

## 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.

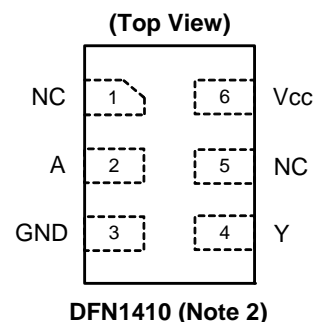
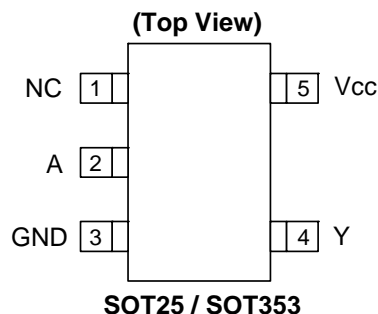
## Features

- Wide Supply Voltage Range from 1.65 to 5.5V
- $\pm 24\text{mA}$  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
- 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

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**Pin Descriptions**

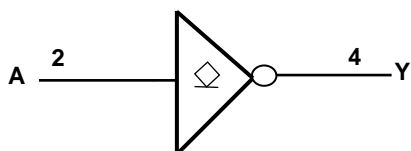
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Pin Name	Description
NC	No connection
A	Data Input
GND	Ground
Y	Data Output Open Drain
Vcc	Supply Voltage

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**Logic Diagram**

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**Function Table**

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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	°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	$V_I$ 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)

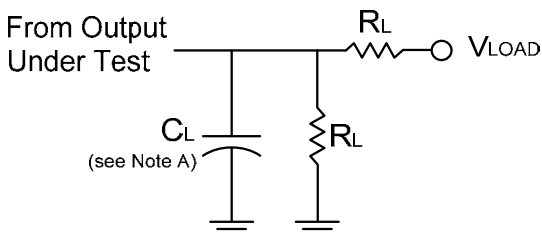
Parameter	From (Input)	TO (OUTPUT)	Vcc = 1.5 V ± 0.1V		Vcc = 1.8 V ± 0.15V		Vcc = 2.5 V ± 0.2V		Vcc = 3.3 V ± 0.3V		Vcc = 5 V ± 0.5V		Unit
			Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	
$t_{pd}$	A	Y	1.5	7.8	1	4.5	0.8	3.2	0.8	3.2	0.8	2.7	ns

### Operating Characteristics

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

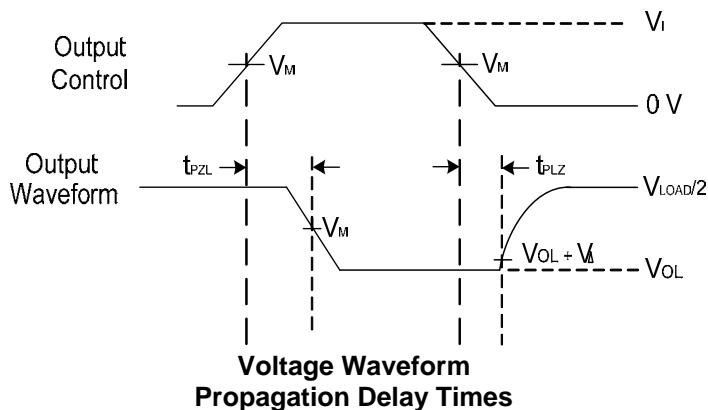
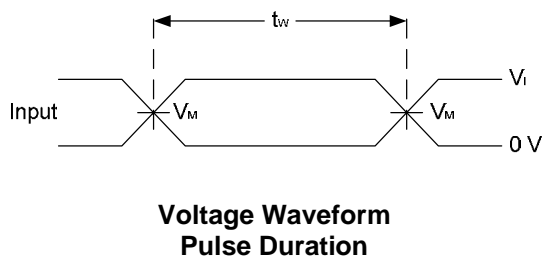
Parameter		Test Conditions	Vcc = 1.5 V	Vcc = 1.8 V	Vcc = 2.5 V	Vcc = 3.3 V	Vcc = 5 V	Unit
			TYP	TYP	TYP	TYP	TYP	
$C_{pd}$	Power dissipation capacitance	$f = 10\text{ MHz}$	3	3	3	4	6	pF

