

# 74AHC2G32; 74AHCT2G32

Dual 2-input OR gate

Rev. 01 — 23 February 2004

Product data sheet

## 1. General description

The 74AHC2G/AHCT2G32 is a high-speed Si-gate CMOS device. This device provides two 2-input OR gates.

## 2. Features

- Symmetrical output impedance
- High noise immunity
- ESD protection:
  - ◆ HBM EIA/JESD22-A114-A exceeds 2000 V
  - ◆ MM EIA/JESD22-A115-A exceeds 200 V
  - ◆ CDM EIA/JESD22-C101 exceeds 1000 V.
- Low power dissipation
- Balanced propagation delays
- SOT505-2 and SOT765-1 package
- Specified from  $-40\text{ }^{\circ}\text{C}$  to  $+85\text{ }^{\circ}\text{C}$  and  $-40\text{ }^{\circ}\text{C}$  to  $+125\text{ }^{\circ}\text{C}$ .

## 3. Quick reference data

Table 1: Quick reference data

$GND = 0\text{ V}$ ;  $T_{amb} = 25\text{ }^{\circ}\text{C}$ ;  $t_r = t_f \leq 3.0\text{ ns}$ .

| Symbol                | Parameter                            | Conditions                                      | Min    | Typ | Max | Unit |
|-----------------------|--------------------------------------|---|--------|-----|-----|------|
| <b>Type 74AHC2G</b>   |                                      |   |        |     |     |      |
| $t_{PHL}$ , $t_{PLH}$ | propagation delay<br>nA and nB to nY | $C_L = 15\text{ pF}$ ;<br>$V_{CC} = 5\text{ V}$ | -      | 3.2 | 5.5 | ns   |
| $C_I$                 | input capacitance                    |   | -      | 1.5 | 10  | pF   |
| $C_{PD}$              | power dissipation<br>capacitance     | $C_L = 50\text{ pF}$ ;<br>$f_i = 1\text{ MHz}$  | [1][2] | 16  | -   | pF   |
| <b>Type 74AHCT2G</b>  |                                      |   |        |     |     |      |
| $t_{PHL}$ , $t_{PLH}$ | propagation delay<br>nA and nB to nY | $C_L = 15\text{ pF}$ ;<br>$V_{CC} = 5\text{ V}$ | -      | 3.3 | 6.9 | ns   |
| $C_I$                 | input capacitance                    |   | -      | 1.5 | 10  | pF   |
| $C_{PD}$              | power dissipation<br>capacitance     | $C_L = 50\text{ pF}$ ;<br>$f_i = 1\text{ MHz}$  | [1][2] | 17  | -   | pF   |

[1]  $C_{PD}$  is used to determine the dynamic power dissipation ( $P_D$  in  $\mu\text{W}$ ).

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

$f_i$  = input frequency in MHz;

$f_o$  = output frequency in MHz;

**PHILIPS**

$C_L$  = output load capacitance in pF;  
 $V_{CC}$  = supply voltage in Volts;  
 $N$  = total load switching outputs;  
 $\Sigma(C_L \times V_{CC}^2 \times f_o)$  = sum of the outputs.

[2] The condition is  $V_I = \text{GND to } V_{CC}$ .

## 4. Ordering information

Table 2: Ordering information

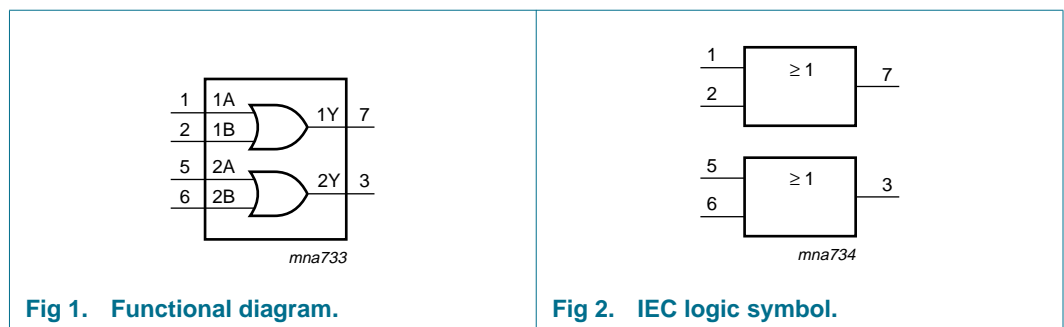
| Type number  | Package           |        |   | Version  |
|--------------|-------------------|--------|---|----------|
|              | Temperature range | Name   | Description   |          |
| 74AHC2G32DP  | -40 °C to +125 °C | TSSOP8 | plastic thin shrink small outline package; 8 leads; body width 3 mm; lead length 0.5 mm | SOT505-2 |
| 74AHCT2G32DP | -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 |
| 74AHC2G32DC  | -40 °C to +125 °C | VSSOP8 | plastic very shrink small outline package; 8 leads; body width 2.3 mm                   | SOT765-1 |
| 74AHCT2G32DC | -40 °C to +125 °C | VSSOP8 | plastic very shrink small outline package; 8 leads; body width 2.3 mm                   | SOT765-1 |

## 5. Marking

Table 3: Marking

| Type number  | Marking code |
|--------------|--------------|
| 74AHC2G32DP  | A32          |
| 74AHCT2G32DP | C32          |
| 74AHC2G32DC  | A32          |
| 74AHCT2G32DC | C32          |

## 6. Functional diagram



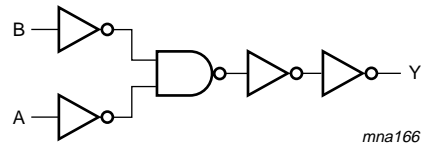


Fig 3. Logic diagram (logic driver).

