Features

- 300W peak pulse power (8/20μs)
- Protects one bi-directional or two uni-directional line(s)
- Ultra low leakage: nA level
- Operating voltage: 5V, 12V, 24V, 36V
- Low clamping voltage
- Complies with following standards:
  – IEC 61000-4-2 (ESD) immunity test
    Air discharge: ±30kV
    Contact discharge: ±30kV
  – IEC61000-4-4 (EFT) 40A (5/50ns)
- RoHS Compliant

Mechanical Characteristics

- Package: SOT-23
- Lead Finish: Matte Tin
- Case Material: “Green” Molding Compound.
- UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 3 per J-STD-020
- Terminal Connections: See Diagram

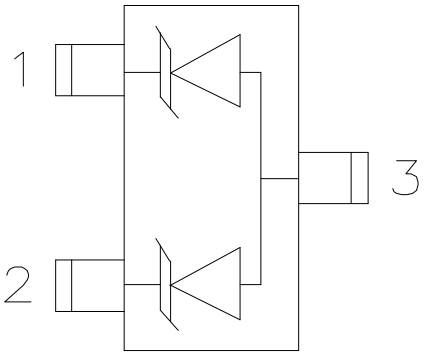
Applications

- Cellular Handsets and Accessories
- Notebooks and Handhelds
- Portable Instrumentation
- Set Top Box
- Industrial Controls
- Server and Desktop PC

Description

The ESDXX21XK is an uni-directional TVS diode array, utilizing leading monolithic silicon technology to provide fast response time and low ESD clamping voltage, making this device an ideal solution for protecting sensitive semiconductor components from damage. The ESDXX21XK complies with the IEC 61000-4-2 (ESD) standard with ±15kV air and ±8kV contact discharge. It is assembled into a lead-free SOT-23 package. It is designed to protect components which are connected to data and transmission lines from voltage surges.

Dimensions and Pin Configuration



SOT23

Circuit and Pin Schematic

Part Number Code

E	S	D	0	5	1	1	L	1
1	2	3	4	5	6	7	8	9

Product Type	
ESD	TSK Electrostatic suppressor ESD Type

Reverse Working Voltage（V）	
3V3	3.3V
05	5V
16	16V

Line	
1	1-Line
2	2-Line
3	3-Line

directional	
0	Bi
1	Uni

Capacitance Type	
L	Low
X	Normal

Size	
1	0201
2	0402
3	DFN0603
4	DFN1006

★ Code 4 to 9 is optional

Absolute Maximum Ratings (T_A=25°C unless otherwise specified)

Parameter	Symbol	Value	Unit
Peak Pulse Power (8/20μs)	Ppk	300	W
ESD per IEC 61000−4−2 (Air) ESD per IEC 61000−4−2 (Contact)	VESD	±30 ±30	kV
Operating Temperature Range	TJ	−55 to +125	°C
Storage Temperature Range	Tstg	−55 to +150	°C

Electrical Characteristics (T_A=25°C unless otherwise specified)

ESD0521Xk

Parameter	Symbol	Min	Typ	Max	Unit	Test Condition
Reverse Working Voltage	VRWM			5	V	
Breakdown Voltage	VBR	6			V	IT = 1mA
Reverse Leakage Current	I_R			1.0	uA	VRWM = 5V
Forward Voltage	VF		0.8	1.2	V	IF = 10mA
Clamping Voltage	VC			8	V	IPP = 1A (8 x 20μs pulse)
				15	V	IPP = 20A (8 x 20μs pulse)
Peak Pulse Current	IPP			20	A	t_p = 8/20μs
Junction Capacitance	CJ			160	pF	VR = 0V, f = 1MHz, Pin 1 to Pin 3 or Pin 2 to Pin 3
Junction Capacitance	CJ			80	pF	VR = 0V, f = 1MHz, Pin 1 to Pin 2

