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Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832
Email & Skype: info@chipsmall.com Web: www.chipsmall.com
Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China

RClamp7534F
Low Capacitance TVS for LVDS Interfaces

PROTECTION PRODUCTS - RailClamp®

Description

RailClamp® TVS diode arrays are specifically designed to protect sensitive components which are connected to high-speed data and transmission lines from over-voltage caused by **ESD** (electrostatic discharge), **CDE** (Cable Discharge Events), and **EFT** (electrical fast transients).

The unique design incorporates surge rated, low capacitance steering diodes and a TVS diode in a single package. This allows the device to absorb large amounts of energy while protecting downstream components from harmful transient events.

The RClamp7534F is in a 6-pin SC-70 package. The leads are finished with lead-free matte tin. They may be used to meet the ESD immunity requirements of IEC 61000-4-2, Level 4 (15kV air, 8kV contact discharge). The combination of small size, low capacitance, and high ESD surge capability makes them ideal for use in applications such as next generation color LCD displays and LVDS interfaces.

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)**
- Array of surge rated diodes with internal TVS Diode
- Small package saves board space
- Protects up to four I/O lines
- Low capacitance **(<3pF)** for high-speed interfaces
- No insertion loss to **2.0GHz**
- Low leakage current and clamping voltage
- Low operating voltage: 5.0V
- Solid-state silicon-avalanche technology

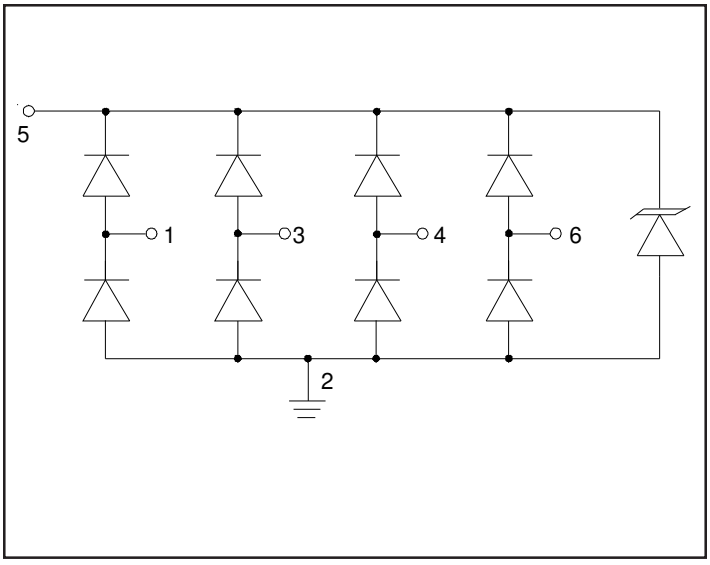
Mechanical Characteristics

- EIAJ SC-70 6L package
- Pb-Free, Halogen Free, RoHS/WEEE Compliant
- Nominal Dimensions: 2.0 x 1.25 x 1.1 mm
- Lead Finish: Matte Sn
- Molding compound flammability rating: UL 94V-0
- Marking : F75
- Packaging : Tape and Reel

