

Description

The SENXX11D3 is designed to replace multilayer varistors (MLVs) in portable applications such as cellular phones, digital cameras and PDA's, using monolithic silicon technology to provide fast response time and low ESD clamping voltage, making this device an ideal solution for protecting sensitive semiconductor components from damage. The SENXX11D3 complies with the IEC 61000-4-2 (ESD) standard with $\pm 30\text{kV}$ air and $\pm 30\text{kV}$ contact discharge. The SENXX11D3 is assembled into a lead-free SOD-323 package and will protect one unidirectional line.

Features

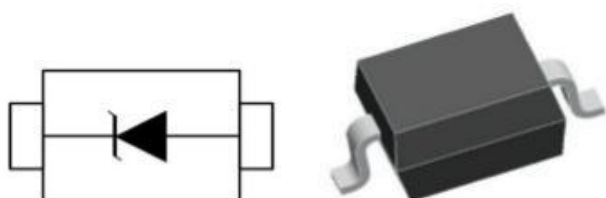
- 350W peak pulse power (8/20us)
- Protects one data or power line
- Ultra low leakage: nA level
- Stand-off Voltage: 3.3 V ~ 36 V
- Ultra low clamping voltage

Complies with following standards:

- IEC 61000-4-2 (ESD) immunity test Air discharge: $\pm 30\text{kV}$
Contact discharge: $\pm 30\text{kV}$
- IEC61000-4-4 (EFT) 40A (5/50ns)

RoHS Compliant

Dimensions & Symbol



Mechanical Characteristics

Package: SOD-323

Case Material: "Green" Molding Compound.

UL Flammability Classification Rating 94V-0

Moisture Sensitivity: Level 3 per J-STD-020

Terminal Connections: See Diagram Below

Marking Information: See Below

Applications

Laptop Computers

Cellular Phones

Digital Cameras

- Personal Digital Assistants(PDAs)

Marking Information



SEN3311D3	SEN0511D3	SEN1211D3	SEN1511D3	SEN2411D3	SEN3611D3
D03	D05	D12	D15	D24	D36

Details marking code reference customer approval list

Ordering Information

Part Number	Packaging	Reel Size
SEN3311D3	3000/Tape & Reel	7 inch
SEN0511D3	3000/Tape & Reel	7 inch
SEN1211D3	3000/Tape & Reel	7 inch
SEN1511D3	3000/Tape & Reel	7 inch
SEN2411D3	3000/Tape & Reel	7 inch
SEN3611D3	3000/Tape & Reel	7 inch

Absolute Maximum Ratings ($T_A=25^{\circ}\text{C}$, RH=45%-75%, unless otherwise noted)

SEN3311D3			
Parameter	Symbol	Value	Unit
Peak Pulse Power (8/20 μs)	P_{pp}	350	W
Peak Pulse Current (8/20 μs)	I_{pp}	20	A
ESD per IEC 61000-4-2 (Air)	VESD	± 30	kV
ESD per IEC 61000-4-2 (Contact)		± 30	
Operating Temperature Range	T_J	-55 to +125	$^{\circ}\text{C}$
Storage Temperature Range	T_{stg}	-55 to +150	$^{\circ}\text{C}$
SEN0511D3			
Parameter	Symbol	Value	Unit
Peak Pulse Power (8/20 μs)	P_{pp}	350	W
Peak Pulse Current (8/20 μs)	I_{pp}	17	A
ESD per IEC 61000-4-2 (Air)	VESD	± 30	kV
ESD per IEC 61000-4-2 (Contact)		± 30	
Operating Temperature Range	T_J	-55 to +125	$^{\circ}\text{C}$
Storage Temperature Range	T_{stg}	-55 to +150	$^{\circ}\text{C}$
SEN1211D3			
Parameter	Symbol	Value	Unit
Peak Pulse Power (8/20 μs)	P_{pp}	350	W
Peak Pulse Current (8/20 μs)	I_{pp}	11	A
ESD per IEC 61000-4-2 (Air)	VESD	± 30	kV
ESD per IEC 61000-4-2 (Contact)		± 30	
Operating Temperature Range	T_J	-55 to +125	$^{\circ}\text{C}$
Storage Temperature Range	T_{stg}	-55 to +150	$^{\circ}\text{C}$

