74LVCE1G126

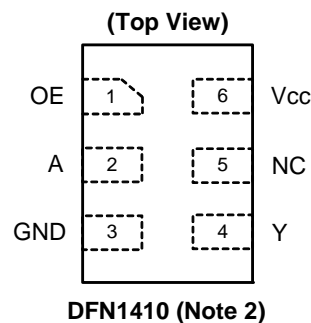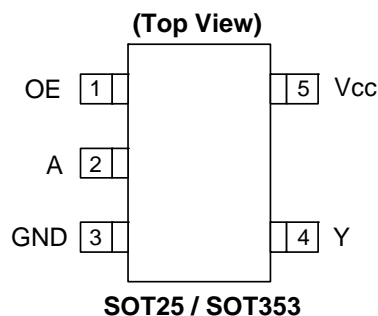## SINGLE BUFFER GATE WITH 3-STATE OUTPUT

Description

The 74LVCE1G126 is a single non-inverting buffer/bus driver with a 3-state output. The output enters a high impedance state when a LOW-level is applied to the output enable (OE) pin. 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.

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.
- ± 24mA 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

(Top View)

OE	1		5	Vcc
A	2			
GND	3		4	Y

SOT25 / SOT353

(Top View)

|				
OE	1		6	Vcc
A	2		5	NC
GND	3		4	Y

DFN1410 (Note 2)

Applications

- Voltage Level Shifting
- Bus Driver / Repeater
- Power Down Signal Isolation
- General Purpose Logic
- 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.
2. Pin 2 and pin 5 of the DFN1410 package are internally connected.

74LVCE1G126
Document number: DS32217 Rev. 3 - 2

1 of 14
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Pin Descriptions

Pin Name	Description
OE	Output Enable (active high)
A	Data Input
GND	Ground
Y	Data Output
Vcc	Supply Voltage

Logic Diagram
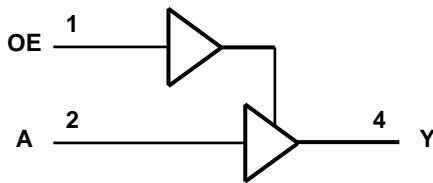
Function Table

Inputs		Output
OE	A	Y
H	H	H
H	L	L
L	X	Z

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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	°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 recommend values.

74LVCE1G126
Document number: DS32217 Rev. 3 - 2

3 of 14
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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_{OH}	High Level Output Current	Vcc=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	
I_{OL}	Low Level Output Current	Vcc=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 to 3V		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	ºC

Note: 4. Unused inputs should be held at Vcc or Ground.

74LVCE1G126
Document number: DS32217 Rev. 3 - 2

4 of 14
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Electrical Characteristics (All typical values are at Vcc = 3.3V, T_A = 25°C)

Over recommended free-air temperature range (unless otherwise noted)

Symbol	Parameter	Test Conditions	Vcc	Min	Typ.	Max	Unit
V_{OH}	High Level Output Voltage	I_{OH} = -100µA	1.4 V to 5.5V	$V_{CC} - 0.1$			V
		I_{OH} = -3mA	1.4 V	1.05			
		I_{OH} = -4mA	1.65 V	1.2			
		I_{OH} = -8mA	2.3V	1.9			
		I_{OH} = -16mA	3 V	2.4			
		I_{OH} = -24mA		2.3			
		I_{OH} = -32mA	4.5 V	3.8			
V_{OL}	Low Level Output Voltage	I_{OL} = 100µA	1.4 V to 5.5V			0.1	V
		I_{OL} = 3mA	1.4V			.4	
		I_{OL} = 4mA	1.65 V			0.45	
		I_{OL} = 8mA	2.3V			0.3	
		I_{OL} = 16mA	3 V			0.4	
		I_{OL} = 24mA				0.55	
		I_{OL} = 32mA	4.5			0.55	
I_I	Input Current	V_I = 5.5 V or GND	0 to 5.5 V			± 5	µA
I_{OFF}	Power Down Leakage Current	V_I or V_O = 5.5V	0			± 10	µA
I_{OZ}	Z State Leakage Current	V_O =0 to 5.5V	3.6V			10	µA
I_{CC}	Supply Current	V_I = 5.5V of GND I_O=0	1.4 V to 5.5V			10	µA
ΔI_{CC}	Additional Supply Current	One input at V_{CC} – 0.6 V Other inputs at V_{CC} or GND	3 V to 5.5V			500	µA
C_i	Input Capacitance	V_i = V_{CC} – or GND	3.3		3.5		pF
θ_{JA}	Thermal Resistance Junction-to-Ambient	SOT25	(Note 5)		204		°C/W
		SOT353	(Note 5)		371		
		DFN1410	(Note 5)		430		
θ_{JC}	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.

