# 74AXP1T14

## Dual supply Schmitt trigger inverter

Rev. 3 — 2 February 2022 Product data sheet

## 1. General description

The 74AXP1T14 is a dual supply Schmitt trigger inverter. It features one input (A), an output (Y) and dual supply pins ($V_{CCI}$ and $V_{CCO}$). The input is referenced to $V_{CCI}$ and the output is referenced to $V_{CCO}$. Input A 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.

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; $C_{PD}$ = 0.5 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 input)
  - 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 2000 V
  - CDM JESD22-C101E exceeds 1000 V
- 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
- Specified from -40 °C to +85 °C

# 3. Ordering information

**Table 1. Ordering information**

| Type number | Package | | | |
|---|---|---|---|---|
| | Temperature range | Name | Description | Version |
| 74AXP1T14GW | -40 °C to +85 °C | TSSOP5 | plastic thin shrink small outline package; 5 leads; body width 1.25 mm | SOT353-1 |
| 74AXP1T14GX | -40 °C to +85 °C | X2SON5 | plastic thermal enhanced extremely thin small outline package; no leads; 5 terminals; body 0.8 × 0.8 × 0.32 mm | SOT1226-3 |

# 4. Marking

**Table 2. Marking**

| Type number | Marking code[1] |
|---|---|
| 74AXP1T14GW | rL |
| 74AXP1T14GX | rL |

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

# 5. Functional diagram

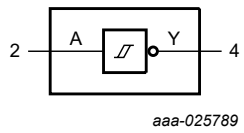



**Fig. 1. Logic symbol**

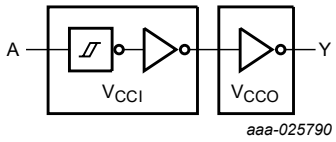



**Fig. 2. Logic diagram**

# 6. Pinning information

## 6.1. Pinning

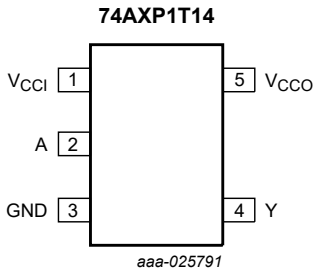
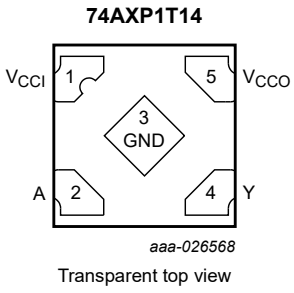



**Fig. 3. Pin configuration SOT353-1 (TSSOP5)**




Transparent top view

**Fig. 4. Pin configuration SOT1226-3 (X2SON5)**

### 6.2. Pin description

**Table 3. Pin description**

| Symbol | Pin | Description |
|---|---|---|
| $V_{CCI}$ | 1 | input supply voltage |
| A | 2 | data input A |
| GND | 3 | ground (0 V) |
| Y | 4 | data output Y |
| $V_{CCO}$ | 5 | output supply voltage |

## 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 |
|---|---|---|---|
| **$V_{CCI}$** | **$V_{CCO}$** | **A** | **Y** |
| 0.7 V to 2.75 V | 1.2 V to 5.5 V | L | H |
| 0.7 V to 2.75 V | 1.2 V to 5.5 V | H | L |
| GND | 1.2 V to 5.5 V | X | Z |
| 0.7 V to 2.75 V | GND | X | Z |
| GND | GND | X | Z |

## 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 |
|---|---|---|---|---|---|
| $V_{CCI}$ | 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 +85 °C [3] | - | 250 | 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 SOT353-1 (TSSOP5) package: $P_{tot}$ derates linearly with 3.3 mW/K above 74 °C.
For SOT1226-3 (X2SON5) package: $P_{tot}$ derates linearly with 3.0 mW/K above 67 °C.

