



74AUP2G04
DUAL INVERTERS

Description

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

The 74AUP2G04 is composed of two inverters with standard pushpull 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_{CC} < 0.9μA
- Low Dynamic Power Consumption
- C_{PD} = 4pF 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 100 mA 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) 1A 1 6 1Y (Top View) (Top View) GND 2 5 Vcc 1A 1 6 1Y 1A 1 6 1Y GND 2 5 Vcc GND 2 5 Vcc GND 2 5 Vcc

DFN1410

2A 3 [4 2Y

DFN1010

2A [3] [4] 2Y **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



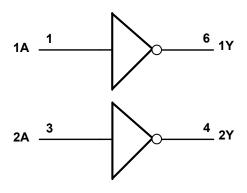
Pin Descriptions

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

Function Table

Inputs	Output			
nA	nY			
Н	L			
Ĺ	Н			

Logic Diagram



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
VI	Input Voltage Range	-0.5 to +4.6	V
Vo	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
lok	Output Clamp Current (V _O < 0)	-50	mA
I _O	Continuous Output Current (V _O = 0 to V _{CC})	±20	mA
Icc	Continuous Current through V _{CC}	50	mA
I _{GND}	Continuous Current through GND	-50	mA
TJ	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	Par	ameter	Min	Max	Unit
Vcc	Operating Voltage		0.8	3.6	V
VI	Input Voltage		0	3.6	V
Vo	Output Voltage		0	V _{CC}	V
		V _{CC} = 0.8V		-20	μΑ
		V _{CC} = 1.1V		-1.1	
	High Lavel Cutout Cumant	V _{CC} = 1.4V		-1.7	1
Іон	High-Level Output Current	V _{CC} = 1.65V		-1.9	mA
		V _{CC} = 2.3V		-3.1	1
		V _{CC} = 3.0V		-4	1
		V _{CC} = 0.8V		20	μA
		V _{CC} = 1.1V		1.1	
	Law Lawal Outant Comment	V _{CC} = 1.4V		1.7	1
l _{OL}	Low-Level Output Current	V _{CC} = 1.65V		1.9	mA
		V _{CC} = 2.3V		3.1	1
		V _{CC} = 3.0V		4	1
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.



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

Symbol	Parameter	Test Conditions	V	T _A = -	+25°C	T _A = -40°0	C to +85°C	Unit
Syllibol	Parameter	rest Conditions	V _{CC}	Min	Max	Min	Max	Ullit
			0.8V to 1.65V	0.80 X V _{CC}		0.80 X V _{CC}		
V	High-Level Input		1.65V to 1.95V	0.65 X V _{CC}		0.65 X V _{CC}		V
V _{IH}	Voltage		2.3V to 2.7V	1.6		1.6		V
			3.0V to 3.6V	2.0		2.0		
			0.8V to 1.65V		0.30 X V _{CC}		0.30 X V _{CC}	
VIL	Low-Level Input		1.65V to 1.95V		0.35 X V _{CC}		0.35 X V _{CC}	V
V IL	Voltage		2.3V to 2.7V		0.7		0.7	v
			3.0V to 3.6V		0.9		0.9	
		I _{OH} = -20μA	0.8V to 3.6V	V _{CC} – 0.1		V _{CC} – 0.1		
		I _{OH} = -1.1mA	1.1V	0.75 X V _{CC}		0.7 X V _{CC}		
		I _{OH} = -1.7mA	1.4V	1.11		1.03		
.,	High-Level Output	I _{OH} = -1.9mA	1.65V	1.32		1.3		V
V _{OH}	Voltage	I _{OH} = -2.3mA	0.01/	2.05		1.97		V
		I _{OH} = -3.1mA	2.3V	1.9		1.85		
		I _{OH} = -2.7mA	0)/	2.72		2.67		
		I _{OH} = -4mA	3V	2.6		2.55		
		I _{OL} = 20μA	0.8V to 3.6V		0.1		0.1	
		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	
.,	Low-Level Output	I _{OL} = 1.9mA	1.65V		0.31		0.35	.,
V_{OL}	Voltage	I _{OL} = 2.3mA	0.01/		0.31		0.33	V
		I _{OL} = 3.1mA	2.3V		0.44		0.45	
		I _{OL} = 2.7mA	0) (0.31		0.33	
		I _{OL} = 4mA	3V		0.44		0.45	
lı	Input Current	A or B Input V _I = GND to 3.6V	0V to 3.6V		± 0.1		± 0.5	μΑ
l _{OFF}	Power Down Leakage Current	V_I or $V_O = 0V$ to 3.6V	0V		± 0.2		± 0.6	μΑ
Δl _{OFF}	Delta Power Down Leakage Current	V_I or $V_O = 0V$ to 3.6V	0V to 0.2V		± 0.2		± 0.6	μA
Icc	Supply Current	$V_I = GND \text{ or } V_{CC}, I_O = 0$	0.8V to 3.6V		0.5		0.9	μA
ΔI _{CC}	Additional Supply Current	One input at V _{CC} -0.6V Other input at V _{CC} or GND	3.3V		40		50	μΑ



