

Product Specification

XBLW SN74LVC1G08

Single 2-input AND Gate

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Description

The SN74LVC1G08 is a single 2-input AND gate.

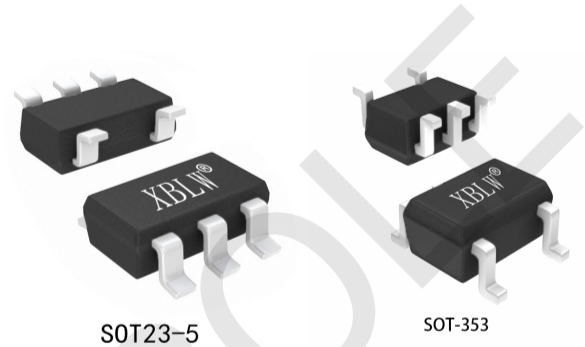
Inputs can be driven from either 3.3 V or 5 V devices.

This feature allows the use of these devices as translators in mixed 3.3 V and 5 V applications.

Schmitt trigger action at all inputs makes the circuit tolerant of slower input rise and fall time.

Features

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



Applications

- ATCA Solutions
- Active Noise Cancellation (ANC)
- Barcode Scanner
- Blood Pressure Monitor
- CPAP Machine
- Cable Solutions
- DLP 3D Machine Vision, Hyperspectral Imaging, Optical Networking, and Spectroscopy
- E-Book
- Embedded PC
- Field Transmitter: Temperature or Pressure Sensor
- Fingerprint Biometrics
- HVAC: Heating, Ventilating, and Air Conditioning
- Network-Attached Storage (NAS)
- Server Motherboard and PSU
- Software Defined Radio (SDR)
- TV: High-Definition (HDTV), LCD, and Digital
- Video Communications System
- Wireless Data Access Card, Headset, Keyboard, Mouse, and LAN Card
- X-ray: Baggage Scanner, Medical, and Dental

Ordering Information

Product Model	Package Type	Marking	Packing	Packing Qty
XBLW SN74LVC1G08T235	SOT-23-5	AEXX	Tape	3000Pcs/Reel
XBLW SN74LVC1G08T353	SOT-353	AEXX	Tape	3000Pcs/Reel

Block Diagram

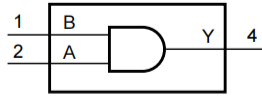


Figure 1. Logic symbol

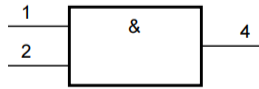


Figure 2. IEC logic symbol

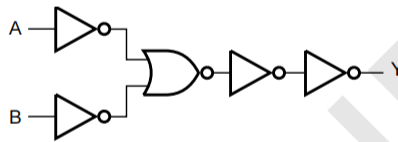
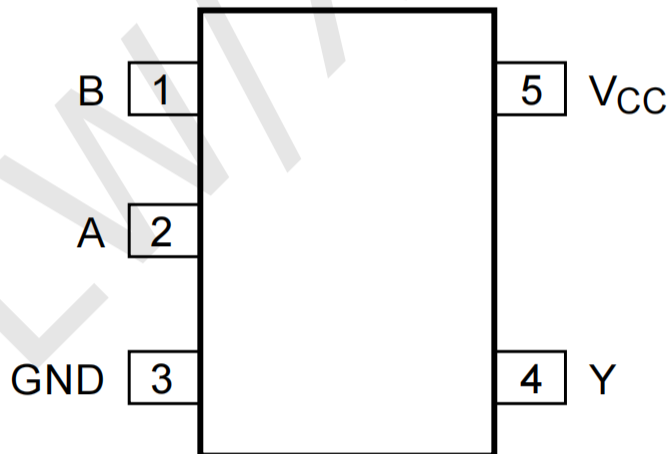


Figure 3. Logic diagram

Pin Configurations



Pin Description

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

Function Table

Input		Output
A	B	Y
L	L	L
L	H	L
H	L	L
H	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 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 _{DD}	-	-	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	Definition	Value	Unit
V _(ESD)	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

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

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

Note: All typical values are measured at $V_{CC}=3.3\text{V}$ and $T_{amb}=25^{\circ}\text{C}$.

