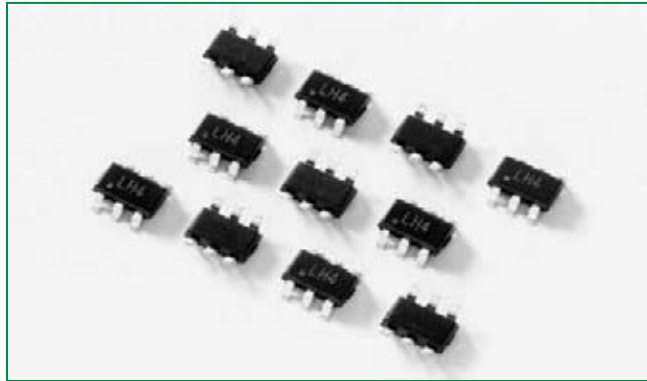
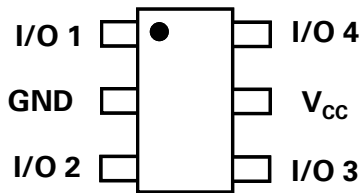


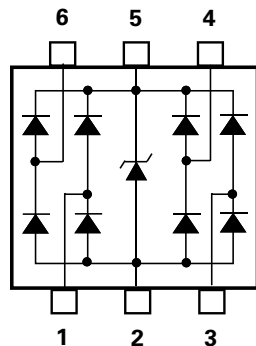
# SP3050 Series 6V 10A Rail Clamp Array



## Pinout



## Functional Block Diagram



## Description

The SP3050 integrates low capacitance rail-to-rail diodes with an additional zener diode to protect each I/O pin against ESD and high surge events. This robust device can safely absorb surge current per IEC61000-4-5 ( $t_p=8/20\mu s$ ) without performance degradation and a minimum  $\pm 20kV$  ESD per IEC61000-4-2. Their very low loading capacitance also makes them ideal for protecting high speed signal pins.

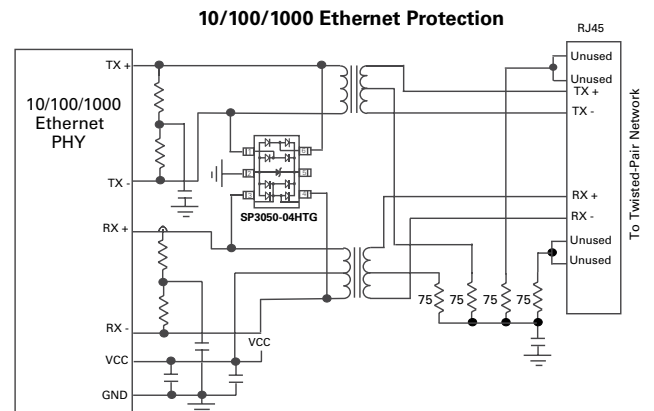
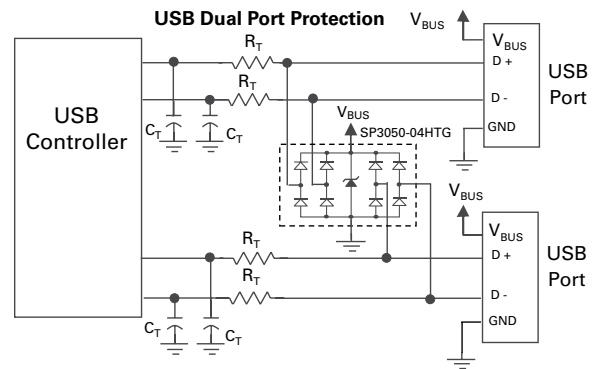
## Features

- ESD, IEC61000-4-2,  $\pm 20kV$  contact,  $\pm 30kV$  air
- EFT, IEC61000-4-4, 40A (5/50ns)
- Lightning, IEC61000-4-5, 10A (8/20 $\mu s$ )
- Low capacitance of 2pF (TYP) per I/O
- Low leakage current of 0.5 $\mu A$  (MAX) at 5V
- Small SOT23-6 packaging

## Applications

- LCD/PDP TVs
- Monitors
- Notebooks
- 10/100/1000 Ethernet
- Firewire
- Set Top Boxes
- Flat Panel Displays
- Portable Medical

## Application Examples



Life Support Note:  
**Not Intended for Use in Life Support or Life Saving Applications**  
The products shown herein are not designed for use in life sustaining or life saving applications unless otherwise expressly indicated.

