AOZ6186

High-Speed USB 2.0 (480 Mbps) DPDT Switch

General Description

The AOZ6186 is a low-voltage high-speed Double-Pole, Double-Throw (DPDT) switch for switching between two USB 2.0 (480 Mbps) sources. The device features very low on capacitance (5 pF typ.) and is designed to operate from a single 1.65 V to 4.5 V supply. The AOZ6186 features an ultra-low on resistance (7 Ω typ.), and low power consumption. The device also features fast switching and guaranteed Break-Before-Make (BBM) switching, assuring the switches never short the driver.

Features

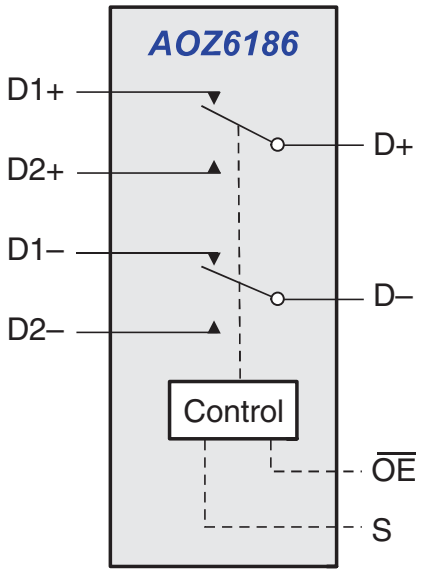
- Low On Resistance (R_{ON}) for 3.6 V supply (7 Ω)
- Low On Capacitance (C_{ON}) for 3.6 V supply (5 pF)
- Over-voltage tolerance (OVT) on all data ports up to 5.5 V
- QFN-10: 1.8 mm x 1.4 mm x 0.55 mm
- Broad 1.65 V to 4.50 V V_{CC} operating range
- Wide –3 dB bandwidth: 960 MHz typ.

Applications

- Cell phone
- PDA
- Portable media player

Green Product

Typical Application

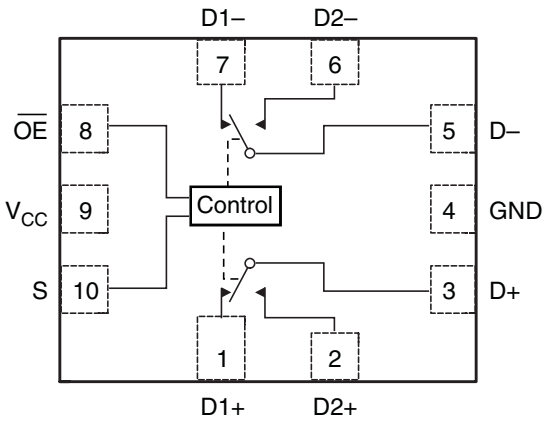


Ordering Information

Part Number	Ambient Temperature Range	Package	Environmental
AOZ6186QT	-40 °C to +85 °C	QFN-10	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 for additional information.

Pin Configuration



QFN-10
(Top Thru View)

Pin Description

Pin Name	Function
S	Control Input
$\overline{OE}$	Output Enable
D1+, D1–, D2+, D2–, D+, D-	Data Ports

Truth Table

$\overline{OE}$	S	D1+, D1–	D2+, D2–
1	X	Off	Off
0	0	On	Off
0	1	Off	On

Absolute Maximum Ratings

Exceeding the Absolute Maximum Ratings may damage the device.

Symbol	Parameter		Rating
V_{CC}	Supply Voltage		-0.5 V to +5.5 V
V_S	Switch Voltage		-0.5 V to V_{CC} + 0.3 V
V_{IN}	Input Voltage		-0.5 V to +4.6 V
I_{IK}	Minimum Input Diode Current		-50 mA
I_{SW}	Switch Current		100 mA
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	All Pins	3000 V
		I/O to GND	5000 V
		Power to GND	5000 V

Maximum Operating Conditions

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

Symbol	Parameter	Rating
V_{CC}	Supply Voltage	1.65 V to 4.5 V
V_{IN}	Control Input Voltage[1]	0 V to V_{CC}
V_{SW}	Switch Input Voltage	0 V to V_{CC}
T_A	Operating Temperature	-40 °C to +85 °C

Note:
1. Unused inputs must be held HIGH or LOW. They may not float.

