Single Inverter with Open Drain Output

General Description

The ET74LVC1G06 is a high performance single inverter with open drain outputs operating from a 1.65V to 5.5V supply. The Output stage is open drain with Over Voltage Tolerance. This allows the ET74LVC1G06 to be used to interface 5.0V circuits to circuits of any voltage between 0 and +7.0V.

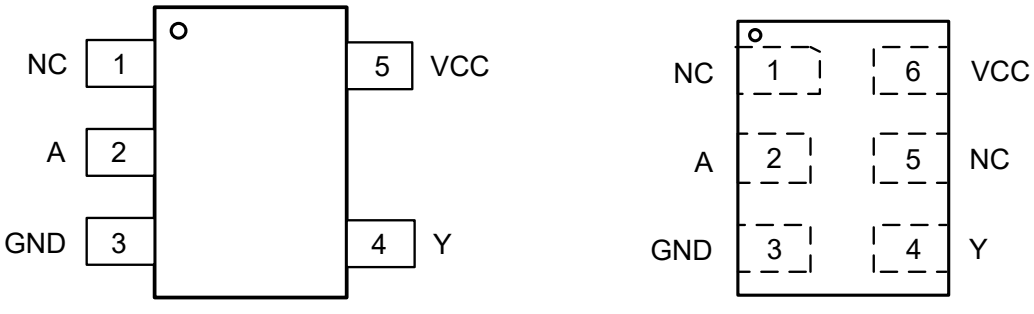
Features

- Extremely High Speed: t_{PD} =2.5ns (typical) at V_{CC}= 5.0V
- Designed for 1.65V to 5.5V V_{CC} Operation, CMOS Compatible
- Over Voltage Tolerant Inputs V_{IN} may be Between 0 and 7.0V for V_{CC} Between 0.5 and 5.5V
- 24mA Output Sink Capability, Pull-up may be between 0 and 7.0V
- Near Zero Static Supply Current Substantially Reduces System Power Requirements
- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant in Configuration
- Tiny SC70-5, SOT23-5 and DFN6 Packages
- MSL1 (DFN6) , MSL3(SC70-5,SOT23-5)

Device Information

Part No.	Package	Size
ET74LVC1G06	SC70-5	1.3mm×2.1mm
ET74LVC1G06T	SOT23-5	1.6mm×2.9mm
ET74LVC1G06Y	DFN6	1.0mm×1.5mm

Pin configuration



SC70-5/ SOT23-5 DFN6(1×1.5)

Figure1. Top View

Pin Function

(SC70-5/ SOT23-5)

Pin No.	Pin Name	Function
1	NC	No connect
2	A	Input
3	GND	Ground
4	Y	Output
5	VCC	Supply Voltage

DFN6

Pin No.	Pin Name	Function
1	NC	No connect
2	A	Input
3	GND	Ground
4	Y	Output
5	NC	No connect
6	VCC	Supply Voltage

Block Diagram

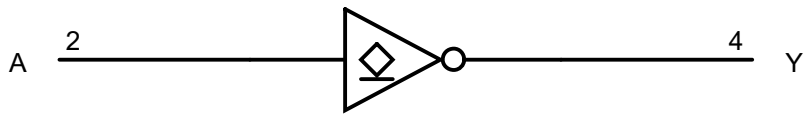


Figure2. Logic Symbol

Functional Description

Function Table

Input A	Output Y
L	Z
H	L

Absolute Maximum Ratings

Symbol	Parameter		Value	Unit
V_{CC}	DC Supply Voltage		−0.5 to 7.0	V
V_I	DC Input Voltage[1]		−0.5 ≤V_I ≤+7.0	V
V_O	DC Output Voltage Output in Higher or Low State		−0.5 to V_{CC} + 0.5	V
I_{IK}	DC Input Diode Current V_I < GND		−50	mA
I_{OK}	DC Output Diode Current V_O < GND, V_O > V_{CC}		±50	mA
I_O	DC Output Sink Current		±50	mA
I_{CC}	DC Supply Current per Supply Pin		±100	mA
I_{GND}	DC Ground Current per Supply Pin		±100	mA
T_{STG}	Storage Temperature Range		−65 to 150	°C
T_L	Lead Temperature, Soldering 10 Seconds		260	°C
T_J	Max Junction Temperature		150	°C
V_{ESD}	ESD Classification	Human Body Model [2]	±4000	V
		Charged Device Model [3]	±1000	
I_{LU}	Max Latch up Current Above V_{CC} and GND at 125°C [4]		±100	mA

