

# 74LVC1G11W6-7 Datasheet



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DiGi Electronics Part Number 74LVC1G11W6-7-DG

Manufacturer Diodes Incorporated

Manufacturer Product Number 74LVC1G11W6-7

Description IC GATE AND 1CH 3-INP SOT26

Detailed Description AND Gate IC 1 Channel SOT-26



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# **Purchase and inquiry**

Manufacturer Product Number:	Manufacturer:					
74LVC1G11W6-7	Diodes Incorporated					
Series:	Product Status:					
74LVC	Active					
Logic Type:	Number of Circuits:					
AND Gate	1					
Number of Inputs:	Features:					
3	<u>-</u>					
Voltage - Supply:	Current - Quiescent (Max):					
1.65V ~ 5.5V	40 μΑ					
Current - Output High, Low:	Input Logic Level - Low:					
32mA, 32mA	0.7V ~ 0.8V					
Input Logic Level - High:	Max Propagation Delay @ V, Max CL:					
1.7V ~ 2V	3.5ns @ 5V, 50pF					
Operating Temperature:	Mounting Type:					
-40°C ~ 125°C	Surface Mount					
Supplier Device Package:	Package / Case:					
SOT-26	SOT-23-6					
Base Product Number:						
74LVC1G11						

# **Environmental & Export classification**

RoHS Status:	Moisture Sensitivity Level (MSL):
ROHS3 Compliant	1 (Unlimited)
REACH Status:	ECCN:
REACH Unaffected	EAR99
HTSUS:	

8542.39.0001







#### **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.

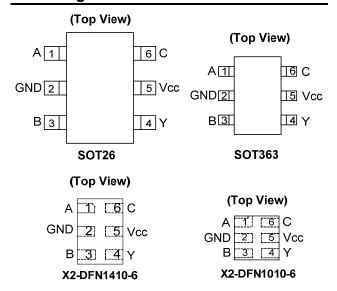
The gate performs the positive Boolean function:

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

## **Features**

- Wide Supply Voltage Range from 1.65V to 5.5V
- ± 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 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.
- See 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.

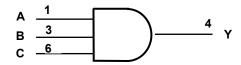
Click here for ordering information, located at the end of datasheet



## **Pin Descriptions**

Pin Name	Function
Α	Data Input
GND	Ground
В	Data Input
Y	Data Output
V <sub>CC</sub>	Supply Voltage
С	Data Input

