

## FEATURES

- Input frequencies up to 135MHz
- PECL-to-TTL version of popular ECLinPS E111
- Guaranteed low skew specification
- Latched input
- Differential internal design
- V<sub>BB</sub> output VECL for single-ended operation
- Single +5V supply
- Reset/enable
- Extra TTL and ECL power/ground pins
- Choice of ECL compatibility: MECL 10KH (10Hxxx) or 100K (100Hxxx)
- Available in 28-pin PLCC package

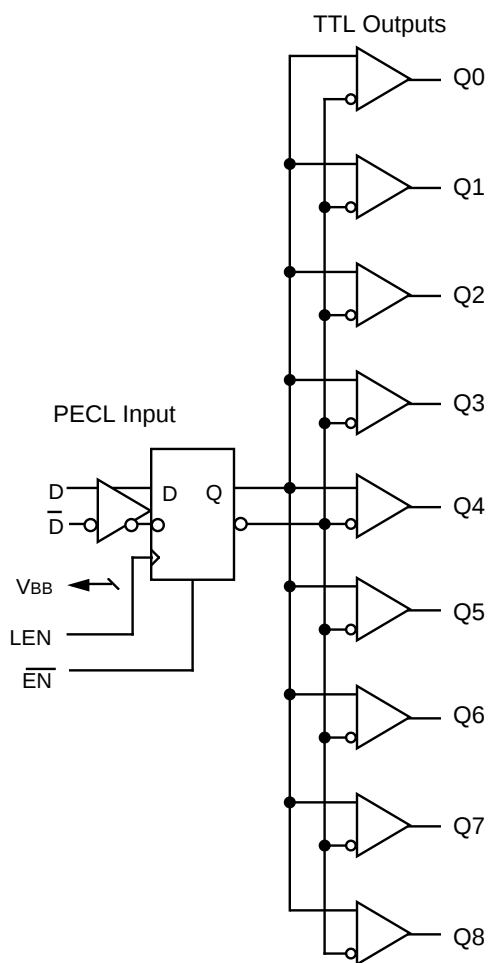
## DESCRIPTION

The SY10/100H641 are single supply, low skew translating 1:9 clock drivers. Devices in the Micrel-Synergy H600 translator series utilize the 28-lead PLCC for optimal power pinning, signal flow-through and electrical performance.

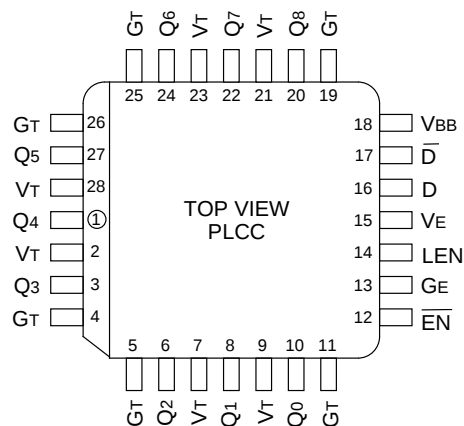
The devices feature a 24mA TTL output stage with AC performance specified into a 50pF load capacitance. A latch is provided on-chip. When LEN is LOW (or left open, in which case it is pulled LOW by the internal pull-downs), the latch is transparent. A HIGH on the enable pin ( $\overline{EN}$ ) forces all outputs LOW.

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

## BLOCK DIAGRAM



## PIN CONFIGURATION



## PIN NAMES

| Pin                             | Function                                |
|---------------------------------|-----------------------------------------|
| GT                              | TTL Ground (0V)                         |
| V <sub>T</sub>                  | TTL V <sub>cc</sub> (+5.0V)             |
| V <sub>E</sub>                  | ECL V <sub>cc</sub> (+5.0V)             |
| GE                              | ECL Ground (0V)                         |
| D, $\overline{D}$               | Signal Input (PECL)                     |
| V <sub>BB</sub>                 | V <sub>BB</sub> Reference Output (PECL) |
| Q <sub>0</sub> - Q <sub>8</sub> | Signal Outputs (TTL)                    |
| $\overline{EN}$                 | Enable Input (PECL)                     |
| LEN                             | Latch Enable Input (PECL)               |

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

| Symbol                                       | Rating                                    | Value                        | Unit |
|----------------------------------------------|-------------------------------------------|------------------------------|------|
| V <sub>E</sub> (ECL)<br>V <sub>T</sub> (TTL) | Power Supply Voltage                      | −0.5 to +7.0<br>−0.5 to +7.0 | V    |
| V <sub>I</sub> (ECL)                         | Input Voltage                             | 0.0 to V <sub>EE</sub>       | V    |
| V <sub>OUT</sub> (TTL)                       | Disabled 3-State Output                   | 0.0 to V <sub>CC</sub> T     | V    |
| I <sub>OUT</sub> (ECL)                       | Output Current<br>- Continuous<br>- Surge | 50<br>100                    | mA   |
| T <sub>store</sub>                           | Storage Temperature                       | −65 to +150                  | °C   |
| T <sub>A</sub>                               | Operating Temperature                     | 0 to +85                     | °C   |

