

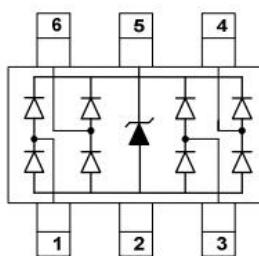
Description

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 μs)
- RoHS Compliant

Dimensions & Symbol (Unit: mm Max)



Circuit Diagram & Pin Schematic

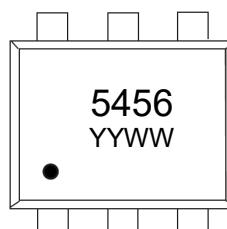
Mechanical Characteristics

- 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 |

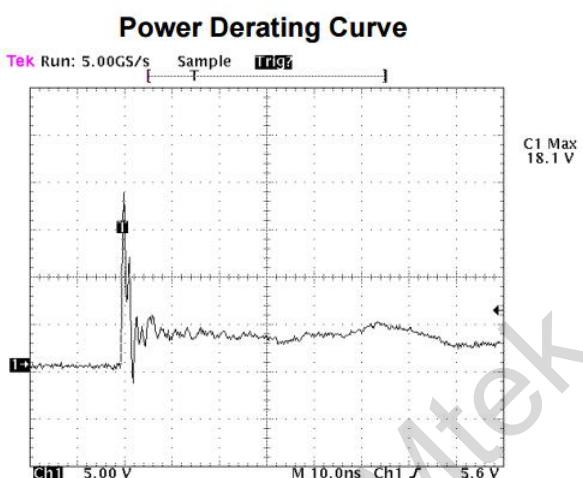
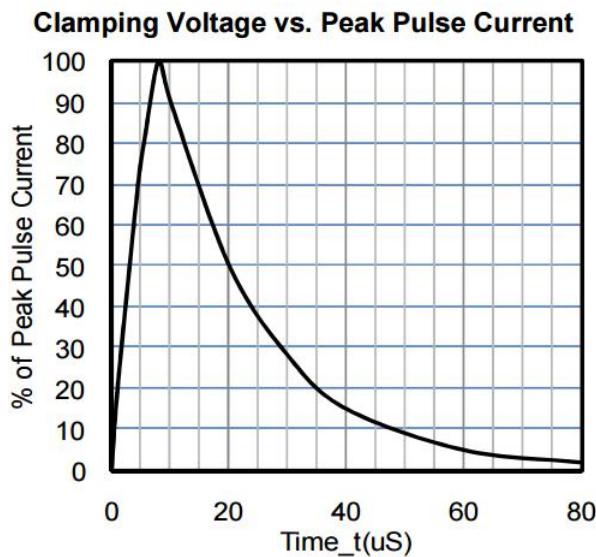
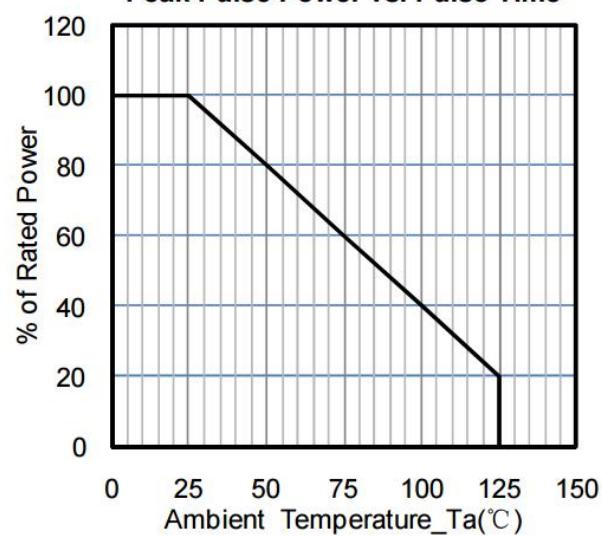
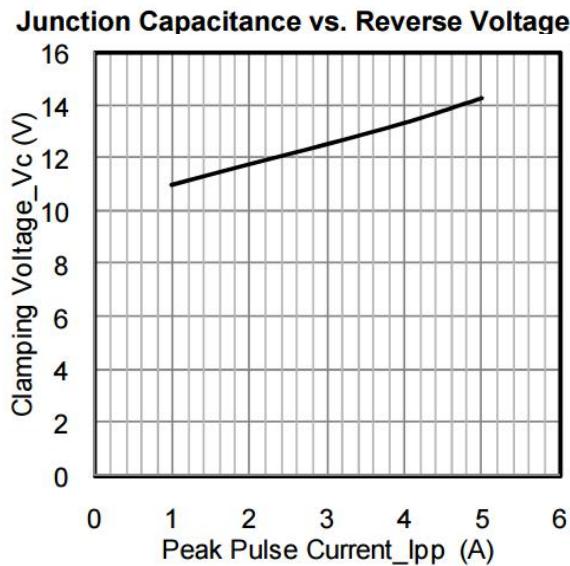
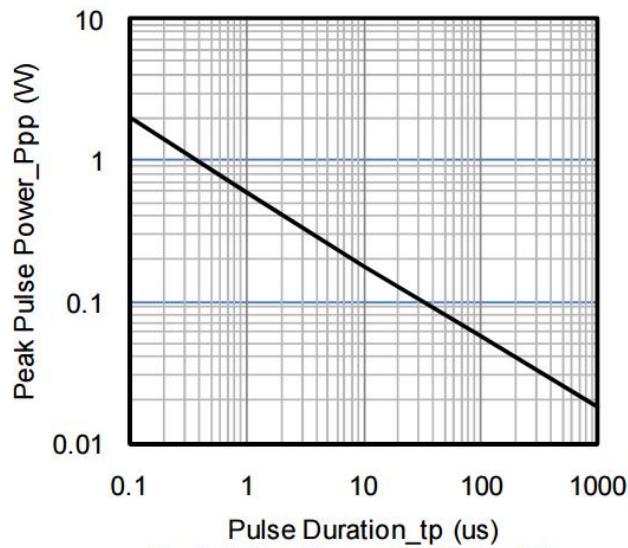
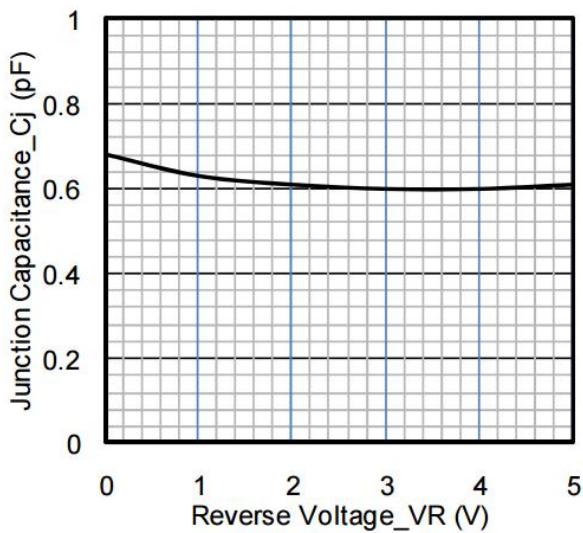
Absolute Maximum Ratings (T_A=25°C unless otherwise specified)

