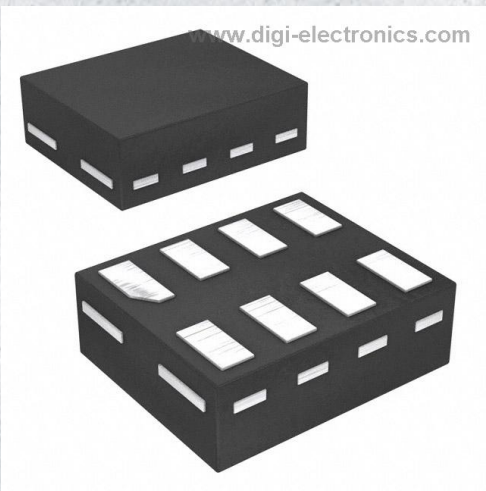
# 74AXP1T57GNX Datasheet




https://www.DiGi-Electronics.com

| | |
|---|---|
| DiGi Electronics Part Number | 74AXP1T57GNX-DG |
| Manufacturer | Nexperia USA Inc. |
| Manufacturer Product Number | 74AXP1T57GNX |
| Description | DUAL SUPPLY GATE SOT1116 |
| Detailed Description | Configurable Multiple Function Configurable 1 Circuit 3 Input 8-XSON (1.2x1) |

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RFQ Email: Info@DiGi-Electronics.com

## Purchase and inquiry

| Manufacturer Product Number: | Manufacturer: |
| --- | --- |
| 74AXP1T57GNX | Nexperia USA Inc. |
| Series: | Product Status: |
| 74AXP | Obsolete |
| Logic Type: | Number of Circuits: |
| Configurable Multiple Function | 1 |
| Number of Inputs: | Schmitt Trigger Input: |
| 3 | Yes |
| Output Type: | Current - Output High, Low: |
| Single-Ended | 12mA, 12mA |
| Voltage - Supply: | Operating Temperature: |
| 0.7V ~ 2.75V, 1.2V ~ 5.5V | -40°C ~ 85°C |
| Mounting Type: | Package / Case: |
| Surface Mount | 8-XFDFN |
| Supplier Device Package: | Base Product Number: |
| 8-XSON (1.2x1) | 74AXP1T57 |

## Environmental & Export classification

| RoHS Status: | Moisture Sensitivity Level (MSL): |
| --- | --- |
| ROHS3 Compliant | 1 (Unlimited) |
| REACH Status: | ECCN: |
| REACH Unaffected | EAR99 |
| HTSUS: | |
| 8542.39.0001 | |

# 74AXP1T57

## Dual supply configurable multiple function gate

Rev. 6 — 17 June 2022 Product data sheet

## 1. General description

The 74AXP1T57 is a dual supply configurable multiple function gate with Schmitt-trigger inputs. It features three inputs (A, B and C), an output (Y) and dual supply pins ($V_{CCI}$ and $V_{CCO}$). The inputs are referenced to $V_{CCI}$ and the output is referenced to $V_{CCO}$. All inputs can be connected directly to $V_{CCI}$ or GND. $V_{CCI}$ can be supplied at any voltage between 0.7 V and 2.75 V and $V_{CCO}$ can be supplied at any voltage between 1.2 V and 5.5 V. This feature allows voltage level translation. The 74AXP1T57 can be configured as any of the following logic functions AND, OR, NAND, NOR, XNOR, inverter and buffer.

This device ensures very low static and dynamic power consumption across the entire supply range and 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:
  - $V_{CCI}$: 0.7 V to 2.75 V
  - $V_{CCO}$: 1.2 V to 5.5 V
- Low input capacitance; $C_I$ = 0.6 pF (typical)
- Low output capacitance; $C_O$ = 1.8 pF (typical)
- Low dynamic power consumption; $C_{PD}$ = 0.6 pF at $V_{CCI}$ = 1.2 V (typical)
- Low dynamic power consumption; $C_{PD}$ = 7.1 pF at $V_{CCO}$ = 3.3 V (typical)
- Low static power consumption; $I_{CCI}$ = 0.5 µA (85 °C maximum)
- Low static power consumption; $I_{CCO}$ = 1.8 µA (85 °C maximum)
- High noise immunity
- Complies with JEDEC standard:
  - JESD8-12A.01 (1.1 V to 1.3 V; A, B, C inputs)
  - JESD8-11A.01 (1.4 V to 1.6 V)
  - JESD8-7A (1.65 V to 1.95 V)
  - JESD8-5A.01 (2.3 V to 2.7 V)
  - JESD8-C (2.7 V to 3.6 V; Y output)
  - JESD12-6 (4.5 V to 5.5 V; Y output)
- ESD protection:
  - HBM ANSI/ESDA/JEDEC JS-001 Class 2 exceeds 2 kV
  - CDM JESD22-C101E exceeds 1 kV
- Latch-up performance exceeds 100 mA per JESD78D Class II
- Inputs accept voltages up to 2.75 V
- Low noise overshoot and undershoot < 10% of $V_{CCO}$
- $I_{OFF}$ circuitry provides partial power-down mode operation
- Multiple package options
- Specified from -40 °C to +85 °C and from -40 °C to +125 °C

# 3. Ordering information

**Table 1. Ordering information**

| Type number | Package | | | |
|---|---|---|---|---|
| | Temperature range | Name | Description | Version |
| 74AXP1T57DC | -40 °C to +125 °C | VSSOP8 | plastic very thin shrink small outline package; 8 leads; body width 2.3 mm | SOT765-1 |
| 74AXP1T57GT | -40 °C to +125 °C | XSON8 | plastic extremely thin small outline package; no leads; 8 terminals; body 1 × 1.95 × 0.5 mm | SOT833-1 |
| 74AXP1T57GN | -40 °C to +125 °C | XSON8 | extremely thin small outline package; no leads; 8 terminals; body 1.2 × 1.0 × 0.35 mm | SOT1116 |
| 74AXP1T57GS | -40 °C to +125 °C | XSON8 | extremely thin small outline package; no leads; 8 terminals; body 1.35 × 1.0 × 0.35 mm | SOT1203 |
| 74AXP1T57GX | -40 °C to +125 °C | X2SON8 | plastic thermal enhanced extremely thin small outline package; no leads; 8 terminals; body 1.35 × 0.8 × 0.32 mm | SOT1233-2 |

# 4. Marking

**Table 2. Marking**

| Type number | Marking code[1] |
|---|---|
| 74AXP1T57DC | rD |
| 74AXP1T57GT | rD |
| 74AXP1T57GN | rD |
| 74AXP1T57GS | rD |
| 74AXP1T57GX | rD |

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

# 5. Functional diagram

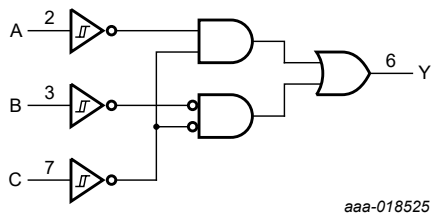



**Fig. 1. Logic symbol**

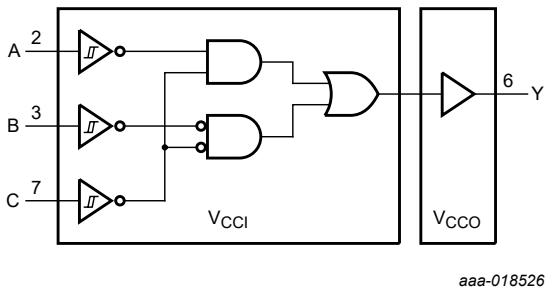



**Fig. 2. Logic diagram**

# 6. Pinning information

## 6.1. Pinning

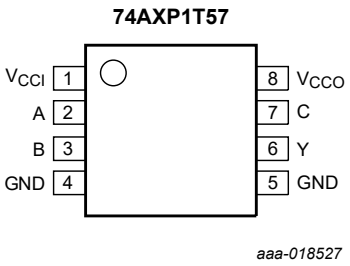



Fig. 3. Pin configuration SOT765-1 (VSSOP8)

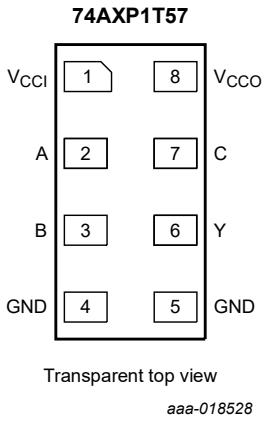



Fig. 4. Pin configuration SOT833-1, SOT1116 and SOT1203 (XSON8)

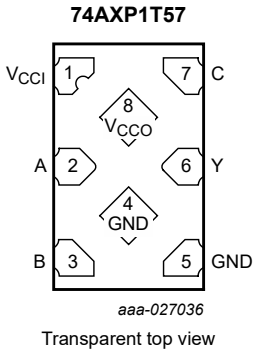



Fig. 5. Pin configuration SOT1233-2 (X2SON8)

## 6.2. Pin description

Table 3. Pin description

| Symbol | Pin | Description |
|---|---|---|
| $V_{CCI}$ | 1 | input supply voltage |
| A, B, C | 2, 3, 7 | data input |
| GND[1] | 4, 5 | ground (0 V) |
| Y | 6 | data output |
| $V_{CCO}$ | 8 | output supply voltage |

[1] All GND pins must be connected to ground (0 V).