Stresses exceeding those listed in this table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

Note1. IO absolute maximum rating must be observed.

Note2. Tested to EIA/JESD22−A114−A.

Note3. Tested to JESD22−C101−A.

Note4. Tested to EIA/JESD78.

Thermal Characteristics

Symbol	Package	Ratings	Value	Unit
$R_{\theta JA}$	SC70-5	Thermal Characteristics, Thermal Resistance, Junction-to-Air	300	°C/W
	SOT23-5		250	
	DFN6(1.0×1.5)		440	
P_D	SC70-5	Power Dissipation in Still Air at 85°C	215	mW
	SOT23-5		260	
	DFN6(1.0×1.5)		150	

Recommended Operating Conditions

Symbol	Parameter	Min	Max	Unit
V_{CC}	DC Supply Voltage	1.65	5.5	V
	Operating Date Retention	1.5	5.5	
V_{IN}	DC Input Voltage	0	5.5	V
V_{OUT}	DC Output Voltage(High or Low State)	0	5.5	V
T_A	Operating Temperature Range	-40	125	°C

Electrical Characteristics

DC Electrical Characteristics

(R_{PULL}=1KΩ,Connect V_{OUT} to V_{CC})

Symbol	Parameter	Condition	V_{CC}(V)	T_A = 25 °C			−40°C ≤T_A≤125°C		Unit
				Min	Typ	Max	Min	Max	
V_{IH}	High−Level Input Voltage		1.65to1.95 2.3 to 5.5	0.75Vcc 0.7Vcc			0.75Vcc 0.7Vcc		V
V_{IL}	Low−Level Input Voltage		1.65to1.95 2.3 to 5.5			0.25Vcc 0.29Vcc		0.25Vcc 0.29Vcc	V
V_{OL}	Low−Level Output Voltage V_{IN} = V_{IH}	I_{OL}=100uA	1.65to5.5		0.0	0.1		0.1	V
		I_{OL}=3mA	1.65		0.08	0.24		0.24	
		I_{OL}=8mA	2.3		0.20	0.3		0.3	
		I_{OL}=12mA	2.7		0.22	0.4		0.4	
		I_{OL}=16mA	3.0		0.28	0.4		0.4	
		I_{OL}=24mA	3.0		0.38	0.55		0.55	
		I_{OL}=32mA	4.5		0.42	0.55		0.55	
I_{IN}	Input Leakage Current	V_{IN} = 5.5 V or GND	0 to 5.5		±0.1			±1.0	uA
I_{OFF}	Power Off Leakage Current	V_{IN} = 5.5 V or V_{OUT}=5.5 V	0			1		10	uA
I_{CC}	Quiescent Supply Current	V_{IN} = 5.5 V or GND	5.5					10	uA

AC Electrical Characteristics

$t_r = t_f = 5.0ns$;

Symbol	Parameter	Condition	V_{CC}(V)	T_A = 25 °C			−40°C≤T_A≤125°C		Unit
				Min	Typ	Max	Min	Max	
t_{PHL}	Propagation Delay (Figure3and4)	R_L=1KΩ,C_L=15pF	1.65	3.0	9.5	12	3.0	16.0	ns
			1.8	3.0	8.0	11	3.0	15.0	
		R_L=1KΩ,C_L=15pF	2.5±0.2	1.0	5.0	7.5	1.0	11.0	
		R_L=1KΩ,C_L=15pF	3.3±0.3	1.0	3.5	6.5	1.0	9.0	
		R_L=500Ω C_L=50pF		1.5	4.5	7.5	1.5	10.0	
		R_L=1KΩ ,C_L=15pF	5.0±0.5	0.5	2.5	5.0	0.5	7.5	
		R_L=500Ω,C_L=50pF		0.8	3.2	6.0	0.8	8.5	

