Single Ultra-Low-Power Buffer with 3-State Output

General Description

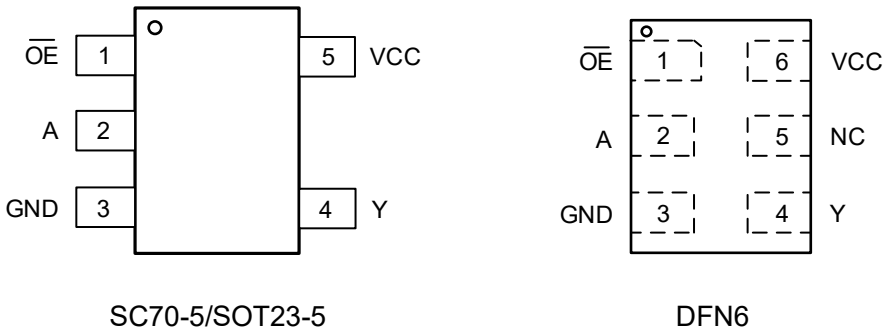
The ET74AUP1G125 is a single Buffer with 3-State output from ultra-low power series, which can operate from a 0.8V to 3.6V supply. This device is fabricated with advanced CMOS technology to achieve ultra-high speed with high output drive.

Features

- Designed for 0.8V to 3.6V V_{CC} Operation
- ±4mA Balanced Output Sink and Source Capability
- Near Zero Static Supply Current Substantially Reduces System Power Requirements
- These Devices are Pb-Free and RoHS Compliant
- ESD Protection Complies with JESD22 Standard
  -- HBM: ±4000V Pass (JEDEC JS-001)
  -- CDM: ±1000V Pass (JEDEC JS-002)
- Latch-up Performance Exceeds ±100mA per JEDEC JESD78
- Part No. and Package Information

Part No.	Package	Packing Option	MSL
ET74AUP1G125	SC70-5 (1.3mm × 2.1mm)	Tape and Reel, 3K/Reel	1
ET74AUP1G125T	SOT23-5 (1.6mm × 2.9mm)	Tape and Reel, 3K/Reel	3
ET74AUP1G125Y	DFN6 (1.0mm × 1.5mm)	Tape and Reel, 3K/Reel	1

Pin Configuration



SC70-5/SOT23-5 DFN6

Figure1. Pin Configuration

Pin Function

SC70-5/ SOT23-5

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

DFN6

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

Block Diagram

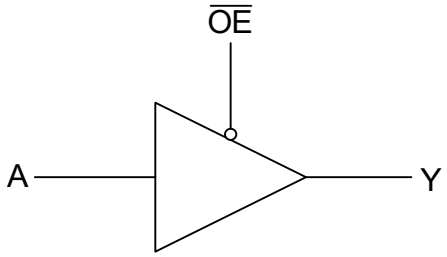


Figure2. Logic Symbol

Functional Table

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

Absolute Maximum Ratings

Symbol	Parameter		Value	Unit
V_{CC}	DC Supply Voltage (VCC Pin)		-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 85°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 JEDEC JS-001;

Note3: CDM tested per JEDEC JS-002;

Note4: Latch up Current Maximum Rating tested per JEDEC JESD78F.

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		440	
P_D	SC70-5	Power Dissipation in Still Air at 85°C	215	mW
	SOT23-5		260	
	DFN6		150	

Recommended Operating Conditions

Symbol	Parameter		Min	Max	Unit
V_{CC}	DC Supply Voltage Operating		0.8	3.6	V
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	85	°C
t_r, t_f	Input Rise and Fall Time	V_{CC} = 0.8V to 3.6V	0	20	ns/V

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	0.75V_{CC}			0.75V_{CC}		V
			0.9~1.95	0.7V_{CC}			0.7V_{CC}		
			2.3~2.7	1.6			1.6		
			3.0~3.6	2.0			2.0		
V_{IL}	Low-Level Input Voltage		0.8			0.25V_{CC}		0.25V_{CC}	V
			0.9~1.95			0.3V_{CC}		0.3V_{CC}	
			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_I = V_{CC} or GND	0~3.6			±0.1		±0.2	uA
I_{OFF}	Power Off Leakage Current	V_I = 3.6V or V_O = 3.6V	0			±0.2		±0.5	uA
I_{CC}	Quiescent Supply Current	V_I = 3.6V or GND	3.6			±0.2		±0.7	uA
ΔI_{CC}	Additional Quiescent Supply Current	V_I = 2.7V	3.3			60		90	uA

