Notice for TAIYO YUDEN Products
[For General Electronic Equipment]

Please read this notice before using the TAIYO YUDEN products.

⚠️ REMINDERS

- Product information in this catalog is as of October 2018. All of the contents specified herein are subject to change without notice due to technical improvements, etc. Therefore, please check for the latest information carefully before practical application or use of our products.

Please note that TAIYO YUDEN shall not be in any way responsible for any damages and defects in products or equipment incorporating our products, which are caused under the conditions other than those specified in this catalog or individual product specification sheets.

- Please contact TAIYO YUDEN for further details of product specifications as the individual product specification sheets are available.

- Please conduct validation and verification of our products in actual condition of mounting and operating environment before using our products.

- The products listed in this catalog are intended for use in general electronic equipment (e.g., AV equipment, OA equipment, home electric appliances, office equipment, information and communication equipment including, without limitation, mobile phone, and PC) and medical equipment classified as Class I or II by IMDRF. Please be sure to contact TAIYO YUDEN for further information before using the products for any equipment which may directly cause loss of human life or bodily injury (e.g., transportation equipment including, without limitation, automotive powertrain control system, train control system, and ship control system, traffic signal equipment, disaster prevention equipment, medical equipment classified as Class III by IMDRF, highly public information network equipment including, without limitation, telephone exchange, and base station).

Please do not incorporate our products into any equipment requiring high levels of safety and/or reliability (e.g., aerospace equipment, aviation equipment*, medical equipment classified as Class IV by IMDRF, nuclear control equipment, undersea equipment, military equipment).

*Note: There is a possibility that our products can be used only for aviation equipment that does not directly affect the safe operation of aircraft (e.g., in-flight entertainment, cabin light, electric seat, cooking equipment) if such use meets requirements specified separately by TAIYO YUDEN. Please be sure to contact TAIYO YUDEN for further information before using our products for such aviation equipment.

When our products are used even for high safety and/or reliability-required devices or circuits of general electronic equipment, it is strongly recommended to perform a thorough safety evaluation prior to use of our products and to install a protection circuit as necessary.

Please note that unless you obtain prior written consent of TAIYO YUDEN, TAIYO YUDEN shall not be in any way responsible for any damages incurred by you or third parties arising from use of the products listed in this catalog for any equipment requiring inquiry to TAIYO YUDEN or prohibited for use by TAIYO YUDEN as described above.

- Information contained in this catalog is intended to convey examples of typical performances and/or applications of our products and is not intended to make any warranty with respect to the intellectual property rights or any other related rights of TAIYO YUDEN or any third parties nor grant any license under such rights.

- Please note that the scope of warranty for our products is limited to the delivered our products themselves and TAIYO YUDEN shall not be in any way responsible for any damages resulting from a fault or defect in our products. Notwithstanding the foregoing, if there is a written agreement (e.g., supply and purchase agreement, quality assurance agreement) signed by TAIYO YUDEN and your company, TAIYO YUDEN will warrant our products in accordance with such agreement.

- The contents of this catalog are applicable to our products which are purchased from our sales offices or authorized distributors (hereinafter “TAIYO YUDEN’s official sales channel”). Please note that the contents of this catalog are not applicable to our products purchased from any seller other than TAIYO YUDEN’s official sales channel.

- Caution for Export

Some of our products listed in this catalog may require specific procedures for export according to “U.S. Export Administration Regulations”, “Foreign Exchange and Foreign Trade Control Law” of Japan, and other applicable regulations. Should you have any questions on this matter, please contact our sales staff.

TAIYO YUDEN 2019
**FEATURES**

- Use of strontium titanate semiconductor ceramics.
- Large net voltage non-linear coefficient ($\alpha$) of 3 to 7, and large electrostatic capacitance of 10 to 150 nF. Noise can thus be absorbed over a wide range of frequencies.
- Surface electrode type/Side mount electrode type

**APPLICATIONS**

- Eliminates sparks between governor contact and commutator and brushes; absorbs noise in micro motors.