# 9. Recommended operating conditions

**Table 6. 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 | +85 | °C |

# 10. Static characteristics

**Table 7. 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 | | Unit |
|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | Min | Max | |
| $V_{T+}$ | positive-going threshold voltage | see Fig. 5 and Fig. 6 | | | | | | |
| | | $V_{CCI}$ = 0.75 V to 0.85 V | $0.3V_{CCI}$ | - | $0.8V_{CCI}$ | $0.3V_{CCI}$ | $0.8V_{CCI}$ | V |
| | | $V_{CCI}$ = 1.1 V to 1.95 V | $0.4V_{CCI}$ | - | $0.7V_{CCI}$ | $0.4V_{CCI}$ | $0.7V_{CCI}$ | V |
| | | $V_{CCI}$ = 2.3 V to 2.7 V | 0.9 | - | 1.7 | 0.9 | 1.7 | V |
| $V_{T-}$ | negative-going threshold voltage | see Fig. 5 and Fig. 6 | | | | | | |
| | | $V_{CCI}$ = 0.75 V to 0.85 V | $0.2V_{CCI}$ | - | $0.7V_{CCI}$ | $0.2V_{CCI}$ | $0.7V_{CCI}$ | V |
| | | $V_{CCI}$ = 1.1 V to 1.95 V | $0.3V_{CCI}$ | - | $0.6V_{CCI}$ | $0.3V_{CCI}$ | $0.6V_{CCI}$ | V |
| | | $V_{CCI}$ = 2.3 V to 2.7 V | 0.7 | - | 1.5 | 0.7 | 1.5 | V |
| $V_H$ | hysteresis voltage | see Fig. 5 and Fig. 6 | | | | | | |
| | | $V_{CCI}$ = 0.75 V to 0.85 V | $0.06V_{CCI}$ | - | $0.5V_{CCI}$ | $0.06V_{CCI}$ | $0.5V_{CCI}$ | V |
| | | $V_{CCI}$ = 1.1 V to 1.95 V | $0.1V_{CCI}$ | - | $0.4V_{CCI}$ | $0.1V_{CCI}$ | $0.4V_{CCI}$ | V |
| | | $V_{CCI}$ = 2.3 V to 2.7 V | 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] | - | 1.05 | - | - | - | V |
| | | $I_O$ = -3 mA; $V_{CCO}$ = 1.4 V | 1.05 | - | - | 1.05 | - | V |
| | | $I_O$ = -4.5 mA; $V_{CCO}$ = 1.65 V | 1.2 | - | - | 1.2 | - | V |
| | | $I_O$ = -8 mA; $V_{CCO}$ = 2.3 V | 1.7 | - | - | 1.7 | - | V |
| | | $I_O$ = -10 mA; $V_{CCO}$ = 3.0 V | 2.2 | - | - | 2.2 | - | V |
| | | $I_O$ = -12 mA; $V_{CCO}$ = 4.5 V | 3.7 | - | - | 3.7 | - | V |
| $V_{OL}$ | LOW-level output voltage | $I_O$ = 2 mA; $V_{CCO}$ = 1.2 V [1] | - | 0.18 | - | - | - | V |
| | | $I_O$ = 3 mA; $V_{CCO}$ = 1.4 V | - | - | 0.35 | - | 0.35 | V |
| | | $I_O$ = 4.5 mA; $V_{CCO}$ = 1.65 V | - | - | 0.45 | - | 0.45 | V |
| | | $I_O$ = 8 mA; $V_{CCO}$ = 2.3 V | - | - | 0.7 | - | 0.7 | V |
| | | $I_O$ = 10 mA; $V_{CCO}$ = 3.0 V | - | - | 0.8 | - | 0.8 | V |
| | | $I_O$ = 12 mA; $V_{CCO}$ = 4.5 V | - | - | 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 [1] | - | ±0.001 | ±0.1 | - | ±0.5 | µA |

| Symbol | Parameter | Conditions | $T_{amb}$ = 25 °C | | | $T_{amb}$ = -40 °C to +85 °C | | Unit |
|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | Min | Max | |
| $I_{OZ}$ | 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 | 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 [1] | - | ±0.01 | ±0.1 | - | ±0.5 | 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 [1] | - | ±0.01 | ±0.1 | - | ±0.5 | 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 [1] | - | ±0.02 | ±0.1 | - | ±0.5 | 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 [1] | - | ±0.02 | ±0.1 | - | ±0.5 | µA |

