

Single Bus Buffer Gate with 3-State Output

General Description

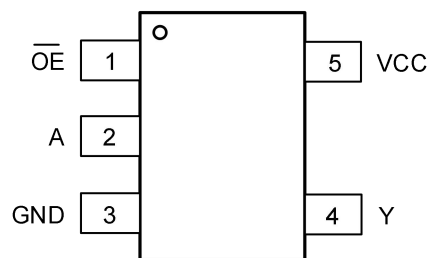
The ETQ74HCT1G125 device is a single bus buffer gate/line driver with 3-state output. The output is disabled when the output-enable ($\overline{OE}$) input is high. When $\overline{OE}$ is low, data is passed from the A input to the Y output.

Features

- Designed for 4.5V to 5.5V V_{CC} Operation
- Over-voltage Tolerant Inputs Accept Voltages to 5.5V
- $\pm 8\text{mA}$ Balanced Output Sink and Source Capability
- Near Zero Static Supply Current Substantially Reduces System Power Requirements
- Multiple Package Options Automotive AEC-Q100 Grade 1 Qualified
 - Ambient Temperature Range of -40°C to 125°C
 - ESD HBM $\pm 4\text{KV}$ PASS
 - ESD CDM $\pm 1\text{KV}$ PASS
 - Latch Up Current to $\pm 100\text{mA}$ PASS
- Part No. and Package Information

Part No.	Package	Packing Option	MSL
ETQ74HCT1G125	SC70-5 (1.3mm $\times$ 2.1mm)	Tape and Reel, 3K/Reel	1

Pin Configuration



SC70-5

Figure1. Pin Configuration

ETQ74HCT1G125

Pin Function

SC70-5

Pin No.	Pin Name	Function
1	$\overline{OE}$	Enable Input
2	A	Input
3	GND	Ground
4	Y	Output
5	VCC	Supply Voltage

Block Diagram

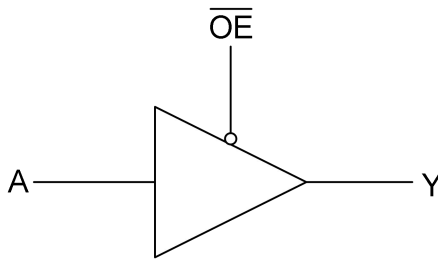


Figure2. Logic Symbol

Functional Table

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

ETQ74HCT1G125

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		-20	mA
I _{OK}	DC Output Diode Current, V _O < GND, V _O > V _{CC}		±20	mA
I _O	DC Output Sink Current		±25	mA
I _{CC}	DC Supply Current Per Supply Pin		50	mA
I _{GND}	DC Ground Current Per Supply Pin		-50	mA
T _{STG}	Storage Temperature Range		-65 to 150	°C
T _L	Lead Temperature, Soldering 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.

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 _{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

ETQ74HCT1G125

Recommended Operating Conditions

Over operating free-air temperature range (unless otherwise noted)⁽⁵⁾

Symbol	Parameter	Min	Max	Unit
V _{CC}	Supply Voltage	4.5	5.5	V
V _I	Input Voltage	0	V _{CC}	V
V _O	Output Voltage	0	V _{CC}	V
Δt/ΔV	Input Transition Rise or Fall Rate		20	ns/V
T _A	Operating Free-air Temperature	-40	125	°C

Note5: All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation.

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		4.5	2			2		V
			5.5	2			2		
V _{IL}	Low-Level Input Voltage		4.5			0.8		0.8	V
			5.5			0.8		0.8	
V _{OH}	High-Level Output Voltage	I _{OH} = -50μA	4.5	4.4	4.5		4.4		V
		I _{OH} = -8mA	4.5	3.94			3.8		
V _{OL}	Low-Level Output Voltage	I _{OL} = 50μA	4.5			0.1		0.1	V
		I _{OL} = 8mA	4.5			0.36		0.44	
I _I	Input Current	V _I = 5.5V or GND	0~5.5			±0.1		±1	μA
I _{OZ}	OFF-state Output Current	V _O = V _{CC} or GND	5.5			±0.25		±2.5	uA
I _{CC}	Supply Current	V _I = V _{CC} or GND, I _O = 0mA	5.5			1.0		10	μA
ΔI _{CC} ⁽⁶⁾	Change in Supply Current	One Input at 3.4V, Other Inputs at V _{CC} or GND	5.5			1.35		1.5	mA

Note6: This is the increase in supply current for each input at one of the specified TTL voltage levels, rather than 0 V or V_{CC}.

ETQ74HCT1G125

AC Electrical Characteristics

$t_r = t_f = 3\text{ns}$, (see [Figure3](#))

Symbol	Parameter	Condition	$V_{CC}(V)$	$T_A = 25^\circ\text{C}$			$-40^\circ\text{C} \leq T_A \leq 125^\circ\text{C}$		Unit
				Min	Typ	Max	Min	Max	
t_{PLH} t_{PHL}	Propagation Delay	$C_L = 50\text{pF}$	4.5		14	25		29	ns
		$C_L = 15\text{pF}$	5.0		12				
t_{PZL} t_{PZH}	Output Enable Time	$C_L = 50\text{pF}$	4.5		12	30		34	ns
t_{PLZ} t_{PHZ}	Output Disable Time	$C_L = 50\text{pF}$	4.5		13	26		30	ns

Capacitance Characteristics

$V_{CC} = 5V$, $T_A = 25^\circ\text{C}$

Symbol	Parameter	Condition	Typ	Unit
C_I	Input Capacitance	$V_I = V_{CC}$ or GND	4	pF
C_{PD} (7)	Power Dissipation Capacitance	No Load, $f = 1\text{MHz}$	14	pF

Note7: C_{PD} is used to determine the dynamic power dissipation (P_D in μW).

