

# 74HC158

## Quad 2-input multiplexer; inverting

Rev. 4 — 23 December 2015

Product data sheet

### 1. General description

The 74HC158 is a high-speed Si-gate CMOS device and is pin compatible with low power Schottky TTL (LSTTL). The 74HC158 is specified in compliance with JEDEC standard no. 7A.

The 74HC158 is a quad 2-input multiplexer which select 4 bits of data from two sources and are controlled by a common data select input (S). The four outputs present the selected data in the inverted form. The enable input ( $\bar{E}$ ) is active LOW.

When  $\bar{E}$  is HIGH, all the outputs ( $1\bar{Y}$  to  $4\bar{Y}$ ) are forced HIGH regardless of all other input conditions.

Moving the data from two groups of registers to four common output buses is a common use of the 74HC158. The state of S determines the particular register from which the data comes. It can also be used as a function generator.

The device is useful for implementing highly irregular logic by generating any four of the 16 different functions of two variables with one variable common.

The 74HC158 is the logic implementation of a 4-pole, 2-position switch, where the position of the switch is determined by the logic levels applied to S.

The logic equations for the output are:

$$1\bar{Y} = \bar{E} \cdot (1I1.S + 1I0.\bar{S})$$

$$2\bar{Y} = \bar{E} \cdot (2I1.S + 2I0.\bar{S})$$

$$3\bar{Y} = \bar{E} \cdot (3I1.S + 3I0.\bar{S})$$

$$4\bar{Y} = \bar{E} \cdot (4I1.S + 4I0.\bar{S})$$

The 74HC158 is identical to the 74HC157 but has inverting outputs.

### 2. Features and benefits

- Low-power dissipation
- Inverting data path
- Complies with JEDEC standard no. 7A
- ESD protection:
  - ◆ HBM JESD22-A114F exceeds 2 000 V
  - ◆ MM JESD22-A115-A exceeds 200 V
- Multiple package options
- Specified from  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$  and  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$

3. Ordering information

Table 1. Ordering information

| Type number | Package           |      |                                                               | Version  |
|-------------|-------------------|------|---------------------------------------------------------------|----------|
|             | Temperature range | Name | Description                                                   |          |
| 74HC158D    | −40 °C to +125 °C | SO16 | plastic small outline package; 16 leads;<br>body width 3.9 mm | SOT109-1 |