SP3050

### Absolute Maximum Ratings

Symbol	Parameter	Value	Units
$I_{PP}$	Peak Current ( $t_p=8/20\mu s$ ) <sup>1</sup>	10	A
$P_{PK}$	Peak Pulse Power ( $t_p=8/20\mu s$ )	150	W
$T_{OP}$	Operating Temperature	-40 to 85	°C
$T_{STOR}$	Storage Temperature	-50 to 150	°C

CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

<sup>1</sup>Non-repetitive pulse per waveform on page 3

### Thermal Information

Parameter	Rating	Units
Storage Temperature Range	-65 to 150	°C
Maximum Junction Temperature	150	°C
Maximum Lead Temperature (Soldering 20-40s)	260	°C

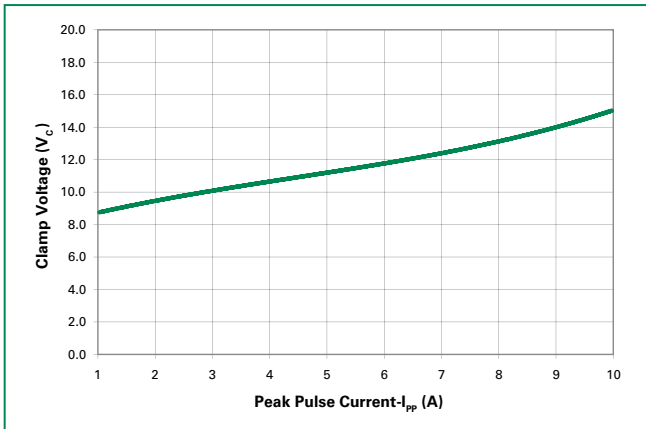
### Electrical Characteristics ( $T_{OP}=25^\circ C$ )

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	$V_{RWM}$	$I_R \leq 1\mu A$			6.0	V
Reverse Voltage Drop	$V_R$	$I_R = 1mA$		8.0		V
Reverse Leakage Current	$I_{LEAK}$	$V_R=5V$		0.1	0.5	$\mu A$
Clamp Voltage <sup>1</sup>	$V_C$	$I_{PP}=1A, t_p=8/20\mu s, I/O$ to GND <sup>2</sup>		8.8	10.0	V
		$I_{PP}=5A, t_p=8/20\mu s, I/O$ to GND <sup>2</sup>		11.5	13.0	V
		$I_{PP}=8A, t_p=8/20\mu s, I/O$ to GND <sup>2</sup>		13.2	15.0	V
Dynamic Resistance	$R_{DYN}$	$(V_{C2} - V_{C1}) / (I_{PP2} - I_{PP1})$		0.7		$\Omega$
ESD Withstand Voltage <sup>1</sup>	$V_{ESD}$	IEC61000-4-2 (Contact)	$\pm 20$			kV
		IEC61000-4-2 (Air)	$\pm 30$			kV
Diode Capacitance <sup>1</sup>	$C_{I/O-GND}$	Reverse Bias=0V		2.4	3.0	pF
		Reverse Bias=1.65V		2.0		pF
Diode Capacitance <sup>1</sup>	$C_{I/O-I/O}$	Reverse Bias=0V		1.2		pF

Notes: <sup>1</sup> Parameter is guaranteed by design and/or device characterization.

<sup>2</sup> Repetitive pulse per waveform on page 3.

### Clamping Voltage vs. $I_{PP}$



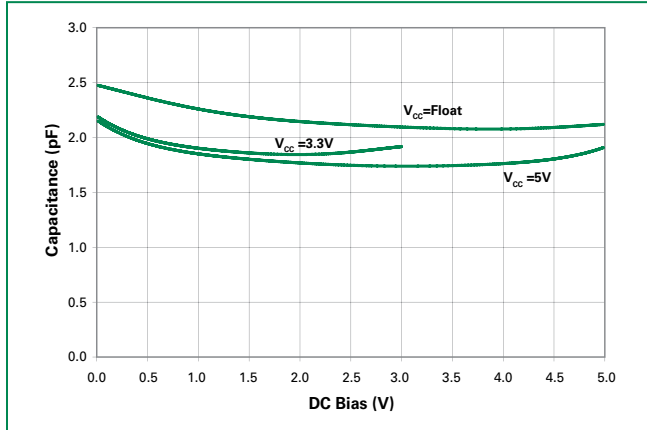
### Product Characteristics

<b>Lead Plating</b>	Matte Tin
<b>Lead Material</b>	Copper Alloy
<b>Lead Coplanarity</b>	0.0004 inches (0.102mm)
<b>Substitute Material</b>	Silicon
<b>Body Material</b>	Molded Epoxy
<b>Flammability</b>	UL94-V-0

