PROTECTION PRODUCTS

Description

RailClamps are surge rated diode arrays designed to protect high speed data interfaces. The SR70 has been specifically designed to protect sensitive components which are connected to data and transmission lines from over-voltages caused by **ESD** (electrostatic discharge), **EFT** (electrical fast transients), and **lightning**. The SR70 has been optimized for use on ADSL and other high-speed interfaces.

The unique design of the SR70 integrates four surge rated, low capacitance steering diodes in a low profile SOT-143 package. It has a typical capacitance of only 5pF and may be used to protect two high-speed lines without sacrificing signal integrity. The SR70 is designed to replace "standard" rectifiers that are not rated for the high energy surges that are normally expected in telecommunications applications.

During transient conditions, the steering diodes direct the transient to either the positive side of the power supply line or to ground. The maximum clamping voltage seen by the protected circuit will be one diode drop (V_F) above the supply (reference) voltage. The SR70 may be used as a stand alone device or in conjunction with TVS diodes for enhanced protection.

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) 1kV, 24A (8/20µs)
◆ Array of surge rated, low capacitance diodes
◆ Protects two I/O lines
◆ Low capacitance (5pF typical) for high-speed interfaces
◆ Low clamping voltage
◆ Solid-state silicon-avalanche technology

Mechanical Characteristics

◆ JEDEC SOT-143 package
◆ UL 497B listed
◆ Molding compound flammability rating: UL 94V-0
◆ Marking : R70
◆ Packaging : Tape and Reel per EIA 481

Applications

◆ ADSL Lines
◆ I²C Bus Protection
◆ Video Line Protection
◆ T1/E1 secondary IC Side Protection
◆ Portable Electronics
◆ Microcontroller Input Protection
◆ WAN/LAN Equipment
◆ ISDN S/T Interface

Circuit Diagram
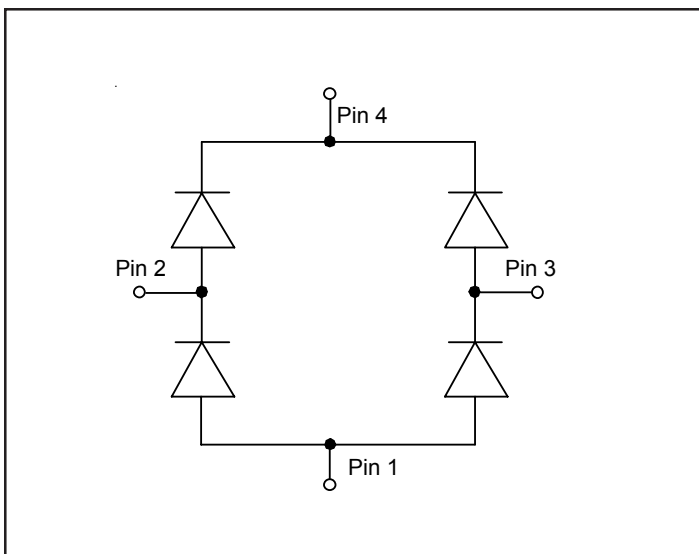
Schematic & PIN Configuration

SOT-143 (Top View)

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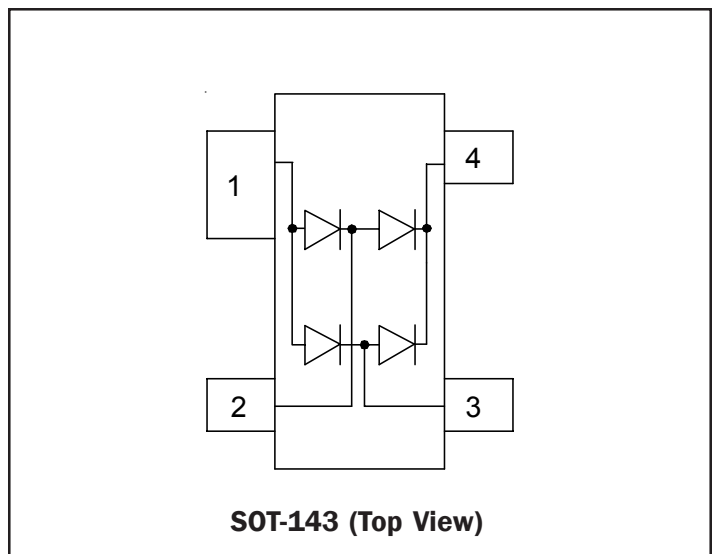
PROTECTION PRODUCTS

