

## Description

The 74LVC2G06 is a dual inverter gate with open drain outputs. The device is designed for operation with a power supply range of 1.65V 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<sub>OFF</sub>. The I<sub>OFF</sub> 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 32mA.

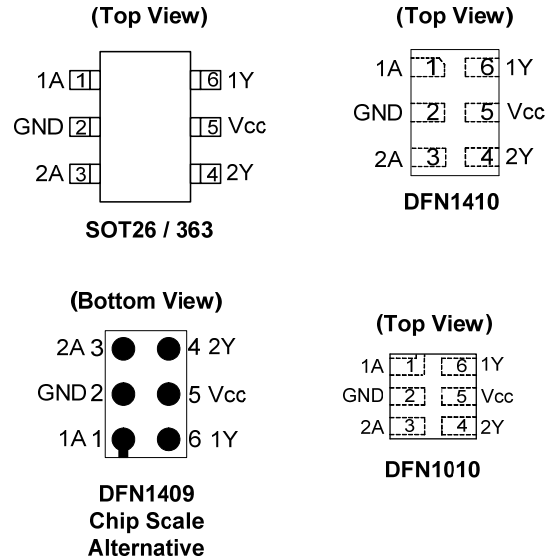
## Features

- 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, SOT353, DFN1010, DFN1409 and DFN1410
- Leadless packages per JESD30E
  - DFN1410 denoted as X2-DFN1410-6
  - DFN1409 denoted as X2-DFN1409-6
  - DFN1010 denoted as X2-DFN1010-6
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

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.

## Pin Assignments



## Applications

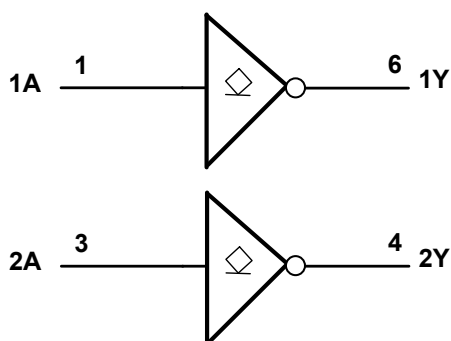
- Voltage Level Shifting
- General Purpose Logic
- Power Down Signal Isolation
- Wide array of products such as:
  - PCs, networking, notebooks, netbooks, tablets
  - Computer peripherals, hard drives, CD/DVD ROM
  - TV, DVD, DVR, set top box
  - Cell Phones, Personal Navigation / GPS
  - MP3 players, Cameras, Video Recorders

[Click here for ordering information, located at the end of datasheet](#)

## Pin Descriptions

Pin Name	Pin NO.	Function
1A	1	Data Input
GND	2	Ground
2A	3	Data Input
2Y	4	Data Output Open Drain
V <sub>CC</sub>	5	Supply Voltage
1Y	6	Data Output Open Drain

## Logic Diagram



## Function Table

Inputs	Output
A	Y
H	L
L	Z

## Absolute Maximum Ratings (Note 4) (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Symbol	Description	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 <sub>CC</sub>	Supply Voltage Range	-0.5 to +6.5	V
V <sub>I</sub>	Input Voltage Range	-0.5 to +6.5	V
V <sub>O</sub>	Voltage applied to output in high impedance or I <sub>OFF</sub> state	-0.5 to +6.5	V
V <sub>O</sub>	Voltage applied to output in high or low state	-0.3 to V <sub>CC</sub> +0.5	V
I <sub>IK</sub>	Input Clamp Current V <sub>I</sub> < 0	-50	mA
I <sub>OK</sub>	Output Clamp Current V <sub>O</sub> < 0	-50	mA
I <sub>O</sub>	Continuous Output Current	-50	mA
	Continuous Current Through V <sub>DD</sub> or GND	±100	mA
T <sub>J</sub>	Operating Junction Temperature	-40 to +150	°C
T <sub>STG</sub>	Storage Temperature	-65 to +150	°C

Note: 4. 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 5) (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Symbol	Parameter	Min	Max	Unit	
$V_{CC}$	Operating Voltage	Operating	1.65	5.5	V
		Data retention only	1.5		V
$V_{IH}$	High-Level Input Voltage	$V_{CC} = 1.65\text{V to }1.95\text{V}$	$0.65 \times V_{CC}$		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	$V_{CC} = 1.65\text{V to }1.95\text{V}$		$0.35 \times V_{CC}$	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	$V_{CC} = 1.65\text{V}$		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	
		$V_{CC} = 5\text{V} \pm 0.5\text{V}$		10	
$T_A$	Operating free-air temperature	-40	+125	$^\circ\text{C}$	

Note: 5. Unused inputs should be held at  $V_{CC}$  or Ground.

