

## 100EL16 5V ECL Differential Receiver

### General Description

The 100EL16 is a 5V differential receiver that contains an internally supply voltage source,  $V_{BB}$ . When used in a single ended input condition the unused input must be tied to  $V_{BB}$ . When operating in this mode use a 0.01  $\mu$ F capacitor to decouple  $V_{BB}$  and  $V_{CC}$  and also limit the current sinking or sourcing capability to 0.5mA. When  $V_{BB}$  is not used it should be left open.

With inputs open or both inputs at  $V_{EE}$  the differential Q output defaults LOW.

The 100 series is temperature compensated.

### Features

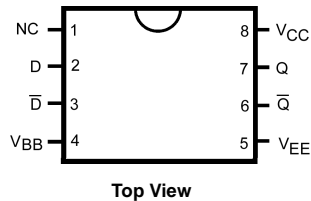
- Typical propagation delay of 250 ps
- Typical  $I_{EE}$  of 18 mA
- Internal pull-down resistors on inputs
- Fairchild MSOP-8 package is a drop-in replacement to ON TSSOP-8
- Meets or exceeds JEDEC specification EIA/JESD78 IC latch-up test
- Moisture Sensitivity Level 1
- ESD Performance:
  - Human Body Model > 2000V
  - Machine Model > 200V

### Ordering Code:

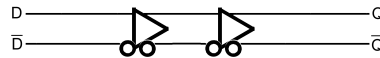
Order Number	Package Number	Product Code Top Mark	Package Description
100EL16M	M08A	KEL16	8-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow
100EL16M8 (Preliminary)	MA08D	KL16	8-Lead Molded Small Outline Package (MSOP), JEDEC MO-187, 3.0mm Wide

Devices also available in Tape and Reel. Specify by appending suffix letter "X" to the ordering code.

### Connection Diagram



### Logic Diagram



### Pin Descriptions

Pin Name	Description
Q, $\bar{Q}$	ECL Data Outputs
D, $\bar{D}$	ECL Data Inputs
$V_{BB}$	Reference Voltage
$V_{CC}$	Positive Supply
$V_{EE}$	Negative Supply
NC	No Connect

**Absolute Maximum Ratings** (Note 1)

PECL Supply Voltage ( $V_{CC}$ )	$V_{EE} = 0V$	0.0V to +8.0V
NECL Supply Voltage ( $V_{EE}$ )	$V_{CC} = 0V$	0.0V to -8.0V
PECL DC Input Voltage ( $V_I$ )	$V_{EE} = 0V$	0.0V to +6.0V
NECL DC Input Voltage ( $V_I$ )	$V_{CC} = 0V$	0.0V to -6.0V
DC Output Current ( $I_{OUT}$ )		
Continuous		50 mA
Surge		100 mA
$V_{BB}$ Sink/Source Current ( $I_{BB}$ )		$\pm 0.5$ mA
Storage Temperature ( $T_{STG}$ )		-65°C to +150°C

**Recommended Operating Conditions**

PECL Power Supply	$V_{CC} = 4.2V$ to 5.5V
NECL Power Supply	$V_{EE} = -4.2V$ to -5.5V
Free Air Operating Temperature ( $T_A$ )	-40°C to +85°C

**Note 1:** The "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated at these limits. The parametric values defined in the Electrical Characteristics tables are not guaranteed at the absolute maximum rating. The "Recommended Operating Conditions" table will define the conditions for actual device operation.

