

# 74AUP2G57

Low-power dual PCB configurable multiple function gate

Rev. 3 — 7 May 2021

Product data sheet

## 1. General description

The 74AUP2G57 is a dual configurable multiple function gate with Schmitt-trigger inputs. Each gate within the device can be configured as any of the following logic functions AND, OR, NAND, NOR, XNOR, inverter and buffer; using the 3-bit input. All inputs can be connected directly to  $V_{CC}$  or GND.

This device ensures very low static and dynamic power consumption across the entire  $V_{CC}$  range from 0.8 V to 3.6 V.

This device is fully specified for partial power down applications using  $I_{OFF}$ . The  $I_{OFF}$  circuitry disables the output, preventing the potentially damaging backflow current through the device when it is powered down.

## 2. Features and benefits

- Wide supply voltage range from 0.8 V to 3.6 V
- High noise immunity
- ESD protection:
  - HBM JESD22-A114F exceeds 5000 V
  - MM JESD22-A115-A exceeds 200 V
  - CDM JESD22-C101E exceeds 1000 V
- Low static power consumption;  $I_{CC} = 0.9 \mu\text{A}$  (maximum)
- Latch-up performance exceeds 100 mA per JESD 78 Class II
- Inputs accept voltages up to 3.6 V
- Low noise overshoot and undershoot < 10% of  $V_{CC}$
- $I_{OFF}$  circuitry provides partial power-down mode operation
- Specified from -40 °C to +85 °C and -40 °C to +125 °C

## 3. Ordering information

Table 1. Ordering information

| Type number | Package           |         |   |           |
|-------------|-------------------|---------|---|-----------|
|             | Temperature range | Name    | Description   | Version   |
| 74AUP2G57DP | -40 °C to +125 °C | TSSOP10 | plastic thin shrink small outline package; 10 leads; body width 3 mm                          | SOT552-1  |
| 74AUP2G57GU | -40 °C to +125 °C | XQFN10  | plastic, extremely thin quad flat package; no leads; 10 terminals; body 1.40 × 1.80 × 0.50 mm | SOT1160-1 |

## 4. Marking

Table 2. Marking

| Type number | Marking code [1] |
|-------------|------------------|
| 74AUP2G57DP | aC               |
| 74AUP2G57GU | aC               |

[1] The pin 1 indicator is located on the lower left corner of the device, below the marking code.

## 5. Functional diagram

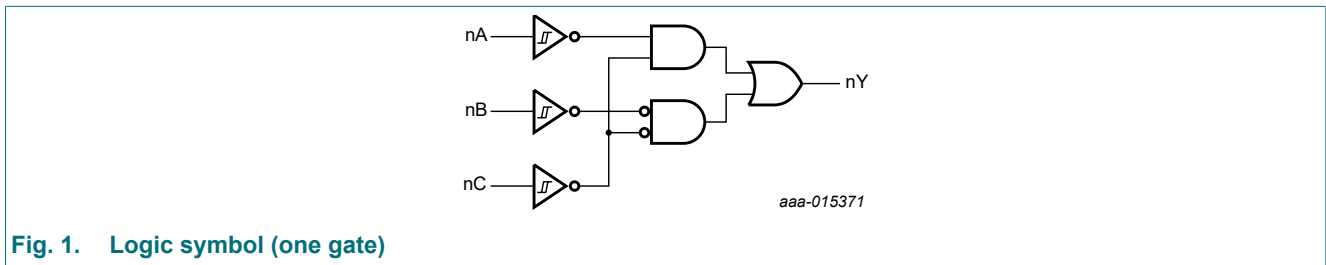


Fig. 1. Logic symbol (one gate)

## 6. Pinning information

### 6.1. Pinning

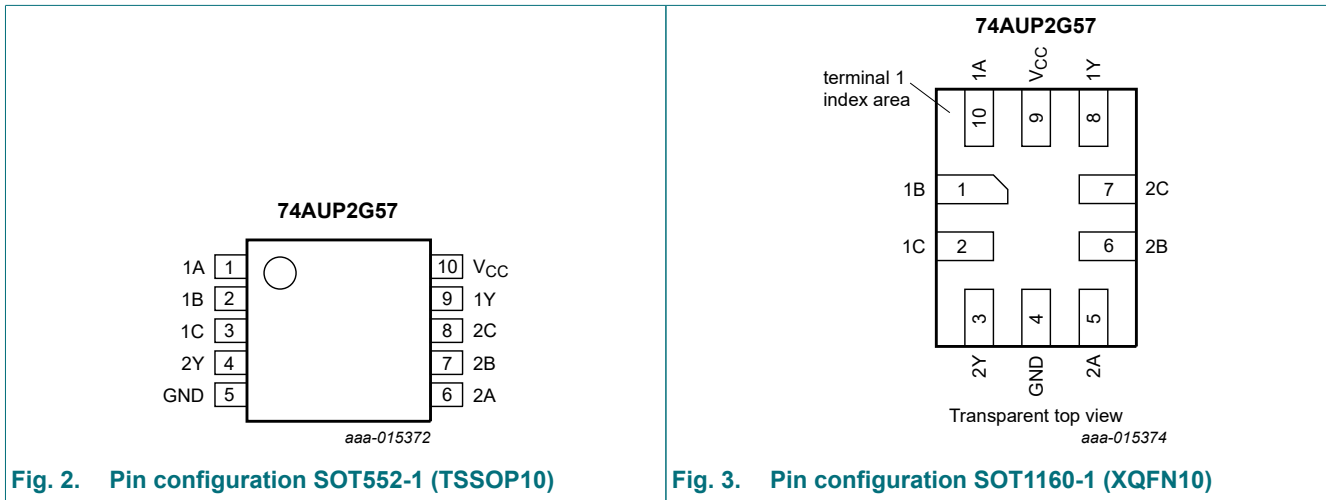


Fig. 2. Pin configuration SOT552-1 (TSSOP10)

Fig. 3. Pin configuration SOT1160-1 (XQFN10)

## 6.2. Pin description

Table 3. Pin description

| Symbol          | Pin      |           | Description    |
|-----------------|----------|-----------|----------------|
|                 | SOT552-1 | SOT1160-1 |                |
| 1A, 2A          | 1, 6     | 10, 5     | data input     |
| 1B, 2B          | 2, 7     | 1, 6      | data input     |
| 1C, 2C          | 3, 8     | 2, 7      | data input     |
| 1Y, 2Y          | 9, 4     | 8, 3      | data output    |
| GND             | 5        | 4         | ground (0 V)   |
| V <sub>CC</sub> | 10       | 9         | supply voltage |

