# NX3L1T5157

## Low-ohmic single-pole double-throw analog switch

Rev. 6.1 — 30 November 2016 Product data sheet

## 1. General description

The NX3L1T5157 is a low-ohmic single-pole double-throw analog switch suitable for use as an analog or digital 2:1 multiplexer/demultiplexer. It has a digital select input (S), two independent inputs/outputs (Y0 and Y1) and a common input/output (Z).

Schmitt trigger action at the digital input makes the circuit tolerant to slower input rise and fall times. Low threshold digital input allows this device to be driven by 1.8 V logic levels in 3.3 V applications without significant increase in supply current $I_{CC}$. This makes it possible for the NX3L1T5157 to switch 4.3 V signals with a 1.8 V digital controller, eliminating the need for logic level translation. The NX3L1T5157 allows signals with amplitude up to $V_{CC}$ to be transmitted from Z to Y0 or Y1, or from Y0 or Y1 to Z. Its low ON resistance (0.5 Ω) and flatness (0.13 Ω) ensures minimal attenuation and distortion of transmitted signals.

## 2. Features and benefits

- Wide supply voltage range from 1.4 V to 4.3 V
- Very low ON resistance (peak):
  - 1.6 Ω (typical) at $V_{CC}$ = 1.4 V
  - 1.0 Ω (typical) at $V_{CC}$ = 1.65 V
  - 0.55 Ω (typical) at $V_{CC}$ = 2.3 V
  - 0.50 Ω (typical) at $V_{CC}$ = 2.7 V
  - 0.50 Ω (typical) at $V_{CC}$ = 4.3 V
- Break-before-make switching
- High noise immunity
- ESD protection:
  - HBM JESD22-A114F Class 3A exceeds 7500 V
  - MM JESD22-A115-A exceeds 200 V
  - CDM AEC-Q100-011 revision B exceeds 1000 V
  - IEC61000-4-2 contact discharge exceeds 8000 V for switch ports
- CMOS low-power consumption
- Latch-up performance exceeds 100 mA per JESD78 Class II Level A
- 1.8 V control logic at $V_{CC}$ = 3.6 V
- Control input accepts voltages above supply voltage
- Very low supply current, even when input is below $V_{CC}$
- High current handling capability (350 mA continuous current under 3.3 V supply)
- Specified from −40 °C to +85 °C and from −40 °C to +125 °C

## 3. Applications

- Cell phone
- PDA
- Portable media player

## 4. Ordering information

**Table 1. Ordering information**

| Type number | Package | | | |
|---|---|---|---|---|
| | Temperature range | Name | Description | Version |
| NX3L1T5157GM | –40 °C to +125 °C | XSON6 | plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1.45 × 0.5 mm | SOT886 |

## 5. Marking

**Table 2. Marking codes[1]**

| Type number | Marking code |
|---|---|
| NX3L1T5157GM | DI |

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

## 6. Functional diagram

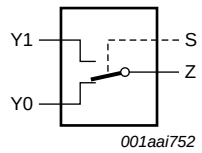



**Fig 1. Logic symbol**

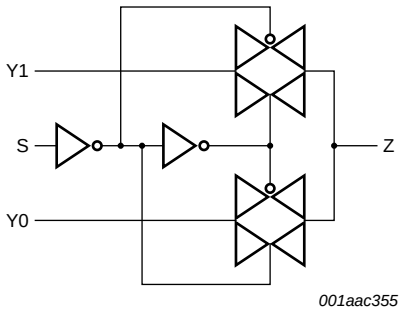
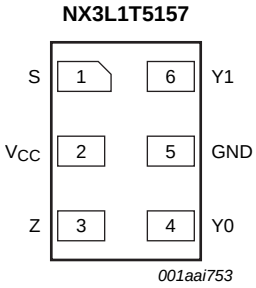



**Fig 2. Logic diagram**

# 7. Pinning information

## 7.1 Pinning




Transparent top view

**Fig 3. Pin configuration SOT886 (XSON6)**

## 7.2 Pin description

**Table 3. Pin description**

| Symbol | Pin | Description |
|---|---|---|
| S | 1 | select input |
| $V_{CC}$ | 2 | supply voltage |
| Z | 3 | common input or output |
| Y0 | 4 | independent input or output |
| GND | 5 | ground (0 V) |
| Y1 | 6 | independent input or output |

# 8. Functional description

**Table 4. Function table[1]**

| Input S | Channel on |
|---|---|
| L | Y0 |
| H | Y1 |

[1] H = HIGH voltage level; L = LOW voltage level.

# 9. 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 |
| $V_I$ | input voltage | select input S [1] | −0.5 | +4.6 | V |
| $V_{SW}$ | switch voltage | [2] | −0.5 | $V_{CC}$ + 0.5 | V |
| $I_{IK}$ | input clamping current | $V_I$ < −0.5 V | −50 | - | mA |
| $I_{SK}$ | switch clamping current | $V_I$ < −0.5 V or $V_I$ > $V_{CC}$ + 0.5 V | - | ±50 | mA |
| $I_{SW}$ | switch current | $V_{SW}$ > −0.5 V or $V_{SW}$ < $V_{CC}$ + 0.5 V; source or sink current | - | ±350 | mA |
| | | $V_{SW}$ > −0.5 V or $V_{SW}$ < $V_{CC}$ + 0.5 V; pulsed at 1 ms duration, < 10 % duty cycle; peak current | - | ±500 | mA |
| $T_{stg}$ | storage temperature | | −65 | +150 | °C |
| $P_{tot}$ | total power dissipation | $T_{amb}$ = −40 °C to +125 °C [3] | - | 250 | mW |

[1] The minimum input voltage rating may be exceeded if the input current rating is observed.

[2] The minimum and maximum switch voltage ratings may be exceeded if the switch clamping current rating is observed but may not exceed 4.6 V.

[3] For XSON6 package: above 118 °C the value of $P_{tot}$ derates linearly with 7.8 mW/K.

# 10. Recommended operating conditions

**Table 6. Recommended operating conditions**

| Symbol | Parameter | Conditions | Min | Max | Unit |
|---|---|---|---|---|---|
| $V_{CC}$ | supply voltage | | 1.4 | 4.3 | V |
| $V_I$ | input voltage | select input S | 0 | 4.3 | V |
| $V_{SW}$ | switch voltage | [1] | 0 | $V_{CC}$ | V |
| $T_{amb}$ | ambient temperature | | −40 | +125 | °C |
| $\Delta t/\Delta V$ | input transition rise and fall rate | $V_{CC}$ = 1.4 V to 4.3 V [2] | - | 200 | ns/V |

[1] To avoid sinking GND current from terminal Z when switch current flows in terminal Yn, the voltage drop across the bidirectional switch must not exceed 0.4 V. If the switch current flows into terminal Z, no GND current will flow from terminal Yn. In this case, there is no limit for the voltage drop across the switch.

[2] Applies to control signal levels.

