

## General Description

The AOZ6233 is a 0.35Ω low-voltage Dual Single Pole Double Throw (SPDT) analog switch. The AOZ6233 operates from a single 1.65V to 3.6V supply. It features an ultra-low On Resistance of 0.35Ω at a +2.7V supply and 25°C. The AOZ6233 is designed for break-before-make operation.

## Features

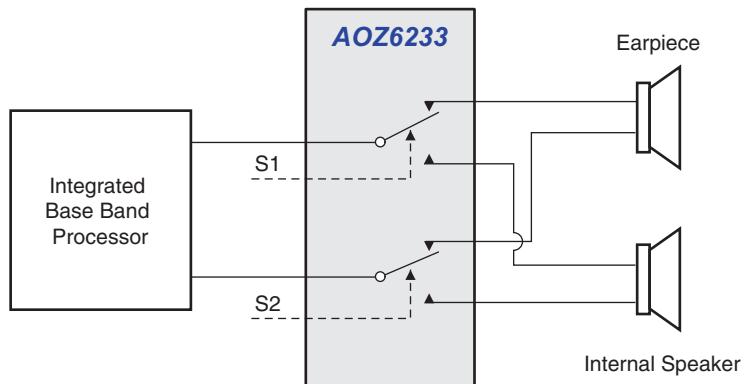
- Typical 0.35Ω On Resistance ( $R_{ON}$ ) for +2.7V supply
- 0.15Ω maximum  $R_{ON}$  flatness for +2.7V supply
- 1.6mm x 2.1mm QFN package
- Broad  $V_{CC}$  operating range
- Low THD (0.02% typical for 32Ω load)
- High current handling capability (350mA continuous current under 3.3V supply)

## Applications

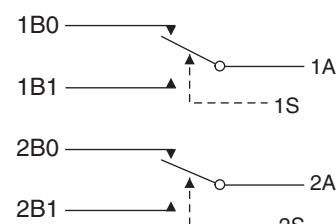
- Cell phone
- PDA
- Portable media player



## Typical Application



## Pin Configuration



## Ordering Information

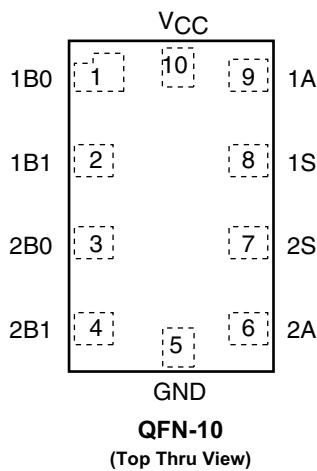
Part Number	Ambient Temperature Range	Package	Environmental
AOZ6233QI	-40°C to +85°C	QFN-10	RoHS Compliant Green Product



AOS Green Products use reduced levels of Halogens, and are also RoHS compliant.

Please visit [www.aosmd.com/web/quality/rohs\\_compliant.jsp](http://www.aosmd.com/web/quality/rohs_compliant.jsp) for additional information.

## Pin Configuration



## Pin Description

Pin Name	Function
1A, 2A, 1B0, 1B1, 2B0, 2B1	Data Ports
1S, 2S	Control Input

## Truth Table

Logic Input	Function
0	B0 Connected to A
1	B1 Connected to A

## Absolute Maximum Ratings

Exceeding the Absolute Maximum ratings may damage the device.

Symbol	Parameter	Rating
$V_{CC}$	Supply Voltage	-0.5V to +5.5V
$V_S$	Switch Voltage <sup>(1)</sup>	-0.5 to $V_{CC}$ + 0.5V
$V_{IN}$	Input Voltage <sup>(1)</sup>	-0.5 to $V_{CC}$
$I_{IK}$	Minimum Input Diode Current <sup>(2)</sup>	-50mA
$I_{SW}$	Switch Current	350mA
$I_{SWPEAK}$	Peak Switch Current (Pulsed at 1ms duration, <10% Duty Cycle)	500mA
$T_{STG}$	Storage Temperature Range	-65°C to +150°C
$T_J$	Maximum Junction Temperature	+150°C
$T_L$	Lead Temperature (Soldering, 10 seconds)	+260°C
ESD	Human Body Model	8000V
	Charged Device Model	1000V

## Recommend Operating Ratings

The device is not guaranteed to operate beyond the Maximum Operating Ratings.

