



**THE DATASHEET OF  
AOZ8310DI-05**



## General Description

The AOZ8310DI is a series of one-line, high-power transient voltage suppressor designed to protect power rail/bus from surge and ESD events, with an operating voltage range from 2.5V to 36V.

This device incorporates one unidirectional TVS diode in an ultra-small 1.6mm x 1.0mm DFN package. It may be used to meet the ESD immunity requirements of IEC 61000-4-2, Level 4 ( $\pm 15\text{kV}$  air,  $\pm 8\text{kV}$  contact discharge).

The AOZ8310DI comes in an RoHS compliant package and is rated over a  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$  ambient temperature range.

## Features

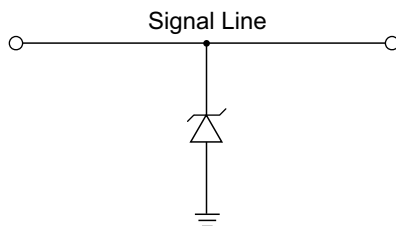
- Surge protection for power rail
- IEC 61000-4-5 8/20 $\mu\text{s}$  22-85A
- IEC 61000-4-2 (ESD)  $\pm 30\text{kV}$  (air and contact)
- Human body model (HBM)  $\pm 30\text{kV}$
- IEC 61000-4-4 (EFT) 80A (5/50ns)
- Peak pulse power 1100W to 1500W
- Operating voltage: 2.5V, 5V, 8V, 9V, 12V, 18V, 20V, 26V, 36V
- Green product

## Applications

- USB voltage bus
- Battery protection
- Mobile devices
- Screen panels
- Other power rails

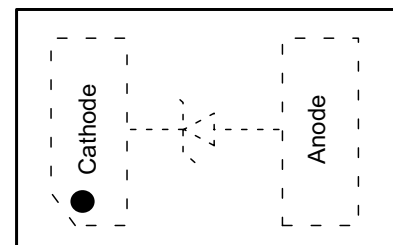


## Typical Application



Unidirection Protection of Single Line

## Pin Configuration



DFN1.6x1.0\_2L

## Ordering Information

Part Number	Ambient Temperature Range	Package	Environmental
AOZ8310DI-02	-40°C to +125°C	1.6mm x 1.0mm DFN-2L	Green Product
AOZ8310DI-05			
AOZ8310DI-08			
AOZ8310DI-09			
AOZ8310DI-12			
AOZ8310DI-18			
AOZ8310DI-20			
AOZ8310DI-26			
AOZ8310DI-36			



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

## Absolute Maximum Ratings

*Exceeding the Absolute Maximum ratings may damage the device.*

Parameter	Rating
VP-VN	2.5V to 36V
Peak Pulse Current ( $I_{PP}$ ), $t_P = 8/20\mu s$	22A to 85A
Peak Pulse Power ( $P_{PP}$ ), $t_P = 8/20\mu s$	1100W to 1500W
Storage Temperature ( $T_S$ )	-65°C to +150°C
ESD Rating per IEC61000-4-2, Contact <sup>(1)</sup>	±30kV
ESD Rating per IEC61000-4-2, Air <sup>(1)</sup>	±30kV
ESD Rating per Human Body Model <sup>(2)</sup>	±30kV

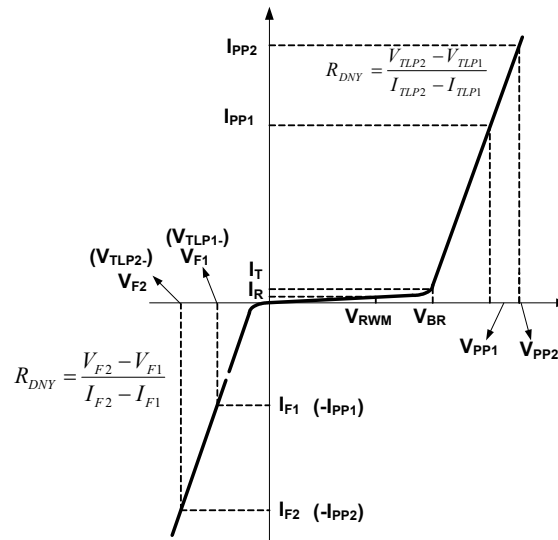
### Notes:

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

## Maximum Operating Ratings

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

## Electrical Characteristics



$T_A = 25^\circ\text{C}$  unless otherwise specified.

