Multilayer Varistor for ESD pulse

Series **EZJS** : For Power line
(ST:Strontium Titanate) (High capacitance)

■ Features

- Multilayer monolithic ceramic construction
- Excellent solderability and superior heat resistance
- Large surge current and energy capabilities in withstanding small size.

● Series EZJS

- Multilayer varistor of Strontium Titanate ceramic suppresses the pulse noise, especially high frequency noise(ESD, burst-noise) and protects the equipment from the transient surge.
- This Varistor is suitable for low-frequency signal circuit power and audio signal line due to large capacitance.

■ Precautions for Handling

see Page 112 to 118

■ Packing method

see Page 111, 182

■ Explanation of Part Numbers

1	2	3	4	5	6	7	8	9	10	11	12	
E	Z	J	S	2	V	B	2	2	3			(Example)

Product Code (Multilayer Varistor) — Design No.

Series code
(ST)

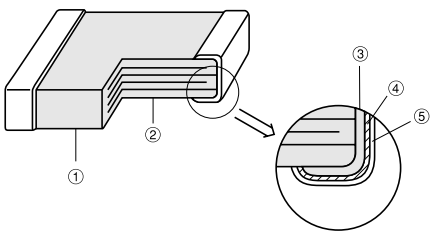
Size Code	
1	0603 (1608)
2	0805 (2012)

Packaging Style	
V	Paper Taping
Y	Embossed Taping

Maximum Allowable voltage	
B	DC 6 V
C	DC 18 V
D	DC 30 V

Capacitance
The first digitits are significant figures and the third one denotes the number of zeros following.

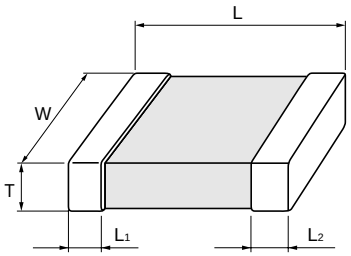
■ Construction



No	Name	
①	Semiconductive Ceramics	
②	Inner electrode	
③	Electrode	Substrate electrode
④		Intermediate electrode
⑤		External electrode

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use.
Should a safety concern arise regarding this product, please be sure to contact us immediately.

■ Dimmension in mm(not to scale)



(Unit:mm)

Size Code (EIA)	Part Numbers	L	W	T	L1, L2
0603	EZJS1□□□□□	1.60±0.15	0.8±0.1	0.8±0.1	0.3±0.2
0805	EZJS2VB223	2.0±0.2	1.25±0.20	0.8±0.2	0.50±0.25
	EZJS2VB822			1.25±0.20	
	EZJS2YD472				

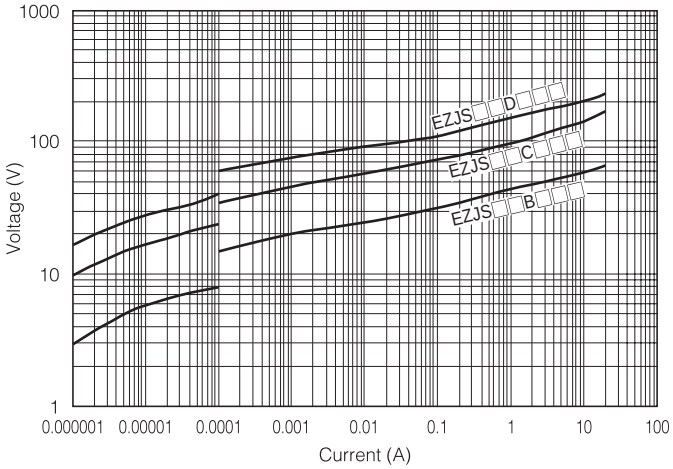
■ Ratings and Characteristics

Size Code (EIA)	Part No.	Maximum Allowable Voltage	Varistor Voltage @ 1mA	Capacitance @ 1 kHz	Maximum ESD IEC61000-4-2
0603	EZJS1VB822	DC 6 V	12 V	8200 pF	Contact Discharge Voltage: 30 kV
	EZJS1VC392	DC 18 V	30 V	3900 pF	
	EZJS1VD182	DC 30 V	50 V	1800 pF	
0805	EZJS2VB223	DC 6 V	12 V	22000 pF	
	EZJZ2YC822	DC 18 V	30 V	8200 pF	
	EZJS2YD472	DC 30 V	50 V	4700 pF	

