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Product Specification

XBLW SN74LVC1G125

Single Bus Buffer Gate With 3-State Output

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Description

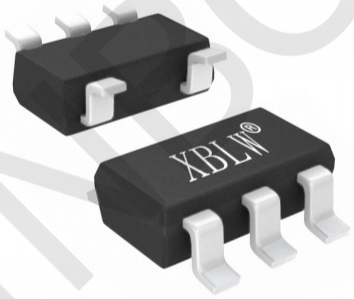
The SN74LVC1G125 provides one non-inverting buffer/line driver with 3-state output. The 3-state output is controlled by the output enable input ($\overline{OE}$). A HIGH-level at pin $\overline{OE}$ causes the output to assume a high-impedance OFF-state.

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

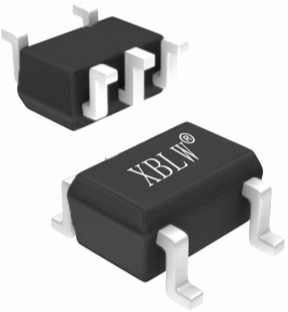
- ±24 mA output drive (VCC = 3.0 V)
- CMOS low power consumption
- Direct interface with TTL levels
- Latch-up performance exceeds 250 mA
- Overvoltage tolerant inputs to 5.5 V
- Wide supply voltage range from 1.65 V to 5.5 V
- Specked from -40 °C to +105 °C
- Packaging information: SOT-23-5/SOT-353



SOT23-5

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



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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

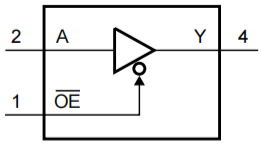


Figure 1. Logic symbol

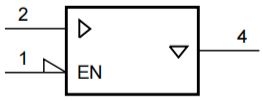


Figure 2. IEC logic symbol

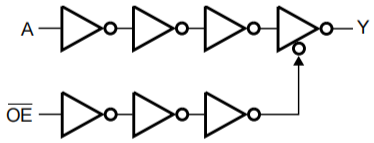
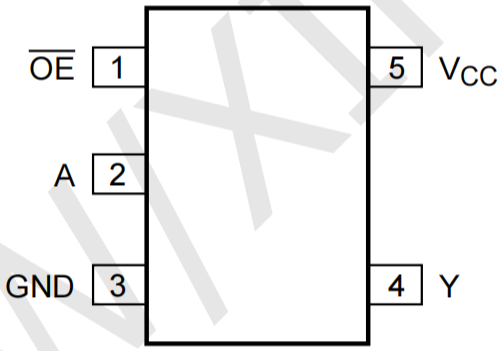


Figure 3. Logic diagram

Pin Configurations



Pin Description

Pin No.	Pin Name	Description
1	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
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

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

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
A to Y propagation delay	t_{pd}	see Figure 5	Vcc=1.65V to 1.95 V	1.0	3.3	&0	ns
			Vcc=2.3V to 2.7V	0.5	2.2	5.5	ns
			Vcc=2.7V	0.5	2.5	5.5	ns
			Vcc=3.0V to 3.6V	0.5	2.1	4.5	ns
			Vcc=4.5V to 5.5V	0.5	1.7	4.0	ns
OE to Y enable time	t_{en}	see Figure 6	Vcc=1.65V to 1.95 V	1.0	4.1	9.4	ns
			Vcc=2.3V to 2.7V	0.5	2.8	6.6	ns
			Vcc=2.7V	0.5	3.3	6.6	ns
			Vcc=3.0V to 3.6V	0.5	2.4	5.3	ns
			Vcc=4.5V to 5.5V	0.5	2.1	5.0	ns
OE to Y disable time	t_{dis}	see Figure 6	Vcc=1.65V to 1.95 V	1.0	4.3	9.2	ns
			Vcc=2.3V to 2.7V	0.5	2.7	5.0	ns
			Vcc=2.7V	0.5	3.0	5.0	ns
			Vcc=3.0V to 3.6V	0.5	3.1	5.0	ns
			Vcc=4.5V to 5.5V	0.5	2.2	4.2	ns
Power dissipation capacitance	C_{PD}		output enabled	-	25	-	pF
			output disabled	-	6	-	pF

Note:

[1] Typical values are measured at Tamb=25°C. and Vcc=1.8V, 2.5V, 2.7V, 3.3V and 5.0V respectively.

[2] t_{pd} is the same as tPLH and tPHL.

[3] t_{en} is the same as tPZH and tPZL.

[4] t_{dis} is the same as tPLZ and tPHZ.

