Single ULP Buffer with 3-State Output

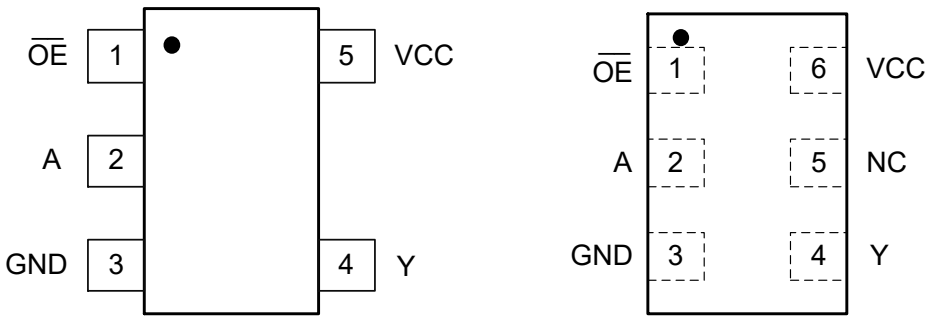
General Description

The ET74AUP1G125 is a single Buffer with 3−State output from ultra low power series, which can operate from a 0.8V to 3.6V supply. This device is fabricated with advanced CMOS technology to achieve ultra-high speed with high output drive.

Features

- Designed for 0.8V to 3.6V VCC Operation
- Low static power consumption; ICC = 0.7μA (maximum)
- 4mA 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
- Packages are SC70-5,SOT23-5 or small DFN6
- MSL1 (DFN6) , MSL3(SC70-5,SOT23-5)

Pin Configuration



SC70-5/SOT23-5 DFN6

Figure1. (Top View)

Device Information

Part No.	Package	Size
ET74AUP1G125	SC70-5	1.3mm×2.1mm
ET74AUP1G125T	SOT23-5	1.6mm×2.9mm
ET74AUP1G125Y	DFN6	1.0mm×1.5mm

Pin Function

Pin No.		Pin Name	Function
SC70-5	DFN6		
1	1	$\overline{OE}$	Enable input
2	2	A	Input
3	3	GND	Ground
4	4	Y	Output
/	5	NC	No connect
5	6	VCC	Supply Voltage

Block Diagram

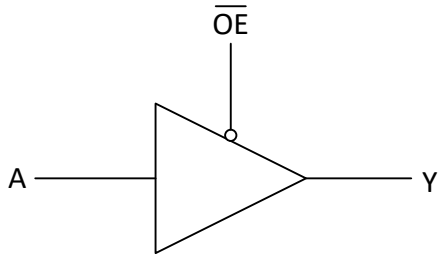


Figure2.

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 4.6	V
V_I	DC Input Voltage		−0.5 ≤V_I ≤+4.6	V
V_O	DC Output Voltage Output in Higher or Low State (1)		−0.5 to 4.6	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		±20	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	Max Junction Temperature		150	°C
V_{ESD}	ESD Classification	Human Body Model (2)	±4000	V
		Charged Device Model (3)	±1000	
I_{LU}	Max 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. Tested to EIA/JESD22−A114−A. **3**. Tested to JESD22−C101−A. **4**. Tested to EIA/JESD78.

Thermal Characteristics

Symbol	Package	Ratings	Value	Unit
$R_{\theta JA}$	SC70-5	Thermal Characteristics, Thermal Resistance, Junction-to-Air	300	°C/W
	SOT23-5		250	
	DFN6(1×1.5)		440	
P_D	SC70-5	Power Dissipation in Still Air at 85°C	215	mW
	SOT23-5		260	
	DFN6(1×1.5)		150	

Recommended Operating Conditions

Symbol	Parameter		Min	Max	Unit
V_{CC}	DC Supply Voltage Operating		0.8	3.6	V
V_{IN}	DC Input Voltage		0	3.6	V
V_{OUT}	DC Output Voltage (High or Low State)		0	3.6	V
T_A	Operating Temperature Range		-40	85	°C
t_r,t_f	Input Rise and Fall Time	V_{CC} = 0.8V to 3.6V	0	20	ns/V