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

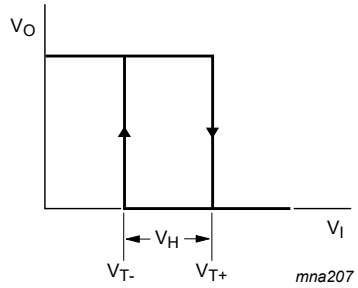



Fig. 5. Transfer characteristic

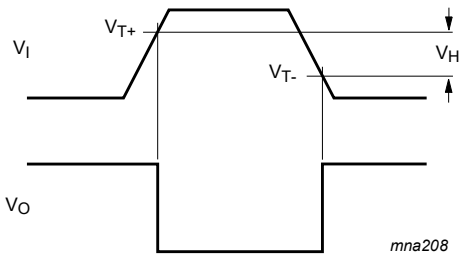



Fig. 6. Definition of $V_{T+}$, $V_{T-}$, and $V_H$

### Table 8. 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 | | Unit |
|---|---|---|---|---|---|---|---|
| | | | Typ | Max | Typ | 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 | nA |
| | | $V_{CCI}$ = 1.3 V to 2.75 V [2] | 1 | 100 | 20 | 500 | nA |
| | | $V_{CCI}$ = 2.75 V; $V_{CCO}$ = 0 V | 1 | 100 | 20 | 500 | nA |
| | | $V_{CCI}$ = 0 V; $V_{CCO}$ = 5.5 V | 1 | 100 | 1 | 100 | nA |
| $I_{CCO}$ | output supply current | $V_I$ = 0 V or $V_{CCI}$; $I_O$ = 0 A; see Table 9 | | | | | |
| | | $V_{CCO}$ = 1.2 V to 3.6 V [1] | 0.001 | 1.0 | 0.01 | 1.2 | µA |
| | | $V_{CCO}$ = 3.6 V to 5.5 V [3] | 0.8 | 1.5 | 1.0 | 1.8 | µA |
| | | $V_{CCI}$ = 2.75 V; $V_{CCO}$ = 0 V | 0.001 | 0.1 | 0.003 | 0.2 | µA |
| | | $V_{CCI}$ = 0 V; $V_{CCO}$ = 3.6 V | 0.2 | 0.6 | 0.3 | 0.8 | µA |
| | | $V_{CCI}$ = 0 V; $V_{CCO}$ = 5.5 V | 0.4 | 0.8 | 0.5 | 1.0 | µA |

| Symbol | Parameter | Conditions | $T_{amb}$ = 25 °C | | $T_{amb}$ = -40 °C to +85 °C | | Unit |
|---|---|---|---|---|---|---|---|
| | | | Typ | Max | Typ | Max | |
| $\Delta I_{CCI}$ | additional input supply current | $V_I = V_{CCI}$ - 0.5 V; $V_{CCI}$ = 2.5 V | 2 | 100 | 14 | 150 | 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 9. 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 10. Dynamic characteristics**

*Voltages are referenced to GND (ground = 0 V); for test circuit see Fig. 11 ; for wave form see Fig. 7.*

| Symbol | Parameter | Conditions | $V_{CCO}$ | | | | | | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1.2 V | 1.5 V ± 0.1 V | | | 1.8 V ± 0.15 V | | | |
| | | | Typ[1] | Min | Typ[1] | Max | Min | Typ[1] | Max | |
| **$T_{amb}$ = 25 °C** | | | | | | | | | | |
| $t_{pd}$ | propagation delay | A to Y [2] | | | | | | | | |
| | | $V_{CCI}$ = 0.75 V to 0.85 V | 23 | 3 | 18 | 73 | 3 | 16 | 69 | ns |
| | | $V_{CCI}$ = 1.1 V to 1.3 V | 16.9 | 3.1 | 10.8 | 20.1 | 2.8 | 8.7 | 16.1 | ns |
| | | $V_{CCI}$ = 1.4 V to 1.6 V | 16.0 | 2.8 | 9.9 | 18.5 | 2.5 | 7.8 | 13.5 | ns |
| | | $V_{CCI}$ = 1.65 V to 1.95 V | 15.6 | 2.7 | 9.5 | 17.7 | 2.4 | 7.3 | 12.2 | ns |
| | | $V_{CCI}$ = 2.3 V to 2.7 V | 15.2 | 2.5 | 9.0 | 17.3 | 2.2 | 6.9 | 11.5 | ns |
| **$T_{amb}$ = -40 °C to +85 °C** | | | | | | | | | | |
| $t_{pd}$ | propagation delay | A to Y [2] | | | | | | | | |
| | | $V_{CCI}$ = 0.75 V to 0.85 V | 23 | 3 | 18 | 148 | 3 | 16 | 145 | ns |
| | | $V_{CCI}$ = 1.1 V to 1.3 V | 16.9 | 3.1 | 10.8 | 20.1 | 2.8 | 8.7 | 16.1 | ns |
| | | $V_{CCI}$ = 1.4 V to 1.6 V | 16.0 | 2.8 | 9.9 | 18.5 | 2.5 | 7.8 | 13.5 | ns |
| | | $V_{CCI}$ = 1.65 V to 1.95 V | 15.6 | 2.7 | 9.5 | 17.7 | 2.4 | 7.3 | 12.2 | ns |
| | | $V_{CCI}$ = 2.3 V to 2.7 V | 15.2 | 2.5 | 9.0 | 17.3 | 2.2 | 6.9 | 11.5 | ns |
| $t_t$ | transition time | $V_{CCI}$ = 0.75 V to 2.7 V [3] | - | 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 11. Dynamic characteristics**