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

$P_D=(C_{PD} \times Vcc^2 \times f_i \times N)+X(C_L \times Vcc^2 \times f_o)$ where:

fi=input frequency in MHz;

fo=output frequency in MHz;

C_L=output load capacitance in pF;

Vcc=supply voltage in V;

N=number of inputs switching.

$\sum(C_L \times Vcc^2 \times f_o)$=sum of outputs.

AC 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
A to Y propagation delay	t_{pd}	see Figure 5	Vcc=1.65V to 1.95 V	1.0		10.5	ns
			Vcc=2.3V to 2.7V	0.5		7.0	ns
			Vcc=2.7V	0.5		7.0	ns
			Vcc=3.0V to 3.6V	0.5		6.0	ns
			Vcc=4.5V to 5.5V	0.5		5.5	ns
OE to Y enable time	t_{en}	see Figure 6	Vcc=1.65V to 1.95 V	1.0		12.0	ns
			Vcc=2.3V to 2.7V	0.5		8.5	ns
			Vcc=2.7V	0.5		8.5	ns
			Vcc=3.0V to 3.6V	0.5		7.0	ns
			Vcc=4.5V to 5.5V	0.5		6.5	ns
OE to Y disable time	t_{dis}	see Figure 6	Vcc=1.65V to 1.95 V	1.0		12.0	ns
			Vcc=2.3V to 2.7V	0.5		6.5	ns
			Vcc=2.7V	0.5		6.5	ns
			Vcc=3.0V to 3.6V	0.5		6.5	ns
			Vcc=4.5V to 5.5V	0.5		5.5	ns

Note:

[1] Typical values are measured at Tamb=25°C. and Vcc=1.8V, 2.5V, 2.7V, 3.3V and 5.0V respectively.

[2] t_{pd} is the same as tPLH and tPHL.

[3] t_{en} is the same as tPZH and tPZL.

[4] t_{dis} is the same as tPLZ and tPHZ.

Testing Circuit

AC Testing Circuit

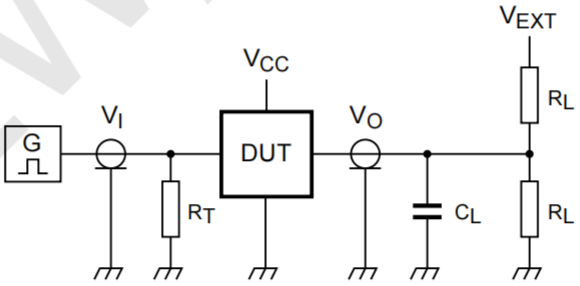


Figure 4. Test circuit for measuring switching times

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 Zo of the pulse generator.

V_{EXT}=External voltage for measuring switching times.

AC Testing Waveforms

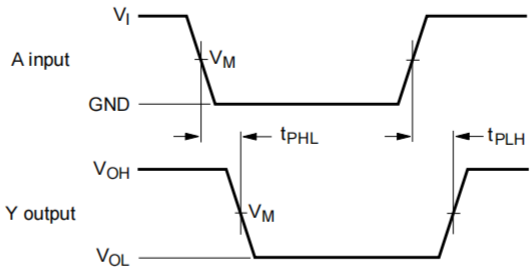


Figure 5. The input A to output Y propagation delay times

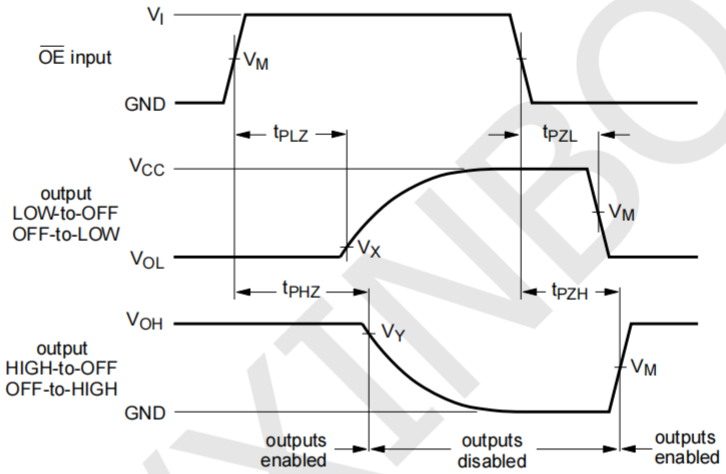


Figure 6. 3-state enable and disable times

Measurement Points

Supply voltage	Input	Output		
V_{CC}	V_M	V_M	V_X	V_Y
1.65V to 1.95 V	0.5xVcc	0.5xVcc	V_{OL}+0.15V	V_{OH}-0.15V
2.3V to 2.7V	0.5xVcc	0.5xVcc	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	0.5xVcc	0.5xVcc	V_{OL}+0.3V	V_{OH}-0.3V

