

CD4041M/CD4041C Quad True/Complement Buffer

General Description

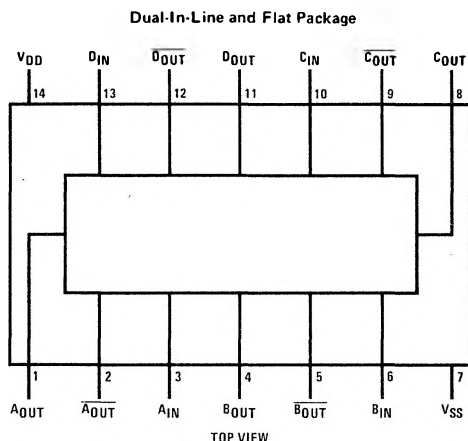
The CD4041M/CD4041C is a quad true/complement buffer consisting of N- and P-channel enhancement mode transistors having low-channel resistance and high current (sourcing and sinking) capability. The CD4041 is intended for use as a buffer, line driver, or CMOS-to-TTL driver.

All inputs are protected from static discharge by diode clamps to V_{DD} and V_{SS} .

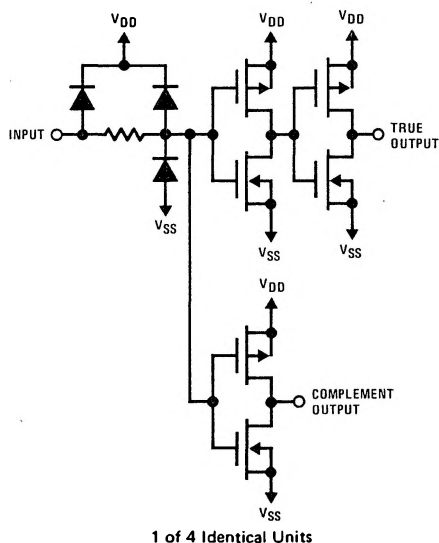
Features

- Wide supply voltage range 3.0 V to 15 V
- High noise immunity 40% V_{DD} (typ.)
- True output
 - High current source and sink capability
 - 8 mA (typ.) @ $V_O = 9.5$ V, $V_{DD} = 10$ V
 - 3.2 mA (typ.) @ $V_O = 0.4$ V, $V_{DD} = 5$ V (two TTL loads)
- Complement output
 - Medium current source and sink capability
 - 3.6 mA (typ.) @ $V_O = 9.5$ V, $V_{DD} = 10$ V
 - 1.6 mA (typ.) @ $V_O = 0.4$ V, $V_{DD} = 5$ V

Connection Diagram



Schematic Diagram



Absolute Maximum Ratings

(Notes 1 and 2)

V_{DD} Supply Voltage	-0.5V to +18V
V_{IN} Input Voltage	-0.5V to V_{DD} + 0.5V
T_S Storage Temperature Range	-65°C to +150°C
P_D Package Dissipation	500 mW
T_L Lead Temperature (Soldering, 10 seconds)	300°C

Recommended Operating Conditions

(Note 2)

V_{DD} Supply Voltage	3V to 15V
V_{IN} Input Voltage	0V to V_{DD}
T_A Operating Temperature Range	-55°C to +125°C
CD4041M	-40°C to +85°C
CD4041C	

DC Electrical Characteristics CD4041M (Note 2)

