

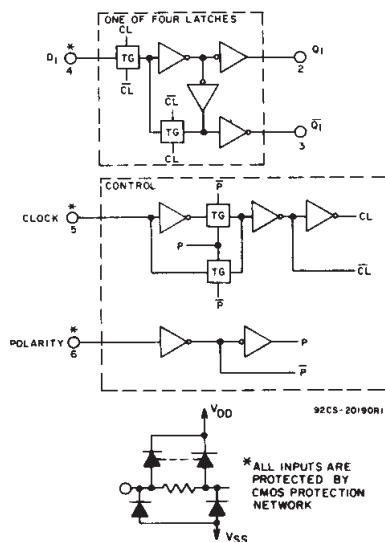
CMOS

Quad Clocked "D" Latch

High-Voltage Types (20-Volt Rating)

■ CD4042B types contain four latch circuits, each strobed by a common clock. Complementary buffered outputs are available from each circuit. The impedance of the n- and p-channel output devices is balanced and all outputs are electrically identical. Information present at the data input is transferred to outputs Q and \bar{Q} during the CLOCK level which is programmed by the POLARITY input. For POLARITY = 0 the transfer occurs during the 0 CLOCK level and for POLARITY = 1 the transfer occurs during the 1 CLOCK level. The outputs follow the data input providing the CLOCK and POLARITY levels defined above are present. When a CLOCK transition occurs (positive for POLARITY = 0 and negative for POLARITY = 1) the information present at the input during the CLOCK transition is retained at the outputs until an opposite CLOCK transition occurs.

The CD4042B types are supplied in 16-lead hermetic dual-in-line ceramic packages (F3A suffixes), 16-lead dual-in-line plastic package (E suffix), 16-lead small-outline packages (D, DR, DT, DW, DWR, and NSR suffixes), and 16-lead thin shrink small-outline packages (PW and PWR suffixes).



CLOCK	POLARITY	Q
0	0	D
	0	LATCH
1	1	D
	1	LATCH

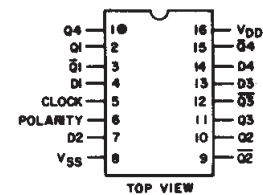
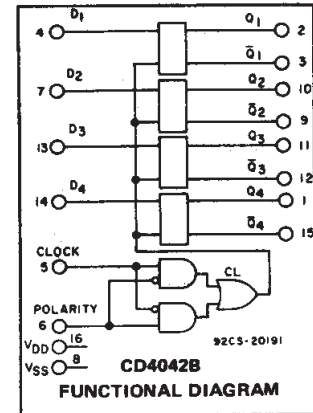
Fig. 1 – Logic block diagram and truth table.

Features:

- Clock polarity control
- Q and \bar{Q} outputs
- Common clock
- Low power TTL compatible
- Standardized symmetrical output characteristics
- 100% tested for quiescent current at 20 V
- Maximum input current of 1 μ A at 18 V over full package-temperature range; 100 nA at 18 V and 25°C
- 5-V, 10-V, and 15-V parametric ratings
- 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"

Applications:

- Buffer storage
- Holding register
- General digital logic



92CS-20756R1

TERMINAL ASSIGNMENT

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	1	1	30	30	—	0.02	1	μA
	—	0,10	10	2	2	60	60	—	0.02	2	
	—	0,15	15	4	4	120	120	—	0.02	4	
	—	0,20	20	20	20	600	600	—	0.04	20	
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	—	
	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	—	
Output High (Source) Current, I _{OH} Min.	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

CD4042B Types

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

$\pm 10\text{mA}$

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 Linearity at $12\text{mW}/^\circ\text{C}$ 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°C to $+125^\circ\text{C}$

STORAGE TEMPERATURE RANGE (T_{stg})

-65°C to $+150^\circ\text{C}$

LEAD TEMPERATURE (DURING SOLDERING):

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

RECOMMENDED OPERATING CONDITIONS at $T_A = 25^\circ\text{C}$, Except as Noted.
For maximum reliability, nominal operating conditions should be selected so that operation is always within the following ranges:

CHARACTERISTIC	V_{DD} (V)	LIMITS		UNITS
		Min.	Max.	
Supply-Voltage Range (For $T_A = \text{Full Package Temperature Range}$)	—	3	18	V
Clock Pulse Width, t_W	5	200	—	ns
	10	100	—	
	15	60	—	
Setup Time, t_S	5	50	—	ns
	10	30	—	
	15	25	—	
Hold Time, t_H	5	120	—	ns
	10	60	—	
	15	50	—	
Clock Rise or Fall Time: t_r, t_f	5, 10, 15	Not rise or fall time sensitive.		μs