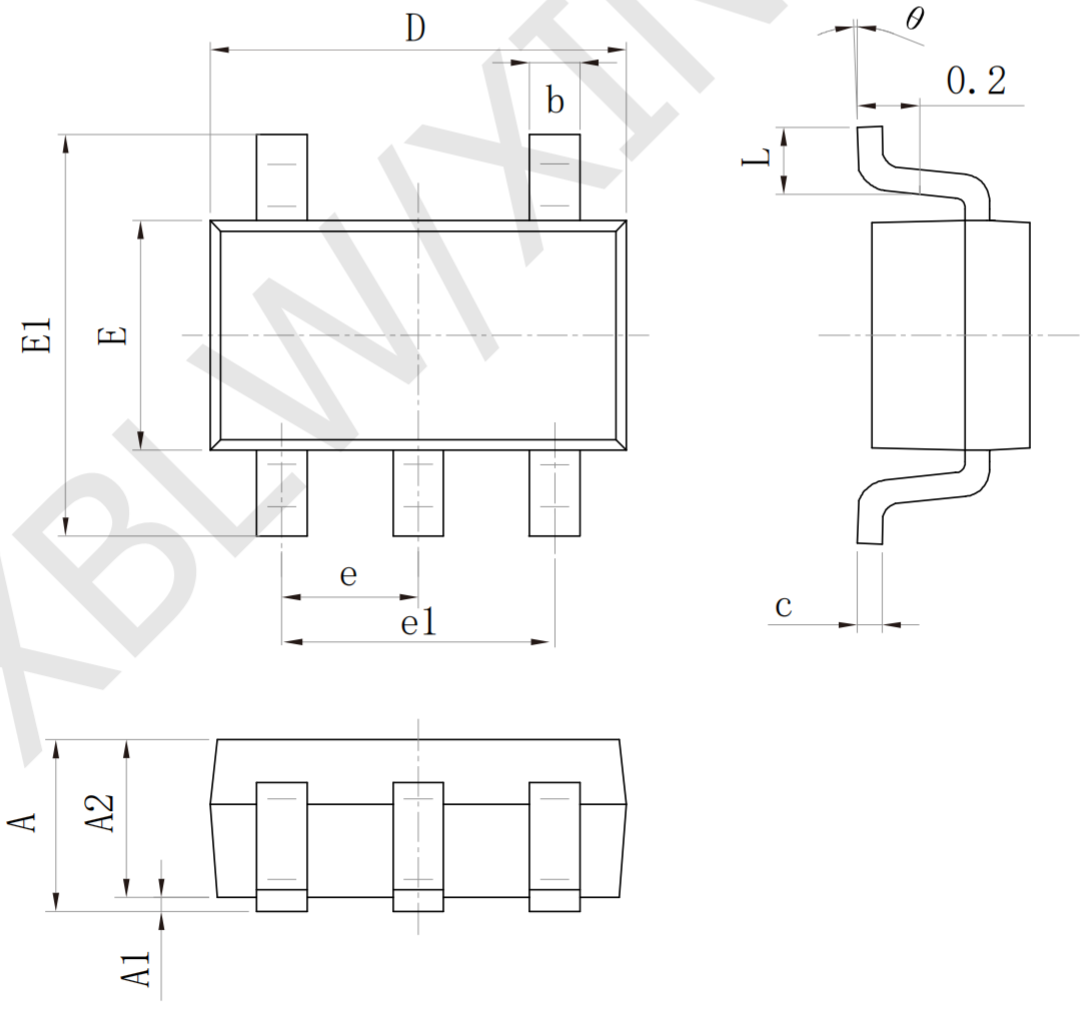
Test Data

Supply voltage	Input		Load		V_{EXT}		
V_{CC}	V_I	T_r,t_f	C_L	R_L	t_{PLH}, t_{PHL}	t_{PZH}, tP_{HZ}	t_{PZL}, t_{PLZ}
1.65V to 1.95 V	Vcc	<2.0ns	30pF	1kQ	open	GND	2xVcc
2.3V to 2.7V	Vcc	<2.0ns	30pF	500Q	open	GND	2xVcc
2.7V	2.7V	<2.5ns	50pF	500Q	open	GND	6V
3.0V to 3.6V	2.7V	<2.5ns	50pF	500Q	open	GND	6V
4.5V to 5.5V	Vcc	<2.5ns	50pF	500Q	open	GND	2xVcc

