TC74LCX244F/FW/FS

Low Voltage Octal Bus Buffer With 5V Tolerant Inputs and Outputs

The TC74LCX244 is a high performance CMOS OCTAL BUS BUFFER. Designed for use in 3.3 Volt systems, it achieves high speed operation while maintaining the CMOS low power dissipation.

The device is designed for low-voltage (3.3V) V_{CC} applications, but it could be used to interface to 5V supply environment for both inputs and outputs.

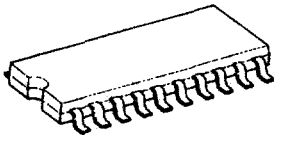
The 74LCX244 is non-inverting 3-state buffer having two active-low output enables. This device is designed to be used with 3-state memory address drivers, etc.

All inputs are equipped with protection circuits against static discharge.

Features

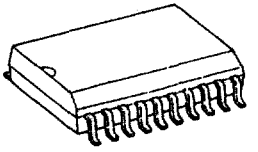
- Low Voltage Operation: V_{CC} = 2.0 ~ 3.6V
- High Speed Operation: t_{pd} = 6.5ns (Max.) (V_{CC} = 3.0 ~ 3.6V)
- Output Current: $|I_{OH}|/I_{OL}$ = 24mA (Min.) (V_{CC} = 3.0V)
- Latch-up Performance: ±500mA
- Available in JEDEC SOP, EIAJ SOP and SSOP
- Power down protection is provided on all inputs and outputs.
- Pin and Function Compatible with the 74 series
  - (74AC/VHC/HC/F/ALS/LS etc.) 244 type.

TC74LCX244F



SOP20-P-300

TC74LCX244FW

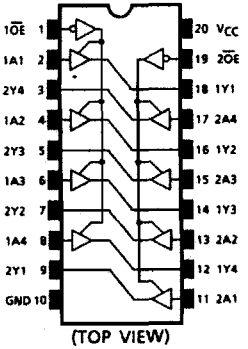


SOL20-P-300

TC74LCX244FS

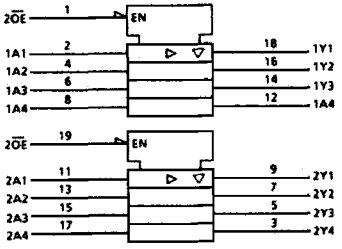
SSOP20-P-225A

Weight SOP20-P-300 : 0.22g (Typ.)
SOL20-P-300 : 0.46g (Typ.)
SSOP20-P-225A : 0.09g (Typ.)



(TOP VIEW)

Pin Assignment



IEC Logic Symbol

Truth Table

Inputs		Outputs
$\overline{OE}$	A_n	
L	L	L
L	H	H
H	X	Z

X: Don't Care
Z: High Impedance

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Supply Voltage Range	V_{CC}	-0.5 ~ 7.0	V
DC Input Voltage	V_{IN}	-0.5 ~ 7.0	V
DC Output Voltage	V_{OUT}	-0.5 ~ 7.0 (Note 1) -0.5 ~ V_{CC} + 0.5 (Note 2)	V
Input Diode Current	I_{IK}	-50	mA
Output Diode Current	I_{OK}	±50 (Note 3)	mA
DC Output Current	I_{OUT}	±50	mA
Power Dissipation	P_D	180	mW
DC V_{CC}/Ground Current	I_{CC}/I_{GND}	±100	mA
Storage Temperature	T_{stg}	-65 ~ 150	°C

(Note 1) Off-State
(Note 2) High or Low State. I_{OUT} absolute maximum rating must be observed.
(Note 3) V_{OUT} < GND, V_{OUT} > V_{CC}

Recommended Operating Conditions

Parameter	Symbol	Value	Unit
Supply Voltage	V_{CC}	2.0 ~ 3.6 1.5 ~ 3.6 (Note 4)	V
Input Voltage	V_{IN}	0 ~ 5.5	V
Output Voltage	V_{OUT}	0 ~ 5.5 (Note 5) 0 ~ V_{CC} (Note 6)	V
Output Current	I_{OH}/I_{OL}	±24 (Note 7) ±12 (Note 8)	mA
Operating Temperature	T_{opr}	-40 ~ 85	°C
Input Rise and Fall Time	dt/dv	0 ~ 10 (Note 9)	ns/V

(Note 4) Data Retension Only
(Note 5) Off-State
(Note 6) High or Low State
(Note 7) V_{CC} = 3.0 ~ 3.6V
(Note 8) V_{CC} = 2.7 ~ 3.0V
(Note 9) V_{IN} = 0.8 ~ 2.0V, V_{CC} = 3.0V

Electrical Characteristics

DC Characteristics (Ta = -40 ~ 85°C)

