# MC10EP116, MC100EP116

# 3.3 V / 5 V Hex Differential Line Receiver/Driver

**ON Semiconductor®**

**http://onsemi.com**

### Description

The MC10EP116/100EP116 is a 6-bit differential line receiver based on the EP16 device. The 3.0 GHz bandwidth provided by the high frequency outputs makes the device ideal for buffering of very high speed oscillators.

The $V_{BB}$ pin, an internally generated voltage supply, is available to this device only. For single−ended input conditions, the unused differential input is connected to $V_{BB}$ as a switching reference voltage. $V_{BB}$ may also rebias AC coupled inputs. When used, decouple $V_{BB}$ and $V_{CC}$ via a 0.01 μF capacitor and limit current sourcing or sinking to 0.5 mA. When not used, $V_{BB}$ should be left open.

The design incorporates two stages of gain, internal to the device, making it an excellent choice for use in high bandwidth amplifier applications.

The differential inputs have internal clamp structures which will force the Q output of a gate in an open input condition to go to a LOW state. Thus, inputs of unused gates can be left open and will not affect the operation of the rest of the device. Note that the input clamp will take affect only if both inputs fall 2.5 V below $V_{CC}$.

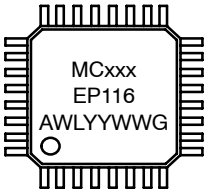
The 100 Series contains temperature compensation.

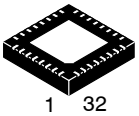
### Features

- 260 ps Typical Propagation Delay
- Maximum Frequency > 3 GHz Typical
- PECL Mode Operating Range: $V_{CC}$ = 3.0 V to 5.5 V with $V_{EE}$ = 0 V
- NECL Mode Operating Range: $V_{CC}$ = 0 V with $V_{EE}$ = −3.0 V to −5.5 V
- Open Input Default State
- Safety Clamp on Inputs
- Q Output Will Default LOW with Inputs Open or at $V_{EE}$
- $V_{BB}$ Output
- Pb−Free Packages are Available

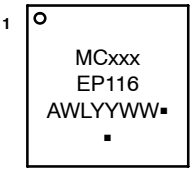
**MARKING DIAGRAM***

**LQFP−32**
**FA SUFFIX**
**CASE 873A**




**QFN32**
**MN SUFFIX**
**CASE 488AM**



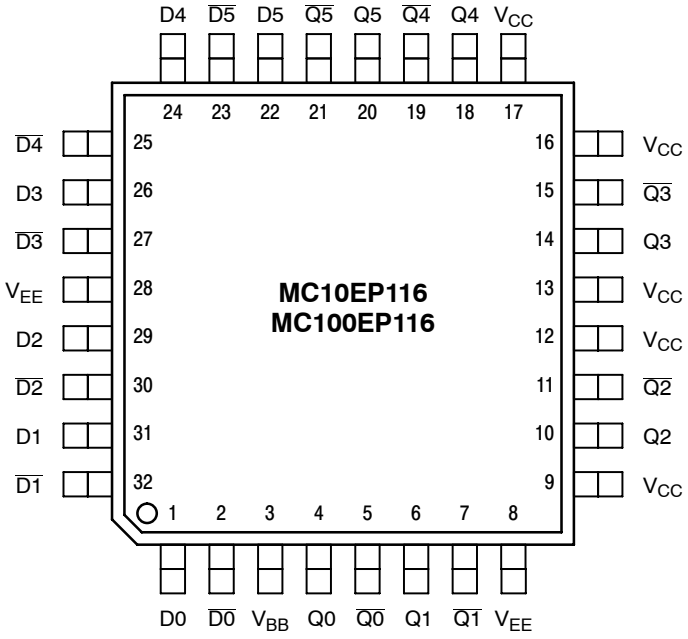

| | |
|---|---|
| xxx | = 10 or 100 |
| A | = Assembly Location |
| WL, L | = Wafer Lot |
| YY, Y | = Year |
| WW, W | = Work Week |
| G or ▪ | = Pb−Free Package |

(Note: Microdot may be in either location)

*For additional marking information, refer to Application Note AND8002/D.

### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 9 of this data sheet.




Warning: All $V_{CC}$ and $V_{EE}$ pins must be externally connected to Power Supply to guarantee proper operation.

