74AHC1G00; 74AHCT1G00

2-input NAND gate

Rev. 9 — 10 January 2022

Product data sheet

1. General description

The 74AHC1G00; 74AHCT1G00 is a single 2-input NAND gate. Inputs are overvoltage tolerant. This feature allows the use of these devices as translators in mixed voltage environments.

2. Features and benefits

- Wide supply voltage range from 2.0 to 5.5 V
- Overvoltage tolerant inputs to 5.5 V
- · High noise immunity
- · CMOS low power dissipation
- Latch-up performance exceeds 100 mA per JESD 78 Class II Level A
- · Symmetrical output impedance
- · Balanced propagation delays
- Input levels:
 - For 74AHC1G00: CMOS level
 - For 74AHCT1G00: TTL level
- SOT353-1 and SOT753 package options
- ESD protection:
 - HBM JESD22-A114E: exceeds 2000 V
 - MM JESD22-A115-A: exceeds 200 V
 - CDM JESD22-C101C: exceeds 1000 V
- Specified from -40 °C to +125 °C

3. Ordering information

Table 1. Ordering information

Type number	Package								
	Temperature range	Name	Description	Version					
74AHC1G00GW	-40 °C to +125 °C	TSSOP5	plastic thin shrink small outline package;	SOT353-1					
74AHCT1G00GW			5 leads; body width 1.25 mm						
74AHC1G00GV	-40 °C to +125 °C	SC-74A	plastic surface-mounted package; 5 leads	SOT753					
74AHCT1G00GV									



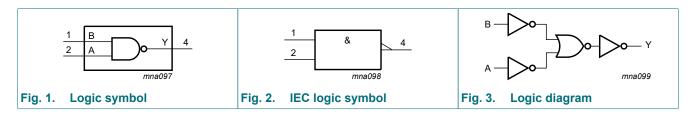
4. Marking

Table 2. Marking codes

Type number	Marking[1]
74AHC1G00GW	AA
74AHC1G00GV	A00
74AHCT1G00GW	CA
74AHCT1G00GV	C00

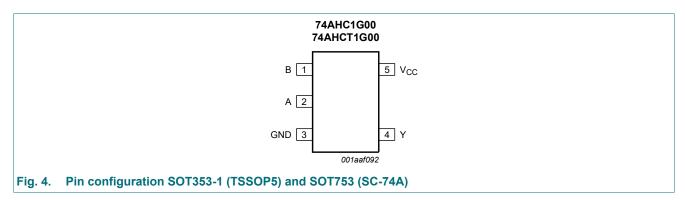
^[1] The pin 1 indicator is located on the lower left corner of the device, below the marking code.

5. Functional diagram



6. Pinning information

6.1. Pinning



6.2. Pin description

Table 3. Pin description

Symbol	Pin	Description
В	1	data input
A	2	data input
GND	3	ground (0 V)
Υ	4	data output
V _{CC}	5	supply voltage

7. Functional description

Table 4. Function table

H = HIGH voltage level; L = LOW voltage level

Inputs	Output	
Α	В	Υ
L	L	Н
L	Н	Н
Н	L	Н
Н	Н	L

8. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
V_{CC}	supply voltage			-0.5	+7.0	V
VI	input voltage			-0.5	+7.0	V
I _{IK}	input clamping current	V _I < -0.5 V		-20	-	mA
I _{OK}	output clamping current	$V_{O} < -0.5 \text{ V or } V_{O} > V_{CC} + 0.5 \text{ V}$	[1]	-	±20	mA
Io	output current	$-0.5 \text{ V} < \text{V}_{\text{O}} < \text{V}_{\text{CC}} + 0.5 \text{ V}$		-	±25	mA
I _{CC}	supply current			-	75	mA
I_{GND}	ground current			-75	-	mA
T _{stg}	storage temperature			-65	+150	°C
P _{tot}	total power dissipation	T _{amb} = -40 °C to +125 °C	[2]	-	250	mW

^[1] The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

9. Recommended operating conditions

Table 6. Recommended operating conditions

Voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	74	74AHC1G00		74AHCT1G00			Unit
			Min	Тур	Max	Min	Тур	Max	
V_{CC}	supply voltage		2.0	5.0	5.5	4.5	5.0	5.5	V
VI	input voltage		0	-	5.5	0	-	5.5	V
Vo	output voltage		0	-	V _{CC}	0	-	V _{CC}	V
T _{amb}	ambient temperature		-40	+25	+125	-40	+25	+125	°C
Δt/ΔV	input transition rise and	$V_{CC} = 3.3 \text{ V} \pm 0.3 \text{ V}$	-	-	100	-	-	-	ns/V
	fall rate	$V_{CC} = 5.0 \text{ V} \pm 0.5 \text{ V}$	-	-	20	-	-	20	ns/V

^[2] For SOT353-1 (TSSOP5) package: P_{tot} derates linearly with 3.3 mW/K above 74 °C. For SOT753 (SC-74A) package: P_{tot} derates linearly with 3.8 mW/K above 85 °C.

