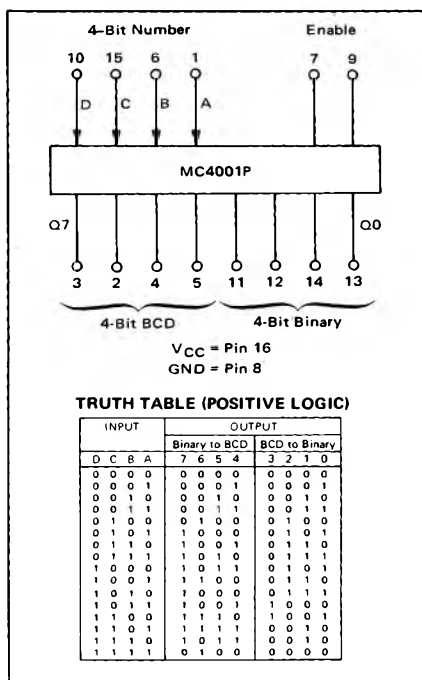


BCD-TO-BINARY/
BINARY-TO-BCD
NUMBER CONVERTER

MC4001L,P*

MC4300/MC4000 series



The MC4001 is derived from the XC170/171 128-Bit Read Only Memory. It serves as a basic building block in Binary-to-BCD and BCD-to-Binary converters. Conversion of any length binary or BCD word can be accomplished by interconnecting MC4001 packages. The MC4001 also contains a full adder and subtractor.

Features:

Address times < 45 ns

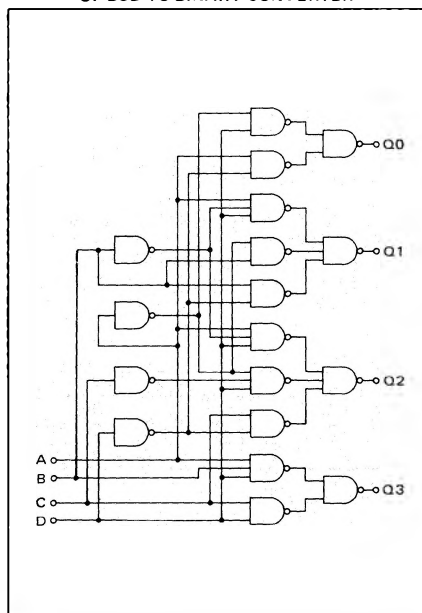
Outputs sink 16 mA

Output capacitance < 7.0 pF @ 1.5 V

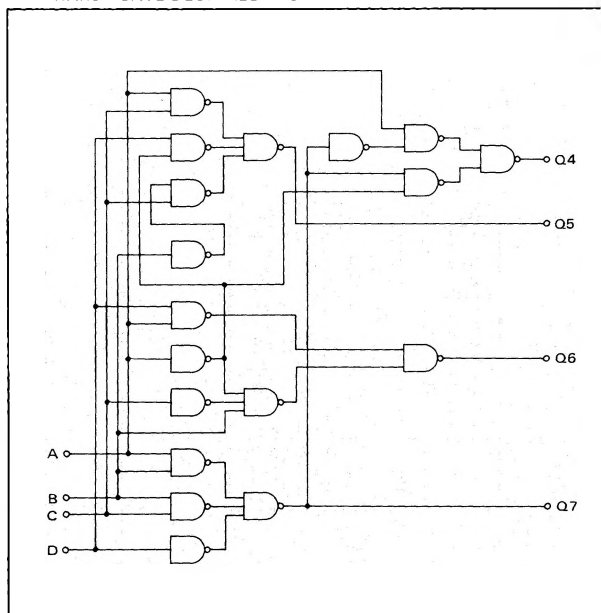
ENABLE INPUT TRUTH TABLE (POSITIVE LOGIC)

E	E	Q7	Q6	Q5	Q4	Q3	Q2	Q1	Q0
0	0	1	1	1	1	1	1	1	1
0	1	1	1	1	1	1	1	1	1
1	0	1	1	1	1	1	1	1	1
1	1	FUNCTION ENABLED							

"NAND" GATE EQUIVALENT
OF BCD-TO-BINARY CONVERTER



"NAND" GATE EQUIVALENT OF BINARY-TO-BCD CONVERTER



* L suffix = 16-pin dual in-line ceramic package (Case 620).
P suffix = 16-pin dual in-line plastic package (Case 612).

