

## Description

The 74LVC2G14 is a dual Schmitt trigger inverter gate with standard push-pull outputs. The device is designed for operation with a power supply range of 1.65V 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<sub>OFF</sub>. The I<sub>OFF</sub> circuitry disables the output preventing damaging current backflow when the device is powered down.

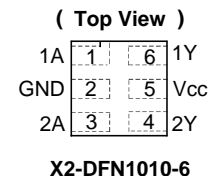
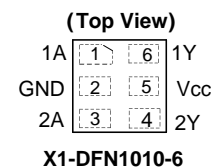
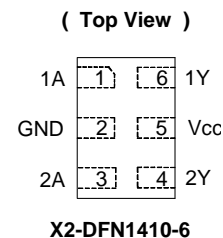
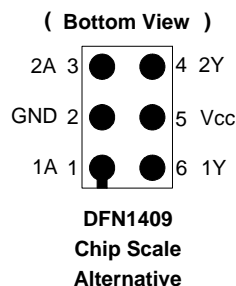
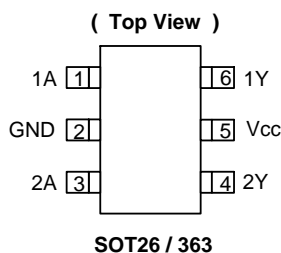
The gate performs the positive Boolean function:

$$Y = \overline{A}$$

## Features

- Wide Supply Voltage Range from 1.65V to 5.5V
- ±24mA Output Drive at 3.0V
- 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)
  - Exceeds 2000-V Human Body Model (A114)
  - Exceeds 1000-V Charged Device Model (C101)
- Latch-Up Exceeds 100mA per JESD 78, Class I
- DFN1409 Package Designed as a Direct Replacement for Chip Scale Packaging
- Range of Package Options SOT26, SOT363, X1-DFN1010-6, X2-DFN1010-6, X2-DFN1409-6, and X2-DFN1410-6
- Leadless Packages Named per JESD30E
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

## Pin Assignments

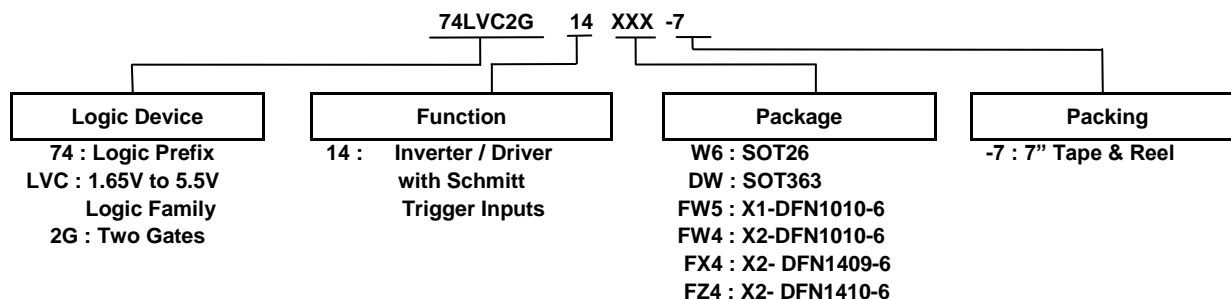


## Applications

- Voltage Level Shifting
- General Purpose Logic
- Power Down Signal Isolation
- Wide Array of Products Such As:
  - PCs, Networking, Notebooks, Netbooks, Tablets
  - Computer Peripherals, Hard Drives, SSD, CD/DVD ROM
  - TV, DVD, DVR, Set Top Box
  - Cell Phones, Personal Navigation / GPS
  - MP3 Players, Cameras, Video Recorders

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
  2. See [http://www.diodes.com/quality/lead\\_free.html](http://www.diodes.com/quality/lead_free.html) for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
  3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