**Figure 1. 32−Lead LQFP Pinout** (Top View)

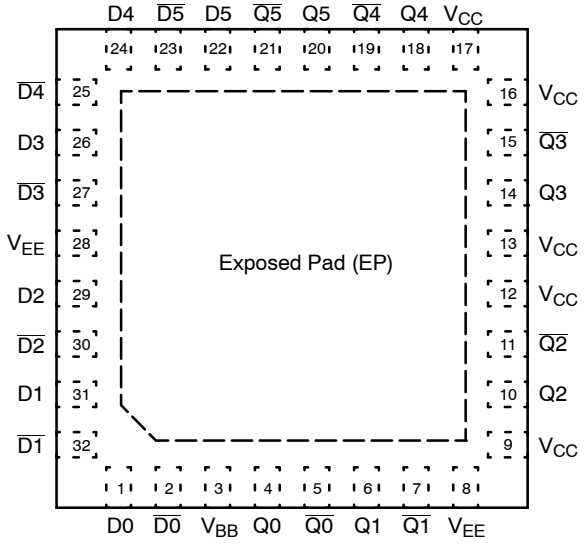



**Figure 2. 32−Lead QFN Pinout** (Top View)

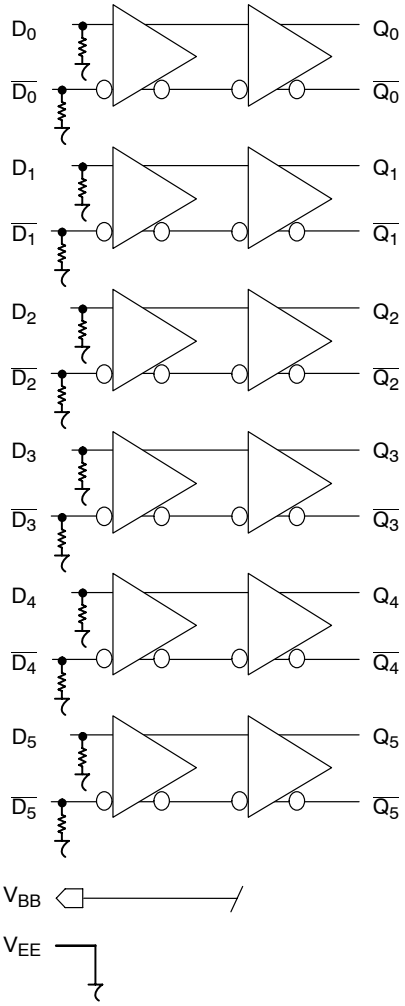



**Figure 3. Logic Diagram**

**Table 1. PIN DESCRIPTION**

| PIN | FUNCTION |
|---|---|
| D[0:5]*, $\overline{D[0:5]}$* | ECL Differential Data Inputs |
| Q[0:5], $\overline{Q[0:5]}$ | ECL Differential Data Outputs |
| $V_{BB}$ | Reference Voltage Output |
| $V_{CC}$ | Positive Supply |
| $V_{EE}$ | Negative Supply |

* Pins will default LOW when left open.

**Table 2. ATTRIBUTES**

| Characteristics | | Value | |
|---|---|---|---|
| Internal Input Pulldown Resistor | | 75 kΩ | |
| Internal Input Pullup Resistor | | N/A | |
| ESD Protection | Human Body Model<br>Machine Model<br>Charged Device Model | > 2 kV<br>> 100 V<br>> 2 kV | |
| Moisture Sensitivity, Indefinite Time Out of Drypack (Note 1) | | Pb Pkg | Pb−Free Pkg |
| | LQFP−32<br>QFN−32 | Level 2<br>− | Level 2<br>Level 1 |
| Flammability Rating | Oxygen Index: 28 to 34 | UL−94 V−0 @ 0.125 in | |
| Transistor Count | | 729 Devices | |
| Meets or exceeds JEDEC Spec EIA/JESD78 IC Latchup Test | | | |

1. For additional information, see Application Note AND8003/D.

**Table 3. MAXIMUM RATINGS**

| Symbol | Parameter | Condition 1 | Condition 2 | Rating | Units |
|---|---|---|---|---|---|
| $V_{CC}$ | PECL Mode Power Supply | $V_{EE}$ = 0 V | | 6 | V |
| $V_{EE}$ | NECL Mode Power Supply | $V_{CC}$ = 0 V | | −6 | V |
| $V_I$ | PECL Mode Input Voltage<br>NECL Mode Input Voltage | $V_{EE}$ = 0 V<br>$V_{CC}$ = 0 V | $V_I \le V_{CC}$<br>$V_I \ge V_{EE}$ | 6<br>−6 | V |
| $I_{out}$ | Output Current | Continuous<br>Surge | | 50<br>100 | mA |
| $I_{BB}$ | $V_{BB}$ Sink/Source | | | ± 0.5 | mA |
| $T_A$ | Operating Temperature Range | | | −40 to +85 | °C |
| $T_{stg}$ | Storage Temperature Range | | | −65 to +150 | °C |
| $\theta_{JA}$ | Thermal Resistance (Junction−to−Ambient) | 0 lfpm<br>500 lfpm | 32 LQFP<br>32 LQFP | 80<br>55 | °C/W |
| $\theta_{JC}$ | Thermal Resistance (Junction−to−Case) | Standard Board | 32 LQFP | 12 to 17 | °C/W |
| $\theta_{JA}$ | Thermal Resistance (Junction−to−Ambient) | 0 lfpm<br>500 lfpm | 32 QFN<br>32 QFN | 31<br>27 | °C/W |
| $\theta_{JC}$ | Thermal Resistance (Junction−to−Case) | 2S2P | 32 QFN | 12 | °C/W |
| $T_{sol}$ | Wave Solder Pb<br>Pb−Free | | | 265<br>265 | °C |

