

Description

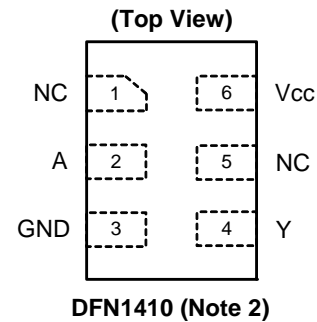
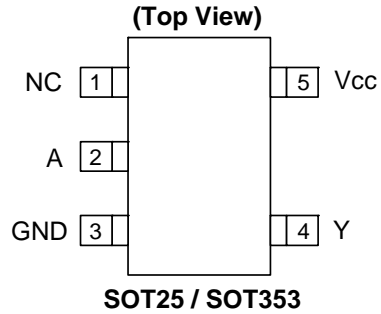
The 74LVCE1G06 is a single inverter gate with an open drain output. The device is designed for operation with a power supply range of 1.4V to 5.5V. The input is tolerant to 5.5V allowing this device to be used in a mixed voltage environment. The device is fully specified for partial power down applications using I_{OFF}. The I_{OFF} circuitry disables the output preventing damaging current backflow when the device is powered down. The open-drain output can be connected to other open drain outputs to implement active-low wired-OR or active-high wired-AND functions. The maximum sink current is 32 mA.

Features

- Wide Supply Voltage Range from 1.65 to 5.5V
- ± 24mA 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
- 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.
2. Pin 2 and pin 5 of the DFN1410 package are internally connected.

Pin Assignments



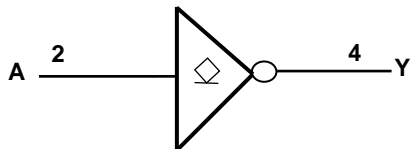
Applications

- Voltage Level Shifting
- General Purpose Logic
- Power Down Signal Isolation
- 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 |
|----------|------------------------|
| NC | No connection |
| A | Data Input |
| GND | Ground |
| Y | Data Output Open Drain |
| Vcc | Supply Voltage |

Logic Diagram



Function Table

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

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 | ± 50 | mA |
| | Continuous current through Vdd or GND | ± 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 _{CC} | Operating Voltage | Operating | 1.4 | 5.5 | V |
| | | Data retention only | 1.2 | | V |
| V _{IH} | High-level Input Voltage | V _{CC} = 1.4 V to 1.95 V | 0.65 X V _{CC} | | V |
| | | V _{CC} = 2.3 V to 2.7 V | 1.7 | | |
| | | V _{CC} = 3 V to 3.6 V | 2 | | |
| | | V _{CC} = 4.5 V to 5.5 V | 0.7 X V _{CC} | | |
| V _{IL} | Low-level input voltage | V _{CC} = 1.4 V to 1.95 V | | 0.35 X V _{CC} | V |
| | | V _{CC} = 2.3 V to 2.7 V | | 0.7 | |
| | | V _{CC} = 3 V to 3.6 V | | 0.8 | |
| | | V _{CC} = 4.5 V to 5.5 V | | 0.3 X V _{CC} | |
| V _I | Input Voltage | | 0 | 5.5 | V |
| V _O | Output Voltage | | 0 | V _{CC} | V |
| I _{OL} | Low-level output current | V _{CC} =1.4 V | | 3 | mA |
| | | V _{CC} = 1.65 V | | 4 | |
| | | V _{CC} = 2.3 V | | 8 | |
| | | V _{CC} = 3 V | | 16 | |
| | | | | 24 | |
| V _{CC} = 4.5 V | | 32 | | | |
| Δt/ΔV | Input transition rise or fall rate | V _{CC} = 1.4 V to 3.0 V | | 20 | ns/V |
| | | V _{CC} = 3.3 V ± 0.3 V | | 10 | |
| | | V _{CC} = 5 V ± 0.5 V | | 5 | |
| T _A | Operating free-air temperature | | -40 | 85 | °C |

