

# NX3L1T53

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

Rev. 8 — 23 January 2013

Product data sheet

### 1. General description

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The NX3L1T53 is a low-ohmic single-pole double-throw analog switch suitable for use as an analog or digital 2:1 multiplexer/demultiplexer. It has a digital select input (S), two independent inputs/outputs (Y0 and Y1), 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 digital inputs makes the circuit tolerant to slower input rise and fall times. Low threshold digital inputs allows this device to be driven by 1.8 V logic levels in 3.3 V applications without significant increase in supply current  $I_{CC}$ . This makes it possible for the NX3L1T53 to switch 4.3 V signals with a 1.8 V digital controller, eliminating the need for logic level translation. The NX3L1T53 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 and benefits

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- Wide supply voltage range from 1.4 V to 4.3 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
  - ◆ 0.50  $\Omega$  (typical) at  $V_{CC} = 4.3$  V
- Break-before-make switching
- High noise immunity
- ESD protection:
  - ◆ HBM JESD22-A114F Class 3A exceeds 7500 V
  - ◆ MM JESD22-A115-A exceeds 200 V
  - ◆ CDM AEC-Q100-011 revision B exceeds 1000 V
  - ◆ IEC61000-4-2 contact discharge exceeds 8000 V for switch ports
- CMOS low-power consumption
- Latch-up performance exceeds 100 mA per JESD 78 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
NX3L1T53GT	-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
NX3L1T53GD	-40 °C to +125 °C	XSON8	plastic extremely thin small outline package; no leads; 8 terminals; body 3 × 2 × 0.5 mm	SOT996-2
NX3L1T53GM	-40 °C to +125 °C	XQFN8	plastic, extremely thin quad flat package; no leads; 8 terminals; body 1.6 × 1.6 × 0.5 mm	SOT902-2

### 5. Marking

Table 2. Marking codes<sup>[1]</sup>

Type number	Marking code
NX3L1T53GT	M53
NX3L1T53GD	M53
NX3L1T53GM	M53

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

## 6. Functional diagram

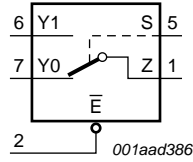


Fig 1. Logic symbol

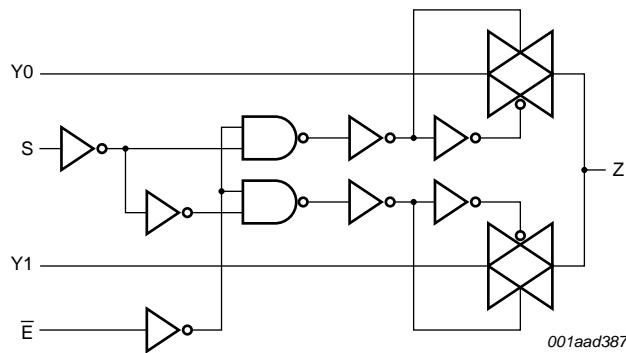


Fig 2. Logic diagram

## 7. Pinning information

### 7.1 Pinning

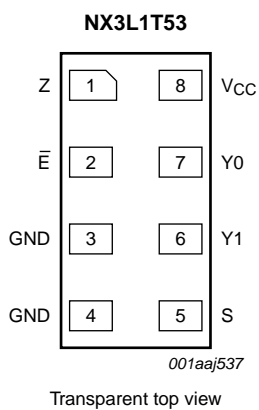


Fig 3. Pin configuration SOT833-1 (XSON8)

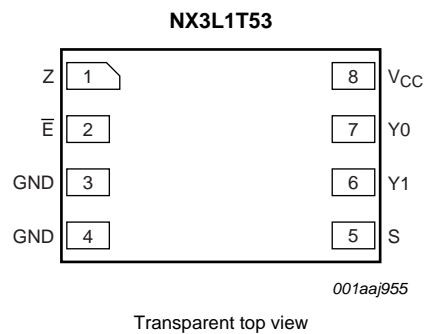
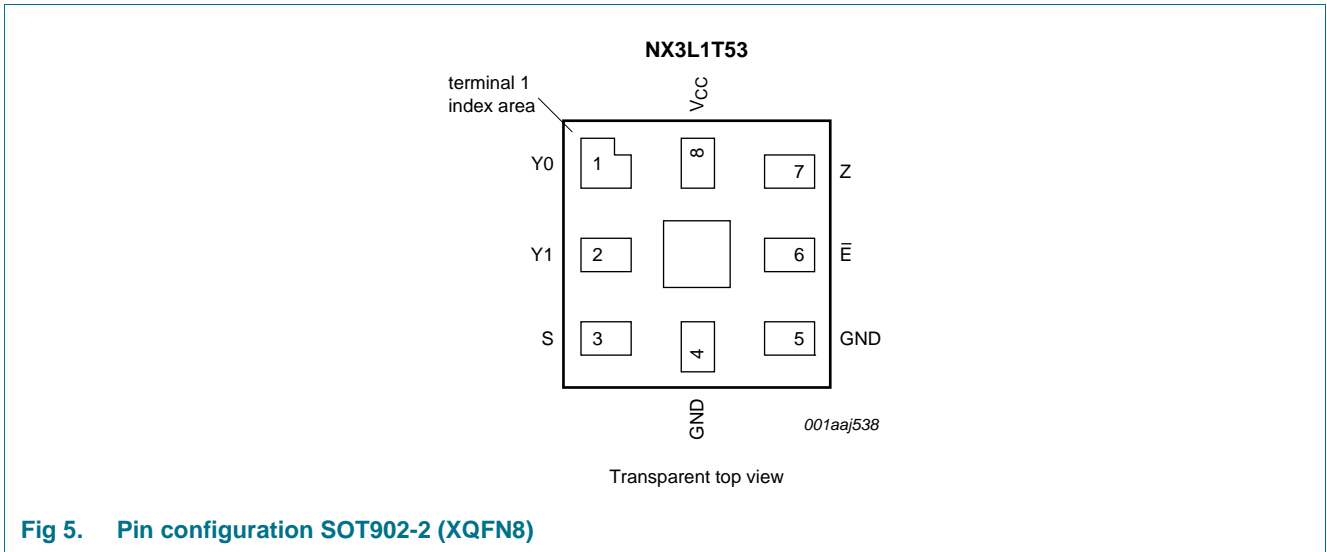


Fig 4. Pin configuration SOT996-2 (XSON8)



## 7.2 Pin description

**Table 3. Pin description**

Symbol	Pin		Description
	SOT833-1 and SOT996-2	SOT902-2	
Z	1	7	common output or input
Ē	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 on
S	Ē	
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 but may not exceed 4.6 V.