## 7. Functional description

Table 4. Function table

*H = HIGH voltage level; L = LOW voltage level.*

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

### 7.1. Logic configurations

Table 5. Function selection table

| Logic function                        | Figure  |
|---------------------------------------|---|
| 2-input AND                           | see <a href="#">Fig. 4</a>                            |
| 2-input AND with both inputs inverted | see <a href="#">Fig. 7</a>                            |
| 2-input NAND with inverted input      | see <a href="#">Fig. 5</a> and <a href="#">Fig. 6</a> |
| 2-input OR with inverted input        | see <a href="#">Fig. 5</a> and <a href="#">Fig. 6</a> |
| 2-input NOR                           | see <a href="#">Fig. 7</a>                            |
| 2-input NOR with both inputs inverted | see <a href="#">Fig. 4</a>                            |
| 2-input XNOR                          | see <a href="#">Fig. 8</a>                            |
| Inverter                              | see <a href="#">Fig. 9</a>                            |
| Buffer                                | see <a href="#">Fig. 10</a>                           |

|  |  |
|--|--|
| <p>Pin numbers are not valid for SOT1160-1 package</p> | <p>Pin numbers are not valid for SOT1160-1 package</p> |
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## 8. 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 | +4.6     | V    |
| $I_{IK}$  | input clamping current  | $V_I < 0$ V                     | -50  | -        | mA   |
| $V_I$     | input voltage           |                                 | -0.5 | +4.6     | V    |
| $I_{OK}$  | output clamping current | $V_O < 0$ V                     | -50  | -        | mA   |
| $V_O$     | output voltage          | Active mode and Power-down mode | -0.5 | +4.6     | V    |
| $I_O$     | output current          | $V_O = 0$ V to $V_{CC}$         | -    | $\pm 20$ | mA   |
| $I_{CC}$  | supply current          |                                 | -    | 50       | mA   |
| $I_{GND}$ | ground current          |                                 | -50  | -        | mA   |
| $T_{stg}$ | storage temperature     |                                 | -65  | +150     | °C   |
| $P_{tot}$ | total 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.

[2] For SOT552-1 (TSSOP10) packages:  $P_{tot}$  derates linearly with 8.3 mW/K above 120 °C.

For SOT1160-1 (XQFN10) package:  $P_{tot}$  derates linearly with 7.1 mW/K above 115 °C.

## 9. Recommended operating conditions

**Table 7. Recommended operating conditions**

| Symbol    | Parameter           | Conditions                      | Min | Max      | Unit |
|-----------|---------------------|---------------------------------|-----|----------|------|
| $V_{CC}$  | supply voltage      |                                 | 0.8 | 3.6      | V    |
| $V_I$     | input voltage       |                                 | 0   | 3.6      | V    |
| $V_O$     | output voltage      | Active mode                     | 0   | $V_{CC}$ | V    |
|           |                     | Power-down mode; $V_{CC} = 0$ V | 0   | 3.6      | V    |
| $T_{amb}$ | ambient temperature |                                 | -40 | +125     | °C   |

## 10. Static characteristics

**Table 8. 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>OH</sub>                | HIGH-level output voltage            | V <sub>I</sub> = V <sub>T+</sub> or V <sub>T-</sub>  |                        |     |                       |      |
|                                |                                      | I <sub>O</sub> = -20 μA; V <sub>CC</sub> = 0.8 V to 3.6 V  | V <sub>CC</sub> - 0.1  | -   | -                     | V    |
|                                |                                      | I <sub>O</sub> = -1.1 mA; V <sub>CC</sub> = 1.1 V  | 0.75 × V <sub>CC</sub> | -   | -                     | V    |
|                                |                                      | I <sub>O</sub> = -1.7 mA; V <sub>CC</sub> = 1.4 V  | 1.11                   | -   | -                     | V    |
|                                |                                      | I <sub>O</sub> = -1.9 mA; V <sub>CC</sub> = 1.65 V   | 1.32                   | -   | -                     | V    |
|                                |                                      | I <sub>O</sub> = -2.3 mA; V <sub>CC</sub> = 2.3 V  | 2.05                   | -   | -                     | V    |
|                                |                                      | I <sub>O</sub> = -3.1 mA; V <sub>CC</sub> = 2.3 V  | 1.9                    | -   | -                     | V    |
|                                |                                      | I <sub>O</sub> = -2.7 mA; V <sub>CC</sub> = 3.0 V  | 2.72                   | -   | -                     | V    |
|                                |                                      | I <sub>O</sub> = -4.0 mA; V <sub>CC</sub> = 3.0 V  | 2.6                    | -   | -                     | V    |
| V <sub>OL</sub>                | LOW-level output voltage             | V <sub>I</sub> = V <sub>T+</sub> or V <sub>T-</sub>  |                        |     |                       |      |
|                                |                                      | I <sub>O</sub> = 20 μA; V <sub>CC</sub> = 0.8 V to 3.6 V   | -                      | -   | 0.1                   | V    |
|                                |                                      | I <sub>O</sub> = 1.1 mA; V <sub>CC</sub> = 1.1 V   | -                      | -   | 0.3 × V <sub>CC</sub> | V    |
|                                |                                      | I <sub>O</sub> = 1.7 mA; V <sub>CC</sub> = 1.4 V   | -                      | -   | 0.31                  | V    |
|                                |                                      | I <sub>O</sub> = 1.9 mA; V <sub>CC</sub> = 1.65 V  | -                      | -   | 0.31                  | V    |
|                                |                                      | I <sub>O</sub> = 2.3 mA; V <sub>CC</sub> = 2.3 V   | -                      | -   | 0.31                  | V    |
|                                |                                      | I <sub>O</sub> = 3.1 mA; V <sub>CC</sub> = 2.3 V   | -                      | -   | 0.44                  | V    |
|                                |                                      | I <sub>O</sub> = 2.7 mA; V <sub>CC</sub> = 3.0 V   | -                      | -   | 0.31                  | V    |
|                                |                                      | I <sub>O</sub> = 4.0 mA; V <sub>CC</sub> = 3.0 V   | -                      | -   | 0.44                  | V    |
| I <sub>I</sub>                 | input leakage current                | V <sub>I</sub> = GND to 3.6 V; V <sub>CC</sub> = 0 V to 3.6 V                                    | -                      | -   | ±0.1                  | μA   |
| I <sub>OFF</sub>               | power-off leakage current            | V <sub>I</sub> or V <sub>O</sub> = 0 V to 3.6 V; V <sub>CC</sub> = 0 V                           | -                      | -   | ±0.2                  | μA   |
| ΔI <sub>OFF</sub>              | additional power-off leakage current | V <sub>I</sub> or V <sub>O</sub> = 0 V to 3.6 V; V <sub>CC</sub> = 0 V to 0.2 V                  | -                      | -   | ±0.2                  | μA   |
| I <sub>CC</sub>                | supply current                       | V <sub>I</sub> = GND or V <sub>CC</sub> ; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 0.8 V to 3.6 V | -                      | -   | 0.5                   | μA   |
| ΔI <sub>CC</sub>               | additional supply current            | V <sub>I</sub> = V <sub>CC</sub> - 0.6 V; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 3.3 V          | -                      | -   | 40                    | μA   |
| C <sub>I</sub>                 | input capacitance                    | V <sub>I</sub> = GND or V <sub>CC</sub> ; V <sub>CC</sub> = 0 V to 3.6 V                         | -                      | 1.1 | -                     | pF   |
| C <sub>O</sub>                 | output capacitance                   | V <sub>O</sub> = GND; V <sub>CC</sub> = 0 V  | -                      | 1.7 | -                     | pF   |

