MICREL ®

3.3V SINGLE SUPPLY QUAD PECL-TO-TTL OUTPUT ENABLE

Precision Edge®
SY10H842L
SY100H842L

Precision Edge®

FEATURES

- 3.3V power supply
- 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
- V_{BB} reference output
- Single supply
- 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

DESCRIPTION

The SY10/100H842L are single supply, low skew translating 1:4 clock drivers.

The devices feature a 24mA TTL output stage, with AC performance specified into a 20pF load capacitance. 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 H842 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.
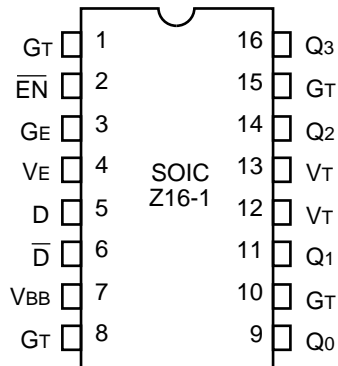
BLOCK DIAGRAM
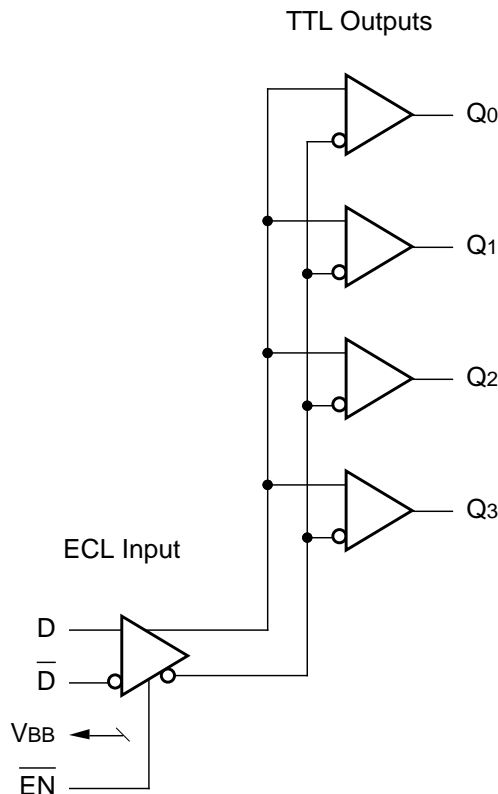
PIN NAMES

Pin	Function
G_T	TTL Ground (0V)
V_T	TTL V_{CC} (+3.3V)
V_E	ECL V_{CC} (+3.3V)
G_E	ECL Ground (0V)
D, $\overline{D}$	Signal Input (PECL)
V_{BB}	V_{BB} Reference Output (PECL)
Q_0 - Q_3	Signal Outputs (TTL)
$\overline{EN}$	Enable Input (PECL)

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PACKAGE/ORDERING INFORMATION

GT ⬛ 1   16 ⬛ Q3
EN̄ ⬛ 2   15 ⬛ GT
GE ⬛ 3   14 ⬛ Q2
VE ⬛ 4   SOIC   13 ⬛ VT
D ⬛ 5   Z16-1   12 ⬛ VT
D̄ ⬛ 6   11 ⬛ Q1
VBB ⬛ 7   10 ⬛ GT
GT ⬛ 8   9 ⬛ Q0

16-Pin SOIC (Z16-1)

Ordering Information[1]

Part Number	Package Type	Operating Range	Package Marking	Lead Finish
SY10H842LZC	Z16-1	Commercial	SY10H842LZC	Sn-Pb
SY10H842LZCTR[2]	Z16-1	Commercial	SY10H842LZC	Sn-Pb
SY100H842LZC	Z16-1	Commercial	SY100H842LZC	Sn-Pb
SY100H842LZCTR[2]	Z16-1	Commercial	SY100H842LZC	Sn-Pb
SY10H842LZH[3]	Z16-1	Commercial	SY10H842LZH with Pb-Free bar-line indicator	NiPdAu Pb-Free
SY10H842LZHTR[2, 3]	Z16-1	Commercial	SY10H842LZH with Pb-Free bar-line indicator	NiPdAu Pb-Free
SY100H842LZG[3]	Z16-1	Industrial	SY100H842LZG with Pb-Free bar-line indicator	NiPdAu Pb-Free
SY100H842LZGTR[2, 3]	Z16-1	Industrial	SY100H842LZG 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	$\overline{EN}$	Q
L	L	L
H	L	H
X	H	L

