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October 1987
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MM74C42 BCD-to-Decimal Decoder

MM74C42
BCD-to-Decimal Decoder

General Description

The MM74C42 one-of-ten decoder is a monolithic complementary MOS (CMOS) integrated circuit constructed with N- and P-channel enhancement transistors. This decoder produces a logical "0" at the output corresponding to a four bit binary input from zero to nine, and a logical "1" at the other outputs. For binary inputs from ten to fifteen all outputs are logical "1".

Features

■ Supply voltage range: 3V to 15V
■ Tenth power TTL compatible: drive 2 LPTTL loads
■ High noise immunity: 0.45 V_{CC} (typ.)
■ Low power: 50 nW (typ.)
■ Medium speed operation: 10 MHz (typ.) with 10V V_{CC}

Applications

• Automotive
• Data terminals
• Instrumentation
• Medical electronics
• Alarm systems
• Industrial electronics
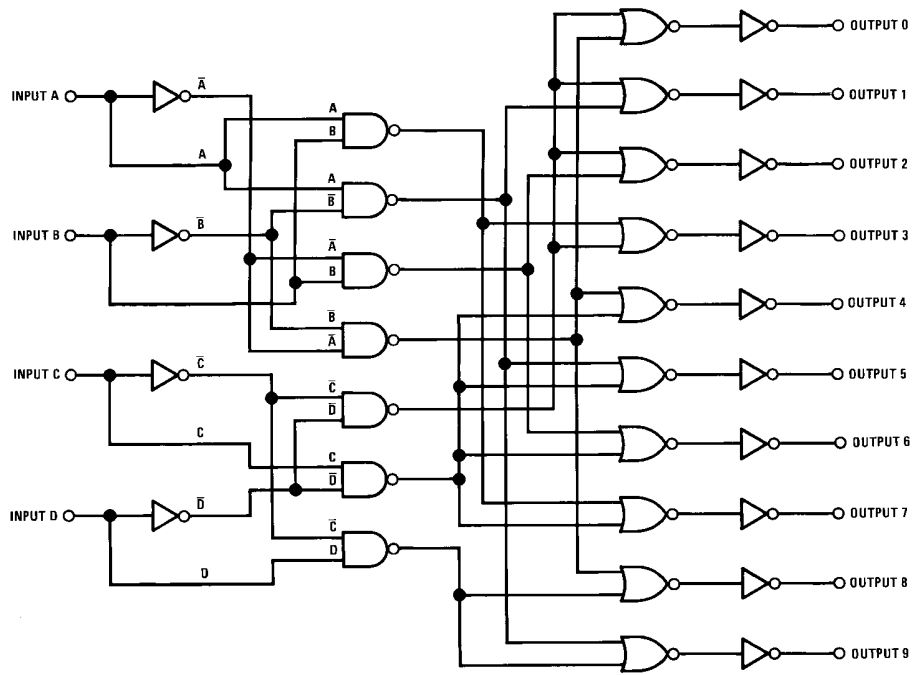• Remote metering
• Computers

Ordering Code:

Order Number	Package Number	Package Description
MM74C42N	N16E	16-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide

Connection Diagram

Top View
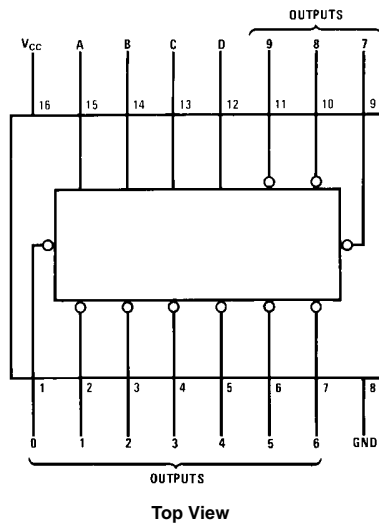
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Schematic Diagram

Truth Table

Inputs				Outputs									
D	C	B	A	0	1	2	3	4	5	6	7	8	9
0	0	0	0	0	1	1	1	1	1	1	1	1	1
0	0	0	1	1	0	1	1	1	1	1	1	1	1
0	0	1	0	1	1	0	1	1	1	1	1	1	1
0	0	1	1	1	1	1	0	1	1	1	1	1	1
0	1	0	0	1	1	1	1	0	1	1	1	1	1
0	1	0	1	1	1	1	1	1	0	1	1	1	1
0	1	1	0	1	1	1	1	1	1	0	1	1	1
0	1	1	1	1	1	1	1	1	1	1	0	1	1
1	0	0	0	1	1	1	1	1	1	1	1	0	1
1	0	0	1	1	1	1	1	1	1	1	1	1	0
1	0	1	0	1	1	1	1	1	1	1	1	1	1
1	0	1	1	1	1	1	1	1	1	1	1	1	1
1	1	0	0	1	1	1	1	1	1	1	1	1	1
1	1	0	1	1	1	1	1	1	1	1	1	1	1
1	1	1	0	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1

