

# MC10H176

## Hex D Master-Slave Flip-Flop

### Description

The MC10H176 contains six master slave type D flip-flops with a common clock. This MECL 10H™ part is a functional/pinout duplication of the standard MECL 10K™ family part, with 100% improvement in clock frequency and propagation delay and no increase in power-supply current.

### Features

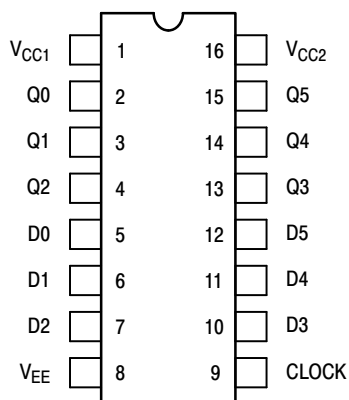
- Propagation Delay, 1.7 ns Typical
- Power Dissipation, 460 mW Typical
- Improved Noise Margin 150 mV (Over Operating Voltage and Temperature Range)
- Voltage Compensated
- MECL 10K Compatible
- These Devices are Pb-Free, Halogen Free and are RoHS Compliant

### CLOCKED TRUTH TABLE

| C   | Q | Q <sub>n+1</sub> |
|-----|---|------------------|
| L   | X | Q <sub>n</sub>   |
| H * | L | L                |
| H * | H | H                |

\* A clock H is a clock transition from a low to a high state.

### DIP PIN ASSIGNMENT

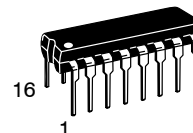


Pin assignment is for Dual-in-Line Package.  
For PLCC pin assignment, see the Pin Conversion Tables on page 18 of the ON Semiconductor MECL Data Book (DL122/D).



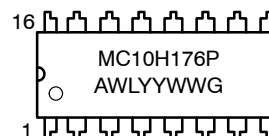
**ON Semiconductor®**

[www.onsemi.com](http://www.onsemi.com)



**PDIP-16**  
**P SUFFIX**  
**CASE 648-02**

### MARKING DIAGRAMS\*



A = Assembly Location  
WL, L = Wafer Lot  
YY, Y = Year  
WW, W = Work Week  
G = Pb-Free Package

\*For additional marking information, refer to Application Note [AND8002/D](#).

### ORDERING INFORMATION

| Device     | Package              | Shipping      |
|------------|----------------------|---------------|
| MC10H176PG | PDIP-16<br>(Pb-Free) | 25 Units/Tube |

# MC10H176

**Table 1. MAXIMUM RATINGS**

| Symbol    | Characteristic                                  | Rating                     | Unit |
|-----------|---|----------------------------|------|
| $V_{EE}$  | Power Supply ( $V_{CC} = 0$ )                   | -8.0 to 0                  | Vdc  |
| $V_I$     | Input Voltage ( $V_{CC} = 0$ )                  | 0 to $V_{EE}$              | Vdc  |
| $I_{out}$ | Output Current<br>Continuous<br>Surge           | 50<br>100                  | mA   |
| $T_A$     | Operating Temperature Range                     | 0 to +75                   | °C   |
| $T_{stg}$ | Storage Temperature Range<br>Plastic<br>Ceramic | -55 to +150<br>-55 to +165 | °C   |

**Table 2. ELECTRICAL CHARACTERISTICS** ( $V_{EE} = -5.2\text{ V} \pm 5\%$ ) (Note 1)

| Symbol    | Characteristic                                     | 0°    |       | 25°   |       | 75°   |        | Unit          |
|-----------|--|-------|-------|-------|-------|-------|--------|---------------|
|           |  | Min   | Max   | Min   | Max   | Min   | Max    |               |
| $I_E$     | Power Supply Current                               | -     | 123   | -     | 112   | -     | 123    | mA            |
| $I_{inH}$ | Input Current High<br>Pins 5,6,7,10,11,12<br>Pin 9 | -     | 425   | -     | 265   | -     | 265    | $\mu\text{A}$ |
|           |  | -     | 670   | -     | 420   | -     | 420    |               |
| $I_{inL}$ | Input Current Low                                  | 0.5   | -     | 0.5   | -     | 0.3   | -      | $\mu\text{A}$ |
| $V_{OH}$  | High Output Voltage                                | -1.02 | -0.84 | -0.98 | -0.81 | -0.92 | -0.735 | Vdc           |
| $V_{OL}$  | Low Output Voltage                                 | -1.95 | -1.63 | -1.95 | -1.63 | -1.95 | -1.60  | Vdc           |
| $V_{IH}$  | High Input Voltage                                 | -1.17 | -0.84 | -1.13 | -0.81 | -1.07 | -0.735 | Vdc           |
| $V_{IL}$  | Low Input Voltage                                  | -1.95 | -1.48 | -1.95 | -1.48 | -1.95 | -1.45  | Vdc           |

1. Each MECL 10H™ series circuit has been designed to meet the dc specifications shown in the test table, after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and transverse air flow greater than 500 linear fpm is maintained. Outputs are terminated through a 50  $\Omega$  resistor to -2.0 V.

