

## Dual Inverter with Schmitt-Trigger Inputs

### General Description

The ET74LVC2G14 is a high-performance dual inverter with schmitt-trigger inputs operating from a 1.65V to 5.5V supply. This device is fabricated with advanced CMOS technology to achieve ultra-high speed with high output drive.

The ET74LVC2G14 is capable of transforming slowly changing input signals into sharply defined, jitter-free output signals. In addition, it has a greater noise margin than conventional inverters. The ET74LVC2G14 has hysteresis between positive-going and negative-going input thresholds (typically 1V) which is determined internally by transistor ratios and is essentially insensitive to temperature and supply voltage variations.

### Features

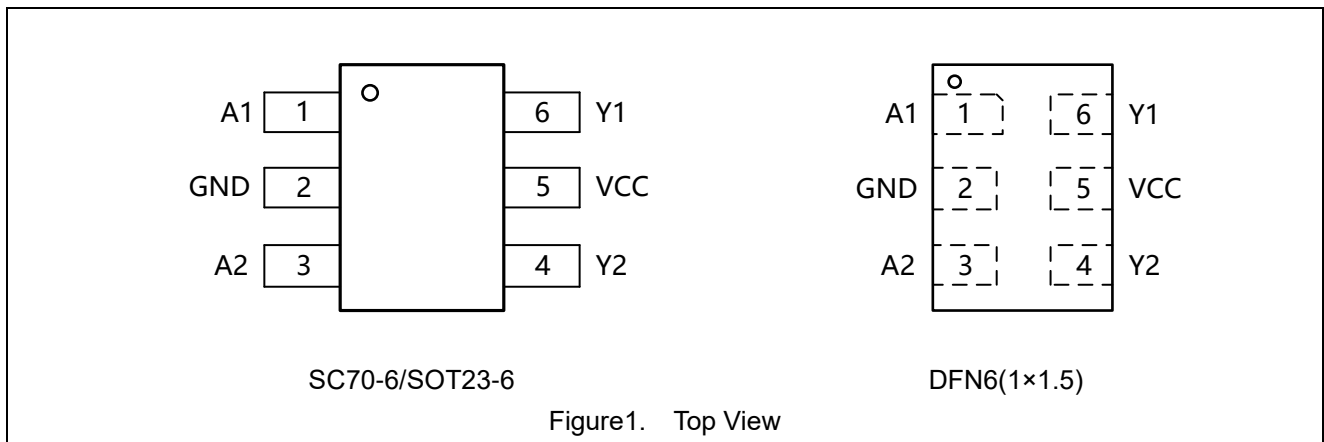
- Designed for 1.65V to 5.5V VCC Operation
- Over-Voltage Tolerant Inputs and Outputs
- 24mA Balanced Output Sink and Source Output Capability
- Near Zero Static Supply Current Substantially Reduces System Power Requirements
- These Devices are Pb-Free and are RoHS Compliant

### Device Information

| Part No.     | Package               | Packing Option    | MSL |
|--------------|-----------------------|-------------------|-----|
| ET74LVC2G14  | SC70-6 (1.3mm×2.1mm)  | Tape and Reel, 3K | 1   |
| ET74LVC2G14T | SOT23-6 (1.6mm×2.9mm) | Tape and Reel, 3K | 3   |
| ET74LVC2G14Y | DFN6 (1.0mm×1.5mm)    | Tape and Reel, 3K | 1   |

