

# MC10EP16T, MC100EP16T

## 3.3 V / 5 V ECL Differential Receiver/Driver with Internal Termination

### Description

The EP16T is a world-class differential receiver/driver. The device is functionally equivalent to the EP16 with internal termination resistors. A  $50\ \Omega$  resistor is connected from the D input to the VT pin and from the  $\overline{D}$  input to the  $\overline{VT}$  pin. Tie the VT and  $\overline{VT}$  pins to VTT supply ( $V_{CC} - 2\text{ V}$ ) for parallel termination or connect VT and  $\overline{VT}$  pins for  $100\ \Omega$  input series termination.

Special considerations are required for differential inputs under No Signal conditions to prevent instability.

The 100 Series contains temperature compensation.

### Features

- 220 ps Typical Propagation Delay
- Maximum Frequency > 3 GHz Typical
- PECL Mode Operating Range:
  - ♦  $V_{CC} = 3.0\text{ V}$  to  $5.5\text{ V}$  with  $V_{EE} = 0\text{ V}$
- NECL Mode Operating Range:
  - ♦  $V_{CC} = 0\text{ V}$  with  $V_{EE} = -3.0\text{ V}$  to  $-5.5\text{ V}$
- Internal  $50\ \Omega$  Termination Resistors
- These Devices are Pb-Free, Halogen Free and are RoHS Compliant



ON Semiconductor®

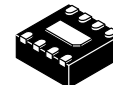
<http://onsemi.com>



SOIC-8 NB  
D SUFFIX  
CASE  
751-07

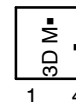
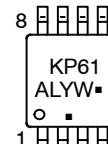
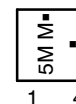
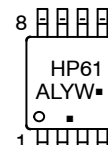


TSSOP-8  
DT SUFFIX  
CASE  
948R-02



DFN-8  
MN SUFFIX  
CASE 506AA

### MARKING DIAGRAMS\*



|               |                       |
|---------------|-----------------------|
| H = MC10      | A = Assembly Location |
| K = MC100     | L = Wafer Lot         |
| 5M = MC10     | Y = Year              |
| 3D = MC100    | W = Work Week         |
| M = Date Code | ■ = Pb-Free Package   |

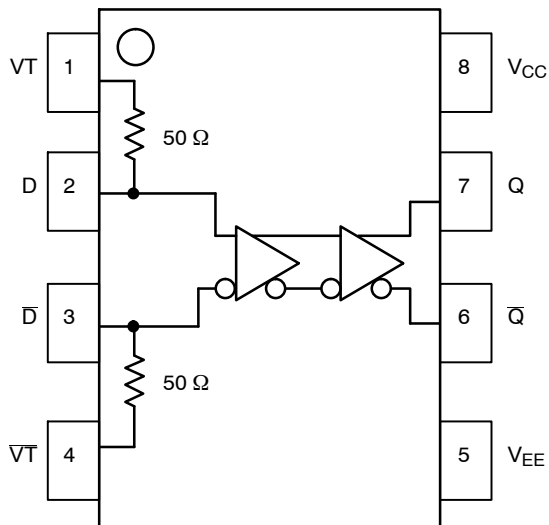
(Note: Microdot may be in either location)

\*For additional marking information, refer to Application Note [AND8002/D](#).

### ORDERING INFORMATION

See detailed ordering and shipping information on page 8 of this data sheet.

# MC10EP16T, MC100EP16T



**Table 1. PIN DESCRIPTION**

| PIN          | FUNCTION                                                                                                                                                                        |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| D, $\bar{D}$ | ECL Data Inputs                                                                                                                                                                 |
| Q, $\bar{Q}$ | ECL Data Outputs                                                                                                                                                                |
| $V_{CC}$     | Positive Supply                                                                                                                                                                 |
| $V_{EE}$     | Negative Supply                                                                                                                                                                 |
| VT           | 50 $\Omega$ Termination Resistor to D                                                                                                                                           |
| $\bar{V}T$   | 50 $\Omega$ Termination Resistor to $\bar{D}$                                                                                                                                   |
| EP           | (DFN-8 only) Thermal exposed pad must be connected to a sufficient thermal conduit. Electrically connect to the most negative supply (GND) or leave unconnected, floating open. |

