



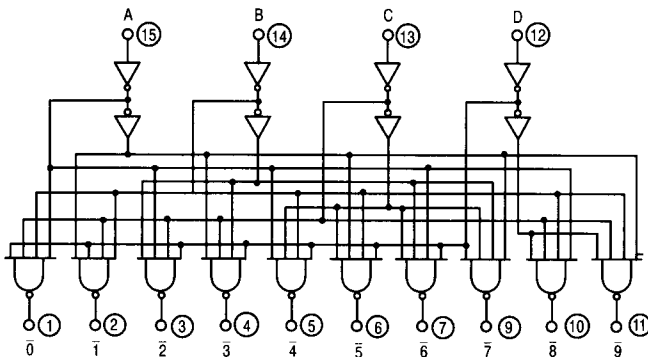
1-of-10 Decoder

ELECTRICALLY TESTED PER:
MIL-M-38510/30703

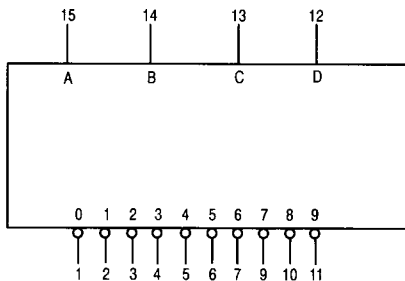
The LSTTL/MSI 54LS42A is a multipurpose decoder designed to accept four BCD inputs and provide ten mutually exclusive outputs. The LS42A is fabricated with the Schottky barrier diode process for high-speed and is completely compatible with all Motorola TTL families.

- Multifunction Capability
- Demultiplexing Capability
- Mutually Exclusive Outputs
- Input Clamp Diodes Limit High-Speed Termination Effect

LOGIC DIAGRAM



LOGIC SYMBOL



FUNCTIONAL DESCRIPTION

The LS42A decoder accepts four active HIGH BCD inputs and provides ten mutually exclusive active LOW outputs, as shown by the logic symbol or diagram. The active LOW outputs facilitate addressing over MSI units with LOW input enables.

The logic design of the LS42A ensures that all outputs are HIGH when binary codes greater than nine are applied to the inputs.

The most significant input D produces a useful inhibit function when the LS42A is used as a one-of-eight decoder. The D input can also be used as the Data input in an 8-output demultiplexer application.

Military 54LS42A



AVAILABLE AS:

- 1) JAN: JM38510/30703BXA
- 2) SMD: N/A
- 3) 883: 54LS42A/BXAJC

X = CASE OUTLINE AS FOLLOWS:
PACKAGE: CERDIP: E
CERFLAT: F
LCC: 2

THE LETTER "M" APPEARS BEFORE THE / ON LCC.

PIN ASSIGNMENTS

| FUNCT. | DIL 620-09 | FLATS 650-05 | LCC 756A-02 | BURN-IN (COND. A) |
|--------|---------------|-----------------|----------------|----------------------|
| 0 | 1 | 1 | 2 | VCC |
| 1 | 2 | 2 | 3 | VCC |
| 2 | 3 | 3 | 4 | VCC |
| 3 | 4 | 4 | 5 | VCC |
| 4 | 5 | 5 | 7 | VCC |
| 5 | 6 | 6 | 8 | VCC |
| 6 | 7 | 7 | 9 | VCC |
| GND | 8 | 8 | 10 | GND |
| 7 | 9 | 9 | 12 | VCC |
| 8 | 10 | 10 | 13 | VCC |
| 9 | 11 | 11 | 14 | VCC |
| D | 12 | 12 | 15 | VCC |
| C | 13 | 13 | 17 | VCC |
| B | 14 | 14 | 18 | VCC |
| A | 15 | 15 | 19 | VCC |
| VCC | 16 | 16 | 20 | VCC |

BURN-IN CONDITIONS:
VCC = 5.0 V MIN/6.0 V MAX

| Pin Names | Loading (Note a) | Loading (Note a) | |
|---------------|--|---------------------|--------------------------|
| | | HIGH | LOW |
| A-D 0 to 9 | Address Inputs Active Low Outputs (Note b) | 0.5 U.L. 10 U.L. | 0.25 U.L. 5(2.5) U.L. |

NOTES:

- One TTL Unit Load (U.L.) = 40 µA HIGH/ 1.6 mA LOW.
- The Output LOW drive factor is 2.5 U.L. for Military (54) Temperature Ranges.

