

Product Specification

XBLW SN74LVC1G17

Single Schmitt Trigger Buffer

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Description

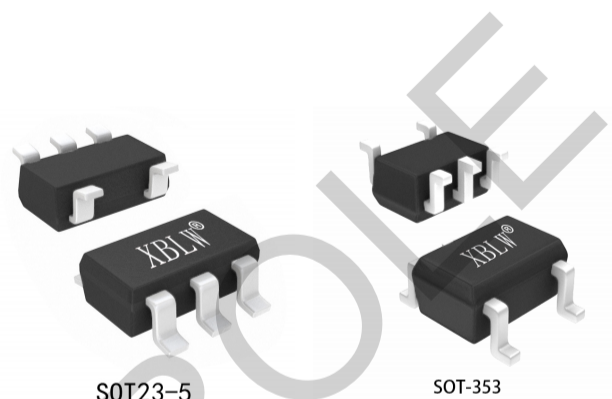
The SN74LVC1G17 provides a buffer function with Schmitt trigger input. It is capable of transforming slowly changing input signals into sharply defined outputs.

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.

Features

- Wide supply voltage range from 1.65V to 5.5V
- $\pm 24\text{mA}$ output drive ($V_{CC}=3.0\text{V}$)
- CMOS low power consumption
- Direct interface with TTL levels
- Unlimited rise and fall times
- Input accepts voltages up to 5V
- Specified from -40°C to $+125^{\circ}\text{C}$
- Packaging information: SOT-23-5/SOT-353



Applications

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

Ordering Information

Product Model	Package Type	Marking	Packing	Packing Qty
XBLW SN74LVC1G17T235	SOT-23-5	AFXX	Tape	3000Pcs/Reel
XBLW SN74LVC1G17T353	SOT-353	AFXX	Tape	3000Pcs/Reel

Block Diagram

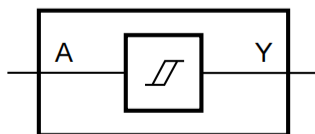


Figure 1. Logic symbol

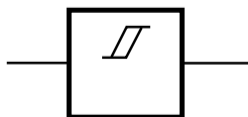


Figure 2. IEC logic symbol

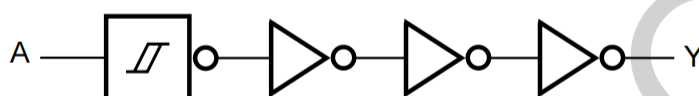
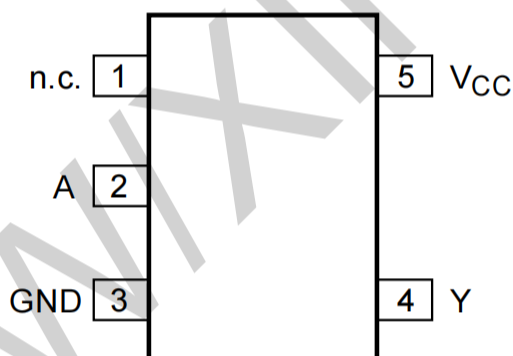


Figure 3. Logic diagram

Pin Configurations



Pin Description

Pin No.	Pin Name	Description
1	n.c.	Not Connected
2	A	Data Input
3	GND	Ground (0V)
4	Y	Data Output
5	V _{CC}	Supply Voltage

Function Table

Input	Output
A	Y
L	L
H	H

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 voltage	V_I	-	-0.5	+6.5	V
output voltage	V_O	Active mode	-0.5	$V_{CC}+0.5$	V
		Power-down mode; $V_{CC}=0V$	-0.5	+6.5	V
input clamping current	I_{IK}	$V_I < 0V$	-50	-	mA
output clamping current	I_{OK}	$V_O > V_{CC}$ or $V_O < 0V$	-	± 50	mA
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	°C
total power dissipation	P_{tot}	-	-	250	mW
soldering temperature	T_L	10s	260		°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	-	V_{CC}	V
		Power-down mode; $V_{CC}=0V$	0	-	5.5	V
ambient temperature	T_{amb}	-	-40	-	+125	°C

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
HIGH-level output voltage	V _{OH}	V _I = V _{T+} or V _{T-}	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 _{T+} or V _{T-}	I _O =100uA; V _{CC} =1.65V to 5.5V	-	-	0.10 V
			I _O =4mA; V _{CC} =1.65V	-	-	0.45 V
			I _O =8mA; V _{CC} =2.3V	-	-	0.30 V
			I _O =12mA; V _{CC} =2.7V	-	-	0.40 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	-	-	5.0	-	pF

Note: All typical values are measured at maximum V_{CC} and T_{amb}=25°C.

