



# 2.5V/3.3/5V 2.5GHz 1:4 PECL/ECL CLOCK DRIVER WITH 2:1 DIFFERENTIAL INPUT MUX

Precision Edge®  
SY89830U

## FEATURES

- **Guaranteed AC parameters over temp/voltage:**
  - > 2.5GHz  $f_{MAX}$
  - < 25ps within-device skew
  - < 225ps  $t_r/t_f$  time
  - < 450ps prop delay
- **Low jitter design:**
  - < 1ps<sub>RMS</sub> cycle-to-cycle jitter
  - < 15ps<sub>pp</sub> total jitter
- **2:1 Differential MUX input**
- **Flexible supply voltage: 2.5V/3.3V/5V**
- **Wide operating temperature range: -40°C to +85°C**
- **100K ECL compatible outputs**
- **Inputs accept PECL/LVPECL/ECL/HSTL logic levels**
- **Available in a 16-pin TSSOP package**



Precision Edge®

## DESCRIPTION

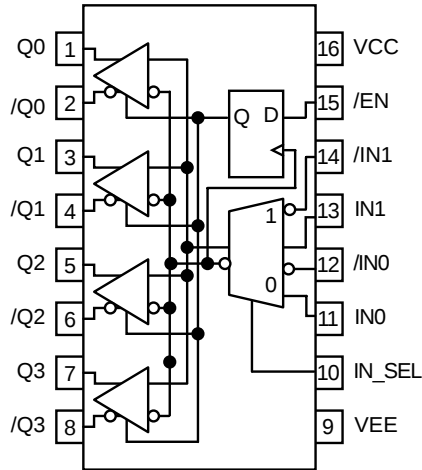
The SY89830U is a high-speed, 2.5GHz differential PECL 1:4 fanout buffer optimized for ultra-low skew applications. Within device skew is guaranteed to be less than 25ps over temperature and supply voltage. The wide supply voltage operation allows this fanout buffer to operate in 2.5V, 3.3V, and 5V systems.

The SY89830U features a 2:1 input MUX, making it an ideal solution for redundant clock switchover applications. If only one input pair is used, the other pair may be left floating. In addition, this device includes a synchronous enable pin that forces the outputs into a fixed logic state. Enable or disable state is initiated only after the outputs are in a LOW state, thus eliminating the possibility of a "runt" clock pulse.

The SY89830U I/O are fully differential and 100K ECL compatible. Differential 10K ECL logic can interface directly into the SY89830U inputs.

The SY89830U is part of Micrel's high-speed precision edge timing and distribution family. For applications that require a different I/O combination, consult the Micrel website at [www.micrel.com](http://www.micrel.com), and choose from a comprehensive product line of high-speed, low-skew fanout buffers, translators, and clock generators.

## PACKAGE/ORDERING INFORMATION



16-Pin TSSOP (T32-1)

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

| Part Number                     | Package Type | Operating Range | Package Marking                        | Lead Finish    |
|---------------------------------|--------------|-----------------|----------------------------------------|----------------|
| SY89830UK4I                     | K4-16-1      | Industrial      | 89830U                                 | Sn-Pb          |
| SY89830UK4ITR <sup>(2)</sup>    | K4-16-1      | Industrial      | 89830U                                 | Sn-Pb          |
| SY89830UK4G <sup>(3)</sup>      | K4-16-1      | Industrial      | 89830U with Pb-Free bar line indicator | NiPdAu Pb-Free |
| SY89830UK4GTR <sup>(2, 3)</sup> | K4-16-1      | Industrial      | 89830U with Pb-Free bar line indicator | NiPdAu Pb-Free |

## 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.

## PIN DESCRIPTION

| Pin Number                | Pin Name               | Pin Function                                                                                                                                                                                                                                                                                                         |
|---------------------------|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1, 2, 3, 4,<br>5, 6, 7, 8 | Q0 to Q3<br>/Q0 to /Q3 | (LV)PECL, (LV)ECL differential outputs: Terminate with $50\Omega$ to $V_{CC}-2V$ . For single-ended applications, terminate the unused output with $50\Omega$ to $V_{CC}-2V$ .                                                                                                                                       |
| 9                         | $V_{EE}$               | Negative Power Supply: For LVPECL, PECL applications, connect to GND.                                                                                                                                                                                                                                                |
| 10                        | IN_SEL                 | (LV)PECL, (LV)ECL compatible 2:1 mux input signal select: When IN_SEL is LOW, the IN0 input pair is selected. When IN_SEL is HIGH, the IN1 input pair is selected. Includes a $75k\Omega$ pull-down. Default state is LOW and IN0 is selected.                                                                       |
| 11, 12, 13, 14            | IN0, /IN0<br>IN1, /IN1 | (LV)PECL, (LV)ECL, HSTL clock or data inputs. Internal $75k\Omega$ pull-down resistors on IN0, IN1. Internal $75k\Omega$ pull-up and $75k\Omega$ pull-down resistors on /IN0, /IN1. /IN0, /IN1 default condition is $V_{CC}/2$ when left floating. IN0, IN1 default condition is LOW when left floating.             |
| 15                        | /EN                    | (LV)PECL, (LV)ECL compatible synchronous enable: When /EN goes HIGH, $Q_{OUT}$ will go LOW and / $Q_{OUT}$ will go HIGH on the next LOW input clock transition. Includes a $75k\Omega$ pull-down. Default state is LOW when left floating. The internal latch is clocked on the falling edge of the input (IN0, IN1) |
| 16                        | $V_{CC}$               | Positive Power Supply: Bypass with $0.1\mu\text{F}/0.01\mu\text{F}$ low ESR capacitors.                                                                                                                                                                                                                              |

