



**D FLIP-FLOP  
WITH SET AND RESET**

**SY10EL31  
SY100EL31**

**FEATURES**

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

**DESCRIPTION**

The SY10/100EL31 are D flip-flops with set and reset. The devices are functionally equivalent to the E131 devices, with higher performance capabilities. With propagation delays and output transition times significantly faster than the E131, the EL31 is ideally suited for those applications which require the ultimate in AC performance.

Both the set and reset inputs are asynchronous, level triggered signals. 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.

**PIN NAMES**

| Pin | Function     |
|-----|--------------|
| D   | Data Inputs  |
| Q   | Data Outputs |
| S   | Set          |
| R   | Reset        |
| CLK | Clock Input  |

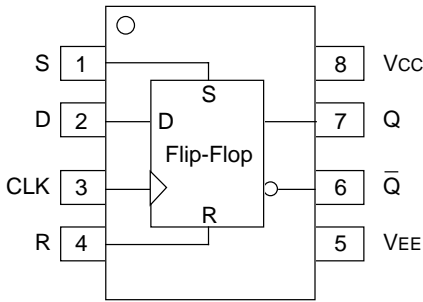
**TRUTH TABLE<sup>(1)</sup>**

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

**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    |
|---------------------------------|--------------|-----------------|---------------------------------------|----------------|
| SY10EL31ZC                      | Z8-1         | Commercial      | HEL31                                 | Sn-Pb          |
| SY10EL31ZCTR <sup>(2)</sup>     | Z8-1         | Commercial      | HEL31                                 | Sn-Pb          |
| SY100EL31ZC                     | Z8-1         | Commercial      | XEL31                                 | Sn-Pb          |
| SY100EL31ZCTR <sup>(2)</sup>    | Z8-1         | Commercial      | XEL31                                 | Sn-Pb          |
| SY10EL31ZI                      | Z8-1         | Industrial      | HEL31                                 | Sn-Pb          |
| SY10EL31ZITR <sup>(2)</sup>     | Z8-1         | Industrial      | HEL31                                 | Sn-Pb          |
| SY100EL31ZI                     | Z8-1         | Industrial      | XEL31                                 | Sn-Pb          |
| SY100EL31ZITR <sup>(2)</sup>    | Z8-1         | Industrial      | XEL31                                 | Sn-Pb          |
| SY10EL31ZG <sup>(3)</sup>       | Z8-1         | Industrial      | HEL31 with Pb-Free bar-line indicator | Pb-Free NiPdAu |
| SY10EL31ZGTR <sup>(2, 3)</sup>  | Z8-1         | Industrial      | HEL31 with Pb-Free bar-line indicator | Pb-Free NiPdAu |
| SY100EL31ZG <sup>(3)</sup>      | Z8-1         | Industrial      | XEL31 with Pb-Free bar-line indicator | Pb-Free NiPdAu |
| SY100EL31ZGTR <sup>(2, 3)</sup> | Z8-1         | Industrial      | XEL31 with Pb-Free bar-line indicator | Pb-Free NiPdAu |

**Notes:**

1. Contact factory for die availability. Dice are guaranteed at T<sub>A</sub> = 25°C, DC Electricals only.
2. Tape and Reel.
3. Pb-Free package is recommended for new designs.

