

# NX3L1G53

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

Rev. 02 — 18 July 2008

Product data sheet

### 1. General description

---

The NX3L1G53 provides one low-ohmic single-pole double-throw analog switch, suitable for use as an analog or digital multiplexer/demultiplexer. It has a digital select input (S), two independent inputs/outputs (Y0, Y1), a common input/output (Z) and an active LOW enable input ( $\bar{E}$ ). When pin  $\bar{E}$  is HIGH, the switch is turned off. Schmitt-trigger action at the select input (S) and enable input ( $\bar{E}$ ) makes the circuit tolerant to slower input rise and fall times across the entire  $V_{CC}$  range from 1.4 V to 3.6 V.

The NX3L1G53 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  $\Omega$ ) and flatness (0.13  $\Omega$ ) ensures minimal attenuation and distortion of transmitted signals.

### 2. Features

---

- Wide supply voltage range from 1.4 V to 3.6 V
- Very low ON resistance (peak):
  - ◆ 1.6  $\Omega$  (typical) at  $V_{CC} = 1.4$  V
  - ◆ 1.0  $\Omega$  (typical) at  $V_{CC} = 1.65$  V
  - ◆ 0.55  $\Omega$  (typical) at  $V_{CC} = 2.3$  V
  - ◆ 0.50  $\Omega$  (typical) at  $V_{CC} = 2.7$  V
- Break-before-make switching
- High noise immunity
- ESD protection:
  - ◆ HBM JESD22-A114E Class 3A exceeds 7500 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 78 Class II Level A
- Direct interface with TTL levels at 3.0 V
- Control input accepts voltages above supply voltage
- 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			Version
	Temperature range	Name	Description	
NX3L1G53GT	-40 °C to +125 °C	XSON8	plastic extremely thin small outline package; no leads; 8 terminals; body 1 × 1.95 × 0.5 mm	SOT833-1
NX3L1G53GM	-40 °C to +125 °C	XQFN8U	plastic extremely thin quad flat package; no leads; 8 terminals; UTLP based; body 1.6 × 1.6 × 0.5 mm	SOT902-1

## 5. Marking

Table 2. Marking

Type number	Marking code
NX3L1G53GT	D53
NX3L1G53GM	D53

## 6. Functional diagram

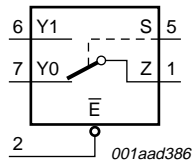


Fig 1. Logic symbol

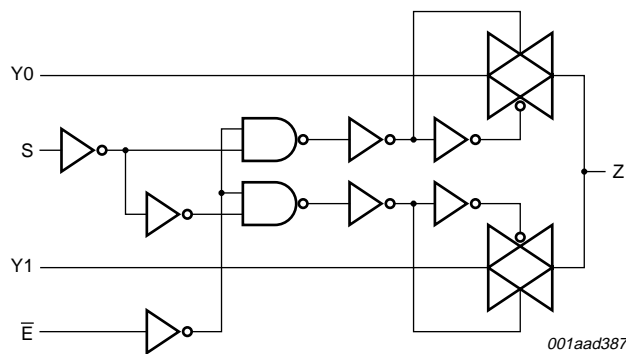
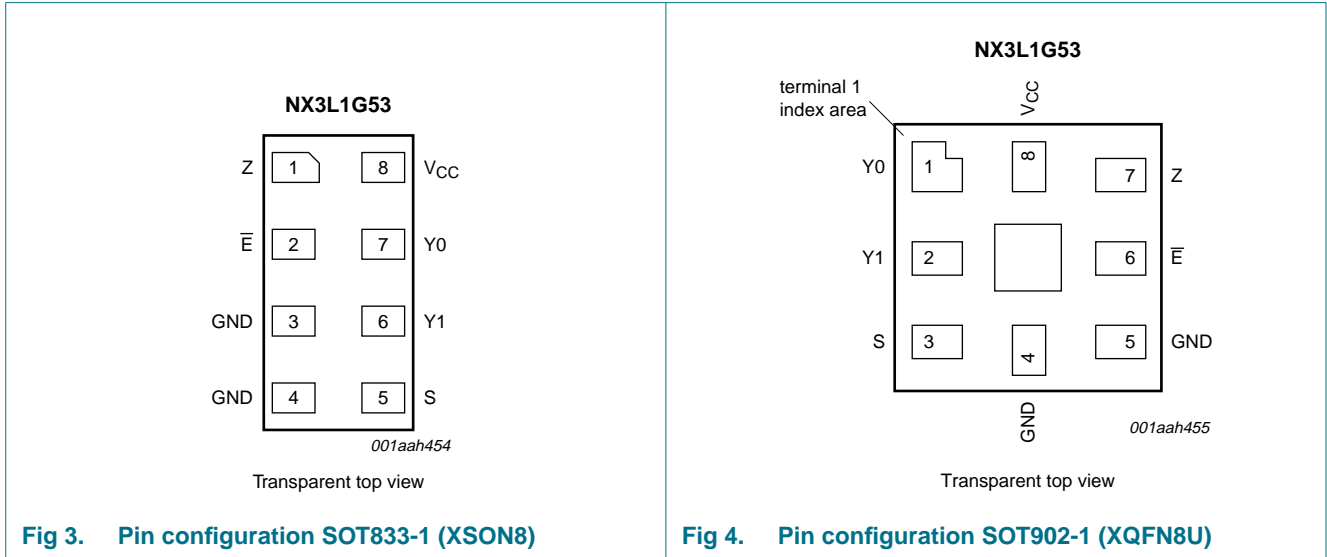


Fig 2. Logic diagram

## 7. Pinning information

### 7.1 Pinning



**Fig 3. Pin configuration SOT833-1 (XSON8)**

**Fig 4. Pin configuration SOT902-1 (XQFN8U)**

### 7.2 Pin description

**Table 3. Pin description**

Symbol	Pin		Description
	SOT833-1	SOT902-1	
Z	1	7	common output or input
$\bar{E}$	2	6	enable input (active LOW)
GND	3	5	ground (0 V)
GND	4	4	ground (0 V)
S	5	3	select input
Y1	6	2	independent input or output
Y0	7	1	independent input or output
V <sub>CC</sub>	8	8	supply voltage

## 8. Functional description

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

Input		Channel
S	$\bar{E}$	
L	L	Y0 to Z or Z to Y0
H	L	Y1 to Z or Z to Y1
X	H	switch off

[1] H = HIGH voltage level; L = LOW voltage level; X = don't care.

## 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 and enable input $\bar{E}$	[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	-	$\pm 50$	mA
$I_{SW}$	switch current	$V_{SW} > -0.5$ V or $V_{SW} < V_{CC} + 0.5$ V; source or sink current	-	$\pm 350$	mA
		$V_{SW} > -0.5$ V or $V_{SW} < V_{CC} + 0.5$ V; pulsed at 1 ms duration, < 10 % duty cycle; peak current	-	$\pm 500$	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.
- [3] For XSON8 and XQFN8U packages: above 45 °C the value of  $P_{tot}$  derates linearly with 2.4 mW/K.

