

PROTECTION PRODUCTS - TransClamp™

Description

A TransClamp™ is a low capacitance TVS array designed to protect high speed data interfaces. This series has been specifically designed to protect sensitive components which are connected to data and transmission lines from overvoltage caused by **ESD** (electrostatic discharge), **CDE** (Cable Discharge Events), and **Lightning**.

These devices integrate low capacitance, surge-rated compensation diodes with high power transient voltage suppressors (TVS). The capacitance of the device is limited to 15pF maximum to ensure correct signal transmission on high-speed lines.

The TClamp™1201S is in a 6-pin, RoHS/WEEE compliant, SOT-23 package. The leads are finished with lead-free matte tin. They are particularly well suited for applications where board space is at a premium. The TClamp1201S may be used to protect ADSL interfaces, multi-protocol serial transceivers, portable electronics, and wireless systems.

Features

- ◆ Transient protection for high-speed data lines to **IEC 61000-4-2 (ESD) ±15kV (air), ±8kV (contact)**
IEC 61000-4-4 (EFT) 40A (5/50ns)
IEC 61000-4-5 (Lightning) , 20A (8/20µs)
- ◆ Optimized for easy PCB layout
- ◆ Low capacitance: **15pF**
- ◆ Operating voltage: **12V**
- ◆ Low clamping voltage
- ◆ Small Package saves board space
- ◆ Solid-state technology

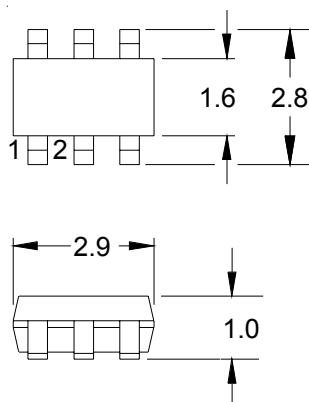
Mechanical Characteristics

- ◆ JEDEC SOT-23 6L package
- ◆ RoHS/WEEE Compliant
- ◆ Nominal Dimensions: 2.9 x 2.8mm
- ◆ Molding compound flammability rating: UL 94V-0
- ◆ Marking: Marking Code
- ◆ Packaging: Tape and Reel

Applications

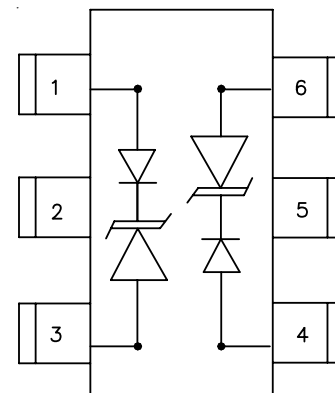
- ◆ ADSL Interfaces
- ◆ RS-232, RS-422 Interfaces
- ◆ Multi-Protocol Serial Transceivers
- ◆ High-Speed Data Lines
- ◆ WAN/LAN Equipment
- ◆ Integrated Magnetics
- ◆ Carrier Class Equipment
- ◆ Customer Premise Equipment

Package Dimensions



6 Pin SOT-23 package
Nominal Dimensions in mm

Schematic & Pin Configuration



(Top Side View)

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Absolute Maximum Rating

Rating	Symbol	Value	Units
Peak Pulse Power ($t_p = 8/20\mu s$)	P_{pk}	500	Watts
Peak Pulse Current ($t_p = 8/20\mu s$)	I_{pp}	20	A
ESD per IEC 61000-4-2 (Air) ESD per IEC 61000-4-2 (Contact)	V_{ESD}	30 30	kV
Operating Temperature	T_J	-40 to +85	°C
Storage Temperature	T_{STG}	-55 to +150	°C

