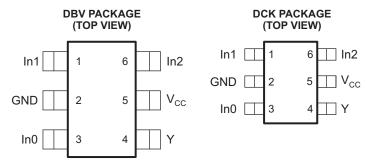


CONFIGURABLE MULTIPLE-FUNCTION GATE

FEATURES

- Qualified for Automotive Applications
- Supports 5-V V_{CC} Operation
- Inputs Accept Voltages to 5.5 V
- Max t_{pd} of 7.3 ns at 3.3 V
- Low Power Consumption, 10-μA Max I_{CC}
- ±24-mA Output Drive at 3.3 V
- I_{off} Supports Partial-Power-Down Mode Operation

- Latch-Up Performance Exceeds 100 mA Per JESD 78, Class II
- ESD Protection Exceeds JESD 22
 - 2000-V Human-Body Model (A114-A)
 - 200-V Machine Model (A115-A)
 - 1000-V Charged-Device Model (C101)
- Choose From Nine Specific Logic Functions



See mechanical drawings for dimensions.

DESCRIPTION/ORDERING INFORMATION

This configurable multiple-function gate is designed for 1.65-V to 5.5-V V_{CC} operation.

The SN74LVC1G97 features configurable multiple functions. The output state is determined by eight patterns of 3-bit input. The user can choose the logic functions MUX, AND, OR, NAND, NOR, inverter, and noninverter. All inputs can be connected to V_{CC} or GND.

This device functions as an independent gate but, because of Schmitt action, it may have different input threshold levels for positive-going $(V_{T_{+}})$ and negative-going $(V_{T_{-}})$ signals.

This device is fully specified for partial-power-down applications using I_{off} . The I_{off} circuitry disables the outputs, preventing damaging current backflow through the device when it is powered down.

ORDERING INFORMATION⁽¹⁾

T _A	PACKAG	E ⁽²⁾	ORDERABLE PART NUMBER	TOP-SIDE MARKING ⁽³⁾
–40°C to 125°C	SOT (SOT-23) - DBV	Reel of 3000	SN74LVC1G97QDBVRQ1	C97_
-40 C to 125 C	SOT (SC-70) - DCK	Reel of 3000	SN74LVC1G97QDCKRQ1	CS_

For the most current package and ordering information, see the Package Option Addendum at the end of this document, or see the TI
web site at www.ti.com.



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

⁽²⁾ Package drawings, thermal data, and symbolization are available at www.ti.com/packaging.

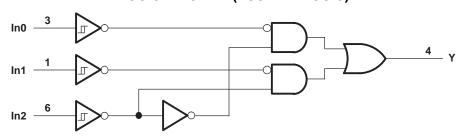
⁽³⁾ DBV/DCK: The actual top-side marking has one additional character that designates the wafer fab/assembly site.



FUNCTION TABLE

	INPUTS	OUTPUT	
ln2	ln1	In0	Y
L	L	L	Г
L	L	Н	L
L	Н	L	Н
L	Н	Н	Н
Н	L	L	L
Н	L	Н	Н
Н	Н	L	L
Н	Н	Н	Н

LOGIC DIAGRAM (POSITIVE LOGIC)



FUNCTION TABLE

LOGIC FUNCTION	FIGURE NO.
2-to-1 data selector	1
2-input AND gate	2
2-input OR gate with one inverted input	3
2-input NAND gate with one inverted input	3
2-input AND gate with one inverted input	4
2-input NOR gate with one inverted input	4
2-input OR gate	5
Inverter	6
Noninverted buffer	7



LOGIC CONFIGURATIONS

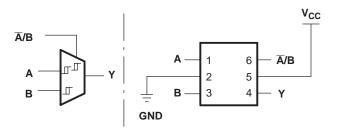
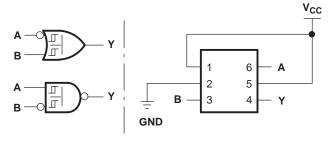


Figure 1. 2-to-1 Data Selector

Figure 2. 2-Input AND Gate



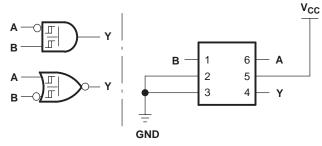
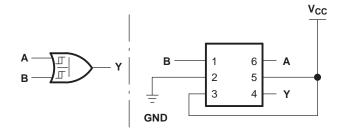