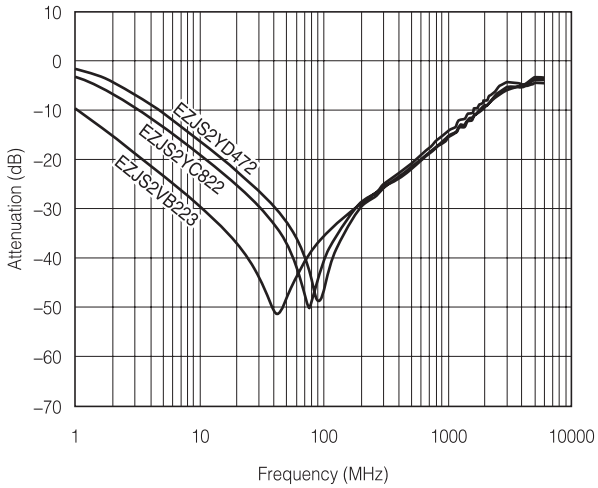
● Operating Temperature Range: -40 to 85 °C

■ Typical Characteristics

● Voltage vs. Current



■ Frequency Characteristics



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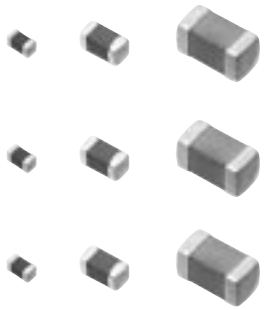
Multilayer Varistor for ESD pulse

Series **EZJZ** : For high speed signal line
(ZnO:Zinc Oxide) (Small capacitance)



■ Features

- Multilayer monolithic ceramic construction
- Excellent solderability and superior heat resistance
- Large surge current and energy capabilities in withstanding small size.

● Series EZJZ

- Multilayer varistor of Zinc oxide ceramic. suppresses the pulse noise(ESD, burst-noise) and protects the equipment from the transient surge.
- This Varistor is suitable for high-speed signal line due to small capacitance.

■ Precautions for Handling

see Page 112 to 118

■ Packing method

see Page 111, 182

■ Explanation of Part Numbers

1	2	3	4	5	6	7	8	9	10	11	12	
E	Z	J	Z	1	V	2	7	0	G	A		(Example)

Product Code (Multilayer Varistor)

Design No.

Series code
ZnO

Size Code	
Z	0201(0603)
0	0402(1005)
1	0603(1608)

Packaging Style	
V	Paper Taping

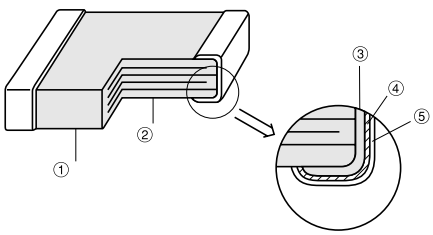
Nomiral Varistor voltage
The first digitits are significant figures and the third one denotes the number of zeros following.

Capacitance Code	
A	3 pF max.
R	20 pF max.
C	22 pF max.
D	27 pF max.
P	33 pF max.
S	39 pF max.
T	43 pF max.
E	47 pF max.
G	100 pF max.
J	220 pF max.
K	330 pF max.

✻Below 3 pF displays 2 figures a top using the 10 or 11th figure.
Ex. 2.0 pF·····20, 1.5 p·····F15

Design No.	
Nil	Cap. Tolerance : max.
C	Cap. Tolerance : ±0.25 pF
D	Cap. Tolerance : ±0.50 pF
K	Cap. Tolerance : ±10 %
M	Cap. Tolerance : ±20 %

■ Construction



No	Name	
①	Semiconductive Ceramics	
②	Inner electrode	
③	Electrode	Substrate electrode
④		Intermediate electrode
⑤		External electrode

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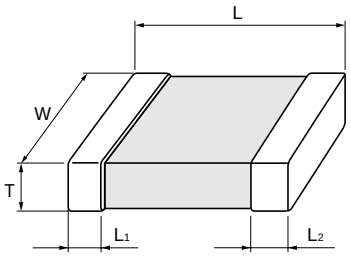
■ Dimmension in mm(not to scale)



(Unit:mm)

Size Code (EIA)	Part Numbers	L	W	T	L1, L2
0201	EZJZZ□□□□□A	0.60±0.03	0.30±0.03	0.30±0.03	0.15±0.05
0402	EZJZ0□□□□□A	1.00±0.50	0.50±0.05	0.50±0.05	0.2±0.1
0603	EZJZ1□□□□□A	1.6±0.1	0.8±0.1	0.8±0.1	0.3±0.2

