

TRANSIENT VOLTAGE SUPPRESSOR

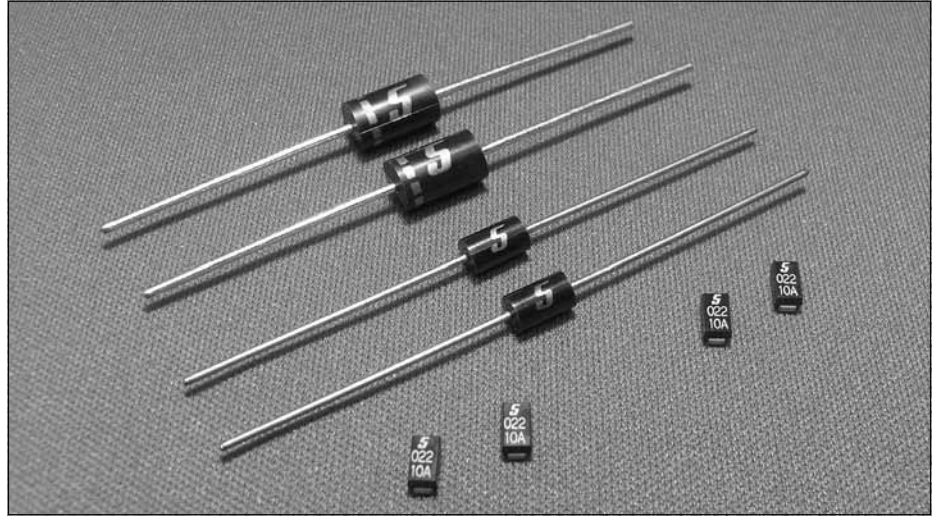
VRD

VRD is a transient voltage suppressor used for protecting electric circuits from surge voltage and thus preventing breakdown.

VRD has superior surge suppression characteristics, such as extremely fast response time, very low clamping voltage, and high surge capacity. Unlike metal oxide varistors, VRD does not have characteristics to change with surge variations within the rated capacity. This feature comprises another superior characteristics of the VRD as a transient voltage suppressors.

Part number

Z2 033 U - 52Z			
Z2	033	U	52Z
			52Z : Axial tapping winding type
			52R : Axial tapping relay type
			FT : Radial form tapping type
			Nil : individually packed in a bag
		U	Uni-Polar
		Nil	Bi-Polar
			Break down voltage
			Type
			Z2 : Rated electricity 1.0W
			Z6 : Rated electricity 2.0W
			ZD : Rated electricity 0.5W (reverse blocking type)



Electrical characteristics

Figure 1 shows the electrical characteristics. Bipolar type has almost symmetrical breakdown Voltage (V_B) The reverse breakdown voltage of the ZD type is 200 Volts or more at 10 μ A DC.

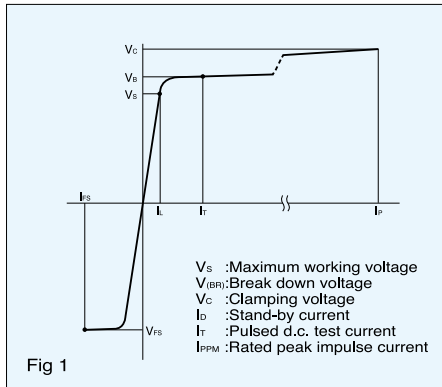


Fig 1

Taping

One of standard taping is as shown in Figure.

