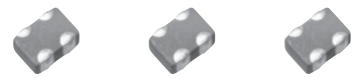


Multilayer Varistor for ESD pulse [2 Array Type for high speed signal lines]

Series: **EZJZS**



Features

- Excellent ESD suppression due to original advanced material technology
- Having large electrostatic resistance meeting IEC61000-4-2, Level 4 standard
- Having no polarity (bipolar) facilitated replacing Zener Diodes. Capable of replacing 2 Zener Diodes and 1 Capacitor
- 2 Array per package for multiple lines
- Lead-free terminal electrodes enabled great solderability
- Wide range of products is available by adopting multilayer structure, meeting various needs.
- Ultra low capacitance for signal lines of high speed busses
- Ideal for USB 2.0, IEEE1394, and HDMI high speed data busses
- RoHS compliant

As for Packaging Methods, Handling Precautions

Please see Data Files

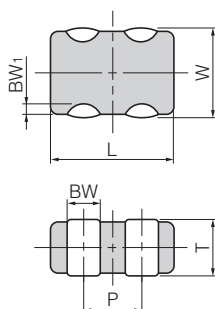
Explanation of Part Numbers

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------------|------------------------|---|--------------------------|---|---|---|---|---|---|----|----|-----------|-----------|---|------------|---|------------|---|------------|---|------------|---|------------|---|------------|---|-------------|-----|-----------------------|---|------------------------|---|------------------------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | (Example) | | | | | | | | | | | | | | | | | | | | | |
| E | Z | J | Z | S | V | 2 | 7 | 0 | E | A | | | | | | | | | | | | | | | | | | | | | | | |
| Product Code | | | Series Code | | | Nominal Varistor Voltage | | | Design Code | | | | | | | | | | | | | | | | | | | | | | | | |
| Size Code | | | Packaging Style Code | | | Capacitance Code | | | Design Code | | | | | | | | | | | | | | | | | | | | | | | | |
| S 0504 2 Array Type | | | V 2 Array Paper Taping | | | The first and second digits denote the first 2 figures of varistor voltage and the third digit indicates the number of zeros following. | | | <table border="1"> <tr><td>A</td><td>3 pF max.</td></tr> <tr><td>R</td><td>20 pF max.</td></tr> <tr><td>D</td><td>27 pF max.</td></tr> <tr><td>P</td><td>33 pF max.</td></tr> <tr><td>S</td><td>39 pF max.</td></tr> <tr><td>T</td><td>43 pF max.</td></tr> <tr><td>E</td><td>47 pF max.</td></tr> <tr><td>J</td><td>220 pF max.</td></tr> </table> <table border="1"> <tr><td>Nil</td><td>Cap. Tolerance : max.</td></tr> <tr><td>K</td><td>Cap. Tolerance : ±10 %</td></tr> <tr><td>M</td><td>Cap. Tolerance : ±20 %</td></tr> </table> | | | A | 3 pF max. | R | 20 pF max. | D | 27 pF max. | P | 33 pF max. | S | 39 pF max. | T | 43 pF max. | E | 47 pF max. | J | 220 pF max. | Nil | Cap. Tolerance : max. | K | Cap. Tolerance : ±10 % | M | Cap. Tolerance : ±20 % |
| A | 3 pF max. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| R | 20 pF max. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| D | 27 pF max. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| P | 33 pF max. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| S | 39 pF max. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| T | 43 pF max. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| E | 47 pF max. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| J | 220 pF max. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Nil | Cap. Tolerance : max. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| K | Cap. Tolerance : ±10 % | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| M | Cap. Tolerance : ±20 % | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Construction

| No. | Name |
|-----|-------------------------|
| ① | Semiconductive Ceramics |
| ② | Internal electrode |
| ③ | Substrate electrode |
| ④ | Terminal electrode |
| ⑤ | External electrode |

Dimensions in mm (not to scale)



