

### Description

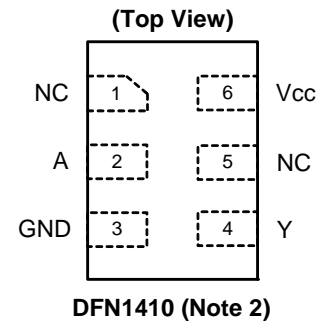
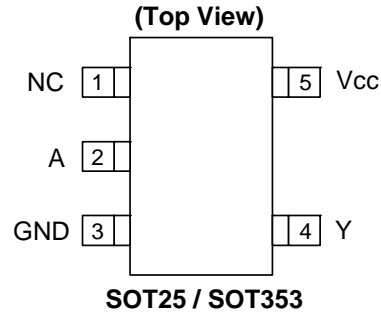
The 74LVCE1G06 is a single inverter gate with an open drain output. The device is designed for operation with a power supply range of 1.4V to 5.5V. The input is tolerant to 5.5V allowing this device to be used in a mixed voltage environment. The device is fully specified for partial power down applications 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
- $\pm 24$ 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
- 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



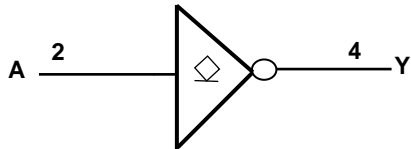
### Applications

- Voltage Level Shifting
- General Purpose Logic
- 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                                      | $\pm 50$               | 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                         | 1.4                    | 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>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 V to 3.0 V  |                        | 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   |

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         |
|-----------------|-------------------------------------|--|----------------|-----|-----|----------|--------------|
| $V_{OL}$        | 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     |     |     | $\pm 5$  | $\mu A$      |
| $I_{OZ}$        | Z State Leakage Current             | $V_O = 5.5V$                           | 3.6 V          |     |     | $\pm 10$ | $\mu A$      |
| $I_{OFF}$       | Power Down Leakage Current          | $V_I$ or $V_O = 5.5V$                  | 0 V            |     |     | $\pm 10$ | $\mu A$      |
| $I_{CC}$        | Supply Current                      | $V_I = 5.5 \text{ V}$ or GND $I_O = 0$ | 1.4 V to 5.5 V |     |     | 10       | $\mu A$      |
| $\Delta I_{CC}$ | Additional Supply Current           | Input at $V_{CC} - 0.6 \text{ V}$      | 3 V to 5.5 V   |     |     | 500      | $\mu A$      |
| $C_{ii}$        | 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           |
| $\theta_{JA}$   | Thermal Resistance Junction-to-Case | 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 |          |              |

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)

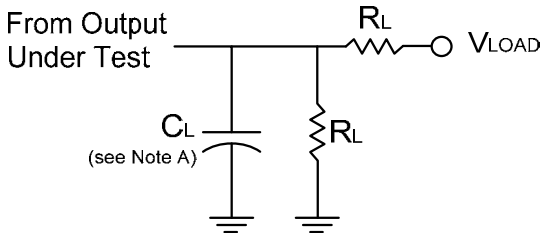
| Parameter | From (Input) | TO (OUTPUT) | $V_{CC} = 1.5\text{ V} \pm 0.1\text{ V}$ |     | $V_{CC} = 1.8\text{ V} \pm 0.15\text{ V}$ |     | $V_{CC} = 2.5\text{ V} \pm 0.2\text{ V}$ |     | $V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$ |     | $V_{CC} = 5\text{ V} \pm 0.5\text{ V}$ |     | Unit |
|-----------|--------------|-------------|--|-----|---|-----|--|-----|--|-----|--|-----|------|
|           |              |             | 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

