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XINBOLE

Product Specification

XBLW SN74LVC1G00

Single 2-input NAND Gate

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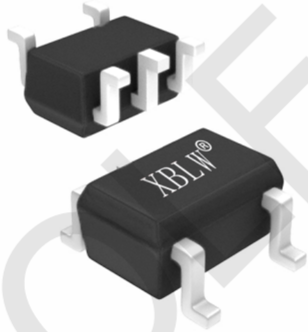
RoHS

Description

The SN74LVC1G00 is a single 2-input NAND Gate. Inputs can be driven from either 3.3 V or 5 V devices. This feature allows the use of these devices as translators in mixed 3.3 V and 5 V environments. Schmitt-trigger action at all inputs makes the circuit tolerant of slower input rise and fall times.

Features

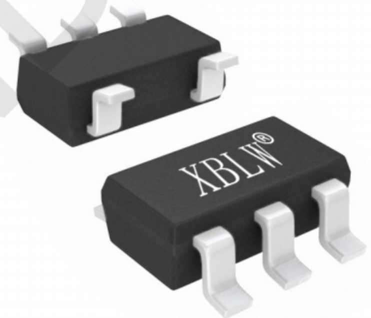
- Wide supply voltage range from 1.65V to 5.5V
- ±24mA output drive (V_{CC}=3.0V)
- CMOS low power consumption
- Input accepts voltages up to 5V
- Specified from -40°Cto +125°C
- Packaging information: SOT-23-5/SOT-353



SOT-353

Applications

- AV Receiver
- Embedded PC
- Tablet: Enterprise
- Audio Dock: Portable
- Blu-ray Player and Home Theater
- Video Analytics: Server
- Wireless Headset, Keyboard, and Mouse
- Personal Digital Assistant (PDA)
- MP3 Player/Recorder (Portable Audio)
- Solid State Drive (SSD): Client and Enterprise
- TV: LCD/Digital and High-Definition (HDTV)
- Power: Telecom/Server AC/DC Supply: Single Controller: Analog and Digital



SOT23-5

Ordering Information:

Product Model	Package Type	Marking	Packing	Packing Qty
XBLW SN74LVC1G00T235	SOT-23-5	AHXX	Tape	3000Pcs/Reel
XBLW SN74LVC1G00T353	SOT-353	AHXX	Tape	3000Pcs/Reel

Block Diagram

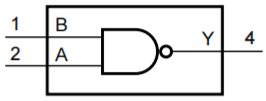


Figure 1. Logic symbol

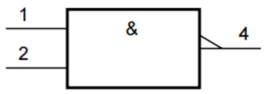


Figure 2. IEC logic symbol

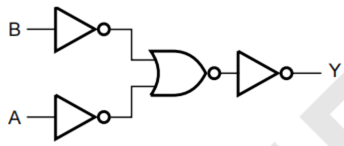
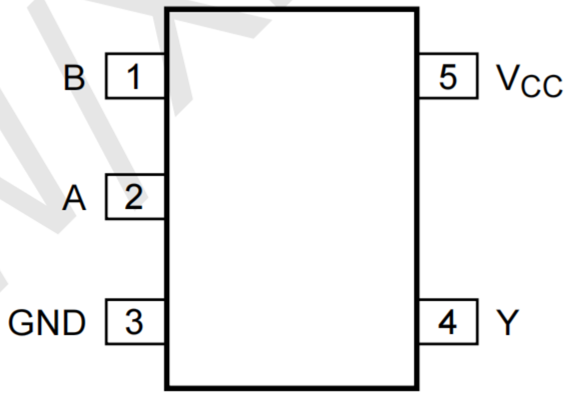


Figure 3. Logic diagram

Pin Configurations



Pin Description

Pin No.	Pin Name	Description
1	B	data input
2	A	data input
3	GND	ground (0V)
4	Y	data output
5	V_{CC}	supply voltage

Function Table

Input		Output
A	B	Y
L	L	H
L	H	H
H	L	H
H	H	L

Note: H=HIGH voltage level; L=LOW voltage level.