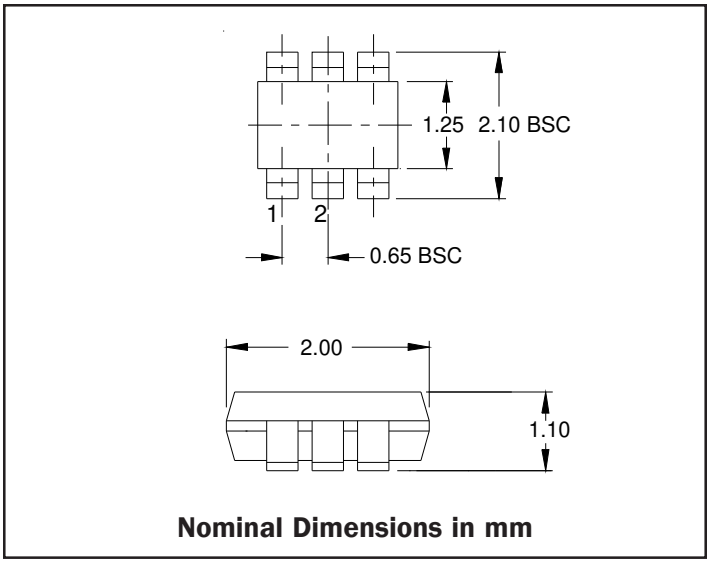
Applications

- LVDS Interfaces
- LCD TV

Circuit Diagram



PIN Configuration



Nominal Dimensions in mm

Absolute Maximum Rating

Rating	Symbol	Value	Units
Peak Pulse Power (tp = 2/10µs)	P_{pk}	300	Watts
Peak Pulse Current (V = 80V, R= 8 Ohms, tp = 2/10µs)	I_{PP}	10	A
ESD per IEC 61000-4-2 (Air) ESD per IEC 61000-4-2 (Contact)	V_{ESD}	15 8	kV
Operating Temperature	T_J	-55 to +125	°C
Storage Temperature	T_{STG}	-55 to +150	°C

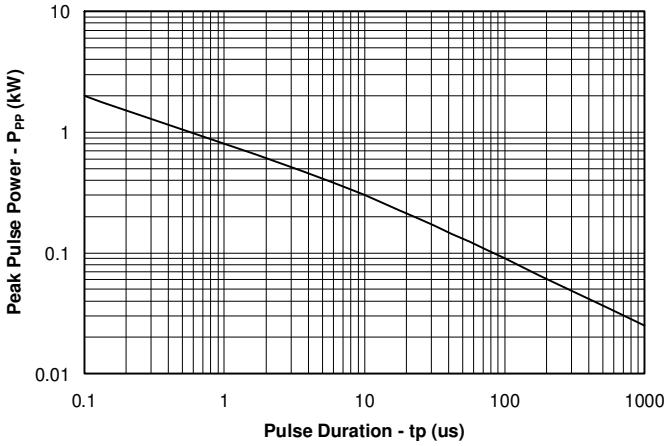
Electrical Characteristics (T=25°C)

Parameter	Symbol	Conditions	Minimum	Typical	Maximum	Units
Reverse Stand-Off Voltage	V_{RWM}	Pin 5 to GND			5	V
Reverse Breakdown Voltage	V_{BR}	I_t = 1mA Any I/O to GND	6	8	9.5	V
Reverse Leakage Current	I_R	V_{RWM} = 5V, T=25°C Any I/O to GND			3	µA
Forward Voltage	V_F	I_F = 100mA Any I/O pin to pin 5 GND to any I/O			1.6	V
Clamping Voltage	V_C	V = 80V, R= 8 Ohms, tp = 2/10µs Any I/O pin to GND			30	V
Junction Capacitance	C_j	V_R = 0V, f = 1MHz Any I/O pin to GND		1.9	3	pF
		V_R = 0V, f = 1MHz Between I/O pins		0.80	1	pF

