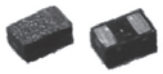

Single-Channel Silicon ESD Protection Devices

NEW

Silicon ESD (SESD) devices help provide protection and improve reliability for applications including consumer, portable and mobile electronics. The 0402- and 0201-sized devices have low capacitance of 0.10pF for bi-directional devices and 0.20pF for uni-directional devices with low insertion loss. This helps provide protection for high-speed data signals. The single-channel SESD devices provide robust ESD protection with industry-leading 20kV contacts and air discharge ratings per IEC61000-4-2 standard. The ultra-low capacitance enables signal integrity for today's highest-speed interfaces including USB 3.0/2.0, HDMI, eSATA, DisplayPort and Thunderbolt.

TE offers the single-channel devices in uni-directional and bi-directional configurations. Bi-directional devices offer the lowest capacitance and insertion loss, allow placement on the PCB without orientation constraint and do not clip signals that swing below ground. Uni-directional devices offer a low negative breakover voltage and help provide protection for high-speed digital interfaces. The 0201-sized XDFN small footprint — measuring a mere 0.6mm x 0.3mm x 0.31mm — offers designers placement flexibility in space-constrained applications.

Benefits

- Low capacitance provides low insertion loss for high speed data signals
- Provides ESD protection up to 20kV contact and air discharge per IEC61000-4-2
- Small size ESD protection diodes for high-speed data signals (0402- and 0201-size devices)
- Helps protect electronic circuits against damage from Electrostatic Discharge (ESD), lightning and cable discharge events
- Assists equipment to pass IEC61000-4-2, level 4 testing

Features

- Low capacitance: at 0.10pF (typ, bi-di) and at 0.20 pF (typ, uni-di)
- Low leakage current: 50nA @ 5V (max)
- Low clamping voltage: +10.0 / - 10.V (typ, bi-di) +9.20 / -0.8V (typ, uni-di) @ (tp=8x20μs, Ipp=2A)
- ESD: 20kV contact / air discharge per IEC61000-4-2
- Surge: 2A (max) @ (tp=8x20μs) per IEC61000-4-5
- Small size and low profile: XDFN packages
- RoHS compliant, Pb and halogen free (refers to: Br≤900ppm, Cl≤900ppm, Br + Cl≤1500ppm)

Applications

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

RoHS Compliant, ELV Compliant HF Halogen Free

Table SE1 Device Maximum Ratings

Part Number	ESD Withstand* (IEC 61000-4-2, level 4) Contact (kV)	ESD Withstand* (IEC 61000-4-2, level 4) Air (kV)	Temperature Operating (°C)	Temperature Storage (°C)	Peak Current (tp=8x20μs) Ipp (A)
SESD0201X1UN-0020-090	± 20	± 20	-55 to +125	-55 to +150	2.0
SESD0402X1UN-0020-090	± 20	± 20	-55 to +125	-55 to +150	2.0
SESD0201X1BN-0010-098	± 20	± 20	-55 to +125	-55 to +150	2.0
SESD0402X1BN-0010-098	± 20	± 20	-55 to +125	-55 to +150	2.0

* 20kV @ 1 pulse; 10kV @ 100 pulses; 8kV @ 1,000 pulses (under IEC6100-4-2)
- Maximum leakage current post 15kV & 20kV pulses is less than 1μA
- 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

Table SE2 Device Electrical Characteristics @ T = 25°C

Part Number	Input Capacitance* Typical (pF)	Input Capacitance* Maximum (pF)	Breakdown Voltage (Typ) V_{BR} @ I_T=1mA (V)	Reverse Working Voltage (V) Min	Reverse Working Voltage (V) Max	Reverse Leakage Current (Typ) I_L @ V_{RWM}=5.0V (nA)	Clamping Voltage (Typ) V_{CL} @ Ipp=2.0A (V)
SESD0201X1UN-0020-090	0.20	0.25	+9.00 / -0.80	0	+7.00	25.0	+9.20 / -0.80
SESD0402X1UN-0020-090	0.20	0.25	+9.00 / -0.80	0	+7.00	25.0	+9.20 / -0.80
SESD0201X1BN-0010-098	0.10	0.13	+9.80 / -9.80	-7.00	+7.00	25.0	+10.0 / -10.0
SESD0402X1BN-0010-098	0.10	0.13	+9.80 / -9.80	-7.00	+7.00	25.0	+10.0 / -10.0

* @ V_R = OV, f = 3GHz

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Figures SE1-SE2 Device IV Characteristics

Figure SE1

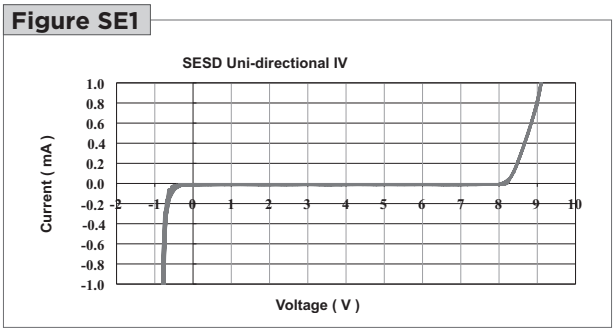
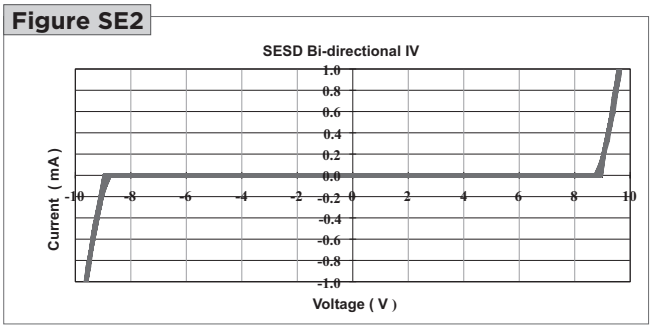


Figure SE2



Figures SE3-SE4 Insertion Loss Diagrams

Application / Protocols	Bit Rate (Gbps)	@Freq (GHz)	Ins. Loss (dB)
HDMI 1.4 (1080P)	2.25	1.13	-0.23
DisplayPort	2.70	1.35	-0.26
HDMI 1.4 (4K / QuadHD)*	3.40	1.70	-0.30
USB 3.0	5.00	2.50	-0.38
eSATA	6.00	3.00	-0.44
Thunderbolt	10.0	5.00	-0.69

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

RoHS Compliant, ELV Compliant HF Halogen Free

Figures SE3-SE4 Insertion Loss Diagrams

Cont'd

Figure SE3

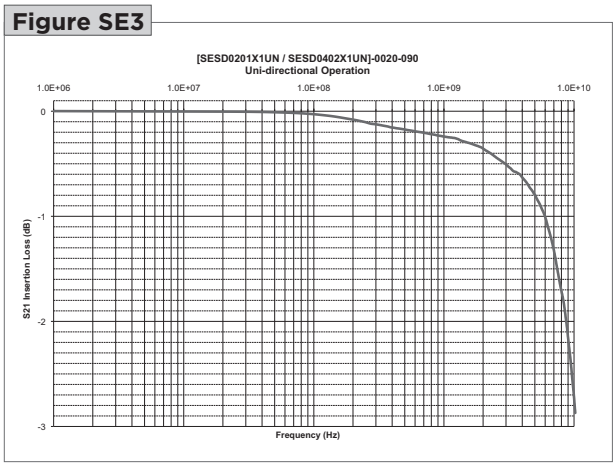
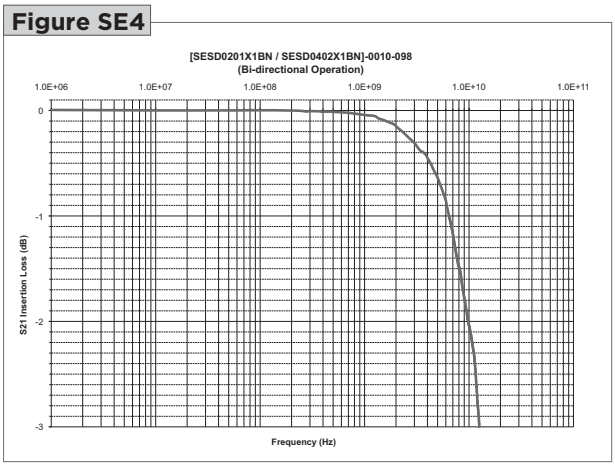


