UESD6V8V4X

Quad Channel Low Capacitance ESD Protection Array

UESD6V8V4A SC70-6/SC88/SOT363
UESD6V8V4B SC89-6/SOT563/SOT666
UESD6V8V4C TSOP-6/SOT23-6

General Description

UESD6V8V4X are surge rated diode arrays designed to protect high speed data interfaces. This series has been specifically designed to protect sensitive components which are connected to data and transmission lines from over-voltage caused by ESD (electrostatic discharge).
The unique design incorporates surge rated, low capacitance steering diodes and a TVS diode in a single package. During transient conditions, the steering diodes direct the transient to either the positive side of the power supply line or to ground. The internal TVS diode prevents over-voltage on the power line, protecting any downstream components.
The low capacitance array configuration allows the user to protect four high-speed data or transmission lines. The low inductance construction minimizes voltage overshoot during high current surges. This device is optimized for ESD protection of portable electronics. They may be used to meet the ESD immunity requirements of IEC 61000-4-2, Level 4 (± 15kV air, ± 8kV contact discharge).

Applications

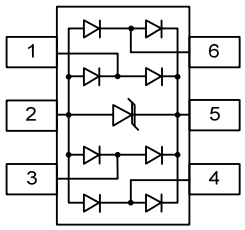
- USB 2.0
- USB OTG
- Monitors and Flat Panel
- Displays Digital Visual Interface (DVI)
- High-Definition Multimedia Interface (HDMI)
- SIM Ports IEEE 1394 Firewire Ports

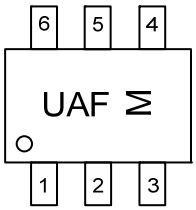
Features

- Transient Protection for High-Speed Data Lines to IEC 61000-4-2 (ESD) ± 15kV (Air), ± 8kV (Contact)
- Array of Surge Rated Diodes with Internal TVS Diode
- Protects up to Four I/O Lines & Power Lines
- Low Capacitance for High-Speed Interfaces
- Low Leakage Current and Clamping Voltage
- Low Operating Voltage: 5.0V
- Solid-State Silicon-Avalanche Technology

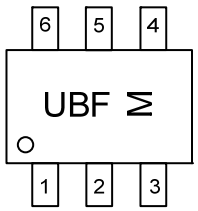
Pin Configurations

Top View





M: Month Code
UESD6V8V4A
SC70-6/SC88/SOT363



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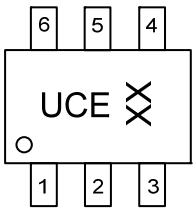
UESD6V8V4B
SC89-6/SOT563/SOT666



XX: Week Code
UESD6V8V4C
TSOP-6/SOT23-6

Ordering Information

Part Number	Working Voltage	Packaging Type	Channel	Marking Code	Shipping Qty
UESD6V8V4A	5.0V	SC70-6/SC88/SOT363	4	UAF	3000pcs/7Inch Tape & Reel
UESD6V8V4B		SC89-6/SOT563/SOT666		UBF	
UESD6V8V4C		TSOP-6/SOT23-6		UCE	

Absolute Maximum Ratings

Rating	Symbol	Value	Unit
Peak Pulse Power (t_P=8/20μs)	P_{pk}	150	Watts
Peak Pulse Current (t_P=8/20μs)	I_{PP}	6	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

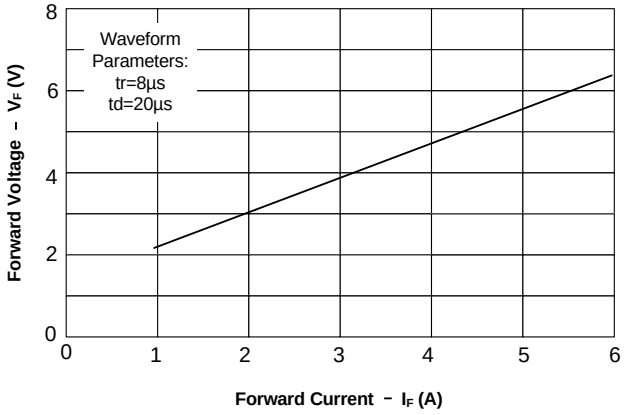
Electrical Characteristics

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Reverse Stand-Off Voltage	V_{RWM}				5.0	V
Reverse Breakdown Voltage	V_{BR}	I_T=1mA, Pin 5 to 2	6.0			V
Reverse Leakage Current	I_R	V_{RWM}=5V, T=25°C Pin 5 to 2			2	μA
Clamping Voltage	V_C	I_{PP}=1A, 8/20μs Any Pin to Pin 2			15	V
Clamping Voltage	V_C	I_{PP}=6A, 8/20μs Any Pin to Pin 2			25	V
Junction Capacitance	C_j	V_R=0V, f=1MHz Any I/O Pin to Pin 2 (Note 1)			2	pF
		V_R=0V, f=1MHz Between I/O Pins (Note 1)			1	pF