## 7. Pinning information

### 7.1 Pinning

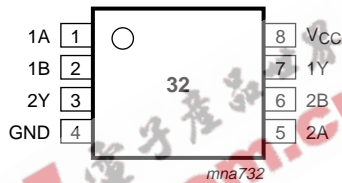


Fig 4. Pin configuration.

### 7.2 Pin description

Table 4: Pin description

| Pin | Symbol          | Description    |
|-----|-----------------|----------------|
| 1   | 1A              | data input     |
| 2   | 1B              | data input     |
| 3   | 2Y              | data output    |
| 4   | GND             | ground (0 V)   |
| 5   | 2A              | data input     |
| 6   | 2B              | data input     |
| 7   | 1Y              | data output    |
| 8   | V <sub>CC</sub> | supply voltage |

## 8. Functional description

### 8.1 Function table

Table 5: Function table [1]

| Input |    | Output |
|-------|----|--------|
| nA    | nB | nY     |
| L     | L  | L      |
| L     | H  | H      |
| H     | L  | H      |
| H     | H  | H      |

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

## 9. Limiting values

Table 6: 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    |
| $V_I$             | input voltage                 |  | -0.5 | +7.0 | V    |
| $I_{IK}$          | input diode current           | $V_I < -0.5$ V                           | -    | -20  | mA   |
| $I_{OK}$          | output diode current          | $V_O < -0.5$ V or $V_O > V_{CC} + 0.5$ V | [1]  | ±20  | mA   |
| $I_O$             | output source or sink current | $V_O > -0.5$ V or $V_O < V_{CC} + 0.5$ V | -    | ±25  | mA   |
| $I_{CC}, I_{GND}$ | $V_{CC}$ or GND current       |  | -    | ±75  | mA   |
| $T_{stg}$         | storage temperature           |  | -65  | +150 | °C   |
| $P_{tot}$         | power dissipation             | $T_{amb} = -40$ °C to +125 °C            | -    | 250  | mW   |

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

## 10. Recommended operating conditions

Table 7: Recommended operating operations

| Symbol              | Parameter                     | Conditions   | Min | Typ | Max      | Unit |
|---------------------|-------------------------------|--|-----|-----|----------|------|
| <b>Type 74AHC2G</b> |                               |  |     |     |          |      |
| $V_{CC}$            | supply voltage                |  | 2.0 | 5.0 | 5.5      | V    |
| $V_I$               | input voltage                 |  | 0   | -   | 5.5      | V    |
| $V_O$               | output voltage                |  | 0   | -   | $V_{CC}$ | V    |
| $T_{amb}$           | operating ambient temperature | see <a href="#">Section 11</a> and <a href="#">Section 12</a> per device | -40 | +25 | +125     | °C   |

Table 7: Recommended operating operations ...continued

| Symbol               | Parameter                     | Conditions   | Min | Typ | Max      | Unit |
|----------------------|-------------------------------|--|-----|-----|----------|------|
| $t_r, t_f$           | input rise and fall times     | $V_{CC} = 3.3 \text{ V} \pm 0.3 \text{ V}$                               | -   | -   | 100      | ns/V |
|                      |                               | $V_{CC} = 5 \text{ V} \pm 0.5 \text{ V}$                                 | -   | -   | 20       | ns/V |
| <b>Type 74AHCT2G</b> |                               |  |     |     |          |      |
| $V_{CC}$             | supply voltage                |  | 4.5 | 5.0 | 5.5      | V    |
| $V_I$                | input voltage                 |  | 0   | -   | 5.5      | V    |
| $V_O$                | output voltage                |  | 0   | -   | $V_{CC}$ | V    |
| $T_{amb}$            | operating ambient temperature | see <a href="#">Section 11</a> and <a href="#">Section 12</a> per device | -40 | +25 | +125     | °C   |
| $t_r, t_f$           | input rise and fall times     | $V_{CC} = 5 \text{ V} \pm 0.5 \text{ V}$                                 | -   | -   | 20       | ns/V |

## 11. Static characteristics

Table 8: Static characteristics type 74AHC2G32

At recommended operating conditions; voltages are referenced to GND (ground = 0 V).

