# Single 2-Input NOR Gate

## General Description

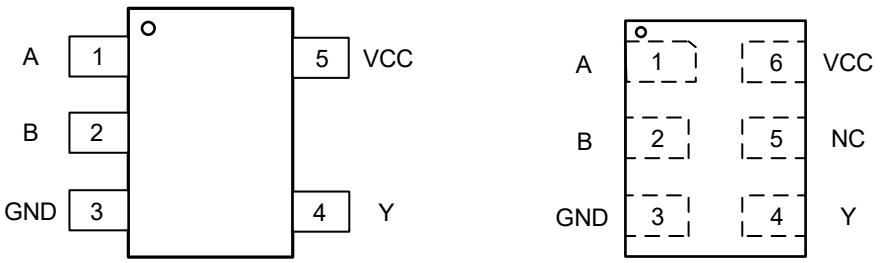
The ET74LV1T02 is a high performance single 2-input NOR Gate operating from a 1.6V to 5.5V supply. This device is fabricated with advanced CMOS technology to achieve ultra-high speed with high output drive.

## Features

- Designed for 1.6V to 5.5V $V_{CC}$ Operation
- Over-Voltage Tolerant Inputs Accept Voltages to 5.5V
- ±8mA Balanced Sink and Source Output 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 |
|---|---|---|---|
| ET74LV1T02 | SC70-5 (1.3mm × 2.1mm) | Tape and Reel, 3K/Reel | 1 |
| ET74LV1T02T | SOT23-5 (1.6mm × 2.9mm) | Tape and Reel, 3K/Reel | 3 |
| ET74LV1T02Y | DFN6 (1.0mm × 1.5mm) | Tape and Reel, 3K/Reel | 1 |

## Pin Configuration




SOT23-5/SC70-5 DFN6

Figure1. Pin Configuration

## Pin Function

SC70-5/ SOT23-5

| 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

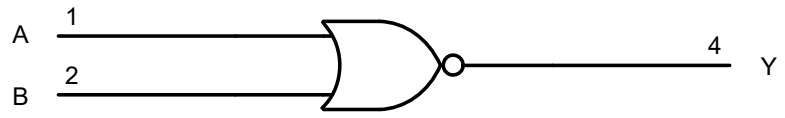



Figure2. Logic Symbol

## Function 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 (VCC Pin) | | -0.5 to 7.0 | V |
| $V_I$ | DC Input Voltage (1) | | -0.5 ≤ $V_I$ ≤ 7.0 | V |
| $V_O$ | DC Output Voltage Output in Higher or Low State | | -0.5 to $V_{CC}$ + 0.5 | 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 | |
| $I_{LU}$ | 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 |
| | 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 | | 1.6 | 5.5 | 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 | $V_{CC}$ = 1.8V to 5.5V | 0 | 20 | ns/V |

