

## Single 2-Input NOR Gate

### General Description

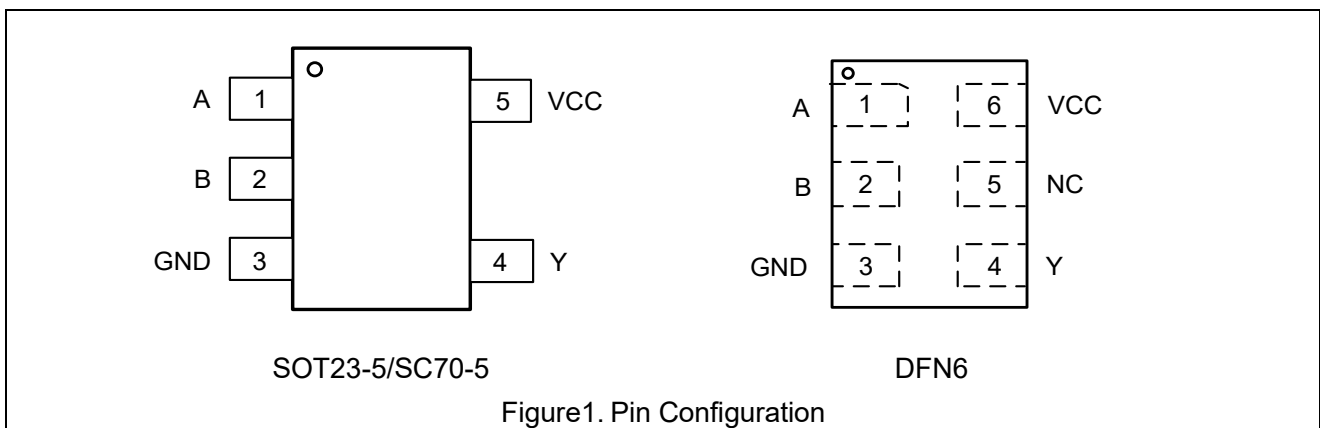
The ET74AHCT1G02 is a high performance single 2-input NOR Gate operating from a 4.5V to 5.5V supply. This device is fabricated with advanced CMOS technology to achieve ultra-high speed with high output drive.

### Features

- Designed for 4.5V to 5.5V V<sub>CC</sub> Operation
- Over-Voltage Tolerant Inputs Accept Voltages to 5.5V
- $\pm 8\text{mA}$  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:  $\pm 4000\text{V}$  Pass (JEDEC JS-001)
  - CDM:  $\pm 1000\text{V}$  Pass (JEDEC JS-002)
- Latch-up Performance Exceeds  $\pm 100\text{mA}$  per JEDEC JESD78F
- Part No. and Package Information

| Part No.      | Package                 | Packing Option         | MSL |
|---------------|-------------------------|------------------------|-----|
| ET74AHCT1G02  | SC70-5 (1.3mm × 2.1mm)  | Tape and Reel, 3K/Reel | 1   |
| ET74AHCT1G02T | SOT23-5 (1.6mm × 2.9mm) | Tape and Reel, 3K/Reel | 3   |
| ET74AHCT1G02Y | DFN6 (1.0mm × 1.5mm)    | Tape and Reel, 3K/Reel | 1   |

