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XINBOLE

Product Specification

XBLW SN74LVC1G125

Single Bus Buffer Gate With 3-State Output

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Description

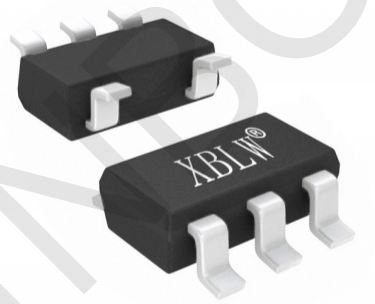
The SN74LVC1G125 provides one non-inverting buffer/line driver with 3-state output. The 3-state output is controlled by the output enable input ($\overline{OE}$). A HIGH-level at pin $\overline{OE}$ causes the output to assume a high-impedance OFF-state.

The input can be driven from either 3.3V or 5V devices. This feature allows the use of this device in a mixed 3.3V and 5V environment.

This device is fully specified for partial power-down applications using I_{OFF}. The I_{OFF} circuitry disables the output, preventing the damaging backflow current through the device when it is powered down.

Features

- ±24 mA output drive (VCC = 3.0 V)
- CMOS low power consumption
- Direct interface with TTL levels
- Latch-up performance exceeds 250 mA
- Overvoltage tolerant inputs to 5.5 V
- Wide supply voltage range from 1.65 V to 5.5 V
- Specked from -40 °C to +105 °C
- Packaging information: SOT-23-5/SOT-353



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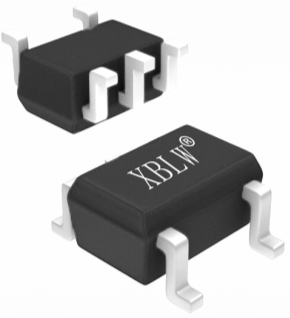
Applications

- Cable Modem Termination System
- High-Speed Data Acquisition and Generation
- Military: Radar and Sonar
- Motor Control: High-Voltage
- Power Line Communication Modem
- SSD: Internal or External
- Video Broadcasting and Infrastructure: Scalable Platform



SOT-353

Ordering Information

Product Model	Package Type	Marking	Packing	Packing Qty
XBLW SN74LVC1G125T235	SOT-23-5	ACXX	Tape	3000Pcs/Reel
XBLW SN74LVC1G125T353	SOT-353	ACXX	Tape	3000Pcs/Reel

Block Diagram

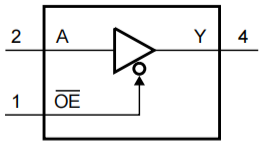


Figure 1. Logic symbol

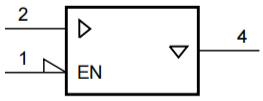


Figure 2. IEC logic symbol

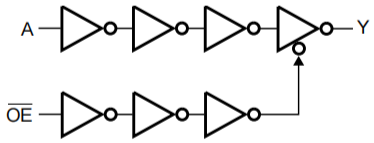
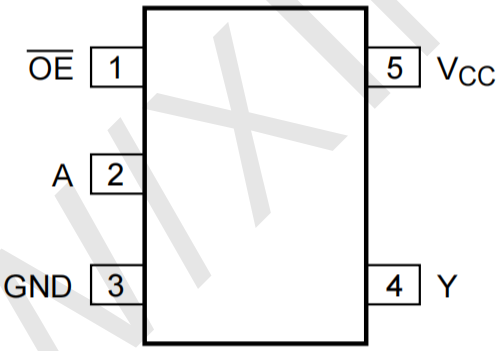


Figure 3. Logic diagram

Pin Configurations



Pin Description

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

Function Table

Input		Output
$\overline{OE}$	A	Y
L	L	L
L	H	H
H	X	Z

Note: H=HIGH voltage level; L=LOW voltage level; X=don't care; Z=high-impedance OFF-state.

