

## 3.3 V/5 V ECL Dual Differential 2:1 Multiplexer MC10EP56, MC100EP56

### Description

The MC10/100EP56 is a dual, fully differential 2:1 multiplexer. The differential data path makes the device ideal for multiplexing low skew clock or other skew sensitive signals. Multiple  $V_{BB}$  pins are provided.

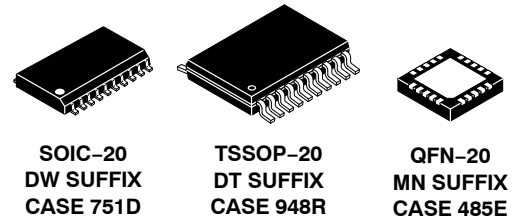
The  $V_{BB}$  pin, an internally generated voltage supply, is available to this device only. For single-ended input conditions, the unused differential input is connected to  $V_{BB}$  as a switching reference voltage.  $V_{BB}$  may also rebias AC coupled inputs. When used, decouple  $V_{BB}$  and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

The device features both individual and common select inputs to address both data path and random logic applications.

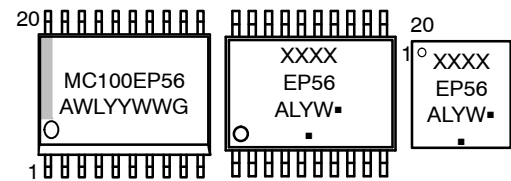
The 100 Series contains temperature compensation.

### Features

- 360 ps Typical Propagation Delays
- 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
- Separate and Common Select
- Q Output Will Default LOW with Inputs Open or at  $V_{EE}$
- $V_{BB}$  Outputs
- These Devices are Pb-Free and are RoHS Compliant



### MARKING DIAGRAM



XXXX = MC10 or 100  
A = Assembly Location  
WL, L = Wafer Lot  
YY, Y = Year  
WW, W = Work Week  
G, ■ = Pb-Free Package

(Note: Microdot may be in either location)

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

### ORDERING INFORMATION

| Device         | Package            | Shipping†          |
|----------------|--------------------|--------------------|
| MC10EP56DTG    | TSSOP-20 (Pb-Free) | 75 Units / Tube    |
| MC10EP56DTR2G  | TSSOP-20 (Pb-Free) | 2500 / Tape & Reel |
| MC100EP56DWG   | SOIC-20 (Pb-Free)  | 38 Units / Tube    |
| MC100EP56DTG   | TSSOP-20 (Pb-Free) | 75 Units / Tube    |
| MC100EP56DTR2G | TSSOP-20 (Pb-Free) | 2500 / Tape & Reel |
| MC100EP56MNG   | QFN-20 (Pb-Free)   | 92 Units / Tube    |

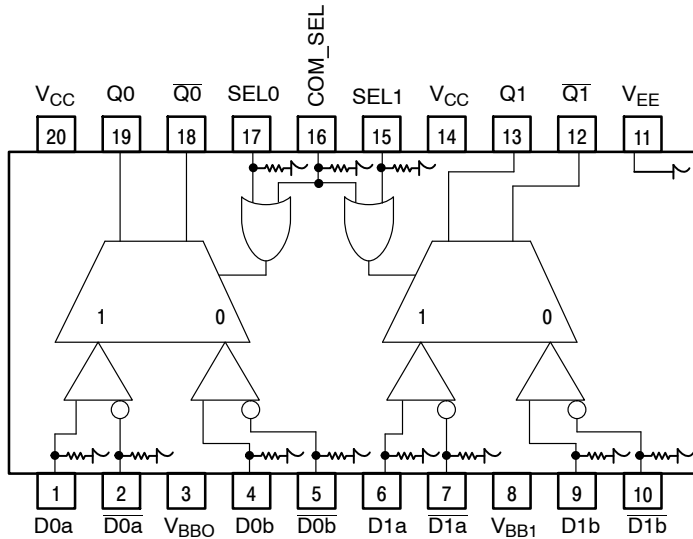
### DISCONTINUED (Note 1)

|             |                  |                 |
|-------------|------------------|-----------------|
| MC10EP56MNG | QFN-20 (Pb-Free) | 92 Units / Tube |
|-------------|------------------|-----------------|

†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](#).

1. **DISCONTINUED:** This device is not recommended for new design. Please contact your onsemi representative for information. The most current information on this device may be available on [www.onsemi.com](http://www.onsemi.com).

