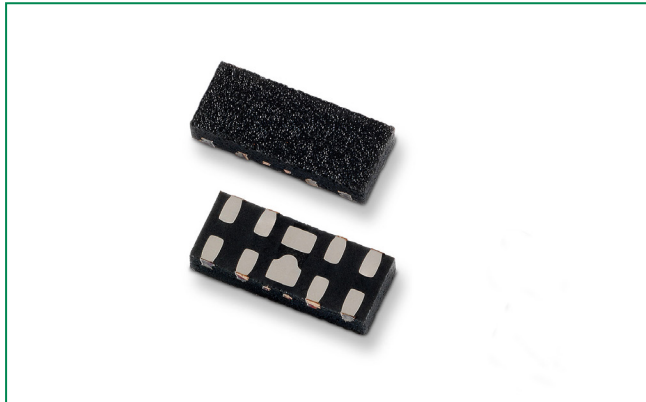


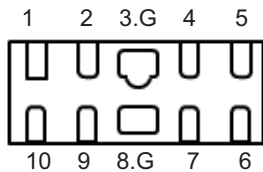
SP3420, 0.32pF, 6A Diode Array



**Description**

The SP3420 includes four channel ultra low capacitance and high-level ESD protection diodes to protect high-speed data rate such as USB 3.1, DisplayPort, Thunderbolt, and e-SATA. The typical capacitance of 0.32pF helps ensure signal integrity and this robust device can safely absorb repetitive ESD strikes at the maximum level specified in the IEC 61000-4-2 international standard (Level 4, ±8kV contact discharge) without performance degradation safely dissipate 6A of 8/20µs surge current (IEC 61000-4-5 2<sup>nd</sup> edition).

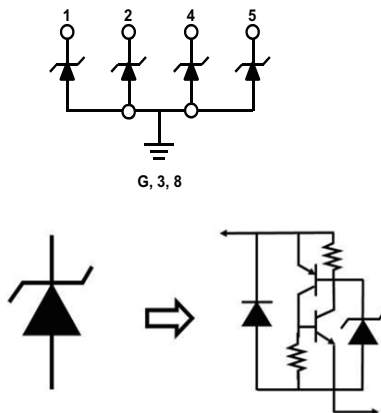
**Pinout**



**Features**

- ESD, IEC 61000-4-2, ±12kV contact, ±15kV air
- EFT, IEC 61000-4-4, 40A (5/50ns)
- Lightning, IEC 61000-4-5 2<sup>nd</sup> edition, 6A (t<sub>p</sub>=8/20µs)
- Low capacitance of 0.32pF@1.5V (TYP)
- Low leakage current of 0.02µA (TYP) at 3.3V
- Low operating and clamping voltage
- AEC-Q101 qualified
- Halogen free, Lead free and RoHS compliant
- Moisture Sensitivity Level (MSL -1)

**Functional Block Diagram**



**Applications**

- Ultra-high speed data lines
- USB 3.1, 3.0, 2.0
- DisplayPort(TM)
- Thunderbolt (Light Peak)
- V-by-One®
- LVDS interfaces
- Consumer, mobile and portable electronics
- Tablet PC and external storage with high speed interfaces

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.

### Absolute Maximum Ratings

Symbol	Parameter	Value	Units
$I_{PP}$	Peak Current ( $t_p=8/20\mu s$ )	6	A
$T_{OP}$	Operating Temperature	-40 to 125	°C
$T_{STOR}$	Storage Temperature	-55 to 150	°C

Notes:

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	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	$V_{RWM}$	$I_R = 1\mu A$			3.3	V
Breakdown Voltage	$V_{BR}$	$I_R = 1mA$	6.5	8.5		V
Reverse Leakage Current	$I_{LEAK}$	$V_R=3.3V$		0.02	0.1	$\mu A$
Holding Voltage	$V_{HOLD}$	I/O to GND		1.7		V
Clamp Voltage <sup>1</sup>	$V_C$	$I_{PP}=1A, t_p=8/20\mu s$		2.7	3.5	V
		$I_{PP}=6A, t_p=8/20\mu s$		4	6	V
Dynamic Resistance <sup>2</sup>	$R_{DYN}$	TLP, $t_p=100ns$		0.3		$\Omega$
ESD Withstand Voltage <sup>1,3</sup>	$V_{ESD}$	IEC 61000-4-2 (Contact Discharge)	$\pm 12$			kV
		IEC 61000-4-2 (Air Discharge)	$\pm 15$			kV
Diode Capacitance <sup>1</sup>	$C_{I/O-GND}$	Reverse Bias=1.5V, $f=1MHz$		0.32	0.35	pF