## 10. Recommended operating conditions

**Table 6. Recommended operating conditions**

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{CC}$	supply voltage		1.4	3.6	V
$V_I$	input voltage	select input S and enable input $\bar{E}$	0	3.6	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 3.6 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 signals.

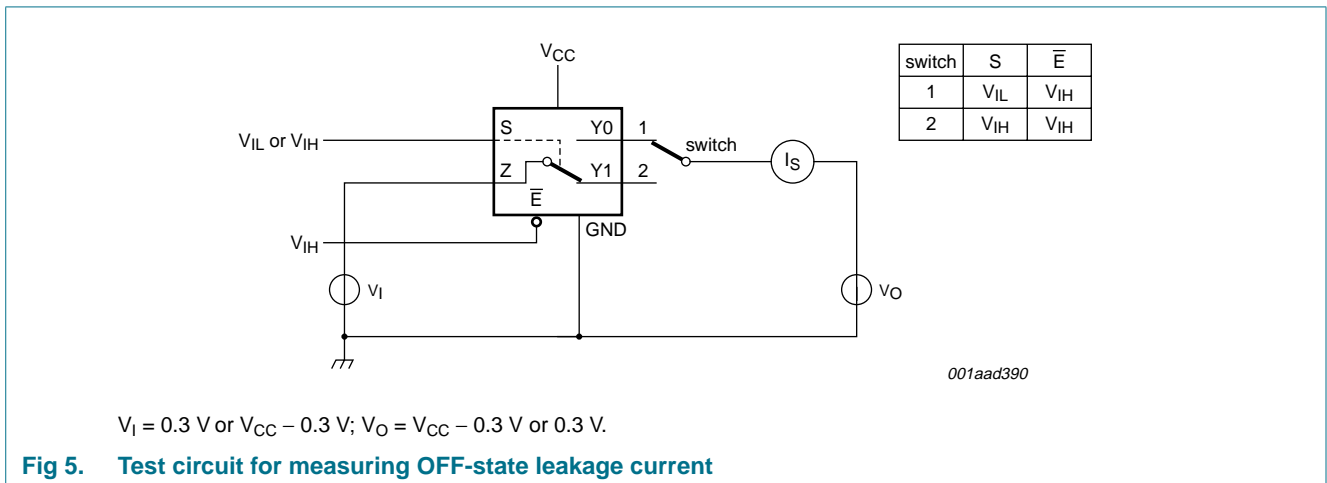
## 11. Static characteristics

**Table 7. Static characteristics**

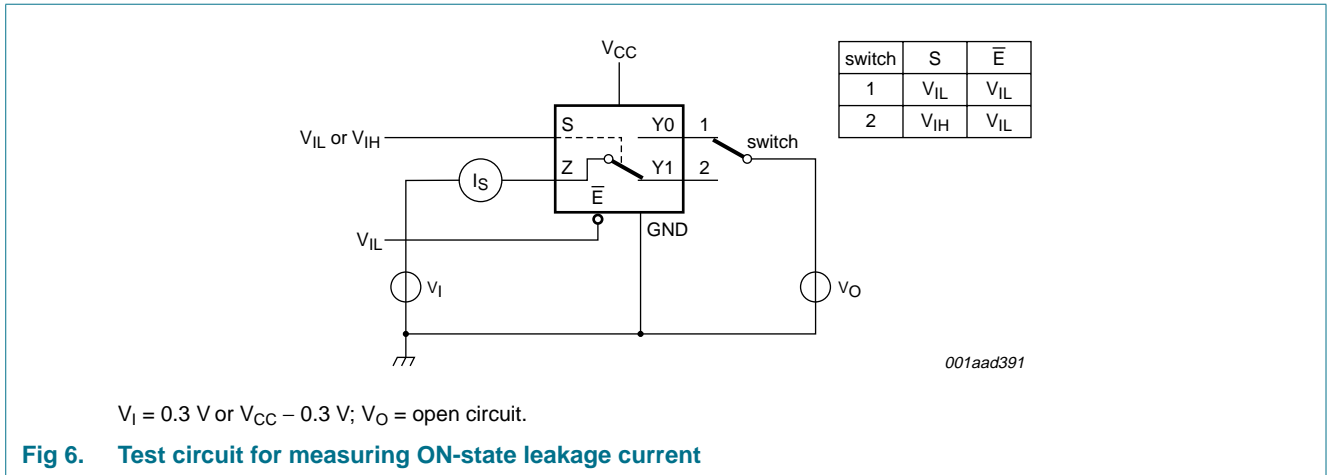
At recommended operating conditions; voltages are referenced to GND (ground 0 V).

Symbol	Parameter	Conditions	25 °C			-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 1.95 V	0.65V <sub>CC</sub>	-	-	0.65V <sub>CC</sub>	-	-	V
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.7	-	-	1.7	-	-	V
		V <sub>CC</sub> = 2.7 V to 3.6 V	2.0	-	-	2.0	-	-	V
V <sub>IL</sub>	LOW-level input voltage	V <sub>CC</sub> = 1.4 V to 1.95 V	-	-	0.35V <sub>CC</sub>	-	0.35V <sub>CC</sub>	0.35V <sub>CC</sub>	V
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	-	0.7	-	0.7	0.7	V
		V <sub>CC</sub> = 2.7 V to 3.6 V	-	-	0.8	-	0.8	0.8	V
I <sub>I</sub>	input leakage current	enable input $\bar{E}$ ; V <sub>I</sub> = GND to 3.6 V; V <sub>CC</sub> = 1.4 V to 3.6 V	-	-	-	-	±0.5	±1	µA
I <sub>S(OFF)</sub>	OFF-state leakage current	Y0 and Y1 port; V <sub>CC</sub> = 1.4 V to 3.6 V; see <a href="#">Figure 5</a>	-	-	±5	-	±50	±500	nA
I <sub>S(ON)</sub>	ON-state leakage current	Z port; V <sub>CC</sub> = 1.4 V to 3.6 V; see <a href="#">Figure 6</a>	-	-	±5	-	±50	±500	nA
I <sub>CC</sub>	supply current	V <sub>I</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 3.6 V; V <sub>SW</sub> = GND or V <sub>CC</sub>	-	-	100	-	690	6000	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



