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

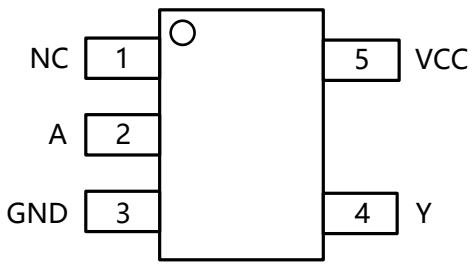


Figure1. Pin Configuration

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

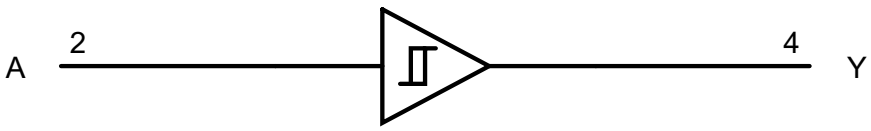


Figure2. Logic Symbol

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 2.3~5.5	0.75V_{CC} 0.7V_{CC}			0.75V_{CC} 0.7V_{CC}		V
V_{IL}	Low-Level Input Voltage		1.65~1.95 2.3~5.5			0.25V_{CC} 0.3V_{CC}		0.25V_{CC} 0.3V_{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} 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

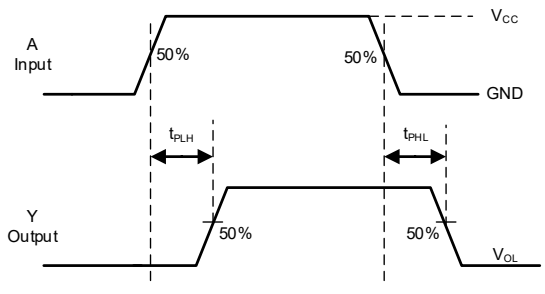


Figure3. Switching Waveform

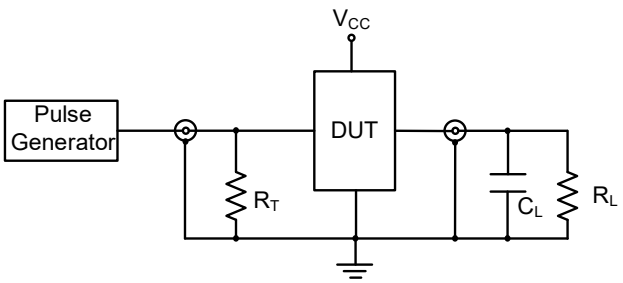
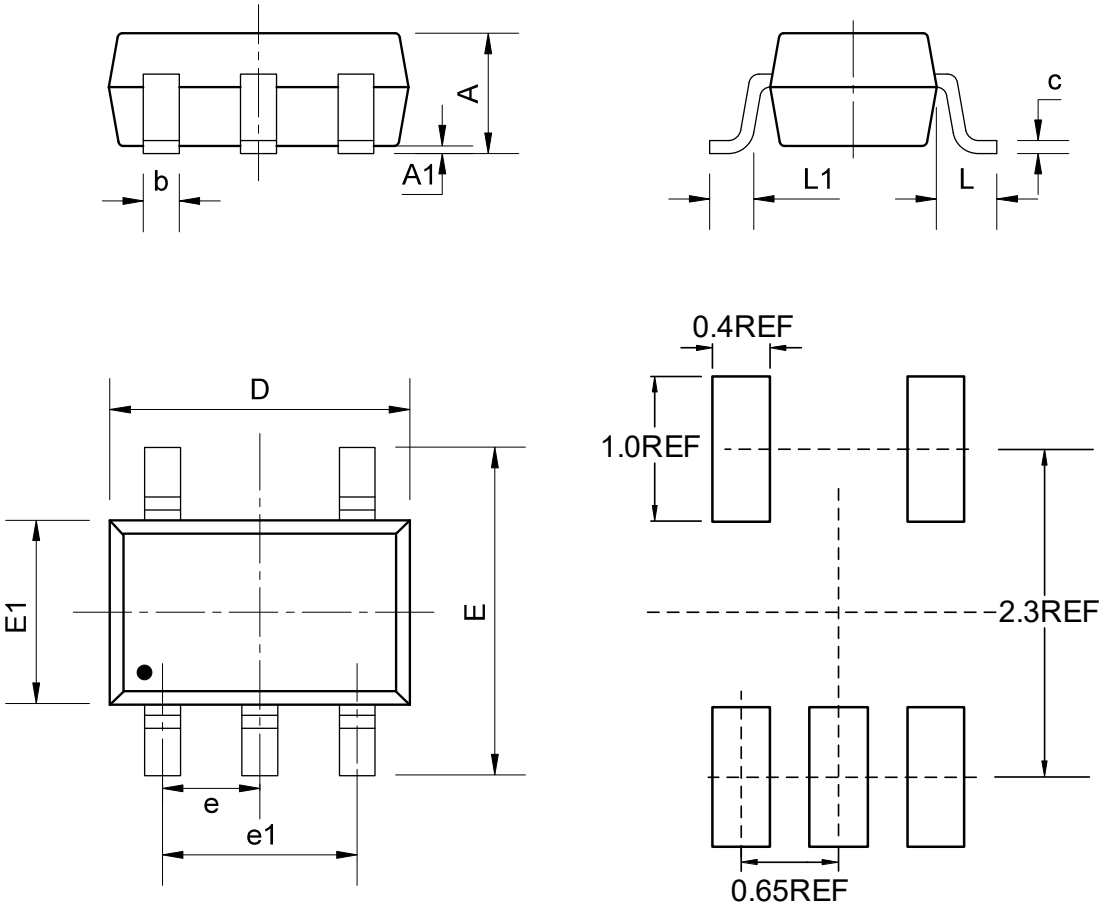


