

# 74AUP2G04

Low-power dual inverter

Rev. 8 — 31 January 2022

Product data sheet

## 1. General description

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The 74AUP2G04 is a dual inverter. Schmitt-trigger action at all inputs makes the circuit tolerant of slower input rise and fall times. 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

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- Wide supply voltage range from 0.8 V to 3.6 V
- High noise immunity
- Complies with JEDEC standards:
  - JESD8-12 (0.8 V to 1.3 V)
  - JESD8-11 (0.9 V to 1.65 V)
  - JESD8-7 (1.2 V to 1.95 V)
  - JESD8-5 (1.8 V to 2.7 V)
  - JESD8-B (2.7 V to 3.6 V)
- ESD protection:
  - HBM JESD22-A114F Class 3A 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
- Multiple package options
- Specified from  $-40\text{ }^{\circ}\text{C}$  to  $+85\text{ }^{\circ}\text{C}$  and  $-40\text{ }^{\circ}\text{C}$  to  $+125\text{ }^{\circ}\text{C}$

### 3. Ordering information

Table 1. Ordering information

| Type number | Package           |        |  | Version   |
|-------------|-------------------|--------|--|-----------|
|             | Temperature range | Name   | Description  |           |
| 74AUP2G04GW | -40 °C to +125 °C | TSSOP6 | plastic thin shrink small outline package; 6 leads; body width 1.25 mm   | SOT363-2  |
| 74AUP2G04GM | -40 °C to +125 °C | XSON6  | plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1.45 × 0.5 mm                    | SOT886    |
| 74AUP2G04GN | -40 °C to +125 °C | XSON6  | extremely thin small outline package; no leads; 6 terminals; body 0.9 × 1.0 × 0.35 mm                          | SOT1115   |
| 74AUP2G04GS | -40 °C to +125 °C | XSON6  | extremely thin small outline package; no leads; 6 terminals; body 1.0 × 1.0 × 0.35 mm                          | SOT1202   |
| 74AUP2G04GX | -40 °C to +125 °C | X2SON6 | plastic thermal enhanced extremely thin small outline package; no leads; 6 terminals; body 1.0 × 0.8 × 0.32 mm | SOT1255-2 |

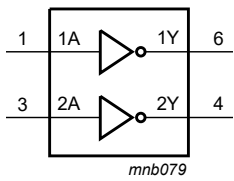
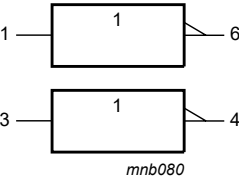
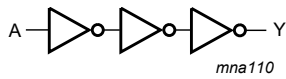
### 4. Marking

Table 2. Marking

| Type number | Marking code <sup>[1]</sup> |
|-------------|-----------------------------|
| 74AUP2G04GW | p4                          |
| 74AUP2G04GM | p4                          |
| 74AUP2G04GN | p4                          |
| 74AUP2G04GS | p4                          |
| 74AUP2G04GX | p4                          |

