

Single Non-inverting Schmitt Trigger Buffer

General Description

The ETQ74LVC1G17 is a high performance single non-inverting buffer with open drain outputs operating from a 1.65 to 5.5V supply. The Output stage is open drain with Over Voltage Tolerance.

This allows the ETQ74LVC1G17 to be used to interface 5.0V circuits to circuits of any voltage between 0V and +7.0V.

Features

- Designed for 1.65V to 5.5V VCC Operation
- Over-voltage Tolerant Inputs
- 24mA Balanced Output Sink and Source Capability
- Near Zero Static Supply Current Substantially Reduces System Power Requirements
- These Devices are Pb-Free and are RoHS Compliant
- MSL Level1
- Automotive AEC-Q100 Grade 1 Qualified
 - Ambient temperature range of -40°C to +125°C
 - ESD HBM 4KV PASS
 - ESD CDM 1KV PASS

Device Information

Part No.	Package	Size
ETQ74LVC1G17	SC70-5	2.07mm × 2.30mm

Applications

- Fully compliant with standards for automotive applications
- Combine normal power signals from multiple power rails

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Pin Configuration

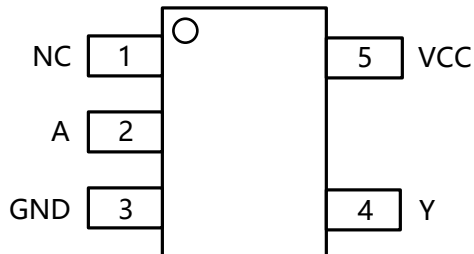


Figure 1. Top View

Pin Function

Pin No.	Name	Description
1	NC	No Connect
2	A	Input A
3	GND	Ground
4	Y	Output Y
5	VCC	Power Supply

Block Diagram

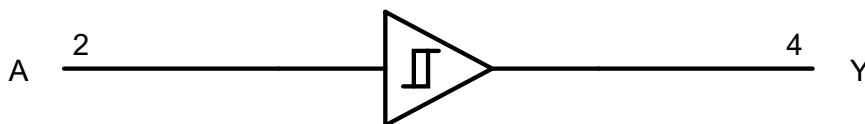


Figure 2. Logic Symbol

Functional Description

Function Table

Input A	Output Y
L	L
H	H

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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, 1 mm from Case for 10 Seconds		260	°C
T _J	Junction Temperature Under Bias		150	°C
V _{ESD}	ESD Classification	Human Body Model ⁽²⁾	±4000	V
		Charged Device Model ⁽³⁾	±1000	
I _{LU}	Latch up Current Above V _{CC} and GND at 125°C ⁽⁴⁾		±100	mA

Stresses exceeding those listed in the Maximum Ratings 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.

Notes:

1. IO absolute maximum rating must be observed.
2. HBM tested per AEC-Q100-002(EIA/JESD22-A114);
3. CDM tested per AEC-Q100-011(EIA/JESD22-C101);
4. Latch up Current Maximum Rating tested per AEC-Q100-004(EIA/JESD78E).

Thermal Characteristics

Symbol	Package	Ratings	Value	Unit
R _{θJA}	SC70-5	Thermal Characteristics, Thermal Resistance, Junction-to-Air	300	°C/W
P _D	SC70-5	Power Dissipation in Still Air at 85°C	215	mW

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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
t _r ,t _f	Input Rise and Fall Time	V _{CC} = 2.5 V ± 0.2 V	0	20	ns/V
		V _{CC} = 3.0 V ± 0.3 V	0	10	
		V _{CC} = 5.0 V ± 0.5 V	0	5	

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied.

