

## Description

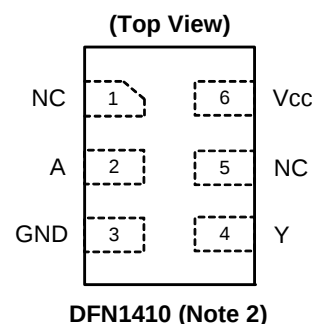
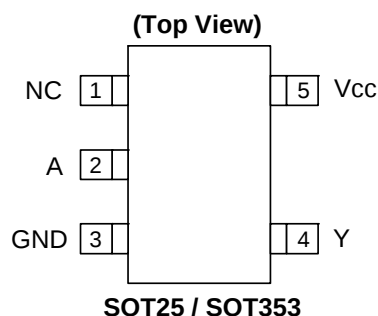
The 74LVCE1G07 is a single inverter gate with an open drain output. The device is designed for operation with a power supply range of 4V to 5.5V. The input is tolerant to 5.5V allowing this device to be used in a mixed voltage environment. The device is fully specified for partial power down applications 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
- $\pm 24\text{mA}$  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



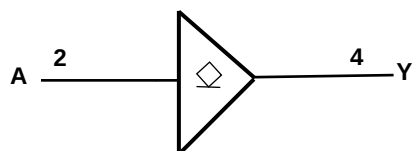
## Applications

- Voltage Level Shifting
- General Purpose Logic
- 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

## 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      | Z      |
| 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             | °C   |
| $T_{STG}$ | Storage Temperature                                            | -65 to 150             | °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           | $V_{CC} = 1.4 \text{ V to } 1.95 \text{ V}$ | $0.65 \times V_{CC}$ |                      | V    |
|                     |                                    | $V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$  | 1.7                  |                      |      |
|                     |                                    | $V_{CC} = 3 \text{ V to } 3.6 \text{ V}$    | 2                    |                      |      |
|                     |                                    | $V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$  | $0.7 \times V_{CC}$  |                      |      |
| $V_{IL}$            | Low-level input voltage            | $V_{CC} = 1.4 \text{ V to } 1.95 \text{ V}$ |                      | $0.35 \times V_{CC}$ | V    |
|                     |                                    | $V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$  |                      | 0.7                  |      |
|                     |                                    | $V_{CC} = 3 \text{ V to } 3.6 \text{ V}$    |                      | 0.8                  |      |
|                     |                                    | $V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$  |                      | $0.3 \times V_{CC}$  |      |
| $V_I$               | Input Voltage                      |                                             | 0                    | 5.5                  | V    |
| $V_O$               | Output Voltage                     |                                             | 0                    | $V_{CC}$             | V    |
| $I_{OL}$            | Low-level output current           | $V_{CC} = 1.4 \text{ V}$                    |                      | 3                    | mA   |
|                     |                                    | $V_{CC} = 1.65 \text{ V}$                   |                      | 4                    |      |
|                     |                                    | $V_{CC} = 2.3 \text{ V}$                    |                      | 8                    |      |
|                     |                                    | $V_{CC} = 3 \text{ V}$                      |                      | 16                   |      |
|                     |                                    |                                             |                      | 24                   |      |
|                     |                                    | $V_{CC} = 4.5 \text{ V}$                    |                      | 32                   |      |
| $\Delta t/\Delta V$ | Input transition rise or fall rate | $V_{CC} = 1.4 \text{ V to } 3.0 \text{ V}$  |                      | 20                   | ns/V |
|                     |                                    | $V_{CC} = 3.3 \text{ V} \pm 0.3 \text{ V}$  |                      | 10                   |      |
|                     |                                    | $V_{CC} = 5 \text{ V} \pm 0.5 \text{ V}$    |                      | 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     |     |     | $\pm 5$  | $\mu A$      |
| $I_{OZ}$        | Z State Leakage Current             | $V_O = 5.5V$                          | 3.6 V          |     |     | $\pm 10$ | $\mu A$      |
| $I_{OFF}$       | Power Down Leakage Current          | $V_I \text{ or } V_O = 5.5V$          | 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                   | $V_I = V_{CC} \text{ or GND}$         | 3.3V           |     | 4   |          | pF           |
| $C_O$           | Output Capacitance                  | $V_O = V_{CC} \text{ or GND}$         | 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)