**Table 3. AC PARAMETERS**

|            |                   |     |     |     |     |     |     |     |
|------------|-------------------|-----|-----|-----|-----|-----|-----|-----|
| $t_{pd}$   | Propagation Delay | 0.9 | 2.1 | 0.9 | 2.2 | 1.0 | 2.4 | ns  |
| $t_{set}$  | Set-up Time       | 1.5 | -   | 1.5 | -   | 1.5 | -   | ns  |
| $t_{hold}$ | Hold Time         | 0.9 | -   | 0.9 | -   | 1.0 | -   | ns  |
| $t_r$      | Rise Time         | 0.5 | 1.8 | 0.5 | 1.9 | 0.5 | 2.0 | ns  |
| $t_f$      | Fall Time         | 0.5 | 1.8 | 0.5 | 1.9 | 0.5 | 2.0 | ns  |
| $f_{tog}$  | Toggle Frequency  | 250 | -   | 250 | -   | 250 | -   | MHz |

NOTE: Device will meet the specifications after thermal equilibrium has been established when mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lfm. Electrical parameters are guaranteed only over the declared operating temperature range. Functional operation of the device exceeding these conditions is not implied. Device specification limit values are applied individually under normal operating conditions and not valid simultaneously.

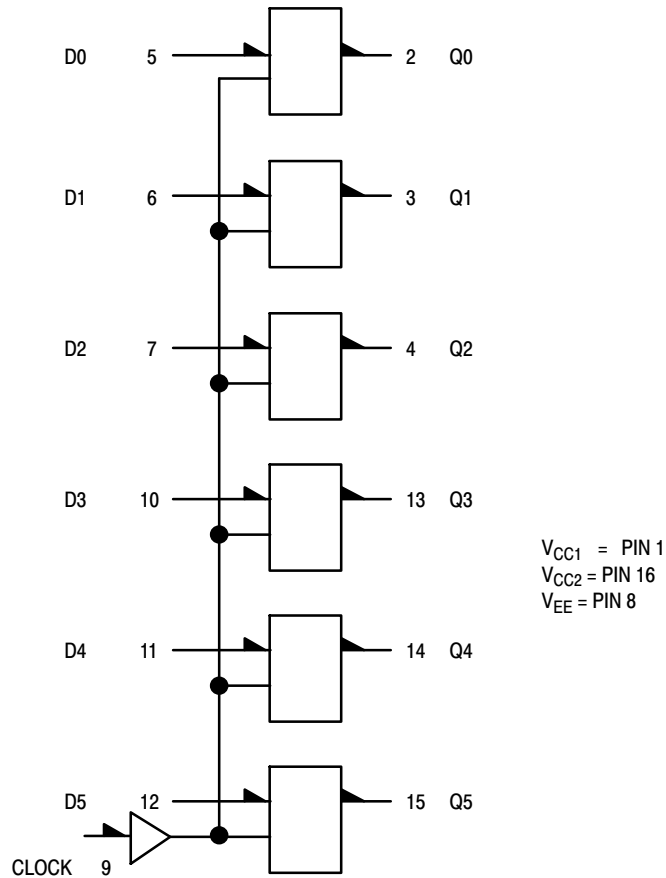
# MC10H176

## APPLICATION INFORMATION

The MC10H176 contains six high-speed, master slave type "D" flip-flops. Data is entered into the master when the clock is low. Master-to-slave data transfer takes place on the positive-going Clock transition. Thus, outputs may change

only on a positive-going Clock transition. A change in the information present at the data (D) input will not affect the output information any other time due to the master-slave construction of this device.

