

**SINGLE 3 INPUT POSITIVE AND GATE**
**Description**

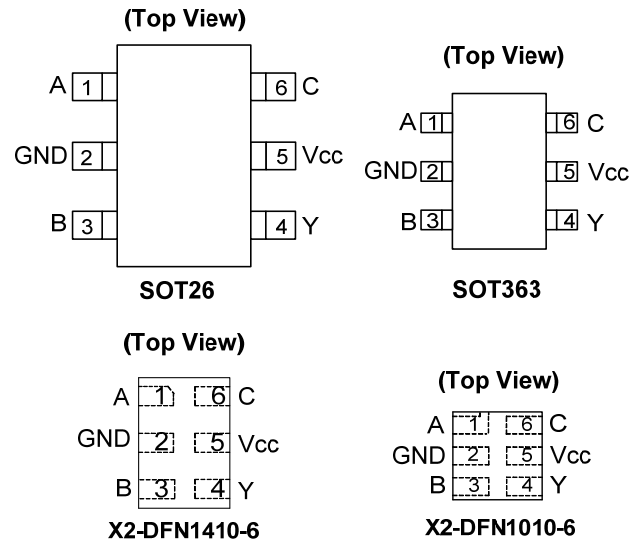
The 74LVC1G11 is a single 3-input positive AND gate with a standard push-pull output. The device is designed for operation with a power supply range of 1.65V to 5.5V. The inputs are tolerant to 5.5V allowing this device to be used in a mixed voltage environment. The device is fully specified for partial power down applications using IOFF. The IOFF circuitry disables the output preventing damaging current backflow when the device is powered down.

The gate performs the positive Boolean function:

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

**Features**

- Wide Supply Voltage Range from 1.65V to 5.5V
- $\pm 24\text{mA}$  Output Drive at 3.3V
- CMOS Low Power Consumption
- IOFF Supports Partial-Power-Down Mode Operation
- Inputs Accept up to 5.5V
- ESD Protection Exceeds JESD 22:
  - 200-V Machine Model (A115-A)
  - 2000-V Human Body Model (A114-A)
- Latch-Up Exceeds 100mA per JESD 78, Class I
- Range of Package Options
- **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, PDAs
  - Computer Peripherals, Hard Drives, CD/DVD ROM
  - TV, DVD, DVR, Set Top Box
  - Cell Phones, Personal Navigation / GPS
  - MP3 players, Cameras, Video Recorders

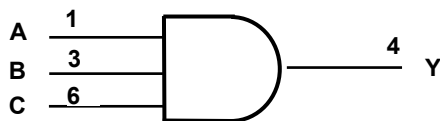
- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
  2. See [http://www.diodes.com/quality/lead\\_free.html](http://www.diodes.com/quality/lead_free.html) for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "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.

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

## Pin Descriptions

Pin Name	Function
A	Data Input
GND	Ground
B	Data Input
Y	Data Output
V <sub>CC</sub>	Supply Voltage
C	Data Input

## Logic Diagram



## Function Table

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

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

Symbol	Parameter	Rating	Unit
ESD HBM	Human Body Model ESD Protection	2	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	-50	mA
I <sub>O</sub>	Continuous output current	±50	mA
I <sub>CC MAX CONT</sub>	Continuous current through V <sub>CC</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<sub>A</sub> = +25°C, unless otherwise specified.)

