

NX3L2T66GM,125 Datasheet



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DiGi Electronics Part Number NX3L2T66GM,125-DG

Manufacturer NXP Semiconductors

Manufacturer Product Number NX3L2T66GM,125

Description IC SW SPST-NOX2 750MOHM 8XQFNU

Detailed Description 2 Circuit IC Switch 1:1 750mOhm 8-XQFNU (1.6x1.6

)



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Purchase and inquiry

Manufacturer Product Number:	Manufacturer:
NX3L2T66GM,125	NXP Semiconductors
Series:	Product Status:
-	Discontinued at Digi-Key
Switch Circuit:	Multiplexer/Demultiplexer Circuit:
SPST - NO	1:1
Number of Circuits:	On-State Resistance (Max):
2	750mOhm
Channel-to-Channel Matching (\(\Delta \text{Ron} \)):	Voltage - Supply, Single (V+):
20mOhm	1.4V ~ 4.3V
Voltage - Supply, Dual (V±):	Switch Time (Ton, Toff) (Max):
-	28ns, 20ns
-3db Bandwidth:	Charge Injection:
60MHz	6рС
Channel Capacitance (CS(off), CD(off)):	Current - Leakage (IS(off)) (Max):
35pF	10nA
Crosstalk:	Operating Temperature:
-90dB @ 100kHz	-40°C ~ 125°C (TA)
Mounting Type:	Package / Case:
Surface Mount	8-XFQFN Exposed Pad
Supplier Device Package:	Base Product Number:
8-XQFNU (1.6x1.6)	NX3

Environmental & Export classification

8542.39.0001

RoHS Status:	Moisture Sensitivity Level (MSL):
ROHS3 Compliant	1 (Unlimited)
REACH Status:	ECCN:
REACH Unaffected	EAR99
HTSUS:	

NX3L2T66

Dual low-ohmic single-pole single-throw analog switch Rev. 7.1 — 12 August 2020 Product data sheet

1 General description

NX3L2T66 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. A low input voltage threshold allows pin nE to be driven by lower level logic signals without a significant increase in supply current I_{CC} . This makes it possible for the NX3L2T66 to switch 4.3 V signals with a 1.8 V digital controller, eliminating the need for logic level translation.

NX3L2T66 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
 - -0.55Ω (typical) at $V_{CC} = 2.3 V$
 - 0.50 Ω (typical) at V_{CC} = 2.7 V
 - -0.50Ω (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
- 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	Topside	Package	Package						
NV2L2T66CT	marking ^[1]	Name	Description	Version					
NX3L2T66GT	DOO	XSON8	plastic extremely thin small outline package; no leads; 8 terminals; body 1 × 1.95 × 0.5 mm	SOT833-1					
NX3L2T66GM	DOO	XQFN8	plastic extremely thin quad flat package; no leads; 8 terminals; body 1.6 × 1.6 × 0.5 mm	SOT902-2					

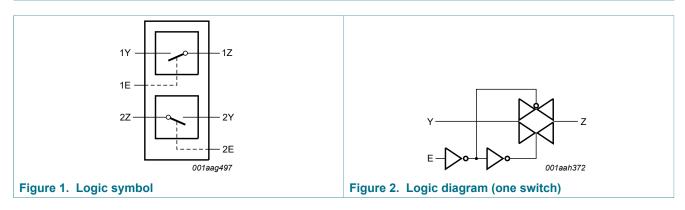
^[1] The pin 1 indicator is located on the lower left corner of the device, below the marking code.

4.1 Ordering options

Table 2. Ordering options

Type number	Orderable part number	Package	Packing method	Minimum order quantity	Temperature
NX3L2T66GT	NX3L2T66GT,115	XSON8	REEL 7" Q1 NDP	5000	T _{amb} = -40 °C to +125 °C
NX3L2T66GM	NX3L2T66GM,125	XQFN8	REEL 7" Q3 NDP	4000	T _{amb} = -40 °C to +125 °C

