

**UCD4093T**

Preliminary

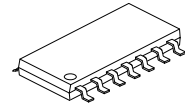
CMOS IC

**QUAD 2-INPUT NAND
SCHMITT TRIGGER****■ DESCRIPTION**

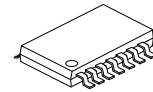
The **UCD4093T** device is designed for 3V to 15V V_{CC} operation.

This device consists of four Schmitt trigger circuits. Each circuit functions as a two-input NAND gate with Schmitt trigger action on both inputs. The gate switches at different points for positive and negative going signals. The difference between the positive voltage (V_{T+}) and the negative voltage (V_{T-}) is defined as hysteresis voltage (V_H).

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.



SOP-14U



TSSOP-14U

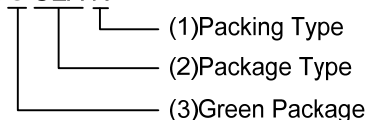
■ FEATURES

- * Schmitt trigger action on each input with no external components
- * Noise immunity greater than 50%
- * No limit on input rise and fall times
- * Standardized, symmetrical output characteristics
- * 5V, 10V and 15V parametric ratings

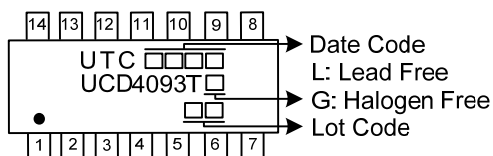
■ ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
UCD4093TL-UEA-R	UCD4093TG-UEA-R	SOP-14U	Tape Reel
UCD4093TL-UEB-R	UCD4093TG-UEB-R	TSSOP-14U	Tape Reel

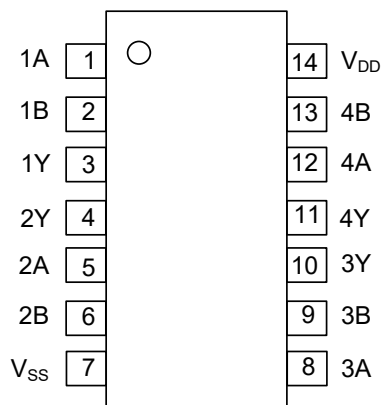
UCD4093TG-UEA-R



- (1) R: Tape Reel
- (2) UEA: SOP-14U, UEB: TSSOP-14U
- (3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING

■ PIN CONFIGURATION

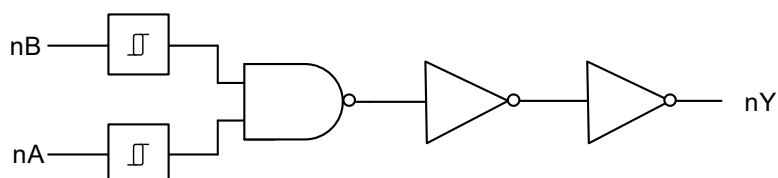


■ FUNCTION TABLE (each gate)

INPUT	INPUT	OUTPUT
A	B	Y
L	L	H
L	H	H
H	L	H
H	H	L

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

■ LOGIC DIAGRAM (positive logic)



■ **ABSOLUTE MAXIMUM RATING** ($T_A=25^{\circ}\text{C}$, unless otherwise specified) (Note)

PARAMETER	SYMBOL	CONDITIONS	RATINGS	UNIT
Supply Voltage	V_{DD}		-0.5 ~ +18	V
Input Voltage	V_{IN}		-0.5 ~ $V_{DD}+0.5$	V
Input Clamp Current	I_{IK}	$V_{IN} < 0\text{V}$ or $V_{IN} > V_{DD}$	± 10	mA
Output Clamp Current	I_{OK}	$V_{OUT} < 0\text{V}$ or $V_{OUT} > V_{DD}$	± 10	mA
Output Current	I_{OUT}		± 10	mA
Supply Current	I_{DD}		50	mA
Storage Temperature	T_{STG}		-65 ~ +150	$^{\circ}\text{C}$

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_{DD}	Operating	3		15	V
Input Voltage	V_{IN}		0		V_{DD}	V
Operating Temperature	T_A		-40		+125	$^{\circ}\text{C}$