10. Static characteristics

Table 7. Static characteristics

Voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions		25 °C		-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Тур	Max	Min	Max	Min	Max	
74AHC1	G00									
V _{IH}	HIGH-level	V _{CC} = 2.0 V	1.5	-	-	1.5	-	1.5	-	٧
	input voltage	V _{CC} = 3.0 V	2.1	-	-	2.1	-	2.1	-	٧
		V _{CC} = 5.5 V	3.85	-	-	3.85	-	3.85	-	V
V _{IL}	LOW-level	V _{CC} = 2.0 V	-	-	0.5	-	0.5	-	0.5	٧
	input voltage	V _{CC} = 3.0 V	-	-	0.9	-	0.9	-	0.9	٧
		V _{CC} = 5.5 V	-	-	1.65	-	1.65	-	1.65	V
V _{OH}	HIGH-level	V _I = V _{IH} or V _{IL}								
	output voltage	I _O = -50 μA; V _{CC} = 2.0 V	1.9	2.0	-	1.9	-	1.9	-	٧
		I _O = -50 μA; V _{CC} = 3.0 V	2.9	3.0	-	2.9	-	2.9	-	V
		I _O = -50 μA; V _{CC} = 4.5 V	4.4	4.5	-	4.4	-	4.4	-	V
		$I_O = -4.0 \text{ mA}; V_{CC} = 3.0 \text{ V}$	2.58	-	-	2.48	-	2.40	-	٧
		$I_O = -8.0 \text{ mA}; V_{CC} = 4.5 \text{ V}$	3.94	-	-	3.8	-	3.70	-	V
V _{OL}	LOW-level	$V_I = V_{IH}$ or V_{IL}								
	output voltage	I _O = 50 μA; V _{CC} = 2.0 V	-	0	0.1	-	0.1	-	0.1	٧
		$I_O = 50 \mu A; V_{CC} = 3.0 V$	-	0	0.1	-	0.1	-	0.1	٧
		I _O = 50 μA; V _{CC} = 4.5 V	-	0	0.1	-	0.1	-	0.1	٧
		$I_O = 4.0 \text{ mA}; V_{CC} = 3.0 \text{ V}$	-	-	0.36	-	0.44	-	0.55	٧
		I _O = 8.0 mA; V _{CC} = 4.5 V	-	-	0.36	-	0.44	-	0.55	٧
I _I	input leakage current	V _I = 5.5 V or GND; V _{CC} = 0 V to 5.5 V	-	-	0.1	-	1.0	-	2.0	μΑ
I _{CC}	supply current	$V_I = V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 5.5 \text{ V}$	-	-	1.0	-	10	-	40	μΑ
C _I	input capacitance		-	1.5	10	-	10	-	10	pF
74AHCT	1G00		1							
V _{IH}	HIGH-level input voltage	V _{CC} = 4.5 V to 5.5 V	2.0	-	-	2.0	-	2.0	-	V
V_{IL}	LOW-level input voltage	V _{CC} = 4.5 V to 5.5 V	-	-	0.8	-	0.8	-	0.8	V
V _{OH}	HIGH-level	$V_I = V_{IH}$ or V_{IL} ; $V_{CC} = 4.5 \text{ V}$								
	output voltage	I _O = -50 μA	4.4	4.5	-	4.4	-	4.4	-	V
		I _O = -8.0 mA	3.94	-	-	3.8	-	3.70	-	V
V _{OL}	LOW-level	$V_I = V_{IH}$ or V_{IL} ; $V_{CC} = 4.5 \text{ V}$								
	output voltage	I _O = 50 μA	-	0	0.1	-	0.1	-	0.1	٧
		I _O = 8.0 mA	-	-	0.36	-	0.44	-	0.55	٧
I _I	input leakage current	V _I = 5.5 V or GND; V _{CC} = 0 V to 5.5 V	-	-	0.1	-	1.0	-	2.0	μA
I _{CC}		V _I = V _{CC} or GND; I _O = 0 A; V _{CC} = 5.5 V	-	-	1.0	-	10	-	40	μA

Symbol	Parameter	Conditions	25 °C		25 °C -40 °C to +85 °C		-40 °C to +125 °C		Unit	
			Min	Тур	Max	Min	Max	Min	Max	
ΔI _{CC}	supply current	per input pin; V_I = 3.4 V; other inputs at V_{CC} or GND; I_O = 0 A; V_{CC} = 5.5 V	-	-	1.35	-	1.5	-	1.5	mA
C _I	input capacitance		-	1.5	10	-	10	-	10	pF

11. Dynamic characteristics

Table 8. Dynamic characteristics

GND = 0 V; $t_r = t_f = \le 3.0$ ns. For test circuit see Fig. 6.

