## FEATURES

- Input frequencies up to 80MHz
- PECL-to-TTL version of popular ECLinPS E111
- Guaranteed low skew specification
- Latched input
- Differential ECL internal design
- $V_{BB}$ output 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)
- ESD protection of 2000V
- Fully compatible with Motorola MC10H641/100H641
- Available in 28-pin PLCC package

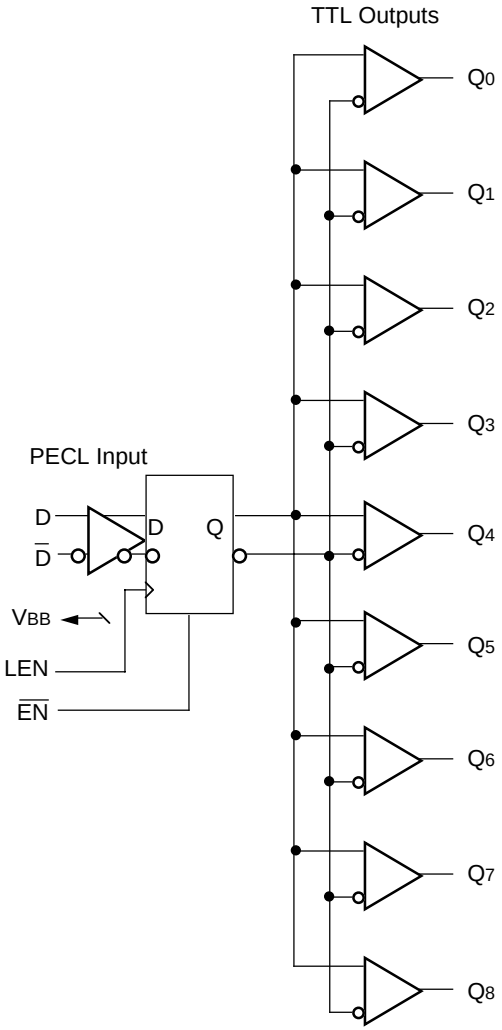
## DESCRIPTION

The SY10/100H641A are single supply, low skew translating 1:9 clock drivers. Devices in the Synergy H600 translator series utilize the 28-lead PLCC for optimal power pinning, signal flow-through and electrical performance.

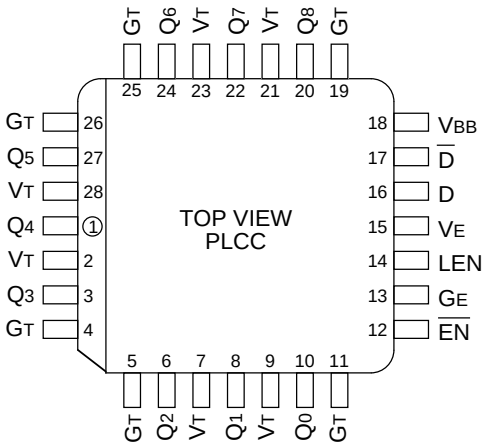
The devices feature a 24mA TTL output stage with AC performance specified into a 50pF load capacitance. A latch is provided on-chip. When LEN is LOW (or left open, in which case it is pulled LOW by the internal pull-downs), the latch is transparent. A HIGH on the enable pin ($\overline{EN}$) forces all 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 |
|---|---|
| $G_T$ | TTL Ground (0V) |
| $V_T$ | TTL $V_{CC}$ (+5.0V) |
| $V_E$ | ECL $V_{CC}$ (+5.0V) |
| $G_E$ | ECL Ground (0V) |
| D, $\overline{D}$ | Signal Input (PECL) |
| $V_{BB}$ | $V_{BB}$ Reference Output (PECL) |
| $Q_0$ - $Q_8$ | Signal Outputs (TTL) |
| $\overline{EN}$ | Enable Input (PECL) |
| LEN | Latch Enable Input (PECL) |





