

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} .

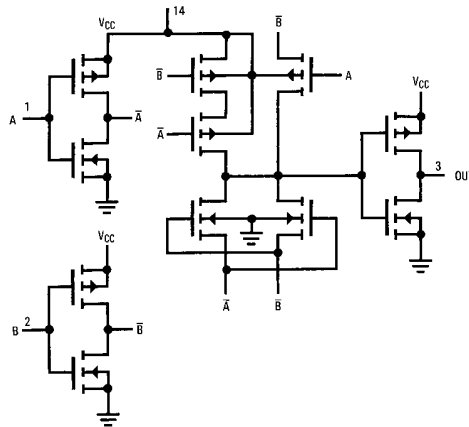
Features

- Wide supply voltage range 3.0V to 15V
- Low power 100 nW (typ.)
- Medium speed operation $t_{PHL} = t_{PLH} = 40$ ns (typ.)
at $C_L = 15$ pF, 10V supply
- High noise immunity 0.45 V_{CC} (typ.)

Applications

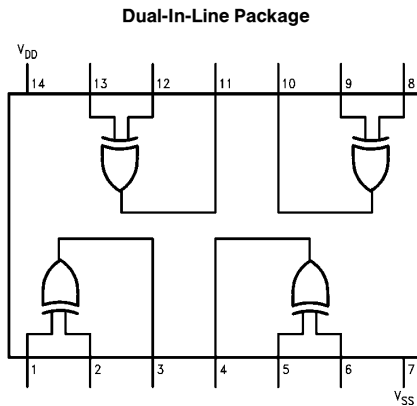
- Automotive
- Data terminals
- Instrumentation
- Medical electronics
- Industrial controls
- Remote metering
- Computers

Schematic Diagram



TL/F/5961-1

Connection Diagram



Order Number CD4030

TL/F/5961-2

Absolute Maximum Ratings

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Voltage at Any Pin (Note 1) $V_{SS} - 0.3V$ to $V_{SS} + 15.5V$

Operating Temperature Range

CD4030M

CD4030C

−55°C to +125°C

−40°C to +85°C

Storage Temperature Range

−65°C to +150°C

Power Dissipation (P_D)

Dual-In-Line

700 mW

Small Outline

500 mW

Operating V_{DD} Range

$V_{SS} + 3.0V$ to $V_{SS} + 15V$

Lead Temperature

(Soldering, 10 seconds)

260°C

DC Electrical Characteristics CD4030M

Symbol	Parameter	Conditions	Limits									Units
			−55°C			+25°C			+125°C			
			Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
I _L	Quiescent Device Current	V _{DD} = 5.0V V _{DD} = 10V			0.5 1.0		0.005 0.01	0.5 1.0			30 60	μA μA
P _D	Quiescent Device Dissipation Package	V _{DD} = 5.0V V _{DD} = 10V			2.5 10		0.025 0.1	2.5 10			150 600	μW μW
V _{OL}	Output Voltage Low Level	V _{DD} = 5.0V V _{DD} = 10V			0.05 0.05		0 0	0.05 0.05			0.05 0.05	V V
V _{OH}	Output Voltage High Level	V _{DD} = 5.0V V _{DD} = 10V	4.95 9.95			4.95 9.95	5.0 10		4.95 9.95			V V
V _{NL}	Noise Immunity (All Inputs)	V _{DD} = 5.0V V _{DD} = 10V	1.5 3.0			1.5 3.0	2.25 4.5		1.4 2.9			V V
V _{NH}	Noise Immunity (All Inputs)	V _{DD} = 5.0V V _{DD} = 10V	1.4 2.9			1.5 3.0	2.25 4.5		1.5 3.0			V V
I _{DN}	Output Drive Current N-Channel (Note 2)	V _{DD} = 5.0V V _{DD} = 10V	0.75 1.5			0.6 1.2	1.2 2.4		0.45 0.9			mA mA
I _{DP}	Output Drive Current P-Channel (Note 2)	V _{DD} = 5.0V V _{DD} = 10V	−0.45 −0.95			−0.3 −0.65	−0.6 −1.3		−0.21 −0.45			mA mA
I _I	Input Current	V _I = 0V or V _I = V _{DD}					10					pA

DC Electrical Characteristics CD4030C

Symbol	Parameter	Conditions	Limits									Units
			− 40°C			+ 25°C			+ 85°C			
			Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
I _L	Quiescent Device Current	V _{DD} = 5.0V V _{DD} = 10V			5.0 10		0.05 0.1	5.0 10			70 140	μA μA
P _D	Quiescent Device Dissipation Package	V _{DD} = 5.0V V _{DD} = 10V			25 100		0.25 1.0	25 100			350 1,400	μW μW
V _{OL}	Output Voltage Low Level	V _{DD} = 5.0V V _{DD} = 10V			0.05 0.05		0 0	0.05 0.05			0.05 0.05	V V
V _{OH}	Output Voltage High Level	V _{DD} = 5.0V V _{DD} = 10V	4.95 9.95			4.95 9.95	5.0 10		4.95 9.95			V V
V _{NL}	Noise Immunity (All Inputs)	V _{DD} = 5.0V V _{DD} = 10V	1.5 3.0			1.5 3.0	2.25 4.5		1.4 2.9			V V
V _{NH}	Noise Immunity (All Inputs)	V _{DD} = 5.0V V _{DD} = 10V	1.4 2.9			1.5 3.0	2.25 4.5		1.5 3.0			V V
I _{DN}	Output Drive Current N-Channel (Note 2)	V _{DD} = 5.0V V _{DD} = 10V	0.35 0.7			0.3 0.6	1.2 2.4		0.25 0.5			mA mA
I _{DP}	Output Drive Current P-Channel (Note 2)	V _{DD} = 5.0V V _{DD} = 10 V	−0.21 −0.45			−0.15 −0.32	−0.6 −1.3		−0.12 −0.25			mA mA
I _I	Input Current	V _I = 0V or V _I = V _{DD}					10					pA