Symbol	Parameter	Conditions			25 °C		-40 °C to	o +85 °C	-40 °C to +125 °C		Unit
				Min	Тур	Max	Min	Max	Min	Max	
74AHC1	G00										
t _{pd} propagation	A and B to Y; see Fig. 5	[1]									
	delay	V _{CC} = 3.0 V to 3.6 V	[2]								
		C _L = 15 pF		-	4.5	7.9	1.0	9.5	1.0	10.5	ns
		C _L = 50 pF		-	6.5	11.4	1.0	13.0	1.0	14.5	ns
		V _{CC} = 4.5 V to 5.5 V	[3]								
		C _L = 15 pF		-	3.5	5.5	1.0	6.5	1.0	7.0	ns
		C _L = 50 pF		-	4.9	7.5	1.0	8.5	1.0	9.5	ns
C _{PD}	power dissipation capacitance	C_L = 50 pF; f = 1 MHz; V_I = GND to V_{CC}	[4]	-	17	-	-	-	-	-	pF
74AHCT	1G00			'	'		1			<u>'</u>	
t _{pd}	propagation	A and B to Y; see Fig. 5	[1]								
	delay	V _{CC} = 4.5 V to 5.5 V	[3]								
		C _L = 15 pF		-	3.6	6.2	1.0	7.1	1.0	8.0	ns
		C _L = 50 pF		-	5.0	7.9	1.0	9.0	1.0	10.0	ns
C _{PD}	power dissipation capacitance	C_L = 50 pF; f = 1 MHz; V_I = GND to V_{CC}	[4]	-	18	-	-	-	-	-	pF

- [1] t_{pd} is the same as t_{PLH} and t_{PHL} . [2] Typical values are measured at $V_{CC} = 3.3 \text{ V}$. [3] Typical values are measured at $V_{CC} = 5.0 \text{ V}$. [4] C_{PD} is used to determine the dynamic power dissipation P_D (μ W).

 $P_D = C_{PD} x V_{CC}^2 x f_i + \Sigma (C_L x V_{CC}^2 x f_o)$ where:

f_i = input frequency in MHz;

 f_o = output frequency in MHz;

C_L = output load capacitance in pF;

V_{CC} = supply voltage in Volts.

11.1. Waveform and test circuit

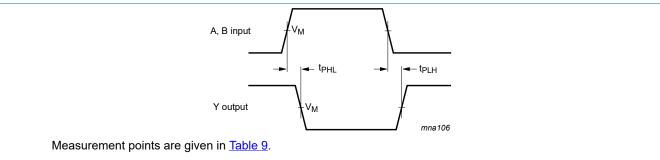
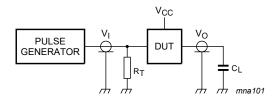


Fig. 5. The inputs (A and B) to output (Y) propagation delays

Table 9. Measurement point

Туре	Input	Output	
	V _I	V _M	V _M
74AHC1G00	GND to V _{CC}	0.5 x V _{CC}	0.5 x V _{CC}
74AHCT1G00	GND to 3.0 V	1.5 V	0.5 x V _{CC}



Test data is given in Table 8.

Definitions for test circuit:

C_L = Load capacitance including jig and probe capacitance;

 R_T = Termination resistance should be equal to output impedance Z_0 of the pulse generator.

