

Description

The SENXX12S2 is an uni-directional TVS diode array, utilizing leading 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 SENXX12S2 complies with the IEC 61000-4-2 (ESD) standard with $\pm 30\text{kV}$ air and $\pm 30\text{kV}$ contact discharge. It is assembled into a lead-free SOT-23 package. It is designed to protect components which are connected to data and transmission lines from voltage surges.

Features

- 350W peak pulse power (8/20us)
- Protects one bi-directional or two uni-directional line(s)
- 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

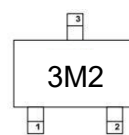
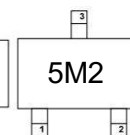
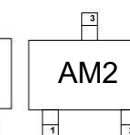
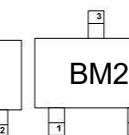
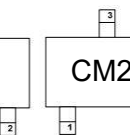
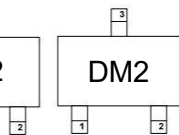
Mechanical Characteristics

- Package: SOT-23
- Lead Finish: Matte Tin
- 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

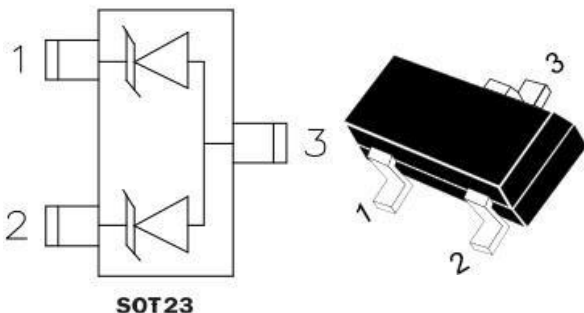
Applications

- Cellular Handsets and Accessories
- Personal Digital Assistants
- Notebooks and Handhelds
- Portable Instrumentation
- Set Top Box
- Industrial Controls
- Server and Desktop PC

Marking Information

					
SEN3312S2	SEN0512S2	SEN1212S2	SEN1512S2	SEN2412S2	SEN3612S2

Dimensions & Symbol (Unit: mm Max)



Details marking code reference specification of approval list

Ordering information

Part Number	Packaging	Reel Size
SEN3312S2	3000/Tape & Reel	7 inch
SEN0512S2	3000/Tape & Reel	7 inch
SEN1212S2	3000/Tape & Reel	7 inch
SEN1512S2	3000/Tape & Reel	7 inch
SEN2412S2	3000/Tape & Reel	7 inch
SEN3612S2	3000/Tape & Reel	7 inch

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

SEN3312S2			
Parameter	Symbol	Value	Unit
Peak Pulse Power (8/20 μs)	Ppp	300	W
Peak Pulse Current (8/20 μs)	Ipp	25	A
ESD per IEC 61000-4-2 (Air)	VESD	± 30	kV
ESD per IEC 61000-4-2 (Contact)		± 30	
Operating Temperature Range	TJ	-55 to +125	$^{\circ}\text{C}$
Storage Temperature Range	Tstg	-55 to +150	$^{\circ}\text{C}$
SEN0512S2			
Parameter	Symbol	Value	Unit
Peak Pulse Power (8/20 μs)	Ppp	300	W
Peak Pulse Current (8/20 μs)	Ipp	18	A
ESD per IEC 61000-4-2 (Air)	VESD	± 30	kV
ESD per IEC 61000-4-2 (Contact)		± 30	
Operating Temperature Range	TJ	-55 to +125	$^{\circ}\text{C}$
Storage Temperature Range	Tstg	-55 to +150	$^{\circ}\text{C}$
SEN1212S2			
Parameter	Symbol	Value	Unit
Peak Pulse Power (8/20 μs)	Ppp	300	W
Peak Pulse Current (8/20 μs)	Ipp	12	A
ESD per IEC 61000-4-2 (Air)	VESD	± 30	kV
ESD per IEC 61000-4-2 (Contact)		± 30	
Operating Temperature Range	TJ	-55 to +125	$^{\circ}\text{C}$
Storage Temperature Range	Tstg	-55 to +150	$^{\circ}\text{C}$

