

### FEATURES

- 3.3V power supply
- Translates positive ECL-to-TTL (PECL-to-TTL)
- 300ps pin-to-pin skew
- 500ps part-to-part skew
- Differential internal design for increased noise immunity and stable threshold inputs
- VBB reference output
- Single supply
- Enable input
- Extra TTL and ECL power/ground pins to reduce cross-talk/noise
- High drive capability: 24mA each output
- Fully compatible with industry standard 10K, 100K I/O levels
- Available in 16-pin SOIC package



Precision Edge®

### DESCRIPTION

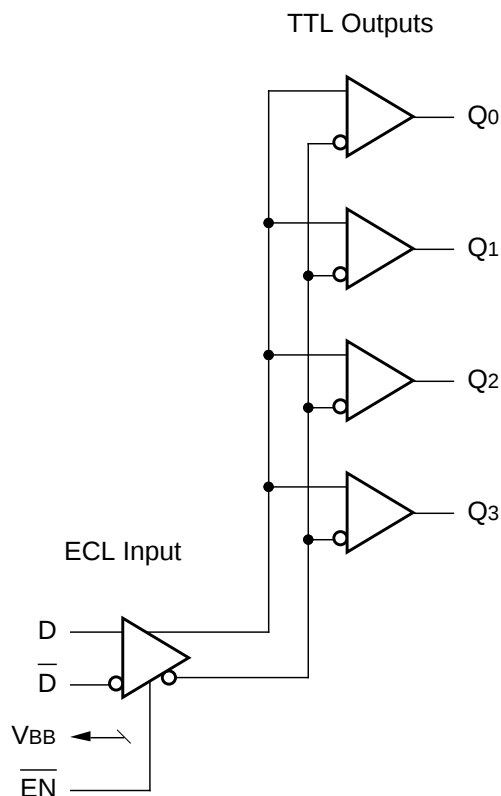
The SY10/100H842L are single supply, low skew translating 1:4 clock drivers.

The devices feature a 24mA TTL output stage, with AC performance specified into a 20pF load capacitance. A HIGH on the enable pin ( $\overline{EN}$ ) forces all outputs LOW.

As frequencies increase to 40MHz and above, precise timing and shaping of clock signals becomes extremely important. The H842 solves several clock distribution problems such as minimizing skew (300ps), maximizing clock fanout (24mA drive), and precise duty cycle control through a proprietary differential internal design.

The 10K version is compatible with 10KH ECL logic levels. The 100K version is compatible with 100K levels.

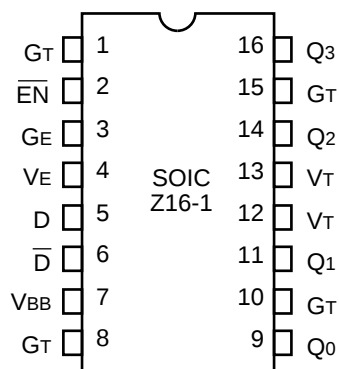
### BLOCK DIAGRAM



### PIN NAMES

| Pin               | Function                    |
|-------------------|-----------------------------|
| GT                | TTL Ground (0V)             |
| VT                | TTL Vcc (+3.3V)             |
| VE                | ECL Vcc (+3.3V)             |
| GE                | ECL Ground (0V)             |
| D, $\overline{D}$ | Signal Input (PECL)         |
| VBB               | VBB Reference Output (PECL) |
| Q0 - Q3           | Signal Outputs (TTL)        |
| $\overline{EN}$   | Enable Input (PECL)         |

## PACKAGE/ORDERING INFORMATION



16-Pin SOIC (Z16-1)

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

| Part Number                      | Package Type | Operating Range | Package Marking                              | Lead Finish    |
|----------------------------------|--------------|-----------------|----------------------------------------------|----------------|
| SY10H842LZC                      | Z16-1        | Commercial      | SY10H842LZC                                  | Sn-Pb          |
| SY10H842LZCTR <sup>(2)</sup>     | Z16-1        | Commercial      | SY10H842LZC                                  | Sn-Pb          |
| SY100H842LZC                     | Z16-1        | Commercial      | SY100H842LZC                                 | Sn-Pb          |
| SY100H842LZCTR <sup>(2)</sup>    | Z16-1        | Commercial      | SY100H842LZC                                 | Sn-Pb          |
| SY10H842LZH <sup>(3)</sup>       | Z16-1        | Commercial      | SY10H842LZH with Pb-Free bar-line indicator  | NiPdAu Pb-Free |
| SY10H842LZHTR <sup>(2, 3)</sup>  | Z16-1        | Commercial      | SY10H842LZH with Pb-Free bar-line indicator  | NiPdAu Pb-Free |
| SY100H842LZG <sup>(3)</sup>      | Z16-1        | Industrial      | SY100H842LZG with Pb-Free bar-line indicator | NiPdAu Pb-Free |
| SY100H842LZGTR <sup>(2, 3)</sup> | Z16-1        | Industrial      | SY100H842LZG 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.