**ORDERING CODE**

<table>
<thead>
<tr>
<th>S</th>
<th>R</th>
<th>J</th>
<th>△</th>
<th>△</th>
<th>0</th>
<th>4</th>
<th>0</th>
<th>F</th>
<th>3</th>
</tr>
</thead>
</table>

1. **Material**: S | STR
2. **External Dimension**: $\phi_D$ (mm)
   - H: 6.00
   - J: 8.00
   - △: Blank Space
3. **Nominal Lower Limit Voltage $E_{\text{IL}}$ [V]**
   - Example Number: 0.1
   - 2.0
   - 176
   - 17.6
4. **Upper Limit Voltage [V]**
   - A: 1
   - B: 2
   - C: 3
   - D: 4
   - E: 5
   - F: 6
   - G: 7
   - H: 8
   - I: 9
   - J: 0
5. **Number of Electrode**
   - 3 or 5 Poles

**EXTERNAL DIMENSIONS**

Surface Electrode Type (SRJC)

<table>
<thead>
<tr>
<th>$\phi_D$</th>
<th>$\phi_d$</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.50 ± 0.20</td>
<td>5.00 ± 0.20</td>
<td>0.65 ± 0.10</td>
</tr>
<tr>
<td>(0.335 ± 0.008)</td>
<td>(0.197 ± 0.008)</td>
<td>(0.026 ± 0.004/−0.006)</td>
</tr>
</tbody>
</table>

Unit: mm (inch)

**PART NUMBERS/MINIMUM QUANTITY**

<table>
<thead>
<tr>
<th>Ordering code</th>
<th>EHS (Environmental Hazardous Substances)</th>
<th>Outside diameter $\phi_D$ [mm]</th>
<th>Inside diameter $\phi_d$ [mm]</th>
<th>Thickness T [mm]</th>
<th>Measuring Current [mA]</th>
<th>$E_{\text{IL}}$ Voltage [V]</th>
<th>Non-linear coefficient $\alpha$</th>
<th>Number of Electrode</th>
<th>Minimum Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>SRR</td>
<td>RoHS</td>
<td>12.70 ± 0.40</td>
<td>9.50 ± 0.30</td>
<td>1.30 max.</td>
<td>10</td>
<td>13.0 to 50.0</td>
<td>≥2.0</td>
<td>3 or 5</td>
<td>1000</td>
</tr>
<tr>
<td>SRPP</td>
<td>RoHS</td>
<td>12.00 ± 0.30</td>
<td>6.85 ± 0.15</td>
<td>1.10 max.</td>
<td>3</td>
<td>4.0 to 60.0</td>
<td>2.0 to 35.0</td>
<td>3 or 5</td>
<td>2000</td>
</tr>
<tr>
<td>SRJA</td>
<td>RoHS</td>
<td>8.50 ± 0.25</td>
<td>5.80 ± 0.15</td>
<td>0.65 ± 0.15</td>
<td>4</td>
<td>2.0 to 35.0</td>
<td>3.0 to 9.0</td>
<td>3</td>
<td>3000</td>
</tr>
<tr>
<td>SRJC</td>
<td>RoHS</td>
<td>8.50 ± 0.20</td>
<td>5.00 ± 0.20</td>
<td>0.65 ± 0.15</td>
<td>2</td>
<td>2.0 to 35.0</td>
<td>3</td>
<td>6000</td>
<td></td>
</tr>
<tr>
<td>SRG</td>
<td>RoHS</td>
<td>5.85 ± 0.15</td>
<td>4.10 ± 0.05</td>
<td>0.5 ± 0.1</td>
<td>2</td>
<td>2.0 to 35.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SRHN</td>
<td>RoHS</td>
<td>4.20 ± 0.15</td>
<td>2.80 ± 0.12</td>
<td>0.50 ± 0.1</td>
<td>1</td>
<td>2.0 to 6.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SRHTT</td>
<td>RoHS</td>
<td>3.00 ± 0.12</td>
<td>2.15 ± 0.10</td>
<td>0.55 max.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SRHVP</td>
<td>RoHS</td>
<td>2.80 ± 0.15</td>
<td>1.90 ± 0.05</td>
<td>0.50 max.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

We have various shape besides the above. We will cope with the custom about the shape and the character after consultation.
## PACKAGING

#### Minimum Quantity

<table>
<thead>
<tr>
<th>Type</th>
<th>Minimum Quantity [pcs]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Case Package</td>
</tr>
<tr>
<td>SRR</td>
<td>1000</td>
</tr>
<tr>
<td>SRPP</td>
<td>2000</td>
</tr>
<tr>
<td>SRJA</td>
<td>3000</td>
</tr>
<tr>
<td>SRJC</td>
<td>3000</td>
</tr>
<tr>
<td>SRG</td>
<td>3000</td>
</tr>
<tr>
<td>SRHN</td>
<td>6000</td>
</tr>
<tr>
<td>SRHTT</td>
<td>6000</td>
</tr>
<tr>
<td>SRHVP</td>
<td>6000</td>
</tr>
</tbody>
</table>