| Symbol                                      | Parameter                                       | Conditions   | Min  | Typ  | Max  | Unit          |
|---|---|--|------|------|------|---------------|
| <b><math>T_{amb} = 25 \text{ °C}</math></b> |   |  |      |      |      |               |
| $V_{IH}$                                    | HIGH-level input voltage                        | $V_{CC} = 2.0 \text{ V}$   | 1.5  | -    | -    | V             |
|   |   | $V_{CC} = 3.0 \text{ V}$   | 2.1  | -    | -    | V             |
|   |   | $V_{CC} = 5.5 \text{ V}$   | 3.85 | -    | -    | V             |
| $V_{IL}$                                    | LOW-level input voltage                         | $V_{CC} = 2.0 \text{ V}$   | -    | -    | 0.5  | V             |
|   |   | $V_{CC} = 3.0 \text{ V}$   | -    | -    | 0.9  | V             |
|   |   | $V_{CC} = 5.5 \text{ V}$   | -    | -    | 1.65 | V             |
| $V_{OH}$                                    | HIGH-level output voltage                       | $V_I = V_{IH}$ or $V_{IL}$   |      |      |      |               |
|   |   | $I_O = -50 \text{ } \mu\text{A}; V_{CC} = 2.0 \text{ V}$           | 1.9  | 2.0  | -    | V             |
|   |   | $I_O = -50 \text{ } \mu\text{A}; V_{CC} = 3.0 \text{ V}$           | 2.9  | 3.0  | -    | V             |
|   |   | $I_O = -50 \text{ } \mu\text{A}; V_{CC} = 4.5 \text{ V}$           | 4.4  | 4.5  | -    | V             |
|   |   | $I_O = -4.0 \text{ mA}; V_{CC} = 3.0 \text{ V}$                    | 2.58 | -    | -    | V             |
|   | $I_O = -8.0 \text{ mA}; V_{CC} = 4.5 \text{ V}$ | 3.94   | -    | -    | V    |               |
| $V_{OL}$                                    | LOW-level output voltage                        | $V_I = V_{IH}$ or $V_{IL}$   |      |      |      |               |
|   |   | $I_O = 50 \text{ } \mu\text{A}; V_{CC} = 2.0 \text{ V}$            | -    | 0    | 0.1  | V             |
|   |   | $I_O = 50 \text{ } \mu\text{A}; V_{CC} = 3.0 \text{ V}$            | -    | 0    | 0.1  | V             |
|   |   | $I_O = 50 \text{ } \mu\text{A}; V_{CC} = 4.5 \text{ V}$            | -    | 0    | 0.1  | V             |
|   |   | $I_O = 4.0 \text{ mA}; V_{CC} = 3.0 \text{ V}$                     | -    | -    | 0.36 | V             |
|   | $I_O = 8.0 \text{ mA}; V_{CC} = 4.5 \text{ V}$  | -  | -    | 0.36 | V    |               |
| $I_{LI}$                                    | input leakage current                           | $V_I = V_{CC}$ or GND; $V_{CC} = 5.5 \text{ V}$                    | -    | -    | 0.1  | $\mu\text{A}$ |
| $I_{CC}$                                    | quiescent supply current                        | $V_I = V_{CC}$ or GND; $I_O = 0 \text{ A}; V_{CC} = 5.5 \text{ V}$ | -    | -    | 1.0  | $\mu\text{A}$ |
| $C_I$                                       | input capacitance                               |  | -    | 1.5  | 10   | pF            |

**Table 8: Static characteristics type 74AHC2G32 ...continued**

At recommended operating conditions; voltages are referenced to GND (ground = 0 V).

| Symbol                                     | Parameter                 | Conditions   | Min  | Typ | Max  | Unit |
|--|---------------------------|--|------|-----|------|------|
| <b>T<sub>amb</sub> = -40 °C to +85 °C</b>  |                           |  |      |     |      |      |
| V <sub>IH</sub>                            | HIGH-level input voltage  | V <sub>CC</sub> = 2.0 V  | 1.5  | -   | -    | V    |
|  |                           | V <sub>CC</sub> = 3.0 V  | 2.1  | -   | -    | V    |
|  |                           | V <sub>CC</sub> = 5.5 V  | 3.85 | -   | -    | V    |
| V <sub>IL</sub>                            | LOW-level input voltage   | V <sub>CC</sub> = 2.0 V  | -    | -   | 0.5  | V    |
|  |                           | V <sub>CC</sub> = 3.0 V  | -    | -   | 0.9  | V    |
|  |                           | V <sub>CC</sub> = 5.5 V  | -    | -   | 1.65 | V    |
| V <sub>OH</sub>                            | HIGH-level output voltage | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>                                    |      |     |      |      |
|  |                           | I <sub>O</sub> = -50 μA; V <sub>CC</sub> = 2.0 V                                       | 1.9  | -   | -    | V    |
|  |                           | I <sub>O</sub> = -50 μA; V <sub>CC</sub> = 3.0 V                                       | 2.9  | -   | -    | V    |
|  |                           | I <sub>O</sub> = -50 μA; V <sub>CC</sub> = 4.5 V                                       | 4.4  | -   | -    | V    |
|  |                           | I <sub>O</sub> = -4.0 mA; V <sub>CC</sub> = 3.0 V                                      | 2.48 | -   | -    | V    |
| V <sub>OL</sub>                            | LOW-level output voltage  | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>                                    |      |     |      |      |
|  |                           | I <sub>O</sub> = 50 μA; V <sub>CC</sub> = 2.0 V  | -    | -   | 0.1  | V    |
|  |                           | I <sub>O</sub> = 50 μA; V <sub>CC</sub> = 3.0 V  | -    | -   | 0.1  | V    |
|  |                           | I <sub>O</sub> = 50 μA; V <sub>CC</sub> = 4.5 V  | -    | -   | 0.1  | V    |
|  |                           | I <sub>O</sub> = 4.0 mA; V <sub>CC</sub> = 3.0 V                                       | -    | -   | 0.44 | V    |
| I <sub>LI</sub>                            | input leakage current     | V <sub>I</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 5.5 V                       | -    | -   | 1.0  | μA   |
|  |                           | V <sub>I</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 5.5 V | -    | -   | 10   | μA   |
| C <sub>I</sub>                             | input capacitance         |  | -    | -   | 10   | pF   |
| <b>T<sub>amb</sub> = -40 °C to +125 °C</b> |                           |  |      |     |      |      |
| V <sub>IH</sub>                            | HIGH-level input voltage  | V <sub>CC</sub> = 2.0 V  | 1.5  | -   | -    | V    |
|  |                           | V <sub>CC</sub> = 3.0 V  | 2.1  | -   | -    | V    |
|  |                           | V <sub>CC</sub> = 5.5 V  | 3.85 | -   | -    | V    |
| V <sub>IL</sub>                            | LOW-level input voltage   | V <sub>CC</sub> = 2.0 V  | -    | -   | 0.5  | V    |
|  |                           | V <sub>CC</sub> = 3.0 V  | -    | -   | 0.9  | V    |
|  |                           | V <sub>CC</sub> = 5.5 V  | -    | -   | 1.65 | V    |
| V <sub>OH</sub>                            | HIGH-level output voltage | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>                                    |      |     |      |      |
|  |                           | I <sub>O</sub> = -50 μA; V <sub>CC</sub> = 2.0 V                                       | 1.9  | -   | -    | V    |
|  |                           | I <sub>O</sub> = -50 μA; V <sub>CC</sub> = 3.0 V                                       | 2.9  | -   | -    | V    |
|  |                           | I <sub>O</sub> = -50 μA; V <sub>CC</sub> = 4.5 V                                       | 4.4  | -   | -    | V    |
|  |                           | I <sub>O</sub> = -4.0 mA; V <sub>CC</sub> = 3.0 V                                      | 2.40 | -   | -    | V    |
|  |                           | I <sub>O</sub> = -8.0 mA; V <sub>CC</sub> = 4.5 V                                      | 3.70 | -   | -    | V    |

