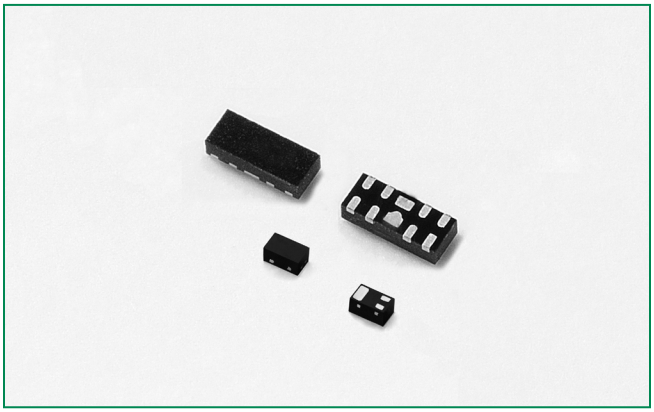
SESD Series Enhanced ESD Diode Arrays

RoHS Pb GREEN ELV

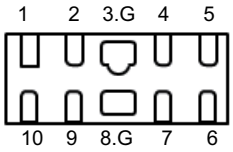


Description

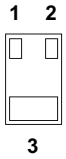
The SESD Series Enhanced ESD Diode Arrays provides higher order ESD protection in signal-integrity-preserving unidirectional arrays for the world's most challenging high speed serial interfaces. Compelling packaging options including the standard 2.5mmx1.0mm and the SOD-883. Standard packages minimizes trace layout complexity, saves significant PCB space, and improves reusability of the footprints. The nominal capacitance makes the devices applicable to the worlds' fastest consumer serial interfaces.

Pinout

1004 DFN array

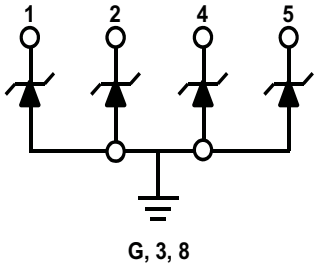


0402 DFN array

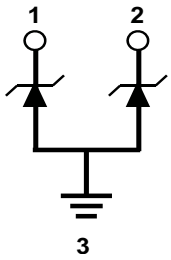


Bottom View

Functional Block Diagram



1004 DFN array



0402 DFN array

Features

- 0.30pF TYP capacitance
- ESD, IEC61000-4-2, ±22kV contact, ±22kV air
- Low clamping voltage of 13V @ I_{PP}=2.2A (t_P=8/20µs)
- Low profile 1004 and 0402 DFN array packages
- Facilitates excellent signal integrity
- ELV Compliant

Applications

- Ultra-high speed data lines
- USB 3.1, 3.0, 2.0
- HDMI 2.0, 1.4a, 1.3
- DisplayPort(TM)
- V-by-One®
- Thunderbolt (Light Peak)
- Consumer, mobile and portable electronics
- Tablet PC and external storage with high speed interfaces
- Applications requiring high ESD performance in small packages

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Absolute Maximum Ratings

Symbol	Parameter	Value	Units
I_{PP}	Peak Current (t_p=8/20µs)	2.2	A
T_{OP}	Operating Temperature	-55 to 125	°C
T_{STOR}	Storage Temperature	-55 to 150	°C

CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

Thermal Information

Parameter	Rating	Units
Storage Temperature Range	-55 to 150	°C
Maximum Junction Temperature	150	°C
Maximum Lead Temperature (Soldering 20-40s)	260	°C

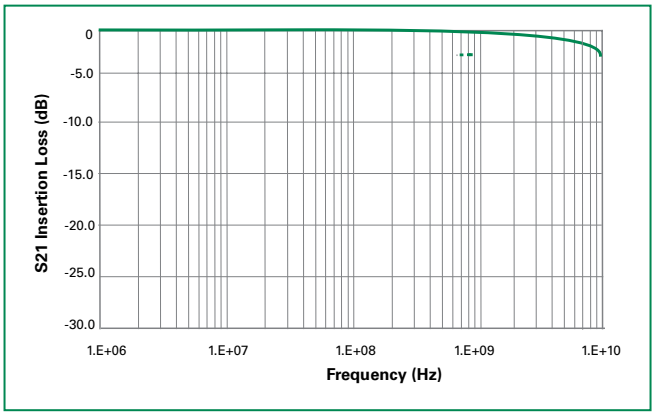
1004 DFN Array Electrical Characteristics - (T_{OP}=25°C)

