# Single 2-Input OR Gate

## General Description

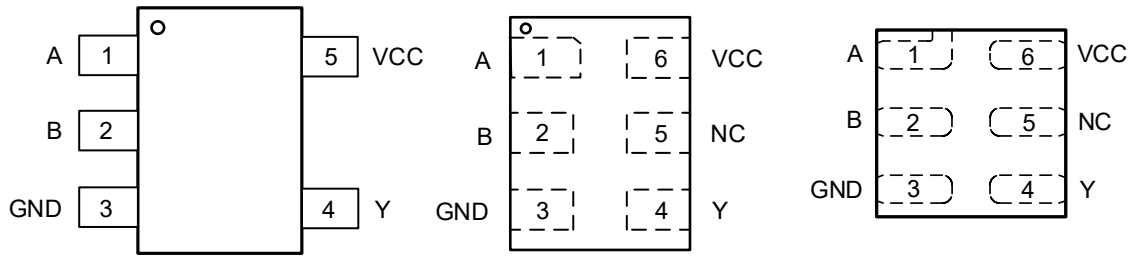
The ETQ74AUP1G32 is a single 2-input OR Gate, which can operate from a 0.8V to 3.6V supply.
This device is fabricated with advanced CMOS technology to achieve ultra-high speed with high output drive.

## Features

- Designed for 0.8V to 3.6V $V_{CC}$ Operation
- Low static power consumption; $I_{CC}$ = 0.7μA (Maximum)
- ±4mA Balanced Output Sink and Source Capability
- Near Zero Static Supply Current Substantially Reduces System Power Requirements
- These Devices are Pb-Free and RoHS Compliant
- Multiple Package Options Automotive AEC-Q100 Grade 1 Qualified
  -- Ambient Temperature Range of -40°C to 125°C
  -- ESD HBM ±4KV PASS
  -- ESD CDM ±1KV PASS
  -- Latch Up Current to ±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




SC70-5 DFN6 (1.0mm × 1.5mm) 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 Y |
| / | 5 | NC | No Connect |
| 5 | 6 | VCC | Supply Voltage |

## Block Diagram

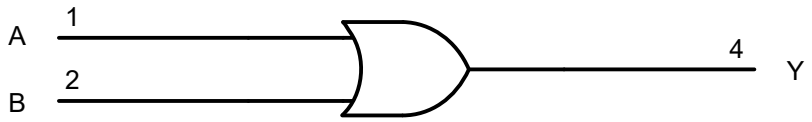



Figure2. Logic Symbol

## Function Table

| Input | | Output |
|---|---|---|
| A | B | Y |
| L | L | L |
| L | H | H |
| H | L | H |
| 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) | | $-0.5 \le V_I \le 4.6$ | 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 |
|---|---|---|---|---|
| $R_{\theta JA}$ | 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 |
| $V_I$ | 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 | 0.75$V_{CC}$ | | | 0.75$V_{CC}$ | | V |
| | | | 0.9~1.95 | 0.7$V_{CC}$ | | | 0.7$V_{CC}$ | | |
| | | | 2.3~2.7 | 1.6 | | | 1.6 | | |
| | | | 3.0~3.6 | 2.0 | | | 2.0 | | |
| $V_{IL}$ | Low-Level Input Voltage | | 0.8 | | | 0.25$V_{CC}$ | | 0.25$V_{CC}$ | V |
| | | | 0.9~1.95 | | | 0.3$V_{CC}$ | | 0.3$V_{CC}$ | |
| | | | 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 |
| $\Delta I_{OFF}$ | Additional Power Off Leakage Current | $V_I$ or $V_O$ = 0V~3.6V | 0~0.2 | | | ±0.2 | | ±10 | uA |

**DC Electrical Characteristics (Continued)**

| 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 |
| $\Delta I_{CC}$ | Additional Quiescent Supply Current | $V_I$ = 2.7V | 3.3 | | | 60 | | 120 | uA |