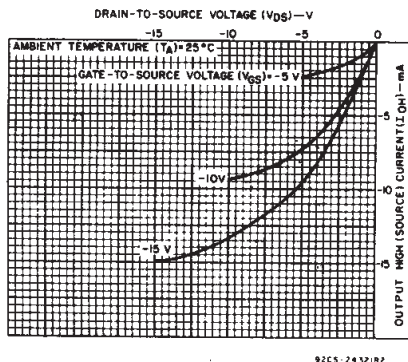


Fig. 5 — Minimum output high (source) current characteristics.

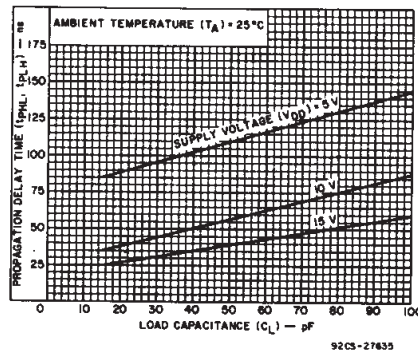


Fig. 6 — Typical propagation delay time vs. load capacitance—data to Q.

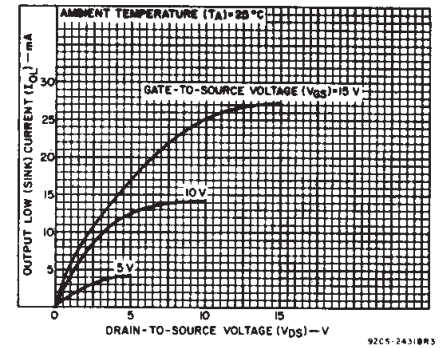


Fig. 2 — Typical output low (sink) current characteristics.

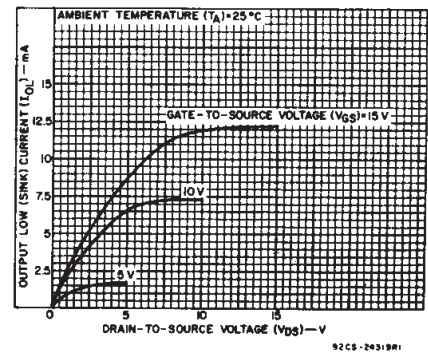


Fig. 3 — Minimum output low (sink) current characteristics.

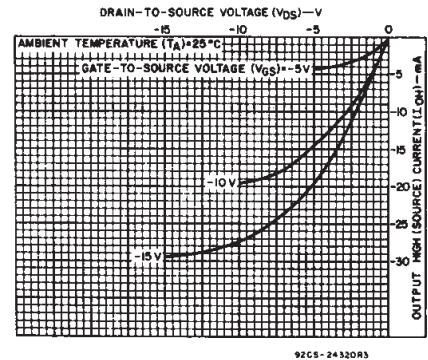


Fig. 4 — Typical output high (source) current characteristics.

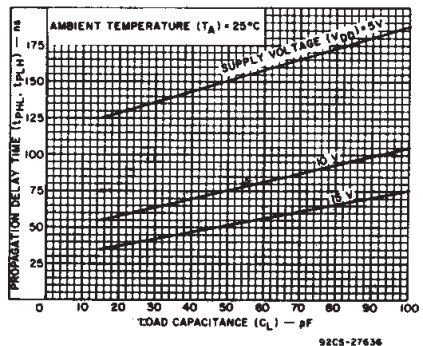


Fig. 7 — Typical propagation delay time vs. load capacitance—data to \bar{Q} .

