AOZ8937DI

7-Channel Combo TVS

General Description

The AOZ8937DI is a 7-channel combo transient voltage suppressor array designed to protect high-speed data lines such as USB3.1, Thunderbolt, Displayport, and VBUS from damaging ESD events.

This device incorporates 6 channels for high speed data lines and 1 channel for VBUS.

The AOZ8937DI comes in a RoHS compliant and Halogen Free DFN4.1x2.0 package and is rated for -40°C to +125°C junction temperature range.

Features

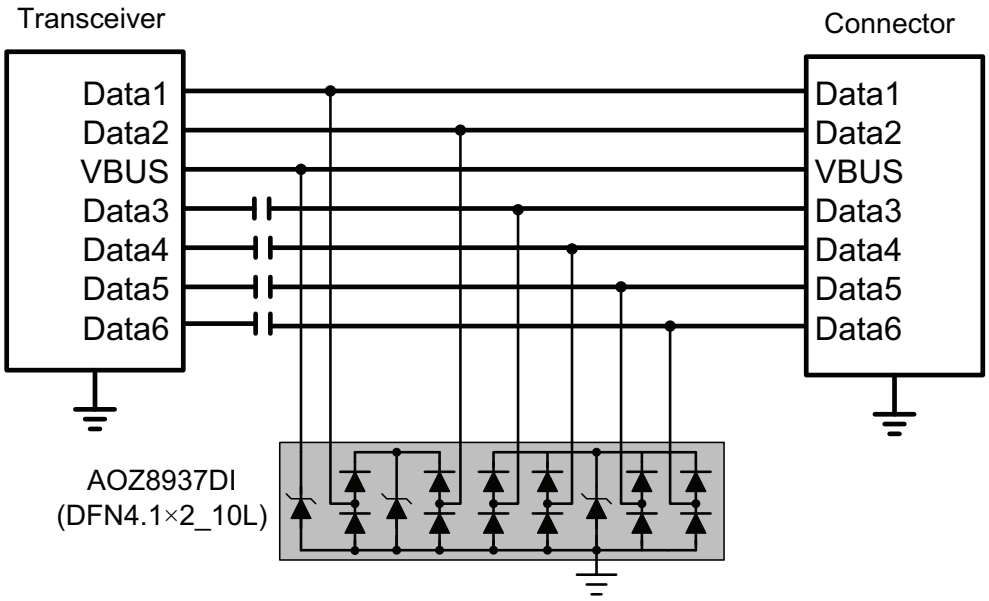
- IEC61000-4-2, ESD immunity (Contact/Air)
  - ± 12/15 kV (High Speed Data lines)
  - ± 30/30 kV (VBUS)
- IEC61000-4-5, Surge Immunity (8/20μs)
  - ± 3 A (High Speed Data lines)
  - ± 5 A (VBUS).
- Capacitance between I/O to GND
  - 0.3 pF (High Speed Data lines)
  - 16 pF (VBUS)

