

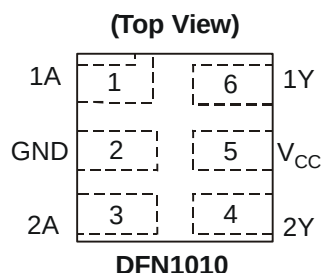
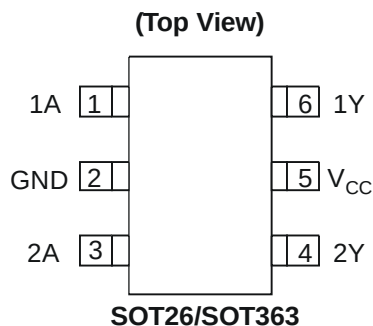
### Description

The 74LVC2G14 is a dual Schmitt trigger inverter gate with standard push-pull outputs. 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<sub>OFF</sub>. The I<sub>OFF</sub> circuitry disables the output preventing damaging current backflow when the device is powered down.

The gate performs the positive Boolean function:

$$Y = \overline{A}$$

### Pin Assignments



### Features

- Wide Supply Voltage Range from 1.65V to 5.5V
- ±24mA Output Drive at 3.0V
- CMOS low power consumption
- IOFF Supports Partial-Power-Down Mode Operation
- Inputs accept up to 5.5V
- ESD Protection Tested per JESD 22
  - o Exceeds 200-V Machine Model (A115-A)
  - o Exceeds 2000-V Human Body Model (A114-A)
  - o Exceeds 1000-V Charged Device Model (C101)
- Latch-Up Exceeds 100mA per JESD 78, Class II
- Range of Package Options
- SOT26, SOT363, and DFN1010 Available in "Green" Molding Compound (no Br, Sb)
- Lead Free Finish/ RoHS Compliant (Note 1)

### Applications

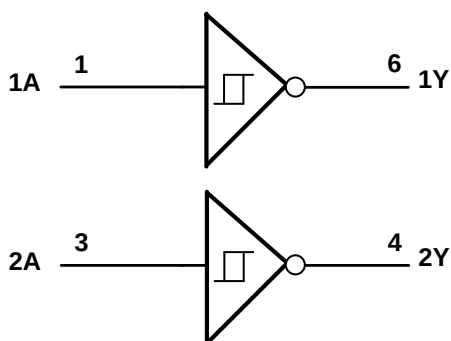
- Voltage Level Shifting
- General Purpose Logic
- Power Down Signal Isolation
- Wide array of products such as:
  - o PCs, networking, notebooks, netbooks, PDAs
  - o Computer peripherals, hard drives, CD/DVD ROM
  - o TV, DVD, DVR, set top box
  - o Cell Phones, Personal Navigation / GPS
  - o MP3 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        | Pin NO. | Description    |
|-----------------|---------|----------------|
| 1A              | 1       | Data Input     |
| GND             | 2       | Ground         |
| 2A              | 3       | Data Input     |
| 2Y              | 4       | Data Output    |
| V <sub>CC</sub> | 5       | Supply Voltage |
| 1Y              | 6       | Data Output    |

## Logic Diagram



## Function Table

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

### Absolute Maximum Ratings (Note 2)

| Symbol    | Description                                                    | Rating                 | Unit |
|-----------|----------------------------------------------------------------|------------------------|------|
| ESD HBM   | Human Body Model ESD Protection                                | 2                      | KV   |
| ESD CDM   | Charged Device Model ESD Protection                            | 1                      | 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             | °C   |
| $T_{STG}$ | 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 |
|---------------------|------------------------------------|------------------------------------------|----------|------|
| $V_{CC}$            | Operating Voltage                  | Operating                                | 1.65     | 5.5  |
|                     |                                    | Data retention only                      | 1.5      |      |
| $V_I$               | Input Voltage                      | 0                                        | 5.5      | V    |
| $V_O$               | Output Voltage                     | 0                                        | $V_{CC}$ | V    |
| $I_{OH}$            | High-level output current          | $V_{CC} = 1.65V$                         | -4       | mA   |
|                     |                                    | $V_{CC} = 2.3V$                          | -8       |      |
|                     |                                    | $V_{CC} = 3V$                            | -16      |      |
|                     |                                    |                                          | -24      |      |
|                     |                                    | $V_{CC} = 4.5V$                          | -32      |      |
| $I_{OL}$            | Low-level output current           | $V_{CC} = 1.65V$                         | 4        | mA   |
|                     |                                    | $V_{CC} = 2.3V$                          | 8        |      |
|                     |                                    | $V_{CC} = 3V$                            | 16       |      |
|                     |                                    |                                          | 24       |      |
|                     |                                    | $V_{CC} = 4.5V$                          | 32       |      |
| $\Delta t/\Delta V$ | Input transition rise or fall rate | $V_{CC} = 1.8V \pm 0.15V, 2.5V \pm 0.2V$ | 20       | ns/V |
|                     |                                    | $V_{CC} = 3.3V \pm 0.3V$                 | 10       |      |
|                     |                                    | $V_{CC} = 5V \pm 0.5V$                   | 5        |      |
| $T_A$               | Operating free-air temperature     | -40                                      | 125      | °C   |

Notes: 3. Unused inputs should be held at  $V_{CC}$  or Ground.