**Electrical Characteristics**

Symbol	Parameter	Test Conditions	$V_{CC}$	-40°C to +85°C		-40°C to +125°C		Unit
				Min	Max	Min	Max	
$V_{OL}$	Low-Level Output Voltage	$I_{OL} = 100\mu\text{A}$	1.65V to 5.5V		0.1		0.1	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		$\pm 5$		$\pm 20$	$\mu\text{A}$
$I_{OZ}$	Z State Leakage Current	$V_O = 0$ to 5.5V	3.6V		$\pm 10$		$\pm 10$	$\mu\text{A}$
$I_{OFF}$	Power Down Leakage Current	$V_I$ or $V_O = 5.5\text{V}$	0V		$\pm 10$		$\pm 20$	$\mu\text{A}$
$I_{CC}$	Supply Current	$V_I = 5.5\text{V}$ or GND, $I_O = 0$	1.65V to 5.5V		10		40	$\mu\text{A}$
$\Delta I_{CC}$	Additional Supply Current	Input at $V_{CC} - 0.6\text{V}$	3V to 5.5V		500		5000	$\mu\text{A}$

**Package Characteristics** (All typical values are at  $V_{CC} = 3.3V$ ,  $T_A = +25^{\circ}C$ .)

Symbol	Parameter	Package	Conditions	Min	Typ	Max	Unit
$C_I$	Input Capacitance	Typical of all packages	$V_{CC} = 3.3V$ $V_I = V_{CC} - \text{or GND}$		3.5		pF
$\theta_{JA}$	Thermal Resistance Junction-to-Ambient	SOT26	(Note 6)		204		$^{\circ}C/W$
		SOT363			371		
		X2-DFN1410-6			430		
		X2-DFN1409-6			450		
		X2-DFN1010-6			510		
$\theta_{JC}$	Thermal Resistance Junction-to-Case	SOT26	(Note 6)		52		$^{\circ}C/W$
		SOT363			143		
		X2-DFN1410-6			190		
		X2-DFN1409-6			225		
		X2-DFN1010-6			250		

Note: 6. Test condition for SOT26, SOT363, X2-DFN1410-6, X2-DFN1409-6 and X2-DFN1010-6: Device mounted on FR-4 substrate PC board, 2oz copper with minimum recommended pad layout.

**Switching Characteristics**

$T_A = -40^{\circ}C$  to  $+85^{\circ}C$ ,  $C_L = 30$  or  $50pF$  (see Figure 1)

Parameter	From (Input)	TO (OUTPUT)	$V_{CC} = 1.8V \pm 0.15V$		$V_{CC} = 2.5V \pm 0.2V$		$V_{CC} = 3.3V \pm 0.3V$		$V_{CC} = 5V \pm 0.5V$		Unit
			Min	Max	Min	Max	Min	Max	Min	Max	
$t_{pd}$	A	Y	0.5	6.5	0.5	3.9	0.5	3.4	0.5	2.9	ns

$T_A = -40^{\circ}C$  to  $+125^{\circ}C$ ,  $C_L = 30$  or  $50pF$  (see Figure 1)

Parameter	From (Input)	TO (OUTPUT)	$V_{CC} = 1.8V \pm 0.15V$		$V_{CC} = 2.5V \pm 0.2V$		$V_{CC} = 3.3V \pm 0.3V$		$V_{CC} = 5V \pm 0.5V$		Unit
			Min	Max	Min	Max	Min	Max	Min	Max	
$t_{pd}$	A	Y	0.5	8.2	0.5	4.9	0.5	4.3	0.5	3.7	ns

