74LVC2G3157-Q100

Dual 10 Ω single-pole double-throw analog switch

Rev. 2 — 12 May 2021 Product data sheet

1. General description

The 74LVC2G3157-Q100 is a dual low-ohmic single-pole double-throw analog switch suitable for use as an analog or digital 2:1 multiplexer/demultiplexer. Each switch has a digital select input (nS), two independent inputs/outputs (nY0 and nY1) and a common input/output (nZ).

Schmitt trigger action at the select inputs makes the circuit tolerant of slower input rise and fall times across the entire V_{CC} range from 1.65 V to 5.5 V.

This product has been qualified to the Automotive Electronics Council (AEC) standard Q100 (Grade 1) and is suitable for use in automotive applications.

2. Features and benefits

- Automotive product qualification in accordance with AEC-Q100 (Grade 1)
  - Specified from -40 °C to +85 °C and from -40 °C to +125 °C
- Wide supply voltage range from 1.65 V to 5.5 V
- Very low ON resistance:
  - 10.4 Ω (typical) at V_{CC} = 2.7 V
  - 7.8 Ω (typical) at V_{CC} = 3.3 V
  - 6.2 Ω (typical) at V_{CC} = 5 V
- Switch current capability of 32 mA
- Break-before-make switching
- High noise immunity
- CMOS low power consumption
- TTL interface compatibility at 3.3 V
- Latch-up performance exceeds 100 mA per JESD 78 Class II
- ESD protection:
  - MIL-STD-883, method 3015 exceeds 2 kV
  - HBM ANSI/ESDA/JEDEC JS-001 Class 2 exceeds 2 kV
  - MM JESD22-A115-C exceeds 200 V (C = 200 pF; R = 0 Ω)
- Select input accepts voltages up to 5.5 V

3. Ordering information

Table 1. Ordering information

Type number	Package			
	Temperature range	Name	Description	Version
74LVC2G3157DP-Q100	-40 °C to +125 °C	TSSOP10	plastic thin shrink small outline package; 10 leads; body width 3 mm	SOT552-1

nexperia

4. Marking

Table 2. Marking codes

Type number	Marking code[1]
74LVC2G3157DP-Q100	YJ

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

5. Functional diagram

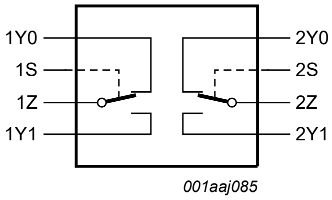


Fig. 1. Logic symbol

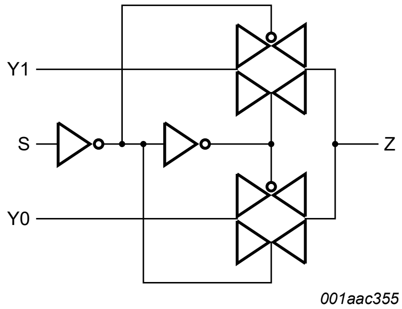


Fig. 2. Logic diagram (one switch)

6. Pinning information

6.1. Pinning

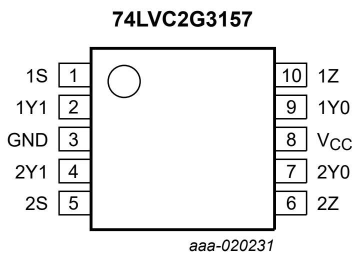


Fig. 3. Pin configuration SOT552-1 (TSSOP10)

6.2. Pin description

Table 3. Pin description

Symbol	Pin	Description
1S	1	select input
1Y1	2	independent input or output
GND	3	ground (0 V)
2Y1	4	independent input or output
2S	5	select input
2Z	6	common output or input
2Y0	7	independent input or output
V_{CC}	8	supply voltage
1Y0	9	independent input or output
1Z	10	common output or input

7. Functional description

Table 4. Function table

H = HIGH voltage level; L = LOW voltage level.

Input nS	Channel on
L	nY0
H	nY1

8. 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	+6.5	V
V_I	input voltage		[1]	-0.5	+6.5	V
I_{IK}	input clamping current	$V_I < -0.5$ V		-50	-	mA
I_{SK}	switch clamping current	$V_I < -0.5$ V or $V_I > V_{CC} + 0.5$ V		-	±50	mA
V_{SW}	switch voltage	enable and disable mode	[2]	-0.5	$V_{CC} + 0.5$	V
I_{SW}	switch current	$V_{SW} > -0.5$ V or $V_{SW} < V_{CC} + 0.5$ V		-	±50	mA
I_{CC}	supply current			-	100	mA
I_{GND}	ground current			-100	-	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 SOT552-1 (TSSOP10) packages: P_{tot} derates linearly with 8.3 mW/K above 120 °C.

9. Recommended operating conditions

Table 6. Recommended operating conditions

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{CC}	supply voltage			1.65	-	5.5	V
V_I	input voltage			0	-	5.5	V
V_{SW}	switch voltage	enable and disable mode	[1]	0	-	V_{CC}	V
T_{amb}	ambient temperature			-40	-	+125	°C
Δt/ΔV	input transition rise and fall rate	V_{CC} = 1.65 V to 2.7 V	[2]	-	-	20	ns/V
		V_{CC} = 2.7 V to 5.5 V	[2]	-	-	10	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.