[3] For XSON8 and XQFN8 packages: above 118 °C the value of  $P_{tot}$  derates linearly with 7.8 mW/K.

## 10. Recommended operating conditions

**Table 6. Recommended operating conditions**

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

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

[2] Applies to control signal levels.

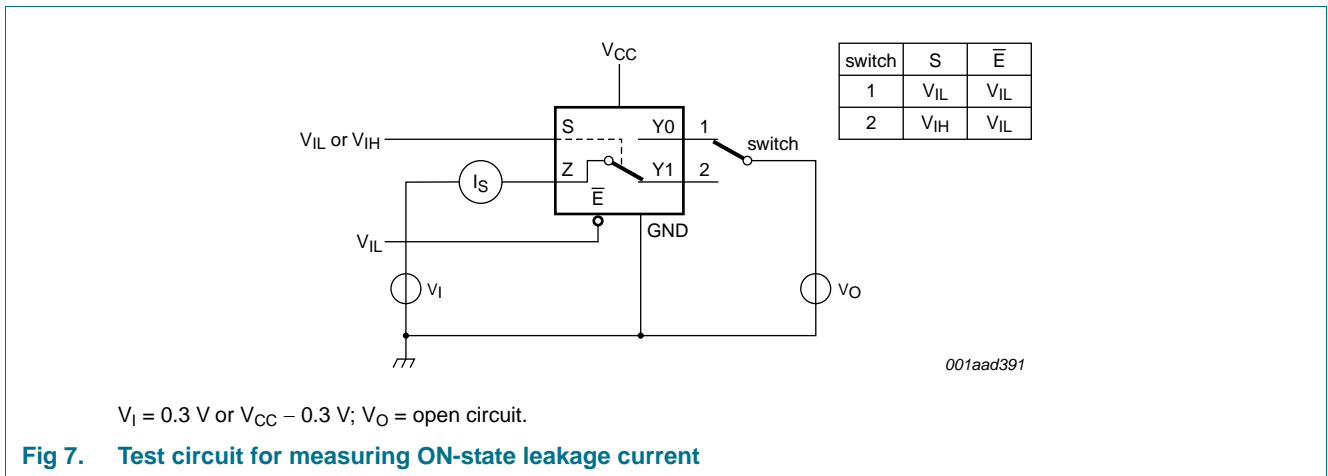
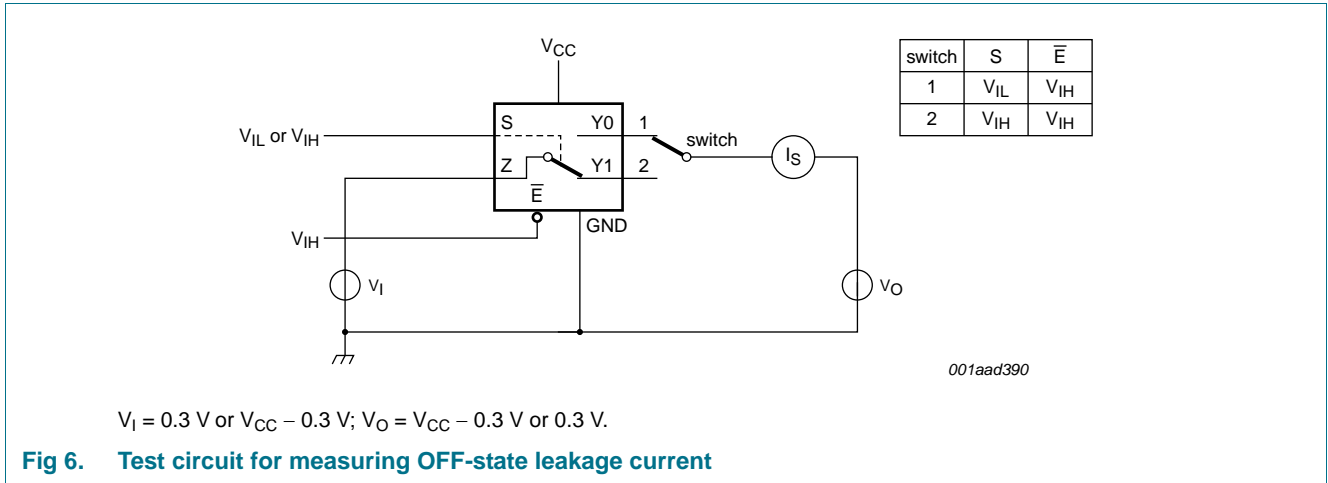
## 11. Static characteristics

**Table 7. Static characteristics**

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

Symbol	Parameter	Conditions	T <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 S and enable input $\bar{E}$ ; V <sub>I</sub> = GND to 4.3 V; V <sub>CC</sub> = 1.4 V to 4.3 V	-	-	-	-	±0.5	±1	µA
I <sub>S(OFF)</sub>	OFF-state leakage current	Y0 and Y1 port; 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	Z port; 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; V <sub>SW</sub> = GND or V <sub>CC</sub>							
		V <sub>CC</sub> = 3.6 V	-	-	100	-	690	6000	nA
		V <sub>CC</sub> = 4.3 V	-	-	150	-	800	7000	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
C <sub>I</sub>	input capacitance	V <sub>I</sub> = 1.8 V; V <sub>CC</sub> = 2.5 V	-	50	200	-	300	500	nA
			-	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**

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

Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to +125 °C		Unit
			Min	Typ <sup>[1]</sup>	Max	Min	Max	
$R_{ON(peak)}$	ON resistance (peak)	$V_I = \text{GND to }V_{CC};$ $I_{SW} = 100\text{ mA};$ see <a href="#">Figure 8</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	$\Omega$
		$V_{CC} = 4.3\text{ V}$	-	0.5	0.75	-	0.9	$\Omega$

