

- ◆ **CMOS Inverter**
- ◆ **High Speed Operation $t_{pd}=4.0ns$ TYP**
- ◆ **Operating Voltage Range 2V~5.5V**
- ◆ **Low Power Consumption $1\mu A$ MAX**

Applications

- Crystal Oscillators
- Palmtops
- Digital Equipment

General Description

The XC74UL04AA is a CMOS Inverter, manufactured using silicon gate CMOS fabrication.

CMOS low power circuit operation makes high speed LS-TTL operations achievable.

The internal non-buffered, single-step composition makes the XC74UL04AA suitable to use with crystal oscillators.

As the XC74UL04AA is integrated into mini molded, SSOT-25 and SOT-25 packages, high density mounting is possible.

Features

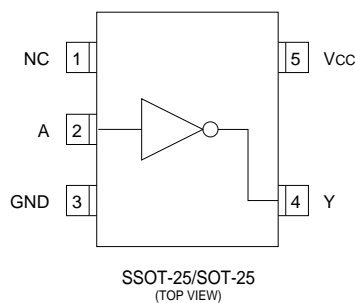
High Speed Operation: $t_{pd}=4.0ns$ TYP

Operating Voltage Range: 2V~5.5V

Low Power Consumption: $1\mu A$ MAX

Space Saving Package: SSOT-25 and SOT-25

Pin Configuration



Function

INPUT	OUTPUT
A	Y
H	L
L	H

H=High level, L=Low level

Absolute Maximum Ratings

$T_a = -40^\circ C \sim 85^\circ C$

PARAMETER	SYMBOL	RATINGS	UNITS
Power Supply Voltage	VCC	-0.5 ~ +6.0	V
Input Voltage	VIN	-0.5 ~ +6.0	V
Output Voltage	VOU	-0.5 ~ VCC +0.5	V
Input Diode Current	I _{IK}	-20	mA
Output Diode Current	I _{OK}	±20	mA
Output Current	I _{OUT}	±25	mA
VCC ,GND Current	I _{CC} , I _{GND}	±50	mA
Continuous Total Power Dissipation	P _d	150	mW
Storage Temperature	T _{stg}	-65 ~ +150	°C

Note: Voltage is all Ground standardized.

Ordering Information

XC74UL xxxxxx
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DESIGNATOR	DESCRIPTION
a	Package Type N=SSOT-25 M=SOT-25
b	Device Orientation R=Embossed Tape (Orientation of Device:Right) L=Embossed Tape (Orientation of Device:Left)

DC Electrical Characteristics

PARAMETER	SYMBOL	V _{CC} (V)	CONDITIONS	Ta=25°C			Ta=-40-85°C		UNITS	
				MIN	TYP	MAX	MIN	MAX		
Input Voltage	V _{IH}	2.0		1.5	-	-	1.5	-	V	
		3.0		2.1	-	-	2.1	-		
		5.5		3.85	-	-	3.85	-		
	V _{IL}	2.0		-	-	0.5	-	0.5	V	
		3.0		-	-	0.9	-	0.9		
		5.5		-	-	1.65	-	1.65		
Output Voltage	V _{OH}	2.0	V _{IN} =V _{IH} or V _{IL}	I _{OH} =-50μA	1.9	2.0	-	1.9	-	V
		3.0			2.9	3.0	-	2.9	-	
		4.5			4.4	4.5	-	4.4	-	
		3.0			2.58	-	-	2.48	-	
		4.5			3.94	-	-	3.80	-	
	V _{OL}	2.0		I _{OL} =50μA	-	-	0.1	-	0.1	V
		3.0			-	-	0.1	-	0.1	
		4.5			-	-	0.1	-	0.1	
		3.0			-	-	0.36	-	0.44	
		4.5			-	-	0.36	-	0.44	
Input Current	I _{IN}	5.5	V _{IN} =V _{CC} or GND	-0.1	-	0.1	-1.0	1.0	μA	
Quiescent Supply Current	I _{CC}	5.5	V _{IN} =V _{CC} or GND, I _{OUT} =0μA	-	-	1.0	-	10.0		

