

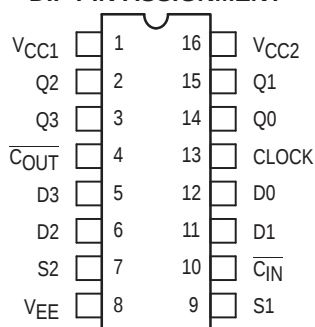
# Universal Hexadecimal Counter

- Counting Frequency, 250 MHz Minimum
- Power Dissipation, 625 mW Typical
- Improved Noise Margin 150 mV  
(Over Operating Voltage and Temperature Range)
- Voltage Compensated
- MECL 10K-Compatible

| CIN | S1 | S2 | Operating Mode         |
|-----|----|----|------------------------|
| X   | L  | L  | Preset (Program)       |
| L   | L  | H  | Increment (Count Up)   |
| H   | L  | H  | Hold Count             |
| L   | H  | L  | Decrement (Count Down) |
| H   | H  | L  | Hold Count             |
| X   | H  | H  | Hold (Stop Count)      |

[illegible]

## DIP PIN ASSIGNMENT



<http://onsemi.com>

Diagram of the MC10H136L AWLYYWW component, showing a 16-pin package with pins numbered 1 to 16.

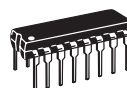


Diagram of the MC10H136P AWLYYWW package, showing a 16-pin configuration with pins numbered 1 to 16.



Diagram of a component labeled 10H136 AWLYYWW. The component has 16 pins, numbered 1 to 16. Pin 1 is at the top center, and pin 16 is at the bottom center. The pins are arranged in a rectangular pattern around the component body.

## ORDERING INFORMATION

| Device     | Package | Shipping      |
|------------|---------|---------------|
| MC10H136L  | CDIP-16 | 25 Units/Rail |
| MC10H136P  | PDIP-16 | 25 Units/Rail |
| MC10H136FN | PLCC-20 | 46 Units/Rail |

# MC10H136

## 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 – Continuous<br>– Surge           | 50<br>100                  | mA       |
| $T_A$     | Operating Temperature Range                      | 0 to +75                   | °C       |
| $T_{stg}$ | Storage Temperature Range – Plastic<br>– Ceramic | -55 to +150<br>-55 to +165 | °C<br>°C |

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

| Symbol    | Characteristic                              | 0°    |       | 25°   |       | 75°   |        | Unit          |
|-----------|---------------------------------------------|-------|-------|-------|-------|-------|--------|---------------|
|           |                                             | Min   | Max   | Min   | Max   | Min   | Max    |               |
| $I_E$     | Power Supply Current                        | –     | 165   | –     | 150   | –     | 165    | mA            |
| $I_{inH}$ | Input Current High<br>Pins 5, 6, 11, 12, 13 | –     | 430   | –     | 275   | –     | 275    | $\mu\text{A}$ |
|           | Pin 9                                       | –     | 670   | –     | 420   | –     | 420    |               |
|           | Pin 7                                       | –     | 535   | –     | 335   | –     | 335    |               |
|           | Pin 10                                      | –     | 380   | –     | 240   | –     | 240    |               |
| $I_{inL}$ | 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           |