**Fig 5. Test circuit for measuring OFF-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 13](#).

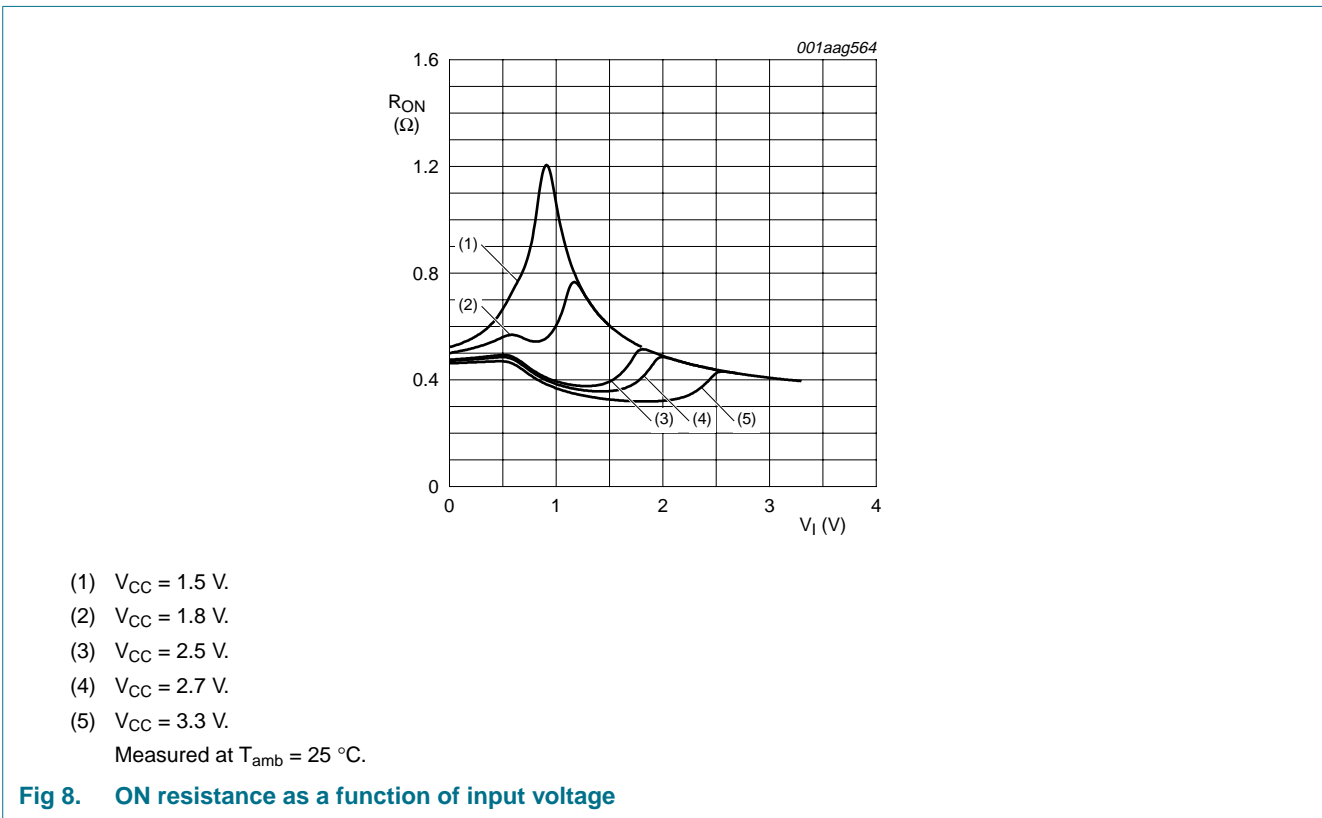
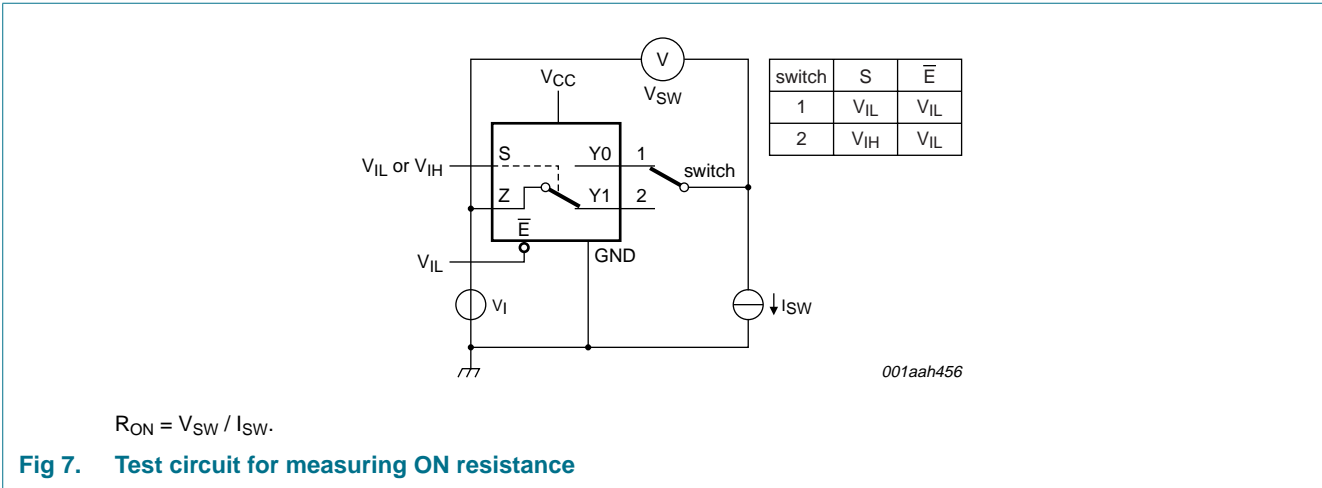
Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to +125 °C		Unit	
			Min	Typ <sup>[1]</sup>	Max	Min	Max		
$R_{ON(\text{peak})}$	ON resistance (peak)	$V_I = \text{GND to } V_{CC}$ ; $I_{SW} = 100\text{ mA}$ ; see <a href="#">Figure 7</a>							
			$V_{CC} = 1.4\text{ V}$	-	1.6	3.7	-	4.1	$\Omega$
			$V_{CC} = 1.65\text{ V}$	-	1.0	1.6	-	1.7	$\Omega$
			$V_{CC} = 2.3\text{ V}$	-	0.55	0.8	-	0.9	$\Omega$
			$V_{CC} = 2.7\text{ V}$	-	0.5	0.75	-	0.9	$\Omega$
$\Delta R_{ON}$	ON resistance mismatch between channels	$V_I = \text{GND to } V_{CC}$ ; $I_{SW} = 100\text{ mA}$							
			$V_{CC} = 1.4\text{ V}$	-	0.04	0.3	-	0.3	$\Omega$
			$V_{CC} = 1.65\text{ V}$	-	0.04	0.2	-	0.3	$\Omega$
			$V_{CC} = 2.3\text{ V}$	-	0.02	0.08	-	0.1	$\Omega$
			$V_{CC} = 2.7\text{ V}$	-	0.02	0.075	-	0.1	$\Omega$
$R_{ON(\text{flat})}$	ON resistance (flatness)	$V_I = \text{GND to } V_{CC}$ ; $I_{SW} = 100\text{ mA}$							
			$V_{CC} = 1.4\text{ V}$	-	1.0	3.3	-	3.6	$\Omega$
			$V_{CC} = 1.65\text{ V}$	-	0.5	1.2	-	1.3	$\Omega$
			$V_{CC} = 2.3\text{ V}$	-	0.15	0.3	-	0.35	$\Omega$
			$V_{CC} = 2.7\text{ V}$	-	0.13	0.3	-	0.35	$\Omega$