Electrical Characteristics

DC Electrical Characteristics

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	0.75V _{CC} 0.7V _{CC}			0.75V _{CC} 0.7V _{CC}		V
V _{IL}	Low-Level Input Voltage		1.65to1.95 2.3 to 5.5			0.25V _{CC} 0.3V _{CC}		0.25V _{CC} 0.3V _{CC}	V
V _{OH}	High-Level Output Voltage V _{IN} = V _{IL}	I _{OH} = -100uA	1.65to5.5	V _{CC} -0.1	V _{CC}		V _{CC} -0.1		V
		I _{OH} = -3mA	1.65	1.29	1.52		1.29		
		I _{OH} = -8mA	2.3	1.9	2.1		1.9		
		I _{OH} = -12mA	2.7	2.2	2.4		2.2		
		I _{OH} = -16mA	3.0	2.4	2.7		2.4		
		I _{OH} = -24mA	3.0	2.3	2.5		2.3		
		I _{OH} = -32mA	4.5	3.8	4.0		3.8		
V _{OL}	Low-Level Output Voltage V _{IN} = V _{IH}	I _{OH} = 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} = 5.5V or GND	0 to 5.5		±0.1			±1.0	uA

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I_{OFF}	Power Off Leakage Current	$V_{IN} = 5.5V$ or $V_{OUT} = 5.5V$	0			1		10	μA
I_{CC}	Quiescent Supply Current	$V_{IN} = 5.5V$ or GND	5.5					10	μA

AC Electrical Characteristics

$t_r = t_f = 2.5ns$

Symbol	Parameter	Condition	$V_{CC}(V)$	$T_A = 25^\circ C$			$-40^\circ C \leq T_A \leq 125^\circ C$		Unit
				Min	Typ	Max	Min	Max	
t_{PLH} t_{PHL}	Propagation Delay (Figure3 and4)	$R_L = 1M\Omega$ $C_L = 15 pF$	1.65	2.0	10.1	12.9	2.0	13.9	ns
			1.8	2.0	9.1	11.6	2.0	12.4	
		$R_L = 1M\Omega$ $C_L = 15 pF$	2.5	0.2	6.0	7.7	0.8	8.2	
		$R_L = 1M\Omega$ $C_L = 15 pF$	3.3	0.8	5.0	6.5	0.5	7.0	
		$R_L = 500\Omega$ $C_L = 50 pF$		1.2	5.6	7.1	1.5	7.6	
		$R_L = 1M\Omega$ $C_L = 15 pF$	5.0	0.5	4.4	5.6	0.5	6.1	
		$R_L = 500\Omega$ $C_L = 50 pF$		0.8	4.8	6.1	0.8	6.6	

Capacitance Characteristics

Symbol	Parameter	Condition	Typ	Unit
C_{IN}	Input Capacitance	$V_{CC} = 5.5 V, V_I = 0 V$ or V_{CC}	>2.5	pF
C_{PD}	Power Dissipation Capacitance ⁽⁵⁾	10 MHz, $V_{CC} = 3.3 V, V_I = 0 V$ or V_{CC}	4	pF
		10 MHz, $V_{CC} = 5.5 V, V_I = 0 V$ or V_{CC}	4	

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:
 $I_{CC(OPR)} = C_{PD} \times V_{CC} \times f_{in} + I_{CC} \times C_{PD}$ is used to determine the no-load dynamic power consumption;
 $P_D = C_{PD} \times V_{CC}^2 \times f_{in} + I_{CC} \times V_{CC} \times Fig.$