**Table 8:** Static characteristics type 74AHC2G32 ...continued

At recommended operating conditions; voltages are referenced to GND (ground = 0 V).

| Symbol          | Parameter                | Conditions   | Min | Typ | Max  | Unit |
|-----------------|--------------------------|--|-----|-----|------|------|
| V <sub>OL</sub> | LOW-level output voltage | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>                                    |     |     |      |      |
|                 |                          | I <sub>O</sub> = 50 μA; V <sub>CC</sub> = 2.0 V  | -   | -   | 0.1  | V    |
|                 |                          | I <sub>O</sub> = 50 μA; V <sub>CC</sub> = 3.0 V  | -   | -   | 0.1  | V    |
|                 |                          | I <sub>O</sub> = 50 μA; V <sub>CC</sub> = 4.5 V  | -   | -   | 0.1  | V    |
|                 |                          | I <sub>O</sub> = 4.0 mA; V <sub>CC</sub> = 3.0 V                                       | -   | -   | 0.55 | V    |
|                 |                          | I <sub>O</sub> = 8.0 mA; V <sub>CC</sub> = 4.5 V                                       | -   | -   | 0.55 | V    |
| I <sub>LI</sub> | input leakage current    | V <sub>I</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 5.5 V                       | -   | -   | 2.0  | μA   |
| I <sub>CC</sub> | quiescent supply current | V <sub>I</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 5.5 V | -   | -   | 40   | μA   |
| C <sub>I</sub>  | input capacitance        |  | -   | -   | 10   | pF   |

**Table 9:** Static characteristics type 74AHCT2G32

At recommended operating conditions; voltages are referenced to GND (ground = 0 V).

| Symbol                                    | Parameter   | Conditions  | Min  | Typ | Max  | Unit |
|---|---|---|------|-----|------|------|
| <b>T<sub>amb</sub> = 25 °C</b>            |   |   |      |     |      |      |
| V <sub>IH</sub>                           | HIGH-level input voltage                          | V <sub>CC</sub> = 4.5 V to 5.5 V  | 2.0  | -   | -    | V    |
| V <sub>IL</sub>                           | LOW-level input voltage                           | V <sub>CC</sub> = 4.5 V to 5.5 V  | -    | -   | 0.8  | V    |
| V <sub>OH</sub>                           | HIGH-level output voltage                         | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>   |      |     |      |      |
|   |   | I <sub>O</sub> = -50 μA; V <sub>CC</sub> = 4.5 V  | 4.4  | 4.5 | -    | V    |
|   |   | I <sub>O</sub> = -8.0 mA; V <sub>CC</sub> = 4.5 V   | 3.94 | -   | -    | V    |
| V <sub>OL</sub>                           | LOW-level output voltage                          | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>   |      |     |      |      |
|   |   | I <sub>O</sub> = 50 μA; V <sub>CC</sub> = 4.5 V   | -    | 0   | 0.1  | V    |
|   |   | I <sub>O</sub> = 8.0 mA; V <sub>CC</sub> = 4.5 V  | -    | -   | 0.36 | V    |
| I <sub>LI</sub>                           | input leakage current                             | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>CC</sub> = 5.5 V                                 | -    | -   | 0.1  | μA   |
| I <sub>CC</sub>                           | quiescent supply current                          | V <sub>I</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 5.5 V                        | -    | -   | 1.0  | μA   |
| ΔI <sub>CC</sub>                          | additional quiescent supply current per input pin | V <sub>I</sub> = 3.4 V; other inputs at V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 5.5 V | -    | -   | 1.35 | mA   |
| C <sub>I</sub>                            | input capacitance                                 |   | -    | 1.5 | 10   | pF   |
| <b>T<sub>amb</sub> = -40 °C to +85 °C</b> |   |   |      |     |      |      |
| V <sub>IH</sub>                           | HIGH-level input voltage                          | V <sub>CC</sub> = 4.5 V to 5.5 V  | 2.0  | -   | -    | V    |
| V <sub>IL</sub>                           | LOW-level input voltage                           | V <sub>CC</sub> = 4.5 V to 5.5 V  | -    | -   | 0.8  | V    |
| V <sub>OH</sub>                           | HIGH-level output voltage                         | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>   |      |     |      |      |
|   |   | I <sub>O</sub> = -50 μA; V <sub>CC</sub> = 4.5 V  | 4.4  | -   | -    | V    |
|   |   | I <sub>O</sub> = -8.0 mA; V <sub>CC</sub> = 4.5 V   | 3.8  | -   | -    | V    |