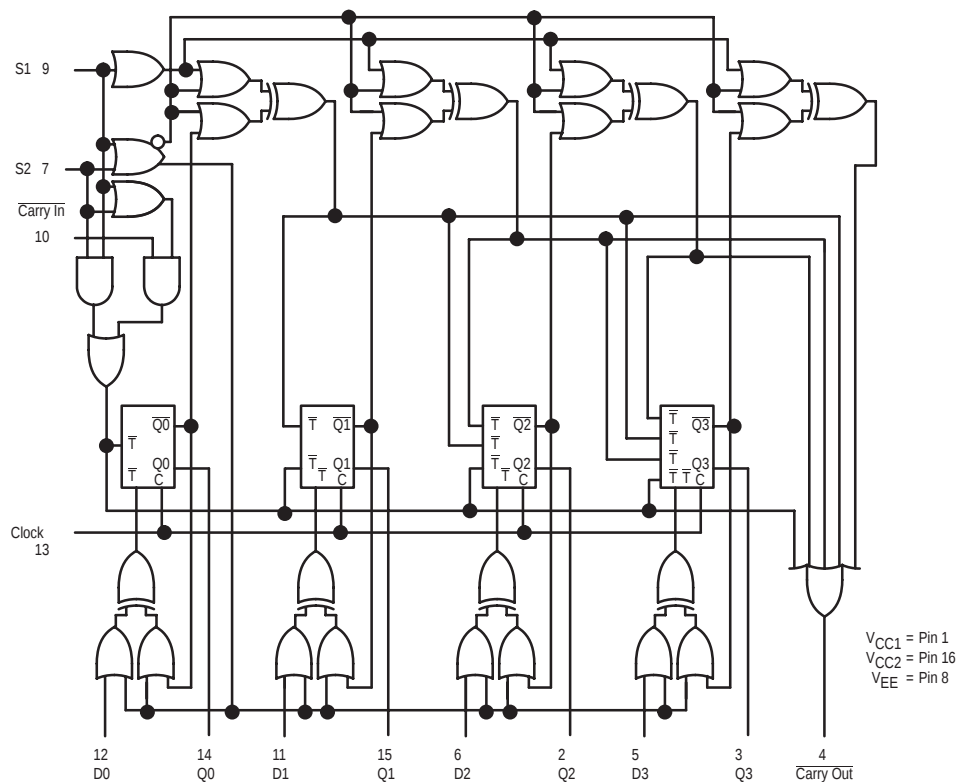
## AC PARAMETERS

|             |                                 |      |     |      |     |      |     |     |
|-------------|---------------------------------|------|-----|------|-----|------|-----|-----|
| $t_{pd}$    | Propagation Delay<br>Clock to Q | 0.7  | 2.3 | 0.7  | 2.4 | 0.7  | 2.5 | ns  |
|             | Clock to Carry Out              | 1.0  | 4.8 | 1.0  | 4.9 | 1.0  | 5.0 |     |
|             | Carry in to Carry<br>Out        | 0.7  | 2.5 | 0.7  | 2.6 | 0.7  | 2.7 |     |
| $t_{set}$   | Set-up Time<br>Data (D0 to C)   | 2.0  | –   | 2.0  | –   | 2.0  | –   | ns  |
|             | Select (S to C)                 | 3.5  | –   | 3.5  | –   | 3.5  | –   |     |
|             | Carry In ( $C_{in}$ to C)       | 2.0  | –   | 2.0  | –   | 2.0  | –   |     |
|             | (C to $C_{in}$ )                | 0    | –   | 0    | –   | 0    | –   |     |
| $t_{hold}$  | Hold Time<br>Data (C to D0)     | 0    | –   | 0    | –   | 0    | –   | ns  |
|             | Select (C to S)                 | -0.5 | –   | -0.5 | –   | -0.5 | –   |     |
|             | Carry In (C to $C_{in}$ )       | 0    | –   | 0    | –   | 0    | –   |     |
|             | ( $C_{in}$ to C)                | 2.2  | –   | 2.2  | –   | 2.2  | –   |     |
| $f_{count}$ | Counting Frequency              | 250  | –   | 250  | –   | 250  | –   | MHz |
| $t_r$       | Rise Time                       | 0.5  | 2.3 | 0.5  | 2.4 | 0.5  | 2.5 | ns  |
| $t_f$       | Fall Time                       | 0.5  | 2.3 | 0.5  | 2.4 | 0.5  | 2.5 | ns  |

- 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-ohm resistor to -2.0 volts.