*Voltages are referenced to GND (ground = 0 V); for test circuit see Fig. 11 ; for waveform see Fig. 7.*

| Symbol | Parameter | Conditions | $V_{CCO}$ | | | | | | | | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 2.5 V ± 0.2 V | | | 3.3 V ± 0.3 V | | | 5.0 V ± 0.5 V | | | |
| | | | Min | Typ[1] | Max× | Min | Typ[1] | Max | Min | Typ[1] | Max | |
| **$T_{amb}$ = 25 °C** | | | | | | | | | | | | |
| $t_{pd}$ | propagation delay | A to Y [2] | | | | | | | | | | |
| | | $V_{CCI}$ = 0.75 V to 0.85 V | 2 | 14 | 69 | 2 | 14 | 77 | 2 | 15 | 89 | ns |
| | | $V_{CCI}$ = 1.1 V to 1.3 V | 2.4 | 6.9 | 11.1 | 2.2 | 6.3 | 9.8 | 2.1 | 6.0 | 9.3 | ns |
| | | $V_{CCI}$ = 1.4 V to 1.6 V | 2.1 | 6.0 | 9.4 | 2.0 | 5.4 | 8.5 | 1.9 | 5.0 | 8.0 | ns |
| | | $V_{CCI}$ = 1.65 V to 1.95 V | 2.0 | 5.6 | 9.0 | 1.8 | 4.9 | 8.0 | 1.8 | 4.6 | 7.6 | ns |
| | | $V_{CCI}$ = 2.3 V to 2.7 V | 1.9 | 5.1 | 8.5 | 1.7 | 4.5 | 7.5 | 1.6 | 4.1 | 7.0 | ns |
| **$T_{amb}$ = -40 °C to +85 °C** | | | | | | | | | | | | |
| $t_{pd}$ | propagation delay | A to Y [2] | | | | | | | | | | |
| | | $V_{CCI}$ = 0.75 V to 0.85 V | 2 | 14 | 164 | 2 | 14 | 191 | 2 | 15 | 222 | ns |
| | | $V_{CCI}$ = 1.1 V to 1.3 V | 2.4 | 6.9 | 11.1 | 2.2 | 6.3 | 9.8 | 2.1 | 6.0 | 9.3 | ns |
| | | $V_{CCI}$ = 1.4 V to 1.6 V | 2.1 | 6.0 | 9.4 | 2.0 | 5.4 | 8.5 | 1.9 | 5.0 | 8.0 | ns |
| | | $V_{CCI}$ = 1.65 V to 1.95 V | 2.0 | 5.6 | 9.0 | 1.8 | 4.9 | 8.0 | 1.8 | 4.6 | 7.6 | ns |
| | | $V_{CCI}$ = 2.3 V to 2.7 V | 1.9 | 5.1 | 8.5 | 1.7 | 4.5 | 7.5 | 1.6 | 4.1 | 7.0 | ns |
| $t_t$ | transition time | $V_{CCI}$ = 0.75 V to 2.7 V [3] | 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 test circuit see Fig. 11; for wave form see Fig. 7.*

| 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:

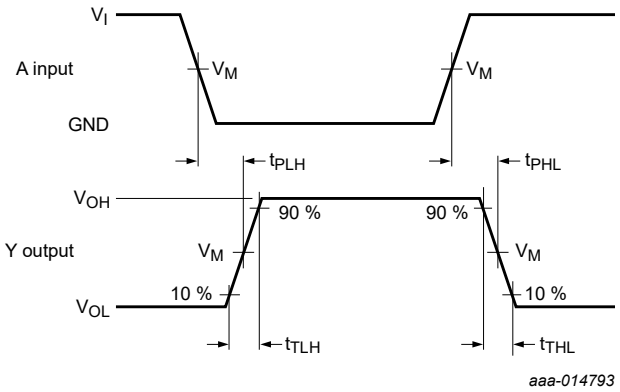
$C_{PD}$ = power dissipation capacitance of the input supply.
$V_{CCI}$ = input supply voltage in V;
$f_i$ = input frequency in MHz;
N = number of inputs switching;

[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;

## 11.1. Waveforms and test circuit



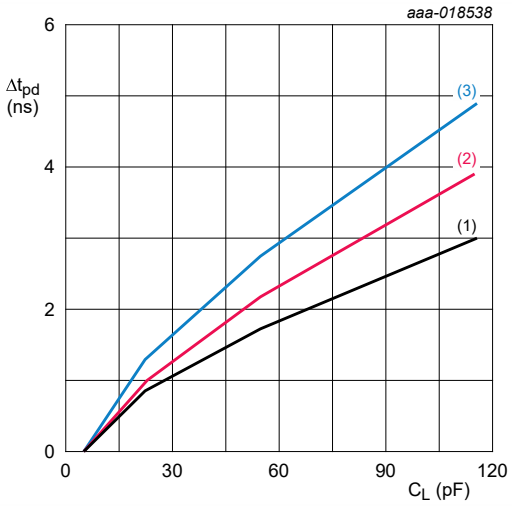

Measurement points are given in Table 13 .

