# NX3DV3899

## Dual double-pole double-throw analog switch

**Rev. 2 — 23 November 2010** **Product data sheet**

## 1. General description

The NX3DV3899 is a dual double-pole double-throw analog data-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. 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 NX3DV3899 to switch 4.3 V signals with a 1.8 V digital controller, eliminating the need for logic level translation. The NX3DV3899 allows signals with amplitude up to $V_{CC}$ to be transmitted from nZ to nY0 or nY1; or from nY0 or nY1 to nZ.

## 2. Features and benefits

- Wide supply voltage range from 1.4 V to 4.3 V
- Very low ON resistance (peak):
  - 7.2 Ω (typical) at $V_{CC}$ = 1.4 V
  - 5.4 Ω (typical) at $V_{CC}$ = 1.65 V
  - 2.9 Ω (typical) at $V_{CC}$ = 2.5 V
  - 2.4 Ω (typical) at $V_{CC}$ = 3.0 V
  - 2.3 Ω (typical) at $V_{CC}$ = 3.6 V
  - 2.2 Ω (typical) at $V_{CC}$ = 4.3 V
- Break-before-make switching
- High noise immunity
- ESD protection:
  - HBM JESD22-A114F Class 2A exceeds 2000 V (all pins)
  - HBM JESD22-A114F Class 3A exceeds 5000 V (I/O pins to GND)
  - 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

- Data switch
- Cell phone
- PDA
- Portable media player

## 4. Ordering information

**Table 1. Ordering information**

| Type number | Package | | | |
|---|---|---|---|---|
| | Temperature range | Name | Description | Version |
| NX3DV3899HR | –40 °C to +125 °C | HXQFN16U | plastic thermal enhanced extremely thin quad flat package; no leads; 16 terminals; UTLP based; body 3 × 3 × 0.5 mm | SOT1039-1 |
| NX3DV3899GU | –40 °C to +125 °C | XQFN16 | plastic, extremely thin quad flat package; no leads; 16 terminals; body 1.80 × 2.60 × 0.50 mm | SOT1161-1 |

## 5. Marking

**Table 2. Marking codes**

| Type number | Marking code |
|---|---|
| NX3DV3899HR | ×99 |
| NX3DV3899GU | ×9 |

## 6. Functional diagram

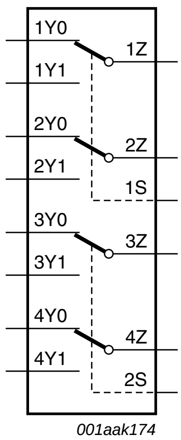



**Fig 1. Logic symbol**

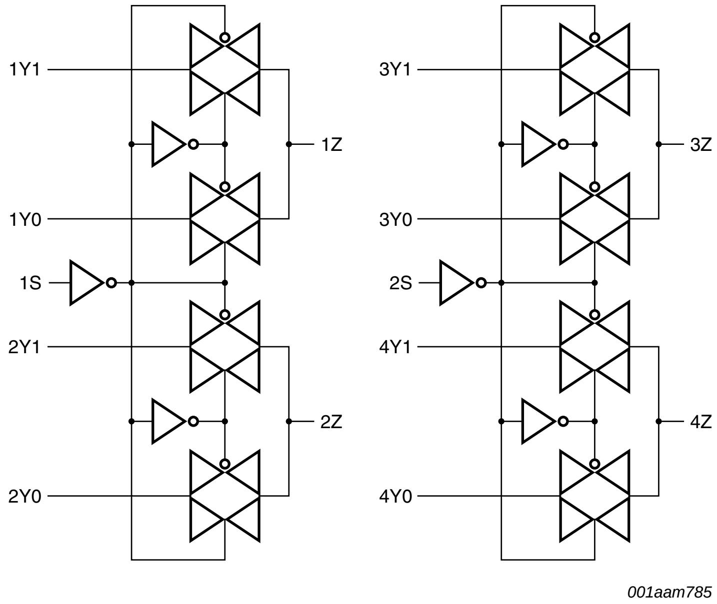
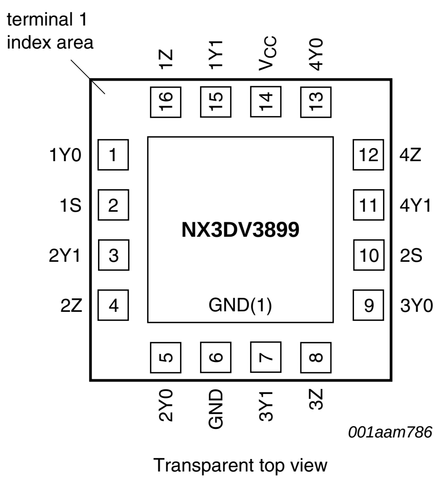



**Fig 2. Logic diagram**

# 7. Pinning information

## 7.1 Pinning




(1) This is not a supply pin, the substrate is attached to this pad using conductive die attach material. There is no electrical or mechanical requirement to solder this pad however if it is soldered the solder land should remain floating or be connected to GND.