AC Electrical Characteristics

$t_r = t_f = 3ns$

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 (xA to xY; See Figure 3 & 4)	C_L = 15pF(5)	0.8	15.3	32.5	106	13.8	259	ns
			1.2 ± 0.1	5.8	8.9	16.3	5.3	16.3	
			1.5 ± 0.1	4.0	5.6	10.1	3.5	10.9	
			1.8 ± 0.1	3.1	4.2	7.8	2.6	8.6	
			2.5 ± 0.2	2.1	2.8	5.8	1.8	6.4	
			3.3 ± 0.3	1.7	2.2	4.9	1.4	5.4	
		C_L = 30pF(5)	0.8	18.3	37.5	130	16.6	323	ns
			1.2 ± 0.1	7.0	10.7	19.3	6.4	19.3	
			1.5 ± 0.1	4.8	6.9	12.0	4.2	12.9	
			1.8 ± 0.1	3.7	5.1	9.2	3.2	10.2	
			2.5 ± 0.2	2.6	3.5	6.7	2.2	7.5	
			3.3 ± 0.3	2.0	2.2	5.6	1.7	6.3	
t_{PZL}, t_{PZH}	Output Enable Time (xOE to xY; See See Figure 5 & 6)	C_L = 15pF(5)	0.8		32.4	108.7		242.5	ns
			1.2 ± 0.1		9.2	14.1		14.4	
			1.5 ± 0.1		6.0	8.5		9.5	
			1.8 ± 0.1		4.6	6.1		7.3	
			2.5 ± 0.2		3.1	3.9		4.9	
			3.3 ± 0.3		2.4	2.9		3.8	
		C_L = 30pF(5)	0.8		40.8	149.6		305.9	ns
			1.2 ± 0.1		11.2	17.2		17.7	
			1.5 ± 0.1		7.4	10.3		11.7	
			1.8 ± 0.1		5.6	7.5		9.0	
			2.5 ± 0.2		3.9	4.9		6.2	
			3.3 ± 0.3		3.1	3.7		4.8	
t_{PLZ}, t_{PHZ}	Output Disable Time (xOE to xY; Figure 5 & 6)	C_L = 15pF(5)	0.8		24.3	58.6		142.3	ns
			1.2 ± 0.1		10.2	12.6		12.9	
			1.5 ± 0.1		7.8	8.9		9.6	
			1.8 ± 0.1		7.7	8.5		9.2	
			2.5 ± 0.2		5.9	6.3		6.9	
			3.3 ± 0.3		6.9	7.1		7.6	
		C_L = 30pF(5)	0.8		29.8	65.1		160.3	ns
			1.2 ± 0.1		13.6	16.0		16.3	
			1.5 ± 0.1		10.5	11.6		12.3	
			1.8 ± 0.1		11.2	11.9		12.6	
			2.5 ± 0.2		8.4	8.8		9.3	
			3.3 ± 0.3		10.7	10.9		11.4	

Capacitance Characteristics

Symbol	Parameter	Condition		Typ	Unit
C_I	Input Capacitance	V_{CC} = 3.6V, V_I = 0V or V_{CC}		2	pF
C_O	output capacitance	V_{CC} = 0V, V_O = GND		3	pF
C_{PD}	Power Dissipation Capacitance (5)	1MHz, V_I = 0V 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} = 3.3V	9.6	