Symbol	Parameter		Min	Max	Unit
V <sub>CC</sub>	Operating Voltage	Operating	1.65	5.5	V
		Data Retention Only	1.5		V
V <sub>IH</sub>	High-Level Input Voltage	V <sub>CC</sub> = 1.65V to 1.95V	0.65 X V <sub>CC</sub>		V
		V <sub>CC</sub> = 2.3V to 2.7V	1.7		
		V <sub>CC</sub> = 3V to 3.6V	2		
		V <sub>CC</sub> = 4.5V to 5.5V	0.7 X V <sub>CC</sub>		
V <sub>IL</sub>	Low-Level Input Voltage	V <sub>CC</sub> = 1.65V to 1.95V		0.35 X V <sub>CC</sub>	V
		V <sub>CC</sub> = 2.3V to 2.7V		0.7	
		V <sub>CC</sub> = 3V to 3.6V		0.8	
		V <sub>CC</sub> = 4.5V to 5.5V		0.3 X V <sub>CC</sub>	
V <sub>I</sub>	Input Voltage		0	5.5	V
V <sub>O</sub>	Output Voltage		0	V <sub>CC</sub>	V
I <sub>OH</sub>	High-Level Output Current	V <sub>CC</sub> = 1.65V		-4	mA
		V <sub>CC</sub> = 2.3V		-8	
		V <sub>CC</sub> = 3V		-16	
		V <sub>CC</sub> = 4.5V		-24	
I <sub>OL</sub>	Low-Level Output Current	V <sub>CC</sub> = 1.65V		4	mA
		V <sub>CC</sub> = 2.3V		8	
		V <sub>CC</sub> = 3V		16	
		V <sub>CC</sub> = 4.5V		24	
Δt/ΔV	Input Transition Rise or Fall Rate	V <sub>CC</sub> = 1.8V ± 0.15V, 2.5V ± 0.2V		20	ns/V
		V <sub>CC</sub> = 3.3V ± 0.3V		10	
		V <sub>CC</sub> = 5V ± 0.5V		5	
T <sub>A</sub>	Operating Free-Air Temperature		-40	+125	°C

Note: 5. Unused inputs should be held at V<sub>CC</sub> or Ground.

**Electrical Characteristics**  $T_A = -40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$  (All typical values are at  $V_{CC} = 3.3\text{V}$ ,  $T_A = +25^{\circ}\text{C}$ , unless otherwise specified.)

Symbol	Parameter	Test Conditions	$V_{CC}$	Min	Typ	Max	Unit
$V_{OH}$	High-Level Output Voltage	$I_{OH} = -100\mu\text{A}$	1.65V to 5.5V	$V_{CC} - 0.1$			V
		$I_{OH} = -4\text{mA}$	1.65V	1.2			
		$I_{OH} = -8\text{mA}$	2.3V	1.9			
		$I_{OH} = -16\text{mA}$	3V	2.4			
		$I_{OH} = -24\text{mA}$		2.3			
		$I_{OH} = -32\text{mA}$	4.5V	3.8			
$V_{OL}$	Low-Level Output Voltage	$I_{OL} = 100\mu\text{A}$	1.65V to 5.5V			0.1	V
		$I_{OL} = 4\text{mA}$	1.65V			0.45	
		$I_{OL} = 8\text{mA}$	2.3V			0.3	
		$I_{OL} = 16\text{mA}$	3V			0.4	
		$I_{OL} = 24\text{mA}$				0.55	
		$I_{OL} = 32\text{mA}$	4.5V			0.55	
$I_I$	Input Current	$V_I = 5.5\text{V}$ or GND	0 to 5.5V			$\pm 5$	$\mu\text{A}$
$I_{OFF}$	Power Down Leakage Current	$V_I$ or $V_O = 5.5\text{V}$	0			$\pm 10$	$\mu\text{A}$
$I_{CC}$	Supply Current	$V_I = 5.5\text{V}$ of GND, $I_O = 0$	1.65V to 5.5V			10	$\mu\text{A}$
$\Delta I_{CC}$	Additional Supply Current	Input at $V_{CC} - 0.6\text{V}$	3V to 5.5V			500	$\mu\text{A}$

**Electrical Characteristics**  $T_A = -40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$  (All typical values are at  $V_{CC} = 3.3\text{V}$ ,  $T_A = +25^{\circ}\text{C}$ , unless otherwise specified.)