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

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

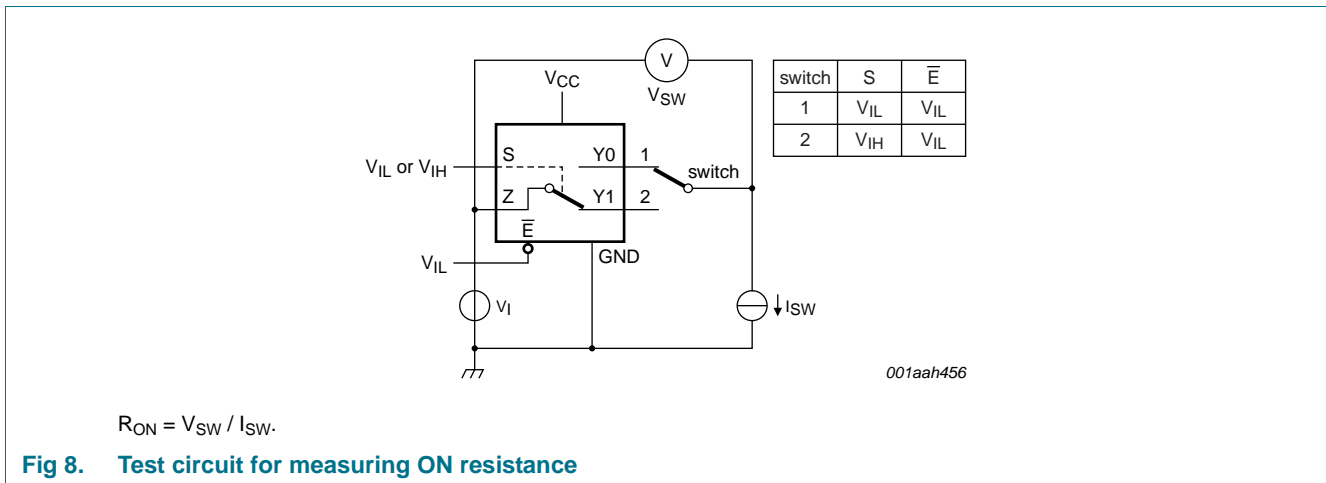
Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to +125 °C		Unit	
			Min	Typ <sup>[1]</sup>	Max	Min	Max		
$\Delta R_{ON}$	ON resistance mismatch between channels	$V_I = \text{GND to } V_{CC};$ $I_{SW} = 100 \text{ mA}$ <sup>[2]</sup>	$V_{CC} = 1.4 \text{ V}$	-	0.04	0.3	-	0.3	$\Omega$
			$V_{CC} = 1.65 \text{ V}$	-	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	$\Omega$
			$V_{CC} = 4.3 \text{ V}$	-	0.02	0.075	-	0.1	$\Omega$
			$R_{ON(\text{flat})}$	ON resistance (flatness)	$V_I = \text{GND to } V_{CC};$ $I_{SW} = 100 \text{ mA}$ <sup>[3]</sup>	$V_{CC} = 1.4 \text{ V}$	-	1.0	3.3
$V_{CC} = 1.65 \text{ V}$	-	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	$\Omega$	
$V_{CC} = 4.3 \text{ V}$	-	0.2	0.4			-	0.45	$\Omega$	

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

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

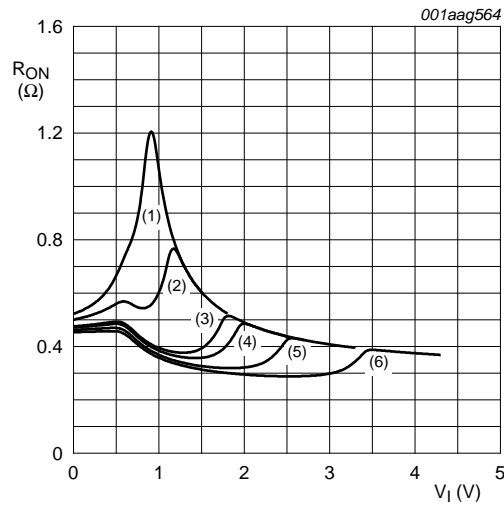
[3] Flatness is defined as the difference between the maximum and minimum value of ON resistance measured at identical  $V_{CC}$  and temperature.

### 11.3 ON resistance test circuit and waveforms



**Fig 8. Test circuit for measuring ON resistance**

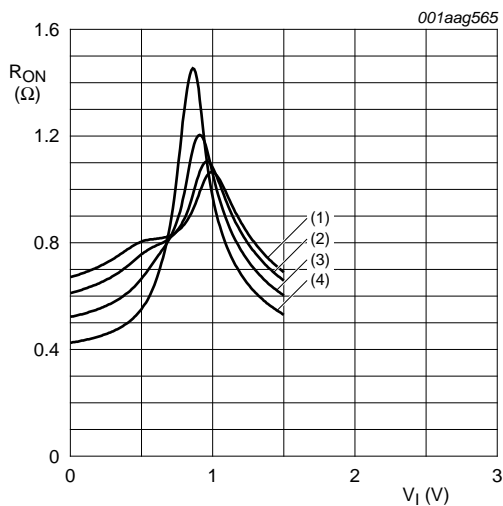




- (1)  $V_{CC} = 1.5\text{ V}$ .
- (2)  $V_{CC} = 1.8\text{ V}$ .
- (3)  $V_{CC} = 2.5\text{ V}$ .
- (4)  $V_{CC} = 2.7\text{ V}$ .
- (5)  $V_{CC} = 3.3\text{ V}$ .
- (6)  $V_{CC} = 4.3\text{ V}$ .

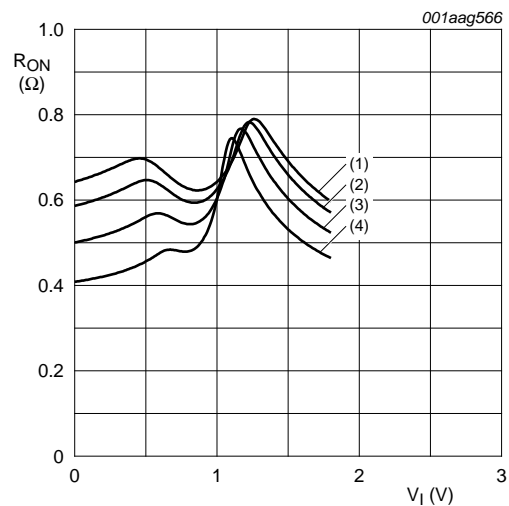
Measured at  $T_{amb} = 25\text{ }^{\circ}\text{C}$ .