DC Electrical Characteristics

Unless otherwise indicated, specifications indicate a temperature range of -40 °C to +85 °C.
All typical values are at 25 °C unless otherwise specified.

Symbol	Parameter	Conditions	V_{CC} (V)	Min.	Typ.	Max.	Units
V_{CL}	Clamp Voltage	I_{IN} = -18 mA	3.0			-1.2	V
V_{IH}	Input Voltage HIGH		4.3	1.4			V
			2.7 to 3.6	1.3			
			2.3 to 2.7	1.1			
			1.65 to 1.95	0.9			
V_{IL}	Input Voltage LOW		4.3			0.7	V
			2.7 to 3.6			0.5	
			2.3 to 2.7			0.4	
			1.65 to 1.95			0.4	
I_{IN}	Control Input Leakage	V_{IN} = 0 V to V_{CC}	1.65 to 4.5	-1.0		1.0	µA
I_{OZ}	Off State Leakage	V_{IN} = 0 V to V_{CC}	1.65 to 4.5	-1.0		1.0	µA
I_{OFF}	Power OFF Leakage Current (I/O ports)	V_{IN} = 0 V to V_{CC}	0	-1.0		1.0	µA
R_{ON}	On−Resistance	I_{ON} = 8 mA, V_{IN} = 0 V to 0.4 V	4.3		7	10	Ω
			2.7 to 3.6		9	12	
			2.3 to 2.7		12	16	
Δ R_{ON}	On−Resistance Matching	I_{ON} = 8 mA, V_{IN} = 0 V to 0.4 V	4.3		0.6		Ω
			2.7 to 3.6		0.6		
			2.3 to 2.7		0.6		
$R_{FLAT (ON)}$	On−Resistance Flatness	I_{ON} = 8mA, V_{IN} = 0 V to 0.4 V	4.3		0.4		Ω
			2.7 to 3.6		1.5		
			2.3 to 2.7		1.8		
I_{CC}	Quiescent Supply Current	I_{OUT} = 0 mA	4.3			1.0	µA
I_{CCT}	Increase in I_{CC} per Input Control Voltage	$V_{Control}$ = 2.6 V	4.3		3.0	7.0	µA
		$V_{Control}$ = 1.8 V			7.0	15.0	

AC Electrical Characteristics

Unless otherwise indicated, specifications indicate a temperature range of -40 °C to +85 °C.
All typical values are at 25 °C unless otherwise specified.

Symbol	Parameter	Conditions	V_{CC} (V)	Min.	Typ.	Max.	Units
t_{ON}	Turn-On Time	R_L = 50 Ω, C_L = 5 pF	3.6 to 4.3		18	35	ns
			2.7 to 3.6		21	45	
			2.3 to 2.7		36	65	
			1.65 to 1.95		80	120	
t_{OFF}	Turn-Off Time	R_L = 50 Ω, C_L = 5 pF	3.6 to 4.3		11	30	ns
			2.7 to 3.6		11	40	
			2.3 to 2.7		14	55	
			1.65 to 1.95		59	100	
t_{PD}	Propagation Delay	R_L = 50 Ω, C_L = 5 pF	1.65 to 4.5		0.25		ns
t_{BBM}	Break-Before-Make	R_L = 50 Ω, C_L = 5 pF	1.65 to 4.5		6.2		ns
O_{IRR}	Off Isolation	R_L = 50 Ω, f = 240 MHz	1.65 to 4.5		-36		dB
X_{TALK}	Crosstalk	R_L = 50 Ω, f = 240 MHz	1.65 to 4.5		-40		dB
BW	-3 dB Bandwidth	R_L = 50 Ω, C_L = 0 pF	1.65 to 4.5		960		MHz

USB Hi-Speed AC Electrical Characteristics

Unless otherwise indicated, specifications indicate a temperature range of -40 °C to +85 °C.
All typical values are at 25 °C unless otherwise specified.