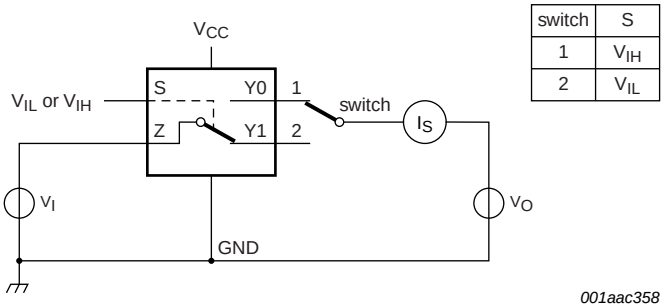
## 11. Static characteristics

**Table 7. Static characteristics**

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

| Symbol | Parameter | Conditions | $T_{amb}$ = 25 °C | | | $T_{amb}$ = –40 °C to +125 °C | | | Unit |
|---|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | Min | Max (85 °C) | Max (125 °C) | |
| $V_{IH}$ | HIGH-level input voltage | $V_{CC}$ = 1.4 V to 1.6 V | 0.9 | - | - | 0.9 | - | - | V |
| | | $V_{CC}$ = 1.65 V to 1.95 V | 0.9 | - | - | 0.9 | - | - | V |
| | | $V_{CC}$ = 2.3 V to 2.7 V | 1.1 | - | - | 1.1 | - | - | V |
| | | $V_{CC}$ = 2.7 V to 3.6 V | 1.3 | - | - | 1.3 | - | - | V |
| | | $V_{CC}$ = 3.6 V to 4.3 V | 1.4 | - | - | 1.4 | - | - | V |
| $V_{IL}$ | LOW-level input voltage | $V_{CC}$ = 1.4 V to 1.6 V | - | - | 0.3 | - | 0.3 | 0.3 | V |
| | | $V_{CC}$ = 1.65 V to 1.95 V | - | - | 0.4 | - | 0.4 | 0.3 | V |
| | | $V_{CC}$ = 2.3 V to 2.7 V | - | - | 0.4 | - | 0.4 | 0.4 | V |
| | | $V_{CC}$ = 2.7 V to 3.6 V | - | - | 0.5 | - | 0.5 | 0.5 | V |
| | | $V_{CC}$ = 3.6 V to 4.3 V | - | - | 0.6 | - | 0.6 | 0.6 | V |
| $I_I$ | input leakage current | select input S; $V_I$ = GND to 4.3 V; $V_{CC}$ = 1.4 V to 4.3 V | - | - | - | - | ±0.5 | ±1 | µA |
| $I_{S(OFF)}$ | OFF-state leakage current | Y0 and Y1 port; see Figure 4 | | | | | | | |
| | | $V_{CC}$ = 1.4 V to 3.6 V | - | - | ±5 | - | ±50 | ±500 | nA |
| | | $V_{CC}$ = 3.6 V to 4.3 V | - | - | ±10 | - | ±50 | ±500 | nA |
| $I_{S(ON)}$ | ON-state leakage current | Z port; see Figure 5 | | | | | | | |
| | | $V_{CC}$ = 1.4 V to 3.6 V | - | - | ±5 | - | ±50 | ±500 | nA |
| | | $V_{CC}$ = 3.6 V to 4.3 V | - | - | ±10 | - | ±50 | ±500 | nA |
| $I_{CC}$ | supply current | $V_I$ = $V_{CC}$ or GND; $V_{SW}$ = GND or $V_{CC}$ | | | | | | | |
| | | $V_{CC}$ = 3.6 V | - | - | 100 | - | 690 | 6000 | nA |
| | | $V_{CC}$ = 4.3 V | - | - | 150 | - | 800 | 7000 | nA |
| $\Delta I_{CC}$ | additional supply current | $V_{SW}$ = GND or $V_{CC}$ | | | | | | | |
| | | $V_I$ = 2.6 V; $V_{CC}$ = 4.3 V | - | 2.0 | 4.0 | - | 7 | 7 | µA |
| | | $V_I$ = 2.6 V; $V_{CC}$ = 3.6 V | - | 0.35 | 0.7 | - | 1 | 1 | µA |
| | | $V_I$ = 1.8 V; $V_{CC}$ = 4.3 V | - | 7.0 | 10.0 | - | 15 | 15 | µA |
| | | $V_I$ = 1.8 V; $V_{CC}$ = 3.6 V | - | 2.5 | 4.0 | - | 5 | 5 | µA |
| | | $V_I$ = 1.8 V; $V_{CC}$ = 2.5 V | - | 50 | 200 | - | 300 | 500 | nA |
| $C_I$ | input capacitance | | - | 1.0 | - | - | - | - | pF |
| $C_{S(OFF)}$ | OFF-state capacitance | | - | 35 | - | - | - | - | pF |
| $C_{S(ON)}$ | ON-state capacitance | | - | 130 | - | - | - | - | pF |

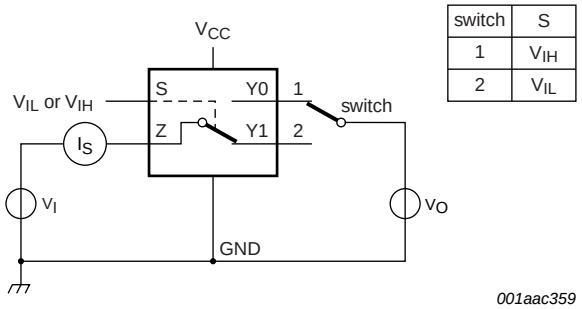
## 11.1 Test circuits




| switch | S |
|---|---|
| 1 | $V_{IH}$ |
| 2 | $V_{IL}$ |

$V_I$ = 0.3 V or $V_{CC}$ − 0.3 V; $V_O$ = $V_{CC}$ − 0.3 V or 0.3 V.

**Fig 4. Test circuit for measuring OFF-state leakage current**




| switch | S |
|---|---|
| 1 | $V_{IH}$ |
| 2 | $V_{IL}$ |

$V_I$ = 0.3 V or $V_{CC}$ − 0.3 V; $V_O$ = $V_{CC}$ − 0.3 V or 0.3 V.

**Fig 5. Test circuit for measuring ON-state leakage current**

## 11.2 ON resistance

**Table 8. ON resistance**

*At recommended operating conditions; voltages are referenced to GND (ground = 0 V); for graphs see Figure 7 to Figure 13.*

| Symbol | Parameter | Conditions | $T_{amb}$ = –40 °C to +85 °C | | | $T_{amb}$ = –40 °C to +125 °C | | Unit |
|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ[1] | Max | Min | Max | |
| $R_{ON(peak)}$ | ON resistance (peak) | $V_I$ = GND to $V_{CC}$; $I_{SW}$ = 100 mA; see Figure 6 | | | | | | |
| | | $V_{CC}$ = 1.4 V | - | 1.6 | 3.7 | - | 4.1 | Ω |
| | | $V_{CC}$ = 1.65 V | - | 1.0 | 1.6 | - | 1.7 | Ω |
| | | $V_{CC}$ = 2.3 V | - | 0.55 | 0.8 | - | 0.9 | Ω |
| | | $V_{CC}$ = 2.7 V | - | 0.5 | 0.75 | - | 0.9 | Ω |
| | | $V_{CC}$ = 4.3 V | - | 0.5 | 0.75 | - | 0.9 | Ω |

**Table 8. ON resistance** *...continued*

*At recommended operating conditions; voltages are referenced to GND (ground = 0 V); for graphs see Figure 7 to Figure 13.*

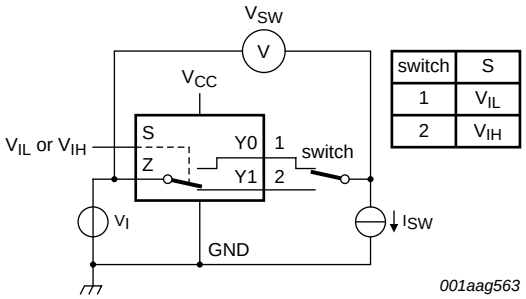
| Symbol | Parameter | Conditions | $T_{amb}$ = –40 °C to +85 °C | | | $T_{amb}$ = –40 °C to +125 °C | | Unit |
|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ[1] | Max | Min | Max | |
| $\Delta R_{ON}$ | ON resistance mismatch between channels | $V_I$ = GND to $V_{CC}$; $I_{SW}$ = 100 mA [2] | | | | | | |
| | | $V_{CC}$ = 1.4 V | - | 0.04 | 0.3 | - | 0.3 | Ω |
| | | $V_{CC}$ = 1.65 V | - | 0.04 | 0.2 | - | 0.3 | Ω |
| | | $V_{CC}$ = 2.3 V | - | 0.02 | 0.08 | - | 0.1 | Ω |
| | | $V_{CC}$ = 2.7 V | - | 0.02 | 0.075 | - | 0.1 | Ω |
| | | $V_{CC}$ = 4.3 V | - | 0.02 | 0.075 | - | 0.1 | Ω |
| $R_{ON(flat)}$ | ON resistance (flatness) | $V_I$ = GND to $V_{CC}$; $I_{SW}$ = 100 mA [3] | | | | | | |
| | | $V_{CC}$ = 1.4 V | - | 1.0 | 3.3 | - | 3.6 | Ω |
| | | $V_{CC}$ = 1.65 V | - | 0.5 | 1.2 | - | 1.3 | Ω |
| | | $V_{CC}$ = 2.3 V | - | 0.15 | 0.3 | - | 0.35 | Ω |
| | | $V_{CC}$ = 2.7 V | - | 0.13 | 0.3 | - | 0.35 | Ω |
| | | $V_{CC}$ = 4.3 V | - | 0.2 | 0.4 | - | 0.45 | Ω |

[1] Typical values are measured at $T_{amb}$ = 25 °C.