DC 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	
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	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 _{IH} or V _{IL}	I _O =100uA; V _{CC} =1.65V to 5.5V	-	-	0.1	V
			I _O =4mA; V _{CC} =1.65V	-	-	0.70	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, 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 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, 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

Testing Circuit

AC Testing Circuit

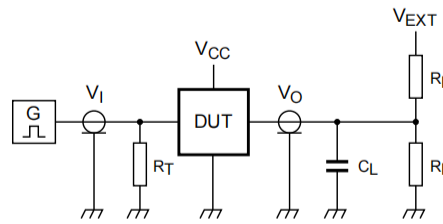


Figure 4. Test circuit for measuring switching times

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

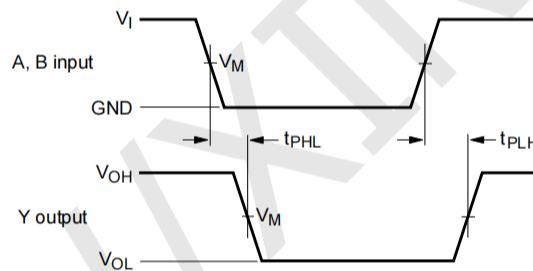


Figure 5. The input A, B to output Y propagation delays

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	$0.5 \times V_{cc}$	$0.5 \times V_{cc}$