Symbol	Parameter	Conditions	V_{CC} (V)	Min.	Typ.	Max.	Units
t_{SK}	Skew of Opposite Transitions of the Same Output	R_L = 50 Ω, C_L = 5 pF	1.65 to 4.5		20		ps
t_J	Total Jitter	R_L = 50 Ω, C_L = 5 pF, $t_r = t_f$ = 500 ps (10% to 90%), f = 480MHz, PRBS = $2^{15} - 1$	1.65 to 4.5		200		ps

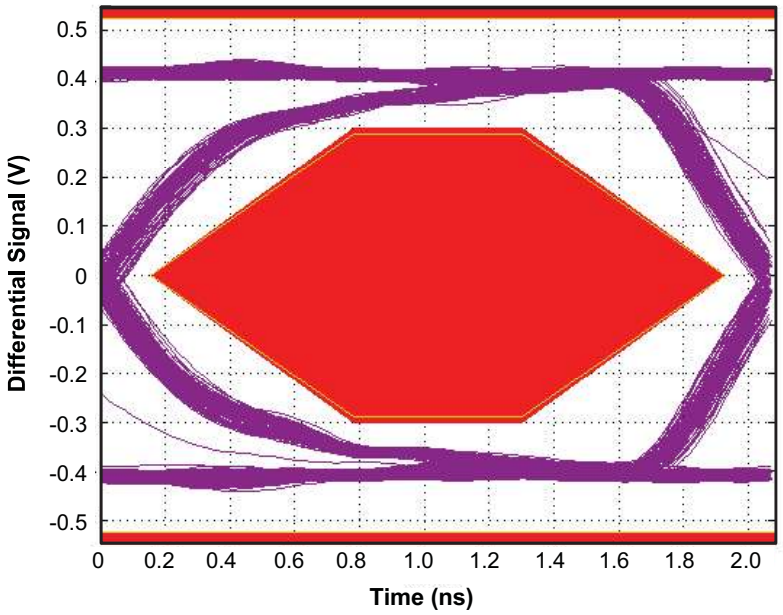
Capacitance

Unless otherwise indicated, specifications indicate a temperature range of -40 °C to +85 °C.
All typical values are at 25 °C unless otherwise specified.

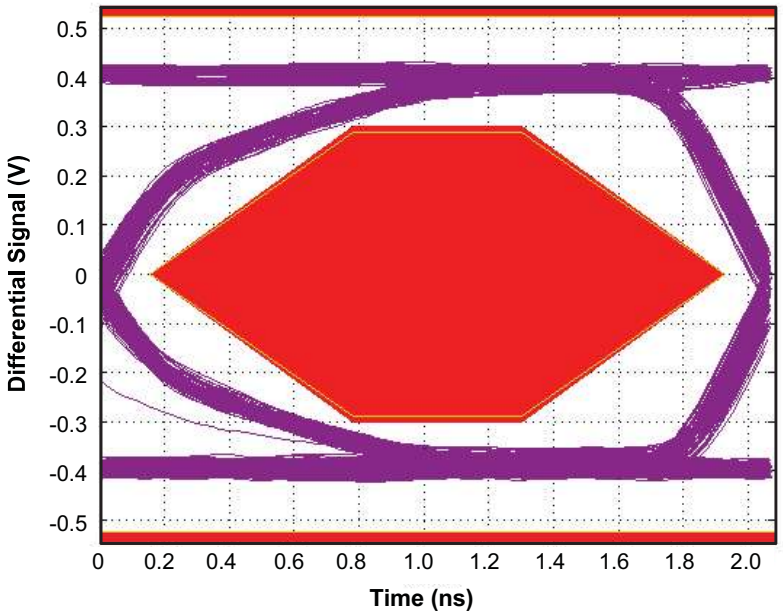
Symbol	Parameter	Conditions	V_{CC} (V)	Min.	Typ.	Max.	Units
C_{IN}	Control Pin Input Capacitance	1 MHz	3.3		1.7		pF
		10 MHz			1.7		
C_{ON}	D+/D- On Capacitance	$\overline{OE}$ = 0V, f = 1 MHz	3.3		4.7		
		$\overline{OE}$ = 0V, f = 10 MHz			5.0		
C_{OFF}	HSD1n/HSD2n Off Capacitance	$\overline{OE}$ = V_{CC}, f = 1 MHz	3.3		1.8		
		$\overline{OE}$ = 0V, f = 10 MHz			2.0		