Parameter		Symbol	Test Condition		V_{CC} (V)	Min.	Max.	Unit
Input Voltage	"H" level	V_{IH}	–		2.7 ~ 3.6	2.0	–	V
	"L" level	V_{IL}	–		2.7 ~ 3.6	–	0.8	V
Output Voltage	"H" level	V_{OH}	V_{IN} = V_{IH} or V_{IL}	I_{OH} = -100μA I_{OH} = -12mA I_{OH} = -18mA I_{OH} = -24mA	2.7 ~ 3.6 2.7 3.0 3.0	V_{CC} - 0.2 2.2 2.4 2.2	– – – –	V
	"L" level	V_{OL}	V_{IN} = V_{IH} or V_{IL}	I_{OL} =100μA I_{OL} =12mA I_{OL} =16mA I_{OL} = 24mA	2.7 ~ 3.6 2.7 3.0 3.0	– – – –	0.2 0.4 0.4 0.55	V
Input Leakage Current		I_{IN}	V_{IN} = 0 ~ 5.5V		2.7 ~ 3.6	–	±5.0	μA
3-State Output Off-State Current		I_{OZ}	V_{IN} = V_{IH} or V_{IL} V_{OUT} = 0 ~ 5.5V		2.7 ~ 3.6	–	±5.0	μA
Power Off Leakage Current		I_{OFF}	V_{IN}/V_{OUT} = 5.5V		0	–	10.0	μA
Quiescent Supply Current		I_{CC}	V_{IN} = V_{CC} or GND		2.7 ~ 3.6	–	10.0	μA
			V_{IN}/V_{OUT} = 3.6 ~ 5.5V		2.7 ~ 3.6	–	±10.0	
Increase in I_{CC} per Input		ΔI_{CC}	V_{IH} = V_{CC} - 0.6V		2.7 ~ 3.6	–	500	μA

AC Characteristics (Ta = -40 ~ 85°C)

Parameter	Symbol	Test Condition	V_{CC} = (V)	Min.	Max.	Unit
Propagation Delay Time	t_{pLH} t_{pHL}	(Fig. 1, 2)	2.7	–	7.5	ns
			3.3±0.3	1.5	6.5	
Output Enable Time	t_{pZL} t_{pZH}	(Fig. 1, 3)	2.7	–	9.0	ns
			3.3±0.3	1.5	8.0	
Output Disable Time	t_{pLZ} t_{pHZ}	(Fig. 1, 3)	2.7	–	8.0	ns
			3.3±0.3	1.5	7.0	
Output to Output Skew	t_{osLH} t_{osHL}	(Note 10)	2.7	–	–	ns
			3.3±0.3	–	1.0	

(Note 10) Parameter guaranteed by design. ($t_{osLH} = |t_{pLHm} - t_{pLHn}|$, $t_{osHL} = |t_{pHLm} - t_{pHLn}|$)

Dynamic Switching Characteristics (Ta = 25°C, Input $t_r = t_f$ = 2.5ns, C_L = 50pF, R_L = 500Ω)

Parameter	Symbol	Test Condition	V_{CC}(V)	Typical	Unit
Quiet Output Maximum Dynamic V_{OL}	V_{OLP}	V_{IH} = 3.3V, V_{IL} = 0V	3.3	0.8	V
Quiet Output Minimum Dynamic V_{OL}	$\|V_{OLV}\|$	V_{IH} = 3.3V, V_{IL} = 0V	3.3	0.8	V

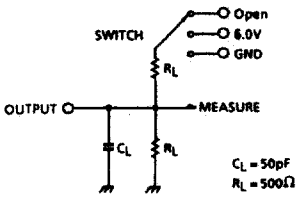
Capacitive Characteristics (Ta = 25°C)

Parameter	Symbol	Test Condition	V_{CC}(V)	Typical	Unit
Input Capacitance	C_{IN}	–	3.3	7	pF
Bus Input Capacitance	C_{OUT}	–	3.3	8	pF
Power Dissipation Capacitance	C_{PD}	f_{IN} = 10MHz (Note 11)	3.3	25	pF

(Note 11) 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.) = C_{PD} • V_{CC} • f_{IN} + I_{CC}/8 (per bit)

TEST CIRCUIT

Fig.1



Parameter	Switch
tpLH, tpHL	Open
tpLZ, tpZL	6.0V
tpHZ, tpZH	GND

AC WAVEFORM

Fig.2 t_{pLH}, t_{pHL}

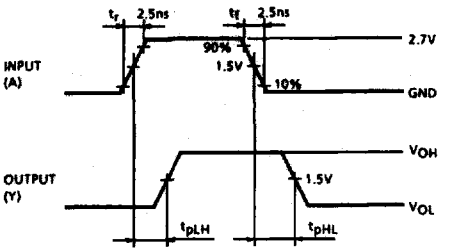
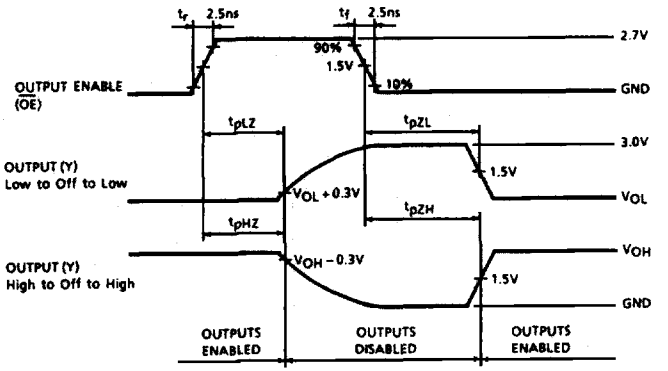


Fig.3 t_{pLZ}, t_{pHZ}, t_{pZL}, t_{pZH}



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