DUAL INVERTERS WITH OPEN DRAIN OUTPUTS

NEW PRODUCT

Description

The Advanced Ultra Low Power (AUP) CMOS logic family is designed for low power and extended battery life in portable applications.

The 74AUP2G06 is composed of two inverters with open drain outputs designed for operation over a power supply range of 0.8V to 3.6V. 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 gates perform the positive Boolean function:

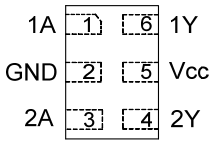
$$Y = \overline{A}$$

Features

- Advanced Ultra Low Power (AUP) CMOS
- Supply Voltage Range from 0.8V to 3.6V
- - 4mA Output Drive at 3.0V
- Low Static power consumption
- I_C < 0.9µA
- Low Dynamic Power Consumption
- C_{PD} = 0.6pF Typical at 3.6V
- Schmitt Trigger Action at All Inputs Make the Circuit Tolerant for Slower Input Rise and Fall Time. The hysteresis is typically 250mV at V_{CC} = 3.0V
- I_{OFF} Supports Partial-Power-Down Mode Operation
- ESD Protection 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
- Leadless packages per JESD30E
  - DFN1410 denoted as X2-DFN1410-6
  - DFN1010 denoted as X2-DFN1010-6
  - DFN0910 denoted as X2-DFN0910-6
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

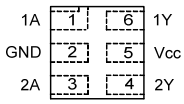
Pin Assignments

(Top View)



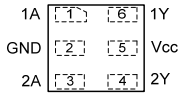
DFN1410

(Top View)



DFN1010

(Top View)



DFN0910

Applications

- Suited for battery and low power needs
- Wide array of products such as:
  - PCs, networking, notebooks, netbooks, PDAs
  - Tablet Computers, E-readers
  - 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 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.

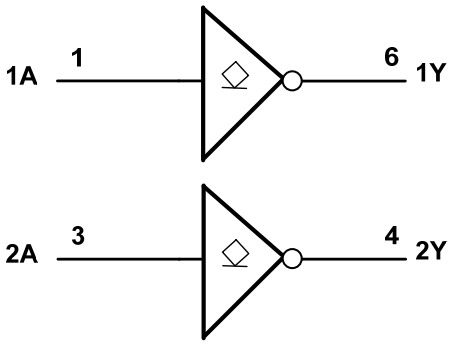
Click here for ordering information, located at the end of datasheet

NEW PRODUCT

Pin Descriptions

Pin Name	Pin NO	Function
1A	1	Data Input
GND	2	Ground
2A	3	Data Input
2Y	4	Data Output
V_{CC}	5	Supply Voltage
1Y	6	Data Output

Logic Diagram



Function Table

Inputs	Output
nA	**nY**
H	L
L	Z

NEW PRODUCT

Absolute Maximum Ratings (Note 4) (@T_A = +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_{CC}	Supply Voltage Range	-0.5 to +4.6	V
V_I	Input Voltage Range	-0.5 to +4.6	V
V_o	Voltage Applied to Output in High or Low State	-0.5 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 (V_O = 0 to V_{CC})	±20	mA
I_{CC}	Continuous Current through V_{CC}	50	mA
I_{GND}	Continuous Current through GND	-50	mA
T_J	Operating Junction Temperature	-40 to +150	°C
T_{STG}	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°C, unless otherwise specified.)

