

### Description

The 74LVC1G08 is a single 2-input positive AND gate with a standard totem pole output. The device is designed for operation with a power supply range of 1.65V 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:

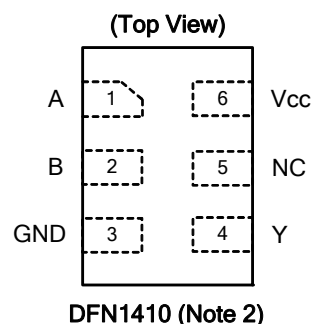
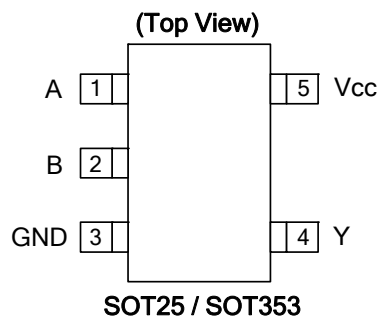
$$Y = A \bullet B \text{ or } Y = \overline{\overline{A} + \overline{B}}$$

### Features

- Wide Supply Voltage Range from 1.65 to 5.5V
- $\pm 24\text{mA}$  Output Drive at 3.3V
- CMOS low power consumption
- $I_{OFF}$  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



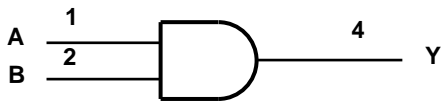
### Applications

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

**Pin Descriptions**

| Pin Name | Description    |
|----------|----------------|
| A        | Data Input     |
| B        | Data Input     |
| GND      | Ground         |
| Y        | Data Output    |
| Vcc      | Supply Voltage |
| NC       | No Connection  |

**Logic Diagram**



**Function Table**

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

### 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             | $^{\circ}C$ |
| $T_{STG}$ | Storage Temperature  | -65 to 150             | $^{\circ}C$ |

Notes: 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                                   | 1.65                   | 5.5                    | V    |
|                        |                                    | Data retention only                         | 1.5                    |                        | V    |
| V <sub>IH</sub>        | High-level Input Voltage           | V <sub>CC</sub> = 1.65V to 1.95V            | 0.65 X V <sub>CC</sub> |                        | V    |
|                        |                                    | V <sub>CC</sub> = 2.3V to 2.7               | 1.7                    |                        |      |
|                        |                                    | V <sub>CC</sub> = 3 V to 3.6V               | 2                      |                        |      |
|                        |                                    | V <sub>CC</sub> = 4.5V to 5.5V              | 0.7 X V <sub>CC</sub>  |                        |      |
| V <sub>IL</sub>        | Low-level input voltage            | V <sub>CC</sub> = 1.65V to 1.95V            |                        | 0.35 X V <sub>CC</sub> | V    |
|                        |                                    | V <sub>CC</sub> = 2.3V to 2.7V              |                        | 0.7                    |      |
|                        |                                    | V <sub>CC</sub> = 3V to 3.6V                |                        | 0.8                    |      |
|                        |                                    | V <sub>CC</sub> = 4.5V to 5.5V              |                        | 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> = 1.65V                     |                        | -4                     | mA   |
|                        |                                    | V <sub>CC</sub> = 2.3V                      |                        | -8                     |      |
|                        |                                    | V <sub>CC</sub> = 3V                        |                        | -16                    |      |
|                        |                                    |   |                        | -24                    |      |
| V <sub>CC</sub> = 4.5V |                                    | -32   |                        |                        |      |
| I <sub>OL</sub>        | Low-level output current           | V <sub>CC</sub> = 1.65V                     |                        | 4                      | mA   |
|                        |                                    | V <sub>CC</sub> = 2.3V                      |                        | 8                      |      |
|                        |                                    | V <sub>CC</sub> = 3V                        |                        | 16                     |      |
|                        |                                    |   |                        | 24                     |      |
| V <sub>CC</sub> = 4.5V |                                    | 32  |                        |                        |      |
| Δt/ΔV                  | Input transition rise or fall rate | V <sub>CC</sub> = 1.8V ± 0.15V, 2.5V ± 0.2V |                        | 20                     | ns/V |
|                        |                                    | V <sub>CC</sub> = 3.3V ± 0.3V               |                        | 10                     |      |
|                        |                                    | V <sub>CC</sub> = 5V ± 0.5V                 |                        | 5                      |      |
| T <sub>A</sub>         | Operating free-air temperature     |   | -40                    | 85                     | °C   |