SEN1512S2

Parameter	Symbol	Value	Unit
Peak Pulse Power (8/20μs)	Ppp	300	W
Peak Pulse Current (8/20μs)	Ipp	10	A
ESD per IEC 61000-4-2 (Air)	VESD	±30	kV
ESD per IEC 61000-4-2 (Contact)		±30	
Operating Temperature Range	TJ	-55 to +125	°C
Storage Temperature Range	Tstg	-55 to +150	°C

SEN2412S2

Parameter	Symbol	Value	Unit
Peak Pulse Power (8/20μs)	Ppp	300	W
Peak Pulse Current (8/20μs)	Ipp	5	A
ESD per IEC 61000-4-2 (Air)	VESD	±30	kV
ESD per IEC 61000-4-2 (Contact)		±30	
Operating Temperature Range	TJ	-55 to +125	°C
Storage Temperature Range	Tstg	-55 to +150	°C

SEN3612S2

Parameter	Symbol	Value	Unit
Peak Pulse Power (8/20μs)	Ppp	300	W
Peak Pulse Current (8/20μs)	Ipp	4	A
ESD per IEC 61000-4-2 (Air)	VESD	±30	kV
ESD per IEC 61000-4-2 (Contact)		±30	
Operating Temperature Range	TJ	-55 to +125	°C
Storage Temperature Range	Tstg	-55 to +150	°C

Electrical Characteristics (T_A=25°C)

SEN3312S2

Parameter	Symbol	Min	Typ	Max	Unit	Test Condition
Reverse Working Voltage	VRWM			3.3	V	
Breakdown Voltage	VBR	4.0			V	IT = 1mA
Reverse Leakage Current	IR			1	uA	VRWM = 3.3V
Clamping Voltage	VC		7.5		V	IPP = 1A (8 x 20uS pulse)
Clamping Voltage	VC			14	V	IPP = 25A (8 x 20uS pulse)
Junction Capacitance	CJ			240	pF	VR = 0V, f = 1MHz

SEN0512S2

Parameter	Symbol	Min	Typ	Max	Unit	Test Condition
Reverse Working Voltage	VRWM			5	V	
Breakdown Voltage	VBR	6.0			V	IT = 1mA
Reverse Leakage Current	IR			1		VRWM = 5V
Clamping Voltage	VC		9.8		V	IPP = 1A (8 x 20uS pulse)
Clamping Voltage	VC			16.7	V	IPP = 18A (8 x 20uS pulse)
Junction Capacitance	CJ			180	pF	VR = 0V, f = 1MHz

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Parameter	Symbol	Min	Typ	Max	Unit	Test Condition
Reverse Working Voltage	VRWM			12	V	
Breakdown Voltage	VBR	13.3			V	IT = 1mA
Reverse Leakage Current	IR			1	uA	VRWM = 12V
Clamping Voltage	VC		19		V	IPP = 1A (8 x 20uS pulse)
Clamping Voltage	VC			25	V	IPP = 12A (8 x 20uS pulse)
Junction Capacitance	CJ			60	pF	VR = 0V, f = 1MHz

SEN1512S2

Parameter	Symbol	Min	Typ	Max	Unit	Test Condition
Reverse Working Voltage	VRWM			15	V	
Breakdown Voltage	VBR	16.7			V	IT = 1mA
Reverse Leakage Current	IR			1	uA	VRWM =15V
Clamping Voltage	VC		24		V	IPP = 1A (8 x 20uS pulse)
Clamping Voltage	VC			35	V	IPP = 10A (8 x 20uS pulse)
Junction Capacitance	CJ			55	pF	VR = 0V, f = 1MHz