Switching Electrical Characteristics

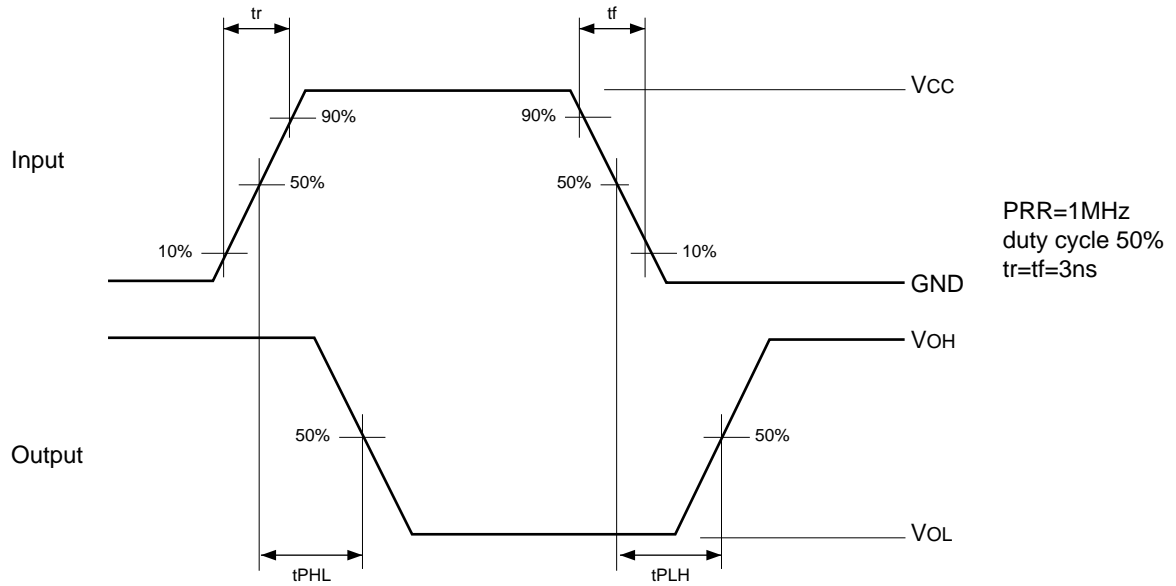
tr=tf=3ns

PARAMETER	SYMBOL	C _L	V _{CC} (V)	CONDITIONS	Ta=25°C			Ta=-40-85°C		UNITS
					MIN	TYP	MAX	MIN	MAX	
Propagation Delay Time	t _{PLH}	15pF	3.3		-	2.7	7.1	1	8.5	ns
			5.0		-	2.1	5.5	1	6.5	
		50pF	3.3		-	4.1	10.6	1	12	ns
			5.0		-	3.2	7.5	1	8.5	
	t _{PHL}	15pF	3.3		-	2.5	7.1	1	8.5	ns
			5.0		-	2.0	5.5	1	6.5	
		50pF	3.3		-	3.9	10.6	1	12	ns
			5.0		-	3.0	7.5	1	8.5	
Input Capacitance	C _{IN}	-	5.0	V _{IN} =V _{CC} or GND	-	2	10	-	10	pF
Power Dissipation Capacitance	C _{pd}			No Load, f=1MHz	-	8.9	-	-	-	pF