# 7. Functional description

**Table 4. Function table**

*H = HIGH voltage level; L = LOW voltage level; X = don't care; Z = high-impedance OFF-state.*

| Supply voltage | | Input | | | Output |
|---|---|---|---|---|---|
| $V_{CCI}$ | $V_{CCO}$ | C | B | A | Y |
| 0.7 V to 2.75 V | 1.2 V to 5.5 V | L | L | L | H |
| 0.7 V to 2.75 V | 1.2 V to 5.5 V | L | L | H | L |
| 0.7 V to 2.75 V | 1.2 V to 5.5 V | L | H | L | H |
| 0.7 V to 2.75 V | 1.2 V to 5.5 V | L | H | H | L |
| 0.7 V to 2.75 V | 1.2 V to 5.5 V | H | L | L | L |
| 0.7 V to 2.75 V | 1.2 V to 5.5 V | H | L | H | L |
| 0.7 V to 2.75 V | 1.2 V to 5.5 V | H | H | L | H |
| 0.7 V to 2.75 V | 1.2 V to 5.5 V | H | H | H | H |
| GND | 1.2 V to 5.5 V | X | X | X | Z |
| 0.7 V to 2.75 V | GND | X | X | X | Z |
| GND | GND | X | X | X | Z |

## 7.1. Logic configurations

**Table 5. Function selection table**

| Logic function | Figure |
|---|---|
| 2-input AND | see Fig. 6 |
| 2-input AND with both inputs inverted | see Fig. 9 |
| 2-input NAND with inverted input | see Fig. 7 and Fig. 8 |
| 2-input OR with inverted input | see Fig. 7 and Fig. 8 |
| 2-input NOR | see Fig. 9 |
| 2-input NOR with both inputs inverted | see Fig. 6 |
| 2-input XNOR | see Fig. 10 |
| Inverter | see Fig. 11 |
| Buffer | see Fig. 12 |

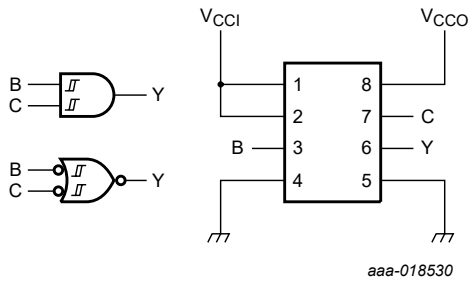



**Fig. 6. 2-input AND gate or 2-input NOR gate with both inputs inverted**

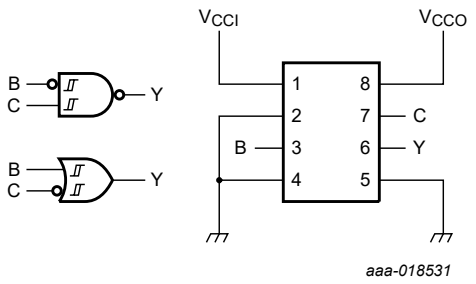



**Fig. 7. 2-input NAND gate with input B inverted or 2-input OR gate with input C inverted**

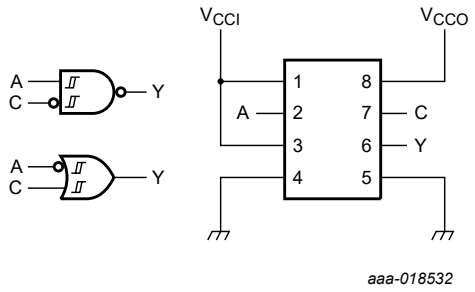



Fig. 8. 2-input NAND gate with input C inverted or 2-input OR gate with input A inverted

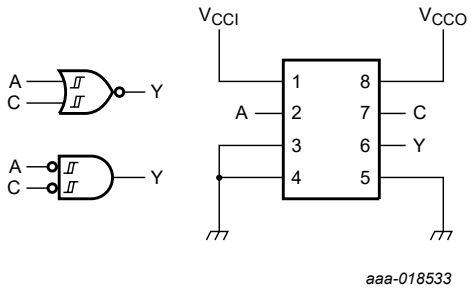



Fig. 9. 2-input NOR gate or 2-input AND gate with both inputs inverted

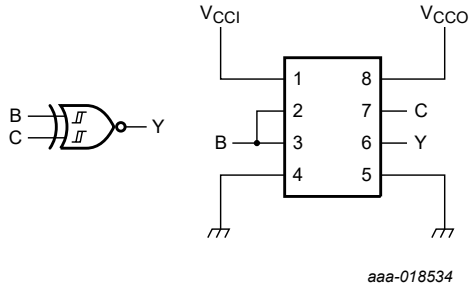



Fig. 10. 2-input XNOR gate

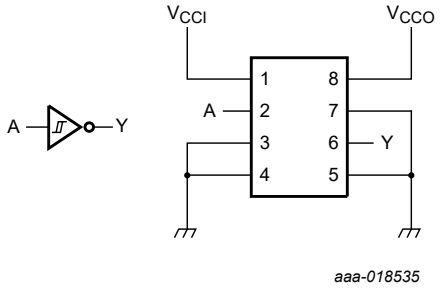



Fig. 11. Inverter

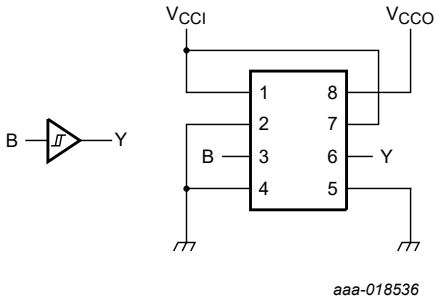



Fig. 12. Buffer

# 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 |
|---|---|---|---|---|---|---|
| $V_{CCI}$ | input supply voltage | | | -0.5 | +3.3 | V |
| $V_{CCO}$ | output supply voltage | | | -0.5 | +6.0 | V |
| $I_{IK}$ | input clamping current | $V_I$ < 0 V | | -50 | - | mA |
| $V_I$ | input voltage | | [1] | -0.5 | +3.3 | V |
| $I_{OK}$ | output clamping current | $V_O$ < 0 V | | -50 | - | mA |
| $V_O$ | output voltage | Active mode | [1] [2] | -0.5 | $V_{CCO}$ + 0.5 | V |
| | | Power-down or 3-state mode | [1] | -0.5 | +6.0 | V |
| $I_O$ | output current | $V_O$ = 0 V to $V_{CCO}$ | | - | ±25 | mA |
| $I_{CCI}$ | input supply current | | | - | 50 | mA |
| $I_{CCO}$ | output 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 | | | | |
| | | All packages except SOT1233-2 | [3] | - | 250 | mW |
| | | SOT1233-2 package | [4] | - | 300 | mW |

[1] The minimum input and output voltage ratings may be exceeded if the input and output current ratings are observed.
[2] $V_{CCO}$ + 0.5 V should not exceed 6.0 V.
[3] For SOT765-1 (VSSOP8) package: $P_{tot}$ derates linearly with 4.9 mW/K above 99 °C.
For SOT833-1 (XSON8) package: $P_{tot}$ derates linearly with 3.1 mW/K above 68 °C.
For SOT1116 (XSON8) package: $P_{tot}$ derates linearly with 4.2 mW/K above 90 °C.
For SOT1203 (XSON8) package: $P_{tot}$ derates linearly with 3.6 mW/K above 81 °C.
[4] For SOT1233-2 (X2SON8) package: $P_{tot}$ derates linearly with 7.7 mW/K above 118 °C.