## Ordering Information



Part Number	Package Code	Package (Note 4)	Package Size	7" Tape and Reel (Note 5)	
				Quantity	Part Number Suffix
74LVC2G14W6-7	W6	SOT26	2.8mm X 2.2 mm X 1.1mm 0.95 mm lead pitch	3000/Tape & Reel	-7
74LVC2G14DW-7	DW	SOT363	2.0mm X 2.0mm X 1.1mm 0.65 mm lead pitch	3000/Tape & Reel	-7
74LVC2G14FW5-7	FW5	X1-DFN1010-6	1.0mm X 1.0mm X 0.5mm 0.35 mm pad pitch	5000/Tape & Reel	-7
74LVC2G14FW4-7	FW4	X2-DFN1010-6	1.0mm X 1.0mm X 0.4mm 0.35 mm pad pitch	5000/Tape & Reel	-7
74LVC2G14FX4-7	FX4	X2-DFN1409-6 Chip Scale Alternative	1.4mm X 0.9mm X 0.4mm 0.5 mm pad pitch	5000/Tape & Reel	-7
74LVC2G14FZ4-7	FZ4	X2-DFN1410-6	1.4mm X 1.0mm X 0.4mm 0.5 mm pad pitch	5000/Tape & Reel	-7

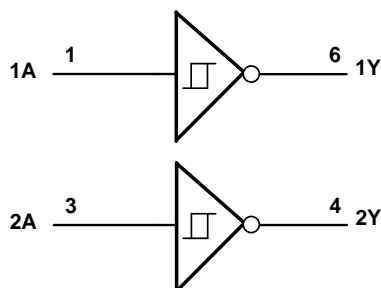
Notes: 4. Pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at <http://www.diodes.com/datasheets/ap02001.pdf>.

5. The taping orientation is located on our website at <http://www.diodes.com/datasheets/ap02007.pdf>.

## Pin Descriptions

Pin Name	Pin Number	Function
1A	1	Data Input
GND	2	Ground
2A	3	Data Input
2Y	4	Data Output
V <sub>CC</sub>	5	Supply Voltage
1Y	6	Data Output

## Logic Diagram



## Function Table

Inputs	Output
A	Y
H	L
L	H

**Absolute Maximum Ratings** (Notes 6 and 7) (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Symbol	Parameter	Rating	Unit
ESD HBM	Human Body Model ESD Protection	2	kV
ESD CDM	Charged Device Model ESD Protection	1	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 $V_O < 0$	-50	mA
$I_O$	Continuous Output Current	-50	mA
—	Continuous Current Through $V_{DD}$ or GND	$\pm 100$	mA
$T_J$	Operating Junction Temperature	-40 to +150	$^\circ\text{C}$
$T_{STG}$	Storage Temperature	-65 to +150	$^\circ\text{C}$

- Note:
- 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.
  - Forcing the maximum allowed voltage could cause a condition exceeding the maximum current or conversely forcing the maximum current could cause a condition exceeding the maximum voltage. The ratings of both current and voltage must be maintained within the controlled range.

**Recommended Operating Conditions** (Note 8) (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Symbol	Parameter	Min	Max	Unit	
$V_{CC}$	Operating Voltage	Operating	1.65	5.5	V
		Data retention only	1.5	—	V
$V_I$	Input Voltage	0	5.5	V	
$V_O$	Output Voltage	0	$V_{CC}$	V	
$I_{OH}$	High-Level Output Current	$V_{CC} = 1.65\text{V}$	—	-4	mA
		$V_{CC} = 2.3\text{V}$	—	-8	
		$V_{CC} = 3\text{V}$	—	-16	
		$V_{CC} = 4.5\text{V}$	—	-24	
$I_{OL}$	Low-Level Output Current	$V_{CC} = 1.65\text{V}$	—	4	mA
		$V_{CC} = 2.3\text{V}$	—	8	
		$V_{CC} = 3\text{V}$	—	16	
		$V_{CC} = 4.5\text{V}$	—	24	
$\Delta t/\Delta V$	Input Transition Rise or Fall Rate	$V_{CC} = 1.8\text{V} \pm 0.15\text{V}, 2.5\text{V} \pm 0.2\text{V}$	—	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	+125	$^\circ\text{C}$

- Note:
- Unused inputs should be held at  $V_{CC}$  or Ground.

**Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Symbol	Parameter	Test Conditions	$V_{CC}$	-40°C to +85°C		-40°C to +125°C		Unit	
				Min	Max	Min	Max		
$V_{T+}$	Positive-going Input Threshold Voltage	—	1.8V	0.70	1.50	0.70	1.70	V	
			2.3V	1.00	1.80	1.00	2.00		
			3V	1.30	2.20	1.30	2.40		
			4.5V	1.90	3.10	1.90	3.30		
			5.5V	2.20	3.60	2.20	3.80		
$V_{T-}$	Negative-going Input Threshold Voltage	—	1.65V	0.25	0.90	0.39	1.10	V	
			2.3V	0.40	1.15	0.25	0.87		
			3V	0.60	1.50	0.40	1.35		
			4.5V	1.00	2.00	0.60	1.70		
			5.5V	1.20	2.30	1.00	2.50		
$\Delta V_T$	Hysteresis ( $V_{T+} - V_{T-}$ )	—	1.8V	0.15	1.00	0.37	1.20	V	
			2.3V	0.25	1.10	0.15	1.30		
			3V	0.40	1.20	0.40	1.40		
			4.5V	0.60	1.50	0.60	1.70		
			5.5V	0.70	1.70	0.70	1.90		
$V_{OH}$	High-Level Output Voltage	$I_{OH} = -100\mu\text{A}$	1.65V to 4.5V	$V_{CC} - 0.1$	—	$V_{CC} - 0.1$	—	V	
		$I_{OH} = -4\text{mA}$	1.65V	1.2	—	0.95	—		
		$I_{OH} = -8\text{mA}$	2.3V	1.9	—	1.7	—		
		$I_{OH} = -16\text{mA}$	3V	2.4	—	1.9	—		
		$I_{OH} = -24\text{mA}$		2.3	—	2.0	—		
		$I_{OH} = -32\text{mA}$	4.5V	3.8	—	3.4	—		
$V_{OL}$	Low-Level Output Voltage	$I_{OL} = 100\mu\text{A}$	1.65V to 4.5V	—	0.1	—	0.10	V	
		$I_{OL} = 4\text{mA}$	1.65V	—	0.45	—	0.70		
		$I_{OL} = 8\text{mA}$	2.3V	—	0.3	—	0.45		
		$I_{OL} = 16\text{mA}$	3V	—	—	0.4	—		0.60
		$I_{OL} = 24\text{mA}$		—	—	0.55	—		0.80
		$I_{OL} = 32\text{mA}$	4.5V	—	—	0.55	—		0.80
$I_I$	Input Current	$V_I = 5.5\text{V}$ or GND	0 to 5.5V	—	$\pm 5$	—	$\pm 20$	$\mu\text{A}$	
$I_{OFF}$	Power Down Leakage Current	$V_I$ or $V_O = 5.5\text{V}$	0	—	$\pm 10$	—	$\pm 20$	$\mu\text{A}$	
$I_{CC}$	Supply Current	$V_I = 5.5\text{V}$ or GND, $I_O = 0$	1.65V to 5.5V	—	10	—	40	$\mu\text{A}$	

**Package Characteristics** (@T<sub>A</sub> = +25°C, V<sub>CC</sub> = 3.3V, unless otherwise specified.)

Symbol	Parameter	Package	Conditions	Min	Typ	Max	Unit
C <sub>I</sub>	Input Capacitance	Typical of all packages	V <sub>CC</sub> = 3.3V V <sub>I</sub> = V <sub>CC</sub> or GND	—	3.5	—	pF
θ <sub>JA</sub>	Thermal Resistance Junction-to-Ambient	SOT26	(Note 9)	—	204	—	°C/W
		SOT363		—	371	—	
		X2-DFN1410-6		—	430	—	
		X2-DFN1409-6		—	450	—	
		X1-DFN1010-6		—	495	—	
		X2-DFN1010-6		—	510	—	
θ <sub>JC</sub>	Thermal Resistance Junction-to-Case	SOT26	(Note 9)	—	52	—	°C/W
		SOT363		—	143	—	
		X2-DFN1410-6		—	190	—	
		X2-DFN1409-6		—	225	—	
		X1-DFN1010-6		—	245	—	
		X2-DFN1010-6		—	250	—	

Note: 9. Test condition for all packages: : Device mounted on FR-4 substrate PC board, 2oz copper with minimum recommended pad layout.