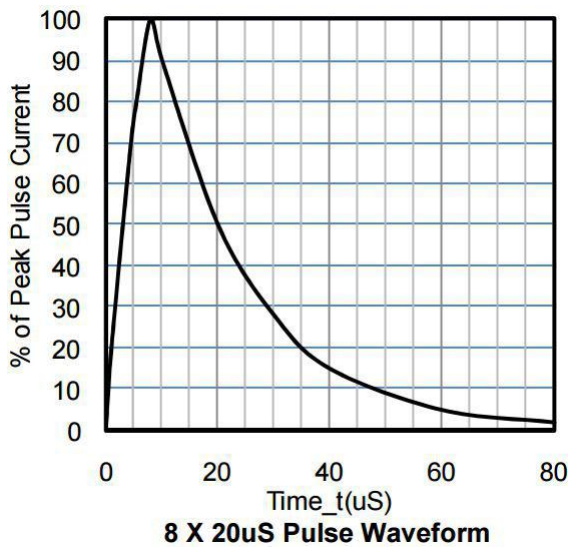
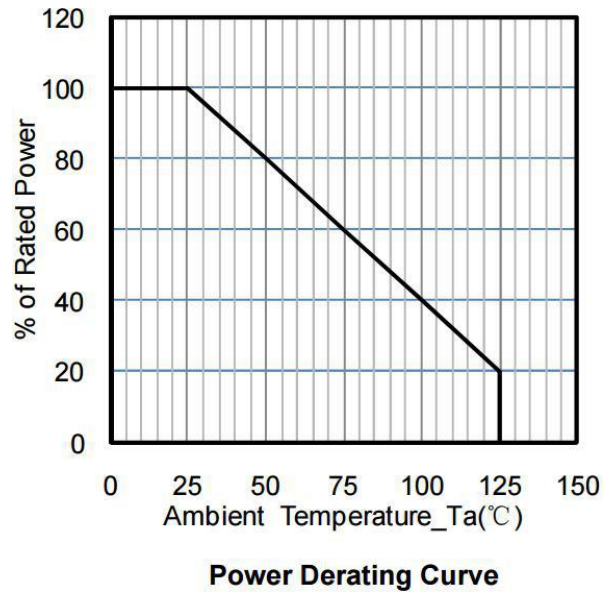
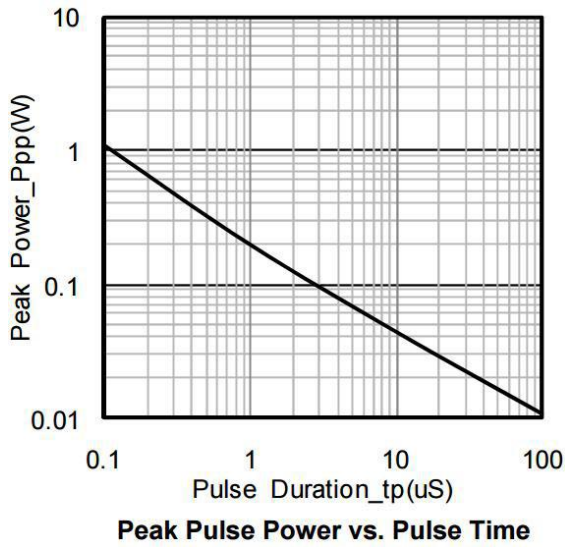
SEN2412S2

Parameter	Symbol	Min	Typ	Max	Unit	Test Condition
Reverse Working Voltage	VRWM			24	V	
Breakdown Voltage	VBR	26.7			V	IT = 1mA
Reverse Leakage Current	IR			1	uA	VRWM =24V
Clamping Voltage	VC		35		V	IPP = 1A (8 x 20uS pulse)
Clamping Voltage	VC			55	V	IPP = 5A (8 x 20uS pulse)
Junction Capacitance	CJ			36	pF	VR = 0V, f = 1MHz

