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.

APPLICATION

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℃
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.)

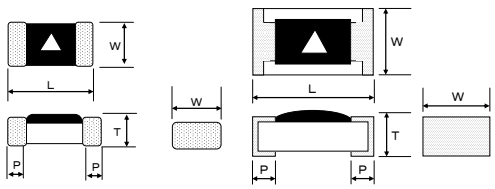
ORDERING INFORMATION

KVA　2402　102　NA　29

Type code	Rated voltage code	Trigger voltage code	Package style code	Case code
Surge Absorber (for ESD Elimination)	Code : Rated voltage 2402 : 24V	Code : Trigger voltage 102 : 1000V	Packaging type NA : ϕ180 Reel	Code : Case size 07 : 1.0 × 0.5 29 : 1.6 × 0.8

DIMENSIONS

〔size 1005〕　〔size 1608〕



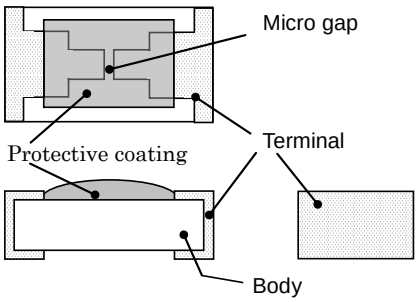
Main body：Alumina ceramic
Terminal：Tin plating　(mm)

Case size	Case code	L	W	T max	P
1005	07	$1.00^{\pm0.05}$	$0.50^{\pm0.05}$	0.35	$0.20^{\pm0.1}$
1608	29	$1.60^{\pm0.1}$	$0.80^{\pm0.1}$	0.50	$0.30^{\pm0.2}$

MARKING

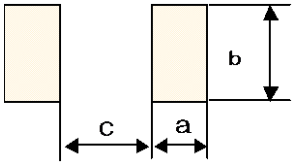
Code	Rated voltage	Trigger voltage
△	24 VDC	1000 V max.

CONSTRUCTION



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

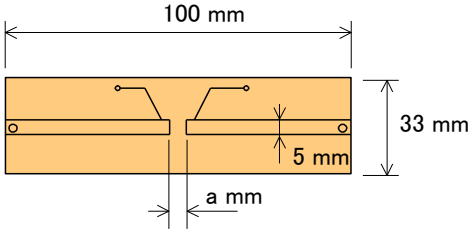
RECOMMENDED PAD DIMENSIONS



(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：35μm

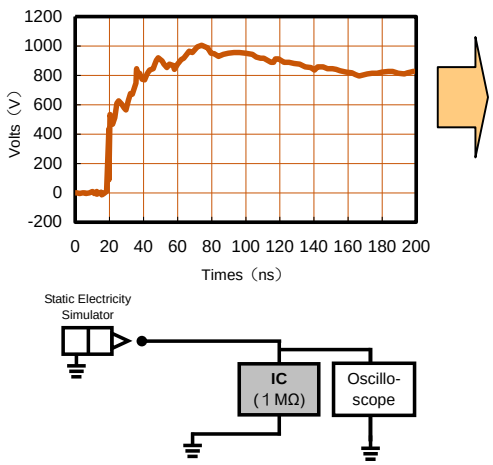
Case size	Size a
1005	0.6
1608	1.2

(mm)

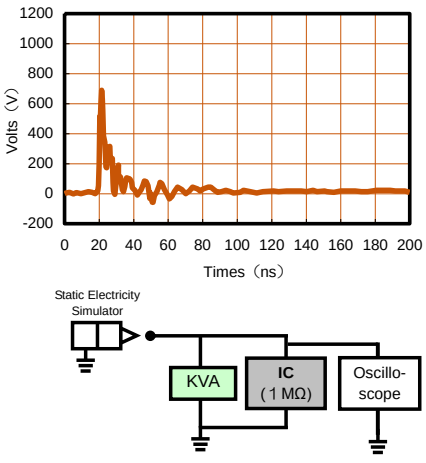
STATIC SUPPRESSION -Example of ESD Elimination-

Surge Absorber absorbs and suppresses static electricity.

Original ESD waveform at 1 kV



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

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

⚠ 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)Please 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.

(5) Should not rub the protective coat surface with a cotton swab or abrush,it might cause the lack for marking and protective coat.

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™, Techno Care™, Clean Through™, etc.) will be applied to Type KVA, be sure to preliminarily check that the solvent will not damage 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) Please do not use Type KVA in the environment where dew condensation occurs.
In case Type KVA has to be used under the dew condensation condition, please apply moisture-proof coating over Type KVA . Covering Type KVA with moisture-proof coating may affect electrical characteristics, please evaluate the effects sufficiently before use.

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_2S（hydrogen sulfide）or SO_2(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 us for recommendation.
The longer storage term causes packages and tapings to worsen. If the products are stored for longer term, please contact us 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/