5 Functional diagram

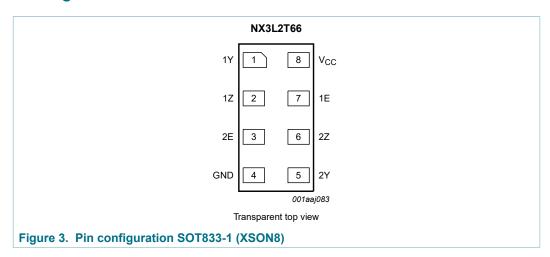


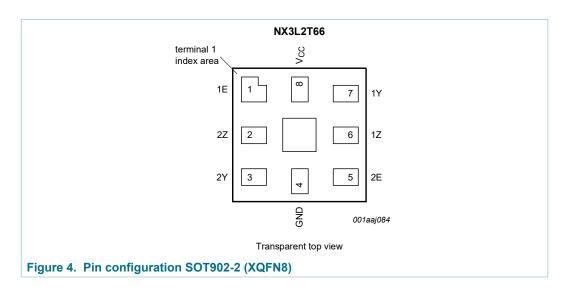
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6 Pinning information

6.1 Pinning





6.2 Pin description

Table 3. Pin description

Table 5. I	in description							
Symbol	Pin		Description					
	SOT833-1	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					

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Functional description

Table 4. Function table [1]

Input nE	Switch
L	OFF-state
Н	ON-state

H = HIGH voltage level; L = LOW voltage level

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	[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	$V_{I} < -0.5 \text{ V or } V_{I} > V_{CC} + 0.5 \text{ V}$		-	±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
		$V_{\rm SW}$ > -0.5 V or $V_{\rm SW}$ < $V_{\rm CC}$ + 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	[3]	-	250	mW

Recommended operating conditions

Table 6. Recommended operating conditions

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		[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

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

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The minimum input voltage rating may be exceeded if the input current rating is observed.

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

^[2] [3]

Applies to control signal levels.

10 Static characteristics

Table 7. Static characteristics

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

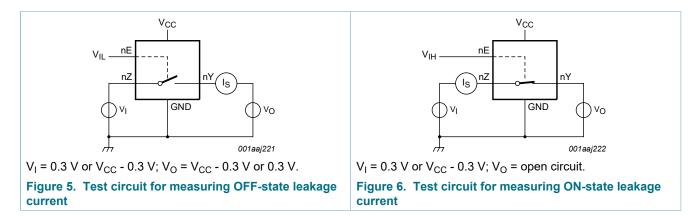
Symbol	Parameter	Conditions	Ta	_{mb} = 25	°C	$T_{amb} = -40 ^{\circ}\text{C} \text{ to } +125 ^{\circ}\text{C}$			Unit
			Min	Тур	Max	Min	Max (85 °C)	Max (125 °C)	
V _{IH}	HIGH-level	V _{CC} = 1.4 V to 1.6 V	0.9	-	-	0.9	-	-	٧
	input voltage	V _{CC} = 1.65 V to 1.95 V	0.9	-	-	0.9	-	-	V
		V _{CC} = 2.3 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	V _{CC} = 1.4 V to 1.6 V	-	-	0.3	-	0.3	0.3	V
	input voltage	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	enable input nE; V_I = GND to 4.3 V; V_{CC} = 1.4 V to 4.3 V	-	-	-	-	±0.5	±1	μΑ
leaka	OFF-state	nY port; see Figure 5							
	leakage current	V _{CC} = 1.4 V to 3.6 V	-	-	±5	-	±50	±500	nA
		V _{CC} = 3.6 V to 4.3 V	-	-	±10	-	±50	±500	nA
I _{S(ON)}	ON-state	nZ port; see Figure 6							
	leakage current	V _{CC} = 1.4 V to 3.6 V	-	-	±5	-	±50	±500	nA
		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
ΔI _{CC}	additional	V _{SW} = GND or V _{CC}							
	supply current	V _I = 2.6 V; V _{CC} = 4.3 V	-	2.0	4.0	-	7	7	μΑ
		V _I = 2.6 V; V _{CC} = 3.6 V	-	0.35	0.7	-	1	1	μΑ
		V _I = 1.8 V; V _{CC} = 4.3 V	-	7.0	10.0	-	15	15	μΑ
		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		-	35	-	-	-	-	pF

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Dual low-ohmic single-pole single-throw analog switch

Symbol	Parameter	Conditions		T _{amb} = 25 °C			T _{amb} = -	Unit		
				Min	Тур	Max	Min	Max (85 °C)	Max (125 °C)	
C _{S(ON)}	ON-state capacitance			-	110	-	-	-	-	pF

10.1 Test circuits



10.2 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	rameter Conditions		T _{amb =} -40 ° C to +85 °C			T _{amb} C to +	Unit	
				Min	Typ ^[1]	Max	Min	Max	
$R_{ON(peak)}$	ON resistance (peak)	V _I = GND to V _{CC} ; I _{SW} = 100 mA; see <u>Figure 7</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
ΔR _{ON}	ON resistance mismatch between channels	V_I = GND to V_{CC} ; I_{SW} = 100 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 to V_{CC} ; I_{SW} = 100 mA	[3]						
		V _{CC} = 1.4 V		-	1.0	3.3	-	3.6	Ω

