Dual low-ohmic single-pole single-throw analog switchRev. 8 — 7 February 2013Product data sheet

1. General description

The NX3L2G66 is a dual low-ohmic single-pole single-throw analog switch. Each switch has two input/output terminals (nY and nZ) and an active HIGH enable input (nE). When pin nE is LOW, the analog switch is turned off.

Schmitt trigger action at the enable input (nE) makes the circuit tolerant to slower input rise and fall times. The NX3L2G66 allows signals with amplitude up to V_{CC} to be transmitted from nY to nZ; or from nZ to nY. Its low ON resistance (0.5 Ω) and flatness (0.13 Ω) ensures minimal attenuation and distortion of transmitted signals.

2. Features and benefits

- Wide supply voltage range from 1.4 V to 4.3 V
- Very low ON resistance (peak):
 - 1.6 Ω (typical) at V_{CC} = 1.4 V
 - 1.0 Ω (typical) at V_{CC} = 1.65 V
 - 0.55 Ω (typical) at V_{CC} = 2.3 V
 - 0.50 Ω (typical) at V_{CC} = 2.7 V
 - 0.50 Ω (typical) at V_{CC} = 4.3 V
- 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 4000 V for switch ports
- 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. Orderi	Table 1. Ordering information							
Type number	Package							
	Temperature range	Name	Description	Version				
NX3L2G66GT	–40 °C to +125 °C	XSON8	plastic extremely thin small outline package; no leads; 8 terminals; body 1 \times 1.95 \times 0.5 mm	SOT833-1				
NX3L2G66GD	–40 °C to +125 °C	XSON8	plastic extremely thin small outline package; no leads; 8 terminals; body $3 \times 2 \times 0.5$ mm	SOT996-2				
NX3L2G66GM	–40 °C to +125 °C	XQFN8	plastic, extremely thin quad flat package; no leads; 8 terminals; body $1.6 \times 1.6 \times 0.5$ mm	SOT902-2				

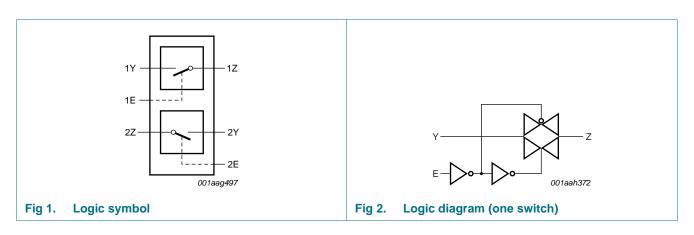
5. Marking

Table 2.Marking codes

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Type number	Marking code
NX3L2G66GT	D66
NX3L2G66GD	D66
NX3L2G66GM	D66

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

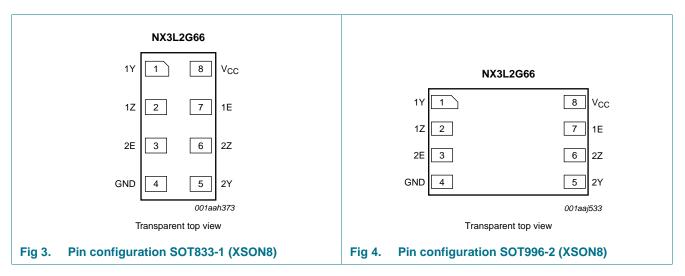
6. Functional diagram

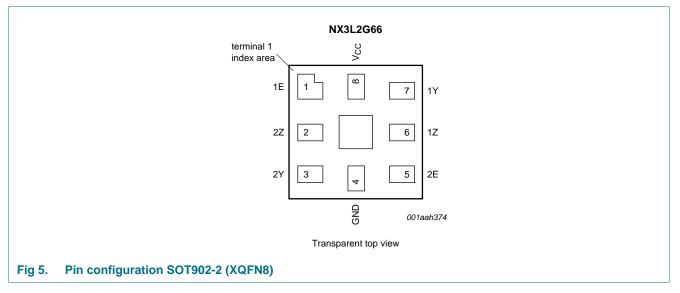


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7. Pinning information

7.1 Pinning





7.2 Pin description

Table 3. Pin description							
Symbol	Symbol Pin		Description				
	SOT833-1 and SOT996-2	SOT902-2					
1Y, 2Y	1, 5	7, 3	independent input or output				
1Z, 2Z	2, 6	6, 2	independent input or output				
GND	4	4	ground (0 V)				
1E, 2E	7, 3	1, 5	enable input (active HIGH)				
V _{CC}	8	8	supply voltage				