74LVCE1G126
Document number: DS32217 Rev. 3 - 2

5 of 14
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February 2011
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Switching Characteristics

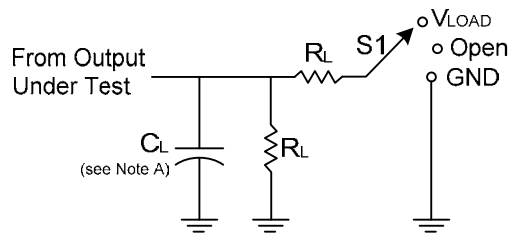Over recommended free-air temperature range, CL = 15pF (see Figure 1)

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		Unit
			Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	
t_{pd}	A	Y	1.7	6.9	1.1	4.8	0.4	3.6	0.4	3	0.4	3	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		Unit
			Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	
t_{pd}	A	Y	2.6	8	1.8	5.6	0.8	4.4	0.8	3.6	0.9	3.6	ns
t_{en}	$\overline{OE}$	Y	2.8	9.4	1.9	6.5	1	5.2	0.9	4.3	0.9	4.3	
t_{dis}	$\overline{OE}$	Y	1.6	9.8	1.1	6.8	0.8	4.4	0.8	4.5	0.9	3.7	

Operating Characteristics

T_A = 25 ºC

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	
C_{pd}	Power dissipation capacitance	Outputs enabled	f = 10 MHz	19	19	19	19	19	pF
		Outputs disabled		2	2	2	3	4	

74LVCE1G126
Document number: DS32217 Rev. 3 - 2

6 of 14
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February 2011
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Parameter Measurement Information

TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	Vload
t_{PHZ}/t_{PZH}	GND

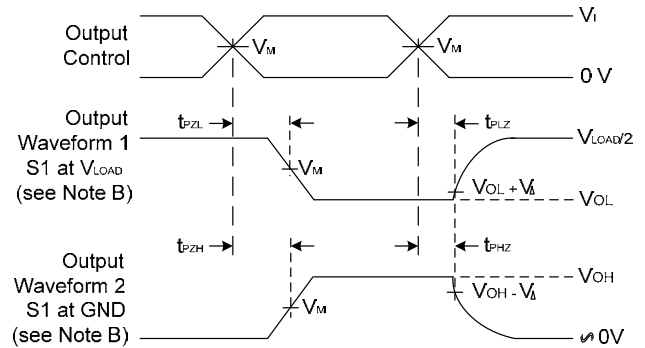| Vcc	Inputs		V_M	C_L	R_L
	V_I	t_r/t_f			
1.5V±0.1V	V_{CC}	≤2ns	$V_{CC}/2$	15pF	1MΩ
1.8V±0.15V	V_{CC}	≤2ns	$V_{CC}/2$	15pF	1MΩ
2.5V±0.2V	V_{CC}	≤2ns	$V_{CC}/2$	15pF	1MΩ
3.3V±0.3V	3V	≤2.5ns	1.5V	15pF	1MΩ
5V±0.5V	V_{CC}	≤2.5ns	$V_{CC}/2$	15pF	1MΩ
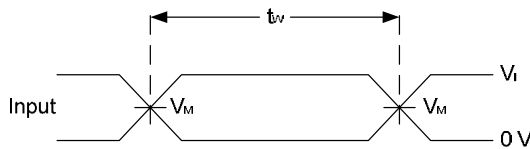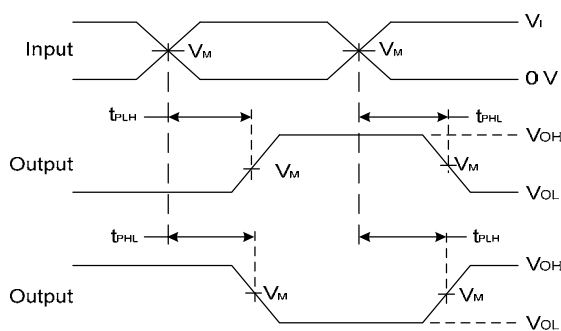
Voltage Waveform Pulse Duration

