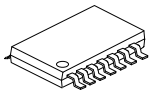
HEX INVERTERS



TSSOP-14

■ DESCRIPTION

The **U74LVCU04** is designed specifically for 1.6V to 3.6V V_{CC} operation.

This device contains six independent inverters with unbuffered outputs and performs the Boolean function $Y = \overline{A}$ in positive logic.

This device is fully specified for partial-power-down applications using I_{OFF}. The I_{OFF} circuitry disables the outputs, preventing damaging current backflow through the device when it is powered down.

■ FEATURES

* Operate from 1.65V to 3.6V
* Inputs accept voltages to 5.5V
* I_{OFF} supports partial-power-down mode
* Low power dissipation: I_{CC}=1μA (Max.)
* ±24mA output drive (V_{CC}=3.3V)
* Unbuffered Outputs

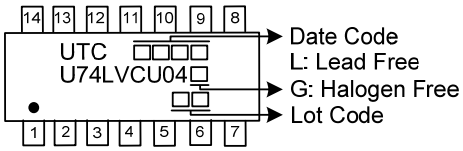
■ ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74LVCU04L-P14-R	U74LVCU04G-P14-R	TSSOP-14	Tape Reel

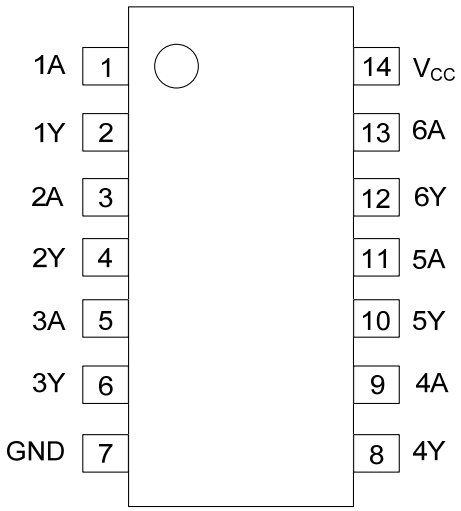
U74LVCU04G-P14-R
- (1)Packing Type
- (2)Package Type
- (3)Green Package

(1) R: Tape Reel
(2) P14: TSSOP-14
(3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING



■ PIN CONFIGURATION

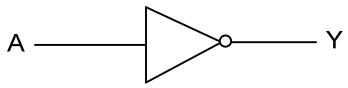


■ FUNCTION TABLE (each gate)

INPUT (A)	OUTPUT (Y)
H	L
L	H

Note: H: HIGH Voltage Level L: LOW Voltage Level

■ LOGIC DIAGRAM (positive logic)



■ ABSOLUTE MAXIMUM RATING (T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V_{CC}	-0.5 ~ +6.5	V
Input Voltage	V_{IN}	-0.5 ~ +6.5	V
Output Voltage	V_{OUT}	-0.5 ~ V_{CC}+0.5	V
Continuous Output Current	I_{OUT}	±50	mA
Continuous Current Through V_{CC} or GND		±100	mA
Input Clamp Current (V_{IN}<0)	I_{IK}	-50	mA
Output Clamp Current (V_{OUT}<0)	I_{OK}	-50	mA
Storage Temperature Range	T_{STG}	-65 ~ +150	°C

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	V_{CC}	Operating	1.65		3.6	V
		Data retention only	1.5			V
Input Voltage	V_I		0		5.5	V
Output Voltage	V_O		0		V_{CC}	V
Operating Temperature	T_A		-40		+125	°C

■ ELECTRICAL CHARACTERISTICS (Unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	T_A=25°C			T_A=-40~+125°C			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
High-Level Input Voltage	V_{IH}	V_{CC}=1.65V	1.32			1.5			V
		V_{CC}=2.3V	1.84			2.0			V
		V_{CC}=2.7V	2.16			2.16			V
		V_{CC}=3V	2.4			2.4			V
		V_{CC}=3.6V	2.88			2.88			V
Low-Level Input Voltage	V_{IL}	V_{CC}=1.65V			0.4			0.4	V
		V_{CC}=2.3V			0.5			0.5	V
		V_{CC}=2.7~3.6V			0.65			0.65	V
High-Level Output Voltage	V_{OH}	V_{CC}=1.65~3.6V, I_{OH}=-100μA	V_{CC} -0.2			V_{CC} -0.3			V
		V_{CC}=1.65V, I_{OH}=-4mA	1.2			1.05			V
		V_{CC}=2.3V, I_{OH}=-8mA	1.7			1.65			V
		V_{CC}=2.7V, I_{OH}=-12mA	2.2			2.05			V
		V_{CC}=3V, I_{OH}=-12mA	2.4			2.25			V
		V_{CC}=3V, I_{OH}=-24mA	2.2			2.0			V
Low-Level Output Voltage	V_{OL}	V_{CC}=1.65~3.6V, I_{OL}=100μA			0.2			0.6	V
		V_{CC}=1.65V, I_{OL}=4mA			0.45			0.65	V
		V_{CC}=2.3V, I_{OL}=8mA			0.7			0.8	V
		V_{CC}=2.7V, I_{OL}=12mA			0.4			0.8	V
		V_{CC}=3V, I_{OL}=24mA			0.55			0.8	V
Input Leakage Current	I_I	V_{CC}=3.6V, V_{IN}= 5.5V or GND			±0.1			±0.1	μA
Quiescent Supply Current	I_{CC}	V_{CC}=3.6V, V_{IN}= V_{CC} or GND, I_{OUT}=0			1			10	μA
Additional Quiescent Supply Current Per Input Pin	ΔI_{CC}	V_{CC}=2.7 ~ 3.6V, One input at V_{CC}-0.6V, other inputs at V_{CC} or GND			500			5000	μA
Input Capacitance	C_{IN}	V_{CC}=3.3V, V_{IN}=V_{CC} or GND		8			-		pF

