

54LS283,DM54LS283,DM74LS283

54LS283 DM54LS283 DM74LS283 4-Bit Binary Adders with Fast Carry



Literature Number: SNOS300A

54LS283/DM54LS283/DM74LS283 4-Bit Binary Adders with Fast Carry

General Description

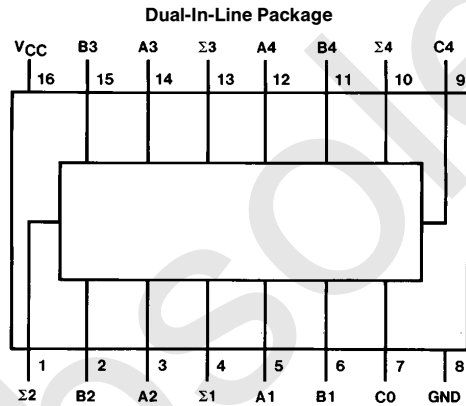
These full adders perform the addition of two 4-bit binary numbers. The sum (Σ) outputs are provided for each bit and the resultant carry (C_4) is obtained from the fourth bit. These adders feature full internal look ahead across all four bits. This provides the system designer with partial look-ahead 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
- Alternate Military/Aerospace device (54LS283) is available. Contact a National Semiconductor Sales Office/Distributor for specifications.

Connection Diagram



TL/F/6421-1

Order Number 54LS283DMQB, 54LS283FMQB, 54LS283LMQB,
DM54LS283J, DM54LS283W, DM74LS283M or DM74LS283N
See NS Package Number E20A, J16A, M16A, N16E or W16A

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 | 7V |
| Operating Free Air Temperature Range | |
| DM54LS and 54LS | -55°C to +125°C |
| DM74LS | 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 | DM54LS283 | | | DM74LS283 | | | Units |
|-----------------|--------------------------------|-----------|-----|------|-----------|-----|------|-------|
| | | Min | Nom | Max | Min | Nom | Max | |
| V _{CC} | Supply Voltage | 4.5 | 5 | 5.5 | 4.75 | 5 | 5.25 | V |
| V _{IH} | High Level Input Voltage | 2 | | | 2 | | | V |
| V _{IL} | Low Level Input Voltage | | | 0.7 | | | 0.8 | V |
| I _{OH} | High Level Output Current | | | -0.4 | | | -0.4 | mA |
| I _{OL} | Low Level Output Current | | | 4 | | | 8 | mA |
| T _A | 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 (Note 1) | Max | Units |
|------------------|-----------------------------------|--|---|--------------|------|-------|
| V _I | Input Clamp Voltage | V _{CC} = Min, I _I = -18 mA | | | -1.5 | V |
| V _{OH} | High Level Output Voltage | V _{CC} = Min, I _{OH} = Max V _{IL} = Max, V _{IH} = Min | DM54 | 2.5 | 3.4 | V |
| | | | DM74 | 2.7 | 3.4 | |
| V _{OL} | Low Level Output Voltage | V _{CC} = Min, I _{OL} = Max V _{IL} = Max, V _{IH} = Min | DM54 | 0.25 | 0.4 | V |
| | | | DM74 | 0.35 | 0.5 | |
| | | | I _{OL} = 4 mA, V _{CC} = Min | DM74 | 0.25 | |
| I _I | Input Current @ Max Input Voltage | V _{CC} = Max V _I = 7V | A, B | | 0.2 | mA |
| | | | C0 | | 0.1 | |
| I _{IH} | High Level Input Current | V _{CC} = Max V _I = 2.7V | A, B | | 40 | μA |
| | | | C0 | | 20 | |
| I _{IL} | Low Level Input Current | V _{CC} = Max V _I = 0.4V | A, B | | -0.8 | mA |
| | | | C0 | | -0.4 | |
| I _{OS} | Short Circuit Output Current | V _{CC} = Max (Note 2) | DM54 | -20 | -100 | mA |
| | | | DM74 | -20 | -100 | |
| I _{CC1} | Supply Current | V _{CC} = Max (Note 3) | | 19 | 34 | mA |
| I _{CC2} | Supply Current | V _{CC} = Max (Note 4) | | 22 | 39 | mA |