8. Functional description

Table 4. Function table^[1]

Input nE	Switch
L	OFF-state
Н	ON-state

[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
VI	input voltage	enable input nE	<u>[1]</u> –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	$V_{\rm I}$ < –0.5 V or $V_{\rm I}$ > $V_{\rm CC}$ + 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	$T_{amb} = -40 \text{ °C to } +125 \text{ °C}$	[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 Ptot derates linearly with 7.8 mW/K.

10. Recommended operating conditions

Table 6.	Recommended operating con	ditions					
Symbol	Parameter	Conditions		Min	Тур	Max	Unit
V _{CC}	supply voltage			1.4	-	4.3	V
VI	input voltage	enable input nE		0	-	4.3	V
V _{SW}	switch voltage		<u>[1]</u>	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 nZ when switch current flows in terminal nY, 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 nY. 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	Tar	_{nb} = 25	°C	T _{amb} = -	-40 °C to	+125 °C	Unit
			Min	Тур	Max	Min	Max (85 °C)	Max (125 °C)	
V _{IH}	HIGH-level	V _{CC} = 1.4 V to 1.95 V	$0.65V_{CC}$	-	-	$0.65V_{CC}$	-	-	V
	input voltage	V_{CC} = 2.3 V to 2.7 V	1.7	-	-	1.7	-	-	V
		$V_{CC} = 2.7 \text{ V} \text{ to } 3.6 \text{ V}$	2.0	-	-	2.0	-	-	V
		$V_{CC} = 3.6 \text{ V to } 4.3 \text{ V}$	$0.7V_{CC}$	-	-	$0.7V_{CC}$	-	-	V
V _{IL}	LOW-level	$V_{CC} = 1.4 \text{ V}$ to 1.95 V	-	-	$0.35V_{CC}$	-	$0.35V_{CC}$	$0.35V_{CC}$	V
	input voltage	V_{CC} = 2.3 V to 2.7 V	-	-	0.7	-	0.7	0.7	V
		V_{CC} = 2.7 V to 3.6 V	-	-	0.8	-	0.8	0.8	V
		V_{CC} = 3.6 V to 4.3 V	-	-	$0.3V_{CC}$	-	$0.3V_{CC}$	$0.3V_{CC}$	V
I	input leakage current	enable input nE; 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	nY port; see Figure 6							
	leakage current	V_{CC} = 1.4 V to 3.6 V	-	-	±5	-	±50	±500	nA
	current	V_{CC} = 3.6 V to 4.3 V	-	-	±10	-	±50	±500	nA
I _{S(ON)}	ON-state	nZ port; see Figure 7							
	leakage current	V_{CC} = 1.4 V to 3.6 V	-	-	±5	-	±50	±500	nA
	current	V_{CC} = 3.6 V to 4.3 V	-	-	±10	-	±50	±500	nA
I _{CC}	supply current	$V_I = V_{CC}$ or GND; $V_{SW} = GND$ or V_{CC}							
		V _{CC} = 3.6 V	-	-	100	-	690	6000	nA
		$V_{CC} = 4.3 V$	-	-	150	-	800	7000	nA

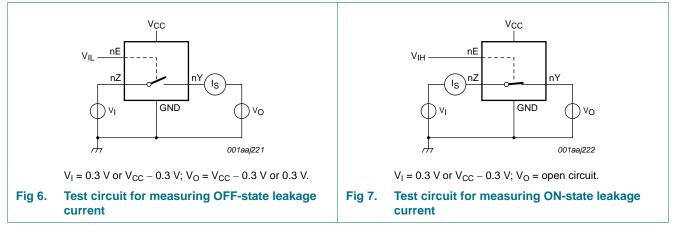
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Table 7. Static characteristics ...continued

