

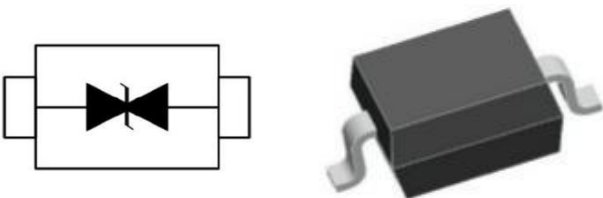
Description

The SENXX01D3 is a bi-directional TVS diode, utilizing leading monolithic silicon technology to provide fast response time and low ESD clamping voltage, making this device an ideal solution for protecting voltage sensitive high-speed data lines. The SENXX01D3 has a low capacitance with a typical value at 1pF, and 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 leadfree SOD-323 package. The small size, low capacitance and high ESD surge protection make SENXX01D3 an ideal choice to protect cell phone, wireless systems, and communication equipment. .

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

- Cell Phone Handsets and Accessories
- Microprocessor based equipment
- Personal Digital Assistants (PDA's)
- Notebooks, Desktops, and Servers
- Portable Instrumentation
- Networking and Telecom
- Serial and Parallel Ports.
- Peripherals

Marking Information



SEN3301D3	SEN0501D3	SEN1201D3	SEN1501D3	SEN2401D3	SEN3601D3
03B	05B	12B	15B	24B	36B

Details marking code reference customer approval list

Ordering Information

Part Number	Packaging	Reel Size
SEN3301D3	3000/Tape & Reel	7 inch
SEN0501D3	3000/Tape & Reel	7 inch
SEN1201D3	3000/Tape & Reel	7 inch
SEN1501D3	3000/Tape & Reel	7 inch
SEN2401D3	3000/Tape & Reel	7 inch
SEN3601D3	3000/Tape & Reel	7 inch

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

SEN3301D3			
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)	V_{ESD}	± 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	$^{\circ}\text{C}$
SEN0501D3			
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)	V_{ESD}	± 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	$^{\circ}\text{C}$
SEN1201D3			
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)	V_{ESD}	± 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	$^{\circ}\text{C}$

SEN1501D3

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

SEN2401D3

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

SEN3601D3

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

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

SEN3301D3

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			0.5	μA	$V_{RWM} = 3.3\text{V}$
Clamping Voltage	V_C		7		V	$I_{PP} = 1\text{A}$ (8 x 20 μs pulse)
Clamping Voltage	V_C			19	V	$I_{PP} = 20\text{A}$ (8 x 20 μs pulse)
Junction Capacitance	C_J		450		pF	$V_R = 0\text{V}$, $f = 1\text{MHz}$

SEN0501D3

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			0.2	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			21	V	$I_{PP} = 17\text{A}$ (8 x 20 μs pulse)
Junction Capacitance	C_J		200		pF	$V_R = 0\text{V}$, $f = 1\text{MHz}$

SEN1201D3

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			0.1	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		75		pF	$V_R = 0\text{V}$, $f = 1\text{MHz}$

SEN1501D3

Parameter	Symbol	Min	Typ	Max	Unit	Test Condition
Reverse Working Voltage	V_{RWM}			15	V	
Breakdown Voltage	V_{BR}	16.7			V	$I_T = 1mA$
Reverse Leakage Current	I_R			0.1	μA	$V_{RWM} = 15V$
Clamping Voltage	V_C		24		V	$I_{PP} = 1A$ (8 x 20 μs pulse)
Clamping Voltage	V_C			38	V	$I_{PP} = 10A$ (8 x 20 μs pulse)
Junction Capacitance	C_J		68		pF	$V_R = 0V, f = 1MHz$

