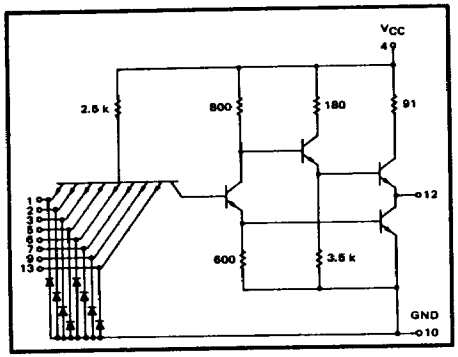
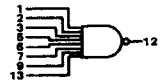
# MC2105 • MC2155
# MC2005 • MC2055




This device is an 8-input NAND gate. It is useful when processing a large number of variables, such as in encoders or decoders.



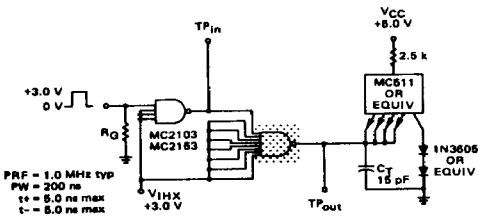

Positive Logic:
$12 = \overline{1 + 2 + 3 + 5 + 6 + 7 + 9 + 13}$

Negative Logic:
$12 = \overline{1 + 2 + 3 + 5 + 6 + 7 + 9 + 13}$

Total Power Dissipation = 22 mW typ/Pkg
Propagation Delay Time = 8.0 ns typ

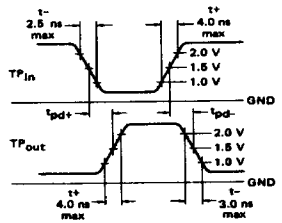
| TYPE NO. | INPUT LOADING FACTOR ($I_F$) | | OUTPUT DRIVE ($I_{OL}$) | | TEMPERATURE RANGE |
|---|---|---|---|---|---|
| MC2105<br>MC2155 | 1 | −2.0 mA | 11<br>6 | MC2100 series Gates 22 mA<br>MC2100 series Gates 12 mA | −55°C to +125°C |
| MC2005<br>MC2055 | 1 | −2.5 mA | 9<br>5 | MC2000 series Gates 22.5 mA<br>MC2000 series Gates 12.5 mA | 0°C to +75°C |

## SWITCHING TIME TEST CIRCUIT



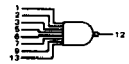

NOTES:
$R_G$ = 50 ohms
$C_T$ = the total parasitic capacitance which includes probe, wiring, and load capacitances.
Scope rise time < 1.0 ns
Probe capacitance < 5.0 pF

## VOLTAGE WAVEFORMS AND DEFINITIONS



## ELECTRICAL CHARACTERISTICS

Test procedures are shown for only one input of the device. To complete testing, sequence through remaining inputs in the same manner.




| @ Test Temperature | | $I_{OL}$ mA Pr° | $I_{OL}$ mA Std | $I_{OH}$ mA Pr° | $I_{OH}$ mA Std | $I_{in}$ mA | $V_{IL}$ Volts | $V_{IH}$ Volts | $V_R$ Volts | $V_{th\,1}$ Volts | $V_{th\,0}$ Volts | $V_{out}$ Volts | $V_{CC}$ Volts | $V_{CCH}$ Volts | $V_{BIX}$ Volts |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MC2105*, MC2155 | −55°C | 22.0 | 12.0 | -2.2 | -1.2 | 1.0 | 0.45 | 2.7 | 4.5 | 2.0 | 0.9 | 5.5 | 5.0 | - | - |
| | +25°C | 22.0 | 12.0 | -2.2 | -1.2 | 1.0 | 0.45 | 2.7 | 4.5 | 1.7 | 1.1 | 5.5 | 5.0 | 8.0 | 3.0 |
| | +125°C | 22.0 | 12.0 | -2.2 | -1.2 | 1.0 | 0.45 | 2.7 | 4.5 | 1.4 | 0.9 | 5.5 | 5.0 | - | - |
| MC2005*, MC2055 | 0°C | 22.5 | 12.5 | -1.8 | -1.0 | 1.0 | 0.45 | 2.9 | 4.5 | 1.9 | 1.0 | 5.5 | 5.0 | - | - |
| | +25°C | 22.5 | 12.5 | -1.8 | -1.0 | 1.0 | 0.45 | 2.9 | 4.5 | 1.8 | 1.1 | 5.5 | 5.0 | 7.0 | 3.0 |
| | +75°C | 22.5 | 12.5 | -1.8 | -1.0 | 1.0 | 0.45 | 2.9 | 4.5 | 1.7 | 1.0 | 5.5 | 5.0 | - | - |

