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Kind regards,

Team Nexperia

74HC1G00; 74HCT1G00
2-input NAND gate
Rev. 5 — 25 September 2013 **Product data sheet**

1. General description

The 74HC1G00; 74HCT1G00 is a single 2-input NAND gate. Inputs include clamp diodes that enable the use of current limiting resistors to interface inputs to voltages in excess of V_{CC}.

2. Features and benefits

- Wide supply voltage range from 2.0 V to 6.0 V
- Input levels:
  - For 74HC1G00: CMOS level
  - For 74HCT1G00: TTL level
- Symmetrical output impedance
- High noise immunity
- Low power dissipation
- Balanced propagation delays
- ESD protection:
  - HBM JESD22-A114E exceeds 2000 V
  - MM JESD22-A115-A exceeds 200 V
- Multiple package options
- Specified from −40 °C to +85 °C and −40 °C to +125 °C

3. Ordering information

Table 1. Ordering information

Type number	Package			
	Temperature range	Name	Description	Version
74HC1G00GW	−40 °C to +125 °C	TSSOP5	plastic thin shrink small outline package; 5 leads; body width 1.25 mm	SOT353-1
74HCT1G00GW				
74HC1G00GV	−40 °C to +125 °C	SC-74A	plastic surface-mounted package; 5 leads	SOT753
74HCT1G00GV				

4. Marking

Table 2.   Marking codes

Type number	Marking[1]
74HC1G00GW	HA
74HCT1G00GW	TA
74HC1G00GV	H00
74HCT1G00GV	T00

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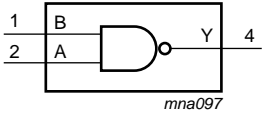
5. Functional diagram

| Fig 1.   Logic symbol | Fig 2.   IEC logic symbol | Fig 3.   Logic diagram |
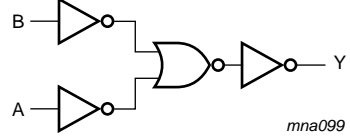
6. Pinning information

6.1 Pinning
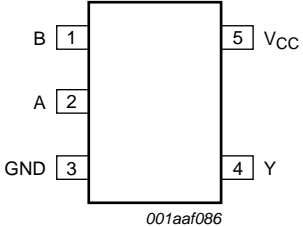
Fig 4.   Pin configuration

6.2 Pin description

Table 3.   Pin description

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

74HC_HCT1G00

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7. Functional description

Table 4. Function table
H = HIGH voltage level; L = LOW voltage level

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

8. Limiting values

Table 5. Limiting values
In accordance with the Absolute Maximum Rating System (IEC 60134). Voltages are referenced to GND (ground = 0 V). [1]

Symbol	Parameter	Conditions	Min	Max	Unit
V_{CC}	supply voltage		−0.5	+7.0	V
I_{IK}	input clamping current	$V_I < -0.5$ V or $V_I > V_{CC} + 0.5$ V	-	±20	mA
I_{OK}	output clamping current	$V_O < -0.5$ V or $V_O > V_{CC} + 0.5$ V	-	±20	mA
I_O	output current	-0.5 V $< V_O < V_{CC} + 0.5$ V	-	±12.5	mA
I_{CC}	supply current		-	25	mA
I_{GND}	ground current		−25	-	mA
T_{stg}	storage temperature		−65	+150	°C
P_{tot}	total power dissipation	$T_{amb} = -40$ °C to +125 °C [2]	-	200	mW

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

[2] Above 55 °C, the value of P_{tot} derates linearly with 2.5 mW/K.

9. Recommended operating conditions

Table 6. Recommended operating conditions
Voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	74HC1G00			74HCT1G00			Unit
			Min	**Typ**	**Max**	**Min**	**Typ**	**Max**	
V_{CC}	supply voltage		2.0	5.0	6.0	4.5	5.0	5.5	V
V_I	input voltage		0	-	V_{CC}	0	-	V_{CC}	V
V_O	output voltage		0	-	V_{CC}	0	-	V_{CC}	V
T_{amb}	ambient temperature		−40	+25	+125	−40	+25	+125	°C
$\Delta t/\Delta V$	input transition rise and fall rate	$V_{CC} = 2.0$ V	-	-	625	-	-	-	ns/V
		$V_{CC} = 4.5$ V	-	-	139	-	-	139	ns/V
		$V_{CC} = 6.0$ V	-	-	83	-	-	-	ns/V

10. Static characteristics

Table 7. Static characteristics

Voltages are referenced to GND (ground = 0 V). All typical values are measured at T_{amb} = 25 ℃.

