FEATURES

- **Guaranteed AC performance over temperature and voltage:**
  - **> 800MHz f_{MAX} (typical)**
  - **< 50ps within-device skew**
- **Low voltage operation:**
  - **LVPECL: +3.3V ±10%**
  - **LVECL: –3.3V ±10%**
- **Internal 75kΩ pull-down resistors**
- **Guaranteed over industrial temperature range: –40°C to +85°C**
- **Pin-for-pin, plug-in replacement for MC100LVE310**
- **Available in 28-pin PLCC package**

DESCRIPTION

The SY100E310L is a 3.3V, precision 2:8 ECL/PECL fanout buffer optimized for precision low-skew clock distribution. The SY100E310L features fully differential clock paths to minimize both device and system skew resulting in skew performance of < 50ps. In addition, the device includes a 2:1 multiplexer input for redundant switchover applications.

The SY100E310L is optimized for low voltage +3.3V LVPECL or –3.3V LVECL applications.

Data sheets and support documentation can be found on Micrel's web site at www.micrel.com.

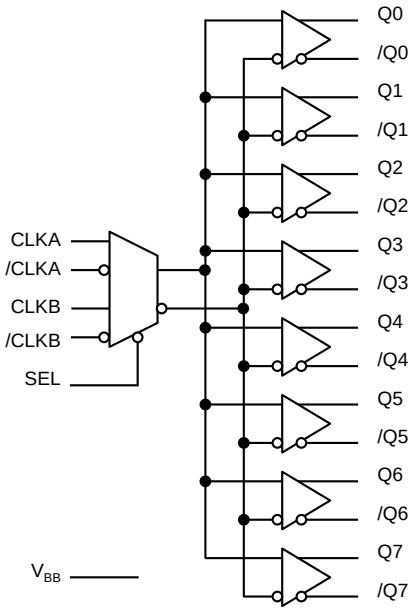
APPLICATIONS

- **Communications clock distribution**
- **Redundant clock switchover**
- **High-end server clock distribution**

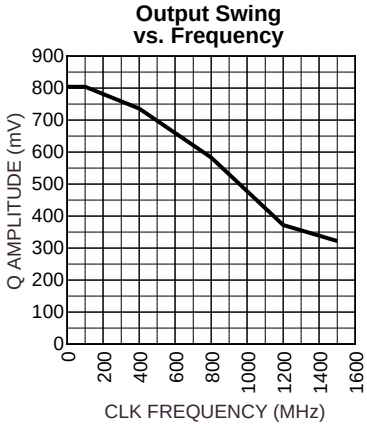
CROSS REFERENCE TABLE

Micrel Semiconductor	On Semiconductor
SY100E310LJI	MC100LVE310FN
SY100E310LJITR	MC100LVE310FNR2

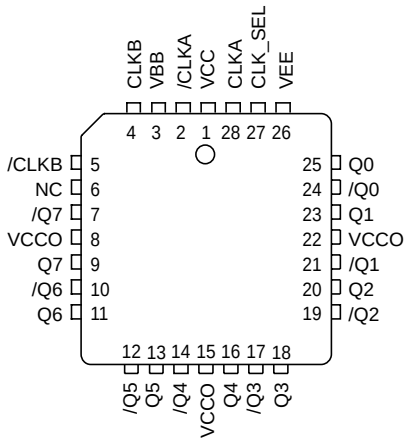
FUNCTIONAL BLOCK DIAGRAM



TYPICAL PERFORMANCE



PACKAGE/ORDERING INFORMATION



28-Pin PLCC (J28-1)

Ordering Information[1]

Part Number	Package Type	Operating Range	Package Marking	Lead Finish
SY100E310JI	J28-1	Industrial	SY100E310LJI	Sn-Pb
SY100E310JITR[2]	J28-1	Industrial	SY100E310LJI	Sn-Pb
SY100E310JY[3]	J28-1	Industrial	SY100E310JY with Pb-Free bar-line indicator	Matte-Sn
SY100E310JYTR[2, 3]	J28-1	Industrial	SY100E310JY 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.

