# SINGLE SUPPLY 1:9 PECL-TO-TTL

**SY10H641**
**SY100H641**



## Features

- **Input frequencies up to 135MHz**
- **PECL-to-TTL version of popular ECLinPS E111**
- **Guaranteed low skew specification**
- **Latched input**
- **Differential internal design**
- **$V_{BB}$ 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**

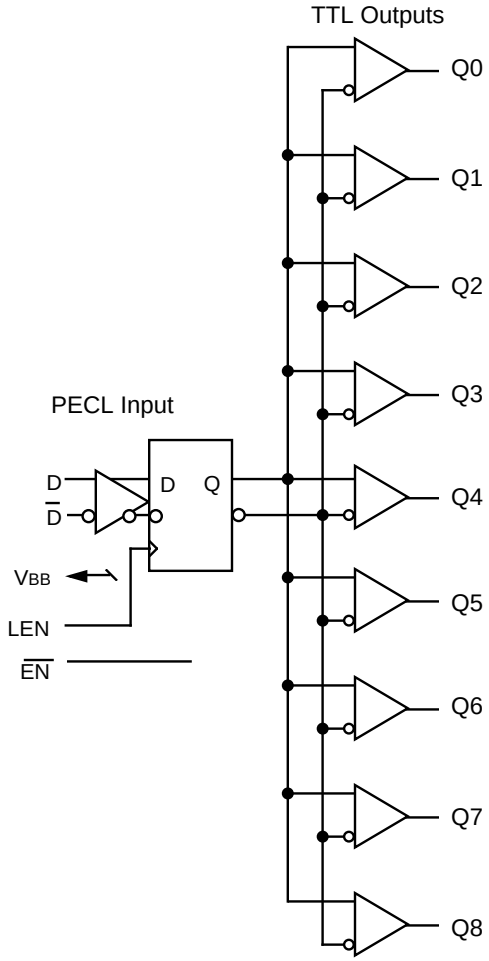
## General Description

The SY10/100H641 are single supply, low skew translating 1:9 clock drivers. Devices in the Micrel 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.

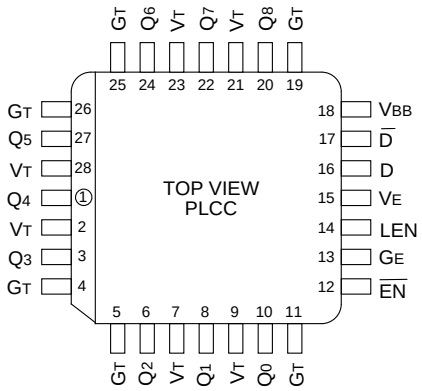
## Block Diagram




## Pin Description

| | |
|---|---|
| $G_T$ | 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) |

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

**(1)**

| Part Number | Package Type | Operating Range | Package Marking | Lead Finish |
|---|---|---|---|---|
| SY10H641JC | J28-1 | Commercial | SY10H641JC | Sn-Pb |
| SY10H641JCTR[2] | J28-1 | Commercial | SY10H641JC | Sn-Pb |
| SY100H641JC | J28-1 | Commercial | SY100H641JC | Sn-Pb |
| SY100H641JCTR[2] | J28-1 | Commercial | SY100H641JC | Sn-Pb |
| SY10H641JZ[3] | J28-1 | Commercial | SY10H641JZ with Pb-Free bar-line indicator | Matte-Sn |
| SY10H641JZTR[2, 3] | J28-1 | Commercial | SY10H641JZ with Pb-Free bar-line indicator | Matte-Sn |
| SY100H641JZ[3] | J28-1 | Commercial | SY100H641JZ with Pb-Free bar-line indicator | Matte-Sn |
| SY100H641JZTR[2, 3] | J28-1 | Commercial | SY100H641JZ with Pb-Free bar-line indicator | Matte-Sn |

**Notes:**

1. Contact factory for die availability. Dice are guaranteed at $T_A$ = 25°C, DC Electricals only.
2. Tape and Reel.
3. Pb-Free package is recommended for new designs.