4. Functional diagram

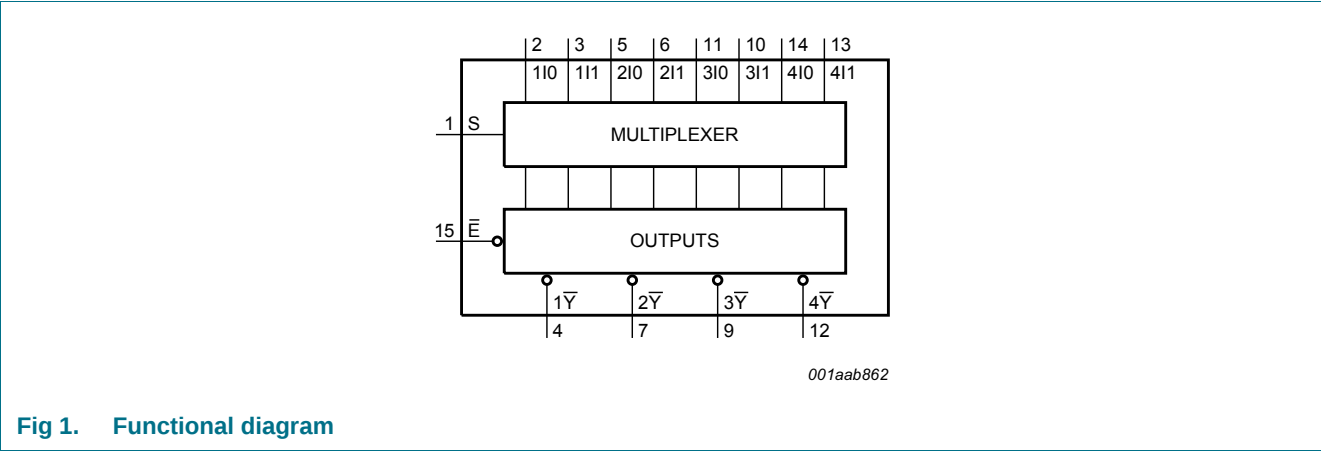


Fig 1. Functional diagram

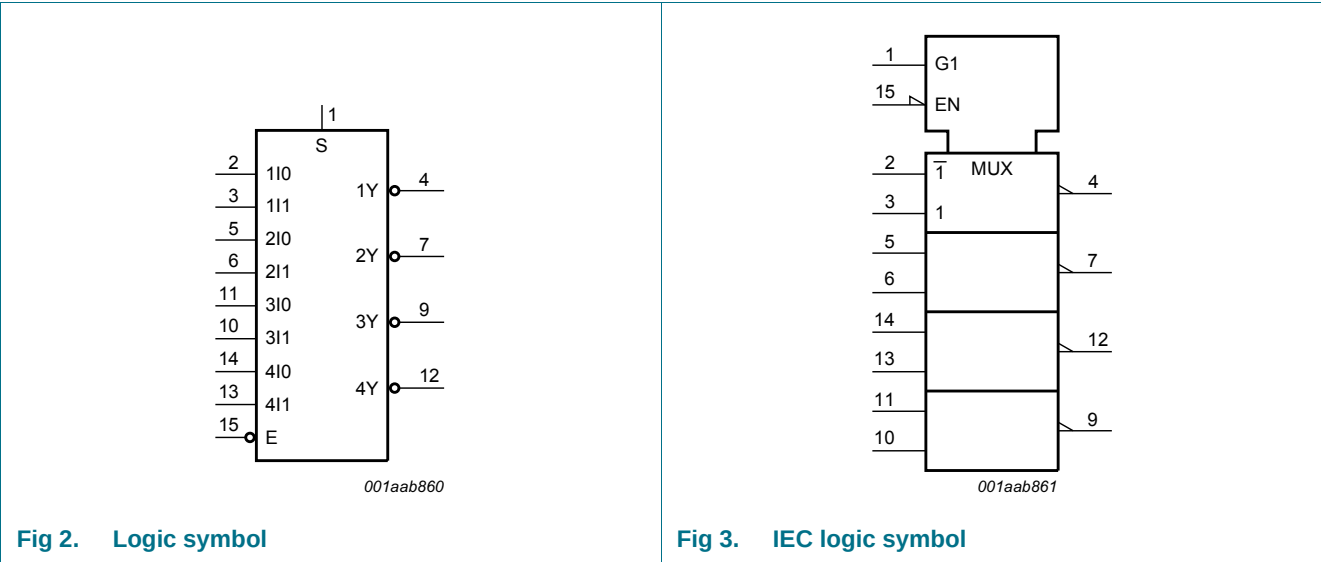


Fig 2. Logic symbol

Fig 3. IEC logic symbol

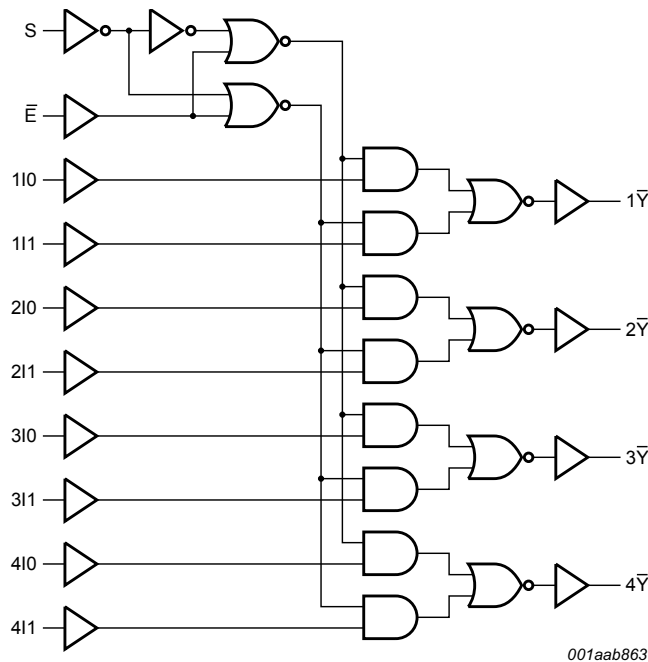


Fig 4. Logic diagram

5. Pinning information

5.1 Pinning

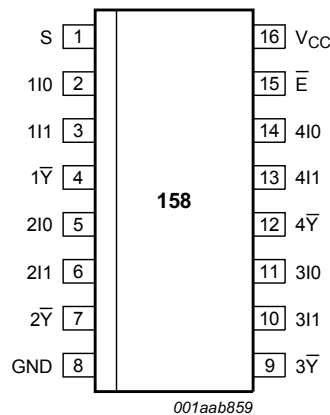


Fig 5. Pin configuration

5.2 Pin description

Table 2. Pin description

| Symbol          | Pin | Description                |
|-----------------|-----|----------------------------|
| S               | 1   | common data select input   |
| 1I0             | 2   | data input 1 from source 0 |
| 1I1             | 3   | data input 1 from source 1 |
| 1Y              | 4   | multiplexer output 1       |
| 2I0             | 5   | data input 2 from source 0 |
| 2I1             | 6   | data input 2 from source 1 |
| 2Y              | 7   | multiplexer output 2       |
| GND             | 8   | ground (0 V)               |
| 3Y              | 9   | multiplexer output 3       |
| 3I1             | 10  | data input 3 from source 1 |
| 3I0             | 11  | data input 3 from source 0 |
| 4Y              | 12  | multiplexer output 4       |
| 4I1             | 13  | data input 4 from source 1 |
| 4I0             | 14  | data input 4 from source 0 |
| E               | 15  | enable input (active LOW)  |
| V <sub>CC</sub> | 16  | positive supply voltage    |

6. Functional description

6.1 Function table

Table 3. Function<sup>[1]</sup>

| Control |   | Input |     | Output |
|---------|---|-------|-----|--------|
| E       | S | nI0   | nI1 | nY     |
| H       | X | X     | X   | H      |
| L       | L | L     | X   | H      |
|         |   | H     | X   | L      |
|         | H | X     | L   | H      |
|         |   | X     | H   | L      |

[1] H = HIGH voltage level;  
L = LOW voltage level;  
X = don't care.