Symbol	Parameter		Min	Max	Unit
V_{CC}	Operating Voltage		0.8	3.6	V
V_I	Input Voltage		0	3.6	V
V_O	Output Voltage		0	V_{CC}	V
I_{OL}	Low-Level Output Current	V_{CC} = 0.8V	—	20	µA
		V_{CC} = 1.1V	—	1.1	mA
		V_{CC} = 1.4V	—	1.7	
		V_{CC} = 1.65V	—	1.9	
		V_{CC} = 2.3V	—	3.1	
		V_{CC} = 3.0V	—	4	
Δt/ΔV	Input Transition Rise or Fall Rate	V_{CC} = 0.8V to 3.6V	—	200	ns/V
T_A	Operating Free-Air Temperature		-40	+125	°C

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

NEW PRODUCT

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Symbol	Parameter	Test Conditions	V_{CC}	T_A = +25°C		T_A = -40 to +85°C		Unit
				Min	Max	Min	Max	
V_{IH}	High-Level Input Voltage		0.8V to 1.65V	0.80 X V_{CC}		0.80 X V_{CC}		V
			1.65V to 1.95V	0.65 X V_{CC}		0.65 X V_{CC}		
			2.3V to 2.7V	1.6		1.6		
			3.0V to 3.6V	2.0		2.0		
V_{IL}	Low-Level Input voltage		0.8V to 1.65V		0.30 X V_{CC}		0.30 X V_{CC}	V
			1.65V to 1.95V		0.35 X V_{CC}		0.35 X V_{CC}	
			2.3V to 2.7V		0.7		0.7	
			3.0V to 3.6V		0.9		0.9	
V_{OL}	Low-Level Output Voltage	I_{OL} = 20µA	0.8V to 3.6V		0.1		0.1	V
		I_{OL} = 1.1mA	1.1V		0.3 X V_{CC}		0.3 X V_{CC}	
		I_{OL} = 1.7mA	1.4V		0.31		0.37	
		I_{OL} = 1.9mA	1.65V		0.31		0.35	
		I_{OL} = 2.3mA	2.3V		0.31		0.33	
		I_{OL} = 3.1mA			0.44		0.45	
		I_{OL} = 2.7mA	3V		0.31		0.33	
		I_{OL} = 4mA			0.44		0.45	
I_I	Input Current	A or B Input, V_I = GND to 3.6V	0V to 3.6V		±0.1		±0.5	µA
I_{OZ}	Z State Leakage Current	V_O = 3.6V, V_i = 3.6V	3.6V		±0.1		±0.5	µA
I_{OFF}	Power Down Leakage Current	V_I or V_O = 0V to 3.6V	0V		±0.2		±0.6	µA
ΔI_{OFF}	Delta Power Down Leakage Current	V_I or V_O = 0V to 3.6V	0V to 0.2V		±0.2		±0.6	µA
I_{CC}	Supply Current	V_I = GND or V_{CC}, I_O = 0	0.8V to 3.6V		0.5		0.9	µA
ΔI_{CC}	Additional Supply Current	One input at V_{CC} -0.6V Other inputs at V_{CC} or GND	3.3V		40		50	µA

Symbol	Parameter	Test Conditions	V_{CC}	T_A = -40°C to +125°C		Unit
				Min	Max	
V_{IH}	High-Level Input Voltage		0.8V to 1.65V	0.80 X V_{CC}		V
			1.65V to 1.95V	0.70 X V_{CC}		
			2.3V to 2.7V	1.6		
			3.0V to 3.6V	2.0		
V_{IL}	Low-Level Input voltage		0.8V to 1.65V		0.25 X V_{CC}	V
			1.65V to 1.95V		0.30 X V_{CC}	
			2.3V to 2.7V		0.7	
			3.0V to 3.6V		0.9	
V_{OL}	Low-Level Output Voltage	I_{OL} = 20µA	0.8V to 3.6V		0.11	V
		I_{OL} = 1.1mA	1.1V		0.33 X V_{CC}	
		I_{OL} = 1.7mA	1.4V		0.41	
		I_{OL} = 1.9mA	1.65V		0.39	
		I_{OL} = 2.3mA	2.3V		0.36	
		I_{OL} = 3.1mA			0.50	
		I_{OL} = 2.7mA	3V		0.36	
		I_{OL} = 4mA			0.50	
I_I	Input Current	A or B Input, V_I = GND to 3.6V	0V to 3.6V		± 0.75	µA
I_{OZ}	Z State Leakage Current	V_O = 3.6V, V_i = 3.6V	3.6V		± 0.75	µA
I_{OFF}	Power Down Leakage Current	V_I or V_O = 0V to 3.6V	0V		± 0.75	µA
ΔI_{OFF}	Delta Power Down Leakage Current	V_I or V_O = 0V to 3.6V	0V to 0.2V		± 2.5	µA
I_{CC}	Supply Current	V_I = GND or V_{CC}, I_O = 0	0.8V to 3.6V		1.4	µA
ΔI_{CC}	Additional Supply Current	Input at V_{CC} -0.6V Other inputs at V_{CC} or GND	3.3V		75	µA

