



**SINGLE SUPPLY QUAD
PECL-TO-TTL W/LATCHED
OUTPUT ENABLE**

**Precision Edge®
SY10H841
SY100H841**

FEATURES

- 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
- Latch 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 SY10/100H841 are single supply, low skew translating 1:4 clock drivers.

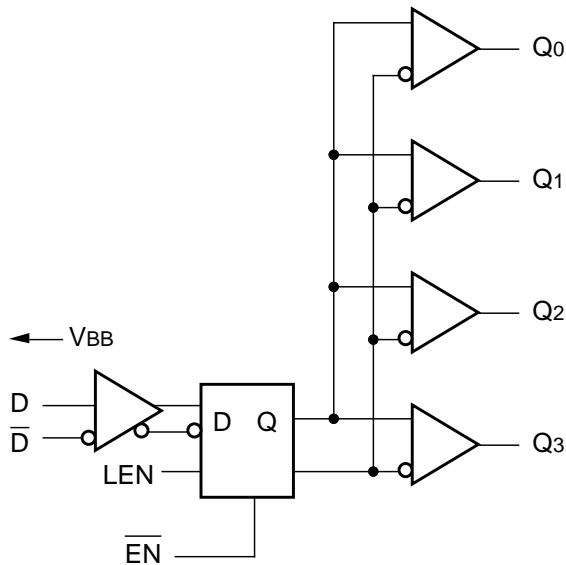
The devices feature a 24mA TTL output stage, with AC performance specified into a 50pF load capacitance.

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.

As frequencies increase to 40MHz and above, precise timing and shaping of clock signals becomes extremely important. The H841 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.

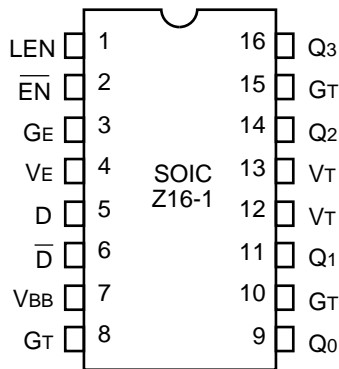
BLOCK DIAGRAM



PIN NAMES

| Pin | Function |
|-------------------|-----------------------------|
| GT | TTL Ground (0V) |
| VT | TTL Vcc (+5.0V) |
| VE | ECL Vcc (+5.0V) |
| 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) |
| LEN | Latch Enable Input |

PACKAGE/ORDERING INFORMATION



16-Pin SOIC (Z16-1)

Ordering Information⁽¹⁾

| Part Number | Package Type | Operating Range | Package Marking | Lead Finish |
|---------------------------------|--------------|-----------------|---------------------------------------------|----------------|
| SY10H841ZC | Z16-1 | Commercial | SY10H841ZC | Sn-Pb |
| SY10H841ZCTR ⁽²⁾ | Z16-1 | Commercial | SY10H841ZC | Sn-Pb |
| SY100H841ZC | Z16-1 | Commercial | SY100H841ZC | Sn-Pb |
| SY100H841ZCTR ⁽²⁾ | Z16-1 | Commercial | SY100H841ZC | Sn-Pb |
| SY10H841ZH ⁽³⁾ | Z16-1 | Commercial | SY10H841ZH with Pb-Free bar-line indicator | NiPdAu Pb-Free |
| SY10H841ZHTR ^(2, 3) | Z16-1 | Commercial | SY10H841ZH with Pb-Free bar-line indicator | NiPdAu Pb-Free |
| SY100H841ZH ⁽³⁾ | Z16-1 | Commercial | SY100H841ZH with Pb-Free bar-line indicator | NiPdAu Pb-Free |
| SY100H841ZHTR ^(2, 3) | Z16-1 | Commercial | SY100H841ZH with Pb-Free bar-line indicator | NiPdAu Pb-Free |

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.

