DESCRIPTION

The AO3011 is a push-pull output comparator. It features an uncommitted on-chip voltage reference and have low quiescent current, input common-mode range 100mV beyond the supply rails, and single-supply operation from 2.5V to 5.5V. The integrated 1.2V series voltage reference offers low 60μV/°C drift, is stable with up to 10nF capacitive load, and can provide up to 310μA (TYP) of output current.

Featuring a push-pull output stage, the AO3011 allows for operation with absolute minimum power consumption when driving any capacitive or resistive load.

The AO3011 operates over an ambient temperature range of -40°C to +125°C.

The AO3011 is available in SOT-26 and DFN6(1.6x1.6) Packages.

ORDERING INFORMATION

Package Type	Part Number	
SOT-26 SPQ: 3,000pcs/Reel	E6	AO3011E6R
		AO3011E6VR
DFN6(1.6x1.6) SPQ:3,000pcs/Reel	J6C	AO3011J6CR
		AO3011J6CVR
Note	V: Halogen free Package R: Tape & Reel	
AiT provides all RoHS products		

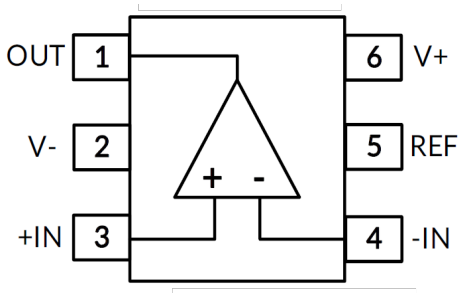
FEATURES

- Low Supply Current:3.5μA(TYP) at Vs=2.5V
- Supply Range: +2.5V to +5.5V
- Integrated Voltage Reference:1.2V
- Low Input Offset Voltage: Vos(max) = 3.5mV at Vs=5V
- Rail-to-Rail Input
- Push-Pull Output
- Operating Temperature Range: -40°C to +125°C
- Available in SOT-26 and DFN6(1.6x1.6) Packages

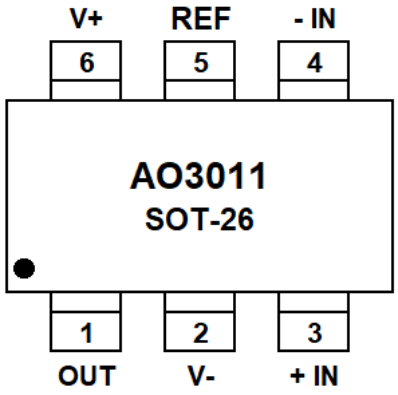
APPLICATION

- RC Times
- Multivibrators
- Window Detectors
- System Monitoring
- Memory Addressing
- Ensor Systems: Smoke Detectors, Light Sensors, Alarms

TYPICAL PPLICATION

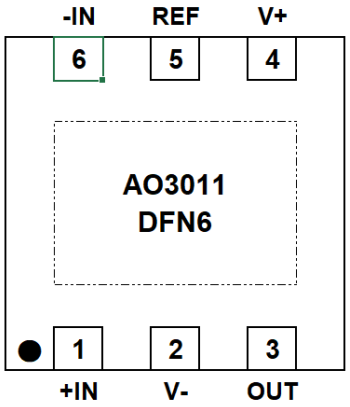


PIN DESCRIPTION



SOT-26, E6

Top View



DFN6(1.6x1.6), J6C

Top View

PIN#		Symbol	I/O	Function
SOT-26	DFN6(1.6x1.6)			
1	3	OUT	O	Output
2	2	V-	P	Negative (Lowest) Power Supply
3	1	+IN	I	Noninverting Input
4	6	-IN	I	Inverting Input
5	5	REF	O	Voltage Reference
6	4	V+	P	Positive (Highest) Power Supply

I=input, O=output, P=Power

ABSOLUTE MAXIMUM RATINGS

over operating free-air temperature range (unless otherwise noted)