**Fig 3. Pin configuration SOT1039-1 (HXQFN16U)**

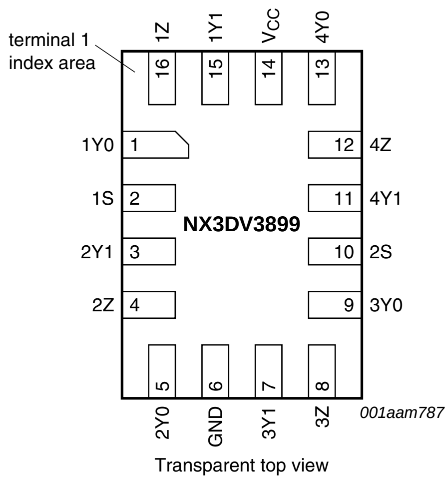



**Fig 4. Pin configuration SOT1161-1 (XQFN16)**

### 7.2 Pin description

**Table 3. Pin description**

| Symbol | Pin | Description |
|---|---|---|
| 1Y0, 2Y0, 3Y0, 4Y0 | 1, 5, 9, 13 | independent input or output |
| 1S, 2S | 2, 10 | select input |
| 1Y1, 2Y1, 3Y1, 4Y1 | 15, 3, 7, 11 | independent input or output |
| 1Z, 2Z, 3Z, 4Z | 16, 4, 8, 12 | common output or input |
| GND | 6 | ground (0 V) |
| $V_{CC}$ | 14 | supply voltage |

## 8. Functional description

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

| 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 |
|---|---|---|---|---|---|---|
| $V_{CC}$ | supply voltage | | | –0.5 | +4.6 | V |
| $V_I$ | input voltage | select input nS | [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 | | | | |
| | | HXQFN16U | [3] | - | 250 | mW |
| | | XQFN16 | [4] | - | 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 HXQFN16U package: above 135 °C the value of $P_{tot}$ derates linearly with 16.9 mW/K.

[4] 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 |
| Δt/ΔV | 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 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).*

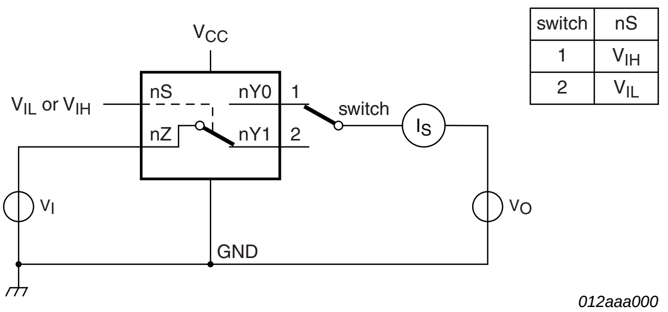
| Symbol | Parameter | Conditions | $T_{amb}$ = 25 °C | | | $T_{amb}$ = –40 °C to +125 °C | | | Unit |
|---|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | Min | Max (85 °C) | Max (125 °C) | |
| $V_{IH}$ | HIGH-level input voltage | $V_{CC}$ = 1.4 V to 1.6 V | 0.9 | - | - | 0.9 | - | - | 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 nS; $V_I$ = 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 | nY0 and nY1 port; see Figure 5 | | | | | | | |
| | | $V_{CC}$ = 1.4 V to 4.3 V | - | - | ±5 | - | ±50 | ±500 | nA |
| $I_{S(ON)}$ | ON-state leakage current | nZ port; see Figure 6 | | | | | | | |
| | | $V_{CC}$ = 1.4 V to 4.3 V | - | - | ±5 | - | ±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 | - | 500 | 5000 | nA |
| | | $V_{CC}$ = 4.3 V | - | - | 150 | - | 800 | 6000 | nA |

**Table 7. Static characteristics** *...continued*

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

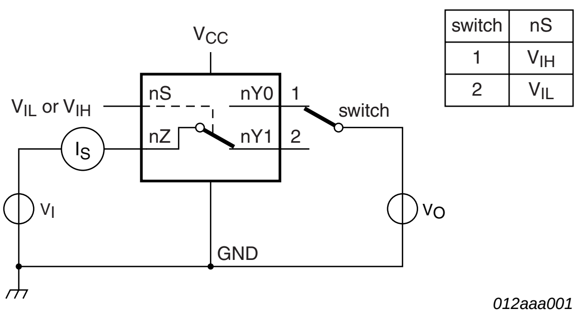
| Symbol | Parameter | Conditions | $T_{amb}$ = 25 °C | | | $T_{amb}$ = –40 °C to +125 °C | | | Unit |
|---|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | Min | Max (85 °C) | Max (125 °C) | |
| $\Delta I_{CC}$ | additional supply current | $V_{SW}$ = GND or $V_{CC}$ | | | | | | | |
| | | $V_I$ = 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 | | - | 8 | - | - | - | - | pF |
| $C_{S(ON)}$ | ON-state capacitance | | - | 30 | - | - | - | - | pF |

## 11.1 Test circuits




$V_I$ = 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 OFF-state leakage current**