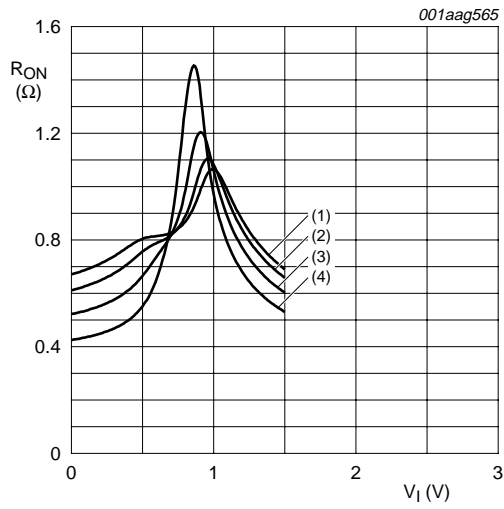
[1] Typical values are measured at  $T_{\text{amb}} = 25\text{ °C}$ .

[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.

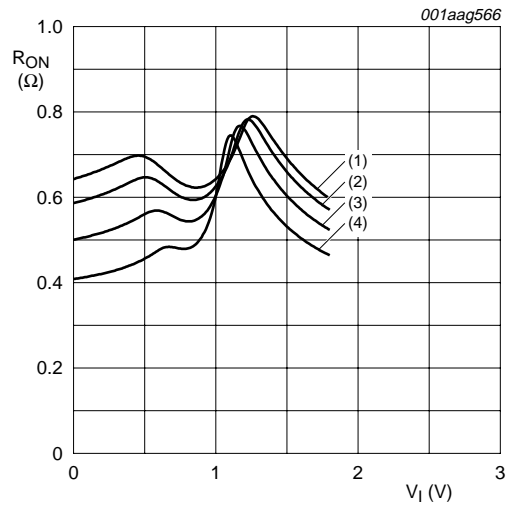
11.3 ON resistance test circuit and waveforms





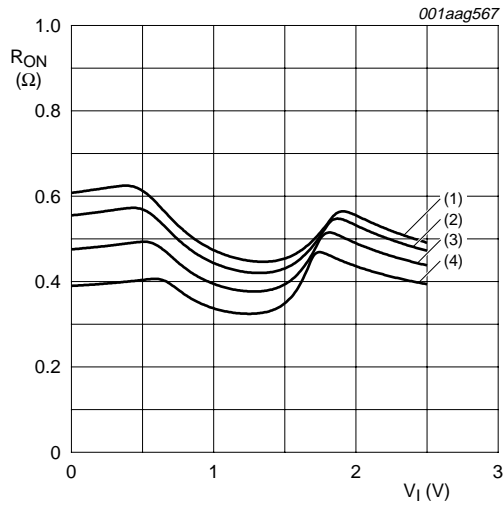
- (1)  $T_{amb} = 125\text{ }^{\circ}\text{C}.$
- (2)  $T_{amb} = 85\text{ }^{\circ}\text{C}.$
- (3)  $T_{amb} = 25\text{ }^{\circ}\text{C}.$
- (4)  $T_{amb} = -40\text{ }^{\circ}\text{C}.$

**Fig 9. ON resistance as a function of input voltage;**  
 $V_{CC} = 1.5\text{ V}$



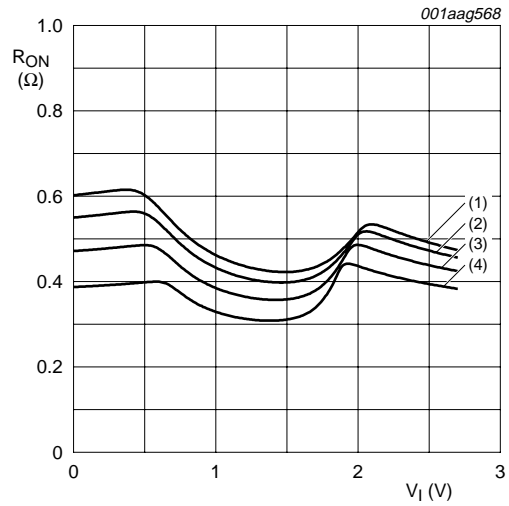
- (1)  $T_{amb} = 125\text{ }^{\circ}\text{C}.$
- (2)  $T_{amb} = 85\text{ }^{\circ}\text{C}.$
- (3)  $T_{amb} = 25\text{ }^{\circ}\text{C}.$
- (4)  $T_{amb} = -40\text{ }^{\circ}\text{C}.$

**Fig 10. 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)  $T_{amb} = -40\text{ }^{\circ}\text{C}.$

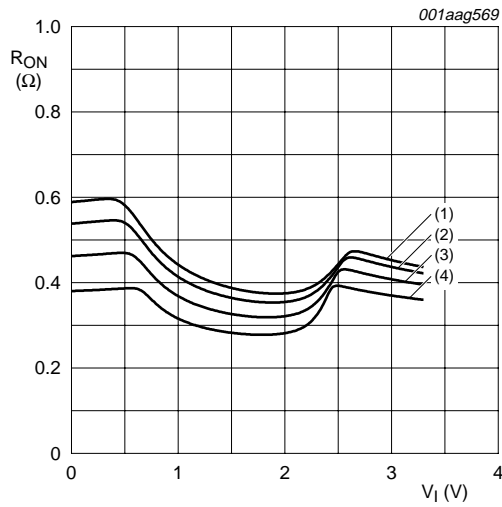
**Fig 11. ON resistance as a function of input voltage;**  
 $V_{CC} = 2.5\text{ V}$



- (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 12. ON resistance as a function of input voltage;**  
 $V_{CC} = 2.7\text{ V}$





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

Fig 13. ON resistance as a function of input voltage;  $V_{CC} = 3.3\text{ V}$

## 12. Dynamic characteristics

Table 9. Dynamic characteristics

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

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	S or $\bar{E}$ to Z or $Y_n$ ; see Figure 14							
		$V_{CC} = 1.4\text{ V to }1.6\text{ V}$	-	28	42	-	45	50	ns
		$V_{CC} = 1.65\text{ V to }1.95\text{ V}$	-	23	34	-	37	41	ns
		$V_{CC} = 2.3\text{ V to }2.7\text{ V}$	-	17	27	-	29	31	ns
		$V_{CC} = 2.7\text{ V to }3.6\text{ V}$	-	15	24	-	26	28	ns
$t_{dis}$	disable time	S or $\bar{E}$ to Z or $Y_n$ ; see Figure 14							
		$V_{CC} = 1.4\text{ V to }1.6\text{ V}$	-	10	19	-	21	23	ns
		$V_{CC} = 1.65\text{ V to }1.95\text{ V}$	-	7	14	-	16	17	ns
		$V_{CC} = 2.3\text{ V to }2.7\text{ V}$	-	5	9	-	10	11	ns
		$V_{CC} = 2.7\text{ V to }3.6\text{ V}$	-	4	8	-	9	9	ns

