

# CD4071B, CD4072B, CD4075B Types

## CMOS OR Gates

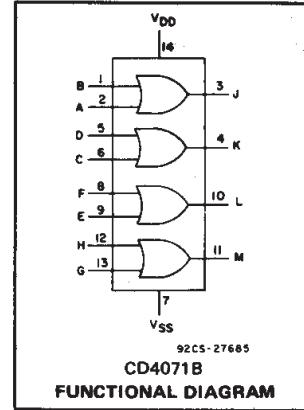
High-Voltage Types (20-Volt Rating)

CD4071B Quad 2-Input OR Gate  
CD4072B Dual 4-Input OR Gate  
CD4075B Triple 3-Input OR Gate

■ CD4071B, CD4072B, and CD4075B OR gates provide the system designer with direct implementation of the positive-logic OR function and supplement the existing family of CMOS gates. The CD4071, CD4072, and CD4075 types are supplied in 14-lead dual-in-line ceramic packages (D and F suffixes), 14-lead dual-in-line plastic packages (E suffix), and in chip form (H suffix).

**Features:**

- Medium-Speed Operation- $t_{pLH}$ ,  $t_{pHL} = 60$  ns (typ.) at  $V_{DD} = 10$  V
- 100% tested for quiescent current at 20 V
- Maximum input current of  $1 \mu A$  at 18 V over full package-temperature range; 100 nA at 18 V and 25°C
- Standardized, symmetrical output characteristics
- Noise margin (over full package temperature range)
  - 1 V at  $V_{DD} = 5$  V
  - 2 V at  $V_{DD} = 10$  V
  - 2.5 V at  $V_{DD} = 15$  V
- 5-V, 10-V, and 15-V parametric ratings
- Meets all requirements of JEDEC Tentative Standard No. 13B, "Standard Specifications for Description of 'B' Series CMOS Devices"



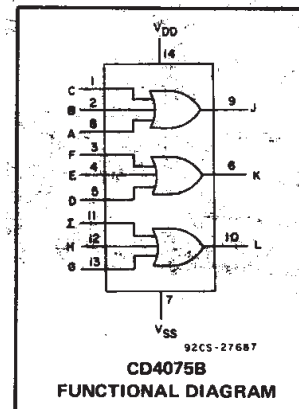
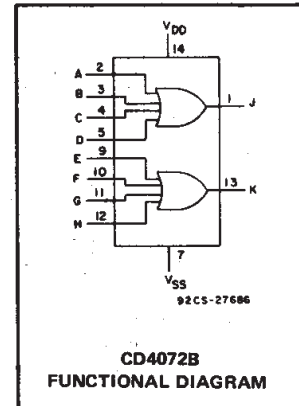
**RECOMMENDED OPERATING CONDITIONS**

For maximum reliability, nominal operating conditions should be selected so that operation is always within the following ranges:

CHARACTERISTIC	LIMITS		UNITS
	MIN.	MAX.	
Supply-Voltage Range (For $T_A =$ Full Package-Temperature Range)	3	18	V

