

Single 2-input OR Gate

General Description

The ETQ74AUP1G32 is a single 2-input OR Gate, 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
- Low static power consumption; $I_{CC} = 0.7\mu A$ (maximum)
- $\pm 4mA$ 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
- Multiple Package Options Automotive AEC-Q100 Grade 1 Qualified
 - Ambient Temperature Range of $-40^{\circ}C$ to $+125^{\circ}C$
 - ESD HBM $\pm 4KV$ PASS
 - ESD CDM $\pm 1KV$ PASS
 - Latch Up Current to $\pm 100mA$ PASS
- Part No. and Package Information

Part No.	Package	Packing Option	MSL
ETQ74AUP1G32	SC70-5(1.3mm × 2.1mm)	Tape and Reel, 3K/Reel	1
ETQ74AUP1G32Y	DFN6(1.0mm × 1.5mm)	Tape and Reel, 3K/Reel	1
ETQ74AUP1G32N1	DFN6(1.0mm × 1.0mm)	Tape and Reel, 10K/Reel	1

Pin Configuration

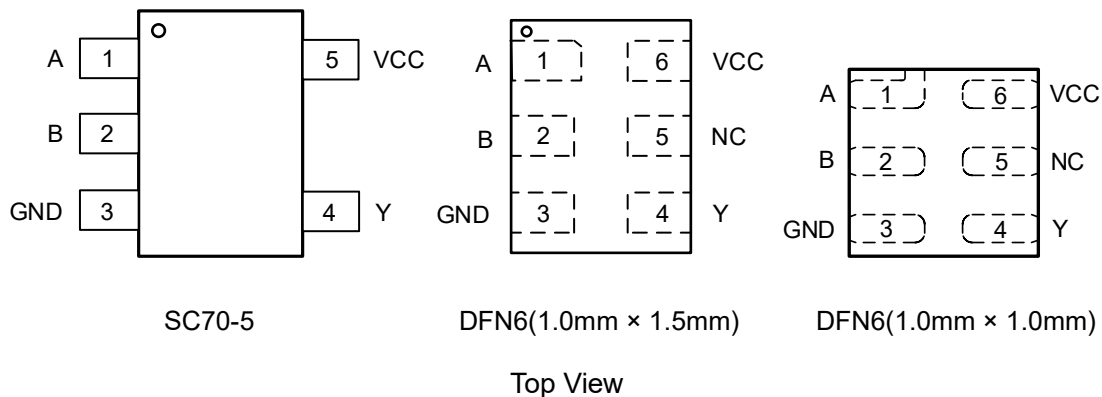


Figure1. Pin Configuration

ETQ74AUP1G32

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 Y
/	5	NC	No Connect
5	6	VCC	Supply Voltage

Block Diagram

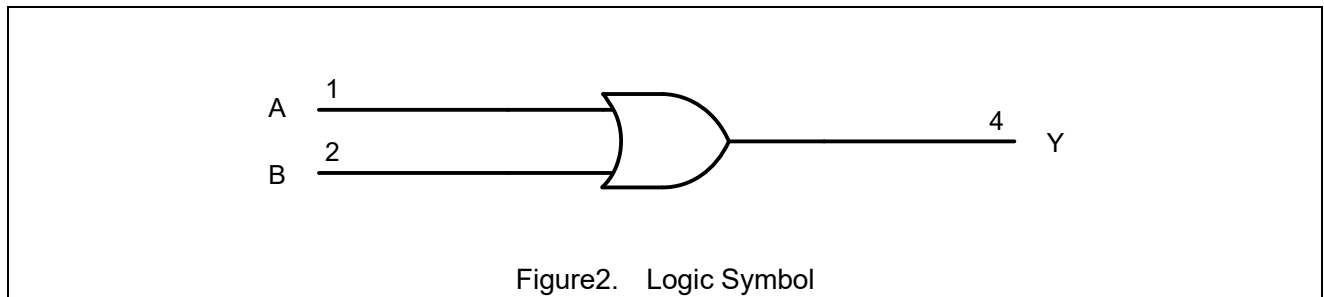


Figure2. Logic Symbol

Functional Description

Function Table

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

ETQ74AUP1G32

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		±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}	Latch Up Current Above V _{CC} and GND at 125°C ⁽⁴⁾		±100	mA

Stresses exceeding those listed in this 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
	DFN6(1mm × 1.5mm)		440	
	DFN6(1mm × 1mm)		440	

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	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.