## TRUTH TABLE

| D | $\overline{EN}$ | Q |
|---|-----------------|---|
| L | L               | L |
| H | L               | H |
| X | H               | L |

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

| Symbol                         | Rating                                           | Value                           | Unit     |
|--------------------------------|--------------------------------------------------|---------------------------------|----------|
| $V_E$ (ECL)<br>$V_T$ (TTL)     | Power Supply Voltage                             | –0.5 to +7.0<br>–0.5 to +7.0    | V        |
| $V_I$ (ECL)<br>$V_{OUT}$ (TTL) | Input Voltage                                    | 0.0 to $V_{EE}$<br>0.0 to $V_T$ | V        |
| $T_{LEAD}$                     | Lead Temperature Range (soldering, 20sec.)       | +260                            | °C       |
| $T_{store}$                    | Storage Temperature                              | –65 to +150                     | °C       |
| $T_A$                          | Operating Temperature<br>SY10H842L<br>SY100H842L | 0 to +85<br>–40 to +85          | °C<br>°C |

## 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.

## PIN DESCRIPTION

| Pin | Symbol          | Description                      |
|-----|-----------------|----------------------------------|
| 1   | $G_T$           | TTL Ground (0V)                  |
| 2   | $\overline{EN}$ | Enable Input (PECL)              |
| 3   | $G_E$           | ECL Ground (0V)                  |
| 4   | $V_E$           | ECL $V_{CC}$ (+3.3V)             |
| 5   | D               | ECL Signal Input (Non-inverting) |
| 6   | $\overline{D}$  | ECL Signal Input (Inverting)     |
| 7   | $V_{BB}$        | $V_{BB}$ Reference Output (PECL) |
| 8   | $G_T$           | TTL Ground (0V)                  |
| 9   | $Q_0$           | Signal Output (TTL)              |
| 10  | $G_T$           | TTL Ground (0V)                  |
| 11  | $Q_1$           | Signal Output (TTL)              |
| 12  | $V_T$           | TTL $V_{CC}$ (+3.3V)             |
| 13  | $V_T$           | TTL $V_{CC}$ (+3.3V)             |
| 14  | $Q_2$           | Signal Output (TTL)              |
| 15  | $G_T$           | TTL Ground (0V)                  |
| 16  | $Q_3$           | Signal Output (TTL)              |

## DC CHARACTERISTICS

 $V_T = V_E = +3.0V$  to +3.6V

| Symbol    | Parameter            |     | $T_A = 0^\circ C$ |      | $T_A = +25^\circ C$ |      | $T_A = +85^\circ C$ |      | Unit | Condition            |
|-----------|----------------------|-----|-------------------|------|---------------------|------|---------------------|------|------|----------------------|
|           |                      |     | Min.              | Max. | Min.                | Max. | Min.                | Max. |      |                      |
| $I_{EE}$  | Power Supply Current | ECL | —                 | 35   | —                   | 35   | —                   | 35   | mA   | $V_E$ Pin            |
| $I_{CCH}$ | Power Supply Current | TTL | —                 | 20   | —                   | 20   | —                   | 20   | mA   | Total all $V_T$ pins |
| $I_{CCL}$ |                      |     | —                 | 25   | —                   | 25   | —                   | 25   |      |                      |

## TTL DC ELECTRICAL CHARACTERISTICS

 $V_T = V_E = +3.0V$  to +3.6V

| Symbol   | Parameter                    | $T_A = 0^\circ C$ |      | $T_A = +25^\circ C$ |      | $T_A = +85^\circ C$ |      | Unit | Condition         |
|----------|------------------------------|-------------------|------|---------------------|------|---------------------|------|------|-------------------|
|          |                              | Min.              | Max. | Min.                | Max. | Min.                | Max. |      |                   |
| $V_{OH}$ | Output HIGH Voltage          | 2.0               | —    | 2.0                 | —    | 2.0                 | —    | V    | $I_{OH} = -3.0mA$ |
| $V_{OL}$ | Output LOW Voltage           | —                 | 0.5  | —                   | 0.5  | —                   | 0.5  | V    | $I_{OL} = 24mA$   |
| $I_{OS}$ | Output Short Circuit Current | –80               | —    | –80                 | —    | –80                 | —    | mA   | $V_{OUT} = 0V$    |