Electrical Parameter

Absolute Maximum Ratings

(Voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Max.	Unit
supply voltage	V_{CC}	-	-0.5	+6.5	V
input clamping current	I_{IK}	$V_I < 0V$	-50	-	mA
input voltage	V_I	-	-0.5	+6.5	V
output clamping current	I_{OK}	$V_O > V_{CC}$ or $V_O < 0V$	-	±50	mA
output voltage	V_O	Active mode	-0.5	V_{CC}+0.5	V
		Power-down mode	-0.5	+6.5	V
output current	I_O	V_O=0V to V_{CC}	-	±50	mA
supply current	I_{CC}	-	-	100	mA
ground current	I_{GND}	-	-100	-	mA
storage temperature	T_{stg}	-	-65	+150	℃
total power dissipation	P_{tot}	-	-	250	mW
soldering temperature	T_L	10s	260		℃

Recommended Operating Conditions

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
supply voltage	V_{CC}	-	1.65	-	5.5	V
input voltage	V_I	-	0	-	5.5	V
output voltage	V_O	Active mode	0	-	V_{CC}	V
		Power-down mode; V_{CC}=0V	0	-	5.5	V
ambient temperature	T_{amb}	-	-40	-	+125	℃

ESD Ratings

Parameter		Defintion	Vaue	Unit
$V_{(ESD)}$	Electrostatic discharge	Human body model (HBM), per ANSI/ESDA/JEDEC JS-001, all pins (1)	±2000	V
		Charged device model (CDM), per JEDEC specification JESD22-C101, all pins (2)	±1000	

(1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.
(2) JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process.

Electrical Characteristics

DC Characteristics 1

(T_{amb}=-40℃ to +85℃, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
HIGH-level input voltage	V_{IH}	V_{CC}=1.65V to 1.95V		0.65× V_{CC}	-	-	V
		V_{CC}=2.3V to 2.7V		1.7	-	-	V
		V_{CC}=2.7V to 3.6V		2.0	-	-	V
		V_{CC}=4.5V to 5.5V		0.7× V_{CC}	-	-	V
LOW-level input voltage	V_{IL}	V_{CC}=1.65V to 1.95V		-	-	0.35× V_{CC}	V
		V_{CC}=2.3V to 2.7V		-	-	0.7	V
		V_{CC}=2.7V to 3.6V		-	-	0.8	V
		V_{CC}=4.5V to 5.5V		-	-	0.3× V_{CC}	V
HIGH-level output voltage	V_{OH}	V_I = V_{IH} or V_{IL}	I_O=-100uA; V_{CC}=1.65V to 5.5V	V_{CC} - 0.1	-	-	V
			I_O=-4mA; V_{CC}=1.65V	1.2	-	-	V
			I_O=-8mA; V_{CC}=2.3V	1.9	-	-	V
			I_O=-12mA; V_{CC}=2.7V	2.2	-	-	V
			I_O=-24mA; V_{CC}=3.0V	2.3	-	-	V
			I_O=-32mA; V_{CC}=4.5V	3.8	-	-	V
LOW-level output voltage	V_{OL}	V_I = V_{IH} or V_{IL}	I_O=100uA; V_{CC}=1.65V to 5.5V	-	-	0.1	V
			I_O=4mA; V_{CC}=1.65V	-	-	0.45	V
			I_O=8mA; V_{CC}=2.3V	-	-	0.3	V
			I_O=12mA; V_{CC}=2.7V	-	-	0.4	V
			I_O=24mA; V_{CC}=3.0V	-	-	0.55	V
			I_O=32mA; V_{CC}=4.5V	-	-	0.55	V
input leakage current	I_I	V_I=5.5V or GND; V_{CC}=0V to 5.5V		-	-	±1	uA
power-off leakage current	I_{OFF}	V_I or V_O=5.5V; V_{CC}=0V		-	-	±2	uA
supply current	I_{CC}	V_I=5.5V or GND; I_O=0A; V_{CC}=1.65V to 5.5V		-	-	4	uA
additional supply current	ΔI_{CC}	per pin; V_I=V_{CC}-0.6V; I_O=0A; V_{CC}=2.3V to 5.5V		-	-	500	uA
input capacitance	C_I	V_{CC}=3.3V; V_I=GND to V_{CC}		-	5	-	pF

Note: All typical values are measured at V_{CC}=3.3V and T_{amb}=25℃.