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

**Fig 6. 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 8 to Figure 14.*

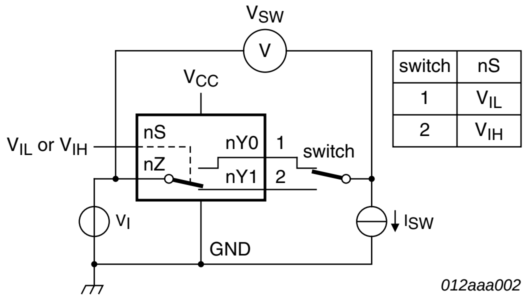
| Symbol | Parameter | Conditions | | $T_{amb}$ = −40 °C to +85 °C | | | $T_{amb}$ = −40 °C to +125 °C | | Unit |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Min | Typ[1] | Max | Min | Max | |
| $R_{ON(peak)}$ | ON resistance (peak) | $V_I$ = GND to $V_{CC}$; $I_{SW}$ = 100 mA; see Figure 7 | | | | | | | |
| | | $V_{CC}$ = 1.4 V | | - | 7.2 | 9.3 | - | 10 | Ω |
| | | $V_{CC}$ = 1.65 V | | - | 5.4 | 7.3 | - | 8 | Ω |
| | | $V_{CC}$ = 2.5 V | | - | 2.9 | 3.9 | - | 4.5 | Ω |
| | | $V_{CC}$ = 3.0 V | | - | 2.4 | 3.4 | - | 4.5 | Ω |
| | | $V_{CC}$ = 3.6 V | | - | 2.3 | 3.3 | - | 4.2 | Ω |
| | | $V_{CC}$ = 4.3 V | | - | 2.2 | 3.3 | - | 4.2 | Ω |
| $\Delta R_{ON}$ | ON resistance mismatch between channels | $V_I$ = GND to $V_{CC}$; $I_{SW}$ = 100 mA | [2] | | | | | | |
| | | $V_{CC}$ = 3.0 V | | - | 0.8 | - | - | - | Ω |
| | | $V_{CC}$ = 4.3 V | | - | 0.7 | - | - | - | Ω |
| $R_{ON(flat)}$ | ON resistance (flatness) | $V_I$ = GND to $V_{CC}$; $I_{SW}$ = 100 mA | [3] | | | | | | |
| | | $V_{CC}$ = 1.4 V | | - | 4.4 | - | - | - | Ω |
| | | $V_{CC}$ = 1.65 V | | - | 2.8 | - | - | - | Ω |
| | | $V_{CC}$ = 2.5 V | | - | 1.0 | - | - | - | Ω |
| | | $V_{CC}$ = 3.0 V | | - | 0.8 | - | - | - | Ω |
| | | $V_{CC}$ = 3.6 V | | - | 0.9 | - | - | - | Ω |
| | | $V_{CC}$ = 4.3 V | | - | 1.0 | - | - | - | Ω |

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

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

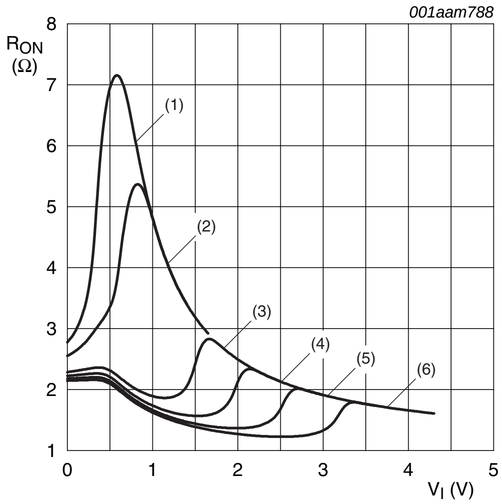
[3] Flatness is defined as the difference between the maximum and minimum value of ON resistance measured at identical $V_{CC}$ and temperature.

### 11.3 ON resistance test circuit and graphs




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

**Fig 7. Test circuit for measuring ON resistance**




(1) $V_{CC}$ = 1.4 V.

(2) $V_{CC}$ = 1.65 V.

(3) $V_{CC}$ = 2.5 V.

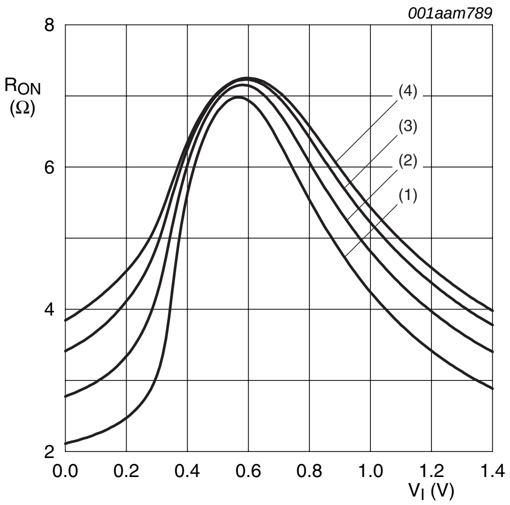
(4) $V_{CC}$ = 3.0 V.

(5) $V_{CC}$ = 3.6 V.

(6) $V_{CC}$ = 4.3 V.

Measured at $T_{amb}$ = 25 °C.

**Fig 8. Typical ON resistance as a function of input voltage**



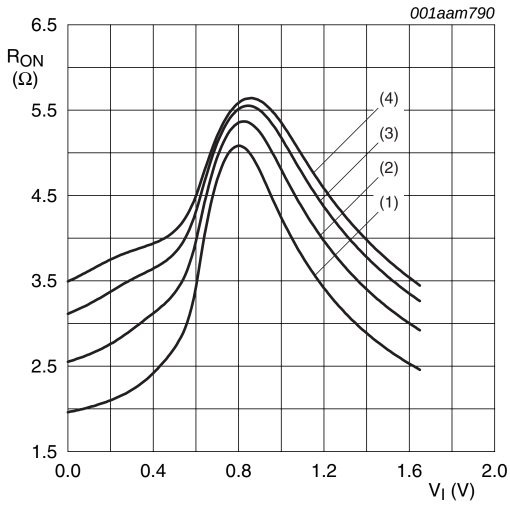

(1) $T_{amb}$ = 125 °C.

