



CD4030M/CD4030C Quad EXCLUSIVE-OR Gate

General Description

The EXCLUSIVE-OR 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} .

- Medium speed operation
- High noise immunity

$t_{PHL} = t_{PLH} = 40 \text{ ns (typ.)}$
 at $C_L = 15 \text{ pF}$, 10V supply
 $0.45 V_{CC}$ (typ.)

Features

- Wide supply voltage range
- Low power

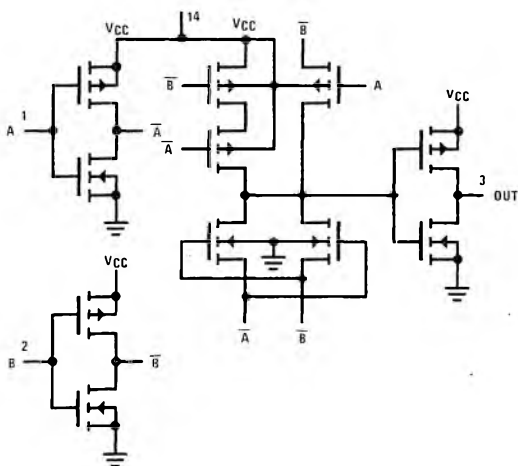
3.0V to 15V
 100 nW (typ.)

Applications

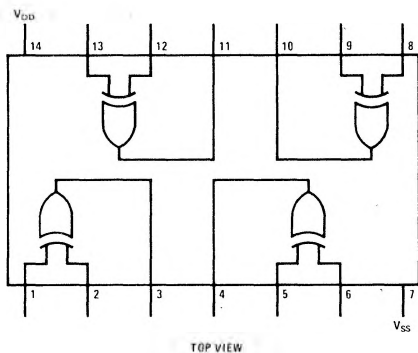
- Automotive
- Data terminals
- Instrumentation
- Medical electronics

- Industrial controls
- Remote metering
- Computers

Schematic Diagram



Connection Diagram



Absolute Maximum Ratings

Voltage at Any Pin (Note 1)	$V_{SS} - 0.3V$ to $V_{SS} + 15.5V$
Operating Temperature Range	
CD4030M	-55°C to +125°C
CD4030C	-40°C to +85°C
Storage Temperature Range	-65°C to +150°C
Package Dissipation	500 mW
Operating V_{DD} Range	$V_{SS} + 3.0V$ to $V_{SS} + 15V$
Lead Temperature (Soldering, 10 seconds)	300°C

DC Electrical Characteristics CD4030M

PARAMETER	CONDITIONS	LIMITS									UNITS
		-55°C			25°C			125°C			
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
Quiescent Device Current (I_L)	$V_{DD} = 5.0V$			0.5		0.005	0.5			30	μA
	$V_{DD} = 10V$			1.0		0.01	1.0			60	μA
Quiescent Device Dissipation Package (P_D)	$V_{DD} = 5.0V$			2.5		0.025	2.5			150	μW
	$V_{DD} = 10V$			10		0.1	10			600	μW
Output Voltage Low Level (V_{OL})	$V_{DD} = 5.0V$			0.05		0	0.05			0.05	V
	$V_{DD} = 10V$			0.05		0	0.05			0.05	V
Output Voltage High Level (V_{OH})	$V_{DD} = 5.0V$	4.95			4.95	5.0		4.95			V
	$V_{DD} = 10V$	9.95			9.95	10		9.95			V
Noise Immunity (All Inputs) (V_{NL})	$V_{DD} = 5.0V$	1.5			1.5	2.25		1.4			V
	$V_{DD} = 10V$	3.0			3.0	4.5		2.9			V
Noise Immunity (All Inputs) (V_{NH})	$V_{DD} = 5.0V$	1.4			1.5	2.25		1.5			V
	$V_{DD} = 10V$	2.9			3.0	4.5		3.0			V
Output Drive Current N-Channel (I_{DN})	$V_{DD} = 5.0V$			0.75		0.6	1.2			0.45	mA
	$V_{DD} = 10V$			1.5		1.2	2.4			0.9	mA
Output Drive Current P-Channel (I_{DP})	$V_{DD} = 5.0V$			-0.45		-0.3	-0.6			-0.21	mA
	$V_{DD} = 10V$			-0.95		-0.65	-1.3			-0.45	mA
Input Current (I_I)	$V_I = 0V$ or $V_I = V_{DD}$						10				pA

