



CD4023M/CD4023C Triple 3-Input NAND Gate CD4025M/CD4025C Triple 3-Input NOR Gate

General Description

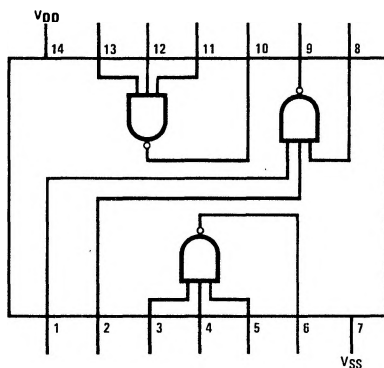
These triple gates are monolithic complementary MOS (CMOS) integrated circuits constructed with N- and P-channel enhancement mode transistors. All inputs are protected against static discharge with diodes to V_{DD} and V_{SS} .

Features

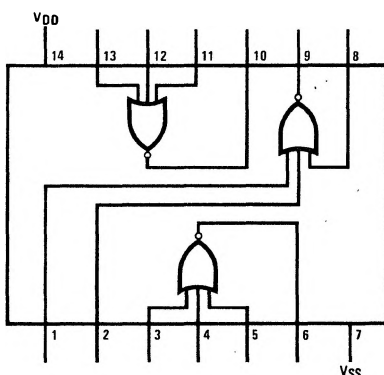
- Wide supply voltage range
- High noise immunity
- 5-10 V parametric ratings
- Low Power

3.0 V to 15 V
0.45 V_{DD} (typ.)

Connection Diagrams



CD4023M/CD4023C
TOP VIEW



CD4025M/CD4025C
TOP VIEW

Absolute Maximum Ratings (Note 1)

Voltage at Any Pin $V_{SS} -$ to $V_{DD} + 0.3 V$
 Operating Temperature Range $-55^{\circ}C$ to $+125^{\circ}C$
 CD4023M, CD4025M $-55^{\circ}C$ to $+125^{\circ}C$
 CD4023C, CD4025C $-40^{\circ}C$ to $+85^{\circ}C$

Storage Temperature Range $-65^{\circ}C$ to $+150^{\circ}C$
 Package Dissipation 500 mW
 Operating V_{DD} Range $V_{SS} + 3.0 V$ to $V_{SS} + 15 V$
 Lead Temperature (Soldering, 10 seconds) $300^{\circ}C$

DC Electrical Characteristics — CD4023M, CD4025M

Parameter		Conditions	Limits						Units	
			-55°C		25°C			125°C		
			Min.	Max.	Min.	Typ.	Max.	Min.		Max.
I _L	Quiescent Device Current	V _{DD} = 5.0 V		0.05		0.001	0.05		3.0	μA
		V _{DD} = 10 V		0.1		0.001	0.1		6.0	μA
P _D	Quiescent Device Dissipation/Package	V _{DD} = 5.0 V		0.25		0.005	0.25		15	μW
		V _{DD} = 10 V		1.0		0.01	1.0		60	μW
V _{OL}	Output Voltage Low Level	V _{DD} = 5.0 V, V _I = V _{DD} , I _O = 0 A		0.05		0	0.05		0.05	V
		V _{DD} = 10 V, V _I = V _{DD} , I _O = 0 A		0.05		0	0.05		0.05	V
V _{OH}	Output Voltage High Level	V _{DD} = 5.0 V, V _I = V _{SS} , I _O = 0 A	4.95		4.95	5.0		4.95		V
		V _{DD} = 10 V, V _I = V _{SS} , I _O = 0 A	9.95		9.95	10		9.95		V
V _{NL}	Noise Immunity (All Inputs)	V _{DD} = 5.0 V, V _O = 3.6 V, I _O = 0 A	1.5		1.5	2.25		1.4		V
		V _{DD} = 10 V, V _O = 7.2 V, I _O = 0 A	3.0		3.0	4.5		2.9		V
V _{NH}	Noise Immunity (All Inputs)	V _{DD} = 5.0 V, V _O = 0.95 V, I _O = 0 A	1.4		1.5	2.25		1.5		V
		V _{DD} = 10 V, V _O = 2.9 V, I _O = 0 A	2.9		3.0	4.5		3.0		V
I _{DN}	Output Drive Current N-Channel (4025)	V _{DD} = 5.0 V, V _O = 0.4 V, V _I = V _{DD}	0.5		0.40	1.0		0.28		mA
		V _{DD} = 10 V, V _O = 0.5 V, V _I = V _{DD}	1.1		0.9	2.5		0.65		mA
I _{DP}	Output Drive Current P-Channel (4025)	V _{DD} = 5.0 V, V _O = 2.5 V, V _I = V _{SS}	-0.62		-0.5	-2.0		-0.35		mA
		V _{DD} = 10 V, V _O = 9.5 V, V _I = V _{SS}	-0.62		-0.5	-1.0		-0.35		mA
I _{DN}	Output Drive Current N-Channel (4023)	V _{DD} = 5.0 V, V _O = 0.4 V, V _I = V _{DD}	0.31		0.25	0.5		0.175		mA
		V _{DD} = 10 V, V _O = 0.5 V, V _I = V _{DD}	0.63		0.5	0.6		0.35		mA
I _{DP}	Output Drive Current P-Channel (4023)	V _{DD} = 5.0 V, V _O = 2.5 V, V _I = V _{SS}	-0.31		-0.25	-0.5		-0.175		mA
		V _{DD} = 10 V, V _O = 9.5 V, V _I = V _{SS}	-0.75		-0.6	-1.2		-0.4		mA
I _I	Input Current					10				pA