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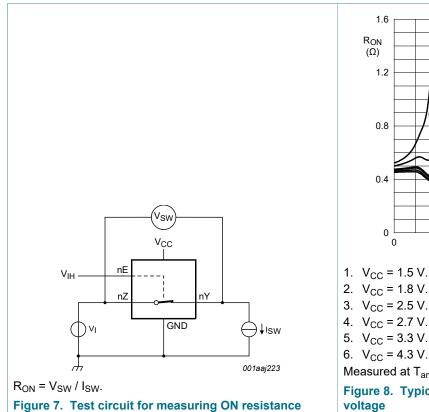
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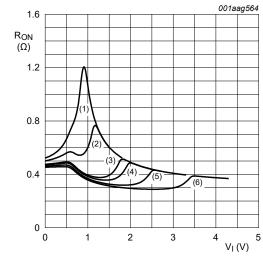
Dual low-ohmic single-pole single-throw analog switch

Symbol	Parameter Conditions		T _{amb} = -40 ° C to +85 °C			T _{amb} : C to +	Unit		
				Min	Typ [1]	Max	Min	Max	
		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

- [2] [3]
- Typical values are measured at T_{amb} = 25 °C. 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 temperature.

10.3 ON resistance test circuit and graphs





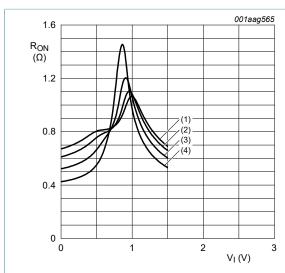
- 1. $V_{CC} = 1.5 V$.

Measured at T_{amb} = 25 °C.

Figure 8. Typical ON resistance as a function of input

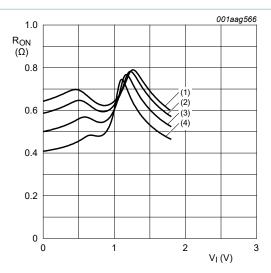
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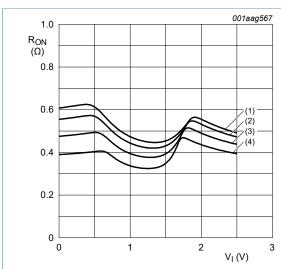
- 1. $T_{amb} = 125 \, ^{\circ}C$.
- 2. $T_{amb} = 85 \,^{\circ}C$.
- 3. $T_{amb} = 25 \, ^{\circ}C$.
- 4. $T_{amb} = -40 \, ^{\circ}C$.

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



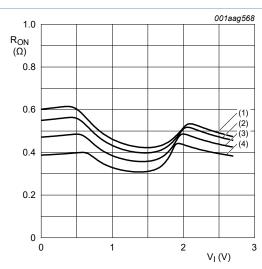
- 1. T_{amb} = 125 °C.
- 2. $T_{amb} = 85 \, ^{\circ}C$.
- 3. $T_{amb} = 25 \,^{\circ}C$.
- 4. T_{amb} = -40 °C.

Figure 10. ON resistance as a function of input voltage; $V_{CC} = 1.8 \text{ V}$



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

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

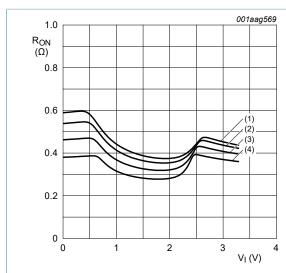


- 1. $T_{amb} = 125 \, ^{\circ}C$.
- 2. $T_{amb} = 85 \, ^{\circ}C$.
- 3. $T_{amb} = 25 \,^{\circ}C$.
- 4. $T_{amb} = -40 \, ^{\circ}C$.

Figure 12. ON resistance as a function of input voltage; V_{CC} = 2.7 V

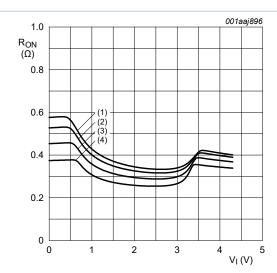
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- 1. T_{amb} = 125 °C.
- 2. T_{amb} = 85 °C.
- 3. $T_{amb} = 25 \, ^{\circ}C$.
- 4. $T_{amb} = -40 \, ^{\circ}C$.