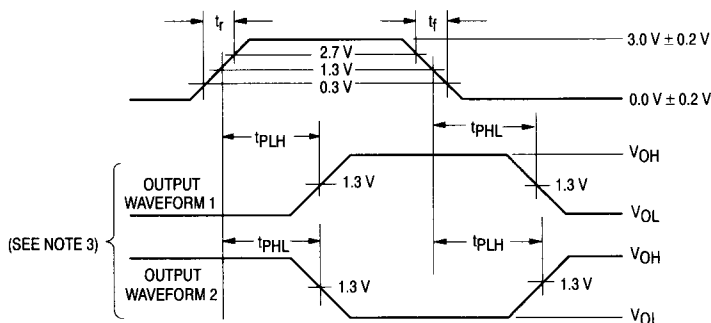
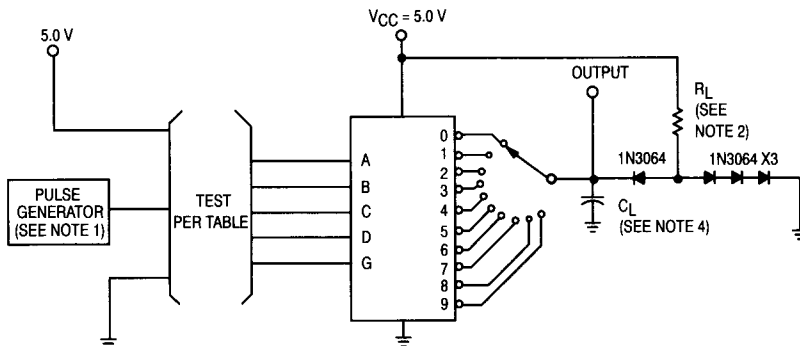


54LS42A

| TRUTH TABLE | | | | | | | | | | | | | |
|-------------|---|---|---|---------|---|---|---|---|---|---|---|---|---|
| Inputs | | | | Outputs | | | | | | | | | |
| A | B | C | D | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| L | L | L | L | L | H | H | H | H | H | H | H | H | H |
| H | L | L | L | H | L | H | H | H | H | H | H | H | H |
| L | H | L | L | H | H | L | H | H | H | H | H | H | H |
| H | H | L | L | H | H | H | L | H | H | H | H | H | H |
| L | L | H | L | H | H | H | H | L | H | H | H | H | H |
| H | L | H | L | H | H | H | H | H | L | H | H | H | H |
| L | H | H | L | H | H | H | H | H | H | L | H | H | H |
| H | H | H | L | H | H | H | H | H | H | H | L | H | H |
| L | L | L | H | H | H | H | H | H | H | H | H | L | H |
| H | L | L | H | H | H | H | H | H | H | H | H | H | L |
| L | H | L | H | H | H | H | H | H | H | H | H | H | H |
| H | H | L | H | H | H | H | H | H | H | H | H | H | H |
| L | L | H | H | H | H | H | H | H | H | H | H | H | H |
| H | L | H | H | H | H | H | H | H | H | H | H | H | H |
| L | H | H | H | H | H | H | H | H | H | H | H | H | H |
| H | H | H | H | H | H | H | H | H | H | H | H | H | H |

H = HIGH Voltage Levels
L = LOW Voltage Levels

TEST CIRCUIT AND WAVEFORM



NOTES:

- The input pulse generator has the following characteristics: $t_r \leq 15$ ns, $t_f \leq 6.0$ ns, $PRR \leq 1.0$ MHz, and minimum duty cycle = 50%.
- $R_L = 2.0$ k $\Omega \pm 10\%$.
- Input-output waveform combination in accordance with truth table.
- $C_L = 50$ pF $\pm 10\%$, including scope probe, wiring and stray capacitance.
- Voltage measurements are to be made with respect to network ground terminal.
- All diodes are 1N3064 or equivalent.
- The limits specified for $C_L = 15$ pF are guaranteed but not tested.
- Terminal conditions (pins not designated may be high ≥ 2.0 V, low ≤ 0.7 V, or open).