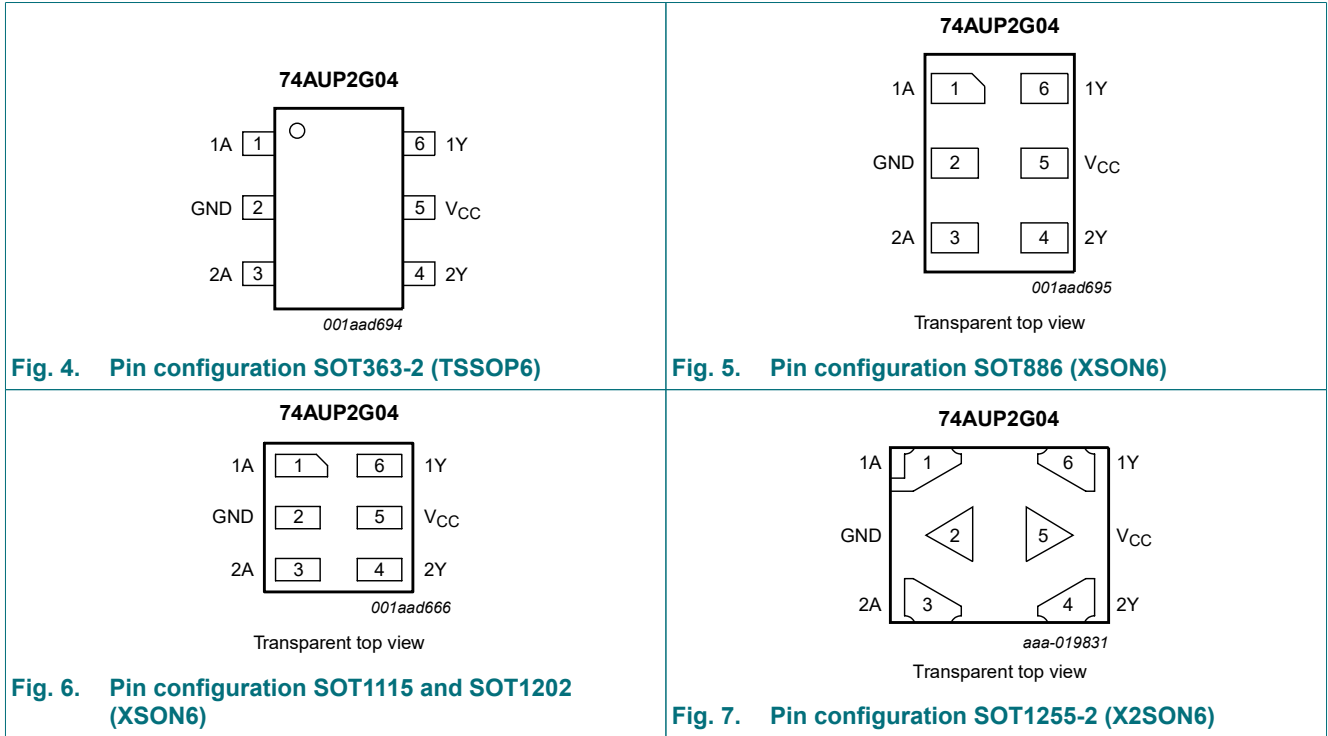
[1] The pin 1 indicator is located on the lower left corner of the device, below the marking code.

### 5. Functional diagram

|   |   |   |
|---|---|---|
|  |  |  |
| <b>Fig. 1. Logic symbol</b>   | <b>Fig. 2. IEC logic symbol</b>   | <b>Fig. 3. Logic diagram</b>  |

## 6. Pinning information

### 6.1. Pinning



### 6.2. Pin description

Table 3. Pin description

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

## 7. Functional description

Table 4. Function table

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

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

## 8. Limiting values

**Table 5. Limiting values**

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

| 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           |                                 | [1] -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 | [1] -0.5 | +4.6 | V    |
| $I_O$     | output current          | $V_O = 0$ V to $V_{CC}$         | -        | ±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   | [2] -    | 250  | mW   |

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

[2] For SOT363-2 (TSSOP6) package:  $P_{tot}$  derates linearly with 3.7 mW/K above 83 °C.

For SOT886 (XSON6) package:  $P_{tot}$  derates linearly with 3.3 mW/K above 74 °C.

For SOT1115 (XSON6) package:  $P_{tot}$  derates linearly with 3.2 mW/K above 71 °C.

For SOT1202 (XSON6) package:  $P_{tot}$  derates linearly with 3.3 mW/K above 74 °C.

For SOT1255-2 (X2SON6) package:  $P_{tot}$  derates linearly with 3.3 mW/K above 75 °C.

## 9. Recommended operating conditions

**Table 6. 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   |
| $\Delta t/\Delta V$ | input transition rise and fall rate | $V_{CC} = 0.8$ V to 3.6 V       | 0   | 200      | ns/V |

