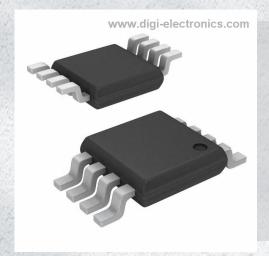


74HC2G00DP,125 Datasheet



https://www.DiGi-Electronics.com

DiGi Electronics Part Number 74HC2G00DP,125-DG

Manufacturer Nexperia USA Inc.

Manufacturer Product Number 74HC2G00DP,125

Description IC GATE NAND 2CH 2-INP 8TSSOP

Detailed Description NAND Gate IC 2 Channel 8-TSSOP



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RFQ Email: Info@DiGi-Electronics.com

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Purchase and inquiry

Manufacturer Product Number:	Manufacturer:
74HC2G00DP,125	Nexperia USA Inc.
Series:	Product Status:
74HC	Active
Logic Type:	Number of Circuits:
NAND Gate	2
Number of Inputs:	Features:
2	
Voltage - Supply:	Current - Quiescent (Max):
2V ~ 6V	20 μΑ
Current - Output High, Low:	Input Logic Level - Low:
5.2mA, 5.2mA	0.5V ~ 1.8V
Input Logic Level - High:	Max Propagation Delay @ V, Max CL:
1.5V ~ 4.2V	7ns @ 6V, 50pF
Operating Temperature:	Mounting Type:
-40°C ~ 125°C	Surface Mount
Supplier Device Package:	Package / Case:
8-TSSOP	8-TSSOP, 8-MSOP (0.118", 3.00mm Width)
Base Product Number:	
74HC2G00	

Environmental & Export classification

RoHS Status:	Moisture Sensitivity Level (MSL):
ROHS3 Compliant	1 (Unlimited)
REACH Status:	ECCN:
REACH Unaffected	EAR99
HTSUS:	
8542.39.0001	



Product data sheet

1. General description

The 74HC2G00; 74HCT2G00 is a dual 2-input NAND gate. Inputs include clamp diodes. This enables 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
- CMOS low power dissipation
- Input levels:
 - For 74HC2G00: CMOS level
 - For 74HCT2G00: TTL level
- Symmetrical output impedance
- · High noise immunity
- · Balanced propagation delays
- Latch-up performance exceeds 100 mA per JESD 78 Class II Level B
- · Complies with JEDEC standards:
 - JESD8C (2.7 V to 3.6 V)
 - JESD7A (2.0 V to 6.0 V)
- ESD protection:
 - HBM: ANSI/ESDA/JEDEC JS-001 class 2 exceeds 2000 V
 - CDM: ANSI/ESDA/JEDEC JS-002 class C3 exceeds 1000 V
- Specified from -40 °C to +85 °C and -40 °C to +125 °C

3. Ordering information

Table 1. Ordering information

Type number	Package	ackage						
	Temperature range	perature range Name Description						
74HC2G00DP 74HCT2G00DP	-40 °C to +125 °C	TSSOP8	plastic thin shrink small outline package; 8 leads; body width 3 mm; lead length 0.5 mm	SOT505-2				
74HC2G00DC 74HCT2G00DC	-40 °C to +125 °C	VSSOP8	plastic very thin shrink small outline package; 8 leads; body width 2.3 mm	SOT765-1				



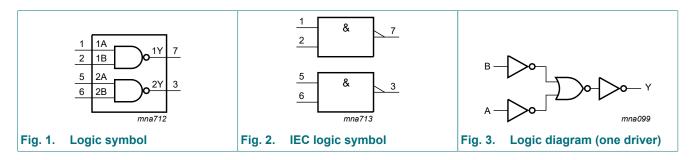
4. Marking

Table 2. Marking code

Type number	Marking code[1]
74HC2G00DP	H00
74HCT2G00DP	Т00
74HC2G00DC	H00
74HCT2G00DC	Т00

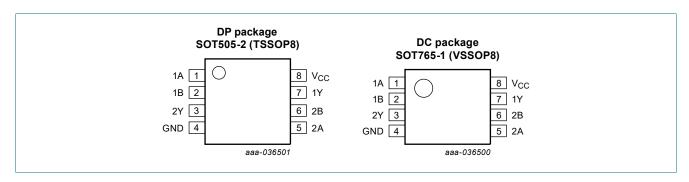
^[1] The pin 1 indicator is located on the lower left corner of the device, below the marking code.