NEW PRODUCT

Switching Characteristics

C_L = 5pF see Figure 1

Parameter	From Input	TO OUTPUT	V_{CC}	T_A = +25°C			T_A = -40°C to +85°C		T_A = -40°C to +125°C		Unit
				Min	Typ	Max	Min	Max	Min	Max	
t_{pd}	A	Y	0.8V		12.8						ns
			1.2V ± 0.1V	2.6	5.8	11.3	2.3	12.5	2.3	15.9	
			1.5V ± 0.1V	1.8	3.6	6.4	1.6	7.4	1.6	8.2	
			1.8V ± 0.15V	1.5	2.9	5	1.4	5.9	1.4	6.5	
			2.5V ± 0.2V	1.2	2.4	3.9	1.1	4.5	1.1	5	
			3.3V ± 0.3V	0.9	3	3.5	0.8	3.9	0.8	4.3	

C_L = 10pF see Figure 1

Parameter	From Input	TO OUTPUT	V_{CC}	T_A = +25°C			T_A = -40°C to +85°C		T_A = -40°C to +125°C		Unit
				Min	Typ	Max	Min	Max	Min	Max	
t_{pd}	A	Y	0.8V		14.5						ns
			1.2V ± 0.1V	3.1	7	13.4	2.9	15.1	2.9	19.2	
			1.5V ± 0.1V	2.3	4.8	7.5	2.1	8.7	2.1	10.5	
			1.8V ± 0.15V	2	3.8	4.8	1.8	7	1.8	7.7	
			2.5V ± 0.2V	1.6	3.1	4.6	1.5	5.4	1.5	6	
			3.3V ± 0.3V	1.2	4.3	4.9	1.1	5.4	1.1	5.9	

C_L = 15pF see Figure 1

Parameter	From Input	TO OUTPUT	V_{CC}	T_A = +25°C			T_A = -40°C to +85°C		T_A = -40°C to +125°C		Unit
				Min	Typ	Max	Min	Max	Min	Max	
t_{pd}	A	Y	0.8V		16.2						ns
			1.2V ± 0.1V	3.5	8.2	14.3	3.3	17.4	3.3	22.5	
			1.5V ± 0.1V	2.6	6.2	8.6	2.4	10.5	2.4	13.7	
			1.8V ± 0.15V	2.3	5	6.7	2.1	8	2.1	9.8	
			2.5V ± 0.2V	2.1	3.9	5.1	1.8	6.1	1.8	6.8	
			3.3V ± 0.3V	1.6	5.6	6.4	1.4	7.1	1.4	7.8	

C_L = 30pF see Figure 1

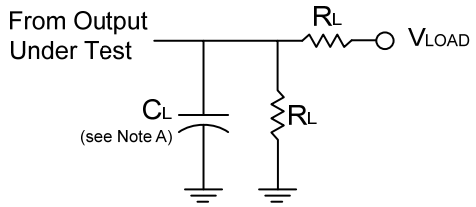
Parameter	From Input	TO OUTPUT	V_{CC}	T_A = +25°C			T_A = -40°C to +85°C		T_A = -40°C to +125°C		Unit
				Min	Typ	Max	Min	Max	Min	Max	
t_{pd}	A	Y	0.8V		19.8						ns
			1.2V ± 0.1V	4.8	9.8	18.4	4.4	18.4	4.4	25.8	
			1.5V ± 0.1V	3.6	8.2	13.9	3.2	13.9	3.2	18	
			1.8V ± 0.15V	3.2	7.8	12.2	2.9	12.2	2.9	15.2	
			2.5V ± 0.2V	2.4	7.5	9.9	2.6	9.9	2.6	11.4	
			3.3V ± 0.3V	1.8	9.2	10.6	2.1	11.6	2.1	12.8	

NEW PRODUCT

Operating Characteristics (@T_A = +25°C, unless otherwise specified.)