## Low-power dual PCB configurable multiple function gate

| Symbol  | Parameter                            | Conditions   | Min                   | Typ | Max                   | Unit |
|---|--------------------------------------|--|-----------------------|-----|-----------------------|------|
| <b>T<sub>amb</sub> = -40 °C to +85 °C</b>         |                                      |  |                       |     |                       |      |
| V <sub>OH</sub>                                   | HIGH-level output voltage            | V <sub>I</sub> = V <sub>T+</sub> or V <sub>T-</sub>  |                       |     |                       |      |
|   |                                      | I <sub>O</sub> = -20 μA; V <sub>CC</sub> = 0.8 V to 3.6 V  | V <sub>CC</sub> - 0.1 | -   | -                     | V    |
|   |                                      | I <sub>O</sub> = -1.1 mA; V <sub>CC</sub> = 1.1 V  | 0.7 × V <sub>CC</sub> | -   | -                     | V    |
|   |                                      | I <sub>O</sub> = -1.7 mA; V <sub>CC</sub> = 1.4 V  | 1.03                  | -   | -                     | V    |
|   |                                      | I <sub>O</sub> = -1.9 mA; V <sub>CC</sub> = 1.65 V   | 1.30                  | -   | -                     | V    |
|   |                                      | I <sub>O</sub> = -2.3 mA; V <sub>CC</sub> = 2.3 V  | 1.97                  | -   | -                     | V    |
|   |                                      | I <sub>O</sub> = -3.1 mA; V <sub>CC</sub> = 2.3 V  | 1.85                  | -   | -                     | V    |
|   |                                      | I <sub>O</sub> = -2.7 mA; V <sub>CC</sub> = 3.0 V  | 2.67                  | -   | -                     | V    |
| I <sub>O</sub> = -4.0 mA; V <sub>CC</sub> = 3.0 V | 2.55                                 | -  | -                     | V   |                       |      |
| V <sub>OL</sub>                                   | LOW-level output voltage             | V <sub>I</sub> = V <sub>T+</sub> or V <sub>T-</sub>  |                       |     |                       |      |
|   |                                      | I <sub>O</sub> = 20 μA; V <sub>CC</sub> = 0.8 V to 3.6 V   | -                     | -   | 0.1                   | V    |
|   |                                      | I <sub>O</sub> = 1.1 mA; V <sub>CC</sub> = 1.1 V   | -                     | -   | 0.3 × V <sub>CC</sub> | V    |
|   |                                      | I <sub>O</sub> = 1.7 mA; V <sub>CC</sub> = 1.4 V   | -                     | -   | 0.37                  | V    |
|   |                                      | I <sub>O</sub> = 1.9 mA; V <sub>CC</sub> = 1.65 V  | -                     | -   | 0.35                  | V    |
|   |                                      | I <sub>O</sub> = 2.3 mA; V <sub>CC</sub> = 2.3 V   | -                     | -   | 0.33                  | V    |
|   |                                      | I <sub>O</sub> = 3.1 mA; V <sub>CC</sub> = 2.3 V   | -                     | -   | 0.45                  | V    |
|   |                                      | I <sub>O</sub> = 2.7 mA; V <sub>CC</sub> = 3.0 V   | -                     | -   | 0.33                  | V    |
| I <sub>O</sub> = 4.0 mA; V <sub>CC</sub> = 3.0 V  | -                                    | -  | 0.45                  | V   |                       |      |
| I <sub>I</sub>                                    | input leakage current                | V <sub>I</sub> = GND to 3.6 V; V <sub>CC</sub> = 0 V to 3.6 V                                    | -                     | -   | ±0.5                  | μA   |
| I <sub>OFF</sub>                                  | power-off leakage current            | V <sub>I</sub> or V <sub>O</sub> = 0 V to 3.6 V; V <sub>CC</sub> = 0 V                           | -                     | -   | ±0.5                  | μA   |
| ΔI <sub>OFF</sub>                                 | additional power-off leakage current | V <sub>I</sub> or V <sub>O</sub> = 0 V to 3.6 V; V <sub>CC</sub> = 0 V to 0.2 V                  | -                     | -   | ±0.6                  | μA   |
| I <sub>CC</sub>                                   | supply current                       | V <sub>I</sub> = GND or V <sub>CC</sub> ; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 0.8 V to 3.6 V | -                     | -   | 0.9                   | μA   |
| ΔI <sub>CC</sub>                                  | additional supply current            | V <sub>I</sub> = V <sub>CC</sub> - 0.6 V; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 3.3 V          | -                     | -   | 50                    | μA   |

| Symbol  | Parameter                            | Conditions   | Min                    | Typ | Max                    | Unit |
|---|--------------------------------------|--|------------------------|-----|------------------------|------|
| <b>T<sub>amb</sub> = -40 °C to +125 °C</b>        |                                      |  |                        |     |                        |      |
| V <sub>OH</sub>                                   | HIGH-level output voltage            | V <sub>I</sub> = V <sub>T+</sub> or V <sub>T-</sub>  |                        |     |                        |      |
|   |                                      | I <sub>O</sub> = -20 μA; V <sub>CC</sub> = 0.8 V to 3.6 V  | V <sub>CC</sub> - 0.11 | -   | -                      | V    |
|   |                                      | I <sub>O</sub> = -1.1 mA; V <sub>CC</sub> = 1.1 V  | 0.6 × V <sub>CC</sub>  | -   | -                      | V    |
|   |                                      | I <sub>O</sub> = -1.7 mA; V <sub>CC</sub> = 1.4 V  | 0.93                   | -   | -                      | V    |
|   |                                      | I <sub>O</sub> = -1.9 mA; V <sub>CC</sub> = 1.65 V   | 1.17                   | -   | -                      | V    |
|   |                                      | I <sub>O</sub> = -2.3 mA; V <sub>CC</sub> = 2.3 V  | 1.77                   | -   | -                      | V    |
|   |                                      | I <sub>O</sub> = -3.1 mA; V <sub>CC</sub> = 2.3 V  | 1.67                   | -   | -                      | V    |
|   |                                      | I <sub>O</sub> = -2.7 mA; V <sub>CC</sub> = 3.0 V  | 2.40                   | -   | -                      | V    |
| I <sub>O</sub> = -4.0 mA; V <sub>CC</sub> = 3.0 V | 2.30                                 | -  | -                      | V   |                        |      |
| V <sub>OL</sub>                                   | LOW-level output voltage             | V <sub>I</sub> = V <sub>T+</sub> or V <sub>T-</sub>  |                        |     |                        |      |
|   |                                      | I <sub>O</sub> = 20 μA; V <sub>CC</sub> = 0.8 V to 3.6 V   | -                      | -   | 0.11                   | V    |
|   |                                      | I <sub>O</sub> = 1.1 mA; V <sub>CC</sub> = 1.1 V   | -                      | -   | 0.33 × V <sub>CC</sub> | V    |
|   |                                      | I <sub>O</sub> = 1.7 mA; V <sub>CC</sub> = 1.4 V   | -                      | -   | 0.41                   | V    |
|   |                                      | I <sub>O</sub> = 1.9 mA; V <sub>CC</sub> = 1.65 V  | -                      | -   | 0.39                   | V    |
|   |                                      | I <sub>O</sub> = 2.3 mA; V <sub>CC</sub> = 2.3 V   | -                      | -   | 0.36                   | V    |
|   |                                      | I <sub>O</sub> = 3.1 mA; V <sub>CC</sub> = 2.3 V   | -                      | -   | 0.50                   | V    |
|   |                                      | I <sub>O</sub> = 2.7 mA; V <sub>CC</sub> = 3.0 V   | -                      | -   | 0.36                   | V    |
| I <sub>O</sub> = 4.0 mA; V <sub>CC</sub> = 3.0 V  | -                                    | -  | 0.50                   | V   |                        |      |
| I <sub>I</sub>                                    | input leakage current                | V <sub>I</sub> = GND to 3.6 V; V <sub>CC</sub> = 0 V to 3.6 V                                    | -                      | -   | ±0.75                  | μA   |
| I <sub>OFF</sub>                                  | power-off leakage current            | V <sub>I</sub> or V <sub>O</sub> = 0 V to 3.6 V; V <sub>CC</sub> = 0 V                           | -                      | -   | ±0.75                  | μA   |
| ΔI <sub>OFF</sub>                                 | additional power-off leakage current | V <sub>I</sub> or V <sub>O</sub> = 0 V to 3.6 V; V <sub>CC</sub> = 0 V to 0.2 V                  | -                      | -   | ±0.75                  | μA   |
| I <sub>CC</sub>                                   | supply current                       | V <sub>I</sub> = GND or V <sub>CC</sub> ; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 0.8 V to 3.6 V | -                      | -   | 1.4                    | μA   |
| ΔI <sub>CC</sub>                                  | additional supply current            | V <sub>I</sub> = V <sub>CC</sub> - 0.6 V; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 3.3 V          | -                      | -   | 75                     | μA   |

