General Description

The 74AUP1G00 is a high performance single 2−input NAND Gate operating from 0.8V to 3.6V supply. This device is fabricated with advanced CMOS technology to achieve ultra-high speed with high output drive.

Features

- Designed for 0.8V to 3.6V V_{CC} Operation

- Low static power consumption; I_{CC} = 0.7µA (maximum)

- 4mA Balanced Output Sink and Source Capability

- Near Zero Static Supply Current Substantially Reduces System Power Requirements

- These Devices are Pb−Free and are RoHS Compliant

- Tiny SC70-5, SOT23-5 and DFN6(1.0×1.5) Packages

Pin Configuration

SC70-5/SOT23-5   DFN6(1×1.5)
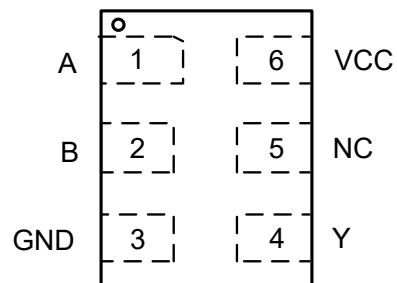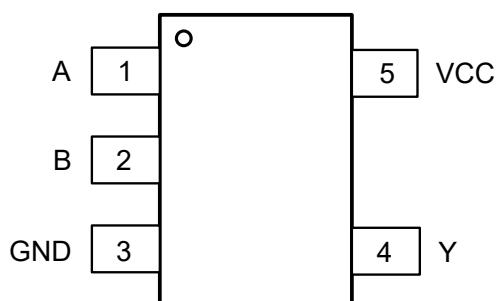
Figure1.   Top View

Pin Function

(SC70-5/ SOT23-5)

Pin No.	Pin Name	Function
1	NC	No connect
2	A	Input
3	GND	Ground
4	Y	Output
5	VCC	Supply Voltage

DFN6

Pin No.	Pin Name	Function
1	NC	No connect
2	A	Input
3	GND	Ground
4	Y	Output
5	NC	No connect
6	VCC	Supply Voltage

Block Diagram
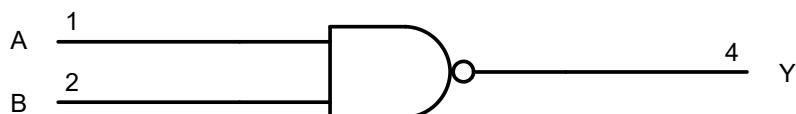
Figure2.   Logic Symbol

Functional Description

Function Table

Input		Output
A	**B**	**Y**
L	L	H
L	H	H
H	L	H
H	H	L

Absolute Maximum Ratings

Symbol	Parameter		Value	Unit
V_{CC}	DC Supply Voltage		-0.5 to 4.6	V
V_I	DC Input Voltage		$-0.5 \leq V_I \leq +4.6$	V
V_O	DC Output Voltage Output in Higher or Low State [1]		-0.5 to 4.6	V
I_{IK}	DC Input Diode Current $\quad V_I <$ GND		−50	mA
I_{OK}	DC Output Diode Current $\quad V_O <$ GND, $V_O > V_{CC}$		±50	mA
I_O	DC Output Sink Current		±20	mA
I_{CC}	DC Supply Current per Supply Pin		±50	mA
I_{GND}	DC Ground Current per Supply Pin		±50	mA
T_{STG}	Storage Temperature Range		-65 to 150	°C
T_L	Lead Temperature, Soldering 10 Seconds		260	°C
T_J	Max Junction Temperature		150	°C
V_{ESD}	ESD Classification	Human Body Model [2]	±4000	V
		Charged Device Model [3]	±1000	
I_{LU}	Max Latch up Current Above V_{CC} and GND at 125°C [4]		±100	mA

Thermal Characteristics

Symbol	Package	Ratings	Value	Unit
$R_{\theta JA}$	SC70-5	Thermal Characteristics, Thermal Resistance, Junction-to-Air	300	°C/W
	SOT23-5		250	
	DFN6(1×1.5)		440	
P_D	SC70-5	Power Dissipation in Still Air at 85°C	215	mW
	SOT23-5		260	
	DFN6(1×1.5)		150	

Recommended Operating Conditions

Symbol	Parameter		Min	Max	Unit
V_{CC}	DC Supply Voltage Operating		0.8	3.6	V
V_{IN}	DC Input Voltage		0	3.6	V
V_{OUT}	DC Output Voltage (High or Low State)		0	3.6	V
T_A	Operating Temperature Range		-40	85	°C
t_r, t_f	Input Rise and Fall Time	V_{CC} = 0.8V to 3.6V	0	20	ns/V

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied.