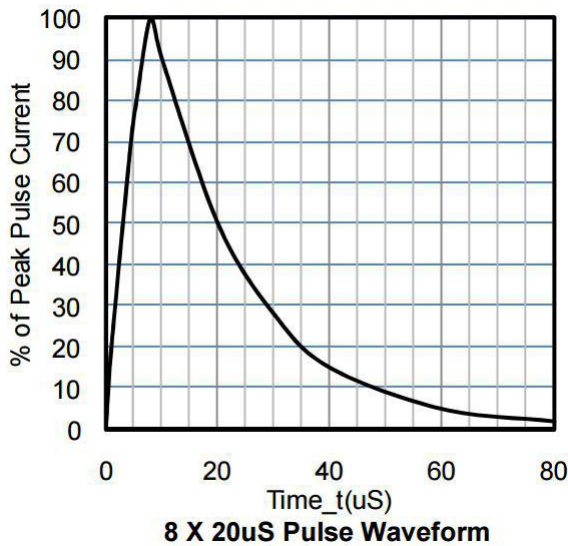
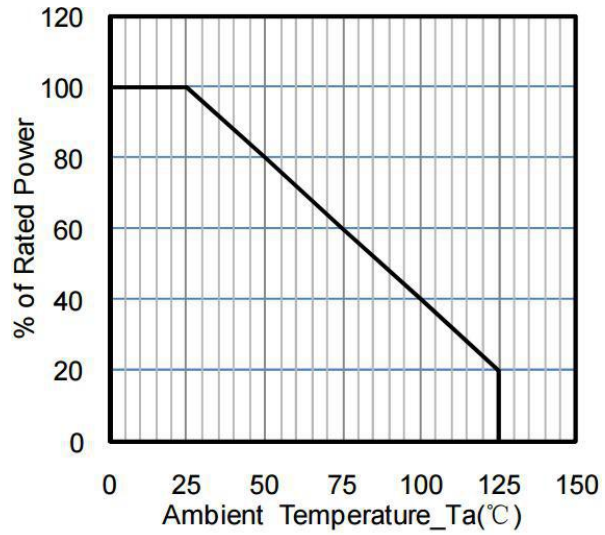
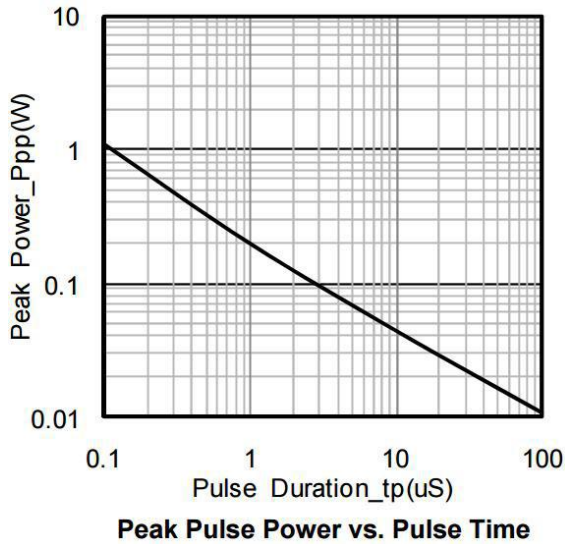
SEN2401D3

Parameter	Symbol	Min	Typ	Max	Unit	Test Condition
Reverse Working Voltage	V_{RWM}			24	V	
Breakdown Voltage	V_{BR}	26.7			V	$I_T = 1mA$
Reverse Leakage Current	I_R			0.1	μA	$V_{RWM} = 24V$
Clamping Voltage	V_C		43		V	$I_{PP} = 1A$ (8 x 20 μs pulse)
Clamping Voltage	V_C			52	V	$I_{PP} = 7A$ (8 x 20 μs pulse)
Junction Capacitance	C_J		57		pF	$V_R = 0V, f = 1MHz$