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
<b>AOZ8310DI-02</b>						
$V_{RWM}$	Reverse Working Voltage	I/O Pin-to-Ground			2.5	V
$V_{BR}$	Reverse Breakdown Voltage	$I_T = 1\text{mA}$ , I/O Pin-to-Ground	2.8	3.3	5	V
$I_R$	Reverse Leakage Current	Max. $V_{RWM}$ , I/O Pin-to-Ground		100	1000	nA
$I_{PP}$	Peak Pulse Current	IEC61000-4-5, 8/20 $\mu\text{s}$ , I/O Pin-to-Ground			75	A
$V_{CL}$	Clamping Voltage <sup>(3)</sup> (100ns Transmission Line Pulse, I/O Pin-to-Ground)	$I_{TLP} = 1\text{A}$ $I_{TLP} = -1\text{A}$		4.5 -1	6 -2	V
		$I_{TLP} = 30\text{A}$ $I_{TLP} = -30\text{A}$		5.5 -3.5	7.5 -5	V
	Clamping Voltage <sup>(3)</sup> (IEC61000-4-5 8/20 $\mu\text{s}$ , I/O Pin-to-Ground)	$I_{PP} = 10\text{A}$ $I_{PP} = -10\text{A}$		5.5 -2.5	7.5 -4	V
		$I_{PP} = 75\text{A}$ $I_{PP} = -75\text{A}$		13 -10	15 -12	V
$R_{DNY}$	Dynamic Resistance <sup>(3)</sup>	$I_{TLP} = 1\text{A to } 30\text{A}$ $I_{TLP} = -1\text{A to } -30\text{A}$		0.05 0.1		$\Omega$
$P_{PP}$	Peak Pulse Power	IEC61000-4-5, 8/20 $\mu\text{s}$ , I/O Pin-to-Ground			1100	W
$C_J$	Junction Capacitance	$V_{I/O} = 0\text{V}$ , $f = 1\text{MHz}$ , I/O Pin-to-Ground		100		pF