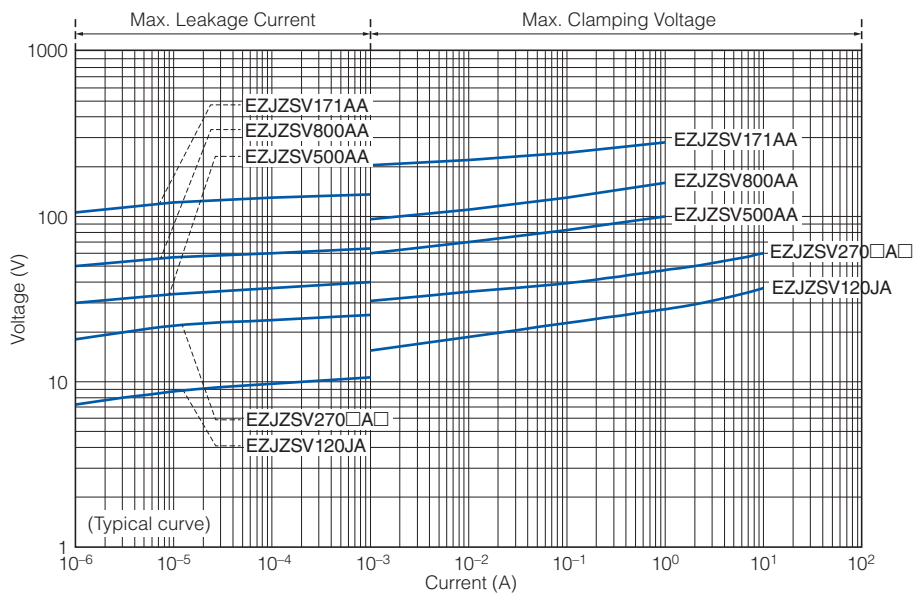
| Size(inch) | L | W | T | BW | BW ₁ | P |
|-------------------|-----------|---------|--|-----------|-----------------|-----------|
| 0504 (2 Array) | 1.37±0.15 | 1.0±0.1 | 0.60 ^{+0.06} _{-0.10} | 0.36±0.10 | 0.2±0.1 | 0.64±0.10 |

Ratings and Characteristics

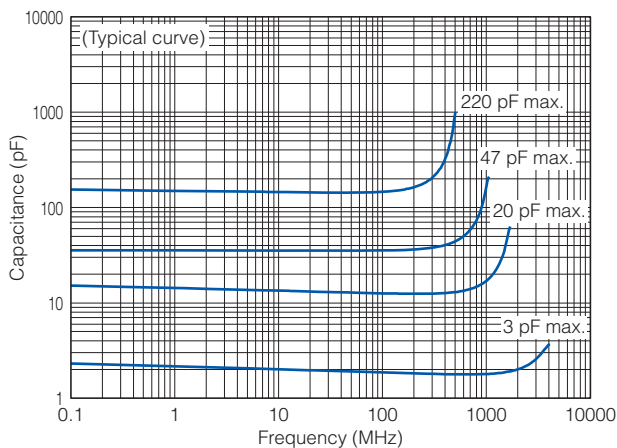
| Size | Part No. | Maximum allowable voltage DC (V) | Nominal varistor voltage at 1mA (V) | Capacitance (pF) | | Maximum peak current at 8/20 μ s, 2times (A) | Maximum ESD IEC61000-4-2 |
|-------------------|--------------|----------------------------------|-------------------------------------|---------------------------|-----------|--|---------------------------|
| | | | | at 1MHz | at 1kHz | | |
| 0504 (2 Array) | EZJZSV120JA | 6.7 | 12 | 220 max. [150 typ.] | 175 typ. | 5 | Contact discharge 8 kV |
| | EZJZSV270EA | 16 | 27 | 47 max. [33 typ.] | 37 typ. | 5 | |
| | EZJZSV270RA | 16 | 27 | 20 max. [15 typ.] | 16.5 typ. | 3 | |
| | EZJZSV270DA□ | 16 | 27 | 27 \pm 10 %/ \pm 20 % | 30 typ. | 5 | |
| | EZJZSV270PA□ | 16 | 27 | 33 \pm 10 %/ \pm 20 % | 37 typ. | 5 | |
| | EZJZSV270SA□ | 16 | 27 | 39 \pm 10 %/ \pm 20 % | 43 typ. | 5 | |
| | EZJZSV270TA□ | 16 | 27 | 43 \pm 10 %/ \pm 20 % | 47 typ. | 5 | |
| | EZJZSV270EA□ | 16 | 27 | 47 \pm 10 %/ \pm 20 % | 52 typ. | 5 | |
| | EZJZSV500AA | 5 | 50 | 3 max. [2.1 typ.] | — | — | |
| | EZJZSV800AA | 18 | 80 | 3 max. [2.1 typ.] | — | — | |
| EZJZSV171AA | 18 | 170 | 3 max. [2.1 typ.] | — | — | | |