### DC ELECTRICAL CHARACTERISTICS

VEE = VEE (Min.) to VEE (Max.); VCC = GND

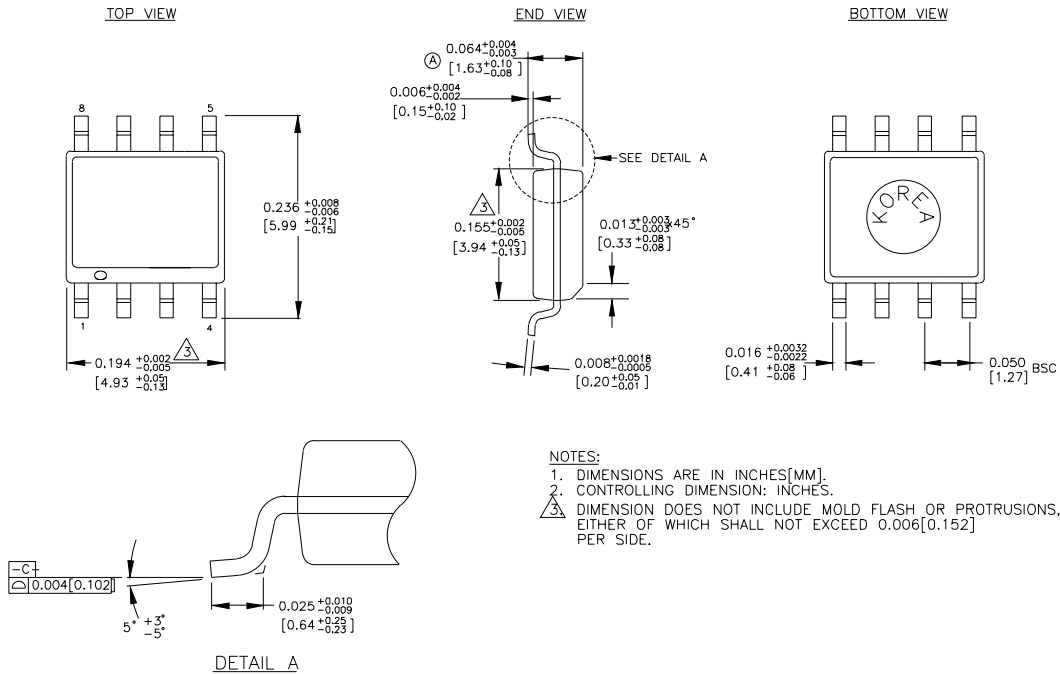
| Symbol          | Parameter            | TA = -40°C |      |      | TA = 0°C |      |      | TA = +25°C |      |      | TA = +85°C |      |      | Unit |
|-----------------|----------------------|------------|------|------|----------|------|------|------------|------|------|------------|------|------|------|
|                 |                      | Min.       | Typ. | Max. | Min.     | Typ. | Max. | Min.       | Typ. | Max. | Min.       | Typ. | Max. |      |
| IEE             | Power Supply Current |            |      |      |          |      |      |            |      |      |            |      |      | mA   |
|                 | 10EL                 | —          | 27   | 32   | 18       | 27   | 32   | 18         | 27   | 32   | 18         | 27   | 32   |      |
|                 | 100EL                | —          | 27   | 32   | 18       | 27   | 32   | 18         | 27   | 32   | 21         | 31   | 37   |      |
| VEE             | 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

VEE = VEE (Min.) to VEE (Max.); VCC = GND

| Symbol                           | Parameter                                  | TA = -40°C |      |      | TA = 0°C |      |      | TA = +25°C |      |      | TA = +85°C |      |      | Unit |
|----------------------------------|--|------------|------|------|----------|------|------|------------|------|------|------------|------|------|------|
|                                  |  | Min.       | Typ. | Max. | Min.     | Typ. | Max. | Min.       | Typ. | Max. | Min.       | Typ. | Max. |      |
| f <sub>MAX</sub>                 | Maximum Toggle Frequency                   | 20         | 2.5  | —    | 2.2      | 2.8  | —    | 2.2        | 2.8  | —    | 2.2        | 2.8  | —    | GHz  |
| t <sub>PD</sub>                  | Propagation Delay to Output<br>CLK<br>S, R | 315        | 465  | 630  | 365      | 465  | 580  | 375        | 475  | 590  | 430        | 530  | 645  | ps   |
|                                  |  | 295        | 455  | 630  | 345      | 455  | 580  | 355        | 465  | 590  | 400        | 510  | 645  |      |
| 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>                  | Set/Reset Recovery                         | 400        | 200  | —    | 400      | 200  | —    | 400        | 200  | —    | 400        | 200  | —    | ps   |
| t <sub>PW</sub>                  | Minimum Pulse Width<br>CLK, Set, Reset     | 400        | —    | —    | 400      | —    | —    | 400        | —    | —    | 400        | —    | —    | ps   |
| 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   |

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



Rev. 03

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