Parameter	Test Conditions	Min	Typ	Max	Units
Input Capacitance	@ V_R = 0V, f = 3GHz		0.30		pF
Breakdown Voltage	V_{BR} @ I_T=1mA		8.80		V
Reverse Working Voltage				7.0	V
Reverse Leakage Current	I_L @ V_{RWM}=5.0V		25		nA
Clamping Voltage	V_{CL} @ I_{PP}=2.2A		13.0		V
ESD Withstand Voltage	IEC61000-4-2 (Contact)	±22			kV
	IEC61000-4-2 (Air)	±22			

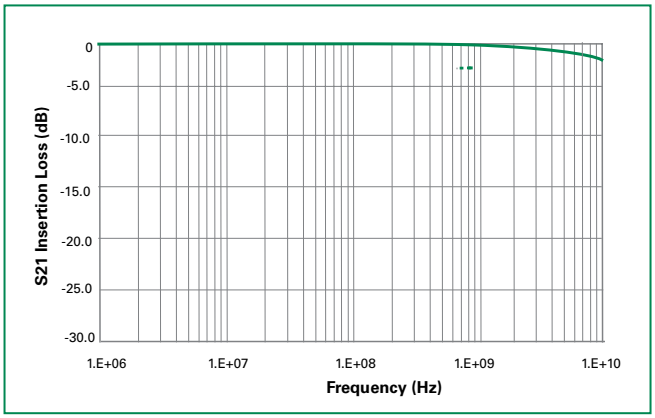
0402 DFN Array Electrical Characteristics - (T_{OP}=25°C)

Parameter	Test Conditions	Min	Typ	Max	Units
Input Capacitance	@ V_R = 0V, f = 3GHz		0.30		pF
Breakdown Voltage	V_{BR} @ I_T=1mA		8.80		V
Reverse Working Voltage				7.0	V
Reverse Leakage Current	I_L @ V_{RWM}=5.0V		25		nA
Clamping Voltage	V_{CL} @ I_{PP}=2.2A		13.0		V
ESD Withstand Voltage	IEC61000-4-2 (Contact)	±22			kV
	IEC61000-4-2 (Air)	±22			

Insertion Loss Diagram - SESD 1004Q4UG-030-088



Insertion Loss Diagram - SESD0402Q2UG-0030-088



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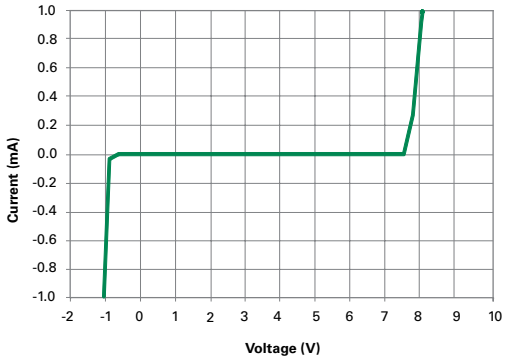
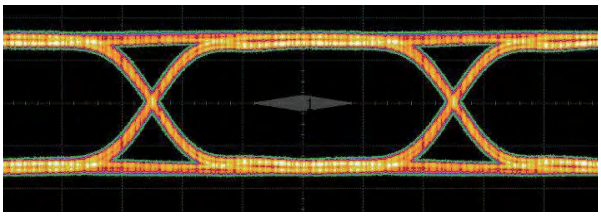
Device IV Curve

