

MC10H131

Dual D Type Master-Slave Flip-Flop

Description

The MC10H131 is a MECL 10H™ part which is a functional/pinout duplication of the standard MECL 10K™ family part, with 100% improvement in clock speed and propagation delay and no increase in power-supply current.

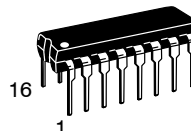
Features

- Propagation Delay, 1.0 ns Typical
- Power Dissipation, 235 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

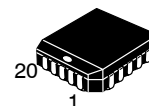


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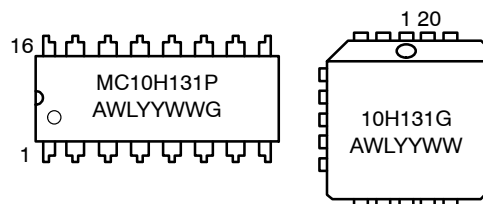


**PDIP-16
P SUFFIX
CASE 648-08**



**PLCC-20
FN SUFFIX
CASE 775-02**

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† |
|---------------|----------------------|-----------------|
| MC10H131FNG | PLCC-20 (Pb-Free) | 46 Units/Tube |
| MC10H131FNR2G | PLCC-20 (Pb-Free) | 500/Tape & Reel |
| MC10H131PG | PDIP-16 (Pb-Free) | 25 Units/Tube |

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, [BRD8011/D](#).

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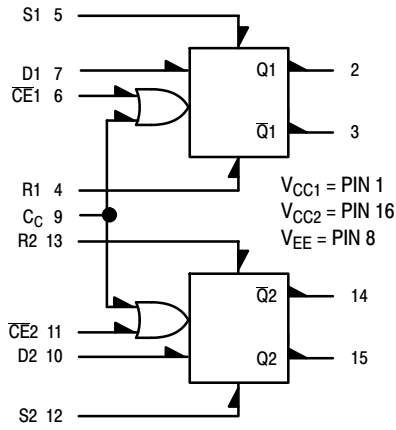
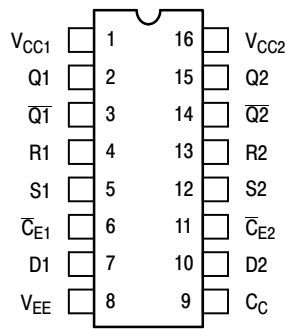


Figure 1. Logic Diagram



Pin assignment is for Dual-in-Line Package.

Figure 2. Pin Assignment

Table 1. RS TRUTH TABLE

| R | S | Q_{n+1} |
|---|---|-----------|
| L | L | Q_n |
| L | H | H |
| H | L | L |
| H | H | ND |

ND = Not Defined

Table 2. CLOCKED TRUTH TABLE

| C | D | Q_{n+1} |
|---|---|-----------|
| L | X | Q_n |
| H | L | L |
| H | H | H |

$$C = \overline{CE} + C_C$$

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

Table 3. 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 Surge | 50 100 | mA |
| T_A | Operating Temperature Range | 0 to +75 | °C |
| T_{stg} | Storage Temperature Range Plastic Ceramic | -55 to +150 -55 to +165 | °C |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

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Table 4. 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 | – | 62 | – | 56 | – | 62 | mA |
| I_{inH} | Input Current High | – | 530 | – | 310 | – | 310 | μA |
| | Pins 6, 11 | – | 660 | – | 390 | – | 390 | |
| | Pin 9 | – | 485 | – | 285 | – | 285 | |
| | Pins 7, 10 | – | 790 | – | 465 | – | 465 | |
| I_{inL} | Input Current Low | 0.5 | – | 0.5 | – | 0.3 | – | μA |
| 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 lpm is maintained. Outputs are terminated through a 50 Ω resistor to -2.0 V .

Table 5. AC CHARACTERISTICS

| Symbol | Characteristic | 0° | | 25° | | 75° | | Unit |
|------------|--|-----|-----|-----|-----|-----|-----|------|
| | | Min | Max | Min | Max | Min | Max | |
| t_{pd} | Propagation Delay Clock, CE Set, Reset | 0.8 | 1.6 | 0.8 | 1.7 | 0.8 | 1.8 | ns |
| | | 0.6 | 1.6 | 0.7 | 1.7 | 0.7 | 1.8 | |
| t_r | Rise Time | 0.6 | 2.0 | 0.6 | 2.0 | 0.6 | 2.2 | ns |
| t_f | Fall Time | 0.6 | 2.0 | 0.6 | 2.0 | 0.6 | 2.2 | ns |
| t_{set} | Set-up Time | 0.7 | – | 0.7 | – | 0.7 | – | ns |
| t_{hold} | Hold Time | 0.8 | – | 0.8 | – | 0.8 | – | 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 lpm. 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.

APPLICATION INFORMATION

The MC10H131 is a dual master-slave type D flip-flop. Asynchronous Set (S) and Reset (R) override Clock (C_C) and Clock Enable (\overline{CE}) inputs. Each flip-flop may be clocked separately by holding the common clock in the new low state and using the enable inputs for the clocking function. If the common clock is to be used to clock the flip-flop, the Clock Enable inputs must be in the low state.