### Electrical Characteristics

| Symbol           | Parameter                                       | Test Conditions                                   | V <sub>CC</sub> | 40°C to 85°C          |      | -40°C to 125°C        |      | Unit |
|------------------|-------------------------------------------------|---------------------------------------------------|-----------------|-----------------------|------|-----------------------|------|------|
|                  |                                                 |                                                   |                 | Min                   | Max  | Min                   | Max  |      |
| V <sub>T+</sub>  | Positive-going input threshold Voltage          |                                                   | 1.8V            | 0.70                  | 1.50 | 0.70                  | 1.70 | V    |
|                  |                                                 |                                                   | 2.3V            | 1.00                  | 1.80 | 1.00                  | 2.00 |      |
|                  |                                                 |                                                   | 3V              | 1.30                  | 2.20 | 1.30                  | 2.40 |      |
|                  |                                                 |                                                   | 4.5V            | 1.90                  | 3.10 | 1.90                  | 3.30 |      |
|                  |                                                 |                                                   | 5.5V            | 2.20                  | 3.60 | 2.20                  | 3.80 |      |
| V <sub>T-</sub>  | Negative-going input threshold Voltage          |                                                   | 1.65V           | 0.25                  | 0.90 | 0.39                  | 1.10 | V    |
|                  |                                                 |                                                   | 2.3V            | 0.40                  | 1.15 | 0.25                  | 0.87 |      |
|                  |                                                 |                                                   | 3V              | 0.60                  | 1.50 | 0.40                  | 1.35 |      |
|                  |                                                 |                                                   | 4.5V            | 1.00                  | 2.00 | 0.60                  | 1.70 |      |
|                  |                                                 |                                                   | 5.5V            | 1.20                  | 2.30 | 1.00                  | 2.50 |      |
| ΔV <sub>T</sub>  | Hysteresis (V <sub>T+</sub> - V <sub>T-</sub> ) |                                                   | 1.8V            | 0.15                  | 1.00 | 0.37                  | 1.20 | μA   |
|                  |                                                 |                                                   | 2.3V            | 0.25                  | 1.10 | 0.15                  | 1.30 |      |
|                  |                                                 |                                                   | 3V              | 0.40                  | 1.20 | 0.40                  | 1.40 |      |
|                  |                                                 |                                                   | 4.5V            | 0.60                  | 1.50 | 0.60                  | 1.70 |      |
|                  |                                                 |                                                   | 5.5V            | 0.70                  | 1.70 | 0.70                  | 1.90 |      |
| V <sub>OH</sub>  | High Level Output Voltage                       | I <sub>OH</sub> = -100 μA                         | 1.65V to 4.5V   | V <sub>CC</sub> - 0.1 |      | V <sub>CC</sub> - 0.1 |      | V    |
|                  |                                                 | I <sub>OH</sub> = -4 mA                           | 1.65V           | 1.2                   |      | 0.95                  |      |      |
|                  |                                                 | I <sub>OH</sub> = -8 mA                           | 2.3V            | 1.9                   |      | 1.7                   |      |      |
|                  |                                                 | I <sub>OH</sub> = -16 mA                          | 3V              | 2.4                   |      | 1.9                   |      |      |
|                  |                                                 | I <sub>OH</sub> = -24 mA                          |                 | 2.3                   |      | 2.0                   |      |      |
|                  |                                                 | I <sub>OH</sub> = -32 mA                          | 4.5V            | 3.8                   |      | 3.4                   |      |      |
| V <sub>OL</sub>  | Low-Level Output Voltage                        | I <sub>OL</sub> = 100 μA                          | 1.65V to 4.5V   |                       | 0.1  |                       | 0.10 | V    |
|                  |                                                 | I <sub>OL</sub> = 4 mA                            | 1.65V           |                       | 0.45 |                       | 0.70 |      |
|                  |                                                 | I <sub>OL</sub> = 8 mA                            | 2.3V            |                       | 0.3  |                       | 0.45 |      |
|                  |                                                 | I <sub>OL</sub> = 16 mA                           | 3V              |                       | 0.4  |                       | 0.60 |      |
|                  |                                                 | I <sub>OL</sub> = 24 mA                           |                 |                       | 0.55 |                       | 0.80 |      |
|                  |                                                 | I <sub>OL</sub> = 32 mA                           | 4.5             |                       | 0.55 |                       | 0.80 |      |
| I <sub>I</sub>   | Input Current                                   | V <sub>I</sub> = 5.5 V or GND                     | 0 to 5.5V       |                       | ± 5  |                       | ± 20 | μA   |
| I <sub>OFF</sub> | Power Down Leakage Current                      | V <sub>I</sub> or V <sub>O</sub> = 5.5V           | 0               |                       | ± 10 |                       | ± 20 | μA   |
| I <sub>CC</sub>  | Supply Current                                  | V <sub>I</sub> = 5.5V of GND<br>I <sub>O</sub> =0 | 1.65V to 5.5V   |                       | 10   |                       | 40   | μA   |