Notes: 4. Unused inputs should be held at V_{CC} 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_{OL} | Low Level Output Voltage | $I_{OL} = 100 \mu A$ | 1.4 V to 5.5 V | | | 0.1 | V |
| | | $I_{OL} = 3 \text{ mA}$ | 1.4 V | | | 0.4 | |
| | | $I_{OL} = 4 \text{ mA}$ | 1.65 V | | | 0.45 | |
| | | $I_{OL} = 8 \text{ mA}$ | 2.3 V | | | 0.3 | |
| | | $I_{OL} = 16 \text{ mA}$ | 3 V | | | 0.4 | |
| | | $I_{OL} = 24 \text{ mA}$ | | | | 0.55 | |
| | | $I_{OL} = 32 \text{ mA}$ | 4.5 V | | | 0.55 | |
| I_I | Input Current | $V_I = 5.5 \text{ V}$ or GND | 0 to 5.5 V | | | ± 5 | μA |
| I_{OZ} | Z State Leakage Current | $V_O = 5.5V$ | 3.6 V | | | ± 10 | μA |
| I_{OFF} | Power Down Leakage Current | V_I or $V_O = 5.5V$ | 0 V | | | ± 10 | μA |
| I_{CC} | Supply Current | $V_I = 5.5 \text{ V}$ or GND $I_O = 0$ | 1.4 V to 5.5 V | | | 10 | μA |
| ΔI_{CC} | Additional Supply Current | Input at $V_{CC} - 0.6 \text{ V}$ | 3 V to 5.5 V | | | 500 | μA |
| C_{ii} | Input Capacitance | $V_I = V_{CC}$ or GND | 3.3V | | 4 | | pF |
| C_O | Output Capacitance | $V_O = V_{CC}$ or GND | 3.3V | | 5 | | pF |
| θ_{JA} | Thermal Resistance Junction-to-Case | SOT25 | (Note 5) | | 204 | | $^\circ C/W$ |
| | | SOT353 | (Note 5) | | 371 | | |
| | | DFN1410 | (Note 5) | | 430 | | |
| θ_{JC} | Thermal Resistance Junction-to-Case | SOT25 | (Note 5) | | 52 | | $^\circ C/W$ |
| | | SOT353 | (Note 5) | | 143 | | |
| | | DFN1410 | (Note 5) | | 190 | | |

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, $C_L = 15\text{pF}$ (see Figure 1)

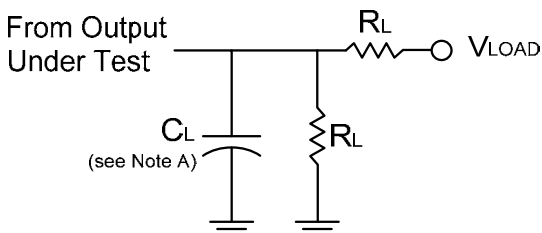
| Parameter | From (Input) | TO (OUTPUT) | $V_{CC} = 1.5\text{ V} \pm 0.1\text{ V}$ | | $V_{CC} = 1.8\text{ V} \pm 0.15\text{ V}$ | | $V_{CC} = 2.5\text{ V} \pm 0.2\text{ V}$ | | $V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$ | | $V_{CC} = 5\text{ V} \pm 0.5\text{ V}$ | | Unit |
|-----------|--------------|-------------|--|-----|---|-----|--|-----|--|-----|--|-----|------|
| | | | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | |
| t_{pd} | A | Y | 1.5 | 7.8 | 1 | 4.5 | 0.8 | 3.2 | 0.8 | 3.2 | 0.8 | 2.7 | ns |

Operating Characteristics

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

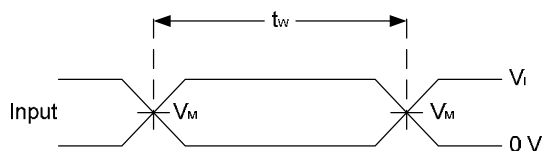
| Parameter | | Test Conditions | $V_{CC} = 1.5\text{ V}$ | $V_{CC} = 1.8\text{ V}$ | $V_{CC} = 2.5\text{ V}$ | $V_{CC} = 3.3\text{ V}$ | $V_{CC} = 5\text{ V}$ | Unit |
|-----------|-------------------------------|---------------------|-------------------------|-------------------------|-------------------------|-------------------------|-----------------------|------|
| | | | TYP | TYP | TYP | TYP | TYP | |
| C_{pd} | Power dissipation capacitance | $f = 10\text{ MHz}$ | 3 | 3 | 3 | 4 | 6 | pF |