### Pin Configuration



# ET74AHCT1G02

## Pin Function

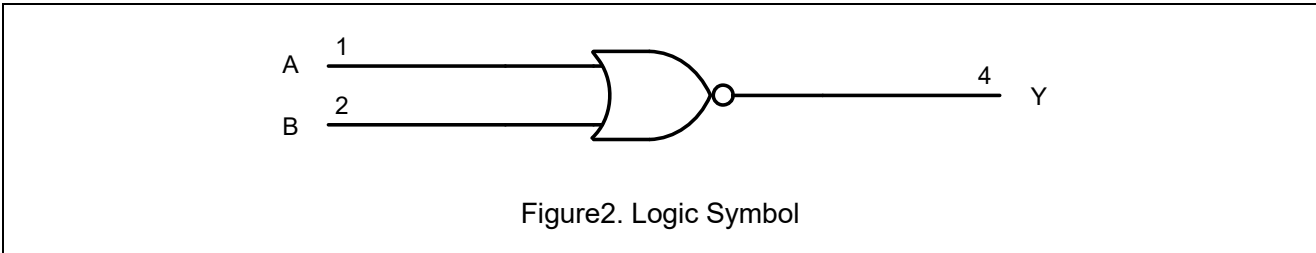
SC70-5/SOT23-5

| 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



## Function Table

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

# ET74AHCT1G02

## Absolute Maximum Ratings

| Symbol           | Parameter                                                                       |                                     | Value                         | Unit |
|------------------|---------------------------------------------------------------------------------|-------------------------------------|-------------------------------|------|
| V <sub>CC</sub>  | DC Supply Voltage (VCC Pin)                                                     |                                     | -0.5 to 7.0                   | V    |
| V <sub>I</sub>   | DC Input Voltage <sup>(1)</sup>                                                 |                                     | -0.5 ≤ V <sub>I</sub> ≤ 7.0   | V    |
| V <sub>O</sub>   | DC Output Voltage Output in Higher or Low State                                 |                                     | -0.5 to V <sub>CC</sub> + 0.5 | V    |
| I <sub>IK</sub>  | DC Input Diode Current, V <sub>I</sub> < GND                                    |                                     | -50                           | mA   |
| I <sub>OK</sub>  | DC Output Diode Current, V <sub>O</sub> < GND, V <sub>O</sub> > V <sub>CC</sub> |                                     | ±50                           | mA   |
| I <sub>O</sub>   | DC Output Sink Current                                                          |                                     | ±50                           | mA   |
| I <sub>CC</sub>  | DC Supply Current Per Supply Pin                                                |                                     | 100                           | mA   |
| I <sub>GND</sub> | DC Ground Current Per Supply Pin                                                |                                     | -100                          | mA   |
| T <sub>STG</sub> | Storage Temperature Range                                                       |                                     | -65 to 150                    | °C   |
| T <sub>L</sub>   | Lead Temperature, Soldering 10 Seconds                                          |                                     | 260                           | °C   |
| T <sub>J</sub>   | Max Junction Temperature                                                        |                                     | 150                           | °C   |
| V <sub>ESD</sub> | ESD Classification                                                              | Human Body Model <sup>(2)</sup>     | ±4000                         | V    |
|                  |                                                                                 | Charged Device Model <sup>(3)</sup> | ±1000                         |      |
| I <sub>LU</sub>  | Latch up Current Above V <sub>CC</sub> and GND at 125°C <sup>(4)</sup>          |                                     | ±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<sub>O</sub> 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 <sub>θJA</sub> | SC70-5  | Thermal Characteristics, Thermal Resistance, Junction-to-Air | 300   | °C/W |
|                  | SOT23-5 |                                                              | 250   |      |
|                  | DFN6    |                                                              | 440   |      |
| P <sub>D</sub>   | 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 <sub>CC</sub> | DC Supply Voltage                    | 4.5 | 5.5             | V    |
| V <sub>I</sub>  | DC Input Voltage                     | 0   | V <sub>CC</sub> | V    |
| V <sub>O</sub>  | DC Output Voltage(High or Low State) | 0   | V <sub>CC</sub> | V    |
| T <sub>A</sub>  | Operating Temperature Range          | -40 | 125             | °C   |

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## Electrical Characteristics