Absolute Maximum Rating

Rating	Symbol	Value	Units
Peak Pulse Current (t_p = 8/20μs)	I_{PP}	24	A
Rectifier Repetitive Peak Reverse Voltage	V_{RRM}	70	V
ESD per IEC 61000-4-2 (Air) ESD per IEC 61000-4-2 (Contact)	V_{ESD}	15 8	kV
Lead Soldering Temperature	T_L	260 (10 sec.)	°C
Operating Temperature	T_J	-55 to +125	°C
Storage Temperature	T_{STG}	-55 to +150	°C

Electrical Characteristics (T=25ºC)

SR70

Parameter	Symbol	Conditions	Minimum	Typical	Maximum	Units
Peak Reverse Stand-Off Voltage	V_{RRM}				70	V
Reverse Breakdown Voltage	V_{BR}	I_t = 50μA	85			V
Reverse Leakage Current	I_R	V_{RWM} = 70V, T=25°C			5	μA
Forward Clamping Voltage	V_{FC}	I_{PP} = 1A, t_p = 8/20μs			1.5	V
Forward Clamping Voltage	V_{FC}	I_{PP} = 10A, t_p = 8/20μs			3.3	V
Forward Clamping Voltage	V_{FC}	I_{PP} = 24A, t_p = 8/20μs			7	V
Junction Capacitance	C_j	Between I/O pins and Ground V_R = 0V, f = 1MHz		5	10	pF
		Between I/O pins V_R = 0V, f = 1MHz		3		pF

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Typical Characteristics

Non-Repetitive Peak Pulse Power vs. Pulse Time

Peak Pulse Power - P_{Pk} (kW) vs. Pulse Duration - tp (µs)

Power Derating Curve

% of Rated Power or I_P vs. Ambient Temperature - T_A (°C)

Pulse Waveform

Percent of I_{PP} vs. Time (µs)

Waveform Parameters:
tr = 8µs
td = 20µs

e^{-t}

td = I_{PP}/2

Capacitance vs. Reverse Voltage

% Change in Capacitance vs. Reverse Voltage - V_R (V)