## 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 | | 1.65~1.8 | 0.94 | | | 1.0 | | V |
| | | | 2.0 | 0.99 | | | 1.03 | | |
| | | | 2.25~2.5 | 1.135 | | | 1.18 | | |
| | | | 2.75 | 1.21 | | | 1.23 | | |
| | | | 3.0~3.3 | 1.35 | | | 1.37 | | |
| | | | 3.6 | 1.47 | | | 1.48 | | |
| | | | 4.5~5.0 | 2.02 | | | 2.03 | | |
| | | | 5.5 | 2.10 | | | 2.11 | | |
| $V_{IL}$ | Low-level Input Voltage | | 1.65~2.0 | | | 0.45 | | 0.40 | V |
| | | | 2.25~2.75 | | | 0.75 | | 0.71 | |
| | | | 3.0~3.6 | | | 0.80 | | 0.65 | |
| | | | 4.5~5.5 | | | 0.80 | | 0.80 | |
| $V_{OH}$ | High-level Output Voltage | $I_{OH}$ = -20μA | 1.65~5.5 | $V_{CC}$ - 0.1 | $V_{CC}$ | | $V_{CC}$ - 0.1 | | V |
| | | $I_{OH}$ = -2mA | 1.65 | 1.28 | | | 1.21 | | |
| | | $I_{OH}$ = -2mA | 1.8 | 1.5 | | | 1.45 | | |
| | | $I_{OH}$ = -2.3mA | 2.3 | 2.0 | | | 2.0 | | |
| | | $I_{OH}$ = -3mA | 2.3 | 2.0 | | | 1.93 | | |
| | | $I_{OH}$ = -3mA | 2.5 | 2.25 | | | 2.15 | | |
| | | $I_{OH}$ = -3mA | 3.0 | 2.78 | | | 2.7 | | |
| | | $I_{OH}$ = -5.5mA | 3.0 | 2.6 | | | 2.49 | | |
| | | $I_{OH}$ = -5.5mA | 3.3 | 2.9 | | | 2.8 | | |
| | | $I_{OH}$ = -4mA | 4.5 | 4.2 | | | 4.1 | | |
| | | $I_{OH}$ = -8mA | 4.5 | 4.1 | | | 3.95 | | |
| | | $I_{OH}$ = -8mA | 5.5 | 4.6 | | | 4.5 | | |
| $V_{OL}$ | Low-level Output Voltage | $I_{OL}$ = 20μA | 1.65~5.5 | | | 0.1 | | 0.1 | V |
| | | $I_{OL}$ = 2mA | 1.65 | | | 0.2 | | 0.25 | |
| | | $I_{OL}$ = 2.3mA | 2.3 | | | 0.1 | | 0.15 | |
| | | $I_{OL}$ = 3mA | 2.3 | | | 0.15 | | 0.2 | |
| | | $I_{OL}$ =3mA | 3.0 | | | 0.1 | | 0.15 | |
| | | $I_{OL}$ = 5.5mA | 3.0 | | | 0.2 | | 0.252 | |
| | | $I_{OL}$ = 4mA | 4.5 | | | 0.15 | | 0.2 | |
| | | $I_{OL}$ = 8mA | 4.5 | | | 0.3 | | 0.35 | |
| $I_I$ | Input Leakage Current | $V_I$ = 5.5V or GND | 0~5.5 | | | ±0.1 | | ±1.0 | μA |

**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 | $V_I$ = 5.5 V or GND | 5.5 | | | 1.0 | | 10 | μA |
| $\Delta I_{CC}$ | Additional Supply Current | Per Input Pin; $V_I$ = 0.3V or 1.1V; $I_O$ = 0mA; Other Pins at $V_{CC}$ or GND | 1.8 | | | 10 | | 10 | μA |
| | | Per Input Pin; $V_I$ = 0.3V or 3.4V; $I_O$ = 0mA; Other Pins at $V_{CC}$ or GND | 5.5 | | | 1.35 | | 1.5 | mA |

**AC Electrical Characteristics**

| 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 & 4) | $C_L$ = 15pF | 1.8 | | 12.2 | 15.4 | | 17.4 | ns |
| | | $C_L$ = 30pF | 1.8 | | 13.1 | 16.6 | | 17.6 | |
| | | $C_L$ = 15pF | 2.5 | | 8.4 | 10.4 | | 12 | |
| | | $C_L$ = 30pF | 2.5 | | 9.1 | 11.3 | | 13 | |
| | | $C_L$ = 15pF | 3.3 | | 6.7 | 8.3 | | 9.4 | |
| | | $C_L$ = 30pF | 3.3 | | 7.3 | 8.9 | | 10.2 | |
| | | $C_L$ = 15pF | 5.0 | | 5.6 | 6.5 | | 7.3 | |
| | | $C_L$ = 30pF | 5.0 | | 6 | 7 | | 7.9 | |