10. Static characteristics

Table 7. Static characteristics

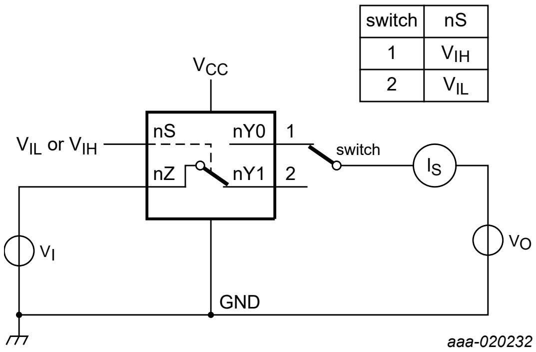
At recommended operating conditions; voltages are referenced to GND (ground 0 V).

Symbol	Parameter	Conditions		-40 °C to +85 °C			-40 °C to +125 °C		Unit
				Min	Typ[1]	Max	Min	Max	
V_{IH}	HIGH-level input voltage	V_{CC} = 1.65 V to 1.95 V		0.65V_{CC}	-	-	0.65V_{CC}	-	V
		V_{CC} = 2.3 V to 2.7 V		1.7	-	-	1.7	-	V
		V_{CC} = 3 V to 3.6 V		2.0	-	-	2.0	-	V
		V_{CC} = 4.5 V to 5.5 V		0.7V_{CC}	-	-	0.7V_{CC}	-	V
V_{IL}	LOW-level input voltage	V_{CC} = 1.65 V to 1.95 V		-	-	0.35V_{CC}	-	0.35V_{CC}	V
		V_{CC} = 2.3 V to 2.7 V		-	-	0.7	-	0.7	V
		V_{CC} = 3 V to 3.6 V		-	-	0.8	-	0.8	V
		V_{CC} = 4.5 V to 5.5 V		-	-	0.3V_{CC}		0.3V_{CC}	V
I_I	input leakage current	pin nS; V_I = 5.5 V or GND; V_{CC} = 0 V to 5.5 V	[2]	-	±0.1	±1	-	±1	μA
$I_{S(OFF)}$	OFF-state leakage current	V_{CC} = 5.5 V; see Fig. 4	[2]	-	±0.1	±0.2	-	±0.5	μA
$I_{S(ON)}$	ON-state leakage current	V_{CC} = 5.5 V; see Fig. 5	[2]	-	±0.1	±1	-	±2	μA
I_{CC}	supply current	V_I = 5.5 V or GND; V_{SW} = GND or V_{CC}; V_{CC} = 1.65 V to 5.5 V	[2]	-	0.1	4	-	4	μA
ΔI_{CC}	additional supply current	pin nS; V_I = V_{CC} - 0.6 V; V_{CC} = 5.5 V; V_{SW} = GND or V_{CC}	[2]	-	5	500	-	500	μA
C_I	input capacitance			-	2.5	-	-	-	pF
$C_{S(OFF)}$	OFF-state capacitance			-	6.0	-	-	-	pF
$C_{S(ON)}$	ON-state capacitance			-	18	-	-	-	pF

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

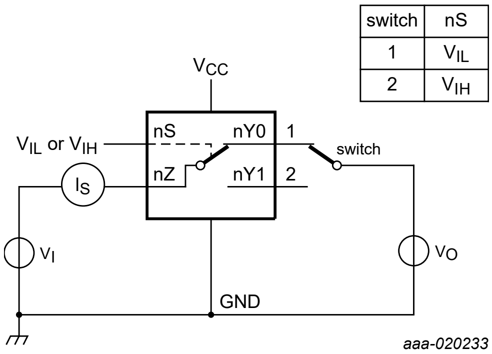
[2] These typical values are measured at V_{CC} = 3.3 V

10.1. Test circuits



$V_I = V_{CC}$ or GND and V_O = GND or V_{CC}.

Fig. 4. Test circuit for measuring OFF-state leakage current



$V_I = V_{CC}$ or GND and V_O = open circuit.

Fig. 5. Test circuit for measuring ON-state leakage current

10.2. ON resistance

Table 8. ON resistance

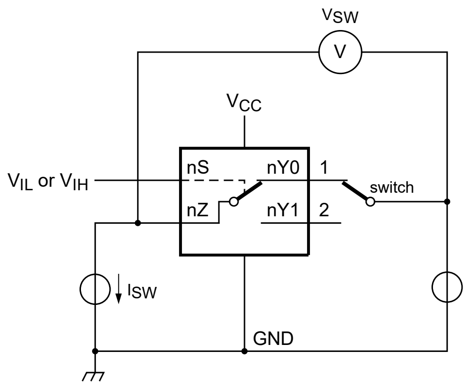
At recommended operating conditions; voltages are referenced to GND (ground 0 V); for graphs see Fig. 7 to Fig. 12.

Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to +125 °C		Unit
			Min	Typ[1]	Max	Min	Max	
$R_{ON(peak)}$	ON resistance (peak)	V_I = GND to V_{CC}; see Fig. 6						
		I_{SW} = 4 mA;V_{CC} = 1.65 V to 1.95 V	-	34.0	130	-	195	Ω
		I_{SW} = 8 mA; V_{CC} = 2.3 V to 2.7 V	-	12.0	30	-	45	Ω
		I_{SW} = 12 mA; V_{CC} = 2.7 V	-	10.4	25	-	38	Ω
		I_{SW} = 24 mA; V_{CC} = 3.0 V to 3.6 V	-	7.8	20	-	30	Ω
		I_{SW} = 32 mA; V_{CC} = 4.5 V to 5.5 V	-	6.2	15	-	23	Ω
$R_{ON(rail)}$	ON resistance (rail)	V_I = GND; see Fig. 6						
		I_{SW} = 4 mA;V_{CC} = 1.65 V to 1.95 V	-	8.2	18	-	27	Ω
		I_{SW} = 8 mA; V_{CC} = 2.3 V to 2.7 V	-	7.1	16	-	24	Ω
		I_{SW} = 12 mA; V_{CC} = 2.7 V	-	6.9	14	-	21	Ω
		I_{SW} = 24 mA; V_{CC} = 3.0 V to 3.6 V	-	6.5	12	-	18	Ω
		I_{SW} = 32 mA; V_{CC} = 4.5 V to 5.5 V	-	5.8	10	-	15	Ω
		$V_I = V_{CC}$; see Fig. 6						
		I_{SW} = 4 mA;V_{CC} = 1.65 V to 1.95 V	-	10.4	30	-	45	Ω
		I_{SW} = 8 mA; V_{CC} = 2.3 V to 2.7 V	-	7.6	20	-	30	Ω
		I_{SW} = 12 mA; V_{CC} = 2.7 V	-	7.0	18	-	27	Ω
		I_{SW} = 24 mA; V_{CC} = 3.0 V to 3.6 V	-	6.1	15	-	23	Ω
		I_{SW} = 32 mA; V_{CC} = 4.5 V to 5.5 V	-	4.9	10	-	15	Ω

Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to +125 °C		Unit
			Min	Typ[1]	Max	Min	Max	
$R_{ON(flat)}$	ON resistance (flatness)	V_I = GND to V_{CC} [2]						
		I_{SW} = 4 mA; V_{CC} = 1.65 V to 1.95 V	-	26.0	-	-	-	Ω
		I_{SW} = 8 mA; V_{CC} = 2.3 V to 2.7 V	-	5.0	-	-	-	Ω
		I_{SW} = 12 mA; V_{CC} = 2.7 V	-	3.5	-	-	-	Ω
		I_{SW} = 24 mA; V_{CC} = 3.0 V to 3.6 V	-	2.0	-	-	-	Ω
		I_{SW} = 32 mA; V_{CC} = 4.5 V to 5.5 V	-	1.5	-	-	-	Ω

[1] Typical values are measured at T_{amb} = 25 °C and nominal V_{CC}.
[2] Flatness is defined as the difference between the maximum and minimum value of ON resistance measured at identical V_{CC} and temperature.

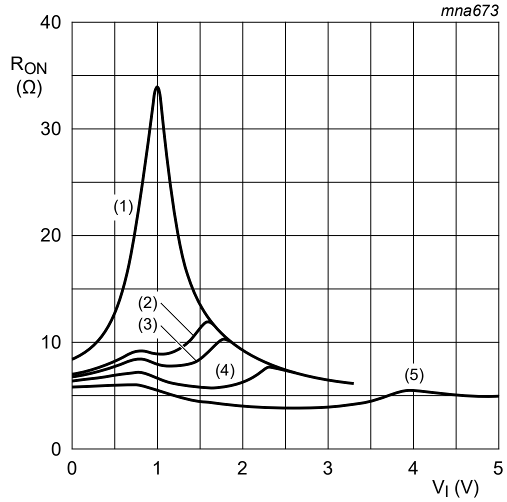
10.3. ON resistance test circuit and graphs



switch	nS
1	V_{IL}
2	V_{IH}

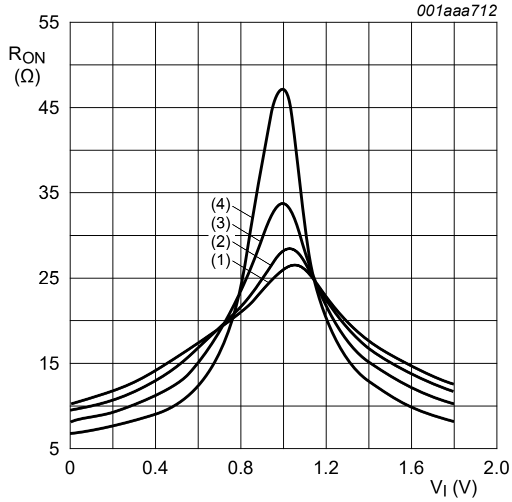
$R_{ON} = V_{SW}/I_{SW}$.

Fig. 6. Test circuit for measuring ON resistance



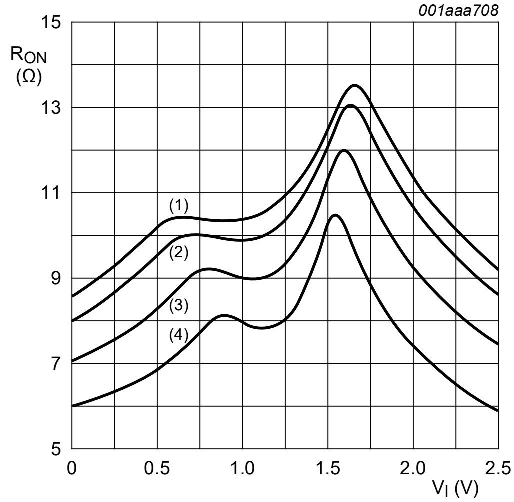
(1) V_{CC} = 1.8 V.
(2) V_{CC} = 2.5 V.
(3) V_{CC} = 2.7 V.
(4) V_{CC} = 3.3 V.
(5) V_{CC} = 5.0 V.