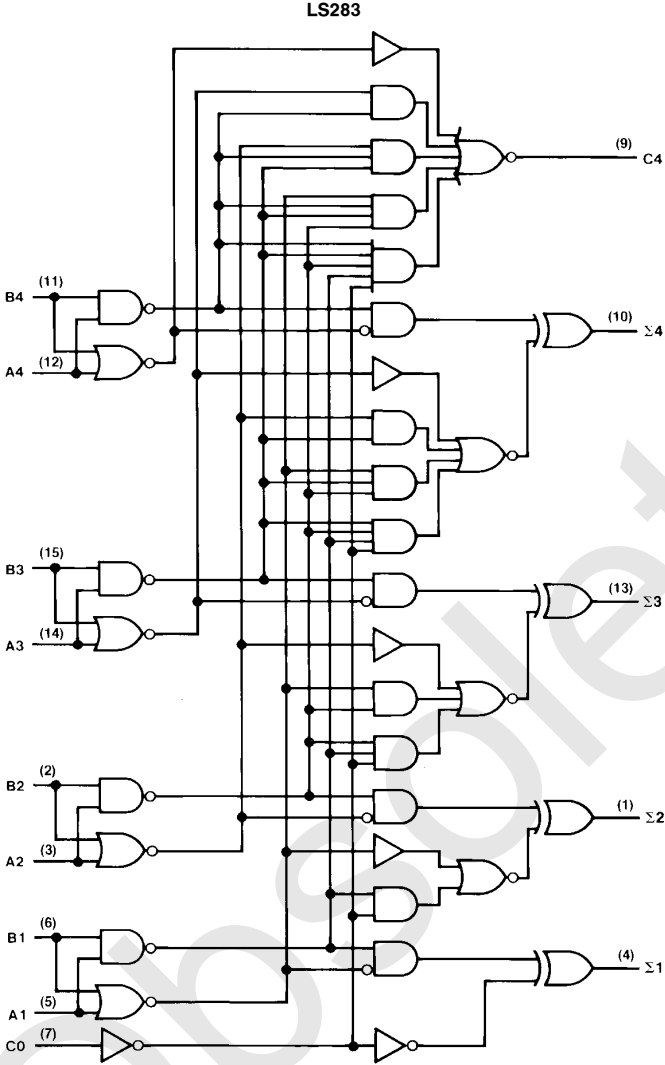
Note 1: All typicals are at V_{CC} = 5V, T_A = 25°C.

Note 2: Not more than one output should be shorted at a time, and the duration should not exceed one second.

Note 3: 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 4: I_{CC2} is measured with all outputs open and all inputs grounded.

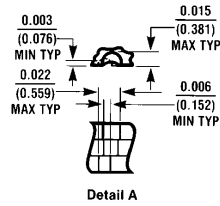
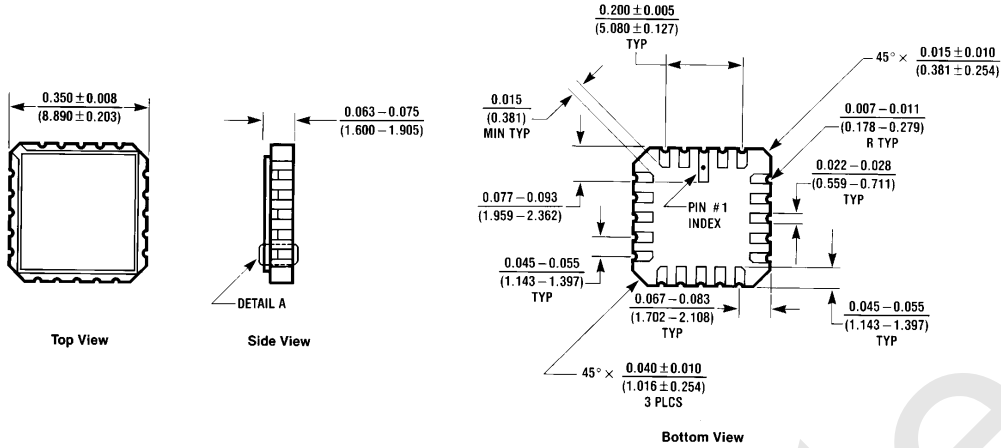
Logic Diagram