[2] Measured at identical $V_{CC}$, temperature and input voltage.

[3] Flatness is defined as the difference between the maximum and minimum value of ON resistance measured at identical $V_{CC}$ and temperature.

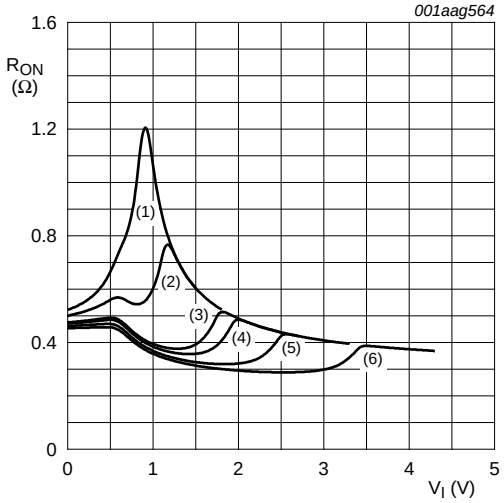
## 11.3 ON resistance test circuit and graphs




| switch | S |
|---|---|
| 1 | $V_{IL}$ |
| 2 | $V_{IH}$ |

$R_{ON} = V_{SW} / I_{SW}$.

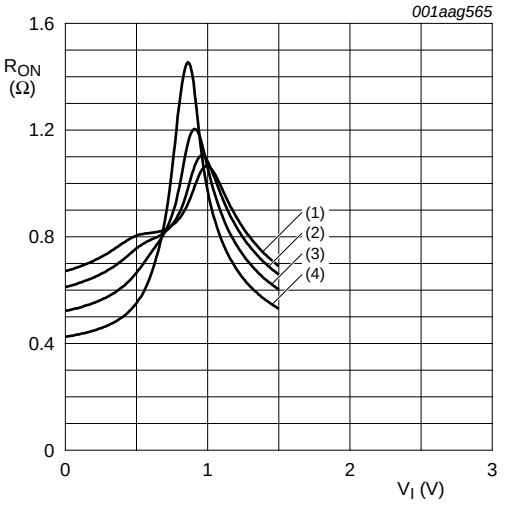
**Fig 6. Test circuit for measuring ON resistance**




(1) $V_{CC}$ = 1.5 V.
(2) $V_{CC}$ = 1.8 V.
(3) $V_{CC}$ = 2.5 V.
(4) $V_{CC}$ = 2.7 V.
(5) $V_{CC}$ = 3.3 V.
(6) $V_{CC}$ = 4.3 V.

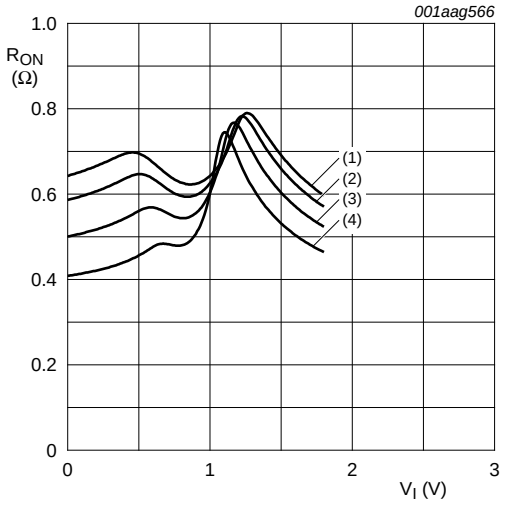
Measured at $T_{amb}$ = 25 °C.

**Fig 7. Typical ON resistance as a function of input voltage**



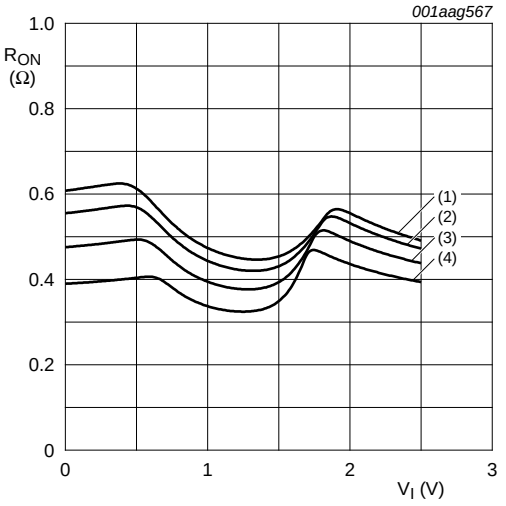

(1) $T_{amb}$ = 125 °C.
(2) $T_{amb}$ = 85 °C.
(3) $T_{amb}$ = 25 °C.
(4) $T_{amb}$ = −40 °C.

**Fig 8. ON resistance as a function of input voltage; $V_{CC}$ = 1.5 V**



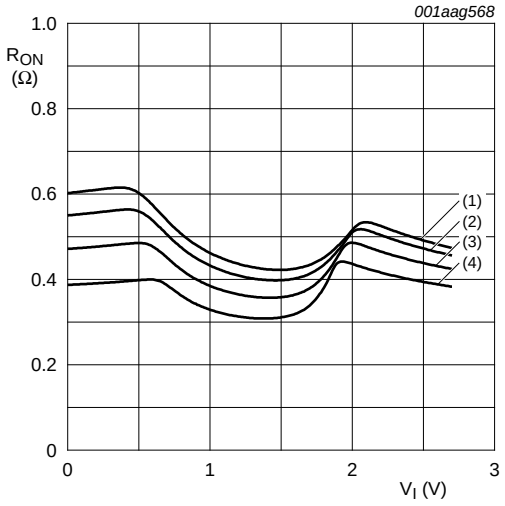

(1) $T_{amb}$ = 125 °C.
(2) $T_{amb}$ = 85 °C.
(3) $T_{amb}$ = 25 °C.
(4) $T_{amb}$ = −40 °C.

**Fig 9. ON resistance as a function of input voltage; $V_{CC}$ = 1.8 V**



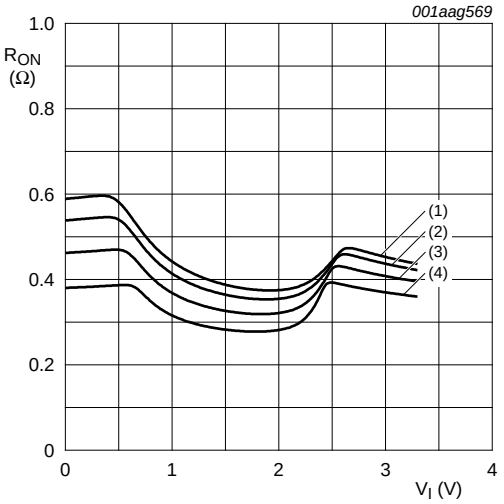

(1) $T_{amb}$ = 125 °C.
(2) $T_{amb}$ = 85 °C.
(3) $T_{amb}$ = 25 °C.
(4) $T_{amb}$ = −40 °C.

