SP0544T Series 0.5pF 12KV Diode Array

OBSOLETE DATE: 06/10th/2020 PCN/ECN# ESU270-51
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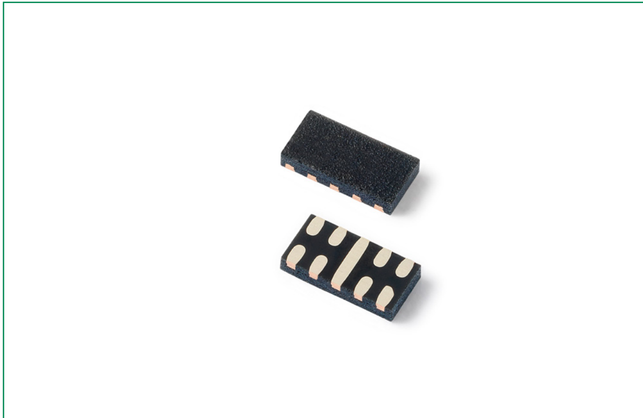
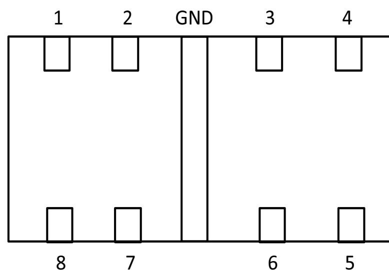


Description

The SP0544T integrates 4 channels of ultra low capacitance rail-to-rail diodes and an additional zener diode to provide protection for electronic equipment that may experience destructive electrostatic discharges (ESD). This robust device can safely absorb repetitive ESD strikes above the maximum level specified in the IEC61000-4-2 international standard (±8kV contact discharge) without performance degradation. The extremely low loading capacitance also makes it ideal for protecting high speed signal pins such as V-By-One, HDMI, USB3.0, USB2.0, and IEEE 1394.

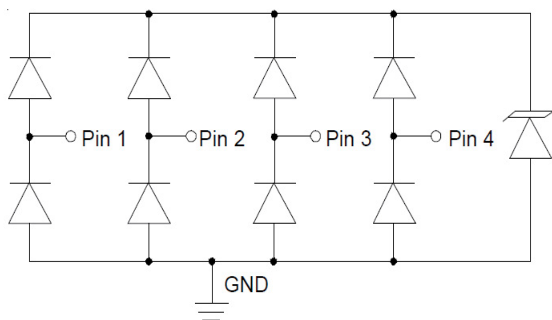
Pinout



Features

- ESD, IEC61000-4-2, ±12kV contact, ±25kV air
- EFT, IEC61000-4-4, 40A (t_P=5/50ns)
- Lightning, IEC61000-4-5 2nd edition, 4A (t_P=8/20μs)
- Low capacitance of 0.5pF (TYP) per I/O
- Low leakage current of 1.5μA (MAX) at 5V
- Halogen free, Lead free and RoHS compliant

Functional Block Diagram



Note: Pins 5-8 not internally connected

Applications

- V-By-One
- Embedded DisplayPort
- USB 2.0/3.0 Ports
- HDMI
- Flat Panel Displays
- LCD/LED TVs
- Smartphones
- Mobile Computing

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=8/20μs)	4.0	A
T_{OP}	Operating Temperature	-40 to 150	°C
T_{STOR}	Storage Temperature	-55 to 150	°C

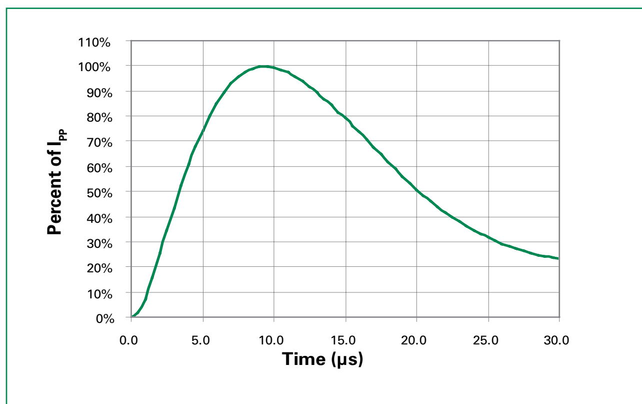
Note: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

Electrical Characteristics (T_{OP}=25°C)