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

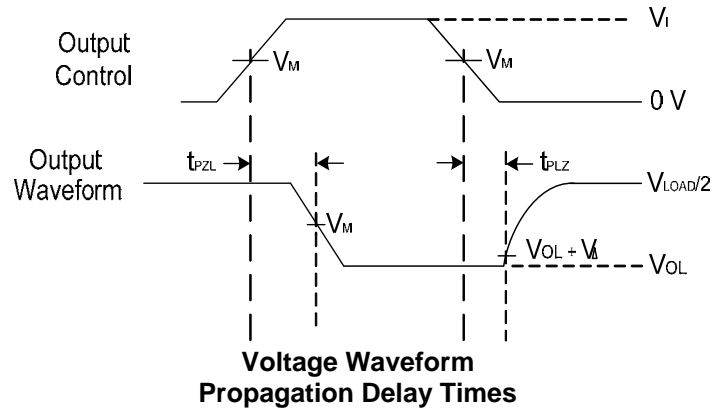
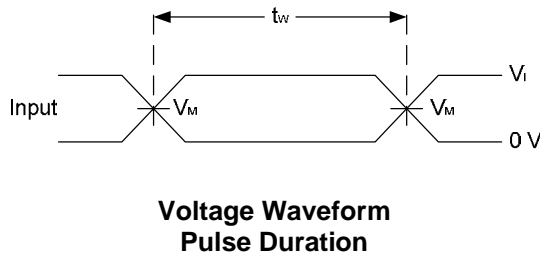
| Parameter |                               | Test Conditions     | $V_{CC} = 1.5\text{ V}$ | $V_{CC} = 1.8\text{ V}$ | $V_{CC} = 2.5\text{ V}$ | $V_{CC} = 3.3\text{ V}$ | $V_{CC} = 5\text{ V}$ | Unit |
|-----------|-------------------------------|---------------------|-------------------------|-------------------------|-------------------------|-------------------------|-----------------------|------|
|           |                               |                     | 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 <sub>CC</sub> | Inputs          |                                | V <sub>M</sub>     | V <sub>LOAD</sub>   | C <sub>L</sub> | R <sub>L</sub> | V <sub>Δ</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 | 2 X V <sub>CC</sub> | 30pF           | 1KΩ            | 0.15V          |
| 2.5V±0.2V       | V <sub>CC</sub> | ≤2ns                           | V <sub>CC</sub> /2 | 2 X V <sub>CC</sub> | 30pF           | 500Ω           | 0.15V          |
| 3.3V±0.3V       | 3V              | ≤2.5ns                         | 1.5V               | 6V                  | 50pF           | 500Ω           | 0.3V           |
| 5V±0.5V         | V <sub>CC</sub> | ≤2.5ns                         | V <sub>CC</sub> /2 | 2 X V <sub>CC</sub> | 50pF           | 500Ω           | 0.3V           |

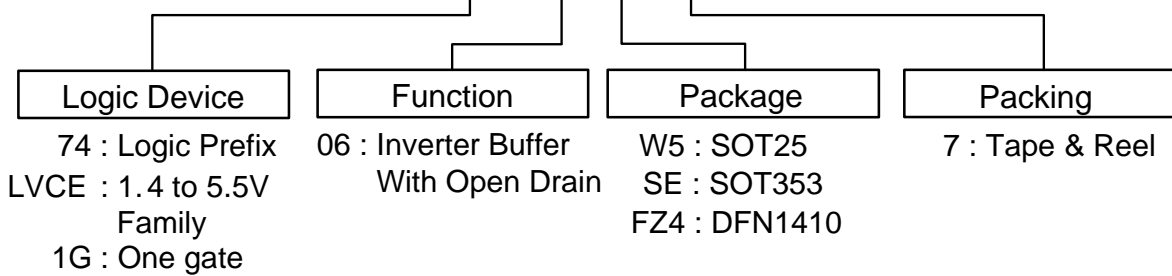


**Figure 1. Load Circuit and Voltage Waveforms**

- 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  $V_{OL} + V_{\Delta}$

**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>.

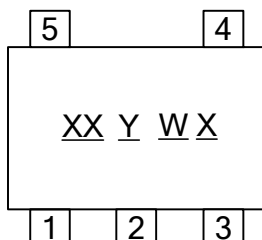
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**Marking Information**

**(1) SOT25 and SOT353**

(Top View)

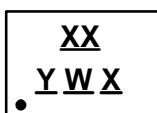


XX : Identification code  
Y : Year 0~9  
W : Week : A~Z : 1~26 week;  
a~z : 27~52 week; z represents  
52 and 53 week  
X : A~Z : Internal code

