

DM74ALS374

Octal 3-STATE D-Type Edge-Triggered Flip-Flop

General Description

This 8-bit register features totem-pole 3-STATE outputs designed specifically for driving highly-capacitive or relatively low-impedance loads. The high-impedance state and increased high-logic-level drive provides this register with the capability of being connected directly to and driving the bus lines in a bus-organized system without need for interface or pull-up components. It is particularly attractive for implementing buffer registers, I/O ports, bidirectional bus drivers, and working registers.

The eight flip-flops of the DM74ALS374 are edge-triggered D-type flip-flops. On the positive transition of the clock, the Q outputs will be set to the logic states that were set up at the D inputs.

A buffered output control input can be used to place the eight outputs in either a normal logic state (HIGH or LOW logic levels) or a high-impedance state. In the high-impedance state the outputs neither load nor drive the bus lines significantly.

The output control does not affect the internal operation of the flip-flops. That is, the old data can be retained or new data can be entered even while the outputs are OFF.

Features

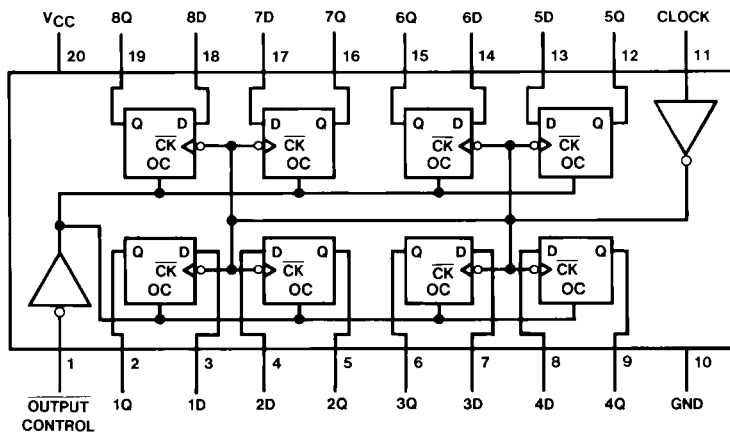
- Switching specifications at 50 pF
- Switching specifications guaranteed over full temperature and V_{CC} range
- Advanced oxide-isolated, ion-implanted Schottky TTL process
- Functionally and pin-for-pin compatible with LS TTL counterpart
- Improved AC performance over DM74LS374 at approximately half the power
- 3-STATE buffer-type outputs drive bus lines directly

Ordering Code:

| Order Number | Package Number | Package Description |
|--------------|----------------|---|
| DM74ALS374WM | M20B | 20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300 Wide |
| DM74ALS374SJ | M20D | 20-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide |
| DM74ALS374N | N20A | 20-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide |

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

Connection Diagram

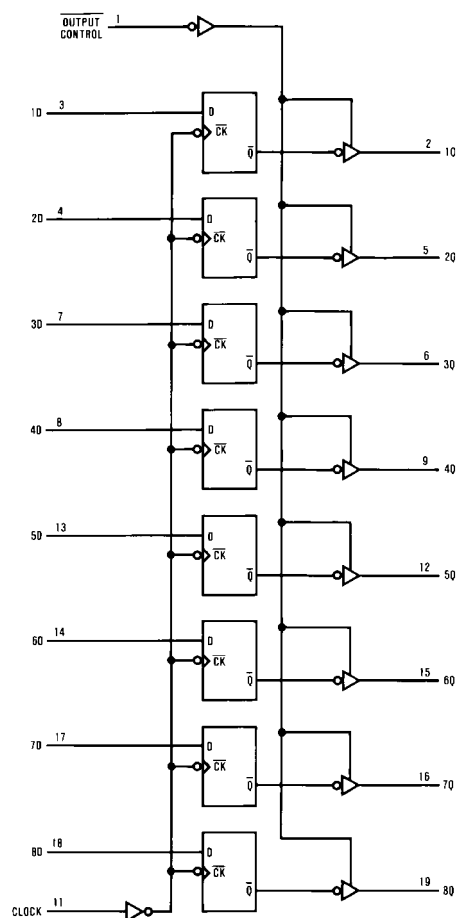


Function Table

| Output Control | Clock | D | Output Q |
|----------------|------------|---|----------|
| L | \uparrow | H | H |
| L | \uparrow | L | L |
| L | L | X | Q_0 |
| H | X | X | Z |

L = LOW State
 H = HIGH State
 X = Don't Care
 \uparrow = Positive Edge Transition
 Z = High Impedance State
 Q_0 = Previous Condition of Q

Logic Diagram



Absolute Maximum Ratings(Note 1)

| | |
|--------------------------------------|-----------------|
| Supply Voltage | 7V |
| Input Voltage | 7V |
| Voltage Applied to Disabled Output | 5.5V |
| Operating Free Air Temperature Range | 0°C to +70°C |
| Storage Temperature Range (Note 2) | -65°C to +150°C |
| Typical θ_{JA} | |
| N Package | 60.0°C/W |
| M Package | 79.0°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.

