# (A) MOTOROLA

T-43-22

# Quad 2-Input NOR Gate

**ELECTRICALLY TESTED PER:**
MPG 1662 (– 30°C to + 85°C)

- $P_D$ = 240 mW typ/pkg
- $t_{pd}$ = 0.9 ns typ (510 ohm load)
  = 1.1 ns typ (50 ohm load)
- Full Load Current, $I_L$ = – 25 mAdc max

| ABSOLUTE MAXIMUM RATINGS: | Symbol | Min | Max | Unit |
|---|---|---|---|---|
| Power Supply Voltage ($V_{CC}$ = 0) | $V_{CC}$ | – 8.0 | 0 | Vdc |
| Base Input Voltage ($V_{CC}$ = 0) | $V_{IN}$ | 0 | $V_{EE}$ | Vdc |
| Output Source Current Continuous | $I_O$ | | < 40 | mAdc |
| Storage Temperature Range | $T_{stg}$ | – 55 | + 125 | °C |
| Operating Temperature Range | $T_A$ | – 30 | + 85 | °C |

## PIN ASSIGNMENTS

| FUNCTION | DIL | FLATS | BURN-IN (CONDITION C) |
|---|---|---|---|
| $V_{CC1}$ | 1 | 5 | GND |
| $A_{OUT}$ | 2 | 6 | 51 Ω to $V_{TT}$ |
| $B_{OUT}$ | 3 | 7 | 51 Ω to $V_{TT}$ |
| $A_{IN1}$ | 4 | 8 | OPEN |
| $A_{IN2}$ | 5 | 9 | OPEN |
| $B_{IN1}$ | 6 | 10 | OPEN |
| $B_{IN2}$ | 7 | 11 | OPEN |
| $V_{EE}$ | 8 | 12 | $V_{EE}$ |
| N.C. | 9 | 13 | OPEN |
| $C_{IN1}$ | 10 | 14 | OPEN |
| $C_{IN2}$ | 11 | 15 | GND |
| $D_{IN1}$ | 12 | 16 | OPEN |
| $D_{IN2}$ | 13 | 1 | GND |
| $C_{OUT}$ | 14 | 2 | 51 Ω to $V_{TT}$ |
| $D_{OUT}$ | 15 | 3 | 51 Ω to $V_{TT}$ |
| $V_{CC2}$ | 16 | 4 | GND |

**BURN - IN CONDITIONS:**
$V_{TT}$ = – 2.0 V MAX/ – 2.2 V MIN
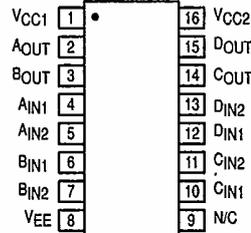$V_{EE}$ = – 5.7 V MAX/ – 5.2 V MIN

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## Military 1662

**MP0**

### AVAILABLE AS
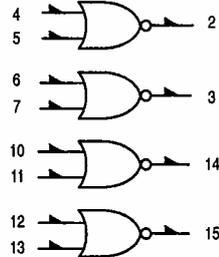
1) JAN: N/A
2) SMD: N/A
3) 883: N/A
4) 1662/BXA *
X = CASE OUTLINE AS FOLLOWS:

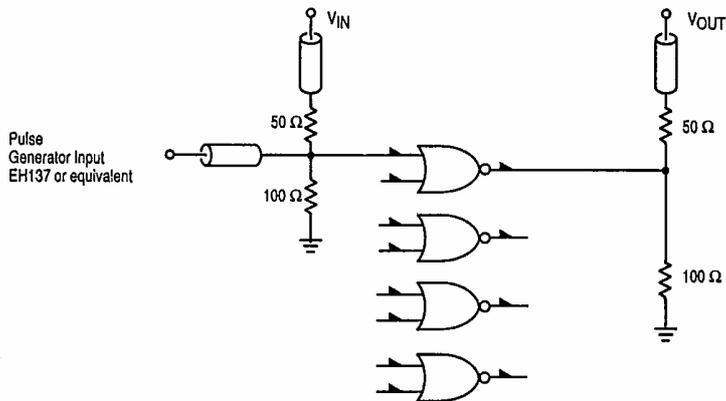PACKAGE: CERDIP: E
CERFLAT: F

* 883 Processing (Non-Compliant)