Electrical Characteristics

DC Electrical Characteristics

Symbol	Parameter	Condition	V$_{CC}$(V)	T$_A$ = 25°C			−40°C ≤T$_A$≤85°C		Unit
				Min	Typ	Max	Min	Max	
V$_{IH}$	High−Level Input Voltage		0.8V	0.75Vcc			0.75Vcc		V
			0.9 to 1.95	0.7Vcc			0.7Vcc		
			2.3 to 2.7	1.6			1.6		
			3.0 to 3.6	2.0			2.0		
V$_{IL}$	Low−Level Input Voltage		0.8			0.25Vcc		0.25Vcc	V
			0.9 to 1.95			0.3Vcc		0.3Vcc	
			2.3 to 2.7			0.7		0.7	
			3.0 to 3.6			0.9		0.9	
V$_{OH}$	High−Level Output Voltage	I$_{OH}$=-20uA	0.8 to 3.6	V$_{CC}$−0.1			V$_{CC}$−0.1		V
		I$_{OH}$=-1.1mA	1.1	0.82	1.02		0.77		
		I$_{OH}$=-1.7mA	1.4	1.11	1.32		1.03		
		I$_{OH}$=-1.9mA	1.65	1.32	1.58		1.30		
		I$_{OH}$=-2.3mA	2.3	2.05	2.24		1.97		
		I$_{OH}$=-3.1mA		1.9	2.22		1.85		
		I$_{OH}$=-2.7mA	3.0	2.72	2.95		2.67		
		I$_{OH}$=-4.0mA		2.6	2.92		2.55		
V$_{OL}$	Low−Level Output Voltage	I$_{OL}$=20uA	0.8 to 3.6			0.1		0.1	V
		I$_{OL}$=1.1mA	1.1		0.11	0.33		0.33	
		I$_{OL}$=1.7mA	1.4		0.12	0.31		0.37	
		I$_{OL}$=1.9mA	1.65		0.11	0.31		0.35	
		I$_{OL}$=2.3mA	2.3		0.14	0.31		0.33	
		I$_{OL}$=3.1mA			0.19	0.44		0.45	
		I$_{OL}$=2.7mA	3.0		0.11	0.31		0.33	
		I$_{OL}$=4.0mA			0.16	0.44		0.45	
I$_{IN}$	Input Leakage Current	V$_{IN}$ = V$_{CC}$ or GND	0 to 3.6			±0.1		±0.2	uA
I$_{OFF}$	Power Off Leakage Current	V$_{IN}$ = 3.6 V or V$_{OUT}$ = 3.6 V	0			±0.2		±0.5	uA
I$_{CC}$	Quiescent Supply Current	V$_{IN}$ = 3.6V or GND	3.6			±0.2		±0.7	uA

AC Electrical Characteristics

$t_r = t_f = 2.5ns$

Symbol	Parameter	Condition	V_{CC}(V)	$T_A = 25°C$			$-40°C ≤ T_A ≤ 85°C$		Unit
				Min	Typ	Max	Min	Max	
t_{PHL} t_{PLH}	Propagation Delay (Figure3 And 4)	C_L= 5 pF[5]	0.8	13.2	29	90.1	11.9	220	ns
			1.2	5.0	7.6	14.3	4.6	14.4	
			1.5	3.4	4.8	8.9	3	9.6	
			1.8	2. 7	3.6	6.9	2.3	7.6	
			2.5	1.9	2.4	5.1	1.6	5.6	
			3.3	1.5	1.9	4.4	1.3	4.8	
		C_L= 10 pF[5]	0.8	14.3	31.3	97.9	12.8	239	ns
			1.2	5.4	8.3	15.3	5.0	15.3	
			1.5	3.7	5.2	9.5	3.2	10.2	
			1.8	2.9	3.9	7.4	2.5	8.1	
			2.5	2.0	2.6	5.4	1.7	6.0	
			3.3	1.6	2.0	4.6	1.3	5.1	
		C_L= 15 pF[5]	0.8	15.3	32.5	106	13.8	259	ns
			1.2	5.8	8.9	16.3	5.3	16.3	
			1.5	4.0	5.6	10.1	3.5	10.9	
			1.8	3.1	4.2	7.8	2.6	8.6	
			2.5	2.1	2.8	5.8	1.8	6.4	
			3.3	1.7	2.2	4.9	1.4	5.4	
		C_L= 30 pF[5]	0.8	18.3	37.5	130	16.6	323	ns
			1.2	7.0	10.7	19.3	6.4	19.3	
			1.5	4.8	6.9	12.0	4.2	12.9	
			1.8	3.7	5.1	9.2	3.2	10.2	
			2.5	2.6	3.5	6.7	2.2	7.5	
			3.3	2.0	2.2	5.6	1.7	6.3	

Note5. C_L includes probe and jig capacitance.

