

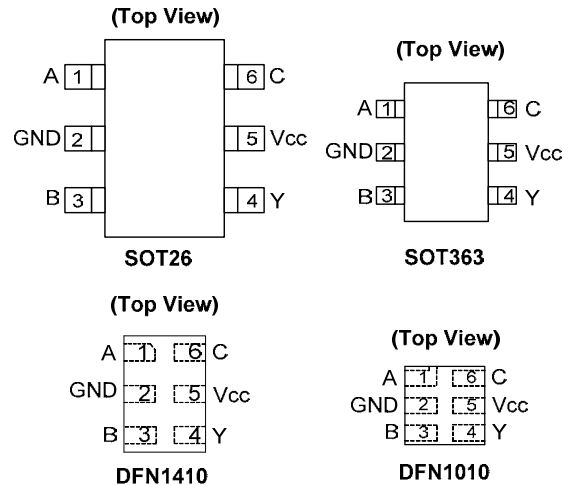
### Description

The 74LVC1G11 is a single 3-input positive AND gate with a standard push-pull 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 IOFF. The IOFF circuitry disables the output preventing damaging current backflow when the device is powered down.

The gate performs the positive Boolean function:

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

### Pin Assignments



### Features

- Wide Supply Voltage Range from 1.65V to 5.5V
- $\pm 24\text{mA}$  Output Drive at 3.3V
- CMOS low power consumption
- IOFF Supports Partial-Power-Down Mode Operation
- Inputs accept up to 5.5V
- ESD Protection Exceeds JESD 22
  - o 200-V Machine Model (A115-A)
  - o 2000-V Human Body Model (A114-A)
- Latch-Up Exceeds 100mA per JESD 78, Class II
- Range of Package Options
- SOT26, SOT363, DFN140, and DFN1010: Available in "Green" Molding Compound (no Br, Sb)
- Lead Free Finish/ RoHS Compliant (Note 1)

### Applications

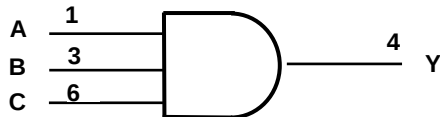
- Voltage Level Shifting
- General Purpose Logic
- Power Down Signal Isolation
- Wide array of products such as:
  - o PCs, networking, notebooks, netbooks, PDAs
  - o Computer peripherals, hard drives, CD/DVD ROM
  - o TV, DVD, DVR, set top box
  - o Cell Phones, Personal Navigation / GPS
  - o MP3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

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).

## Pin Descriptions

| Pin Name        | Description    |
|-----------------|----------------|
| A               | Data Input     |
| GND             | Ground         |
| B               | Data Input     |
| Y               | Data Output    |
| V <sub>CC</sub> | Supply Voltage |
| C               | Data Input     |

## Logic Diagram



## Function Table

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

## Absolute Maximum Ratings (Note 2)

| Symbol           | Description                                                           | Rating                       | Unit |
|------------------|-----------------------------------------------------------------------|------------------------------|------|
| ESD HBM          | Human Body Model ESD Protection                                       | 2                            | KV   |
| ESD MM           | Machine Model ESD Protection                                          | 200                          | V    |
| V <sub>CC</sub>  | Supply Voltage Range                                                  | -0.5 to 6.5                  | V    |
| V <sub>I</sub>   | Input Voltage Range                                                   | -0.5 to 6.5                  | V    |
| V <sub>O</sub>   | Voltage applied to output in high impedance or I <sub>OFF</sub> state | -0.5 to 6.5                  | V    |
| V <sub>O</sub>   | Voltage applied to output in high or low state                        | -0.3 to V <sub>CC</sub> +0.5 | V    |
| I <sub>IK</sub>  | Input Clamp Current V <sub>I</sub> < 0                                | -50                          | mA   |
| I <sub>OK</sub>  | Output Clamp Current                                                  | -50                          | mA   |
| I <sub>O</sub>   | Continuous output current                                             | ±50                          | mA   |
|                  | Continuous current through V <sub>DD</sub> or GND                     | ±100                         | mA   |
| T <sub>J</sub>   | Operating Junction Temperature                                        | -40 to 150                   | °C   |
| T <sub>STG</sub> | Storage Temperature                                                   | -65 to 150                   | °C   |

Notes: 2. 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 3)

| 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 2.7V              | 1.7                    |                        |      |
|                 |                                    | V <sub>CC</sub> = 3V 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                    | 125                    | °C   |

Notes: 3. Unused inputs should be held at V<sub>CC</sub> or Ground.