DC Characteristics 2

(T_{amb}=-40℃ to +125℃, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
HIGH-level input voltage	V_{IH}	V_{CC}=1.65V to 1.95V	0.65×V_{CC}	-	-	V
		V_{CC}=2.3V to 2.7V	1.7	-	-	V
		V_{CC}=2.7V to 3.6V	2.0	-	-	V
		V_{CC}=4.5V to 5.5V	0.7×V_{CC}	-	-	V
LOW-level input voltage	V_{IL}	V_{CC}=1.65V to 1.95V	-	-	0.35×V_{CC}	V
		V_{CC}=2.3V to 2.7V	-	-	0.7	V
		V_{CC}=2.7V to 3.6V	-	-	0.8	V
		V_{CC}=4.5V to 5.5V	-	-	0.3×V_{CC}	V
HIGH-level output voltage	V_{OH}	V_I = V_{IH} or V_{IL}; I_O=-100uA; V_{CC}=1.65V to 5.5V	V_{CC} - 0.1	-	-	V
		V_I = V_{IH} or V_{IL}; I_O=-4mA; V_{CC}=1.65V	0.95	-	-	V
		V_I = V_{IH} or V_{IL}; I_O=-8mA; V_{CC}=2.3V	1.7	-	-	V
		V_I = V_{IH} or V_{IL}; I_O=-12mA; V_{CC}=2.7V	1.9	-	-	V
		V_I = V_{IH} or V_{IL}; I_O=-24mA; V_{CC}=3.0V	2.0	-	-	V
		V_I = V_{IH} or V_{IL}; I_O=-32mA; V_{CC}=4.5V	3.4	-	-	V
LOW-level output voltage	V_{OL}	V_I = V_{IH} or V_{IL}; I_O=100uA; V_{CC}=1.65V to 5.5V	-	-	0.1	V
		V_I = V_{IH} or V_{IL}; I_O=4mA; V_{CC}=1.65V	-	-	0.7	V
		V_I = V_{IH} or V_{IL}; I_O=8mA; V_{CC}=2.3V	-	-	0.45	V
		V_I = V_{IH} or V_{IL}; I_O=12mA; V_{CC}=2.7V	-	-	0.6	V
		V_I = V_{IH} or V_{IL}; I_O=24mA; V_{CC}=3.0V	-	-	0.8	V
		V_I = V_{IH} or V_{IL}; I_O=32mA; V_{CC}=4.5V	-	-	0.8	V
input leakage current	I_I	V_I=5.5V or GND; V_{CC}=0V to 5.5V	-	-	±1	uA
power-off leakage current	I_{OFF}	V_I or V_O=5.5V; V_{CC}=0V	-	-	±2	uA
supply current	I_{CC}	V_I=5.5V or GND; I_O=0A; V_{CC}=1.65V to 5.5V	-	-	4	uA
additional supply current	ΔI_{CC}	per pin; V_I=V_{CC}-0.6V; I_O=0A; V_{CC}=2.3V to 5.5V	-	-	500	uA

AC Characteristics 1

(T_{amb}=-40℃ to +85℃, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Typ.[1]	Max.	Unit
A, B to Y propagation delay	t_{PHL}	see Figure 5	V_{CC}=1.65V to 1.95V	-	12.5	18.8	ns
			V_{CC}=2.3V to 2.7V	-	10.5	15.8	ns
			V_{CC}=2.7V	-	10	15	ns
			V_{CC}=3.0V to 3.6V	-	9.5	14.3	ns
			V_{CC}=4.5V to 5.5V	-	9	13.5	ns
A, B to Y propagation delay	t_{PLH}	see Figure 5	V_{CC}=1.65V to 1.95V	-	14	21	ns
			V_{CC}=2.3V to 2.7V	-	10	15	ns
			V_{CC}=2.7V	-	9.5	14.3	ns
			V_{CC}=3.0V to 3.6V	-	8.5	12.8	ns
			V_{CC}=4.5V to 5.5V	-	7.5	11.3	ns

Note:

[1] Typical values are measuredat T_{amb}=25℃ and V_{CC}=1.8V, 2.5V, 2.7V, 3.3V and 5.0V respectively.

[2]Typical values are measured at Vcc=3.3Vor 5V.

[3]C_{PD} is used to determine the dynamic power dissipation (P_D in uW).

$P_D=C_{PD}\times V_{CC}^2\times f_i+\sum(C_L\times V_{CC}^2\times f_o)$where:

fi=input frequency in MHz;

fo=output frequency in MHz;

C_L=output loadcapacitance in pF;

Vcc=supply voltage in V;

N=number of inputs switching;

$\sum(C_L\times V_{CC}^2\times f_o)$=sum of outputs.

