

## Single Inverter with Schmitt Trigger

### General Description

The ET74LVC1G14 is an inverter in three tiny footprint packages. The device performs much as LCX multi-gate products in speed and drive.

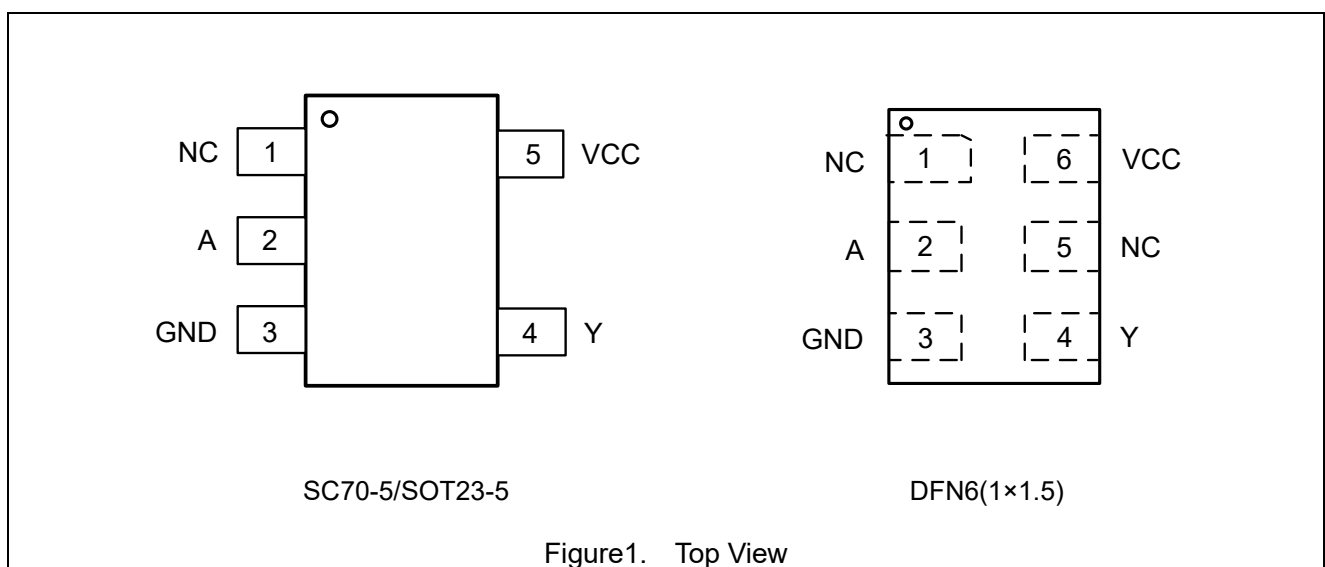
### Features

- 24mA Sink and Source Output Capability
- Over-Voltage Tolerant Inputs and Outputs
- Chip Complexity: FETs = 20
- Designed for 1.65V to 5.5V VCC Operation
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant.
- Tiny SC70-5, SOT23-5 and DFN6(1.0×1.5) Packages
- MSL1 (DFN6) , MSL3(SC70-5,SOT23-5)

### Device Information

| Part No.     | Package | Size        |
|--------------|---------|-------------|
| ET74LVC1G14  | SC70-5  | 1.3mm×2.1mm |
| ET74LVC1G14T | SOT23-5 | 1.6mm×2.9mm |
| ET74LVC1G14Y | DFN6    | 1.0mm×1.5mm |

### Pin Configuration



# ET74LVC1G14

## Pin Function

(SC70-5/ SOT23-5)

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

## DFN6

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

## Block Diagram

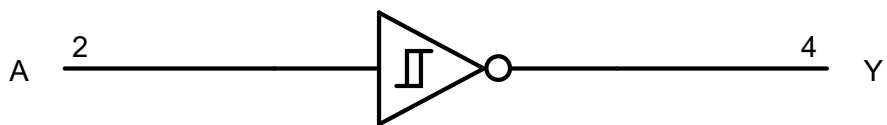


Figure2. Logic Symbol

## Functional Description

### Function Table

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

# ET74LVC1G14

## 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 Latchup Current Above $V_{CC}$ and GND at 125°C <sup>(4)</sup> |                                     | $\pm 100$                 | mA   |

