

Multi-Channel Silicon ESD Protector Overvoltage Protection Device

PRODUCT: SESD0402Q2UG-0020-090

DOCUMENT: SCD28188
REV LETTER: B
REV DATE: FEBRUARY 6, 2012
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Specification Status: RELEASED

BENEFITS

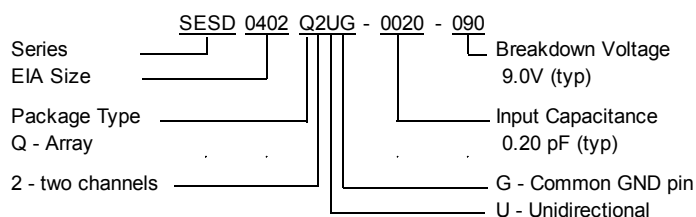
- Industry-leading lowest capacitance; provides lowest insertion loss for high speed data signals
- Industry's smallest footprint and lowest profile multi-channel ESD array helps to optimize board space
- Flow-through and single connection design helps routing PCB matched impedance high speed data lines
- 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



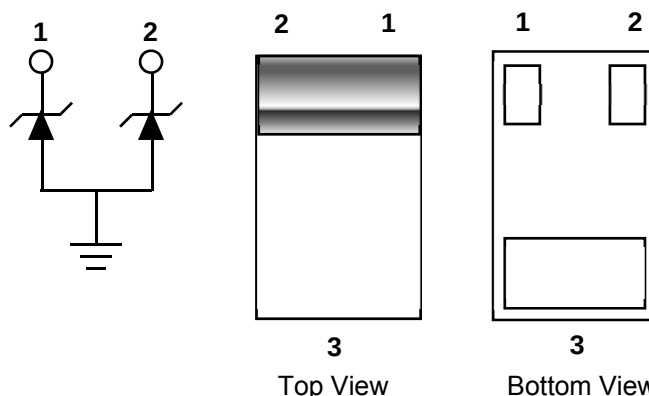
FEATURES

- Low Capacitance: 0.20 pF (200fF) (typ)
- Low leakage current : 25nA @ 5V (typ)
- Low clamping voltage : +9.20 / -0.80V (typ) @ (tp=8x20μs, Ipp=2A)
- ESD maximum rating per IEC61000-4-2 standard:
 - o 20kV contact discharge
 - o 20kV air discharge
- Surge: 2A (max) @ (tp=8x20μs) per IEC61000-4-5
- Small size and low profile XDFN array package: 0.31mm height

PART NUMBERING



SCHEMATIC AND PIN CONFIGURATION



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 DFN 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≤900ppm, Cl≤900ppm, Br+Cl≤1500ppm
SESD devices meet MSL-1 Requirements
DFN case epoxy meets UL 94 V-0

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DEVICE MAXIMUM RATING

ESD Withstand ⁽¹⁾ (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

⁽¹⁾ 20kV @ 1 pulse; 10kV @ 100 pulses; 8kV @ 1,000 pulses (under IEC6100-4-2)

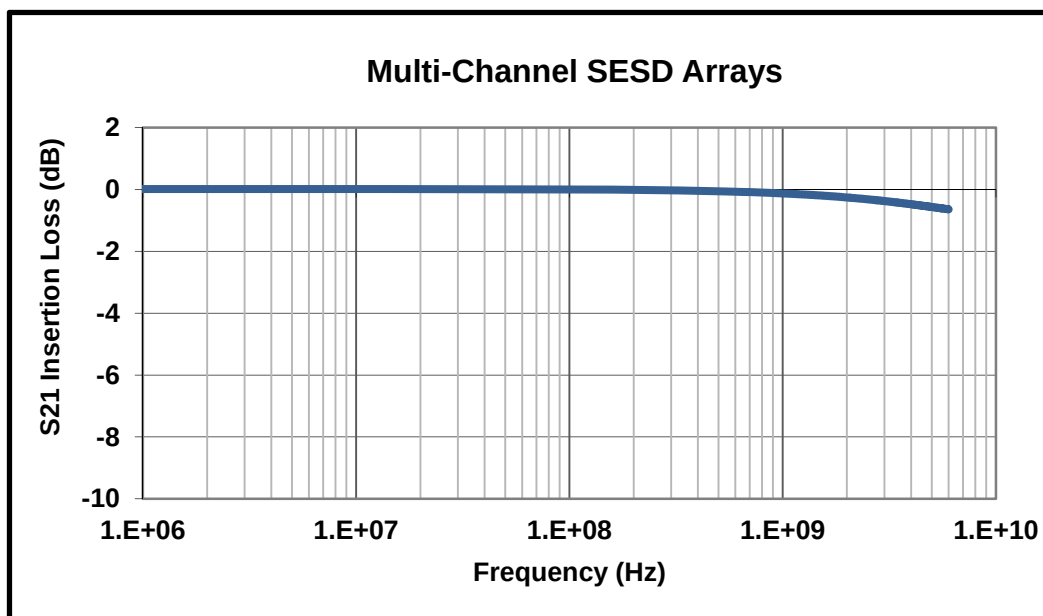
- Device maximum rating @ T = 25°C, unless otherwise specified.
- Caution: Stress exceeding Device Maximum Ratings may damage the device.
Prolonged exposure to stresses above the recommended operating conditions may affect device reliability.