Rev.: D Amendment: /0
Issue Date: February, 1999

## ABSOLUTE MAXIMUM RATINGS(1)

| 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) | Input Voltage | 0.0 to $V_E$ | V |
| $V_{OUT}$ (TTL) | Disabled 3-State Output | 0.0 to $V_T$ | V |
| $I_{OUT}$ (ECL) | Output Current<br>- Continuous<br>- Surge | <br>50<br>100 | mA |
| $T_{store}$ | Storage Temperature | –65 to +150 | °C |
| $T_A$ | Operating Temperature | 0 to +85 | °C |

**NOTE:**

1. Do not exceed.

## TRUTH TABLE

| D | LEN | $\overline{EN}$ | Q |
|---|---|---|---|
| L | L | L | L |
| H | L | L | H |
| X | H | L | $Q_0$ |
| X | X | H | L |

## $V_{CC}$ AND $C_{LOAD}$

Ranges to meet duty cycle requirement: 0°C ≤ $T_A$ ≤ 85°C. Output duty cycle measured relative to 1.5V.

| Symbol | Parameter | | Min. | Typ. | Max. | Unit | Condition |
|---|---|---|---|---|---|---|---|
| $P_{W1}$ | Ranges of $V_{CC}$ and $C_L$ to meet min. pulse width (HIGH or LOW) at $f_{OUT}$ ≤ 40MHz | $V_{CC}$<br>$C_L$<br>$P_W$ | 4.75<br>10<br>11 | 5.0<br>—<br>— | 5.25<br>50<br>— | V<br>pF<br>ns | All Outputs |
| $P_{W2}$ | Ranges of $V_{CC}$ and $C_L$ to meet min. pulse width (HIGH or LOW) at $f_{OUT}$ ≤ 50MHz | $V_{CC}$<br>$C_L$<br>$P_W$ | 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

$V_T = V_E = 5.0V \pm 5\%$

| Symbol | Parameter | | $T_A$ = 0°C | | $T_A$ = +25°C | | $T_A$ = +85°C | | Unit | Condition |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Min. | Max. | Min. | Max. | Min. | Max. | | |
| $I_{EE}$ | Power Supply Current | ECL | — | 30 | — | 30 | — | 30 | mA | $V_E$ Pin |
| $I_{CCH}$ | | TTL | — | 30 | — | 30 | — | 30 | | Total all $V_T$ pins |
| $I_{CCL}$ | | | — | 37 | — | 37 | — | 37 | | |

## TTL DC ELECTRICAL CHARACTERISTICS

$V_T = V_E = 5.0V \pm 5\%$

| Symbol | Parameter | $T_A$ = 0°C | | $T_A$ = +25°C | | $T_A$ = +85°C | | Unit | Condition |
|---|---|---|---|---|---|---|---|---|---|
| | | Min. | Max. | Min. | Max. | Min. | Max. | | |
| $V_{OH}$ | Output HIGH Voltage | 2.5 | — | 2.5 | — | 2.5 | — | V | $I_{OH}$ = –15mA |
| $V_{OL}$ | Output LOW Voltage | — | 0.5 | — | 0.5 | — | 0.5 | V | $I_{OL}$ = 24mA |
| $I_{OS}$ | Output Short Circuit Current | –100 | –225 | –100 | –225 | –100 | –225 | mA | $V_{OUT}$ = 0V |

## 10H ECL DC ELECTRICAL CHARACTERISTICS

$V_T = V_E = 5.0V \pm 5\%$

| Symbol | Parameter | $T_A = 0°C$ | | $T_A = +25°C$ | | $T_A = +85°C$ | | Unit | Condition |
|---|---|---|---|---|---|---|---|---|---|
| | | Min. | Max. | Min. | Max. | Min. | Max. | | |
| $I_{IH}$ | Input HIGH Current | — | 225 | — | 175 | — | 175 | µA | — |
| $I_{IL}$ | Input LOW Current | 0.5 | — | 0.5 | — | 0.5 | — | µA | — |
| $V_{IH}$ | Input HIGH Voltage(1) | 3.830 | 4.160 | 3.870 | 4.190 | 3.940 | 4.280 | V | $V_E$ = 5.0V |
| $V_{IL}$ | Input LOW Voltage(1) | 3.050 | 3.520 | 3.050 | 3.520 | 3.050 | 3.555 | V | $V_E$ = 5.0V |
| $V_{BB}$ | Output Reference Voltage(1) | 3.620 | 3.730 | 3.650 | 3.750 | 3.690 | 3.810 | V | $V_E$ = 5.0V |

**NOTE:**

1. $V_{IH}$, $V_{IL}$ and $V_{BB}$ are referenced to $V_E$ and will vary 1:1 with the power supply. The levels shown are for $V_E$ = +5.0V.