AC Characteristics 2

(T_{amb}=-40℃ to +125℃, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
A, B to Y propagation delay	t_{PHL}	see Figure 5	V_{CC}=1.65V to 1.95V	-	-	20.8	ns
			V_{CC}=2.3V to 2.7V	-	-	17.8	ns
			V_{CC}=2.7V	-	-	17	ns
			V_{CC}=3.0V to 3.6V	-	-	16.3	ns
			V_{CC}=4.5V to 5.5V	-	-	15.5	ns
A, B to Y propagation delay	t_{PLH}	see Figure 5	V_{CC}=1.65V to 1.95V	-	-	23	ns
			V_{CC}=2.3V to 2.7V	-	-	17	ns
			V_{CC}=2.7V	-	-	16.3	ns
			V_{CC}=3.0V to 3.6V	-	-	14.8	ns
			V_{CC}=4.5V to 5.5V	-	-	13.3	ns

Note:

[1] Typical values are measuredat Tamb=25℃ and VCC=1.8V, 2.5V, 2.7V, 3.3V and 5.0V respectively.

[2] Typical values are measured at Vcc=3.3V or 5V.

Testing Circuit

AC Testing Circuit

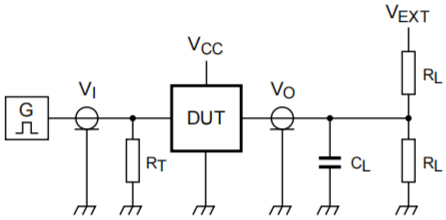


Figure 4. Test circuit for measuring switching times

Definitions for test circuit:
R_L=Load resistance.
C_L=Load capacitance including jig and probe capacitance.
R_T=Termination resistance; should be equal to the output impedance Z_o of the pulse generator.
V_{EXT}=External voltage for measuring switching times.

AC Testing Waveforms

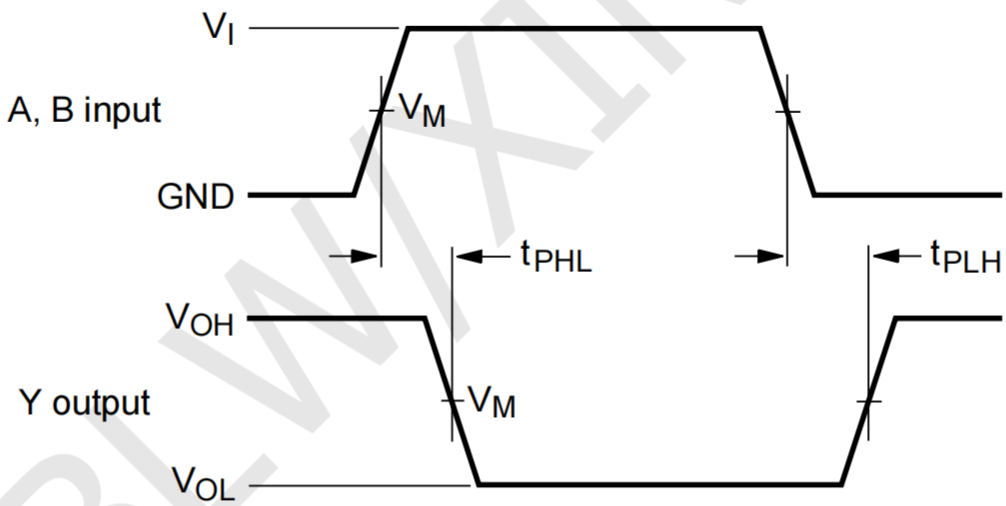


Figure 5. The input A, B to output Y propagation delays

Measurement Points

Supply voltage	Input	Output
V_{CC}	V_M	V_M
1.65V to 1.95V	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$
2.3V to 2.7V	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$
2.7V	1.5V	1.5V
3.0V to 3.6V	1.5V	1.5V
4.5V to 5.5V	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$