**Fig 10. ON resistance as a function of input voltage; $V_{CC}$ = 2.5 V**



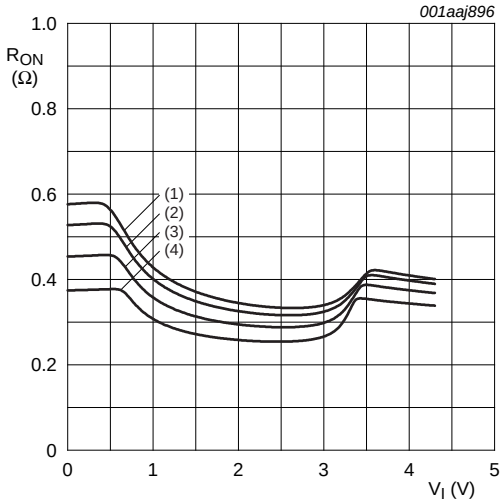

(1) $T_{amb}$ = 125 °C.
(2) $T_{amb}$ = 85 °C.
(3) $T_{amb}$ = 25 °C.
(4) $T_{amb}$ = −40 °C.

**Fig 11. ON resistance as a function of input voltage; $V_{CC}$ = 2.7 V**




(1) $T_{amb}$ = 125 °C.
(2) $T_{amb}$ = 85 °C.
(3) $T_{amb}$ = 25 °C.
(4) $T_{amb}$ = –40 °C.

**Fig 12. ON resistance as a function of input voltage; $V_{CC}$ = 3.3 V**




(1) $T_{amb}$ = 125 °C.
(2) $T_{amb}$ = 85 °C.
(3) $T_{amb}$ = 25 °C.
(4) $T_{amb}$ = –40 °C.

**Fig 13. ON resistance as a function of input voltage; $V_{CC}$ = 4.3 V**

## 12. Dynamic characteristics

**Table 9. Dynamic characteristics**

*At recommended operating conditions; voltages are referenced to GND (ground = 0 V); for load circuit see Figure 16.*

| Symbol | Parameter | Conditions | 25 °C | | | –40 °C to +125 °C | | | Unit |
|---|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ[1] | Max | Min | Max (85 °C) | Max (125 °C) | |
| $t_{en}$ | enable time | S to Z or Yn; see Figure 14 | | | | | | | |
| | | $V_{CC}$ = 1.4 V to 1.6 V | - | 50 | 90 | - | 120 | 120 | ns |
| | | $V_{CC}$ = 1.65 V to 1.95 V | - | 36 | 70 | - | 80 | 90 | ns |
| | | $V_{CC}$ = 2.3 V to 2.7 V | - | 24 | 45 | - | 50 | 55 | ns |
| | | $V_{CC}$ = 2.7 V to 3.6 V | - | 22 | 40 | - | 45 | 50 | ns |
| | | $V_{CC}$ = 3.6 V to 4.3 V | - | 22 | 40 | - | 45 | 50 | ns |
| $t_{dis}$ | disable time | S to Z or Yn; see Figure 14 | | | | | | | |
| | | $V_{CC}$ = 1.4 V to 1.6 V | - | 32 | 70 | - | 80 | 90 | ns |
| | | $V_{CC}$ = 1.65 V to 1.95 V | - | 20 | 55 | - | 60 | 65 | ns |
| | | $V_{CC}$ = 2.3 V to 2.7 V | - | 12 | 25 | - | 30 | 35 | ns |
| | | $V_{CC}$ = 2.7 V to 3.6 V | - | 10 | 20 | - | 25 | 30 | ns |
| | | $V_{CC}$ = 3.6 V to 4.3 V | - | 10 | 20 | - | 25 | 30 | ns |

**Table 9. Dynamic characteristics** *...continued*

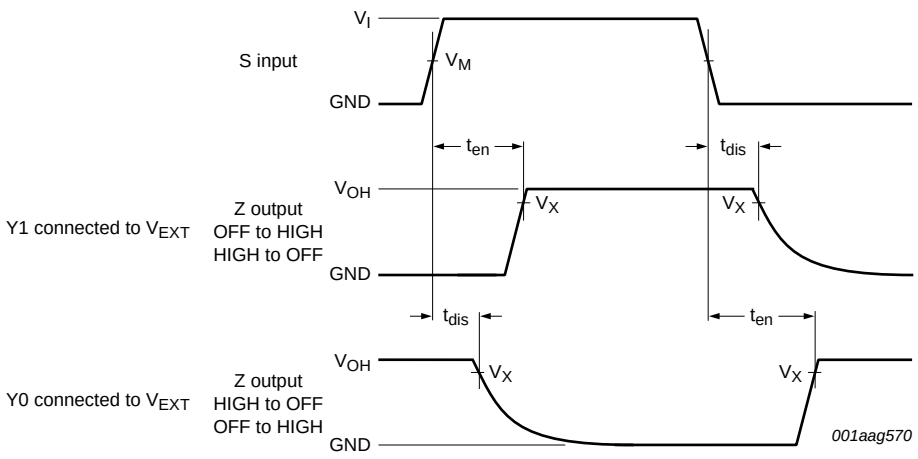
*At recommended operating conditions; voltages are referenced to GND (ground = 0 V); for load circuit see Figure 16.*

| Symbol | Parameter | Conditions | 25 °C | | | –40 °C to +125 °C | | | Unit |
|---|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ[1] | Max | Min | Max (85 °C) | Max (125 °C) | |
| $t_{b-m}$ | break-before-make time | see Figure 15 [2] | | | | | | | |
| | | $V_{CC}$ = 1.4 V to 1.6 V | - | 19 | - | 9 | - | - | ns |
| | | $V_{CC}$ = 1.65 V to 1.95 V | - | 17 | - | 7 | - | - | ns |
| | | $V_{CC}$ = 2.3 V to 2.7 V | - | 13 | - | 4 | - | - | ns |
| | | $V_{CC}$ = 2.7 V to 3.6 V | - | 10 | - | 3 | - | - | ns |
| | | $V_{CC}$ = 3.6 V to 4.3 V | - | 10 | - | 2 | - | - | ns |

[1] Typical values are measured at $T_{amb}$ = 25 °C and $V_{CC}$ = 1.5 V, 1.8 V, 2.5 V, 3.3 V and 4.3 V respectively.

[2] Break-before-make guaranteed by design.

## 12.1 Waveform and test circuits



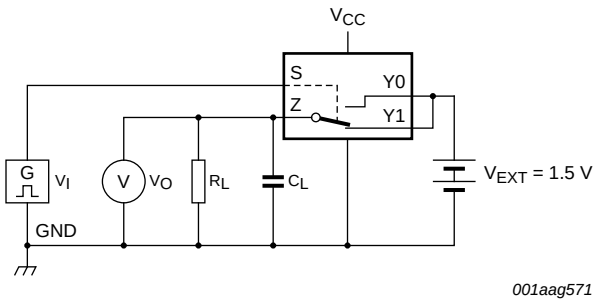

Measurement points are given in Table 10.

Logic level: $V_{OH}$ is typical output voltage level that occurs with the output load.

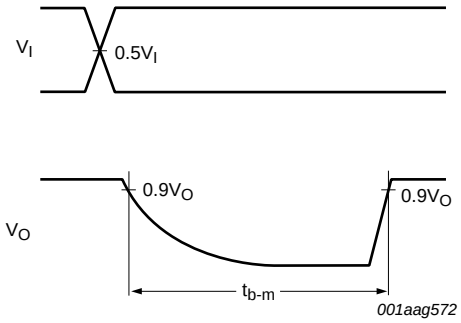
**Fig 14. Enable and disable times**

**Table 10. Measurement points**

| Supply voltage | Input | Output |
|---|---|---|
| $V_{CC}$ | $V_M$ | $V_X$ |
| 1.4 V to 4.3 V | $0.5V_{CC}$ | $0.9V_{OH}$ |

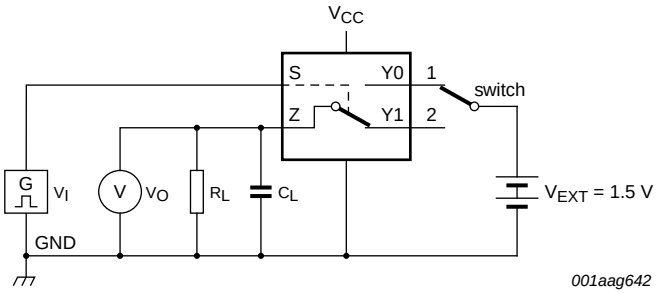



a. Test circuit




b. Input and output measurement points

**Fig 15. Test circuit for measuring break-before-make timing**




Test data is given in Table 11.

