

General Description

The AOZ8231B is a one-line bi-directional transient voltage suppressor diode designed to protect voltage sensitive electronics from high transient conditions and ESD.

This device incorporates one TVS diode in an ultra-small 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 AOZ8231B comes in an RoHS compliant DFN 1.0 x 0.6 package and is rated over a -40°C to $+85^{\circ}\text{C}$ ambient temperature range.

The ultra-small 1.0 x 0.6 x 0.5mm DFN package makes it ideal for applications where PCB space is a premium. The small size and high ESD protection makes it ideal for protecting voltage sensitive electronics from high transient conditions and ESD.

Features

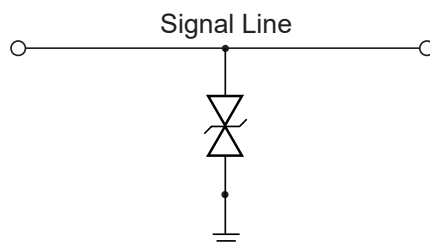
- ESD protection for high-speed data lines:
 - Exceeds: IEC 61000-4-2 (ESD) $\pm 18\text{kV}$ (air), $\pm 18\text{kV}$ (contact)
 - Human Body Model (HBM) $\pm 30\text{kV}$
 - IEC 61000-4-5 (Lightning) $\pm 4\text{A}$ (8/20 μS)
 - IEC 61000-4-4 (EFT) $\pm 40\text{A}$
- Small package saves board space
- Low insertion loss
- Low clamping voltage
- Operating voltage: 8V
- Pb-free device

Applications

- Portable handheld devices
- Keypads, data lines, buttons
- Notebook computers
- Digital Cameras
- Portable GPS
- MP3 players



Typical Application



Bidirection Protection of Single Line

Pin Configuration



Ordering Information

Part Number	Ambient Temperature Range	Package	Environmental
AOZ8231BDI-08	-40°C to +85°C	DFN 1.0 x 0.6	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.

Absolute Maximum Ratings

Exceeding the Absolute Maximum ratings may damage the device.

Parameter	Rating
VP – VN	8V
Peak Pulse Current, $t_p = 8/20\mu s$	4A
Storage Temperature (T_S)	-65°C to +150°C
ESD Rating per IEC61000-4-2, Contact ⁽¹⁾	±18kV
ESD Rating per IEC61000-4-2, Air ⁽¹⁾	±18kV
ESD Rating per Human Body Model ⁽²⁾	±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. $V_F = 0.9\text{V Max.}$ @ $I_F = 10\text{mA}$ for all types

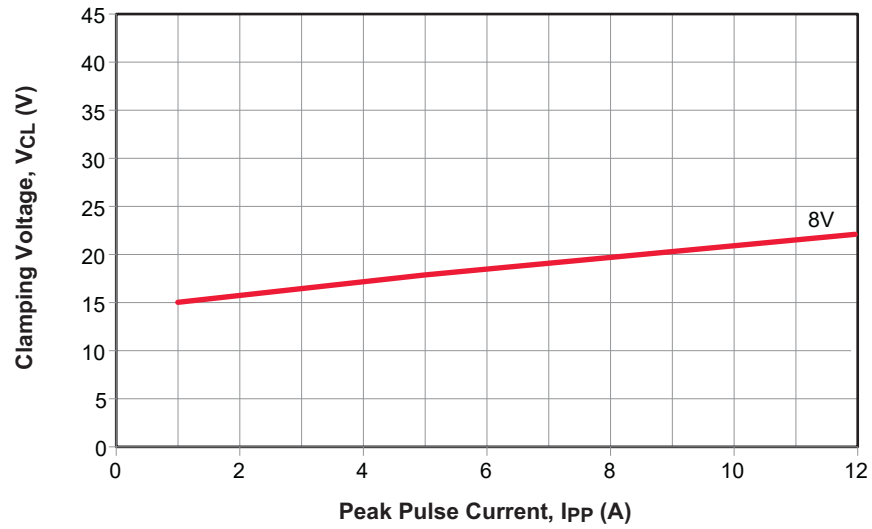
Symbol	Parameter	Diagram
I_{PP}	Reverse Peak Pulse Current, ($t_{\text{period}} = 100\text{ns}$, $t_r = 1\text{ns}$)	
V_{CL}	Clamping Voltage @ I_{PP}	
V_{RWM}	Working Peak Reverse Voltage	
I_R	Maximum Reverse Leakage Current	
V_{BR}	Breakdown Voltage	
I_F	Forward Current	
V_F	Forward Voltage	
P_{PK}	Peak Power Dissipation	
C_J	Capacitance @ $V_R = 0$ and $f = 1\text{MHz}$	