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

Symbol	Parameter	Test Conditions	V	T _A = -40°C 1	to +125 °C	Unit
Symbol	Faiailletei	rest conditions	V _{CC}	Min	Max	Oilit
			0.8V to 1.65V	0.80 X V _{CC}		
VIH	High-Level Input Voltage		1.65V to 1.95V	0.70 X V _{CC}		V
VIH	Trigit-Level input voitage		2.3V to 2.7V	1.6		V
			3.0V to 3.6V	2.0		
			0.8V to 1.65V		0.25 X V _{CC}	
V _{IL}	Low-Level Input Voltage		1.65V to 1.95V		0.30 X V _{CC}	V
V IL	Low Level input voltage		2.3V to 2.7V		0.7	v
			3.0V to 3.6V		0.9	
		I _{OH} = -20μA	0.8V to 3.6V	V _{CC} – 0.11		
		I _{OH} = -1.1mA	1.1V	0.6 X V _{CC}		
		I _{OH} = -1.7mA	1.4V	0.93		
.,	High Lovel Output Voltage	I _{OH} = -1.9mA	1.65V	1.17		٧
V _{OH}	High-Level Output Voltage	I _{OH} = -2.3mA	2.2)/	1.77		
		I _{OH} = -3.1mA	2.3V	1.67		
		I _{OH} = -2.7mA	3V	2.40		
		I _{OH} = -4mA	3 V	2.30		
		I _{OL} = 20μA	0.8V to 3.6V		0.11	
		I _{OL} = 1.1mA	1.1V		0.33 X V _{CC}	
		I _{OL} = 1.7mA	1.4V		0.41	
.,	Low Lovel Output Voltage	I _{OL} = 1.9mA	1.65V		0.39	V
V _{OL}	Low-Level Output Voltage	I _{OL} = 2.3mA	2.21/		0.36	V
		I _{OL} = 3.1mA	2.3V		0.50	
		I _{OL} = 2.7mA	3V		0.36	
		I _{OL} = 4mA	3V		0.50	
II	Input Current	A or B Input, V _I = GND to 3.6V	0V to 3.6V		± 0.75	μΑ
I _{OFF}	Power Down Leakage Current	V_I or $V_O = 0V$ to 3.6V	0V		± 1.0	μΑ
ΔI_{OFF}	Delta Power Down Leakage Current	V_1 or V_0 = 0V to 3.6V	0V to 0.2V		± 2.5	μΑ
Icc	Supply Current	$V_I = GND \text{ or } V_{CC}, I_O = 0$	0.8V to 3.6V		1.4	μΑ
Δl _{CC}	Additional Supply Current	Input at V _{CC} -0.6V Other input at V _{CC} or GND	3.3V		75	μΑ

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

	Parameter Test Conditions		Vcc	Тур	Unit
			0.8V	5.1	
	C. Pours d'acte the constitue of		1.2V ± 0.1V	5.2	
0		f = 1MHz	1.5V ± 0.1V	5.2	
C_{pd}	Power dissipation capacitance	No Load	1.8V ± 0.15V	5.5	pF
			2.5V ± 0.2V	5.7	
			3.3V ± 0.3V	6.0	
Cı	Input Capacitance	V _i = V _{CC} or GND	0V or 3.3V	2.0	pF
Co	Output Capacitance	$V_O = V_{CC}$ or GND	0V	3.5	pF



Switching Characteristics

C_L = 5pF see Figure 1

Parameter From		то	Vaa		T _A = +25°C		T _A = -40°C to +85°C		T _A = -40°C to +125°C		Unit
Faranietei	Input OUTPUT	OUTPUT	V _{CC}	Min	Тур	Max	Min	Max	Min	Max	Oilit
			V8.0		19.2						
			1.2V ± 0.1V	2.6	5.5	11.3	2.3	12.5	2.3	13.9	ns
	۸		1.5V ± 0.1V	1.8	3.6	6.4	1.6	7.4	1.6	8.2	
t _{pd}	Α	T T	1.8V ± 0.15V	1.5	2.9	5.0	1.4	5.9	1.4	6.5	
			2.5V ± 0.2V	1.2	2.4	3.9	1.1	4.5	1.1	5.0	
			$3.3V \pm 0.3V$	0.9	1.9	3.2	0.8	3.9	0.8	4.3	