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

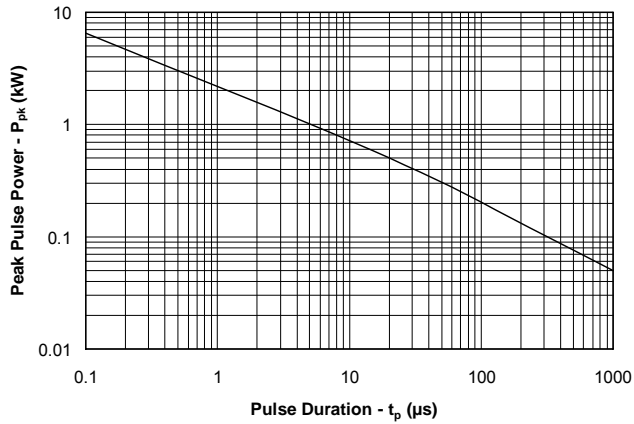
TClamp1201S						
Parameter	Symbol	Conditions	Minimum	Typical	Maximum	Units
Reverse Stand-Off Voltage	V_{RWM}				12	V
Reverse Breakdown Voltage	V_{BR}	$I_t = 1mA$	13.3			V
Reverse Leakage Current	I_R	$V_{RWM} = 12V, T=25^\circ C$			5	μA
Clamping Voltage	V_C	$I_{pp} = 5A, t_p = 8/20\mu s$			19	V
Clamping Voltage	V_C	$I_{pp} = 20A, t_p = 8/20\mu s$			26.6	V
Peak Pulse Current	I_{pp}	$t_p = 8/20\mu s$			20	A
Junction Capacitance ¹	C_j	Between I/O pins and Ground $V_R = 0V, f = 1MHz$		8	15	pF

Note: 1) Junction capacitance with pins 1 and 6 tied together and pins 3 and 4 tied together

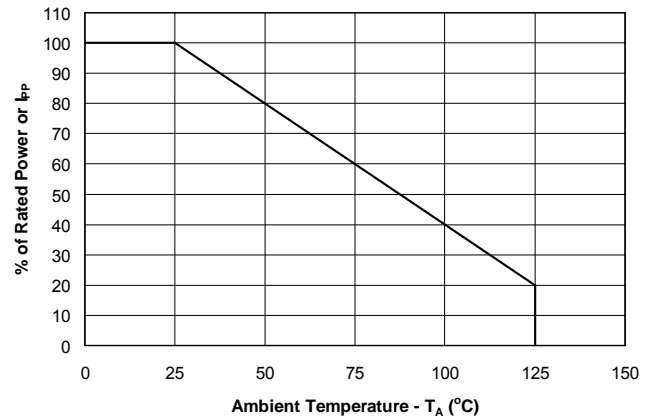
PROTECTION PRODUCTS

Typical Characteristics

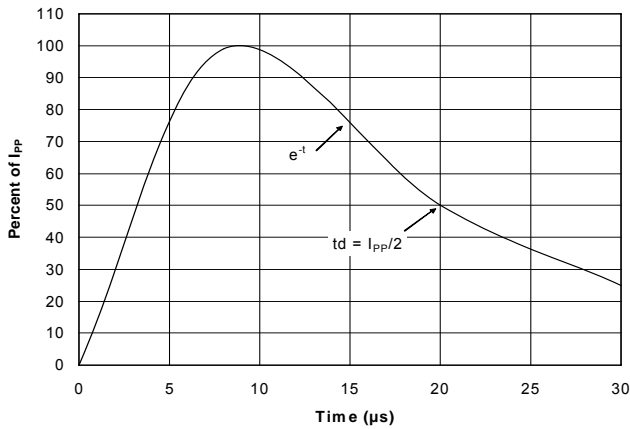
Non-Repetitive Peak Pulse Power vs. Pulse Time