Device	Device Marking	V_{RWM} (V) Max.	V_{BR} (V) Min. @ 1mA	I_R (μA) Max.	V_{CL} Max.			C_J (pF) Typ.	C_J (pF) Max.
					$I_{PP} = 1\text{A}$	$I_{PP} = 5\text{A}$	$I_{PP} = 12\text{A}$		
AOZ8231BDI-08	1	8.0	9.5	0.1	15.0	18	22.5	45	56

Typical Performance Characteristics

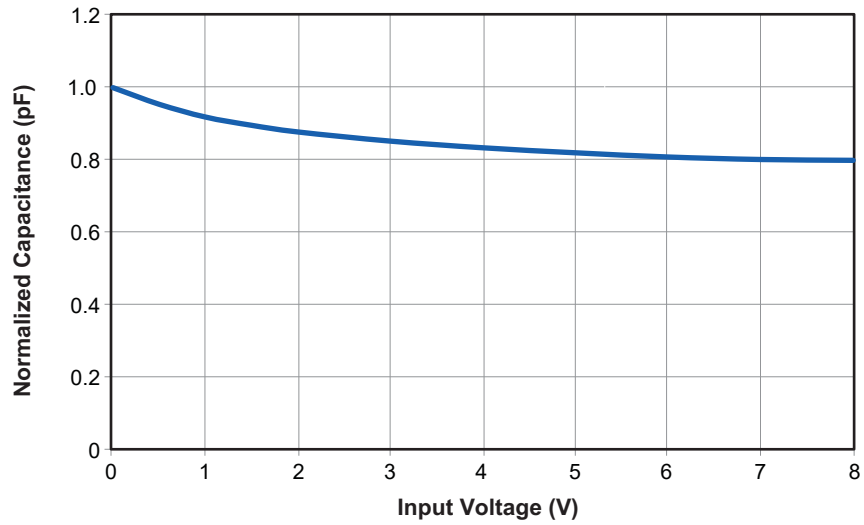
Clamping Voltage vs. Peak Pulse Current

($t_{\text{period}} = 100 \text{ ns}$, $t_r = 1 \text{ ns}$)

