



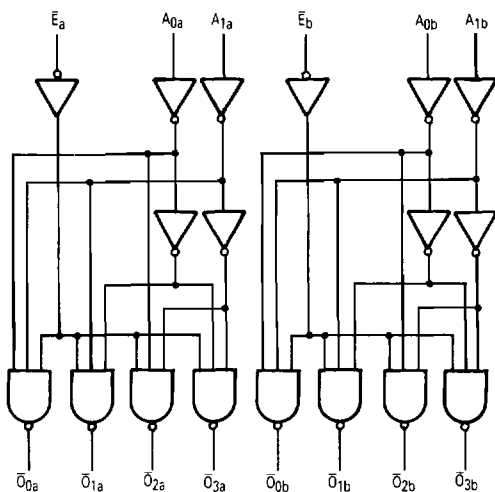
Dual 1-of-4 Decoder (Active Low Outputs With Enable)

**ELECTRICALLY TESTED PER:
MIL-M-38510/33702**

The 54F139 is a high-speed Dual 1-of-4 Decoder/Demultiplexer. The device has two independent decoders, each accepting two inputs and providing four mutually exclusive active LOW Outputs. Each decoder has an active LOW Enable input which can be used as a data input for a 4-output demultiplexer. Each half of the F139 can be used as a function generator providing all four minterms of two variables.

- Multifunction Capability
- Two Completely Independent 1-of-4 Decoders
- Active Low Mutually Exclusive Outputs
- Input Clamp Diodes Limit High Speed Termination Effect

LOGIC DIAGRAM



FUNCTIONAL DESCRIPTION

The F139 is a high-speed dual 1-of-4 decode/demultiplexer fabricated with the Schottky barrier diode process. The device has two independent decoders, each of which accept two binary weighted inputs (A_0 , A_1) and provide four mutually exclusive active LOW outputs (\bar{O}_0 , \bar{O}_3). Each decoder has an active LOW Enable (\bar{E}). When \bar{E} is HIGH all outputs are forced HIGH. The enable can be used as the data input for a 4 output demultiplexer application.

Each half of the F139 generates all four minterms of two variables. These four minterms are useful in some applications, replacing multiple gate functions, and thereby reducing the number of packages required in a logic network.

Military 54F139



AVAILABLE:

- 1) JAN: JM 38510/33702BXA
- 2) SMD: *
- 3) 883C: 54F139/BXAJC

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

***Call Factory for latest update**

PIN ASSIGNMENTS

| FUNCTION | DIL | FLATS | LCC | BURN-IN (CONDITION A) |
|----------------|-----|-------|-----|--------------------------|
| \bar{E}_a | 1 | 1 | 2 | VCC |
| A_{0a} | 2 | 2 | 3 | VCC |
| A_{1a} | 3 | 3 | 4 | VCC |
| \bar{O}_{0a} | 4 | 4 | 5 | OPEN |
| \bar{O}_{1a} | 5 | 5 | 7 | OPEN |
| \bar{O}_{2a} | 6 | 6 | 8 | OPEN |
| \bar{O}_{3a} | 7 | 7 | 9 | OPEN |
| GND | 8 | 8 | 10 | GND |
| \bar{O}_{3b} | 9 | 9 | 12 | OPEN |
| \bar{O}_{2b} | 10 | 10 | 13 | OPEN |
| \bar{O}_{1b} | 11 | 11 | 14 | OPEN |
| \bar{O}_{0b} | 12 | 12 | 15 | OPEN |
| A_{1b} | 13 | 13 | 17 | VCC |
| A_{0b} | 14 | 14 | 18 | VCC |
| \bar{E}_b | 15 | 15 | 19 | VCC |
| VCC | 16 | 16 | 20 | VCC |

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

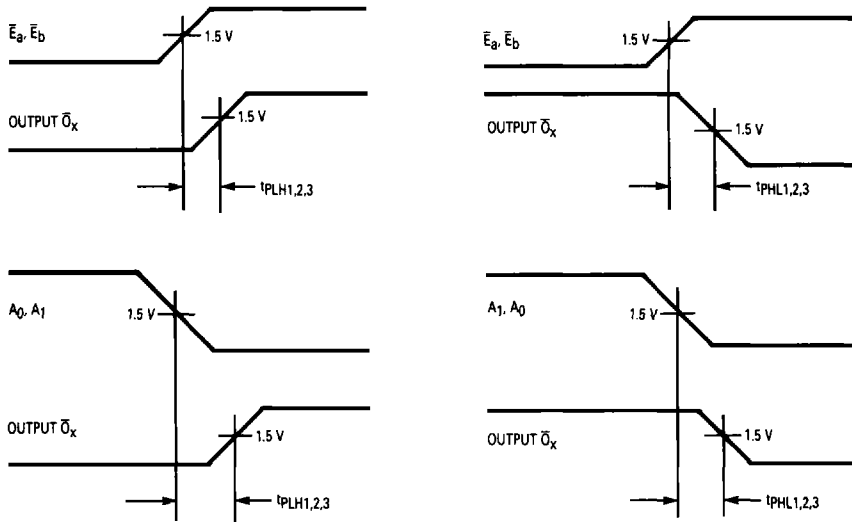
TRUTH TABLE

| Inputs | | | Outputs | | | |
|-----------|-------|-------|-------------|-------------|-------------|-------------|
| \bar{E} | A_0 | A_1 | \bar{O}_0 | \bar{O}_1 | \bar{O}_2 | \bar{O}_3 |
| H | X | X | H | H | H | H |
| L | L | L | L | H | H | H |
| L | H | L | H | L | H | H |
| L | L | H | H | H | L | H |
| L | H | H | H | H | H | L |

