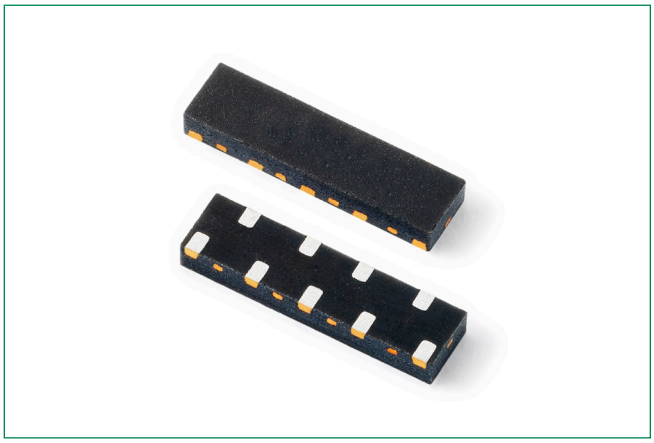
SP7538P Series

Low Capacitance ESD Protection

HF RoHS Pb



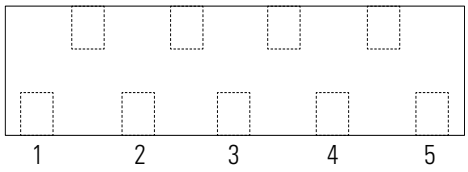
Description

The SP7538P integrates 8 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 maximum level, ±8kV contact discharge, as specified in the international standard IEC 61000-4-2, without performance degradation 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.

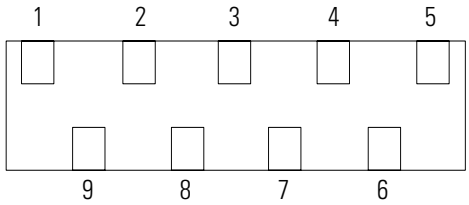
Features & Benefits

- ESD, IEC61000-4-2, ±12kV contact, ±25kV air
- EFT, IEC61000-4-4, 40A (tP=5/50ns)
- Lightning, IEC61000-4-5 2nd edition, 4A (tP=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
- AEC-Q101 qualified

Pinout



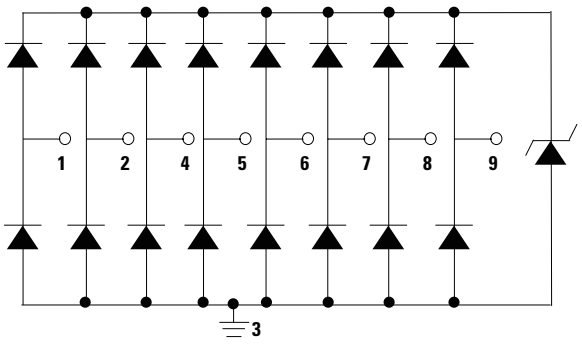
Top View



Applications

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

Functional Block Diagram



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.

Revised: JC. 12/02/21

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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

Caution: 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.

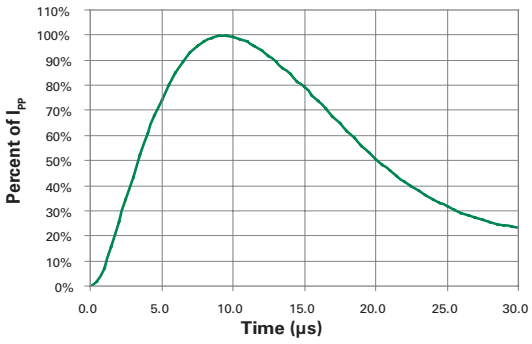
Electrical Characteristics (T_{OP}=25°C)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	V_{RWM}	$I_R \leq 1\mu A$			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}	IEC 61000-4-2 (Contact)	±12			kV
		IEC 61000-4-2 (Air)	±25			kV
Diode Capacitance[1]	$C_{I/O-GND}$	Reverse Bias=0V, f=1 MHz		0.5		pF
Diode Capacitance[1]	$C_{I/O-/O}$	Reverse Bias=0V, f=1 MHz		0.3		pF