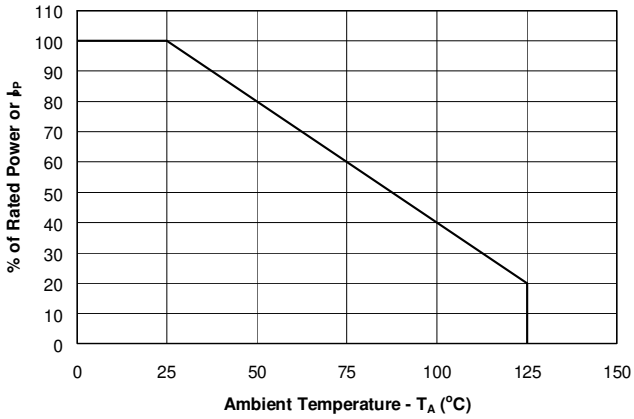
Note 1: I/O pins are pin 1, 3, 4, and 6

Typical Characteristics

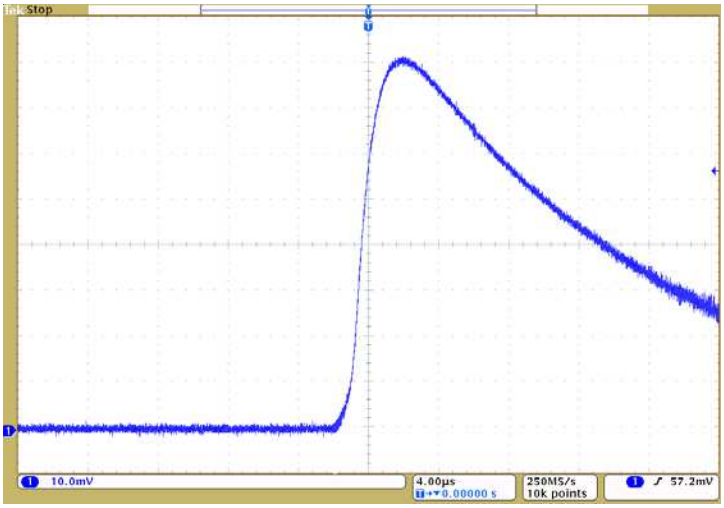
Non-Repetitive Peak Pulse Power vs. Pulse Time



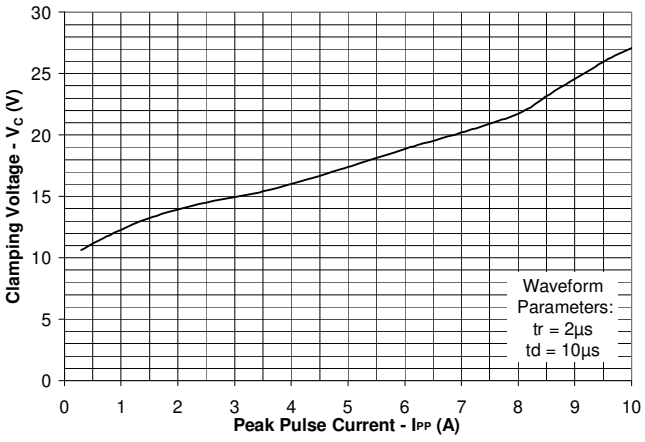
Power Derating Curve



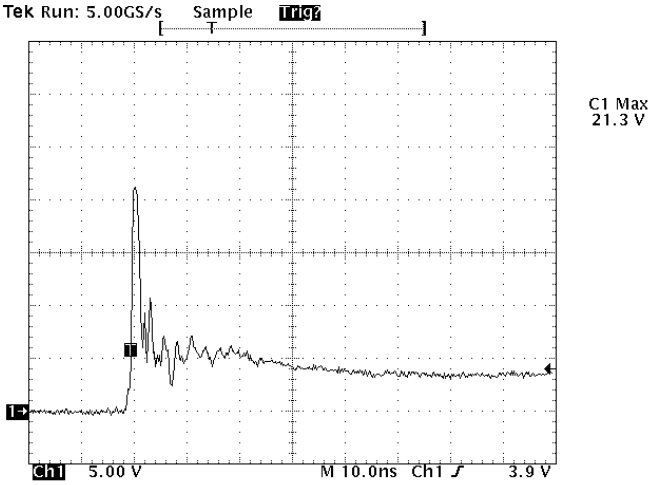
Surge Current Output Waveform (tp = 2/10us)



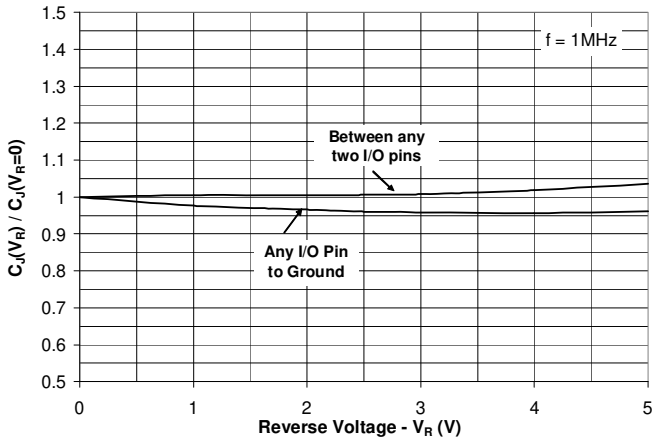
Clamping Voltage vs. Peak Pulse Current (tp = 2/10us)