Capacitive Characteristics

Symbol	Parameter	Condition	Typical	Unit
C_{IN}	Input Capacitance	V_{CC}= 5.5 V, V_I = 0 V or V_{CC}	2.8	pF
C_{PD}	Power Dissipation Capacitance (5)	10 MHz,V_{CC} = 3.3 V, V_I = 0 V or V_{CC}	2.5	pF
		10 MHz,V_{CC} = 5.5 V, V_I = 0 V or V_{CC}	3.0	

Note5. C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load. Average operating current can be obtained by the equation: $I_{CC(OPR)}=C_{PD}\times V_{CC}\times fin+I_{CC}\times C_{PD}$ is used to determine the no−load dynamic power consumption; $P_D=C_{PD}\times V_{CC}^2\times fin+I_{CC}\times V_{CC}\times Fig.$

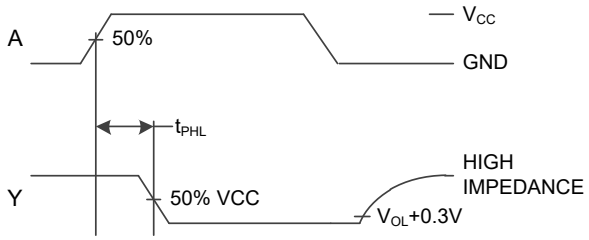


Figure3. Switching Waveforms

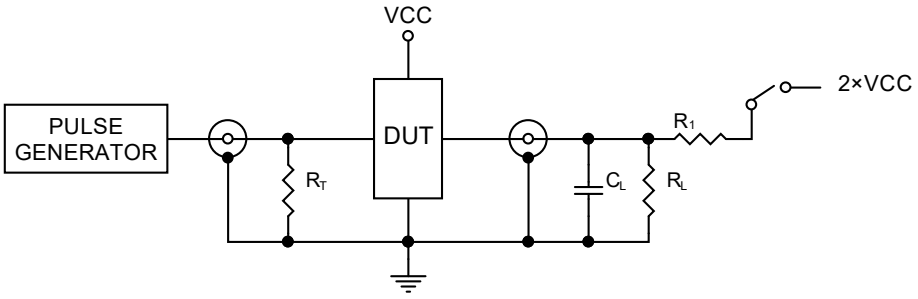
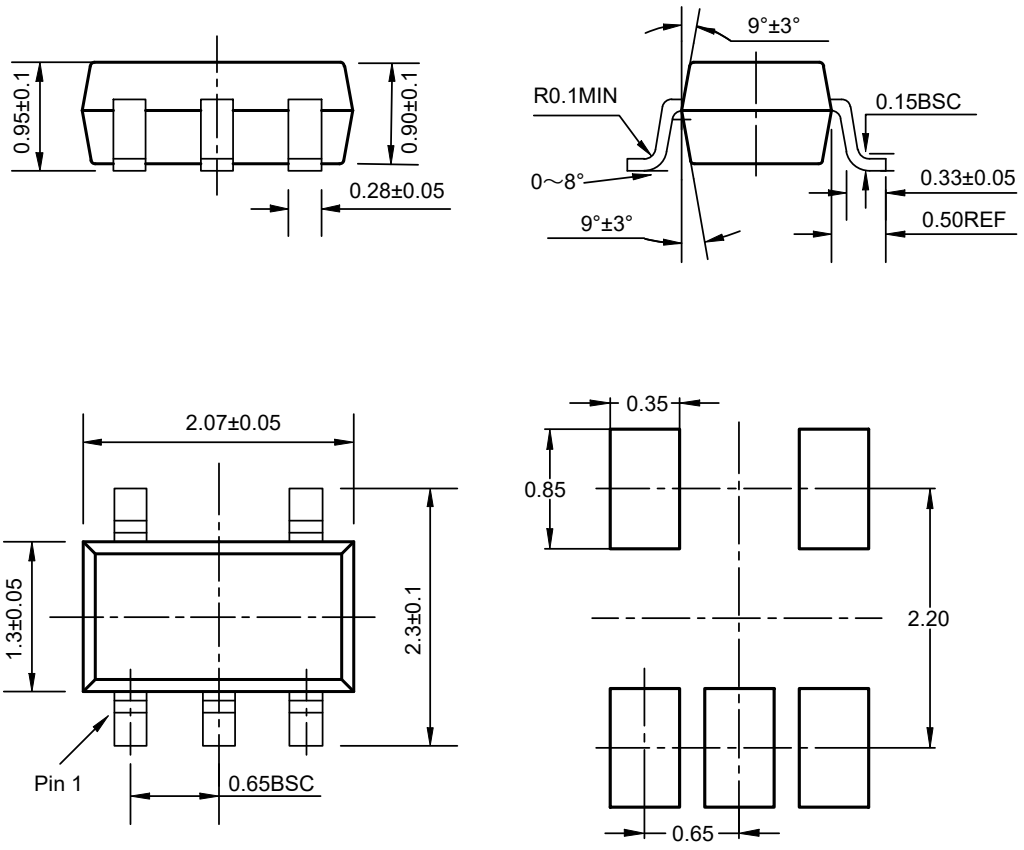


