

## 74F544

### Octal Registered Transceiver

#### General Description

The 74F544 octal transceiver contains two sets of D-type latches for temporary storage of data flowing in either direction. Separate Latch Enable and Output Enable inputs are provided for each register to permit independent control of inputting and outputting in either direction of data flow. The A outputs are guaranteed to sink 24 mA while the B outputs are rated for 64 mA. The 74F544 inverts data in both directions.

#### Features

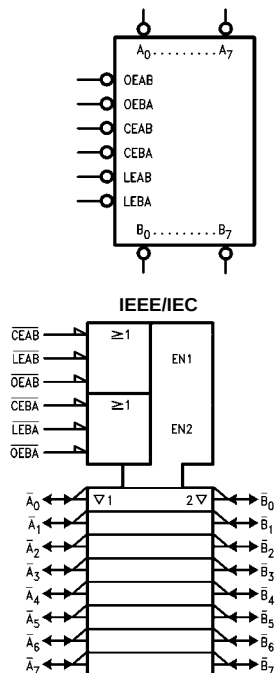
- 8-bit octal transceiver
- Back-to-back registers for storage
- Separate controls for data flow in each direction
- A outputs sink 24 mA, B outputs sink 64 mA

#### Ordering Code:

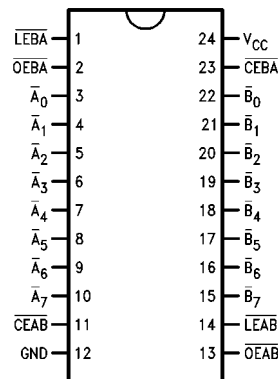
| Order Number | Package Number | Package Description                                                       |
|--------------|----------------|---------------------------------------------------------------------------|
| 74F544SC     | M24B           | 24-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300 Wide |
| 74F544MSA    | MSA24          | 24-Lead Shrink Small Outline Package (SSOP), EIAJ TYPE II, 5.3mm Wide     |
| 74F544SPC    | N24C           | 24-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-100, 0.300 Wide     |

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

#### Logic Symbols



#### Connection Diagram



## Unit Loading/Fan Out

| Pin Names                               | Description                                     | U.L.<br>HIGH/LOW           | Input $I_{IH}/I_{IL}$<br>Output $I_{OH}/I_{OL}$ |
|-----------------------------------------|-------------------------------------------------|----------------------------|-------------------------------------------------|
| $\overline{OEAB}$                       | A-to-B Output Enable Input (Active LOW)         | 1.0/1.0                    | 20 $\mu A$ –0.6 mA                              |
| $\overline{OEBA}$                       | B-to-A Output Enable Input (Active LOW)         | 1.0/1.0                    | 20 $\mu A$ –0.6 mA                              |
| $\overline{CEAB}$                       | A-to-B Enable Input (Active LOW)                | 1.0/2.0                    | 20 $\mu A$ –1.2 mA                              |
| $\overline{CEBA}$                       | B-to-A Enable Input (Active LOW)                | 1.0/2.0                    | 20 $\mu A$ –1.2 mA                              |
| $\overline{LEAB}$                       | A-to-B Latch Enable Input (Active LOW)          | 1.0/1.0                    | 20 $\mu A$ –0.6 mA                              |
| $\overline{LEBA}$                       | B-to-A Latch Enable Input (Active LOW)          | 1.0/1.0                    | 20 $\mu A$ –0.6 mA                              |
| $\overline{A_0}\text{--}\overline{A_7}$ | A-to-B Data Inputs or<br>B-to-A 3-STATE Outputs | 3.5/1.083<br>150/40(33.3)  | 70 $\mu A$ –650 $\mu A$<br>–3 mA/24 mA (20 mA)  |
| $\overline{B_0}\text{--}\overline{B_7}$ | B-to-A Data Inputs or<br>A-to-B 3-STATE Outputs | 3.5/1.083<br>600/106.6(80) | 70 $\mu A$ –650 $\mu A$<br>–12 mA/64 mA (48 mA) |