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≤85°C		Unit
				Min	Typ	Max	Min	Max	
V_{IH}	High−Level Input Voltage		0.8	0.75Vcc			0.75Vcc		V
			0.9~1.95	0.7Vcc			0.7Vcc		
			2.3~2.7	1.6			1.6		
			3.0~3.6	2.0			2.0		
V_{IL}	Low−Level Input Voltage		0.8			0.25Vcc		0.25Vcc	V
			0.9~1.95			0.3Vcc		0.3Vcc	
			2.3~2.7			0.7		0.7	
			3.0~3.6			0.9		0.9	
V_{OH}	High−Level Output Voltage	I_{OH}=−20uA	0.8~3.6	V_{CC}−0.1			V_{CC}−0.1		V
		I_{OH}=−1.1mA	1.1	0.82	1.02		0.77		
		I_{OH}=−1.7mA	1.4	1.11	1.32		1.03		
		I_{OH}=−1.9mA	1.65	1.32	1.58		1.30		
		I_{OH}=−2.3mA	2.3	2.05	2.24		1.97		
		I_{OH}=−3.1mA		1.9	2.22		1.85		
		I_{OH}=-2.7mA	3.0	2.72	2.95		2.67		
		I_{OH}=-4.0mA		2.6	2.92		2.55		
V_{OL}	Low−Level Output Voltage	I_{OL}=20uA	0.8~3.6			0.1		0.1	V
		I_{OL}=1.1mA	1.1		0.11	0.33		0.33	
		I_{OL}=1.7mA	1.4		0.12	0.31		0.37	
		I_{OL}=1.9mA	1.65		0.11	0.31		0.35	
		I_{OL}=2.3mA	2.3		0.14	0.31		0.33	
		I_{OL}=3.1mA			0.19	0.44		0.45	
		I_{OL}=2.7mA	3.0		0.11	0.31		0.33	
		I_{OL}=4.0mA			0.16	0.44		0.45	
I_{IN}	Input Leakage Current	V_{IN} = V_{CC} or GND	0~3.6			±0.1		±0.2	uA
I_{OFF}	Power Off Leakage Current	V_{IN} = 3.6V or V_{OUT} = 3.6V	0			±0.2		±0.5	uA
I_{CC}	Quiescent Supply Current	V_{IN} = 3.6V or GND	3.6			±0.2		±0.7	uA
Δ I_{CC}	Additional Quiescent Supply Current	V_{IN} = 2.7V	3.3			60		90	uA

AC Electrical Characteristics

$t_r = t_f = 2.5ns$

Symbol	Parameter	Condition	V_{CC}(V)	T_A = 25°C			−40°C ≤T_A≤85°C		Unit
				Min	Typ	Max	Min	Max	
t_{PLH} t_{PHL}	Propagation Delay (Figure3 And 4)	C_L= 5 pF[5]	0.8	13.2	29	90.1	11.9	220	ns
			1.2	5.0	7.6	14.3	4.6	14.4	
			1.5	3.4	4.8	8.9	3	9.6	
			1.8	2. 7	3.6	6.9	2.3	7.6	
			2.5	1.9	2.4	5.1	1.6	5.6	
			3.3	1.5	1.9	4.4	1.3	4.8	
		C_L= 10 pF[5]	0.8	14.3	31.3	97.9	12.8	239	ns
			1.2	5.4	8.3	15.3	5.0	15.3	
			1.5	3.7	5.2	9.5	3.2	10.2	
			1.8	2.9	3.9	7.4	2.5	8.1	
			2.5	2.0	2.6	5.4	1.7	6.0	
			3.3	1.6	2.0	4.6	1.3	5.1	
		C_L= 15 pF[5]	0.8	15.3	32.5	106	13.8	259	ns
			1.2	5.8	8.9	16.3	5.3	16.3	
			1.5	4.0	5.6	10.1	3.5	10.9	
			1.8	3.1	4.2	7.8	2.6	8.6	
			2.5	2.1	2.8	5.8	1.8	6.4	
			3.3	1.7	2.2	4.9	1.4	5.4	
		C_L= 30 pF[5]	0.8	18.3	37.5	130	16.6	323	ns
			1.2	7.0	10.7	19.3	6.4	19.3	
			1.5	4.8	6.9	12.0	4.2	12.9	
			1.8	3.7	5.1	9.2	3.2	10.2	
			2.5	2.6	3.5	6.7	2.2	7.5	
			3.3	2.0	2.2	5.6	1.7	6.3	

Note5. C_L includes probe and jig capacitance.

