General Description

This single 2-input positive-AND gate is designed for 1.65-V to 5.5-V Vcc operation.

The SN74LVC1G08 performs the Boolean function $Y=A\cdot B$ or $Y=\overline{\overline{A}+\overline{B}}$ in positive logic.

The CMOS device has high output drive while maintaining low static power dissipatior over a broad Vcc operating range.

This device is fully specified for partial-power-down applications using loff.

The loff circuitry disables the outputs, preventing damaging current backfow through the device when it is powered down.

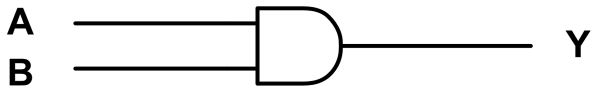
Features

- Supports 5V VCC operation
- Inputs accept voltages to 5.5 V
- Provides down translation to VCC
- Low power consumption,10-μA Max ICC
- ±24-mA outputdrive at 3.3 V
- loff supports live insertion,partial -power -down mode, and back drive protection

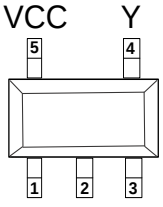
Applications

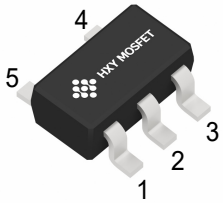
- Active noise cancellation(ANC)
- Barcode scanner
- Blood pressuremonitor
- CPAP machine
- Fingerprint biometrics
- HVAC:heating,ventilating,and air conditioning
- Network-attached storage(NAS)
- Server motherboard andPSU
- Software defined radio(SDR)
- Video communications system

Functional Block Diagram



Pinning and Pin Functions





SOT-23-5L/SOT-353(SC-70-5)

Pin		Type	Description
Name	OT-23-5L/SOT-353 (SC-70-5)		
A	1	I	Data Input
B	2	I	Data Input
GND	3	-	Ground
Y	4	O	Data Output
V_{CC}	5	-	Supply Voltage

Absolute Maximum Ratings

Parameters			Min	Max.	Unit
V_{CC}	Supply voltage range		-0.5	6.5	V
V_I	Input voltage range		-0.5	6.5	V
V_O	Voltage range applied to any output in the high-impedance or power-off state		-0.5	6.5	V
V_O	Voltage range applied to any output in the high or low state		-0.5	V_{CC}+0.5	V
I_{IK}	Input clamp current	V_I<0		-50	mA
I_{OK}	Output clamp current	V_O<0		-50	mA
I_O	Continuous output current			±50	mA
Continuous current through V_{CC} or GND				±100	mA
T_J	Junction temperature under bias			150	℃
T_{stg}	Storage temperature range		-65	150	℃

(1) Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under Recommended Operating Conditions is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
(2) The input negative-voltage and output voltage ratings may be exceeded if the input and output current ratings are observed.

Recommended Operating Conditions

Over operating free-air temperature range (unless otherwise noted)

Symbol	Parameter		Min	Max	Unit
V_{CC}	Supply Voltage		1.65	5.5	V
V_{IH}	High-Level Input Voltage	VCC=1.65V to1.95V	0.65×VCC		V
		VCC=2.3V to 2.7V	1.7		
		VCC=3V to 3.6V	2		
		VCC=4.5V to 5.5V	0.7×VCC		
V_{IL}	Low-Level Input Voltage	VCC=1.65V to1.95V		0.35×VCC	V
		VCC=2.3V to 2.7V		0.7	
		VCC=3V to 3.6V		0.8	
		VCC=4.5V to 5.5V		0.3×VCC	
V_I	Input Voltage		0	5.5	V
V_O	Output Voltage		0	VCC	V
I_{OH}	High-Level Output Current	VCC=1.65V		-4	mA
		VCC=2.3V		-8	
		VCC=3V		-16	
				-24	
		VCC=4.5V		-32	
I_{OL}	Low-Level Output Current	VCC=1.65V		4	mA
		VCC=2.3V		8	
		VCC=3V		16	
				24	
		VCC=4.5V		32	
Δt/Δv	Input Transition Rise or Fall Rate	VCC=1.8V±0.15V,2.5V±0.2V		20	ns/V
		VCC=3.3V±0.3V		10	
		VCC=5V±0.5V		5	
TA	Operating Free-Air Temperature		-40	125	℃

ESD Ratings

ESD			Value	Unit
V(ESD)	Electrostatic Discharge	Human-Body Model (HBM)(1)	8 K	V
		Charged-Device Model (CDM)(2)	2 K	V

(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.