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

Symbol	Parameter	Conditions	T	T _{amb} = 25 °C			T _{amb} = -40 °C to +125 °C			
			Min	Тур	Max	Min	Max (85 °C)	Max (125 °C)		
CI	input capacitance		-	1.0	-	-	-	-	pF	
$C_{\text{S(OFF)}}$	OFF-state capacitance		-	35	-	-	-	-	pF	
$C_{S(ON)}$	ON-state capacitance		-	110	-	-	-	-	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	T _{amb} :	T _{amb} = -40 °C to +85 °C			T _{amb} = −40 °C to +125 °C		
			Min	Typ <mark>[1]</mark>	Max	Min	Max		
R _{ON(peak)} ON resistance (peak)	$V_I = GND$ to V_{CC} ; $I_{SW} = 100 \text{ mA}$; see <u>Figure 8</u>								
		$V_{CC} = 1.4 V$	-	1.6	3.7	-	4.1	Ω	
		V _{CC} = 1.65 V	-	1.0	1.6	-	1.7	Ω	
		$V_{CC} = 2.3 V$	-	0.55	0.8	-	0.9	Ω	
		$V_{CC} = 2.7 V$	-	0.5	0.75	-	0.9	Ω	
		$V_{CC} = 4.3 V$	-	0.5	0.75	-	0.9	Ω	

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Symbol	Parameter	Conditions 1		T _{amb} = −40 °C to +85 °C			T _{amb} = -40 °C to +125 °C		
			Min	Typ <mark>[1]</mark>	Max	Min	Max	_	
ΔR_{ON} ON resistance mismatch between channels	$V_I = GND \text{ to } V_{CC};$ $I_{SW} = 100 \text{ mA}$	2]					·		
	$V_{CC} = 1.4 V$	-	0.04	0.3	-	0.3	Ω		
	V _{CC} = 1.65 V	-	0.04	0.2	-	0.3	Ω		
	$V_{CC} = 2.3 V$	-	0.02	0.08	-	0.1	Ω		
		$V_{CC} = 2.7 V$	-	0.02	0.075	-	0.1	Ω	
		$V_{CC} = 4.3 V$	-	0.02	0.075	-	0.1	Ω	
R _{ON(flat)}	ON resistance (flatness)	$V_I = GND \text{ to } V_{CC};$ $I_{SW} = 100 \text{ mA}$	<u>3]</u>						
		$V_{CC} = 1.4 V$	-	1.0	3.3	-	3.6	Ω	
		V _{CC} = 1.65 V	-	0.5	1.2	-	1.3	Ω	
		$V_{CC} = 2.3 V$	-	0.15	0.3	-	0.35	Ω	
		$V_{CC} = 2.7 V$	-	0.13	0.3	-	0.35	Ω	
		$V_{CC} = 4.3 V$	-	0.2	0.4	-	0.45	Ω	

Table 8. ON resistance ... continued

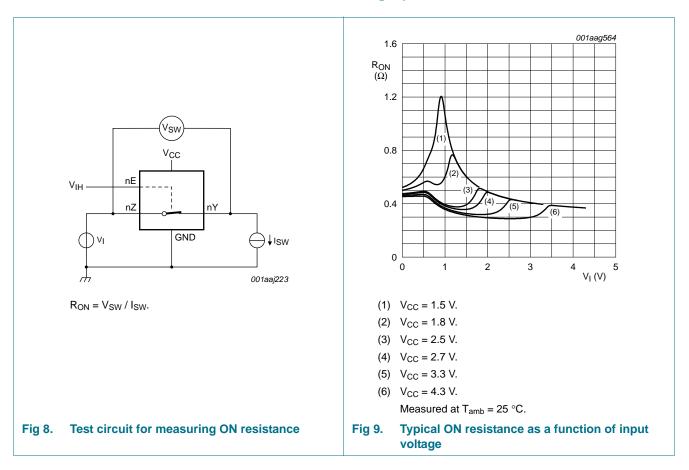
At recommended operating conditions: voltages are referenced to GND (ground = 0 V); for graphs see Figure 9 to Figure 15