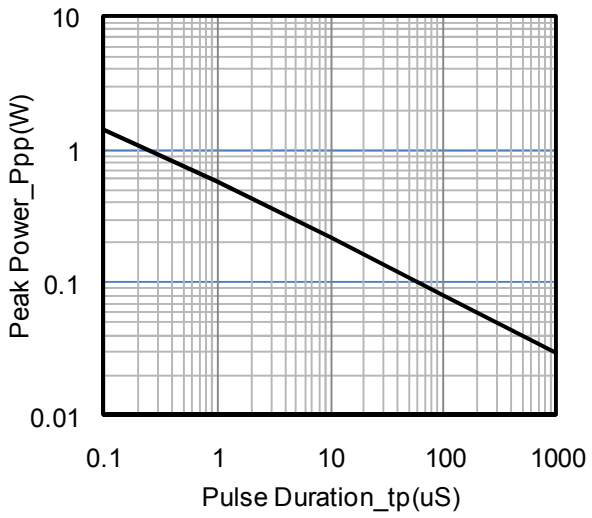
ESD1221Xk						
Parameter	**Symbol**	**Min**	**Typ**	**Max**	**Unit**	**Test Condition**
Reverse Working Voltage	V_{RWM}			12	V	
Breakdown Voltage	V_{BR}	13.3			V	I_T = 1mA
Reverse Leakage Current	I_R			0.5	uA	V_{RWM} = 12V
Forward Voltage	V_F		0.8	1.2	V	I_F = 10mA
Clamping Voltage	V_C			18	V	I_{PP} = 1A (8 x 20μs pulse)
				25	V	I_{PP} = 12A (8 x 20μs pulse)
Peak Pulse Current	I_{PP}			12	A	t_p = 8/20μs
Junction Capacitance	C_J		55	70	pF	VR = 0V, f = 1MHz, Pin 1 to Pin 3 or Pin 2 to Pin 3
Junction Capacitance	C_J			35	pF	VR = 0V, f = 1MHz, Pin 1 to Pin 2

ESD1521Xk						
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			0.3	uA	V_{RWM} = 24V
Forward Voltage	V_F		0.8	1.2	V	I_F = 10mA
Clamping Voltage	V_C			22	V	I_{PP} = 1A (8 x 20μs pulse)
				30	V	I_{PP} = 10A (8 x 20μs pulse)
Peak Pulse Current	I_{PP}			10	A	t_p = 8/20μs
Junction Capacitance	C_J		48	65	pF	VR = 0V, f = 1MHz, Pin 1 to Pin 3 or Pin 2 to Pin 3
Junction Capacitance	C_J			33	pF	VR = 0V, f = 1MHz, Pin 1 to Pin 2

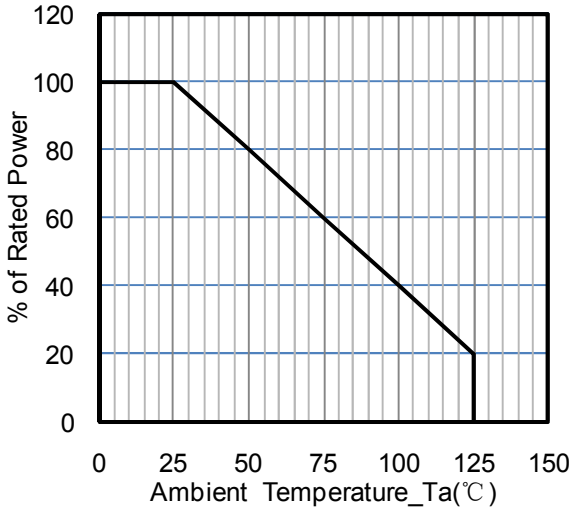
ESD2421Xk						
Parameter	**Symbol**	**Min**	**Typ**	**Max**	**Unit**	**Test Condition**
Reverse Working Voltage	V_{RWM}			24	V	
Breakdown Voltage	V_{BR}	27			V	I_T = 1mA
Reverse Leakage Current	I_R			0.2	uA	V_{RWM} = 24V
Forward Voltage	V_F		0.8	1.2	V	I_F = 10mA
Clamping Voltage	V_C			40	V	I_{PP} = 1A (8 x 20μs pulse)
				60	V	I_{PP} = 5A (8 x 20μs pulse)
Peak Pulse Current	I_{PP}			5	A	t_p = 8/20μs
Junction Capacitance	C_J			50	pF	VR = 0V, f = 1MHz, Pin 1 to Pin 3 or Pin 2 to Pin 3
Junction Capacitance	C_J			25	pF	VR = 0V, f = 1MHz, Pin 1 to Pin 2

ESD3621Xk						
Parameter	**Symbol**	**Min**	**Typ**	**Max**	**Unit**	**Test Condition**
Reverse Working Voltage	V_{RWM}			36	V	
Breakdown Voltage	V_{BR}	38			V	I_T = 1mA
Reverse Leakage Current	I_R			0.2	uA	V_{RWM} = 36V
Forward Voltage	V_F		0.8	1.2	V	I_F = 10mA
Clamping Voltage	V_C			50	V	I_{PP} = 1A (8 x 20μs pulse)
				75	V	I_{PP} = 4A (8 x 20μs pulse)
Peak Pulse Current	I_{PP}			4	A	t_p = 8/20μs
Junction Capacitance	C_J			40	pF	VR = 0V, f = 1MHz, Pin 1 to Pin 3 or Pin 2 to Pin 3
Junction Capacitance	C_J			20	pF	VR = 0V, f = 1MHz, Pin 1 to Pin 2

