



SPE0583

Ultra Low Capacitance 4-Line ESD Protection Array

DESCRIPTION

The SPE0583 is 4-channel very low capacitance ESD transient voltage suppressor which provides a very high level of protection for sensitive electronic components that may be subjected to electrostatic discharge. It is particularly well-suited to protect systems with high speed communication lines from ESD, EFT, and lightning.

The SPE0583 is consists of two low capacitance steering diodes and a TVS diode in SOT-363 package. Each channel of SPE0583 could safely dissipate ESD strikes of $\pm 15\text{kV}$ air discharge as well as $\pm 8\text{kV}$ contact discharge, meeting the requirement of the IEC 61000-4-2 international standard. Using the MIL-STD-883 (Method 3015) specification for Human Body Model (HBM) ESD, the device provides protection for contact discharges to greater than $\pm 15\text{kV}$.

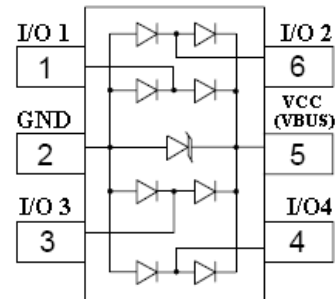
APPLICATIONS

- ◆ Cellular Handsets and Accessories
- ◆ Cordless Phone
- ◆ PDA
- ◆ Notebooks and Handhelds
- ◆ Portable Instrumentation
- ◆ Digital Cameras
- ◆ MP3 Player High Definition Multi-Media Interface Protection
- ◆ HDMI 1.2~2.1
- ◆ USB2.0/USB3.0 and Type C
- ◆ Monitors and Notebook Computers
- ◆ HDSL, IDSL Secondary IC Side Protection
- ◆ 10/100/1000 Ethernet

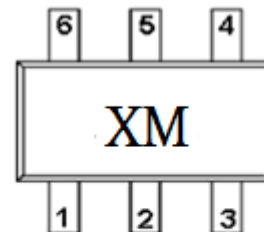
FEATURES

- ◆ Transient protection for data lines to IEC 61000-4-2 (ESD) $\pm 15\text{kV}$ (air) $\pm 8\text{kV}$ (contact) IEC 61000-4-4 (EFT) 40A (5/50ns)
- ◆ Protects five bidirectional I/O lines
- ◆ Working voltage: 5V
- ◆ Low leakage current
- ◆ Low operating and clamping voltages
- ◆ Low capacitance: 0.35 pF typical

PIN CONFIGURATION (SOT-363 / SC-70-6L)



PART MARKING



X=Month Code
M=Specific Device Code



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ORDERING INFORMATION

Part Number	Package	Part Marking
SPE0583S36RGB	SOT-363	XM

M=Month Code (A~Z)

※ SPE0583S36RGB : Tape Reel ; Pb – Free ; Halogen – Free

ABSOLUTE MAXIMUM RATINGS

(TA=25°C Unless otherwise noted)

Parameter	Symbol	Typical	Unit
Peak Pulse Power (tp = 8/20 μs)	Ppk	100	W
Maximum Peak Pulse Current (tp = 8/20 μs)	Ipp	4	A
ESD per IEC 61000 – 4 – 2 (Air)	Vpp	±15	KV
ESD per IEC 61000 – 4 – 2 (Contact)	Vpp	±8	KV
Operating Junction Temperature	Tj	-55 ~ 125	°C
Storage Temperature Range	TSTG	-55 ~ 150	°C
Lead Soldering Temperature	TL	260 (10sec)	°C

ELECTRICAL CHARACTERISTICS

(TA=25°C Unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ	Max.	Unit
Reverse Stand – Off Voltage	VRWM				5	V
Forward Voltage @ IF	VF	IF = 15mA			1.15	V
Reverse Breakdown Voltage	VBR	It = 1mA	6.0	7.0		V
Reverse Leakage Current	IR	VRWM = 5V , T=25°C			1	μA
Clamping Voltage	VC	Ipp = 1A , tp = 8/20 μs			15	V
Junction Capacitance	Cj	VR = 0V, f = 1MHz Any I/O pin to Ground			0.8	pF
		VR = 0V, f = 1MHz Between I/O pins			0.35	