### Electrical Characteristics $T_A = -40^\circ\text{C}$ to $85^\circ\text{C}$ (All typical values are at $V_{CC} = 3.3\text{V}$ , $T_A = 25^\circ\text{C}$ )

| Symbol          | Parameter                  | Test Conditions                         | $V_{CC}$      | Min            | Typ. | Max      | Unit          |
|-----------------|----------------------------|-----------------------------------------|---------------|----------------|------|----------|---------------|
| $V_{OH}$        | High Level Output Voltage  | $I_{OH} = -100\mu\text{A}$              | 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   | $I_{OL} = 100\mu\text{A}$               | 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              | $V_I = 5.5\text{V}$ or GND              | 0 to 5.5V     |                |      | $\pm 5$  | $\mu\text{A}$ |
| $I_{OFF}$       | Power Down Leakage Current | $V_I$ or $V_O = 5.5\text{V}$            | 0             |                |      | $\pm 10$ | $\mu\text{A}$ |
| $I_{CC}$        | Supply Current             | $V_I = 5.5\text{V}$ of GND<br>$I_O = 0$ | 1.65V to 5.5V |                |      | 10       | $\mu\text{A}$ |
| $\Delta I_{CC}$ | Additional Supply Current  | Input at $V_{CC} - 0.6\text{V}$         | 3V to 5.5V    |                |      | 500      | $\mu\text{A}$ |

**Electrical Characteristics**  $T_A = -40^{\circ}\text{C}$  to  $125^{\circ}\text{C}$  (All typical values are at  $V_{CC} = 3.3\text{V}$ ,  $T_A = 25^{\circ}\text{C}$ )

| Symbol          | Parameter                  | Test Conditions                         | $V_{CC}$      | Min            | Typ. | Max      | Unit          |
|-----------------|----------------------------|-----------------------------------------|---------------|----------------|------|----------|---------------|
| $V_{OH}$        | High Level Output Voltage  | $I_{OH} = -100\mu\text{A}$              | 1.65V to 5.5V | $V_{CC} - 0.1$ |      |          | V             |
|                 |                            | $I_{OH} = -4\text{mA}$                  | 1.65V         | 0.95           |      |          |               |
|                 |                            | $I_{OH} = -8\text{mA}$                  | 2.3V          | 1.7            |      |          |               |
|                 |                            | $I_{OH} = -16\text{mA}$                 | 3V            | 1.9            |      |          |               |
|                 |                            | $I_{OH} = -24\text{mA}$                 |               | 2.0            |      |          |               |
|                 |                            | $I_{OH} = -32\text{mA}$                 | 4.5V          | 3.4            |      |          |               |
| $V_{OL}$        | High-level Input Voltage   | $I_{OL} = 100\mu\text{A}$               | 1.65V to 5.5V |                |      | 0.1      | V             |
|                 |                            | $I_{OL} = 4\text{mA}$                   | 1.65V         |                |      | 0.70     |               |
|                 |                            | $I_{OL} = 8\text{mA}$                   | 2.3V          |                |      | 0.45     |               |
|                 |                            | $I_{OL} = 16\text{mA}$                  | 3V            |                |      | 0.60     |               |
|                 |                            | $I_{OL} = 24\text{mA}$                  |               |                |      | 0.80     |               |
|                 |                            | $I_{OL} = 32\text{mA}$                  | 4.5V          |                |      | 0.80     |               |
| $I_I$           | Input Current              | $V_I = 5.5\text{V}$ or GND              | 0 to 5.5V     |                |      | $\pm 20$ | $\mu\text{A}$ |
| $I_{OFF}$       | Power Down Leakage Current | $V_I$ or $V_O = 5.5\text{V}$            | 0             |                |      | $\pm 20$ | $\mu\text{A}$ |
| $I_{CC}$        | Supply Current             | $V_I = 5.5\text{V}$ of GND<br>$I_O = 0$ | 1.65V to 5.5V |                |      | 40       | $\mu\text{A}$ |
| $\Delta I_{CC}$ | Additional Supply Current  | Input at $V_{CC} - 0.6\text{V}$         | 3V to 5.5V    |                |      | 5000     | $\mu\text{A}$ |