| Parameter | Symbol | Value | Unit |
|---------------------------------|------------------|-------------|------|
| Peak Pulse Power (8/20μs) | Ppk | 100 | W |
| Peak Pulse Current (8/20μs) | Ipp | 5 | A |
| ESD per IEC 61000-4-2 (Air) | VESD | ±25 | kV |
| ESD per IEC 61000-4-2 (Contact) | | ±20 | |
| Operating Temperature Range | T _J | -55 to +125 | °C |
| Storage Temperature Range | T _{stg} | -55 to +150 | °C |

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

| Parameter | Symbol | Min | Typ | Max | Unit | Test Condition |
|-------------------------|------------------|-----|-----|-----|------|---|
| Reverse Working Voltage | V _{RWM} | | | 5 | V | |
| Breakdown Voltage | V _{BR} | 6 | | | V | I _T = 1mA |
| Reverse Leakage Current | I _R | | | 0.5 | μA | V _{RWM} = 5.0V |
| Clamping Voltage | V _C | | | 15 | V | I _{PP} = 1A (8 x 20μs pulse) |
| Clamping Voltage | V _C | | | 20 | V | I _{PP} = 5A (8 x 20μs pulse) |
| Junction Capacitance | C _J | | 0.3 | 0.4 | pF | Between I/O pins VR=0V, f=1MHZ |
| Junction Capacitance | C _J | | | 0.8 | pF | Any I/O pins to Ground VR=0V, f=1MHZ |

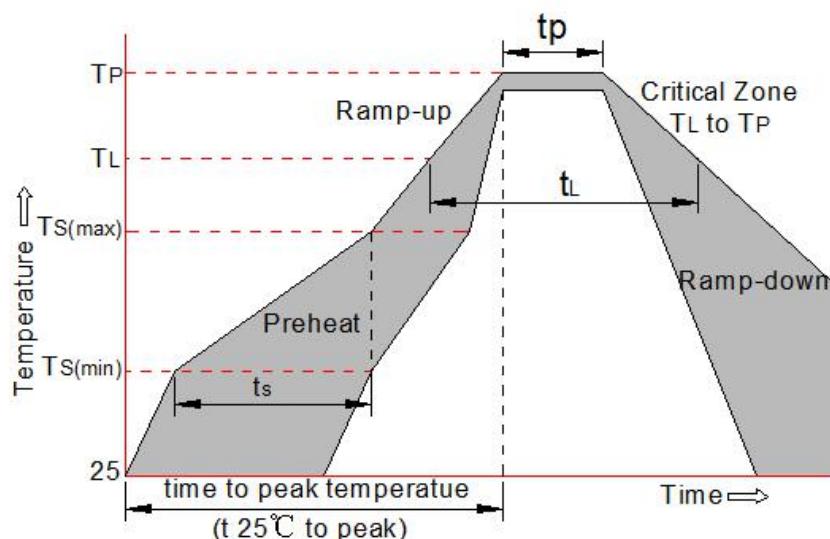
Typical Performance Characteristics ($T_A=25^\circ\text{C}$ unless otherwise Specified)



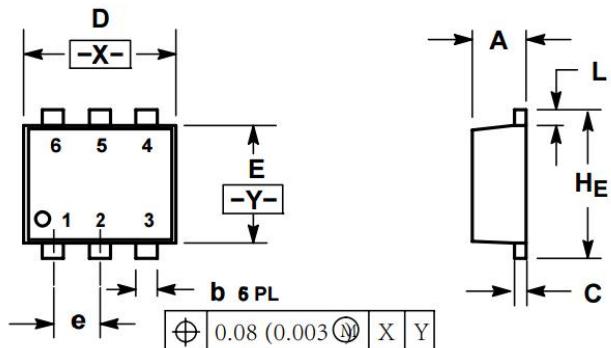
8 kV Contact per IEC61000-4-2

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) (ts) | 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 |

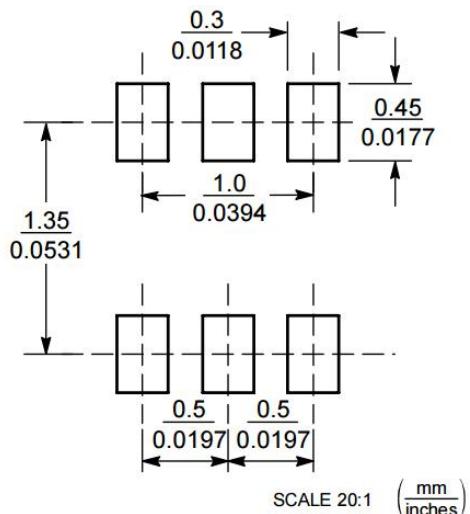


Package mechanical data



| 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_F | 1.50 | 1.60 | 1.70 | 0.059 | 0.062 | 0.066 |

Suggested Land Pattern



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