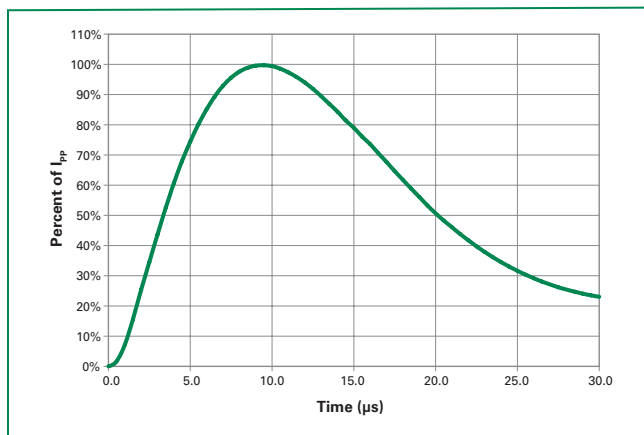
Notes:

1Parameter is guaranteed by design and/or component characterization.

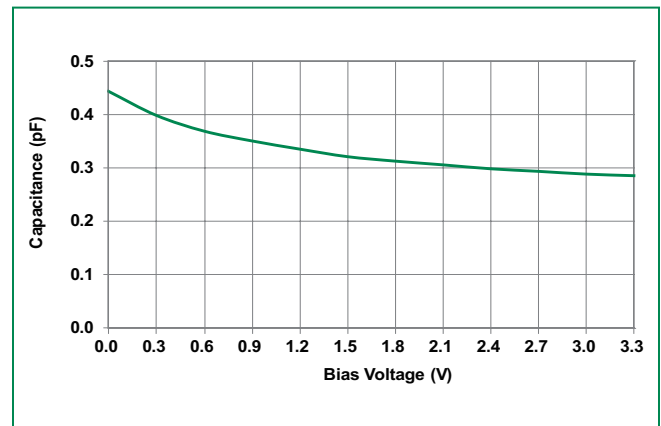
2 Transmission Line Pulse (TLP) test setting : Std. TDR(50 $\Omega$ ),  $t_p=100ns$ ,  $t_r=0.2ns$  ITLP and VTLP averaging window: start  $t_1=70ns$  to end  $t_2=90ns$

3 Device stressed with ten non-repetitive ESD pulses.

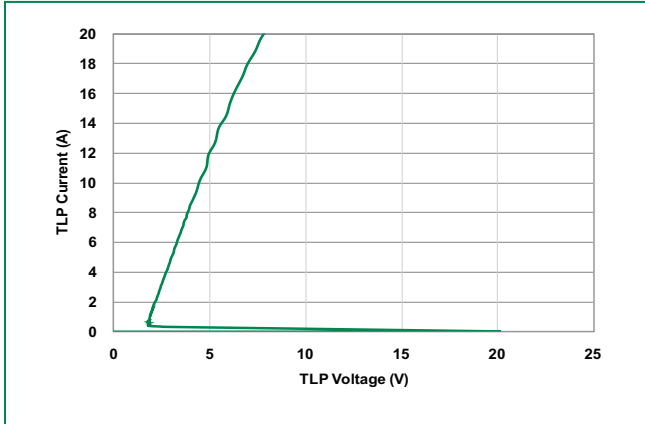
### 8/20 $\mu s$ Pulse Waveform



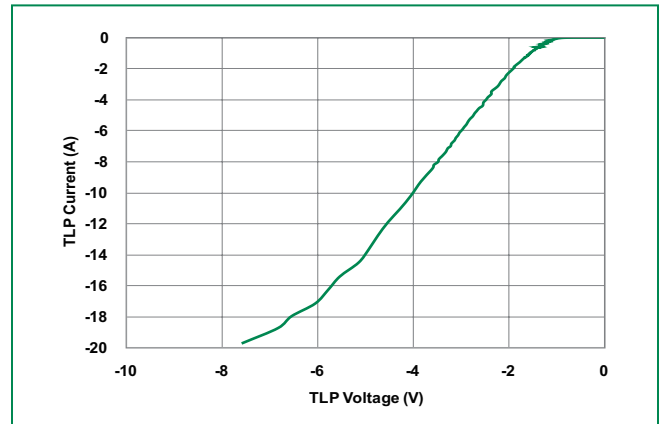
### Capacitance vs. Reverse Bias



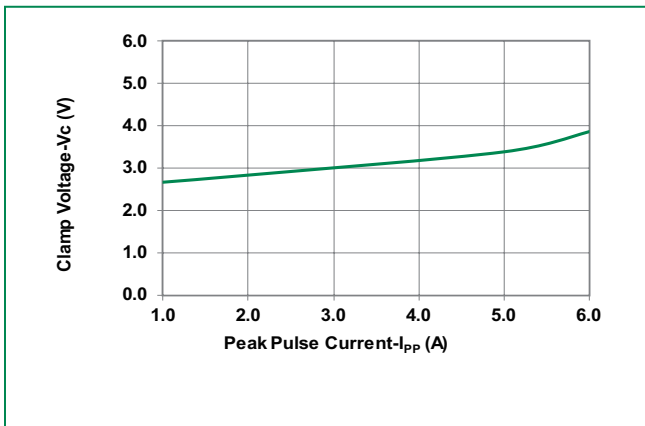
**Positive Transmission Line Pulsing (TLP) Plot**