## 11. Dynamic characteristics

**Table 9. Dynamic characteristics**

Voltages are referenced to GND (ground = 0 V); for test circuit, see Fig. 12.

| Symbol                      | Parameter         | Conditions                           | 25 °C |         |      | -40 °C to +85 °C |      | -40 °C to +125 °C |      | Unit |
|-----------------------------|-------------------|--------------------------------------|-------|---------|------|------------------|------|-------------------|------|------|
|                             |                   |                                      | Min   | Typ [1] | Max  | Min              | Max  | Min               | Max  |      |
| <b>C<sub>L</sub> = 5 pF</b> |                   |                                      |       |         |      |                  |      |                   |      |      |
| t <sub>pd</sub>             | propagation delay | nA, nB and nC to nY; see Fig. 11 [2] |       |         |      |                  |      |                   |      |      |
|                             |                   | V <sub>CC</sub> = 0.8 V              | -     | 22.6    | -    | -                | -    | -                 | -    | ns   |
|                             |                   | V <sub>CC</sub> = 1.1 V to 1.3 V     | 2.8   | 6.5     | 12.6 | 2.5              | 13.0 | 2.5               | 13.2 | ns   |
|                             |                   | V <sub>CC</sub> = 1.4 V to 1.6 V     | 2.2   | 4.6     | 7.6  | 2.5              | 8.2  | 2.5               | 8.6  | ns   |
|                             |                   | V <sub>CC</sub> = 1.65 V to 1.95 V   | 2.1   | 3.9     | 6.2  | 2.0              | 6.8  | 2.0               | 7.2  | ns   |
|                             |                   | V <sub>CC</sub> = 2.3 V to 2.7 V     | 2.0   | 3.1     | 4.5  | 1.8              | 5.1  | 1.8               | 5.3  | ns   |
|                             |                   | V <sub>CC</sub> = 3.0 V to 3.6 V     | 1.8   | 2.8     | 3.9  | 1.5              | 4.1  | 1.5               | 4.3  | ns   |

## Low-power dual PCB configurable multiple function gate

| Symbol  | Parameter                     | Conditions  | 25 °C |         |      | -40 °C to +85 °C |      | -40 °C to +125 °C |      | Unit |
|---|-------------------------------|---|-------|---------|------|------------------|------|-------------------|------|------|
|   |                               |   | Min   | Typ [1] | Max  | Min              | Max  | Min               | Max  |      |
| <b>C<sub>L</sub> = 10 pF</b>                        |                               |   |       |         |      |                  |      |                   |      |      |
| t <sub>pd</sub>                                     | propagation delay             | nA, nB and nC to nY; see Fig. 11 [2]                                    |       |         |      |                  |      |                   |      |      |
|   |                               | V <sub>CC</sub> = 0.8 V   | -     | 26.1    | -    | -                | -    | -                 | -    | ns   |
|   |                               | V <sub>CC</sub> = 1.1 V to 1.3 V  | 3.2   | 7.3     | 14.4 | 2.8              | 14.9 | 2.8               | 15.2 | ns   |
|   |                               | V <sub>CC</sub> = 1.4 V to 1.6 V  | 2.6   | 5.2     | 8.7  | 2.8              | 9.3  | 2.8               | 9.8  | ns   |
|   |                               | V <sub>CC</sub> = 1.65 V to 1.95 V                                      | 2.5   | 4.5     | 7.0  | 2.2              | 7.8  | 2.2               | 8.2  | ns   |
|   |                               | V <sub>CC</sub> = 2.3 V to 2.7 V  | 2.4   | 3.7     | 5.2  | 2.1              | 5.9  | 2.1               | 6.2  | ns   |
|   |                               | V <sub>CC</sub> = 3.0 V to 3.6 V  | 2.3   | 3.4     | 4.6  | 1.9              | 4.9  | 1.9               | 5.1  | ns   |
| <b>C<sub>L</sub> = 15 pF</b>                        |                               |   |       |         |      |                  |      |                   |      |      |
| t <sub>pd</sub>                                     | propagation delay             | nA, nB and nC to nY; see Fig. 11 [2]                                    |       |         |      |                  |      |                   |      |      |
|   |                               | V <sub>CC</sub> = 0.8 V   | -     | 31.6    | -    | -                | -    | -                 | -    | ns   |
|   |                               | V <sub>CC</sub> = 1.1 V to 1.3 V  | 3.4   | 8.0     | 15.7 | 3.1              | 16.7 | 3.1               | 17.0 | ns   |
|   |                               | V <sub>CC</sub> = 1.4 V to 1.6 V  | 2.8   | 5.7     | 9.4  | 3.1              | 10.4 | 3.1               | 10.9 | ns   |
|   |                               | V <sub>CC</sub> = 1.65 V to 1.95 V                                      | 2.6   | 4.9     | 7.7  | 2.5              | 8.7  | 2.5               | 9.2  | ns   |
|   |                               | V <sub>CC</sub> = 2.3 V to 2.7 V  | 2.6   | 4.1     | 5.7  | 2.4              | 6.5  | 2.4               | 6.9  | ns   |
|   |                               | V <sub>CC</sub> = 3.0 V to 3.6 V  | 2.5   | 3.8     | 5.0  | 2.2              | 5.5  | 2.2               | 5.7  | ns   |
| <b>C<sub>L</sub> = 30 pF</b>                        |                               |   |       |         |      |                  |      |                   |      |      |
| t <sub>pd</sub>                                     | propagation delay             | nA, nB and nC to nY; see Fig. 11 [2]                                    |       |         |      |                  |      |                   |      |      |
|   |                               | V <sub>CC</sub> = 0.8 V   | -     | 37.8    | -    | -                | -    | -                 | -    | ns   |
|   |                               | V <sub>CC</sub> = 1.1 V to 1.3 V  | 4.6   | 10.4    | 20.9 | 3.9              | 21.8 | 3.9               | 22.3 | ns   |
|   |                               | V <sub>CC</sub> = 1.4 V to 1.6 V  | 3.6   | 7.4     | 12.2 | 3.8              | 13.4 | 3.8               | 14.1 | ns   |
|   |                               | V <sub>CC</sub> = 1.65 V to 1.95 V                                      | 3.5   | 6.2     | 9.9  | 3.1              | 11.1 | 3.1               | 11.8 | ns   |
|   |                               | V <sub>CC</sub> = 2.3 V to 2.7 V  | 3.4   | 5.2     | 7.4  | 3.1              | 8.3  | 3.1               | 8.8  | ns   |
|   |                               | V <sub>CC</sub> = 3.0 V to 3.6 V  | 3.2   | 4.9     | 6.6  | 2.8              | 7.0  | 2.8               | 7.4  | ns   |
| <b>C<sub>L</sub> = 5 pF, 10 pF, 15 pF and 30 pF</b> |                               |   |       |         |      |                  |      |                   |      |      |
| C <sub>PD</sub>                                     | power dissipation capacitance | f <sub>i</sub> = 1 MHz; V <sub>I</sub> = GND to V <sub>CC</sub> [3] [4] |       |         |      |                  |      |                   |      |      |
|   |                               | V <sub>CC</sub> = 0.8 V   | -     | 2.6     | -    | -                | -    | -                 | -    | pF   |
|   |                               | V <sub>CC</sub> = 1.1 V to 1.3 V  | -     | 2.8     | -    | -                | -    | -                 | -    | pF   |
|   |                               | V <sub>CC</sub> = 1.4 V to 1.6 V  | -     | 2.9     | -    | -                | -    | -                 | -    | pF   |
|   |                               | V <sub>CC</sub> = 1.65 V to 1.95 V                                      | -     | 3.1     | -    | -                | -    | -                 | -    | pF   |
|   |                               | V <sub>CC</sub> = 2.3 V to 2.7 V  | -     | 3.7     | -    | -                | -    | -                 | -    | pF   |
|   |                               | V <sub>CC</sub> = 3.0 V to 3.6 V  | -     | 4.3     | -    | -                | -    | -                 | pF   |      |

