

# 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.

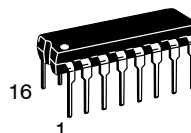
### Features

- 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

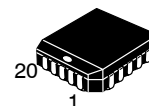


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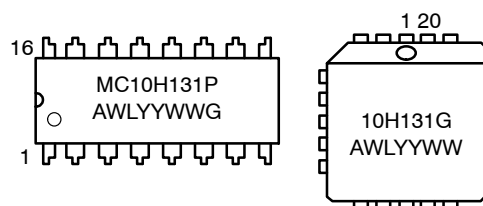


**PDIP-16  
P SUFFIX  
CASE 648-08**



**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

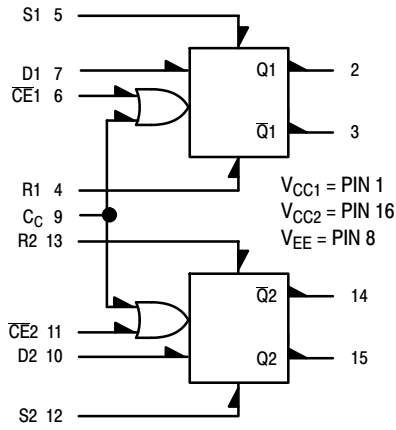
\*For additional marking information, refer to Application Note [AND8002/D](#).

### ORDERING INFORMATION

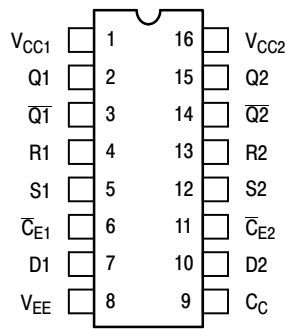
Device	Package	Shipping†
MC10H131FNG	PLCC-20 (Pb-Free)	46 Units/Tube
MC10H131FNR2G	PLCC-20 (Pb-Free)	500/Tape & Reel
MC10H131PG	PDIP-16 (Pb-Free)	25 Units/Tube

†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](#).

# MC10H131



**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.

# MC10H131

**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	$\mu\text{A}$
	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	-	$\mu\text{A}$
$V_{OH}$	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 lpm is maintained. Outputs are terminated through a 50  $\Omega$  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.