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

**Table 2. ATTRIBUTES**

| Characteristics                                                             | Value                         |
|-----------------------------------------------------------------------------|-------------------------------|
| Internal Input Pulldown Resistor                                            | N/A                           |
| Internal Input Pullup Resistor                                              | N/A                           |
| ESD Protection<br>Human Body Model<br>Machine Model<br>Charged Device Model | > 4 kV<br>> 200 V<br>> 2 kV   |
| Moisture Sensitivity, Indefinite Time Out of Drypack (Note 1)               | Pb-Free Pkg                   |
| SOIC-8 NB<br>TSSOP-8<br>DFN-8                                               | Level 1<br>Level 3<br>Level 1 |
| Flammability Rating<br>Oxygen Index: 28 to 34                               | UL 94 V-0 @ 0.125 in          |
| Transistor Count                                                            | 167 Devices                   |
| Meets or exceeds JEDEC Spec EIA/JESD78 IC Latchup Test                      |                               |

1. For additional information, see Application Note [AND8003/D](#)

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**Table 3. MAXIMUM RATINGS**

| Symbol        | Parameter                                          | Condition 1                                    | Condition 2                            | Rating      | Unit |
|---------------|----------------------------------------------------|------------------------------------------------|----------------------------------------|-------------|------|
| $V_{CC}$      | PECL Mode Power Supply                             | $V_{EE} = 0\text{ V}$                          |                                        | 6           | V    |
| $V_{EE}$      | NECL Mode Power Supply                             | $V_{CC} = 0\text{ V}$                          |                                        | -6          | V    |
| $V_I$         | PECL Mode Input Voltage<br>NECL Mode Input Voltage | $V_{EE} = 0\text{ V}$<br>$V_{CC} = 0\text{ V}$ | $V_I \leq V_{CC}$<br>$V_I \geq V_{EE}$ | 6<br>-6     | V    |
| $I_{out}$     | Output Current                                     | Continuous<br>Surge                            |                                        | 50<br>100   | mA   |
| $I_{BB}$      | $V_{BB}$ Sink/Source                               |                                                |                                        | $\pm 0.5$   | 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                             | SOIC-8 NB                              | 190<br>130  | °C/W |
| $\theta_{JC}$ | Thermal Resistance (Junction-to-Case)              | Standard Board                                 | SOIC-8 NB                              | 41 to 44    | °C/W |
| $\theta_{JA}$ | Thermal Resistance (Junction-to-Ambient)           | 0 lfpm<br>500 lfpm                             | TSSOP-8                                | 185<br>140  | °C/W |
| $\theta_{JC}$ | Thermal Resistance (Junction-to-Case)              | Standard Board                                 | TSSOP-8                                | 41 to 44    | °C/W |
| $\theta_{JA}$ | Thermal Resistance (Junction-to-Ambient)           | 0 lfpm<br>500 lfpm                             | DFN-8                                  | 129<br>84   | °C/W |
| $T_{sol}$     | Wave Solder (Pb-Free)                              |                                                |                                        | 265         | °C   |
| $\theta_{JC}$ | Thermal Resistance (Junction-to-Case)              | (Note 1)                                       | DFN-8                                  | 35 to 40    | °C/W |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. JEDEC standard multilayer board – 2S2P (2 signal, 2 power)

**Table 4. 10EP DC CHARACTERISTICS, PECL ( $V_{CC} = 3.3\text{ V}$ ,  $V_{EE} = 0\text{ V}$  (Note 1))**

| Symbol      | Characteristic                                                             | -40°C |      |      | 25°C |      |      | 85°C |      |      | Unit          |
|-------------|----------------------------------------------------------------------------|-------|------|------|------|------|------|------|------|------|---------------|
|             |                                                                            | Min   | Typ  | Max  | Min  | Typ  | Max  | Min  | Typ  | Max  |               |
| $I_{EE}$    | Power Supply Current                                                       | 16    | 23   | 31   | 16   | 23   | 31   | 16   | 23   | 31   | mA            |
| $V_{OH}$    | Output HIGH Voltage (Note 2)                                               | 2165  | 2290 | 2415 | 2230 | 2355 | 2480 | 2290 | 2415 | 2540 | mV            |
| $V_{OL}$    | Output LOW Voltage (Note 2)                                                | 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 | 1430 |      | 1755 | 1490 |      | 1815 | mV            |
| $V_{IHCMR}$ | Input HIGH Voltage Common Mode Range (Differential Configuration) (Note 3) | 2.0   |      | 3.3  | 2.0  |      | 3.3  | 2.0  |      | 3.3  | V             |
| $R_T$       | Internal Termination Resistor                                              | 43    |      | 57   | 43   | 50   | 57   | 43   |      | 57   | $\Omega$      |
| $I_{IH}$    | Input HIGH Current                                                         |       |      | 150  |      |      | 150  |      |      | 150  | $\mu\text{A}$ |
| $I_{IL}$    | Input LOW Current                                                          | -150  |      |      | -150 |      |      | -150 |      |      | $\mu\text{A}$ |

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.

