

## Single Channel Silicon ESD Protector Overvoltage Protection Device

### Specification Status: Preliminary

#### BENEFITS

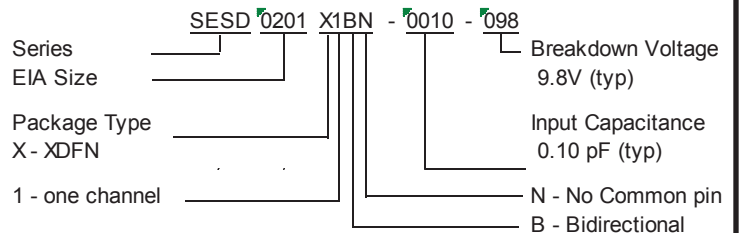
- Industry-leading lowest capacitance; provides lowest insertion loss for high speed data signals
- Small size ESD protection diodes for high speed data signals (0201 size devices)
- Helps protect electronic circuits against damage from Electrostatic Discharge (ESD), surge and cable discharge events
- Assists equipment to pass IEC61000-4-2, level 4 testing

#### FEATURES

- Low capacitance: 0.10 pF (typ, bi-di)
- Low leakage current: 50nA @ 5V (max)
- Low clamping voltage:  $\pm 9.90V$  (typ, bi-di) @ (tp=8x20 $\mu$ s, Ipp= 2A)
- ESD maximum rating per IEC61000-4-2 standard:
  - $\pm 20kV$  contact discharge
  - $\pm 20kV$  air discharge
- Surge: 2A (max, bi-di) @ (tp=8x20 $\mu$ s) per IEC61000-4-2-5
- Small size and low profile: XDFN packages
- Bi-directional operation



#### PART NUMBERING



#### APPLICATIONS

- Consumer, mobile and portable electronics
- Tablet PC and external storage with high speed interfaces
- Ultra-high speed data lines
- USB 3.0/2.0, HDMI 1.3/1.4, DisplayPort, Thunderbolt (Light Peak), V-by-One HS, and LVDS interfaces
- Applications requiring high ESD performance in small packages

#### MATERIALS INFORMATION

RoHS Compliant    ELV Compliant    Halogen Free \*    Lead Free

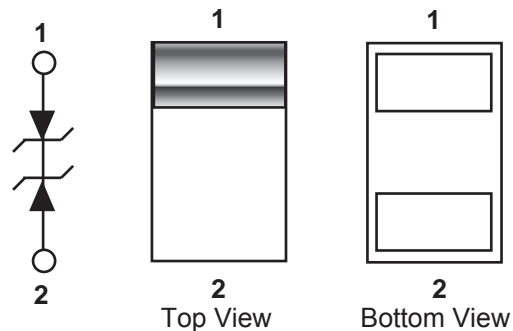
Directive 2000/53/EC  
Compliant

Directive 2002/95/EC  
Compliant



\* Halogen Free refers to: Br $\leq$ 900ppm, Cl $\leq$ 900ppm, Br+Cl $\leq$ 1500ppm  
SESD devices meet MSL-1 Requirements  
DFN case epoxy meets UL 94 V-0

#### SCHEMATIC AND PIN CONFIGURATION



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### DEVICE MAXIMUM RATING

ESD withstand <sup>(1)</sup> (IEC 61000-4-2, level 4)		Temperature		Peak Current (tp=8x20µs)
Contact (kV)	Air (kV)	Operating (°C)	Storage (°C)	Ipp (A)
± 20	± 20	-55 to +125	-55 to +150	2.0

<sup>(1)</sup> 20kV @ ± 1 pulse; 10kV @ ± 50 pulses; 8kV @ 1,000 pulses (under IEC6100-4-2)