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

**Table 4. 10EP DC CHARACTERISTICS, PECL** $V_{CC}$ = 3.3 V, $V_{EE}$ = 0 V (Note 2)

| Symbol | Characteristic | −40°C | | | 25°C | | | 85°C | | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | |
| $I_{EE}$ | Power Supply Current | 60 | 75 | 90 | 60 | 80 | 95 | 60 | 85 | 95 | mA |
| $V_{OH}$ | Output HIGH Voltage (Note 3) | 2165 | 2290 | 2415 | 2230 | 2355 | 2480 | 2290 | 2415 | 2540 | mV |
| $V_{OL}$ | Output LOW Voltage (Note 3) | 1365 | 1490 | 1615 | 1430 | 1555 | 1680 | 1490 | 1615 | 1740 | mV |
| $V_{IH}$ | Input HIGH Voltage (Single−Ended) | 2090 | | 2415 | 2155 | | 2480 | 2215 | | 2540 | mV |
| $V_{IL}$ | Input LOW Voltage (Single−Ended) | 1365 | | 1690 | 1460 | | 1755 | 1490 | | 1815 | mV |
| $V_{BB}$ | Output Voltage Reference | 1790 | 1890 | 1990 | 1855 | 1955 | 2055 | 1915 | 2015 | 2115 | mV |
| $V_{IHCMR}$ | Input HIGH Voltage Common Mode Range (Differential Configuration) (Note 4) | 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 | 0.5 | | | 0.5 | | | 0.5 | | | μA |

NOTE: Device will meet the specifications after thermal equilibrium has been established when mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lfpm. Electrical parameters are guaranteed only over the declared operating temperature range. Functional operation of the device exceeding these conditions is not implied. Device specification limit values are applied individually under normal operating conditions and not valid simultaneously.

2. Input and output parameters vary 1:1 with $V_{CC}$. $V_{EE}$ can vary +0.3 V to −2.2 V.
3. All loading with 50 Ω to $V_{CC}$ − 2.0 V.
4. $V_{IHCMR}$ min varies 1:1 with $V_{EE}$, $V_{IHCMR}$ max varies 1:1 with $V_{CC}$. The $V_{IHCMR}$ range is referenced to the most positive side of the differential input signal.

**Table 5. 10EP DC CHARACTERISTICS, PECL** $V_{CC}$ = 5.0 V, $V_{EE}$ = 0 V (Note 5)

| Symbol | Characteristic | −40°C | | | 25°C | | | 85°C | | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | |
| $I_{EE}$ | Power Supply Current | 60 | 75 | 90 | 60 | 80 | 95 | 60 | 85 | 95 | mA |
| $V_{OH}$ | Output HIGH Voltage (Note 6) | 3865 | 3990 | 4115 | 3930 | 4055 | 4180 | 3990 | 4115 | 4240 | mV |
| $V_{OL}$ | Output LOW Voltage (Note 6) | 3065 | 3190 | 3315 | 3130 | 3255 | 3380 | 3190 | 3315 | 3440 | mV |
| $V_{IH}$ | Input HIGH Voltage (Single−Ended) | 3790 | | 4115 | 3855 | | 4180 | 3915 | | 4240 | mV |
| $V_{IL}$ | Input LOW Voltage (Single−Ended) | 3065 | | 3390 | 3130 | | 3455 | 3190 | | 3515 | mV |
| $V_{BB}$ | Output Voltage Reference | 3490 | 3590 | 3690 | 3555 | 3655 | 3755 | 3615 | 3715 | 3815 | mV |
| $V_{IHCMR}$ | Input HIGH Voltage Common Mode Range (Differential Configuration) (Note 7) | 2.0 | | 5.0 | 2.0 | | 5.0 | 2.0 | | 5.0 | V |
| $I_{IH}$ | Input HIGH Current | | | 150 | | | 150 | | | 150 | μA |
| $I_{IL}$ | Input LOW Current | 0.5 | | | 0.5 | | | 0.5 | | | μA |

NOTE: Device will meet the specifications after thermal equilibrium has been established when mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lfpm. Electrical parameters are guaranteed only over the declared operating temperature range. Functional operation of the device exceeding these conditions is not implied. Device specification limit values are applied individually under normal operating conditions and not valid simultaneously.

5. Input and output parameters vary 1:1 with $V_{CC}$. $V_{EE}$ can vary +2.0 V to −0.5 V.
6. All loading with 50 Ω to $V_{CC}$ − 2.0 V.
7. $V_{IHCMR}$ min varies 1:1 with $V_{EE}$, $V_{IHCMR}$ max varies 1:1 with $V_{CC}$. The $V_{IHCMR}$ range is referenced to the most positive side of the differential input signal.