V_{CC}, Supply Voltage, Vs=(V+) - (V-)		7V
V_I, Input Voltage Pin (IN+, IN-) (1)		(V-)-0.5V ~ (V+) +0.5V
Single Output Pin (2)		(V-)-0.5V ~ (V+) +0.5V
Single Input Pin (IN+, IN-) (1)		-10mA ~ +10mA
Signal Output Pin (2)		-10mA ~ +10mA
Output Short-Circuit (3)		Continuous
θ_{JA}, Package Thermal Impedance (4)	SOT-26	230°C/W
	DFN6(1.6x1.6)	160°C/W
T_A, Operating Range,		-40°C ~ +125°C
T_J, Junction Temperature		-40°C ~ +150°C
T_{STG}, Storage Temperature		-65°C ~ +150°C

Stresses above may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated in the Electrical Characteristics are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

(1) The input and output negative-voltage ratings may be exceeded if the input and output current ratings are observed.

(2) The value of V_{CC} is provided in the Recommended Operating Conditions table.

(3) The package thermal impedance is calculated in accordance with JESD-51.

(4) The maximum power dissipation is a function of TJ(MAX), $R_{\theta JA}$, and T_A. The maximum allowable power dissipation at any ambient temperature is $P_D = (T_{J(MAX)} - T_A) / R_{\theta JA}$. All numbers apply for packages soldered directly onto a PCB.

ESD RATINGS

Parameter	Symbol	Min	Unit
Human-Body Model (HBM), per ANSI/ESDA/JEDEC JS-001	$V_{(ESD)}$ Electrostatic Discharge	±3000	V
Machine Model (MM)		±200	

RECOMMENDED OPERATING CONFITIONS

Parameter		Min.	Max.	Unit
Supply Voltage, VS=(V+) – (V-)	Single-Supply	2.50	5.50	V
	Dual-Supply	±1.25	±2.75	

ELECTRICAL CHARACTERISTICS

(T_A = +25°C, V+=2.5V, V-=0V, V_{CM}=Vs/2, unless otherwise noted.)

Parameter	Symbol	Conditions	Min	Typ.	Max	Unit
POWER SUPPLY						
Operating Voltage Range	V_S	-	2.5	-	5.5	V
Quiescent Current	I_Q	-	-	3.50	8	μA
Power-Supply Rejection Ratio	PSRR	V_S = 2.5V ~5.5 V, V_{CM}=(V)+0.5V	-	70	-	dB
INPUT						
Input Offset Voltage	V_{OS}	V_{CM} = 0V	-	1	5	mV
		V_{CM} = 5V	-	1	5	
Low-Level Input Voltage	ΔVos/ΔT	V_{CM} = V_S / 2, -40°C≤T_A≤125°C	-	2	-	μV/°C
Input Bias Current (1) (2)	IB	-	-	1	10	pA
Common-Mode Voltage Range	V_{CM}	T_A=–40°C~ 125°C	(V-)-0.10	-	(V+) +0.10	V
Common-Mode Rejection Ratio	CMRR	V_{CM} =-0.1V~ 5.1V	-	70	-	dB
OUTPUT						
Output Swing from Upper Rail	V_{OH}	I_O=25uA	2.410	2.440	-	V
		I_O=95uA	2.186	2.277	-	
Output Swing from Lower Rail	V_{OL}	I_O=25uA	-	55	80	mV
		I_O=95uA	-	215	289	
Short Circuit Sink Current	I_{SC}	V_S=±2.5V, V_{OUT}=0V	-	-0.6	-0.3	mA
Short Circuit Source Current		V_S=±2.5V, V_{OUT}=0V	0.3	0.6	-	
SWITCHING						
Propagation Delay H to L (3)	T_{PHL}	Overdrive = 20 mV	-	45	-	μs
		Overdrive = 100 mV	-	15	-	
Propagation Delay L to H (3)	T_{PLH}	Overdrive = 20 mV	-	40	-	
		Overdrive = 100 mV	-	20	-	
Rise Time	T_R	Overdrive = 100 mV	-	30	-	μs
Fall Time	T_F	Overdrive = 100 mV	-	30	-	μs
Noise of V_{REF}	-	F=0.1Hz ~ 10Hz	-	20	-	μV_{RMS}
VOLTAGE REFERENCE						
Reference Voltage	V_{REF}	I_{REF}=0mA	1.176	1.200	1.224	
Reference Voltage Drift	-	-	-	60	-	μV/°C
Reference Output Current (Source)	-	-	80	110	-	μA

(1) This parameter is ensured by design and/or characterization and is not tested in production.
(2) Positive current corresponds to current flowing into the device.
(3) High-to-low and low-to-high refers to the transition at the input.

