

## FEATURES

- 3.3V (SY100S834L) and 5V (SY100S834) power supply options
- 50ps output-to-output skew
- Synchronous enable/disable
- Master Reset for synchronization
- Internal 75KΩ input pull-down resistors
- Available in 16-pin SOIC package



Precision Edge®

## DESCRIPTION

The SY100S834/L is low skew (÷1, ÷2, ÷4) or (÷2, ÷4, ÷8) clock generation chip designed explicitly for low skew clock generation applications. The internal dividers are synchronous to each other, therefore, the common output edges are all precisely aligned. The devices can be driven by either a differential or single-ended ECL or, if positive power supplies are used, PECL input signal. In addition, by using the VBB output, a sinusoidal source can be AC-coupled into the device. If a single-ended input is to be used, the VBB output should be connected to the  $\overline{\text{CLK}}$  input and bypassed to ground via a 0.01μF capacitor. The VBB output is designed to act as the switching reference for the input of the SY100S834/L under single-ended input conditions. As a result, this pin can only source/sink up to 0.5mA of current.

The Function Select (FSEL) input is used to determine what clock generation chip function is. When FSEL input is LOW, SY100S834/L functions as a divide by 2, by 4 and by 8 clock generation chip. However, if FSEL input is HIGH, it functions as a divide by 1, by 2 and by 4 clock generation chip. This latter feature will increase the clock frequency by two folds.

The common enable ( $\overline{\text{EN}}$ ) is synchronous so that the internal dividers will only be enabled/disabled when the internal clock is already in the LOW state. This avoids any chance of generating a runt clock pulse on the internal clock when the device is enabled/disabled as can happen with an asynchronous control. An internal runt pulse could lead to losing synchronization between the internal divider stages. The internal enable flip-flop is clocked on the falling edge of the input clock, therefore, all associated specification limits are referenced to the negative edge of the clock input.

Upon start-up, the internal flip-flops will attain a random state; the master reset (MR) input allows for the synchronization of the internal dividers, as well as for multiple SY100S834/Ls in a system.

## TRUTH TABLE

| CLK | $\overline{\text{EN}}$ | MR | Function   |
|-----|------------------------|----|------------|
| Z   | L                      | L  | Divide     |
| ZZ  | H                      | L  | Hold Q0-2  |
| X   | X                      | H  | Reset Q0-2 |

### Notes:

Z = LOW-to-HIGH transition

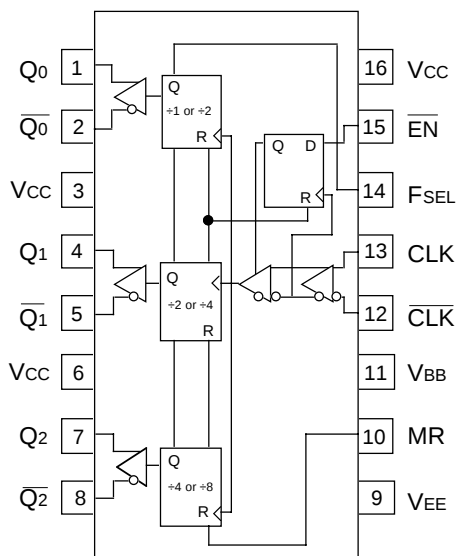
ZZ = HIGH-to-LOW transition

| FSEL | Q0 Outputs  | Q1 Outputs  | Q2 Outputs  |
|------|-------------|-------------|-------------|
| L    | Divide by 2 | Divide by 4 | Divide by 8 |
| H    | Divide by 1 | Divide by 2 | Divide by 4 |

## PIN NAMES

| Pin                    | Function                      |
|------------------------|-------------------------------|
| CLK                    | Differential Clock Inputs     |
| FSEL                   | Function Select               |
| $\overline{\text{EN}}$ | Synchronous Enable            |
| MR                     | Master Reset                  |
| VBB                    | Reference Output              |
| Q0                     | Differential ÷1 or ÷2 Outputs |
| Q1                     | Differential ÷2 or ÷4 Outputs |
| Q2                     | Differential ÷4 or ÷8 Outputs |

## PACKAGE/ORDERING INFORMATION



16-Pin SOIC (Z16-2)

