

September 1999 Revised September 2003

74LVX541

Low Voltage Octal Buffer/Line Driver with 3-STATE Outputs

General Description

The LVX541 is an octal non-inverting buffer and line driver designed to be employed as a memory address driver, clock driver and bus oriented transmitter or receiver which provides improved PC board density. The inputs tolerate up to 7V allowing interface of 5V systems to 3V systems.

Features

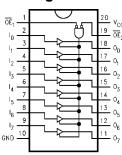
- Input voltage translation from 5V to 3V
- Ideal for low power/low noise 3.3V applications
- Guaranteed simultaneous switching noise level and dynamic threshold performance

Ordering Code:

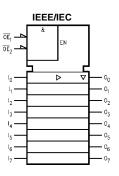
Order Number	Package Number	Package Description
74LVX541M	M20B	20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300" Wide
74LVX541SJ	M20D	20-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
74LVX541MTC	MTC20	20-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide

Surface mount packages are also available on Tape and Reel. Specify by appending the suffix letter "X" to the ordering code.

Connection Diagram



Logic Symbol



Pin Descriptions

Pin Names	Descriptions
$\overline{OE}_1, \overline{OE}_2$	3-STATE Output Enable Inputs
l ₀ - l ₇	Inputs
O ₀ - O ₇	3-STATE Outputs

Truth Table

	Inputs					
OE ₁	OE ₂	I	Outputs			
L	L	Н	Н			
Н	X	Χ	Z			
Х	Н	X	Z			
L	L	L	L			

H = HIGH Voltage Level X = Immaterial
L = LOW Voltage Level Z = High Impedance

Absolute Maximum Ratings(Note 1)

Supply Voltage (V $_{CC}$) -0.5V to +7.0V

DC Input Diode Current (I_{IK})

 $V_{l} = -0.5V$ -20 mA DC Input Voltage (V₁) -0.5V to 7V

DC Output Diode Current (I_{OK})

 $\begin{aligned} \text{V}_{\text{O}} &= -0.5 \text{V} & -20 \text{ mA} \\ \text{V}_{\text{O}} &= \text{V}_{\text{CC}} + 0.5 \text{V} & +20 \text{ mA} \end{aligned}$

-0.5V to $V_{CC} + 0.5$ V

DC Output Voltage (V_O)

DC Output Source

or Sink Current (I_O) ±25 mA

DC V_{CC} or Ground Current

Power Dissipation 180 mW

Recommended Operating Conditions (Note 2)

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 tables are not guaranteed at the absolute maximum ratings. The "Recommended Operating Conditions" table will define the conditions for actual device operation.

Note 2: Unused inputs must be held HIGH or LOW. They may not float

DC Electrical Characteristics

Symbol	Parameter	V _{cc}	$T_A = 25^{\circ}C$		$T_A = -40^{\circ}C \text{ to } +85^{\circ}C$		Units	Conditions	
Oyinboi		- 66	Min	Тур	Max	Min	Max	Units	Conditions
V _{IH}	HIGH Level Input	2.0	1.5			1.5			
	Voltage	3.0	2.0			2.0		V	
		3.6	2.4			2.4			
V _{IL}	LOW Level Input	2.0			0.5		0.5		
	Voltage	3.0			0.8		0.8	V	
		3.6			0.8		0.8		
V _{OH}	HIGH Level Output	2.0	1.9	2.0		1.9			$V_{IN} = V_{IH} \text{ or } V_{IL}$ $I_{OH} = -50 \mu A$ $I_{OH} = -50 \mu A$ $I_{OH} = -4 \text{ mA}$
	Voltage	3.0	2.9	3.0		2.9		V	$V_{IN} = V_{IH} \text{ or } V_{IL} I_{OH} = -50 \mu\text{A}$
		3.0	2.58			2.48			$I_{OH} = -4 \text{ mA}$
V _{OL}	LOW Level Output	2.0		0.0	0.1		0.1		$I_{OL} = 50 \mu A$
	Voltage	3.0		0.0	0.1		0.1	V	$V_{IN} = V_{IH} \text{ or } V_{IL} I_{OL} = 50 \mu\text{A}$
		3.0			0.36		0.44		I _{OL} = 4 mA
l _{OZ}	3-STATE Output	3.6			±0.25		±2.5	μА	$V_{IN} = V_{IH}$ or V_{IL}
	OFF-State Current	3.0			±0.25		±2.5	μΑ	$V_{OUT} = V_{CC}$ or GND
I _{IN}	Input Leakage Current	3.6			±0.1		±1.0	μΑ	V _{IN} = 5.5V or GND
I _{CC}	Quiescent Supply Current	3.6			4.0		40.0	μΑ	V _{IN} = V _{CC} or GND

Noise Characteristics (Note 3)

Symbol	Parameter	V _{CC} T _A = 25°C		Units	Conditions		
C)		(V)	Тур	Limits		- Containone	
V _{OLP}	Quiet Output Maximum Dynamic V _{OL}	3.3	0.5	0.8	V	C _L = 50 pF	
V _{OLV}	Quiet Output Minimum Dynamic V _{OL}	3.3	-0.5	-0.8	V	C _L = 50 pF	
V _{IHD}	Minimum HIGH Level Dynamic Input Voltage	3.3		2.0	V	C _L = 50 pF	
V _{ILD}	Maximum HIGH Level Dynamic Input Voltage	3.3		0.8	V	C _L = 50 pF	