Applications

- USB3.1/3.2&USB2.0
- Thunderbolt
- Displayport
- Notebook computers

Green Product

Typical Application

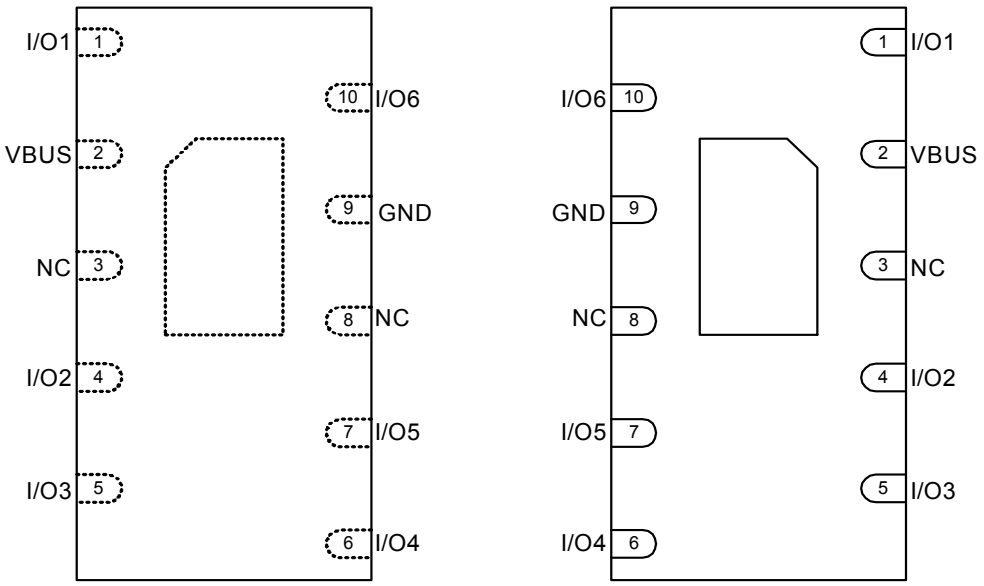


Ordering Information

Part Number	Ambient Temperature Range	Package	Environmental
AOZ8937DI	-40°C to +125°C	DFN4.1X2_10L	Green Product

AOS Green Products use reduced levels of Halogens, and are also RoHS compliant.
Please visit www.aosmd.com/media/AOSGreenPolicy.pdf for additional information.

Pin Configuration



Top View Bottom View

Absolute Maximum Ratings

Exceeding the Absolute Maximum ratings may damage the device.

Parameter	Rating	
	I/O1 to I/O6 (Pin 1, 4, 5, 6, 7,10)	**VBUS (Pin2)**
Storage Temperature (T_S)	-65°C to +150°C	-65 °C to +150°C
ESD Rating per IEC61000-4-2, contact(1)	±12kV	±30kV
ESD Rating per IEC61000-4-2, air(1)	±15kV	±30kV
8/20µs Surge IEC61000-4-5	±3 A	±5 A

Notes:

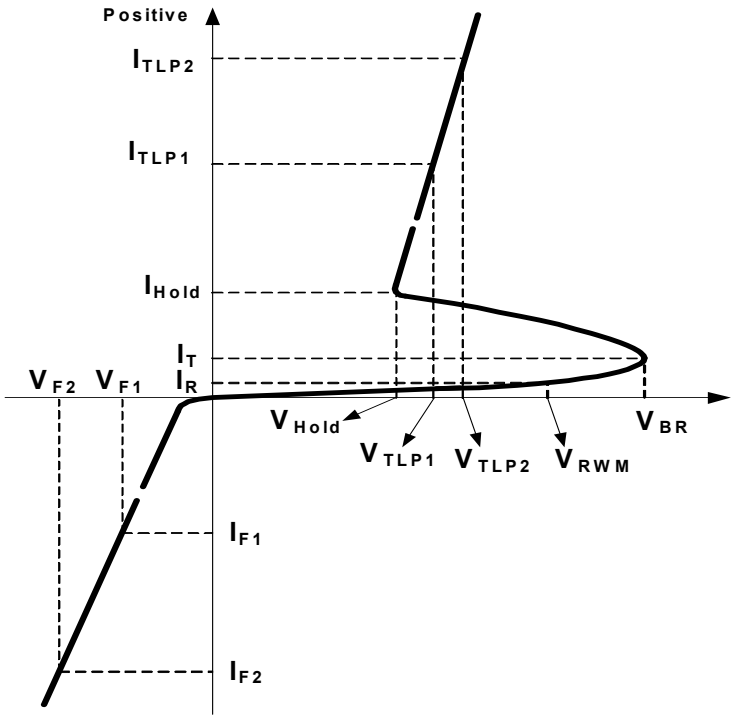
1. IEC 61000-4-2 discharge with $C_{Discharge}$ = 150pF, $R_{Discharge}$ = 330Ω.
2. Human Body Discharge per MIL-STD-883, Method 3015 $C_{Discharge}$ = 100pF, $R_{Discharge}$ = 1.5kΩ.

Maximum Operating Ratings

Parameter	Rating
Junction Temperature (T_J)	-40°C to +125°C

Electrical Characteristics

T_A = 25°C unless otherwise specified. Any I/O Pin to GND.



