5V/3.3V 1:9 DIFFERENTIAL CLOCK DRIVER (w/o ENABLE)

Precision Edge®
SY10E111A/L
SY100E111A/L

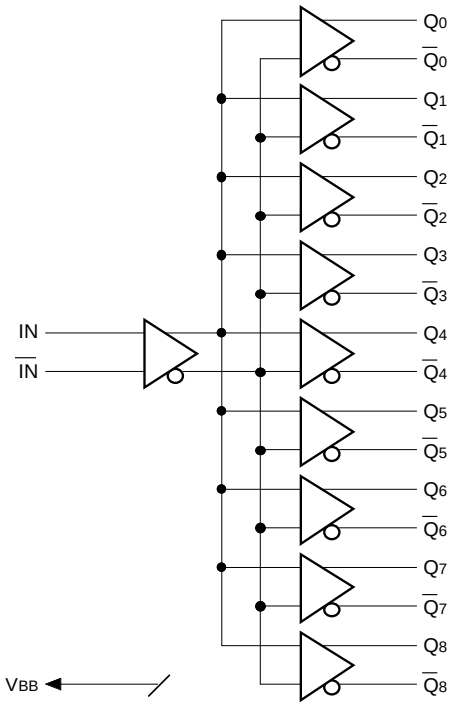
FEATURES

- 5V and 3.3V power supply options
- 200ps part-to-part skew
- 50ps output-to-output skew
- Differential design
- V_{BB} output
- Voltage and temperature compensated outputs
- 75KΩ input pulldown resistors
- Fully compatible with Motorola MC100LVE111
- Available in 28-pin PLCC package



Precision Edge®

BLOCK DIAGRAM



PIN NAMES

Pin	Function
IN, $\overline{IN}$	Differential Input Pair
Q_0, $\overline{Q}_0$ — Q_8, $\overline{Q}_8$	Differential Outputs
V_{BB}	V_{BB} Output
V_{CCO}	V_{CC} to Output

DESCRIPTION

The SY10/100E111A/L are low skew 1-to-9 differential driver designed for clock distribution in mind. The SY10/100E111A/L's function and performance are similar to the popular SY10/100E111, with the improvement of lower jitter and the added feature of low voltage operation. It accepts one signal input, which can be either differential or single-ended if the V_{BB} output is used. The signal is fanned out to 9 identical differential outputs.

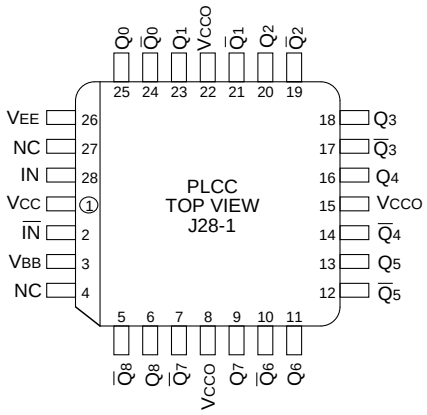
The E111A/L are specifically designed, modeled and produced with low skew as the key goal. Optimal design and layout serve to minimize gate to gate skew within a device, and empirical modeling is used to determine process control limits that ensure consistent t_{pd} distributions from lot to lot. The net result is a dependable, guaranteed low skew device.

To ensure that the tight skew specification is met it is necessary that both sides of the differential output are terminated into 50Ω, even if only one side is being used. In most applications, all nine differential pairs will be used and therefore terminated. In the case where fewer that nine pairs are used, it is necessary to terminate at least the output pairs on the same package side as the pair(s) being used on that side, in order to maintain minimum skew. Failure to do this will result in small degradations of propagation delay (on the order of 10-20ps) of the output(s) being used which, while not being catastrophic to most designs, will mean a loss of skew margin.

The E111A/L, as with most other ECL devices, can be operated from a positive V_{CC} supply in PECL mode. This allows the E111A/L to be used for high performance clock distribution in +5V/+3.3V systems. Designers can take advantage of the E111A/L's performance to distribute low skew clocks across the backplane or the board. In a PECL environment, series or Thevenin line terminations are typically used as they require no additional power supplies. For systems incorporating GTL, parallel termination offers the lowest power by taking advantage of the 1.2V supply as terminating voltage.