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



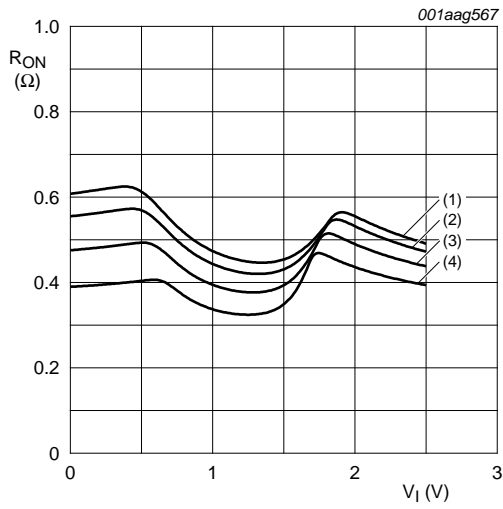
- (1)  $T_{amb} = 125\text{ }^{\circ}\text{C}$ .
- (2)  $T_{amb} = 85\text{ }^{\circ}\text{C}$ .
- (3)  $T_{amb} = 25\text{ }^{\circ}\text{C}$ .
- (4)  $T_{amb} = -40\text{ }^{\circ}\text{C}$ .

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



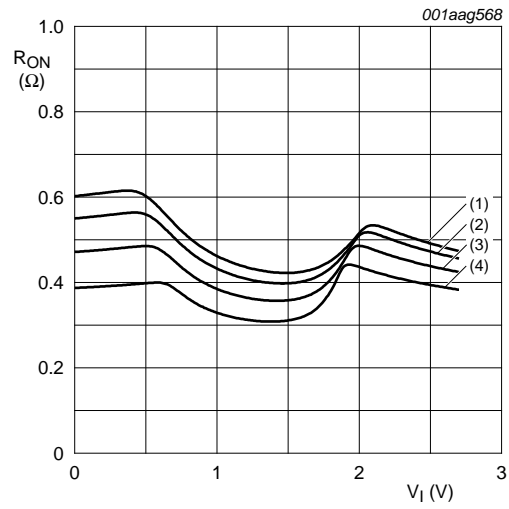
- (1)  $T_{amb} = 125\text{ }^{\circ}\text{C}$ .
- (2)  $T_{amb} = 85\text{ }^{\circ}\text{C}$ .
- (3)  $T_{amb} = 25\text{ }^{\circ}\text{C}$ .
- (4)  $T_{amb} = -40\text{ }^{\circ}\text{C}$ .

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



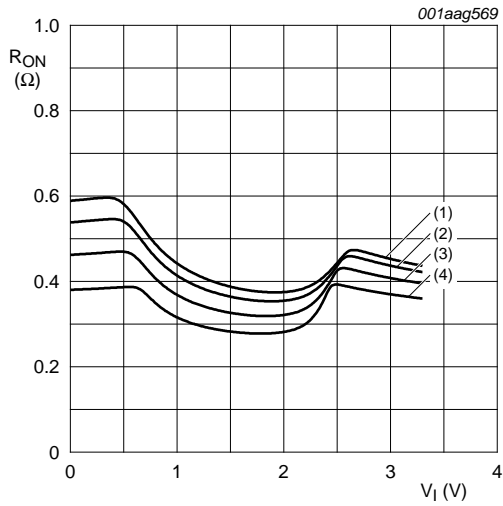
- (1)  $T_{amb} = 125\text{ }^{\circ}\text{C}.$
- (2)  $T_{amb} = 85\text{ }^{\circ}\text{C}.$
- (3)  $T_{amb} = 25\text{ }^{\circ}\text{C}.$
- (4)  $T_{amb} = -40\text{ }^{\circ}\text{C}.$

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



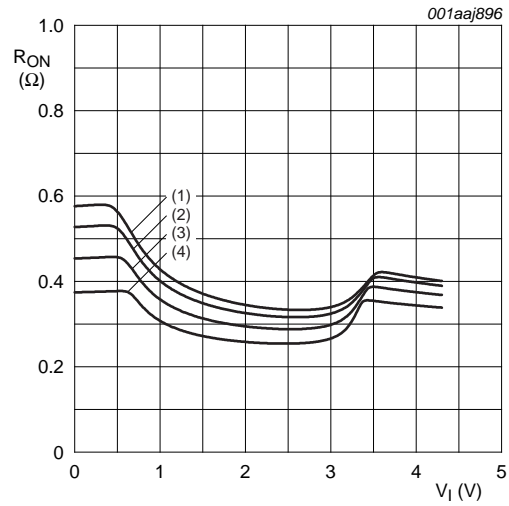
- (1)  $T_{amb} = 125\text{ }^{\circ}\text{C}.$
- (2)  $T_{amb} = 85\text{ }^{\circ}\text{C}.$
- (3)  $T_{amb} = 25\text{ }^{\circ}\text{C}.$
- (4)  $T_{amb} = -40\text{ }^{\circ}\text{C}.$

**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 <sub>en</sub>	enable time	S or $\bar{E}$ to Z or Yn; see <a href="#">Figure 16</a>							
		V <sub>CC</sub> = 1.4 V to 1.6 V	-	50	90	-	120	120	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	-	36	70	-	80	90	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	24	45	-	50	55	ns
		V <sub>CC</sub> = 2.7 V to 3.6 V	-	22	40	-	45	50	ns
		V <sub>CC</sub> = 3.6 V to 4.3 V	-	22	40	-	45	50	ns
t <sub>dis</sub>	disable time	S or $\bar{E}$ to Z or Yn; see <a href="#">Figure 16</a>							
		V <sub>CC</sub> = 1.4 V to 1.6 V	-	32	70	-	80	90	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	-	20	55	-	60	65	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	12	25	-	30	35	ns
		V <sub>CC</sub> = 2.7 V to 3.6 V	-	10	20	-	25	30	ns
		V <sub>CC</sub> = 3.6 V to 4.3 V	-	10	20	-	25	30	ns
t <sub>b-m</sub>	break-before-make time	see <a href="#">Figure 17</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	-	4	-	-	ns
		V <sub>CC</sub> = 2.7 V to 3.6 V	-	10	-	3	-	-	ns
		V <sub>CC</sub> = 3.6 V to 4.3 V	-	10	-	2	-	-	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, 3.3 V and 4.3 V respectively.

