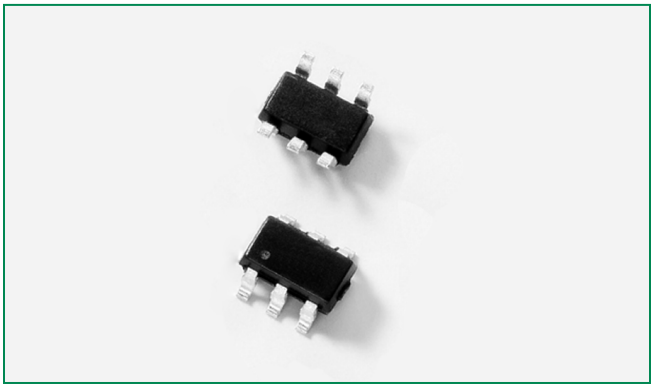
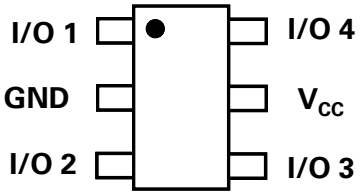
Littelfuse®
Expertise Applied | Answers Delivered

SP3051 Series 6V 20A Diode Array

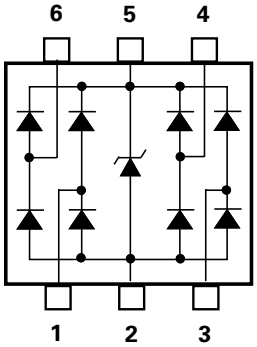
RoHS Pb GREEN



Pinout



Functional Block Diagram



Description

The SP3051 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 20A of current per IEC61000-4-5 (t_P=8/20µs) without performance degradation and a minimum ±30kV ESD per IEC61000-4-2. Their very low loading capacitance also makes them ideal for protecting high speed signal pins.

Features

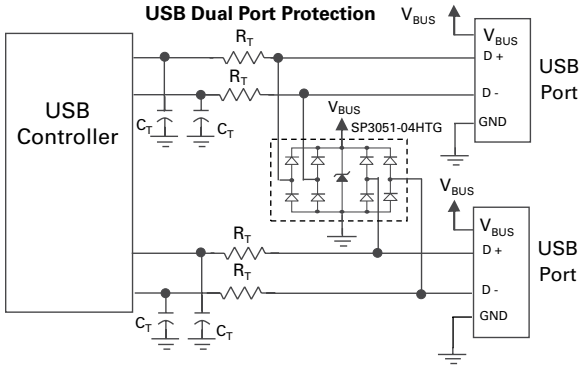
- ESD, IEC61000-4-2, ±30kV contact, ±30kV air
- EFT, IEC61000-4-4, 40A (5/50ns)
- Lightning, IEC61000-4-5, 20A (8/20µs)
- Low capacitance of 3.8pF (TYP) per I/O
- Low leakage current of 0.5µA (MAX) at 5V
- Small SOT23-6 (JEDEC MO-178AB) packaging

Applications

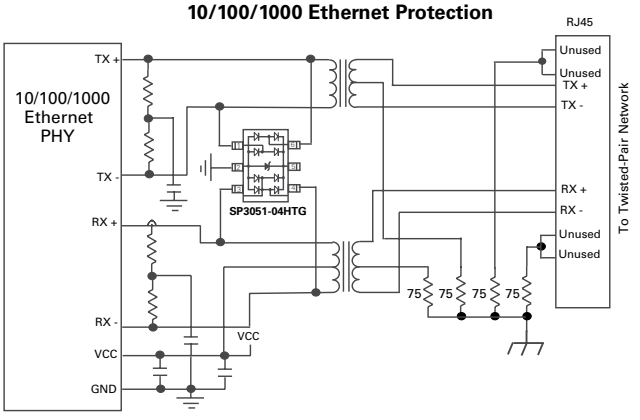
- LCD/PDP TVs
- Monitors
- Notebooks
- 10/100/1000 Ethernet
- Firewire
- Set Top Boxes
- Flat Panel Displays
- Portable Medical

Application Examples

USB Dual Port Protection



10/100/1000 Ethernet Protection



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.