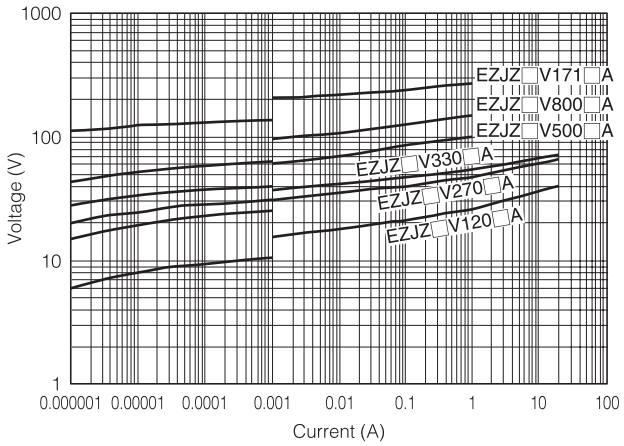
■ Ratings and Characteristics

Type	Size Code (EIA)	Part No.	Maximum Allowable Voltage	Varistor Voltage @ 1mA	Capacitance @ 1 MHz	Maximum Peak Current @ 8/20 μs	Maximum ESD IEC61000-4-2
Ultra low capacitance	0201	EZJZZV800AA	DC 5 V	80 V	3 pF max.	———	Contact Discharge Voltage: 8 kV Air Gap Discharge Voltage: 15 kV
	0402	EZJZ0V80015D	DC 5 V	80 V	1.5±0.5 pF	———	
		EZJZ0V500AA	DC 5 V	50 V	3 pF max.	———	
		EZJZ0V800AA	DC 18 V	80 V	3 pF max.	———	
		EZJZ0V171AA	DC 18 V	170 V	3 pF max.	———	
	0603	EZJZ1V500AA	DC 5 V	50 V	3 pF max.	———	
		EZJZ1V800AA	DC 18 V	80 V	3 pF max.	———	
		EZJZ1V171AA	DC 18 V	170 V	3 pF max.	———	
Low capacitance	0201	EZJZZV120EA	DC 6.7 V	12 V	47 pF max.	1 A	
		EZJZZV270RA	DC 16 V	27 V	20 pF max.	1 A	
	0402	EZJZ0V120JA	DC 6.7 V	12 V	220 pF max.	10 A	
		EZJZ0V270RA	DC 16 V	27 V	20 pF max.	3 A	
		EZJZ0V270EA	DC 16 V	27 V	47 pF max.	10 A	
	0603	EZJZ1V120KA	DC 6.7 V	12 V	330 pF max.	20 A	
		EZJZ1V270GA	DC 16 V	27 V	100 pF max.	20 A	
		EZJZ1V330GA	DC 26 V	33 V	100 pF max.	20 A	

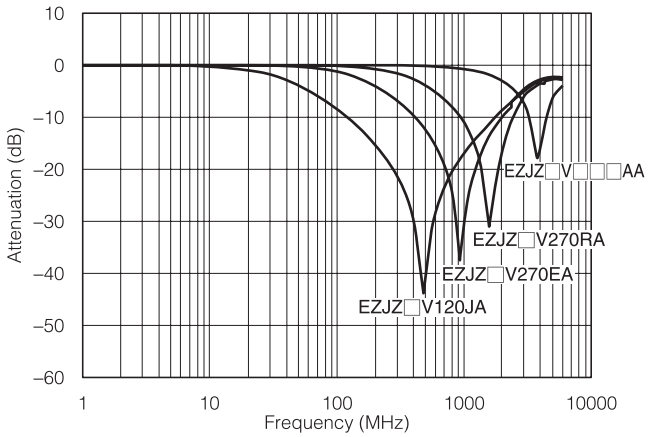
● Operating Temperature Range: -40 to 85 °C

■ Typical Characteristics

● Voltage vs. Current



■ Frequency Characteristics



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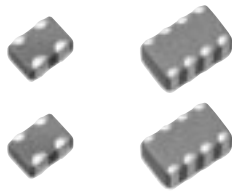
Multilayer Varistor for ESD pulse

Series **EZJZS**
Series **EZJZR**



■ Features

- Multilayer monolithic ceramic construction
- Excellent solderability and superior heat resistance
- Large surge current and energy capabilities in withstanding small size.

● Series EZJZS, R

- Multilayer varistor of Zinc oxide ceramic. suppresses the pulse noise(ESD, burst-noise) and protects the equipment from the transient surge.
- This Varistor is suitable for high-speed signal line due to small capacitance.
-

■ Precautions for Handling

see Page 112 to 118

■ Packing method

see Page 111, 182

■ Explanation of Part Numbers

1	2	3	4	5	6	7	8	9	10	11	12	
E	Z	J	Z	S	V	2	7	0	E	A	K	(Example)

Product Code (Multilayer Varistor)

Design No.

Series code
ZnO

Size Code	
S	2 Array Type
R	4 Array Type

Packaging Style	
V	Paper Taping

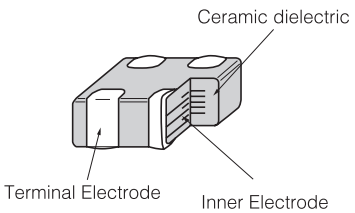
Nomiral Varistor voltage
The first digitits are significant figures and the third one denotes the number of zeros following.

