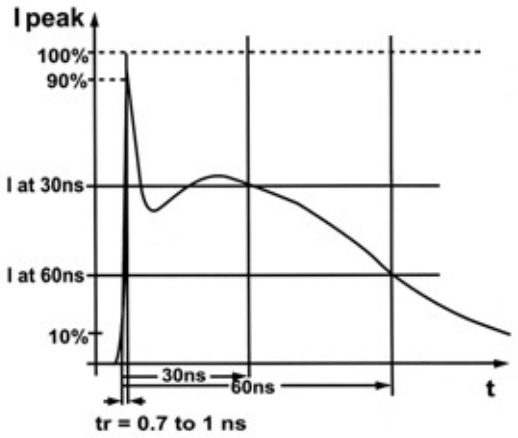
Multi Layer Chip Varistors

Introduction

Multi layer chip varistors(MLV) have good nonlinear voltage-current characteristics and high surge capability. They also have fast-response characteristics in several hundred pico second level. They are very suitable and widely used for the problems of transient over-voltage protection caused by ESD(Electrostatic Discharge).



Features

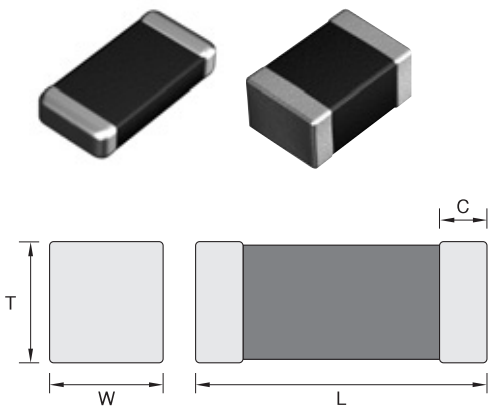
- The fastest response time about 300~700ps
- Repetitive pulse characteristics
- High discharge transient current and energy handling capability
- Thermal stability through 125℃
- EMI/RFI Attenuation characteristics

Applications

- Latch up protection for CMOS
- MOSFET protection for ESD/EOS
- High speed data I/O Port protection
- Keypad, Keyboard protection
- CDMA, GSM, Cordless phone
- Notebook, Workstations
- Digital camcorder
- CD-ROM, DVD-ROM, MD, MP3-PLAYER
- Automotive Application
- Onboard computer, electric motor control

※ special specification like a Automobile, Medical, Military, Aviation should be discuss with our sales representatives

Shape & Dimensions



(Unit : mm)

Size Code	L	W	T Max.	C Min.
1005(0402)	1.0±0.05	0.5±0.05	0.55	0.1
1608(0603)	1.6±0.15	0.8±0.15	0.9	0.2
2012(0805)	2.0±0.20	1.25±0.20	1.3	0.2
3216(1206)	3.2±0.25	1.60±0.20	1.4	0.2

How to Order(Product Identification)

VSN 1005 X 05 N R

1 2 3 4 5 6

1 Series

Code	Product Name
VSN	Chip Varistor Normal Type
VSL	Low Capacitance Type
VSH	High Surge Type
VHS	High Speed Type

2 Size Code

The first two digits : Length(mm)

The last two digits : Width(mm)

3 Energy Rating Code

Code	Energy rating	Code	Energy rating
A	0.1J	H	1.2J
B	0.2J	J	1.5J
C	0.3J	K	2.0J
D	0.4J	P	3.0J
E	0.6J	U	0.01J
F	0.7J	V	0.02J
G	0.9J	X	0.05J