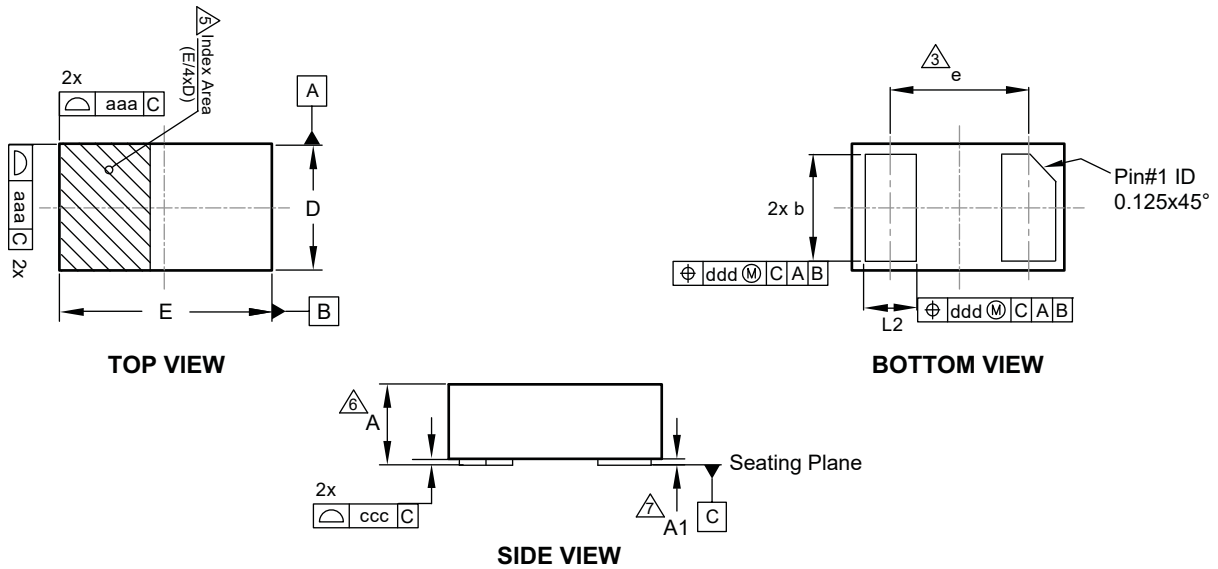


Typical Variation of C_{IN} vs. V_R

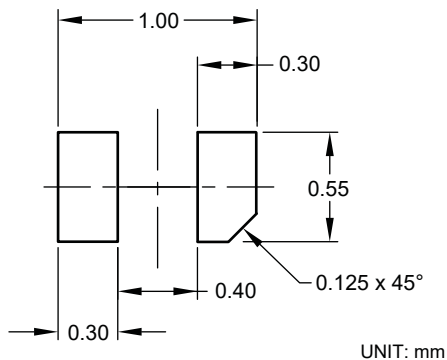
($f = 1 \text{ MHz}$, $T = 25 \text{ }^\circ\text{C}$)



Package Dimensions, DFN 1.0 x 0.6



RECOMMENDED LAND PATTERN



Dimensions in millimeters

Symbols	Min.	Nom.	Max.
A	0.47	0.51	0.55
A1	0.00	0.02	0.05
b	0.45	0.50	0.55
D	0.60 BSC		
E	1.00 BSC		
e	0.65 BSC		
L	0.20	0.25	0.30
aaa	0.05		
ccc	0.03		
ddd	0.10		

Dimensions in inches

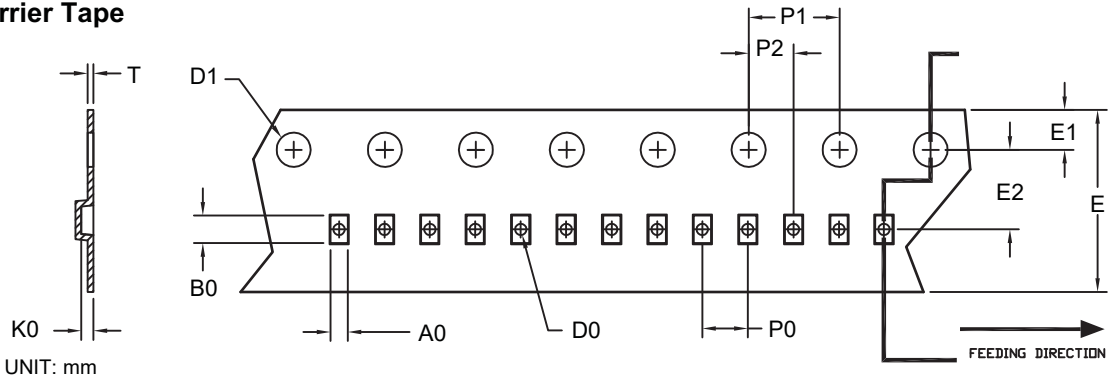
Symbols	Min.	Nom.	Max.
A	0.019	0.020	0.022
A1	0.000	0.001	0.002
b	0.018	0.020	0.022
D	0.024		
E	0.039		
e	0.026		
L	0.008	0.010	0.012
aaa	0.002		
ccc	0.001		
ddd	0.004		

Notes:

1. Dimensions and tolerancing conform to ASME Y14.5-2009.
2. All dimensions are in millimeters.
3. "e" represents the terminal grid pitch.
4. N is the total number of terminals.
5. A visual index feature must be located within the hatched area. Typical index feature (chamfer) must be located on the edge of the Pin#1 feature.
6. This dimension includes stand-off height "A1" and packaged body thickness, but does not include attached feature e.g. external heatsink or chip capacitors, an internal heatslug is not considered as attached feature.
7. Dimension "A1" is primarily terminal plating, and does not include small metal protrusions.

