveform at 1 kV when KVA is used**



When mounted in parallel with the elements to be protected, such as ICs, between the elements and GND, Type KVA suppresses ESD applied to the elements and prevents malfunction and breaking.

## PERFORMANCE

No.	Item	Performance	Test method									
1	Trigger voltage	Shall not exceed 1000 V.	Contact discharging conforming to IEC61000-4-2 Tester capacity : 150 pF/Resistance : 330 Ω									
2	Clamp voltage	Shall not exceed 200 V.	Contact discharging conforming to IEC61000-4-2 Tester capacity : 150 pF/Resistance : 330 Ω Test voltage : 8 kV (level 4)									
3	Capacitance	size 1005 : Shall not exceed 0.1pF. size 1608 : Shall not exceed 0.2pF.	Measuring frequency : 1 MHz Measuring voltage : 1 V									
4	Leakage current	Shall not exceed 1 nA.	Test voltage: 6V									
5	Insulation resistance	Shall exceed 1 MΩ.	Resistance between terminals.									
6	Electrode strength (Bending)	No mechanical damage. Shall meet specification of trigger voltage and the insulation resistance.	Board supporting width : 90 mm Bending speed : Approx. 0.5 mm/sec. Duration : 30 sec. Bending : 3 mm									
7	Shear test	No mechanical damage. Shall meet specification of trigger voltage and the insulation resistance.	Applied force : size 1005 10 N (1.02 kgf) size 1608 20 N (2.04 kgf) Duration : 10 sec. Tool : R0.5 Direction of the press : side face									
8	Substrate bending test	No mechanical damage. Shall meet specification of trigger voltage and the insulation resistance.	Supporting dimension : size 1005 0.5 mm size 1608 0.8 mm Applied force : size 1005 5 N (0.51 kgf) size 1608 10 N (1.02 kgf) Tool : R0.5 Direction of the press : thickness direction of product.									
9	Solderability (Solder Wetting time)	Solder Wetting time : within 3sec.	Solder : Sn-3Ag-0.5Cu Temperature : 245 ± 3°C meniscograph method Solder : JISZ3282 H60A, H60S, H63A Temperature : 230 ± 2°C meniscograph method									
10	Solderability (new uniform coating of solder)	The dipping surface of the terminals shall be covered more than 95% with new solder.	Solder : Sn-3Ag-0.5Cu Temperature : 245 ± 3°C Dipping : 3sec. Solder : JISZ3282 H60A, H60S, H63A Temperature : 230 ± 2°C Dipping : 3sec.									
11	Resistance to soldering heat	Marking shall be legible. No mechanical damage. Shall meet specification of trigger voltage and the insulation resistance.	Dipping (1 cycle) Preconditioning : 100 ~ 150°C, 60 sec. Temperature : 265 ± 3°C/6 ~ 7 sec. Reflow soldering (2 cycles) Preconditioning : 1 ~ 2 min, 180°C or less Peak : 250 ± 5° C, 5 sec. Holding : 230 ~ 250°C, 30 ~ 40 sec. Cooling : more than 2 min. Manual soldering Temperature : 350 ± 10°C Duration : 3 ~ 4 sec. Measure after 1 hour left under room temp. and humidity.									
12	Solvent resistance	Marking shall be legible. No mechanical damage. Shall meet specification of trigger voltage and the insulation resistance.	Dipping rinse Solvent : Isopropyl alcohol Duration : 90 sec.									
13	ESD endurance	No mechanical damage. The resistance between terminals shall be 1 MΩ or more, and the trigger voltage shall be met.	Conforming to IEC61000-4-2 Tester capacity : 150pF / Resistance : 330 Ω Test voltage : It depends below.(level 4) 1000 cycles <table border="1"> <thead> <tr> <th>Case size</th> <th>Contact discharge</th> <th>Air discharge</th> </tr> </thead> <tbody> <tr> <td>1005</td> <td>8kV</td> <td>8kV</td> </tr> <tr> <td>1608</td> <td>8kV</td> <td>15kV</td> </tr> </tbody> </table>	Case size	Contact discharge	Air discharge	1005	8kV	8kV	1608	8kV	15kV
Case size	Contact discharge	Air discharge										
1005	8kV	8kV										
1608	8kV	15kV										
14	Vibration	No mechanical damage. Shall meet specification of trigger voltage and the insulation resistance.	Frequency range : 10 ~ 55 ~ 10 Hz/min. Vibration amplitude : 1.5 mm. Duration : 2 hours in each of XYZ directions (total : 6 hours)									
15	Shock	No mechanical damage. Shall meet specification of trigger voltage and the insulation resistance..	Peak value : 490 m/s <sup>2</sup> (50 G) Duration : 11 msec. 6 aspects × 3 times (total : 18 times)									
16	Thermal shock	No mechanical damage. Shall meet specification of trigger voltage and the insulation resistance.	-55 ± 3° C : 30 min. Room temperature : 2 ~ 3 min or less 125 ± 2° C : 30 min. Room temperature : 2 ~ 3 min or less Repeat above step for 10 cycles.									
17	Moisture resistance	No mechanical damage. Shall meet specification of trigger voltage and the insulation resistance.	Temperature : 85 ± 3°C Humidity : 85 ± 5% RH Leaving Duration : 1000 h									
18	Load life	No mechanical damage. Shall meet specification of trigger voltage and the insulation resistance.	Temperature : 85 ± 2°C Applied : 24V (Rated voltage) Duration : 1000 hours									
19	Accelerated damp heat steady state	No mechanical damage. Shall meet specification of trigger voltage and the insulation resistance.	Temperature : 85 ± 3°C Humidity : 85 ± 5%RH Applied : 24V(rated voltage) Duration : 1000 hours									
20	Stability	No mechanical damage. Shall meet specification of trigger voltage and the insulation resistance.	Temperature : 125 ± 2°C Leaving Duration : 1000 hours									

