

## Description

The EP0504S1 is a 2-line ultra-low capacitance 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 voltage sensitive high-speed data lines. The EP0504S1 has a very low capacitance with a typical value at 0.3pF, and complies with the IEC 61000-4-2(ESD) standard with  $\pm 18\text{kV}$  air and  $\pm 18\text{kV}$  contact discharge. It is assembled into a lead-free SOT-143 package. The small size, very low capacitance and high ESD surge protection make EP0504S1 an ideal choice to protect cell phone, digital video interfaces, high speed data ports, and many other portable applications.

## Mechanical Characteristics

- ◆ Package: SOT-143
- ◆ 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

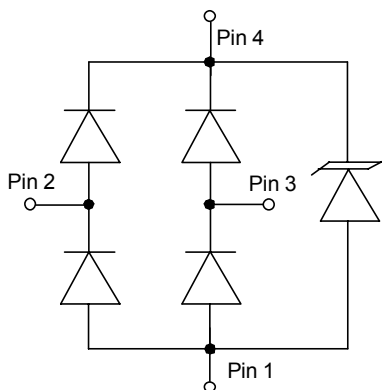
## Features

- ◆ Ultra low capacitance: 0.3pF typical
- ◆ Ultra low leakage: nA level
- ◆ Operating voltage: 5V
- ◆ Low clamping voltage
- ◆ 4-pin SOT-143 package
- ◆ Protects two data lines and one power line
- ◆ Complies with following standards:
  - IEC 61000-4-2 (ESD) immunity test  
Air discharge:  $\pm 18\text{kV}$   
Contact discharge:  $\pm 18\text{kV}$
  - IEC61000-4-4 (EFT) 40A (5/50ns)
  - IEC61000-4-5 (Lightning) 4A (8/20 $\mu\text{s}$ )
- ◆ RoHS Compliant
- ◆ AEC-Q101 qualified (Automotive grade with suffix "Q").
- ◆ Exsemi technology

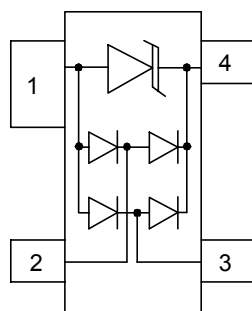
## Applications

- ◆ Cellular Handsets and Accessories
- ◆ Notebooks and Handhelds
- ◆ Personal Digital Assistants
- ◆ Portable Instrumentation
- ◆ Digital Cameras
- ◆ Peripherals
- ◆ Audio Players, Keypads, Side Keys, LCD
- ◆ USB 2.0

## Dimensions and Pin Configuration

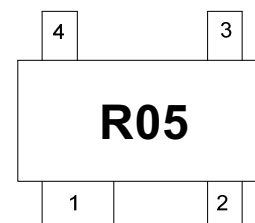


Circuit Diagram



Pin Schematic

## Marking Information



## Ordering Information

Part Number	Marking	Packaging	Reel Size
EP0504S1	R05	3000/Tape & Reel	7 inch

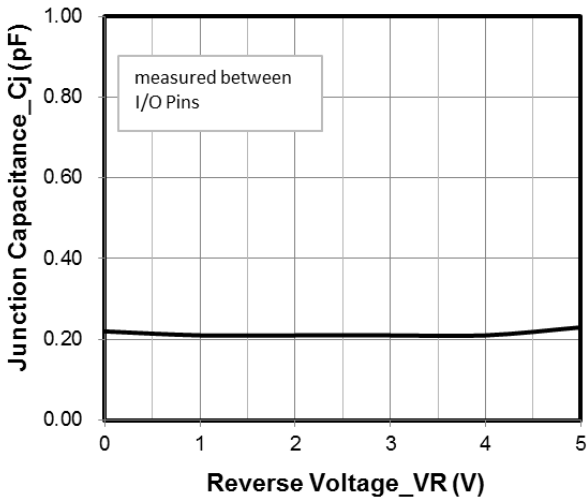
Parameter	Symbol	Value	Unit
Peak Pulse Power (8/20 $\mu$ s)	Ppk	60	W
Peak Pulse Current (8/20 $\mu$ s)	I <sub>PP</sub>	4	A
ESD per IEC 61000-4-2 (Air)	V <sub>ESD</sub>	$\pm$ 20	kV
ESD per IEC 61000-4-2 (Contact)		$\pm$ 15	
Operating Temperature Range	T <sub>J</sub>	-55 to +125	$^{\circ}$ C
Storage Temperature Range	T <sub>stg</sub>	-55 to +150	$^{\circ}$ C