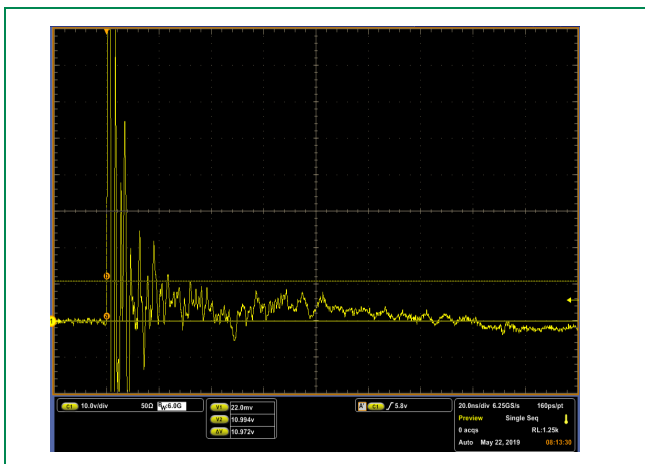
**Negative Transmission Line Pulsing (TLP) Plot**



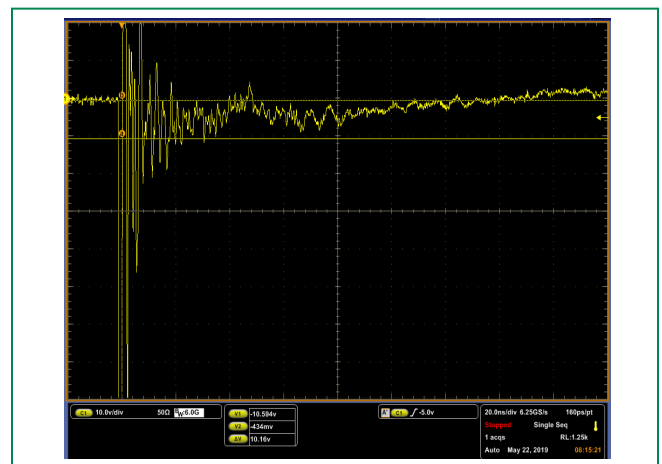
**Clamping Voltage vs. Peak Pulse Current**



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

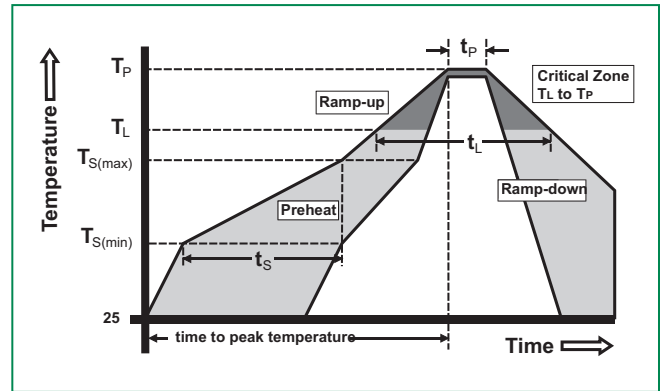


**IEC 61000-4-2 -8 kV Contact ESD Clamping Voltage**



### Soldering Parameters

Reflow Condition		Pb – Free assembly
Pre Heat	- Temperature Min ( $T_{s(min)}$ )	150°C
	- Temperature Max ( $T_{s(max)}$ )	200°C
	- Time (min to max) ( $t_s$ )	60 – 180 secs
Average ramp up rate (Liquidus) Temp ( $T_L$ ) to peak		3°C/second max
$T_{s(max)}$ to $T_L$ - Ramp-up Rate		3°C/second max
Reflow	- Temperature ( $T_L$ ) (Liquidus)	217°C
	- Temperature ( $t_L$ )	60 – 150 seconds
Peak Temperature ( $T_p$ )		260 <sup>+0/-5</sup> °C
Time within 5°C of actual peak Temperature ( $t_p$ )		20 – 40 seconds
Ramp-down Rate		6°C/second max
Time 25°C to peak Temperature ( $T_p$ )		8 minutes Max.
Do not exceed		260°C