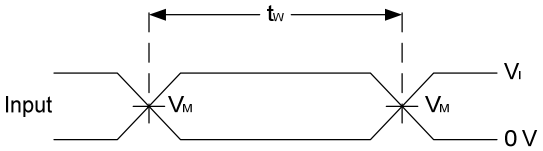
Parameter		Test Conditions	V_{CC}	Typ	Unit
C_{pd}	Power Dissipation Capacitance	f = 1MHz No Load	0.8V	0.3	pF
			1.2V ± 0.1V	0.4	
			1.5V ± 0.1V	0.5	
			1.8V ± 0.15V	0.5	
			2.5V ± 0.2V	0.5	
			3.3V ± 0.3V	0.6	
C_I	Input Capacitance	V_I = V_{CC} or GND	0V or 3.3V	2.0	pF
C_O	Output Capacitance	V_O = V_{CC} or GND	0V	2.0	pF

Parameter Measurement Information

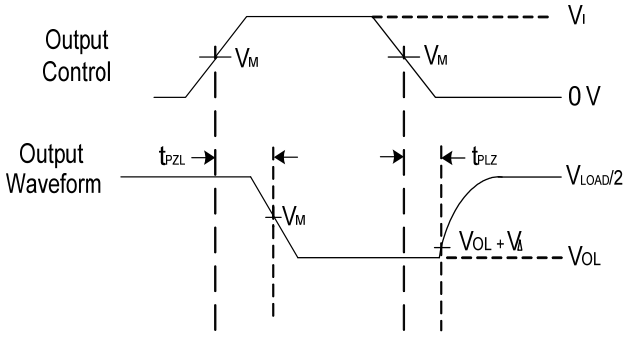


TEST	Condition
t_{PLZ} (see Notes D and E)	Vload
t_{PZL}(see Notes D and F)	Vload

V_{CC}	Inputs		V_M	V_{LOAD}	C_L	R_L	V_Δ
	V_I	t_r/t_f					
0.8V	V_{CC}	≤3 ns	$V_{CC}/2$	2 X V_{CC}	5, 10, 15, 30pF	5kΩ	0.1V
1.2V±0.1V	V_{CC}	≤3 ns	$V_{CC}/2$	2 X V_{CC}	5, 10, 15, 30pF	5kΩ	0.1V
1.5V±0.1V	V_{CC}	≤3 ns	$V_{CC}/2$	2 X V_{CC}	5, 10, 15, 30pF	5kΩ	0.15V
1.8V±0.15V	V_{CC}	≤3 ns	$V_{CC}/2$	2 X V_{CC}	5, 10, 15, 30pF	5kΩ	0.15V
2.5V±0.2V	V_{CC}	≤3 ns	$V_{CC}/2$	2 X V_{CC}	5, 10, 15, 30pF	5kΩ	0.15V
3.3V±0.3V	V_{CC}	≤3 ns	$V_{CC}/2$	2 X V_{CC}	5, 10, 15, 30pF	5kΩ	0.3V



Voltage Waveform Pulse Duration



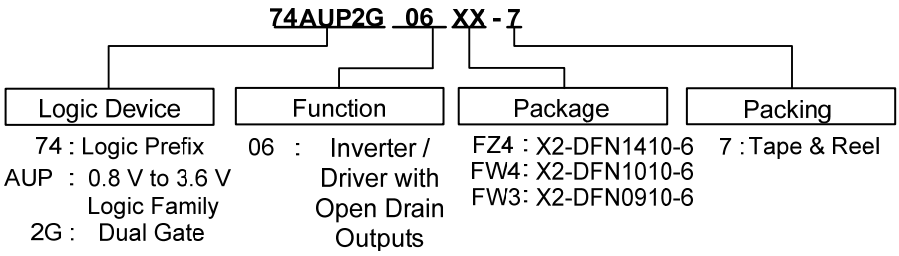
Voltage Waveform Propagation Delay Times

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. 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.
D. t_{PLZ} is measured at V_{OL} +V_Δ.

