



MILITARY DATA SHEET

MN54AC02-X REV 1A0

Original Creation Date: 06/27/96
Last Update Date: 09/11/96
Last Major Revision Date: 06/27/96

Quad 2-Input NOR Gate

General Description

The 'AC02 contains four, 2-input NOR gates.

Industry Part Number

54AC02

NS Part Numbers

54AC02DMQB
54AC02FMQB
54AC02LMQB

Prime Die

Z002

Processing

MIL-STD-883, Method 5004

Quality Conformance Inspection

MIL-STD-883, Method 5005

| Subgrp | Description | Temp (°C) |
|---------------|---------------------|------------------|
| 1 | Static tests at | +25 C |
| 2 | Static tests at | +125C |
| 3 | Static tests at | -55 C |
| 4 | Dynamic tests at | +25 C |
| 5 | Dynamic tests at | +125C |
| 6 | Dynamic tests at | -55 C |
| 7 | Functional tests at | +25 C |
| 8A | Functional tests at | +125C |
| 8B | Functional tests at | -55 C |
| 9 | Switching tests at | +25 C |
| 10 | Switching tests at | +125C |
| 11 | Switching tests at | -55 C |

Features

- Icc reduced by 50%
- Outputs source/sink 24 mA
- Standard Military Drawing (SMD)
 - AC02: 5962-87612

(Absolute Maximum Ratings)

(Note 1)

| | |
|---|--------------------|
| Supply Voltage (Vcc) | -0.5V to +7.0V |
| DC Input Diode Current (Iik) | |
| Vi = -0.5V | -20 mA |
| Vi = Vcc +0.5V | +20 mA |
| DC Input Voltage (Vi) | -0.5V to Vcc +0.5V |
| DC Output Diode Current (Iok) | |
| Vo = -0.5V | -20 mA |
| Vo = Vcc +0.5V | +20 mA |
| DC Output Voltage (Vo) | -0.5V to Vcc +0.5V |
| DC Output Source or Sink Current (Io) | ± 50 mA |
| DC Vcc or Ground Current per Output Pin (Icc or Ignd) | ± 50 mA |
| Storage Temperature (Tstg) | -65 C to +150 C |
| Junction Temperature (Tj) | |
| CDIP | 175 C |

Note 1: Absolute maximum ratings are those values beyond which damage to the device may occur. The databook specifications should be met, without exception, to ensure that the system design is reliable over its power supply, temperature, and output/input loading variables. National does not recommend operation of FACT™ circuits outside databook specifications.

Recommended Operating Conditions

| | |
|--|-----------------|
| Supply Voltage (Vcc) | 2.0V to 6.0V |
| Input Voltage (Vi) | 0V to Vcc |
| Output Voltage (Vo) | 0V to Vcc |
| Operating Temperature (Ta) | -55 C to +125 C |
| Minimum Input Edge Rate (Delta V/ Delta t) | |
| AC Devices | |
| Vin from 30% to 70% of Vcc | |
| Vcc @ 3.0V, 4.5V, 5.5V | 125 mV/ns |

Electrical Characteristics

DC PARAMETER

(The following conditions apply to all the following parameters, unless otherwise specified.)

DC: VCC=3.0V to 5.5V, Temp Range: -55C to 125C. NOTE: -55C TEMPERATURE, SUBGROUP 3 IS GUARANTEED BUT NOT TESTED.

| SYMBOL | PARAMETER | CONDITIONS | NOTES | PIN-NAME | MIN | MAX | UNIT | SUB-GROUPS |
|--|-----------------------------|---|---------|----------|------|---------|------|------------|
| IIH | High level input current | VCC=5.5V, VM=5.5V, VINL=0.0V | 1, 2 | INPUT | | 0.1 | uA | 1 |
| | | | 1, 2 | INPUT | | 1.0 | uA | 2, 3 |
| IIL | Low Level Input Current | VVC=5.5V, VM=0.0V, VINH=5.5V | 1, 2 | INPUT | | -0.1 | uA | 1 |
| | | | 1, 2 | INPUT | | -1.0 | uA | 2, 3 |
| VOL | Low level output voltage | VCC=3.0V, VIH=2.1V, IOL=12.0mA, VIL=0.9V | 1, 2 | OUTPUT | | .36 | V | 1 |
| | | | 1, 2 | OUTPUT | | .50 | V | 2, 3 |
| | | VCC=3.0V, VIH=2.1V, IOL=50.0uA, VIL=0.9V | 1, 2 | OUTPUT | | .10 | V | 1, 2, 3 |
| | | | 1, 2 | OUTPUT | | .10 | V | 1, 2, 3 |
| | | VCC=4.5V, VIH =3.15V, IOL=50.0uA, VIL=1.35V | 1, 2 | OUTPUT | | .36 | V | 1 |
| | | | 1, 2 | OUTPUT | | .50 | V | 2, 3 |
| | | VCC=4.5V, VIH=3.15V, IOL=24.0mA, VIL=1.35V | 1, 2 | OUTPUT | | .36 | V | 1 |
| | | | 1, 2 | OUTPUT | | .50 | V | 2, 3 |
| VCC=5.5V, VIH=3.85V, IOL=24.0mA, VIL=1.65V | 1, 2 | OUTPUT | | .36 | V | 1 | | |
| | 1, 2 | OUTPUT | | .50 | V | 2, 3 | | |
| VCC=5.5V, VIH=3.85V, IOL=50.0uA, VIL=1.65V | 1, 2 | OUTPUT | | .10 | V | 1, 2, 3 | | |
| | 1, 2 | OUTPUT | | .10 | V | 1, 2, 3 | | |
| VIOL | Dynamic Output Current LOW | VCC=5.5V, VIH=3.85V, IOL=50.0mA | 1, 2, 7 | OUTPUT | | 1.65 | V | 1, 2, 3 |
| VOH | High level output voltage | VCC=3.0V, VIL=0.9V, IOH=-12mA | 1, 2 | OUTPUT | 2.56 | | V | 1 |
| | | | 1, 2 | OUTPUT | 2.40 | | V | 2, 3 |
| | | VCC=3.0V, VIL=0.9V, IOH=-50.0uA | 1, 2 | OUTPUT | 2.9 | | V | 1, 2, 3 |
| | | | 1, 2 | OUTPUT | 2.9 | | V | 1, 2, 3 |
| | | VCC=4.5V, VIL=1.35V, IOH=-24.0mA | 1, 2 | OUTPUT | 3.86 | | V | 1 |
| | | | 1, 2 | OUTPUT | 3.70 | | V | 2, 3 |
| | | VCC=4.5V, VIL=1.35V, IOH=-50.0uA | 1, 2 | OUTPUT | 4.40 | | V | 1, 2, 3 |
| | | | 1, 2 | OUTPUT | 4.40 | | V | 1, 2, 3 |
| VCC=5.5V, VIL=1.65V, IOH=-24.0mA | 1, 2 | OUTPUT | 4.86 | | V | 1 | | |
| | 1, 2 | OUTPUT | 4.70 | | V | 2, 3 | | |
| VCC=5.5V, VIL=1.65V, IOH=-50.0uA | 1, 2 | OUTPUT | 5.4 | | V | 1, 2, 3 | | |
| | 1, 2 | OUTPUT | 5.4 | | V | 1, 2, 3 | | |
| VIQH | Dynamic Output Current HIGH | VCC=5.5V, IOH=-50.0mA, VIL=1.65V | 1, 2, 7 | OUTPUT | 3.85 | | V | 1, 2, 3 |
| ICCH | Supply Current | VCC=5.5V, VINL=0.0V | 1, 2 | VCC | | 2.0 | uA | 1 |
| | | | 1, 2 | VCC | | 40 | uA | 2, 3 |