## Functional Description

The 74F544 contains two sets of eight D-type latches, with separate input and output controls for each set. For data flow from A to B, for example, the A-to-B Enable ( $\overline{CEAB}$ ) input must be LOW in order to enter data from  $\overline{A_0}\text{--}\overline{A_7}$  or take data from  $\overline{B_0}\text{--}\overline{B_7}$ , as indicated in the Data I/O Control Table. With  $\overline{CEAB}$  LOW, a LOW signal on the A-to-B Latch Enable ( $\overline{LEAB}$ ) input makes the A-to-B latches transparent; a subsequent LOW-to-HIGH transition of the  $\overline{LEAB}$  signal puts the A latches in the storage mode and their outputs no longer change with the A inputs. With  $\overline{CEAB}$  and  $\overline{OEAB}$  both LOW, the 3-STATE B output buffers are active and reflect the data present at the output of the A latches. Control of data flow from B to A is similar, but using the  $\overline{CEBA}$ ,  $\overline{LEBA}$  and  $\overline{OEBA}$  inputs.

## Data I/O Control Table

| Inputs            |                   |                   | Latch Status | Output Buffers |
|-------------------|-------------------|-------------------|--------------|----------------|
| $\overline{CEAB}$ | $\overline{LEAB}$ | $\overline{OEAB}$ |              |                |
| H                 | X                 | X                 | Latched      | High Z         |
| X                 | H                 | X                 | Latched      | —              |
| L                 | L                 | X                 | Transparent  | —              |
| X                 | X                 | H                 | —            | High Z         |
| L                 | X                 | L                 | —            | Driving        |

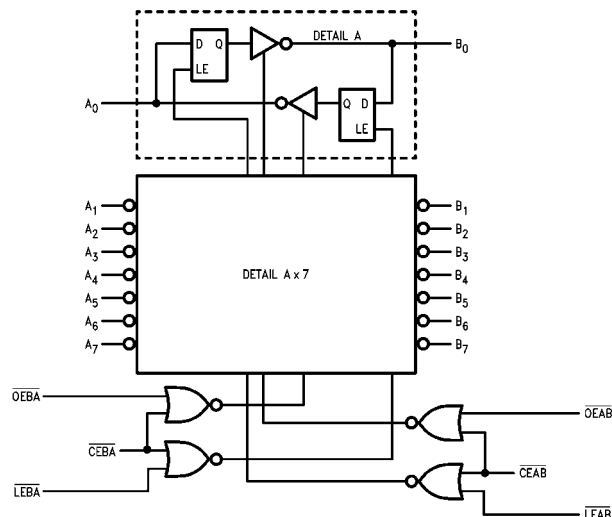
H = HIGH Voltage Level

L = LOW Voltage Level

X = Immaterial

**Note:** A-to-B data flow shown; B-to-A flow control is the same, except using  $\overline{CEBA}$ ,  $\overline{LEBA}$  and  $\overline{OEBA}$ .

## Logic Diagram



Please note that this diagram is provided only for the understanding of logic operations and should not be used to estimate propagation delays.

**Absolute Maximum Ratings**(Note 1)

|                                             |                   |
|---------------------------------------------|-------------------|
| Storage Temperature                         | -65°C to +150°C   |
| Ambient Temperature under Bias              | -55°C to +125°C   |
| Junction Temperature under Bias             | -55°C to +150°C   |
| V <sub>CC</sub> Pin Potential to Ground Pin | -0.5V to +7.0V    |
| Input Voltage (Note 2)                      | -0.5V to +7.0V    |
| Input Current (Note 2)                      | -30 mA to +5.0 mA |

Voltage Applied to Output

in HIGH State (with V<sub>CC</sub> = 0V)Standard Output -0.5V to V<sub>CC</sub>

3-STATE Output -0.5V to +5.5V

Current Applied to Output

in LOW State (Max) twice the rated I<sub>OL</sub> (mA)**Recommended Operating Conditions**

|                              |                |
|------------------------------|----------------|
| Free Air Ambient Temperature | 0°C to +70°C   |
| Supply Voltage               | +4.5V to +5.5V |

**Note 1:** Absolute maximum ratings are values beyond which the device may be damaged or have its useful life impaired. Functional operation under these conditions is not implied.