**10H ECL DC ELECTRICAL CHARACTERISTICS**V<sub>T</sub> = V<sub>E</sub> = +3.0V to +3.6V

| Symbol          | Parameter                | T <sub>A</sub> = 0°C |       | T <sub>A</sub> = +25°C |       | T <sub>A</sub> = +85°C |       | Unit | Condition             |
|-----------------|--------------------------|----------------------|-------|------------------------|-------|------------------------|-------|------|-----------------------|
|                 |                          | Min.                 | Max.  | Min.                   | Max.  | Min.                   | Max.  |      |                       |
| I <sub>IH</sub> | Input HIGH Current       | —                    | 225   | —                      | 175   | —                      | 175   | μA   |                       |
| I <sub>IL</sub> | Input LOW Current        | 0.5                  | —     | 0.5                    | —     | 0.5                    | —     | μA   | —                     |
| V <sub>IH</sub> | Input HIGH Voltage       | 2.130                | 2.460 | 2.170                  | 2.490 | 2.240                  | 2.580 | V    | V <sub>E</sub> = 3.3V |
| V <sub>IL</sub> | Input LOW Voltage        | 1.350                | 1.820 | 1.350                  | 1.820 | 1.350                  | 1.855 | V    | V <sub>E</sub> = 3.3V |
| V <sub>BB</sub> | Output Reference Voltage | 1.920                | 2.030 | 1.950                  | 2.050 | 1.990                  | 2.111 | V    | V <sub>E</sub> = 3.3V |

**Note:**

1. ECL V<sub>IH</sub>, V<sub>IL</sub> and V<sub>BB</sub> are referenced to V<sub>CC</sub>E and will vary 1:1 with the power supply. The levels shown are for I<sub>VT</sub> = I<sub>VO</sub> = V<sub>CC</sub>E = +3.3V.

**100H ECL DC ELECTRICAL CHARACTERISTICS**V<sub>T</sub> = V<sub>E</sub> = +3.0V to +3.6V

| Symbol          | Parameter                | T <sub>A</sub> = 0°C |       | T <sub>A</sub> = +25°C |       | T <sub>A</sub> = +85°C |       | Unit | Condition             |
|-----------------|--------------------------|----------------------|-------|------------------------|-------|------------------------|-------|------|-----------------------|
|                 |                          | Min.                 | Max.  | Min.                   | Max.  | Min.                   | Max.  |      |                       |
| I <sub>IH</sub> | Input HIGH Current       | —                    | 225   | —                      | 175   | —                      | 175   | μA   | —                     |
| I <sub>IL</sub> | Input LOW Current        | 0.5                  | —     | 0.5                    | —     | 0.5                    | —     | μA   | —                     |
| V <sub>IH</sub> | Input HIGH Voltage       | 2.135                | 2.420 | 2.135                  | 2.420 | 2.135                  | 2.420 | V    | V <sub>E</sub> = 3.3V |
| V <sub>IL</sub> | Input LOW Voltage        | 1.490                | 1.825 | 1.490                  | 1.825 | 1.490                  | 1.825 | V    | V <sub>E</sub> = 3.3V |
| V <sub>BB</sub> | Output Reference Voltage | 1.920                | 2.040 | 1.920                  | 2.040 | 1.920                  | 2.040 | V    | V <sub>E</sub> = 3.3V |

**Note:**

1. ECL V<sub>IH</sub>, V<sub>IL</sub> and V<sub>BB</sub> are referenced to V<sub>CC</sub>E and will vary 1:1 with the power supply. The levels shown are for I<sub>VT</sub> = I<sub>VO</sub> = V<sub>CC</sub>E = +3.3V.