**NOTE:**

1. Do not exceed.

**TRUTH TABLE**

| D | LEN | $\overline{\text{EN}}$ | Q              |
|---|-----|------------------------|----------------|
| L | L   | L                      | L              |
| H | L   | L                      | H              |
| X | H   | L                      | Q <sub>0</sub> |
| X | X   | H                      | L              |

**V<sub>CC</sub> AND CLOAD**

Ranges to meet duty cycle requirement: 0°C ≤ T<sub>A</sub> ≤ 85°C. Output duty cycle measured relative to 1.5V.

| Symbol | Parameter                                                                                                       |                                         | Min.               | Typ.          | Max.             | Unit          | Condition   |
|--------|-----------------------------------------------------------------------------------------------------------------|-----------------------------------------|--------------------|---------------|------------------|---------------|-------------|
| Pw1    | Ranges of V <sub>CC</sub> and C <sub>L</sub> to meet min. pulse width (HIGH or LOW) at f <sub>OUT</sub> ≤ 40MHz | V <sub>CC</sub><br>C <sub>L</sub><br>Pw | 4.75<br>10<br>11   | 5.0<br>—<br>— | 5.25<br>50<br>—  | V<br>pF<br>ns | All Outputs |
| Pw2    | Ranges of V <sub>CC</sub> and C <sub>L</sub> to meet min. pulse width (HIGH or LOW) at f <sub>OUT</sub> ≤ 50MHz | V <sub>CC</sub><br>C <sub>L</sub><br>Pw | 4.875<br>15<br>9.0 | 5.0<br>—<br>— | 5.125<br>27<br>— | V<br>pF<br>ns | All Outputs |

**DC ELECTRICAL CHARACTERISTICS**

V<sub>T</sub> = V<sub>E</sub> = 5.0V ± 5%

| 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>EE</sub>   | Power Supply Current | ECL | —                    | 30   | —                      | 30   | —                      | 30   | mA   | V <sub>E</sub> Pin            |
| I <sub>CC</sub> H |                      | TTL | —                    | 30   | —                      | 30   | —                      | 30   |      | Total all V <sub>T</sub> pins |
| I <sub>CC</sub> L |                      |     | —                    | 35   | —                      | 35   | —                      | 35   |      |                               |

**TTL DC ELECTRICAL CHARACTERISTICS**

V<sub>T</sub> = V<sub>E</sub> = 5.0V ± 5%

| 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. |      |                         |
| V <sub>OH</sub> | Output HIGH Voltage          | 2.0                  | —    | 2.0                    | —    | 2.0                    | —    | V    | I <sub>OH</sub> = −15mA |
| V <sub>OL</sub> | Output LOW Voltage           | —                    | 0.5  | —                      | 0.5  | —                      | 0.5  | V    | I <sub>OL</sub> = 24mA  |
| I <sub>OS</sub> | Output Short Circuit Current | −100                 | −225 | −100                   | −225 | −100                   | −225 | mA   | V <sub>OUT</sub> = 0V   |

**10H ECL DC ELECTRICAL CHARACTERISTICS**

VT = VE = 5.0V ± 5%

| Symbol          | Parameter                               | TA = 0°C |       | TA = +25°C |       | TA = +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 <sup>(1)</sup>       | 3.830    | 4.160 | 3.870      | 4.190 | 3.940      | 4.280 | V    | VE = 5.0V |
| V <sub>IL</sub> | Input LOW Voltage <sup>(1)</sup>        | 3.050    | 3.520 | 3.050      | 3.520 | 3.050      | 3.555 | V    | VE = 5.0V |
| V <sub>BB</sub> | Output Reference Voltage <sup>(1)</sup> | 3.620    | 3.730 | 3.650      | 3.750 | 3.690      | 3.810 | V    | VE = 5.0V |

**NOTE:**1. V<sub>IH</sub>, V<sub>IL</sub> and V<sub>BB</sub> are referenced to V<sub>E</sub> and will vary 1:1 with the power supply. The levels shown are for V<sub>E</sub> = +5.0V.**100H ECL DC ELECTRICAL CHARACTERISTICS**