5. Functional diagram



6. Pinning information

6.1. Pinning



6.2. Pin description

Table 3. Pin description

Symbol	Pin	Description
1A, 2A	1, 5	data input
1B, 2B	2, 6	data input
GND	4	ground (0 V)
1Y, 2Y	7, 3	data output
V _{CC}	8	supply voltage

7. Functional description

Table 4. Function table

 $H = HIGH \ voltage \ level; \ L = LOW \ voltage \ level.$

Input		Output
nA	nB	nY
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). Voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	Min	Max	Unit
V _{CC}	supply voltage		-0.5	+7.0	V
I _{IK}	input clamping current	$V_I < -0.5 \text{ V or } V_I > V_{CC} + 0.5 \text{ V}$ [1]	-	±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	$V_O = -0.5 \text{ V to } (V_{CC} + 0.5 \text{ V})$ [1]	-	25	mA
I _{CC}	supply current	[1]	-	50	mA
I _{GND}	ground current	[1]	-50	-	mA
T _{stg}	storage temperature		-65	+150	°C
P_D	dynamic power dissipation	$T_{amb} = -40 ^{\circ}\text{C} \text{ to } +125 ^{\circ}\text{C}$ [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	74HC2G00		74HCT2G00				
			Min	Тур	Max	Min	Тур	Max	
V _{CC}	supply voltage		2.0	5.0	6.0	4.5	5.0	5.5	V
VI	input voltage		0	-	V _{CC}	0	-	V _{CC}	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} = 2.0 V	-	-	625	-	-	-	ns/V
	fall rate	V _{CC} = 4.5 V	-	1.67	139	-	1.67	139	ns/V
		V _{CC} = 6.0 V	-	-	83	-	-	-	ns/V

^[2] For SOT505-2 (TSSOP8) package: P_{tot} derates linearly with 4.6 mW/K above 96 °C. For SOT765-1 (VSSOP8) package: P_{tot} derates linearly with 4.9 mW/K above 99 °C.

10. Static characteristics

Table 7. Static characteristics

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

Symbol	Parameter	Conditions	-40	°C to +8	5 °C	-40 °C to +125 °C		Unit
			Min	Тур	Max	Min	Max	
74HC2G	00							
V _{IH}	HIGH-level input	V _{CC} = 2.0 V	1.5	1.2	-	1.5	-	V
	voltage	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	V _I = V _{IH} or V _{IL}						
	voltage	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
		$I_O = -4.0 \text{ mA}; V_{CC} = 4.5 \text{ V}$	4.13	4.32	-	3.7	-	V
		I_{O} = -5.2 mA; V_{CC} = 6.0 V	5.63	5.81	-	5.2	-	V
V _{OL}	LOW-level output	V _I = V _{IH} or V _{IL}						
	voltage	$I_{O} = 20 \mu A; V_{CC} = 2.0 V$	-	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 = 4.0 mA; V _{CC} = 4.5 V	-	0.15	0.33	-	0.4	V
		I_{O} = 5.2 mA; V_{CC} = 6.0 V	-	0.16	0.33	-	0.4	V
l _l	input leakage current	$V_I = V_{CC}$ or GND; $V_{CC} = 6.0 \text{ V}$	-	-	±1.0	-	±1.0	μA
I _{CC}	supply current	per input pin; $V_I = V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 6.0$ V	-	-	10	-	20	μΑ
Cı	input capacitance		-	1.5	-	-	-	pF
74HCT2	G00				'		'	
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	$V_I = V_{IH}$ or V_{IL}						
	voltage	I _O = -20 μA; V _{CC} = 4.5 V	4.4	4.5	-	4.4	-	V
		I_{O} = -4.0 mA; V_{CC} = 4.5 V	4.13	4.32	-	3.7	-	V
V _{OL}	LOW-level output	V _I = V _{IH} or V _{IL}						
	voltage	$I_{O} = 20 \mu A; V_{CC} = 4.5 V$	-	0	0.1	-	0.1	V
		I _O = 4.0 mA; V _{CC} = 4.5 V	-	0.15	0.33	-	0.4	V
I _I	input leakage current	$V_I = V_{CC}$ or GND; $V_{CC} = 5.5 \text{ V}$	-	-	±1.0	-	±1.0	μA
I _{CC}	supply current	$V_I = V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 5.5$ V	-	-	10	-	20	μΑ
ΔI _{CC}	additional supply current	per input; $V_{CC} = 4.5 \text{ V to } 5.5 \text{ V};$ $V_{I} = V_{CC} - 2.1 \text{ V};$ $I_{O} = 0 \text{ A}$	-	-	375	-	410	μΑ
Cı	input capacitance		-	1.5	-	-	-	pF

11. Dynamic characteristics

Table 8. Dynamic characteristics

Voltages are referenced to GND (ground = 0 V); all typical values are measured at T_{amb} = 25 °C; for test circuit see Fig. 5.

