Dual 2-input OR gate Rev. 3 — 14 May 2013

Product data sheet

1. General description

The 74AHC2G32; 74AHCT2G32 is a high-speed Si-gate CMOS device.

The 74AHC2G32; 74AHCT2G32 provides two 2-input OR gates.

2. Features and benefits

- Symmetrical output impedance
- High noise immunity
- ESD protection:
 - ◆ HBM JESD22-A114E exceeds 2000 V
 - MM JESD22-A115-A exceeds 200 V
 - CDM JESD22-C101C exceeds 1000 V
- Low power dissipation
- Balanced propagation delays
- Multiple package options
- Specified from -40 °C to +85 °C and from -40 °C to +125 °C

3. Ordering information

Table 1. Ordering information

Type number	Package									
	Temperature range	Name	Description	Version						
74AHC2G32DP	–40 °C to +125 °C	TSSOP8	plastic thin shrink small outline package; 8 leads; body	SOT505-2						
74AHCT2G32DP			width 3 mm; lead length 0.5 mm							
74AHC2G32DC	–40 °C to +125 °C	VSSOP8	plastic very thin shrink small outline package; 8 leads;	SOT765-1						
74AHCT2G32DC			body width 2.3 mm							
74AHC2G32GD	–40 °C to +125 °C	XSON8	plastic extremely thin small outline package; no leads;	SOT996-2						
74AHCT2G32GD	_		8 terminals; body $3 \times 2 \times 0.5$ mm							



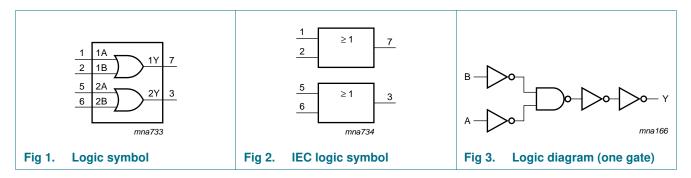
Dual 2-input OR gate

4. Marking

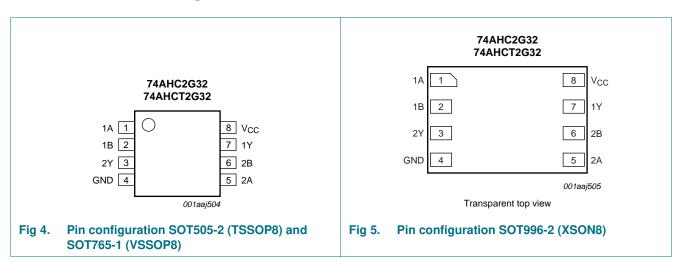
Table 2. Marking	
Type number	Marking code ^[1]
74AHC2G32DP	A32
74AHCT2G32DP	C32
74AHC2G32DC	A32
74AHCT2G32DC	C32
74AHC2G32GD	A32
74AHCT2G32GD	C32

[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^[1]

Input	Output	
nA	nB	nY
L	L	L
L	Н	Н
Н	L	Н
Н	Н	Н

[1] H = HIGH voltage level; L = LOW voltage level.

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
VI	input voltage		-0.5	+7.0	V
l _{IK}	input clamping current	V _I < -0.5 V	<u>[1]</u> –20	-	mA
I _{OK}	output clamping current	$V_O < -0.5$ V or $V_O > V_{CC}$ + 0.5 V	<u>[1]</u> -	±20	mA
lo	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	$T_{amb} = -40 \text{ °C to } +125 \text{ °C}$	[2] _	250	mW

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

[2] For TSSOP8 package: above 55 °C the value of P_{tot} derates linearly with 2.5 mW/K. For VSSOP8 package: above 110 °C the value of P_{tot} derates linearly with 8 mW/K. For XSON8 package: above 45 °C the value of P_{tot} derates linearly with 2.4 mW/K.