Symbol	Parameter	Rating
$V_{CC}$	Supply Voltage	1.65V to +3.6V
$V_{IN}$	Control Input Voltage <sup>(3)</sup>	0V to $V_{CC}$
$V_{SW}$	Switch Input Voltage	0V to $V_{CC}$
$T_A$	Operating Temperature	-40°C to +85°C

**Notes:**

1. The input and output negative voltage ratings may be exceeded if the input and output diode current ratings are observed.
2. Negative current should not exceed minimum negative value.
3. Unused inputs must be held HIGH or LOW. They may not float.

## DC Electrical Characteristics

All typical values are at 25°C unless otherwise specified.

Symbol	Parameter	Conditions	V <sub>CC</sub> (V)	Min.	Typ.	Max.	Units
V <sub>IH</sub>	Input Voltage HIGH		2.7 to 3.6	2.0			V
			2.3 to 2.7	1.7			
			1.65 to 1.95	0.65 x V <sub>CC</sub>			
V <sub>IL</sub>	Input Voltage LOW		2.7 to 3.6			0.8	V
			2.3 to 2.7			0.7	
			1.65 to 1.95			0.35 x V <sub>CC</sub>	
I <sub>IN</sub>	Control Input Leakage	V <sub>IN</sub> = 0V to V <sub>CC</sub>	1.65 to 3.6	-0.5		0.5	μA
I <sub>NO(OFF)</sub> , I <sub>NC(OFF)</sub>	Off-Leakage Current of Port nB <sub>0</sub> and nB <sub>1</sub>	nA = 0.3V, 3.3V, nB <sub>0</sub> or nB <sub>1</sub> = 0.3V, 3.3V or floating	3.6	-50		50	nA
		nA = 0.3V, 2.4V, nB <sub>0</sub> or nB <sub>1</sub> = 0.3V, 2.4V or floating	2.7	-50		50	
		nA = 0.3V, 1.65V, nB <sub>0</sub> or nB <sub>1</sub> = 0.3V, 1.65V or floating	1.95	-50		50	
I <sub>A(ON)</sub>	On Leakage Current of Port 1A and 2A	nA = 0.3V, 3.3V, nB <sub>0</sub> or nB <sub>1</sub> = 0.3V, 3.3V or floating	3.6	-50		50	nA
		nA = 0.3V, 2.4V, nB <sub>0</sub> or nB <sub>1</sub> = 0.3V, 2.4V or floating	2.7	-50		50	
		nA = 0.3V, 1.65V, nB <sub>0</sub> or nB <sub>1</sub> = 0.3V, 1.65V or floating	1.95	-50		50	
R <sub>ON</sub>	Switch On Resistance <sup>(4)</sup> See Figure 1	I <sub>OUT</sub> = 100mA, nB <sub>0</sub> or nB <sub>1</sub> = 0V, 0.7V, 2.0V, 2.7V	2.7		0.35	0.60	Ω
		I <sub>OUT</sub> = 100mA, nB <sub>0</sub> or nB <sub>1</sub> = 0V, 0.7V, 1.6V, 2.3V	2.3		0.40	0.70	
		I <sub>OUT</sub> = 100mA, nB <sub>0</sub> or nB <sub>1</sub> = 0.8V	1.65		1.0	3.0	
ΔR <sub>ON</sub>	On Resistance Matching Between Channels <sup>(5)</sup>	I <sub>OUT</sub> = 100mA, nB <sub>0</sub> or nB <sub>1</sub> = 0.7V	2.7		0.040	0.075	Ω
			2.3		0.040	0.080	
			1.65		0.1		
R <sub>FLAT(ON)</sub>	On Resistance Flatness <sup>(6)</sup>	I <sub>OUT</sub> = 100mA, nB <sub>0</sub> or nB <sub>1</sub> = 0V to V <sub>CC</sub>	2.7			0.15	Ω
			2.3			0.3	
			1.65		1.6		
I <sub>CC</sub>	Quiescent Supply Current	V <sub>IN</sub> = 0V or V <sub>CC</sub> , I <sub>OUT</sub> = 0A	3.6	-500		500	nA
I <sub>CCT</sub>	Increase in I <sub>CC</sub> per Input	V <sub>IN</sub> = 1.8V	3.6		75		μA
		V <sub>IN</sub> = 2.6V			5		

**Notes:**

4. On resistance is determined by the voltage drop between A and B pins at the indicated current through the switch.

5.  $\Delta R_{ON} = R_{ONmax} - R_{ONmin}$  measured at identical V<sub>CC</sub>, temperature, and voltage.