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

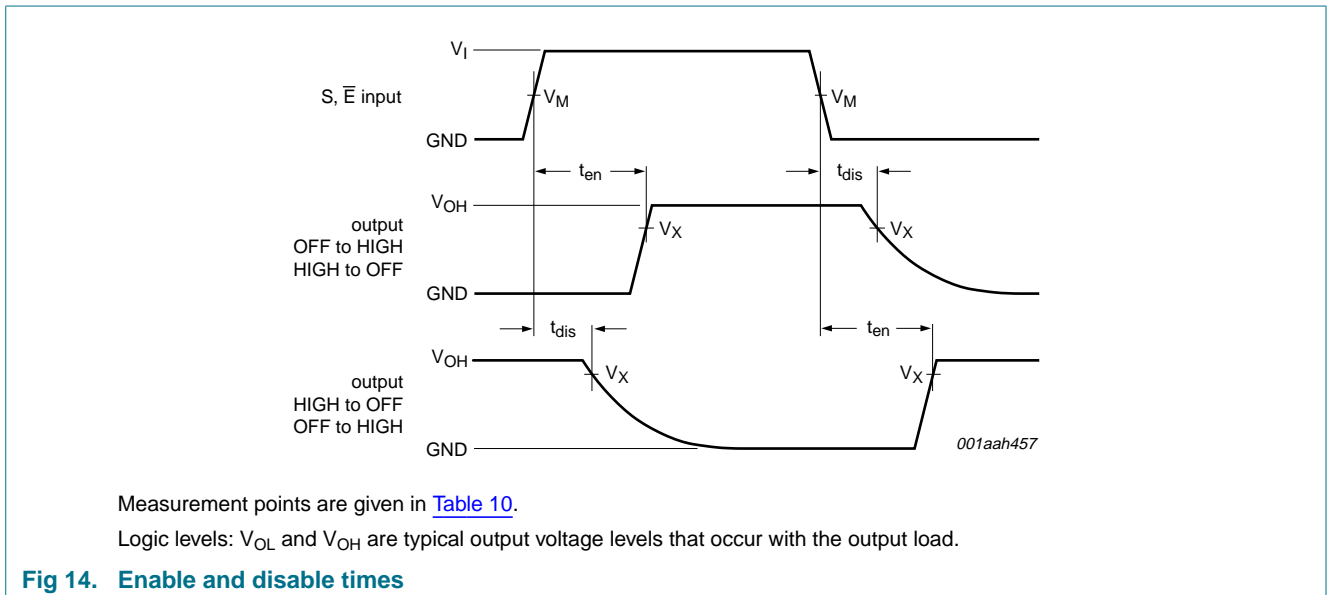
At recommended operating conditions; voltages are referenced to GND (ground = 0 V); for load circuit see [Figure 16](#).

Symbol	Parameter	Conditions	25 °C			-40 °C to +125 °C			Unit
			Min	Typ <sup>[1]</sup>	Max	Min	Max (85 °C)	Max (125 °C)	
t <sub>b-m</sub>	break-before-make time	see <a href="#">Figure 15</a> <sup>[2]</sup>							
		V <sub>CC</sub> = 1.4 V to 1.6 V	-	19	-	9	-	-	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	-	17	-	7	-	-	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	13	-	5	-	-	ns
		V <sub>CC</sub> = 2.7 V to 3.6 V	-	10	-	3	-	-	ns

[1] Typical values are measured at T<sub>amb</sub> = 25 °C and V<sub>CC</sub> = 1.5 V, 1.8 V, 2.5 V and 3.3 V respectively.

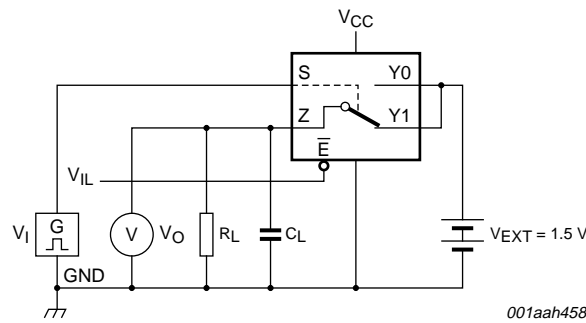
[2] Break-before-make guaranteed by design.

### 12.1 Waveform and test circuits

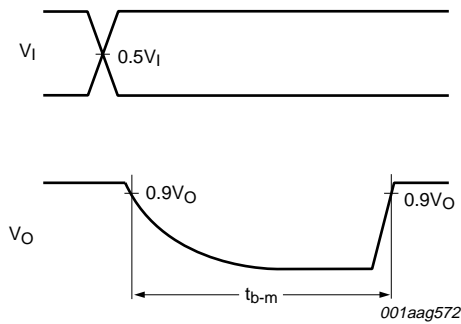


**Table 10. Measurement points**

Supply voltage	Input	Output
V <sub>CC</sub>	V <sub>M</sub>	V <sub>X</sub>
1.4 V to 3.6 V	0.5V <sub>CC</sub>	0.9V <sub>OH</sub>

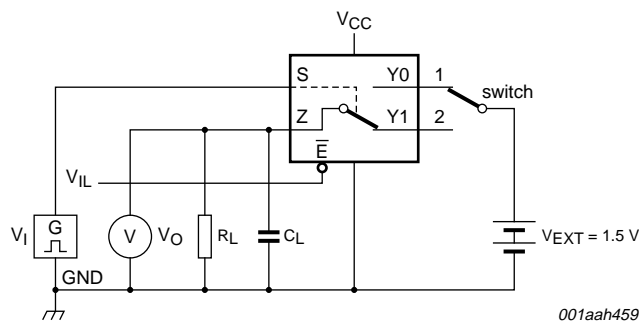


a. Test circuit



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.

$V_I$  may be connected to S or  $\bar{E}$ .

