

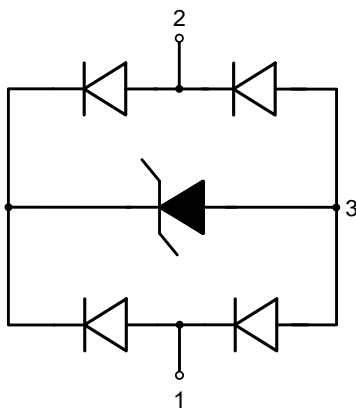
Description

The DUL0512S2 is an uni-directional TVS diode, utilizing leading monolithic silicon technology to provide fast response time and low ESD clamping voltage, making this device an ideal solution for protecting voltage sensitive high-speed data lines. The DUL0512S2 has an ultra-low capacitance with a typical value at 0.4pF, and complies with the IEC 61000-4-2 (ESD) standard with $\pm 20\text{kV}$ air and $\pm 20\text{kV}$ contact discharge. It is assembled into a lead-free SOT-23 package. The small size, ultra-low capacitance and high ESD surge protection make DUL0512S2 an ideal choice to protect cell phone, digital video interfaces and other high speed ports.

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 Below
- ◆ Marking Information: See Below

Dimensions and Pin Configuration



Circuit and Pin Schematic

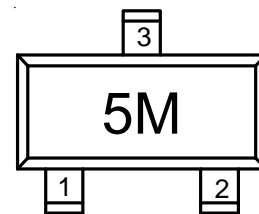
Features

- ◆ Ultra low capacitance: 0.4pF typical
- ◆ Ultra low leakage: nA level
- ◆ Low operating voltage: 5V
- ◆ Low clamping voltage
- ◆ Up to 2-line protects
- ◆ Complies with following standards:
 - IEC 61000-4-2 (ESD) immunity test
Air discharge: $\pm 20\text{kV}$
Contact discharge: $\pm 20\text{kV}$
 - IEC61000-4-4 (EFT) 40A (5/50ns)
 - IEC61000-4-5 (Lighting) 4A (8/20 μs)
- ◆ RoHS Compliant

Applications

- ◆ USB2.0 and 3.0 Ports
- ◆ HDMI 1.3 and 1.4
- ◆ Digital Video Interface(DVI)
- ◆ PCI Express and Serial SATA Ports
- ◆ Notebook Computer
- ◆ IEEE 1394
- ◆ Portable Electronics