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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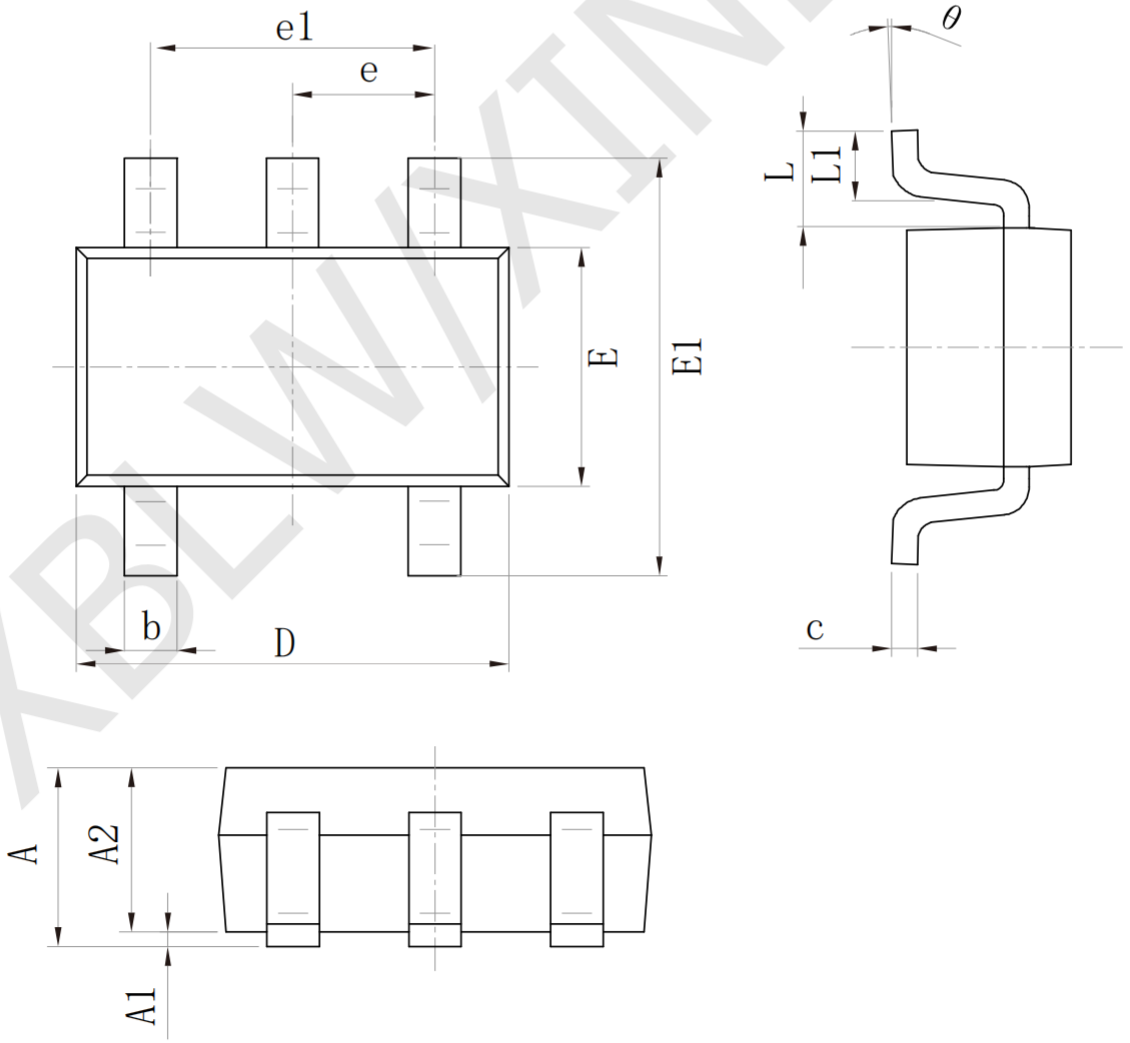
Size / Symbol	Dimensions In Millimeters		Size / Symbol	Dimensions In Inches	
	Min(mm)	Max(mm)		Min(in)	Max(in)
A	0.900	1.100	A	0.035	0.043
A1	0.000	0.100	A1	0.000	0.004
A2	0.900	1.000	A2	0.035	0.039
b	0.150	0.350	b	0.006	0.014
c	0.080	0.150	C	0.003	0.006
D	2.000	2.200	D	0.079	0.087
E	1.150	1.350	E	0.045	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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- Any semi-guide product is subject to failure or malfunction under specified conditions. It is the buyer's responsibility to comply with safety standards when using XBLW products for system design and whole machine manufacturing. And take the appropriate safety measures to avoid the potential in the risk of loss of personal injury or loss of property situation!

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