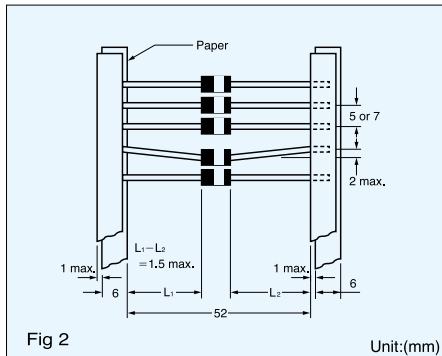


Fig 2

Taping qty

Part series	Taping method		Qty(pcs)
Z2,Z2U	Axial taping	reel type	5,000
		winding type	2,000
	Radial taping	winding type	2,000
		reel type	2,500
Z6,Z6U	Axial taping	reel type	2,500
		winding type	1,000

Surge capability

Allowable surge capability (P_{PPM}) is determined by the following equation:

$$P_{PPM} = I_{PPM} \times V_c$$

I_{PPM} : Rated peak impulse current

V_c : clamping voltage

The allowable surge capability (Rated peak impulse power dissipation P_{PPM}) of VRD is shown in following Figure 3 and the surge capability derating characteristics are shown in Figure 6.

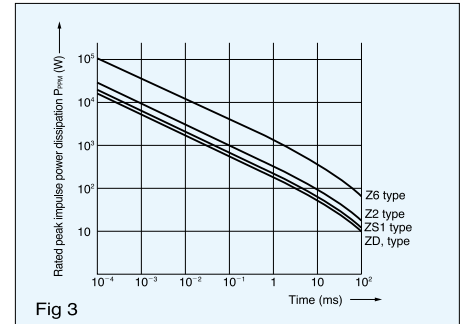


Fig 3

Surge waveform

There are many types of surge waveform depending on the source of the surge. For the VRD surge suppression characteristics test, the EXP waveform shown below is used. The EXP waveform is shown as t_a/t_b depending on the time width, however 10/1000 waveform is used as the standard test waveform.

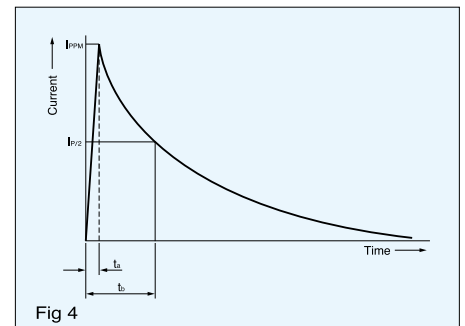
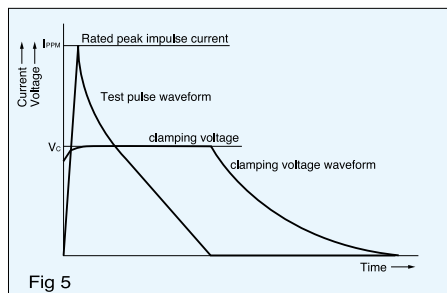


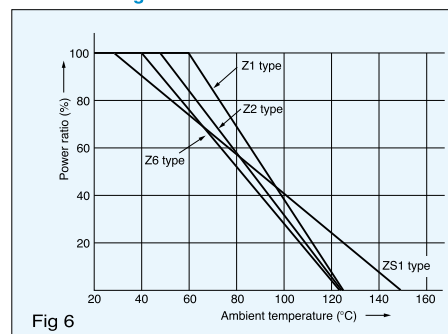
Fig 4

Surge suppression characteristics

When EXP waveform is applied, the surge suppression waveform shown in the figure 5 can be observed.



Power derating



Z2 type VRD has bipolar or unipolar electrical characteristics.

Maximum ratings

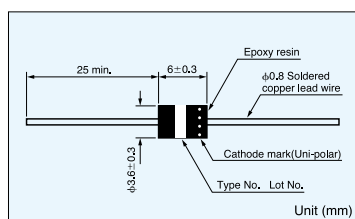
Rated peak impulse power dissipation
:500 W (10/1000 μ s)
6.00 kW (8/20 μ s)

Rated average power dissipation:1W
Operating and storage temperature
: -40°C to 125°C