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**

$t_r = t_f$ = 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 (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 | 30 | |
| | | | 1.5 | 3.8 | 6.0 | 11.8 | 3.3 | 22 | |
| | | | 1.8 | 3.0 | 4.5 | 8.9 | 2.6 | 18 | |
| | | | 2.5 | 2.1 | 3.0 | 6.3 | 1.8 | 13.2 | |
| | | | 3.3 | 1.7 | 2.3 | 5.3 | 1.4 | 11.5 | |
| | | $C_L$ = 30pF(5) | 0.8 | 17.6 | 34.3 | 133 | 15.5 | 382 | ns |
| | | | 1.2 | 6.7 | 11.3 | 22.2 | 6.2 | 34.5 | |
| | | | 1.5 | 4.6 | 7.2 | 13.6 | 4.0 | 24.6 | |
| | | | 1.8 | 3.6 | 5.4 | 10.2 | 3.1 | 19.5 | |
| | | | 2.5 | 2.5 | 3.6 | 7.3 | 2.2 | 13.8 | |
| | | | 3.3 | 2.0 | 2.8 | 6.0 | 1.7 | 11.5 | |

***Note5***. $C_L$ includes probe and jig capacitance.

### Capacitance Characteristics

| Symbol | Parameter | Condition | | Typ | 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, $V_O$ = 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 | |
| | | | $V_{CC}$ = 3.3V | 9.6 | |

***Note6***. $C_{PD}$ is used to determine the dynamic power dissipation ($P_D$ in μW).

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

$f_i$ = input frequency in MHz;

$f_o$ = output frequency in MHz;

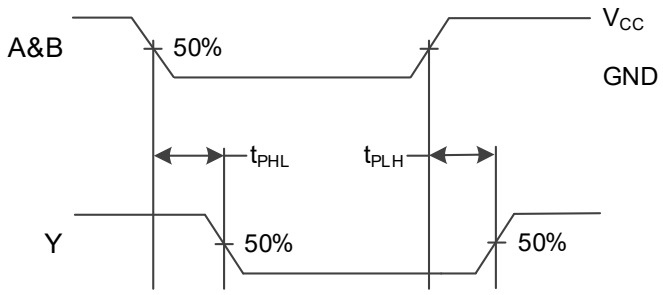
$C_L$ = output load capacitance in pF;

$V_{CC}$ = 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

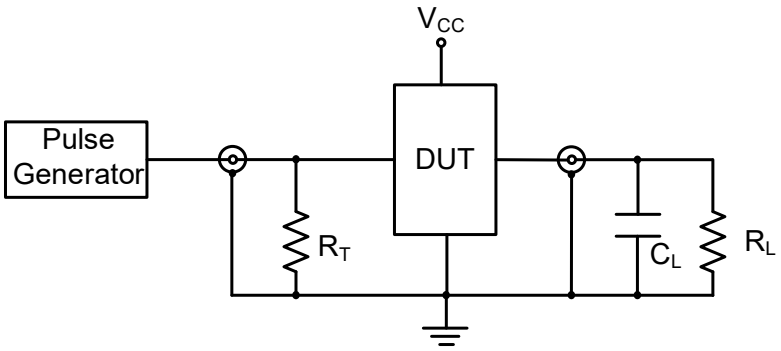



PROPAGATION DELAYS

$t_r = t_f$ = 3ns, 10% to 90%;