**Note 2:** Either voltage limit or current limit is sufficient to protect inputs.

**DC Electrical Characteristics**

| Symbol                             | Parameter                          | Min                                                                                                           | Typ                             | Max          | Units | V <sub>CC</sub> | Conditions                                                                                                                                                                                                                                 |
|------------------------------------|------------------------------------|---------------------------------------------------------------------------------------------------------------|---------------------------------|--------------|-------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| V <sub>IH</sub>                    | Input HIGH Voltage                 | 2.0                                                                                                           |                                 |              | V     |                 | Recognized as a HIGH Signal                                                                                                                                                                                                                |
| V <sub>IL</sub>                    | Input LOW Voltage                  |                                                                                                               |                                 | 0.8          | V     |                 | Recognized as a LOW Signal                                                                                                                                                                                                                 |
| V <sub>CD</sub>                    | Input Clamp Diode Voltage          |                                                                                                               |                                 | -1.2         | V     | Min             | I <sub>IN</sub> = -18 mA,<br>(except $\bar{A}_n, \bar{B}_n$ )                                                                                                                                                                              |
| V <sub>OH</sub>                    | Output HIGH Voltage                | 10% V <sub>CC</sub><br>10% V <sub>CC</sub><br>10% V <sub>CC</sub><br>5% V <sub>CC</sub><br>5% V <sub>CC</sub> | 2.5<br>2.4<br>2.0<br>2.7<br>2.7 |              | V     | Min             | I <sub>OH</sub> = -1 mA ( $\bar{A}_n$ )<br>I <sub>OH</sub> = -3 mA ( $\bar{A}_n, \bar{B}_n$ )<br>I <sub>OH</sub> = -15 mA ( $\bar{B}_n$ )<br>I <sub>OH</sub> = -1 mA ( $\bar{A}_n$ )<br>I <sub>OH</sub> = -3 mA ( $\bar{A}_n, \bar{B}_n$ ) |
| V <sub>OL</sub>                    | Output LOW Voltage                 | 10% V <sub>CC</sub><br>10% V <sub>CC</sub>                                                                    |                                 | 0.5<br>0.55  | V     | Min             | I <sub>OL</sub> = 24 mA ( $\bar{A}_n$ )<br>I <sub>OL</sub> = 64 mA ( $\bar{B}_n$ )                                                                                                                                                         |
| I <sub>IH</sub>                    | Input HIGH Current                 |                                                                                                               |                                 | 20.0<br>5.0  | μA    | Max             | V <sub>IN</sub> = 2.7V (except $\bar{A}_n, \bar{B}_n$ )                                                                                                                                                                                    |
| I <sub>BVI</sub>                   | Input HIGH Current Breakdown Test  |                                                                                                               |                                 | 7.0          | μA    | Max             | V <sub>IN</sub> = 7.0V (except $\bar{A}_n, \bar{B}_n$ )                                                                                                                                                                                    |
| I <sub>BVIT</sub>                  | Input HIGH Current Breakdown (I/O) |                                                                                                               |                                 | 0.5          | mA    | Max             | V <sub>IN</sub> = 5.5V ( $\bar{A}_n, \bar{B}_n$ )                                                                                                                                                                                          |
| I <sub>CEX</sub>                   | Output HIGH Leakage Current        |                                                                                                               |                                 | 250          | μA    | Max             | V <sub>OUT</sub> = V <sub>CC</sub> ( $\bar{A}_n, \bar{B}_n$ )                                                                                                                                                                              |
