Single 2-Input AND Gate

General Description

The ET74AUP1G08 is a single 2-input AND Gate operating 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.

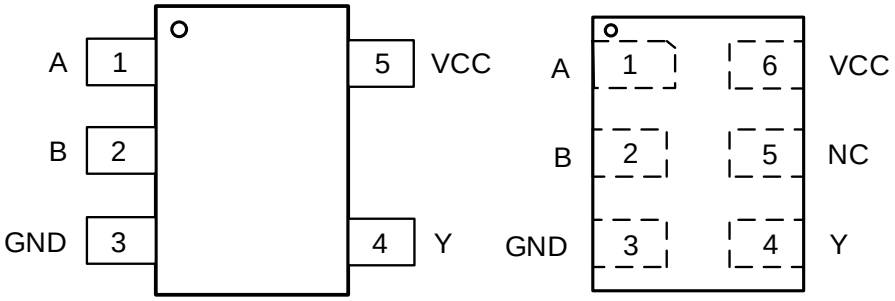
Schmitt trigger inputs make the circuit tolerant to slower input rise and fall times across the entire V_{CC} range.

Features

- Designed for 0.8V to 3.6V V_{CC} Operation
- Over-Voltage Tolerant Inputs Accept Voltages to 3.6V
- ±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 JESD78F
- Part No. and Package Information

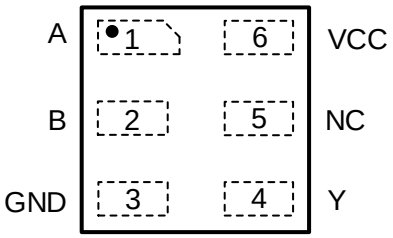
Part No.	Package	Packing Option	MSL
ET74AUP1G08	SC70-5 (1.3mm × 2.1mm)	Tape and Reel, 3K/Reel	1
ET74AUP1G08Y	DFN6 (1.0mm × 1.5mm)	Tape and Reel, 3K/Reel	1
ET74AUP1G08N	DFN6 (1.0mm × 1.0mm)	Tape and Reel, 5K/Reel	1
ET74AUP1G08N1	DFN6 (1.0mm × 1.0mm)	Tape and Reel, 5K/Reel	1

Pin Configuration

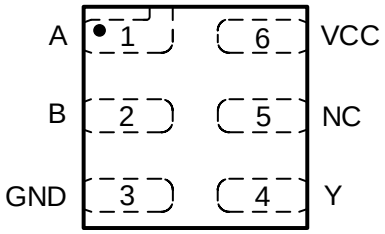


ET74AUP1G08
SC70-5

ET74AUP1G08Y
DFN6 (1.0mm × 1.5mm)



ET74AUP1G08N
DFN6 (1.0mm × 1.0mm)



ET74AUP1G08N1
DFN6 (1.0mm × 1.0mm)

Figure1. Pin Configuration

Pin Function

Pin No.		Pin Name	Function
SC70-5	DFN6		
1	1	A	Input A
2	2	B	Input B
3	3	GND	Ground
4	4	Y	Output
/	5	NC	No Connect
5	6	VCC	Supply Voltage

Block Diagram



Figure2. Logic Symbol

Functional Table

Input		Output
A	B	Y
L	L	L
L	H	L
H	L	L
H	H	H

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 (1)		-0.5 ≤ V_I ≤ 4.6	V
V_O	DC Output Voltage Output in Higher or Low State		-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		±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, 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.

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
	DFN6 (1mm × 1.5mm)		440	
	DFN6 (1mm × 1mm)		440	
P_D	SC70-5	Power Dissipation in Still Air at 85°C	215	mW
	DFN6 (1mm × 1.5mm)		260	
	DFN6 (1mm × 1mm)		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	125	°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 ≤ 125°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		±1.0	uA
I_{OFF}	Power Off Leakage Current	V_I = 3.6V or V_O = 3.6V	0			±0.2		±2.0	uA
ΔI_{OFF}	Additional Power Off Leakage Current	V_I or V_O = 0~3.6V	0~0.2			±0.2		±10	uA