**Parameter Measurement Information**



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

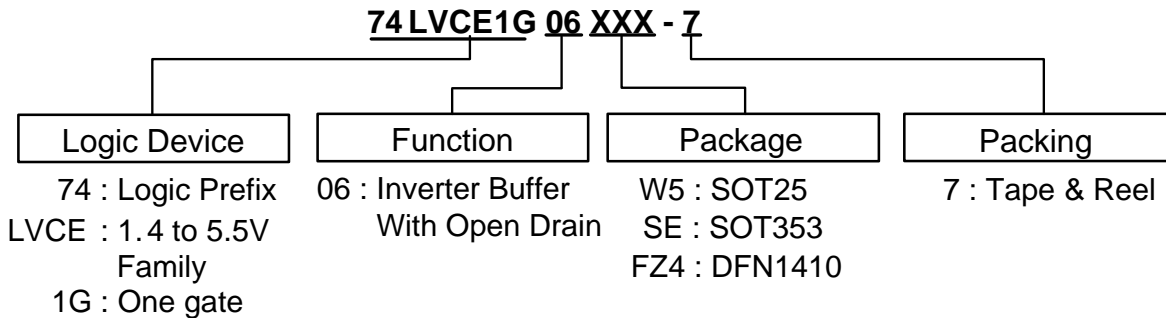
$V_{CC}$	Inputs		$V_M$	$V_{LOAD}$	$C_L$	$R_L$	$V_{\Delta}$
	$V_I$	$t_r/t_f$					
$1.8V \pm 0.15V$	$V_{CC}$	$\leq 2ns$	$V_{CC}/2$	$2 \times V_{CC}$	30pF	1K $\Omega$	0.15V
$2.5V \pm 0.2V$	$V_{CC}$	$\leq 2ns$	$V_{CC}/2$	$2 \times V_{CC}$	30pF	500 $\Omega$	0.15V
$3.3V \pm 0.3V$	3V	$\leq 2.5ns$	1.5V	6V	50pF	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
74LVCE1G06W5-7	W5	SOT25	3000/Tape & Reel	-7
74LVCE1G06SE-7	SE	SOT353	3000/Tape & Reel	-7
74LVCE1G06FZ4-7	FZ4	DFN1410	5000/Tape & Reel	-7

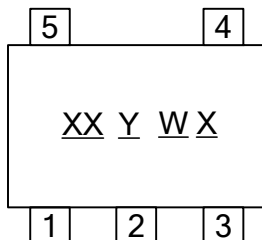
Notes: 6. Pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at <http://www.diodes.com/datasheets/ap02001.pdf>.



## Marking Information

### (1) SOT25 and SOT353

(Top View)

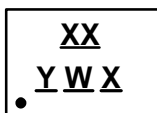


XX : Identification code  
Y : Year 0~9  
W : Week : A~Z : 1~26 week;  
a~z : 27~52 week; z represents  
52 and 53 week  
X : A~Z : Internal code

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

### (2) DFN1410

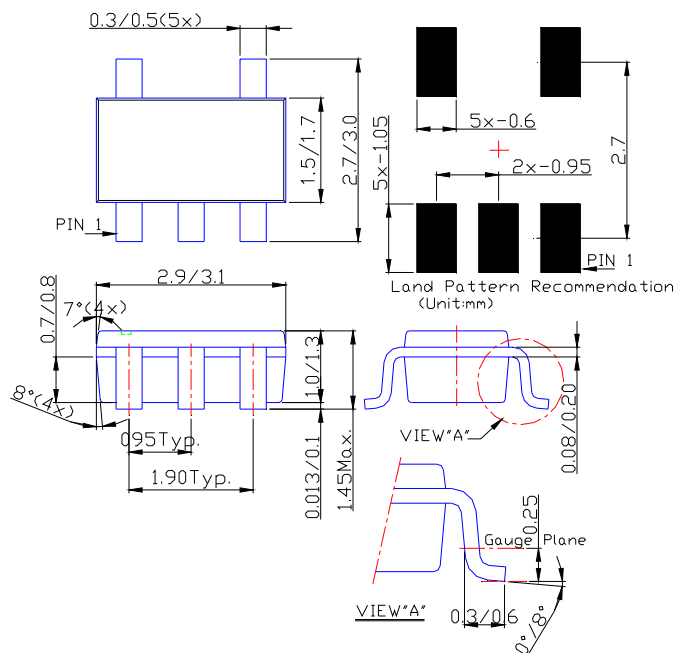
(Top View)



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

**(1) Package Type: SOT25**



Technical drawing of a 10-pin D-sub connector showing front, top, and detail views with dimensions in mm.