# 9. Recommended operating conditions

**Table 7. Recommended operating conditions**

*Voltages are referenced to GND (ground = 0 V).*

| Symbol | Parameter | Conditions | Min | Max | Unit |
|---|---|---|---|---|---|
| $V_{CCI}$ | input supply voltage | | 0.7 | 2.75 | V |
| $V_{CCO}$ | output supply voltage | | 1.2 | 5.5 | V |
| $V_I$ | input voltage | | 0 | 2.75 | V |
| $V_O$ | output voltage | Active mode | 0 | $V_{CCO}$ | V |
| | | Power-down or 3-state mode | 0 | 5.5 | V |
| $T_{amb}$ | ambient temperature | | -40 | +125 | °C |

## 10. Static characteristics

**Table 8. Static characteristics**

*At recommended operating conditions, unless otherwise specified; voltages are referenced to GND (ground = 0 V).*

| Symbol | Parameter | Conditions | $T_{amb}$ = 25 °C | | | $T_{amb}$ = -40 °C to +85 °C | | $T_{amb}$ = -40 °C to +125 °C | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ[1] | Max | Min | Max | Min | Max | |
| $V_{T+}$ | positive-going threshold voltage | see Fig. 13 and Fig. 14 | | | | | | | | |
| | | $V_{CCI}$ = 0.75 V to 0.85 V | $0.3V_{CCI}$ | - | $0.8V_{CCI}$ | $0.3V_{CCI}$ | $0.8V_{CCI}$ | $0.3V_{CCI}$ | $0.8V_{CCI}$ | V |
| | | $V_{CCI}$ = 1.1 V to 1.95 V | $0.4V_{CCI}$ | - | $0.7V_{CCI}$ | $0.4V_{CCI}$ | $0.7V_{CCI}$ | $0.4V_{CCI}$ | $0.7V_{CCI}$ | V |
| | | $V_{CCI}$ = 2.3 V to 2.7 V | 0.9 | - | 1.7 | 0.9 | 1.7 | 0.9 | 1.7 | V |
| $V_{T-}$ | negative-going threshold voltage | see Fig. 13 and Fig. 14 | | | | | | | | |
| | | $V_{CCI}$ = 0.75 V to 0.85 V | $0.2V_{CCI}$ | - | $0.7V_{CCI}$ | $0.2V_{CCI}$ | $0.7V_{CCI}$ | $0.2V_{CCI}$ | $0.7V_{CCI}$ | V |
| | | $V_{CCI}$ = 1.1 V to 1.95 V | $0.3V_{CCI}$ | - | $0.6V_{CCI}$ | $0.3V_{CCI}$ | $0.6V_{CCI}$ | $0.3V_{CCI}$ | $0.6V_{CCI}$ | V |
| | | $V_{CCI}$ = 2.3 V to 2.7 V | 0.7 | - | 1.5 | 0.7 | 1.5 | 0.7 | 1.5 | V |
| $V_H$ | hysteresis voltage | see Fig. 13 and Fig. 14 | | | | | | | | |
| | | $V_{CCI}$ = 0.75 V to 0.85 V | $0.06V_{CCI}$ | - | $0.5V_{CCI}$ | $0.06V_{CCI}$ | $0.5V_{CCI}$ | $0.06V_{CCI}$ | $0.5V_{CCI}$ | V |
| | | $V_{CCI}$ = 1.1 V to 1.95 V | $0.1V_{CCI}$ | - | $0.4V_{CCI}$ | $0.1V_{CCI}$ | $0.4V_{CCI}$ | $0.1V_{CCI}$ | $0.4V_{CCI}$ | V |
| | | $V_{CCI}$ = 2.3 V to 2.7 V | 0.2 | - | 1.0 | 0.2 | 1.0 | 0.2 | 1.0 | V |
| $V_{OH}$ | HIGH-level output voltage | $I_O$ = -2 mA; $V_{CCO}$ = 1.2 V | - | 1.05 | - | - | - | - | - | V |
| | | $I_O$ = -3 mA; $V_{CCO}$ = 1.4 V | 1.05 | - | - | 1.05 | - | 1.05 | - | V |
| | | $I_O$ = -4.5 mA; $V_{CCO}$ = 1.65 V | 1.2 | - | - | 1.2 | - | 1.2 | - | V |
| | | $I_O$ = -8 mA; $V_{CCO}$ = 2.3 V | 1.7 | - | - | 1.7 | - | 1.7 | - | V |
| | | $I_O$ = -10 mA; $V_{CCO}$ = 3.0 V | 2.2 | - | - | 2.2 | - | 2.2 | - | V |
| | | $I_O$ = -12 mA; $V_{CCO}$ = 4.5 V | 3.7 | - | - | 3.7 | - | 3.7 | - | V |

| Symbol | Parameter | Conditions | $T_{amb}$ = 25 °C | | | $T_{amb}$ = -40 °C to +85 °C | | $T_{amb}$ = -40 °C to +125 °C | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ[1] | Max | Min | Max | Min | Max | |
| $V_{OL}$ | LOW-level output voltage | $I_O$ = 2 mA; $V_{CCO}$ = 1.2 V | - | 0.18 | - | - | - | - | - | V |
| | | $I_O$ = 3 mA; $V_{CCO}$ = 1.4 V | - | - | 0.35 | - | 0.35 | - | 0.35 | V |
| | | $I_O$ = 4.5 mA; $V_{CCO}$ = 1.65 V | - | - | 0.45 | - | 0.45 | - | 0.45 | V |
| | | $I_O$ = 8 mA; $V_{CCO}$ = 2.3 V | - | - | 0.7 | - | 0.7 | - | 0.7 | V |
| | | $I_O$ = 10 mA; $V_{CCO}$ = 3.0 V | - | - | 0.8 | - | 0.8 | - | 0.8 | V |
| | | $I_O$ = 12 mA; $V_{CCO}$ = 4.5 V | - | - | 0.8 | - | 0.8 | - | 0.8 | V |
| $I_I$ | input leakage current | $V_I$ = 0 V to 2.75 V; $V_{CCI}$ = 0 V to 2.75 V | - | ±0.001 | ±0.1 | - | ±0.5 | - | ±1.0 | µA |
| $I_{OZ}$ | OFF-state output current | $V_O$ = 0 V to 5.5 V; $V_{CCO}$ = 1.2 V to 5.5 V | - | ±0.001 | ±0.1 | - | ±0.5 | - | ±2.0 | µA |
| $I_{OFF}$ | power-off leakage current | inputs; $V_I$ = 0 V to 2.75 V; $V_{CCI}$ = 0 V; $V_{CCO}$ = 0 V to 5.5 V | - | ±0.01 | ±0.1 | - | ±0.5 | - | ±2.0 | µA |
| | | output; $V_O$ = 0 V to 5.5 V; $V_{CCO}$ = 0 V; $V_{CCI}$ = 0 V to 2.75 V; $V_I$ = 0 V to 2.75 V | - | ±0.01 | ±0.1 | - | ±0.5 | - | ±2.0 | µA |
| $\Delta I_{OFF}$ | additional power-off leakage current | inputs; $V_I$ = 0 V or 2.75 V; $V_{CCI}$ = 0 V to 0.1 V; $V_{CCO}$ = 0 V to 5.5 V | - | ±0.02 | ±0.1 | - | ±0.5 | - | ±2.0 | µA |
| | | output; $V_O$ = 0 V or 5.5 V; $V_{CCO}$ = 0 V to 0.1 V; $V_{CCI}$ = 0 V to 2.75 V; $V_I$ = 0 V or 2.75 V | - | ±0.02 | ±0.1 | - | ±0.5 | - | ±2.0 | µA |

[1] Typical values are measured at $V_{CCI} = V_{CCO}$ = 1.2 V unless otherwise specified.

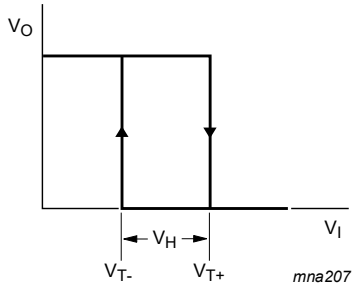



Fig. 13. Transfer characteristic

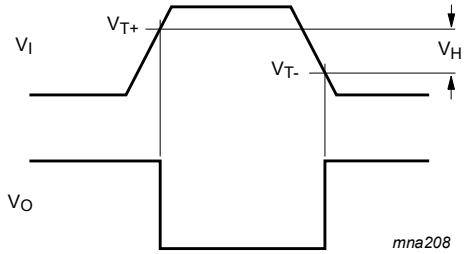



Fig. 14. Definition of $V_{T+}$, $V_{T-}$, and $V_H$

**Table 9. Static characteristics supply current**

*At recommended operating conditions, unless otherwise specified; voltages are referenced to GND (ground = 0 V).*

| Symbol | Parameter | Conditions | $T_{amb}$ = 25 °C | | $T_{amb}$ = -40 °C to +85 °C | | $T_{amb}$ = -40 °C to +125 °C | Unit |
|---|---|---|---|---|---|---|---|---|
| | | | Typ | Max | Typ | Max | Max | |
| $I_{CCI}$ | input supply current | $V_I$ = 0 V or $V_{CCI}$; | | | | | | |
| | | $V_{CCI}$ = 0.7 V to 1.3 V [1] | 1 | 100 | 10 | 300 | 500 | nA |
| | | $V_{CCI}$ = 1.3 V to 2.75 V [2] | 1 | 100 | 20 | 500 | 1000 | nA |
| | | $V_{CCI}$ = 2.75 V; $V_{CCO}$ = 0 V | 1 | 100 | 20 | 500 | 1000 | nA |
| | | $V_{CCI}$ = 0 V; $V_{CCO}$ = 5.5 V | 1 | 100 | 1 | 100 | 500 | nA |
| $I_{CCO}$ | output supply current | $V_I$ = 0 V or $V_{CCI}$; $I_O$ = 0 A; see Table 10 | | | | | | |
| | | $V_{CCO}$ = 1.2 V to 3.6 V [1] | 0.001 | 1.0 | 0.01 | 1.2 | 1.3 | µA |
| | | $V_{CCO}$ = 3.6 V to 5.5 V [3] | 0.8 | 1.5 | 1.0 | 1.8 | 2.0 | µA |
| | | $V_{CCI}$ = 2.75 V; $V_{CCO}$ = 0 V | 0.001 | 0.1 | 0.003 | 0.2 | 0.5 | µA |
| | | $V_{CCI}$ = 0 V; $V_{CCO}$ = 3.6 V | 0.2 | 0.6 | 0.3 | 0.8 | 1.2 | µA |
| | | $V_{CCI}$ = 0 V; $V_{CCO}$ = 5.5 V | 0.4 | 0.8 | 0.5 | 1.0 | 1.5 | µA |
| $\Delta I_{CCI}$ | additional input supply current | $V_I$ = $V_{CCI}$ - 0.5 V; $V_{CCI}$ = 2.5 V | 2 | 100 | 14 | 150 | 200 | µA |