Fig. 7. Typical ON resistance as a function of input voltage; T_{amb} = 25 °C



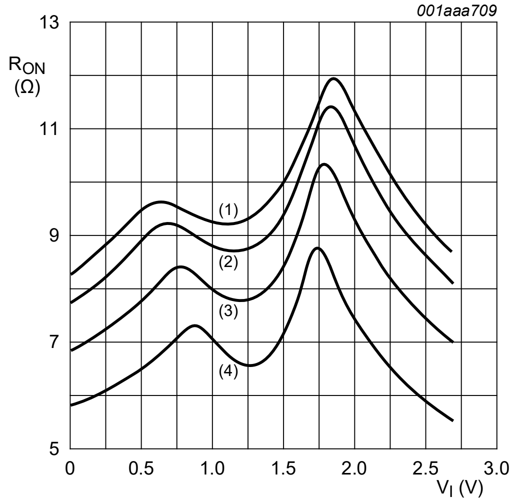
(1) T_{amb} = 125 °C.
(2) T_{amb} = 85 °C.
(3) T_{amb} = 25 °C.
(4) T_{amb} = -40 °C.

Fig. 8. ON resistance as a function of input voltage; V_{CC} = 1.8 V



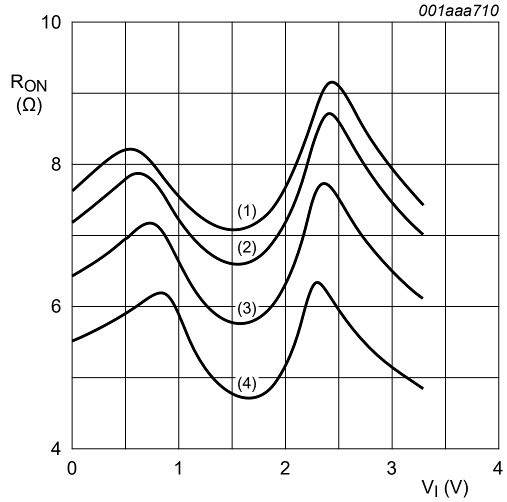
(1) T_{amb} = 125 °C.
(2) T_{amb} = 85 °C.
(3) T_{amb} = 25 °C.
(4) T_{amb} = -40 °C.

Fig. 9. ON resistance as a function of input voltage; V_{CC} = 2.5 V



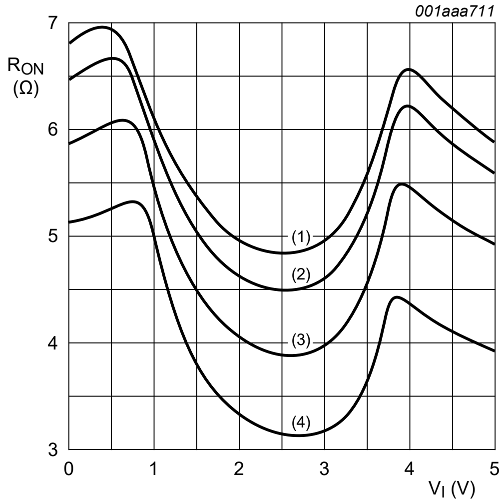
(1) T_{amb} = 125 °C.
(2) T_{amb} = 85 °C.
(3) T_{amb} = 25 °C.
(4) T_{amb} = -40 °C.

Fig. 10. ON resistance as a function of input voltage; V_{CC} = 2.7 V



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

Fig. 11. ON resistance as a function of input voltage; V_{CC} = 3.3 V



(1) T_{amb} = 125 °C.

(2) T_{amb} = 85 °C.

(3) T_{amb} = 25 °C.

(4) T_{amb} = -40 °C.

Fig. 12. ON resistance as a function of input voltage; V_{CC} = 5.0 V

11. Dynamic characteristics

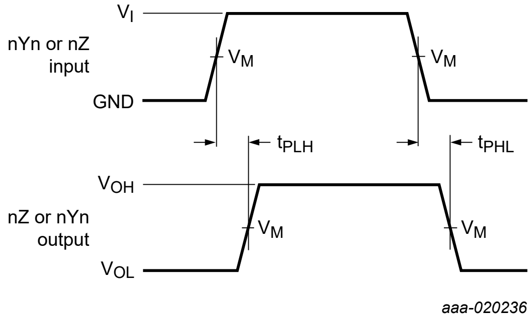
Table 9. Dynamic characteristics

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

Symbol	Parameter	Conditions		-40 °C to +85 °C			-40 °C to +125 °C		Unit
				Min	Typ[1]	Max	Min	Max	
t_{pd}	propagation delay	nYn to nZ or nZ to nYn; see Fig. 13	[2] [3]						
		V_{CC} = 1.65 V to 1.95 V		-	-	2	-	3.0	ns
		V_{CC} = 2.3 V to 2.7 V		-	-	1.2	-	2.0	ns
		V_{CC} = 2.7 V		-	-	1.0	-	1.5	ns
		V_{CC} = 3.0 V to 3.6 V		-	-	0.8	-	1.5	ns
		V_{CC} = 4.5 V to 5.5 V		-	-	0.6	-	1.0	ns
t_{en}	enable time	nS to nYn; see Fig. 14	[4]						
		V_{CC} = 1.65 V to 1.95 V		1	8.7	24	1	26.5	ns
		V_{CC} = 2.3 V to 2.7 V		1	5.3	14	1	15.5	ns
		V_{CC} = 2.7 V		1	4.9	14	1	15.5	ns
		V_{CC} = 3.0 V to 3.6 V		0.5	4	7.6	0.5	8.5	ns
		V_{CC} = 4.5 V to 5.5 V		0.5	3	5.7	0.5	6.6	ns
t_{dis}	disable time	nS to nYn; see Fig. 14	[5]						
		V_{CC} = 1.65 V to 1.95 V		2.5	6	13	2.5	14.5	ns
		V_{CC} = 2.3 V to 2.7 V		2	4.4	7.5	2	8.5	ns
		V_{CC} = 2.7 V		1.5	4.2	7.5	1.5	8.5	ns
		V_{CC} = 3.0 V to 3.6 V		1.5	3.6	5.3	1.5	6	ns
		V_{CC} = 4.5 V to 5.5 V		0.8	2.9	3.8	0.8	4.5	ns
t_{b-m}	break-before-make time	C_L = 35 pF; R_L = 50 Ω; see Fig. 15	[6]						
		V_{CC} = 1.65 V to 1.95 V		0.5	-	-	0.5	-	ns
		V_{CC} = 2.3 V to 2.7 V		0.5	-	-	0.5	-	ns
		V_{CC} = 2.7 V		0.5	-	-	0.5	-	ns
		V_{CC} = 3 V to 3.6 V		0.5	-	-	0.5	-	ns
		V_{CC} = 4.5 V to 5.5 V		0.5	-	-	0.5	-	ns