(2) $T_{amb}$ = 85 °C.

(3) $T_{amb}$ = 25 °C.

(4) $T_{amb}$ = −40 °C.

**Fig 9. ON resistance as a function of input voltage; $V_{CC}$ = 1.4 V**



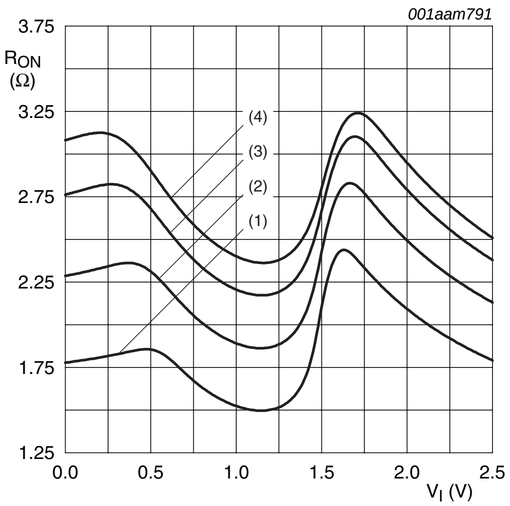

(1) $T_{amb}$ = 125 °C.

(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; $V_{CC}$ = 1.65 V**



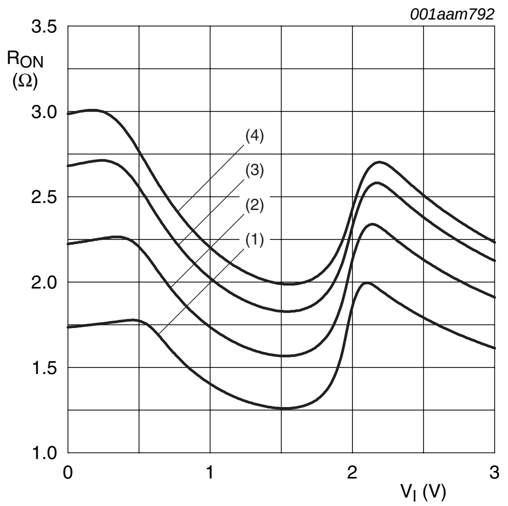

(1) $T_{amb}$ = 125 °C.

(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; $V_{CC}$ = 2.5 V**



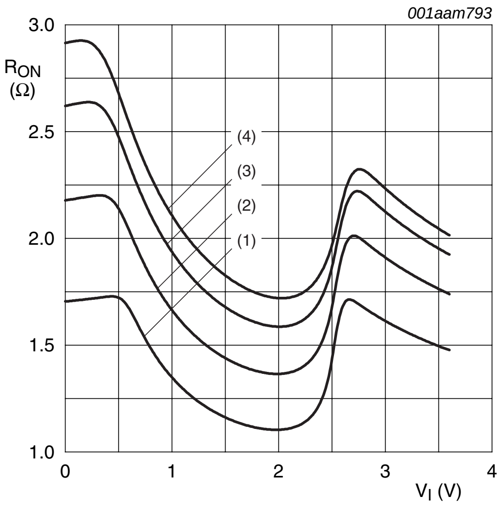

(1) $T_{amb}$ = 125 °C.

(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; $V_{CC}$ = 3.0 V**



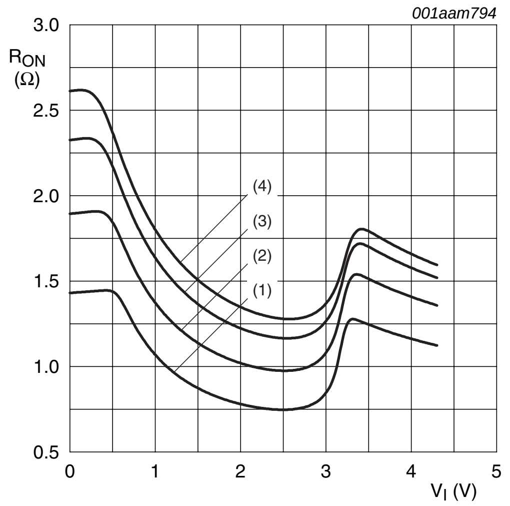

(1) $T_{amb}$ = 125 °C.

(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; $V_{CC}$ = 3.6 V**




(1) $T_{amb}$ = 125 °C.

(2) $T_{amb}$ = 85 °C.

(3) $T_{amb}$ = 25 °C.

(4) $T_{amb}$ = −40 °C.