### DC Electrical Characteristics

| Symbol           | Parameter                 | Condition                                      | V <sub>CC</sub> (V) | T <sub>A</sub> = 25°C |     |      | -40°C ≤ T <sub>A</sub> ≤ 125°C |      | Unit |
|------------------|---------------------------|------------------------------------------------|---------------------|-----------------------|-----|------|--------------------------------|------|------|
|                  |                           |                                                |                     | Min                   | Typ | Max  | Min                            | Max  |      |
| V <sub>IH</sub>  | High-Level Input Voltage  |                                                | 4.5                 | 2                     |     |      | 2                              |      | V    |
|                  |                           |                                                | 5.5                 | 2                     |     |      | 2                              |      |      |
| V <sub>IL</sub>  | Low-Level Input Voltage   |                                                | 4.5                 |                       |     | 0.8  |                                | 0.8  | V    |
|                  |                           |                                                | 5.5                 |                       |     | 0.8  |                                | 0.8  |      |
| V <sub>OH</sub>  | High-Level Output Voltage | I <sub>OH</sub> = -50uA                        | 4.5                 | 4.4                   | 4.5 |      | 4.4                            |      | V    |
|                  |                           | I <sub>OH</sub> = -8mA                         |                     | 3.94                  |     |      | 3.8                            |      |      |
| V <sub>OL</sub>  | Low-Level Output Voltage  | I <sub>OL</sub> = 50uA                         | 4.5                 |                       |     | 0.1  |                                | 0.1  | V    |
|                  |                           | I <sub>OL</sub> = 8mA                          |                     |                       |     | 0.36 |                                | 0.44 |      |
| I <sub>I</sub>   | Input Leakage Current     | V <sub>I</sub> = 5.5V or GND                   | 0~5.5               |                       |     | ±0.1 |                                | ±1.0 | uA   |
| I <sub>OFF</sub> | Power Off Leakage Current | V <sub>I</sub> = 5.5V or V <sub>O</sub> = 5.5V | 0                   |                       |     | 1    |                                | 10   | uA   |
| I <sub>CC</sub>  | Quiescent Supply Current  | V <sub>I</sub> = 5.5V or GND                   | 5.5                 |                       |     | 1    |                                | 10   | 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.

# ET74AHCT1G02

## AC Electrical Characteristics

$t_r = t_f = 3\text{ns}$ ; Over recommended operating free-air temperature range,  $V_{CC} = 5\text{V} \pm 0.5\text{V}$  (unless otherwise noted)

| Symbol    | Parameter         | Condition           | $T_A = 25^\circ\text{C}$ |     |     | $-40^\circ\text{C} \leq T_A \leq 125^\circ\text{C}$ |     | Unit |
|-----------|-------------------|---------------------|--------------------------|-----|-----|-----------------------------------------------------|-----|------|
|           |                   |                     | Min                      | Typ | Max | Min                                                 | Max |      |
| $t_{PLH}$ | Propagation Delay | $C_L = 15\text{pF}$ |                          | 5   | 8   | 1.0                                                 | 10  | ns   |
| $t_{PHL}$ |                   | $C_L = 50\text{pF}$ |                          | 6.5 | 10  | 1.0                                                 | 12  | ns   |

## Capacitance Characteristics

| Symbol   | Parameter                         | Condition                                                   | Typ | Unit |
|----------|-----------------------------------|-------------------------------------------------------------|-----|------|
| $C_{IN}$ | Input Capacitance                 | $V_{CC} = 5\text{V}$ , $V_I = 0\text{V}$ or $V_{CC}$        | 5   | pF   |
| $C_{PD}$ | Power Dissipation Capacitance (5) | 10MHz, $V_{CC} = 5\text{V}$ , $V_I = 0\text{V}$ or $V_{CC}$ | 28  | pF   |

**Note5:**  $C_{PD}$  is used to determine the dynamic power dissipation ( $P_D$  in  $\mu\text{W}$ ).

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

$f_i$  = input frequency in MHz;

$f_o$  = output frequency in MHz;

