

# NX3L2467

## Dual low-ohmic double-pole double-throw analog switch

Rev. 02 — 19 May 2010

Product data sheet

### 1. General description

The NX3L2467 is a dual low-ohmic double-pole double-throw analog switch suitable for use as an analog or digital multiplexer/demultiplexer. It consists of four switches, each with two independent input/outputs (nY0 and nY1) and a common input/output (nZ). The two digital inputs (1S and 2S) are used to select the switch position. 1S is used in selecting the independent inputs/outputs switched to 1Z and 2Z, and 2S is used in selecting the independent inputs/outputs switched to 3Z and 4Z. Schmitt trigger action at the select input (nS) makes the circuit tolerant to slower input rise and fall times across the entire  $V_{CC}$  range from 1.4 V to 4.3 V.

A low input voltage threshold allows pin nS to be driven by lower level logic signals without a significant increase in supply current  $I_{CC}$ . This makes it possible for the NX3L2467 to switch 4.3 V signals with a 1.8 V digital controller, eliminating the need for logic level translation. The NX3L2467 allows signals with amplitude up to  $V_{CC}$  to be transmitted from nZ to nY0 or nY1; or from nY0 or nY1 to nZ. Its low ON resistance (0.5  $\Omega$ ) and flatness (0.13  $\Omega$ ) 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):
  - ◆ 1.7  $\Omega$  (typical) at  $V_{CC} = 1.4$  V
  - ◆ 1.0  $\Omega$  (typical) at  $V_{CC} = 1.65$  V
  - ◆ 0.6  $\Omega$  (typical) at  $V_{CC} = 2.3$  V
  - ◆ 0.5  $\Omega$  (typical) at  $V_{CC} = 2.7$  V
  - 0.5  $\Omega$  (typical) at  $V_{CC} = 4.3$  V
- Break-before-make switching
- High noise immunity
- ESD protection:
  - ◆ HBM JESD22-A114F Class 3A exceeds 4000 V
  - ◆ MM JESD22-A115-A exceeds 200 V
  - ◆ CDM AEC-Q100-011 revision B exceeds 1000 V
- CMOS low-power consumption
- Latch-up performance exceeds 100 mA per JESD 78B 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

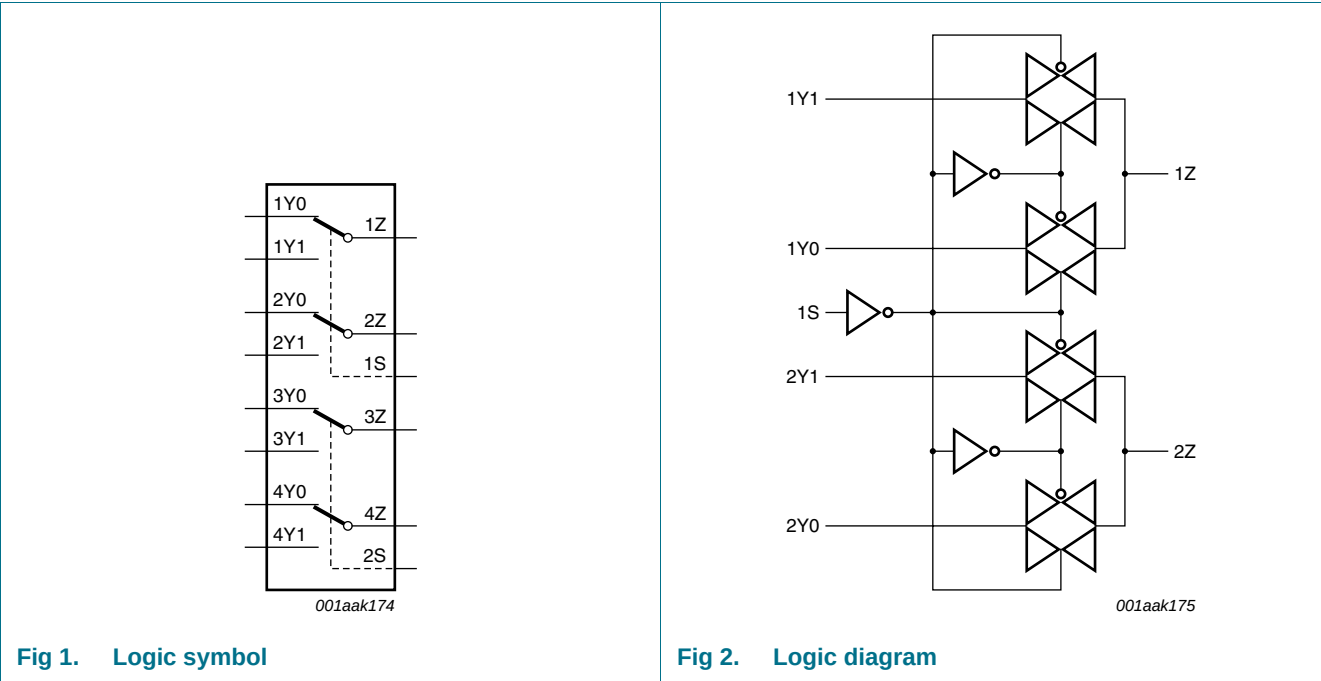
| Type number | Package           |          |                                                                                                                    |           |
|-------------|-------------------|----------|--------------------------------------------------------------------------------------------------------------------|-----------|
|             | Temperature range | Name     | Description                                                                                                        | Version   |
| NX3L2467PW  | –40 °C to +125 °C | TSSOP16  | plastic thin shrink small outline package; 16 leads; body width 4.4 mm                                             | SOT403-1  |
| NX3L2467HR  | –40 °C to +125 °C | HXQFN16U | plastic thermal enhanced extremely thin quad flat package; no leads; 16 terminals; UTLP based; body 3 x 3 x 0.5 mm | SOT1039-1 |
| NX3L2467GU  | –40 °C to +125 °C | XQFN16   | plastic, extremely thin quad flat package; no leads; 16 terminals; body 1.80 x 2.60 x 0.50 mm                      | SOT1161-1 |

### 5. Marking

Table 2. Marking codes

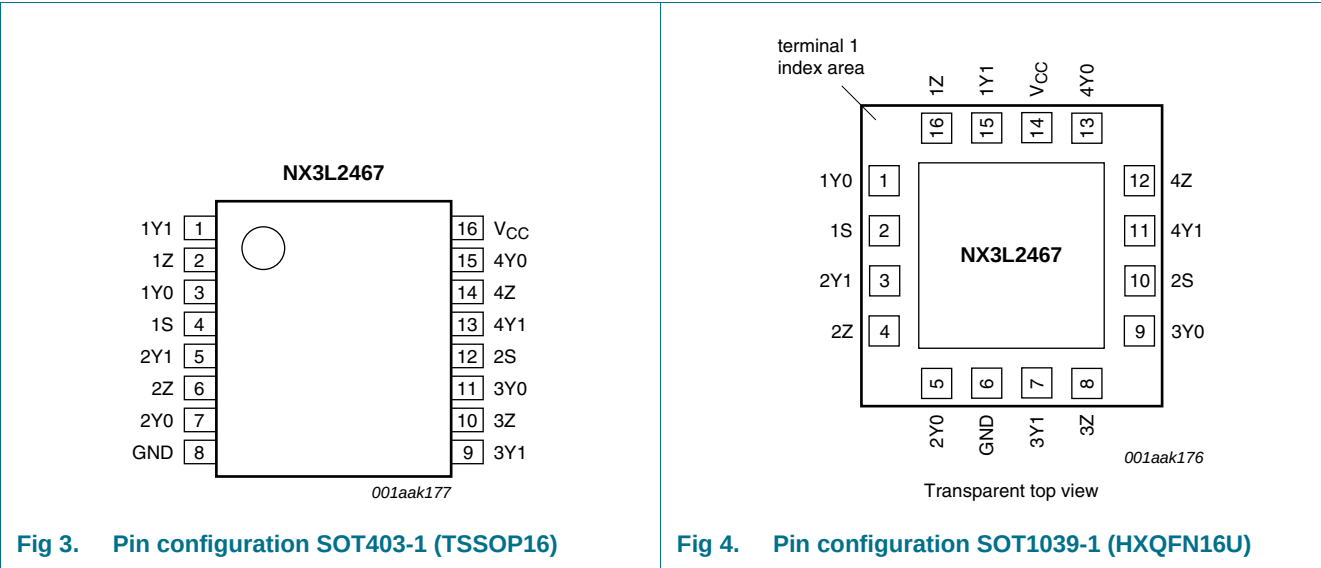
| Type number | Marking code |
|-------------|--------------|
| NX3L2467PW  | X3L2467      |
| NX3L2467HR  | D67          |
| NX3L2467GU  | D67          |

6. Functional diagram



7. Pinning information

7.1 Pinning



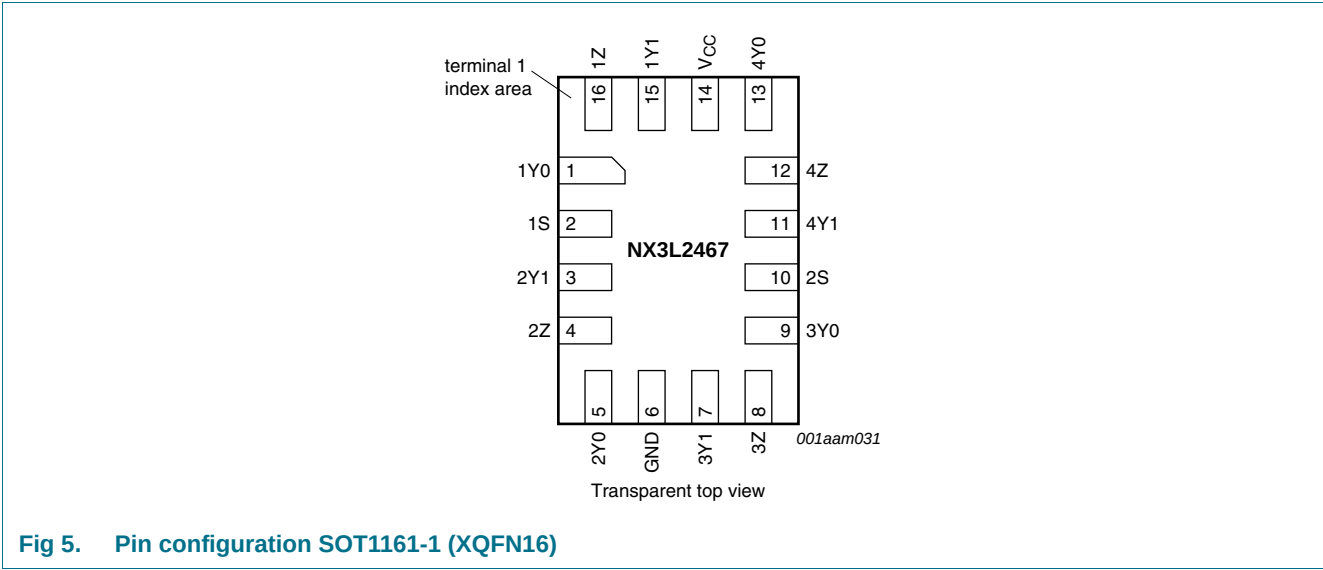


Fig 5. Pin configuration SOT1161-1 (XQFN16)

