SPA™ Silicon Protection Array Products

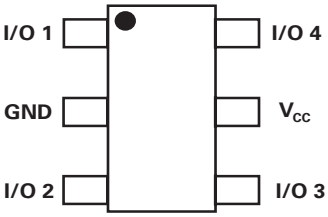
Low Capacitance ESD Protection Array

SP3002 Lead-Free/Green Series

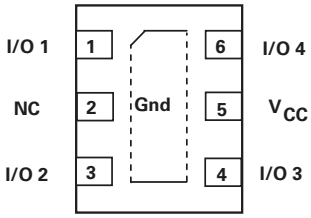
Description

The SP3002 has ultra low capacitance rail-to-rail diodes with an additional zener diode fabricated in a proprietary silicon avalanche technology to protect each I/O pin providing a high level of protection for electronic equipment that may experience destructive electrostatic discharges (ESD). These robust diodes can safely absorb repetitive ESD strikes at the maximum level (Level 4) specified in the IEC 61000-4-2 international standard without performance degradation. Their very low loading capacitance also makes them ideal for protecting high speed signal pins such as HDMI, DVI, USB2.0, and IEEE 1394.

Pinout



SC70-6 and SOT23-6

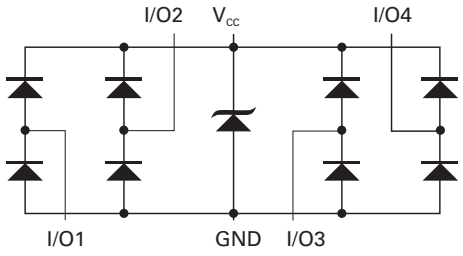


uDFN-6
(1.6x1.6x0.5mm)

Features

- Low capacitance of 0.85 pF (TYP) per I/O
- ESD protection of ±12kV contact discharge, ±15kV air discharge, (IEC61000-4-2)
- EFT protection, IEC61000-4-4, 40A (5/50ns)
- Low leakage current of 0.5µA (MAX) at 5V
- Small packaging options saves board space
- Lightning Protection, IEC61000-4-5, 4.5A (8/20µs)

Functional Block Diagram



Applications

- Computer Peripherals
- Mobile Phones
- PDA's
- Digital Cameras
- Network Hardware/Ports
- Test Equipment
- Medical Equipment

Absolute Maximum Ratings

Symbol	Parameter	Value	Units
I_{PP}	Peak Current (t_p=8/20μs)	4.5	A
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.

Thermal Information

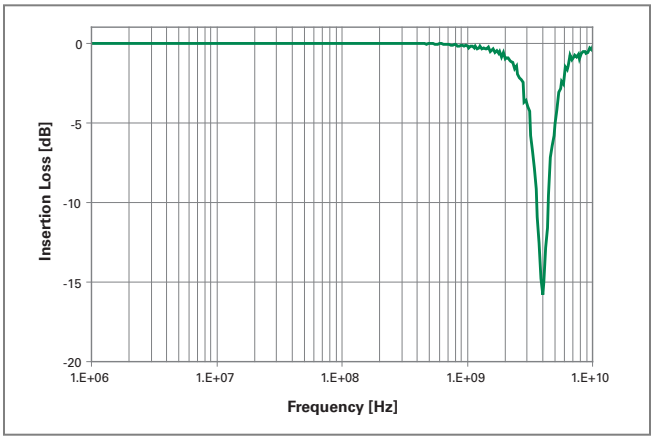
Parameter	Rating	Units
Storage Temperature Range	-65 to 150	°C
Maximum Junction Temperature	150	°C
Maximum Lead Temperature (Soldering 10s)	260	°C