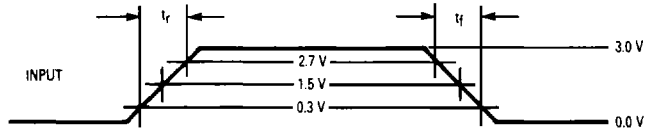
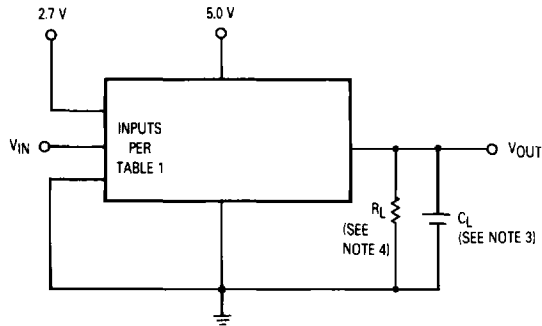
H = HIGH Voltage Levels
L = LOW Voltage Levels
X = Don't Care

54F139

SWITCHING TIME WAVEFORMS



TEST CIRCUIT AND WAVEFORM



NOTES:

1. V_{IN} = Input pulse has the following characteristics:
 $t_r = t_f \approx 2.5$ ns, PRR ≤ 1.0 MHz and $Z_{out} \approx 50 \Omega$.
2. Terminal conditions (pins not designated may be high ≥ 2.0 V, low ≤ 0.8 V, or open).
3. $C_L = 50$ pF $\pm 10\%$ including scope probe, wiring and stray capacitance, without package in test fixture.
4. $R_L = 499 \Omega \pm 5.0\%$.
5. Voltage measurements are to be made with respect to network ground.

54F139

| Symbol | Parameter | Limits | | | | | | Units | 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} = -1.0 mA, \bar{E}_x = 2.0 V or 0.8 V, V _{IL} = 0.8 V, V _{IH} = 2.0 V. |
| V _{OL} | Logical "0" Output Voltage | | 0.5 | | 0.5 | | 0.5 | V | V _{CC} = 4.5 V, I _{OL} = 20 mA, \bar{E}_x = 0.8 V, V _{IL} = 0.8 V, V _{IH} = 2.0 V. |
| V _{IC} | Input Clamping Voltage | | -1.2 | | | | | V | V _{CC} = 4.5 V, I _{IIN} = -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 open). |
| I _{IHH} | Logical "1" Input Current | | 100 | | 100 | | 100 | μA | V _{CC} = 5.5 V, V _{IHH} = 7.0 V (other inputs are open). |
| I _{OS} | Output Short Circuit Current | -60 | -150 | -60 | -150 | -60 | -150 | mA | V _{CC} = 5.5 V, V _{IIN} = 0 V (all inputs), \bar{E}_x = 5.5 V, V _{OUT} = 0 V. |
| I _{IL} | Logical "0" Input Current | 0 | -0.6 | 0 | -0.6 | 0 | -0.6 | mA | V _{CC} = 5.5 V, V _{IIN} = 0.5 V, other inputs are open. |
| I _{OD} | Diode Current | 60 | | 60 | | 60 | | mA | V _{CC} = 4.5 V, V _{IIN} = 0 V, 0.5 V or 5.5 V, \bar{E}_x = 0 V, V _{OUT} = 2.5 V. |
| I _{CC} | Power Supply Current | | 20 | | 20 | | 20 | mA | V _{CC} = 5.5 V, V _{IIN} = 5.5 V (both inputs), \bar{E}_x = 0 V. |
| V _{IH} | Logical "1" Input Voltage | 2.0 | | 2.0 | | 2.0 | | V | V _{CC} = 4.5 V. |
| V _{IL} | Logical "0" Input Voltage | | 0.8 | | 0.8 | | 0.8 | V | V _{CC} = 4.5 V. |
| | | Subgroup 7 | | Subgroup 8A | | Subgroup 8B | | | |
| | Functional Tests | | | | | | | | per Truth Table with V _{CC} = 4.5 V, (Repeat at), V _{CC} = 5.5 V, V _{INL} = 0.5 V, and V _{INH} = 2.5 V. |

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| Symbol | Parameter | Limits | | | | | | Units | Test Condition (Unless Otherwise Specified) |
|-------------------|--|------------|-----|------------|------|------------|------|-------|--|
| | | +25°C | | +125°C | | -55°C | | | |
| | | Subgroup 1 | | Subgroup 2 | | Subgroup 3 | | | |
| | | Min | Max | Min | Max | Min | Max | | |
| t _{PHL1} | Propagation Delay :Data-Output \bar{E}_a or \bar{E}_b to \bar{O}_x | 1.5 | 6.5 | 1.5 | 8.0 | 1.5 | 8.0 | ns | V _{CC} = 5.0 V, C _L = 50 pF, R _L = 499 Ω. |
| t _{PLH1} | Propagation Delay :Data-Output \bar{E}_a or \bar{E}_b to \bar{O}_x | 1.5 | 7.0 | 1.5 | 9.0 | 1.5 | 9.0 | ns | V _{CC} = 5.0 V, C _L = 50 pF, R _L = 499 Ω. |
| t _{PHL3} | Propagation Delay A _{0a} , A _{0b} , A _{1a} or A _{1b} to O _x | 1.5 | 8.0 | 1.5 | 9.5 | 1.5 | 9.5 | ns | V _{CC} = 5.0 V, C _L = 50 pF, R _L = 499 Ω. |
| t _{PLH3} | Propagation Delay A _{0a} , A _{0b} , A _{1a} or A _{1b} to O _x | 1.5 | 7.0 | 1.5 | 12.5 | 1.5 | 12.5 | ns | V _{CC} = 5.0 V, C _L = 50 pF, R _L = 499 Ω. |