# 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 1.65V 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 6.5V.

## Features

- Designed for 1.65V to 5.5V $V_{CC}$ Operation
- Over-voltage Tolerant Inputs Accept Voltages to 5.5V
- ±32mA Balanced Output Sink and Source Capability
- Near Zero Static Supply Current Substantially Reduces System Power Requirements
- These Devices are Pb-Free and RoHS Compliant
- Multiple Package Options Automotive AEC-Q100 Grade 1 Qualified
  -- Ambient Temperature Range of -40°C to 125°C
  -- ESD HBM ±4KV PASS
  -- ESD CDM ±1.5KV PASS
  -- Latch Up Current to ±200mA PASS
- Part No. and Package Information

| Part No. | Package | Packing Option | MSL |
|---|---|---|---|
| ETQ74LVC1G17 | SC70-5 (1.3mm × 2.1mm) | Tape and Reel, 3K/Reel | 1 |

## Applications

- Fully Compliant with Standards for Automotive Applications
- Combine Normal Power Signals from Multiple Power Rails

## Pin Configuration

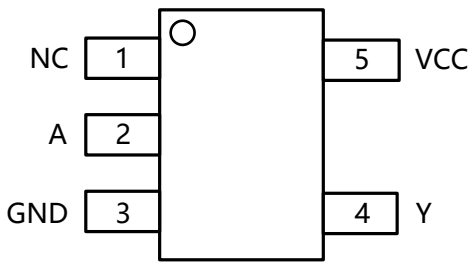



Figure1. Pin Configuration

## Pin Function

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

## Block Diagram

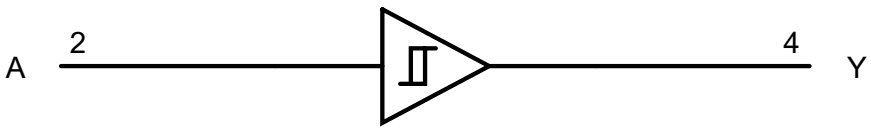



Figure2. Logic Symbol

## Functional Table

| Input A | Output Y |
|---|---|
| L | L |
| H | H |

## Absolute Maximum Ratings

| Symbol | Parameter | | Value | Unit |
|---|---|---|---|---|
| $V_{CC}$ | DC Supply Voltage (VCC Pin) | | -0.5 to 6.5 | V |
| $V_I$ | DC Input Voltage[1] | | $-0.5 \le V_I \le 6.5$ | 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, 1mm 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] | ±1500 | |
| $I_{LU}$ | Latch Up Current Above $V_{CC}$ and GND at 125°C [4] | | ±200 | 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.

***Note1:*** $I_O$ absolute maximum rating must be observed.

***Note2:*** HBM tested per AEC-Q100-002(JEDEC JS-001);

***Note3:*** CDM tested per AEC-Q100-011(JEDEC JS-002);

***Note4:*** Latch up Current Maximum Rating tested per AEC-Q100-004(JEDEC JESD78F).

## Thermal Characteristics

| Symbol | Package | Ratings | Value | Unit |
|---|---|---|---|---|
| $R_{\theta JA}$ | 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 |

## Recommended Operating Conditions

| Symbol | Parameter | | Min | Max | Unit |
|---|---|---|---|---|---|
| $V_{CC}$ | DC Supply Voltage(VCC Pin) | | 1.65 | 5.5 | V |
| | Operating Date Retention | | 1.5 | 5.5 | |
| $V_I$ | DC Input Voltage | | 0 | $V_{CC}$ | V |
| $V_O$ | DC Output Voltage(High or Low State) | | 0 | $V_{CC}$ | V |
| $T_A$ | Operating Temperature Range | | -40 | 125 | °C |
| $t_r$, $t_f$ | Input Rise and Fall Time | $V_{CC}$ = 2.5V ± 0.2V | 0 | 20 | ns/V |
| | | $V_{CC}$ = 3.0V ± 0.3V | 0 | 10 | |
| | | $V_{CC}$ = 5.0V ± 0.5V | 0 | 5 | |