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

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

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

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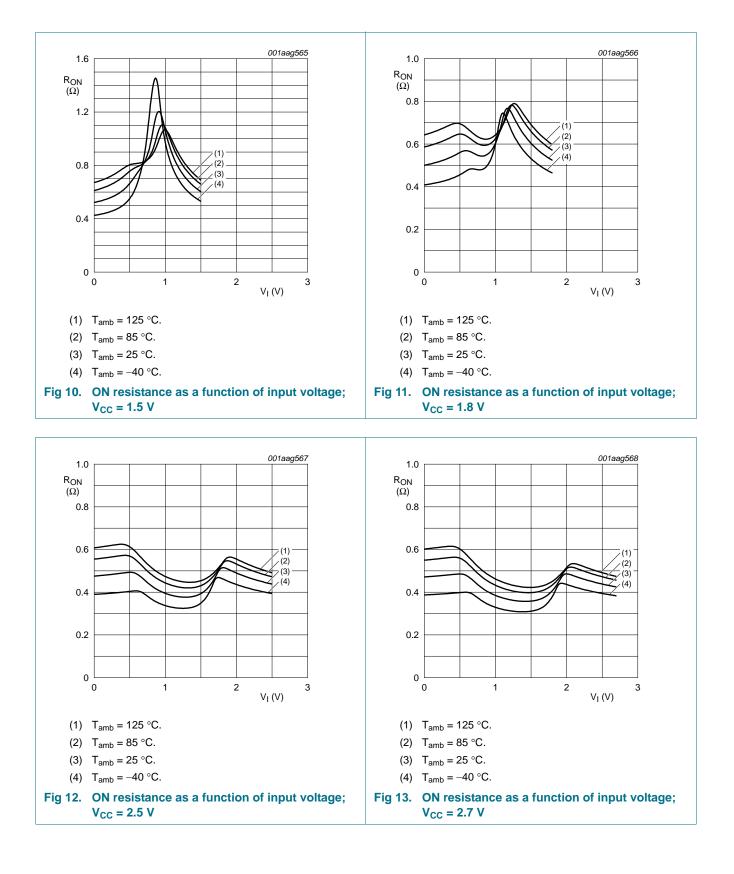


11.3 ON resistance test circuit and graphs

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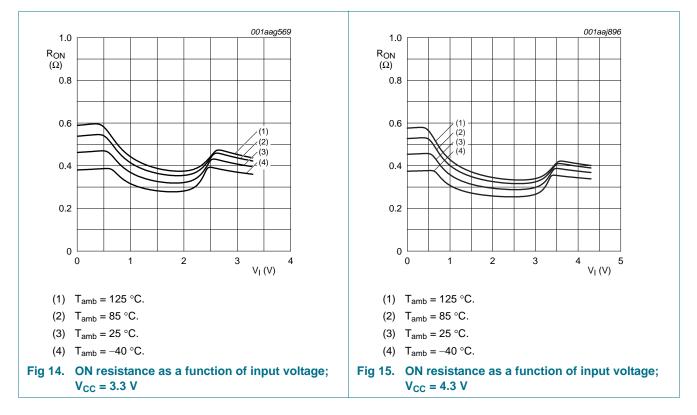
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12. Dynamic characteristics

Table 9. Dynamic characteristics

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

Symbol	Parameter	Conditions	Ta	_{mb} = 25	°C	T _{amb} =	–40 °C to	+125 °C	Unit
			Min	Тур <u>^[1]</u>	Мах	Min	Max (85 °C)	Max (125 °C)	
t _{en}	enable time	nE to nZ or nY; see <u>Figure 16</u>							
		V_{CC} = 1.4 V to 1.6 V	-	27	41	-	43	48	ns
		V_{CC} = 1.65 V to 1.95 V	-	22	33	-	34	36	ns
		V_{CC} = 2.3 V to 2.7 V	-	17	26	-	27	30	ns
		V_{CC} = 2.7 V to 3.6 V	-	14	23	-	24	26	ns
		$V_{CC} = 3.6 V \text{ to } 4.3 V$	-	14	23	-	24	26	ns
t _{dis}	disable time	nE to nZ or nY; see <u>Figure 16</u>							
		V_{CC} = 1.4 V to 1.6 V	-	9	18	-	19	21	ns
		V_{CC} = 1.65 V to 1.95 V	-	7	13	-	14	15	ns
		V_{CC} = 2.3 V to 2.7 V	-	4	8	-	9	10	ns
		V_{CC} = 2.7 V to 3.6 V	-	4	8	-	8	9	ns
		V_{CC} = 3.6 V to 4.3 V	-	4	8	-	8	9	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.