# MC10EP56, MC100EP56



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

**Figure 1. 20-Lead Package (Top View) and Logic Diagram**

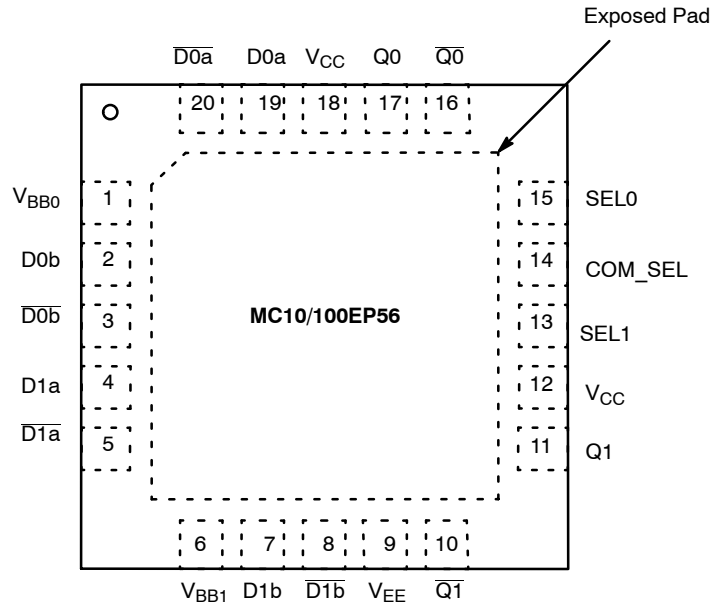
**Table 1. PIN DESCRIPTION**

| PIN                                   | FUNCTION                 |
|---------------------------------------|--------------------------|
| D0a* – D1a*                           | ECL Input Data a         |
| $\overline{D0a}^* - \overline{D1a}^*$ | ECL Input Data a Invert  |
| D0b* – D1b*                           | ECL Input Data b         |
| $\overline{D0b}^* - \overline{D1b}^*$ | ECL Input Data b Invert  |
| SEL0* – SEL1*                         | ECL Indiv. Select Input  |
| COM_SEL*                              | ECL Common Select Input  |
| $V_{BB0}$ , $V_{BB1}$                 | Output Reference Voltage |
| Q0 – Q1                               | ECL True Outputs         |
| $\overline{Q0} - \overline{Q1}$       | ECL Inverted Outputs     |
| $V_{CC}$                              | Positive Supply          |
| $V_{EE}$                              | Negative Supply          |
| EP                                    | Exposed Pad              |

\* Pins will default LOW when left open.

**Table 2. TRUTH TABLE**

| SEL0 | SEL1 | COM_SEL | Q0,<br>$\overline{Q0}$ | Q1,<br>$\overline{Q1}$ |
|------|------|---------|------------------------|------------------------|
| X    | X    | H       | a                      | a                      |
| L    | L    | L       | b                      | b                      |
| L    | H    | L       | b                      | a                      |
| H    | H    | L       | a                      | a                      |
| H    | L    | L       | a                      | b                      |



NOTE: The Exposed Pad (EP) on package bottom must be attached to a heat-sinking conduit. The Exposed Pad may only be electrically connected to  $V_{EE}$ .

**Figure 1. QFN-20 Pinout (Top View)**

# MC10EP56, MC100EP56

**Table 3. ATTRIBUTES**

| Characteristics                                                             | Value                         |
|-----------------------------------------------------------------------------|-------------------------------|
| Internal Input Pulldown Resistor                                            | 75 k $\Omega$                 |
| Internal Input Pullup Resistor                                              | N/A                           |
| ESD Protection<br>Human Body Model<br>Machine Model<br>Charged Device Model | > 2 kV<br>> 150 V<br>> 2 kV   |
| Moisture Sensitivity, Indefinite Time Out of Drypack (Note 1)               | Pb-Free Pkg                   |
| SOIC<br>TSSOP<br>QFN                                                        | Level 3<br>Level 3<br>Level 1 |
| Flammability Rating<br>Oxygen Index: 28 to 34                               | UL 94 V-0 @ 0.125 in          |
| Transistor Count                                                            | 140 Devices                   |
| Meets or exceeds JEDEC Spec EIA/JESD78 IC Latchup Test                      |                               |