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



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

Figure 14. ON resistance as a function of input voltage; $V_{CC} = 4.3 \text{ V}$

11 Dynamic characteristics

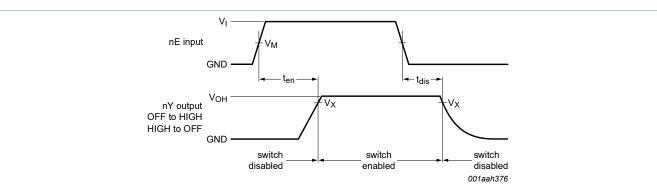
Table 9. Dynamic characteristics

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

Symbol	Parameter	Conditions	Ta	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	nE to nZ or nY; see Figure 15							
		V _{CC} = 1.4 V to 1.6 V	-	35	49	-	53	57	ns
		V _{CC} = 1.65 V to 1.95 V	-	28	40	-	43	48	ns
		V _{CC} = 2.3 V to 2.7 V	-	20	30	-	32	35	ns
		V _{CC} = 2.7 V to 3.6 V	-	18	28	-	30	32	ns
		V _{CC} = 3.6 V to 4.3 V	-	18	28	-	30	32	ns
t _{dis}	disable time	nE to nZ or nY; see Figure 15							
		V _{CC} = 1.4 V to 1.6 V	-	32	70	-	80	90	ns
		V _{CC} = 1.65 V to 1.95 V	-	23	55	-	60	65	ns
		V _{CC} = 2.3 V to 2.7 V	-	14	25	-	30	35	ns
		V _{CC} = 2.7 V to 3.6 V	-	11	20	-	25	30	ns
		V _{CC} = 3.6 V to 4.3 V	-	11	20	-	25	30	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.

11.1 Waveform and test circuits



Measurement points are given in <u>Table 10</u>.

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

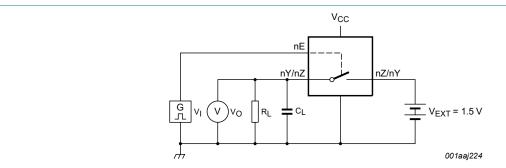
Figure 15. Enable and disable times

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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}



Test data is given in Table 11.

Definitions test circuit:

R_I = Load resistance.

C_L = Load capacitance including jig and probe capacitance.

 V_{EXT} = External voltage for measuring switching times.

Figure 16. Test circuit for measuring switching times

Table 11. Test data

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

11.2 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 = $t_f \le 2.5$ 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 Ω ; see Figure 17	[1]				
	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	R_L = 50 Ω; see Figure 18	[1]				
	response	V _{CC} = 1.4 V to 4.3 V		-	60	-	MHz
α_{iso}	isolation (OFF-state)	f_i = 100 kHz; R_L = 50 Ω ; see Figure 19	[1]				

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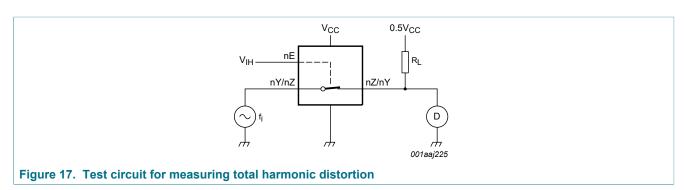
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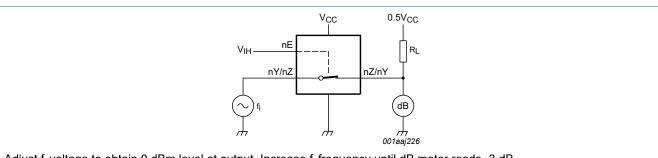
Dual low-ohmic single-pole single-throw analog switch

Symbol	Parameter Conditions			Ta	_{amb} = 25 °C		Unit
				Min	Тур	Max	
		V _{CC} = 1.4 V to 4.3 V		-	-90	-	dB
V _{ct}	crosstalk voltage	between digital inputs and switch; f_i = 1 MHz; C_L = 50 pF; R_L = 50 Ω ; see Figure 20					
		V _{CC} = 1.4 V to 3.6 V		-	0.2	-	V
		V _{CC} = 3.6 V to 4.3 V		-	0.2	-	V
Xtalk	crosstalk	between switches; f_i = 100 kHz; R_L = 50 Ω ; see Figure 21	[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 M Ω ; V_{gen} = 0 V; R_{gen} = 0 Ω ; see <u>Figure 22</u>					
		V _{CC} = 1.5 V		-	3	-	pC
		V _{CC} = 1.8 V		-	3	-	рС
		V _{CC} = 2.5 V		-	3	-	рC
		V _{CC} = 3.3 V		-	3	-	рC
		V _{CC} = 4.3 V		-	6	-	pC