| V <sub>ID</sub>                    | Input Leakage Test                 | 4.75                                                                                                          |                                 |              | V     | 0.0             | I <sub>ID</sub> = 1.9 μA<br>All Other Pins Grounded                                                                                                                                                                                        |
| I <sub>OD</sub>                    | Output Leakage Circuit Current     |                                                                                                               |                                 | 3.75         | μA    | 0.0             | V <sub>IOD</sub> = 150 mV<br>All Other Pins Grounded                                                                                                                                                                                       |
| I <sub>IL</sub>                    | Input LOW Current                  |                                                                                                               |                                 | -0.6<br>-1.2 | mA    | Max             | V <sub>IN</sub> = 0.5V ( $\overline{OEAB}, \overline{OEBA}$ )<br>V <sub>IN</sub> = 0.5V ( $\overline{CEAB}, \overline{CEBA}$ )                                                                                                             |
| I <sub>IH</sub> + I <sub>OZH</sub> | Output Leakage Current             |                                                                                                               |                                 | 70           | μA    | Max             | V <sub>OUT</sub> = 2.7V ( $\bar{A}_n, \bar{B}_n$ )                                                                                                                                                                                         |
| I <sub>IL</sub> + I <sub>OZL</sub> | Output Leakage Current             |                                                                                                               |                                 | -650         | μA    | Max             | V <sub>OUT</sub> = 0.5V ( $\bar{A}_n, \bar{B}_n$ )                                                                                                                                                                                         |
| I <sub>OS</sub>                    | Output Short-Circuit Current       | -60<br>-100                                                                                                   |                                 | -150<br>-225 | mA    | Max             | V <sub>OUT</sub> = 0V ( $\bar{A}_n$ )<br>V <sub>OUT</sub> = 0V ( $\bar{B}_n$ )                                                                                                                                                             |
| I <sub>ZZ</sub>                    | Bus Drainage Test                  |                                                                                                               |                                 | 500          | μA    | 0.0V            | V <sub>OUT</sub> = 5.25V ( $\bar{A}_n, \bar{B}_n$ )                                                                                                                                                                                        |
| I <sub>CCH</sub>                   | Power Supply Current               |                                                                                                               | 70                              | 105          | mA    | Max             | V <sub>O</sub> = HIGH                                                                                                                                                                                                                      |
| I <sub>CCL</sub>                   | Power Supply Current               |                                                                                                               | 85                              | 130          | mA    | Max             | V <sub>O</sub> = LOW                                                                                                                                                                                                                       |
| I <sub>CCZ</sub>                   | Power Supply Current               |                                                                                                               | 83                              | 125          | mA    | Max             | V <sub>O</sub> = HIGH Z                                                                                                                                                                                                                    |