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

**Table 4. 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<br>V                                       |
| $I_{out}$     | Output Current                                     | Continuous<br>Surge                            |                                        | 50<br>100   | mA<br>mA                                     |
| $I_{BB}$      | $V_{BB}$ Sink/Source                               |                                                |                                        | $\pm 0.5$   | mA                                           |
| $T_A$         | Operating Temperature Range                        |                                                |                                        | -40 to +85  | $^{\circ}\text{C}$                           |
| $T_{stg}$     | Storage Temperature Range                          |                                                |                                        | -65 to +150 | $^{\circ}\text{C}$                           |
| $\theta_{JA}$ | Thermal Resistance (Junction-to-Ambient)           | 0 lfpm<br>500 lfpm                             | 20 TSSOP<br>20 TSSOP                   | 140<br>100  | $^{\circ}\text{C/W}$<br>$^{\circ}\text{C/W}$ |
| $\theta_{JC}$ | Thermal Resistance (Junction-to-Case)              | Standard Board                                 | 20 TSSOP                               | 23 to 41    | $^{\circ}\text{C/W}$                         |
| $\theta_{JA}$ | Thermal Resistance (Junction-to-Ambient)           | 0 lfpm<br>500 lfpm                             | 20 SOIC<br>20 SOIC                     | 90<br>60    | $^{\circ}\text{C/W}$<br>$^{\circ}\text{C/W}$ |
| $\theta_{JC}$ | Thermal Resistance (Junction-to-Case)              | Standard Board                                 | 20 SOIC                                | 33 to 35    | $^{\circ}\text{C/W}$                         |
| $\theta_{JA}$ | Thermal Resistance (Junction-to-Ambient)           | 0 lfpm<br>500 lfpm                             | QFN-20<br>QFN-20                       | 47<br>33    | $^{\circ}\text{C/W}$<br>$^{\circ}\text{C/W}$ |
| $\theta_{JC}$ | Thermal Resistance (Junction-to-Case)              | Standard Board                                 | QFN-20                                 | 18          | $^{\circ}\text{C/W}$                         |
| $T_{sol}$     | Wave Solder<br>Pb-Free                             | <2 to 3 sec @ 260 $^{\circ}\text{C}$           |                                        | 265         | $^{\circ}\text{C}$                           |

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.

# MC10EP56, MC100EP56

**Table 5. 10EP DC CHARACTERISTICS, PECL  $V_{CC} = 3.3\text{ V}$ ,  $V_{EE} = 0\text{ V}$  (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                                                       | 45    | 61   | 75   | 45   | 63   | 75   | 45   | 65   | 75   | 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  | $\mu\text{A}$ |
| $I_{IL}$    | 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.

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  $\Omega$  to  $V_{CC} - 2.0\text{ V}$ .

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 6. 10EP DC CHARACTERISTICS, PECL  $V_{CC} = 5.0\text{ V}$ ,  $V_{EE} = 0\text{ V}$  (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                                                       | 45    | 61   | 75   | 45   | 63   | 75   | 45   | 65   | 75   | 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  | $\mu\text{A}$ |
| $I_{IL}$    | 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.

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  $\Omega$  to  $V_{CC} - 2.0\text{ V}$ .

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.

# MC10EP56, MC100EP56

**Table 7. 10EP DC CHARACTERISTICS, NECL**  $V_{CC} = 0\text{ V}$ ,  $V_{EE} = -5.5\text{ V}$  to  $-3.0\text{ V}$  (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                                                        | 45           | 61    | 75    | 45           | 63    | 75    | 45           | 65    | 75    | 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                                                           | -150         |       |       | -150         |       |       | -150         |       |       | 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.

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

9. All loading with  $50\ \Omega$  to  $V_{CC} - 2.0\text{ V}$ .

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 8. 100EP DC CHARACTERISTICS, PECL**  $V_{CC} = 3.3\text{ V}$ ,  $V_{EE} = 0\text{ V}$  (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                                                        | 50    | 61   | 75   | 50   | 63   | 77   | 55   | 66   | 80   | 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)                                                | 1305  | 1480 | 1605 | 1305 | 1480 | 1605 | 1305 | 1480 | 1605 | mV   |
| $V_{IH}$    | Input HIGH Voltage (Single-Ended)                                           | 2075  |      | 2420 | 2075 |      | 2420 | 2075 |      | 2420 | mV   |
| $V_{IL}$    | Input LOW Voltage (Single-Ended)                                            | 1305  |      | 1675 | 1305 |      | 1675 | 1305 |      | 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                                                           | -150  |      |      | -150 |      |      | -150 |      |      | 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.