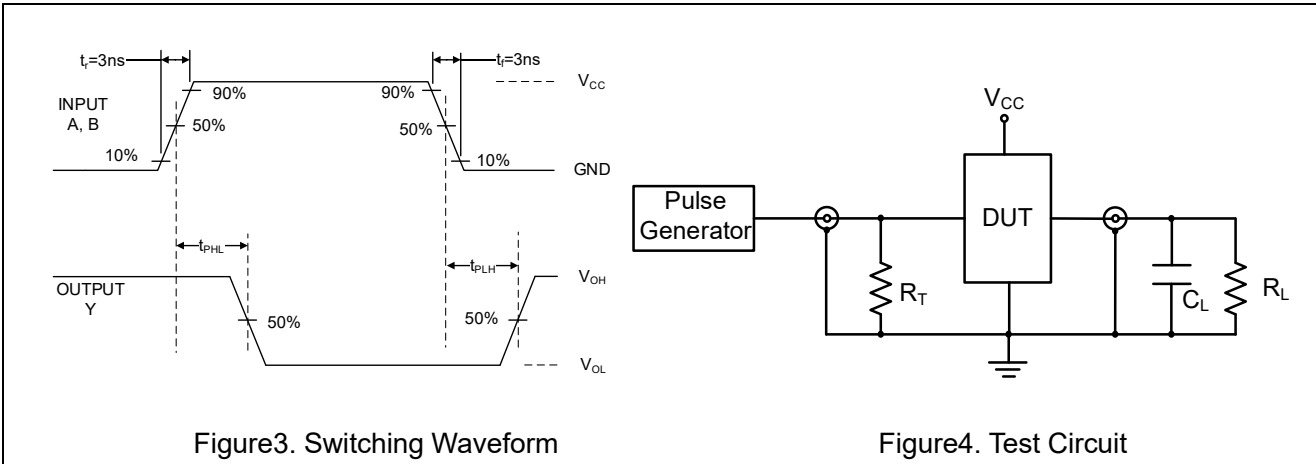
$C_L$  = output load capacitance in pF;

$V_{CC}$  = supply voltage in V;

$N$  = number of inputs switching;

$\Sigma(C_L \times V_{CC}^2 \times f_o)$  = sum of outputs.