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

**Fig. 7. Input A 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 2.7 V | $0.5V_{CCO}$ | $0.5V_{CCI}$ | $V_{CCI}$ |

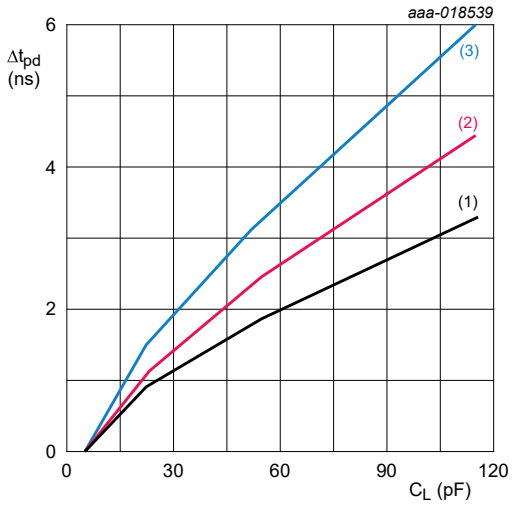



$T_{amb}$ = -40 °C to +85 °C unless otherwise specified.

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

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

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



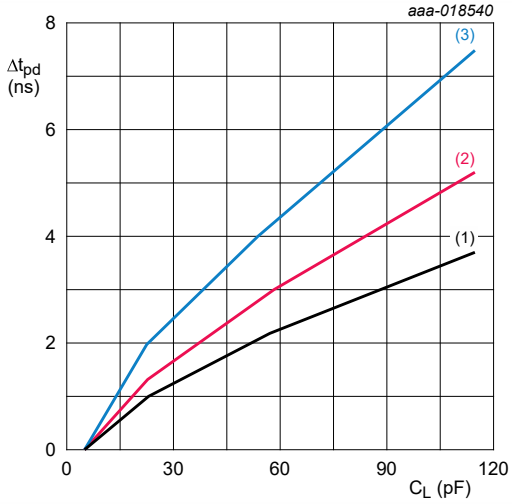

$T_{amb}$ = -40 °C to +85 °C unless otherwise specified.

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

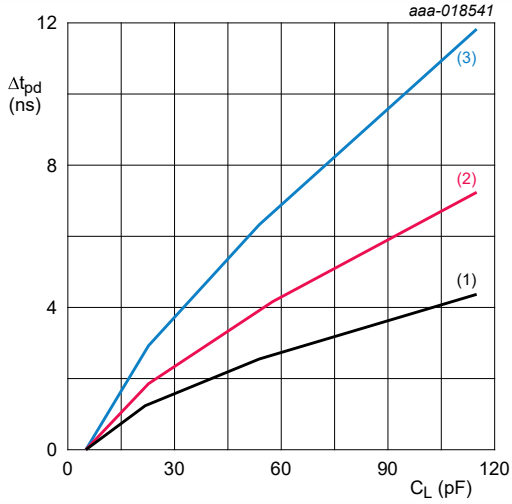
(2) Typical: $T_{amb}$ = 25 °C; $V_{CCO}$ = 3.3 V

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

**Fig. 8. Additional propagation delay versus load capacitance**

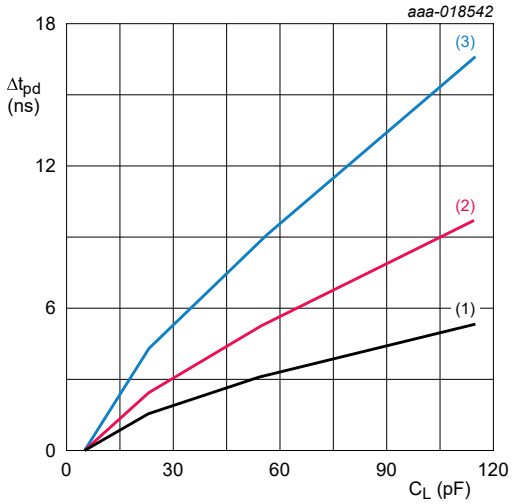



$T_{amb}$ = -40 °C to +85 °C unless otherwise specified.
(1) Minimum: $V_{CCO}$ = 2.7 V
(2) Typical: $T_{amb}$ = 25 °C; $V_{CCO}$ = 2.5 V
(3) Maximum: $V_{CCO}$ = 2.3 V

