

# NC7LCX08

## Low Voltage Single 2-Input AND Gate with 5V Tolerant Inputs

### General Description

The LCX08 contains a single 2-input AND gate. The inputs tolerate voltages up to 7V allowing the interface of 5V systems to 3V systems.

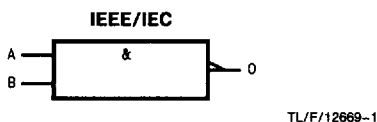
Tiny LCX logic allows designers to place logic exactly where it's needed on a printed circuit board. This eliminates excessive signal routing, saving board space and cost, improving reliability and reducing delays and skew introduced by the signal traces.

Tiny LCX logic in the TinyPak™ is fabricated with an advanced CMOS technology to achieve high speed operation while maintaining CMOS low power dissipation.

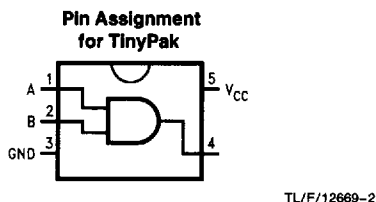
### Features

- 5V tolerant inputs
- 5.5 ns  $t_{PD}$  max, 10  $\mu$ A  $I_{CCQ}$  max
- Power down high impedance inputs and output
- Supports live insertion/withdrawal
- 2.0V–3.6V  $V_{CC}$  supply operation
- $\pm 24$  mA output drive
- Implements patented Quiet Series™ noise/EMI reduction circuitry
- Latch-up performance exceeds 500 mA

### Logic Symbol



### Connection Diagram



Pin Names	Description
A, B	Inputs
O	Output

	5-Pin SOT-23-5	Supplied As
Order Number	NC7LCX08M5 NC7LCX08M5X	250 Units in Tape and Reel 3000 Units in Tape and Reel
See NS Package Number	MA05B	

### Absolute Maximum Ratings (Note 1)

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

Symbol	Parameter	Value	Conditions	Units
V <sub>CC</sub>	Supply Voltage	-0.5 to +6.0		V
V <sub>I</sub>	DC Input Voltage	-0.5 to +6.0		V
V <sub>O</sub>	DC Output Voltage	-0.5 to V <sub>CC</sub> + 0.5	Output in High or Low State (Note 2)	V
I <sub>IK</sub>	DC Input Diode Current	-50	V <sub>I</sub> < GND	mA
I <sub>OK</sub>	DC Output Diode Current	-50 +50	V <sub>O</sub> < GND V <sub>O</sub> > V <sub>CC</sub>	mA
I <sub>O</sub>	DC Output Source/Sink Current	±50		mA
I <sub>CC</sub>	DC Supply Current per Supply Pin	±100		mA
I <sub>GND</sub>	DC Ground Current per Ground Pin	±100		mA
T <sub>STG</sub>	Storage Temperature	-65 to +150		°C

**Note 1:** 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.

**Note 2:** I<sub>O</sub> Absolute Maximum Rating must be observed.

### Recommended Operating Conditions

Symbol	Parameter	Min	Max	Units
V <sub>CC</sub>	Supply Voltage	Operating	2.0	3.6
		Data Retention	1.5	3.6
V <sub>I</sub>	Input Voltage	0	5.5	V
V <sub>O</sub>	Output Voltage	0	V <sub>CC</sub>	V
I <sub>OH</sub> /I <sub>OL</sub>	Output Current	V <sub>CC</sub> = 3.0V - 3.6V V <sub>CC</sub> = 2.7V	±24 ±12	mA
T <sub>A</sub>	Free-Air Operating Temperature	-40	85	°C
Δt/ΔV	Input Edge Rate, V <sub>IN</sub> = 0.8V-2.0V, V <sub>CC</sub> = 3.0V	0	10	ns/V

### DC Electrical Characteristics

Symbol	Parameter	Conditions	V <sub>CC</sub> (V)	T <sub>A</sub> = -40°C to +85°C		Units
				Min	Max	
V <sub>IH</sub>	HIGH Level Input Voltage		2.7-3.6	2.0		V
V <sub>IL</sub>	LOW Level Input Voltage		2.7-3.6		0.8	V
V <sub>OH</sub>	HIGH Level Output Voltage	I <sub>OH</sub> = -100 μA	2.7-3.6	V <sub>CC</sub> - 0.2		V
		I <sub>OH</sub> = -12 mA	2.7	2.2		V
		I <sub>OH</sub> = -18 mA	3.0	2.4		V
		I <sub>OH</sub> = -24 mA	3.0	2.2		V
V <sub>OL</sub>	LOW Level Output Voltage	I <sub>OL</sub> = 100 μA	2.7-3.6		0.2	V
		I <sub>OL</sub> = 12 mA	2.7		0.4	V
		I <sub>OL</sub> = 16 mA	3.0		0.4	V
		I <sub>OL</sub> = 24 mA	3.0		0.55	V
I <sub>I</sub>	Input Leakage Current	0 ≤ V <sub>I</sub> ≤ 5.5V	2.7-3.6		±5.0	μA
I <sub>OFF</sub>	Power-Off Leakage Current	V <sub>I</sub> or V <sub>O</sub> = 5.5V	0		10	μA
I <sub>CC</sub>	Quiescent Supply Current	V <sub>I</sub> = V <sub>CC</sub> or GND	2.7-3.6		10	μA
		3.6V ≤ V <sub>I</sub> , V <sub>O</sub> ≤ 5.5V	2.7-3.6		±10	μA
ΔI <sub>CC</sub>	Increase in I <sub>CC</sub> per Input	V <sub>IH</sub> = V <sub>CC</sub> - 0.6V	2.7-3.6		500	μA

### AC Electrical Characteristics

Symbol	Parameter	$T_A = -40^{\circ}\text{C to } +85^{\circ}\text{C}$				Units
		$V_{CC} = 3.3\text{V} \pm 0.3\text{V}$		$V_{CC} = 2.7\text{V}$		
		Min	Max	Min	Max	
$t_{PLH}$	Propagation Delay	1.5	5.5	1.5	6.2	ns
$t_{PHL}$		1.5	5.5	1.5	6.2	

### Capacitance

Symbol	Parameter	Conditions	Typical	Units
$C_{IN}$	Input Capacitance	$V_{CC} = \text{Open}, V_I = 0\text{V or } V_{CC}$	7	pF
$C_{OUT}$	Output Capacitance	$V_{CC} = 3.3\text{V}, V_I = 0\text{V or } V_{CC}$	8	pF
$C_{PD}$	Power Dissipation Capacitance	$V_{CC} = 3.3\text{V}, V_I = 0\text{V or } V_{CC}, F = 10\text{ MHz}$	25	pF