Marking Information



5M=Device Marking Code

Ordering Information

Part Number	Marking	Packaging	Reel Size
DUL0512S2	5M	3000/Tape & Reel	7 inch

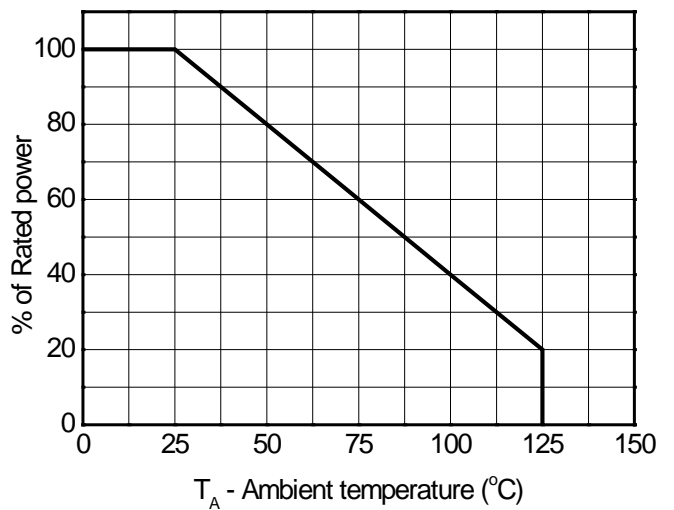
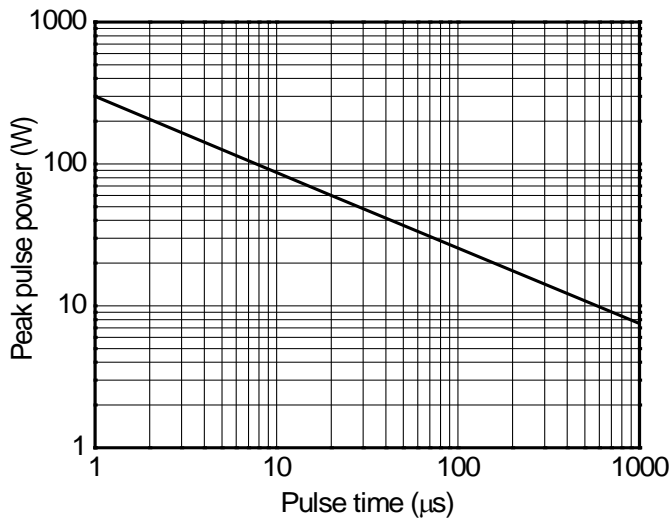
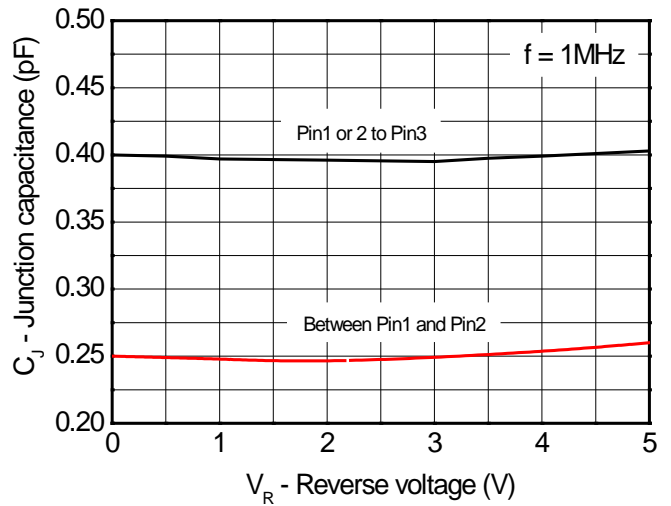
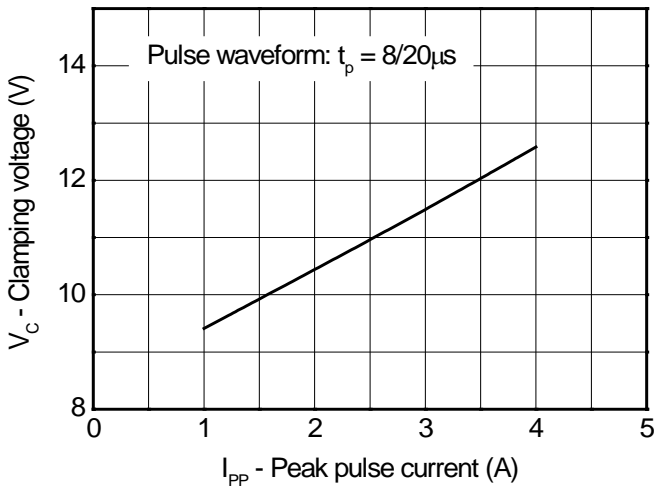
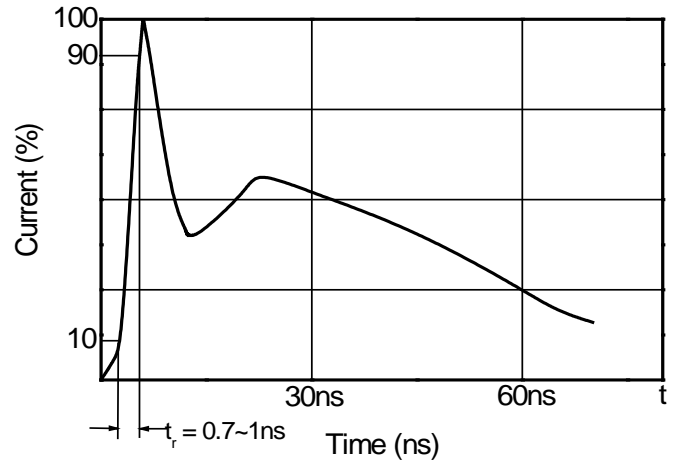
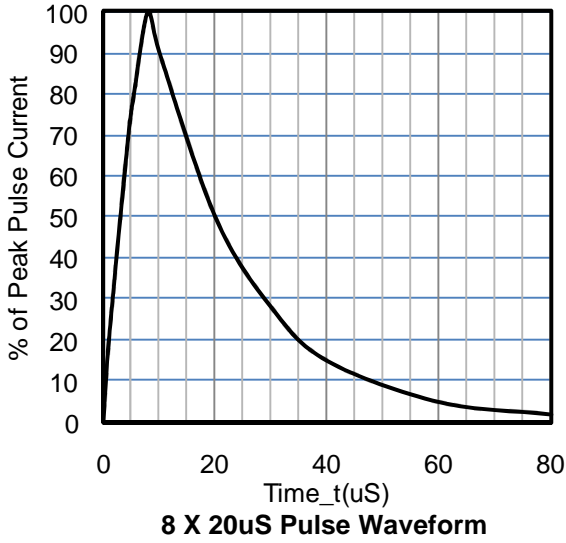
Absolute Maximum Ratings ($T_A=25^{\circ}\text{C}$ unless otherwise specified)