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

**(2) DFN1410**

(Top View)

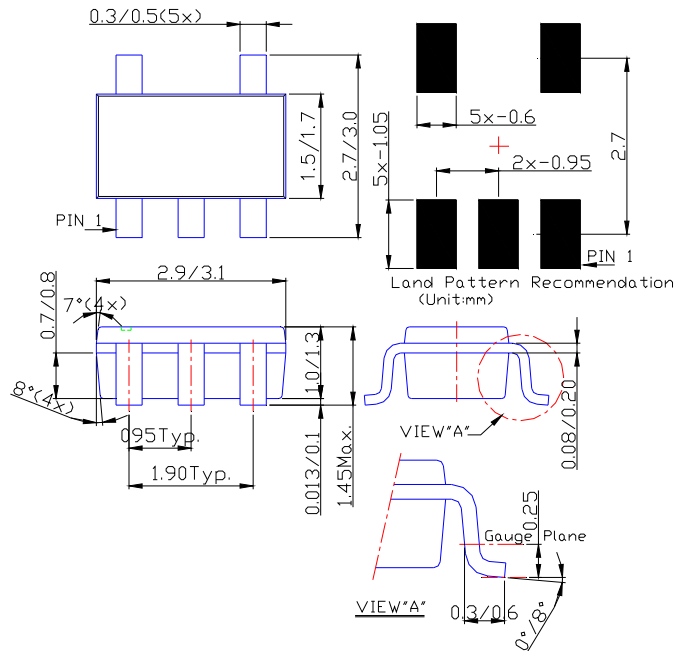


XX : Identification Code  
Y : Year : 0~9  
W : Week : A~Z : 1~26 week;  
a~z : 27~52 week; z represents  
52 and 53 week  
X : A~Z : Internal code

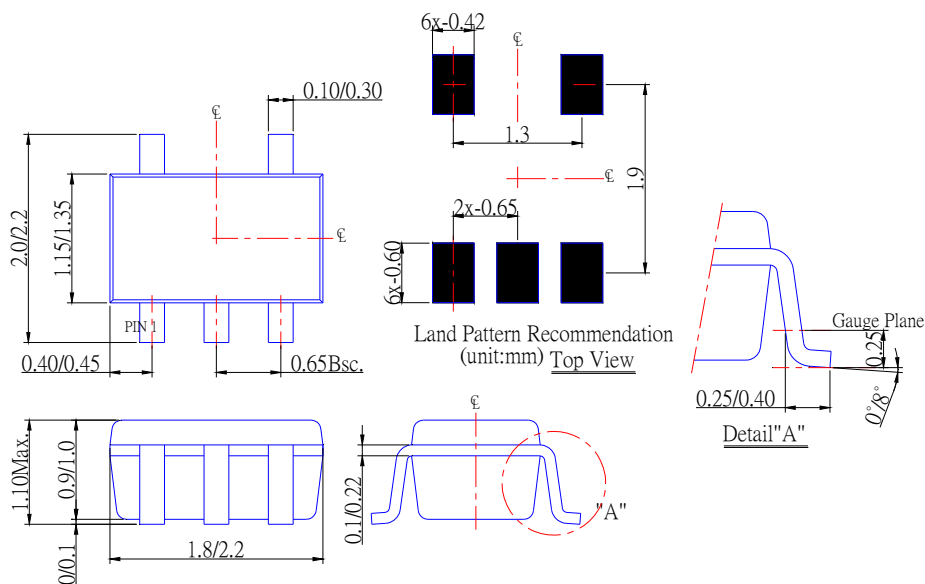
| Part Number   | Package | Identification Code |
|---------------|---------|---------------------|
| 74LVCE1G06FZ4 | DFN1410 | PM                  |

