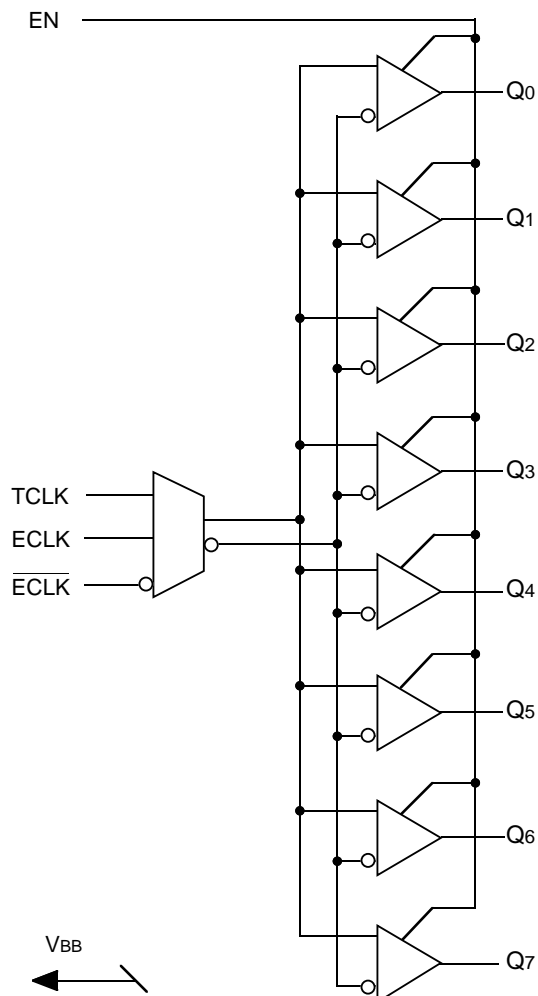


## FEATURES

- 3.3V power supply
- PECL/TTL-to-TTL version of popular ECLinPS E111AE/LE
- Guaranteed low skew specification
- Three-state enable
- Differential internal design
- VBB output for single-ended operation
- Extra TTL and ECL power/ground pins
- Choice of ECL compatibility: 10K or 100K
- Matched high and low output impedance
- Available in 28-pin PLCC package

## BLOCK DIAGRAM



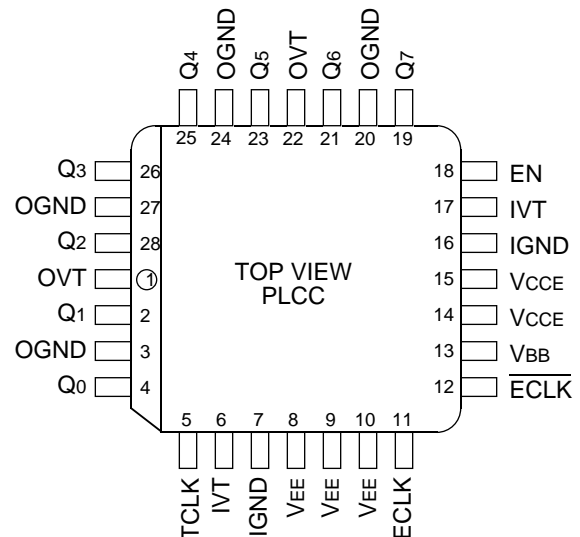
## DESCRIPTION

The SY10/100H646L are single supply, low skew translating 1:8 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 single supply H646L is similar to the HA643 which is a dual supply 1:8 version of the same function.

These devices feature a 24mA TTL output stage, with AC performance specified into a 20pF load capacitance.

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

## PIN CONFIGURATION



## PIN NAMES

| Pin        | Function                         |
|------------|----------------------------------|
| OGND       | TTL Output Ground (0V)           |
| OVT        | TTL Output Vcc (+3.0V)           |
| IGND       | Internal TTL GND (0V)            |
| IVT        | Internal TTL Vcc (+3.0V)         |
| VEE        | ECL VEE (0V)                     |
| VCC        | ECL Ground (+3.0V)               |
| ECLK, ECLK | Differential Signal Input (PECL) |
| VBB        | VBB Reference Output             |
| Q0-Q7      | Signal Outputs (TTL)             |
| EN         | Three-State Enable Input (TTL)   |
| TCLK       | Signal Input (TTL)               |

### 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)<br>V <sub>I</sub> (TTL) | Input Voltage                             | 0.0 to V <sub>EE</sub><br>-0.5 to V <sub>CC</sub> | V    |
| V <sub>OUT</sub> (TTL)                       | Disabled 3-State Output                   | 0.0 to V <sub>CCT</sub>                           | 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:**

- Do not exceed.