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

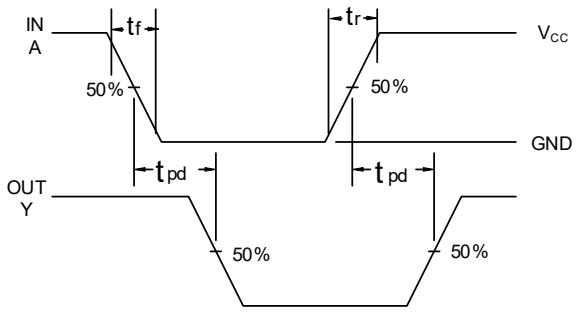


Figure3. Switch Waveform

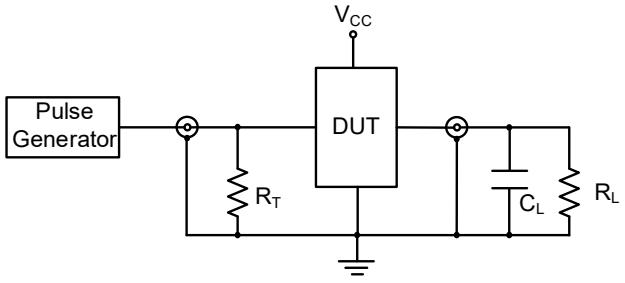
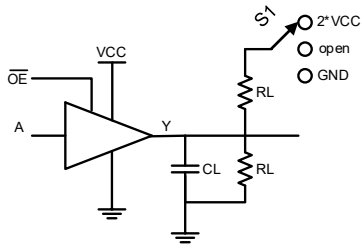


Figure4. Test Circuit R_T=50Ω(typ)



