



January 1999
Revised January 1999

74LVT16244A • 74LVTH16244

Low Voltage 16-Bit Buffer/Line Driver with 3-STATE Outputs (Preliminary)

General Description

The LVT16244A and LVTH16244 contain sixteen non-inverting buffers with 3-STATE outputs designed to be employed as a memory and address driver, clock driver, or bus oriented transmitter/receiver. The device is nibble controlled. Individual 3-STATE control inputs can be shorted together for 8-bit or 16-bit operation.

The LVTH16244 data inputs include bushold, eliminating the need for external pull-up resistors to hold unused inputs.

These buffers and line drivers are designed for low-voltage (3.3V) V_{CC} applications, but with the capability to provide a TTL interface to a 5V environment. The LVT16244A and LVTH16244 are fabricated with an advanced BiCMOS

technology to achieve high speed operation similar to 5V ABT while maintaining a low power dissipation

Features

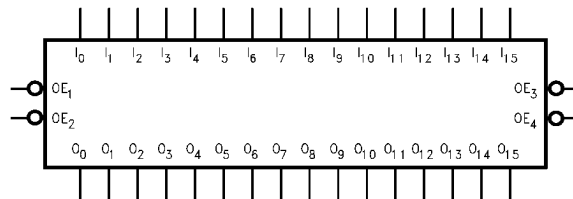
- Input and output interface capability to systems at 5V V_{CC}
- Bus-Hold data inputs eliminate the need for external pull-up resistors to hold unused inputs (74LVTH16244), also available without bushold feature (74LVT16244A).
- Live insertion/extraction permitted
- Power Up/Down high impedance provides glitch-free bus loading
- Outputs source/sink $-32\text{ mA}/+64\text{ mA}$
- Functionally compatible with the 74 series 16244
- Latch-up performance exceeds 500 mA

Ordering Code:

Order Number	Package Number	Package Description
74LVT16244AMEA	MS48A	48-Lead Small Shrink Outline Package (SSOP), JEDEC MO-118, 0.300" Wide
74LVT16244AMTD	MTD48	48-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 6.1mm Wide
74LVTH16244MEA	MS48A	48-Lead Small Shrink Outline Package (SSOP), JEDEC MO-118, 0.300" Wide
74LVTH16244MTD	MTD48	48-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 6.1mm Wide

Device also available in Tape and Reel. Specify by appending suffix letter "X" to the ordering code.

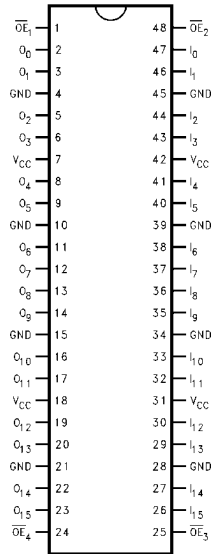
Logic Symbol



74LVT16244A • 74LVTH16244 Low Voltage 16-Bit Buffer/Line Driver with 3-STATE Outputs (Preliminary)

74LVT16244A • 74LVTH16244

Connection Diagram



Functional Description

The LVT16244A and LVTH16244 contain sixteen non-inverting buffers with 3-STATE outputs. The device is nibble (4 bits) controlled with each nibble functioning identically, but independent of the other. The control pins can be shorted together to obtain full 16-bit operation.

Pin Descriptions

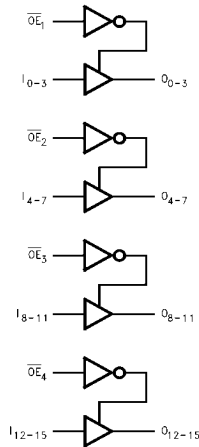
Pin Names	Description
$\overline{OE}_n$	Output Enable Inputs (Active Low)
I_0-I_{15}	Inputs
O_0-O_{15}	Outputs