4 Working Voltage Code

Code	Working Voltage
03	3.5Vdc
05	5.6Vdc
09	9.0Vdc
□□	Two digits are real value

5 Termination Code

N : Plating(Ni/Sn) Type

6 Packaging Code

Code	Packaging
B	Bulk Pack
R	Tape&Reel Pack
E	Embossed Tape Pack

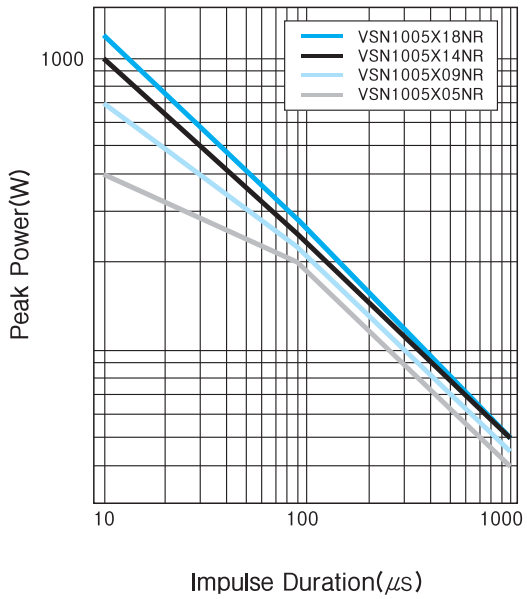
Specifications(Normal Type)

ESD Protection of RF Amplifier, FET, High Speed Data Line

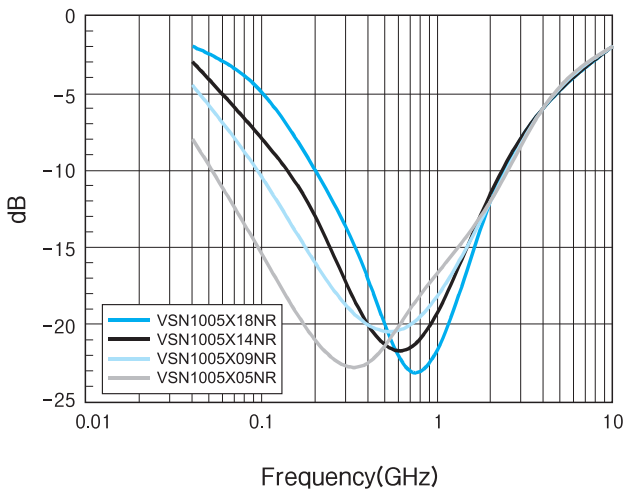
Part No.	Working Voltage	Varistor Voltage	Clamping Voltage	Max. Peak Current	Max Energy	Typical Capacitance pF@1MHz
	$V_{W(DC)}$	$V_{b(@1mA)}$	V_c	I_p(A)	E_t(J)	
VSN1005X05NR	5.6	7.6~9.3	15.5	20	0.05	180
VSN1005X09NR	9	11.0~14.0	20	20	0.05	150
VSN1005X14NR	14	16.5~20.3	30	20	0.05	120
VSN1005X18NR	18	22.9~28.0	40	20	0.05	90

Note) See Page 105

Peak Power vs Pulse Duration



Insertion Loss Characteristics



Specifications(Normal Type)

For ESD, CMOS Latch Up, FET Protection

Part No.	Working Voltage	Varistor Voltage	Clamping Voltage	Max. Peak Current	Max Energy	Typical Capacitance
	$V_{W(DC)}$	$V_{b(@1mA)}$	V_C	I_P(A)	E_t(J)	pF@1MHz
VSN1608A05NR	5.6	7.6~9.3	16	30	0.1	800
VSN1608A09NR	9.0	11.0~14.0	20	30	0.1	500
VSN1608A12NR	12	14.8~18.3	27	40	0.1	350
VSN1608A14NR	14	16.5~20.3	30	30	0.1	250
VSN1608A18NR	18	22.9~28.0	40	30	0.1	200
VSN1608A26NR	26	31.0~38.0	58	30	0.1	70
VSN1608A30NR	30	37.0~46.0	65	30	0.1	70
VSN2012A05NR	5.6	7.6~9.3	16	40	0.1	1250
VSN2012A09NR	9	11.0~14.0	20	40	0.1	740
VSN2012A12NR	12	14.8~18.3	25	40	0.1	525
VSN2012A14NR	14	16.5~20.3	30	40	0.1	375
VSN2012A18NR	18	22.9~28.0	40	30	0.1	350
VSN2012A26NR	26	31.0~38.0	58	30	0.1	140
VSN2012A30NR	30	37.0~46.0	65	30	0.1	100
VSN3216A05NR	5.6	7.6~9.3	16	40	0.1	850
VSN3216A09NR	9	11.0~14.0	20	40	0.1	650
VSN3216A14NR	14	16.5~20.3	30	40	0.1	500
VSN3216A18NR	18	22.9~28.0	40	30	0.1	290
VSN3216A26NR	26	31.0~38.0	58	30	0.1	270
VSN3216A30NR	30	37.0~46.0	65	30	0.1	200