Symbol	Parameter	Conditions		-40	°C to +8	5 °C	-40 °C t	Unit	
					Тур	Max	Min	Max	
74HC2G	000	,					•	'	
t _{pd}	propagation delay	nA and nB to nY; see Fig. 4	[1]						
		V _{CC} = 2.0 V		-	25	95	-	110	ns
		V _{CC} = 4.5 V		-	9	19	-	22	ns
		V _{CC} = 6.0 V		-	7	16	-	20	ns
t _t	transition time	see Fig. 4	[2]						
		V _{CC} = 2.0 V		-	18	95	-	125	ns
		V _{CC} = 4.5 V		-	6	19	-	25	ns
		V _{CC} = 6.0 V		-	5	16	-	20	ns
C _{PD}	power dissipation capacitance	V_I = GND to V_{CC}	[3]	-	10	-	-	-	pF
74HCT2	G00		,		'		1	•	'
t _{pd}	propagation delay	nA and nB to nY; see Fig. 4	[1]						
		V _{CC} = 4.5 V		-	12	24	-	29	ns
t _t	transition time	V _{CC} = 4.5 V; see <u>Fig. 4</u>	[2]	-	6	19	-	22	ns
C _{PD}	power dissipation capacitance	$V_I = GND \text{ to } V_{CC} - 1.5 \text{ V}$	[3]	-	10	-	-	-	pF

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

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

 f_i = input frequency in MHz;

f_o = output frequency in MHz;

C_L = output load capacitance in pF;

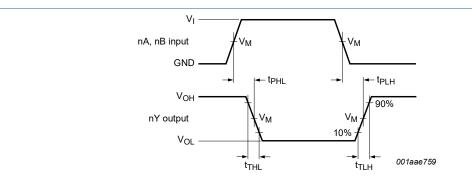
V_{CC} = supply voltage in V;

N = number of inputs switching;

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

 t_t is the same as t_{TLH} and t_{THL} . C_{PD} is used to determine the dynamic power dissipation (P_D in μW).

11.1. Waveforms and test circuit



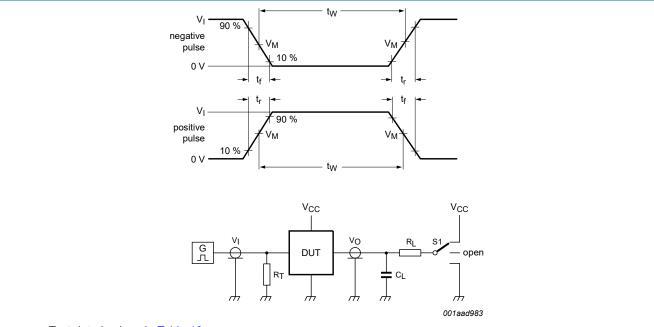
Measurement points are given in Table 9.

V_{OL} and V_{OH} are typical output voltage levels that occur with the output load.

Fig. 4. Propagation delay data input (nA, nB) to data output (nY) and transition time output (nY)

Table 9. Measurement points

Туре	Input	Output	
	V _M	V _M	
74HC2G00	0.5 x V _{CC}	0.5 x V _{CC}	
74HCT2G00	1.3 V	1.3 V	



Test data is given in Table 10.

Definitions for test circuit:

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

 C_L = Load capacitance including jig and probe capacitance; R_L = Load resistance; S1 = Test selection switch.

Fig. 5. Test circuit for measuring switching times

Table 10. Test data

Туре	Input		Input Load		Load		S1 position
	VI	t _r , t _f	CL	R _L	t _{PHL} , t _{PLH}		
74HC2G00	V _{CC}	≤ 6 ns	50 pF	1 kΩ	open		
74HCT2G00	3 V	≤ 6 ns	50 pF	1 kΩ	open		

74HC_HCT2G00

12. Package information

TSSOP8: plastic thin shrink small outline package; 8 leads; body width 3 mm; lead length 0.5 mm SOT505-2