Eye Patterns

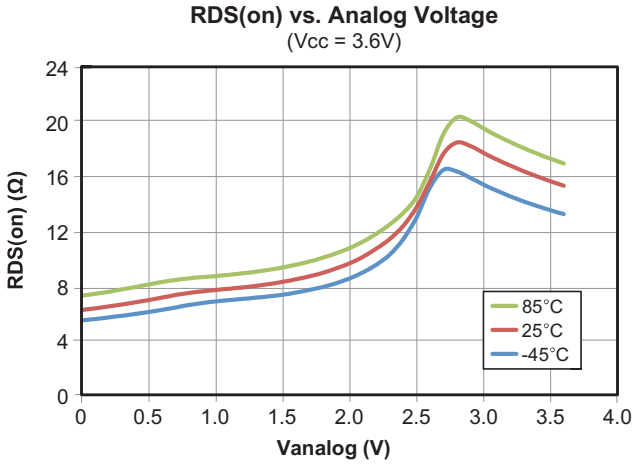
480-Mbps USB Signal Without AOZ6186QT

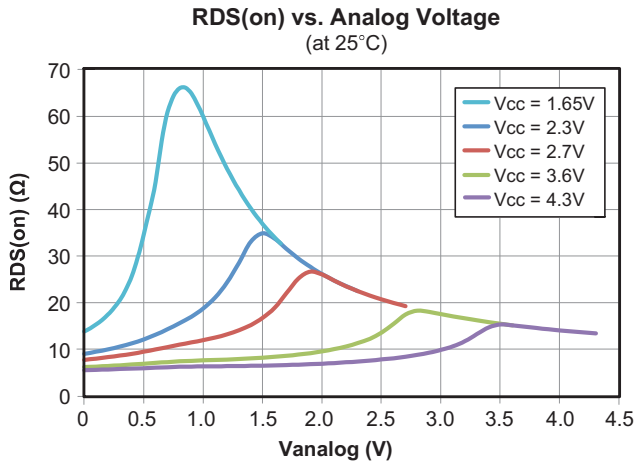


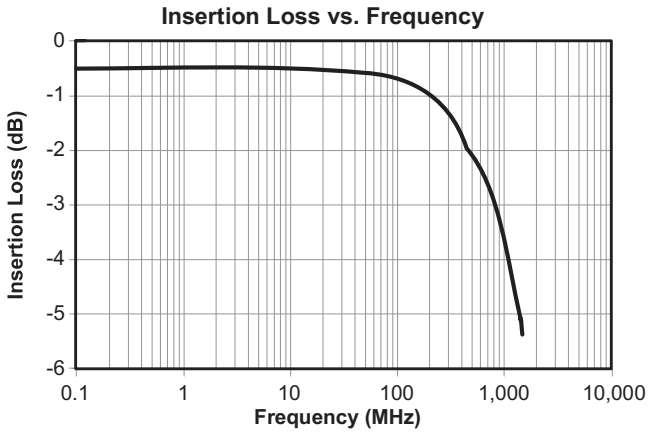
480-Mbps USB Signal With AOZ6186QT

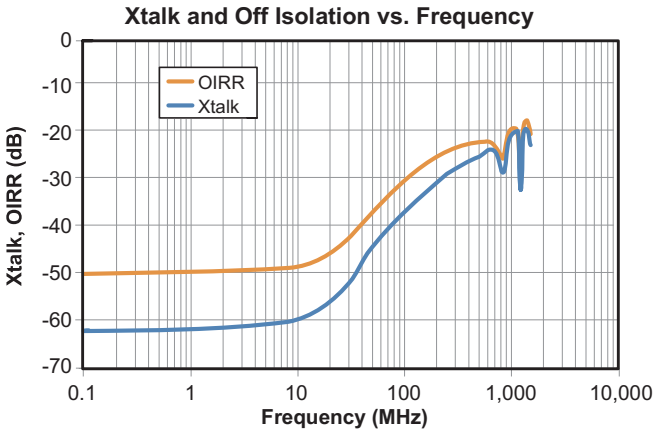


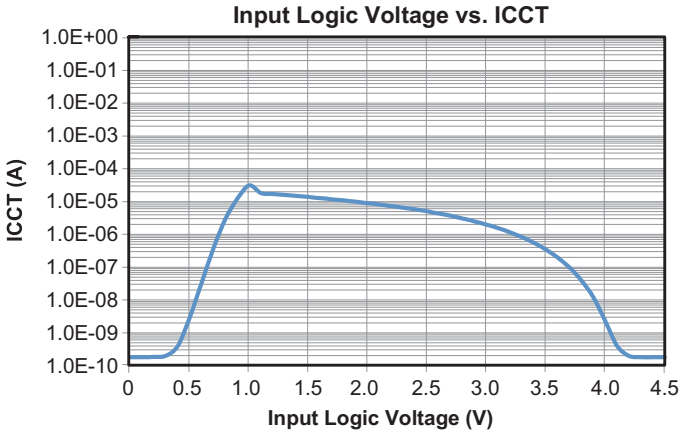
Typical Performance Characteristics