DC 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
HIGH-level output voltage	V _{OH}	V _I = V _{T+} or V _{T-}	I _O =-100uA; V _{CC} =1.65V to 5.5V	V _{CC} -0.1	-	V
			I _O =-4mA; V _{CC} =1.65V	0.95	-	V
			I _O =-8mA; V _{CC} =2.3V	1.7	-	V
			I _O =-12mA; V _{CC} =2.7V	1.9	-	V
			I _O =-24mA; V _{CC} =3.0V	2.0	-	V
			I _O =-32mA; V _{CC} =4.5V	3.4	-	V
LOW-level output voltage	V _{OL}	V _I = V _{T+} or V _{T-}	I _O =100uA; V _{CC} =1.65V to 5.5V	-	-	0.10 V
			I _O =4mA; V _{CC} =1.65V	-	-	0.70 V
			I _O =8mA; V _{CC} =2.3V	-	-	0.45 V
			I _O =12mA; V _{CC} =2.7V	-	-	0.60 V
			I _O =24mA; V _{CC} =3.0V	-	-	0.80 V
			I _O =32mA; V _{CC} =4.5V	-	-	0.80 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°C to +85°C, voltages are referenced to GND (ground = 0V), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ. ^[1]	Max.	Unit
A toY propagation delay	t _{PLH}	see Figure 5	V _{CC} =1.65V to 1.95V	-	14	ns
			V _{CC} =2.3V to 2.7V	-	10	ns
			V _{CC} =2.7V	-	9	ns
			V _{CC} =3.0V to 3.6V	-	8	ns
			V _{CC} =4.5V to 5.5V	-	7	ns
A toY propagation delay	t _{PHL}	see Figure 5	V _{CC} =1.65V to 1.95V	-	12.5	ns
			V _{CC} =2.3V to 2.7V	-	11	ns
			V _{CC} =2.7V	-	11	ns
			V _{CC} =3.0V to 3.6V	-	11	ns
			V _{CC} =4.5V to 5.5V	-	10	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

(Tamb=-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}	see Figure 5	$V_{CC}=1.65V$ to $1.95V$	-	-	23 ns
			$V_{CC}=2.3V$ to $2.7V$	-	-	17 ns
			$V_{CC}=2.7V$	-	-	15.5 ns
			$V_{CC}=3.0V$ to $3.6V$	-	-	14 ns
			$V_{CC}=4.5V$ to $5.5V$	-	-	12.5 ns
A to Y propagation delay	t_{PHL}	see Figure 5	$V_{CC}=1.65V$ to $1.95V$	-	-	20.8 ns
			$V_{CC}=2.3V$ to $2.7V$	-	-	18.5 ns
			$V_{CC}=2.7V$	-	-	18.5 ns
			$V_{CC}=3.0V$ to $3.6V$	-	-	18.5 ns
			$V_{CC}=4.5V$ to $5.5V$	-	-	17 ns

