

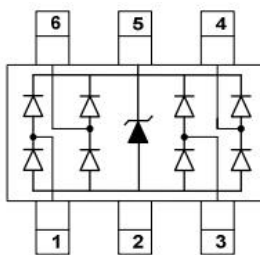
## Description

The CLAMP0504S is an ultra low capacitance TVS 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 CLAMP0504S has an ultra-low capacitance with a typical value at 0.3pF, and complies with the IEC 61000-4-2 (ESD) standard with  $\pm 25\text{kV}$  air and  $\pm 20\text{kV}$  contact discharge. It is assembled into a 6-pin lead-free SOT-563 package. The combination of small size, ultra low capacitance, and high ESD surge capability make it ideal for use in applications such as USB 3.0, multimedia, and other high speed ports.

## Features

- Ultra low capacitance: 0.3pF typical (I/O to I/O)
- Ultra low leakage: nA level
- Working voltage: 5V
- Low clamping voltage
- Up to 4 data lines and one power line protects
- Complies with following standards:
  - IEC 61000-4-2 (ESD) immunity test
    - Air discharge:  $\pm 25\text{kV}$
    - Contact discharge:  $\pm 20\text{kV}$
  - IEC61000-4-5 (Lightning) 5A (8/20 $\mu\text{s}$ )
- RoHS Compliant

## Dimensions & Symbol (Unit: mm Max)



Circuit Diagram & Pin Schematic

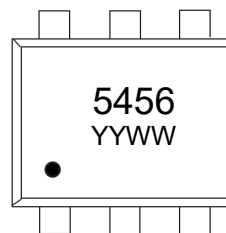
## Mechanical Characteristics

- Package: SOT-563
- Lead Finish: Matte Tin
- Case Material: "Green" Molding Compound.
- Moisture Sensitivity: Level 3 per J-STD-020
- Terminal Connections: See Diagram Below
- Marking Information: See Below

## Applications

- USB 2.0 and USB 3.0 Ports
- USB OTG
- Digital Video Interface (DVI)
- Monitor and Flat Panel Displays
- PCI Express and Serial SATA Ports
- Gigabit Ethernet
- IEEE 1394 Firewire Ports
- Consumer products (STB, DVD, DSC, DVC...)

## Marking information



5456 = Device Marking Code  
YYWW = Date Code  
Dot denotes Pin1

## Ordering Information

Part Number	Packaging	Reel Size
CLAMP0504S	3000/Tape & Reel	7 inch

## Absolute Maximum Ratings (T<sub>A</sub>=25°C unless otherwise specified)

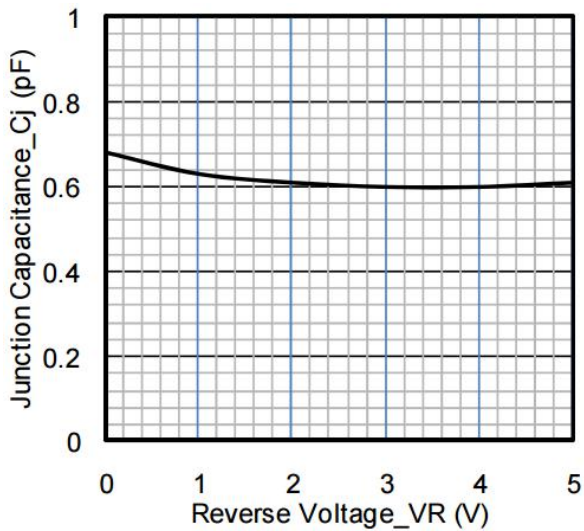
Parameter	Symbol	Value	Unit
Peak Pulse Power (8/20μs)	P <sub>pk</sub>	100	W
Peak Pulse Current (8/20μs)	I <sub>pp</sub>	5	A
ESD per IEC 61000-4-2 (Air)	V <sub>ESD</sub>	±25	kV
ESD per IEC 61000-4-2 (Contact)		±20	
Operating Temperature Range	T <sub>J</sub>	-55 to +125	°C
Storage Temperature Range	T <sub>stg</sub>	-55 to +150	°C