## 10. Static characteristics

**Table 7. 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> = 0.8 V  | 0.70 × V <sub>CC</sub> | -   | -                      | V    |
|  |                                      | V <sub>CC</sub> = 0.9 V to 1.95 V  | 0.65 × V <sub>CC</sub> | -   | -                      | V    |
|  |                                      | V <sub>CC</sub> = 2.3 V to 2.7 V   | 1.6                    | -   | -                      | V    |
|  |                                      | V <sub>CC</sub> = 3.0 V to 3.6 V   | 2.0                    | -   | -                      | V    |
| V <sub>IL</sub>                                  | LOW-level input voltage              | V <sub>CC</sub> = 0.8 V  | -                      | -   | 0.30 × V <sub>CC</sub> | V    |
|  |                                      | V <sub>CC</sub> = 0.9 V to 1.95 V  | -                      | -   | 0.35 × V <sub>CC</sub> | V    |
|  |                                      | V <sub>CC</sub> = 2.3 V to 2.7 V   | -                      | -   | 0.7                    | V    |
|  |                                      | V <sub>CC</sub> = 3.0 V to 3.6 V   | -                      | -   | 0.9                    | 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> = 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    |
| 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> = 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>CC</sub> = 0 V to 3.6 V; V <sub>I</sub> = GND or V <sub>CC</sub>                          | -                      | 0.8 | -                      | pF   |
| C <sub>O</sub>                                   | output capacitance                   | V <sub>O</sub> = GND; V <sub>CC</sub> = 0 V  | -                      | 1.7 | -                      | pF   |

| Symbol                                    | Parameter                            | Conditions   | Min                    | Typ | Max                    | Unit |
|---|--------------------------------------|--|------------------------|-----|------------------------|------|
| <b>T<sub>amb</sub> = -40 °C to +85 °C</b> |                                      |  |                        |     |                        |      |
| V <sub>IH</sub>                           | HIGH-level input voltage             | V <sub>CC</sub> = 0.8 V  | 0.70 × V <sub>CC</sub> | -   | -                      | V    |
|   |                                      | V <sub>CC</sub> = 0.9 V to 1.95 V  | 0.65 × V <sub>CC</sub> | -   | -                      | V    |
|   |                                      | V <sub>CC</sub> = 2.3 V to 2.7 V   | 1.6                    | -   | -                      | V    |
|   |                                      | V <sub>CC</sub> = 3.0 V to 3.6 V   | 2.0                    | -   | -                      | V    |
| V <sub>IL</sub>                           | LOW-level input voltage              | V <sub>CC</sub> = 0.8 V  | -                      | -   | 0.30 × V <sub>CC</sub> | V    |
|   |                                      | V <sub>CC</sub> = 0.9 V to 1.95 V  | -                      | -   | 0.35 × V <sub>CC</sub> | V    |
|   |                                      | V <sub>CC</sub> = 2.3 V to 2.7 V   | -                      | -   | 0.7                    | V    |
|   |                                      | V <sub>CC</sub> = 3.0 V to 3.6 V   | -                      | -   | 0.9                    | 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> = 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>IH</sub> or V <sub>IL</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>IH</sub>                            | HIGH-level input voltage             | V <sub>CC</sub> = 0.8 V  | 0.75 × V <sub>CC</sub> | -   | -                      | V    |
|  |                                      | V <sub>CC</sub> = 0.9 V to 1.95 V  | 0.70 × V <sub>CC</sub> | -   | -                      | V    |
|  |                                      | V <sub>CC</sub> = 2.3 V to 2.7 V   | 1.6                    | -   | -                      | V    |
|  |                                      | V <sub>CC</sub> = 3.0 V to 3.6 V   | 2.0                    | -   | -                      | V    |
| V <sub>IL</sub>                            | LOW-level input voltage              | V <sub>CC</sub> = 0.8 V  | -                      | -   | 0.25 × V <sub>CC</sub> | V    |
|  |                                      | V <sub>CC</sub> = 0.9 V to 1.95 V  | -                      | -   | 0.30 × V <sub>CC</sub> | V    |
|  |                                      | V <sub>CC</sub> = 2.3 V to 2.7 V   | -                      | -   | 0.7                    | V    |
|  |                                      | V <sub>CC</sub> = 3.0 V to 3.6 V   | -                      | -   | 0.9                    | 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> = 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>IH</sub> or V <sub>IL</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 8. Dynamic characteristics**

Voltages are referenced to GND (ground = 0 V); for test circuit see Fig. 9.