Capacitance Characteristics

Symbol	Parameter	Condition		Typical	Unit
C_{IN}	Input Capacitance	V_{CC}= 3.6V, V_I = 0 V or V_{CC}		2	pF
C_O	output capacitance	V_{CC}= 0V, V_{OUT} = GND		3	pF
C_{PD}	Power Dissipation Capacitance [6]	1 MHz, V_I = 0 V to V_{CC}	V_{CC}= 0.8V	7.6	pF
			V_{CC}= 1.2V	8.1	
			V_{CC}= 1.5V	8.5	
			V_{CC}= 1.8V	8.6	
			V_{CC}= 2.5V	9.0	
			V_{CC}= 3.3 V	9.6	

Note6. C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load. Average operating current can be obtained by the equation: $I_{CC(OPR)}=C_{PD}×V_{CC}×fin+I_{CC}×C_{PD}$ is used to determine the no−load dynamic power consumption; $P_D=C_{PD}×V_{CC}^2 ×fin+I_{CC}×V_{CC}×Fig.$
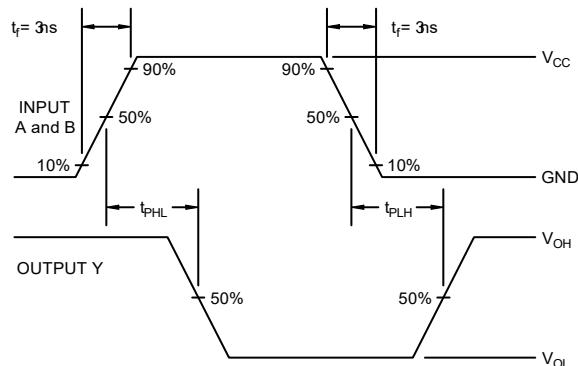

Figure3.   Switching Waveform
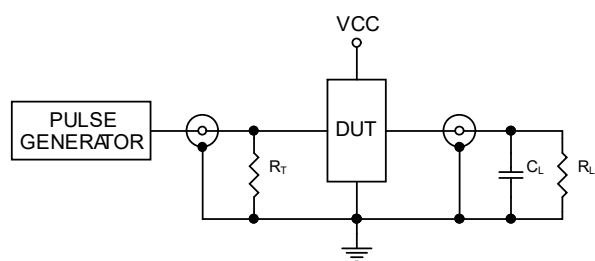

Figure4.   Test Circuit

Package Dimension

SC70-5（SOT353）
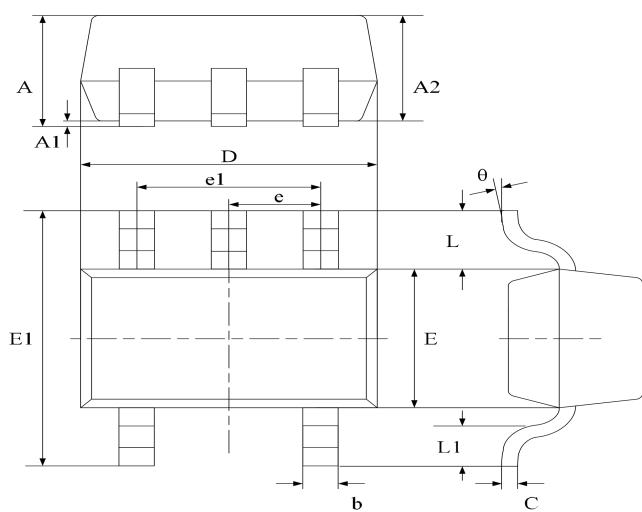
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.800	1.100	0.035	0.043
A1	0.000	0.100	0.000	0.004
A2	0.800	0.900	0.035	0.039
b	0.150	0.350	0.006	0.014
C	0.080	0.150	0.003	0.006
D	1.8500	2.150	0.079	0.087
E	1.100	1.400	0.045	0.053
E1	1.950	2.200	0.085	0.096
e	0.850 typ.		0.026 typ.	
e1	1.200	1.400	0.047	0.055
L	0.42 ref.		0.021 ref.	
L1	0.260	0.460	0.010	0.018
θ	0°	8°	0°	8°

