

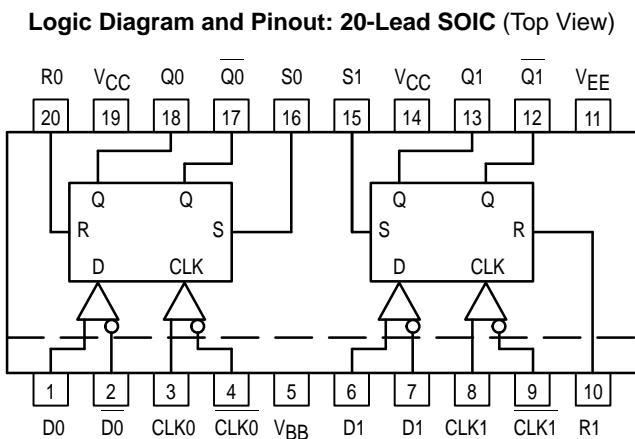
## Dual Differential Data and Clock D Flip-Flop With Set and Reset

The MC100LVEL29 is a dual master–slave flip flop. The device features fully differential Data and Clock inputs as well as outputs. The MC100EL29 is pin and functionally equivalent to the MC100LVEL29 but is specified for operation at the standard 100E ECL voltage supply. A  $V_{BB}$  output is provided for AC coupling, refer to the interfacing section of the ECLinPS Data Book (DL140) for more information on AC coupling ECL signals. Data enters the master latch when the clock is LOW and transfers to the slave upon a positive transition on the clock input.

The differential inputs have special circuitry which ensures device stability under open input conditions. When both differential inputs are left open the D input will pull down to  $V_{EE}$  and the  $\bar{D}$  input will bias around  $V_{CC}/2$ . The outputs will go to a defined state, however the state will be random based on how the flip flop powers up.

Both flip flops feature asynchronous, overriding Set and Reset inputs. Note that the Set and Reset inputs cannot both be HIGH simultaneously.

- 1100MHz Flip–Flop Toggle Frequency
- 20–lead SOIC Package
- 580ps Propagation Delays

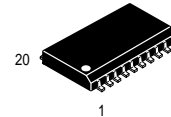


### MC100LVEL29

**DC CHARACTERISTICS** ( $V_{EE} = -3.0V$  to  $-3.8V$ ;  $V_{CC} = GND$ )

| 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     |       | 35  | 50    |       | 35  | 50    |       | 35  | 50    |       | 35  | 50    | mA      |
| $V_{BB}$ | Output Reference Voltage | -1.38 |     | -1.26 | -1.38 |     | -1.26 | -1.38 |     | -1.26 | -1.38 |     | -1.26 | V       |
| $I_{IH}$ | Input HIGH Current       |       |     | 150   |       |     | 150   |       |     | 150   |       |     | 150   | $\mu A$ |
| $I_{IL}$ | Input LOW Current        |       |     |       |       |     |       |       |     |       |       |     |       | $\mu A$ |
|          | $D_n$ Inputs             | 0.5   |     |       | 0.5   |     |       | 0.5   |     |       | 0.5   |     |       | $\mu A$ |
|          | $\bar{D}_n$ Inputs       | -300  |     |       | -300  |     |       | -300  |     |       | -300  |     |       | $\mu A$ |

## MC100LVEL29 MC100EL29



**DW SUFFIX**  
PLASTIC SOIC PACKAGE  
CASE 751D-04

### TRUTH TABLE

| R | S | D | CLK | Q     | $\bar{Q}$ |
|---|---|---|-----|-------|-----------|
| L | L | L | Z   | L     | H         |
| L | L | H | Z   | H     | L         |
| H | L | X | X   | L     | H         |
| L | H | X | X   | H     | L         |
| H | H | X | X   | Undef | Undef     |

Z = LOW to HIGH Transition

### PIN NAMES

| Pins      | Function     |
|-----------|--------------|
| D0–D1     | Data Inputs  |
| R0–R1     | Reset Inputs |
| CLK0–CLK1 | Clock Inputs |
| S0–S1     | Set Inputs   |