54LS42A

| Symbol | Parameter | Limits | | | | | | Unit | Test Condition (Unless Otherwise Specified) |
|------------------|------------------------------|------------|--------|-------------|--------|-------------|--------|------|---|
| | | + 25°C | | + 125°C | | - 55°C | | | |
| | | Subgroup 1 | | Subgroup 2 | | Subgroup 3 | | | |
| | | Min | Max | Min | Max | Min | Max | | |
| V _{OH} | Logical "1" Output Voltage | 2.5 | | 2.5 | | 2.5 | | V | V _{CC} = 4.5 V, I _{OH} = - 0.4 mA, V _{IH} = 2.0 V (all inputs). |
| V _{OL} | Logical "0" Output Voltage | | 0.4 | | 0.4 | | 0.4 | V | V _{CC} = 4.5 V, I _{OL} = 4.0 mA, V _{IN} = 0.7 V or 2.0 V per Truth Table. |
| V _{IC} | Input Clamping Voltage | | - 1.5 | | | | | V | V _{CC} = 4.5 V, I _{IN} = - 18 mA, other inputs are open. |
| I _{IH} | Logical "1" Input Current | | 20 | | 20 | | 20 | μA | V _{CC} = 5.5 V, V _{IH} = 2.7 V, other inputs are GND. |
| I _{IHH} | Logical "1" Input Current | | 100 | | 100 | | 100 | μA | V _{CC} = 5.5 V, V _{IHH} = 5.5 V, other inputs are GND. |
| I _{OS} | Output Short Circuit Current | - 15 | - 100 | - 15 | - 100 | - 15 | - 100 | mA | V _{CC} = 5.5 V, V _{IN} = 0.4 V, other inputs = 4.5 V. |
| I _{IL} | Logical "0" Input Current | - 0.12 | - 0.36 | - 0.12 | - 0.36 | - 0.12 | - 0.36 | μA | V _{CC} = 5.5 V, V _{IN} = 5.5 V (all inputs), V _{OUT} = GND. |
| I _{CC} | Power Supply Current Off | | 13 | | 13 | | 13 | mA | V _{CC} = 5.5 V, V _{IN} = GND (all inputs). |
| V _{IH} | Logical "1" Input Voltage | 2.0 | | 2.0 | | 2.0 | | V | V _{CC} = 4.5 V. |
| V _{IL} | Logical "0" Input Voltage | | 0.7 | | 0.7 | | 0.7 | V | V _{CC} = 4.5 V. |
| | Functional Tests | Subgroup 7 | | Subgroup 8A | | Subgroup 8B | | | per Truth Table with V _{CC} = 5.0 V, V _{INL} = 0.4 V, and V _{INH} = 2.5 V. |

| Symbol | Parameter | Limits | | | | | | Unit | Test Condition (Unless Otherwise Specified) |
|--|---|------------|----------|-------------|----------|-------------|----------|------|---|
| | | + 25°C | | + 125°C | | - 55°C | | | |
| | | Subgroup 9 | | Subgroup 10 | | Subgroup 11 | | | |
| | | Min | Max | Min | Max | Min | Max | | |
| t _{PHL2} t _{PHL2} | Propagation Delay /Data-Output High-Low | 5.0 — | 30 25 | 5.0 — | 45 40 | 5.0 — | 45 40 | ns | V _{CC} = 5.0 V, C _L = 50 pF, R _L = 2.0 kΩ. V _{CC} = 5.0 V, C _L = 15 pF. |
| t _{PLH2} t _{PLH2} | Propagation Delay /Data-Output Low-High | 5.0 — | 30 25 | 5.0 — | 45 40 | 5.0 — | 45 40 | ns | V _{CC} = 5.0 V, C _L = 50 pF, R _L = 2.0 kΩ. V _{CC} = 5.0 V, C _L = 15 pF. |
| t _{PHL4} t _{PHL4} | Propagation Delay /Data-Output High-Low | 5.0 — | 35 30 | 5.0 — | 53 48 | 5.0 — | 53 48 | ns | V _{CC} = 5.0 V, C _L = 50 pF, R _L = 2.0 kΩ. V _{CC} = 5.0 V, C _L = 15 pF. |
| t _{PLH4} t _{PLH4} | Propagation Delay /Data-Output Low-High | 5.0 — | 35 30 | 5.0 — | 53 48 | 5.0 — | 53 48 | ns | V _{CC} = 5.0 V, C _L = 50 pF, R _L = 2.0 kΩ. V _{CC} = 5.0 V, C _L = 15 pF. |

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