



## DIFFERENTIAL CLOCK D FLIP-FLOP

**SY10EL51**  
**SY100EL51**

### FEATURES

- 475ps propagation delay
- 2.8GHz toggle frequency
- Internal 75K $\Omega$  input pull-down resistors
- Available in 8-pin SOIC package

### DESCRIPTION

The SY10/100EL51 are differential clock D flip-flops with reset. These devices are functionally similar to the E151 devices, 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 VEE) conditions.

### PIN NAMES

| Pin | Function    |
|-----|-------------|
| R   | Reset Input |
| D   | Data Input  |
| CLK | Clock Input |
| Q   | Data Output |

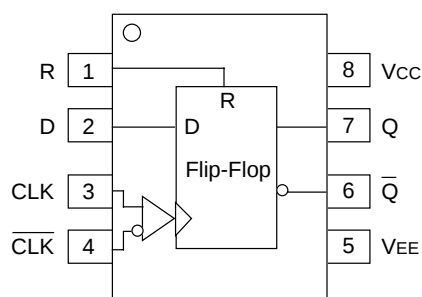
### TRUTH TABLE<sup>(1)</sup>

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

**NOTE:**

1. Z = LOW-to-HIGH transition.

## PACKAGE/ORDERING INFORMATION



8-Pin SOIC (Z8-1)

Ordering Information<sup>(1)</sup>

| Part Number                     | Package Type | Operating Range | Package Marking                       | Lead Finish    |
|---------------------------------|--------------|-----------------|---------------------------------------|----------------|
| SY10EL51ZC                      | Z8-1         | Commercial      | HEL51                                 | Sn-Pb          |
| SY10EL51ZCTR <sup>(2)</sup>     | Z8-1         | Commercial      | HEL51                                 | Sn-Pb          |
| SY100EL51ZC                     | Z8-1         | Commercial      | XEL51                                 | Sn-Pb          |
| SY100EL51ZCTR <sup>(2)</sup>    | Z8-1         | Commercial      | XEL51                                 | Sn-Pb          |
| SY10EL51ZI                      | Z8-1         | Industrial      | HEL51                                 | Sn-Pb          |
| SY10EL51ZITR <sup>(2)</sup>     | Z8-1         | Industrial      | HEL51                                 | Sn-Pb          |
| SY100EL51ZI                     | Z8-1         | Industrial      | XEL51                                 | Sn-Pb          |
| SY100EL51ZITR <sup>(2)</sup>    | Z8-1         | Industrial      | XEL51                                 | Sn-Pb          |
| SY10EL51ZG <sup>(3)</sup>       | Z8-1         | Industrial      | HEL51 with Pb-Free bar-line indicator | Pb-Free NiPdAu |
| SY10EL51ZGTR <sup>(2, 3)</sup>  | Z8-1         | Industrial      | HEL51 with Pb-Free bar-line indicator | Pb-Free NiPdAu |
| SY100EL51ZG <sup>(3)</sup>      | Z8-1         | Industrial      | XEL51 with Pb-Free bar-line indicator | Pb-Free NiPdAu |
| SY100EL51ZGTR <sup>(2, 3)</sup> | Z8-1         | Industrial      | XEL51 with Pb-Free bar-line indicator | Pb-Free NiPdAu |

## Notes:

1. Contact factory for die availability. Dice are guaranteed at  $T_A = 25^\circ\text{C}$ , DC Electricals only.
2. Tape and Reel.
3. Pb-Free package is recommended for new designs.