**Table 6. 10EP DC CHARACTERISTICS, NECL** $V_{CC}$ = 0 V, $V_{EE}$ = −5.5 V to −3.0 V (Note 8)

| Symbol | Characteristic | −40°C | | | 25°C | | | 85°C | | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | |
| $I_{EE}$ | Power Supply Current | 60 | 75 | 90 | 60 | 80 | 95 | 60 | 85 | 95 | mA |
| $V_{OH}$ | Output HIGH Voltage (Note 9) | −1135 | −1010 | −885 | −1070 | −945 | −820 | −1010 | −885 | −760 | mV |
| $V_{OL}$ | Output LOW Voltage (Note 9) | −1935 | −1810 | −1685 | −1870 | −1745 | −1620 | −1810 | −1685 | −1560 | mV |
| $V_{IH}$ | Input HIGH Voltage (Single−Ended) | −1210 | | −885 | −1145 | | −820 | −1085 | | −760 | mV |
| $V_{IL}$ | Input LOW Voltage (Single−Ended) | −1935 | | −1610 | −1870 | | −1545 | −1810 | | −1485 | mV |
| $V_{BB}$ | Output Voltage Reference | −1510 | −1410 | −1310 | −1445 | −1345 | −1245 | −1385 | −1285 | −1185 | mV |
| $V_{IHCMR}$ | Input HIGH Voltage Common Mode Range (Differential Configuration) (Note 10) | $V_{EE}$+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 | 0.5 | | | 0.5 | | | 0.5 | | | μA |

NOTE: Device will meet the specifications after thermal equilibrium has been established when mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lfpm. Electrical parameters are guaranteed only over the declared operating temperature range. Functional operation of the device exceeding these conditions is not implied. Device specification limit values are applied individually under normal operating conditions and not valid simultaneously.

8. Input and output parameters vary 1:1 with $V_{CC}$.
9. All loading with 50 Ω to $V_{CC}$ − 2.0 V.
10. $V_{IHCMR}$ min varies 1:1 with $V_{EE}$, $V_{IHCMR}$ max varies 1:1 with $V_{CC}$. The $V_{IHCMR}$ range is referenced to the most positive side of the differential input signal.

**Table 7. 100EP DC CHARACTERISTICS, PECL** $V_{CC}$ = 3.3 V, $V_{EE}$ = 0 V (Note 11)

| Symbol | Characteristic | −40°C | | | 25°C | | | 85°C | | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | |
| $I_{EE}$ | Power Supply Current | 60 | 75 | 90 | 60 | 80 | 95 | 60 | 85 | 95 | mA |
| $V_{OH}$ | Output HIGH Voltage (Note 12) | 2155 | 2280 | 2405 | 2155 | 2280 | 2405 | 2155 | 2280 | 2405 | mV |
| $V_{OL}$ | Output LOW Voltage (Note 12) | 1355 | 1480 | 1605 | 1355 | 1480 | 1605 | 1355 | 1480 | 1605 | mV |
| $V_{IH}$ | Input HIGH Voltage (Single−Ended) | 2075 | | 2420 | 2075 | | 2420 | 2075 | | 2420 | mV |
| $V_{IL}$ | Input LOW Voltage (Single−Ended) | 1355 | | 1675 | 1490 | | 1675 | 1490 | | 1675 | mV |
| $V_{BB}$ | Output Voltage Reference | 1775 | 1875 | 1975 | 1775 | 1875 | 1975 | 1775 | 1875 | 1975 | mV |
| $V_{IHCMR}$ | Input HIGH Voltage Common Mode Range (Differential Configuration) (Note 13) | 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 | 0.5 | | | 0.5 | | | 0.5 | | | μA |

NOTE: Device will meet the specifications after thermal equilibrium has been established when mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lfpm. Electrical parameters are guaranteed only over the declared operating temperature range. Functional operation of the device exceeding these conditions is not implied. Device specification limit values are applied individually under normal operating conditions and not valid simultaneously.

11. Input and output parameters vary 1:1 with $V_{CC}$. $V_{EE}$ can vary +0.3 V to −2.2 V.
12. All loading with 50 Ω to $V_{CC}$ − 2.0 V.
13. $V_{IHCMR}$ min varies 1:1 with $V_{EE}$, $V_{IHCMR}$ max varies 1:1 with $V_{CC}$. The $V_{IHCMR}$ range is referenced to the most positive side of the differential input signal.

**Table 8. 100EP DC CHARACTERISTICS, PECL** $V_{CC}$ = 5.0 V, $V_{EE}$ = 0 V (Note 14)

| Symbol | Characteristic | −40°C | | | 25°C | | | 85°C | | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | |
| $I_{EE}$ | Power Supply Current | 60 | 75 | 90 | 60 | 80 | 95 | 60 | 85 | 95 | mA |
| $V_{OH}$ | Output HIGH Voltage (Note 15) | 3855 | 3980 | 4105 | 3855 | 3980 | 4105 | 3855 | 3980 | 4105 | mV |
| $V_{OL}$ | Output LOW Voltage (Note 15) | 3055 | 3180 | 3305 | 3055 | 3180 | 3305 | 3055 | 3180 | 3305 | mV |
| $V_{IH}$ | Input HIGH Voltage (Single−Ended) | 3775 | | 4120 | 3775 | | 4120 | 3775 | | 4120 | mV |
| $V_{IL}$ | Input LOW Voltage (Single−Ended) | 3790 | | 3375 | 3190 | | 3375 | 3190 | | 3375 | mV |
| $V_{BB}$ | Output Voltage Reference | 3475 | 3575 | 3675 | 3475 | 3575 | 3675 | 3475 | 3575 | 3675 | mV |
| $V_{IHCMR}$ | Input HIGH Voltage Common Mode Range (Differential Configuration) (Note 16) | 2.0 | | 5.0 | 2.0 | | 5.0 | 2.0 | | 5.0 | V |
| $I_{IH}$ | Input HIGH Current | | | 150 | | | 150 | | | 150 | μA |
| $I_{IL}$ | Input LOW Current | 0.5 | | | 0.5 | | | 0.5 | | | μA |