[1] Typical values are measured at $V_{CCI}$ = $V_{CCO}$ = 1.2 V unless otherwise specified.
[2] Typical values are measured at $V_{CCI}$ = $V_{CCO}$ = 2.5 V.
[3] Typical values are measured at $V_{CCI}$ = 1.2 V and $V_{CCO}$ = 5.0 V.

**Table 10. Typical output supply current ($I_{CCO}$)**

| $V_{CCI}$ | $V_{CCO}$ | | | | | | | Unit |
|---|---|---|---|---|---|---|---|---|
| | 0 V | 1.2 V | 1.5 V | 1.8 V | 2.5 V | 3.3 V | 5.0 V | |
| 0 V | 0 | 1 | 5 | 20 | 100 | 200 | 400 | nA |
| 0.8 V | 1 | 10 | 150 | 200 | 300 | 500 | 800 | nA |
| 1.2 V | 1 | 1 | 5 | 200 | 300 | 500 | 800 | nA |
| 1.5 V | 1 | 1 | 5 | 100 | 300 | 500 | 800 | nA |
| 1.8 V | 1 | 1 | 5 | 100 | 300 | 500 | 800 | nA |
| 2.5 V | 1 | 1 | 5 | 100 | 100 | 500 | 800 | nA |

## 11. Dynamic characteristics

**Table 11. Dynamic characteristics**

*Voltages are referenced to GND (ground = 0 V); for waveform, see Fig. 15; for additional propagation delay graphs see Fig. 16 to #unique_15/unique_15_Connect_42_fig_s4k_wyy_hnb; for test circuit, see Fig. 22 .*

| Symbol | Parameter | Conditions | $V_{CCO}$ [1] | | | | | | | | | | | | | | | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1.2 V | 1.5 V ± 0.1 V | | | 1.8 V ± 0.15 V | | | 2.5 V ± 0.2 V | | | 3.3 V ± 0.3 V | | | 5.0 V ± 0.5 V | | | |
| | | | Typ | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | |
| **$T_{amb}$ = 25 °C** | | | | | | | | | | | | | | | | | | | |
| $t_{pd}$ | propagation delay | A, B and C to Y [2] | | | | | | | | | | | | | | | | | |
| | | $V_{CCI}$ = 0.75 V to 0.85 V | 25 | 4 | 20 | 76 | 4 | 18 | 72 | 3 | 16 | 72 | 3 | 16 | 80 | 3 | 17 | 92 | ns |
| | | $V_{CCI}$ = 1.1 V to 1.3 V | 16.5 | 3.4 | 10.9 | 21.0 | 3.0 | 8.9 | 17.0 | 2.6 | 7.3 | 12.0 | 2.5 | 6.7 | 10.7 | 2.4 | 6.4 | 10.2 | ns |
| | | $V_{CCI}$ = 1.4 V to 1.6 V | 15.5 | 3.1 | 9.9 | 19.0 | 2.6 | 7.9 | 14.0 | 2.3 | 6.2 | 9.9 | 2.1 | 5.6 | 9.0 | 2.1 | 5.3 | 8.5 | ns |
| | | $V_{CCI}$ = 1.65 V to 1.95 V | 15.0 | 2.6 | 9.4 | 18.0 | 2.1 | 7.4 | 12.5 | 1.7 | 5.7 | 9.3 | 1.6 | 5.1 | 8.3 | 1.5 | 4.8 | 7.9 | ns |
| | | $V_{CCI}$ = 2.3 V to 2.7 V | 14.5 | 2.7 | 8.9 | 17.5 | 2.2 | 6.9 | 11.7 | 1.9 | 5.2 | 8.7 | 1.8 | 4.6 | 7.7 | 1.7 | 4.3 | 7.2 | ns |
| **$T_{amb}$ = -40 °C to +85 °C** | | | | | | | | | | | | | | | | | | | |
| $t_{pd}$ | propagation delay | A, B and C to Y [2] | | | | | | | | | | | | | | | | | |
| | | $V_{CCI}$ = 0.75 V to 0.85 V | 25 | 3 | 20 | 151 | 3 | 18 | 148 | 2 | 16 | 167 | 2 | 16 | 194 | 2 | 17 | 225 | ns |
| | | $V_{CCI}$ = 1.1 V to 1.3 V | 16.5 | 3.4 | 10.9 | 21.0 | 3.0 | 8.9 | 17.0 | 2.6 | 7.3 | 12.0 | 2.5 | 6.7 | 10.7 | 2.4 | 6.4 | 10.2 | ns |
| | | $V_{CCI}$ = 1.4 V to 1.6 V | 15.5 | 3.1 | 9.9 | 19.0 | 2.6 | 7.9 | 14.0 | 2.3 | 6.2 | 9.9 | 2.1 | 5.6 | 9.0 | 2.1 | 5.3 | 8.5 | ns |
| | | $V_{CCI}$ = 1.65 V to 1.95 V | 15.0 | 2.6 | 9.4 | 18.0 | 2.1 | 7.4 | 12.5 | 1.7 | 5.7 | 9.3 | 1.6 | 5.1 | 8.3 | 1.5 | 4.8 | 7.9 | ns |
| | | $V_{CCI}$ = 2.3 V to 2.7 V | 14.5 | 2.7 | 8.9 | 17.5 | 2.2 | 6.9 | 11.7 | 1.9 | 5.2 | 8.7 | 1.8 | 4.6 | 7.7 | 1.7 | 4.3 | 7.2 | ns |
| **$T_{amb}$ = -40 °C to +125 °C** | | | | | | | | | | | | | | | | | | | |
| $t_{pd}$ | propagation delay | A, B and C to Y [2] | | | | | | | | | | | | | | | | | |
| | | $V_{CCI}$ = 0.75 V to 0.85 V | 25 | 3 | 20 | 151 | 3 | 18 | 148 | 2 | 16 | 167 | 2 | 16 | 194 | 2 | 17 | 225 | ns |
| | | $V_{CCI}$ = 1.1 V to 1.3 V | 16.5 | 3.4 | 10.9 | 21.0 | 3.0 | 8.9 | 17.5 | 2.6 | 7.3 | 15.0 | 2.5 | 6.7 | 13.0 | 2.4 | 6.4 | 12.0 | ns |
| | | $V_{CCI}$ = 1.4 V to 1.6 V | 15.5 | 3.1 | 9.9 | 20.0 | 2.6 | 7.9 | 16.5 | 2.3 | 6.2 | 12.0 | 2.1 | 5.6 | 10.9 | 2.1 | 5.3 | 10.3 | ns |
| | | $V_{CCI}$ = 1.65 V to 1.95 V | 15.0 | 2.6 | 9.4 | 19.0 | 2.1 | 7.4 | 15.5 | 1.7 | 5.7 | 11.3 | 1.6 | 5.1 | 10.4 | 1.5 | 4.8 | 9.7 | ns |
| | | $V_{CCI}$ = 2.3 V to 2.7 V | 14.5 | 2.7 | 8.9 | 18.0 | 2.2 | 6.9 | 14.5 | 1.9 | 5.2 | 10.6 | 1.8 | 4.6 | 9.6 | 1.7 | 4.3 | 8.9 | ns |

| Symbol | Parameter | Conditions | $V_{CCO}$ [1] | | | | | | | | | | | | | | | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1.2 V | 1.5 V ± 0.1 V | | | 1.8 V ± 0.15 V | | | 2.5 V ± 0.2 V | | | 3.3 V ± 0.3 V | | | 5.0 V ± 0.5 V | | | |
| | | | Typ | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | |
| $t_t$ | transition time | $V_{CCI}$ = 0.75 V to 2.7 V [3] | - | 1.0 | - | - | 1.0 | - | - | 1.0 | - | - | 1.0 | - | - | 1.0 | - | - | ns |

[1] Typical values are measured at nominal supply voltages and $T_{amb}$ = +25 °C.
[2] $t_{pd}$ is the same as $t_{PLH}$ and $t_{PHL}$.
[3] $t_t$ is the same as $t_{THL}$ and $t_{TLH}$.

