



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

General Description

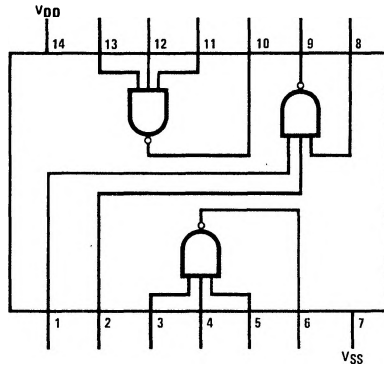
These triple gates are monolithic complementary MOS (CMOS) integrated circuits constructed with N- and P-channel enhancement mode transistors. All inputs are protected against static discharge with diodes to V_{DD} and V_{SS} .

Features

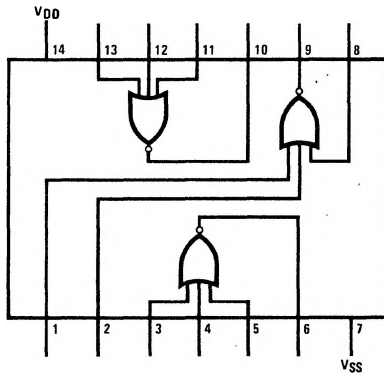
- Wide supply voltage range
- High noise immunity
- 5-10V parametric ratings
- Low Power

3.0V to 15V
 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 $V_{DD} + 0.3V$	Storage Temperature Range	$-65^{\circ}C$ to $+150^{\circ}C$
Operating Temperature Range	$-55^{\circ}C$ to $+125^{\circ}C$	Package Dissipation	500 mW
CD4023M, CD4025M	$-55^{\circ}C$ to $+125^{\circ}C$	Operating V_{DD} Range	$V_{SS} + 3.0V$ to $V_{SS} + 15V$
CD4023C, CD4025C	$-40^{\circ}C$ to $+85^{\circ}C$	Lead Temperature (Soldering, 10 seconds)	$300^{\circ}C$