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

12.1 Waveform and test circuits

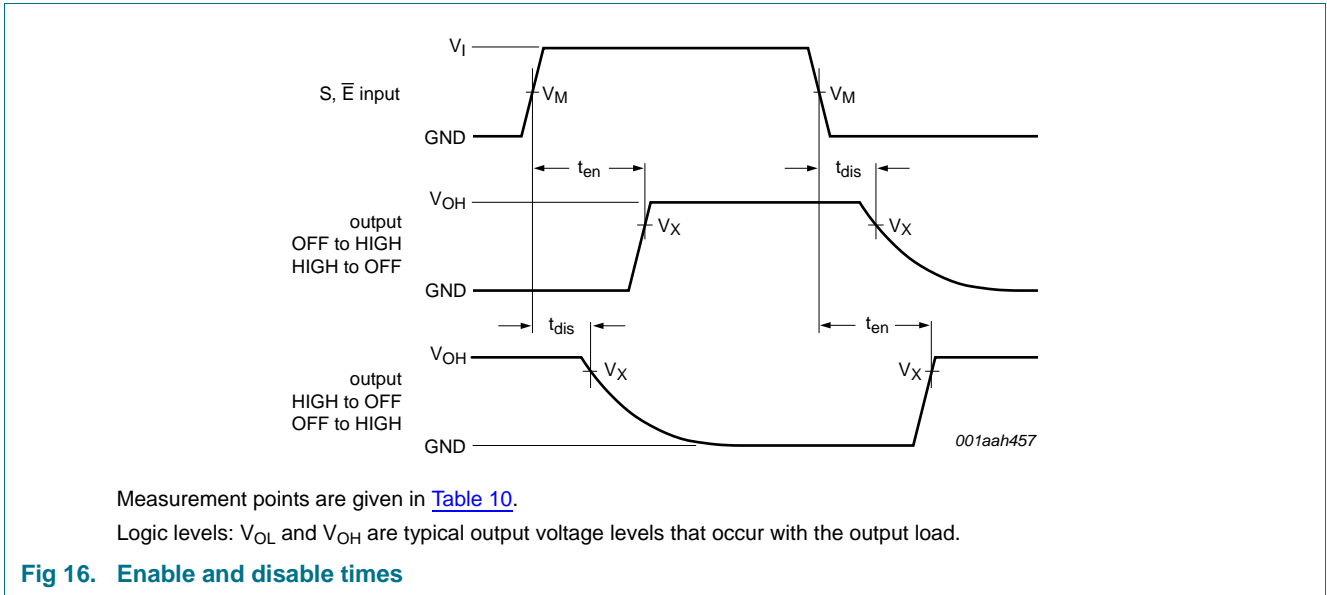
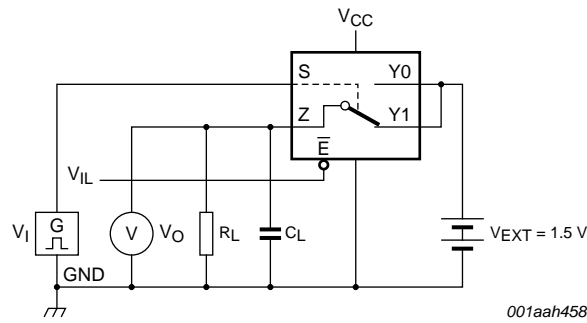
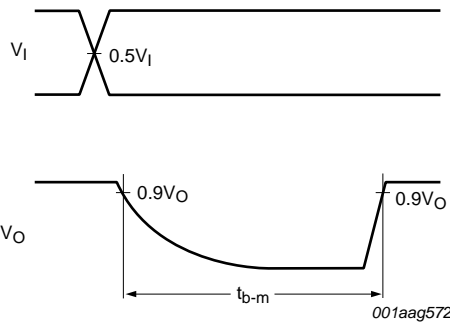


Table 10. Measurement points

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

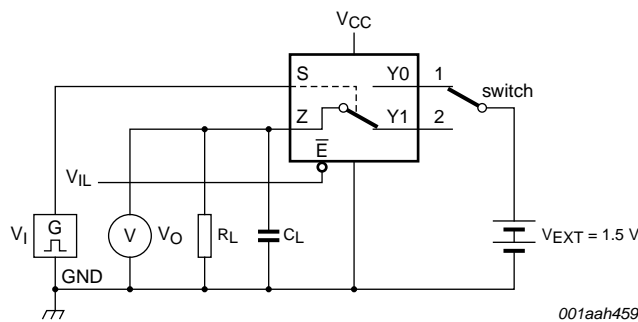


a. Test circuit



b. Input and output measurement points

**Fig 17. 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 18. Test circuit for measuring 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 4.3 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 19</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)	-	0.02	-	%
		V <sub>CC</sub> = 2.7 V; V <sub>I</sub> = 2 V (p-p)	-	0.02	-	%
		V <sub>CC</sub> = 4.3 V; V <sub>I</sub> = 2 V (p-p)	-	0.02	-	%
f <sub>(-3dB)</sub>	-3 dB frequency response	R <sub>L</sub> = 50 Ω; see <a href="#">Figure 20</a>	[1]			
		V <sub>CC</sub> = 1.4 V to 4.3 V	-	60	-	MHz
α <sub>iso</sub>	isolation (OFF-state)	f <sub>i</sub> = 100 kHz; R <sub>L</sub> = 50 Ω; see <a href="#">Figure 21</a>	[1]			
		V <sub>CC</sub> = 1.4 V to 4.3 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 22</a>				
		V <sub>CC</sub> = 1.4 V to 3.6 V	-	0.2	-	V
		V <sub>CC</sub> = 3.6 V to 4.3 V	-	0.3	-	V
Xtalk	crosstalk	between switches; f <sub>i</sub> = 100 kHz; R <sub>L</sub> = 50 Ω; see <a href="#">Figure 23</a>	[1]			
		V <sub>CC</sub> = 1.4 V to 4.3 V	-	-90	-	dB
Q <sub>inj</sub>	charge injection	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 24</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
		V <sub>CC</sub> = 4.3 V	-	15	-	pC