| Characteristic | Symbol | Pin Under Test | MC2105, MC2155 Test Limits −55°C Min | −55°C Max | +25°C Min | +25°C Max | +125°C Min | +125°C Max | MC2005, MC2055 Test Limits 0°C Min | 0°C Max | +25°C Min | +25°C Max | +75°C Min | +75°C Max | Unit | TEST CURRENT / VOLTAGE APPLIED TO PINS LISTED BELOW: $I_{OL}$ | $I_{OH}$ | $I_{in}$ | $V_{IL}$ | $V_{IH}$ | $V_R$ | $V_{th\,1}$ | $V_{th\,0}$ | $V_{out}$ | $V_{CC}$ | $V_{CCH}$ | $V_{BIX}$ | Gnd |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Input** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Forward Current | $I_F$ | 1 | - | -2.0 | - | -2.0 | - | -2.0 | - | -2.5 | - | -2.5 | - | -2.5 | mAdc | - | - | - | - | - | 2,3,5,6 7,9,13 | - | - | - | 4 | - | - | 1,10 |
| Leakage Current | $I_R$ | 1 | - | 100 | - | 100 | - | 100 | - | 100 | - | 100 | - | 100 | μAdc | - | - | - | - | - | 1 | - | - | - | 4 | - | - | 2,3,5,6,7, 9,10,13 |
| Inverse Beta Current | $I_L$ | 1 | - | 100 | - | 100 | - | 100 | - | 100 | - | 100 | - | 100 | μAdc | - | - | - | - | - | 1 | - | - | - | 4 | - | - | 10 |
| Breakdown Voltage | $BV_{in}$ "0" | 1 | 5.5 | - | 5.5 | - | 5.5 | - | 5.5 | - | 5.5 | - | 5.5 | - | Vdc | - | - | 1 | - | - | - | - | - | - | 4 | - | - | 10 |
| | $BV_{in}$ "1" | 1 | 5.5 | - | 5.5 | - | 5.5 | - | 5.5 | - | 5.5 | - | 5.5 | - | Vdc | - | - | 1 | - | - | - | - | - | - | 4 | - | - | 2,3,5,6,7, 9,10,13 |
| **Output** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Output Voltage | $V_{out}$ "0" | 12 | - | 0.45 | - | 0.45 | - | 0.45 | - | 0.45 | - | 0.45 | - | 0.45 | Vdc | 12 | - | - | - | - | - | 1 | - | - | 4 | - | - | 10 |
| | $V_{out}$ "1" | 12 | 2.5 | - | 2.4 | - | 2.5 | - | 2.5 | - | 2.4 | - | 2.5 | - | Vdc | - | 12 | - | - | - | - | - | 1 | - | 4 | - | - | 10 |
| Leakage Current | $I_{OLK}$ | 12 | - | 250 | - | 250 | - | 250 | - | 250 | - | 250 | - | 250 | μAdc | - | - | - | - | - | - | - | - | 12 | 4 | - | - | 1,2,3,5,6,7, 9,10,13 |
| Short-Circuit Current | $I_{SC}$ | 12 | -25 | -100 | -25 | -100 | -25 | -100 | -25 | -100 | -25 | -100 | -25 | -100 | mAdc | - | - | - | - | - | - | - | - | - | 4 | - | - | 1,2,3,5,6,7, 9,10,12,13 |
| Output Voltage | $V_{OL}$ | 12 | - | 0.40 | - | 0.40 | - | 0.45 | - | 0.40 | - | 0.40 | - | 0.45 | Vdc | 12 | - | - | - | 1 | - | - | - | - | 4 | - | - | 10 |
| | $V_{OH}$ | 12 | 2.70 | - | 3.10 | - | 3.15 | - | 2.9 | - | 3.0 | - | 3.0 | - | Vdc | - | 12 | - | 1 | - | - | - | - | - | 4 | - | - | 10 |
| **Power Requirements (Total Device)** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Power Supply Current | $I_{max}$ | 4 | - | - | - | 6.50 | - | - | - | - | - | 6.75 | - | - | mAdc | - | - | - | - | - | - | - | - | - | - | 4 | - | 1,10 |
| Power Supply Drain | $I_{PDH}$ | 4 | - | 7.5 | - | 7.5 | - | 7.5 | - | 10 | - | 10 | - | 10 | mAdc | - | - | - | - | - | - | - | - | - | 4 | - | - | 10 |
| | $I_{PDL}$ | 4 | - | 3.75 | - | 3.75 | - | 3.75 | - | 5.0 | - | 5.0 | - | 5.0 | mAdc | - | - | - | - | - | - | - | - | - | 4 | - | - | 1,10 |
| **Switching Parameters** | | | | | | | | | | | | | | | | Pulse In | Pulse Out | | | | | | | | | | | |
| Turn-On Delay | $t_{pd-}$ | 1,12 | - | - | - | 12 | - | - | - | - | - | 12 | - | - | ns | 1 | 12 | - | - | - | - | - | - | - | 4 | - | 2,3,5,6, 7,9,13 | 10 |
| Turn-Off Delay | $t_{pd+}$ | 1,12 | - | - | - | 10 | - | - | - | - | - | 10 | - | - | ns | 1 | 12 | - | - | - | - | - | - | - | 4 | - | 2,3,5,6, 7,9,13 | 10 |
| Rise Time | $t_+$ | 1,12 | - | - | - | 4.0 | - | - | - | - | - | 4.0 | - | - | ns | 1 | 12 | - | - | - | - | - | - | - | 4 | - | 2,3,5,6, 7,9,13 | 10 |
| Fall Time | $t_-$ | 1,12 | - | - | - | 3.0 | - | - | - | - | - | 3.0 | - | - | ns | 1 | 12 | - | - | - | - | - | - | - | 4 | - | 2,3,5,6, 7,9,13 | 10 |