T_A = +25°C, V+=5V, V-=0V, V_{CM}=Vs/2, unless otherwise noted.)

Parameter	Symbol	Conditions	Min	Typ.	Max	Unit
POWER SUPPLY						
Operating Voltage Range	V_S	-	2.5	-	5.5	V
Quiescent Current	I_Q	-	-	4.85	10	μA
Power-Supply Rejection Ratio	PSRR	V_S = 2.5V ~5.5 V, V_{CM}=(V)+0.5V	-	70	-	dB
INPUT						
Input Offset Voltage	V_{OS}	V_{CM} = 0V	-	1	3.5	mV
		V_{CM} = 5V	-	1	3.5	
Low-Level Input Voltage	ΔVos/ΔT	V_{CM} = V_S / 2, -40°C≤T_A≤125°C	-	2	-	μV/°C
Input Bias Current (1) (2)	IB	-	-	1	10	pA
Common-Mode Voltage Range	V_{CM}	T_A=–40°C~ 125°C	(V-)-0.10	-	(V+) +0.10	V
Common-Mode Rejection Ratio	CMRR	V_{CM} =-0.1V~ 5.1V	-	70	-	dB
OUTPUT						
Output Swing from Upper Rail	V_{OH}	I_O=25uA	4.915	4.935	-	V
		I_O=95uA	4.720	4.785	-	
Output Swing from Lower Rail	V_{OL}	I_O=25uA	-	55	72	mV
		I_O=95uA	-	215	280	
Short Circuit Sink Current	I_{SC}	V_S=±2.5V, V_{OUT}=0V	-	-1.1	-0.9	mA
Short Circuit Source Current		V_S=±2.5V, V_{OUT}=0V	0.9	1.1	-	
SWITCHING						
Propagation Delay H to L (3)	T_{PHL}	Overdrive = 20 mV	-	25	-	μs
		Overdrive = 100 mV	-	10	-	
Propagation Delay L to H (3)	T_{PLH}	Overdrive = 20 mV	-	20	-	
		Overdrive = 100 mV	-	10	-	
Rise Time	T_R	Overdrive = 100 mV	-	12	-	μs
Fall Time	T_F	Overdrive = 100 mV	-	12	-	μs
Noise of V_{REF}	-	F=0.1Hz ~ 10Hz	-	20	-	$μV_{RMS}$
VOLTAGE REFERENCE						
Reference Voltage	V_{REF}	I_{REF}=0mA	1.176	1.200	1.224	
Reference Voltage Drift	-	-	-	50	-	μV/°C
Reference Output Current (Source)	-	-	200	310	-	μA

(1) This parameter is ensured by design and/or characterization and is not tested in production.
(2) Positive current corresponds to current flowing into the device.
(3) High-to-low and low-to-high refers to the transition at the input.

TYPICAL PERFORMANCE CHARACTERISTICS

At T_A = +25°C, Vs=5V, V_{CM} = 3VS/2, C_L=15pF unless otherwise noted.