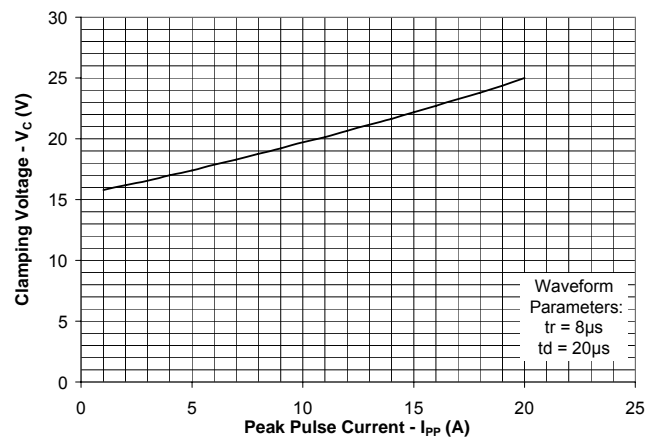
Power Derating Curve



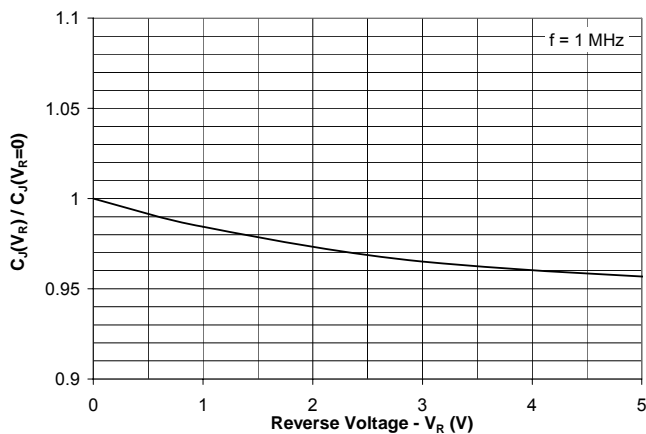
Pulse Waveform



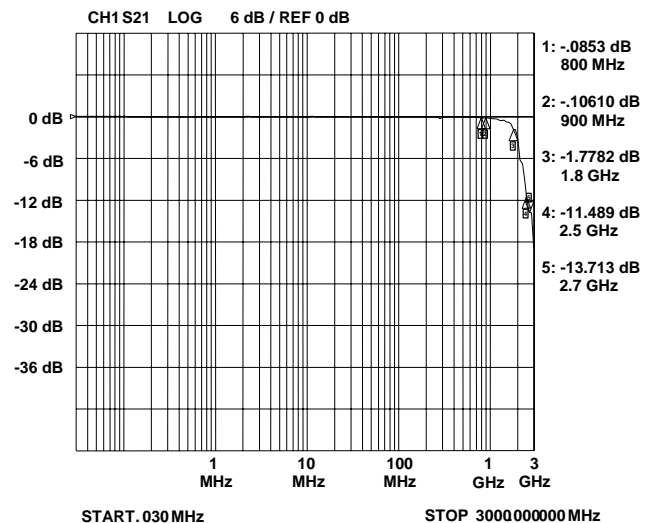
Clamping Voltage vs. Peak Pulse Current



Normalized Junction Capacitance vs. Reverse Voltage (Line-to-Ground)



Typical Insertion Loss S21 (Each Line)



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Applications Information

Device Connection for Metallic Protection of High-Speed Data Lines

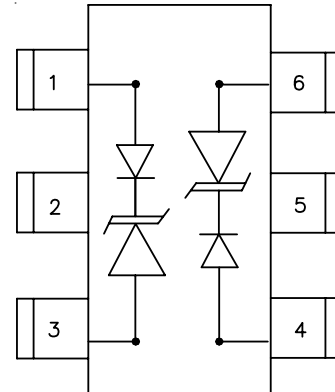
The TClamp1201S is designed to protect high-speed data lines from transient over-voltages which result from lightning and ESD. The device is designed to protect one line in common mode (Line-to-Ground) or one line pair in metallic (Line-to-Line) mode. For metallic mode protection, the input of line 1 is connected at pin 1 and the output is connected at pin 6. Likewise, the input of line 2 is connected at pin 3 and the output is connected at pin 4. For common mode protection, ground either pins 1 and 6 or pins 3 and 4. For proper operation in either configuration, pins 1 and 6 must be connected together and pins 3 and 4 must be connected together using the PCB trace.

The ground connection should be made directly to the ground plane for best results.