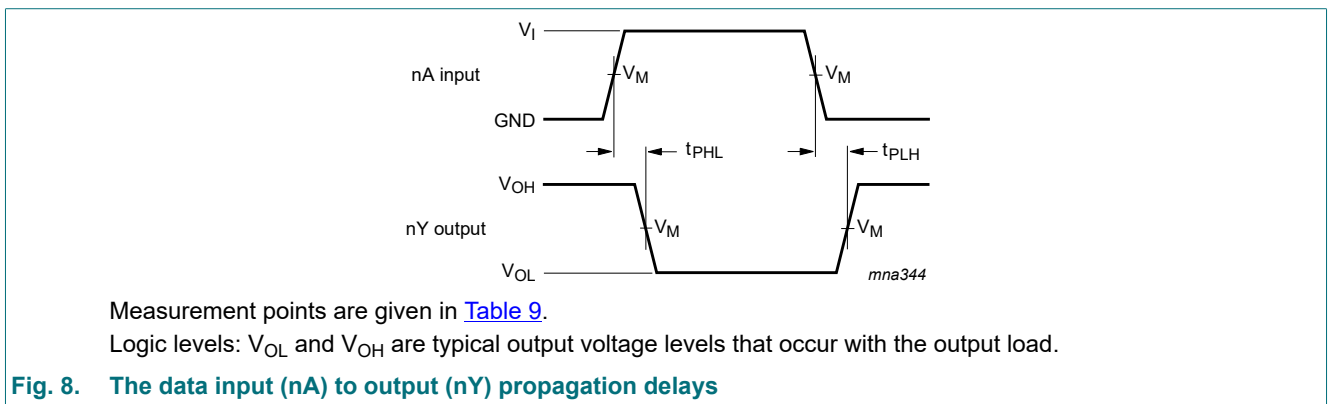
| Symbol                       | Parameter         | Conditions                         | 25 °C |         |      | -40 °C to +85 °C |      | -40 °C to +125 °C |      | Unit |
|------------------------------|-------------------|------------------------------------|-------|---------|------|------------------|------|-------------------|------|------|
|                              |                   |                                    | Min   | Typ [1] | Max  | Min              | Max  | Min               | Max  |      |
| <b>C<sub>L</sub> = 5 pF</b>  |                   |                                    |       |         |      |                  |      |                   |      |      |
| t <sub>pd</sub>              | propagation delay | nA to nY; see Fig. 8 [2]           |       |         |      |                  |      |                   |      |      |
|                              |                   | V <sub>CC</sub> = 0.8 V            | -     | 16.0    | -    | -                | -    | -                 | -    | ns   |
|                              |                   | V <sub>CC</sub> = 1.1 V to 1.3 V   | 2.4   | 5.0     | 10.3 | 2.1              | 11.4 | 2.1               | 12.6 | ns   |
|                              |                   | V <sub>CC</sub> = 1.4 V to 1.6 V   | 1.8   | 3.6     | 6.4  | 1.6              | 7.4  | 1.6               | 8.2  | ns   |
|                              |                   | V <sub>CC</sub> = 1.65 V to 1.95 V | 1.5   | 2.9     | 5.0  | 1.4              | 5.9  | 1.4               | 6.5  | ns   |
|                              |                   | V <sub>CC</sub> = 2.3 V to 2.7 V   | 1.2   | 2.4     | 3.9  | 1.1              | 4.5  | 1.1               | 5.0  | ns   |
| <b>C<sub>L</sub> = 10 pF</b> |                   |                                    |       |         |      |                  |      |                   |      |      |
| t <sub>pd</sub>              | propagation delay | nA to nY; see Fig. 8 [2]           |       |         |      |                  |      |                   |      |      |
|                              |                   | V <sub>CC</sub> = 0.8 V            | -     | 19.8    | -    | -                | -    | -                 | -    | ns   |
|                              |                   | V <sub>CC</sub> = 1.1 V to 1.3 V   | 2.8   | 5.9     | 12.2 | 2.6              | 13.7 | 2.6               | 15.1 | ns   |
|                              |                   | V <sub>CC</sub> = 1.4 V to 1.6 V   | 2.3   | 4.2     | 7.5  | 2.1              | 8.7  | 2.1               | 9.6  | ns   |
|                              |                   | V <sub>CC</sub> = 1.65 V to 1.95 V | 2.0   | 3.5     | 5.9  | 1.8              | 7.0  | 1.8               | 7.7  | ns   |
|                              |                   | V <sub>CC</sub> = 2.3 V to 2.7 V   | 1.7   | 2.9     | 4.6  | 1.5              | 5.4  | 1.5               | 6.0  | ns   |
| <b>C<sub>L</sub> = 15 pF</b> |                   |                                    |       |         |      |                  |      |                   |      |      |
| t <sub>pd</sub>              | propagation delay | nA to nY; see Fig. 8 [2]           |       |         |      |                  |      |                   |      |      |
|                              |                   | V <sub>CC</sub> = 0.8 V            | -     | 23.3    | -    | -                | -    | -                 | -    | ns   |
|                              |                   | V <sub>CC</sub> = 1.1 V to 1.3 V   | 3.2   | 6.7     | 13.0 | 3.0              | 15.8 | 3.0               | 17.4 | ns   |
|                              |                   | V <sub>CC</sub> = 1.4 V to 1.6 V   | 2.6   | 4.7     | 8.6  | 2.4              | 10.0 | 2.4               | 11.0 | ns   |
|                              |                   | V <sub>CC</sub> = 1.65 V to 1.95 V | 2.3   | 4.0     | 6.7  | 2.1              | 8.0  | 2.1               | 8.8  | ns   |
|                              |                   | V <sub>CC</sub> = 2.3 V to 2.7 V   | 2.1   | 3.3     | 5.1  | 1.8              | 6.1  | 1.8               | 6.8  | ns   |
| <b>C<sub>L</sub> = 30 pF</b> |                   |                                    |       |         |      |                  |      |                   |      |      |
| t <sub>pd</sub>              | propagation delay | nA to nY; see Fig. 8 [2]           |       |         |      |                  |      |                   |      |      |
|                              |                   | V <sub>CC</sub> = 0.8 V            | -     | 33.6    | -    | -                | -    | -                 | -    | ns   |
|                              |                   | V <sub>CC</sub> = 1.1 V to 1.3 V   | 4.4   | 8.9     | 16.0 | 4.0              | 19.0 | 4.0               | 20.9 | ns   |
|                              |                   | V <sub>CC</sub> = 1.4 V to 1.6 V   | 3.6   | 6.3     | 10.8 | 3.2              | 12.9 | 3.2               | 14.2 | ns   |
|                              |                   | V <sub>CC</sub> = 1.65 V to 1.95 V | 3.2   | 5.3     | 9.0  | 2.9              | 10.5 | 2.9               | 11.6 | ns   |
|                              |                   | V <sub>CC</sub> = 2.3 V to 2.7 V   | 2.9   | 4.5     | 6.5  | 2.6              | 7.6  | 2.6               | 8.4  | ns   |
| <b>C<sub>L</sub> = 30 pF</b> |                   |                                    |       |         |      |                  |      |                   |      |      |
| t <sub>pd</sub>              | propagation delay | V <sub>CC</sub> = 3.0 V to 3.6 V   | 2.9   | 4.2     | 5.4  | 2.6              | 6.2  | 2.6               | 6.9  | ns   |