**STATIC ELECTRICAL CHARACTERISTICS**

CHARACTERISTIC	CONDITIONS			LIMITS AT INDICATED TEMPERATURES (°C)							UNITS
	$V_O$ (V)	$V_{IN}$ (V)	$V_{DD}$ (V)	-55	-40	+85	+125	+25			
								Min.	Typ.	Max.	
Quiescent Device Current, $I_{DD}$ Max.	-	0.5	5	0.25	0.25	7.5	7.5	-	0.01	0.25	$\mu A$
	-	0.10	10	0.5	0.5	15	15	-	0.01	0.5	
	-	0.15	15	1	1	30	30	-	0.01	1	
	-	0.20	20	5	5	150	150	-	0.02	5	
Output Low (Sink) Current $I_{OL}$ Min.	0.4	0.5	5	0.64	0.61	0.42	0.36	0.51	1	-	mA
	0.5	0.10	10	1.6	1.5	1.1	0.9	1.3	2.6	-	
	1.5	0.15	15	4.2	4	2.8	2.4	3.4	6.8	-	
	4.6	0.5	5	-0.64	-0.61	-0.42	-0.36	-0.51	-1	-	
Output High (Source) Current, $I_{OH}$ Min.	2.5	0.5	5	-2	-1.8	-1.3	-1.15	-1.6	-3.2	-	mA
	9.5	0.10	10	-1.6	-1.5	-1.1	-0.9	-1.3	-2.6	-	
	13.5	0.15	15	-4.2	-4	-2.8	-2.4	-3.4	-6.8	-	
	4.6	0.5	5	-0.64	-0.61	-0.42	-0.36	-0.51	-1	-	
Output Voltage: Low-Level, $V_{OL}$ Max.	-	0.5	5	0.05				-	0	0.05	V
	-	0.10	10	0.05				-	0	0.05	
	-	0.15	15	0.05				-	0	0.05	
Output Voltage: High-Level, $V_{OH}$ Min.	-	0.5	5	4.95				4.95	5	-	V
	-	0.10	10	9.95				9.95	10	-	
	-	0.15	15	14.95				14.95	15	-	
Input Low Voltage, $V_{IL}$ Max.	0.5, 4.5	-	5	1.5				-	-	1.5	V
	1, 9	-	10	3				-	-	3	
	1.5, 13.5	-	15	4				-	-	4	
Input High Voltage, $V_{IH}$ Min.	4.5	-	5	3.5				3.5	-	-	V
	9	-	10	7				7	-	-	
	13.5	-	15	11				11	-	-	
Input Current $I_{IN}$ Max.		0.18	18	$\pm 0.1$	$\pm 0.1$	$\pm 1$	$\pm 1$	-	$\pm 10^{-5}$	$\pm 0.1$	$\mu A$



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## MAXIMUM RATINGS, Absolute-Maximum Values:

### DC SUPPLY-VOLTAGE RANGE, ( $V_{DD}$ )

Voltages referenced to  $V_{SS}$  Terminal ..... -0.5V to +20V

INPUT VOLTAGE RANGE, ALL INPUTS ..... -0.5V to  $V_{DD}$  +0.5V

DC INPUT CURRENT, ANY ONE INPUT .....  $\pm 10$ mA

### POWER DISSIPATION PER PACKAGE ( $P_D$ ):

For  $T_A = -55^\circ\text{C}$  to  $+100^\circ\text{C}$  ..... 500mW

For  $T_A = +100^\circ\text{C}$  to  $+125^\circ\text{C}$  ..... Derate Linearly at 12mW/ $^\circ\text{C}$  to 200mW

### DEVICE DISSIPATION PER OUTPUT TRANSISTOR

FOR  $T_A = \text{FULL PACKAGE-TEMPERATURE RANGE (All Package Types)}$  ..... 100mW

OPERATING-TEMPERATURE RANGE ( $T_A$ ) .....  $-55^\circ\text{C}$  to  $+125^\circ\text{C}$

STORAGE TEMPERATURE RANGE ( $T_{stg}$ ) .....  $-65^\circ\text{C}$  to  $+150^\circ\text{C}$

### LEAD TEMPERATURE (DURING SOLDERING):

At distance  $1/16 \pm 1/32$  inch ( $1.59 \pm 0.79$ mm) from case for 10s max .....  $+265^\circ\text{C}$

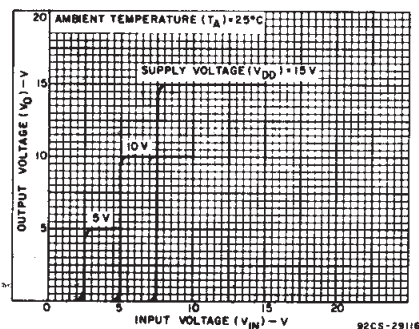


Fig. 1 - Typical voltage transfer characteristics.