SEN1511D3

Parameter	Symbol	Value	Unit
Peak Pulse Power (8/20 μ s)	P _{pp}	350	W
Peak Pulse Current (8/20 μ s)	I _{pp}	10	A
ESD per IEC 61000-4-2 (Air)	V _{ESD}	\pm 30	kV
ESD per IEC 61000-4-2 (Contact)		\pm 30	
Operating Temperature Range	T _J	-55 to +125	$^{\circ}$ C
Storage Temperature Range	T _{stg}	-55 to +150	$^{\circ}$ C

SEN2411D3

Parameter	Symbol	Value	Unit
Peak Pulse Power (8/20 μ s)	P _{pp}	350	W
Peak Pulse Current (8/20 μ s)	I _{pp}	7	A
ESD per IEC 61000-4-2 (Air)	V _{ESD}	\pm 30	kV
ESD per IEC 61000-4-2 (Contact)		\pm 30	
Operating Temperature Range	T _J	-55 to +125	$^{\circ}$ C
Storage Temperature Range	T _{stg}	-55 to +150	$^{\circ}$ C

SEN3611D3

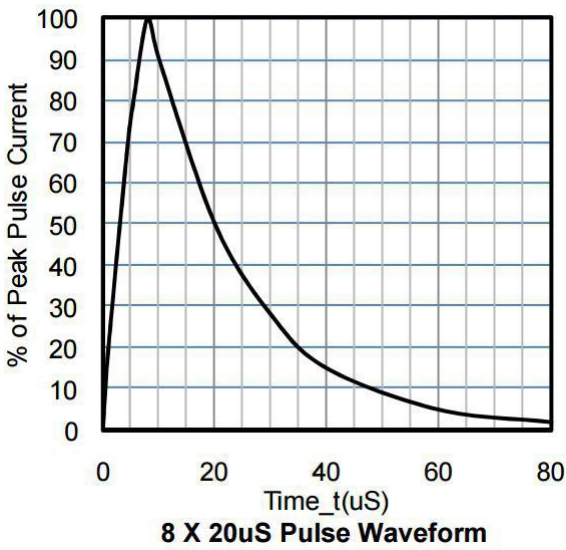
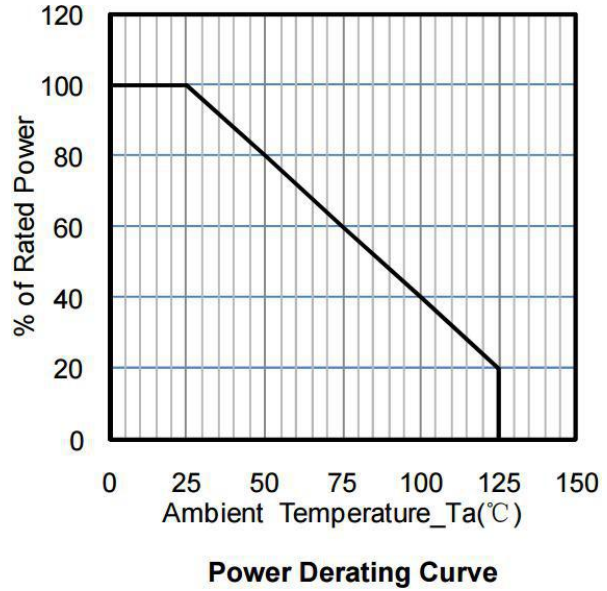
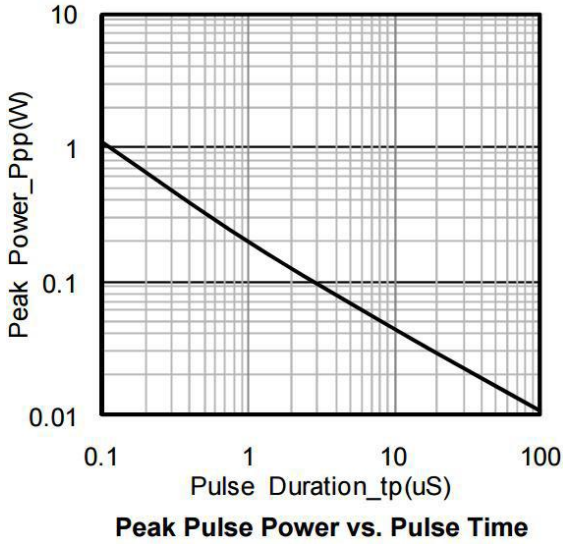
Parameter	Symbol	Value	Unit
Peak Pulse Power (8/20 μ s)	P _{pp}	350	W
Peak Pulse Current (8/20 μ s)	I _{pp}	5	A
ESD per IEC 61000-4-2 (Air)	V _{ESD}	\pm 30	kV
ESD per IEC 61000-4-2 (Contact)		\pm 30	
Operating Temperature Range	T _J	-55 to +125	$^{\circ}$ C
Storage Temperature Range	T _{stg}	-55 to +150	$^{\circ}$ C