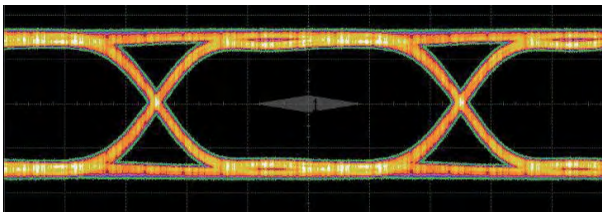


USB3.0 Eye Diagram

5.0 Gb/s, 1000mV differential, CPO Compliant Test Pattern



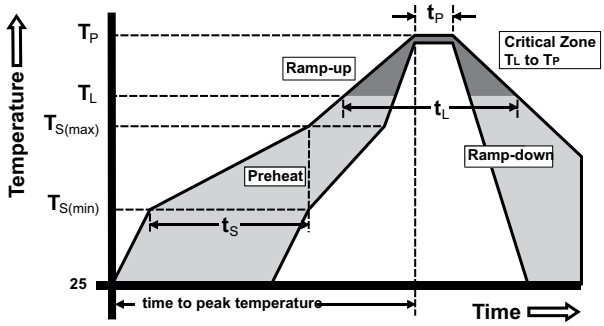
Without SESD Device



With SESD Device

Soldering Parameters

Reflow Condition		Pb – Free assembly
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 (Liquidus) Temp (T_L) to peak		3°C/second max
$T_{S(max)}$ to T_L - Ramp-up Rate		3°C/second max
Reflow	- Temperature (T_L) (Liquidus)	217°C
	- Temperature (t_L)	60 – 150 seconds
Peak Temperature (T_P)		$260^{+0/-5}$ °C
Time within 5°C of actual peak Temperature (t_p)		20 – 40 seconds
Ramp-down Rate		6°C/second max
Time 25°C to peak Temperature (T_P)		8 minutes Max.
Do not exceed		260°C



Product Characteristics of 0402 DFN Package

Lead Plating	Pre-Plated Frame
Lead Material	Copper Alloy
Lead Coplanarity	0.0004 inches (0.102mm)
Substrate material	Silicon
Body Material	Molded Epoxy
Flammability	UL 94 V-0

Notes :
1. All dimensions are in millimeters
2. Dimensions include solder plating.
3. Dimensions are exclusive of mold flash & metal burr.
4. Blo is facing up for mold and facing down for trim/form, i.e. reverse trim/form.
5. Package surface matte finish VDI 11-13.

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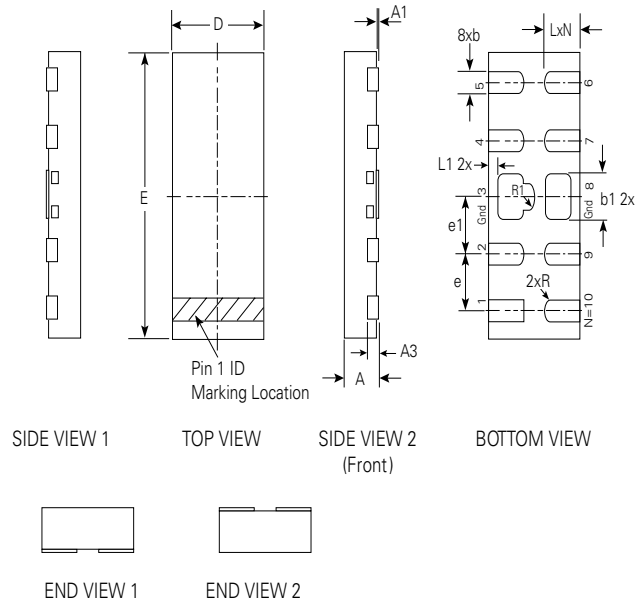
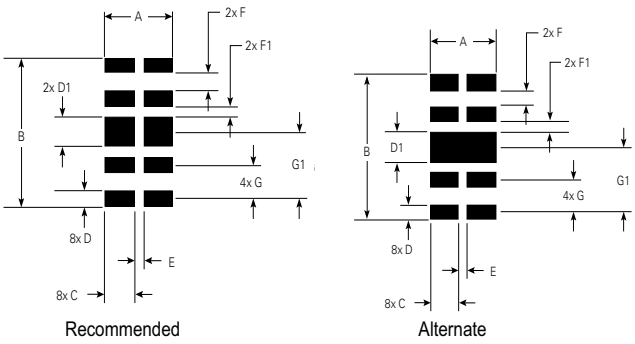
Package Dimensions — 1004 DFN Array