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

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

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

### Switching Characteristics

$T_A = -40^\circ C$  to  $85^\circ C$ ,  $C_L = 30$  or  $50pF$  (see Figure 1)

| Parameter | From<br>(Input) | TO<br>(OUTPUT) | $V_{CC} = 1.8V \pm 0.15V$ |      | $V_{CC} = 2.5V \pm 0.2V$ |     | $V_{CC} = 3.3V \pm 0.3V$ |     | $V_{CC} = 5V \pm 0.5V$ |     | Unit |
|-----------|-----------------|----------------|---------------------------|------|--------------------------|-----|--------------------------|-----|------------------------|-----|------|
|           |                 |                | Min                       | Max  | Min                      | Max | Min                      | Max | Min                    | Max |      |
| $t_{pd}$  | A               | Y              | 0.5                       | 11.0 | 0.5                      | 6.5 | 0.5                      | 6.0 | 0.5                    | 4.3 | ns   |

$T_A = -40^\circ C$  to  $125^\circ C$ ,  $C_L = 30$  or  $50pF$  (see Figure 1)

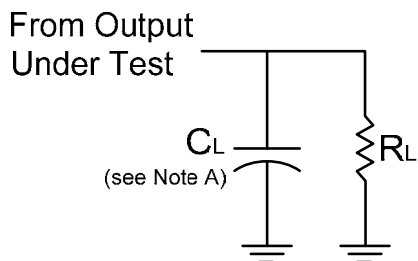
| Parameter | From<br>(Input) | TO<br>(OUTPUT) | $V_{CC} = 1.8V \pm 0.15V$ |      | $V_{CC} = 2.5V \pm 0.2V$ |     | $V_{CC} = 3.3V \pm 0.3V$ |     | $V_{CC} = 5V \pm 0.5V$ |     | Unit |
|-----------|-----------------|----------------|---------------------------|------|--------------------------|-----|--------------------------|-----|------------------------|-----|------|
|           |                 |                | Min                       | Max  | Min                      | Max | Min                      | Max | Min                    | Max |      |
| $t_{pd}$  | A               | Y              | 0.5                       | 12.0 | 0.5                      | 7.2 | 0.50                     | 6.7 | 0.5                    | 4.7 | ns   |

### Operating Characteristics

$T_A = 25^\circ C$

| Parameter |                                  | Test<br>Conditions   | $V_{CC} = 1.8V$ | $V_{CC} = 2.5V$ | $V_{CC} = 3.3V$ | $V_{CC} = 5V$ | Unit |
|-----------|----------------------------------|----------------------|-----------------|-----------------|-----------------|---------------|------|
|           |                                  |                      | Typ.            | Typ.            | Typ.            | Typ.          |      |
| $C_{pd}$  | Power dissipation<br>capacitance | $f = 10 \text{ MHz}$ | 17              | 19              | 20              | 21            | pF   |