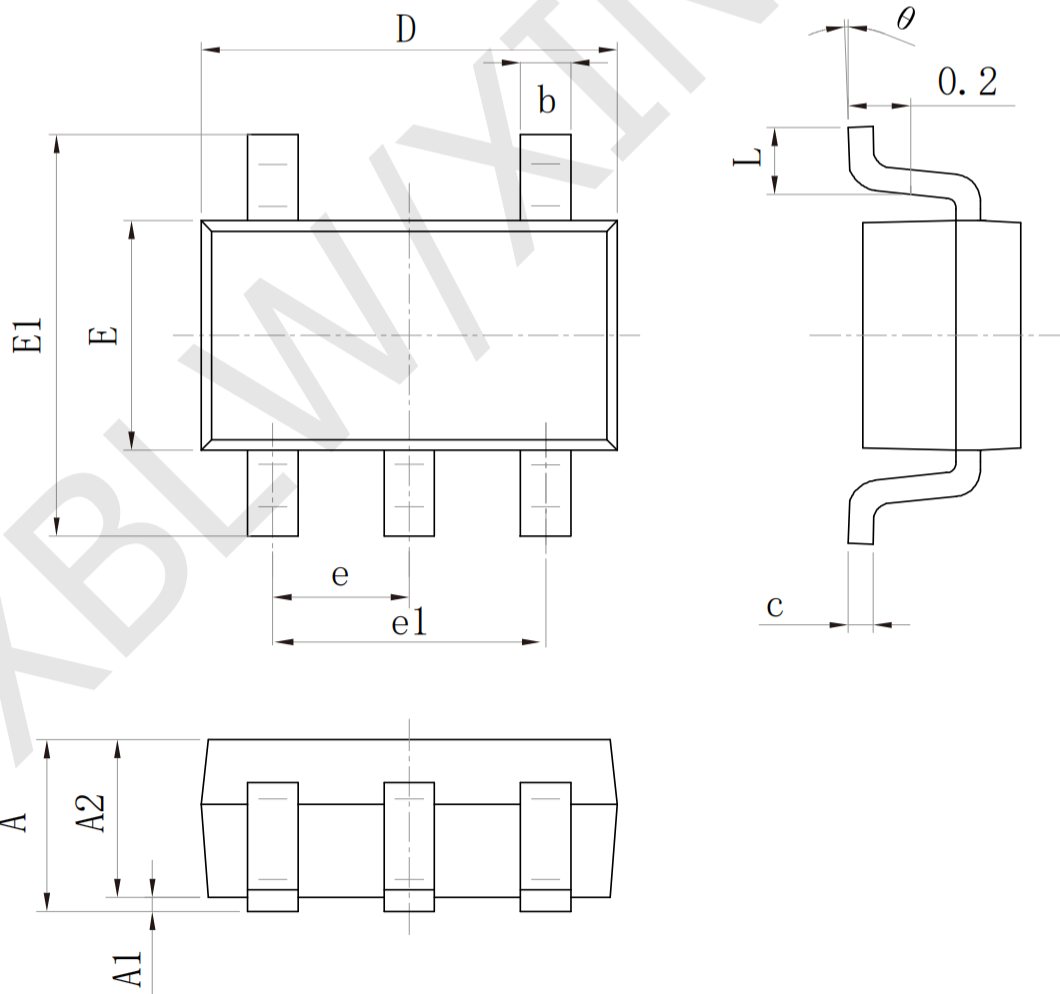
Test Data

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

Package Information

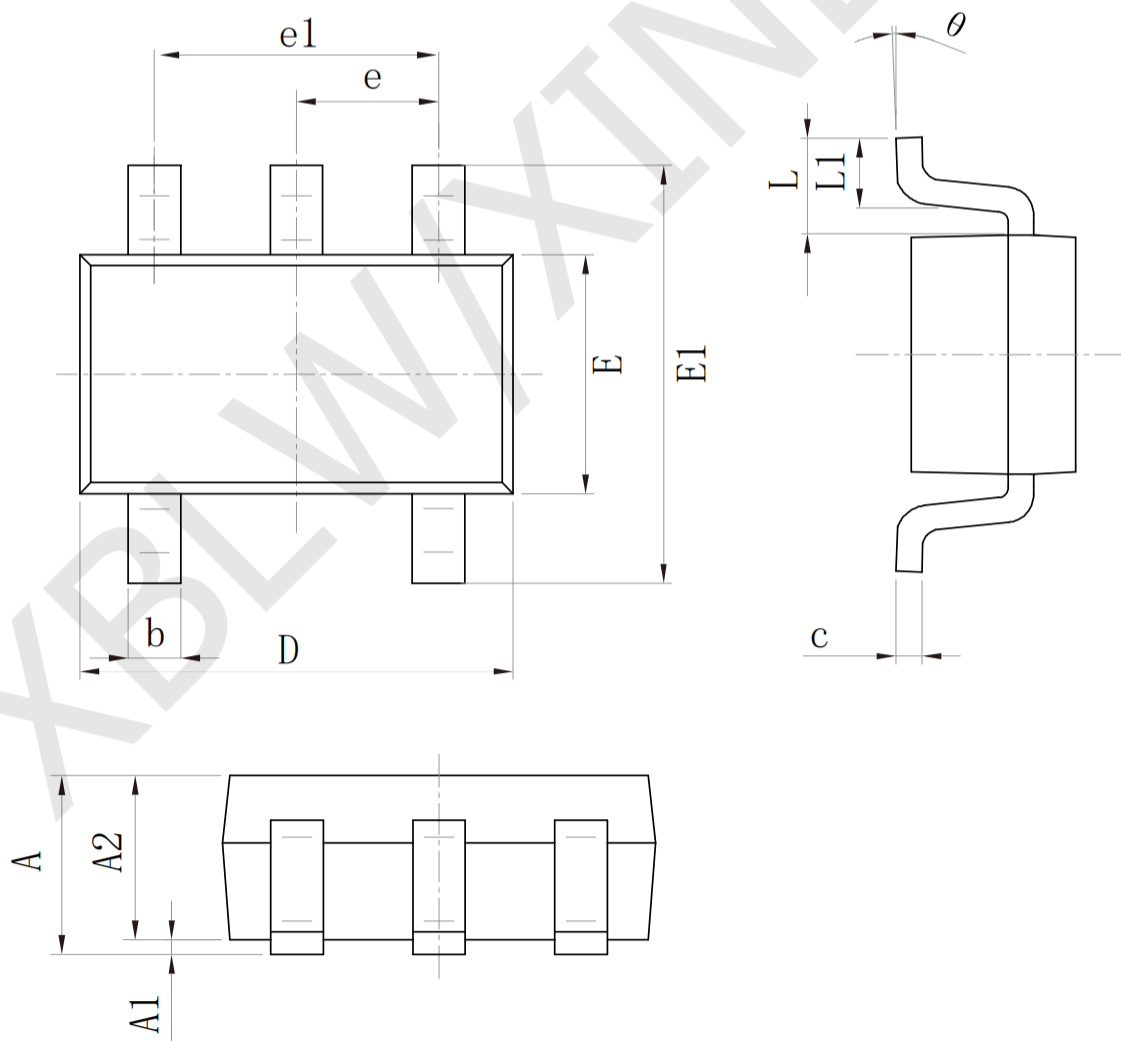
- SOT23-5

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	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°



• 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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