I/O to GND
f = 1MHz
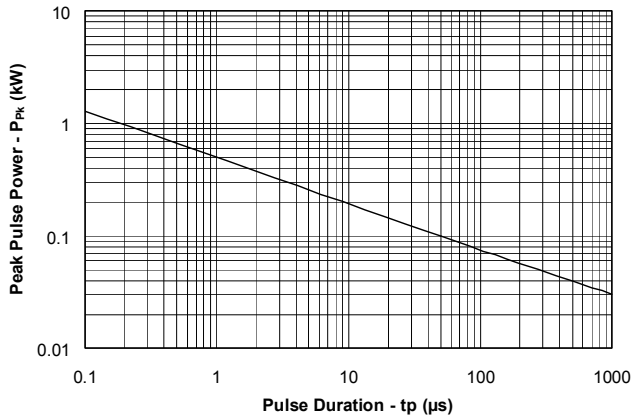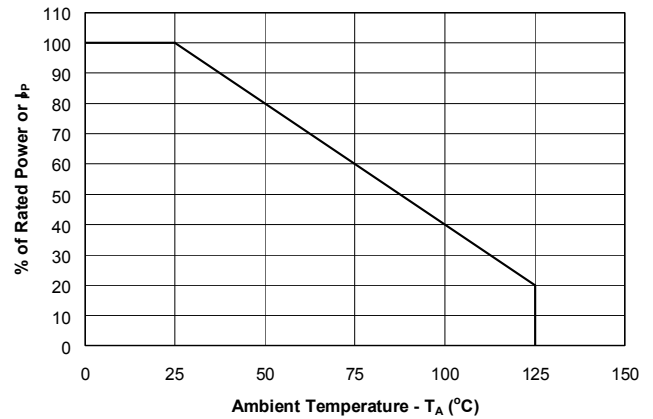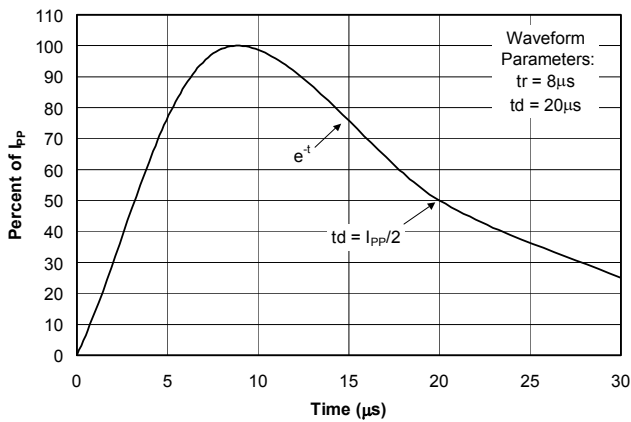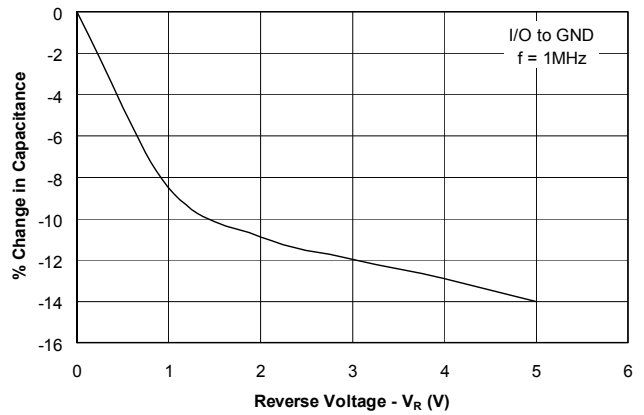
Forward Voltage vs. Forward Current

Forward Voltage - V_F (V) vs. Forward Current - I_F (A)

Waveform Parameters:
tr = 8µs
td = 20µs
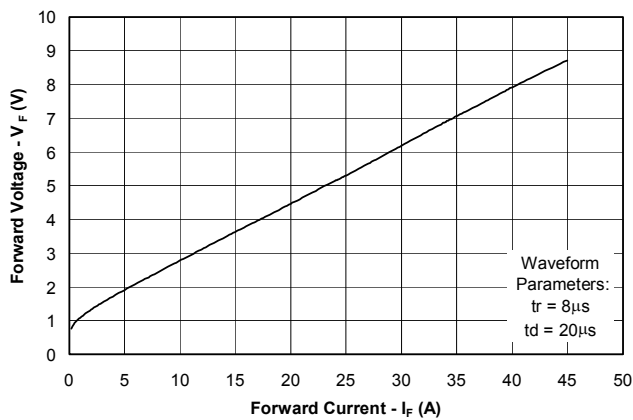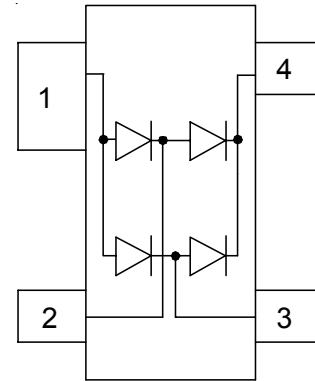
PROTECTION PRODUCTS

Applications Information

Device Connection Options for Protection of Two High-Speed Data Lines

The SR70 is designed to protect two data lines from transient over-voltages by clamping them to a fixed reference. When the voltage on the protected line exceeds the reference voltage (plus diode V_F) the steering diodes are forward biased, conducting the transient current away from the sensitive circuitry. Data lines are connected at pins 2 and 3. The negative reference (REF1) is connected at pin 1. This pin should be connected directly to a ground plane on the board for best results. The path length is kept as short as possible to minimize parasitic inductance.
The positive reference (REF2) is connected at pin 4. The options for connecting the positive reference are as follows:

1. To protect data lines and the power line, connect pins 2 and 3 directly to the positive supply rail (V_{CC}). In this configuration the data lines are referenced to the supply voltage. An external TVS diode may be added between the supply rail and ground in order to prevent over-voltage on the supply rail.
2. In applications where no positive supply reference is available, or complete supply isolation is desired, an external TVS diode may be used as the reference. 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).
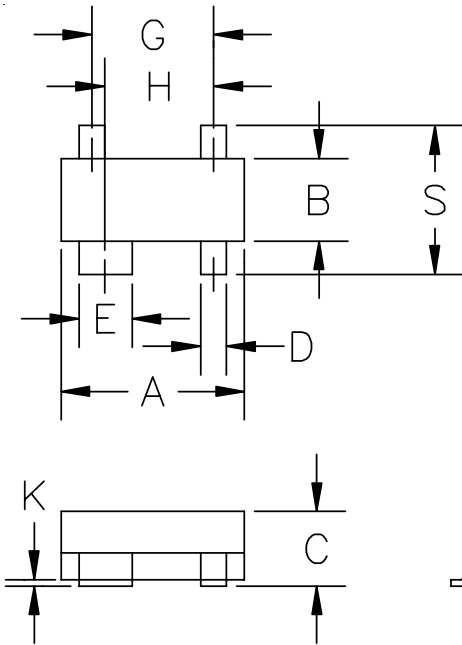
SR70 Pin Configuration

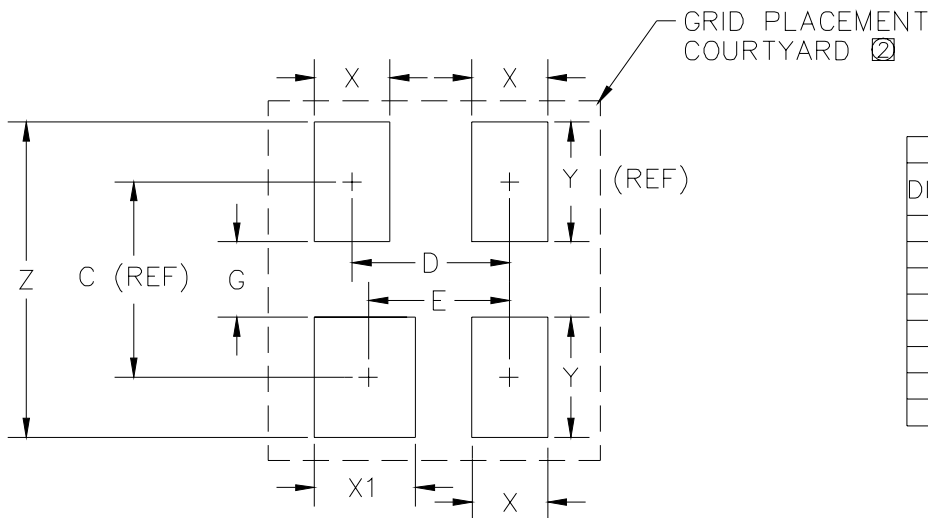**Data Line and Power Supply Protection Using Vcc as reference**

To Protected IC

ТИ

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Marking Codes

Part Number	Marking Code
SR70	R70

R70
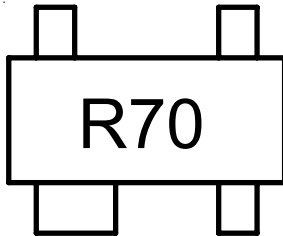
SR70 Marking (Top View)

Ordering Information

Part Number	Qty per Reel	Reel Size
SR70.TC	3,000	7 Inch
SR70.TG	10,000	13 Inch

Contact Information

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Protection Products Division
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