

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 = 0.5mA 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°C for maximum for $< 2\text{--}3$ seconds; 245°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

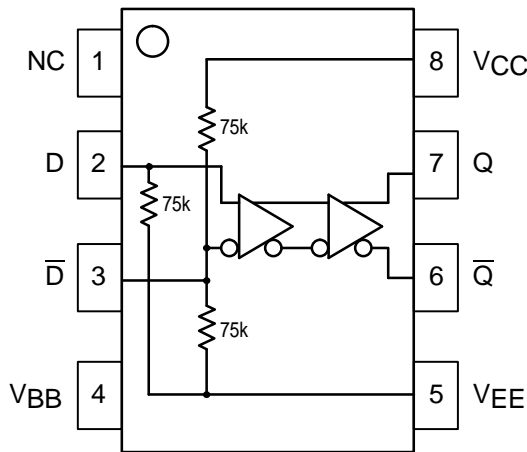


Figure 1. 8-Lead Pinout (Top View) and Logic Diagram

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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
θ_{JA}	Thermal Resistance (Junction-to-Ambient) Still Air 500lfpm	190 130	°C/W
θ_{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	μA
I_{IL}	Input LOW Current $\begin{smallmatrix} D \\ \bar{D} \end{smallmatrix}$	0.5 -600			0.5 -600			0.5 -600			0.5 -600			μA μA
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 Ω 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 ≈ 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_{CC}	Power Supply Voltage	3.0		5.5	3.0		5.5	3.0		5.5	3.0		5.5	V
V_{BB}	Reference Voltage													
V_{OH}	Output HIGH Voltage	3920		4110	3980		4160	4020		4190	4090		4280	mV
V_{OL}	Output LOW Voltage	3050		3350	3050		3370	3050		3370	3050		3405	mV
V_{IH}	Input HIGH Voltage	3770		4110	3830		4160	3870		4190	3940		4280	mV
V_{IL}	Input LOW Voltage	3050		3500	3050		3520	3050		3520	3050		3555	mV
I_{IH}	Input HIGH Current			150			150			150				μ 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			μ A
I_{EE}	V_{EE} Supply Current	23		29	23		29	23		29	23		29	mA

6. Input and output level parameters are for $V_{CC}=5.0V$ and levels will vary 1:1 with V_{CC} .

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_{CC}	Power Supply Voltage	3.0		5.5	3.0		5.5	3.0		5.5	3.0		5.5	V
V_{BB}	Reference Voltage													
V_{OH}	Output HIGH Voltage	2220		2410	2280		2460	2320		2490	2390		2580	mV
V_{OL}	Output LOW Voltage	1350		1650	1350		1670	1350		1670	1650		1705	mV
V_{IH}	Input HIGH Voltage	2070		2410	2130		2460	2170		2490	2240		2580	mV
V_{IL}	Input LOW Voltage	1350		1800	1350		1820	1350		1820	1350		1855	mV
I_{IH}	Input HIGH Current			150			150			150			150	μ 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			μ A
I_{EE}	V_{EE} Supply Current	23		29	23		29	23		29	23		29	mA

7. Input and output level parameters are for $V_{CC}=3.3V$ and levels will vary 1:1 with V_{CC} .

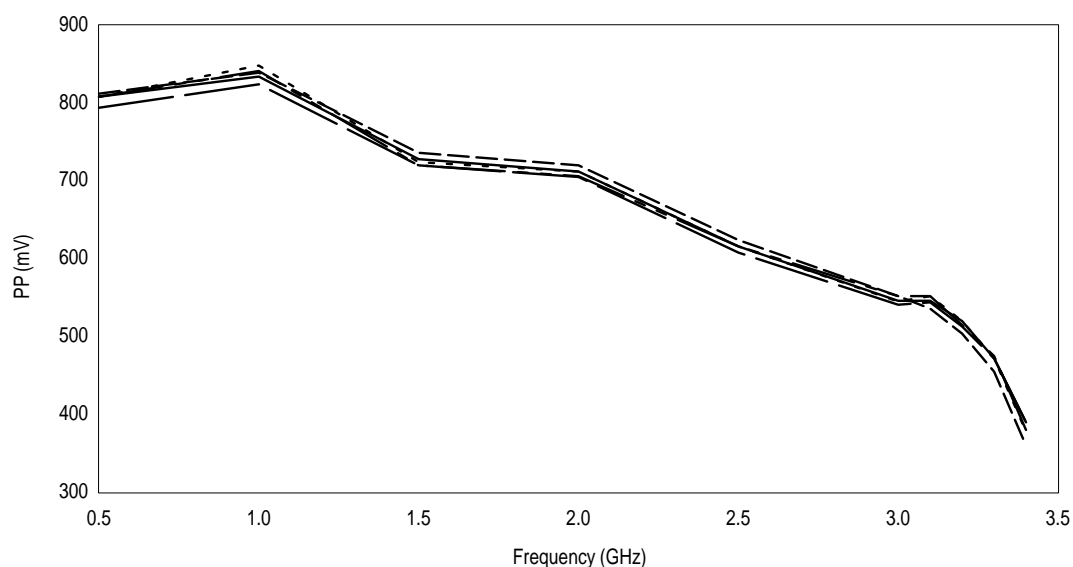
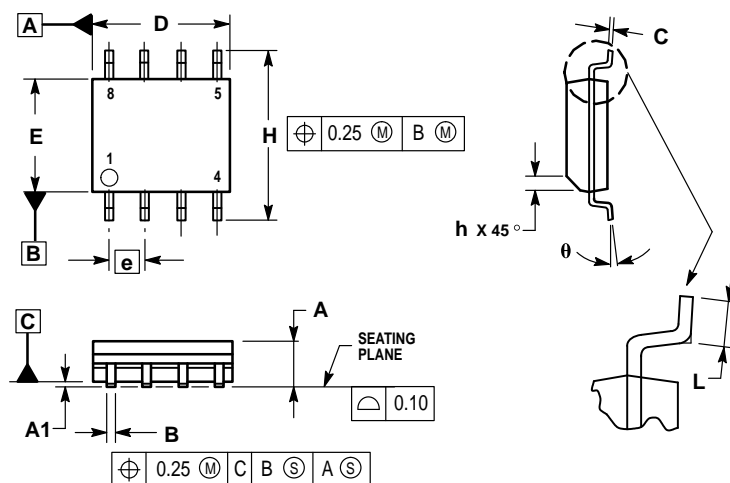


Figure 2. Frequency vs. Peak-to-Peak Jitter

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
θ	0°	7°

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