



UCD4070B

Preliminary

CMOS IC

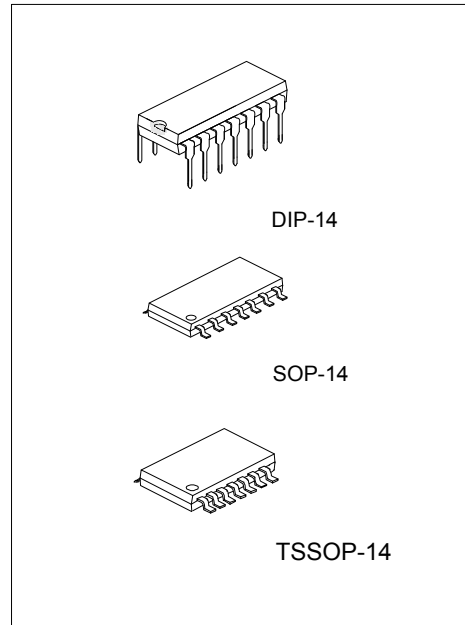
CMOS QUAD EXCLUSIVE-OR GATE

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

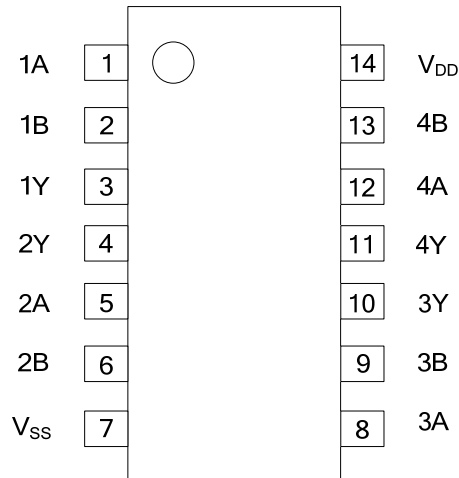
Ordering Number		Package	Packing
Lead Free	Halogen Free		
UCD4070BL-D14-T	UCD4070BG-D14-T	DIP-14	Tube
-	UCD4070BG-S14-R	SOP-14	Tape Reel
-	UCD4070BG-P14-R	TSSOP-14	Tape Reel

<p>UCD4070BL-D14-T</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) R: Tape Reel, T: Tube (2) D14: DIP-14, S14: SOP-14, P14: TSSOP-14 (3) L: Lead Free, G: Halogen Free and Lead Free</p>
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MARKING

DIP-14	SOP-14 / TSSOP-14
<p>14 13 12 11 10 9 8 UTC □□□□ → Date Code UCD4070B □ → L: Lead Free □ → G: Halogen Free □ → Lot Code 1 2 3 4 5 6 7</p>	<p>14 13 12 11 10 9 8 → Date Code UTC □□□□ UCD4070BG □ □ → Lot Code 1 2 3 4 5 6 7</p>

■ 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
Power Dissipation	DIP-14	750	mW
	SOP-14	500	mW
	TSSOP-14	500	mW
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	$I_{I(LEAK)}$	$V_{DD}= 15V, V_{IN} = V_{DD} \text{ or } GND$			± 0.1	μA
Quiescent Supply Current	I_{DD}	$V_{DD}= 5V, V_{IN} = V_{DD} \text{ or } V_{SS}, I_{OUT} = 0$		0.01	0.25	μA
		$V_{DD}= 10V, V_{IN} = V_{DD} \text{ or } V_{SS}, I_{OUT} = 0$		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

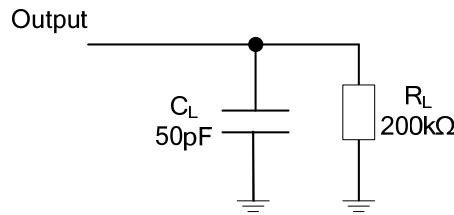
($T_A=25^{\circ}\text{C}$, Input: $t_R=t_F=20\text{ns}$, $C_L=50\text{pF}$, $R_L=200\text{K}\Omega$, unless otherwise specified)

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	

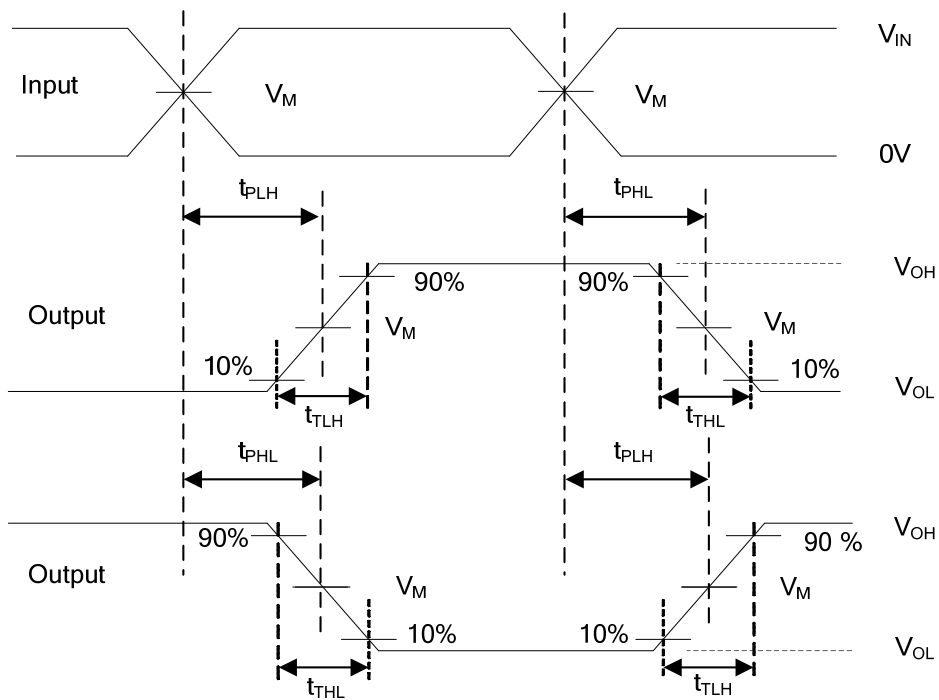
■ OPERATING CHARACTERISTICS ($T_A=25^{\circ}\text{C}$)

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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