**Table 12. Typical dynamic characteristics at $T_{amb}$ = 25 °C**

*Voltages are referenced to GND (ground = 0 V); for waveform, see Fig. 15; for additional propagation delay graphs see Fig. 16 to #unique_15/unique_15_Connect_42_fig_s4k_wyy_hnb; for test circuit, see Fig. 22 .*

| Symbol | Parameter | Conditions | $V_{CCO}$ | | | | | | Unit |
|---|---|---|---|---|---|---|---|---|---|
| | | | 1.2 V | 1.5 V | 1.8 V | 2.5 V | 3.3 V | 5.0 V | |
| $C_{PD}$ | power dissipation capacitance | $f_i$ = 1 MHz; $R_L$ = ∞ Ω; $V_I$ = 0 V to $V_{CCI}$; [1] | | | | | | | |
| | | input supply [2] | | | | | | | |
| | | $V_{CCI}$ = 0.8 V | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | pF |
| | | $V_{CCI}$ = 1.2 V | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | pF |
| | | $V_{CCI}$ = 1.5 V | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | pF |
| | | $V_{CCI}$ = 1.8 V | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | pF |
| | | $V_{CCI}$ = 2.5 V | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | pF |
| | | output supply [3] | | | | | | | |
| | | $V_{CCI}$ = 0.8 V | 6.7 | 6.8 | 6.8 | 6.9 | 7.5 | 9.5 | pF |
| | | $V_{CCI}$ = 1.2 V | 6.8 | 6.9 | 7.0 | 7.0 | 7.1 | 7.6 | pF |
| | | $V_{CCI}$ = 1.5 V | 6.9 | 6.9 | 6.9 | 7.0 | 7.1 | 7.6 | pF |
| | | $V_{CCI}$ = 1.8 V | 6.9 | 6.9 | 6.9 | 7.0 | 7.2 | 7.6 | pF |
| | | $V_{CCI}$ = 2.5 V | 6.9 | 7.0 | 7.0 | 7.0 | 7.2 | 7.6 | pF |
| $C_I$ | input capacitance | $V_I$ = 0 V or $V_{CCI}$; $V_{CCI}$ = 0 V to 2.7 V | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | pF |
| $C_O$ | output capacitance | $V_O$ = 0 V; $V_{CCO}$ = 0 V | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | pF |

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

[2] Power dissipated from input supply ($V_{CCI}$)

$P_D = C_{PD} \times V_{CCI}^2 \times f_i \times N$ where:

$C_{PD}$ = power dissipation capacitance of the input supply;

$V_{CCI}$ = input supply voltage in V;

$f_i$ = input frequency in MHz;

N = number of inputs switching.

[3] Power dissipated from output supply ($V_{CCO}$)

$P_D = (C_L + C_{PD}) \times V_{CCO}^2 \times f_o$ where:

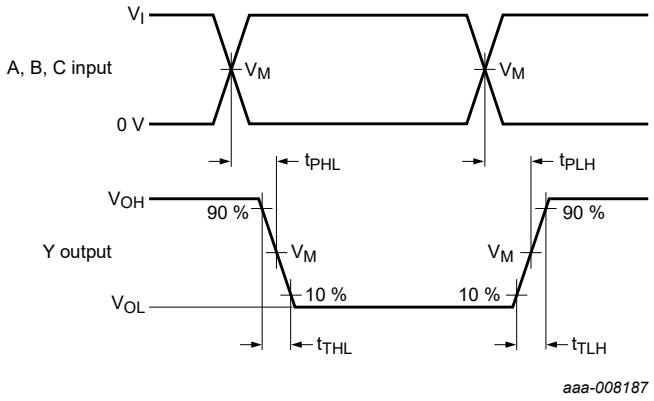
$C_L$ = load capacitance in pF;

$C_{PD}$ = power dissipation capacitance of the output supply;

$V_{CCO}$ = output supply voltage in V;

$f_o$ = output frequency in MHz.

## 12. Waveform, graphs and test circuit



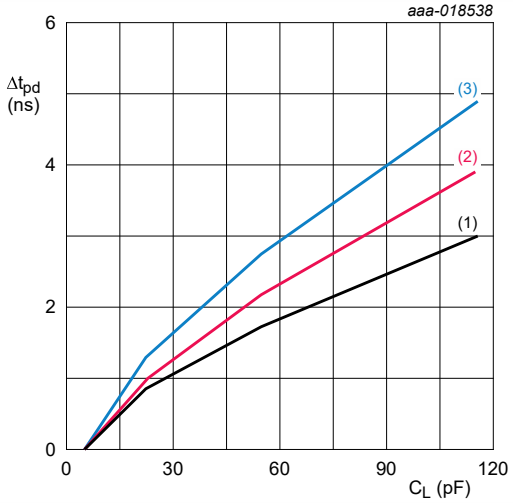

Measurement points are given in Table 13.

$V_{OL}$ and $V_{OH}$ are typical output voltage levels that occur with the output load.

**Fig. 15. Input A, B and C to output Y propagation delay times and output transition times**

**Table 13. Measurement points**

| Supply voltage | | Output | Input | |
|---|---|---|---|---|
| $V_{CCI}$ | $V_{CCO}$ | $V_M$ | $V_M$ | $V_I$ |
| 0.75 V to 2.7 V | 1.2 V to 5.5 V | $0.5V_{CCO}$ | $0.5V_{CCI}$ | $V_{CCI}$ |



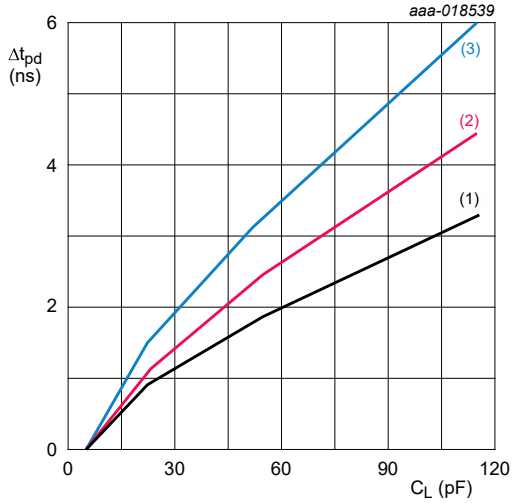

$T_{amb}$ = -40 °C to +125 °C unless otherwise specified.

(1) Minimum: $V_{CCO}$ = 5.5 V

(2) Typical: $T_{amb}$ = 25 °C; $V_{CCO}$ = 5 V

(3) Maximum: $V_{CCO}$ = 4.5 V

**Fig. 16. Additional propagation delay versus load capacitance**



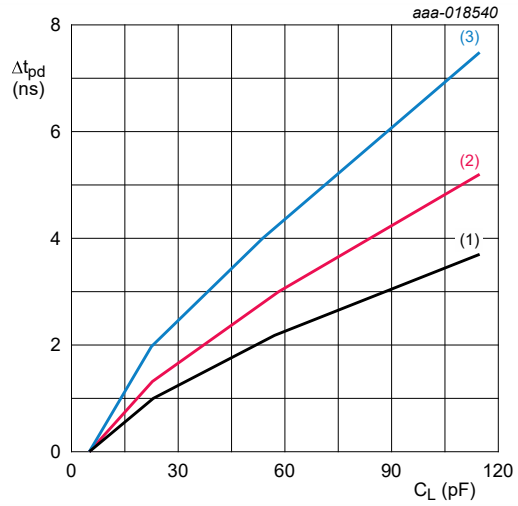

$T_{amb}$ = -40 °C to +125 °C unless otherwise specified.

(1) Minimum: $V_{CCO}$ = 3.6 V

(2) Typical: $T_{amb}$ = 25 °C; $V_{CCO}$ = 3.3 V

(3) Maximum: $V_{CCO}$ = 3 V

**Fig. 17. Additional propagation delay versus load capacitance**



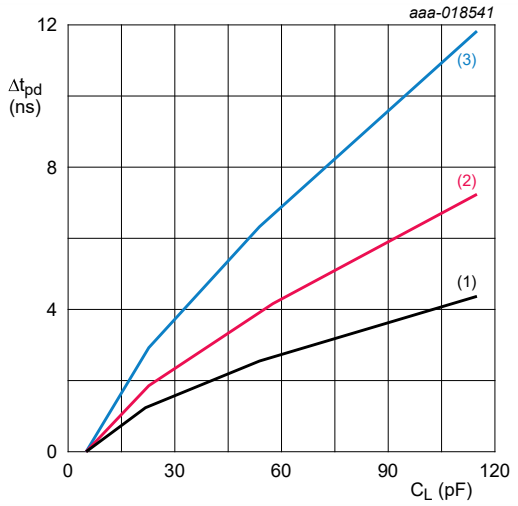

$T_{amb}$ = -40 °C to +125 °C unless otherwise specified.