[1] All typical values are measured at nominal V<sub>CC</sub>.

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

[3] All specified values are the average typical values over all stated loads.

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

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

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;

∑(C<sub>L</sub> × V<sub>CC</sub><sup>2</sup> × f<sub>o</sub>) = sum of the outputs.

11.1. Waveform and test circuit

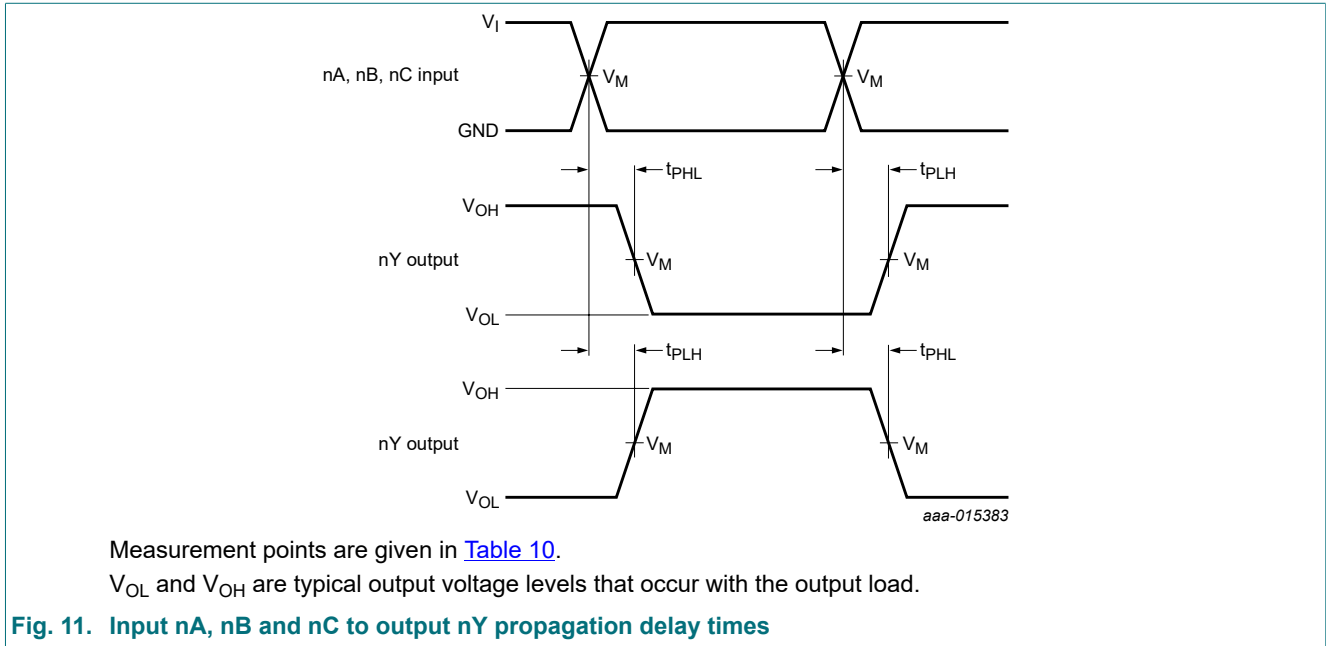


Table 10. Measurement points

| Supply voltage | Output              | Input               |          |               |
|----------------|---------------------|---------------------|----------|---------------|
| $V_{CC}$       | $V_M$               | $V_M$               | $V_I$    | $t_r = t_f$   |
| 0.8 V to 3.6 V | $0.5 \times V_{CC}$ | $0.5 \times V_{CC}$ | $V_{CC}$ | $\leq 3.0$ ns |