Capacitance Code	
D	27 pF max.
P	33 pF max.
S	39 pF max.
T	43 pF max.
E	47 pF max.

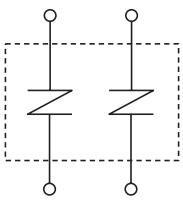
Design No.	
Nil	Cap. Tolerance : max.
K	Cap. Tolerance : ±10 %
M	Cap. Tolerance : ±20 %

■ Construction

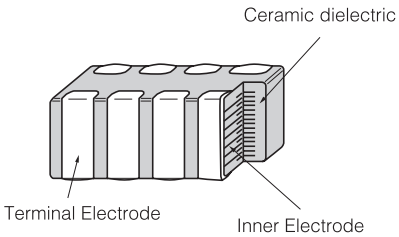
[2 Array Type]



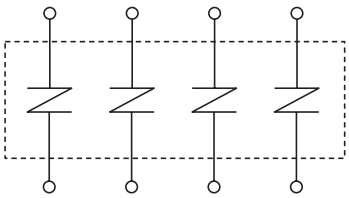
Schematic



[4 Array Type]



Schematic



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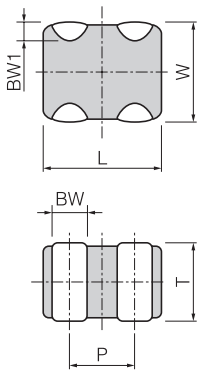
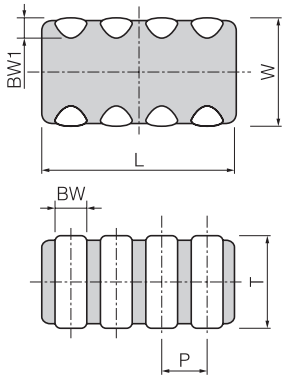
■ Dimmension in mm(not to scale)

[2 Array Type]



[4 Array Type]



(Unit:mm)

Type	Part Numbers	L	W	T	BW	BW1	P
2 Array Type	EZJZS□□□□□A	1.37±0.15	1.0±0.1	0.60±0.06	0.36±0.10	0.2±0.1	0.64±0.10
4 Array Type	EZJZR□□□□□A	2.00±0.15	1.25±0.15	0.85±0.10	0.25±0.10	$0.2^{+0.3}_{-0.1}$	0.5±0.1

■ Ratings and Characteristics

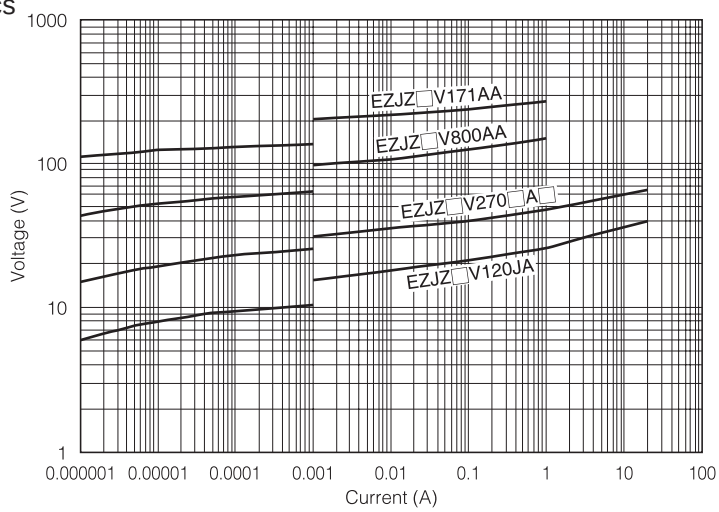
Type	Size Code (EIA)	Prat Numbers	Maximum Allowable Voltage	Varistor Voltage @ 1mA	Capacitance @ 1MH z	Maximum Peak Current @8/20 μs	Maximum ESD IEC61000-4-2
2 Array Type	0504	EZJZSV120JA	DC 6.7 V	12 V	220 pF max.	5 A	Contact Discharge Voltage: 8 kV Air Gap Discharge Voltage:15 kV
		EZJZSV270RA	DC 16 V	27 V	20 pF max.	3 A	
		EZJZSV270EA	DC 16 V	27 V	47 pF max.	5 A	
		EZJZSV800AA	DC 18 V	80 V	3 pF max.	———	
		EZJZSV171AA	DC 18 V	170 V	3 pF max.	———	
4 Array Type	0805	EZJZRV120JA	DC 6.7 V	12 V	220 pF max.	5 A	
		EZJZRV270RA	DC 16 V	27 V	20 pF max.	3 A	
		EZJZRV270EA	DC 16 V	27 V	47 pF max.	5 A	
		EZJZRV800AA	DC 18 V	80 V	3 pF max.	———	
		EZJZRV171AA	DC 18 V	170 V	3 pF max.	———	