DC Electrical Characteristics CD4030C

PARAMETER	CONDITIONS	LIMITS									UNITS
		-40°C			25°C			85°C			
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
Quiescent Device Current (I_L)	$V_{DD} = 5.0V$			5.0		0.05	5.0			70	μA
	$V_{DD} = 10V$			10		0.1	10			140	μA
Quiescent Device Dissipation Package (P_D)	$V_{DD} = 5.0V$			25		0.25	25			350	μW
	$V_{DD} = 10V$			100		1.0	100			1,400	μW
Output Voltage Low Level (V_{OL})	$V_{DD} = 5.0V$			0.05		0	0.05			0.05	V
	$V_{DD} = 10V$			0.05		0	0.05			0.05	V
Output Voltage High Level (V_{OH})	$V_{DD} = 5.0V$	4.95			4.95	5.0		4.95			V
	$V_{DD} = 10V$	9.95			9.95	10		9.95			V
Noise Immunity (All Inputs) (V_{NL})	$V_{DD} = 5.0V$	1.5			1.5	2.25		1.4			V
	$V_{DD} = 10V$	3.0			3.0	4.5		2.9			V
Noise Immunity (All Inputs) (V_{NH})	$V_{DD} = 5.0V$	1.4			1.5	2.25		1.5			V
	$V_{DD} = 10V$	2.9			3.0	4.5		3.0			V
Output Drive Current N-Channel (I_{DN})	$V_{DD} = 5.0$			0.35		0.3	1.2			0.25	mA
	$V_{DD} = 10V$			0.7		0.6	2.4			0.5	mA
Output Drive Current P-Channel (I_{DP})	$V_{DD} = 5.0V$			-0.21		-0.15	-0.6			-0.12	mA
	$V_{DD} = 10V$			-0.45		-0.32	-1.3			-0.25	mA
Input Current (I_I)	$V_I = 0V$ or $V_I = V_{DD}$						10				pA

Note 1: This device should not be connected to circuits with power on because high transient voltages may cause permanent damage.

AC Electrical Characteristics CD4030M

PARAMETER	CONDITIONS	LIMITS			UNITS
		MIN	TYP	MAX	
Propagation Delay Time (t_{PHL})	$V_{DD} = 5.0V$		100	200	ns
	$V_{DD} = 10V$		40	100	ns
Propagation Delay Time (t_{PLH})	$V_{DD} = 5.0V$		100	200	ns
	$V_{DD} = 10V$		40	100	ns
Transition Time High to Low Level (t_{THL})	$V_{DD} = 5.0V$		70	150	ns
	$V_{DD} = 10V$		25	75	ns
Transition Time Low to High Level (t_{TLH})	$V_{DD} = 5.0V$		80	150	ns
	$V_{DD} = 10V$		30	75	ns
Input Capacitance (C_I)	$V_I = 0V$ or $V_I = V_{DD}$		5.0		pF

AC Electrical Characteristics CD4030C

PARAMETER	CONDITIONS	LIMITS			UNITS
		MIN	TYP	MAX	
Propagation Delay Time (t_{PHL})	$V_{DD} = 5.0V$		100	300	ns
	$V_{DD} = 10V$		40	150	ns
Propagation Delay Time (t_{PLH})	$V_{DD} = 5.0V$		100	300	ns
	$V_{DD} = 10V$		40	150	ns
Transition Time High to Low Level (t_{THL})	$V_{DD} = 5.0V$		70	300	ns
	$V_{DD} = 10V$		25	150	ns
Transition Time Low to High Level (t_{TLH})	$V_{DD} = 5.0V$		80	300	ns
	$V_{DD} = 10V$		30	150	ns
Input Capacitance (C_I)	$V_I = 0V$ or $V_I = V_{DD}$		5.0		pF

Truth Table (For One of Four Identical Gates)

A	B	J
0	0	0
1	0	1
0	1	1
1	1	0

Where: "1" = High Level
 "0" = Low Level