

# 74HC151; 74HCT151

## 8-input multiplexer

Rev. 4 — 11 February 2013

Product data sheet

### 1. General description

The 74HC151; 74HCT151 are 8-bit multiplexer with eight binary inputs (I0 to I7), three select inputs (S0 to S2) and an enable input ( $\bar{E}$ ). One of the eight binary inputs is selected by the select inputs and routed to the complementary outputs (Y and  $\bar{Y}$ ). A HIGH on  $\bar{E}$  forces the output Y LOW and output  $\bar{Y}$  HIGH. Inputs also include clamp diodes that enable the use of current limiting resistors to interface inputs to voltages in excess of  $V_{CC}$ .

### 2. Features and benefits

- Input levels:
  - ◆ For 74HC151: CMOS level
  - ◆ For 74HCT151: TTL level
- Low-power dissipation
- Non-inverting data path
- Specified in compliance 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  $-40\text{ }^{\circ}\text{C}$  to  $+85\text{ }^{\circ}\text{C}$  and from  $-40\text{ }^{\circ}\text{C}$  to  $+125\text{ }^{\circ}\text{C}$

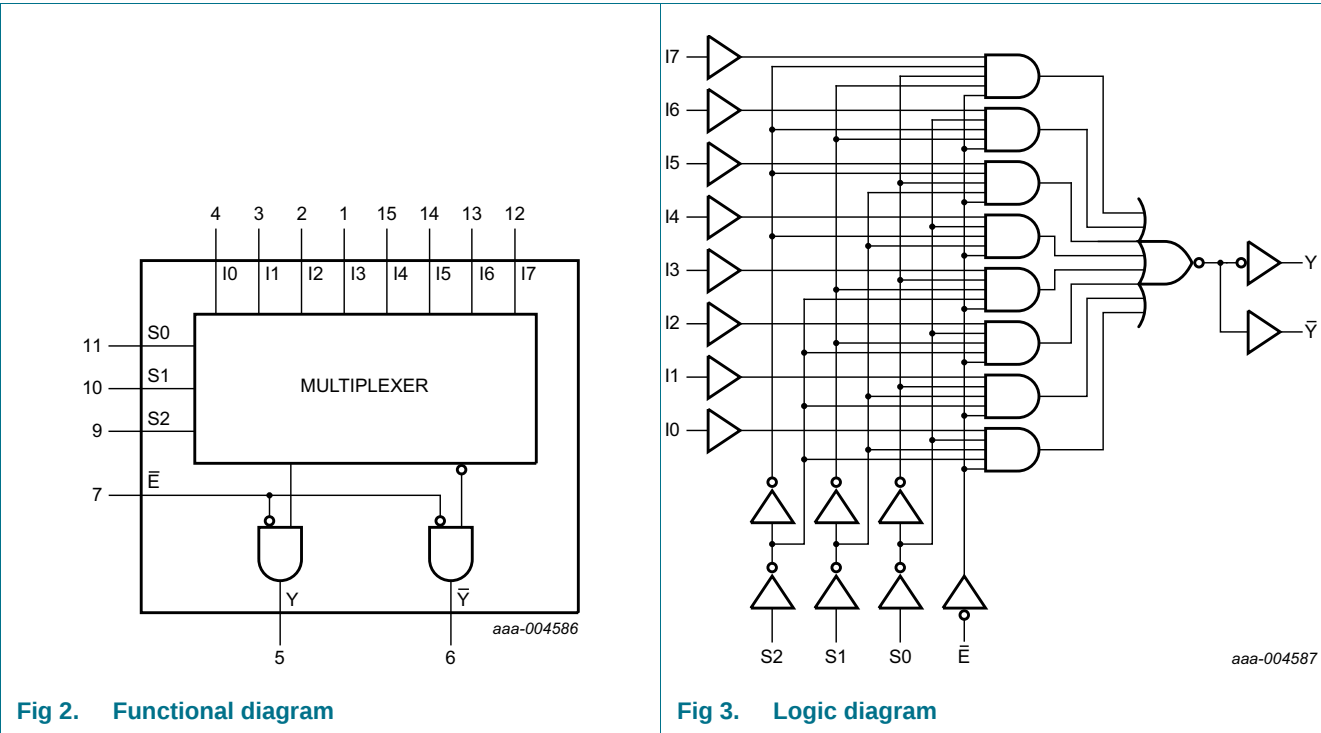
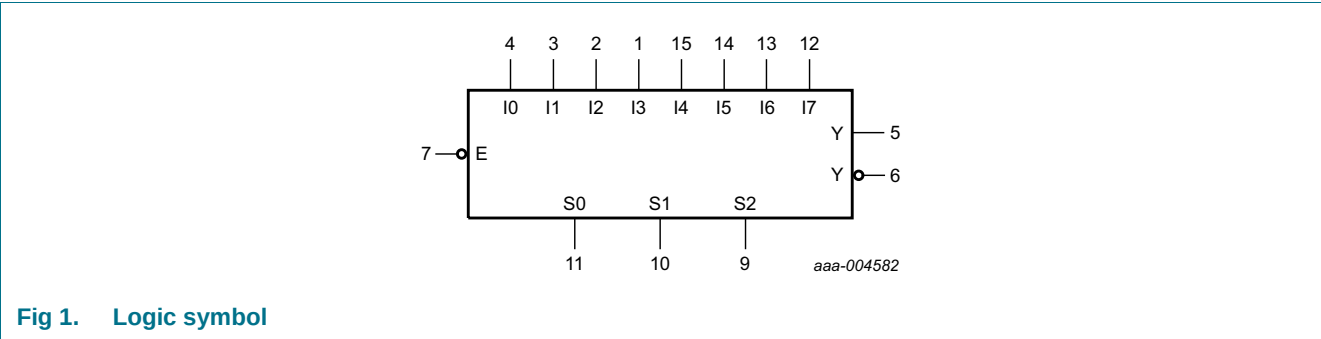
### 3. Ordering information

Table 1. Ordering information

| Type number | Package                                                         |         |                                                                        |          |
|-------------|-----------------------------------------------------------------|---------|------------------------------------------------------------------------|----------|
|             | Temperature range                                               | Name    | Description                                                            | Version  |
| 74HC151N    | $-40\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$ | DIP16   | plastic dual in-line package; 16 leads (300 mil)                       | SOT38-4  |
| 74HCT151N   |                                                                 |         |                                                                        |          |
| 74HC151D    | $-40\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$ | SO16    | plastic small outline package; 16 leads; body width 3.9 mm             | SOT109-1 |
| 74HCT151D   |                                                                 |         |                                                                        |          |
| 74HC151DB   | $-40\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$ | SSOP16  | plastic shrink small outline package; 16 leads; body width 5.3 mm      | SOT338-1 |
| 74HCT151DB  |                                                                 |         |                                                                        |          |
| 74HC151PW   | $-40\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$ | TSSOP16 | plastic thin shrink small outline package; 16 leads; body width 4.4 mm | SOT403-1 |
| 74HCT151PW  |                                                                 |         |                                                                        |          |