**100EL PECL DC Electrical Characteristics**  $V_{CC} = 5.0V$ ;  $V_{EE} = 0.0V$  (Note 2)

Symbol	Parameter	-40°C			25°C			85°C			Units
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
$I_{EE}$	Power Supply Current		18	22		18	22		21	26	mA
$V_{OH}$	Output HIGH Voltage (Note 3)	3915	3995	4120	3975	4045	4120	3975	4050	4120	mV
$V_{OL}$	Output LOW Voltage (Note 3)	3170	3305	3445	3190	3295	3380	3190	3295	3380	mV
$V_{IH}$	Input HIGH Voltage (Single Ended)	3835		4120	3835		4120	3835		4120	mV
$V_{IL}$	Input LOW Voltage (Single Ended)	3190		3525	3190		3525	3190		3525	mV
$V_{BB}$	Output Voltage Reference	3.62		3.74	3.62		3.74	3.62		3.74	V
$V_{IHCMR}$	Input HIGH Voltage Common Mode Range (Differential) (Note 4)	2.5		4.6	2.5		4.6	2.5		4.6	V
$I_{IH}$	Input HIGH Current (Note 5)			150			150			150	$\mu A$
$I_{IL}$	Input LOW Current (Note 5)	0.5			0.5			0.5			$\mu A$

**Note 2:** Input and output parameters vary 1 to 1 with  $V_{CC}$ .  $V_{EE}$  can vary +0.8V/-0.5V.

**Note 3:** Outputs are terminated through a 50 $\Omega$  Resistor to  $V_{CC} - 2.0V$ .

**Note 4:**  $V_{IHCMR}$  minimum varies 1 to 1 with  $V_{EE}$ .  $V_{IHCMR}$  maximum varies 1-to-1 with  $V_{CC}$ . The  $V_{IHCMR}$  range is referenced to the most positive side of the differential input signal. Normal operation is obtained if the HIGH level falls within the specified range and the peak-to-peak voltage lies between  $V_{PPMIN}$  and 1V.

**Note 5:** Absolute value of the input HIGH and LOW current should not exceed the absolute value of the stated Min or Max specification.

**Note:** Devices are designed to meet the DC specifications after thermal equilibrium has been established. Circuit is tested with air flow greater than 500LFPM maintained.

**100EL NECL DC Electrical Characteristics**  $V_{CC} = 0.0V$ ;  $V_{EE} = -5.0V$  (Note 6)

Symbol	Parameter	-40°C			25°C			85°C			Units
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
$I_{EE}$	Power Supply Current		18	22		18	22		21	26	mA
$V_{OH}$	Output HIGH Voltage (Note 7)	-1085	-1005	-880	-1025	-955	-880	-1025	-955	-880	mV
$V_{OL}$	Output LOW Voltage (Note 7)	-1830	-1695	-1555	-1810	-1705	-1620	-1810	-1705	-1620	mV
$V_{IH}$	Input HIGH Voltage (Single Ended)	-1165		-880	-1165		-880	-1165		-880	mV
$V_{IL}$	Input LOW Voltage (Single Ended)	-1810		-1475	-1810		-1475	-1810		-1475	mV
$V_{BB}$	Output Voltage Reference	-1.38		-1.26	-1.38		-1.26	-1.38		-1.26	V
$V_{IHCMR}$	Input HIGH Voltage Common Mode Range (Differential) (Note 8)	-2.5		-0.4	-2.5		-0.4	-2.5		-0.4	V
$I_{IH}$	Input HIGH Current (Note 9)			150			150			150	$\mu A$
$I_{IL}$	Input LOW Current (Note 9)	0.5			0.5			0.5			$\mu A$

**Note 6:** Input and output parameters vary 1 to 1 with  $V_{CC}$ .  $V_{EE}$  can vary +0.8V/-0.5V.

**Note 7:** Outputs are terminated through a 50 $\Omega$  Resistor to  $V_{CC} - 2.0V$ .

**Note 8:**  $V_{IHCMR}$  minimum varies 1 to 1 with  $V_{EE}$ .  $V_{IHCMR}$  maximum varies 1 to 1 with  $V_{CC}$ . The  $V_{IHCMR}$  range is referenced to the most positive side of the differential input signal. Normal operation is obtained if the HIGH level falls within the specified range and the peak-to-peak voltage lies between  $V_{PPMIN}$  and 1V.

**Note 9:** Absolute value of the input HIGH and LOW current should not exceed the absolute value of the stated Min or Max specification.

**Note:** Devices are designed to meet the DC specifications after thermal equilibrium has been established. Circuit is tested with air flow greater than 500LFPM maintained.

