

### Description

The 74LVCE1G00 is a single 2-input positive NAND gate with a standard totem pole output. The device is designed for operation with a power supply range of 1.4V to 5.5V. The inputs are tolerant to 5.5V allowing this device to be used in a mixed voltage environment. The device is fully specified for partial power down applications using  $I_{OFF}$ . The  $I_{OFF}$  circuitry disables the output preventing damaging current backflow when the device is powered down. The gate performs the positive Boolean function:

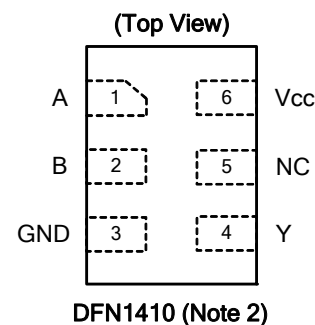
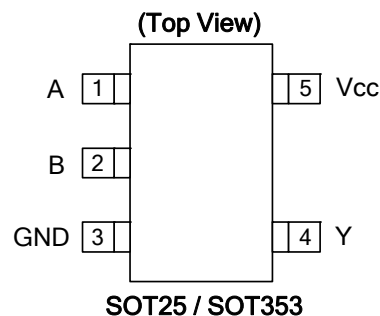
$$Y = \overline{A \bullet B} \text{ or } Y = \overline{A} + \overline{B}$$

### Features

- Extended Supply Voltage Range from 1.4 to 5.5V
- Switching speed characterized for operation at 1.5V
- Offers 30% speed improvement over LVC at 1.8V.
- $\pm 24\text{mA}$  Output Drive at 3.3V
- CMOS low power consumption
- IOFF Supports Partial-Power-Down Mode Operation
- Inputs accept up to 5.5V
- ESD Protection Tested per JESD 22
  - Exceeds 200-V Machine Model (A115-A)
  - Exceeds 2000-V Human Body Model (A114-A)
- Latch-Up Exceeds 100mA per JESD 78, Class II
- Range of Package Options
- Direct Interface with TTL Levels
- SOT25, SOT353, and DFN1410: Assembled with "Green" Molding Compound (no Br, Sb)
- Lead Free Finish/ RoHS Compliant (Note 1)

Notes: 1. EU Directive 2002/95/EC (RoHS). All applicable RoHS exemptions applied. Please visit our website at [http://www.diodes.com/products/lead\\_free.html](http://www.diodes.com/products/lead_free.html).  
2. Pin 2 and pin 5 of the DFN1410 package are internally connected.

### Pin Assignments



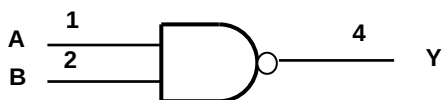
### Applications

- Voltage Level Shifting
- General Purpose Logic
- Wide array of products such as.
  - o PCs, networking, notebooks, netbooks, PDAs
  - o Computer peripherals, hard drives, CD/DVD ROM
  - o TV, DVD, DVR, set top box
  - o Cell Phones, Personal Navigation / GPS
  - o MP3 players ,Cameras, Video Recorders

## Pin Descriptions

| Pin Name | Description    |
|----------|----------------|
| A        | Data Input     |
| B        | Data Input     |
| GND      | Ground         |
| Y        | Data Output    |
| Vcc      | Supply Voltage |

## Logic Diagram



## Function Table

| Inputs |   | Output |
|--------|---|--------|
| A      | B | Y      |
| H      | H | L      |
| L      | X | H      |
| X      | L | H      |