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

| IN0                   | IN1                   | IN_SEL | /EN | Q |
|-----------------------|-----------------------|--------|-----|---|
| L                     | X                     | L      | L   | L |
| H                     | X                     | L      | L   | H |
| X                     | L                     | H      | L   | L |
| X                     | H                     | H      | L   | H |
| $\overline{\text{L}}$ | X                     | L      | H   | L |
| X                     | $\overline{\text{L}}$ | H      | H   | L |

## Note:

1.  $\overline{\text{L}}$  = negative edge

**ABSOLUTE MAXIMUM RATINGS<sup>(1)</sup>**

| Symbol            | Rating                                                                                                                                                   | Value                  | Unit |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|------|
| $V_{CC} - V_{EE}$ | Power Supply Voltage                                                                                                                                     | 6.0                    | V    |
| $V_{IN}$          | Input Voltage ( $V_{CC} = 0V$ , $V_{IN}$ not more negative than $V_{EE}$ )<br>Input Voltage ( $V_{EE} = 0V$ , $V_{IN}$ not more positive than $V_{CC}$ ) | -6.0 to 0<br>+6.0 to 0 | V    |
| $I_{OUT}$         | Output Current<br>–Continuous<br>–Surge                                                                                                                  | 50<br>100              | mA   |
| $T_A$             | Operating Temperature Range                                                                                                                              | -40 to +85             | °C   |
| $T_{LEAD}$        | Lead Temperature (soldering, 20sec.)                                                                                                                     | 260                    | °C   |
| $T_{store}$       | Storage Temperature Range                                                                                                                                | -65 to +150            | °C   |
| $\theta_{JA}$     | Package Thermal Resistance (Junction-to-Ambient)<br>–Still-Air (single-layer PCB)<br>–Still-Air (multi-layer PCB)<br>–500lfpm (multi-layer PCB)          | 115<br>75<br>65        | °C/W |
| $\theta_{JC}$     | Package Thermal Resistance (Junction-to-Case)                                                                                                            | 21                     | °C/W |

**Note:**

1. Permanent device damage may occur if absolute maximum ratings are exceeded. This is a stress rating only and functional operation is not implied at conditions other than those detailed in the operational sections of this data sheet. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

**DC ELECTRICAL CHARACTERISTICS<sup>(1)</sup>**

| Symbol   | Parameter                                                                                                                  | $T_A = -40^\circ\text{C}$ |      |      | $T_A = +25^\circ\text{C}$ |      |      | $T_A = +85^\circ\text{C}$ |      |      | Unit | Condition                              |
|----------|----------------------------------------------------------------------------------------------------------------------------|---------------------------|------|------|---------------------------|------|------|---------------------------|------|------|------|----------------------------------------|
|          |                                                                                                                            | Min.                      | Typ. | Max. | Min.                      | Typ. | Max. | Min.                      | Typ. | Max. |      |                                        |
| $V_{CC}$ | Power Supply Voltage<br>(PECL) 4.5 5.0 5.5<br>(LVPECL) 2.375 3.3 3.63<br>(ECL) -5.5 -5.0 -4.5<br>(LVECL) -3.63 -3.3 -2.375 | 4.5                       | 5.0  | 5.5  | 4.5                       | 5.0  | 5.5  | 4.5                       | 5.0  | 5.5  | V    |                                        |
| $I_{CC}$ | Power Supply Current                                                                                                       | —                         | —    | 70   | —                         | 50   | 72   | —                         | —    | 75   | mA   |                                        |
| $I_{IH}$ | Input HIGH Current                                                                                                         | —                         | —    | 150  | —                         | —    | 150  | —                         | —    | 150  | μA   | $V_{IN} = V_{IH}$                      |
| $I_{IL}$ | Input LOW Current IN /IN                                                                                                   | 0.5 -150                  | —    | —    | 0.5 -150                  | —    | —    | 0.5 -150                  | —    | —    | μA   | $V_{IN} = V_{IL}$<br>$V_{IN} = V_{IL}$ |
| $C_{IN}$ | Input Capacitance (TSSOP)                                                                                                  | —                         | —    | —    | —                         | 1.0  | —    | —                         | —    | —    | pF   |                                        |

**Note:**

1. 100KEP circuits are designed to meet the DC specifications shown in the above table after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and traverse airflow greater than 500lfpm is maintained.

