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74AUP2G3404 BUFFER AND INVERTER

Description

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

The 74AUP2G3404 has one buffer and one inverter. Both gates have push-pull 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 $I_{\rm OFF}$. The $I_{\rm OFF}$ circuitry disables the output preventing damaging current backflow when the device is powered down

Pin Assignments

(Top View)







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} = 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

Notes:

- 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)

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

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.

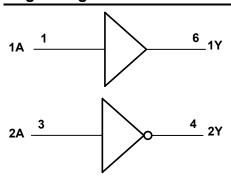
Click for Ordering Information



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 Tables

Input	Output
1A	1Y
Н	Н
L	L

Input	Output
2A	2Y
Н	L
L	Н



Absolute Maximum Ratings (Note 4) (@TA = +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
Іок	Output Clamp Current (Vo < 0)	-50	mA
Io	Continuous Output Current (V _O = 0 to V _{CC})	±20	mA
lcc	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:

Recommended Operating Conditions (Note 5) (@T_A = +25°C, unless otherwise specified.)

Symbol		Parameter	Min	Max	Unit
Vcc	Operating Voltage	_	8.0	3.6	V
VI	Input Voltage		0	3.6	V
Vo	Output Voltage		0	Vcc	V
		$V_{CC} = 0.8V$		-20	μA
		V _{CC} = 1.1V	_	-1.1	
	High-Level Output Current	V _{CC} = 1.4V	_	-1.7	
I _{OH}	nigh-Level Output Current	V _{CC} = 1.65V	_	-1.9	mA
		V _{CC} = 2.3V	_	-3.1	
		V _{CC} = 3.0V	_	-4	
		$V_{CC} = 0.8V$		20	μA
		V _{CC} = 1.1V	_	1.1	
	Low-Level Output Current	V _{CC} = 1.4V	_	1.7	
l _{OL}	Low-Level Output Current	V _{CC} = 1.65V	_	1.9	mA
		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.

^{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.



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

Cymphol	Parameter	Test Conditions	V	T _A = -	+25°C	T _A =-40	to +85°C	Unit	
Symbol	Parameter	rest Conditions	V _{CC}	Min	Max	Min	Max	Unit	
		_	0.8V to 1.65V	0.80 X V _{CC}	_	0.80 X V _{CC}	_		
VIH	High-Level Input		1.65V to 1.95V	0.65 X V _{CC}	_	0.65 X V _{CC}	_	V	
VIH	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}		
VII	Low-Level Input	_	1.65V to 1.95V	_	0.35 X V _{CC}	_	0.35 X V _{CC}	V	
۷IL	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	_		
	l F	I _{OH} = -1.1mA	1.1V	0.75 X V _{CC}	_	0.7 X V _{CC}	_		
High-Level	$I_{OH} = -1.7 \text{mA}$	1.4V	1.11	_	1.03	_			
		$I_{OH} = -1.9 \text{mA}$	1.65V	1.32	_	1.3	_	V	
VOH	Output Voltage	I _{OH} = -2.3mA	2.3V	2.05	_	1.97	_		
		I _{OH} = -3.1mA	2.5 V	1.9	_	1.85	_		
	l F	$I_{OH} = -2.7 \text{mA}$	3V	2.72	_	2.67	_		
		I _{OH} = -4mA	5 V	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		
VoL	Low-Level Input	I _{OL} = 1.9mA	1.65V	_	0.31	_	0.35	V	
VOL	Voltage	$I_{OL} = 2.3 \text{mA}$	2.3V	_	0.31	_	0.33	ľ	
		I _{OL} = 3.1mA	2.5 V	_	0.44	_	0.45		
		$I_{OL} = 2.7 \text{mA}$	3V	_	0.31	_	0.33		
		I _{OL} = 4mA	3 V	_	0.44	_	0.45	1	
lı	Input Current	A or B Input	0V to 3.6V	_	± 0.1	_	± 0.5	μΑ	
I _{OFF}	Power Down	V_I or $V_O = 0V$ to 3.6V	0V	_	± 0.2	_	± 0.6	μA	
ΔI_{OFF}	Delta Power	V_I or $V_O = 0V$ to 3.6V	0V to 0.2V	_	± 0.2	_	± 0.6	μΑ	
Icc	Supply Current	$V_I = GND \text{ or } V_{CC}, I_O = 0$	0.8V to 3.6V	_	0.5	_	0.9	μΑ	
ΔI_{CC}	Additional Supply	One input at V _{CC} –0.6V Other	3.3V	_	40	_	50	μA	



