# Single 2-Input NOR Gate

## General Description

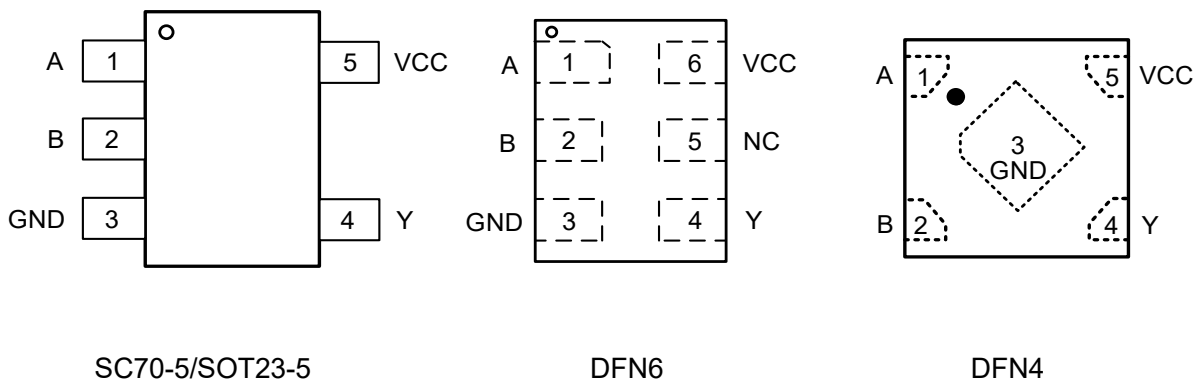
The ET74AUP1G02 is a high performance single 2-input NOR Gate operating from 0.8V to 3.6V supply. This device is fabricated with advanced CMOS technology to achieve ultra-high speed with high output drive.

## Features

- Designed for 0.8V to 3.6V $V_{CC}$ Operation
- 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 |
|---|---|---|---|
| ET74AUP1G02 | SC70-5 (1.3mm × 2.1mm) | Tape and Reel, 3K/Reel | 1 |
| ET74AUP1G02T | SOT23-5 (1.6mm × 2.9mm) | Tape and Reel, 3K/Reel | 3 |
| ET74AUP1G02Y | DFN6 (1.0mm × 1.5mm) | Tape and Reel, 3K/Reel | 1 |
| ET74AUP1G02Y1 | DFN4 (0.8mm × 0.8mm) | Tape and Reel, 3K/Reel | 1 |

## Pin Configuration




SC70-5/SOT23-5 DFN6 DFN4

Figure1. Pin Configuration

## Pin Function

SC70-5 / SOT23-5 / DFN4

| Pin No. | Pin Name | Function |
|---|---|---|
| 1 | A | Input A |
| 2 | B | Input B |
| 3 | GND | Ground |
| 4 | Y | Output Y |
| 5 | VCC | Supply Voltage |

DFN6

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

## Block Diagram

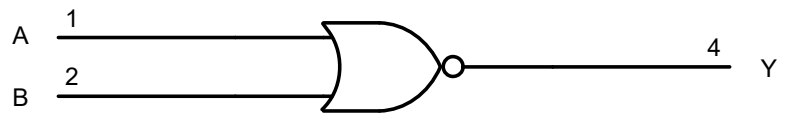



Figure2. Logic Symbol

## Functional Table

| Input | | Output |
|---|---|---|
| **A** | **B** | **Y** |
| L | L | H |
| L | H | L |
| H | L | L |
| H | H | L |

## 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 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 | |
| | DFN4 | | 260 | |
| $P_D$ | SC70-5 | Power Dissipation in Still Air at 85°C | 215 | mW |
| | SOT23-5 | | 260 | |
| | DFN6 | | 150 | |
| | DFN4 | | 250 | |