### Absolute Maximum Ratings (Note 3)

| Symbol    | Description                                                    | Rating                 | Unit               |
|-----------|----------------------------------------------------------------|------------------------|--------------------|
| ESD HBM   | Human Body Model ESD Protection                                | 2                      | KV                 |
| ESD MM    | Machine Model ESD Protection                                   | 200                    | V                  |
| $V_{CC}$  | Supply Voltage Range                                           | -0.5 to 6.5            | V                  |
| $V_I$     | Input Voltage Range                                            | -0.5 to 6.5            | V                  |
| $V_O$     | Voltage applied to output in high impedance or $I_{OFF}$ state | -0.5 to 6.5            | V                  |
| $V_O$     | Voltage applied to output in high or low state                 | -0.3 to $V_{CC} + 0.5$ | V                  |
| $I_{IK}$  | Input Clamp Current $V_I < 0$                                  | -50                    | mA                 |
| $I_{OK}$  | Output Clamp Current                                           | -50                    | mA                 |
| $I_O$     | Continuous output current                                      | $\pm 50$               | mA                 |
|           | Continuous current through Vdd or GND                          | $\pm 100$              | mA                 |
| $T_J$     | Operating Junction Temperature                                 | -40 to 150             | $^{\circ}\text{C}$ |
| $T_{STG}$ | Storage Temperature                                            | -65 to 150             | $^{\circ}\text{C}$ |

Note: 3. Stresses beyond the absolute maximum may result in immediate failure or reduced reliability. These are stress values and device operation should be within recommend values.

### Recommended Operating Conditions (Note 4)

| Symbol          | Parameter                          |                                   | Min                    | Max                    | Unit |
|-----------------|------------------------------------|-----------------------------------|------------------------|------------------------|------|
| V <sub>CC</sub> | Operating Voltage                  | Operating                         | 1.4                    | 5.5                    | V    |
|                 |                                    | Data retention only               | 1.2                    |                        | V    |
| V <sub>IH</sub> | High-level Input Voltage           | V <sub>CC</sub> = 1.4 V to 1.95 V | 0.65 X V <sub>CC</sub> |                        | V    |
|                 |                                    | V <sub>CC</sub> = 2.3 V to 2.7 V  | 1.7                    |                        |      |
|                 |                                    | V <sub>CC</sub> = 3 V to 3.6 V    | 2                      |                        |      |
|                 |                                    | V <sub>CC</sub> = 4.5 V to 5.5 V  | 0.7 X V <sub>CC</sub>  |                        |      |
| V <sub>IL</sub> | Low-level input voltage            | V <sub>CC</sub> = 1.4 V to 1.95 V |                        | 0.35 X V <sub>CC</sub> | V    |
|                 |                                    | V <sub>CC</sub> = 2.3 V to 2.7 V  |                        | 0.7                    |      |
|                 |                                    | V <sub>CC</sub> = 3 V to 3.6 V    |                        | 0.8                    |      |
|                 |                                    | V <sub>CC</sub> = 4.5 V to 5.5 V  |                        | 0.3 X V <sub>CC</sub>  |      |
| V <sub>I</sub>  | Input Voltage                      |                                   | 0                      | 5.5                    | V    |
| V <sub>O</sub>  | Output Voltage                     |                                   | 0                      | V <sub>CC</sub>        | V    |
| I <sub>OH</sub> | High-level output current          | V <sub>CC</sub> =1.4 V            |                        | -3                     | mA   |
|                 |                                    | V <sub>CC</sub> = 1.65 V          |                        | -4                     |      |
|                 |                                    | V <sub>CC</sub> = 2.3 V           |                        | -8                     |      |
|                 |                                    | V <sub>CC</sub> = 3 V             |                        | -16                    |      |
|                 |                                    |                                   |                        | -24                    |      |
|                 |                                    | V <sub>CC</sub> = 4.5 V           |                        | -32                    |      |
| I <sub>OL</sub> | Low-level output current           | V <sub>CC</sub> =1.4 V            |                        | 3                      | mA   |
|                 |                                    | V <sub>CC</sub> = 1.65 V          |                        | 4                      |      |
|                 |                                    | V <sub>CC</sub> = 2.3 V           |                        | 8                      |      |
|                 |                                    | V <sub>CC</sub> = 3 V             |                        | 16                     |      |
|                 |                                    |                                   |                        | 24                     |      |
|                 |                                    | V <sub>CC</sub> = 4.5 V           |                        | 32                     |      |
| Δt/ΔV           | Input transition rise or fall rate | V <sub>CC</sub> = 1.4 to 3V       |                        | 20                     | ns/V |
|                 |                                    | V <sub>CC</sub> = 3.3 V ± 0.3 V   |                        | 10                     |      |
|                 |                                    | V <sub>CC</sub> = 5 V ± 0.5 V     |                        | 5                      |      |
| T <sub>A</sub>  | Operating free-air temperature     |                                   | -40                    | 85                     | °C   |