Truth Table

Inputs		Outputs
$\overline{OE}_1$	I_0-I_3	O_0-O_3
L	L	L
L	H	H
H	X	Z
Inputs		Outputs
$\overline{OE}_2$	I_4-I_7	O_4-O_7
L	L	L
L	H	H
H	X	Z
Inputs		Outputs
$\overline{OE}_3$	I_8-I_{11}	O_8-O_{11}
L	L	L
L	H	H
H	X	Z
Inputs		Outputs
$\overline{OE}_4$	$I_{12}-I_{15}$	$O_{12}-O_{15}$
L	L	L
L	H	H
H	X	Z

H = High Voltage Level
L = Low Voltage Level
X = Immaterial
Z = High Impedance

Logic Diagram



Absolute Maximum Ratings(Note 1)

Symbol	Parameter	Value	Conditions	Units
V_{CC}	Supply Voltage	-0.5 to +4.6		V
V_I	DC Input Voltage	-0.5 to +7.0		V
V_O	Output Voltage	-0.5 to +7.0	Output in 3-STATE	V
		-0.5 to +7.0	Output in High or Low State (Note 2)	
I_{IK}	DC Input Diode Current	-50	$V_I < \text{GND}$	mA
I_{OK}	DC Output Diode Current	-50	$V_O < \text{GND}$	mA
I_O	DC Output Current	64	$V_O > V_{CC}$ Output at HIGH State	mA
		128	$V_O > V_{CC}$ Output at LOW State	
I_{CC}	DC Supply Current per Supply Pin	± 64		mA
I_{GND}	DC Ground Current per Ground Pin	± 128		mA
T_{STG}	Storage Temperature	-65 to +150		°C

Recommended Operating Conditions

Symbol	Parameter	Min	Max	Units
V_{CC}	Supply Voltage	2.7	3.6	V
V_I	Input Voltage	0	5.5	V
I_{OH}	High-Level Output Current		-32	mA
I_{OL}	Low-Level Output Current		64	mA
T_A	Free Air Operating Temperature	-40	+85	°C
$\Delta t/\Delta V$	Input Edge Rate, $V_{IN} = 0.8V-2.0V$, $V_{CC} = 3.0V$	0	10	ns/V

Note 1: Absolute Maximum continuous ratings are those values beyond which damage to the device may occur. Exposure to these conditions or conditions beyond those indicated may adversely affect device reliability. Functional operation under absolute maximum rated conditions is not implied.

Note 2: I_O Absolute Maximum Rating must be observed.

DC Electrical Characteristics

Symbol	Parameter	V_{CC} (V)	$T_A = -40^\circ\text{C to } +85^\circ\text{C}$			Units	Conditions
			Min	Typ (Note 3)	Max		
V_{IK}	Input Clamp Diode Voltage	2.7			-1.2	V	$I_I = -18 \text{ mA}$
V_{IH}	Input HIGH Voltage	2.7-3.6	2.0			V	$V_O \leq 0.1V$ or
V_{IL}	Input LOW Voltage	2.7-3.6			0.8	V	$V_O \geq V_{CC} - 0.1V$
V_{OH}	Output HIGH Voltage	2.7-3.6	$V_{CC} - 0.2$			V	$I_{OH} = -100 \mu\text{A}$
		2.7	2.4				$I_{OH} = -8 \text{ mA}$
		3.0	2.0				$I_{OH} = -32 \text{ mA}$
V_{OL}	Output LOW Voltage	2.7			0.2	V	$I_{OL} = 100 \mu\text{A}$
		2.7			0.5		$I_{OL} = 24 \text{ mA}$
		3.0			0.4		$I_{OL} = 16 \text{ mA}$
		3.0			0.5		$I_{OL} = 32 \text{ mA}$
$I_{I(HOLD)}$ (Note 4)	Bus-Hold Input Minimum Drive	3.0	75			μA	$V_I = 0.8V$
			-75				$V_I = 2.0V$
$I_{I(OP)}$ (Note 4)	Bus-Hold Input Over-Drive Current to Change State	3.0	500			μA	(Note 5)
			-500				(Note 6)
I_I	Input Current	3.6			10	μA	$V_I = 5.5V$
		Control Pins	3.6		± 1		$V_I = 0V$ or V_{CC}
		Data Pins	3.6		-5		$V_I = 0V$
					1		$V_I = V_{CC}$
I_{OFF}	Power Off Leakage Current	0			± 100	μA	$0V \leq V_I$ or $V_O \leq 5.5V$
$I_{PU/PD}$	Power Up/Down 3-STATE Current	0 - 1.5V			± 100	μA	$V_O = 0.5V$ to $3.0V$ $V_I = \text{GND}$ or V_{CC}
I_{OZL}	3-STATE Output Leakage Current	3.6			-5	μA	$V_O = 0.5V$
I_{OZH}	3-STATE Output Leakage Current	3.6			5	μA	$V_O = 3.0V$