1. Input and output parameters vary 1:1 with  $V_{CC}$ .  $V_{EE}$  can vary +0.3 V to -2.2 V.
2. All loading with 50  $\Omega$  to  $V_{CC} - 2.0\text{ V}$ .
3.  $V_{IHCMR}$  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.

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**Table 5. 10EP DC CHARACTERISTICS, PECL** ( $V_{CC} = 5.0\text{ V}$ ,  $V_{EE} = 0\text{ V}$  (Note 1))

| Symbol      | Characteristic                                                             | -40°C |      |      | 25°C |      |      | 85°C |      |      | Unit          |
|-------------|----------------------------------------------------------------------------|-------|------|------|------|------|------|------|------|------|---------------|
|             |                                                                            | Min   | Typ  | Max  | Min  | Typ  | Max  | Min  | Typ  | Max  |               |
| $I_{EE}$    | Power Supply Current                                                       | 16    | 23   | 31   | 16   | 23   | 31   | 16   | 23   | 31   | mA            |
| $V_{OH}$    | Output HIGH Voltage (Note 2)                                               | 3865  | 3990 | 4115 | 3930 | 4055 | 4180 | 3990 | 4115 | 4240 | mV            |
| $V_{OL}$    | Output LOW Voltage (Note 2)                                                | 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            |
| $V_{IHCMR}$ | Input HIGH Voltage Common Mode Range (Differential Configuration) (Note 3) | 2.0   |      | 5.0  | 2.0  |      | 5.0  | 2.0  |      | 5.0  | V             |
| $R_T$       | Internal Termination Resistor                                              | 43    |      | 57   | 43   | 50   | 57   | 43   |      | 57   | $\Omega$      |
| $I_{IH}$    | Input HIGH Current                                                         |       |      | 150  |      |      | 150  |      |      | 150  | $\mu\text{A}$ |
| $I_{IL}$    | Input LOW Current                                                          | -150  |      |      | -150 |      |      | -150 |      |      | $\mu\text{A}$ |

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 lfm. 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.

1. Input and output parameters vary 1:1 with  $V_{CC}$ .  $V_{EE}$  can vary +2.0 V to -0.5 V.
2. All loading with 50  $\Omega$  to  $V_{CC} - 2.0\text{ V}$ .
3.  $V_{IHCMR}$  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** ( $V_{CC} = 0\text{ V}$ ;  $V_{EE} = -5.5\text{ V}$  to  $-3.0\text{ V}$  (Note 1))

| Symbol      | Characteristic                                                             | -40°C          |       |       | 25°C           |       |       | 85°C           |       |       | Unit          |
|-------------|----------------------------------------------------------------------------|----------------|-------|-------|----------------|-------|-------|----------------|-------|-------|---------------|
|             |                                                                            | Min            | Typ   | Max   | Min            | Typ   | Max   | Min            | Typ   | Max   |               |
| $I_{EE}$    | Power Supply Current                                                       | 16             | 23    | 31    | 16             | 23    | 31    | 16             | 23    | 31    | mA            |
| $V_{OH}$    | Output HIGH Voltage (Note 2)                                               | -1135          | -1010 | -885  | -1070          | -945  | -820  | -1010          | -885  | -760  | mV            |
| $V_{OL}$    | Output LOW Voltage (Note 2)                                                | -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            |
| $V_{IHCMR}$ | Input HIGH Voltage Common Mode Range (Differential Configuration) (Note 3) | $V_{EE} + 2.0$ |       | 0.0   | $V_{EE} + 2.0$ |       | 0.0   | $V_{EE} + 2.0$ |       | 0.0   | V             |
| $R_T$       | Internal Termination Resistor                                              | 43             |       | 57    | 43             | 50    | 57    | 43             |       | 57    | $\Omega$      |
| $I_{IH}$    | Input HIGH Current                                                         |                |       | 150   |                |       | 150   |                |       | 150   | $\mu\text{A}$ |
| $I_{IL}$    | Input LOW Current                                                          | -150           |       |       | -150           |       |       | -150           |       |       | $\mu\text{A}$ |

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 lfm. 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.