# MC100LVEL29 MC100EL29

## MC100LVEL29

### AC CHARACTERISTICS ( $V_{EE} = -3.0V$ to $-3.8V$ ; $V_{CC} = GND$ )

| 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  | 1.1          |     |              | 1.1          |     |              | 1.1          |     |              | 1.1          |     |              | GHz  |
| t <sub>PLH</sub><br>t <sub>PHL</sub> | Propagation Delay<br>to Output<br>CLK<br>S, R                         | 480<br>480   |     | 680<br>700   | 490<br>490   |     | 690<br>710   | 500<br>500   |     | 700<br>720   | 520<br>520   |     | 720<br>740   | ps   |
| t <sub>S</sub><br>t <sub>H</sub>     | Setup Time<br>Hold Time   | 0<br>100     |     |              | 0<br>100     |     |              | 0<br>100     |     |              | 0<br>100     |     |              | ps   |
| t <sub>RR</sub>                      | Set/Reset Recovery  | 100          |     |              | 100          |     |              | 100          |     |              | 100          |     |              | ps   |
| t <sub>PW</sub>                      | Minimum Pulse Width<br>CLK, Set, Reset                                | 400          |     |              | 400          |     |              | 400          |     |              | 400          |     |              | ps   |
| V <sub>PP</sub>                      | Minimum Input Swing   | 150          |     |              | 150          |     |              | 150          |     |              | 150          |     |              | mV   |
| V <sub>CMR</sub> <sup>1</sup>        | Common Mode Range<br>V <sub>PP</sub> <500mV<br>V <sub>PP</sub> ≥500mV | -2.0<br>-1.8 |     | -0.4<br>-0.4 | -2.1<br>-1.9 |     | -0.4<br>-0.4 | -2.1<br>-1.9 |     | -0.4<br>-0.4 | -2.1<br>-1.9 |     | -0.4<br>-0.4 | V    |
| t <sub>r</sub><br>t <sub>f</sub>     | Output Rise/Fall Times Q<br>(20% – 80%)                               | 280          |     | 550          | 280          |     | 550          | 280          |     | 550          | 280          |     | 550          | ps   |

1. 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<sub>ppmin</sub> and 1V. The lower end of the CMR range varies 1:1 with V<sub>EE</sub>. The numbers in the spec table assume a nominal V<sub>EE</sub> = -3.3V. Note for PECL operation, the V<sub>CMR(min)</sub> will be fixed at 3.3V - |V<sub>CMR(min)</sub>|.

## MC100EL29

### DC CHARACTERISTICS ( $V_{EE} = -4.2V$ to $-5.5V$ ; $V_{CC} = GND$ )

| 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                        |             | 35  | 50    |             | 35  | 50    |             | 35  | 50    |             | 35  | 50    | mA   |
| V <sub>BB</sub> | Output Reference Voltage                    | -1.38       |     | -1.26 | -1.38       |     | -1.26 | -1.38       |     | -1.26 | -1.38       |     | -1.26 | V    |
| I <sub>IH</sub> | Input HIGH Current                          |             |     | 150   |             |     | 150   |             |     | 150   |             |     | 150   | μA   |
| I <sub>IL</sub> | Input LOW Current<br>Dn Inputs<br>Dn Inputs | 0.5<br>-300 |     |       | 0.5<br>-300 |     |       | 0.5<br>-300 |     |       | 0.5<br>-300 |     |       | μA   |

## MC100EL29

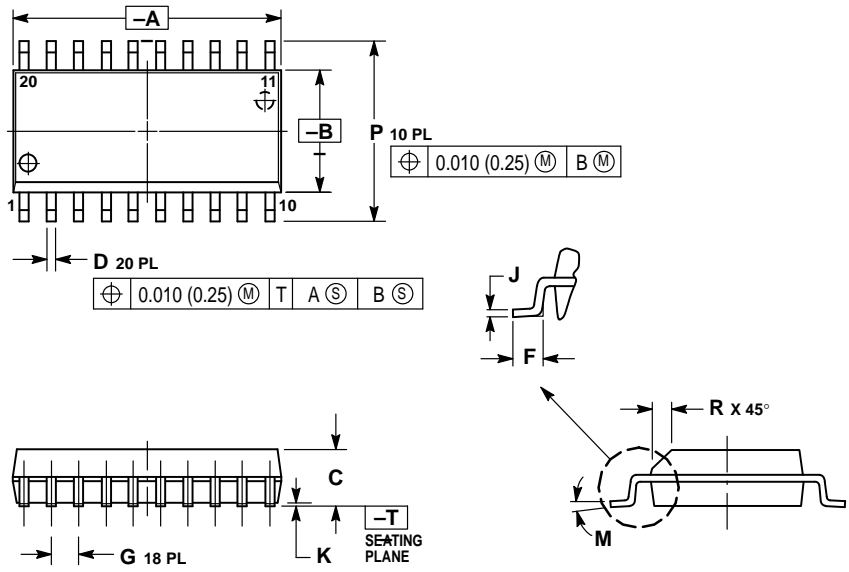
### AC CHARACTERISTICS ( $V_{EE} = -4.2V$ to $-5.5V$ ; $V_{CC} = GND$ )