6. Flatness is defined as the difference between the maximum and minimum value of R<sub>ON</sub> over the specified range of conditions.

## AC Electrical Characteristics

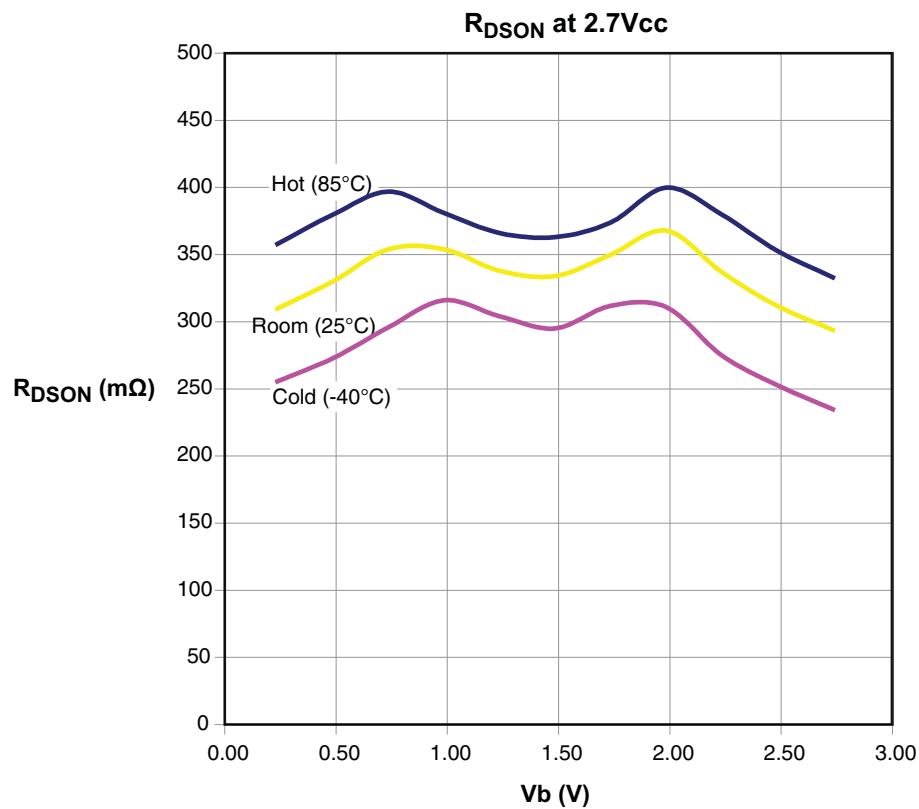
All typical values are at 25°C unless otherwise specified.

Symbol	Parameter	Conditions	V <sub>CC</sub> (V)	Min.	Typ.	Max.	Units
t <sub>ON</sub>	Turn-On Time	nB0 or nB1 = 1.5V, R <sub>L</sub> = 50Ω, C <sub>L</sub> = 35pF	2.7 to 3.6		40.0	50.0	ns
			2.3 to 2.7		50.0	55.0	
			1.65 to 1.95		75.0	90.0	
t <sub>OFF</sub>	Turn-Off Time	nB0 or nB1 = 1.5V, R <sub>L</sub> = 50Ω, C <sub>L</sub> = 35pF	2.7 to 3.6		10.0	25.0	ns
			2.3 to 2.7		20.0	25.0	
			1.65 to 1.95		50.0	55.0	
t <sub>BBM</sub>	Break-Before-Make Time	nB0 or nB1 = 1.5V, R <sub>L</sub> = 50Ω, C <sub>L</sub> = 35pF	2.7 to 3.6	2.0	17.0		ns
			2.3 to 2.7	2.0	15.0		
			1.65 to 1.95	2.0	12.0		
Q	Charge Injection	C <sub>L</sub> = 100pF, V <sub>GEN</sub> = 0V, R <sub>GEN</sub> = 0Ω	1.65 to 3.6		9.0		pC
OIRR	Off Isolation	f = 100kHz, R <sub>L</sub> = 50Ω, C <sub>L</sub> = 5pF (Stray)	1.65 to 3.6		-95		dB
Xtalk	Crosstalk	f = 100kHz, R <sub>L</sub> = 50Ω, C <sub>L</sub> = 5pF (Stray)	1.65 to 3.6		-95		dB
BW	-3dB Bandwidth	R <sub>L</sub> = 50Ω	1.65 to 3.6		45.0		MHz
THD	Total Harmonic Distortion	R <sub>L</sub> = 32Ω, V <sub>IN</sub> = 2V <sub>pk-pk</sub> , f = 20Hz to 20kHz	2.7 to 3.6		0.024		%
		R <sub>L</sub> = 32Ω, V <sub>IN</sub> = 1.5V <sub>pk-pk</sub> , f = 20Hz to 20kHz	2.3 to 2.7		0.015		
		R <sub>L</sub> = 32Ω, V <sub>IN</sub> = 1.2V <sub>pk-pk</sub> , f = 20Hz to 20kHz	1.65 to 1.95		0.35		