Dual 2-input OR gate

9. Recommended operating conditions

Table 6. Recommended operating conditions

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

Symbol	Parameter	Conditions	74	4AHC2G	32	74	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
$\Delta t / \Delta V$	input transition rise and fall rate	V_{CC} = 3.3 V \pm 0.3 V	-	-	100	-	-	-	ns/V
		$V_{CC}=5.0~V\pm0.5~V$	-	-	20	-	-	20	ns/V

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	
74AHC2	G32					1	1			
V _{IH}	HIGH-level	V _{CC} = 2.0 V	1.5	-	-	1.5	-	1.5	-	V
	input voltage	V _{CC} = 3.0 V	2.1	-	-	2.1	-	2.1	-	V
		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	V
	input voltage	V _{CC} = 3.0 V	-	-	0.9	-	0.9	-	0.9	V
		V _{CC} = 5.5 V	-	-	1.65	-	1.65	-	1.65	V
V _{OH} HIGH-level		$V_{I} = V_{IH} \text{ or } V_{IL}$								
output volta	output voltage	$I_O = -50 \ \mu\text{A}; \ V_{CC} = 2.0 \ \text{V}$	1.9	2.0	-	1.9	-	1.9	-	V
		$I_{O} = -50 \ \mu\text{A}; \ V_{CC} = 3.0 \ V$	2.9	3.0	-	2.9	-	2.9	-	V
		$I_O = -50 \ \mu\text{A}; \ V_{CC} = 4.5 \ \text{V}$	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	-	V
		$I_{O} = -8.0 \text{ mA}; V_{CC} = 4.5 \text{ V}$	3.94	-	-	3.8	-	3.70	-	V
V _{OL}	LOW-level	$V_{I} = V_{IH} \text{ or } V_{IL}$								
	output voltage	$I_{O} = 50 \ \mu A; \ V_{CC} = 2.0 \ V$	-	0	0.1	-	0.1	-	0.1	V
		$I_{O} = 50 \ \mu A; \ V_{CC} = 3.0 \ V$	-	0	0.1	-	0.1	-	0.1	V
		$I_{O} = 50 \ \mu A; V_{CC} = 4.5 \ V$	-	0	0.1	-	0.1	-	0.1	V
		$I_{O} = 4.0 \text{ mA}; V_{CC} = 3.0 \text{ V}$	-	-	0.36	-	0.44	-	0.55	V
		$I_{O} = 8.0 \text{ mA}; V_{CC} = 4.5 \text{ V}$	-	-	0.36	-	0.44	-	0.55	V
lı	input leakage current		-	-	0.1	-	1.0	-	2.0	μA
I _{CC}	supply current		-	-	1.0	-	10	-	40	μA
CI	input capacitance		-	1.5	10	-	10	-	10	рF

74AHC_AHCT2G32

4 of 14

Dual 2-input OR gate

Symbol	Parameter	Conditions		25 °C		_40 °C	to +85 °C	_40 °C	to +125 °C	Unit
			Min	Тур	Max	Min	Max	Min	Max	
74AHCT	2G32									
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	$V_{I} = V_{IH} \text{ or } V_{IL}; V_{CC} = 4.5 \text{ V}$								
	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
- 01	LOW-level	V_{I} = V_{IH} or $V_{IL};V_{CC}$ = 4.5 V								
	output voltage	I _O = 50 μA	-	0	0.1	-	0.1	-	0.1	V
		l _O = 8.0 mA	-	-	0.36	-	0.44	-	0.55	V
l _l	input leakage current	$V_1 = 5.5 V \text{ or GND};$ $V_{CC} = 0 V \text{ to } 5.5 V$	-	-	0.1	-	1.0	-	2.0	μA
I _{CC}	supply current		-	-	1.0	-	10	-	40	μA
ΔI_{CC}	additional supply current	per input pin; $V_1 = 3.4 V$; other inputs at V_{CC} or GND; $I_O = 0 A$; $V_{CC} = 5.5 V$	-	-	1.35	-	1.5	-	1.5	mA
CI	input capacitance		-	1.5	10	-	10	-	10	рF

Table 7. Static characteristics ...continued Voltages are referenced to CND (ground = 0.V)

11. Dynamic characteristics

Table 8. Dynamic characteristics

GND = 0 V; for test circuit see Figure 7.

