

### Description

The 74LVCE1G32 is a single 2-input positive OR gate with a standard totem pole output. The device is designed for operation with a power supply range of 1.4V 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  $I_{OFF}$ . The  $I_{OFF}$  circuitry disables the output preventing damaging current backflow when the device is powered down.

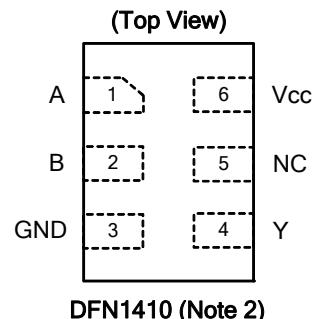
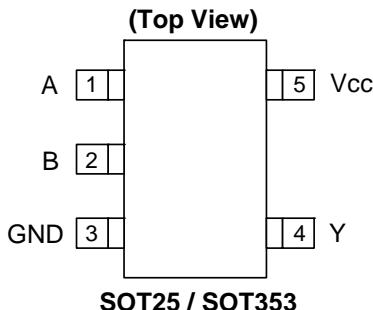
The gate performs the positive Boolean function:

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

### Features

- Extended Supply Voltage Range from 1.4 to 5.5V
- Switching speed characterized for operation at 1.5V
- Offers 30% speed improvement over LVC at 1.8V.
- $\pm 24\text{mA}$  Output Drive at 3.3V
- CMOS low power consumption
- IOFF Supports Partial-Power-Down Mode Operation
- Inputs accept up to 5.5V
- ESD Protection 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)

### Pin Assignments



### Applications

- Voltage Level Shifting
- Bus Driver / Repeater
- Power Down Signal Isolation
- General Purpose Logic
- 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

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.

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**Pin Descriptions**

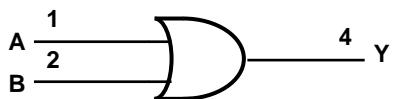
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Pin Name	Description
A	Data Input
B	Data Input
GND	Ground
Y	Data Output
Vcc	Supply Voltage

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**Logic Diagram**

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**Function Table**

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Inputs		Output
A	B	Y
H	X	H
X	H	H
L	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

Note: 3. Stresses beyond the absolute maximum may result in immediate failure or reduced reliability. These are stress values and device operation should be within recommended values.

**Recommended Operating Conditions (Note 4)**

Symbol	Parameter	Min	Max	Unit
$V_{CC}$	Operating	1.4	5.5	V
	Data retention only	1.2		V
$V_{IH}$	High-level Input Voltage	$0.65 \times V_{CC}$		V
		1.7		
		2		
		$0.7 \times V_{CC}$		
$V_{IL}$	Low-level input voltage	$0.35 \times V_{CC}$		V
		0.7		
		0.8		
		$0.3 \times V_{CC}$		
$V_I$	Input Voltage	0	5.5	V
$V_O$	Output Voltage	0	$V_{CC}$	V
$I_{OH}$	High-level output current	$V_{CC}=1.4\text{ V}$	-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	
$I_{OL}$	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	$V_{CC}=1.4\text{ to }3\text{ V}$	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

Note: 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	V <sub>CC</sub>	Min	Typ.	Max	Unit
V <sub>OH</sub>	High Level Output Voltage	I <sub>OH</sub> = -100µA	1.4 V to 5.5V	V <sub>CC</sub> - 0.1			V
		I <sub>OH</sub> = -3mA	1.4 V	1.05			
		I <sub>OH</sub> = -4mA	1.65 V	1.2			
		I <sub>OH</sub> = -8mA	2.3V	1.9			
		I <sub>OH</sub> = -16mA	3 V	2.4			
		I <sub>OH</sub> = -24mA		2.3			
		I <sub>OH</sub> = -32mA	4.5 V	3.8			
V <sub>OL</sub>	High-level Input Voltage	I <sub>OL</sub> = 100µA	1.4 V to 5.5V			0.1	V
		I <sub>OL</sub> = 3mA	1.4 V			.4	
		I <sub>OL</sub> = 4mA	1.65 V			0.45	
		I <sub>OL</sub> = 8mA	2.3V			0.3	
		I <sub>OL</sub> = 16mA	3 V			0.4	
		I <sub>OL</sub> = 24mA				0.55	
		I <sub>OL</sub> = 32mA	4.5			0.55	
I <sub>I</sub>	Input Current	V <sub>I</sub> = 5.5 V or GND	0 to 5.5 V			± 5	µA
I <sub>OFF</sub>	Power Down Leakage Current	V <sub>I</sub> or V <sub>O</sub> = 5.5V	0			± 10	µA
I <sub>CC</sub>	Supply Current	V <sub>I</sub> = 5.5V or GND I <sub>O</sub> =0	1.4 V to 5.5V			10	µA
ΔI <sub>CC</sub>	Additional Supply Current	One input at V <sub>CC</sub> – 0.6 V Other inputs at V <sub>CC</sub> or GND	3 V to 5.5V			500	µA
C <sub>i</sub>	Input Capacitance	V <sub>I</sub> = V <sub>CC</sub> – or GND	3.3		3.5		pF
θ <sub>JA</sub>	Thermal Resistance Junction-to-Ambient	SOT25	(Note 5)		204		°C/W
		SOT353	(Note 5)		371		
		DFN1410	(Note 5)		430		
θ <sub>JC</sub>	Thermal Resistance Junction-to-Case	SOT25	(Note 5)		52		°C/W
		SOT353	(Note 5)		143		
		DFN1410	(Note 5)		190		