## 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 | | 1.65~1.95<br>2.3~5.5 | 0.75$V_{CC}$<br>0.7$V_{CC}$ | | | 0.75$V_{CC}$<br>0.7$V_{CC}$ | | V |
| $V_{IL}$ | Low-Level Input Voltage | | 1.65~1.95<br>2.3~5.5 | | | 0.25$V_{CC}$<br>0.3$V_{CC}$ | | 0.25$V_{CC}$<br>0.3$V_{CC}$ | V |
| $V_{OH}$ | High-Level Output Voltage $V_I = V_{IH}$ | $I_{OH}$ = -100uA | 1.65~5.5 | $V_{CC}$ - 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 $V_I = V_{IL}$ | $I_{OL}$ = 100uA | 1.65~5.5 | | 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 | $V_I$ = 5.5V or GND | 0~5.5 | | ±0.1 | | | ±1.0 | uA |
| $I_{OFF}$ | Power Off Leakage Current | $V_I$ = 5.5V or $V_O$ = 5.5V | 0 | | | 1 | | 10 | uA |
| $I_{CC}$ | Quiescent Supply Current | $V_I$ = 5.5V or GND | 5.5 | | | | | 10 | uA |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

### AC Electrical Characteristics

$t_r = t_f = 3ns$

| Symbol | Parameter | Condition | $V_{CC}$(V) | $T_A$ = 25°C | | | -40°C ≤ $T_A$ ≤ 125°C | | Unit |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Min | Typ | Max | Min | Max | |
| $t_{PLH}$<br>$t_{PHL}$ | Propagation Delay (Figure 3 and 4) | $R_L$ = 1MΩ $C_L$ = 15pF | 1.65 | 2.0 | 12 | 16 | 2.0 | 20 | ns |
| | | | 1.8 | 2.0 | 10.1 | 14 | 2.0 | 17 | |
| | | $R_L$ = 1MΩ $C_L$ = 15pF | 2.5 | 0.2 | 6.2 | 9.1 | 0.8 | 11.1 | |
| | | $R_L$ = 1MΩ $C_L$ = 15pF | 3.3 | 0.8 | 5.0 | 7.5 | 0.5 | 8.0 | |
| | | $R_L$ = 500Ω $C_L$ = 50pF | | 1.2 | 5.6 | 8.1 | 1.5 | 8.6 | |
| | | $R_L$ = 1MΩ $C_L$ = 15pF | 5.0 | 0.5 | 4.4 | 5.6 | 0.5 | 6.1 | |
| | | $R_L$ = 500Ω $C_L$ = 50pF | | 0.8 | 4.8 | 6.1 | 0.8 | 6.6 | |

### Capacitance Characteristics

| Symbol | Parameter | Condition | Typ | Unit |
|---|---|---|---|---|
| $C_{IN}$ | Input Capacitance | $V_{CC}$ = 5.5V, $V_I$ = 0V or $V_{CC}$ | 4.5 | pF |
| $C_{PD}$ | Power Dissipation Capacitance[(5)] | 10MHz, $V_{CC}$ = 3.3V, $V_I$ = 0V or $V_{CC}$ | 20 | pF |
| | | 10MHz, $V_{CC}$ = 5.5V, $V_I$ = 0V or $V_{CC}$ | 24 | |

***Note5***. $C_{PD}$ is used to determine the dynamic power dissipation ($P_D$ in μW).

$P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma(C_L \times V_{CC}^2 \times f_o)$ where:

$f_i$ = input frequency in MHz;

$f_o$ = output frequency in MHz;

$C_L$ = output load capacitance in pF;

$V_{CC}$ = supply voltage in V;

N = number of inputs switching;

$\Sigma(C_L \times V_{CC}^2 \times f_o)$ = sum of outputs.