Symbol	Parameter	Conditions			25 °C		–40 °C	to +85 °C	–40 °C to +125 °C		Unit
				Min	Тур	Max	Min	Max	Min	Max	
74AHC2	G32										
t _{pd}	propagation delay	nA, nB to nY; see Figure 6	[1]								
		$V_{CC} = 3.0 \text{ V} \text{ to } 3.6 \text{ V}$	[2]								
		C _L = 15 pF		-	4.4	7.9	1.0	9.5	1.0	10.0	ns
		C _L = 50 pF		-	6.3	11.4	1.0	13.0	1.0	14.5	ns
		$V_{CC} = 4.5 \text{ V} \text{ to } 5.5 \text{ V}$	[3]								
		C _L = 15 pF		-	3.2	5.5	1.0	6.5	1.0	7.0	ns
		C _L = 50 pF		-	4.6	7.5	1.0	8.5	1.0	9.5	ns
C _{PD}	power dissipation capacitance	per buffer; $C_L = 50 \text{ pF}; f_i = 1 \text{ MHz};$ $V_I = \text{GND to } V_{CC}$	<u>[4]</u>	-	16	-	-	-	-	-	pF

Dual 2-input OR gate

Symbol	Parameter	Conditions		25 °C			–40 °C to +85 °C		–40 °C t	o +125 °C	Unit
				Min	Тур	Max	Min	Max	Min	Max	
74AHCT	2G32						1				
Pa 1	propagation delay	nA, nB to nY; see Figure 6	[1]								
		$V_{CC} = 4.5 \text{ V} \text{ to } 5.5 \text{ V}$	[3]								
		C _L = 15 pF		-	3.3	6.9	1.0	8.0	1.0	9.0	ns
		C _L = 50 pF		-	4.8	7.9	1.0	9.0	1.0	10.0	ns
C _{PD}	power dissipation capacitance	per buffer; $C_L = 50 \text{ pF}; f_i = 1 \text{ MHz};$ $V_I = \text{GND to } V_{CC}$	<u>[4]</u>	-	17	-	-	-	-	-	pF

Dynamic characteristics ... continued Table 8.

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

[2] Typical values are measured at V_{CC} = 3.3 V.

[3] Typical values are measured at $V_{CC} = 5.0$ V.

[4] C_{PD} is used to determine the dynamic power dissipation (P_D in μ W). $P_{D} = C_{PD} \times V_{CC}^{2} \times f_{i} \times N + \Sigma (C_{L} \times V_{CC}^{2} \times f_{o}) \text{ where:}$ 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;

 $\Sigma(C_L \times V_{CC}^2 \times f_0)$ = sum of the outputs.

12. Waveforms

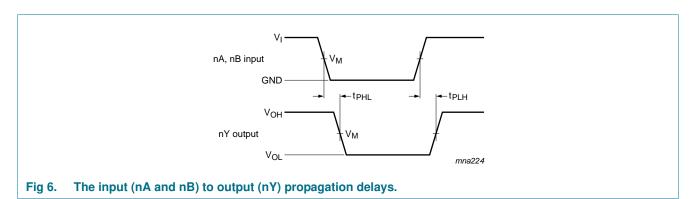


Table 9. **Measurement points**

Туре	Input	Output
	V _M	V _M
74AHC2G32	0.5V _{CC}	0.5V _{CC}
74AHCT2G32	1.5 V	0.5V _{CC}