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	
I_{CC}	Quiescent Supply Current	V_I = 3.6V or GND	3.6			±0.2		±3.0	uA
ΔI_{CC}	Additional Quiescent Supply Current	V_I = 2.7V	3.3			60		120	uA

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)	C_L = 15pF	0.8	14.5	33.9	127	12.8	352	ns
			1.2	5.5	9.5	19.3	5.1	22.5	
			1.5	3.8	6.0	11.8	3.3	16.2	
			1.8	3.0	4.5	8.9	2.6	13.2	
			2.5	2.1	3.0	6.3	1.8	10.3	
			3.3	1.7	2.3	5.3	1.4	9.0	
		C_L = 30pF	0.8	17.6	34.3	133	15.5	382	ns
			1.2	6.7	11.3	22.2	6.2	23.5	
			1.5	4.6	7.2	13.6	4.0	17.3	
			1.8	3.6	5.4	10.2	3.1	14.7	
			2.5	2.5	3.6	7.3	2.2	11.4	
			3.3	2.0	2.8	6.0	1.7	9.9	

Capacitance Characteristics

Symbol	Parameter	Condition		Typ	Unit
C_{IN}	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)	10MHz, 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

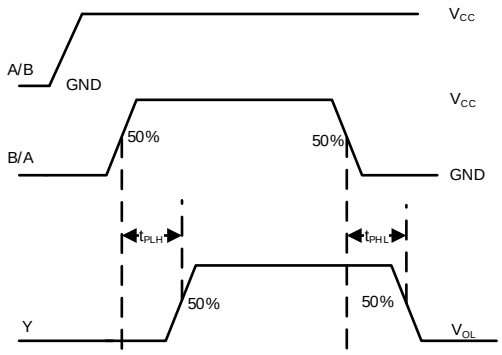


Figure3. Switching Waveform

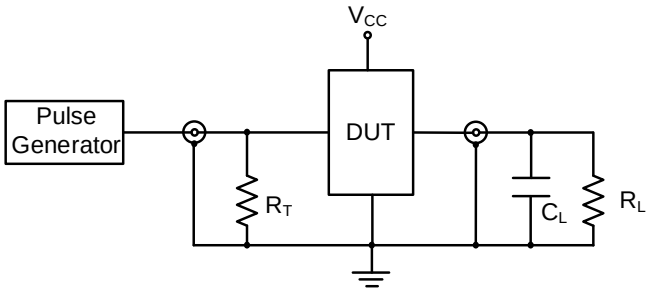
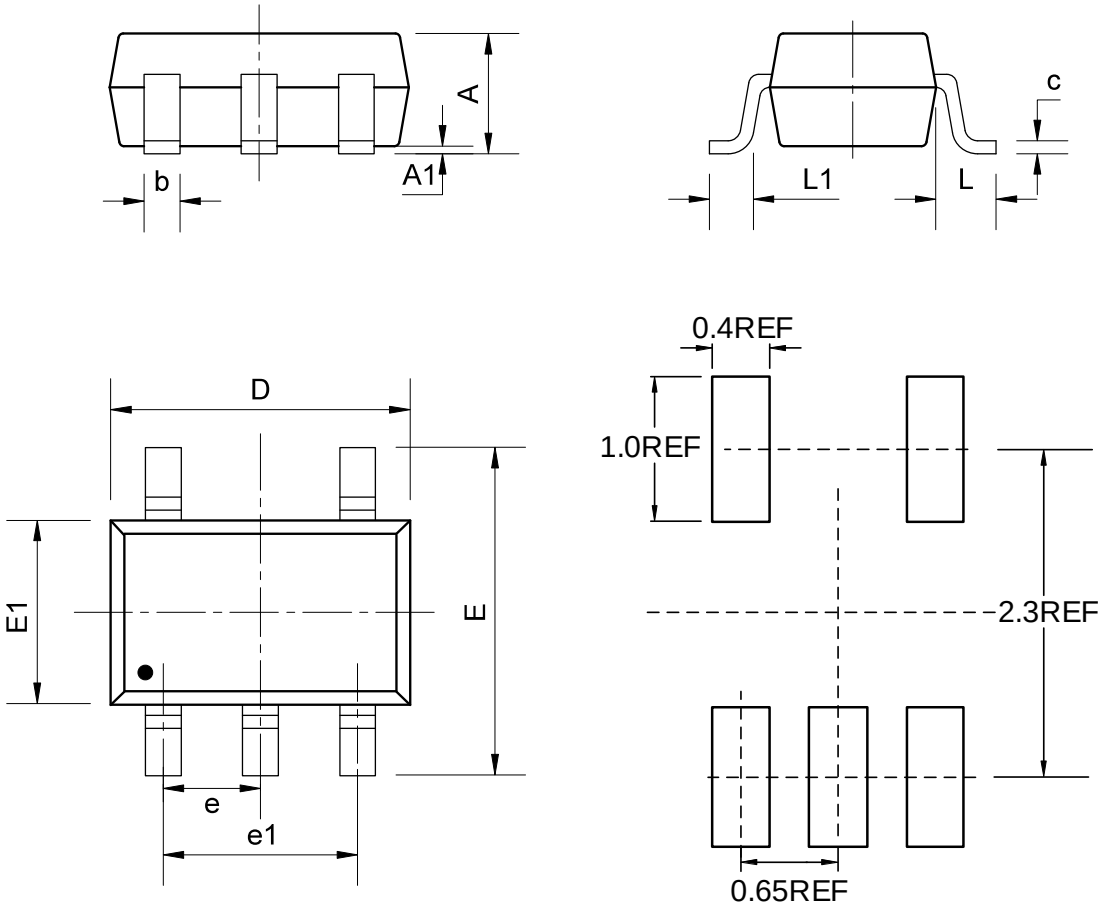