**Operating Characteristics**

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

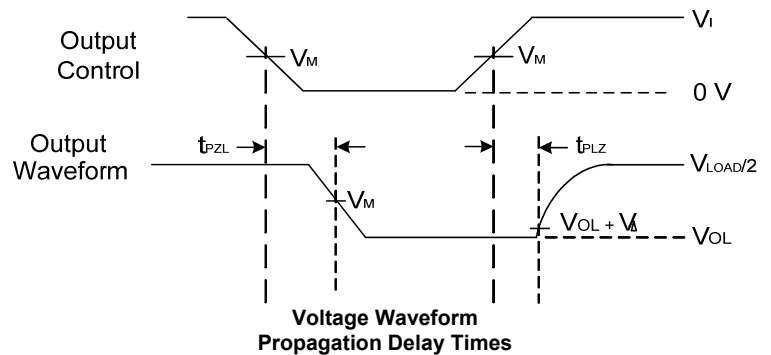
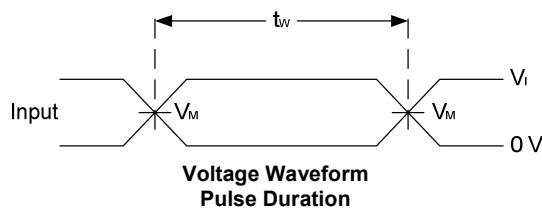
Parameter	Test Conditions	$V_{CC} = 1.8V$	$V_{CC} = 2.5V$	$V_{CC} = 3.3V$	$V_{CC} = 5V$	Unit
		Typ	Typ	Typ	Typ	
$C_{pd}$	Power dissipation capacitance $f = 10$ MHz	3	3	4	6	pF

**Parameter Measurement Information**



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

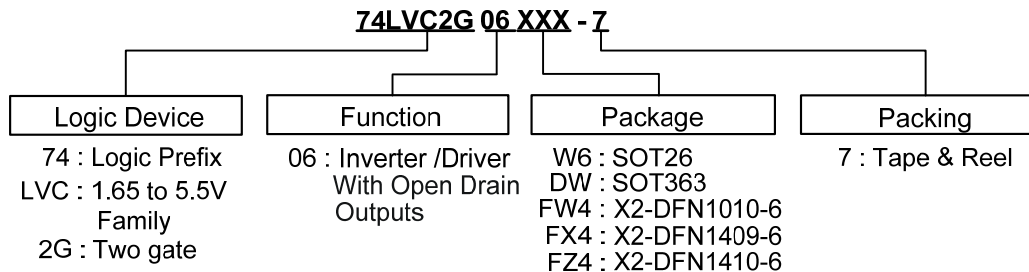
V <sub>CC</sub>	Inputs		V <sub>M</sub>	V <sub>LOAD</sub>	C <sub>L</sub>	R <sub>L</sub>	V $\Delta$
	V <sub>I</sub>	t <sub>r</sub> /t <sub>f</sub>					
1.8V $\pm$ 0.15V	V <sub>CC</sub>	$\leq 2$ ns	V <sub>CC</sub> /2	2 X V <sub>CC</sub>	30pF	1k $\Omega$	0.15V
2.5V $\pm$ 0.2V	V <sub>CC</sub>	$\leq 2$ ns	V <sub>CC</sub> /2	2 X V <sub>CC</sub>	30pF	500 $\Omega$	0.15V
3.3V $\pm$ 0.3V	3V	$\leq 2.5$ ns	1.5 V	6 V	50pF	500 $\Omega$	0.3V
5V $\pm$ 0.5V	V <sub>CC</sub>	$\leq 2.5$ ns	V <sub>CC</sub> /2	2 X V <sub>CC</sub>	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

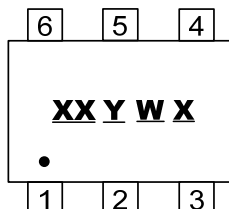


Device	Package Code	Packaging (Note 7)	7" Tape and Reel	
			Quantity	Part Number Suffix
74LVC2G06W6-7	W6	SOT26	3000/Tape & Reel	-7
74LVC2G06DW-7	DW	SOT363	3000/Tape & Reel	-7
74LVC2G06FW4-7	FW4	X2-DFN1010-6	5000/Tape & Reel	-7
74LVC2G06FX4-7	FX4	X2-DFN1409-6	5000/Tape & Reel	-7
74LVC2G06FZ4-7	FZ4	X2-DFN1410-6	5000/Tape & Reel	-7

Note: 7. The taping orientation is located on our website at <http://www.diodes.com/datasheets/ap02007.pdf>

## Marking Information

(1) SOT26, SOT363

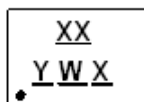


**XX** : Identification code  
**Y** : Year 0~9  
**W** : Week : A~Z : 1~26 week;  
           a~z : 27~52 week; z represents 52 and 53 week  
**X** : A~Z : Internal Code

Part Number	Package	Identification Code
74LVC2G06W6	SOT26	Z3
74LVC2G06DW	SOT363	Z3