Definitions test circuit:

$R_L$ = Load resistance.

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

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

**Fig 16. Load circuit for switching times**

**Table 11. Test data**

| Supply voltage | Input | | Load | |
|---|---|---|---|---|
| $V_{CC}$ | $V_I$ | $t_r$, $t_f$ | $C_L$ | $R_L$ |
| 1.4 V to 4.3 V | $V_{CC}$ | ≤ 2.5 ns | 35 pF | 50 Ω |

## 12.2 Additional dynamic characteristics

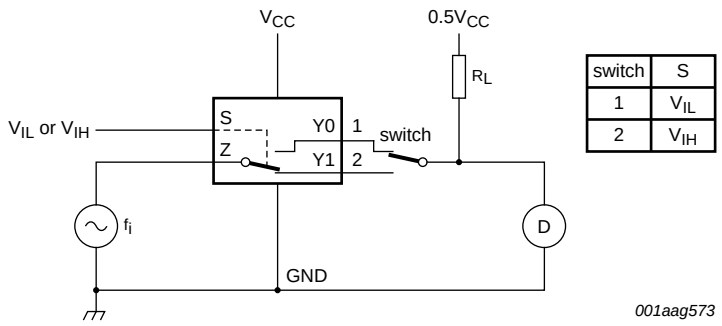
**Table 12. Additional dynamic characteristics**

*At recommended operating conditions; voltages are referenced to GND (ground = 0 V); $V_I$ = GND or $V_{CC}$ (unless otherwise specified); $t_r = t_f \leq 2.5$ ns; $T_{amb}$ = 25 °C.*

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| THD | total harmonic distortion | $f_i$ = 20 Hz to 20 kHz; $R_L$ = 32 Ω; see Figure 17 | [1] | | | | |
| | | $V_{CC}$ = 1.4 V; $V_I$ = 1 V (p-p) | | - | 0.15 | - | % |
| | | $V_{CC}$ = 1.65 V; $V_I$ = 1.2 V (p-p) | | - | 0.10 | - | % |
| | | $V_{CC}$ = 2.3 V; $V_I$ = 1.5 V (p-p) | | - | 0.02 | - | % |
| | | $V_{CC}$ = 2.7 V; $V_I$ = 2 V (p-p) | | - | 0.02 | - | % |
| | | $V_{CC}$ = 4.3 V; $V_I$ = 2 V (p-p) | | - | 0.02 | - | % |
| $f_{(-3dB)}$ | −3 dB frequency response | $R_L$ = 50 Ω; see Figure 18 | [1] | | | | |
| | | $V_{CC}$ = 1.4 V to 4.3 V | | - | 60 | - | MHz |
| $\alpha_{iso}$ | isolation (OFF-state) | $f_i$ = 100 kHz; $R_L$ = 50 Ω; see Figure 19 | [1] | | | | |
| | | $V_{CC}$ = 1.4 V to 4.3 V | | - | −90 | - | dB |
| $V_{ct}$ | crosstalk voltage | between digital inputs and switch; $f_i$ = 1 MHz; $C_L$ = 50 pF; $R_L$ = 50 Ω; see Figure 20 | | | | | |
| | | $V_{CC}$ = 1.4 V to 3.6 V | | - | 0.2 | - | V |
| | | $V_{CC}$ = 3.6 V to 4.3 V | | - | 0.3 | - | V |
| $Q_{inj}$ | charge injection | $f_i$ = 1 MHz; $C_L$ = 0.1 nF; $R_L$ = 1 MΩ; $V_{gen}$ = 0 V; $R_{gen}$ = 0 Ω; see Figure 21 | | | | | |
| | | $V_{CC}$ = 1.5 V | | - | 3 | - | pC |
| | | $V_{CC}$ = 1.8 V | | - | 4 | - | pC |
| | | $V_{CC}$ = 2.5 V | | - | 6 | - | pC |
| | | $V_{CC}$ = 3.3 V | | - | 9 | - | pC |
| | | $V_{CC}$ = 4.3 V | | - | 15 | - | pC |

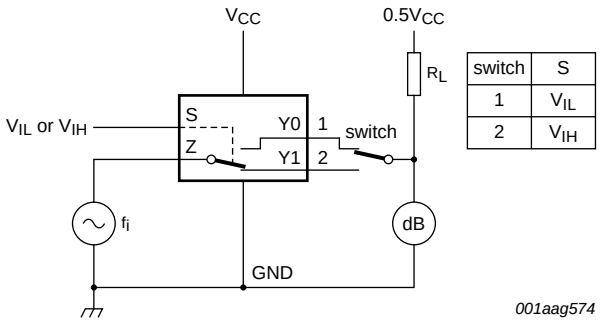
[1] $f_i$ is biased at $0.5V_{CC}$.

## 12.3 Test circuits



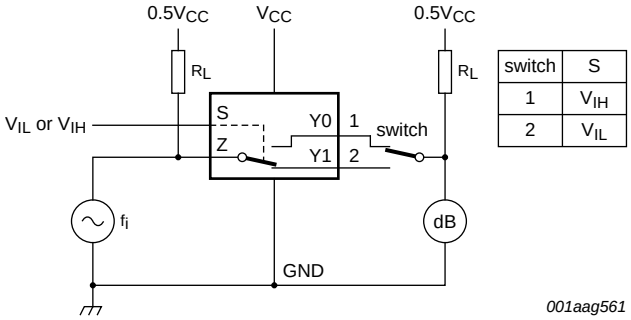

| switch | S |
|---|---|
| 1 | $V_{IL}$ |
| 2 | $V_{IH}$ |

**Fig 17. Test circuit for measuring total harmonic distortion**



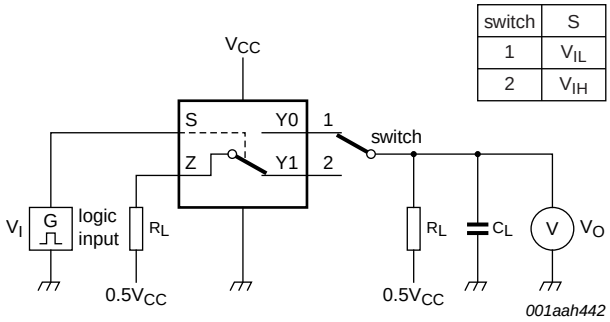

Adjust $f_i$ voltage to obtain 0 dBm level at output. Increase $f_i$ frequency until dB meter reads −3 dB.

**Fig 18. Test circuit for measuring the frequency response when channel is in ON-state**

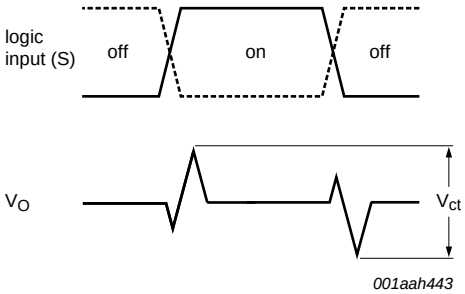



Adjust $f_i$ voltage to obtain 0 dBm level at input.