**Capacitance Characteristics**

| Symbol | Parameter | Condition | Typ | Unit |
|---|---|---|---|---|
| $C_{IN}$ | Input Capacitance | $V_{CC}$ = 5.5V, $V_I$ = 0V or $V_{CC}$ | 5 | pF |
| $C_{PD}$ | Power Dissipation Capacitance (5) | 10MHz, $V_{CC}$ = 3.3V, $V_I$ = 0V or $V_{CC}$ | 26 | pF |
| | | 10MHz, $V_{CC}$ = 5.5V, $V_I$ = 0V or $V_{CC}$ | 30 | |

***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

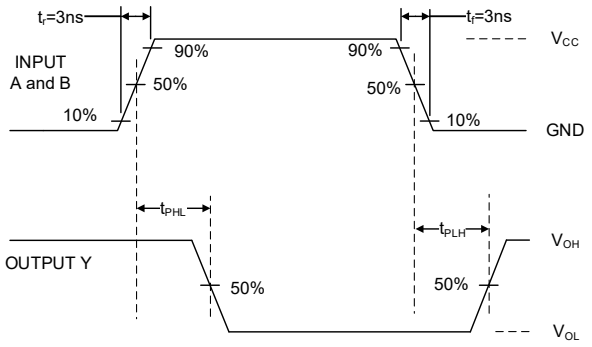
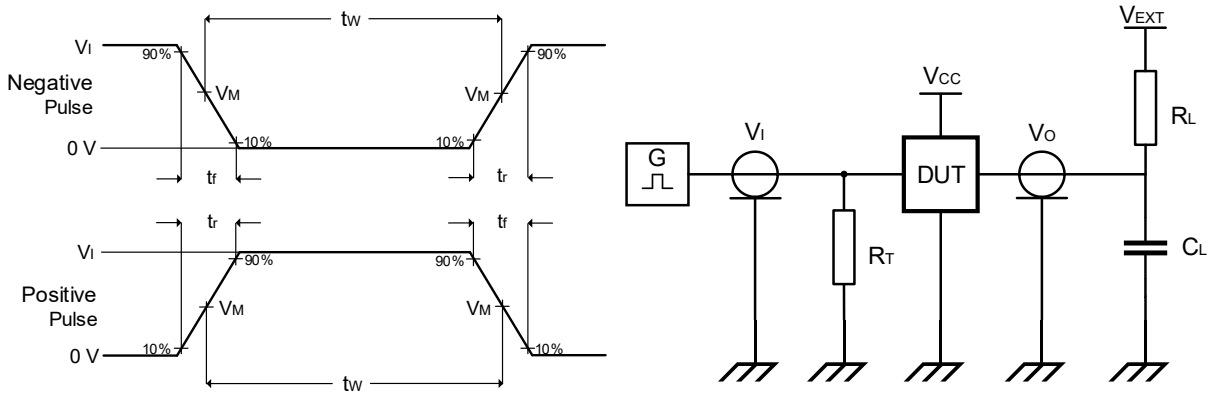



Figure3. Switching Waveform




Measurement points are given in Table1.

Definitions test circuit:

$R_L$ = Load resistance;

$C_L$ = Load capacitance including jig and probe capacitance;

$R_T$ = Termination resistance should be equal to output impedance $Z_O$ of the pulse generator;

$V_{EXT}$ = External voltage for measuring switching times.

