

Multilayer Varistor for Automotive

Series: **EZJP**



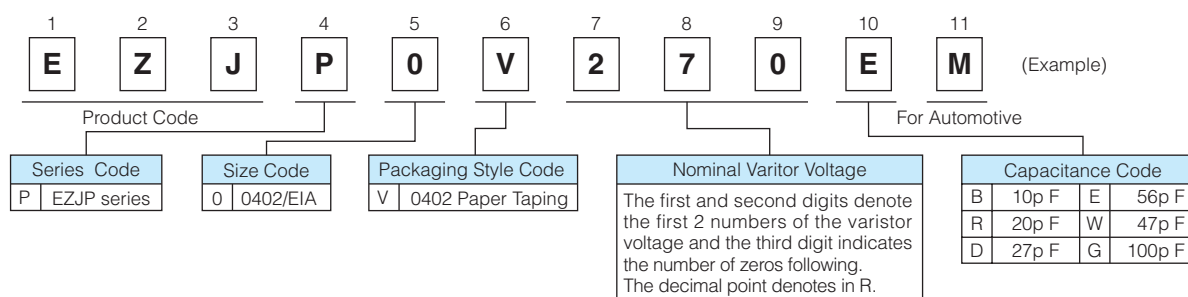
Features

- Excellent ESD suppression due to original advanced material technology
- Having large electrostatic resistance meeting IEC61000-4-2, ISO10605
- Having no polarity (bipolar) facilitated replacing Zener Diodes. Capable of replacing 2 Zener Diodes and 1 Capacitor.
- Lead-free plating terminal electrodes enabling great solderability
- Wide range of products is available by adopting multilayer structure, meeting various needs.
- AEC-Q200 qualified
- RoHS compliant

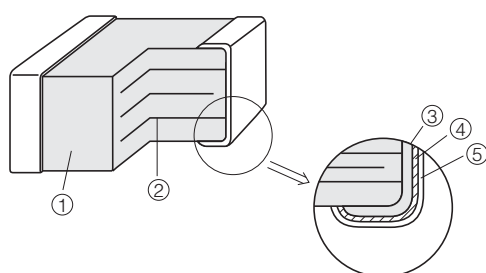
As for Packaging Methods, Handling Precautions

Please see Data Files

Explanation of Part Numbers

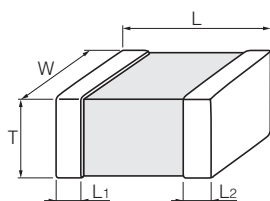


Construction



No.	Name	
①	Zinc oxide-based ceramics	
②	Internal electrode	
③	Terminal electrode	Substrate electrode
④		Intermediate electrode
⑤		External electrode

Dimensions in mm (not to scale)

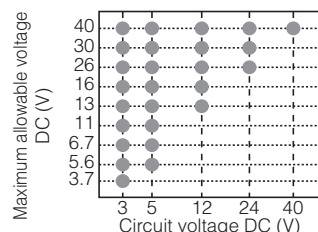


Size Code	Size(inch)	L	W	T	L ₁ , L ₂
0	0402/EIA	1.00±0.05	0.50±0.05	0.50±0.05	0.2±0.1

Features

Wide variety of products is available by adopting multilayer construction, which achieved wide range of usage, such as application to DC voltage lines and signal lines.