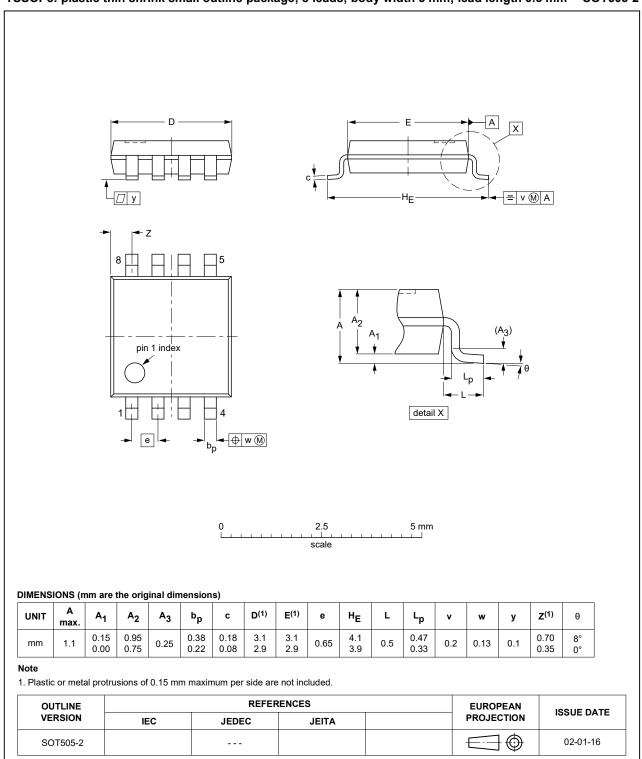


Fig. 6. Package outline SOT505-2 (TSSOP8)

74HC2G00; 74HCT2G00

Dual 2-input NAND gate

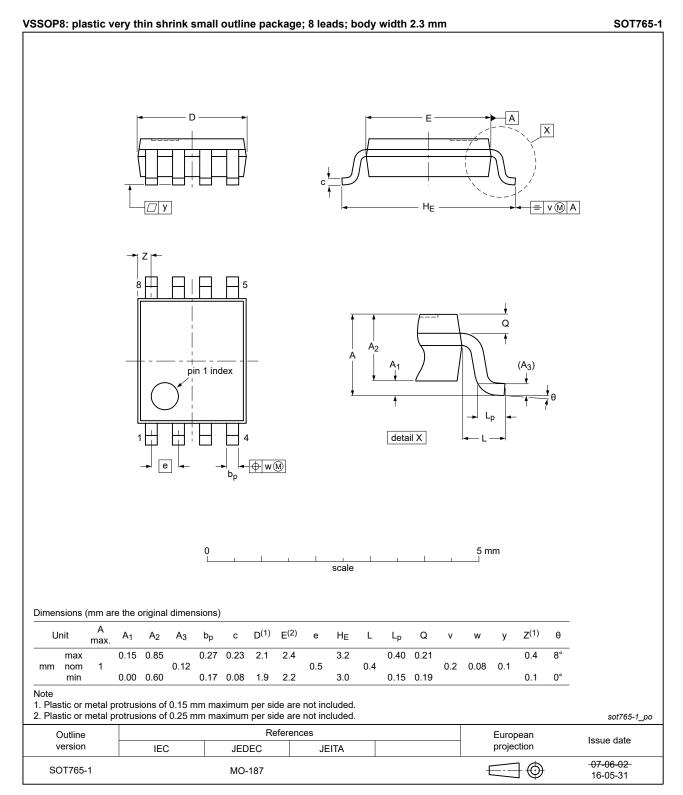


Fig. 7. Package outline SOT765-1 (VSSOP8)

74HC2G00; 74HCT2G00

Dual 2-input NAND gate

13. Abbreviations

Table 11. Abbreviations

Acronym	Description
ANSI	American National Standards Institute
CMOS	Complementary Metal-Oxide Semiconductor
ESD	ElectroStatic Discharge
ESDA	ElectroStatic Discharge Association
НВМ	Human Body Model
JEDEC	Joint Electron Device Engineering Council
TTL	Transistor-Transistor Logic

14. Revision history

Table 12. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes			
74HC_HCT2G00 v.7.1	20240813	Product data sheet	-	74HC_HCT2G00 v.7			
74HC_HCT2G00 v.7	20231201	Product data sheet	-	74HC_HCT2G00 v.6			
Modifications:	Section 2: I	<u>Section 2</u> : ESD specification updated according to the latest JEDEC standard.					
74HC_HCT2G00 v.6	20181120	Product data sheet	-	74HC_HCT2G00 v.5			
Modifications:	guidelines	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. Type numbers 74HC2G00GD and 74HCT2G00GD (SOT996-2/XSON8) removed. 					
74HC_HCT2G00 v.5	20130926	Product data sheet	-	74HC_HCT2G00 v.4			
Modifications:	For type nu XSON8.	For type numbers 74HC2G00GD and 74HCT2G00GD XSON8U has changed to XSON8.					
74HC_HCT2G00 v.4	20080703	Product data sheet	-	74HC_HCT2G00 v.3			
74HC_HCT2G00 v.3	20060405	Product data sheet	-	74HC_HCT2G00 v.2			
74HC_HCT2G00 v.2	20030212	Product specification	-	74HC_HCT2G00 v.1			
74HC_HCT2G00 v.1	20020710	Product specification	-	-			

74HC2G00; 74HCT2G00

Dual 2-input NAND gate

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.
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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Nexperia

74HC2G00; 74HCT2G00

Dual 2-input NAND gate

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Date of release: 13 August 2024

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