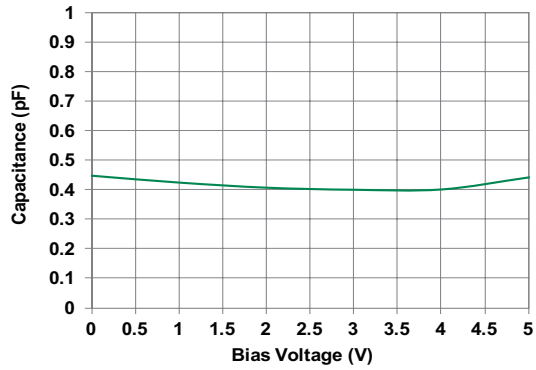
Note: [1] Parameter is guaranteed by design and/or device characterization.

[2] Transmission Line Pulse (TLP) with 100ns width and 2ns rise time.

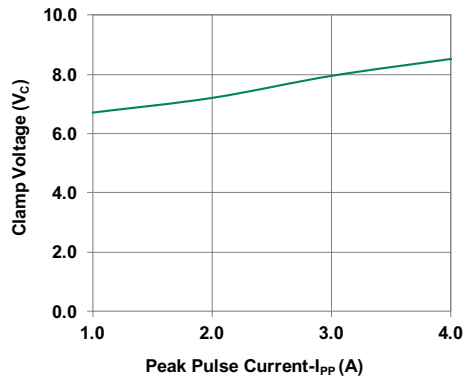
8/20µS Pulse Waveform



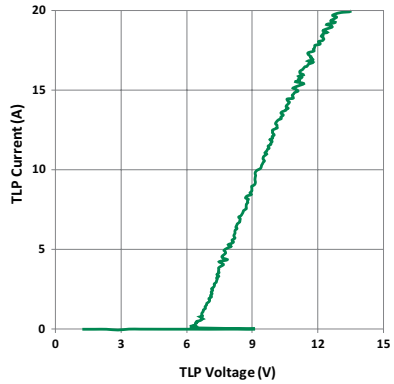
Capacitance vs. Reverse Bias



Clamping Voltage vs IPP



Transmission Line Pulsing(TLP) Plot



Revised: JC. 12/02/21

SP7538P Series
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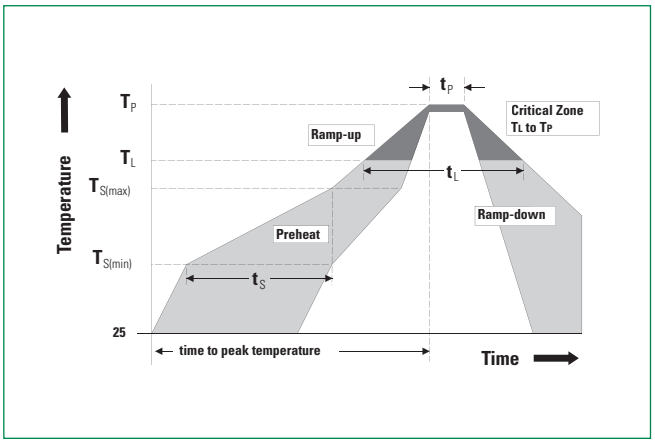
Soldering Parameters

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 – 120 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)		30 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

SP 7538P U T G

TVS Diode Arrays
(SPA® Diodes)

Series

G= Green

T= Tape & Reel

Package
U=µDFN-9 (3.8x1.0mm)

Product Characteristics

Lead Plating	Matte Tin and PPF
Lead Material	Copper Alloy
Substrate material	Silicon
Body Material	Molded Compund
Flammability	UL Recognized compound meeting flammability rating V-0

