

## DM74LS20

### *Dual 4-Input NAND Gate*

This device contains two independent gates each of which performs the logic NAND function.

#### **Rochester Electronics Manufactured Components**

Rochester branded components are manufactured using either die/wafers purchased from the original suppliers or Rochester wafers recreated from the original IP. All re-creations are done with the approval of the Original Component Manufacturer (OCM).

Parts are tested using original factory test programs or Rochester developed test solutions to guarantee product meets or exceeds the OCM data sheet.

#### **Quality Overview**

- ISO-9001
- AS9120 certification
- Qualified Manufacturers List (QML) MIL-PRF-35835
  - Class Q Military
  - Class V Space Level
- Qualified Suppliers List of Distributors (QSLD)
  - Rochester is a critical supplier to DLA and meets all industry and DLA standards.

Rochester Electronics, LLC is committed to supplying products that satisfy customer expectations for quality and are equal to those originally supplied by industry manufacturers.

*The original manufacturer's datasheet accompanying this document reflects the performance and specifications of the Rochester manufactured version of this device. Rochester Electronics guarantees the performance of its semiconductor products to the original OCM specifications. 'Typical' values are for reference purposes only. Certain minimum or maximum ratings may be based on product characterization, design, simulation, or sample testing.*

**FOR REFERENCE ONLY**

## DM74LS20

### Dual 4-Input NAND Gate

#### General Description

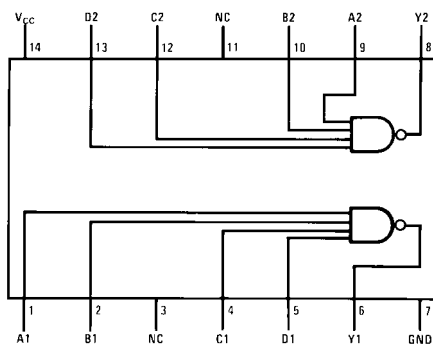
This device contains two independent gates each of which performs the logic NAND function.

#### Ordering Code:

| Order Number | Package Number | Package Description   |
|--------------|----------------|---|
| DM74LS20M    | M14A           | 14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-120, 0.150 Narrow |
| DM74LS20N    | N14A           | 14-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide       |

Devices also available in Tape and Reel. Specify by appending the suffix letter "X" to the ordering code.

#### Connection Diagram



#### Function Table

$$Y = \overline{ABCD}$$

| Inputs |   |   |   | Output |
|--------|---|---|---|--------|
| A      | B | C | D | Y      |
| X      | X | X | L | H      |
| X      | X | L | X | H      |
| X      | L | X | X | H      |
| L      | X | X | X | H      |
| H      | H | H | H | L      |

H = HIGH Logic Level

L = LOW Logic Level

X = Either LOW or HIGH Logic Level

**Absolute Maximum Ratings**(Note 1)

|                                      |                 |
|--------------------------------------|-----------------|
| Supply Voltage                       | 7V              |
| Input Voltage                        | 7V              |
| Operating Free Air Temperature Range | 0°C to +70°C    |
| Storage Temperature Range            | –65°C to +150°C |

**Note 1:** The "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated at these limits. The parametric values defined in the Electrical Characteristics tables are not guaranteed at the absolute maximum ratings. The "Recommended Operating Conditions" table will define the conditions for actual device operation.

**Recommended Operating Conditions**

| Symbol          | Parameter                      | Min  | Nom | Max  | Units |
|-----------------|--------------------------------|------|-----|------|-------|
| V <sub>CC</sub> | Supply Voltage                 | 4.75 | 5   | 5.25 | V     |
| V <sub>IH</sub> | HIGH Level Input Voltage       | 2    |     |      | V     |
| V <sub>IL</sub> | LOW Level Input Voltage        |      |     | 0.8  | V     |
| I <sub>OH</sub> | HIGH Level Output Current      |      |     | –0.4 | mA    |
| I <sub>OL</sub> | LOW Level Output Current       |      |     | 8    | mA    |
| T <sub>A</sub>  | Free Air Operating Temperature | 0    |     | 70   | °C    |

**Electrical Characteristics**

over recommended operating free air temperature range (unless otherwise noted)

| Symbol           | Parameter                         | Conditions  | Min | Typ<br>(Note 2) | Max   | Units |
|------------------|-----------------------------------|---|-----|-----------------|-------|-------|
| V <sub>I</sub>   | Input Clamp Voltage               | V <sub>CC</sub> = Min, I <sub>I</sub> = –18 mA                      |     |                 | –1.5  | V     |
| V <sub>OH</sub>  | HIGH Level Output Voltage         | V <sub>CC</sub> = Min, I <sub>OH</sub> = Max, V <sub>IL</sub> = Max | 2.7 | 3.4             |       | V     |
| V <sub>OL</sub>  | LOW Level Output Voltage          | V <sub>CC</sub> = Min, I <sub>OL</sub> = Max, V <sub>IH</sub> = Min |     | 0.35            | 0.5   | V     |
|                  |                                   | I <sub>OL</sub> = 4 mA, V <sub>CC</sub> = Min                       |     | 0.25            | 0.4   |       |
| I <sub>I</sub>   | Input Current @ Max Input Voltage | V <sub>CC</sub> = Max, V <sub>I</sub> = 7V                          |     |                 | 0.1   | mA    |
| I <sub>IH</sub>  | HIGH Level Input Current          | V <sub>CC</sub> = Max, V <sub>I</sub> = 2.7V                        |     |                 | 20    | μA    |
| I <sub>IL</sub>  | LOW Level Input Current           | V <sub>CC</sub> = Max, V <sub>I</sub> = 0.4V                        |     |                 | –0.36 | mA    |
| I <sub>OS</sub>  | Short Circuit Output Current      | V <sub>CC</sub> = Max (Note 3)                                      | –20 |                 | –100  | mA    |
| I <sub>CCH</sub> | Supply Current with Outputs HIGH  | V <sub>CC</sub> = Max   |     | 0.4             | 0.8   | mA    |
| I <sub>CCL</sub> | Supply Current with Outputs LOW   | V <sub>CC</sub> = Max   |     | 1.2             | 2.2   | mA    |

