

74LCX16240

Low-Voltage 16-Bit Inverting Buffer/Line Driver with 5V Tolerant Inputs/Outputs

General Description

The LCX16240 contains sixteen inverting buffers with TRI-STATE® outputs designed to be employed as a memory and address driver, clock driver, or bus-oriented transmitter/receiver. The device is nibble controlled. Each nibble has separate TRI-STATE control inputs which can be shorted together for full 16-bit operation.

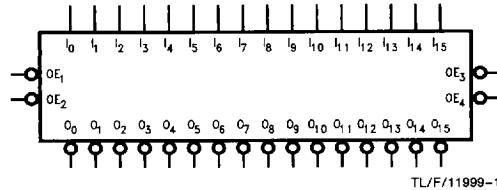
The LCX16240 is designed for low voltage (3.3V) V_{CC} applications with capacity of interfacing to a 5V signal environment.

The LCX16240 is fabricated with an advanced CMOS technology to achieve high speed operation while maintaining CMOS low power dissipation.

Features

- 4.5 ns t_{PD} max, 20 μ A I_{CCQ} max
- 5V tolerant inputs and outputs
- Power down high impedance inputs and outputs
- Supports live insertion/withdrawal
- 2.0V–3.6V V_{CC} supply operation
- ± 24 mA output drive
- Implements patented Quiet Series™ noise/EMI reduction circuitry
- Functionally compatible with the 74 series 16240
- Latch-up performance exceeds 500 mA
- ESD performance:
Human body model > 2500V
Machine model > 200V

Logic Symbol

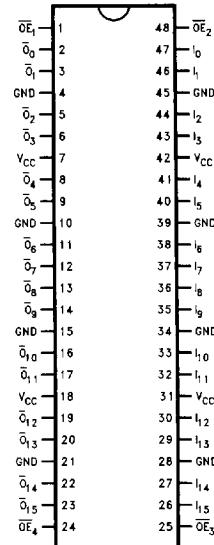


Pin Names	Description
\overline{OE}_n	Output Enable Inputs (Active Low)
l_0-l_{15}	Inputs
$\overline{O}_0-\overline{O}_{15}$	Outputs

	SSOP	TSSOP
Order Number	74LCX16240MEA 74LCX16240MEAX	74LCX16240MTD 74LCX16240MTDX
See NS Package Number	MS48A	MTD48

Connection Diagram

Pin Assignment for SSOP and TSSOP

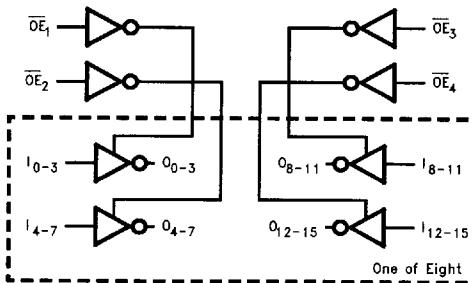


Functional Description

The LCX16240 contains sixteen inverting buffers with TRI-STATE standard outputs. The device is nibble (4 bits) controlled with each nibble functioning identically, but independent of the other. The control pins may be shorted together to obtain full 16-bit operation. The TRI-STATE out-

puts are controlled by an Output Enable (\overline{OE}_n) input for each nibble. When \overline{OE}_n is LOW, the outputs are in 2-state mode. When \overline{OE}_n is HIGH, the outputs are in the high impedance mode, but this does not interfere with entering new data into the inputs.

Logic Diagram



TL/F/11999-3

Truth Tables

Inputs		Outputs
\overline{OE}_1	I_0-I_3	$\overline{O}_0-\overline{O}_3$
L	L	H
L	H	L
H	X	Z

Inputs		Outputs
\overline{OE}_2	I_4-I_7	$\overline{O}_4-\overline{O}_7$
L	L	H
L	H	L
H	X	Z

Inputs		Outputs
\overline{OE}_3	I_8-I_{11}	$\overline{O}_8-\overline{O}_{11}$
L	L	H
L	H	L
H	X	Z

Inputs		Outputs
\overline{OE}_4	$I_{12}-I_{15}$	$\overline{O}_{12}-\overline{O}_{15}$
L	L	H
L	H	L
H	X	Z

