

## 9309/DM9309 Dual 4-Bit Data Selectors/Multiplexers

### General Description

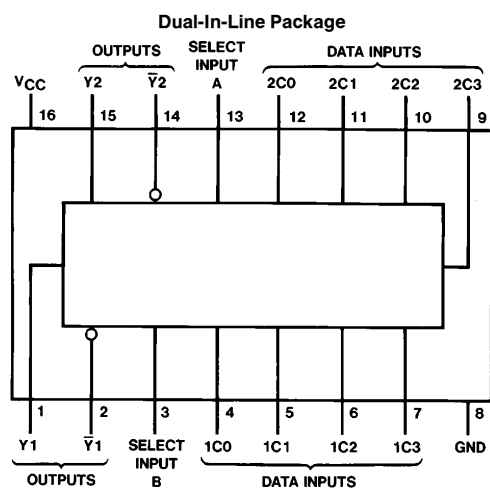
These data selectors/multiplexers contain inverter/drivers to supply full complementary, on-chip, binary decoded data selection.

The 9309/DM9309 contains two separate 4-bit multiplexers with complementary Y and  $\bar{Y}$  outputs; however, the two sections have common address select inputs.

### Features

- Complementary outputs
- Dual one-of-four data selectors

### Connection Diagram



TL/F/6602-1

Order Number 9309DMQB, 9309FMQB or DM9309N  
See NS Package Number J16A, N16E or W16A

### Function Table

| Inputs |   |      |    |    |    | Outputs |           |
|--------|---|------|----|----|----|---------|-----------|
| Select |   | Data |    |    |    | Y       | $\bar{Y}$ |
| B      | A | C0   | C1 | C2 | C3 |         |           |
| L      | L | L    | X  | X  | X  | L       | H         |
| L      | L | H    | X  | X  | X  | H       | L         |
| L      | H | X    | L  | X  | X  | L       | H         |
| L      | H | X    | H  | X  | X  | H       | L         |
| H      | L | X    | X  | L  | X  | L       | H         |
| H      | L | X    | X  | H  | X  | H       | L         |
| H      | H | X    | X  | X  | L  | L       | H         |
| H      | H | X    | X  | X  | H  | H       | L         |

Select inputs A and B are common to both sections.

H = High Level, L = Low Level, X = Don't Care.

## Absolute Maximum Ratings (Note)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

|                                      |                 |
|--------------------------------------|-----------------|
| Supply Voltage                       | 7V              |
| Input Voltage                        | 5.5V            |
| Operating Free Air Temperature Range |                 |
| Military                             | −55°C to +125°C |
| Commercial                           | 0°C to +70°C    |
| Storage Temperature Range            | −65°C to +150°C |

Note: 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” table 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                      | Military |     |      | Commercial |     |      | Units |
|-----------------|--------------------------------|----------|-----|------|------------|-----|------|-------|
|                 |                                | Min      | Nom | Max  | Min        | Nom | Max  |       |
| V <sub>CC</sub> | Supply Voltage                 | 4.5      | 5   | 5.5  | 4.75       | 5   | 5.25 | V     |
| V <sub>IH</sub> | High Level Input Voltage       | 2        |     |      | 2          |     |      | V     |
| V <sub>IL</sub> | Low Level Input Voltage        |          |     | 0.8  |            |     | 0.8  | V     |
| I <sub>OH</sub> | High Level Output Current      |          |     | −0.8 |            |     | −0.8 | mA    |
| I <sub>OL</sub> | Low Level Output Current       |          |     | 16   |            |     | 16   | mA    |
| T <sub>A</sub>  | Free Air Operating Temperature | −55      |     | 125  | 0          |     | 70   | °C    |

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

| Symbol          | Parameter                         | Conditions                                                                                   | Min                      | Typ<br>(Note 1) | Max        | Units |
|-----------------|-----------------------------------|----------------------------------------------------------------------------------------------|--------------------------|-----------------|------------|-------|
| V <sub>I</sub>  | Input Clamp Voltage               | V <sub>CC</sub> = Min, I <sub>I</sub> = −12 mA                                               |                          |                 | −1.5       | V     |
| V <sub>OH</sub> | High Level Output Voltage         | V <sub>CC</sub> = Min, I <sub>OH</sub> = Max<br>V <sub>IL</sub> = Max, V <sub>IH</sub> = Min | 2.4                      | 3.4             |            | V     |
| V <sub>OL</sub> | Low Level Output Voltage          | V <sub>CC</sub> = Min, I <sub>OL</sub> = Max<br>V <sub>IH</sub> = Min, V <sub>IL</sub> = Max |                          | 0.2             | 0.4        | V     |
| I <sub>I</sub>  | Input Current @ Max Input Voltage | V <sub>CC</sub> = Max, V <sub>I</sub> = 5.5V                                                 |                          |                 | 1          | mA    |
| I <sub>IH</sub> | High Level Input Current          | V <sub>CC</sub> = Max, V <sub>I</sub> = 2.4V                                                 |                          |                 | 40         | μA    |
| I <sub>IL</sub> | Low Level Input Current           | V <sub>CC</sub> = Max, V <sub>I</sub> = 0.4V                                                 |                          |                 | −1.6       | mA    |
| I <sub>OS</sub> | Short Circuit Output Current      | V <sub>CC</sub> = Max (Note 2)                                                               | MIL<br>−20<br>COM<br>−30 |                 | −70<br>−85 | mA    |
| I <sub>CC</sub> | Supply Current                    | V <sub>CC</sub> = Max (Note 3)                                                               |                          | 27              | 44         | mA    |