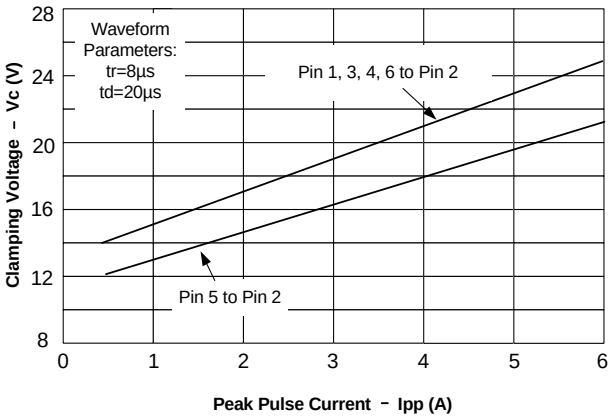
Note 1: I/O pins are pin 1, 3, 4, and 6

Typical Operating Characteristics

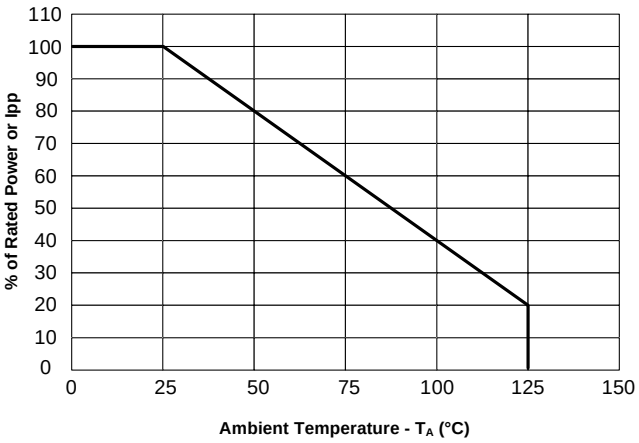
Forward Voltage vs. Forward Current



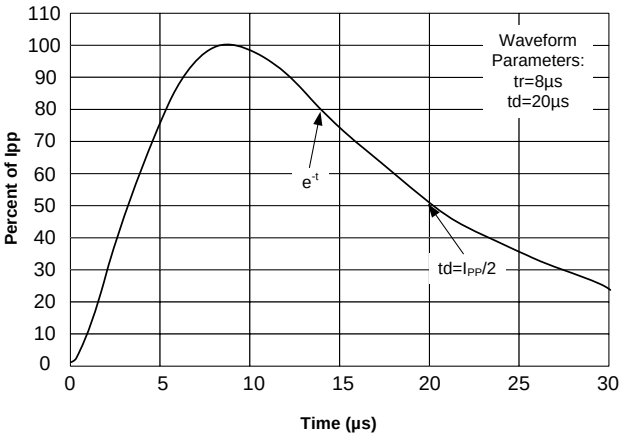
Clamping Voltage vs. Peak Pulse Current



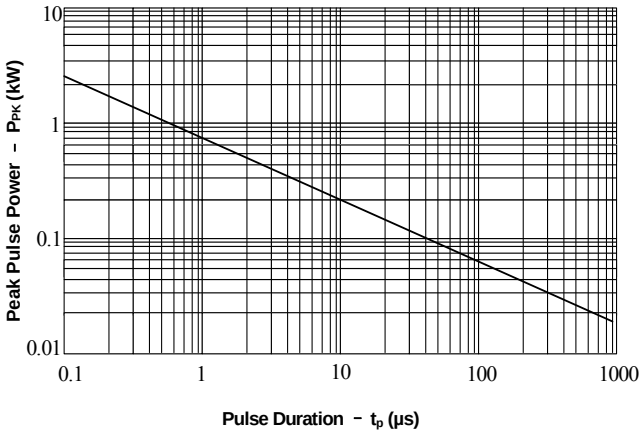
Power Derating Curve



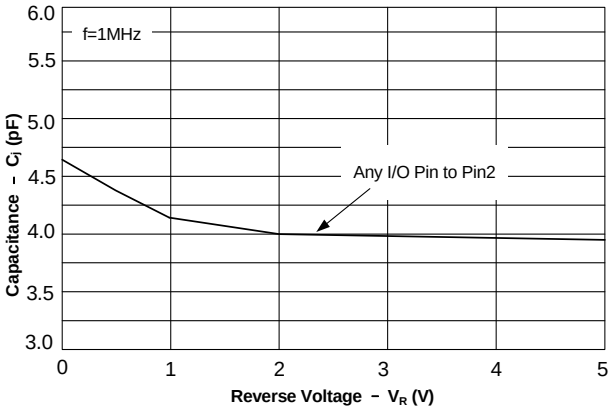
Pulse Waveform



Non-Repetitive Peak Pulse Power vs. Pulse Time



Junction Capacitance vs. Reverse Voltage



Application Information

Device Connection Options for Protection of Four High-Speed 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. See Figure 1.
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. See Figure 2.