Note) See Page 105

Specifications(High Speed Type)

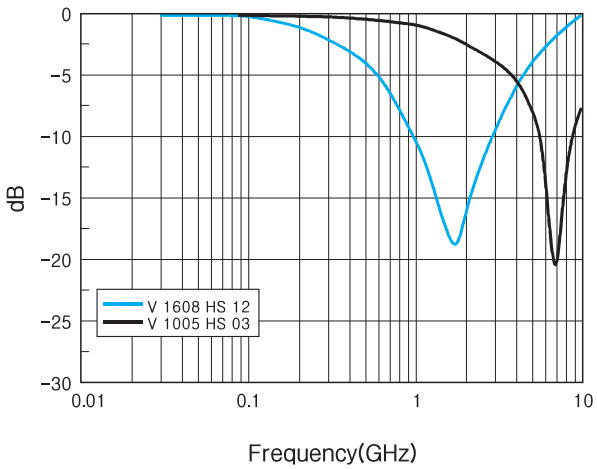
Protect for Very High Speed Data Transmission Line

- 3pF & 12pF Capacitance Versions Suitable for High Speed Data-Rate Line
- Very Low Leakage Currents
- ESD Rated to IEC 61000-4-2(Level 4)
- Very Suitable for USB, IEEE 1394 Data Line Protection
- Mobile Communications/Cellular Phone Etc.

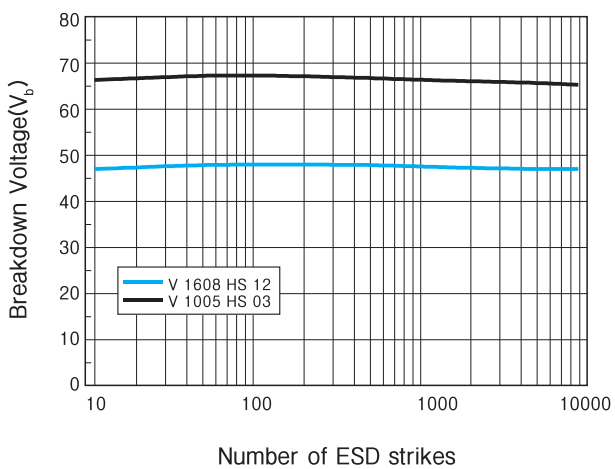
Part No.	Working Voltage	Maximu Leakage Current at Specified DC Voltage				Max Energy pF@1MHz	Typical Inductance (di/dt=0.1A/ns)
	$V_{W(DC)}$	3.5V	5.5V	9V	15V		
V1005HS03	< 30	0.05	0.10	0.15	0.25	3	< 1.0
V1005HS06	< 30	0.05	0.10	0.15	0.25	6	< 1.0
V1005HS12	< 18	0.10	0.15	0.25	0.50	12	< 1.0
V1608HS03	< 30	0.05	0.10	0.15	0.25	3	< 1.0
V1608HS06	< 30	0.05	0.10	0.15	0.25	6	< 1.0
V1608HS12	< 18	0.10	0.15	0.25	0.50	12	< 1.0

Note) See Page 105

Insertion Loss Characteristics



ESD Repetitive Characteristics



Specifications(Low Capacitance Type)

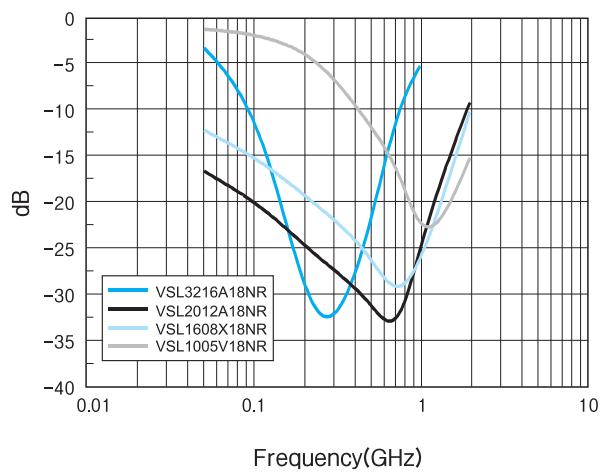
Protect for High Speed Data Transmission Line