74AHC_AHCT2G32

NXP Semiconductors

74AHC2G32; 74AHCT2G32

Dual 2-input OR gate

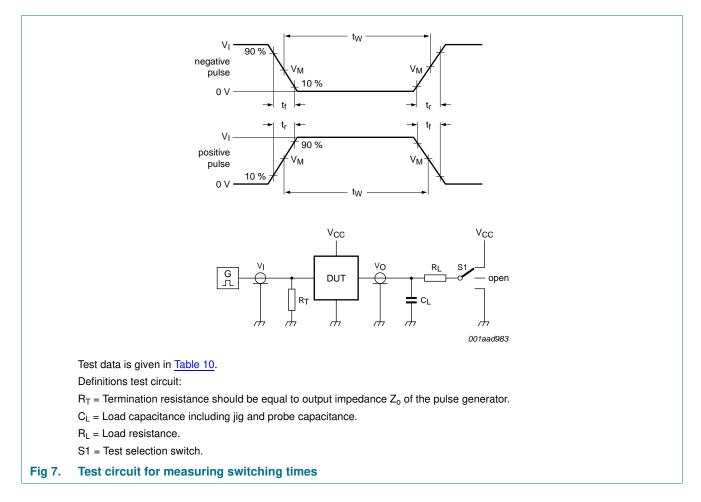


Table 10. Test data

Туре	Input		Load		S1 position			
	VI	t _r , t _f	CL	RL	t _{PHL} , t _{PLH}	t _{PZH} , t _{PHZ}	t _{PZL} , t _{PLZ}	
74AHC2G32	V _{CC}	≤ 3 ns	15 pF, 50 pF	1 kΩ	open	GND	V _{CC}	
74AHCT2G32	3 V	\leq 3 ns	15 pF, 50 pF	1 kΩ	open	GND	V _{CC}	

Product data sheet

Dual 2-input OR gate

13. Package outline

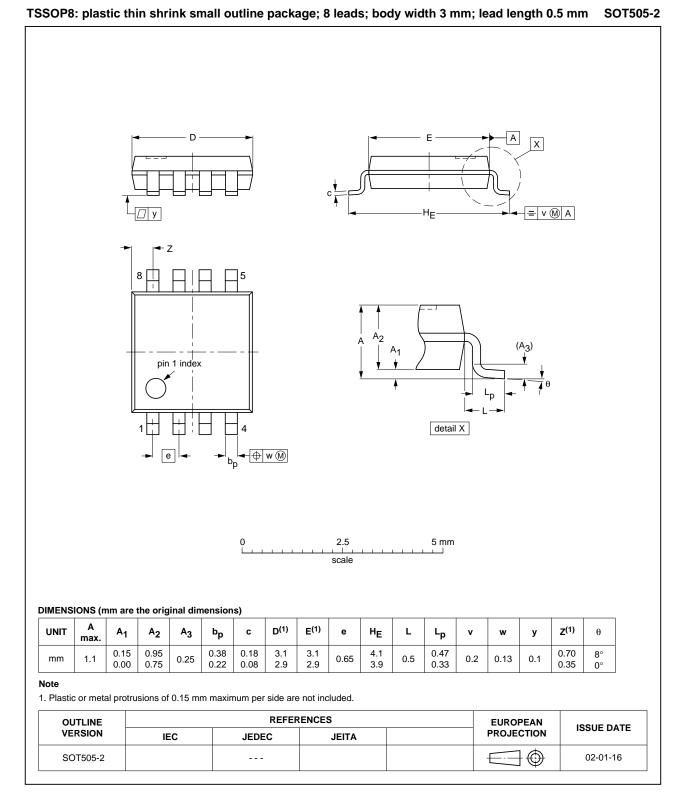


Fig 8. Package outline SOT505-2 (TSSOP8)