## Ordering Information

| Part Number                      | Package Type | Operating Range | Package Marking                              | Lead Finish    |
|----------------------------------|--------------|-----------------|----------------------------------------------|----------------|
| SY100S834ZC                      | Z16-2        | Commercial      | SY100S834ZC                                  | Sn-Pb          |
| SY100S834ZCTR <sup>(1)</sup>     | Z16-2        | Commercial      | SY100S834ZC                                  | Sn-Pb          |
| SY100S834LZC                     | Z16-2        | Commercial      | SY100S834LZC                                 | Sn-Pb          |
| SY100S834LZCTR <sup>(1)</sup>    | Z16-2        | Commercial      | SY100S834LZC                                 | Sn-Pb          |
| SY100S834ZI                      | Z16-2        | Industrial      | SY100S834ZI                                  | Sn-Pb          |
| SY100S834ZITR <sup>(1)</sup>     | Z16-2        | Industrial      | SY100S834ZI                                  | Sn-Pb          |
| SY100S834LZI                     | Z16-2        | Industrial      | SY100S834LZI                                 | Sn-Pb          |
| SY100S834LZITR <sup>(1)</sup>    | Z16-2        | Industrial      | SY100S834LZI                                 | Sn-Pb          |
| SY100S834ZG <sup>(2)</sup>       | Z16-2        | Industrial      | SY100S834ZG with Pb-Free bar-line indicator  | NiPdAu Pb-Free |
| SY100S834ZGTR <sup>(1, 2)</sup>  | Z16-2        | Industrial      | SY100S834ZG with Pb-Free bar-line indicator  | NiPdAu Pb-Free |
| SY100S834LZG <sup>(2)</sup>      | Z16-2        | Industrial      | SY100S834LZG with Pb-Free bar-line indicator | NiPdAu Pb-Free |
| SY100S834LZGTR <sup>(1, 2)</sup> | Z16-2        | Industrial      | SY100S834LZG with Pb-Free bar-line indicator | NiPdAu Pb-Free |

## Notes:

1. Tape and Reel.
2. Pb-Free package is recommended for new designs.

**3.3V PECL OUTPUT DC ELECTRICAL CHARACTERISTICS<sup>(1)</sup>** $V_{CC} = 3.3V \pm 10\%$ ;  $R_L = 50\Omega$  to  $V_{CC} - 2V$ ,  $V_{EE} = GND$ 

| 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.  |      |
| I <sub>EE</sub>  | Power Supply Current             | —          | —     | 49    | —        | —     | 49    | —          | —     | 49    | —          | —     | 54    | mA   |
| V <sub>OH</sub>  | Output HIGH Voltage              | 2.215      | 2.295 | 2.42  | 2.275    | 2.345 | 2.42  | 2.275      | 2.345 | 2.42  | 2.275      | 2.345 | 2.42  | V    |
| V <sub>OL</sub>  | Output LOW Voltage               | 1.47       | 1.605 | 1.745 | 1.49     | 1.595 | 1.68  | 1.49       | 1.595 | 1.68  | 1.49       | 1.595 | 1.68  | V    |
| V <sub>IH</sub>  | Input HIGH Voltage               | 2.135      | —     | 2.42  | 2.135    | —     | 2.42  | 2.135      | —     | 2.42  | 2.135      | —     | 2.42  | V    |
| V <sub>IL</sub>  | Input LOW Voltage                | 1.49       | —     | 1.825 | 1.49     | —     | 1.825 | 1.49       | —     | 1.825 | 1.49       | —     | 1.825 | V    |
| V <sub>BB</sub>  | Output Reference Voltage         | 1.92       | —     | 2.04  | 1.92     | —     | 2.04  | 1.92       | —     | 2.04  | 1.92       | —     | 2.04  | V    |
| V <sub>CMR</sub> | Common Mode Range <sup>(2)</sup> | 2          | —     | 2.9   | 1.9      | —     | 2.9   | 1.9        | —     | 2.9   | 1.9        | —     | 2.9   | V    |
| I <sub>IH</sub>  | Input HIGH Current               | —          | —     | 150   | —        | —     | 150   | —          | —     | 150   | —          | —     | 150   | μA   |
| I <sub>IL</sub>  | Input LOW Current                | 0.5        | —     | —     | 0.5      | —     | —     | 0.5        | —     | —     | 0.5        | —     | —     | μA   |

**Note:**

- These values are for  $V_{CC} = 3.3V$ . Level specifications will vary 1:1 with  $V_{CC}$ .
- 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  $V_{PP}$  min. and 1V. The lower end of the CMR range varies 1:1 with  $V_{EE}$ . Note for PECL operation, the  $V_{CMR}$  (min) will be fixed at  $3.3V - IV_{CMR}$  (min).