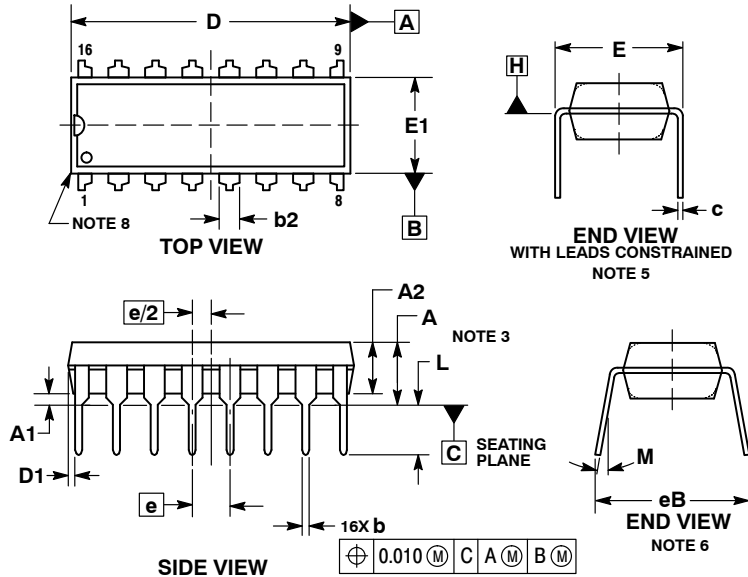
### LOGIC DIAGRAM



# MC10H176

## PACKAGE DIMENSIONS

### PDIP-16 CASE 648-08 ISSUE V



#### NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: INCHES.
3. DIMENSIONS A, A1 AND L ARE MEASURED WITH THE PACKAGE SEATED IN JEDEC SEATING PLANE GAUGE GS-3.
4. DIMENSIONS D, D1 AND E1 DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS. MOLD FLASH OR PROTRUSIONS ARE NOT TO EXCEED 0.10 INCH.
5. DIMENSION E IS MEASURED AT A POINT 0.015 BELOW DATUM PLANE H WITH THE LEADS CONSTRAINED PERPENDICULAR TO DATUM C.
6. DIMENSION eB IS MEASURED AT THE LEAD TIPS WITH THE LEADS UNCONSTRAINED.
7. DATUM PLANE H IS COINCIDENT WITH THE BOTTOM OF THE LEADS, WHERE THE LEADS EXIT THE BODY.
8. PACKAGE CONTOUR IS OPTIONAL (ROUNDED OR SQUARE CORNERS).

| DIM | INCHES    |       | MILLIMETERS |       |
|-----|-----------|-------|-------------|-------|
|     | MIN       | MAX   | MIN         | MAX   |
| A   | ---       | 0.210 | ---         | 5.33  |
| A1  | 0.015     | ----  | 0.38        | ---   |
| A2  | 0.115     | 0.195 | 2.92        | 4.95  |
| b   | 0.014     | 0.022 | 0.35        | 0.56  |
| b2  | 0.060 TYP |       | 1.52 TYP    |       |
| C   | 0.008     | 0.014 | 0.20        | 0.36  |
| D   | 0.735     | 0.775 | 18.67       | 19.69 |
| D1  | 0.005     | ----  | 0.13        | ---   |
| E   | 0.300     | 0.325 | 7.62        | 8.26  |
| E1  | 0.240     | 0.280 | 6.10        | 7.11  |
| e   | 0.100 BSC |       | 2.54 BSC    |       |
| eB  | ----      | 0.430 | ----        | 10.92 |
| L   | 0.115     | 0.150 | 2.92        | 3.81  |
| M   | ----      | 10°   | ----        | 10°   |


#### STYLE 1:

- PIN 1. CATHODE
- CATHODE
- CATHODE
- CATHODE
- CATHODE
- CATHODE
- CATHODE
- CATHODE
- ANODE
- ANODE
- ANODE
- ANODE
- ANODE
- ANODE
- ANODE
- ANODE

#### STYLE 2:

- PIN 1. COMMON DRAIN
- COMMON DRAIN
- COMMON DRAIN
- COMMON DRAIN
- COMMON DRAIN
- COMMON DRAIN
- COMMON DRAIN
- COMMON DRAIN
- GATE
- SOURCE
- GATE
- SOURCE
- GATE
- SOURCE
- GATE
- SOURCE

MECL is a trademark of Semiconductor Components Industries, LLC (SCILLC) or its subsidiaries in the United States and/or other countries.

ON Semiconductor and  are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at [www.onsemi.com/site/pdf/Patent-Marketing.pdf](http://www.onsemi.com/site/pdf/Patent-Marketing.pdf). ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

## PUBLICATION ORDERING INFORMATION

#### LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor  
19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA  
Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada  
Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada  
Email: [orderlit@onsemi.com](mailto:orderlit@onsemi.com)

**N. American Technical Support:** 800-282-9855 Toll Free  
USA/Canada  
**Europe, Middle East and Africa Technical Support:**  
Phone: 421 33 790 2910  
**Japan Customer Focus Center**  
Phone: 81-3-5817-1050

**ON Semiconductor Website:** [www.onsemi.com](http://www.onsemi.com)

**Order Literature:** <http://www.onsemi.com/orderlit>

For additional information, please contact your local Sales Representative

# Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[ON Semiconductor:](#)

[MC10H176FNG](#) [MC10H176FNR2G](#) [MC10H176PG](#)