NOTE: Device will meet the specifications after thermal equilibrium has been established when mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lfpm. Electrical parameters are guaranteed only over the declared operating temperature range. Functional operation of the device exceeding these conditions is not implied. Device specification limit values are applied individually under normal operating conditions and not valid simultaneously.

14. Input and output parameters vary 1:1 with $V_{CC}$. $V_{EE}$ can vary +2.0 V to −0.5 V.
15. All loading with 50 Ω to $V_{CC}$ − 2.0 V.
16. $V_{IHCMR}$ min varies 1:1 with $V_{EE}$, $V_{IHCMR}$ max varies 1:1 with $V_{CC}$. The $V_{IHCMR}$ range is referenced to the most positive side of the differential input signal.

**Table 9. 100EP DC CHARACTERISTICS, NECL** $V_{CC}$ = 0 V, $V_{EE}$ = −5.5 V to −3.0 V (Note 17)

| Symbol | Characteristic | −40°C | | | 25°C | | | 85°C | | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | |
| $I_{EE}$ | Power Supply Current | 60 | 75 | 90 | 60 | 80 | 95 | 60 | 85 | 95 | mA |
| $V_{OH}$ | Output HIGH Voltage (Note 18) | −1145 | −1020 | −895 | −1145 | −1020 | −895 | −1145 | −1020 | −895 | mV |
| $V_{OL}$ | Output LOW Voltage (Note 18) | −1945 | −1820 | −1695 | −1945 | −1820 | −1695 | −1945 | −1820 | −1695 | mV |
| $V_{IH}$ | Input HIGH Voltage (Single−Ended) | −1225 | | −880 | −1225 | | −880 | −1225 | | −880 | mV |
| $V_{IL}$ | Input LOW Voltage (Single−Ended) | −1945 | | −1625 | −1945 | | −1625 | −1945 | | −1625 | mV |
| $V_{BB}$ | Output Voltage Reference | −1525 | −1425 | −1325 | −1525 | −1425 | −1325 | −1525 | −1425 | −1325 | mV |
| $V_{IHCMR}$ | Input HIGH Voltage Common Mode Range (Differential Configuration) (Note 19) | $V_{EE}$+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 | 0.5 | | | 0.5 | | | 0.5 | | | μA |

NOTE: Device will meet the specifications after thermal equilibrium has been established when mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lfpm. Electrical parameters are guaranteed only over the declared operating temperature range. Functional operation of the device exceeding these conditions is not implied. Device specification limit values are applied individually under normal operating conditions and not valid simultaneously.

17. Input and output parameters vary 1:1 with $V_{CC}$.
18. All loading with 50 Ω to $V_{CC}$ − 2.0 V.
19. $V_{IHCMR}$ min varies 1:1 with $V_{EE}$, $V_{IHCMR}$ max varies 1:1 with $V_{CC}$. The $V_{IHCMR}$ range is referenced to the most positive side of the differential input signal.

**Table 10. AC CHARACTERISTICS** $V_{CC}$ = 0 V; $V_{EE}$ = −3.0 V to −5.5 V or $V_{CC}$ = 3.0 V to 5.5 V; $V_{EE}$ = 0 V (Note 20)

| Symbol | Characteristic | −40°C | | | 25°C | | | 85°C | | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | |
| $f_{max}$ | Maximum Frequency (See Figure 4 $F_{max}$/JITTER) | | > 3 | | | > 3 | | | > 3 | | GHz |
| $t_{PLH}$, $t_{PHL}$ | Propagation Delay to Output Differential | 160 | 250 | 340 | 160 | 260 | 340 | 190 | 300 | 380 | ps |
| $t_{SKEW}$ | Duty Cycle Skew (Note 21) | | 5.0 | 20 | | 5.0 | 20 | | 5.0 | 20 | ps |
| $t_{SKEW}$ | Within Device Skew<br>Device to Device Skew (Note 21) | | | 100<br>180 | | | 100<br>180 | | | 100<br>190 | ps |
| $t_{JITTER}$ | Cycle−to−Cycle Jitter (See Figure 4 $F_{max}$/JITTER) | | 0.2 | < 1 | | 0.2 | < 1 | | 0.2 | < 1 | ps |
| $V_{PP}$ | Input Voltage Swing (Differential Configuration) | 150 | 800 | 1200 | 150 | 800 | 1200 | 150 | 800 | 1200 | mV |
| $t_r$<br>$t_f$ | Output Rise/Fall Times Q, $\overline{Q}$ (20% − 80%) | 90 | 150 | 220 | 90 | 160 | 240 | 90 | 160 | 250 | ps |

NOTE: Device will meet the specifications after thermal equilibrium has been established when mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lfpm. Electrical parameters are guaranteed only over the declared operating temperature range. Functional operation of the device exceeding these conditions is not implied. Device specification limit values are applied individually under normal operating conditions and not valid simultaneously.