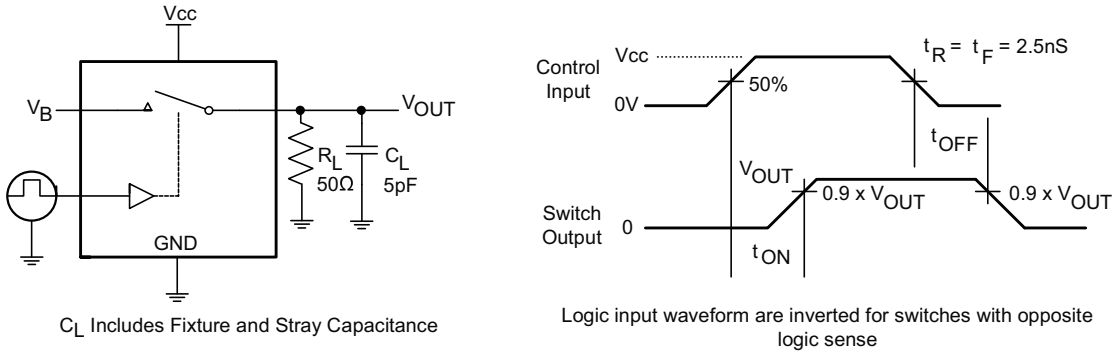








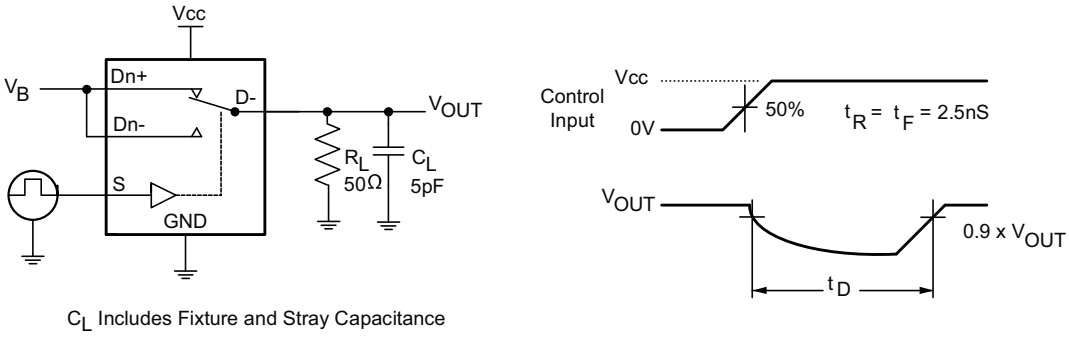
AC Loading and Waveforms



C_L Includes Fixture and Stray Capacitance

Logic input waveform are inverted for switches with opposite logic sense

Figure 1. Turn-On/Turn-Off Timing



C_L Includes Fixture and Stray Capacitance

Figure 2. Break-Before-Make Timing