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Absolute Maximum Ratings(Note 1)

Voltage at Any Pin (Note 1)	$-0.3V$ to $V_{CC} + 0.3V$
Operating Temperature Range	$-55°C$ to $+125°C$
Storage Temperature Range	$-65°C$ to $+150°C$
Power Dissipation (P_D)	
Dual-In-Line	700 mW
Small Outline	500 mW
Operating V_{CC} Range	3.0V to 15V
Absolute Maximum V_{CC}	18V
Lead Temperature	
(Soldering, 10 seconds)	260°C

Note 1: "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. Except for "Operating Temperature Range" they are not meant to imply that the devices should be operated at these limits. The Electrical Characteristics tables provide conditions for actual device operation.

DC Electrical Characteristics

Min/Max limits apply across temperature range unless otherwise noted

Symbol	Parameter	Conditions	Min	Typ	Max	Units
CMOS TO CMOS						
$V_{IN(1)}$	Logical "1" Input Voltage	$V_{CC} = 5.0V$	3.5			V
		$V_{CC} = 10V$	8.0			
$V_{IN(0)}$	Logical "0" Input Voltage	$V_{CC} = 5.0V$			1.5	V
		$V_{CC} = 10V$			2.0	
$V_{OUT(1)}$	Logical "1" Output Voltage	$V_{CC} = 5.0V$, $I_O = -10$ μA	4.5			V
		$V_{CC} = 10V$, $I_O = -10$ μA	9.0			
$V_{OUT(0)}$	Logical "0" Output Voltage	$V_{CC} = 5.0V$, $I_O = 10$ μA			0.5	V
		$V_{CC} = 10V$, $I_O = 10$ μA			1.0	
$I_{IN(1)}$	Logical "1" Input Current	$V_{CC} = 15V$, $V_{IN} = 15V$			1.0	μA
$I_{IN(0)}$	Logical "0" Input Current	$V_{CC} = 15V$, $V_{IN} = 0V$	-1.0			μA
I_{CC}	Supply Current	$V_{CC} = 15V$		0.05	300	μA
CMOS/LPTTL INTERFACE						
$V_{IN(1)}$	Logical "1" Input Voltage	$V_{CC} = 4.75V$	$V_{CC} - 1.5$			V
$V_{IN(0)}$	Logical "0" Input Voltage	$V_{CC} = 4.75V$			0.8	V
$V_{OUT(1)}$	Logical "1" Output Voltage	$V_{CC} = 4.75V$, $I_O = -360$ μA	2.4			V
$V_{OUT(0)}$	Logical "0" Output Voltage	$V_{CC} = 4.75V$, $I_O = 360$ μA			0.4	V
OUTPUT DRIVE (see Family Characteristics Data Sheet) $T_A = 25°C$ (short circuit current)						
I_{SOURCE}	Output Source Current	$V_{CC} = 5.0V$, $V_{IN(0)} = 0V$, $V_{OUT} = 0V$	-1.75			mA
I_{SOURCE}	Output Source Current	$V_{CC} = 10V$, $V_{IN(0)} = 0V$, $V_{OUT} = 0V$	-8.0			mA
I_{SINK}	Output Sink Current	$V_{CC} = 5.0V$, $V_{IN(1)} = 5.0V$, $V_{OUT} = V_{CC}$	1.75			mA
I_{SINK}	Output Sink Current	$V_{CC} = 10V$, $V_{IN(1)} = 10V$, $V_{OUT} = V_{CC}$	8.0			mA

AC Electrical Characteristics (Note 2)

$T_A = 25°C$, $C_L = 50$ pF, unless otherwise specified

Symbol	Parameter	Conditions	Min	Typ	Max	Units
t_{pd}	Propagation Delay Time to	$V_{CC} = 5.0V$		200	300	ns
	Logical "0" or "1"	$V_{CC} = 10V$		90	140	ns
C_{IN}	Input Capacitance	(Note 3)		5		pF
C_{PD}	Power Dissipation Capacitance	(Note 4)		50		pF

Note 2: AC Parameters are guaranteed by DC correlated testing.

Note 3: Capacitance is guaranteed by periodic testing.

Note 4: C_{PD} determines the no load AC power consumption of any CMOS device. For complete explanation see Family Characteristics Application Note—AN-90.

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Physical Dimensions inches (millimeters) unless otherwise noted

16-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide
Package Number N16E

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