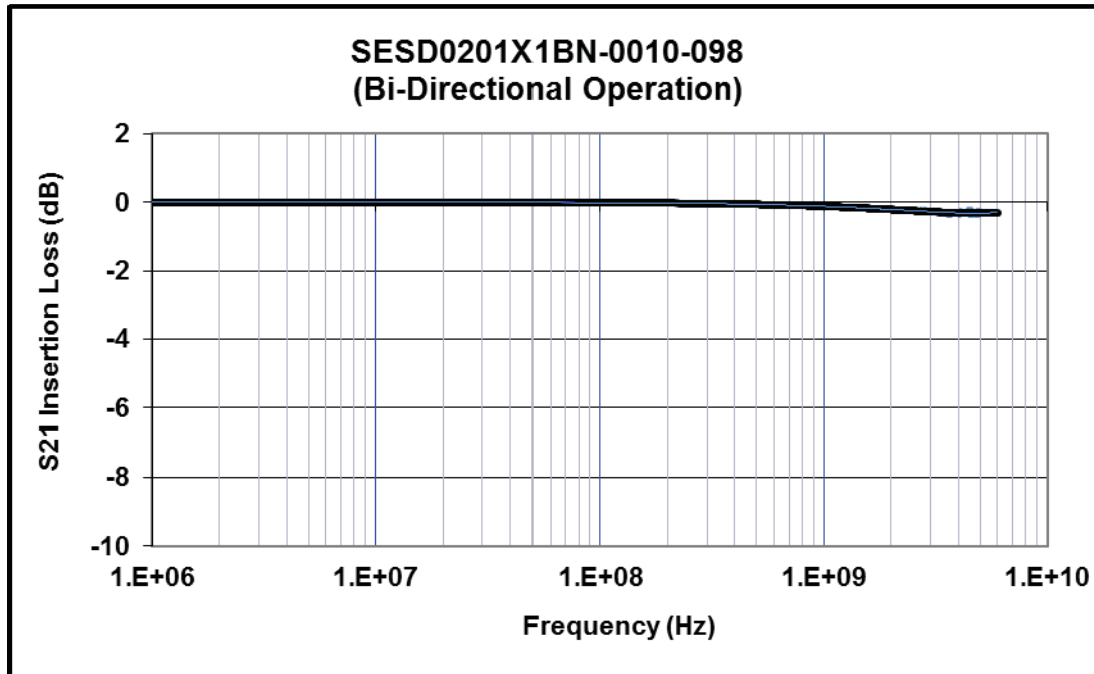
- Device maximum rating @ T = 25°C, unless otherwise specified.
- Caution: Stress exceeding Device Maximum Ratings may damage the device.  
Prolonged exposure to stresses above the recommended operating conditions may affect device reliability.

### DEVICE ELECTRICAL CHARACTERISTICS

Input Capacitance @ V <sub>R</sub> = 0V, f = 3GHz (pF)		Breakdown Voltage V <sub>BR</sub> @ I <sub>T</sub> =1mA (V)	Reverse Working Voltage (V)		Reverse Leakage Current I <sub>L</sub> @ V <sub>WRV</sub> =5.0V (nA)		Clamping Voltage V <sub>CL</sub> @ Ipp=2.0A (V)
Typ	Maximum	Typ	Min	Max	Typ	Max	Max
0.10	0.12	+9.80 / -9.80	-9.00	+9.00	<5.0	50.0	+9.90 / -9.90

- All device electrical characteristics @ T = 25°C, unless otherwise specified.