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
output voltage	V_O	Active mode	-0.5	Vcc+0.5	V
		Power-down mode	-0.5	6.5	V
input voltage	V_i	-	-0.5	6.5	V
input clamping current	I_{IK}	Vi < 0V	-50	-	mA
Output clamping current	I_{OK}	Vo > Vcc or Vo < 0V	-	±50	mA
output current	I_O	Vo=0V to Vcc	-	±50	mA
supply current	I_{CC}	-	-	100	mA
ground current	I_{GND}	-	-100	-	mA
total power dissipation	P_{tot}	-	-	250	mW
storage temperature	T_{stg}	-	-65	150	°C
Soldering temperature	T_L	10s		250	°C

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	-	Vcc	V
		Power-down mode; Vcc=0V	0	-	5.5	V
ambient temperature	T_{amb}		-40	-	105	°C
input transition rise and fall rate	△t/△V	Vcc=1.65V to 2.7V	-	-	20	ns/V
		Vcc=2.7V to 5.5V	-	-	10	ns/V

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

(Tamb=-40°C to +85°C, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
HIGH-level input voltage	V_{IH}	Vcc=1.65V to 1.95V		0.65xVcc	-	-	V
		Vcc=2.3V to 2.7V		1.7	-	-	V
		Vcc=2.7V to 3.6V		2.0	-	-	V
		Vcc=4.5V to 5.5V		0.7xVcc	-	-	V
LOW-level input voltage	V_{iL}	Vcc=1.65V to 1.95V			-	0.35xVcc	V
		Vcc=2.3V to 2.7V		-	-	0.7	V
		Vcc=2.7V to 3.6V		-	-	0.8	V
		Vcc=4.5V to 5.5V		-	-	0.3xVcc	V
HIGH-level output voltage	V_{OH}	$V_I = V_{IH}$ or V_{IL}	Io=-100uA; Vcc=1.65V to 5.5V	Vcc-0.1	-		V
			Io=-4mA; Vcc=1.65V	1.2			V
			Io=-8mA; Vcc=2.3V	1.9			V
			Io=-12mA; Vcc=2.7V	2.2			V
			Io=-24mA; Vcc=3.0V	2.3			V
			Io=-32mA; Vcc=4.5V	3.8			V
LOW-level output voltage	V_{OL}	$V_I = V_{IH}$ or V_{IL}	Io=100uA; Vcc=1.65V to 5.5V	-	-	0.10	V
			Io=4mA; Vcc=1.65V			0.45	V
			Io=8mA; Vcc=2.3V			0.30	V
			Io=12mA; Vcc=2.7V			0.40	V
			Io=24mA; Vcc=3.0V			0.55	V
			Io=32mA; Vcc=4.5V			0.55	V
input leakage current	I_i	V_I=5.5V or GND; Vcc=0V to 5.5V		-	±0.1	±1	uA
OFF-state output current	I_{OZ}	$V_I=V_{IH}$ or V_{IL}; V_O=5.5V or GND; Vcc=3.6V		-	±0.1	±2	uA
power-off leakage current	I_{OFF}	V_I or V_O=5.5V; Vcc=0V		-	±0.1	±2	uA
supply current	I_{CC}	V_I=5.5V or GND; Io=0A; Vcc=1.65V to 5.5V		-	0.1	4	uA
additional supply current	$\triangle I_{CC}$	per pin; Vi=Vcc-0.6V; Io=0A; Vcc=2.3V to 5.5V		-	5	500	uA
input capacitance	C_i	-		-	5	-	pF

Note: All typical values are measured at Vcc=3.3V and Tamb=25°C.