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

**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 |
|-----------------|-------------|--------------------------------------------------------------|-------|------|
| $R_{\theta JA}$ | SC70-5      | Thermal Characteristics, Thermal Resistance, Junction-to-Air | 300   | °C/W |
|                 | SOT23-5     |                                                              | 250   |      |
|                 | DFN6(1×1.5) |                                                              | 440   |      |
| $P_D$           | SC70-5      | Power Dissipation in Still Air at 85°C                       | 215   | mW   |
|                 | SOT23-5     |                                                              | 260   |      |
|                 | DFN6(1×1.5) |                                                              | 150   |      |

# ET74LVC1G14

## Recommended Operating Conditions

| Symbol                         | Parameter                             |                                 | Min  | Max | Unit |
|--------------------------------|---------------------------------------|---------------------------------|------|-----|------|
| V <sub>CC</sub>                | DC Supply Voltage Operating           |                                 | 1.65 | 5.5 | V    |
|                                | 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           |                                 | -55  | 125 | °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> = -100µA       | 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>OL</sub> = 100µA        | 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> = 5.5 V or GND | 0 to 5.5                   |                                           | ±0.1            |                                           |                                           | ±1.0                                      | µA   |

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

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

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

| Symbol                 | Parameter                            | Condition                                     | $V_{CC}(\text{V})$ | $T_A = 25\ ^\circ\text{C}$ |     |      | $-40^\circ\text{C} \leq T_A \leq 125^\circ\text{C}$ |      | Unit |
|------------------------|--------------------------------------|-----------------------------------------------|--------------------|----------------------------|-----|------|-----------------------------------------------------|------|------|
|                        |                                      |                                               |                    | Min                        | Typ | Max  | Min                                                 | Max  |      |
| $t_{PLH}$<br>$t_{PHL}$ | Propagation Delay<br>(Figure3 and 4) | $R_L = 1\text{ M}\Omega$ $C_L = 15\text{ pF}$ | 1.65               | 2.0                        | 5.3 | 11.4 | 2.0                                                 | 12.0 | ns   |
|                        |                                      |                                               | 1.8                | 2.0                        | 4.4 | 9.5  | 2.0                                                 | 10.0 |      |
|                        |                                      | $R_L = 1\text{ M}\Omega$ $C_L = 15\text{ pF}$ | $2.5 \pm 0.2$      | 0.2                        | 3.5 | 6.5  | 0.8                                                 | 7.0  |      |
|                        |                                      | $R_L = 1\text{ M}\Omega$ $C_L = 15\text{ pF}$ | $3.3 \pm 0.3$      | 0.8                        | 2.1 | 4.5  | 0.5                                                 | 4.7  |      |
|                        |                                      | $R_L = 500\ \Omega$ $C_L = 50\text{ pF}$      |                    | 1.2                        | 2.9 | 5.5  | 1.5                                                 | 5.2  |      |
|                        |                                      | $R_L = 1\text{ M}\Omega$ $C_L = 15\text{ pF}$ | $5.0 \pm 0.5$      | 0.5                        | 1.8 | 3.9  | 0.5                                                 | 4.1  |      |
|                        |                                      | $R_L = 500\ \Omega$ $C_L = 50\text{ pF}$      |                    | 0.8                        | 2.4 | 4.3  | 0.8                                                 | 4.5  |      |