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

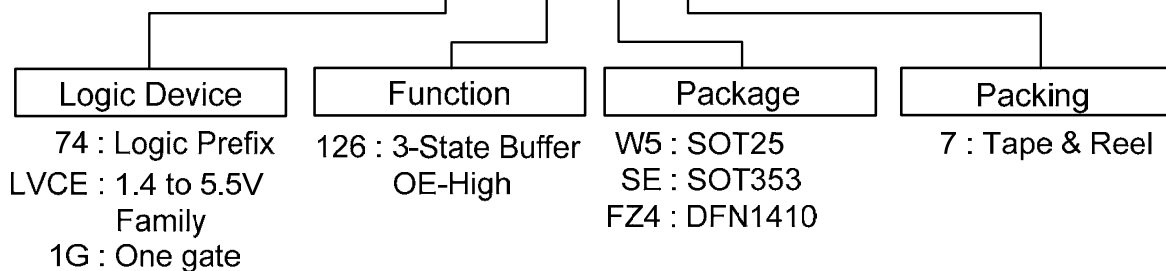**Voltage Waveform Enable and Disable Times
Low and High Level Enabling**

Notes: A. Includes test lead and test apparatus capacitance.
        B. All pulses are supplied at pulse repetition rate ≤ 10 MHz.
        C. Inputs are measured separately one transition per measurement.
        D. t_{PLZ} and t_{PHZ} are the same as $t_{dis.}$
        E. t_{PZL} and t_{PZH} are the same as $t_{EN.}$
        F. t_{PLH} and t_{PHL} are the same as $t_{PD}.$

Figure 1. Load Circuit and Voltage Waveforms

74LVCE1G126
Document number: DS32217 Rev. 3 - 2

7 of 14
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February 2011
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Parameter Measurement Information (Continued)
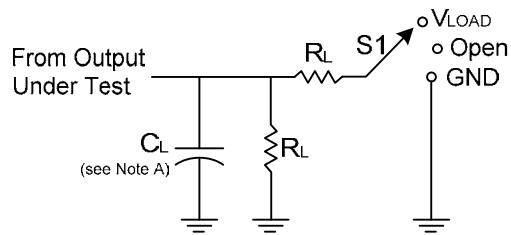
NEW PRODUCT

TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	Vload
t_{PHZ}/t_{PZH}	GND

Vcc	Inputs		V_M	C_L	R_L
	V_I	t_r/t_f			
1.5V±0.1V	V_{CC}	≤2ns	$V_{CC}/2$	30pF	1KΩ
1.8V±0.15V	V_{CC}	≤2ns	$V_{CC}/2$	30pF	1KΩ
2.5V±0.2V	V_{CC}	≤2ns	$V_{CC}/2$	30pF	500Ω
3.3V±0.3V	3V	≤2.5ns	1.5V	50pF	500Ω
5V±0.5V	V_{CC}	≤2.5ns	$V_{CC}/2$	50pF	500Ω
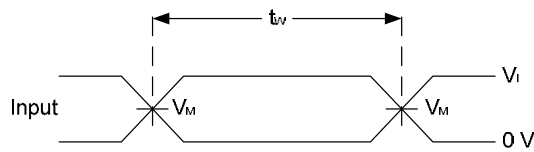
Voltage Waveform Pulse Duration
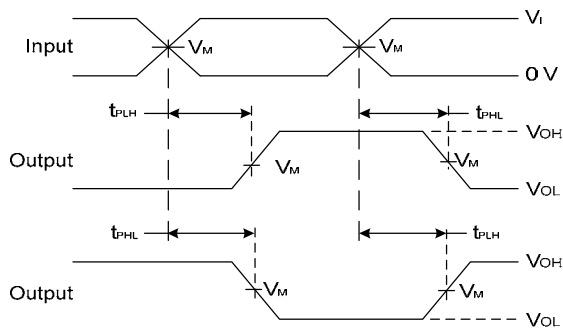
**Voltage Waveform Propagation Delay Times
Inverting and Non Inverting Outputs**
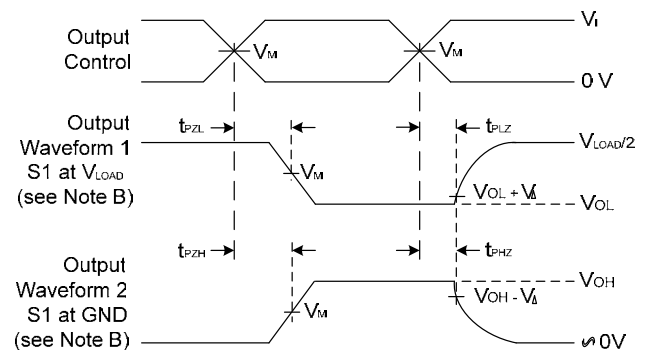
**Voltage Waveform Enable and Disable Times
Low and High Level Enabling**