7.2 Pin description

Table 3. Pin description

| Symbol             | Pin                     |              | Description                 |
|--------------------|-------------------------|--------------|-----------------------------|
|                    | SOT1039-1 and SOT1161-1 | SOT403-1     |                             |
| 1Y0, 2Y0, 3Y0, 4Y0 | 1, 5, 9, 13             | 3, 7, 11, 15 | independent input or output |
| 1S, 2S             | 2, 10                   | 4, 12        | select input                |
| 1Y1, 2Y1, 3Y1, 4Y1 | 15, 3, 7, 11            | 1, 5, 9, 13  | independent input or output |
| 1Z, 2Z, 3Z, 4Z     | 16, 4, 8, 12            | 2, 6, 10, 14 | common output or input      |
| GND                | 6                       | 8            | ground (0 V)                |
| V <sub>CC</sub>    | 14                      | 16           | supply voltage              |

8. Functional description

Table 4. Function table<sup>[1]</sup>

| Input nS | Channel on |
|----------|------------|
| L        | nY0        |
| H        | nY1        |

[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 <sub>CC</sub> | supply voltage |                 | −0.5                | +4.6                  | V    |
| V <sub>I</sub>  | input voltage  | select input nS | <sup>[1]</sup> −0.5 | +4.6                  | V    |
| V <sub>SW</sub> | switch voltage |                 | <sup>[2]</sup> −0.5 | V <sub>CC</sub> + 0.5 | V    |

**Table 5.** Limiting values ...continued

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

| Symbol    | Parameter               | Conditions                                                                                                                    | Min   | Max       | Unit |
|-----------|-------------------------|-------------------------------------------------------------------------------------------------------------------------------|-------|-----------|------|
| $I_{IK}$  | input clamping current  | $V_I < -0.5\text{ V}$                                                                                                         | -50   | -         | mA   |
| $I_{SK}$  | switch clamping current | $V_I < -0.5\text{ V}$ or $V_I > V_{CC} + 0.5\text{ V}$                                                                        | -     | $\pm 50$  | mA   |
| $I_{SW}$  | switch current          | $V_{SW} > -0.5\text{ V}$ or $V_{SW} < V_{CC} + 0.5\text{ V}$ ;<br>source or sink current                                      | -     | $\pm 350$ | mA   |
|           |                         | $V_{SW} > -0.5\text{ V}$ or $V_{SW} < V_{CC} + 0.5\text{ V}$ ;<br>pulsed at 1 ms duration, < 10 % duty cycle;<br>peak current | -     | $\pm 500$ | mA   |
| $T_{stg}$ | storage temperature     |                                                                                                                               | -65   | +150      | °C   |
| $P_{tot}$ | total power dissipation | $T_{amb} = -40\text{ °C}$ to $+125\text{ °C}$                                                                                 |       |           |      |
|           |                         | TSSOP16                                                                                                                       | [3] - | 500       | mW   |
|           |                         | HXQFN16U                                                                                                                      | [4] - | 250       | mW   |
|           |                         | XQFN16                                                                                                                        | [5] - | 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 TSSOP16 package: above 60 °C the value of  $P_{tot}$  derates linearly with 5.5 mW/K above.
- [4] For HXQFN16U package: above 135 °C the value of  $P_{tot}$  derates linearly with 16.9 mW/K.
- [5] For XQFN16 package: above 133 °C the value of  $P_{tot}$  derates linearly with 14.5 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 nS                           | 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 | $V_{CC} = 1.4\text{ V}$ to $4.3\text{ V}$ | [2] -    | 200  | ns/V |

- [1] To avoid sinking GND current from terminal nZ when switch current flows in terminal nYn, the voltage drop across the bidirectional switch must not exceed 0.4 V. If the switch current flows into terminal nZ, no GND current will flow from terminal nYn. In this case, there is no limit for the voltage drop across the switch.
- [2] Applies to control signal levels.

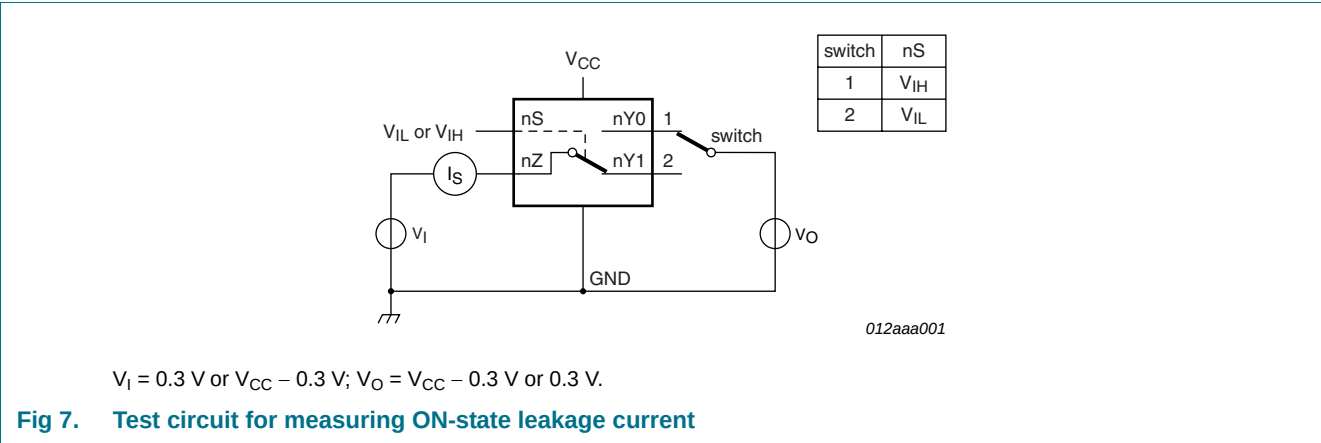
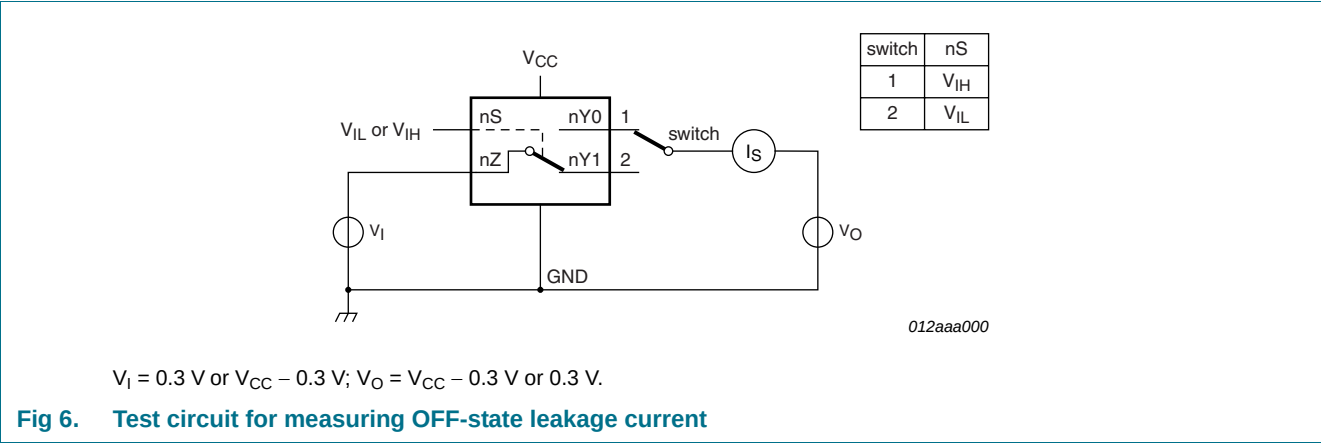
## 11. Static characteristics