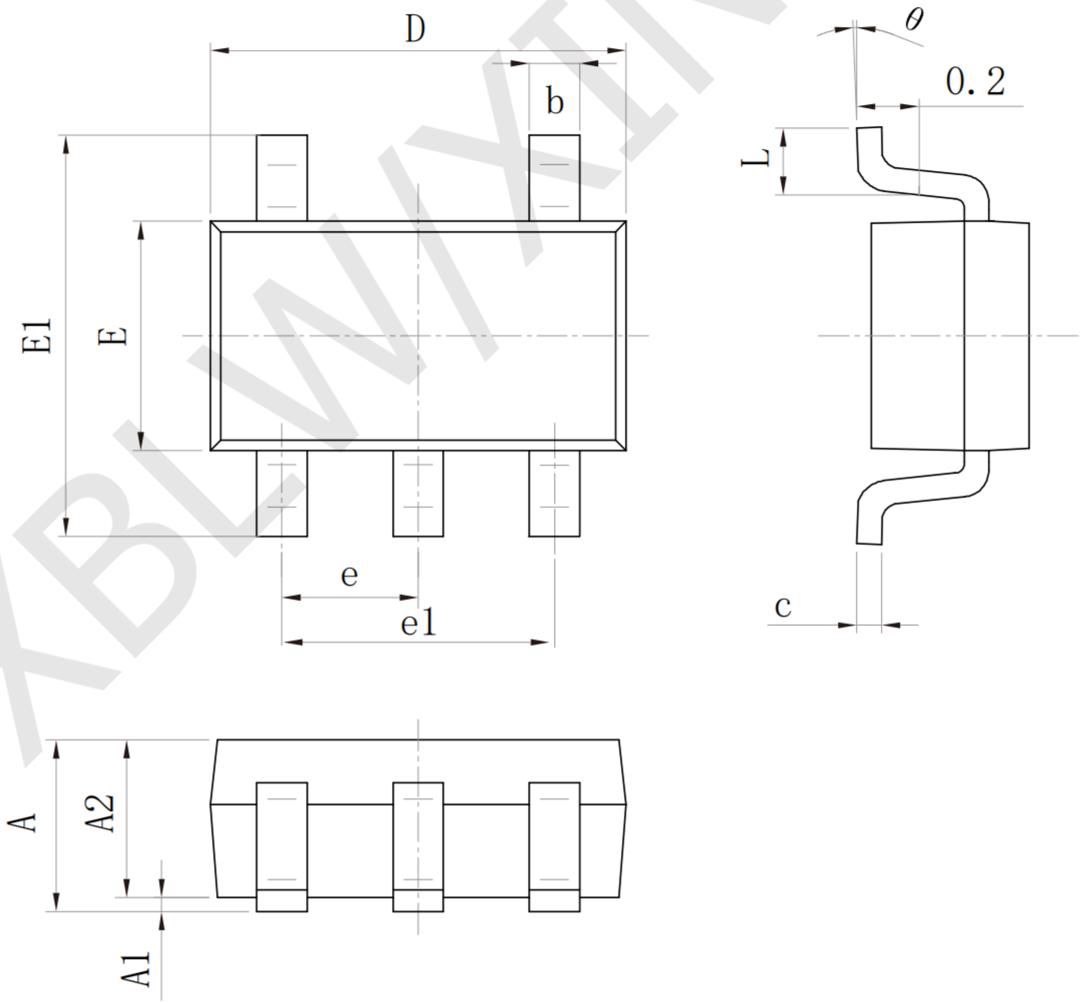
Test Data

Supply voltage	Input		Load		V_{EXT}
V_{CC}	V_I	$t_r = t_f$	C_L	R_L	t_{PLH}, t_{PHL}
1.65V to 1.95V	V_{CC}	≤ 3ns	30pF	1kΩ	open
2.3V to 2.7V	V_{CC}	≤ 3ns	30pF	500Ω	open
2.7V	2.7V	≤ 3ns	50pF	500Ω	open
3.0V to 3.6V	2.7V	≤ 3ns	50pF	500Ω	open
4.5V to 5.5V	V_{CC}	≤ 3ns	50pF	500Ω	open

Package Information

- SOT23-5

SIZE / SYMBOL	Dimensions In Millimeters		SIZE / SYMBOL	Dimensions In Inches	
	MIN (mm)	MAX (mm)		MIN (in)	MAX (in)
A	1.050	1.250	A	0.041	0.049
A1	0.000	0.100	A1	0.000	0.004
A2	1.050	1.150	A2	0.041	0.045
b	0.300	0.500	b	0.012	0.020
c	0.100	0.200	c	0.004	0.008
D	2.820	3.020	D	0.111	0.119
E	1.500	1.700	E	0.059	0.067
E1	2.650	2.950	E1	0.104	0.116
e	0.95 (BSC)		e	0.037 (BSC)	
e1	1.800	2.000	e1	0.071	0.079
L	0.300	0.600	L	0.012	0.024
θ	0°	8°	θ	0°	8°