DC Electrical Characteristics — CD4023M, CD4025M

Parameter	Conditions	Limits							Units
		$-55^{\circ}C$		$25^{\circ}C$			$125^{\circ}C$		
		Min.	Max.	Min.	Typ.	Max.	Min.	Max.	
I_L Quiescent Device Current	$V_{DD} = 5.0V$		0.05		0.001	0.05		3.0	μA
	$V_{DD} = 10V$		0.1		0.001	0.1		6.0	μA
P_D Quiescent Device Dissipation/Package	$V_{DD} = 5.0V$		0.25		0.005	0.25		15	μW
	$V_{DD} = 10V$		1.0		0.01	1.0		60	μW
V_{OL} Output Voltage Low Level	$V_{DD} = 5.0V, V_I = V_{DD}, I_O = 0A$		0.05		0	0.05		0.05	V
	$V_{DD} = 10V, V_I = V_{DD}, I_O = 0A$		0.05		0	0.05		0.05	V
V_{OH} Output Voltage High Level	$V_{DD} = 5.0V, V_I = V_{SS}, I_O = 0A$	4.95		4.95	5.0		4.95		V
	$V_{DD} = 10V, V_I = V_{SS}, I_O = 0A$	9.95		9.95	10		9.95		V
V_{NL} Noise Immunity (All Inputs)	$V_{DD} = 5.0V, V_O = 3.6V, I_O = 0A$	1.5		1.5	2.25		1.4		V
	$V_{DD} = 10V, V_O = 7.2V, I_O = 0A$	3.0		3.0	4.5		2.9		V
V_{NH} Noise Immunity (All Inputs)	$V_{DD} = 5.0V, V_O = 0.95V, I_O = 0A$	1.4		1.5	2.25		1.5		V
	$V_{DD} = 10V, V_O = 2.9V, I_O = 0A$	2.9		3.0	4.5		3.0		V
I_{DN} Output Drive Current N-Channel (4025)	$V_{DD} = 5.0V, V_O = 0.4V, V_I = V_{DD}$	0.5		0.40	1.0		0.28		mA
	$V_{DD} = 10V, V_O = 0.5V, V_I = V_{DD}$	1.1		0.9	2.5		0.65		mA
I_{DP} Output Drive Current P-Channel (4025)	$V_{DD} = 5.0V, V_O = 2.5V, V_I = V_{SS}$	-0.62		-0.5	-2.0		-0.35		mA
	$V_{DD} = 10V, V_O = 9.5V, V_I = V_{SS}$	-0.62		-0.5	-1.0		-0.35		mA
I_{DN} Output Drive Current N-Channel (4023)	$V_{DD} = 5.0V, V_O = 0.4V, V_I = V_{DD}$	0.31		0.25	0.5		0.175		mA
	$V_{DD} = 10V, V_O = 0.5V, V_I = V_{DD}$	0.63		0.5	0.6		0.35		mA
I_{DP} Output Drive Current P-Channel (4023)	$V_{DD} = 5.0V, V_O = 2.5V, V_I = V_{SS}$	-0.31		-0.25	-0.5		-0.175		mA
	$V_{DD} = 10V, V_O = 9.5V, V_I = V_{SS}$	-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 Current	V _{DD} = 5.0V		0.5		0.005	0.5		15	μA
	V _{DD} = 10V		5.0		0.005	5.0		30	μA
P _D Quiescent Device Dissipation/Package	V _{DD} = 5.0V		2.5		0.025	2.5		75	μW
	V _{DD} = 10V		50		0.05	50		300	μW
V _{OL} Output Voltage Low Level	V _{DD} = 5.0V, V _I = V _{DD} , I _O = 0A		0.01		0	0.01		0.05	V
	V _{DD} = 10V, V _I = V _{DD} , I _O = 0A		0.01		0	0.01		0.05	V
V _{OH} Output Voltage High Level	V _{DD} = 5.0V, V _I = V _{SS} , I _O = 0A	4.99		4.99	5.0		4.95		V
	V _{DD} = 10V, V _I = V _{SS} , I _O = 0A	9.99		9.99	10		9.95		V
I _I Input Current					10				pA
V _{NL} Noise Immunity (All Inputs)	V _{DD} = 5.0V, V _O = 3.6V, I _O = 0A	1.5		1.5	2.25		1.4		V
	V _{DD} = 10V, V _O = 7.2V, I _O = 0A	3.0		3.0	4.5		2.9		V
V _{NH} Noise Immunity (All Inputs)	V _{DD} = 5.0V, V _I = 0.95V, I _O = 0A	1.4		1.5	2.25		1.5		V
	V _{DD} = 10V, V _O = 2.9V, I _O = 0A	2.9		3.0	4.5		3.0		V
I _{DN} Output Drive Current N-Channel (4025)	V _{DD} = 5.0V, V _O = 0.4V, V _I = V _{DD}	0.35		0.3	1.0		0.24		mA
	V _{DD} = 10V, V _O = 0.5V, V _I = V _{DD}	0.72		0.6	2.5		0.48		mA
I _{DP} Output Drive Current P-Channel (4025)	V _{DD} = 5.0V, V _O = 2.5V, V _I = V _{SS}	-0.35		-0.3	-2.0		-0.24		mA
	V _{DD} = 10V, V _O = 9.5V, V _I = V _{SS}	-0.3		-0.25	-1.0		-0.2		mA
I _{DN} Output Drive Current N-Channel (4023)	V _{DD} = 5.0V, V _O = 0.4V, V _I = V _{DD}	0.145		0.12	0.5		0.095		mA
	V _{DD} = 10V, V _O = 0.5V, V _I = V _{DD}	0.3		0.25	0.6		0.2		mA
I _{DP} Output Drive Current P-Channel (4023)	V _{DD} = 5.0V, V _O = 2.5V, V _I = V _{SS}	-0.145		-0.12	-0.5		-0.095		mA
	V _{DD} = 10V, V _O = 9.5V, 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