PIN DESCRIPTION

Pin Number	Pin Name	Pin Function
1	VCC	Positive Core Power Supply. Bypass with 0.1µF‖0.01µF low ESR capacitors. Not internally connected to V_{CCO}. Must be externally connected to V_{CCO} on PCB.
28, 2, 4, 5	CLKA, /CLKA CLKB, /CLKB	Differential Inputs: These input pairs are the differential data inputs to the device.
3	VBB	Reference Voltage Output. Used for AC-coupled inputs or single-ended inputs.
6	NC	No Connect.
8, 15, 22	VCCO	Positive Power Supply. Bypass with 0.1µF‖0.01µF low ESR capacitors. Not internally connected to V_{CC}. Must be externally connected to V_{CC} on PCB.
24, 21, 19, 17, 14, 12, 10, 7	/Q0, /Q1, /Q2, /Q3 /Q4, /Q5, /Q6, /Q7	Differential Outputs.
25, 23, 20, 18, 16, 13, 11, 9,	Q0, Q1, Q2, Q3 Q4, Q5, Q6, Q7	Differential Outputs.
26	VEE	Negative Supply.
27	CLK_SEL	Single-Ended Clock Select.

Absolute Maximum Ratings[1]

Supply Voltage (V_{CC}) ..... –0.5V to +4.0V
Input Voltage (V_{IN}) ..... –0.5V to V_{CC}
Termination Current[3]
  Source or sink current on V_{BB} (I_{BB}) ..... ±0.5mA
Input Current
  Source or sink current
  (CLKA, /CLKA, CLKB, /CLKB, CLK_SEL) ..... ±50mA
Lead Temperature (soldering, 20 sec.) ..... +260°C
Storage Temperature (T_S) ..... –65°C to +150°C

Operating Ratings[2]

Supply Voltage (V_{CC}) ..... +3.0V to +3.6V
Ambient Temperature (T_A) ..... –40°C to +85°C
Package Thermal Resistance
  PLCC (θ_{JA})
    Still-Air ..... 63.5°C/W
    500lfpm ..... 43.5°C/W

DC ELECTRICAL CHARACTERISTICS[4]

T_A = –40°C to +85°C; unless noted.

Symbol	Parameter	Condition	Min	Typ	Max	Units
V_{CC}	Power Supply		3.0	3.3	3.6	V

LVPECL DC ELECTRICAL CHARACTERISTICS[4, 5]

V_{CC} = +3.3V, V_{EE} = 0V; T_A = –40°C to +85°C; unless noted.

Symbol	Parameter	Condition	Min	Typ	Max	Units
I_{CC}	Power Supply Current	No load, max. V_{CC}		55	70	mA
V_{OH}	Output High Voltage (Q0-Q7, /Q0-/Q7)	R_L = 50Ω to V_{CC} –2V	2215	2345	2420	mV
V_{OL}	Output Low Voltage (Q0-Q7, /Q0-/Q7)	R_L = 50Ω to V_{CC} –2V	1470	1595	1680	mV
V_{IH}	Input High Voltage (CLKA, /CLKA, CLKB, /CLKB, CLK_SEL)		2135		2420	mV
V_{IL}	Input Low Voltage (CLKA, /CLKA, CLKB, /CLKB, CLK_SEL)		1490		1825	mV
V_{IHCMR}	Input High Voltage Common Mode Range (Differential) (CLKA, / CLKA, CLKB, /CLKB)	**Note 6**	1.8		2.9	V
V_{BB}	Output Reference Voltage		1.92		2.04	V
I_{IN}	Input HIGH Current (CLKA, /CLKA, CLKB,/CLKB, CLK_SEL)				150	µA
I_{IL}	Input LOW Current (CLKA, /CLKA, CLKB, /CLKB, CLK_SEL)		0.5			µA

Notes:

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.
2. The data sheet limits are not guaranteed if the device is operated beyond the operating ratings.
3. Due to the limited drive capability use for input of the same package only.
4. The circuit is designed to meet the DC specifications shown in the above table after thermal equilibrium has been established.
5. Input and output parameters vary 1:1 with V_{CC}. V_{CC} can vary ±0.3V.
6. V_{IHCMR} is defined as the range within which the V_{IH} level may vary with the device still meeting the propagation delay specification. The V_{IL} level must be such that the peak-to-peak voltage is less than 1.0V and then greater than or equal to V_{PP}(min).