Symbol	Parameter	Conditions	−40 °C to +85 °C			−40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	
For type 74HC1G00								
V_{IH}	HIGH-level input voltage	V_{CC} = 2.0 V	1.5	1.2	-	1.5	-	V
		V_{CC} = 4.5 V	3.15	2.4	-	3.15	-	V
		V_{CC} = 6.0 V	4.2	3.2	-	4.2	-	V
V_{IL}	LOW-level input voltage	V_{CC} = 2.0 V	-	0.8	0.5	-	0.5	V
		V_{CC} = 4.5 V	-	2.1	1.35	-	1.35	V
		V_{CC} = 6.0 V	-	2.8	1.8	-	1.8	V
V_{OH}	HIGH-level output voltage	$V_I = V_{IH}$ or V_{IL}						
		I_O = −20 μA; V_{CC} = 2.0 V	1.9	2.0	-	1.9	-	V
		I_O = −20 μA; V_{CC} = 4.5 V	4.4	4.5	-	4.4	-	V
		I_O = −20 μA; V_{CC} = 6.0 V	5.9	6.0	-	5.9	-	V
		I_O = −2.0 mA; V_{CC} = 4.5 V	4.13	4.32	-	3.7	-	V
		I_O = −2.6 mA; V_{CC} = 6.0 V	5.63	5.81	-	5.2	-	V
V_{OL}	LOW-level output voltage	$V_I = V_{IH}$ or V_{IL}						
		I_O = 20 μA; V_{CC} = 2.0 V	-	0	0.1	-	0.1	V
		I_O = 20 μA; V_{CC} = 4.5 V	-	0	0.1	-	0.1	V
		I_O = 20 μA; V_{CC} = 6.0 V	-	0	0.1	-	0.1	V
		I_O = 2.0 mA; V_{CC} = 4.5 V	-	0.15	0.33	-	0.4	V
		I_O = 2.6 mA; V_{CC} = 6.0 V	-	0.16	0.33	-	0.4	V
I_I	input leakage current	$V_I = V_{CC}$ or GND; V_{CC} = 6.0 V	-	-	1.0	-	1.0	μA
I_{CC}	supply current	$V_I = V_{CC}$ or GND; I_O = 0 A; V_{CC} = 6.0 V	-	-	10	-	20	μA
C_I	input capacitance		-	1.5	-	-	-	pF
For type 74HCT1G00								
V_{IH}	HIGH-level input voltage	V_{CC} = 4.5 V to 5.5 V	2.0	1.6	-	2.0	-	V
V_{IL}	LOW-level input voltage	V_{CC} = 4.5 V to 5.5 V	-	1.2	0.8	-	0.8	V
V_{OH}	HIGH-level output voltage	$V_I = V_{IH}$ or V_{IL}						
		I_O = −20 μA; V_{CC} = 4.5 V	4.4	4.5	-	4.4	-	V
		I_O = −2.0 mA; V_{CC} = 4.5 V	4.13	4.32	-	3.7	-	V
V_{OL}	LOW-level output voltage	$V_I = V_{IH}$ or V_{IL}						
		I_O = 20 μA; V_{CC} = 4.5 V	-	0	0.1	-	0.1	V
		I_O = 2.0 mA; V_{CC} = 4.5 V	-	0.15	0.33	-	0.4	V
I_I	input leakage current	$V_I = V_{CC}$ or GND; V_{CC} = 5.5 V	-	-	1.0	-	1.0	μA

Table 7.   **Static characteristics** *...continued*

Voltages are referenced to GND (ground = 0 V). All typical values are measured at T_{amb} = 25 °C.

Symbol	Parameter	Conditions	–40 °C to +85 °C			–40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	
I_{CC}	supply current	V_I = V_{CC} or GND; I_O = 0 A; V_{CC} = 5.5 V	-	-	10	-	20	μA
ΔI_{CC}	additional supply current	per input; V_{CC} = 4.5 V to 5.5 V; V_I = V_{CC} − 2.1 V; I_O = 0 A	-	-	500	-	850	μA
C_I	input capacitance		-	1.5	-	-	-	pF

11. Dynamic characteristics

Table 8.   **Dynamic characteristics**

GND = 0 V; t_r = t_f ≤ 6.0 ns; All typical values are measured at T_{amb} = 25 °C. For test circuit, see Figure 6