**100EL AC Electrical Characteristics**  $V_{CC} = 5V$ ;  $V_{EE} = 0.0V$  or  $V_{CC} = 0.0V$ ;  $V_{EE} = -5V$   
 (Note 10)(Note 11)

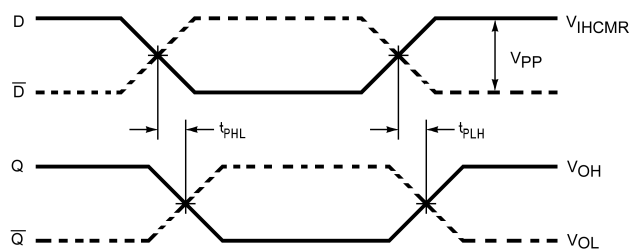
Symbol	Parameter	-40°C			25°C			85°C			Units	Figure Number	
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max			
$f_{MAX}$	Maximum Toggle Frequency	TBD			TBD			TBD			GHz		
$t_{PLH}$ , $t_{PHL}$	Propagation Delay to Output (Diff) (SE)	125	250	375	175	250	325	205	280	355	ps	Figures 1, 3	
$t_{SKEW}$	Duty Cycle Skew (Note 12)	5			20			5			ps		
$t_{JITTER}$	Cycle-to-Cycle Jitter	TBD			TBD			TBD			ps		
$V_{PP}$	Input Swing	150			1000			150			1000	mV	Figure 1
$t_r$ , $t_f$	Output Rise Times Q (20% to 80%)	100	190	350	100	190	350	100	190	350	ps	Figure 2	

**Note 10:**  $V_{EE}$  can vary +0.8V / -0.5V.

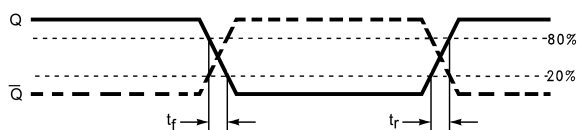
**Note 11:** Measured using a 750 mV input swing centered at  $V_{CC} - 1.32V$ ; 50% duty cycle clock source;  $t_r = t_f = 250$  ps (20% - 80%) at  $f_{IN} = 1$  MHz. All loading with  $50\Omega$  to  $V_{CC} - 2.0V$ .

**Note 12:** Duty cycle skew is the difference between a  $t_{PLH}$  and  $t_{PHL}$  propagation delay through a device under identical conditions.