Figure4. Test Circuit

Package Dimension

SC70-5 (1.3mm × 2.1mm)

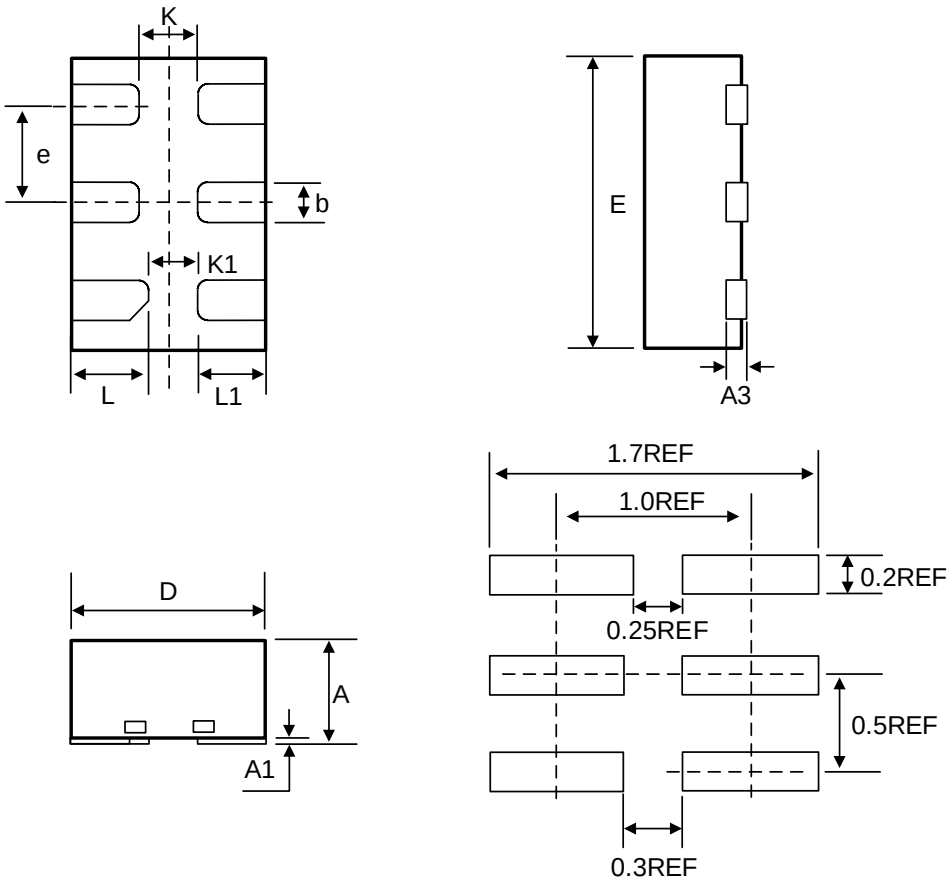


COMMON DIMENSIONS

(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		

DFN6 (1.0mm × 1.5mm)