ESD Clamping (8kV Contact per IEC 61000-4-2)



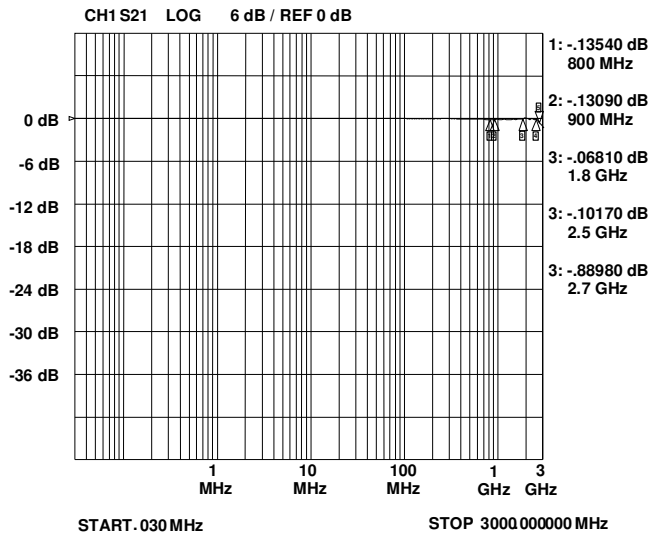
Normalized Capacitance vs. Reverse Voltage



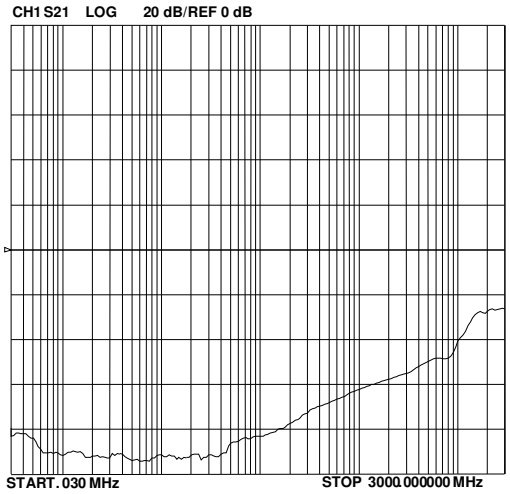
Note: Data is taken with a 10x attenuator

Typical Characteristics

Insertion Loss S21 (I/O to Gnd)



