

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}

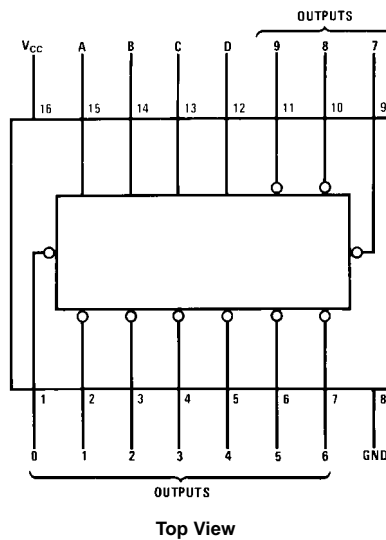
Applications

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

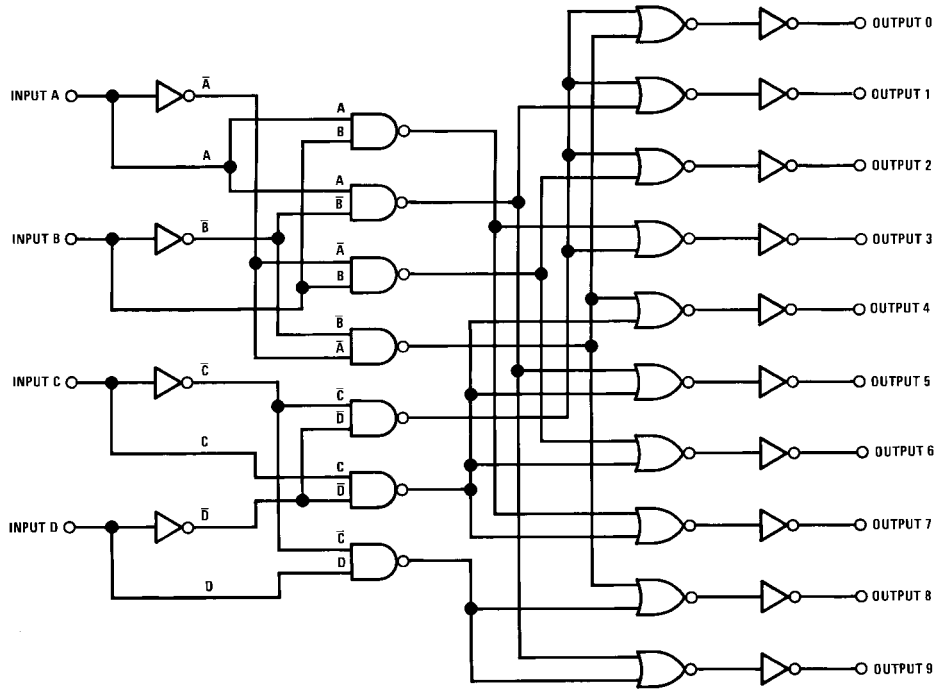
Ordering Code:

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

Connection Diagram



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 |

| Absolute Maximum Ratings (Note 1) | | Absolute Maximum V_{CC} | 18V |
|-----------------------------------|--------------------------|---------------------------|-------|
| Voltage at Any Pin (Note 1) | -0.3V to $V_{CC} + 0.3V$ | Lead Temperature | 260°C |
| Operating Temperature Range | -55°C to +125°C | (Soldering, 10 seconds) | |
| 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 | | |

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 | $V_{CC} = 5.0V, I_O = -10 \mu A$ | 4.5 | | | V |
| | | $V_{CC} = 10V, I_O = -10 \mu A$ | 9.0 | | | |
| $V_{OUT(0)}$ | Logical "0" Output Voltage | $V_{CC} = 5.0V, I_O = 10 \mu A$ | | | 0.5 | V |
| | | $V_{CC} = 10V, I_O = 10 \mu A$ | | | 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 | $V_{CC} = 4.75V, I_O = -360 \mu A$ | 2.4 | | | V |
| $V_{OUT(0)}$ | Logical "0" Output Voltage | $V_{CC} = 4.75V, I_O = 360 \mu A$ | | | 0.4 | V |
| OUTPUT DRIVE (see Family Characteristics Data Sheet) $T_A = 25^\circ C$ (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)

$T_A = 25^\circ C, C_L = 50 \text{ pF}$, unless otherwise specified

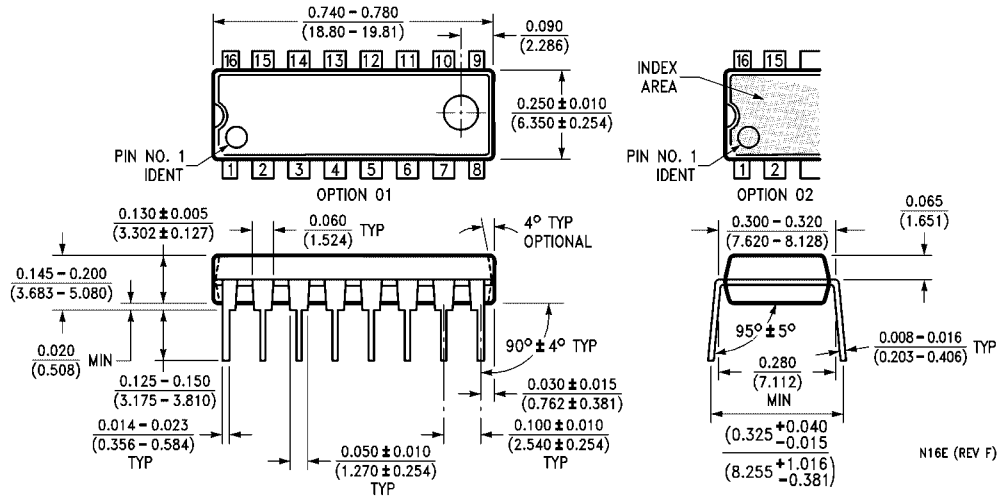
| Symbol | Parameter | Conditions | Min | Typ | Max | Units |
|----------|----------------------------------------------|-----------------|-----|-----|-----|-------|
| t_{pd} | Propagation Delay Time to Logical "0" or "1" | $V_{CC} = 5.0V$ | | 200 | 300 | ns |
| | | $V_{CC} = 10V$ | | 90 | 140 | ns |
| 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.

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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