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

Symbol	Parameter	Test Conditions	V	T _A = -40	to 125°C	Unit
Syllibol	Faranietei	rest conditions	V _{CC}	Min	Max	Unit
		_	0.8V to 1.65V	0.80 X V _{CC}	_	
V _{IH}	High-Level Input Voltage	_	1.65V to 1.95V	0.70 X V _{CC}	_	V
VIH	High-Level Input Voltage	_	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}	
VIL	Low-Level Input Voltage	_	1.65V to 1.95V	_	0.30 X V _{CC}	V
VIL	Low-Level input voltage	_	2.3V to 2.7V	_	0.7	·
		_	3.0V to 3.6V	_	0.9	
		$I_{OH} = -20\mu A$	0.8V to 3.6V	V _{CC} – 0.11	_	
		$I_{OH} = -1.1$ mA	1.1V	0.6 X V _{CC}	_	
		I _{OH} = -1.7mA	1.4V	0.93	_	
.,	High Lavel Output Valtage	I _{OH} = -1.9mA	1.65V	1.17	_	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
Voн	High-Level Output Voltage	I _{OH} = -2.3mA	2.21/	1.77	_	V
		I _{OH} = -3.1mA	2.3V	1.67	_	
		I _{OH} = -2.7mA	21/	2.40	_	
		I _{OH} = -4mA	3V	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	
		I _{OL} = 1.9mA	1.65V	_	0.39	.,
V_{OL}	Low-Level Input Voltage	I _{OL} = 2.3mA	2.01	_	0.36	V
		I _{OL} = 3.1mA	2.3V	_	0.50	
		I _{OL} = 2.7mA		_	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	μA
l _{OFF}	Power Down Leakage Current	V_1 or $V_0 = 0V$ to 3.6V	0V	_	± 1.0	μA
Δl _{OFF}	Delta Power Down Leakage Current	V _I or V _O = 0V to 3.6V	0V to 0.2V	_	± 2.5	μA
Icc	Supply Current	$V_1 = GND \text{ or } V_{CC}, I_0 = 0$	0.8V to 3.6V	_	1.4	μA
Δl _{CC}	Additional Supply Current	Input at V_{CC} –0.6V Other input at V_{CC} or GND	3.3V	_	75	μА

Operating and Package Characteristics

T_A = +25°C

	Parameter	Test Conditions	Vcc	Тур	Unit	
			0.8V	5.1		
			1.2V ± 0.1V	5.2		
0	Power dissipation capacitance	f = 1MHz	1.5V ± 0.1V	5.2	pF	
C_{pd}		No Load	1.8V ± 0.15V	5.5		
			2.5V ± 0.2V	5.7		
			3.3V ± 0.3V	6.0		
CI	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	TO OUTPUT	V _{CC}	7	T _A = +25°C			T _A = -40 to +85°C		T _A = -40 to +125°C		
Faranietei	Input		V CC	Min	Тур	Max	Min	Max	Min	Max	Unit	
			V8.0		16.0							
	Α	Y	1.2V ± 0.1V	2.4	5.0	10.3	2.0	11.4	2.0	12.6	ns	
			1.5V ± 0.1V	1.8	3.6	6.4	1.6	7.4	1.6	8.2		
t _{pd}			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 ± 0.3V	1.1	2.1	3.2	1.0	3.9	1.0	4.3		

