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September 2012

74AUP1G95 TinyLogic[®] Low Power Universal Configurable Two-Input Logic Gate (Open Drain Output)

Features

- 0.8 V to 3.6 V V_{CC} Supply Operation
- 3.6 V Over-Voltage Tolerant I/Os at V_{CC} from 0.8V to 3.6 V
- Extremely High Speed tpd
 - 3.2 ns: Typical at 3.3 V
- Power-Off High-Impedance Inputs and Outputs
- Low Static Power Consumption
 - I_{CC}=0.9 μA Maximum
- Low Dynamic Power Consumption
 - C_{PD}=3.0 pF Typical at 3.3 V
- Ultra-Small MicroPak™ Packages

Description

The 74AUP1G95 is a universal, configurable, two-input logic gate with an open-drain output that provides a high-performance and low-power solution for battery-powered portable applications. This product is designed for a wide low voltage operating range (0.8 V to 3.6 V) and guarantees very low static and dynamic power consumption across the entire voltage range. All inputs are implemented with hysteresis to allow for slower transition input signals and better switching noise immunity.

The 74AUP1G95 provides for multiple functions, as determined by various configurations of the three inputs. The potential logic functions provided are MUX, AND, OR, NAND, NOR, inverter, and buffer (see Figure 2 through Figure 8).

Ordering Information

Part Number	Top Mark	Package	Packing Method
74AUP1G95L6X	AN	6-Lead, MicroPak™, 1.0 mm Wide	5000 Units on Tape & Reel
74AUP1G95FHX	AN	6-Lead, MicroPak2™, 1x1 mm Body, .35 mm Pitch	5000 Units on Tape & Reel

Pin Configuration

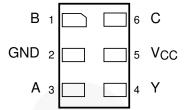


Figure 1. MicroPak™ (Top Through View)

Pin Definitions

Pin #	Name	Description	
1	В	Data Input	
2	GND Ground		
3	A Data Ir		
4	Υ	Output (Open Drain)	
5	V _{CC} Supply Voltage		
6	С	Data Input	

Function Table

	Inputs		Y=Output
С	В	Α	
L	L	L	L
L	L	Н	L
L	Н	L	H ⁽¹
L	Н	Н	H ⁽¹⁾
Н	L	L	L
Н	L	Н	H ⁽¹⁾
Н	Н	L	L
Н	Н	Н	H ⁽¹⁾

H = HIGH Logic Level

L = LOW Logic Level

Note:

1. High impedance output state, open drain.

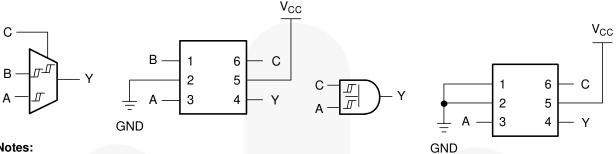
Function Selection Table

2-Input Logic Function	Connection Configuration		
2-to-1 MUX	Figure 2		
2-Input AND Gate	Figure 3		
2-Input OR Gate with One Inverted Input	Figure 4		
2-Input NAND Gate with One Inverted Input	Figure 4		
2-Input AND Gate with One Inverted Input	Figure 5		
2-Input NOR Gate with One Inverted Input	Figure 5		
2-Input OR Gate	Figure 6		
Inverted	Figure 7		
Buffer	Figure 8		

Logic Configurations

Figure 2 through Figure 8 show the logical functions that can be implemented using the 74AUP1G95. The diagrams show the DeMorgan's equivalent logic duals given two-input function. The а

implementation is next to the board-level physical implementation of how the pins should be connected.



Notes:

- When C is L, Y=B.
- When C is H, Y=A.

2-to-1 MUX Figure 2.