Type	Size Code (EIA)	Prat Numbers	Maximum Allowable Voltage	Varistor Voltage @ 1mA	Capacitance @ 1MH z	Maximum Peak Current @8/20 μs	Maximum ESD IEC61000-4-2
2 Array Capacitance Control Type	0504	EZJZSV270DA□	DC 16 V	27 V	27 pF	5 A	Contact Discharge Voltage: 8 kV Air Gap Discharge Voltage:15 kV
		EZJZSV270PA□			33 pF		
		EZJZSV270SA□			39 pF		
		EZJZSV270TA□			43 pF		
		EZJZSV270EA□			47 pF		

- Operating Temperature Range: -40 to 85 °C
- □:Capacitance Tolerance Code (K:±10 %, M:±20 %)

■ Typical Characteristics

- Voltage vs. Current



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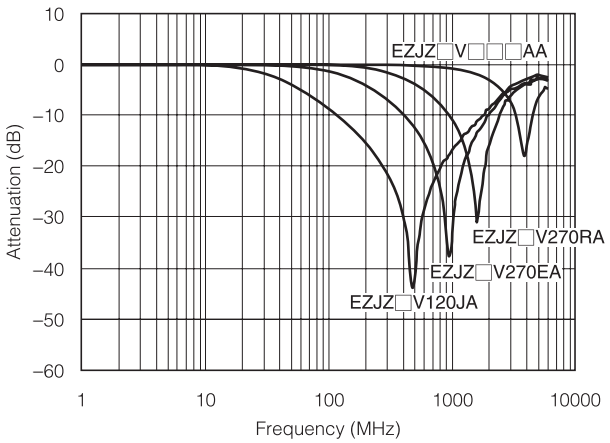
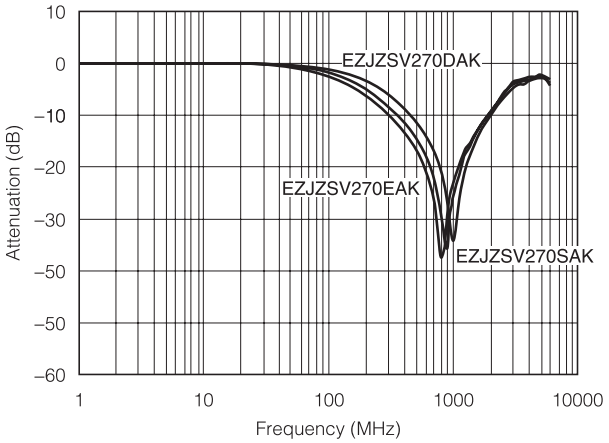
■ Frequency Characteristics





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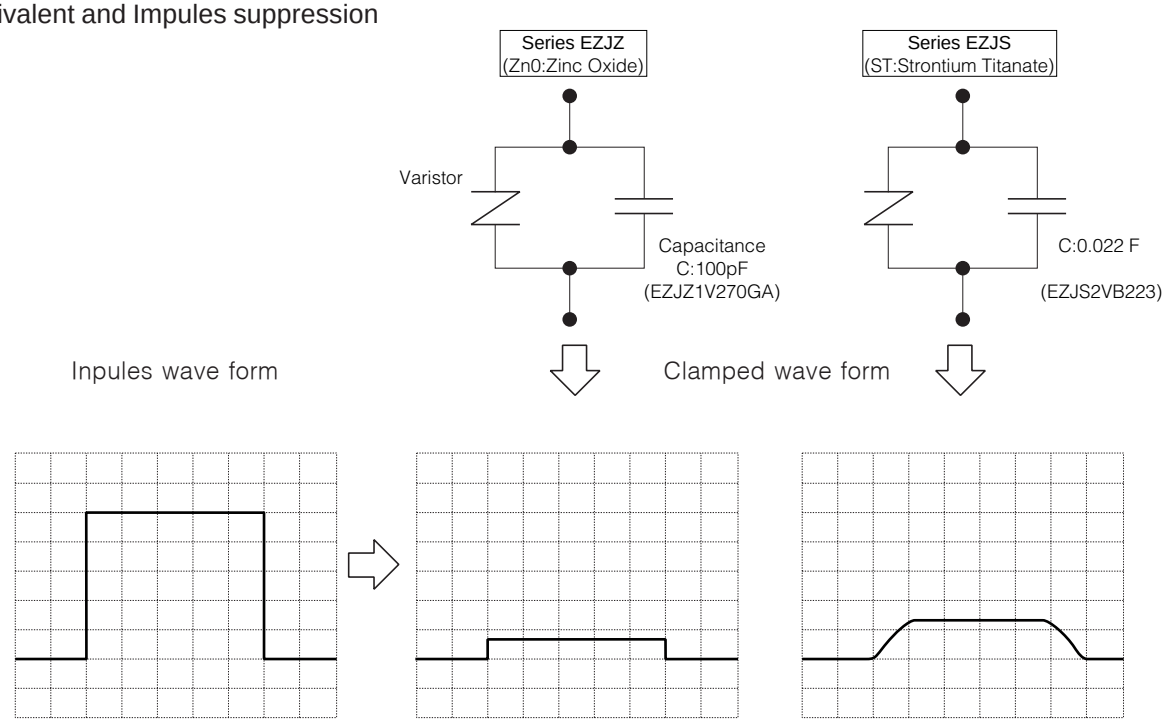
■ Recommended Applications