(1) Minimum: $V_{CCO}$ = 2.7 V

(2) Typical: $T_{amb}$ = 25 °C; $V_{CCO}$ = 2.5 V

(3) Maximum: $V_{CCO}$ = 2.3 V

**Fig. 18. Additional propagation delay versus load capacitance**



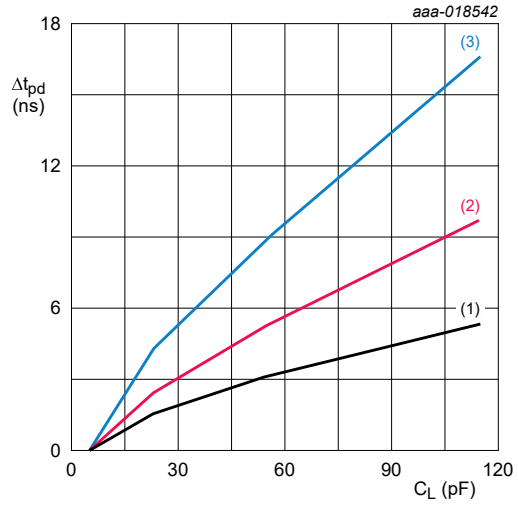

$T_{amb}$ = -40 °C to +125 °C unless otherwise specified.

(1) Minimum: $V_{CCO}$ = 1.95 V

(2) Typical: $T_{amb}$ = 25 °C; $V_{CCO}$ = 1.8 V

(3) Maximum: $V_{CCO}$ = 1.65 V

**Fig. 19. Additional propagation delay versus load capacitance**



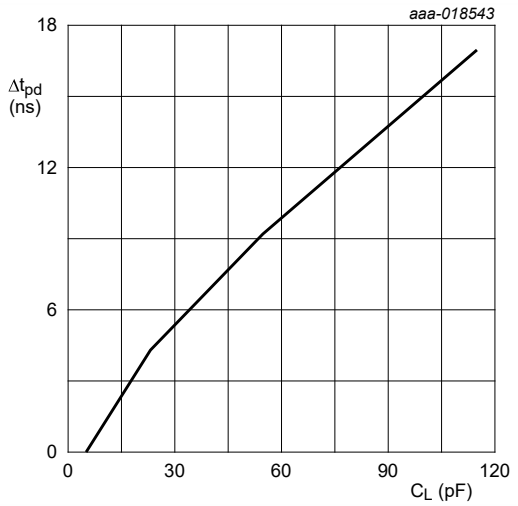

$T_{amb}$ = -40 °C to +125 °C unless otherwise specified.

(1) Minimum: $V_{CCO}$ = 1.6 V

(2) Typical: $T_{amb}$ = 25 °C; $V_{CCO}$ = 1.5 V

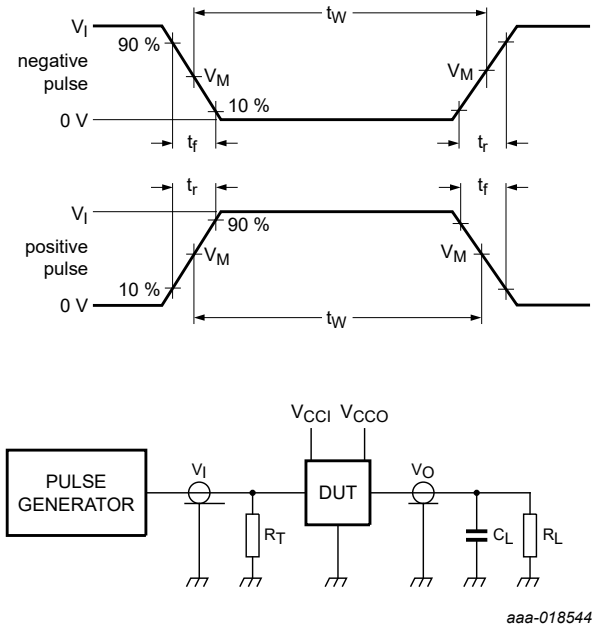
(3) Maximum: $V_{CCO}$ = 1.4 V

**Fig. 20. Additional propagation delay versus load capacitance**




$T_{amb}$ = 25 °C; $V_{CCO}$ = 1.2 V.

**Fig. 21. Additional propagation delay versus load capacitance**




Test data is given in Table 14.

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.

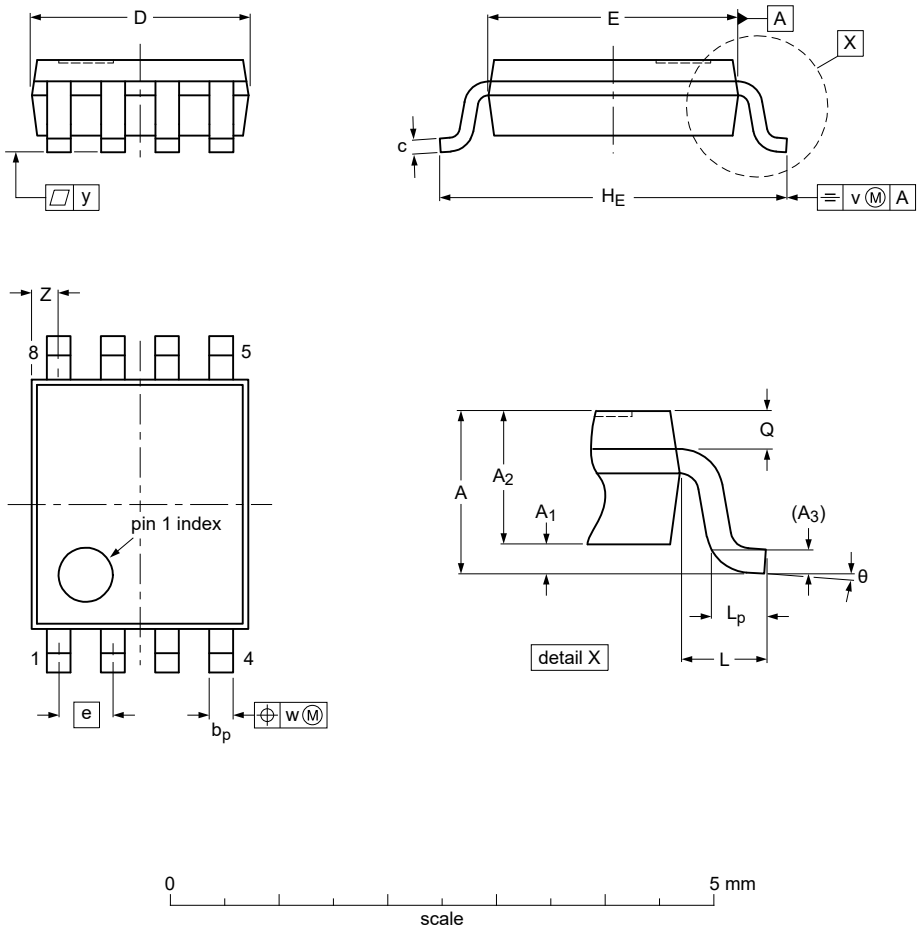
**Fig. 22. Test circuit for measuring switching times**

**Table 14. Test data**

| Supply voltage | | Load | | Input | |
|---|---|---|---|---|---|
| $V_{CCI}$ | $V_{CCO}$ | $C_L$ | $R_L$ | $t_r$, $t_f$ | $V_I$ |
| 0.75 V to 2.7 V | 1.2 V to 5.5 V | 5 pF | 5 kΩ | ≤3.0 ns | $V_{CCI}$ |

## 13. Package outline

**VSSOP8: plastic very thin shrink small outline package; 8 leads; body width 2.3 mm** **SOT765-1**




Dimensions (mm are the original dimensions)

| Unit | A max. | $A_1$ | $A_2$ | $A_3$ | $b_p$ | c | $D^{(1)}$ | $E^{(2)}$ | e | $H_E$ | L | $L_p$ | Q | v | w | y | $Z^{(1)}$ | θ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| max | | 0.15 | 0.85 | | 0.27 | 0.23 | 2.1 | 2.4 | | 3.2 | | 0.40 | 0.21 | | | | 0.4 | 8° |
| mm nom | 1 | | | 0.12 | | | | | 0.5 | | 0.4 | | | 0.2 | 0.08 | 0.1 | | |
| min | | 0.00 | 0.60 | | 0.17 | 0.08 | 1.9 | 2.2 | | 3.0 | | 0.15 | 0.19 | | | | 0.1 | 0° |