Revised: 01/26/15

Absolute Maximum Ratings

Symbol	Parameter	Value	Units
I_{PP}	Peak Current (t_p=8/20µs)[1]	20	A
P_{PK}	Peak Pulse Power (t_p=8/20µs)	400	W
T_{OP}	Operating Temperature	-40 to125	°C
T_{STOR}	Storage Temperature	-55 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.

Thermal Information

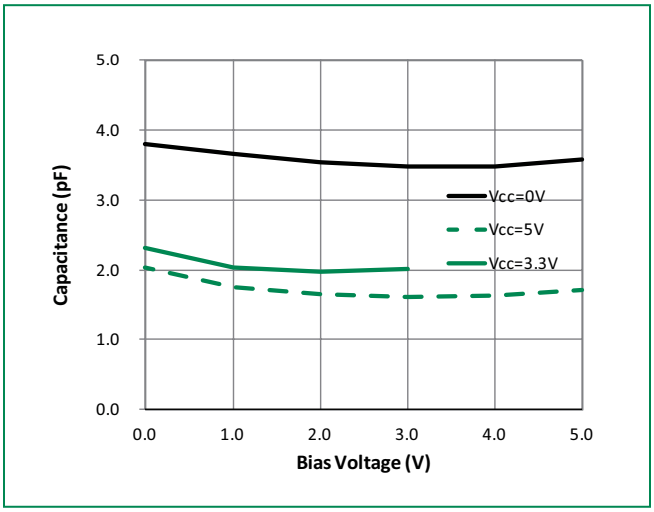
Parameter	Rating	Units
Storage Temperature Range	-55 to 150	°C
Maximum Junction Temperature	150	°C
Maximum Lead Temperature (Soldering 20-40s)	260	°C

Electrical Characteristics (T_{OP}=25°C)

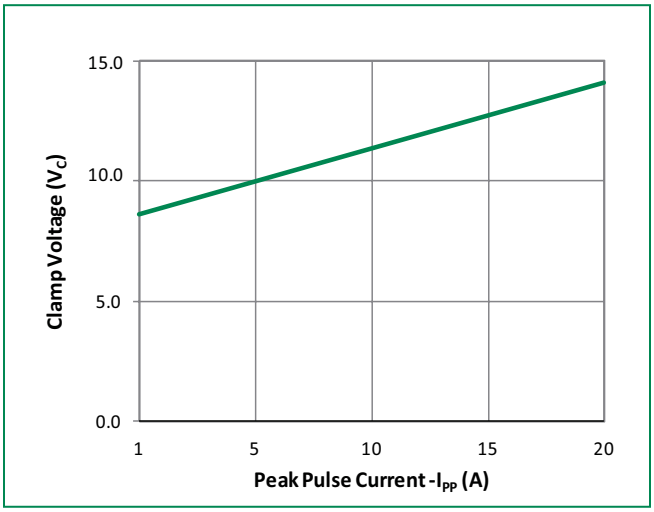
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	V_{RWM}	$I_R \leq 1\mu A$			6.0	V
Breakdown Voltage	V_R	I_R = 1mA		8.0		V
Reverse Leakage Current	I_{LEAK}	V_R=5V		0.1	0.5	µA
Clamp Voltage[1]	V_C	I_{PP}=1A, t_p=8/20µs, I/O to GND[2]		9.0	10.5	V
		I_{PP}=10A, t_p=8/20µs, I/O to GND[2]		11.5	15.0	V
		I_{PP}=20A, t_p=8/20µs, I/O to GND[2]		14.3	17.0	V
Dynamic Resistance	R_{DYN}	$(V_{C2} - V_{C1}) / (I_{PP2} - I_{PP1})$		0.3		Ω
ESD Withstand Voltage[1]	V_{ESD}	IEC61000-4-2 (Contact)	±30			kV
		IEC61000-4-2 (Air)	±30			kV
Diode Capacitance[1]	$C_{I/O-GND}$	Reverse Bias=0V		3.8	4.2	pF
		Vcc=5V, Reverse Bias=2.5V		1.7	2.0	pF
Diode Capacitance[1]	$C_{I/O-I/O}$	Reverse Bias=0V		2.0		pF

Notes: [1] Parameter is guaranteed by design and/or device characterization.
[2] Repetitive pulse per waveform shown on page 3.