**Table 7. Static characteristics**

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

| Symbol              | Parameter                 | Conditions                                                                             | T <sub>amb</sub> = 25 °C |      |      | T <sub>amb</sub> = –40 °C to +125 °C |             |              | Unit |
|---------------------|---------------------------|----------------------------------------------------------------------------------------|--------------------------|------|------|--------------------------------------|-------------|--------------|------|
|                     |                           |                                                                                        | Min                      | Typ  | Max  | Min                                  | Max (85 °C) | Max (125 °C) |      |
| V <sub>IH</sub>     | HIGH-level input voltage  | V <sub>CC</sub> = 1.4 V to 1.6 V                                                       | 0.9                      | -    | -    | 0.9                                  | -           | -            | V    |
|                     |                           | V <sub>CC</sub> = 1.65 V to 1.95 V                                                     | 0.9                      | -    | -    | 0.9                                  | -           | -            | V    |
|                     |                           | V <sub>CC</sub> = 2.3 V to 2.7 V                                                       | 1.1                      | -    | -    | 1.1                                  | -           | -            | V    |
|                     |                           | V <sub>CC</sub> = 2.7 V to 3.6 V                                                       | 1.3                      | -    | -    | 1.3                                  | -           | -            | V    |
|                     |                           | V <sub>CC</sub> = 3.6 V to 4.3 V                                                       | 1.4                      | -    | -    | 1.4                                  | -           | -            | V    |
| V <sub>IL</sub>     | LOW-level input voltage   | V <sub>CC</sub> = 1.4 V to 1.6 V                                                       | -                        | -    | 0.3  | -                                    | 0.3         | 0.3          | V    |
|                     |                           | V <sub>CC</sub> = 1.65 V to 1.95 V                                                     | -                        | -    | 0.4  | -                                    | 0.4         | 0.3          | V    |
|                     |                           | V <sub>CC</sub> = 2.3 V to 2.7 V                                                       | -                        | -    | 0.4  | -                                    | 0.4         | 0.4          | V    |
|                     |                           | V <sub>CC</sub> = 2.7 V to 3.6 V                                                       | -                        | -    | 0.5  | -                                    | 0.5         | 0.5          | V    |
|                     |                           | V <sub>CC</sub> = 3.6 V to 4.3 V                                                       | -                        | -    | 0.6  | -                                    | 0.6         | 0.6          | V    |
| I <sub>I</sub>      | input leakage current     | select input nS;<br>V <sub>I</sub> = GND to 4.3 V;<br>V <sub>CC</sub> = 1.4 V to 4.3 V | -                        | -    | -    | -                                    | ±0.5        | ±1           | μA   |
| I <sub>S(OFF)</sub> | OFF-state leakage current | nY0 and nY1 port;<br>see <a href="#">Figure 6</a>                                      |                          |      |      |                                      |             |              |      |
|                     |                           | V <sub>CC</sub> = 1.4 V to 3.6 V                                                       | -                        | -    | ±5   | -                                    | ±50         | ±500         | nA   |
|                     |                           | V <sub>CC</sub> = 3.6 V to 4.3 V                                                       | -                        | -    | ±10  | -                                    | ±50         | ±500         | nA   |
| I <sub>S(ON)</sub>  | ON-state leakage current  | nZ port;<br>V <sub>CC</sub> = 1.4 V to 3.6 V;<br>see <a href="#">Figure 7</a>          |                          |      |      |                                      |             |              |      |
|                     |                           | V <sub>CC</sub> = 1.4 V to 3.6 V                                                       | -                        | -    | ±5   | -                                    | ±50         | ±500         | nA   |
|                     |                           | V <sub>CC</sub> = 3.6 V to 4.3 V                                                       | -                        | -    | ±10  | -                                    | ±50         | ±500         | nA   |
| I <sub>CC</sub>     | supply current            | V <sub>I</sub> = V <sub>CC</sub> or GND;<br>V <sub>SW</sub> = GND or V <sub>CC</sub>   |                          |      |      |                                      |             |              |      |
|                     |                           | V <sub>CC</sub> = 3.6 V                                                                | -                        | -    | 100  | -                                    | 500         | 5000         | nA   |
|                     |                           | V <sub>CC</sub> = 4.3 V                                                                | -                        | -    | 150  | -                                    | 800         | 6000         | nA   |
| ΔI <sub>CC</sub>    | additional supply current | V <sub>SW</sub> = GND or V <sub>CC</sub>                                               |                          |      |      |                                      |             |              |      |
|                     |                           | V <sub>I</sub> = 2.6 V; V <sub>CC</sub> = 4.3 V                                        | -                        | 2.0  | 4.0  | -                                    | 7           | 7            | μA   |
|                     |                           | V <sub>I</sub> = 2.6 V; V <sub>CC</sub> = 3.6 V                                        | -                        | 0.35 | 0.7  | -                                    | 1           | 1            | μA   |
|                     |                           | V <sub>I</sub> = 1.8 V; V <sub>CC</sub> = 4.3 V                                        | -                        | 7.0  | 10.0 | -                                    | 15          | 15           | μA   |
|                     |                           | V <sub>I</sub> = 1.8 V; V <sub>CC</sub> = 3.6 V                                        | -                        | 2.5  | 4.0  | -                                    | 5           | 5            | μA   |
|                     |                           | V <sub>I</sub> = 1.8 V; V <sub>CC</sub> = 2.5 V                                        | -                        | 50   | 200  | -                                    | 300         | 500          | nA   |
| C <sub>I</sub>      | input capacitance         |                                                                                        | -                        | 1.0  | -    | -                                    | -           | -            | pF   |
| C <sub>S(OFF)</sub> | OFF-state capacitance     |                                                                                        | -                        | 35   | -    | -                                    | -           | -            | pF   |
| C <sub>S(ON)</sub>  | ON-state capacitance      |                                                                                        | -                        | 130  | -    | -                                    | -           | -            | pF   |

11.1 Test circuits



11.2 ON resistance

Table 8. ON resistance[1]  
At recommended operating conditions; voltages are referenced to GND (ground = 0 V); for graphs see Figure 9 to Figure 15.

| Symbol                | Parameter            | Conditions                                                                          | T <sub>amb</sub> = −40 °C to +85 °C |        |      | T <sub>amb</sub> = −40 °C to +125 °C |     | Unit |
|-----------------------|----------------------|-------------------------------------------------------------------------------------|-------------------------------------|--------|------|--------------------------------------|-----|------|
|                       |                      |                                                                                     | Min                                 | Typ[2] | Max  | Min                                  | Max |      |
| R <sub>ON(peak)</sub> | ON resistance (peak) | V <sub>I</sub> = GND to V <sub>CC</sub> ;<br>I <sub>SW</sub> = 100 mA; see Figure 8 |                                     |        |      |                                      |     |      |
|                       |                      | V <sub>CC</sub> = 1.4 V                                                             | -                                   | 1.7    | 3.7  | -                                    | 4.1 | Ω    |
|                       |                      | V <sub>CC</sub> = 1.65 V                                                            | -                                   | 1.0    | 1.6  | -                                    | 1.7 | Ω    |
|                       |                      | V <sub>CC</sub> = 2.3 V                                                             | -                                   | 0.6    | 0.8  | -                                    | 0.9 | Ω    |
|                       |                      | V <sub>CC</sub> = 2.7 V                                                             | -                                   | 0.5    | 0.75 | -                                    | 0.9 | Ω    |
|                       |                      | V <sub>CC</sub> = 4.3 V                                                             | -                                   | 0.5    | 0.75 | -                                    | 0.9 | Ω    |

**Table 8. ON resistance**<sup>[1]</sup>

At recommended operating conditions; voltages are referenced to GND (ground = 0 V); for graphs see [Figure 9](#) to [Figure 15](#).

| Symbol          | Parameter                               | Conditions                                                                        | T <sub>amb</sub> = -40 °C to +85 °C |                    |     | T <sub>amb</sub> = -40 °C to +125 °C |      | Unit |
|-----------------|-----------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------|--------------------|-----|--------------------------------------|------|------|
|                 |                                         |                                                                                   | Min                                 | Typ <sup>[2]</sup> | Max | Min                                  | Max  |      |
| $\Delta R_{ON}$ | ON resistance mismatch between channels | V <sub>I</sub> = GND to V <sub>CC</sub> ; I <sub>SW</sub> = 100 mA <sup>[3]</sup> |                                     |                    |     |                                      |      |      |
|                 |                                         | V <sub>CC</sub> = 1.4 V; V <sub>SW</sub> = 0.4 V                                  | -                                   | 0.18               | 0.3 | -                                    | 0.3  | Ω    |
|                 |                                         | V <sub>CC</sub> = 1.65 V; V <sub>SW</sub> = 0.5 V                                 | -                                   | 0.18               | 0.2 | -                                    | 0.3  | Ω    |
|                 |                                         | V <sub>CC</sub> = 2.3 V; V <sub>SW</sub> = 0.7 V                                  | -                                   | 0.07               | 0.1 | -                                    | 0.13 | Ω    |
|                 |                                         | V <sub>CC</sub> = 2.7 V; V <sub>SW</sub> = 0.8 V                                  | -                                   | 0.07               | 0.1 | -                                    | 0.13 | Ω    |
|                 |                                         | V <sub>CC</sub> = 4.3 V; V <sub>SW</sub> = 0.8 V                                  | -                                   | 0.07               | 0.1 | -                                    | 0.13 | Ω    |
| $R_{ON(Flat)}$  | ON resistance (flatness)                | V <sub>I</sub> = GND to V <sub>CC</sub> ; I <sub>SW</sub> = 100 mA <sup>[4]</sup> |                                     |                    |     |                                      |      |      |
|                 |                                         | V <sub>CC</sub> = 1.4 V                                                           | -                                   | 1.0                | 3.3 | -                                    | 3.6  | Ω    |
|                 |                                         | V <sub>CC</sub> = 1.65 V                                                          | -                                   | 0.5                | 1.2 | -                                    | 1.3  | Ω    |
|                 |                                         | V <sub>CC</sub> = 2.3 V                                                           | -                                   | 0.15               | 0.3 | -                                    | 0.35 | Ω    |
|                 |                                         | V <sub>CC</sub> = 2.7 V                                                           | -                                   | 0.13               | 0.3 | -                                    | 0.35 | Ω    |
|                 |                                         | V <sub>CC</sub> = 4.3 V                                                           | -                                   | 0.2                | 0.4 | -                                    | 0.45 | Ω    |

[1] For NX3L2467PW (TSSOP16 package), all ON resistance values are up to 0.05 Ω higher.

[2] Typical values are measured at T<sub>amb</sub> = 25 °C.

[3] Measured at identical V<sub>CC</sub>, temperature and input voltage.

[4] Flatness is defined as the difference between the maximum and minimum value of ON resistance measured at identical V<sub>CC</sub> and temperature.



11.3 ON resistance test circuit and graphs

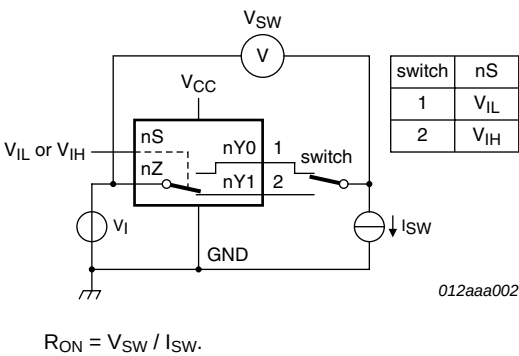
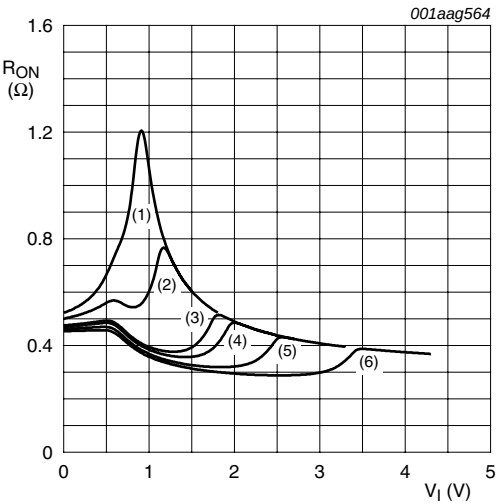
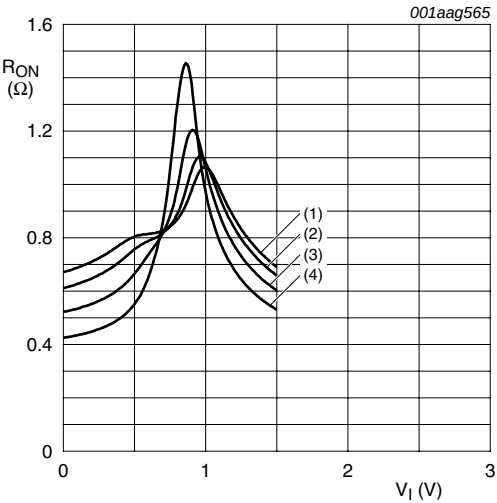