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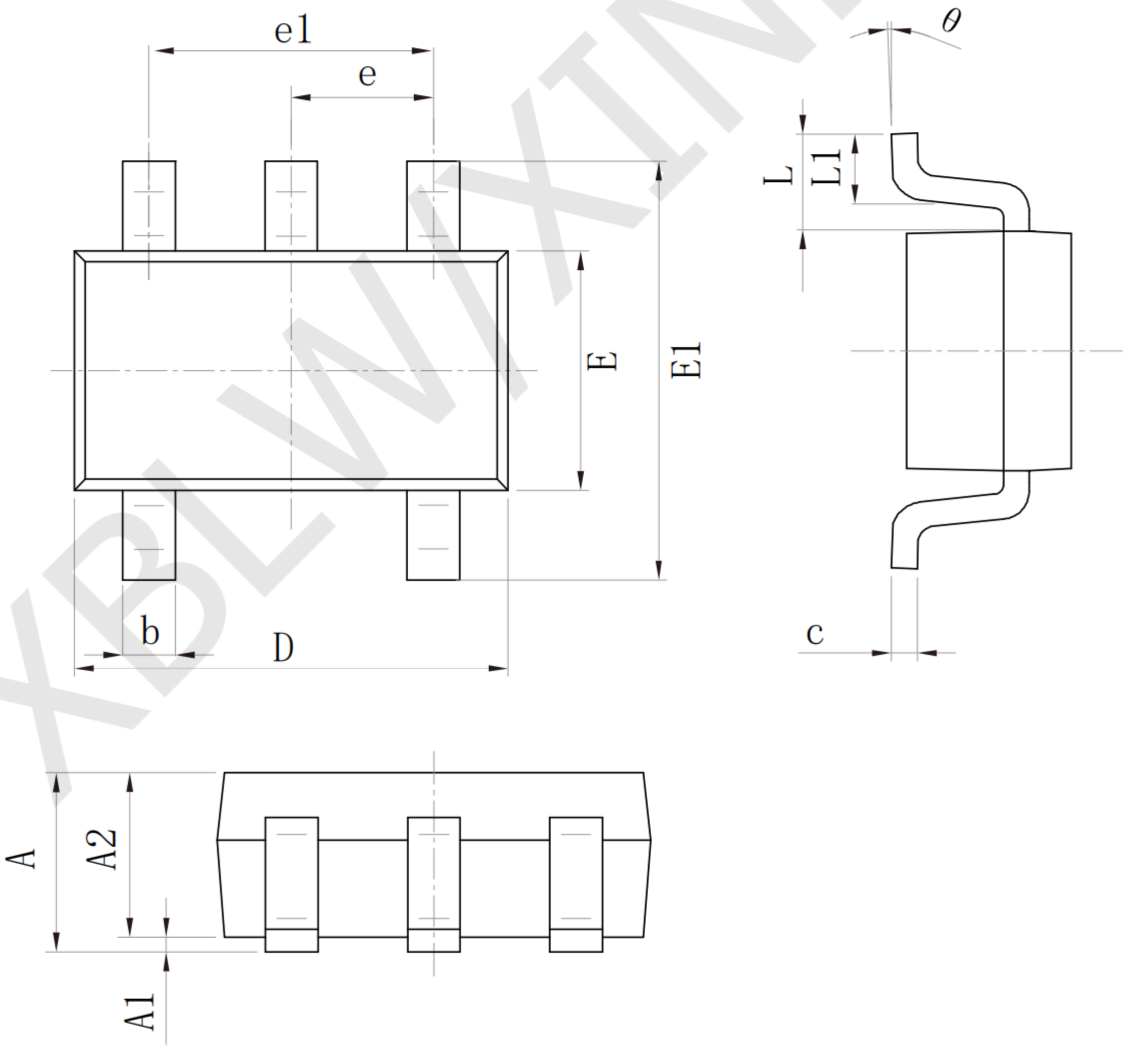
Size / Symbol	Dimensions In Millimeters		Size / Symbol	Dimensions In Inches	
	Min(mm)	Max(mm)		Min(in)	Max(in)
A	0.900	1.100	A	0.035	0.043
A1	0.000	0.100	A1	0.000	0.004
A2	0.900	1.000	A2	0.035	0.039
b	0.150	0.350	b	0.006	0.014
c	0.080	0.150	C	0.003	0.006
D	2.000	2.200	D	0.079	0.087
E	1.150	1.350	E	0.045	0.053
E1	2.150	2.450	E1	0.085	0.096
e	0.650(TYP)		e	0.026(TYP)	
e1	1.200	1.400	e1	0.047	0.055
L	0.525(REF)		L	0.021(REF)	
L1	0.260	0.460	L1	0.010	0.018
θ	0°	8°	θ	0°	8°



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