DEVICE ELECTRICAL CHARACTERISTICS

Input Capacitance @ V _R = 0V, f = 3GHz, I/O to GND (pF)		Breakdown Voltage V _{BR} @ I _T =1mA (V)	Reverse Working Voltage (V)		Reverse Leakage Current I _L @ V _{RWM} =5.0V (nA)		Clamping Voltage V _{CL} @ Ipp=2.0A (V)
Typ	Maximum	Typ	Min	Max	Typ	Max	Typ
0.20	0.22	+9.00 / -0.80	0	+8.00	25.0	50.0	+9.20 / -0.80

- 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	-0.15
DisplayPort	2.70	1.35	-0.20
HDMI 1.4 (4K / QuadHD)*	3.40	1.70	-0.23
USB3.0	5.00	2.50	-0.29
eSATA	6.00	3.00	-0.35
Thunderbolt	10.0	5.00	-0.50

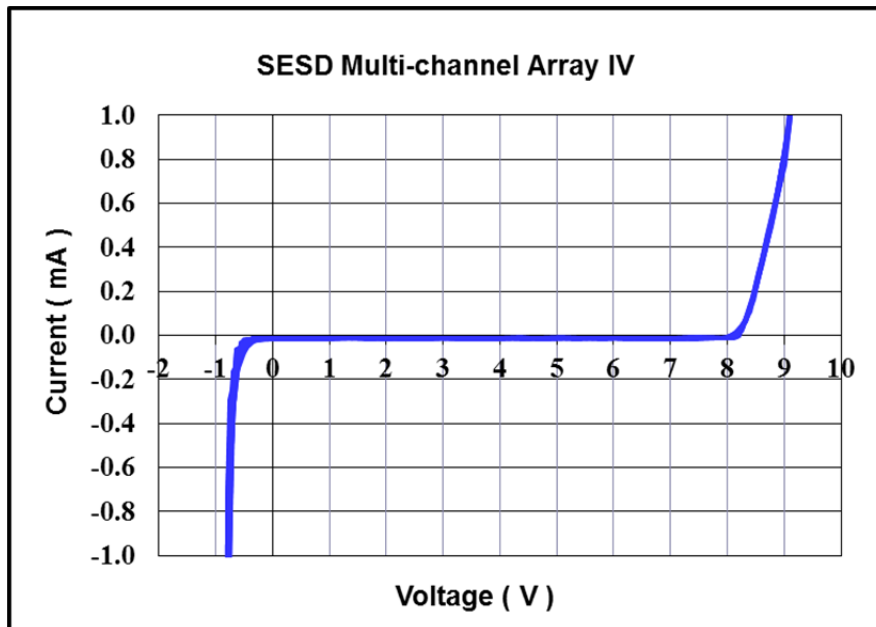
*HDMI 4K / QuadHD resolutions (4096 x 2160) ready