DC Characteristics 2

(Tamb=-40°C to +105°C, voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
HIGH-level input voltage	V_{IH}	Vcc=1.65V to 1.95V		0.65xVcc	-	-	V
		Vcc=2.3V to 2.7V		1.7	-	-	V
		Vcc=2.7V to 3.6V		2.0	-	-	V
		Vcc=4.5V to 5.5V		0.7xVcc	-	-	V
LOW-level input voltage	V_{iL}	Vcc=1.65V to 1.95V			-	0.35xVcc	V
		Vcc=2.3V to 2.7V		-	-	0.7	V
		Vcc=2.7V to 3.6V		-	-	0.8	V
		Vcc=4.5V to 5.5V		-	-	0.3xVcc	V
HIGH-level output voltage	V_{OH}	V_I = V_{IH} or V_{IL}	Io=-100uA; Vcc=1.65V to 5.5V	Vcc -0.1	-		V
			Io=-4mA; Vcc=1.65V	0.95			V
			Io=-8mA; Vcc=2.3V	1.7			V
			Io=-12mA; Vcc=2.7V	1.9			V
			Io=-24mA; Vcc=3.0V	2.0			V
			Io=-32mA; Vcc=4.5V	3.4			V
LOW-level output voltage	V_{OL}	V_I = V_{IH} or V_{IL}	Io=100uA; Vcc=1.65V to 5.5V	-	-	0.10	V
			Io=4mA; Vcc=1.65V			0.70	V
			Io=8mA; Vcc=2.3V			0.45	V
			Io=12mA; Vcc=2.7V			0.60	V
			Io=24mA; Vcc=3.0V			0.80	V
			Io=32mA; Vcc=4.5V			0.80	V
input leakage current	I_i	V_I=5.5V or GND; Vcc=0V to 5.5V		-	-	±1	uA
OFF-state output current	I_{OZ}	V_I=V_{IH} or V_{IL}; V_O=5.5V or GND; Vcc=3.6V		-	-	±2	uA
power-off leakage current	I_{OFF}	V_I or V_O=5.5V; Vcc=0V		-	-	±2	uA
supply current	I_{CC}	V_I=5.5V or GND; Io=0A; Vcc=1.65V to 5.5V		-	-	4	uA
additional supply current	$\triangle I_{CC}$	per pin; V_i=Vcc-0.6V; Io=0A; Vcc=2.3V to 5.5V		-	-	500	uA

Note: All typical values are measured at Vcc=3.3V and Tamb=25°C.

AC Characteristics 1

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

Parameter	Symbol	Conditions		Min.	Typ. [1]	Max.	Unit
A to Y propagation delay	t_{PLH}, t_{PHL}	see Figure 5	V_{CC}=1.65V to 1.95V	-	9.9	14.9	ns
			V_{CC}=2.3V to 2.7V	-	6.6	9.9	ns
			V_{CC}=2.7V	-	7.5	11.3	ns
			V_{CC}=3.0V to 3.6V	-	6.3	9.5	ns
			V_{CC}=4.5V to 5.5V	-	5.1	7.7	ns
$\overline{OE}$ to Y enable time	t_{PZH}, t_{PZL}	see Figure 6	V_{CC}=1.65V to 1.95V	-	12.3	18.5	ns
			V_{CC}=2.3V to 2.7V	-	8.4	12.6	ns
			V_{CC}=2.7V	-	9.9	14.9	ns
			V_{CC}=3.0V to 3.6V	-	7.2	10.8	ns
			V_{CC}=4.5V to 5.5V	-	6.3	9.5	ns
$\overline{OE}$ to Y disable time	t_{PLZ}, t_{PHZ}	see Figure 6	V_{CC}=1.65V to 1.95V	-	12.9	19.4	ns
			V_{CC}=2.3V to 2.7V	-	8.1	12.2	ns
			V_{CC}=2.7V	-	9.0	13.5	ns
			V_{CC}=3.0V to 3.6V	-	9.3	14.0	ns
			V_{CC}=4.5V to 5.5V	-	6.6	9.9	ns

Note:

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

AC Characteristics 2

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

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
A to Y propagation delay	t_{PLH}, t_{PHL}	see Figure 5	V_{CC}=1.65V to 1.95V	-	-	19.5	ns
			V_{CC}=2.3V to 2.7V	-	-	12.6	ns
			V_{CC}=2.7V	-	-	14.3	ns
			V_{CC}=3.0V to 3.6V	-	-	12.6	ns
			V_{CC}=4.5V to 5.5V	-	-	10.5	ns
$\overline{OE}$ to Y enable time	t_{PZH}, t_{PZL}	see Figure 6	V_{CC}=1.65V to 1.95V	-	-	23.6	ns
			V_{CC}=2.3V to 2.7V	-	-	16.2	ns
			V_{CC}=2.7V	-	-	19.1	ns
			V_{CC}=3.0V to 3.6V	-	-	14.3	ns
			V_{CC}=4.5V to 5.5V	-	-	12.3	ns
$\overline{OE}$ to Y disable time	t_{PLZ}, t_{PHZ}	see Figure 6	V_{CC}=1.65V to 1.95V	-	-	25.2	ns
			V_{CC}=2.3V to 2.7V	-	-	15.8	ns
			V_{CC}=2.7V	-	-	17.6	ns
			V_{CC}=3.0V to 3.6V	-	-	18.1	ns
			V_{CC}=4.5V to 5.5V	-	-	13.0	ns

Testing Circuit

AC Testing Circuit

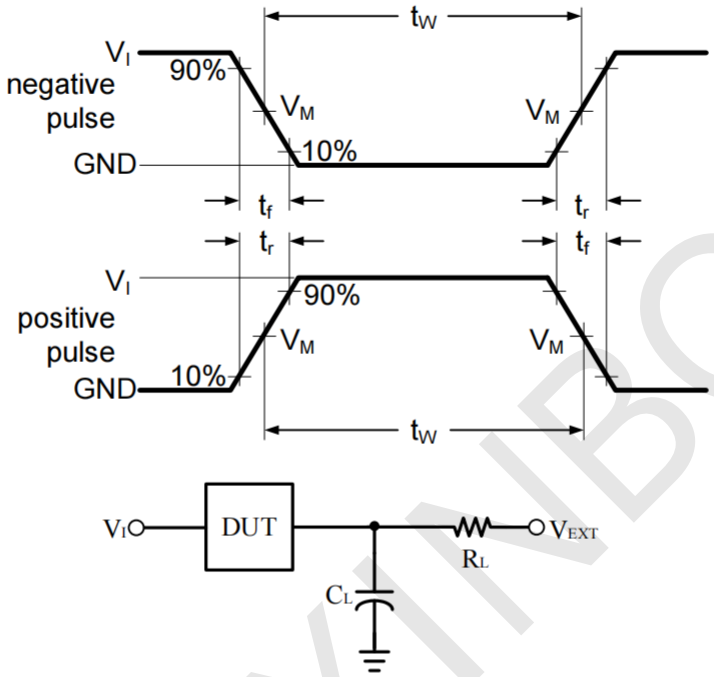


Figure 4. Load circuit

C_L includes probe and jig capacitance.