Note: 4. Unused inputs should be held at V<sub>CC</sub> or Ground.

### Electrical Characteristics (All typical values are at $V_{CC} = 3.3V$ , $T_A = 25^\circ C$ )

Over recommended free-air temperature range (unless otherwise noted)

| Symbol          | Parameter                              | Test Conditions                                               | Vcc           | Min            | Typ. | Max      | Unit         |
|-----------------|----------------------------------------|---------------------------------------------------------------|---------------|----------------|------|----------|--------------|
| $V_{OH}$        | High Level Output Voltage              | $I_{OH} = -100\mu A$                                          | 1.4 V to 5.5V | $V_{CC} - 0.1$ |      |          | V            |
|                 |                                        | $I_{OH} = -3mA$                                               | 1.4 V         | 1.05           |      |          |              |
|                 |                                        | $I_{OH} = -4mA$                                               | 1.65 V        | 1.2            |      |          |              |
|                 |                                        | $I_{OH} = -8mA$                                               | 2.3V          | 1.9            |      |          |              |
|                 |                                        | $I_{OH} = -16mA$                                              | 3 V           | 2.4            |      |          |              |
|                 |                                        | $I_{OH} = -24mA$                                              |               | 2.3            |      |          |              |
|                 |                                        | $I_{OH} = -32mA$                                              | 4.5 V         | 3.8            |      |          |              |
| $V_{OL}$        | High-level Input Voltage               | $I_{OL} = 100\mu A$                                           | 1.4 V to 5.5V |                |      | 0.1      | V            |
|                 |                                        | $I_{OL} = 3mA$                                                | 1.4 V         |                |      | .4       |              |
|                 |                                        | $I_{OL} = 4mA$                                                | 1.65 V        |                |      | 0.45     |              |
|                 |                                        | $I_{OL} = 8mA$                                                | 2.3V          |                |      | 0.3      |              |
|                 |                                        | $I_{OL} = 16mA$                                               | 3 V           |                |      | 0.4      |              |
|                 |                                        | $I_{OL} = 24mA$                                               |               |                |      | 0.55     |              |
|                 |                                        | $I_{OL} = 32mA$                                               | 4.5           |                |      | 0.55     |              |
| $I_I$           | Input Current                          | $V_I = 5.5 V$ or GND                                          | 0 to 5.5 V    |                |      | $\pm 5$  | $\mu A$      |
| $I_{OFF}$       | Power Down Leakage Current             | $V_I$ or $V_O = 5.5V$                                         | 0             |                |      | $\pm 10$ | $\mu A$      |
| $I_{CC}$        | Supply Current                         | $V_I = 5.5V$ of GND<br>$I_O = 0$                              | 1.4 V to 5.5V |                |      | 10       | $\mu A$      |
| $\Delta I_{CC}$ | Additional Supply Current              | One input at $V_{CC} - 0.6 V$ Other inputs at $V_{CC}$ or GND | 3 V to 5.5V   |                |      | 500      | $\mu A$      |
| $C_i$           | Input Capacitance                      | $V_i = V_{CC} -$ or GND                                       | 3.3           |                | 3.5  |          | pF           |
| $\theta_{JA}$   | Thermal Resistance Junction-to-Ambient | SOT25                                                         | (Note 5)      |                | 204  |          | $^\circ C/W$ |
|                 |                                        | SOT353                                                        | (Note 5)      |                | 371  |          |              |
|                 |                                        | DFN1410                                                       | (Note 5)      |                | 430  |          |              |
| $\theta_{JC}$   | Thermal Resistance Junction-to-Case    | SOT25                                                         | (Note 5)      |                | 52   |          | $^\circ C/W$ |
|                 |                                        | SOT353                                                        | (Note 5)      |                | 143  |          |              |
|                 |                                        | DFN1410                                                       | (Note 5)      |                | 190  |          |              |

Note: 5. Test condition for SOT25, SOT353, and DFN1410: Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.