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

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.

ETQ74HCT1G125

AC Test Circuit

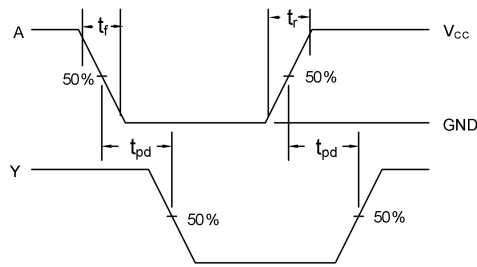


Figure3. Switch Waveform

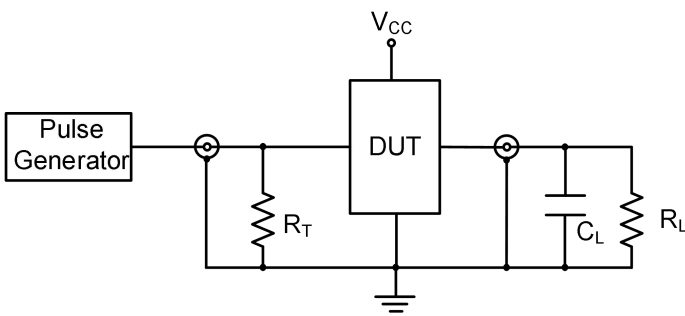


Figure4. Test Circuit $R_T = 50\Omega(\text{typ})$

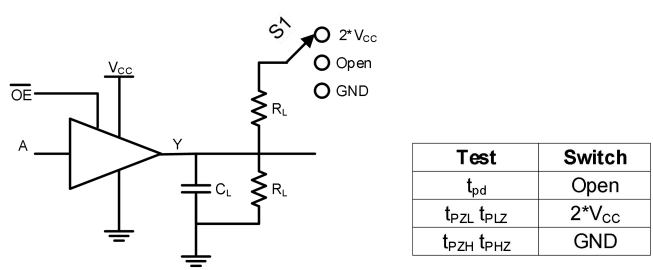


Figure5. Output Enable/Disable Time Test Circuit

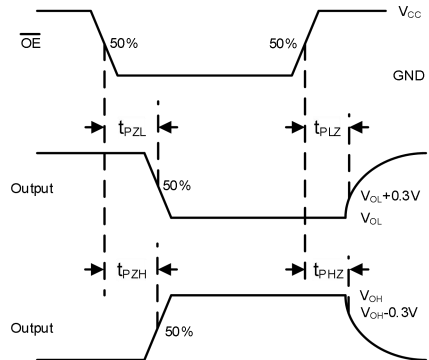
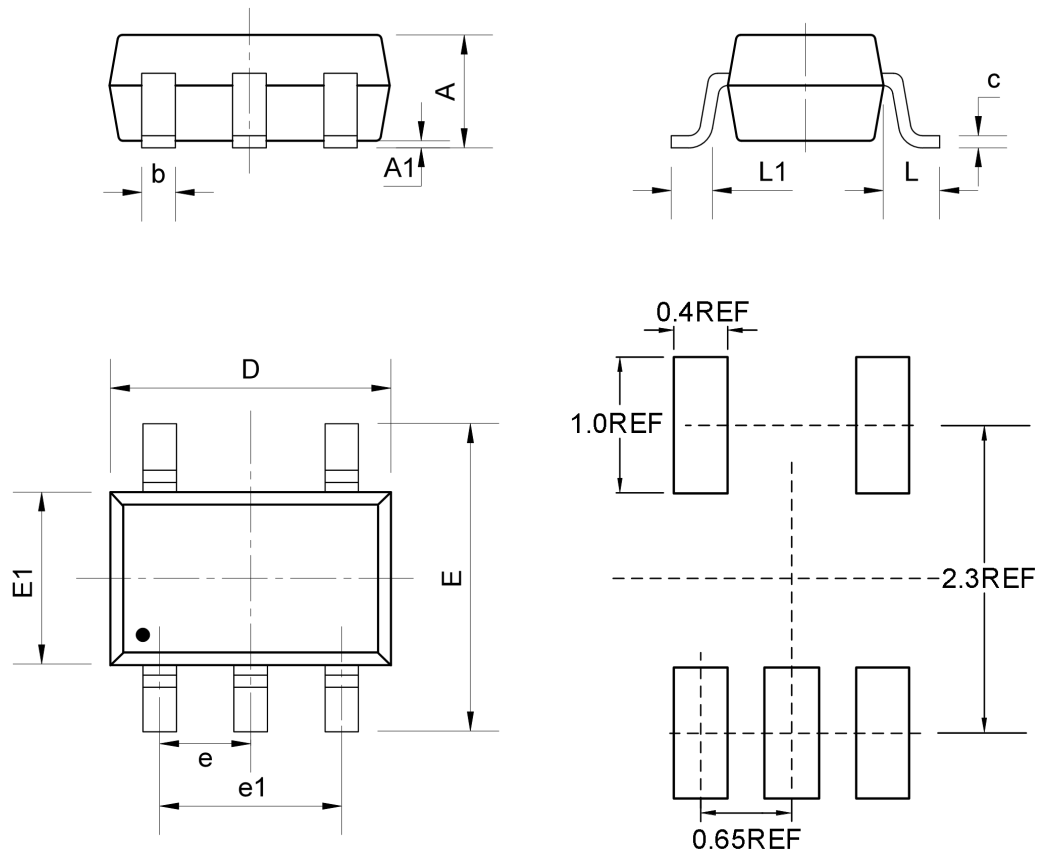


Figure6. Output Enable/Disable Waveform

ETQ74HCT1G125

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		

