

# TC74LCX08F/FN/FS

## TENTATIVE DATA

### LOW-VOLTAGE QUAD 2-INPUT AND GATE WITH 5V TOLERANT INPUTS AND OUTPUTS

The TC74LCX08 is a high performance CMOS 2-INPUT AND GATE. Designed for use in 3.3 Volt systems, it achieves high speed operation while maintaining the CMOS low power dissipation.

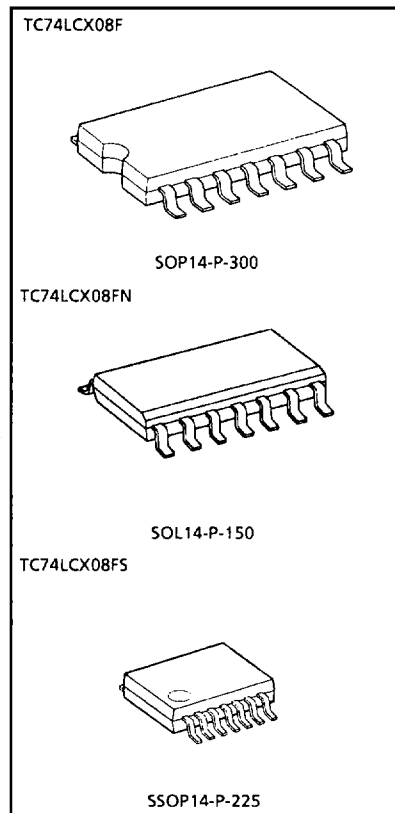
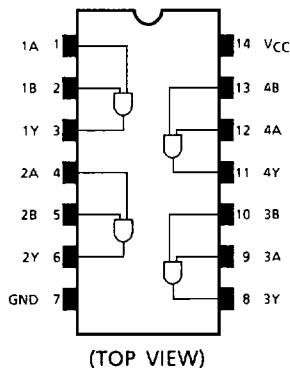
The device is designed for low-voltage (3.3V)  $V_{CC}$  applications, but it could be used to interface to 5V supply environment for inputs.

All inputs are equipped with protection circuits against static discharge.

#### FEATURES

- Low Voltage Operation :  $V_{CC} = 2.0 \sim 3.6V$
- High Speed Operation :  $t_{pd} = 5.5 \text{ ns (max.)}$  at  $V_{CC} = 3.0 \sim 3.6V$
- Output Current :  $|I_{OH}|/|I_{OL}| = 24\text{mA (min.)}$  at  $V_{CC} = 3.0V$
- Latch-up Performance :  $\pm 500\text{mA}$
- 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. ) 08 type.

#### PIN CONNECTION

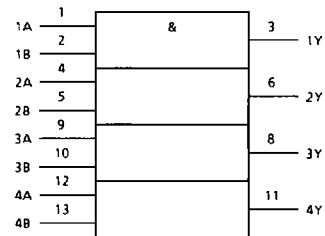


Weight SOP14-P-300 : 0.18g (Typ.)  
SOL14-P-150 : 0.12g (Typ.)  
SSOP14-P-225 : 0.07g (Typ.)

TRUTH TABLE

INPUTS		OUTPUTS
A	B	Y
L	L	L
L	H	L
H	L	L
H	H	H

IEC LOGIC SYMBOL



MAXIMUM RATINGS

PARAMETER	SYMBOL	RATING	UNIT
Power Supply Voltage	$V_{CC}$	-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)	V
		-0.5~ $V_{CC}$ +0.5 (Note 2)	
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)  $V_{CC}=0V$

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

(Note 4) Data Retention Only

(Note 5)  $V_{CC}=0V$

(Note 6) High or Low State

(Note 7)  $V_{CC}=3.0\sim 3.6V$

(Note 8)  $V_{CC}=2.7\sim 3.0V$

(Note 9)  $V_{IN}=0.8\sim 2.0V$ ,  $V_{CC}=3.0V$

**ELECTRICAL CHARACTERISTICS**

DC characteristics ( $T_a = -40\sim 85^\circ C$ )

CHARACTERISTIC	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	$V_{OH}$	$V_{IN} = V_{IH}$	$I_{OH} = -100\mu A$	2.7~3.6	$V_{CC} - 0.2$	—	V
				$I_{OH} = -12mA$	2.7	2.2	—	
				$I_{OH} = -18mA$	3.0	2.4	—	
				$I_{OH} = -24mA$	3.0	2.2	—	
	"L" Level	$V_{OL}$	$V_{IN} = V_{IH} \text{ or } V_{IL}$	$I_{OL} = 100\mu A$	2.7~3.6	—	0.2	V
				$I_{OL} = 12mA$	2.7	—	0.4	
				$I_{OL} = 16mA$	3.0	—	0.4	
				$I_{OL} = 24mA$	3.0	—	0.55	
Input Leakage Current	$I_{IN}$	$V_{IN} = 0\sim 5.5V$	2.7~3.6	—	$\pm 5.0$	$\mu A$		
Power Off Leakage Current	$I_{OFF}$	$V_{IN} / V_{OUT} = 5.5V$	0	—	10.0	$\mu A$		
Quiescent Supply Current	$I_{CC}$	$V_{IN} = V_{CC} \text{ or } GND$	2.7~3.6	—	10.0	$\mu A$		
		$V_{IN} / V_{OUT} = 3.6\sim 5.5V$	2.7~3.6	—	$\pm 10.0$			
Increase In $I_{CC}$ Per Input	$\Delta I_{CC}$	$V_{IH} = V_{CC} - 0.6V$	2.7~3.6	—	500	$\mu A$		

AC characteristics (Ta = -40~85°C)

PARAMETER	SYMBOL	TEST CONDITION	VCC (V)	MIN.	MAX.	UNIT
Propagation Delay Time	t <sub>pLH</sub>	(Fig. 1, 2)	2.7	—	6.2	ns
	t <sub>pHL</sub>		3.3 ± 0.3	1.5	5.5	
Output To Output Skew	t <sub>osLH</sub>	(Note 10)	2.7	—	—	ns
	t <sub>osHL</sub>		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<sub>r</sub> = t<sub>f</sub> = 2.5ns, C<sub>L</sub> = 50pF, R<sub>L</sub> = 500Ω)

PARAMETER	SYMBOL	TEST CONDITION	VCC (V)	TYP	UNIT
Quiet Output Maximum Dynamic V <sub>OL</sub>	V <sub>OLP</sub>	V <sub>IH</sub> = 3.3V, V <sub>IL</sub> = 0V	3.3	TBD	V
Quiet Output Minimum Dynamic V <sub>OL</sub>	V <sub>OLV</sub>	V <sub>IH</sub> = 3.3V, V <sub>IL</sub> = 0V	3.3	TBD	V

CAPACITIVE CHARACTERISTICS (Ta = 25°C)

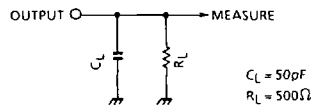
PARAMETER	SYMBOL	TEST CONDITION	VCC (V)	TYP	UNIT
Input Capacitance	C <sub>IN</sub>	—	3.3	TBD	pF
Power Dissipation Capacitance	C <sub>PD</sub>	f <sub>IN</sub> = 10MHz (Note 11)	3.3	TBD	pF

 (Note 11) C<sub>PD</sub> 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 :

$$I_{CC} (opr.) = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC} / 4 \text{ (Per gate)}$$

Fig.1 TEST CIRCUIT



AC WAVEFORM

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