### TRUTH TABLE

| TCLK | ECLK | $\overline{\text{ECLK}}$ | EN | Q |
|------|------|--------------------------|----|---|
| GND  | L    | H                        | H  | L |
| GND  | H    | L                        | H  | H |
| H    | GND  | GND                      | H  | H |
| L    | GND  | GND                      | H  | L |
| X    | X    | X                        | L  | Z |

**NOTE:**

- X = Don't Care
- L = Low Voltage Level
- H = High Voltage Level
- Z = Three-State

### DC ELECTRICAL CHARACTERISTICS

OVT = IVT = V<sub>CC</sub>E = 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>CC</sub> L | Power Supply Current | —                    | 120  | —                      | 120  | —                      | 120  | mA   | Total all OVT, IVT, and V <sub>CC</sub> E pins |
| I <sub>CC</sub> H |                      | —                    | 120  | —                      | 120  | —                      | 120  |      |  |

### TTL DC ELECTRICAL CHARACTERISTICS

OVT = IVT = V<sub>CC</sub>E = 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.      |      |  |
| V <sub>I</sub> H | Input HIGH Voltage           | 2.0                  | —         | 2.0                    | —         | 2.0                    | —         | V    |  |
| V <sub>I</sub> L | Input LOW Voltage            | —                    | 0.8       | —                      | 0.8       | —                      | 0.8       | V    |  |
| I <sub>I</sub> H | Input HIGH Current           | —                    | 20<br>100 | —                      | 20<br>100 | —                      | 20<br>100 | μA   | V <sub>I</sub> N = 2.7 V<br>V <sub>I</sub> N = V <sub>CC</sub> |
| I <sub>I</sub> L | Input LOW Current            | —                    | -0.4      | —                      | -0.4      | —                      | -0.4      | mA   | V <sub>I</sub> N = 0.5 V                                       |
| V <sub>O</sub> H | Output HIGH Voltage          | 2.0                  | —         | 2.0                    | —         | 2.0                    | —         | V    | I <sub>O</sub> H = -3.0 mA                                     |
| V <sub>O</sub> L | Output LOW Voltage           | —                    | 0.5       | —                      | 0.5       | —                      | 0.5       | V    | I <sub>O</sub> L = 24 mA                                       |
| V <sub>I</sub> K | Input Clamp Voltage          | —                    | -1.2      | —                      | -1.2      | —                      | -1.2      | V    | I <sub>I</sub> N = -18mA                                       |
| I <sub>O</sub> S | Output Short Circuit Current | -100                 | —         | -100                   | —         | -100                   | —         | mA   | V <sub>O</sub> H = 0V  |

**10H ECL DC ELECTRICAL CHARACTERISTICS**OVT = IVT = V<sub>CC</sub>E = 3.0V to 3.6V

| 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>       | 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 <sup>(1)</sup>        | 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 <sup>(1)</sup> | 1.920    | 2.030 | 1.950      | 2.050 | 1.990      | 2.110 | V    | V <sub>E</sub> = 3.3V |

**NOTE:**1. V<sub>IH</sub>, V<sub>IL</sub> and V<sub>BB</sub> are referenced to V<sub>CC</sub> and will vary 1:1 with the power supply. The levels shown are for V<sub>CC</sub> = +3.3V.**100H ECL DC ELECTRICAL CHARACTERISTICS**OVT = IVT = V<sub>CC</sub>E = 3.0V to 3.6V

| 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>       | 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 <sup>(1)</sup>        | 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 <sup>(1)</sup> | 1.920    | 2.040 | 1.920      | 2.040 | 1.920      | 2.040 | V    | V <sub>E</sub> = 3.3V |

