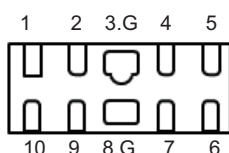


# SC1004U-ULC-04UTG

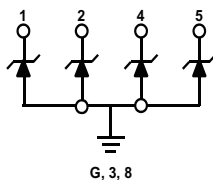
## Ultra Low Capacitance Diode Arrays



### Pinout



### Functional Block Diagram



Pin 6, 7, 9, 10 are NC

## Description

The SC1004U-ULC-04UTG provides signal integrity preserving unidirectional ESD protection for the world's most challenging high speed serial interfaces. Compelling packaging options including the standard 2.5mmx1.0mm layout, trace layout complexity, saves significant PCB space. Providing in excess of 12kV contact ESD protection (IEC 61000-4-2) while maintaining extremely low leakage and dynamic resistance, offered in the industry's most progressive and soon to be popular footprints, it sets higher standards for signal integrity and usability.

## Features

- 0.20pFTYP capacitance
- ESD, IEC 61000-4-2, +12kV / -12kV contact, +15kV / -15kV air
- Low clamping voltage of 11.0V @  $I_{pp}=2.0A$  ( $t_p=8/20\mu s$ )
- Low profile DFN array packages
- Facilitates excellent signal integrity
- ELV Compliant
- Moisture Sensitivity Level(MSL -1)
- Halogen free, Lead free and RoHS compliant

## Applications

- USB 3.1, 3.0, 2.0
- HDMI 2.0, 1.4a, 1.3
- DisplayPort™
- V-by-One®
- Thunderbolt (Light Peak)
- LVDS interfaces
- Consumer, mobile and portable electronics
- Tablet PC and external storage with high speed interfaces
- Applications requiring high ESD performance in small packages

#### Life Support Note:

Not Intended for Use in Life Support or Life Saving Applications  
The products shown herein are not designed for use in life sustaining or life saving applications unless otherwise expressly indicated.

# SC1004U-ULC-04UTG

## Ultra Low Capacitance Diode Arrays

### Absolute Maximum Ratings

Symbol	Parameter	Value	Units
$I_{PP}$	Peak Current ( $t_p=8/20\mu s$ )	2	A
$T_{OP}$	Operating Temperature	-40 to 125	°C
$T_{STOR}$	Storage Temperature	-55 to 150	°C

**Caution:** Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the component. This is a stress only rating and operation of the component at these or any other conditions above those indicated in the operational sections of this specification is not implied.

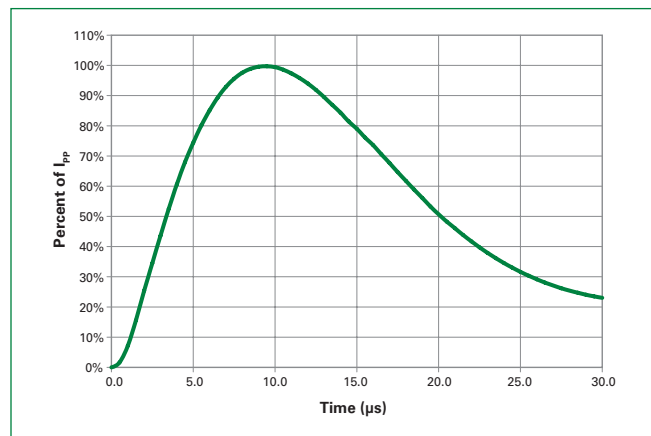
### Electrical Characteristics ( $T_{OP}=25^\circ C$ )

Parameter	Test Conditions	Min	Typ	Max	Units
Input Capacitance	@ $V_R = 0V$ , $f = 3GHz$		0.20	0.22	pF
Breakdown Voltage	$V_{BR}$ @ $I_T=1mA$	7.5	8.5		V
Reverse Standoff Voltage				7.0	V
Reverse Leakage Current	$I_L$ @ $V_{RWM}=5.0V$		25	50	nA
Clamping Voltage	$V_{CL}$ @ $I_{PP}=2.0A$		11		V
Dynamic Resistance <sup>2</sup>	TLP, $t_p=100ns$		0.55		$\Omega$
Peak Pulse Current	$t_p=8/20\mu s$			2.0	A
ESD Withstand Voltage	IEC 61000-4-2 (Contact)	$\pm 12$			kV
	IEC 61000-4-2 (Air)	$\pm 15$			kV