## Electrical Characteristics (T<sub>A</sub>=25°C unless otherwise specified)

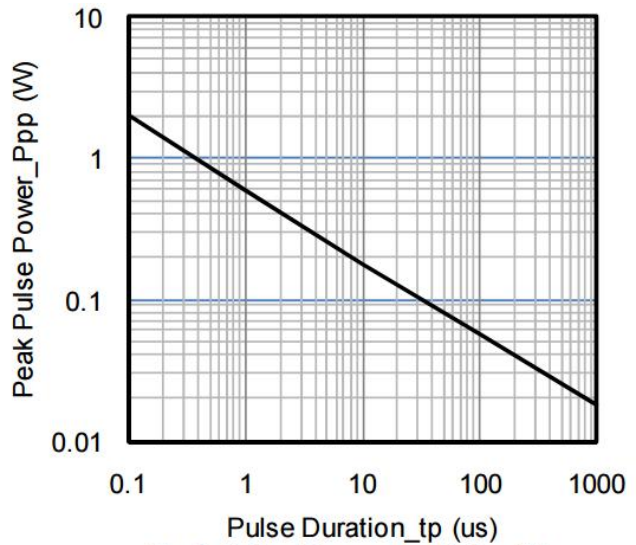
Parameter	Symbol	Min	Typ	Max	Unit	Test Condition
Reverse Working Voltage	V <sub>RWM</sub>			5	V	
Breakdown Voltage	V <sub>BR</sub>	6			V	I <sub>T</sub> = 1mA
Reverse Leakage Current	I <sub>R</sub>			0.5	μA	V <sub>RWM</sub> = 5.0V
Clamping Voltage	V <sub>C</sub>			15	V	I <sub>PP</sub> = 1A (8 x 20μs pulse)
Clamping Voltage	V <sub>C</sub>			20	V	I <sub>PP</sub> = 5A (8 x 20μs pulse)
Junction Capacitance	C <sub>J</sub>		0.3	0.4	pF	Between I/O pins V <sub>R</sub> =0V, f=1MHZ
Junction Capacitance	C <sub>J</sub>			0.8	pF	Any I/O pins to Ground V <sub>R</sub> =0V, f=1MHZ

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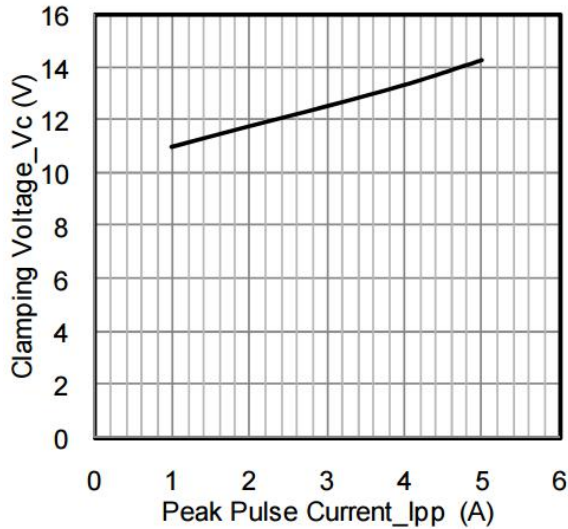
**Typical Performance Characteristics ( $T_A=25^{\circ}\text{C}$  unless otherwise Specified)**



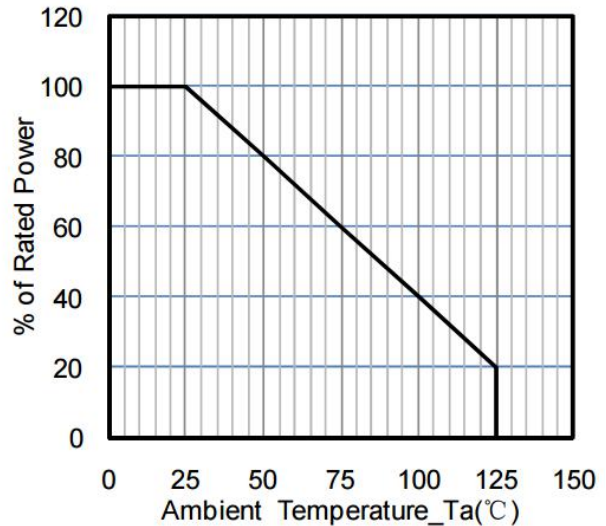
**Junction Capacitance vs. Reverse Voltage**



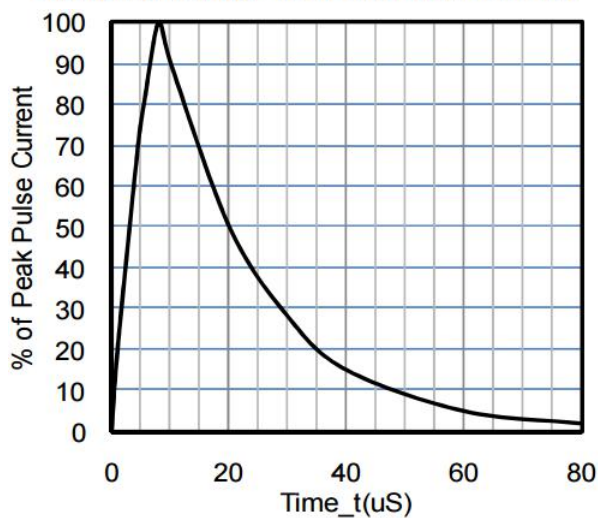
**Peak Pulse Power vs. Pulse Time**



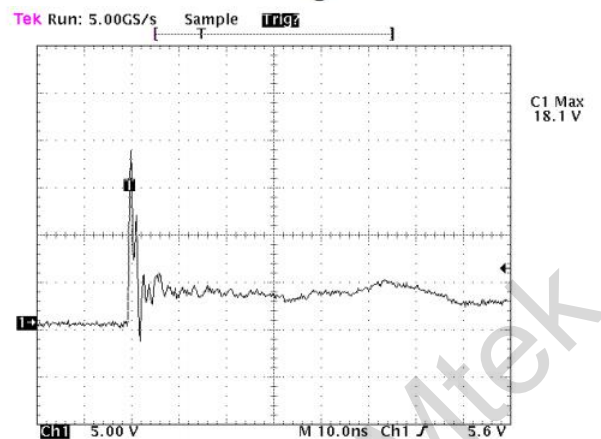
**Clamping Voltage vs. Peak Pulse Current**



