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Team Nexperia

74HC1G32; 74HCT1G32

2-input OR gate

Rev. 05 — 14 March 2008

Product data sheet

1. General description

74HC1G32 and 74HCT1G32 are high-speed Si-gate CMOS devices. They provide a 2-input OR function.

The HC device has CMOS input switching levels and supply voltage range 2 V to 6 V.

The HCT device has TTL input switching levels and supply voltage range 4.5 V to 5.5 V.

The standard output currents are half those of the 74HC32 and 74HCT32.

2. Features

- Symmetrical output impedance
- High noise immunity
- Low power dissipation
- Balanced propagation delays
- SOT353-1 and SOT753 package options

3. Ordering information

Table 1. Ordering information

Type number	Package							
	Temperature range	Name	Description	Version				
74HC1G32GW	–40 °C to +125 °C	TSSOP5	plastic thin shrink small outline package; 5 leads;	SOT353-1				
74HCT1G32GW			body width 1.25 mm					
74HC1G32GV	–40 °C to +125 °C	SC-74A	plastic surface-mounted package; 5 leads	SOT753				
74HCT1G32GV								

4. Marking

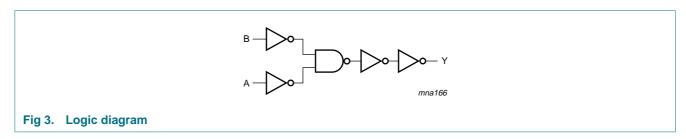
Table 2. Marking codes

Type number	Marking code
74HC1G32GW	HG
74HCT1G32GW	TG
74HC1G32GV	H32
74HCT1G32GV	T32



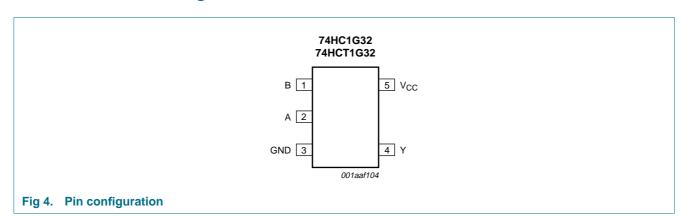
5. Functional diagram





6. Pinning information

6.1 Pinning



6.2 Pin description

Table 3. Pin description

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

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7. Functional description

Table 4. Function table

H = HIGH voltage level; L = LOW voltage level

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

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	$V_{I} < -0.5 \text{ V or } V_{I} > V_{CC} + 0.5 \text{ V}$	-	±20	mA
I _{OK}	output clamping current	$V_O < -0.5 \text{ V or } V_O > V_{CC} + 0.5 \text{ V}$	-	±20	mA
I _O	output current	$-0.5 \text{ V} < \text{V}_{\text{O}} < \text{V}_{\text{CC}} + 0.5 \text{ V}$	-	±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	$T_{amb} = -40 ^{\circ}\text{C} \text{ to } +125 ^{\circ}\text{C}$	[2] _	200	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 Condition		Conditions	74HC1G32			74HCT1G32			Unit
			Min	Тур	Max	Min	Тур	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	$V_{CC} = 2.0 \text{ V}$	-	-	625	-	-	-	ns/V
	and fall rate	$V_{CC} = 4.5 \text{ V}$	-	-	139	-	-	139	ns/V
		$V_{CC} = 6.0 \text{ V}$	-	-	83	-	-	-	ns/V

^[2] Above 55 $^{\circ}\text{C}$ the value of P $_{tot}$ derates linearly with 2.5 mW/K.