**Fig 19. Test circuit for measuring isolation (OFF-state)**

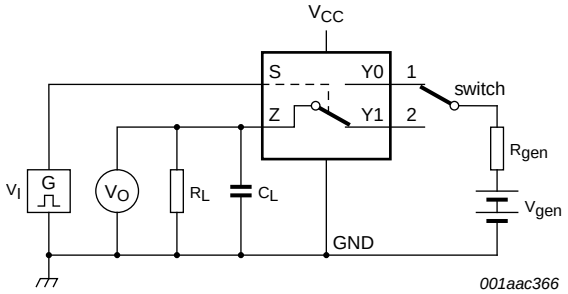



a. Test circuit

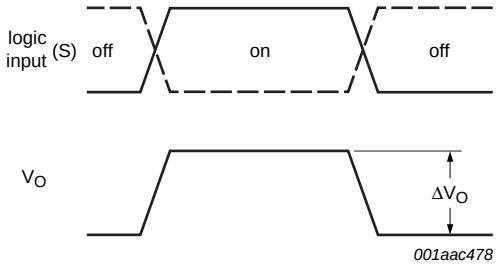



b. Input and output pulse definitions

**Fig 20. Test circuit for measuring crosstalk voltage between digital inputs and switch**




a. Test circuit




b. Input and output pulse definitions

Definition: $Q_{inj} = \Delta V_O \times C_L$.

$\Delta V_O$ = output voltage variation.

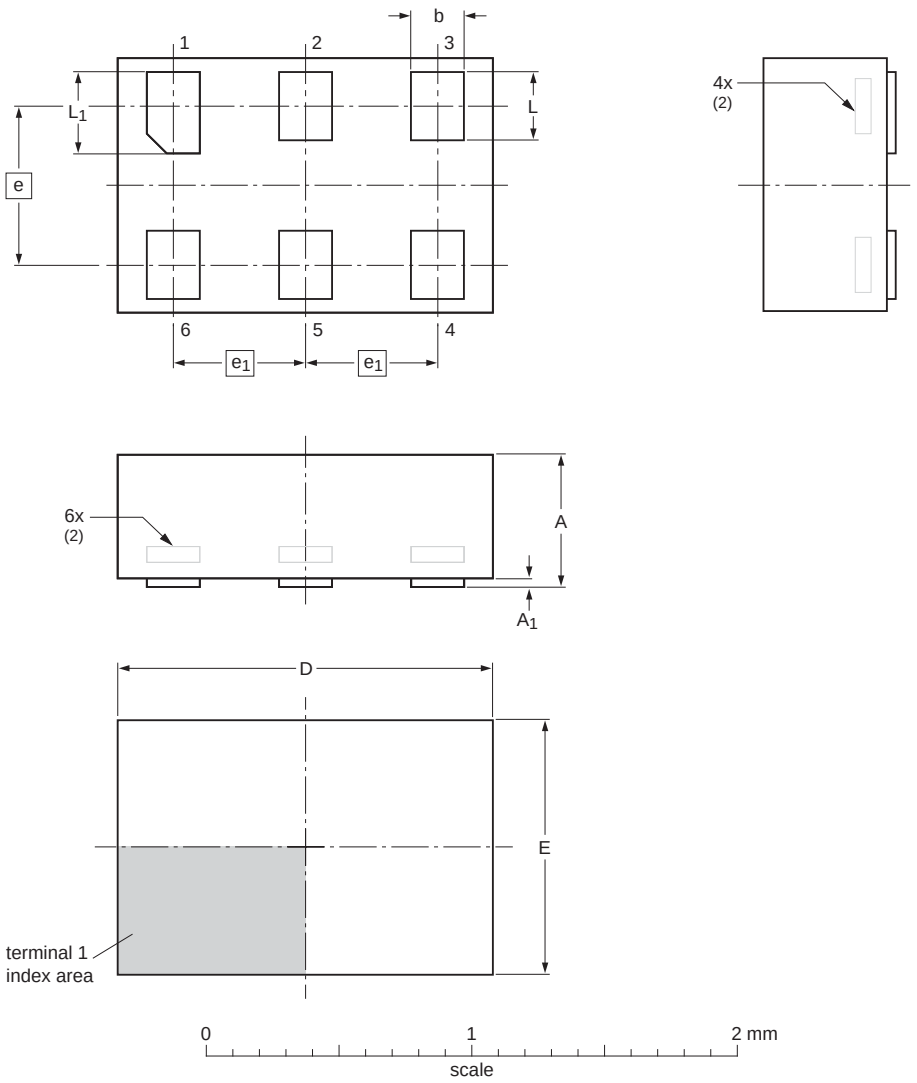
$R_{gen}$ = generator resistance.

$V_{gen}$ = generator voltage.

**Fig 21. Test circuit for measuring charge injection**

## 13. Package outline

XSON6: plastic extremely thin small outline package; no leads; 6 terminals; body 1 x 1.45 x 0.5 mm SOT886




Dimensions (mm are the original dimensions)

| Unit | | A(1) | $A_1$ | b | D | E | e | $e_1$ | L | $L_1$ |
|---|---|---|---|---|---|---|---|---|---|---|
| mm | max | 0.5 | 0.04 | 0.25 | 1.50 | 1.05 | | | 0.35 | 0.40 |
| | nom | | | 0.20 | 1.45 | 1.00 | 0.6 | 0.5 | 0.30 | 0.35 |
| | min | | | 0.17 | 1.40 | 0.95 | | | 0.27 | 0.32 |

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

*sot886_po*

| Outline version | References | | | | European projection | Issue date |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT886 | | MO-252 | | | | ~~04-07-22~~ 12-01-05 |

**Fig 22. Package outline SOT886 (XSON6)**

# 14. Packing information

## 14.1 XSON6; Reel pack; SMD, 7" Q1/T1 Standard product orientation; Orderable part number ending ,115 or Ordering code (12NC) ending 115

### 14.1.1 Packing method

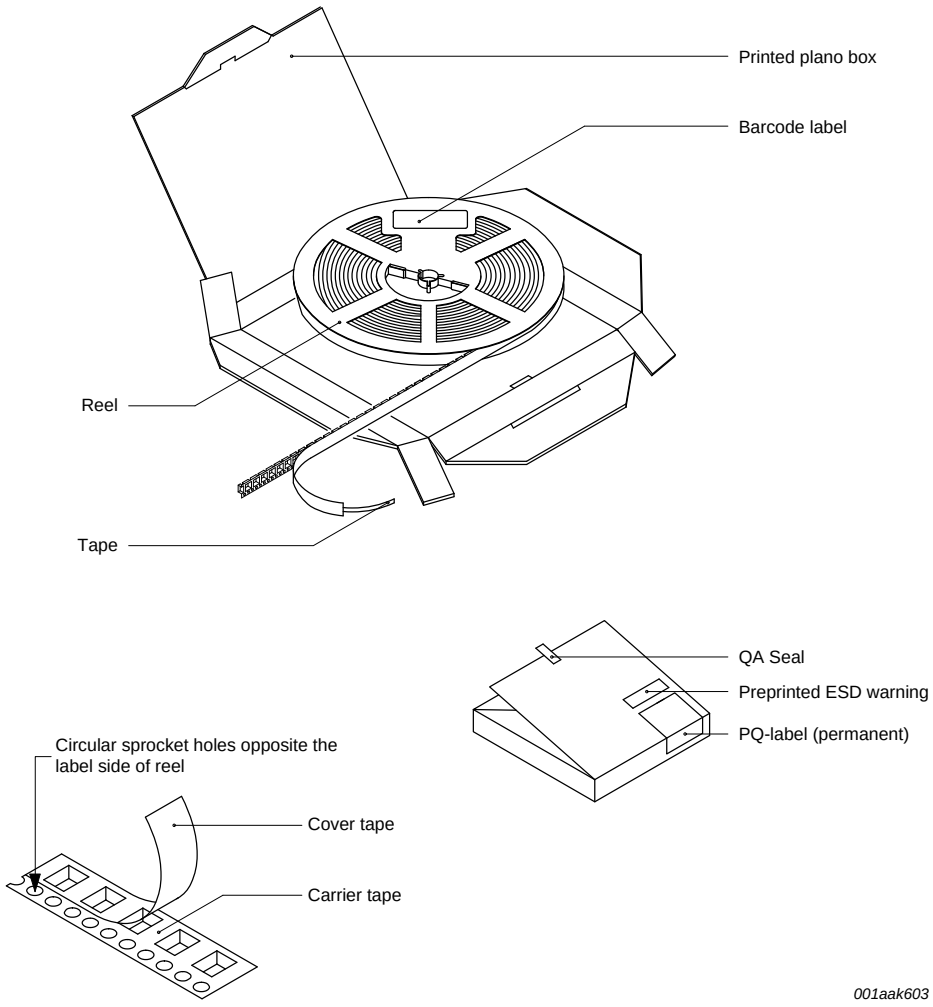



**Fig 23. Reel pack for SMD**

**Table 13. Dimensions and quantities**

| Reel dimensions d x w (mm) | SPQ/PQ (pcs) | Reels per box | Outer box dimensions l x w x h (mm) |
|---|---|---|---|
| 180 x 8 | 5000 | 1 | 186 x 186 x 17 |