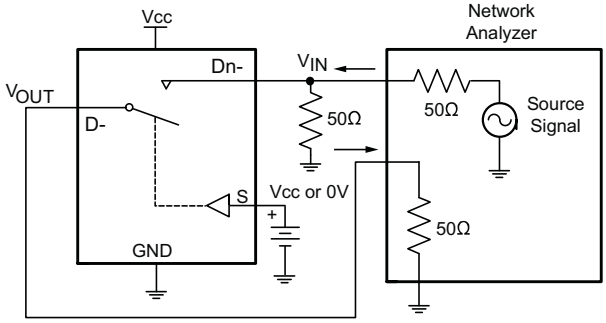


Figure 3. Off Isolation

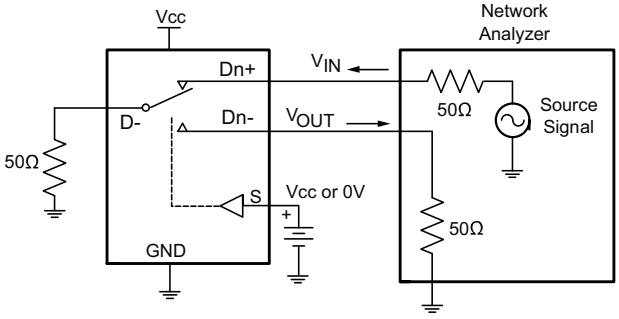


Figure 4. Crosstalk

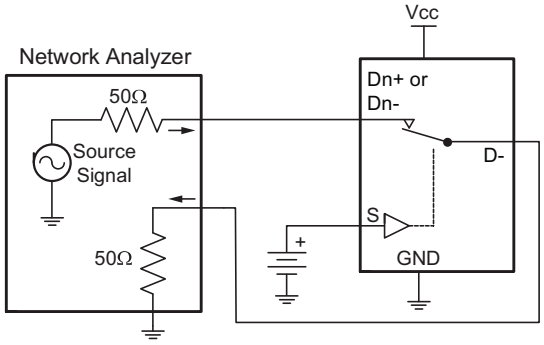


Figure 5. Bandwidth

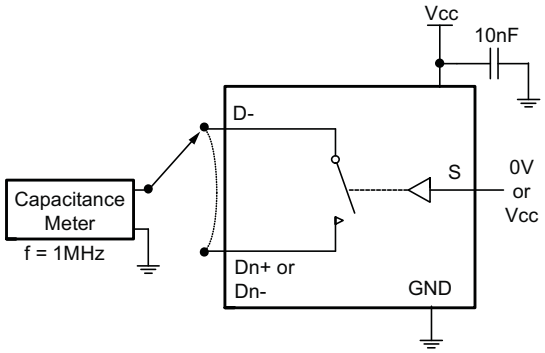
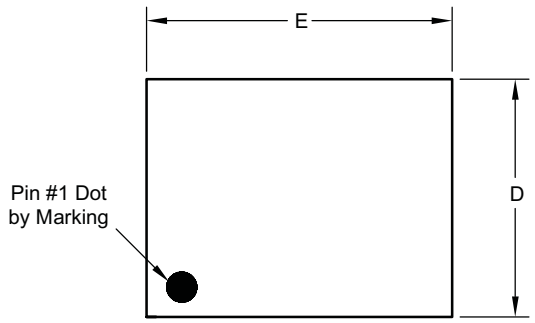
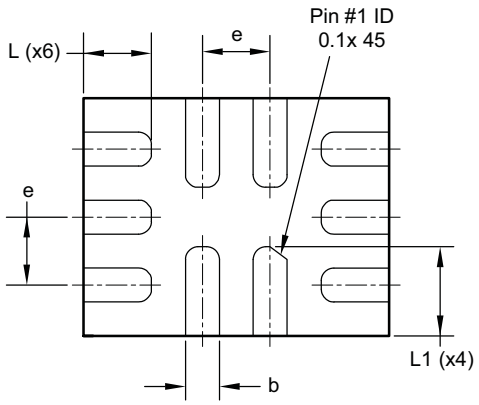