Parameter Measurement Information

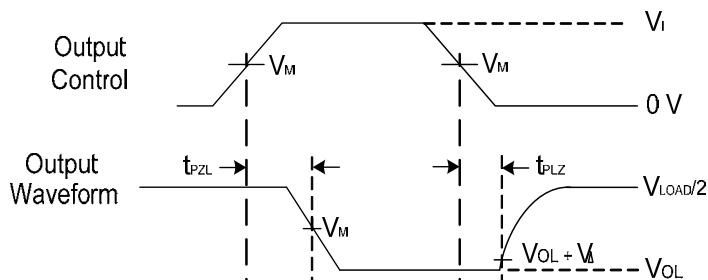


| TEST | Condition |
|-------------------------------|-----------|
| t_{PLZ} (see Notes D and E) | Vload |
| t_{PZL} (see Notes D and F) | Vload |

| V _{CC} | Inputs | | V _M | V _{LOAD} | C _L | R _L | V _Δ |
|-----------------|-----------------|--------------------------------|--------------------|---------------------|----------------|----------------|----------------|
| | V _I | t _r /t _f | | | | | |
| 1.8V±0.15V | V _{CC} | ≤2ns | V _{CC} /2 | 2 X V _{CC} | 30pF | 1KΩ | 0.15V |
| 2.5V±0.2V | V _{CC} | ≤2ns | V _{CC} /2 | 2 X V _{CC} | 30pF | 500Ω | 0.15V |
| 3.3V±0.3V | 3V | ≤2.5ns | 1.5V | 6V | 50pF | 500Ω | 0.3V |
| 5V±0.5V | V _{CC} | ≤2.5ns | V _{CC} /2 | 2 X V _{CC} | 50pF | 500Ω | 0.3V |



**Voltage Waveform
Pulse Duration**



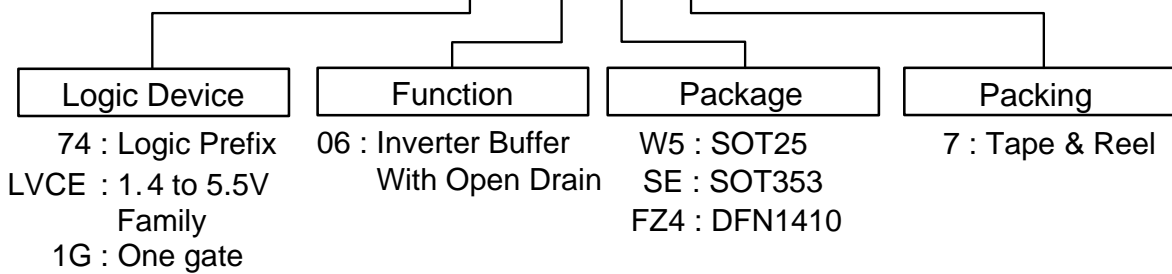
**Voltage Waveform
Propagation Delay Times**

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. The inputs are measured one at a time with one transition per measurement.
 - D. For the open drain device t_{PLZ} and t_{PZL} are the same as t_{PD}
 - E. t_{PZL} is measured at V_M.
 - F. t_{PLZ} is measured at V_{OL} + V_Δ

Ordering Information

74LVCE1G 06 XXX - 7



| Device | Package Code | Packaging (Note 6) | 7" Tape and Reel | |
|-----------------|--------------|--------------------|------------------|--------------------|
| | | | Quantity | Part Number Suffix |
| 74LVCE1G06W5-7 | W5 | SOT25 | 3000/Tape & Reel | -7 |
| 74LVCE1G06SE-7 | SE | SOT353 | 3000/Tape & Reel | -7 |
| 74LVCE1G06FZ4-7 | FZ4 | DFN1410 | 5000/Tape & Reel | -7 |



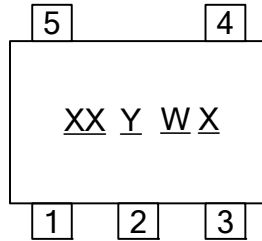
Notes: 6. Pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at <http://www.diodes.com/datasheets/ap02001.pdf>.