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
<b>AOZ8310DI-05</b>						
V <sub>RWM</sub>	Reverse Working Voltage	I/O Pin-to-Ground			5	V
V <sub>BR</sub>	Reverse Breakdown Voltage	I <sub>T</sub> = 1mA, I/O Pin-to-Ground	6	7.5	8.5	V
I <sub>R</sub>	Reverse Leakage Current	Max. V <sub>RWM</sub> , I/O Pin-to-Ground		100	1000	nA
I <sub>PP</sub>	Peak Pulse Current	IEC61000-4-5, 8/20μs, I/O Pin-to-Ground			85	A
V <sub>CL</sub>	Clamping Voltage <sup>(3)</sup> (100ns Transmission Line Pulse, I/O Pin-to-Ground)	I <sub>TLP</sub> = 1A I <sub>TLP</sub> = -1A		8 -1	9.5 -2	V
		I <sub>TLP</sub> = 30A I <sub>TLP</sub> = -30A		9.5 -3.5	11 -5	V
	Clamping Voltage <sup>(3)</sup> (IEC61000-4-5 8/20μs, I/O Pin-to- Ground)	I <sub>PP</sub> = 20A I <sub>PP</sub> = -20A		9.5 -2.5	11 -4	V
		I <sub>PP</sub> = 85A I <sub>PP</sub> = -85A		14.3 -6	16 -8	V
R <sub>DNY</sub>	Dynamic Resistance <sup>(3)</sup>	I <sub>TLP</sub> = 1A to 30A I <sub>TLP</sub> = -1A to -30A		0.05 0.09		Ω
P <sub>PP</sub>	Peak Pulse Power	IEC61000-4-5, 8/20μs, I/O Pin-to-Ground			1500	W
C <sub>J</sub>	Junction Capacitance	V <sub>I/O</sub> = 0V, f = 1MHz, I/O Pin-to-Ground		675		pF
<b>AOZ8310DI-08</b>						
V <sub>RWM</sub>	Reverse Working Voltage	I/O Pin-to-Ground			8	V
V <sub>BR</sub>	Reverse Breakdown Voltage	I <sub>T</sub> = 1mA, I/O Pin-to-Ground	9	10	12	V
I <sub>R</sub>	Reverse Leakage Current	Max. V <sub>RWM</sub> , I/O Pin-to-Ground		10	100	nA
I <sub>PP</sub>	Peak Pulse Current	IEC61000-4-5, 8/20μs, I/O Pin-to-Ground			70	A
V <sub>CL</sub>	Clamping Voltage <sup>(3)</sup> (100ns Transmission Line Pulse, I/O Pin-to-Ground)	I <sub>TLP</sub> = 1A I <sub>TLP</sub> = -1A		10.5 -0.9	12 -1.5	V
		I <sub>TLP</sub> = 30A I <sub>TLP</sub> = -30A		12 -3.7	13.5 -5	V
	Clamping Voltage <sup>(3)</sup> (IEC61000-4-5 8/20μs, I/O Pin-to- Ground)	I <sub>PP</sub> = 10A I <sub>PP</sub> = -10A		12 -2.4	14 -4	V
		I <sub>PP</sub> = 70A I <sub>PP</sub> = -70A		21 -9	24 -11	V
R <sub>DNY</sub>	Dynamic Resistance <sup>(3)</sup>	I <sub>TLP</sub> = 1A to 30A I <sub>TLP</sub> = -1A to -30A		0.05 0.1		Ω
P <sub>PP</sub>	Peak Pulse Power	IEC61000-4-5, 8/20μs, I/O Pin-to-Ground			1500	W
C <sub>J</sub>	Junction Capacitance	V <sub>I/O</sub> = 0V, f = 1MHz, I/O Pin-to-Ground		425		pF