| 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  | 1.1          |     |              | 1.1          |     |              | 1.1          |     |              | 1.1          |     |              | GHz  |
| t <sub>PLH</sub><br>t <sub>PHL</sub> | Propagation Delay<br>to Output<br>CLK<br>S, R                         | 480<br>480   |     | 680<br>700   | 490<br>490   |     | 690<br>710   | 500<br>500   |     | 700<br>720   | 520<br>520   |     | 720<br>740   | ps   |
| t <sub>S</sub><br>t <sub>H</sub>     | Setup Time<br>Hold Time   | 0<br>100     |     |              | 0<br>100     |     |              | 0<br>100     |     |              | 0<br>100     |     |              | ps   |
| t <sub>RR</sub>                      | Set/Reset Recovery  | 100          |     |              | 100          |     |              | 100          |     |              | 100          |     |              | ps   |
| t <sub>PW</sub>                      | Minimum Pulse Width<br>CLK, Set, Reset                                | 400          |     |              | 400          |     |              | 400          |     |              | 400          |     |              | ps   |
| V <sub>PP</sub>                      | Minimum Input Swing   | 150          |     |              | 150          |     |              | 150          |     |              | 150          |     |              | mV   |
| V <sub>CMR</sub> <sup>1</sup>        | Common Mode Range<br>V <sub>PP</sub> <500mV<br>V <sub>PP</sub> ≥500mV | -3.2<br>-3.0 |     | -0.4<br>-0.4 | -3.3<br>-3.1 |     | -0.4<br>-0.4 | -3.3<br>-3.1 |     | -0.4<br>-0.4 | -3.3<br>-3.1 |     | -0.4<br>-0.4 | V    |
| t <sub>r</sub><br>t <sub>f</sub>     | Output Rise/Fall Times Q<br>(20% – 80%)                               | 280          |     | 550          | 280          |     | 550          | 280          |     | 550          | 280          |     | 550          | ps   |

1. 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<sub>ppmin</sub> and 1V. The lower end of the CMR range varies 1:1 with V<sub>EE</sub>. The numbers in the spec table assume a nominal V<sub>EE</sub> = -4.5V. Note for PECL operation, the V<sub>CMR(min)</sub> will be fixed at 5.0V - |V<sub>CMR(min)</sub>|.

OUTLINE DIMENSIONS

DW SUFFIX  
PLASTIC SOIC PACKAGE  
CASE 751D-04  
ISSUE E



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: MILLIMETER.
  3. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
  4. MAXIMUM MOLD PROTRUSION 0.150 (0.006) PER SIDE.
  5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.13 (0.005) TOTAL IN EXCESS OF D DIMENSION AT MAXIMUM MATERIAL CONDITION.

| DIM | MILLIMETERS |       | INCHES    |       |
|-----|-------------|-------|-----------|-------|
|     | MIN         | MAX   | MIN       | MAX   |
| A   | 12.65       | 12.95 | 0.499     | 0.510 |
| B   | 7.40        | 7.60  | 0.292     | 0.299 |
| C   | 2.35        | 2.65  | 0.093     | 0.104 |
| D   | 0.35        | 0.49  | 0.014     | 0.019 |
| F   | 0.50        | 0.90  | 0.020     | 0.035 |
| G   | 1.27 BSC    |       | 0.050 BSC |       |
| J   | 0.25        | 0.32  | 0.010     | 0.012 |
| K   | 0.10        | 0.25  | 0.004     | 0.009 |
| M   | 0°          | 7°    | 0°        | 7°    |
| P   | 10.05       | 10.55 | 0.395     | 0.415 |
| R   | 0.25        | 0.75  | 0.010     | 0.029 |

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