**Fig 14. 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 test circuit see Figure 17.*

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

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

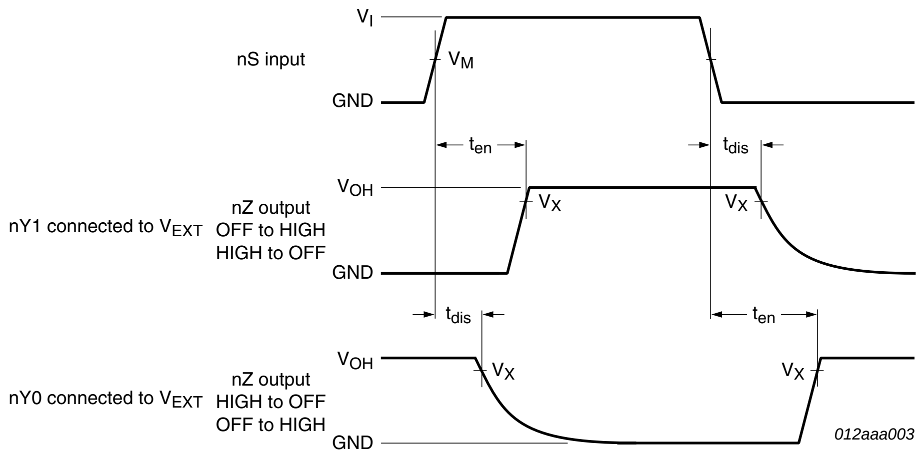
*At recommended operating conditions; voltages are referenced to GND (ground = 0 V); for test circuit see Figure 17.*

| Symbol | Parameter | Conditions | $T_{amb}$ = 25 °C | | | $T_{amb}$ = −40 °C to +125 °C | | | Unit |
|---|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ[1] | Max | Min | Max (85 °C) | Max (125 °C) | |
| $t_{b\text{-}m}$ | break-before-make time | see Figure 16 [2] | | | | | | | |
| | | $V_{CC}$ = 1.4 V to 1.6 V | - | 20 | - | 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 | - | 11 | - | 3 | - | - | ns |
| | | $V_{CC}$ = 3.6 V to 4.3 V | - | 11 | - | 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.

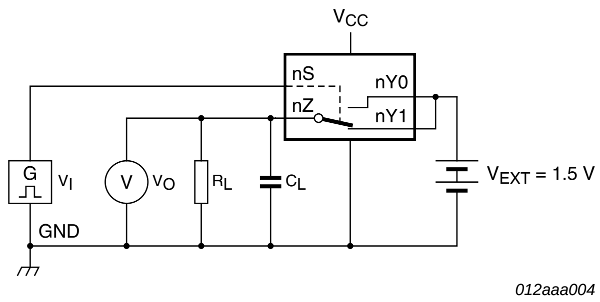
Logic level: $V_{OH}$ is typical output voltage level that occurs with the output load.

**Fig 15. Enable and disable times**

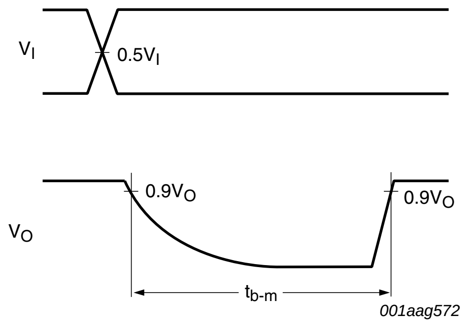
**Table 10. Measurement points**

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

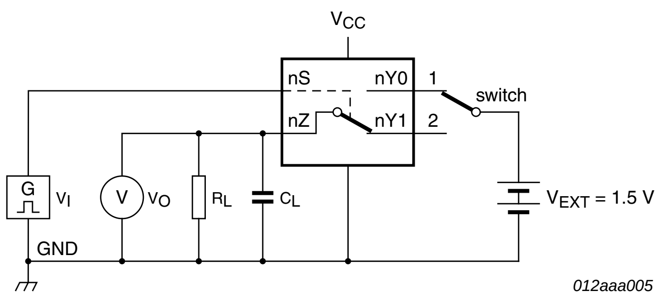



a. Test circuit




b. Input and output measurement points

**Fig 16. 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 17. Test circuit for measuring 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

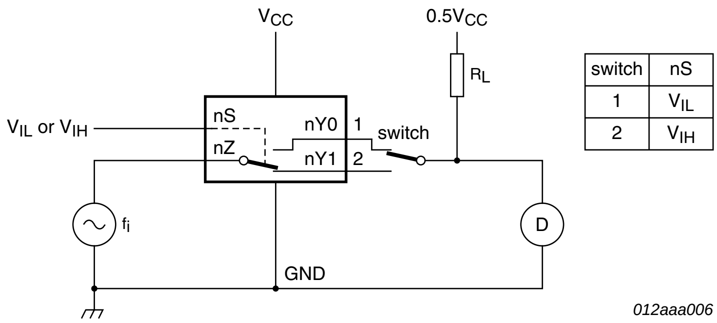
**Table 12. Additional dynamic characteristics**

