

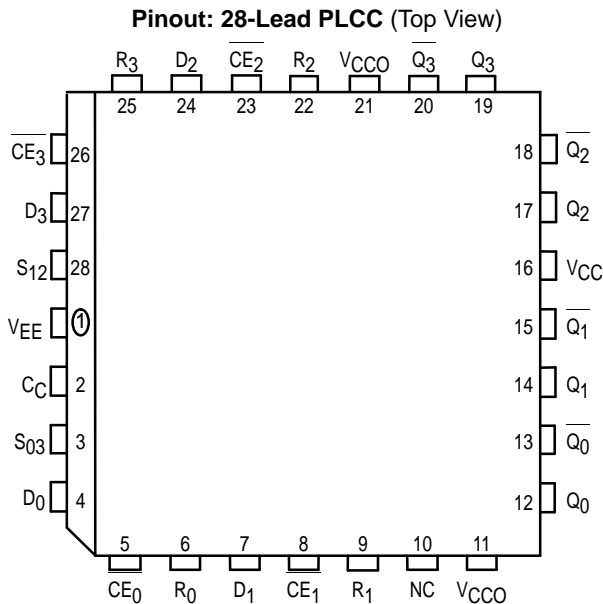
## 4-Bit D Flip-Flop

The MC10E/100E131 is a quad master-slave D-type flip-flop with differential outputs. Each flip-flop may be clocked separately by holding Common Clock ( $\overline{C_C}$ ) LOW and using the Clock Enable ( $\overline{C_E}$ ) inputs for clocking. Common clocking is achieved by holding the  $\overline{C_E}$  inputs LOW and using  $\overline{C_C}$  to clock all four flip-flops. In this case, the  $\overline{C_E}$  inputs perform the function of controlling the common clock, to each flip-flop.

Individual asynchronous resets are provided ( $\overline{R}$ ). Asynchronous set controls ( $\overline{S}$ ) are ganged together in pairs, with the pairing chosen to reflect physical chip symmetry.

Data enters the master when both  $\overline{C_C}$  and  $\overline{C_E}$  are LOW, and transfers to the slave when either  $\overline{C_C}$  or  $\overline{C_E}$  (or both) go HIGH.

- 1100MHz Min. Toggle Frequency
- Differential Outputs
- Individual and Common Clocks
- Individual Resets (asynchronous)
- Paired Sets (asynchronous)
- Extended 100E  $V_{EE}$  Range of - 4.2V to - 5.46V
- 75k $\Omega$  Input Pulldown Resistors



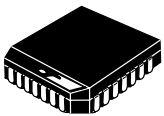
\* All  $V_{CC}$  and  $V_{CCO}$  pins are tied together on the die.

### PIN NAMES

Pin	Function
$\overline{D_0} - \overline{D_3}$	Data Inputs
$\overline{CE_0} - \overline{CE_3}$	Clock Enables (Individual)
$\overline{R_0} - \overline{R_3}$	Resets
$\overline{C_C}$	Common Clock
$\overline{S_{03}}, \overline{S_{12}}$	Sets (paired)
$\overline{Q_0} - \overline{Q_3}$	True Outputs
$\overline{Q_0} - \overline{Q_3}$	Inverting Outputs