1. Input and output parameters vary 1:1 with  $V_{CC}$ .
2. All loading with 50  $\Omega$  to  $V_{CC} - 2.0\text{ V}$ .
3.  $V_{IHCMR}$  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.

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**Table 7. 100EP DC CHARACTERISTICS, PECL** ( $V_{CC} = 3.3\text{ V}$ ,  $V_{EE} = 0\text{ V}$  (Note 1))

| Symbol      | Characteristic                                                             | -40°C |      |      | 25°C |      |      | 85°C |      |      | Unit          |
|-------------|----------------------------------------------------------------------------|-------|------|------|------|------|------|------|------|------|---------------|
|             |                                                                            | Min   | Typ  | Max  | Min  | Typ  | Max  | Min  | Typ  | Max  |               |
| $I_{EE}$    | Power Supply Current                                                       | 18    | 25   | 35   | 20   | 27   | 37   | 22   | 29   | 39   | mA            |
| $V_{OH}$    | Output HIGH Voltage (Note 2)                                               | 2155  | 2280 | 2405 | 2155 | 2280 | 2405 | 2155 | 2280 | 2405 | mV            |
| $V_{OL}$    | Output LOW Voltage (Note 2)                                                | 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 | 1355 |      | 1675 | 1355 |      | 1675 | mV            |
| $V_{IHCMR}$ | Input HIGH Voltage Common Mode Range (Differential Configuration) (Note 3) | 2.0   |      | 3.3  | 2.0  |      | 3.3  | 2.0  |      | 3.3  | V             |
| $R_T$       | Internal Termination Resistor                                              | 43    |      | 57   | 43   | 50   | 57   | 43   |      | 57   | $\Omega$      |
| $I_{IH}$    | Input HIGH Current                                                         |       |      | 150  |      |      | 150  |      |      | 150  | $\mu\text{A}$ |
| $I_{IL}$    | Input LOW Current                                                          | -150  |      |      | -150 |      |      | -150 |      |      | $\mu\text{A}$ |

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 lfm. 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.

1. Input and output parameters vary 1:1 with  $V_{CC}$ .  $V_{EE}$  can vary +0.3 V to -2.2 V.
2. All loading with 50  $\Omega$  to  $V_{CC} - 2.0\text{ V}$ .
3.  $V_{IHCMR}$  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** ( $V_{CC} = 5.0\text{ V}$ ,  $V_{EE} = 0\text{ V}$  (Note 1))

| Symbol      | Characteristic                                                             | -40°C |      |      | 25°C |      |      | 85°C |      |      | Unit          |
|-------------|----------------------------------------------------------------------------|-------|------|------|------|------|------|------|------|------|---------------|
|             |                                                                            | Min   | Typ  | Max  | Min  | Typ  | Max  | Min  | Typ  | Max  |               |
| $I_{EE}$    | Power Supply Current                                                       | 18    | 25   | 35   | 20   | 27   | 37   | 22   | 29   | 39   | mA            |
| $V_{OH}$    | Output HIGH Voltage (Note 2)                                               | 3855  | 3980 | 4105 | 3855 | 3980 | 4105 | 3855 | 3980 | 4105 | mV            |
| $V_{OL}$    | Output LOW Voltage (Note 2)                                                | 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)                                           | 3055  |      | 3375 | 3055 |      | 3375 | 3055 |      | 3375 | mV            |
| $V_{IHCMR}$ | Input HIGH Voltage Common Mode Range (Differential Configuration) (Note 3) | 2.0   |      | 5.0  | 2.0  |      | 5.0  | 2.0  |      | 5.0  | V             |
| $R_T$       | Internal Termination Resistor                                              | 43    |      | 57   | 43   | 50   | 57   | 43   |      | 57   | $\Omega$      |
| $I_{IH}$    | Input HIGH Current                                                         |       |      | 150  |      |      | 150  |      |      | 150  | $\mu\text{A}$ |
| $I_{IL}$    | Input LOW Current                                                          | -150  |      |      | -150 |      |      | -150 |      |      | $\mu\text{A}$ |

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 lfm. 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.

1. Input and output parameters vary 1:1 with  $V_{CC}$ .  $V_{EE}$  can vary +2.0 V to -0.5 V.
2. All loading with 50  $\Omega$  to  $V_{CC} - 2.0\text{ V}$ .
3.  $V_{IHCMR}$  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.