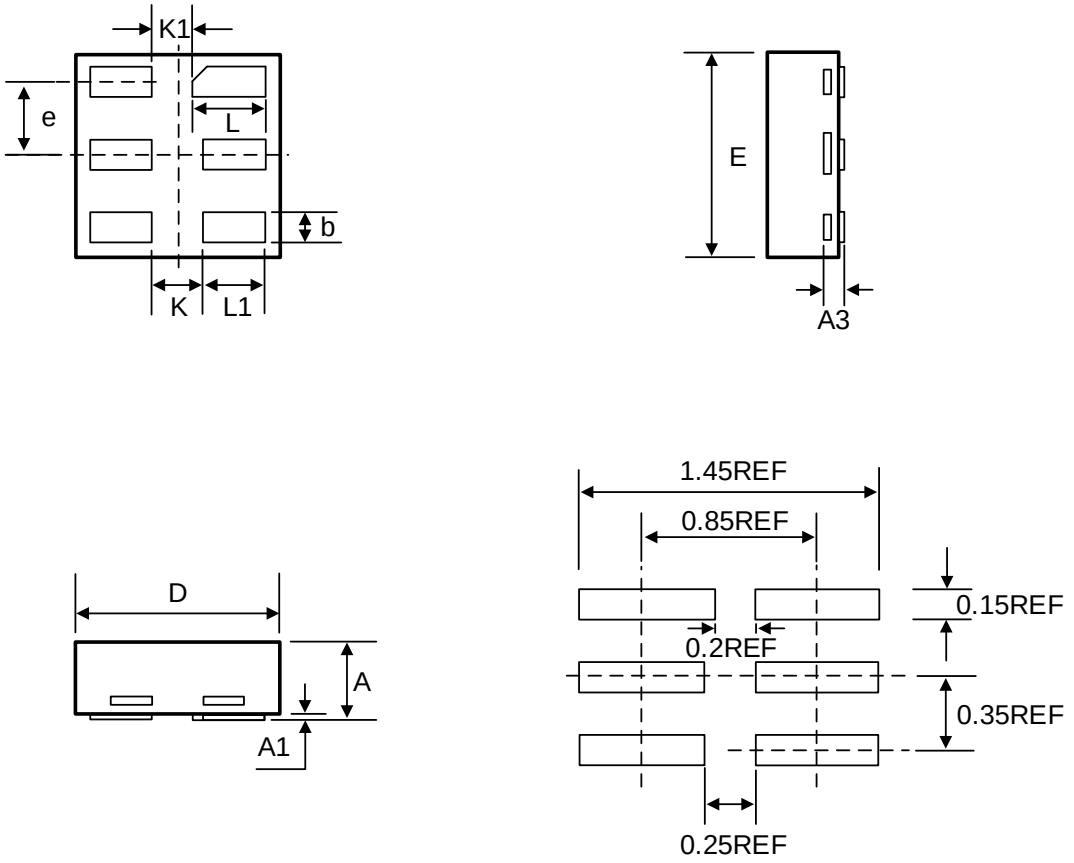


COMMON DIMENSIONS

(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

DFN6 (1mm × 1mm) N

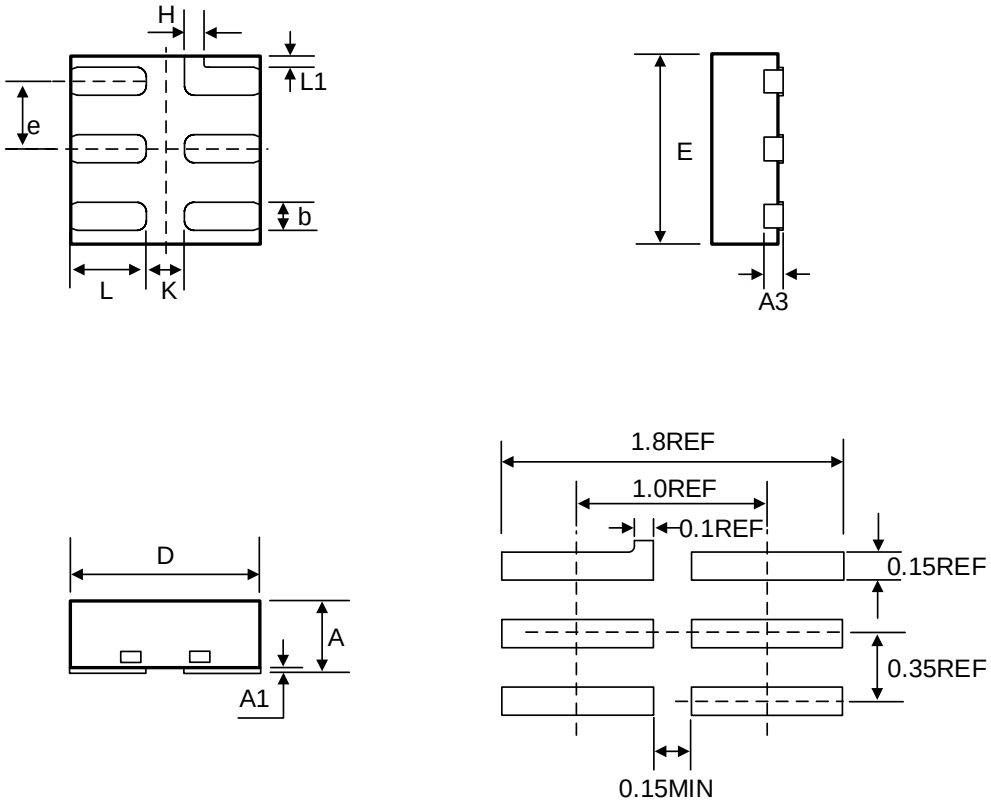


COMMON DIMENSIONS

(Unit: mm)

SYMBOL	MIN	NOM	MAX
A	0.50	0.55	0.60