# MC10H136

## LOGIC DIAGRAM



**NOTE:** FLIP-FLOPS WILL TOGGLE WHEN ALL  $\bar{T}$  INPUTS ARE LOW.

## APPLICATION INFORMATION

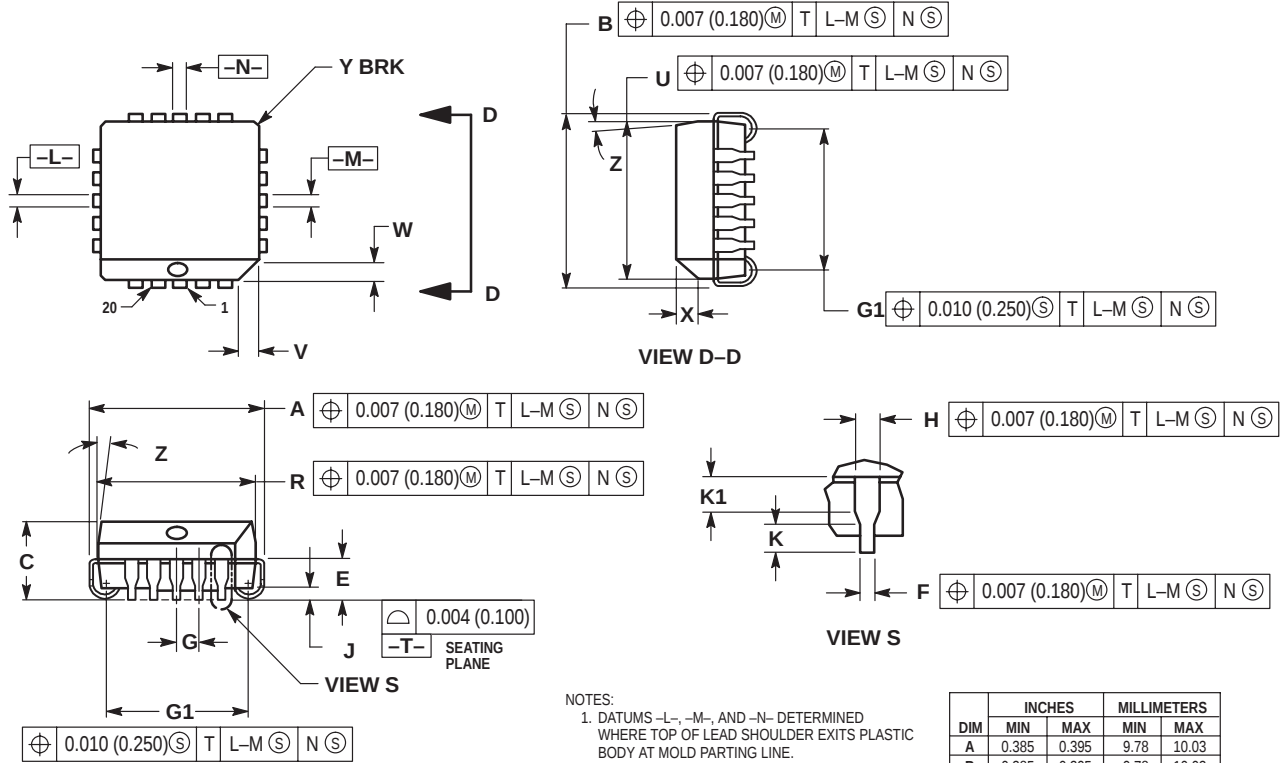
The MC10H136 is a high speed synchronous counter that operates at 250 MHz. Counter operating modes include count up, count down, pre-set and hold count. This device allows the designer to use one basic counter for many applications.

The S1, S2, control lines determine the operating modes of the counter. In the pre-set mode, a clock pulse is necessary to load the counter with the information present on the data inputs (D0, D1, D2, and D3). Carry out goes low on the terminal count or when the counter is being pre-set.