4. Functional diagram



5. Pinning information

5.1 Pinning

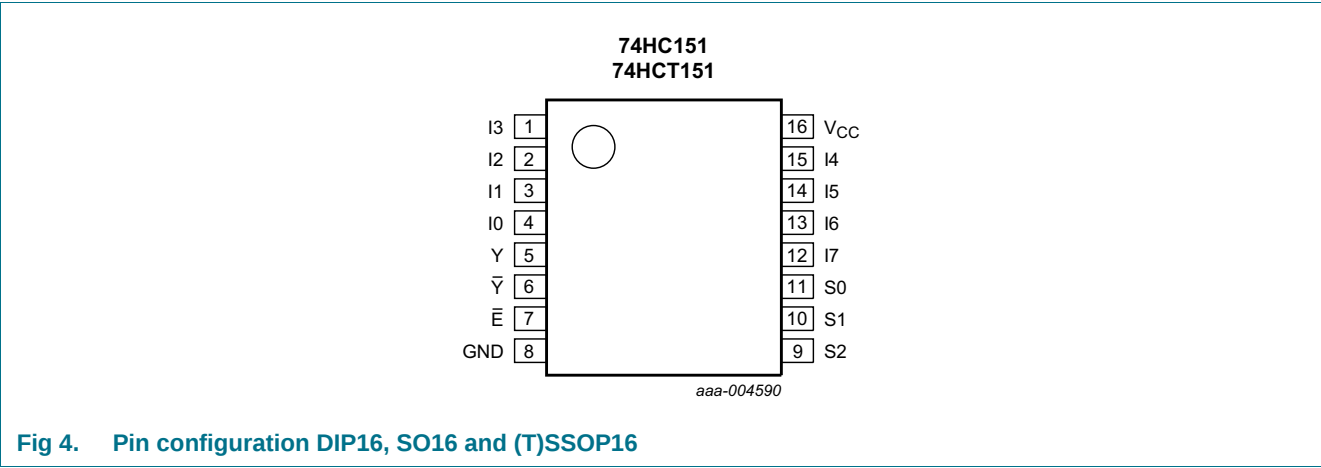


Fig 4. Pin configuration DIP16, SO16 and (T)SSOP16

5.2 Pin description

Table 2. Pin description

| Symbol     | Pin                        | Description                      |
|------------|----------------------------|----------------------------------|
| I0 to I7   | 4, 3, 2, 1, 15, 14, 13, 12 | data inputs                      |
| Y          | 5                          | multiplexer output               |
| Ȳ         | 6                          | complementary multiplexer output |
| Ē         | 7                          | enable input (active LOW)        |
| GND        | 8                          | ground (0 V)                     |
| S0, S1, S2 | 11, 10, 9                  | common data select inputs        |
| VCC        | 16                         | supply voltage                   |

## 6. Functional description

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

| Input          |    |    |    |    |    |    |    |    |    |    |    | Output         |   |
|----------------|----|----|----|----|----|----|----|----|----|----|----|----------------|---|
| $\overline{E}$ | S2 | S1 | S0 | I0 | I1 | I2 | I3 | I4 | I5 | I6 | I7 | $\overline{Y}$ | Y |
| H              | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | H              | L |
| L              | L  | L  | L  | L  | X  | X  | X  | X  | X  | X  | X  | H              | L |
| L              | L  | L  | L  | H  | X  | X  | X  | X  | X  | X  | X  | L              | H |
| L              | L  | L  | H  | X  | L  | X  | X  | X  | X  | X  | X  | H              | L |
| L              | L  | L  | H  | X  | H  | X  | X  | X  | X  | X  | X  | L              | H |
| L              | L  | H  | L  | X  | X  | L  | X  | X  | X  | X  | X  | H              | L |
| L              | L  | H  | L  | X  | X  | H  | X  | X  | X  | X  | X  | L              | H |
| L              | L  | H  | H  | X  | X  | X  | L  | X  | X  | X  | X  | H              | L |
| L              | L  | H  | H  | X  | X  | X  | H  | X  | X  | X  | X  | L              | H |
| L              | H  | L  | L  | X  | X  | X  | X  | L  | X  | X  | X  | H              | L |
| L              | H  | L  | L  | X  | X  | X  | X  | H  | X  | X  | X  | L              | H |
| L              | H  | L  | H  | X  | X  | X  | X  | X  | L  | X  | X  | H              | L |
| L              | H  | L  | H  | X  | X  | X  | X  | X  | H  | X  | X  | L              | H |
| L              | H  | H  | L  | X  | X  | X  | X  | X  | X  | L  | X  | H              | L |
| L              | H  | H  | L  | X  | X  | X  | X  | X  | X  | H  | X  | L              | H |
| L              | H  | H  | H  | X  | X  | X  | X  | X  | X  | X  | L  | H              | L |
| L              | H  | H  | H  | X  | X  | X  | X  | X  | X  | X  | H  | L              | H |

[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 |
|-----------|-------------------------|--------------------------------------------------------|------|----------|------|
| $V_{CC}$  | supply voltage          |                                                        | -0.5 | +7       | V    |
| $I_{IK}$  | input clamping current  | $V_I < -0.5\text{ V}$ or $V_I > V_{CC} + 0.5\text{ V}$ | -    | $\pm 20$ | mA   |
| $I_{OK}$  | output clamping current | $V_O < -0.5\text{ V}$ or $V_O > V_{CC} + 0.5\text{ V}$ | -    | $\pm 20$ | mA   |
| $I_O$     | output current          | $V_O = -0.5\text{ V}$ to $(V_{CC} + 0.5\text{ V})$     | -    | $\pm 25$ | mA   |
| $I_{CC}$  | supply current          |                                                        | -    | +50      | mA   |
| $I_{GND}$ | ground current          |                                                        | -    | -50      | mA   |
| $T_{stg}$ | storage temperature     |                                                        | -65  | +150     | °C   |

**Table 4.** Limiting values ...continued

In accordance with the Absolute Maximum Rating System (IEC 60134). Voltages are referenced to GND (ground = 0 V).

| Symbol           | Parameter               | Conditions                           | Min   | Max | Unit |
|------------------|-------------------------|--------------------------------------|-------|-----|------|
| P <sub>tot</sub> | total power dissipation | T <sub>amb</sub> = -40 °C to +125 °C |       |     |      |
|                  | DIP16 package           |                                      | [1] - | 750 | mW   |
|                  | SO16 package            |                                      | [2] - | 500 | mW   |
|                  | (T)SSOP16 package       |                                      | [3] - | 500 | mW   |

[1] For DIP16 package: P<sub>tot</sub> derates linearly with 12 mW/K above 70 °C.

[2] For SO16 package: P<sub>tot</sub> derates linearly with 8 mW/K above 70 °C.

[3] For SSOP16 and TSSOP16 packages: P<sub>tot</sub> derates linearly with 5.5 mW/K above 60 °C.

## 8. Recommended operating conditions

**Table 5.** Recommended operating conditions

Voltages are referenced to GND (ground = 0 V)