Precision Edge is a registered trademark of Micrel, Inc.

PACKAGE/ORDERING INFORMATION



28-Pin PLCC (J28-1)

Ordering Information(1)

Part Number	Package Type	Operating Range	Package Marking	Lead Finish
SY10E111LJI	J28-1	Industrial	SY10E111LJI	Sn-Pb
SY10E111LJITR(2)	J28-1	Industrial	SY10E111LJI	Sn-Pb
SY100E111LJI	J28-1	Industrial	SY100E111LJI	Sn-Pb
SY100E111LJITR(2)	J28-1	Industrial	SY100E111LJI	Sn-Pb
SY10E111LJC	J28-1	Commercial	SY10E111LJC	Sn-Pb
SY10E111LJCTR(2)	J28-1	Commercial	SY10E111LJC	Sn-Pb
SY100E111LJC	J28-1	Commercial	SY100E111LJC	Sn-Pb
SY100E111LJCTR(2)	J28-1	Commercial	SY100E111LJC	Sn-Pb
SY10E111AJI	J28-1	Industrial	SY10E111AJI	Sn-Pb
SY10E111AJITR(2)	J28-1	Industrial	SY10E111AJI	Sn-Pb
SY100E111AJI	J28-1	Industrial	SY100E111AJI	Sn-Pb
SY100E111AJITR(2)	J28-1	Industrial	SY100E111AJI	Sn-Pb
SY10E111AJC	J28-1	Commercial	SY10E111AJC	Sn-Pb
SY10E111AJCTR(2)	J28-1	Commercial	SY10E111AJC	Sn-Pb
SY100E111AJC	J28-1	Commercial	SY100E111AJC	Sn-Pb
SY100E111AJCTR(2)	J28-1	Commercial	SY100E111AJC	Sn-Pb
SY10E111LJY(3)	J28-1	Industrial	SY10E111LJY with Pb-Free bar-line indicator	Matte-Sn
SY10E111LJYTR(2, 3)	J28-1	Industrial	SY10E111LJY with Pb-Free bar-line indicator	Matte-Sn
SY100E111LJY(3)	J28-1	Industrial	SY100E111LJY with Pb-Free bar-line indicator	Matte-Sn
SY100E111LJYTR(2, 3)	J28-1	Industrial	SY100E111LJY with Pb-Free bar-line indicator	Matte-Sn
SY10E111AJY(3)	J28-1	Industiral	SY10E111AJY with Pb-Free bar-line indicator	Matte-Sn
SY10E111AJYTR(2, 3)	J28-1	Industrial	SY10E111AJY with Pb-Free bar-line indicator	Matte-Sn
SY100E111AJY(3)	J28-1	Industrial	SY100E111AJY with Pb-Free bar-line indicator	Matte-Sn
SY100E111AJYTR(2, 3)	J28-1	Industrial	SY100E111AJY 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.

PRODUCT/PROCESS INFORMATION

Process:	Bipolar
ESD Rating:	Per Mil Std. 883 Human Body Model, >1.5kV (all pins).

ABSOLUTE MAXIMUM RATINGS(1)

Symbol	Rating	Value	Unit
V_{CC}	Power Supply Voltage (V_{EE} = 0)	+6.0 to 0	V
V_{EE}	Power Supply Voltage (V_{CC} = 0)	–6.0 to 0	V
V_{IN}	Input Voltage (V_{CC} = 0V, V_{IN} not more negative than V_{EE}) Input Voltage (V_{EE} = 0V, V_{IN} not more positive than V_{CC})	–6.0 to 0 +6.0 to 0	V V
I_{OUT}	Output Current –Continuous –Surge	50 100	mA
T_{LEAD}	Lead Storage Temperature Range (soldering, 20sec.)	+260	°C
T_A	Operating Temperature Range	–40 to +85	°C
T_{store}	Storage Temperature Range	–65 to +150	°C
θ_{JA}	Thermal Resistance (Junction-to-Ambient) –Still Air	79	°C/W
θ_{JC}	Thermal Resistance (Junction-to-Case)	24	°C/W
ESD	Mil Std. 883 Human Body Model, All Pins	>1.5k	V

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.