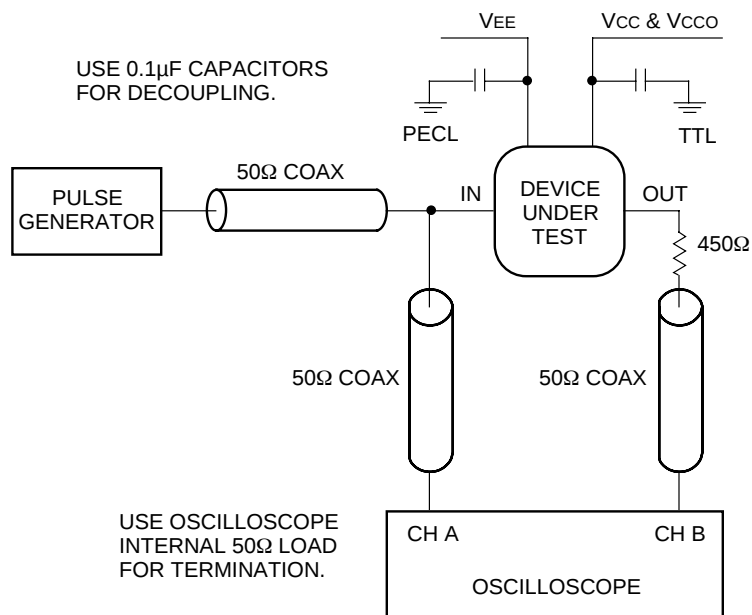
**AC CHARACTERISTICS**V<sub>T</sub> = V<sub>E</sub> = +3.0V to +3.6V

| Symbol                               | Parameter                             |                                | T <sub>A</sub> = 0°C |      | T <sub>A</sub> = +25°C |      | T <sub>A</sub> = +85°C |      | Unit | Condition             |
|--------------------------------------|---------------------------------------|--------------------------------|----------------------|------|------------------------|------|------------------------|------|------|-----------------------|
|                                      |                                       |                                | Min.                 | Max. | Min.                   | Max. | Min.                   | Max. |      |                       |
| t <sub>PLH</sub><br>t <sub>PHL</sub> | Propagation Delay<br>D to Output      | Q <sub>0</sub> –Q <sub>3</sub> | 2.2                  | 3.2  | 2.1                    | 3.1  | 2.0                    | 3.0  | ns   | C <sub>L</sub> = 20pF |
| t <sub>skpp</sub>                    | Part-to-Part Skew <sup>(1,4)</sup>    | Q <sub>0</sub> –Q <sub>3</sub> | —                    | 0.5  | —                      | 0.5  | —                      | 0.5  | ns   | C <sub>L</sub> = 20pF |
| t <sub>skew++</sub>                  | Within-Device Skew <sup>(2,4)</sup>   | Q <sub>0</sub> –Q <sub>3</sub> | —                    | 0.3  | —                      | 0.3  | —                      | 0.3  | ns   | C <sub>L</sub> = 20pF |
| t <sub>skew--</sub>                  | Within-Device Skew <sup>(3,4)</sup>   | Q <sub>0</sub> –Q <sub>3</sub> | —                    | 0.3  | —                      | 0.3  | —                      | 0.3  | ns   | C <sub>L</sub> = 20pF |
| t <sub>PLH</sub><br>t <sub>PHL</sub> | Propagation Delay<br>EN to Output     | Q <sub>0</sub> –Q <sub>3</sub> | 2.2                  | 3.2  | 2.1                    | 3.1  | 2.0                    | 3.0  | ns   | C <sub>L</sub> = 20pF |
| t <sub>r</sub><br>t <sub>f</sub>     | Output Rise/Fall Time<br>1.0V to 2.0V | Q <sub>0</sub> –Q <sub>3</sub> | —                    | 1.5  | —                      | 1.5  | —                      | 1.5  | ns   | C <sub>L</sub> = 20pF |
| f <sub>MAX</sub>                     | Max. Input Frequency <sup>(5,6)</sup> | Q <sub>0</sub> –Q <sub>3</sub> | 160                  | —    | 160                    | —    | 160                    | —    | MHz  | C <sub>L</sub> = 20pF |

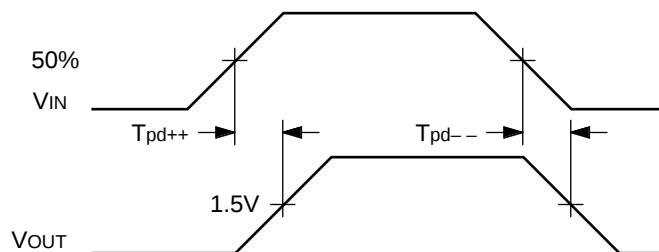
**Notes:**

1. Device-to-Device Skew considering HIGH-to-HIGH transitions at common V<sub>CC</sub> level.
2. Within-Device Skew considering HIGH-to-HIGH transitions at common V<sub>CC</sub> level.
3. Within-Device Skew considering LOW-to-LOW transitions at common V<sub>CC</sub> level.
4. All skew parameters are guaranteed but not tested.
5. Frequency at which output levels will meet a 0.8V to 2.0V minimum swing.
6. The f<sub>MAX</sub> value is specified as the minimum guaranteed maximum frequency. Actual operational maximum frequency may be greater.