C_L = 10pF see Figure 1

Parameter	From	то	V	T _A = +25°C			T _A = -40	to +85°C	T _A = -40 to	Unit	
rarameter	Input	OUTPUT	V _{CC}	Min	Тур	Max	Min	Max	Min	Max	Offic
			V8.0		19.8						
		Y	1.2V ± 0.1V	2.8	5.9	12.2	2.3	13.7	2.3	15.1	ns
	^		1.5V ± 0.1V	2.3	4.2	7.5	1.9	8.7	1.9	9.6	
t _{pd}	A		1.8V ± 0.15V	2.0	3.5	5.9	1.7	7.0	1.7	7.7	
			2.5V ± 0.2V	1.7	2.9	4.6	1.5	5.4	1.5	6.0	
			3.3V ± 0.3V	1.6	2.7	3.8	1.4	4.5	1.4	5.1	

C_L = 15pF see Figure 1

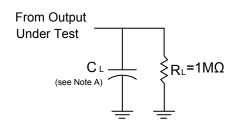
Parameter	From	TO OUTPUT	Vcc	-	T _A = +25°C			to +85°C	$T_A = -40 \text{ to}$	+125°C	Unit
Input	Input			Min	Тур	Max	Min	Max	Min	Max	Unit
		A Y	V8.0		23.3						
			1.2V ± 0.1V	3.2	6.7	13.0	2.6	15.8	2.6	17.4	
4	^		1.5V ± 0.1V	2.6	4.7	8.6	2.2	10.0	2.2	11.0	1
t _{pd} A	А		1.8V ± 0.15V	2.3	4.0	6.7	2.0	8.0	2.0	8.8	ns
			2.5V ± 0.2V	2.1	3.3	5.1	1.8	6.1	1.8	6.8]
			3.3V ± 0.3V	2.0	3.1	4.2	1.6	5.0	1.6	5.5	

C_L = 30pF see Figure 1

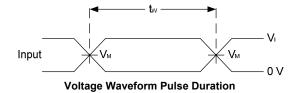
Parameter	From	TO OUTPUT	V _{CC}	-	T _A = +25°C			to +85°C	$T_A = -40 \text{ to}$	Unit	
Input	Input			Min	Тур	Max	Min	Max	Min	Max	Oill
		V	0.8V		33.6						ns
			1.2V ± 0.1V	4.4	8.9	16.3	3.6	19.0	3.6	20.9	
			1.5V ± 0.1V	3.6	6.3	10.8	3.2	12.9	3.2	14.2	
t _{pd} A	A	Ť	1.8V ± 0.15V	3.2	5.3	9.0	2.9	10.5	2.9	11.6	
			2.5V ± 0.2V	2.4	4.5	6.5	2.6	7.6	2.6	8.5	
			3.3V ± 0.3V	2.2	4.2	5.6	2.2	6.2	2.2	7.2	

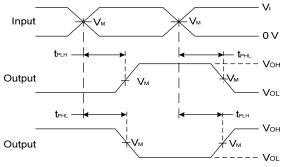


Parameter Measurement Information



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





Voltage Waveform Propagation Delay Times Inverting and Non Inverting Outputs

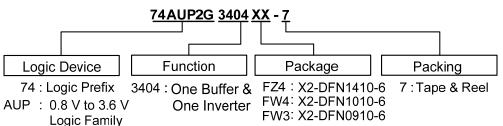
Figure 1 Load Circuit and Voltage Waveforms

Notes: A. Includes test lead and test apparatus capacitance.