SOT23-5
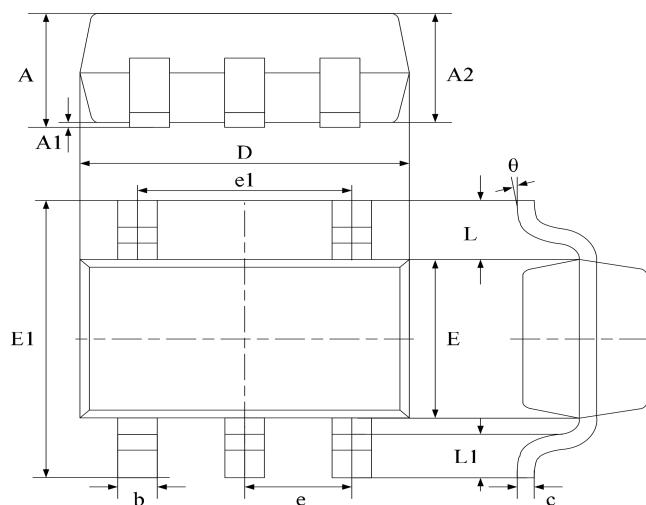
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.040	1.350	0.042	0.055
A1	0.040	0.150	0.002	0.006
A2	1.000	1.200	0.041	0.049
b	0.380	0.480	0.015	0.020
c	0.110	0.210	0.004	0.009
D	2.720	3.120	0.111	0.127
E	1.400	1.800	0.057	0.073
E1	2.600	3.000	0.106	0.122
e	0.950 typ.		0.037 typ.	
e1	1.900 typ.		0.078 typ.	
L	0.700 ref.		0.028 ref.	
L1	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

DFN6(1.0×1.5)
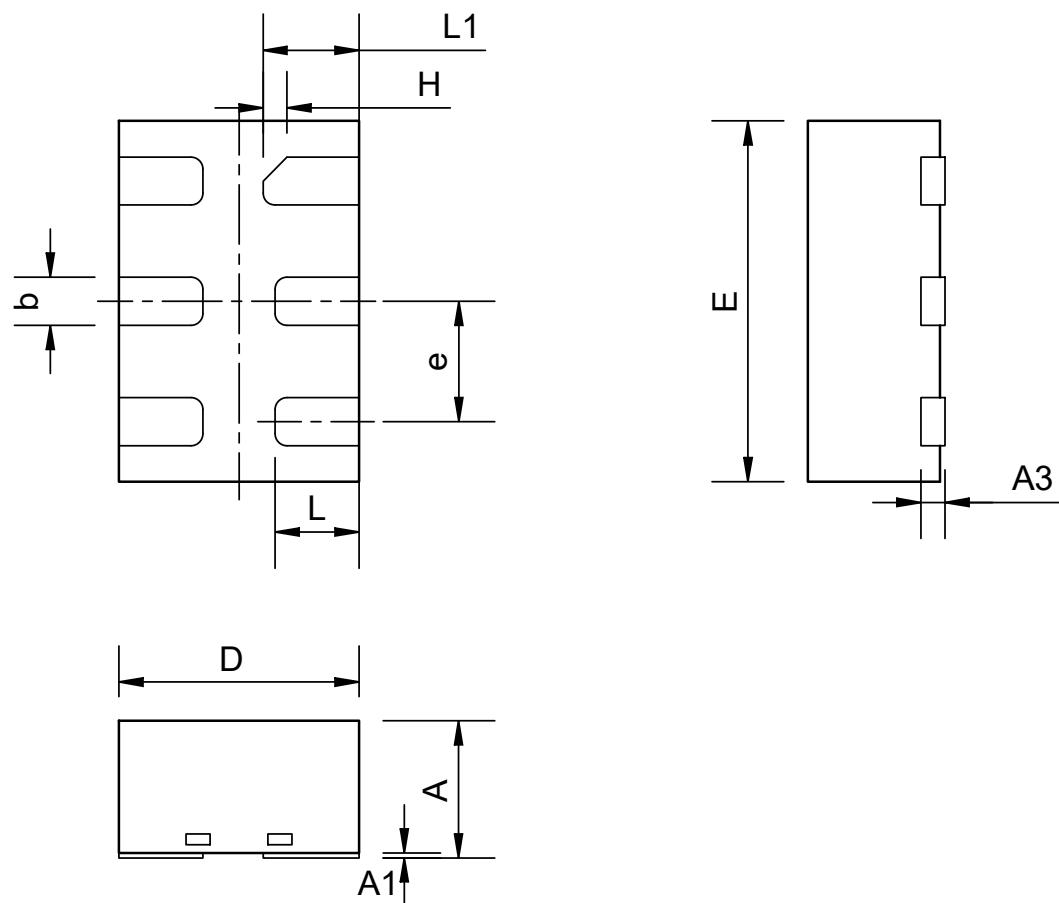
COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	0.50	--	0.60
A1	0	0.02	0.05
A3	0.10REF		
b	0.15	0.20	0.25
D	0.90	1.00	1.10
E	1.40	1.50	1.60
e	0.40	0.50	0.60
H	0.10REF		
L	0.30	0.35	0.40
L1	0.35	0.40	0.45

Ordering information

Order code	Package	Baseqty	Deliverymode	Marking
UMW SN74AUP1G00DCKR	SC70-5	3000	Tape and reel	HAR U
UMW SN74AUP1G00DBVR	SOT23-5	3000	Tape and reel	H00R U
UMW SN74AUP1G00DRYR	DFN6	5000	Tape and reel	HA U