AC Electrical Characteristics* CD4030M

Symbol	Parameter	Conditions	Limits			Units
			Min	Typ	Max	
t_{PHL}	Propagation Delay Time	$V_{DD} = 5.0V$ $V_{DD} = 10V$		100	200	ns
				40	100	ns
t_{PLH}	Propagation Delay Time	$V_{DD} = 5.0V$ $V_{DD} = 10V$		100	200	ns
				40	100	ns
t_{THL}	Transition Time High to Low Level	$V_{DD} = 5.0V$ $V_{DD} = 10V$		70	150	ns
				25	75	ns
t_{TLH}	Transition Time Low to High Level	$V_{DD} = 5.0V$ $V_{DD} = 10V$		80	150	ns
				30	75	ns
C_I	Input Capacitance	$V_I = 0V$ or $V_I = V_{DD}$		5.0		pF

*AC Parameters are guaranteed by DC correlated testing.

AC Electrical Characteristics* CD4030C

Symbol	Parameter	Conditions	Limits			Units
			Min	Typ	Max	
t_{PHL}	Propagation Delay Time	$V_{DD} = 5.0V$ $V_{DD} = 10V$		100	300	ns
				40	150	ns
t_{PLH}	Propagation Delay Time	$V_{DD} = 5.0V$ $V_{DD} = 10V$		100	300	ns
				40	150	ns
t_{THL}	Transition Time High to Low Level	$V_{DD} = 5.0V$ $V_{DD} = 10V$		70	300	ns
				25	150	ns
t_{TLH}	Transition Time Low to High Level	$V_{DD} = 5.0V$ $V_{DD} = 10V$		80	300	ns
				30	150	ns
C_I	Input Capacitance	$V_I = 0V$ or $V_I = V_{DD}$		5.0		pF

*AC Parameters are guaranteed by DC correlated testing.

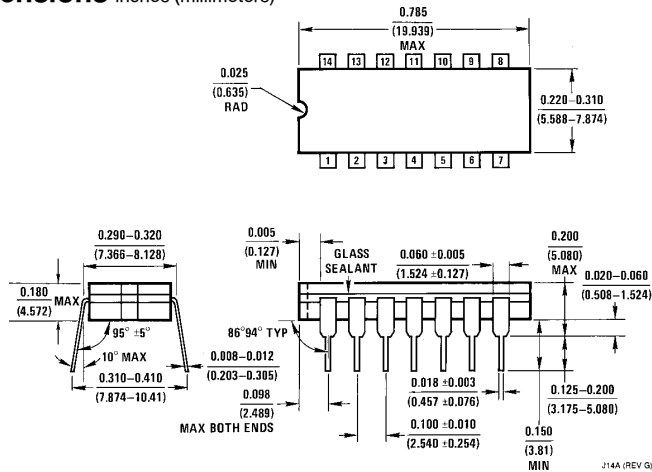
Note 1: This device should not be connected to circuits with power on because high transient voltages may cause permanent damage.

Note 2: I_{DN} and I_{DP} are tested one output at a time.

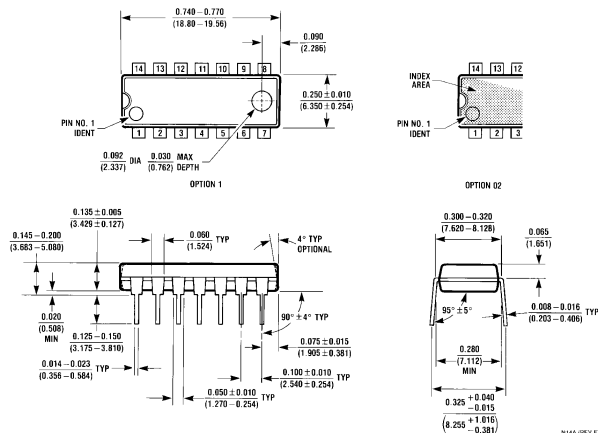
Truth Table (For One of Four Identical Gates)

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

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

Physical Dimensions inches (millimeters)

Ceramic Dual-In-Line Package (J)
Order Number CD4030MJ or CD4030CJ
NS Package Number J14A



Molded Dual-In-Line Package (N)
Order Number CD4030MN or CD4030CN
NS Package Number N14A

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