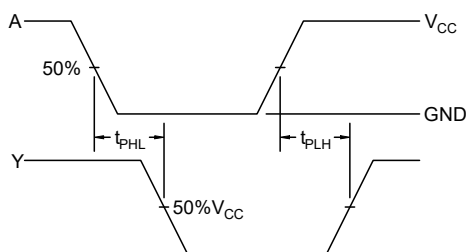


Figure 3. Switching Waveform

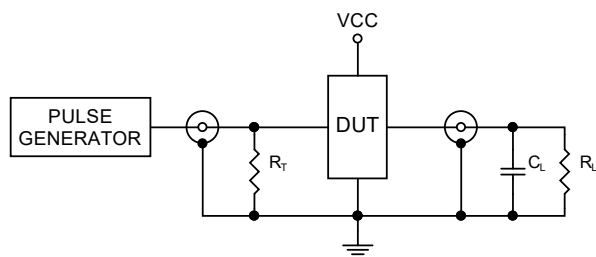
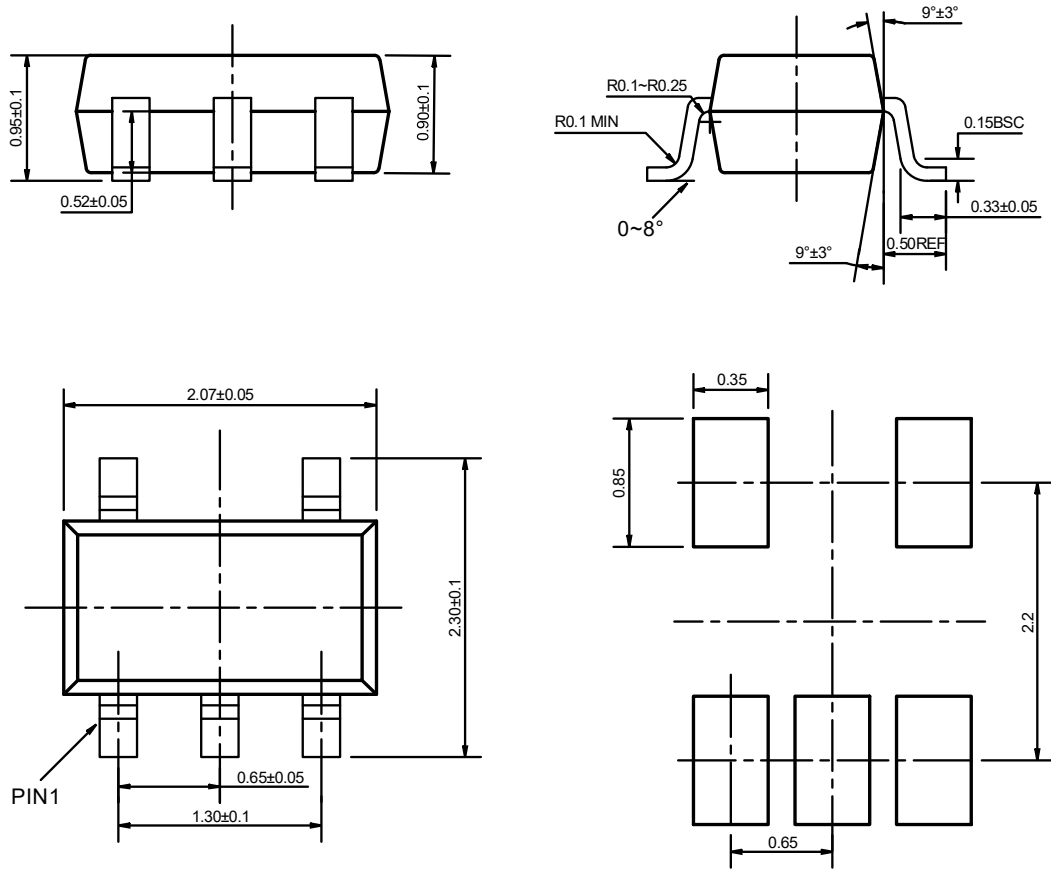


Figure 4. Test Circuit

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Package Dimension

SC70-5



Recommended Land Pattern

Unit: mm

Revision History and Checking Table

Version	Date	Revision Item	Modifier	Function & Spec Checking	Package & Tape Checking
1.0	2017-10-23	Original Version	Ma Yong jian	Ma Yong jian	Liu Jia Ying
1.1	2022-08-01	Update Typeset ETQ version	Shibo	Shibo	Shibo