**Switching Characteristics**

T<sub>A</sub> = -40°C to +85°C, C<sub>L</sub> = 30 or 50pF (see Figure 1)

Parameter	From (Input)	TO (OUTPUT)	V <sub>CC</sub> = 1.8V ± 0.15V		V <sub>CC</sub> = 2.5V ± 0.2V		V <sub>CC</sub> = 3.3V ± 0.3V		V <sub>CC</sub> = 5V ± 0.5V		Unit
			Min	Max	Min	Max	Min	Max	Min	Max	
t <sub>PD</sub>	A	Y	0.5	11.0	0.5	6.5	0.5	6.0	0.5	4.3	ns

T<sub>A</sub> = -40°C to +125°C, C<sub>L</sub> = 30 or 50pF (see Figure 1)

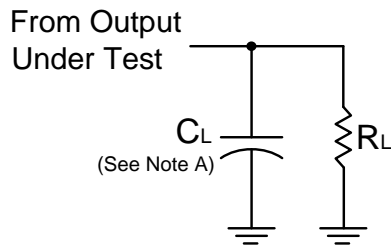
Parameter	From (Input)	TO (OUTPUT)	V <sub>CC</sub> = 1.8V ± 0.15V		V <sub>CC</sub> = 2.5V ± 0.2V		V <sub>CC</sub> = 3.3V ± 0.3V		V <sub>CC</sub> = 5V ± 0.5V		Unit
			Min	Max	Min	Max	Min	Max	Min	Max	
t <sub>PD</sub>	A	Y	0.5	12.0	0.5	7.2	0.5	6.7	0.5	4.7	ns

**Operating Characteristics**

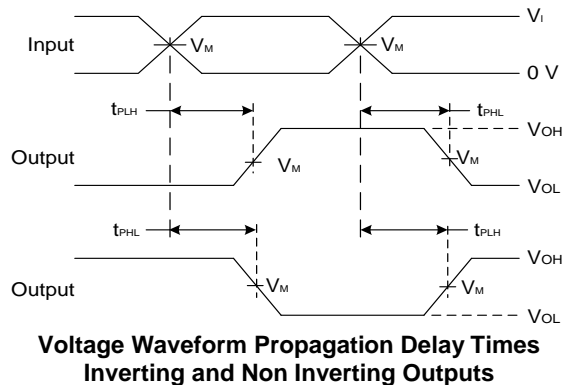
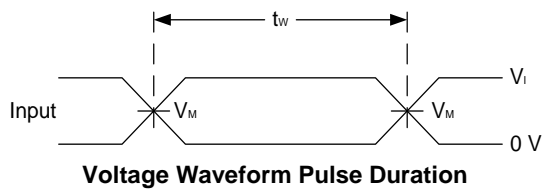
T<sub>A</sub> = +25°C

Parameter	Test Conditions	V <sub>CC</sub> = 1.8V	V <sub>CC</sub> = 2.5V	V <sub>CC</sub> = 3.3V	V <sub>CC</sub> = 5V	Unit
		Typ	Typ	Typ	Typ	
C <sub>PD</sub>	Power Dissipation Capacitance f = 10MHz	17	19	20	21	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>			
1.8V±0.15V	V <sub>CC</sub>	≤2ns	V <sub>CC</sub> /2	30 pF	1kΩ
2.5V±0.2V	V <sub>CC</sub>	≤2ns	V <sub>CC</sub> /2	30 pF	500Ω
3.3V±0.3V	3V	≤2.5ns	1.5V	50 pF	500Ω
5V±0.5V	V <sub>CC</sub>	≤2.5ns	V <sub>CC</sub> /2	50 pF	500Ω

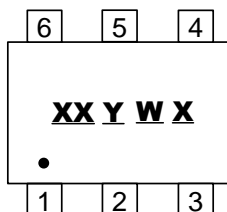


**Figure 1. Load Circuit and Voltage Waveforms**

- Notes:
- A. Includes test lead and test apparatus capacitance.
  - B. All pulses are supplied at pulse repetition rate ≤ 10MHz.
  - 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>.