Note: 5. Test condition for SOT25, SOT353, and DFN1410: Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.

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**Switching Characteristics**


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Over recommended free-air temperature range, CL = 15pF (see Figure 1)

Parameter	From (Input)	TO (OUTPUT)	Vcc = 1.5 V ± 0.1V		Vcc = 1.8 V ± 0.15V		Vcc = 2.5 V ± 0.2V		Vcc = 3.3 V ± 0.3V		Vcc = 5 V ± 0.5V		
			Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	
t <sub>pd</sub>	A or B	Y	1.9	7.2	1.3	5	0.6	3.5	0.7	2.9	0.7	2.9	ns

Over recommended free-air temperature range, CL = 30 or 50pF as noted (see Figure 2)

Parameter	From (Input)	TO (OUTPUT)	Vcc = 1.5 V ± 0.1V		Vcc = 1.8 V ± 0.15V		Vcc = 2.5 V ± 0.2V		Vcc = 3.3 V ± 0.3V		Vcc = 5 V ± 0.5V		
			Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	
t <sub>pd</sub>	A or B	Y	2.8	8	1.9	5.6	0.9	4.4	0.9	3.6	0.9	3.6	ns

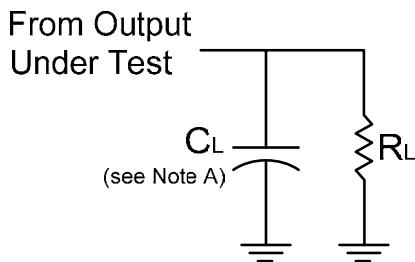
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**Operating Characteristics**

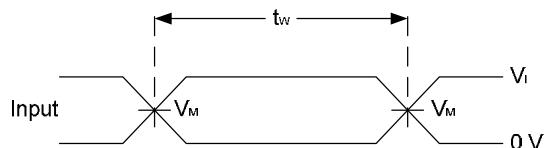
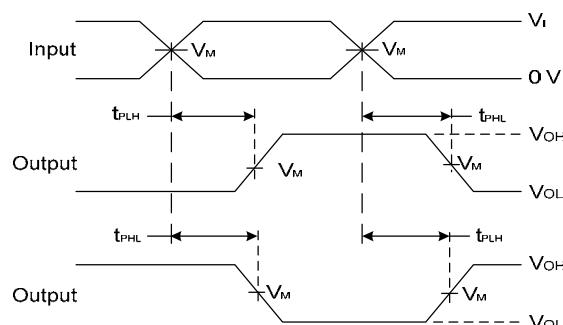

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 T<sub>A</sub> = 25 °C

Parameter	Test 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	TYP	TYP	TYP	TYP	TYP	
C <sub>pd</sub>	Power dissipation capacitance	f = 10 MHz	20	20	20	21	21	22	22	22	22	pF