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Marking Information

(1) SOT25 and SOT353

(Top View)

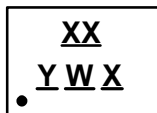


XX : Identification code
Y : Year 0~9
W : Week : A~Z : 1~26 week;
a~z : 27~52 week; z represents
52 and 53 week
X : A~Z : Internal code

| Part Number | Package | Identification Code |
|--------------|---------|---------------------|
| 74LVCE1G06W5 | SOT25 | PM |
| 74LVCE1G06SE | SOT353 | PM |

(2) DFN1410

(Top View)

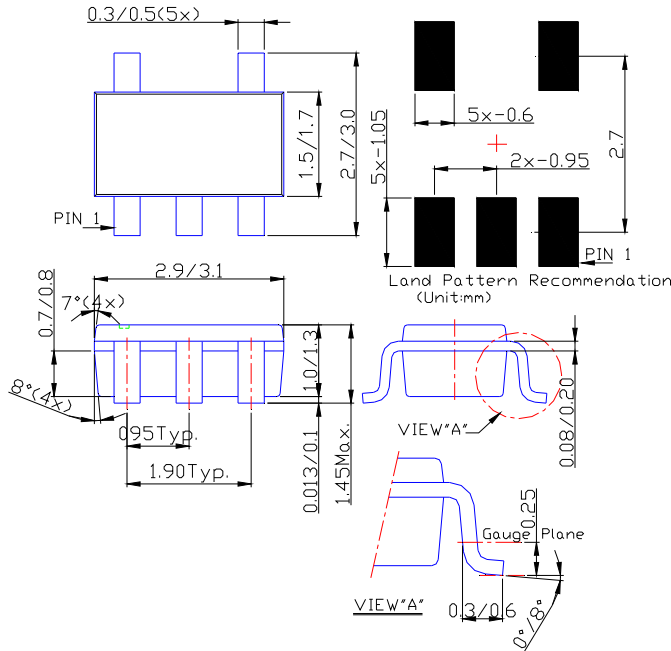


XX : Identification Code
Y : Year : 0~9
W : Week : A~Z : 1~26 week;
a~z : 27~52 week; z represents
52 and 53 week
X : A~Z : Internal code

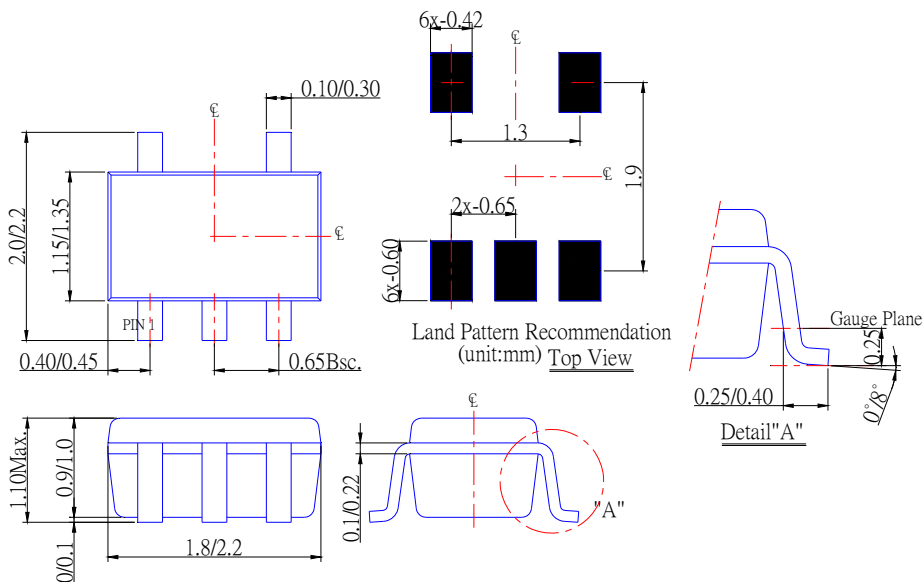
| Part Number | Package | Identification Code |
|---------------|---------|---------------------|
| 74LVCE1G06FZ4 | DFN1410 | PM |

Package Outline Dimensions (All Dimensions in mm)