Figure 3. 2-Input AND Gate

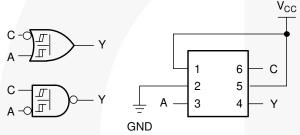


Figure 4. 2-Input OR Gate with One Inverted Input 2-Input NAND Gate with One Inverted Input

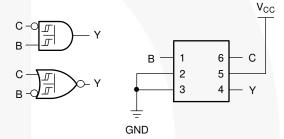


Figure 5. 2-Input AND Gate with One Inverted Input 2-Input NOR Gate with One Inverted Input

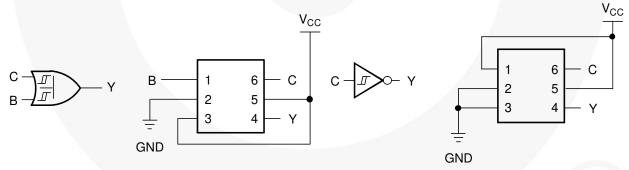


Figure 6. 2-Input OR Gate

Figure 7. Inverter

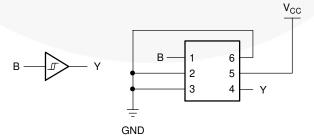


Figure 8. **Buffer**

Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

Symbol	Para	Parameter			Unit
V _{CC}	Supply Voltage		-0.5	4.6	V
V _{IN}	DC Input Voltage		-0.5	4.6	V
V _{OUT} ⁽²⁾	DC Output Voltage	-0.5	4.6	V	
I _{IK}	DC Input Diode Current	$V_{IN} < 0 V$		-50	mA
I _{OK}	DC Output Diode Current	V _{OUT} < 0 V		-50	mA
I _{OL}	DC Output Sink Current			+50	mA
I _{CC} or I _{GND}	DC V _{CC} or Ground Current per S	Supply Pin		±50	mA
T _{STG}	Storage Temperature Range		-65	+150	°C
T_J	Junction Temperature Under Bia	as		+150	°C
TL	Junction Lead Temperature, So	ldering 10s		+260	°C
P_{D}	Power Dissipation at +85°C	MicroPak™-6		130	mW
		MicroPak2™-6		120	
ESD	Human Body Model, JEDEC:JE	SD22-A114		4000	V
LSD	Charged Device Model, JEDEC	:JESD22-C101		2000	V

Note:

Recommended Operating Conditions⁽³⁾

The Recommended Operating Conditions table defines the conditions for actual device operation. Recommended operating conditions are specified to ensure optimal performance to the datasheet specifications. Fairchild does not recommend exceeding them or designing to Absolute Maximum Ratings.

Symbol	Parameter	Condition	Min.	Max.	Unit	
V _{CC}	Supply Voltage		0.8	3.6	V	
V_{IN}	Input Voltage		0	3.6	V	
V _{OUT}	Output Voltage		0	3.6	V	
		V _{CC} =3.0 V to 3.6 V		±4.0		
	Outrait Command	V _{CC} =2.3 V to 2.7 V	37	±3.1		
		V _{CC} =1.65 V to 1.95 V		±1.9	mA	
I _{OL}	Output Current	V _{CC} =1.4 V to 1.6 V		±1.7		
		V _{CC} =1.1 V to 1.3 V		±1.1		
		V _{CC} =0.8 V		±20.0	μΑ	
T _A	Operating Temperature, Free Air		-40	+85	°C	
Δ	Thermal Resistance	MicroPak™-6		500	°C/W	
$ heta_{\sf JA}$	Thermal Resistance	MicroPak2™-6		560		

Note:

3. Unused inputs must be held HIGH or LOW. They may not float.

^{2.} Io absolute maximum rating must be observed.