DC Electrical Characteristics — CD4023C, CD4025C

Parameter		Conditions	Limits						Units	
			-40°C		25°C			85°C		
			Min.	Max.	Min.	Typ.	Max.	Min.		Max.
I _L	Quiescent Device	V _{DD} = 5.0 V		0.5		0.005	0.5		15	μA
	Current	V _{DD} = 10 V		5.0		0.005	5.0		30	μA
P _D	Quiescent Device	V _{DD} = 5.0 V		2.5		0.025	2.5		75	μW
	Dissipation/Package	V _{DD} = 10 V		50		0.05	50		300	μW
V _{OL}	Output Voltage Low	V _{DD} = 5.0 V, V _I = V _{DD} , I _O = 0 A		0.01		0	0.01		0.05	V
	Level	V _{DD} = 10 V, V _I = V _{DD} , I _O = 0 A		0.01		0	0.01		0.05	V
V _{OH}	Output Voltage High	V _{DD} = 5.0 V, V _I = V _{SS} , I _O = 0 A	4.99		4.99	5.0		4.95		V
	Level	V _{DD} = 10 V, V _I = V _{SS} , I _O = 0 A	9.99		9.99	10		9.95		V
I _I	Input Current					10				pA
V _{NL}	Noise Immunity	V _{DD} = 5.0 V, V _O = 3.6 V, I _O = 0 A	1.5		1.5	2.25		1.4		V
	(All Inputs)	V _{DD} = 10 V, V _O = 7.2 V, I _O = 0 A	3.0		3.0	4.5		2.9		V
V _{NH}	Noise Immunity	V _{DD} = 5.0 V, V _I = 0.95 V, I _O = 0 A	1.4		1.5	2.25		1.5		V
	(All Inputs)	V _{DD} = 10 V, V _O = 2.9 V, I _O = 0 A	2.9		3.0	4.5		3.0		V
I _{DN}	Output Drive Current	V _{DD} = 5.0 V, V _O = 0.4 V, V _I = V _{DD}	0.35		0.3	1.0		0.24		mA
	N-Channel (4025)	V _{DD} = 10 V, V _O = 0.5 V, V _I = V _{DD}	0.72		0.6	2.5		0.48		mA
I _{DP}	Output Drive Current	V _{DD} = 5.0 V, V _O = 2.5 V, V _I = V _{SS}	-0.35		-0.3	-2.0		-0.24		mA
	P-Channel (4025)	V _{DD} = 10 V, V _O = 9.5 V, V _I = V _{SS}	-0.3		-0.25	-1.0		-0.2		mA
I _{DN}	Output Drive Current	V _{DD} = 5.0 V, V _O = 0.4 V, V _I = V _{DD}	0.145		0.12	0.5		0.095		mA
	N-Channel (4023)	V _{DD} = 10 V, V _O = 0.5 V, V _I = V _{DD}	0.3		0.25	0.6		0.2		mA
I _{DP}	Output Drive Current	V _{DD} = 5.0 V, V _O = 2.5 V, V _I = V _{SS}	-0.145		-0.12	-0.5		-0.095		mA
	P-Channel (4023)	V _{DD} = 10 V, V _O = 9.5 V, V _I = V _{SS}	-0.35		-0.3	-1.2		-0.24		mA
I _I	Input Current					10				pA