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

11.3 Test circuits





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

Figure 18. Test circuit for measuring the frequency response when channel is in ON-state

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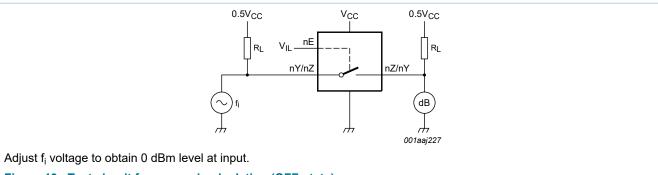
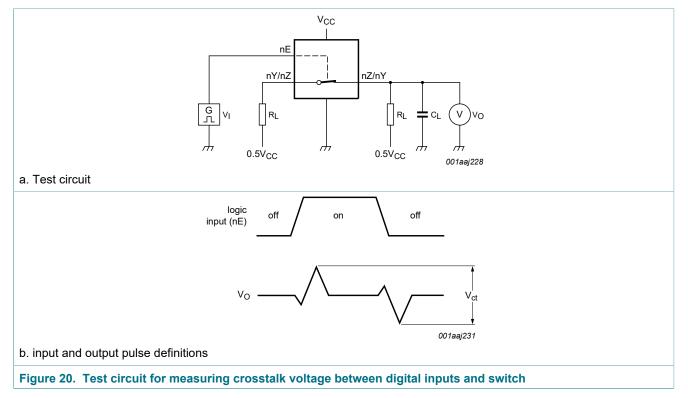
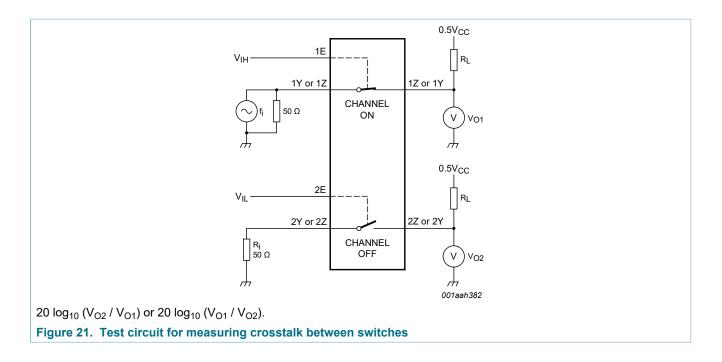


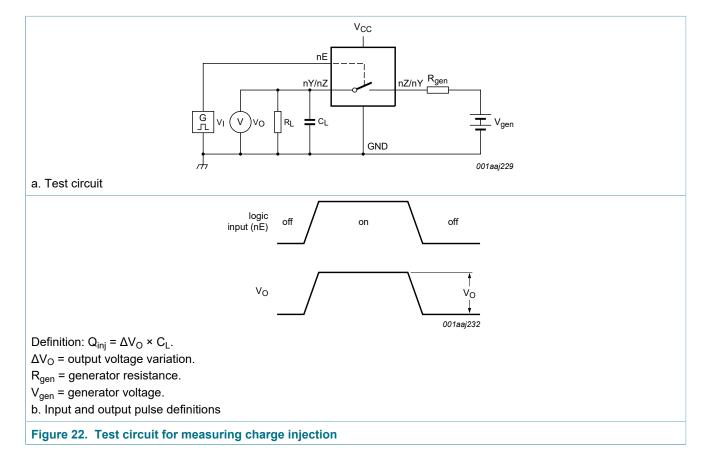
Figure 19. Test circuit for measuring isolation (OFF-state)