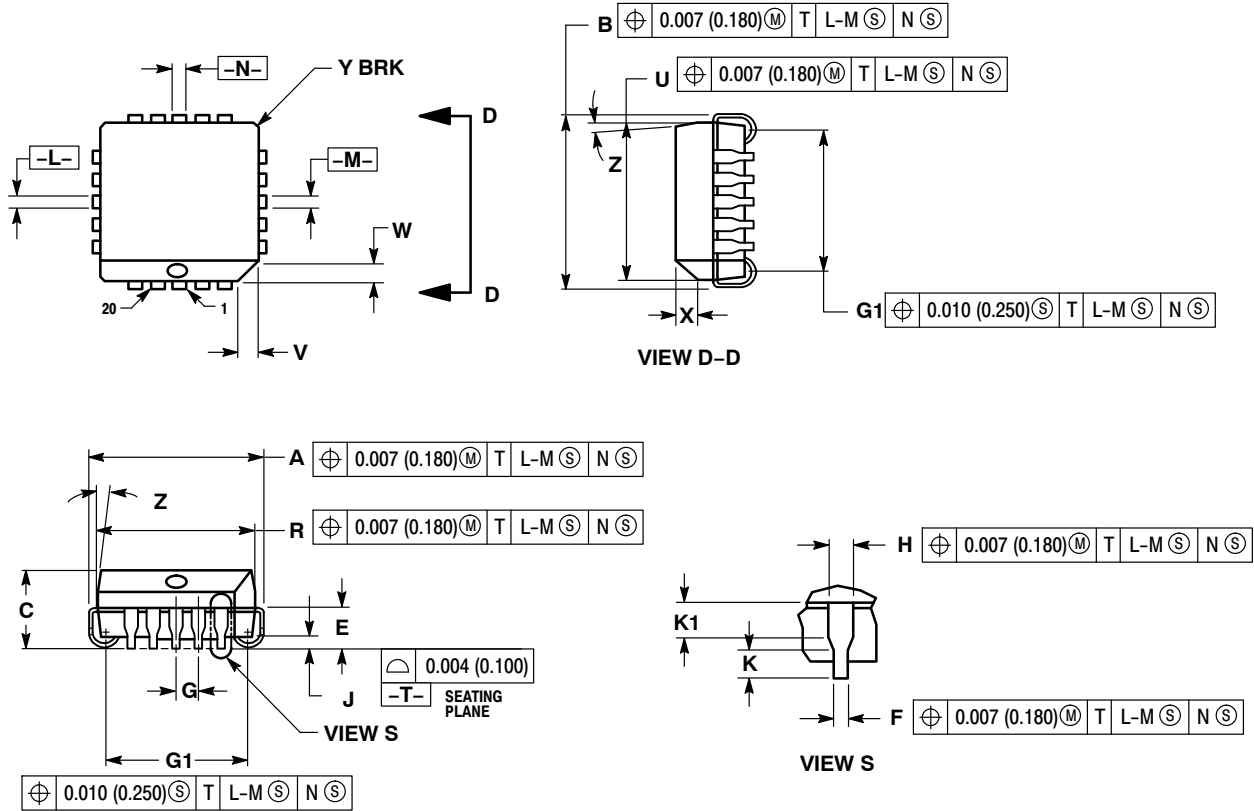
In this case, the enable inputs perform the function of controlling the common clock.

The output states of the flip-flop change on the positive transition of the clock. A change in the information present at the data (D) input will not affect the output information at any other time due to master slave construction.

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PACKAGE DIMENSIONS

20 LEAD PLLC
CASE 775-02
ISSUE F



NOTES:

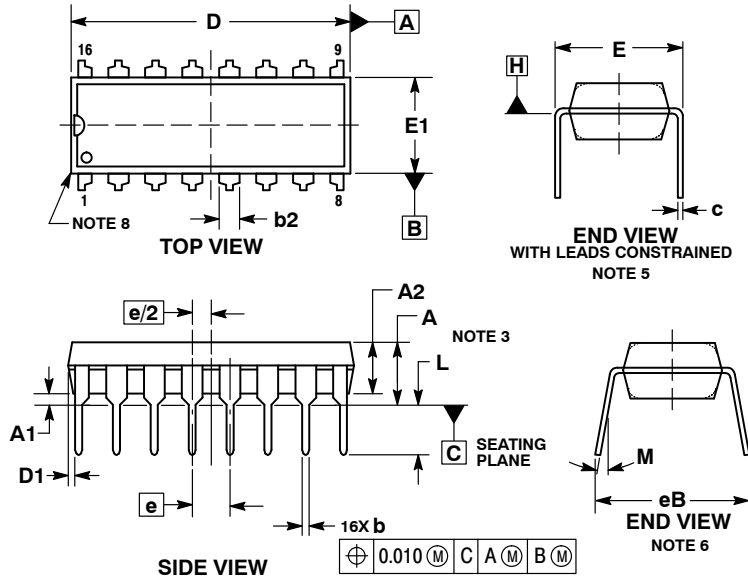
1. DIMENSIONS AND TOLERANCING PER ANSI Y14.5M, 1982.
2. DIMENSIONS IN INCHES.
3. DATUMS -L-, -M-, AND -N- DETERMINED WHERE TOP OF LEAD SHOULDER EXITS PLASTIC BODY AT MOLD PARTING LINE.
4. DIMENSION G1, TRUE POSITION TO BE MEASURED AT DATUM -T-, SEATING PLANE.
5. DIMENSIONS R AND U DO NOT INCLUDE MOLD FLASH. ALLOWABLE MOLD FLASH IS 0.010 (0.250) PER SIDE.
6. DIMENSIONS IN 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 | 0.021 | 0.33 | 0.53 |
| 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 | ---- |

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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
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- GATE
- SOURCE

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