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

**AC ELECTRICAL CHARACTERISTICS**

IVT = OVT = VCCE = 3.0V to 3.6V

| Symbol     | Parameter                                | TA = 0°C |      |      | TA = +25°C |      |      | TA = +85°C |      |      | Unit | Condition |
|------------|--|----------|------|------|------------|------|------|------------|------|------|------|-----------|
|            |  | Min.     | Typ. | Max. | Min.       | Typ. | Max. | Min.       | Typ. | Max. |      |           |
| tPLH       | Propagation Delay ECLK to Q              | 2.3      | —    | 3.3  | 2.25       | —    | 3.25 | 2.2        | —    | 3.2  | ns   | CL = 20pF |
| tPHL       | TCLK to Q                                | 2.3      | —    | 3.3  | 2.25       | —    | 3.25 | 2.2        | —    | 3.2  |      |           |
| tskpp      | Part-to-Part Skew <sup>(1,4)</sup>       | —        | —    | 0.5  | —          | —    | 0.5  | —          | —    | 0.5  | ns   | CL = 20pF |
| tskew++    | Within-Device Skew <sup>(2,4)</sup>      | —        | —    | 0.3  | —          | —    | 0.3  | —          | —    | 0.3  | ns   | CL = 20pF |
| tskew--    | Within-Device Skew <sup>(3,4)</sup>      | —        | —    | 0.3  | —          | —    | 0.3  | —          | —    | 0.3  | ns   | CL = 20pF |
| tr         | Rise 0.8V to 2.0V                        | 0.3      | —    | 1.5  | 0.3        | —    | 1.5  | 0.3        | —    | 1.5  | ns   | CL = 20pF |
| tf         | Fall Time 0.8V to 2.0V                   | 0.3      | —    | 1.5  | 0.3        | —    | 1.5  | 0.3        | —    | 1.5  | ns   | CL = 20pF |
| tPW        | Output Pulse Width                       |          |      |      |            |      |      |            |      |      | ns   | CL = 20pF |
|            | 66MHz @ 2.0V                             | 5.5      | —    | —    | 5.5        | —    | —    | 5.5        | —    | —    |      |           |
|            | 66MHz @ 0.8V                             | 5.5      | —    | —    | 5.5        | —    | —    | 5.5        | —    | —    |      |           |
|            | 60MHz @ 2.0V                             | 6.0      | —    | —    | 6.0        | —    | —    | 6.0        | —    | —    |      |           |
|            | 60MHz @ 0.8V                             | 6.0      | —    | —    | 6.0        | —    | —    | 6.0        | —    | —    |      |           |
| tStability | Clock Stability <sup>(7)</sup>           | —        | —    | ±75  | —          | —    | ±75  | —          | —    | ±75  | ps   | CL = 20pF |
| fMAX       | Maximum Input Frequency <sup>(5,6)</sup> | 160      | —    | —    | 160        | —    | —    | 160        | —    | —    | MHz  | CL = 20pF |

**NOTES:**

1. Device-to-Device Skew considering HIGH-to-HIGH or LOW-to-LOW transitions at common Vcc level.
2. Within-Device Skew considering HIGH-to-HIGH transitions at common Vcc level.
3. Within-Device Skew considering LOW-to-LOW transitions at common Vcc 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 fMAX value is specified as the minimum guaranteed maximum frequency. Actual operational maximum frequency may be greater.
7. Clock stability is the period variation between two successive rising edges.

**PRODUCT ORDERING CODE**

| Ordering Code  | Package Type | Operating Range |
|----------------|--------------|-----------------|
| SY10H646LJC    | J28-1        | Commercial      |
| SY10H646LJCTR  | J28-1        | Commercial      |
| SY100H646LJC   | J28-1        | Commercial      |
| SY100H646LJCTR | J28-1        | Commercial      |