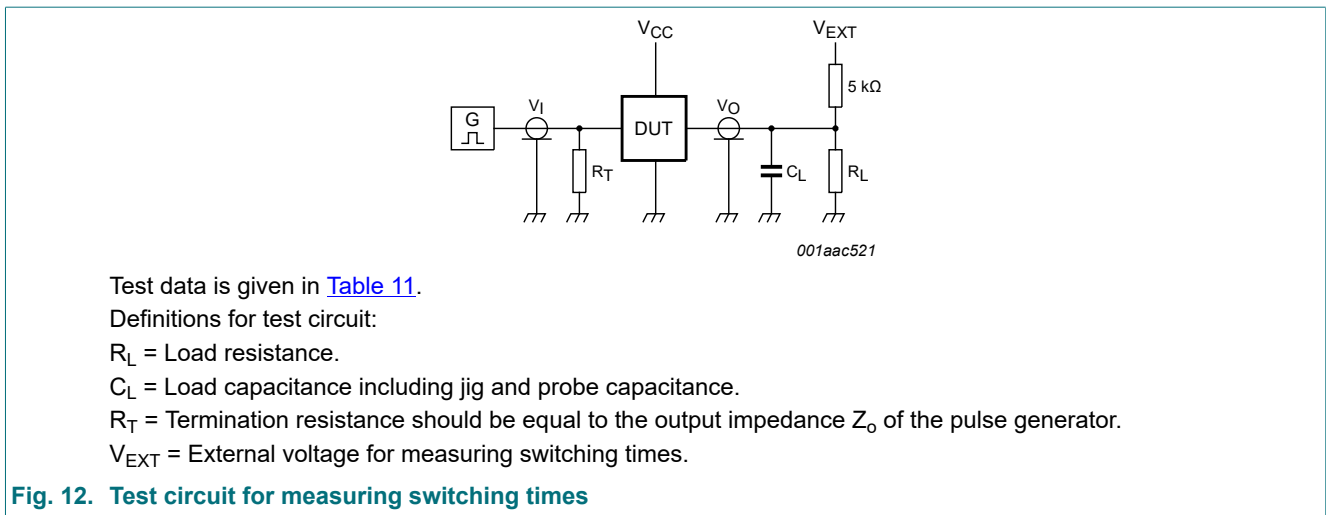


Table 11. Test data

| Supply voltage | Load                         |              | $V_{EXT}$          |                    |                    |
|----------------|------------------------------|--------------|--------------------|--------------------|--------------------|
| $V_{CC}$       | $C_L$                        | $R_L$ [1]    | $t_{PLH}, t_{PHL}$ | $t_{PZH}, t_{PHZ}$ | $t_{PZL}, t_{PLZ}$ |
| 0.8 V to 3.6 V | 5 pF, 10 pF, 15 pF and 30 pF | 5 kΩ or 1 MΩ | open               | GND                | $2 \times V_{CC}$  |

[1] For measuring enable and disable times,  $R_L = 5$  kΩ.  
 For measuring propagation delays, set-up and hold times, and pulse width,  $R_L = 1$  MΩ.

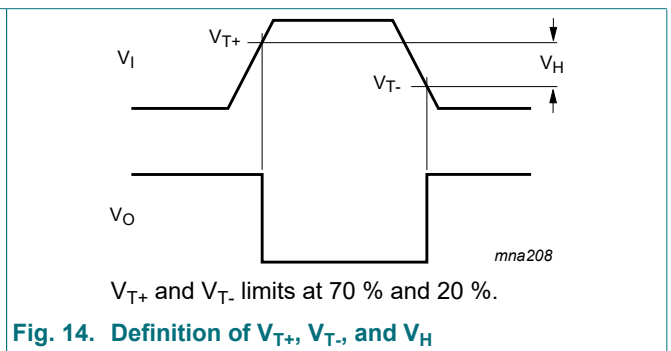
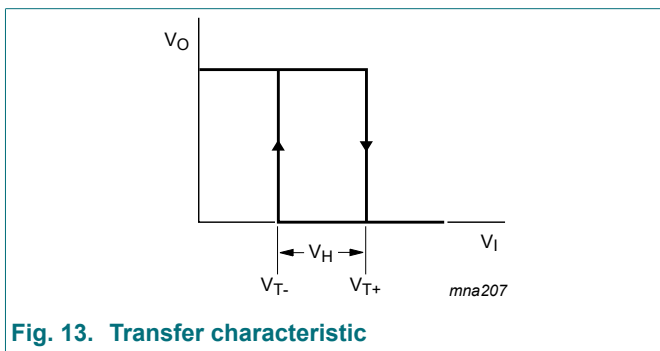
## 12. Transfer characteristics

**Table 12. Transfer characteristics**

Voltages are referenced to GND (ground = 0 V); for test circuit see Fig. 12.

| Symbol          | Parameter                        | Conditions  | 25 °C |     |      | -40 °C to +85 °C |      | -40 °C to +125 °C |      | Unit |
|-----------------|----------------------------------|---|-------|-----|------|------------------|------|-------------------|------|------|
|                 |                                  |   | Min   | Typ | Max  | Min              | Max  | Min               | Max  |      |
| V <sub>T+</sub> | positive-going threshold voltage | see Fig. 13 and Fig. 14   |       |     |      |                  |      |                   |      |      |
|                 |                                  | V <sub>CC</sub> = 0.8 V   | 0.30  | -   | 0.60 | 0.30             | 0.60 | 0.30              | 0.62 | V    |
|                 |                                  | V <sub>CC</sub> = 1.1 V   | 0.53  | -   | 0.90 | 0.53             | 0.90 | 0.53              | 0.92 | V    |
|                 |                                  | V <sub>CC</sub> = 1.4 V   | 0.74  | -   | 1.11 | 0.74             | 1.11 | 0.74              | 1.13 | V    |
|                 |                                  | V <sub>CC</sub> = 1.65 V  | 0.91  | -   | 1.29 | 0.91             | 1.29 | 0.91              | 1.31 | V    |
|                 |                                  | V <sub>CC</sub> = 2.3 V   | 1.37  | -   | 1.77 | 1.37             | 1.77 | 1.37              | 1.80 | V    |
|                 |                                  | V <sub>CC</sub> = 3.0 V   | 1.88  | -   | 2.29 | 1.88             | 2.29 | 1.88              | 2.32 | V    |
| V <sub>T-</sub> | negative-going threshold voltage | see Fig. 13 and Fig. 14   |       |     |      |                  |      |                   |      |      |
|                 |                                  | V <sub>CC</sub> = 0.8 V   | 0.10  | -   | 0.60 | 0.10             | 0.60 | 0.10              | 0.60 | V    |
|                 |                                  | V <sub>CC</sub> = 1.1 V   | 0.26  | -   | 0.65 | 0.26             | 0.65 | 0.26              | 0.65 | V    |
|                 |                                  | V <sub>CC</sub> = 1.4 V   | 0.39  | -   | 0.75 | 0.39             | 0.75 | 0.39              | 0.75 | V    |
|                 |                                  | V <sub>CC</sub> = 1.65 V  | 0.47  | -   | 0.84 | 0.47             | 0.84 | 0.47              | 0.84 | V    |
|                 |                                  | V <sub>CC</sub> = 2.3 V   | 0.69  | -   | 1.04 | 0.69             | 1.04 | 0.69              | 1.04 | V    |
|                 |                                  | V <sub>CC</sub> = 3.0 V   | 0.88  | -   | 1.24 | 0.88             | 1.24 | 0.88              | 1.24 | V    |
| V <sub>H</sub>  | hysteresis voltage               | (V <sub>T+</sub> - V <sub>T-</sub> ); see Fig. 13, Fig. 14, Fig. 15 and Fig. 16 |       |     |      |                  |      |                   |      |      |
|                 |                                  | V <sub>CC</sub> = 0.8 V   | 0.07  | -   | 0.50 | 0.07             | 0.50 | 0.07              | 0.50 | V    |
|                 |                                  | V <sub>CC</sub> = 1.1 V   | 0.08  | -   | 0.46 | 0.08             | 0.46 | 0.08              | 0.46 | V    |
|                 |                                  | V <sub>CC</sub> = 1.4 V   | 0.18  | -   | 0.56 | 0.18             | 0.56 | 0.18              | 0.56 | V    |
|                 |                                  | V <sub>CC</sub> = 1.65 V  | 0.27  | -   | 0.66 | 0.27             | 0.66 | 0.27              | 0.66 | V    |
|                 |                                  | V <sub>CC</sub> = 2.3 V   | 0.53  | -   | 0.92 | 0.53             | 0.92 | 0.53              | 0.92 | V    |
|                 |                                  | V <sub>CC</sub> = 3.0 V   | 0.79  | -   | 1.31 | 0.79             | 1.31 | 0.79              | 1.31 | V    |

