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March 1987  
Revised February 2000

## DM74ALS645A Octal Bus Transceivers

### General Description

These octal bus transceivers are designed for asynchronous two-way communication between data busses. These devices transmit data from the A bus to the B bus or from the B bus to the A bus depending upon the level at the direction control (DIR) input. The enable input (G) can be used to disable the device so the busses are effectively isolated.

### Features

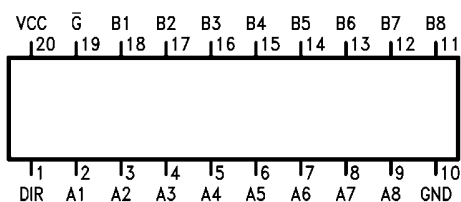
- Advanced Oxide-isolated Ion-implanted Schottky TTL process
- Switching performance is guaranteed over full temperature and V<sub>CC</sub> supply range
- Switching performance specified at 50 pF
- PNP input design reduces input loading

### Ordering Code:

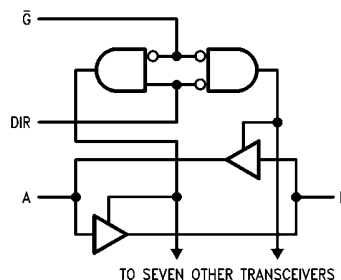
| Order Number  | Package Number | Package Description   |
|---------------|----------------|---|
| DM74ALS645AWM | M20B           | 20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300 Wide |
| DM74ALS645AN  | N20A           | 20-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide     |

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

### Connection Diagram



### Logic Diagram



### Function Table

| Control Inputs |     | Operation       |
|----------------|-----|-----------------|
| G-bar          | DIR |                 |
| L              | L   | B Data to A Bus |
| L              | H   | A Data to B Bus |
| H              | X   | Isolation       |

L = LOW Logic Level  
 H = HIGH Logic Level  
 X = Either LOW or HIGH Logic Level

DM74ALS645A

### Absolute Maximum Ratings (Note 1)

|                                      |                 |
|--------------------------------------|-----------------|
| Supply Voltage                       | 7V              |
| Input Voltage;                       |                 |
| Control Inputs                       | 7V              |
| I/O Ports                            | 5.5V            |
| Operating Free Air Temperature Range | 0°C to +70°C    |
| Storage Temperature Range            | -65°C to +150°C |
| Typical $\theta_{JA}$                |                 |
| N Package                            | 53.0°C/W        |
| M Package                            | 72.0°C/W        |

**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 | Typ | Max | Units |
|----------|--------------------------------------|-----|-----|-----|-------|
| $V_{CC}$ | Supply Voltage                       | 4.5 | 5   | 5.5 | V     |
| $V_{IH}$ | HIGH Level Input Voltage             | 2   |     |     | V     |
| $V_{IL}$ | LOW Level Input Voltage              |     |     | 0.8 | V     |
| $I_{OH}$ | HIGH Level Output Current            |     |     | -15 | mA    |
| $I_{OL}$ | LOW Level Output Current             |     |     | 24  | mA    |
| $T_A$    | Operating Free Air Temperature Range | 0   |     | 70  | °C    |