| 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, 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  | -     | 2.5     | -   | -                | -   | -                 | -   | pF   |
|   |                               | V <sub>CC</sub> = 1.1 V to 1.3 V                                       | -     | 2.7     | -   | -                | -   | -                 | -   | pF   |
|   |                               | V <sub>CC</sub> = 1.4 V to 1.6 V                                       | -     | 2.8     | -   | -                | -   | -                 | -   | pF   |
|   |                               | V <sub>CC</sub> = 1.65 V to 1.95 V                                     | -     | 3.0     | -   | -                | -   | -                 | -   | pF   |
|   |                               | V <sub>CC</sub> = 2.3 V to 2.7 V                                       | -     | 3.5     | -   | -                | -   | -                 | -   | pF   |
|   |                               | V <sub>CC</sub> = 3.0 V to 3.6 V                                       | -     | 4.0     | -   | -                | -   | -                 | -   | pF   |

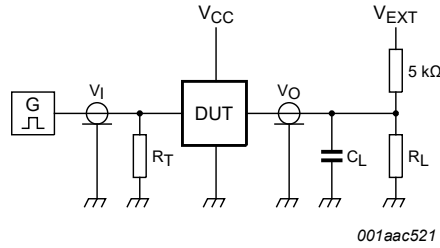
- [1] All typical values are measured at nominal V<sub>CC</sub>.
- [2] t<sub>pd</sub> is the same as t<sub>PLH</sub> and t<sub>PHL</sub>.
- [3] All specified values are the average typical values over all stated loads.
- [4] C<sub>PD</sub> is used to determine the dynamic power dissipation (P<sub>D</sub> in μW).  
 $P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma(C_L \times V_{CC}^2 \times f_o)$  where:  
 f<sub>i</sub> = input frequency in MHz;  
 f<sub>o</sub> = output frequency in MHz;  
 C<sub>L</sub> = load capacitance in pF;  
 V<sub>CC</sub> = supply voltage in V;  
 N = number of inputs switching;  
 Σ(C<sub>L</sub> × V<sub>CC</sub><sup>2</sup> × f<sub>o</sub>) = sum of the outputs.