AC Electrical Characteristics

$T_A = 25^\circ\text{C}$, $C_L = 15\text{pF}$, and input rise and fall times = 20 ns.
Typical temperature coefficient for all values of $V_{DD} = 0.3\%/^\circ\text{C}$

Parameter	Conditions	Min.	Typ.	Max.	Units
CD4025M					
t_{PHL} Propagation Delay Time High to Low Level	$V_{DD} = 5.0\text{V}$		35	50	ns
	$V_{DD} = 10\text{V}$		25	40	ns
t_{PLH} Propagation Delay Time Low to High Level	$V_{DD} = 5.0\text{V}$		35	40	ns
	$V_{DD} = 10\text{V}$		25	70	ns
t_{THL} Transition Time High to Low Level	$V_{DD} = 5.0\text{V}$		65	125	ns
	$V_{DD} = 10\text{V}$		35	70	ns
t_{TLH} Transition Time Low to High Level	$V_{DD} = 5.0\text{V}$		65	175	ns
	$V_{DD} = 10\text{V}$		35	75	ns
C_i Input Capacitance	Any Input		5.0		pF

CD4025C					
t_{PHL} Propagation Delay Time High to Low Level	$V_{DD} = 5.0\text{V}$		35	80	ns
	$V_{DD} = 10\text{V}$		25	55	ns
t_{PLH} Propagation Delay Time Low to High Level	$V_{DD} = 5.0\text{V}$		35	120	ns
	$V_{DD} = 10\text{V}$		25	65	ns
t_{THL} Transition Time High to Low Level	$V_{DD} = 5.0\text{V}$		65	200	ns
	$V_{DD} = 10\text{V}$		35	115	ns
t_{TLH} Transition Time Low to High Level	$V_{DD} = 5.0\text{V}$		65	300	ns
	$V_{DD} = 10\text{V}$		35	125	ns
C_i Input Capacitance	Any Input		5.0		pF

AC Electrical Characteristics

$T_A = 25^\circ\text{C}$, $C_L = 15\text{pF}$, and input rise and fall times = 20 ns.
Typical temperature coefficient for all values of $V_{DD} = 0.3\%/^\circ\text{C}$

Parameter	Conditions	Min.	Typ.	Max.	Units
CD4023M					
t_{PHL} Propagation Delay Time High to Low Level	$V_{DD} = 5.0\text{V}$		50	75	ns
	$V_{DD} = 10\text{V}$		25	40	ns
t_{PLH} Propagation Delay Time Low to High Level	$V_{DD} = 5.0\text{V}$		50	75	ns
	$V_{DD} = 10\text{V}$		25	40	ns
t_{THL} Transition Time High to Low Level	$V_{DD} = 5.0\text{V}$		75	125	ns
	$V_{DD} = 10\text{V}$		50	75	ns
t_{TLH} Transition Time Low to High Level	$V_{DD} = 5.0\text{V}$		75	100	ns
	$V_{DD} = 10\text{V}$		40	60	ns
C_i Input Capacitance	Any Input		5.0		pF

CD4023C					
t_{PHL} Propagation Delay Time High to Low Level	$V_{DD} = 5.0\text{V}$		50	100	ns
	$V_{DD} = 10\text{V}$		25	50	ns
t_{PLH} Propagation Delay Time Low to High Level	$V_{DD} = 5.0\text{V}$		50	100	ns
	$V_{DD} = 10\text{V}$		25	50	ns
t_{THL} Transition Time High to Low Level	$V_{DD} = 5.0\text{V}$		75	150	ns
	$V_{DD} = 10\text{V}$		50	100	ns
t_{TLH} Transition Time Low to High Level	$V_{DD} = 5.0\text{V}$		75	125	ns
	$V_{DD} = 10\text{V}$		40	75	ns
C_i Input Capacitance	Any Input		5.0		pF