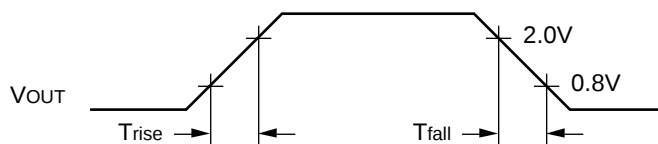
## TTL SWITCHING CIRCUIT

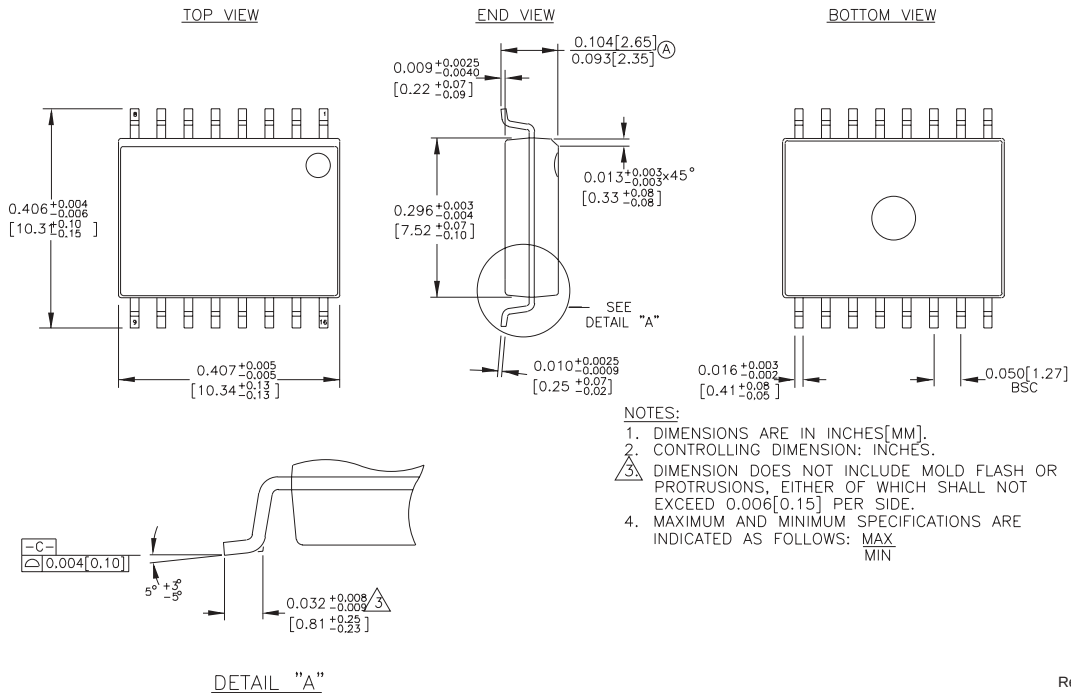


## ECL/TTL PROPAGATION DELAY — SINGLE ENDED



## ECL/TTL WAVEFORMS: RISE AND FALL TIMES



**16-PIN SOIC .300" WIDE (Z16-1)**

Rev. 03

**MICREL, INC. 2180 FORTUNE DRIVE SAN JOSE, CA 95131 USA**TEL + 1 (408) 944-0800 FAX + 1 (408) 474-1000 WEB <http://www.micrel.com>

The information furnished by Micrel in this data sheet is believed to be accurate and reliable. However, no responsibility is assumed by Micrel for its use. Micrel reserves the right to change circuitry and specifications at any time without notification to the customer.

Micrel Products are not designed or authorized for use as components in life support appliances, devices or systems where malfunction of a product can reasonably be expected to result in personal injury. Life support devices or systems are devices or systems that (a) are intended for surgical implant into the body or (b) support or sustain life, and whose failure to perform can be reasonably expected to result in a significant injury to the user. A Purchaser's use or sale of Micrel Products for use in life support appliances, devices or systems is at Purchaser's own risk and Purchaser agrees to fully indemnify Micrel for any damages resulting from such use or sale.

© 2006 Micrel, Incorporated.