Fig 1. Supply Voltage vs. Quiescent Current

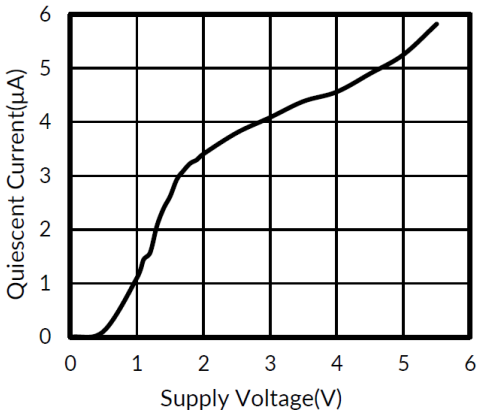


Fig 2. Input Bias Current vs. Temperature

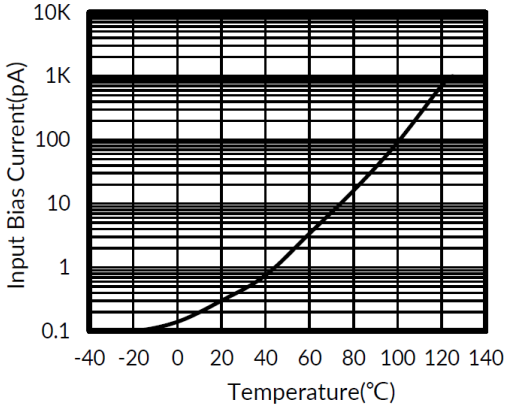


Fig 3. Supply Current vs. Temperature

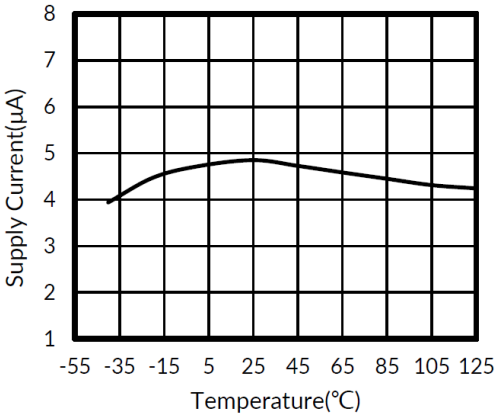


Fig 4. Reference Voltage vs. Temperature

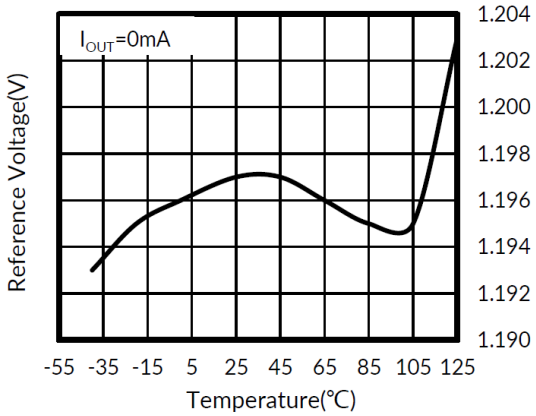


Fig 5. Propagation Delay vs. Overdrive

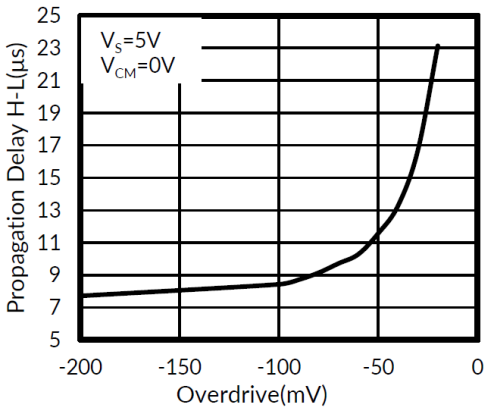


Fig 6. Propagation Delay vs. Overdrive