**(100KEP) LVPECL DC ELECTRICAL CHARACTERISTICS<sup>(1)</sup>** $V_{CC} = 2.5V \pm 5\%$ ,  $V_{EE} = 0V$ 

| Symbol      | Parameter                                           | $T_A = -40^\circ C$ |      |          | $T_A = +25^\circ C$ |      |          | $T_A = +85^\circ C$ |      |          | Unit | Condition       |
|-------------|-----------------------------------------------------|---------------------|------|----------|---------------------|------|----------|---------------------|------|----------|------|-----------------|
|             |                                                     | Min.                | Typ. | Max.     | Min.                | Typ. | Max.     | Min.                | Typ. | Max.     |      |                 |
| $V_{IL}$    | Input LOW Voltage (Single-ended)                    | 555                 | —    | 875      | 555                 | —    | 875      | 555                 | —    | 875      | mV   | $V_{CC} = 2.5V$ |
| $V_{IH}$    | Input HIGH Voltage (Single-ended)                   | 1275                | —    | 1620     | 1275                | —    | 1620     | 1275                | —    | 1620     | mV   | $V_{CC} = 2.5V$ |
| $V_{OL}$    | Output LOW Voltage                                  | 555                 | 680  | 805      | 555                 | 680  | 805      | 555                 | 680  | 805      | mV   | $V_{CC} = 2.5V$ |
| $V_{OH}$    | Output HIGH Voltage                                 | 1355                | 1480 | 1605     | 1355                | 1480 | 1605     | 1355                | 1480 | 1605     | mV   | $V_{CC} = 2.5V$ |
| $V_{IHCMR}$ | Input HIGH Voltage Common Mode Range <sup>(2)</sup> | 1.2                 | —    | $V_{CC}$ | 1.2                 | —    | $V_{CC}$ | 1.2                 | —    | $V_{CC}$ | V    |                 |

**Notes:**

- 100KEP circuits are designed to meet the DC specifications shown in the above table after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and traverse airflow greater than 500lfpm is maintained. Input and output parameters vary 1:1 with  $V_{CC}$ . Output load is  $50\Omega$  to  $V_{CC} - 2V$ .
- The  $V_{IHCMR}$  range is referenced to the most positive side of the differential input signal.

**(100KEP) LVPECL DC ELECTRICAL CHARACTERISTICS<sup>(1)</sup>** $V_{CC} = 3.3V \pm 10\%$ ,  $V_{EE} = 0V$ 

| Symbol      | Parameter                                           | $T_A = -40^\circ C$ |      |          | $T_A = +25^\circ C$ |      |          | $T_A = +85^\circ C$ |      |          | Unit | Condition       |
|-------------|-----------------------------------------------------|---------------------|------|----------|---------------------|------|----------|---------------------|------|----------|------|-----------------|
|             |                                                     | Min.                | Typ. | Max.     | Min.                | Typ. | Max.     | Min.                | Typ. | Max.     |      |                 |
| $V_{IL}$    | Input LOW Voltage (Single-Ended)                    | 1355                | —    | 1675     | 1355                | —    | 1675     | 1355                | —    | 1675     | mV   | $V_{CC} = 3.3V$ |
| $V_{IH}$    | Input HIGH Voltage (Single-Ended)                   | 2075                | —    | 2420     | 2075                | —    | 2420     | 2075                | —    | 2420     | mV   | $V_{CC} = 3.3V$ |
| $V_{OL}$    | Output LOW Voltage                                  | 1355                | 1480 | 1605     | 1355                | 1480 | 1605     | 1355                | 1480 | 1605     | mV   | $V_{CC} = 3.3V$ |
| $V_{OH}$    | Output HIGH Voltage                                 | 2155                | 2280 | 2405     | 2155                | 2280 | 2405     | 2155                | 2280 | 2405     | mV   | $V_{CC} = 3.3V$ |
| $V_{IHCMR}$ | Input HIGH Voltage Common Mode Range <sup>(2)</sup> | 1.2                 | —    | $V_{CC}$ | 1.2                 | —    | $V_{CC}$ | 1.2                 | —    | $V_{CC}$ | V    |                 |

**Notes:**

- 100KEP circuits are designed to meet the DC specifications shown in the above table after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and traverse airflow greater than 500lfpm is maintained. Input and output parameters vary 1:1 with  $V_{CC}$ . Output load is  $50\Omega$  to  $V_{CC} - 2V$ .
- The  $V_{IHCMR}$  range is referenced to the most positive side of the differential input signal.