Figure 6. ON/Off Capacitance Measurement

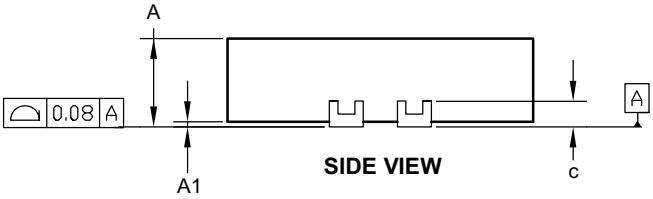
Package Dimensions, QFN 1.8x1.4, 10L



Top View

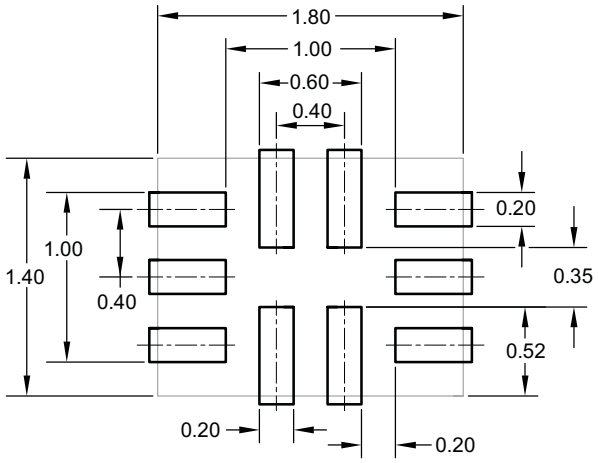


Bottom View



SIDE VIEW

RECOMMENDED LAND PATTERN



UNIT: mm

Dimensions in millimeters

Symbols	Min.	Nom.	Max.
A	0.50	0.55	0.60
A1	0.00	—	0.05
b	0.15	0.20	0.25
c	0.152 REF.		
D	1.35	1.40	1.45
E	1.75	1.80	1.85
e	0.40 BSC		
L	0.35	0.40	0.45
L1	0.475	0.525	0.575

Dimensions in inches

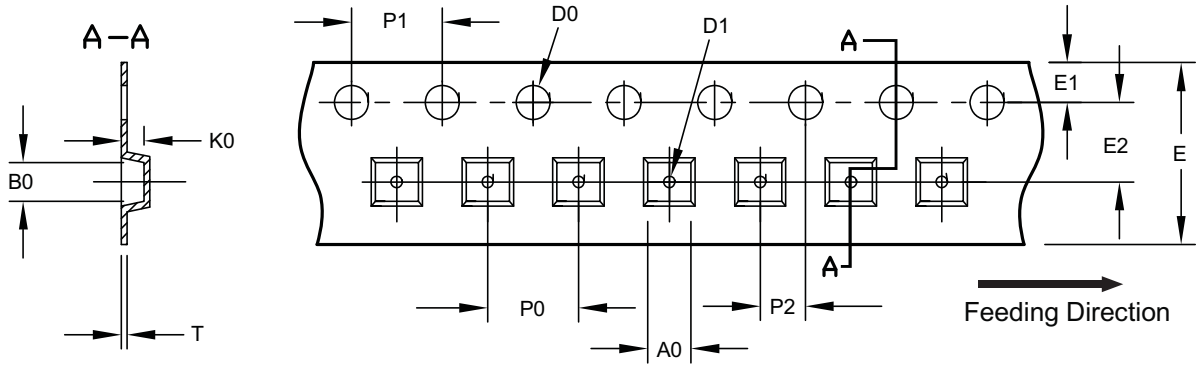
Symbols	Min.	Nom.	Max.
A	0.020	0.022	0.024
A1	0.000	—	0.002
b	0.006	0.008	0.010
c	0.006 REF.		
D	0.053	0.055	0.057
E	0.069	0.071	0.073
e	0.016 BSC		
L	0.014	0.016	0.018
L1	0.019	0.021	0.023

Notes:

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

Tape and Reel Dimensions, QFN 1.8x1.4, 10L

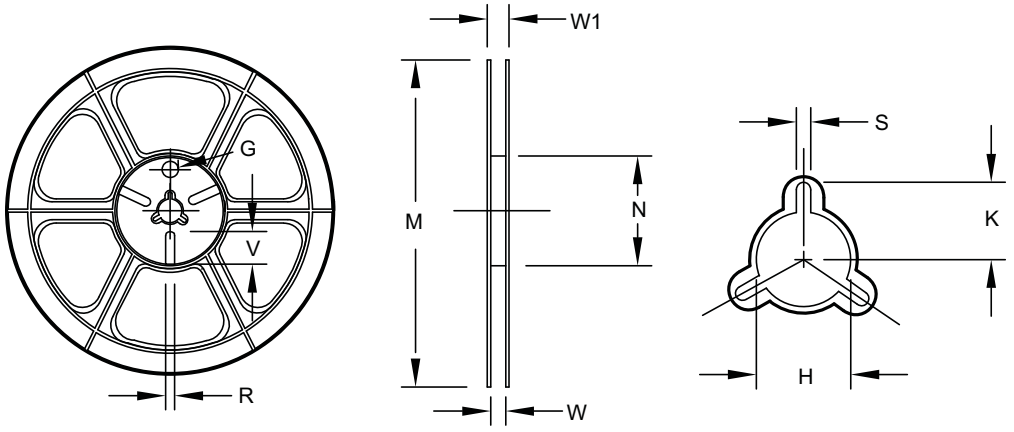
Carrier Tape



UNIT: mm

Package	A0	B0	K0	D0	D1	E	E1	E2	P0	P1	P2	T
QFN 1.8 x 1.4	1.90 ±0.05	1.70 ±0.05	1.00 ±0.05	1.50 +0.10/-0	0.50 ±0.05	8.00 +0.20/-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

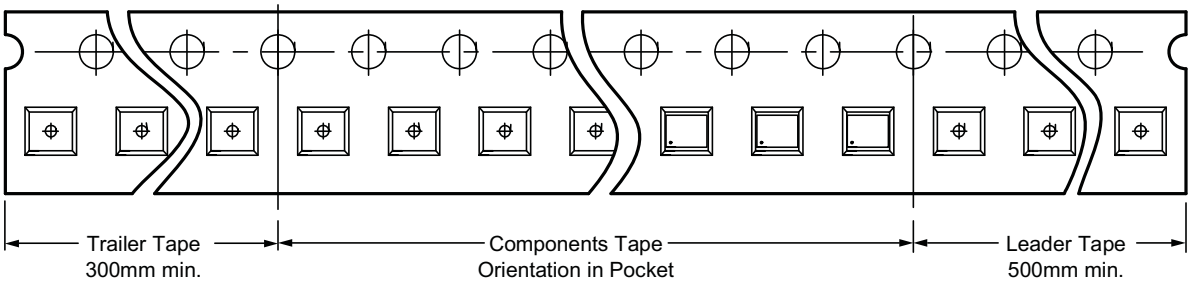
Reel



UNIT: mm

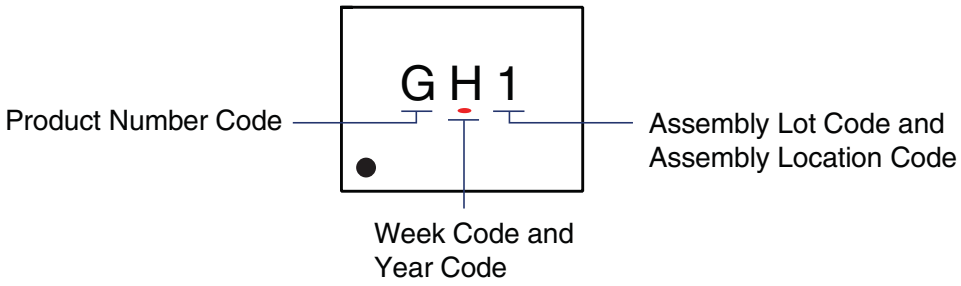
Tape Size	Reel Size	M	N	W	W1	H	K	S	G	R	V
8mm	ø178	ø178.0 ±1.0	ø70.5 ±1.0	9.0 ±0.5	11.8 ±1.1	ø13.0 +0.5/-0.2	10.25 ±0.1	2.4 ±0.1	ø9.8	N/A	N/A

Leader/Trailer and Orientation



Part Marking

AOZ6186QT
(QFN-10)



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.

LIFE SUPPORT POLICY

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As used herein:

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.

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.

单击下面可查看定价，库存，交付和生命周期等信息

>>AOS(万代)