**Parameter Measurement Information**


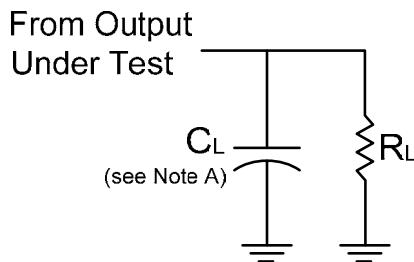
V <sub>cc</sub>	Inputs		V <sub>M</sub>	C <sub>L</sub>	R <sub>L</sub>
	V <sub>I</sub>	t <sub>r</sub> /t <sub>f</sub>			
1.5V±0.1V	V <sub>cc</sub>	≤2ns	V <sub>cc</sub> /2	15pF	1MΩ
1.8V±0.15V	V <sub>cc</sub>	≤2ns	V <sub>cc</sub> /2	15pF	1MΩ
2.5V±0.2V	V <sub>cc</sub>	≤2ns	V <sub>cc</sub> /2	15pF	1MΩ
3.3V±0.3V	3V	≤2.5ns	1.5V	15pF	1MΩ
5V±0.5V	V <sub>cc</sub>	≤2.5ns	V <sub>cc</sub> /2	15pF	1MΩ


**Voltage Waveform  
Pulse Duration**

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

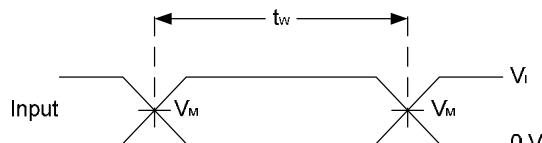
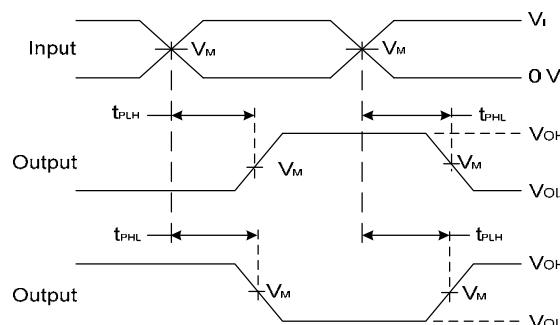
Notes:

- 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<sub>PLH</sub> and t<sub>PHL</sub> are the same as t<sub>PD</sub>.

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

**Parameter Measurement Information (Continued)**


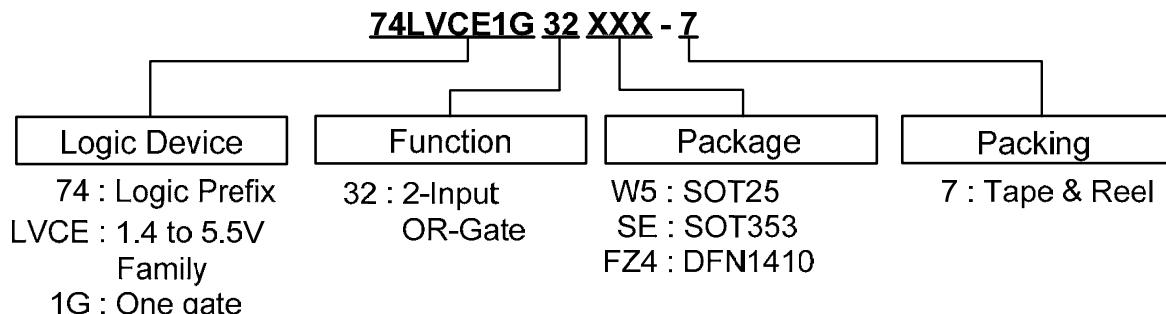
V <sub>cc</sub>	Inputs		V <sub>M</sub>	C <sub>L</sub>	R <sub>L</sub>
	V <sub>I</sub>	t <sub>r</sub> /t <sub>f</sub>			
1.5V±0.1V	V <sub>cc</sub>	≤2ns	V <sub>cc</sub> /2	30pF	1KΩ
1.8V±0.15V	V <sub>cc</sub>	≤2ns	V <sub>cc</sub> /2	30pF	1KΩ
2.5V±0.2V	V <sub>cc</sub>	≤2ns	V <sub>cc</sub> /2	30pF	500Ω
3.3V±0.3V	3V	≤2.5ns	1.5V	50pF	500Ω
5V±0.5V	V <sub>cc</sub>	≤2.5ns	V <sub>cc</sub> /2	50pF	500Ω


**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**


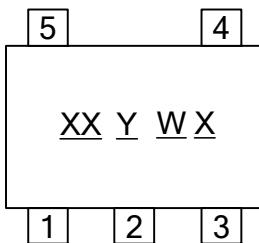
Device	Package Code	Packaging (Note 5)	7" Tape and Reel	
			Quantity	Part Number Suffix
74LVCE1G32W5-7	W6	SOT25	3000/Tape & Reel	-7
74LVCE1G32SE-7	SE	SOT353	3000/Tape & Reel	-7
74LVCE1G32FZ4-7	FZ4	DFN1410	5000/Tape & Reel	-7