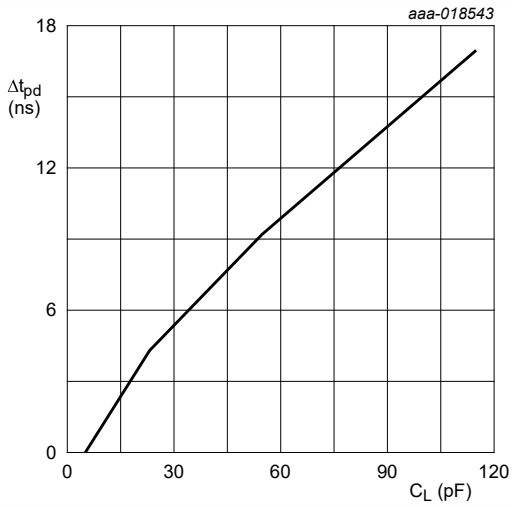



$T_{amb}$ = -40 °C to +85 °C unless otherwise specified.
(1) Minimum: $V_{CCO}$ = 1.95 V
(2) Typical: $T_{amb}$ = 25 °C; $V_{CCO}$ = 1.8 V
(3) Maximum: $V_{CCO}$ = 1.65 V

**Fig. 9. Additional propagation delay versus load capacitance**

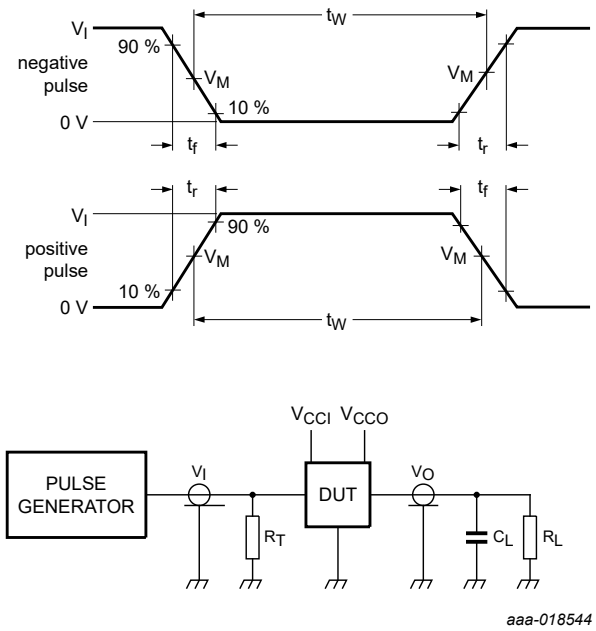



$T_{amb}$ = -40 °C to +85 °C unless otherwise specified.
(1) Minimum: $V_{CCO}$ = 1.6 V
(2) Typical: $T_{amb}$ = 25 °C; $V_{CCO}$ = 1.5 V
(3) Maximum: $V_{CCO}$ = 1.4 V




$T_{amb}$ = 25 °C; $V_{CCO}$ = 1.2 V.

