

4-Bit D Flip-Flop

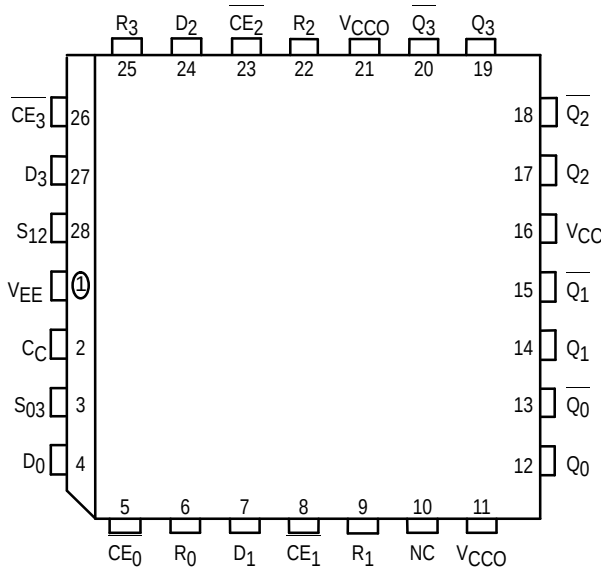
The MC10E100E131 is a quad master-slave D-type flip-flop with differential outputs. Each flip-flop may be clocked separately by holding Common Clock (C_C) LOW and using the Clock Enable ($\overline{CE}$) inputs for clocking. Common clocking is achieved by holding the $\overline{CE}$ inputs LOW and using C_C to clock all four flip-flops. In this case, the $\overline{CE}$ inputs perform the function of controlling the common clock, to each flip-flop.

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

Data enters the master when both C_C and $\overline{CE}$ are LOW, and transfers to the slave when either C_C or $\overline{CE}$ (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 Ω Input Pulldown Resistors

Pinout: 28-Lead PLCC (Top View)



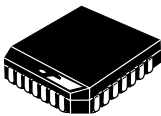
* All V_{CC} and V_{CCO} pins are tied together on the die.

PIN NAMES

Pin	Function
$D_0 - D_3$	Data Inputs
$\overline{CE}_0 - \overline{CE}_3$	Clock Enables (Individual)
$R_0 - R_3$	Resets
C_C	Common Clock
S_{03}, S_{12}	Sets (paired)
$\overline{Q}_0 - \overline{Q}_3$	True Outputs
$Q_0 - Q_3$	Inverting Outputs

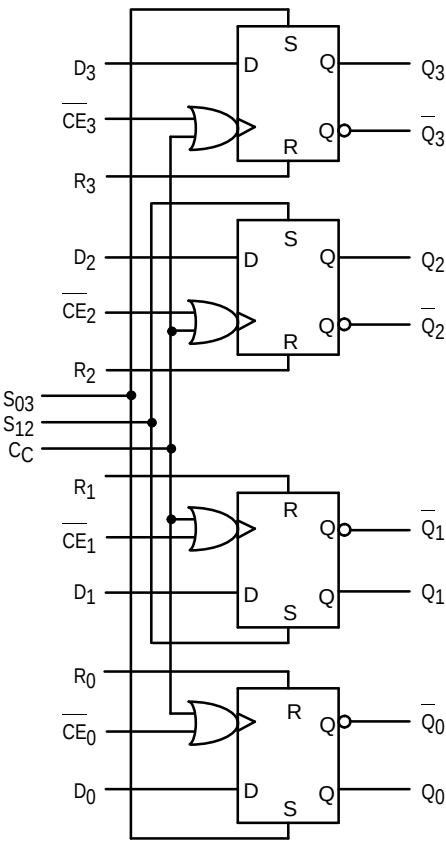
MC10E131
MC100E131

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	μA	
				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		

