

ECLPS Plus™

Product Preview Differential Receiver

- 160ps Propagation Delay
- Maximum Frequency > 2.7GHz
- PECL mode: 3.0V to 5.5V V_{CC} with $V_{EE} = 0V$
- ECL mode: 0V V_{CC} with $V_{EE} = -3.0V$ to $-5.5V$
- Internal Input Resistors: Pulldown on D, Pulldown and Pullup on \bar{D}
- Q Output will default LOW with inputs open or at V_{EE}
- ESD Protection: >4KV HBM, >200V MM
- V_{BB} Output
- New Differential Input Common Mode Range
- Moisture Sensitivity Level 1, Indefinite Time Out of Drypack
- Flammability Rating: UL-94 code V-0 @ 1/8", Oxygen Index 28 to 34
- Transistor Count: 167 devices

The MC10EP16 is a differential receiver. The device is functionally equivalent to the EL16 and LVEL16 devices with higher performance capabilities. With output transition times significantly faster than the EL16 and LVEL16, 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 within the package. 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 μ f capacitor.

This document contains information on a product under development. Motorola reserves the right to change or discontinue this product without notice.

MC10EP16



SO-8, D SUFFIX
8-LEAD PLASTIC SOIC PACKAGE
CASE 751

ORDERING INFORMATION

MC10EP16D SOIC

PIN DESCRIPTION

| PIN | FUNCTION |
|--------------|---------------------|
| D, \bar{D} | ECL Data Inputs |
| Q, \bar{Q} | ECL Data Outputs |
| V_{BB} | Ref. Voltage Output |



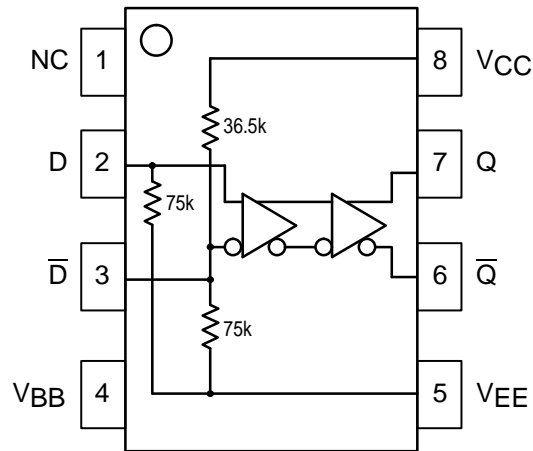


Figure 1. 8-Lead Pinout (Top View) and Logic Diagram

MAXIMUM RATINGS*

| Symbol | Parameter | Value | Unit |
|------------------|--|---------------|------|
| V _{EE} | Power Supply (V _{CC} = 0V) | −6.0 to 0 | VDC |
| V _{CC} | Power Supply (V _{EE} = 0V) | 6.0 to 0 | VDC |
| V _I | Input Voltage (V _{CC} = 0V, V _I not more negative than V _{EE}) | −6.0 to 0 | VDC |
| V _I | Input Voltage (V _{EE} = 0V, V _I not more positive than V _{CC}) | 6.0 to 0 | VDC |
| I _{out} | Output Current Continuous Surge | 50 100 | mA |
| I _{BB} | V _{BB} Sink/Source Current† | ± 0.5 | mA |
| T _A | Operating Temperature Range | −40 to +85 | °C |
| T _{stg} | Storage Temperature | −65 to +150 | °C |
| θ _{JA} | Thermal Resistance (Junction-to-Ambient) Still Air 500lfpm | 190 130 | °C/W |
| θ _{JC} | Thermal Resistance (Junction-to-Case) | 41 to 44 ± 5% | °C/W |
| T _{sol} | Solder Temperature (<2 to 3 Seconds: 245°C desired) | 265 | °C |

* Maximum Ratings are those values beyond which damage to the device may occur.

† Use for inputs of same package only.

DC CHARACTERISTICS, ECL/LVECL ($V_{CC} = 0V$; $V_{EE} = -5.5V$ to $-3.0V$) (Note 4.)

| Symbol | Characteristic | -40°C | | | 25°C | | | 85°C | | | Unit |
|-----------------|--|--------------|-------|-------|--------------|-------|-------|--------------|-------|-------|------|
| | | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | |
| IEE | Power Supply Current (Note 1.) | 23 | 24 | 29 | 23 | 24 | 29 | 23 | 24 | 29 | mA |
| VOH | Output HIGH Voltage (Note 2.) | -1135 | -1060 | -885 | -1070 | -945 | -820 | -1010 | -885 | -760 | mV |
| VOL | Output LOW Voltage (Note 2.) | -1935 | -1810 | -1685 | -1870 | -1745 | -1620 | -1810 | -1685 | -1560 | mV |
| VIH | Input HIGH Voltage Single Ended | -1210 | | -885 | -1145 | | -820 | -1085 | | -760 | mV |
| VIL | Input LOW Voltage Single Ended | -1935 | | -1610 | -1870 | | -1545 | -1810 | | -1485 | mV |
| VBB | Output Voltage Reference | -1510 | -1410 | -1310 | -1445 | -1345 | -1245 | -1385 | -1285 | -1185 | mV |
| VIHCMR | Input HIGH Voltage Common Mode Range (Note 3.) | $V_{EE}+2.0$ | | 0.0 | $V_{EE}+2.0$ | | 0.0 | $V_{EE}+2.0$ | | 0.0 | V |
| I _{IH} | Input HIGH Current | | | 150 | | | 150 | | | 150 | μA |
| I _{IL} | Input LOW Current $\frac{D}{\bar{D}}$ | 0.5 -150 | | | 0.5 -150 | | | 0.5 -150 | | | μA |

NOTE: 10EP circuits are designed to meet the DC specifications shown in the above 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.