NEW PRODUCT

Ordering Information

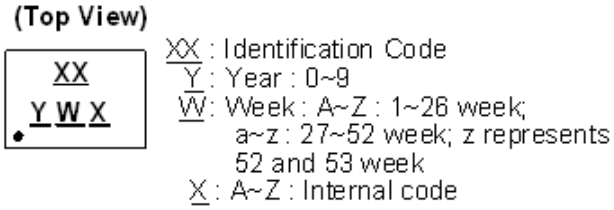


Device	Package Code	Packaging	7" Tape and Reel (Note 6)	
			Quantity	Part Number Suffix
74AUP2G06FZ4-7	FZ4	X2-DFN1410-6	5000/Tape & Reel	-7
74AUP2G06FW4-7	FW4	X2-DFN1010-6	5000/Tape & Reel	-7
74AUP2G06FW3-7	FW3	X2-DFN0910-6	5000/Tape & Reel	-7

Note: 6. The taping orientation is located on our website at http://www.diodes.com/datasheets/ap02007.pdf

Marking Information

(1) X2-DFN1410-6, X2-DFN1010-6, X2-DFN0910-6



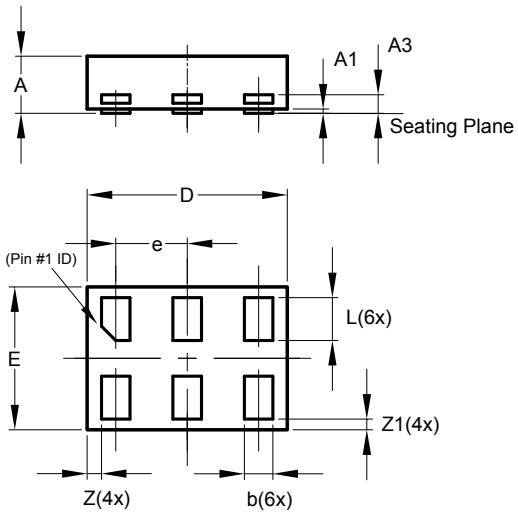
Part Number	Package	Identification Code
74AUP2G06FZ4	X2-DFN1410-6	RN
74AUP2G06FW4	X2-DFN1010-6	SN
74AUP2G06FW3	X2-DFN0910-6	MN

NEW PRODUCT

Package Outline Dimensions (All dimensions in mm.)

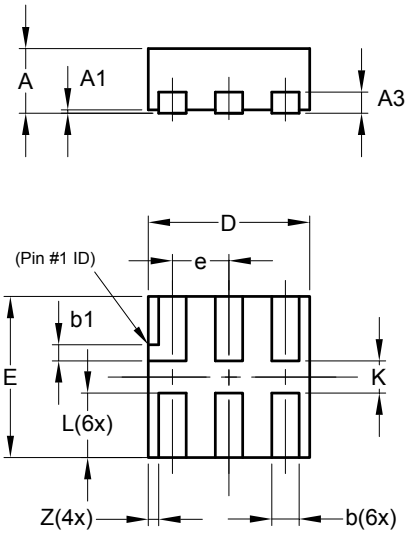
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.