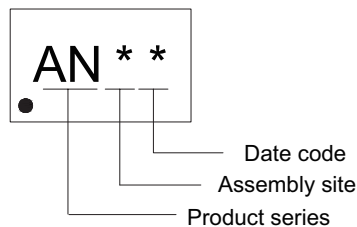
### Ordering Information

Part Number	Package	Min. Order Qty.
SP3420-04UTG	$\mu$ DFN-10 (2.5x1.0mm)	3000

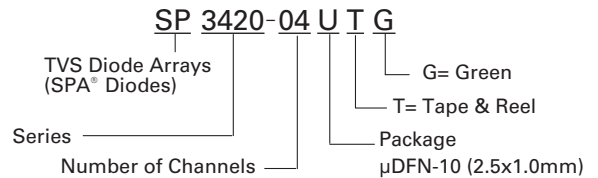
### Product Characteristics

Lead Plating	PPF
Lead Material	Copper Alloy
Substrate Material	Silicon
Body Material	Molded Compound
Flammability	UL Recognized compound meeting flammability rating V-0

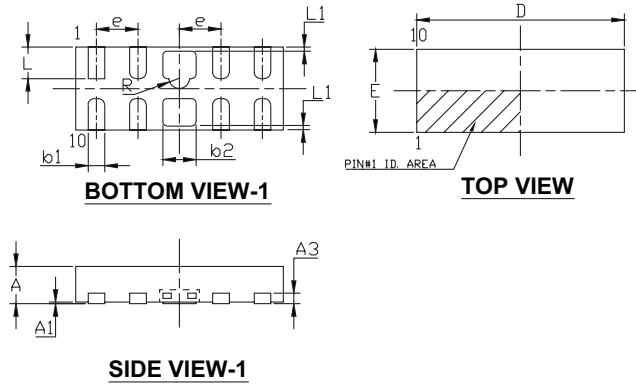
### Part Marking System



### Part Numbering System

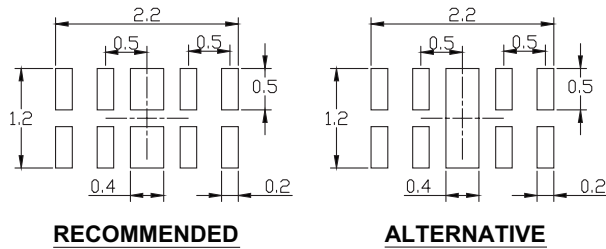


**Package Dimensions -  $\mu$ DFN-10 (2.5x1.0mm)**



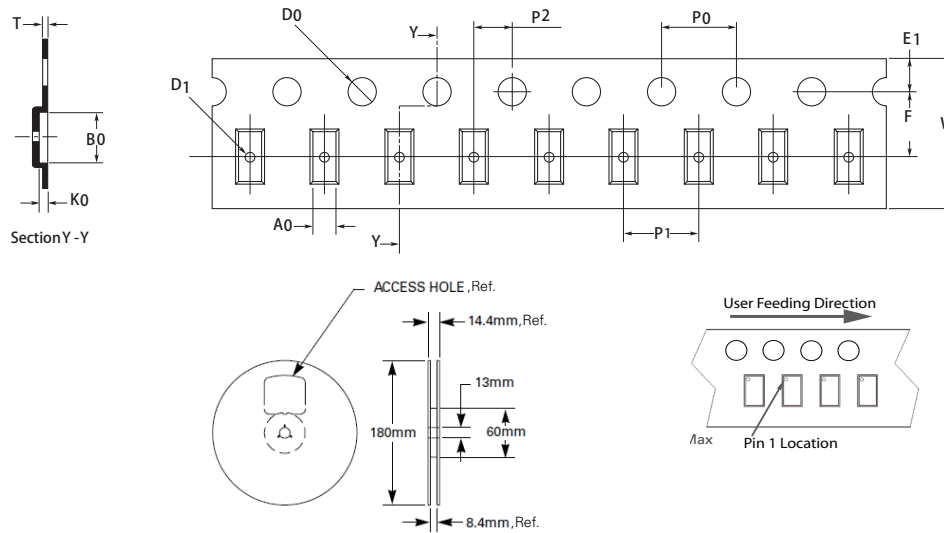
Symbol	Millimeters		Inches	
	Min	Max	Min	Max
A	0.40	0.60	0.013	0.024
A1	0.00	0.05	0.000	0.002
A3	0.127 REF		0.005 REF	
b1	0.15	0.25	0.006	0.010
b2	0.35	0.45	0.014	0.018
D	2.40	2.60	0.094	0.102
E	0.90	1.10	0.035	0.043
e	0.50 BSC		0.020 BSC	
L	0.28	0.48	0.011	0.019
L1	0.00	0.15	0.000	0.006
R	0.125 REF		0.005 REF	

**SOLDERING PATTERN**



UNIT: mm

**Tape & Reel Specification -  $\mu$ DFN-10 (2.5x1.0mm)**



Symbol	Millimeters
A0	1.15 min/1.30 max
B0	2.70+/-0.05
D0	$\varnothing$ 1.50 min/1.65 max
D1	$\varnothing$ 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

8mm TAPE AND REEL

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