**Parameter Measurement Information**



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

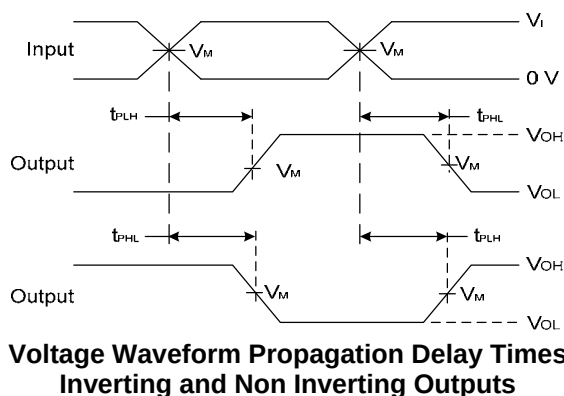
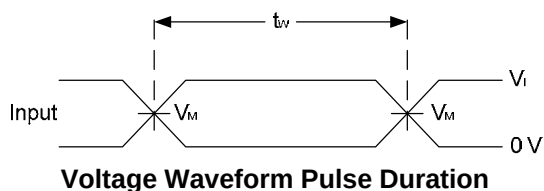
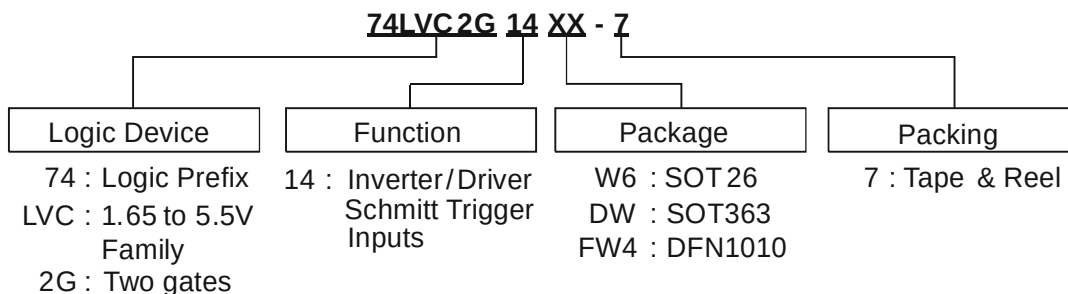


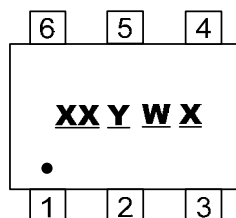
**Figure 1. Load Circuit and Voltage Waveforms**

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

**Ordering Information**


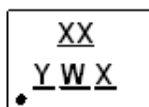
| Device         | Package Code | Packaging (Note 5) | 7" Tape and Reel |                    |
|----------------|--------------|--------------------|------------------|--------------------|
|                |              |                    | Quantity         | Part Number Suffix |
| 74LVC2G14W6-7  | W6           | SOT26              | 3000/Tape & Reel | -7                 |
| 74LVC2G14DW-7  | DW           | SOT363             | 3000/Tape & Reel | -7                 |
| 74LVC2G14FW4-7 | FW4          | DFN1010            | 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

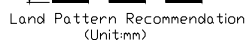
| Part Number | Package | Identification Code |
|-------------|---------|---------------------|
| 74LVC2G14W6 | SOT26   | Z5                  |
| 74LVC2G14DW | SOT363  | Z5                  |

**(2) DFN1010**
**(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 |
|--------------|---------|---------------------|
| 74LVC2G14FW4 | DFN1010 | Z5                  |

**(1) Package Type: SOT26**

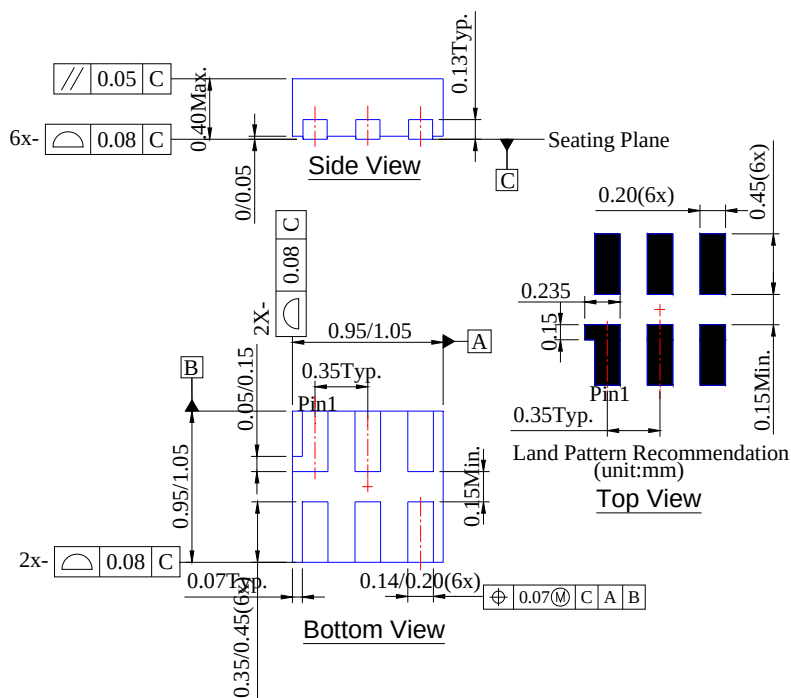


**(2) Package Type: SOT363**



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

**(3) Package Type: DFN1010**



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