**Table 9: Static characteristics type 74AHCT2G32 ...continued**

At recommended operating conditions; voltages are referenced to GND (ground = 0 V).

| Symbol                                     | Parameter   | Conditions   | Min  | Typ | Max  | Unit |
|--|---|--|------|-----|------|------|
| V <sub>OL</sub>                            | LOW-level output voltage                          | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub><br>I <sub>O</sub> = 50 μA; V <sub>CC</sub> = 4.5 V           | -    | -   | 0.1  | V    |
|  |   | I <sub>O</sub> = 8.0 mA; V <sub>CC</sub> = 4.5 V   | -    | -   | 0.44 | V    |
| I <sub>LI</sub>                            | input leakage current                             | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>CC</sub> = 5.5 V                                    | -    | -   | 1.0  | μA   |
| I <sub>CC</sub>                            | quiescent supply current                          | V <sub>I</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A;<br>V <sub>CC</sub> = 5.5 V                        | -    | -   | 10   | μA   |
| ΔI <sub>CC</sub>                           | additional quiescent supply current per input pin | V <sub>I</sub> = 3.4 V; other inputs at V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A;<br>V <sub>CC</sub> = 5.5 V | -    | -   | 1.5  | mA   |
| C <sub>I</sub>                             | input capacitance                                 |  | -    | -   | 10   | pF   |
| <b>T<sub>amb</sub> = -40 °C to +125 °C</b> |   |  |      |     |      |      |
| V <sub>IH</sub>                            | HIGH-level input voltage                          | V <sub>CC</sub> = 4.5 V to 5.5 V   | 2.0  | -   | -    | V    |
| V <sub>IL</sub>                            | LOW-level input voltage                           | V <sub>CC</sub> = 4.5 V to 5.5 V   | -    | -   | 0.8  | V    |
| V <sub>OH</sub>                            | HIGH-level output voltage                         | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub><br>I <sub>O</sub> = -50 μA; V <sub>CC</sub> = 4.5 V          | 4.4  | -   | -    | V    |
|  |   | I <sub>O</sub> = -8.0 mA; V <sub>CC</sub> = 4.5 V  | 3.70 | -   | -    | V    |
| V <sub>OL</sub>                            | LOW-level output voltage                          | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub><br>I <sub>O</sub> = 50 μA; V <sub>CC</sub> = 4.5 V           | -    | -   | 0.1  | V    |
|  |   | I <sub>O</sub> = 8.0 mA; V <sub>CC</sub> = 4.5 V   | -    | -   | 0.55 | V    |
| I <sub>LI</sub>                            | input leakage current                             | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>CC</sub> = 5.5 V                                    | -    | -   | 2.0  | μA   |
| I <sub>CC</sub>                            | quiescent supply current                          | V <sub>I</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A;<br>V <sub>CC</sub> = 5.5 V                        | -    | -   | 40   | μA   |
| ΔI <sub>CC</sub>                           | additional quiescent supply current per input pin | V <sub>I</sub> = 3.4 V; other inputs at V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A;<br>V <sub>CC</sub> = 5.5 V | -    | -   | 1.5  | mA   |
| C <sub>I</sub>                             | input capacitance                                 |  | -    | -   | 10   | pF   |



## 12. Dynamic characteristics

**Table 10: Dynamic characteristics type 74AHC2G32**

At recommended operating conditions; voltages are referenced to GND (ground = 0 V);  $t_r = t_f \leq 3.0$  ns; see [Figure 6](#).