## Marking Information

### (1) SOT26, SOT363

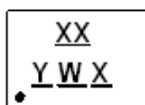


XX : Identification code  
Y : Year 0~9  
W : Week : A~Z : 1~26 week;  
           a~z : 27~52 week; z represents  
           52 and 53 week  
X : A~Z : Internal Code

Part Number	Package	Identification Code
74LVC2G14W6-7	SOT26	Z5
74LVC2G14DW-7	SOT363	Z5

### (2) X1-DFN1010-6, X2-DFN1010-6, X2-DFN1409-6, X2-DFN1410-6

#### (Top View)

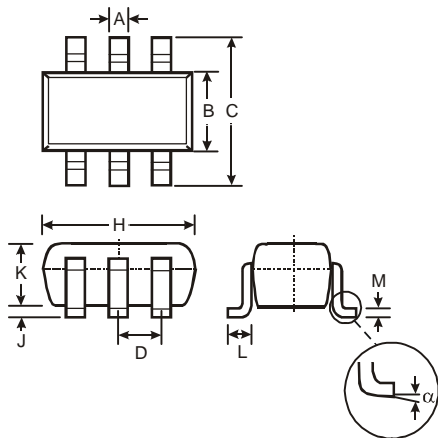


XX : Identification Code  
Y : Year : 0~9  
W : Week : A~Z : 1~26 week;  
           a~z : 27~52 week; z represents  
           52 and 53 week  
X : A~Z : Internal code

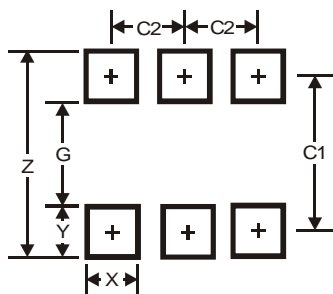
Part Number	Package	Identification Code
74LVC2G14FW4-7	X2-DFN1010-6	Z5
74LVC2G14FW5-7	X1-DFN1010-6	W5
74LVC2G14FX4-7	X2-DFN1409-6	X5
74LVC2G14FZ4-7	X2-DFN1410-6	Z5

**SOT26 Package Outline Dimensions and Suggested Pad Layout**

Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



SOT26			
Dim	Min	Max	Typ
A	0.35	0.50	0.38
B	1.50	1.70	1.60
C	2.70	3.00	2.80
D	—	—	0.95
H	2.90	3.10	3.00
J	0.013	0.10	0.05
K	1.00	1.30	1.10
L	0.35	0.55	0.40
M	0.10	0.20	0.15
$\alpha$	0°	8°	—
All Dimensions in mm			

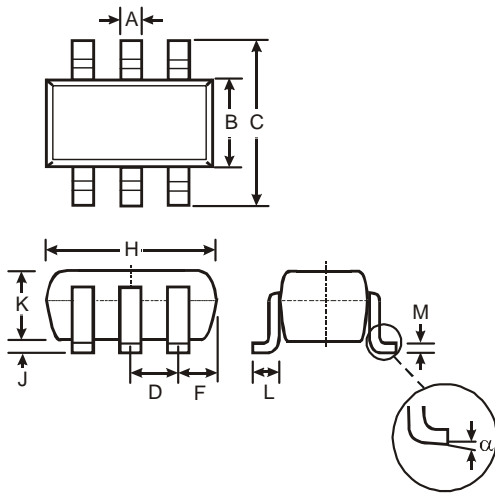


Dimensions	Value (in mm)
Z	3.20
G	1.60
X	0.55
Y	0.80
C1	2.40
C2	0.95

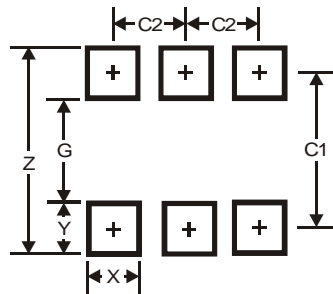


**SOT363 Package Outline Dimensions and Suggested Pad Layout**

Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



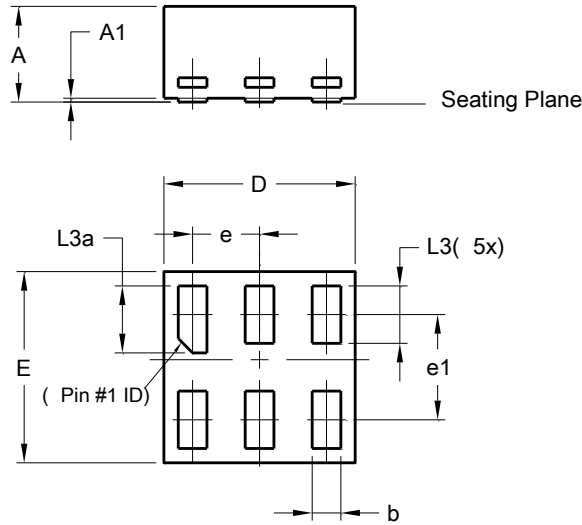
SOT363			
Dim	Min	Max	Typ
A	0.10	0.30	0.25
B	1.15	1.35	1.30
C	2.00	2.20	2.10
D	0.65 Typ		
F	0.40	0.45	0.425
H	1.80	2.20	2.15
J	0	0.10	0.05
K	0.90	1.00	1.00
L	0.25	0.40	0.30
M	0.10	0.22	0.11
α	0°	8°	-
All Dimensions in mm			