ETQ74AUP1G32

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 to 1.95	0.7V _{CC}			0.7V _{CC}		
			2.3 to 2.7	1.6			1.6		
			3.0 to 3.6	2.0			2.0		
V _{IL}	Low-Level Input Voltage		0.8			0.25V _{CC}		0.25V _{CC}	V
			0.9 to 1.95			0.3V _{CC}		0.3V _{CC}	
			2.3 to 2.7			0.7		0.7	
			3.0 to 3.6			0.9		0.9	
V _{OH}	High-Level Output Voltage	I _{OH} =-20μA	0.8 to 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} =20μA	0.8 to 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 to 3.6			±0.1		±1.0	μA
I _{OFF}	Power Off Leakage Current	V _{IN} = 3.6V or V _{OUT} = 3.6V	0			±0.2		±1.0	μA
ΔI _{OFF}	Additional Power Off Leakage Current	V _{IN} or V _{OUT} = 0~3.6V	0 to 0.2			±0.2		±1.2	μA
I _{CC}	Quiescent Supply Current	V _{IN} = 3.6V or GND	3.6			±0.2		±3.0	μA

ETQ74AUP1G32

ΔI_{CC}	Additional Quiescent Supply Current	$V_{IN} = 2.7V$	3.3			60		90	μA
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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

$t_r = t_f = 5ns$

Symbol	Parameter	Condition	$V_{CC}(V)$	$T_A = 25^{\circ}C$			$-40^{\circ}C \leq T_A \leq 85^{\circ}C$		Unit
				Min	Typ	Max	Min	Max	
t_{PLH} t_{PHL}	Propagation Delay (Figure3 and 4)	$C_L = 15pF^{(5)}$	0.8	14.5	33.9	127	12.8	352	ns
			1.2	5.5	9.5	19.3	5.1	20.5	
			1.5	3.8	6.0	11.8	3.3	13.2	
			1.8	3.0	4.5	8.9	2.6	10.2	
			2.5	2.1	3.0	6.3	1.8	7.3	
			3.3	1.7	2.3	5.3	1.4	6.0	
		$C_L = 30pF^{(5)}$	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	15.3	
			1.8	3.6	5.4	10.2	3.1	11.7	
			2.5	2.5	3.6	7.3	2.2	8.4	
			3.3	2.0	2.8	6.0	1.7	6.9	

Note5. C_L includes probe and jig capacitance.

ETQ74AUP1G32

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⁾	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} = 3.3 V	9.6	

Note6. 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;

Σ(C_L × V_{CC}² × f_o) = sum of outputs.

AC Test Circuit

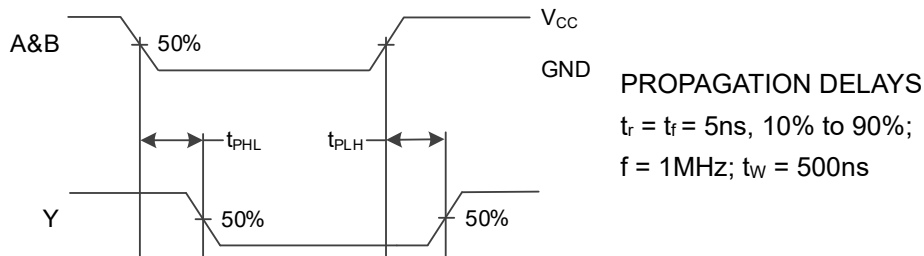
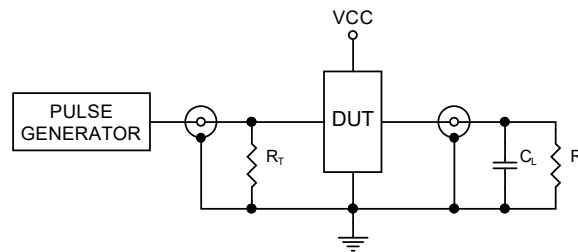