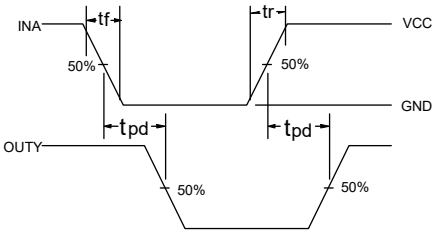
Capacitance Characteristics

Symbol	Parameter	Condition		Typical	Unit
C_{IN}	Input Capacitance	V_{CC}= 3.6V, V_I = 0 V or V_{CC}		2	pF
C_O	output capacitance	V_{CC}= 0V, V_{OUT} = GND		3	pF
C_{PD}	Power Dissipation Capacitance [6]	1 MHz, V_I = 0 V to V_{CC}	V_{CC}= 0.8V	7.6	pF
			V_{CC}= 1.2V	8.1	
			V_{CC}= 1.5V	8.5	
			V_{CC}= 1.8V	8.6	
			V_{CC}= 2.5V	9.0	
			V_{CC}= 3.3 V	9.6	

Note6. 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;

Figure3. Switch Waveform

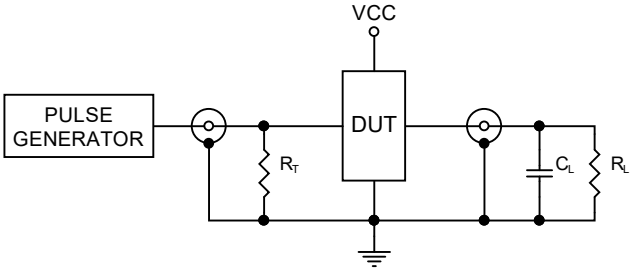
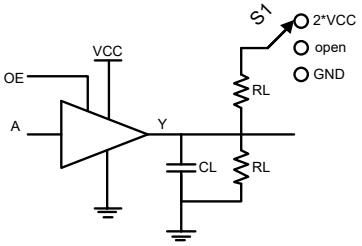


Figure4. Test Circuit R_T=50Ω(typ)



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

Figure5. Output Enable/Disable Time Test Circuit

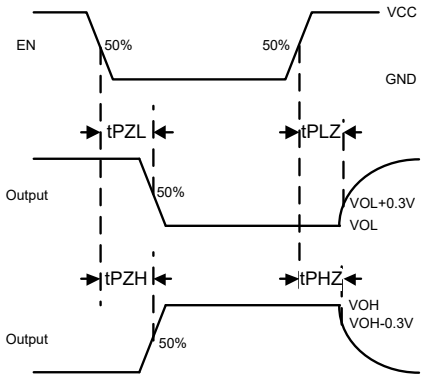
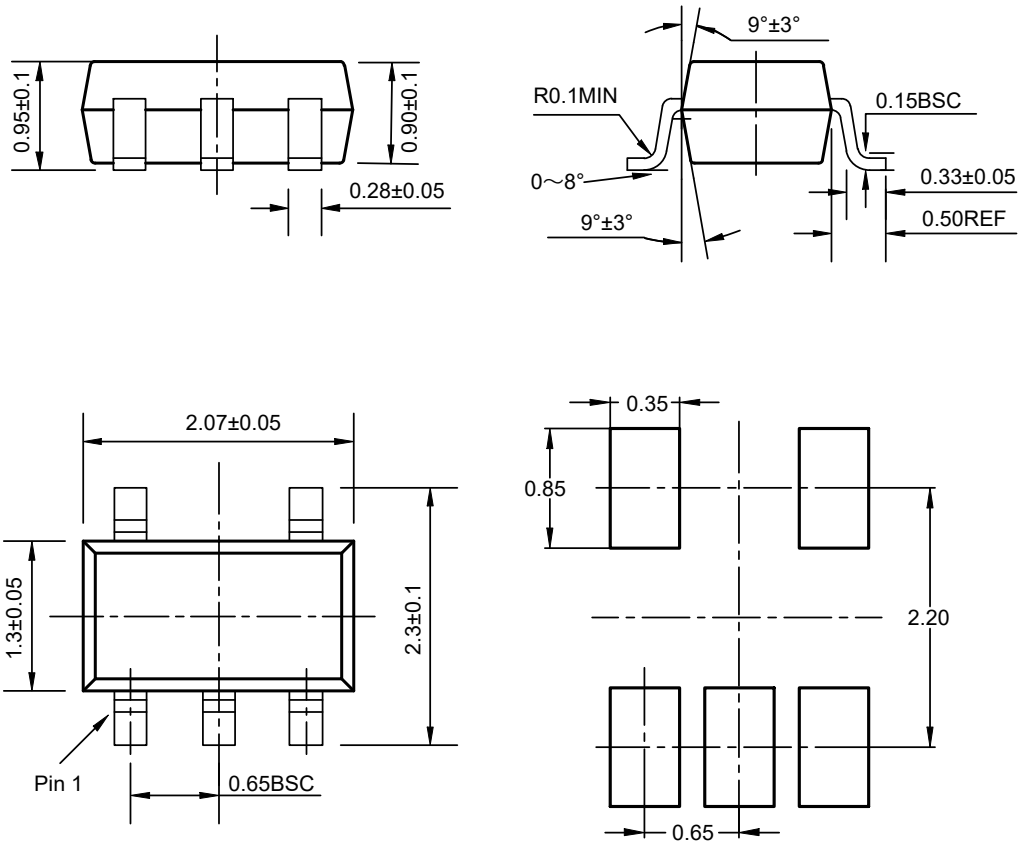