### 11.1. Waveforms and test circuit



**Table 9. Measurement points**

| Supply voltage  | Output                | Input                 |                 |                                 |
|-----------------|-----------------------|-----------------------|-----------------|---------------------------------|
| V <sub>CC</sub> | V <sub>M</sub>        | V <sub>M</sub>        | V <sub>I</sub>  | t <sub>r</sub> = t <sub>f</sub> |
| 0.8 V to 3.6 V  | 0.5 × V <sub>CC</sub> | 0.5 × V <sub>CC</sub> | V <sub>CC</sub> | ≤ 3.0 ns                        |



Test data is given in [Table 10](#).

Definitions for test circuit:

$R_L$  = Load resistance;

$C_L$  = Load capacitance including jig and probe capacitance;

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

$V_{EXT}$  = External voltage for measuring switching times.

**Fig. 9. Test circuit for measuring switching times**

**Table 10. 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,  $R_L = 5 \text{ k}\Omega$ .

For measuring propagation delays, set-up and hold times, and pulse width,  $R_L = 1 \text{ M}\Omega$ .

## 12. Package outline

TSSOP6: plastic thin shrink small outline package; 6 leads; body width 1.25 mm

SOT363-2



Fig. 10. Package outline SOT363-2 (TSSOP6)

XSON6: plastic extremely thin small outline package; no leads; 6 terminals; body 1 x 1.45 x 0.5 mm

SOT886



Fig. 11. Package outline SOT886 (XSON6)

**XSON6: extremely thin small outline package; no leads;**  
**6 terminals; body 0.9 x 1.0 x 0.35 mm**

SOT1115



**Fig. 12. Package outline SOT1115 (XSON6)**

XSON6: extremely thin small outline package; no leads;  
6 terminals; body 1.0 x 1.0 x 0.35 mm

SOT1202



Fig. 13. Package outline SOT1202 (XSON6)

X2SON6: plastic thermal enhanced extremely thin small outline package; no leads; 6 terminals; body 1.0 x 0.8 x 0.32 mm