| Symbol           | Parameter                           | Conditions              | 74HC151 |      |                 | 74HCT151 |      |                 | Unit |
|------------------|-------------------------------------|-------------------------|---------|------|-----------------|----------|------|-----------------|------|
|                  |                                     |                         | Min     | Typ  | Max             | Min      | Typ  | Max             |      |
| V <sub>CC</sub>  | supply voltage                      |                         | 2.0     | 5.0  | 6.0             | 4.5      | 5.0  | 5.5             | V    |
| V <sub>I</sub>   | input voltage                       |                         | 0       | -    | V <sub>CC</sub> | 0        | -    | V <sub>CC</sub> | V    |
| V <sub>O</sub>   | output voltage                      |                         | 0       | -    | V <sub>CC</sub> | 0        | -    | V <sub>CC</sub> | V    |
| T <sub>amb</sub> | ambient temperature                 |                         | -40     | +25  | +125            | -40      | +25  | +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             | -        | 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                                                                             | T <sub>amb</sub> = 25 °C |      |      | T <sub>amb</sub> = –40 °C to +85 °C |      | T <sub>amb</sub> = –40 °C to +125 °C |      | Unit |
|-----------------|---------------------------|----------------------------------------------------------------------------------------|--------------------------|------|------|-------------------------------------|------|--------------------------------------|------|------|
|                 |                           |                                                                                        | Min                      | Typ  | Max  | Min                                 | Max  | Min                                  | Max  |      |
| 74HC151         |                           |                                                                                        |                          |      |      |                                     |      |                                      |      |      |
| V <sub>IH</sub> | HIGH-level input voltage  | V <sub>CC</sub> = 2.0 V                                                                | 1.5                      | 1.2  | -    | 1.5                                 | -    | 1.5                                  | -    | V    |
|                 |                           | V <sub>CC</sub> = 4.5 V                                                                | 3.15                     | 2.4  | -    | 3.15                                | -    | 3.15                                 | -    | V    |
|                 |                           | V <sub>CC</sub> = 6.0 V                                                                | 4.2                      | 3.2  | -    | 4.2                                 | -    | 4.2                                  | -    | V    |
| V <sub>IL</sub> | LOW-level input voltage   | V <sub>CC</sub> = 2.0 V                                                                | -                        | 0.8  | 0.5  | -                                   | 0.5  | -                                    | 0.5  | V    |
|                 |                           | V <sub>CC</sub> = 4.5 V                                                                | -                        | 2.1  | 1.35 | -                                   | 1.35 | -                                    | 1.35 | V    |
|                 |                           | V <sub>CC</sub> = 6.0 V                                                                | -                        | 2.8  | 1.8  | -                                   | 1.8  | -                                    | 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  | -    | 1.9                                 | -    | 1.9                                  | -    | V    |
|                 |                           | I <sub>O</sub> = –20 μA; V <sub>CC</sub> = 4.5 V                                       | 4.4                      | 4.5  | -    | 4.4                                 | -    | 4.4                                  | -    | V    |
|                 |                           | I <sub>O</sub> = –20 μA; V <sub>CC</sub> = 6.0 V                                       | 5.9                      | 6.0  | -    | 5.9                                 | -    | 5.9                                  | -    | V    |
|                 |                           | I <sub>O</sub> = –4.0 mA; V <sub>CC</sub> = 4.5 V                                      | 3.98                     | 4.32 | -    | 3.84                                | -    | 3.7                                  | -    | V    |
|                 |                           | I <sub>O</sub> = –5.2 mA; V <sub>CC</sub> = 6.0 V                                      | 5.48                     | 5.81 | -    | 5.34                                | -    | 5.2                                  | -    | 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  | -                                   | 0.1  | -                                    | 0.1  | V    |
|                 |                           | I <sub>O</sub> = 20 μA; V <sub>CC</sub> = 4.5 V                                        | -                        | 0    | 0.1  | -                                   | 0.1  | -                                    | 0.1  | V    |
|                 |                           | I <sub>O</sub> = 20 μA; V <sub>CC</sub> = 6.0 V                                        | -                        | 0    | 0.1  | -                                   | 0.1  | -                                    | 0.1  | V    |
|                 |                           | I <sub>O</sub> = 4.0 mA; V <sub>CC</sub> = 4.5 V                                       | -                        | 0.15 | 0.26 | -                                   | 0.33 | -                                    | 0.4  | V    |
|                 |                           | I <sub>O</sub> = 5.2 mA; V <sub>CC</sub> = 6.0 V                                       | -                        | 0.16 | 0.26 | -                                   | 0.33 | -                                    | 0.4  | 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 | -                                   | ±1.0 | -                                    | ±1.0 | 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  | -                                   | 80   | -                                    | 160  | μA   |
| C <sub>I</sub>  | input capacitance         |                                                                                        | -                        | 3.5  | -    |                                     |      |                                      |      | pF   |

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

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

| Symbol           | Parameter                 | Conditions                                                                                                                               | T <sub>amb</sub> = 25 °C |      |      | T <sub>amb</sub> = −40 °C to +85 °C |      | T <sub>amb</sub> = −40 °C to +125 °C |      | Unit |
|------------------|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|------|------|-------------------------------------|------|--------------------------------------|------|------|
|                  |                           |                                                                                                                                          | Min                      | Typ  | Max  | Min                                 | Max  | Min                                  | Max  |      |
| 74HCT151         |                           |                                                                                                                                          |                          |      |      |                                     |      |                                      |      |      |
| V <sub>IH</sub>  | HIGH-level input voltage  | V <sub>CC</sub> = 4.5 V to 5.5 V                                                                                                         | 2.0                      | 1.6  | -    | 2.0                                 | -    | 2.0                                  | -    | V    |
| V <sub>IL</sub>  | LOW-level input voltage   | V <sub>CC</sub> = 4.5 V to 5.5 V                                                                                                         | -                        | 1.2  | 0.8  | -                                   | 0.8  | -                                    | 0.8  | V    |
| V <sub>OH</sub>  | HIGH-level output voltage | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>CC</sub> = 4.5 V                                                            |                          |      |      |                                     |      |                                      |      |      |
|                  |                           | I <sub>O</sub> = −20 μA                                                                                                                  | 4.4                      | 4.5  | -    | 4.4                                 | -    | 4.4                                  | -    | V    |
|                  |                           | I <sub>O</sub> = −4 mA                                                                                                                   | 3.98                     | 4.32 | -    | 3.84                                | -    | 3.7                                  | -    | V    |
| V <sub>OL</sub>  | LOW-level output voltage  | V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>CC</sub> = 4.5 V                                                            |                          |      |      |                                     |      |                                      |      |      |
|                  |                           | I <sub>O</sub> = 20 μA                                                                                                                   | -                        | 0    | 0.1  | -                                   | 0.1  | -                                    | 0.1  | V    |
|                  |                           | I <sub>O</sub> = 4.0 mA                                                                                                                  | -                        | 0.15 | 0.26 | -                                   | 0.33 | -                                    | 0.4  | V    |
| I <sub>I</sub>   | input leakage current     | V <sub>I</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 5.5 V                                                                         | -                        | -    | ±0.1 | -                                   | ±1.0 | -                                    | ±1.0 | 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> = 5.5 V                                                   | -                        | -    | 8.0  | -                                   | 80   | -                                    | 160  | μA   |
| ΔI <sub>CC</sub> | additional supply current | V <sub>I</sub> = V <sub>CC</sub> − 2.1 V; other inputs at V <sub>CC</sub> or GND; V <sub>CC</sub> = 4.5 V to 5.5 V; I <sub>O</sub> = 0 A |                          |      |      |                                     |      |                                      |      |      |
|                  |                           | per input pin; In inputs                                                                                                                 | -                        | 45   | 162  | -                                   | 203  | -                                    | 221  | μA   |
|                  |                           | per input pin; $\overline{E}$ input                                                                                                      | -                        | 30   | 108  | -                                   | 135  | -                                    | 147  | μA   |
|                  |                           | per input pin; Sn input                                                                                                                  | -                        | 150  | 540  | -                                   | 675  | -                                    | 735  | μA   |
| C <sub>I</sub>   | input capacitance         |                                                                                                                                          | -                        | 3.5  | -    |                                     |      |                                      |      | pF   |

## 10. Dynamic characteristics

**Table 7. Dynamic characteristics**

Voltages are referenced to GND (ground = 0 V);  $C_L = 50$  pF unless otherwise specified; for test circuit see [Figure 7](#).