Capacitance vs. Reverse Voltage



Clamping Voltage vs. Peak Pulse Current



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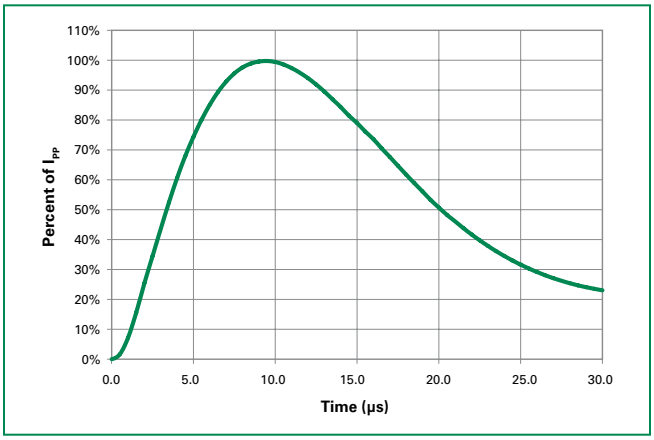
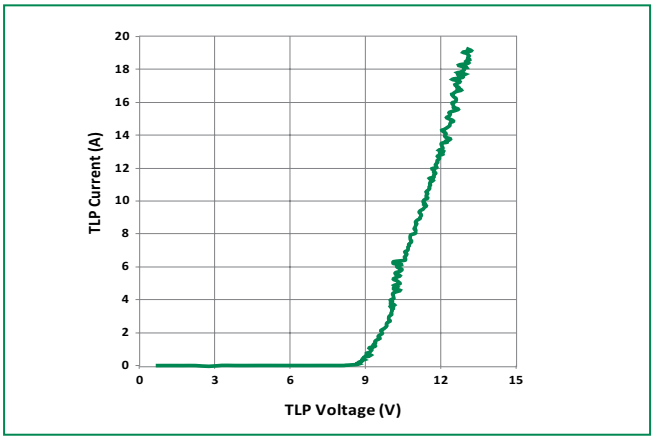
Pulse Waveform



Transmission Line Pulsing(TLP) Plot

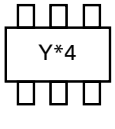


Part Numbering System

SP 3051 - 04 H T G

- SP: TVS Diode Arrays (SPA® Diodes)
- 3051: Series
- 04: Number of Channels
- H: Package H: SOT23-6
- T: T= Tape & Reel
- G: G= Green

Part Marking System



Y * 4

- Y: Product Series
- *: Assembly Site (Varies)
- 4: Number of Channels

Ordering Information

Part Number	Package	Marking	Min. Order Qty.
SP3051-04HTG	SOT23-6	YH4	3000

Product Characteristics

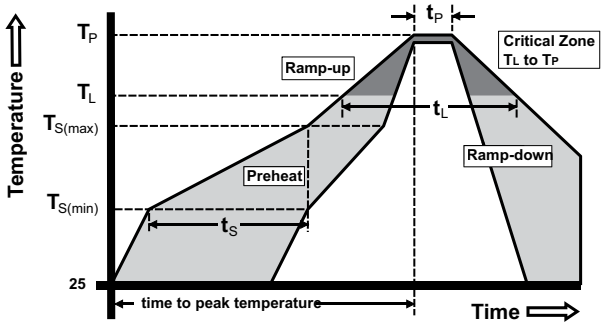
Lead Plating	Matte Tin
Lead Material	Copper Alloy
Lead Coplanarity	0.0004 inches (0.102mm)
Substitute Material	Silicon
Body Material	Molded Epoxy
Flammability	UL 94 V-0

Notes :