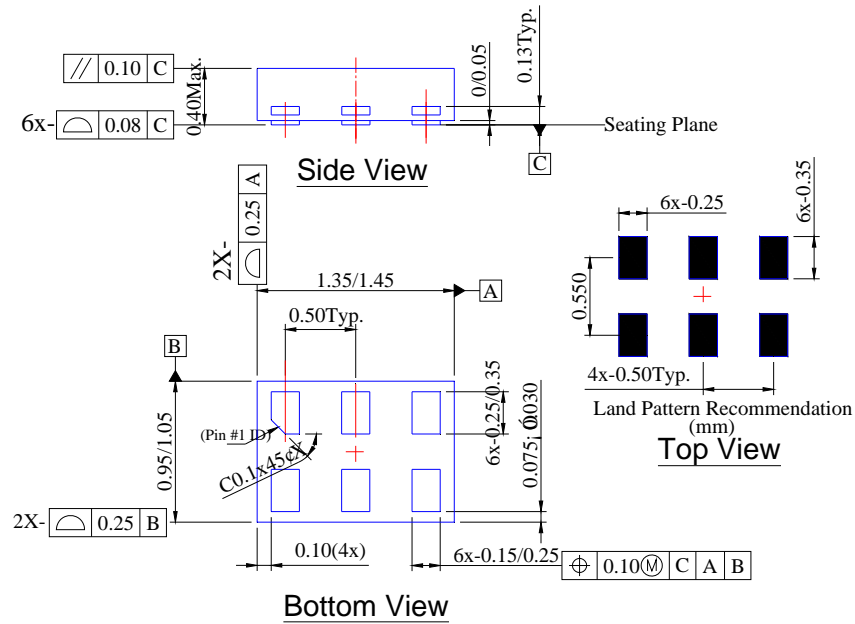
**Front View:** Overall height is 2.0/2.2 mm. Pin height is 1.15/1.35 mm. Pin pitch is 0.40/0.45 mm. Pin width is 0.65 BSC. Pin spacing is 0.10/0.30 mm. A centerline is indicated by a dashed red line.

**Top View:** Shows the land pattern recommendation. Dimensions include 6x-0.42 mm for the pin holes, 1.3 mm for the hole spacing, 1.9 mm for the overall width, 2x-0.65 mm for the land width, and 6x-0.60 mm for the land spacing. A centerline is indicated by a dashed red line.

**Detail "A":** Shows the profile of the connector housing. Dimensions include 0.25/0.40 mm for the base width, 0.25 mm for the base height, and a 0°/8° angle for the side wall. A gauge plane is indicated.

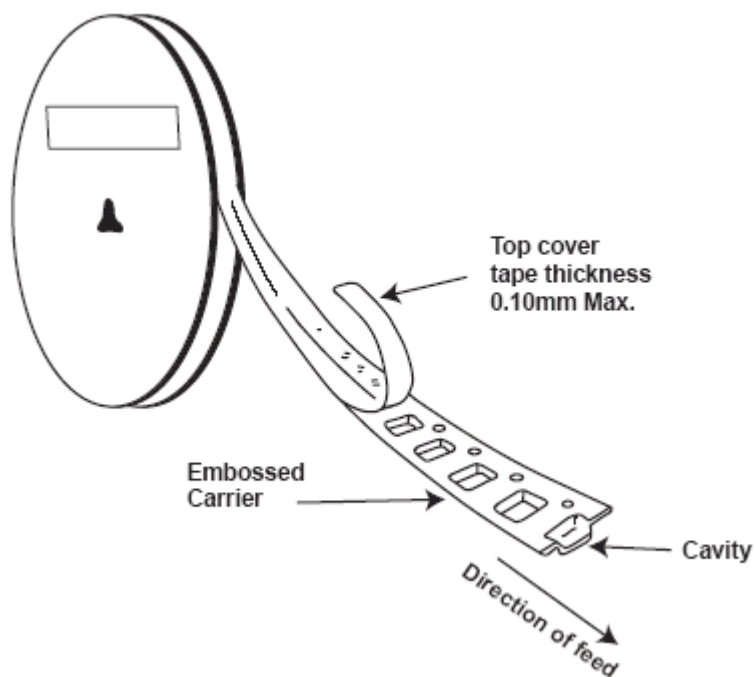
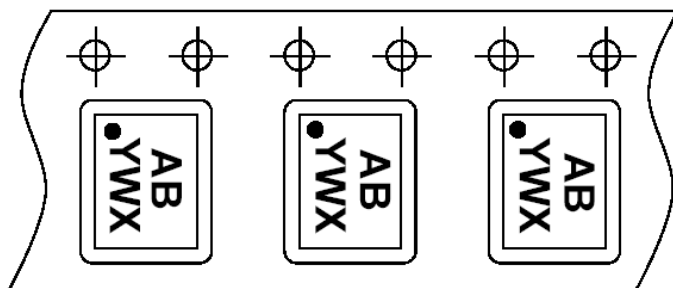
**Package Outline Dimensions (Continued)**

**(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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