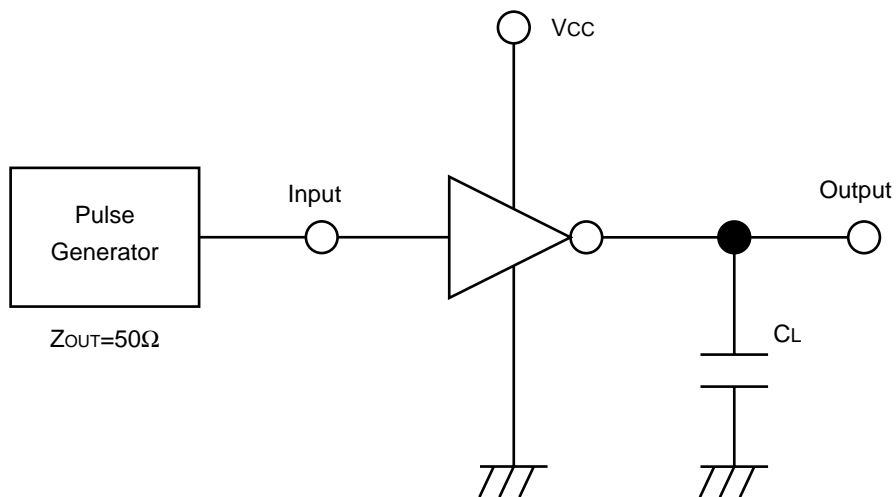
Recommended Operating Conditions

PARAMETER	SYMBOL	V _{CC} (V)	CONDITIONS	UNITS
Supply Voltage	V _{CC}	-	2 ~ 5.5	V
Input Voltage	V _{IN}	-	0 ~ 5.5	V
Output Voltage	V _{OUT}	-	0 ~ V _{CC}	V
Operating Temperature	T _{opr}	-	-40 ~ +85	°C
Output Current	I _{OH}	3.0	-4	mA
		4.5	-8	
	I _{OL}	3.0	4	
		4.5	8	
Input Rise and Fall Time	tr, tf	3.3	0 ~ 100	ns/V
		5.0	0 ~ 20	

Waveforms



Typical Application Circuit



Note: open output when measuring supply current

DC Electrical Characteristics

PARAMETER	SYMBOL	V _{CC} (V)	CONDITIONS	Ta=25°C			Ta=-40~85°C		UNITS	
				MIN	TYP	MAX	MIN	MAX		
Input Voltage	V _{IH}	2.0		1.7	-	-	1.7	-	V	
		3.0		2.4	-	-	2.4	-		
		5.5		4.4	-	-	4.4	-		
	V _{IL}	2.0		-	-	0.3	-	0.3	V	
		3.0		-	-	0.6	-	0.6		
		5.5		-	-	1.1	-	1.1		
Output Voltage	V _{OH}	2.0	V _{IN} =V _{IL}	I _{OH} =-50μA	1.8	2.0	-	1.8	-	V
		3.0			2.7	3.0	-	2.7	-	
		4.5			4.0	4.5	-	4.0	-	
		3.0		I _{OH} =-4mA	2.58	-	-	2.48	-	
		4.5		I _{OH} =-8mA	3.94	-	-	3.80	-	
	V _{OL}	V _{IN} =V _{IH}	I _{OL} =50μA	2.0	-	-	0.2	-	0.2	V
				3.0	-	-	0.3	-	0.3	
				4.5	-	-	0.5	-	0.5	
			3.0	I _{OL} =4mA	-	-	0.36	-	0.44	
			4.5	I _{OL} =8mA	-	-	0.36	-	0.44	
Input Current	I _{IN}	5.5	V _{IN} =V _{CC} or GND	-0.1	-	0.1	-1.0	1.0	μA	
Quiescent Supply Current	I _{CC}	5.5	V _{IN} =V _{CC} or GND, I _{OUT} =0μA	-	-	1.0	-	10.0		