Tape and Reel Dimensions, DFN 1.0 x 0.6

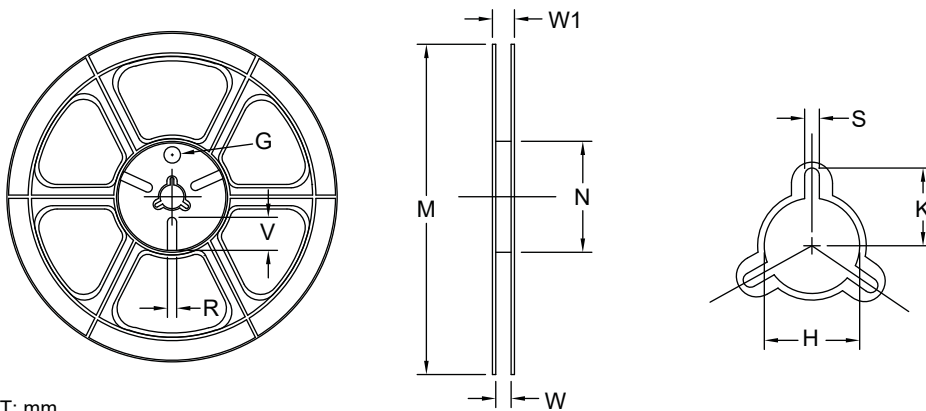
Carrier Tape



UNIT: mm

Option	Package	A0	B0	K0	D0	D1	E	E1	E2	P0	P1	P2	T
A	DFN 1.0x0.6/ DFN 1.0x0.6A (8 mm)	0.69 ±0.05	1.19 ±0.05	0.66 ±0.05	0.40 ±0.05	1.50 ±0.10	8.00 +0.3/-0.1	1.75 ±0.10	3.50 ±0.05	2.00 ±0.05	4.00 ±0.10	2.00 ±0.05	0.23 ±0.02
B	DFN 1.0x0.6/ DFN 1.0x0.6A (8 mm)	0.65 ±0.04	1.05 ±0.04	0.61 ±0.04	0.40 ±0.05	1.50 ±0.10	8.00 +0.3/-0.1	1.75 ±0.10	3.50 ±0.05	2.00 ±0.10	4.00 ±0.10	2.00 ±0.05	0.20 ±0.05

Reel

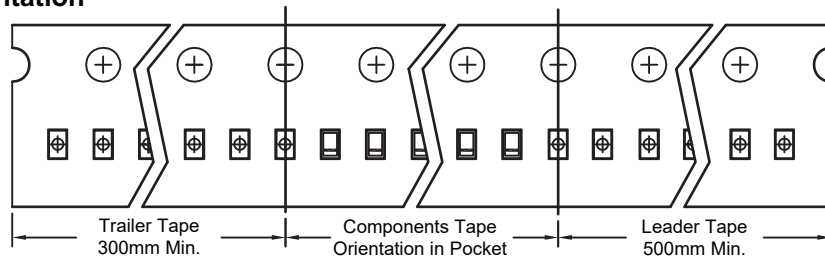


UNIT: mm

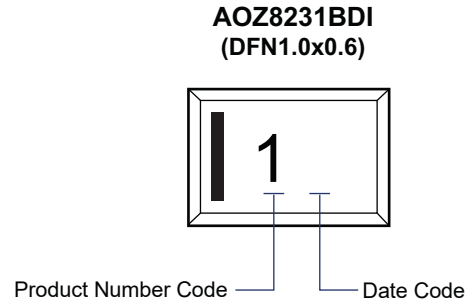
Tape Size	Reel Size	M	N	W	W1	H	K	S	G	R	V
8mm	ø178	ø178 ±0.5	ø55 ±1	8.4 +1.5/-0	Max. 14.4	ø13.0 ±0.5	Max. 10.1	2.0 ±0.5	N/A	N/A	N/A