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

Figure5. Output Enable/Disable Time Test Circuit

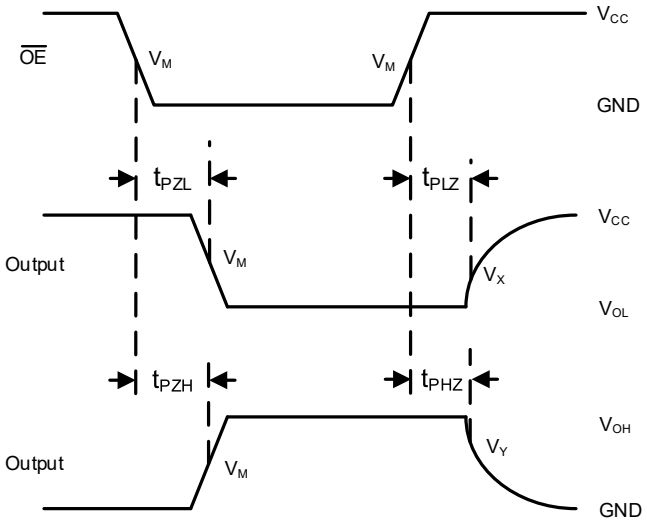


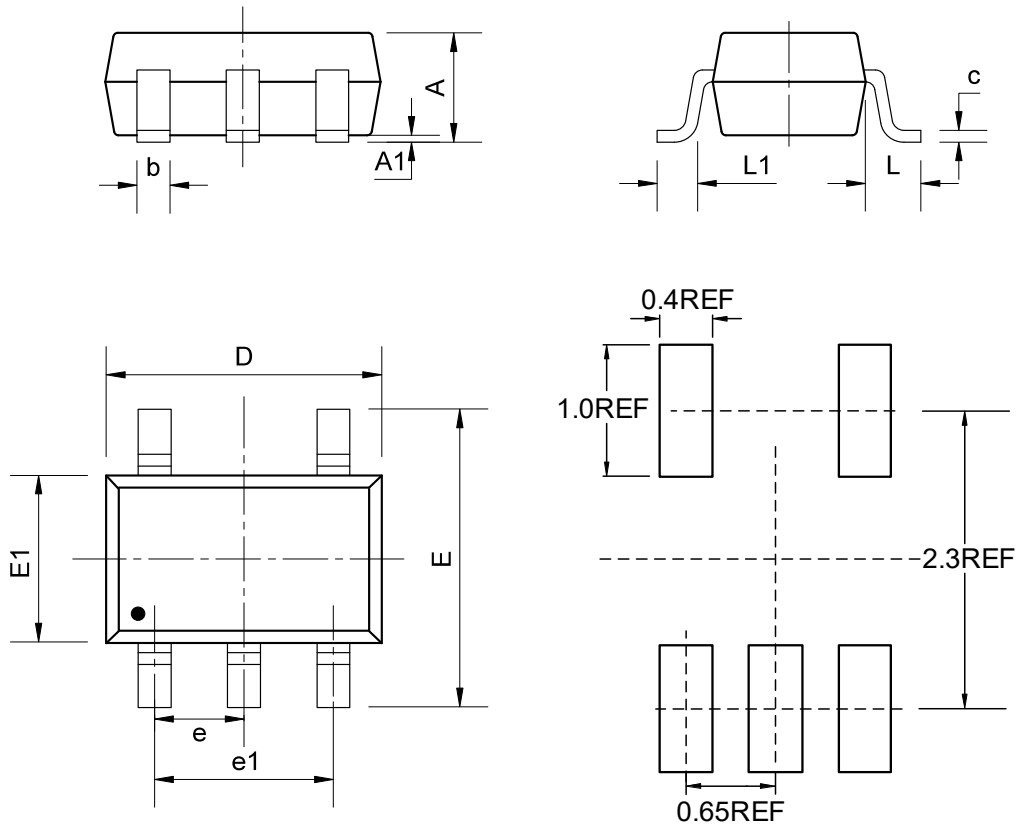
Figure6. Output Enable/Disable Waveform

Table1. Measurement Points

Supply Voltage	Input	Output		
V_{CC}	V_M	V_M	V_X	V_Y
0.8V	0.5 × V_{CC}	0.5 × V_{CC}	V_{OL} + 0.1V	V_{OH} - 0.1V
1.2V ± 0.1V	0.5 × V_{CC}	0.5 × V_{CC}	V_{OL} + 0.1V	V_{OH} - 0.1V
1.5V ± 0.1V	0.5 × V_{CC}	0.5 × V_{CC}	V_{OL} + 0.1V	V_{OH} - 0.1V
1.8V ± 0.1V	0.5 × V_{CC}	0.5 × V_{CC}	V_{OL} + 0.15V	V_{OH} - 0.15V
2.5V ± 0.2V	0.5 × V_{CC}	0.5 × V_{CC}	V_{OL} + 0.15V	V_{OH} - 0.15V
3.3V ± 0.3V	0.5 × V_{CC}	0.5 × V_{CC}	V_{OL} + 0.3V	V_{OH} - 0.3V

Package Dimension

SC70-5 (1.3mm × 2.1mm)

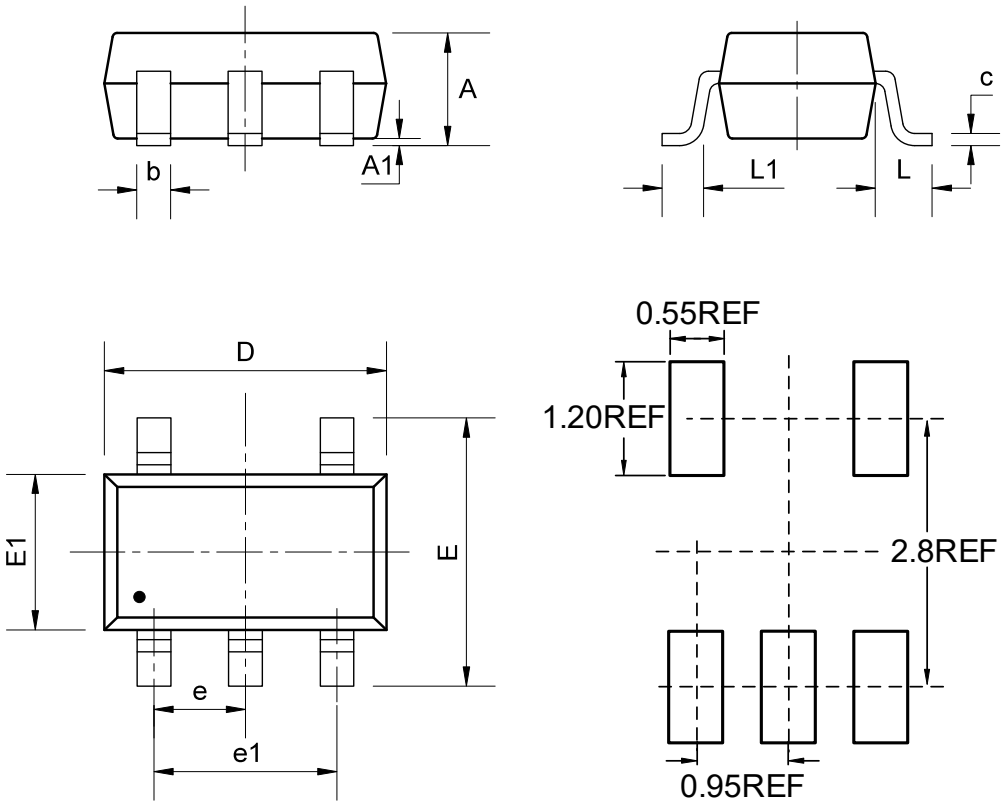


COMMON DIMENSIONS

(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		

SOT23-5 (1.6mm × 2.9mm)