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12 Package outline

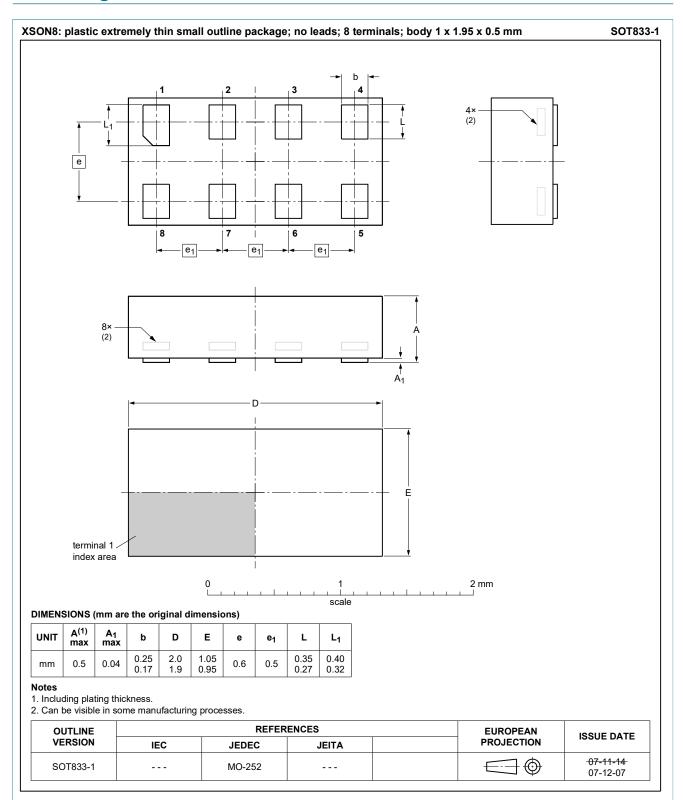
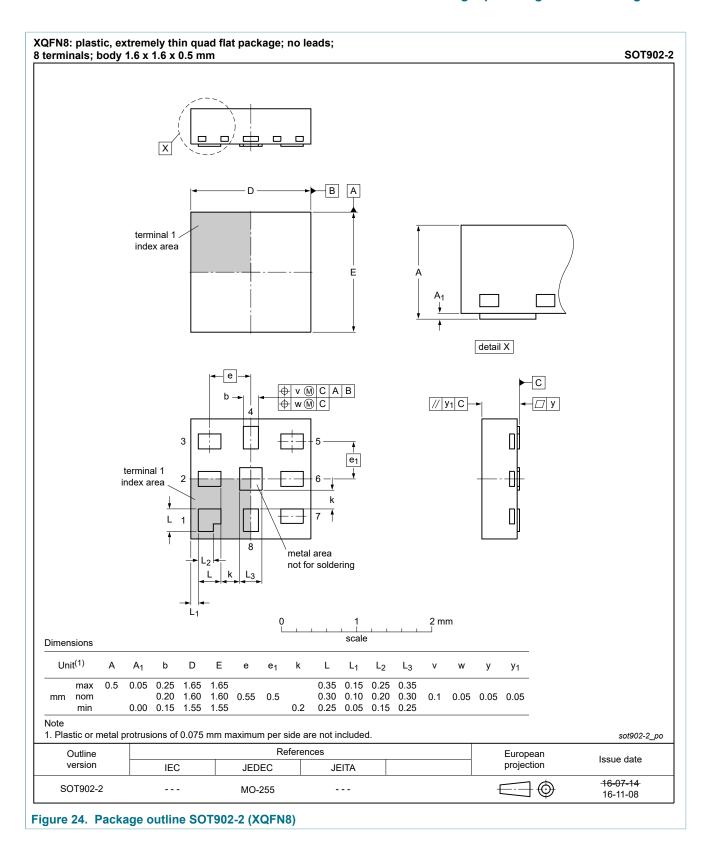


Figure 23. Package outline SOT833-1 (XSON8)

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13 Abbreviations

Table 13. Abbreviations

Acronym	Description
CDM	Charged Device Model
CMOS	Complementary Metal Oxide Semiconductor
ESD	ElectroStatic Discharge
НВМ	Human Body Model
MM	Machine Model
PDA	Personal Digital Assistant

14 Revision history

Table 14. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
NX3L2T66 v.7.1	20200811	Product data sheet	-	-
Modifications:	Removed NX3Updated <u>Figur</u>	L2T66GD package option e 24		,
NX3L2T66 v.7	20130208	Product data sheet	-	NX3L2T66 v.6
NX3L2T66 v.6	20120606	Product data sheet	-	NX3L2T66 v.5
NX3L2T66 v.5	20111107	Product data sheet	-	NX3L2T66 v.4
NX3L2T66 v.4	20101229	Product data sheet	-	NX3L2T66 v.3
NX3L2T66 v.3	20090828	Product data sheet	-	NX3L2T66 v.2
NX3L2T66 v.2	20090420	Product data sheet	-	NX3L2T66 v.1
NX3L2T66 v.1	20081204	Product data sheet	-	-

15 Legal information

15.1 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.

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- [2] The term 'short data sheet' is explained in section "Definitions".
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VCC = 2.7 V 8

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