[1] Typical values are measured at T_{amb} = 25 °C and nominal V_{CC}.
[2] t_{pd} is the same as t_{PLH} and t_{PHL}.
[3] Propagation delay is the calculated RC time constant of the typical ON resistance of the switch and the specified capacitance when driven by an ideal voltage source (zero output impedance).
[4] t_{en} is the same as t_{PZH} and t_{PZL}.
[5] t_{dis} is the same as t_{PLZ} and t_{PHZ}.
[6] Break-before-make specified by design.

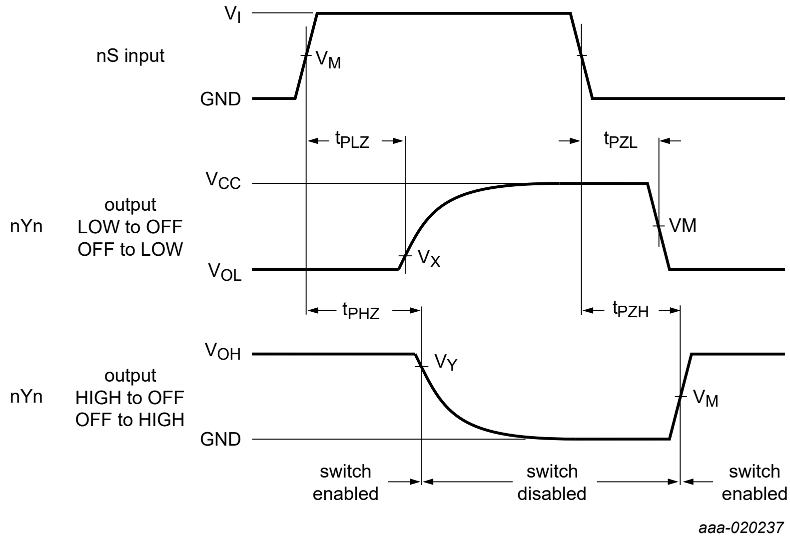
11.1. Waveforms and test circuits



Measurement points are given in Table 10.

Logic levels: V_{OL} and V_{OH} are typical output voltage levels that occur with the output load.

Fig. 13. Input (nYn or nZ) to output (nZ or nYn) propagation delays



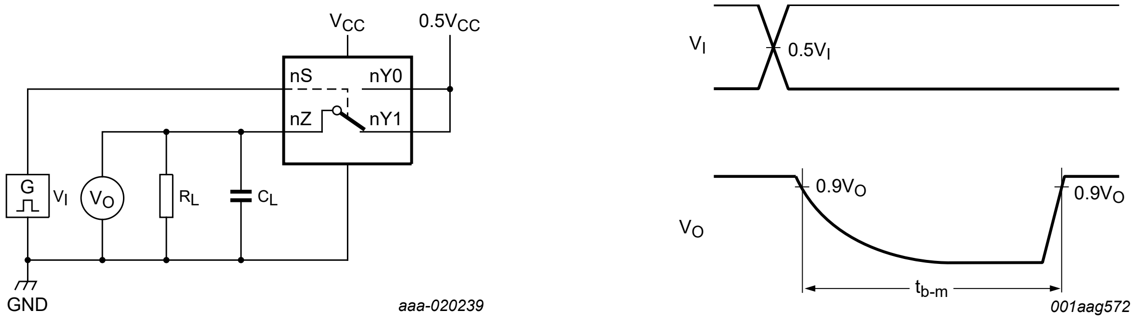
Measurement points are given in Table 10.

Logic levels: V_{OL} and V_{OH} are typical output voltage levels that occur with the output load.

Fig. 14. Enable and disable times

Table 10. Measurement points

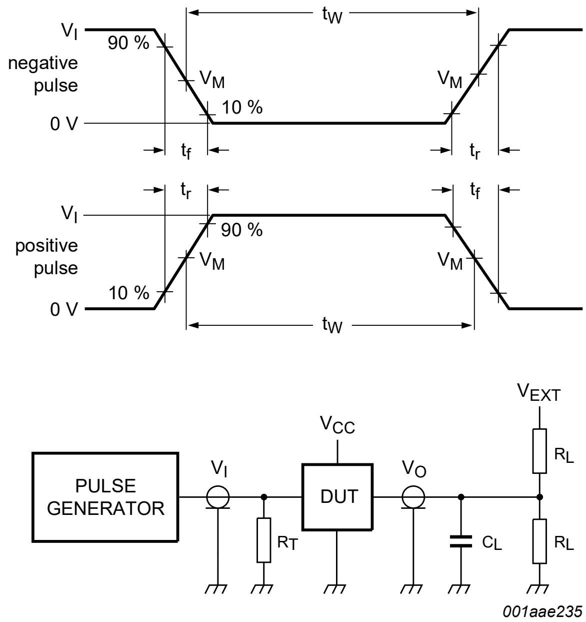
Supply voltage	Input	Output		
V_{CC}	V_M	V_M	V_X	V_Y
1.65 V to 5.5 V	$0.5V_{CC}$	$0.5V_{CC}$	V_{OL} + 0.3 V	V_{OH} - 0.3 V



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 for test circuit:

R_L = Load resistance.