- Operating Temperature Range: -40 to 85 °C
- * □ : Capacitance Tolerance Code K: \pm 10 %, M: \pm 20 %
- * Avoid flow soldering.

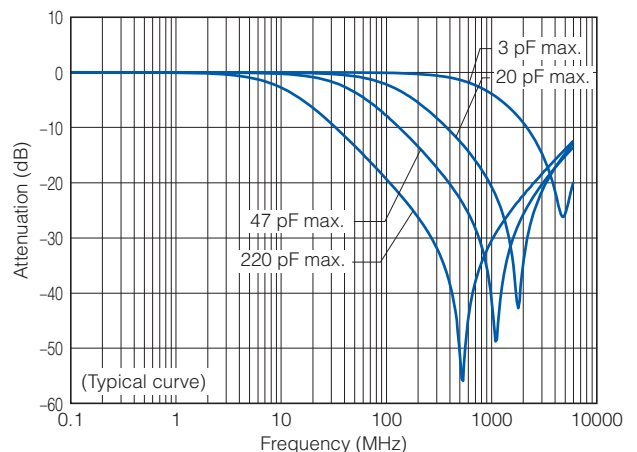
Voltage vs. Current



Frequency vs. Capacitance

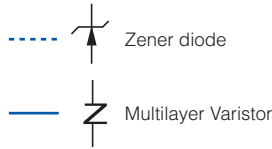
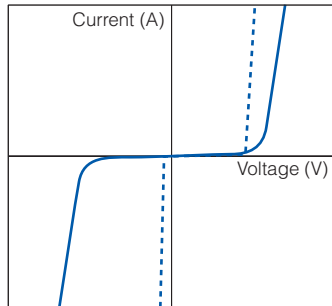


Attenuation vs. Frequency

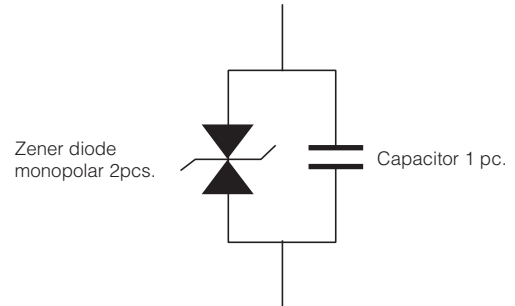


Varistor Characteristics and Equivalent Circuit

A Multilayer Varistor does not have an electrical polarity like zener diodes and is equivalent to total 3 pcs. of 2 zener diodes and 1 capacitor.



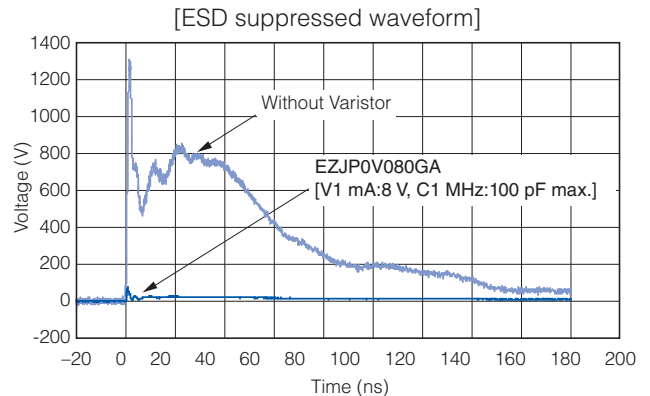
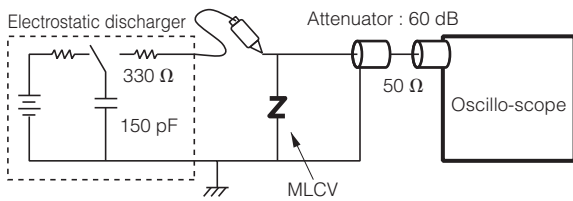
[Equivalent Circuit]