**(100KEP) PECL DC ELECTRICAL CHARACTERISTICS<sup>(1)</sup>** $V_{CC} = 5.0V \pm 10\%$ ,  $V_{EE} = 0V$ 

| Symbol      | Parameter                                           | $T_A = -40^\circ C$ |      |          | $T_A = +25^\circ C$ |      |          | $T_A = +85^\circ C$ |      |          | Unit | Condition       |
|-------------|-----------------------------------------------------|---------------------|------|----------|---------------------|------|----------|---------------------|------|----------|------|-----------------|
|             |                                                     | Min.                | Typ. | Max.     | Min.                | Typ. | Max.     | Min.                | Typ. | Max.     |      |                 |
| $V_{IL}$    | Input LOW Voltage (Single-Ended)                    | 3055                | —    | 3375     | 3055                | —    | 3375     | 3055                | —    | 3375     | mV   | $V_{CC} = 5.0V$ |
| $V_{IH}$    | Input HIGH Voltage (Single-Ended)                   | 3775                | —    | 4120     | 3775                | —    | 4120     | 3775                | —    | 4120     | mV   | $V_{CC} = 5.0V$ |
| $V_{OL}$    | Output LOW Voltage                                  | 3055                | 3180 | 3305     | 3055                | 3180 | 3305     | 3055                | 3180 | 3305     | mV   | $V_{CC} = 5.0V$ |
| $V_{OH}$    | Output HIGH Voltage                                 | 3855                | 3980 | 4105     | 3855                | 3980 | 4105     | 3855                | 3980 | 4105     | mV   | $V_{CC} = 5.0V$ |
| $V_{IHCMR}$ | Input HIGH Voltage <sup>(2)</sup> Common Mode Range | 1.2                 | —    | $V_{CC}$ | 1.2                 | —    | $V_{CC}$ | 1.2                 | —    | $V_{CC}$ | V    |                 |

**Notes:**

- 100KEP circuits are designed to meet the DC specifications shown in the above table after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and traverse airflow greater than 500lfpm is maintained. Input and output parameters vary 1:1 with  $V_{CC}$ . Output load is  $50\Omega$  to  $V_{CC} - 2V$ .
- The  $V_{IHCMR}$  range is referenced to the most positive side of the differential input signal.

**(100KEP) LVECL DC ELECTRICAL CHARACTERISTICS<sup>(1)</sup>** $V_{CC} = 0V$ ,  $V_{EE} = -2.375V$  to  $-3.63V$ 

| Symbol      | Parameter                                           | $T_A = -40^\circ C$ |       |       | $T_A = +25^\circ C$ |       |       | $T_A = +85^\circ C$ |       |       | Unit | Condition                 |
|-------------|-----------------------------------------------------|---------------------|-------|-------|---------------------|-------|-------|---------------------|-------|-------|------|---------------------------|
|             |                                                     | Min.                | Typ.  | Max.  | Min.                | Typ.  | Max.  | Min.                | Typ.  | Max.  |      |                           |
| $V_{IL}$    | Input LOW Voltage (Single-ended)                    | -1945               | —     | -1625 | -1945               | —     | -1625 | -1945               | —     | -1625 | mV   |                           |
| $V_{IH}$    | Input HIGH Voltage (Single-ended)                   | -1225               | —     | -880  | -1225               | —     | -880  | -1225               | —     | -880  | mV   |                           |
| $V_{OL}$    | Output LOW Voltage                                  | -1945               | -1820 | -1695 | -1945               | -1820 | -1695 | -1945               | -1820 | -1695 | mV   | $50\Omega$ to $V_{CC}-2V$ |
| $V_{OH}$    | Output HIGH Voltage                                 | -1145               | -1020 | -895  | -1145               | -1020 | -895  | -1145               | -1020 | -895  | mV   | $50\Omega$ to $V_{CC}-2V$ |
| $V_{IHCMR}$ | Input HIGH Voltage Common Mode Range <sup>(2)</sup> | $V_{EE}+1.2$        | —     | 0.0   | $V_{EE}+1.2$        | —     | 0.0   | $V_{EE}+1.2$        | —     | 0.0   | V    |                           |

**Notes:**

- 100KEP circuits are designed to meet the DC specifications shown in the above table after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and traverse airflow greater than 500lfpm is maintained.
- The  $V_{IHCMR}$  range is referenced to the most positive side of the differential input signal.