C_L = Load capacitance including jig and probe capacitance.

R_T = Termination resistance should be equal to output impedance Z_o of the pulse generator.

V_{EXT} = Test voltage for switching times.

Fig. 16. Test circuit for measuring switching times

Table 11. Test data

Supply voltage	Input		Load		V_{EXT}		
V_{CC}	V_I	t_r, t_f	C_L	R_L	t_{PLH}, t_{PHL}	t_{PZH}, t_{PHZ}	t_{PZL}, t_{PLZ}
1.65 V to 1.95 V	V_{CC}	≤ 2.0 ns	50 pF	500 Ω	open	GND	$2V_{CC}$
2.3 V to 2.7 V	V_{CC}	≤ 2.0 ns	50 pF	500 Ω	open	GND	$2V_{CC}$
2.7 V	V_{CC}	≤ 2.5 ns	50 pF	500 Ω	open	GND	$2V_{CC}$
3 V to 3.6 V	V_{CC}	≤ 2.5 ns	50 pF	500 Ω	open	GND	$2V_{CC}$
4.5 V to 5.5 V	V_{CC}	≤ 2.5 ns	50 pF	500 Ω	open	GND	$2V_{CC}$

11.2. Additional dynamic characteristics

Table 12. Additional dynamic characteristics

At recommended operating conditions; voltages are referenced to GND (ground = 0 V); T_{amb} = 25 °C.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
THD	total harmonic distortion	f_i = 600 Hz to 20 kHz; R_L = 600 Ω; C_L = 50 pF; V_I = 0.5 V (p-p); see Fig. 17				
		V_{CC} = 1.65 V	-	0.260	-	%
		V_{CC} = 2.3 V	-	0.078	-	%
		V_{CC} = 3.0 V	-	0.078	-	%
		V_{CC} = 4.5 V	-	0.078	-	%
$f_{(-3dB)}$	-3 dB frequency response	R_L = 50 Ω; see Fig. 18				
		V_{CC} = 1.65 V	-	200	-	MHz
		V_{CC} = 2.3 V	-	300	-	MHz
		V_{CC} = 3.0 V	-	300	-	MHz
		V_{CC} = 4.5 V	-	300	-	MHz
α_{iso}	isolation (OFF-state)	R_L = 50 Ω; C_L = 5 pF; f_i = 10 MHz; see Fig. 19				
		V_{CC} = 1.65 V	-	-42	-	dB
		V_{CC} = 2.3 V	-	-42	-	dB
		V_{CC} = 3.0 V	-	-40	-	dB
		V_{CC} = 4.5 V	-	-40	-	dB
Xtalk	crosstalk	between switches; f_i = 10 MHz; see Fig. 20				
		V_{CC} = 1.65 V	-	-54	-	dB
		V_{CC} = 2.3 V	-	-54	-	dB
		V_{CC} = 3.0 V	-	-54	-	dB
		V_{CC} = 4.5 V	-	-54	-	dB
Q_{inj}	charge injection	C_L = 0.1 nF; V_{gen} = 0 V; R_{gen} = 0 Ω; f_i = 1 MHz; R_L = 1 MΩ; see Fig. 21				
		V_{CC} = 1.8 V	-	3.3	-	pC
		V_{CC} = 2.5 V	-	4.1	-	pC
		V_{CC} = 3.3 V	-	5.0	-	pC
		V_{CC} = 4.5 V	-	6.4	-	pC
		V_{CC} = 5.5 V	-	7.5	-	pC

11.3. Test circuits

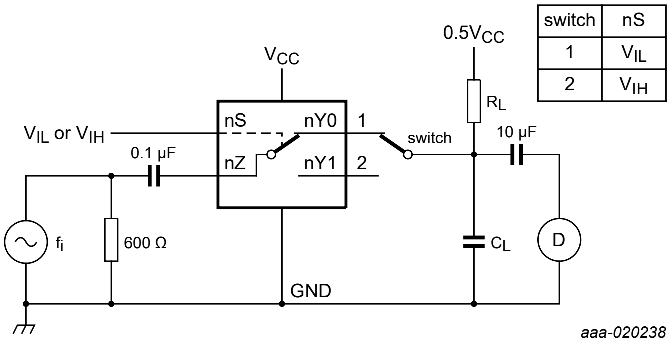
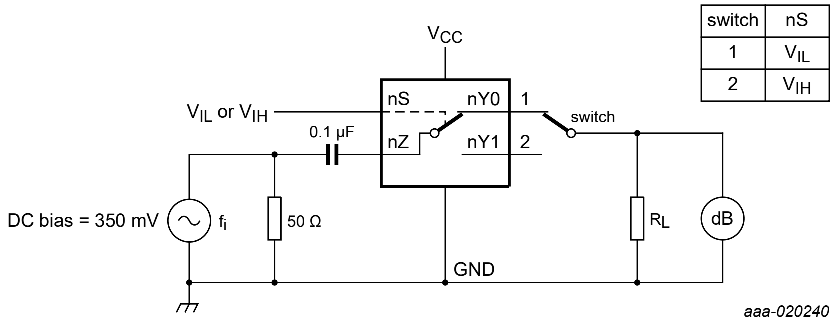
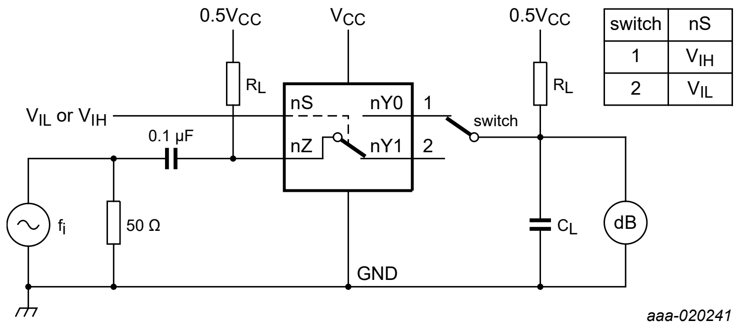