Symbol	Parameter	Test Conditions	$V_{CC}$	Min	Typ	Max	Unit
$V_{OH}$	High-Level Output Voltage	$I_{OH} = -100\mu\text{A}$	1.65V to 5.5V	$V_{CC} - 0.1$			V
		$I_{OH} = -4\text{mA}$	1.65V	0.95			
		$I_{OH} = -8\text{mA}$	2.3V	1.7			
		$I_{OH} = -16\text{mA}$	3V	1.9			
		$I_{OH} = -24\text{mA}$		2.0			
		$I_{OH} = -32\text{mA}$	4.5V	3.4			
$V_{OL}$	Low-Level Output Voltage	$I_{OL} = 100\mu\text{A}$	1.65V to 5.5V			0.1	V
		$I_{OL} = 4\text{mA}$	1.65V			0.70	
		$I_{OL} = 8\text{mA}$	2.3V			0.45	
		$I_{OL} = 16\text{mA}$	3V			0.60	
		$I_{OL} = 24\text{mA}$				0.80	
		$I_{OL} = 32\text{mA}$	4.5V			0.80	
$I_I$	Input Current	$V_I = 5.5\text{V}$ or GND	0 to 5.5V			$\pm 20$	$\mu\text{A}$
$I_{OFF}$	Power Down Leakage Current	$V_I$ or $V_O = 5.5\text{V}$	0			$\pm 20$	$\mu\text{A}$
$I_{CC}$	Supply Current	$V_I = 5.5\text{V}$ of GND, $I_O = 0$	1.65V to 5.5V			40	$\mu\text{A}$
$\Delta I_{CC}$	Additional Supply Current	Input at $V_{CC} - 0.6\text{V}$	3V to 5.5V			5000	$\mu\text{A}$

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

Symbol	Parameter	Test Conditions	$V_{CC}$	Min	Typ	Max	Unit
$C_I$	Input Capacitance	$V_I = V_{CC} - \text{or GND}$	3.3		3.5		pF
$\theta_{JA}$	Thermal Resistance Junction-to-Ambient	SOT26	(Note 6)		204		$^{\circ}C/W$
		SOT363			371		
		X2-DFN1410-6			430		
		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-DFN1010-6			250		

Note: 6. Test condition for SOT26, SOT363, X2-DFN1410-6 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  $+85^{\circ}C$ ,  $C_L = 15pF$  (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	
$t_{pd}$	Any	Y	1.0	15.2	0.7	5.6	0.7	4.1	0.7	3.1	ns

$T_A = -40^{\circ}C$  to  $+85^{\circ}C$ ,  $C_L = 30$  or  $50pF$  (see Figure 2)

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	
$t_{pd}$	Any	Y	1.0	17.2	0.7	6.2	0.7	4.9	0.7	3.5	ns

$T_A = -40^{\circ}C$  to  $+125^{\circ}C$ ,  $C_L = 15 pF$  (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	
$t_{pd}$	Any	Y	1.0	18.3	0.7	6.7	0.7	4.9	0.7	3.7	ns

$T_A = -40^{\circ}C$  to  $+125^{\circ}C$ ,  $C_L = 30$  or  $50pF$  (see Figure 2)

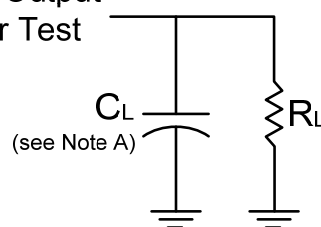
Parameter	From (Input)	TO (OUTPUT)	$V_{CC} = 1.8V \pm 0.15V$		$V_{CC} = 2.5V \pm 0.2V$		$V_{CC} = 3.3V \pm 0.3V$		$V_{CC} = 5V \pm 0.5V$		Unit
			Min	Max	Min	Max	Min	Max	Min	Max	
$t_{pd}$	Any	Y	1.0	20.7	0.7	7.5	0.7	5.9	0.7	4.2	ns

## Operating Characteristics (@T<sub>A</sub> = +25°C, unless otherwise specified.)

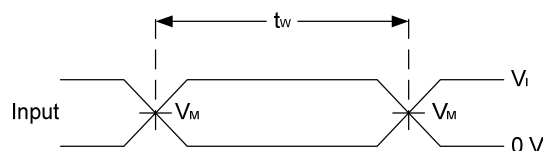
Parameter		Test Conditions	V <sub>CC</sub> = 1.8V	V <sub>CC</sub> = 2.5V	V <sub>CC</sub> = 3.3V	V <sub>CC</sub> = 5V	Unit
			Typ	Typ	Typ	Typ	
C <sub>pd</sub>	Power dissipation capacitance	f = 10 MHz	17	18	19	22	pF