20. Measured using a 750 mV source, 50% duty cycle clock source. All loading with 50 Ω to $V_{CC}$ − 2.0 V.
21. 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.

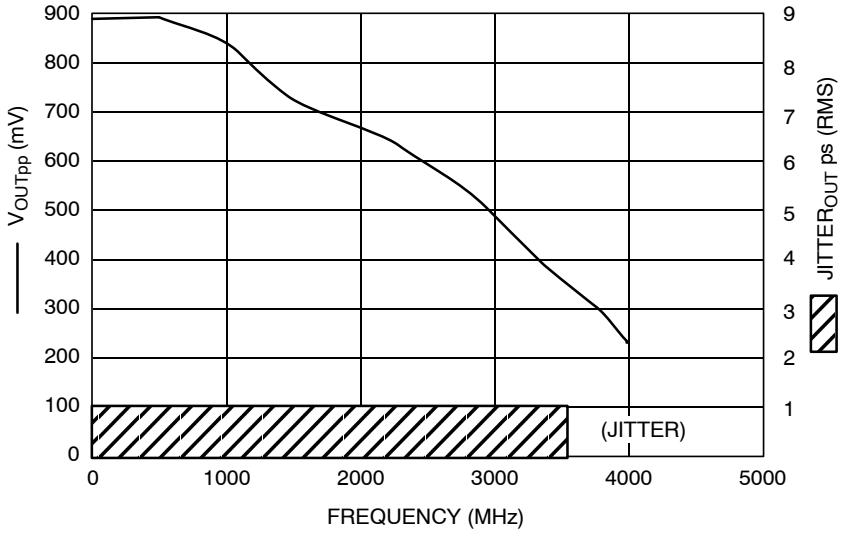



**Figure 4. $F_{max}$/Jitter**

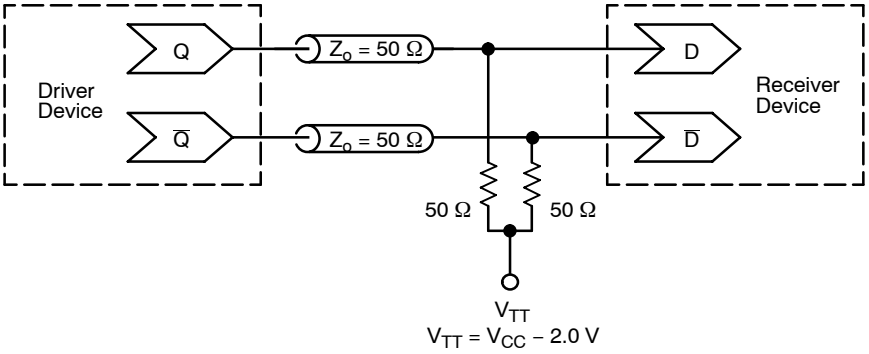



**Figure 5. Typical Termination for Output Driver and Device Evaluation (See Application Note AND8020/D − Termination of ECL Logic Devices.)**

## ORDERING INFORMATION

| Device | Package | Shipping† |
|---|---|---|
| MC10EP116FA | LQFP−32 | 250 Units / Tray |
| MC10EP116FAG | LQFP−32 (Pb−Free) | 250 Units / Tray |
| MC10EP116FAR2 | LQFP−32 | 2000 / Tape & Reel |
| MC10EP116FAR2G | LQFP−32 (Pb−Free) | 2000 / Tape & Reel |
| MC10EP116MNG | QFN−32 (Pb−Free) | 74 Units / Rail |
| MC10EP116MNR4G | QFN−32 (Pb−Free) | 1000 / Tape & Reel |
| MC100EP116FA | LQFP−32 | 250 Units / Tray |
| MC100EP116FAG | LQFP−32 (Pb−Free) | 250 Units / Tray |
| MC100EP116FAR2 | LQFP−32 | 2000 / Tape & Reel |
| MC100EP116FAR2G | LQFP−32 (Pb−Free) | 2000 / Tape & Reel |
| MC100EP116MNG | QFN−32 (Pb−Free) | 74 Units / Rail |
| MC100EP116MNR4G | QFN−32 (Pb−Free) | 1000 / Tape & Reel |