### 14.1.2 Product orientation

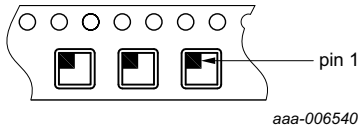



**Fig 24. Product orientation in carrier tape**

### 14.1.3 Carrier tape dimensions

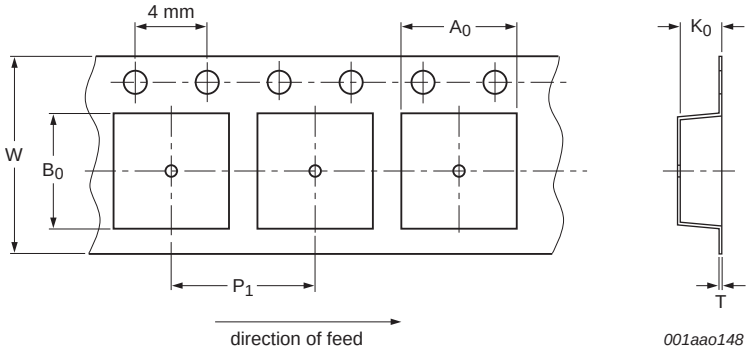



**Fig 25. Carrier tape dimensions**

**Table 14. Carrier tape dimensions**

*In accordance with IEC 60286-3.*

| $A_0$ (mm) | $B_0$ (mm) | $K_0$ (mm) | T (mm) | $P_1$ (mm) | W (mm) |
|---|---|---|---|---|---|
| 1.2 | 1.6 | 0.63 | - | 4 | 8 |

### 14.1.4 Reel dimensions

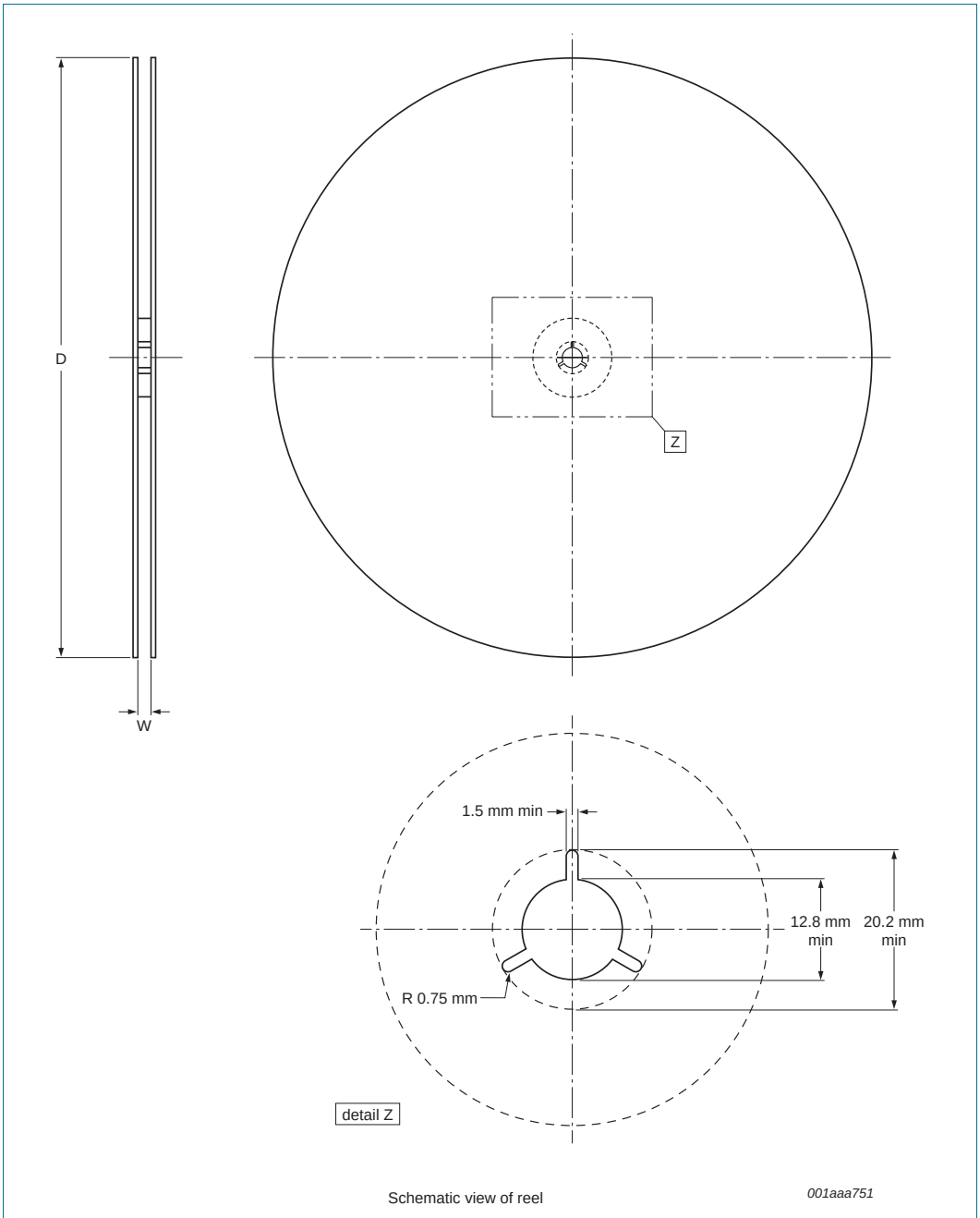



**Fig 26. Schematic view of reel**

**Table 15. Reel dimensions**

*In accordance with IEC 60286-3.*

| D (mm) | W (mm) |
|---|---|
| 180 | 8 |

### 14.1.5 Barcode label

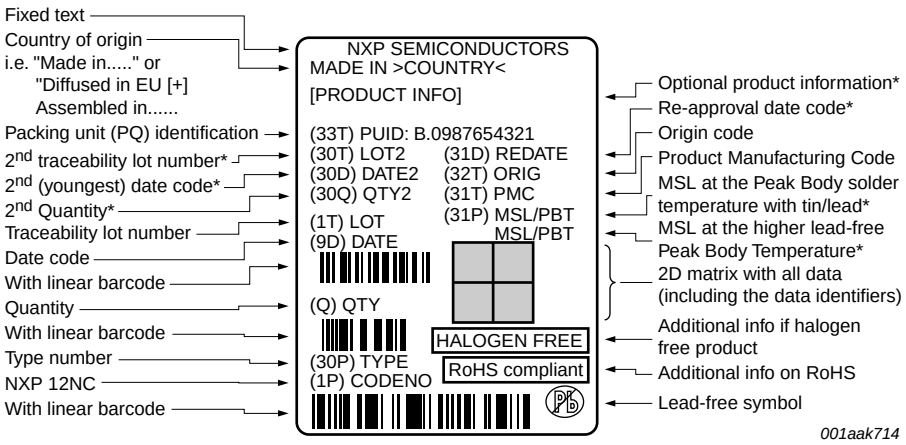



**Fig 27. Box information barcode**

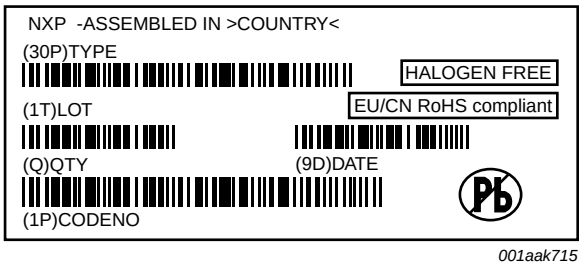



**Fig 28. Reel information barcode**

**Table 16. Barcode dimensions**

| Box barcode label<br>l x w (mm) | Reel barcode label<br>l x w (mm) |
|---|---|
| 100 x 75 | 35 x 75 |