| Symbol           | Parameter         | Conditions                                                      | T <sub>amb</sub> = 25 °C |     |     | T <sub>amb</sub> = −40 °C<br>to +85 °C |     | T <sub>amb</sub> = −40 °C<br>to +125 °C |     | Unit |
|------------------|-------------------|-----------------------------------------------------------------|--------------------------|-----|-----|----------------------------------------|-----|-----------------------------------------|-----|------|
|                  |                   |                                                                 | Min                      | Typ | Max | Min                                    | Max | Min                                     | Max |      |
| For type 74HC151 |                   |                                                                 |                          |     |     |                                        |     |                                         |     |      |
| t <sub>pd</sub>  | propagation delay | In to Y; see <a href="#">Figure 5</a>                           | <a href="#">[1]</a>      |     |     |                                        |     |                                         |     |      |
|                  |                   | V <sub>CC</sub> = 2.0 V                                         | -                        | 52  | 170 | -                                      | 215 | -                                       | 255 | ns   |
|                  |                   | V <sub>CC</sub> = 4.5 V                                         | -                        | 19  | 34  | -                                      | 43  | -                                       | 51  | ns   |
|                  |                   | V <sub>CC</sub> = 5 V; C <sub>L</sub> = 15 pF                   | -                        | 17  | -   | -                                      | -   | -                                       | -   | ns   |
|                  |                   | V <sub>CC</sub> = 6.0 V                                         | -                        | 15  | 29  | -                                      | 37  | -                                       | 43  | ns   |
|                  |                   | In to $\overline{Y}$ ; see <a href="#">Figure 5</a>             | <a href="#">[1]</a>      |     |     |                                        |     |                                         |     |      |
|                  |                   | V <sub>CC</sub> = 2.0 V                                         | -                        | 58  | 185 | -                                      | 230 | -                                       | 280 | ns   |
|                  |                   | V <sub>CC</sub> = 4.5 V                                         | -                        | 21  | 37  | -                                      | 46  | -                                       | 56  | ns   |
|                  |                   | V <sub>CC</sub> = 5 V; C <sub>L</sub> = 15 pF                   | -                        | 17  | -   | -                                      | -   | -                                       | -   | ns   |
|                  |                   | V <sub>CC</sub> = 6.0 V                                         | -                        | 17  | 31  | -                                      | 39  | -                                       | 48  | ns   |
|                  |                   | Sn to Y; see <a href="#">Figure 6</a>                           | <a href="#">[1]</a>      |     |     |                                        |     |                                         |     |      |
|                  |                   | V <sub>CC</sub> = 2.0 V                                         | -                        | 61  | 185 | -                                      | 230 | -                                       | 280 | ns   |
|                  |                   | V <sub>CC</sub> = 4.5 V                                         | -                        | 22  | 37  | -                                      | 46  | -                                       | 56  | ns   |
|                  |                   | V <sub>CC</sub> = 5 V; C <sub>L</sub> = 15 pF                   | -                        | 19  | -   | -                                      | -   | -                                       | -   | ns   |
|                  |                   | V <sub>CC</sub> = 6.0 V                                         | -                        | 18  | 31  | -                                      | 39  | -                                       | 48  | ns   |
|                  |                   | Sn to $\overline{Y}$ ; see <a href="#">Figure 6</a>             | <a href="#">[1]</a>      |     |     |                                        |     |                                         |     |      |
|                  |                   | V <sub>CC</sub> = 2.0 V                                         | -                        | 61  | 205 | -                                      | 255 | -                                       | 310 | ns   |
|                  |                   | V <sub>CC</sub> = 4.5 V                                         | -                        | 22  | 41  | -                                      | 51  | -                                       | 62  | ns   |
|                  |                   | V <sub>CC</sub> = 5 V; C <sub>L</sub> = 15 pF                   | -                        | 19  | -   | -                                      | -   | -                                       | -   | ns   |
|                  |                   | V <sub>CC</sub> = 6.0 V                                         | -                        | 18  | 35  | -                                      | 43  | -                                       | 53  | ns   |
|                  |                   | $\overline{E}$ to Y; see <a href="#">Figure 6</a>               |                          |     |     |                                        |     |                                         |     |      |
|                  |                   | V <sub>CC</sub> = 2.0 V                                         | -                        | 41  | 125 | -                                      | 155 | -                                       | 190 | ns   |
|                  |                   | V <sub>CC</sub> = 4.5 V                                         | -                        | 15  | 25  | -                                      | 31  | -                                       | 38  | ns   |
|                  |                   | V <sub>CC</sub> = 5 V; C <sub>L</sub> = 15 pF                   | -                        | 12  | -   | -                                      | -   | -                                       | -   | ns   |
|                  |                   | V <sub>CC</sub> = 6.0 V                                         | -                        | 12  | 21  | -                                      | 26  | -                                       | 32  | ns   |
|                  |                   | $\overline{E}$ to $\overline{Y}$ ; see <a href="#">Figure 6</a> |                          |     |     |                                        |     |                                         |     |      |
|                  |                   | V <sub>CC</sub> = 2.0 V                                         | -                        | 47  | 145 | -                                      | 180 | -                                       | 220 | ns   |
|                  |                   | V <sub>CC</sub> = 4.5 V                                         | -                        | 17  | 29  | -                                      | 36  | -                                       | 44  | ns   |
|                  |                   | V <sub>CC</sub> = 5 V; C <sub>L</sub> = 15 pF                   | -                        | 14  | -   | -                                      | -   | -                                       | -   | ns   |
|                  |                   | V <sub>CC</sub> = 6.0 V                                         | -                        | 14  | 25  | -                                      | 31  | -                                       | 38  | ns   |
| t <sub>t</sub>   | transition time   | Y, $\overline{Y}$ ; see <a href="#">Figure 5</a>                | <a href="#">[2]</a>      |     |     |                                        |     |                                         |     |      |
|                  |                   | V <sub>CC</sub> = 2.0 V                                         | -                        | 19  | 75  | -                                      | 95  | -                                       | 110 | ns   |
|                  |                   | V <sub>CC</sub> = 4.5 V                                         | -                        | 7   | 15  | -                                      | 19  | -                                       | 22  | ns   |
|                  |                   | V <sub>CC</sub> = 6.0 V                                         | -                        | 6   | 13  | -                                      | 16  | -                                       | 19  | ns   |

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

Voltages are referenced to GND (ground = 0 V);  $C_L = 50$  pF unless otherwise specified; for test circuit see [Figure 7](#).