**5V PECL OUTPUT DC ELECTRICAL CHARACTERISTICS<sup>(3)</sup>** $V_{CC} = 5V \pm 10\%$ ;  $R_L = 50\Omega$  to  $V_{CC} - 2V$ ,  $V_{EE} = GND$ 

| 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.  |      |
| I <sub>EE</sub>  | Power Supply Current             | —          | —     | 49    | —        | —     | 49    | —          | —     | 49    | —          | —     | 54    | mA   |
| V <sub>OH</sub>  | Output HIGH Voltage              | 3.915      | 3.995 | 4.12  | 3.975    | 4.045 | 4.12  | 3.975      | 4.045 | 4.12  | 3.975      | 4.045 | 4.12  | V    |
| V <sub>OL</sub>  | Output LOW Voltage               | 3.17       | 3.305 | 3.445 | 3.19     | 3.295 | 3.38  | 3.19       | 3.295 | 3.38  | 3.19       | 3.295 | 3.38  | V    |
| V <sub>IH</sub>  | Input HIGH Voltage               | 3.835      | —     | 4.12  | 3.835    | —     | 4.12  | 3.835      | —     | 4.12  | 3.835      | —     | 4.12  | V    |
| V <sub>IL</sub>  | Input LOW Voltage                | 3.19       | —     | 3.525 | 3.19     | —     | 3.525 | 3.19       | —     | 3.525 | 3.19       | —     | 3.525 | V    |
| V <sub>BB</sub>  | Output Reference Voltage         | 3.62       | —     | 3.74  | 3.62     | —     | 3.74  | 3.62       | —     | 3.74  | 3.62       | —     | 3.74  | V    |
| V <sub>CMR</sub> | Common Mode Range <sup>(4)</sup> | 2          | —     | 4.6   | 1.9      | —     | 4.6   | 1.9        | —     | 4.6   | 1.9        | —     | 4.6   | V    |
| I <sub>IH</sub>  | Input HIGH Current               | —          | —     | 150   | —        | —     | 150   | —          | —     | 150   | —          | —     | 150   | μA   |
| I <sub>IL</sub>  | Input LOW Current                | 0.5        | —     | —     | 0.5      | —     | —     | 0.5        | —     | —     | 0.5        | —     | —     | μA   |

**Notes:**

- These values are for  $V_{CC} = 5V$ . Level specifications will vary 1:1 with  $V_{CC}$ .
- 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  $V_{PP}$  min. and 1V. The lower end of the CMR range varies 1:1 with  $V_{EE}$ . Note for PECL operation, the  $V_{CMR}$  (min) will be fixed at  $3.3V - IV_{CMR}$  (min).

$$V_{CC} = \text{GND}; R_L = 50\Omega \text{ to } V_{CC}-2V, V_{EE} = -3.0V \text{ to } -5.5V$$

| 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             | —                      | —     | 49    | —                    | —     | 49    | —                      | —     | 49    | —                      | —     | 54    | mA   |
| V <sub>OH</sub>  | Output HIGH Voltage              | -1085                  | -1005 | -880  | -1025                | -955  | -880  | -1025                  | -955  | -880  | -1025                  | -955  | -880  | mV   |
| V <sub>OL</sub>  | Output LOW Voltage               | -1830                  | -1695 | -1555 | -1830                | -1705 | -1620 | -1810                  | -1705 | -1620 | -1810                  | -1705 | -1620 | mV   |
| V <sub>IH</sub>  | Input HIGH Voltage               | -1165                  | —     | -880  | -1165                | —     | -880  | -1165                  | —     | -880  | -1165                  | —     | -880  | mV   |
| V <sub>IL</sub>  | Input LOW Voltage                | -1810                  | —     | -1475 | -1810                | —     | -1475 | -1810                  | —     | -1475 | -1810                  | —     | -1475 | mV   |
| V <sub>BB</sub>  | Output Reference Voltage         | -1.38                  | —     | -1.26 | -1.38                | —     | -1.26 | -1.38                  | —     | -1.26 | -1.38                  | —     | -1.26 | V    |
| V <sub>CMR</sub> | Common Mode Range <sup>(2)</sup> | -1.3                   | —     | -0.4  | -1.4                 | —     | -0.4  | -1.4                   | —     | -0.4  | -1.4                   | —     | -0.4  | V    |
| I <sub>IH</sub>  | Input HIGH Current               | —                      | —     | 150   | —                    | —     | 150   | —                      | —     | 150   | —                      | —     | 150   | μA   |
| I <sub>IL</sub>  | Input LOW Current                | 0.5                    | —     | —     | 0.5                  | —     | —     | 0.5                    | —     | —     | 0.5                    | —     | —     | μA   |