PARAMETER	CONDITIONS	-55°C		25°C			125°C		UNITS
		MIN	MAX	MIN	TYP	MAX	MIN	MAX	
I_{DD} Quiescent Device Current	$V_{DD} = 5V$		1		0.01	1		30	μA
	$V_{DD} = 10V$		2		0.01	2		60	μA
	$V_{DD} = 15V$		4		0.01	4		120	μA
V_{OL} Low Level Output Voltage	$ I_O < 1 \mu A, V_{IL} = 0V, V_{IH} = V_{DD}$								
	$V_{DD} = 5V$		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	$ I_O < 1 \mu A, V_{IL} = 0V, V_{IH} = V_{DD}$								
	$V_{DD} = 5V$	4.95		4.95	5		4.95		V
	$V_{DD} = 10V$	9.95		9.95	10		9.95		V
	$V_{DD} = 15V$	14.95		14.95	15		14.95		V
V_{IL} Low Level Input Voltage	$ I_O < 1 \mu A$								
	$V_{DD} = 5V, V_O = 0.5V \text{ or } 4.5V$		1.0		2	1.0		1.0	V
	$V_{DD} = 10V, V_O = 1V \text{ or } 9V$		2.0		4	2.0		2.0	V
	$V_{DD} = 15V, V_O = 1.5V \text{ or } 13.5V$		3.0		6	3.0		3.0	V
V_{IH} High Level Input Voltage	$ I_O < 1 \mu A$								
	$V_{DD} = 5V, V_O = 0.5V \text{ or } 4.5V$	4.0		4.0	3		4.0		V
	$V_{DD} = 10V, V_O = 1V \text{ or } 9V$	8.0		8.0	6		8.0		V
	$V_{DD} = 15V, V_O = 1.5V \text{ or } 13.5V$	12.0		12.0	9		12.0		V
I_{OL} Low Level Output Current True Output	$V_{IL} = 0V$								
	$V_{DD} = 5V, V_O = 0.4V$	2.1		1.6	3.2		1.2		mA
	$V_{DD} = 10V, V_O = 0.5V$	6.25		5.0	10		3.5		mA
	$V_{DD} = 15V, V_O = 1.5V$	14		12	24		8		mA
I_{OL} Low Level Output Current Complement Output	$V_{IH} = V_{DD}$								
	$V_{DD} = 5V, V_O = 0.4V$	1.0		0.8	1.6		0.55		mA
	$V_{DD} = 10V, V_O = 0.5V$	2.5		2	4.0		1.4		mA
	$V_{DD} = 15V, V_O = 1.5V$	5.5		4.5	9.0		3.0		mA
I_{OH} High Level Output Current True Output	$V_{IH} = V_{DD}$								
	$V_{DD} = 5V, V_O = 4.6V$	-1.75		-1.4	-2.8		-1.0		mA
	$V_{DD} = 10V, V_O = 9.5V$	-5.0		-4.0	-8.0		-2.8		mA
	$V_{DD} = 15V, V_O = 13.5V$	-11		-9	-18		-6		mA
I_{OH} High Level Output Current Complement Output	$V_{IL} = 0V$								
	$V_{DD} = 5V, V_O = 4.6V$	-0.75		-0.6	-1.2		-0.4		mA
	$V_{DD} = 10V, V_O = 9.5V$	-2.25		-1.8	-3.6		-1.25		mA
	$V_{DD} = 15V, V_O = 13.5V$	-4.8		-4	-8		-2.7		mA
I_{IN} Input Current	$V_{DD} = 15V, V_{IN} = 0V$		-0.1		-10^{-5}	-0.1		-1.0	μA
	$V_{DD} = 15V, V_{IN} = 15V$		0.1		10^{-5}	0.1		1.0	μA

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.

DC Electrical Characteristics CD4041C (Note 2)