| Symbol   | Parameter                            | Conditions                                 | Min     | Typ | Max  | Unit |    |
|--|--------------------------------------|--|---------|-----|------|------|----|
| <b><math>T_{amb} = 25</math> °C</b>                          |                                      |  |         |     |      |      |    |
| $t_{PHL}$ , $t_{PLH}$  | propagation delay<br>nA and nB to nY | see <a href="#">Figure 5</a>               |         |     |      |      |    |
|  |                                      | $V_{CC} = 3.0$ V to $3.6$ V; $C_L = 15$ pF | [1]     | -   | 4.4  | 7.9  | ns |
|  |                                      | $V_{CC} = 4.5$ V to $5.5$ V; $C_L = 15$ pF | [2]     | -   | 3.2  | 5.5  | ns |
|  |                                      | $V_{CC} = 3.0$ V to $3.6$ V; $C_L = 50$ pF | -       | -   | 6.3  | 11.4 | ns |
|  |                                      | $V_{CC} = 4.5$ V to $5.5$ V; $C_L = 50$ pF | -       | -   | 4.6  | 7.5  | ns |
| $C_{PD}$   | power dissipation<br>capacitance     | $C_L = 50$ pF; $f_i = 1$ MHz               | [3] [4] | -   | 16   | -    | pF |
| <b><math>T_{amb} = -40</math> °C to <math>+85</math> °C</b>  |                                      |  |         |     |      |      |    |
| $t_{PHL}$ , $t_{PLH}$  | propagation delay<br>nA and nB to nY | see <a href="#">Figure 5</a>               |         |     |      |      |    |
|  |                                      | $V_{CC} = 3.0$ V to $3.6$ V; $C_L = 15$ pF | 1.0     | -   | 9.5  | ns   |    |
|  |                                      | $V_{CC} = 4.5$ V to $5.5$ V; $C_L = 15$ pF | 1.0     | -   | 6.5  | ns   |    |
|  |                                      | $V_{CC} = 3.0$ V to $3.6$ V; $C_L = 50$ pF | 1.0     | -   | 13.0 | ns   |    |
|  |                                      | $V_{CC} = 4.5$ V to $5.5$ V; $C_L = 50$ pF | 1.0     | -   | 8.5  | ns   |    |
| <b><math>T_{amb} = -40</math> °C to <math>+125</math> °C</b> |                                      |  |         |     |      |      |    |
| $t_{PHL}$ , $t_{PLH}$  | propagation delay<br>nA and nB to nY | see <a href="#">Figure 5</a>               |         |     |      |      |    |
|  |                                      | $V_{CC} = 3.0$ V to $3.6$ V; $C_L = 15$ pF | 1.0     | -   | 10.0 | ns   |    |
|  |                                      | $V_{CC} = 4.5$ V to $5.5$ V; $C_L = 15$ pF | 1.0     | -   | 7.0  | ns   |    |
|  |                                      | $V_{CC} = 3.0$ V to $3.6$ V; $C_L = 50$ pF | 1.0     | -   | 14.5 | ns   |    |
|  |                                      | $V_{CC} = 4.5$ V to $5.5$ V; $C_L = 50$ pF | 1.0     | -   | 9.5  | ns   |    |

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

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

[3]  $C_{PD}$  is used to determine the dynamic power dissipation ( $P_D$  in  $\mu$ 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 Volts;

$N$  = total load switching outputs;

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

[4] The condition is  $V_i = \text{GND}$  to  $V_{CC}$ .

**Table 11: Dynamic characteristics type 74AHCT2G32**

At recommended operating conditions; voltages are referenced to GND (ground = 0 V);  $t_r = t_f \leq 3.0$  ns; see [Figure 6](#).

| Symbol   | Parameter                            | Conditions   | Min       | Typ | Max  | Unit |
|--|--------------------------------------|--|-----------|-----|------|------|
| <b><math>T_{amb} = 25</math> °C</b>                          |                                      |  |           |     |      |      |
| $t_{PHL}$ , $t_{PLH}$  | propagation delay<br>nA and nB to nY | see <a href="#">Figure 5</a><br>$V_{CC} = 4.5$ V to $5.5$ V; $C_L = 15$ pF | [1] -     | 3.3 | 6.9  | ns   |
|  |                                      | $V_{CC} = 4.5$ V to $5.5$ V; $C_L = 50$ pF                                 | [1] -     | 4.8 | 7.9  | ns   |
| $C_{PD}$   | power dissipation<br>capacitance     | $C_L = 50$ pF; $f_i = 1$ MHz   | [2] [3] - | 17  | -    | pF   |
| <b><math>T_{amb} = -40</math> °C to <math>+85</math> °C</b>  |                                      |  |           |     |      |      |
| $t_{PHL}$ , $t_{PLH}$  | propagation delay<br>nA and nB to nY | see <a href="#">Figure 5</a><br>$V_{CC} = 4.5$ V to $5.5$ V; $C_L = 15$ pF | 1.0       | -   | 8.0  | ns   |
|  |                                      | $V_{CC} = 4.5$ V to $5.5$ V; $C_L = 50$ pF                                 | 1.0       | -   | 9.0  | ns   |
| <b><math>T_{amb} = -40</math> °C to <math>+125</math> °C</b> |                                      |  |           |     |      |      |
| $t_{PHL}$ , $t_{PLH}$  | propagation delay<br>nA and nB to nY | see <a href="#">Figure 5</a><br>$V_{CC} = 4.5$ V to $5.5$ V; $C_L = 15$ pF | 1.0       | -   | 9.0  | ns   |
|  |                                      | $V_{CC} = 4.5$ V to $5.5$ V; $C_L = 50$ pF                                 | 1.0       | -   | 10.0 | ns   |

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

[2]  $C_{PD}$  is used to determine the dynamic power dissipation ( $P_D$  in  $\mu$ W).