## AC Test Circuit

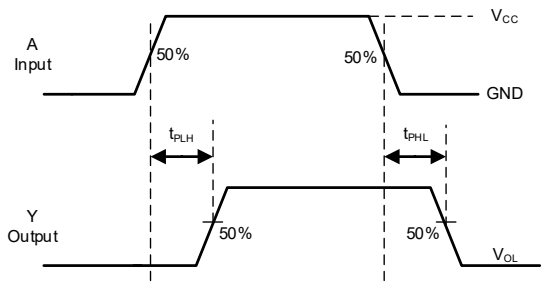



Figure3. Switching Waveform

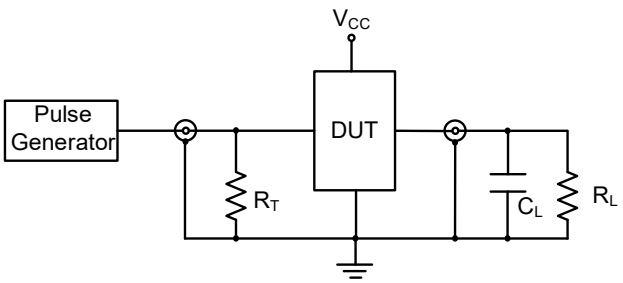
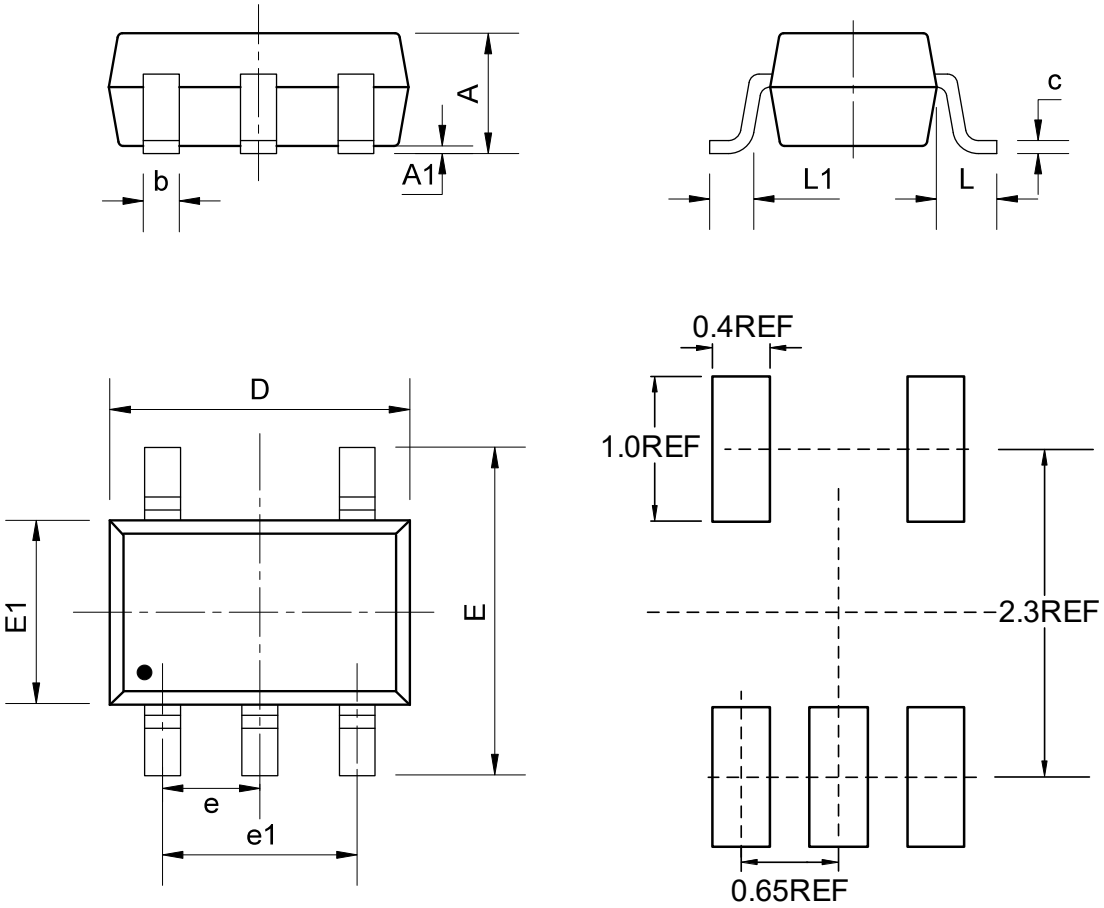