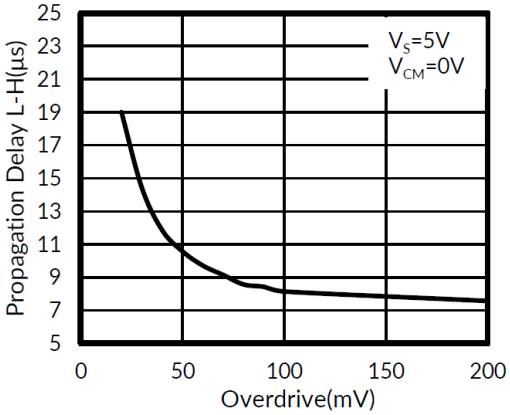


Fig 7. Propagation Delay vs. Overdrive

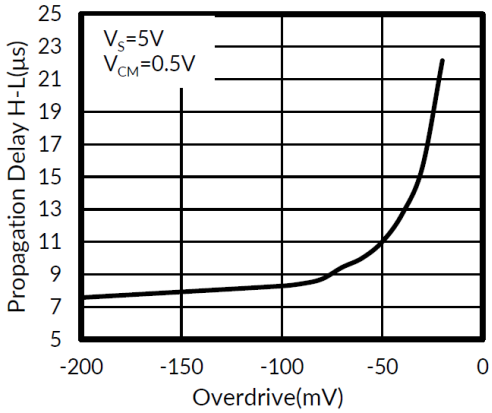


Fig 8. Propagation Delay vs. Overdrive

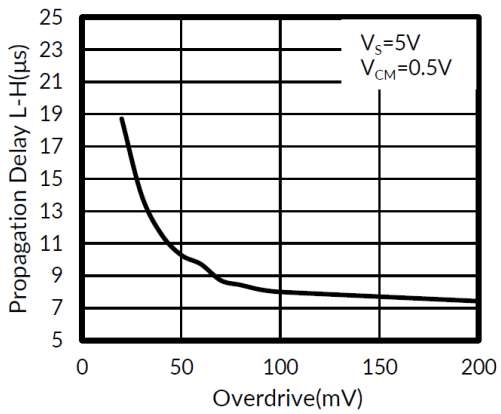


Fig 9. Propagation Delay vs. Overdrive

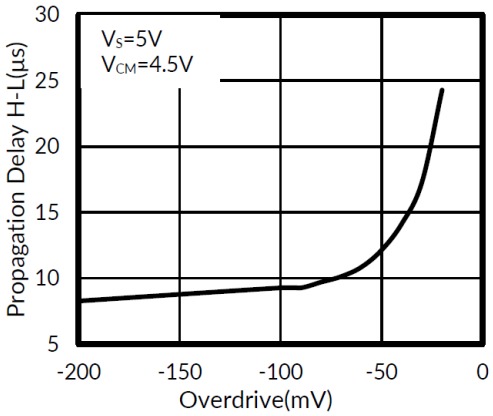


Fig 10. Propagation Delay vs. Overdrive

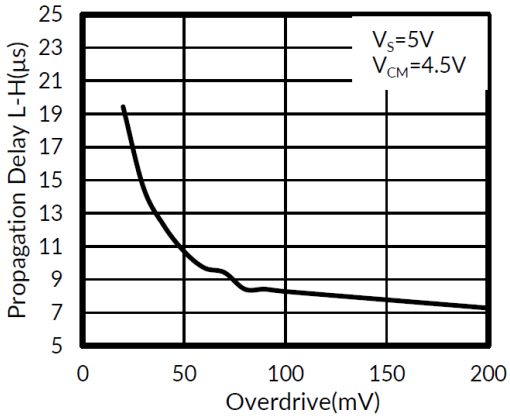


Fig 11. Propagation Delay vs. Overdrive