## **Logic Diagram**



## **Function Table**

	Inputs	Output	
Α	В	С	Υ
Н	Н	Н	Н
L	Χ	Х	L
Х	L	Х	L
Х	Х	L	L

## Absolute Maximum Ratings (Note 4) (@TA = +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
Vcc	Supply Voltage Range	-0.5 to 6.5	V
VI	Input Voltage Range	-0.5 to 6.5	V
Vo	Voltage applied to output in high impedance or I <sub>OFF</sub> state	-0.5 to 6.5	V
Vo	Voltage applied to output in high or low state	-0.3 to V <sub>CC</sub> +0.5	V
lık	Input Clamp Current V <sub>I</sub> <0	-50	mA
lok	Output Clamp Current	-50	mA
Io	Continuous output current	±50	mA
I <sub>CC MAX CONT</sub>	Continuous current through Vcc or GND	±100	mA
TJ	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
\/	Operating Voltage	Operating	1.65	5.5	V
Vcc	Operating voltage	Data Retention Only	1.5		V
		V <sub>CC</sub> = 1.65V to 1.95V	0.65 X V <sub>CC</sub>		
\/	High Loyel Input Voltage	V <sub>CC</sub> = 2.3V to 2.7V	1.7		V
V <sub>IH</sub>	High-Level Input Voltage	V <sub>CC</sub> = 3V to 3.6V	2		V
		V <sub>CC</sub> = 4.5V to 5.5V	0.7 X V <sub>CC</sub>		
		V <sub>CC</sub> = 1.65V to 1.95V		0.35 X V <sub>CC</sub>	
	Law Lavel Innut Valtage	V <sub>CC</sub> = 2.3V to 2.7V		0.7	V
$V_{IL}$	Low-Level input voltage	V <sub>CC</sub> = 3V to 3.6V		0.8	V
		V <sub>CC</sub> = 4.5V to 5.5V		0.3 X V <sub>CC</sub>	
VI	Input Voltage	•	0	5.5	V
Vo	Output Voltage		0	V <sub>CC</sub>	V
	V <sub>O</sub> Output Voltage	V <sub>CC</sub> = 1.65V		-4	
		V <sub>CC</sub> = 2.3V		-8	
I <sub>OH</sub>	High-Level Output Current	V - 2V		-16	mA
	CC Operating Voltage  High-Level Input Voltage  Low-Level Input Voltage  Input Voltage Output Voltage  High-Level Output Current  Low-Level Output Current  AV Input Transition Rise or Fall Rate  Operating Free-Air	V <sub>CC</sub> = 3V		-24	
		V <sub>CC</sub> = 4.5V		-32	
		V <sub>CC</sub> = 1.65V		4	
		$V_{CC} = 2.3V$		8	
$I_{OL}$	Low-Level Output Current	V <sub>CC</sub> = 3V		16	mA
		VCC - 3V		24	
		V <sub>CC</sub> = 4.5V		32	
		$V_{CC}$ = 1.8V ± 0.15V, 2.5V ± 0.2V		20	
Δt/ΔV		$V_{CC} = 3.3V \pm 0.3V$		10	ns/V
		$V_{CC} = 5V \pm 0.5V$		5	
T <sub>A</sub>			-40	+125	°C

Note:

5. Unused inputs should be held at  $V_{\mbox{\footnotesize CC}}$  or Ground.





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

Symbol	Parameter	Test Conditions	Vcc	Min	Тур	Max	Unit
		I <sub>OH</sub> = -100μA	1.65V to 5.5V	V <sub>CC</sub> - 0.1			
		I <sub>OH</sub> = -4mA	1.65V	1.2			
	High Lavel Output Valtage	I <sub>OH</sub> = -8mA	2.3V	1.9			1/
VoH	High-Level Output Voltage	I <sub>OH</sub> = -16mA	2)./	2.4			V
		I <sub>OH</sub> = -24mA	3V	2.3			
		I <sub>OH</sub> = -32mA	4.5V	3.8			
		I <sub>OL</sub> = 100μA	1.65V to 5.5V			0.1	
		I <sub>OL</sub> = 4mA	1.65V			0.45	
\ /		I <sub>OL</sub> = 8mA	2.3V			0.3	V
$V_{OL}$	Low-Level Output Voltage	I <sub>OL</sub> = 16mA	2)./			0.4	V
		I <sub>OL</sub> = 24mA	3V			0.55	
		I <sub>OL</sub> = 32mA	4.5V			0.55	
I <sub>I</sub>	Input Current	V <sub>I</sub> = 5.5 V or GND	0 to 5.5V			± 5	μΑ
l <sub>OFF</sub>	Power Down Leakage Current	V <sub>I</sub> or V <sub>O</sub> = 5.5V	0			± 10	μΑ
Icc	Supply Current	$V_1 = 5.5V \text{ of GND}, I_0 = 0$	1.65V to 5.5V			10	μA
ΔI <sub>CC</sub>	Additional Supply Current	Input at V <sub>CC</sub> –0.6V	3V to 5.5V			500	μA