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

$f_i$  = input frequency in MHz;

$f_o$  = output frequency in MHz;

$C_L$  = output load capacitance in pF;

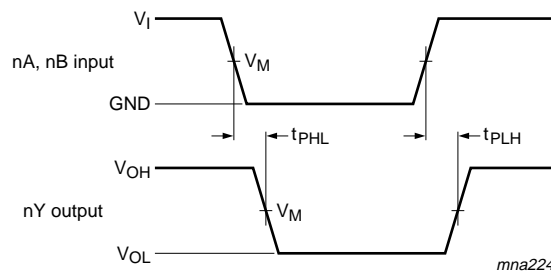
$V_{CC}$  = supply voltage in Volts;

$N$  = total load switching outputs;

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

[3] The condition is  $V_I = GND$  to  $V_{CC}$ .

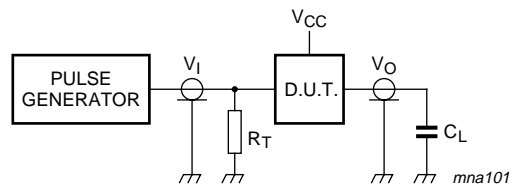
### 13. Waveforms



74AHC2G32:  $V_M = 0.5 \times V_{CC}$ ;  $V_I = GND$  to  $V_{CC}$ .

74AHCT2G32: input  $V_M = 1.5$  V and output  $V_M = 0.5 \times V_{CC}$ ;  $V_I = GND$  to  $3.0$  V.

**Fig 5. The input (nA and nB) to output (nY) propagation delays.**



Definitions for test circuit:

$C_L$  = Load capacitance including jig and probe capacitance (See [Section 12](#) for the value).

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

**Fig 6. Load circuitry for switching times.**

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14. Package outline

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

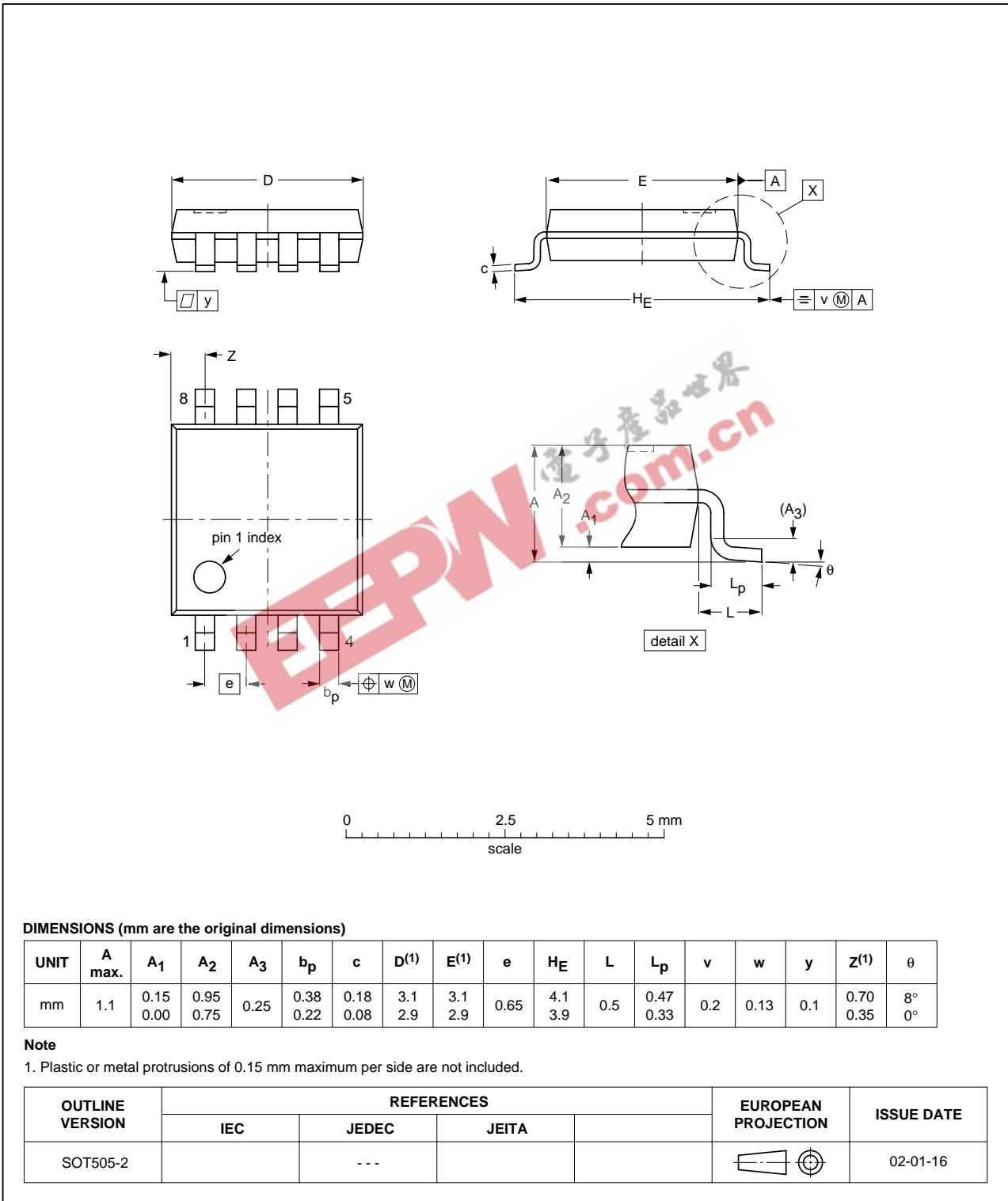


Fig 7. Package outline TSSOP8

VSSOP8: plastic very thin shrink small outline package; 8 leads; body width 2.3 mm