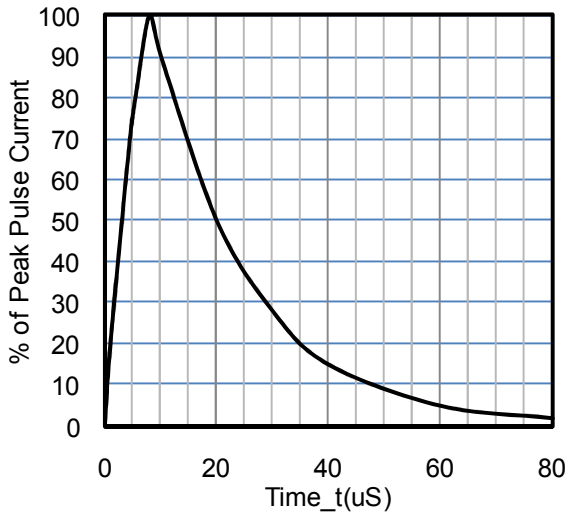
Typical Performance Characteristics (TA=25°C unless otherwise Specified)



Peak Pulse Power vs. Pulse Time

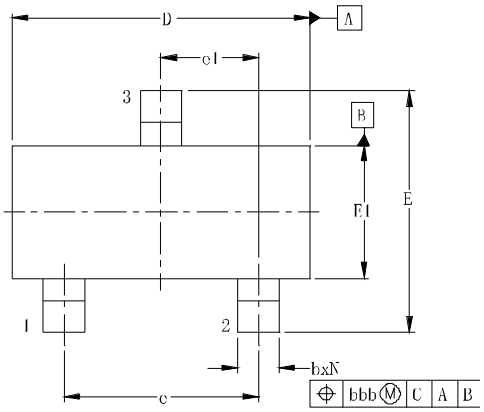


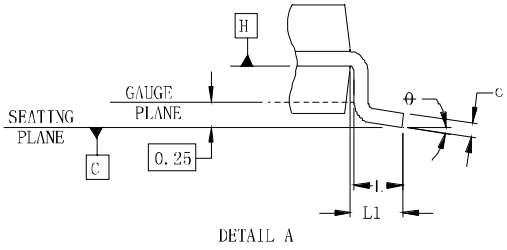
Power Derating Curve



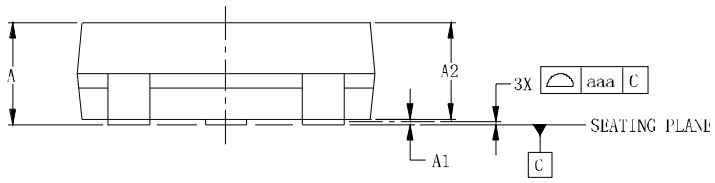
8 X 20us Pulse Waveform

SOT-23 Package Outline Drawing

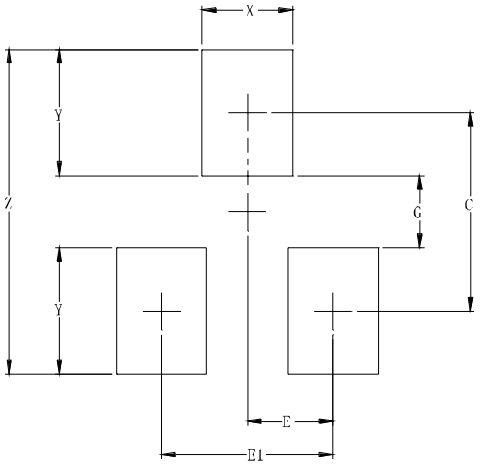




DIMENSIONS						
DIM	INCHES			MILLIMETERS		
	MIN	NOM	MAX	MIN	NOM	MAX
A	.035	—	.044	0.89	—	1.12
A1	.000	—	.004	0.01	—	0.10
A2	.035	.037	.040	0.88	0.95	1.02
b	.012	—	.020	0.30	—	0.51
c	.003	—	.007	0.08	—	0.18
D	.110	.114	.120	2.80	2.90	3.04
E	.082	.093	.104	2.10	2.37	2.64
E1	.047	.051	.055	1.20	1.30	1.40
e	.075			1.90 BSC		
e1	.037			0.95 BSC		
L	.015	.020	.024	0.40	0.50	0.60
L1	.022			(0.55)		
N	3			3		
θ	0°	—	8°	0°	—	8°
aaa	.001			0.10		
bbb	.008			0.20		



Suggested Land Pattern



DIMENSIONS		
DIM	INCHES	MILLIMETERS
C	.087	2.20
E	.037	0.95
E1	.075	1.90
G	.031	0.80
X	.039	1.00
Y	.055	1.40
Z	.141	3.60

Ordering Information

Part Number	Packaging	Reel Size
ESD0521Xk	3000/Tape & Reel	7 inch
ESD1221Xk	3000/Tape & Reel	7 inch
ESD1521Xk	3000/Tape & Reel	7 inch
ESD2421Xk	3000/Tape & Reel	7 inch
ESD3621Xk	3000/Tape & Reel	7 inch