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**Table 9. 100EP DC CHARACTERISTICS, NECL** ( $V_{CC} = 0\text{ V}$ ;  $V_{EE} = -5.5\text{ V}$  to  $-3.0\text{ V}$  (Note 1))

| Symbol      | Characteristic                                                             | -40°C          |       |       | 25°C           |       |       | 85°C           |       |       | Unit          |
|-------------|----------------------------------------------------------------------------|----------------|-------|-------|----------------|-------|-------|----------------|-------|-------|---------------|
|             |                                                                            | Min            | Typ   | Max   | Min            | Typ   | Max   | Min            | Typ   | Max   |               |
| $I_{EE}$    | Power Supply Current                                                       | 18             | 25    | 35    | 20             | 27    | 37    | 22             | 29    | 39    | mA            |
| $V_{OH}$    | Output HIGH Voltage (Note 2)                                               | -1145          | -1020 | -895  | -1145          | -1020 | -895  | -1145          | -1020 | -895  | mV            |
| $V_{OL}$    | Output LOW Voltage (Note 2)                                                | -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            |
| $V_{IHCMR}$ | Input HIGH Voltage Common Mode Range (Differential Configuration) (Note 3) | $V_{EE} + 2.0$ |       | 0.0   | $V_{EE} + 2.0$ |       | 0.0   | $V_{EE} + 2.0$ |       | 0.0   | V             |
| $R_T$       | Internal Termination Resistor                                              | 43             |       | 57    | 43             | 50    | 57    | 43             |       | 57    | $\Omega$      |
| $I_{IH}$    | Input HIGH Current                                                         |                |       | 150   |                |       | 150   |                |       | 150   | $\mu\text{A}$ |
| $I_{IL}$    | Input LOW Current                                                          | -150           |       |       | -150           |       |       | -150           |       |       | $\mu\text{A}$ |

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 lfm. 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.

1. Input and output parameters vary 1:1 with  $V_{CC}$ .
2. All loading with  $50\ \Omega$  to  $V_{CC} - 2.0\text{ V}$ .
3.  $V_{IHCMR}$  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** ( $V_{CC} = 0\text{ V}$ ;  $V_{EE} = -3.0\text{ V}$  to  $-5.5\text{ V}$  or  $V_{CC} = 3.0\text{ V}$  to  $5.5\text{ V}$ ;  $V_{EE} = 0\text{ V}$  (Note 1))

| Symbol                   | Characteristic                                   | -40°C |     |      | 25°C |     |      | 85°C |     |      | Unit |
|--------------------------|--------------------------------------------------|-------|-----|------|------|-----|------|------|-----|------|------|
|                          |                                                  | Min   | Typ | Max  | Min  | Typ | Max  | Min  | Typ | Max  |      |
| $f_{\max}$               | Maximum Frequency (Figure 2)                     |       | > 3 |      |      | > 3 |      |      | > 3 |      | GHz  |
| $t_{PLH}$ ,<br>$t_{PHL}$ | Propagation Delay to Output Differential         | 150   | 230 | 300  | 150  | 240 | 300  | 200  | 275 | 350  | ps   |
| $t_{SKEW}$               | Duty Cycle Skew (Note 2)                         |       | 5.0 | 20   |      | 5.0 | 20   |      | 5.0 | 20   | ps   |
| $t_{JITTER}$             | Cycle-to-Cycle Jitter (Figure 2)                 |       | 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 (20% – 80%) Q, $\bar{Q}$  | 70    | 120 | 170  | 80   | 130 | 180  | 100  | 140 | 200  | 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 lfm. 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.

1. Measured using a 750 mV source, 50% duty cycle clock source. All loading with  $50\ \Omega$  to  $V_{CC} - 2.0\text{ V}$ .
2. 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.