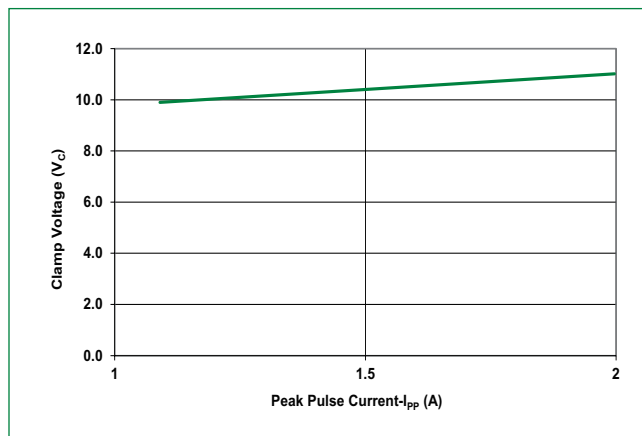
**Note:**

- Parameter is guaranteed by design and/or component characterization.
- Transmission Line Pulse (TLP) with 100ns width, 0.2ns rise time, and average window  $t_1=70ns$  to  $t_2=90ns$

#### 8/20 $\mu s$ Pulse Waveform



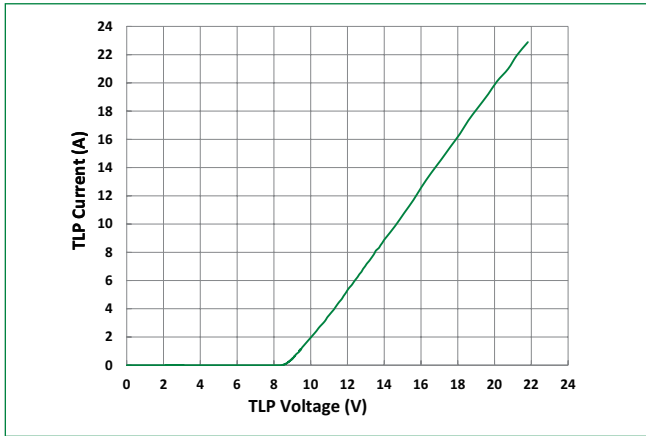
#### Clamping Voltage vs $I_{PP}$



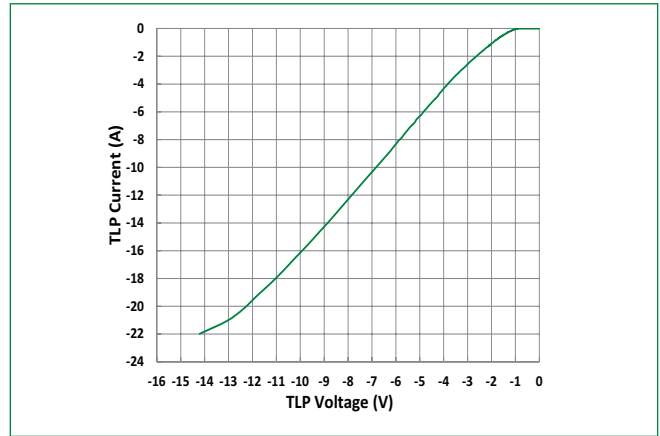
# SC1004U-ULC-04UTG

## Ultra Low Capacitance Diode Arrays

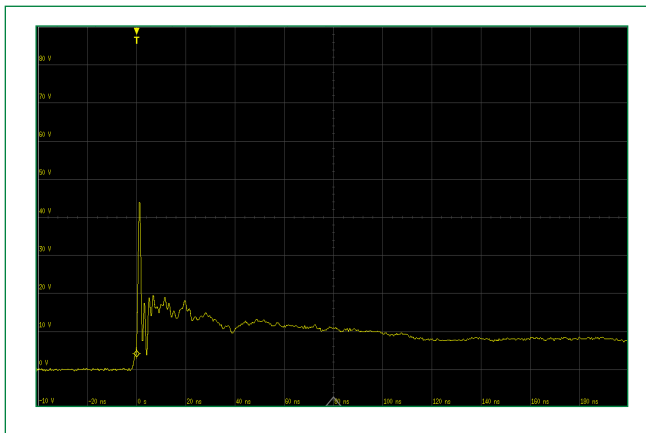
**Positive Transmission Line Pulsing (TLP) Plot**



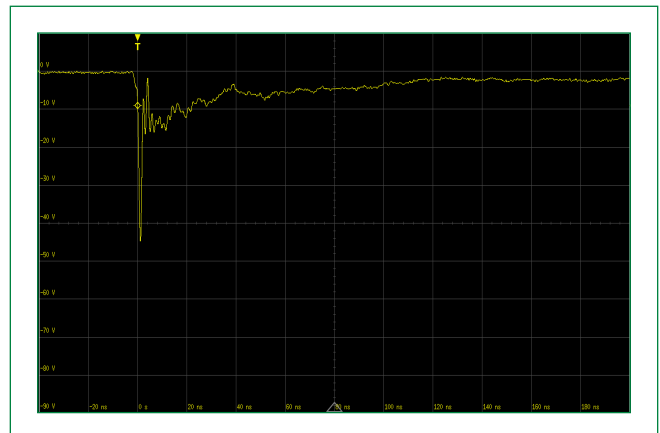
**Negative Transmission Line Pulsing (TLP) Plot**