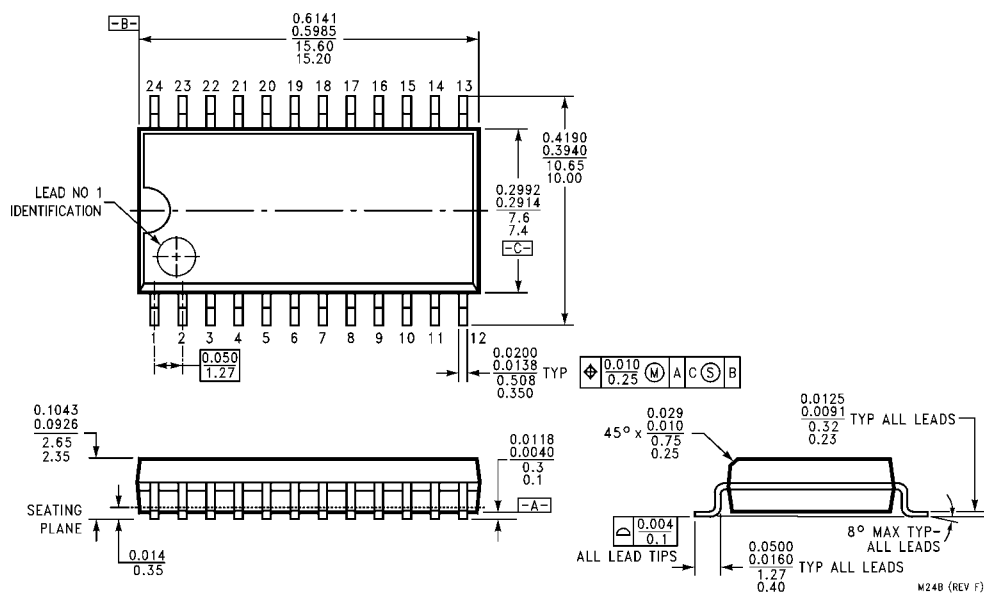
## AC Electrical Characteristics

| Symbol                               | Parameter                                                                                                                   | T <sub>A</sub> = +25°C<br>V <sub>CC</sub> = +5.0V<br>C <sub>L</sub> = 50 pF |      |      | T <sub>A</sub> = -55°C to +125°C<br>V <sub>CC</sub> = +5.0V<br>C <sub>L</sub> = 50 pF |      | T <sub>A</sub> = 0°C to +70°C<br>V <sub>CC</sub> = +5.0V<br>C <sub>L</sub> = 50 pF |      | Units |
|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|------|------|---------------------------------------------------------------------------------------|------|------------------------------------------------------------------------------------|------|-------|
|                                      |                                                                                                                             | Min                                                                         | Typ  | Max  | Min                                                                                   | Max  | Min                                                                                | Max  |       |
| t <sub>PLH</sub><br>t <sub>PHL</sub> | Propagation Delay<br>Transparent Mode<br>A <sub>n</sub> to B <sub>n</sub> or B <sub>n</sub> to A <sub>n</sub>               | 3.0                                                                         | 7.0  | 9.5  | 3.0                                                                                   | 12.0 | 3.0                                                                                | 10.5 | ns    |
| t <sub>PLH</sub><br>t <sub>PHL</sub> | Propagation Delay<br>LEBA to A <sub>n</sub>                                                                                 | 6.0                                                                         | 10.0 | 13.0 | 6.0                                                                                   | 18.0 | 6.0                                                                                | 14.5 |       |
| t <sub>PLH</sub><br>t <sub>PHL</sub> | Propagation Delay<br>LEAB to B <sub>n</sub>                                                                                 | 4.0                                                                         | 7.0  | 9.5  | 4.0                                                                                   | 11.5 | 4.0                                                                                | 10.5 | ns    |
| t <sub>PLH</sub><br>t <sub>PHL</sub> | Propagation Delay<br>LEAB to B <sub>n</sub>                                                                                 | 6.0                                                                         | 10.0 | 13.0 | 6.0                                                                                   | 18.0 | 6.0                                                                                | 14.5 |       |
| t <sub>PZH</sub><br>t <sub>PZL</sub> | Output Enable Time<br>OEBA or OEAB to A <sub>n</sub> or B <sub>n</sub><br>CEBA or CEAB to A <sub>n</sub> or B <sub>n</sub>  | 3.0                                                                         | 7.0  | 9.0  | 3.0                                                                                   | 11.0 | 3.0                                                                                | 10.0 | ns    |
| t <sub>PHZ</sub><br>t <sub>PLZ</sub> | Output Disable Time<br>OEBA or OEAB to A <sub>n</sub> or B <sub>n</sub><br>CEBA or CEAB to A <sub>n</sub> or B <sub>n</sub> | 1.0                                                                         | 6.0  | 8.0  | 2.0                                                                                   | 10.0 | 1.0                                                                                | 9.0  |       |
| t <sub>PHZ</sub><br>t <sub>PLZ</sub> | Output Disable Time<br>OEBA or OEAB to A <sub>n</sub> or B <sub>n</sub><br>CEBA or CEAB to A <sub>n</sub> or B <sub>n</sub> | 2.5                                                                         | 5.5  | 10.5 | 2.0                                                                                   | 9.5  | 2.5                                                                                | 11.5 |       |