Transfer 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
positive-going threshold voltage	V_{T+}	see Figure 6 and Figure 7	$V_{CC}=1.8V$	0.82	1.02	1.2 V
			$V_{CC}=2.3V$	1.03	1.25	1.45 V
			$V_{CC}=3.0V$	1.29	1.5	1.71 V
			$V_{CC}=4.5V$	1.84	2.15	2.41 V
			$V_{CC}=5.5V$	2.19	2.6	2.91 V
negative-going threshold voltage	V_{T-}	see Figure 6 and Figure 7	$V_{CC}=1.8V$	0.45	0.6	0.75 V
			$V_{CC}=2.3V$	0.64	0.8	0.96 V
			$V_{CC}=3.0V$	0.86	1.1	1.34 V
			$V_{CC}=4.5V$	1.35	1.75	2.09 V
			$V_{CC}=5.5V$	1.61	2.15	2.59 V
hysteresis voltage	V_H	see Figure 6 and Figure 7	$V_{CC}=1.8V$	-	0.4	- V
			$V_{CC}=2.3V$	-	0.4	- V
			$V_{CC}=3.0V$	-	0.42	- V
			$V_{CC}=4.5V$	-	0.45	- V
			$V_{CC}=5.5V$	-	0.47	- V

Transfer Characteristics 2

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
positive-going threshold voltage	V_{T+}	see Figure 6 and Figure 7	$V_{CC}=1.8V$	0.79	-	1.2 V
			$V_{CC}=2.3V$	1.00	-	1.45 V
			$V_{CC}=3.0V$	1.26	-	1.71 V
			$V_{CC}=4.5V$	1.81	-	2.41 V
			$V_{CC}=5.5V$	2.16	-	2.91 V
negative-going threshold voltage	V_{T-}	see Figure 6 and Figure 7	$V_{CC}=1.8V$	0.45	-	0.78 V
			$V_{CC}=2.3V$	0.64	-	0.99 V
			$V_{CC}=3.0V$	0.86	-	1.37 V
			$V_{CC}=4.5V$	1.35	-	2.12 V
			$V_{CC}=5.5V$	1.61	-	2.62 V
hysteresis voltage	V_H	see Figure 6 and Figure 7	$V_{CC}=1.8V$	-	0.4	- V
			$V_{CC}=2.3V$	-	0.4	- V
			$V_{CC}=3.0V$	-	0.42	- V
			$V_{CC}=4.5V$	-	0.45	- V
			$V_{CC}=5.5V$	-	0.47	- V

Testing Circuit

AC Testing Circuit

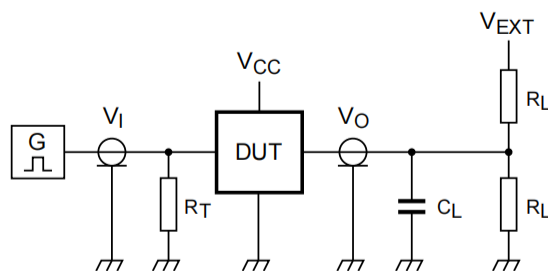


Figure 4. Test circuit for measuring switching times

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

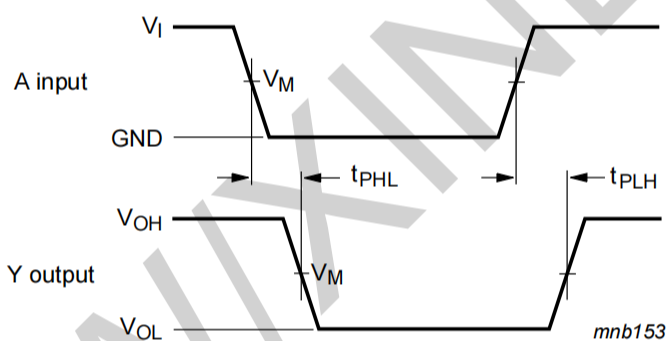


Figure 5. The data input (A) to output (Y) propagation delays

Transfer Characteristics Waveforms

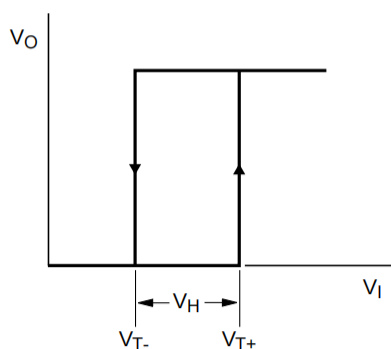


Figure 6. Transfer characteristic

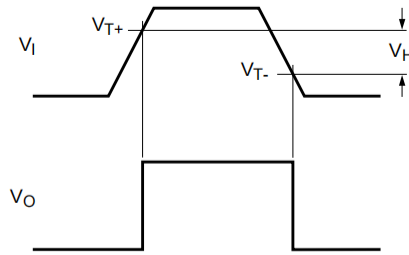


Figure 7. Definition of V_{T+} , V_{T-} and V_H

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	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$

