



# THE DATASHEET OF MC100EL57DR2G

# MC10EL57, MC100EL57

## 5 V ECL 4:1 Differential Multiplexer

### Description

The MC10/100EL57 is a fully differential 4:1 multiplexer. By leaving the SEL1 line open (pulled LOW via the input pulldown resistors) the device can also be used as a differential 2:1 multiplexer with SEL0 input selecting between D0 and D1.

The SEL1 is the most significant select line. The binary number applied to the select inputs will select the same numbered data input (i.e., 00 selects D0).

Multiple  $V_{BB}$  outputs are provided for single-ended or AC coupled interfaces. 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 100 Series contains temperature compensation.

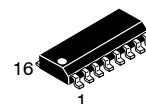
### Features

- Useful as Either 4:1 or 2:1 Multiplexer
- $V_{BB}$  Output for Single-Ended Operation
- PECL Mode Operating Range:  $V_{CC} = 4.2$  V to 5.7 V with  $V_{EE} = 0$  V
- NECL Mode Operating Range:  $V_{CC} = 0$  V with  $V_{EE} = -4.2$  V to  $-5.7$  V
- Internal Input Pulldown Resistors on All Inputs
- Q Outputs Will Default LOW with Inputs Open or at  $V_{EE}$
- These Devices are Pb-Free, Halogen Free and are RoHS Compliant



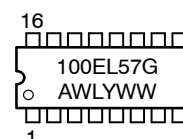
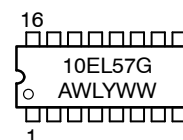
ON Semiconductor®

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SOIC-16  
D SUFFIX  
CASE 751B-05

### MARKING DIAGRAMS\*



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

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

### ORDERING INFORMATION

| Device        | Package              | Shipping†        |
|---------------|----------------------|------------------|
| MC10EL57DG    | SOIC-16 NB (Pb-Free) | 48 Units/Tube    |
| MC10EL57DR2G  | SOIC-16 NB (Pb-Free) | 2500 Tape & Reel |
| MC100EL57DG   | SOIC-16 NB (Pb-Free) | 48 Units/Tube    |
| MC100EL57DR2G | SOIC-16 NB (Pb-Free) | 2500 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](#).

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**Table 1. 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>Charge Device Model | > 1 kV<br>> 100 V<br>> 2 kV |
| Moisture Sensitivity (Note 1)                                              | Level 1                     |
| Flammability Rating<br>Oxygen Index: 28 to 34                              | UL 94 V-0 @ 0.125 in        |
| Transistor Count                                                           | 109 Devices                 |
| Meets or Exceeds JEDEC Spec EIA/JESD78 IC Latchup Test                     |                             |

1. For additional Moisture Sensitivity information, refer to Application Note [AND8003/D](#).

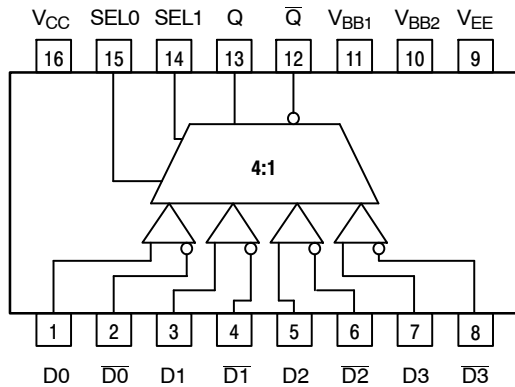


**Table 3. FUNCTION TABLE**

| SEL1* | SEL0* | DATA OUT |
|-------|-------|----------|
| L     | L     | D0       |
| L     | H     | D1       |
| H     | L     | D2       |
| H     | H     | D3       |

\* Pin will default low when left open.

**Figure 1. Logic Diagram and Pinout Assignment**

**Table 2. PIN DESCRIPTION**

| PIN                     | FUNCTION                 |
|-------------------------|--------------------------|
| D0-3, $\overline{D0-3}$ | ECL Diff Data Inputs     |
| SEL0,1                  | ECL MUX Select Inputs    |
| Q, $\overline{Q}$       | ECL Data Outputs         |
| VBB1, VBB2              | Reference Voltage Output |
| VCC                     | Positive Supply          |
| VEE                     | Negative Supply          |

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**Table 4. MAXIMUM RATINGS**

| Symbol        | Parameter                                          | Condition 1                                    | Condition 2                            | Rating      | Unit |
|---------------|----------------------------------------------------|------------------------------------------------|----------------------------------------|-------------|------|
| $V_{CC}$      | PECL Mode Power Supply                             | $V_{EE} = 0\text{ V}$                          |                                        | 8           | V    |
| $V_{EE}$      | NECL Mode Power Supply                             | $V_{CC} = 0\text{ V}$                          |                                        | -8          | 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-16<br>SOIC-16                     | 130<br>75   | °C/W |
| $\theta_{JC}$ | Thermal Resistance (Junction-to-Case)              | Standard Board                                 | SOIC-16                                | 33 to 36    | °C/W |
| $T_{sol}$     | Wave Solder (Pb-Free)                              | < 2 to 3 sec @ 260°C                           |                                        | 265         | °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.

