

DM74LS283

4-Bit Binary Adder with Fast Carry

General Description

These full adders perform the addition of two 4-bit binary numbers. The sum (Σ) outputs are provided for each bit and the resultant carry (C4) is obtained from the fourth bit. These adders feature full internal look ahead across all four bits. This provides the system designer with partial look-ahead performance at the economy and reduced package count of a ripple-carry implementation.

The adder logic, including the carry, is implemented in its true form meaning that the end-around carry can be accomplished without the need for logic or level inversion.

Features

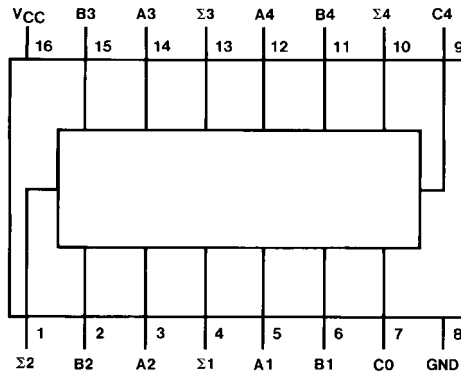
- Full-carry look-ahead across the four bits
- Systems achieve partial look-ahead performance with the economy of ripple carry
- Typical add times
 - Two 8-bit words 25 ns
 - Two 16-bit words 45 ns
- Typical power dissipation per 4-bit adder 95 mW

Ordering Code:

| Order Number | Package Number | Package Description |
|--------------|----------------|---|
| DM74LS283M | M16A | 16-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150 Narrow |
| DM74LS283N | N16E | 16-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



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_{CC} | Supply Voltage | 4.75 | 5 | 5.25 | V |
| V_{IH} | HIGH Level Input Voltage | 2 | | | V |
| V_{IL} | LOW Level Input Voltage | | | 0.8 | V |
| I_{OH} | HIGH Level Output Current | | | -0.4 | mA |
| I_{OL} | LOW Level Output Current | | | 8 | mA |
| T_A | Free Air Operating Temperature | 0 | | 70 | °C |

Electrical Characteristics

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

| Symbol | Parameter | Conditions | Min | Typ (Note 2) | Max | Units |
|-----------|-----------------------------------|--|------------|-----------------|--------------|---------------|
| V_I | Input Clamp Voltage | $V_{CC} = \text{Min}, I_I = -18 \text{ mA}$ | | | -1.5 | V |
| V_{OH} | HIGH Level Output Voltage | $V_{CC} = \text{Min}, I_{OH} = \text{Max}$ $V_{IL} = \text{Max}, V_{IH} = \text{Min}$ | 2.7 | 3.4 | | V |
| V_{OL} | LOW Level Output Voltage | $V_{CC} = \text{Min}, I_{OL} = \text{Max}$ $V_{IL} = \text{Max}, V_{IH} = \text{Min}$ $I_{OL} = 4 \text{ mA}, V_{CC} = \text{Min}$ | | 0.35 0.25 | 0.5 0.4 | V |
| I_I | Input Current @ Max Input Voltage | $V_{CC} = \text{Max}$ $V_I = 7V$ | A, B C0 | | 0.2 0.1 | mA |
| I_{IH} | HIGH Level Input Current | $V_{CC} = \text{Max}$ $V_I = 2.7V$ | A, B C0 | | 40 20 | μA |
| I_{IL} | LOW Level Input Current | $V_{CC} = \text{Max}$ $V_I = 0.4V$ | A, B C0 | | -0.8 -0.4 | mA |
| I_{OS} | Short Circuit Output Current | $V_{CC} = \text{Max}$ | | -20 | -100 | mA |
| I_{CC1} | Supply Current | $V_{CC} = \text{Max}$ (Note 4) | | 19 | 34 | mA |
| I_{CC2} | Supply Current | $V_{CC} = \text{Max}$ (Note 5) | | 22 | 39 | mA |

Note 2: All typicals are at $V_{CC} = 5V, T_A = 25^\circ\text{C}$.

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

Note 4: I_{CC1} is measured with all outputs OPEN, all B inputs LOW and all other inputs at 4.5V, or all inputs at 4.5V.