Notes: 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              | $I_{OH} = -100 \mu A$   | 1.65V to 5.5V | $V_{CC} - 0.1$ |      |          | V            |
|                 |  | $I_{OH} = -4 \text{ mA}$                                      | 1.65V         | 1.2            |      |          |              |
|                 |  | $I_{OH} = -8 \text{ mA}$                                      | 2.3V          | 1.9            |      |          |              |
|                 |  | $I_{OH} = -16 \text{ mA}$                                     | 3V            | 2.4            |      |          |              |
|                 |  | $I_{OH} = -24 \text{ mA}$                                     |               | 2.3            |      |          |              |
|                 |  | $I_{OH} = -32 \text{ mA}$                                     | 4.5V          | 3.8            |      |          |              |
| $V_{OL}$        | High-level Input Voltage               | $I_{OL} = 100 \mu A$  | 1.65V to 5.5V |                |      | 0.1      | V            |
|                 |  | $I_{OL} = 4 \text{ mA}$                                       | 1.65V         |                |      | 0.45     |              |
|                 |  | $I_{OL} = 8 \text{ mA}$                                       | 2.3V          |                |      | 0.3      |              |
|                 |  | $I_{OL} = 16 \text{ mA}$                                      | 3V            |                |      | 0.4      |              |
|                 |  | $I_{OL} = 24 \text{ mA}$                                      |               |                |      | 0.55     |              |
|                 |  | $I_{OL} = 32 \text{ mA}$                                      | 4.5V          |                |      | 0.55     |              |
| $I_I$           | Input Current                          | $V_I = 5.5V$ or GND   | 0 to 5.5V     |                |      | $\pm 5$  | $\mu A$      |
| $I_{OFF}$       | Power Down Leakage Current             | $V_I$ or $V_O = 5.5V$   | 0             |                |      | $\pm 10$ | $\mu A$      |
| $I_{CC}$        | Supply Current                         | $V_I = 5.5V$ or GND<br>$I_O = 0$                              | 1.65V 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 | 3V to 5.5V    |                |      | 500      | $\mu A$      |
| $C_i$           | Input Capacitance                      | $V_i = V_{CC} -$ or GND                                       | 3.3           |                | 4    |          | pF           |
| $\theta_{JA}$   | Thermal Resistance Junction-to-Ambient | SOT25   | (Note 5)      |                | 204  |          | $^\circ C/W$ |
|                 |  | SOT353  | (Note 5)      |                | 371  |          | $^\circ C/W$ |
|                 |  | DFN1410   | (Note 5)      |                | 430  |          | $^\circ C/W$ |
| $\theta_{JC}$   | Thermal Resistance Junction-to-Case    | SOT25   | (Note 5)      |                | 52   |          | $^\circ C/W$ |
|                 |  | SOT353  | (Note 5)      |                | 143  |          | $^\circ C/W$ |
|                 |  | DFN1410   | (Note 5)      |                | 190  |          | $^\circ C/W$ |

Notes: 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, CL = 15pF (see Figure 1)

| Parameter       | From (Input) | TO (OUTPUT) | Vcc = 1.8 V ± 0.15V |     | Vcc = 2.5 V ± 0.2V |     | Vcc = 3.3 V ± 0.3V |     | Vcc = 5 V ± 0.5V |     | Unit |
|-----------------|--------------|-------------|---------------------|-----|--------------------|-----|--------------------|-----|------------------|-----|------|
|                 |              |             | Min                 | Max | Min                | Max | Min                | Max | Min              | Max |      |
| t <sub>pd</sub> | A or B       | Y           | 1.5                 | 7.2 | 0.7                | 4.4 | 0.8                | 3.6 | 0.8              | 3.4 | ns   |