Symbol	Parameter	Conditions		–40 °C to +85 °C			–40 °C to +125 °C		Unit
				Min	Typ	Max	Min	Max	
For type 74HC1G00									
t_{pd}	propagation delay	A and B to Y; see Figure 5	[1]						
		V_{CC} = 2.0 V; C_L = 50 pF		-	25	115	-	135	ns
		V_{CC} = 4.5 V; C_L = 50 pF		-	9	23	-	27	ns
		V_{CC} = 5.0 V; C_L = 15 pF		-	7	-	-	-	ns
		V_{CC} = 6.0 V; C_L = 50 pF		-	8	20	-	23	ns
C_{PD}	power dissipation capacitance	V_I = GND to V_{CC}	[2]	-	19	-	-	-	pF
For type 74HCT1G00									
t_{pd}	propagation delay	A and B to Y; see Figure 5	[1]						
		V_{CC} = 4.5 V; C_L = 50 pF		-	12	24	-	27	ns
		V_{CC} = 5.0 V; C_L = 15 pF		-	10	-	-	-	ns
C_{PD}	power dissipation capacitance	V_I = GND to V_{CC} − 1.5 V	[2]	-	21	-	-	-	pF

[1] t_{pd} is the same as t_{PLH} and t_{PHL}.

[2] C_{PD} is used to determine the dynamic power dissipation P_D (μW).

    P_D = $C_{PD} \times V_{CC}^2 \times f_i + \Sigma$ ($C_L \times V_{CC}^2 \times f_o$) where:
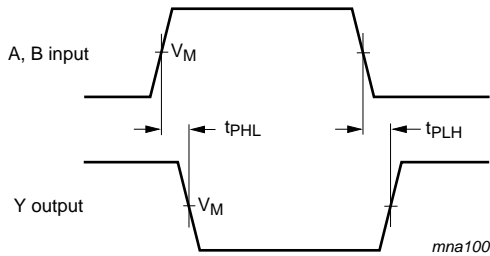
    f_i = input frequency in MHz; f_o = output frequency in MHz

    C_L = output load capacitance in pF
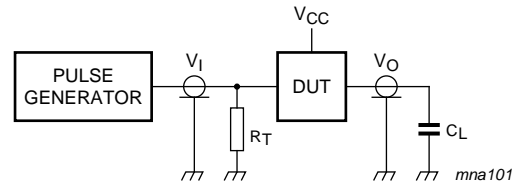
    V_{CC} = supply voltage in Volts

    Σ ($C_L \times V_{CC}^2 \times f_o$) = sum of outputs

12. Waveforms

For HC1G: $V_M = 0.5 \times V_{CC}$; $V_I = $ GND to V_{CC}

For HCT1G: $V_M = 1.3$ V; $V_I = $ GND to 3.0 V

Fig 5.   Input to output propagation delays

Test data is given in Table 8.

C_L = Load capacitance including jig and probe capacitance.

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

Fig 6.   Load circuitry for switching times

74HC_HCT1G00

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13. Package outline

TSSOP5: plastic thin shrink small outline package; 5 leads; body width 1.25 mm

SOT353-1

DIMENSIONS (mm are the original dimensions)

UNIT	A max.	A$_1$	A$_2$	A$_3$	b$_p$	c	D$^{(1)}$	E$^{(1)}$	e	e$_1$	H$_E$	L	L$_p$	v	w	y	Z$^{(1)}$	θ
mm	1.1	0.1 0	1.0 0.8	0.15	0.30 0.15	0.25 0.08	2.25 1.85	1.35 1.15	0.65	1.3	2.25 2.0	0.425	0.46 0.21	0.3	0.1	0.1	0.60 0.15	7° 0°