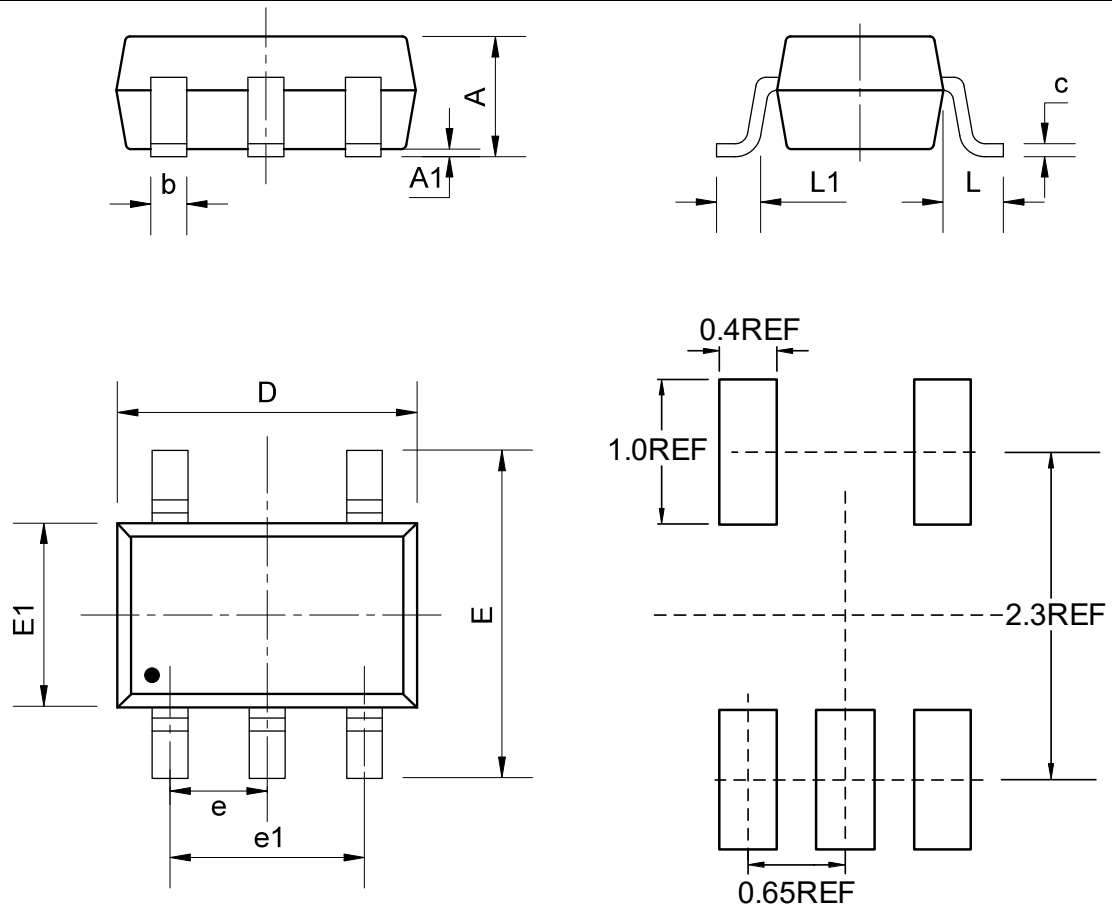
## AC Test Circuit



# ET74AHCT1G02

## Package Dimension

SC70-5 (1.3mm × 2.1mm)



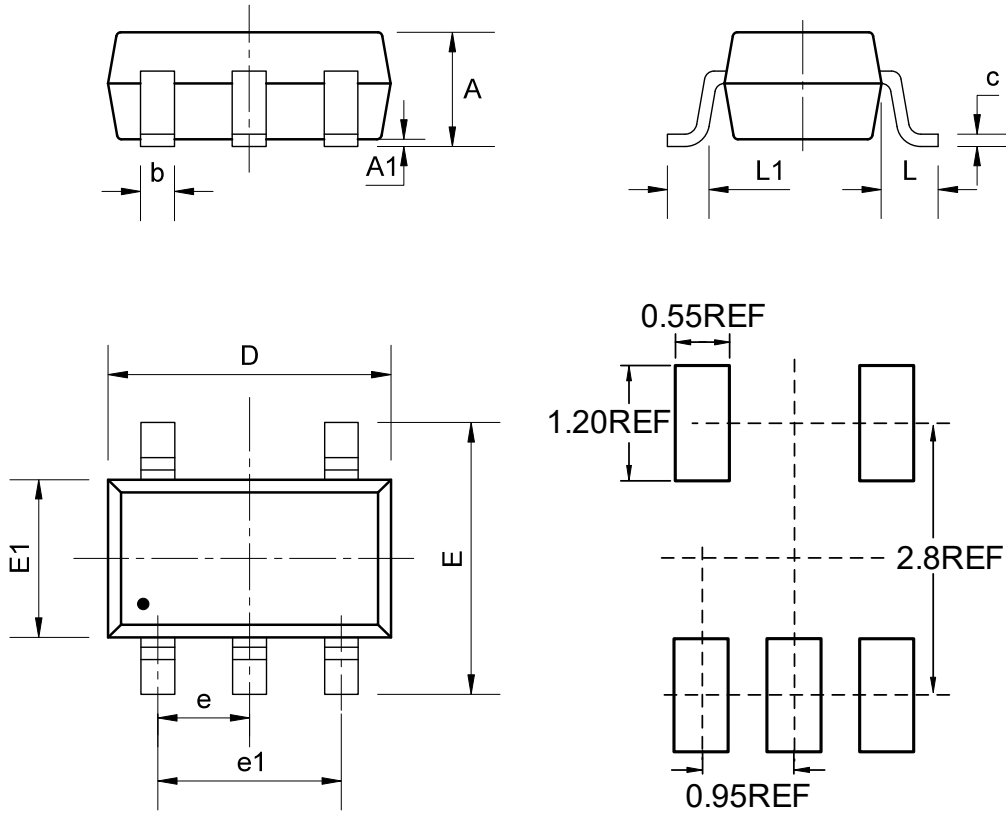
### COMMON DIMENSIONS

(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 |      |      |

# ET74AHCT1G02

SOT23-5 (1.6mm × 2.9mm)