Fig 8. Test circuit for measuring ON resistance



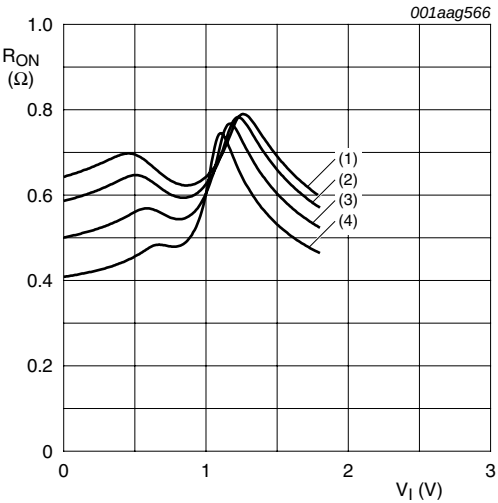
- (1)  $V_{CC} = 1.5$  V.
  - (2)  $V_{CC} = 1.8$  V.
  - (3)  $V_{CC} = 2.5$  V.
  - (4)  $V_{CC} = 2.7$  V.
  - (5)  $V_{CC} = 3.3$  V.
  - (6)  $V_{CC} = 4.3$  V.
- Measured at  $T_{amb} = 25$  °C.

Fig 9. Typical ON resistance as a function of input voltage



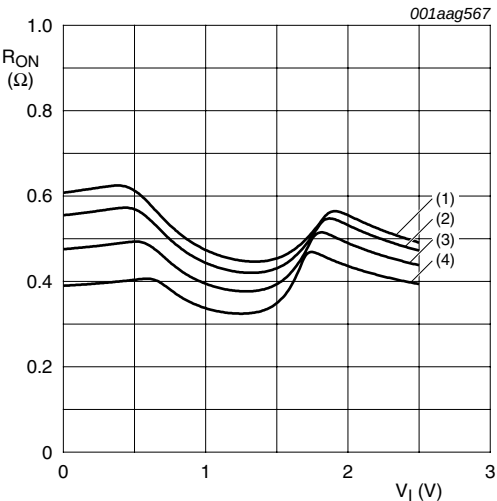
- (1)  $T_{amb} = 125\text{ }^{\circ}\text{C}.$
- (2)  $T_{amb} = 85\text{ }^{\circ}\text{C}.$
- (3)  $T_{amb} = 25\text{ }^{\circ}\text{C}.$
- (4)  $T_{amb} = -40\text{ }^{\circ}\text{C}.$

Fig 10. ON resistance as a function of input voltage;  
 $V_{CC} = 1.5\text{ V}$



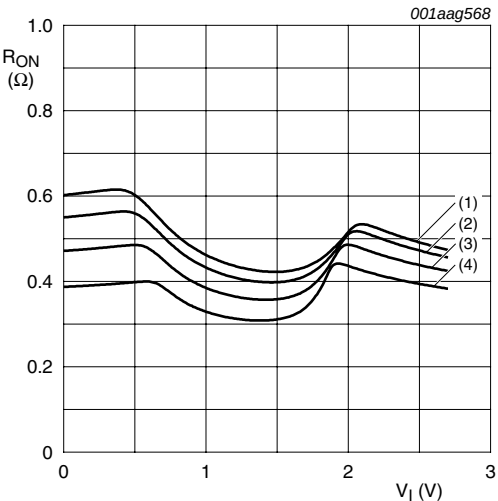
- (1)  $T_{amb} = 125\text{ }^{\circ}\text{C}.$
- (2)  $T_{amb} = 85\text{ }^{\circ}\text{C}.$
- (3)  $T_{amb} = 25\text{ }^{\circ}\text{C}.$
- (4)  $T_{amb} = -40\text{ }^{\circ}\text{C}.$

Fig 11. ON resistance as a function of input voltage;  
 $V_{CC} = 1.8\text{ V}$



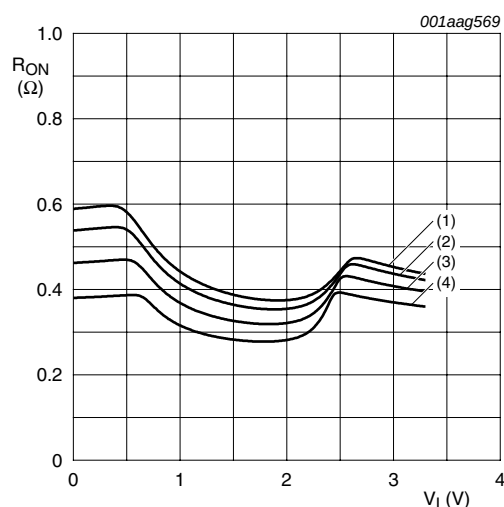
- (1)  $T_{amb} = 125\text{ }^{\circ}\text{C}.$
- (2)  $T_{amb} = 85\text{ }^{\circ}\text{C}.$
- (3)  $T_{amb} = 25\text{ }^{\circ}\text{C}.$
- (4)  $T_{amb} = -40\text{ }^{\circ}\text{C}.$

Fig 12. ON resistance as a function of input voltage;  
 $V_{CC} = 2.5\text{ V}$



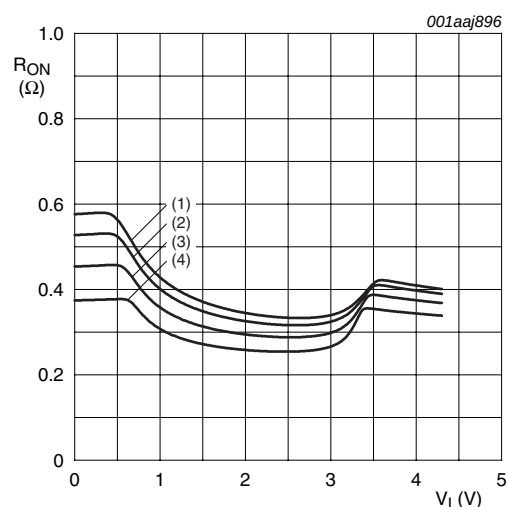
- (1)  $T_{amb} = 125\text{ }^{\circ}\text{C}.$
- (2)  $T_{amb} = 85\text{ }^{\circ}\text{C}.$
- (3)  $T_{amb} = 25\text{ }^{\circ}\text{C}.$
- (4)  $T_{amb} = -40\text{ }^{\circ}\text{C}.$

Fig 13. ON resistance as a function of input voltage;  
 $V_{CC} = 2.7\text{ V}$



- (1)  $T_{amb} = 125\text{ }^{\circ}\text{C}$ .
- (2)  $T_{amb} = 85\text{ }^{\circ}\text{C}$ .
- (3)  $T_{amb} = 25\text{ }^{\circ}\text{C}$ .
- (4)  $T_{amb} = -40\text{ }^{\circ}\text{C}$ .

**Fig 14.** ON resistance as a function of input voltage;  
 $V_{CC} = 3.3\text{ V}$



- (1)  $T_{amb} = 125\text{ }^{\circ}\text{C}$ .
- (2)  $T_{amb} = 85\text{ }^{\circ}\text{C}$ .
- (3)  $T_{amb} = 25\text{ }^{\circ}\text{C}$ .
- (4)  $T_{amb} = -40\text{ }^{\circ}\text{C}$ .

**Fig 15.** ON resistance as a function of input voltage;  
 $V_{CC} = 4.3\text{ V}$

## 12. Dynamic characteristics

**Table 9.** Dynamic characteristics

At recommended operating conditions; voltages are referenced to GND (ground = 0 V); for load circuit see [Figure 18](#).

| Symbol    | Parameter    | Conditions                                        | 25 °C |                    |     | -40 °C to +125 °C |             |              | Unit |
|-----------|--------------|---------------------------------------------------|-------|--------------------|-----|-------------------|-------------|--------------|------|
|           |              |                                                   | Min   | Typ <sup>[1]</sup> | Max | Min               | Max (85 °C) | Max (125 °C) |      |
| $t_{en}$  | enable time  | nS to nZ or nYn;<br>see <a href="#">Figure 16</a> |       |                    |     |                   |             |              |      |
|           |              | $V_{CC} = 1.4\text{ V to }1.6\text{ V}$           | -     | 41                 | 90  | -                 | 120         | 120          | ns   |
|           |              | $V_{CC} = 1.65\text{ V to }1.95\text{ V}$         | -     | 30                 | 70  | -                 | 80          | 90           | ns   |
|           |              | $V_{CC} = 2.3\text{ V to }2.7\text{ V}$           | -     | 20                 | 45  | -                 | 50          | 55           | ns   |
|           |              | $V_{CC} = 2.7\text{ V to }3.6\text{ V}$           | -     | 19                 | 40  | -                 | 45          | 50           | ns   |
|           |              | $V_{CC} = 3.6\text{ V to }4.3\text{ V}$           | -     | 19                 | 40  | -                 | 45          | 50           | ns   |
| $t_{dis}$ | disable time | nS to nZ or nYn;<br>see <a href="#">Figure 16</a> |       |                    |     |                   |             |              |      |
|           |              | $V_{CC} = 1.4\text{ V to }1.6\text{ V}$           | -     | 24                 | 70  | -                 | 80          | 90           | ns   |
|           |              | $V_{CC} = 1.65\text{ V to }1.95\text{ V}$         | -     | 15                 | 55  | -                 | 60          | 65           | ns   |
|           |              | $V_{CC} = 2.3\text{ V to }2.7\text{ V}$           | -     | 9                  | 25  | -                 | 30          | 35           | ns   |
|           |              | $V_{CC} = 2.7\text{ V to }3.6\text{ V}$           | -     | 8                  | 20  | -                 | 25          | 30           | ns   |
|           |              | $V_{CC} = 3.6\text{ V to }4.3\text{ V}$           | -     | 8                  | 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 18.