Thermal Information

Package Type	θ_{JA}	θ_{JC}	Unit
SOT-23-5L	250	81	°C/W
SOT-353(SC-70-5	400	150	°C/W

Electrical Characteristics

V_{CC}=1.65V to 5.5V, FULL=–40°C to +125°C. Typical values are at TA=+25°C (unless otherwise noted)

Parameter	Test Conditions	V_{CC}	–40°C to 85°C			–40°C to 125°C			Unit
			Min	Typ	Max	Min	Typ	Max	
V_{OH}	I_{OH}=–100 µA	1.65 V to 5.5 V	V_{CC}-0.1			V_{CC}-0.1			V
	I_{OH}=–4 mA	1.65 V	1.2			1.2			
	I_{OH}=–8 mA	2.3 V	1.9			1.9			
	I_{OH}=–16 mA	3 V	2.4			2.4			
	I_{OH}=–24 mA		2.3			2.3			
	I_{OH}=–32 mA	4.5 V	3.8			3.8			
V_{OL}	I_{OL}=100 µA	1.65 V to 5.5 V			0.1			0.1	V
	I_{OL}=4 mA	1.65 V			0.45			0.45	
	I_{OL}=8 mA	2.3 V			0.3			0.3	
	I_{OL}=16 mA	3 V			0.4			0.4	
	I_{OL}=24 mA				0.55			0.55	
	I_{OL}=32 mA	4.5 V			0.55			0.55	
I_I A or B Inputs	V_I=5.5 V or GND	0 to 5.5 V			±5			±5	µA
I_{off}	V_I or V_O=5.5 V	0			±10			±10	µA
I_{CC}	V_I=5.5 V or GND, I_O=0	1.65 V to 5.5 V			10			10	µA
ΔI_{CC}	One Input at V_{CC} – 0.6 V, Other Inputs at V_{CC} or GND	3 V to 5.5 V			10			10	µA
C_i	V_I=V_{CC} or GND	3.3 V		5			5		pF

(1) All unused digital inputs of the device must be held at V_{CC} or GND to ensure proper device operation

Switching Characteristics,CL=15pF

Over recommended operating free-air temperature range (unless otherwise noted)

Parameter	From (Input)	To (Output)	–40°C to 85°C								Unit
			V_{CC}=1.8 V ± 0.15 V		V_{CC}=2.5 V ± 0.2 V		V_{CC}=3.3 V ± 0.3 V		V_{CC}=5 V ± 0.5 V		
			Min	Max	Min	Max	Min	Max	Min	Max	
tpd	A or B	Y	1.5	7.2	0.7	4.4	0.8	3.6	0.8	3.4	ns

Over recommended operating free-air temperature range, CL=30 pF or 50 pF (unless otherwise noted)

Parameter	From (Input)	To (Output)	–40°C to 85°C								Unit
			V_{CC}=1.8 V ± 0.15 V		V_{CC}=2.5 V ± 0.2 V		V_{CC}=3.3 V ± 0.3 V		V_{CC}=5 V ± 0.5 V		
			Min	Max	Min	Max	Min	Max	Min	Max	
tpd	A or B	Y	2.4	8	1.1	5.5	1	4.5	1	4	ns

Over recommended operating free-air temperature range, CL=30 pF or 50 pF (unless otherwise noted)

Parameter	From (Input)	TO (Output)	–40°C to 125°C								Unit
			V_{CC}=1.8 V ± 0.15 V		V_{CC}=2.5 V ± 0.2 V		V_{CC}=3.3 V ± 0.3 V		V_{CC}=5 V ± 0.5 V		
			Min	Max	Min	Max	Min	Max	Min	Max	
tpd	A or B	Y	2.4	10	1.1	7	1	6	1	5	ns

Operating Characteristics

T_A=25°C

	Parameter	Test Conditions	V_{CC}=1.8 V	V_{CC}=2.5 V	V_{CC}=3.3 V	V_{CC}=5 V	Unit
			Typ	Typ	Typ	Typ	
Cpd	Power Dissipation Capacitance	f=10 MHz	16	18	19	20	pF

Typical Characteristics

Over recommended operating free-air temperature range, C_L=30 pF or 50 pF (unless otherwise noted).