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

**(Top View)**



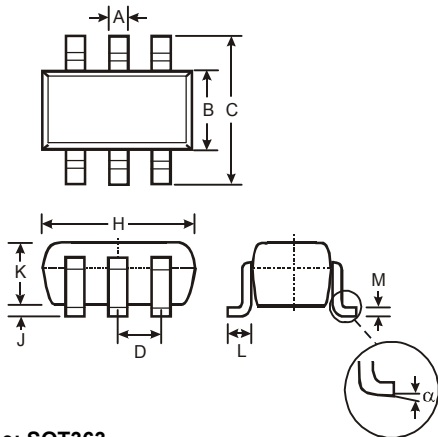
**XX** : Identification Code  
**Y** : Year : 0~9  
**W** : Week : A~Z : 1~26 week;  
           a~z : 27~52 week; z represents 52 and 53 week  
**X** : A~Z : Internal code

Part Number	Package	Identification Code
74LVC2G06FW4	X2-DFN1010-6	Z3
74LVC2G06FX4	X2-DFN1409-6	X3
74LVC2G06FZ4	X2-DFN1410-6	Z3

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

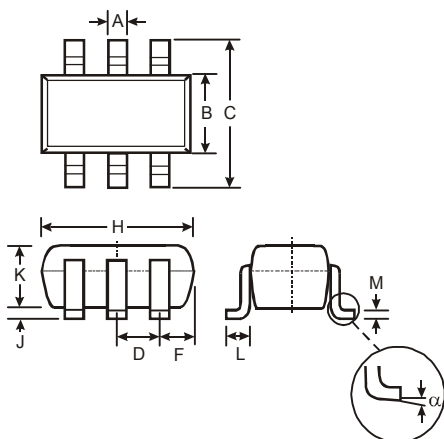
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.

(1) Package Type: SOT26



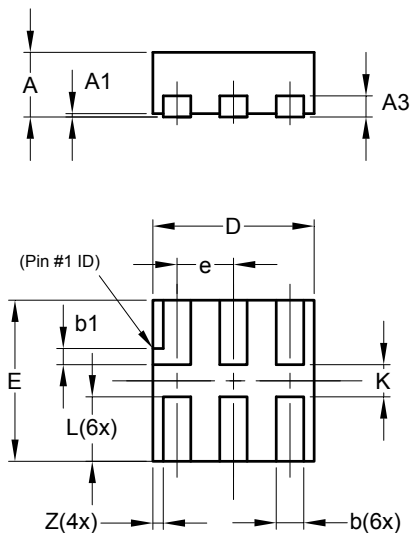
SOT26			
Dim	Min	Max	Typ
A	0.35	0.50	0.38
B	1.50	1.70	1.60
C	2.70	3.00	2.80
D	—	—	0.95
H	2.90	3.10	3.00
J	0.013	0.10	0.05
K	1.00	1.30	1.10
L	0.35	0.55	0.40
M	0.10	0.20	0.15
α	0°	8°	—
All Dimensions in mm			

(2) Package Type: SOT363



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			

(3) Package Type: X2-DFN1010-6

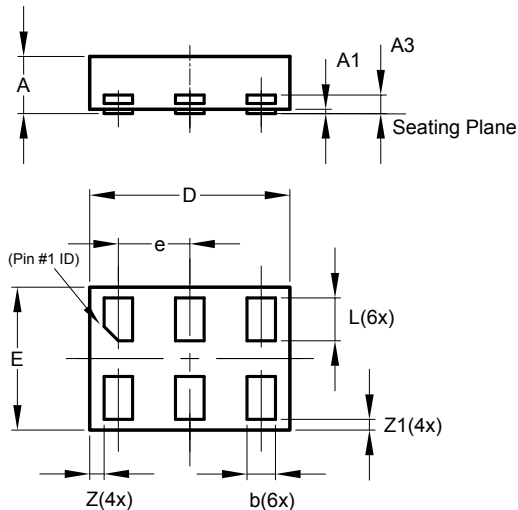


X2-DFN1010-6			
Dim	Min	Max	Typ
A	—	0.40	0.39
A1	0.00	0.05	0.02
A3	—	—	0.13
b	0.14	0.20	0.17
b1	0.05	0.15	0.10
D	0.95	1.05	1.00
E	0.95	1.05	1.00
e	—	—	0.35
L	0.35	0.45	0.40
K	0.15	—	—
Z	—	—	0.065
All Dimensions in mm			

