



# CD4072BM/CD4072BC Dual 4-Input OR Gate CD4082BM/CD4082BC Dual 4-Input AND Gate

## General Description

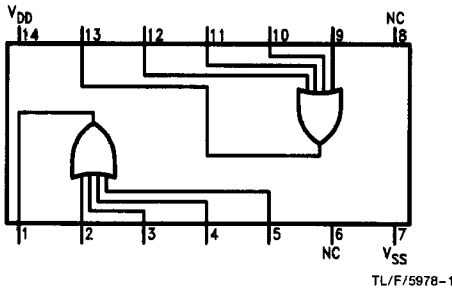
These dual gates are monolithic complementary MOS (CMOS) integrated circuits constructed with N- and P-channel enhancement mode transistors. They have equal source and sink current capabilities and conform to standard B series output drive. The devices also have buffered outputs which improve transfer characteristics by providing very high gain. All inputs are protected against static discharge with diodes to  $V_{DD}$  and  $V_{SS}$ .

## Features

- Wide supply voltage range 3.0V to 15V
- High noise immunity 0.45  $V_{DD}$  (typ.)
- Low power TTL compatibility fanout of 2 driving 74L or 1 driving 74LS
- 5V–10V–15V parametric ratings
- Symmetrical output characteristics
- Maximum input leakage 1  $\mu A$  at 15V over full temperature range

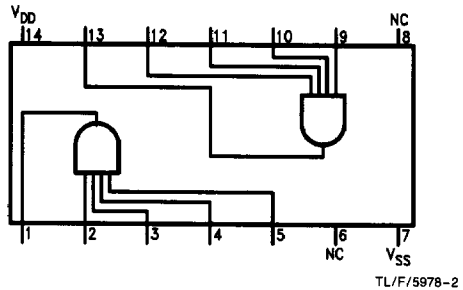
## Connection Diagrams

CD4072BM/CD4072BC



Top View

CD4082BM/CD4082BC



Top View

Order Number CD4072B\* or CD4082B\*

\*Please look into Section 8, Appendix D for availability of various package types.

### Absolute Maximum Ratings (Notes 1 & 2)

If Military/Aerospace specified devices are required, contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Supply Voltage ( $V_{DD}$ )	-0.5V to +18V
Input Voltage ( $V_{IN}$ )	-0.5 to $V_{DD}$ + 0.5V
Storage Temperature Range ( $T_S$ )	-65°C to +150°C
Power Dissipation ( $P_D$ )	
Dual-In-Line	700 mW
Small Outline	500 mW
Lead Temperature ( $T_L$ )	
(Soldering, 10 seconds)	260°C

### Recommended Operating Conditions (Note 2)

Supply Voltage ( $V_{DD}$ )	3.0V to 15V
Input Voltage ( $V_{IN}$ )	0V to $V_{DD}$ V
Operating Temperature Range ( $T_A$ )	
CD4072BM, CD4082BM	-55°C to +125°C
CD4072BC, CD4082BC	-40°C to +85°C

### DC Electrical Characteristics CD4072BM, CD4082BM (Note 2)

Symbol	Parameter	Conditions	-55°C		+25°C			+125°C		Units
			Min	Max	Min	Typ	Max	Min	Max	
$I_{DD}$	Quiescent Device Current	$V_{DD} = 5.0V$		0.25		0.004	0.25		7.5	$\mu A$
		$V_{DD} = 10V$		0.5		0.005	0.5		15	$\mu A$
		$V_{DD} = 15V$		1.0		0.006	1.0		30	$\mu A$
$V_{OL}$	Low Level Output Voltage	$V_{DD} = 5.0V$		0.05		0	0.05		0.05	V
		$V_{DD} = 10V$		0.05		0	0.05		0.05	V
		$V_{DD} = 15V$		0.05		0	0.05		0.05	V
$V_{OH}$	High Level Output Voltage	$V_{DD} = 5.0V$	4.95		4.95	5.0		4.95		V
		$V_{DD} = 10V$	9.95		9.95	10		9.95		V
		$V_{DD} = 15V$	14.95		14.95	10		14.95		V
$V_{IL}$	Low Level Input Voltage	$V_{DD} = 5.0V, V_O = 0.5V$ or 4.5V		1.5		2.25	1.5		1.5	V
		$V_{DD} = 10V, V_O = 1.0V$ or 9.0V		3.0		4.50	3.0		3.0	V
		$V_{DD} = 15V, V_O = 1.5V$ or 13.5V		4.0		6.75	4.0		4.0	V
$V_{IH}$	High Level Input Voltage	$V_{DD} = 5.0V, V_O = 0.5V$ or 4.5V	3.5		3.5	2.75		3.5		V
		$V_{DD} = 10V, V_O = 1.0V$ or 9.0V	7.0		7.0	5.50		7.0		V
		$V_{DD} = 15V, V_O = 1.5V$ or 13.5V	11.0		11.0	8.25		11.0		V
$I_{OL}$	Low Level Output Current (Note 3)	$V_{DD} = 5.0V, V_O = 0.4V$	0.64		0.51	0.88		0.36		mA
		$V_{DD} = 10V, V_O = 0.5V$	1.6		1.3	2.2		0.90		mA
		$V_{DD} = 15V, V_O = 1.5V$	4.2		3.4	8.0		2.4		mA
$I_{OH}$	High Level Output Current (Note 3)	$V_{DD} = 5.0V, V_O = 4.6V$	-0.64		-0.51	-0.88		-0.36		mA
		$V_{DD} = 10V, V_O = 9.5V$	-1.6		-1.3	-2.2		-0.90		mA
		$V_{DD} = 15V, V_O = 13.5V$	-4.2		-3.4	-8.0		-2.4		mA
$I_{IN}$	Input Current	$V_{DD} = 15V, V_{IN} = 0V$		-0.10		-10 <sup>-5</sup>	-0.10		-1.0	$\mu A$
		$V_{DD} = 15V, V_{IN} = 15V$		0.10		10 <sup>-5</sup>	0.10		1.0	$\mu A$

**Note 1:** "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. They are not meant to imply that the devices should be operated at these limits. The tables of "Recommended Operating Conditions" and "Electrical Characteristics" provide conditions for actual device operation.