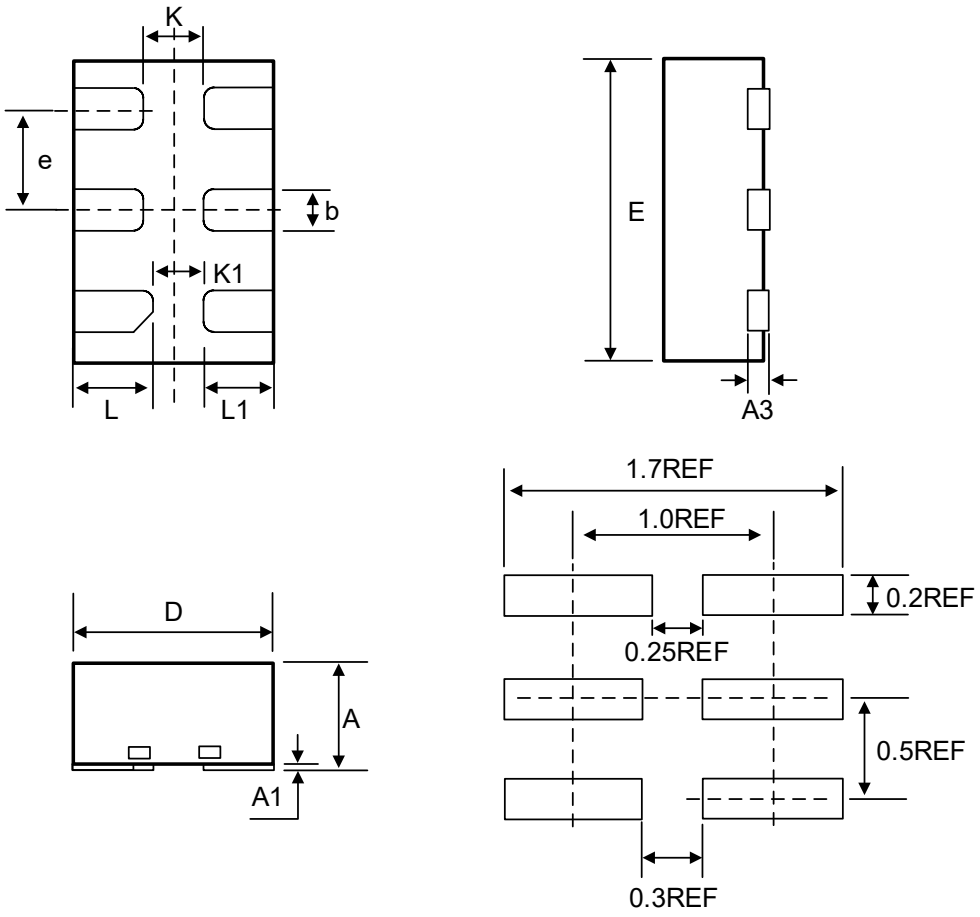


COMMON DIMENSIONS

(Unit: mm)

SYMBOL	MIN	NOM	MAX
A	-	-	1.45
A1	0.00	-	0.15
b	0.28	0.35	0.50
c	0.08	0.15	0.22
D	2.75	2.9	3.05
e	0.90	0.95	1.00
e1	1.80	1.90	2.00
E	2.60	2.80	3.00
E1	1.45	1.6	1.75
L	0.60REF		
L1	0.30	0.45	0.60

DFN6 (1.0mm × 1.5mm)