# ET74LVC2G14

## Pin Configuration

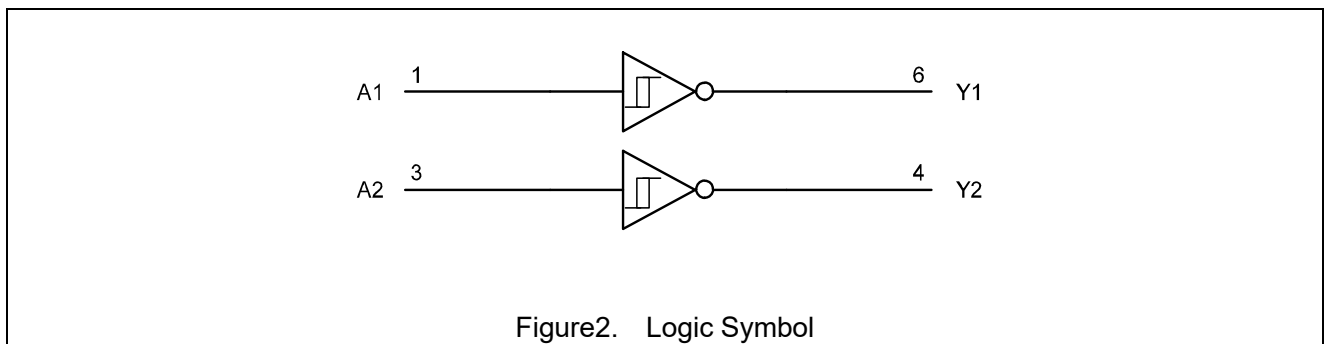


## Pin Function

SC70-6/ SOT23-6/DFN6

| Pin No. | Pin Name | Function       |
|---------|----------|----------------|
| 1       | A1       | Input CH1      |
| 2       | GND      | Ground         |
| 3       | A2       | Input CH2      |
| 4       | Y2       | Output CH2     |
| 5       | VCC      | Supply Voltage |
| 6       | Y1       | Output CH1     |

## Block Diagram



## Function Table

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

# ET74LVC2G14

## Absolute Maximum Ratings

| Symbol    | Parameter                                                           |                                     | Value                     | Unit |
|-----------|---------------------------------------------------------------------|-------------------------------------|---------------------------|------|
| $V_{CC}$  | DC Supply Voltage                                                   |                                     | -0.5 to 7.0               | V    |
| $V_I$     | DC Input Voltage <sup>(1)</sup>                                     |                                     | $-0.5 \leq V_I \leq +7.0$ | 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                                             | $V_O < GND, V_O > V_{CC}$           | $\pm 50$                  | mA   |
| $I_O$     | DC Output Sink Current                                              |                                     | $\pm 50$                  | mA   |
| $I_{CC}$  | DC Supply Current per Supply Pin                                    |                                     | $\pm 100$                 | mA   |
| $I_{GND}$ | DC Ground Current per Supply Pin                                    |                                     | $\pm 100$                 | 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 <sup>(2)</sup>     | $\pm 4000$                | V    |
|           |                                                                     | Charged Device Model <sup>(3)</sup> | $\pm 1000$                |      |
| $I_{LU}$  | Max Latch up Current Above $V_{CC}$ and GND at 125°C <sup>(4)</sup> |                                     | $\pm 100$                 | 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.** IO absolute maximum rating must be observed.

**Note2.** Tested to EIA/JESD22-A114-A.

**Note3.** Tested to JESD22-C101-A.

**Note4.** Tested to EIA/JESD78.

## Thermal Characteristics

| Symbol          | Package       | Ratings                                                      | Value | Unit |
|-----------------|---------------|--------------------------------------------------------------|-------|------|
| $R_{\theta JA}$ | SC70-6        | Thermal Characteristics, Thermal Resistance, Junction-to-Air | 280   | °C/W |
|                 | SOT23-6       |                                                              | 180   |      |
|                 | DFN6(1.0×1.5) |                                                              | 440   |      |
| $P_D$           | SC70-6        | Power Dissipation in Still Air at 85°C                       | 230   | mW   |
|                 | SOT23-6       |                                                              | 360   |      |
|                 | DFN6(1.0×1.5) |                                                              | 150   |      |

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## Recommended Operating Conditions

| Symbol                         | Parameter                            |                                 | Min  | Max | Unit |
|--------------------------------|--------------------------------------|---------------------------------|------|-----|------|
| V <sub>CC</sub>                | DC Supply Voltage                    |                                 | 1.65 | 5.5 | V    |
|                                | Operating Date Retention             |                                 | 1.5  | 5.5 |      |
| V <sub>IN</sub>                | DC Input Voltage                     |                                 | 0    | 5.5 | V    |
| V <sub>OUT</sub>               | DC Output Voltage(High or Low State) |                                 | 0    | 5.5 | V    |
| T <sub>A</sub>                 | Operating Temperature Range          |                                 | -40  | 85  | °C   |
| t <sub>r</sub> ,t <sub>f</sub> | Input Rise and Fall Time             | V <sub>CC</sub> = 2.5 V ± 0.2 V | 0    | 20  | ns/V |
|                                |                                      | V <sub>CC</sub> = 3.0 V ± 0.3 V | 0    | 10  |      |
|                                |                                      | V <sub>CC</sub> = 5.0 V ± 0.5 V | 0    | 5   |      |