VT = VE = 5.0V ± 5%

| Symbol          | Parameter                               | TA = 0°C |       | TA = +25°C |       | TA = +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 <sup>(1)</sup>       | 3.835    | 4.120 | 3.835      | 4.120 | 3.835      | 4.120 | V    | VE = 5.0V |
| V <sub>IL</sub> | Input LOW Voltage <sup>(1)</sup>        | 3.190    | 3.525 | 3.190      | 3.525 | 3.190      | 3.525 | V    | VE = 5.0V |
| V <sub>BB</sub> | Output Reference Voltage <sup>(1)</sup> | 3.620    | 3.740 | 3.620      | 3.740 | 3.620      | 3.740 | V    | VE = 5.0V |

**NOTE:**1. V<sub>IH</sub>, V<sub>IL</sub> and V<sub>BB</sub> are referenced to V<sub>E</sub> and will vary 1:1 with the power supply. The levels shown are for V<sub>E</sub> = +5.0V.**AC ELECTRICAL CHARACTERISTICS**

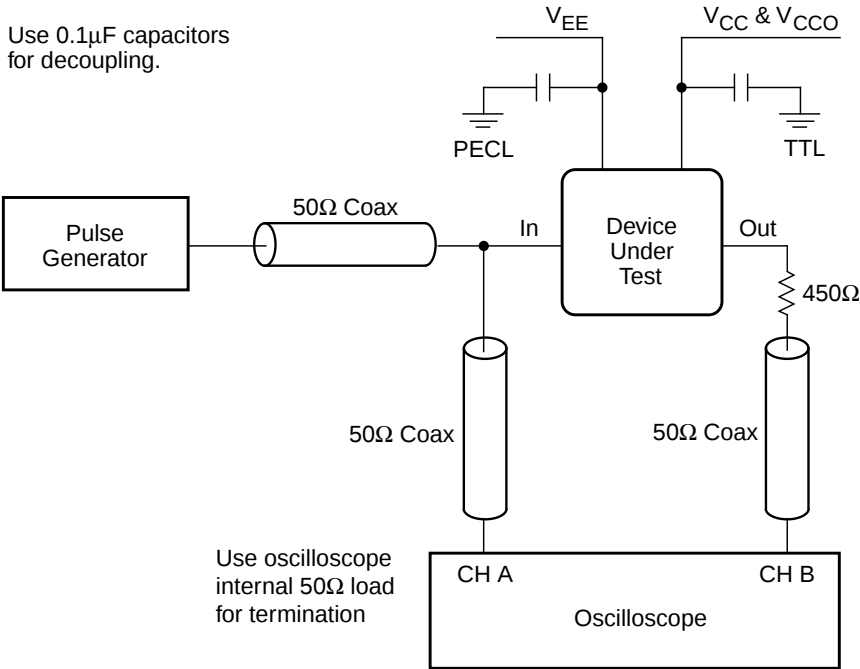
VT = VE = 5.0V ± 5%

| Symbol                               | Parameter                                | TA = 0°C   |            | TA = +25°C |            | TA = +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         | 5.0        | 6.0        | 4.8        | 5.8        | 5.3        | 6.3        | ns   | CL = 50pF |
| t <sub>skpp</sub>                    | Part-to-Part Skew <sup>(1,4)</sup>       | —          | 1.0        | —          | 1.0        | —          | 1.0        | ns   | CL = 50pF |
| t <sub>skew++</sub>                  | Within-Device Skew <sup>(2,4)</sup>      | —          | 0.5        | —          | 0.5        | —          | 0.5        | ns   | CL = 50pF |
| t <sub>skew--</sub>                  | Within-Device Skew <sup>(3,4)</sup>      | —          | 0.5        | —          | 0.5        | —          | 0.5        | ns   | CL = 50pF |
| t <sub>PLH</sub><br>t <sub>PHL</sub> | Propagation Delay<br>LEN to Output       | 4.9        | 6.9        | 4.9        | 6.9        | 5.0        | 7.0        | ns   | CL = 50pF |
| t <sub>PLH</sub><br>t <sub>PHL</sub> | Propagation Delay<br>EN to Output        | 5.0        | 7.0        | 4.9        | 6.9        | 5.0        | 7.0        | ns   | CL = 50pF |
| t <sub>r</sub><br>t <sub>f</sub>     | Output Rise/Fall Time<br>0.8V to 2.0V    | —          | 1.7<br>1.6 | —          | 1.7<br>1.6 | —          | 1.7<br>1.6 | ns   | CL = 50pF |
| f <sub>MAX</sub>                     | Maximum Input Frequency <sup>(5,6)</sup> | 135        | —          | 135        | —          | 135        | —          | MHz  | CL = 50pF |
| —                                    | Pulse Width                              | 1.5        | —          | 1.5        | —          | 1.5        | —          | ns   | —         |
| —                                    | Recovery Time                            | 1.25       | —          | 1.25       | —          | 1.25       | —          | ns   | —         |
| t <sub>s</sub>                       | Set-up Time                              | 0.5 (typ.) |            | 0.5 (typ.) |            | 0.5 (typ.) |            | ns   | —         |
| t <sub>h</sub>                       | Hold Time                                | 0.5 (typ.) |            | 0.5 (typ.) |            | 0.5 (typ.) |            | ns   | —         |