### 12.1. Waveform transfer characteristics



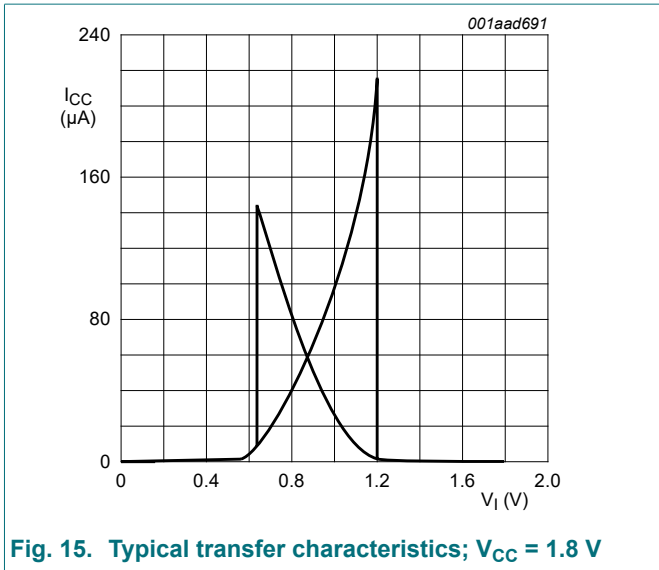


Fig. 15. Typical transfer characteristics;  $V_{CC} = 1.8\text{ V}$

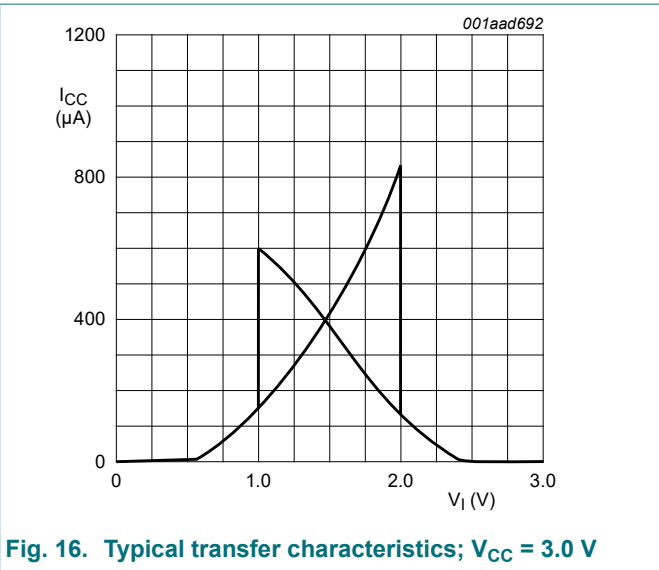


Fig. 16. Typical transfer characteristics;  $V_{CC} = 3.0\text{ V}$

13. Package outline

TSSOP10: plastic thin shrink small outline package; 10 leads; body width 3 mm

SOT552-1

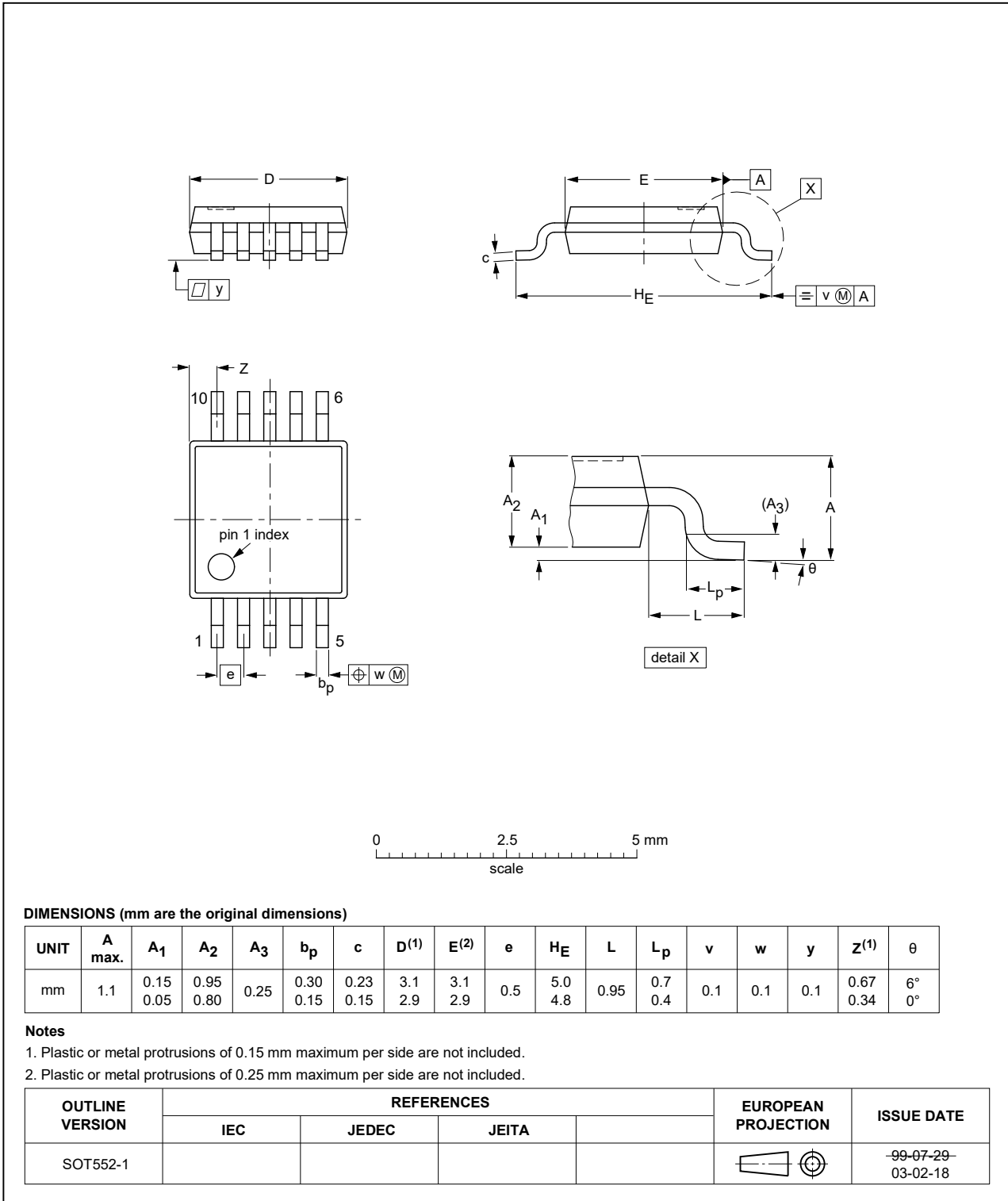


Fig. 17. Package outline SOT552-1 (TSSOP10)