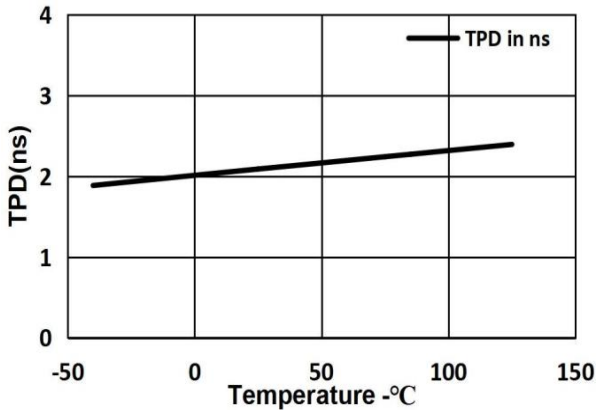


Fig.8-1. T_{PD} Across Temperature at 3.3 V V_{CC}

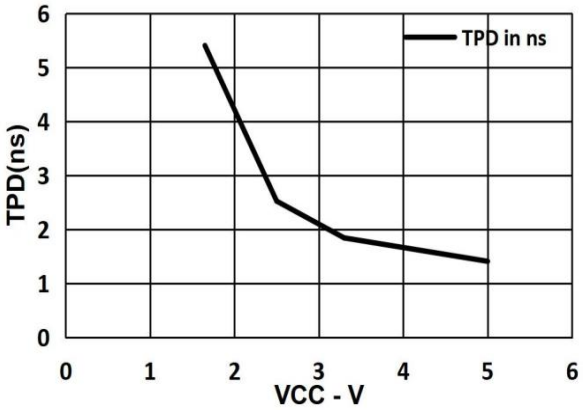
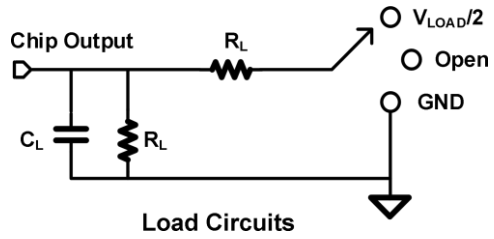


Fig.8-2. T_{PD} Across V_{CC} at 25℃

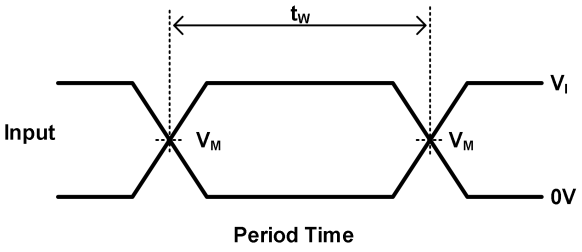
Parameter Measurement Information



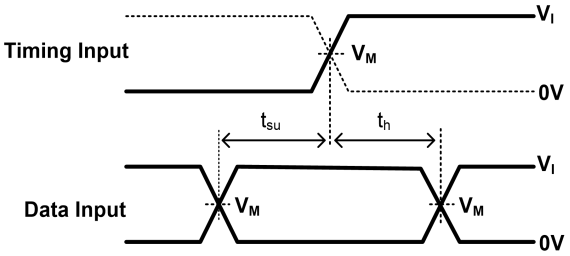
Load Circuits

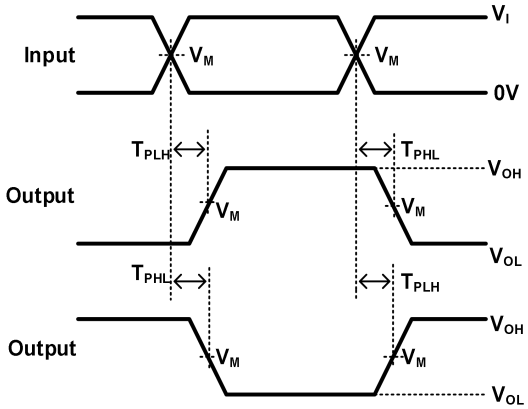
TEST	S1
T_{PHL}/T_{PLH}	OPEN
T_{PLZ}/T_{PZL}	V_{LOAD}
T_{PHZ}/T_{PZH}	GND