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

| Symbol        | Parameter                              | Test Conditions         | $V_{CC}$ | Min | Typ. | Max | Unit                 |
|---------------|----------------------------------------|-------------------------|----------|-----|------|-----|----------------------|
| $C_I$         | Input Capacitance                      | $V_I = V_{CC} -$ or GND | 3.3      |     | 3.5  |     | pF                   |
| $\theta_{JA}$ | Thermal Resistance Junction-to-Ambient | SOT26                   | (Note 4) |     | 204  |     | $^{\circ}\text{C/W}$ |
|               |                                        | SOT363                  |          |     | 371  |     |                      |
|               |                                        | DFN1410                 |          |     | 430  |     |                      |
|               |                                        | DFN1010                 |          |     | 510  |     |                      |
| $\theta_{JC}$ | Thermal Resistance Junction-to-Case    | SOT26                   | (Note 4) |     | 52   |     | $^{\circ}\text{C/W}$ |
|               |                                        | SOT363                  |          |     | 143  |     |                      |
|               |                                        | DFN1410                 |          |     | 190  |     |                      |
|               |                                        | DFN1010                 |          |     | 250  |     |                      |

Notes: 4. Test condition for SOT26, SOT363, DFN1410 and DFN1010 : Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.

## Switching Characteristics

$T_A = -40^\circ\text{C}$  to  $85^\circ\text{C}$ ,  $C_L = 15\text{pF}$  (see Figure 1)

| Parameter | From (Input) | TO (OUTPUT) | $V_{CC} = 1.8\text{V} \pm 0.15\text{V}$ |      | $V_{CC} = 2.5\text{V} \pm 0.2\text{V}$ |     | $V_{CC} = 3.3\text{V} \pm 0.3\text{V}$ |     | $V_{CC} = 5\text{V} \pm 0.5\text{V}$ |     | Unit |
|-----------|--------------|-------------|-----------------------------------------|------|----------------------------------------|-----|----------------------------------------|-----|--------------------------------------|-----|------|
|           |              |             | Min                                     | Max  | Min                                    | Max | Min                                    | Max | Min                                  | Max |      |
| $t_{pd}$  | Any          | Y           | 1.0                                     | 15.2 | 0.7                                    | 5.6 | 0.7                                    | 4.1 | 0.7                                  | 3.1 | ns   |

$T_A = -40^\circ\text{C}$  to  $85^\circ\text{C}$ ,  $C_L = 30$  or  $50\text{pF}$  (see Figure 2)

| Parameter | From (Input) | TO (OUTPUT) | $V_{CC} = 1.8\text{V} \pm 0.15\text{V}$ |      | $V_{CC} = 2.5\text{V} \pm 0.2\text{V}$ |     | $V_{CC} = 3.3\text{V} \pm 0.3\text{V}$ |     | $V_{CC} = 5\text{V} \pm 0.5\text{V}$ |     | Unit |
|-----------|--------------|-------------|-----------------------------------------|------|----------------------------------------|-----|----------------------------------------|-----|--------------------------------------|-----|------|
|           |              |             | Min                                     | Max  | Min                                    | Max | Min                                    | Max | Min                                  | Max |      |
| $t_{pd}$  | Any          | Y           | 1.0                                     | 17.2 | 0.7                                    | 6.2 | 0.7                                    | 4.9 | 0.7                                  | 3.5 | ns   |

$T_A = -40^\circ\text{C}$  to  $125^\circ\text{C}$ ,  $C_L = 15\text{pF}$  (see Figure 1)

| Parameter | From (Input) | TO (OUTPUT) | $V_{CC} = 1.8\text{V} \pm 0.15\text{V}$ |      | $V_{CC} = 2.5\text{V} \pm 0.2\text{V}$ |     | $V_{CC} = 3.3\text{V} \pm 0.3\text{V}$ |     | $V_{CC} = 5\text{V} \pm 0.5\text{V}$ |     | Unit |
|-----------|--------------|-------------|-----------------------------------------|------|----------------------------------------|-----|----------------------------------------|-----|--------------------------------------|-----|------|
|           |              |             | Min                                     | Max  | Min                                    | Max | Min                                    | Max | Min                                  | Max |      |
| $t_{pd}$  | Any          | Y           | 1.0                                     | 18.3 | 0.7                                    | 6.7 | 0.7                                    | 4.9 | 0.7                                  | 3.7 | ns   |