1. $V_{CC} = 0V$, $V_{EE} = V_{EEmin}$ to V_{EEmax} , all other pins floating.
2. All loading with 50 ohms to $V_{CC}-2.0$ volts.
3. $VIHCMR$ min varies 1:1 with V_{EE} , max varies 1:1 with V_{CC} .
4. Input and output parameters vary 1:1 with V_{CC} .

DC CHARACTERISTICS, LVPECL ($V_{CC} = 3.3V \pm 0.3V$, $V_{EE} = 0V$) (Note 8.)

| Symbol | Characteristic | -40°C | | | 25°C | | | 85°C | | | Unit |
|-----------------|--|-------------|------|------|-------------|------|------|-------------|------|------|------|
| | | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | |
| IEE | Power Supply Current (Note 5.) | 23 | 24 | 29 | 23 | 24 | 29 | 23 | 24 | 29 | mA |
| VOH | Output HIGH Voltage (Note 6.) | 2165 | 2240 | 2415 | 2230 | 2355 | 2480 | 2290 | 2415 | 2540 | mV |
| VOL | Output LOW Voltage (Note 6.) | 1365 | 1490 | 1615 | 1430 | 1555 | 1680 | 1490 | 1615 | 1740 | mV |
| VIH | Input HIGH Voltage Single Ended | 2090 | | 2415 | 2155 | | 2480 | 2215 | | 2540 | mV |
| VIL | Input LOW Voltage Single Ended | 1365 | | 1690 | 1430 | | 1755 | 1490 | | 1815 | mV |
| VBB | Output Voltage Reference | 1790 | 1890 | 1990 | 1855 | 1955 | 2055 | 1915 | 2015 | 2115 | mV |
| VIHCMR | Input HIGH Voltage Common Mode Range (Note 7.) | 2.0 | | 3.3 | 2.0 | | 3.3 | 2.0 | | 3.3 | V |
| I _{IH} | Input HIGH Current | | | 150 | | | 150 | | | 150 | μA |
| I _{IL} | Input LOW Current $\frac{D}{\bar{D}}$ | 0.5 -150 | | | 0.5 -150 | | | 0.5 -150 | | | μA |

NOTE: 10EP circuits are designed to meet the DC specifications shown in the above 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.

5. $V_{CC} = 3.0V$, $V_{EE} = 0V$, all other pins floating.
6. All loading with 50 ohms to $V_{CC}-2.0$ volts.
7. $VIHCMR$ min varies 1:1 with V_{EE} , max varies 1:1 with V_{CC} .
8. Input and output parameters vary 1:1 with V_{CC} .

DC CHARACTERISTICS, PECL ($V_{CC} = 5.0V \pm 0.5V$, $V_{EE} = 0V$) (Note 12.)

| Symbol | Characteristic | -40°C | | | 25°C | | | 85°C | | | Unit |
|--------|---|------------------------------|------|------|-------------|------|------|-------------|------|------|------|
| | | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | |
| IEE | Power Supply Current (Note 9.) | 23 | 24 | 29 | 23 | 24 | 29 | 23 | 24 | 29 | mA |
| VOH | Output HIGH Voltage (Note 10.) | 3865 | 3940 | 4115 | 3930 | 4055 | 4180 | 3990 | 4115 | 4240 | mV |
| VOL | Output LOW Voltage (Note 10.) | 3065 | 3190 | 3315 | 3130 | 3255 | 3380 | 3190 | 3315 | 3440 | mV |
| VIH | Input HIGH Voltage Single Ended | 3790 | | 4115 | 3855 | | 4180 | 3915 | | 4240 | mV |
| VIL | Input LOW Voltage Single Ended | 3065 | | 3390 | 3130 | | 3455 | 3190 | | 3515 | mV |
| VBB | Output Voltage Reference | 3490 | 3590 | 3690 | 3555 | 3655 | 3755 | 3615 | 3715 | 3815 | mV |
| VIHCMR | Input HIGH Voltage Common Mode Range (Note 11.) | 2.0 | | 5.0 | 2.0 | | 5.0 | 2.0 | | 5.0 | V |
| IiH | Input HIGH Current | | | 150 | | | 150 | | | 150 | μA |
| IiL | Input LOW Current | $\frac{D}{D}$ 0.5 -150 | | | 0.5 -150 | | | 0.5 -150 | | | μA |

NOTE: 10EP circuits are designed to meet the DC specifications shown in the above 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.