TL/F/6421-2

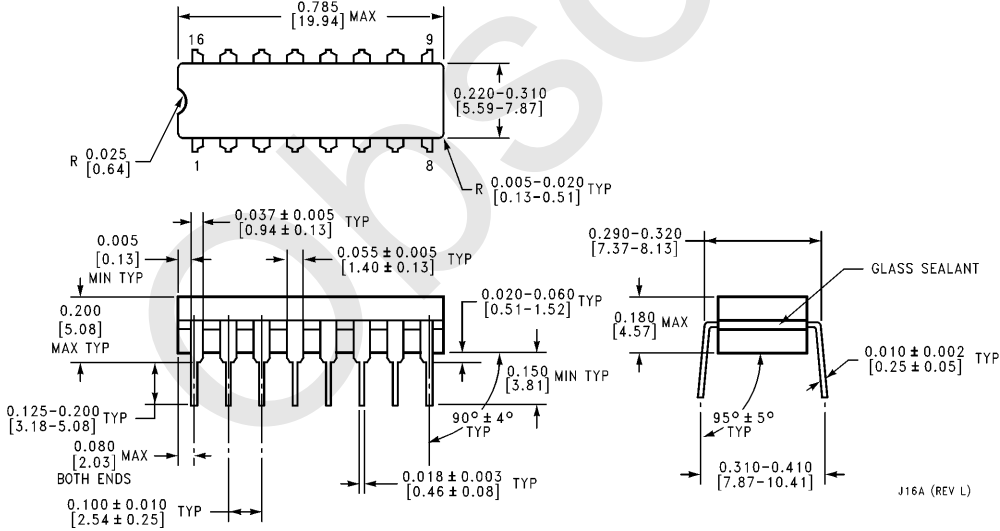
Obsolete

Physical Dimensions inches (millimeters)



Ceramic Leadless Chip Carrier Package (E)
Order Number 54LS283LMQB
NS Package Number E20A

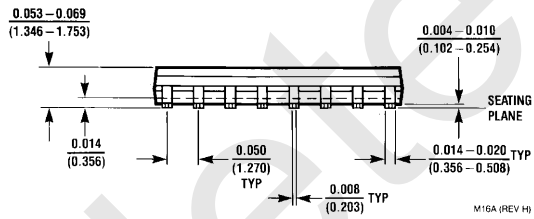
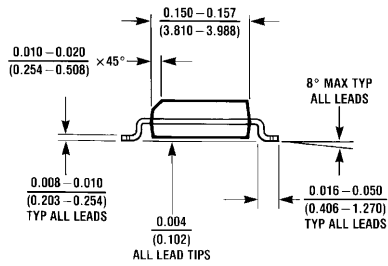
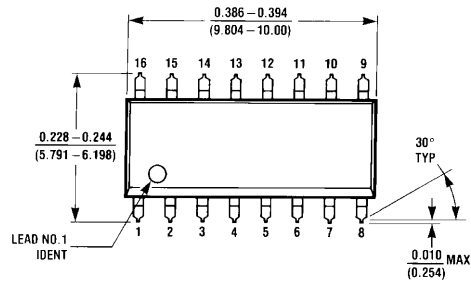
E20A (REV D)