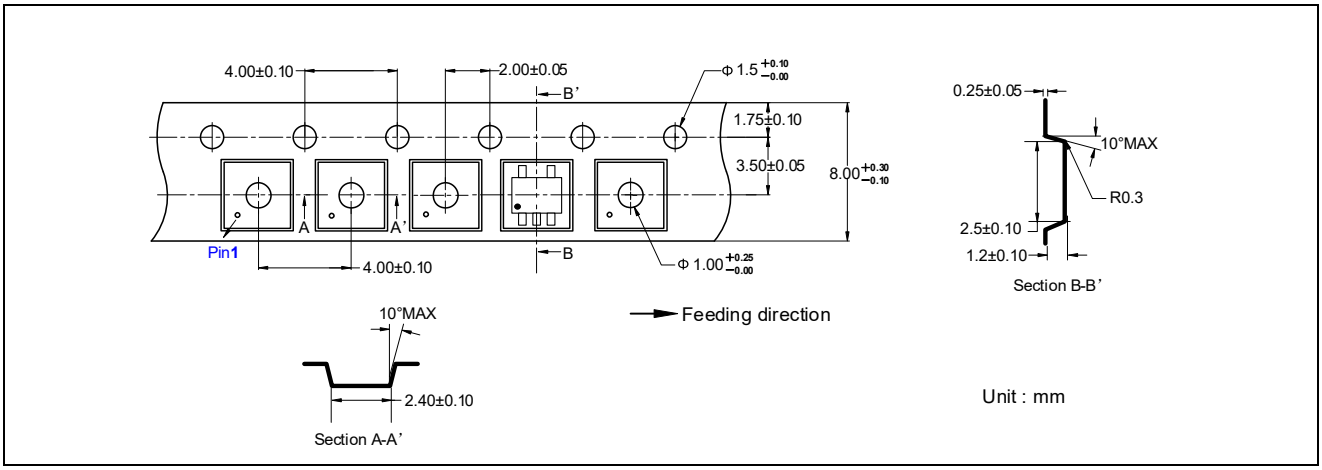
COMMON DIMENSIONS

(Unit: mm)

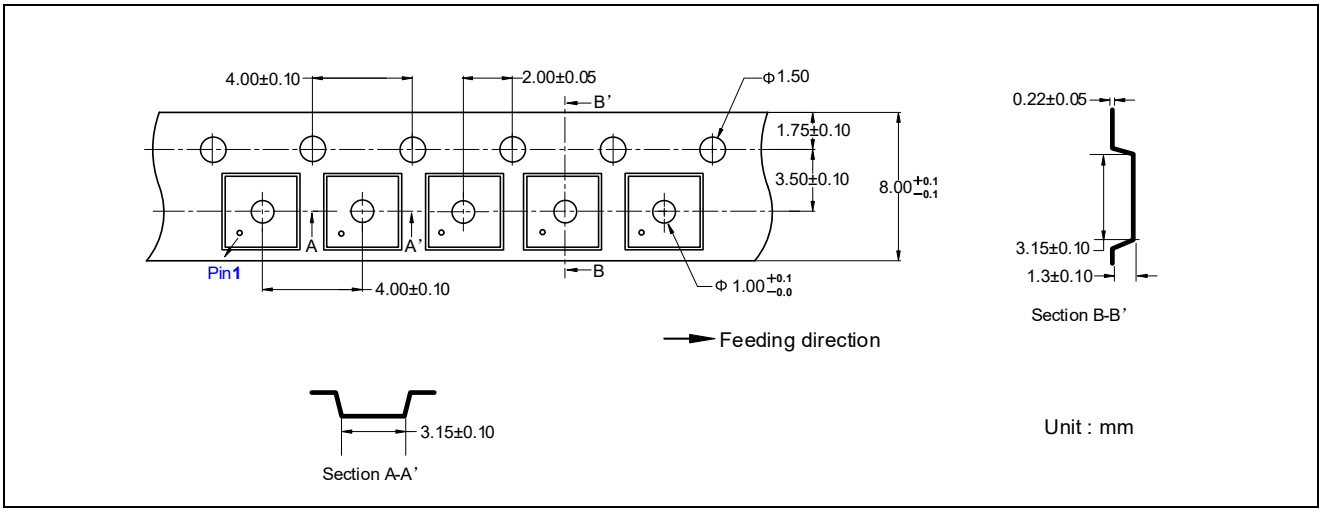
SYMBOL	MIN	NOM	MAX
A	0.50	--	0.60
A1	0.00	0.02	0.05
A3		0.10REF	
b	0.15	0.20	0.25
D	0.90	1.00	1.10
E	1.40	1.50	1.60
e		0.50BSC	
K		0.30REF	
K1		0.25REF	
L	0.35	0.40	0.45
L1	0.30	0.35	0.40