A1	0	0.02	0.05
A3		0.10REF	
b	0.10	0.15	0.20
D	0.95	1.00	1.05
E	0.95	1.00	1.05
e	0.30	0.35	0.40
K		0.25REF	
K1		0.20REF	
L	0.30	0.35	0.40
L1	0.25	0.30	0.35

DFN6 (1mm × 1mm) N1



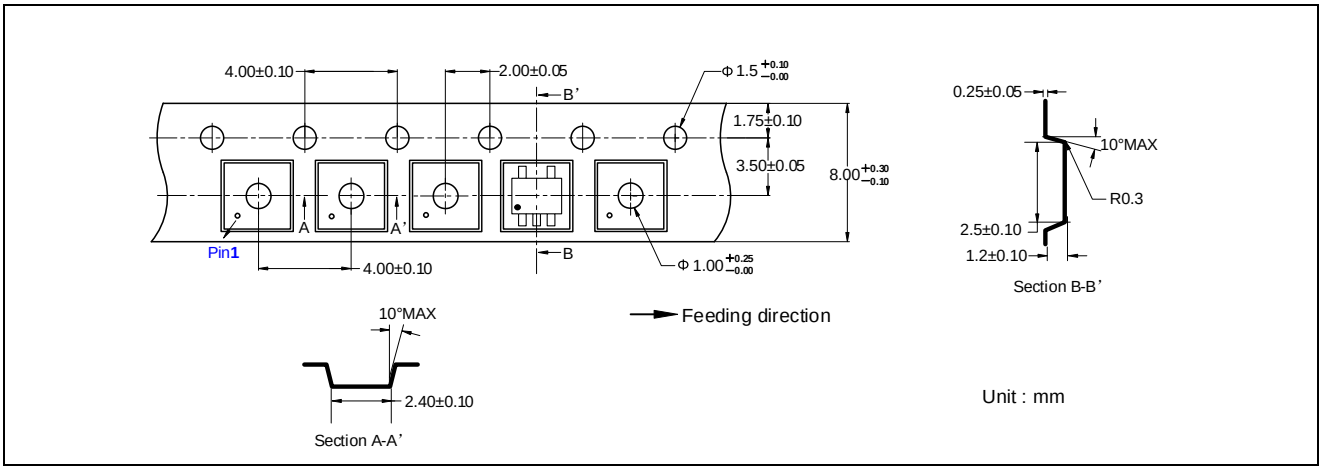
COMMON DIMENSIONS

(Unit: mm)