$T_A = -40^\circ\text{C}$  to  $125^\circ\text{C}$ ,  $C_L = 30$  or  $50\text{pF}$  (see Figure 2)

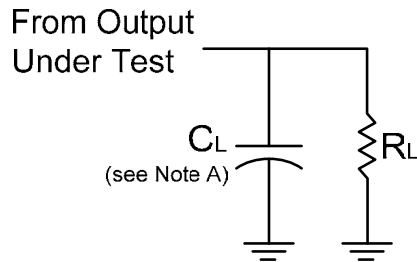
| Parameter | From (Input) | TO (OUTPUT) | $V_{CC} = 1.8\text{V} \pm 0.15\text{V}$ |      | $V_{CC} = 2.5\text{V} \pm 0.2\text{V}$ |     | $V_{CC} = 3.3\text{V} \pm 0.3\text{V}$ |     | $V_{CC} = 5\text{V} \pm 0.5\text{V}$ |     | Unit |
|-----------|--------------|-------------|-----------------------------------------|------|----------------------------------------|-----|----------------------------------------|-----|--------------------------------------|-----|------|
|           |              |             | Min                                     | Max  | Min                                    | Max | Min                                    | Max | Min                                  | Max |      |
| $t_{pd}$  | Any          | Y           | 1.0                                     | 20.7 | 0.7                                    | 7.5 | 0.7                                    | 5.9 | 0.7                                  | 4.2 | ns   |

## Operating Characteristics

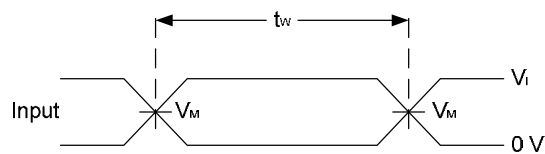
$T_A = 25^\circ\text{C}$

| Parameter |                               | Test Conditions     | $V_{CC} = 1.8\text{V}$ | $V_{CC} = 2.5\text{V}$ | $V_{CC} = 3.3\text{V}$ | $V_{CC} = 5\text{V}$ | Unit |
|-----------|-------------------------------|---------------------|------------------------|------------------------|------------------------|----------------------|------|
|           |                               |                     | Typ.                   | Typ.                   | Typ.                   | Typ.                 |      |
| $C_{pd}$  | Power dissipation capacitance | $f = 10\text{ MHz}$ | 17                     | 18                     | 19                     | 22                   | pF   |

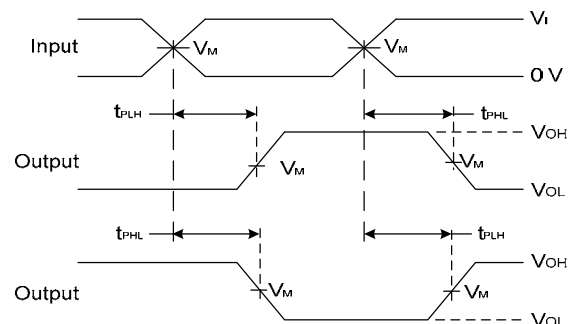
**Parameter Measurement Information**



| $V_{CC}$         | Inputs   |              | $V_M$      | $C_L$ | $R_L$       |
|------------------|----------|--------------|------------|-------|-------------|
|                  | $V_I$    | $t_r/t_f$    |            |       |             |
| $1.8V \pm 0.15V$ | $V_{CC}$ | $\leq 2ns$   | $V_{CC}/2$ | 15pF  | 1M $\Omega$ |
| $2.5V \pm 0.2V$  | $V_{CC}$ | $\leq 2ns$   | $V_{CC}/2$ | 15pF  | 1M $\Omega$ |
| $3.3V \pm 0.3V$  | 3V       | $\leq 2.5ns$ | 1.5V       | 15pF  | 1M $\Omega$ |
| $5V \pm 0.5V$    | $V_{CC}$ | $\leq 2.5ns$ | $V_{CC}/2$ | 15pF  | 1M $\Omega$ |