## Capacitance Characteristics

| Symbol   | Parameter                                    | Condition                                                        | Typ  | Unit |
|----------|----------------------------------------------|------------------------------------------------------------------|------|------|
| $C_{IN}$ | Input Capacitance                            | $V_{CC} = 5.5\text{ V}$ , $V_I = 0\text{ V}$ or $V_{CC}$         | >2.5 | pF   |
| $C_{PD}$ | Power Dissipation Capacitance <sup>(6)</sup> | 10 MHz, $V_{CC} = 3.3\text{ V}$ , $V_I = 0\text{ V}$ or $V_{CC}$ | 9    | pF   |
|          |                                              | 10 MHz, $V_{CC} = 5.5\text{ V}$ , $V_I = 0\text{ V}$ or $V_{CC}$ | 11   |      |

6.  $C_{PD}$  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;  $P_D = C_{PD} \times V_{CC}^2 \times f_{in} + I_{CC} \times V_{CC} \times Fig.$

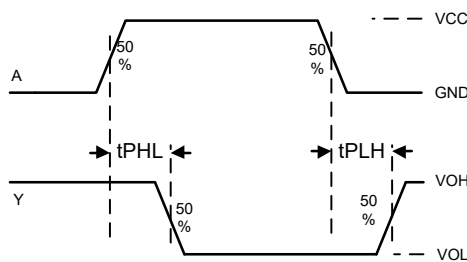


Figure3. Switching Waveform

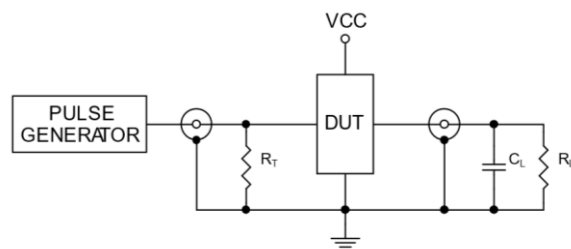
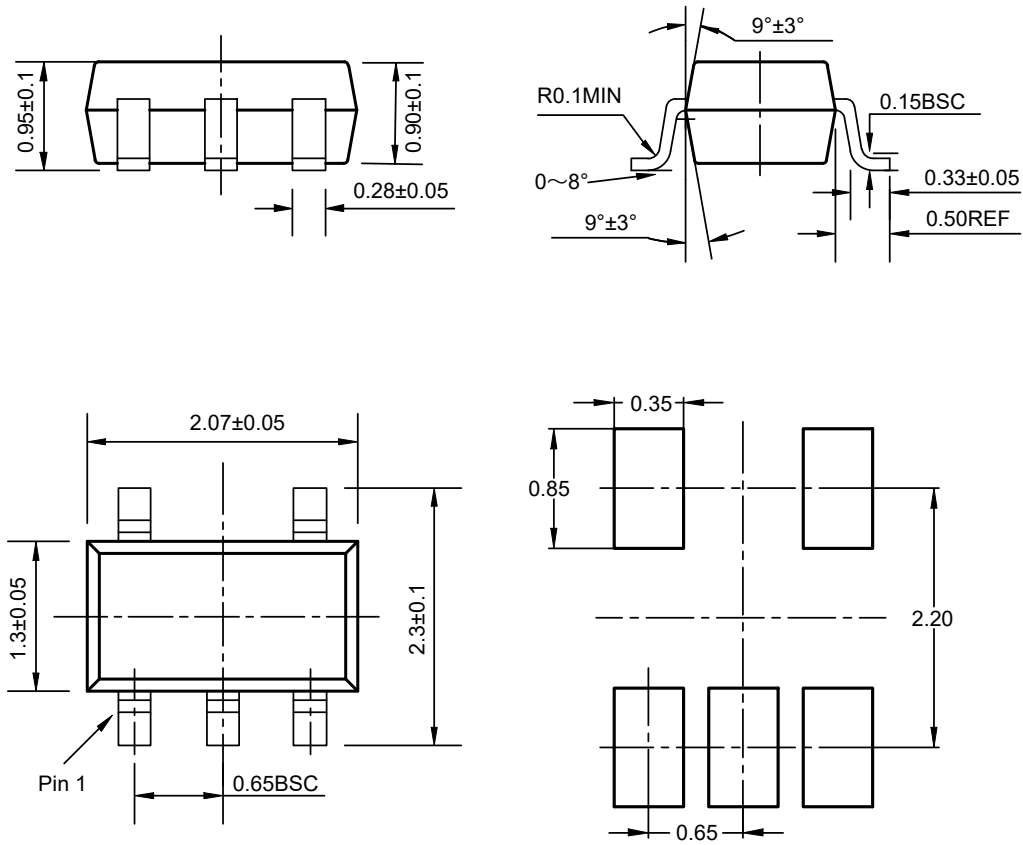