## Parameter Measurement Information

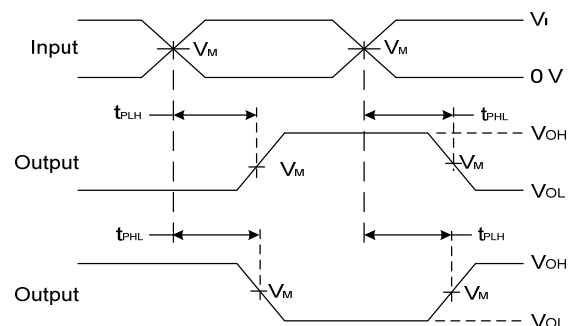
From Output  
Under Test



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	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**



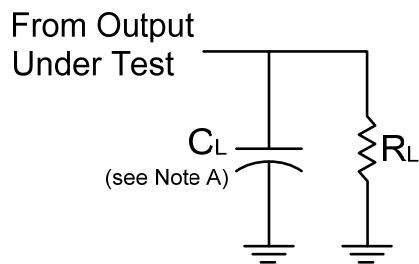
**Voltage Waveform  
Propagation Delay Times  
Inverting and Non Inverting Outputs**

Notes:

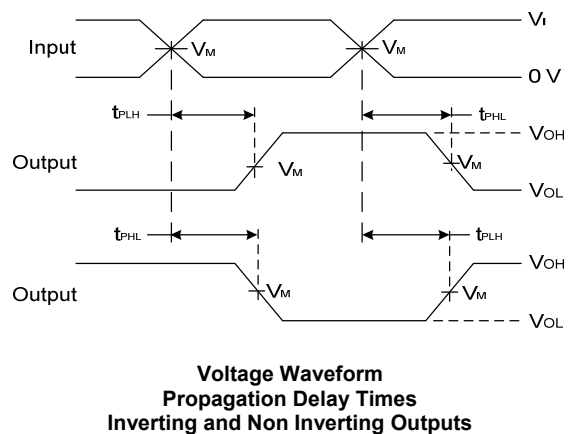
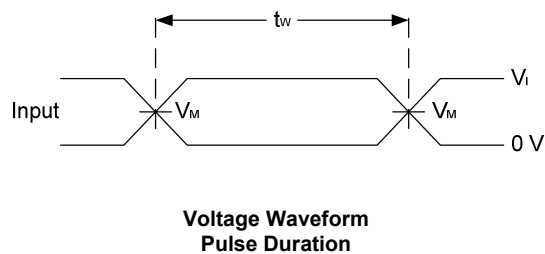
- Includes test lead and test apparatus capacitance.
- All pulses are supplied at pulse repetition rate ≤ 10MHz
- Inputs are measured separately one transition per measurement
- t<sub>PLH</sub> and t<sub>PHL</sub> are the same as t<sub>PD</sub>

**Figure 1 Load Circuit and Voltage Waveforms**

**Parameter Measurement Information** (cont.)



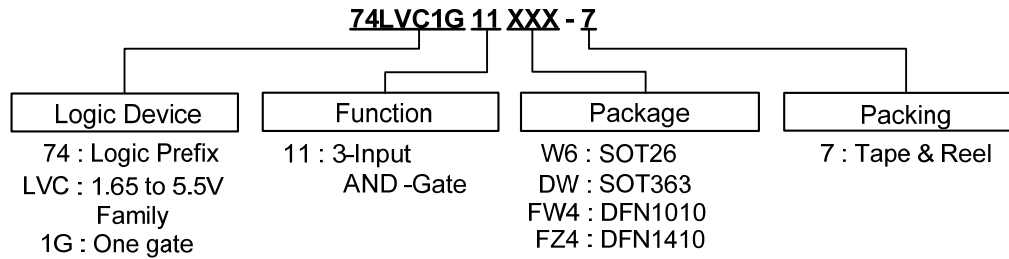
$V_{CC}$	Inputs		$V_M$	$C_L$	$R_L$
	$V_I$	$t_r/t_f$			
$1.8V \pm 0.15V$	$V_{CC}$	$\leq 2ns$	$V_{CC}/2$	30pF	1k $\Omega$
$2.5V \pm 0.2V$	$V_{CC}$	$\leq 2ns$	$V_{CC}/2$	30pF	500 $\Omega$
$3.3V \pm 0.3V$	3V	$\leq 2.5ns$	1.5V	50pF	500 $\Omega$
$5V \pm 0.5V$	$V_{CC}$	$\leq 2.5ns$	$V_{CC}/2$	50pF	500 $\Omega$



