Single Non−inverting Buffer with 3-state Output

General Description

The ETQ74LVC1G125 is a high performance non−inverting buffer operating from a 1.65V to 5.5V supply. This device is fabricated with advanced CMOS technology to achieve ultra-high speed with high output drive.

ETQ74LVC1G125 operates over an ambient temperature range of -40°C to +125°C.

Features

- Designed for 1.65V to 5.5V VCC Operation
- Over-voltage Tolerant Inputs
- 24 mA 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
- 3−State OE Input is Active−Low
- MSL1
- Automotive AEC-Q100 Grade 1 Qualified
  - -- Ambient temperature range of -40°C to +125°C
  - -- ESD HBM 4KV PASS
  - -- ESD CDM 1KV PASS
- Part No. and Package

Part No.	Package	Size
ETQ74LVC1G125	SC70-5	2.07mm×2.30mm

Applications

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

Pin Configuration

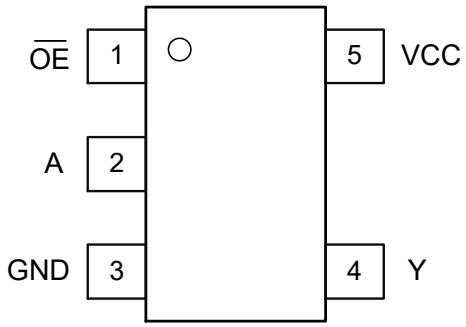


Figure1. Top View

Pin Function

Pin No.	Name	Description
1	$\overline{OE}$	Control Pin,Low Active
2	A	Input A
3	GND	Ground
4	Y	Output Y
5	VCC	Power Supply

Block Diagram

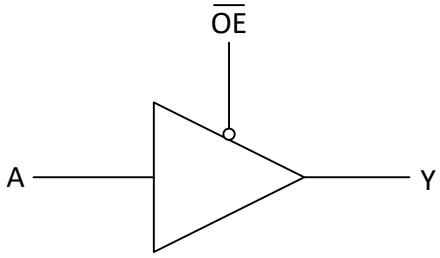


Figure2. Logic Symbol

Functional Description

Function Table

Input		Output
$\overline{OE}$	A	Y
L	L	L
L	H	H
H	X	Z

Absolute Maximum Ratings

Symbol	Parameter		Value	Unit
V_{CC}	DC Supply Voltage		−0.5 to 7.0	V
V_I	DC Input Voltage		−0.5 ≤V_I ≤+7.0	V
V_O	DC Output Voltage Output in Higher or Low State (1)		−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	Max Junction Temperature		150	°C
θ_{JA}	Thermal Resistance	SC70-5	300	°C /W
P_D	Power Dissipation in Still Air at 85°C		215	mW
V_{ESD}	ESD Classification	Human Body Model (2)	±4000	V
		Charged Device Model (3)	±1000	
I_{LU}	Latchup 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).

Recommended Operating Conditions

Symbol	Parameter		Min	Max	Unit
V_{CC}	DC Supply Voltage Operating		1.65	5.5	V
	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		1.65 to 1.95 2.3 to 5.5	0.75Vcc 0.7Vcc			0.75Vcc 0.7Vcc		V
V_{IL}	Low−Level Input Voltage		1.65 to 1.95 2.3 to 5.5			0.25Vcc 0.3Vcc		0.25Vcc 0.3Vcc	V
V_{OH}	High−Level Output Voltage V_{IN} = V_{IL}	I_{OH} =−100uA	1.65 to 5.5	Vcc−0.1	Vcc		Vcc−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	1.65 to 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_{IN} = 5.5V or GND	0 to 5.5			±0.1		±1.0	uA
I_{OFF}	Power Off Leakage Current	V_{IN} = 5.5V or V_{OUT} = 5.5V	0			1		10	uA
I_{CC}	Quiescent Supply Current	V_{IN} = 5.5V or GND	5.5			1		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