SEN3601D3

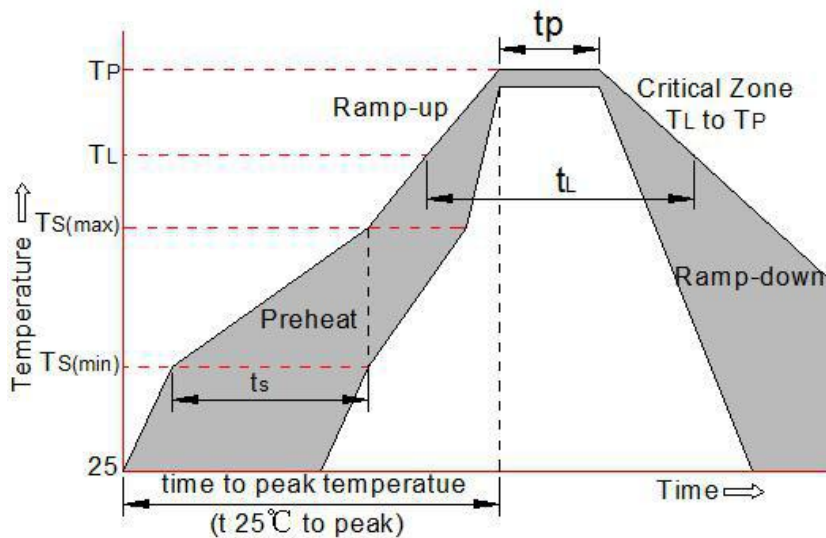
Parameter	Symbol	Min	Typ	Max	Unit	Test Condition
Reverse Working Voltage	V_{RWM}			36	V	
Breakdown Voltage	V_{BR}	40			V	$I_T = 1mA$
Reverse Leakage Current	I_R			0.1	μA	$V_{RWM} = 36V$
Clamping Voltage	V_C		63		V	$I_{PP} = 1A$ (8 x 20 μs pulse)
Clamping Voltage	V_C			80	V	$I_{PP} = 5A$ (8 x 20 μs pulse)
Junction Capacitance	C_J		35		pF	$V_R = 0V, f = 1MHz$

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

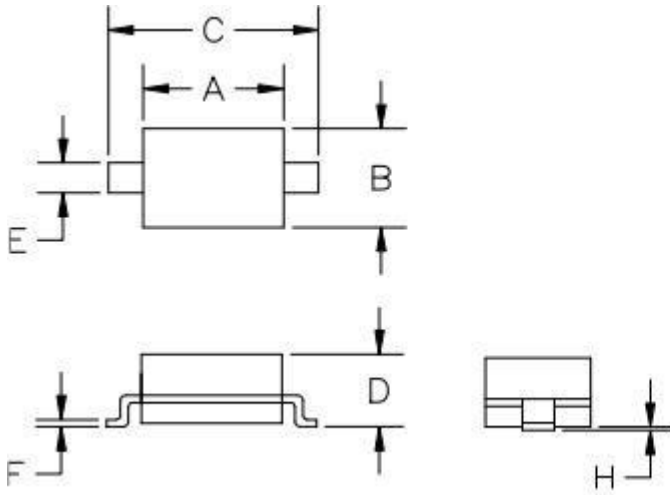


Soldering Parameters

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

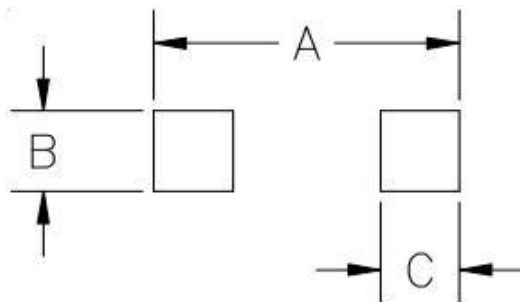


Package Mechanical Data



SYM	DIMENSIONS			
	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	1.50	1.80	0.060	0.071
B	1.20	1.40	0.045	0.054
C	2.30	2.70	0.090	0.107
D	-	1.10	-	0.043
E	0.30	0.40	0.012	0.016
F	0.10	0.25	0.004	0.010
H	-	0.10	-	0.004

Suggested Land Pattern



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

Contact Information

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