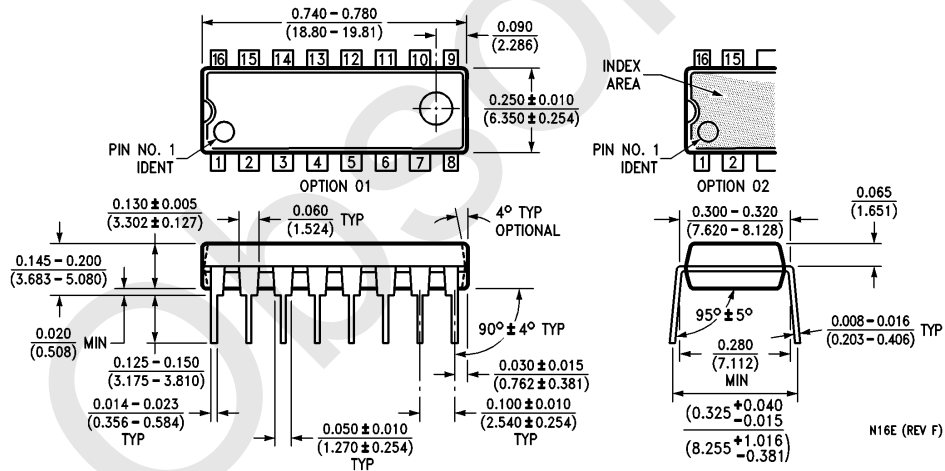
16-Lead Ceramic Dual-In-Line Package (J)
Order Number 54LS283DMQB or DM54LS283J
NS Package Number J16A

J16A (REV L)

Physical Dimensions inches (millimeters) (Continued)

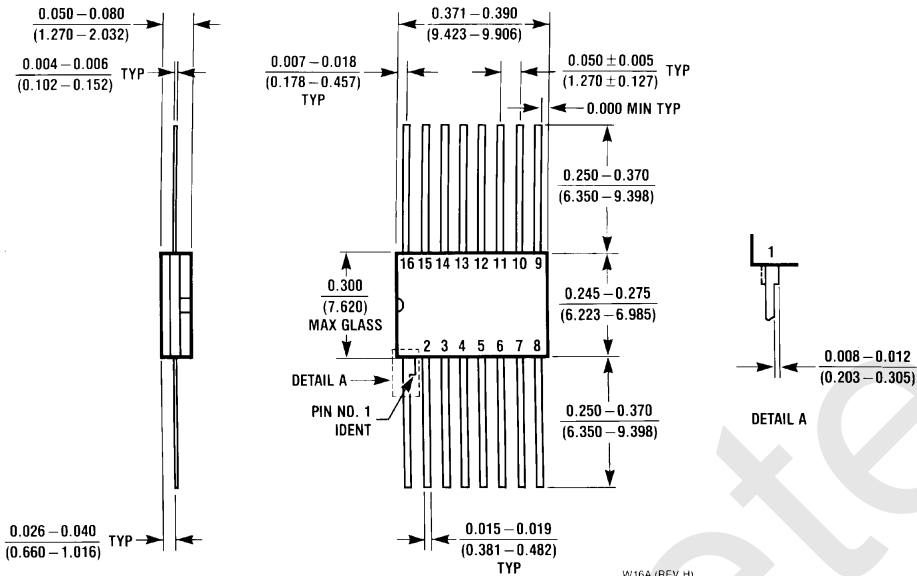


16-Lead Small Outline Molded Package (M)
Order Number DM74LS283M
NS Package Number M16A



16-Lead Molded Dual-In-Line Package (N)
Order Number DM74LS283N
NS Package Number N16E

Physical Dimensions inches (millimeters) (Continued)



16-Lead Ceramic Flat Package (W)
Order Number 54LS283FMQB or DM54LS283W
NS Package Number W16A

W16A (REV H)

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