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

**Table 11. Test data**

Supply voltage	Input		Load	
V <sub>CC</sub>	V <sub>I</sub>	t <sub>r</sub> , t <sub>f</sub>	C <sub>L</sub>	R <sub>L</sub>
1.4 V to 3.6 V	V <sub>CC</sub>	≤ 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<sub>I</sub> = GND or V<sub>CC</sub> (unless otherwise specified); t<sub>r</sub> = t<sub>f</sub> ≤ 2.5 ns; T<sub>amb</sub> = 25 °C.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
THD	total harmonic distortion	f <sub>i</sub> = 20 Hz to 20 kHz; R <sub>L</sub> = 32 Ω; see <a href="#">Figure 17</a>	[1]			
		V <sub>CC</sub> = 1.4 V; V <sub>I</sub> = 1 V (p-p)	-	0.15	-	%
		V <sub>CC</sub> = 1.65 V; V <sub>I</sub> = 1.2 V (p-p)	-	0.10	-	%
		V <sub>CC</sub> = 2.3 V; V <sub>I</sub> = 1.5 V (p-p)	-	0.015	-	%
f <sub>(-3dB)</sub>	-3 dB frequency response	R <sub>L</sub> = 50 Ω; see <a href="#">Figure 18</a>	[1]			
		V <sub>CC</sub> = 1.4 V to 3.6 V	-	60	-	MHz
		f <sub>i</sub> = 100 kHz; R <sub>L</sub> = 50 Ω; see <a href="#">Figure 19</a>	[1]			
		V <sub>CC</sub> = 1.4 V to 3.6 V	-	-90	-	dB
V <sub>ct</sub>	crosstalk voltage	between digital inputs and switch; f <sub>i</sub> = 1 MHz; C <sub>L</sub> = 50 pF; R <sub>L</sub> = 50 Ω; see <a href="#">Figure 20</a>				
Xtalk	crosstalk	between switches;	[1]			
		f <sub>i</sub> = 100 kHz; R <sub>L</sub> = 50 Ω; see <a href="#">Figure 21</a>				
Q <sub>inj</sub>	charge injection	V <sub>CC</sub> = 1.4 V to 3.6 V	-	0.21	-	V
		f <sub>i</sub> = 1 MHz; C <sub>L</sub> = 0.1 nF; R <sub>L</sub> = 1 MΩ; V <sub>gen</sub> = 0 V; R <sub>gen</sub> = 0 Ω; see <a href="#">Figure 22</a>				
		V <sub>CC</sub> = 1.5 V	-	3	-	pC
		V <sub>CC</sub> = 1.8 V	-	4	-	pC
		V <sub>CC</sub> = 2.5 V	-	6	-	pC
		V <sub>CC</sub> = 3.3 V	-	9	-	pC

[1] f<sub>i</sub> is biased at 0.5V<sub>CC</sub>.

12.3 Test circuits

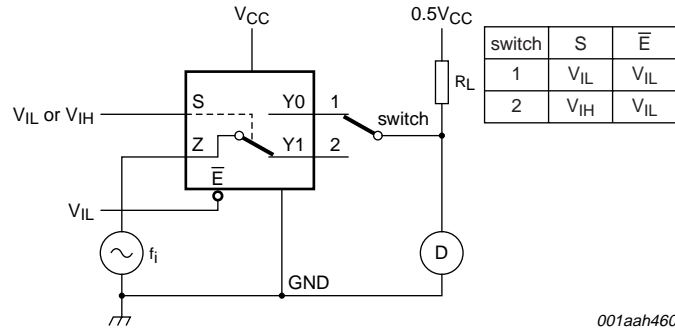
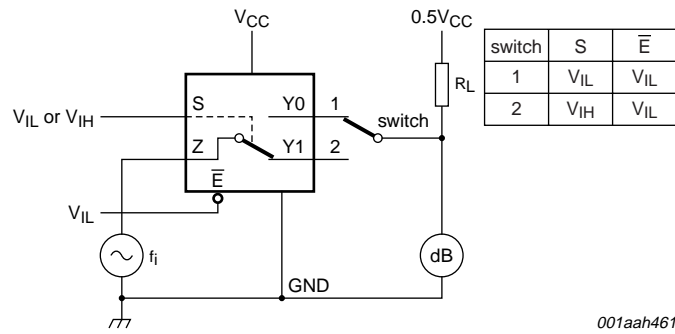
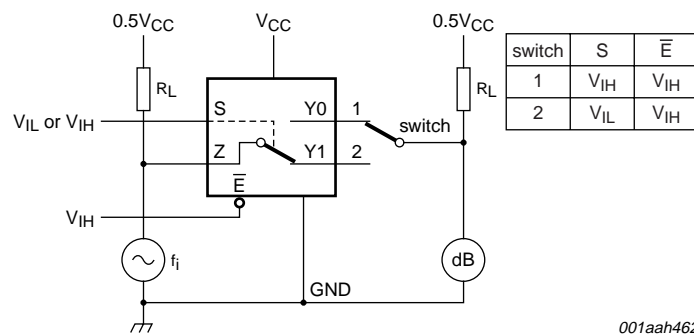


Fig 17. Test circuit for measuring total harmonic distortion



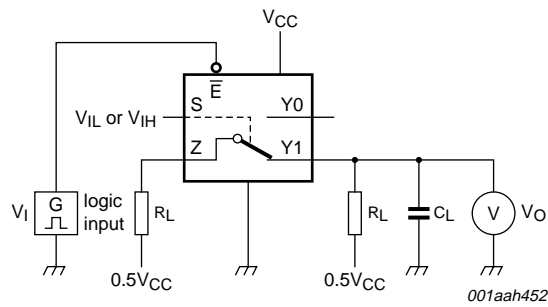
Adjust  $f_i$  voltage to obtain 0 dBm level at output. Increase  $f_i$  frequency until dB meter reads -3 dB.

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

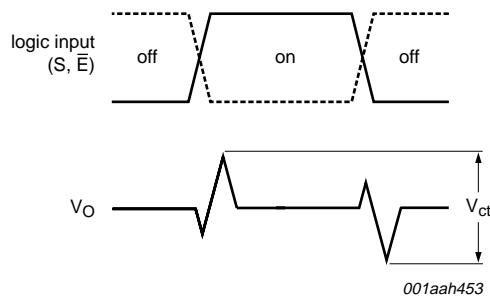


Adjust  $f_i$  voltage to obtain 0 dBm level at input.

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



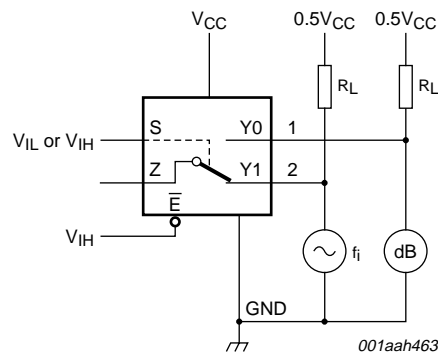
a. Test circuit



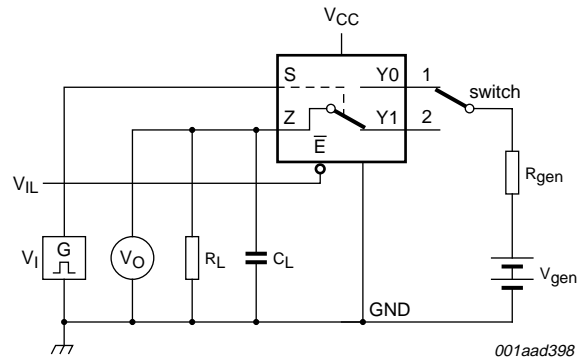
b. Input and output pulse definitions

$V_I$  may be connected to S or  $\bar{E}$ .