| 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 $V_{EE}$ | V |
| $V_{OUT}$ (TTL) | Disabled 3-State Output | 0.0 to $V_{CCT}$ | V |
| $I_{OUT}$ (ECL) | Output Current<br>- Continuous<br>- Surge | <br>50<br>100 | mA |
| $T_{LEAD}$ | Lead Temperature Range (soldering, 20sec) | +260 | ˚C |
| $T_{store}$ | Storage Temperature | –65 to +150 | ˚C |
| $T_A$ | Operating Temperature | 0 to +85 | ˚C |

**Note:**

1. Do not exceed.

| | | — | |
|---|---|---|---|
| L | L | L | L |
| H | L | L | H |
| X | H | L | $Q_0$ |
| X | X | H | L |

°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 |

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

| 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 |
| $I_{CCL}$ | | | — | 35 | — | 35 | — | 35 | | |

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

| 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 | 2.0 | — | 2.0 | — | 2.0 | — | 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 Series

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

| 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 Series

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

| 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.

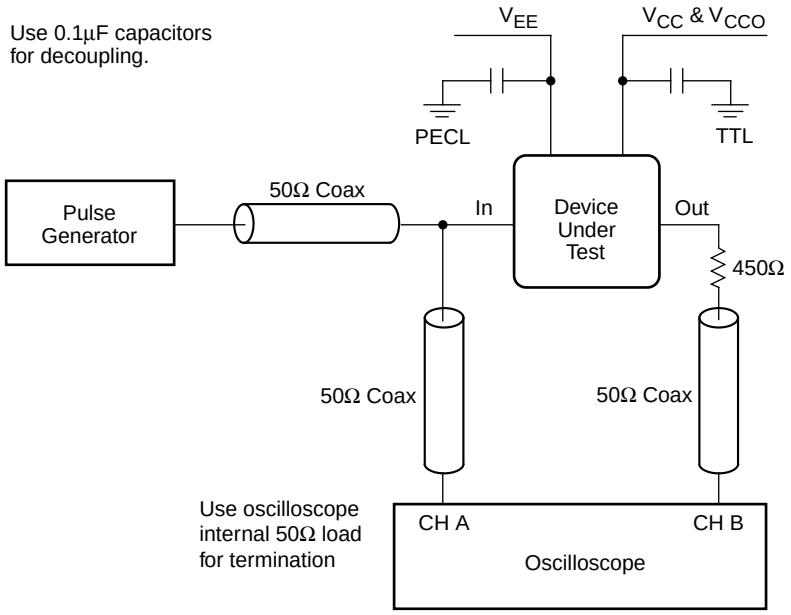
## AC Electrical Characteristics

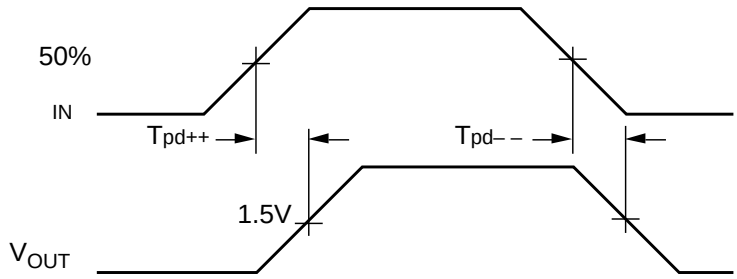