Symbol mark

Bi-polar

Uni-polar



Part No.		Stand-off voltage V _S V	Stand-by current I _O μA	Breakdown voltage V _(BR) V	Pulsed d.c. test current I _T mA	Clamping Voltage & Rated peak impulse current				Temperature coefficient (TYP)	Capacitance (TYP) pF
Bi-polar type	Uni-polar type					10/1000μs		8/20μs			
						V _C V	I _{PPM} A	V _C V	I _{PPM} A		
—	Z2008U	6.63	500	7.38-9.02	10	12.5	40.0	16.3	372	0.063	2400
—	Z2010U	8.10	20	9.00-11.0	1	15.0	33.4	19.5	311	0.071	1900
Z2012	—	9.72	10.8-13.2	17.3		28.9	22.7	267	0.066	790	
—	Z2012U			12.1		13.5-16.5	22.0	22.7	28.4	213	0.074
Z2015	—	14.5	13.5-16.5				26.5	18.8	34.0	178	0.075
—	Z2015U			17.8		16.2-19.8					31.9
Z2018	—	21.8	16.2-19.8				39.1	12.8	50.5	120	
—	Z2018U			26.8		19.8-24.2					47.7
Z2022	—	31.6	19.8-24.2				56.4	8.86	73.0	83.0	
—	Z2022U			38.1		24.3-29.7					67.8
Z2027	—	45.4	24.3-29.7				80.5	6.21	105.0	57.7	
—	Z2027U			55.1	29.7-36.3	98.0					5.10
Z2033	—	66.4	29.7-36.3				118.0	4.24	153.0	39.6	
—	Z2033U			81.0	35.1-42.9	144.0					3.47
Z2039	—	97.2	35.1-42.9				173.0	2.89	222.0	27.3	
—	Z2039U			121.0	42.3-51.7	215.0					2.32
Z2047	—	146.0	42.3-51.7				258.0	1.94	333.0	18.2	
—	Z2047U			108-132	50.4-61.6	0.097					400
Z2056	—	61.2-74.8	50.4-61.6				98.0	5.10	127.0	47.7	
—	Z2056U			73.8-90.2	50.4-61.6	118.0					4.24
Z2068	—	73.8-90.2	50.4-61.6				144.0	3.47	187.0	32.4	
—	Z2068U			90.0-110	50.4-61.6	173.0					2.89
Z2082	—	90.0-110	50.4-61.6				215.0	2.32	277.0	21.9	
—	Z2082U			108-132	50.4-61.6	258.0					1.94
Z2100	—	108-132	50.4-61.6				98.0	5.10	127.0	47.7	
—	Z2100U			135-165	50.4-61.6	118.0					4.24
Z2120	—	135-165	50.4-61.6				144.0	3.47	187.0	32.4	
—	Z2120U			162-198	50.4-61.6	173.0					2.89
Z2150	—	162-198	50.4-61.6				215.0	2.32	277.0	21.9	
—	Z2150U			162-198	50.4-61.6	258.0					1.94
Z2180	—	162-198	50.4-61.6				98.0	5.10	127.0	47.7	
—	Z2180U			73.8-90.2	50.4-61.6	118.0					4.24

NOTE: Nonsuffix:bi-polar, suffix"U" : uni-polar.