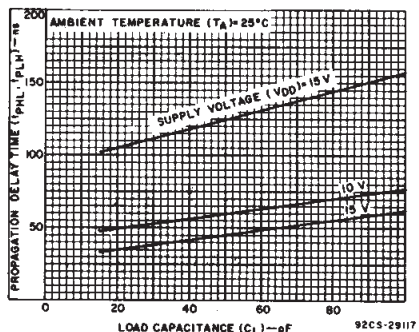


Fig. 2 - Typical propagation delay time as a function of load capacitance.

## DYNAMIC ELECTRICAL CHARACTERISTICS at $T_A = 25^\circ\text{C}$ , Input $t_r, t_f = 20$ ns, and $C_L = 50$ pF, $R_L = 200$ k $\Omega$

CHARACTERISTIC	TEST CONDITIONS	ALL TYPES LIMITS			UNITS
		$V_{DD}$ VOLTS	TYP.	MAX.	
Propagation Delay Time, $t_{PHL}, t_{PLH}$		5	125	250	ns
		10	60	120	
		15	45	90	
Transition Time, $t_{THL}, t_{TLH}$		5	100	200	ns
		10	50	100	
		15	40	80	
Input Capacitance, $C_{IN}$	Any Input	—	5	7.5	pF

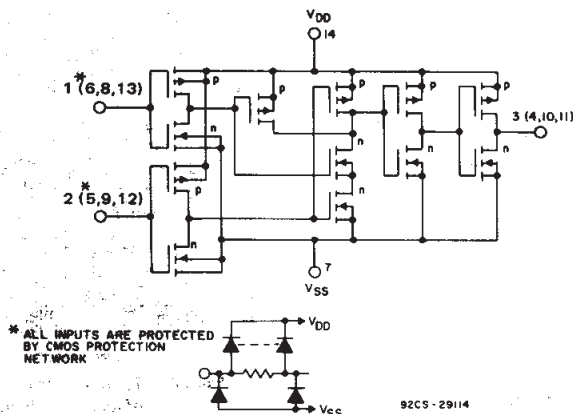


Fig. 3 - Schematic diagram for CD4071B (1 of 4 identical gates).

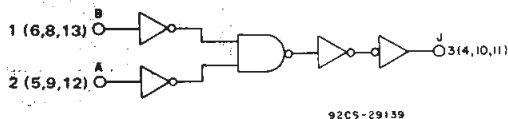


Fig. 5 - Logic diagram for CD4071B (1 of 4 identical gates).

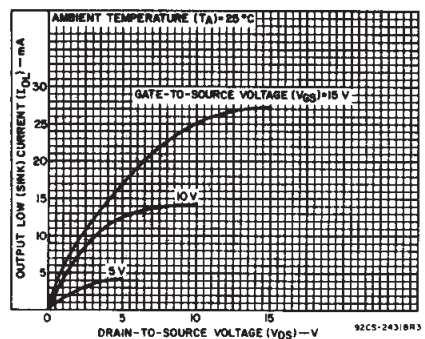


Fig. 4 - Typical output low (sink) current characteristics.

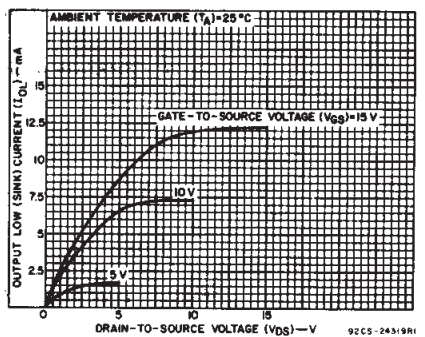


Fig. 6 - Minimum output low (sink) current characteristics.