## 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 |

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 | | 0.8V | 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 | | ±0.2 | uA |
| $I_{OFF}$ | Power Off Leakage Current | $V_I$ = 3.6 V or $V_O$ = 3.6 V | 0 | | | ±0.2 | | ±0.5 | uA |
| $I_{CC}$ | Quiescent Supply Current | $V_I$ = 3.6V or GND | 3.6 | | | ±0.2 | | ±0.7 | 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 | |
| $t_{PHL}$<br>$t_{PLH}$ | Propagation Delay (Figure 3 & 4) | $C_L$ = 15pF[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 | |
| | | $C_L$ = 30pF[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 | | 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 (6) | 1MHz, $V_I$ = 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 | |
| | | | $V_{CC}$ = 3.3V | 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

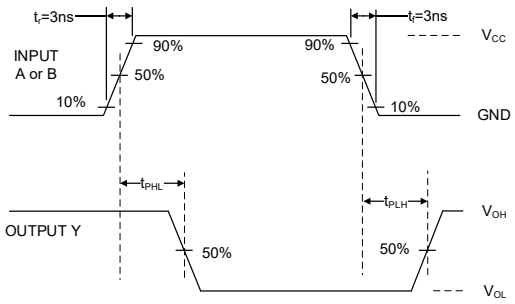



Figure3. Switching Waveform

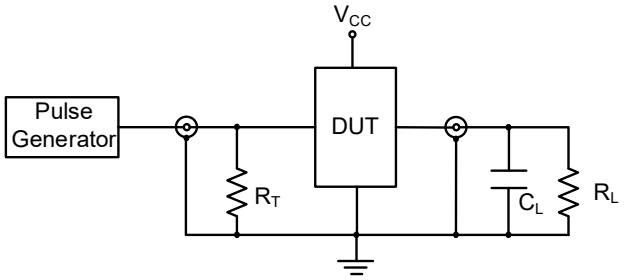
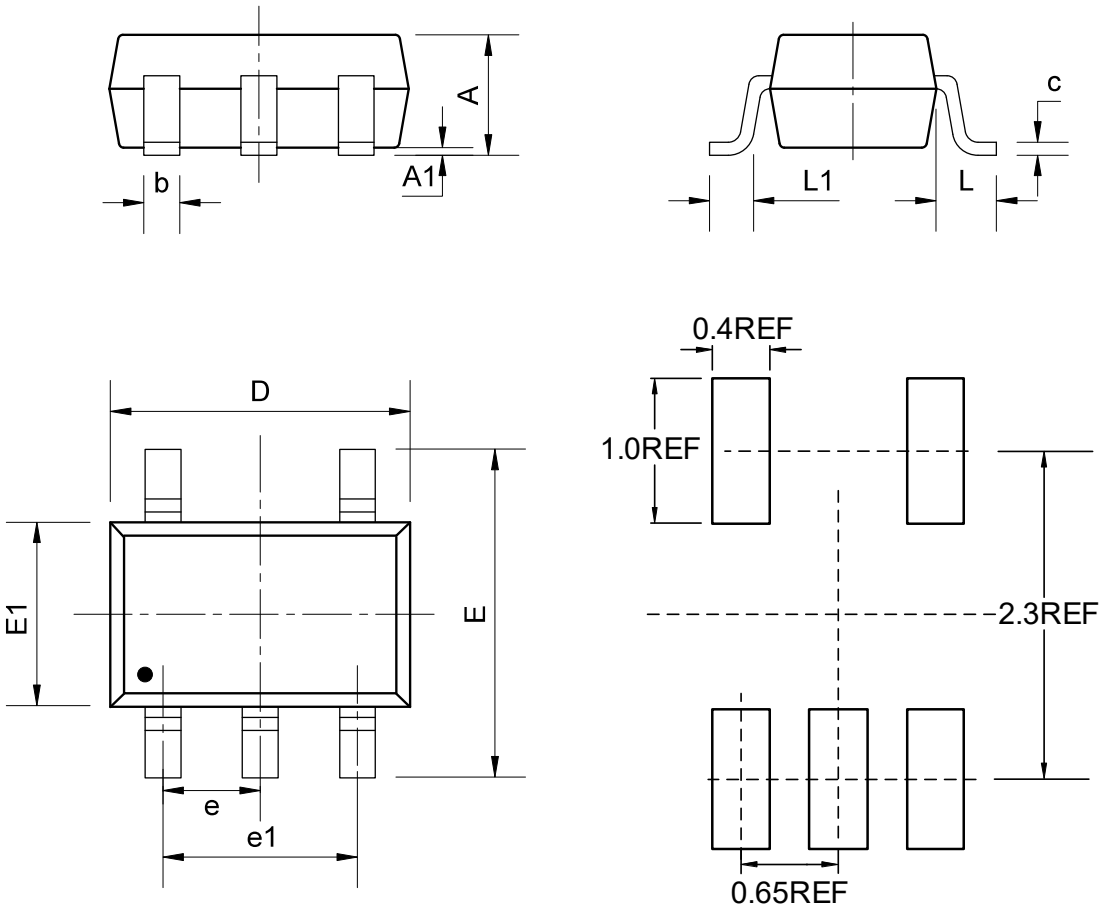



