TEXAS INSTRUMENTS

Data sheet acquired from Harris Semiconductor
SCHS059

CD4078B Types

CMOS 8-Input NOR/OR Gate

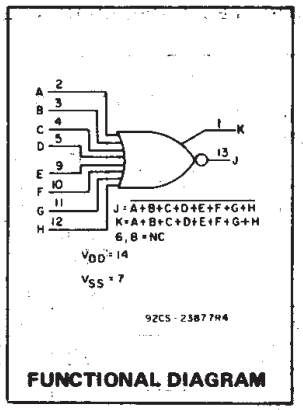
High-Voltage Types (20-Volt Rating)

■ CD4078B NOR/OR Gate provides the system designer with direct implementation of the positive-logic 8-input NOR and OR functions and supplements the existing family of CMOS gates.

The CD4078B 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_{PHL}, t_{PLH} = 75 ns (typ.) at V_{DD} = 10 V
- Buffered inputs and output
- 5-V, 10-V, and 15-V parametric ratings
- Standardized symmetrical output characteristics
- 100% tested for quiescent current at 20 V
- Maximum input current of 1 μA at 18 V over full package-temperature range: 100 nA at 18 V and 25°C
- 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
- Meets all requirements of JEDEC Tentative **Standard No. 13B**, "Standard Specifications for Description of 'B' Series CMOS Devices"



FUNCTIONAL DIAGRAM

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 ..... ±10mA
POWER DISSIPATION PER PACKAGE (P_D):
For T_A = -55°C to +100°C 500mW
For T_A = +100°C to +125°C ..... Derate Linearily at 12mW/°C to 200mW
DEVICE DISSIPATION PER OUTPUT TRANSISTOR
FOR T_A = FULL PACKAGE-TEMPERATURE RANGE (All Package Types) 100mW
OPERATING-TEMPERATURE RANGE (T_A) ..... -55°C to +125°C
STORAGE TEMPERATURE RANGE (T_{stg}) ..... -65°C to +150°C
LEAD TEMPERATURE (DURING SOLDERING):
At distance 1/16 ± 1/32 inch (1.59 ± 0.79mm) from case for 10s max ..... +265°C

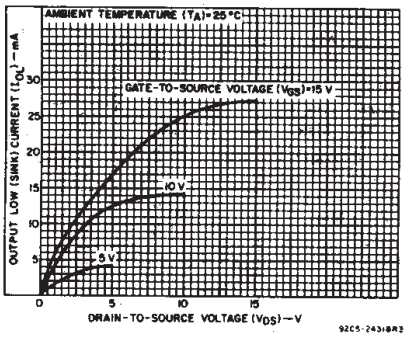


Fig. 2 — Typical output low (sink) current characteristics.

RECOMMENDED OPERATING CONDITIONS

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

CHARACTERISTIC	Min.	Max.	Units
Supply Voltage Range (For T_A Full Package Temperature Range)	3	18	V

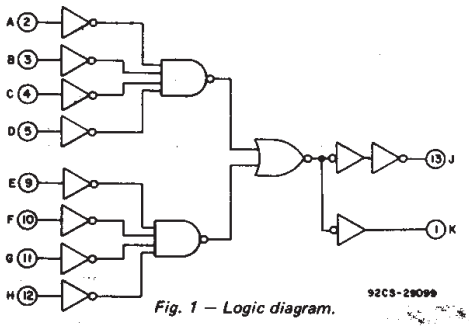


Fig. 1 — Logic diagram.

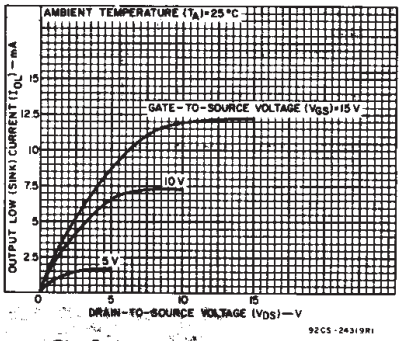


Fig. 3 — Minimum output low (sink) current characteristics.

DYNAMIC ELECTRICAL CHARACTERISTICS

At T_A = 25°C; Input t_r, t_f = 20 ns, C_L = 50 pF, R_L = 200kΩ

CHARACTERISTIC	TEST CONDITIONS		LIMITS		UNITS
		V_{DD} VOLTS	TYP.	MAX.	
Propagation Delay Time, t_{PHL}, t_{PLH}		5	150	300	ns
		10	75	150	
		15	55	110	
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

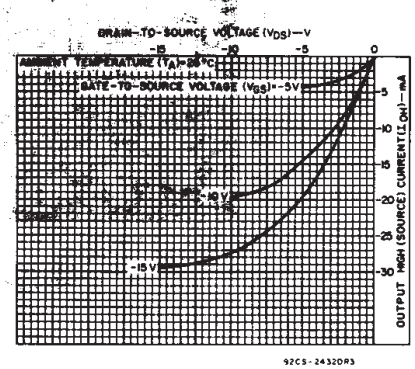


Fig. 4 — Typical output high (source) current characteristics.