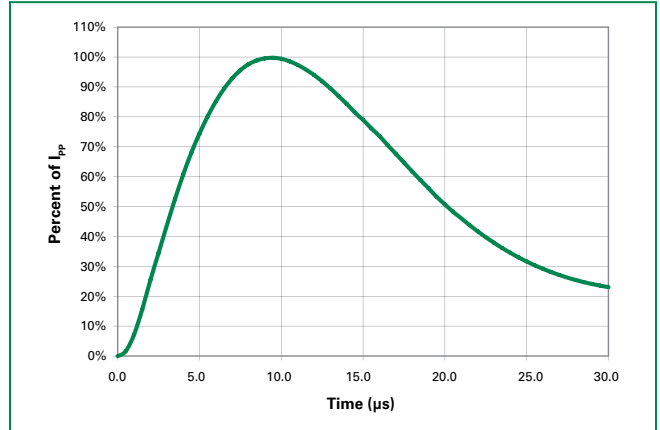
Notes :

1. All dimensions are in millimeters
2. Dimensions include solder plating.
3. Dimensions are exclusive of mold flash & metal burr.
4. All specifications comply to JEDEC SPEC MO-223 Issue A
5. Blo is facing up for mold and facing down for trim/form, i.e. reverse trim/form.
6. Package surface matte finish VDI 11-13.

**Capacitance vs. Reverse Bias**

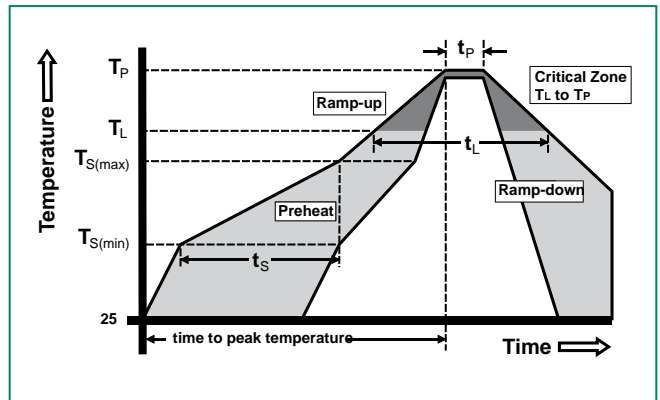


**Pulse Waveform**

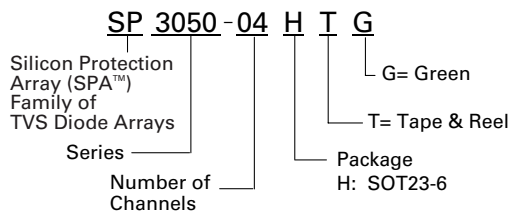


**Soldering Parameters**

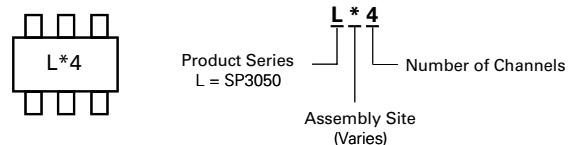
Reflow Condition		Pb – Free assembly
Pre Heat	- Temperature Min ( $T_{s(min)}$ )	150°C
	- Temperature Max ( $T_{s(max)}$ )	200°C
	- Time (min to max) ( $t_s$ )	60 – 180 secs
Average ramp up rate (Liquidus) Temp ( $T_L$ ) to peak		3°C/second max
$T_{s(max)}$ to $T_L$ - Ramp-up Rate		3°C/second max
Reflow	- Temperature ( $T_L$ ) (Liquidus)	217°C
	- Temperature ( $t_L$ )	60 – 150 seconds
Peak Temperature ( $T_p$ )		260 <sup>+0/-5</sup> °C
Time within 5°C of actual peak Temperature ( $t_p$ )		20 – 40 seconds
Ramp-down Rate		6°C/second max
Time 25°C to peak Temperature ( $T_p$ )		8 minutes Max.
Do not exceed		260°C