Figure4. Test Circuit

## Package Dimension

SC70-5 (1.3mm × 2.1mm)

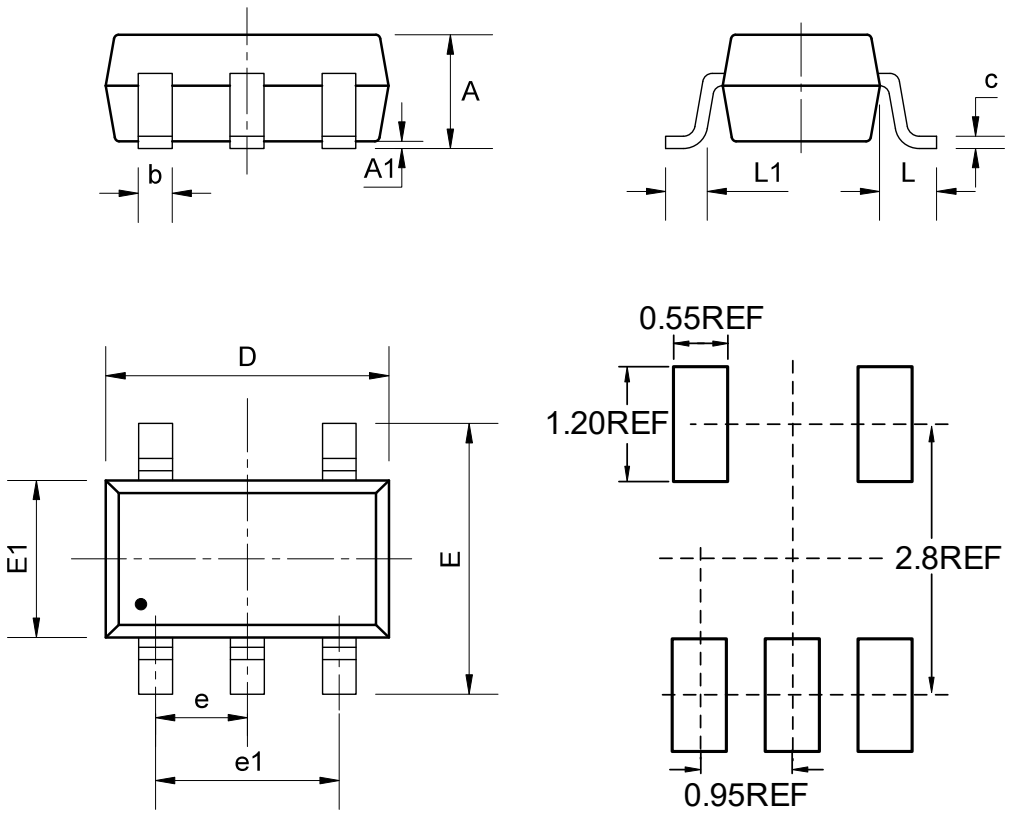



COMMON DIMENSIONS

(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 | | |

SOT23-5 (1.6mm × 2.9mm)