| Symbol                   | Parameter                     | Conditions                                                                    | T <sub>amb</sub> = 25 °C |     |     | T <sub>amb</sub> = –40 °C to +85 °C |     | T <sub>amb</sub> = –40 °C to +125 °C |     | Unit |
|--------------------------|-------------------------------|-------------------------------------------------------------------------------|--------------------------|-----|-----|-------------------------------------|-----|--------------------------------------|-----|------|
|                          |                               |                                                                               | Min                      | Typ | Max | Min                                 | Max | Min                                  | Max |      |
| C <sub>PD</sub>          | power dissipation capacitance | C <sub>L</sub> = 50 pF; f = 1 MHz;<br>V <sub>I</sub> = GND to V <sub>CC</sub> | [3]                      | -   | 40  | -                                   | -   | -                                    | -   | pF   |
| <b>For type 74HCT151</b> |                               |                                                                               |                          |     |     |                                     |     |                                      |     |      |
| t <sub>pd</sub>          | propagation delay             | In to Y; see <a href="#">Figure 5</a>                                         | [1]                      | -   | -   | -                                   | -   | -                                    | -   | -    |
|                          |                               | V <sub>CC</sub> = 4.5 V                                                       | -                        | 22  | 38  | -                                   | 48  | -                                    | 57  | ns   |
|                          |                               | V <sub>CC</sub> = 5 V; C <sub>L</sub> = 15 pF                                 | -                        | 19  | -   | -                                   | -   | -                                    | -   | ns   |
|                          |                               | In to $\bar{Y}$ ; see <a href="#">Figure 5</a>                                | [1]                      | -   | -   | -                                   | -   | -                                    | -   | -    |
|                          |                               | V <sub>CC</sub> = 4.5 V                                                       | -                        | 22  | 38  | -                                   | 48  | -                                    | 57  | ns   |
|                          |                               | V <sub>CC</sub> = 5 V; C <sub>L</sub> = 15 pF                                 | -                        | 19  | -   | -                                   | -   | -                                    | -   | ns   |
|                          |                               | Sn to Y; see <a href="#">Figure 6</a>                                         | [1]                      | -   | -   | -                                   | -   | -                                    | -   | -    |
|                          |                               | V <sub>CC</sub> = 4.5 V                                                       | -                        | 23  | 41  | -                                   | 51  | -                                    | 62  | ns   |
|                          |                               | V <sub>CC</sub> = 5 V; C <sub>L</sub> = 15 pF                                 | -                        | 20  | -   | -                                   | -   | -                                    | -   | ns   |
|                          |                               | Sn to $\bar{Y}$ ; see <a href="#">Figure 6</a>                                | [1]                      | -   | -   | -                                   | -   | -                                    | -   | -    |
|                          |                               | V <sub>CC</sub> = 4.5 V                                                       | -                        | 25  | 43  | -                                   | 54  | -                                    | 65  | ns   |
|                          |                               | V <sub>CC</sub> = 5 V; C <sub>L</sub> = 15 pF                                 | -                        | 20  | -   | -                                   | -   | -                                    | -   | ns   |
|                          |                               | $\bar{E}$ to Y; see <a href="#">Figure 6</a>                                  | [1]                      | -   | -   | -                                   | -   | -                                    | -   | -    |
|                          |                               | V <sub>CC</sub> = 4.5 V                                                       | -                        | 16  | 29  | -                                   | 36  | -                                    | 44  | ns   |
|                          |                               | V <sub>CC</sub> = 5 V; C <sub>L</sub> = 15 pF                                 | -                        | 13  | -   | -                                   | -   | -                                    | -   | ns   |
|                          |                               | $\bar{E}$ to $\bar{Y}$ ; see <a href="#">Figure 6</a>                         | [1]                      | -   | -   | -                                   | -   | -                                    | -   | -    |
|                          |                               | V <sub>CC</sub> = 4.5 V                                                       | -                        | 21  | 36  | -                                   | 45  | -                                    | 54  | ns   |
|                          |                               | V <sub>CC</sub> = 5 V; C <sub>L</sub> = 15 pF                                 | -                        | 18  | -   | -                                   | -   | -                                    | -   | ns   |
| t <sub>t</sub>           | transition time               | Y, $\bar{Y}$ ; see <a href="#">Figure 5</a>                                   | [2]                      | -   | -   | -                                   | -   | -                                    | -   | -    |
|                          |                               | V <sub>CC</sub> = 4.5 V                                                       | -                        | 7   | 15  | -                                   | 19  | -                                    | 22  | ns   |
| C <sub>PD</sub>          | power dissipation capacitance | C <sub>L</sub> = 50 pF; f = 1 MHz;<br>V <sub>I</sub> = GND to V <sub>CC</sub> | [3]                      | -   | 40  | -                                   | -   | -                                    | -   | pF   |

[1] t<sub>pd</sub> is the same as t<sub>PLH</sub> and t<sub>PHL</sub>.

[2] t<sub>t</sub> is the same as t<sub>THL</sub> and t<sub>TLH</sub>.

[3] C<sub>PD</sub> is used to determine the dynamic power dissipation (P<sub>D</sub> in μW).

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

f<sub>i</sub> = input frequency in MHz;

f<sub>o</sub> = output frequency in MHz;

C<sub>L</sub> = output load capacitance in pF;

V<sub>CC</sub> = supply voltage in V;

N = number of inputs switching;