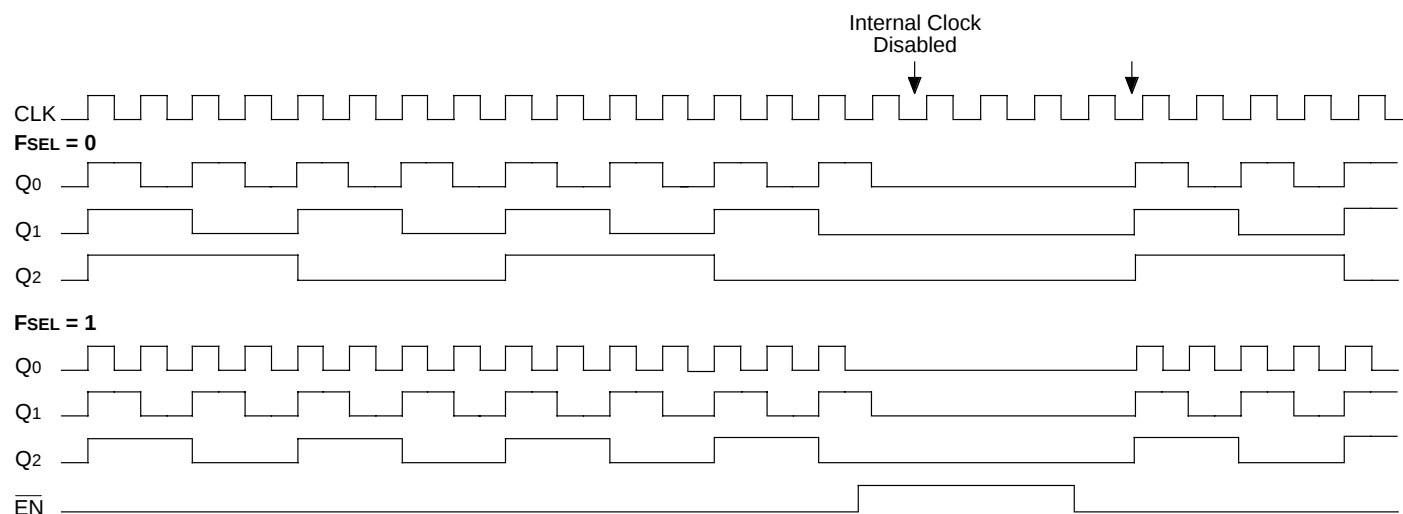
2. The CMR range is referenced to the most positive side of the differential input signal. Normal operation is obtained if the HIGH level falls within the specified range and the peak-to-peak voltage lies between  $V_{PP}$  min. and 1V. The lower end of the CMR range varies 1:1 with  $V_{EE}$ . The numbers in the spec table assume a nominal  $V_{EE} = -3.3V$ . Note for PECL operation, the  $V_{CMR}$  (min) will be fixed at  $3.3V - IV_{CMR}$  (min).

$$V_{EE} = V_{EE} \text{ (Min.) to } V_{EE} \text{ (Max.)}; V_{CC} = \text{GND}$$