f = 1MHz; $t_W$ = 500ns

Figure 3. Switching Waveforms

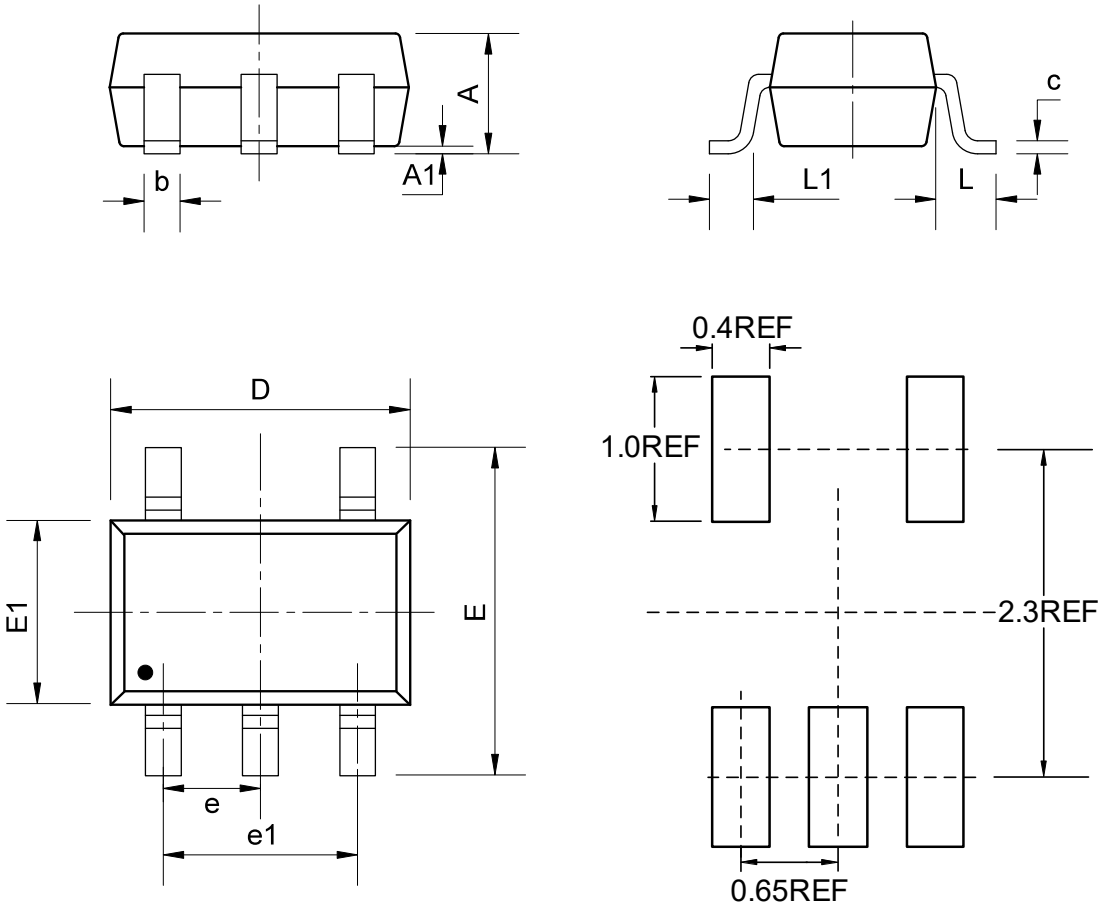



$R_T$ = 50Ω (typ)

Figure4. Test Circuit

## Package Dimension

SC70-5 (1.3mm × 2.1mm)

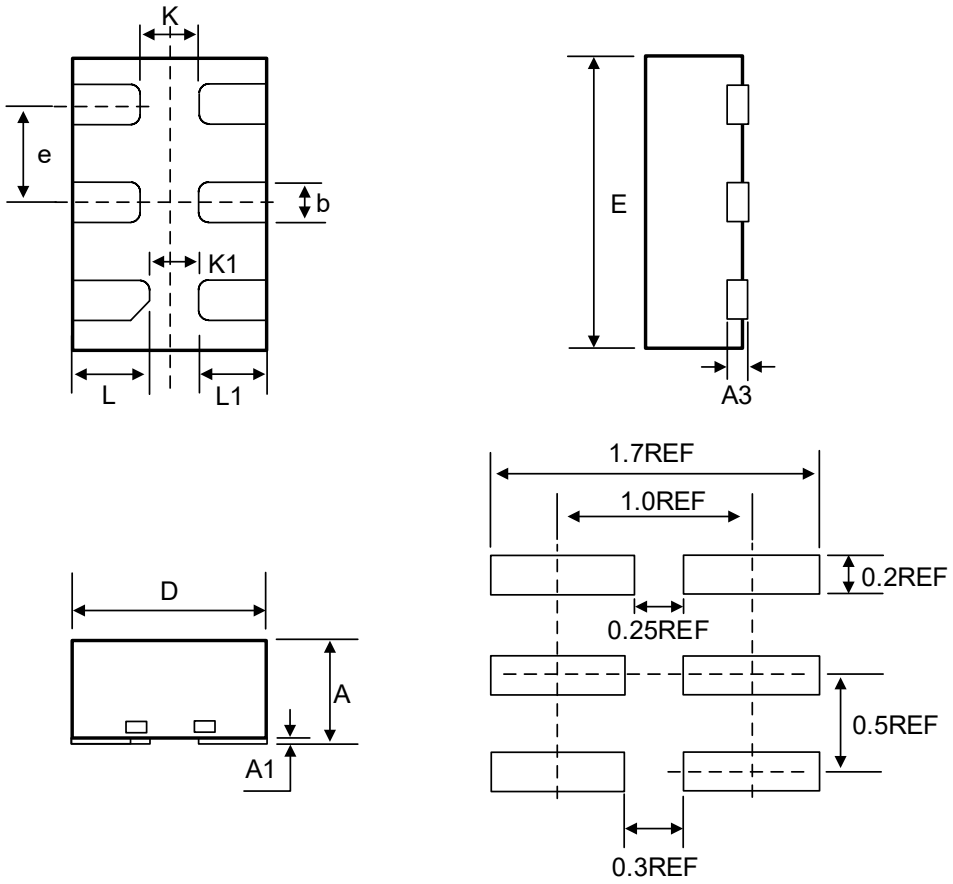



COMMON DIMENSIONS

(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)