# MC10H136

## PACKAGE DIMENSIONS

PLCC-20  
FN SUFFIX  
PLASTIC PLCC PACKAGE  
CASE 775-02  
ISSUE C



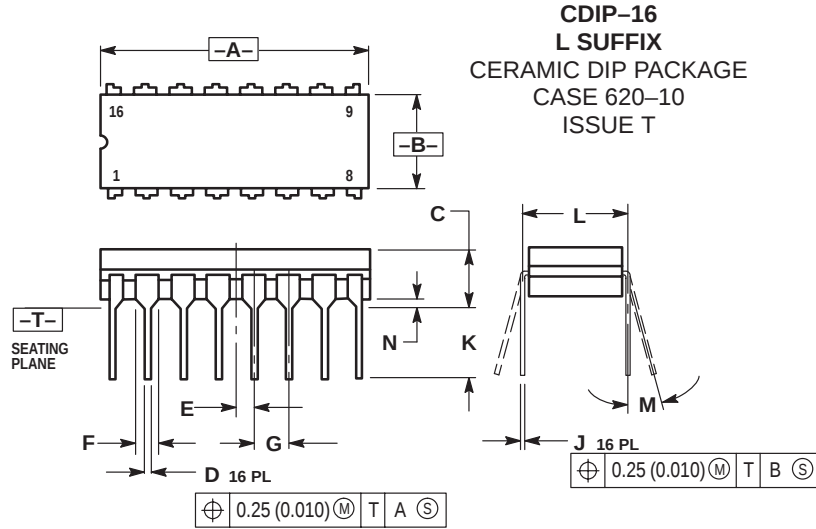
### NOTES:

1. DATUMS -L-, -M-, AND -N- DETERMINED WHERE TOP OF LEAD SHOULDER EXITS PLASTIC BODY AT MOLD PARTING LINE.
2. DIMENSION G1, TRUE POSITION TO BE MEASURED AT DATUM -T-, SEATING PLANE.
3. DIMENSIONS R AND U DO NOT INCLUDE MOLD FLASH. ALLOWABLE MOLD FLASH IS 0.010 (0.250) PER SIDE.
4. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
5. CONTROLLING DIMENSION: INCH.
6. THE PACKAGE TOP MAY BE SMALLER THAN THE PACKAGE BOTTOM BY UP TO 0.012 (0.300). DIMENSIONS R AND U ARE DETERMINED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY EXCLUSIVE OF MOLD FLASH, TIE BAR BURRS, GATE BURRS AND INTERLEAD FLASH, BUT INCLUDING ANY MISMATCH BETWEEN THE TOP AND BOTTOM OF THE PLASTIC BODY.
7. DIMENSION H DOES NOT INCLUDE DAMBAR PROTRUSION OR INTRUSION. THE DAMBAR PROTRUSION(S) SHALL NOT CAUSE THE H DIMENSION TO BE GREATER THAN 0.037 (0.940). THE DAMBAR INTRUSION(S) SHALL NOT CAUSE THE H DIMENSION TO BE SMALLER THAN 0.025 (0.635).

| DIM | INCHES    |       | MILLIMETERS |       |
|-----|-----------|-------|-------------|-------|
|     | MIN       | MAX   | MIN         | MAX   |
| A   | 0.385     | 0.395 | 9.78        | 10.03 |
| B   | 0.385     | 0.395 | 9.78        | 10.03 |
| C   | 0.165     | 0.180 | 4.20        | 4.57  |
| E   | 0.090     | 0.110 | 2.29        | 2.79  |
| F   | 0.013     | 0.019 | 0.33        | 0.48  |
| G   | 0.050 BSC |       | 1.27 BSC    |       |
| H   | 0.026     | 0.032 | 0.66        | 0.81  |
| J   | 0.020     | —     | 0.51        | —     |
| K   | 0.025     | —     | 0.64        | —     |
| R   | 0.350     | 0.356 | 8.89        | 9.04  |
| U   | 0.350     | 0.356 | 8.89        | 9.04  |
| V   | 0.042     | 0.048 | 1.07        | 1.21  |
| W   | 0.042     | 0.048 | 1.07        | 1.21  |
| X   | 0.042     | 0.056 | 1.07        | 1.42  |
| Y   | —         | 0.020 | —           | 0.50  |
| Z   | 2 °       | 10 °  | 2 °         | 10 °  |
| G1  | 0.310     | 0.330 | 7.88        | 8.38  |
| K1  | 0.040     | —     | 1.02        | —     |