9. $V_{CC} = 5.0V$, $V_{EE} = 0V$, all other pins floating.

10. All loading with 50 ohms to V_{CC} -2.0 volts.

11. VIHCMR min varies 1:1 with V_{EE} , max varies 1:1 with V_{CC} .

12. Input and output parameters vary 1:1 with V_{CC} .

AC CHARACTERISTICS ($V_{CC} = 0V$; $V_{EE} = -3.0V$ to $-5.5V$) or ($V_{CC} = 3.0V$ to $5.5V$; $V_{EE} = 0V$)

| Symbol | Characteristic | -40°C | | | 25°C | | | 85°C | | | Unit |
|--|--|-------|-----|------|------|-----|------|------|-----|------|------|
| | | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | |
| f _{max} | Maximum Toggle Frequency (Note 13.) | 2.7 | | | 2.7 | | | 2.7 | | | GHz |
| t _{PLH} , t _{PHL} | Propagation Delay to Output Differential | 100 | 160 | 240 | 100 | 160 | 240 | 120 | 190 | 280 | ps |
| t _{SKEW} | Duty Cycle Skew (Note 14.) | | 5.0 | | | 5.0 | 20 | | 5.0 | 20 | ps |
| t _{JITTER} | Cycle-to-Cycle Jitter | | TBD | | | TBD | | | TBD | | ps |
| V _{PP} | Input Voltage Swing (Diff.) | 150 | 800 | 1200 | 150 | 800 | 1200 | 150 | 800 | 1200 | mV |
| t _r t _f | Output Rise/Fall Times (20% – 80%) | 70 | 120 | 170 | 80 | 130 | 180 | 100 | 150 | 200 | ps |

13. F_{max} guaranteed for functionality only. See Figure 2 for typical output swing. VOL and VOH levels are guaranteed at DC only.

14. Skew is measured between outputs under identical transitions. Duty cycle skew is defined only for differential operation when the delays are measured from the cross point of the inputs to the cross point of the outputs.

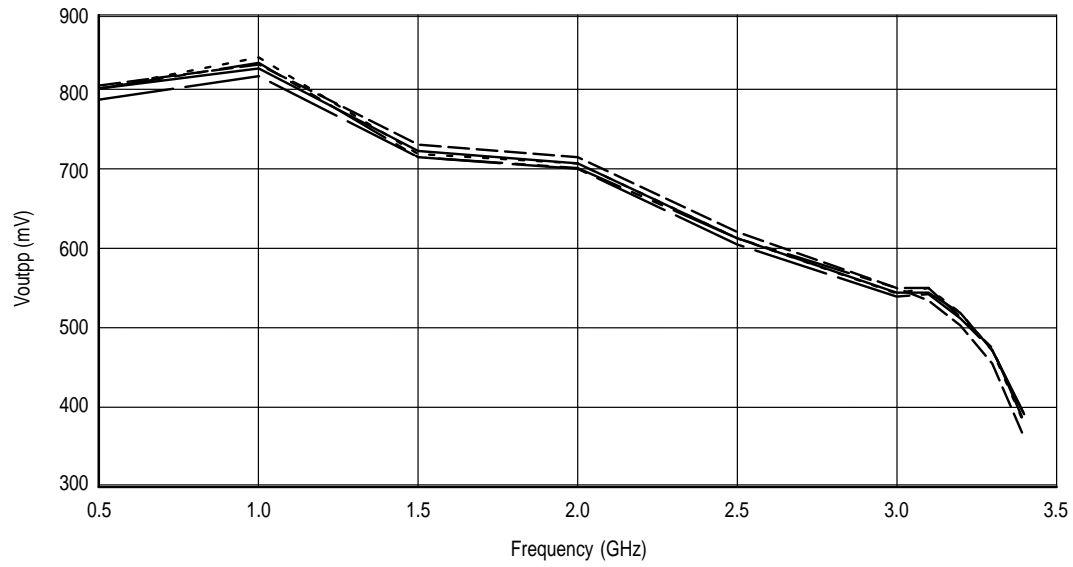
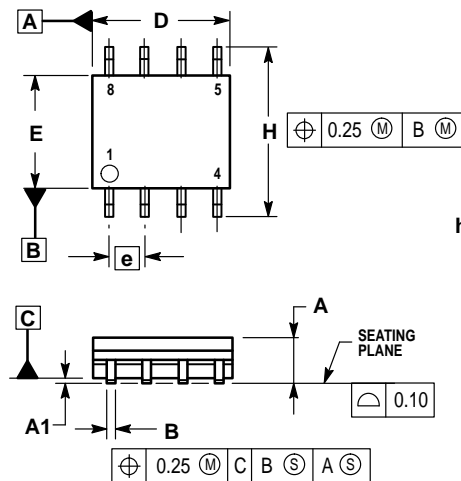


Figure 2. Typical Output V_{pp} vs. Frequency

OUTLINE DIMENSIONS


SO-8, 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.

| MILLIMETERS | | |
|-------------|----------|------|
| DIM | 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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