7. Limiting values

Table 4. 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 <sub>CC</sub>  | supply voltage          |                                                                     | −0.5 | +7   | V    |
| I <sub>IK</sub>  | input clamping current  | V <sub>I</sub> < −0.5 V or V <sub>I</sub> > V <sub>CC</sub> + 0.5 V | -    | ±20  | mA   |
| I <sub>OK</sub>  | output clamping current | V <sub>O</sub> < −0.5 V or V <sub>O</sub> > V <sub>CC</sub> + 0.5 V | -    | ±20  | mA   |
| I <sub>O</sub>   | output current          | V <sub>O</sub> = −0.5 V to V <sub>CC</sub> + 0.5 V                  | -    | ±25  | mA   |
| I <sub>CC</sub>  | supply current          |                                                                     | -    | +50  | mA   |
| I <sub>GND</sub> | ground current          |                                                                     | −50  | -    | mA   |
| T <sub>stg</sub> | storage temperature     |                                                                     | −65  | +150 | °C   |
| P <sub>tot</sub> | total power dissipation | T <sub>amb</sub> = −40 °C to +125 °C                                |      |      |      |
|                  |                         | SO16 package [1]                                                    | -    | 500  | mW   |

[1] Above 70 °C: P<sub>tot</sub> derates linearly with 8 mW/K.

8. Recommended operating conditions

Table 5. Recommended operating conditions

| Symbol           | Parameter                           | Conditions              | Min | Typ  | Max             | Unit |
|------------------|-------------------------------------|-------------------------|-----|------|-----------------|------|
| V <sub>CC</sub>  | supply voltage                      |                         | 2.0 | 5.0  | 6.0             | V    |
| V <sub>I</sub>   | input voltage                       |                         | 0   | -    | V <sub>CC</sub> | V    |
| V <sub>O</sub>   | output voltage                      |                         | 0   | -    | V <sub>CC</sub> | V    |
| T <sub>amb</sub> | ambient temperature                 |                         | −40 | -    | +125            | °C   |
| Δt/ΔV            | input transition rise and fall rate | V <sub>CC</sub> = 2.0 V | -   | -    | 625             | ns/V |
|                  |                                     | V <sub>CC</sub> = 4.5 V | -   | 1.67 | 139             | ns/V |
|                  |                                     | V <sub>CC</sub> = 6.0 V | -   | -    | 83              | ns/V |

## 9. Static characteristics

**Table 6. Static characteristics**

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> = 2.0 V                                                                | 1.5  | 1.2  | -    | V    |
|                                           |                           | V <sub>CC</sub> = 4.5 V                                                                | 3.15 | 2.4  | -    | V    |
|                                           |                           | V <sub>CC</sub> = 6.0 V                                                                | 4.2  | 3.2  | -    | V    |
| V <sub>IL</sub>                           | LOW-level input voltage   | V <sub>CC</sub> = 2.0 V                                                                | -    | 0.8  | 0.5  | V    |
|                                           |                           | V <sub>CC</sub> = 4.5 V                                                                | -    | 2.1  | 1.35 | V    |
|                                           |                           | V <sub>CC</sub> = 6.0 V                                                                | -    | 2.8  | 1.8  | 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> = -20 µA; V <sub>CC</sub> = 2.0 V                                       | 1.9  | 2.0  | -    | V    |
|                                           |                           | I <sub>O</sub> = -20 µA; V <sub>CC</sub> = 4.5 V                                       | 4.4  | 4.5  | -    | V    |
|                                           |                           | I <sub>O</sub> = -20 µA; V <sub>CC</sub> = 6.0 V                                       | 5.9  | 6.0  | -    | V    |
|                                           |                           | I <sub>O</sub> = -4 mA; V <sub>CC</sub> = 4.5 V                                        | 3.98 | 4.32 | -    | V    |
|                                           |                           | I <sub>O</sub> = -5.2 mA; V <sub>CC</sub> = 6.0 V                                      | 5.48 | 5.81 | -    | 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> = 20 µA; V <sub>CC</sub> = 2.0 V                                        | -    | 0    | 0.1  | V    |
|                                           |                           | I <sub>O</sub> = 20 µA; V <sub>CC</sub> = 4.5 V                                        | -    | 0    | 0.1  | V    |
|                                           |                           | I <sub>O</sub> = 20 µA; V <sub>CC</sub> = 6.0 V                                        | -    | 0    | 0.1  | V    |
|                                           |                           | I <sub>O</sub> = 4 mA; V <sub>CC</sub> = 4.5 V                                         | -    | 0.15 | 0.26 | V    |
|                                           |                           | I <sub>O</sub> = 5.2 mA; V <sub>CC</sub> = 6.0 V                                       | -    | 0.16 | 0.26 | V    |
| I <sub>I</sub>                            | input leakage current     | V <sub>I</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 6.0 V                       | -    | -    | ±0.1 | µA   |
| I <sub>CC</sub>                           | supply current            | V <sub>I</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 6.0 V | -    | -    | 8.0  | µA   |
| C <sub>I</sub>                            | input capacitance         |                                                                                        | -    | 3.5  | -    | pF   |
| <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> = 4.5 V                                                                | 3.15 | -    | -    | V    |
|                                           |                           | V <sub>CC</sub> = 6.0 V                                                                | 4.2  | -    | -    | V    |
| V <sub>IL</sub>                           | LOW-level input voltage   | V <sub>CC</sub> = 2.0 V                                                                | -    | -    | 0.5  | V    |
|                                           |                           | V <sub>CC</sub> = 4.5 V                                                                | -    | -    | 1.35 | V    |
|                                           |                           | V <sub>CC</sub> = 6.0 V                                                                | -    | -    | 1.8  | 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> = -20 µA; V <sub>CC</sub> = 2.0 V                                       | 1.9  | -    | -    | V    |
|                                           |                           | I <sub>O</sub> = -20 µA; V <sub>CC</sub> = 4.5 V                                       | 4.4  | -    | -    | V    |
|                                           |                           | I <sub>O</sub> = -20 µA; V <sub>CC</sub> = 6.0 V                                       | 5.9  | -    | -    | V    |
|                                           |                           | I <sub>O</sub> = -4 mA; V <sub>CC</sub> = 4.5 V                                        | 3.84 | -    | -    | V    |
|                                           |                           | I <sub>O</sub> = -5.2 mA; V <sub>CC</sub> = 6.0 V                                      | 5.34 | -    | -    | V    |