| Symbol    | Parameter              | Conditions                                | 25 °C |                    |     | –40 °C to +125 °C |             |              | Unit |
|-----------|------------------------|-------------------------------------------|-------|--------------------|-----|-------------------|-------------|--------------|------|
|           |                        |                                           | Min   | Typ <sup>[1]</sup> | Max | Min               | Max (85 °C) | Max (125 °C) |      |
| $t_{b-m}$ | break-before-make time | see Figure 17                             |       |                    |     |                   |             |              |      |
|           |                        | $V_{CC} = 1.4\text{ V to }1.6\text{ V}$   | -     | 20                 | -   | 9                 | -           | -            | ns   |
|           |                        | $V_{CC} = 1.65\text{ V to }1.95\text{ V}$ | -     | 17                 | -   | 7                 | -           | -            | ns   |
|           |                        | $V_{CC} = 2.3\text{ V to }2.7\text{ V}$   | -     | 13                 | -   | 4                 | -           | -            | ns   |
|           |                        | $V_{CC} = 2.7\text{ V to }3.6\text{ V}$   | -     | 11                 | -   | 3                 | -           | -            | ns   |
|           |                        | $V_{CC} = 3.6\text{ V to }4.3\text{ V}$   | -     | 11                 | -   | 2                 | -           | -            | ns   |

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

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

12.1 Waveform and test circuits

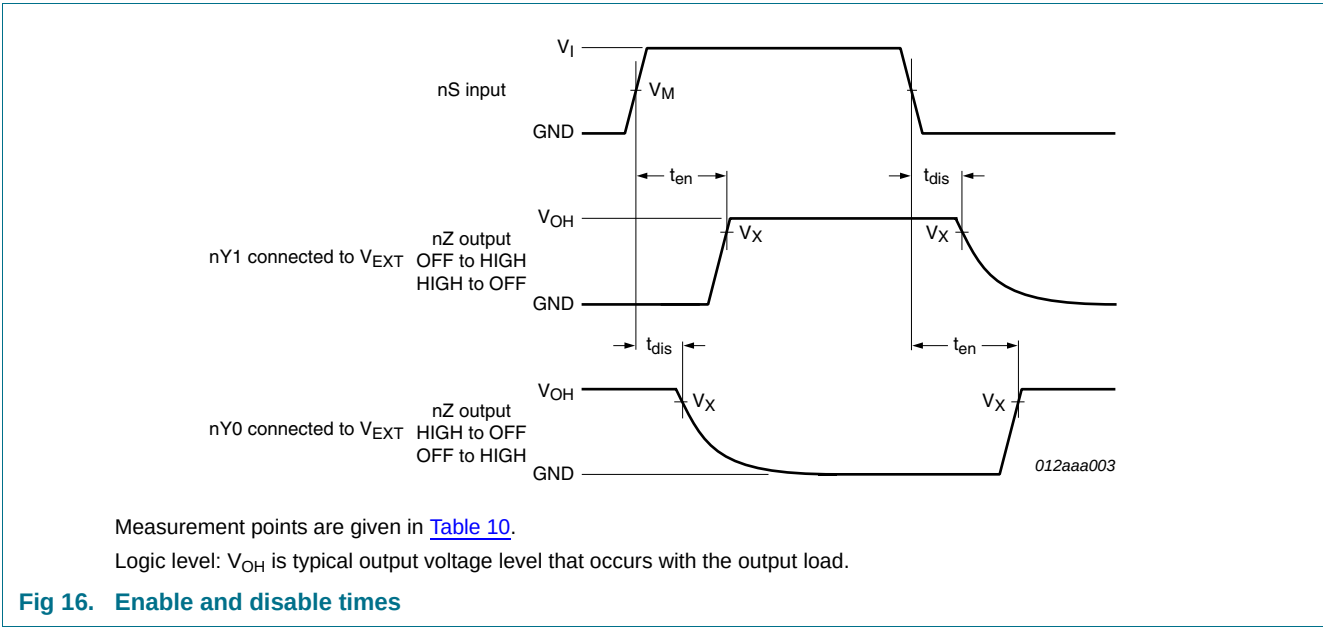


Table 10. Measurement points

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

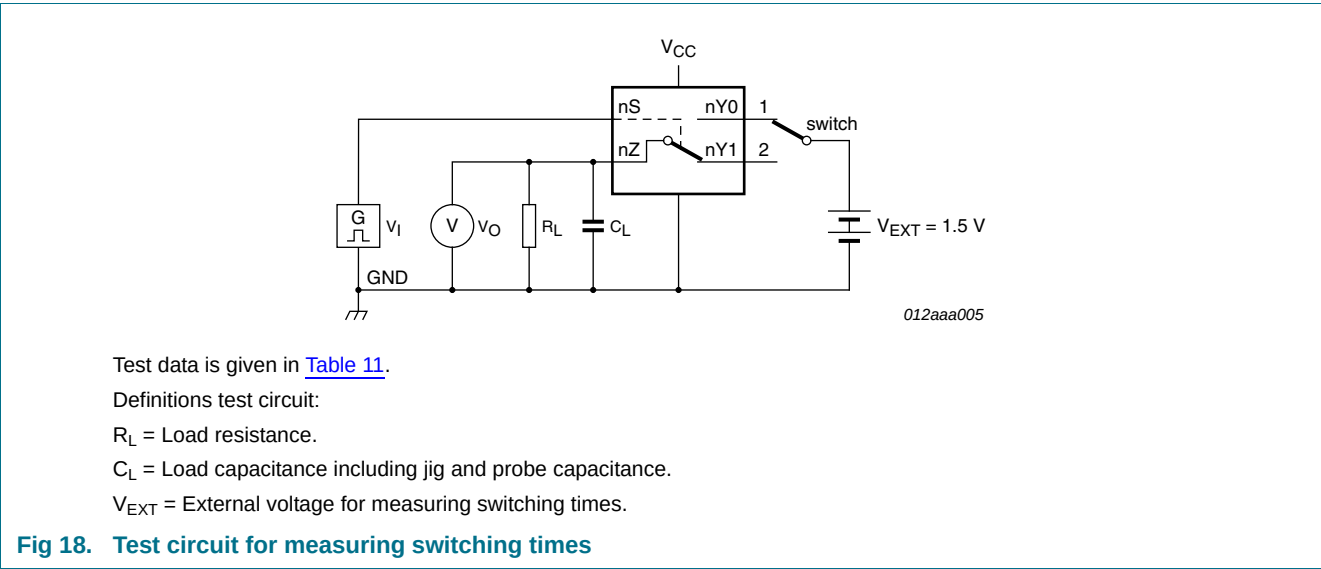
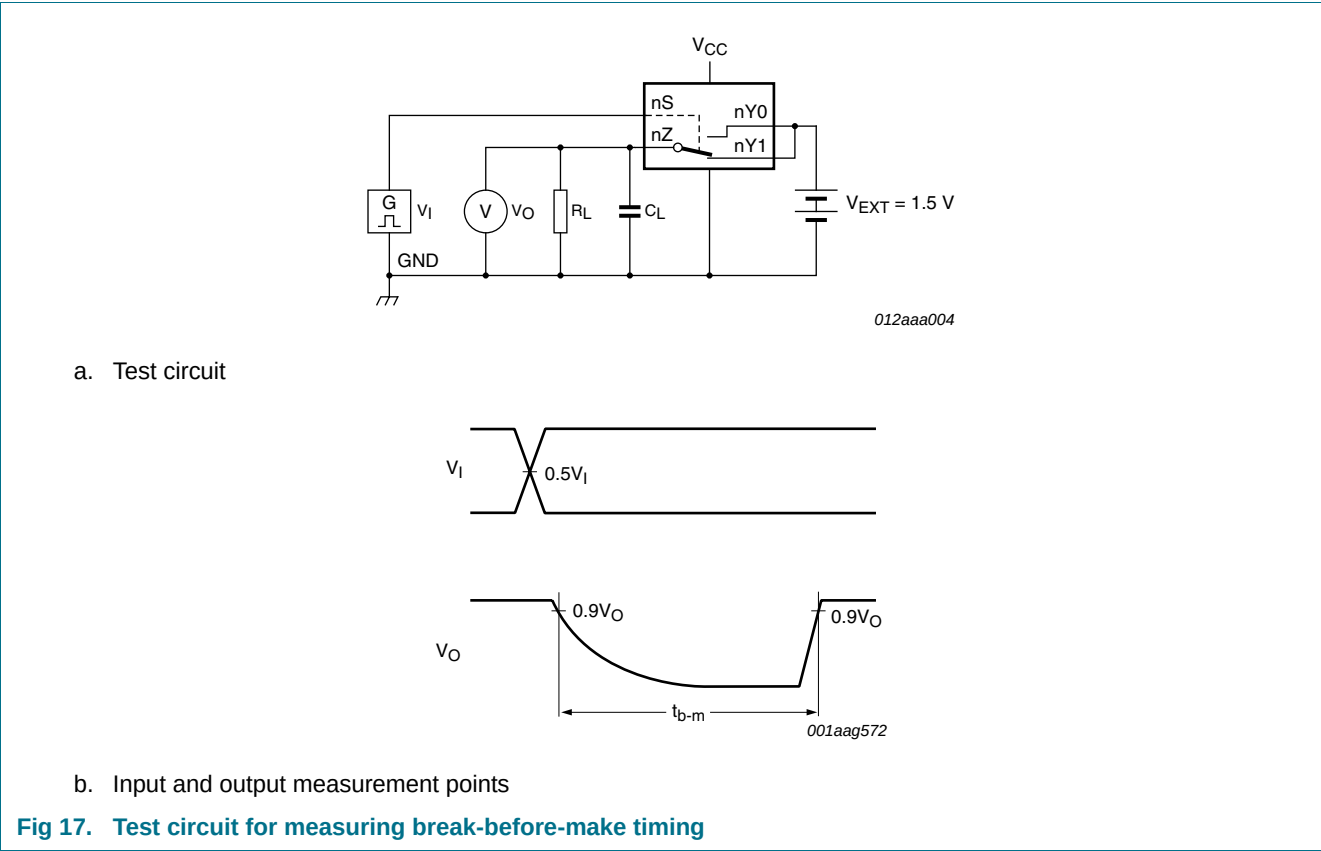


Table 11. Test data

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

## 12.2 Additional dynamic characteristics

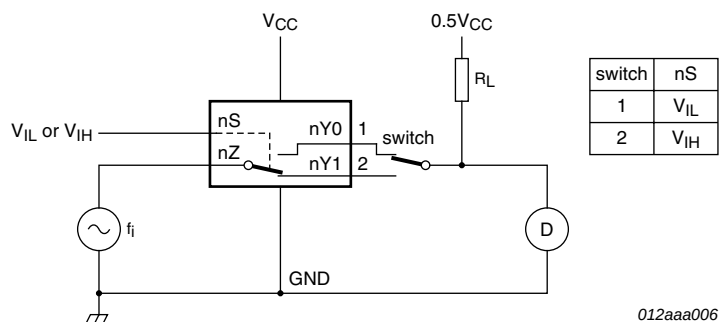
**Table 12. Additional dynamic characteristics**