Parameter	Symbol	Value	Unit
Peak Pulse Power(8/20 μs)	Ppk	60	W
Peak Pulse Current(8/20 μs)	Ipp	4	A
ESD per IEC 61000-4-2 (Air)	VESD	± 20	kV
ESD per IEC 61000-4-2 (Contact)		± 20	
Operating Temperature Range	TJ	-55 to +125	$^{\circ}\text{C}$
Storage Temperature Range	Tstg	-55 to +150	$^{\circ}\text{C}$

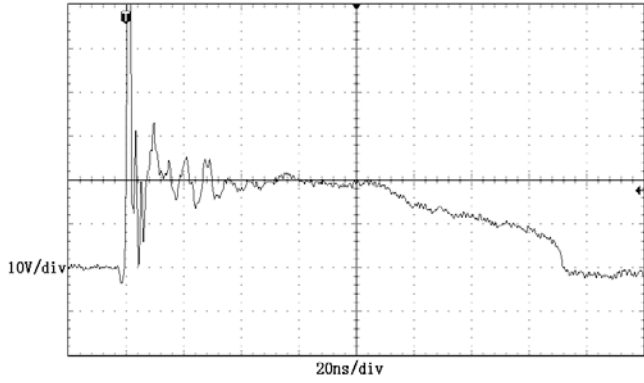
Electrical Characteristics ($T_A=25^{\circ}\text{C}$ unless otherwise specified)

Parameter	Symbol	Min	Typ	Max	Unit	Test Condition
Reverse Working Voltage	VRWM			5	V	
Breakdown Voltage	VBR	6	8	9	V	
Reverse Leakage Current	IR			1.0	μA	VRWM = 5V
Forward Voltage	VF		1.0	1.2	V	IF = 10mA
Clamping Voltage	VC			11	V	I _{PP} = 1A (8 x 20 μs pulse)
Clamping Voltage	VC			15	V	I _{PP} = 4A (8 x 20 μs pulse)
Junction Capacitance	CJ		0.4	0.65	pF	VR = 0V, f = 1MHz, any I/O pin to GND
Junction Capacitance	CJ		0.25	0.4	pF	VR = 0V, f = 1MHz, between any I/O pins

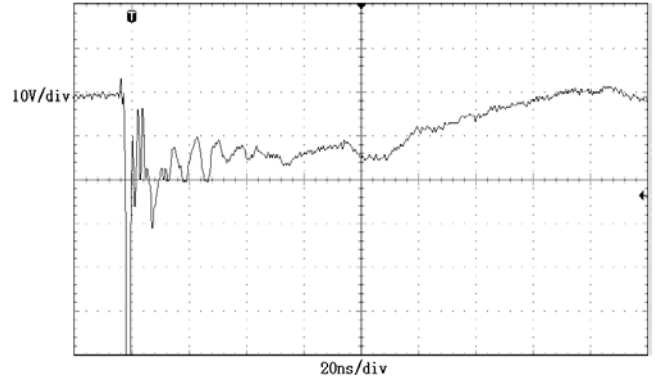
Typical Performance Characteristics (TA=25°C unless otherwise Specified)



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**ESD clamping
(+8kV contact discharge per IEC61000-4-2)**



**ESD clamping
(-8kV contact discharge per IEC61000-4-2)**

Application Information

The DUL0512S2 is designed to protect two high speed line against ESD. Fig1 is shown the connection and Fig2 is shown PCB Layout guide for USB interface ESD protection