Analog Crosstalk



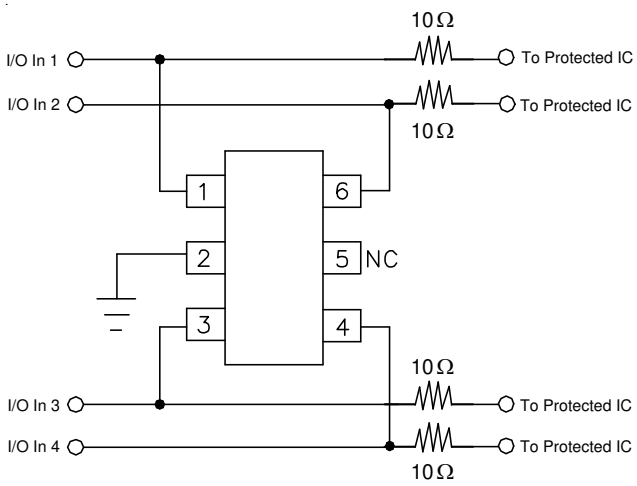
Applications Information

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

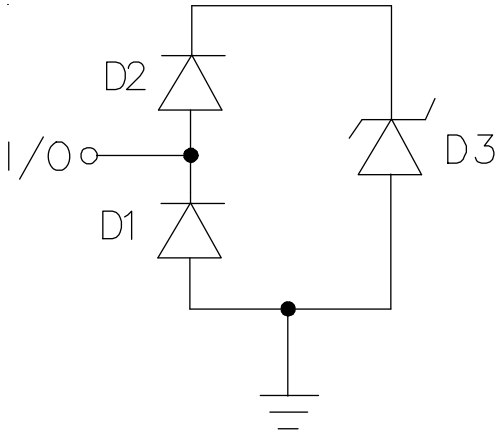
This device is designed to protect high-speed data lines. When the voltage on the protected line exceeds the breakdown voltage of the internal TVS diode, the steering diodes are forward biased, conducting the transient current away from the sensitive circuitry to ground.

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. An external 10 Ohm resistor can be added as shown. This helps restrict the flow of ESD current further enhancing the circuit protection capability of the device. When configured as shown, a LVDS chip may withstand up to 10A for a 2/10 us impulse waveform.

Enhanced Protection of Four Data Lines



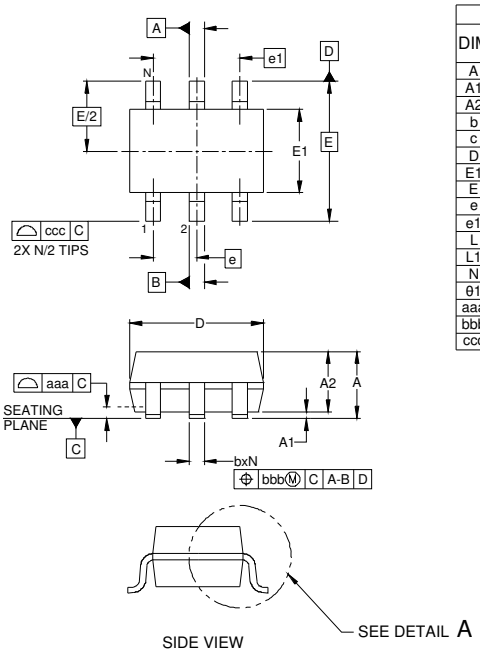
Applications Information - Spice Model



Spice Model

Spice Parameters				
Parameter	**Unit**	**D1 (LCRD)**	**D2 (LCRD)**	**D3 (TVS)**
IS	Amp	1E-20	1E-20	2.19E-12
BV	Volt	100	100	7.8
VJ	Volt	0.66	0.65	0.57
RS	Ohm	0.314	0.687	1.444
IBV	Amp	1E-3	1E-3	1E-3
CJO	Farad	1.5E-12	1.5E-12	121E-12
TT	sec	2.541E-9	2.541E-9	2.541E-9
M	--	0.01	0.01	0.236
N	--	1.1	1.1	1.1
EG	eV	1.11	1.11	1.11

Outline Drawing - SC-70

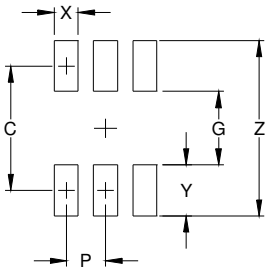


DIM	INCHES			MILLIMETERS		
	MIN	NOM	MAX	MIN	NOM	MAX
A	-	-	.043	-	-	1.10
A1	.000	-	.004	0.00	-	0.10
A2	.028	.035	.039	0.70	0.90	1.00
b	.006	-	.012	0.15	-	0.30
c	.003	-	.009	0.08	-	0.22
D	.071	.079	.087	1.80	2.00	2.20
E1	.045	.049	.053	1.15	1.25	1.35
E	.083 BSC			2.10 BSC		
e	.026 BSC			0.65 BSC		
e1	.051			1.30 BSC		
L	.010	.014	.018	0.26	0.36	0.46
L1	(.017)			(0.42)		
N	6			6		
θ1	0°	-	8°	0°	-	8°
aaa	.004			0.10		
bbb	.004			0.10		
ccc	.012			0.30		

NOTES:

1. CONTROLLING DIMENSIONS ARE IN MILLIMETERS (ANGLES IN DEGREES).
2. DATUMS -A- AND -B- TO BE DETERMINED AT DATUM PLANE -H-
3. DIMENSIONS "E1" AND "D" DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.
4. REFERENCE JEDEC STD MO-203, VARIATION AB.