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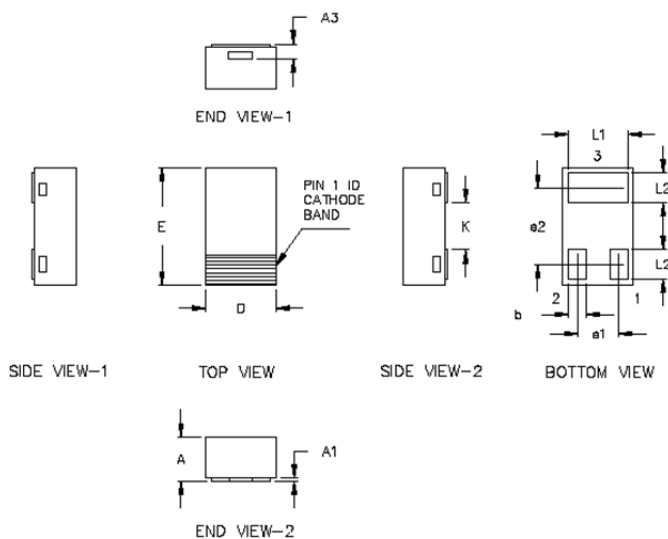
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FIGURE 2. DEVICE IV CURVE



DEVICE DIMENSIONS



SESD0402Q2UG-0020-090						
Dim	Millimeters (mm)			Inches (in)		
	Min	Nom	Max	Min	Nom	Max
A	0.33	0.38	0.43	0.013	0.015	0.017
A1	0	--	0.05	0	--	0.002
A3	0.13 ref.			0.005 ref.		
D	0.55	0.60	0.65	0.022	0.024	0.026
E	0.95	1.00	1.05	0.037	0.039	0.041
K	0.35	0.40	0.45	0.014	0.016	0.018
L1	0.45	0.50	0.55	0.018	0.020	0.022
L2	0.20	0.25	0.30	0.008	0.010	0.012
b	0.10	0.15	0.20	0.004	0.006	0.008
e1	0.35 BSC			0.014 BSC		
e2	0.65 BSC			0.026 BSC		

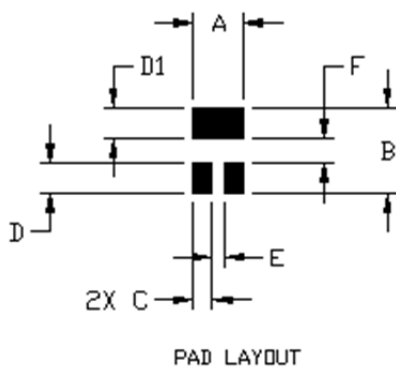
BSC – Basic Spacing between Centers

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RECOMMENDED LANDING PATTERN:

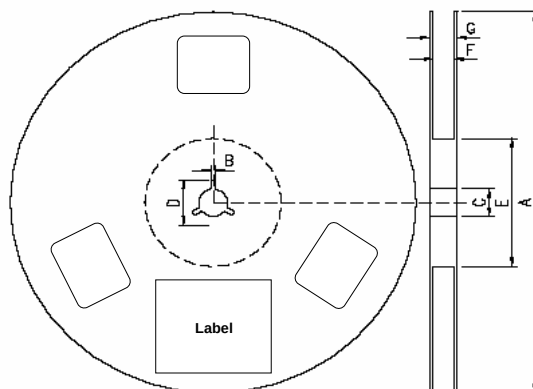


SESD Landing Pad Layout 3 Pin 2-ch 0402 Size Array		
Symbol	Millimeters (mm)	Inches (in)
A	0.60	0.024
B	1.00	0.039
C	0.23	0.009
D	0.35	0.014
D1	0.35	0.014
E	0.15	0.006
F	0.30	0.012