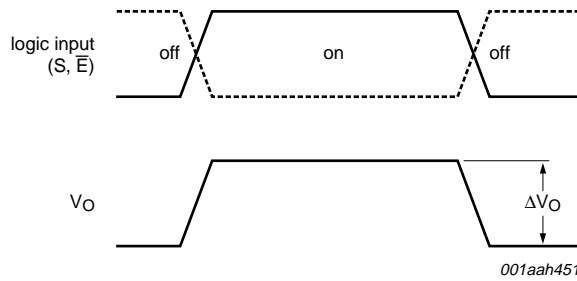
**Fig 20. Test circuit for measuring crosstalk voltage between digital inputs and switch**



**Fig 21. Test circuit for measuring crosstalk**



a. Test circuit



b. Input and output pulse definitions

- $Q_{inj} = \Delta V_O \times C_L$ .
- $\Delta V_O$  = output voltage variation.
- $R_{gen}$  = generator resistance.
- $V_{gen}$  = generator voltage.
- $V_I$  may be connected to S or  $\bar{E}$ .

**Fig 22. Test circuit for measuring charge injection**

13. Package outline

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

SOT833-1

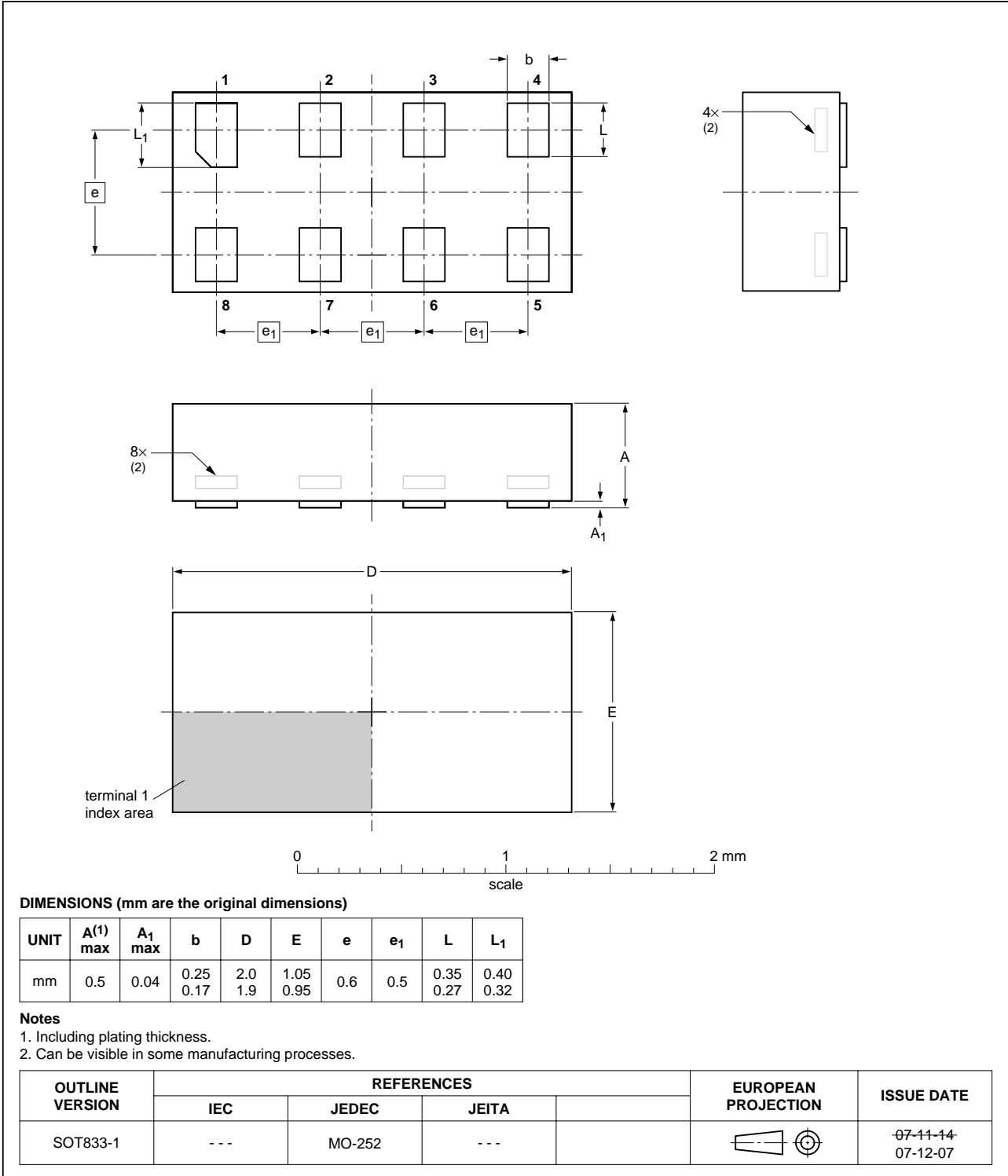


Fig 23. Package outline SOT833-1 (XSON8)



XQFN8U: plastic extremely thin quad flat package; no leads; 8 terminals; UTLP based; body 1.6 x 1.6 x 0.5 mm