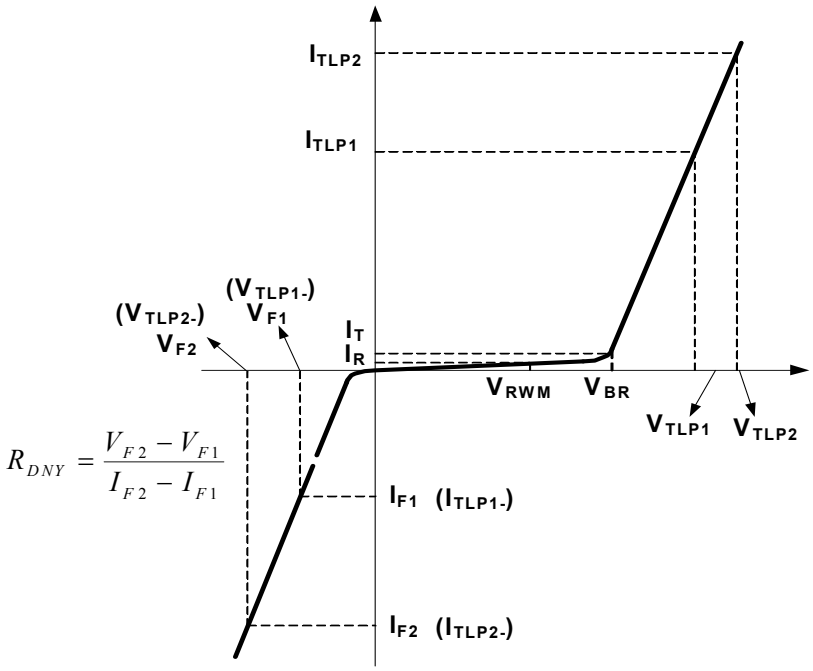
I/O1 to I/O6 (Pin 1, 4, 5, 6, 7, 10)						
Symbol	**Parameter**	**Conditions**	**Min.**	**Typ.**	**Max.**	**Units**
V_{RWM}	Reverse Working Voltage				5.5	V
V_{BR}	Reverse Breakdown Voltage	I_T = 100µA	6.5			V
I_R	Reverse Leakage Current	V_T = Max. V_{RWM}			100	µA
V_F	Forward Voltage		0.7	0.85	0.95	V
V_{CL}	Clamping Voltage[3][4] (100ns Transmission Line Pulse)	I_{TLP} = 1A I_{TLP} = -1A		3 -1	4 -2	V
		I_{TLP} = 16A I_{TLP} = -16A		12 -8	15 -10	
R_{DYN}	Dynamic Resistance[3][4]	I_{TLP} = 8A to 16A I_{TLP} = -8A to -16A		0.35 0.40		Ω
I_{PP}	Peak Pulse Current[3] IEC61000-4-5 Surge 8/20µs				±3	A
V_{CL}	Clamping Voltage[3] IEC61000-4-5 Surge 8/20µs	I_{PP} = 1A I_{PP} = -1A		2 -1.8		V
		I_{PP} = 3A I_{PP} = -3A		3.7 -3		
C_j	Junction Capacitance	$V_{I/O}$ = 0V, f = 1MHz		0.3	0.45	pF

Notes:

3. These specifications are guaranteed by design and characterization.
4. Measurements performed using a 100ns Transmission Line Pulse (TLP) system.

Electrical Characteristics

T_A = 25°C unless otherwise specified. Any I/O Pin to GND.