Note 2: This product meets application requirements of 500 temperature cycles from -65°C to +150°C.

Recommended Operating Conditions

| Symbol | Parameter | Min | Nom | 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 | | | -2.6 | mA |
| I_{OL} | LOW Level Output Current | | | 24 | mA |
| f_{CLOCK} | Clock Frequency | 0 | | 35 | MHz |
| t_W | Width of Clock Pulse | HIGH | 14 | | ns |
| | | LOW | 14 | | ns |
| t_{SU} | Data Setup Time (Note 3) | 10 \uparrow | | | ns |
| t_H | Data Hold Time (Note 3) | 0 \uparrow | | | ns |
| T_A | Free Air Operating Temperature | 0 | | 70 | °C |

Note 3: The (1) arrow indicates the positive edge of the Clock is used for reference.

DC Electrical Characteristics

over recommended operating free air temperature range. All typical values are measured at $V_{CC} = 5V$, $T_A = 25^\circ C$.

| Symbol | Parameter | Conditions | Min | Typ | Max | Units |
|-----------|--|--|--------------|------|------|---------|
| V_{IK} | Input Clamp Voltage | $V_{CC} = 4.5V$, $I_I = -18\text{ mA}$ | | | -1.5 | V |
| V_{OH} | HIGH Level Output Voltage | $V_{CC} = 4.5V$, $I_{OH} = \text{Max}$ | 2.4 | 3.2 | | V |
| | | $V_{CC} = 4.5V$ to $5.5V$, $I_{OH} = -400\text{ }\mu A$ | $V_{CC} - 2$ | | | V |
| V_{OL} | LOW Level Output Voltage | $V_{CC} = 4.5V$, $I_{OL} = 12\text{ mA}$ | | 0.25 | 0.4 | V |
| | | $I_{OL} = 24\text{ mA}$ | | 0.35 | 0.5 | V |
| I_I | Input Current @ Max. Input Voltage | $V_{CC} = 5.5V$, $V_{IH} = 7V$ | | | 0.1 | mA |
| I_{IH} | HIGH Level Input Current | $V_{CC} = 5.5V$, $V_{IH} = 2.7V$ | | | 20 | μA |
| I_{IL} | LOW Level Input Current | $V_{CC} = 5.5V$, $V_{IL} = 0.4V$ | | | -0.2 | mA |
| I_O | Output Drive Current | $V_{CC} = 5.5V$, $V_O = 2.25V$ | -30 | | -112 | mA |
| I_{OZH} | OFF-State Output Current, HIGH Level Voltage Applied | $V_{CC} = 5.5V$, $V_O = 2.7V$ | | | 20 | μA |
| I_{OZL} | OFF-State Output Current, LOW Level Voltage Applied | $V_{CC} = 5.5V$, $V_O = 0.4V$ | | | -20 | μA |
| I_{CC} | Supply Current | $V_{CC} = 5.5V$, Outputs HIGH | | 11 | 19 | mA |
| | | Outputs Open | | 19 | 28 | mA |
| | | Outputs Disabled | | 20 | 31 | mA |

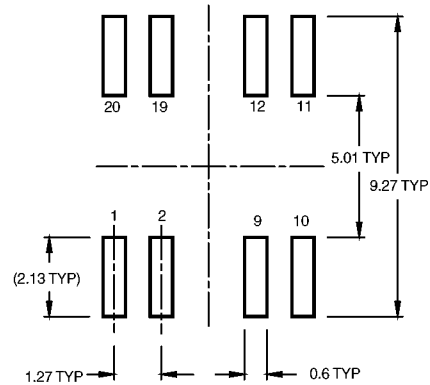
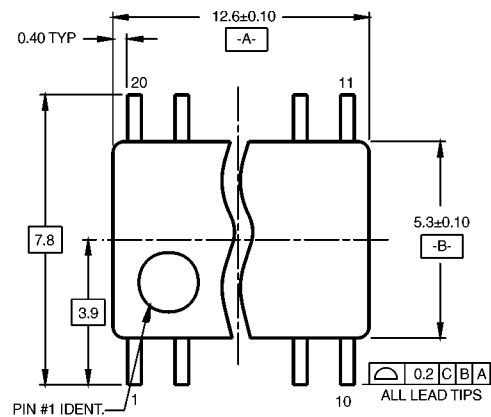
AC Electrical Characteristics