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

11. Waveforms

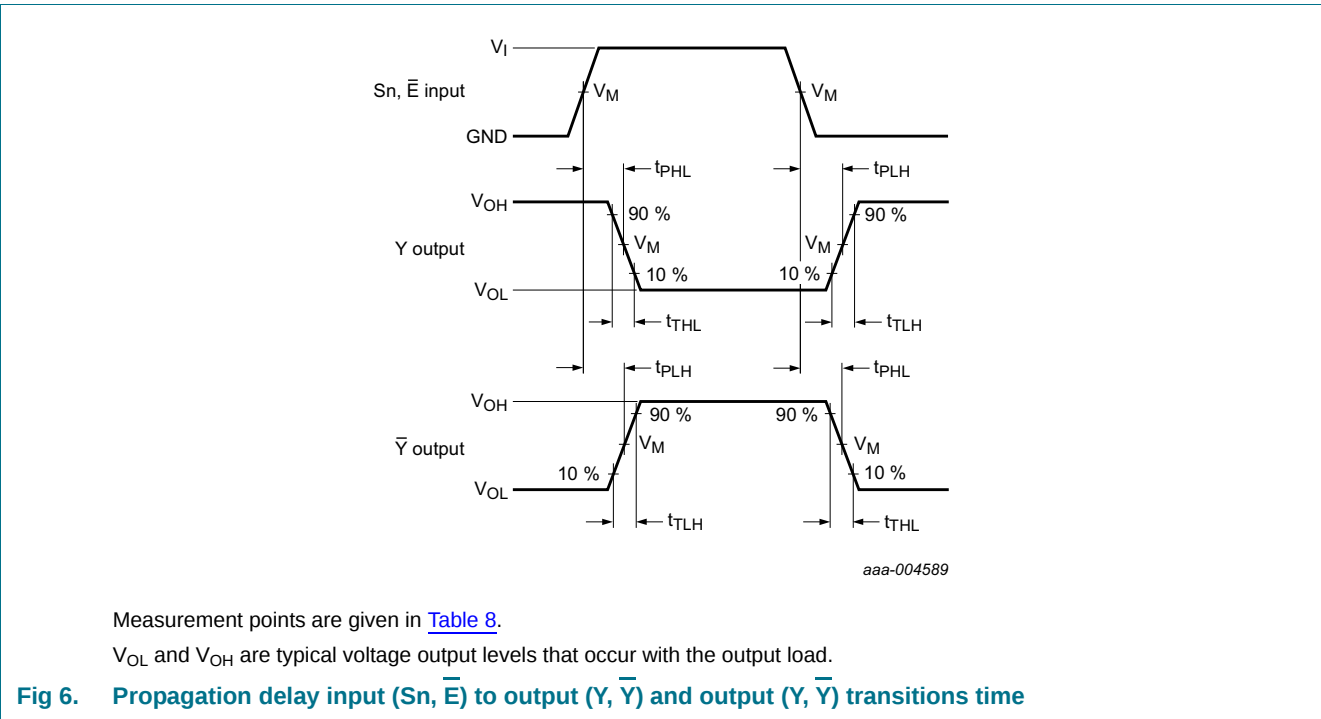
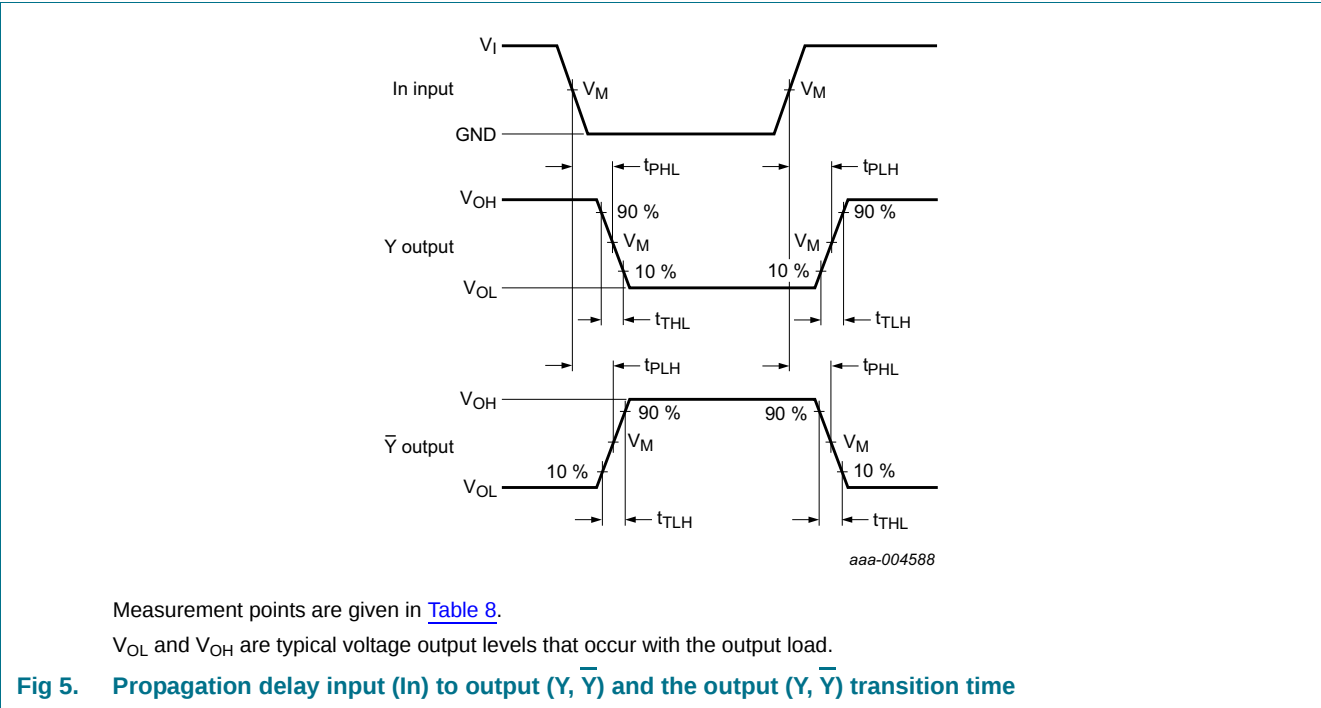
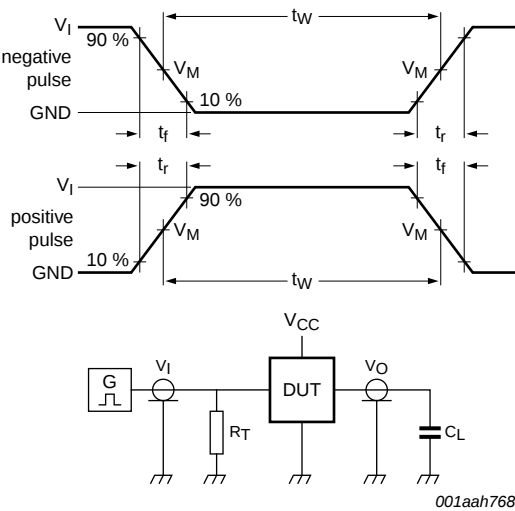


Table 8. Measurement points

| Type     | Input       | Output      |
|----------|-------------|-------------|
|          | $V_M$       | $V_M$       |
| 74HC151  | $0.5V_{CC}$ | $0.5V_{CC}$ |
| 74HCT151 | 1.3 V       | 1.3 V       |



Test data is given in [Table 9](#).

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 7. Test circuit for measuring switching times

Table 9. Test data

| Type     | Input    |            | Load         | Test               |
|----------|----------|------------|--------------|--------------------|
|          | $V_I$    | $t_r, t_f$ | $C_L$        |                    |
| 74HC151  | $V_{CC}$ | 6.0 ns     | 15 pF, 50 pF | $t_{PLH}, t_{PHL}$ |
| 74HCT151 | 3.0 V    | 6.0 ns     | 15 pF, 50 pF | $t_{PLH}, t_{PHL}$ |

12. Package outline

DIP16: plastic dual in-line package; 16 leads (300 mil)