## MC10EP16T, MC100EP16T

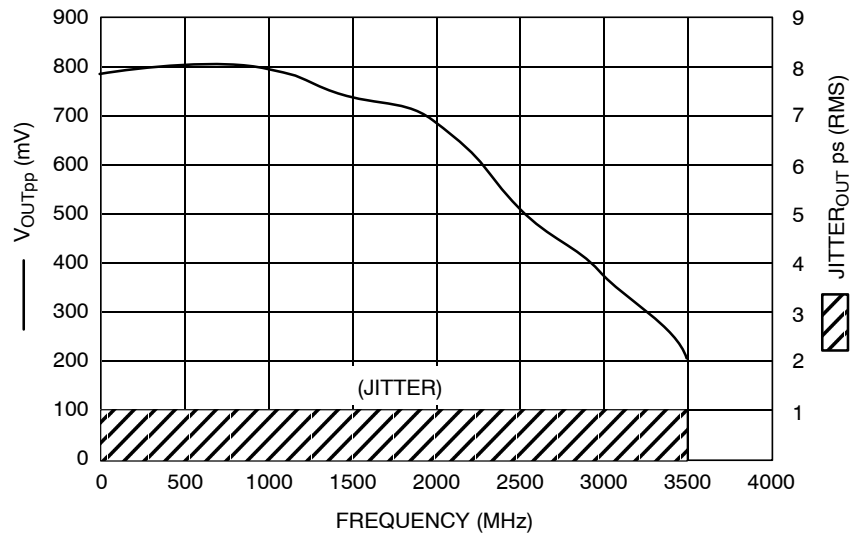


Figure 2.  $F_{max}/Jitter$

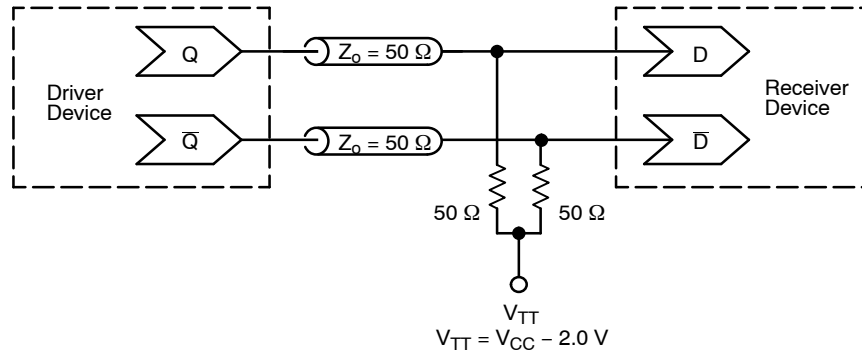


Figure 3. Typical Termination for Output Driver and Device Evaluation  
(See Application Note [AND8020/D](#) – Termination of ECL Logic Devices.)

# MC10EP16T, MC100EP16T

## ORDERING INFORMATION

| Device          | Package                | Shipping <sup>†</sup> |
|-----------------|------------------------|-----------------------|
| MC10EP16TDG     | SOIC-8 NB<br>(Pb-Free) | 98 Units / Rail       |
| MC10EP16TDR2G   | SOIC-8 NB<br>(Pb-Free) | 2500 / Tape & Reel    |
| MC10EP16TDTG    | TSSOP-8<br>(Pb-Free)   | 100 Units / Rail      |
| MC10EP16TDTR2G  | TSSOP-8<br>(Pb-Free)   | 2500 / Tape & Reel    |
| MC10EP16TMNR4G  | DFN-8<br>(Pb-Free)     | 1000 / Tape & Reel    |
| MC100EP16TDG    | SOIC-8 NB<br>(Pb-Free) | 98 Units / Rail       |
| MC100EP16TDR2G  | SOIC-8 NB<br>(Pb-Free) | 2500 / Tape & Reel    |
| MC100EP16TDTG   | TSSOP-8<br>(Pb-Free)   | 100 Units / Rail      |
| MC100EP16TDTR2G | TSSOP-8<br>(Pb-Free)   | 2500 / Tape & Reel    |
| MC100EP16TMNR4G | DFN-8<br>(Pb-Free)     | 1000 / Tape & Reel    |

<sup>†</sup>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](#).

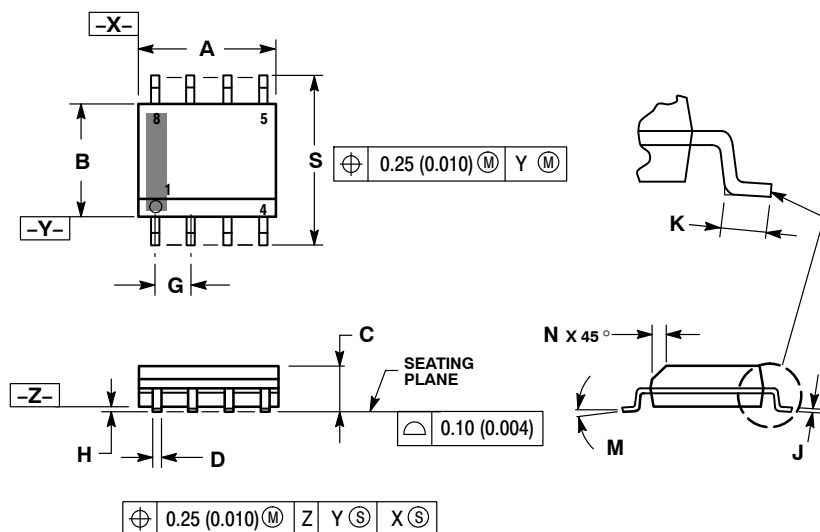
## Resource Reference of Application Notes