Leader / Trailer & Orientation

TVS
Unit Per Reel:
10000pcs



Part Marking



LEGAL DISCLAIMER

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http://www.aosmd.com/terms_and_conditions_of_sale

LIFE SUPPORT POLICY

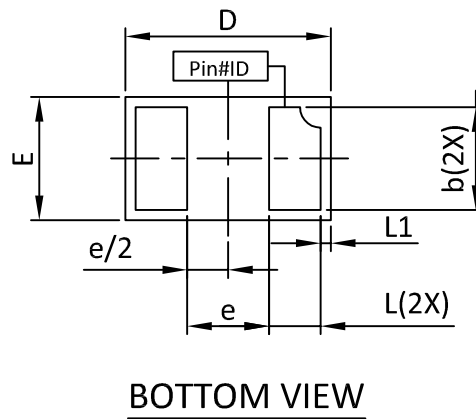
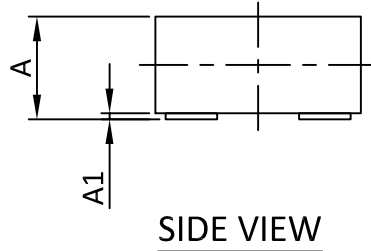
ALPHA AND OMEGA SEMICONDUCTOR PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS.

As used herein:

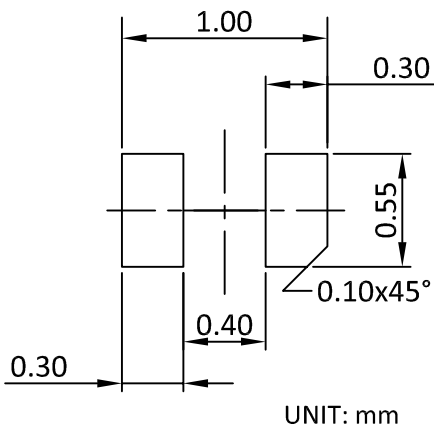
- | | |
|---|---|
| <p>1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body or (b) support or sustain life, and (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury of the user.</p> | <p>2. A critical component in any component of a life support, device, or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.</p> |
|---|---|



DFN1.0x0.6_2L_EP2_S PACKAGE OUTLINE



RECOMMENDED LAND PATTERN



SYMBOLS	DIMENSION IN MM			DIMENSION IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.31	---	0.55	0.012	----	0.022
A1	0.00	0.03	0.05	0.000	0.001	0.002
b	0.45	0.50	0.55	0.018	0.020	0.022
D	0.95	1.00	1.05	0.037	0.039	0.041
E	---	0.60	---	----	0.024	----
e	---	0.40	---	----	0.016	----
L	0.20	0.25	0.30	0.008	0.010	0.012
L1	---	0.05	---	----	0.002	----

NOTE

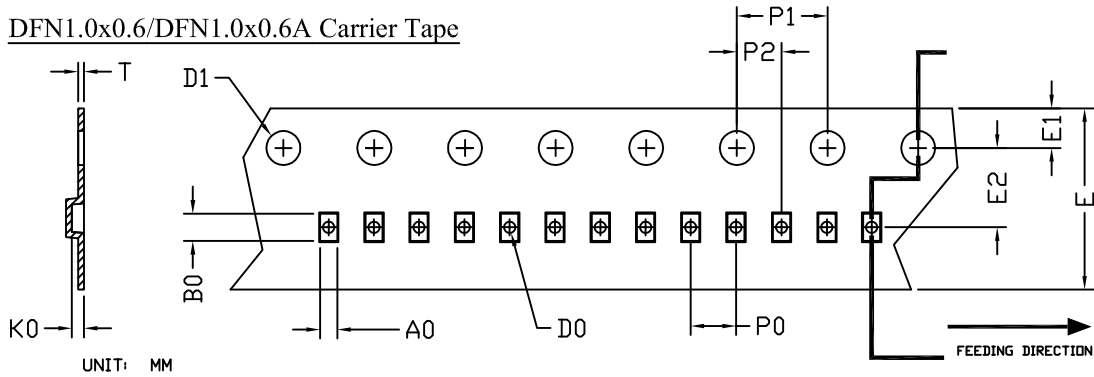
1. ALL DIMENSION ARE IN MILLIMETERS.ANGLES ARE IN DEGREES.
2. COPLANARITY APPLIES TO THE EXPOSED HEAT SINK SLUG AS WELL AS THE TERMINALS.
3. THE SHAPE OF PIN ID CAN BE DIFFERENT PER MANUFACTURING LOCATION & PIN1 NOTCH IS ONLY FOR REFERENCE.