**Table 6.** Static characteristics ...continued

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

| Symbol                                                                                        | Parameter                 | Conditions                                                         | Min  | Typ | Max       | Unit          |
|-----------------------------------------------------------------------------------------------|---------------------------|--------------------------------------------------------------------|------|-----|-----------|---------------|
| $V_{OL}$                                                                                      | LOW-level output voltage  | $V_I = V_{IH}$ or $V_{IL}$                                         |      |     |           |               |
|                                                                                               |                           | $I_O = 20\ \mu\text{A}; V_{CC} = 2.0\ \text{V}$                    | -    | -   | 0.1       | V             |
|                                                                                               |                           | $I_O = 20\ \mu\text{A}; V_{CC} = 4.5\ \text{V}$                    | -    | -   | 0.1       | V             |
|                                                                                               |                           | $I_O = 20\ \mu\text{A}; V_{CC} = 6.0\ \text{V}$                    | -    | -   | 0.1       | V             |
|                                                                                               |                           | $I_O = 4\ \text{mA}; V_{CC} = 4.5\ \text{V}$                       | -    | -   | 0.33      | V             |
|                                                                                               |                           | $I_O = 5.2\ \text{mA}; V_{CC} = 6.0\ \text{V}$                     | -    | -   | 0.33      | V             |
| $I_I$                                                                                         | input leakage current     | $V_I = V_{CC}$ or GND; $V_{CC} = 6.0\ \text{V}$                    | -    | -   | $\pm 1.0$ | $\mu\text{A}$ |
| $I_{CC}$                                                                                      | supply current            | $V_I = V_{CC}$ or GND; $I_O = 0\ \text{A}; V_{CC} = 6.0\ \text{V}$ | -    | -   | 80        | $\mu\text{A}$ |
| <b><math>T_{\text{amb}} = -40\ ^\circ\text{C}</math> to <math>+125\ ^\circ\text{C}</math></b> |                           |                                                                    |      |     |           |               |
| $V_{IH}$                                                                                      | HIGH-level input voltage  | $V_{CC} = 2.0\ \text{V}$                                           | 1.5  | -   | -         | V             |
|                                                                                               |                           | $V_{CC} = 4.5\ \text{V}$                                           | 3.15 | -   | -         | V             |
|                                                                                               |                           | $V_{CC} = 6.0\ \text{V}$                                           | 4.2  | -   | -         | V             |
| $V_{IL}$                                                                                      | LOW-level input voltage   | $V_{CC} = 2.0\ \text{V}$                                           | -    | -   | 0.5       | V             |
|                                                                                               |                           | $V_{CC} = 4.5\ \text{V}$                                           | -    | -   | 1.35      | V             |
|                                                                                               |                           | $V_{CC} = 6.0\ \text{V}$                                           | -    | -   | 1.8       | V             |
| $V_{OH}$                                                                                      | HIGH-level output voltage | $V_I = V_{IH}$ or $V_{IL}$                                         |      |     |           |               |
|                                                                                               |                           | $I_O = -20\ \mu\text{A}; V_{CC} = 2.0\ \text{V}$                   | 1.9  | -   | -         | V             |
|                                                                                               |                           | $I_O = -20\ \mu\text{A}; V_{CC} = 4.5\ \text{V}$                   | 4.4  | -   | -         | V             |
|                                                                                               |                           | $I_O = -20\ \mu\text{A}; V_{CC} = 6.0\ \text{V}$                   | 5.9  | -   | -         | V             |
|                                                                                               |                           | $I_O = -4\ \text{mA}; V_{CC} = 4.5\ \text{V}$                      | 3.7  | -   | -         | V             |
|                                                                                               |                           | $I_O = -5.2\ \text{mA}; V_{CC} = 6.0\ \text{V}$                    | 5.2  | -   | -         | V             |
| $V_{OL}$                                                                                      | LOW-level output voltage  | $V_I = V_{IH}$ or $V_{IL}$                                         |      |     |           |               |
|                                                                                               |                           | $I_O = 20\ \mu\text{A}; V_{CC} = 2.0\ \text{V}$                    | -    | -   | 0.1       | V             |
|                                                                                               |                           | $I_O = 20\ \mu\text{A}; V_{CC} = 4.5\ \text{V}$                    | -    | -   | 0.1       | V             |
|                                                                                               |                           | $I_O = 20\ \mu\text{A}; V_{CC} = 6.0\ \text{V}$                    | -    | -   | 0.1       | V             |
|                                                                                               |                           | $I_O = 4\ \text{mA}; V_{CC} = 4.5\ \text{V}$                       | -    | -   | 0.4       | V             |
|                                                                                               |                           | $I_O = 5.2\ \text{mA}; V_{CC} = 6.0\ \text{V}$                     | -    | -   | 0.4       | V             |
| $I_I$                                                                                         | input leakage current     | $V_I = V_{CC}$ or GND; $V_{CC} = 6.0\ \text{V}$                    | -    | -   | $\pm 1.0$ | $\mu\text{A}$ |
| $I_{CC}$                                                                                      | supply current            | $V_I = V_{CC}$ or GND; $I_O = 0\ \text{A}; V_{CC} = 6.0\ \text{V}$ | -    | -   | 160       | $\mu\text{A}$ |