Note 3: Input $t_r = t_f = 3 \text{ ns.}$

AC Electrical Characteristics

Symbol	Parameter	V _{CC}		$T_A = 25^{\circ}C$		$T_A = -40^{\circ}C \text{ to } +85^{\circ}C$			Conditions	
Symbol		(V)	Min	Тур	Max	Min	Max	Units	Conditions	
t _{PLH}	Propagation Delay	2.7		6.1	11.3	1.0	13.5		C _L = 15 pF	
t _{PHL}	Time			8.6	14.9	1.0	17.0	ns	C _L = 50 pF	
		3.3 ± 0.3		4.7	7.0	1.0	8.5	115	C _L = 15 pF	
				7.2	10.5	1.0	12.0		C _L = 50 pF	
t _{PZL}	3-STATE Output	2.7		7.1	13.8	1.0	16.5		C _L = 15 pF	
t_{PZH}	Enable Time								$R_L = 1 k\Omega$	
				9.6	17.3	1.0	20.0		C _L = 50 pF	
								ns	$R_L = 1 k\Omega$	
		3.3 ± 0.3		6.8	10.5	1.0	12.5	115	C _L = 15 pF	
									$R_L = 1 k\Omega$	
				9.3	14.0	1.0	16.0		C _L = 50 pF	
									$R_L = 1 k\Omega$	
t _{PLZ}	3-STATE Output	2.7		11.6	17.9	1.0	20.0	ns	C _L = 50 pF	
t_{PHZ}	Disable Time	3.3 ± 0.3		10.7	15.4	1.0	17.5	115	$R_L = 1 k\Omega$	
t _{OSLH}	Output to Output	2.7			1.5		1.5	ns	C _L = 50 pF	
toshL	Skew (Note 4)	3.3			1.5		1.5	113		

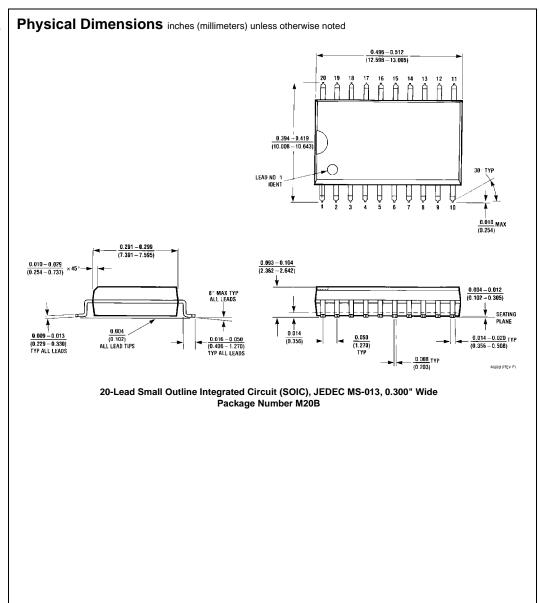
Note 4: Parameter guaranteed by design. $t_{OSLH} = |t_{PLHm} - t_{PLHn}|$; $t_{OSHL} = |t_{PHLm} - t_{PHLn}|$.

Capacitance

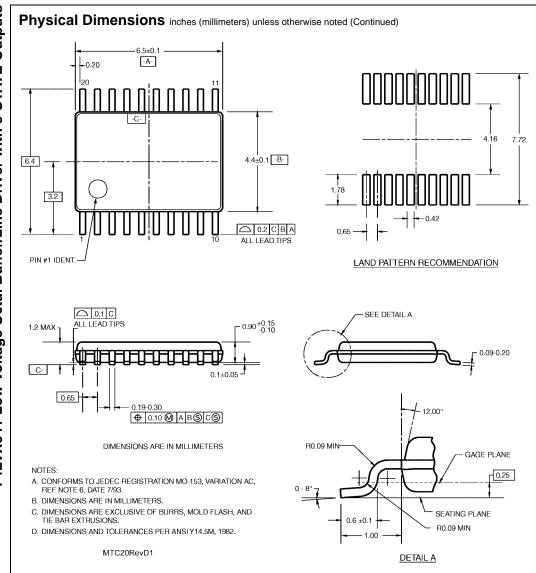
Symbol	Parameter		$\textbf{T}_{\boldsymbol{A}} = +25^{\circ}\textbf{C}$		T _A = -40°	Units	
	i diameter	Min	Тур	Max	Min	Max	Oilles
C _{IN}	Input Capacitance		4	10		10	pF
C _{OUT}	Output Capacitance		6				pF
C _{PD}	Power Dissipation Capacitance (Note 5)		19				pF

Note 5: C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

Average operating current can be obtained by the equation: $I_{CC(opr.)} = \frac{C_{PD} \times V_{CC} \times f_{IN} + I_{CC}}{8 \text{ (per bit)}}$



Physical Dimensions inches (millimeters) unless otherwise noted (Continued) 12.6±0.10 0.40 TYP --A-5.3±0.10 9.27 TYP 7.8 -B-3.9 0.2 C B A ALL LEAD TIPS 10 PIN #1 IDENT.-0.6 TYP 1.27 TYP LAND PATTERN RECOMMENDATION ALL LEAD TIPS SEE DETAIL A 0.1 C 1.8±0.1 -C-L _{0.15±0.05} 0.15-0.25 -1.27 TYP 0.35-0.51 ⊕ 0.12 **(** C A DIMENSIONS ARE IN MILLIMETERS GAGE PLANE 0.25 NOTES: A. CONFORMS TO EIAJ EDR-7320 REGISTRATION, ESTABLISHED IN DECEMBER, 1998. B. DIMENSIONS ARE IN MILLIMETERS. C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS. 0.60±0.15 SEATING PLANE 1.25 -M20DRevB1 DETAIL A 20-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide Package Number M20D



20-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide Package Number MTC20

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