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12.1 Waveform and test circuits

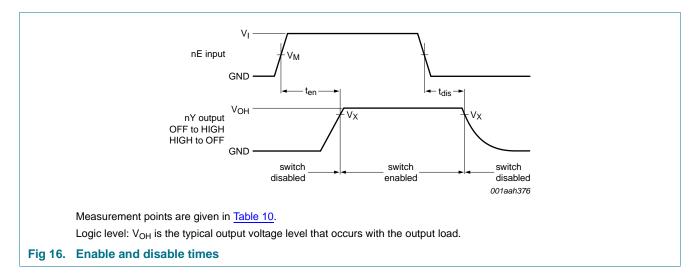


Table 10.Measurement points

Supply voltage	Input	Output
V _{cc}	V _M	V _X
1.4 V to 4.3 V	0.5V _{CC}	0.9V _{OH}

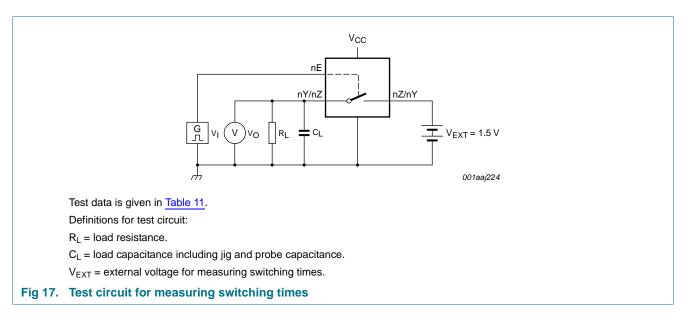


Table 11. Test data

Supply voltage	Input		Load		
V _{CC}	VI	t _r , t _f	CL	RL	
1.4 V to 4.3 V	V _{CC}	\leq 2.5 ns	35 pF	50 Ω	

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12.2 Additional dynamic characteristics

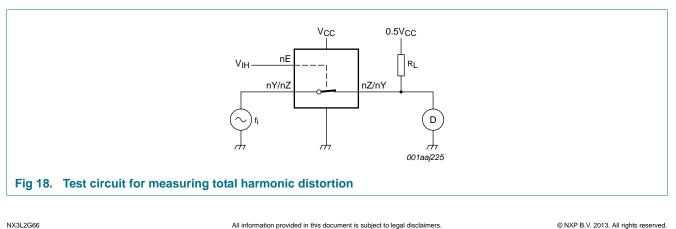
Table 12. Additional dynamic characteristics

At recommended operating conditions; voltages are referenced to GND (ground = 0 V); $V_1 = GND$ or V_{CC} (unless otherwise specified); $t_r = t_f \le 2.5 \text{ ns.}$