### Switching Characteristics

Over recommended free-air temperature range,  $C_L = 15\text{pF}$  (see Figure 1)

| Parameter | From (Input) | TO (OUTPUT) | Vcc = 1.5 V<br>± 0.1V |     | Vcc = 1.8 V<br>± 0.15V |     | Vcc = 2.5 V<br>± 0.2V |     | Vcc = 3.3 V<br>± 0.3V |     | Vcc = 5 V<br>± 0.5V |     | Unit |
|-----------|--------------|-------------|-----------------------|-----|------------------------|-----|-----------------------|-----|-----------------------|-----|---------------------|-----|------|
|           |              |             | Min                   | Max | Min                    | Max | Min                   | Max | Min                   | Max | Min                 | Max |      |
| $t_{pd}$  | A or B       | Y           | 2.2                   | 7.2 | 1.5                    | 5   | 0.6                   | 3.5 | 0.6                   | 3.1 | 0.7                 | 3   | ns   |

Over recommended free-air temperature range,  $C_L = 30$  or  $50\text{pF}$  as noted (see Figure 2)

| Parameter | From (Input) | TO (OUTPUT) | Vcc = 1.5 V<br>± 0.1V |     | Vcc = 1.8 V<br>± 0.15V |     | Vcc = 2.5 V<br>± 0.2V |     | Vcc = 3.3 V<br>± 0.3V |     | Vcc = 5 V<br>± 0.5V |     | Unit |
|-----------|--------------|-------------|-----------------------|-----|------------------------|-----|-----------------------|-----|-----------------------|-----|---------------------|-----|------|
|           |              |             | Min                   | Max | Min                    | Max | Min                   | Max | Min                   | Max | Min                 | Max |      |
| $t_{pd}$  | A or B       | Y           | 3.1                   | 9   | 2.1                    | 6.3 | 1                     | 4.4 | 0.8                   | 3.8 | 0.9                 | 3.6 | ns   |

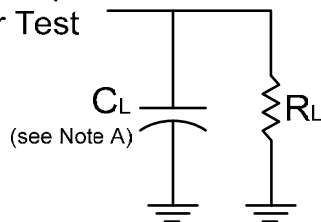
### Operating Characteristics

$T_A = 25^\circ\text{C}$

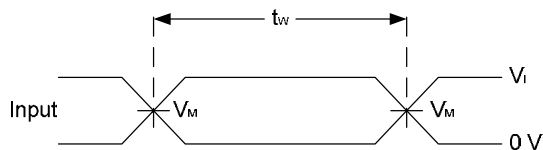
| Parameter |                               | Test Conditions     | Vcc = 1.5 V | Vcc = 1.8 V | Vcc = 2.5 V | Vcc = 3.3 V | Vcc = 5 V | Unit |
|-----------|-------------------------------|---------------------|-------------|-------------|-------------|-------------|-----------|------|
|           |                               |                     | TYP         | TYP         | TYP         | TYP         | TYP       |      |
| $C_{pd}$  | Power dissipation capacitance | $f = 10\text{ MHz}$ | 22          | 22          | 22          | 23          | 25        | pF   |