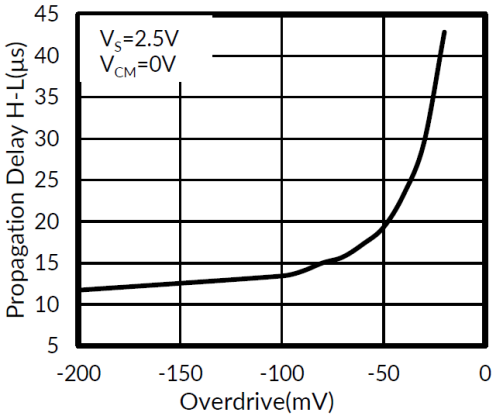


Fig 12. Propagation Delay vs. Overdrive

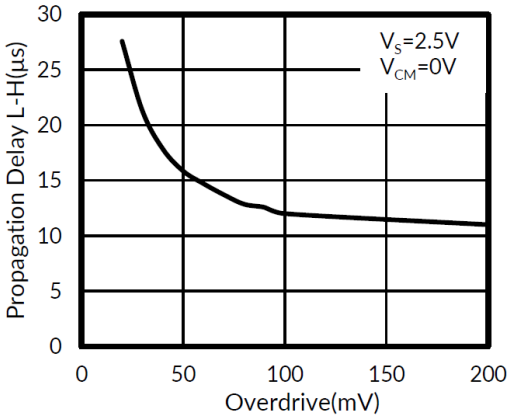


Fig 13. Propagation Delay vs. Overdrive

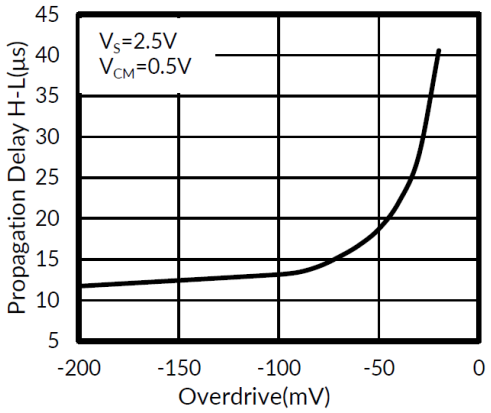


Fig 14. Propagation Delay vs. Overdrive

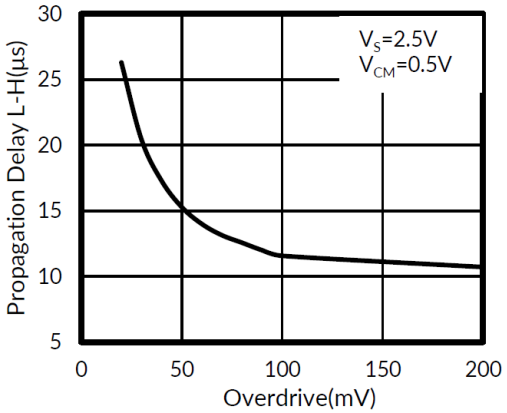


Fig 15. Propagation Delay vs. Overdrive

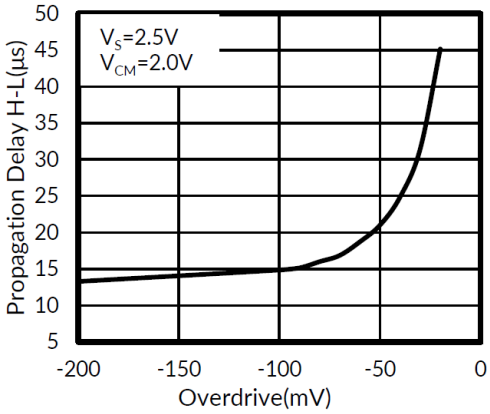
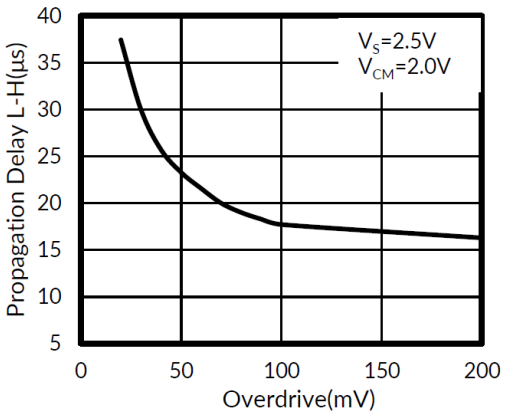
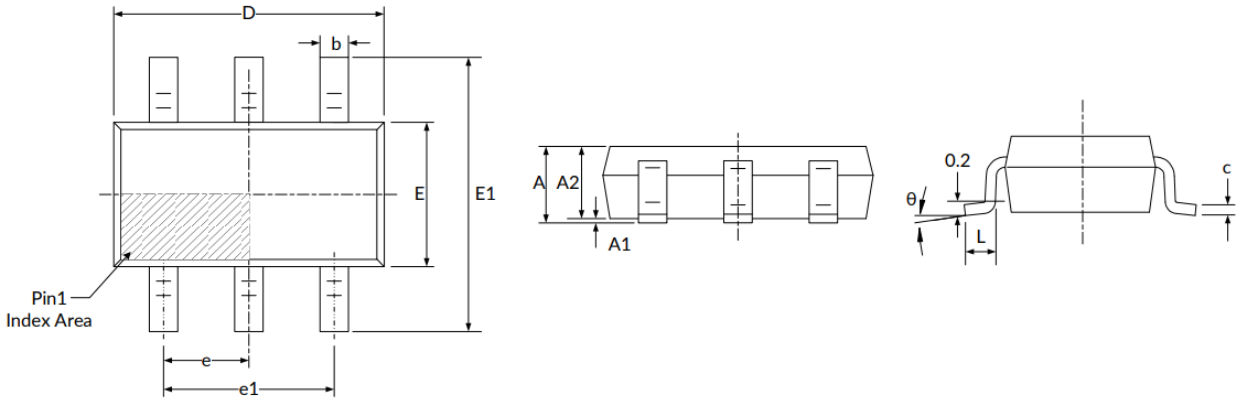