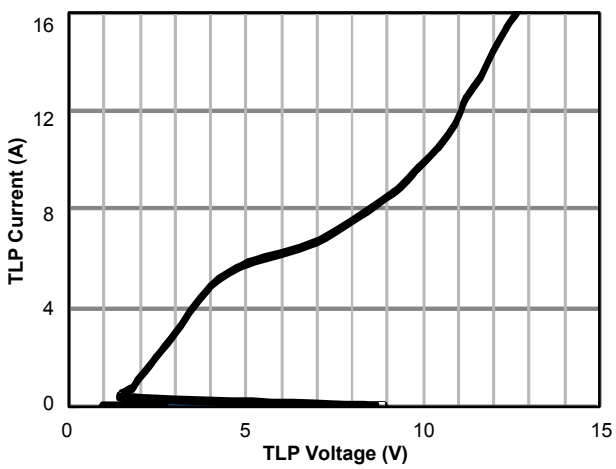
VBUS (Pin 2)						
Symbol	**Parameter**	**Conditions**	**Min.**	**Typ.**	**Max.**	**Units**
V_{RWM}	Reverse Working Voltage				5.5	V
V_{BR}	Reverse Breakdown Voltage	I_T = 1mA	6			V
I_R	Reverse Leakage Current	V_T = Max, V_{RWM}			1	µA
V_F	Forward Voltage		0.65	0.85	0.95	V
V_{CL}	Clamping Voltage[3][4] (100ns Transmission Line Pulse)	I_{TLP} = 1A I_{TLP} = -1A		8 -1	10 -2	V
		I_{TLP} = 16A I_{TLP} = -16A		10 -10	12 -15	
I_{PP}	Peak Pulse Current[3] IEC61000-4-5 Surge 8/20µs				±5	A

Notes:

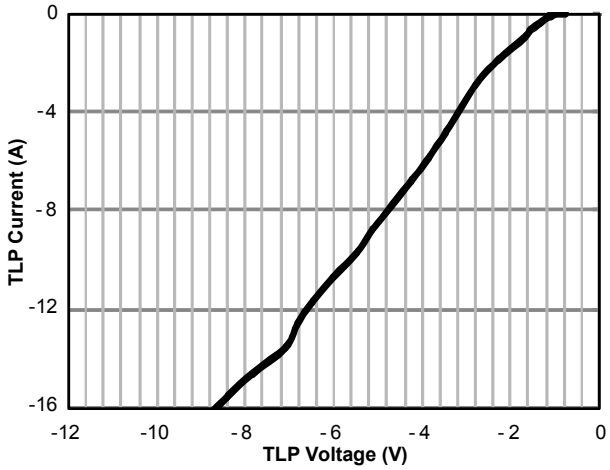
3. These specifications are guaranteed by design and characterization.
4. Measurements performed using a 100ns Transmission Line Pulse (TLP) system.

Typical Performance Characteristics (I/O1 to I/O6)

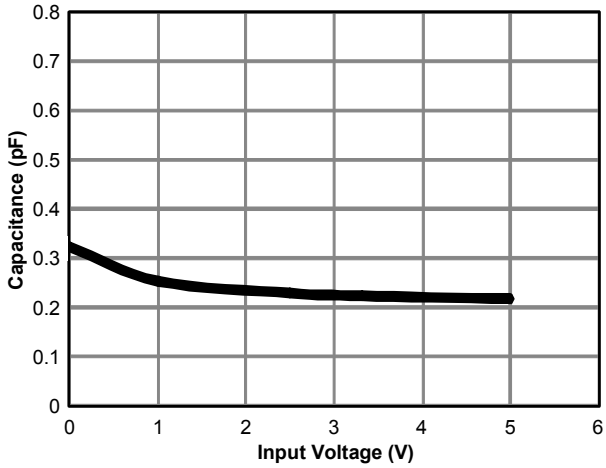
Positive Transmission Line Pulse
(tp=100ns, tr=0.2ns)



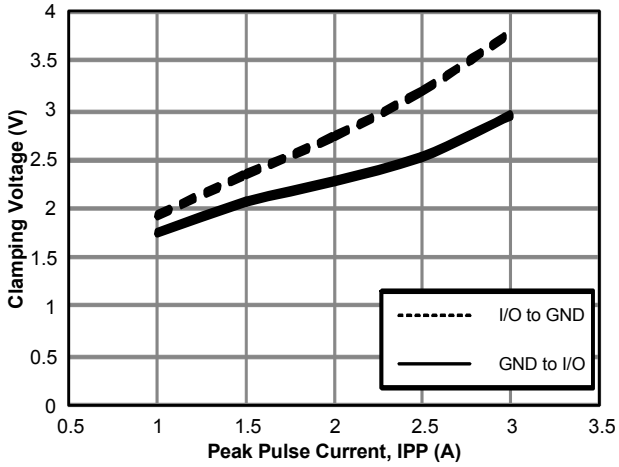
Negative Transmission Line Pulse
(tp=100ns, tr=0.2ns)