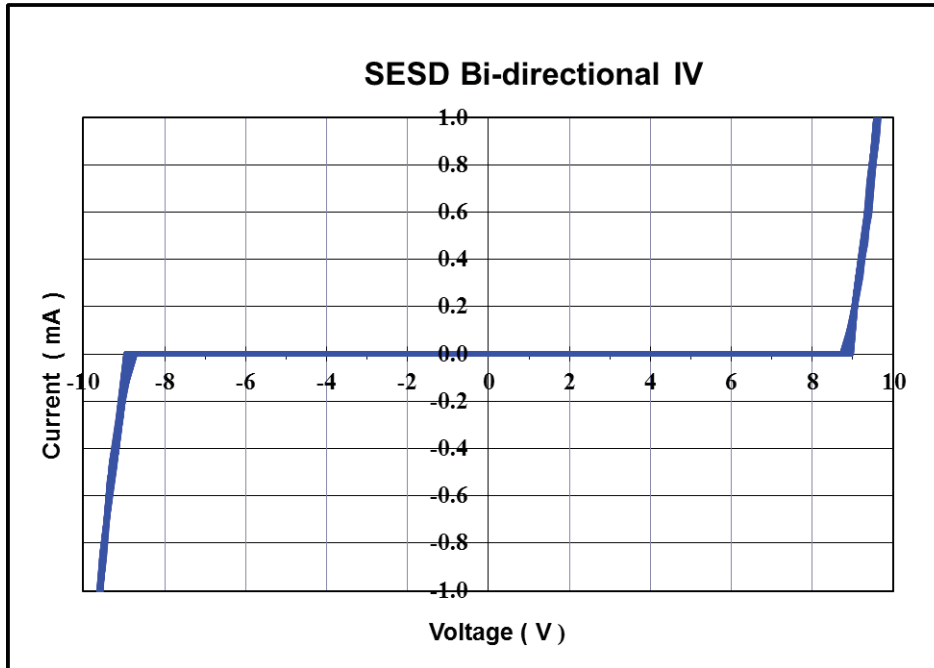
### FIGURE 1. INSERTION LOSS DIAGRAM



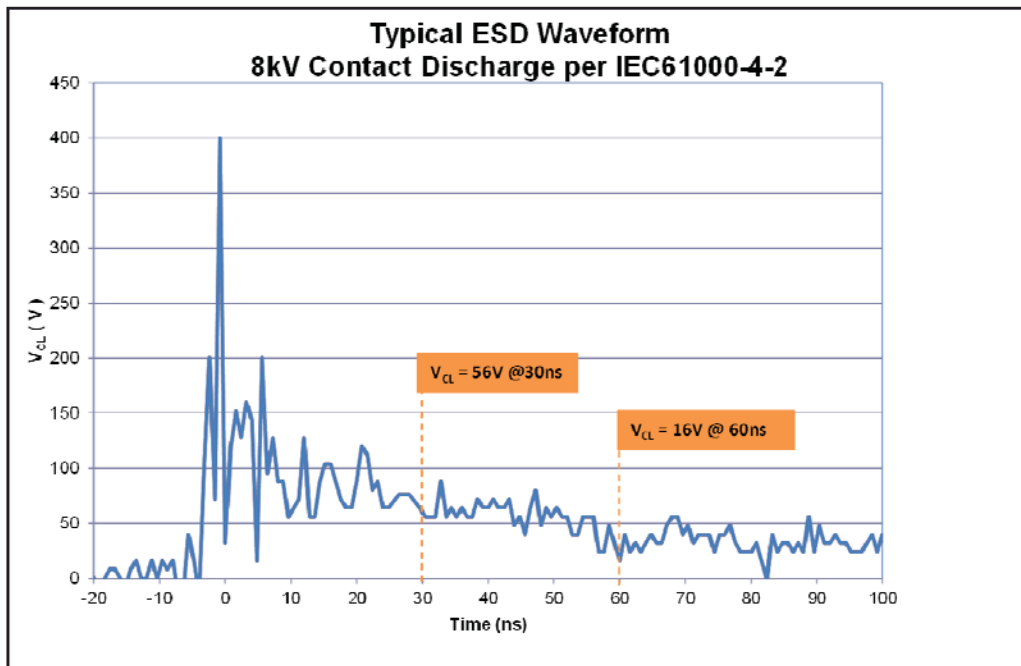
Application	Bit Rate (Gbps)	@Freq (GHz)	Ins. Loss (dB)
HDMI 1.4 (1080P)	2.25	1.13	-0.12
DisplayPort	2.70	1.35	-0.16
HDMI 1.4 (max spec)	3.40	1.70	-0.19
USB3.0	5.00	2.50	-0.23
eSATA	6.00	3.00	-0.27
Thunderbolt	10.0	5.00	-0.30

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**FIGURE 2. DEVICE IV CURVE**

