

## CMOS Logic

## ■ GENERAL DESCRIPTION

The XC74ULU04A is a CMOS Inverter, manufactured using silicon gate CMOS fabrication.

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

The internal circuit is composed of a single stage inverter, so can be used in the crystal oscillator.

As the XC74ULU04A is integrated into mini molded, SSOT-25 and SON-6 packages, high density mounting is possible.

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## ■ APPLICATIONS

- Crystal oscillators
- Palmtops
- Digital equipment

## ■ FEATURES

**High Speed Operation** : tpd = 2.3ns (TYP.)

**Operating Voltage Range** : 2V ~ 5.5V

**Low Power Consumption** : 1  $\mu$  A (MAX.)

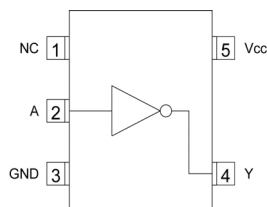
**CMOS Inverter**

**Unbuffered Type**

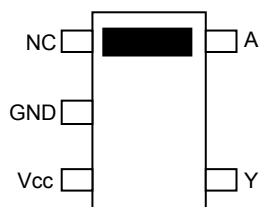
**Ultra Small Packages** : SSOT-25, SON-6\*

\* Under Development

## ■ PIN CONFIGURATION



SSOT-25  
(TOP VIEW)  
XC74ULU04AN



SON-6  
(TOP VIEW)  
XC74ULU04AR

## ■ FUNCTIONS

INPUT	OUTPUT
A	Y
H	L
L	H

H=High level

L=Low level

## ■ ABSOLUTE MAXIMUM RATINGS

Ta=-40°C~85°C

PARAMETER	SYMBOL	RATINGS	UNITS
Supply Voltage	VCC	-0.5~+6.0	V
Input Voltage	VIN	-0.5~+6.0	V
Output Voltage	VOUT	-0.5~VCC+0.5	V
Input Diode Current	I <sub>IK</sub>	-20	mA
Output Diode Current	I <sub>OK</sub>	±20	mA
Output Current	I <sub>OUT</sub>	±25	mA
VCC,GND Current	I <sub>CC</sub> ,I <sub>GND</sub>	±50	mA
Power Dissipation	SSOT-25* <sup>1</sup>	150	mW
	SON-6* <sup>2</sup>	200	
Storage Temperature Range	T <sub>stg</sub>	-65~+150	°C

Voltage is all ground standardized.

\* 1) Ta=55°C

\* 2) Ta=25°C

## RECOMMENDED OPERATING CONDITIONS

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

## DC ELECTRICAL CHARACTERISTICS

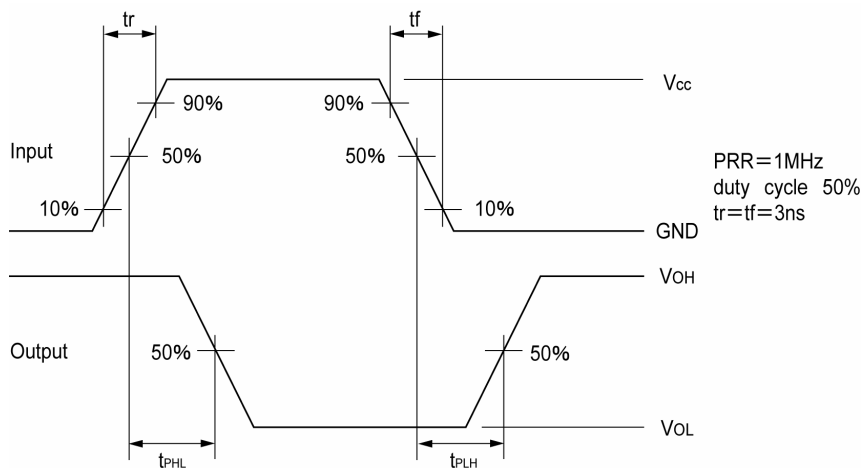
PARAMETER	SYMBOL	V <sub>CC</sub> (V)	CONDITIONS	Ta=25°C			Ta=-40°C~85°C		UNITS		
				MIN.	TYP.	MAX.	MIN.	MAX.			
Input Voltage	V <sub>IH</sub>	2.0		1.7	—	—	1.7	—	V		
		3.0		2.4	—	—	2.4	—			
		5.5		4.4	—	—	4.4	—			
	V <sub>IL</sub>	2.0		—	—	0.3	—	0.3	V		
		3.0		—	—	0.6	—	0.6			
		5.5		—	—	1.1	—	1.1		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

## SWITCHING ELECTRICAL CHARACTERISTICS

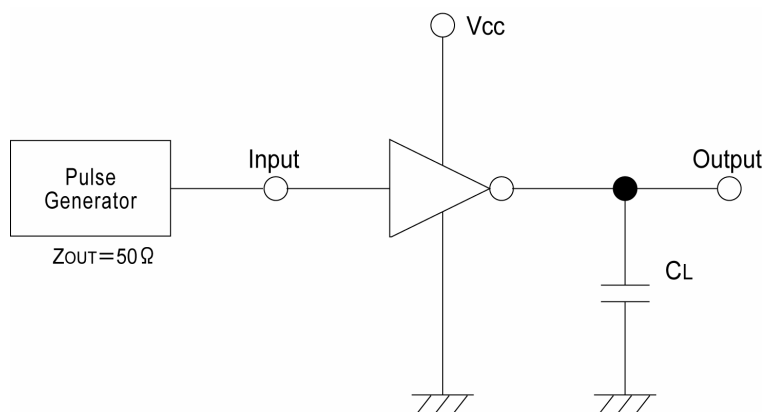
t<sub>r</sub>=t<sub>f</sub>=3ns

PARAMETER	SYMBOL	C <sub>L</sub>	V <sub>CC</sub> (V)	CONDITIONS	Ta=25°C			Ta=-40°C~85°C		UNITS
					MIN.	TYP.	MAX.	MIN.	MAX.	
Delay Time	t <sub>PLH</sub>	15pF	3.3		—	2.8	8.9	1.0	10.5	ns
			5.0		—	2.4	5.5	1.0	6.5	
		50pF	3.3		—	4.5	11.4	1.0	13.0	ns
			5.0		—	3.6	7.0	1.0	8.0	
	t <sub>PHL</sub>	15pF	3.3		—	2.7	8.9	1.0	10.5	ns
			5.0		—	2.2	5.5	1.0	6.5	
		50pF	3.3		—	4.2	11.4	1.0	13.0	ns
			5.0		—	3.5	7.0	1.0	8.0	
Input Capacitance	C <sub>IN</sub>	—	5.0	V <sub>IN</sub> =V <sub>CC</sub> or GND	—	2	10	—	10	pF
Power Dissipation Capacitance	C <sub>pd</sub>	No Load, f=1MHz			—	16	—	—	—	pF

## ■ WAVEFORM



## ■ TEST CIRCUIT



Note: Open output when measuring supply current

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