Note

1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT353-1		MO-203	SC-88A			~~00-09-01~~ 03-02-19
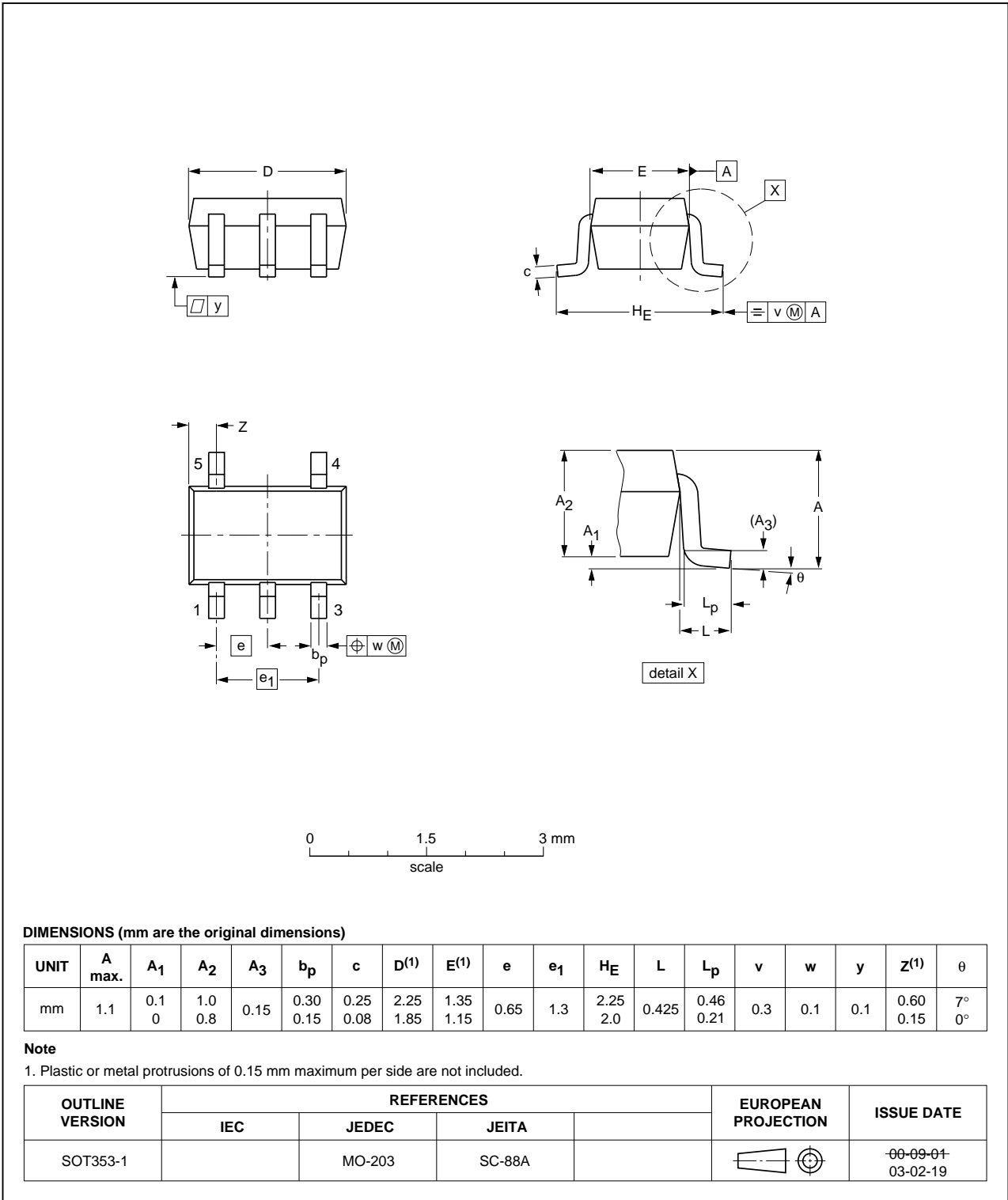
Fig 7.   Package outline SOT353-1 (TSSOP5)

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Plastic surface-mounted package; 5 leads

SOT753

DIMENSIONS (mm are the original dimensions)

UNIT	A	A₁	bp	c	D	E	e	HE	Lp	Q	v	w	y
mm	1.1 0.9	0.100 0.013	0.40 0.25	0.26 0.10	3.1 2.7	1.7 1.3	0.95	3.0 2.5	0.6 0.2	0.33 0.23	0.2	0.2	0.1

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT753			SC-74A			02-04-16 06-03-16

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

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14. Abbreviations

Table 9.   Abbreviations

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

15. Revision history

Table 10.   Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74HC_HCT1G00 v.5	20130925	Product data sheet	-	74HC_HCT1G00 v.4
Modifications:	• Section 1 "General description" updated.			
74HC_HCT1G00 v.4	20070711	Product data sheet	-	74HC_HCT1G00 v.3
Modifications:	• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors. • Legal texts have been adapted to the new company name where appropriate. • Package SOT353 changed to SOT353-1 in Section 3 and Section 13. • Quick reference data and Soldering sections removed. • Section 2 "Features and benefits" updated.			
74HC_HCT1G00 v.3	20020515	Product specification	-	74HC_HCT1G00 v.2
74HC_HCT1G00 v.2	20010302	Product specification	-	74HC_HCT1G00 v.1
74HC_HCT1G00 v.1	19980730	Preliminary specification	-	-

16. Legal information

16.1 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.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

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