

Product Preview  
**Differential Receiver**

The MC10EP16 is a differential receiver. The device is functionally equivalent to the EL16 device with higher performance capabilities. With output transition times significantly faster than the EL16 the EP16 is ideally suited for interfacing with high frequency sources.

The EP16 provides a  $V_{BB}$  output for either single-ended use or as a DC bias for AC coupling to the device. The  $V_{BB}$  pin should be used only as a bias for the EP16 as its current sink/source capability is limited. Whenever used, the  $V_{BB}$  pin should be bypassed to ground via a  $0.01\mu\text{f}$  capacitor.

Under open input conditions (pulled to  $V_{EE}$ ) internal input clamps will force the Q output LOW.

- 160ps Propagation Delay
- High Bandwidth Output Transitions
- $75\text{k}\Omega$  Internal Input Pulldown Resistors
- $>1000\text{V}$  ESD Protection
- Maximum Frequency  $> 2.7\text{GHz}$
- $V_{BB}$  Sink/Source Current =  $0.5\text{mA}$  maximum
- Component Count = 22 NPN devices

NOTE: Inputs have  $75\text{k}\Omega$  to  $V_{EE}$  on  $\overline{D}$  input and  $75\text{k}\Omega$  to  $V_{EE}$  and  $V_{CC}$  on D input and when left open, force outputs to known state  $Q=\text{Low}$ ,  $\overline{Q}=\text{High}$ . Solder temp  $265^\circ\text{C}$  for maximum for  $< 2-3$  seconds;  $245^\circ\text{C}$  desired.

**MC10EP16**



**D SUFFIX**  
8-LEAD PLASTIC SOIC PACKAGE  
CASE 751-06

**PIN DESCRIPTION**

PIN	FUNCTION
D, $\overline{D}$ Q, $\overline{Q}$ $V_{BB}$	Data Inputs Data Outputs Ref. Voltage Output

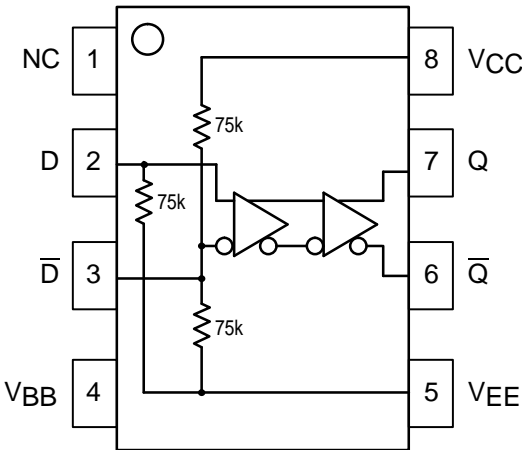


Figure 1. 8-Lead Pinout (Top View) and Logic Diagram

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**MAXIMUM RATINGS\***

Symbol	Parameter	Value	Unit
$V_{EE}$	Power Supply ( $V_{CC} = 0V$ )	-8.0 to +0	VDC
$V_I$	Input Voltage ( $V_{CC} = 0V$ )	0 to +6.0	VDC
$I_{out}$	Output Current Continuous Surge	50 100	mA
$T_A$	Operating Temperature Range	-40 to +85	°C
$V_{EE}$	Operating Range	-5.5 to 3.0	V
$\theta_{JA}$	Thermal Resistance (Junction-to-Ambient) Still Air 500lfpm	190 130	°C/W
$\theta_{JC}$	Thermal Resistance (Junction-to-Case)	41 to 44 ( $\pm 5\%$ )	°C/W

\* Maximum Ratings are those values beyond which damage to the device may occur. Functional operation should be restricted to the Recommended Operating Conditions.

**DC CHARACTERISTICS** ( $V_{EE} = V_{EE}(\text{min})$  to  $V_{EE}(\text{max})$ ;  $V_{CC} = \text{GND}$ ; Note 1.)

Symbol	Characteristic	-40°C			0°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
$V_{OH}$	Output HIGH Voltage	-1080		-890	-1020		-840	-980		-810	-910		-720	mV
$V_{OL}$	Output LOW Voltage	-1950		-1650	-1950		-1630	-1950		-1630	-1950		-1595	mV
$V_{IH}$	Input HIGH Voltage	-1230		-890	-1170		-840	-1130		-810	-1060		-720	mV
$V_{IL}$	Input LOW Voltage	-1950		-1500	-1950		-1480	-1950		-1480	-1950		-1445	mV
$V_{EE}$	Power Supply Voltage	-5.5		-3.0	-5.5		-3.0	-5.5		-3.0	-5.5		-3.0	Volts
$V_{BB}$	Reference Voltage													mV
$I_{IH}$	Input HIGH Current			150			150			150			150	$\mu A$
$I_{IL}$	Input LOW Current $\begin{smallmatrix} D \\ \bar{D} \end{smallmatrix}$	0.5 -600			0.5 -600			0.5 -600			0.5 -600			$\mu A$ $\mu A$
$I_{EE}$	$V_{EE}$ Supply Current	23		29	23		29	23		29	23		29	mA