**Parameter Measurement Information**

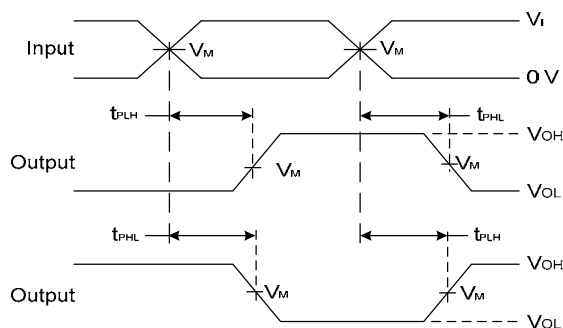
From Output  
Under Test



| V <sub>CC</sub> | Inputs          |                                | V <sub>M</sub>     | C <sub>L</sub> | R <sub>L</sub> |
|-----------------|-----------------|--------------------------------|--------------------|----------------|----------------|
|                 | V <sub>I</sub>  | t <sub>r</sub> /t <sub>f</sub> |                    |                |                |
| 1.5V±0.10V      | V <sub>CC</sub> | ≤2ns                           | V <sub>CC</sub> /2 | 15pF           | 1MΩ            |
| 1.8V±0.15V      | V <sub>CC</sub> | ≤2ns                           | V <sub>CC</sub> /2 | 15pF           | 1MΩ            |
| 2.5V±0.2V       | V <sub>CC</sub> | ≤2ns                           | V <sub>CC</sub> /2 | 15pF           | 1MΩ            |
| 3.3V±0.3V       | 3V              | ≤2.5ns                         | 1.5V               | 15pF           | 1MΩ            |
| 5V±0.5V         | V <sub>CC</sub> | ≤2.5ns                         | V <sub>CC</sub> /2 | 15pF           | 1MΩ            |



**Voltage Waveform  
Pulse Duration**

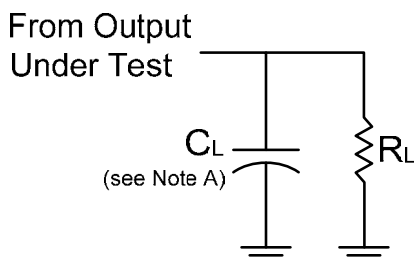


**Voltage Waveform  
Propagation Delay Times  
Inverting and Non Inverting Outputs**

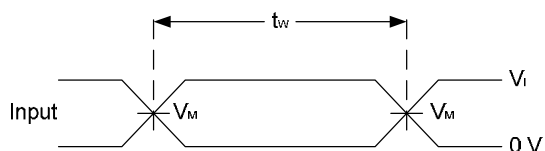
- Notes:
- A. Includes test lead and test apparatus capacitance.
  - B. All pulses are supplied at pulse repetition rate ≤ 10 MHz.
  - C. Inputs are measured separately one transition per measurement.
  - D. t<sub>PLH</sub> and t<sub>PHL</sub> are the same as t<sub>PD</sub>.

**Figure 1. Load Circuit and Voltage Waveforms**

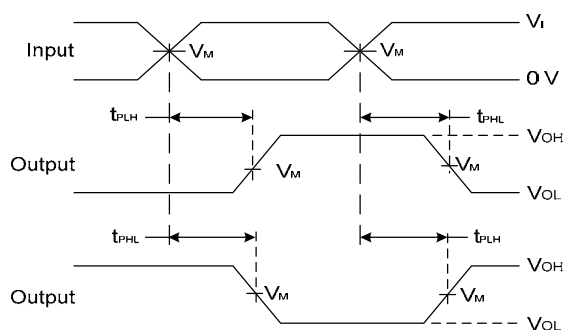
**Parameter Measurement Information (Continued)**



| $V_{CC}$         | Inputs   |              | $V_M$      | $C_L$ | $R_L$        |
|------------------|----------|--------------|------------|-------|--------------|
|                  | $V_I$    | $t_r/t_f$    |            |       |              |
| $1.5V \pm 0.10V$ | $V_{CC}$ | $\leq 2ns$   | $V_{CC}/2$ | 30pF  | 1K $\Omega$  |
| $1.8V \pm 0.15V$ | $V_{CC}$ | $\leq 2ns$   | $V_{CC}/2$ | 30pF  | 1K $\Omega$  |
| $2.5V \pm 0.2V$  | $V_{CC}$ | $\leq 2ns$   | $V_{CC}/2$ | 30pF  | 500 $\Omega$ |
| $3.3V \pm 0.3V$  | 3V       | $\leq 2.5ns$ | 1.5V       | 50pF  | 500 $\Omega$ |
| $5V \pm 0.5V$    | $V_{CC}$ | $\leq 2.5ns$ | $V_{CC}/2$ | 50pF  | 500 $\Omega$ |