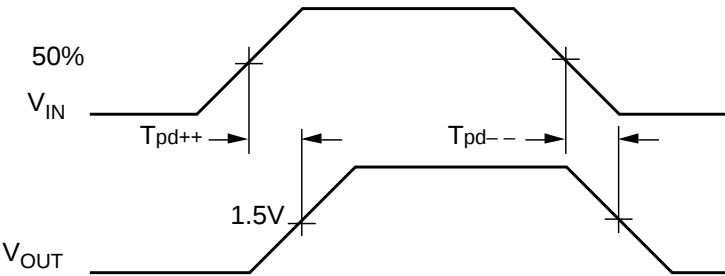
**NOTES:**

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

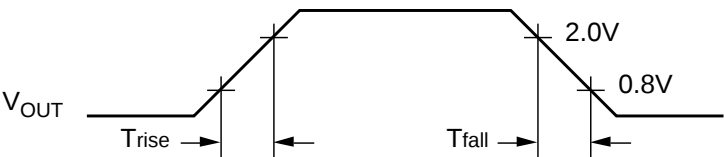
TTL SWITCHING CIRCUIT



ECL/TTL PROPAGATION DELAY — SINGLE ENDED

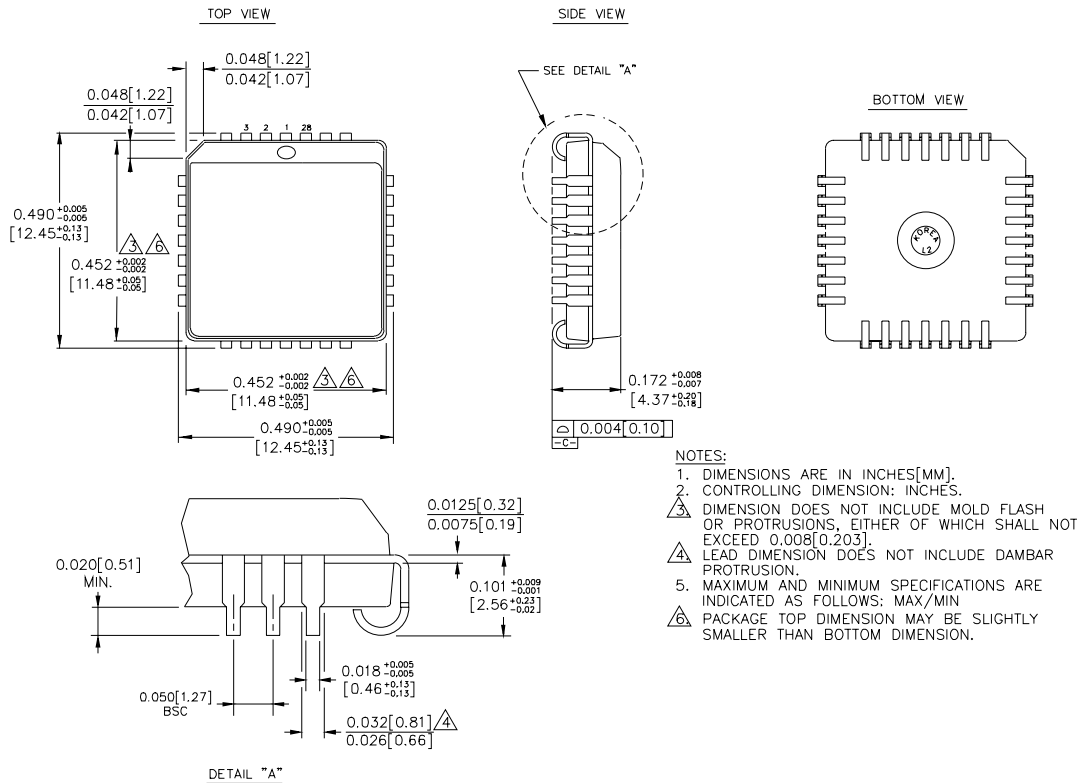


ECL/TTL WAVEFORMS: RISE AND FALL TIMES



PRODUCT ORDERING CODE

| Ordering Code | Package Type | Operating Range |
|---------------|--------------|-----------------|
| SY10H641JC    | J28-1        | Commercial      |
| SY10H641JCTR  | J28-1        | Commercial      |
| SY100H641JC   | J28-1        | Commercial      |
| SY100H641JCTR | J28-1        | Commercial      |

**28 LEAD PLCC (J28-1)**

Rev. 03

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