### Electrical Characteristics (T<sub>A</sub>=25 $^{\circ}$ C unless otherwise specified)

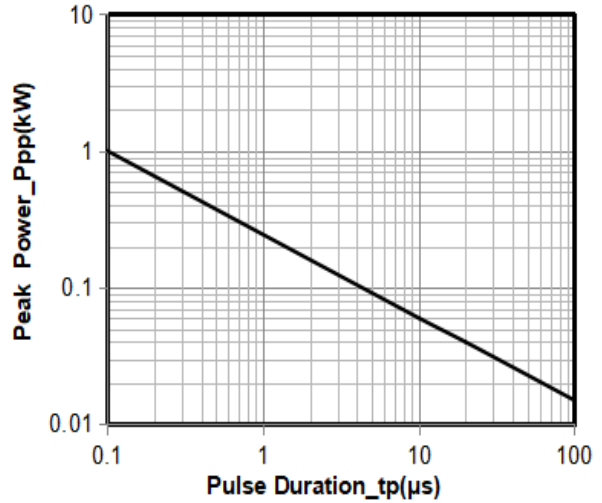
Parameter	Symbol	Min	Typ	Max	Unit	Test Condition
Reverse Working Voltage	V <sub>RWM</sub>			5	V	Any I/O pin to ground
Breakdown Voltage	V <sub>BR</sub>	6			V	I <sub>T</sub> = 1mA, any I/O pin to ground
Reverse Leakage Current	I <sub>R</sub>			0.5	$\mu$ A	V <sub>RWM</sub> = 5V, any I/O pin to ground
Clamping Voltage	V <sub>C</sub>			10	V	I <sub>PP</sub> = 1A (8 x 20 $\mu$ s pulse), any I/O pin to ground
Clamping Voltage	V <sub>C</sub>			15	V	I <sub>PP</sub> = 4A (8 x 20 $\mu$ s pulse), any I/O pin to ground
Junction Capacitance	C <sub>J</sub>		0.2	0.3	pF	V <sub>R</sub> = 0V, f = 1MHz, between I/O pins
Junction Capacitance	C <sub>J</sub>			0.5	pF	V <sub>R</sub> = 0V, f = 1MHz, any I/O pin to ground

Note 1: I/O pins are pin 2&3

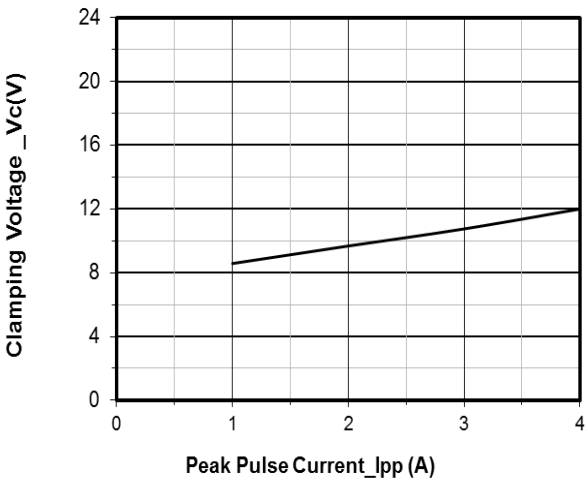
Typical Performance Characteristics (TA=25°C unless otherwise S pecified)



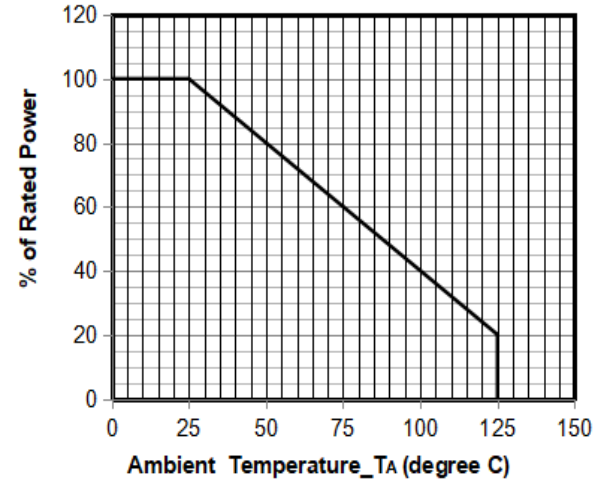
Junction Capacitance vs. Reverse Voltage