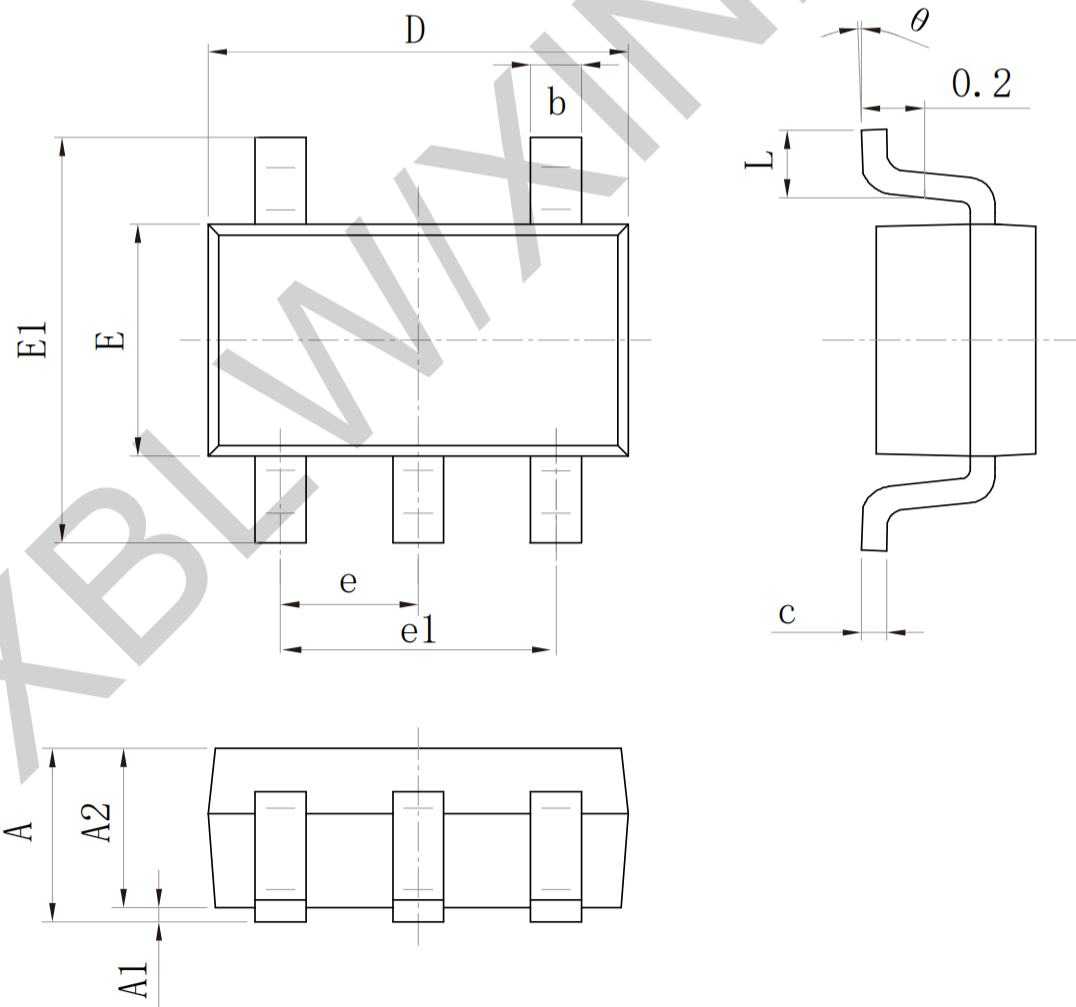
Test Data

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}	$\leq 3ns$	30pF	1k Ω	open
2.3V to 2.7V	V_{CC}	$\leq 3ns$	30pF	500 Ω	open
2.7V	2.7V	$\leq 3ns$	50pF	500 Ω	open
3.0V to 3.6V	2.7V	$\leq 3ns$	50pF	500 Ω	open
4.5V to 5.5V	V_{CC}	$\leq 3ns$	50pF	500 Ω	open