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

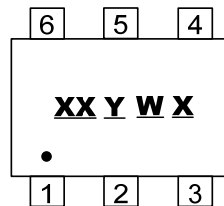


Part Number	Package Code	Packaging (Note 7)	7" Tape and Reel	
			Quantity	Part Number Suffix
74LVC1G11W6-7	W6	SOT26	3000/Tape & Reel	-7
74LVC1G11DW-7	DW	SOT363	3000/Tape & Reel	-7
74LVC1G11FW4-7	FW4	X2-DFN1010-6	5000/Tape & Reel	-7
74LVC1G11FZ4-7	FW4	X2-DFN1410-6	5000/Tape & Reel	-7

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

## Marking Information

### (1) SOT26, SOT363

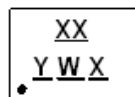


XX : Identification code  
 Y : Year 0~9  
 W : Week : A~Z : 1~26 week;  
       a~z : 27~52 week; z represents  
       52 and 53 week  
 X : A~Z : Internal Code

Part Number	Package	Identification Code
74LVC1G11W6	SOT26	TV
74LVC1G11DW	SOT363	TV

### (2) X2-DFN1010-6, 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

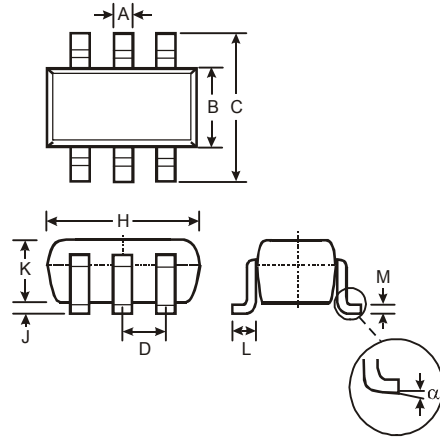
Part Number	Package	Identification Code
74LVC1G11FW4	X2-DFN1010-6	TV
74LVC1G11FZ4	X2-DFN1410-6	TV



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

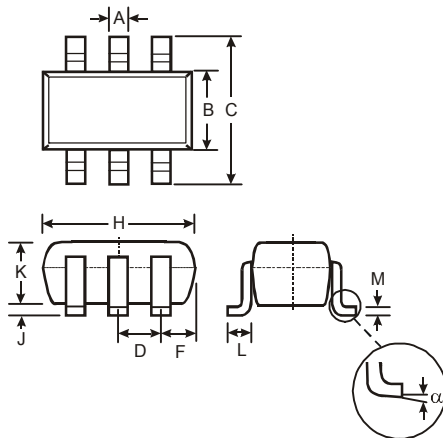
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.

### (1) Package Type: SOT26



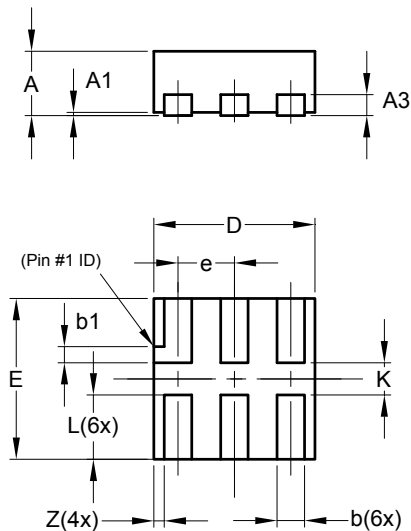
SOT26			
Dim	Min	Max	Typ
A	0.35	0.50	0.38
B	1.50	1.70	1.60
C	2.70	3.00	2.80
D	—	—	0.95
H	2.90	3.10	3.00
J	0.013	0.10	0.05
K	1.00	1.30	1.10
L	0.35	0.55	0.40
M	0.10	0.20	0.15
$\alpha$	0°	8°	—
All Dimensions in mm			