Fig. 17. Test circuit for measuring total harmonic distortion



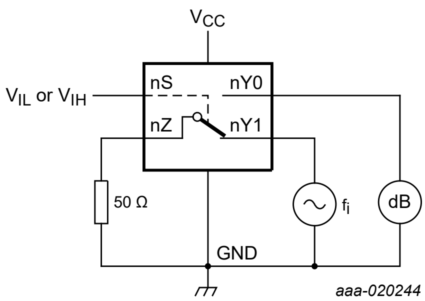
Adjust f_i voltage to obtain 0 dBm level at output. Increase f_i frequency until dB meter reads -3 dB.

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



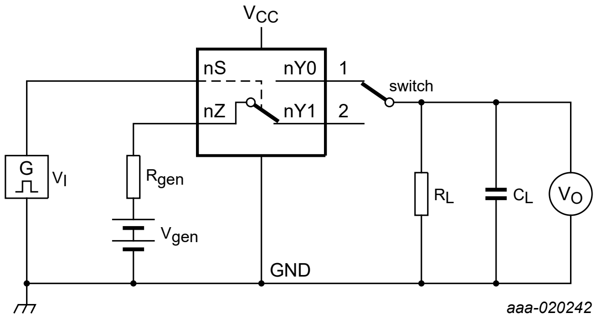
Adjust f_i voltage to obtain 0 dBm level at input.

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

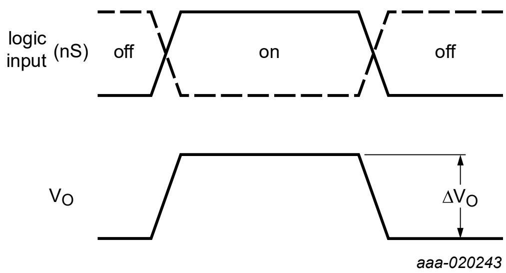


Adjust f_i voltage to obtain 0 dBm level at input.

Fig. 20. Test circuit for measuring crosstalk



a. Test circuit



b. Input and output pulse definitions

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

ΔV_O = output voltage variation.

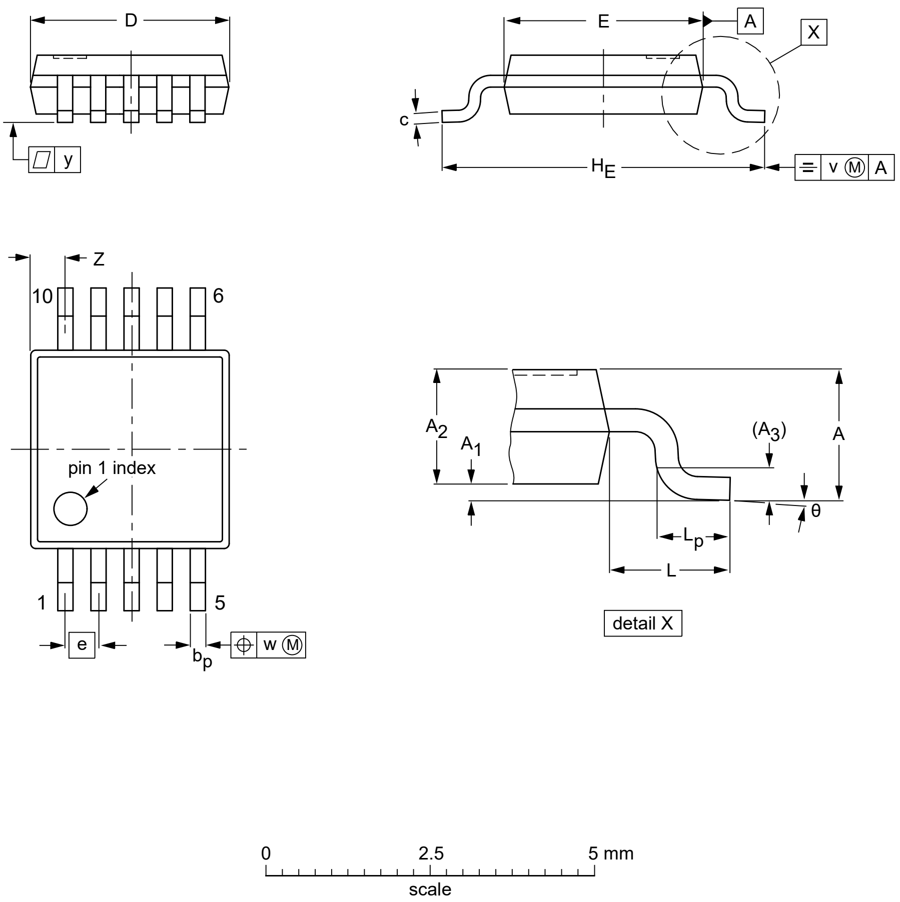
R_{gen} = generator resistance.