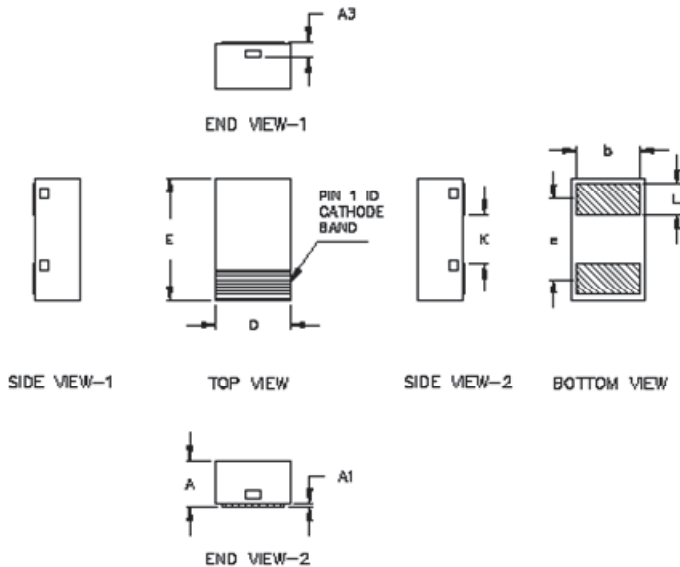


**FIGURE 3. ESD WITHSTAND**



## Single Channel Silicon ESD Protector Overvoltage Protection Device

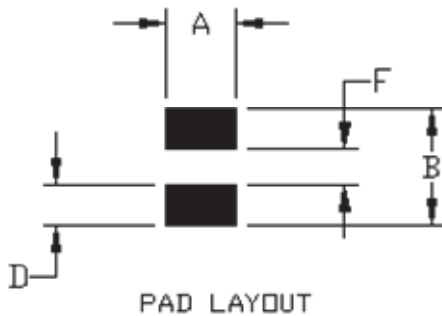
### DEVICE DIMENSIONS



SESD0201X1BN-0010-098						
Dim	Millimeters (mm)			Inches (in)		
	Min	Nom	Max	Min	Nom	Max
A	0.30	0.31	0.32	0.0115	0.0122	0.0125
A1	0	-	0.05	0	-	0.0020
A3	0.102 ref.			0.0040 ref.		
D	0.285	0.320	0.355	0.0112	0.0120	0.0139
E	0.585	0.620	0.655	0.0230	0.0244	0.0237
K	0.130	0.155	0.180	0.0052	0.0061	0.0071
b	0.235	0.260	0.285	0.0083	0.0102	0.0112
L	0.175	0.200	0.225	0.0069	0.0079	0.0088
e	0.355 BSC			0.014 BSC		

BSC – Basic Spacing between Centers

### RECOMMENDED LANDING PATTERN:



SESD Landing Pad Layout 0201 Package		
Symbol	Milimeters (mm)	Inches (in)
A	0.32	0.013
B	0.62	0.024
D	0.24	0.009
F	0.14	0.006