Symbol	Parameter	Conditions		T _{amb} = 25		°C	Unit
				Min	Тур	Max	-
THD	total harmonic	$f_i = 20$ Hz to 20 kHz; $R_L = 32 \Omega$; see Figure 18	<u>[1]</u>				
	distortion	V _{CC} = 1.4 V; V _I = 1 V (p-p)		-	0.15	-	%
		V _{CC} = 1.65 V; V _I = 1.2 V (p-p)		-	0.10	-	%
		V _{CC} = 2.3 V; V _I = 1.5 V (p-p)		-	0.02	-	%
		V _{CC} = 2.7 V; V _I = 2 V (p-p)		-	0.02	-	%
		V _{CC} = 4.3 V; V _I = 2 V (p-p)		-	0.02	-	%
f _(-3dB)	–3 dB frequency response	$R_L = 50 \Omega$; see Figure 19	<u>[1]</u>				
		$V_{CC} = 1.4 \text{ V} \text{ to } 4.3 \text{ V}$		-	60	-	MHz
α_{iso}	isolation (OFF-state)	$f_i = 100 \text{ kHz}; \text{ R}_L = 50 \Omega; \text{ see } \frac{\text{Figure 20}}{100 \text{ kHz}}$	<u>[1]</u>				
		$V_{CC} = 1.4 \text{ V} \text{ to } 4.3 \text{ V}$		-	-90	-	dB
V _{ct}	crosstalk voltage	between digital inputs and switch; $f_i = 1 \text{ MHz}$; $C_L = 50 \text{ pF}$; $R_L = 50 \Omega$; see Figure 21					
		$V_{CC} = 1.4 \text{ V to } 3.6 \text{ V}$		-	0.2	-	V
		$V_{CC} = 3.6 \text{ V to } 4.3 \text{ V}$		-	0.2	-	V
Xtalk	crosstalk	between switches; $f_i = 100 \text{ kHz; } R_L = 50 \Omega$; see Figure 22	<u>[1]</u>				
		$V_{CC} = 1.4 \text{ V to } 4.3 \text{ V}$		-	-90	-	dB
Q _{inj}	charge injection	$f_i = 1 \text{ MHz}; C_L = 0.1 \text{ nF}; R_L = 1 \text{ M}\Omega; V_{gen} = 0 \text{ V}; R_{gen} = 0 \Omega;$ see <u>Figure 23</u>					
		V _{CC} = 1.5 V		-	3	-	рС
		V _{CC} = 1.8 V		-	3	-	рС
		$V_{CC} = 2.5 V$		-	3	-	рС
		$V_{CC} = 3.3 V$		-	3	-	рС
		$V_{CC} = 4.3 V$		-	6	-	рС

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

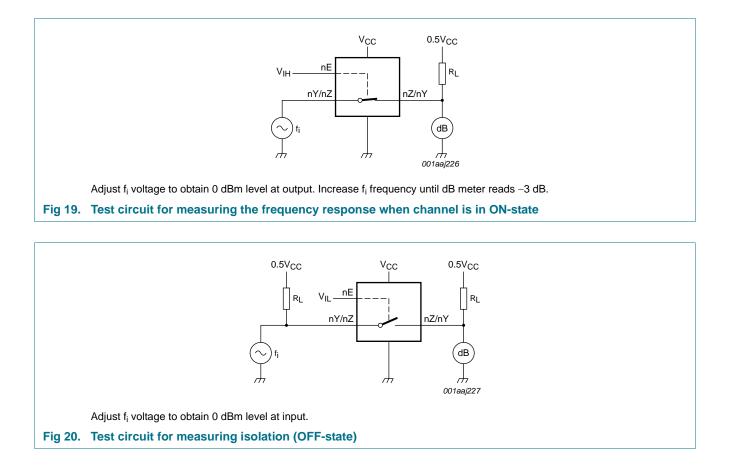
12.3 Test circuits



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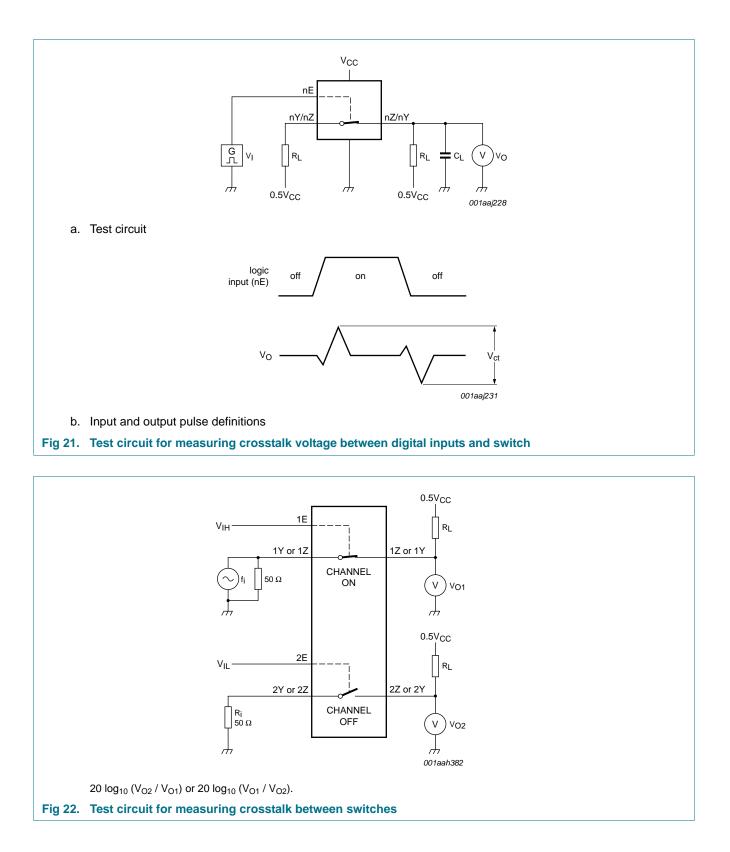
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NX3L2G66