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
<b>AOZ8310DI-09</b>						
V <sub>RWM</sub>	Reverse Working Voltage	I/O Pin-to-Ground			9	V
V <sub>BR</sub>	Reverse Breakdown Voltage	I <sub>T</sub> = 1mA, I/O Pin-to-Ground	10	11	13	V
I <sub>R</sub>	Reverse Leakage Current	Max. V <sub>RWM</sub> , I/O Pin-to-Ground		10	100	nA
I <sub>PP</sub>	Peak Pulse Current	IEC61000-4-5, 8/20μs, I/O Pin-to-Ground			65	A
V <sub>CL</sub>	Clamping Voltage <sup>(3)</sup> (100ns Transmission Line Pulse, I/O Pin-to-Ground)	I <sub>TLP</sub> = 1A I <sub>TLP</sub> = -1A		11.5 -0.9	13 -1.5	V
		I <sub>TLP</sub> = 30A I <sub>TLP</sub> = -30A		13.3 -3.7	15 -5	V
	Clamping Voltage <sup>(3)</sup> (IEC61000-4-5 8/20μs, I/O Pin-to-Ground)	I <sub>PP</sub> = 10A I <sub>PP</sub> = -10A		13.5 -2.4	15 -4.5	V
		I <sub>PP</sub> = 65A I <sub>PP</sub> = -65A		21.5 -8.5	24 -10.5	V
R <sub>DNY</sub>	Dynamic Resistance <sup>(3)</sup>	I <sub>TLP</sub> = 1A to 30A I <sub>TLP</sub> = -1A to -30A		0.05 0.1		Ω
P <sub>PP</sub>	Peak Pulse Power	IEC61000-4-5, 8/20μs, I/O Pin-to-Ground			1500	W
C <sub>J</sub>	Junction Capacitance	V <sub>I/O</sub> = 0V, f = 1MHz, I/O Pin-to-Ground		385		pF
<b>AOZ8310DI-12</b>						
V <sub>RWM</sub>	Reverse Working Voltage	I/O Pin-to-Ground			12	V
V <sub>BR</sub>	Reverse Breakdown Voltage	I <sub>T</sub> = 1mA, I/O Pin-to-Ground	13.2	15	17	V
I <sub>R</sub>	Reverse Leakage Current	Max. V <sub>RWM</sub> , I/O Pin-to-Ground		5	100	nA
I <sub>PP</sub>	Peak Pulse Current	IEC61000-4-5, 8/20μs, I/O Pin-to-Ground			45	A
V <sub>CL</sub>	Clamping Voltage <sup>(3)</sup> (100ns Transmission Line Pulse, I/O Pin-to-Ground)	I <sub>TLP</sub> = 1A I <sub>TLP</sub> = -1A		15.5 -0.9	18 -1.5	V
		I <sub>TLP</sub> = 30A I <sub>TLP</sub> = -30A		17 -3.5	19 -5	V
	Clamping Voltage <sup>(3)</sup> (IEC61000-4-5 8/20μs, I/O Pin-to-Ground)	I <sub>PP</sub> = 10A I <sub>PP</sub> = -10A		18 -2.4	21 -4.5	V
		I <sub>PP</sub> = 45A I <sub>PP</sub> = -45A		26 -6.8	30 -8.5	V
R <sub>DNY</sub>	Dynamic Resistance <sup>(3)</sup>	I <sub>TLP</sub> = 1A to 30A I <sub>TLP</sub> = -1A to -30A		0.05 0.1		Ω
P <sub>PP</sub>	Peak Pulse Power	IEC61000-4-5, 8/20μs, I/O Pin-to-Ground			1500	W
C <sub>J</sub>	Junction Capacitance	V <sub>I/O</sub> = 0V, f = 1MHz, I/O Pin-to-Ground		275		pF