1. 10EL circuits are designed to meet the DC specifications shown in the table after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and transverse airflow greater than 500lfpm is maintained. Outputs are terminated through a 50 $\Omega$  resistor to  $V_{CC} - 2.0V$  except where otherwise specified on the individual data sheets.

**AC CHARACTERISTICS** ( $V_{EE} = V_{EE}(\text{min})$  to  $V_{EE}(\text{max})$ ;  $V_{CC} = \text{GND}$ )

Symbol	Characteristic	-40°C			0°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
$f_{max}$	Maximum Frequency (Note 2.)	2.7			2.7			2.7			2.7			GHz
$t_{PLH}$ , $t_{PHL}$	Propagation Delay to Output Diff.		160			160			160			160		ps
$t_{SKEW}$	Duty Cycle Skew (Note 3.) Diff.		5.0			5.0	20		5.0	20		5.0	20	ps
$V_{PP}$	Minimum Input Swing (Note 4.)	150			150			150			150			mV
$V_{CMR}$	Common Mode Range (Note 5.)	-0.4			-0.4			-0.4			-0.4			V
$t_r$ , $t_f$	Output Rise/Fall Times Q (20% - 80%)		110			110			110			110		ps

2. Minimum  $f_{max}$  specified to 2.7GHz with reduced output swing. See Figure 2 on page 3.
3. Duty cycle skew is the difference between a  $T_{PLH}$  and  $T_{PHL}$  propagation delay through a device.
4. Minimum input swing for which AC parameters guaranteed. The device has a DC gain of  $\approx 40$ .
5. The CMR 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. The lower end of the CMR range is dependent on  $V_{EE}$  and is equal to  $V_{EE} + 2.5V$ .

**PECL CHARACTERISTICS** (Note 6.)

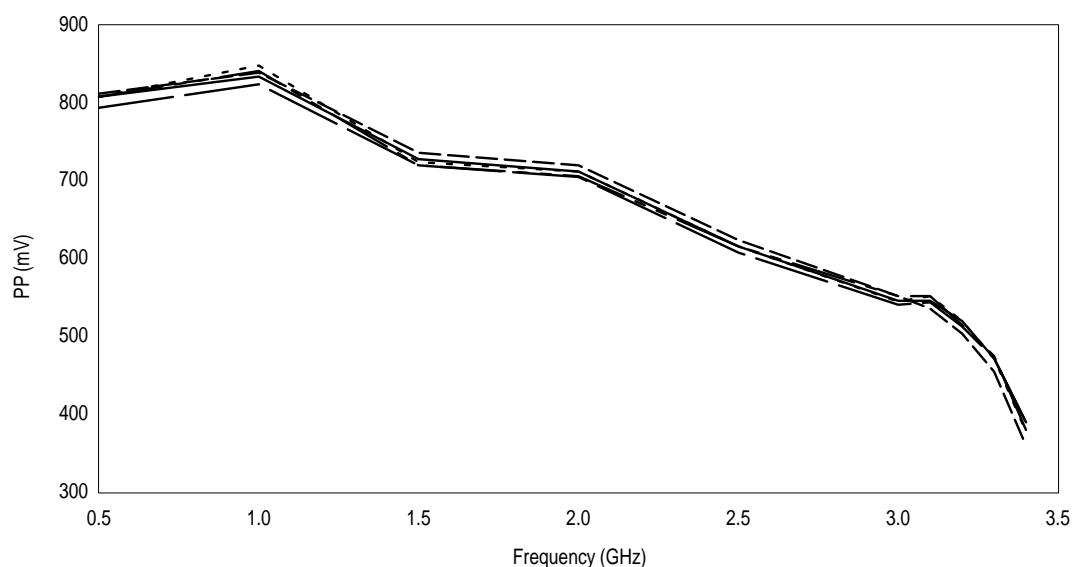
Symbol	Characteristic	-40°C			0°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
V <sub>CC</sub>	Power Supply Voltage	3.0		5.5	3.0		5.5	3.0		5.5	3.0		5.5	V
V <sub>BB</sub>	Reference Voltage													
V <sub>OH</sub>	Output HIGH Voltage	3920		4110	3980		4160	4020		4190	4090		4280	mV
V <sub>OL</sub>	Output LOW Voltage	3050		3350	3050		3370	3050		3370	3050		3405	mV
V <sub>IH</sub>	Input HIGH Voltage	3770		4110	3830		4160	3870		4190	3940		4280	mV
V <sub>IL</sub>	Input LOW Voltage	3050		3500	3050		3520	3050		3520	3050		3555	mV
I <sub>IH</sub>	Input HIGH Current			150			150			150				μA
I <sub>IL</sub>	Input LOW Current <span style="float: right;">D D</span>	0.5 -600			0.5 -600			0.5 -600			0.5 -600			μA
I <sub>EE</sub>	V <sub>EE</sub> Supply Current	23		29	23		29	23		29	23		29	mA