PIN DESCRIPTION

Pin	Symbol	Description
1	G_T	TTL Ground (0V)
2	$\overline{EN}$	Enable Input (PECL)
3	G_E	ECL Ground (0V)
4	V_E	ECL Vcc (+3.3V)
5	D	ECL Signal Input (Non-inverting)
6	$\overline{D}$	ECL Signal Input (Inverting)
7	V_{BB}	VBB Reference Output (PECL)
8	G_T	TTL Ground (0V)
9	Q_0	Signal Output (TTL)
10	G_T	TTL Ground (0V)
11	Q_1	Signal Output (TTL)
12	V_T	TTL Vcc (+3.3V)
13	V_T	TTL Vcc (+3.3V)
14	Q_2	Signal Output (TTL)
15	G_T	TTL Ground (0V)
16	Q_3	Signal Output (TTL)

ABSOLUTE MAXIMUM RATINGS[1]

Symbol	Rating	Value	Unit
V_E (ECL) V_T (TTL)	Power Supply Voltage	–0.5 to +7.0 –0.5 to +7.0	V
V_I (ECL) V_{OUT} (TTL)	Input Voltage	0.0 to V_{EE} 0.0 to V_T	V
T_{LEAD}	Lead Temperature Range (soldering, 20sec.)	+260	˚C
T_{store}	Storage Temperature	–65 to +150	˚C
T_A	Operating Temperature SY10H842L SY100H842L	 0 to +85 –40 to +85	 ˚C ˚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 ratlng conditions for extended periods may affect device reliability.

DC CHARACTERISTICS

$V_T = V_E = +3.0V$ to +3.6V

Symbol	Parameter		$T_A = 0°C$ Min.	Max.	$T_A = +25°C$ Min.	Max.	$T_A = +85°C$ Min.	Max.	Unit	Condition
I_{EE}	Power Supply Current	ECL	—	35	—	35	—	35	mA	V_E Pin
I_{CCH}	Power Supply Current	TTL	—	20	—	20	—	20	mA	Total all V_T pins
I_{CCL}			—	25	—	25	—	25		

TTL DC ELECTRICAL CHARACTERISTICS

$V_T = V_E = +3.0V$ to +3.6V

Symbol	Parameter	$T_A = 0°C$ Min.	Max.	$T_A = +25°C$ Min.	Max.	$T_A = +85°C$ Min.	Max.	Unit	Condition
V_{OH}	Output HIGH Voltage	2.0	—	2.0	—	2.0	—	V	$I_{OH} = -3.0mA$
V_{OL}	Output LOW Voltage	—	0.5	—	0.5	—	0.5	V	$I_{OL} = 24mA$
I_{OS}	Output Short Circuit Current	–80	—	–80	—	–80	—	mA	$V_{OUT} = 0V$

10H ECL DC ELECTRICAL CHARACTERISTICS

$V_T = V_E = +3.0V$ to $+3.6V$

Symbol	Parameter	TA = 0°C		TA = +25°C		TA = +85°C		Unit	Condition
		Min.	Max.	Min.	Max.	Min.	Max.		
I_{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	2.130	2.460	2.170	2.490	2.240	2.580	V	$V_E = 3.3V$
V_{IL}	Input LOW Voltage	1.350	1.820	1.350	1.820	1.350	1.855	V	$V_E = 3.3V$
V_{BB}	Output Reference Voltage	1.920	2.030	1.950	2.050	1.990	2.111	V	$V_E = 3.3V$

Note:

1. ECL V_{IH}, V_{IL} and V_{BB} are referenced to V_{CCE} and will vary 1:1 with the power supply. The levels shown are for IVT = IVO = V_{CCE} = +3.3V.