**Voltage Waveform  
Pulse Duration**

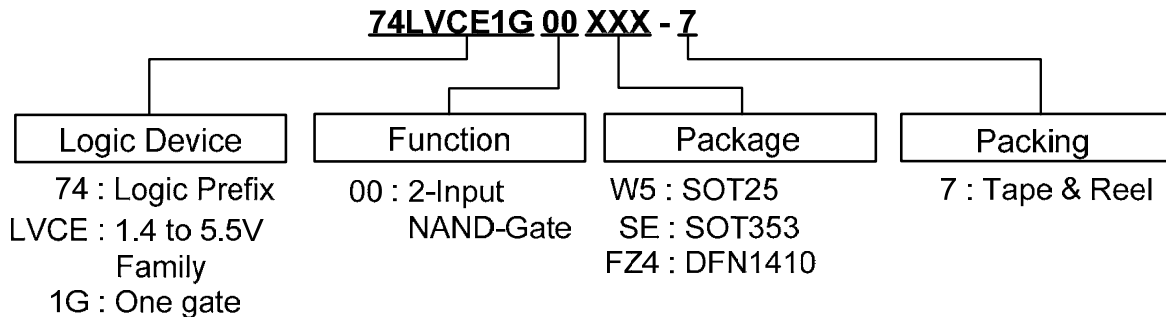


**Voltage Waveform  
Propagation Delay Times  
Inverting and Non Inverting Outputs**

- Notes:
- A. Includes test lead and test apparatus capacitance.
  - B. All pulses are supplied at pulse repetition rate  $\leq 10$  MHz.
  - C. Inputs are measured separately one transition per measurement.
  - D.  $t_{PLH}$  and  $t_{PHL}$  are the same as  $t_{PD}$ .

**Figure 2. Load Circuit and Voltage Waveforms**

**Ordering Information**



| Device          | Package Code | Packaging (Note 5) | 7" Tape and Reel |                    |
|-----------------|--------------|--------------------|------------------|--------------------|
|                 |              |                    | Quantity         | Part Number Suffix |
| 74LVCE1G00W5-7  | W6           | SOT25              | 3000/Tape & Reel | -7                 |
| 74LVCE1G00SE-7  | SE           | SOT353             | 3000/Tape & Reel | -7                 |
| 74LVCE1G00FZ4-7 | FZ4          | DFN1410            | 5000/Tape & Reel | -7                 |

Note: 6. Pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at <http://www.diodes.com/datasheets/ap02001.pdf>.

## Marking Information

### (1) SOT25 and SOT353

(Top View)



XX : Identification code

Y : Year 0~9

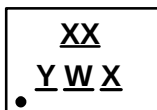
W : Week : A~Z : 1~26 week;  
a~z : 27~52 week; z represents  
52 and 53 week

X : A~Z : Internal code

| Part Number  | Package | Identification Code |
|--------------|---------|---------------------|
| 74LVCE1G00W5 | SOT25   | PS                  |
| 74LVCE1G00SE | SOT353  | PS                  |

### (3) DFN1410

(Top View)