C_L = 10pF see Figure 1

Parameter From	то	V	T _A = +25°C			T _A = -40°C to +85°C		T _A = -40°C to +125°C		Unit	
Farailletei	Input O	OUTPUT	V _{CC}	Min	Тур	Max	Min	Max	Min	Max	Oilit
			V8.0		23.8						
			1.2V ± 0.1V	3.1	6.5	13.4	2.9	15.1	2.9	16.6	ns
	^	V	1.5V ± 0.1V	2.3	4.2	7.5	2.1	8.7	2.1	9.6	
t _{pd}	Α	Ţ	1.8V ± 0.15V	2.0	3.5	5.9	1.8	7.0	1.8	7.7	
			2.5V ± 0.2V	1.6	2.9	4.6	1.5	5.4	1.5	6.0	
			3.3V ± 0.3V	1.2	2.4	3.8	1.1	4.5	1.1	5.0	

C_L = 15pF see Figure 1

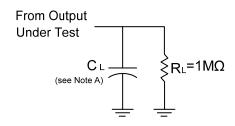
Parameter	From	то		T _A = +25°C			T _A = -40°C to +85°C		T _A = -40°C to +125°C		Unit
Faranietei	Input	OUTPUT	Vcc	Min	Тур	Max	Min	Max	Min	Max	Offic
			V8.0		28.0						
			1.2V ± 0.1V	3.5	7.4	14.3	3.3	17.4	3.3	19.1	ns
	Α		1.5V ± 0.1V	2.6	4.7	8.6	2.4	10.0	2.4	11.0	
ι _{pd}	A	r	1.8V ± 0.15V	2.3	4.0	6.7	2.1	8.0	2.1	8.8	
			2.5V ± 0.2V	2.1	3.3	5.1	1.8	6.1	1.8	6.8	
			3.3V ± 0.3V	1.6	2.8	4.2	1.4	5.0	1.4	5.5	

 C_L = 30pF see Figure 1

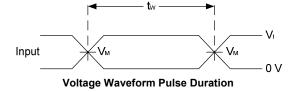
Parameter	otor From TO		V		T _A = +25°C	;	$T_A = -40^{\circ}C \text{ to } +85^{\circ}C$		T _A = -40°C	to +125°C	Unit
raiaiiletei	Input	OUTPUT	V _{CC}	Min	Тур	Max	Min	Max	Min	Max	OIIIL
		0.8V		40.3							
			1.2V ± 0.1V	4.8	9.8	17.6	4.4	20.9	4.4	23.0	
	^	V	1.5V ± 0.1V	3.6	6.3	10.8	3.2	12.9	3.2	14.2	
t _{pd}	Α	Y	1.8V ± 0.15V	3.2	5.3	9.0	2.9	10.5	2.9	11.6	ns
			2.5V ± 0.2V	2.4	4.5	6.5	2.6	7.6	2.6	8.4	
			3.3V ± 0.3V	1.8	3.8	5.4	2.1	6.2	2.1	6.9	

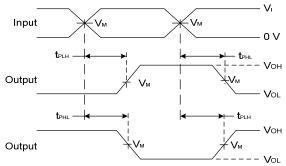


Parameter Measurement Information



.,	In	puts	v	
Vcc	VI	t _r /t _f	V _M	CL
0.8V	Vcc	≤3 ns	V _{CC} /2	5, 10, 15, 30pF
1.2V ± 0.1V	Vcc	≤3 ns	V _{CC} /2	5, 10, 15, 30pF
1.5V ± 0.1V	Vcc	≤3 ns	V _{CC} /2	5, 10, 15, 30pF
1.8V ± 0.15V	V _{CC}	≤3 ns	V _{CC} /2	5, 10, 15, 30pF
2.5V ± 0.2V	Vcc	≤3 ns	V _{CC} /2	5, 10, 15, 30pF
3.3V ± 0.3V	V _{CC}	≤3 ns	V _{CC} /2	5, 10, 15, 30pF