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	35 °C	–40 °C t	o +125 °C	Unit
			Min	Тур	Max	Min	Max	
74HC1G3	2					•		
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	V _{CC} = 2.0 V	-	0.8	0.5	-	0.5	V
	voltage	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	$I_{O} = -20 \mu A; V_{CC} = 2.0 V$	1.9	2.0	-	1.9	-	V
		$I_{O} = -20 \mu A; V_{CC} = 4.5 V$	4.4	4.5	-	4.4	-	V
		$I_{O} = -20 \mu A; V_{CC} = 6.0 V$	5.9	6.0	-	5.9	-	V
		$I_{O} = -2.0 \text{ mA}; V_{CC} = 4.5 \text{ V}$	4.13	4.32	-	3.7	-	V
		$I_{O} = -2.6 \text{ mA}; V_{CC} = 6.0 \text{ V}$	5.63	5.81	-	5.2	-	V
V_{OL}	LOW-level output	$V_I = V_{IH}$ or V_{IL}						
	voltage	$I_O = 20 \mu A$; $V_{CC} = 2.0 \text{ V}$	-	0	0.1	-	0.1	V
		$I_O = 20 \mu A$; $V_{CC} = 4.5 \text{ V}$	-	0	0.1	-	0.1	V
		$I_O = 20 \mu A$; $V_{CC} = 6.0 \text{ V}$	-	0	0.1	-	0.1	V
		$I_O = 2.0 \text{ mA}; V_{CC} = 4.5 \text{ V}$	-	0.15	0.33	-	0.4	V
		$I_{O} = 2.6 \text{ mA}; V_{CC} = 6.0 \text{ V}$	-	0.16	0.33	-	0.4	V
I _I	input leakage current	$V_I = V_{CC}$ or GND; $V_{CC} = 6.0 \text{ V}$	-	-	1.0	-	1.0	μΑ
I _{CC}	supply current	$V_I = V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 6.0 \text{ V}$	-	-	10	-	20	μΑ
C _I	input capacitance		-	1.5	-	-	-	pF
74HCT1G	32							
V_{IH}	HIGH-level input voltage	$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$	2.0	1.6	-	2.0	-	V
V_{IL}	LOW-level input voltage	$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$	-	1.2	8.0	-	8.0	V
V _{OH}	HIGH-level output	$V_I = V_{IH}$ or V_{IL} ; $V_{CC} = 4.5 \text{ V}$						
	voltage	$I_O = -20 \mu A$	4.4	4.5	-	4.4	-	V
		$I_{O} = -2.0 \text{ mA}$	4.13	4.32	-	3.7	-	V
V _{OL}	LOW-level output	$V_I = V_{IH}$ or V_{IL} ; $V_{CC} = 4.5 \text{ V}$						
	voltage	I _O = 20 μA	-	0	0.1	-	0.1	V
		I _O = 2.0 mA	-	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	μΑ

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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 t	Unit	
			Min	Тур	Max	Min	Max	
I _{CC}	supply current	$V_I = V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 5.5 \text{ V}$	-	-	10	-	20	μΑ
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	μΑ
Cı	input capacitance		-	1.5	-	-	-	pF

11. Dynamic characteristics

Table 8. Dynamic characteristics

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

Symbol	Parameter	Conditions		-40 °C to +8		5 °C	-40 °C t	–40 °C to +125 °C	
				Min	Тур	Max	Min	Max	
74HC1G	32	'					'	'	
t _{pd}	propagation delay	A and B to Y; see Figure 5	<u>[1]</u>						
		$V_{CC} = 2.0 \text{ V}; C_L = 50 \text{ pF}$		-	18	115	-	135	ns
		$V_{CC} = 4.5 \text{ V}; C_L = 50 \text{ pF}$		-	8	23	-	27	ns
		$V_{CC} = 5.0 \text{ V}; C_L = 15 \text{ pF}$		-	8	-	-	-	ns
		$V_{CC} = 6.0 \text{ V}; C_L = 50 \text{ pF}$		-	7	20	-	23	ns
C_{PD}	power dissipation capacitance	$V_I = GND \text{ to } V_{CC}$	<u>[2]</u>	-	19	-	-	-	pF
74HCT1	G32								
t _{pd}	propagation delay	A and B to Y; see Figure 5	[1]						
		$V_{CC} = 4.5 \text{ V}; C_L = 50 \text{ pF}$		-	10	24	-	27	ns
		$V_{CC} = 5.0 \text{ V}; C_L = 15 \text{ pF}$		-	10	-	-	-	ns
C_{PD}	power dissipation capacitance	$V_I = GND \text{ to } V_{CC} - 1.5 \text{ V}$	[2]	-	20	-	-	-	pF

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

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

 f_i = input frequency in MHz

f_o = output frequency in MHz

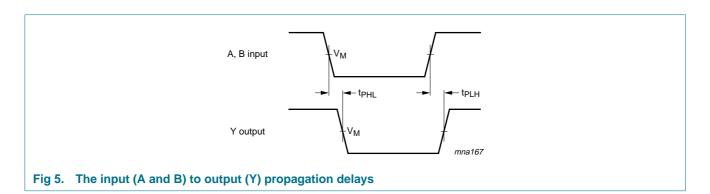
C_L = output load capacitance in pF

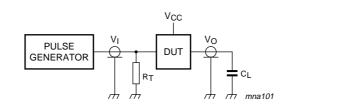
V_{CC} = supply voltage in V

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

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

12. Waveforms





Measurement points are given in Table 8. Definitions for test circuit:

 C_L = Load capacitance including jig and probe capacitance.