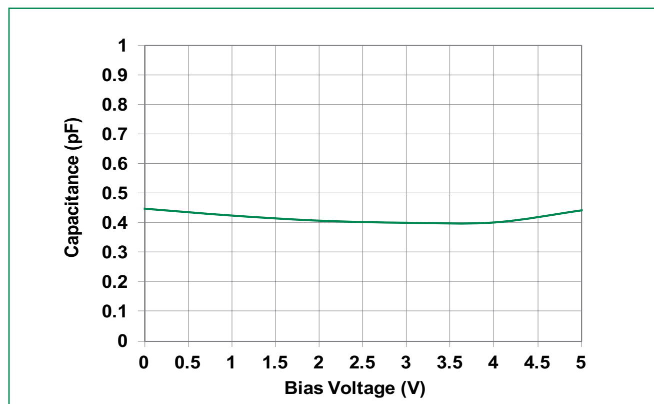
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	V_{RWM}	I_R ≤ 1μA			5.0	V
Reverse Leakage Current	I_{LEAK}	V_R=5V, Any I/O to GND			1.5	μA
Clamp Voltage[1]	V_C	I_{PP}=1A, t_p=8/20μs, Fwd		6.6		V
		I_{PP}=2A, t_p=8/20μs, Fwd		7.0		V
Dynamic Resistance[2]	R_{DYN}	TLP, t_p=100ns, I/O to GND		0.3		Ω
ESD Withstand Voltage[1]	V_{ESD}	IEC61000-4-2 (Contact)	±12			kV
		IEC61000-4-2 (Air)	±25			kV
Diode Capacitance[1]	$C_{I/O-GND}$	Reverse Bias=0V, f=1 MHz		0.5		pF
Diode Capacitance[1]	$C_{I/O-I/O}$	Reverse Bias=0V, f=1 MHz		0.3		pF

Note: [1] Parameter is guaranteed by design and/or device characterization.
[2] Transmission Line Pulse (TLP) with 100ns width and 2ns rise time.

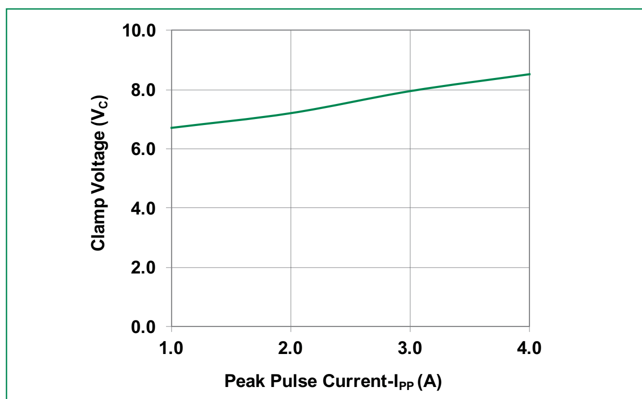
8/20μS Pulse Waveform



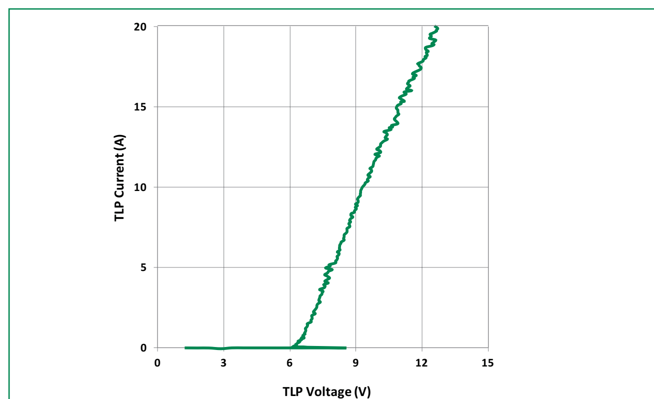
Capacitance vs. Reverse Bias



Clamping Voltage vs I_{PP}



Transmission Line Pulsing(TLP) Plot



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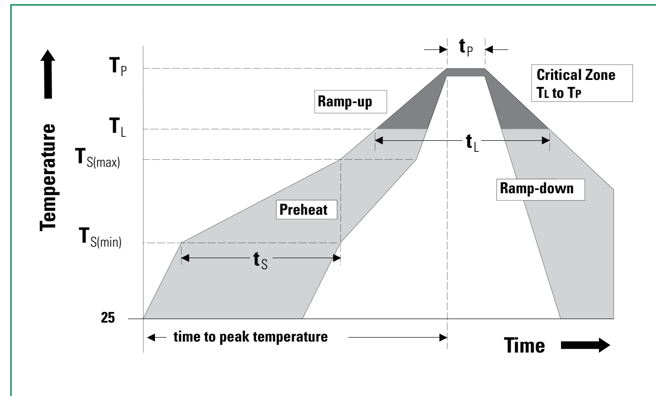
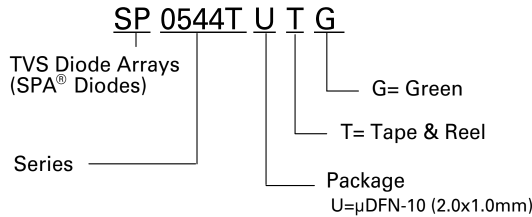
Soldering Parameters