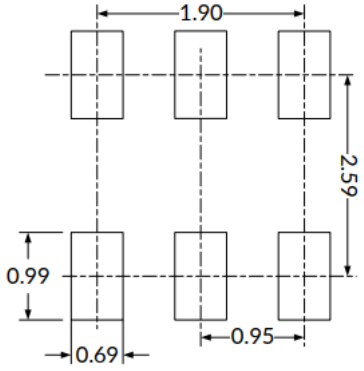
Fig 16. Propagation Delay vs. Overdrive



PACKAGE INFORMATION

Dimension in SOT-26 (Unit: mm)

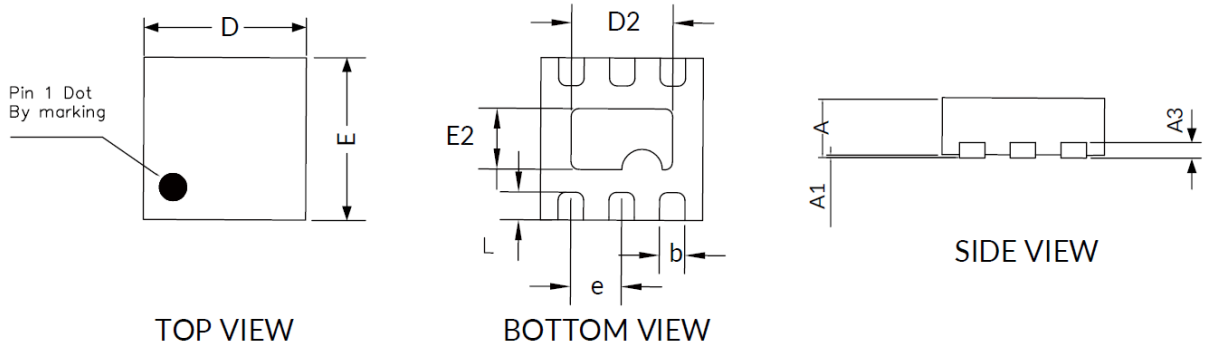




Recommended Land Pattern (Unit: mm)

Symbol	Millimeters	
	Min	Max
A	1.050	1.250
A1	0.000	0.100
A2	1.050	1.150
b	0.300	0.500
c	0.100	0.200
D	2.820	3.020
e	0.950 BSC	
e1	1.800	2.000
E	1.500	1.700
E1	2.650	2.950
L	0.300	0.600
θ	0°	8°

Dimension in DFN6(1.6x1.6)(Unit: mm)



Symbol	Millimeters	
	Min	Max
A	0.500	0.600
A1	0.000	0.050
A3	0.150 REF.	
b	0.200	0.300
D	1.550	1.650
D2	0.900	1.050
E	1.550	1.650
E2	0.500	0.650
e	0.500 BSC.	
L	0.200	0.300

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