Notes: A. Includes test lead and test apparatus capacitance.
B. All pulses are supplied at pulse repetition rate ≤ 10 MHz.
C. Inputs are measured separately one transition per measurement.
D. t_{PLZ} and t_{PHZ} are the same as t_{dis}.
E. t_{PZL} and t_{PZH} are the same as t_{EN0}.
F. t_{PLH} and t_{PHL} are the same as t_{PD}.

Figure 2. Load Circuit and Voltage Waveforms

74LVCE1G126
Document number: DS32217 Rev. 3 - 2

8 of 14
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SINGLE BUFFER GATE WITH 3-STATE OUTPUT

NEW PRODUCT

Ordering Information

74LVCE1G 126 XXX - 7

Logic Device	Function	Package	Packing
74 : Logic Prefix LVCE : 1.4 to 5.5V Family 1G : One gate	126 : 3-State Buffer OE-High	W5 : SOT25 SE : SOT353 FZ4 : DFN1410	7 : Tape & Reel

Device	Package Code	Packaging (Note 5)	7" Tape and Reel	
			Quantity	Part Number Suffix
74LVCE1G126W5-7	W6	SOT25	3000/Tape & Reel	-7
74LVCE1G126SE-7	SE	SOT353	3000/Tape & Reel	-7
74LVCE1G126FZ4-7	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.

74LVCE1G126
Document number: DS32217 Rev. 3 - 2

9 of 14
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February 2011
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Marking Information

(1) SOT25 and SOT353

(Top View)
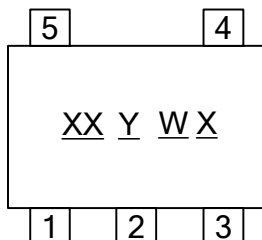
```
 5        4
┌─────────┐
│         │
│ XX Y W X│
│         │
└─────────┘
 1   2   3
```

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
74LVCE1G126W5	SOT25	PZ
74LVCE1G126SE	SOT353	PZ

(2) DFN1410

(Top View)
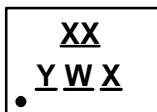
```
┌──────────┐
│   XX     │
│  Y W X   │
│ ●        │
└──────────┘
```

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
74LVCE1G126FZ4	DFN1410	PZ

74LVCE1G126
Document number: DS32217 Rev. 3 - 2

10 of 14
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February 2011
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Package Outline Dimensions (All Dimensions in mm)

(1) Package Type: SOT25

0.3/0.5(5x)

1.5/1.7

2.7/3.0

PIN 1

5x-1.05

5x-0.6

2x-0.95

2.7

PIN 1

Land Pattern Recommendation
(Unit:mm)

2.9/3.1

0.7/0.8

7°(4x)

8°(4x)

0.95Typ.

1.90Typ.

1.0/1.3

0.013/0.1

1.45Max.

0.08/0.20

VIEW"A"

Gauge Plane

0.25

VIEW"A"

0.3/0.6

0°/8°

(2) Package Type: SOT353

6x-0.42

0.10/0.30

1.3

1.9

2x-0.65

6x-0.60

2.0/2.2

1.15/1.35

PIN 1

0.40/0.45

0.65Bsc.

Land Pattern Recommendation
(unit:mm) Top View

Gauge Plane

0.25

0.25/0.40

0°/8°

Detail"A"

1.10Max.

0.9/1.0

0/0.1

1.8/2.2

0.10/0.22

"A"

74LVCE1G126
Document number: DS32217 Rev. 3 - 2

11 of 14
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Package Outline Dimensions (All Dimensions in mm)

(3) Package Type: DFN1410

Side View

Bottom View

Top View

Land Pattern Recommendation (mm)