* Prime Fan-Out.

Table 3-4 DSP56001A Identification by Signal Name (Continued)

| Signal Name | 132 pin "FC" PQFP or "FE" CQFP Pin No. | 88 pin "RC" PGA Pin No. | Signal Name | 132 pin "FC" PQFP or "FE" CQFP Pin No. | 88 pin "RC" PGA Pin No. |
|---|---|---|---|---|---|
| $\overline{WT}$ | 45 | L13 | nc | 103 | |
| X/$\overline{Y}$ | 48 | N13 | nc | 107 | |
| XTAL | 126 | A6 | nc | 110 | |
| nc | 3 | | nc | 116 | |
| nc | 4 | | nc | 117 | |
| nc | 7 | | nc | 122 | |
| nc | 17 | | nc | 125 | |
| nc | 18 | | nc | 132 | |
| nc | 21 | | | | |

Power and ground pins have special considerations for noise immunity. See the section **Design Considerations**.

Table 3-5 DSP56001A Power Supply Pins

| 132 pin "FC" PQFP or "FE" CQFP Pin No. | 88 pin "RC" PGA Pin No. | Power Supply | Circuit Supplied |
|---|---|---|---|
| 63 | L8 | $V_{CCN}$ | Address Bus Buffers |
| 64 | | | |
| 55 | L6 | GNDN | |
| 56 | L9 | | |
| 73 | | | |
| 74 | | | |