Figure 3. 2-Input OR Gate With One Inverted Input 2-Input NAND Gate With One Inverted Input

Figure 4. 2-Input AND Gate With One Inverted Input 2-Input NOR Gate With One Inverted Input



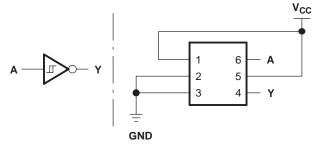


Figure 5. 2-Input OR Gate

Figure 6. Inverter

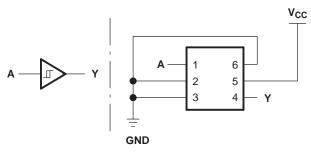


Figure 7. Noninverted Buffer



Absolute Maximum Ratings⁽¹⁾

over operating free-air temperature range (unless otherwise noted)

			MIN	MAX	UNIT
V _{CC}	Supply voltage range		-0.5	6.5	V
V_{I}	Input voltage range ⁽²⁾		-0.5	6.5	V
Vo	Voltage range applied to any output in the high-impedance	or power-off state ⁽²⁾	-0.5	6.5	V
Vo	Voltage range applied to any output in the high or low state	(2)(3)	-0.5	V _{CC} + 0.5	V
I _{IK}	Input clamp current	V _I < 0		-50	mA
I _{OK}	Output clamp current	V _O < 0		-50	mA
Io	Continuous output current			±50	mA
	Continuous current through V _{CC} or GND			±100	mA
0	Declare the weed in a decree (4)	DBV package		165	°C/W
θ_{JA}	Package thermal impedance ⁽⁴⁾	DCK package		259	- C/VV
T _{stg}	Storage temperature range		-65	150	°C

⁽¹⁾ Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

Recommended Operating Conditions⁽¹⁾

			MIN	MAX	UNIT
\ /	Curalizations	Operating	1.65	5.5	V
V _{CC}	Supply voltage	Data retention only	1.5		V
V_{I}	Input voltage		0	5.5	V
Vo	Output voltage		0	V _{CC}	V
		V _{CC} = 1.65 V		-4	
	High-level output current	V _{CC} = 2.3 V		-8	
I_{OH}		V 2V		-16	
		V _{CC} = 3 V		-24	
		V _{CC} = 4.5 V		-24	
		V _{CC} = 1.65 V		4	
		V _{CC} = 2.3 V		8	
I_{OL}	Low-level output current	V 2V	16		mA
		V _{CC} = 3 V		24	
		V _{CC} = 4.5 V		24	
T_A	Operating free-air temperature		-40	125	°C

⁽¹⁾ All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, literature number SCBA004.

Submit Documentation Feedback

⁽²⁾ The input and output negative-voltage ratings may be exceeded if the input and output current ratings are observed.

³⁾ The value of V_{CC} is provided in the recommended operating conditions table.

⁽⁴⁾ The package thermal impedance is calculated in accordance with JESD 51-7.



Electrical Characteristics

over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER	TEST CONDITIONS	V _{CC}	MIN	TYP ⁽¹⁾ MAX	UNIT
		1.65 V	0.6	1.4	
_ V _{T+}		2.3 V	1	1.8	
Positive-going input threshold		3 V	1.3	2.2	V
voltage		4.5 V	1.9	3.1	
		5.5 V	2.2	3.6	
		1.65 V	0.3	0.7	
V_{T-}		2.3 V	0.5	1	
Negative-going input threshold		3 V	0.7	1.4	V
voltage		4.5 V	1	2	
		5.5 V	1.2	2.3	
		1.65 V	0.3	0.8	
ΔV_{T}		2.3 V	0.4	0.9	
Hysteresis		3 V	0.5	1	V
$(V_{T+} - V_{T-})$		4.5 V	0.6	1.5	
		5.5 V	0.7	1.7	
	$I_{OH} = -100 \mu\text{A}$	1.65 V to 5.5 V	V _{CC} - 0.2		
	$I_{OH} = -4 \text{ mA}$	1.65 V	1.2		
	$I_{OH} = -8 \text{ mA}$	2.3 V	1.9		V
V _{OH}	I _{OH} = -16 mA	3 V	2.4		V
	J. 24 m A	3 V	2.3		
	$I_{OH} = -24 \text{ mA}$	4.5 V	3.8		
	I _{OL} = 100 μA	1.65 V to 5.5 V		0.1	
	I _{OL} = 4 mA	1.65 V		0.45	
	I _{OL} = 8 mA	2.3 V		0.3	V
V _{OL}	I _{OL} = 16 mA	3 V		0.45	V
		3 V		0.55	
	I _{OL} = 24 mA	4.5 V		0.58	
I _I	V _I = 5.5 V or GND	0 to 5.5 V		±5	μΑ
I _{off}	V_I or $V_O = 5.5 \text{ V}$	0		±10	μΑ
I _{CC}	$V_1 = 5.5 \text{ V or GND}, \qquad I_0 = 0$	1.65 V to 5.5 V		10	μΑ
ΔI _{CC}	One input at $V_{CC} - 0.6 \text{ V}$, Other inputs at V_{CC} or GND	3 V to 5.5 V		500	μΑ
C _i	$V_I = V_{CC}$ or GND	3.3 V		3.5	pF