Electrical Characteristics ($T_A=25^\circ\text{C}$)

SEN3311D3						
Parameter	Symbol	Min	Typ	Max	Unit	Test Condition
Reverse Working Voltage	V_{RWM}			3.3	V	
Breakdown Voltage	V_{BR}	4.0			V	$I_T = 1\text{mA}$
Reverse Leakage Current	I_R			40	μA	$V_{RWM} = 3.3\text{V}$
Clamping Voltage	V_C		6.5		V	$I_{PP} = 1\text{A}$ (8 x 20 μs pulse)
Clamping Voltage	V_C			10.5	V	$I_{PP} = 20\text{A}$ (8 x 20 μs pulse)
Junction Capacitance	C_J		450		pF	$V_R = 0\text{V}$, $f = 1\text{MHz}$
SEN0511D3						
Parameter	Symbol	Min	Typ	Max	Unit	Test Condition
Reverse Working Voltage	V_{RWM}			5	V	
Breakdown Voltage	V_{BR}	6.2			V	$I_T = 1\text{mA}$
Reverse Leakage Current	I_R			10	μA	$V_{RWM} = 5\text{V}$
Clamping Voltage	V_C		9.8		V	$I_{PP} = 1\text{A}$ (8 x 20 μs pulse)
Clamping Voltage	V_C			18.6	V	$I_{PP} = 17\text{A}$ (8 x 20 μs pulse)
Junction Capacitance	C_J		300		pF	$V_R = 0\text{V}$, $f = 1\text{MHz}$
SEN1211D3						
Parameter	Symbol	Min	Typ	Max	Unit	Test Condition
Reverse Working Voltage	V_{RWM}			12	V	
Breakdown Voltage	V_{BR}	13.3			V	$I_T = 1\text{mA}$
Reverse Leakage Current	I_R			1	μA	$V_{RWM} = 12\text{V}$
Clamping Voltage	V_C		19		V	$I_{PP} = 1\text{A}$ (8 x 20 μs pulse)
Clamping Voltage	V_C			32	V	$I_{PP} = 11\text{A}$ (8 x 20 μs pulse)
Junction Capacitance	C_J		130		pF	$V_R = 0\text{V}$, $f = 1\text{MHz}$

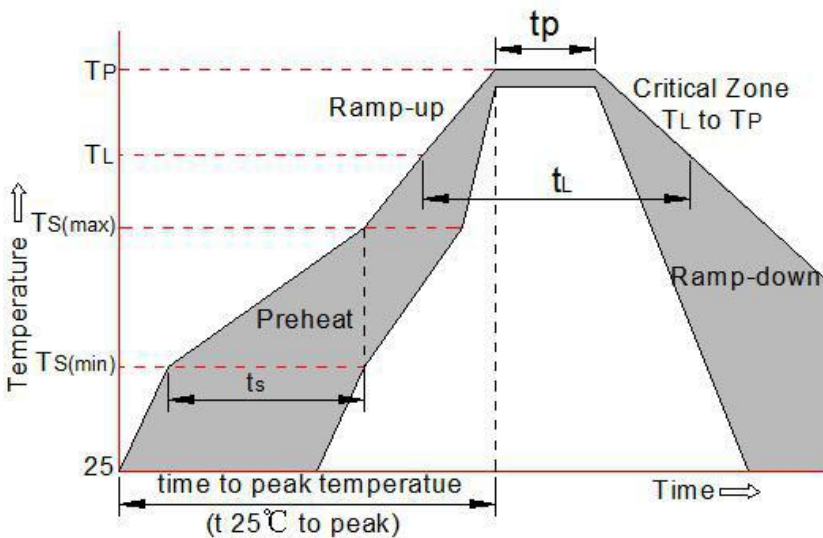
SEN1511D3						
Parameter	Symbol	Min	Typ	Max	Unit	Test Condition
Reverse Working Voltage	V_{RWM}			15	V	
Breakdown Voltage	V_{BR}	16.7			V	IT = 1mA
Reverse Leakage Current	I_R			1	uA	VRWM = 15V
Clamping Voltage	V_C		17.6		V	IPP = 1A (8 x 20uS pulse)
Clamping Voltage	V_C			38	V	IPP = 10A (8 x 20uS pulse)
Junction Capacitance	C_J		120		pF	VR = 0V, f = 1MHz
SEN2411D3						
Parameter	Symbol	Min	Typ	Max	Unit	Test Condition
Reverse Working Voltage	V_{RWM}			24	V	
Breakdown Voltage	V_{BR}	26.7			V	IT = 1mA
Reverse Leakage Current	I_R			1	uA	VRWM = 24V
Clamping Voltage	V_C		43		V	IPP = 1A (8 x 20uS pulse)
Clamping Voltage	V_C			52	V	IPP = 7A (8 x 20uS pulse)
Junction Capacitance	C_J		80		pF	VR = 0V, f = 1MHz
SEN3611D3						
Parameter	Symbol	Min	Typ	Max	Unit	Test Condition
Reverse Working Voltage	V_{RWM}			36	V	
Breakdown Voltage	V_{BR}	40			V	IT = 1mA
Reverse Leakage Current	I_R			1	uA	VRWM = 40V
Clamping Voltage	V_C		60		V	IPP = 1A (8 x 20uS pulse)
Clamping Voltage	V_C			52	V	IPP = 5A (8 x 20uS pulse)
Junction Capacitance	C_J		60		pF	VR = 0V, f = 1MHz