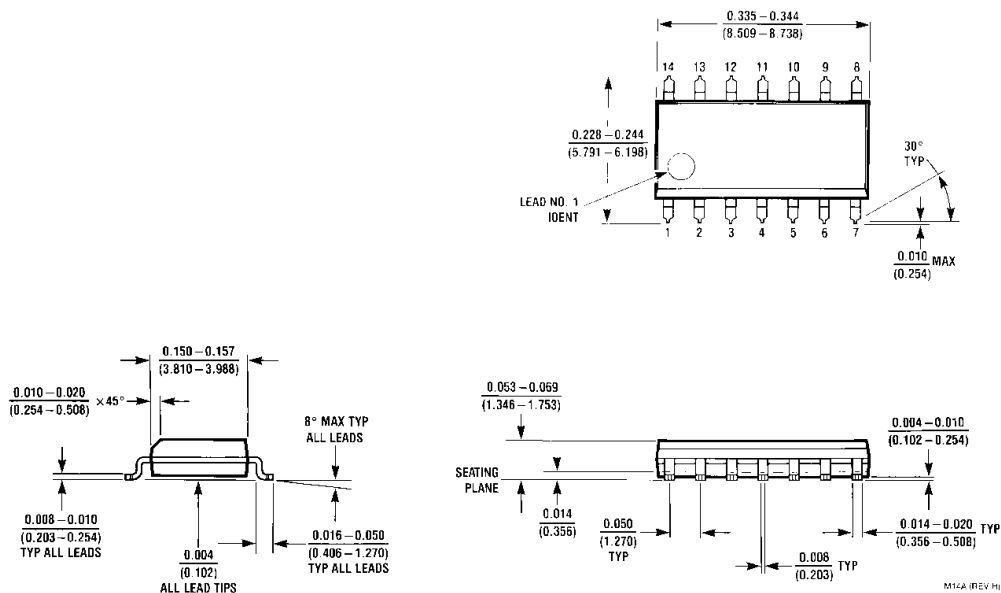
**Note 2:** All typicals are at V<sub>CC</sub> = 5V, T<sub>A</sub> = 25°C.

**Note 3:** Not more than one output should be shorted at a time, and the duration should not exceed one second.

**Switching Characteristics**

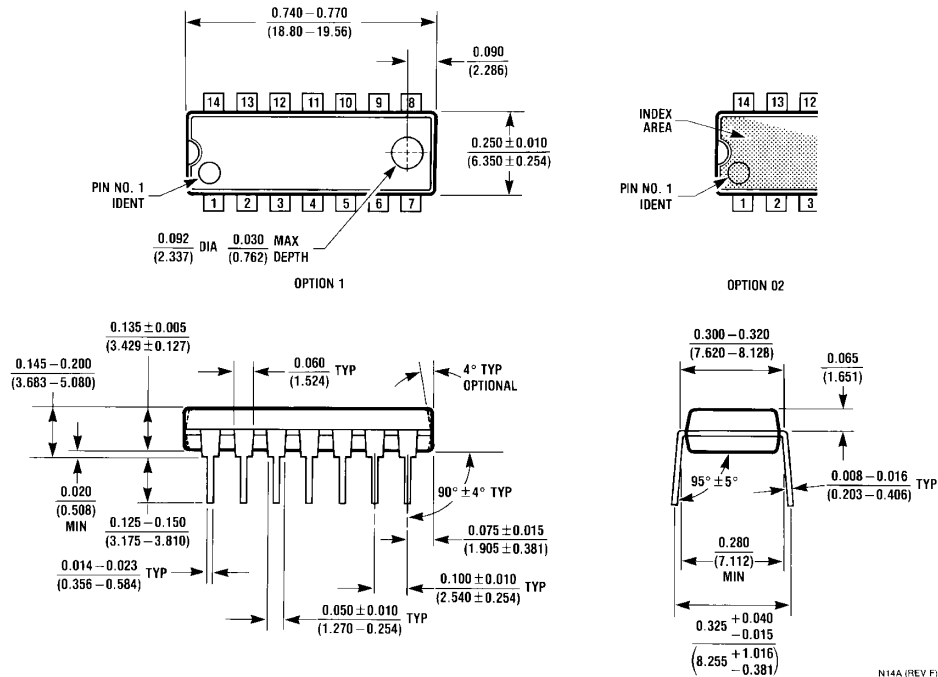
at V<sub>CC</sub> = 5V and T<sub>A</sub> = 25°C

| Symbol           | Parameter  | R <sub>L</sub> = 2 kΩ  |     |                        |     | Units |
|------------------|--|------------------------|-----|------------------------|-----|-------|
|                  |  | C <sub>L</sub> = 15 pF |     | C <sub>L</sub> = 50 pF |     |       |
|                  |  | Min                    | Max | Min                    | Max |       |
| t <sub>PLH</sub> | Propagation Delay Time<br>LOW-to-HIGH Level Output | 3                      | 10  | 4                      | 15  | ns    |
| t <sub>PHL</sub> | Propagation Delay Time<br>HIGH-to-LOW Level Output | 3                      | 10  | 4                      | 15  | ns    |

**Physical Dimensions** inches (millimeters) unless otherwise noted


**14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-120, 0.150 Narrow Package Number M14A**

# Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



14-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide Package Number N14A

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