## Capacitance

Symbol	Parameter	Conditions	V <sub>CC</sub> (V)	Min.	Typ.	Max.	Units
C <sub>IN</sub>	Control Pin Input Capacitance	f = 1MHz	0.0		4		pF
C <sub>OFF</sub>	B Port Off Capacitance	f = 1MHz	3.3		22		pF
C <sub>ON</sub>	A Port On Capacitance	f = 1MHz	3.3		140		pF

## Typical Performance Characteristics



**Figure 1. Switch On Resistance**

## AC Loading and Waveforms

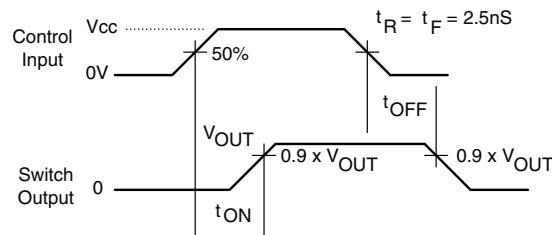
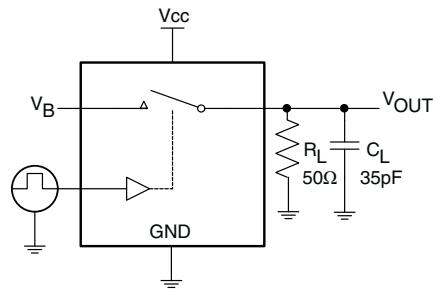


Figure 1. Turn-On/Turn-Off Timing

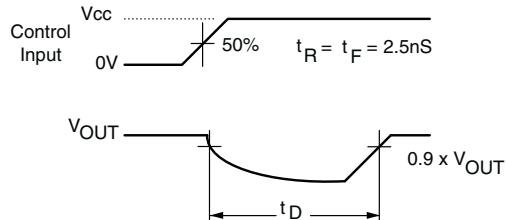
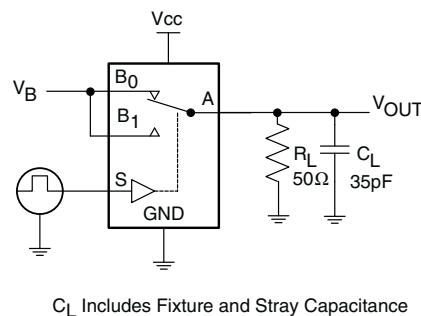