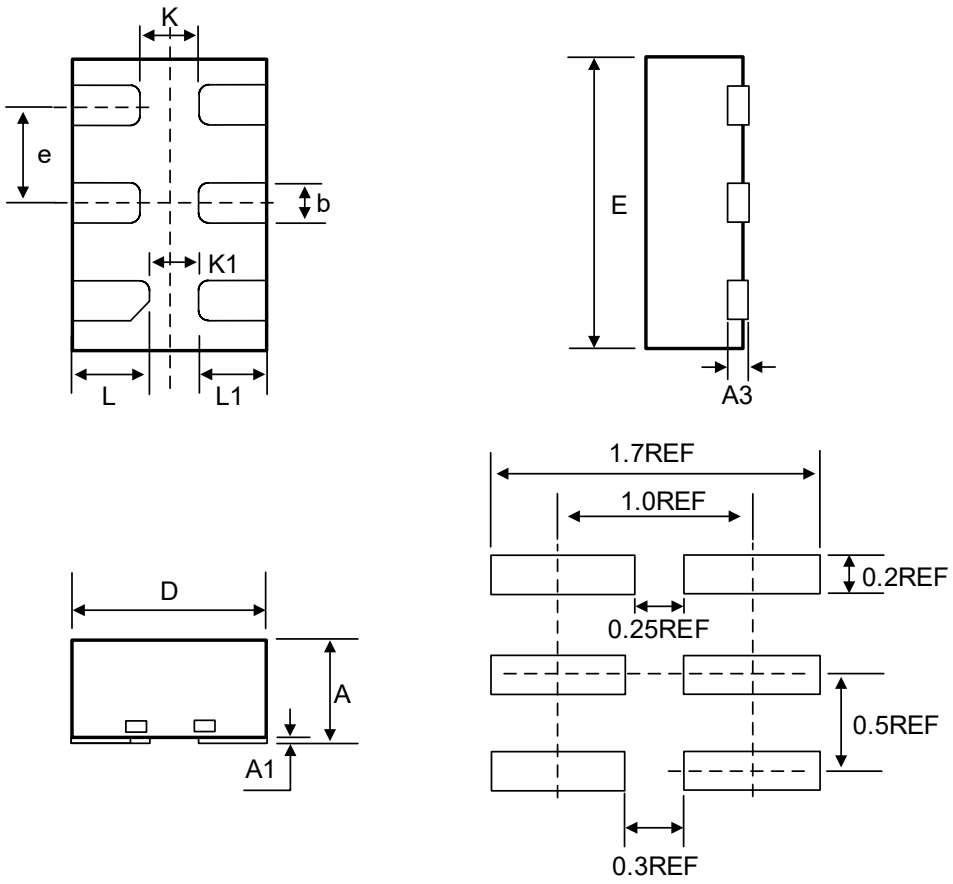



COMMON DIMENSIONS

(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)