Protection of Four Data Lines and Power Supply Line

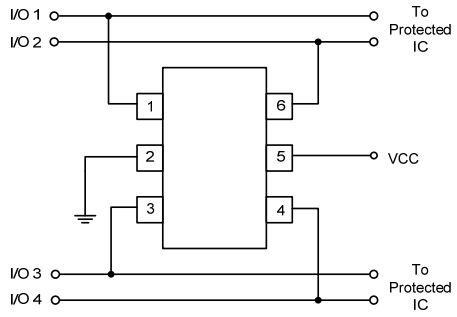


Figure 1

Protection of Four Data Lines Using Internal TVS Diode as Reference

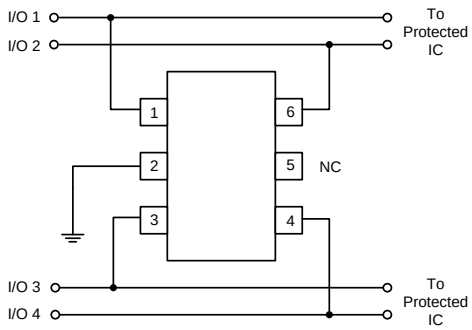


Figure 2

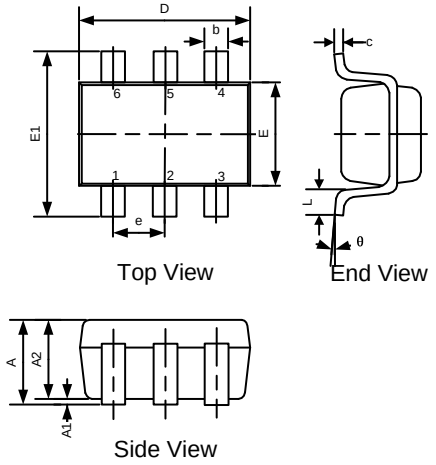
Matte Tin Lead Finish

Matte tin has become the industry standard lead-free replacement for SnPb lead finishes. A matte tin finish is composed of 100% tin solder with large grains. Since the solder volume on the leads is small compared to the solder paste volume that is placed on the land pattern of the PCB, the reflow profile will be determined by the requirements of the solder paste. Therefore, these devices are compatible with both lead-free and SnPb assembly techniques. In addition, unlike other lead-free compositions, matte tin does not have any added alloys that can cause degradation of the solder joint.

Package Information

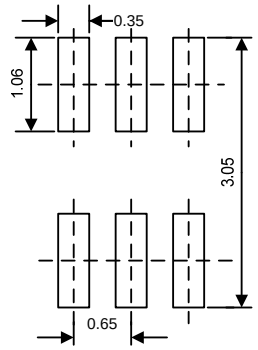
UESD6V8V4A SC70-6/SC88/SOT363

Outline Drawing



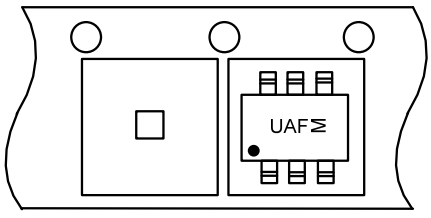
DIMENSIONS						
Symbol	MILLIMETERS			INCHES		
	Min	Typ	Max	Min	Typ	Max
A	0.90	-	1.10	0.035	-	0.043
A1	0.00	0.05	0.10	0.000	0.002	0.004
A2	0.90	-	1.00	0.035	-	0.039
b	0.10	0.25	0.35	0.004	0.010	0.014
c	0.08	0.11	0.22	0.003	0.004	0.009
D	1.80	2.15	2.20	0.071	0.085	0.087
E	1.15	1.30	1.35	0.045	0.051	0.053
E1	2.00	-	2.45	0.079	-	0.096
e	0.65BSC			0.026BSC		
L	0.25	-	0.46	0.010	-	0.018
θ	0°	-	8°	0°	-	8°

Land Pattern



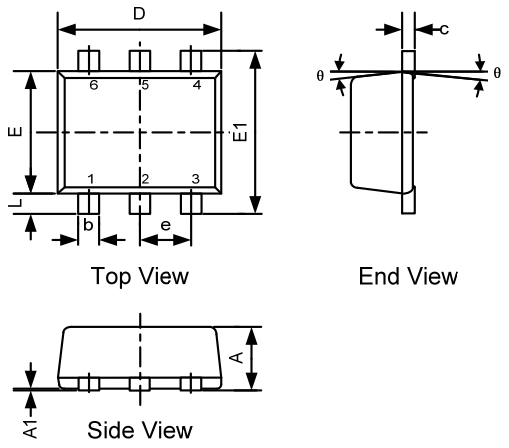
NOTES:
1. Compound dimension: 2.15×1.30;
2. Unit: mm;
3. General tolerance ±0.05mm unless otherwise specified;
4. The layout is just for reference.