Part No.		Stand-off voltage V _s V	Stand-by current I _b μA	Breakdown voltage V _(BR) V	Pulsed d.c. test current I _T mA	Clamping Voltage & Rated peak impulse current				Max. temp. coef. %/°C	Capacitance (TYP) pF	
Bi-polar type	Uni-polar type					10/1000μs		8/20μs				
						V _C V	I _{PPM} A	V _C V	I _{PPM} A			
Z6012	—	9.72	10	10.8-13.2	1	17.3	86.7	22.7	802	0.066	4400	
—	Z6012U			10.8-13.2		—	—	—	—	0.074	8800	
Z6015	—	12.1	5	13.5-16.5		22.0	68.2	28.4	641	0.075	3300	
—	Z6015U			13.5-16.5		—	—	—	—	0.079	6600	
Z6018	—	14.5		16.2-19.8		26.5	56.6	34.0	535	0.079	2700	
—	Z6018U			16.2-19.8		—	—	—	—	0.083	5400	
Z6022	—	17.8		19.8-24.2		31.9	47.0	41.2	442	0.082	2400	
—	Z6022U			19.8-24.2		—	—	—	—	0.086	4400	
Z6027	—	21.8		24.3-29.7		39.1	38.4	50.5	360	0.085	1700	
—	Z6027U			24.3-29.7		—	—	—	—	0.089	3300	
Z6033	—	26.8		29.7-36.3		47.7	31.4	61.7	295	0.087	1400	
—	Z6033U			29.7-36.3		—	—	—	—	0.092	2800	
Z6039	—	31.6		35.1-42.9		56.4	26.6	73.0	249	0.090	1200	
—	Z6039U			35.1-42.9		—	—	—	—	0.095	2400	
Z6047	—	38.1		42.3-51.7		67.8	22.1	88.0	207	0.092	1000	
—	Z6047U			42.3-51.7		—	—	—	—	0.097	2000	
Z6056	—	45.4		50.4-61.6		80.5	18.6	105.0	173	0.094	850	
—	Z6056U			50.4-61.6		—	—	—	—	0.099	1700	
Z6068	—	55.1		61.2-74.8		98.0	15.3	127.0	143	0.096	720	
—	Z6068U			61.2-74.8		—	—	—	—	0.100	1440	
Z6082	—	66.4		73.8-90.2		118.0	12.7	153.0	119	0.099	610	
—	Z6082U			73.8-90.2		—	—	—	—	0.102	1220	
Z6100	—	81.0		90.0-110		144.0	10.4	187.0	97.3	0.101	520	
—	Z6100U			90.0-110		—	—	—	—	0.104	1040	
Z6120	—	97.2		108-132		173.0	8.67	222.0	82.0	0.103	440	
—	Z6120U			108-132		—	—	—	—	0.106	880	
—	Z6150U	121.0		—		135-165	215.0	6.98	277.0	65.7	0.107	720

NOTE : Nonsuffix : Bi-polar, suffix "U" : Uni-polar.

Z6 type VRD has bipolar or unipolar electrical characteristics.

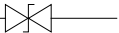
Maximum ratings

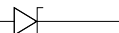
Rated peak impulse power dissipation
:1.5kW(10/1000 μs)
18.0kW(8/20 μs)

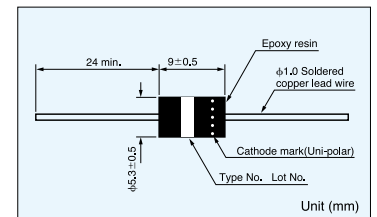
Rated average power dissipation:2W

Operating and storage temperature
:−40°C to 125°C

Symbol mark

Bi-polar 

Uni-polar 



VRD part No.	Stand-off voltage V _S V	Stand-by current I _B μA	Breakdown voltage V _(BR) V	Pulsed d.c. test current I _T mA	Clamping Voltage & Rated peak impulse current				Max. temp. coef. %/°C	Capacitance (TYP) pF
					10/1000μs		8/20μs			
					V _C V	I _{PPM} A	V _C V	I _{PPM} A		
ZD015	11.4	10	12.8-17.2	1	24.0	10.4	31.0	96.7	0.075	31.5
ZD018	13.7		15.3-20.7		28.0	8.93	36.0	83.3	0.079	31.0
ZD022	16.8	5	18.7-25.3		33.2	7.53	43.0	69.7	0.082	29.0
ZD027	20.6		23.0-31.0		40.0	6.25	52.0	57.7	0.085	28.2
ZD033	25.2		28.1-37.9		48.6	5.14	63.0	47.6	0.087	27.2
ZD039	29.8		33.2-44.8		57.4	4.35	74.0	40.5	0.090	26.3
ZD047	35.9		40.0-54.0		68.5	3.65	89.0	33.7	0.092	25.0
ZD056	42.8		47.6-64.4		81.0	3.08	106.0	28.6	0.094	24.1
ZD068	52.0		57.8-78.2		98.0	2.55	127.0	23.8	0.096	22.0