**(100KEP) ECL DC ELECTRICAL CHARACTERISTICS<sup>(1)</sup>** $V_{CC} = 0V$ ,  $V_{EE} = -4.5V$  to  $-5.5V$ 

| Symbol      | Parameter                                           | $T_A = -40^\circ C$ |       |       | $T_A = +25^\circ C$ |       |       | $T_A = +85^\circ C$ |       |       | Unit | Condition                 |
|-------------|-----------------------------------------------------|---------------------|-------|-------|---------------------|-------|-------|---------------------|-------|-------|------|---------------------------|
|             |                                                     | Min.                | Typ.  | Max.  | Min.                | Typ.  | Max.  | Min.                | Typ.  | Max.  |      |                           |
| $V_{IL}$    | Input LOW Voltage (Single-ended)                    | -1945               | —     | -1625 | -1945               | —     | -1625 | -1945               | —     | -1625 | mV   |                           |
| $V_{IH}$    | Input HIGH Voltage (Single-ended)                   | -1225               | —     | -880  | -1225               | —     | -880  | -1225               | —     | -880  | mV   |                           |
| $V_{OL}$    | Output LOW Voltage                                  | -1945               | -1820 | -1695 | -1945               | -1820 | -1695 | -1945               | -1820 | -1695 | mV   | $50\Omega$ to $V_{CC}-2V$ |
| $V_{OH}$    | Output HIGH Voltage                                 | -1145               | -1020 | -895  | -1145               | -1020 | -895  | -1145               | -1020 | -895  | mV   | $50\Omega$ to $V_{CC}-2V$ |
| $V_{IHCMR}$ | Input HIGH Voltage Common Mode Range <sup>(2)</sup> | $V_{EE}+1.2$        | —     | 0.0   | $V_{EE}+1.2$        | —     | 0.0   | $V_{EE}+1.2$        | —     | 0.0   | V    |                           |

**Notes:**

- 100KEP circuits are designed to meet the DC specifications shown in the above table after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and traverse airflow greater than 500lfpm is maintained.
- The  $V_{IHCMR}$  range is referenced to the most positive side of the differential input signal.

**HSTL INPUT DC ELECTRICAL CHARACTERISTICS** $V_{CC} = 2.375V$  to  $3.63V$ ,  $V_{EE} = 0V$ 

| Symbol   | Parameter          | $T_A = -40^\circ C$ |      |      | $T_A = +25^\circ C$ |      |      | $T_A = +85^\circ C$ |      |      | Unit |
|----------|--------------------|---------------------|------|------|---------------------|------|------|---------------------|------|------|------|
|          |                    | Min.                | Typ. | Max. | Min.                | Typ. | Max. | Min.                | Typ. | Max. |      |
| $V_{IH}$ | Input HIGH Voltage | 1200                | —    | —    | 1200                | —    | —    | 1200                | —    | —    | mV   |
| $V_{IL}$ | Input LOW Voltage  | —                   | —    | 400  | —                   | —    | 400  | —                   | —    | 400  | mV   |

**AC ELECTRICAL CHARACTERISTICS**LVPECL:  $V_{CC} = 2.375V$  to  $3.63V$ ,  $V_{EE} = 0V$ ; PECL:  $V_{CC} = 4.50V$  to  $5.50V$ ,  $V_{EE} = 0V$ LVECL:  $V_{CC} = 0V$ ,  $V_{EE} = -2.375V$  to  $-3.63V$ ; ECL:  $V_{CC} = 0V$ ,  $V_{EE} = -4.50V$  to  $-5.5V$ 