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\* INVERTERS 2,3 AND 4 ARE IDENTICAL TO INVERTER 1.  
**Fig. 7 - Schematic diagram for CD4072B (1 of 2 identical gates).**



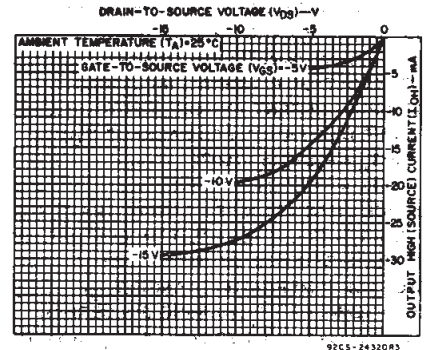
**Fig. 9 - Logic diagram for CD4072B (1 of 2 identical gates).**



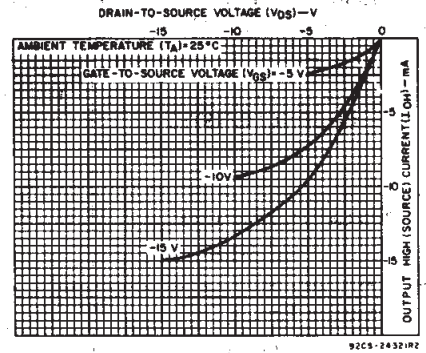
**Fig. 11 - Schematic diagram for CD4075B (1 of 3 identical gates).**



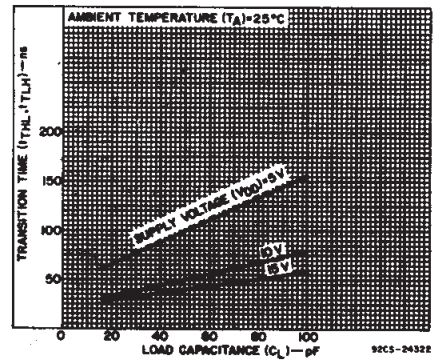
**Fig. 13 - Logic diagram for CD4075B (1 of 3 identical gates).**



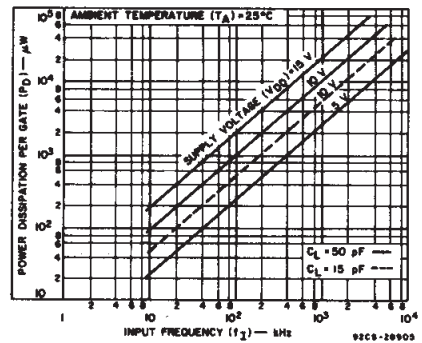
**Fig. 8 - Typical output high (source) current characteristics.**



**Fig. 10 - Minimum output high (source) current characteristics.**



**Fig. 12 - Typical transition time as a function of load capacitance.**



**Fig. 14 - Typical dynamic power dissipation as a function of frequency.**

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## TERMINAL ASSIGNMENTS (TOP VIEW)

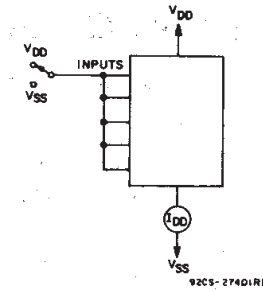
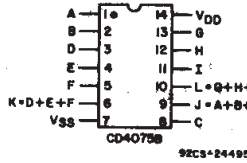
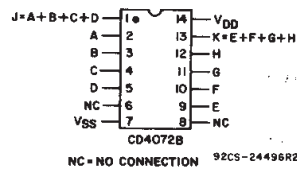
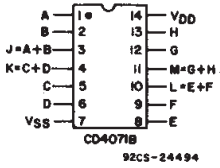


Fig. 15 - Quiescent device current test circuit.

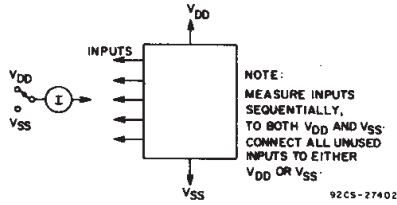


Fig. 16 - Input current test circuit.