STATIC ELECTRICAL CHARACTERISTICS

CHARACTERISTIC	CONDITIONS			LIMITS AT INDICATED TEMPERATURES (°C)							UNITS
								+25			
	V_O (V)	V_{IN} (V)	V_{DD} (V)	−55	−40	+85	+125	Min.	Typ.	Max.	
Quiescent Device Current, I_{DD} Max.	–	0,5	5	0.25	0.25	7.5	7.5	–	0.01	0.25	μA
	–	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		
Output High (Source) Current, I_{OH} Min.	4.6	0,5	5	−0.64	−0.61	−0.42	−0.36	−0.51	−1		
	2.5	0,5	5	−2	−1.8	−1.3	−1.15	−1.6	−3.2		
	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		
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		
	–	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.	0.5,4.5	–	5	3.5				3.5	–	–	
	1,9	–	10	7				7	–	–	
	1.5,13.5	–	15	11				11	–	–	
Input Current I_{IN} Max.		0,18	18	±0.1	±0.1	±1	±1	–	$±10^{-5}$	±0.1	μA

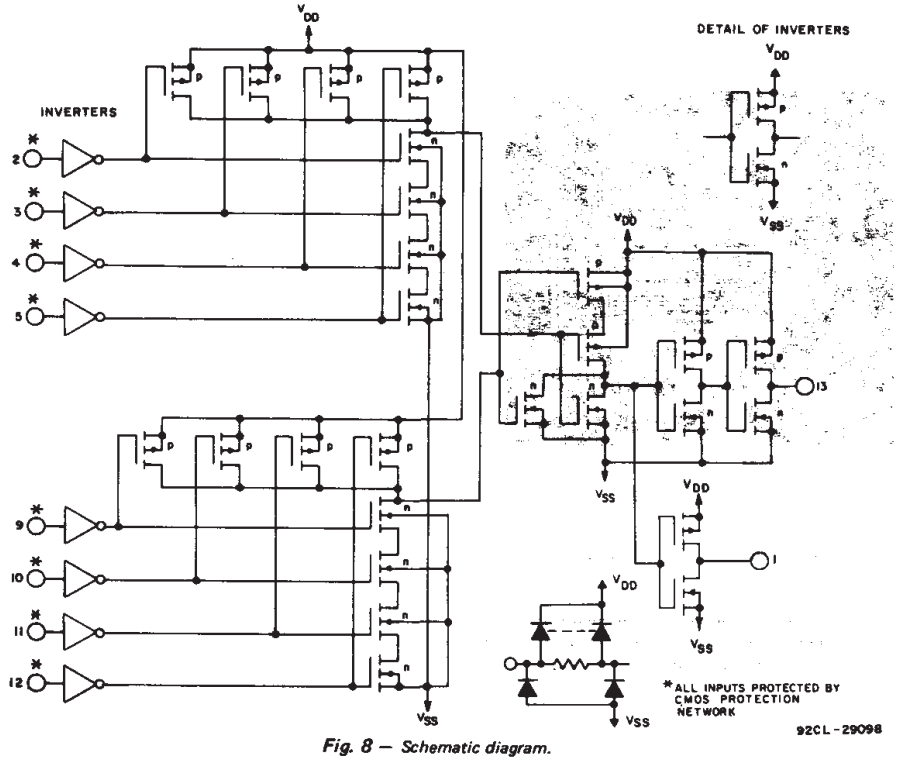


Fig. 8 — Schematic diagram.

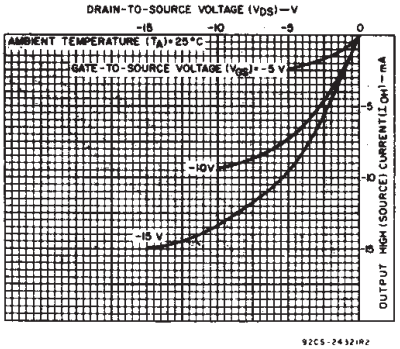


Fig. 5 — Minimum output high (source) current characteristics.

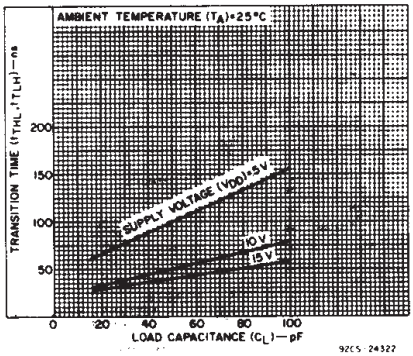


Fig. 6 — Typical transition time as a function of load capacitance.