⁽¹⁾ All typical values are at V_{CC} = 3.3 V, T_A = 25C.

Switching Characteristics

over recommended operating free-air temperature range (unless otherwise noted) (see Figure 8)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC} = 1.8 V ± 0.15 V		V _{CC} = 2.5 V ± 0.2 V		V _{CC} = 3.3 V ± 0.3 V		V _{CC} = 5 V ± 0.5 V		UNIT
	(INFOT)	(001701)	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	
t _{pd}	Any In	Υ	3.2	16.4	2	9.3	1.5	7.3	1.1	6.1	ns

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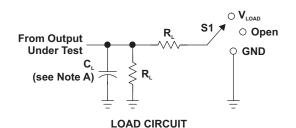
Operating Characteristics

 $T_A = 25^{\circ}C$

	PARAMETER	TEST	V _{CC} = 1.8 V	V _{CC} = 2.5 V	$V_{CC} = 3.3 \text{ V}$	V _{CC} = 5 V	UNIT
	TANAMETER	CONDITIONS	TYP	TYP	TYP	TYP	ONIT
C_{pd}	Power dissipation capacitance	f = 10 MHz	22	23	23	26	pF

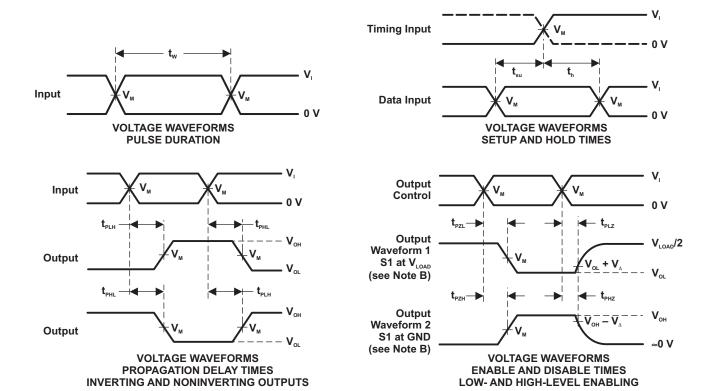


PARAMETER MEASUREMENT INFORMATION



TEST	S1
t _{PLH} /t _{PHL}	Open
t _{PLZ} /t _{PZL}	V _{LOAD}
t _{PHZ} /t _{PZH}	GND

.,	INF	PUTS	.,	V		-	.,,
V _{cc}	V,	t,/t,	V _M	V _{LOAD}	C _L	$R_{\scriptscriptstyle L}$	V _A
1.8 V ± 0.15 V	V _{cc}	≤2 ns	V _{cc} /2	2 × V _{cc}	30 pF	1 k Ω	0.15 V
2.5 V ± 0.2 V	V_{cc}	≤2 ns	V _{cc} /2	2 × V _{cc}	30 pF	500 Ω	0.15 V
3.3 V ± 0.3 V	3 V	≤2.5 ns	1.5 V	6 V	50 pF	500 Ω	0.3 V
5 V ± 0.5 V	V_{cc}	≤2.5 ns	V _{cc} /2	2 × V _{cc}	50 pF	500 Ω	0.3 V



NOTES: A. C. includes probe and jig capacitance.