## 100H ECL DC ELECTRICAL CHARACTERISTICS

$V_T = V_E = 5.0V \pm 5\%$

| Symbol | Parameter | $T_A = 0°C$ | | $T_A = +25°C$ | | $T_A = +85°C$ | | Unit | Condition |
|---|---|---|---|---|---|---|---|---|---|
| | | Min. | Max. | Min. | Max. | Min. | Max. | | |
| $I_{IH}$ | Input HIGH Current | — | 225 | — | 175 | — | 175 | µA | — |
| $I_{IL}$ | Input LOW Current | 0.5 | — | 0.5 | — | 0.5 | — | µA | — |
| $V_{IH}$ | Input HIGH Voltage(1) | 3.835 | 4.120 | 3.835 | 4.120 | 3.835 | 4.120 | V | $V_E$ = 5.0V |
| $V_{IL}$ | Input LOW Voltage(1) | 3.190 | 3.525 | 3.190 | 3.525 | 3.190 | 3.525 | V | $V_E$ = 5.0V |
| $V_{BB}$ | Output Reference Voltage(1) | 3.620 | 3.740 | 3.620 | 3.740 | 3.620 | 3.740 | V | $V_E$ = 5.0V |

**NOTE:**

1. $V_{IH}$, $V_{IL}$ and $V_{BB}$ are referenced to $V_E$ and will vary 1:1 with the power supply. The levels shown are for $V_E$ = +5.0V.