ALPHA & OMEGA
SEMICONDUCTOR

DFN1.0x0.6/DFN1.0x0.6A Tape and Reel Data

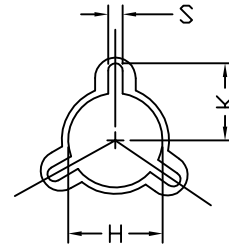
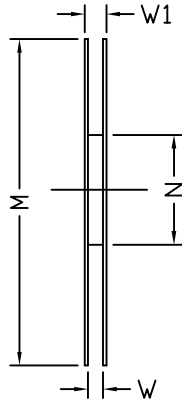
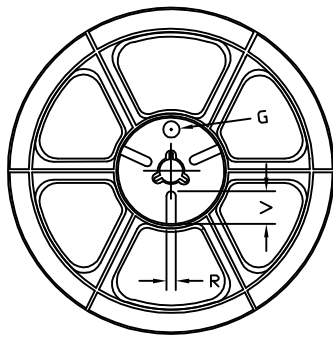
DFN1.0x0.6/DFN1.0x0.6A Carrier Tape



UNIT: MM

PACKAGE	A0	B0	K0	D0	D1	E	E1	E2	P0	P1	P2	T
DFN1.0x0.6/ DFN1.0x0.6A (8 mm)	0.65 ±0.04	1.05 ±0.04	0.61 ±0.04	0.40 ±0.05	1.50 +0.10	8.00 +0.30 -0.10	1.75 ±0.10	3.50 ±0.05	2.00 ±0.10	4.00 ±0.10	2.00 ±0.05	0.20 ±0.05

DFN1.0x0.6/DFN1.0x0.6A Reel



UNIT: MM

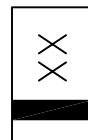
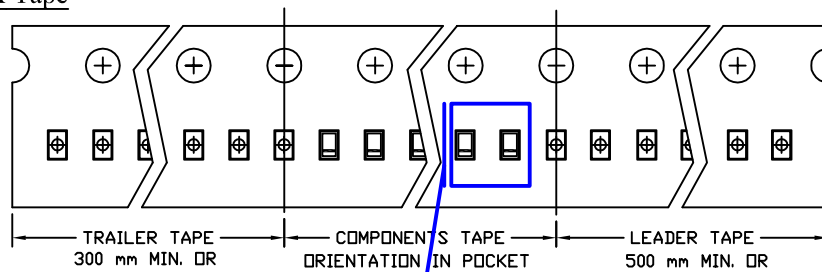
TAPE SIZE	REEL SIZE	M	N	W	W1	H	K	S	G	R	V
8 mm	φ178	φ178 ±0.5	φ55 ±1	8.4 +0.5 -0.5	MAX. 14.4	φ13.0 ±0.5	MAX. 10.1	2.0 ±0.5	N/A	N/A	N/A

DFN1.0x0.6/DFN1.0x0.6A Tape

Leader / Trailer
& Orientation

TVS

Unit Per Reel:
10000pcs



DETAIL:
UNIT DIRECTION IN POCKET

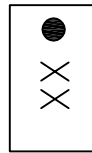
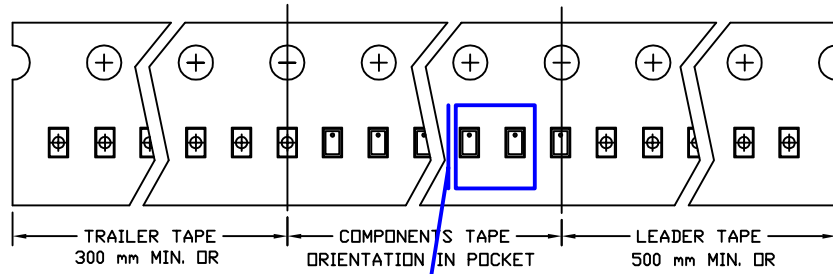