$V_T = V_E = 5.0V \pm 5\%$

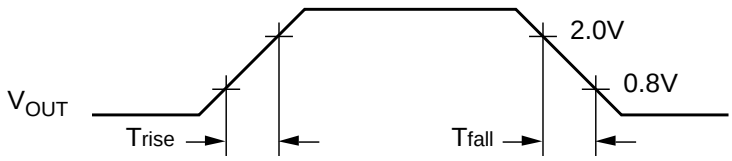
| Symbol | Parameter | $T_A = 0°C$ | | $T_A = +25°C$ | | $T_A = +85°C$ | | Unit | Condition |
|---|---|---|---|---|---|---|---|---|---|
| | | Min. | Max. | Min. | Max. | Min. | Max. | | |
| $t_{PD}$ | Propagation Delay<br>D to Output | 5.0 | 6.0 | 4.8 | 5.8 | 5.3 | 6.3 | ns | $C_L$ = 50pF |
| $t_{skpp}$ | Part-to-Part Skew(1,4) | — | 1.0 | — | 1.0 | — | 1.0 | ns | $C_L$ = 50pF |
| $t_{skew++}$ | Within-Device Skew(2,4) | — | 0.5 | — | 0.5 | — | 0.5 | ns | $C_L$ = 50pF |
| $t_{skew--}$ | Within-Device Skew(3,4) | — | 0.5 | — | 0.5 | — | 0.5 | 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) | 135 | — | 135 | — | 135 | — | 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 | — |

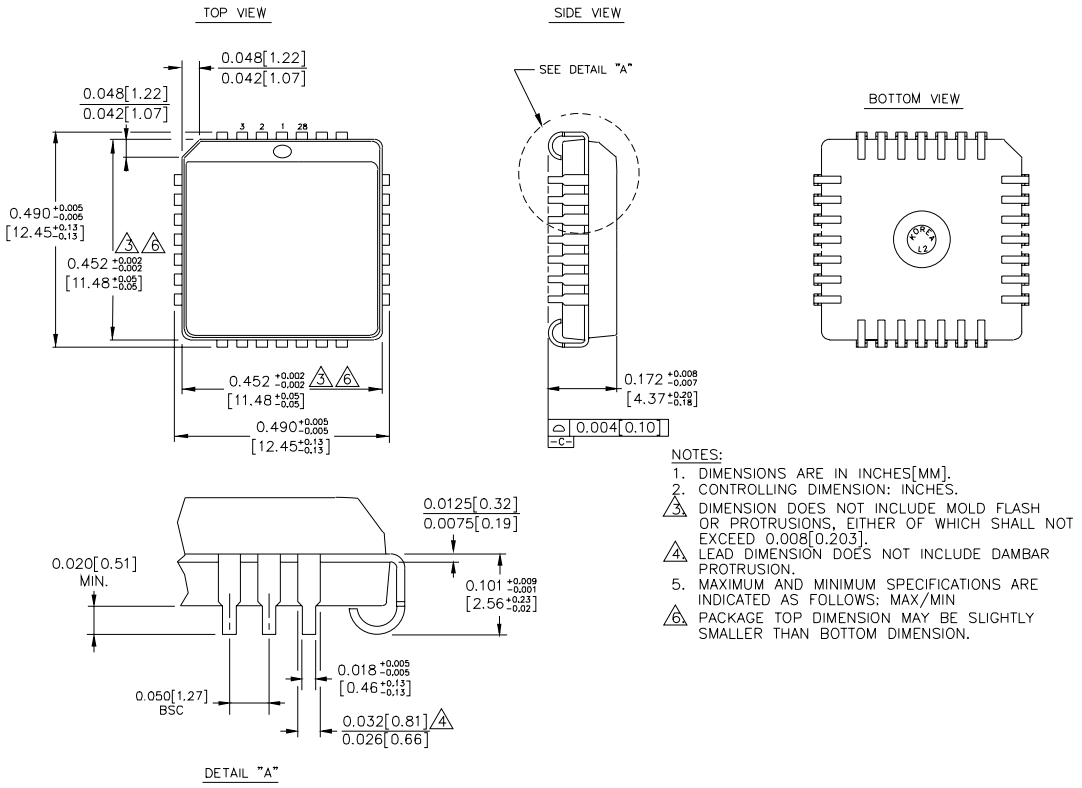
**Notes:**

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.


Use 0.1µF capacitors
for decoupling.
VEE
VCC & VCCO
PECL
TTL
Pulse
Generator
50Ω Coax
In
Device
Under
Test
Out
450Ω
50Ω Coax
50Ω Coax
Use oscilloscope
internal 50Ω load
for termination
CH A
CH B
Oscilloscope


50%
IN
Tpd++
Tpd– –
1.5V
VOUT


2.0V
0.8V
VOUT
Trise
Tfall




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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