Typical Performance Characteristics ($T_A=25^{\circ}\text{C}$ unless otherwise Specified)

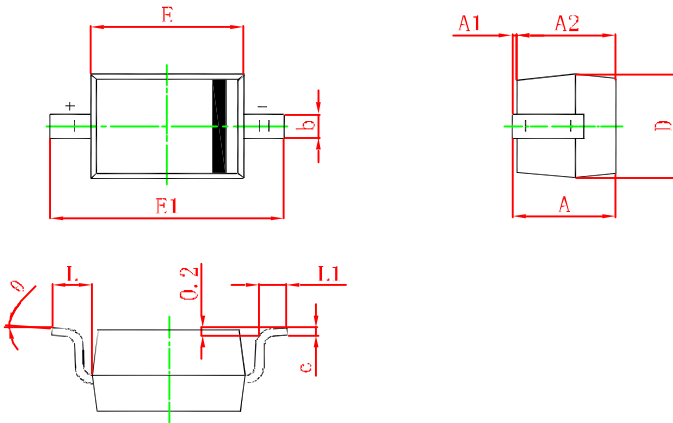


Soldering Parameters

Reflow Condition		Pb-Free assembly (see as bellow)
Pre Heat	-Temperature Min ($T_{s(min)}$)	+150°C
	-Temperature Max($T_{s(max)}$)	+200°C
	-Time (Min to Max) (t_s)	60-180 secs.
Average ramp up rate (Liquid us Temp (T_L) to peak)		3°C/sec. Max
$T_{s(max)}$ to T_L - Ramp-up Rate		3°C/sec. Max
Reflow	-Temperature(T_L) (Liquid us)	+217°C
	-Temperature(t_L)	60-150 secs.
Peak Temp (T_p)		+260(+0/-5)°C
Time within 5°C of actual Peak Temp (t_p)		30 secs. Max
Ramp-down Rate		6°C/sec. Max
Time 25°C to Peak Temp (T_p)		8 min. Max
Do not exceed		+260°C

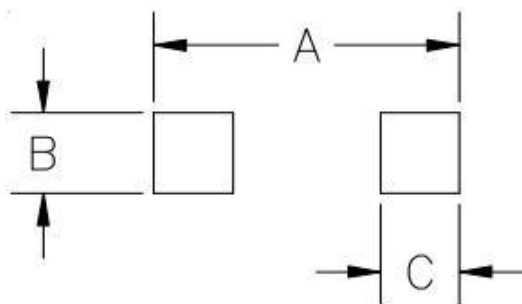


Package Mechanical Data



Symbol	Min.(mm)	Max.(mm)
A		1.000
A1	0.000	0.100
A2	0.800	0.900
b	0.250	0.350
c	0.080	0.150
D	1.200	1.400
E	1.600	1.800
E1	2.500	2.700
L	0.475REF	
L1	0.250	0.400
θ	0°	8°

Suggested Land Pattern



SYM	DIMENSIONS	
	MILLIMETERS	INCHES
A	3.15	0.120
B	0.80	0.031
C	0.80	0.031

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