## Application Notes for Surge Absorber

### 1. Circuit Design

Type KVA Surge Absorber is a part for protection from static electricity and cannot be used for protection from lightning surge. Before using Type KVA Surge Absorber, sufficiently examine its electrical characteristics and the circuit conditions to be mounted.

- (1) Type KVA should always be operated below the rated voltage.
- (2) Use Type KVA under the condition of category temperature.

Type KVA should be selected by determining the operating conditions that will occur after final assembly, or estimating potential abnormalities through cycle testing.

### 2. Assembly and Mounting

During the entire assembly process, observe Type KVA body temperature and the heating time specified in the performance table. In addition, observe the following items :

- (1) Mounting and adjusting with soldering irons are not recommendable since temperature and time control is difficult.  
In case of emergency for using soldering irons, be sure to observe the conditions specified in the performance table.
- (2) Type KVA body should not have direct contact with a soldering iron.
- (3) Once Type KVA mounted on the board, they should never be remounted on boards or substrates.
- (4) During mounting, be careful not to apply any excessive mechanical stresses to Type KVA.

### 3. Solvents

For cleaning of Type KVA, immersion in isopropyl alcohol for 90 seconds (at 20 ~ 30° C liquid temp.) will not be damaged. If organic solvents (Pine Alpha<sup>TM</sup>, Techno Care<sup>TM</sup>, Clean Through<sup>TM</sup>, etc.) will be applied to Type KVA, be sure to preliminarily check that the solvent will not damage the Type KVA.

### 4. Caution During Usage

Type KVA should never be touched in use.

### 5. Environmental Conditions

- (1) Type KVA should not be operated in acid or alkali corrosive atmosphere.
- (2) Type KVA should not be vibrated, shocked, or pressed excessively.
- (3) Type KVA should not be operated in a flammable or explosive atmosphere.
- (4) After mounting Type KVA on a board, covering Fuses with resin may affect to the electric characteristics of Type KVA. Please be sure to evaluate it in advance.

### 6. Emergency

In case of fire, smoking, or offensive odor during operation, please cut off the power in the circuit or pull the plug out.

### 7. Storage

- (1) Type KVA should be stored at room temperature (-10°C ~ +40°C) without direct sunlight but not in corrosive atmosphere such as H<sub>2</sub>S (hydrogen sulfide) or SO<sub>2</sub>(sulfur dioxide). Direct sunlight may cause decolorization and deformation of the exterior and taping.  
Also, there is a fear that solderability will be remarkably lower in high humidity.
- (2) If the products are stored for an extended period of time, please contact Matsuo Sales Department for recommendation. The longer storage term causes packages and tapings to worsen. If the products are stored for longer term, please contact Matsuo Sales Department for advice.
- (3) The products in taping, package, or box should not be given any kind of physical pressure. Deformation of taping or package may affect automatic mounting.

### 8. Disposal

When Type KVA are disposed of as waste or "scrap", they should be treated as "industrial waste". Type KVA contain various kinds of metals and resins.

### 9. Samples

Type KVA received as samples should not be used in any products or devices in the market. Samples are provided for a particular purpose such as configuration, confirmation of electrical characteristics, etc.



**MATSUO ELECTRIC CO., LTD.**

Please feel free to ask our sales department for more information on the Surge Absorber.

Overseas Sales Dep : 5-3, 3-Chome, Sennari-cho, Toyonaka-shi, Osaka 561-8558, Japan Tel : 06-6332-0883 Fax : 06-6332-0920

Head Office : 5-3, 3-Chome, Sennari-cho, Toyonaka-shi, Osaka 561-8558, Japan Tel : 06-6332-0871 Fax : 06-6331-1386

URL : <http://www.ncc-matsuo.co.jp/>

The specifications on this catalog are subject to change without prior notice. Please inquire of our Sales Department to confirm the specifications prior to use.