(1) 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			

(2) Package Type: X2-DFN1010-6



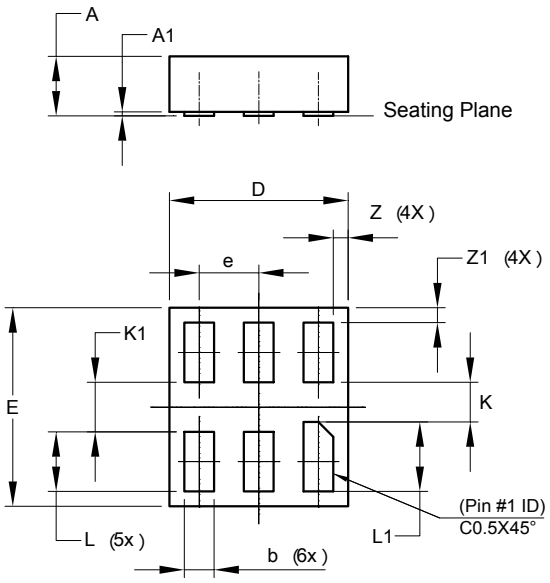
X2-DFN1010-6			
Dim	**Min**	**Max**	**Typ**
A	—	0.40	0.39
A1	0.00	0.05	0.02
A3	—	—	0.13
b	0.14	0.20	0.17
b1	0.05	0.15	0.10
D	0.95	1.05	1.00
E	0.95	1.05	1.00
e	—	—	0.35
L	0.35	0.45	0.40
K	0.15	—	—
Z	—	—	0.065
All Dimensions in mm			

NEW PRODUCT

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

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

(3) Package Type: X2-DFN0910-6



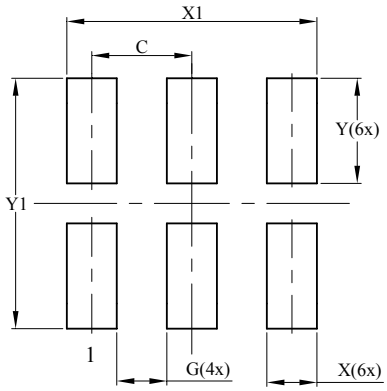
X2-DFN0910-6			
Dim	**Min**	**Max**	**Typ**
A	-	0.35	0.30
A1	0	0.03	0.02
b	0.10	0.20	0.15
D	0.85	0.95	0.90
E	0.95	1.05	1.00
e	-	-	0.30
K	0.20	-	-
K1	0.25	-	-
L	0.25	0.35	0.30
L1	0.30	0.40	0.35
Z	-	-	0.075
Z1	-	-	0.075
All Dimensions in mm			

NEW PRODUCT

Suggested Pad Layout

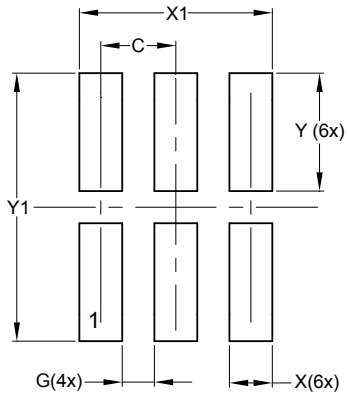
Please see AP02001 at http://www.diodes.com/datasheets/ap02001.pdf for the latest version.

(1) Package Type X2-DFN1410-6



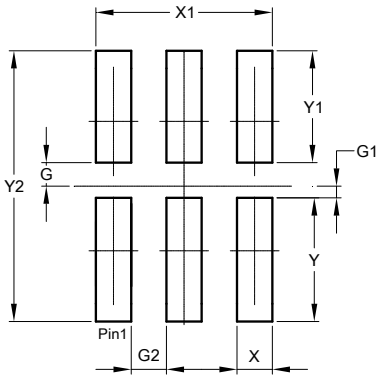
Dimensions	Value (in mm)
C	0.500
G	0.250
X	0.250
X1	1.250
Y	0.525
Y1	1.250

(2) 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

(3) Package Type: X2-DFN0910-6



Dimensions	Value (in mm)
G	0.100
G1	0.050
G2	0.150
X	0.150
X1	0.750
Y	0.525
Y1	0.475
Y2	1.150

NEW PRODUCT

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