Figure 3. Switching Waveforms



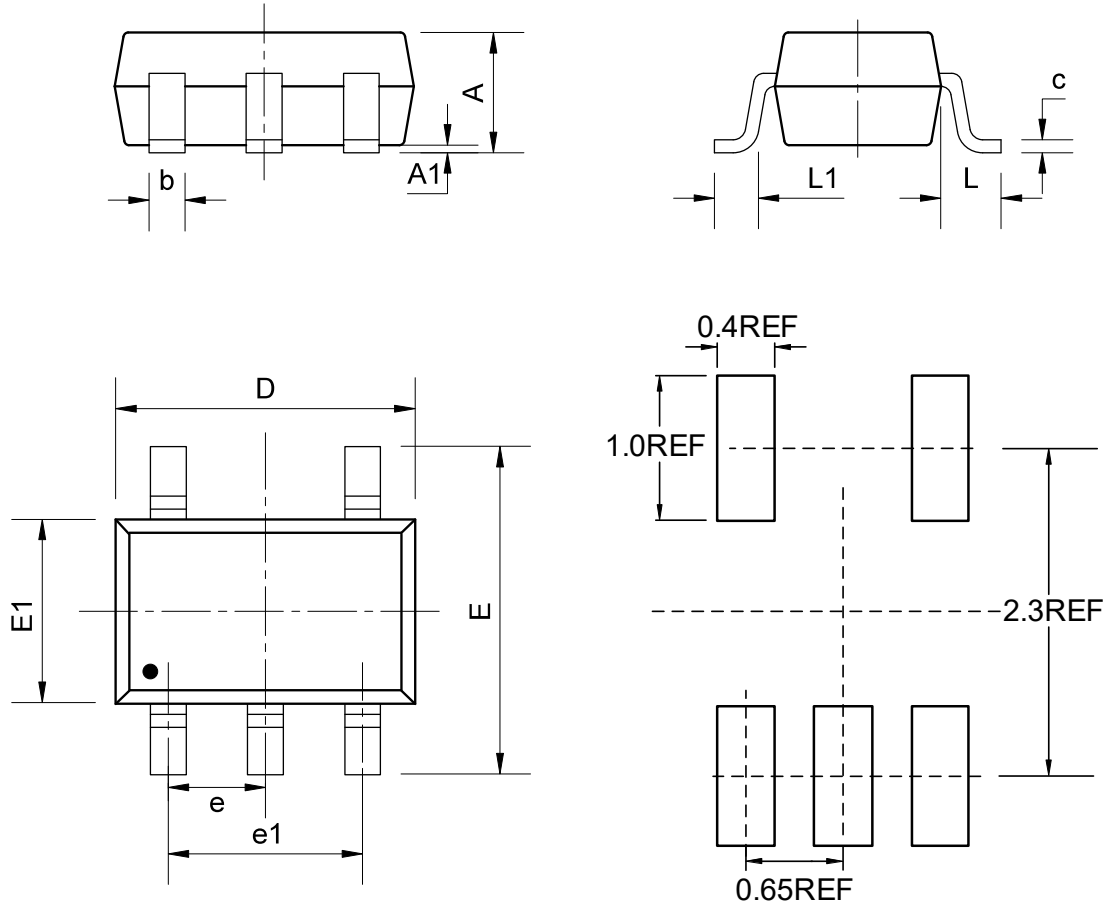
R_T = 50Ω (typ)

Figure4. Test Circuit

ETQ74AUP1G32

Package Dimension

SC70-5(1.3mm × 2.1mm)