Figure4. Test Circuit

Package Dimension

SC70-5 (1.3mm × 2.1mm)



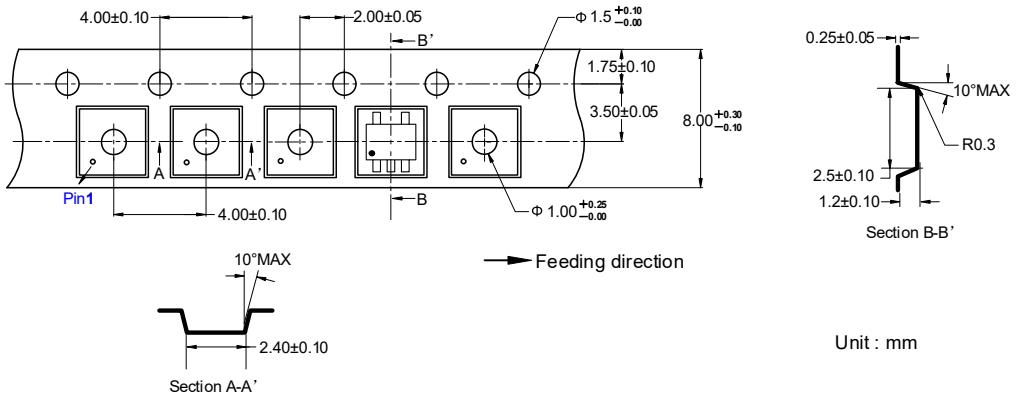
COMMON DIMENSIONS

(Unit: mm)

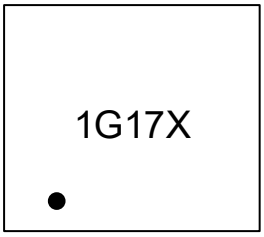
SYMBOL	MIN	NOM	MAX
A	-	-	1.10
A1	0.00	-	0.15
b	0.15	-	0.35
c	0.08	-	0.20
D	2.00	2.10	2.30
e	0.65BSC		
e1	1.30BSC		
E	2.15	2.30	2.50
E1	1.15	1.30	1.45
L	0.50REF		
L1	0.33REF		

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