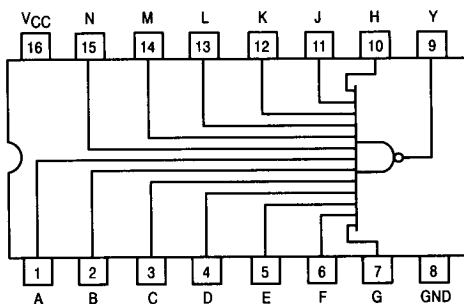




13-Input NAND Gate

ELECTRICALLY TESTED PER:
MPG54LS133

LOGIC DIAGRAM



Military 54LS133



AVAILABLE AS:

- 1) JAN: N/A
- 2) SMD: N/A
- 3) 883: 54LS133/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) |
|--------|---------------|-----------------|----------------|----------------------|
| A | 1 | 1 | 2 | GND |
| B | 2 | 2 | 3 | VCC |
| C | 3 | 3 | 4 | VCC |
| D | 4 | 4 | 5 | VCC |
| E | 5 | 5 | 7 | VCC |
| F | 6 | 6 | 8 | VCC |
| G | 7 | 7 | 9 | VCC |
| GND | 8 | 8 | 10 | GND |
| Y | 9 | 9 | 12 | VCC |
| H | 10 | 10 | 13 | VCC |
| J | 11 | 11 | 14 | VCC |
| K | 12 | 12 | 15 | VCC |
| L | 13 | 13 | 17 | VCC |
| M | 14 | 14 | 18 | VCC |
| N | 15 | 15 | 19 | GND |
| VCC | 16 | 16 | 20 | VCC |

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

TRUTH TABLE

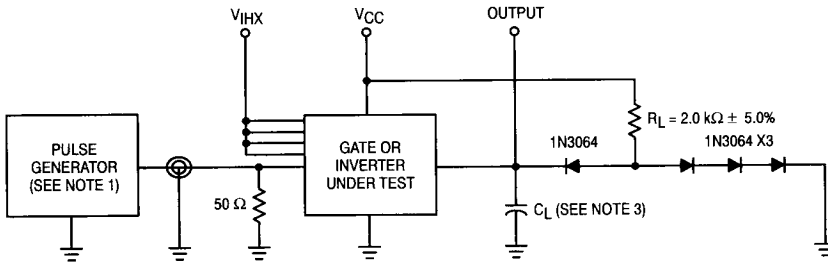
| Inputs | | | | | | | | | | | | | Output |
|--------|---|---|---|---|---|---|---|---|---|---|---|---|--------|
| A | B | C | D | E | F | G | H | J | K | L | M | N | Y |
| L | L | L | L | L | L | L | L | L | L | L | L | H | H |
| L | L | L | L | L | L | L | L | L | L | L | H | L | H |
| L | L | L | L | L | L | L | L | L | L | H | L | L | H |
| L | L | L | L | L | L | L | L | H | L | L | L | L | H |
| L | L | L | L | L | L | L | H | L | L | L | L | L | H |
| L | L | L | L | L | L | H | L | L | L | L | L | L | H |
| L | L | L | L | L | H | L | L | L | L | L | L | L | H |
| L | L | L | L | H | L | L | L | L | L | L | L | L | H |
| L | L | L | H | L | L | L | L | L | L | L | L | L | H |
| L | L | H | L | L | L | L | L | L | L | L | L | L | H |
| L | H | L | L | L | L | L | L | L | L | L | L | L | H |
| H | L | L | L | L | L | L | L | L | L | L | L | L | H |
| L | L | L | L | L | L | L | L | L | L | L | L | L | L |
| H | H | H | H | H | H | H | H | H | H | H | H | H | H |

MOTOROLA MILITARY FAST/LS/TTL DATA

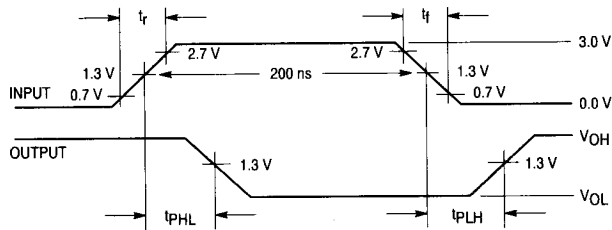
5-142

54LS133

AC TEST CIRCUIT



WAVEFORMS



NOTES:

1. Pulse generator has the following characteristics:
 $t_r \leq 15$ ns, $t_f \leq 6.0$ ns, $PRR \leq 1.0$ MHz, duty cycle = 50% and $Z_{OUT} = 50 \Omega$.
2. Inputs not under test are at 2.7 V.
3. $C_L = 50$ pF $\pm 10\%$, including scope probe, wiring and stray capacitance.
4. $R_L = 2.0$ k $\Omega \pm 5.0\%$.
5. Voltage measurements are to be made with respect to network ground terminal.

54LS133

| Symbol | Parameter | Limits | | | | | | Unit | Test Condition (Unless Otherwise Specified) |
|------------------|---------------------------------|------------|------|-------------|------|-------------|------|------|--|
| | Static Parameters: | + 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} = –400 μA, V _{IL} = 0.7 V, V _{IN} = 2.0 V on other 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 _{IH} = 2.0 V on both inputs. |
| 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 = GND. |
| I _{IHH} | Logical "1" Input Current | | 100 | | 100 | | 100 | μA | V _{CC} = 5.5 V, V _{IHH} = 7.0 V, other inputs = GND. |
| I _{IL} | Logical "0" Input Current | | –0.4 | | –0.4 | | –0.4 | mA | V _{CC} = 5.5 V, V _{IL} = 0.4 V, other inputs = 4.5 V. |
| I _{OS} | Output Short Circuit Current | –20 | –100 | –20 | –100 | –20 | –100 | mA | V _{CC} = 5.5 V, V _{IN} = GND (all inputs), V _{OUT} = GND. |
| I _{CCH} | Power Supply Current | | 0.5 | | 0.5 | | 0.5 | mA | V _{CC} = 5.5 V, V _{IN} = GND (all inputs). |
| I _{CCL} | Power Supply Current | | 1.1 | | 1.1 | | 1.1 | mA | V _{CC} = 5.5 V, V _{IN} = 4.5 V (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) |
|--------------------------------------|--|------------|----------|-------------|----------|-------------|----------|------|--|
| | Switching Parameters: | + 25°C | | + 125°C | | – 55°C | | | |
| | | Subgroup 9 | | Subgroup 10 | | Subgroup 11 | | | |
| | | Min | Max | Min | Max | Min | Max | | |
| t _{PHL} t _{PHL} | Propagation Delay /Data-Output Output High-Low | | 70 59 | | 80 74 | | 80 74 | 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 _{PLH} t _{PLH} | Propagation Delay /Data-Output Output Low-High | | 20 15 | | 30 19 | | 30 19 | ns | V _{CC} = 5.0 V, C _L = 50 pF, R _L = 2.0 kΩ V _{CC} = 5.0 V, C _L = 15 pF. |

NOTE:

1. The limits specified for C_L = 15 pF are guaranteed but not tested.