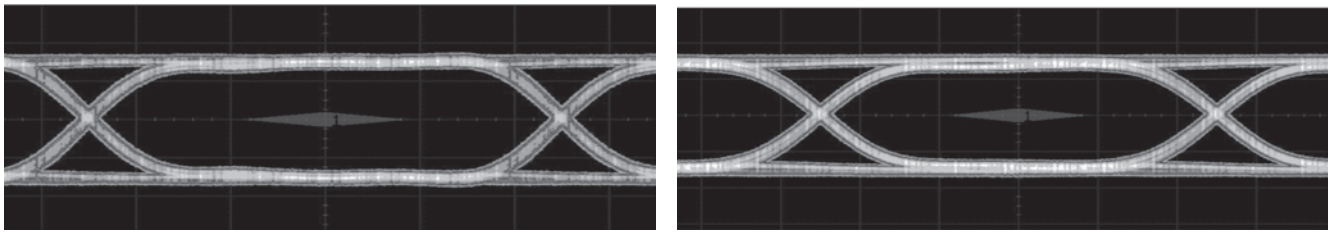
Figure SE4



Figures SE5-SE7 Eye Diagrams

Figure SE5

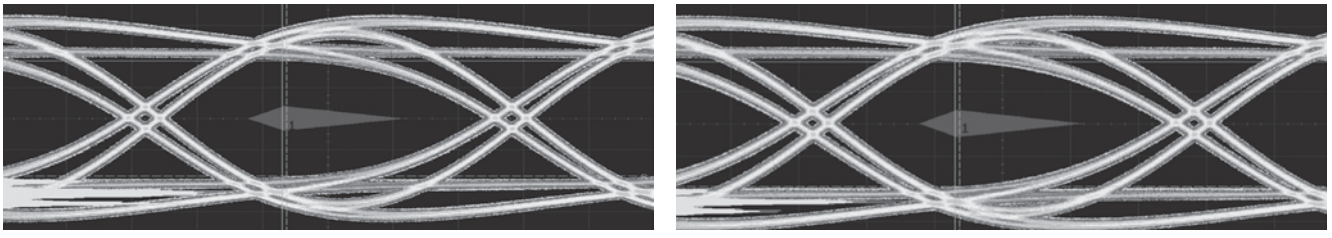
USB 3.0 Eye Diagrams
5.0 Gb/s, 1000mV differential, CPO Compliant Test Pattern



Without SESD Device | **With SESD Device**

Figure SE6

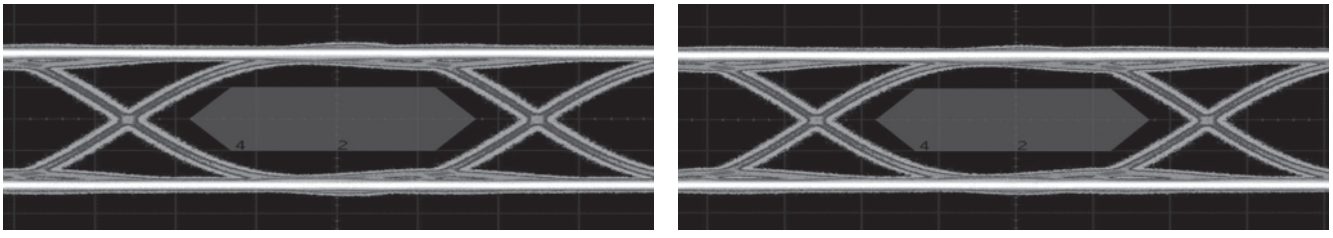
DisplayPort Eye Diagrams
5.4 Gb/s, 800mV differential, PRBS7 Compliant Test Pattern, SSC Enabled



Without SESD Device | **With SESD Device**

Figure SE7

HDMI Eye Diagrams
3.4 Gb/s, 990 mV differential, TMDS Data



Without SESD Device | **With SESD Device**

Table SE3 Dimensions for SESD Devices in Millimeters and (Inches)

Part Number
SESD0201X1UN-0020-090

A			A_1			A_3			D			E		
Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max
0.28	0.30	0.32	0	–	0.05	–	0.102 ref.	–	0.25	0.30	0.35	0.55	0.60	0.65
(0.011)	(0.012)	(0.013)	(0)	–	(0.002)	–	(0.004 ref.)	–	(0.010)	(0.012)	(0.014)	(0.022)	(0.024)	(0.026)

K			b			L_1			L_2			e			
Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Figure
0.11	0.17	0.22	0.20	0.25	0.30	0.13	0.18	0.23	0.14	0.19	0.24	–	0.356 BSC*	–	SE8
(0.004)	(0.007)	(0.009)	(0.008)	(0.010)	(0.012)	(0.005)	(0.008)	(0.009)	(0.006)	(0.007)	(0.009)	–	(0.014 BSC*)	–	

* BSC — Basic Spacing between Centers

Part Number
SESD0201X1BN-0010-098

A			A_1			A_3			D			E		
Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max
0.28	0.30	0.32	0	–	0.05	–	0.102 ref.	–	0.25	0.30	0.35	0.55	0.60	0.65
(0.011)	(0.012)	(0.013)	(0)	–	(0.002)	–	(0.004 ref.)	–	(0.010)	(0.012)	(0.014)	(0.022)	(0.024)	(0.026)

K			b			L_1			L_2			e			
Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Figure
0.11	0.17	0.22	0.20	0.25	0.30	0.13	0.18	0.23	0.14	0.19	0.24	–	0.356 BSC*	–	SE9
(0.004)	(0.007)	(0.009)	(0.008)	(0.010)	(0.012)	(0.005)	(0.008)	(0.009)	(0.006)	(0.007)	(0.009)	–	(0.014 BSC*)	–	

* BSC — Basic Spacing between Centers

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Figure SE8

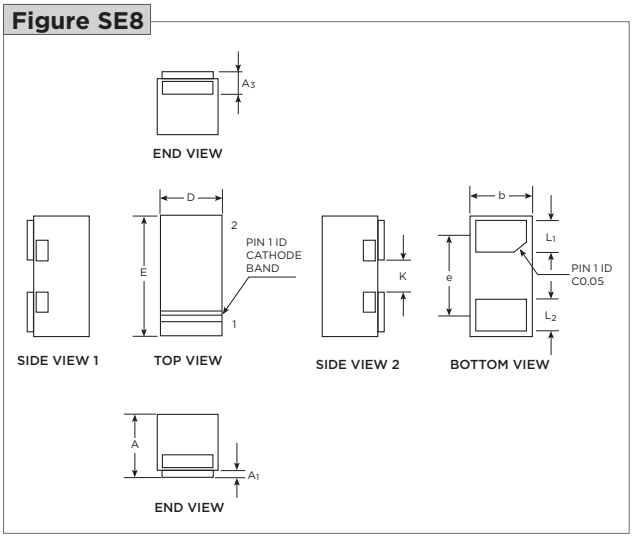
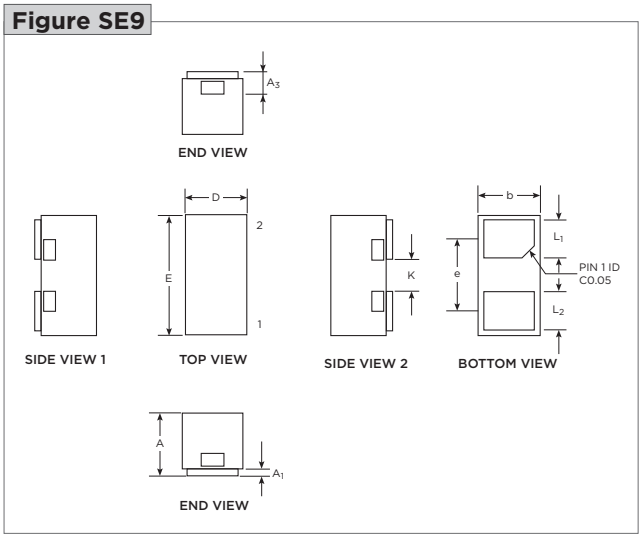


Figure SE9



RoHS Compliant, ELV Compliant HF Halogen Free

Table SE4 Dimensions for SESD Devices in Millimeters and (Inches)

Part Number
SESD0402X1UN-0020-090

A			A_1			A_3			D			E		
Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max
0.33	0.38	0.43	0	–	0.05	–	0.13 ref.	–	0.55	0.60	0.65	0.95	1.00	1.05
(0.013)	(0.015)	(0.017)	(0)	–	(0.002)	–	(0.005 ref.)	–	(0.022)	(0.024)	(0.026)	(0.037)	(0.039)	(0.041)