Note 5: I_{CC2} is measured with all outputs OPEN and all inputs GROUNDED.

Switching Characteristics

at $V_{CC} = 5V$ and $T_A = 25^\circ C$

| Symbol | Parameter | From (Input) To (Output) | $R_L = 2\text{ k}\Omega$ | | | | Units |
|-----------|--|------------------------------|--------------------------|-----|----------------------|-----|-------|
| | | | $C_L = 15\text{ pF}$ | | $C_L = 50\text{ pF}$ | | |
| | | | Min | Max | Min | Max | |
| t_{PLH} | Propagation Delay Time LOW-to-HIGH Level Output | C0 to $\Sigma 1, \Sigma 2$ | | 24 | | 28 | ns |
| t_{PHL} | Propagation Delay Time HIGH-to-LOW Level Output | C0 to $\Sigma 1, \Sigma 2$ | | 24 | | 30 | ns |
| t_{PLH} | Propagation Delay Time LOW-to-HIGH Level Output | C0 to $\Sigma 3$ | | 24 | | 28 | ns |
| t_{PHL} | Propagation Delay Time HIGH-to-LOW Level Output | C0 to $\Sigma 3$ | | 24 | | 30 | ns |
| t_{PLH} | Propagation Delay Time LOW-to-HIGH Level Output | C0 to $\Sigma 4$ | | 24 | | 28 | ns |
| t_{PHL} | Propagation Delay Time HIGH-to-LOW Level Output | C0 to $\Sigma 4$ | | 24 | | 30 | ns |
| t_{PLH} | Propagation Delay Time LOW-to-HIGH Level Output | A_i or B_i to Σ_i | | 24 | | 28 | ns |
| t_{PHL} | Propagation Delay Time HIGH-to-LOW Level Output | A_i or B_i to Σ_i | | 24 | | 30 | ns |
| t_{PLH} | Propagation Delay Time LOW-to-HIGH Level Output | C0 to C4 | | 17 | | 24 | ns |
| t_{PHL} | Propagation Delay Time HIGH-to-LOW Level Output | C0 to C4 | | 17 | | 25 | ns |
| t_{PLH} | Propagation Delay Time LOW-to-HIGH Level Output | A_i or B_i to C4 | | 17 | | 24 | ns |
| t_{PHL} | Propagation Delay Time HIGH-to-LOW Level Output | A_i or B_i to C4 | | 17 | | 26 | ns |

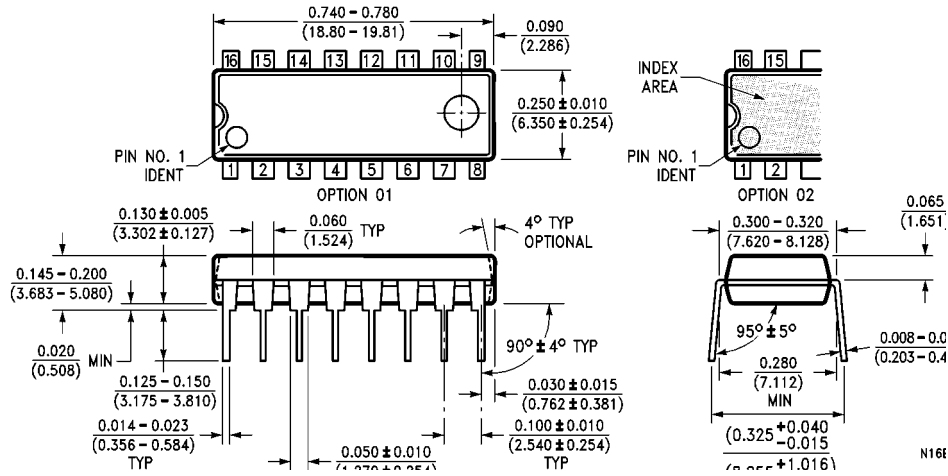
Physical Dimensions inches (millimeters) unless otherwise noted



16-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150 Narrow Package Number M16A

M16A (REV H)

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



**16-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide
Package Number N16E**

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