ESD Suppressive Effects

Typical effects of ESD suppression

Test conditions: IEC61000-4-2* Level 4 Contact discharge, 8 kV

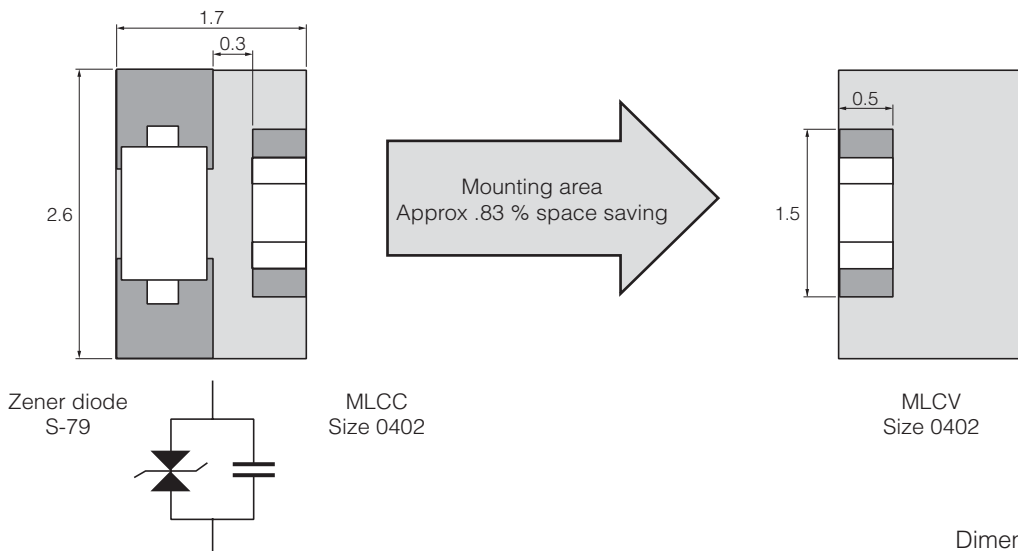


* IEC61000-4-2 ... International Standard of the ESD testing method (HBM) for electronic equipment ability to withstand ESD generated from a human body. It sets 4 levels of severity

| Severity | Level 1 | Level 2 | Level 3 | Level 4 |
|-------------------|---------|---------|---------|---------|
| Contact discharge | 2 kV | 4 kV | 6 kV | 8 kV |
| Air discharge | 2 kV | 4 kV | 8 kV | 15 kV |

Replacement of Zener diode

Replacing "Zener diode and Capacitor" with Multilayer Varistor saves both the mounting area and number of components used.



Dimensions in mm

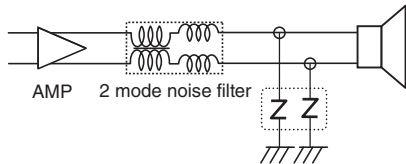
Recommended Applications

| Applications | Series | Circuit | Series | | | |
|--|----------------|---|---|----|----|--|
| | | | DC | 1k | 1M | 1G (Hz) |
| Mobile phones, DSC, PC, PDA, HDD TV (PDP, LC etc.), DVD, DVC, Game consoles, Audio equipment | Series EZJZ, P | Ultra low capacitance (Cap. : 3 pF or less) | [Bar chart showing high performance across all frequencies] | | | DC to GHz Antenna, RF circuit, LVDS, USB, IEEE1394, HDMI etc. |
| | | Low capacitance (Cap. : 20 to 680 pF) | [Bar chart showing high performance at low frequencies] | | | DC to tens of Hz PWR, SW, Audio terminals, LCD, RS232C, etc. |
| PWR, Photoelectric sensors, SSR, Motors, Pressure sensors, Proximity switches | Series EZJS | High capacitance (Cap. : 1800 to 22000 pF) | [Bar chart showing high performance at low frequencies] | | | DC to several kHz PWR, SW, Audio terminals etc. |