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

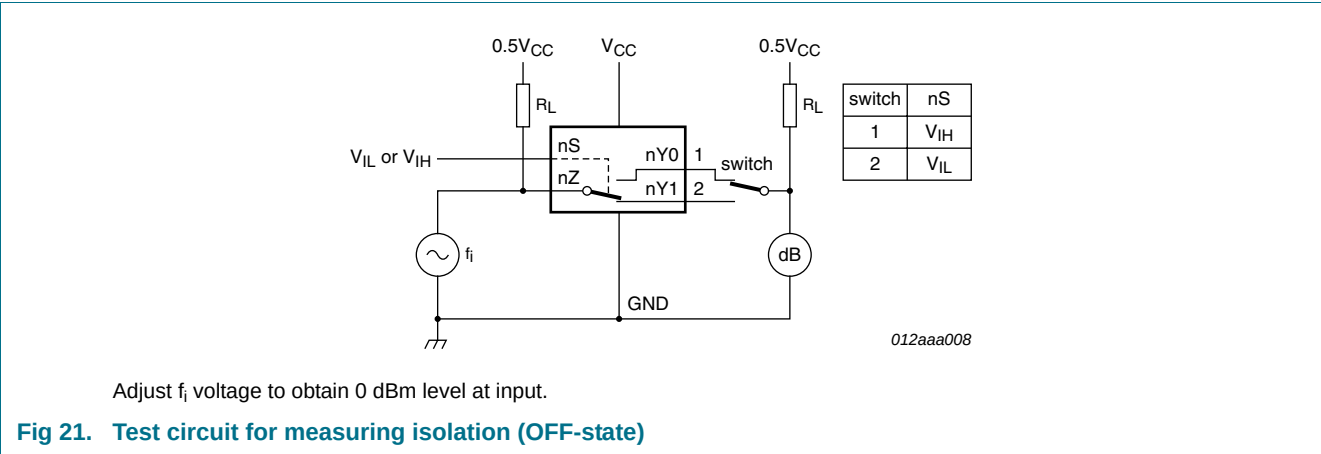
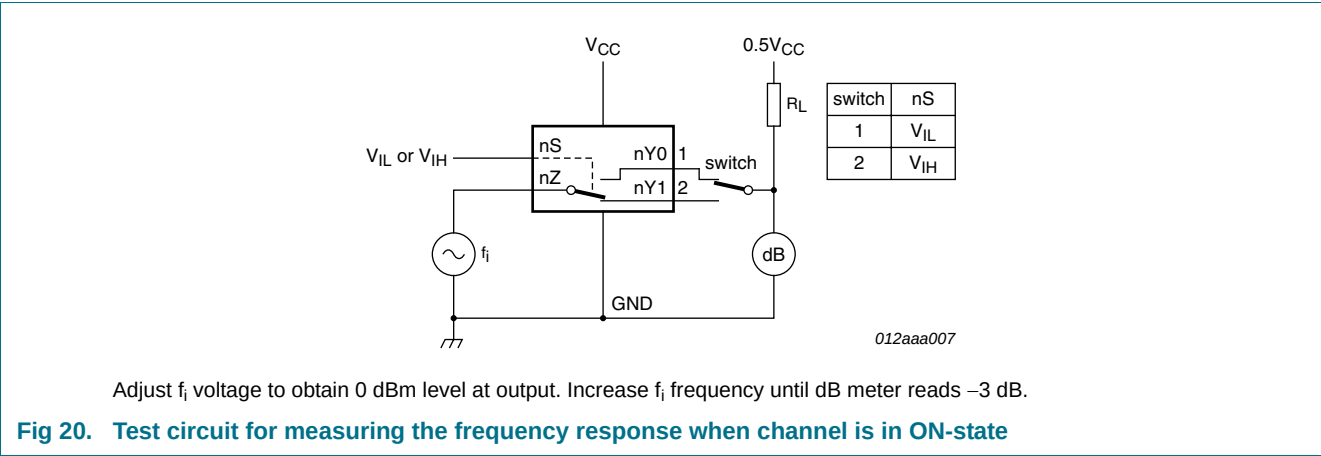
| Symbol                | Parameter                 | Conditions                                                                                                                                                                            | Min | Typ  | Max | Unit |
|-----------------------|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|-----|------|
| THD                   | total harmonic distortion | $f_i = 20 \text{ Hz to } 20 \text{ kHz}$ ; $R_L = 32 \text{ } \Omega$ ; see <a href="#">Figure 19</a>                                                                                 | [1] |      |     |      |
|                       |                           | $V_{CC} = 1.4 \text{ V}$ ; $V_I = 1 \text{ V (p-p)}$                                                                                                                                  | -   | 0.15 | -   | %    |
|                       |                           | $V_{CC} = 1.65 \text{ V}$ ; $V_I = 1.2 \text{ V (p-p)}$                                                                                                                               | -   | 0.10 | -   | %    |
|                       |                           | $V_{CC} = 2.3 \text{ V}$ ; $V_I = 1.5 \text{ V (p-p)}$                                                                                                                                | -   | 0.02 | -   | %    |
|                       |                           | $V_{CC} = 2.7 \text{ V}$ ; $V_I = 2 \text{ V (p-p)}$                                                                                                                                  | -   | 0.02 | -   | %    |
| $f_{(-3\text{dB})}$   | –3 dB frequency response  | $R_L = 50 \text{ } \Omega$ ; see <a href="#">Figure 20</a>                                                                                                                            | [1] |      |     |      |
|                       |                           | $V_{CC} = 1.4 \text{ V to } 4.3 \text{ V}$                                                                                                                                            | -   | 60   | -   | MHz  |
| $\alpha_{\text{iso}}$ | isolation (OFF-state)     | $f_i = 100 \text{ kHz}$ ; $R_L = 50 \text{ } \Omega$ ; see <a href="#">Figure 21</a>                                                                                                  | [1] |      |     |      |
|                       |                           | $V_{CC} = 1.4 \text{ V to } 4.3 \text{ V}$                                                                                                                                            | -   | –90  | -   | dB   |
| $V_{\text{ct}}$       | crosstalk voltage         | between digital inputs and switch;<br>$f_i = 1 \text{ MHz}$ ; $C_L = 50 \text{ pF}$ ; $R_L = 50 \text{ } \Omega$ ; see <a href="#">Figure 22</a>                                      |     |      |     |      |
|                       |                           | $V_{CC} = 1.4 \text{ V to } 3.6 \text{ V}$                                                                                                                                            | -   | 0.2  | -   | V    |
|                       |                           | $V_{CC} = 3.6 \text{ V to } 4.3 \text{ V}$                                                                                                                                            | -   | 0.3  | -   | V    |
| Xtalk                 | crosstalk                 | between switches;<br>$f_i = 100 \text{ kHz}$ ; $R_L = 50 \text{ } \Omega$ ; see <a href="#">Figure 23</a>                                                                             | [1] |      |     |      |
|                       |                           | $V_{CC} = 1.4 \text{ V to } 4.3 \text{ V}$                                                                                                                                            | -   | –90  | -   | dB   |
| $Q_{\text{inj}}$      | charge injection          | $f_i = 1 \text{ MHz}$ ; $C_L = 0.1 \text{ nF}$ ; $R_L = 1 \text{ M}\Omega$ ; $V_{\text{gen}} = 0 \text{ V}$ ;<br>$R_{\text{gen}} = 0 \text{ } \Omega$ ; see <a href="#">Figure 24</a> |     |      |     |      |
|                       |                           | $V_{CC} = 1.5 \text{ V}$                                                                                                                                                              | -   | 3    | -   | pC   |
|                       |                           | $V_{CC} = 1.8 \text{ V}$                                                                                                                                                              | -   | 4    | -   | pC   |
|                       |                           | $V_{CC} = 2.5 \text{ V}$                                                                                                                                                              | -   | 6    | -   | pC   |
|                       |                           | $V_{CC} = 3.3 \text{ V}$                                                                                                                                                              | -   | 9    | -   | pC   |
|                       |                           | $V_{CC} = 4.3 \text{ V}$                                                                                                                                                              | -   | 15   | -   | pC   |