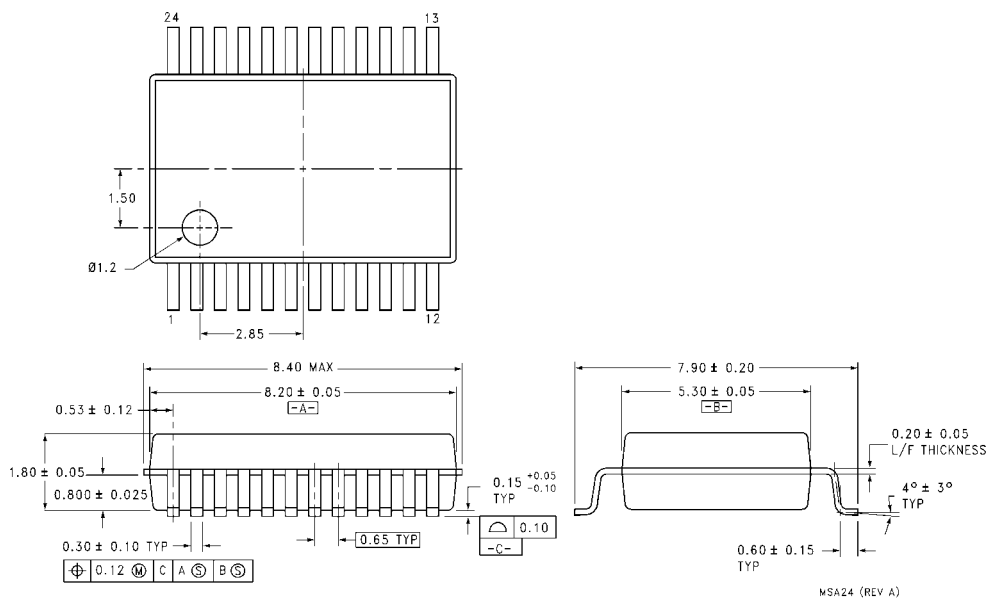
## AC Operating Requirements

| Symbol                                   | Parameter                                                                   | T <sub>A</sub> = +25°C<br>V <sub>CC</sub> = +5.0V |     | T <sub>A</sub> = -55°C to +125°C<br>V <sub>CC</sub> = +5.0V |     | T <sub>A</sub> = 0°C to +70°C<br>V <sub>CC</sub> = +5.0V |     | Units |
|------------------------------------------|-----------------------------------------------------------------------------|---------------------------------------------------|-----|-------------------------------------------------------------|-----|----------------------------------------------------------|-----|-------|
|                                          |                                                                             | Min                                               | Max | Min                                                         | Max | Min                                                      | Max |       |
| t <sub>S</sub> (H)<br>t <sub>S</sub> (L) | Setup Time, HIGH or LOW<br>A <sub>n</sub> or B <sub>n</sub> to LEBA or LEAB | 3.0                                               |     | 3.0                                                         |     | 3.0                                                      |     | ns    |
| t <sub>H</sub> (H)<br>t <sub>H</sub> (L) | Hold Time, HIGH or LOW<br>A <sub>n</sub> or B <sub>n</sub> to LEBA or LEAB  | 3.0                                               |     | 3.0                                                         |     | 3.0                                                      |     |       |
| t <sub>W</sub> (L)                       | Latch Enable, B to A<br>Pulse Width, LOW                                    | 6.0                                               |     | 9.0                                                         |     | 7.5                                                      |     | ns    |

# Physical Dimensions inches (millimeters) unless otherwise noted

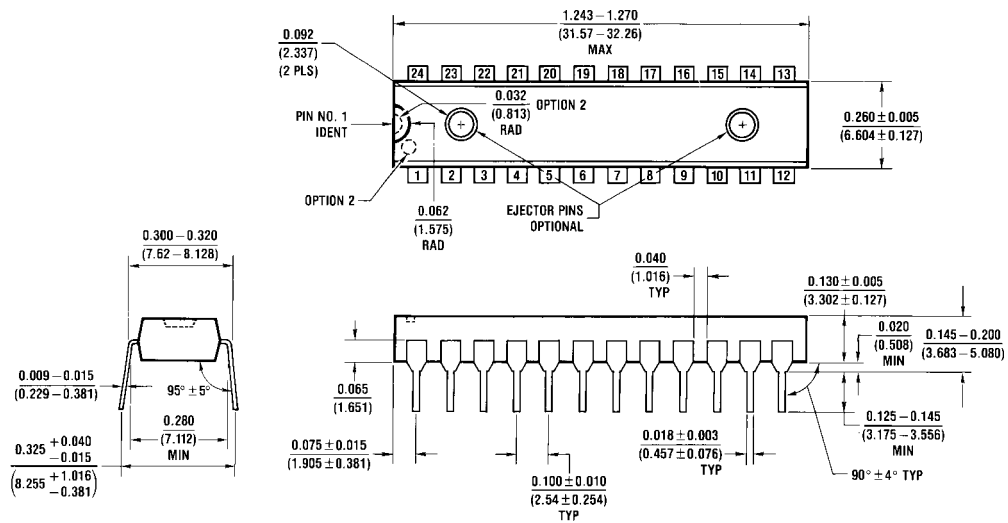


**24-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300 Wide Package Number M24B**



**24-Lead Shrink Small Outline Package (SSOP), EIAJ TYPE II, 5.3mm Wide Package Number MSA24**

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



**24-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-100, 0.300 Wide  
Package Number N24C**

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