Note 1: All typicals are at V<sub>CC</sub> = 5V, T<sub>A</sub> = 25°C.

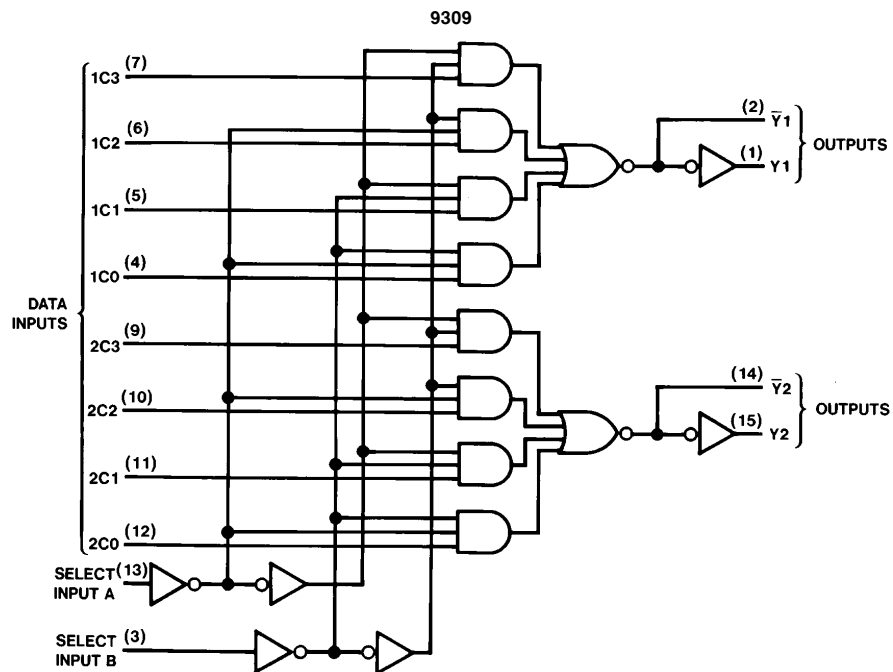
Note 2: Not more than one output should be shorted at a time.

Note 3: I<sub>CC</sub> is measured with the outputs open and all inputs at 4.5V.

# Switching Characteristics at $V_{CC} = 5V$ and $T_A = 25^\circ C$ (See Section 1 for Test Waveforms and Output Load)

| Symbol           | Parameter                                          | From (Input)<br>To (Output) | Military                                      |     | Commercial |     | Units |
|------------------|----------------------------------------------------|-----------------------------|-----------------------------------------------|-----|------------|-----|-------|
|                  |                                                    |                             | R <sub>L</sub> = 400Ω, C <sub>L</sub> = 15 pF |     |            |     |       |
|                  |                                                    |                             | Min                                           | Max | Min        | Max |       |
| t <sub>PLH</sub> | Propagation Delay Time<br>Low to High Level Output | Select<br>to Y              |                                               | 29  |            | 40  | ns    |
| t <sub>PHL</sub> | Propagation Delay Time<br>High to Low Level Output | Select<br>to Y              |                                               | 27  |            | 36  | ns    |
| t <sub>PLH</sub> | Propagation Delay Time<br>Low to High Level Output | Select<br>to $\bar{Y}$      |                                               | 21  |            | 24  | ns    |
| t <sub>PHL</sub> | Propagation Delay Time<br>High to Low Level Output | Select<br>to $\bar{Y}$      |                                               | 21  |            | 29  | ns    |
| t <sub>PLH</sub> | Propagation Delay Time<br>Low to High Level Output | Data<br>to Y                |                                               | 20  |            | 27  | ns    |
| t <sub>PHL</sub> | Propagation Delay Time<br>High to Low Level Output | Data<br>to Y                |                                               | 21  |            | 34  | ns    |
| t <sub>PLH</sub> | Propagation Delay Time<br>Low to High Level Output | Data<br>to $\bar{Y}$        |                                               | 12  |            | 21  | ns    |
| t <sub>PHL</sub> | Propagation Delay Time<br>High to Low Level Output | Data<br>to $\bar{Y}$        |                                               | 13  |            | 13  | ns    |