DC Electrical Characteristics (Continued)

Symbol	Parameter	V _{CC} (V)	T _A = -40°C to +85°C			Units	Conditions
			Min	Typ (Note 3)	Max		
I _{OZH} ⁺	3-STATE Output Leakage Current	3.6			10	μA	V _{CC} < V _O ≤ 5.5V
I _{CCH}	Power Supply Current	3.6			0.19	mA	Outputs High
I _{CCL}	Power Supply Current	3.6			5.0	mA	Outputs Low
I _{CCZ}	Power Supply Current	3.6			0.19	mA	Outputs Disabled
I _{CCZ} ⁺	Power Supply Current	3.6			0.19	mA	V _{CC} ≤ V _O ≤ 5.5V, Outputs Disabled
ΔI _{CC}	Increase in Power Supply Current (Note 7)	3.6			0.2	mA	One Input at V _{CC} - 0.6V Other Inputs at V _{CC} or GND

Note 3: All typical values are at V_{CC} = 3.3V, T_A = 25°C.

Note 4: Applies to Bushold versions only.

Note 5: An external driver must source at least the specified current to switch from LOW to HIGH.

Note 6: An external driver must sink at least the specified current to switch from HIGH to LOW.

Note 7: This is the increase in supply current for each input that is at the specified voltage level rather than V_{CC} or GND.

Dynamic Switching Characteristics (Note 8)

Symbol	Parameter	V _{CC} (V)	T _A = 25°C			Units	Conditions C _L = 50 pF, R _L = 500Ω
			Min	Typ	Max		
V _{OLP}	Quiet Output Maximum Dynamic V _{OL}	3.3		0.8		V	(Note 9)
V _{OLV}	Quiet Output Minimum Dynamic V _{OL}	3.3		-0.8		V	(Note 9)

Note 8: Characterized in SSOP package. Guaranteed parameter, but not tested.

Note 9: Max number of outputs defined as (n). n-1 data inputs are driven 0V to 3V. Output under test held LOW.

AC Electrical Characteristics

Symbol	Parameter	T _A = -40°C to +85°C C _L = 50 pF, R _L = 500Ω					Units
		V _{CC} = 3.3V ±0.3V			V _{CC} = 2.7V		
		Min	Typ (Note 10)	Max	Min	Max	
t _{PLH}	Propagation Delay Data to Output	1.2		3.5	1.2	3.9	ns
t _{PHL}		1.2		3.5	1.2	3.9	
t _{PZH}	Output Enable Time	1.2		4.0	1.2	5.0	ns
t _{PZL}		1.2		5.0	1.2	6.5	
t _{PHZ}	Output Disable Time	2.2		4.7	2.2	5.2	ns
t _{PLZ}		2.0		4.2	2.0	4.4	
t _{OSHL}	Output to Output Skew			1.0		1.0	ns
t _{OSLH}	(Note 11)						

Note 10: All typical values are at V_{CC} = 3.3V, T_A = 25°C.

Note 11: 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 (Note 12)

Symbol	Parameter	Conditions	Typical	Units
C _{IN}	Input Capacitance	V _{CC} = 0V, V _I = 0V or V _{CC}	4	pF
C _{OUT}	Output Capacitance	V _{CC} = 3.0V, V _O = 0V or V _{CC}	9	pF

Note 12: Capacitance is measured at frequency f = 1 MHz, per MIL-STD-883B, Method 3012.