Switching Electrical Characteristics

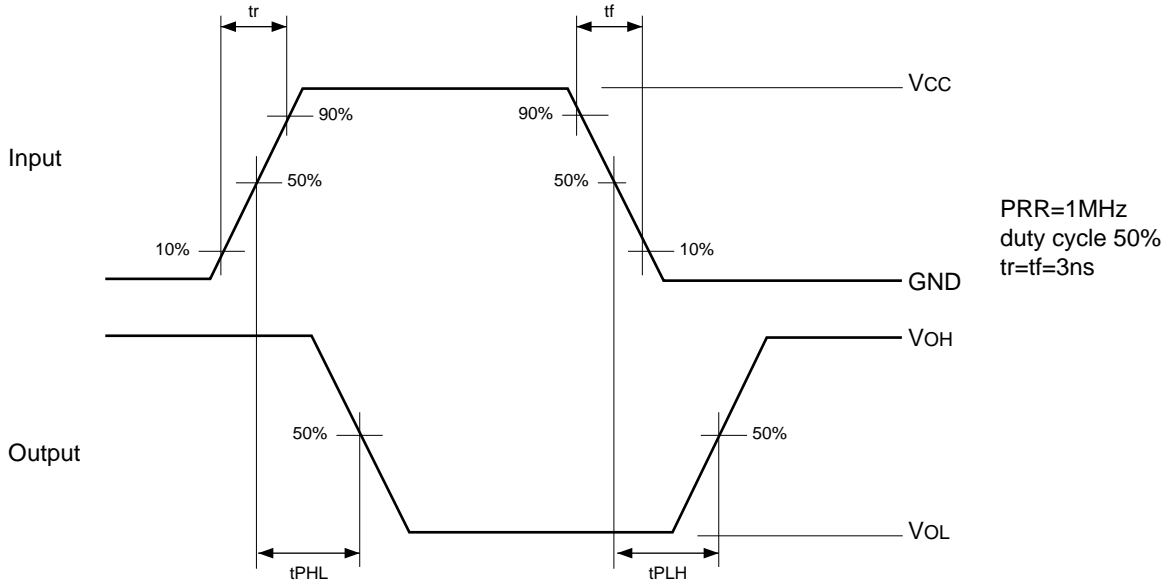
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PARAMETER	SYMBOL	C _L	V _{CC} (V)	CONDITIONS	Ta=25°C			Ta=-40~85°C		UNITS
					MIN	TYP	MAX	MIN	MAX	
Propagation Delay Time	t _{PLH}	15pF	3.3		-	2.8	8.9	1	10.5	ns
			5.0		-	2.4	5.5	1	6.5	
		50pF	3.3		-	4.5	11.4	1	13	ns
			5.0		-	3.6	7	1	8	
	t _{PHL}	15pF	3.3		-	2.7	8.9	1	10.5	ns
			5.0		-	2.2	5.5	1	6.5	
		50pF	3.3		-	4.2	11.4	1	13	ns
			5.0		-	3.5	7	1	8	
Input Capacitance	C _{IN}	-	5.0	V _{IN} =V _{CC} or GND	-	2	10	-	10	pF
Power Dissipation Capacitance	C _{pd}			No Load, f=1MHz	-	16	-	-	-	pF

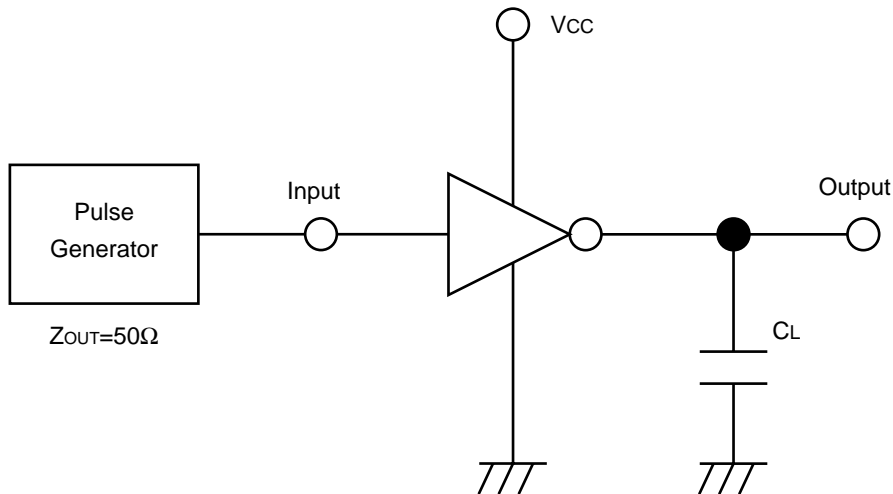
Recommended Operating Conditions

PARAMETER	SYMBOL	V _{CC} (V)	CONDITIONS	UNITS
Supply Voltage	V _{CC}	-	2 ~ 5.5	V
Input Voltage	V _{IN}	-	0 ~ 5.5	V
Output Voltage	V _{OUT}	-	0 ~ V _{CC}	V
Operating Temperature	T _{opr}	-	-40 ~ +85	°C
Output Current	I _{OH}	3.0	-4	mA
		4.5	-8	
	I _{OL}	3.0	4	
		4.5	8	
Input Rise and Fall Time	tr, tf	3.3	0 ~ 100	ns/V
		5.0	0 ~ 20	

Waveforms



Typical Application Circuit



Note: open output when measuring supply current