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Kind regards,

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 74HCT1G32GW | -40 °C to +125 °C | TSSOP5 | plastic thin shrink small outline package; 5 leads; body width 1.25 mm | SOT353-1 |
| 74HC1G32GV 74HCT1G32GV | -40 °C to +125 °C | SC-74A | plastic surface-mounted package; 5 leads | SOT753 |

4. Marking

Table 2. Marking codes

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

5. Functional diagram

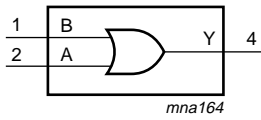


Fig 1. Logic symbol

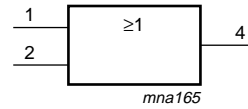


Fig 2. IEC logic symbol

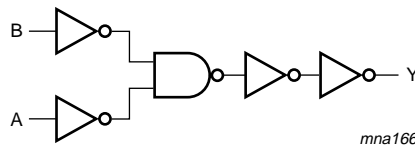


Fig 3. Logic diagram

6. Pinning information

6.1 Pinning

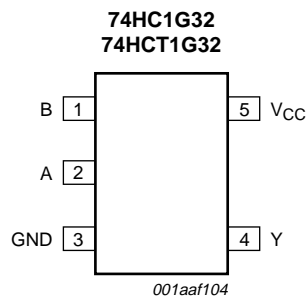


Fig 4. Pin configuration

6.2 Pin description

Table 3. Pin description

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

7. Functional description

Table 4. Function table

H = HIGH voltage level; L = LOW voltage level

| Inputs | | Output |
|--------|---|--------|
| A | B | Y |
| L | L | L |
| L | H | H |
| H | L | H |
| H | H | H |

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 | $V_I < -0.5\text{ V}$ 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 | $-0.5\text{ V} < V_O < V_{CC} + 0.5\text{ V}$ | - | ±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 | $T_{amb} = -40\text{ °C}$ to $+125\text{ °C}$ | [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 | 74HC1G32 | | | 74HCT1G32 | | | 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 | $V_{CC} = 2.0\text{ V}$ | - | - | 625 | - | - | - | ns/V |
| | | $V_{CC} = 4.5\text{ V}$ | - | - | 139 | - | - | 139 | ns/V |
| | | $V_{CC} = 6.0\text{ V}$ | - | - | 83 | - | - | - | ns/V |

10. Static characteristics

Table 7. Static characteristics

Voltages are referenced to GND (ground = 0 V). All typical values are measured at $T_{amb} = 25\text{ }^{\circ}\text{C}$.