LVNECL DC ELECTRICAL CHARACTERISTICS[7, 8]

V_{CC} = +3.3V, V_{EE} = 0V; T_A = –40°C to +85°C; unless noted.

Symbol	Parameter	Condition	Min	Typ	Max	Units
V_{OH}	Output High Voltage (Q0-Q7, /Q0-/Q7)	R_L = 50Ω to V_{CC} –2V	–1085	–955	–880	mV
V_{OL}	Output Low Voltage (Q0-Q7, /Q0-/Q7)	R_L = 50Ω to V_{CC} –2V	–1830	–1705	–1620	mV
V_{IH}	Input High Voltage (CLKA, /CLKA, CLKB, /CLKB, CLK_SEL)		–1165		–880	mV
V_{IL}	Input Low Voltage (CLKA, /CLKA, CLKB, /CLKB, CLK_SEL)		–1810		–1475	mV
V_{IHCMR}	Input High Voltage Common Mode Range (Differential) (CLKA, / CLKA, CLKB, /CLKB)	**Note 9**	–1.5		–0.4	V
V_{BB}	Output Reference Voltage		–1.38		–1.26	V
I_{IN}	Input HIGH Current (CLKA, /CLKA, CLKB,/CLKB, CLK_SEL)				150	µA
I_{IL}	Input LOW Current (CLKA, /CLKA, CLKB, /CLKB, CLK_SEL)		0.5			µA

AC ELECTRICAL CHARACTERISTICS

V_{CC} = +3.0 to +3.6V and V_{EE} = 0V or V_{CC} = 0V and V_{EE} = –3.0 to –3.6V; T_A = –40°C to +85°C; unless noted.

Symbol	Parameter	Condition	Min	Typ	Max	Units
f_{MAX}	Maximum Operating Frequency	V_{OUT} = 400mV		800		MHz
t_{PD}	Propagation Delay CLKA-to-Q, CLKB-to-Q (Differential)	**Note 10**	525		725	ps
	CLKA-to-Q, CLKB-to-Q (Single-ended)	**Note 11**	500		750	ps
t_{SKEW}	Within-Device Skew Part-to-Part Skew (Differential)	**Note 12**			50 200	ps ps
t_{JITTER}	Cycle-to-Cycle Jitter			1		ps_{RMS}
V_{PP}	Input Swing	**Note 13**	500		1000	mV
t_r, t_f	Rise / Fall Time (20% to 80%) (Q0-Q7, /Q0-/Q7)		160	375	600	ps

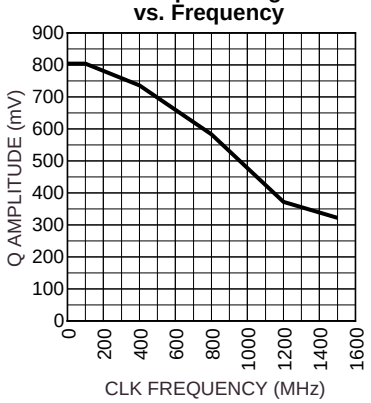
Notes:

7. The circuit is designed to meet the DC specifications shown in the above table after thermal equilibrium has been established.
8. Input and output parameters vary 1:1 with V_{CC}. V_{CC} can vary ±0.3V.
9. V_{IHCMR} is defined as the range within which the V_{IH} level may vary with the device still meeting the propagation delay specification. The V_{IL} level must be such that the peak-to-peak voltage is less than 1.0V and then greater than or equal to V_{PP}(min).
10. The differential propagation delay is defined as the delay from the crossing points of the differential input signals to the crossing point of the differential output signals.
11. The single-ended propagation delay is defined as the delay from the 50% point of the input signal to the 50% point of the output signal.
12. The within-device skew is defined as the worst case difference between any two similar delay paths within a single device.
13. V_{PP}(min) is defined as the minimum input differential voltage which will cause no increase in the propagation delay. The V_{PP}(min) is AC limited for the E310L as a differential input as low as 50 mV will still produce full ECL levels at the output.