K			b			L			e			
Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Figure
0.35	0.40	0.45	0.45	0.50	0.55	0.20	0.25	0.30	–	0.65 BSC*	–	SE10
(0.014)	(0.016)	(0.018)	(0.018)	(0.020)	(0.022)	(0.008)	(0.010)	(0.012)	–	(0.026 BSC*)	–	

* BSC — Basic Spacing between Centers

Part Number
SESD0402X1BN-0010-098

A			A_1			A_3			D			E		
Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max
0.33	0.38	0.43	0	–	0.05	–	0.13 ref.	–	0.55	0.60	0.65	0.95	1.00	1.05
(0.013)	(0.015)	(0.017)	(0)	–	(0.002)	–	(0.005 ref.)	–	(0.022)	(0.024)	(0.026)	(0.037)	(0.039)	(0.041)

K			b			L			e			
Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Figure
0.35	0.40	0.45	0.45	0.50	0.55	0.20	0.25	0.30	–	0.65 BSC*	–	SE11
(0.0014)	(0.016)	(0.018)	(0.018)	(0.020)	(0.022)	(0.008)	(0.010)	(0.012)	–	(0.014 BSC*)	–	

* BSC — Basic Spacing between Centers

Figure SE10

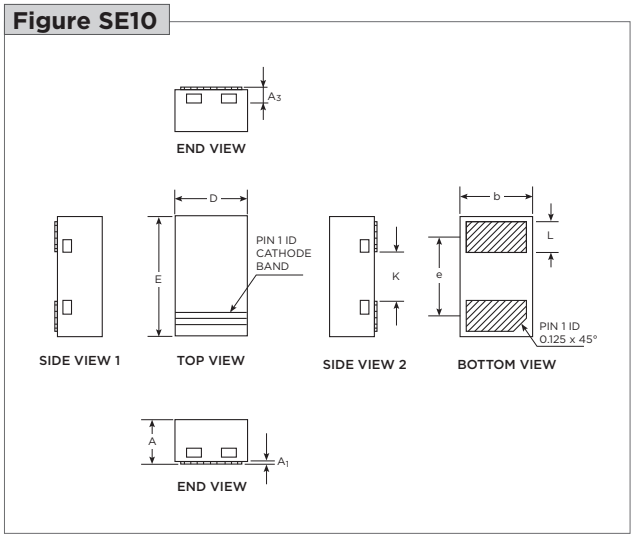


Figure SE11

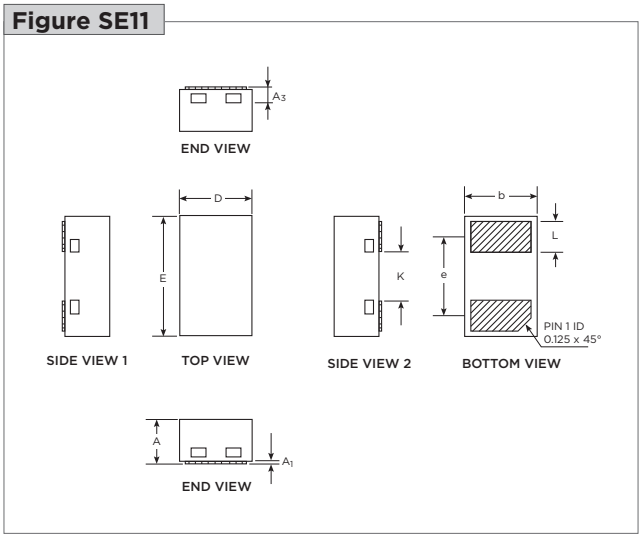


Table SE5 SESD Landing Pad Layout for 0201 Package

Symbol	Millimeters (mm)	Inches (in)
A	0.32	0.013
B	0.62	0.024
D	0.24	0.009
F	0.14	0.006

Figure SE12

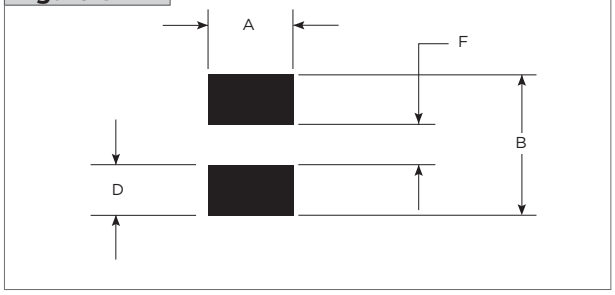


Table SE6 SESD Landing Pad Layout for 0402 Package

Symbol	Millimeters (mm)	Inches (in)
A	0.60	0.024
B	1.00	0.039
D	0.35	0.014
F	0.30	0.012

Figure SE13

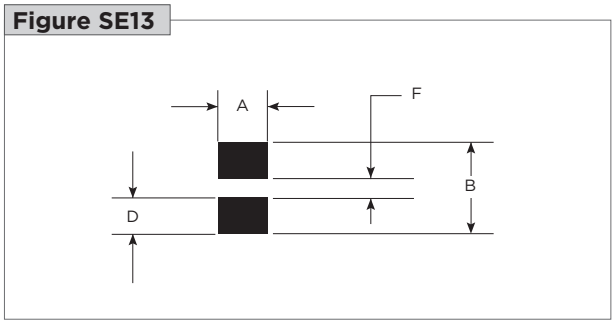


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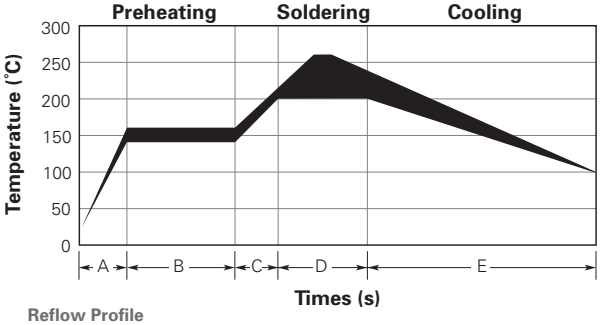
Table SE7 Solder Reflow Recommendations for SESD Devices

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 to 70s 50s to 60s 30s to 40s 5s to 10s
E	Cooling	From Main Heating Temperature to 100°C	4°C/s max



Reflow Profile

RoHS Compliant, ELV Compliant HF Halogen Free

Table SE8 Carrier Tape Specifications

Tape Dimension EIA Mark	SESD0201 Dimension (mm)	SESD0201 Tolerance	SESD0402 Dimension (mm)	SESD0402 Tolerance
W	8.00	±0.10	8.00	±0.10
P_0	4.00	±0.10	4.00	±0.10
P_1	2.00	±0.10	2.00	±0.10
P_2	2.00	±0.05	2.00	±0.05
A_0	0.36	±0.03	0.70	±0.05
B_0	0.66	±0.03	1.15	±0.05
D_0	Ø1.50	-0.00 / +0.10	Ø1.55	±0.05
D_1	Ø0.20	±0.05	Ø0.40	±0.05
E_1	1.75	±0.10	1.75	±0.10
F	3.50	±0.05	3.50	±0.05
K_0	0.33	±0.03	0.47	±0.05
T	0.23	±0.02	0.20	±0.05
Detail A	-	2° (max)	-	3° (max)

Note 1. All dimensions in mm
Note 2. Measured from centerline of pocket to centerline of sprocket hole
Note 3. Cumulative tolerance of 10 sprocket holes is ±0.20
Note 4. Tolerances unless noted ±0.20