Matte Tin Lead Finish

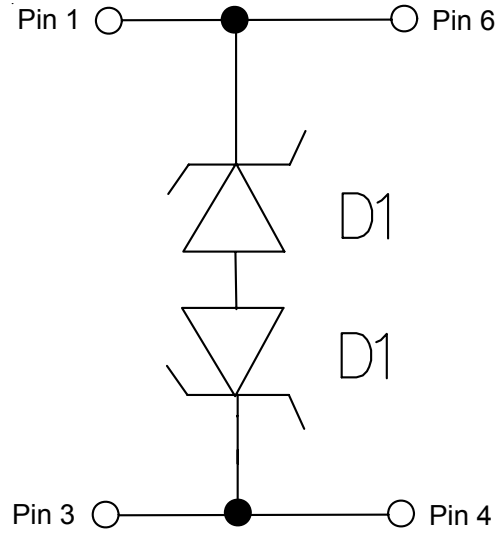
Matte tin has become the industry standard lead-free replacement for SnPb lead finishes. A matte tin finish is composed of 100% tin solder with large grains. Since the solder volume on the leads is small compared to the solder paste volume that is placed on the land pattern of the PCB, the reflow profile will be determined by the requirements of the solder paste. Therefore, these devices are compatible with both lead-free and SnPb assembly techniques. In addition, unlike other lead-free compositions, matte tin does not have any added alloys that can cause degradation of the solder joint.

Pin Configuration (Top Side View)



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Applications Information - Spice Model

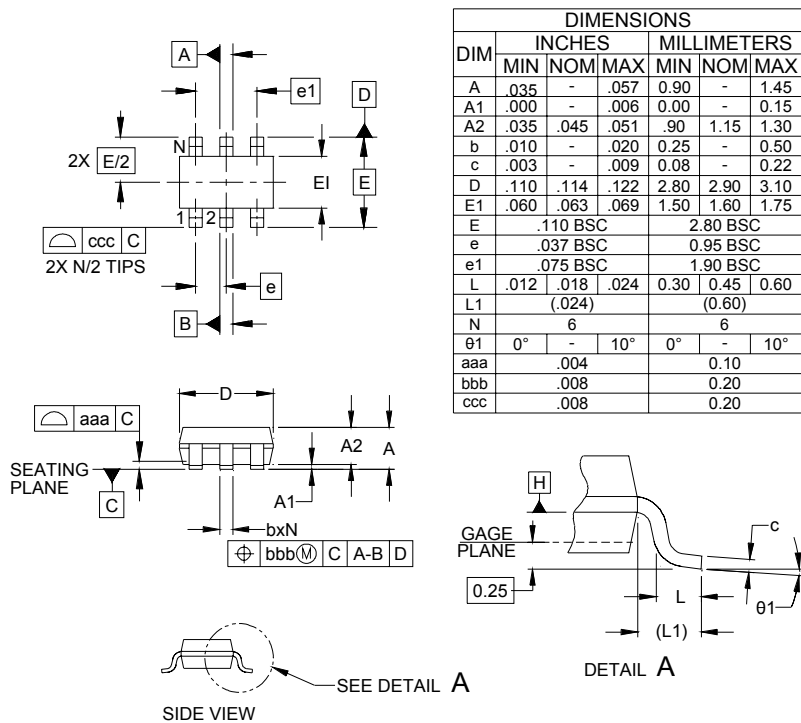


TClamp1201S Spice Model

Table 1 - TClamp1201S Spice Parameters		
Parameter	Unit	D1 (TVS)
IS	Amp	2E-15
BV	Volt	14.296
VJ	Volt	0.7
RS	Ohm	0.23
IBV	Amp	1.0E-3
CJO	Farad	0.92E-12
TT	sec	2.541E-9
M	--	0.02
N	--	1.1
EG	eV	1.11

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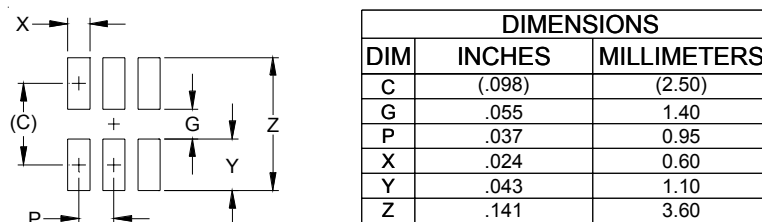
Outline Drawing - SOT-23 6L



NOTES:

1. CONTROLLING DIMENSIONS ARE IN MILLIMETERS (ANGLES IN DEGREES).
2. DATUMS [-A-] AND [-B-] TO BE DETERMINED AT DATUM PLANE [-H-]
3. DIMENSIONS "E1" AND "D" DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.