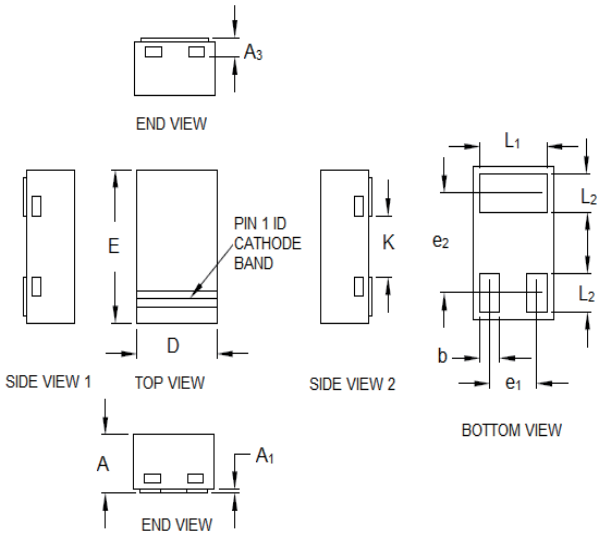
Symbol	Millimeters			Inches		
	Min	Typ	Max	Min	Typ	Max
A	0.33	0.38	0.43	0.013	0.015	0.017
A1	0.00	0.02	0.05	0	--	0.002
A3		0.127 ref.			0.005 ref.	
D	0.90	1.00	1.10	0.035	0.039	0.043
E	2.40	2.50	2.60	0.094	0.098	0.102
b	0.15	0.20	0.25	0.006	0.008	0.010
b1	0.35	0.40	0.45	0.014	0.016	0.018
L	0.33	0.38	0.43	0.013	0.015	0.017
L1	0.00	0.10	0.15	0.000	0.004	0.006
e		0.50 BSC			0.020 BSC	
e1		0.50 BSC			0.020 BSC	
R		0.08 BSC			0.003 BSC	
R1		0.13 BSC			0.005 BSC	
N		10			10	

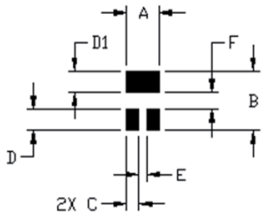


Symbol	Millimeters	Inches
A	1.20	0.047
B	2.20	0.087
C	0.50	0.020
D	0.20	0.008
D1	0.40	0.016
E	0.20	0.008
F	0.30	0.012
F1	0.20	0.008
G	0.50 BSC	0.020 BSC
G1	1.00 BSC	0.039 BSC

Pad Layout

Package Dimensions — 0402 DFN Array



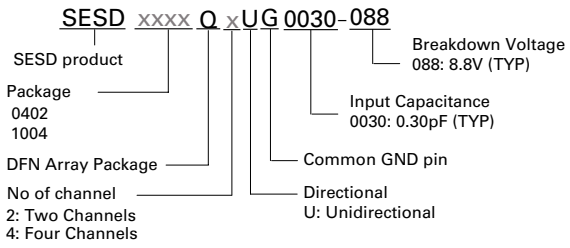


Pad Layout

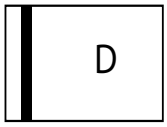
Symbol	Millimeters			Inches		
	Min	Typ	Max	Min	Typ	Max
A	0.33	0.38	0.43	0.013	0.015	0.017
A1	0	-	0.05	0	-	0.002
A3	0.13 ref.			0.005 ref.		
D	0.55	0.60	0.65	0.022	0.024	0.026
E	0.95	1.00	1.05	0.037	0.039	0.041
K	0.35	0.40	0.45	0.014	0.016	0.018
L1	0.45	0.50	0.55	0.018	0.020	0.022
L2	0.20	0.25	0.30	0.008	0.010	0.012
b	0.14	0.19	0.24	0.006	0.007	0.009
e1	0.35 BSC			0.014 BSC		
e2	0.65 BSC			0.026 BSC		

Symbol	Millimeters	Inches
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

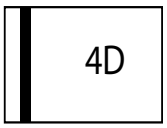
Part Numbering System



Part Marking System



0402



1004

Ordering Information

Part Number	Package	Marking	Ordering Part Number	Reel Quantity
SESD0402Q2UG-0030-088	0402 DFN Array	I D	RF3925-000	50000
SESD1004Q4UG-0030-088	1004 DFN Array	I 4D	RF3923-000	25000