Figure4. Test Circuit

## Package Dimension

SC70-5 (1.3mm × 2.1mm)



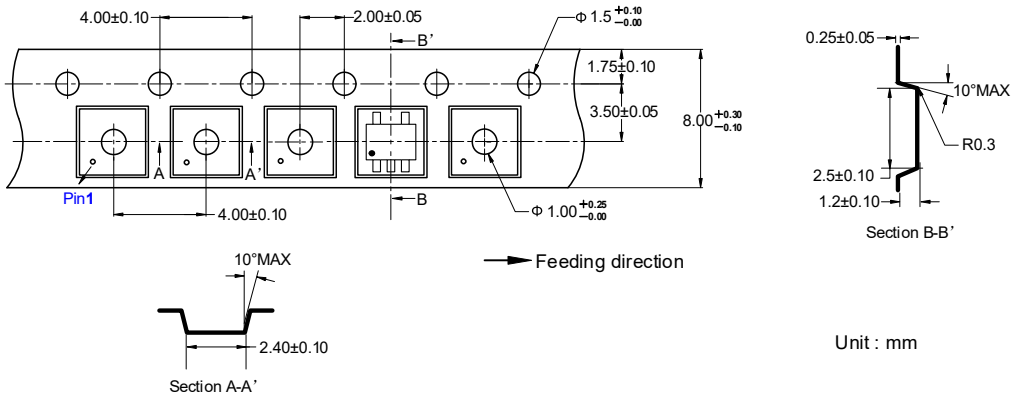

COMMON DIMENSIONS

(Unit: mm)

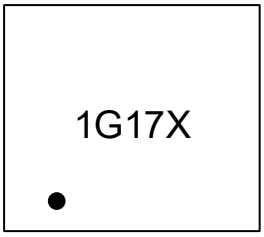
| SYMBOL | MIN | NOM | MAX |
|---|---|---|---|
| A | - | - | 1.10 |
| A1 | 0.00 | - | 0.15 |
| b | 0.15 | - | 0.35 |
| c | 0.08 | - | 0.20 |
| D | 2.00 | 2.10 | 2.30 |
| e | 0.65BSC | | |
| e1 | 1.30BSC | | |
| E | 2.15 | 2.30 | 2.50 |
| E1 | 1.15 | 1.30 | 1.45 |
| L | 0.50REF | | |
| L1 | 0.33REF | | |

## Tape Information

SC70-5 (1.3mm × 2.1mm)




## Marking Information




ETQ74LVC1G17
1G17 = Part Number
X = Tracking Number

## Revision History and Checking Table

| Version | Date | Revision Item | Modifier | Function & Spec Checking | Package & Tape Checking |
|---|---|---|---|---|---|
| 1.0 | 2017-10-23 | Original Version | Ma yongjian | Ma yongjian | Liu jiaying |
| 1.1 | 2022-08-01 | Update Typeset ETQ Version | Shi bo | Shi bo | Shi bo |
| 1.2 | 2024-2-1 | Update AC Electrical Characteristics | Shi bo | Shi bo | Shi bo |
| 1.3 | 2025-06-07 | Add Packing Option | Yang xiaoxu | Yang xiaoxu | Liu jiaying |
| 1.4 | 2025-7-20 | Update Capacitance Characteristics | Zhang wang | Yang xiaoxu | Liu jiaying |
| 1.5 | 2025-10-15 | Update Format | Wang anran | Yang xiaoxu | Liu jiaying |