MC4001L,P (continued)

INPUT and OUTPUT LOADING FACTORS
with respect to M TTL and MD TL families

FAMILY	MC4001 INPUT LOADING FACTOR	MC4001 OUTPUT LOADING FACTOR	<p>Note: Differences in MC4000 series loading factors result from differences in specifications for each family.</p> <p>** Applies only when input is being driven by MD TL gate with 2 k ohm pullup resistor. Logic "1" state drive limitations of gates with 6 k ohm pullup resistors reduce drive capability to fan-out of 3.</p>
MC4000	1.0	5	
MC400	1.0	5	
MC2000	0.67	5	
MC3000	0.7	6	
MC7400	1.0	10	
MC830	1.15**	11	

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Supply Voltage	V _{CC}	−0.5 to +7.0	Vdc
Supply Operating Voltage Range	V _{CC}	4.75 to 5.25	Vdc
Input Voltage	V _{in}	−0.5 to +5.5	Vdc
Power Dissipation (Package Limitation) Derate above T _A =25°C	P _D	625 5.0	mW mW/°C
Operating Temperature Range	T _A	0 to +75	°C
Storage Temperature Range	T _{stg}	−55 to +125	°C

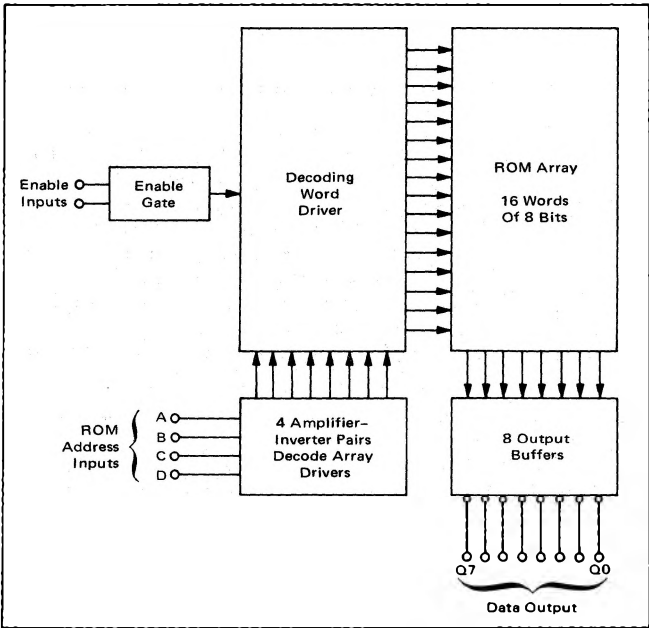
ELECTRICAL CHARACTERISTICS (T_A = 0 to +75°C)

Characteristic	Symbol	Min	Max	Unit
Address Input Forward Current (V _A = 0, V _{CC} = 5.0 Vdc)	I _F	-	1.6	mA _{dc}
Enable Input Forward Current (V _E = 0, V _{CC} = 5.0 Vdc)	I _F	-	1.6	mA _{dc}
Address Input Leakage Current (V _A = 5.5 Vdc, V _{CC} = 5.0 Vdc)	I _R	-	100	μA _{dc}
Enable Input Leakage Current (V _E = 5.5 Vdc, V _{CC} = 5.0 Vdc)	I _R	-	100	μA _{dc}
Logical "0" Output Voltage (I _{OL} = 16 mA _{dc} , V _{IL} = 0.9 Vdc, V _{IH} = 2.0 Vdc, V _{CC} = 4.75 Vdc)	V _{OL}	-	0.45	Vdc
Logical "1" Output Voltage (V _{IL} = 0.9 Vdc, V _{IH} = 2.0 Vdc, I _{OH} = −0.5 mA _{dc} , V _{CC} = 4.75 Vdc)	V _{OH}	-	2.5	Vdc
Power Supply Drain Current (Memory Enabled, V _{CC} = 5.25 Vdc) (Memory Disabled, V _{CC} = 5.25 Vdc)	I _{PD}	- -	93 55	mA _{dc}

SWITCHING TIMES (V_{CC} = 5.0 Vdc, T_A = +25°C)

Positive Input Address to Positive Output	I _{OL} = 10 mA driving 30 pF	t _{A+Q+}	-	45	ns
Negative Input Address to Negative Output		t _{A-Q-}	-	45	ns
Positive Input Address or Enable to Negative Output		t _{A+Q-} or t _{E+Q-}	-	45	ns
Negative Input Address or Enable to Positive Output		t _{A-Q+} or t _{E-Q+}	-	45	ns

FIGURE 4 – BLOCK DIAGRAM



Many functions can be designed from the XC170/171 Read Only Memory. The MC4001 BCD-to-Binary/Binary-to-BCD converter is made from the XC171, which has 2.0 k ohm pullup resistors on the outputs. Through use of a computer-designed metal mask, the truth table shown on the first page of this data sheet is programmed into the Memory by etching out metal links from the device metalization where a logic "1" level must be stored. Logic "0"s are stored where links are not removed.

FIGURE 5 – REPRESENTATIVE CIRCUIT