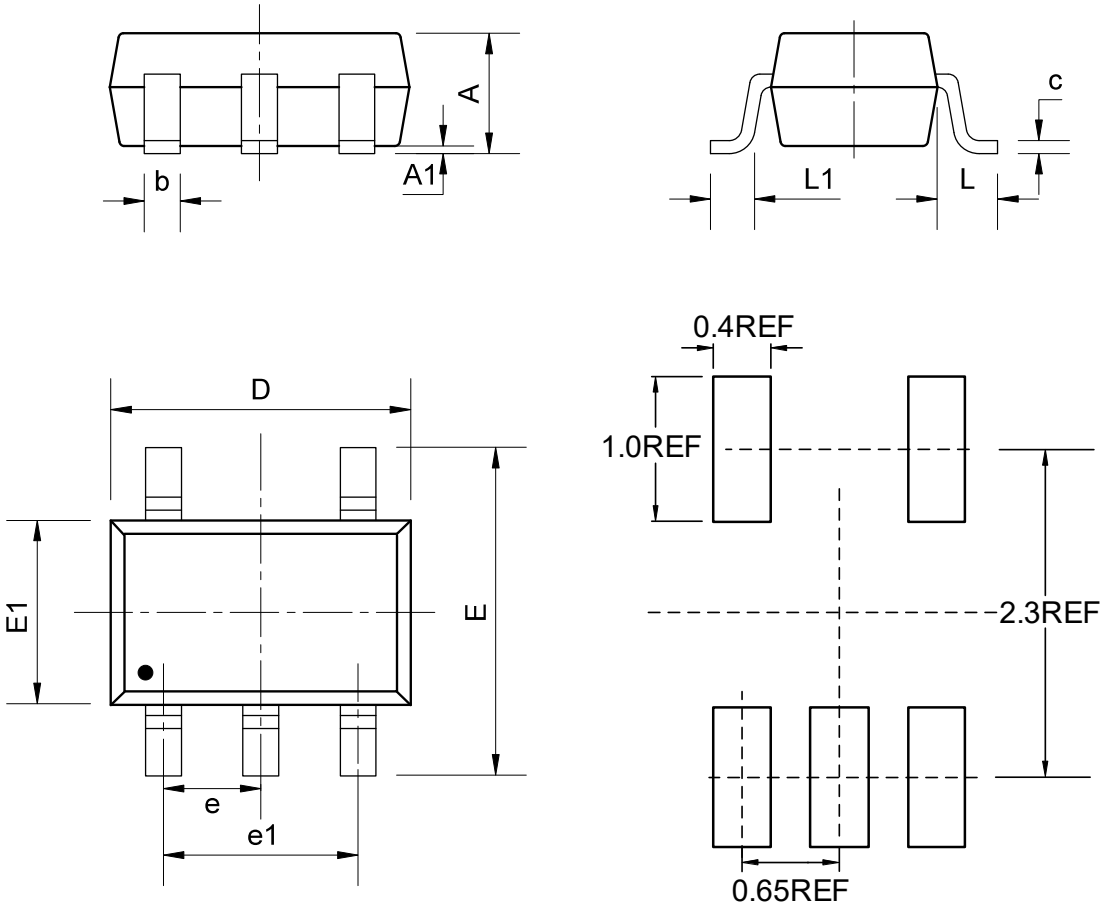
Figure4. Test Circuit for Measuring Switching Times

Table 1. Test Data

| Supply Voltage | Input | | | Load | | $V_{EXT}$ |
|---|---|---|---|---|---|---|
| $V_{CC}$ | $V_I$ | $t_r = t_f$ | $f_{max}$ | $C_L$ | $R_L$ | $t_{PLH}$, $t_{PHL}$ |
| 1.8V | $V_{CC}$ | ≤ 3ns | 15MHz | 15pF, 30pF | 1MΩ | Open |
| 2.5V | $V_{CC}$ | ≤ 3ns | 25MHz | 15pF, 30pF | 1MΩ | Open |
| 3.3V | 3V | ≤ 3ns | 50MHz | 15pF, 30pF | 1MΩ | Open |
| 5.0V | 3V | ≤ 3ns | 50MHz | 15pF, 30pF | 1MΩ | Open |

## Package Dimension

SC70-5 (1.3mm × 2.1mm)