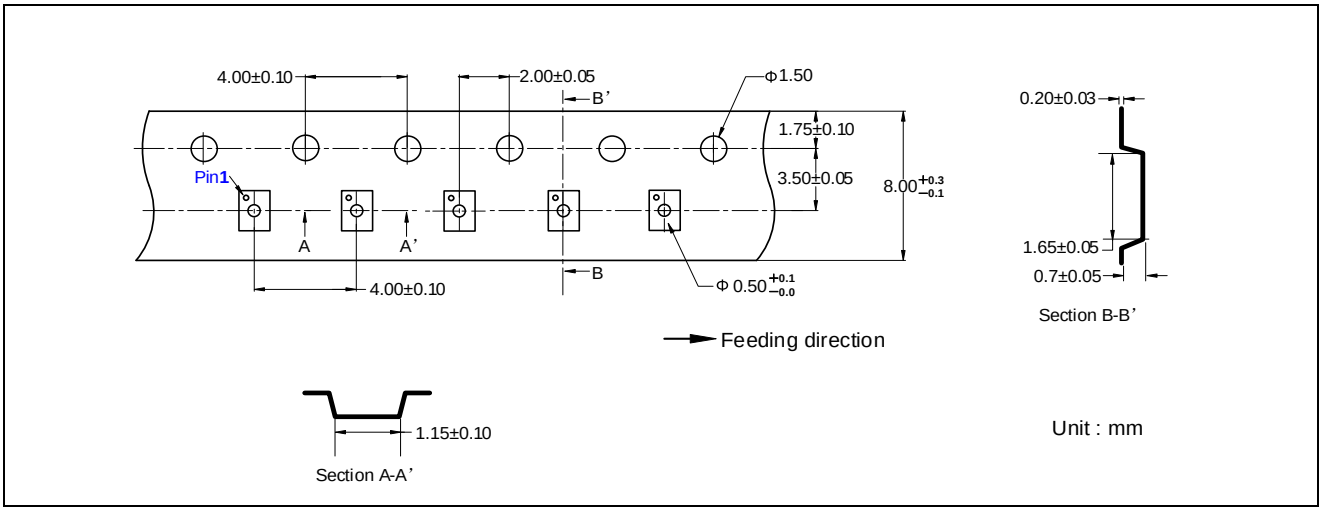
SYMBOL	MIN	NOM	MAX
A	0.34	0.37	0.40
A1	0.00	0.02	0.05
A3		0.10REF	
b	0.10	0.15	0.20
D	0.95	1.00	1.05
E	0.95	1.00	1.05
e	0.30	0.35	0.40
H		0.10REF	
K	0.15	--	--
L	0.35	0.40	0.45
L1		0.075REF	