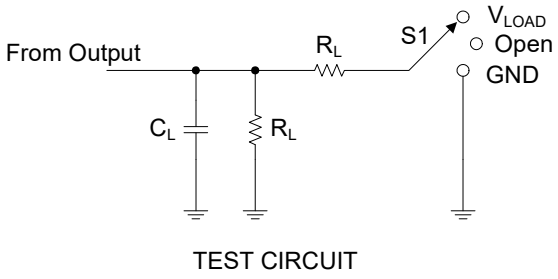
■ SWITCHING CHARACTERISTIC (Unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	T_A=25°C			T_A=-40~+125°C			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
Propagation Delay From Input (A) to Output(Y)	t_{PD}	V_{CC}=1.8V±0.15V	0.3	5.3	7.9	0.3		9.0	ns
		V_{CC}=2.5V±0.2V	0.5	3.6	6.8	0.5		7.0	ns
		V_{CC}=2.7V	0.5	3.4	4.8	0.5		6.0	ns
		V_{CC}=3.3V±0.3V	0.5	3.2	4.1	0.5		5.0	ns

■ OPERATING CHARACTERISTICS (f=10MHz, T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	C_{PD}	V_{CC}=1.8V		3		pF
		V_{CC}=2.5V		4		pF
		V_{CC}=3.3V		5		pF

■ TEST CIRCUIT AND WAVEFORMS

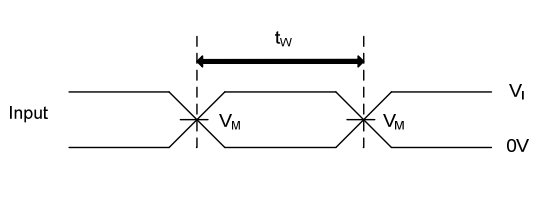


TEST CIRCUIT

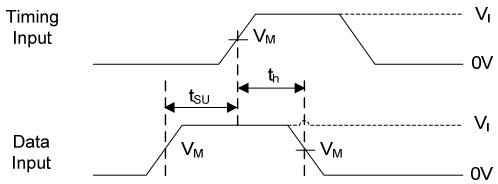
TEST	S1
t_{PLH} / t_{PHL}	OPEN
t_{PLZ} / t_{PZL}	V_{LOAD}
t_{PHZ} / t_{PZL}	GND

Fig.1 Load circuitry for switching times.

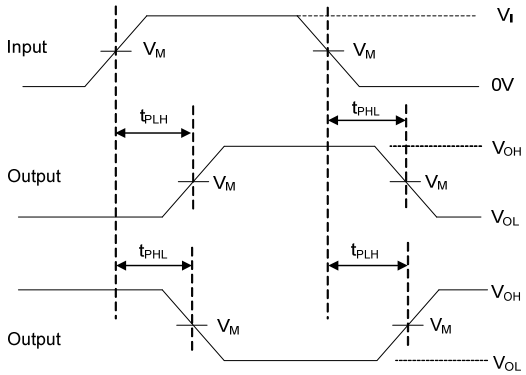
V_{CC}	V_{IN}	t_R,/t_F	V_M	V_{LOAD}	C_L	R_L	V_Δ
1.8V±0.15V	V_{CC}	≤2ns	V_{CC}/2	2×V_{CC}	30pF	1KΩ	0.15V
2.5V±0.2V	V_{CC}	≤2ns	V_{CC}/2	2×V_{CC}	30pF	500Ω	0.15V
2.7V	2.7V	≤2.5ns	1.5V	6V	50pF	500Ω	0.3V
3.3V±0.3V	2.7 V	≤2.5ns	1.5V	6V	50pF	500Ω	0.3V



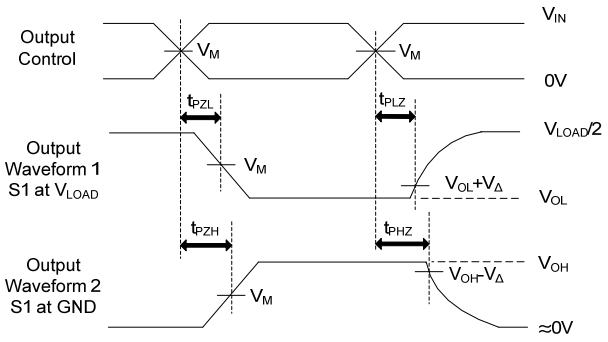
PULSE DURATION



SETUP AND HOLD TIMES



PROPAGATION DELAY TIMES



ENABLE AND DISABLE TIMES

Fig. 2 Propagation delay from input to output and input voltage waveforms.

■ TEST CIRCUIT AND WAVEFORMS (Cont)

Notes: 1. C_L includes probe and jig capacitance.
2. Waveform 1 is for an output with internal conditions such that the output is low, except when disabled by the output control.
   Waveform 2 is for an output with internal conditions such that the output is high, except when disabled by the output control
3. All input pulses are supplied by generators having the following characteristics: PRR 10 MHz, Z = 50 Ω, slew rate 1 V/ns.
4. The outputs are measured one at a time, with one transition per measurement.
5. t_{PLH} and t_{PHZ} are the same as t_{dis}.
6. t_{PZL} and t_{PZH} are the same as t_{en}.
7. t_{PLH} and t_{PHL} are the same as t_{PD}.
8. All parameters and waveforms are not applicable to all devices.