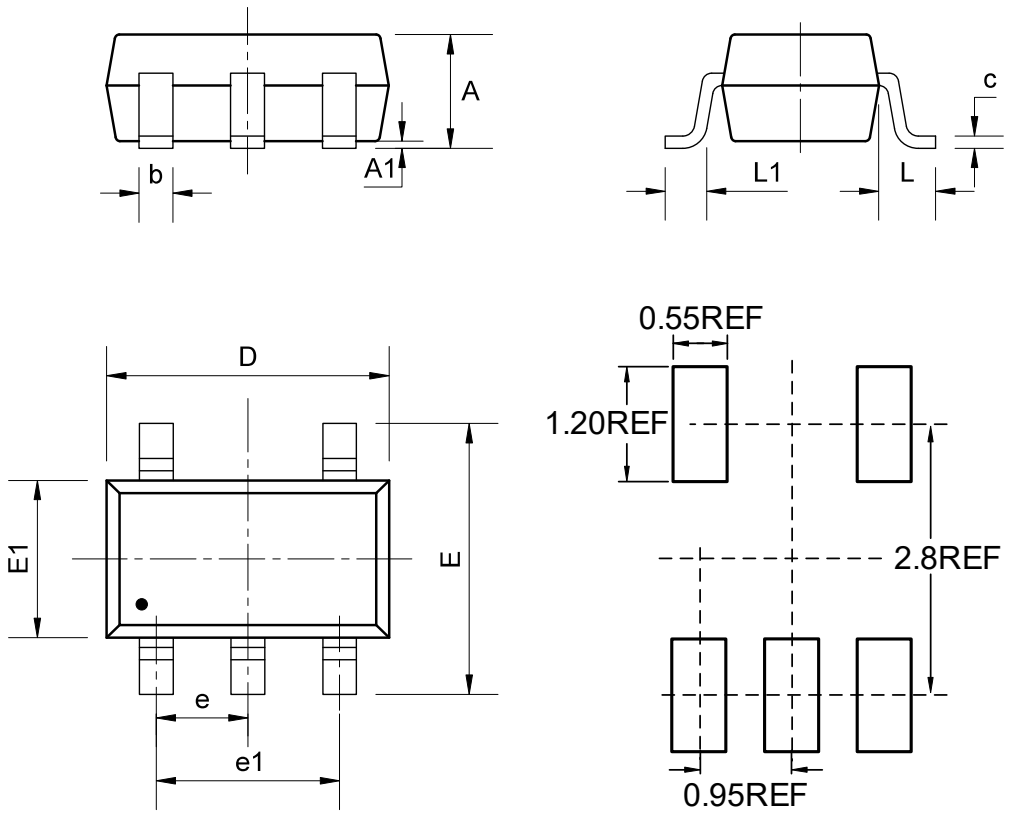



COMMON DIMENSIONS

(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)