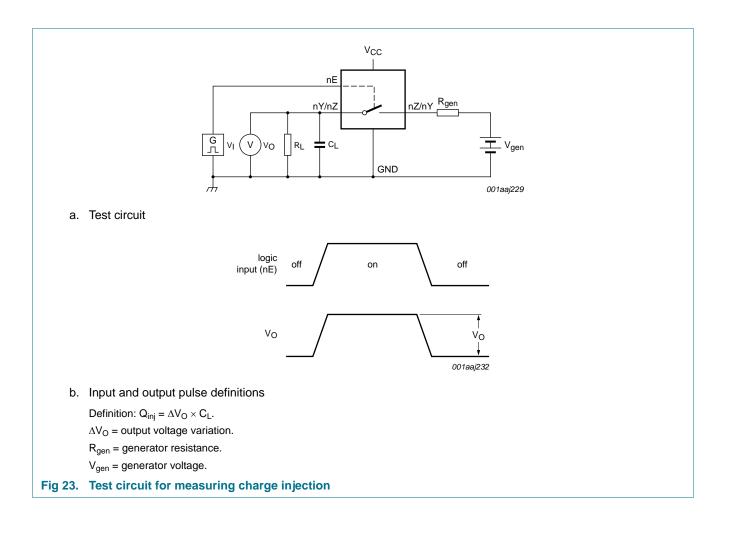
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13. Package outline

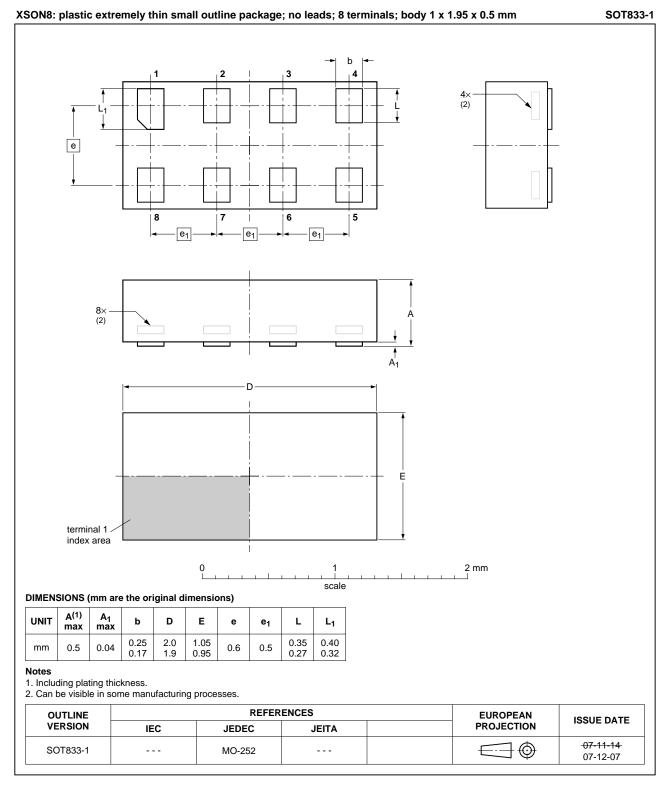
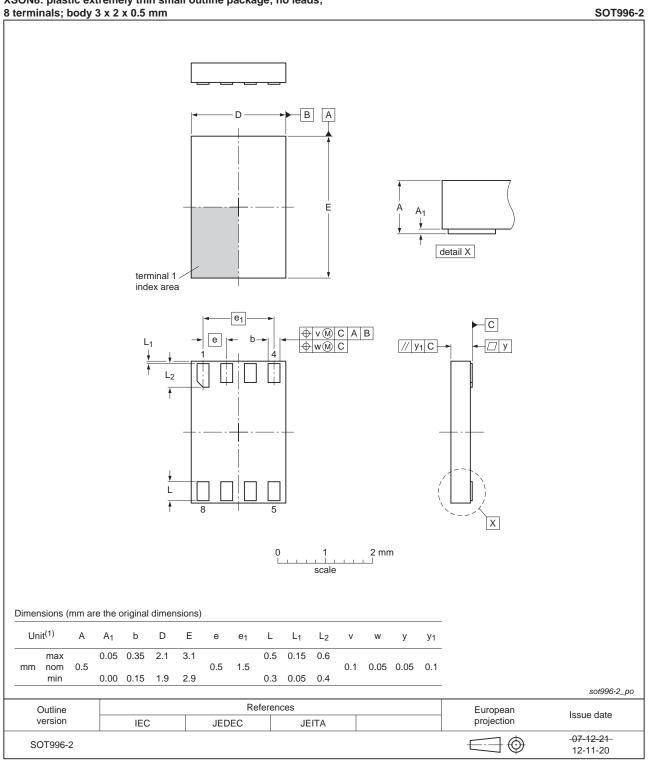


