

74LVQ02 Low Voltage Quad 2-Input NOR Gate

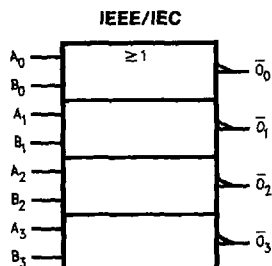
General Description

The LVQ02 contains four, 2-input NOR gates.

Features

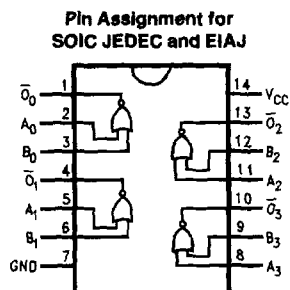
- Ideal for low power/low noise 3.3V applications
- Guaranteed simultaneous switching noise level and dynamic threshold performance
- Guaranteed pin-to-pin skew AC performance
- Guaranteed incident wave switching into 75Ω
- MIL-STD-883 54AC products are available for Military/Aerospace applications

Logic Symbol



TL/F/11342-1

Connection Diagram



TL/F/11342-2

Pin Names	Description
A_n, B_n	Inputs
$\bar{Q}_n$	Outputs

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	SOIC JEDEC	SOIC EIAJ
Order Number	74LVQ02SC 74LVQ02SCX	74LVQ02SJ 74LVQ02SJX
See NS Package Number	M14A	M14D

Absolute Maximum Ratings (Note)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Supply Voltage (V_{CC})	-0.5V to +7.0V
DC Input Diode Current (I_{IK})	
$V_I = -0.5V$	-20 mA
$V_I = V_{CC} + 0.5V$	+20 mA
DC Input Voltage (V_I)	-0.5V to $V_{CC} + 0.5V$
DC Output Diode Current (I_{OK})	
$V_O = -0.5V$	-20 mA
$V_O = V_{CC} + 0.5V$	+20 mA
DC Output Voltage (V_O)	-0.5V to $V_{CC} + 0.5V$
DC Output Source or Sink Current (I_O)	± 50 mA
DC V_{CC} or Ground Current (I_{CC} or I_{GND})	± 200 mA
Storage Temperature (T_{STG})	-65°C to +150°C
DC Latch-Up Source or Sink Current	± 100 mA

Note: The "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated at these limits. The parametric values defined in the "Electrical Characteristics" table are not guaranteed at the absolute maximum ratings. The "Recommended Operating Conditions" table will define the conditions for actual device operation.

Recommended Operating Conditions

Supply Voltage (V_{CC})	
LVQ	2.0V to 3.6V
Input Voltage (V_I)	0V to V_{CC}
Output Voltage (V_O)	0V to V_{CC}
Operating Temperature (T_A)	
74LVQ	-40°C to +85°C
Minimum Input Edge Rate ($\Delta V/\Delta t$)	
V_{IN} from 0.8V to 2.0V	
V_{CC} @ 3.0V	125 mV/ns

DC Characteristics

Symbol	Parameter	V _{CC} (V)	74LVQ02		74LVQ02	Units	Conditions
			T _A = +25°C		T _A = −40°C to +85°C		
			Typ	Guaranteed Limits			
V _{IH}	Minimum High Level Input Voltage	3.0	1.5	2.0	2.0	V	V _{OUT} = 0.1V or V _{CC} − 0.1V
V _{IL}	Maximum Low Level Input Voltage	3.0	1.5	0.8	0.8	V	V _{OUT} = 0.1V or V _{CC} − 0.1V
V _{OH}	Minimum High Level Output Voltage	3.0	2.99	2.9	2.9	V	I _{OUT} = −50 μA
		3.0		2.58	2.48	V	*V _{IN} = V _{IL} or V _{IH} I _{OH} = −12 mA
V _{OL}	Maximum Low Level Output Voltage	3.0	0.002	0.1	0.1	V	I _{OUT} = 50 μA
		3.0		0.36	0.44	V	*V _{IN} = V _{IL} or V _{IH} I _{OL} = 12 mA
I _{IN}	Maximum Input Leakage Current	3.6		±0.1	±1.0	μA	V _I = V _{CC} , GND

*All outputs loaded; thresholds on input associated with output under test.

DC Characteristics (Continued)

Symbol	Parameter	V _{CC} (V)	74LVQ02		74LVQ02	Units	Conditions
			T _A = +25°C		T _A ≈ −40°C to +85°C		
			Typ	Guaranteed Limits			
I _{OLD}	†Minimum Dynamic Output Current	3.6			36	mA	V _{OLD} = 0.8V Max (Note 1)
I _{OHD}		3.6			−25	mA	V _{OHD} = 2.0V Min (Note 1)
I _{CC}	Maximum Quiescent Supply Current	3.6		2.0	20.0	μA	V _{IN} = V _{CC} or GND
V _{OLP}	Quiet Output Maximum Dynamic V _{OL}	3.3	0.6	1.0		V	(Notes 2 & 3)
V _{OLV}	Quiet Output Minimum Dynamic V _{OL}	3.3	−0.7	−1.0		V	(Notes 2 & 3)
V _{IHD}	Maximum High Level Dynamic Input Voltage	3.3	1.7	2.0		V	(Notes 2 & 4)
V _{ILD}	Maximum Low Level Dynamic Input Voltage	3.3	1.7	0.8		V	(Notes 2 & 4)

†Maximum test duration 2.0 ms, one output loaded at a time.

Note 1: Incident wave switching on transmission lines with impedances as low as 75Ω for commercial temperature range is guaranteed for 74LVQ.

Note 2: Worst case package.

Note 3: Max number of outputs defined as (n). Data inputs are driven 0V to 3.3V; one output at GND.

Note 4: Max number of Data Inputs (n) switching. (n − 1) inputs switching 0V to 3.3V. Input-under-test switching: 3.3V to threshold (V_{ILD}), 0V to threshold (V_{IHD}). f = 1 MHz.

AC Electrical Characteristics: See Section 2 for Test Waveforms and Output Load

Symbol	Parameter	V _{CC} (V)	74LVQ02			74LVQ02		Units
			T _A = +25°C C _L = 50 pF			T _A = −40°C to +85°C C _L = 50 pF		
			Min	Typ	Max	Min	Max	
t _{PLH}	Propagation Delay	2.7 3.3 ± 0.3	1.5 1.5	6.0 5.0	10.6 7.5	1.0 1.0	12.0 8.0	ns
t _{PHL}	Propagation Delay	2.7 3.3 ± 0.3	1.5 1.5	6.0 5.0	10.6 7.5	1.0 1.0	12.0 8.0	ns
t _{OSHL} , t _{OSLH}	Output to Output Skew* Data to Output	2.7 3.3 ± 0.3		1.0 1.0	1.5 1.5		1.5 1.5	ns

*Skew is defined as the absolute value of the difference between the actual propagation delay for any two separate outputs of the same device. The specification applies to any outputs switching in the same direction, either HIGH to LOW (t_{OSHL}) or LOW to HIGH (t_{OSLH}). Parameter guaranteed by design.

Capacitance

Symbol	Parameter	Typ	Units	Conditions
C _{IN}	Input Capacitance	4.5	pF	V _{CC} = Open
C _{PD} (Note 1)	Power Dissipation Capacitance	20	pF	V _{CC} = 3.3V

Note 1: C_{PD} is measured at 10 MHz.