SEN3612S2

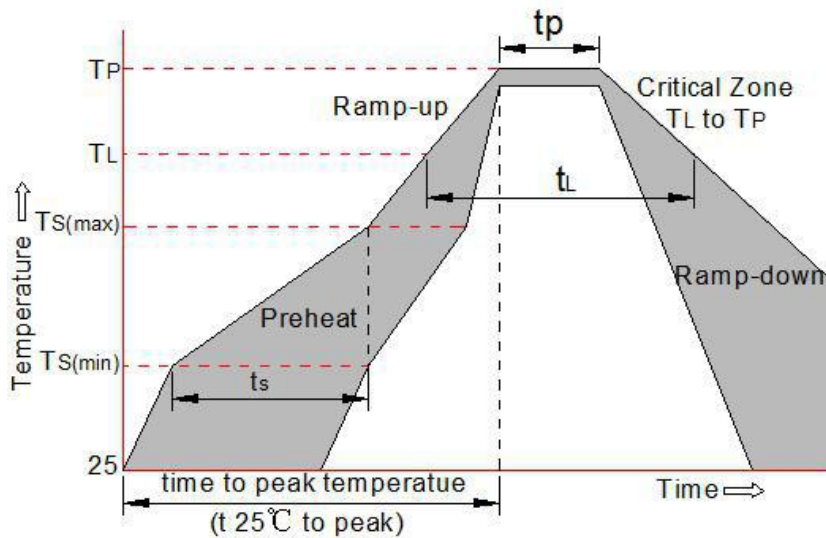
Parameter	Symbol	Min	Typ	Max	Unit	Test Condition
Reverse Working Voltage	VRWM			36	V	
Breakdown Voltage	VBR	40			V	IT = 1mA
Reverse Leakage Current	IR			1	uA	VRWM =36V
Clamping Voltage	VC		60		V	IPP = 1A (8 x 20uS pulse)
Clamping Voltage	VC			75	V	IPP = 4A (8 x 20uS pulse)
Junction Capacitance	CJ			30	pF	VR = 0V, f = 1MHz

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

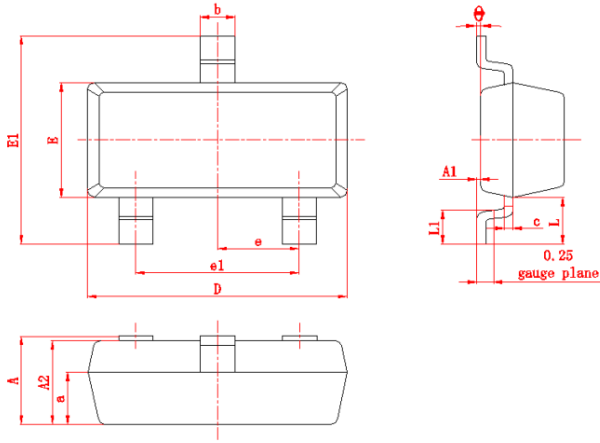


Soldering Parameters

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

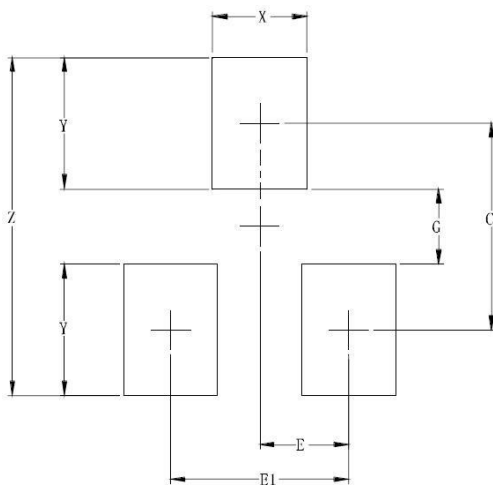


Package Mechanical Data



SYM	DIMENSIONS					
	INCHES			MILLIMETERS		
	MIN	NOM	MAX	MIN	NOM	MAX
A	.035	-	.044	0.90	-	1.12
A1	.000	-	.004	0.01	-	0.10
A2	.035	.037	.040	0.90	0.95	1.05
b	0.012	-	.020	0.30	-	0.51
c	0.03	-	.007	0.08	-	0.18
D	.110	.114	.120	2.80	2.90	3.04
E1	.082	.093	.104	2.25	2.37	2.55
E	.047	.051	.055	1.20	1.30	1.40
e	.075			1.90		
e1	.037			0.95		
L1	.015	.020	.024	0.40	0.50	0.60
L	.022			0.55		
N	3			3		
θ	0°	-	8°	0°	-	8°

Suggested Land Pattern



SYM	DIMENSIONS	
	INCHES	MILLIMETERS
C	.087	2.20
E	.037	0.95
E1	.075	1.90
G	.031	0.80
X1	.039	1.00
Y	.055	1.40
Z	.141	3.60

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