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

12.3 Test circuits

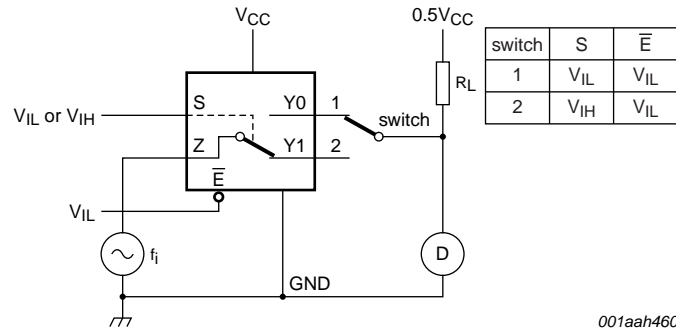
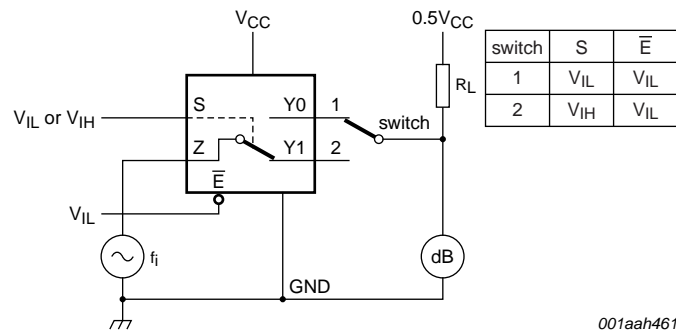
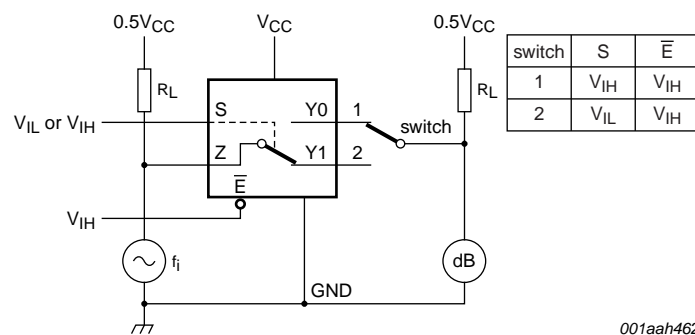


Fig 19. Test circuit for measuring total harmonic distortion



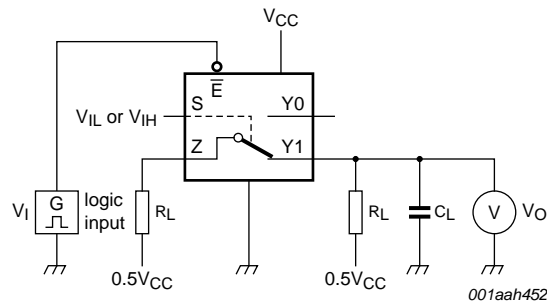
Adjust  $f_i$  voltage to obtain 0 dBm level at output. Increase  $f_i$  frequency until dB meter reads -3 dB.

Fig 20. Test circuit for measuring the frequency response when switch is in ON-state

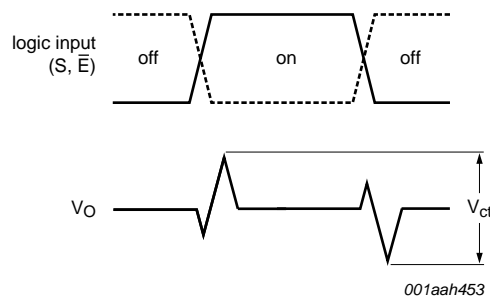


Adjust  $f_i$  voltage to obtain 0 dBm level at input.

Fig 21. Test circuit for measuring isolation (OFF-state)



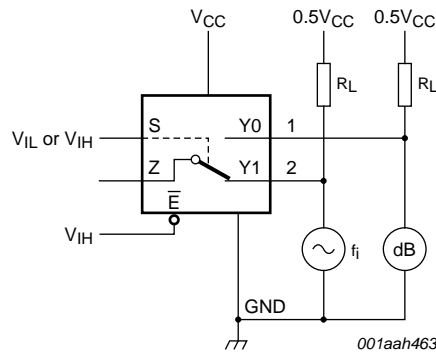
a. Test circuit



b. Input and output pulse definitions

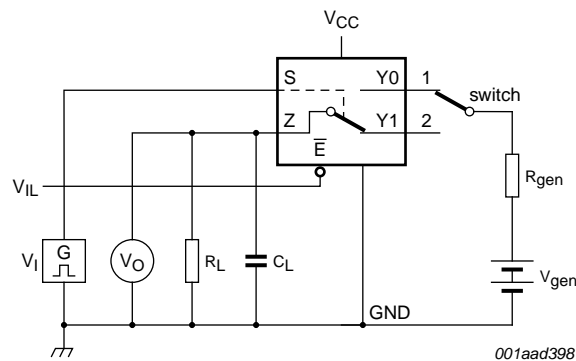
$V_1$  may be connected to S or  $\bar{E}$ .

**Fig 22. Test circuit for measuring crosstalk voltage between digital inputs and switch**

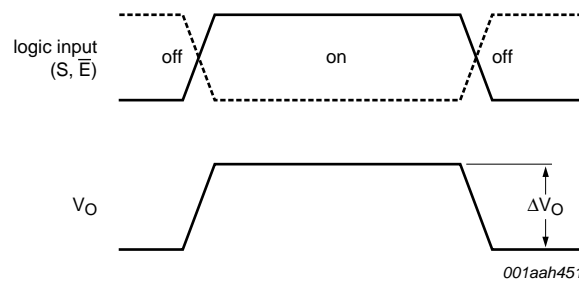


**Fig 23. Test circuit for measuring crosstalk**





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.

$V_1$  may be connected to S or  $\bar{E}$ .