This catalog contains the typical specification only due to the limitation of space. When you consider the purchase of our products, please check our specification. For details of each product (characteristics graph, reliability information, precautions for use, and so on), see our Web site (http://www.ty-top.com/).
## RELIABILITY DATA

### 1. Operating Temperature Range

**Specified Value**

\[-25 \sim +120{}^\circ C\]

For the range of 50 to 120\(^\circ\)C, refer to the derating curve.

### 2. Storage Temperature Range

**Specified Value**

\[-25 \sim +120{}^\circ C\]

### 3. Rated Power

**Specified Value**

Refer to the individual specification

### 4. E\(_{10}\) Characteristic

**Specified Value**

Refer to the individual specification

<table>
<thead>
<tr>
<th>Test Methods and Remarks</th>
<th>((at 25\pm5{}^\circ C))</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(E) : Constant-current source</td>
</tr>
<tr>
<td></td>
<td>(A) : Digital ammeter</td>
</tr>
<tr>
<td></td>
<td>(V) : Digital voltmeter</td>
</tr>
<tr>
<td></td>
<td>(E_{10}) : Voltage at reference current with application of 10mADC</td>
</tr>
<tr>
<td></td>
<td>Input waveform is square wave. (Width : 50m sec., max.)</td>
</tr>
</tbody>
</table>

### 5. Non-linear Coefficient Rated \(\alpha\) (at 25±5\(^\circ\)C)

**Specified Value**

Refer to the individual specification

\[\text{Definition}\quad \alpha = \frac{1}{\log E_{10}/E_{1}}\]

<table>
<thead>
<tr>
<th>Test Methods and Remarks</th>
<th>(E) : Constant-current source</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(A) : Digital ammeter</td>
</tr>
<tr>
<td></td>
<td>(V) : Digital voltmeter</td>
</tr>
<tr>
<td></td>
<td>(E_{10}) : Voltage at reference current with application of 10mADC</td>
</tr>
<tr>
<td></td>
<td>Input waveform is square wave. (Width : 50m sec., max.)</td>
</tr>
</tbody>
</table>

### 6. Capacitance

**Specified Value**

Refer to the individual specification

<table>
<thead>
<tr>
<th>Test Methods and Remarks</th>
<th>Measuring frequency : 1kHz±10%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Measuring voltage : 1.0±0.5Vrms</td>
</tr>
<tr>
<td></td>
<td>Measuring temperature : 25±5(^\circ)C</td>
</tr>
</tbody>
</table>

### 7. Tangent of Loss Angle (\(\tan\delta\))

**Specified Value**

Refer to the individual specification

<table>
<thead>
<tr>
<th>Test Methods and Remarks</th>
<th>Measuring frequency : 1kHz±10%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Measuring voltage : 1.0±0.5Vrms</td>
</tr>
<tr>
<td></td>
<td>Measuring temperature : 25±5(^\circ)C</td>
</tr>
</tbody>
</table>

### 8. Temperature Characteristic of Capacitance

**Specified Value**

Refer to the individual specification

According to JIS C 5101-1

Measurement of voltage at reference current at 25\(^\circ\)C and 50\(^\circ\)C shall be made for the calculation by the following equation.

\[
\alpha = \frac{E_{10}(50{}^\circ C) - E_{10}(25{}^\circ C)}{E_{10}(25{}^\circ C)} \times \frac{100}{50{}^\circ C - 25{}^\circ C}
\]

<table>
<thead>
<tr>
<th>Test Methods and Remarks</th>
<th>Change of maximum capacitance deviation in step 1 to 5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Temperature((^\circ)C)</td>
</tr>
<tr>
<td>1</td>
<td>25 (Reference temperature)</td>
</tr>
<tr>
<td>2</td>
<td>50</td>
</tr>
</tbody>
</table>

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9. Pulse

<table>
<thead>
<tr>
<th>Specified Value</th>
<th>Refer to the individual specification</th>
</tr>
</thead>
</table>

**Test Methods and Remarks**

![Diagram showing pulse test setup]

- **R1**: 2kΩ
- **C1**: 35±5μF
- **E1**: Individual specification
- **Number of pulse application**: 10 times
- **Measuring temperature**: 25±5℃