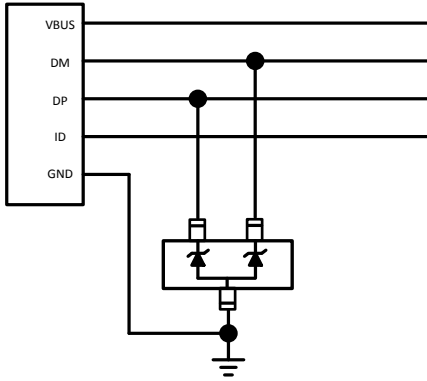


Fig1

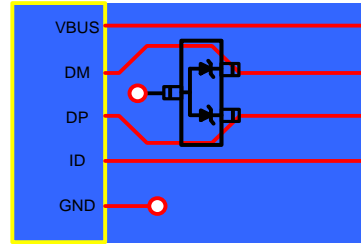
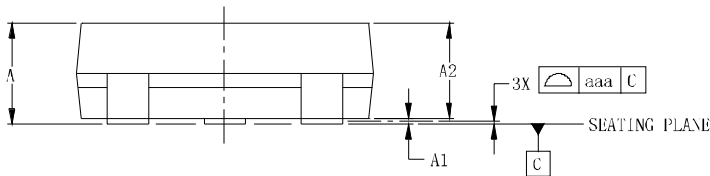
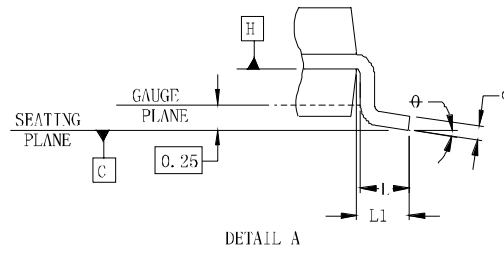
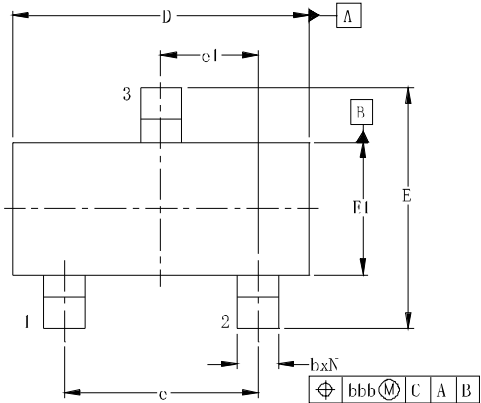


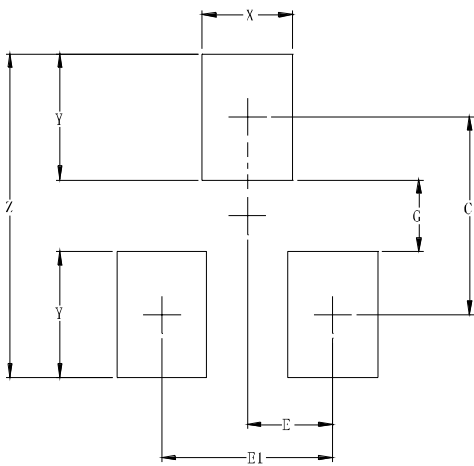
Fig2

SOT-23 Package Outline Drawing



DIMENSIONS						
SYM	INCHES			MILLIMETERS		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.035	-	0.044	0.89	-	1.12
A1	0.000	-	0.004	0.01	-	0.10
A2	0.035	0.037	0.040	0.88	0.95	1.02
b	0.012	-	0.020	0.30	-	0.51
c	0.003	-	0.007	0.08	-	0.18
D	0.110	0.114	0.120	2.80	2.90	3.04
E	0.082	0.093	0.104	2.10	2.37	2.64
E1	0.047	0.051	0.055	1.20	1.30	1.40
e	0.075			1.90BSC		
e1	0.037			0.95BSC		
L	0.015	0.020	0.024	0.40	0.50	0.60
L1	0.022			0.55		
N	3			3		
ϕ	0°	-	8°	0°	-	8°
aaa	0.004			0.10		
bbb	0.008			0.20		

Suggested Land Pattern



DIMENSIONS		
SYM	INCHES	MILLIMETERS
C	0.087	2.20
E	0.037	0.95
E1	0.075	1.90
G	0.031	0.80
X	0.039	1.00
Y	0.055	1.40
Z	0.141	3.60

Contact Information

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