*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; $R_L$ = 600 Ω; see Figure 18 | [1] | | | | |
| | | $V_{CC}$ = 1.4 V; $V_I$ = 1 V (p-p) | | - | 0.05 | - | % |
| | | $V_{CC}$ = 1.65 V; $V_I$ = 1.2 V (p-p) | | - | 0.02 | - | % |
| | | $V_{CC}$ = 2.3 V; $V_I$ = 1.5 V (p-p) | | - | 0.01 | - | % |
| | | $V_{CC}$ = 2.7 V; $V_I$ = 2 V (p-p) | | - | 0.01 | - | % |
| | | $V_{CC}$ = 3.6 V; $V_I$ = 2 V (p-p) | | - | 0.01 | - | % |
| | | $V_{CC}$ = 4.3 V; $V_I$ = 2 V (p-p) | | - | 0.01 | - | % |
| $f_{(-3dB)}$ | –3 dB frequency response | $R_L$ = 50 Ω; see Figure 19 | [1] | | | | |
| | | $V_{CC}$ = 1.4 V to 4.3 V | | - | 200 | - | MHz |
| $\alpha_{iso}$ | isolation (OFF-state) | $f_i$ = 1 MHz; $R_L$ = 50 Ω; see Figure 20 | [1] | | | | |
| | | $V_{CC}$ = 1.4 V to 4.3 V | | - | –70 | - | dB |
| $V_{ct}$ | crosstalk voltage | between digital inputs and switch; $f_i$ = 1 MHz; $C_L$ = 50 pF; $R_L$ = 50 Ω; see Figure 21 | | | | | |
| | | $V_{CC}$ = 1.4 V to 3.6 V | | - | 210 | - | V |
| | | $V_{CC}$ = 3.6 V to 4.3 V | | - | 300 | - | V |
| Xtalk | crosstalk | between switches; $f_i$ = 1 MHz; $R_L$ = 50 Ω; see Figure 22 | [1] | | | | |
| | | $V_{CC}$ = 1.4 V to 4.3 V | | - | –90 | - | dB |
| $Q_{inj}$ | 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 23 | | | | | |
| | | $V_{CC}$ = 1.4 V | | - | 0.5 | - | pC |
| | | $V_{CC}$ = 1.65 V | | - | 0.7 | - | pC |
| | | $V_{CC}$ = 2.5 V | | - | 1.6 | - | pC |
| | | $V_{CC}$ = 3.0 V | | - | 2.1 | - | pC |
| | | $V_{CC}$ = 3.6 V | | - | 2.9 | - | pC |
| | | $V_{CC}$ = 4.3 V | | - | 4.0 | - | pC |

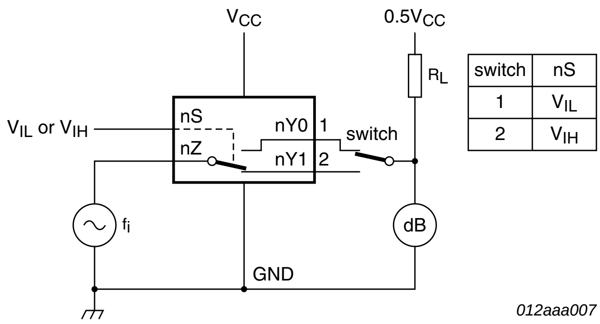
[1] $f_i$ is biased at $0.5V_{CC}$.

## 12.3 Test circuits




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

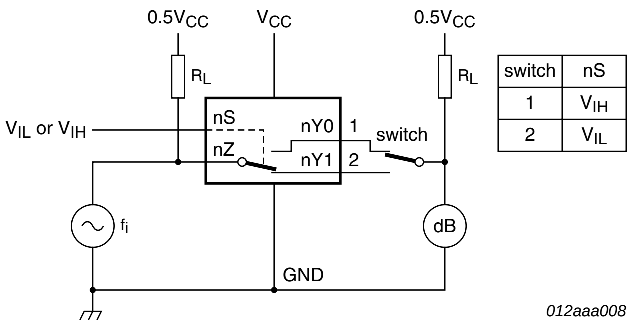
**Fig 18. Test circuit for measuring total harmonic distortion**




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

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

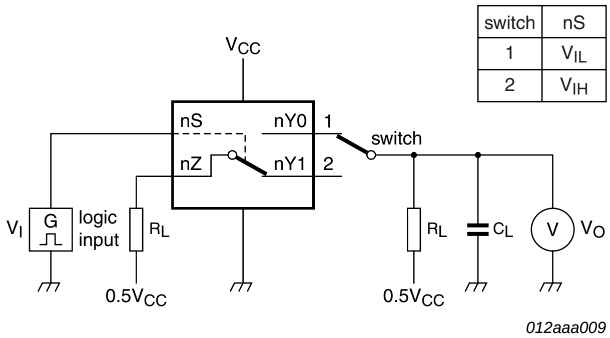
**Fig 19. Test circuit for measuring the frequency response when channel is in ON-state**