AC Testing Waveforms

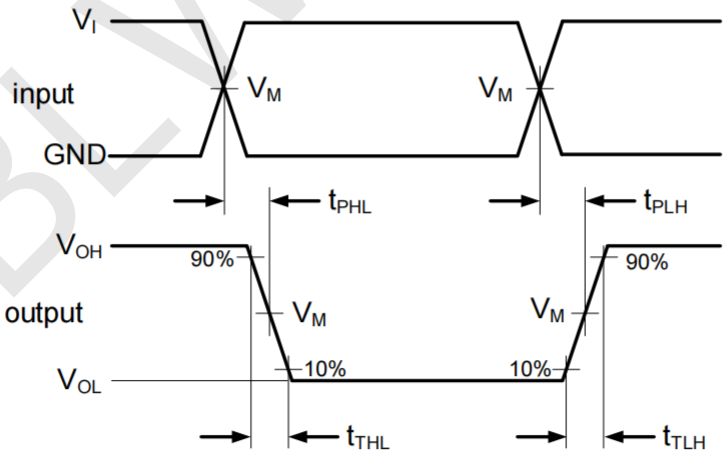


Figure 5. The input A to output Y propagation delay times

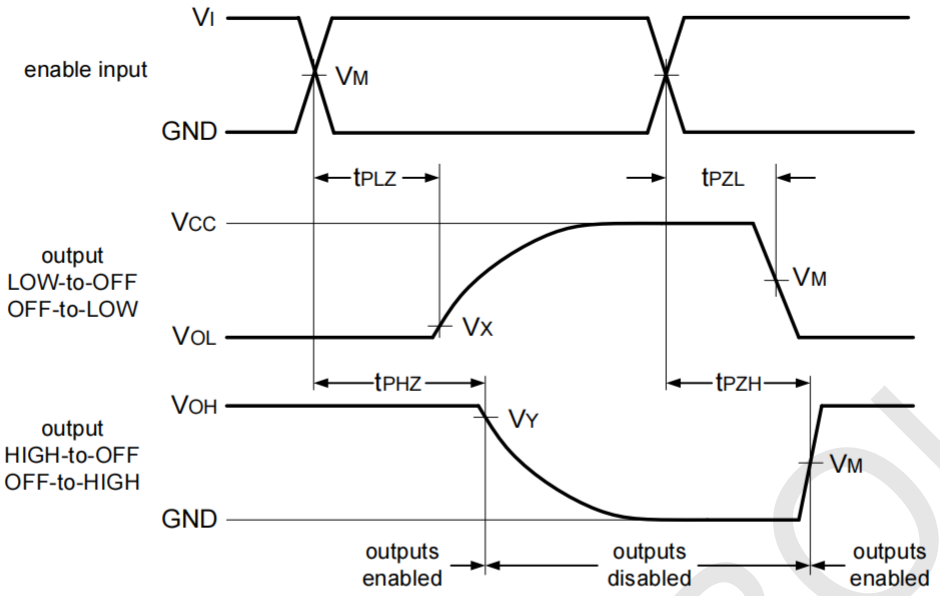


Figure 6. 3-state enable and disable times

Measurement Points

Supply voltage	Input	Output		
V_{CC}	V_M	V_M	V_X	V_Y
1.65V to 1.95V	0.5×V_{CC}	0.5×V_{CC}	V_{OL}+0.15V	V_{OH}-0.15V
2.3V to 2.7V	0.5×V_{CC}	0.5×V_{CC}	V_{OL}+0.15V	V_{OH}-0.15V
2.7V	1.5V	1.5V	V_{OL}+0.3V	V_{OH}-0.3V
3.0V to 3.6V	1.5V	1.5V	V_{OL}+0.3V	V_{OH}-0.3V
4.5V to 5.5V	0.5×V_{CC}	0.5×V_{CC}	V_{OL}+0.3V	V_{OH}-0.3V