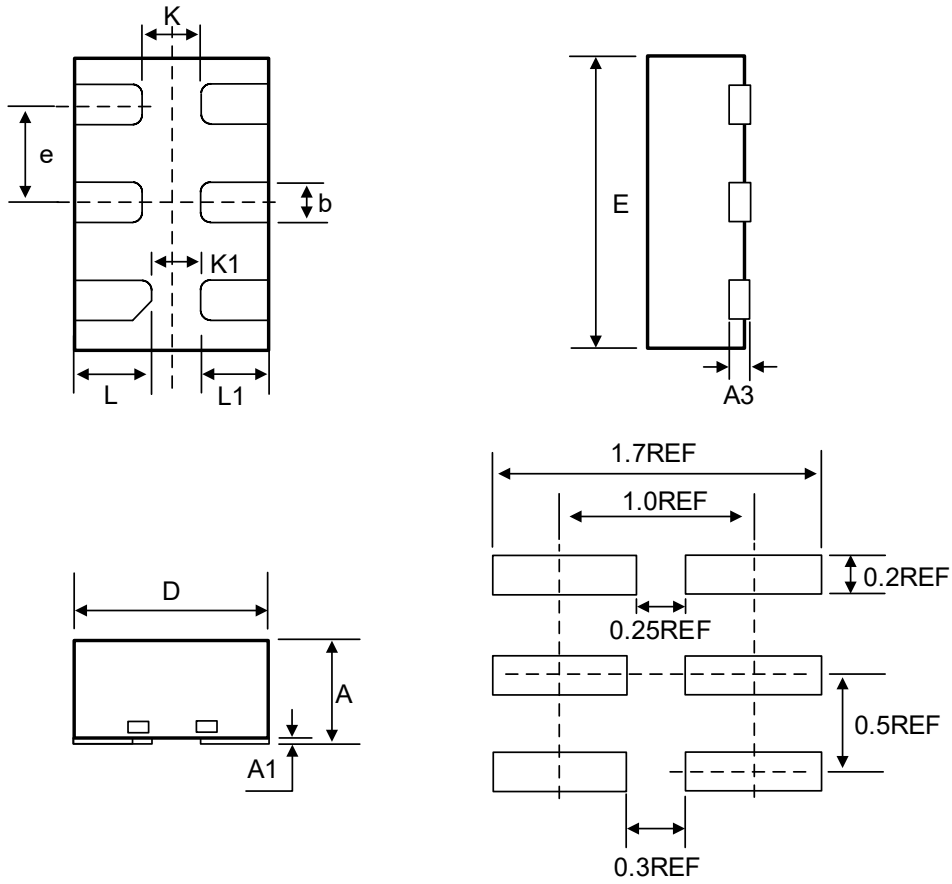
COMMON DIMENSIONS

(Unit: mm)

SYMBOL	MIN	NOM	MAX
A	-	-	1.05
A1	0	-	0.15
b	0.17	-	0.33
c	0.12	-	0.20
D	2.00	2.10	2.20
e	0.65BSC		
e1	1.30BSC		
E	2.20	2.30	2.40
E1	1.21	1.30	1.35
L	0.50REF		
L1	0.33REF		

ETQ74AUP1G32

DFN6 (1.0mm × 1.5mm)