SOT38-4

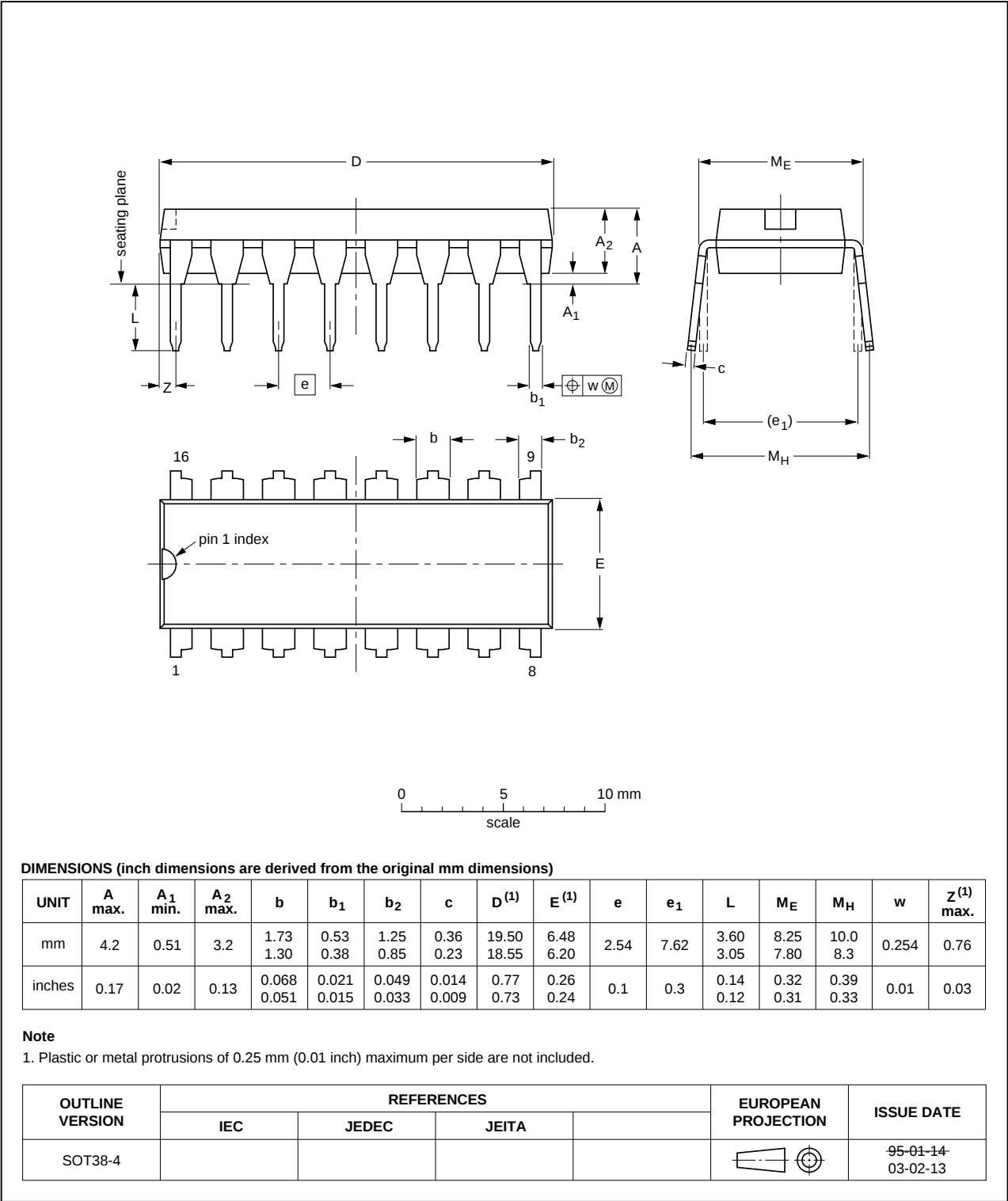
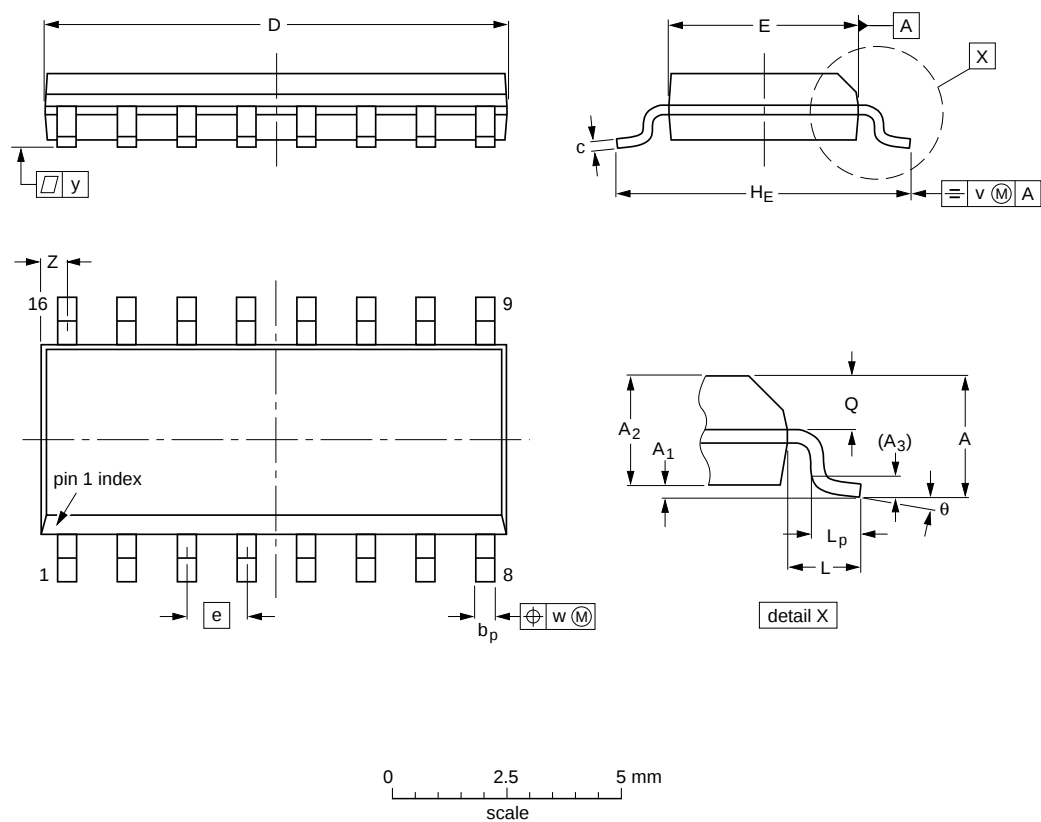


Fig 8. Package outline SOT38-4 (DIP16)

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

SOT109-1



DIMENSIONS (inch dimensions are derived from the original mm dimensions)

| UNIT   | A<br>max. | A <sub>1</sub> | A <sub>2</sub> | A <sub>3</sub> | b <sub>p</sub> | c                | D <sup>(1)</sup> | E <sup>(1)</sup> | e    | H <sub>E</sub> | L     | L <sub>p</sub> | Q              | v    | w    | y     | z <sup>(1)</sup> | θ        |
|--------|-----------|----------------|----------------|----------------|----------------|------------------|------------------|------------------|------|----------------|-------|----------------|----------------|------|------|-------|------------------|----------|
| mm     | 1.75      | 0.25<br>0.10   | 1.45<br>1.25   | 0.25           | 0.49<br>0.36   | 0.25<br>0.19     | 10.0<br>9.8      | 4.0<br>3.8       | 1.27 | 6.2<br>5.8     | 1.05  | 1.0<br>0.4     | 0.7<br>0.6     | 0.25 | 0.25 | 0.1   | 0.7<br>0.3       | 8°<br>0° |
| inches | 0.069     | 0.010<br>0.004 | 0.057<br>0.049 | 0.01           | 0.019<br>0.014 | 0.0100<br>0.0075 | 0.39<br>0.38     | 0.16<br>0.15     | 0.05 | 0.244<br>0.228 | 0.041 | 0.039<br>0.016 | 0.028<br>0.020 | 0.01 | 0.01 | 0.004 | 0.028<br>0.012   |          |

**Note**

1. Plastic or metal protrusions of 0.15 mm (0.006 inch) maximum per side are not included.

| OUTLINE<br>VERSION | REFERENCES |        |       |  | EUROPEAN<br>PROJECTION | ISSUE DATE           |
|--------------------|------------|--------|-------|--|------------------------|----------------------|
|                    | IEC        | JEDEC  | JEITA |  |                        |                      |
| SOT109-1           | 076E07     | MS-012 |       |  |                        | 99-12-27<br>03-02-19 |

Fig 9. Package outline SOT109-1 (SO16)