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

**(1) Package Type: SOT25**

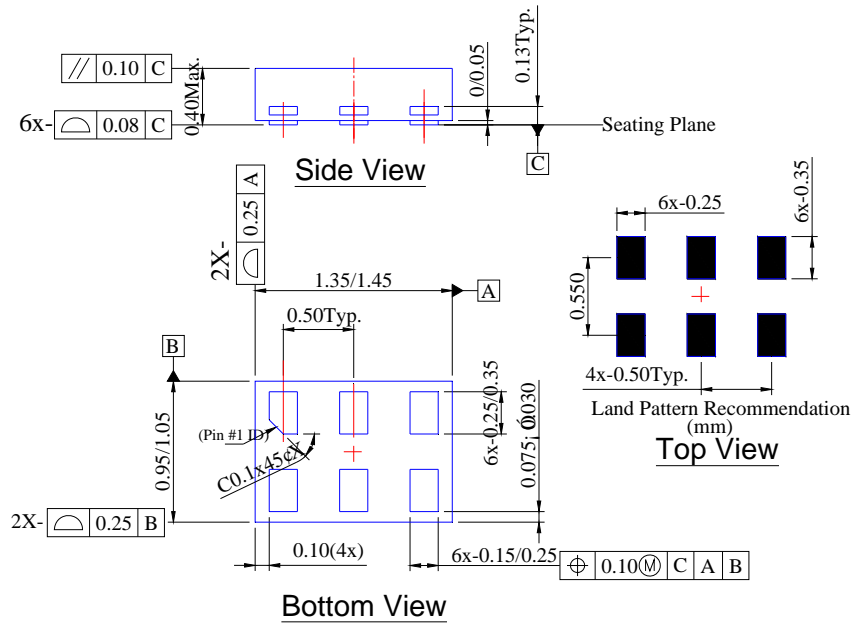


**(2) Package Type: SOT353**



**Package Outline Dimensions (Continued)**

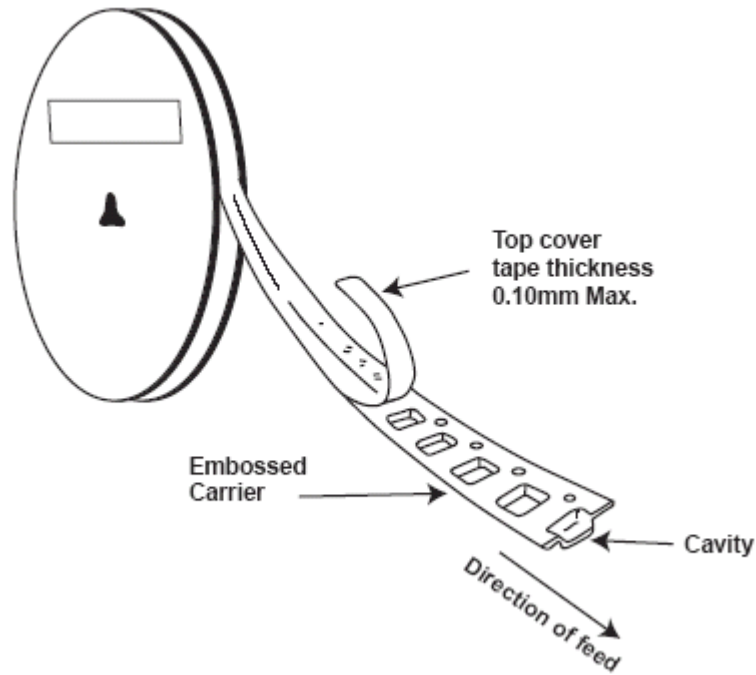
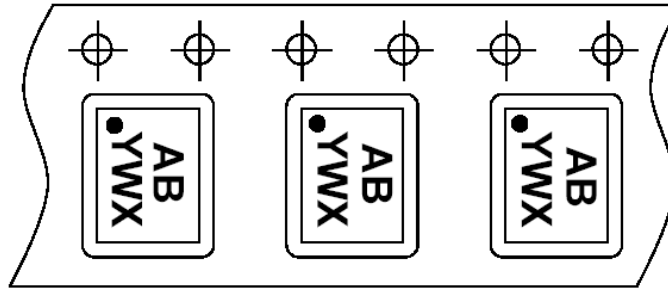
**(3) Package Type: DFN1410**



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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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