Note: 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)

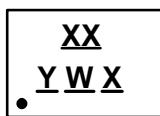


XX : Identification code  
Y : Year 0~9  
W : Week : A~Z : 1~26 week;  
 a~z : 27~52 week; z represents  
 52 and 53 week  
X : A~Z : Internal code

Part Number	Package	Identification Code
74LVCE1G32W5	SOT25	PW
74LVCE1G32SE	SOT353	PW

### (2) DFN1410

(Top View)

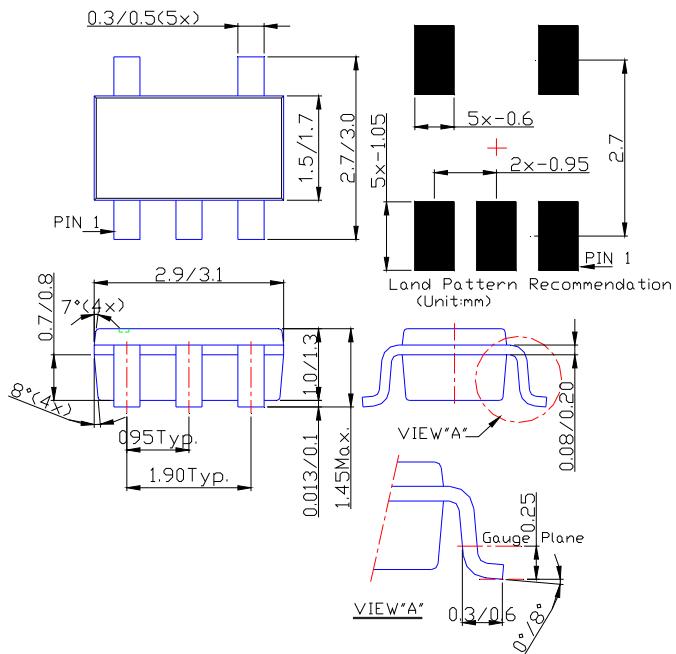


XX : Identification Code  
Y : Year : 0~9  
W : Week : A~Z : 1~26 week;  
 a~z : 27~52 week; z represents  
 52 and 53 week  
X : A~Z : Internal code

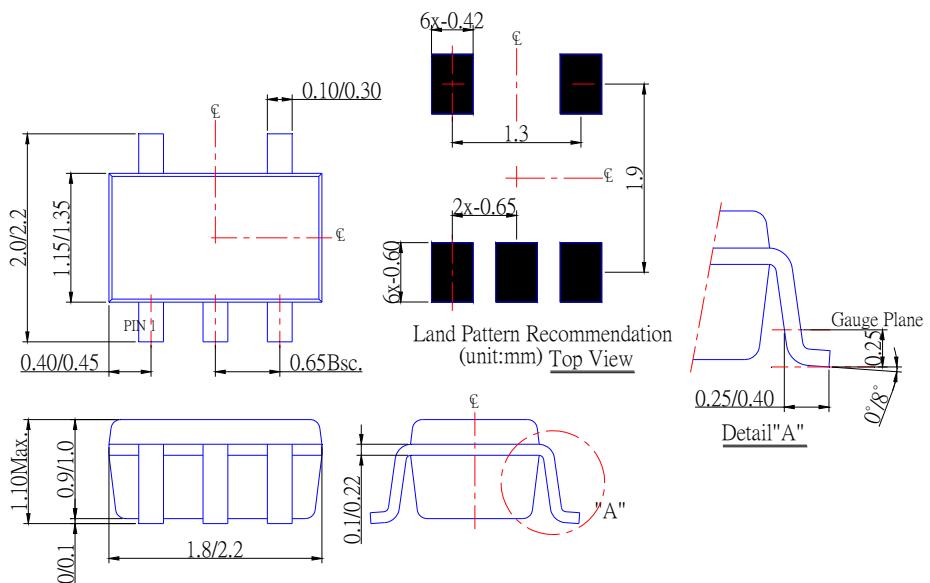
Part Number	Package	Identification Code
74LVCE1G32FZ4	DFN1410	PW