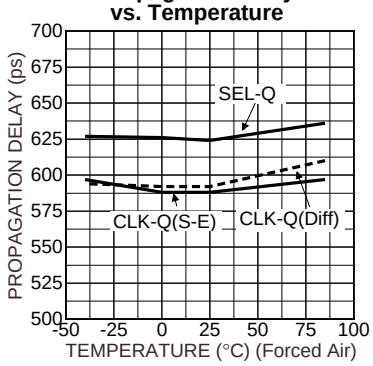
TYPICAL OPERATING CHARACTERISTICS

V_{CC} = 3.3V, T_A = 25°C

Output Swing vs. Frequency



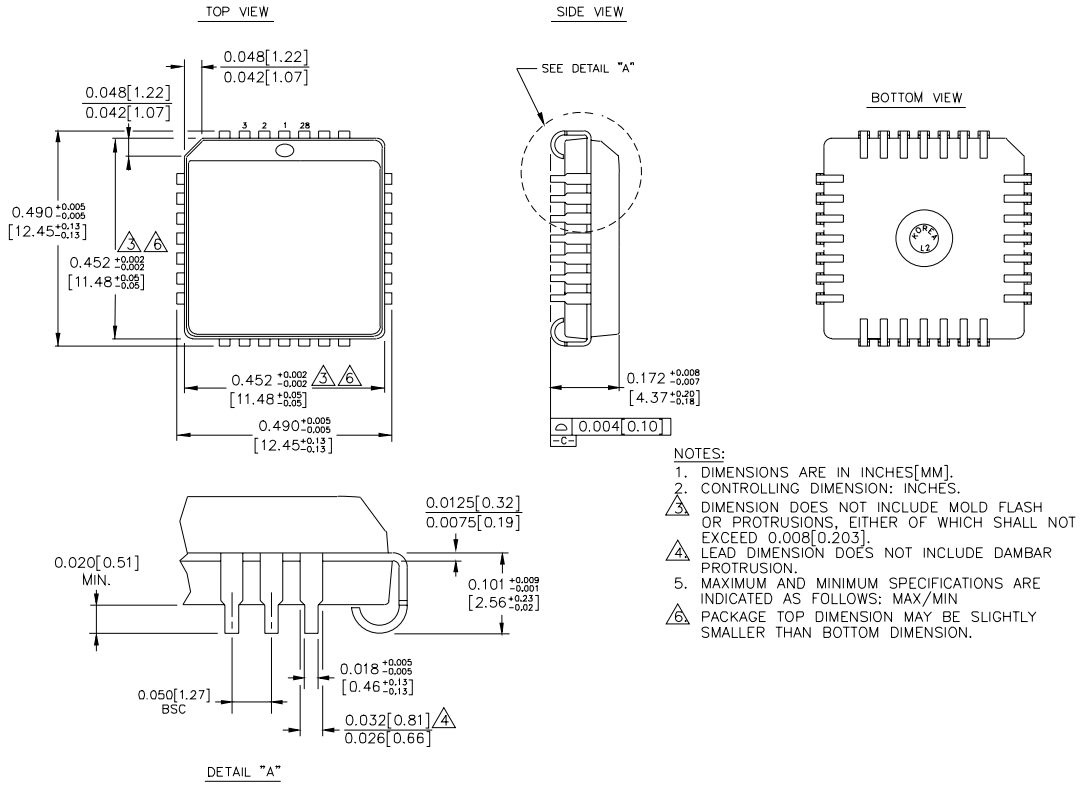
Input to Q Propagation Delay vs. Temperature



RELATED PRODUCT AND SUPPORT DOCUMENTATION

Part Number	Function	Data Sheet Link
HBW Solutions	New Products and Applications	www.micrel.com/product-info/products/solutions.shtml

28-PIN 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.

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