Figure SE14

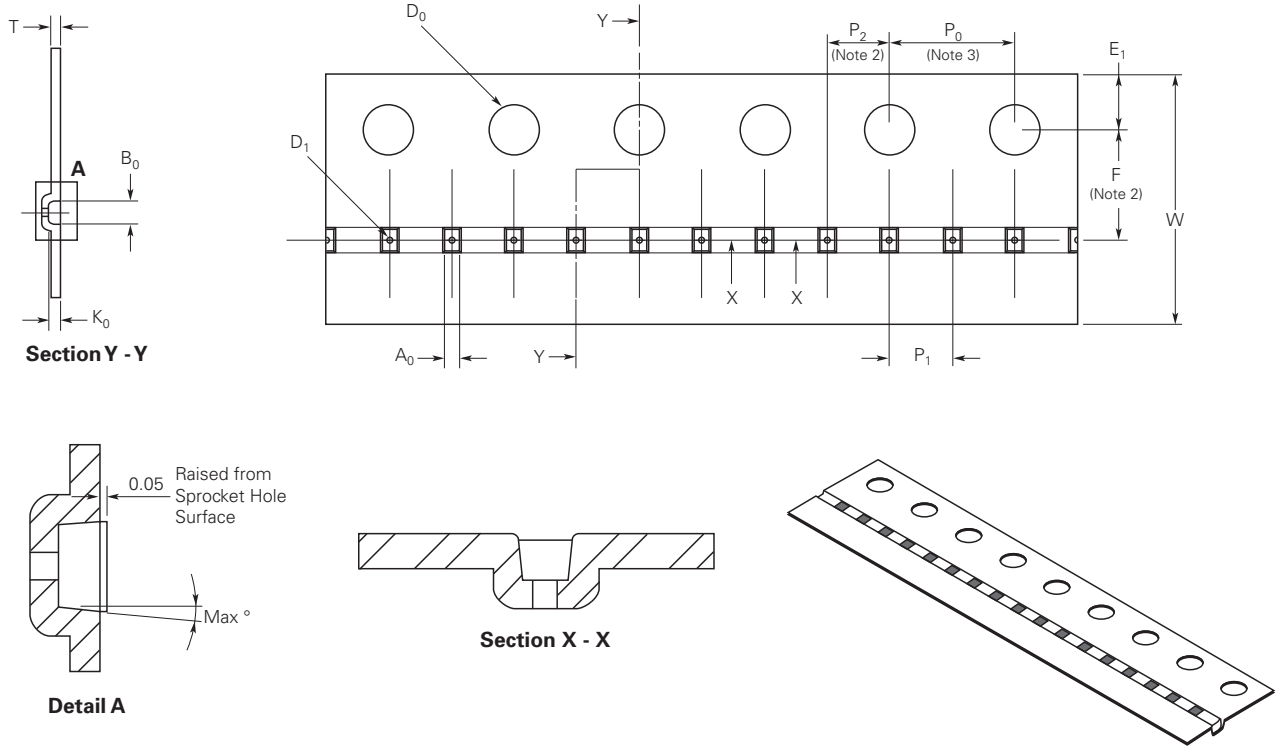
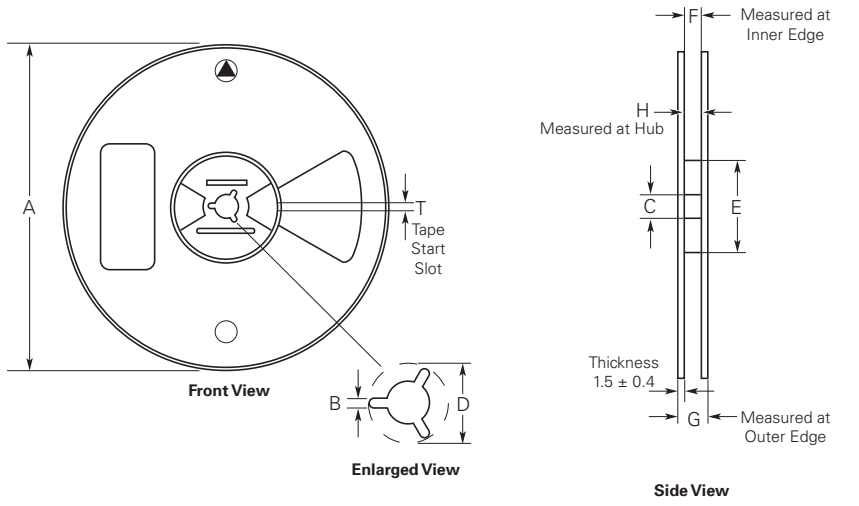


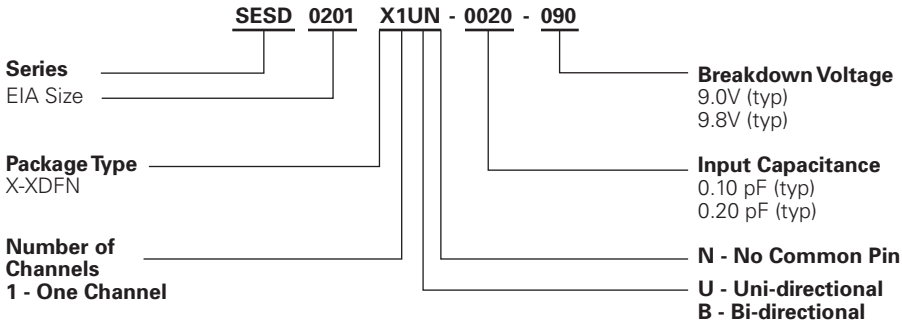
Table SE9 Reel Specifications

Reel Dimension EIA Mark	Dimension (mm)
A	180 ± 2.00
B	1.50 (min)
C	13.10 ± 0.20
D	20.20 (min)
E	60 ± 1.00
F	8.75 ± 1.00
G	11.6 ± 1.00
H	9.4 (max)

Figure SE15



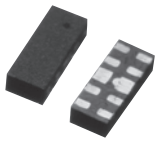
Part Numbering System for Single-Channel Silicon ESD Devices



Part Marking

Part Number	Part Marking
SESD0201X1UN-0020-090	C
SESD0402X1UN-0020-090	C
SESD0201X1BN-0010-098	C
SESD0402X1BN-0010-098	C

RoHS Compliant, ELV Compliant HF Halogen Free

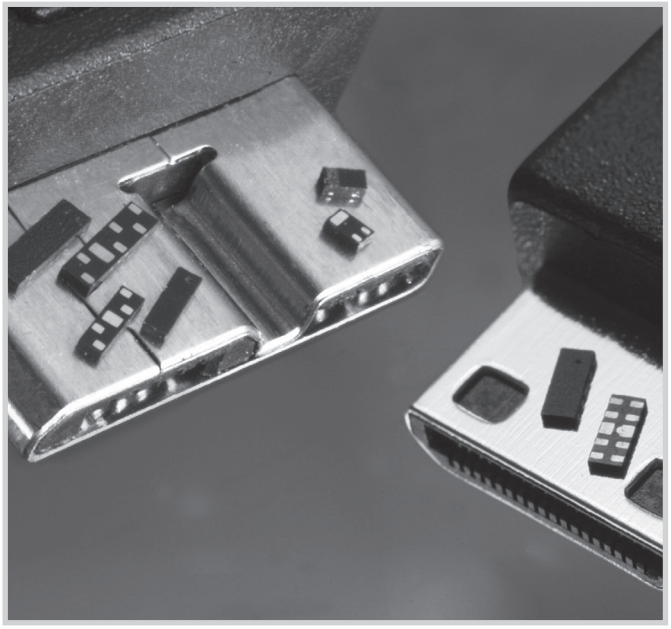


Multi-Channel Silicon ESD Flow-Through Arrays

NEW

The Silicon ESD (SESD) arrays can help provide protection and improve reliability of electronics in applications including but not limited to consumer, portable and mobile electronics. The multi-channel SESD flow-through arrays have low capacitance of 0.20pF with low insertion loss, which help protect high-speed data signals. The SESD arrays provide robust ESD protection with 20kV contact and air discharge rating per the IEC61000-4-2 standard. The low capacitance SESD arrays enable signal integrity for today's highest-speed interfaces including USB 3.0/2.0, HDMI, eSATA, DisplayPort and Thunderbolt.

TE offers four- and six-channel miniature arrays which are up to 85% smaller than common multi-channel arrays for space-constrained applications. TE's ultra-small packages have lower parasitic impedance which reduces insertion loss at high frequencies compared to larger-packaged devices. All of TE's SESD arrays are in flow-through design packages which allow for matched impedance PCB trace routing essential for high-speed signal integrity.