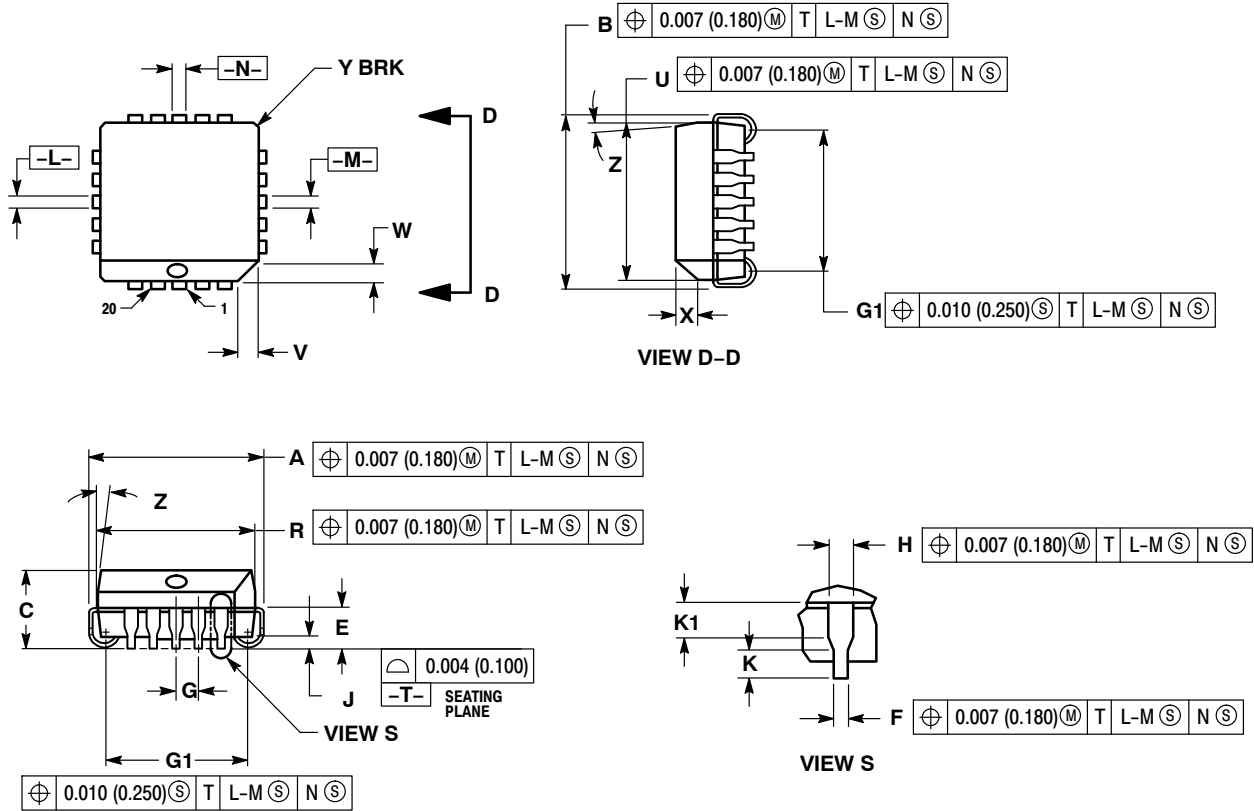
In this case, the enable inputs perform the function of controlling the common clock.

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.

# MC10H131

## PACKAGE DIMENSIONS

20 LEAD PLLC  
CASE 775-02  
ISSUE F



**NOTES:**

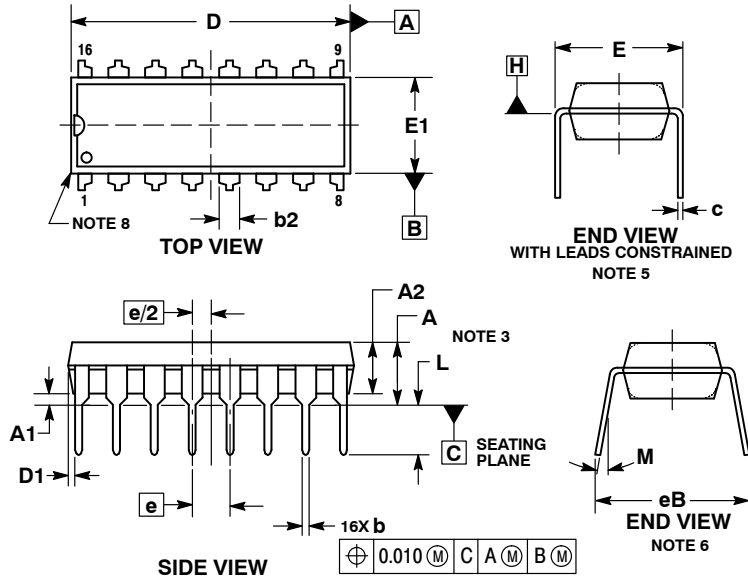
1. DIMENSIONS AND TOLERANCING PER ANSI Y14.5M, 1982.
2. DIMENSIONS IN INCHES.
3. DATUMS -L-, -M-, AND -N- DETERMINED WHERE TOP OF LEAD SHOULDER EXITS PLASTIC BODY AT MOLD PARTING LINE.
4. DIMENSION G1, TRUE POSITION TO BE MEASURED AT DATUM -T-, SEATING PLANE.
5. DIMENSIONS R AND U DO NOT INCLUDE MOLD 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	----

# MC10H131

## 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).

#### 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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