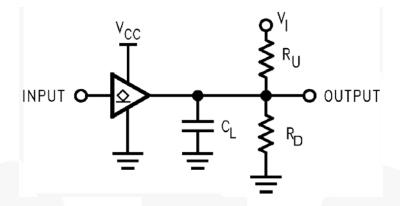
DC Electrical Characteristics

Cumbal	Davamatav	V	Condition	T _A =25°C		T _A =-40 to 85°C		Unit
Symbol	Parameter	V _{cc}	Condition	Min.	Max.	Min.	Max.	Uni
		0.80		0.30	0.60	0.30	0.60	
		1.10		0.53	0.90	0.53	0.90	
Positive	1.40		0.74	1.11	0.74	1.11	V	
V_P	Threshold Voltage	1.65		0.91	1.29	0.91	1.29	\ \
	J	2.30		1.37	1.77	1.37	1.77	
		3.00		1.88	2.29	1.88	2.29	
		0.80		0.10	0.60	0.10	0.60	
		1.10		0.26	0.65	0.26	0.65	Ī
.,	Negative	1.40		0.39	0.75	0.39	0.75	١.,
V_N	Threshold Voltage	1.65		0.47	0.84	0.47	0.84	V
	Vollago	2.30		0.69	1.04	0.69	1.04	
		3.00		0.88	1.24	0.88	1.24	1
		0.80		0.07	0.50	0.07	0.50	
		1.10		0.08	0.46	0.08	0.46	_
, Hysteresis	1.40		0.18	0.56	0.18	0.56	Ī	
V_{H}	V _H Voltage	1.65		0.27	0.66	0.27	0.66	- V
		2.30		0.53	0.92	0.53	0.92	
		3.00		0.79	1.31	0.79	1.31	
		$0.80 \le V_{CC} \le 3.60$	I _{OL} =20 μA		0.10		0.10	
		1.10 ≤ V _{CC} ≤ 1.30			0.30 x V _{CC}		0.30 x V _{CC}	
		$1.40 \le V_{CC} \le 1.60$	I _{OL} =1.7 mA		0.31		0.37	
V_{OL}	LOW Level Output	$1.65 \le V_{CC} \le 1.95$			0.31		0.35	l v
VOL	Voltage	2.30 ≤ V _{CC} ≤ 2.70			0.44		0.45	
		2.70 ≤ V _{CC} ≤ 3.60	I _{OL} =4.0 mA		0.44		0.45	
I _{IN}	Input Leakage Current	0V to 3.6V	$0 \leq V_{IN} \leq 3.6 \ V$		±0.1		±0.5	μΑ
I _{OFF}	Power Off Leakage Current	0V	$0 \le (V_{IN}, V_O)$ $\le 3.6 \text{ V}$		0.2		0.6	μΑ
ΔI_{OFF}	Additional Power Off Leakage Current	0V to 0.2V	V _{IN} or V _O =0 V to 3.6 V		0.2		0.6	μA
	Quiescent		V _{IN} - V _{CC} or GND		0.5		0.9	
I _{CC}	Supply Current	0.8V to 3.6V	$V_{CC} \le V_{IN} \le 3.6 \text{ V}$				±0.9	μΑ
ΔI_{CC}	Increase in I _{CC} per Input	3.3V	V _{IN} =V _{CC} -0.6 V		40.0		50.0	μA

AC Electrical Characteristics

Cymphal	Dovemeter	V	V _{cc} Condition		T _A =25°C		T _A =-40	to 85°C	Unit
Symbol	Parameter	V _{cc}	Condition	Min.	Тур.	Max.	Min.	Max	Unit
		0.80			30				
		$1.10 \le V_{CC} \le 1.30$	C _L =15 pF,	1.0	10.1	18.9	1.0	19.9	
	Propagation	$1.40 \le V_{CC} \le 1.60$	$R_{U}=R_{D}=5 \text{ K}\Omega$	1.0	6.6	11.4	1.0	12.2	
t_{PZL}, t_{PLZ}	Delay	$1.65 \le V_{CC} \le 1.95$	$V_1 = 2 \times (V_{CC})$	1.0	6.3	8.7	1.0	9.7	
		$2.30 \leq V_{CC} \leq 2.70$	(see Figure 9)	1.0	4.7	6.9	1.0	7.5	
		$3.00 \le V_{CC} \le 3.60$		1.0	4.6	6.8	1.0	7.4	
C _{IN}	Input Capacitance	0			0.8				рF
C _{OUT}	Output Capacitance	0			1.7				pF
		0.80			3.0				
		$1.10 \le V_{CC} \le 1.30$			3.1				
	Power	$1.40 \le V_{CC} \le 1.60$	V _{IN} =0 V or V _{CC} ,		3.2				ъГ
C_{PD}	Dissipation Capacitance	$1.65 \le V_{CC} \le 1.95$	f=10 MHz		3.4				рF
		$2.30 \leq V_{CC} \leq 2.70$			3.8				
		$3.00 \leq V_{CC} \leq 3.60$			4.4				

AC Loadings and Waveforms



Notes:

- 4. C_L includes load and stray capacitance. 5. Input PRR = 1.0 MHz, t_W = 500 ns.