Figure 2. Break-Before-Make Timing

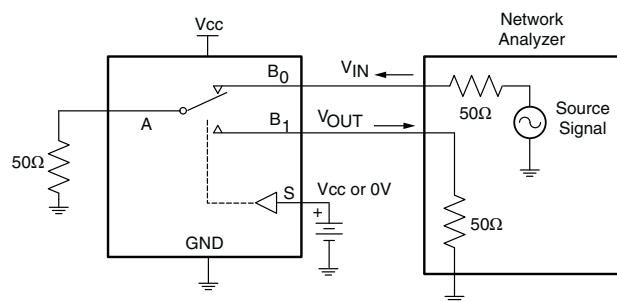
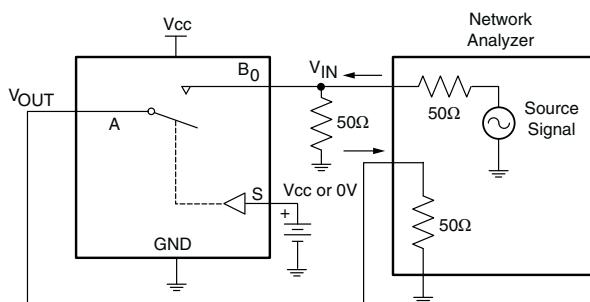
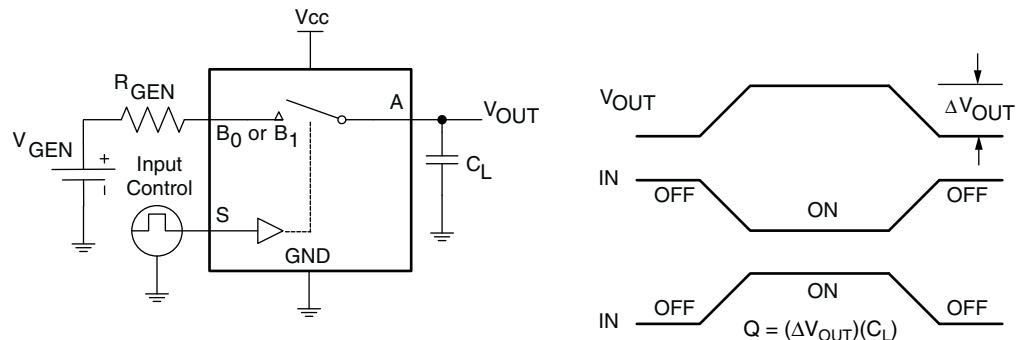


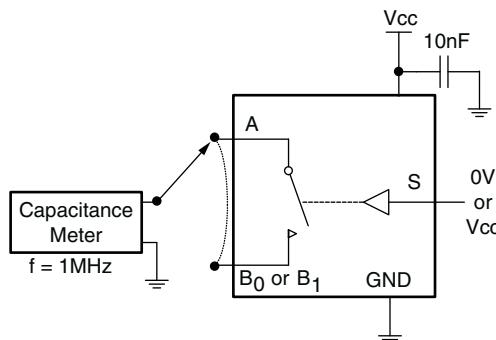
Figure 3. Off Isolation

Figure 4. Crosstalk

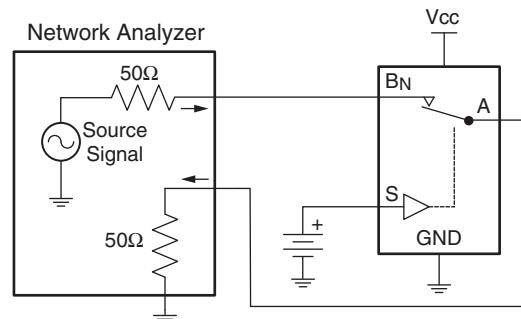
## AC Loading and Waveforms (continued)