TRUTH TABLE

| D | LEN | EN | Q |
|---|-----|----|-------|
| L | L | L | L |
| H | L | L | H |
| X | X | H | L |
| X | H | L | Latch |

ABSOLUTE MAXIMUM RATINGS⁽¹⁾

| Symbol | Rating | Value | Unit |
|------------------------|-------------------------------------------|------------------------------|------|
| VE (ECL) VT (TTL) | Power Supply Voltage | -0.5 to +7.0 -0.5 to +7.0 | V |
| VI (ECL) VOUT (TTL) | Input Voltage | 0.0 to VEE 0.0 to VT | V |
| TLEAD | Lead Temperature Range (soldering, 20sec) | +260 | °C |
| Tstore | Storage Temperature | -65 to +150 | °C |
| TA | Operating Temperature | 0 to +85 | °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 | LEN | Latch Enable Input |
| 2 | EN | Enable Input (PECL) |
| 3 | GE | ECL Ground (0V) |
| 4 | VE | ECL Vcc (+5.0V) |
| 5 | D | ECL Signal Input (Non-inverting) |
| 6 | D̄ | ECL Signal Input (Inverting) |
| 7 | VBB | VBB Reference Output (PECL) |
| 8 | GT | TTL Ground (0V) |
| 9 | Q0 | Signal Output (TTL) |
| 10 | GT | TTL Ground (0V) |
| 11 | Q1 | Signal Output (TTL) |
| 12 | VT | TTL Vcc (+5.0V) |
| 13 | VT | TTL Vcc (+5.0V) |
| 14 | Q2 | Signal Output (TTL) |
| 15 | GT | TTL Ground (0V) |
| 16 | Q3 | Signal Output (TTL) |

VCC AND CLOAD

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

| Symbol | Parameter | | Min. | Typ. | Max. | Unit | Condition |
|--------|-----------------------------------------------------------------------------|-----|-------|------|-------|------|-------------|
| Pw | Ranges of Vcc and CL to meet min. pulse width (HIGH or LOW) at fOUT ≤ 40MHz | Vcc | 4.75 | 5.0 | 5.25 | V | All Outputs |
| | | CL | 10 | — | 50 | pF | |
| | | Pw | 11 | — | — | ns | |
| Pw | Ranges of Vcc and CL to meet min. pulse width (HIGH or LOW) at fOUT ≤ 50MHz | Vcc | 4.875 | 5.0 | 5.125 | V | All Outputs |
| | | CL | 15 | — | 27 | pF | |
| | | Pw | 9.0 | — | — | ns | |

DC 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. | | |
| IEE | Power Supply Current | ECL | — | 40 | — | 40 | — | 40 | mA | VE Pin |
| ICCH | Power Supply Current | TTL | — | 20 | — | 20 | — | 20 | mA | Total all VT pins |
| ICCL | | | — | 25 | — | 25 | — | 25 | | |

TTL DC ELECTRICAL CHARACTERISTICS

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

| Symbol | Parameter | TA = 0°C | | TA = +25°C | | TA = +85°C | | Unit | Condition |
|-----------------|------------------------------|------------|------|------------|------|------------|------|------|-----------------------------------------------------|
| | | Min. | Max. | Min. | Max. | Min. | Max. | | |
| V _{OH} | Output HIGH Voltage | 2.5 2.0 | — | 2.5 2.0 | — | 2.5 2.0 | — | V | I _{OH} = -3.0mA I _{OH} = -15mA |
| V _{OL} | Output LOW Voltage | — | 0.5 | — | 0.5 | — | 0.5 | V | I _{OL} = 24mA |
| I _{OS} | Output Short Circuit Current | -80 | -200 | -80 | -200 | -80 | -200 | mA | V _{OUT} = 0V |

10H ECL DC ELECTRICAL CHARACTERISTICS⁽¹⁾

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

| Symbol | Parameter | TA = 0°C | | TA = +25°C | | TA = +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 | 3.830 | 4.160 | 3.870 | 4.190 | 3.940 | 4.280 | V | V _E = 5.0V |
| V _{IL} | Input LOW Voltage | 3.050 | 3.520 | 3.050 | 3.520 | 3.050 | 3.555 | V | V _E = 5.0V |
| V _{BB} | Output Reference Voltage | 3.620 | 3.730 | 3.650 | 3.750 | 3.690 | 3.810 | V | V _E = 5.0V |

Note:

1. ECL V_{IH}, V_{IL} and V_{BB} are referenced to V_{CC}E and will vary 1:1 with the power supply. The levels shown are for I_{VT} = I_{VO} = V_{CC}E = +5.0V.