- B. Waveform 1 is for an output with internal conditions such that the output is low, except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high, except when disabled by the output control.
- C. All input pulses are supplied by generators having the following characteristics: PRR \leq 10 MHz, Z_{o} = 50 Ω .
- D. The outputs are measured one at a time, with one transition per measurement.
- E. t_{PLZ} and \dot{t}_{PHZ} are the same as t_{dis} .
- F. t_{PZL} and t_{PZH} are the same as t_{en} .
- G. $t_{\mbox{\tiny PLH}}$ and $t_{\mbox{\tiny PHL}}$ are the same as $t_{\mbox{\tiny pd}}.$
- H. All parameters and waveforms are not applicable to all devices.

Figure 8. Load Circuit and Voltage Waveforms





11-Apr-2013

PACKAGING INFORMATION

Orderable Device	Status	Package Type	_	Pins	_	Eco Plan	Lead/Ball Finish	MSL Peak Temp	Op Temp (°C)	Top-Side Markings	Samples
	(1)		Drawing		Qty	(2)		(3)		(4)	
SN74LVC1G97QDBVRQ1	ACTIVE	SOT-23	DBV	6	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	C97O	Samples
SN74LVC1G97QDCKRQ1	ACTIVE	SC70	DCK	6	3000	Green (RoHS & no Sb/Br)	NIPDAU	Level-1-260C-UNLIM	-40 to 125	CSO	Samples

(1) The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

OBSOLETE: TI has discontinued the production of the device.

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.

TBD: The Pb-Free/Green conversion plan has not been defined.

Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

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OTHER QUALIFIED VERSIONS OF SN74LVC1G97-Q1:

⁽³⁾ MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

⁽⁴⁾ Multiple Top-Side Markings will be inside parentheses. Only one Top-Side Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Top-Side Marking for that device.





11-Apr-2013

● Catalog: SN74LVC1G97

Enhanced Product: SN74LVC1G97-EP

NOTE: Qualified Version Definitions:

- Catalog TI's standard catalog product
- Enhanced Product Supports Defense, Aerospace and Medical Applications

PACKAGE MATERIALS INFORMATION

www.ti.com 14-Mar-2013

TAPE AND REEL INFORMATION





	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*All dimensions are nominal

Device	Package Type	Package Drawing		SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74LVC1G97QDBVRQ1	SOT-23	DBV	6	3000	179.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
SN74LVC1G97QDCKRQ1	SC70	DCK	6	3000	179.0	8.4	2.2	2.5	1.2	4.0	8.0	Q3

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*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74LVC1G97QDBVRQ1	SOT-23	DBV	6	3000	203.0	203.0	35.0
SN74LVC1G97QDCKRQ1	SC70	DCK	6	3000	203.0	203.0	35.0

DBV (R-PDSO-G6)

PLASTIC SMALL-OUTLINE PACKAGE



NOTES:

- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Body dimensions do not include mold flash or protrusion. Mold flash and protrusion shall not exceed 0.15 per side.
- D. Leads 1,2,3 may be wider than leads 4,5,6 for package orientation.
- Falls within JEDEC MO-178 Variation AB, except minimum lead width.



DBV (R-PDSO-G6)

PLASTIC SMALL OUTLINE



NOTES:

- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Customers should place a note on the circuit board fabrication drawing not to alter the center solder mask defined pad.
- D. Publication IPC-7351 is recommended for alternate designs.
- E. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Example stencil design based on a 50% volumetric metal load solder paste. Refer to IPC-7525 for other stencil recommendations.



DCK (R-PDSO-G6)

PLASTIC SMALL-OUTLINE PACKAGE



NOTES: A. All linear dimensions are in millimeters.

- B. This drawing is subject to change without notice.
- C. Body dimensions do not include mold flash or protrusion. Mold flash and protrusion shall not exceed 0.15 per side.
- D. Falls within JEDEC MO-203 variation AB.



DCK (R-PDSO-G6)

PLASTIC SMALL OUTLINE



NOTES:

- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Customers should place a note on the circuit board fabrication drawing not to alter the center solder mask defined pad.
- D. Publication IPC-7351 is recommended for alternate designs.
- E. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Example stencil design based on a 50% volumetric metal load solder paste. Refer to IPC-7525 for other stencil recommendations.



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