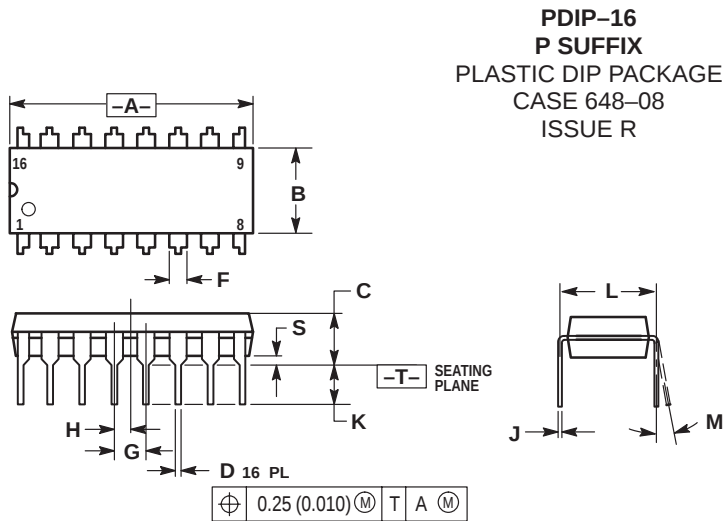
# MC10H136

## PACKAGE DIMENSIONS



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.
  3. DIMENSION L TO CENTER OF LEAD WHEN FORMED PARALLEL.
  4. DIMENSION F MAY NARROW TO 0.76 (0.030) WHERE THE LEAD ENTERS THE CERAMIC BODY.

| DIM | INCHES    |       | MILLIMETERS |       |
|-----|-----------|-------|-------------|-------|
|     | MIN       | MAX   | MIN         | MAX   |
| A   | 0.750     | 0.785 | 19.05       | 19.93 |
| B   | 0.240     | 0.295 | 6.10        | 7.49  |
| C   | —         | 0.200 | —           | 5.08  |
| D   | 0.015     | 0.020 | 0.39        | 0.50  |
| E   | 0.050 BSC |       | 1.27 BSC    |       |
| F   | 0.055     | 0.065 | 1.40        | 1.65  |
| G   | 0.100 BSC |       | 2.54 BSC    |       |
| H   | 0.008     | 0.015 | 0.21        | 0.38  |
| K   | 0.125     | 0.170 | 3.18        | 4.31  |
| L   | 0.300 BSC |       | 7.62 BSC    |       |
| M   | 0°        | 15°   | 0°          | 15°   |
| N   | 0.020     | 0.040 | 0.51        | 1.01  |



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.
  3. DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.
  4. DIMENSION B DOES NOT INCLUDE MOLD FLASH.
  5. ROUNDED CORNERS OPTIONAL.

| DIM | INCHES    |       | MILLIMETERS |       |
|-----|-----------|-------|-------------|-------|
|     | MIN       | MAX   | MIN         | MAX   |
| A   | 0.740     | 0.770 | 18.80       | 19.55 |
| B   | 0.250     | 0.270 | 6.35        | 6.85  |
| C   | 0.145     | 0.175 | 3.69        | 4.44  |
| D   | 0.015     | 0.021 | 0.39        | 0.53  |
| F   | 0.040     | 0.70  | 1.02        | 1.77  |
| G   | 0.100 BSC |       | 2.54 BSC    |       |
| H   | 0.050 BSC |       | 1.27 BSC    |       |
| J   | 0.008     | 0.015 | 0.21        | 0.38  |
| K   | 0.110     | 0.130 | 2.80        | 3.30  |
| L   | 0.295     | 0.305 | 7.50        | 7.74  |
| M   | 0°        | 10°   | 0°          | 10°   |
| S   | 0.020     | 0.040 | 0.51        | 1.01  |

## **Notes**

## Notes

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