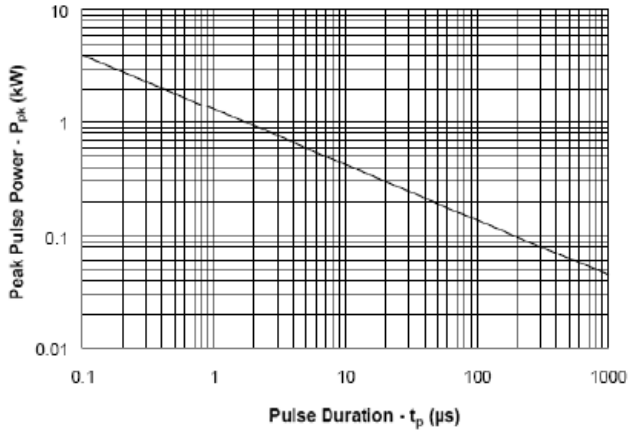


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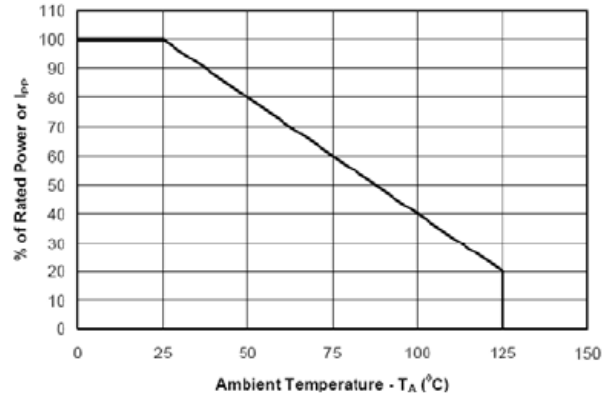
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TYPICAL CHARACTERISTICS

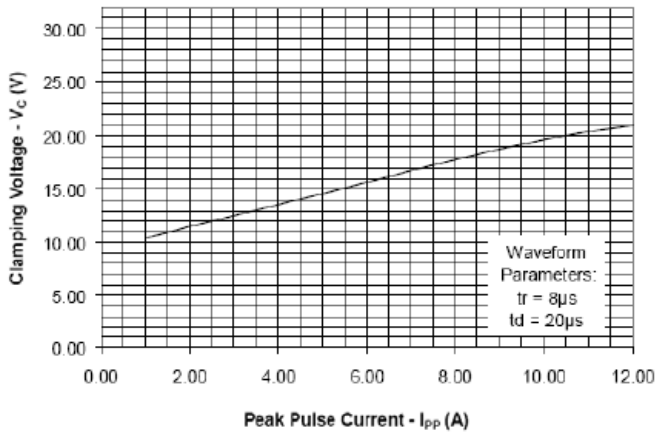
Non-Repetitive Peak Pulse Power vs. Pulse Time



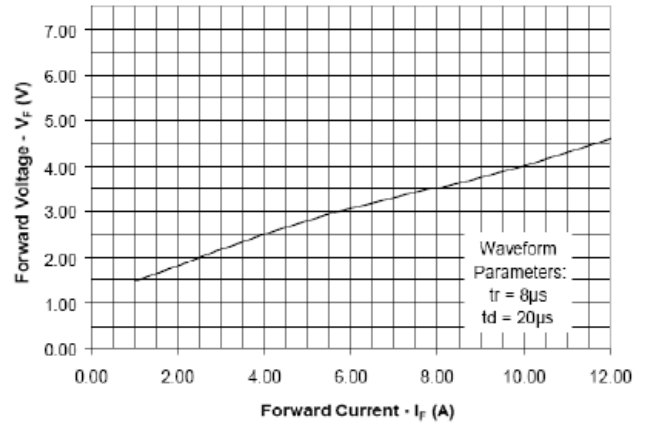
Power Derating Curve



Clamping Voltage vs. Peak Pulse Current



Forward Voltage vs. Forward Current





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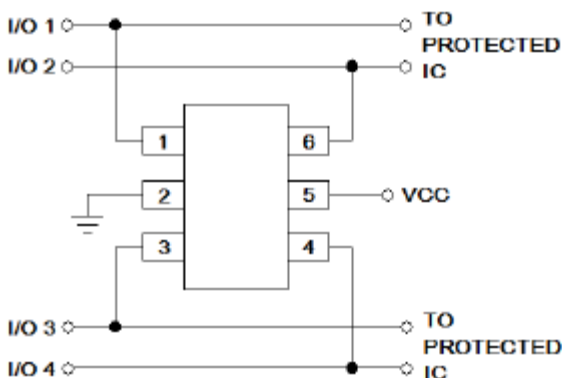
APPLICATION NOTE