Over recommended free-air temperature range, CL = 30 or 50pF as noted (see Figure 2)

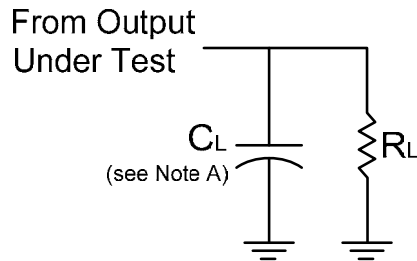
| Parameter       | From (Input) | TO (OUTPUT) | Vcc = 1.8 V ± 0.15V |     | Vcc = 2.5 V ± 0.2V |     | Vcc = 3.3 V ± 0.3V |     | Vcc = 5 V ± 0.5V |     | Unit |
|-----------------|--------------|-------------|---------------------|-----|--------------------|-----|--------------------|-----|------------------|-----|------|
|                 |              |             | Min                 | Max | Min                | Max | Min                | Max | Min              | Max |      |
| t <sub>pd</sub> | A or B       | Y           | 2.4                 | 8.0 | 1.1                | 5.5 | 1.0                | 4.5 | 1.0              | 4.0 | ns   |

### Operating Characteristics

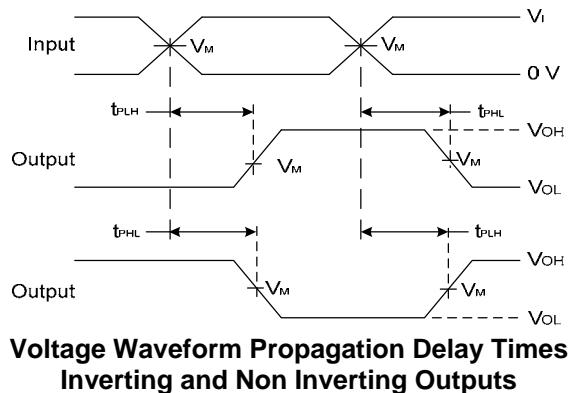
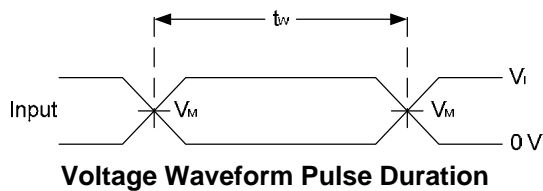
T<sub>A</sub> = 25 °C

| Parameter       |                               | Test Conditions | Vcc = 1.8 V | Vcc = 2.5 V | Vcc = 3.3 V | Vcc = 5 V | Unit |
|-----------------|-------------------------------|-----------------|-------------|-------------|-------------|-----------|------|
|                 |                               |                 | TYP         | TYP         | TYP         | TYP       |      |
| C <sub>pd</sub> | Power dissipation capacitance | f = 10 MHz      | 21          | 24          | 26          | 31        | pF   |

**Parameter Measurement Information**



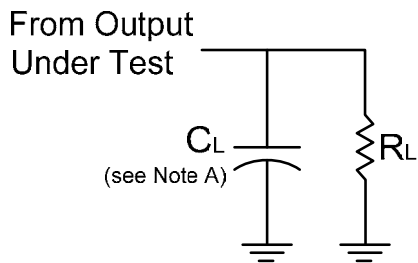
| V <sub>CC</sub> | Inputs          |                                | V <sub>M</sub>     | C <sub>L</sub> | R <sub>L</sub> |
|-----------------|-----------------|--------------------------------|--------------------|----------------|----------------|
|                 | V <sub>I</sub>  | t <sub>r</sub> /t <sub>f</sub> |                    |                |                |
| 1.8V±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            |