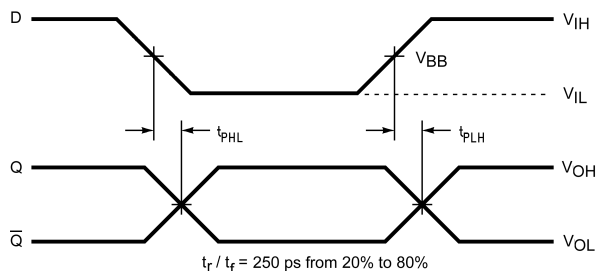
**Switching Waveforms**



**FIGURE 1. Differential to Differential Propagation Delay**

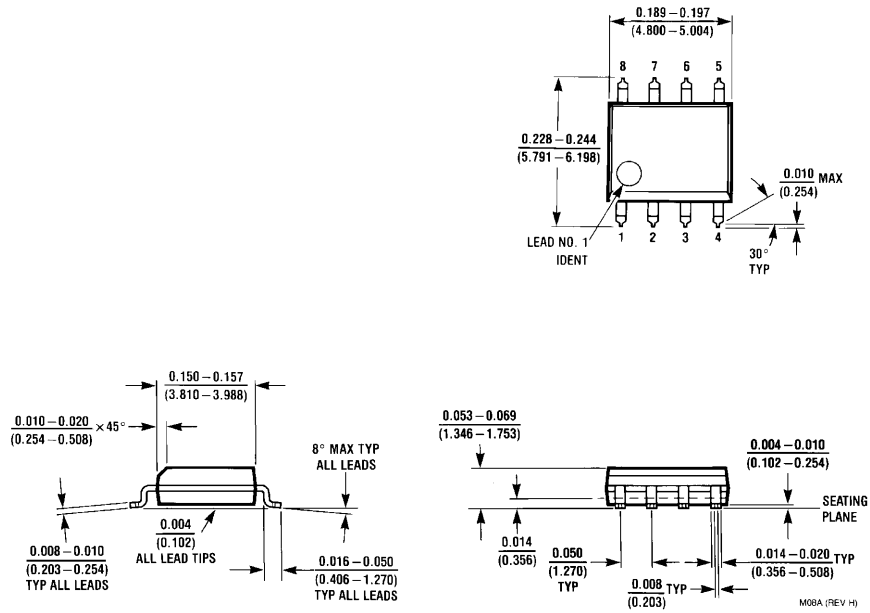


**FIGURE 2. Differential Output Edge Rates**



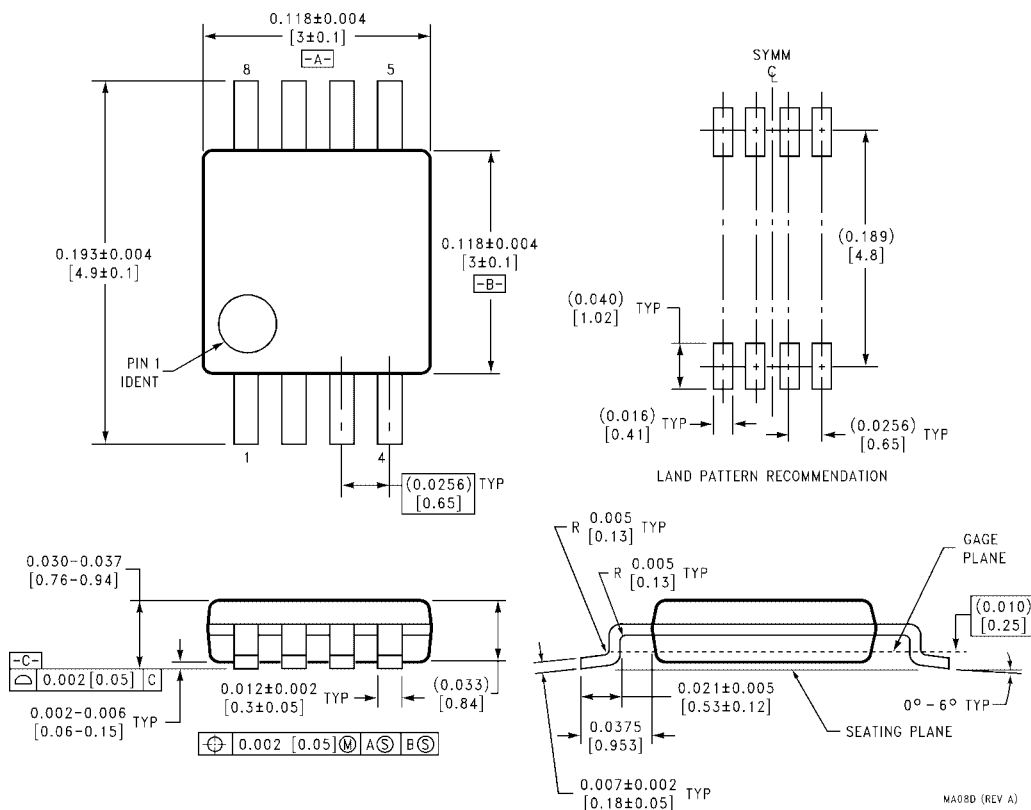
**FIGURE 3. Single Ended to Differential Propagation Delay**

**Physical Dimensions** inches (millimeters) unless otherwise noted



**8-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow  
Package Number M08A**

**Physical Dimensions** inches (millimeters) unless otherwise noted (Continued)



**8-Lead Molded Small Outline Package (MSOP), JEDEC MO-187, 3.0mm Wide  
Package Number MA08D**

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