**XQFN10: plastic, extremely thin quad flat package; no leads; 10 terminals; body 1.40 x 1.80 x 0.50 mm**

SOT1160-1

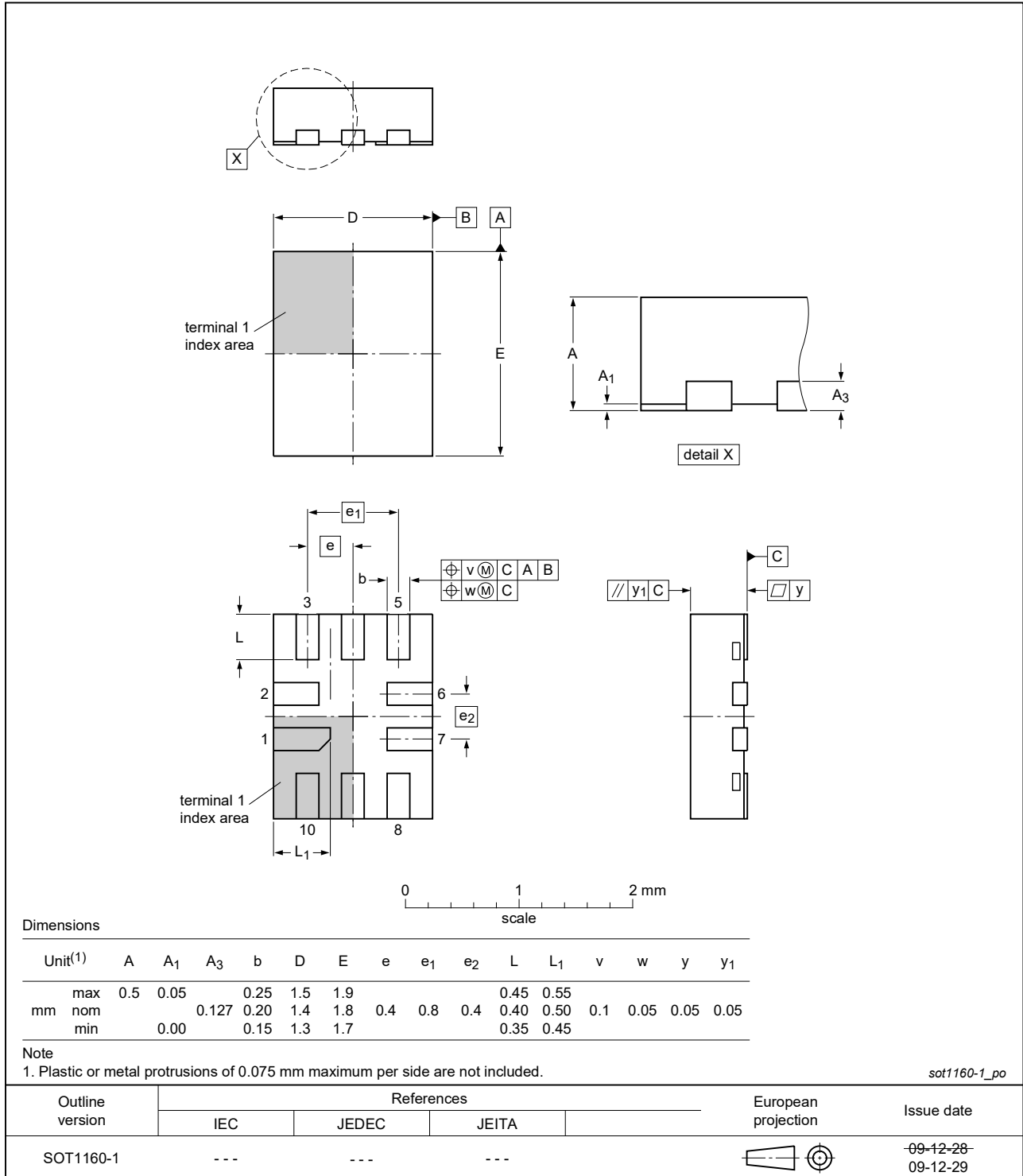


Fig. 18. Package outline SOT1160-1 (XQFN10)

## 14. Abbreviations

Table 13. Abbreviations

| Acronym | Description             |
|---------|-------------------------|
| CDM     | Charged Device Model    |
| DUT     | Device Under Test       |
| ESD     | ElectroStatic Discharge |
| HBM     | Human Body Model        |
| MM      | Machine Model           |
| PCB     | Printed Circuit Board   |

## 15. Revision history

Table 14. Revision history

| Document ID    | Release date   | Data sheet status  | Change notice | Supersedes    |
|----------------|--|--------------------|---------------|---------------|
| 74AUP2G57 v.3  | 20210507   | Product data sheet | -             | 74AUP2G57 v.2 |
| Modifications: | <ul style="list-style-type: none"> <li>The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia.</li> <li>Legal texts have been adapted to the new company name where appropriate.</li> <li>Type number 74AUP2G57GF (SOT1081-2 / XSON10) removed.</li> <li><a href="#">Section 8</a>: Derating values for <math>P_{tot}</math> total power dissipation updated.</li> </ul> |                    |               |               |
| 74AUP2G57 v.2  | 20151202   | Product data sheet | -             | 74AUP2G57 v.1 |
| Modifications: | <ul style="list-style-type: none"> <li>Maximum value temperature range TSSOP10 (74AUP2G57DP) changed from 85 °C to 125 °C.</li> <li>Removed 74AUP2G57GM (SOT1049-3).</li> </ul>  |                    |               |               |
| 74AUP2G57 v.1  | 20141104   | Product data sheet | -             | -             |

## 16. Legal information

### Data sheet status

| Document status [1][2]         | Product status [3] | Definition  |
|--------------------------------|--------------------|---|
| Objective [short] data sheet   | Development        | This document contains data from the objective specification for product development. |
| Preliminary [short] data sheet | Qualification      | This document contains data from the preliminary specification.                       |
| Product [short] data sheet     | Production         | This document contains the product specification.                                     |

- [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".
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