



74LVX244

Low Voltage Octal Buffer/Line Driver with TRI-STATE® Outputs

General Description

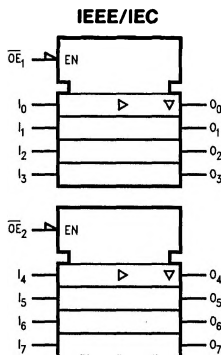
The LVX244 is an octal non-inverting buffer and line driver designed to be employed as a memory address driver, clock driver and bus oriented transmitter or receiver which provides improved PC board density. The inputs tolerate up to 7V allowing interface of 5V systems to 3V systems.

Features

- Input voltage translation from 5V to 3V
- Ideal for low power/low noise 3.3V applications
- Available in SOIC JEDEC, SOIC EIAJ and SSOP packages
- Guaranteed simultaneous switching noise level and dynamic threshold performance

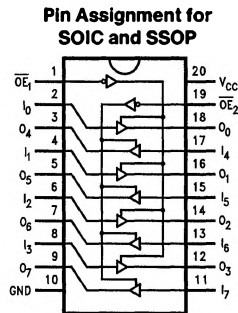
Ordering Code: See Section 11

Logic Symbol



TL/F/11552-2

Connection Diagram



TL/F/11552-1

Pin Names	Description
$\overline{OE}_1, \overline{OE}_2$	TRI-STATE Output Enable Inputs
I_0-I_7	Inputs
O_0-O_7	Outputs

Truth Tables

Inputs		Outputs (Pins 12, 14, 16, 18)
\overline{OE}_1	I_n	
L	L	L
L	H	H
H	X	Z

H = HIGH Voltage Level

X = Immaterial

Inputs		Outputs (Pins 3, 5, 7, 9)
\overline{OE}_2	I_n	
L	L	L
L	H	H
H	X	Z

L = LOW Voltage Level

Z = High Impedance

	SOIC JEDEC	SOIC EIAJ	SSOP TYPE I
Order Number	74LVX244M 74LVX244MX	74LVX244SJ 74LVX244SJX	74LVX244MSCX
See NS Package Number	M20B	M20D	MSC20

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
DC Input Voltage (V_I)	-0.5V to 7V
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)	± 25 mA
DC V_{CC} or Ground Current (I_{CC} or I_{GND})	± 75 mA
Storage Temperature (T_{STG})	-65°C to +150°C
Power Dissipation	180 mW

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})	2.0V to 3.6V
Input Voltage (V_I)	0V to 5.5V
Output Voltage (V_O)	0V to V_{CC}
Operating Temperature (T_A)	-40°C to +85°C
Input Rise and Fall Time ($\Delta t/\Delta V$)	0 ns/V to 100 ns/V

DC Electrical Characteristics

Symbol	Parameter	V_{CC}	74LVX244			74LVX244		Units	Conditions	
			$T_A = +25^\circ\text{C}$			$T_A = -40^\circ\text{C to } +85^\circ\text{C}$				
			Min	Typ	Max	Min	Max			
V_{IH}	High Level Input Voltage	2.0	1.5		1.5		V			
		3.0	2.0		2.0					
		3.6	2.4		2.4					
V_{IL}	Low Level Input Voltage	2.0		0.5		0.5	V			
		3.0		0.8		0.8				
		3.6		0.8		0.8				
V_{OH}	High Level Output Voltage	2.0	1.9	2.0	1.9		V	$V_{IN} = V_{IH}$ or V_{IL}	$I_{OH} = -50 \mu\text{A}$	
		3.0	2.9	3.0	2.9				$I_{OH} = -50 \mu\text{A}$	
		3.0	2.58		2.48				$I_{OH} = -4 \text{ mA}$	
V_{OL}	Low Level Output Voltage	2.0		0.0	0.1		V	$V_{IN} = V_{IH}$ or V_{IL}	$I_{OL} = 50 \mu\text{A}$	
		3.0		0.0	0.1				$I_{OL} = 50 \mu\text{A}$	
		3.0			0.36				$I_{OL} = 4 \text{ mA}$	
I_{OZ}	TRI-STATE Output Off-State Current	3.6		± 0.25		± 2.5	μA	$V_{IN} = V_{IH}$ or V_{IL} $V_{OUT} = V_{CC}$ or GND		
I_{IN}	Input Leakage Current	3.6		± 0.1		± 1.0	μA	$V_{IN} = 5.5V$ or GND		
I_{CC}	Quiescent Supply Current	3.6		4.0		40.0	μA	$V_{IN} = V_{CC}$ or GND		

Noise Characteristics: See Section 2 for Test Methodology

Symbol	Parameter	V _{CC} (V)	74LVX244		Units	C _L (pF)
			T _A = 25°C			
			Typ	Limit		
V _{OLP}	Quiet Output Maximum Dynamic V _{OL}	3.3	0.5	0.8	V	50
V _{OLV}	Quiet Output Minimum Dynamic V _{OL}	3.3	-0.5	-0.8	V	50
V _{IHD}	Minimum High Level Dynamic Input Voltage	3.3		2.0	V	50
V _{ILD}	Maximum Low Level Dynamic Input Voltage	3.3		0.8	V	50

Note: Input $t_r = t_f = 3$ ns

AC Electrical Characteristics: See Section 2 for Test Methodology

Symbol	Parameter	V _{CC} (V)	74LVX244			74LVX244		Units	Conditions
			T _A = +25°C			T _A = -40°C to +85°C			
			Min	Typ	Max	Min	Max		
t _{PLH} , t _{PHL}	Propagation Delay Time	2.7	6.1	11.4	1.0	13.5	ns	C _L = 15 pF	
			8.6	14.9	1.0	17.0		C _L = 50 pF	
		3.3 ± 0.3	4.7	7.1	1.0	8.5		C _L = 15 pF	
			7.2	10.6	1.0	12.0		C _L = 50 pF	
t _{PZL} , t _{PZH}	TRI-STATE Output Enable Time	2.7	7.1	13.8	1.0	16.5	ns	C _L = 15 pF, R _L = 1 kΩ	
			9.6	17.3	1.0	20.0		C _L = 50 pF, R _L = 1 kΩ	
		3.3 ± 0.3	5.5	8.8	1.0	10.5		C _L = 15 pF, R _L = 1 kΩ	
			8.0	12.3	1.0	14.0		C _L = 50 pF, R _L = 1 kΩ	
t _{PLZ} , t _{PHZ}	TRI-STATE Output Disable Time	2.7	11.6	16.0	1.0	19.0	ns	C _L = 50 pF, R _L = 1 kΩ	
		3.3 ± 0.3	9.7	11.4	1.0	13.0			
t _{OSLH} , t _{OSHL}	Output to Output Skew (Note 1)	2.7		1.5		1.5	ns	C _L = 50 pF	

Note 1: Parameter guaranteed by design. t_{OSLH} = |t_{PLHm} - t_{PLHn}|, t_{OSHL} = |t_{PHLm} - t_{PHLn}|

Capacitance

Symbol	Parameter	74LVX244			74LVX244		Units
		T _A = +25°C			T _A = -40°C to +85°C		
		Min	Typ	Max	Min	Max	
C _{IN}	Input Capacitance		4	10		10	pF
C _{OUT}	Output Capacitance		6				pF
C _{PD}	Power Dissipation Capacitance (Note 1)		19				pF

Note 1: 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: $I_{CC(opr.)} = \frac{C_{PD} \times V_{CC} \times f_{IN} + I_{CC}}{8 \text{ (per bit)}}$