**DC ELECTRICAL CHARACTERISTICS**V<sub>EE</sub> = V<sub>EE</sub> (Min.) to V<sub>EE</sub> (Max.); V<sub>CC</sub> = GND

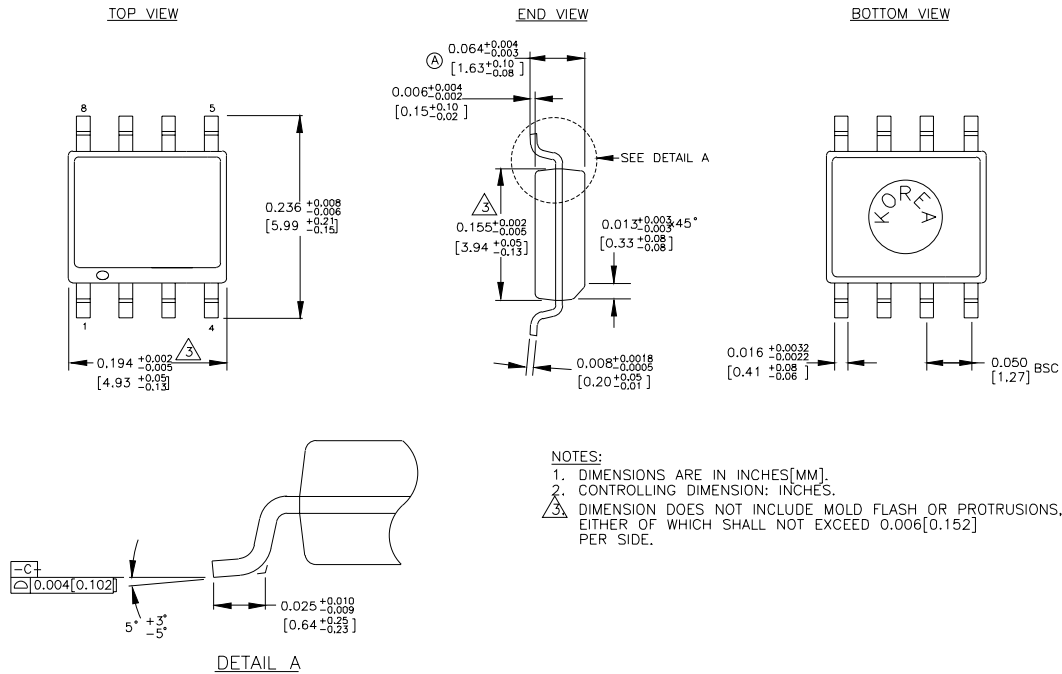
| Symbol          | Parameter            | T <sub>A</sub> = -40°C |      |      | T <sub>A</sub> = 0°C |      |      | T <sub>A</sub> = +25°C |      |      | T <sub>A</sub> = +85°C |      |      | Unit |
|-----------------|----------------------|------------------------|------|------|----------------------|------|------|------------------------|------|------|------------------------|------|------|------|
|                 |                      | Min.                   | Typ. | Max. | Min.                 | Typ. | Max. | Min.                   | Typ. | Max. | Min.                   | Typ. | Max. |      |
| I <sub>EE</sub> | Power Supply Current |                        |      |      |                      |      |      |                        |      |      |                        |      |      | mA   |
|                 | 10EL                 | —                      | 24   | 29   | 19                   | 24   | 29   | 19                     | 24   | 29   | 19                     | 24   | 29   |      |
|                 | 100EL                | —                      | 24   | 29   | 19                   | 24   | 29   | 19                     | 24   | 29   | 19                     | 24   | 29   |      |
| V <sub>EE</sub> | Power Supply Voltage |                        |      |      |                      |      |      |                        |      |      |                        |      |      | V    |
|                 | 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 |      |
|                 | 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 ELECTRICAL CHARACTERISTICS**V<sub>EE</sub> = V<sub>EE</sub> (Min.) to V<sub>EE</sub> (Max.); V<sub>CC</sub> = GND

| Symbol                           | Parameter                                | T <sub>A</sub> = -40°C |      |      | T <sub>A</sub> = 0°C |      |      | T <sub>A</sub> = +25°C |      |      | T <sub>A</sub> = +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>PD</sub>                  | Propagation Delay to Output<br>CLK<br>R  | 325                    | 465  | 605  | 375                  | 465  | 555  | 385                    | 475  | 565  | 440                    | 530  | 620  | ps   |
|                                  |                                          | 305                    | 455  | 605  | 355                  | 455  | 555  | 355                    | 465  | 565  | 410                    | 510  | 620  |      |
| t <sub>S</sub>                   | Set-up 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<br>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>         | (2)                    | —    | -0.4 | (2)                  | —    | -0.4 | (2)                    | —    | -0.4 | (2)                    | —    | -0.4 | V    |
| t <sub>r</sub><br>t <sub>f</sub> | Output Rise/Fall Times Q<br>(20% to 80%) | 100                    | 225  | 350  | 100                  | 225  | 350  | 100                    | 225  | 350  | 100                    | 225  | 350  | ps   |

**NOTES:**

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<sub>PP</sub> min. and 1V. The lower end of the CMR range is dependent on V<sub>EE</sub> and is equal to V<sub>EE</sub> + 3.0V.

**8-PIN SOIC .150" WIDE (Z8-1)**

Rev. 03

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