

## DM74LS377

### Octal D-Type Flip-Flop with Common Enable and Clock

#### General Description

The DM74LS377 is an 8-bit register built using advanced low power Schottky technology. This register consists of eight D-type flip-flops with a buffered common clock and a buffered common input enable. The device is packaged in the space-saving (0.3 inch row spacing) 20-pin package.

#### Features

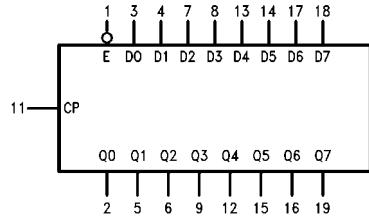
- 8-bit high speed parallel registers
- Positive edge-triggered D-type flip-flops
- Fully buffered common clock and enable inputs

#### Ordering Code:

| Order Number | Package Number | Package Description   |
|--------------|----------------|---|
| DM74LS377WM  | M20B           | 20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300 Wide |
| DM74LS377N   | 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.

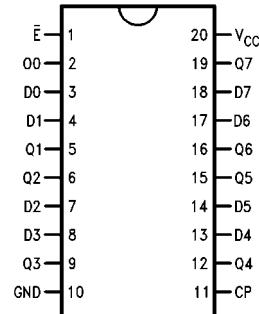
#### Logic Symbol



V<sub>CC</sub> = Pin 20

GND = Pin 10

#### Connection Diagram



#### Pin Descriptions

| Pin Names | Description                            |
|-----------|--|
| E-bar     | Enable Input (Active LOW)              |
| D0-D7     | Data Inputs                            |
| CP        | Clock Pulse Input (Active Rising Edge) |
| Q0-Q7     | Flip-Flop Outputs                      |

#### Truth Table

| Inputs |    |                | Output         |
|--------|----|----------------|----------------|
| E-bar  | CP | D <sub>n</sub> | Q <sub>n</sub> |
| H      | X  | X              | No Change      |
| L      | /  | H              | H              |
| L      | /  | L              | L              |

H = HIGH Voltage Level

L = LOW Voltage Level

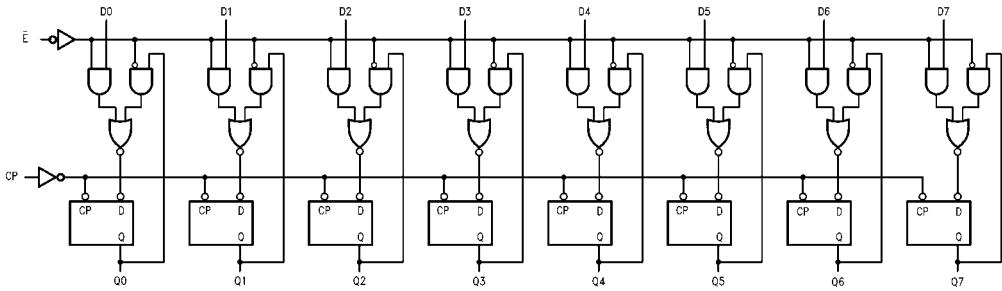
X = Immaterial

## Functional Description

The DM74LS377 consists of eight edge-triggered D flip-flops with individual D inputs and Q outputs. The Clock (CP) and Enable input ( $\bar{E}$ ) are common to all flip-flops.

When  $\bar{E}$  is LOW, new data is entered into the register on the next LOW-to-HIGH transition of CP. When  $\bar{E}$  is HIGH, the register will retain the present data independent of the CP.

## Logic 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    |
| $t_S(H)$ | Setup Time HIGH or LOW         | 10   |     |      |       |
| $t_S(L)$ | $D_n$ to CP                    | 10   |     |      | ns    |
| $t_H(H)$ | Hold Time HIGH or LOW          | 5.0  |     |      |       |
| $t_H(L)$ | $D_n$ to CP                    | 5.0  |     |      | ns    |
| $t_S(H)$ | Setup Time HIGH or LOW         | 10   |     |      |       |
| $t_S(L)$ | $\bar{E}$ to CP                | 20   |     |      | ns    |
| $t_H(H)$ | Hold Time HIGH or LOW          | 5.0  |     |      |       |
| $t_H(L)$ | $\bar{E}$ to CP                | 5.0  |     |      | ns    |
| $t_W(H)$ | CP Pulse Width HIGH or LOW     | 20   |     |      |       |
| $t_W(L)$ |                                | 20   |     |      | ns    |

## 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         | $V_{CC} = \text{Min}$ , $I_{OH} = \text{Max}$<br>$V_{IL} = \text{Max}$ | 2.7 | 3.4          |      | V     |
| $V_{OL}$ | LOW Level Output Voltage          | $V_{CC} = \text{Min}$ , $I_{OL} = \text{Max}$<br>$V_{IH} = \text{Min}$ |     | 0.35         | 0.5  | V     |
|          |                                   | $I_{OL} = 4 \text{ mA}$ , $V_{CC} = \text{Min}$                        |     | 0.25         | 0.4  |       |
| $I_I$    | Input Current @ Max Input Voltage | $V_{CC} = \text{Max}$ , $V_I = 7\text{V}$<br>$V_I = 10\text{V}$        |     |              | 0.1  | mA    |
| $I_{IH}$ | HIGH Level Input Current          | $V_{CC} = \text{Max}$ , $V_I = 2.7\text{V}$                            |     |              | 20.0 | μA    |
| $I_{IL}$ | LOW Level Input Current           | $V_{CC} = \text{Max}$ , $V_I = 0.4\text{V}$                            |     |              | -0.4 | mA    |
| $I_{os}$ | Short Circuit Output Current      | $V_{CC} = \text{Max}$ (Note 3)   | -20 |              | -100 | mA    |
| $I_{cc}$ | Supply Current                    | $V_{CC} = \text{Max}$  |     |              | 28   | mA    |