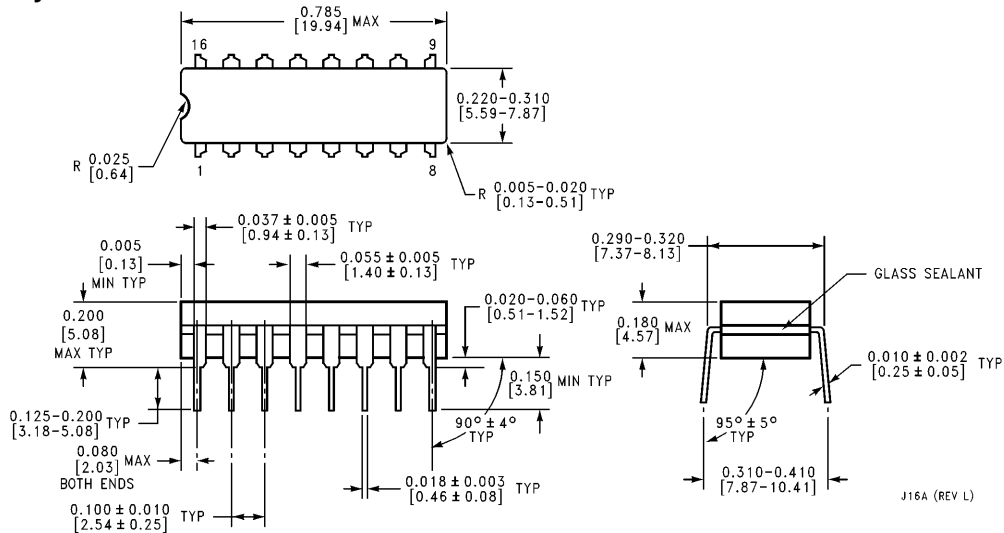
## Logic Diagram



TL/F/6602-2



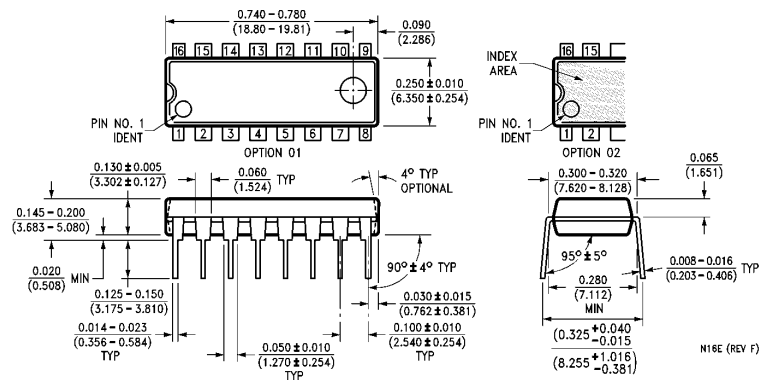
## Physical Dimensions inches (millimeters)



### 16-Lead Ceramic Dual-In-Line Package (J)

Order Number 9309DMQB

NS Package Number J16A

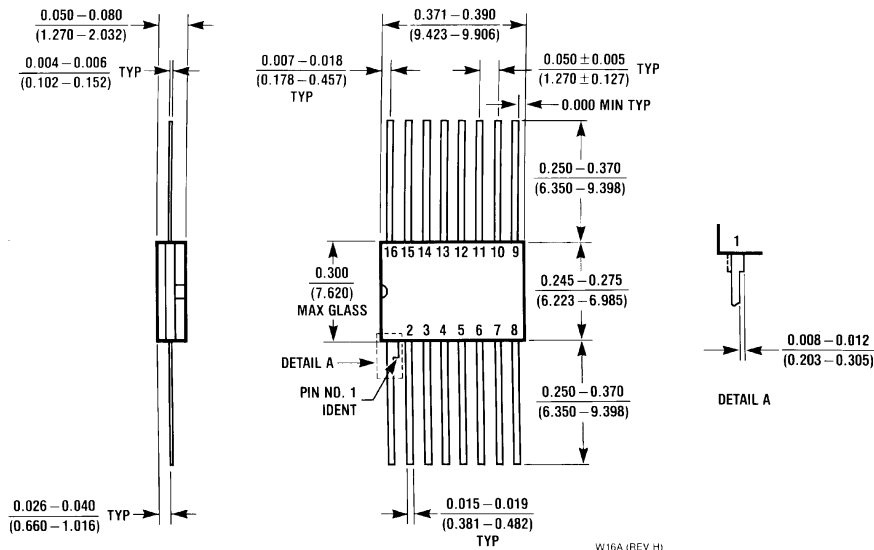


### 16-Lead Molded Dual-In-Line Package (N)

Order Number DM9309N

NS Package Number N16E

# Physical Dimensions inches (millimeters) (Continued)



**16-Lead Ceramic Flat Package (W)**  
**Order Number 9309FMQB**  
**NS Package Number W16A**

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