



## UCD4070B

Preliminary

CMOS IC

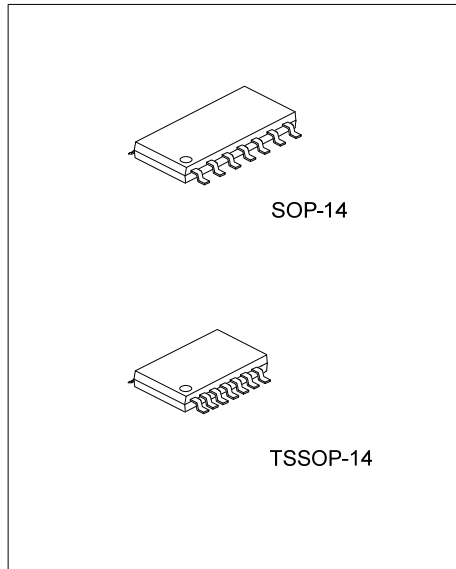
### CMOS QUAD EXCLUSIVE-OR GATE

#### DESCRIPTION

The **UCD4070B** contains four independent 2-input Exclusive-OR gates, they perform the function  $Y=A\oplus B$  in positive logic.

#### FEATURES

- \* High-Voltage Types(20V Rating)
- \* Quad Exclusive-OR Gate
- \* Standardized Symmetrical Output Characteristics
- \*100% Tested for Quiescent Current at 20V
- \* 5V,10V and 15V Parametric Ratings
- \*Maximum input current of 1uA at 18V Over Full Package Temperature Range
  - 100nA at 18V and 25°C
- \*Medium Speed Operation
  - $t_{PHL}$ ,  $t_{PLH}$ =65ns(TYP) at  $V_{DD}$ =10V,  $C_L$ =50pF

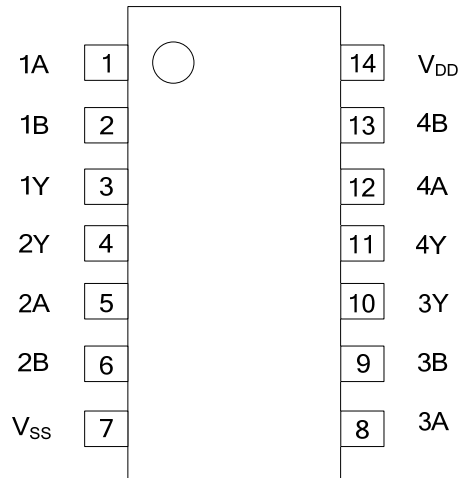


#### ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
UCD4070BL-S14-R	UCD4070BG-S14-R	SOP-14	Tape Reel
UCD4070BL-S14-T	UCD4070BG-S14-T	SOP-14	Tube
UCD4070BL-P14-R	UCD4070BG-P14-R	TSSOP-14	Tape Reel
UCD4070BL-P14-T	UCD4070BG-P14-T	TSSOP-14	Tube

<p>UCD4070BG-S14-T</p> <p>(1)Packing Type (2)Package Type (3)Halogen Free</p>	<p>(1) T: Tube, R: Tape Reel (2) S14: SOP-14, P14: TSSOP-14 (3) L: Lead Free, G: Halogen Free</p>
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■ PIN CONFIGURATION



■ FUNCTION TABLE (each gate)

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

■ LOGIC DIAGRAM (positive logic)



■ ABSOLUTE MAXIMUM RATING (unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	$V_{DD}$	-0.5 ~ 20	V
Input Voltage	$V(nA,nB)$	-0.5 ~ $V_{DD} + 0.5$	V
Operating Temperature	$T_{STG}$	-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	$V_{DD}$		3		18	V
Operating Temperature	$T_{OPR}$		-40		125	°C

■ ELECTRICAL CHARACTERISTICS( $T_A=25^\circ\text{C}$ )

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
High-Level Input Voltage	$V_{IH}$	$V_{DD}= 5V, V_O=0.5V$	3.5			V
		$V_{DD}= 10V, V_O=1.0V$	7.0			
		$V_{DD}= 15V, V_O=1.5V$	11.0			
Low-Level Input Voltage	$V_{IL}$	$V_{DD}= 5V, V_O=4.5V$			1.5	V
		$V_{DD}= 10V, V_O=9.0V$			3.0	
		$V_{DD}= 15V, V_O=13.5V$			4.0	
High-Level Output Voltage	$V_{OH}$	$V_{DD}= 5V, \text{No Load}$	4.95	5		V
		$V_{DD}= 10V, \text{No Load}$	9.95	10		
		$V_{DD}= 15V, \text{No Load}$	14.95	15		
Low-Level Output Voltage	$V_{OL}$	$V_{DD}= 5V, \text{No Load}$		0	0.05	V
		$V_{DD}= 10V, \text{No Load}$		0	0.05	
		$V_{DD}= 15V, \text{No Load}$		0	0.05	
High-Level Output Current (NOTE)	$I_{OH}$	$V_{DD}= 5V, V_O=4.6V$	-0.51	-1		mA
		$V_{DD}= 5V, V_O=2.5V$	-1.6	-3.2		
		$V_{DD}= 10V, V_O=9.5V$	-1.3	-2.6		
		$V_{DD}= 15V, V_O=13.5V$	-3.4	-6.8		
Low-Level Output Current (NOTE)	$I_{OL}$	$V_{DD}= 5V, V_O=0.4V$	0.51	1		mA
		$V_{DD}= 10V, V_O=0.5V$	1.3	2.6		
		$V_{DD}= 15V, V_O=1.5V$	3.4	6.8		
Input Leakage Current	$I_{I(LEAK)}$	$V_{DD}= 15V, V_{IN} = V_{DD} \text{ or } GND$			$\pm 0.1$	$\mu\text{A}$
Quiescent Supply Current	$I_{DD}$	$V_{DD}= 5V, V_{IN} = V_{DD} \text{ or } V_{SS}, I_{OUT} = 0$		0.01	0.25	$\mu\text{A}$
		$V_{DD}= 10V, V_{IN} = V_{DD} \text{ or } V_{SS}, I_{OUT} = 0$		0.01	0.5	
		$V_{DD}= 15V, V_{IN} = V_{DD} \text{ or } V_{SS}, I_{OUT} = 0$		0.01	1.0	
		$V_{DD}= 20V, V_{IN} = V_{DD} \text{ or } V_{SS}, I_{OUT} = 0$		0.02	5.0	