- 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

# MC10EP16T, MC100EP16T

## PACKAGE DIMENSIONS

SOIC-8 NB  
CASE 751-07  
ISSUE AK

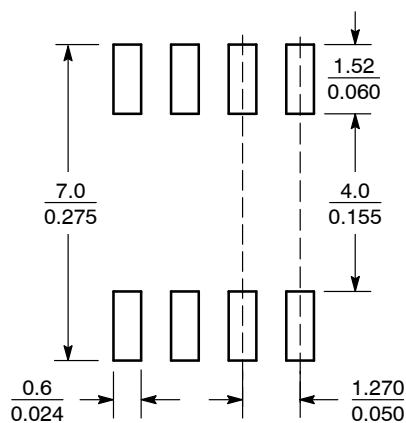


### NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.
6. 751-01 THRU 751-06 ARE OBSOLETE. NEW STANDARD IS 751-07.

| DIM | MILLIMETERS |      | INCHES    |       |
|-----|-------------|------|-----------|-------|
|     | MIN         | MAX  | MIN       | MAX   |
| A   | 4.80        | 5.00 | 0.189     | 0.197 |
| B   | 3.80        | 4.00 | 0.150     | 0.157 |
| C   | 1.35        | 1.75 | 0.053     | 0.069 |
| D   | 0.33        | 0.51 | 0.013     | 0.020 |
| G   | 1.27 BSC    |      | 0.050 BSC |       |
| H   | 0.10        | 0.25 | 0.004     | 0.010 |
| J   | 0.19        | 0.25 | 0.007     | 0.010 |
| K   | 0.40        | 1.27 | 0.016     | 0.050 |
| M   | 0°          | 8°   | 0°        | 8°    |
| N   | 0.25        | 0.50 | 0.010     | 0.020 |
| S   | 5.80        | 6.20 | 0.228     | 0.244 |

## SOLDERING FOOTPRINT\*



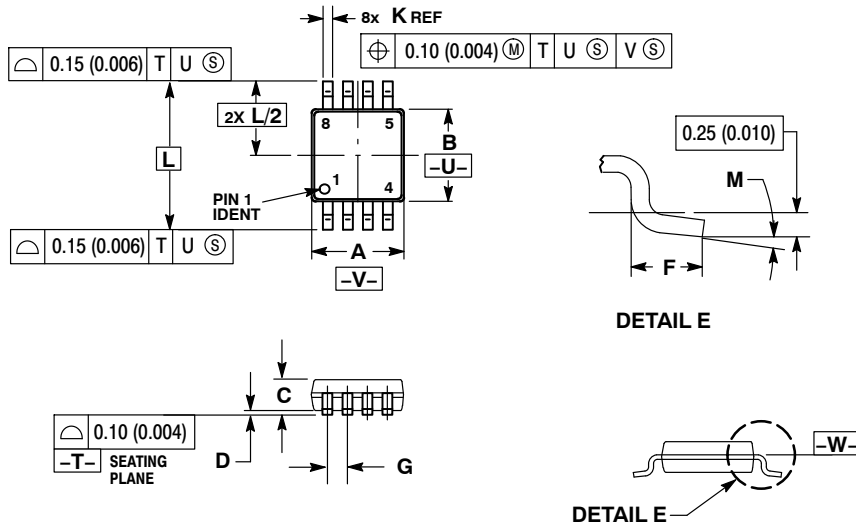
SCALE 6:1  $\left(\frac{\text{mm}}{\text{inches}}\right)$

\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, [SOLDDERM/D](http://www.onsemi.com/SOLDDERM/D).