Benefits

- Low capacitance; provides low insertion loss for high-speed data signals
- Provides ESD protection up to 20kV contact and air discharge per IEC61000-4-2
- Industry's smallest footprint and lowest profile multi-channel ESD arrays 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), lightning and cable discharge events
- Helps assist equipment to pass IEC61000-4-2, level 4 testing

Features

- Low Capacitance: at 0.20pF (typ, 200pF)
- Low leakage current : 25nA @ 5V (typ)
- Low clamping voltage: +9.20 / - 0.8V (typ) (tp=8x20μs, Ipp-2A)
- ESD 20kV Contact and air discharge maximum rating per IEC61000-4-2
- Surge: 2A (max) @ (tp=8x20μs) per IEC61000-4-5
- Small size and low profile: XDFN array package 0.38mm height
- RoHS Compliant, Pb and Halogen Free (refers to: Br≤900ppm, Cl≤900ppm, Br + Cl≤1500ppm)

Applications

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

RoHS Compliant, ELV Compliant HF Halogen Free

Table ME1 Device Maximum Ratings

	ESD Withstand* (IEC 61000-4-2, level 4)		Temperature		Peak Current (tp=8x20μs)
Part Number	Contact (kV)	Air (kV)	Operating (ºC)	Storage (ºC)	Ipp (A)
SESD0402Q2UG-0020-090 (2-ch)	±20	±20	-55 to +125	-55 to +150	2.0
SESD0802Q4UG-0020-090 (4-ch)	±20	±20	-55 to +125	-55 to +150	2.0
SESD1004Q4UG-0020-090 (4-ch)	±20	±20	-55 to +125	-55 to +150	2.0
SESD1103Q6UG-0020-090 (6-ch)	±20	±20	-55 to +125	-55 to +150	2.0

* 20kV @ 1 pulse; 10kV @ 100 pulses; 8kV @ 1,000 pulses (under IEC6100-4-2)
- Maximum leakage current post 15kV and 20kV pulses is less than 1μA
- Device maximum rating @T=25ºC, 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

Table ME2 Device Electrical Characteristics @T = 25ºC

	Input Capacitance*		Breakdown Voltage (Typ)	Reverse Working Voltage (V)		Reverse Leakage Current (Typ)	Clamping Voltage (Typ)
Part Number	Typ (pF)	Max (pF)	V_{BR} @ I_T=1mA (V)	Min	Max	I_L @ V_{RWM}=5.0V (nA)	V_{CL} @ Ipp=2.0V (V)
SESD0402Q2UG-0020-090 (2-ch)	0.20	0.25	+9.00 / -0.80	0	+7.00	25.0	+9.20 / -0.80
SESD0802Q4UG-0020-090 (4-ch)	0.20	0.25	+9.00 / -0.80	0	+7.00	25.0	+9.20 / -0.80
SESD1004Q4UG-0020-090 (4-ch)	0.20	0.25	+9.00 / -0.80	0	+7.00	25.0	+9.20 / -0.80
SESD1103Q6UG-0020-090 (6-ch)	0.20	0.25	+9.00 / -0.80	0	+7.00	25.0	+9.20 / -0.80

* @V_R=OV, f=3GHz

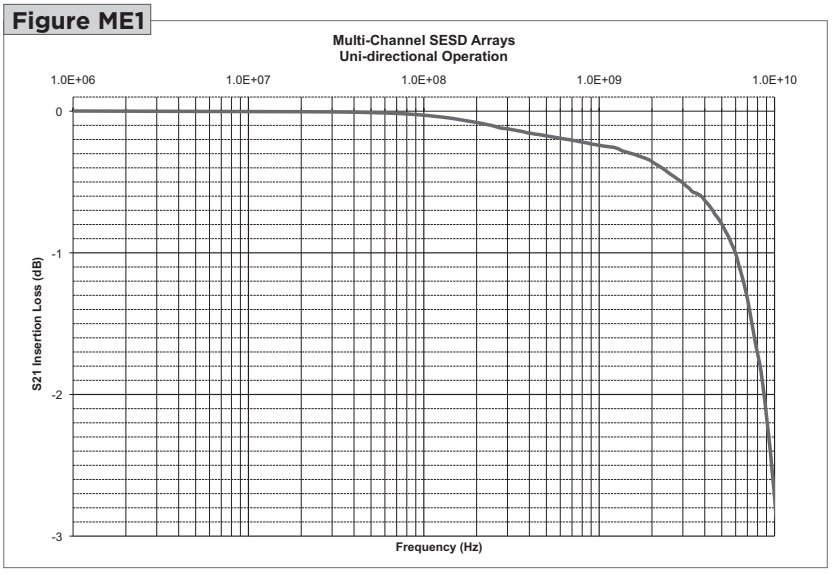
8

Table ME3 Insertion Loss Diagrams

Application / Protocol	Bit Rate (Gbps)	@Freq (GHz)	Ins. Loss (dB)
HDMI 1.4 (1080P)	2.25	1.13	-0.23
DisplayPort	2.70	1.35	-0.26
HDMI 1.4 (4K / QuadHD)*	3.40	1.70	-0.30
USB 3.0	5.00	2.50	-0.38
eSATA	6.00	3.00	-0.44
Thunderbolt	10.0	5.00	-0.69

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

Figure ME1

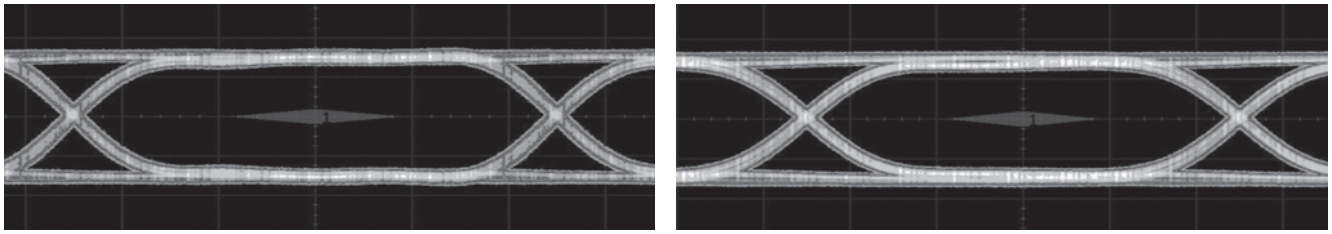


RoHS Compliant, ELV Compliant HF Halogen Free

Figures ME2-ME4 Eye Diagrams

Figure ME2

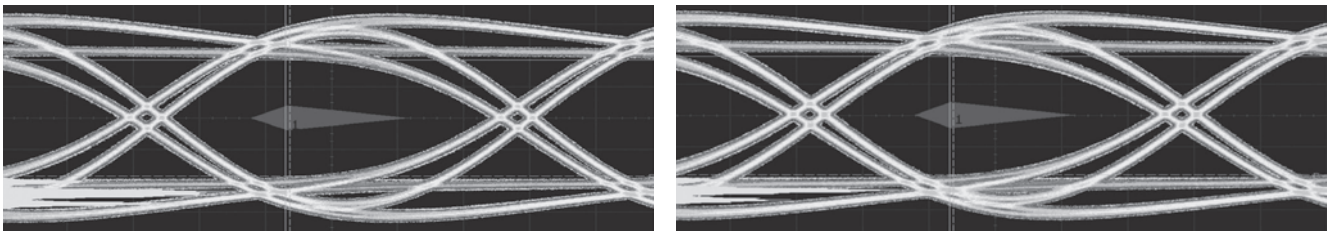
USB 3.0 Eye Diagrams
5.0Gb/s, 1000mV Differential, CPO Compliant Test Pattern



Without SESD Device **With SESD Device**

Figure ME3

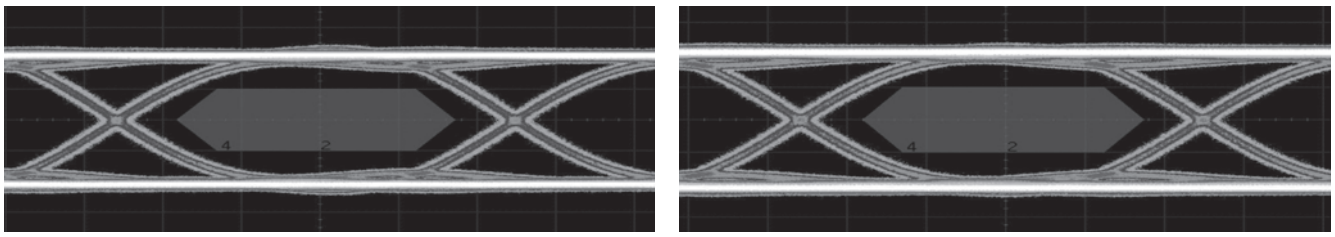
DisplayPort Eye Diagrams
5.4Gb/s, 800mV Differential, PRBS7 Compliant Test Pattern, SSC Enabled



Without SESD Device **With SESD Device**

Figure ME4

HDMI Eye Diagrams
3.4Gb/s, 990 mV Differential, TMDS Data



Without SESD Device **With SESD Device**

Table ME4 Device Dimensions for SESD Devices in Millimeters and (Inches)

Part Number
SESD0402Q4UG-0020-090

A			A_1			A_3			D			E			K		
Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max
0.33	0.38	0.43	0	–	0.05	–	0.13 ref.	–	0.55	0.60	0.65	0.95	1.00	1.05	0.35	0.40	0.45
(0.013)	(0.015)	(0.017)	(0)	–	(0.002)	–	(0.005 ref.)	–	(0.022)	(0.024)	(0.026)	(0.037)	(0.039)	(0.041)	(0.014)	(0.016)	(0.018)