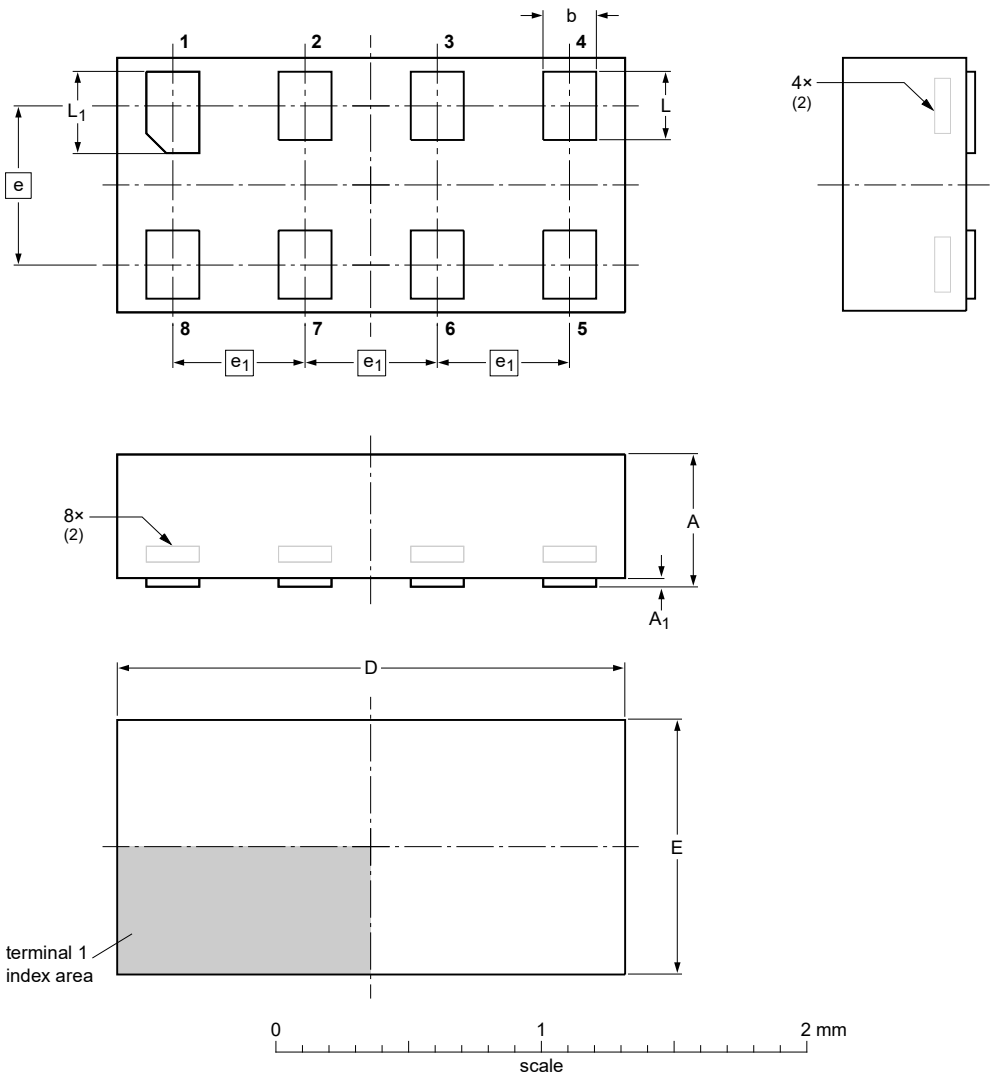
Note
1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.
2. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

*sot765-1_po*

| Outline version | References | | | | European projection | Issue date |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT765-1 | | MO-187 | | | | ~~07-06-02~~ 16-05-31 |

**Fig. 23. Package outline SOT765-1 (VSSOP8)**

**XSON8: plastic extremely thin small outline package; no leads; 8 terminals; body 1 x 1.95 x 0.5 mm** **SOT833-1**




**DIMENSIONS (mm are the original dimensions)**

| UNIT | A(1) max | $A_1$ max | b | D | E | e | $e_1$ | L | $L_1$ |
|---|---|---|---|---|---|---|---|---|---|
| mm | 0.5 | 0.04 | 0.25<br>0.17 | 2.0<br>1.9 | 1.05<br>0.95 | 0.6 | 0.5 | 0.35<br>0.27 | 0.40<br>0.32 |

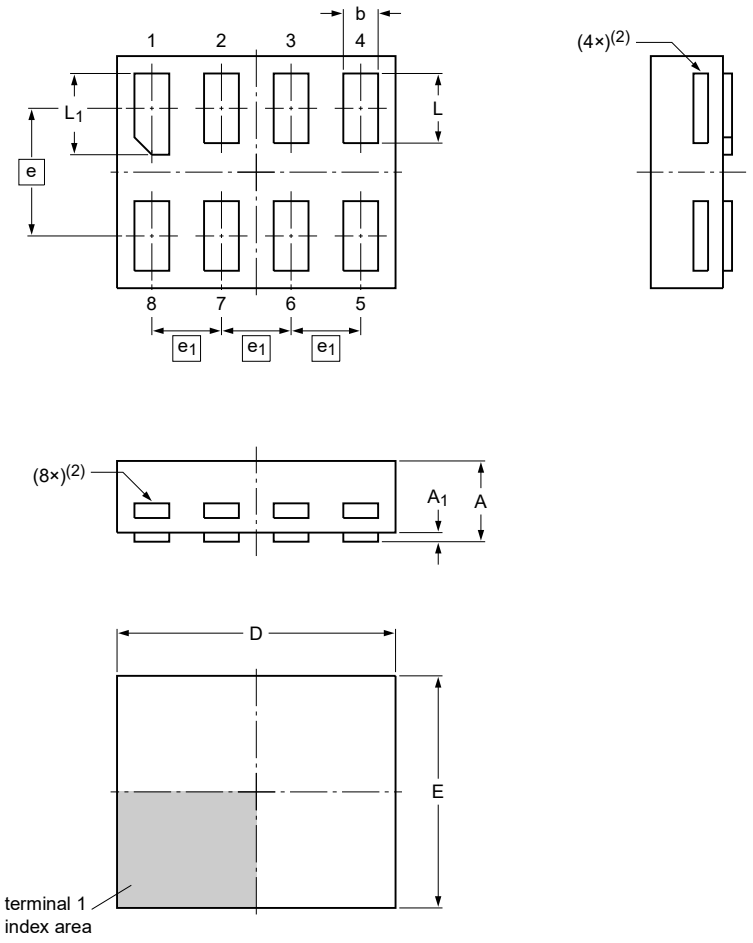
**Notes**

1. Including plating thickness.
2. Can be visible in some manufacturing processes.

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT833-1 | - - - | MO-252 | - - - | | | ~~07-11-14~~<br>07-12-07 |

**Fig. 24. Package outline SOT833-1 (XSON8)**

**XSON8: extremely thin small outline package; no leads;**
**8 terminals; body 1.2 x 1.0 x 0.35 mm** **SOT1116**




Dimensions

| Unit | | A(1) | $A_1$ | b | D | E | e | $e_1$ | L | $L_1$ |
|---|---|---|---|---|---|---|---|---|---|---|
| mm | max | 0.35 | 0.04 | 0.20 | 1.25 | 1.05 | | | 0.35 | 0.40 |
| | nom | | | 0.15 | 1.20 | 1.00 | 0.55 | 0.3 | 0.30 | 0.35 |
| | min | | | 0.12 | 1.15 | 0.95 | | | 0.27 | 0.32 |

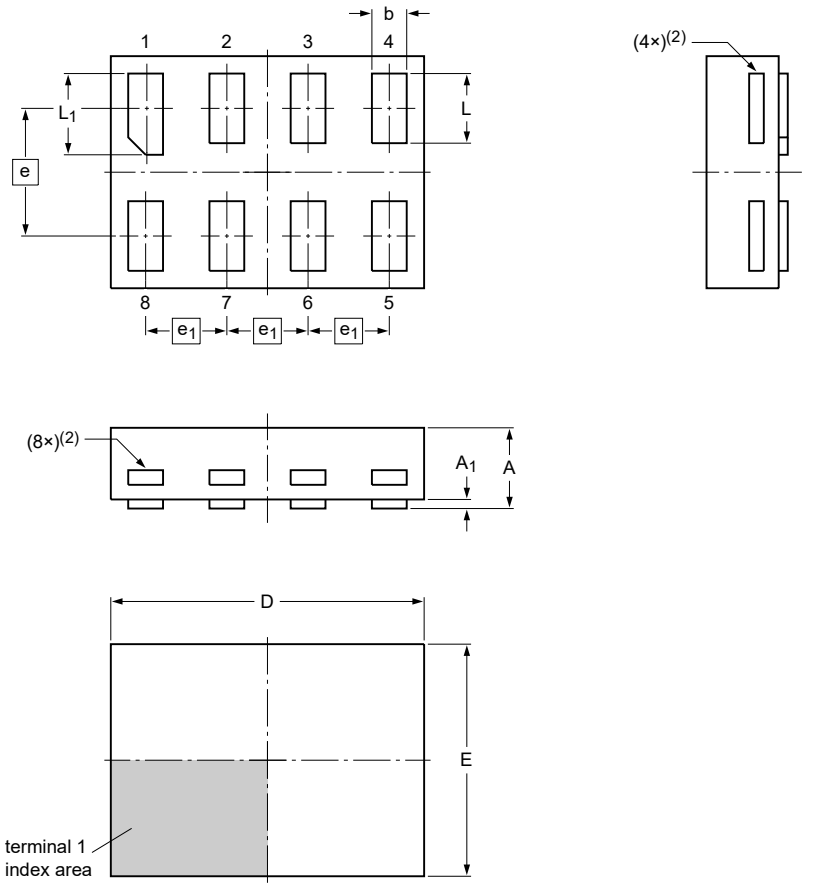
Note
1. Including plating thickness.
2. Visible depending upon used manufacturing technology.