H = High Voltage Level

L = Low Voltage Level

X = Immaterial

Z = High Impedance

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 _{CC}	Supply Voltage	-0.5 to +7.0		V
V _I	DC Input Voltage	-0.5 to +7.0		V
V _O	DC Output Voltage	-0.5 to +7.0	Output in TRI-STATE	V
		-0.5 to V _{CC} + 0.5	Output in High or Low State (Note 2)	V
I _{IK}	DC Input Diode Current	-50	V _I < GND	mA
I _{OK}	DC Output Diode Current	-50	V _O < GND	mA
		+50	V _O > V _{CC}	mA
I _O	DC Output Source/Sink Current	±50		mA
I _{CC}	DC Supply Current per Supply Pin	±100		mA
I _{GND}	DC Ground Current per Ground Pin	±100		mA
T _{STG}	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_O Absolute Maximum Rating must be observed.

Recommended Operating Conditions

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

DC Electrical Characteristics

Symbol	Parameter	Conditions	V _{CC} (V)	T _A = -40°C to +85°C		Units
				Min	Max	
V _{IH}	HIGH Level Input Voltage		2.7-3.6	2.0		V
V _{IL}	LOW Level Input Voltage		2.7-3.6		0.8	V
V _{OH}	HIGH Level Output Voltage	I _{OH} = -100 μA	2.7-3.6	V _{CC} - 0.2		V
		I _{OH} = -12 mA	2.7	2.2		V
		I _{OH} = -18 mA	3.0	2.4		V
		I _{OH} = -24 mA	3.0	2.2		V
V _{OL}	LOW Level Output Voltage	I _{OL} = 100 μA	2.7-3.6		0.2	V
		I _{OL} = 12 mA	2.7		0.4	V
		I _{OL} = 16 mA	3.0		0.4	V
		I _{OL} = 24 mA	3.0		0.55	V
I _I	Input Leakage Current	0 ≤ V _I ≤ 5.5V	2.7-3.6		±5.0	μA
I _{OZ}	TRI-STATE Output Leakage	0 ≤ V _O ≤ 5.5V V _I = V _{IH} or V _{IL}	2.7-3.6		±5.0	μA
I _{OFF}	Power-Off Leakage Current	V _I or V _O = 5.5V	0		10	μA
I _{CC}	Quiescent Supply Current	V _I = V _{CC} or GND	2.7-3.6		20	μA
		3.6V ≤ V _I , V _O ≤ 5.5V	2.7-3.6		±20	μA
ΔI _{CC}	Increase in I _{CC} per Input	V _{IH} = V _{CC} - 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_{PHL} t_{PLH}	Propagation Delay Data to Output	1.5 1.5	4.5 4.5	1.5 1.5	5.3 5.3	ns	
t_{PZL} t_{PZH}	Output Enable Time	1.5 1.5	5.4 5.4	1.5 1.5	6.0 6.0	ns	
t_{PLZ} t_{PHZ}	Output Disable Time	1.5 1.5	5.3 5.3	1.5 1.5	5.4 5.4	ns	
t_{OSHL} t_{OSLH}	Output to Output Skew (Note 1)		1.0 1.0			ns	

Note 1: 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}).

Dynamic Switching Characteristics

Symbol	Parameter	Conditions	V_{CC} (V)	$T_A = 25^\circ\text{C}$	Unit
				Typical	
V_{OLP}	Quiet Output Dynamic Peak V_{OL}	$C_L = 50\text{ pF}, V_{IH} = 3.3\text{V}, V_{IL} = 0\text{V}$	3.3	0.8	V
V_{OLV}	Quiet Output Dynamic Valley V_{OL}	$C_L = 50\text{ pF}, V_{IH} = 3.3\text{V}, V_{IL} = 0\text{V}$	3.3	0.8	V

Capacitance

Symbol	Parameter	Conditions	Typical	Units
C_{IN}	Input Capacitance	$V_{CC} = \text{Open}, V_I = 0\text{V} \text{ or } V_{CC}$	7	pF
C_{OUT}	Output Capacitance	$V_{CC} = 3.3\text{V}, V_I = 0\text{V} \text{ or } V_{CC}$	8	pF
C_{PD}	Power Dissipation Capacitance	$V_{CC} = 3.3\text{V}, V_I = 0\text{V} \text{ or } V_{CC}, F = 10\text{ MHz}$	20	pF