11. Input and output parameters vary 1:1 with  $V_{CC}$ .  $V_{EE}$  can vary  $+0.3\text{ V}$  to  $-2.2\text{ V}$ .

12. All loading with  $50\ \Omega$  to  $V_{CC} - 2.0\text{ V}$ .

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.

# MC10EP56, MC100EP56

**Table 9. 100EP DC CHARACTERISTICS, PECL**  $V_{CC} = 5.0\text{ V}$ ,  $V_{EE} = 0\text{ V}$  (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                                                        | 50    | 61   | 75   | 50   | 63   | 77   | 55   | 66   | 80   | 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)                                                | 3005  | 3180 | 3305 | 3005 | 3180 | 3305 | 3005 | 3180 | 3305 | mV            |
| $V_{IH}$    | Input HIGH Voltage (Single-Ended)                                           | 3775  |      | 4120 | 3775 |      | 4120 | 3775 |      | 4120 | mV            |
| $V_{IL}$    | Input LOW Voltage (Single-Ended)                                            | 3005  |      | 3375 | 3005 |      | 3375 | 3005 |      | 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  | $\mu\text{A}$ |
| $I_{IL}$    | 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.

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  $\Omega$  to  $V_{CC} - 2.0\text{ V}$ .

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 10. 100EP DC CHARACTERISTICS, NECL**  $V_{CC} = 0\text{ V}$ ,  $V_{EE} = -5.5\text{ V}$  to  $-3.0\text{ V}$  (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                                                        | 50           | 61    | 75    | 50           | 63    | 77    | 55           | 66    | 80    | 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)                                                | -1995        | -1820 | -1695 | -1995        | -1820 | -1695 | -1995        | -1820 | -1695 | mV            |
| $V_{IH}$    | Input HIGH Voltage (Single-Ended)                                           | -1225        |       | -880  | -1225        |       | -880  | -1225        |       | -880  | mV            |
| $V_{IL}$    | Input LOW Voltage (Single-Ended)                                            | -1995        |       | -1625 | -1995        |       | -1625 | -1995        |       | -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   | $\mu\text{A}$ |
| $I_{IL}$    | 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.

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

18. All loading with 50  $\Omega$  to  $V_{CC} - 2.0\text{ V}$ .

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.

# MC10EP56, MC100EP56

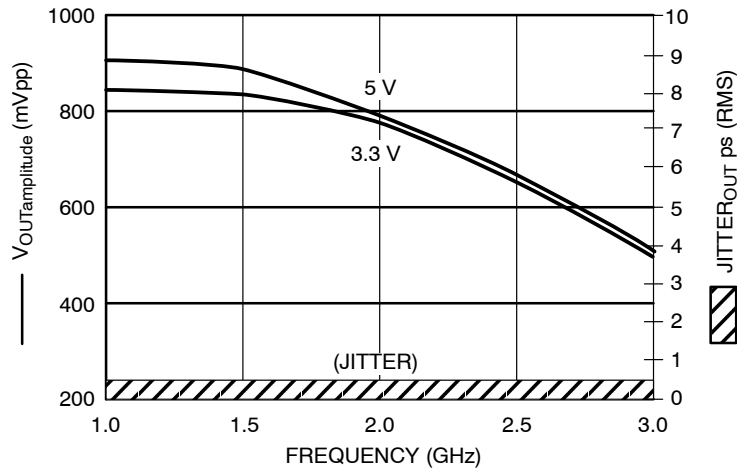
**Table 11. AC CHARACTERISTICS**  $V_{CC} = 0\text{ V}$ ;  $V_{EE} = -3.0\text{ V}$  to  $-5.5\text{ V}$  or  $V_{CC} = 3.0\text{ V}$  to  $5.5\text{ V}$ ;  $V_{EE} = 0\text{ V}$  (Note 20)