100H ECL DC ELECTRICAL CHARACTERISTICS⁽¹⁾

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

| Symbol | Parameter | TA = 0°C | | TA = +25°C | | TA = +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 | 3.835 | 4.120 | 3.835 | 4.120 | 3.835 | 4.120 | V | V _E = 5.0V |
| V _{IL} | Input LOW Voltage | 3.190 | 3.525 | 3.190 | 3.525 | 3.190 | 3.525 | V | V _E = 5.0V |
| V _{BB} | Output Reference Voltage | 3.620 | 3.740 | 3.620 | 3.740 | 3.620 | 3.740 | V | V _E = 5.0V |

Note:

1. ECL V_{IH}, V_{IL} and V_{BB} are referenced to V_{CC}E and will vary 1:1 with the power supply. The levels shown are for I_{VT} = I_{VO} = V_{CC}E = +5.0V.

AC CHARACTERISTICS

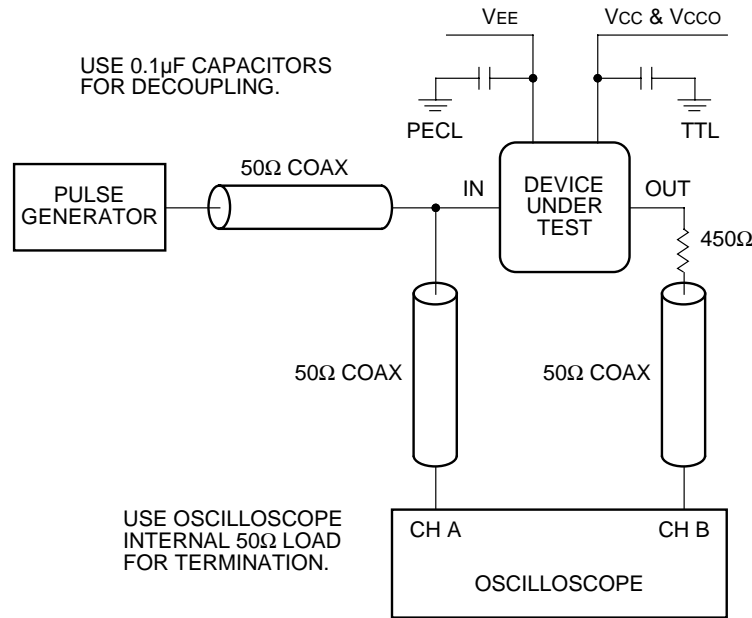
$V_T = V_E = 5.0V \pm 5\%$

| Symbol | Parameter | | TA = 0°C | | TA = +25°C | | TA = +85°C | | Unit | Condition |
|--------------|---------------------------------------|-------|----------|------|------------|------|------------|------|------|-----------|
| | | | Min. | Max. | Min. | Max. | Min. | Max. | | |
| tPLH tPHL | Propagation Delay D to Output | Q0–Q3 | 2.7 | 3.7 | 2.7 | 3.7 | 2.7 | 3.7 | ns | CL = 50pF |
| tskpp | Part-to-Part Skew ^(1,4) | Q0–Q3 | — | 0.5 | — | 0.5 | — | 0.5 | ns | CL = 50pF |
| tskew++ | Within-Device Skew ^(2,4) | Q0–Q3 | — | 0.3 | — | 0.3 | — | 0.3 | ns | CL = 50pF |
| tskew-- | Within-Device Skew ^(3,4) | Q0–Q3 | — | 0.3 | — | 0.3 | — | 0.3 | ns | CL = 50pF |
| tPLH tPHL | Propagation Delay LEN to Q | Q0–Q3 | 2.7 | 3.7 | 2.7 | 3.7 | 2.7 | 3.7 | ns | CL = 50pF |
| tPLH tPHL | Propagation Delay EN to Output | Q0–Q3 | 2.7 | 3.7 | 2.7 | 3.7 | 2.7 | 3.7 | ns | CL = 50pF |
| tr tf | Output Rise/Fall Time 1.0V to 2.0V | Q0–Q3 | — | 1.5 | — | 1.5 | — | 1.5 | ns | CL = 50pF |
| fMAX | Max. Input Frequency ^(5,6) | Q0–Q3 | 160 | — | 160 | — | 160 | — | MHz | CL = 50pF |
| — | Pulse Width | Q0–Q3 | 1.5 | — | 1.5 | — | 1.5 | — | ns | — |
| — | Recovery Time EN | Q0–Q3 | 1.0 | — | 1.0 | — | 1.0 | — | ns | — |
| ts | Set-up Time D, EN | Q0–Q3 | 0.75 | — | 0.75 | — | 0.75 | — | ns | — |
| tH | Hold Time D, EN | Q0–Q3 | 0.75 | — | 0.75 | — | 0.75 | — | ns | — |