(1) Package Type: SOT25

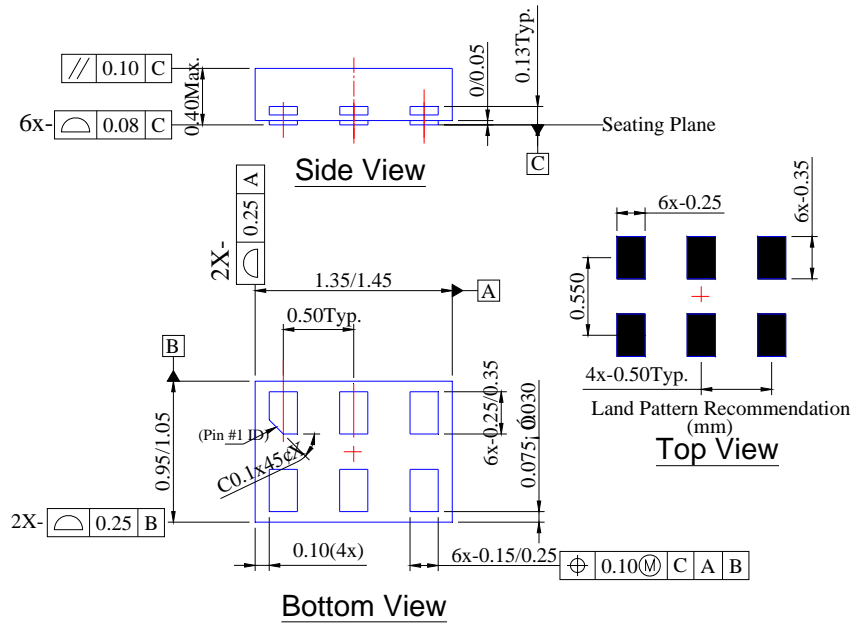


(2) Package Type: SOT353



Package Outline Dimensions (Continued)

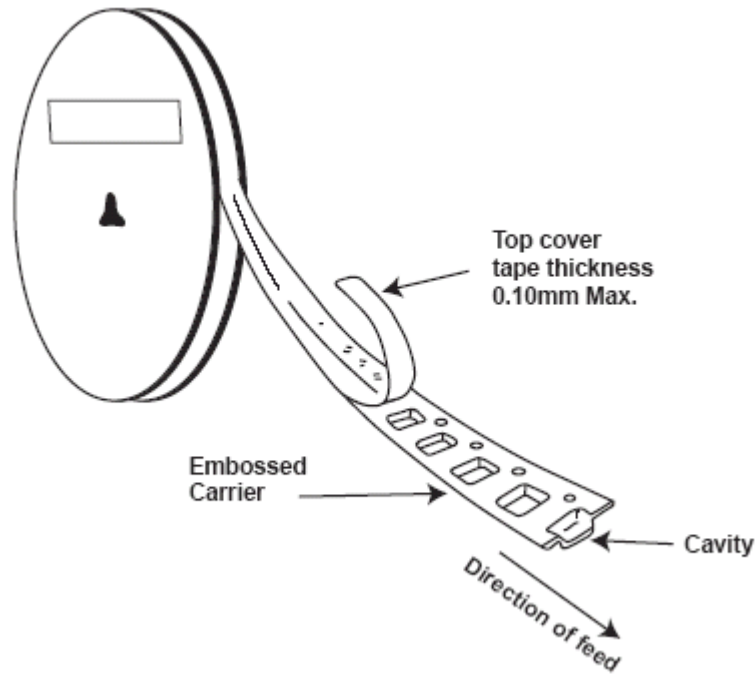
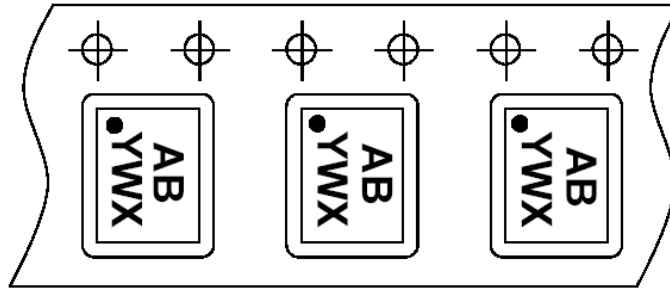
(3) Package Type: DFN1410



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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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