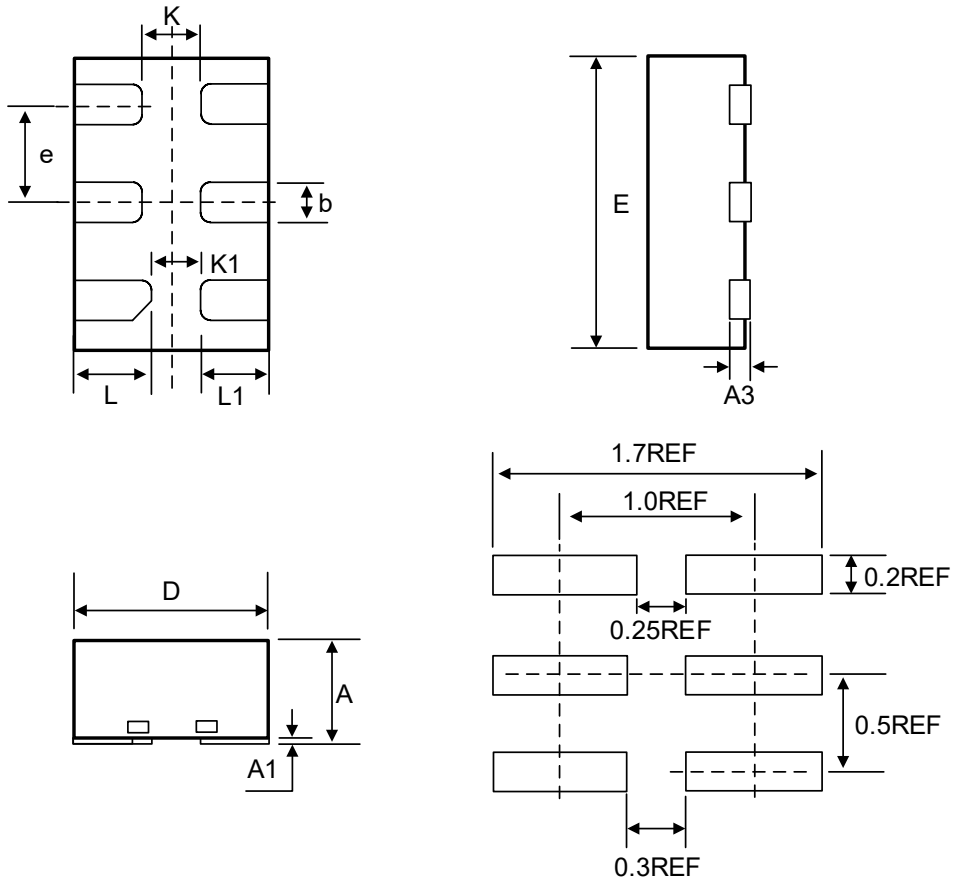
## COMMON DIMENSIONS

(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 |

# ET74AHCT1G02

DFN6 (1.0mm × 1.5mm)



## COMMON DIMENSIONS

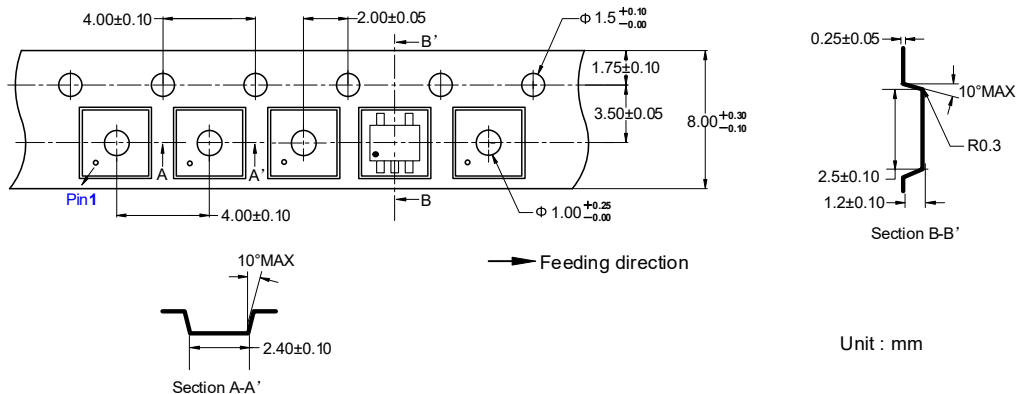
(Unit: mm)