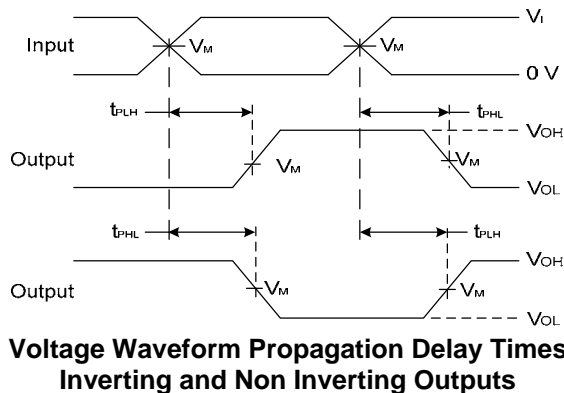
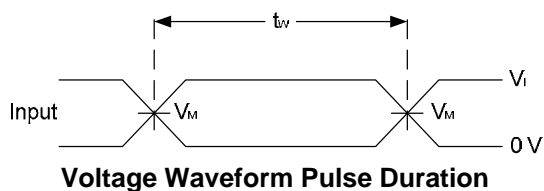
**Figure 1. Load Circuit and Voltage Waveforms**

- 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>.

**Parameter Measurement Information (Continued)**



| 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> |                    |                |                |
| 1.8V±0.15V      | V <sub>CC</sub> | ≤2ns                           | V <sub>CC</sub> /2 | 30pF           | 1KΩ            |
| 2.5V±0.2V       | V <sub>CC</sub> | ≤2ns                           | V <sub>CC</sub> /2 | 30pF           | 500Ω           |
| 3.3V±0.3V       | 3V              | ≤2.5ns                         | 1.5V               | 50pF           | 500Ω           |
| 5V±0.5V         | V <sub>CC</sub> | ≤2.5ns                         | V <sub>CC</sub> /2 | 50pF           | 500Ω           |

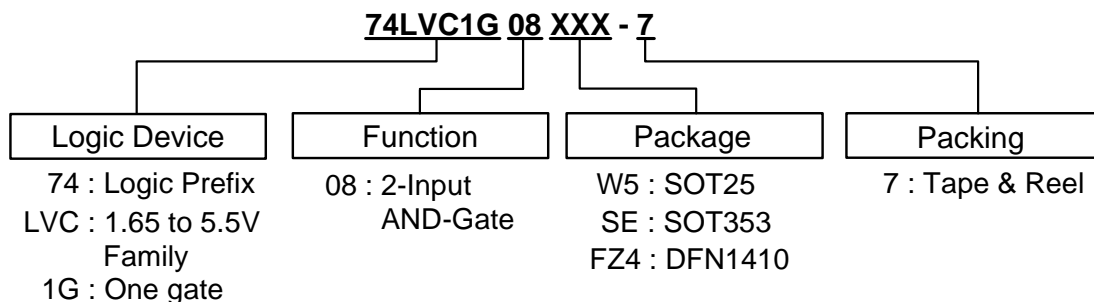


**Figure 2. Load Circuit and Voltage Waveforms**

- 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.  $t_{PLH}$  and  $t_{PHL}$  are the same as  $t_{PD}$ .



### Ordering Information



| Device         | Package Code | Packaging (Note 6) | 7" Tape and Reel |                    |
|----------------|--------------|--------------------|------------------|--------------------|
|                |              |                    | Quantity         | Part Number Suffix |
| 74LVC1G08W5-7  | W5           | SOT25              | 3000/Tape & Reel | -7                 |
| 74LVC1G08SE-7  | SE           | SOT353             | 3000/Tape & Reel | -7                 |
| 74LVC1G08FZ4-7 | FZ4          | DFN1410            | 5000/Tape & Reel | -7                 |

Notes: 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>.

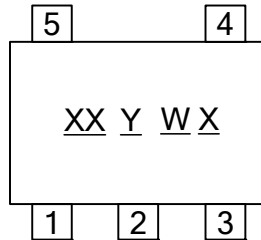
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**Marking Information**

**(1) SOT25 and SOT353**

(Top View)

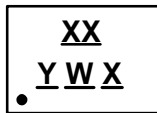


XX : Identification code  
Y : Year 0~9  
W : Week : A~Z : 1~26 week;  
 a~z : 27~52 week; z represents  
 52 and 53 week  
X : A~Z : Internal code

| Part Number | Package | Identification Code |
|-------------|---------|---------------------|
| 74LVC1G08W5 | SOT25   | UV                  |
| 74LVC1G08SE | SOT353  | UV                  |