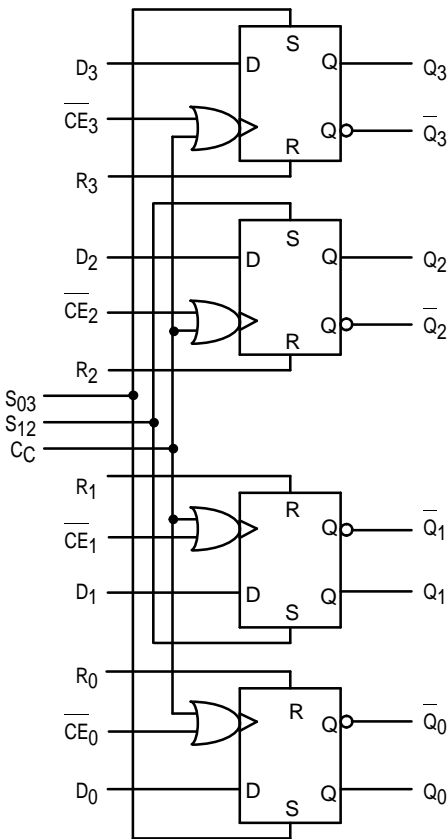
**MC10E131**  
**MC100E131**

**4-BIT**  
**D FLIP-FLOP**



**FN SUFFIX**  
PLASTIC PACKAGE  
CASE 776-02

### LOGIC DIAGRAM



**DC CHARACTERISTICS** ( $V_{EE} = V_{EE}(\text{min})$  to  $V_{EE}(\text{max})$ ;  $V_{CC} = V_{CCO} = \text{GND}$ )

Symbol	Characteristic	-40°C			0°C			25°C			85°C			Unit	Cond
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max		
$I_{IH}$	Input HIGH Current $C_C$ $\overline{S}$ R, CE D			350			350			350			350	$\mu\text{A}$	
				450			450			450			450		
				300			300			300			300		
				150			150			150			150		
$I_{IEE}$	Power Supply Current 10E 100E		58	70		58	70		58	70		58	70	mA	
			58	70		58	70		58	70		67	81		

**AC CHARACTERISTICS** ( $V_{EE} = V_{EE}(\text{min})$  to  $V_{EE}(\text{max})$ ;  $V_{CC} = V_{CCO} = \text{GND}$ )

Symbol	Characteristic		-40°C			0°C to 85°C			Unit	Condition
			Min	Typ	Max	Min	Typ	Max		
$f_{\text{MAX}}$	Maximum Toggle Frequency		1000	1400		1100	1400		MHz	
$t_{\text{PLH}}$ $t_{\text{PHL}}$	Propagation Delay to Output	CE	310	600	750	360	500	700	ps	
		$C_C$	275	600	725	325	500	675		
		R	300	625	775	350	550	725		
		S	300	550	775	350	550	725		
$t_S$	Setup Time	D	200	20		150	20		ps	1
$t_H$	Hold Time	D	225	-20		175	-20		ps	1
$t_{\text{RR}}$	Reset Recovery Time		450	150		400	150		ps	
$t_{\text{PW}}$	Minimum Pulse Width	CLK	400			400			ps	
		R, S	400			400				
$t_{\text{SKEW}}$	Within-Device Skew			60			60		ps	2
$t_r/t_f$	Rise/Fall Time		275	460	725	300	480	675	ps	20–80%

1. Setup/hold times guaranteed for both  $C_C$  and CE.
2. Within-device skew is defined as identical transitions on similar paths through a device.

## OUTLINE DIMENSIONS


FN SUFFIX  
PLASTIC PLCC PACKAGE  
CASE 776-02  
ISSUE D



## NOTES:

- DATUMS -L-, -M-, AND -N- DETERMINED WHERE TOP OF LEAD SHOULDER EXITS PLASTIC BODY AT MOLD PARTING LINE.
- DIM G1, TRUE POSITION TO BE MEASURED AT DATUM -T-, SEATING PLANE.
- DIM R AND U DO NOT INCLUDE MOLD FLASH. ALLOWABLE MOLD FLASH IS 0.010 (0.250) PER SIDE.
- DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
- CONTROLLING DIMENSION: INCH.
- 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.
- 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	0.485	0.495	12.32	12.57
B	0.485	0.495	12.32	12.57
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	0.450	0.456	11.43	11.58
U	0.450	0.456	11.43	11.58
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	0.410	0.430	10.42	10.92
K1	0.040	—	1.02	—

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**How to reach us:**

**USA/EUROPE/Locations Not Listed:** Motorola Literature Distribution;  
P.O. Box 20912; Phoenix, Arizona 85036. 1-800-441-2447 or 602-303-5454

**MFAX:** RMFAX0@email.sps.mot.com – TOUCHTONE 602-244-6609  
**INTERNET:** <http://Design-NET.com>

**JAPAN:** Nippon Motorola Ltd.; Tatsumi-SPD-JLDC, 6F Seibu-Butsuryu-Center,  
3-14-2 Tatsumi Koto-Ku, Tokyo 135, Japan. 03-81-3521-8315

**ASIA/PACIFIC:** Motorola Semiconductors H.K. Ltd.; 8B Tai Ping Industrial Park,  
51 Ting Kok Road, Tai Po, N.T., Hong Kong. 852-26629298