ALPHA & OMEGA
SEMICONDUCTOR

DFN1.0x0.6/DFN1.0x0.6A Tape and Reel Data

MOS

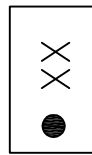
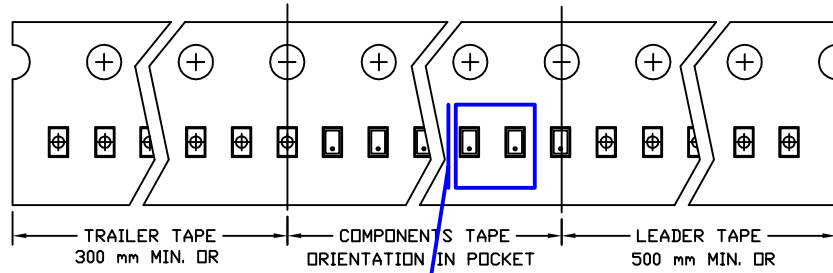
Unit Per Reel:
10000pcs



DETAIL:
UNIT DIRECTION IN POCKET

MOS SPECIAL
PART:
AON1606_002

Unit Per Reel:
10000pcs



DETAIL:
UNIT DIRECTION IN POCKET



AOS Semiconductor Product Reliability Report

AOZ8231BDI-08, rev A

Plastic Encapsulated Device

ALPHA & OMEGA Semiconductor, Inc

www.aosmd.com

Nov, 2018

This AOS product reliability report summarizes the qualification result for AOZ8231BDI-08. Accelerated environmental tests are performed on a specific sample size, and then followed by electrical test at end point. Review of final electrical test result confirms that AOZ8231BDI-08 passes AOS quality and reliability requirements. The released product will be categorized by the process family and be routine monitored for continuously improving the product quality.

I. Reliability Stress Test Summary and Results

Test Item	Test Condition	Time Point	Total Sample Size	Number of Failures	Reference Standard
HTRB	Temp = 150°C , Vdd=100% of VRWMmax	168 / 500 / 1000 hours	462 pcs	0	JESD22-A108
Precondition (Note A)	168hr 85°C / 85%RH + 3 cycle reflow @260°C	-	1386 pcs	0	JESD22-A113
HAST	130°C , 85%RH, 33.3 psia, Vdd = 80% of VRWMmax	96 hours	462 pcs	0	JESD22-A110
Autoclave	121°C , 29.7psia, RH=100%	96 hours	462 pcs	0	JESD22-A102
Temperature Cycle	-65°C to 150°C , air to air	250 / 500 cycles	462 pcs	0	JESD22-A104

Note: The reliability data presents total of available generic data up to the published date.

Note A: MSL (Moisture Sensitivity Level) 1 based on J-STD-020

II. Reliability Evaluation

FIT rate (per billion): 7.63

MTTF = 14960 years

The presentation of FIT rate for the individual product reliability is restricted by the actual burn-in sample size. Failure Rate Determination is based on JEDEC Standard JESD 85. FIT means one failure per billion hours.

Failure Rate = $\text{Chi}^2 \times 10^9 / [2 (N) (H) (Af)] = 7.63$

MTTF = $10^9 / \text{FIT} = 14960$ years

Chi² = Chi Squared Distribution, determined by the number of failures and confidence interval

N = Total Number of units from burn-in tests

H = Duration of burn-in testing

Af = Acceleration Factor from Test to Use Conditions (Ea = 0.7eV and Tuse = 55°C)

Acceleration Factor **[Af]** = $\text{Exp} [Ea / k (1/Tj u - 1/Tj s)]$

Acceleration Factor ratio list:

	55 deg C	70 deg C	85 deg C	100 deg C	115 deg C	130 deg C	150 deg C
Af	259	87	32	13	5.64	2.59	1

Tj s = Stressed junction temperature in degree (Kelvin), K = C+273.16

Tj u = The use junction temperature in degree (Kelvin), K = C+273.16

k = Boltzmann's constant, 8.617164 X 10⁻⁵eV / K