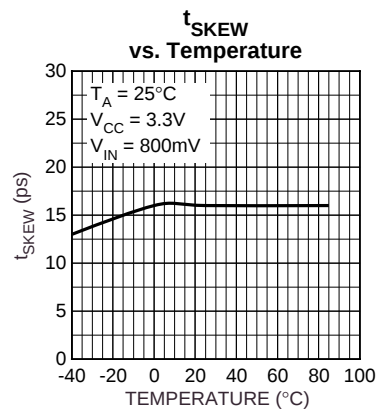
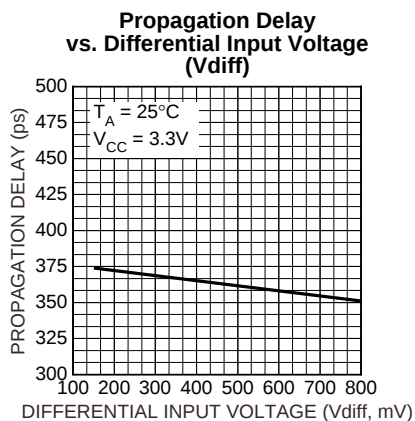
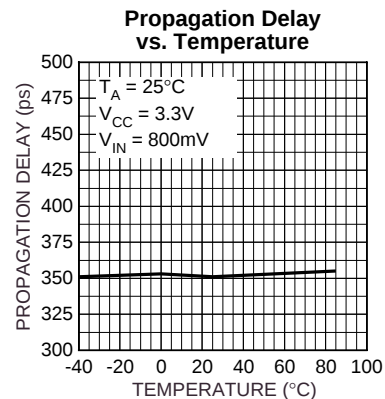
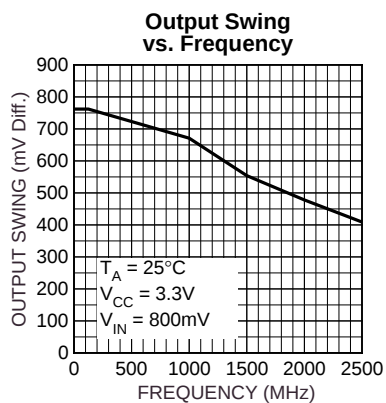
| Symbol           | Parameter                                   | $T_A = -40^\circ C$ |      |      | $T_A = +25^\circ C$ |      |      | $T_A = +85^\circ C$ |      |      | Unit              |
|------------------|---------------------------------------------|---------------------|------|------|---------------------|------|------|---------------------|------|------|-------------------|
|                  |                                             | Min.                | Typ. | Max. | Min.                | Typ. | Max. | Min.                | Typ. | Max. |                   |
| $f_{MAX}^{(1)}$  | Maximum Frequency                           | 2.5                 | —    | —    | 2.5                 | —    | —    | 2.5                 | —    | —    | GHz               |
| $t_{PD}$         | Propagation Delay to Output<br>LVPECL/LVECL |                     |      |      |                     |      |      |                     |      |      |                   |
|                  | Diff. IN (150mV)                            | —                   | —    | —    | —                   | 375  | —    | —                   | —    | —    | ps                |
|                  | Diff. IN (800mV)                            | 300                 | 350  | 450  | 300                 | 350  | 450  | 300                 | 350  | 450  | ps                |
|                  | Single-Ended IN                             | —                   | —    | —    | —                   | 375  | —    | —                   | —    | —    | ps                |
|                  | PECL/ECL                                    |                     |      |      |                     |      |      |                     |      |      |                   |
|                  | Diff. IN (150mV)                            | —                   | —    | —    | —                   | 375  | —    | —                   | —    | —    | ps                |
|                  | Diff. IN (800mV)                            | 275                 | 350  | 425  | 275                 | 350  | 425  | 275                 | 350  | 425  | ps                |
|                  | Single-Ended IN                             | —                   | —    | —    | —                   | 355  | —    | —                   | —    | —    | ps                |
|                  | HSTL                                        | 325                 | —    | 500  | 300                 | —    | 450  | 300                 | —    | 450  | ps                |
| $t_{SKEW}^{(2)}$ | Within-Device Skew (Diff.)                  | —                   | 15   | 25   | —                   | 15   | 25   | —                   | 15   | 25   | ps                |
|                  | Part-to-Part Skew (Diff.)                   | —                   | 100  | 150  | —                   | 100  | 150  | —                   | 100  | 150  | ps                |
| $t_{SW}$         | Select to Valid Output<br>Switchover Time   | —                   | —    | 450  | —                   | 400  | 450  | —                   | —    | 450  | ps                |
| $t_S^{(3)}$      | Set-Up Time /EN to CLK                      | 100                 | 0    | —    | 100                 | 0    | —    | 100                 | 0    | —    | ps                |
| $t_H^{(3)}$      | Hold Time /EN to CLK                        | 200                 | 50   | —    | 200                 | 50   | —    | 200                 | 50   | —    | ps                |
| $t_{JITTER}$     | Cycle-to-Cycle <sup>(4)</sup>               | —                   | 0.2  | 1    | —                   | 0.2  | 1    | —                   | 0.2  | 1    | ps <sub>RMS</sub> |
|                  | Total Jitter (622MHz clock) <sup>(5)</sup>  | —                   | <15  | —    | —                   | <15  | —    | —                   | <15  | —    | ps <sub>PP</sub>  |
| $V_{ID}$         | Input Voltage Swing                         | 150                 | 800  | 1200 | 150                 | 800  | 1200 | 150                 | 800  | 1200 | mV                |
| $t_r, t_f$       | Output Rise/Fall Times<br>(20% to 80%)      | 75                  | —    | 225  | 75                  | 130  | 225  | 85                  | —    | 225  | ps                |