ECL DC ELECTRICAL CHARACTERISTICS(1)

V_{EE} = V_{EE} (Min.) to V_{EE} (Max.); V_{CC} = GND

		T_A = –40°C			T_A = 0°C			T_A = +25°C			T_A = +85°C			
Symbol	Parameter	Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	Unit
V_{OH}	Output HIGH Voltage													mV
	10EL	–1080	—	–890	–1020	—	–840	–980	—	–810	–910	—	–720	
	100EL	–1085	—	–880	–1025	—	–880	–1025	—	–880	–1025	—	–880	
V_{OL}	Output LOW Voltage													mV
	10EL	–1950	—	–1650	–1950	—	–1630	–1950	—	–1630	–1950	—	–1595	
	100EL	–1830	—	–1550	–1810	—	–1620	–1810	—	–1620	–1810	—	–1620	
V_{IH}	Input HIGH Voltage													mV
	10EL	–1230	—	–890	–1170	—	–840	–1130	—	–810	–1060	—	–720	
	100EL	–1165	—	–880	–1165	—	–880	–1165	—	–880	–1165	—	–880	
V_{IL}	Input LOW Voltage													mV
	10EL	–1950	—	–1500	–1950	—	–1480	–1950	—	–1480	–1950	—	–1445	
	100EL	–1810	—	–1475	–1810	—	–1475	–1810	—	–1475	–1810	—	–1475	
V_{BB}	Output Reference Voltage 10EL	–1.43	—	–1.30	–1.38	—	–1.27	–1.35	—	–1.25	–1.31	—	–1.19	V
	100EL	–1.38	—	–1.26	–1.38	—	–1.26	–1.38	—	–1.26	–1.38	—	–1.26	
I_{IH}	Input HIGH Current	—	—	150	—	—	150	—	—	150	—	—	150	µA
I_{IL}	Input LOW Current													µA
	10EL	0.5	—	—	0.5	—	—	0.5	—	—	0.3	—	—	
	100EL	0.5	—	—	0.5	—	—	0.5	—	—	0.5	—	—	
I_{EE}	Power Supply Current													mA
	10EL	35	—	65	35	—	65	35	—	65	35	—	65	
	100EL	35	—	65	35	—	65	35	—	65	35	—	75	

Note 1. Parametric values specified at:

5 volt Power Supply Range	100E111A Series:	-4.2V to -5.5V.
	10E111A Series	-4.75V to -5.5V.
3 volt Power Supply Range	10/100E111L Series:	-3.0V to -3.8V.

3.3V PECL DC ELECTRICAL CHARACTERISTICS[1]

V_{CC} = +3.0V to +3.8V, V_{EE} = GND

		TA = –40°C			TA = 0°C			TA = +25°C			TA = +85°C			
Symbol	**Parameter**	**Min.**	**Typ.**	**Max.**	**Min.**	**Typ.**	**Max.**	**Min.**	**Typ.**	**Max.**	**Min.**	**Typ.**	**Max.**	**Unit**
V_{OH}	Output HIGH Voltage													mV
	Note 2 10EL	2220	—	2110	2280	—	2460	2320	—	2490	2390	—	2580	
	100EL	2215	—	2120	2275	—	2420	2275	—	2420	2275	—	2420	
V_{OL}	Output LOW Voltage													mV
	Note 2 10EL	1350	—	1650	1350	—	1670	1350	—	1670	1350	—	1705	
	100EL	1470	—	1750	1490	—	1680	1490	—	1680	1490	—	1680	
V_{IH}	Input HIGH Voltage													mV
	Note 2 10EL	2070	—	2410	2130	—	2460	2170	—	2490	2240	—	2580	
	100EL	2135	—	2420	2135	—	2420	2135	—	2420	2135	—	2420	
V_{IL}	Input LOW Voltage													mV
	Note 2 10EL	1350	—	1800	1350	—	1820	1350	—	1820	1350	—	1855	
	100EL	1490	—	1825	1490	—	1825	1490	—	1825	1490	—	1825	
V_{BB}	Output Reference													V
	Voltage, **Note 2** 10EL	1.87	—	2.00	1.92	—	2.03	1.95	—	2.05	1.99	—	2.11	
	100EL	1.92	—	2.04	1.92	—	2.04	1.92	—	2.04	1.92	—	2.04	
I_{IH}	Input HIGH Current	—	—	150	—	—	150	—	—	150	—	—	150	µA
I_{IL}	Input LOW Current													µA
	10EL	0.5	—	—	0.5	—	—	0.5	—	—	0.3	—	—	
	100EL	0.5	—	—	0.5	—	—	0.5	—	—	0.5	—	—	
I_{EE}	Power Supply Current													mA
	10EL	—	—	66	—	—	66	—	—	66	—	—	66	
	100EL	—	—	66	—	—	66	—	—	66	—	—	78	