## AC ELECTRICAL CHARACTERISTICS

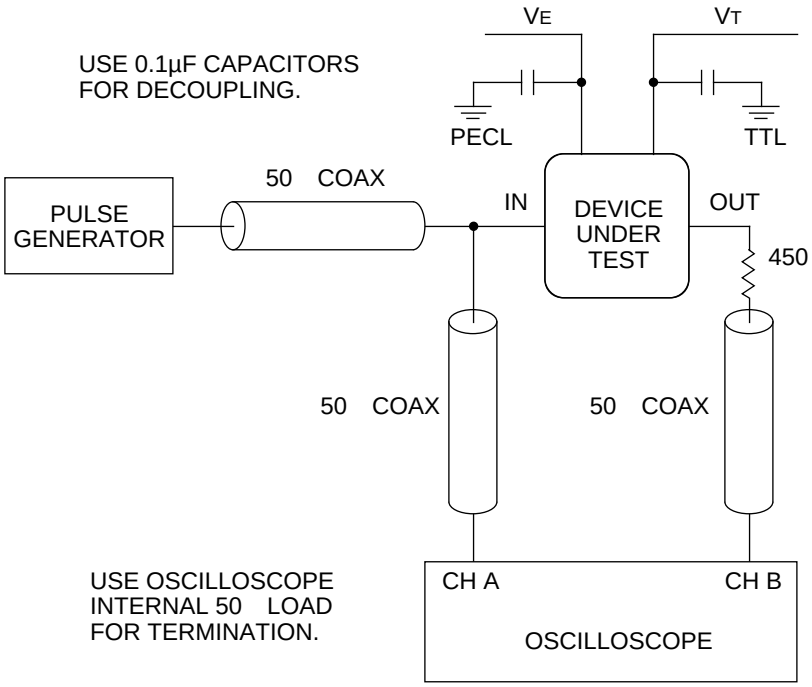
$V_T = V_E = 5.0V \pm 5\%$

| Symbol | Parameter | $T_A = 0°C$ | | $T_A = +25°C$ | | $T_A = +85°C$ | | Unit | Condition |
|---|---|---|---|---|---|---|---|---|---|
| | | Min. | Max. | Min. | Max. | Min. | Max. | | |
| $t_{PLH}$<br>$t_{PHL}$ | Propagation Delay<br>D to Output | 5.0 | 6.0 | 5.0 | 6.0 | 5.0 | 6.0 | ns | $C_L$ = 50pF |
| $t_{skpp}$ | Part-to-Part Skew(1,4) | — | 0.5 | — | 0.5 | — | 0.5 | ns | $C_L$ = 50pF |
| $t_{skew++}$ | Within-Device Skew(2,4) | — | 0.3 | — | 0.3 | — | 0.3 | ns | $C_L$ = 50pF |
| $t_{skew--}$ | Within-Device Skew(3,4) | — | 0.3 | — | 0.3 | — | 0.3 | ns | $C_L$ = 50pF |
| $t_{PLH}$<br>$t_{PHL}$ | Propagation Delay<br>LEN to Output | 4.9 | 6.9 | 4.9 | 6.9 | 5.0 | 7.0 | ns | $C_L$ = 50pF |
| $t_{PLH}$<br>$t_{PHL}$ | Propagation Delay<br>$\overline{EN}$ to Output | 5.0 | 7.0 | 4.9 | 6.9 | 5.0 | 7.0 | ns | $C_L$ = 50pF |
| $t_r$<br>$t_f$ | Output Rise/Fall Time<br>0.8V to 2.0V | —<br>— | 1.7<br>1.6 | —<br>— | 1.7<br>1.6 | —<br>— | 1.7<br>1.6 | ns | $C_L$ = 50pF |
| $f_{MAX}$ | Maximum Input Frequency(5,6) | 80 | — | 80 | — | 80 | — | MHz | $C_L$ = 50pF |
| — | Pulse Width | 1.5 | — | 1.5 | — | 1.5 | — | ns | — |
| — | Recovery Time | 1.25 | — | 1.25 | — | 1.25 | — | ns | — |
| $t_S$ | Set-up Time | 0.5 (typ.) | | 0.5 (typ.) | | 0.5 (typ.) | | ns | — |
| $t_H$ | Hold Time | 0.5 (typ.) | | 0.5 (typ.) | | 0.5 (typ.) | | ns | — |

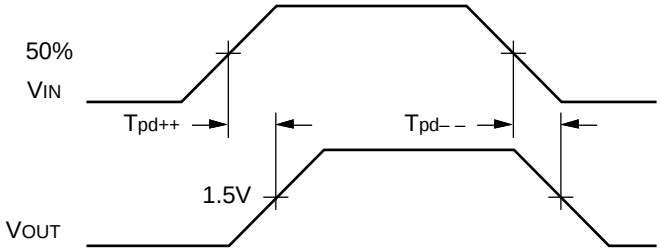
**NOTES:**

1. Device-to-Device Skew considering HIGH-to-HIGH transitions at common power supply voltage.
2. Within-Device Skew considering HIGH-to-HIGH transitions at common power supply voltage.
3. Within-Device Skew considering LOW-to-LOW transitions at common power supply voltage.
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 $f_{MAX}$ value is specified as the minimum guaranteed maximum frequency. Actual operational maximum frequency may be greater.

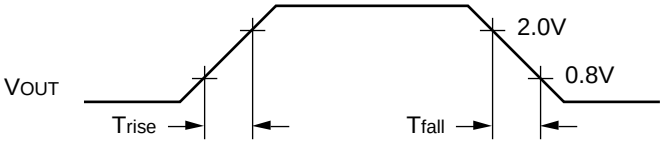
## TTL SWITCHING CIRCUIT




## ECL/TTL PROPAGATION DELAY — SINGLE ENDED




## ECL/TTL WAVEFORMS: RISE AND FALL TIMES




## PRODUCT ORDERING CODE

| Ordering Code | Package Type | Operating Range |
|---|---|---|
| SY10H641AJC | J28-1 | Commercial |
| SY10H641AJCTR | J28-1 | Commercial |
| SY100H641AJC | J28-1 | Commercial |
| SY100H641AJCTR | J28-1 | Commercial |

## 28 LEAD PLASTIC LEADED CHIP CARRIER (J28-1)