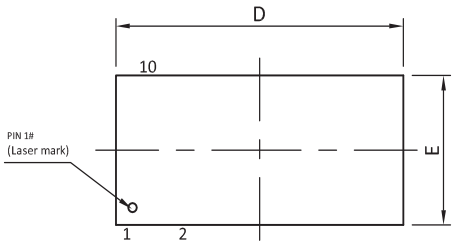
Typical Variations of CJ vs. Input Voltage



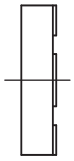
IEC61000-4-5 Surge 8/20µs



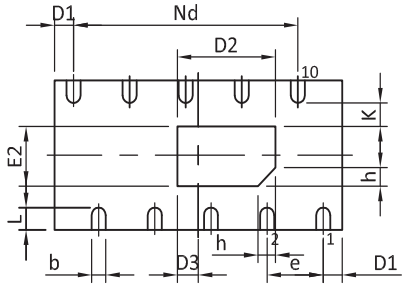
Package Dimensions, DFN4.1x2.0-10L, EP1_S



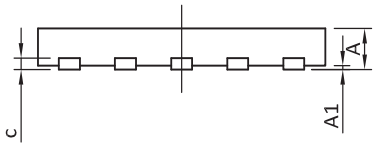
TOP VIEW



SIDE VIEW



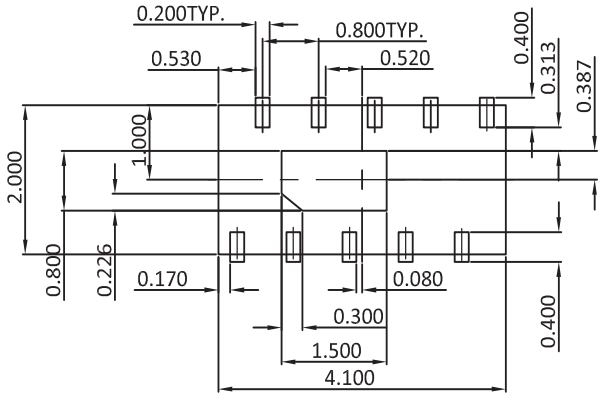
BOTTOM VIEW



SIDE VIEW

SYMBOLS	DIMENSION IN MILLIMETRES			DIMENSION IN INCHS		
	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	4.00	4.10	4.20	0.157	0.161	0.165
D1	0.20	0.25	0.30	0.008	0.010	0.012
D2	1.30	1.40	1.50	0.051	0.055	0.059
D3	0.25	0.30	0.35	0.010	0.012	0.014
e	0.80 BSC			0.031 BSC		
Nd	3.20 BSC			0.126 BSC		
E	1.90	2.00	2.10	0.075	0.079	0.083
E2	0.70	0.80	0.90	0.028	0.031	0.035
K	0.20	---	---	0.008	----	----
L	0.25	0.30	0.35	0.010	0.012	0.014
h	0.15	0.20	0.25	0.006	0.008	0.010