SSOP16: plastic shrink small outline package; 16 leads; body width 5.3 mm

SOT338-1

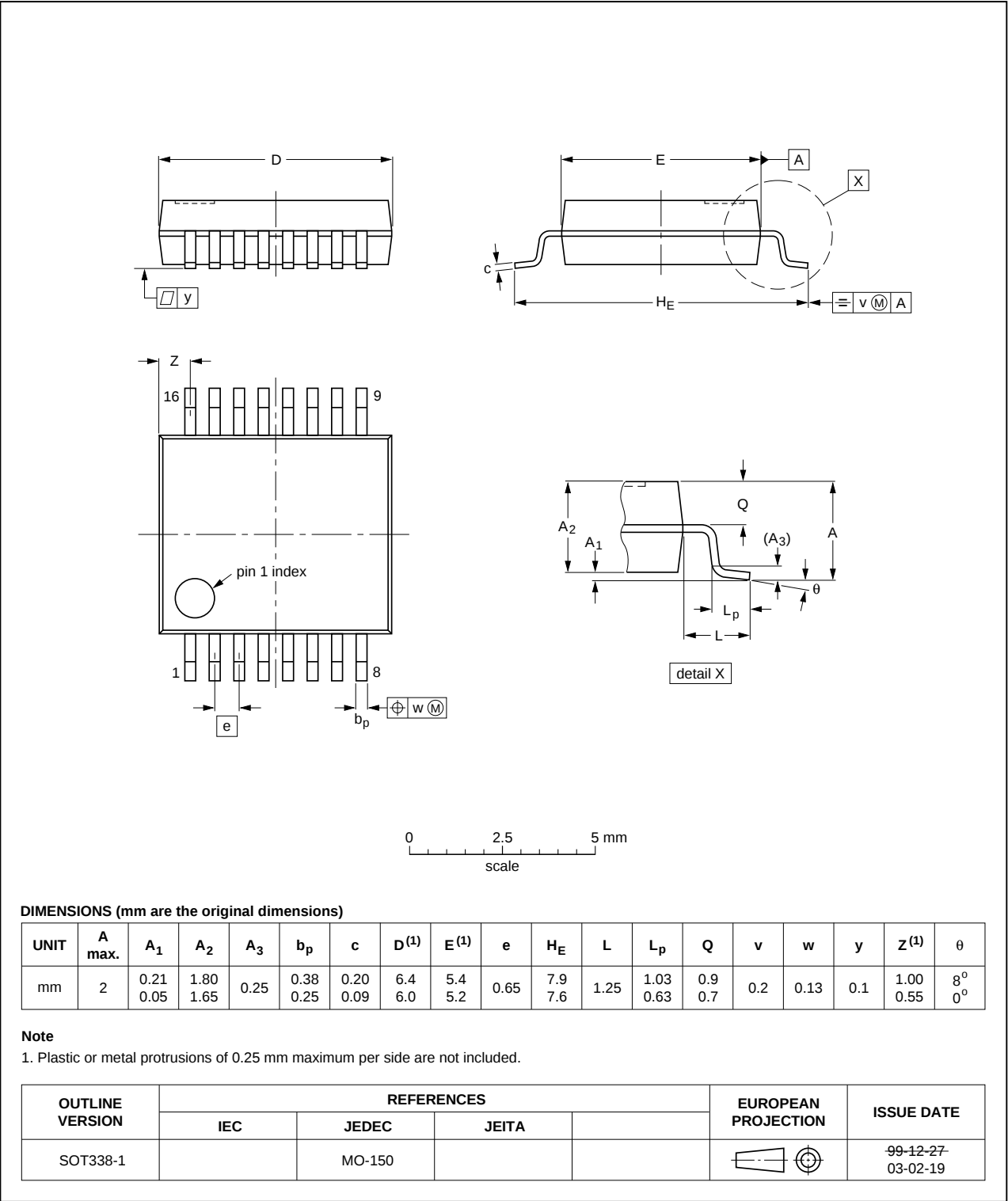


Fig 10. Package outline SOT338-1 (SSOP16)

TSSOP16: plastic thin shrink small outline package; 16 leads; body width 4.4 mm

SOT403-1

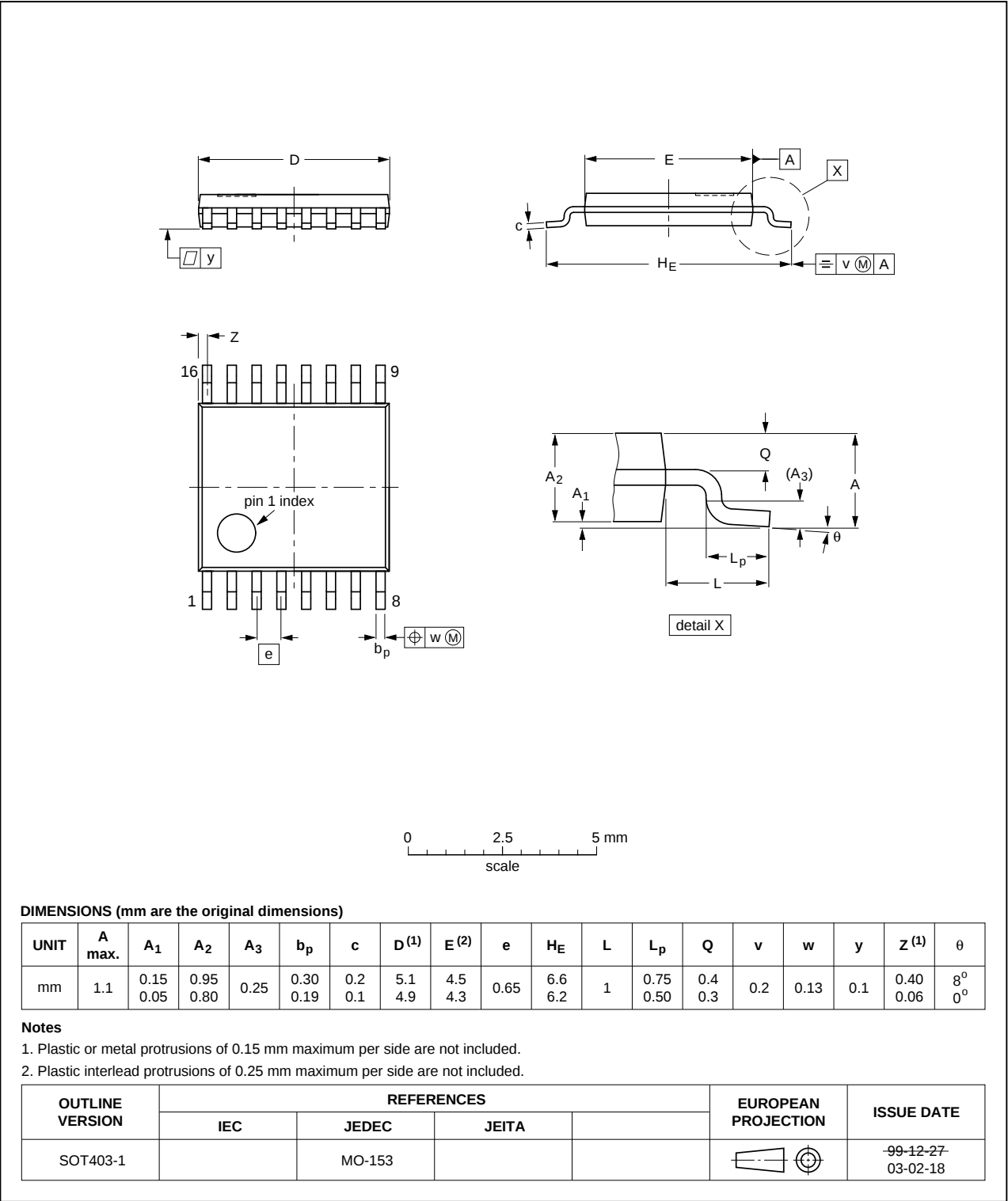


Fig 11. Package outline SOT403-1 (TSSOP16)

## 13. Abbreviations

Table 10. Abbreviations

| Acronym | Description                             |
|---------|-----------------------------------------|
| CMOS    | Complementary Metal Oxide Semiconductor |
| DUT     | Device Under Test                       |
| ESD     | ElectroStatic Discharge                 |
| HBM     | Human Body Model                        |
| MM      | Machine Model                           |
| TTL     | Transistor-Transistor Logic             |
| MIL     | Military                                |

## 14. Revision history

Table 11. Revision history

| Document ID         | Release date                      | Data sheet status     | Change notice | Supersedes          |
|---------------------|-----------------------------------|-----------------------|---------------|---------------------|
| 74HC_HCT151 v.4     | 20130211                          | Product data sheet    | -             | 74HC_HCT151 v.3     |
| Modifications:      | • New descriptive title (errata). |                       |               |                     |
| 74HC_HCT151 v.3     | 20120919                          | Product data sheet    | -             | 74HC_HCT151_CNV v.2 |
| 74HC_HCT151_CNV v.2 | 19970827                          | 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.nxp.com>.

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