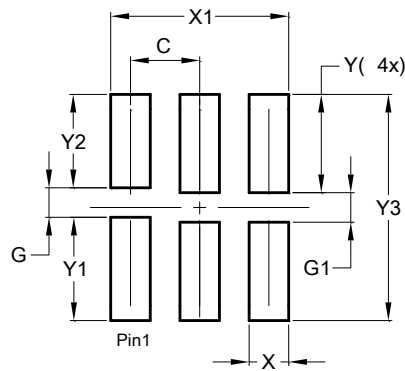
Dimensions	Value (in mm)
Z	2.5
G	1.3
X	0.42
Y	0.6
C1	1.9
C2	0.65

**X1-DFN1010-6 (Type B) Package Outline Dimensions and Suggested Pad Layout**

Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



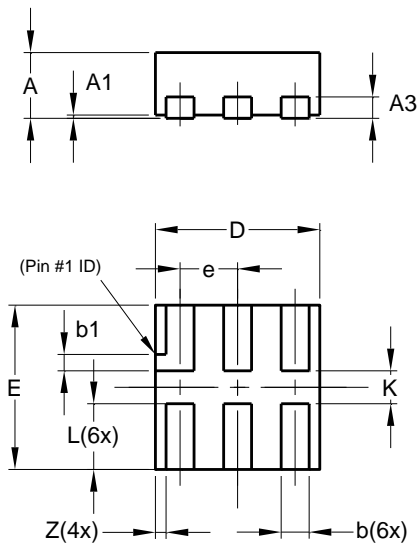
X1-DFN1010-6 (Type B)			
Dim	Min	Max	Typ
A	-	0.50	0.39
A1	-	0.04	-
b	0.12	0.20	0.15
D	0.95	1.050	1.00
E	0.95	1.050	1.00
e	0.35 BSC		
e1	0.55 BSC		
L3	0.27	0.30	0.30
L3a	0.32	0.40	0.35
All Dimensions in mm			



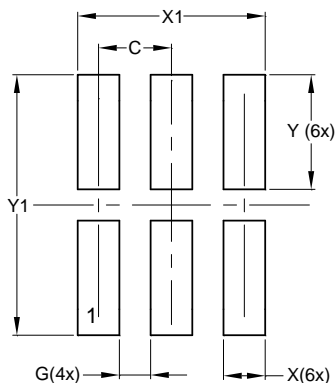
Dimensions	Value (in mm)
C	0.350
G	0.150
G1	0.150
X	0.200
X1	0.900
Y	0.500
Y1	0.525
Y2	0.475
Y3	1.150

**X2-DFN1010-6 Package Outline Dimensions and Suggested Pad Layout**

Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



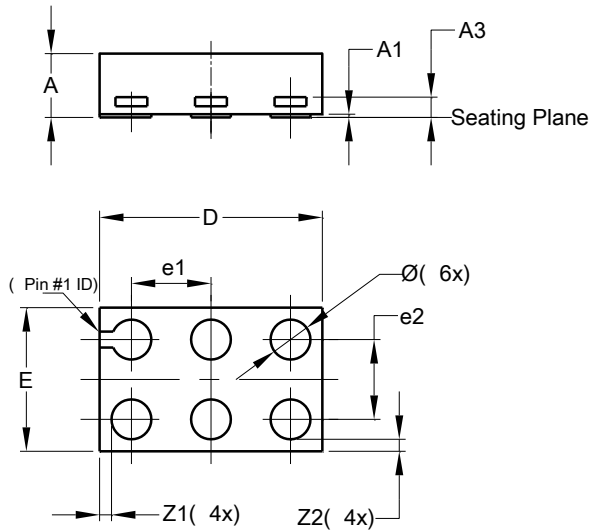
X2-DFN1010-6			
Dim	Min	Max	Typ
A	—	0.40	0.39
A1	0.00	0.05	0.02
A3	—	—	0.13
b	0.14	0.20	0.17
b1	0.05	0.15	0.10
D	0.95	1.05	1.00
E	0.95	1.05	1.00
e	—	—	0.35
L	0.35	0.45	0.40
K	0.15	—	—
Z	—	—	0.065
All Dimensions in mm			