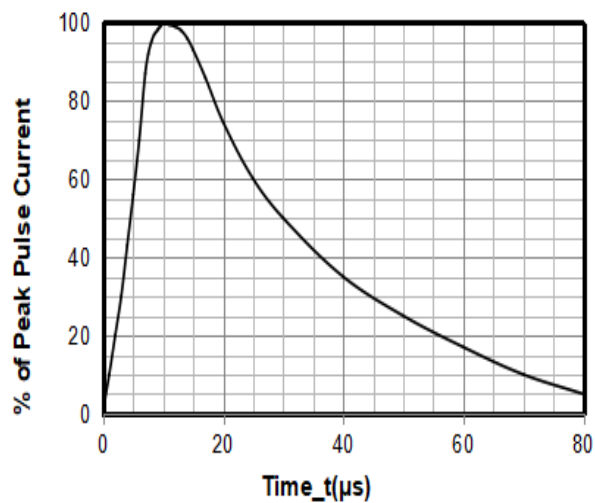
Peak Pulse Power vs. Pulse Time



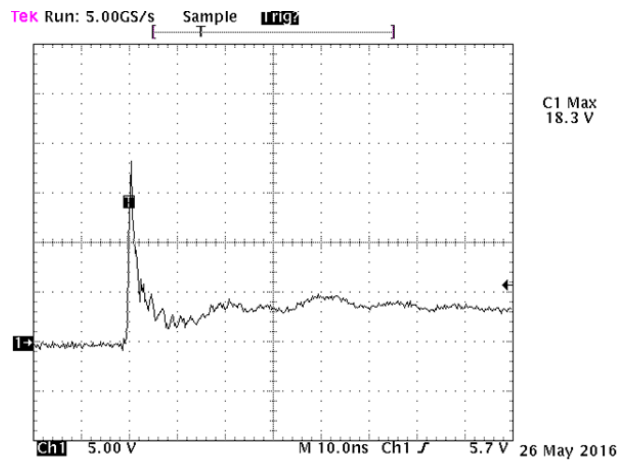
Clamping Voltage vs. Peak Pulse Current



Power Derating Curve



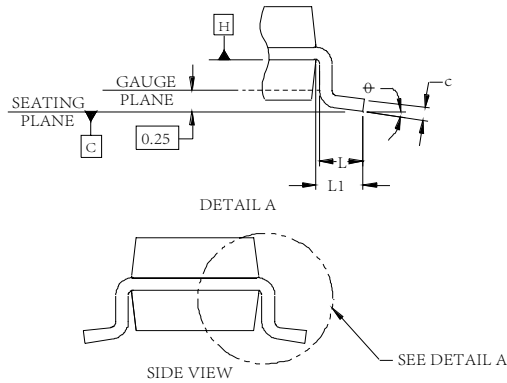
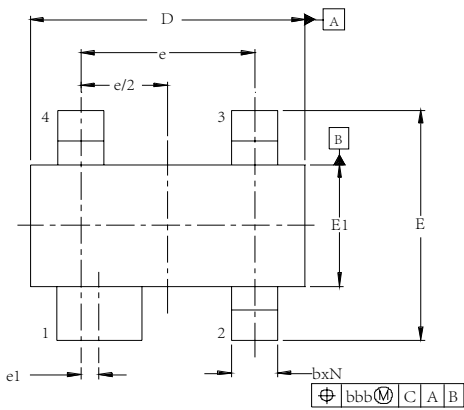
8 X 20μs Pulse Waveform



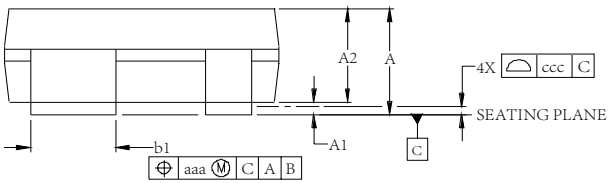
Note: Data is taken with a 10x attenuator

Contact discharge current waveform  
per IEC61000-4-2

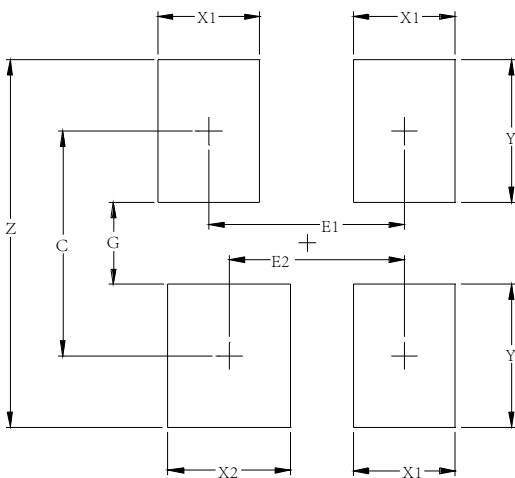
### SOT-143 Package Outline Drawing



DIM	DIMENSIONS					
	INCHES			MILLIMETERS		
	MIN	NOM	MAX	MIN	NOM	MAX
A	.031	-	.048	0.80	-	1.22
A1	.000	-	.006	0.013	-	0.15
A2	.029	.035	.042	0.75	0.90	1.07
b	.011	-	.020	0.30	-	0.51
b1	.029	-	.037	0.76	-	0.94
c	.003	-	.008	0.08	-	0.20
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			1.92 BSC		
e1	.008			0.20 BSC		
L	.015	.020	.024	0.40	0.50	0.60
L1	(0.021)			(0.54)		
N	4			4		
⊕	0°	-	8°	0°	-	8°
aaa	.006			0.15		
bbb	.008			0.20		
ccc	.004			0.10		



### Suggested Land Pattern



SYM	DIMENSIONS	
	MILLIMETERS	INCHES
C	2.20	0.087
E1	1.92	0.076
E2	1.72	0.068
G	0.80	0.031
X1	1.00	0.039
X2	1.20	0.047
Y	1.40	0.055
Z	3.60	0.141