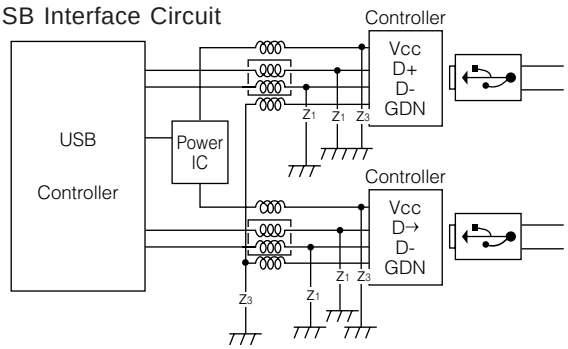
Applications Examples		Series		Recommended Applications (DC 1k 1M 1G (Hz))	
PC mother board HDD CD-ROM DSC	Photoelectric sensor Proximity sensor Pressure switch Flowmeter	Series EZJZ	Ultra low capacitance (3 pF max.)		DC to some tens of GHz Power, Relay. signal line High frequency circuit (USB,IEEE1394,etc)
			Low capacitance (20 to 330 pF)		DC to some tens of GHz Power, Relay. signal line High frequency circuit (RC232C,etc)
Cellular teleptone, PHS PDA	SSR motor	Series EZJS	High capacitance (1800 to 22000 pF)		DC to some hunderds of kHz Power, Relay. Audio signal

■ Equivalent and Impules suppression

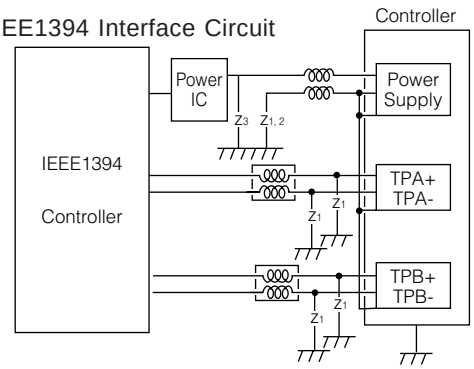


■ Typical circuits requiring protection

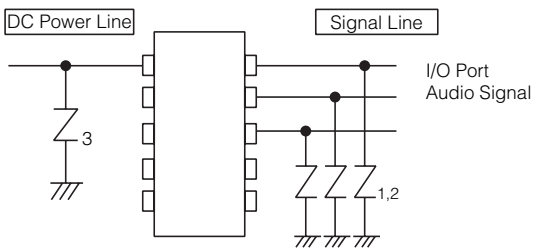
● USB Interface Circuit



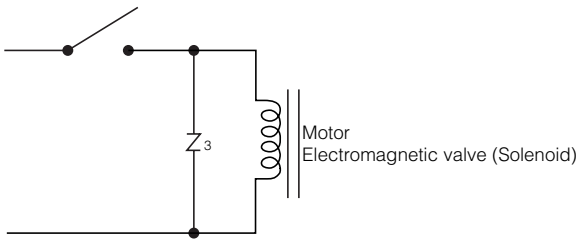
● IEEE1394 Interface Circuit



● IC Protection



● Motor or Electromagnetic surge absorption



Z_1 : EZJZ Series(EZJZ□V171AA)
Z_2 : EZJZ Series
Z_3 : EZJZ Series or EZJS Series

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■ Performance Characteristics