**IEC 61000-4-2 +8 kV Contact ESD Clamping Voltage**



**IEC 61000-4-2 -8 kV Contact ESD Clamping Voltage**

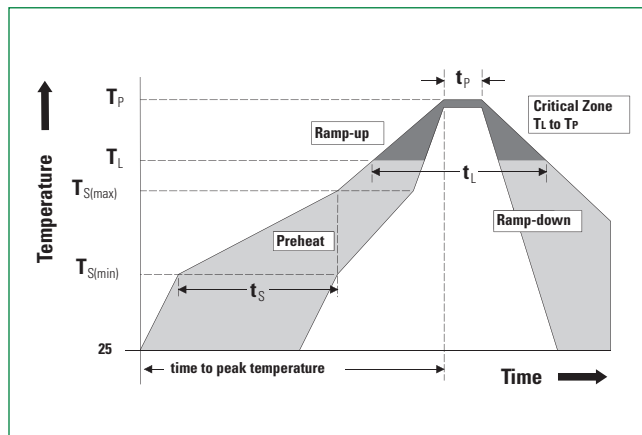


# SC1004U-ULC-04UTG

## Ultra Low Capacitance Diode Arrays

### Soldering Parameters

<b>Reflow Condition</b>		Pb – Free assembly
<b>Pre Heat</b>	- Temperature Min ( $T_{s(min)}$ )	150°C
	- Temperature Max ( $T_{s(max)}$ )	200°C
	- Time (min to max) ( $t_s$ )	60 – 120 secs
<b>Average ramp up rate (Liquidus) Temp (<math>T_L</math>) to peak</b>		3°C/second max
<b><math>T_{s(max)}</math> to <math>T_L</math> - Ramp-up Rate</b>		3°C/second max
<b>Reflow</b>	- Temperature ( $T_L$ ) (Liquidus)	217°C
	- Temperature ( $t_L$ )	60 – 150 seconds
<b>Peak Temperature (<math>T_p</math>)</b>		260 <sup>+0/-5</sup> °C
<b>Time within 5°C of actual peak Temperature (<math>t_p</math>)</b>		30 seconds
<b>Ramp-down Rate</b>		6°C/second max
<b>Time 25°C to peak Temperature (<math>T_p</math>)</b>		8 minutes Max.
<b>Do not exceed</b>		260°C



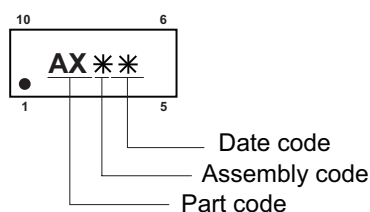
### Ordering Information

Part Number	Package	Min. Order Qty.
SC1004U-ULC-04UTG	1004 DFN Array	3000

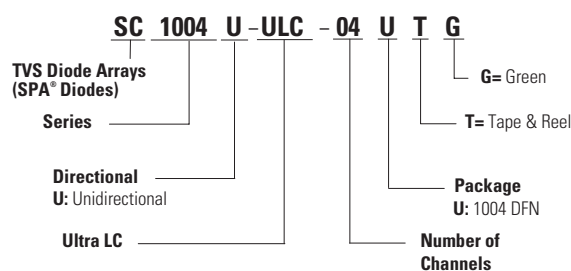
### Product Characteristics

<b>Lead Plating</b>	Pre-Plated Frame or Matte Tin
<b>Lead material</b>	Copper Alloy
<b>Substrate Material</b>	Silicon
<b>Body Material</b>	Molded Compound
<b>Flammability</b>	UL Recognized compound meeting flammability rating V-0