Figure 9. **AC Test Circuit**

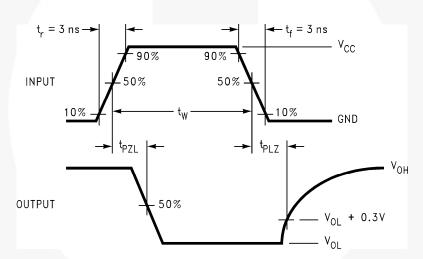
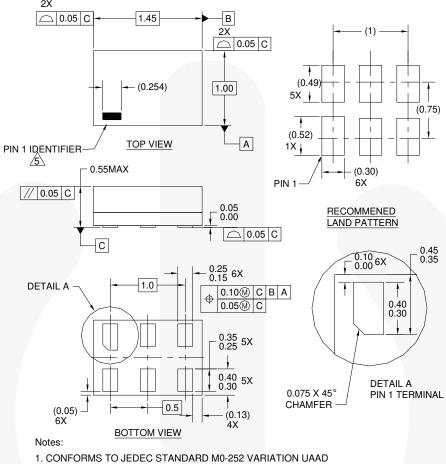


Figure 10. **AC Waveforms**

Symbol		V _{cc}				(R)
Symbol	3.3 V ± 0.3 V	2.5 V ± 0.2 V	1.8 V ± 0.15 V	1.5 V ± 0.10 V	1.2 V ± 0.10 V	0.8 V
V _{mi}	V _{CC} /2	V _{CC} /2	V _{CC} /2	V _{CC} /2	V _{CC} /2	V _{CC} /2
V _{mo}	V _{OL} + 0.3 V	V _{OL} + 0.15 V	V _{OL} + 0.15 V	V _{OL} + 0.1 V	V _{OL} + 0.1 V	V _{OL} + 0.1 V

Physical Dimensions



- 2. DIMENSIONS ARE IN MILLIMETERS
- 3. DRAWING CONFORMS TO ASME Y14.5M-1994
- 4. FILENAME AND REVISION: MAC06AREV4
- 5 PIN ONE IDENTIFIER IS 2X LENGTH OF ANY

OTHER LINE IN THE MARK CODE LAYOUT.

Figure 11. 6-Lead, MicroPak™, 1.0 mm Wide

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Package Designator	Tape Section	Cavity Number	Cavity Status	Cover Type Status
	Leader (Start End)	125 (Typical)	Empty	Sealed
L6X	Carrier	5000	Filled	Sealed
	Trailer (Hub End)	75 (Typical)	Empty	Sealed

Physical Dimensions

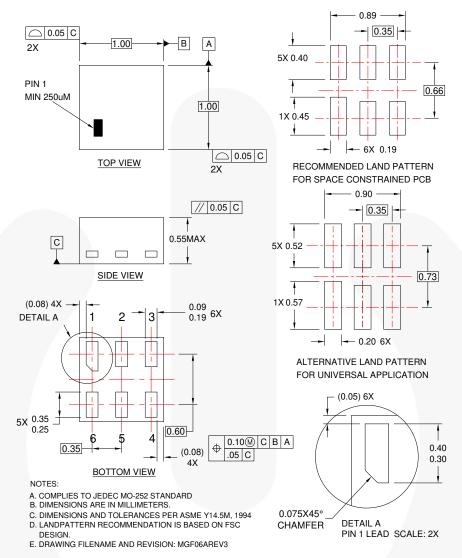


Figure 12. 6-Lead, MicroPak2™, 1x1 mm Body, .35 mm Pitch

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Package Designator	Tape Section	Cavity Number	Cavity Status	Cover Type Status
	Leader (Start End)	125 (Typical)	Empty	Sealed
FHX	Carrier	5000	Filled	Sealed
	Trailer (Hub End)	75 (Typical)	Empty	Sealed





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