L_1			L_2			b			e_1			e_2			
Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Figure
0.45	0.50	0.55	0.20	0.25	0.30	0.10	0.15	0.20	–	0.35 BSC*	–	–	0.65 BSC*	–	ME5
(0.018)	(0.020)	(0.022)	(0.008)	(0.010)	(0.012)	(0.004)	(0.006)	(0.008)	–	(0.014 BSC*)	–	–	(0.026 BSC*)	–	

* BSC — Basic Spacing between Centers

Figure ME5

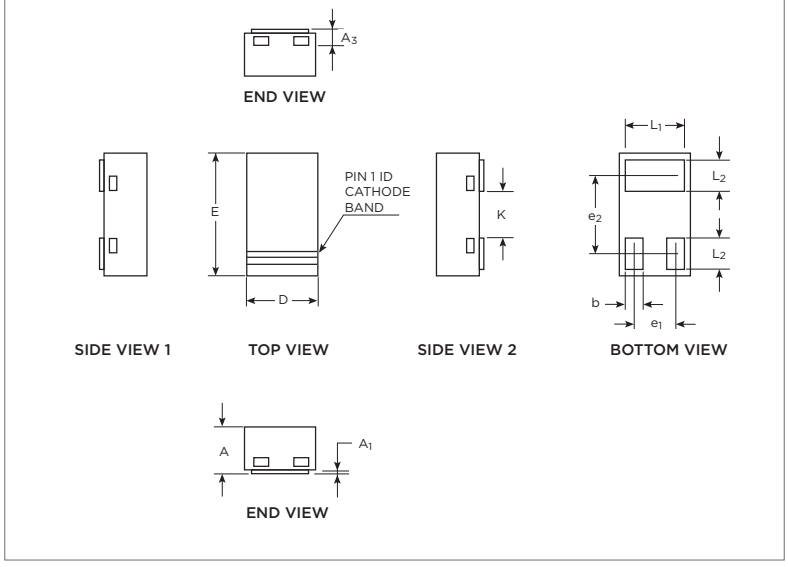
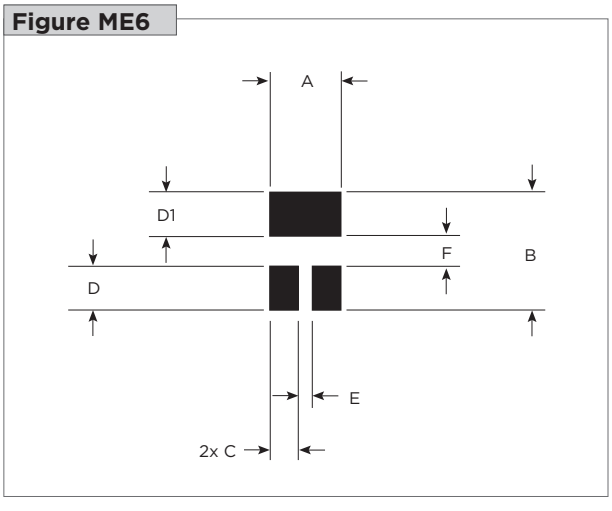


Table ME5 SESD Landing Pad Layout 3 Pin 2-ch 0402 Size Array

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
D_1	0.35	0.014
E	0.15	0.006
F	0.30	0.012

Figure ME6



RoHS Compliant, ELV Compliant HF Halogen Free

Table ME6 Device Dimensions for SESD Devices in Millimeters and (Inches)

Part Number
SESD0802Q4UG-0020-090

A			A_1			A_3			D			E			b			b_1		
Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max
0.33	0.38	0.43	0	0.02	0.05	–	0.127 ref.	–	0.50	0.60	0.70	1.90	2.00	2.10	0.15	0.20	0.25	0.25	0.30	0.36
(0.013)	(0.015)	(0.017)	(0)	–	(0.002)	–	(0.005 ref.)	–	(0.020)	(0.024)	(0.028)	(0.075)	(0.079)	(0.083)	(0.006)	(0.008)	(0.010)	(0.010)	(0.012)	(0.014)

L			L_1			L_2			e			e_1			e_2			N			Figure
Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	
0.25	0.30	0.36	0.35	0.40	0.45	–	0.05 BSC*	–	–	0.40 BSC*	–	–	0.45 BSC*	–	–	0.25 BSC*	–	–	4	–	ME7
(0.010)	(0.012)	(0.014)	(0.014)	(0.016)	(0.018)	–	(0.002 BSC*)	–	–	(0.016 BSC*)	–	–	(0.018 BSC*)	–	–	(0.010 BSC*)	–	–	4	–	

* BSC — Basic Spacing between Centers

Figure ME7

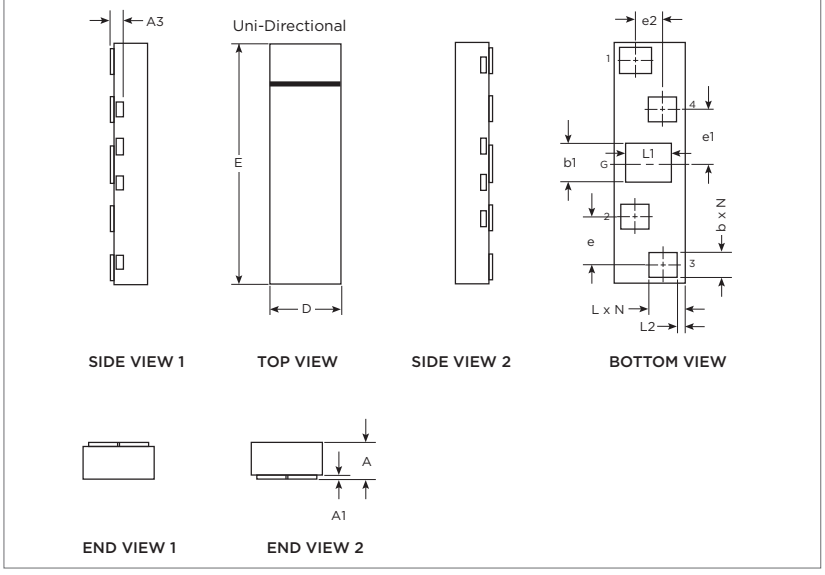


Table ME7 SESD Landing Pad Layout 5 Pin 4-ch Miniature FT Array

Symbol	Millimeters (mm)	Inches (in)
A	0.60	0.024
B	2.00	0.079
C	0.30	0.012
D	0.30	0.012
E	0.30	0.012
F	0.10	0.004
F_1	0.15	0.006
G	0.40 BSC*	0.016 BSC*
G_1	0.45 BSC*	0.018 BSC*

* BSC — Basic Spacing between Centers

Figure ME8

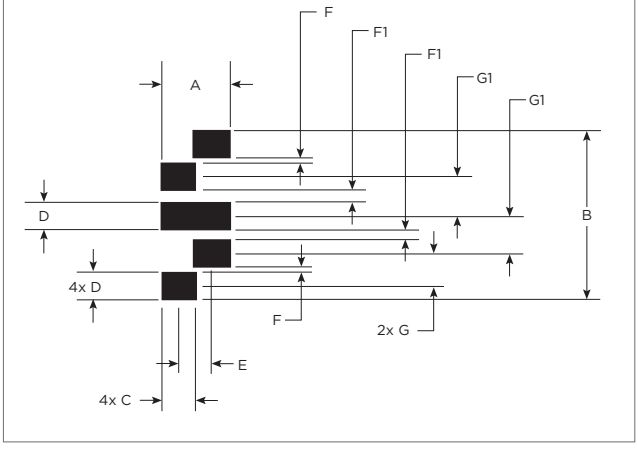


Table ME8 Device Dimensions for SESD Devices in Millimeters and (Inches)

Part Number
SESD1004Q4UG-0020-090

A			A_1			A_3			D			E			b			b_1		
Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max
0.33	0.38	0.43	0	0.02	0.05	–	0.127 ref.	–	0.90	1.00	1.10	2.40	2.50	2.60	0.15	0.20	0.25	0.35	0.40	0.45
(0.013)	(0.015)	(0.017)	(0)	–	(0.002)	–	(0.005 ref.)	–	(0.035)	(0.039)	(0.043)	(0.094)	(0.098)	(0.102)	(0.006)	(0.008)	(0.010)	(0.014)	(0.016)	(0.018)