**Voltage Waveform  
Pulse Duration**



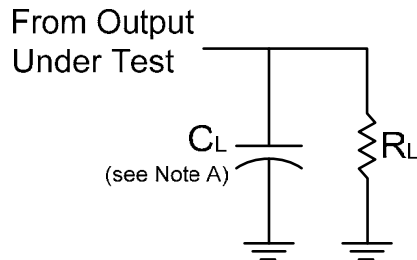
**Voltage Waveform  
Propagation Delay Times  
Inverting and Non Inverting Outputs**

Notes:

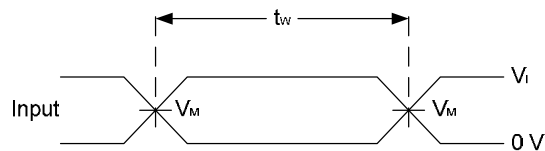
- A. Includes test lead and test apparatus capacitance.
- B. All pulses are supplied at pulse repetition rate  $\leq 10$  MHz
- C. Inputs are measured separately one transition per measurement
- D.  $t_{PLH}$  and  $t_{PHL}$  are the same as  $t_{PD}$

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

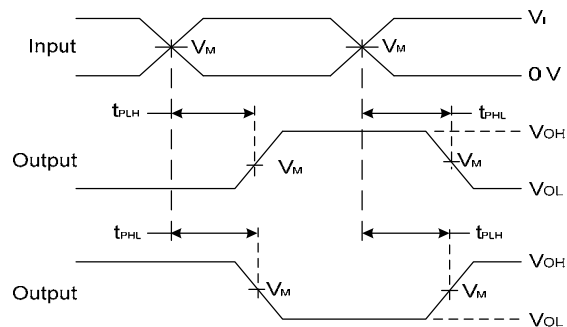
**Parameter Measurement Information (Continued)**



| $V_{CC}$         | Inputs   |              | $V_M$      | $C_L$ | $R_L$        |
|------------------|----------|--------------|------------|-------|--------------|
|                  | $V_I$    | $t_r/t_f$    |            |       |              |
| $1.8V \pm 0.15V$ | $V_{CC}$ | $\leq 2ns$   | $V_{CC}/2$ | 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**

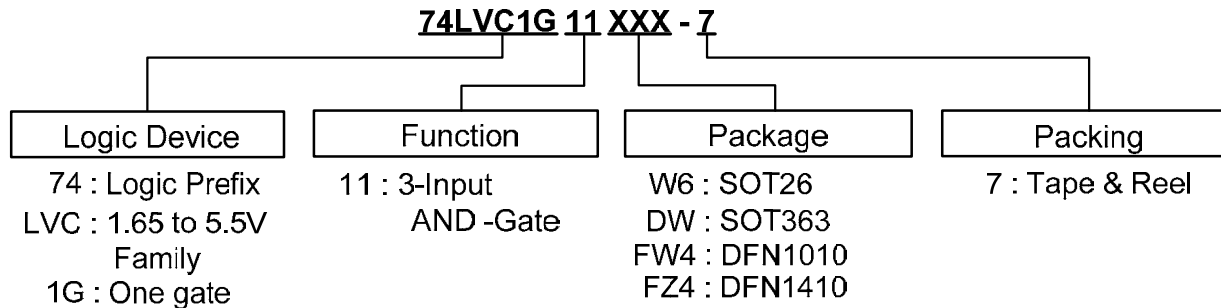


**Voltage Waveform  
Propagation Delay Times  
Inverting and Non Inverting Outputs**

- 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

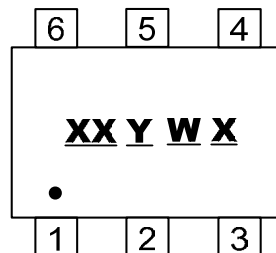


| Device                                                                                           | Package Code | Packaging (Note 7) | 7" Tape and Reel |                    |
|--------------------------------------------------------------------------------------------------|--------------|--------------------|------------------|--------------------|
|                                                                                                  |              |                    | Quantity         | Part Number Suffix |
|  74LVC1G11W6-7  | W6           | SOT26              | 3000/Tape & Reel | -7                 |
|  74LVC1G11DW-7  | DW           | SOT363             | 3000/Tape & Reel | -7                 |
|  74LVC1G11FW4-7 | FW4          | DFN1010            | 5000/Tape & Reel | -7                 |
|  74LVC1G11FZ4-7 | FW4          | DFN1410            | 5000/Tape & Reel | -7                 |