## 10. Dynamic characteristics

**Table 7. Dynamic characteristics**

$GND = 0\text{ V}$ ;  $t_r = t_f = 6\text{ ns}$ ;  $C_L = 50\text{ pF}$ ; for test circuit see [Figure 8](#).

| Symbol                                                       | Parameter                     | Conditions                                                                       | Min | Typ | Max | Unit |
|--------------------------------------------------------------|-------------------------------|----------------------------------------------------------------------------------|-----|-----|-----|------|
| <b><math>T_{amb} = 25\text{ °C}</math></b>                   |                               |                                                                                  |     |     |     |      |
| $t_{pd}$                                                     | propagation delay             | nI0, nI1 to n $\overline{Y}$ ; see <a href="#">Figure 6</a> <sup>[1]</sup>       |     |     |     |      |
|                                                              |                               | $V_{CC} = 2.0\text{ V}$                                                          | -   | 41  | 125 | ns   |
|                                                              |                               | $V_{CC} = 4.5\text{ V}$                                                          | -   | 15  | 25  | ns   |
|                                                              |                               | $V_{CC} = 6.0\text{ V}$                                                          | -   | 12  | 21  | ns   |
|                                                              |                               | $V_{CC} = 5.0\text{ V}$ ; $C_L = 15\text{ pF}$                                   | -   | 12  | -   | ns   |
|                                                              |                               | $\overline{E}$ to n $\overline{Y}$ ; see <a href="#">Figure 7</a> <sup>[1]</sup> |     |     |     |      |
|                                                              |                               | $V_{CC} = 2.0\text{ V}$                                                          | -   | 47  | 145 | ns   |
|                                                              |                               | $V_{CC} = 4.5\text{ V}$                                                          | -   | 17  | 29  | ns   |
|                                                              |                               | $V_{CC} = 6.0\text{ V}$                                                          | -   | 14  | 25  | ns   |
|                                                              |                               | $V_{CC} = 5.0\text{ V}$ ; $C_L = 15\text{ pF}$                                   | -   | 14  | -   | ns   |
|                                                              |                               | S to n $\overline{Y}$ ; see <a href="#">Figure 6</a> <sup>[1]</sup>              |     |     |     |      |
|                                                              |                               | $V_{CC} = 2.0\text{ V}$                                                          | -   | 47  | 145 | ns   |
|                                                              |                               | $V_{CC} = 4.5\text{ V}$                                                          | -   | 17  | 29  | ns   |
|                                                              |                               | $V_{CC} = 6.0\text{ V}$                                                          | -   | 14  | 25  | ns   |
|                                                              |                               | $V_{CC} = 5.0\text{ V}$ ; $C_L = 15\text{ pF}$                                   | -   | 14  | -   | ns   |
| $t_t$                                                        | transition time               | see <a href="#">Figure 6</a> and <a href="#">7</a> <sup>[2]</sup>                |     |     |     |      |
|                                                              |                               | $V_{CC} = 2.0\text{ V}$                                                          | -   | 19  | 75  | ns   |
|                                                              |                               | $V_{CC} = 4.5\text{ V}$                                                          | -   | 7   | 15  | ns   |
|                                                              |                               | $V_{CC} = 6.0\text{ V}$                                                          | -   | 6   | 13  | ns   |
| $C_{PD}$                                                     | power dissipation capacitance | per multiplexer; $V_I = GND$ to $V_{CC}$ <sup>[3]</sup>                          | -   | 40  | -   | pF   |
| <b><math>T_{amb} = -40\text{ °C to }+85\text{ °C}</math></b> |                               |                                                                                  |     |     |     |      |
| $t_{pd}$                                                     | propagation delay             | nI0, nI1 to n $\overline{Y}$ ; see <a href="#">Figure 6</a> <sup>[1]</sup>       |     |     |     |      |
|                                                              |                               | $V_{CC} = 2.0\text{ V}$                                                          | -   | -   | 155 | ns   |
|                                                              |                               | $V_{CC} = 4.5\text{ V}$                                                          | -   | -   | 31  | ns   |
|                                                              |                               | $V_{CC} = 6.0\text{ V}$                                                          | -   | -   | 26  | ns   |
|                                                              |                               | $\overline{E}$ to n $\overline{Y}$ ; see <a href="#">Figure 7</a> <sup>[1]</sup> |     |     |     |      |
|                                                              |                               | $V_{CC} = 2.0\text{ V}$                                                          | -   | -   | 180 | ns   |
|                                                              |                               | $V_{CC} = 4.5\text{ V}$                                                          | -   | -   | 36  | ns   |
|                                                              |                               | $V_{CC} = 6.0\text{ V}$                                                          | -   | -   | 31  | ns   |
|                                                              |                               | S to n $\overline{Y}$ ; see <a href="#">Figure 6</a> <sup>[1]</sup>              |     |     |     |      |
|                                                              |                               | $V_{CC} = 2.0\text{ V}$                                                          | -   | -   | 180 | ns   |
|                                                              |                               | $V_{CC} = 4.5\text{ V}$                                                          | -   | -   | 36  | ns   |
|                                                              |                               | $V_{CC} = 6.0\text{ V}$                                                          | -   | -   | 31  | ns   |
| $t_t$                                                        | transition time               | see <a href="#">Figure 6</a> and <a href="#">7</a> <sup>[2]</sup>                |     |     |     |      |
|                                                              |                               | $V_{CC} = 2.0\text{ V}$                                                          | -   | -   | 95  | ns   |
|                                                              |                               | $V_{CC} = 4.5\text{ V}$                                                          | -   | -   | 19  | ns   |
|                                                              |                               | $V_{CC} = 6.0\text{ V}$                                                          | -   | -   | 16  | ns   |