### Electrical Characteristics

Over Recommended Free Air Temperature Range

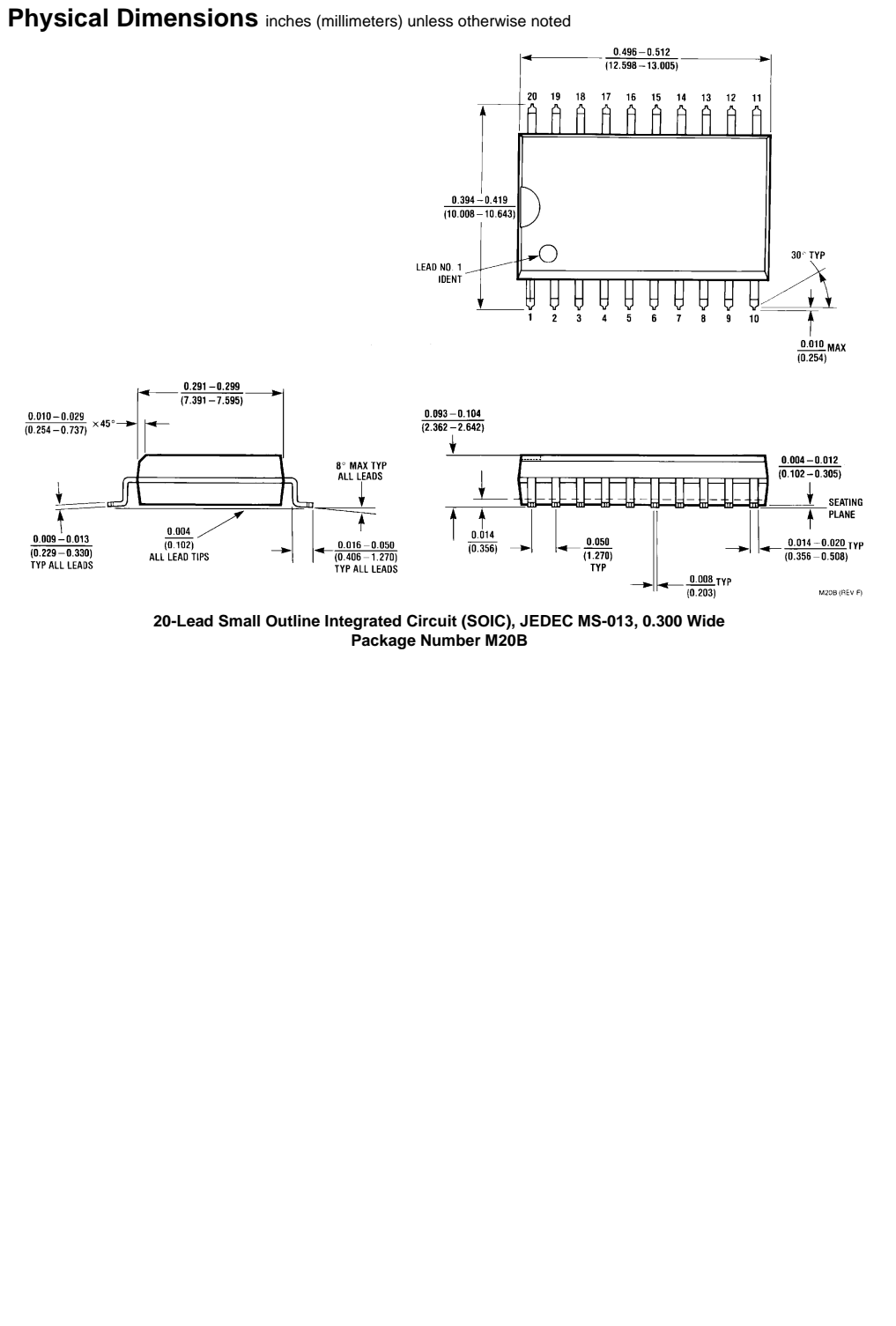
| Symbol   | Parameter                              | Test Conditions                                   | Min                        | Typ          | Max  | Units         |    |
|----------|--|---|----------------------------|--------------|------|---------------|----|
| $V_{IC}$ | Input Clamp Voltage                    | $V_{CC} = \text{Min}, I_I = -18 \text{ mA}$       |                            |              | -1.5 | V             |    |
| $V_{OH}$ | HIGH Level Output Voltage              | $V_{CC} = 4.5 \text{ to } 5.5\text{V}$            | $I_{OH} = -0.4 \text{ mA}$ | $V_{CC} - 2$ |      | V             |    |
|          |  | $V_{CC} = \text{Max}$                             | $I_{OH} = -3 \text{ mA}$   | 2.4          | 3.2  |               |    |
|          |  |   | $I_{OH} = \text{Max}$      | 2            |      |               |    |
| $V_{OL}$ | LOW Level Output Voltage               | $V_{CC} = \text{Min}$                             | $I_{OL} = 12 \text{ mA}$   |              | 0.25 | 0.4           | V  |
|          |  |   | $I_{OL} = 24 \text{ mA}$   |              | 0.35 | 0.5           |    |
| $I_I$    | Input Current at Maximum Input Voltage | $V_{CC} = \text{Max}$                             |                            |              | 100  | $\mu\text{A}$ |    |
| $I_{IH}$ | HIGH Level Input Current               | $V_{CC} = \text{Max}, V_I = 2.7\text{V}$ (Note 2) |                            |              | 20   | $\mu\text{A}$ |    |
| $I_{IL}$ | LOW Level Input Current                | $V_{CC} = \text{Max}, V_I = 0.4\text{V}$ (Note 2) |                            |              | -100 | $\mu\text{A}$ |    |
| $I_O$    | Output Drive Current                   | $V_{CC} = \text{Max}, V_O = 2.25\text{V}$         | -30                        |              | -112 | mA            |    |
| $I_{CC}$ | Supply Current                         | $V_{CC} = \text{Max}$                             | Outputs HIGH               |              | 30   | 45            | mA |
|          |  |   | Outputs LOW                |              | 36   | 55            |    |
|          |  |   | Outputs Disabled           |              | 38   | 58            |    |