Notes: 5. 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>.  
 6. The taping orientation is located on our website at <http://www.diodes.com/datasheets/ap02007.pdf>

## Marking Information

### (1) SOT26, SOT363

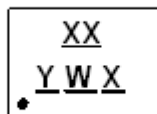


XX : Identification code  
Y : Year 0~9  
W : Week : A~Z : 1~26 week;  
a~z : 27~52 week; z represents  
52 and 53 week  
X : A~Z : Internal Code

| Part Number | Package | Identification Code |
|-------------|---------|---------------------|
| 74LVC1G11W6 | SOT26   | TV                  |
| 74LVC1G11DW | SOT363  | TV                  |

### (2) DFN1010,DFN1410

#### (Top View)

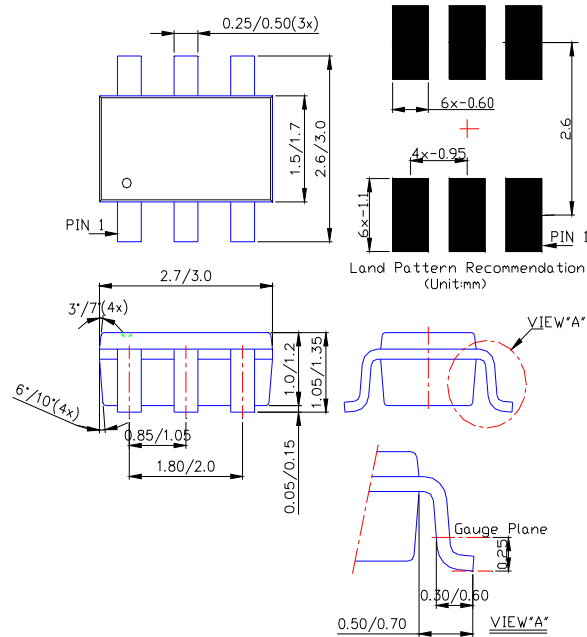


XX : Identification Code  
Y : Year : 0~9  
W : Week : A~Z : 1~26 week;  
a~z : 27~52 week; z represents  
52 and 53 week  
X : A~Z : Internal code

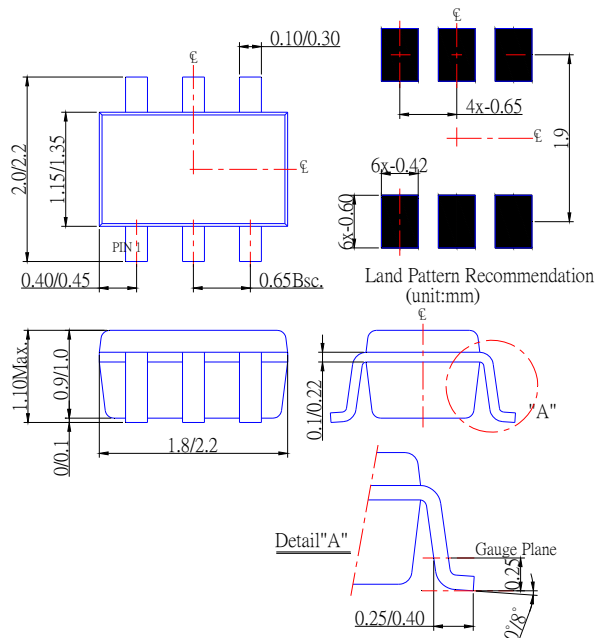
| Part Number  | Package | Identification Code |
|--------------|---------|---------------------|
| 74LVC1G11FW4 | DFN1010 | TV                  |
| 74LVC1G11FZ4 | DFN1410 | TV                  |

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

**(1) Package Type: SOT26**



**(2) Package Type: SOT363**



**NEW PRODUCT**



**NEW PRODUCT**



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