**Table 7. Dynamic characteristics ...continued**

$GND = 0\text{ V}$ ;  $t_r = t_f = 6\text{ ns}$ ;  $C_L = 50\text{ pF}$ ; for test circuit see [Figure 8](#).

| Symbol                                                               | Parameter         | Conditions                                                                                     | Min | Typ | Max | Unit |
|----------------------------------------------------------------------|-------------------|------------------------------------------------------------------------------------------------|-----|-----|-----|------|
| <b><math>T_{\text{amb}} = -40\text{ °C to }+125\text{ °C}</math></b> |                   |                                                                                                |     |     |     |      |
| $t_{\text{pd}}$                                                      | propagation delay | nI0, nI1 to n $\bar{Y}$ ; see <a href="#">Figure 6</a> <span style="float: right;">[1]</span>  |     |     |     |      |
|                                                                      |                   | $V_{\text{CC}} = 2.0\text{ V}$                                                                 | -   | -   | 190 | ns   |
|                                                                      |                   | $V_{\text{CC}} = 4.5\text{ V}$                                                                 | -   | -   | 38  | ns   |
|                                                                      |                   | $V_{\text{CC}} = 6.0\text{ V}$                                                                 | -   | -   | 32  | ns   |
|                                                                      |                   | $\bar{E}$ to n $\bar{Y}$ ; see <a href="#">Figure 7</a> <span style="float: right;">[1]</span> |     |     |     |      |
|                                                                      |                   | $V_{\text{CC}} = 2.0\text{ V}$                                                                 | -   | -   | 220 | ns   |
|                                                                      |                   | $V_{\text{CC}} = 4.5\text{ V}$                                                                 | -   | -   | 44  | ns   |
|                                                                      |                   | $V_{\text{CC}} = 6.0\text{ V}$                                                                 | -   | -   | 38  | ns   |
|                                                                      |                   | S to n $\bar{Y}$ ; see <a href="#">Figure 6</a> <span style="float: right;">[1]</span>         |     |     |     |      |
|                                                                      |                   | $V_{\text{CC}} = 2.0\text{ V}$                                                                 | -   | -   | 220 | ns   |
|                                                                      |                   | $V_{\text{CC}} = 4.5\text{ V}$                                                                 | -   | -   | 44  | ns   |
|                                                                      |                   | $V_{\text{CC}} = 6.0\text{ V}$                                                                 | -   | -   | 38  | ns   |
| $t_t$                                                                | transition time   | see <a href="#">Figure 6</a> and <a href="#">7</a> <span style="float: right;">[2]</span>      |     |     |     |      |
|                                                                      |                   | $V_{\text{CC}} = 2.0\text{ V}$                                                                 | -   | -   | 110 | ns   |
|                                                                      |                   | $V_{\text{CC}} = 4.5\text{ V}$                                                                 | -   | -   | 22  | ns   |
|                                                                      |                   | $V_{\text{CC}} = 6.0\text{ V}$                                                                 | -   | -   | 19  | ns   |

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

[2]  $t_t$  is the same as  $t_{\text{THL}}$  and  $t_{\text{TLH}}$ .