● Electrical

Characteristics	Test Method	Specifications
Standard Test Condition	Unless otherwise specified all test and measurements shall be made at a temperature of 15 to 35 °C and at a relative humidity of 45 to 75 %RH. If results obtained are doubted a further test should be carried out at a temperature of 20± 2 °C and a relative humidity of 60 to 70 %RH.	———
Maximum allowable Voltage	The maximum DC voltage that can be applied continuously in the specified operating temperature.	To meet the specified value.
Varistor voltage	The voltage between two terminals with the specified measuring current C_{mA} DC applied is called V_c or V_{cmA}. The measurement shall be made as fast as possible to avoid heat affection.	
Capacitance	Capacitance shall be measured with the specified measuring frequency, 0.2 to 2.0 Vms., 0V bias and 20 °C.	
Maximum peak current	The Maximum current within the varistor voltage change of ±10 % when a standard impulse current of 8/20 μs is applied two times with an interval of 5 minutes.	
Maximum ESD	The maximum ESD within the varistor voltage change of ±30% when impressing 10 times of ESD (five times of positive-negatives for each polarity) which is based on IEC61000-4-2	
Temperature coefficient Varistor Voltage	Coefficient indicating dependency of V-I characteristics on temperature. This is shown by the change of V_{cmA} per °C at the ambient operating temperature.	EZJZ Series: ±0.1 %/°C EZJS Series: ±0.3 %/°C
Temperature coefficient capacitance	This is shown by the maximum capacitance change at the ambient operating temperature.	EZJZ Series: ±20 % EZJS Series: ±10 %

● Mechanical requirements

Characteristics	Test Method	Specifications
Solderability	After securing the specimen by the body with tweezers and dipping in to the specified soldering flux, the specimen shall be completely immersed into a soldering bath having a temperature of 235±5 °C for 4±1 seconds. And then the specimen shall be visually examined. Use the specified soldering flux and solder following: Soldering Flux: Ethanol solution of rosin about 25 % by weight Solder: Eutectic solder (Sn 63 : Pb 37)	Approximately 75 % of the terminals shall be covered with new solder uniformly,
Resistance to soldering heat	After preheating the specimen according to the following conditions in Table-1, the specimen shall be completely immersed into a soldering bath having a temperature of 270±5 °C for 3±0.5 seconds. And then be stored at room temperature for 24±2 hours. Thereafter, the change of V_c and the mechanical damage shall be examined.	No remarkable mechanical $\Delta V_c/V_c \leq \pm 10$ %

Step	Temperature	Period
1	80 to 100 ˚C	300 to 360 s
2	150 to 200 ˚C	300 to 360 s

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■ Performance Characteristics
● Environmental

<table>
<tr><th>Characteristics</th><th>Test Methods</th><th>Specifications</th></tr>
<tr><td>Temperature Cycle</td><td>Before the measurement after test, the specimen shall be left to stand and mechanical damage shall be examined.
<table>
<tr><th>Step</th><th>Temperature</th><th>Period</th><th>Cycles</th></tr>
<tr><td>1</td><td>T_L</td><td>30 min.</td><td rowspan="4">5 cycles</td></tr>
<tr><td>2</td><td>Room Temp.</td><td>15 min.</td></tr>
<tr><td>3</td><td>T_U</td><td>30 min.</td></tr>
<tr><td>4</td><td>Room Temp.</td><td>15 min.</td></tr>
</table>
T_L : Lower operating temperature
T_U : Upper operating temperature</td><td>To meet
the specified value.</td></tr>
<tr><td>Damp Heat Load</td><td>Allowable Voltage shall be applied continuously to the specimen at specified conditions for specified period and then stored at room temperature and normal humidity for 24±2 hours. Thereafter, the change of Vc and mechanical damage shall be examined.
Ambient condition :40±2 °C, 90 to 95 %RH
Period : 500+24 hours
-0</td><td>No remarkable mechanical damage

$\Delta V_c/V_c \leq \pm 10$ %</td></tr>
<tr><td>High Temperature Load
(Dry Heat Load)</td><td>Allowable Voltage shall be applied continuously to the specimen at specified conditions for specified period and then stored at room temperature and normal humidity for 24±2hours. Thereafter, the change of V_c and mechanical damage shall be examined.
Ambient temp. : Upper operating temperature
Period : 500+24 hours
-0</td><td>No remarkable mechanical damage

$\Delta V_c/V_c \leq \pm 10$ %</td></tr>
</table>

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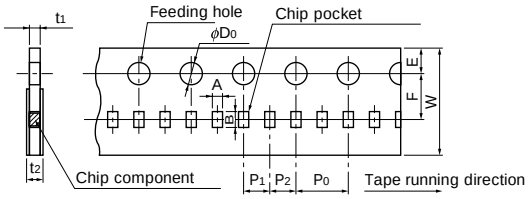
■ Packaging Specifications