● Circuit voltage



- Varistor voltage : 27 to 65 V [at 1m A]
- Capacitance : 10 to 100p F max. [at 1M Hz]

Recommended Applications

- Engine ECU
- Various body ECU
- Communication line, such as CAN, LIN
- Audio, Navigation
- LED Light
- Control SW

Ratings and Characteristics

Size	Part No.	Maximum allowable voltage DC (V)	Nominal varistor voltage at 1m A (V)	Capacitance (pF)		Maximum peak current at 8/20μs, 2 times (A)	Maximum ESD	
				at 1M Hz	at 1k Hz		IEC61000-4-2 150p F/ 330 Ω	ISO10605 330p F/ 2k Ω
0402 /EIA	EZJP0V270GM	18	27	100 max. [85 typ.]	100 typ.	10	Contact discharge 8k V	Contact discharge 25k V
	EZJP0V270EM	18	27	47 max. [33 typ.]	37 typ.	4		
	EZJP0V270RM	18	27	20 max. [15 typ.]	16.5 typ.	1		
	EZJP0V270BM	18	27	10 max. [8 typ.]	10 typ.	–		
	EZJP0V330GM	25	33	100 max. [85 typ.]	100 typ.	10		
	EZJP0V420WM	30	42	56 max. [40 typ.]	45 typ.	6		
	EZJP0V650DM	40	65	27 max. [22 typ.]	33 typ.	2		

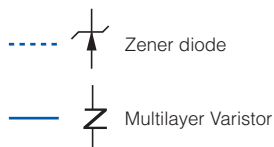
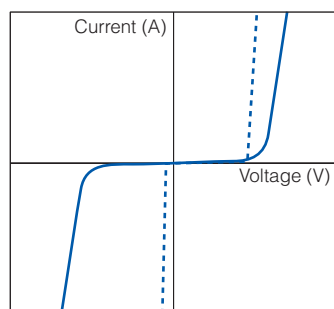
- Operating Temperature Range: –55 to 150 °C

* Recommend soldering method : Reflow soldering

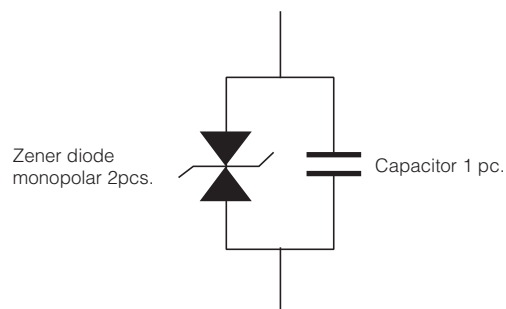
Maximum Allowable Voltage	Maximum DC Voltage that can be applied continuously within the operating temperature range
Varistor Voltage	Varistor starting voltage between terminals at DC 1 mA, also known as Breakdown voltage
Maximum Peak Current	Maximum current that can be withstood under the standard pulse 8/20 μs, 2 times based
Maximum ESD	Maximum voltage that can be withstood under ESD

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.



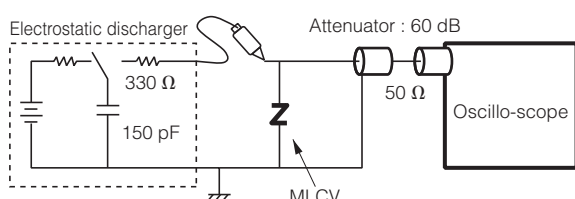
[Equivalent Circuit]



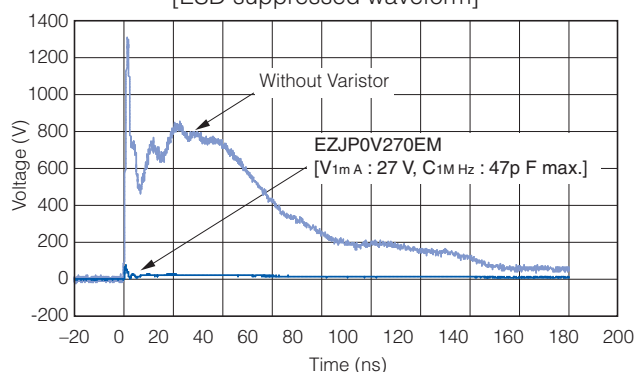
ESD Suppressive Effects

Typical effects of ESD suppression

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



[ESD suppressed waveform]