V_{CC}	INPUTS		V_M	V_{LOAD}	C_L	R_L	V_Δ
	V_I	T_r/T_f					
1.8V±0.15V	V_{CC}	≤2ns	$V_{CC}/2$	$2\times V_{CC}$	15pF	1MΩ	0.15V
2.5V±0.15V	V_{CC}	≤2ns	$V_{CC}/2$	$2\times V_{CC}$	15pF	1MΩ	0.15V
3.3V±0.15V	3V	≤2.5ns	1.5V	6V	15pF	1MΩ	0.3V
5V±0.15V	V_{CC}	≤2.5ns	$V_{CC}/2$	$2\times V_{CC}$	15pF	1MΩ	0.3V

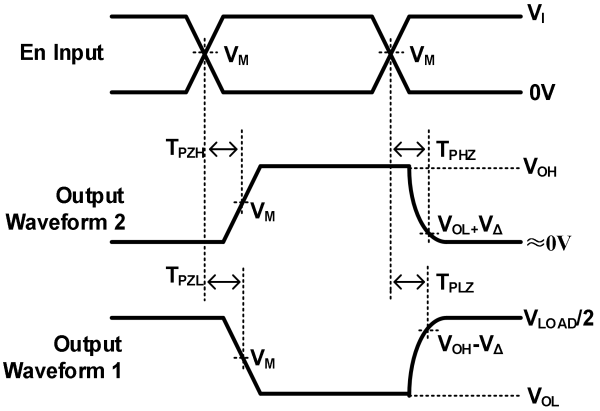


Period Time





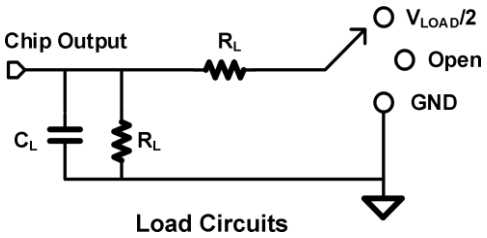
Propagation Delay
for Output and Inverted Output



Enable and Disable Times
Low-And High-Level Enabling

Notes: A. C_L includes probe and jig capacitance.
B. Waveform 1 is for an output with internal conditions such that the output is low, except when disabled by the output control.
Waveform 2 is for an output with internal conditions such that the output is high, except when disabled by the output control.
C. All input pulses are supplied by generators having the following characteristics: PRR 10 MHz, Z =50.
D. The outputs are measured one at a time, with one transition per measurement.
E. t_{PLZ} and t_{PHZ} are the same as t_{dis}.
F. t_{PZL} and t_{PZH} are the same as t_{en}.
G. t_{PLH} and t_{PHL} are the same as t_{pd}.
H. All parameters and waveforms are not applicable to all device.

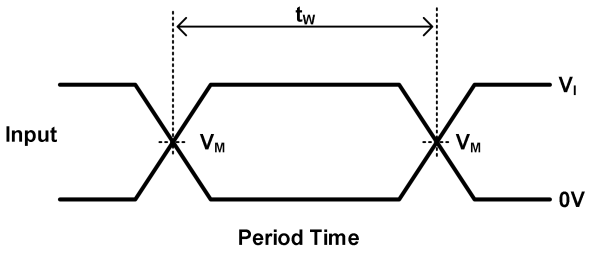
Parameter Measurement Information(Continued)