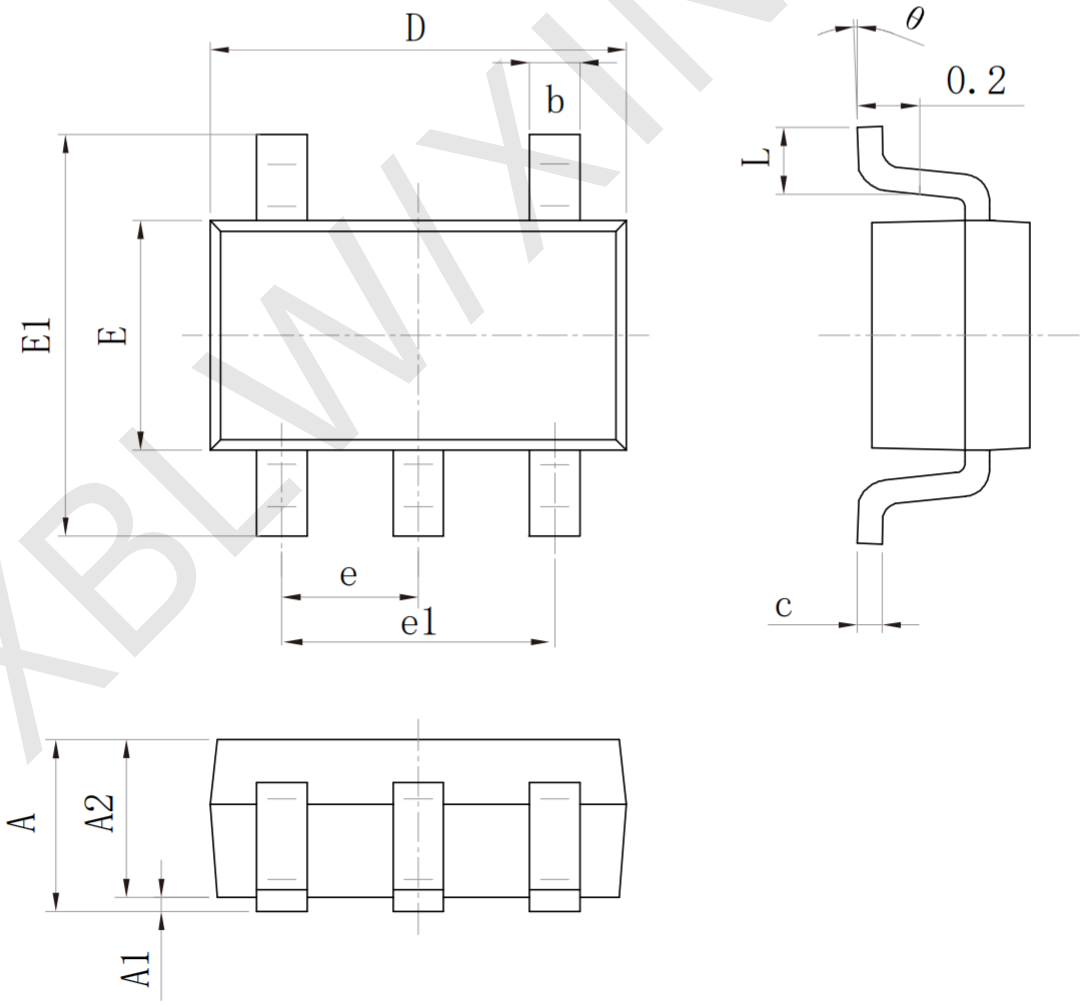
Test Data

Supply voltage	Input		Load		V_{EXT}		
V_{CC}	V_I	t_r, t_f	C_L	R_L	t_{PLH}, t_{PHL}	t_{PZH}, t_{PHZ}	t_{PZL}, t_{PLZ}
1.65V to 1.95V	V_{CC}	≤3ns	30pF	1kΩ	open	GND	2×V_{CC}
2.3V to 2.7V	V_{CC}	≤3ns	30pF	500Ω	open	GND	2×V_{CC}
2.7V	2.7V	≤3ns	50pF	500Ω	open	GND	6V
3.0V to 3.6V	2.7V	≤3ns	50pF	500Ω	open	GND	6V
4.5V to 5.5V	V_{CC}	≤3ns	50pF	500Ω	open	GND	2×V_{CC}