| 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 |

**ET74AHCT1G02**

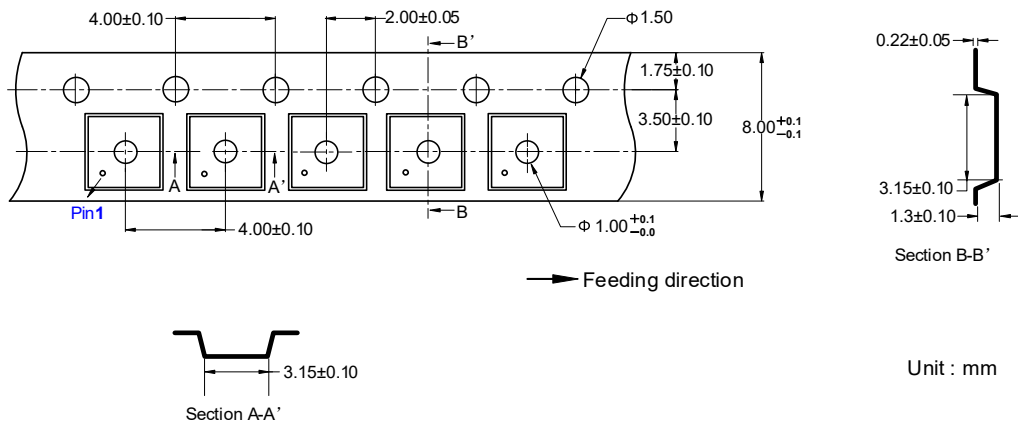
## Tape Information

SC70-5 (1.3mm × 2.1mm)



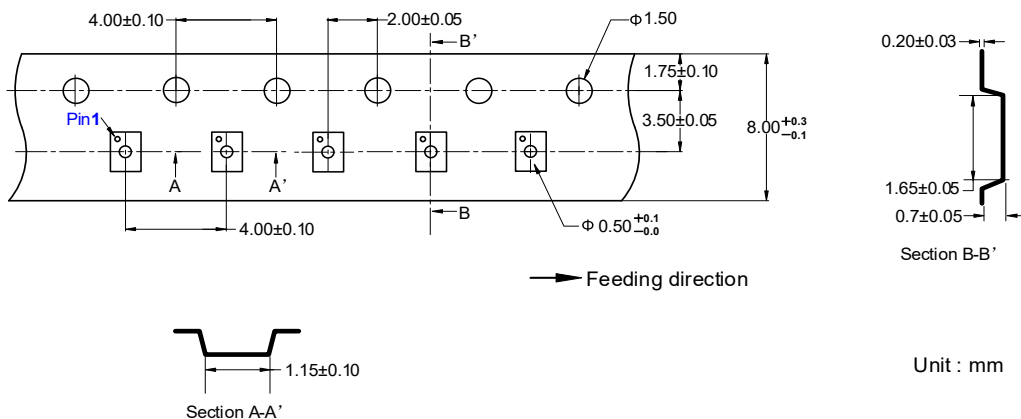
Unit : mm

SOT23-5 (1.6mm × 2.9mm)



Unit : mm

DFN6 (1.0mm × 1.5mm)



Unit : mm

# ET74AHCT1G02

## Marking Information

|                                                                                                               |                                                                                                                             |
|---------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| <div><div>T102X</div><div></div></div> <div>ET74AHCT1G02<br/>T102 = Part Number<br/>X = Tracking Number</div> | <div><div>T102<br/>XXXXX</div><div></div></div> <div>ET74AHCT1G02T<br/>T102 = Part Number<br/>XXXXX = Tracking Number</div> |
|---------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|

## Revision History and Checking Table

| Version | Date       | Revision Item    | Modifier   | Function & Spec Checking | Package & Tape Checking |
|---------|------------|------------------|------------|--------------------------|-------------------------|
| 1.0     | 2025-10-28 | Official Version | Wang anran | Yang xiaoxu              | Liu jiaying             |
| 1.0.a   | 2025-12-25 | Update Format    | Xu tao     | Yang xiaoxu              | Liu jiaying             |