Low capacitance type

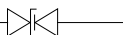
Maximum ratings

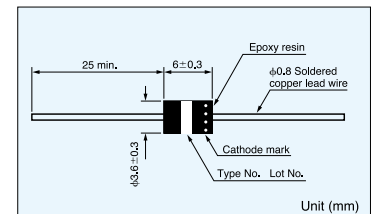
Reverse voltage:200 VDC

Rated peak impulse power dissipation
:250 W(10/1000 μs)
3.00 kW(8/20 μs)

Rated average power dissipation:500 mW
Operating and storage temperature
:−40°C to 125°C

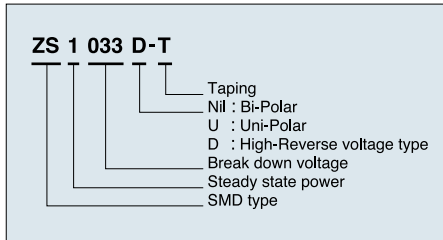
Symbol mark



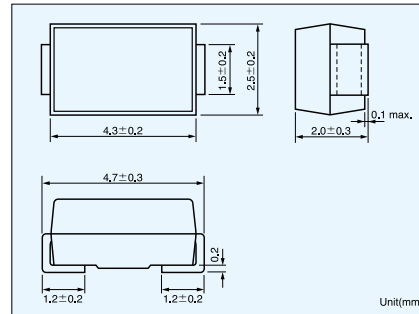


SMD VRD

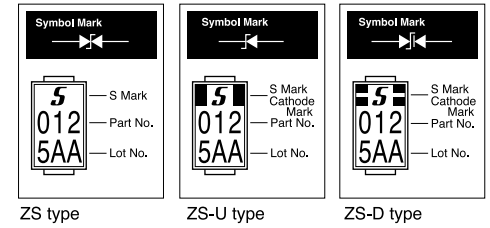
Part number



Dimensions

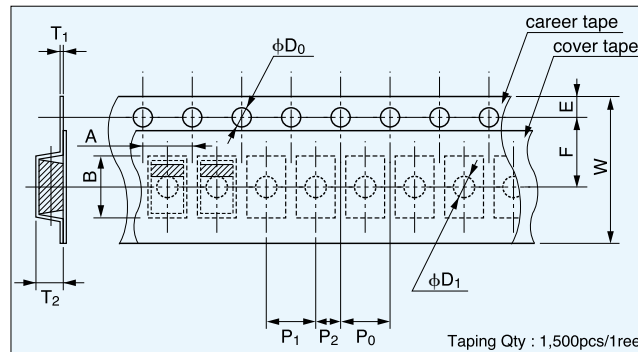


Marking



	Rating
Rated average power dissipation	1.0W
Rated peak impulse power dissipation	300W(10/1000μs)
	1200W(1.2/50μs)
	2000W(8/20μs)
Storage temp. range	-40°C~150°C

Taping



A	B	W	F	E	P ₁
3.0 ±0.1	5.2 ±0.1	12.0 ±0.3	5.5 ±0.05	1.75 ±0.1	4.0 ±0.1
P ₂	P ₀	φD ₀	φD ₁	T ₁	T ₂
2.0 ±0.1	4.0 ±0.1	1.5 +0.1 -0	1.5 +0.2 -0	0.3 ±0.05	(2.6)

Unit (mm)