74LVCE1G126
Document number: DS32217 Rev. 3 - 2

12 of 14
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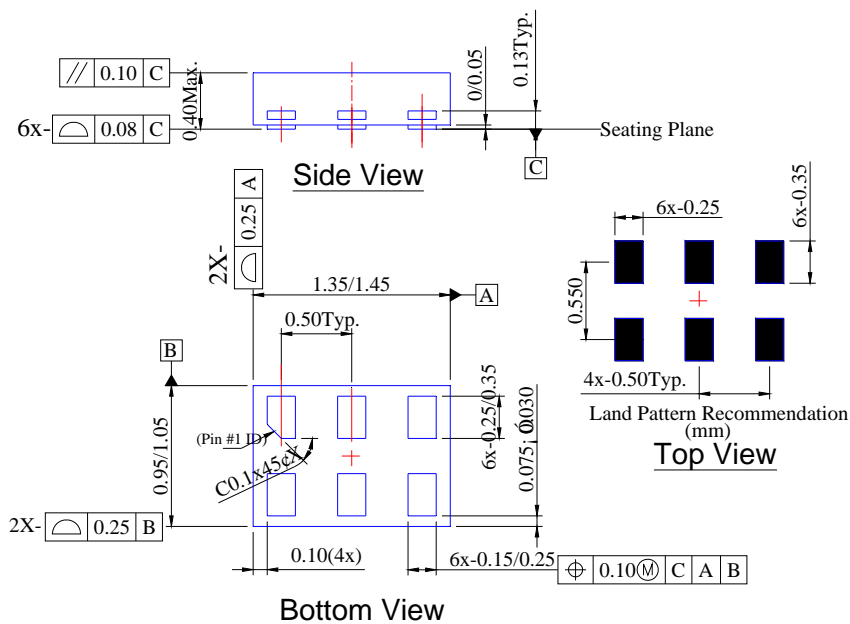
Taping Orientation (Note 7)

For DFN1410

Top cover
tape thickness
0.10mm Max.

Embossed
Carrier

Cavity

Direction of feed
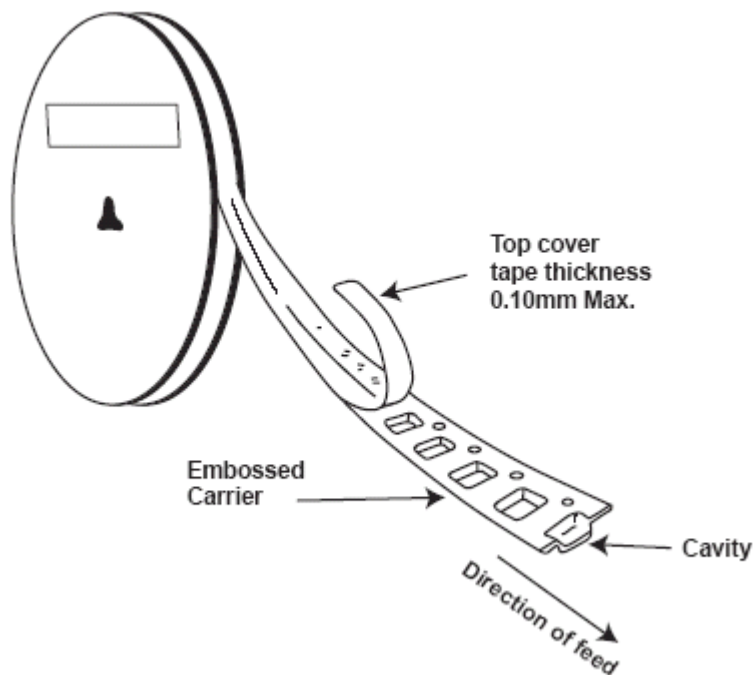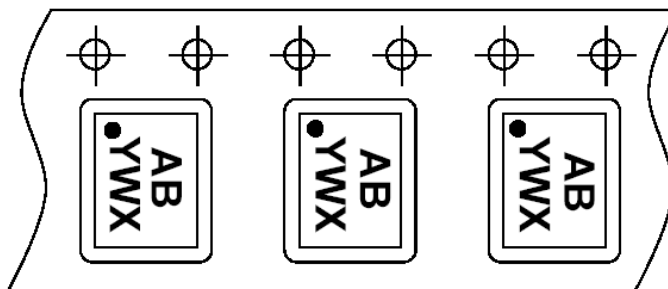
Note: 7. The taping orientation of the other package type can be found on our website at http://www.diodes.com/datasheets/ap02007.pdf

74LVCE1G126
Document number: DS32217 Rev. 3 - 2

13 of 14
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NEW PRODUCT

74LVCE1G126
Document number: DS32217 Rev. 3 - 2

14 of 14
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