**Table 5. 10EL SERIES PECL DC CHARACTERISTICS** ( $V_{CC} = 5.0\text{ V}$ ;  $V_{EE} = 0\text{ V}$  (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                                                       |       |      | 24   |      |      | 24   |      |      | 24   | mA   |
| $V_{OH}$    | Output HIGH Voltage (Note 2)                                               | 3920  | 4010 | 4110 | 4020 | 4105 | 4190 | 4090 | 4185 | 4280 | mV   |
| $V_{OL}$    | Output LOW Voltage (Note 2)                                                | 3050  | 3200 | 3350 | 3050 | 3210 | 3370 | 3050 | 3227 | 3405 | mV   |
| $V_{IH}$    | Input HIGH Voltage (Single-Ended)                                          | 3770  |      | 4110 | 3870 |      | 4190 | 3940 |      | 4280 | mV   |
| $V_{IL}$    | Input LOW Voltage (Single-Ended)                                           | 3050  |      | 3500 | 3050 |      | 3520 | 3050 |      | 3555 | mV   |
| $V_{BB}$    | Output Voltage Reference                                                   | 3.57  |      | 3.7  | 3.65 |      | 3.75 | 3.69 |      | 3.81 | V    |
| $V_{IHCMR}$ | Input HIGH Voltage Common Mode Range (Differential Configuration) (Note 3) | 2.5   |      | 4.6  | 2.5  |      | 4.6  | 2.5  |      | 4.6  | V    |
| $I_{IH}$    | Input HIGH Current                                                         |       |      | 150  |      |      | 150  |      |      | 150  | μA   |
| $I_{IL}$    | Input LOW Current                                                          | 0.5   |      |      | 0.5  |      |      | 0.3  |      |      | 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.

1. Input and output parameters vary 1:1 with  $V_{CC}$ .  $V_{EE}$  can vary +0.06 V / -0.5 V.
2. Outputs are terminated through a 50 Ω resistor 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. Normal operation is obtained if the HIGH level falls within the specified range and the peak-to-peak voltage lies between  $V_{PPmin}$  and 1 V.

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**Table 6. 10EL SERIES NECL DC CHARACTERISTICS** ( $V_{CC} = 0\text{ V}$ ;  $V_{EE} = -5.0\text{ V}$  (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                                                       |       |       | 24    |       |       | 24    |       |       | 24    | mA   |
| $V_{OH}$    | Output HIGH Voltage (Note 2)                                               | -1080 | -990  | -890  | -980  | -895  | -810  | -910  | -815  | -720  | mV   |
| $V_{OL}$    | Output LOW Voltage (Note 2)                                                | -1950 | -1800 | -1650 | -1950 | -1790 | -1630 | -1950 | -1773 | -1595 | mV   |
| $V_{IH}$    | Input HIGH Voltage (Single-Ended)                                          | -1230 |       | -890  | -1130 |       | -810  | -1060 |       | -720  | mV   |
| $V_{IL}$    | Input LOW Voltage (Single-Ended)                                           | -1950 |       | -1500 | -1950 |       | -1480 | -1950 |       | -1445 | mV   |
| $V_{BB}$    | Output Voltage Reference                                                   | -1.43 |       | -1.30 | -1.35 |       | -1.25 | -1.31 |       | -1.19 | V    |
| $V_{IHCMR}$ | Input HIGH Voltage Common Mode Range (Differential Configuration) (Note 3) | -2.5  |       | -0.4  | -2.5  |       | -0.4  | -2.5  |       | -0.4  | V    |
| $I_{IH}$    | Input HIGH Current                                                         |       |       | 150   |       |       | 150   |       |       | 150   | μA   |
| $I_{IL}$    | Input LOW Current                                                          | 0.5   |       |       | 0.5   |       |       | 0.3   |       |       | 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.

1. Input and output parameters vary 1:1 with  $V_{CC}$ .  $V_{EE}$  can vary +0.06 V / -0.5 V.
2. Outputs are terminated through a 50 Ω resistor 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. Normal operation is obtained if the HIGH level falls within the specified range and the peak-to-peak voltage lies between  $V_{ppmin}$  and 1 V.

**Table 7. 100EL SERIES PECL DC CHARACTERISTICS** ( $V_{CC} = 5.0\text{ V}$ ;  $V_{EE} = 0\text{ V}$  (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                                                       |       |      | 24   |      |      | 24   |      |      | 27   | mA   |
| $V_{OH}$    | Output HIGH Voltage (Note 2)                                               | 3915  | 3995 | 4120 | 3975 | 4045 | 4120 | 3975 | 4050 | 4120 | mV   |
| $V_{OL}$    | Output LOW Voltage (Note 2)                                                | 3170  | 3305 | 3445 | 3190 | 3295 | 3380 | 3190 | 3295 | 3380 | mV   |
| $V_{IH}$    | Input HIGH Voltage (Single-Ended)                                          | 3835  |      | 4120 | 3835 |      | 4120 | 3835 |      | 4120 | mV   |
| $V_{IL}$    | Input LOW Voltage (Single-Ended)                                           | 3190  |      | 3525 | 3190 |      | 3525 | 3190 |      | 3525 | mV   |
| $V_{BB}$    | Output Voltage Reference                                                   | 3.62  |      | 3.74 | 3.62 |      | 3.74 | 3.62 |      | 3.74 | V    |
| $V_{IHCMR}$ | Input HIGH Voltage Common Mode Range (Differential Configuration) (Note 3) | 2.5   |      | 4.6  | 2.5  |      | 4.6  | 2.5  |      | 4.6  | 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.