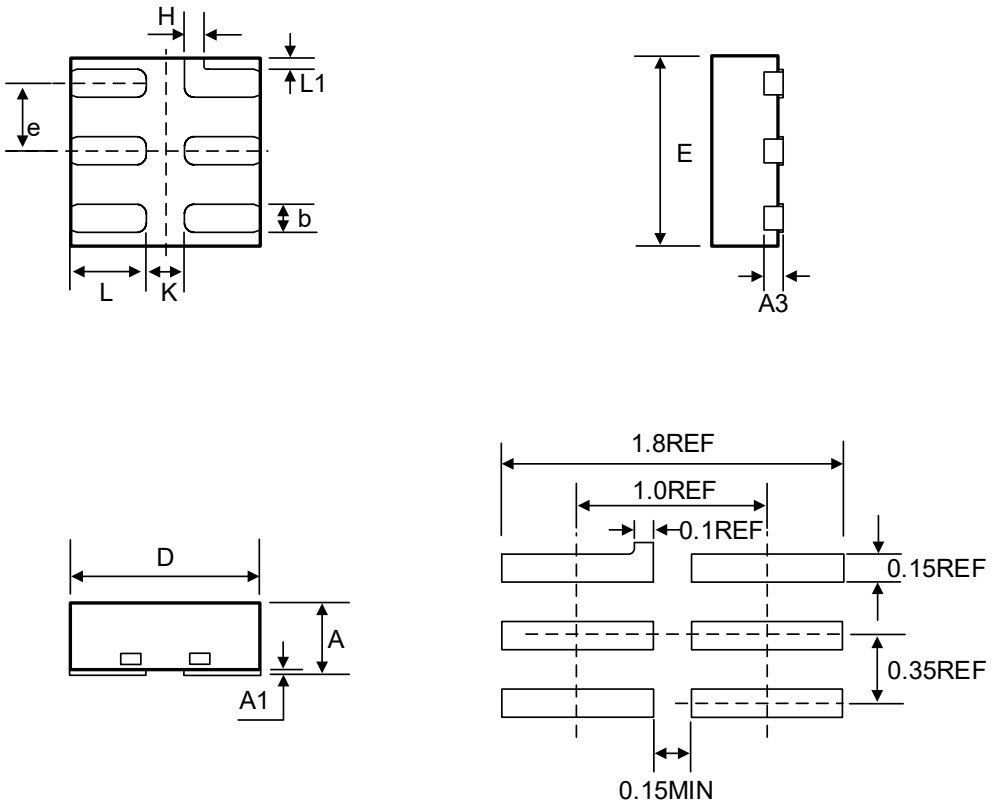



COMMON DIMENSIONS

(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)



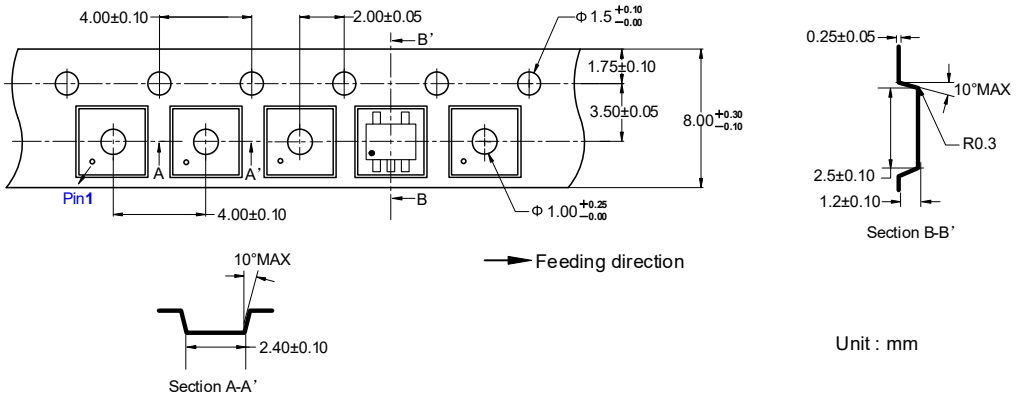

COMMON DIMENSIONS

(Unit: mm)