Package Information

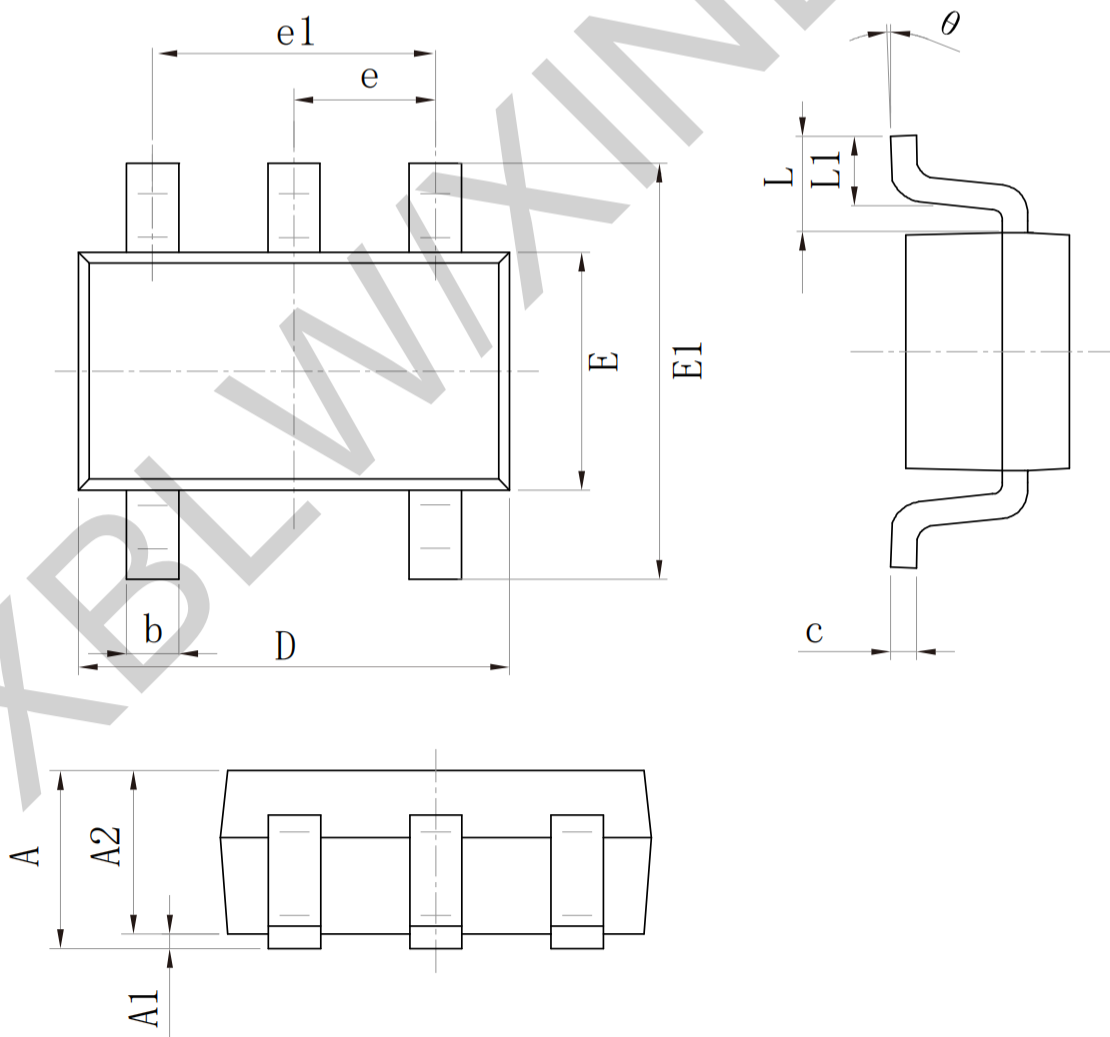
- SOT23-5

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	D1	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°



• SOT-353

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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