Figure6. Output Enable/Disable Waveform

Package Dimension

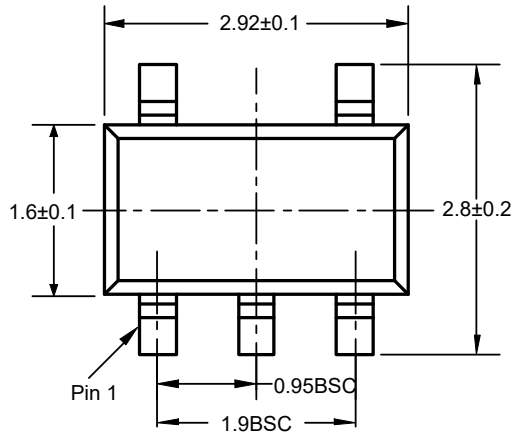
SC70-5

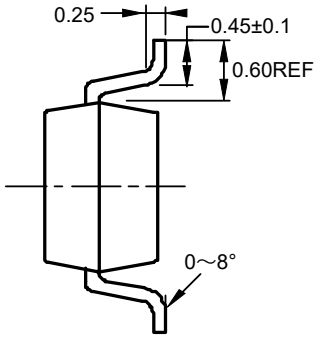


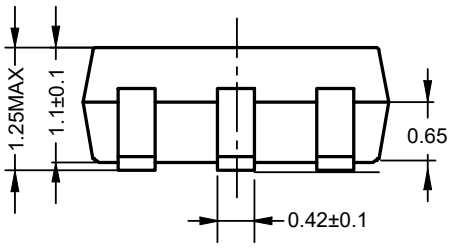
Recommended Land Pattern

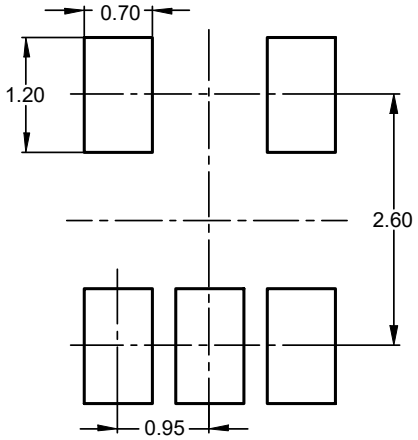
Unit: mm

SOT23-5





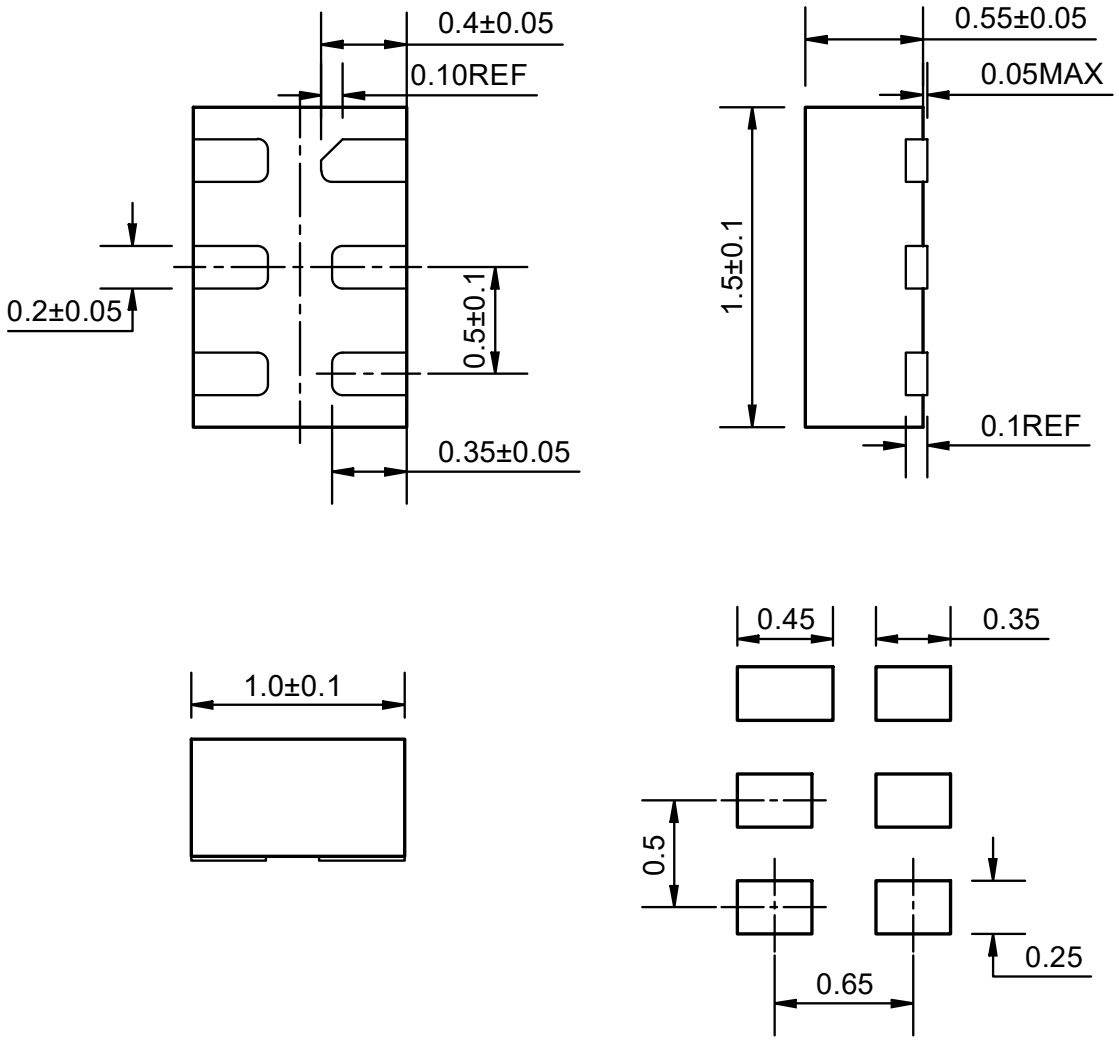




Recommended Land Pattern

Unit: mm

DFN6 (1.0×1.5)



Recommended Land Pattern

Unit: mm

Revision History and Checking Table

Version	Date	Revision Item	Modifier	Function & Spec Checking	Package & Tape Checking
1.0	2022-2-22	Initial Version	Shilj	Shilj	Liujy
1.1	2022-09-8	Update Typeset	Shibo	Shilj	Liujy
1.2	2023-11-29	Update Typeset /ESD/package picture	Shibo	Shibo	Liujy