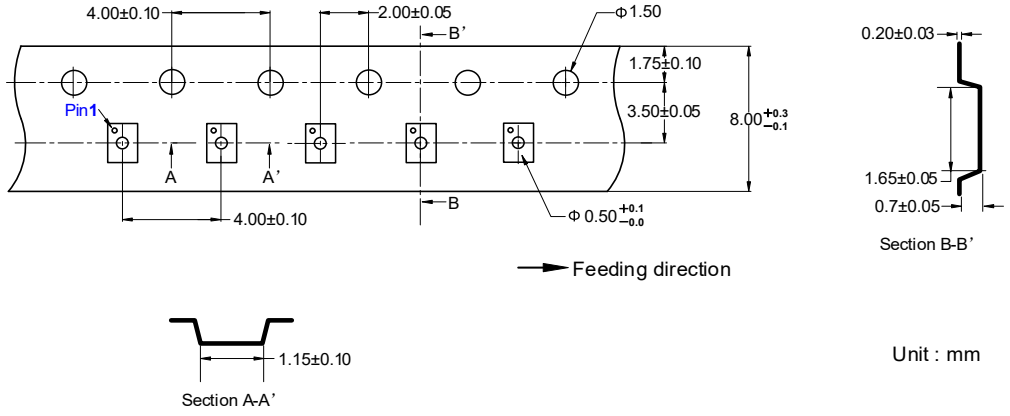
| SYMBOL | MIN | NOM | MAX |
|---|---|---|---|
| A | 0.34 | 0.37 | 0.40 |
| A1 | 0.00 | 0.02 | 0.05 |
| A3 | | 0.10REF | |
| b | 0.10 | 0.15 | 0.20 |
| D | 0.95 | 1.00 | 1.05 |
| E | 0.95 | 1.00 | 1.05 |
| e | 0.30 | 0.35 | 0.40 |
| H | | 0.10REF | |
| K | 0.15 | -- | -- |
| L | 0.35 | 0.40 | 0.45 |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

## Tape Information

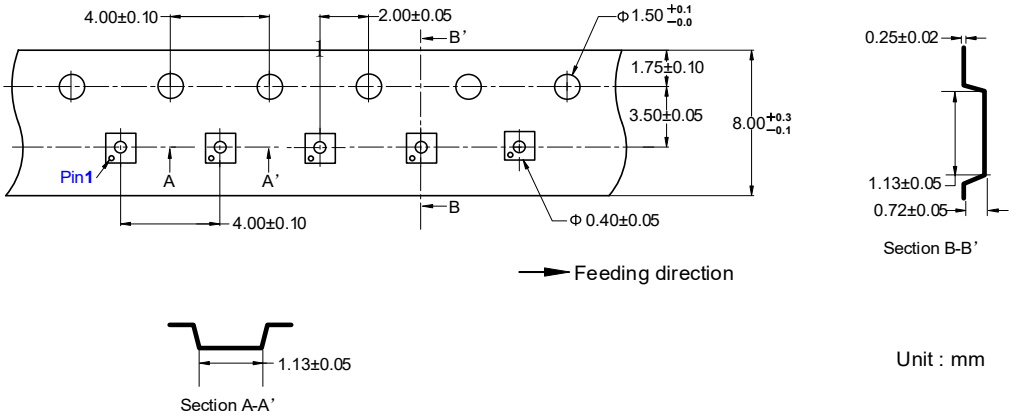
SC70-5 (1.3mm × 2.1mm)



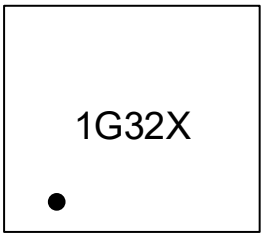

DFN6 (1.0mm × 1.5mm)




DFN6 (1.0mm × 1.0mm)



## Marking Information




ETQ74AUP1G32
1U32 = Part Number
X = Tracking Number

## 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 jiaying |
| 1.1 | 2025-06-07 | Add Packing Option | Yang xiaoxu | Yang xiaoxu | Liu jiaying |
| 1.2 | 2025-10-15 | Update Format | Wang anran | Yang xiaoxu | Liu jiaying |