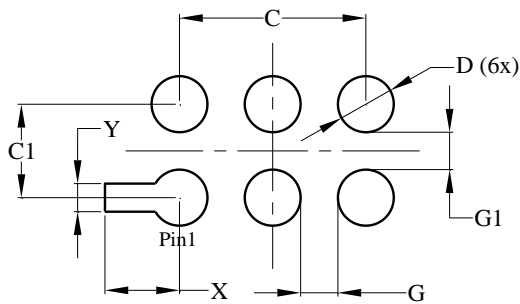
Dimensions	Value (in mm)
C	0.350
G	0.150
X	0.200
X1	0.900
Y	0.550
Y1	1.250

**X2-DFN1409-6 Package Outline Dimensions and Suggested Pad Layout**

Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



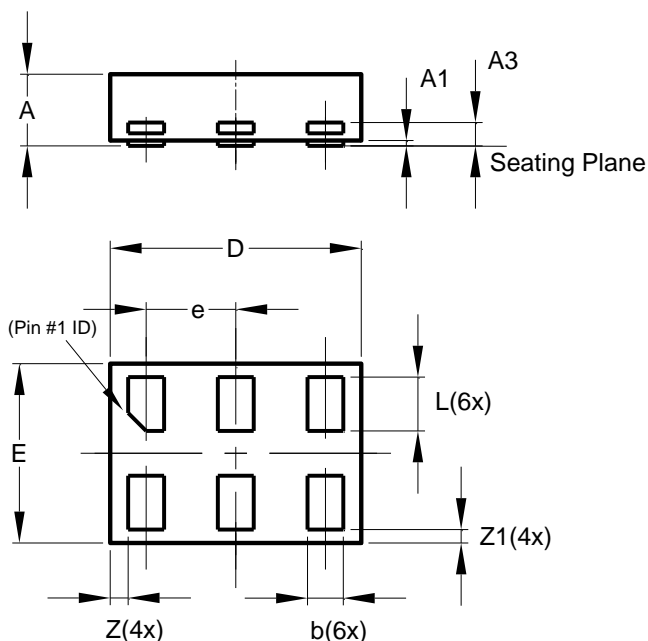
X2-DFN1409-6			
Dim	Min	Max	Typ
A	—	0.40	0.39
A1	0	0.05	0.02
A3	—	—	0.13
$\varnothing$	0.20	0.30	0.25
D	1.35	1.45	1.40
E	0.85	0.95	0.90
e1	—	—	0.50
e2	—	—	0.50
Z1	—	—	0.075
Z2	—	—	0.075
All Dimensions in mm			



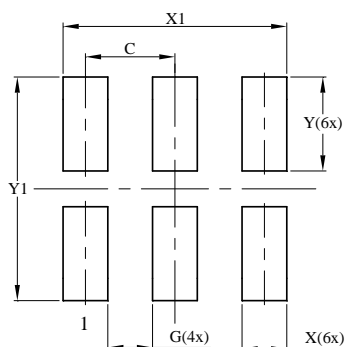
Dimensions	Value (in mm)
C	1.000
C1	0.500
D	0.300
G	0.200
G1	0.200
X	0.400
Y	0.150

**X2-DFN1410-6 Package Outline Dimensions and Suggested Pad Layout**

Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



X2-DFN1410-6			
Dim	Min	Max	Typ
A	—	0.40	0.39
A1	0.00	0.05	0.02
A3	—	—	0.13
b	0.15	0.25	0.20
D	1.35	1.45	1.40
E	0.95	1.05	1.00
e	—	—	0.50
L	0.25	0.35	0.30
Z	—	—	0.10
Z1	0.045	0.105	0.075
All Dimensions in mm			



Dimensions	Value (in mm)
C	0.500
G	0.250
X	0.250
X1	1.250
Y	0.525
Y1	1.250

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