L			L_1			e			e_1			N			R			R_1			Figure
Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	
0.33	0.38	0.43	0.00	0.10	0.15	–	0.50 BSC*	–	–	0.50 BSC*	–	–	10	–	–	0.075 BSC*	–	–	0.125 BSC*	–	ME9
(0.013)	(0.015)	(0.017)	(0.000)	(0.004)	(0.006)	–	(0.020 BSC*)	–	–	(0.020 BSC*)	–	–	10	–	–	(0.003 BSC*)	–	–	(0.005 BSC*)	–	

* BSC — Basic Spacing between Centers

Figure ME9

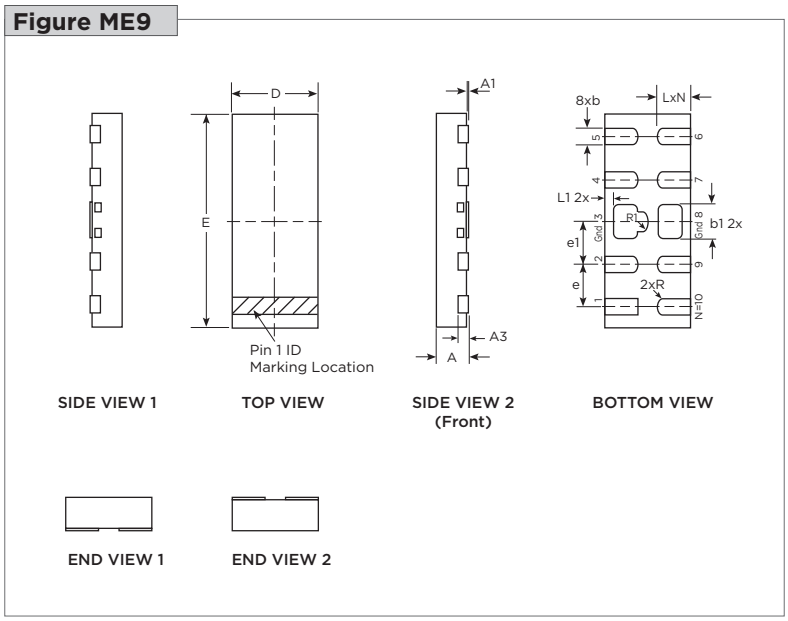
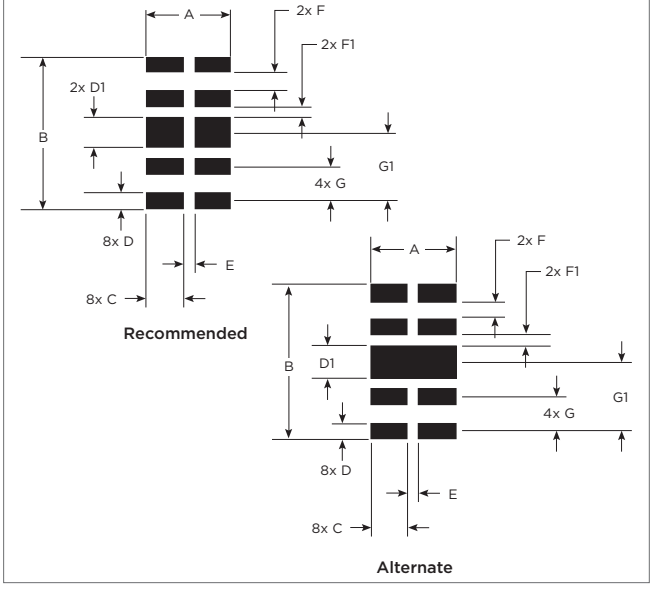


Table ME9 SESD Landing Pad Layout 3 Pin 2-ch 0402 Size Array

Symbol	Millimeters (mm)	Inches (in)
A	1.20	0.047
B	2.20	0.087
C	0.50	0.020
D	0.20	0.008
D_1	0.40	0.016
E	0.20	0.008
F	0.30	0.012
F_1	0.20	0.008
G	0.50 BSC*	0.020 BSC*
G_1	1.00 BSC*	0.039 BSC*

* BSC — Basic Spacing between Centers

Figure ME10



RoHS Compliant, ELV Compliant HF Halogen Free

Table ME10 Device Dimensions for SESD Devices in Millimeters and (Inches)

Part Number
SESD1103Q6UG-0020-090

A			A_1			A_3			D			E			b			b_1		
Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max
0.33	0.38	0.43	0	0.02	0.05	–	0.127 ref.	–	0.70	0.80	0.90	2.70	2.80	2.90	0.15	0.20	0.25	0.25	0.30	0.35
(0.013)	(0.015)	(0.017)	(0)	–	(0.002)	–	(0.005 ref.)	–	(0.027)	(0.031)	(0.035)	(0.106)	(0.110)	(0.114)	(0.006)	(0.008)	(0.010)	(0.010)	(0.012)	(0.014)

L			L_1			L_2			e			e_1			e_2			N			
Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Figure
0.30	0.35	0.40	0.50	0.55	0.60	–	0.05 BSC*	–	–	0.40 BSC*	–	–	0.45 BSC*	–	–	0.40 BSC*	–	–	6	–	ME11
(0.012)	(0.014)	(0.016)	(0.019)	(0.021)	(0.024)	–	(0.002 BSC*)	–	–	(0.016 BSC*)	–	–	(0.018 BSC*)	–	–	(0.016 BSC*)	–	–	6	–	

* BSC — Basic Spacing between Centers

Figure ME11

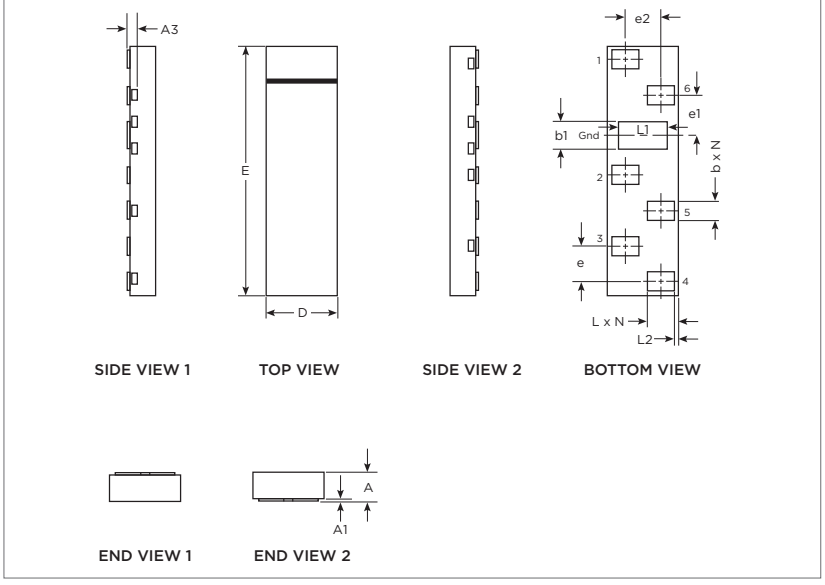


Table ME11 SESD Landing Pad Layout 5 Pin 4-ch Miniature FT Array

Symbol	Millimeters (mm)	Inches (in)
A	0.80	0.031
B	2.80	0.110
C	0.35	0.014
D	0.30	0.012
E	0.45	0.018
F	0.10	0.004
F_1	0.15	0.006
G	0.40 BSC*	0.016 BSC*
G_1	0.45 BSC*	0.018 BSC*

* BSC — Basic Spacing between Centers

Figure ME12

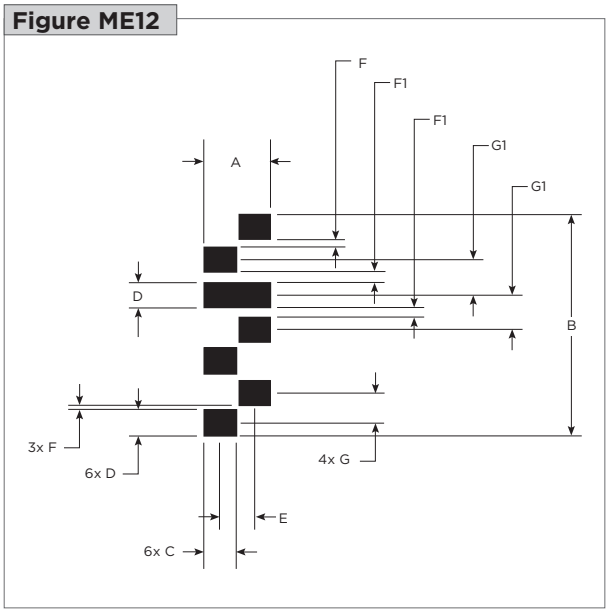
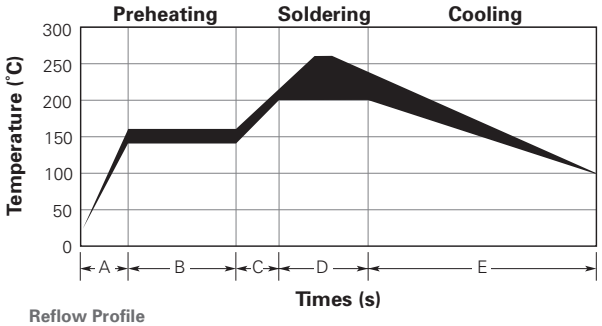