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

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

$f_i$  = input frequency in MHz;

$f_o$  = output frequency in MHz;

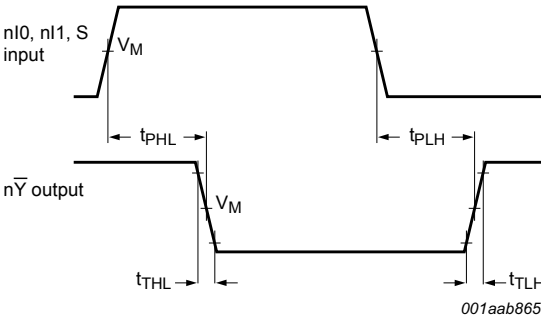
$C_L$  = output load capacitance in pF;

$V_{\text{CC}}$  = supply voltage in V;

$N$  = number of inputs switching;

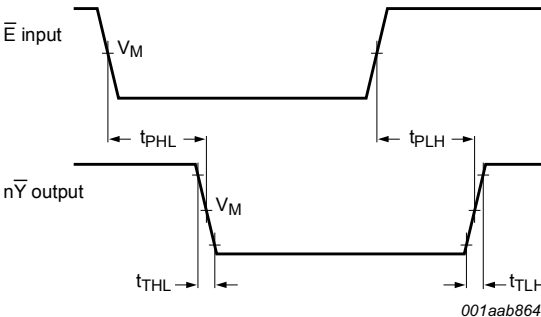
$\Sigma(C_L \times V_{\text{CC}}^2 \times f_o)$  = sum of outputs.

11. Waveforms



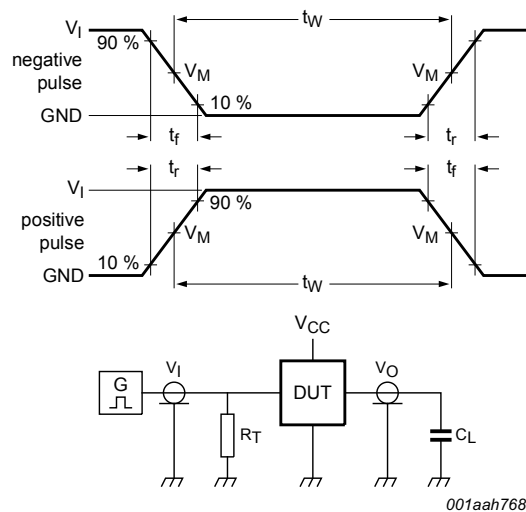
$V_M = 0.5V_{CC}$ .

Fig 6. Waveforms showing the data input (nI0, nI1) to output (nY) propagation delays and the output transition times



$V_M = 0.5V_{CC}$ .

Fig 7. Waveforms showing the enable input (E) to output (nY) propagation delays and the output transition times



Test data is given in [Table 8](#).

Definitions 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 8. Test circuit for measuring switching times**

**Table 8. Test data**

| Type    | Input    |            | Load         | Test               |
|---------|----------|------------|--------------|--------------------|
|         | $V_I$    | $t_r, t_f$ | $C_L$        |                    |
| 74HC158 | $V_{CC}$ | 6.0 ns     | 15 pF, 50 pF | $t_{PLH}, t_{PHL}$ |