Electrical Characteristics

DC PARAMETER (Continued)

(The following conditions apply to all the following parameters, unless otherwise specified.)
 DC: VCC=3.0V to 5.5V, Temp Range: -55C to 125C. NOTE: -55C TEMPERATURE, SUBGROUP 3 IS GUARANTEED BUT NOT TESTED.

| SYMBOL | PARAMETER | CONDITIONS | NOTES | PIN-NAME | MIN | MAX | UNIT | SUB-GROUPS |
|--------|----------------|--------------------------------|-------|----------|-----|-----|------|------------|
| ICCL | Supply Current | VCC=5.5V, VINH=5.5V, VINL=0.0V | 1, 2 | VCC | | 2.0 | uA | 1 |
| | | | 1, 2 | VCC | | 40 | uA | 2, 3 |

AC PARAMETER

(The following conditions apply to all the following parameters, unless otherwise specified.)
 AC: TEMP RANGE: -55 to 125C, CL=50pf, RL=500 OHMS, TRISE=3ns, TFALL=3ns. NOTE: -55C TEMPERATURE, SUBGROUP 11 IS GUARANTEED BUT NOT TESTED.

| | | | | | | | | |
|------|-------------------|----------|---------|------------|-----|-----|----|--------|
| tpLH | Propagation Delay | VCC=4.5V | 3, 4, 8 | An/Bn to 0 | 1.5 | 6.0 | ns | 9 |
| | | | 3, 4, 8 | An/Bn to 0 | 1.5 | 7.0 | ns | 10, 11 |
| | | VCC=3.0V | 3, 4, 8 | An/Bn to 0 | 1.0 | 7.5 | ns | 9 |
| | | | 3, 4, 8 | An/Bn to 0 | 1.0 | 9.0 | ns | 10, 11 |
| tpHL | Propagation Delay | VCC=4.5V | 3, 4, 8 | An/Bn to 0 | 1.5 | 6.5 | ns | 9 |
| | | | 3, 4, 8 | An/Bn to 0 | 1.5 | 7.5 | ns | 10, 11 |
| | | VCC=3.0V | 3, 4, 8 | An/Bn to 0 | 1.0 | 7.5 | ns | 9 |
| | | | 3, 4, 8 | An/Bn to 0 | 1.0 | 9.0 | ns | 10, 11 |

- Note 1: SCREEN TESTED 100% ON EACH DEVICE AT +25C & +125C TEMP., SUBGROUPS 1, 2, 7 & 8.
- Note 2: SAMPLE TESTED (METHOD 5005, TABLE 1) ON EACH MFG. LOT AT +25C & +125C TEMPERATURE, SUBGROUPS A1, 2, 7, & 8.
- Note 3: SCREEN TESTED 100% ON EACH DEVICE AT +25C TEMPERATURE ONLY, SUBGROUP A9.
- Note 4: SAMPLE TESTED (METHOD 5005, TABLE 1) ON EACH MFG. LOT AT +25C & +125C TEMPERATURE, SUBGROUP A9 & 10.
- Note 5: SAMPLE TESTED (METHOD 5005, TABLE 1) ON EACH MFG. LOT AT +25C TEMPERATURE ONLY, SUBGROUP A9.
- Note 6: NOT TESTED AT +125C & -55C TEMPERATURE (DESIGN CHARACTERIZATION DATA).
- Note 7: TRANSMISSION LINE DRIVING TEST, GUARDBAND LIMITS SET FOR +25C, 2 MSEC DURATION MAX.
- Note 8: +25C & +125C MIN LIMITS GUARANTEED FOR 5.5V BY GUARDBANDING 4.5V MIN. LIMITS.