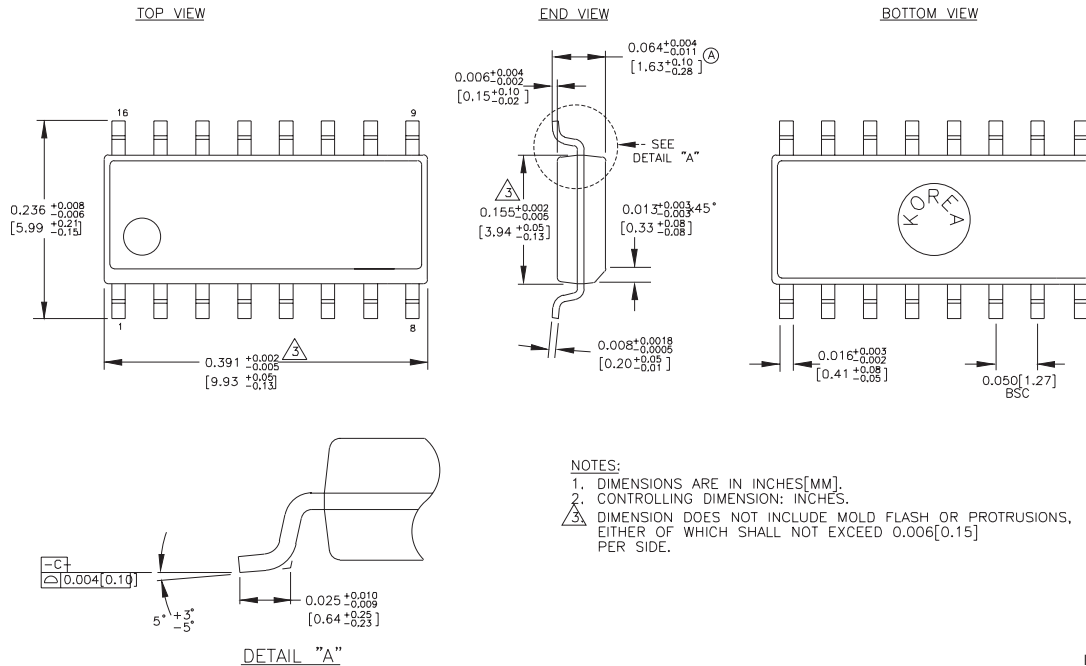
| Symbol                               | Parameter                               | T <sub>A</sub> = −40°C |             |              | T <sub>A</sub> = 0°C |             |              | T <sub>A</sub> = +25°C |             |              | T <sub>A</sub> = +85°C |             |              | Unit |
|--------------------------------------|-----------------------------------------|------------------------|-------------|--------------|----------------------|-------------|--------------|------------------------|-------------|--------------|------------------------|-------------|--------------|------|
|                                      |                                         | Min.                   | Typ.        | Max.         | Min.                 | Typ.        | Max.         | Min.                   | Typ.        | Max.         | Min.                   | Typ.        | Max.         |      |
| t <sub>PLH</sub><br>t <sub>PHL</sub> | Propagation Delay<br>CLK to Output      | 960<br>650             | 1100<br>800 | 1200<br>1010 | 960<br>650           | 1100<br>800 | 1200<br>1010 | 960<br>650             | 1100<br>800 | 1200<br>1010 | 960<br>650             | 1100<br>800 | 1200<br>1010 | ps   |
| t <sub>skew</sub>                    | Within-Device Skew <sup>(4)</sup>       | —                      | —           | 50           | —                    | —           | 50           | —                      | —           | 50           | —                      | —           | 50           | ps   |
| t <sub>S</sub>                       | Set-up Time $\overline{\text{EN}}$      | 400                    | —           | —            | 400                  | —           | —            | 400                    | —           | —            | 400                    | —           | —            | ps   |
| t <sub>H</sub>                       | Hold Time $\overline{\text{EN}}$        | 200                    | —           | —            | 200                  | —           | —            | 200                    | —           | —            | 200                    | —           | —            | ps   |
| V <sub>PP</sub>                      | Minimum Input Swing                     | 250                    | —           | —            | 250                  | —           | —            | 250                    | —           | —            | 250                    | —           | —            | mV   |
| t <sub>r</sub><br>t <sub>f</sub>     | Output Rise/Fall Times<br>Q (20% – 80%) | 275                    | 400         | 525          | 275                  | 400         | 525          | 275                    | 400         | 525          | 275                    | 400         | 525          | ps   |

|                                                              |                           |                 |                 |
|--------------------------------------------------------------|---------------------------|-----------------|-----------------|
| 3. Parametric values specified at:                           | 5 volt Power Supply Range | 100S834 Series: | -4.2V to -5.5V. |
|                                                              | 3 volt Power Supply Range | 100S834L Series | -3.0V to -3.8V. |
| 4. Within-Device Skew is specified for identical transition. |                           |                 |                 |

## TIMING DIAGRAM



The  $\overline{\text{EN}}$  signal will freeze the internal clocks to the flip-flops on the first falling edge of CLK after its assertion. The internal dividers will maintain their state during the internal clock freeze and will return to clocking once the internal clocks are unfrozen. The outputs will transition to their next states in the same manner, time and relationship as they would have had the  $\overline{\text{EN}}$  signal not been asserted.

**16-PIN SOIC .150" WIDE (Z16-2)**

Rev. 02

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