Table ME12 Solder Reflow Recommendations for ESD Devices

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 to 70s 50s to 60s 30s to 40s 5s to 10s
E	Cooling	From Main Heating Temperature to 100°C	4°C/s max



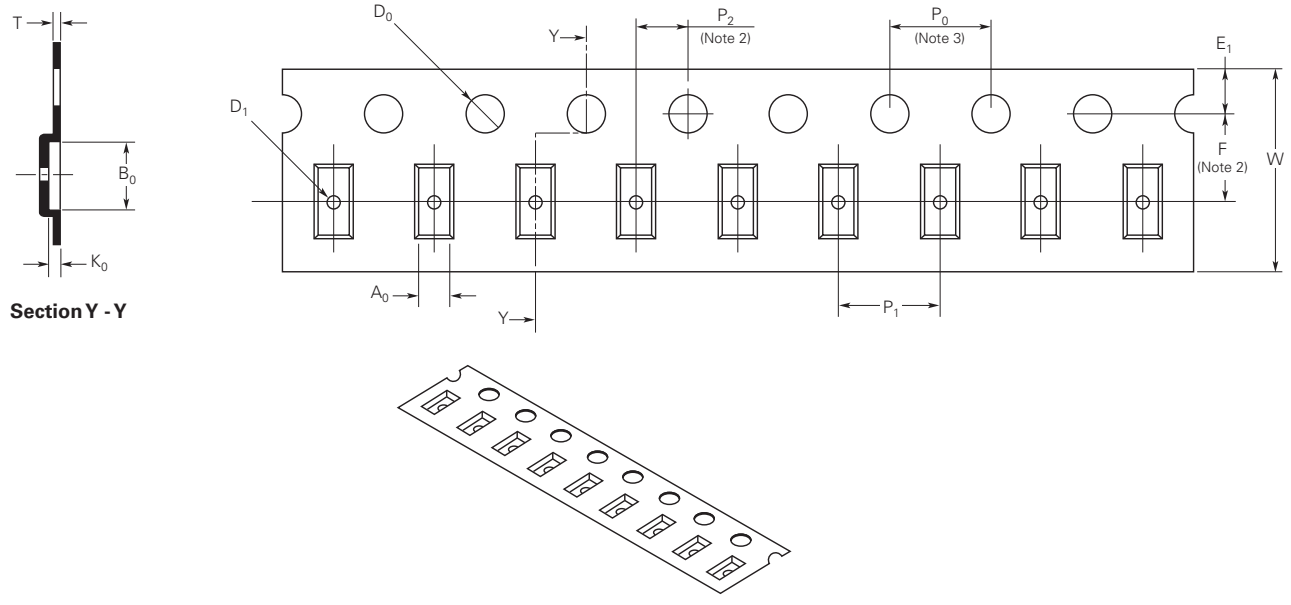
Reflow Profile

Table ME13 Carrier Tape Specifications

Tape Dimension	SESD00402Q		SESD0802Q		SESD1004Q		SESD1103Q	
EIA Mark	Dimension (mm)	Tolerance	Dimension (mm)	Tolerance	Dimension (mm)	Tolerance	Dimension (mm)	Tolerance
W	8.00	± 0.05	8.00	+0.30 / -0.10	8.00	+0.30 / -0.10	8.00	+0.30 / -0.10
zP_0	4.00	±0.10	4.00	±0.10	4.00	±0.10	4.00	±0.10
P_1	2.00	±0.05	2.00	±0.10	4.00	±0.10	4.00	±0.10
P_2	2.00	±0.05	2.00	±0.05	2.00	±0.05	2.00	±0.05
A_0	0.70	±0.05	0.81	±0.05	1.20	±0.05	1.00	±0.05
B_0	1.15	±0.05	2.21	±0.05	2.70	±0.05	3.00	±0.05
D_0	Ø1.55	±0.05	Ø1.50	+0.10 / -0.00	Ø1.50	+0.10 / -0.00	Ø1.50	+0.10 / -0.00
D_1	Ø0.40	±0.05	Ø0.40 (min)	–	Ø0.50 (min)	–	Ø0.50 (min)	–
E_1	1.75	±0.10	1.75	±0.10	1.75	±0.10	1.75	±0.10
F	3.50	±0.05	3.50	±0.05	3.50	±0.05	3.50	±0.05
K_0	0.47	±0.05	0.46	±0.05	0.51	±0.05	0.51	±0.05
T	0.20	±0.05	0.25	±0.20	0.25	±0.05	0.25	±0.05
Detail A	–	3° (max)	–	–	–	–	–	–

Note 1. All dimensions in mm
Note 2. Measured from centerline of pocket to centerline of sprocket hole
Note 3. Cumulative tolerance of 10 sprocket holes is ±0.20
Note 4. Tolerances unless noted ±0.20

Figure ME13

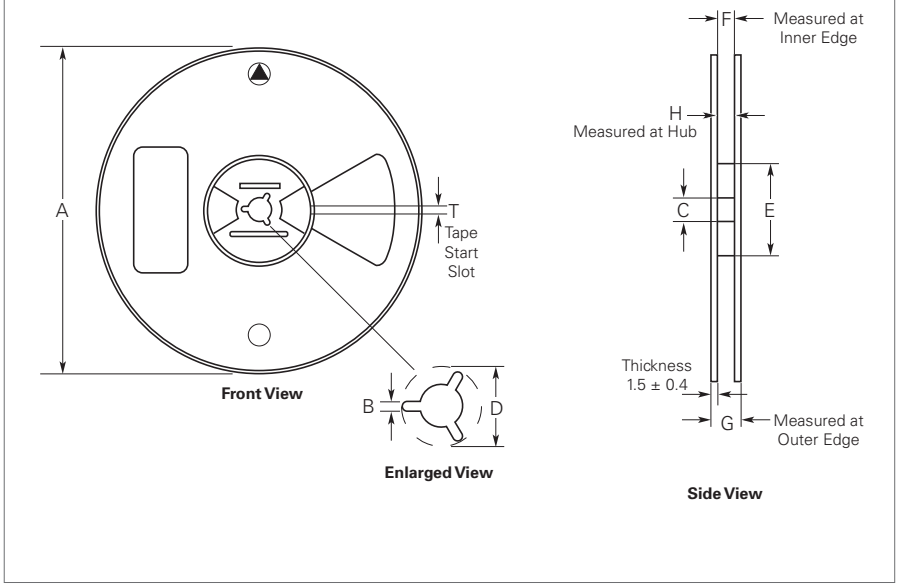


RoHS Compliant, ELV Compliant HF Halogen Free

Table ME14 Reel Specifications

Reel Dimension EIA Mark	Dimension (mm)
A	180 ± 2.00
B	1.50 (min)
C	13.10 ± 0.20
D	20.20 (min)
E	60 ± 1.00
F	8.75 ± 1.00
G	11.6 ± 1.00
H	9.4 (max)

Figure ME13



Part Numbering System for Multi-Channel Silicon ESD Devices

SESD 1004 Q4UG - 0020 - 090

- **Series** / EIA Size
- **Package Type** — Q - Array
- **Number of Channels** — **1 - One Channel**, **2 - Two Channels**, **4 - Four Channels**, **6 - Six Channels**
- **N - No Common Pin**, **G - Common GND Pin**
- **U - Uni-directional**, **B - Bi-directional**
- **Input Capacitance** — 0.10 pF (typ), 0.20 pF (typ)
- **Breakdown Voltage** — 9.0V (typ), 9.8V (typ)

Part Marking

Part Number	Part Marking
SESD0402Q2UG-0020-090 (2-ch)	C
SESD0802Q4UG-0020-090 (4-ch)	MC
SESD1004Q4UG-0020-090 (4-ch)	4C
SESD1103Q6UG-0020-090 (6-ch)	6C