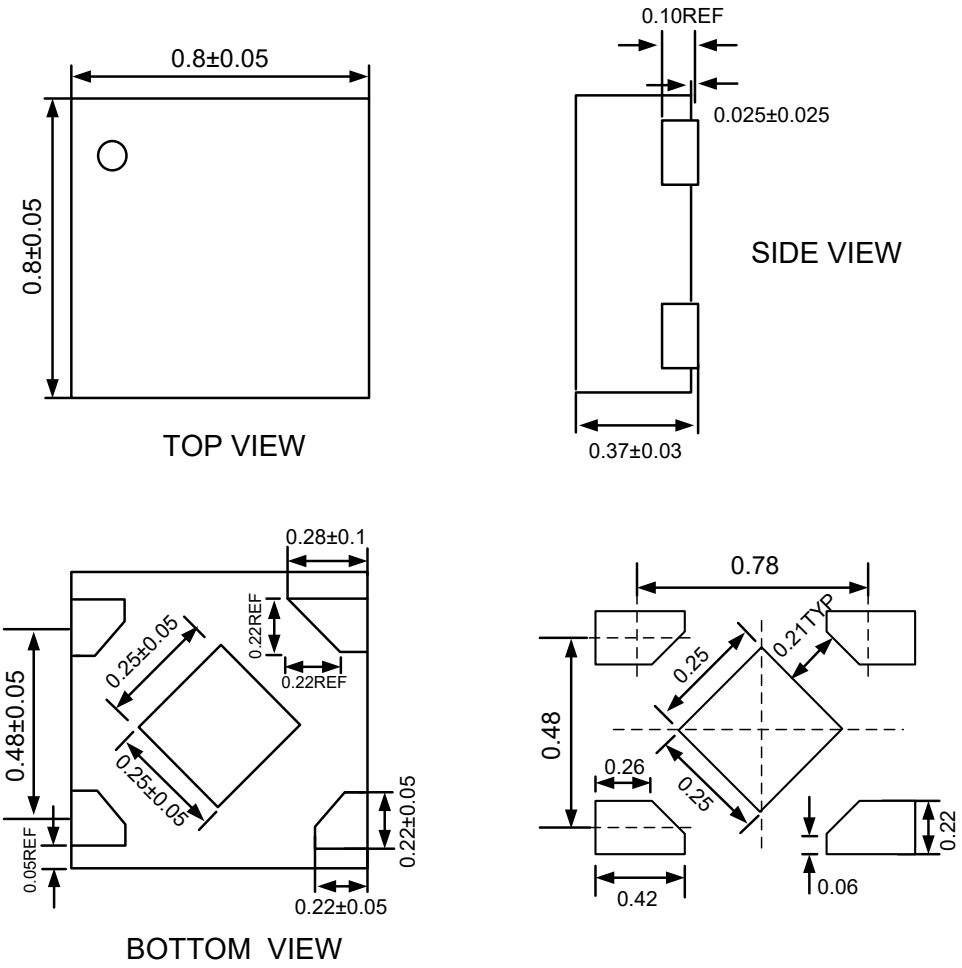



COMMON DIMENSIONS

(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 |

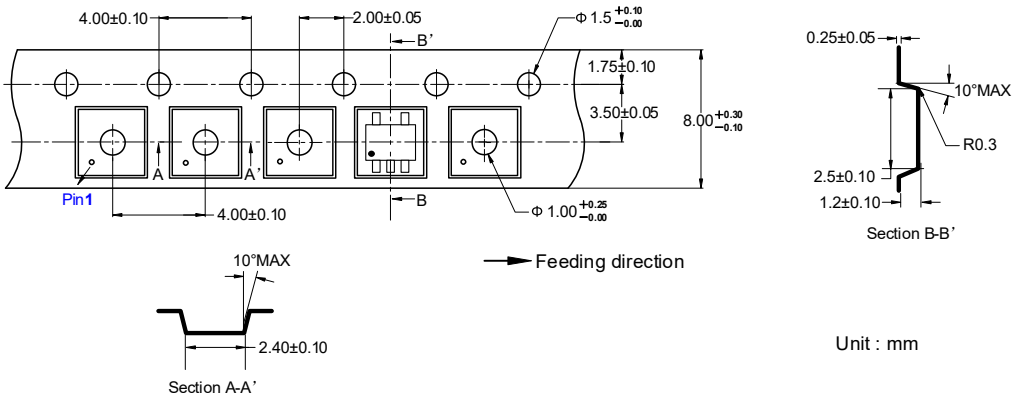
DFN4 (0.8mm × 0.8mm)