XX : Identification Code

Y : Year : 0~9

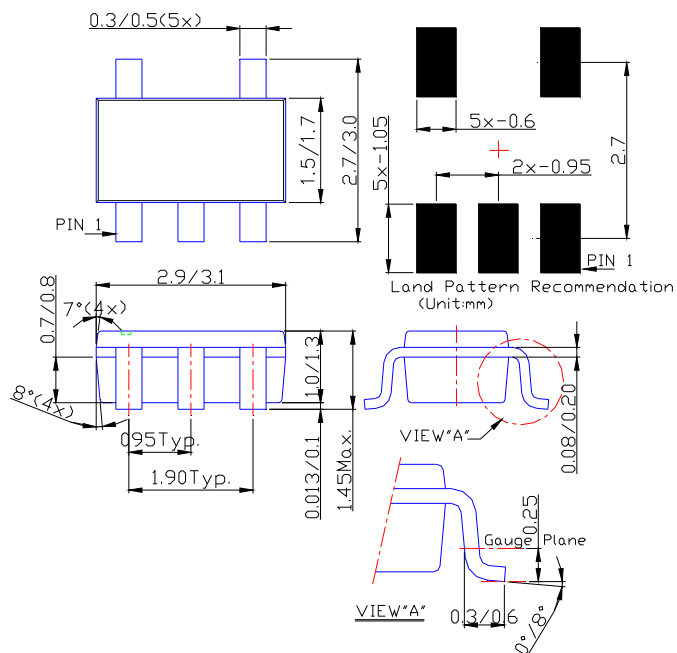
W : Week : A~Z : 1~26 week;  
a~z : 27~52 week; z represents  
52 and 53 week

X : A~Z : Internal code

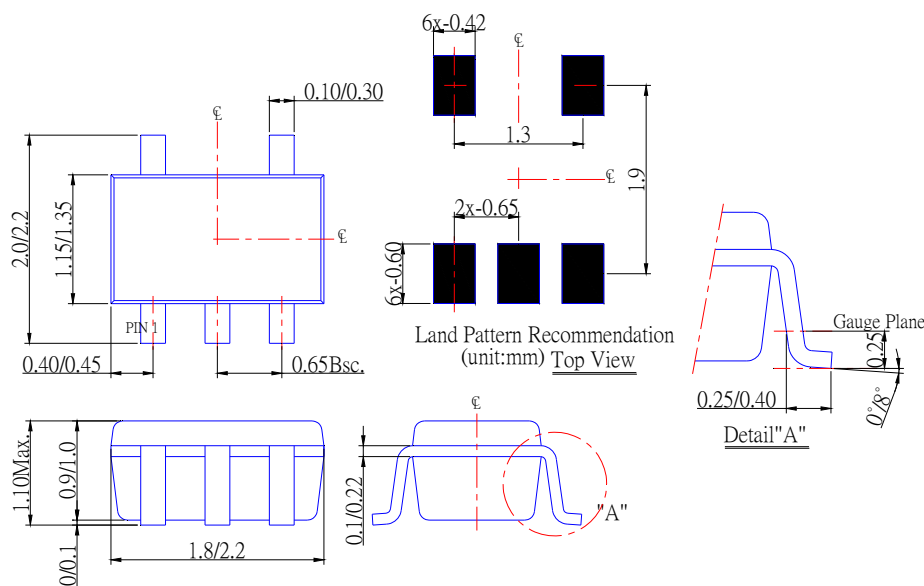
| Part Number   | Package | Identification Code |
|---------------|---------|---------------------|
| 74LVCE1G00FZ4 | DFN1410 | PS                  |