● Standard Packing Quantity

Series	Size Code (EIA)	Thickness	Paper taping	Embossed taping
EZJZ	0201	0.3 mm	Pitch: 2 mm 15,000 pcs./reel	—
	0402	0.5 mm	Pitch: 2 mm 10,000 pcs./reel	—
	0603	0.8 mm	Pitch: 4 mm 4,000 pcs./reel	—
	2 Array Type	0.6 mm	Pitch: 4 mm 4,000 pcs./reel	—
	4 Array Type	0.85 mm	Pitch: 4 mm 4,000 pcs./reel	—
EZJS	0603	0.8 mm	Pitch: 4 mm 4,000 pcs./reel	—
	0805	0.8 mm	Pitch: 4 mm 5,000 pcs./reel	—
		1.25 mm	—	Pitch: 4 mm 2,000 pcs./reel

● Paper Taping

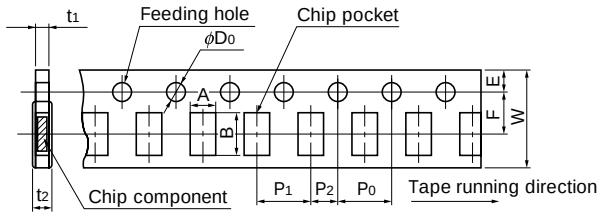
P_1: 2mm



(Unit: mm)

Size Code \ Symbol	A	B	W	F	E	P_1	P_2	P_0	ϕD	t_1	t_2
0201	0.37 ±0.03	0.67 ±0.03	8.0 ±0.2	3.50 ±0.05	1.75 ±0.10	2.00 ±0.05	2.00 ±0.05	4.00 ±0.05	1.5 +0.1 0	0.5 max.	0.8 max.
0402	0.62 ±0.05	1.12 ±0.05								0.7 max.	1.0 max.

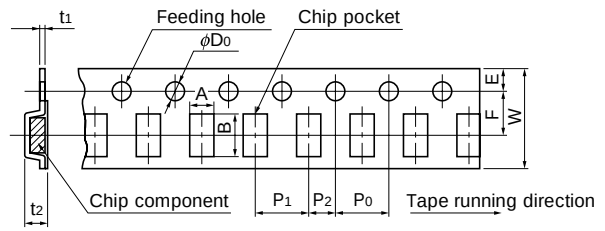
P_1: 4mm



(Unit: mm)

Size Code \ Symbol	A	B	W	F	E	P_1	P_2	P_0	ϕD	t_1	t_2
0603	1.0 ±0.10	1.8 ±0.10	8.0 ±0.2	3.50 ±0.05	1.75 ±0.10	4.0 ±0.1	2.00 ±0.05	4.0 ±0.1 0	1.5 +0.1	1.1 max.	1.4 max.
0805 4 Array Type	1.65 ±0.2	2.4 ±0.2									
0504 2 Array Type	1.18 ±0.10	1.63 ±0.10									

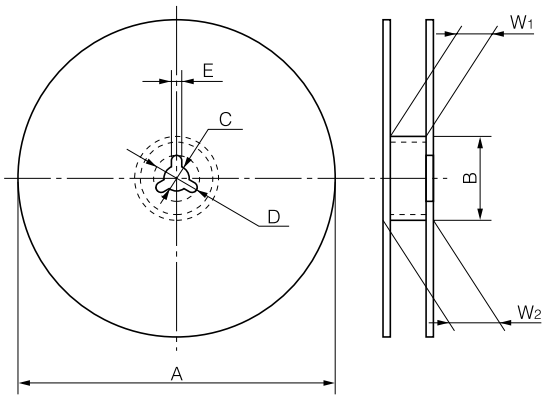
● Embossed Taping



(Unit: mm)

Size Code \ Symbol	A	B	W	F	E	P_1	P_2	P_0	ϕD	t_1	t_2
0805	1.55 ±0.20	2.35 ±0.20	8.0 ±0.2	3.50 ±0.05	1.75 ±0.10	4.0 ±0.1	2.00 ±0.05	4.0 ±0.1	1.5 +0.1 0	0.6 max.	1.5 max.

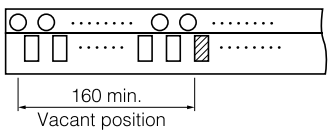
● Reel



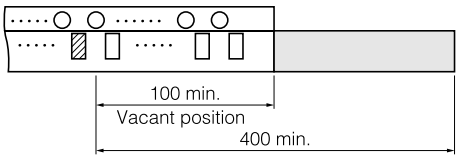
Symbol	A	B	C	D	E	W_1	W_2
Dim. (mm)	$\phi 180^{0}_{-1}$	$\phi 60.0 \pm 0.5$	13.0 ± 0.5	21.0 ± 0.8	2.0 ± 0.5	9.0 ± 0.3	11.4 ± 1.00

● Leader Part and Taped End

Tape end



Leader part



Unit : mm

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