Note 1. Parametric values specified at: 3 volt Power Supply Range 10/100E111L Series: +3.0V to +3.8V.

Note 2. These values are for V_{CC} = 3.3V. Level specifications will vary 1:1 with V_{CC}.

5V PECL DC ELECTRICAL CHARACTERISTICS[1]

V_{CC} = V_{CC} (Min.) to V_{CC} (Max.); V_{EE} = GND

		TA = –40°C			TA = 0°C			TA = +25°C			TA = +85°C			
Symbol	**Parameter**	**Min.**	**Typ.**	**Max.**	**Min.**	**Typ.**	**Max.**	**Min.**	**Typ.**	**Max.**	**Min.**	**Typ.**	**Max.**	**Unit**
V_{OH}	Output HIGH Voltage													mV
	Note 2 10EL	3920	—	4110	3980	—	4160	4020	—	4190	4090	—	4280	
	100EL	3915	—	4120	3975	—	4120	3975	—	4120	3975	—	4120	
V_{OL}	Output LOW Voltage													mV
	Note 2 10EL	3050	—	3350	3050	—	3370	3050	—	3370	3050	—	3405	
	100EL	3170	—	3450	3190	—	3380	3190	—	3380	3190	—	3380	
V_{IH}	Input HIGH Voltage													mV
	Note 2 10EL	3770	—	4110	3830	—	4160	3870	—	4190	3940	—	4280	
	100EL	3835	—	4120	3835	—	4120	3835	—	4120	3835	—	4120	
V_{IL}	Input LOW Voltage													mV
	Note 2 10EL	3050	—	3500	3050	—	3520	3050	—	3520	3050	—	3555	
	100EL	3190	—	3525	3190	—	3525	3190	—	3525	3190	—	3525	
V_{BB}	Output Reference													V
	Voltage, **Note 2** 10EL	3.57	—	3.70	3.62	—	3.73	3.65	—	3.75	3.69	—	3.81	
	100EL	3.62	—	3.74	3.62	—	3.74	3.62	—	3.74	3.62	—	3.74	
I_{IH}	Input HIGH Current	—	—	150	—	—	150	—	—	150	—	—	150	µA
I_{IL}	Input LOW Current													µA
	10EL	0.5	—	—	0.5	—	—	0.5	—	—	0.3	—	—	
	100EL	0.5	—	—	0.5	—	—	0.5	—	—	0.5	—	—	
I_{EE}	Power Supply Current													mA
	10EL	—	—	66	—	—	66	—	—	66	—	—	66	
	100EL	—	—	66	—	—	66	—	—	66	—	—	78	

Note 1. Parametric values specified at: 5 volt Power Supply Range 100E111A Series: +4.2V to +5.5V.
10E111A Series +4.75V to +5.5V.

Note 2. These values are for V_{CC} = 5V. Level specifications will vary 1:1 with V_{CC}.

AC ELECTRICAL CHARACTERISTICS[1]

$V_{EE} = V_{EE}$ (Min.) to V_{EE} (Max.); V_{CC} = GND

Symbol	Parameter	T_A = -40°C			T_A = 0°C			T_A = +25°C			T_A = +85°C			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	
t_{PD}	Propagation Delay to Output													ps
	IN (differential), **Note 2**	380	—	680	430	—	630	430	—	630	430	—	630	
	IN (single-ended), **Note 3**	280	—	780	330	—	730	330	—	730	330	—	730	
t_{skew}	Within-Device Skew, **Note 4**	—	—	75	—	—	50	—	—	50	—	—	50	ps
	Part-to-Part Skew (Diff.)	—	—	250	—	—	200	—	—	200	—	—	200	
V_{PP}	Minimum Input Swing, **Note 5**	250	—	—	250	—	—	250	—	—	250	—	—	mV
V_{CMR}	Common Mode Range, **Note 6**	–1.5	—	–0.4	–1.5	—	–0.4	–1.5	—	–0.4	–1.5	—	–0.4	V
t_r	Rise/Fall Times	200	—	650	200	—	600	200	—	600	200	—	600	ps
t_f	20% to 80%													