Ordering Information

Part Number	Package	Min. Order Qty.
SP7538PUTG	µDFN-9	3000

Part Marking System

SP7538 x

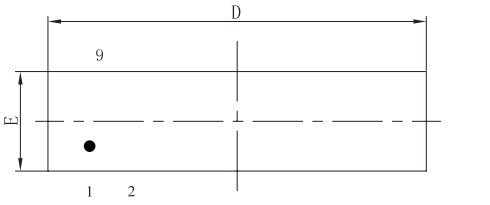
Product Series

Assembly Site

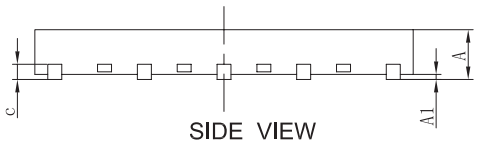
Revised: JC. 12/02/21

SP7538P Series
Low Capacitance ESD Protection

Package Dimensions



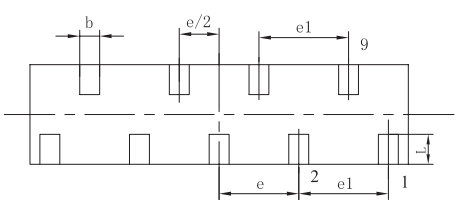
TOP VIEW



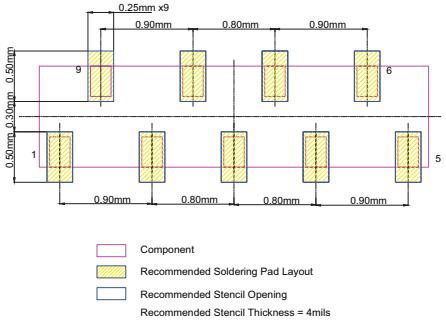
SIDE VIEW

µDFN-9 (3.8x1.0mm) JEDEC MO-229						
Symbol	Millimeters			Inches		
	Min	Nom	Max	Min	Nom	Max
A	0.45	0.50	0.55	0.018	0.020	0.022
A1	-	0.02	0.05	-	0.001	0.002
b	0.15	0.20	0.25	0.006	0.008	0.010
c	0.10	0.15	0.20	0.004	0.006	0.008
D	3.70	3.80	3.90	0.146	0.150	0.154
e		0.80 BSC			0.031 BSC	
e1		0.90 BSC			0.035 BSC	
E	0.90	1.00	1.10	0.035	0.039	0.043
L	0.20	0.30	0.40	0.008	0.012	0.016

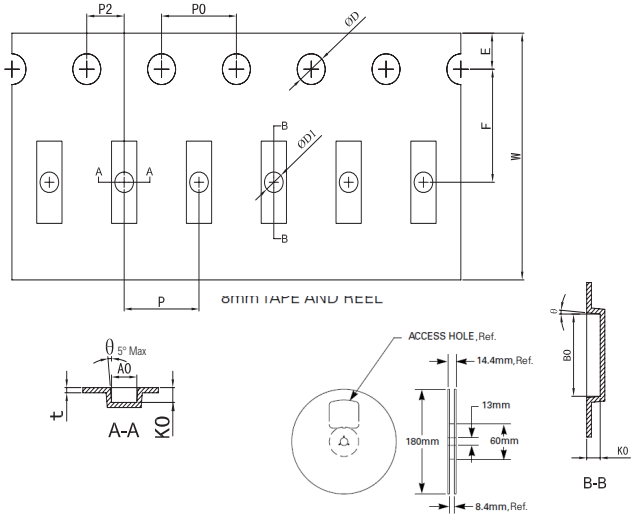
Recommended Soldering Pad Layoutit



BOTTOM VIEW



Embossed Carrier Tape & Reel Specification



Symbol	Millimeters
A0	1.35 +/- 0.10
B0	4.00 +/- 0.05
D	Ø 1.50 + 0.1/ -0
D1	Ø 1.00 +/-0.05
E	1.75 +/- 0.10
F	5.50 +/- 0.05
K0	0.72 +/- 0.05
P	4.00 +/- 0.10
P0	4.00 +/- 0.10
P2	2.00 +/- 0.05
T	0.25 +/- 0.02
W	12.00 + 0.30 /- 0.10

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