Figure4. Test Circuit

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## Package Dimension

SC70-5

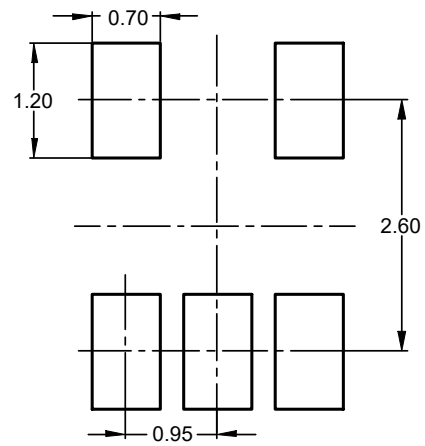
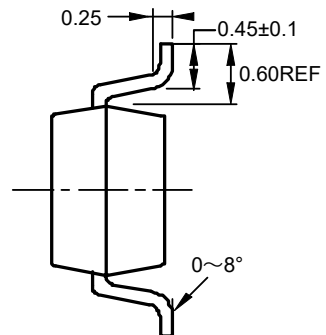
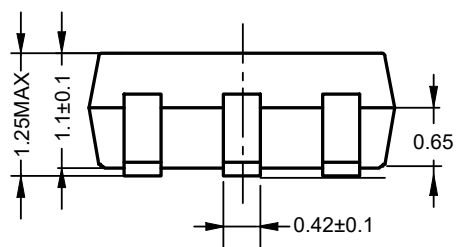
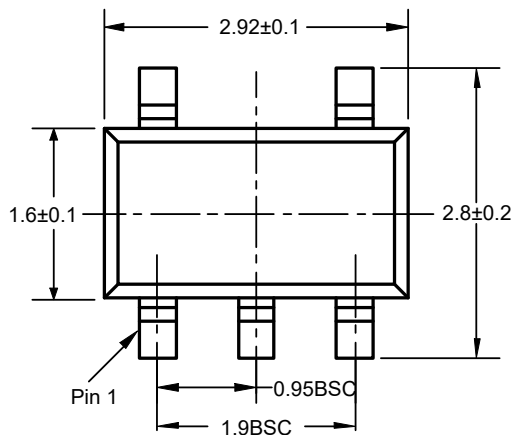