**Package Outline Dimensions (All Dimensions in mm)**

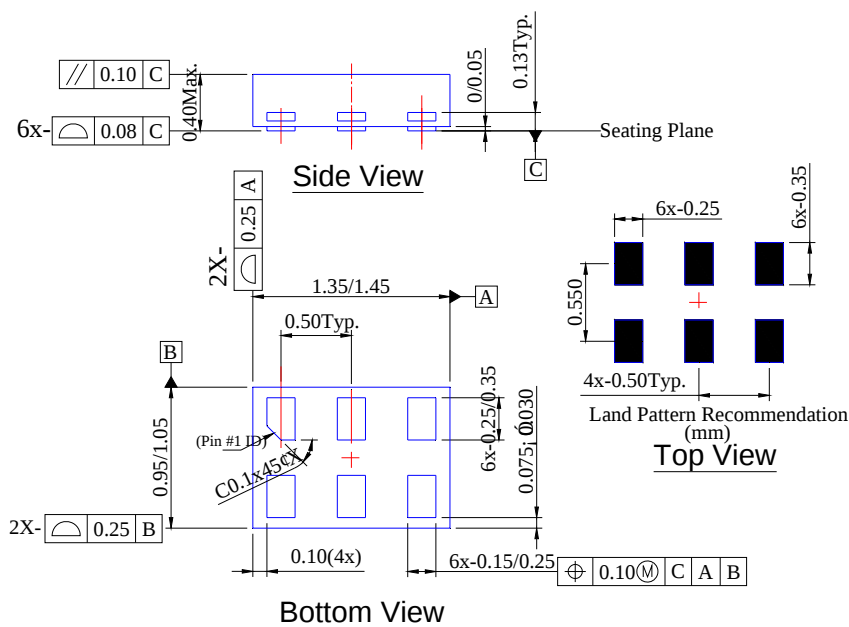
**(1) Package Type: SOT25**



**(2) Package Type: SOT353**

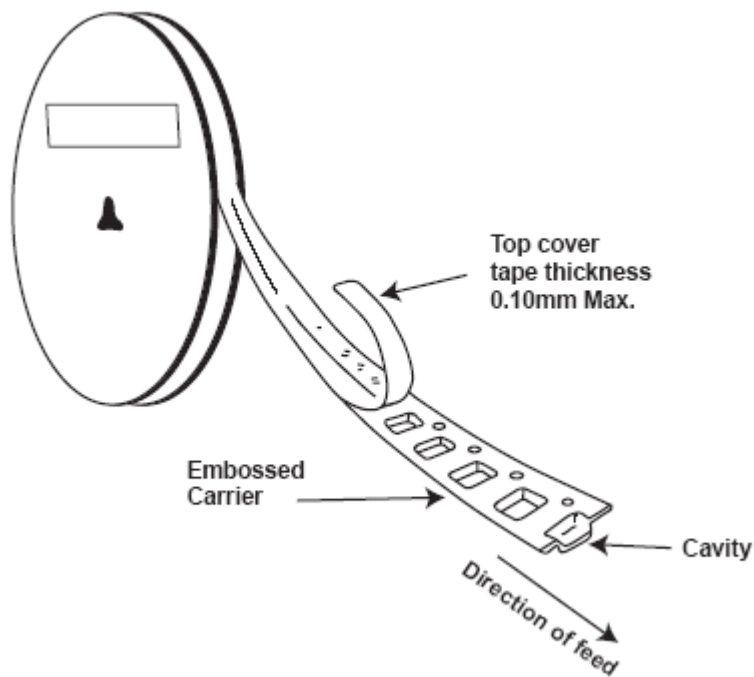
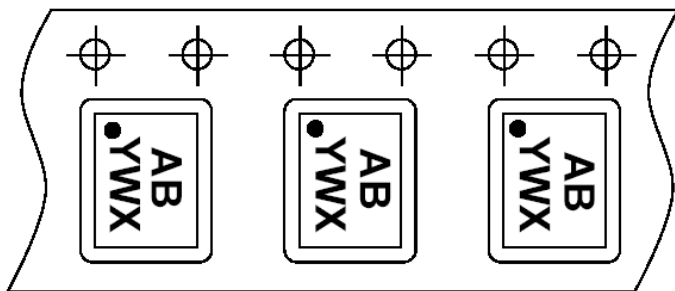


**(3) Package Type: DFN1410**



## Taping Orientation (Note 7)

For DFN1410



Note: 7. The taping orientation of the other package type can be found on our website at <http://www.diodes.com/datasheets/ap02007.pdf>

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В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

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