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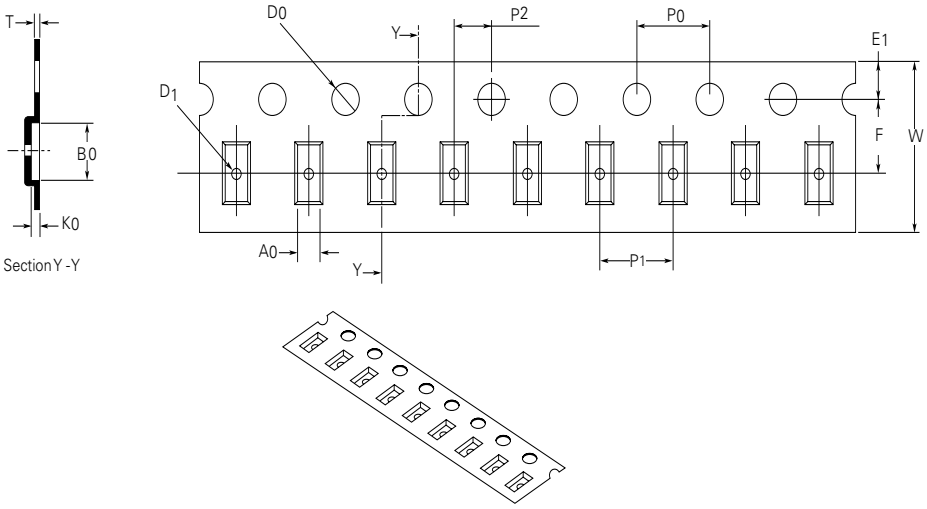
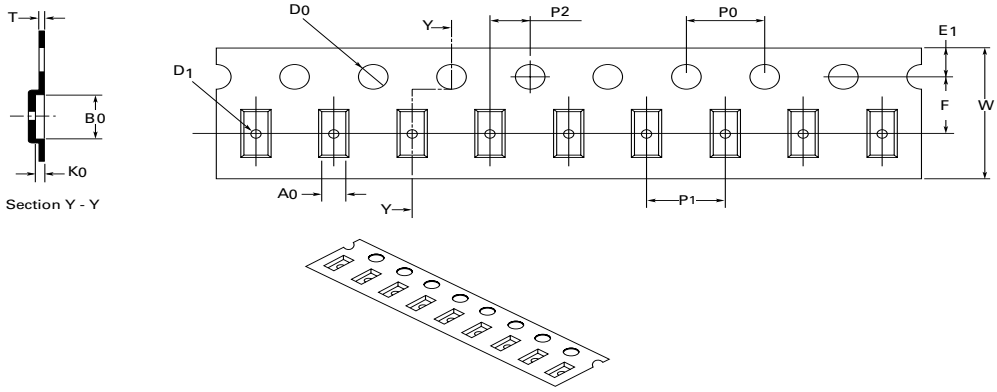
Embossed Carrier Tape & Reel Specification — 1004 DFN Array



Symbol	Millimeters
A0	1.20 ± 0.05
B0	2.70 ± 0.05
D0	ø 1.50 + 0.10/-0
D1	ø 0.50 min
E1	1.75 ± 0.10
F	3.50 ± 0.05
K0	0.51 ± 0.05
P0	4.00 ± 0.10
P1	4.00 ± 0.10
P2	2.00 ± 0.05
W	8.00 +0.03 / -0.10
T	0.25 ± 0.05

Embossed Carrier Tape & Reel Specification — 0402 DFN Array



Symbol	Millimeters
A0	0.70+/-0.05
B0	1.15+/-0.05
D0	ø 1.55+ 0.05
D1	ø 0.40+/- 0.05
E1	1.75+/-0.10
F	3.50+/-0.05
K0	0.47+/-0.05
P0	4.00+/-0.10
P1	2.00+/-0.10
P2	2.00+/-0.05
W	8.00+/-0.10
T	0.20+/-0.05

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