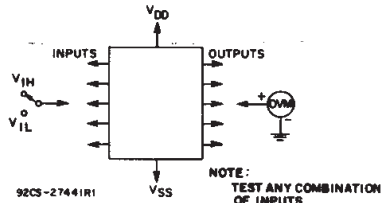
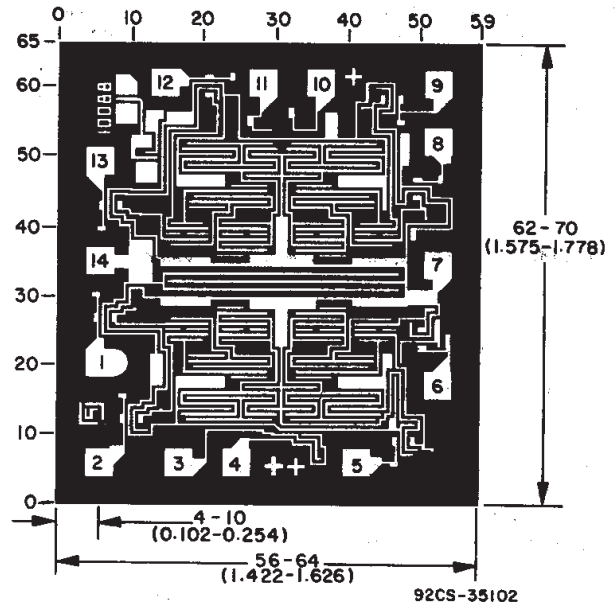
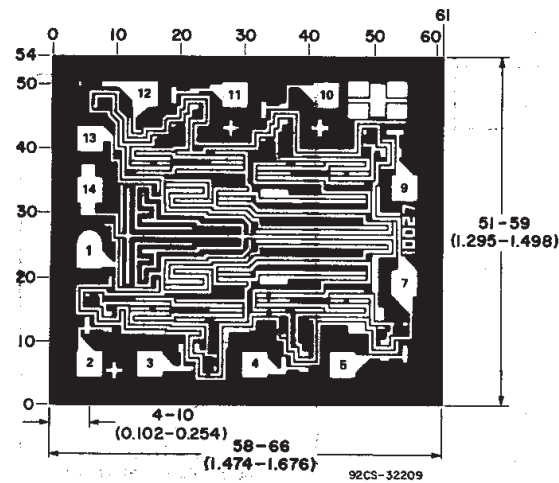


Fig. 17 - Input-voltage test circuit.

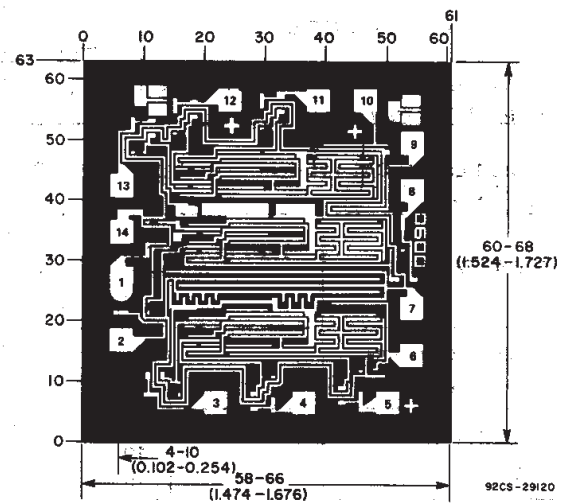
Dimensions in parentheses are in millimeters and are derived from the basic inch dimensions as indicated. Grid graduations are in mils (10<sup>-3</sup> inch).



Chip dimensions and pad layout for CD4071B.



Chip dimensions and pad layout for CD4072B.



Chip dimensions and pad layout for CD4075B.

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