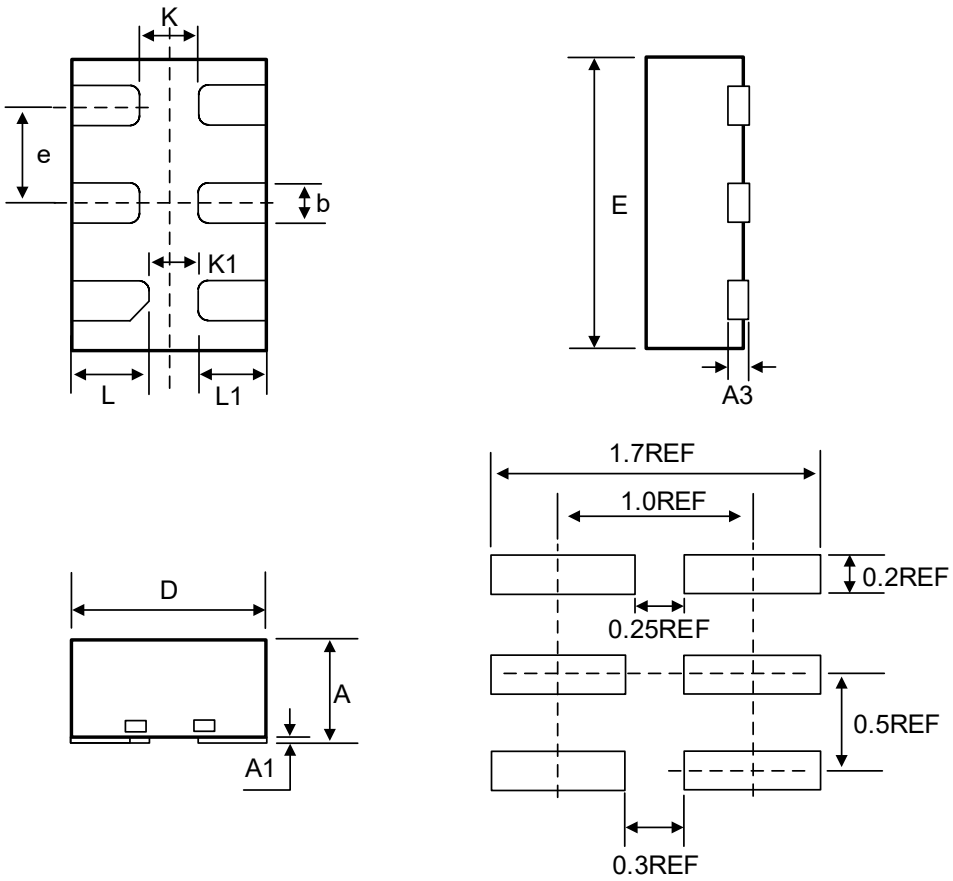



COMMON DIMENSIONS

(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)



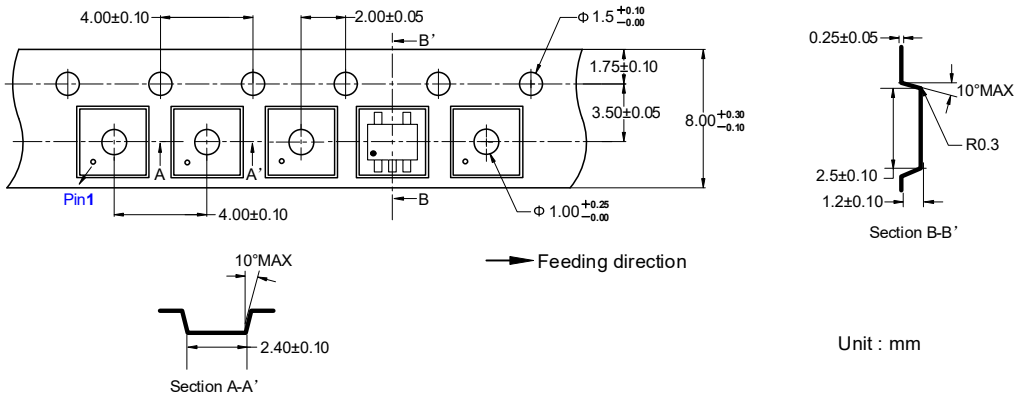

COMMON DIMENSIONS

(Unit: mm)