- Very Low Leakage Current Type for Battery Operated Equipment
- Very Low Capacitance about <200pF Proper to High Speed Data Transmission
- Suitable for USB, IEEE1394 Data Line Protection

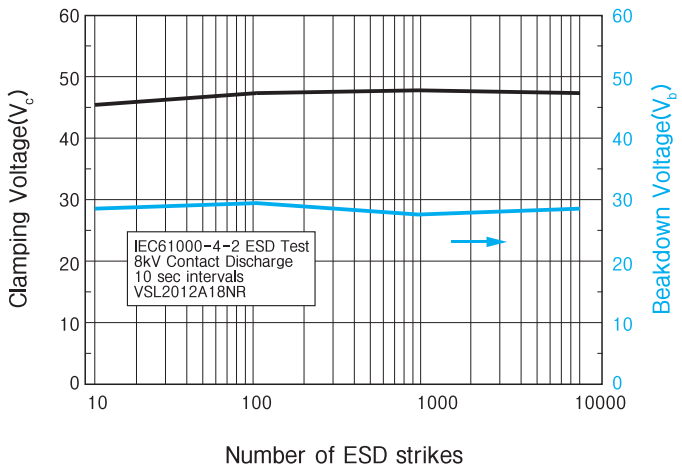
Part No.	Working Voltage	Varistor Voltage	Clamping Voltage	Max. Peak Current	Max Energy	Typical Capacitance
	$V_{W(DC)}$	V1mA	V_C	I_P(A)	E_t(J)	pF@1MHz
VSL1005X03NR	3.6	8	15.5	15	0.05	150
VSL1005X05NR	5.6	12	20	20	0.05	100
VSL1005U05NR	5.6	12	20	15	0.01	50
VSL1005X12NR	12	18	30	20	0.05	50
VSL1005V12NR	12	18	30	15	0.02	25
VSL1005V18NR	18	27	50	15	0.02	30
VSL1005U18NR	18	27	50	10	0.01	15
VSL1608A05NR	5.6	12	20	25	0.1	400
VSL1608X05NR	5.6	12	20	20	0.05	100
VSL1608V05NR	5.6	12	20	15	0.02	50
VSL1608X12NR	12	18	30	20	0.05	80
VSL1608X18NR	18	27	50	20	0.05	75

Note) See Page 105

Insertion Loss Characteristics



ESD Repetitive Characteristics



Specifications(High Surge Current Type)

For Line Surge, Switching Surge, ESD Protection

Part No.	Working Voltage		Varistor Voltage	Clamping Voltage	Max. Peak Current	Max Energy	Typical Capacitance
	$V_{W(DC)}$	$V_{W(AC)}$	$V_{b(@1mA)}$	V_c	I_p(A)	E_t(J)	pF@1MHz
VSH2012C05NR	5.6	4.0	7.6~9.3	15.5	120	0.3	1600
VSH2012C09NR	9	6.4	11.0~14.0	20	120	0.3	1200
VSH2012C14NR	14	10	16.5~20.3	30	120	0.3	600
VSH2012C18NR	18	12	22.9~28.0	40	100	0.3	400
VSH2012C26NR	26	18	31.0~38.0	58	100	0.3	250
VSH2012C30NR	30	21	37.0~46.0	65	100	0.3	200
VSH3216D05NR	5.6	4.0	7.6~9.3	16	150	0.4	1800
VSH3216D09NR	9	6.4	11.0~14.0	20	150	0.4	1500
VSH3216D14NR	14	10	16.5~20.3	30	150	0.4	700
VSH3216D18NR	18	12	22.9~28.0	40	150	0.4	400
VSH3216D26NR	26	18	31.0~38.0	58	120	0.4	300
VSH3216D30NR	30	21	37.0~46.0	65	120	0.4	200

Note) See Page 105