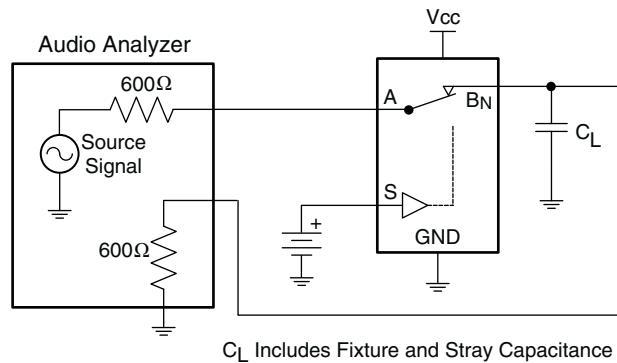
**Figure 5. Charge Injection**



**Figure 6. ON/Off Capacitance Measurement**

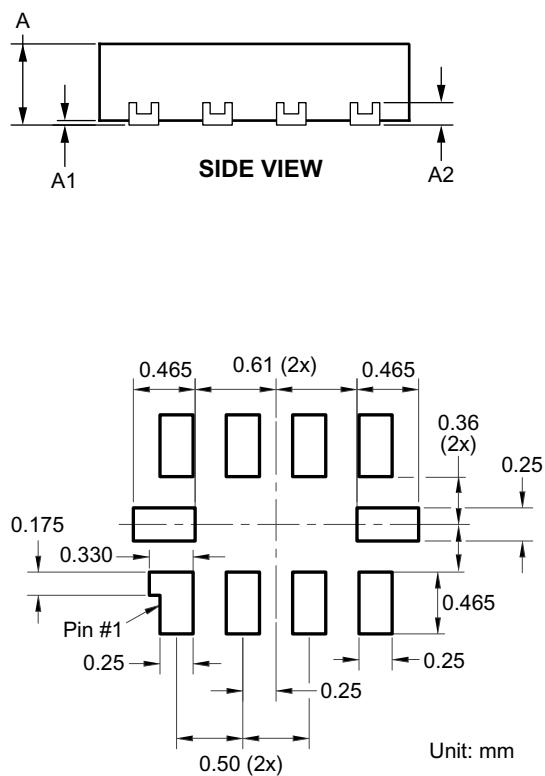
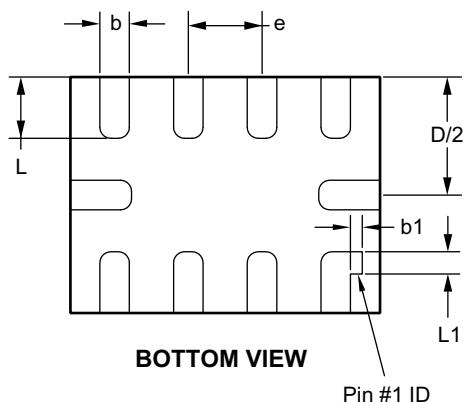
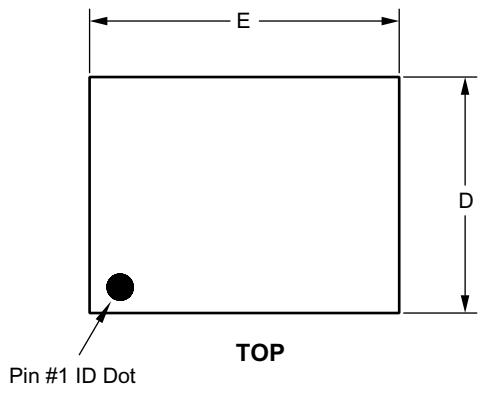


**Figure 7. Bandwidth**



**Figure 8. Harmonic Distortion**

## Package Dimensions, QFN-10



### Dimensions in millimeters

Symbols	Min.	Nom.	Max.
A	0.50	0.55	0.60
A1	0.00	—	0.05
A2		0.152 REF.	
b	0.15	0.20	0.25
b1		0.08 REF.	
D	1.55	1.60	1.65
E	2.05	2.10	2.15
e		0.50 BSC	
L	0.365	0.415	0.465
L1		0.15 REF.	

### Dimensions in inches

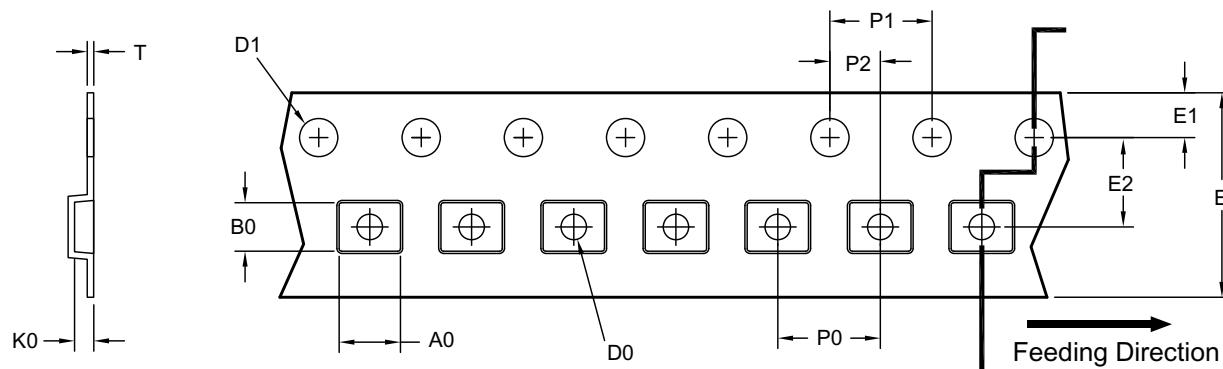
Symbols	Min.	Nom.	Max.
A	0.020	0.022	0.024
A1	0.00	—	0.002
A2		0.006 REF.	
b	0.006	0.008	0.010
b1		0.003 REF.	
D	0.061	0.063	0.065
E	0.081	0.083	0.085
e		0.020 BSC	
L	0.014	0.016	0.018
L1		0.006 REF.	