**Fig 24. 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

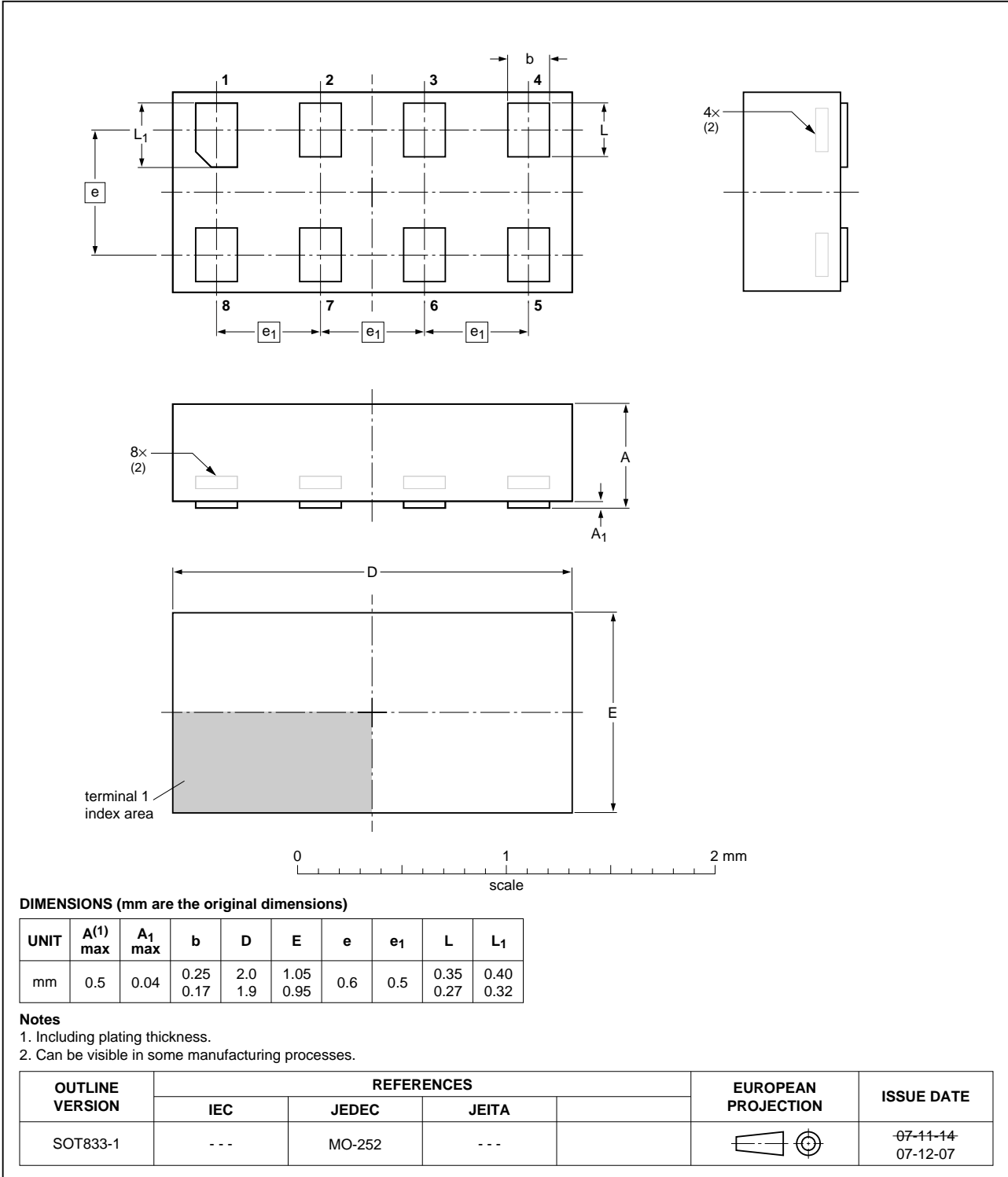


Fig 25. Package outline SOT833-1 (XSON8)

XSON8: plastic extremely thin small outline package; no leads;  
8 terminals; body 3 x 2 x 0.5 mm