1. All dimensions are in millimeters
2. Dimensions include solder plating.
3. Dimensions are exclusive of mold flash & metal burr.
4. Blo is facing up for mold and facing down for trim/form, i.e. reverse trim/form.
5. Package surface matte finish VDI 11-13.
6. All specifications comply to JEDEC Spec MO-178AB Issue C

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)		$260^{+0/-5}$ °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



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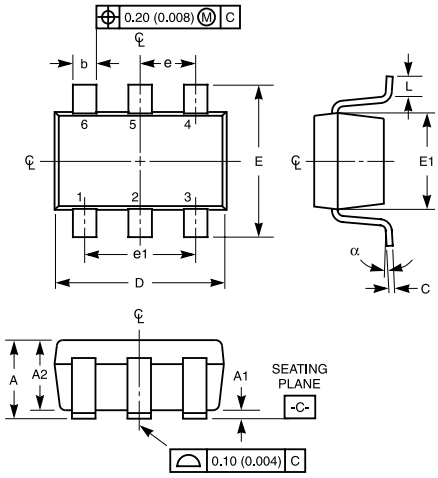
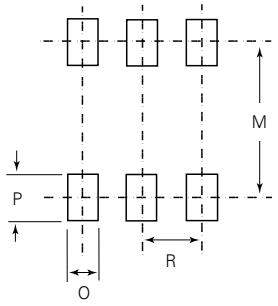
Package Dimensions — SOT23-6



Recommended Solder Pad Layout

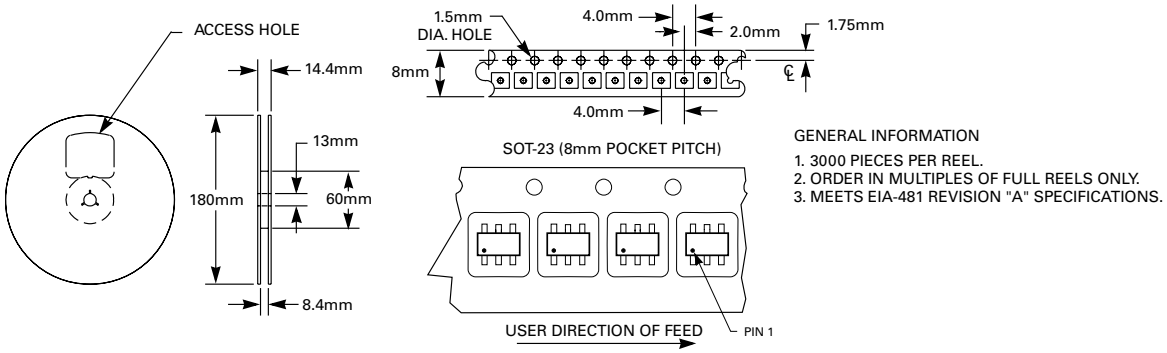


Package	SOT23				
Pins	6				
JEDEC	MO-178AB				
	Millimeters		Inches		Notes
	Min	Max	Min	Max	
A	0.900	1.450	0.035	0.057	-
A1	0.000	0.150	0.000	0.006	-
A2	0.900	1.300	0.035	0.051	-
b	0.350	0.500	0.0138	0.0196	-
C	0.080	0.220	0.0031	0.009	-
D	2.800	3.000	0.11	0.118	3
E	2.600	3.000	0.102	0.118	-
E1	1.500	1.750	0.06	0.069	3
e	0.95 Ref		0.0374 ref		-
e1	1.9 Ref		0.0748 Ref		-
L	0.30	0.600	0.012	0.023	4,5
N	6		6		6
α	0°	8°	0°	8°	-
M		2.590		0.102	-
O		0.690		.027 TYP	-
P		0.990		.039 TYP	-
R		0.950		0.038	-

Notes:
1. Dimensioning and tolerancing Per ASME Y14.5M-1994.
2. Package conforms to EIAJ SC-74 (1992).
3. Dimensions D and E1 are exclusive of mold flash, protrusions, or gate burrs.
4. Foot length 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.

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