**Package Outline Dimensions** (cont.) (All dimensions in mm.)

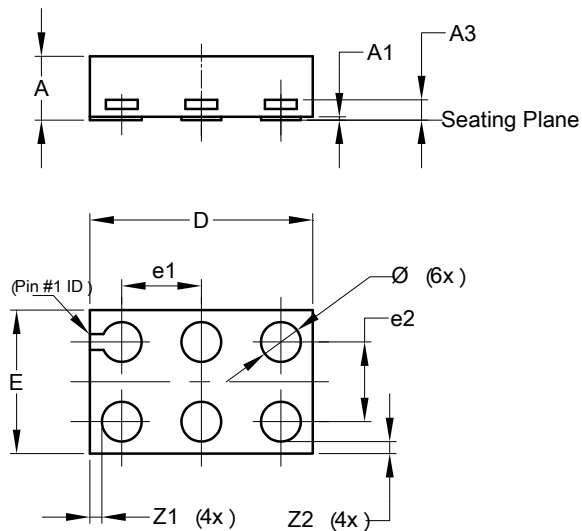
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.

**(4) Package Type X2-DFN1410-6**



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			

**(5) Package Type: X2-DFN1409-6 Chip Scale Replacement**

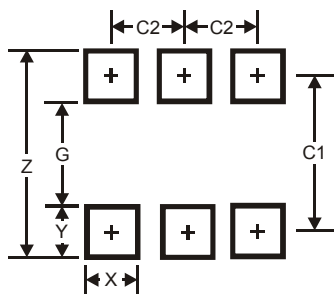


X2-DFN1409-6			
Dim	Min	Max	Typ
A	—	0.40	0.39
A1	0	0.05	0.02
A3	—	—	0.13
Ø	0.20	0.30	0.25
D	1.35	1.45	1.40
E	0.85	0.95	0.90
e1	—	—	0.50
e2	—	—	0.50
Z1	—	—	0.075
Z2	—	—	0.075
All Dimensions in mm			

**Suggested Pad Layout**

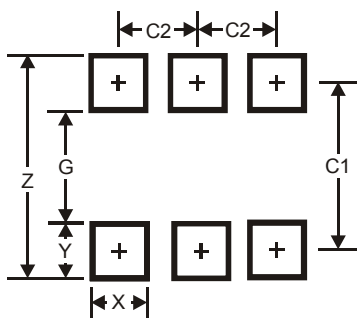
Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.

(1) Package Type: SOT26



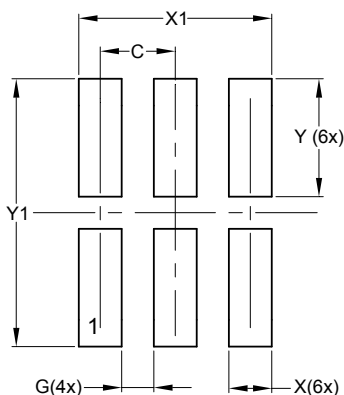
Dimensions	Value (in mm)
Z	3.20
G	1.60
X	0.55
Y	0.80
C1	2.40
C2	0.95

(2) Package Type: SOT363



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

(3) Package Type: X2-DFN1010-6

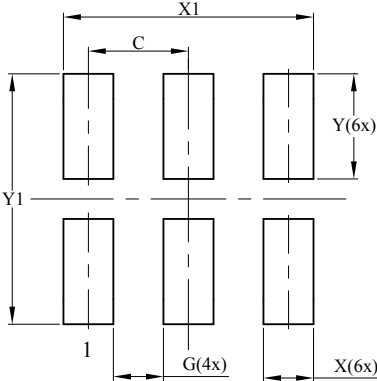


Dimensions	Value (in mm)
C	0.350
G	0.150
X	0.200
X1	0.900
Y	0.550
Y1	1.250

**Suggested Pad Layout (cont.)**

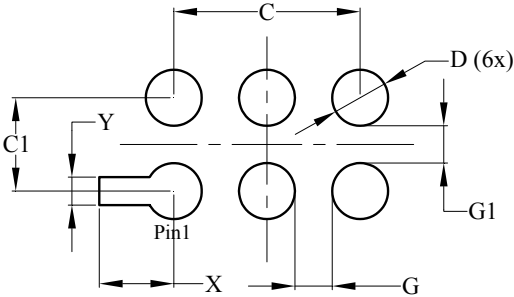
Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.

**(4) Package Type X2-DFN1410-6**



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

**(5) Package Type: X2-DFN1409-6 Chip Scale Replacement**



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

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