**Note 2:**  $V_{SS} = 0V$  unless otherwise specified.

**Note 3:**  $I_{OL}$  and  $I_{OH}$  are tested one output at a time.

## DC Electrical Characteristics CD4072BC, CD4082BC (Note 2)

Symbol	Parameter	Conditions	-40°C		+25°C			+85°C		Units
			Min	Max	Min	Typ	Max	Min	Max	
I <sub>DD</sub>	Quiescent Device Current	V <sub>DD</sub> = 5.0V		1.0		0.004	1.0		7.5	μA
		V <sub>DD</sub> = 10V		2.0		0.005	2.0		15	μA
		V <sub>DD</sub> = 15V		4.0		0.006	4.0		30	μA
V <sub>OL</sub>	Low Level Output Voltage	V <sub>DD</sub> = 5.0V		0.05		0	0.05		0.05	V
		V <sub>DD</sub> = 10V		0.05		0	0.05		0.05	V
		V <sub>DD</sub> = 15V		0.05		0	0.05		0.05	V
V <sub>OH</sub>	High Level Output Voltage	V <sub>DD</sub> = 5.0V	4.95		4.95	5.0		4.95		V
		V <sub>DD</sub> = 10V	9.95		9.95	10		9.95		V
		V <sub>DD</sub> = 15V	14.95		14.95	10		14.95		V
V <sub>IL</sub>	Low Level Input Voltage	V <sub>DD</sub> = 5.0V, V <sub>O</sub> = 0.5V or 4.5V		1.5		2.25	1.5		1.5	V
		V <sub>DD</sub> = 10V, V <sub>O</sub> = 1.0V or 9.0V		3.0		4.50	3.0		3.0	V
		V <sub>DD</sub> = 15V, V <sub>O</sub> = 1.5V or 13.5V		4.0		6.75	4.0		4.0	V
V <sub>IH</sub>	High Level Input Voltage	V <sub>DD</sub> = 5.0V, V <sub>O</sub> = 0.5V or 4.5V	3.5		3.5	2.75		3.5		V
		V <sub>DD</sub> = 10V, V <sub>O</sub> = 1.0V or 9.0V	7.0		7.0	5.50		7.0		V
		V <sub>DD</sub> = 15V, V <sub>O</sub> = 1.5V or 13.5V	11.0		11.0	8.25		11.0		V
I <sub>OL</sub>	Low Level Output Current (Note 3)	V <sub>DD</sub> = 5.0V, V <sub>O</sub> = 0.4V	0.52		0.44	0.88		0.36		mA
		V <sub>DD</sub> = 10V, V <sub>O</sub> = 0.5V	1.3		1.1	2.2		0.90		mA
		V <sub>DD</sub> = 15V, V <sub>O</sub> = 1.5V	3.6		3.0	8.0		2.4		mA
I <sub>OH</sub>	High Level Output Current (Note 3)	V <sub>DD</sub> = 5.0V, V <sub>O</sub> = 4.6V	-0.52		-0.44	-0.88		-0.36		mA
		V <sub>DD</sub> = 10V, V <sub>O</sub> = 9.5V	-1.3		-1.1	-2.2		-0.90		mA
		V <sub>DD</sub> = 15V, V <sub>O</sub> = 13.5V	-3.6		-3.0	-8.0		-2.4		mA
I <sub>IN</sub>	Input Current	V <sub>DD</sub> = 15V, V <sub>IN</sub> = 0V		-0.3		-10 <sup>-5</sup>	-0.3		-1.0	μA
		V <sub>DD</sub> = 15V, V <sub>IN</sub> = 15V		0.3		10 <sup>-5</sup>	0.3		1.0	μA

## AC Electrical Characteristics\* T<sub>A</sub> = 25°C, C<sub>L</sub> = 50 pF, unless otherwise noted

Symbol	Parameter	Conditions	Min	Typ	Max	Units
t <sub>PHL</sub>	Propagation Delay High to Low Level	V <sub>DD</sub> = 5.0V		125	250	ns
		V <sub>DD</sub> = 10V		60	100	ns
		V <sub>DD</sub> = 15V		45	70	ns
t <sub>PLH</sub>	Propagation Delay Low to High Level	V <sub>DD</sub> = 5.0V		125	250	ns
		V <sub>DD</sub> = 10V		60	100	ns
		V <sub>DD</sub> = 15V		45	70	ns
t <sub>THL</sub> , t <sub>TLH</sub>	Transition Time	V <sub>DD</sub> = 5.0V		100	200	ns
		V <sub>DD</sub> = 10V		50	100	ns
		V <sub>DD</sub> = 15V		40	80	ns
C <sub>IN</sub>	Average Input Capacitance (Note 4)	Any Input		5.0	7.5	pF
C <sub>PD</sub>	Power Dissipation Capacity (Note 5)	Any Gate		20		pF

\*AC Parameters are guaranteed by DC correlated testing.

**Note 2:** V<sub>SS</sub> = 0V unless otherwise specified.

**Note 3:** I<sub>OL</sub> and I<sub>OH</sub> are tested one output at a time.

**Note 4:** Capacitance is guaranteed by periodic testing.

**Note 5:** C<sub>PD</sub> determines the no load AC power consumption of any CMOS device. For complete explanation see 54C/74C Family Characteristics, Application Note AN-80.