■ **ELECTRICAL CHARACTERISTICS** ($T_A=25^{\circ}\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
High-Level Output Voltage	V_{OH}	$V_{DD}=5\text{V}$, $ I_{OH} < 1\mu\text{A}$	4.95			V
		$V_{DD}=10\text{V}$, $ I_{OH} < 1\mu\text{A}$	9.95			V
		$V_{DD}=15\text{V}$, $ I_{OH} < 1\mu\text{A}$	14.95			V
Low-Level Output Voltage	V_{OL}	$V_{DD}=5\text{V}$, $ I_{OL} < 1\mu\text{A}$			0.05	V
		$V_{DD}=10\text{V}$, $ I_{OL} < 1\mu\text{A}$			0.05	V
		$V_{DD}=15\text{V}$, $ I_{OL} < 1\mu\text{A}$			0.05	V
Positive-Going Threshold Voltage	V_{T+}	$V_{DD}=5\text{V}$	1.9	2.9	3.5	V
		$V_{DD}=10\text{V}$	3.6	5.2	7	V
		$V_{DD}=15\text{V}$	4.7	7.3	11	V
Negative-Going Threshold Voltage	V_{T-}	$V_{DD}=5\text{V}$	1.5	2.2	3.1	V
		$V_{DD}=10\text{V}$	3	4.2	6.4	V
		$V_{DD}=15\text{V}$	4	6	10.3	V
Hysteresis Voltage	V_H	$V_{DD}=5\text{V}$	0.4	0.7		V
		$V_{DD}=10\text{V}$	0.6	1		V
		$V_{DD}=15\text{V}$	0.4	1.3		V
High-Level Output Current	I_{OH}	$V_{DD}=5\text{V}$, $V_{OUT}=2.5\text{V}$			-1.4	mA
		$V_{DD}=5\text{V}$, $V_{OUT}=4.6\text{V}$			-0.5	mA
		$V_{DD}=10\text{V}$, $V_{OUT}=9.5\text{V}$			-1.3	mA
		$V_{DD}=15\text{V}$, $V_{OUT}=13.5\text{V}$			-3.4	mA
Low-Level Output Current	I_{OL}	$V_{DD}=5\text{V}$, $V_{OUT}=0.4\text{V}$	0.5			mA
		$V_{DD}=10\text{V}$, $V_{OUT}=0.5\text{V}$	1.3			mA
		$V_{DD}=15\text{V}$, $V_{OUT}=1.5\text{V}$	3.4			mA
Input Leakage Current	$I_{I(LEAK)}$	$V_{DD}=15\text{V}$			± 0.1	μA
Quiescent Supply Current	I_{DD}	$V_{DD}=5\text{V}$, $I_{OUT}=0$			1	μA
		$V_{DD}=10\text{V}$, $I_{OUT}=0$			2	μA
		$V_{DD}=15\text{V}$, $I_{OUT}=0$			4	μA

Note: I_{OL} and I_{OH} are tested one output at a time.

■ SWITCHING CHARACTERISTICS

(Input: $t_R=t_F=20\text{ns}$, $C_L=50\text{pF}$, $R_L=200\text{K}\Omega$, $T_A=25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Propagation Delay From Input (nA or nB) to Output (nY)	t_{PHL}/t_{PLH}	$V_{DD}=5\text{V}$		190	380	ns
		$V_{DD}=10\text{V}$		90	180	ns
		$V_{DD}=15\text{V}$		65	130	ns
Output Transition Time (nY)	t_{THL}/t_{TLH}	$V_{DD}=5\text{V}$		100	200	ns
		$V_{DD}=10\text{V}$		50	100	ns
		$V_{DD}=15\text{V}$		40	80	ns

■ OPERATING CHARACTERISTICS ($T_A=25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input Capacitance	C_{IN}	Any Input			7.5	pF

■ TEST CIRCUIT AND WAVEFORMS

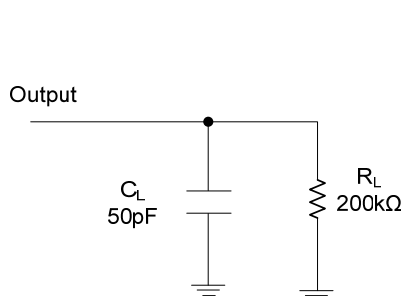


Fig. 1 Test Circuit

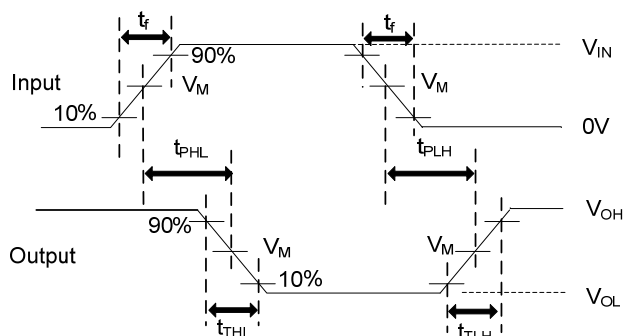


Fig. 2 Propagation Delay And Output Transition Time

V_{DD}	Inputs		V_M	C_L	R_L
	V_{IN}	t_R / t_F			
5V~15V	V_{SS} or V_{DD}	$\leq 20\text{ns}$	$0.5 \times V_{DD}$	50pF	200KΩ

Notes: 1. C_L includes probe and jig capacitance.