Fig 24. Package outline SOT833-1 (XSON8)

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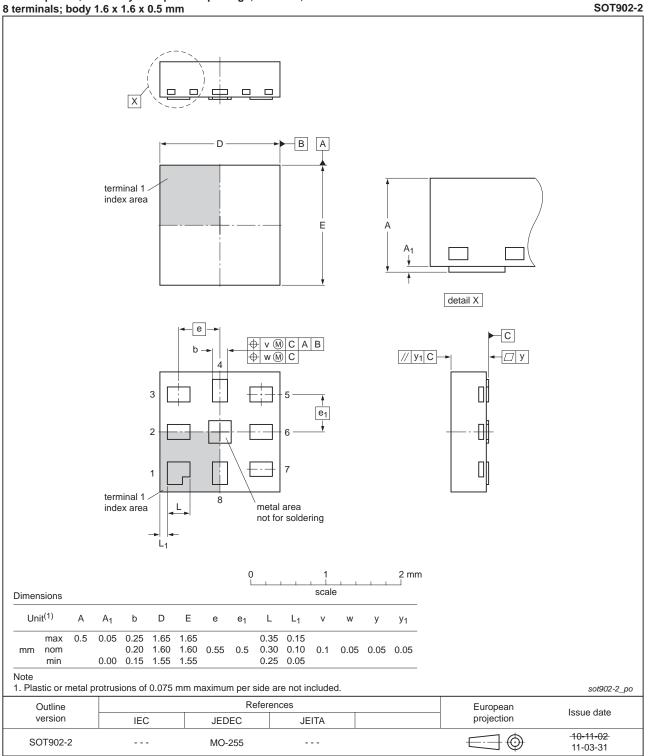


XSON8: plastic extremely thin small outline package; no leads;

Fig 25. Package outline SOT996-2 (XSON8)

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

Fig 26. Package outline SOT902-2 (XQFN8)

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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		
NX3L2G66 v.8	20130207	Product data sheet	-	NX3L2G66 v.7		
Modifications:	 For type nur 	mber NX3L2G66GD XSON	8U has changed to XSO	N8.		
NX3L2G66 v.7	20120613	Product data sheet	-	NX3L2G66 v.6		
NX3L2G66 v.6	20111107	Product data sheet	-	NX3L2G66 v.5		
NX3L2G66 v.5	20110107	Product data sheet	-	NX3L2G66 v.4		
NX3L2G66 v.4	20090828	Product data sheet	-	NX3L2G66 v.3		
NX3L2G66 v.3	20090409	Product data sheet	-	NX3L2G66 v.2		
NX3L2G66 v.2	20090326	Product data sheet	-	NX3L2G66 v.1		
NX3L2G66 v.1	20080131	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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Dual low-ohmic single-pole single-throw analog switch

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