## 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                                       |                                  | 1.65 to 1.95<br>2.3 to 5.5 | 0.75V <sub>CC</sub><br>0.7V <sub>CC</sub> |                 |                                           | 0.75V <sub>CC</sub><br>0.7V <sub>CC</sub> |                                           | V    |
| V <sub>IL</sub> | Low-Level Input Voltage                                        |                                  | 1.65 to 1.95<br>2.3 to 5.5 |                                           |                 | 0.25V <sub>CC</sub><br>0.3V <sub>CC</sub> |                                           | 0.25V <sub>CC</sub><br>0.3V <sub>CC</sub> | V    |
| V <sub>OH</sub> | High-Level Output Voltage<br>V <sub>IN</sub> = V <sub>IL</sub> | I <sub>OH</sub> = -100uA         | 1.65 to 5.5                | V <sub>CC</sub> -0.1                      | V <sub>CC</sub> |                                           | V <sub>CC</sub> -0.1                      |                                           | V    |
|                 |                                                                | I <sub>OH</sub> = -3mA           | 1.65                       | 1.29                                      | 1.52            |                                           | 1.29                                      |                                           |      |
|                 |                                                                | I <sub>OH</sub> = -8mA           | 2.3                        | 1.9                                       | 2.1             |                                           | 1.9                                       |                                           |      |
|                 |                                                                | I <sub>OH</sub> = -12mA          | 2.7                        | 2.2                                       | 2.4             |                                           | 2.2                                       |                                           |      |
|                 |                                                                | I <sub>OH</sub> = -16mA          | 3.0                        | 2.4                                       | 2.7             |                                           | 2.4                                       |                                           |      |
|                 |                                                                | I <sub>OH</sub> = -24mA          | 3.0                        | 2.3                                       | 2.5             |                                           | 2.3                                       |                                           |      |
|                 |                                                                | I <sub>OH</sub> = -32mA          | 4.5                        | 3.8                                       | 4.0             |                                           | 3.8                                       |                                           |      |
| V <sub>OL</sub> | Low-Level Output Voltage<br>V <sub>IN</sub> = V <sub>IH</sub>  | I <sub>OH</sub> = 100uA          | 1.65 to 5.5                |                                           | 0.0             | 0.1                                       |                                           | 0.1                                       | V    |
|                 |                                                                | I <sub>OL</sub> = 3mA            | 1.65                       |                                           | 0.08            | 0.24                                      |                                           | 0.24                                      |      |
|                 |                                                                | I <sub>OL</sub> = 8mA            | 2.3                        |                                           | 0.20            | 0.3                                       |                                           | 0.3                                       |      |
|                 |                                                                | I <sub>OL</sub> = 12mA           | 2.7                        |                                           | 0.22            | 0.4                                       |                                           | 0.4                                       |      |
|                 |                                                                | I <sub>OL</sub> = 16mA           | 3.0                        |                                           | 0.28            | 0.4                                       |                                           | 0.4                                       |      |
|                 |                                                                | I <sub>OL</sub> = 24mA           | 3.0                        |                                           | 0.38            | 0.55                                      |                                           | 0.55                                      |      |
|                 |                                                                | I <sub>OL</sub> = 32mA           | 4.5                        |                                           | 0.42            | 0.55                                      |                                           | 0.55                                      |      |
| I <sub>IN</sub> | Input Leakage Current                                          | V <sub>IN</sub> = 5.5V<br>or GND | 0 to 5.5                   |                                           | ±0.1            |                                           |                                           | ±1.0                                      | μA   |

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|           |                           |                                           |     |  |  |   |  |    |         |
|-----------|---------------------------|-------------------------------------------|-----|--|--|---|--|----|---------|
| $I_{OFF}$ | Power Off Leakage Current | $V_{IN} = 5.5V$<br>or<br>$V_{OUT} = 5.5V$ | 0   |  |  | 1 |  | 10 | $\mu A$ |
| $I_{CC}$  | Quiescent Supply Current  | $V_{IN} = 5.5V$<br>or GND                 | 5.5 |  |  |   |  | 10 | $\mu A$ |