Note 1. Parametric values specified at: 5 volt Power Supply Range 100E111A Series: -4.2V to -5.5V.
10E111A Series -4.75V to -5.5V.
3 volt Power Supply Range 10/100E111L Series: -3.0V to -3.8V.

Note 2. 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.

Note 3. 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.

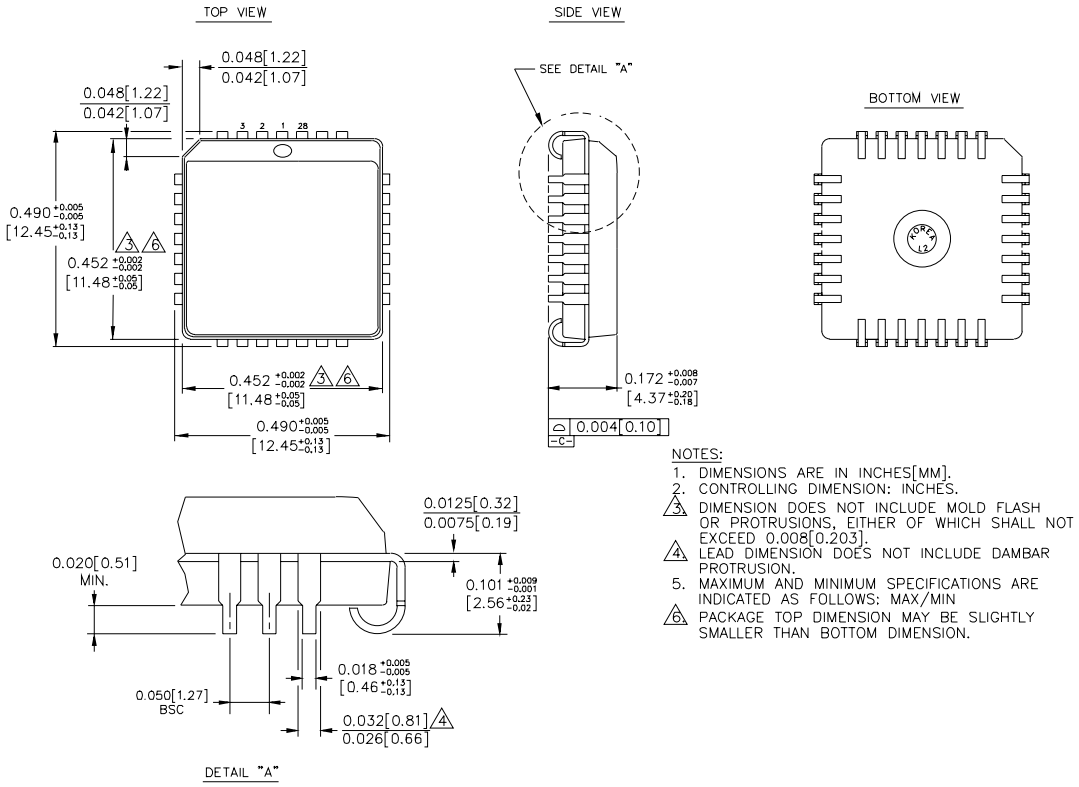
Note 4. The within-device skew is defined as the worst case difference between any two similar delay paths within a single device.

Note 5. 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 E111A/L as a differential input as low as 50mV will still produce full ECL levels at the output.

Note 6. V_{CMR} is defined as the range within 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 greater than or equal to V_{PP} (min).

For PECL operation: V_{CMR} (max) = V_{CC} – $|V_{CMR}$ (max)| and V_{CMR} (min) = V_{CC} – $|V_{CMR}$ (min)|

28-PIN PLCC (J28-1)



Package Notes:

Note 1. Package meets Level 1 moisture sensitivity.

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