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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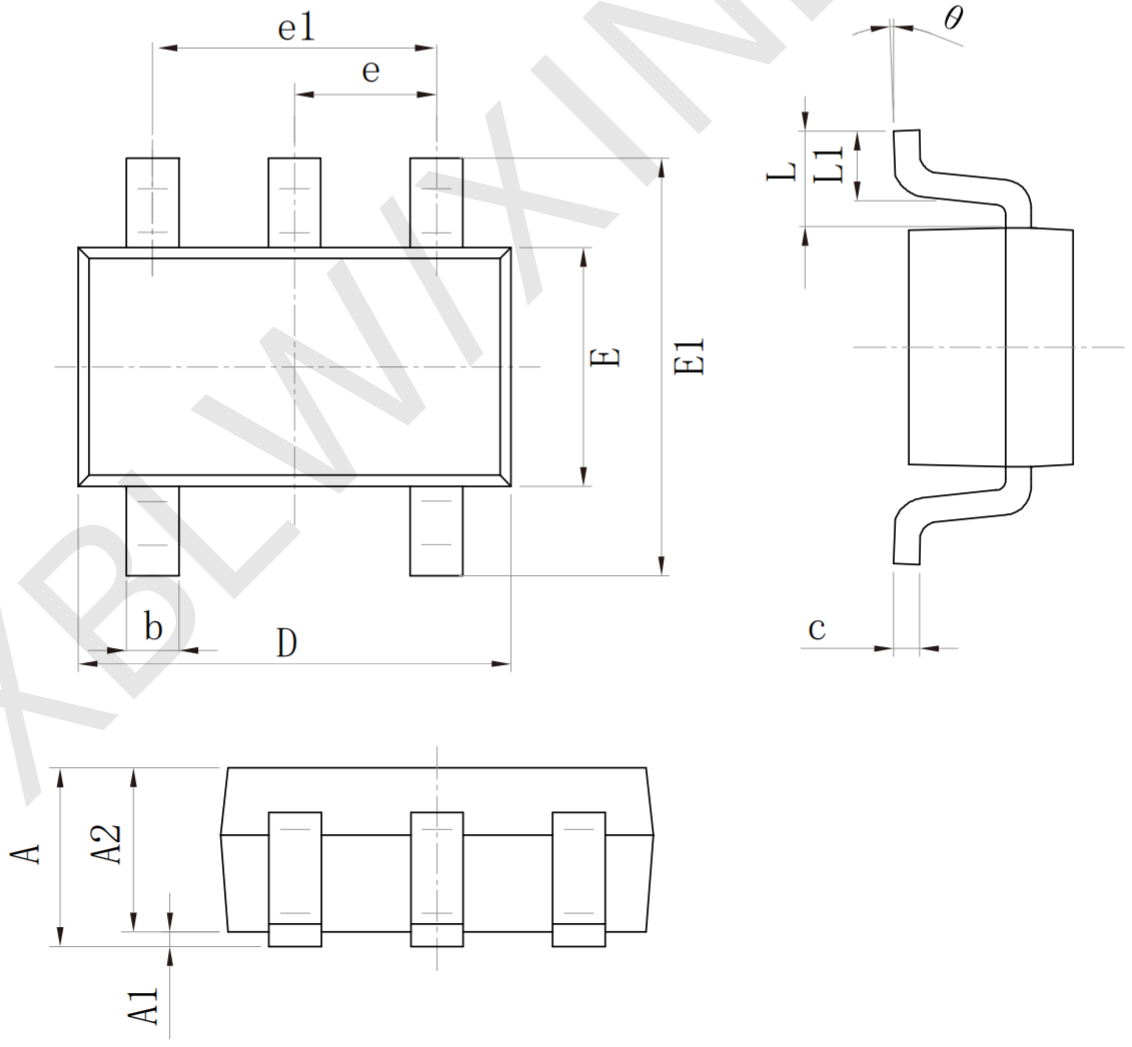
Size / Symbol	Dimensions In Millimeters		Size / Symbol	Dimensions In Inches	
	Min(mm)	Max(mm)		Min(in)	Max(in)
A	0.900	1.100	A	0.035	0.043
A1	0.000	0.100	A1	0.000	0.004
A2	0.900	1.000	A2	0.035	0.039
b	0.150	0.350	b	0.006	0.014
c	0.080	0.150	C	0.003	0.006
D	2.000	2.200	D	0.079	0.087
E	1.150	1.350	E	0.045	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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