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

$t_r = t_f = 2.5ns$ ;  $C_L = 50pF$ ;  $R_L = 500 \Omega$

| Symbol                 | Parameter                           | Condition                     | $V_{CC}(V)$ | $T_A = 25^\circ C$ |      |      | $-40^\circ C \leq T_A \leq 125^\circ C$ |      | Unit |
|------------------------|-------------------------------------|-------------------------------|-------------|--------------------|------|------|-----------------------------------------|------|------|
|                        |                                     |                               |             | Min                | Typ  | Max  | Min                                     | Max  |      |
| $t_{PLH}$<br>$t_{PHL}$ | Propagation Delay<br>(Figure3 and4) | $R_L = 1M\Omega, C_L = 15pF$  | 1.65        | 2.0                | 10.1 | 12.9 | 2.0                                     | 13.9 | ns   |
|                        |                                     |                               | 1.8         | 2.0                | 9.1  | 11.6 | 2.0                                     | 12.4 |      |
|                        |                                     | $R_L = 1M\Omega, C_L = 15pF$  | 2.5         | 0.2                | 6.0  | 7.7  | 0.8                                     | 8.2  |      |
|                        |                                     | $R_L = 1M\Omega, C_L = 15pF$  | 3.3         | 0.8                | 5.0  | 6.5  | 0.5                                     | 7.0  |      |
|                        |                                     | $R_L = 500\Omega, C_L = 50pF$ |             | 1.2                | 5.6  | 7.1  | 1.5                                     | 7.6  |      |
|                        |                                     | $R_L = 1M\Omega, C_L = 15pF$  | 5.0         | 0.5                | 4.4  | 5.6  | 0.5                                     | 6.1  |      |
|                        |                                     | $R_L = 500\Omega, C_L = 50pF$ |             | 0.8                | 4.8  | 6.1  | 0.8                                     | 6.6  |      |

## Capacitive Characteristics

| Symbol   | Parameter                                    | Condition                                    | Typ  | Unit |
|----------|----------------------------------------------|----------------------------------------------|------|------|
| $C_{IN}$ | Input Capacitance                            | $V_{CC} = 5.5V, V_I = 0V$ or $V_{CC}$        | >2.5 | pF   |
| $C_{PD}$ | Power Dissipation Capacitance <sup>(5)</sup> | 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 defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load. Average operating current can be obtained by the equation:  $I_{CC(OPR)} = C_{PD} \times V_{CC} \times f_{in} + I_{CC} \times C_{PD}$  is used to determine the no-load dynamic power consumption;  $P_D = C_{PD} \times V_{CC}^2 \times f_{in} + I_{CC} \times V_{CC} \times Fig.$