SOT996-2

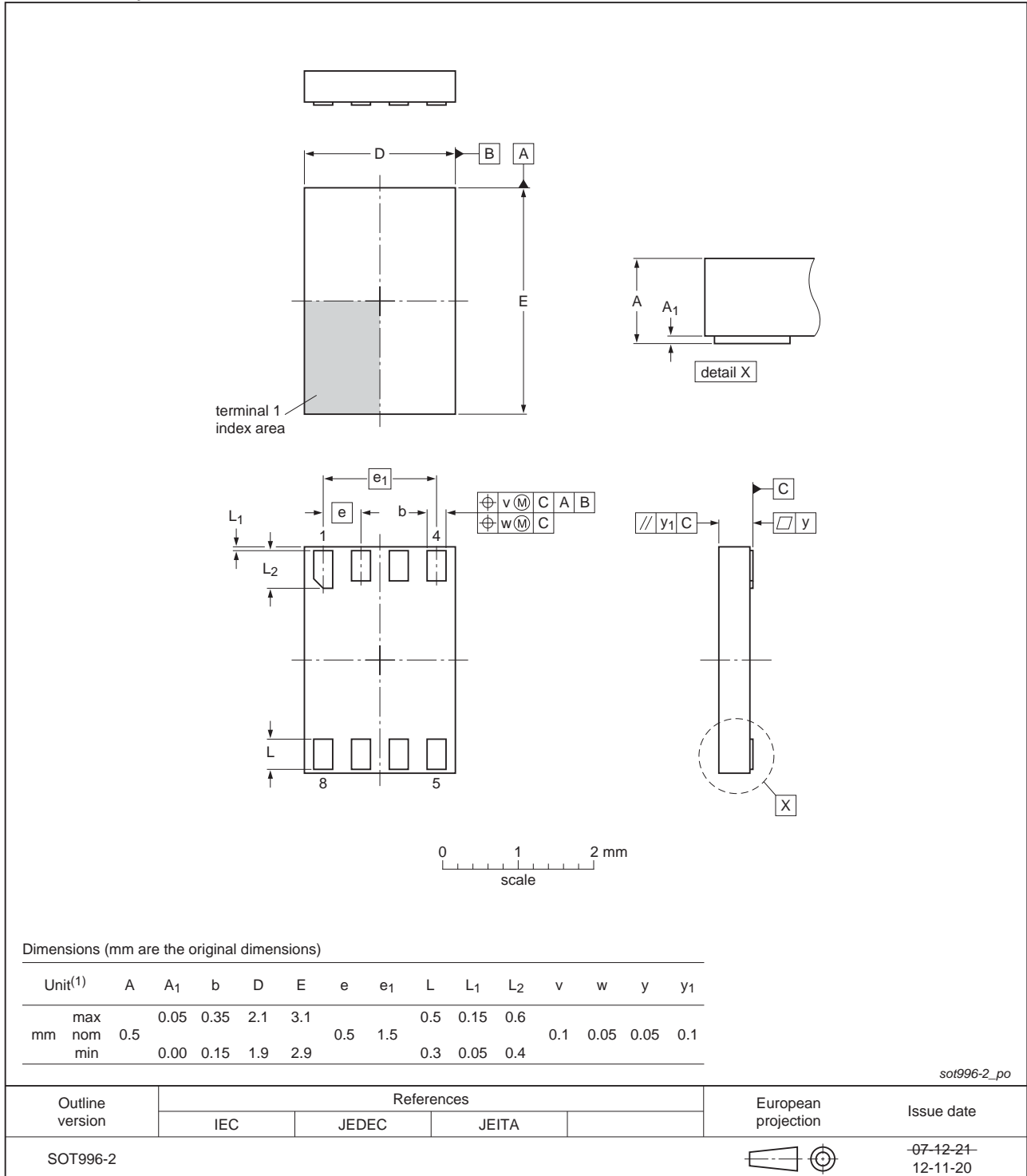


Fig 26. Package outline SOT996-2 (XSON8)

XQFN8: plastic, extremely thin quad flat package; no leads;  
8 terminals; body 1.6 x 1.6 x 0.5 mm

SOT902-2

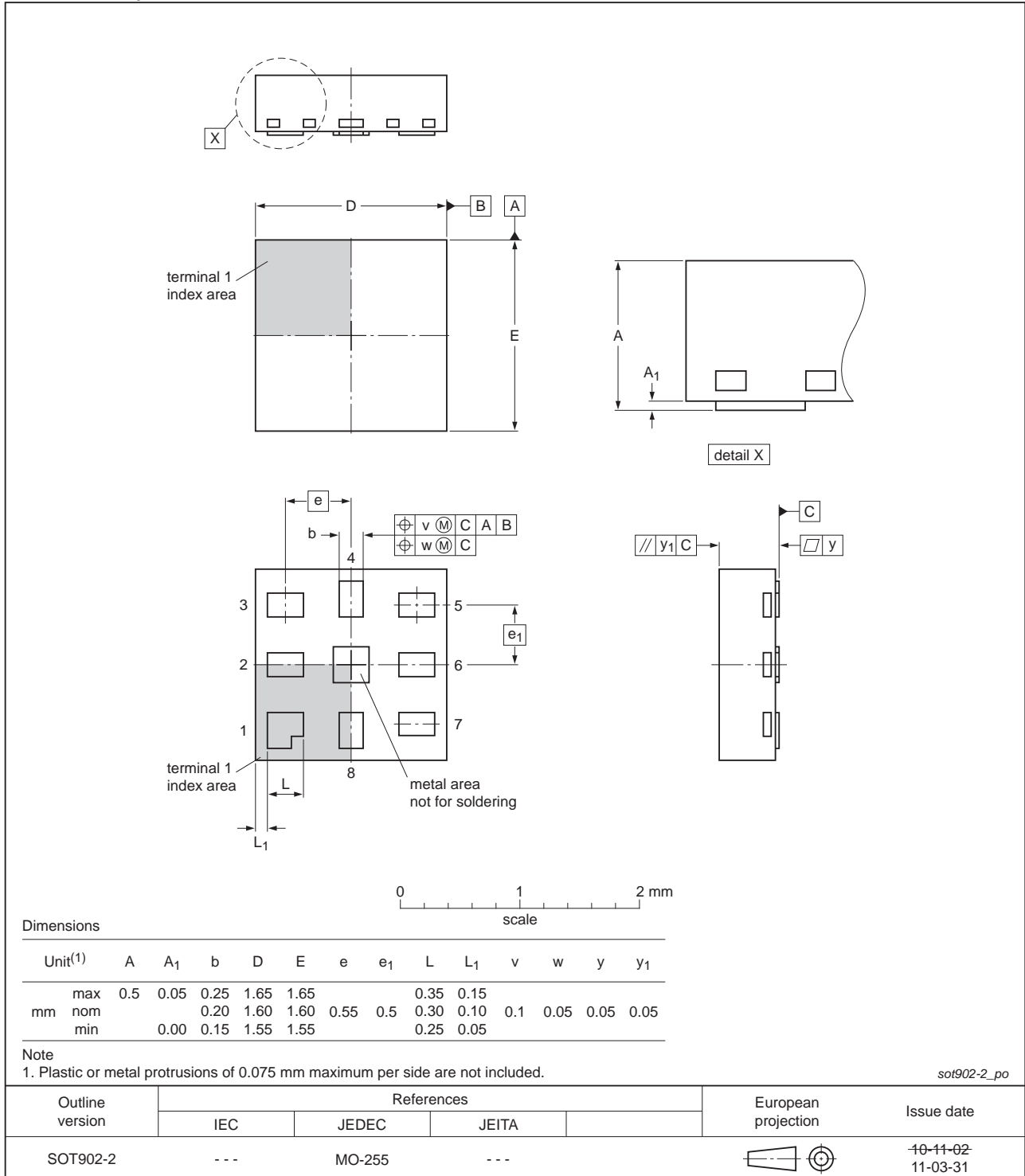


Fig 27. Package outline SOT902-2 (XQFN8)

## 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

## 15. Revision history

Table 14. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
NX3L1T53 v.8	20130123	Product data sheet	-	NX3L1T53 v.7
Modifications:	<ul style="list-style-type: none"> <li>For type number NX3L1T53GD XSON8U has changed to XSON8.</li> </ul>			
NX3L1T53 v.7	20120613	Product data sheet	-	NX3L1T53 v.6
NX3L1T53 v.6	20111108	Product data sheet	-	NX3L1T53 v.5
NX3L1T53 v.5	20110801	Product data sheet	-	NX3L1T53 v.4
NX3L1T53 v.4	20100324	Product data sheet	-	NX3L1T53 v.3
NX3L1T53 v.3	20100201	Product data sheet	-	NX3L1T53 v.2
NX3L1T53 v.2	20090414	Product data sheet	-	NX3L1T53 v.1
NX3L1T53 v.1	20090217	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".

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