Figure4. Test Circult

Package Dimension

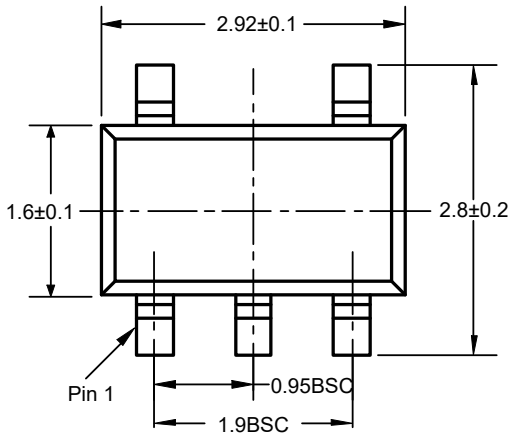
SC70-5

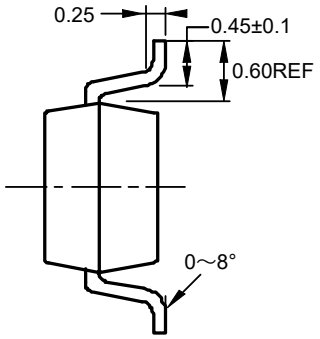


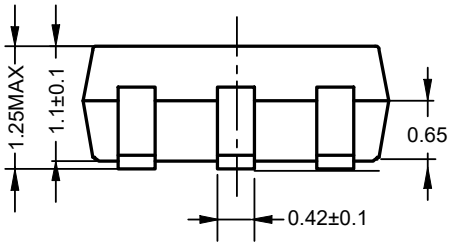
Recommended Land Pattern

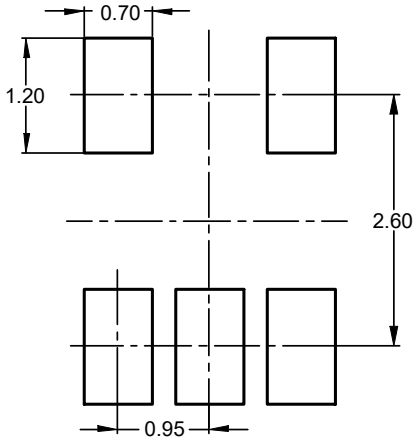
Unit: mm

SOT23-5





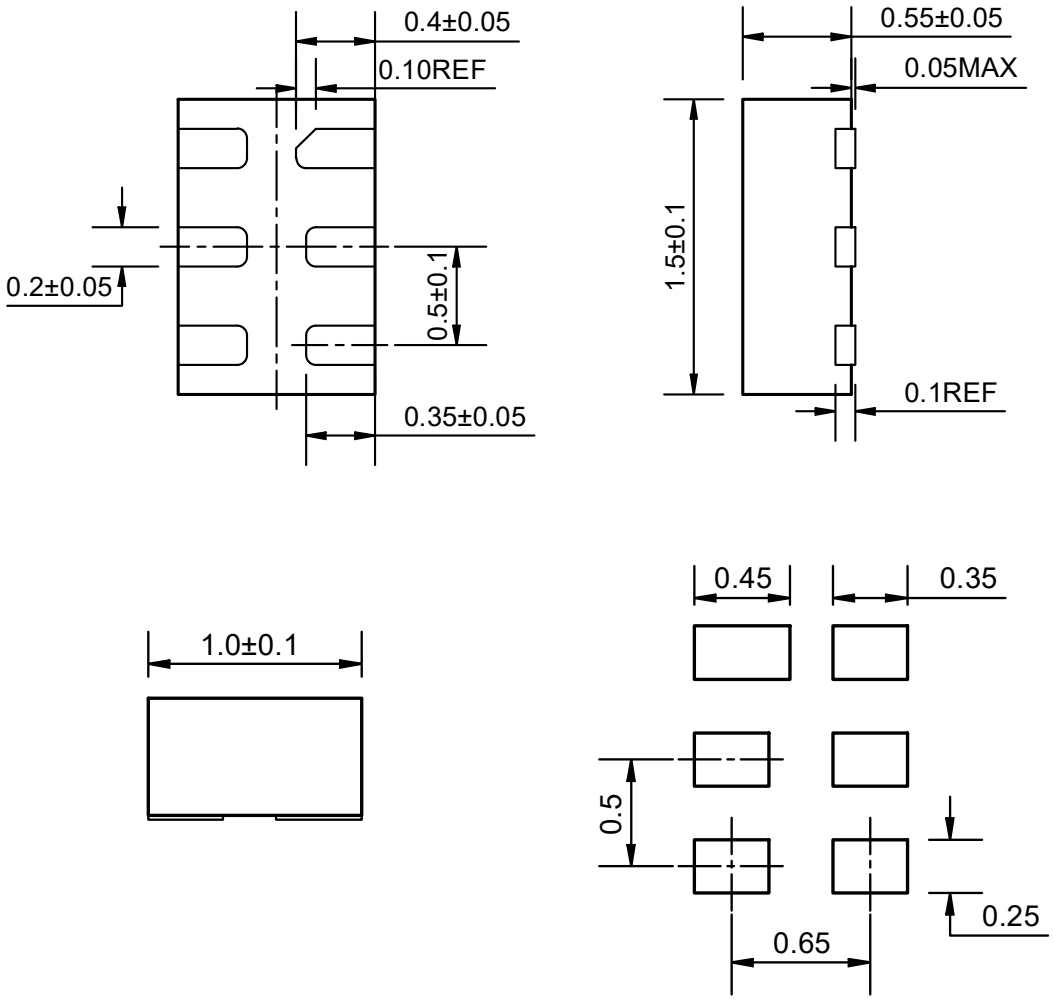




Recommended Land Pattern

Unit: mm

DFN6(1.0×1.5)



Recommended Land Pattern

Unit: mm

Revision History and Checking Table

Version	Date	Revision Item	Modifier	Function & Spec Checking	Package & Tape Checking
1.0	2017-07-19	Original Version	Ma Yong jian	Ma Yong jian	Liu Jia Ying
1.1	2022-08-02	Update Typesetting	Shibo	Shibo	Shibo
1.2	2022-10-14	Update format and Thermal Characteristics and C_{PD}	Wuhan	Shibo	Shibo
1.3	2023-12-07	Update Typeset /ESD	Shibo	Shibo	Shibo