#### Note:

1. Controlling dimension is millimeter. Converted inch dimensions are not necessarily exact.

## Tape and Reel Dimensions, QFN-10

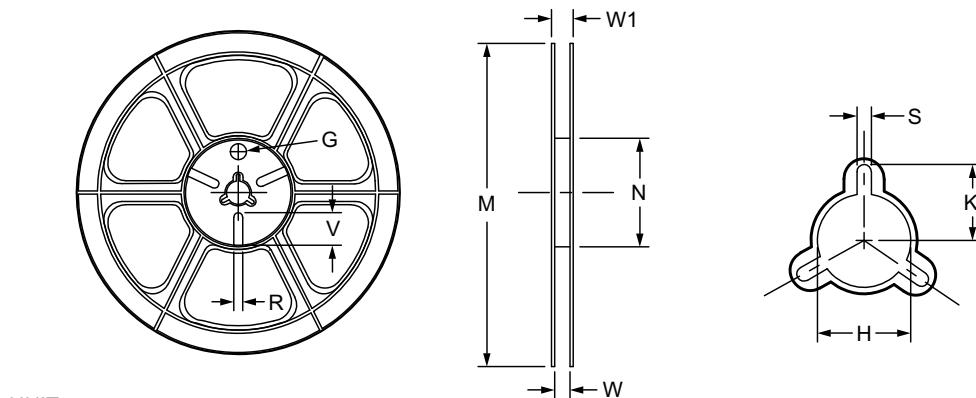
### Carrier Tape



UNIT: mm

Package	A0	B0	K0	D0	D1	E	E1	E2	P0	P1	P2	T
QFN 2.1 x 1.6 (8mm)	0.76 ±0.05	1.21 ±0.05	0.53 ±0.05	0.50 ±0.05	1.5 ±0.10	8.00 +0.30/-0.10	1.75 ±0.10	3.50 ±0.05	4.00 ±0.10	4.00 ±0.10	2.00 ±0.05	0.254 ±0.02

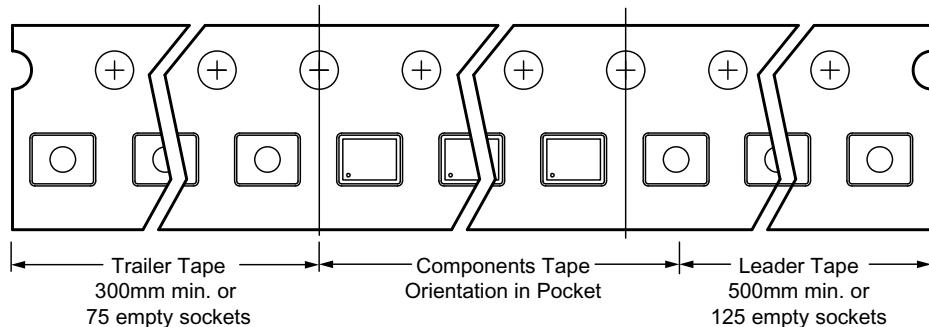
### Reel



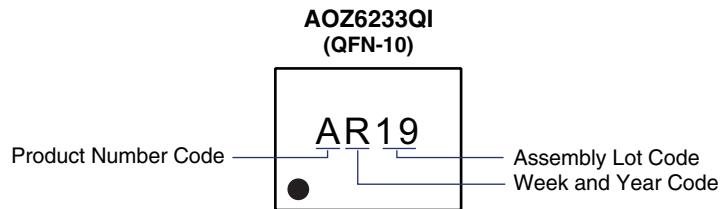
UNIT: mm

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	14.4 Max.	ø13.0 ±0.5	10.1 Max.	2.0 ±0.5	N/A	N/A	N/A

### Leader/Trailer and Orientation



## Part Marking



**This datasheet contains preliminary data; supplementary data may be published at a later date. Alpha & Omega Semiconductor reserves the right to make changes at any time without notice.**

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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.