| Symbol | Parameter | Conditions | From | To | Min | Max | Units |
|-----------|--|---|-------------------|-------|-----|-----|-------|
| f_{MAX} | Maximum Clock Frequency | $V_{CC} = 4.5V$ to $5.5V$ $R_L = 500\Omega$ $C_L = 50 pF$ | | | 35 | | MHz |
| t_{PLH} | Propagation Delay Time LOW-to-HIGH Level Output | | Clock | Any Q | 3 | 12 | ns |
| t_{PHL} | Propagation Delay Time HIGH-to-LOW Level Output | | Clock | Any Q | 5 | 16 | ns |
| t_{PZH} | Output Enable Time to HIGH Level Output | | Output Control | Any Q | 5 | 17 | ns |
| t_{PZL} | Output Enable Time to LOW Level Output | | Output Control | Any Q | 7 | 18 | ns |
| t_{PHZ} | Output Disable Time from HIGH Level Output | | Output Control | Any Q | 2 | 10 | ns |
| t_{PLZ} | Output Disable Time from LOW Level Output | | Output Control | Any Q | 3 | 18 | ns |

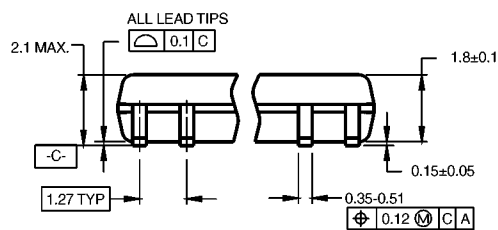
Physical Dimensions inches (millimeters) unless otherwise noted


**20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300 Wide
Package Number M20B**

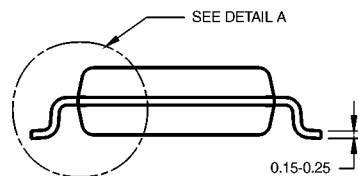
Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



LAND PATTERN RECOMMENDATION



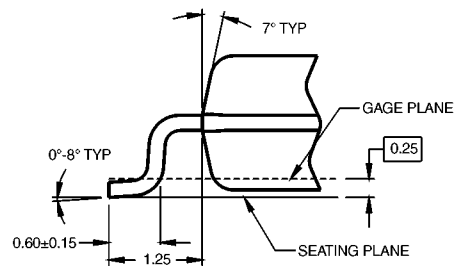
DIMENSIONS ARE IN MILLIMETERS



NOTES:

- A. CONFORMS TO EIAJ EDR-7320 REGISTRATION, ESTABLISHED IN DECEMBER, 1998.
- B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.

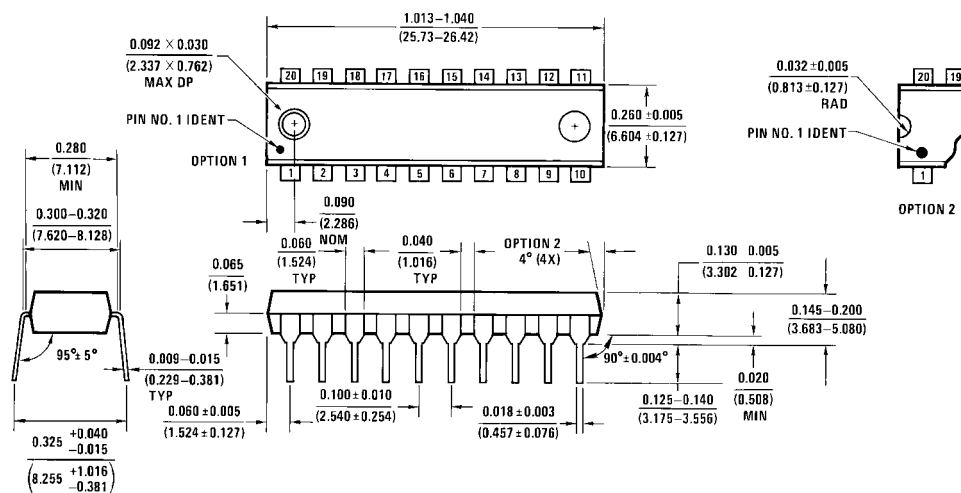
M20DRevB1



DETAIL A

20-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
Package Number M20D

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



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

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