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)		$260^{+0/-5}$ °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



Part Numbering System



Product Characteristics

Lead Plating	Pre-Plated Frame
Lead Material	Copper Alloy
Lead Coplanarity	0.004 inches(0.102mm)
Substrate material	Silicon
Body Material	Molded Epoxy
Flammability	UL 94 V-0

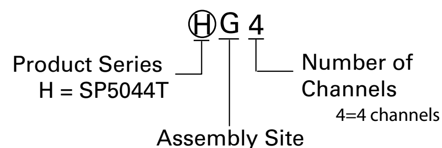
Notes :

1. All dimensions are in millimeters
2. Dimensions include solder plating.
3. Dimensions are exclusive of mold flash & metal burr.
4. Blo is facing up for mold and facing down for trim/form, i.e. reverse trim/form.
5. Package surface matte finish VDI 11-13.

Ordering Information

Part Number	Package	Marking	Min. Order Qty.
SP0544TUTG	μDFN-10	ⒽG4	3000

Part Marking System



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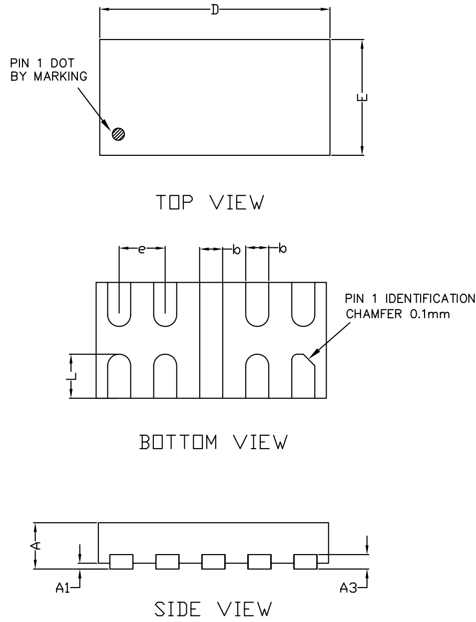
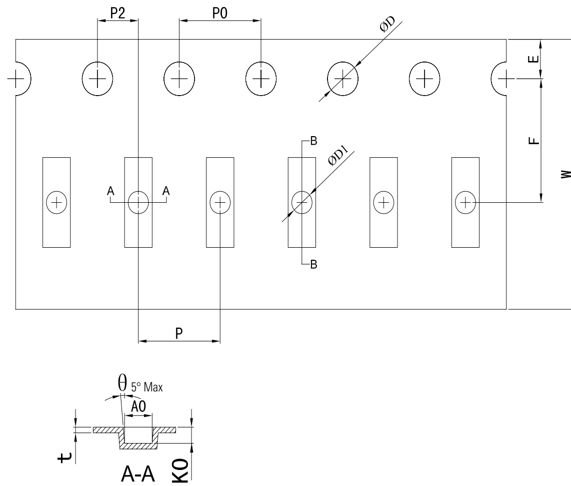
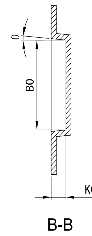
Package Dimensions



Symbol	Millimeters			Inches		
	µDFN--10 (2.0x1.0mm)					
	JEDEC MO-229					
	Min	**Nom**	**Max**	**Min**	**Nom**	**Max**
A	0.3	-	0.4	0.012	-	0.016
A1	0	-	0.05	0	-	0.002
A3	0.125 REF			0.049 REF		
D	1.95	2.00	2.05	0.077	0.079	0.081
E	0.95	1.00	1.05	0.037	0.039	0.041
b	0.15	0.20	0.25	0.006	0.008	0.010
L	0.28	0.38	0.48	0.011	0.015	0.019
e	0.40 BSC			0.016 BSC		

Embossed Carrier Tape & Reel Specification





Symbol	Millimeters
A0	1.15 +/- 0.05
B0	2.15 +/- 0.05
D	Ø 1.55 + 0.1/- 0
D1	Ø 0.80 + 0.25/- 0
E	1.75 +/- 0.10
F	3.50 +/- 0.05
K0	0.48 +/- 0.05
P	4.00 +/- 0.10
P0	4.00 +/- 0.10
P2	2.00 +/- 0.05
T	0.20 +/- 0.03
W	8.00 + 0.30 /- 0.10

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