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

**(1) Package Type: SOT25**

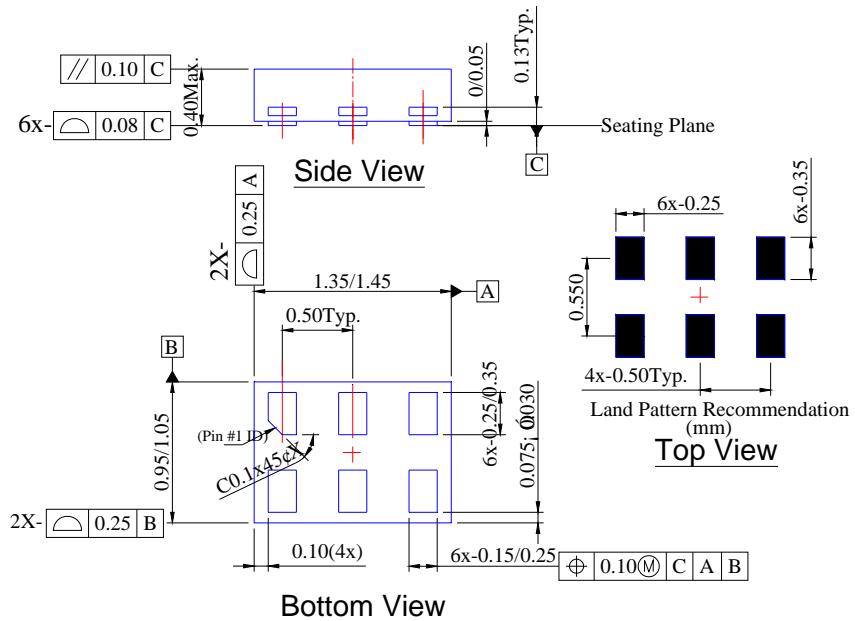


**(2) Package Type: SOT353**



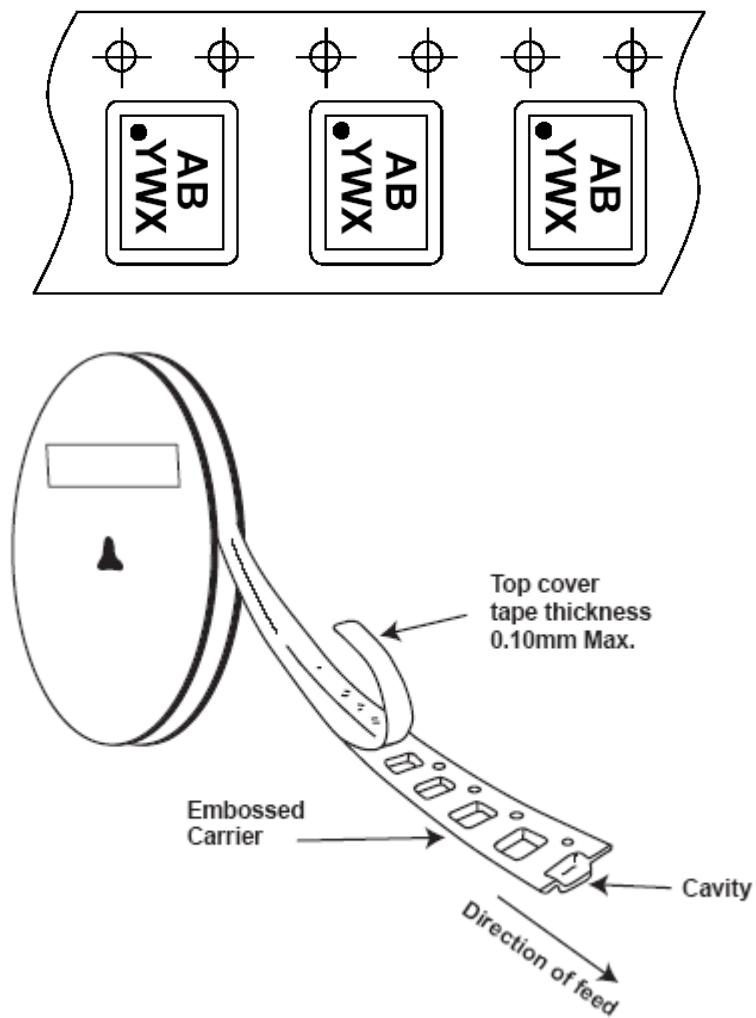
**Package Outline Dimensions (All Dimensions in mm)**

**(3) Package Type: DFN1410**



**Taping Orientation (Note 7)**

For DFN1410



Note: 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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