**Fig. 10. 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.

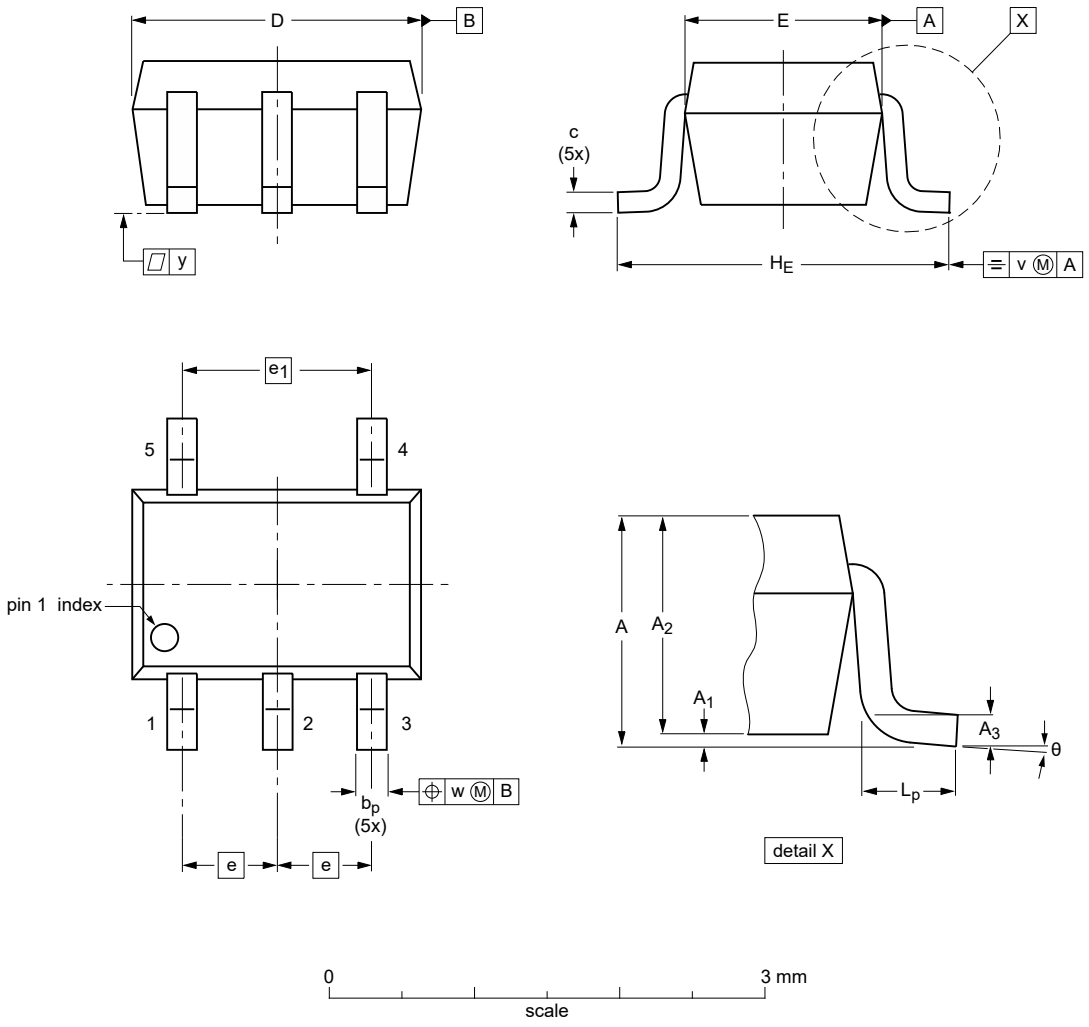
**Fig. 11. Test circuit for measuring switching times**

**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 | $V_{CCI}$ |

## 12. Package outline

**TSSOP5: plastic thin shrink small outline package; 5 leads; body width 1.25 mm** **SOT353-1**




Dimensions (mm are the original dimensions)

| Unit | | A | $A_1$ | $A_2$ | $A_3$ | $b_p$ | c | $D^{(1)}$ | $E^{(1)}$ | e | $e_1$ | $H_E$ | $L_p$ | v | w | y | θ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | max | 1.1 | 0.1 | 1.0 | 0.15 | 0.30 | 0.25 | 2.2 | 1.35 | 0.65 | 1.3 | 2.4 | 0.46 | 0.3 | 0.1 | 0.1 | 8° |
| | min | 0.8 | 0 | 0.8 | | 0.15 | 0.08 | 1.8 | 1.15 | | | 1.8 | 0.26 | | | | 0° |