$t_r = t_f = 2.5ns$

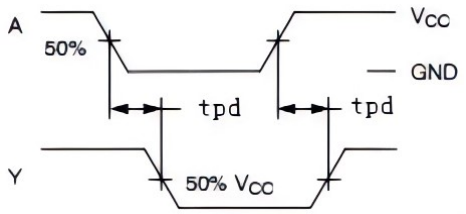
Symbol	Parameter	Condition	V_{CC}(V)	T_A = 25 °C			−40°C ≤T_A≤125°C		Unit
				Min	Typ	Max	Min	Max	
t_{PD}	Propagation Delay (Figure3 and 4)	R_L= 1MΩ C_L= 15pF	1.65	2.0	10.1	12.9	2.0	13.9	ns
			1.8	2.0	9.1	11.6	2.0	12.4	
			2.5	0.2	6.0	7.7	0.8	8.2	
		R_L= 1MΩ C_L= 15pF	3.3	0.8	5.0	6.5	0.5	7.0	
		R_L= 500Ω C_L= 50pF		1.2	5.6	7.1	1.5	7.6	
		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	
t_{PZL}, t_{PZH}	Output Enable Time (Figure5 and 6)	R_L = 500Ω C_L = 50pF	1.65	2.0	12.9	15.8	2.0	16.8	ns
			1.8	2.0	10.8	13.2	2.0	14.1	
			2.5	1.5	7.2	8.8	1.5	9.4	
			3.3	1.5	5.8	7.1	1.5	7.6	
			5.0	0.8	4.5	5.5	0.8	5.9	
t_{PLZ}, t_{PHZ}	Output Disable Time (Figure5 and 6)	R_L = 500Ω C_L = 50pF	1.65	2.0	11.5	14.1	2.0	15.1	ns
			1.8	2.0	9.8	12.0	2.0	12.8	
			2.5	1.5	7.7	9.5	1.5	10.1	
			3.3	1.0	7.2	8.8	1.0	9.4	
			5.0	0.5	5.4	6.8	0.5	7.3	

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)	10MHz,V_{CC} = 3.3 V, V_I = 0 V or V_{CC}	21	pF
		10MHz,V_{CC} = 5.5 V, V_I = 0 V or V_{CC}	21	

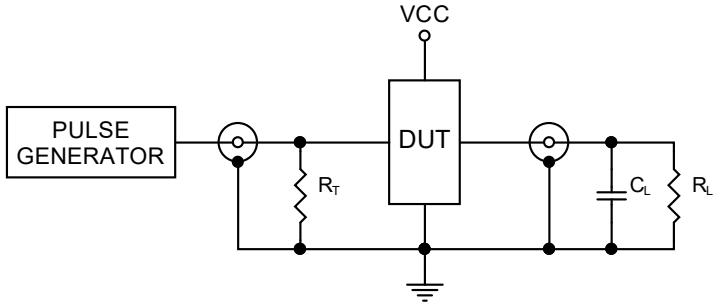
Note5. C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load. Average operating current can be obtained by the equation: $I_{CC(OPR)}=C_{PD}\times V_{CC}\times fin+I_{CC}\times C_{PD}$ is used to determine the no−load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

AC Test Circuit



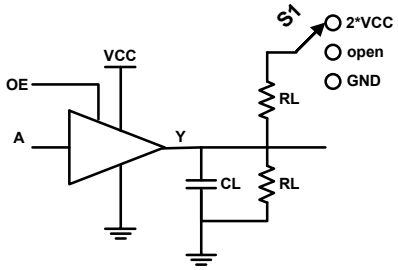
PROPAGATION DELAYS:
tR=tF=2.5ns, 10% to 90%; f=1MHZ;
tW=500ns

Figure 3. Switch Waveform



RT=50Ω(typ)