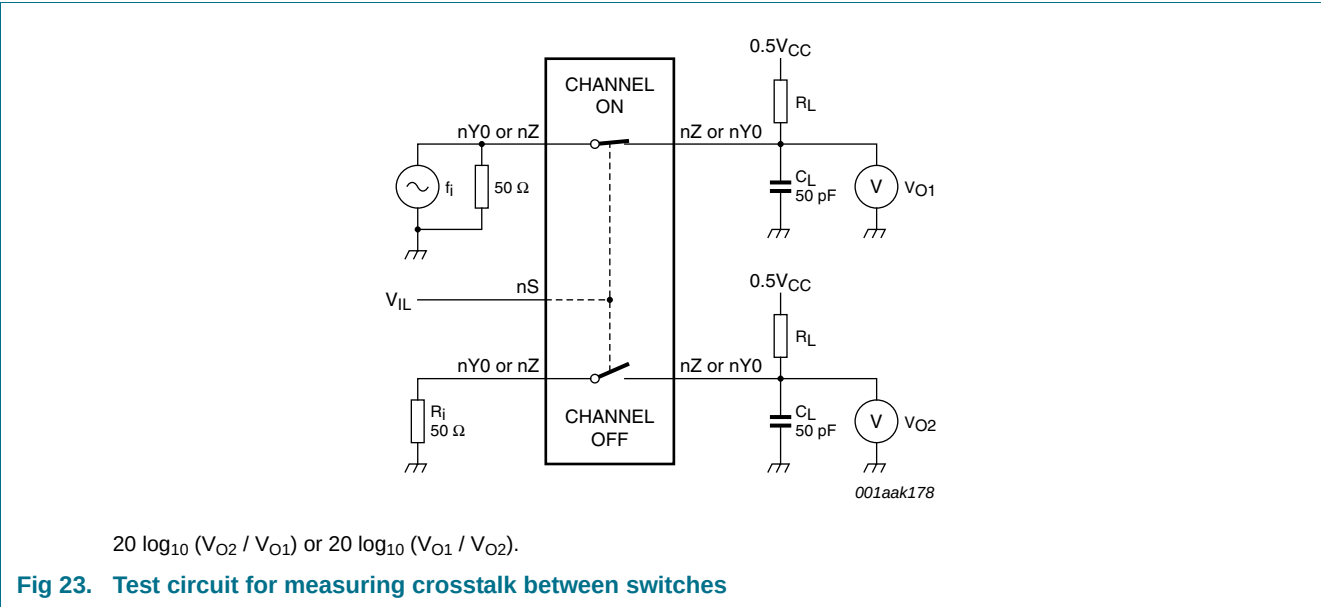
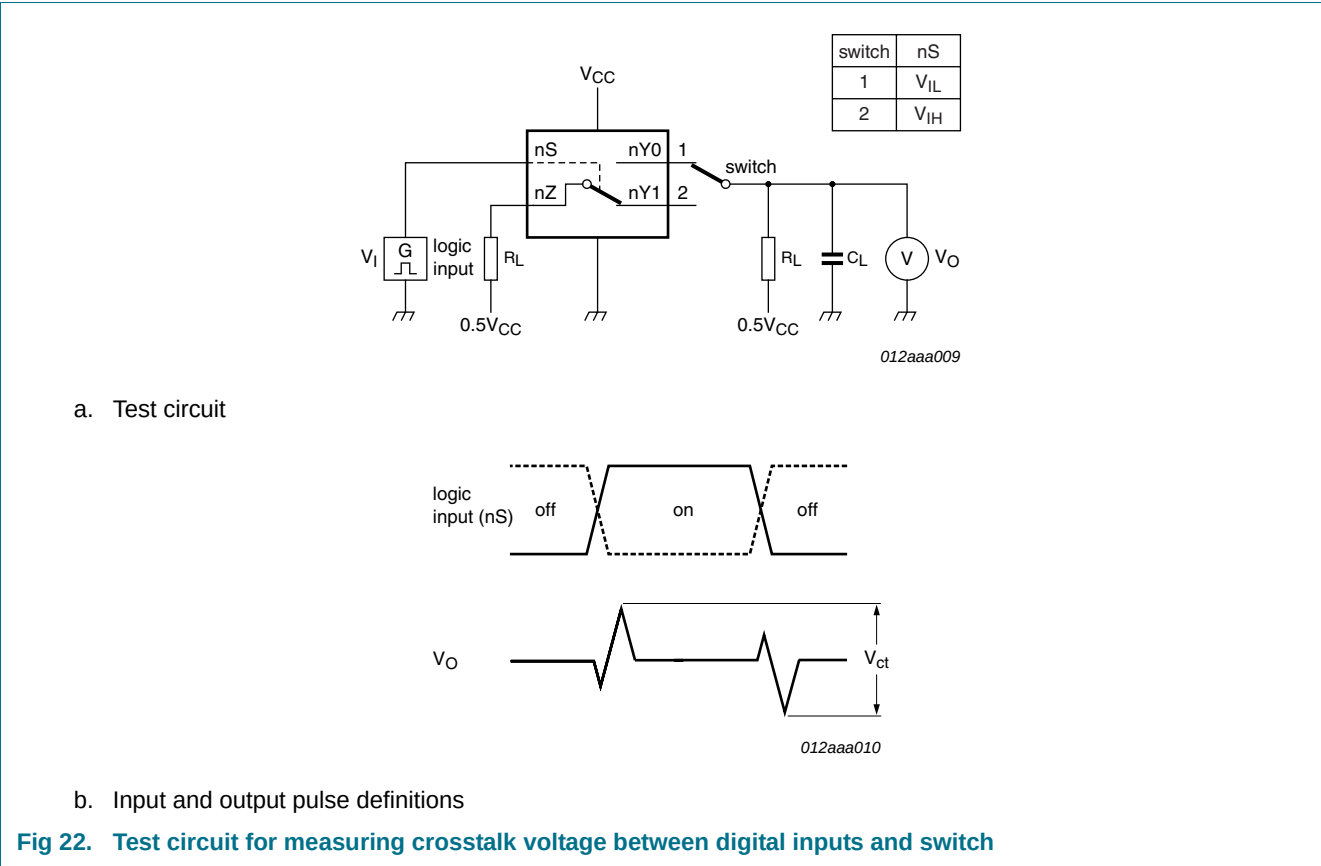
[1]  $f_i$  is biased at  $0.5V_{CC}$ .

## 12.3 Test circuits

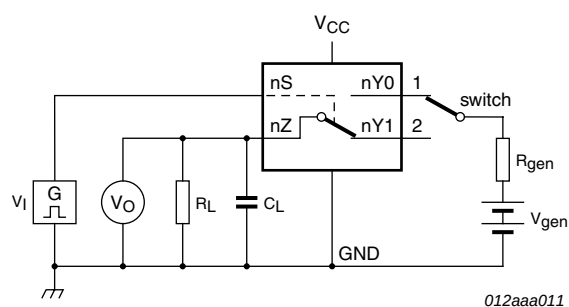


**Fig 19. Test circuit for measuring total harmonic distortion**

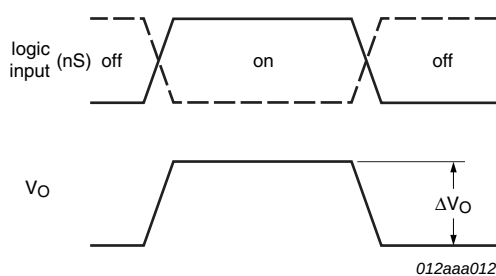








a. Test circuit



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 24. Test circuit for measuring charge injection**

13. Package outline

HXQFN16U: plastic thermal enhanced extremely thin quad flat package; no leads;  
 16 terminals; UTLP based; body 3 x 3 x 0.5 mm

SOT1039-1

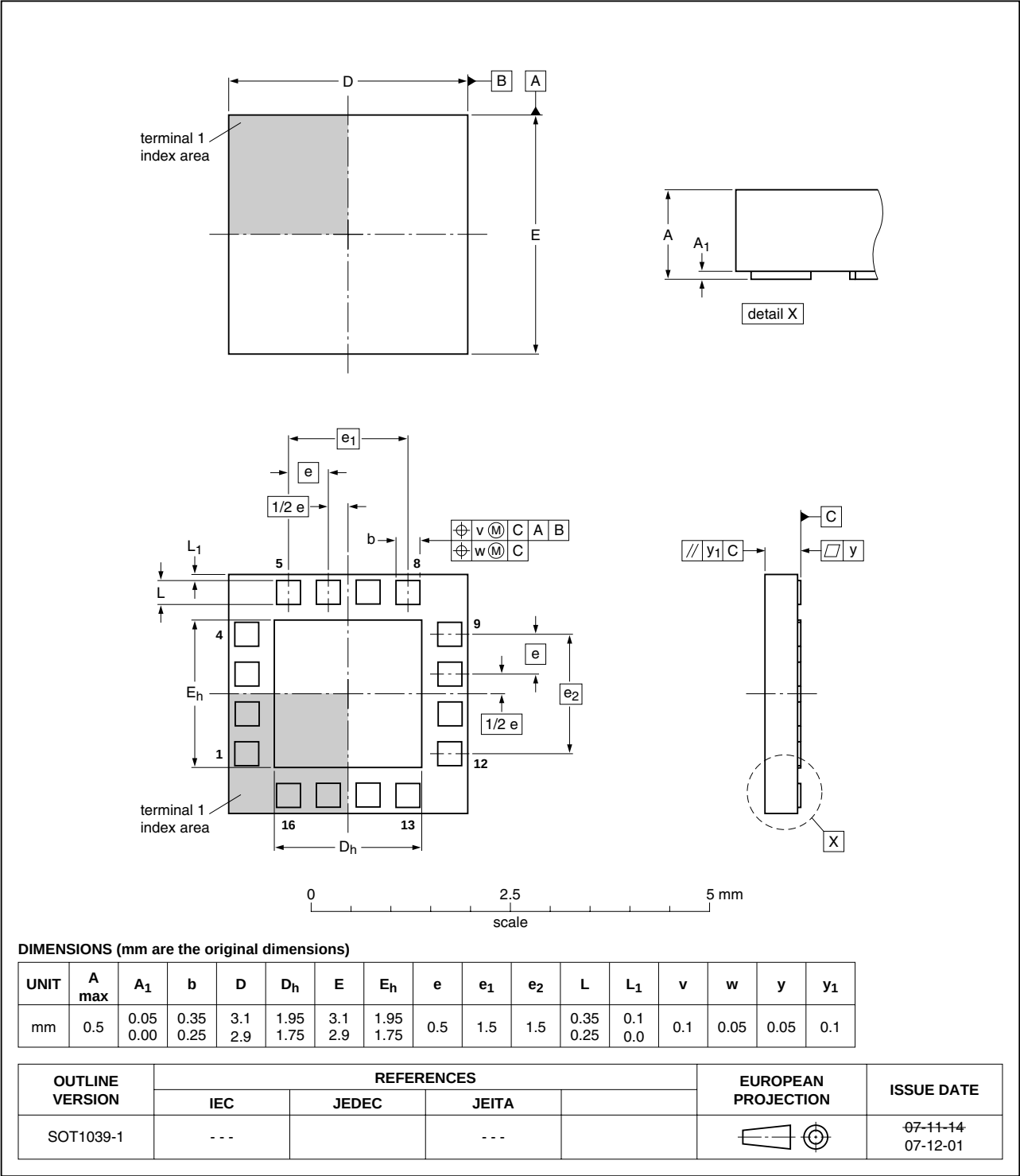


Fig 25. Package outline SOT1039-1 (HXQFN16U)