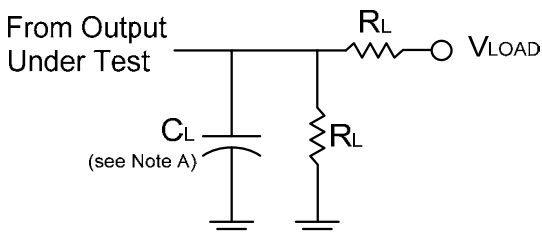
| Parameter | From<br>(Input) | TO<br>(OUTPUT) | Vcc = 1.5 V<br>± 0.1V |     | Vcc = 1.8 V<br>± 0.15V |     | Vcc = 2.5 V<br>± 0.2V |     | Vcc = 3.3 V<br>± 0.3V |     | Vcc = 5 V<br>± 0.5V |     | Unit |
|-----------|-----------------|----------------|-----------------------|-----|------------------------|-----|-----------------------|-----|-----------------------|-----|---------------------|-----|------|
|           |                 |                | Min                   | Max | Min                    | Max | Min                   | Max | Min                   | Max | Min                 | Max |      |
| $t_{pd}$  | A               | Y              | 1.5                   | 9.9 | 1                      | 5.8 | 0.8                   | 4.4 | 0.8                   | 3.4 | 0.8                 | 3.1 | ns   |

### Operating Characteristics

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

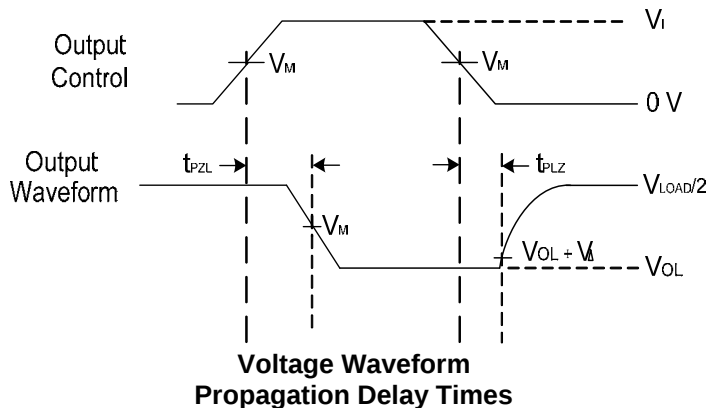
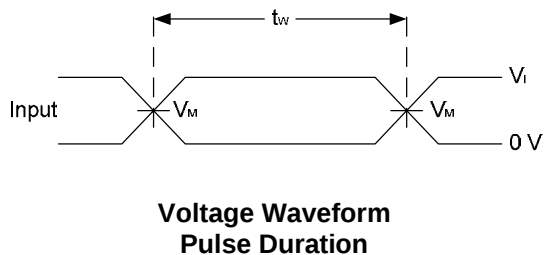
| Parameter |                                     | Test<br>Conditions  | Vcc = 1.5 V | Vcc = 1.8 V | Vcc = 2.5 V | Vcc = 3.3 V | Vcc = 5 V | Unit |
|-----------|-------------------------------------|---------------------|-------------|-------------|-------------|-------------|-----------|------|
| 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