SOT1255-2

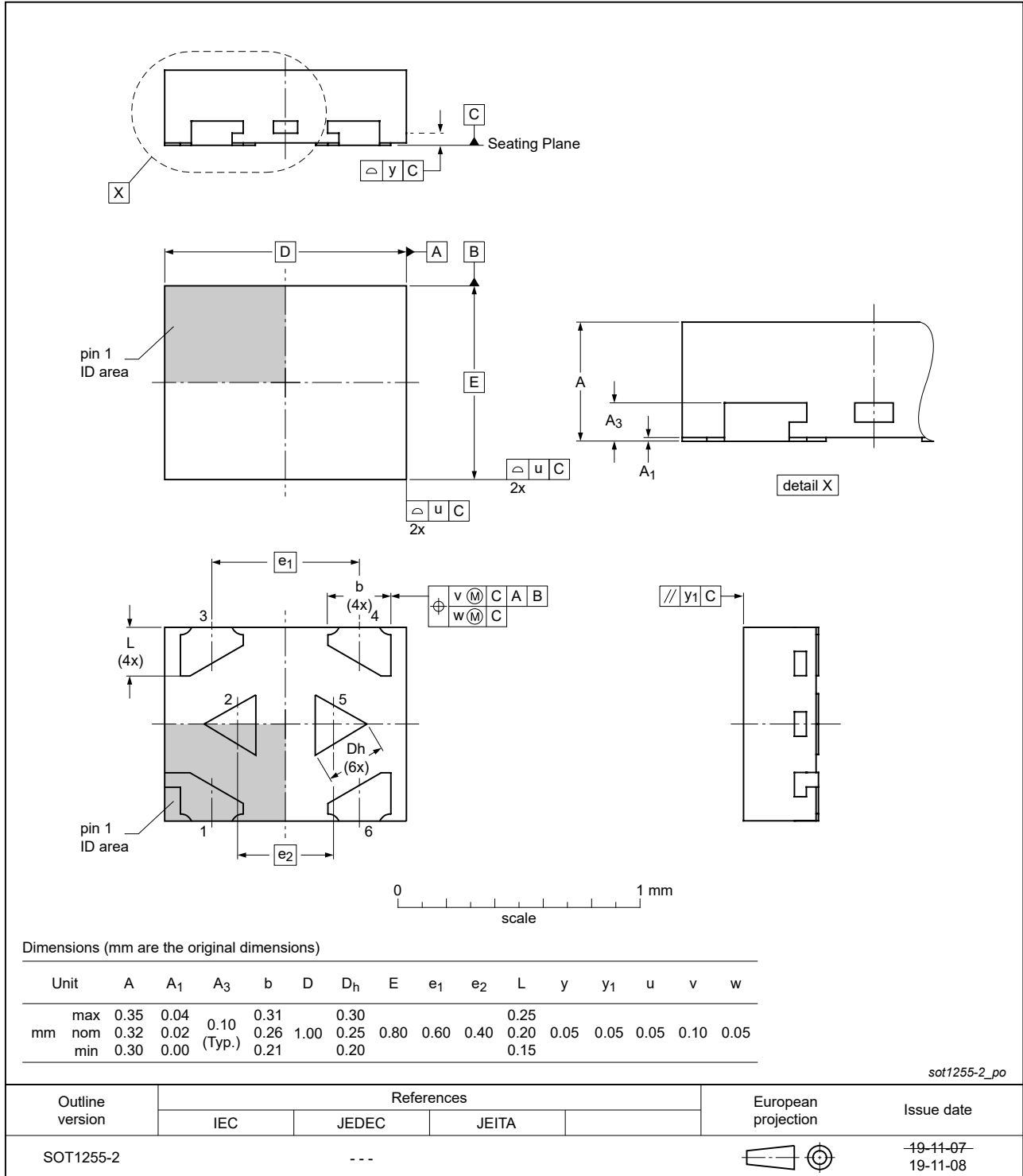


Fig. 14. Package outline SOT1255-2 (X2SON6)

## 13. Abbreviations

Table 11. Abbreviations

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

## 14. Revision history

Table 12. Revision history

| Document ID    | Release date  | Data sheet status  | Change notice | Supersedes    |
|----------------|---|--------------------|---------------|---------------|
| 74AUP2G04 v.8  | 20220131  | Product data sheet | -             | 74AUP2G04 v.7 |
| Modifications: | <ul style="list-style-type: none"> <li>Package SOT363 (SC-88) changed to SOT363-2 (TSSOP6).</li> </ul>  |                    |               |               |
| 74AUP2G04 v.7  | 20211104  | Product data sheet | -             | 74AUP2G04 v.6 |
| 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><a href="#">Section 1</a> updated.</li> <li>Type number 74AUP2G04GF (SOT891/XSON6) removed.</li> <li>SOT1255 (X2SON6) package changed to SOT1255-2 (X2SON6) package.</li> <li><a href="#">Table 5</a>: Derating values for <math>P_{tot}</math> total power dissipation updated.</li> </ul> |                    |               |               |
| 74AUP2G04 v.6  | 20150917  | Product data sheet | -             | 74AUP2G04 v.5 |
| Modifications: | <ul style="list-style-type: none"> <li>Added type number 74AUP2G04GX (SOT1255/X2SON6).</li> </ul>   |                    |               |               |
| 74AUP2G04 v.5  | 20120305  | Product data sheet | -             | 74AUP2G04 v.4 |
| Modifications: | <ul style="list-style-type: none"> <li>Package outline drawing of SOT886 (<a href="#">Fig. 11</a>) modified.</li> </ul>   |                    |               |               |
| 74AUP2G04 v.4  | 20111202  | Product data sheet | -             | 74AUP2G04 v.3 |
| Modifications: | <ul style="list-style-type: none"> <li>Legal pages updated.</li> </ul>  |                    |               |               |
| 74AUP2G04 v.3  | 20101101  | Product data sheet | -             | 74AUP2G04 v.2 |
| 74AUP2G04 v.2  | 20090707  | Product data sheet | -             | 74AUP2G04 v.1 |
| 74AUP2G04 v.1  | 20061122  | Product data sheet | -             | -             |



## 15. 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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