6. Input and output level parameters are for V<sub>CC</sub>=5.0V and levels will vary 1:1 with V<sub>CC</sub>.

**LVPECL CHARACTERISTICS** (Note 7.)

Symbol	Characteristic	-40°C			0°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
V <sub>CC</sub>	Power Supply Voltage	3.0		5.5	3.0		5.5	3.0		5.5	3.0		5.5	V
V <sub>BB</sub>	Reference Voltage													
V <sub>OH</sub>	Output HIGH Voltage	2220		2410	2280		2460	2320		2490	2390		2580	mV
V <sub>OL</sub>	Output LOW Voltage	1350		1650	1350		1670	1350		1670	1650		1705	mV
V <sub>IH</sub>	Input HIGH Voltage	2070		2410	2130		2460	2170		2490	2240		2580	mV
V <sub>IL</sub>	Input LOW Voltage	1350		1800	1350		1820	1350		1820	1350		1855	mV
I <sub>IH</sub>	Input HIGH Current			150			150			150			150	μA
I <sub>IL</sub>	Input LOW Current <span style="float: right;">D D</span>	0.5 -600			0.5 -600			0.5 -600			0.5 -600			μA
I <sub>EE</sub>	V <sub>EE</sub> Supply Current	23		29	23		29	23		29	23		29	mA

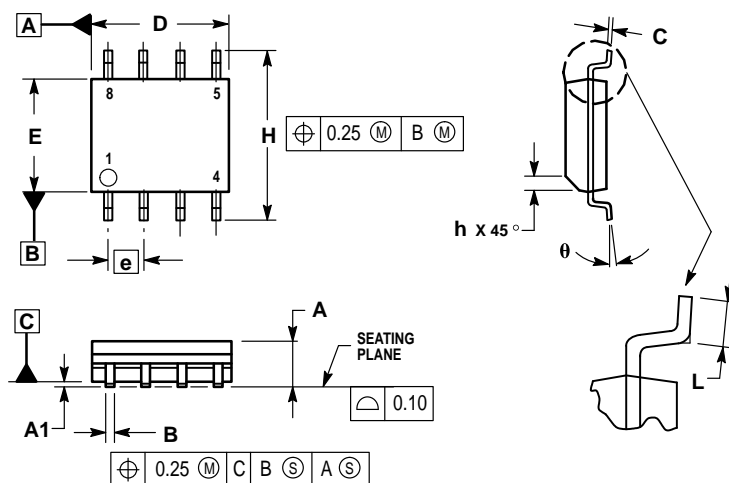
7. Input and output level parameters are for V<sub>CC</sub>=3.3V and levels will vary 1:1 with V<sub>CC</sub>.



**Figure 2. Frequency vs. Peak-to-Peak Jitter**

## OUTLINE DIMENSIONS


**D SUFFIX**  
**PLASTIC SOIC PACKAGE**  
**CASE 751-06**  
**ISSUE T**



## NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. DIMENSIONS ARE IN MILLIMETER.
3. DIMENSION D AND E DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.
5. DIMENSION B DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 TOTAL IN EXCESS OF THE B DIMENSION AT MAXIMUM MATERIAL CONDITION.

DIM	MILLIMETERS	
	MIN	MAX
A	1.35	1.75
A1	0.10	0.25
B	0.35	0.49
C	0.19	0.25
D	4.80	5.00
E	3.80	4.00
e	1.27 BSC	
H	5.80	6.20
h	0.25	0.50
L	0.40	1.25
$\theta$	0°	7°

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