PARAMETER	CONDITIONS	-40°C		25°C			85°C		UNITS
		MIN	MAX	MIN	TYP	MAX	MIN	MAX	
I_{DD} Quiescent Device Current	$V_{DD} = 5V$		4		0.01	4		30	μA
	$V_{DD} = 10V$		8		0.01	8		60	μA
	$V_{DD} = 15V$		16		0.01	16		120	μA
V_{OL} Low Level Output Voltage	$ I_O < 1 \mu A$, $V_{IL} = 0V$, $V_{IH} = V_{DD}$								
	$V_{DD} = 5V$		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	$ I_O < 1 \mu A$, $V_{IL} = 0V$, $V_{IH} = V_{DD}$								
	$V_{DD} = 5V$	4.95		4.95	5		4.95		V
	$V_{DD} = 10V$	9.95		9.95	10		9.95		V
	$V_{DD} = 15V$	14.95		14.95	15		14.95		V
V_{IL} Low Level Input Voltage	$ I_O < 1 \mu A$								
	$V_{DD} = 5V$, $V_O = 0.5V$ or $4.5V$		1.0		2	1.0		1.0	V
	$V_{DD} = 10V$, $V_O = 1V$ or $9V$		2.0		4	2.0		2.0	V
	$V_{DD} = 15V$, $V_O = 1.5V$ or $13.5V$		3.0		6	3.0		3.0	V
V_{IH} High Level Input Voltage	$ I_O < 1 \mu A$								
	$V_{DD} = 5V$, $V_O = 0.5V$ or $4.5V$	4.0		4.0	3		4.0		V
	$V_{DD} = 10V$, $V_O = 1V$ or $9V$	8.0		8.0	6		8.0		V
	$V_{DD} = 15V$, $V_O = 1.5V$ or $13.5V$	12.0		12.0	9		12.0		V
I_{OL} Low Level Output Current True Output	$V_{IL} = 0V$								
	$V_{DD} = 5V$, $V_O = 0.4V$	1.7		1.5	3.2		1.2		mA
	$V_{DD} = 10V$, $V_O = 0.5V$	4.9		4.3	10		3.5		mA
	$V_{DD} = 15V$, $V_O = 1.5V$	11		10	24		8		mA
I_{OL} Low Level Output Current Complement Output	$V_{IH} = V_{DD}$								
	$V_{DD} = 5V$, $V_O = 0.4V$	0.75		0.68	1.6		0.55		mA
	$V_{DD} = 10V$, $V_O = 0.5V$	2.0		1.8	4.0		1.4		mA
	$V_{DD} = 15V$, $V_O = 1.5V$	4.4		3.8	9.0		3.0		mA
I_{OH} High Level Output Current True Output	$V_{IH} = V_{DD}$								
	$V_{DD} = 5V$, $V_O = 4.6V$	-1.5		-1.3	-2.8		-1.0		mA
	$V_{DD} = 10V$, $V_O = 9.5V$	-4.0		-3.5	-8.0		-2.8		mA
	$V_{DD} = 15V$, $V_O = 13.5V$	-8.7		-7.5	-18		-6		mA
I_{OH} High Level Output Current Complement Output	$V_{IL} = 0V$								
	$V_{DD} = 5V$, $V_O = 4.6V$	-0.57		-0.50	-1.2		-0.4		mA
	$V_{DD} = 10V$, $V_O = 9.5V$	-1.8		-1.6	-3.6		-1.25		mA
	$V_{DD} = 15V$, $V_O = 13.5V$	-3.9		-3.4	-8.0		-2.7		mA
I_{IN} Input Current	$V_{DD} = 15V$, $V_{IN} = 0V$		-0.3		-10^{-5}	-0.3		-1.0	μA
	$V_{DD} = 15V$, $V_{IN} = 15V$		0.3		10^{-5}	0.3		1.0	μA

AC Electrical Characteristics $T_A = 25^\circ C$, $C_L = 50pF$, $R_L = 200k$, Input $t_r = t_f = 20ns$, unless otherwise specified

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
t_{PHL} or t_{PLH} Propagation Delay Time True Output	$V_{DD} = 5V$		60	120	ns
	$V_{DD} = 10V$		35	70	ns
	$V_{DD} = 15V$		25	50	ns
t_{PHL} or t_{PLH} Propagation Delay Time Complement Output	$V_{DD} = 5V$		75	150	ns
	$V_{DD} = 10V$		40	80	ns
	$V_{DD} = 15V$		30	65	ns
t_{THL} or t_{TLH} Output Transition Time True Output	$V_{DD} = 5V$		55	110	ns
	$V_{DD} = 10V$		30	60	ns
	$V_{DD} = 15V$		25	50	ns
t_{THL} or t_{TLH} Output Transition Time Complement Output	$V_{DD} = 5V$		90	180	ns
	$V_{DD} = 10V$		45	90	ns
	$V_{DD} = 15V$		35	75	ns
C_{IN} Input Capacitance	Any Input		10	15	pF

Switching Time Waveforms