**Parameter Measurement Information**



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

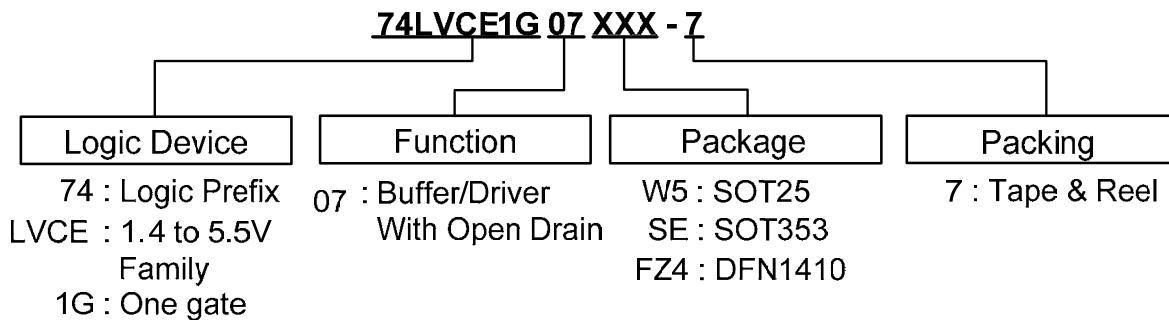
| $V_{CC}$         | Inputs   |              | $V_M$      | $V_{LOAD}$        | $C_L$ | $R_L$        | $V_{\Delta}$ |
|------------------|----------|--------------|------------|-------------------|-------|--------------|--------------|
|                  | $V_I$    | $t_r/t_f$    |            |                   |       |              |              |
| $1.8V \pm 0.15V$ | $V_{CC}$ | $\leq 2ns$   | $V_{CC}/2$ | $2 \times V_{CC}$ | 30pF  | 1K $\Omega$  | 0.15V        |
| $2.5V \pm 0.2V$  | $V_{CC}$ | $\leq 2ns$   | $V_{CC}/2$ | $2 \times V_{CC}$ | 30pF  | 500 $\Omega$ | 0.15V        |
| $3.3V \pm 0.3V$  | 3V       | $\leq 2.5ns$ | 1.5V       | 6V                | 50pF  | 500 $\Omega$ | 0.3V         |
| $5V \pm 0.5V$    | $V_{CC}$ | $\leq 2.5ns$ | $V_{CC}/2$ | $2 \times V_{CC}$ | 50pF  | 500 $\Omega$ | 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  $\leq 10$  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



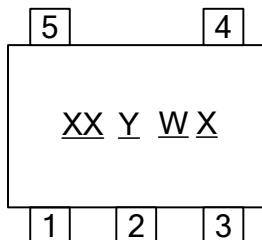
| Device          | Package Code | Packaging (Note 6) | 7" Tape and Reel |                    |
|-----------------|--------------|--------------------|------------------|--------------------|
|                 |              |                    | Quantity         | Part Number Suffix |
| 74LVCE1G07W5-7  | W5           | SOT25              | 3000/Tape & Reel | -7                 |
| 74LVCE1G07SE-7  | SE           | SOT353             | 3000/Tape & Reel | -7                 |
| 74LVCE1G07FZ4-7 | 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>.

## Marking Information

### (1) SOT25 and SOT353

(Top View)



XX : Identification code

Y : Year 0~9

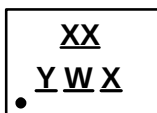
W : Week : A~Z : 1~26 week;  
a~z : 27~52 week; z represents  
52 and 53 week

X : A~Z : Internal code

| Part Number  | Package | Identification Code |
|--------------|---------|---------------------|
| 74LVCE1G07W5 | SOT25   | PN                  |
| 74LVCE1G07SE | SOT353  | PN                  |

### (3) DFN1410

(Top View)