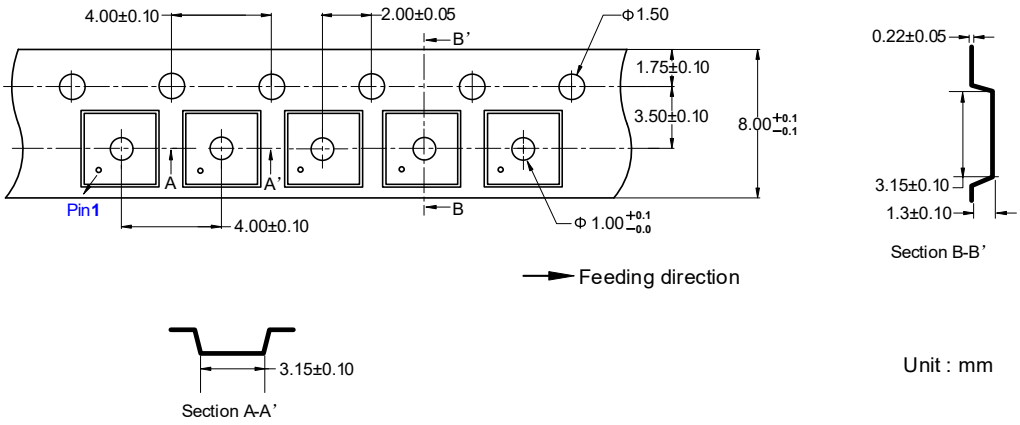
| SYMBOL | MIN | NOM | MAX |
|---|---|---|---|
| A | 0.50 | -- | 0.60 |
| A1 | 0.00 | 0.02 | 0.05 |
| A3 | | 0.10REF | |
| b | 0.15 | 0.20 | 0.25 |
| D | 0.90 | 1.00 | 1.10 |
| E | 1.40 | 1.50 | 1.60 |
| e | | 0.50BSC | |
| K | | 0.30REF | |
| K1 | | 0.25REF | |
| L | 0.35 | 0.40 | 0.45 |
| L1 | 0.30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

## Tape Information

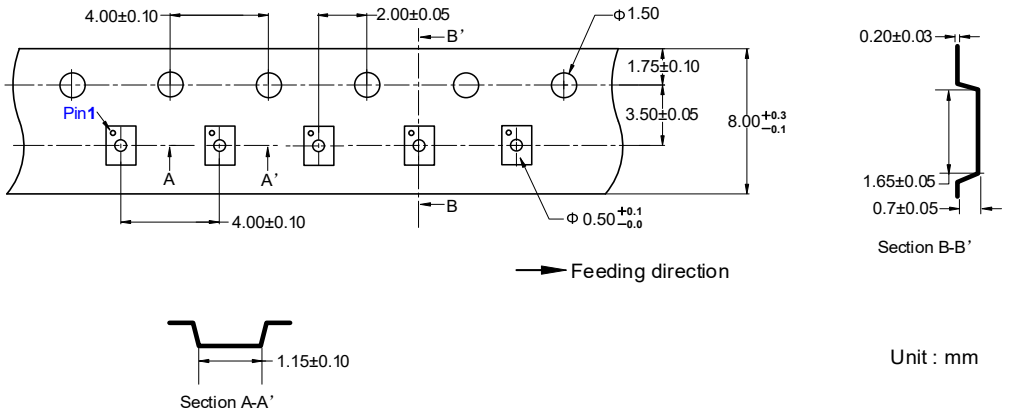
SC70-5 (1.3mm × 2.1mm)



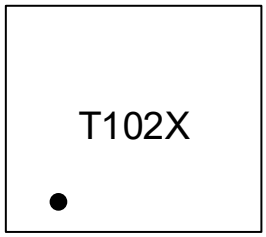

SOT23-5 (1.6mm × 2.9mm)



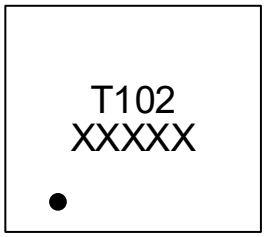

DFN6 (1.0mm × 1.5mm)



## Marking Information




ET74LV1T02
T102 = Part Number
X = Tracking Number




ET74LV1T02T
T102 = Part Number
XXXXX = Tracking Number

## Revision History and Checking Table

| Version | Date | Revision Item | Modifier | Function & Spec Checking | Package & Tape Checking |
|---|---|---|---|---|---|
| 1.0 | 2025-11-03 | Official Version | Wang anran | Yang xiaoxu | Liu jiaying |
| 1.0.a | 2026-03-10 | Update Format | Xu tao | Yang xiaoxu | Liu jiaying |