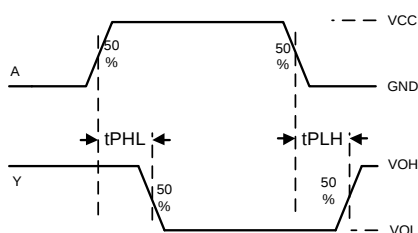


Figure 3. Switching Waveform

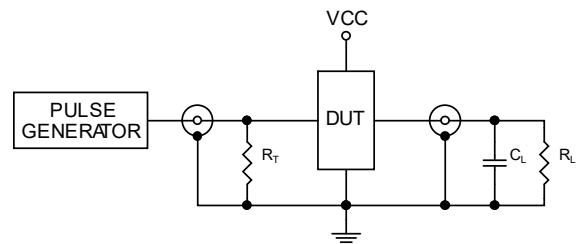
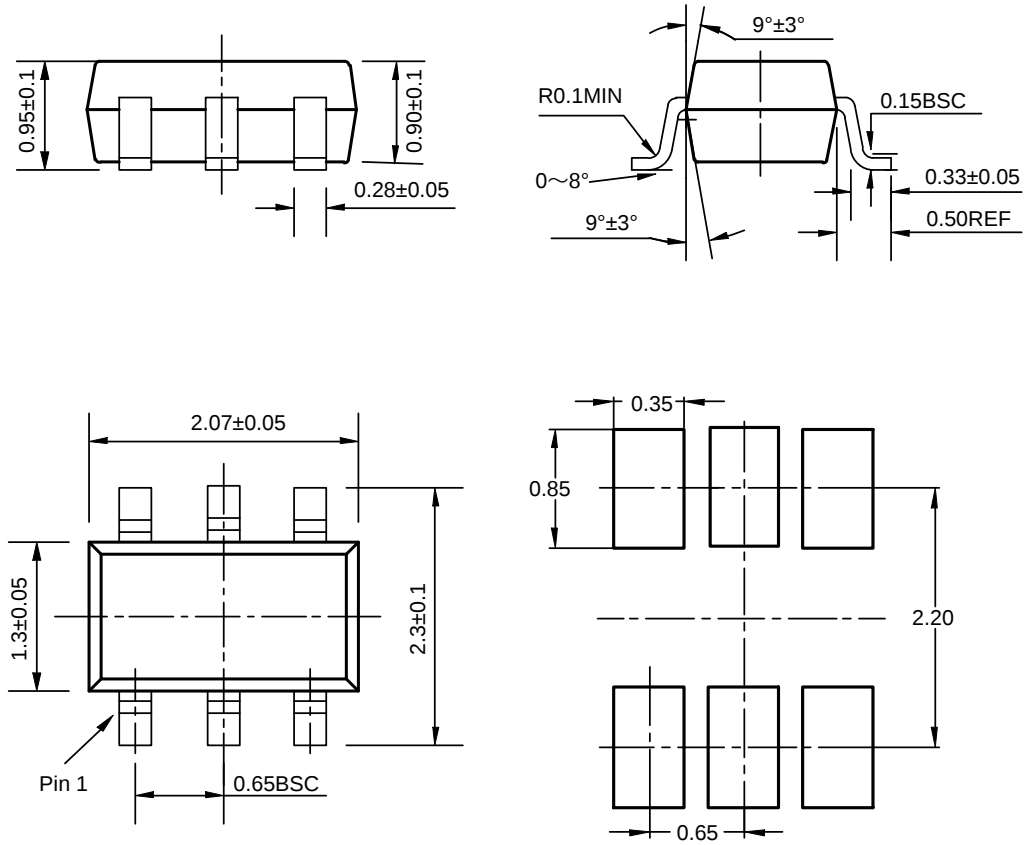


Figure4. Test Circuit

# ET74LVC2G14

## Package Dimension

SC70-6

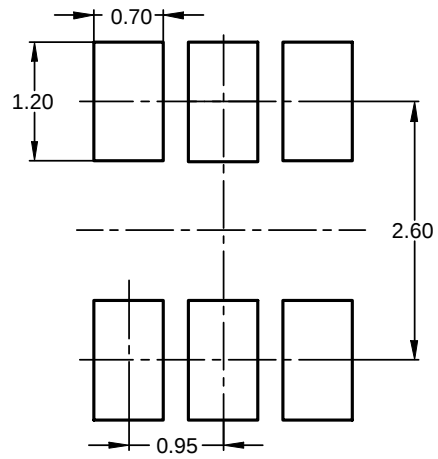
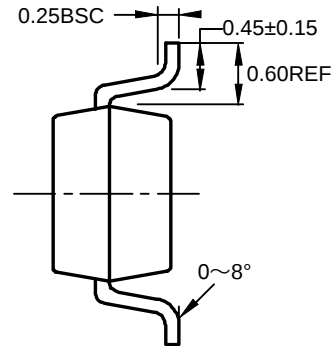
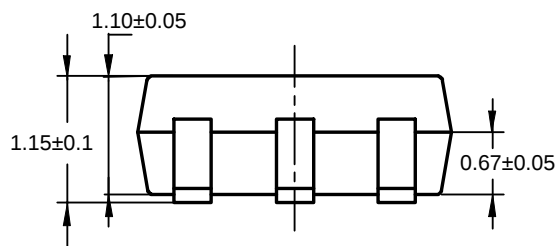
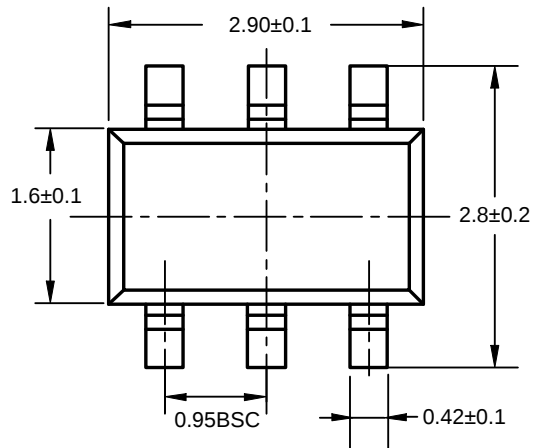