SOT902-1

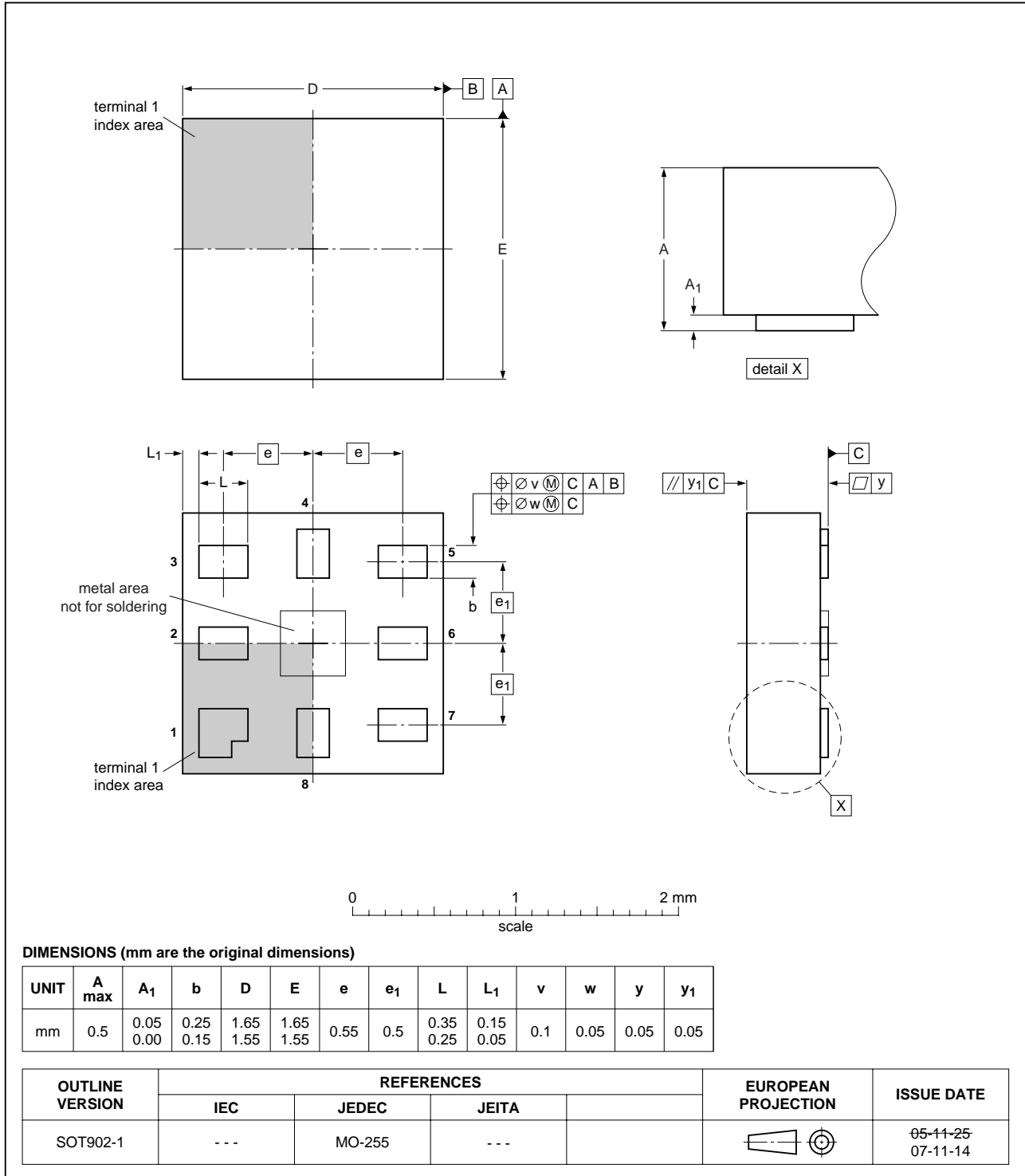


Fig 24. Package outline SOT902-1 (XQFN8U)

## 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
TTL	Transistor-Transistor Logic

## 15. Revision history

Table 14. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
NX3L1G53_2	20080718	Product data sheet	-	NX3L1G53_1
Modifications:	<a href="#">Figure 20</a> : corrected drawing 001aah453			
NX3L1G53_1	20080408	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>.

### 16.2 Definitions

**Draft** — The document is a draft version only. The content is still under internal review and subject to formal approval, which may result in modifications or additions. NXP Semiconductors does not give any representations or warranties as to the accuracy or completeness of information included herein and shall have no liability for the consequences of use of such information.

**Short data sheet** — A short data sheet is an extract from a full data sheet with the same product type number(s) and title. A short data sheet is intended for quick reference only and should not be relied upon to contain detailed and full information. For detailed and full information see the relevant full data sheet, which is available on request via the local NXP Semiconductors sales office. In case of any inconsistency or conflict with the short data sheet, the full data sheet shall prevail.

### 16.3 Disclaimers

**General** — Information in this document is believed to be accurate and reliable. However, NXP Semiconductors does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information.

**Right to make changes** — NXP Semiconductors reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

**Suitability for use** — NXP Semiconductors products are not designed, authorized or warranted to be suitable for use in medical, military, aircraft, space or life support equipment, nor in applications where failure or malfunction of an NXP Semiconductors product can reasonably be expected to result in personal injury, death or severe property or environmental

damage. NXP Semiconductors accepts no liability for inclusion and/or use of NXP Semiconductors products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

**Applications** — Applications that are described herein for any of these products are for illustrative purposes only. NXP Semiconductors makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

**Limiting values** — Stress above one or more limiting values (as defined in the Absolute Maximum Ratings System of IEC 60134) may cause permanent damage to the device. Limiting values are stress ratings only and operation of the device at these or any other conditions above those given in the Characteristics sections of this document is not implied. Exposure to limiting values for extended periods may affect device reliability.

**Terms and conditions of sale** — NXP Semiconductors products are sold subject to the general terms and conditions of commercial sale, as published at <http://www.nxp.com/profile/terms>, including those pertaining to warranty, intellectual property rights infringement and limitation of liability, unless explicitly otherwise agreed to in writing by NXP Semiconductors. In case of any inconsistency or conflict between information in this document and such terms and conditions, the latter will prevail.

**No offer to sell or license** — Nothing in this document may be interpreted or construed as an offer to sell products that is open for acceptance or the grant, conveyance or implication of any license under any copyrights, patents or other industrial or intellectual property rights.

**Quick reference data** — The Quick reference data is an extract of the product data given in the Limiting values and Characteristics sections of this document, and as such is not complete, exhaustive or legally binding.

### 16.4 Trademarks

Notice: All referenced brands, product names, service names and trademarks are the property of their respective owners.

## 17. Contact information

For more information, please visit: <http://www.nxp.com>

For sales office addresses, please send an email to: [salesaddresses@nxp.com](mailto:salesaddresses@nxp.com)

**18. Contents**

**1 General description . . . . . 1**

**2 Features . . . . . 1**

**3 Applications . . . . . 1**

**4 Ordering information . . . . . 2**

**5 Marking . . . . . 2**

**6 Functional diagram . . . . . 2**

**7 Pinning information . . . . . 3**

7.1 Pinning . . . . . 3

7.2 Pin description . . . . . 3

**8 Functional description . . . . . 3**

**9 Limiting values . . . . . 4**

**10 Recommended operating conditions . . . . . 4**

**11 Static characteristics . . . . . 5**

11.1 Test circuits . . . . . 5

11.2 ON resistance . . . . . 6

11.3 ON resistance test circuit and waveforms . . . . . 7

**12 Dynamic characteristics . . . . . 9**

12.1 Waveform and test circuits . . . . . 10

12.2 Additional dynamic characteristics . . . . . 12

12.3 Test circuits . . . . . 13

**13 Package outline . . . . . 16**

**14 Abbreviations . . . . . 18**

**15 Revision history . . . . . 18**

**16 Legal information . . . . . 19**

16.1 Data sheet status . . . . . 19

16.2 Definitions . . . . . 19

16.3 Disclaimers . . . . . 19

16.4 Trademarks . . . . . 19

**17 Contact information . . . . . 19**

**18 Contents . . . . . 20**

Please be aware that important notices concerning this document and the product(s) described herein, have been included in section 'Legal information'.



© NXP B.V. 2008.

All rights reserved.

For more information, please visit: <http://www.nxp.com>

For sales office addresses, please send an email to: [salesaddresses@nxp.com](mailto:salesaddresses@nxp.com)

Date of release: 18 July 2008

Document identifier: NX3L1G53\_2