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

### Resource Reference of Application Notes

**AN1405/D** – ECL Clock Distribution Techniques

**AN1406/D** – Designing with PECL (ECL at +5.0 V)

**AN1503/D** – ECLinPS™ I/O SPiCE Modeling Kit

**AN1504/D** – Metastability and the ECLinPS Family

**AN1568/D** – Interfacing Between LVDS and ECL

**AN1672/D** – The ECL Translator Guide

**AND8001/D** – Odd Number Counters Design

**AND8002/D** – Marking and Date Codes

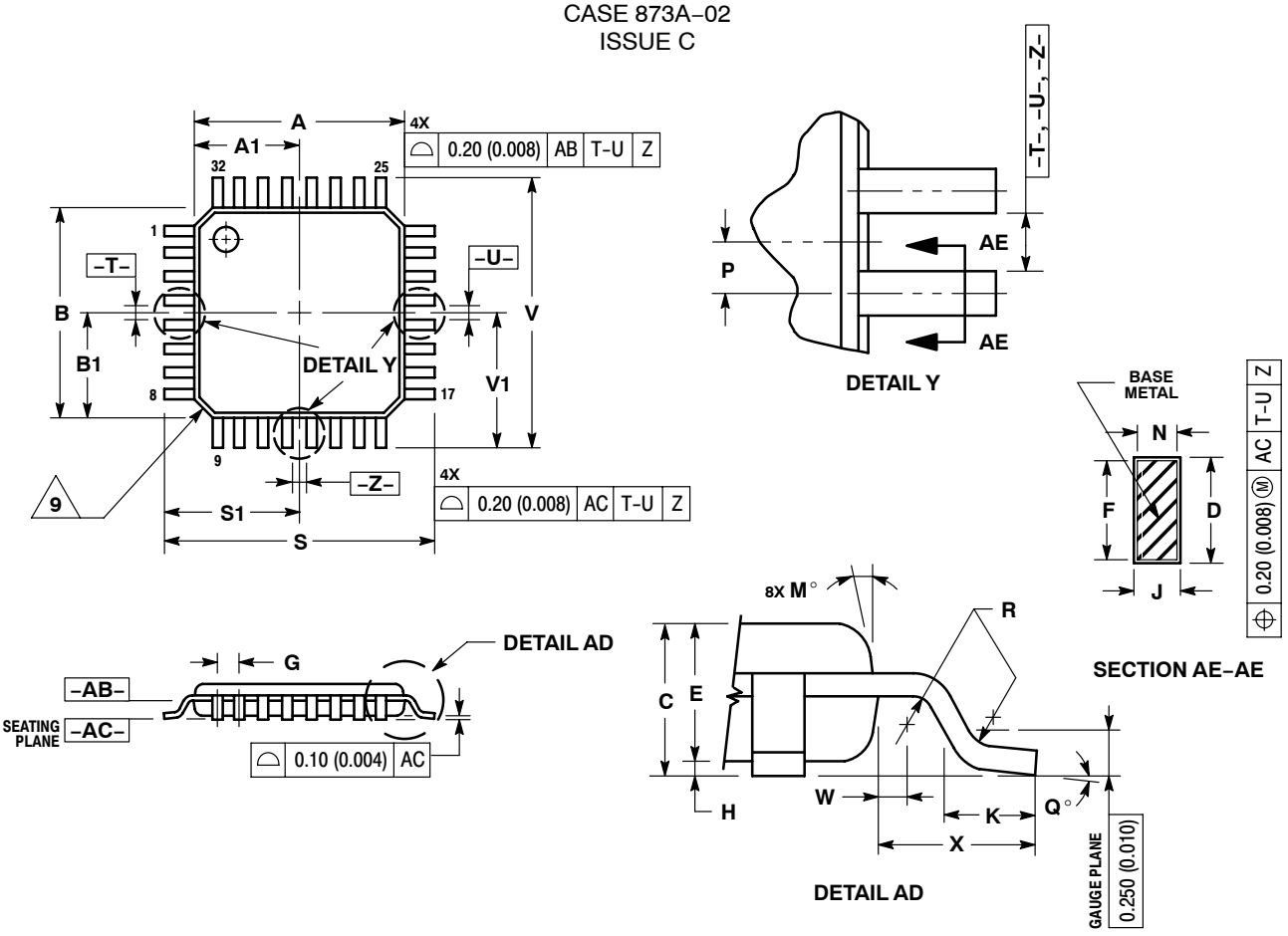
**AND8020/D** – Termination of ECL Logic Devices