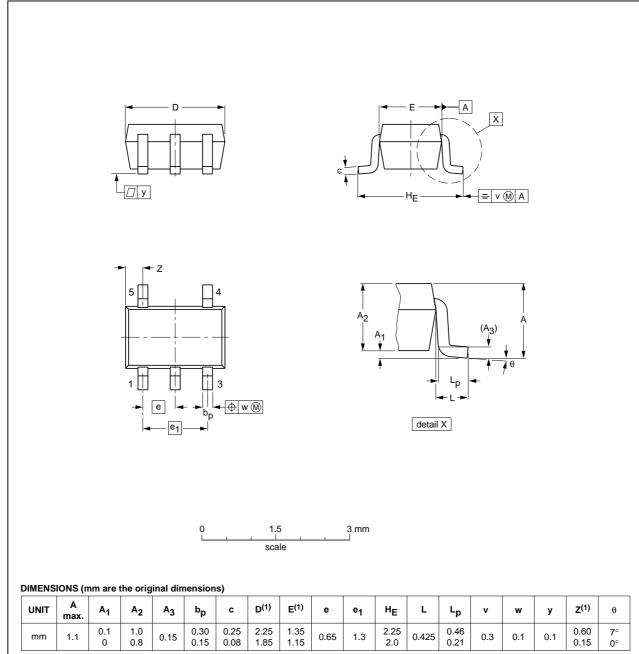
 R_T = Termination resistance should be equal to output impedance Z_0 of the pulse generator.

Fig 6. Load circuitry for switching times

13. Package outline

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

SOT353-1



Note

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

OUTLINE		REFERENCES			EUROPEAN	ISSUE DATE
VERSION	IEC	JEDEC	JEITA		PROJECTION	ISSUE DATE
SOT353-1		MO-203	SC-88A			-00-09-01 03-02-19

Fig 7. Package outline SOT353-1 (TSSOP5)

Plastic surface-mounted package; 5 leads

SOT753

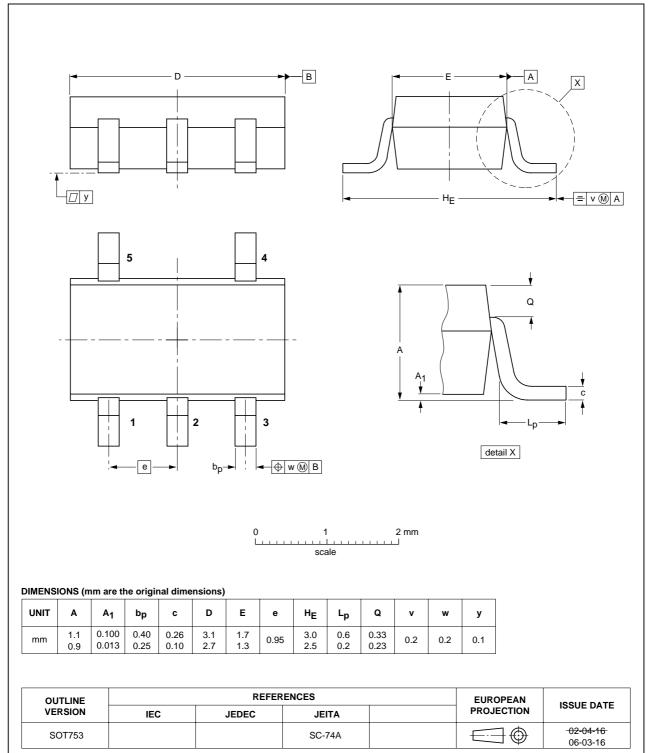


Fig 8. Package outline SOT753 (SC-74A)

14. Abbreviations

Table 9. Abbreviations

Acronym	Description
DUT	Device Under Test
TTL	Transistor-Transistor Logic

15. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74HC_HCT1G32_5	20080314	Product data sheet	-	74HC_HCT1G32_4
Modifications:	 Pin descript 	tion of Pin 4 changed from inp	ut to output in <u>Table 3</u>	<u>3</u> .
74HC_HCT1G32_4	20070514	Product data sheet	-	74HC_HCT1G32_3
74HC_HCT1G32_3	20020515	Product specification	-	74HC_HCT1G32_2
74HC_HCT1G32_2	20010406	Product specification	-	74HC_HCT1G32
74HC_HCT1G32	19971216	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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