10. Body Strength

<table>
<thead>
<tr>
<th>Specified Value</th>
<th>Refer to the individual specification</th>
</tr>
</thead>
</table>

**Test Methods and Remarks**

![Diagram showing body strength test setup]

- **Pressing force**: Refer to Individual specification
- **L**: Depends upon the sample size

11. Adhesion of Electrode

<table>
<thead>
<tr>
<th>Specified Value</th>
<th>No detachment of electrode or sign of such defects</th>
</tr>
</thead>
</table>

**Test Methods and Remarks**

- Lead wire shall be soldered perpendicularly onto the electrode, then pulled out perpendicularly.
- **Speed to pull out**: 2.5cm/2sec.
- **Solder to be used**: Eutectic solder

12. Resistance to Soldering Heat

<table>
<thead>
<tr>
<th>Specified Value</th>
<th>E10: Within ±20%, α: Refer to the individual specification</th>
</tr>
</thead>
</table>

**Test Methods and Remarks**

- **Temperature at the tip of soldering iron**: 280±5℃, 300±5℃
- **Duration**: 2 sec.
- **Preheating temperature**: 150℃, 170℃
- **Recovery**: 1 hr of recovery under the standard condition after the test.

13. Resistance to Solvent

<table>
<thead>
<tr>
<th>Specified Value</th>
<th>No significant abnormality in appearance and legible marking</th>
</tr>
</thead>
</table>

14. Damp Heat

<table>
<thead>
<tr>
<th>Specified Value</th>
<th>E10: Within ±20%, α: Refer to the individual specification</th>
</tr>
</thead>
</table>

**Test Methods and Remarks**

- **Temperature**: 60±10℃
- **Humidity**: 90 to 95% RH
- **Duration**: 300±8 hrs
- **Recovery**: 1 hr of recovery under the standard condition after the removal from test chamber.
- **Measuring conditions**: E1 = Current application for 30 sec.
  - E10 = Current application for 60 sec.

15. DC Load Resistance

<table>
<thead>
<tr>
<th>Specified Value</th>
<th>E10: Within ±20%, α: Refer to the individual specification</th>
</tr>
</thead>
</table>

**Test Methods and Remarks**

- **E**: Constant-current source
- **A**: Digital ammeter
- **V**: Digital voltmeter
- **R**: Load adjusting variable resistor
- **P=⃝×Ⓐ**

**Test environment**: standard condition

- **Current**: Refer to the individual specification
- **Duration**: 300±8 hrs
- **Recovery**: 1 hr of recovery under the standard condition after the removal from test chamber.

**Note on standard condition**: "standard condition" referred to herein is defined as follows:

- 5 to 35℃ of temperature, 45 to 85% relative humidity and 86 to 106kPa of air pressure.

When there are questions concerning measurement results:

- In order to provide correlation data, the test shall be conducted under condition of 25±2℃ of temperature, 60 to 70% relative humidity and 86 to 106kPa of air pressure.
- Unless otherwise specified, all the tests are conducted under the "standard condition."
# RING VARISTORS

## PRECAUTIONS

1. **Circuit Design**

   **Precautions**

   ◆ Verification of operating environment, electrical rating and performance
   1. A malfunction in medical equipment, spacecraft, nuclear reactors, etc. may cause serious harm to human life or have severe social ramifications. As such, any varistors to be used in such equipment may require higher safety and/or reliability considerations and should be clearly differentiated from components used in general purpose applications.

   ◆ Operating Environment precautions
   1. Varistors should not be used in the following environments:
      (1) Environmental conditions to avoid
         a. exposure to water or salt water.
         b. exposure to moisture or condensation.
         c. exposure to corrosive gases (such as hydrogen sulfide, sulfurous acid, chlorine, and ammonia).

2. **Soldering**

   **Precautions**

   ◆ Soldering
   - Be sure to do pre-heating sufficiently so that the difference between a soldering iron and ring varistors in temperature should be 150°C or less.
   - Ring Varistors are susceptible to thermal shock when exposed to rapid or concentrated heating or rapid cooling. Therefore, the soldering process must be conducted with great care so as to prevent malfunction of the components due to excessive thermal shock.
   - Use a 30W soldering iron with a maximum tip diameter of 3.0mm.
   - The soldering iron should not directly touch the products.

   **Technical considerations**

   ◆ Soldering
   Refer to individual specifications.