Recommended Land Pattern

Unit: mm

# ET74LVC2G14

SOT23-6

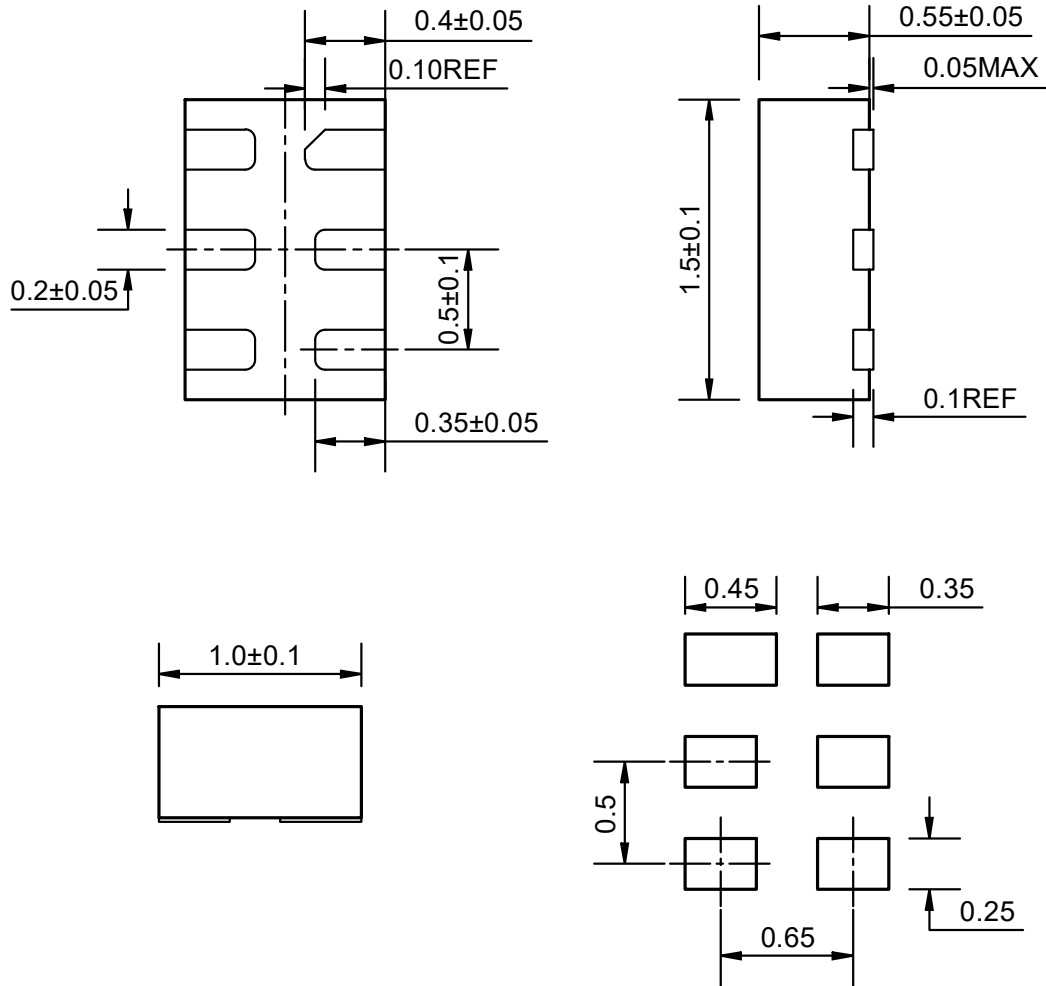


**Recommended Land Pattern**

Unit: mm

# ET74LVC2G14

DFN6



Recommended Land Pattern

Unit: mm

## Revision History and Checking Table

| Version | Date       | Revision Item                             | Modifier     | Function & Spec Checking | Package & Tape Checking |
|---------|------------|-------------------------------------------|--------------|--------------------------|-------------------------|
| 1.0     | 2017-10-23 | Original Version                          | Ma Yong jian | Ma Yong jian             | Liu Jia Ying            |
| 1.1     | 2022-11-24 | Update format and Thermal Characteristics | Shibo        | Shibo                    | Shibo                   |
| 1.2     | 2023-11-29 | Update Typeset /ESD                       | Shibo        | Shibo                    | Shibo                   |
| 1.3     | 2025-06-04 | Add Packing Option                        | Yang xiaoxu  | Yang xiaoxu              | Liu jiaying             |