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

Symbol	Parameter	Test Conditions	Vcc	Min	Тур	Max	Unit
		I <sub>OH</sub> = -100μA	1.65V to 5.5V	V <sub>CC</sub> – 0.1			
		$I_{OH} = -4mA$	1.65V	0.95			
V	High-Level Output Voltage	I <sub>OH</sub> = -8mA	2.3V	1.7			V
$V_{OH}$	High-Level Output voltage	I <sub>OH</sub> = -16mA	3V	1.9			V
		I <sub>OH</sub> = -24mA	3V	2.0			
		I <sub>OH</sub> = -32mA	4.5V	3.4			
		I <sub>OL</sub> = 100μA	1.65V to 5.5V			0.1	
	Lauria and Ontant Valtage	I <sub>OL</sub> = 4mA	1.65V			0.70	
		I <sub>OL</sub> = 8mA	2.3V			0.45	V
$V_{OL}$	Low-Level Output Voltage	I <sub>OL</sub> = 16mA	- 3V			0.60	V
		I <sub>OL</sub> = 24mA	30			0.80	
		I <sub>OL</sub> = 32mA	4.5V			0.80	
lį	Input Current	V <sub>I</sub> = 5.5 V or GND	0 to 5.5V			± 20	μΑ
I <sub>OFF</sub>	Power Down Leakage Current	V <sub>I</sub> or V <sub>O</sub> = 5.5V	0			± 20	μΑ
Icc	Supply Current	$V_1 = 5.5V$ of GND, $I_0 = 0$	1.65V to 5.5V			40	μA
ΔI <sub>CC</sub>	Additional Supply Current	Input at V <sub>CC</sub> –0.6 V	3V to 5.5V			5000	μA





## Package Characteristics (All typical values are at V<sub>CC</sub> = 3.3V, T<sub>A</sub> = +25°C, unless otherwise specified.)

Symbol	Parameter	Test Conditions	Vcc	Min	Тур	Max	Unit	
Cı	Input Capacitance	$V_I = V_{CC} - \text{or GND}$	3.3		3.5		pF	
		SOT26			204			
Α.,	Thermal Resistance Junction-to-Ambient	SOT363	(Note 6)		371		°C/W	
$\theta_{JA}$		X2-DFN1410-6	(Note 6)		430			
		X2-DFN1010-6			510			
		SOT26			52		°C/W	
_	Thermal Resistance Junction-	SOT363	(Note 6)		143			
$\theta_{ m JC}$	to-Case	X2-DFN1410-6	(Note 6)		190			
		X2-DFN1010-6			250			

Note:

## **Switching Characteristics**

## $T_A = -40$ °C to +85°C, $C_L = 15$ pF (see Figure 1)

Parameter	From (Input)		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>	Any	Y	1.0	15.2	0.7	5.6	0.7	4.1	0.7	3.1	ns

#### $T_A = -40$ °C to +85°C, $C_L = 30$ or 50pF (see Figure 2)

Parameter	From (Input)	-	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>	Any	Y	1.0	17.2	0.7	6.2	0.7	4.9	0.7	3.5	ns

#### $T_A = -40$ °C to +125°C, $C_L = 15$ pF (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
		(input) (OOTFOT)	Min	Max	Min	Max	Min	Max	Min	Max	
t <sub>pd</sub>	Any	Υ	1.0	18.3	0.7	6.7	0.7	4.9	0.7	3.7	ns

#### $T_A = -40$ °C to +125°C, $C_L = 30$ or 50pF (see Figure 2)

Parameter	Parameter From TO (Input) (OUTPUT)	TO (OUTPUT)	V <sub>CC</sub> = ± 0.	1.8V 15V	V <sub>CC</sub> = ± 0	: 2.5V :2V	V <sub>CC</sub> = ± 0	3.3V .3V	V <sub>CC</sub> ± 0	= 5V .5V	Unit
	(mpat)	(0011-01)	Min	Max	Min	Max	Min	Max	Min	Max	
t <sub>pd</sub>	Any	Y	1.0	20.7	0.7	7.5	0.7	5.9	0.7	4.2	ns

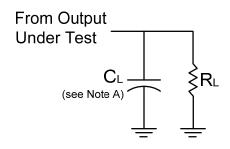
<sup>6.</sup> Test condition for SOT26, SOT363, X2-DFN1410-6 and X2-DFN1010-6 : Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.



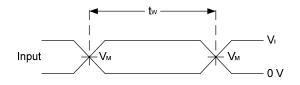
## Operating Characteristics (@T<sub>A</sub> = +25°C, unless otherwise specified.)