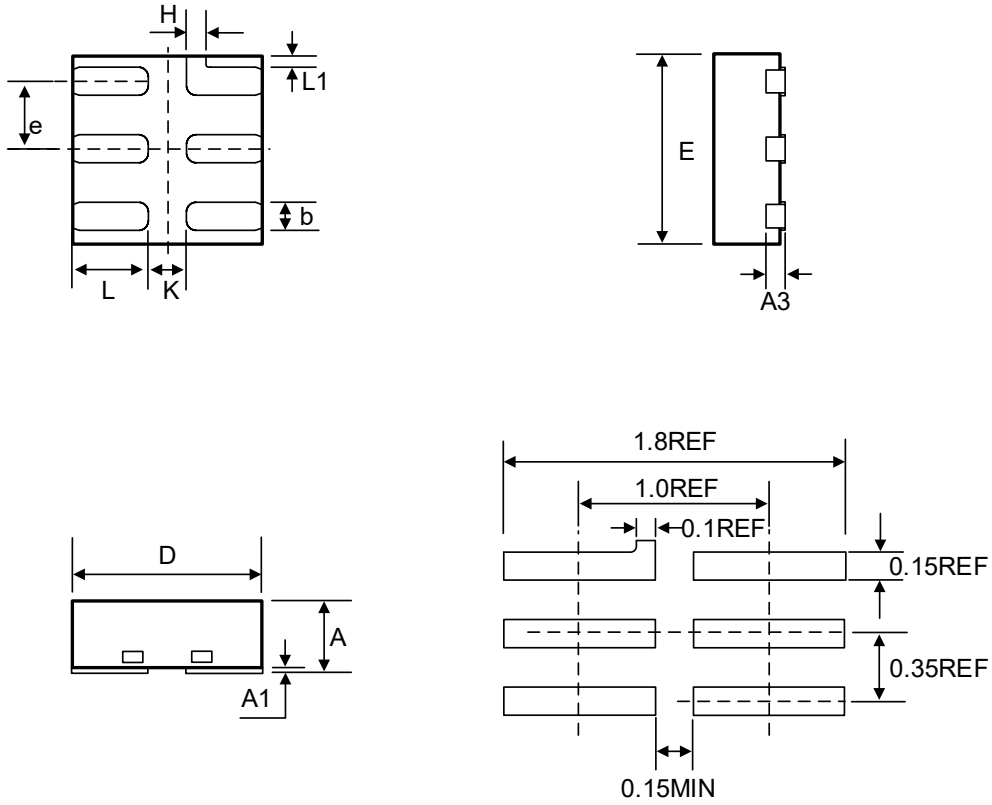
COMMON DIMENSIONS

(Unit: mm)

SYMBOL	MIN	NOM	MAX
A	0.34	0.37	0.40
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
H	0.10REF		
K	0.15	--	--
L	0.35	0.40	0.45
L1	0.075REF		

ETQ74AUP1G32

DFN6(1mm × 1mm)



COMMON DIMENSIONS

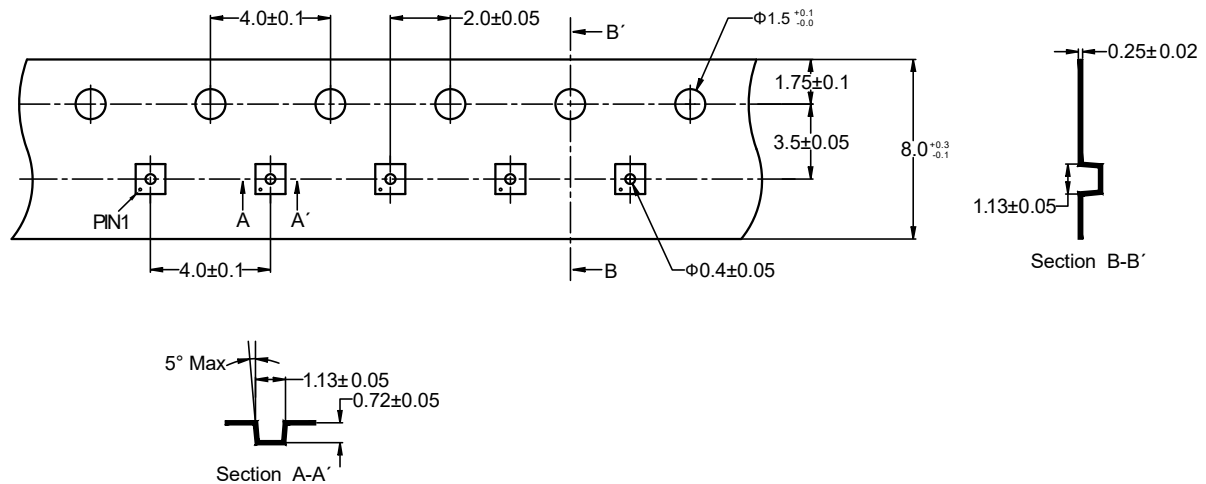
(Unit: mm)

SYMBOL	MIN	NOM	MAX
A	0.34	0.37	0.40
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
H	0.10REF		
K	0.15	--	--
L	0.35	0.40	0.45
L1	0.075REF		

ETQ74AUP1G32

Tape Information

DFN6(1mm × 1mm)



Unit: mm

Revision History and Checking Table

Version	Date	Revision Item	Modifier	Function & Spec Checking	Package & Tape Checking
1.0	2025-05-08	Preliminary Version	Yu yifan	Yang xiaoxu	Liu jiyang
1.1	2025-06-07	Add Packing Option	Yang xiaoxu	Yang xiaoxu	Liu jiyang
1.2	2025-10-15	Update Format	Wang anran	Yang xiaoxu	Liu jiyang