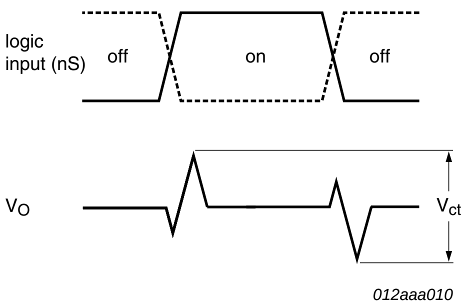

| switch | nS |
|---|---|
| 1 | $V_{IH}$ |
| 2 | $V_{IL}$ |

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

**Fig 20. Test circuit for measuring isolation (OFF-state)**

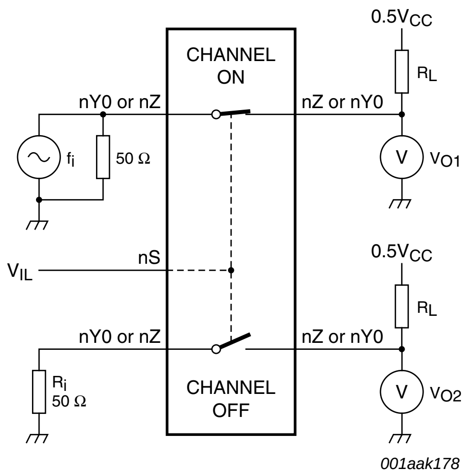



a. Test circuit



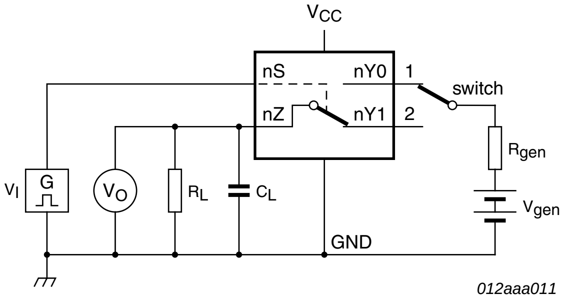

b. Input and output pulse definitions

**Fig 21. Test circuit for measuring crosstalk voltage between digital inputs and switch**

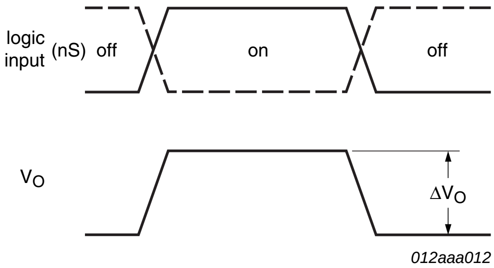



$20 \log_{10} (V_{O2} / V_{O1})$ or $20 \log_{10} (V_{O1} / V_{O2})$.

**Fig 22. Test circuit for measuring crosstalk between switches**




a. Test circuit




b. Input and output pulse definitions

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

$\Delta V_O$ = output voltage variation.

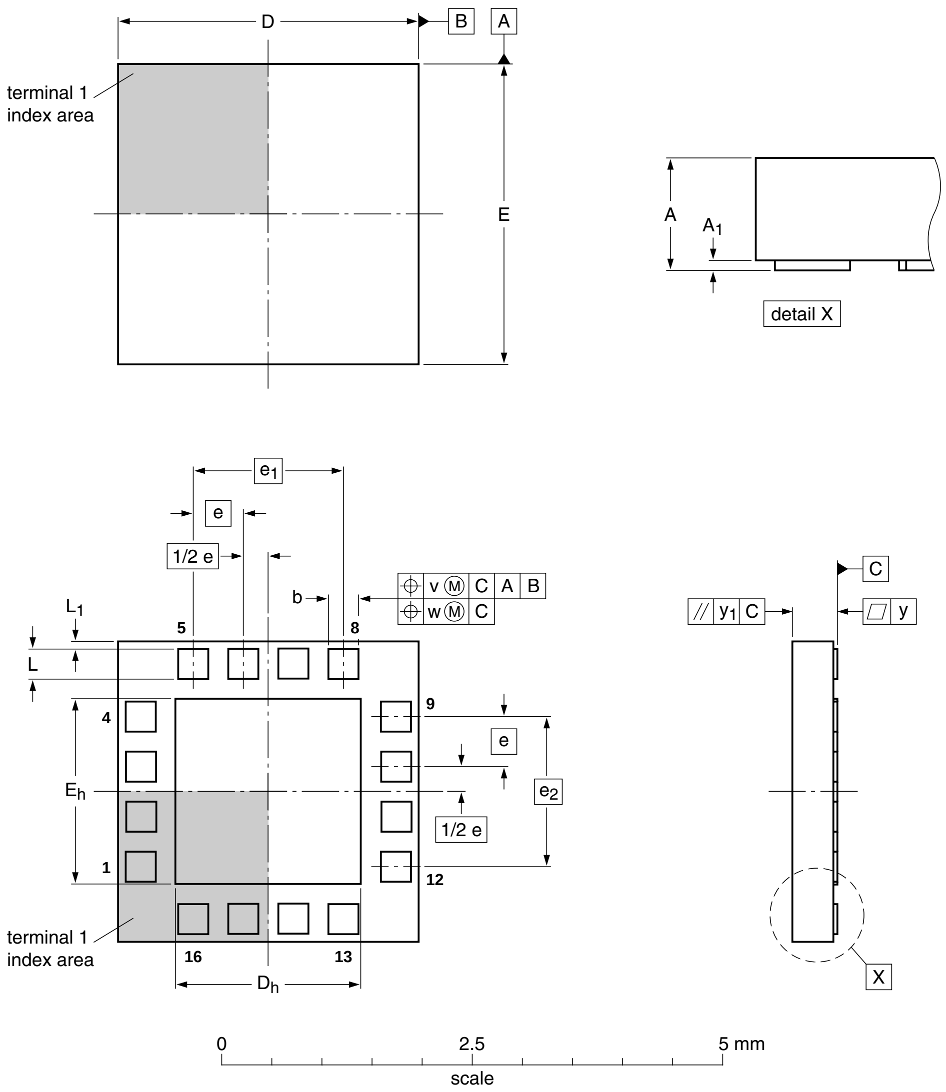
$R_{gen}$ = generator resistance.

$V_{gen}$ = generator voltage.