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

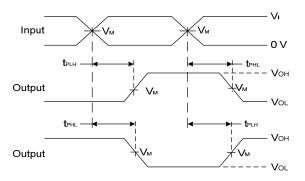
## **Parameter Measurement Information**



V	In	puts	V	C <sub>L</sub> R <sub>L</sub>	
V <sub>CC</sub>	VI	t <sub>r</sub> /t <sub>f</sub>	V <sub>M</sub>		KL
1.8V±0.15V	V <sub>CC</sub>	≤2ns	V <sub>CC</sub> /2	15pF	1ΜΩ
2.5V±0.2V	V <sub>CC</sub>	≤2ns	V <sub>CC</sub> /2	15pF	1ΜΩ
3.3V±0.3V	3V	≤2.5ns	1.5V	15pF	1ΜΩ
5V±0.5V	V <sub>CC</sub>	≤2.5ns	V <sub>CC</sub> /2	15pF	1ΜΩ



Voltage Waveform Pulse Duration



Voltage Waveform Propagation Delay Times Inverting and Non Inverting Outputs

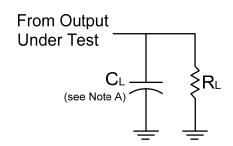
Notes:

- 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.  $t_{PLH}$  and  $t_{PHL}$  are the same as  $t_{PD}$

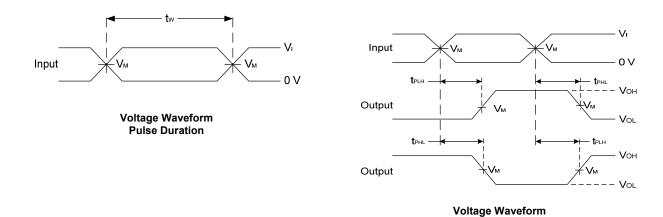
Figure 1 Load Circuit and Voltage Waveforms



## **Parameter Measurement Information (cont.)**



Inputs		V	C.	Б		
V <sub>CC</sub>	VI	t <sub>r</sub> /t <sub>f</sub>	V <sub>M</sub>	C <sub>L</sub>	$R_L$	
1.8V±0.15V	V <sub>CC</sub>	≤2ns	V <sub>CC</sub> /2	30pF	1kΩ	
2.5V±0.2V	V <sub>CC</sub>	≤2ns	V <sub>CC</sub> /2	30pF	500Ω	
3.3V±0.3V	3V	≤2.5ns	1.5V	50pF	500Ω	
5V±0.5V	V <sub>CC</sub>	≤2.5ns	V <sub>CC</sub> /2	50pF	500Ω	



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.  $t_{PLH}$  and  $t_{PHL}$  are the same as  $t_{PD}$ 

Figure 2 Load Circuit and Voltage Waveforms

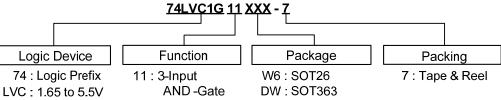
Propagation Delay Times
Inverting and Non Inverting Outputs

Notes:





## **Ordering Information**



Family FW4 : DFN1010

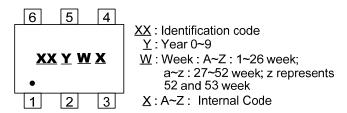
1G : One gate FZ4 : DFN1410

Part Number	Dookaga Cada	Packaging	7" Tape	and Reel
Part Number Package Code		(Note 7)	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



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

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



<u>XX</u> <u>Y **W** X</u>  $\frac{XX}{Y}: I \, \text{dentification Code} \\ \frac{X}{Y}: \, Y \, \text{ear}: \, 0{\sim}9$ 

<u>W</u>: Week: A~Z: 1~26 week; a~z: 27~52 week; z represents

52 and 53 week X : A~Z : Internal code

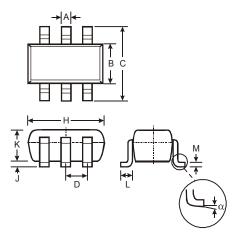
Part Number	Package	Identification Code
74LVC1G11FW4	X2-DFN1010-6	TV
74LVC1G11FZ4	X2-DFN1410-6	TV



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

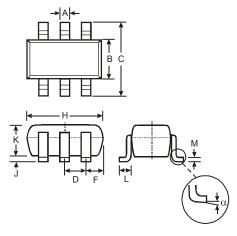
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for the latest version.