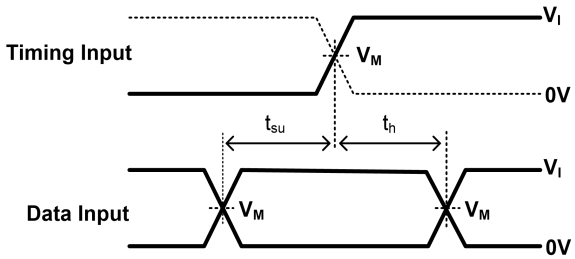
Load Circuits

TEST	S1
T_{PHL}/T_{PLH}	OPEN
T_{PLZ}/T_{PZL}	V_{LOAD}
T_{PHZ}/T_{PZH}	GND

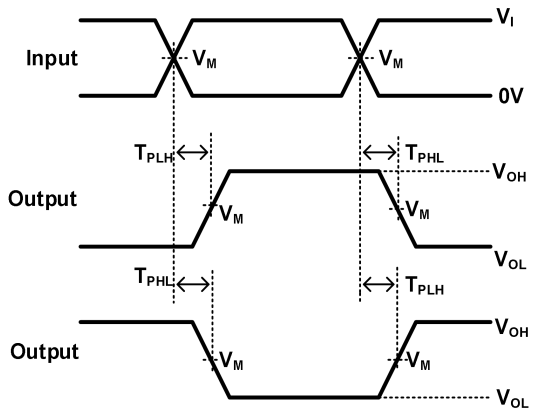
V_{CC}	INPUTS		V_M	V_{LOAD}	C_L	R_L	V_Δ
	V_I	T_r/T_f					
1.8V±0.15V	V_{CC}	≤2ns	$V_{CC}/2$	$2\times V_{CC}$	30pF	1kΩ	0.15V
2.5V±0.15V	V_{CC}	≤2ns	$V_{CC}/2$	$2\times V_{CC}$	30pF	500Ω	0.15V
3.3V±0.15V	3V	≤2.5ns	1.5V	6V	30pF	500Ω	0.3V
5V±0.15V	V_{CC}	≤2.5ns	$V_{CC}/2$	$2\times V_{CC}$	30pF	500Ω	0.3V



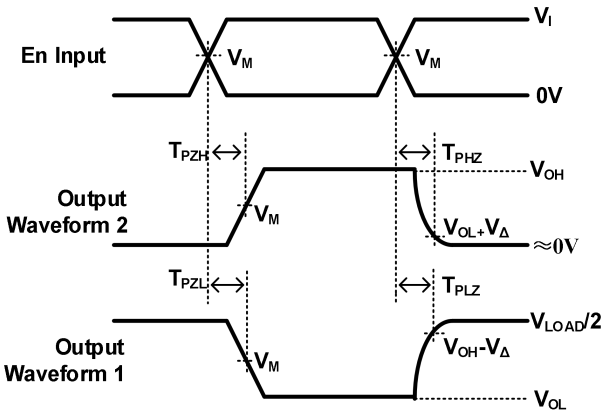
Period Time



Setup and Hold Times



Propagation Delay
for Output and Inverted Output



Enable and Disable Times
Low-And High-Level Enabling

Notes:A. C_L includes probe and jig capacitance.
B. Waveform 1 is for an output with internal conditions such that the output is low, except when disabled by the output control.
Waveform 2 is for an output with internal conditions such that the output is high, except when disabled by the output control.
C. All input pulses are supplied by generators having the following characteristics: PRR 10 MHz, Z =50.
D. The outputs are measured one at a time, with one transition per measurement.
E. t_{PLZ} and t_{PHZ} are the same as t_{dis}.
F. t_{PZL} and t_{PZH} are the same as t_{en}.
G. t_{PLH} and t_{PHL} are the same as t_{pd}.
H. All parameters and waveforms are not applicable to all device.

Detailed Description

The SN74LVC1G08 device contains one 2 -input positive AND gate device and performs the Boolean function $Y=A\cdot B$ or $Y=\overline{\overline{A}+\overline{B}}$. This device is fully specified for partial-power-down applications using I_{off}. The I_{off} circuitry disables the outputs, preventing damaging current back flow through the device when it is powered down.

Feature Description

- Wide operating voltage range.
- Operates from 1.65 V to 5.5 V.
- Allows down voltage translation.
- Inputs accept voltages to 5.5 V.
- I_{off} feature allows voltages on the inputs and outputs, when V_{CC} is 0 V.

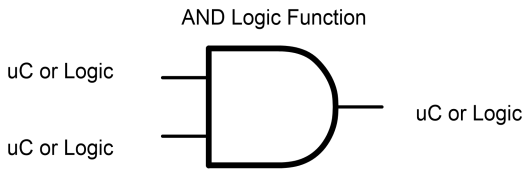
Device Functional Modes

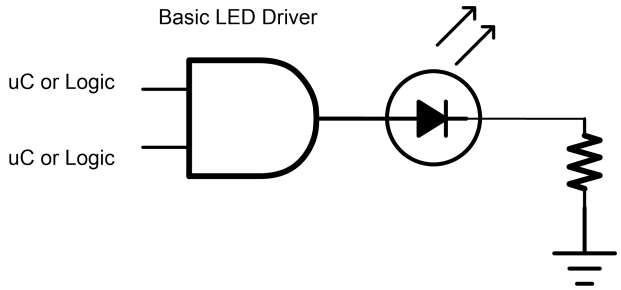
Input A		Output Y
A	**B**	**Y**
H	H	H
L	X	L
X	L	L

Application Information

The SN74LVC1G08 is a high drive CMOS device that can be used for implementing AND logic with high output drive, such as an LED application. It can produce 24 mA of drive current at 3.3 V making it Ideal for driving multiple outputs and good for high speed applications up to 100 MHz. The inputs are 5.5V tolerant allowing it to translate down to Vcc.