Note

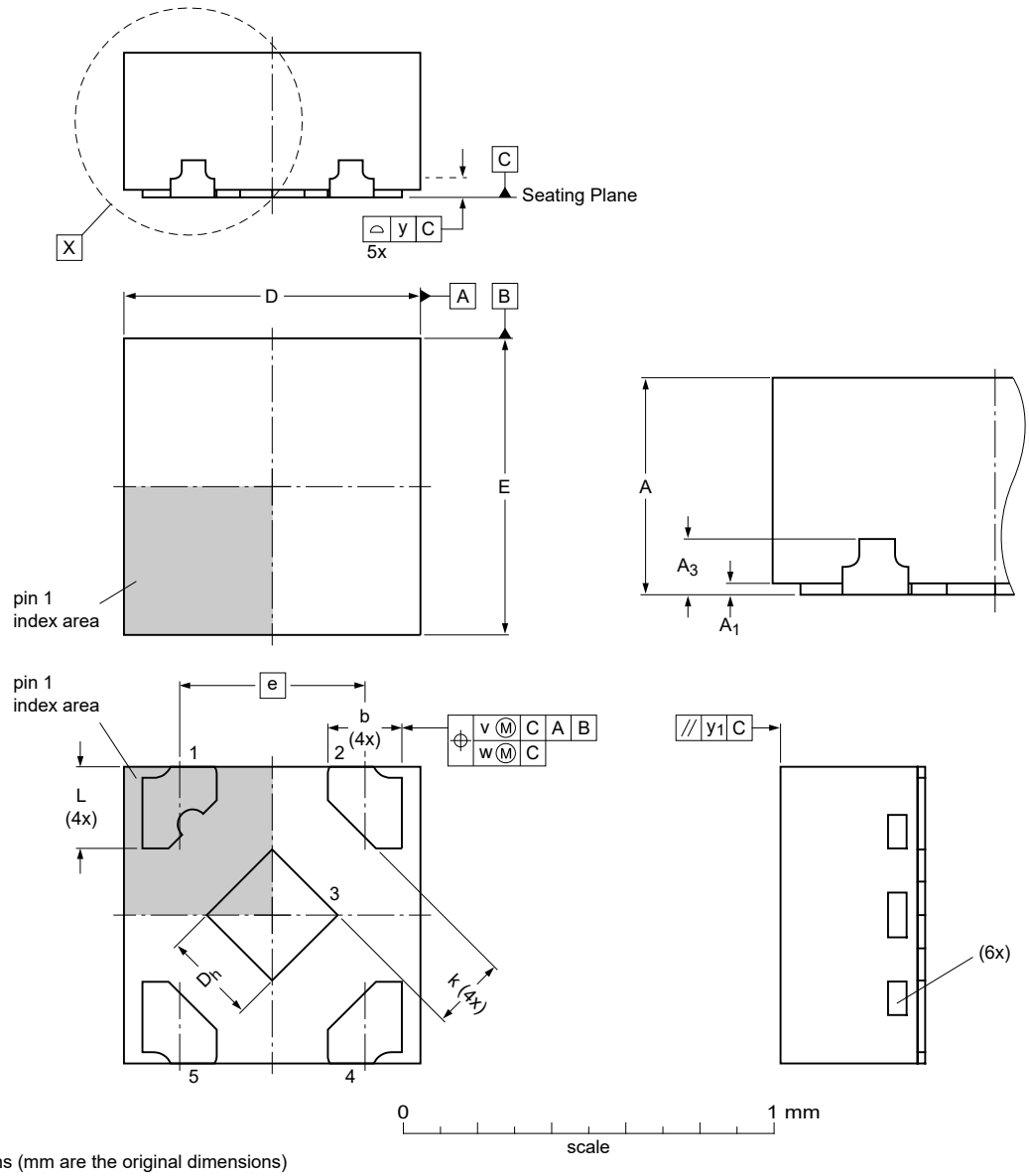
1. Plastic or metal protrusions of 0.2 mm maximum per side are not included.

*sot353-1_po*

| Outline version | References | | | | European projection | Issue date |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT353-1 | | MO-203 | SC-88A | | | ~~21-12-15~~ 21-12-16 |

**Fig. 12. Package outline SOT353-1 (TSSOP5)**

**X2SON5: plastic thermal enhanced extremely thin small outline package; no leads; 5 terminals; body 0.8 x 0.8 x 0.32 mm** **SOT1226-3**




Dimensions (mm are the original dimensions)

| Unit | | A | $A_1$ | $A_3$ | D | $D_h$ | E | b | e | K | L | v | w | y | $y_1$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | max | 0.35 | 0.04 | 0.10 (Typ.) | 0.85 | 0.30 | 0.85 | 0.25 | 0.50 | | 0.27 | 0.1 | 0.05 | 0.05 | 0.05 |
| | nom | 0.32 | 0.02 | | 0.80 | 0.25 | 0.80 | 0.20 | | | 0.22 | | | | |
| | min | 0.30 | 0.00 | | 0.75 | 0.20 | 0.75 | 0.15 | | 0.20 | 0.17 | | | | |

*sot1226-3_po*

| Outline version | References | | | | European projection | Issue date |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | EIAJ | | | |
| SOT1226-3 | | --- | | | | ~~19-11-06~~ 19-11-07 |

**Fig. 13. Package outline SOT1226-3 (X2SON5)**

## 13. Abbreviations

**Table 15. Abbreviations**

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

## 14. Revision history

**Table 16. Revision history**

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|---|---|---|---|---|
| 74AXP1T14 v.3 | 20220202 | Product data sheet | - | 74AXP1T14 v.2 |
| Modifications: | • SOT1226 (X2SON5) package changed to SOT1226-3 (X2SON5) package.<br>• Fig. 12: Package outline drawing for SOT353-1 has changed.<br>• Table 5: Derating values for $P_{tot}$ total power dissipation updated. | | | |
| 74AXP1T14 v.2 | 20170509 | Product data sheet | - | 74AXP1T14 v.1 |
| Modifications: | • Added type number 74AXP1T14GX (SOT1226/X2SON5). | | | |
| 74AXP1T14 v.1 | 20161121 | 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".
[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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