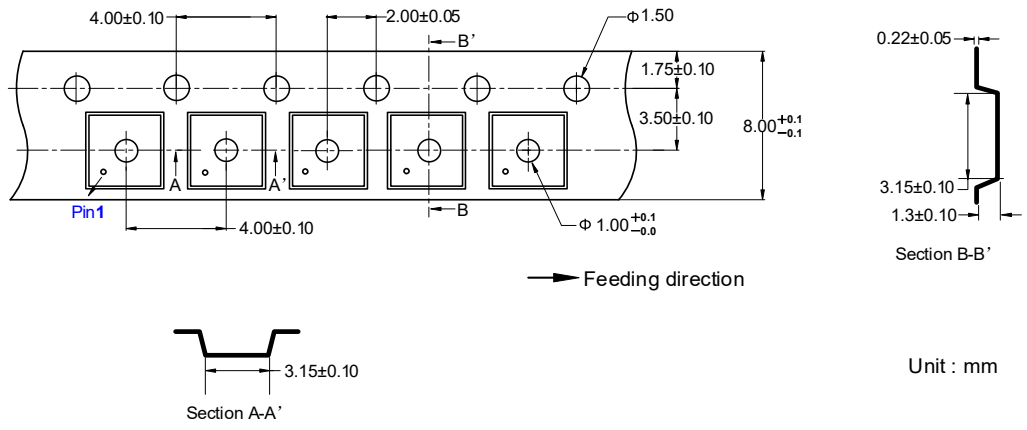

Unit: mm

## Tape Information

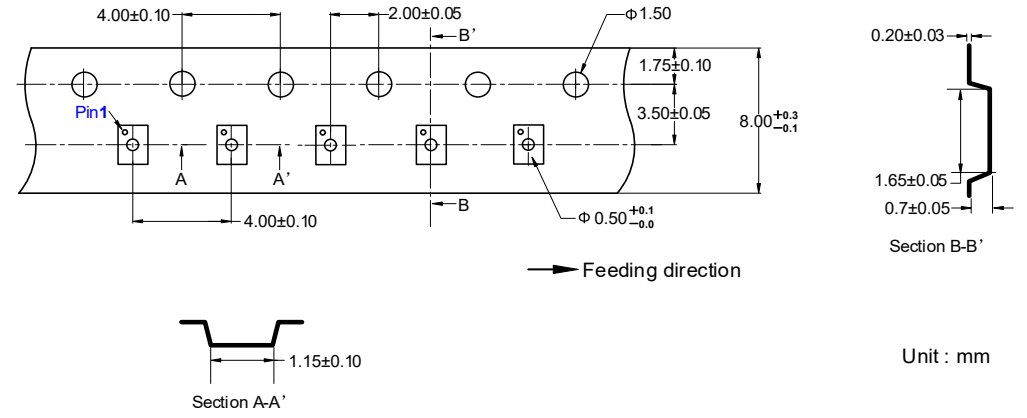
SC70-5 (1.3mm × 2.1mm)



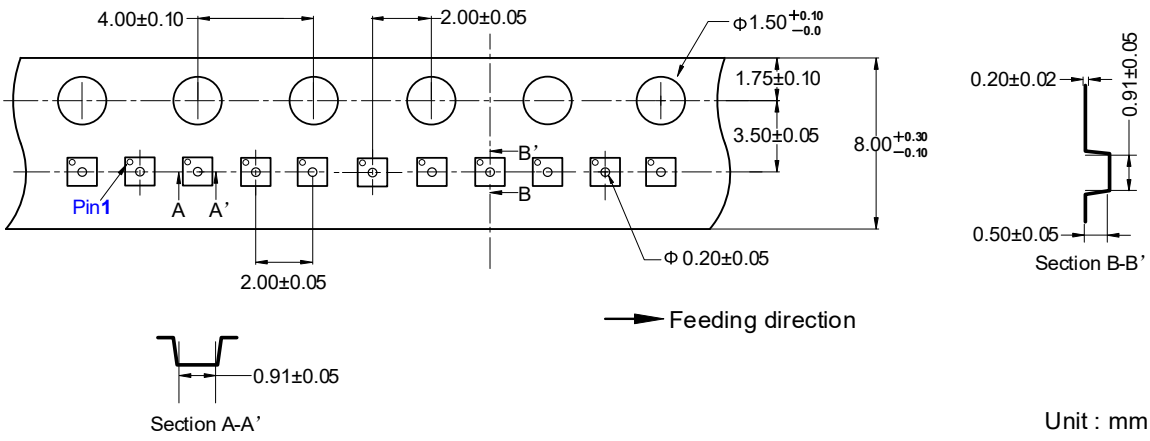
SOT23-5 (1.6mm × 2.9mm)




DFN6 (1.0mm × 1.5mm)




DFN4 (0.8mm × 0.8mm)



## Revision History and Checking Table

| Version | Date | Revision Item | Modifier | Function & Spec Checking | Package & Tape Checking |
|---|---|---|---|---|---|
| 1.0 | 2026-04-03 | Official Version | Xu tao | Yang xiaoxu | Liu jiaying |
| 1.0.a | 2026-08-04 | Correct Tape | Xu tao | Yang xiaoxu | Liu jiaying |