

**MOTOROLA**  
SEMICONDUCTOR TECHNICAL DATA

# Differential Clock D Flip-Flop

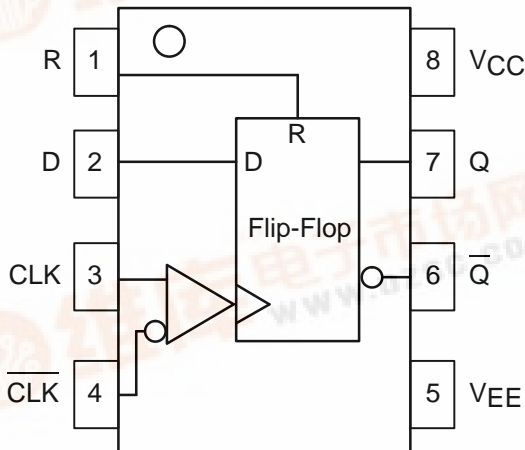
The MC10EL/100EL51 is a differential clock D flip-flop with reset. The device is functionally similar to the E151 device with higher performance capabilities. With propagation delays and output transition times significantly faster than the E151 the EL51 is ideally suited for those applications which require the ultimate in AC performance.

The reset input is an asynchronous, level triggered signal. Data enters the master portion of the flip-flop when the clock is LOW and is transferred to the slave, and thus the outputs, upon a positive transition of the clock. The differential clock inputs of the EL51 allow the device to be used as a negative edge triggered flip-flop.

The differential input employs clamp circuitry to maintain stability under open input (pulled down to  $V_{EE}$ ) conditions.

- 475ps Propagation Delay
- 2.8GHz Toggle Frequency
- 75kΩ Internal Input Pulldown Resistors
- >1000V ESD Protection

### LOGIC DIAGRAM AND PINOUT ASSIGNMENT



## MC10EL51 MC100EL51



**D SUFFIX**  
PLASTIC SOIC PACKAGE  
CASE 751-05

### TRUTH TABLE

D	R	CLK	Q
L	L	Z	L
H	L	Z	H
X	H	X	L

Z = LOW to HIGH Transition



# MC10EL51 MC100EL51

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

Symbol	Characteristic	-40°C			0°C			25°C			85°C			Unit	
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max		
I <sub>EE</sub>	Power Supply Current	10EL	24	29		24	29		24	29		24	29	mA	
		100EL	24	29		24	29		24	29		30	36		
V <sub>EE</sub>	Power Supply Voltage	10EL	-4.75	-5.2	-5.5	-4.75	-5.2	-5.5	-4.75	-5.2	-5.5	-4.75	-5.2	-5.5	V
		100EL	-4.20	-4.5	-5.5	-4.20	-4.5	-5.5	-4.20	-4.5	-5.5	-4.20	-4.5	-5.5	
I <sub>IH</sub>	Input HIGH Current			150			150			150			150	μA	

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

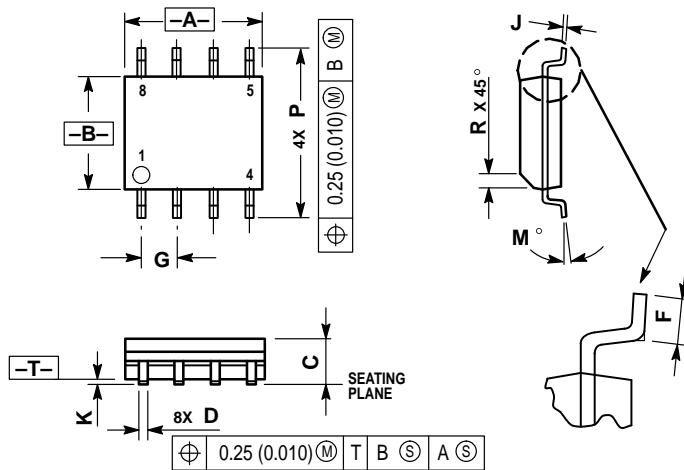
Symbol	Characteristic	-40°C			0°C			25°C			85°C			Unit	
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max		
f <sub>MAX</sub>	Maximum Toggle Frequency	1.8	2.8		2.2	2.8		2.2	2.8		2.2	2.8		GHz	
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay to Output	CLK R	325 305	465 455	605 605	375 355	465 455	555 555	385 355	475 465	565 565	440 410	530 510	620 620	ps
t <sub>S</sub>	Setup Time		150	0		150	0		150	0		150	0	ps	
t <sub>H</sub>	Hold Time		250	100		250	100		250	100		250	100	ps	
t <sub>RR</sub>	Reset Recovery		400	200		400	200		400	200		400	200	ps	
t <sub>PW</sub>	Minimum Pulse Width CLK, Reset		400			400			400			400		ps	
V <sub>PP</sub>	Minimum Input Swing <sup>1</sup>		150			150			150			150		mV	
V <sub>CMR</sub>	Common Mode Range <sup>2</sup>		-0.4		See <sup>2</sup>	-0.4		See <sup>2</sup>	-0.4		See <sup>2</sup>	-0.4		See <sup>2</sup>	V
t <sub>r</sub> t <sub>f</sub>	Output Rise/Fall Times Q (20% – 80%)		100	225	350	100	225	350	100	225	350	100	225	350	ps

1. Minimum input swing for which AC parameters are guaranteed.

2. The CMR range is referenced to the most positive side of the differential input signal. Normal operation is obtained if the HIGH level falls within the specified range and the peak-to-peak voltage lies between  $V_{ppmin}$  and 1V. The lower end of the CMR range is dependent on  $V_{EE}$  and is equal to  $V_{EE} + 2.5V$ .

OUTLINE DIMENSIONS

D SUFFIX  
PLASTIC SOIC PACKAGE  
CASE 751-05  
ISSUE P



- NOTES:
1. DIMENSIONS A AND B ARE DATUMS AND T IS A DATUM SURFACE.
  2. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  3. DIMENSIONS ARE IN MILLIMETER.
  4. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
  5. MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.
  6. DIMENSION D DOES NOT INCLUDE MOLD PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

DIM	MILLIMETERS	
	MIN	MAX
A	4.80	5.00
B	3.80	4.00
C	1.35	1.75
D	0.35	0.49
F	0.40	1.25
G	1.27 BSC	
J	0.18	0.25
K	0.10	0.25
M	0°	7°
P	5.80	6.20
R	0.25	0.50

Motorola reserves the right to make changes without further notice to any products herein. Motorola makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Motorola assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. "Typical" parameters which may be provided in Motorola data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. Motorola does not convey any license under its patent rights nor the rights of others. Motorola products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Motorola product could create a situation where personal injury or death may occur. Should Buyer purchase or use Motorola products for any such unintended or unauthorized application, Buyer shall indemnify and hold Motorola and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Motorola was negligent regarding the design or manufacture of the part. Motorola and are registered trademarks of Motorola, Inc. Motorola, Inc. is an Equal Opportunity/Affirmative Action Employer.

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

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

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

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