Tape Information

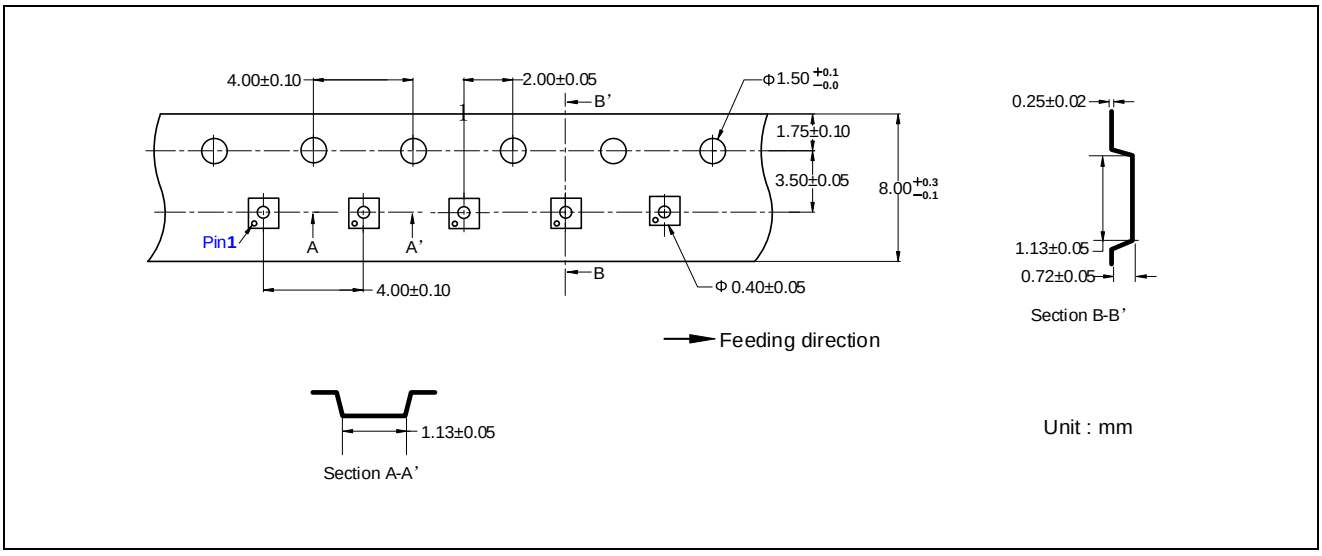
SC70-6 (1.3mm × 2.1mm)



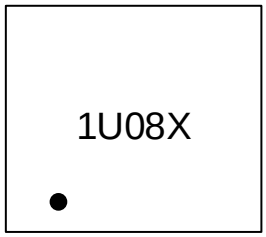
DFN6 (1.0mm × 1.5mm)



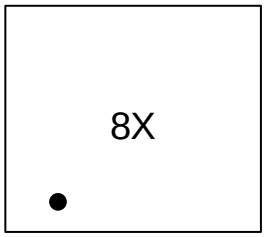
DFN6 (1.0mm × 1.0mm)



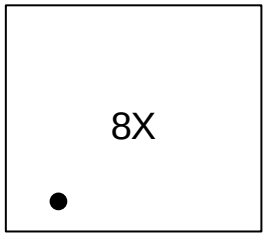
Marking Information



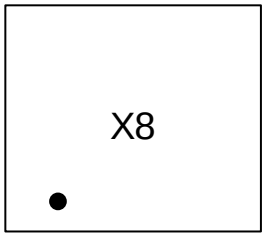
ET74AUP1G08
1G08 = Part Number
X = Tracking Number



ET74AUP1G08Y
8 = Part Number
X = Tracking Number



ET74AUP1G08N
8 = Part Number
X = Tracking Number



ET74AUP1G08N1
8 = Part Number
X = Tracking Number

Revision History and Checking Table

Version	Date	Revision Item	Modifier	Function & Spec Checking	Package & Tape Checking
1.0	2022-04-18	Initial Version	Shi liangjun	Shi liangjun	Liu jiaying
1.1	2022-09-08	Update Typeset	Shi bo	Shi liangjun	Liu jiaying
1.2	2022-10-14	Update format and Thermal Characteristics	Wu han	Shi liangjun	Liu jiaying
1.3	2023-11-29	Update ESD/ Tape picture	Shi bo	Shi bo	Liu jiaying
1.4	2025-05-27	Add Packing Option	Yang xiaoxu	Yang xiaoxu	Liu jiaying
1.5	2025-09-02	Update Typeset	Peng junjie	Yang xiaoxu	Liu jiaying
1.6	2025-12-11	Update T_A = 85°C Characteristics	Li Cheng	Yang xiaoxu	Liu jiaying
1.6.a	2026-01-07	Update Marking	Yang xiaoxu	Yang xiaoxu	Liu jiaying
1.6.b	2026-04-22	Update Format	Xu tao	Yang xiaoxu	Liu jiaying