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

■ SWITCHING CHARACTERISTICS

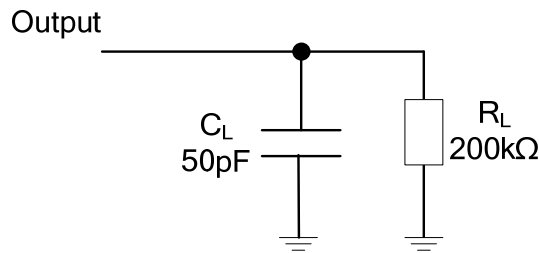
( $T_A=25^\circ\text{C}$ , Input:  $t_R=t_F=20\text{ns}$ ,  $C_L=50\text{pF}$ ,  $R_L=200\text{K}\Omega$ , unless otherwise specified )

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Propagation delay from Input(A or B) to Output(Y)	$t_{PLH}$	$V_{DD}=5\text{V}$		140	280	ns
		$V_{DD}=10\text{V}$		65	130	
		$V_{DD}=15\text{V}$		50	100	
	$t_{PHL}$	$V_{DD}=5\text{V}$		140	280	
		$V_{DD}=10\text{V}$		65	130	
		$V_{DD}=15\text{V}$		50	100	
Transition Time	$t_{TLH}$	$V_{DD}=5\text{V}$		100	200	ns
		$V_{DD}=10\text{V}$		50	100	
	$t_{THL}$	$V_{DD}=15\text{V}$		40	80	

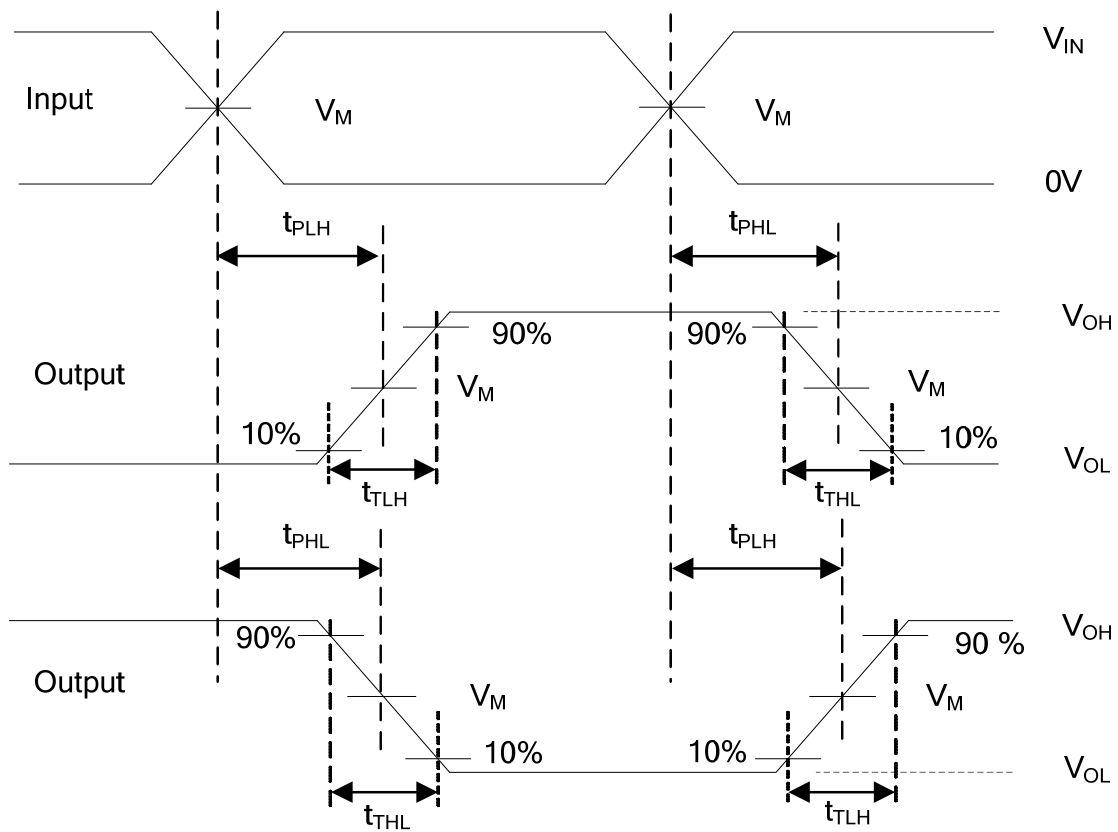
■ OPERATING CHARACTERISTICS( $T_A=25^\circ\text{C}$ )

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Average Input Capacitance	$C_{IN}$	Any Input		5	7.5	pF

■ TEST CIRCUIT AND WAVEFORMS



Definitions for test circuit



VOLTAGE WAVEFORMS  
PROPAGATION DELAY AND OUTPUT TRANSITION TIMES

Note:  $C_L$  includes probe and jig capacitance.

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