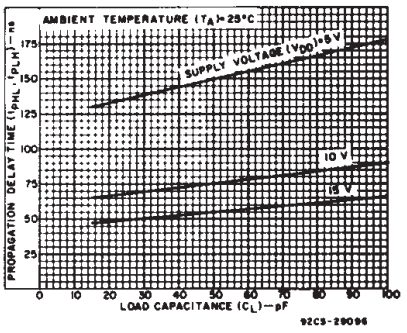


Fig. 7 — Typical propagation delay time as a function of load capacitance.

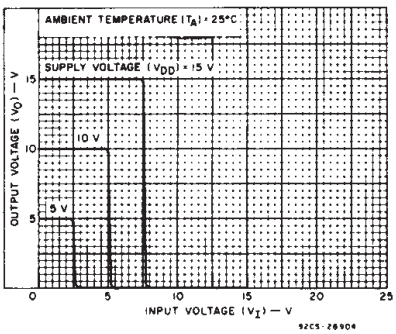


Fig. 9 — Typical voltage transfer characteristics (NOR output).

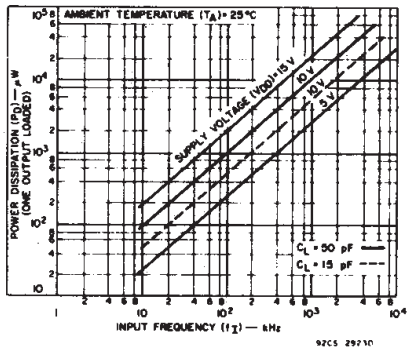


Fig. 10 – Typical dynamic power dissipation as a function of frequency.

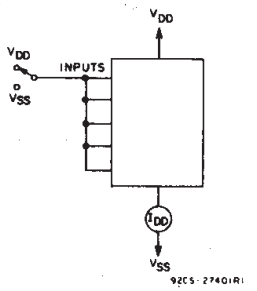


Fig. 11 – Quiescent-device-current test circuit.

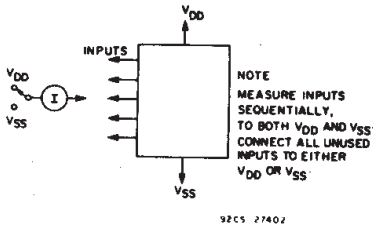


Fig. 12 – Input current test circuit.

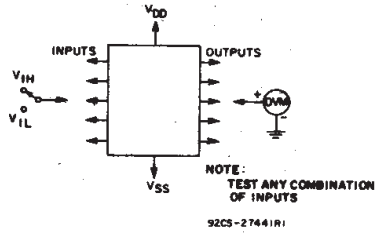


Fig. 13 – Input-voltage test circuit.

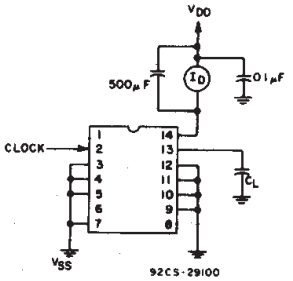
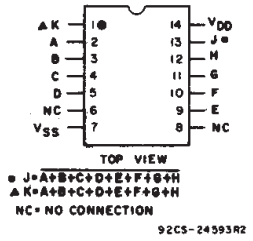
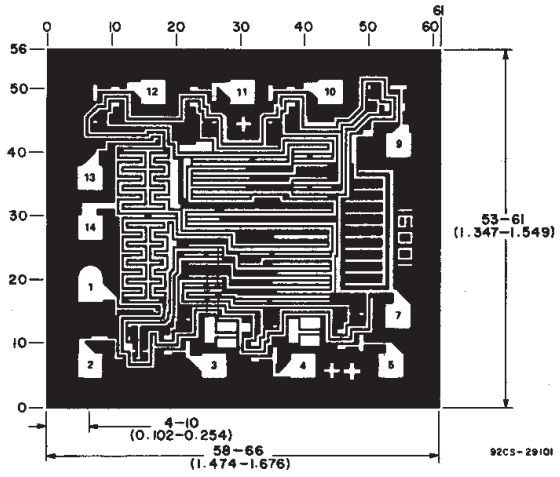


Fig. 14 – Dynamic power dissipation test circuit.



TERMINAL ASSIGNMENT



Dimensions and pad layout for CD4078BH.

Dimensions in parentheses are in millimeters and are derived from the basic inch dimensions as indicated. Grid graduations are in mils (10^{-3} inch).

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