Land Pattern - SC-70

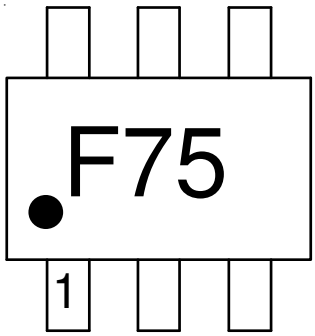


DIMENSIONS		
DIM	INCHES	MILLIMETERS
C	(.073)	(1.85)
G	.039	1.00
P	.026	0.65
X	.016	0.40
Y	.033	0.85
Z	.106	2.70

NOTES:

1. THIS LAND PATTERN IS FOR REFERENCE PURPOSES ONLY. CONSULT YOUR MANUFACTURING GROUP TO ENSURE YOUR COMPANY'S MANUFACTURING GUIDELINES ARE MET.

Marking

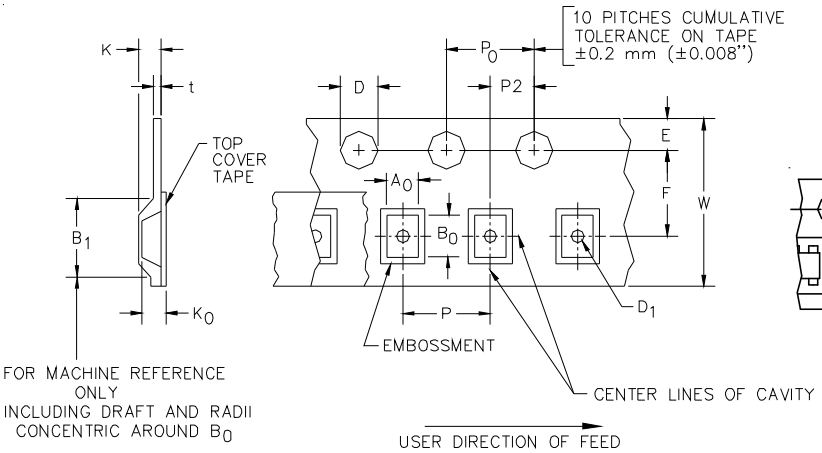


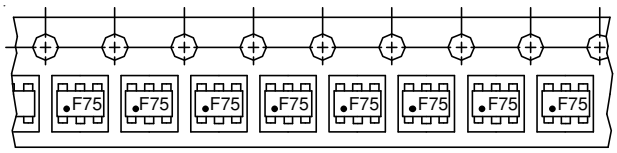
Ordering Information

Part Number	Lead Finish	Qty per Reel	Reel Size
RClamp7534F.TCT	Matte Sn	3,000	7 Inch

RailClamp and RClamp are marks of Semtech Corporation

Tape and Reel Specification





Device Orientation in Tape
Pin 1 in lower left

A0	B0	K0
2.40 +/-0.15 mm	2.40 +/-0.15 mm	1.20 +/-0.15 mm

Tape Width	B, (Max)	D	D1	E	F	K (MAX)	P	P0	P2	T(MAX)	W
8 mm	4.2 mm	1.5 + 0.1 mm - 0.0 mm)	0.5 mm ±0.05	1.750±.10 mm	3.5±0.05 mm	2.4 mm	4.0±0.1 mm	4.0±0.1 mm	2.0±0.05 mm	0.4 mm	8.0 mm + 0.3 mm - 0.1 mm

Contact Information

Semtech Corporation
Protection Products Division
200 Flynn Rd., Camarillo, CA 93012
Phone: (805)498-2111 FAX (805)498-3804