**Part Numbering System**



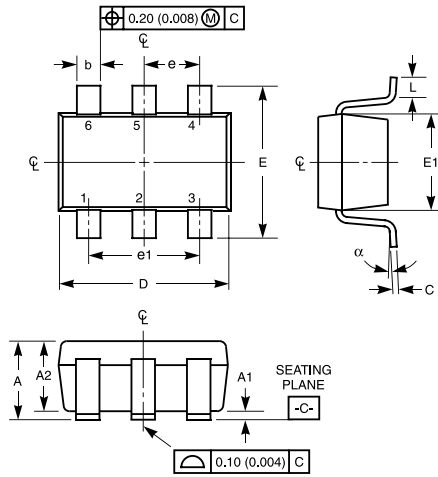
**Part Marking System**



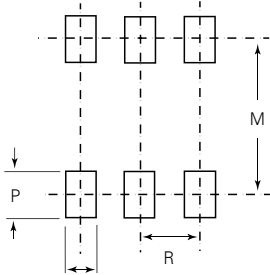
**Ordering Information**

Part Number	Package	Marking	Min. Order Qty.
SP3050-04HTG	SOT23-6	L*4	3000

**Package Dimensions – SOT23-6**



**Recommended Solder Pad Layout**



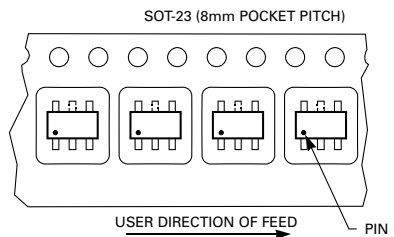
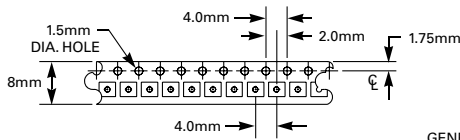
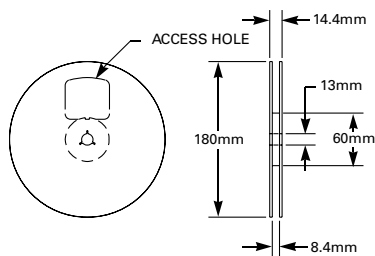
Package	SOT23-6				Notes
Pins	6				
JEDEC	MO-203 Issue A				
	Millimeters		Inches		
	Min	Max	Min	Max	
<b>A</b>	0.900	1.450	0.035	0.057	-
<b>A1</b>	0.000	0.150	0.000	0.006	-
<b>A2</b>	0.900	1.300	0.035	0.051	-
<b>b</b>	0.350	0.500	0.0138	0.0196	-
<b>C</b>	0.080	0.220	0.0031	0.009	-
<b>D</b>	2.800	3.000	0.11	0.118	3
<b>E</b>	2.600	3.000	0.102	0.118	-
<b>E1</b>	1.500	1.750	0.06	0.069	3
<b>e</b>	0.95 Ref		0.0374 ref		-
<b>e1</b>	1.9 Ref		0.0748 Ref		-
<b>L</b>	0.100	0.600	0.004	0.023	4,5
<b>N</b>	6		6		6
<b>a</b>	0°	10°	0°	10°	-
<b>M</b>	2.590		0.102		-
<b>O</b>	0.690		.027 TYP		-
<b>P</b>	0.990		.039 TYP		-
<b>R</b>	0.950		0.038		-

Notes:

1. Dimensioning and tolerances per ANSI 14.5M-1982.
2. Package conforms to EIAJ SC-74 (1992).
3. Dimensions D and E1 are exclusive of mold flash, protrusions, or gate burrs.
4. Footlength L measured at reference to seating plane.
5. "L" is the length of flat foot surface for soldering to substrate.
6. "N" is the number of terminal positions.
7. Controlling dimension: MILLIMETER. Converted inch dimensions are not necessarily exact.

**Embossed Carrier Tape & Reel Specification – SOT23-6**

8mm TAPE AND REEL



GENERAL INFORMATION

1. 3000 PIECES PER REEL.
2. ORDER IN MULTIPLES OF FULL REELS ONLY.
3. MEETS EIA-481 REVISION "A" SPECIFICATIONS.