#### (1) Package Type: SOT26



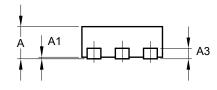
	SOT26				
Dim	Min	Max	Тур		
Α	0.35	0.50	0.38		
В	1.50	1.70	1.60		
O	2.70	3.00	2.80		
D	_	_	0.95		
Н	2.90	3.10	3.00		
7	0.013	0.10	0.05		
K	1.00	1.30	1.10		
L	0.35	0.55	0.40		
М	0.10	0.20	0.15		
α	0°	8°	_		
All D	imensi	ons in	mm		

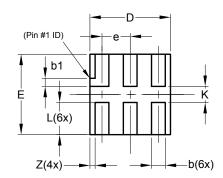
#### (2) Package Type: SOT363



	SOT363				
Dim	Min	Max			
Α	0.10	0.30			
В	1.15	1.35			
С	2.00	2.20			
D	0.65 Typ				
F	0.40	0.45			
Н	1.80	2.20			
J	0	0.10			
K	0.90	1.00			
L	0.25	0.40			
M	0.10	0.22			
α	0°	8°			
All Di	mensions	in mm			

#### (3) Package Type: DFN1010





	X2-DFN1010-6				
Dim	Min	Max	Тур		
Α		0.40	0.39		
A1	0.00	0.05	0.02		
А3	_	_	0.13		
b	0.14	0.20	0.17		
b1	0.05	0.15	0.10		
D	0.95	1.05	1.00		
Е	0.95	1.05	1.00		
е			0.35		
L	0.35	0.45	0.40		
K	0.15		_		
Z			0.065		
All	Dimens	ions in	mm		

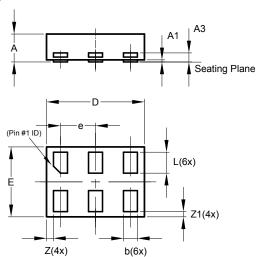




## Package Outline Dimensions (cont.) (All dimensions in mm.)

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	Тур		
Α		0.40	0.39		
A1	0.00	0.05	0.02		
А3			0.13		
b	0.15	0.25	0.20		
D	1.35	1.45	1.40		
Е	0.95	1.05	1.00		
е			0.50		
L	0.25	0.35	0.30		
Z		_	0.10		
<b>Z</b> 1	0.045	0.105	0.075		
All	Dimens	ions in	mm		

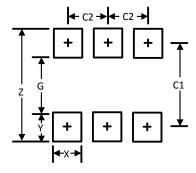




## Suggested Pad Layout (All dimensions in mm.)

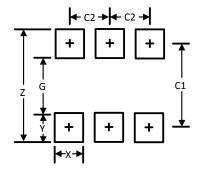
Please see AP02001 at http://www.diodes.com/datasheets/ap02001.pdf for the latest version.

#### (1) Package Type: SOT26



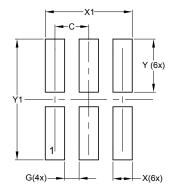
Dimensions	Value (in mm)
Z	3.20
G	1.60
Х	0.55
Y	0.80
C1	2.40
C2	0.95

#### (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



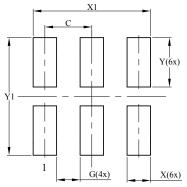
Dimensions	Value (in mm)
С	0.350
G	0.150
X	0.200
X1	0.900
Υ	0.550
Y1	1.250



#### 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)
С	0.500
G	0.250
Х	0.250
X1	1.250
Y	0.525
Y1	1.250

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