| | | |
|---|---|---|
| $V_{CC1}$ 1 | • | 16 $V_{CC2}$ |
| $A_{OUT}$ 2 | | 15 $D_{OUT}$ |
| $B_{OUT}$ 3 | | 14 $C_{OUT}$ |
| $A_{IN1}$ 4 | | 13 $D_{IN2}$ |
| $A_{IN2}$ 5 | | 12 $D_{IN1}$ |
| $B_{IN1}$ 6 | | 11 $C_{IN2}$ |
| $B_{IN2}$ 7 | | 10 $C_{IN1}$ |
| $V_{EE}$ 8 | | 9 N/C |

### LOGIC DIAGRAM

4, 5 → 2
6, 7 → 3
10, 11 → 14
12, 13 → 15

Figure 1. Test Circuit

NOTES

1. Coaxial cables (Equal lengths, typ 2 places) to scope.

2. $t_r = t_f = 1.5$ ns ± 0.2 ns.

3. PRR = 20 MHz, 50% duty cycle.

4. Unused outputs connected to a 50 Ω resistor to ground.

| Temp. | 25°C | 85°C | – 30°C |
|---|---|---|---|
| $V_{ILL}$ | 0.31 V | 0.34 V | 0.28 V |
| $V_{IHH}$ | 1.11 V | 1.19 V | 1.04 V |
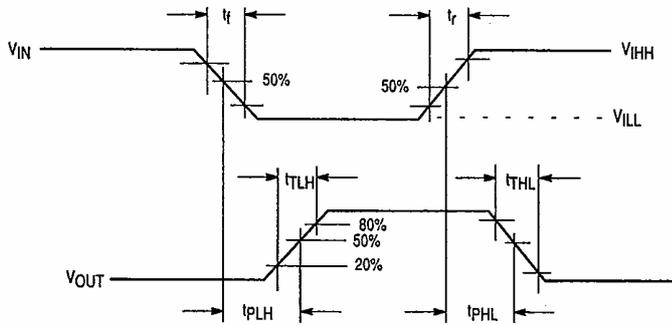


Figure 2. Test Circuit Waveforms

# 1662
## QUIESCENT LIMIT TABLE

| Test Temperature | Test Voltage Values (Volts) | | | | | |
|---|---|---|---|---|---|---|
| | $V_{IH}$ | $V_{IL}$ | $V_{IHA}$ | $V_{ILA}$ | $V_{EE}$ | $V_{EEL}$ |
| $T_A = 25\ °C$ | -0.81 | -1.85 | -1.095 | -1.485 | -5.2 | -3.2 |
| $T_A = 85\ °C$ | -0.70 | -1.83 | -1.025 | -1.440 | -5.2 | -3.2 |
| $T_A = -30\ °C$ | -0.875 | -1.89 | -1.180 | -1.515 | -5.2 | -3.2 |