12. Package outline

SO16: plastic small outline package; 16 leads; body width 3.9 mm

SOT109-1

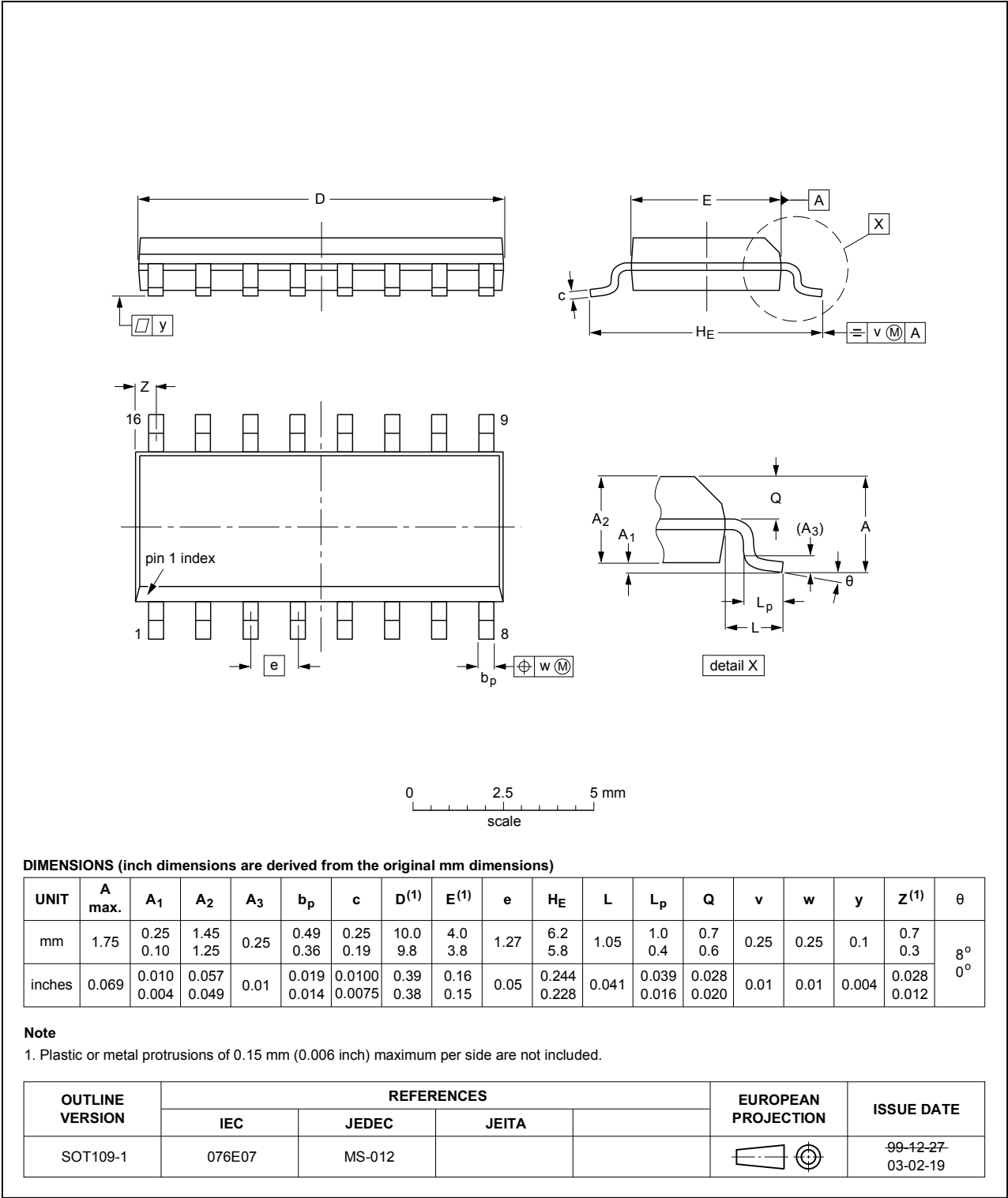


Fig 9. Package outline SOT109-1 (SO16)

## 13. Abbreviations

Table 9. Abbreviations

| Acronym | Abbreviation                                   |
|---------|------------------------------------------------|
| CMOS    | Complementary Metal Oxide Semiconductor        |
| DUT     | Device Under Test                              |
| ESD     | ElectroStatic Discharge                        |
| HBM     | Human Body Model                               |
| LSTTL   | Low-power Schottky Transistor-Transistor Logic |
| MM      | Machine Model                                  |

## 14. Revision history

Table 10. Revision history

| Document ID         | Release date                                                                                                                                                                                                                                                                   | Data sheet status     | Change notice | Supersedes          |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------------|---------------------|
| 74HC158 v.4         | 20151223                                                                                                                                                                                                                                                                       | Product data sheet    | -             | 74HC158 v.3         |
| Modifications:      | <ul style="list-style-type: none"> <li>Type number 74HC158N (SOT38-4) removed.</li> </ul>                                                                                                                                                                                      |                       |               |                     |
| 74HC158 v.3         | 20041112                                                                                                                                                                                                                                                                       | Product data sheet    | -             | 74HC_HCT158_CNV v.2 |
| Modifications:      | <ul style="list-style-type: none"> <li>The format of this data sheet has been redesigned to comply with the current presentation and information standard of Philips Semiconductors.</li> <li>Removed type number 74HCT158.</li> <li>Inserted family specification.</li> </ul> |                       |               |                     |
| 74HC_HCT158_CNV v.2 | 19970827                                                                                                                                                                                                                                                                       | Product specification | -             | 74HC_HCT158 v.1     |
| 74HC_HCT158 v.1     | 19901201                                                                                                                                                                                                                                                                       | Product specification | -             | -                   |

## 15. Legal information

### 15.1 Data sheet status

| Document status <sup>[1][2]</sup> | Product status <sup>[3]</sup> | 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.                                     |

[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL <http://www.nexperia.com>.

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17. Contents

1 General description . . . . . 1

2 Features and benefits . . . . . 1

3 Ordering information . . . . . 2

4 Functional diagram . . . . . 2

5 Pinning information . . . . . 3

5.1 Pinning . . . . . 3

5.2 Pin description . . . . . 4

6 Functional description . . . . . 4

6.1 Function table . . . . . 4

7 Limiting values . . . . . 5

8 Recommended operating conditions . . . . . 5

9 Static characteristics . . . . . 6

10 Dynamic characteristics . . . . . 8

11 Waveforms . . . . . 10

12 Package outline . . . . . 12

13 Abbreviations . . . . . 13

14 Revision history . . . . . 13

15 Legal information . . . . . 14

15.1 Data sheet status . . . . . 14

15.2 Definitions . . . . . 14

15.3 Disclaimers . . . . . 14

15.4 Trademarks . . . . . 15

16 Contact information . . . . . 15

17 Contents . . . . . 16

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