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

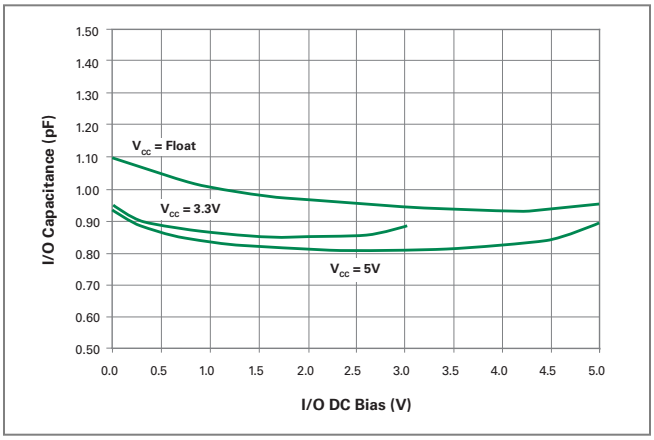
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	V_{RWM}	$I_R \leq 1\mu A$			6.0	V
Reverse Leakage Current	I_{LEAK}	V_R=5V			0.5	μA
Clamp Voltage[1]	V_C	I_{PP}=1A, t_p=8/20μs, Fwd		9.5	11.0	V
		I_{PP}=2A, t_p=8/20μs, Fwd		10.6	13.0	V
ESD Withstand Voltage[1]	V_{ESD}	IEC61000-4-2 (Contact)	±12			kV
		IEC61000-4-2 (Air)	±15			kV
Diode Capacitance[1]	$C_{I/O-GND}$	Reverse Bias=0V	0.95	1.1	1.25	pF
		Reverse Bias=1.65V	0.7	0.85	1.0	pF
Diode Capacitance[1]	$C_{I/O-I/O}$	Reverse Bias=0V		0.5		pF

Note 1: Parameter is guaranteed by design and/or device characterization.

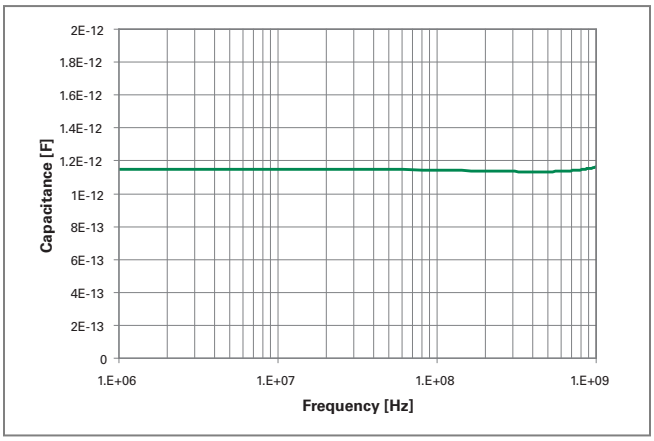
Insertion Loss (S21) I/O to GND



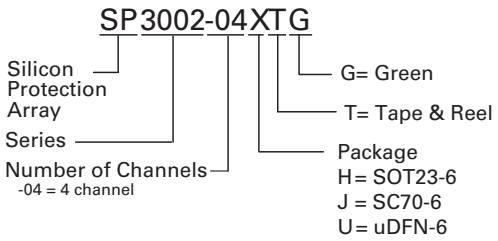
Capacitance vs. Bias Voltage



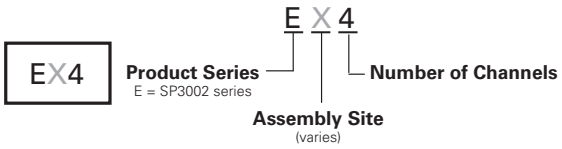
Capacitance vs. Frequency



Part Numbering System



Part Marking System



Product Characteristics

Lead Plating	SC70 & SOT23: Matte Tin uDFN: Pre-Plated Frame
Lead Material	Copper Alloy
Lead Coplanarity	0.0004 inches (0.102mm)
Subsitute Material	Silicon
Body Material	Molded Epoxy
Flammability	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.

Ordering Information

Part Number	Package	Marking	Min. Order Qty.
SP3002-04HTG	SOT23-6	EX4	3000
SP3002-04JTG	SC70-6	EX4	3000
SP3002-04UTG	uDFN-6 (1.6x1.6x0.5mm)	EX4	3000