- B. All pulses are supplied at pulse repetition rate ≤ 10 MHz.
 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

Dovice	Dockono Codo	Packaging	7" Tape and Reel	
Device	Package Code	(Note 7)	Quantity	Part Number Suffix
74AUP2G3404FZ4-7	FZ4	X2-DFN1410-6	5000/Tape & Reel	-7
74AUP2G3404FW4-7	FW4	X2-DFN1010-6	5000/Tape & Reel	-7
74AUP2G3404FW3-7	FW3	X2-DFN0910-6	5000/Tape & Reel	-7

Note:

Marking Information

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

(Top View)

XX XX: Identification Code \overline{Y} : Year: 0~9

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

a~z: 27~52 week; z represents

Output

Description:

A value of the content of th

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

Part Number	Package	Identification Code
74AUP2G3404FZ4	X2-DFN1410-6	RU
74AUP2G3404FW4	X2-DFN1010-6	SU
74AUP2G3404FW3	X2-DFN0910-6	MU

^{7.} The taping orientation is located on our website at http://www.diodes.com/datasheets/ap02007.pdf

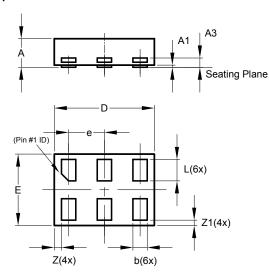
^{8.} For packaging details, go to our website at http://www.diodes.com/products/packages.html



Package Outline Dimensions (All dimensions in mm.)

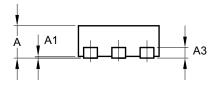
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.

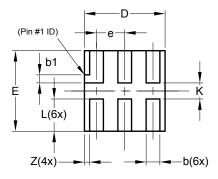
(1) Package Type X2-DFN1410-6



	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





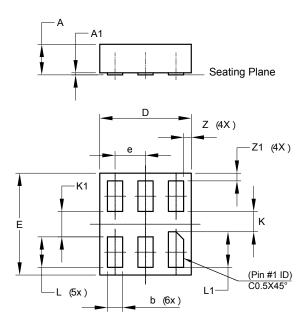
X2-DFN1010-6			
Dim	Min	Max	Тур
Α	1	0.40	0.39
A 1	0.00	0.05	0.02
А3			0.13
b	0.14	0.20	0.17
b1	0.05	0.15	0.10
D	0.95	1.05	1.00
Е	0.95	1.05	1.00
е	1		0.35
L	0.35	0.45	0.40
K	0.15	_	
Z			0.065
All Dimensions in mm			



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



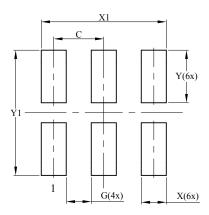
X2-DFN0910-6				
Dim	Min	Max	Тур	
Α	-	0.35	0.30	
A1	0	0.03	0.02	
b	0.10	0.20	0.15	
D	0.85	0.95	0.90	
Е	0.95	1.05	1.00	
е	-	-	0.30	
K	0.20	-	-	
K1	0.25	-	-	
L	0.25	0.35	0.30	
L1	0.30	0.40	0.35	
Z	-	-	0.075	
Z 1	-	-	0.075	
All Dimensions in mm				



Suggested Pad Layout

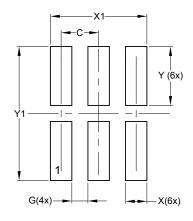
Please see AP02001 at http://www.diodes.com/datasheets/ap02001.pdf for the latest version.

(1) Package Type X2-DFN1410-6



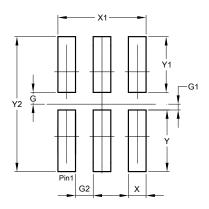
Dimensions	Value (in mm)
С	0.500
G	0.250
Х	0.250
X1	1.250
Υ	0.525
Y1	1.250

(2) Package Type: X2-DFN1010-6



Dimensions	Value (in mm)
С	0.350
G	0.150
Х	0.200
X1	0.900
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
Х	0.150
X1	0.750
Y	0.525
Y1	0.475
Y2	1.150



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