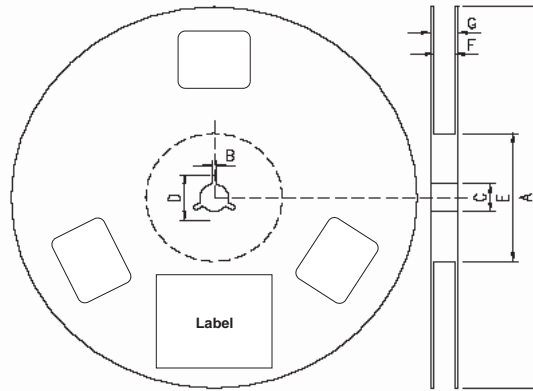
### PACKAGING

Packaging	Tape & Reel	Standard Box
SESD0201X1BN-0010-098	15,000	75,000

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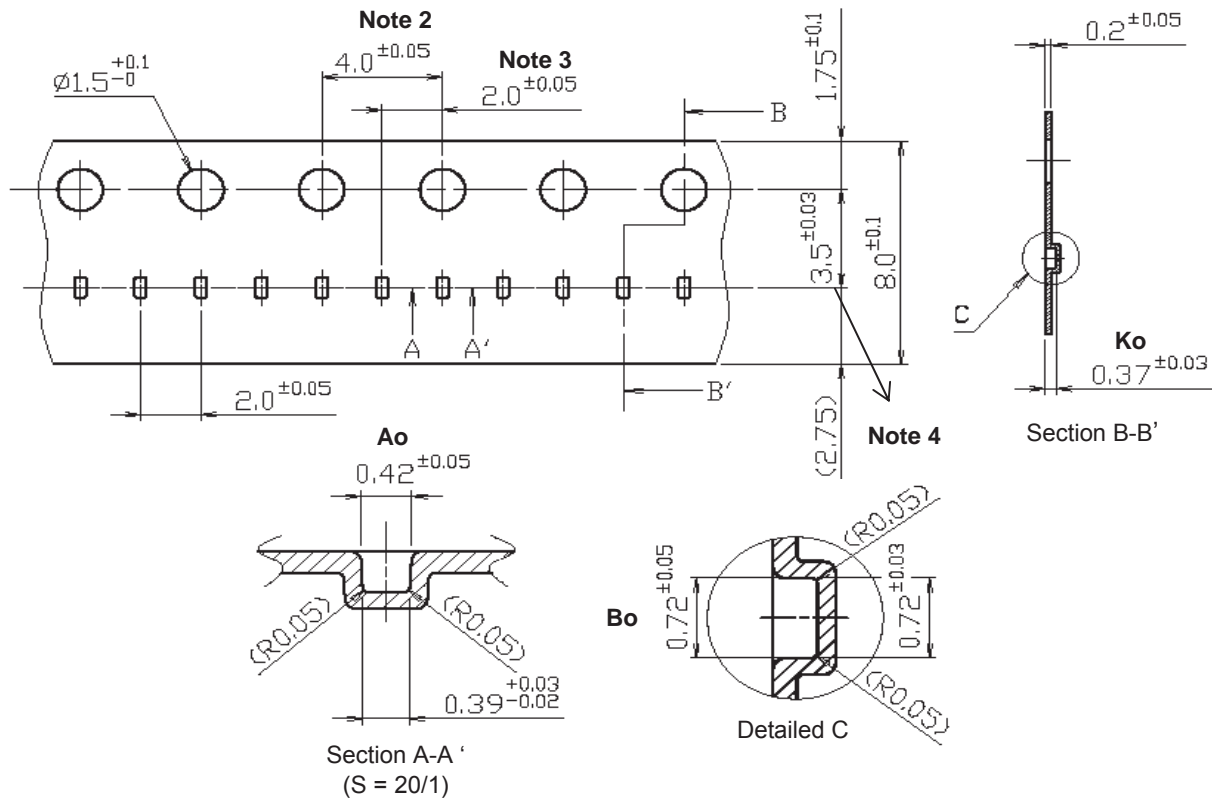
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## REEL DIMENSIONS



Dimensions	A	B	C	D	E	F	G
(mm)	180.0 ± 1.5	23.0 ± 0.2	13.0 + 0.5 / -0.2	17.3 ± 0.2	60.5 ± 1.5	8.4 + 1.5/-0.0	14.4 (max)

## CARRIER TAPE DIMENSIONS



Ao	0.42 ± 0.05
Bo	0.72 ± 0.05
Ko	0.37 ± 0.05

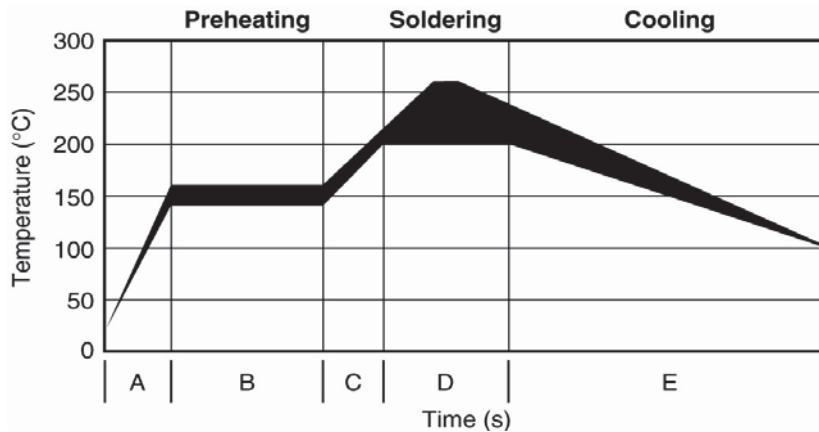
**Note 1.** All dimensions in mm  
**Note 2.** Cumulative tolerance is 200 ± 0.3 / 50MM pitch  
**Note 3.** Center point of hole tolerance is 2.0 ± 0.5  
**Note 4.** Center point of hole tolerance is 3.5 ± 0.5

## Single Channel Silicon ESD Protector Overvoltage Protection Device

### SOLDER REFLOW RECOMMENDATION

A	Temperature ramp up 1	From ambient to Preheating temperature	30s to 60s
B	Preheating	140°C - 160°C	60s to 120s
C	Temperature ramp up 2	From Preheating to Main heating temperature	20s to 40s
D	Main heating	at 200°C at 220°C at 240°C at 260°C	60s ~ 70s 50s ~ 60s 30s ~ 40s 5s ~ 10s
E	Cooling	From main heating temperature to 100°C	4°C/s (max)

**FIGURE 4. REFLOW PROFILE**



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