XX : Identification Code

Y : Year : 0~9

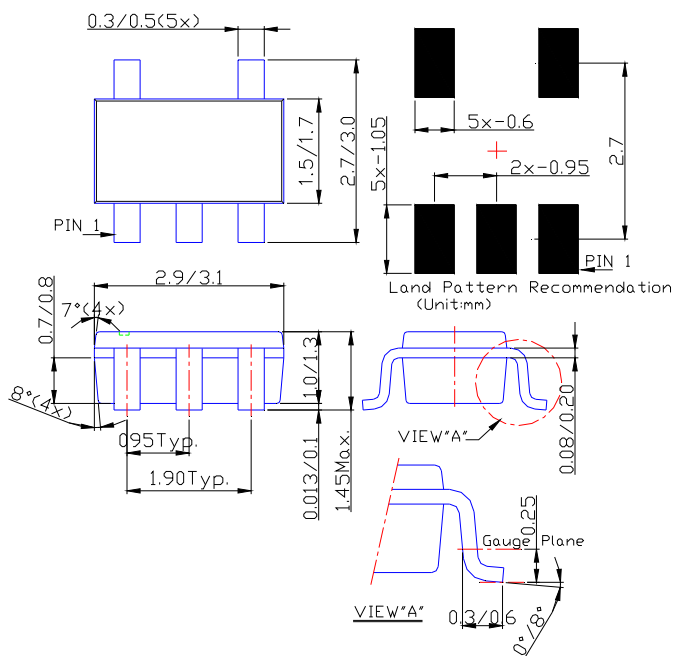
W : Week : A~Z : 1~26 week;  
a~z : 27~52 week; z represents  
52 and 53 week

X : A~Z : Internal code

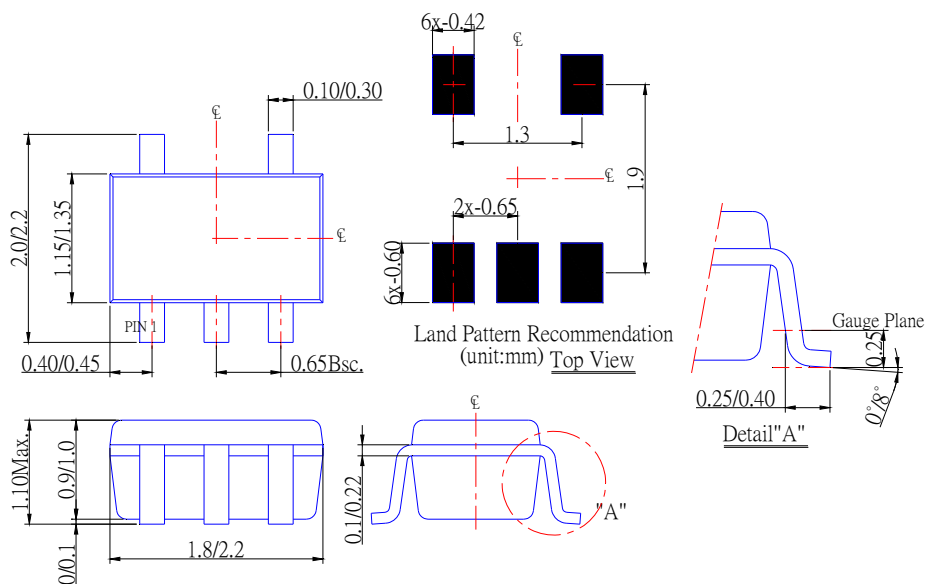
| Part Number   | Package | Identification Code |
|---------------|---------|---------------------|
| 74LVCE1G07FZ4 | DFN1410 | PN                  |