100H ECL DC ELECTRICALCHARACTERISTICS

$V_T = V_E = +3.0V$ to $+3.6V$

Symbol	Parameter	TA = 0°C		TA = +25°C		TA = +85°C		Unit	Condition
		Min.	Max.	Min.	Max.	Min.	Max.		
I_{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	2.135	2.420	2.135	2.420	2.135	2.420	V	$V_E = 3.3V$
V_{IL}	Input LOW Voltage	1.490	1.825	1.490	1.825	1.490	1.825	V	$V_E = 3.3V$
V_{BB}	Output Reference Voltage	1.920	2.040	1.920	2.040	1.920	2.040	V	$V_E = 3.3V$

Note:

1. ECL V_{IH}, V_{IL} and V_{BB} are referenced to V_{CCE} and will vary 1:1 with the power supply. The levels shown are for IVT = IVO = V_{CCE} = +3.3V.
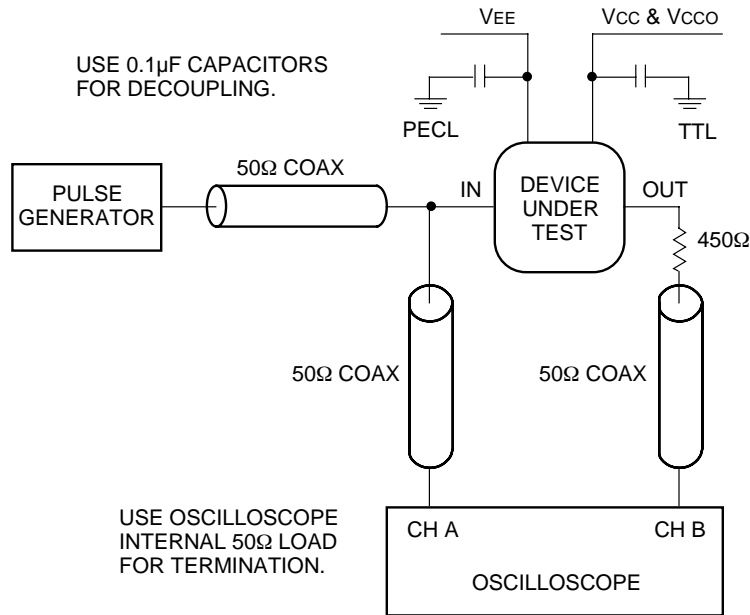
AC CHARACTERISTICS

$V_T = V_E = +3.0V$ to $+3.6V$

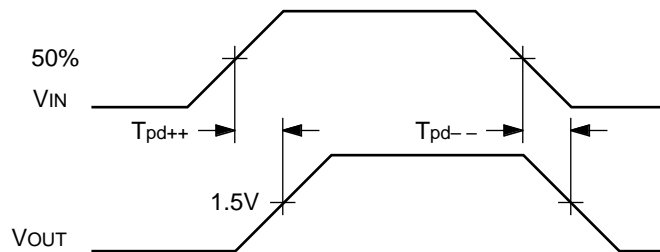| Symbol	Parameter		TA = 0°C		TA = +25°C		TA = +85°C		Unit	Condition
			Min.	Max.	Min.	Max.	Min.	Max.		
t_{PLH} t_{PHL}	Propagation Delay D to Output	$Q_0–Q_3$	2.2	3.2	2.1	3.1	2.0	3.0	ns	C_L = 20pF
t_{skpp}	Part-to-Part Skew[1,4]	$Q_0–Q_3$	—	0.5	—	0.5	—	0.5	ns	C_L = 20pF
t_{skew++}	Within-Device Skew[2,4]	$Q_0–Q_3$	—	0.3	—	0.3	—	0.3	ns	C_L = 20pF
t_{skew--}	Within-Device Skew[3,4]	$Q_0–Q_3$	—	0.3	—	0.3	—	0.3	ns	C_L = 20pF
t_{PLH} t_{PHL}	Propagation Delay $\overline{EN}$ to Output	$Q_0–Q_3$	2.2	3.2	2.1	3.1	2.0	3.0	ns	C_L = 20pF
t_r t_f	Output Rise/Fall Time 1.0V to 2.0V	$Q_0–Q_3$	—	1.5	—	1.5	—	1.5	ns	C_L = 20pF
f_{MAX}	Max. Input Frequency[5,6]	$Q_0–Q_3$	160	—	160	—	160	—	MHz	C_L = 20pF

Notes:

1. Device-to-Device Skew considering HIGH-to-HIGH transitions at common V_{CC} level.

2. Within-Device Skew considering HIGH-to-HIGH transitions at common V_{CC} level.

3. Within-Device Skew considering LOW-to-LOW transitions at common V_{CC} 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 f_{MAX} value is specified as the minimum guaranteed maximum frequency. Actual operational maximum frequency may be greater.
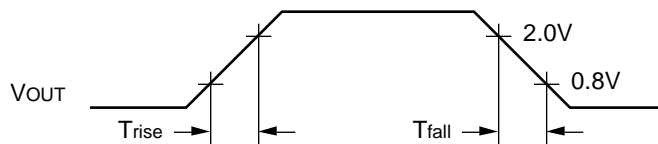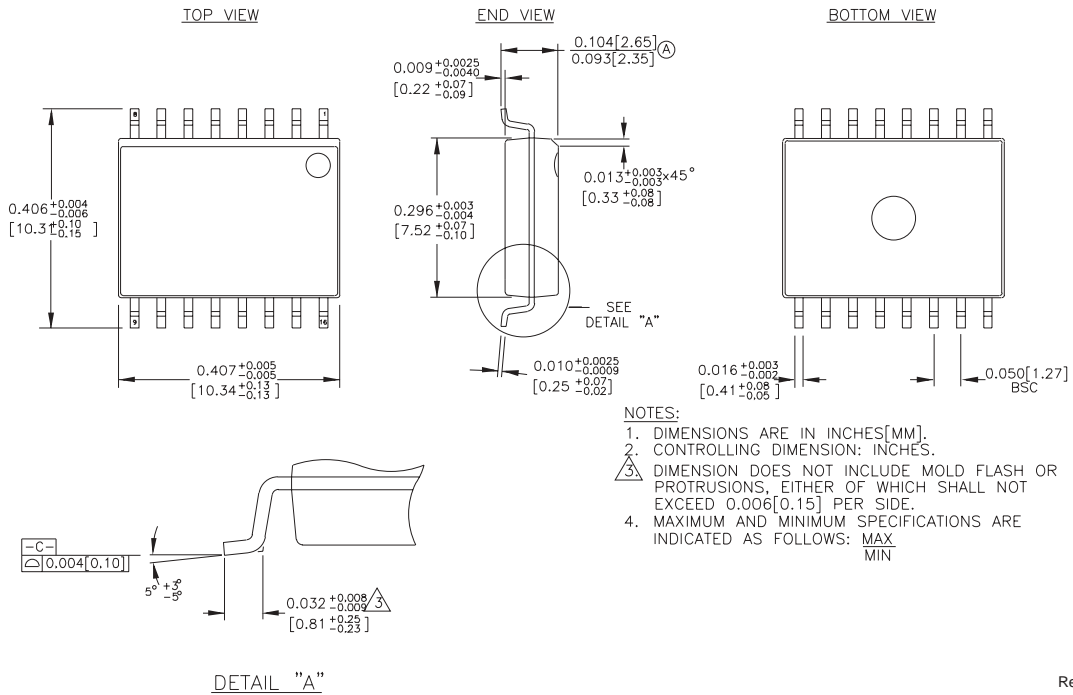
TTL SWITCHING CIRCUIT

USE 0.1µF CAPACITORS
FOR DECOUPLING.

V$_{EE}$

V$_{CC}$ & V$_{CCO}$

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

ECL/TTL PROPAGATION DELAY — SINGLE ENDED

50%

V$_{IN}$

T$_{pd++}$

T$_{pd--}$

1.5V

V$_{OUT}$

ECL/TTL WAVEFORMS: RISE AND FALL TIMES

V$_{OUT}$

2.0V

0.8V

T$_{rise}$

T$_{fall}$

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

TOP VIEW

END VIEW

BOTTOM VIEW

0.406 +0.004 -0.006
[10.3 +0.10 -0.15]

0.407 +0.005 -0.005
[10.34 +0.13 -0.13]

0.009 +0.0025 -0.0040
[0.22 +0.07 -0.09]

0.104[2.65] Ⓐ
0.093[2.35]

0.013 +0.003 -0.003 ×45°
[0.33 +0.08 -0.08]

0.296 +0.003 -0.004
[7.52 +0.07 -0.10]

SEE DETAIL "A"

0.010 +0.0025 -0.0009
[0.25 +0.07 -0.02]

0.016 +0.003 -0.002
[0.41 +0.08 -0.05]

0.050[1.27]
BSC

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 0.006[0.15] PER SIDE.
4. MAXIMUM AND MINIMUM SPECIFICATIONS ARE INDICATED AS FOLLOWS: MAX / MIN

-C-
0.004[0.10]

5° +3° -5°

0.032 +0.008 -0.009 /3\
[0.81 +0.25 -0.23]

DETAIL "A"

Rev. 03

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