**AND8066/D** – Interfacing with ECLinPS

**AND8090/D** – AC Characteristics of ECL Devices

## PACKAGE DIMENSIONS

**32 LEAD LQFP**
CASE 873A–02
ISSUE C

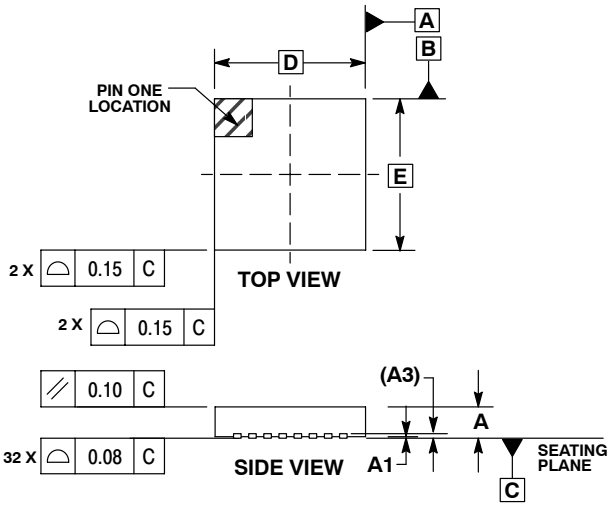


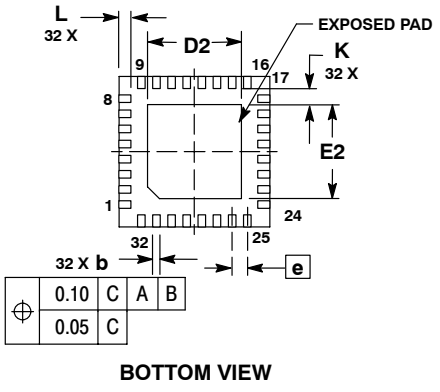

NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DATUM PLANE –AB– IS LOCATED AT BOTTOM OF LEAD AND IS COINCIDENT WITH THE LEAD WHERE THE LEAD EXITS THE PLASTIC BODY AT THE BOTTOM OF THE PARTING LINE.
4. DATUMS –T–, –U–, AND –Z– TO BE DETERMINED AT DATUM PLANE –AB–.
5. DIMENSIONS S AND V TO BE DETERMINED AT SEATING PLANE –AC–.
6. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS 0.250 (0.010) PER SIDE. DIMENSIONS A AND B DO INCLUDE MOLD MISMATCH AND ARE DETERMINED AT DATUM PLANE –AB–.
7. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. DAMBAR PROTRUSION SHALL NOT CAUSE THE D DIMENSION TO EXCEED 0.520 (0.020).
8. MINIMUM SOLDER PLATE THICKNESS SHALL BE 0.0076 (0.0003).
9. EXACT SHAPE OF EACH CORNER MAY VARY FROM DEPICTION.

| | MILLIMETERS | | INCHES | |
|---|---|---|---|---|
| DIM | MIN | MAX | MIN | MAX |
| A | 7.000 BSC | | 0.276 BSC | |
| A1 | 3.500 BSC | | 0.138 BSC | |
| B | 7.000 BSC | | 0.276 BSC | |
| B1 | 3.500 BSC | | 0.138 BSC | |
| C | 1.400 | 1.600 | 0.055 | 0.063 |
| D | 0.300 | 0.450 | 0.012 | 0.018 |
| E | 1.350 | 1.450 | 0.053 | 0.057 |
| F | 0.300 | 0.400 | 0.012 | 0.016 |
| G | 0.800 BSC | | 0.031 BSC | |
| H | 0.050 | 0.150 | 0.002 | 0.006 |
| J | 0.090 | 0.200 | 0.004 | 0.008 |
| K | 0.450 | 0.750 | 0.018 | 0.030 |
| M | 12° REF | | 12° REF | |
| N | 0.090 | 0.160 | 0.004 | 0.006 |
| P | 0.400 BSC | | 0.016 BSC | |
| Q | 1° | 5° | 1° | 5° |
| R | 0.150 | 0.250 | 0.006 | 0.010 |
| S | 9.000 BSC | | 0.354 BSC | |
| S1 | 4.500 BSC | | 0.177 BSC | |
| V | 9.000 BSC | | 0.354 BSC | |
| V1 | 4.500 BSC | | 0.177 BSC | |
| W | 0.200 REF | | 0.008 REF | |
| X | 1.000 REF | | 0.039 REF | |

## PACKAGE DIMENSIONS

**QFN32 5*5*1 0.5 P**
CASE 488AM−01
ISSUE O



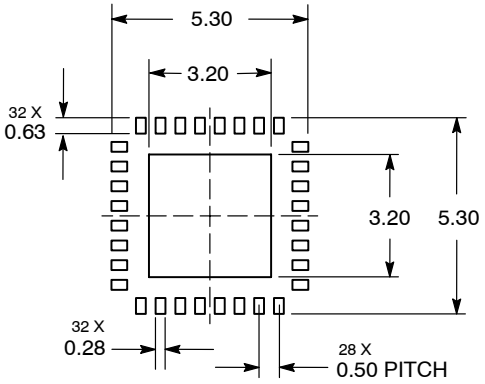




BOTTOM VIEW

NOTES:
1. DIMENSIONS AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.25 AND 0.30 MM TERMINAL
4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.

| | MILLIMETERS | | |
|---|---|---|---|
| DIM | MIN | NOM | MAX |
| A | 0.800 | 0.900 | 1.000 |
| A1 | 0.000 | 0.025 | 0.050 |
| A3 | | 0.200 REF | |
| b | 0.180 | 0.250 | 0.300 |
| D | | 5.00 BSC | |
| D2 | 2.950 | 3.100 | 3.250 |
| E | | 5.00 BSC | |
| E2 | 2.950 | 3.100 | 3.250 |
| e | | 0.500 BSC | |
| K | 0.200 | --- | --- |
| L | 0.300 | 0.400 | 0.500 |

**SOLDERING FOOTPRINT***




*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



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**MC10EP116/D**

Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

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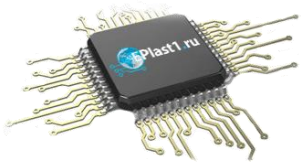
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.

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