Recommended Land Pattern

Unit: mm

# ET74LVC1G14

SOT23-5

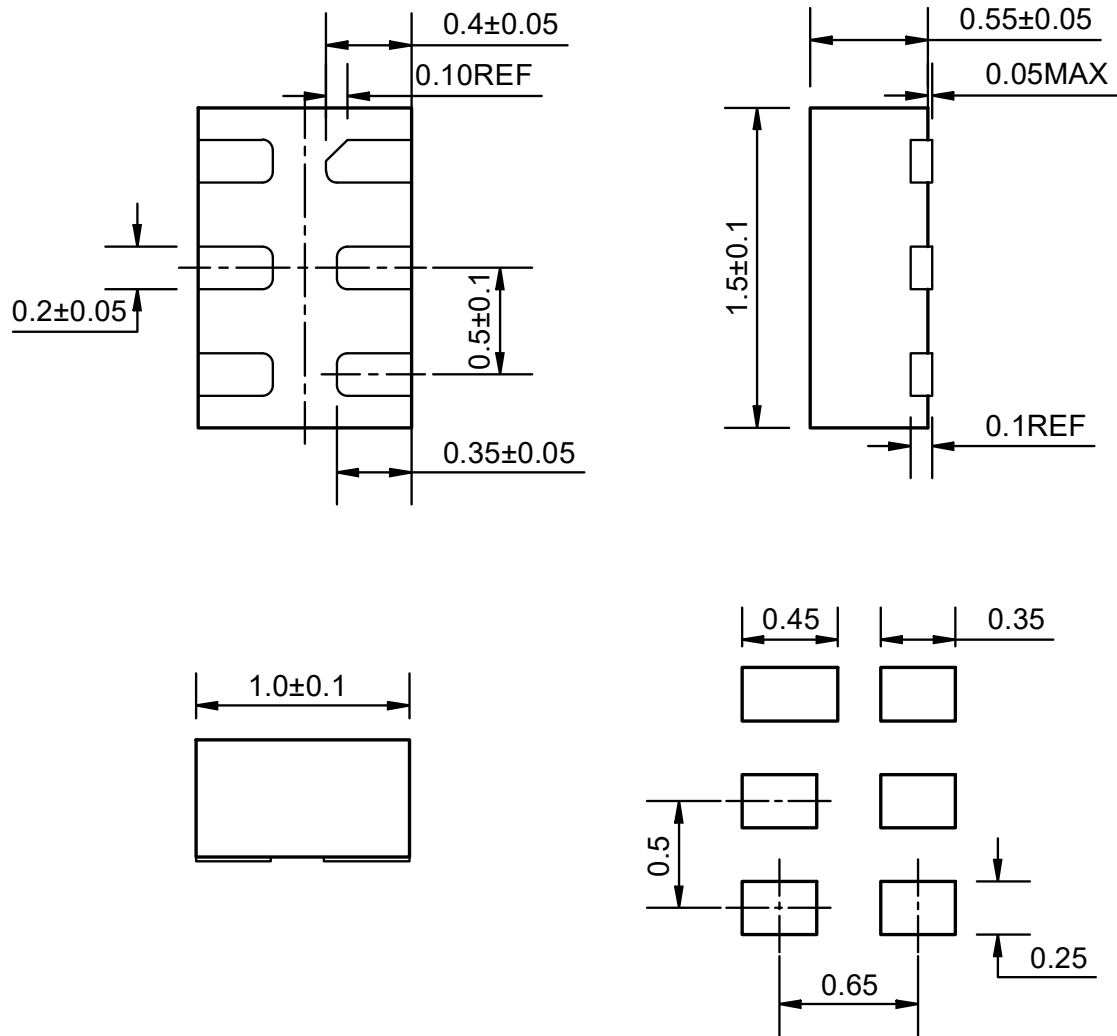


**Recommended Land Pattern**

Unit: mm

# ET74LVC1G14

DFN6 (1.0×1.5)



**Recommended Land Pattern**

Unit: mm

# ET74LVC1G14

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## Revision History and Checking Table

| Version | Date       | Revision Item                                          | Modifier     | Function & Spec<br>Checking | Package &<br>Tape Checking |
|---------|------------|--------------------------------------------------------|--------------|-----------------------------|----------------------------|
| 1.0     | 2017-07-19 | Original Version                                       | Ma Yong jian | Ma Yong jian                | Liu Jia Ying               |
| 1.1     | 2019-07-18 | Update AC Table and<br>Device Information              | Ma Yong jian | Ma Yong jian                | Liu Jia Ying               |
| 1.2     | 2021-06-25 | Update Cpd in AC Table<br>and Lin/Loff/Lcc in Dc Table | Ma Yong jian | Ma Yong jian                | Liu Jia Ying               |
| 1.3     | 2022-01-18 | Add SC70-5<br>Recommended Pad Layout                   | Shibo        | Shibo                       | Zhuji                      |
| 1.4     | 2022-06-10 | ESD Update                                             | Shibo        | Shibo                       | Zhuji                      |
| 1.5     | 2022-10-14 | Update format and Thermal<br>Characteristics           | Wuhan        | Shibo                       | Zhuji                      |
| 1.6     | 2023-11-29 | Update Typeset /ESD                                    | Shibo        | Shibo                       | Shibo                      |