Typical Application

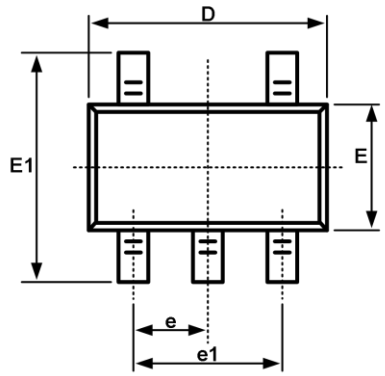


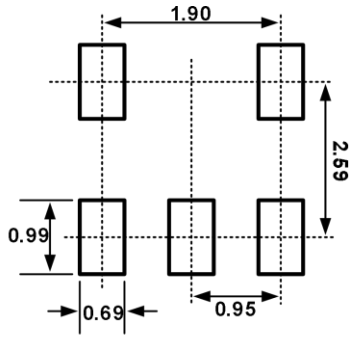


Order information

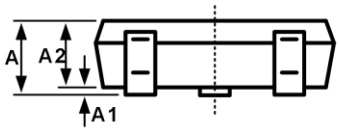
Package	Orderable Device	Packing Option
SOT-23-5L	SN74LVC1G08DBVR	3000/Reel
SOT-353(SC-70-5)	SN74LVC1G08DCKR	

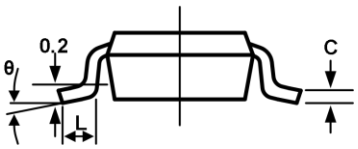
Package Outline
SOT-23-5L





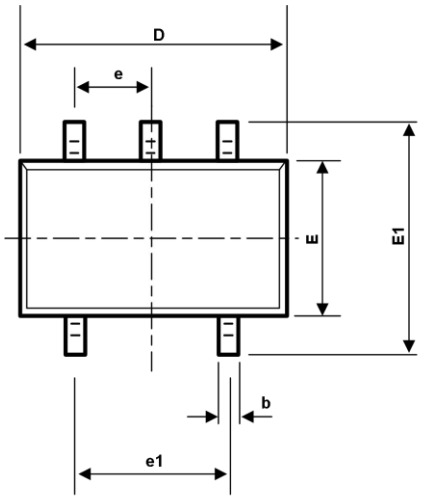
Recommended Land Pattern (Unit: mm)

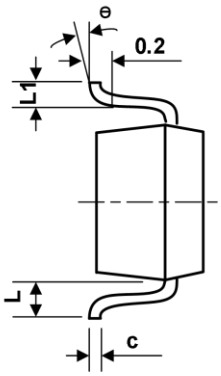


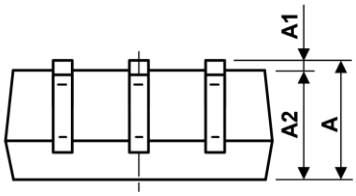


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950BSC		0.037BSC	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
L1	0.600REF		0.024REF	
θ	0°	8°	0°	8°

Package Outline
SOT-353(SC-70-5)







symbol	Dimension In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.100	0.035	0.043
A1	0.000	0.100	0.000	0.004
A2	0.900	1.000	0.035	0.039
b	0.150	0.350	0.006	0.014
c	0.110	0.175	0.004	0.007
D	2.000	2.200	0.079	0.087
E	1.150	1.350	0.045	0.053
E1	2.150	2.450	0.085	0.096
e	0.650TYP		0.026TYP	
e1	1.200	1.400	0.047	0.055
L	0.525REF		0.021REF	
L1	0.260	0.460	0.010	0.018
θ	0°	8°	0°	8°

Attention

■ Any and all HUA XUAN YANG ELECTRONICS products described or contained herein do not have specifications that can handle applications that require extremely high levels of reliability, such as life-support systems, aircraft's control systems, or other applications whose failure can be reasonably expected to result in serious physical and/or material damage. Consult with your HUA XUAN YANG ELECTRONICS representative nearest you before using any HUA XUAN YANG ELECTRONICS products described or contained herein in such applications.

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give rise to accidents or events that could endanger human lives, that could give rise to smoke or fire, or that could cause damage to other property. When designing equipment, adopt safety measures so that these kinds of accidents or events cannot occur. Such measures include but are not limited to protective circuits and error prevention circuits for safe design, redundant design, and structural design.

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