SOT765-1

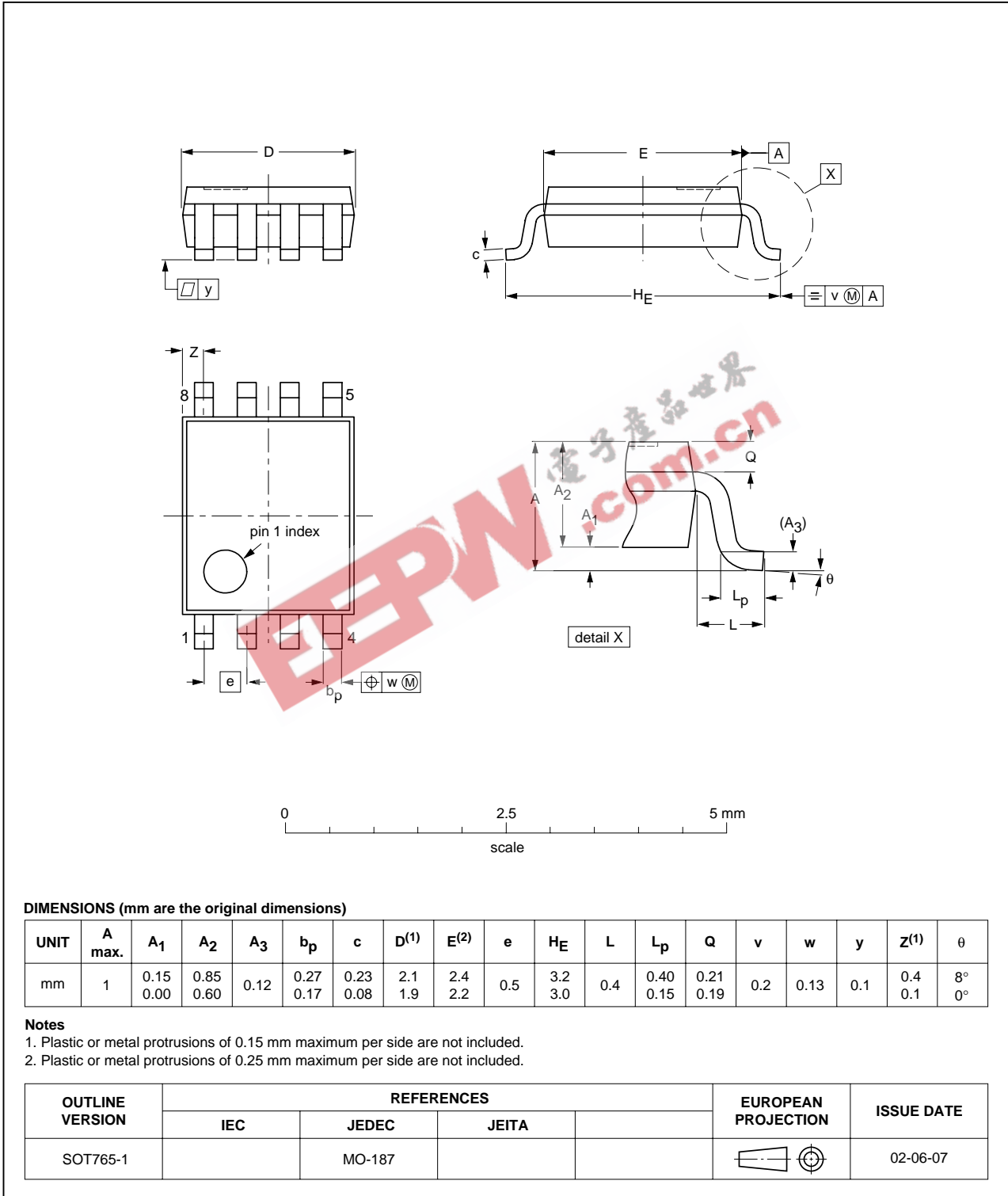


Fig 8. Package outline VSSOP8

## 15. Revision history

Table 12: Revision history

| Document ID      | Release date | Data sheet status | Change notice | Order number   | Supersedes |
|------------------|--------------|-------------------|---------------|----------------|------------|
| 74AHC_AHCT2G32_1 | 20040223     | Product data      | -             | 9397 750 12532 | -          |

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## 16. Data sheet status

| Level | Data sheet status <sup>[1]</sup> | Product status <sup>[2]</sup> <sup>[3]</sup> | Definition   |
|-------|----------------------------------|--|--|
| I     | Objective data                   | Development                                  | This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice.  |
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[3] For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

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