Tape and Reel Orientation



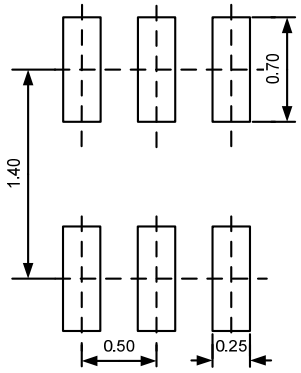
UESD6V8V4B SC89-6/SOT563/SOT666

Outline Drawing



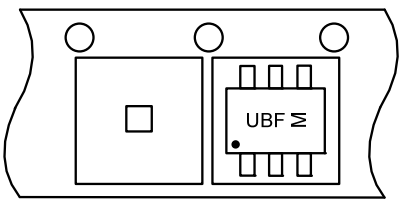
Symbol	DIMENSIONS					
	MILLIMETERS			INCHES		
	Min	Typ	Max	Min	Typ	Max
A	0.525	0.60	0.62	0.021	0.023	0.024
A1	0.00	-	0.05	0.000	-	0.002
b	0.15	-	0.30	0.006	-	0.012
c	0.09	-	0.18	0.004	-	0.007
D	1.50	1.60	1.70	0.059	0.063	0.067
E	1.10	1.20	1.30	0.043	0.047	0.051
E1	1.50	1.60	1.70	0.059	0.063	0.067
e	0.50TYP			0.020TYP		
L	0.10	0.20	0.30	0.004	0.008	0.012
θ	7°REF			7°REF		

Land Pattern



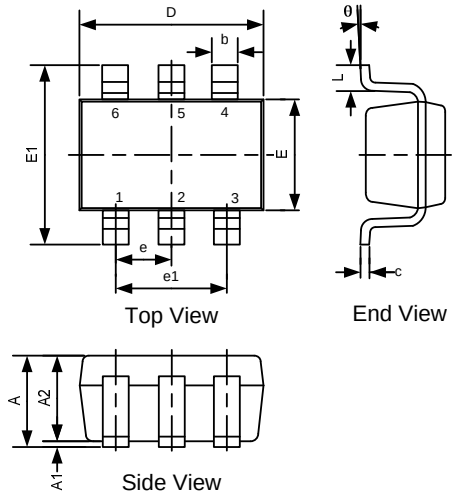
NOTES:
1. Compound dimension: 1.60×1.20;
2. Unit: mm;
3. General tolerance ±0.05mm unless otherwise specified;
4. The layout is just for reference.

Tape and Reel Orientation



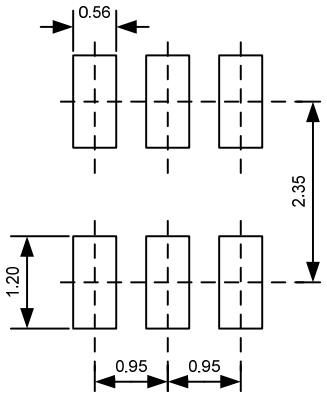
UESD6V8V4C TSOP-6/SOT23-6

Outline Drawing



Symbol	DIMENSIONS					
	MILLIMETERS			INCHES		
	Min	Typ	Max	Min	Typ	Max
A	1.013	1.15	1.40	0.040	0.045	0.055
A1	0.00	0.05	0.10	0.000	0.002	0.004
A2	1.00	1.10	1.30	0.039	0.043	0.051
b	0.30	-	0.50	0.012	-	0.020
c	0.10	0.15	0.20	0.004	0.006	0.008
D	2.82	-	3.10	0.111	-	0.122
E	1.50	1.60	1.70	0.059	0.063	0.067
E1	2.60	2.80	3.00	0.102	0.110	0.118
e	0.95REF			0.037REF		
e1	1.90REF			0.075REF		
L	0.30	-	0.60	0.012	-	0.024
θ	0°	-	8°	0°	-	8°

Land Pattern



NOTES:
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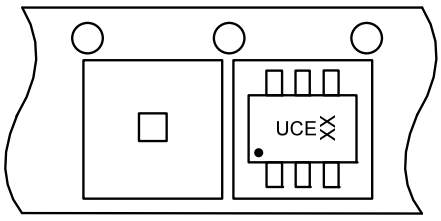
2. Unit: mm;
3. General tolerance ±0.05mm unless otherwise specified;
4. The layout is just for reference.

Tape and Reel Orientation



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