V_{gen} = generator voltage.

Fig. 21. Test circuit for measuring charge injection

12. Package outline

TSSOP10: plastic thin shrink small outline package; 10 leads; body width 3 mm **SOT552-1**



DIMENSIONS (mm are the original dimensions)

UNIT	A max.	A_1	A_2	A_3	b_p	c	D(1)	E(2)	e	H_E	L	L_p	v	w	y	Z(1)	θ
mm	1.1	0.15 0.05	0.95 0.80	0.25	0.30 0.15	0.23 0.15	3.1 2.9	3.1 2.9	0.5	5.0 4.8	0.95	0.7 0.4	0.1	0.1	0.1	0.67 0.34	6° 0°

Notes

1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.
2. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT552-1						~~99-07-29~~ 03-02-18

Fig. 22. Package outline SOT552-1 (TSSOP10)

13. Abbreviations

Table 13. Abbreviations

Acronym	Description
CMOS	Complementary Metal-Oxide Semiconductor
DUT	Device Under Test
ESD	ElectroStatic Discharge
HBM	Human Body Model
MIL	Military
MM	Machine Model
TTL	Transistor-Transistor Logic

14. Revision history

Table 14. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74LVC2G3157_Q100 v.2	20210512	Product data sheet	-	74LVC2G3157_Q100 v.1
Modifications:	• Section 8: Derating values for P_{tot} total power dissipation updated.			
74LVC2G3157_Q100 v.1	20190429	Product data sheet	-	-

15. Legal information

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 https://www.nexperia.com.

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. Nexperia 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 Nexperia sales office. In case of any inconsistency or conflict with the short data sheet, the full data sheet shall prevail.

Product specification — The information and data provided in a Product data sheet shall define the specification of the product as agreed between Nexperia and its customer, unless Nexperia and customer have explicitly agreed otherwise in writing. In no event however, shall an agreement be valid in which the Nexperia product is deemed to offer functions and qualities beyond those described in the Product data sheet.

Disclaimers

Limited warranty and liability — Information in this document is believed to be accurate and reliable. However, Nexperia 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. Nexperia takes no responsibility for the content in this document if provided by an information source outside of Nexperia.

In no event shall Nexperia be liable for any indirect, incidental, punitive, special or consequential damages (including - without limitation - lost profits, lost savings, business interruption, costs related to the removal or replacement of any products or rework charges) whether or not such damages are based on tort (including negligence), warranty, breach of contract or any other legal theory.

Notwithstanding any damages that customer might incur for any reason whatsoever, Nexperia's aggregate and cumulative liability towards customer for the products described herein shall be limited in accordance with the Terms and conditions of commercial sale of Nexperia.

Right to make changes — Nexperia 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 in automotive applications — This Nexperia product has been qualified for use in automotive applications. Unless otherwise agreed in writing, the product is not designed, authorized or warranted to be suitable for use in life support, life-critical or safety-critical systems or equipment, nor in applications where failure or malfunction of an Nexperia product can reasonably be expected to result in personal injury, death or severe property or environmental damage. Nexperia and its suppliers accept no liability for inclusion and/or use of Nexperia products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

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.

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

Customers are responsible for the design and operation of their applications and products using Nexperia products, and Nexperia accepts no liability for any assistance with applications or customer product design. It is customer's sole responsibility to determine whether the Nexperia product is suitable and fit for the customer's applications and products planned, as well as for the planned application and use of customer's third party customer(s). Customers should provide appropriate design and operating safeguards to minimize the risks associated with their applications and products.

Nexperia does not accept any liability related to any default, damage, costs or problem which is based on any weakness or default in the customer's applications or products, or the application or use by customer's third party customer(s). Customer is responsible for doing all necessary testing for the customer's applications and products using Nexperia products in order to avoid a default of the applications and the products or of the application or use by customer's third party customer(s). Nexperia does not accept any liability in this respect.

Limiting values — Stress above one or more limiting values (as defined in the Absolute Maximum Ratings System of IEC 60134) will cause permanent damage to the device. Limiting values are stress ratings only and (proper) operation of the device at these or any other conditions above those given in the Recommended operating conditions section (if present) or the Characteristics sections of this document is not warranted. Constant or repeated exposure to limiting values will permanently and irreversibly affect the quality and reliability of the device.

Terms and conditions of commercial sale — Nexperia products are sold subject to the general terms and conditions of commercial sale, as published at http://www.nexperia.com/profile/terms, unless otherwise agreed in a valid written individual agreement. In case an individual agreement is concluded only the terms and conditions of the respective agreement shall apply. Nexperia hereby expressly objects to applying the customer's general terms and conditions with regard to the purchase of Nexperia products by customer.

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.

Export control — This document as well as the item(s) described herein may be subject to export control regulations. Export might require a prior authorization from competent authorities.

Translations — A non-English (translated) version of a document is for reference only. The English version shall prevail in case of any discrepancy between the translated and English versions.

Trademarks

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

Contents

For more information, please visit: http://www.nexperia.com
For sales office addresses, please send an email to: salesaddresses@nexperia.com
Date of release: 12 May 2021