### Part Marking System



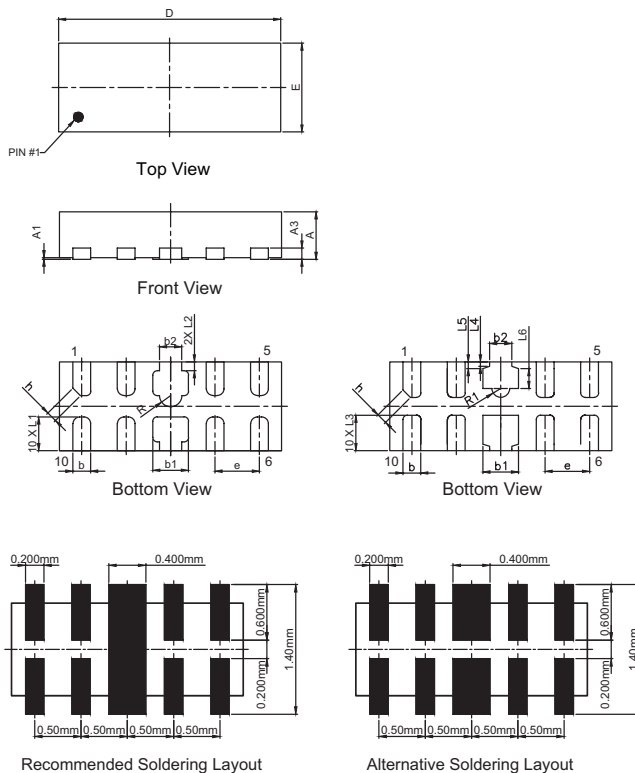
### Part Numbering System



# SC1004U-ULC-04UTG

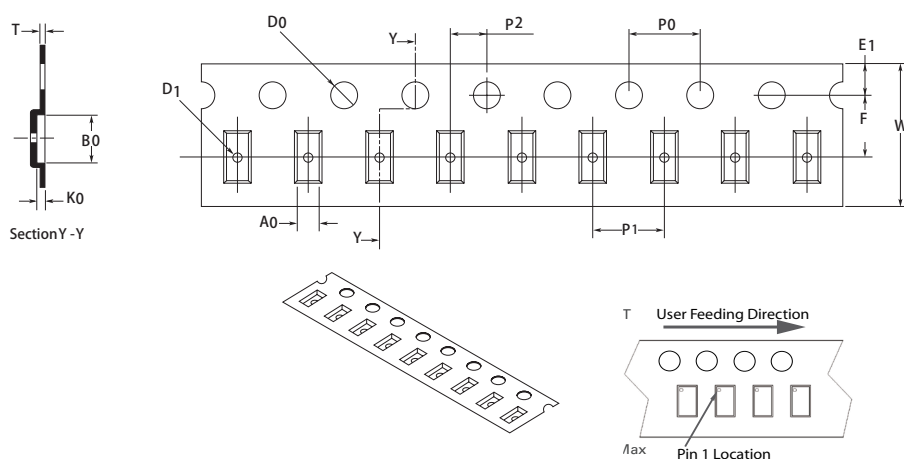
## Ultra Low Capacitance Diode Arrays

### Package Dimensions — 1004 DFN Array



Symbol	Millimeters		Inches	
	Min	Max	Min	Max
A	0.45	0.60	0.0177	0.0236
A1	0.00	0.05	0.0000	0.0020
A3	0.120	0.175	0.0047	0.0069
b	0.15	0.25	0.0059	0.0098
b1	0.35	0.45	0.0138	0.0177
b2	0.20	0.30	0.0079	0.0118
D	2.40	2.60	0.0945	0.1024
E	0.90	1.10	0.0354	0.0433
L1	0.28	0.48	0.0110	0.0189
L2	0.05	0.15	0.0020	0.0059
L3	0.35	0.45	0.0138	0.0177
L4	0.050 REF		0.0020 REF	
L5	0.075 REF		0.0030 REF	
L6	0.225 REF		0.0089 REF	
e	0.500 BASIC		0.0197 BASIC	
R	0.125 REF		0.0049 REF	
R1	0.100 REF		0.0039 REF	
h	0.08	0.16	0.0031	0.0063

### Embossed Carrier Tape & Reel Specification — 1004 DFN Array



Symbol	Millimeters
A0	1.15 min/1.30 max
B0	2.70+/-0.05
D0	ø 1.50 min/1.65 max
D1	ø 0.50 min/1.05 max
E1	1.75+/-0.10
F	3.50+/-0.10
K0	0.46 min/0.75 max
P0	4.00+/-0.10
P1	4.00+/-0.10
P2	2.00+/-0.05
W	8.00+0.30/-0.10
T	0.17 min/0.30 max

**Product Disclaimer:** Littelfuse products are not designed for, and shall not be used for, any purpose (including, without limitation, automotive, military, aerospace, medical, life-saving, life-sustaining or nuclear facility applications, devices intended for surgical implant into the body, or any other application in which the failure or lack of desired operation of the product may result in personal injury, death, or property damage) other than those expressly set forth in applicable Littelfuse product documentation. Warranties granted by Littelfuse shall be deemed void for products used for any purpose not expressly set forth in applicable Littelfuse documentation. Littelfuse shall not be liable for any claims or damages arising out of products used in applications not expressly intended by Littelfuse as set forth in applicable Littelfuse documentation. The sale and use of Littelfuse products is subject to Littelfuse Terms and Conditions of Sale, unless otherwise agreed by Littelfuse. "Littelfuse" includes Littelfuse, Inc., and all of its affiliate entities. <http://www.littelfuse.com/disclaimer-electronics>