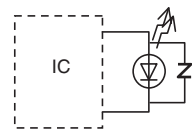
Applications

● Mobile Phone

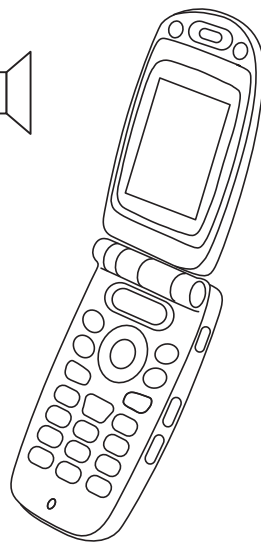
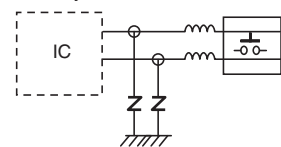
· Audio lines



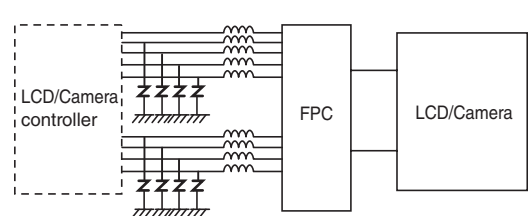
· LED



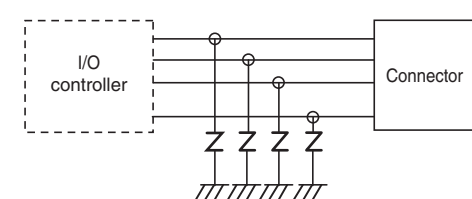
· SW/Keyboard



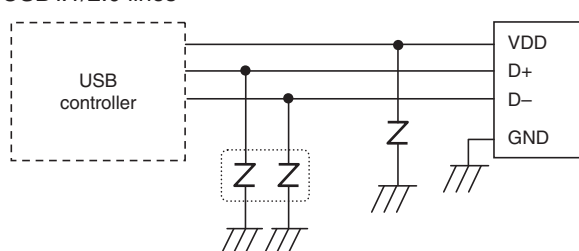
· LCD/Camera lines



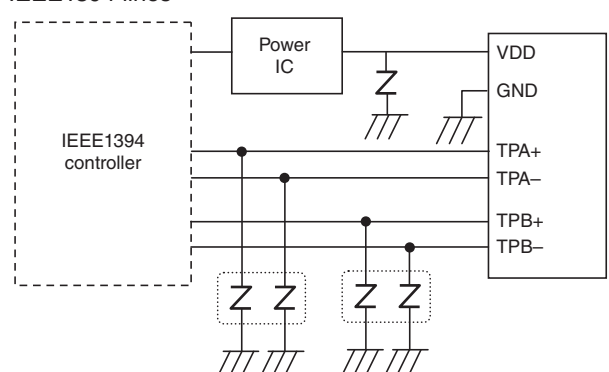
· I/O data lines



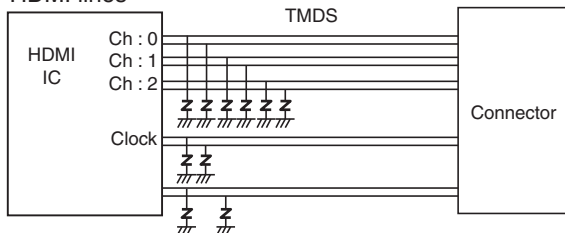
● USB1.1/2.0 lines



● IEEE1394 lines



● HDMI lines



Performance and Testing Methods

| Characteristics | Specifications | Testing Method | | | | | | | | | | | | | | | |
|--------------------------------------|--|--|------|-------------|--------|---|----------------------|----------------|---|----------------|------------|---|----------------------|----------------|---|----------------|------------|
| Standard test conditions | | Electrical characteristics shall be measured under the following conditions. Temp. : 5 to 35 °C, Relative humidity : 85 % or less | | | | | | | | | | | | | | | |
| Varistor voltage | To meet the specified value. | The Varistor voltage is the voltage (V_c , or V_{cMA}) between both end terminals of a Varistor when specified current (C_{mA}) is applied to it. The measurement shall be made as quickly as possible to avoid heating effects. | | | | | | | | | | | | | | | |
| Maximum allowable voltage | To meet the specified value. | The maximum DC voltage that can be applied continuously to a varistor | | | | | | | | | | | | | | | |
| Capacitance | To meet the specified value. | Capacitance shall be measured at the specified frequency, bias voltage 0 V, and measuring voltage 0.2 to 2 Vrms. | | | | | | | | | | | | | | | |
| Maximum peak current | To meet the specified value. | The maximum current measured (Varistor voltage tolerance is within $\pm 10\%$) when a standard impulse current of 8/20 μ seconds is applied twice with an interval of 5 minutes. | | | | | | | | | | | | | | | |
| Maximum ESD | To meet the specified value. | The maximum ESD measured (while the varistor voltage is within $\pm 30\%$ of its nominal value) when exposed to ESD 10 times (five times for each positive-negative polarity) based on IEC61000-4-2. | | | | | | | | | | | | | | | |
| Solder ability | To meet the specified value. | The part shall be immersed into a soldering bath under the conditions below. Solder: H63A Soldering flux : Ethanol solution of rosin (Concentration approx. 25 wt%) Soldering temp. : 230 \pm 5 °C Period : 4 \pm 1 s Soldering position: Immerse both terminal electrodes until they are completely into the soldering bath. | | | | | | | | | | | | | | | |