## 14.2 XSON6; reel pack; standard product orientation; 12NC ending 132

### 14.2.1 Packing method

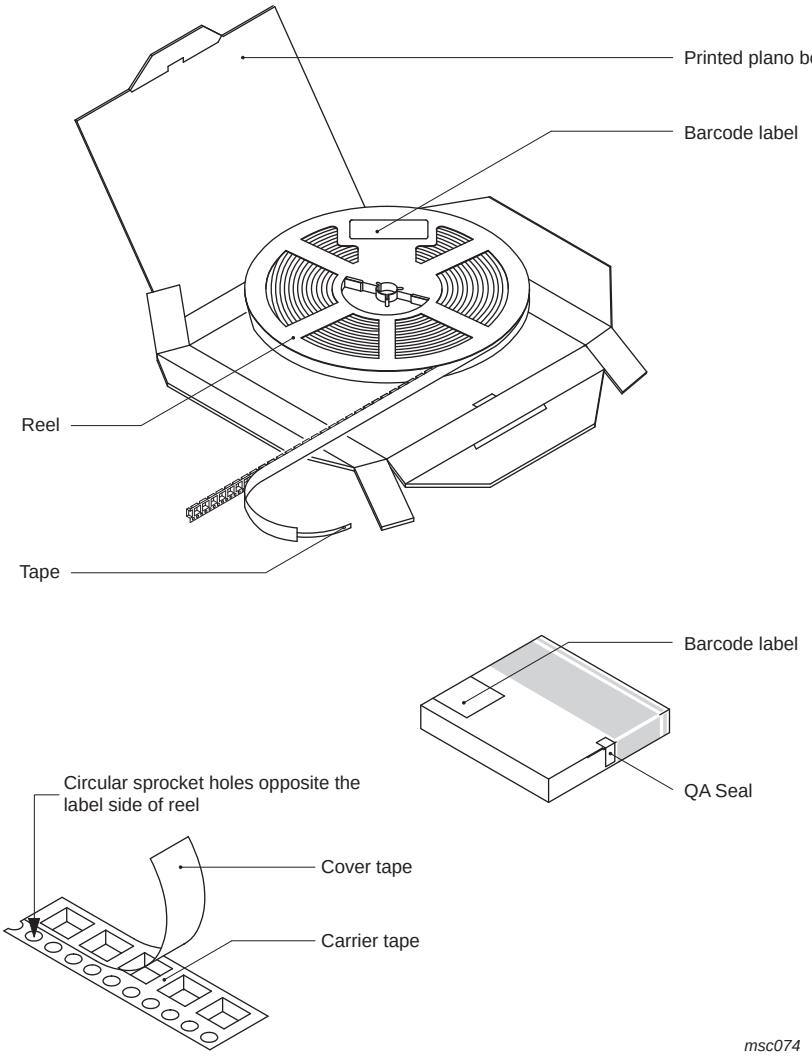



**Fig 29. Reel pack for SMD**

**Table 17. Packing information**

| Package version | 12NC ending | Reel dimensions d x w (mm) [1] | SPQ/PQ (pcs) | Reels per box | Outer box dimensions l x w x h (mm) |
|---|---|---|---|---|---|
| NX3L1T5157 | 132 | 180 x 8 | 5000 | 1 | 186 x 186 x 17 |

[1] d = reel diameter; w = tape width.

### 14.2.2 Product orientation

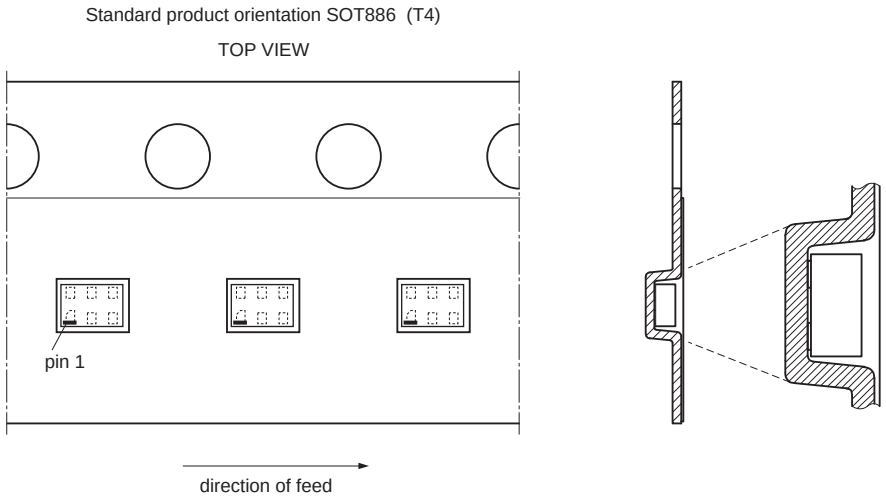



**Fig 30. Product orientation in carrier tape**

### 14.2.3 Carrier tape dimensions

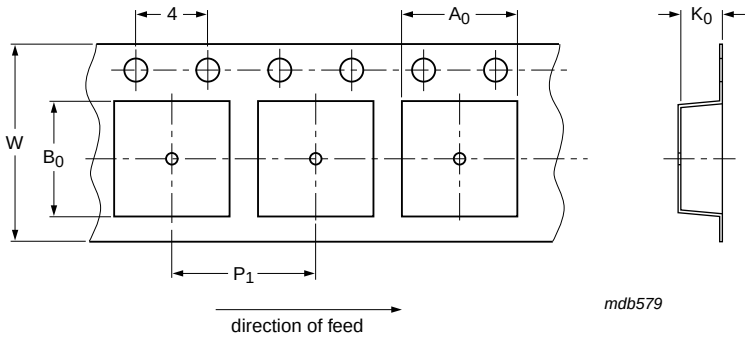



**Fig 31. Carrier tape dimensions**

**Table 18. Carrier tape dimensions**

*In accordance with IEC 60286-3.*

| $A_0$ (mm) | $B_0$ (mm) | $K_0$ (mm) | T (mm) | $P_1$ (mm) | W (mm) |
|---|---|---|---|---|---|
| 1.67 | 1.17 | 0.63 | - | 4.0 | 8 |

## 15. Abbreviations

**Table 19. Abbreviations**

| Acronym | Description |
|---|---|
| CDM | Charged Device Model |
| CMOS | Complementary Metal-Oxide Semiconductor |
| ESD | ElectroStatic Discharge |
| HBM | Human Body Model |
| MM | Machine Model |
| PDA | Personal Digital Assistant |

## 16. Revision history

**Table 20. Revision history**

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|---|---|---|---|---|
| NX3L1T5157 v.6.1 | 20161130 | Product data sheet | - | NX3L1T5157 v.6 |
| Modifications: | • Added Section 14 “Packing information” | | | |
| NX3L1T5157 v.6 | 20111108 | Product data sheet | - | NX3L1T5157 v.5 |
| Modifications: | • Legal pages updated. | | | |
| NX3L1T5157 v.5 | 20110728 | Product data sheet | - | NX3L1T5157 v.4 |
| NX3L1T5157 v.4 | 20100324 | Product data sheet | - | NX3L1T5157 v.3 |
| NX3L1T5157 v.3 | 20100208 | Product data sheet | - | NX3L1T5157 v.2 |
| NX3L1T5157 v.2 | 20090417 | Product data sheet | - | NX3L1T5157 v.1 |
| NX3L1T5157 v.1 | 20080916 | Product data sheet | - | - |

# 17. Legal information

## 17.1 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 URL http://www.nxp.com.

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## 19. Contents





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**Document identifier: NX3L1T5157**