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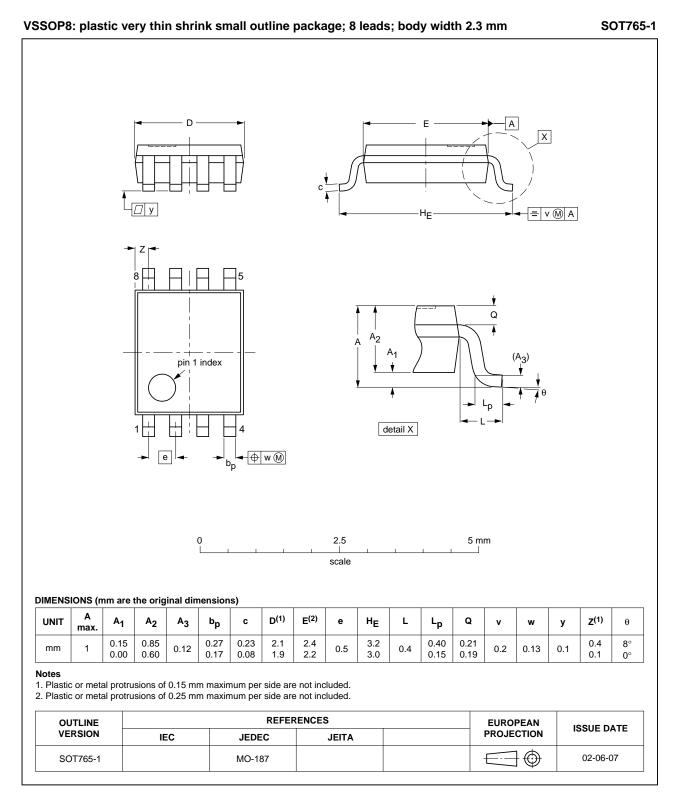
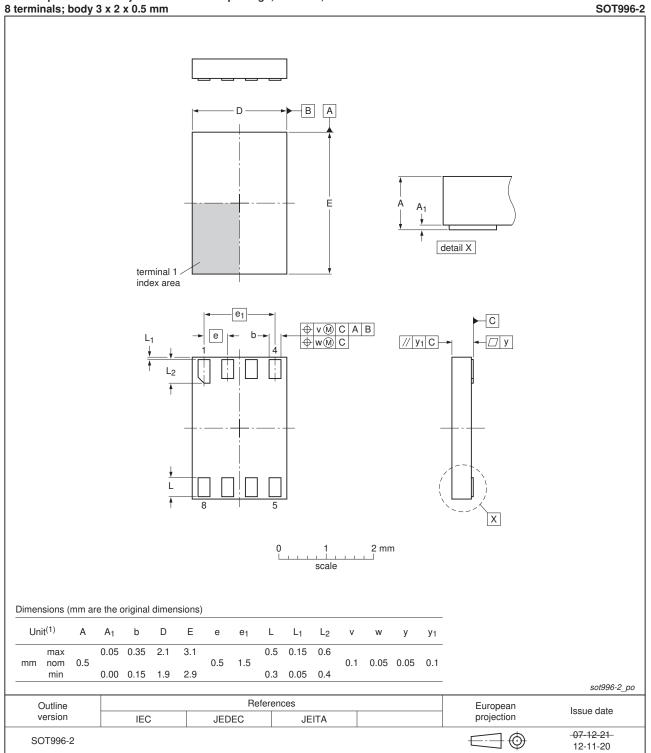


Fig 9. Package outline SOT765-1 (VSSOP8)

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XSON8: plastic extremely thin small outline package; no leads;

Fig 10. Package outline SOT996-2 (XSON8)

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Dual 2-input OR gate

14. Abbreviations

Table 11.	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	

15. Revision history

Table 12. Revision history **Document ID Release date** Data sheet status Change notice Supersedes 74AHC_AHCT2G32 v.3 20130514 Product data sheet 74AHC_AHCT2G32 v.2 • For type number 74AHC2G32GD and 74AHCT2G32GD XSON8U has changed to XSON8. Modifications: 74AHC AHCT2G32 v.2 20090120 Product data sheet 74AHC AHCT2G32 v.1 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. • Added type number 74AHC2G32GD and 74AHCT2G32GD (XSON8U package). 74AHC_AHCT2G32 v.1 20040223 Product 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.
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Product [short] data sheet	Production	This document contains the product specification.

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Dual 2-input OR gate

18. Contents

1	General description 1
2	Features and benefits 1
3	Ordering information 1
4	Marking 2
5	Functional diagram 2
6	Pinning information 2
6.1	Pinning 2
6.2	Pin description 3
7	Functional description 3
8	Limiting values 3
9	Recommended operating conditions 4
10	Static characteristics 4
11	Dynamic characteristics 5
12	Waveforms 6
13	Package outline 8
14	Abbreviations 11
15	Revision history 11
16	Legal information
16.1	Data sheet status 12
16.2	Definitions 12
16.3	Disclaimers
16.4	Trademarks 13
17	Contact information 13
18	Contents 14

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Date of release: 14 May 2013 Document identifier: 74AHC_AHCT2G32