### (2) Package Type: SOT363



SOT363		
Dim	Min	Max
A	0.10	0.30
B	1.15	1.35
C	2.00	2.20
D	0.65 Typ	
F	0.40	0.45
H	1.80	2.20
J	0	0.10
K	0.90	1.00
L	0.25	0.40
M	0.10	0.22
$\alpha$	0°	8°
All Dimensions in mm		

### (3) Package Type: DFN1010

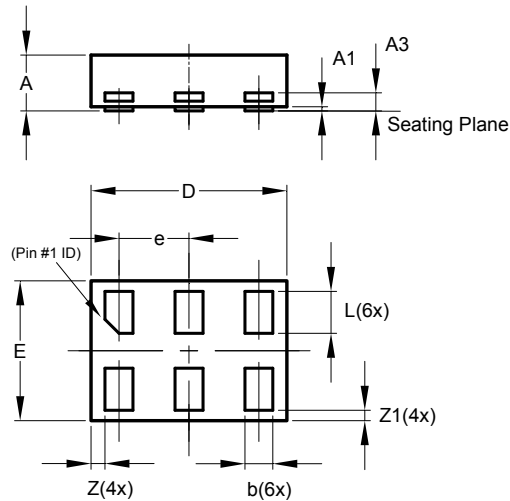


X2-DFN1010-6			
Dim	Min	Max	Typ
A	—	0.40	0.39
A1	0.00	0.05	0.02
A3	—	—	0.13
b	0.14	0.20	0.17
b1	0.05	0.15	0.10
D	0.95	1.05	1.00
E	0.95	1.05	1.00
e	—	—	0.35
L	0.35	0.45	0.40
K	0.15	—	—
Z	—	—	0.065
All Dimensions in mm			

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

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

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

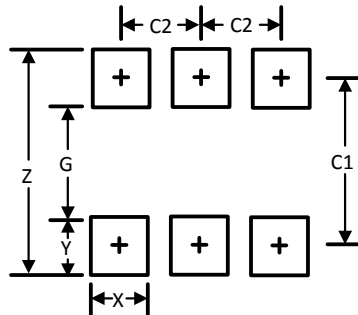


X2-DFN1410-6			
Dim	Min	Max	Typ
A	—	0.40	0.39
A1	0.00	0.05	0.02
A3	—	—	0.13
b	0.15	0.25	0.20
D	1.35	1.45	1.40
E	0.95	1.05	1.00
e	—	—	0.50
L	0.25	0.35	0.30
Z	—	—	0.10
Z1	0.045	0.105	0.075
All Dimensions in mm			

## Suggested Pad Layout (All dimensions in mm.)

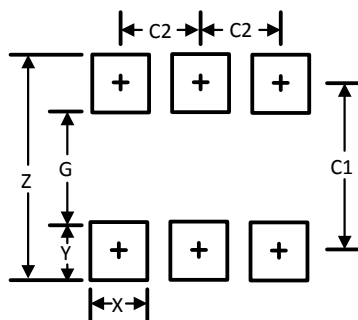
Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.

### (1) Package Type: SOT26



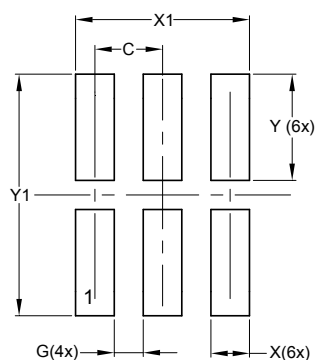
Dimensions	Value (in mm)
Z	3.20
G	1.60
X	0.55
Y	0.80
C1	2.40
C2	0.95

### (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

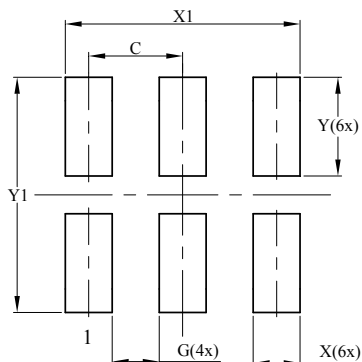


Dimensions	Value (in mm)
C	0.350
G	0.150
X	0.200
X1	0.900
Y	0.550
Y1	1.250

## 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

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