Tape Information

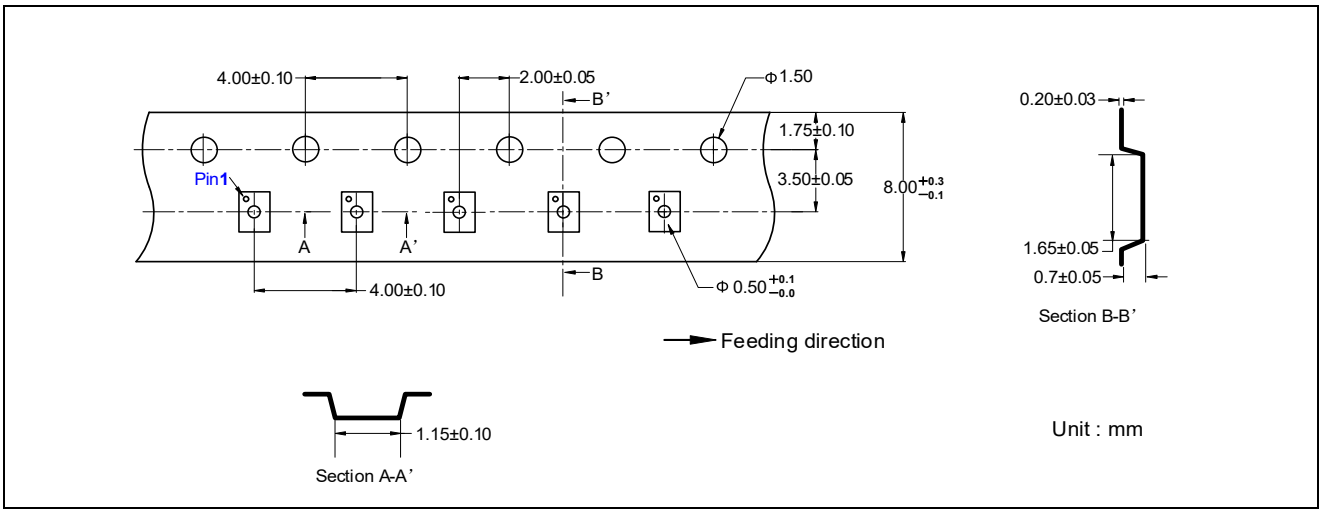
SC70-5 (1.3mm × 2.1mm)



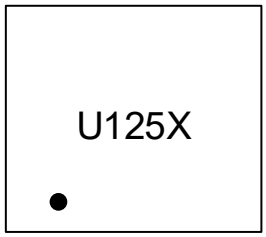
SOT23-5 (1.6mm × 2.9mm)



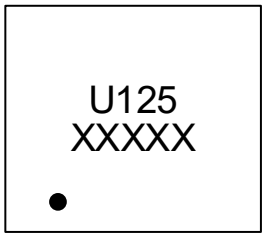
DFN6 (1.0mm × 1.5mm)



Marking Information



ET74AUP1G125
U125 = Part Number
X = Tracking Number



ET74AUP1G125T
U125 = Part Number
XXXXX = Tracking Number

Revision History and Checking Table

Version	Date	Revision Item	Modifier	Function & Spec Checking	Package & Tape Checking
1.0	2022-2-22	Initial Version	Shi liangjun	Shi liangjun	Liu jiaying
1.1	2022-09-8	Update Typeset	Shi bo	Shi liangjun	Liu jiaying
1.2	2023-11-29	Update Typeset /ESD/Package Picture	Shi bo	Shi bo	Liu jiaying
1.3	2025-06-03	Add Packing Option	Yang xiaoxu	Yang xiaoxu	Liu jiaying
1.4	2025-10-31	Update Format	Wang qifan	Yang xiaoxu	Liu jiaying
1.4.a	2025-12-12	Update Format, Add Tape and Marking	Xu tao	Yang xiaoxu	Liu jiaying
1.4.b	2025-04-22	Update Electrical Characteristics	Xu tao	Yang xiaoxu	Liu jiaying