SPE0583 Device Connection for Protection of Four Data Lines

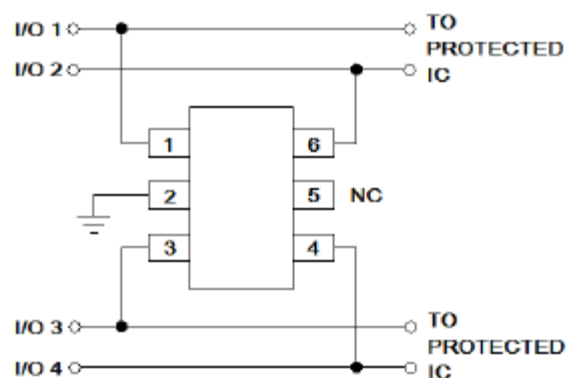
This device is designed to protect data lines by clamping them to a fixed reference. When the voltage on the protected line exceeds the reference voltage the steering diodes are forward biased, conducting the transient current away from the sensitive circuitry. Data lines are connected at pins 1, 3, 4 and 6. Pin 2 should be connected directly to a ground plane. The path length is kept as short as possible to minimize parasitic inductance. The positive reference is connected at pin 5. The options for connecting the positive reference are as follows:

1. To protect data lines and the power line, connect pin 5 directly to the positive supply rail (VCC). In this configuration the data lines are referenced to the supply voltage. The internal TVS diode prevents over-voltage on the supply rail.
2. In applications where the supply rail does not exit the system, the internal TVS may be used as the reference. In this case, pin 5 is not connected. The steering diodes will begin to conduct when the voltage on the protected line exceeds the working voltage of the TVS (plus one diode drop).
3. In applications where complete supply isolation is desired, the internal TVS is again used as the reference and VCC is connected to one of the I/O inputs. An example of this configuration is the protection of a SIM port. The Clock, Reset, I/O, and VCC lines are connected at pins 1, 3, 4, and 6. Pin 2 is connected to ground and pin 5 is not connected.

Data Line and Power Supply Protection Using Vcc as reference



Data Line Protection Using Internal TVS Diode as reference





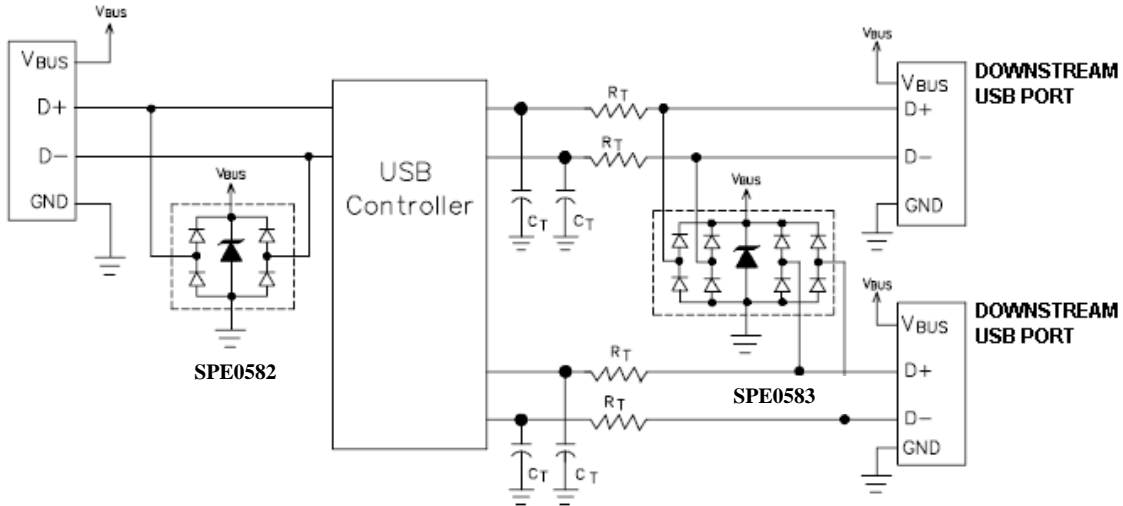
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APPLICATION NOTE

SPE0583 Device Connection for USB Port

UPSTREAM
USB PORT



Universal Serial Bus ESD Protection



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SYNC Power Corporation

7F-2, No.3-1, Park Street

NanKang District (NKSP), Taipei, Taiwan, 115, R.O.C

Phone: 886-2-2655-8178

Fax: 886-2-2655-8468

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