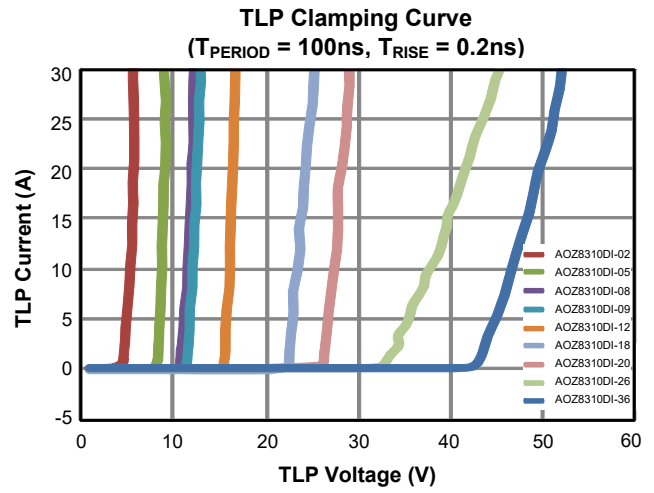
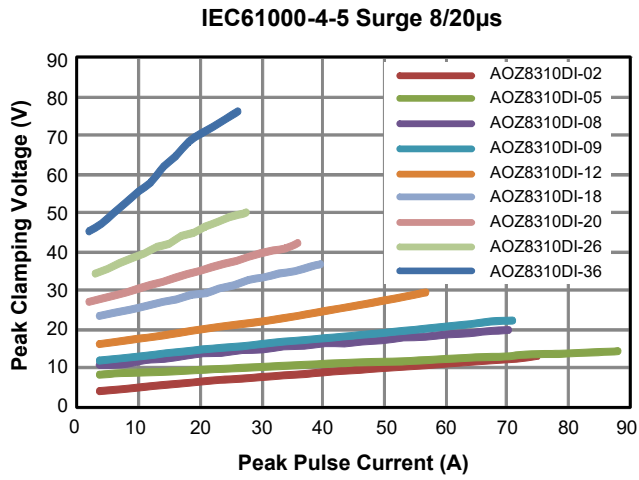
Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
<b>AOZ8310DI-18</b>						
V <sub>RWM</sub>	Reverse Working Voltage	I/O Pin-to-Ground			18	V
V <sub>BR</sub>	Reverse Breakdown Voltage	I <sub>T</sub> = 1mA, I/O Pin-to-Ground	19	21.5	24	V
I <sub>R</sub>	Reverse Leakage Current	Max. V <sub>RWM</sub> , I/O Pin-to-Ground		10	100	nA
I <sub>PP</sub>	Peak Pulse Current	IEC61000-4-5, 8/20μs, I/O Pin-to-Ground			35	A
V <sub>CL</sub>	Clamping Voltage <sup>(3)</sup> (100ns Transmission Line Pulse, I/O Pin-to-Ground)	I <sub>TLP</sub> = 1A I <sub>TLP</sub> = -1A		22 -1	24 -2	V
		I <sub>TLP</sub> = 30A I <sub>TLP</sub> = -30A		26 -4	29 -6	V
	Clamping Voltage <sup>(3)</sup> (IEC61000-4-5 8/20μs, I/O Pin-to- Ground)	I <sub>PP</sub> = 10A I <sub>PP</sub> = -10A		25 -2.5	29 -4.5	V
		I <sub>PP</sub> = 35A I <sub>PP</sub> = -35A		35 -6	39 -8	V
R <sub>DNY</sub>	Dynamic Resistance <sup>(3)</sup>	I <sub>TLP</sub> = 1A to 30A I <sub>TLP</sub> = -1A to -30A		0.1 0.1		Ω
P <sub>PP</sub>	Peak Pulse Power	IEC61000-4-5, 8/20μs, I/O Pin-to-Ground			1200	W
C <sub>J</sub>	Junction Capacitance	V <sub>I/O</sub> = 0V, f = 1MHz, I/O Pin-to-Ground		200		pF
<b>AOZ8310DI-20</b>						
V <sub>RWM</sub>	Reverse Working Voltage	I/O Pin-to-Ground			20	V
V <sub>BR</sub>	Reverse Breakdown Voltage	I <sub>T</sub> = 1mA, I/O Pin-to-Ground	22	25	28	V
I <sub>R</sub>	Reverse Leakage Current	Max. V <sub>RWM</sub> , I/O Pin-to-Ground		2	100	nA
I <sub>PP</sub>	Peak Pulse Current	IEC61000-4-5, 8/20μs, I/O Pin-to-Ground			32	A
V <sub>CL</sub>	Clamping Voltage <sup>(3)</sup> (100ns Transmission Line Pulse, I/O Pin-to-Ground)	I <sub>TLP</sub> = 1A I <sub>TLP</sub> = -1A		25.5 -0.9	28 -1.5	V
		I <sub>TLP</sub> = 30A I <sub>TLP</sub> = -30A		29 -3.5	32 -5	V
	Clamping Voltage <sup>(3)</sup> (IEC61000-4-5 8/20μs, I/O Pin-to- Ground)	I <sub>PP</sub> = 5A I <sub>PP</sub> = -5A		28 -2	31 -4	V
		I <sub>PP</sub> = 32A I <sub>PP</sub> = -32A		40 -5.5	44 -7.5	V
R <sub>DNY</sub>	Dynamic Resistance <sup>(3)</sup>	I <sub>TLP</sub> = 1A to 30A I <sub>TLP</sub> = -1A to -30A		0.12 0.1		Ω
P <sub>PP</sub>	Peak Pulse Power	IEC61000-4-5, 8/20μs, I/O Pin-to-Ground			1200	W
C <sub>J</sub>	Junction Capacitance	V <sub>I/O</sub> = 0V, f = 1MHz, I/O Pin-to-Ground		165		pF