**Fig 23. 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**




DIMENSIONS (mm are the original dimensions)

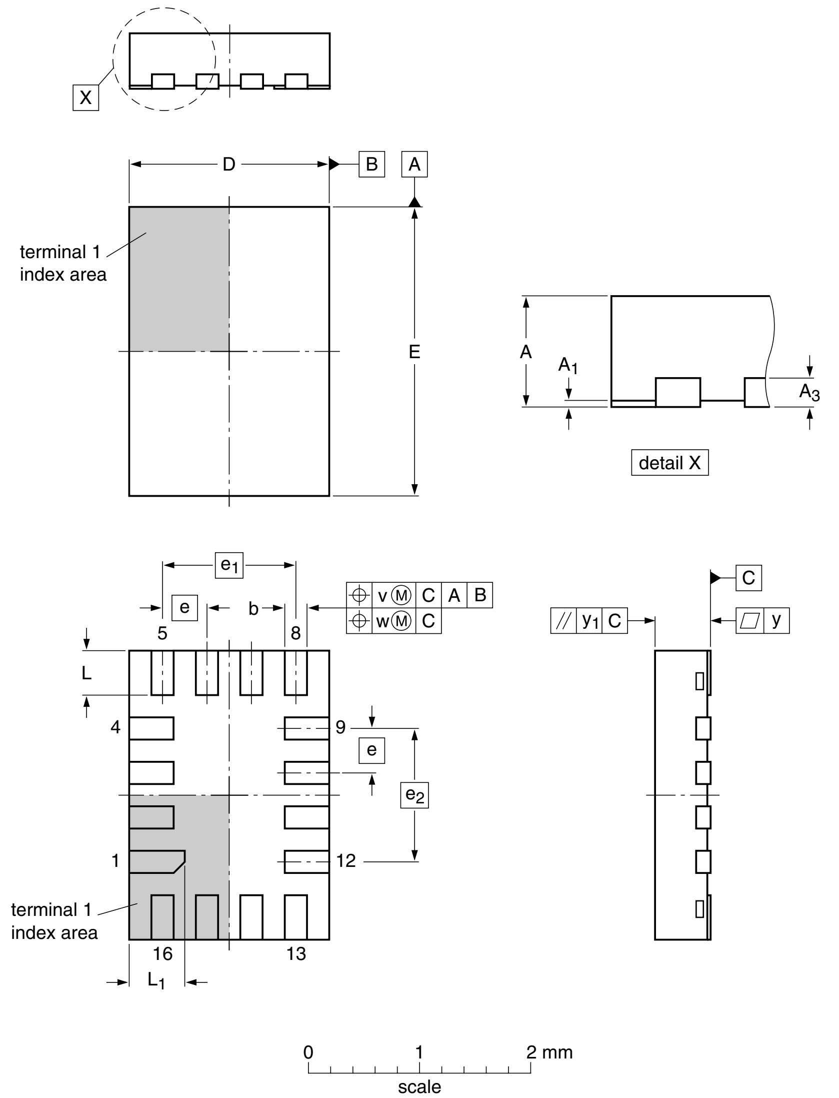
| UNIT | A max | $A_1$ | b | D | $D_h$ | E | $E_h$ | e | $e_1$ | $e_2$ | L | $L_1$ | v | w | y | $y_1$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | 0.5 | 0.05<br>0.00 | 0.35<br>0.25 | 3.1<br>2.9 | 1.95<br>1.75 | 3.1<br>2.9 | 1.95<br>1.75 | 0.5 | 1.5 | 1.5 | 0.35<br>0.25 | 0.1<br>0.0 | 0.1 | 0.05 | 0.05 | 0.1 |

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT1039-1 | - - - | | - - - | | | ~~07-11-14~~<br>07-12-01 |

**Fig 24. Package outline SOT1039-1 (HXQFN16U)**

 All information provided in this document is subject to legal disclaimers. 

**XQFN16: plastic, extremely thin quad flat package; no leads;**
**16 terminals; body 1.80 x 2.60 x 0.50 mm** **SOT1161-1**




Dimensions

| Unit(1) | | A | $A_1$ | $A_3$ | b | D | E | e | $e_1$ | $e_2$ | L | $L_1$ | v | w | y | $y_1$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | max | 0.5 | 0.05 | | 0.25 | 1.9 | 2.7 | | | | 0.45 | 0.55 | | | | |
| mm | nom | | | 0.127 | 0.20 | 1.8 | 2.6 | 0.4 | 1.2 | 1.2 | 0.40 | 0.50 | 0.1 | 0.05 | 0.05 | 0.05 |
| | min | | 0.00 | | 0.15 | 1.7 | 2.5 | | | | 0.35 | 0.45 | | | | |

Note
1. Plastic or metal protrusions of 0.075 mm maximum per side are not included.

*sot1161-1_po*

| Outline version | References | | | | European projection | Issue date |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT1161-1 | - - - | - - - | - - - | | | ~~09-12-28~~ 09-12-29 |

**Fig 25. 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 |

## 15. Revision history

**Table 14. Revision history**

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|---|---|---|---|---|
| NX3DV3899 v.2 | 20101123 | Product data sheet | - | NX3DV3899 v.1 |
| Modifications: | • Table 7: conditions for ON-state leakage current ($I_{S(ON)}$) and supply current ($I_{CC}$) have changed. | | | |
| NX3DV3899 v.1 | 20101021 | Product data sheet | - | - |

# 16. Legal information

## 16.1 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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**Document identifier: NX3DV3899**