**Note 2:** For I/O ports,  $I_{IH}$  and  $I_{IL}$  parameters include the 3-STATE output current ( $I_{OZH}$  and  $I_{OZH}$ ).

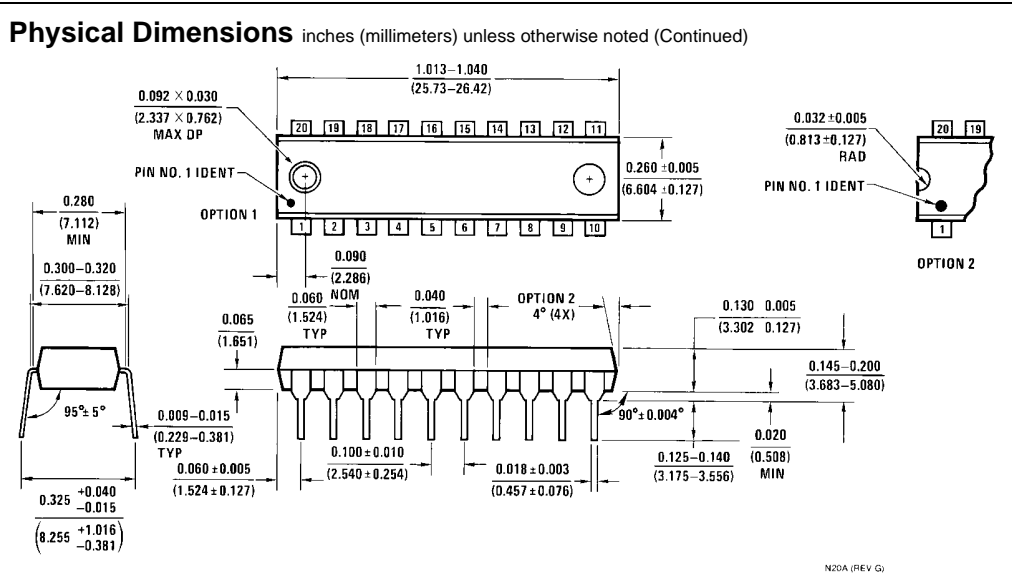
### Switching Characteristics

Over Recommended Operating Free Air Temperature Range

| Symbol    | Parameter  | From (Input) | To (Output) | Conditions   | Min | Max | Units |
|-----------|--|--------------|-------------|--|-----|-----|-------|
| $t_{PLH}$ | Propagation Delay Time<br>LOW-to-HIGH Level Output | A or B       | B or A      | $V_{CC} = 4.5 \text{ to } 5.5\text{V},$<br>$C_L = 50 \text{ pF},$<br>$R_1 = R_2 = 500\Omega$ | 3   | 10  | ns    |
| $t_{PHL}$ | Propagation Delay Time<br>HIGH-to-LOW Level Output | A or B       | B or A      |  |     |     |       |
| $t_{PZH}$ | Output Enable Time to HIGH Level Output            | $\bar{G}$    | A or B      |  | 5   | 20  | ns    |
| $t_{PZL}$ | Output Enable Time to LOW Level Output             | $\bar{G}$    | A or B      |  | 5   | 20  | ns    |
| $t_{PHZ}$ | Output Disable Time from HIGH Level Output         | $\bar{G}$    | A or B      |  | 2   | 10  | ns    |
| $t_{PLZ}$ | Output Disable Time from LOW Level Output          | $\bar{G}$    | A or B      |  | 4   | 15  | ns    |



DM74ALS645A Octal Bus Transceivers



**20-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide  
 Package Number N20A**

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