LAND PATTERN RECOMMENDATIONS



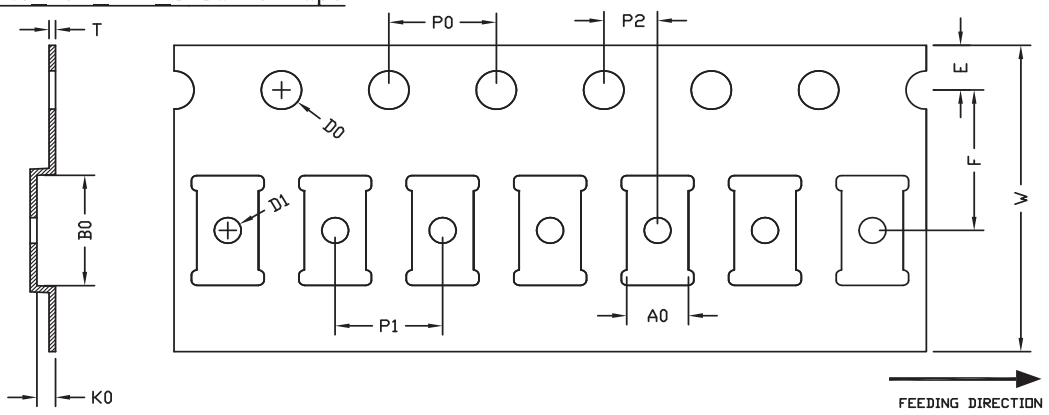
UNIT: mm

NOTES

1. CONTROLLING DIMENSION IS MILLIMETER.
   CONVERTED INCH DIMENSIONS ARE NOT NECESSARILY EXACT.

Tape and Reel Dimensions, DFN4.1x2.0-10L, EP1_S

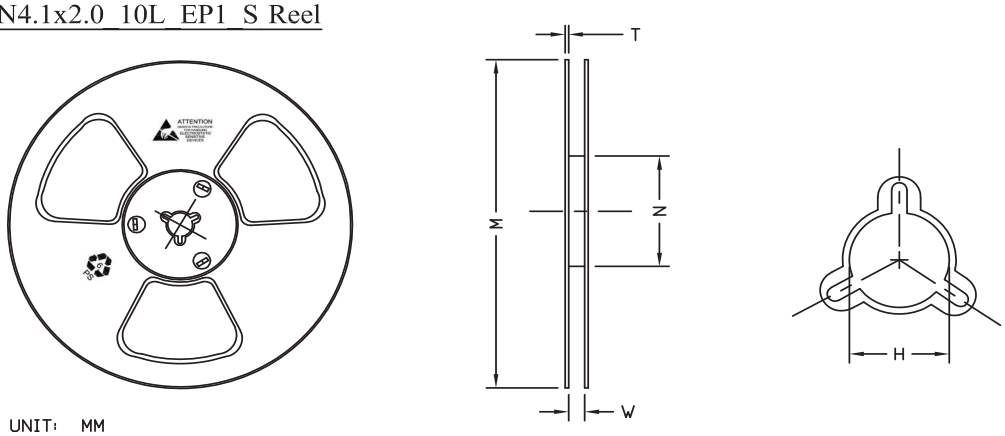
DFN4.1x2.0_10L_EP1_S Carrier Tape



UNIT: MM

PACKAGE	A0	B0	K0	D0	D1	W	E	F	P0	P1	P2	T
DFN4.1x2.0	2.30 ±0.05	4.30 ±0.05	0.70 ±0.05	1.50 +0.1 −0.0	1.00 Min.	12.00 +0.30 −0.10	1.75 ±0.10	5.50 ±0.05	4.00 ±0.10	4.00 ±0.10	2.00 ±0.05	0.25 ±0.03

DFN4.1x2.0_10L_EP1_S Reel



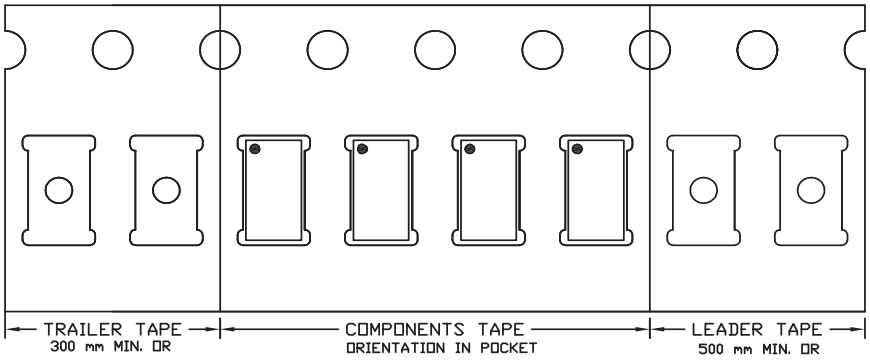
UNIT: MM

TAPE SIZE	REEL SIZE	M	N	W	T	H	K	S	G	R	V
12 mm	ø329	ø329.00 ±1.00	ø100.00 ±1.00	12.80 ±1.00	2.00 ±0.30	ø13.30 ±0.30	---	---	---	---	---

DFN4.1x2.0_10L_EP1_S Package Tape

Leader / Trailer & Orientation

Unit Per Reel: 6000pcs



Part Marking

AOZ8937DI
(DFN4.1x2.0_10L)