| Resistance to soldering heat | $\Delta V_c / V_c$: within $\pm 10\%$ | After the immersion, leave the part for 24 \pm 2 hours under the standard condition, then evaluate its characteristics. Soldering conditions are specified below: Soldering conditions : 270 °C, 3 s / 260 °C, 10 s Soldering position : Immerse both terminal electrodes until they are completely into the soldering bath. | | | | | | | | | | | | | | | |
| Temperature cycling | $\Delta V_c / V_c$: within $\pm 10\%$ | After repeating the cycles stated below for specified number of times, leave the part for 24 \pm 2 hours, then evaluate its characteristics. Cycle : 5 cycles <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Step</th> <th>Temperature</th> <th>Period</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Max. Operating Temp.</td> <td>30\pm3 min</td> </tr> <tr> <td>2</td> <td>Ordinary temp.</td> <td>3 min max.</td> </tr> <tr> <td>3</td> <td>Min. Operating Temp.</td> <td>30\pm3 min</td> </tr> <tr> <td>4</td> <td>Ordinary temp.</td> <td>3 min max.</td> </tr> </tbody> </table> | Step | Temperature | Period | 1 | Max. Operating Temp. | 30 \pm 3 min | 2 | Ordinary temp. | 3 min max. | 3 | Min. Operating Temp. | 30 \pm 3 min | 4 | Ordinary temp. | 3 min max. |
| Step | Temperature | Period | | | | | | | | | | | | | | | |
| 1 | Max. Operating Temp. | 30 \pm 3 min | | | | | | | | | | | | | | | |
| 2 | Ordinary temp. | 3 min max. | | | | | | | | | | | | | | | |
| 3 | Min. Operating Temp. | 30 \pm 3 min | | | | | | | | | | | | | | | |
| 4 | Ordinary temp. | 3 min max. | | | | | | | | | | | | | | | |
| Biased Humidity | $\Delta V_c / V_c$: within $\pm 10\%$ | After conducting the test under the conditions specified below, leave the part 24 \pm 2 hours, then evaluate its characteristics. Temp. : 40 \pm 2 °C Humidity : 90 to 95 %RH Applied voltage : Maximum allowable voltage (Individually specified) Period : 500+24 / 0 h | | | | | | | | | | | | | | | |
| High temperature exposure (dry heat) | $\Delta V_c / V_c$: within $\pm 10\%$ | After conducting the test under the conditions specified below, leave the part 24 \pm 2 hours, then evaluate its characteristics. Temp. : Maximum operating temperature ± 3 °C (Individually specified) Applied voltage : Maximum allowable voltage (Individually specified) Period : 500+24 / 0h | | | | | | | | | | | | | | | |