**Notes:**

- $f_{MAX}$  is defined as the maximum toggle frequency. Measured with 750mV input signal, 50% duty cycle, output swing  $\geq 400mV$  (diff), all loading with  $50\Omega$  to  $V_{CC}-2V$ .
- Skew is measured between outputs under identical transitions.
- Set-up and hold times apply to synchronous applications that intend to enable/disable before the next cycle. For asynchronous applications, set-up and hold time does not apply.
- Cycle-to-cycle jitter definition: The variation in period between adjacent cycles over a random sample of adjacent cycle pairs.  $T_{JITTER\_CC} = T_n - T_{n+1}$  where  $T$  is the time between rising edges of the output signal.
- Total jitter definition: with an ideal clock input applied to one channel of the MUX, no more than one output edge in  $10^{12}$  output edges will deviate by more than the specified peak-to-peak jitter value.

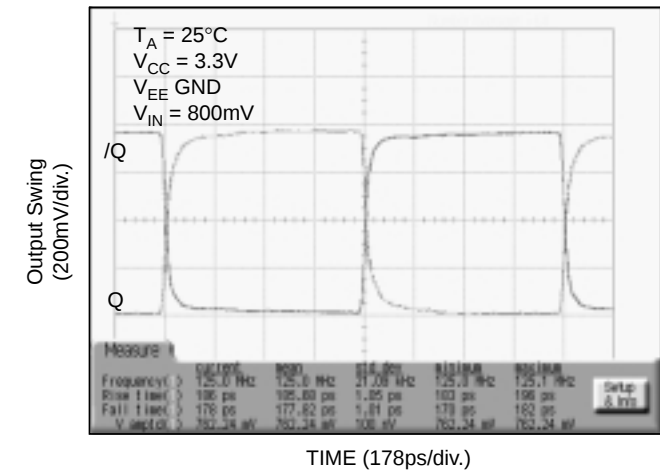
**TYPICAL OPERATING CHARACTERISTICS**

$V_{CC} = 3.3V$ ,  $V_{EE} = GND$ ,  $T_A = 25^\circ C$ , unless otherwise stated.

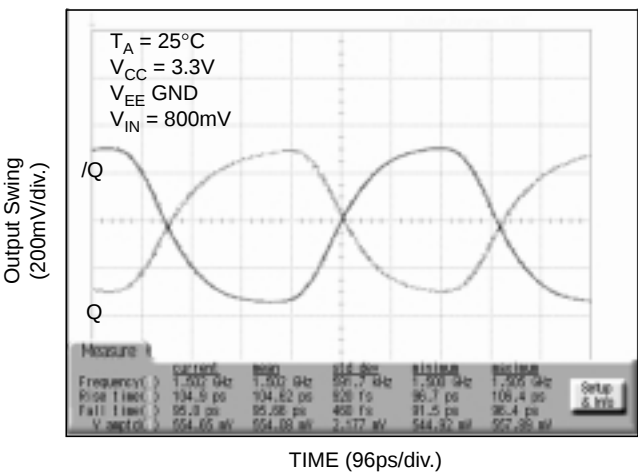


FUNCTIONAL CHARACTERISTICS

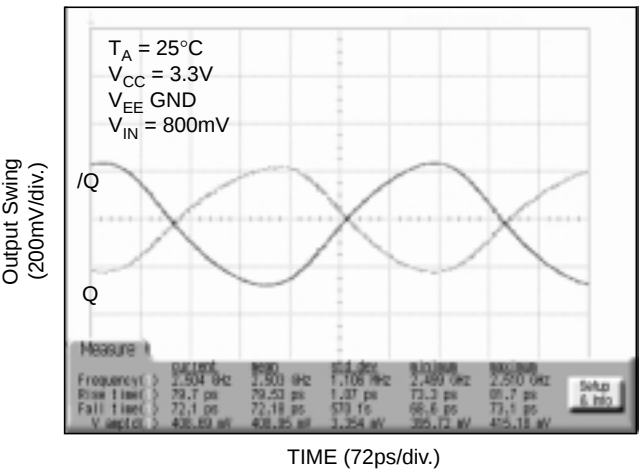
125MHz Output



1.5GHz Output



2.5GHz Output



## TERMINATION RECOMMENDATIONS

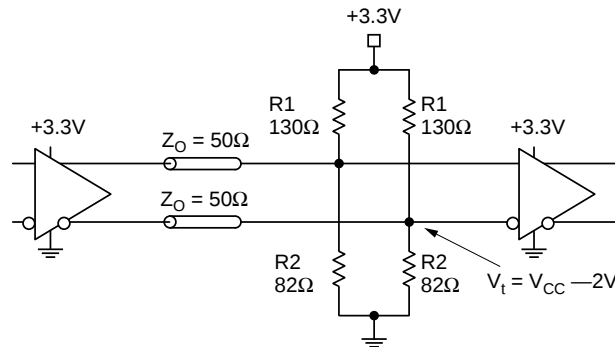


Figure 1. Parallel Termination-Thevenin Equivalent

**Notes:**

- For +2.5V systems:  
R1 = 250Ω  
R2 = 62.5Ω
- For +5.0V systems:  
R1 = 82Ω  
R2 = 130Ω