PACKAGING

Packaging	Tape & Reel	Standard Box
SESD0402Q2UG-0020-090	10,000	50,000

REEL DIMENSIONS



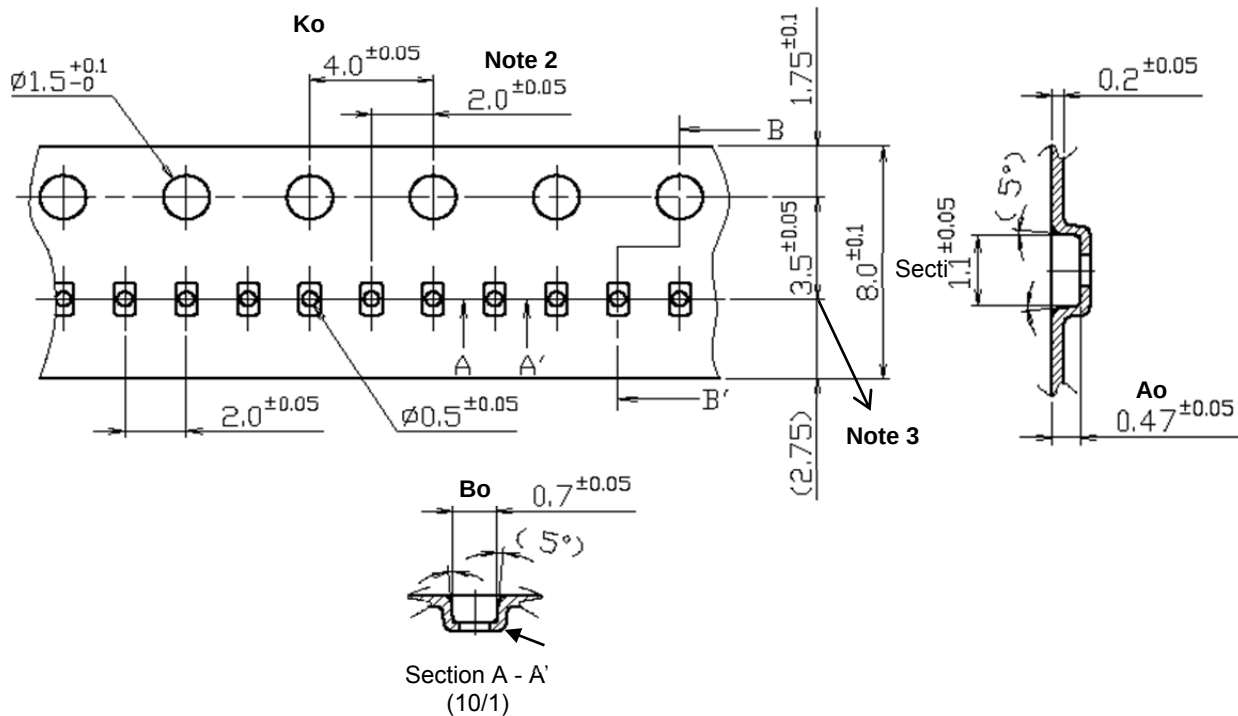
Dimensions	A	B	C	D	E	F	G
(mm)	180.0 ± 1.5	23.0 ± 0.2	13.0 + 0.5 / -0.2	17.3 ± 0.2	60.5 ± 1.5	8.4 +1.5/-0.0	14.4 (max)

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CARRIER TAPE DIMENSIONS



Ao	0.07 ± 0.05
Bo	1.10 ± 0.05
Ko	0.47 ± 0.05

Note 1. All dimensions in mm
Note 2. Cumulative tolerance is $200 \pm 0.3 / 50\text{MM}$ 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

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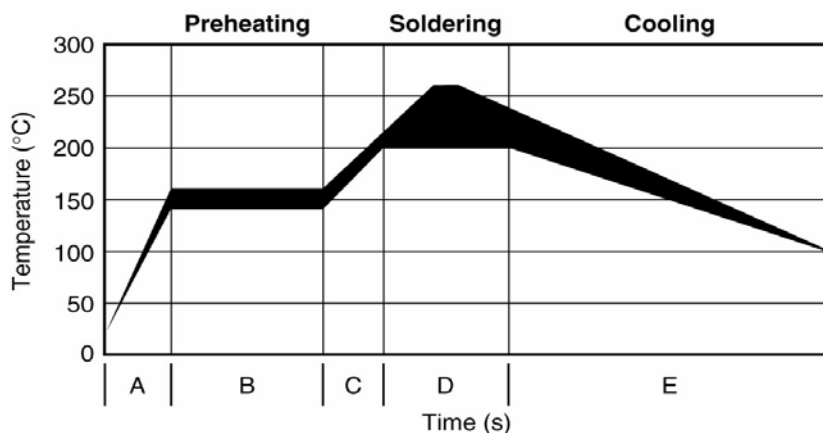
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SOLDER REFLOW RECOMMENDATION

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 3. REFLOW PROFILE



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