**(2) DFN1410**

(Top View)

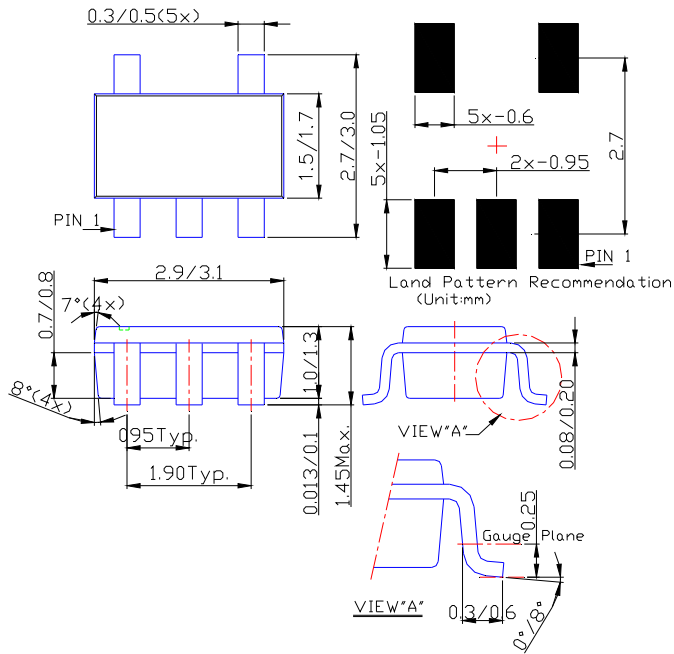


XX : Identification Code  
Y : Year : 0~9  
W : Week : A~Z : 1~26 week;  
 a~z : 27~52 week; z represents  
 52 and 53 week  
X : A~Z : Internal code

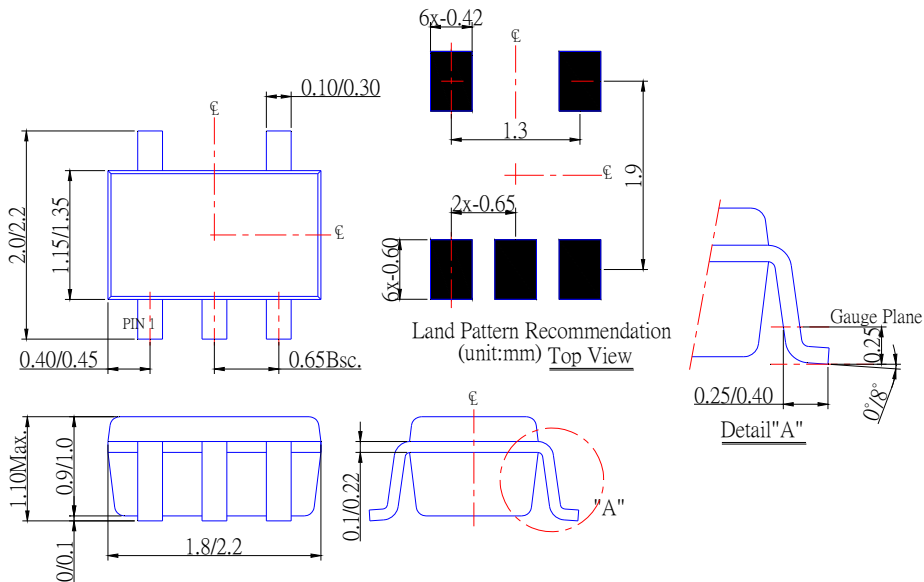
| Part Number  | Package | Identification Code |
|--------------|---------|---------------------|
| 74LVC1G08FZ4 | DFN1410 | UV                  |