Specifications

ZS type

Part No.	Breakdown voltage	Stand-off voltage	Stand-by current	Maximum clamping voltage & Maximum peak pulse current				Temperature coefficient (TYP)	Capacitance (TYP)
	V _(BR)	V _S	I _L max	V _C max/I _{PPM}				25°C~50°C	C
	It=1mA	D.C.	V _S	10/1000μs		8/20μs			
	V	V	μA	V	A	V	A	%/°C	pF
ZS1012	12(10.8~13.2)	9.72	10	17.3	17.3	22.4	89.3	0.066	551
ZS1015	15(13.5~16.5)	12.1	5	22.0	13.6	28.5	70.2	0.075	465
ZS1018	18(16.2~19.8)	14.5		26.5	11.3	34.4	58.1	0.079	376
ZS1022	22(19.8~24.2)	17.8		31.9	9.40	41.4	48.3	0.082	299
ZS1027	27(24.3~29.7)	21.8		39.1	7.67	50.7	39.4	0.085	248
ZS1033	33(29.7~36.3)	26.8		47.7	6.29	61.8	32.4	0.087	198
ZS1039	39(35.1~42.9)	31.6		56.4	5.32	73.1	27.4	0.090	164
ZS1047	47(42.3~51.7)	38.1		67.8	4.42	88.0	22.7	0.092	137

ZS-U type

Part No.	Breakdown voltage	Stand-off voltage	Stand-by current	Maximum clamping voltage & Maximum peak pulse current				Temperature coefficient (TYP)	Capacitance (TYP)
	V _(BR)	V _S	I _L max	V _C max/I _{PPM}					C
	It=1mA	D.C.	V _S	10/1000μs		8/20μs		25°C~50°C	
	V	V	μA	V	A	V	A	%/°C	pF
ZS1012U	12(10.8~13.2)	9.72	10	17.3	17.3	22.4	89.3	0.066	1,102
ZS1015U	15(13.5~16.5)	12.1	5	22.0	13.6	28.5	70.2	0.075	929
ZS1018U	18(16.2~19.8)	14.5		26.5	11.3	34.4	58.1	0.079	751
ZS1022U	22(19.8~24.2)	17.8		31.9	9.40	41.4	48.3	0.082	598
ZS1027U	27(24.3~29.7)	21.8		39.1	7.67	50.7	39.4	0.085	497
ZS1033U	33(29.7~36.3)	26.8		47.7	6.29	61.8	32.4	0.087	395
ZS1039U	39(35.1~42.9)	31.6		56.4	5.32	73.1	27.4	0.090	328
ZS1047U	47(42.3~51.7)	38.1		67.8	4.42	88.0	22.7	0.092	274

ZS-D type

Part No.	Breakdown voltage	Stand-off voltage	Stand-by current	Maximum clamping voltage & Maximum peak pulse current				Temperature coefficient (TYP)	Capacitance (TYP)
	V _(BR)	V _S	I _L max	V _C max/I _{PPM}				25°C~50°C	C
	It=1mA	D.C.	V _S	10/1000μs		8/20μs			
	V	V	μA	V	A	V	A	%/°C	pF
ZS1012D	12(10.8~13.2)	9.72	10	17.3	17.3	22.4	89.3	0.066	30.2
ZS1015D	15(13.5~16.5)	12.1	5	22.0	13.6	28.5	70.2	0.075	29.1
ZS1018D	18(16.2~19.8)	14.5		26.5	11.3	34.4	58.1	0.079	28.2
ZS1022D	22(19.8~24.2)	17.8		31.9	9.40	41.4	48.3	0.082	27.3
ZS1027D	27(24.3~29.7)	21.8		39.1	7.67	50.7	39.4	0.085	26.4
ZS1033D	33(29.7~36.3)	26.8		47.7	6.29	61.8	32.4	0.087	25.5
ZS1039D	39(35.1~42.9)	31.6		56.4	5.32	73.1	27.4	0.090	24.8
ZS1047D	47(42.3~51.7)	38.1		67.8	4.42	88.0	22.7	0.092	24.0

Данный компонент на территории Российской Федерации

Вы можете приобрести в компании MosChip.

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<http://moschip.ru/get-element>

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В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

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