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

**(1) Package Type: SOT25**

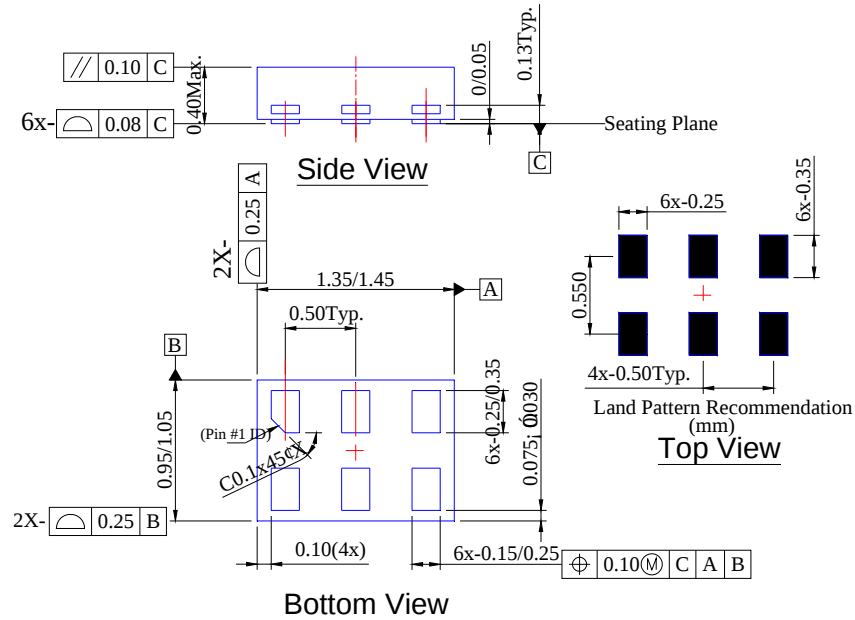


**(2) Package Type: SOT353**



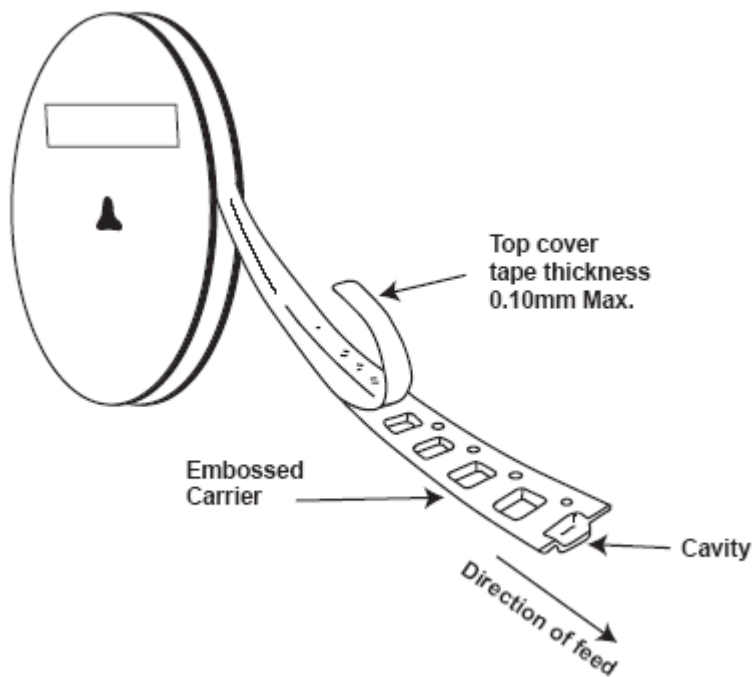
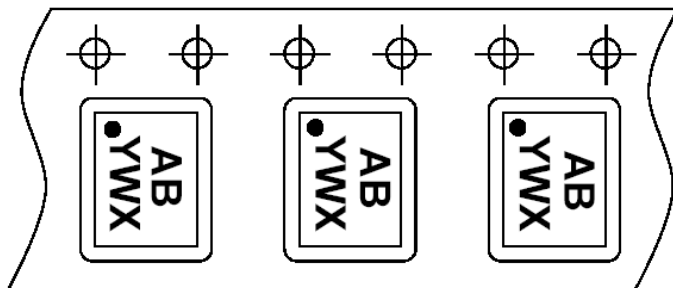
**Package Outline Dimensions (Continued)**

**(3) Package Type: DFN1410**



**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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