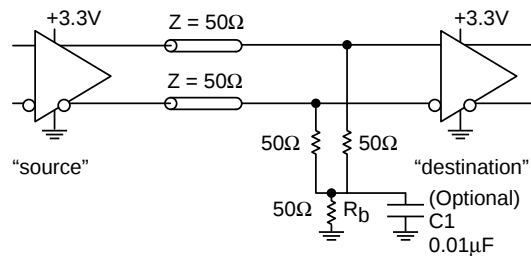


Figure 2. Three-Resistor "Y-Termination"

**Notes:**

- Power-saving alternative to Thevenin termination.
- Place termination resistors as close to destination inputs as possible.
- $R_b$  resistor sets the DC bias voltage, equal to  $V_t$ . For +3.3V systems  $R_b = 46\Omega$  to  $50\Omega$ . For +5V systems,  $R_b = 110\Omega$ .
- C1 is an optional bypass capacitor intended to compensate for any tr/tf mismatches.

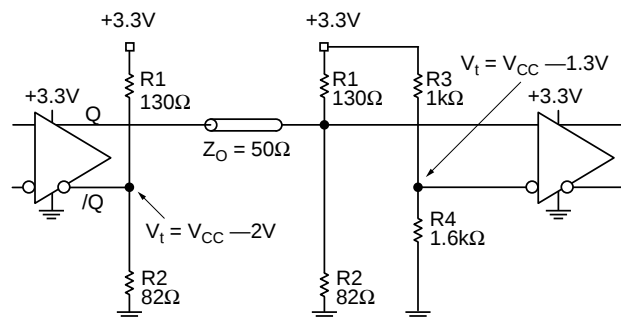
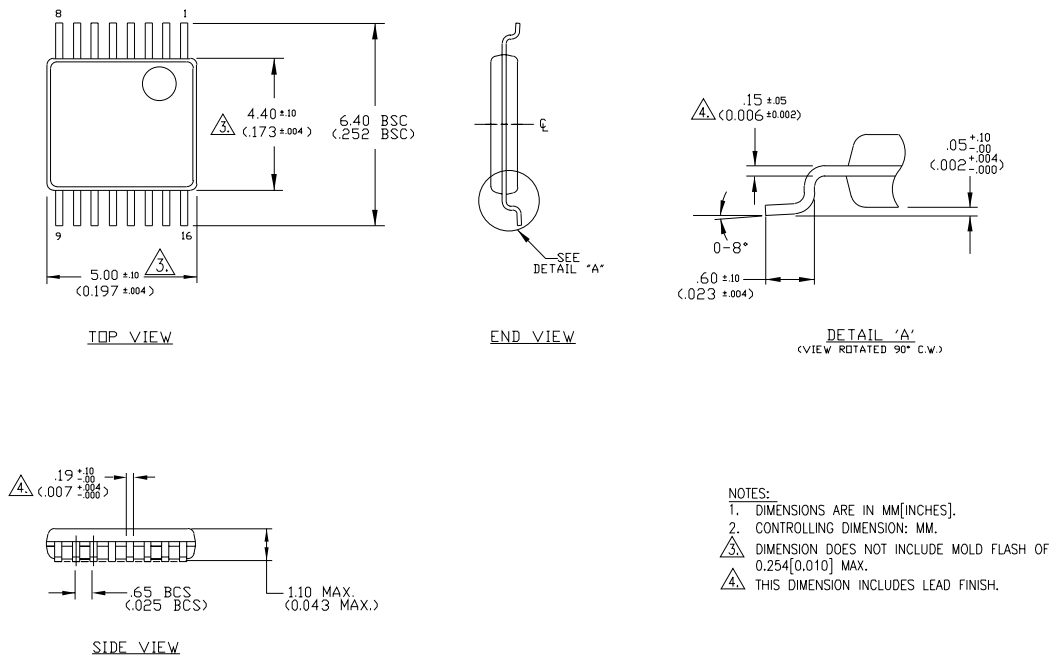


Figure 3. Terminating Unused I/O

**Notes:**

- Unused output (/Q) must be terminated to balance the output.
- For +2.5V systems: R1 = 250Ω, R2 = 62.5Ω, R3 = 1.25kΩ, R4 = 1.2kΩ.

**16 LEAD TSSOP (K4-16-1)**

Rev. 01

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