| Symbol | Parameter | Functional Parameters: | Limits | | | | | | Units | Test Voltage Applied to Pins Below | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | +25 °C Subgroup 1 | | +85 °C Subgroup 2 | | -30 °C Subgroup 3 | | | Pinouts referenced are for DIL package, check Pin Assignments $V_{CC}$ = 0.0 V, Output Load = 50 Ω to -2.0 V | | | | | | |
| | | | Min | Max | Min | Max | Min | Max | | $V_{IH}$ | $V_{IL}$ | $V_{IHA}$ | $V_{ILA}$ | $V_{CC}$ | $V_{EE}$ | P.U.T. |
| $V_{OH}$ | High Output Voltage | | -0.96 | -0.81 | -0.89 | -0.7 | -1.045 | -0.875 | V | | 4 - 7, 10 - 13 | | | 1, 16 | 8 | 2, 3, 14, 15 |
| $V_{OL}$ | Low Output Voltage | | -1.85 | -1.62 | -1.83 | -1.575 | -1.89 | -1.65 | V | 4 - 7, 10 - 13 | | | | 1, 16 | 8 | 2, 3, 14, 15 |
| $V_{OHA}$ | High Output Voltage | | -0.98 | -0.81 | -0.91 | -0.7 | -1.065 | -0.875 | V | | | | 4 - 7, 10 - 13 | 1, 16 | 8 | 2, 3, 14, 15 |
| $V_{OLA}$ | Low Output Voltage | | -1.85 | -1.60 | -1.83 | -1.555 | -1.89 | -1.63 | V | | | 4 - 7, 10 - 13 | | 1, 16 | 8 | 2, 3, 14, 15 |
| $I_{EE}$ | Power Supply Drain Current | | -56 | | -56 | | -56 | | mA | | | | | 1, 16 | 8 | 8 |
| $I_{INH}$ | Input Current High | | | 350 | | 350 | | 350 | μA | 4 - 7, 10 - 13 | | | | 1, 16 | 8 | 4 - 7, 10 - 13 |
| $I_{INL}$ | Input Current Low | | 0.5 | | 0.3 | | 0.5 | | μA | | 4 - 7, 10 - 13 | | | 1, 16 | 8 | 4 - 7, 10 - 13 |

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# 1662
## QUIESCENT LIMIT TABLE

| Test Temperature | Test Voltage Values (Volts) | | | | | | |
|---|---|---|---|---|---|---|---|
| | $V_{IH}$ | $V_{IL}$ | $V_{IHA}$ | $V_{ILA}$ | $V_{EE}$ | $V_{EEL}$ | $V_{CC}$ |
| $T_A = 25\,°C$ | -0.81 | -1.85 | -1.095 | -1.485 | -5.2 | -3.2 | +2.0 |
| $T_A = 85\,°C$ | -0.70 | -1.83 | -1.025 | -1.440 | -5.2 | -3.2 | +2.0 |
| $T_A = -30\,°C$ | -0.875 | -1.89 | -1.180 | -1.515 | -5.2 | -3.2 | +2.0 |

| Symbol | Parameter | Limits | | | | | | Units | TEST VOLTAGE APPLIED TO PINS BELOW | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | +25 °C Subgroup 9 | | +85 °C Subgroup 10 | | -30 °C Subgroup 11 | | | Pinouts referenced are for DIL package, check Pin Assignments  Output Load = 50 Ω to GND | | | | |
| | | Min | Max | Min | Max | Min | Max | | $V_{IN}$ | $V_{OUT}$ | $V_{CC}$ | $V_{EEL}$ | P.U.T. |
| | **Functional Parameters:** | | | | | | | | | | | | |
| $t_{TLH}$ | Rise Time | | 2.1 | | 2.3 | | 2.2 | ns | 5, 6 11, 12 | 2, 3, 14, 16 | 1, 16 | 8 | 2, 3, 14, 15 |
| $t_{THL}$ | Fall Time | | 2.1 | | 2.3 | | 2.2 | ns | 5, 6 11, 12 | 2, 3, 14, 16 | 1, 16 | 8 | 2, 3, 14, 15 |
| $t_{PHL}$ | Propagation Delay High to Low A, B and D | | 1.9 | | 2.1 | | 2.0 | ns | 5, 6 11, 12 | 2, 3, 14, 16 | 1, 16 | 8 | 2, 3, 14, 15 |
| $t_{PLH}$ | Propagation Delay Low to High A, B and D | | 2.1 | | 2.1 | | 2.1 | ns | 5, 6 11, 12 | 2, 3, 14, 16 | 1, 16 | 8 | 2, 3, 14, 15 |
| $t_{PHL}$ | Propagation Delay High to Low C | | 2.0 | | 2.2 | | 2.1 | ns | 5, 6 11, 12 | 2, 3, 14, 16 | 1, 16 | 8 | 2, 3, 14, 15 |
| $t_{PLH}$ | Propagation Delay Low to High C | | 2.1 | | 2.1 | | 2.1 | ns | 5, 6 11, 12 | 2, 3, 14, 16 | 1, 16 | 8 | 2, 3, 14, 15 |