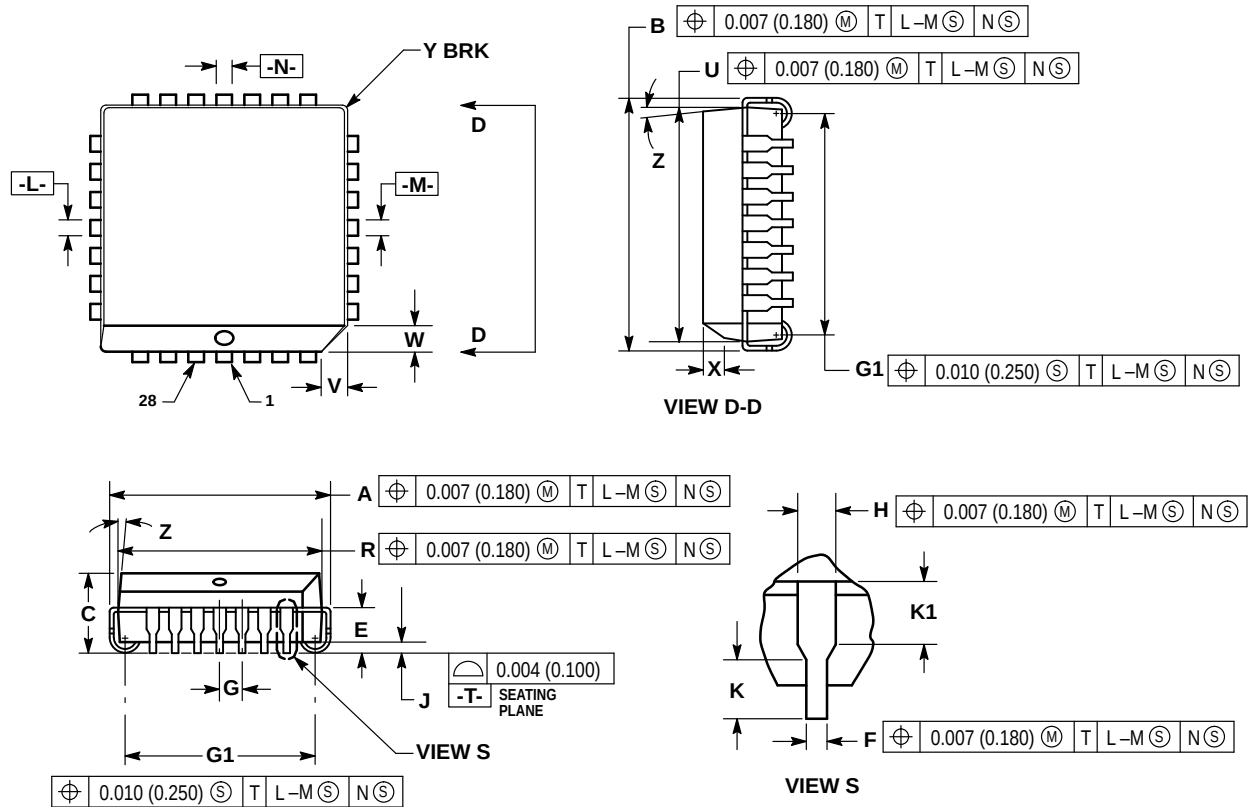
AC CHARACTERISTICS ($V_{EE} = V_{EE}(\text{min})$ to $V_{EE}(\text{max})$; $V_{CC} = V_{CCO} = \text{GND}$)

Symbol	Characteristic	−40°C			0°C to 85°C			Unit	Condition
		Min	Typ	Max	Min	Typ	Max		
f _{MAX}	Maximum Toggle Frequency	1000	1400		1100	1400		MHz	
t _{PLH} t _{PHL}	Propagation Delay to Output CE C _C R S	310 275 300 300	600 600 625 550	750 725 775 775	360 325 350 350	500 500 550 550	700 675 725 725	ps	
t _S	Setup Time D	200	20		150	20		ps	1
t _H	Hold Time D	225	−20		175	−20		ps	1
t _{RR}	Reset Recovery Time	450	150		400	150		ps	
t _{PW}	Minimum Pulse Width CLK R, S	400 400			400 400			ps	
t _{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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