TC74LVX86F/FN/FS

Quad Exclusive OR Gate

The TC74LVX86 is a high speed CMOS EXCLUSIVE OR GATE fabricated with silicon gate C^2MOS technology.

Designed for use in 3.3 Volt systems, it achieves high speed operation while maintaining the CMOS low power dissipation.

This device is suitable for low voltage and battery operated systems.

The internal circuit is included on output buffer, which provide high noise immunity and stable output.

An input protection circuit ensures that 0 to 7V can be applied to the input pins without regard to the supply voltage.

This device can be used to interface 5V to 3V systems and two supply systems such as battery back up.

This circuit prevents device destruction due to mismatched supply and input voltages.

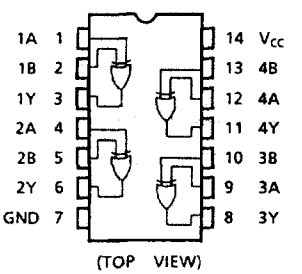
Features

- High Speed: t_{pd} = 5.8ns (Typ.) at V_{CC} = 3.3V
- Low Power Dissipation: I_{CC} = 2μA (Max.) at Ta = 25°C
- Input Voltage Level:
  - V_{IL} = 0.8V (Max.) at V_{CC} = 3V
  - V_{IH} = 2.0V (Min.) at V_{CC} = 3V
- Power Down Protection is provided on all inputs.
- Balanced Propagation Delays: $t_{pLH} \approx t_{pHL}$
- Low Noise: V_{OLP} = 0.5V (Max.)
- Pin and Function Compatible with 74HC86

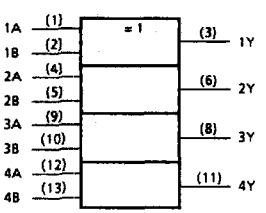
F (SOP14-P-300)
Weight : 0.18g (TYP.)

FN (SOL14-P-150)
Weight : 0.12g (TYP.)

FS (SSOP14-P-225)
Weight : 0.07g (TYP.)



Pin Assignment



IEC Logic Symbol

Truth Table

Inputs		Outputs
A	B	Y
L	L	L
L	H	H
H	L	H
H	H	L

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 ~ V_{CC} + 0.5	V
Input Diode Current	I_{IK}	-20	mA
Output Diode Current	I_{OK}	±20	mA
DC Output Current	I_{OUT}	±25	mA
DC V_{CC}/Ground Current	I_{CC}	±50	mA
Power Dissipation	P_D	180	mW
Storage Temperature	T_{stg}	-65 ~ 150	°C
Lead Temperature 10sec	T_L	300	°C

Recommended Operating Conditions

Parameter	Symbol	Value	Unit
Supply Voltage	V_{CC}	2.0 ~ 3.6	V
Input Voltage	V_{IN}	0 ~ 5.5	V
Output Voltage	V_{OUT}	0 ~ V_{CC}	V
Operating Temperature	T_{opr}	-40 ~ 85	°C
Input Rise and Fall Time	dt/dv	0 ~ 100	ns/V

DC Electrical Characteristics

Parameter	Symbol	Test Condition		V_{CC} (V)	Ta = 25°C Min	Ta = 25°C Typ.	Ta = 25°C Max.	Ta = -40 ~ 85°C Min.	Ta = -40 ~ 85°C Max.	Unit
High-Level Input Voltage	V_{IH}			2.0	1.5	–	–	1.5	–	V
				3.0	2.0	–	–	2.0	–	
				3.6	2.4	–	–	2.4	–	
Low-Level Input Voltage	V_{IL}			2.0	–	–	0.5	–	0.5	
				3.0	–	–	0.8	–	0.8	
				3.6	–	–	0.8	–	0.8	
High-Level Output Voltage	V_{OH}	V_{IN} = V_{IH} or V_{IL}	I_{OH} = -50μA	2.0	1.9	2.0	–	1.9	–	
			I_{OH} = -50μA	3.0	2.9	3.0	–	2.9	–	
			I_{OH} = -4mA	3.0	2.58	–	–	2.48	–	
Low-Level Output Voltage	V_{OL}	V_{IN} = V_{IH} or V_{IL}	I_{OL} = 50μA	2.0	–	0.0	0.1	–	0.1	
			I_{OL} = 50μA	3.0	–	0.0	0.1	–	0.1	
			I_{OL} = 4mA	3.0	–	–	0.36	–	0.44	
Input Leakage Current	I_{IN}	V_{IN} = 5.5V or GND		3.6	–	–	±0.1	–	±1.0	μA
Quiescent Supply Current	I_{CC}	V_{IN} = V_{CC} or GND		3.6	–	–	2.0	–	20.0	

AC Electrical Characteristics (Input $t_r = t_f = 3ns$)

Parameter	Symbol	Test Condition			Ta = 25°C			Ta = -40 ~ 85°C		Unit
			V_{CC} (V)	C_L (pF)	Min	Typ.	Max.	Min.	Max.	
Propagation Delay Time	t_{pLH} t_{pHL}		2.7	15	–	7.5	14.5	1.0	17.5	ns
				50	–	10.0	18.0	1.0	21.0	
			3.3±0.3	15	–	5.8	9.3	1.0	11.0	
				50	–	8.3	12.8	1.0	14.5	
Output to Output Skew	t_{osLH} t_{osHL}	(Note 1)	2.7	50	–	–	1.5	–	1.5	
			3.3±0.3	50	–	–	1.5	–	1.5	
Input Capacitance	C_{IN}	(Note 2)			–	4	10	–	10	pF
Power Dissipation Capacitance	C_{PD}	(Note 3)			–	18	–	–	–	

Note (1) Parameter guaranteed by design. $t_{osLH} = |t_{pLHm} - t_{pLHn}|$, $t_{osHL} = |t_{pHLm} - t_{pHLn}|$

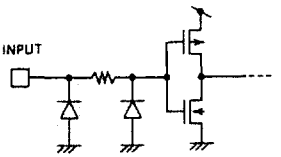
Note (2) Parameter guaranteed by design.

Note (3) C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption. Average operating current can be obtained by the equation:

$I_{CC}(opr) = C_{PD} \bullet V_{CC} \bullet f_{IN} + I_{CC}/4$ (per Gate)

Noise Characteristics (Input $t_r = t_f = 3ns$, $C_L = 50pF$)

Parameter	Symbol	Test Condition	Ta = 25°C		Unit
		V_{CC}	Typ.	Max.	
Quiet Output Maximum Dynamic V_{OL}	V_{OLP}	–	3.3	0.3	0.5	V
Quiet Output Minimum Dynamic V_{OL}	V_{OLV}	–	3.3	-0.3	-0.5	V
Minimum High Level Dynamic Input Voltage	V_{IHD}	–	3.3	–	2.0	V
Maximum Low Level Dynamic Input Voltage	V_{ILD}	–	3.3	–	0.8	V



Input Equivalent Circuit

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