Fig. 6. Test circuit for measuring switching times

12. Package outline

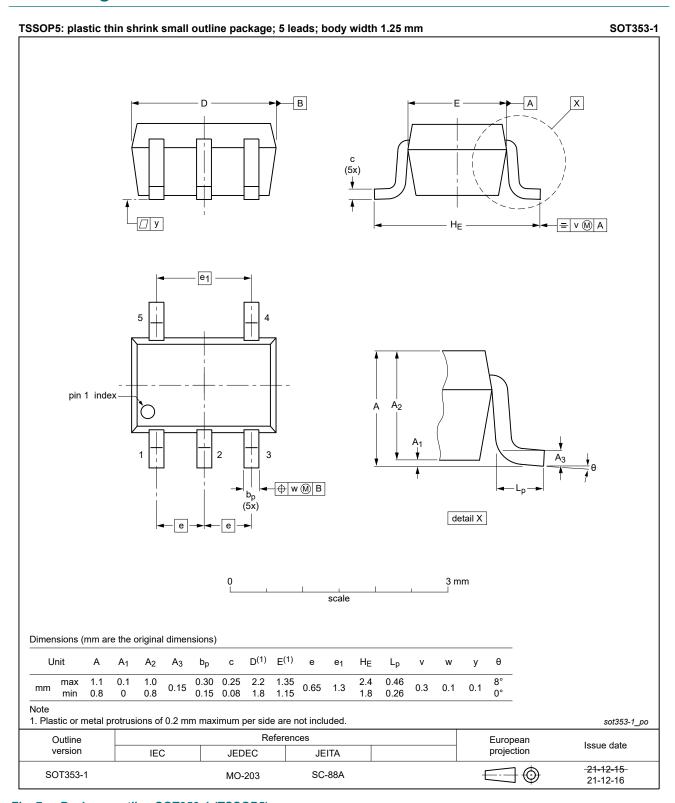


Fig. 7. Package outline SOT353-1 (TSSOP5)

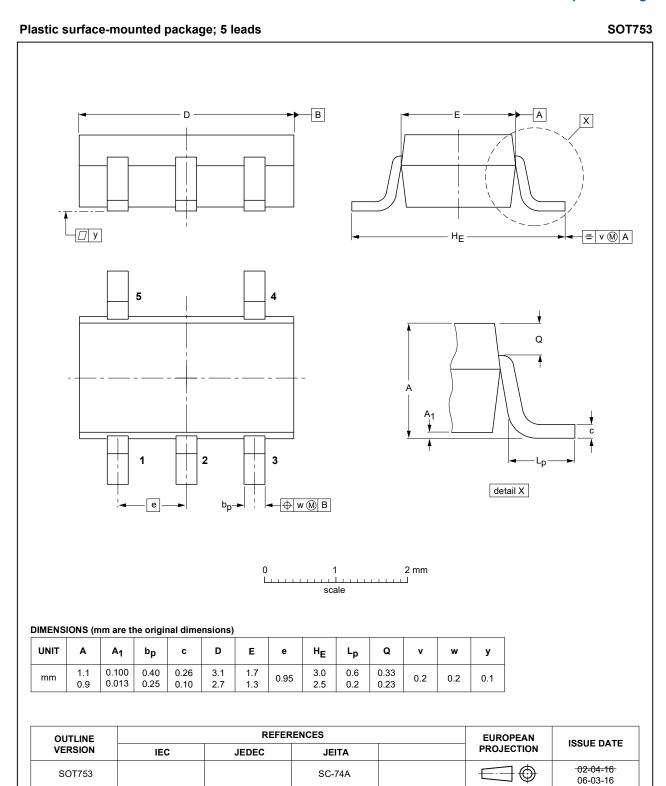


Fig. 8. Package outline SOT753 (SC-74A)

13. Abbreviations

Table 10. Abbreviations

Acronym	Description
CDM	Charged Device Model
CMOS	Complementary Metal-Oxide Semiconductor
DUT	Device Under Test
ESD	ElectroStatic Discharge
HBM	Human Body Model
MM	Machine Model
TTL	Transistor-Transistor Logic

14. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes				
74AHC_AHCT1G00 v.9	20220110	Product data sheet	-	74AHC_AHCT1G00 v.8				
Modifications:	• Fig. 7: Package outline drawing for SOT353-1 (TSSOP5) has changed.							
74AHC_AHCT1G00 v.8	20210609	0210609 Product data sheet - 74AHC_AHCT1G00 v.7						
Modifications:	 The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia. Legal texts have been adapted to the new company name where appropriate. Section 1 and Section 2 updated. Table 5: Derating values for P_{tot} total power dissipation updated. 							
74AHC_AHCT1G00 v.7	20141105	Product data sheet	-	74AHC_AHCT1G00 v.6				
Modifications:	Section 8: table	e note added.						
74AHC_AHCT1G00 v.6	20070530	Product data sheet	-	74AHC_AHCT1G00 v.5				
Modifications:	guidelines of N Legal texts hav Package SOT3	his data sheet has been re IXP Semiconductors. /e been adapted to the nev 353 changed to SOT353-1 e data and Soldering secti	v company name wh in <u>Section 3</u> and <u>Sec</u>	ere appropriate.				
74AHC_AHCT1G00 v.5	20020527	Product specification	-	74AHC_AHCT1G00 v.4				
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74AHC_AHCT1G00 v.3	20010131	Product specification - 74AHC_AHCT1G00 v.2						
74AHC_AHCT1G00 v.2	19990127	Product specification - 74AHC_AHCT1G00_N						
74AHC_AHCT1G00_N v.1	19981125	Preliminary specification						

15. Legal information

Data sheet status

Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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