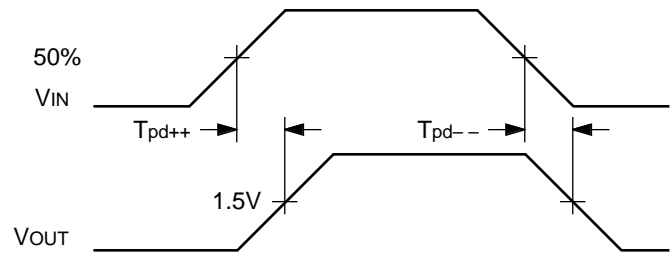
Notes:

1. Device-to-Device Skew considering HIGH-to-HIGH 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 at 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.

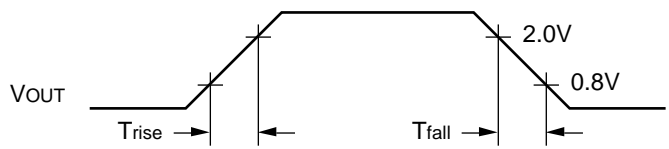
TTL SWITCHING CIRCUIT



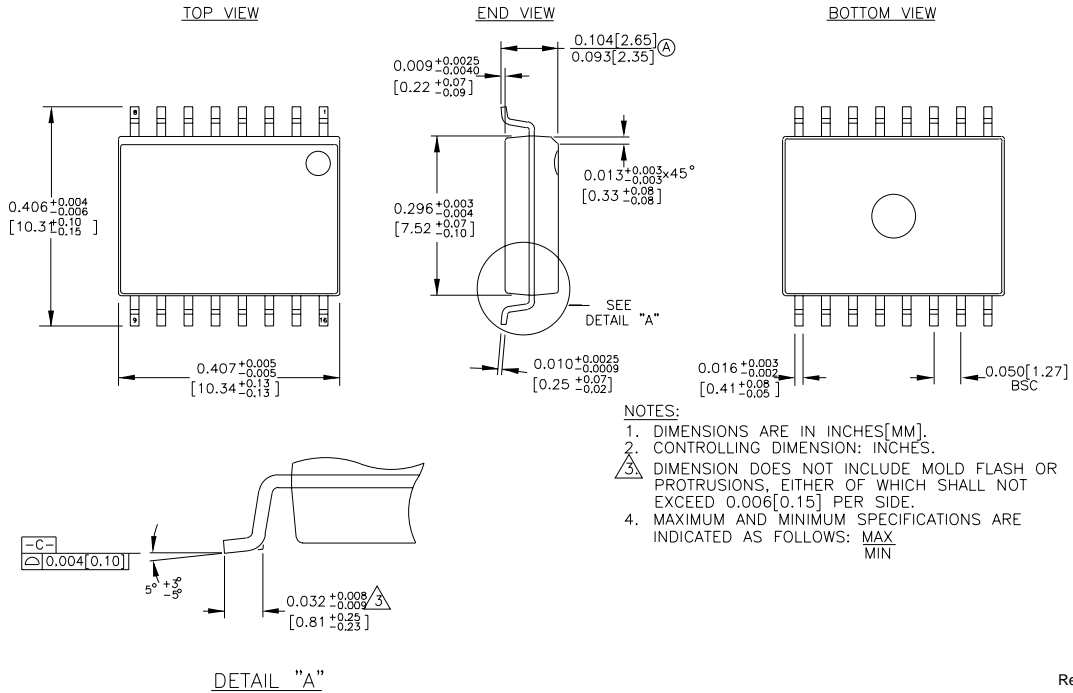
ECL/TTL PROPAGATION DELAY — SINGLE ENDED



ECL/TTL WAVEFORMS: RISE AND FALL TIMES



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



Rev. 03

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