TSSOP16: plastic thin shrink small outline package; 16 leads; body width 4.4 mm

SOT403-1

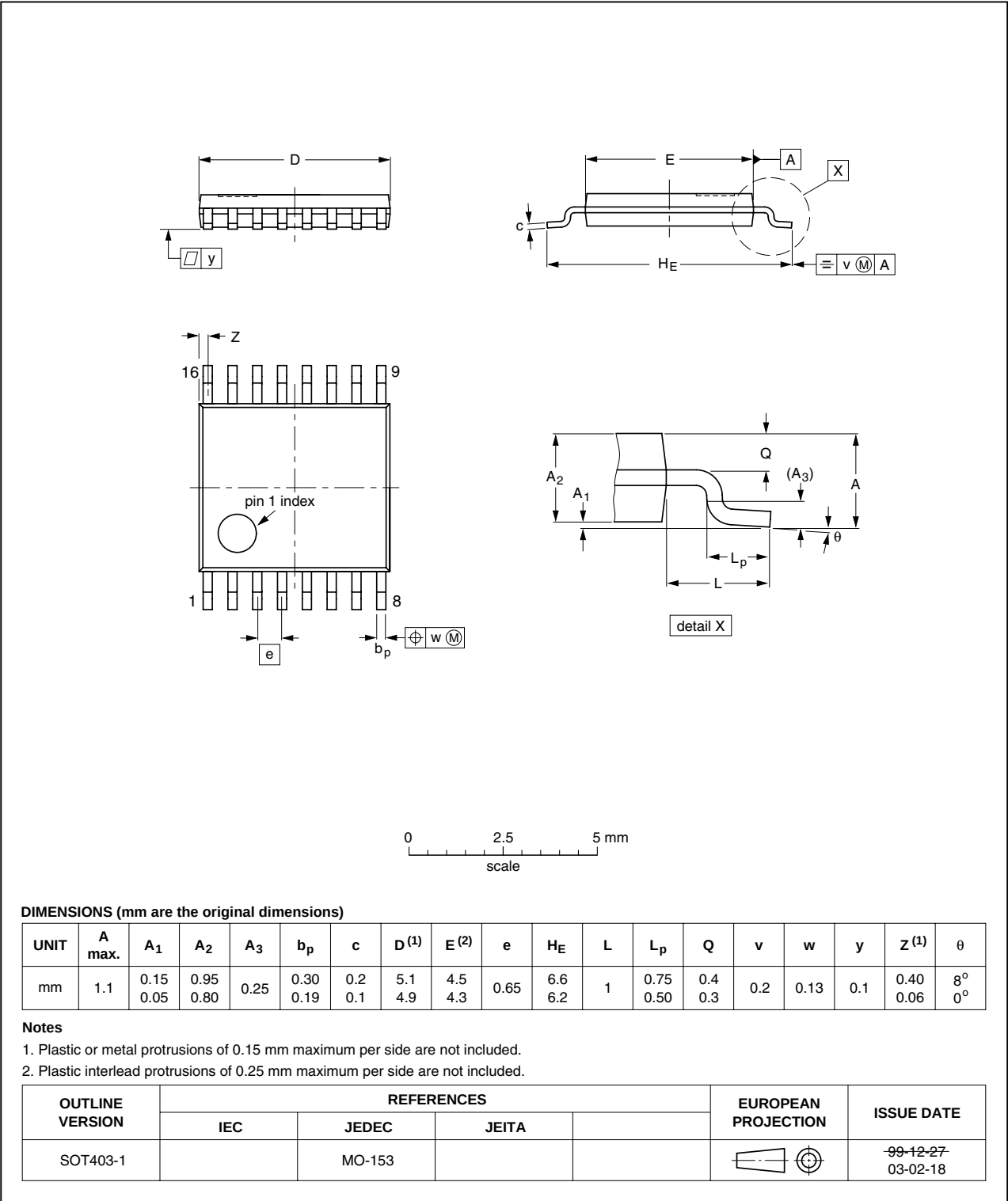


Fig 26. Package outline SOT403-1 (TSSOP16)

XQFN16: plastic, extremely thin quad flat package; no leads;  
16 terminals; body 1.80 x 2.60 x 0.50 mm

SOT1161-1

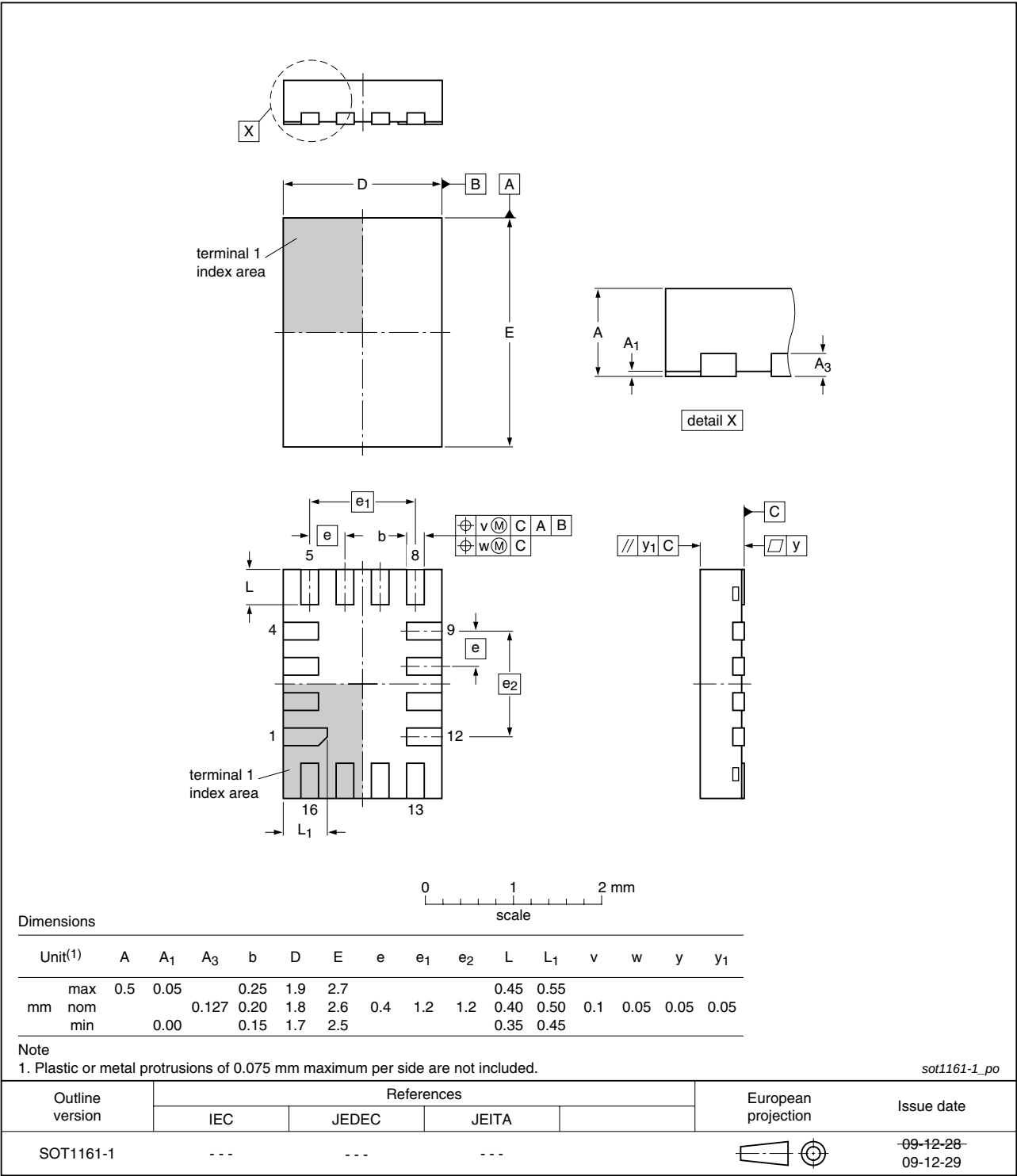


Fig 27. Package outline SOT1161-1 (XQFN16)

## 14. Abbreviations

Table 13. 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              |
| TTL     | Transistor-Transistor Logic             |

## 15. Revision history

Table 14. Revision history

| Document ID    | Release date                                                                                                                                                                              | Data sheet status  | Change notice | Supersedes |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|---------------|------------|
| NX3L2467_2     | 20100519                                                                                                                                                                                  | Product data sheet | -             | NX3L2467_1 |
| Modifications: | <ul style="list-style-type: none"><li>Added type number NX3L2467GU (XQFN16 / SOT1161 package).</li><li><a href="#">Figure 1</a> changed: pin numbers removed from logic symbol.</li></ul> |                    |               |            |
| NX3L2467_1     | 20090623                                                                                                                                                                                  | Product data sheet | -             | -          |

## 16. Legal information

### 16.1 Data sheet status

| Document status <sup>[1][2]</sup> | Product status <sup>[3]</sup> | 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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## 18. Contents

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|           |                                                   |           |
|-----------|---------------------------------------------------|-----------|
| <b>1</b>  | <b>General description</b> . . . . .              | <b>1</b>  |
| <b>2</b>  | <b>Features and benefits</b> . . . . .            | <b>1</b>  |
| <b>3</b>  | <b>Applications</b> . . . . .                     | <b>2</b>  |
| <b>4</b>  | <b>Ordering information</b> . . . . .             | <b>2</b>  |
| <b>5</b>  | <b>Marking</b> . . . . .                          | <b>2</b>  |
| <b>6</b>  | <b>Functional diagram</b> . . . . .               | <b>3</b>  |
| <b>7</b>  | <b>Pinning information</b> . . . . .              | <b>3</b>  |
| 7.1       | Pinning . . . . .                                 | 3         |
| 7.2       | Pin description . . . . .                         | 4         |
| <b>8</b>  | <b>Functional description</b> . . . . .           | <b>4</b>  |
| <b>9</b>  | <b>Limiting values</b> . . . . .                  | <b>4</b>  |
| <b>10</b> | <b>Recommended operating conditions</b> . . . . . | <b>5</b>  |
| <b>11</b> | <b>Static characteristics</b> . . . . .           | <b>6</b>  |
| 11.1      | Test circuits . . . . .                           | 7         |
| 11.2      | ON resistance . . . . .                           | 7         |
| 11.3      | ON resistance test circuit and graphs . . . . .   | 9         |
| <b>12</b> | <b>Dynamic characteristics</b> . . . . .          | <b>11</b> |
| 12.1      | Waveform and test circuits . . . . .              | 12        |
| 12.2      | Additional dynamic characteristics . . . . .      | 14        |
| 12.3      | Test circuits . . . . .                           | 14        |
| <b>13</b> | <b>Package outline</b> . . . . .                  | <b>18</b> |
| <b>14</b> | <b>Abbreviations</b> . . . . .                    | <b>21</b> |
| <b>15</b> | <b>Revision history</b> . . . . .                 | <b>21</b> |
| <b>16</b> | <b>Legal information</b> . . . . .                | <b>22</b> |
| 16.1      | Data sheet status . . . . .                       | 22        |
| 16.2      | Definitions . . . . .                             | 22        |
| 16.3      | Disclaimers . . . . .                             | 22        |
| 16.4      | Trademarks . . . . .                              | 23        |
| <b>17</b> | <b>Contact information</b> . . . . .              | <b>23</b> |
| <b>18</b> | <b>Contents</b> . . . . .                         | <b>24</b> |

---

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