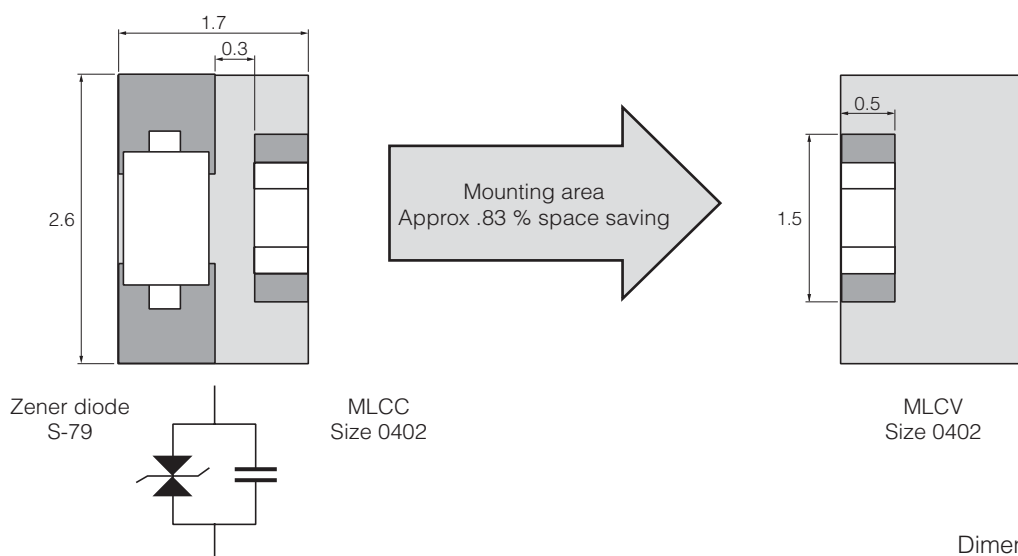


* IEC61000-4-2 ... International Standard of the ESD testing method (HBM) for electronic equipment ability to withstand ESD generated from a human body. It sets 4 levels of severity

Severity	Level 1	Level 2	Level 3	Level 4
Contact discharge	2k V	4k V	6k V	8k V
Air discharge	2k V	4k V	8k V	15k V

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

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_o or V_{cmA}) between both end terminals of a Varistor when specified current (CmA) 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 ± 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 ± 30 % of its nominal value) when exposed to ESD 10 times (five times for each positive-negative polarity) based on IEC61000-4-2, ISO10605.															
Solder ability	To meet the specified value.	The part shall be immersed into a soldering bath under the conditions below. Solder : Sn-Ag-Cu 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 ± 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 ± 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 : 2000 cycle <table border="1"> <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$\pm$3 min</td></tr> <tr> <td>2</td><td>Ordinary temp.</td><td>3 min max.</td></tr> <tr> <td>3</td><td>Min. Operating Temp.</td><td>30$\pm$3 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.
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Vibration	$\Delta V_c / V_c$: within ± 10 %	The varistor shall be soldered on the testing board shown in Fig.3. G force : 5 G Vibration frequency range : 10 to 2000 Hz Sweet time : 20 min. Sweet direction : 12 cycles for 3 courses perpendicular each other															
Mechanical Shock	$\Delta V_c / V_c$: within ± 10 %	The varistor shall be soldered on the testing board shown in Fig.3. Shock-wave formation : Half sine G force : 50 G Shock direction : 6 directions of X, Y, Z, for each three times															
Biased Humidity	$\Delta V_c / V_c$: within ± 10 %	After conducting the test under the conditions specified below, leave the part 24 $\pm$ 2 hours, then evaluate its characteristics. Temp. : 85 $\pm$ 2 °C Humidity : 80 to 85 %RH Applied voltage : Maximum allowable voltage (Individually specified) Period : 2000+24 / 0 h															
High temperature exposure (dry heat)	$\Delta V_c / V_c$: within ± 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 : 2000+24 / 0 h															

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