2. All input pulses are supplied by generators having the following characteristics: $P_{RR} \leq 10\text{MHz}$, $Z_O = 50\Omega$.

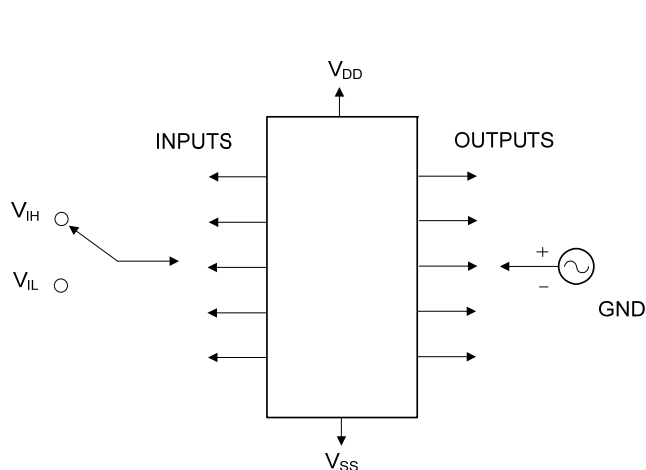


Fig. 3 Input Voltage Test Circuit

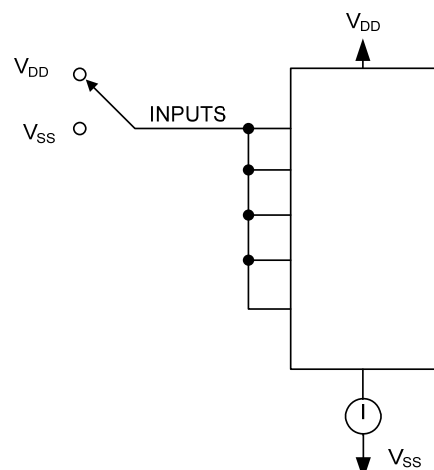


Fig. 4 Quiescent Device Current Test Circuit

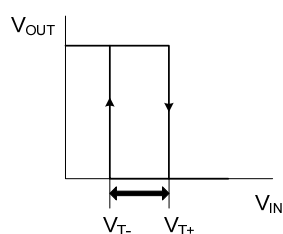


Fig. 5 Transfer Characteristic

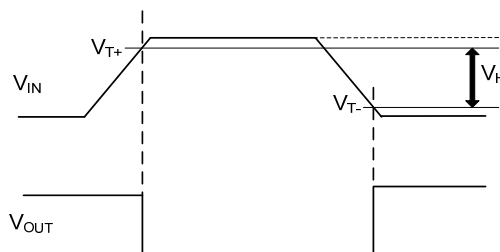


Fig. 6 Waveforms Showing Definition Of V_{T+} And V_{T-}
(Between Limits At 30 % And 70 %) And V_H

■ TEST CIRCUIT AND WAVEFORMS (Cont.)

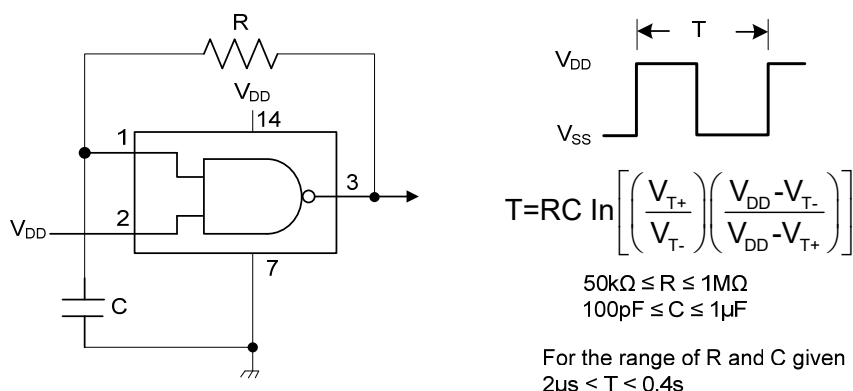


Fig.7 Astable Multivibrator

UTC assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all UTC products described or contained herein. UTC products are not designed for use in life support appliances, devices or systems where malfunction of these products can be reasonably expected to result in personal injury. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. UTC reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.