Voltage Waveform Propagation Delay Times Inverting and Non Inverting Outputs

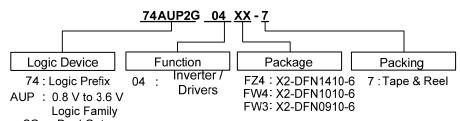
Figure 1. Load Circuit and Voltage Waveforms

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



Ordering Information



2G: Dual Gate

Device Package	Backage Code	ackage Code Packaging -	7" Tape and Reel (Note 6)	
Device	Package Code		Quantity	Part Number Suffix
74AUP2G04FZ4-7	FZ4	X2-DFN1410-6	5000/Tape & Reel	-7
74AUP2G04FW4-7	FW4	X2-DFN1010-6	5000/Tape & Reel	-7
74AUP2G04FW3-7	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

(Top View)

XX $\frac{XX}{Y}$: Identification Code $\frac{X}{Y}$: Year: 0~9

₩: Week: A~Z: 1~26 week; a~z: 27~52 week; z represents

52 and 53 week \underline{X} : $A \sim Z$: Internal code

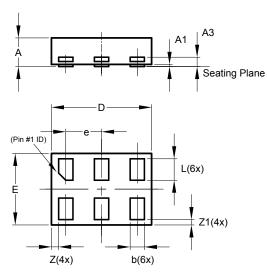
Part Number	Package	Identification Code
74AUP2G04FZ4	X2-DFN1410-6	RM
74AUP2G04FW4	X2-DFN1010-6	SM
74AUP2G04FW3	X2-DFN0910-6	MM



Package Outline Dimensions (All dimensions in mm.)

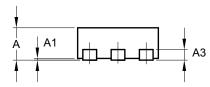
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.

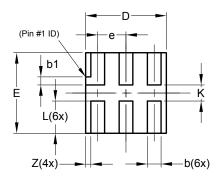
(1) Package Type X2-DFN1410-6



	X2-DFN1410-6			
Dim	Min	Max	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	
Z 1	0.045	0.105	0.075	
All Dimensions in mm				

(2) Package Type: X2-DFN1010-6





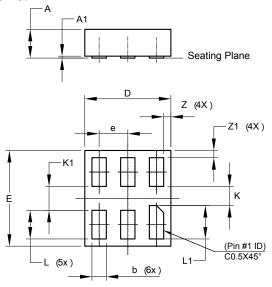
X2-DFN1010-6			
Dim	Min	Max	Тур
Α		0.40	0.39
A1	0.00	0.05	0.02
A3	-	-	0.13
b	0.14	0.20	0.17
b1	0.05	0.15	0.10
D	0.95	1.05	1.00
Е	0.95	1.05	1.00
е		_	0.35
L	0.35	0.45	0.40
K	0.15		_
Z	-	-	0.065
All Dimensions in mm			



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

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

(3) Package Type: X2-DFN0910-6

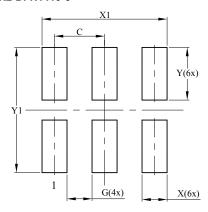


X2-DFN0910-6			
Dim	Min	Max	Тур
Α	-	0.35	0.30
A1	0	0.03	0.02
b	0.10	0.20	0.15
D	0.85	0.95	0.90
E	0.95	1.05	1.00
е	-	-	0.30
K	0.20	-	-
K1	0.25	-	-
L	0.25	0.35	0.30
L1	0.30	0.40	0.35
Z	-	-	0.075
Z 1	-	-	0.075
All Dimensions in mm			

Suggested Pad Layout

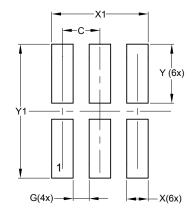
Please see AP02001 at http://www.diodes.com/datasheets/ap02001.pdf for the latest version.

(1) Package Type X2-DFN1410-6



Dimensions	Value	
Dilliensions	(in mm)	
С	0.500	
G	0.250	
Х	0.250	
X1	1.250	
Y	0.525	
Y1	1.250	

(2) Package Type: X2-DFN1010-6



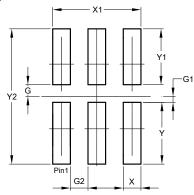
Dimensions	Value (in mm)
С	0.350
G	0.150
Х	0.200
X1	0.900
Υ	0.550
Y1	1.250



Suggested Pad Layout

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

(3) Package Type: X2-DFN0910-6



Page 1	
Dimensions	Value (in mm)
G	0.100
G1	0.050
G2	0.150
Х	0.150
X1	0.750
Y	0.525
Y1	0.475
Y2	1.150

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