| Symbol                                 | Characteristic                                                                                                     | -40°C             |                   |                   | 25°C              |                   |                   | 85°C              |                   |                   | Unit |
|----------------------------------------|--------------------------------------------------------------------------------------------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------|
|                                        |                                                                                                                    | Min               | Typ               | Max               | Min               | Typ               | Max               | Min               | Typ               | Max               |      |
| $f_{\max}$                             | Maximum Frequency<br>(See Figure 2 $F_{\max}/\text{JITTER}$ )                                                      |                   | > 3               |                   |                   | > 3               |                   |                   | > 3               |                   | GHz  |
| $t_{\text{PLH}}$ ,<br>$t_{\text{PHL}}$ | Propagation Delay to<br>Output Differential<br>D to Q, $\bar{Q}$<br>SEL to Q, $\bar{Q}$<br>COM_SEL to Q, $\bar{Q}$ | 250<br>250<br>250 | 340<br>340<br>350 | 450<br>450<br>450 | 270<br>270<br>270 | 360<br>340<br>360 | 470<br>470<br>470 | 300<br>300<br>300 | 400<br>400<br>400 | 500<br>500<br>500 | ps   |
| $t_{\text{SKEW}}$                      | Within-Device Skew (Note 21)<br>Device to Device Skew                                                              |                   | 50                | 100<br>200        |                   | 50                | 100<br>200        |                   | 50                | 100<br>200        | ps   |
| $t_{\text{JITTER}}$                    | Random Clock Jitter<br>(See Figure 2 $F_{\max}/\text{JITTER}$ )                                                    |                   | 0.2               | < 1               |                   | 0.2               | < 1               |                   | 0.2               | < 1               | ps   |
| $V_{\text{PP}}$                        | Input Voltage Swing<br>(Differential Configuration)                                                                | 150               | 800               | 1200              | 150               | 800               | 1200              | 150               | 800               | 1200              | mV   |
| $t_r$ ,<br>$t_f$                       | Output Rise/Fall Times<br>(20% – 80%) Q, $\bar{Q}$                                                                 | 70                | 120               | 170               | 80                | 130               | 180               | 100               | 150               | 230               | ps   |

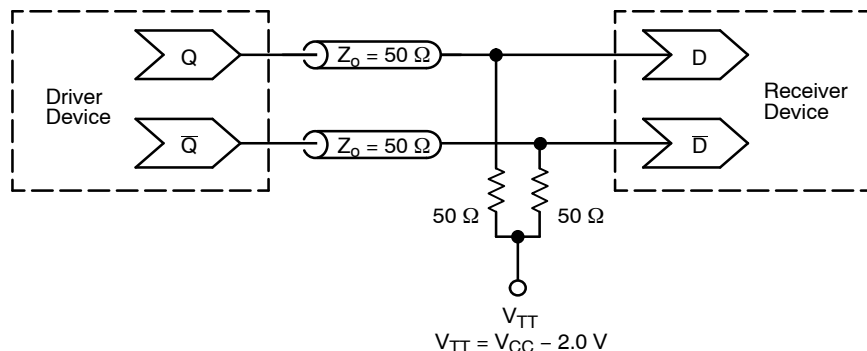
NOTE: Device will meet the specifications after thermal equilibrium has been established when mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lfm.

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

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 2.  $F_{\max}/\text{Jitter}$  @ 25°C**



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

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### 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

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SCALE 1:1

SOIC-20 WB  
CASE 751D-05  
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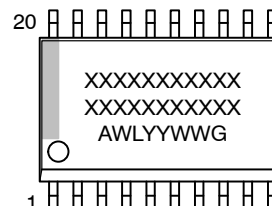


NOTES:

1. DIMENSIONS ARE IN MILLIMETERS.
2. INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994.
3. DIMENSIONS 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 PROTRUSION SHALL BE 0.13 TOTAL IN EXCESS OF B DIMENSION AT MAXIMUM MATERIAL CONDITION.

| DIM      | MILLIMETERS |       |
|----------|-------------|-------|
|          | MIN         | MAX   |
| A        | 2.35        | 2.65  |
| A1       | 0.10        | 0.25  |
| b        | 0.35        | 0.49  |
| c        | 0.23        | 0.32  |
| D        | 12.65       | 12.95 |
| E        | 7.40        | 7.60  |
| e        | 1.27 BSC    |       |
| H        | 10.05       | 10.55 |
| h        | 0.25        | 0.75  |
| L        | 0.50        | 0.90  |
| $\theta$ | 0°          | 7°    |

GENERIC  
MARKING DIAGRAM\*



XXXXXX = Specific Device Code  
A = Assembly Location  
WL = Wafer Lot  
YY = Year  
WW = Work Week  
G = Pb-Free Package

RECOMMENDED  
SOLDERING FOOTPRINT\*



DIMENSIONS: MILLIMETERS

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

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present. Some products may not follow the Generic Marking.

|                  |             |                                                                                                                                                                                     |
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