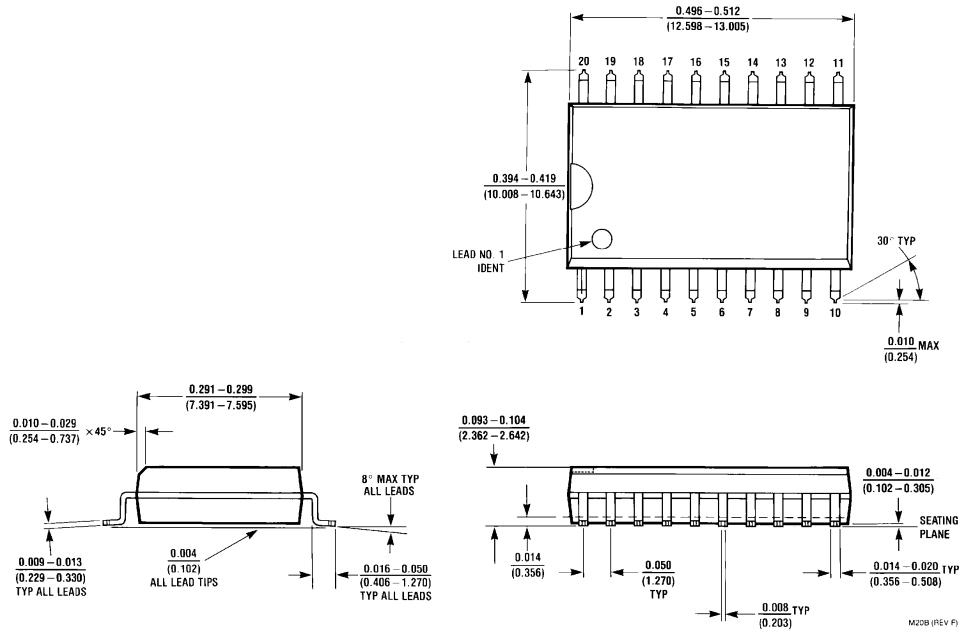
**Note 2:** All typicals are at  $V_{CC} = 5\text{V}$ ,  $T_A = 25^\circ\text{C}$ .

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

## Switching Characteristics

$V_{CC} = +5.0\text{V}$ ,  $T_A = +25^\circ\text{C}$

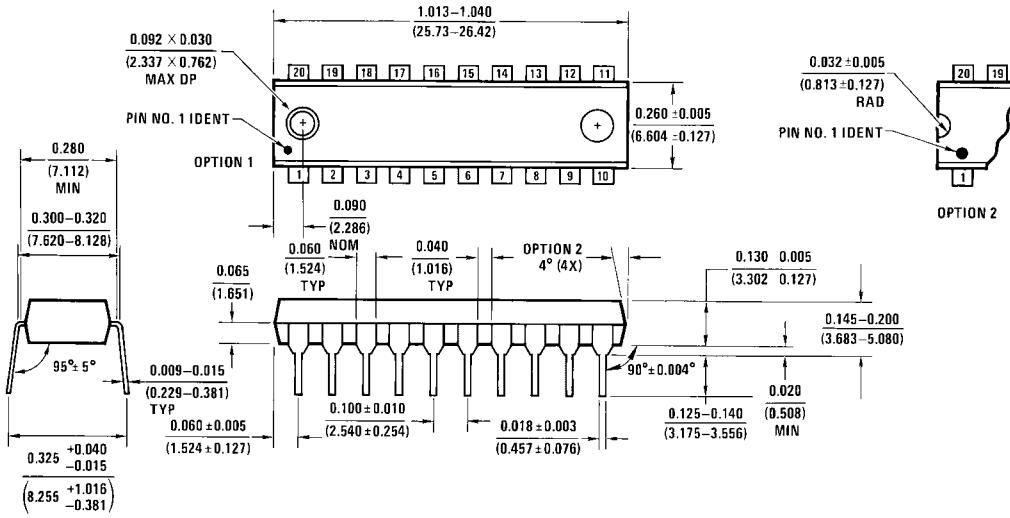
| Symbol    | Parameter                        | $R_L = 2 \text{ k}\Omega$ , $C_L = 15 \text{ pF}$ |     | Units |
|-----------|----------------------------------|---|-----|-------|
|           |                                  | Min   | Max |       |
| $f_{MAX}$ | Maximum Clock Frequency          | 30  |     | MHz   |
| $t_{PLH}$ | Propagation Delay<br>CP to $Q_n$ |   | 25  | ns    |
| $t_{PHL}$ |                                  |   | 25  |       |

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

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

## DM74LS377 Octal D-Type Flip-Flop with Common Enable and Clock

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



N20A (REV G)

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

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