sot1116_po

| Outline version | References | | | | European projection | Issue date |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT1116 | | | | | | ~~10-04-02~~ 10-04-07 |

**Fig. 25. Package outline SOT1116 (XSON8)**

**XSON8: extremely thin small outline package; no leads;**
**8 terminals; body 1.35 x 1.0 x 0.35 mm** **SOT1203**




Dimensions

| Unit | | A(1) | A1 | b | D | E | e | e1 | L | L1 |
|---|---|---|---|---|---|---|---|---|---|---|
| mm | max | 0.35 | 0.04 | 0.20 | 1.40 | 1.05 | | | 0.35 | 0.40 |
| | nom | | | 0.15 | 1.35 | 1.00 | 0.55 | 0.35 | 0.30 | 0.35 |
| | min | | | 0.12 | 1.30 | 0.95 | | | 0.27 | 0.32 |

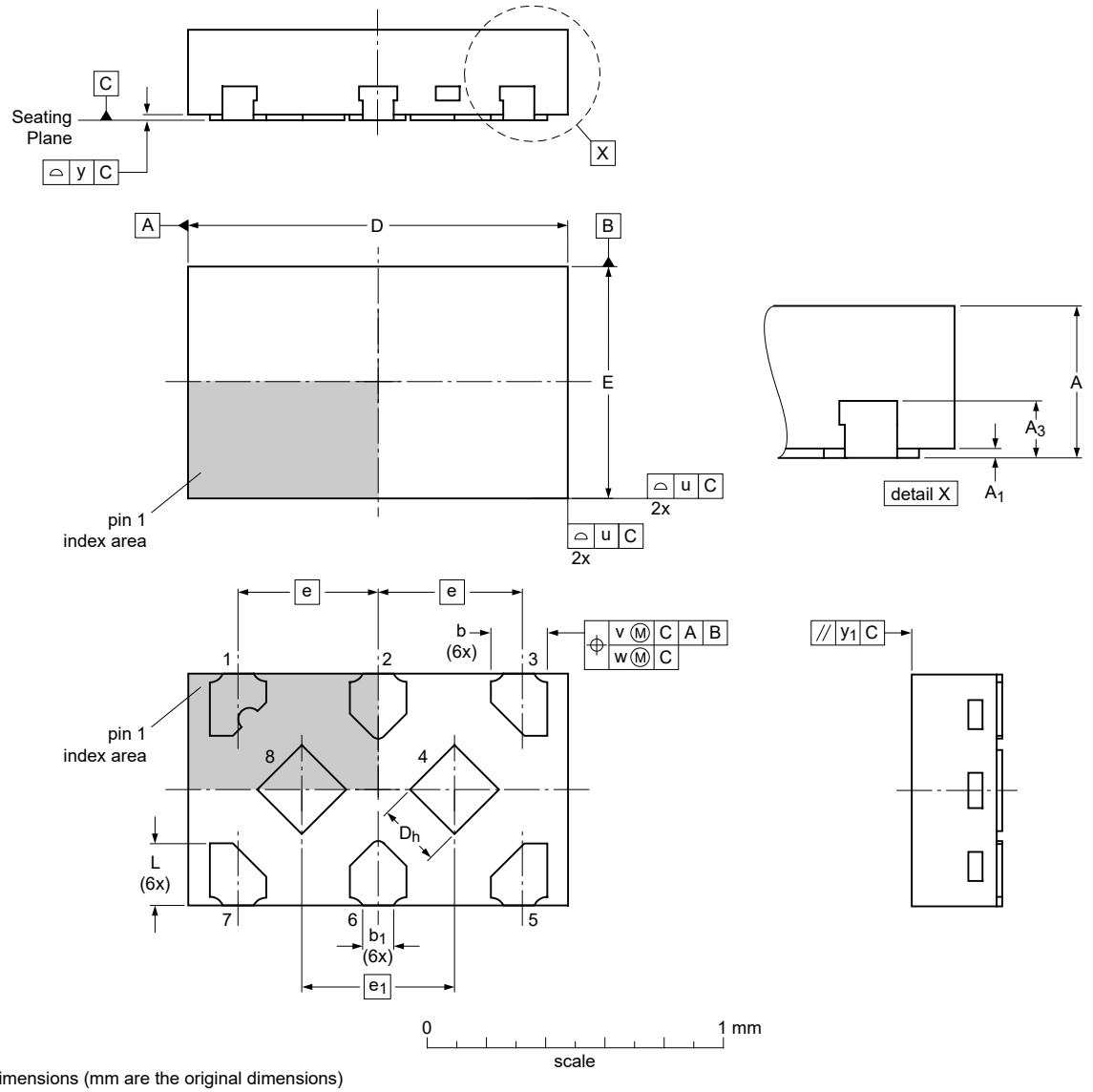
Note
1. Including plating thickness.
2. Visible depending upon used manufacturing technology.

*sot1203_po*

| Outline version | References | | | | European projection | Issue date |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT1203 | | | | | | ~~10-04-02~~ 10-04-06 |

**Fig. 26. Package outline SOT1203 (XSON8)**

**X2SON8: plastic thermal enhanced extremely thin small outline package; no leads; 8 terminals; body 1.35 x 0.8 x 0.32 mm** **SOT1233-2**




Dimensions (mm are the original dimensions)

| Unit | A | $A_1$ | $A_3$ | b | $b_1$ | D | $D_h$ | E | e | $e_1$ | L | u | v | w | y | $y_1$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| max | 0.35 | 0.04 | | 0.25 | | | 0.27 | | | | 0.27 | | | | | |
| mm nom | 0.32 | 0.02 | 0.10 (Typ.) | 0.20 | 0.11 (ref) | 1.35 | 0.22 | 0.80 | 0.50 | 0.54 | 0.22 | 0.05 | 0.10 | 0.05 | 0.05 | 0.05 |
| min | 0.30 | 0.00 | | 0.15 | | | 0.17 | | | | 0.17 | | | | | |

*sot1233-2_po*

| Outline version | References | | | | European projection | Issue date |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT1233-2 | | --- | | | | 19-11-12 |

**Fig. 27. Package outline SOT1233-2 (X2SON8)**

## 14. Abbreviations

**Table 15. Abbreviations**

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

## 15. Revision history

**Table 16. Revision history**

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|---|---|---|---|---|
| 74AXP1T57 v.6 | 20220617 | Product data sheet | - | 74AXP1T57 v.5 |
| Modifications: | • SOT1233 (X2SON8) package changed to SOT1233-2 (X2SON8) package.<br>• Values added for $T_{amb}$ = -40 °C to +125 °C temperature range throughout the data sheet.<br>• Table 6: Derating values for $P_{tot}$ total power dissipation have been updated. | | | |
| 74AXP1T57 v.5 | 20170703 | Product data sheet | - | 74AXP1T57 v.4 |
| Modifications: | • Fig. 27: Package outline drawing for SOT1233 / X2SON8) has changed. | | | |
| 74AXP1T57 v.4 | 20161028 | Product data sheet | - | 74AXP1T57 v.3 |
| Modifications: | • Added type number 74AXP1T57GX (SOT1233/X2SON8) | | | |
| 74AXP1T57 v.3 | 20161007 | Product data sheet | - | 74AXP1T57 v.2 |
| Modifications: | • Type numbers 74AXP1T57DP and 74AXP1T57GD removed. | | | |
| 74AXP1T57 v.2 | 20151222 | Product data sheet | - | 74AXP1T57 v.1 |
| Modifications: | • Table 6: Conditions $V_O$ corrected (errata).<br>• Table 6: Derating values for packages added (errata).<br>• Table 7: Conditions $V_O$ corrected (errata).<br>• Table 8: Conditions $I_{OZ}$ corrected (errata).<br>• Table 9: Conditions $\Delta I_{CCI}$ corrected (errata).<br>• Table 11: Conditions $t_t$ corrected (errata).<br>• Table 12: Removed "leadless packages" from conditions (errata). | | | |
| 74AXP1T57 v.1 | 20150803 | 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".
[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 https://www.nexperia.com.

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