| Symbol | Parameter | Conditions | -40 °C to +85 °C | | | -40 °C to +125 °C | | Unit |
|------------------|---------------------------|---|------------------|------|------|-------------------|------|---------------|
| | | | Min | Typ | Max | Min | Max | |
| 74HC1G32 | | | | | | | | |
| V_{IH} | HIGH-level input voltage | $V_{CC} = 2.0\text{ V}$ | 1.5 | 1.2 | - | 1.5 | - | V |
| | | $V_{CC} = 4.5\text{ V}$ | 3.15 | 2.4 | - | 3.15 | - | V |
| | | $V_{CC} = 6.0\text{ V}$ | 4.2 | 3.2 | - | 4.2 | - | V |
| V_{IL} | LOW-level input voltage | $V_{CC} = 2.0\text{ V}$ | - | 0.8 | 0.5 | - | 0.5 | V |
| | | $V_{CC} = 4.5\text{ V}$ | - | 2.1 | 1.35 | - | 1.35 | V |
| | | $V_{CC} = 6.0\text{ V}$ | - | 2.8 | 1.8 | - | 1.8 | V |
| V_{OH} | HIGH-level output voltage | $V_I = V_{IH}$ or V_{IL} | | | | | | |
| | | $I_O = -20\text{ }\mu\text{A}$; $V_{CC} = 2.0\text{ V}$ | 1.9 | 2.0 | - | 1.9 | - | V |
| | | $I_O = -20\text{ }\mu\text{A}$; $V_{CC} = 4.5\text{ V}$ | 4.4 | 4.5 | - | 4.4 | - | V |
| | | $I_O = -20\text{ }\mu\text{A}$; $V_{CC} = 6.0\text{ V}$ | 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 |
| V_{OL} | LOW-level output voltage | $V_I = V_{IH}$ or V_{IL} | | | | | | |
| | | $I_O = 20\text{ }\mu\text{A}$; $V_{CC} = 2.0\text{ V}$ | - | 0 | 0.1 | - | 0.1 | V |
| | | $I_O = 20\text{ }\mu\text{A}$; $V_{CC} = 4.5\text{ V}$ | - | 0 | 0.1 | - | 0.1 | V |
| | | $I_O = 20\text{ }\mu\text{A}$; $V_{CC} = 6.0\text{ V}$ | - | 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_I | input leakage current | $V_I = V_{CC}$ or GND; $V_{CC} = 6.0\text{ V}$ | - | - | 1.0 | - | 1.0 | μA |
| | | $V_I = V_{CC}$ or GND; $I_O = 0\text{ A}$; $V_{CC} = 6.0\text{ V}$ | - | - | 10 | - | 20 | μA |
| C_I | input capacitance | | - | 1.5 | - | - | - | pF |
| 74HCT1G32 | | | | | | | | |
| 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 | 0.8 | - | 0.8 | V |
| V_{OH} | HIGH-level output voltage | $V_I = V_{IH}$ or V_{IL} ; $V_{CC} = 4.5\text{ V}$ | | | | | | |
| | | $I_O = -20\text{ }\mu\text{A}$ | 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 voltage | $V_I = V_{IH}$ or V_{IL} ; $V_{CC} = 4.5\text{ V}$ | | | | | | |
| | | $I_O = 20\text{ }\mu\text{A}$ | - | 0 | 0.1 | - | 0.1 | V |
| | | $I_O = 2.0\text{ mA}$ | - | 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 | μA |

Table 7. Static characteristics ...continued

Voltages are referenced to GND (ground = 0 V). All typical values are measured at $T_{amb} = 25\text{ }^{\circ}\text{C}$.

| 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; $I_O = 0\text{ A}$; $V_{CC} = 5.5\text{ V}$ | - | - | 10 | - | 20 | μA |
| ΔI_{CC} | additional supply current | per input; $V_{CC} = 4.5\text{ V}$ to 5.5 V ; $V_I = V_{CC} - 2.1\text{ V}$; $I_O = 0\text{ A}$ | - | - | 500 | - | 850 | μA |
| C_I | input capacitance | | - | 1.5 | - | - | - | pF |

11. Dynamic characteristics

Table 8. Dynamic characteristics

$GND = 0\text{ V}$; $t_r = t_f \leq 6.0\text{ ns}$. All typical values are measured at $T_{amb} = 25\text{ }^{\circ}\text{C}$. 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 | |
| 74HC1G32 | | | | | | | | |
| t_{pd} | propagation delay | A and B to Y; see Figure 5 | [1] | | | | | |
| | | $V_{CC} = 2.0\text{ V}$; $C_L = 50\text{ pF}$ | - | 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 | $V_I = GND$ to V_{CC} | - | 19 | - | - | - | pF |
| 74HCT1G32 | | | | | | | | |
| 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 | $V_I = GND$ to $V_{CC} - 1.5\text{ V}$ | - | 20 | - | - | - | 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).

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

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

12. Waveforms

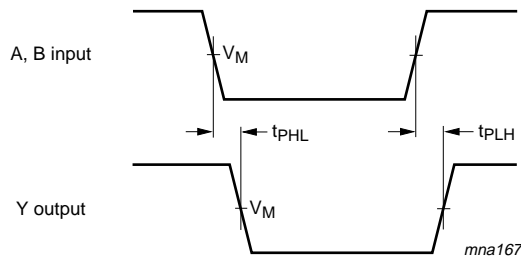
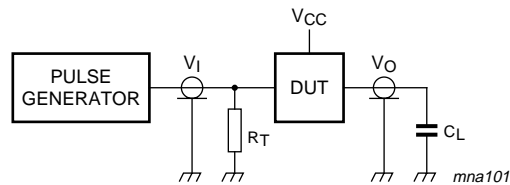


Fig 5. The input (A and B) to output (Y) propagation delays



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_o 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



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 description of Pin 4 changed from input to output in Table 3 . | | | |
| 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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