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
<b>AOZ8310DI-26</b>						
$V_{RWM}$	Reverse Working Voltage	I/O Pin-to-Ground			26	V
$V_{BR}$	Reverse Breakdown Voltage	$I_T = 1\text{mA}$ , I/O Pin-to-Ground	28	31	35	V
$I_R$	Reverse Leakage Current	Max. $V_{RWM}$ , I/O Pin-to-Ground		1	100	nA
$I_{PP}$	Peak Pulse Current	IEC61000-4-5, 8/20 $\mu\text{s}$ , I/O Pin-to-Ground			25	A
$V_{CL}$	Clamping Voltage <sup>(3)</sup> (100ns Transmission Line Pulse, I/O Pin-to-Ground)	$I_{TLP} = 1\text{A}$ $I_{TLP} = -1\text{A}$		32 -0.9	35 -1.5	V
		$I_{TLP} = 30\text{A}$ $I_{TLP} = -30\text{A}$		45 -4.5	50 -5	V
	Clamping Voltage <sup>(3)</sup> (IEC61000-4-5 8/20 $\mu\text{s}$ , I/O Pin-to-Ground)	$I_{PP} = 5\text{A}$ $I_{PP} = -5\text{A}$		36 -2	40 -4	V
		$I_{PP} = 25\text{A}$ $I_{PP} = -25\text{A}$		50 -5.5	55 -7.5	V
$R_{DNY}$	Dynamic Resistance <sup>(3)</sup>	$I_{TLP} = 1\text{A to } 25\text{A}$ $I_{TLP} = -1\text{A to } -25\text{A}$		0.45 -0.12		$\Omega$
$P_{PP}$	Peak Pulse Power	IEC61000-4-5, 8/20 $\mu\text{s}$ , I/O Pin-to-Ground			1200	W
$C_J$	Junction Capacitance	$V_{I/O} = 0\text{V}$ , $f = 1\text{MHz}$ , I/O Pin-to-Ground		150		pF
<b>AOZ8310DI-36</b>						
$V_{RWM}$	Reverse Working Voltage	I/O Pin-to-Ground			36	V
$V_{BR}$	Reverse Breakdown Voltage	$I_T = 1\text{mA}$ , I/O Pin-to-Ground	37	39	44	V
$I_R$	Reverse Leakage Current	Max. $V_{RWM}$ , I/O Pin-to-Ground		10	100	nA
$I_{PP}$	Peak Pulse Current	IEC61000-4-5, 8/20 $\mu\text{s}$ , I/O Pin-to-Ground			22	A
$V_{CL}$	Clamping Voltage <sup>(3)</sup> (100ns Transmission Line Pulse, I/O Pin-to-Ground)	$I_{TLP} = 1\text{A}$ $I_{TLP} = -1\text{A}$		43 -1	47 -2	V
		$I_{TLP} = 30\text{A}$ $I_{TLP} = -30\text{A}$		52 -3.5	56 -5	V
	Clamping Voltage <sup>(3)</sup> (IEC61000-4-5 8/20 $\mu\text{s}$ , I/O Pin-to-Ground)	$I_{PP} = 2\text{A}$ $I_{PP} = -2\text{A}$		45 -1.3	48 -2	V
		$I_{PP} = 22\text{A}$ $I_{PP} = -22\text{A}$		72 -4.3	77 -7	V
$R_{DNY}$	Dynamic Resistance <sup>(3)</sup>	$I_{TLP} = 1\text{A to } 30\text{A}$ $I_{TLP} = -1\text{A to } -30\text{A}$		0.28 0.1		$\Omega$
$P_{PP}$	Peak Pulse Power	IEC61000-4-5, 8/20 $\mu\text{s}$ , I/O Pin-to-Ground			1500	W
$C_J$	Junction Capacitance	$V_{I/O} = 0\text{V}$ , $f = 1\text{MHz}$ , I/O Pin-to-Ground		130		pF

**Note:**

3. These specifications are guaranteed by design and characterization.

## Typical Characteristics



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