**ADDITIONAL INFORMATION**

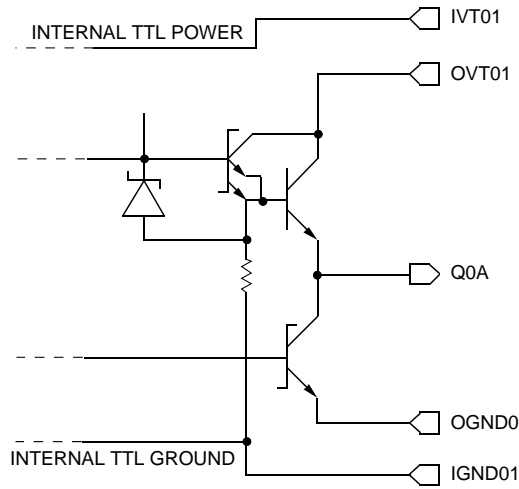


Figure 1. Output Structure

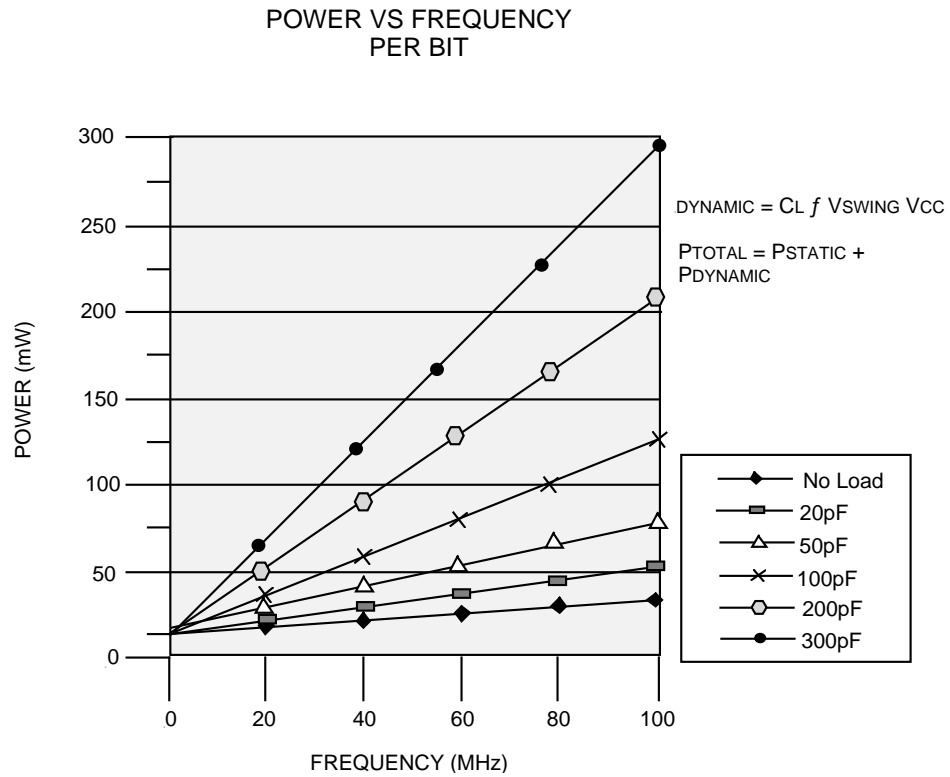
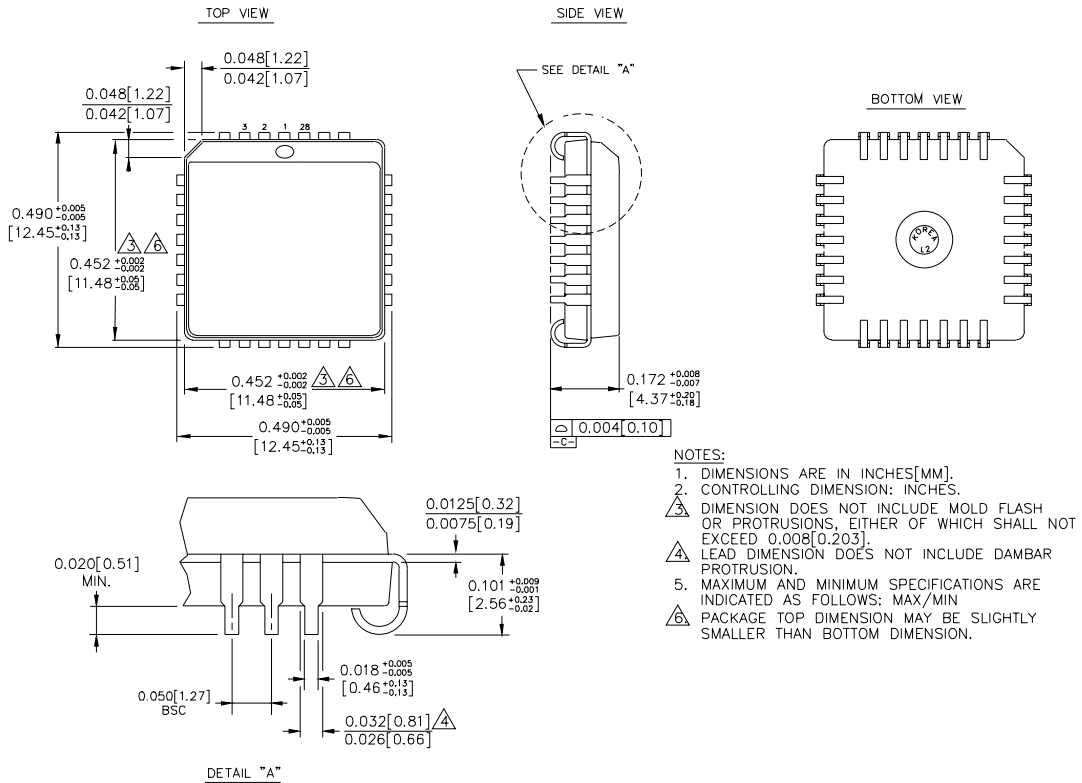


Figure 2. Power Versus Frequency (Typical)

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



- NOTES:**
1. DIMENSIONS ARE IN INCHES[MM].
  2. CONTROLLING DIMENSION: INCHES.
  3. DIMENSION DOES NOT INCLUDE MOLD FLASH OR PROTRUSIONS, EITHER OF WHICH SHALL NOT EXCEED 0.008[0.203].
  4. LEAD DIMENSION DOES NOT INCLUDE DAMBAR PROTRUSION.
  5. MAXIMUM AND MINIMUM SPECIFICATIONS ARE INDICATED AS FOLLOWS: MAX/MIN
  6. PACKAGE TOP DIMENSION MAY BE SLIGHTLY SMALLER THAN BOTTOM DIMENSION.

Rev. 03

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