CD4042B Types

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

CHARACTERISTIC	VDD (V)	LIMITS		UNITS
		Typ.	Max.	
Propagation Delay Time: t_{PHL}, t_{PLH} Data In to Q	5 10 15	110 55 40	220 110 80	ns
Data In to \bar{Q}	5 10 15	150 75 50	300 150 100	ns
Clock to Q	5 10 15	225 100 80	450 200 160	ns
Clock to \bar{Q}	5 10 15	250 115 90	500 230 180	ns
Transition Time: t_{THL}, t_{TLH}	5 10 15	100 50 40	200 100 80	ns
Minimum Clock Pulse Width, t_W	5 10 15	100 50 30	200 100 60	ns
Minimum Hold Time, t_H	5 10 15	60 30 25	120 60 50	ns
Minimum Setup Time, t_S	5 10 15	0 0 0	50 30 25	ns
Clock Input Rise or Fall Time: t_r, t_f	5, 10 15	Not rise or fall time sensitive.		μs
Input Capacitance, C_{IN} Polarity Input	—	5	7.5	pF
All Other Inputs	—	7.5	15	pF

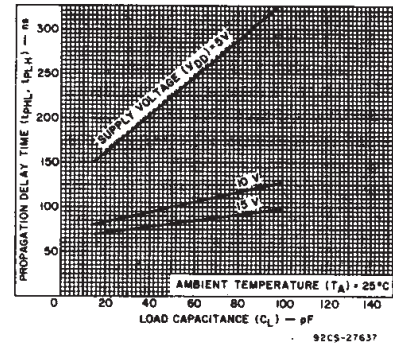


Fig. 8 — Typical propagation delay time vs. load capacitance—clock to Q

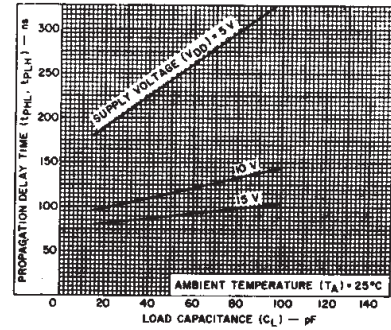
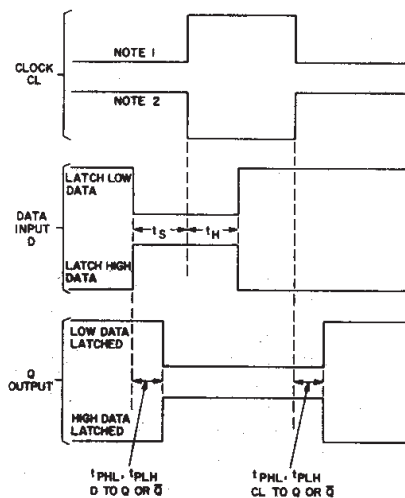


Fig. 9 — Typical propagation delay time vs. load capacitance—clock to \bar{Q} .



NOTES:
 1. FOR POSITIVE CLOCK EDGE, INPUT DATA IS LATCHED WHEN POLARITY IS LOW.
 2. FOR NEGATIVE CLOCK EDGE, INPUT DATA IS LATCHED WHEN POLARITY IS HIGH.

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Fig. 12 — Dynamic test parameters.

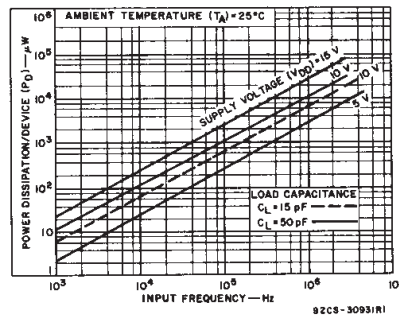


Fig. 10 — Typical power dissipation vs. frequency.

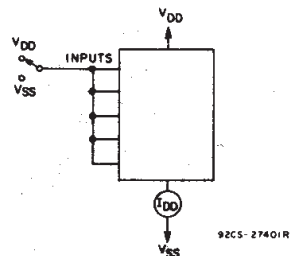


Fig. 13 — Quiescent device current test circuit.

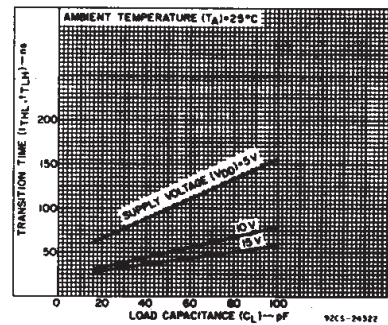


Fig. 11 — Typical transition time vs. load capacitance.

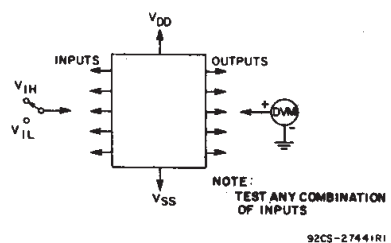


Fig. 14 — Input voltage test circuit.