# MC10EP16T, MC100EP16T

## PACKAGE DIMENSIONS

TSSOP-8  
CASE 948R-02  
ISSUE A



### NOTES:

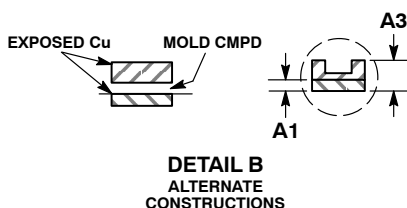
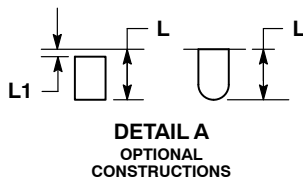
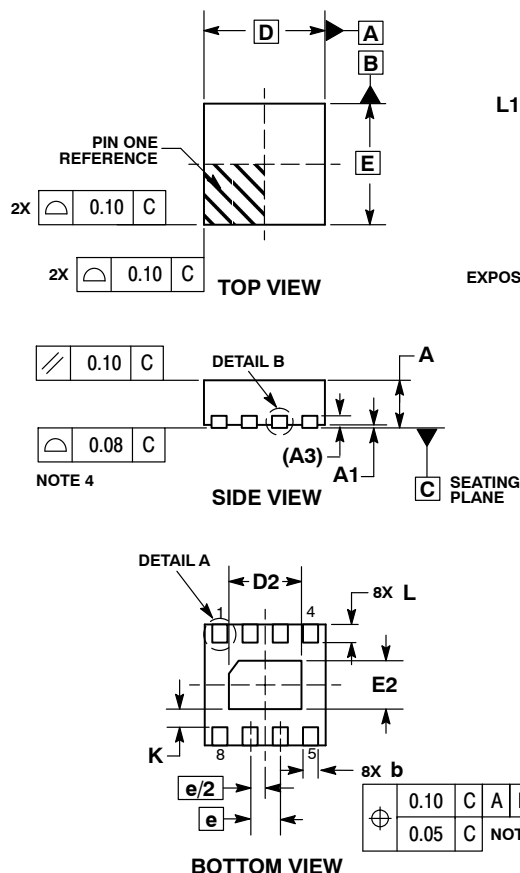
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A DOES NOT INCLUDE MOLD FLASH. PROTRUSIONS OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
4. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 (0.010) PER SIDE.
5. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
6. DIMENSION A AND B ARE TO BE DETERMINED AT DATUM PLANE -W-.

| DIM | MILLIMETERS |      | INCHES    |       |
|-----|-------------|------|-----------|-------|
|     | MIN         | MAX  | MIN       | MAX   |
| A   | 2.90        | 3.10 | 0.114     | 0.122 |
| B   | 2.90        | 3.10 | 0.114     | 0.122 |
| C   | 0.80        | 1.10 | 0.031     | 0.043 |
| D   | 0.05        | 0.15 | 0.002     | 0.006 |
| F   | 0.40        | 0.70 | 0.016     | 0.028 |
| G   | 0.65 BSC    |      | 0.026 BSC |       |
| K   | 0.25        | 0.40 | 0.010     | 0.016 |
| L   | 4.90 BSC    |      | 0.193 BSC |       |
| M   | 0°          | 6°   | 0°        | 6°    |

# MC10EP16T, MC100EP16T

## PACKAGE DIMENSIONS

DFN-8 2x2, 0.5P  
CASE 506AA  
ISSUE F

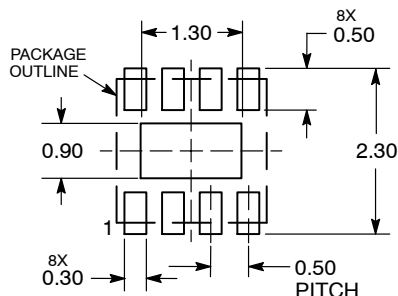


### NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.20 MM FROM TERMINAL TIP.
4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.

| DIM | MILLIMETERS |      |
|-----|-------------|------|
|     | MIN         | MAX  |
| A   | 0.80        | 1.00 |
| A1  | 0.00        | 0.05 |
| A3  | 0.20        | REF  |
| b   | 0.20        | 0.30 |
| D   | 2.00        | BSC  |
| D2  | 1.10        | 1.30 |
| E   | 2.00        | BSC  |
| E2  | 0.70        | 0.90 |
| e   | 0.50        | BSC  |
| K   | 0.30        | REF  |
| L   | 0.25        | 0.35 |
| L1  | ---         | 0.10 |

## RECOMMENDED SOLDERING FOOTPRINT\*



DIMENSIONS: MILLIMETERS

\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, [SOLDDRM/D](#).

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