

# Differential Data and Clock D Flip-Flop

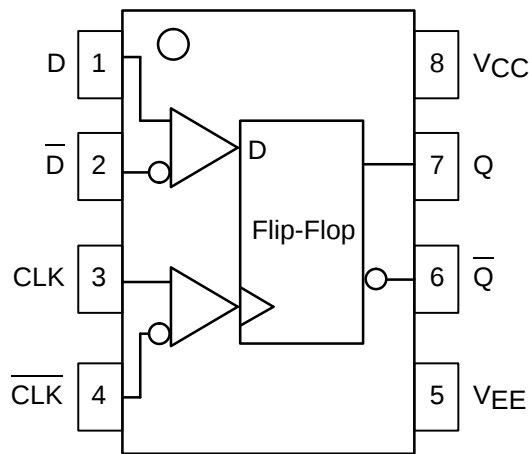
The MC10EL/100EL52 is a differential data, differential clock D flip-flop with reset. The device is functionally equivalent to the E452 device with higher performance capabilities. With propagation delays and output transition times significantly faster than the E452 the EL52 is ideally suited for those applications which require the ultimate in AC performance.

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 EL52 allow the device to also be used as a negative edge triggered device.

The EL52 employs input clamping circuitry so that under open input conditions (pulled down to V<sub>EE</sub>) the outputs of the device will remain stable.

- 365ps Propagation Delay
- 2.0GHz Toggle Frequency
- 75kΩ Internal Input Pulldown Resistors
- >1000V ESD Protection

## LOGIC DIAGRAM AND PINOUT ASSIGNMENT



# MC10EL52 MC100EL52



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

## PIN DESCRIPTION

| PIN | FUNCTION    |
|-----|-------------|
| D   | Data Input  |
| CLK | Clock Input |
| Q   | Data Output |

## TRUTH TABLE

| D | CLK | Q |
|---|-----|---|
| L | Z   | L |
| H | Z   | H |

Z = LOW to HIGH Transition



# MC10EL52 MC100EL52

## 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          |      |
| $I_{EE}$ | Power Supply Current<br>10EL<br>100EL |                | 21<br>21     | 25<br>25     |                | 21<br>21     | 25<br>25     |                | 21<br>21     | 25<br>25     |                | 21<br>24     | 25<br>29     | mA   |
| $V_{EE}$ | Power Supply Voltage<br>10EL<br>100EL | -4.94<br>-4.20 | -5.2<br>-4.5 | -5.5<br>-5.5 | -4.94<br>-4.20 | -5.2<br>-4.5 | -5.5<br>-5.5 | -4.75<br>-4.20 | -5.2<br>-4.5 | -5.5<br>-5.5 | -4.75<br>-4.20 | -5.2<br>-4.5 | -5.5<br>-5.5 | V    |
| $I_{IH}$ | Input HIGH Current                    |                |              | 150          |                |              | 150          |                |              | 150          |                |              | 150          | μA   |

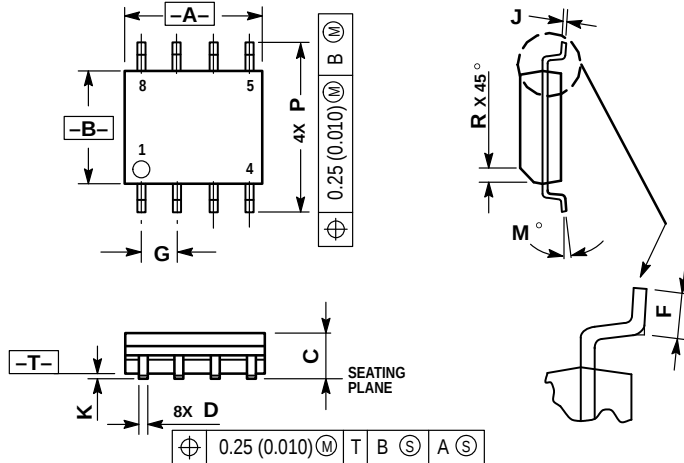
## AC CHARACTERISTICS ( $V_{EE} = V_{EE}(\text{min})$ to $V_{EE}(\text{max})$ ; $V_{CC} = \text{GND}$ )

| Symbol                               | Characteristic                                                                       | -40°C                        |     |                                                      | 0°C                          |     |                                                      | 25°C                         |     |                                                      | 85°C                         |     |                                                      | Unit |
|--------------------------------------|--------------------------------------------------------------------------------------|------------------------------|-----|------------------------------------------------------|------------------------------|-----|------------------------------------------------------|------------------------------|-----|------------------------------------------------------|------------------------------|-----|------------------------------------------------------|------|
|                                      |                                                                                      | Min                          | Typ | Max                                                  | Min                          | Typ | Max                                                  | Min                          | Typ | Max                                                  | Min                          | Typ | Max                                                  |      |
| $f_{\text{MAX}}$                     | Maximum Toggle Frequency                                                             | 1.8                          | 2.5 |                                                      | 2.2                          | 2.8 |                                                      | 2.2                          | 2.8 |                                                      | 2.2                          | 2.8 |                                                      | GHz  |
| $t_{\text{PLH}}$<br>$t_{\text{PHL}}$ | Propagation Delay to Output<br>CLK                                                   | 225                          | 335 | 515                                                  | 275                          | 365 | 465                                                  | 275                          | 365 | 465                                                  | 320                          | 410 | 510                                                  | ps   |
| $t_{\text{S}}$                       | Setup Time                                                                           | 125                          | 0   |                                                      | 125                          | 0   |                                                      | 125                          | 0   |                                                      | 125                          | 0   |                                                      | ps   |
| $t_{\text{H}}$                       | Hold Time                                                                            | 150                          | 50  |                                                      | 150                          | 50  |                                                      | 150                          | 50  |                                                      | 150                          | 50  |                                                      | ps   |
| $t_{\text{PW}}$                      | Minimum Pulse Width                                                                  | 400                          |     |                                                      | 400                          |     |                                                      | 400                          |     |                                                      | 400                          |     |                                                      | ps   |
| $V_{\text{PP}}$                      | Minimum Input Swing <sup>1</sup>                                                     | 150                          |     |                                                      | 150                          |     |                                                      | 150                          |     |                                                      | 150                          |     |                                                      | mV   |
| $V_{\text{CMR}}$                     | Common Mode Range <sup>2</sup><br>D (10EL)<br>D (100EL)<br>CLK (10EL)<br>CLK (100EL) | -0.4<br>-0.4<br>-0.6<br>-0.8 |     | -1.6<br>-1.2<br>See <sup>3</sup><br>See <sup>3</sup> | -0.4<br>-0.4<br>-0.6<br>-0.8 |     | -1.6<br>-1.2<br>See <sup>3</sup><br>See <sup>3</sup> | -0.4<br>-0.4<br>-0.6<br>-0.8 |     | -1.6<br>-1.2<br>See <sup>3</sup><br>See <sup>3</sup> | -0.4<br>-0.4<br>-0.6<br>-0.8 |     | -1.6<br>-1.2<br>See <sup>3</sup><br>See <sup>3</sup> | V    |
| $t_{\text{r}}$<br>$t_{\text{f}}$     | Output Rise/Fall Times Q<br>(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  $V_{\text{ppmin}}$  and 1V.
3. The lower end of the CMR range is dependent on  $V_{EE}$  and is equal to  $V_{EE} + 2.5\text{V}$ .

## 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 |

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