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

**(1) Package Type: SOT25**

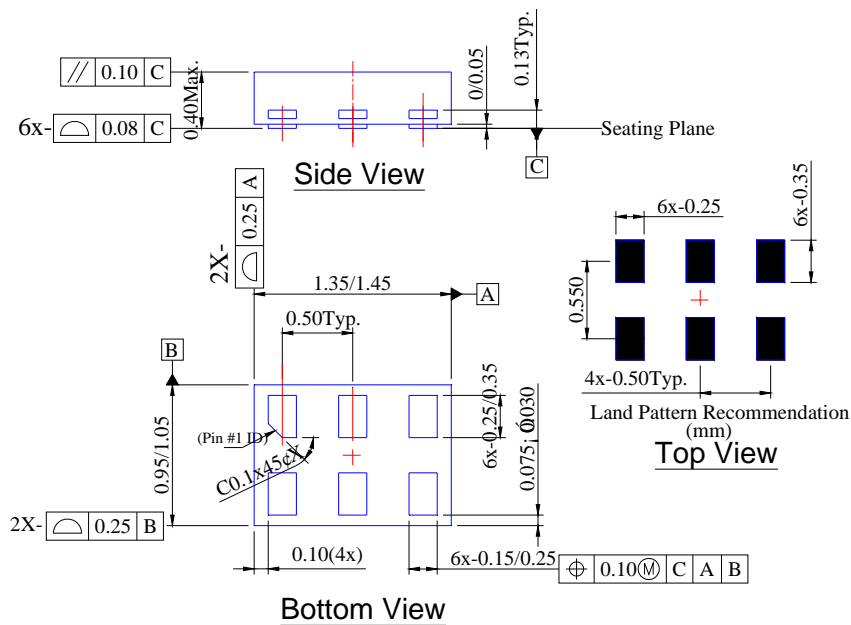


**(2) Package Type: SOT353**



**Package Outline Dimensions (Continued)**

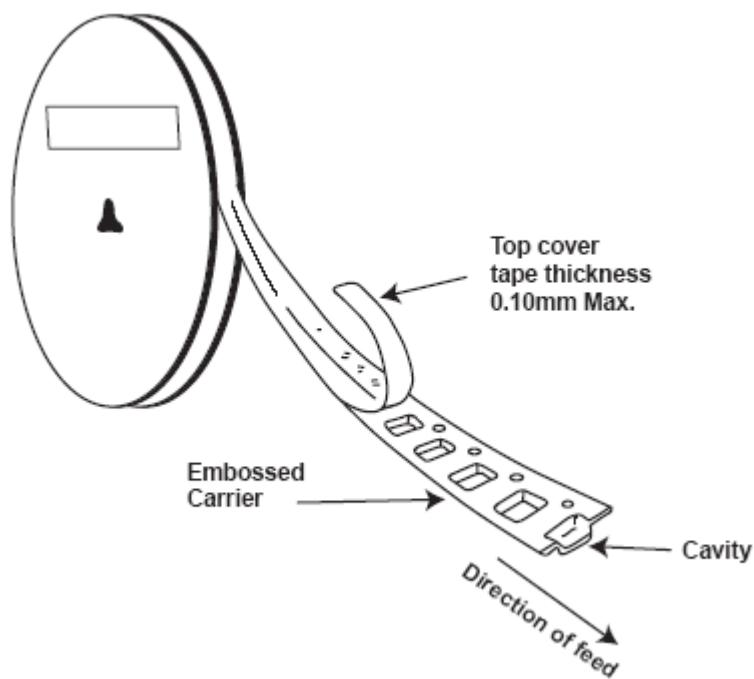
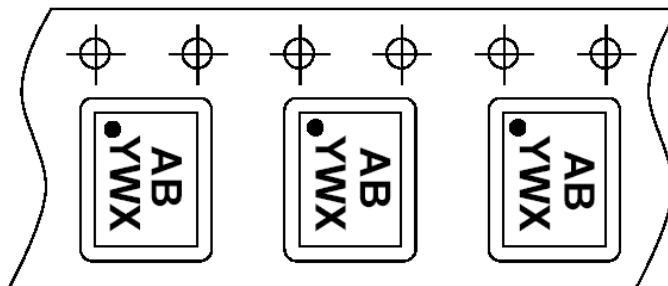
**(3) Package Type: DFN1410**



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**Taping Orientation (Note 7)**

For DFN1410



Notes: 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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