Figure 4. Test Circuit



Test	Swith
tPD	Open
tPZL tPLZ	2*VCC
tPZH tPHZ	GND

Figure 5. Output Enable/Disable Time Test Circuit

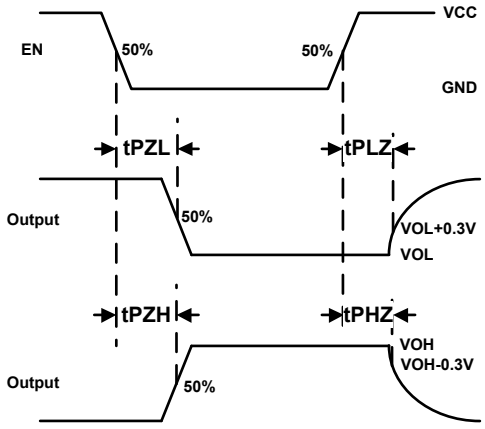
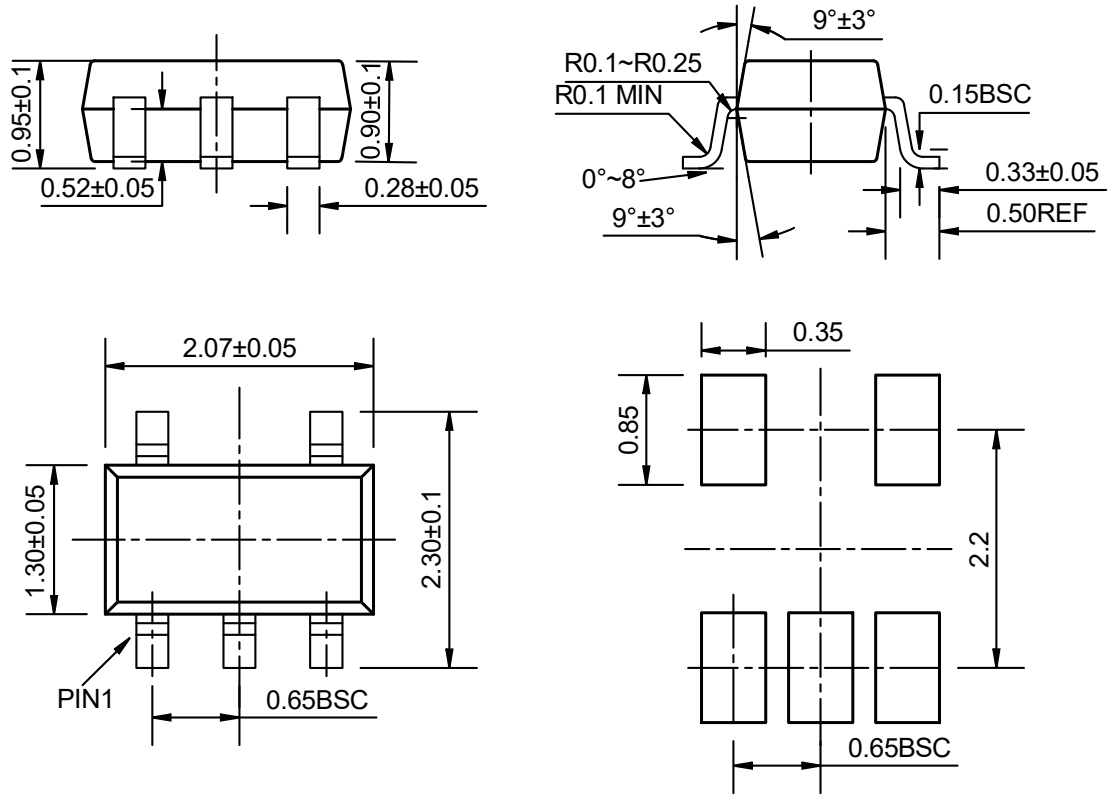


Figure 6. Output Enable/Disable Waveform

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	2018-2-3	Original Version	Shibo	Shibo	Liu Jia Ying
1.1	2023-2-6	Update Typeset	Shibo	Shibo	Shibo