**Power Derating Curve**



**8 X 20uS Pulse Waveform**

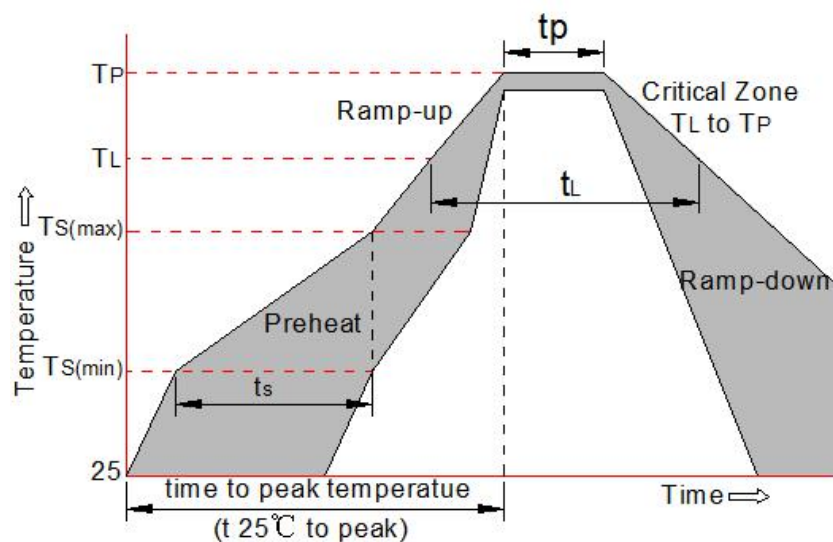


**ESD Clamping Voltage**

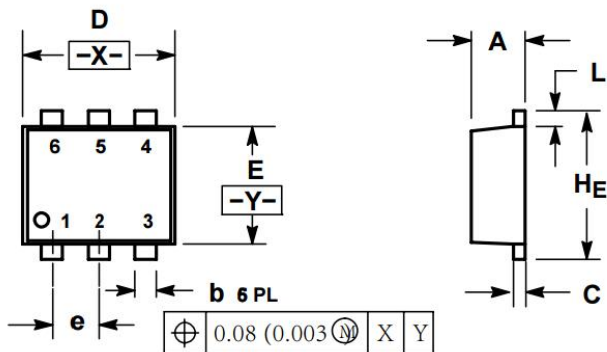
**8 kV Contact per IEC61000-4-2**

## Soldering parameters

Reflow Condition		Pb-Free assembly (see FIG.2)
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 (Liquid us Temp ( $T_L$ ) to peak)		3°C/sec. Max
$T_{s(max)}$ to $T_L$ - Ramp-up Rate		3°C/sec. Max
Reflow	-Temperature( $T_L$ ) (Liquid us)	+217°C
	-Temperature( $t_L$ )	60-150 secs.
Peak Temp ( $T_p$ )		+260(+0/-5)°C
Time within 5°C of actual Peak Temp ( $t_p$ )		30 secs. Max
Ramp-down Rate		6°C/sec. Max
Time 25°C to Peak Temp ( $T_p$ )		8 min. Max
Do not exceed		+260°C

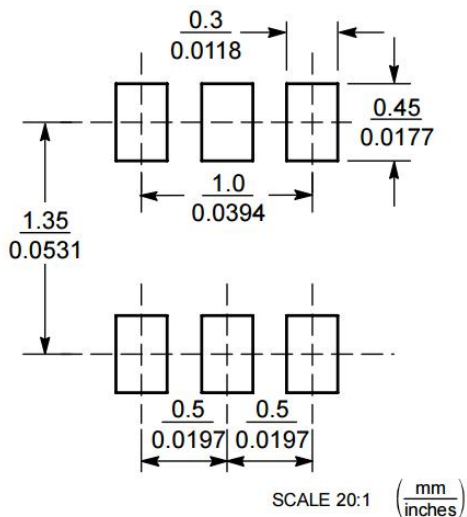


## Package mechanical data



DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.50	0.55	0.60	0.020	0.021	0.023
b	0.17	0.22	0.27	0.007	0.009	0.011
C	0.08	0.12	0.18	0.003	0.005	0.007
D	1.50	1.60	1.70	0.059	0.062	0.066
E	1.10	1.20	1.30	0.043	0.047	0.051
e	0.5 BSC			0.02 BSC		
L	0.10	0.20	0.30	0.004	0.008	0.012
H <sub>E</sub>	1.50	1.60	1.70	0.059	0.062	0.066

## Suggested Land Pattern



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