Land Pattern - SOT-23 6L

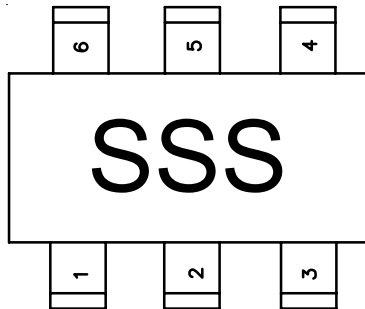


NOTES:

1. THIS LAND PATTERN IS FOR REFERENCE PURPOSES ONLY. CONSULT YOUR MANUFACTURING GROUP TO ENSURE YOUR COMPANY'S MANUFACTURING GUIDELINES ARE MET.

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Marking



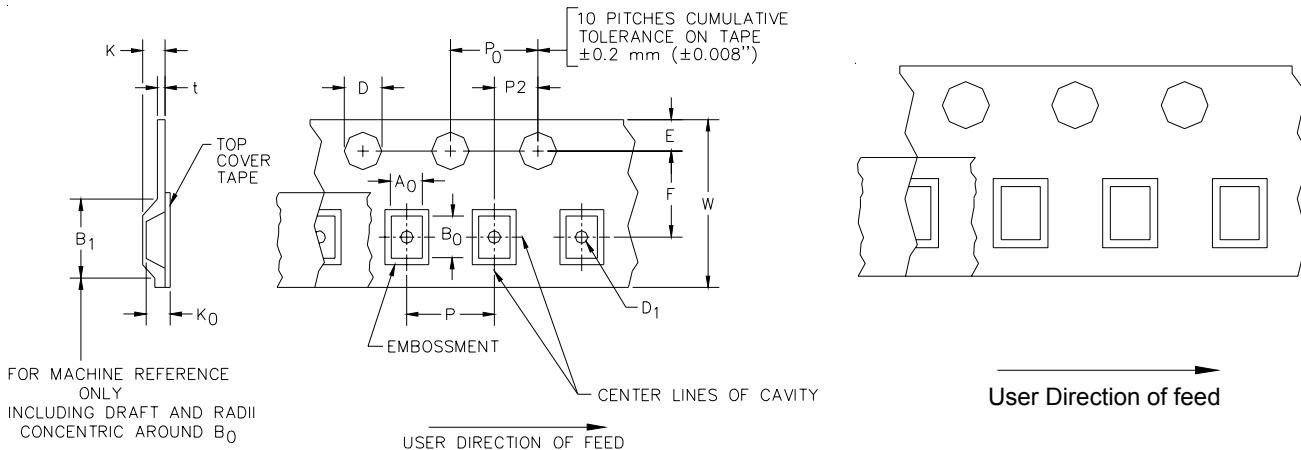
Ordering Information

Part Number	Qty per Reel	Reel Size
TClamp1201S.TCT	3,000	7 Inch

Note: Lead finish is lead-free matte tin

TransClamp and TClamp are marks of Semtech Corporation

Tape and Reel Specification



Device Orientation in Tape

A0	B0	K0
3.23 +/-0.05 mm	3.17 +/-0.05 mm	1.37 +/-0.05 mm

Tape Width	B, (Max)	D	D1	E	F	K (MAX)	P	P0	P2	T(MAX)	W
8 mm	4.2 mm (.165)	1.5 + 0.1 mm - 0.0 mm	1.0 mm ±0.05	1.750±.10 mm	3.5±0.05 mm	2.4 mm	4.0±0.1 mm	4.0±0.1 mm	2.0±0.05 mm	0.4 mm	8.0 mm + 0.3 mm - 0.1 mm

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