1. Input and output parameters vary 1:1 with  $V_{CC}$ .  $V_{EE}$  can vary +0.8 V / -0.5 V.
2. Outputs are terminated through a 50 Ω resistor 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. Normal operation is obtained if the HIGH level falls within the specified range and the peak-to-peak voltage lies between  $V_{ppmin}$  and 1 V.

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**Table 8. 100EL SERIES NECL DC CHARACTERISTICS** ( $V_{CC} = 0\text{ V}$ ;  $V_{EE} = -5.0\text{ V}$  (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                                                       |       |       | 24    |       |       | 24    |       |       | 27    | mA            |
| $V_{OH}$    | Output HIGH Voltage (Note 2)                                               | -1085 | -1005 | -880  | -1025 | -955  | -880  | -1025 | -955  | -880  | mV            |
| $V_{OL}$    | Output LOW Voltage (Note 2)                                                | -1830 | -1695 | -1555 | -1810 | -1705 | -1620 | -1810 | -1705 | -1620 | mV            |
| $V_{IH}$    | Input HIGH Voltage (Single-Ended)                                          | -1165 |       | -880  | -1165 |       | -880  | -1165 |       | -880  | mV            |
| $V_{IL}$    | Input LOW Voltage (Single-Ended)                                           | -1810 |       | -1475 | -1810 |       | -1475 | -1810 |       | -1475 | mV            |
| $V_{BB}$    | Output Voltage Reference                                                   | -1.38 |       | -1.26 | -1.38 |       | -1.26 | -1.38 |       | -1.26 | V             |
| $V_{IHCMR}$ | Input HIGH Voltage Common Mode Range (Differential Configuration) (Note 3) | -2.5  |       | -0.4  | -2.5  |       | -0.4  | -2.5  |       | -0.4  | V             |
| $I_{IH}$    | Input HIGH Current                                                         |       |       | 150   |       |       | 150   |       |       | 150   | $\mu\text{A}$ |
| $I_{IL}$    | Input LOW Current                                                          | 0.5   |       |       | 0.5   |       |       | 0.5   |       |       | $\mu\text{A}$ |

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 +0.8 V / -0.5 V.
2. Outputs are terminated through a 50  $\Omega$  resistor 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. Normal operation is obtained if the HIGH level falls within the specified range and the peak-to-peak voltage lies between  $V_{ppmin}$  and 1 V.

**Table 9. AC CHARACTERISTICS** ( $V_{CC} = 5.0\text{ V}$ ;  $V_{EE} = 0\text{ V}$  or  $V_{CC} = 0\text{ V}$ ;  $V_{EE} = -5.0\text{ V}$  (Note 1))

| Symbol                 | Characteristic                                                                            | -40°C      |     |            | 25°C       |     |            | 85°C       |     |            | Unit |
|------------------------|-------------------------------------------------------------------------------------------|------------|-----|------------|------------|-----|------------|------------|-----|------------|------|
|                        |                                                                                           | Min        | Typ | Max        | Min        | Typ | Max        | Min        | Typ | Max        |      |
| $f_{max}$              | Maximum Toggle Frequency                                                                  |            | TBD |            |            | TBD |            |            | TBD |            | GHz  |
| $t_{PLH}$<br>$t_{PHL}$ | Propagation<br>DATA $\rightarrow$ Q/ $\bar{Q}$<br>Delay<br>SEL $\rightarrow$ Q/ $\bar{Q}$ | 350<br>440 |     | 550<br>690 | 360<br>440 |     | 560<br>690 | 380<br>460 |     | 580<br>710 | ps   |
| $t_{SKEW}$             | Input Skew $D_n, D_m$ to Q                                                                |            |     | 100        |            |     | 100        |            |     | 100        | ps   |
| $t_{JITTER}$           | Cycle-to-Cycle Jitter                                                                     |            | TBD |            |            | TBD |            |            | TBD |            | ps   |
| $V_{PP}$               | Input Swing (Note 2)                                                                      | 150        |     | 1000       | 150        |     | 1000       | 150        |     | 1000       | mV   |
| $t_r$<br>$t_f$         | Output Rise/Fall Times Q (20%–80%)                                                        | 125        |     | 375        | 125        |     | 375        | 125        |     | 375        | 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. 10 Series:  $V_{EE}$  can vary +0.06 V / -0.5 V.  
100 Series:  $V_{EE}$  can vary +0.8 V / -0.5 V.
2.  $V_{ppmin}$  is minimum input swing for which AC parameters guaranteed. The device has a DC gain of  $\approx 40$ .

## MC10EL57, MC100EL57

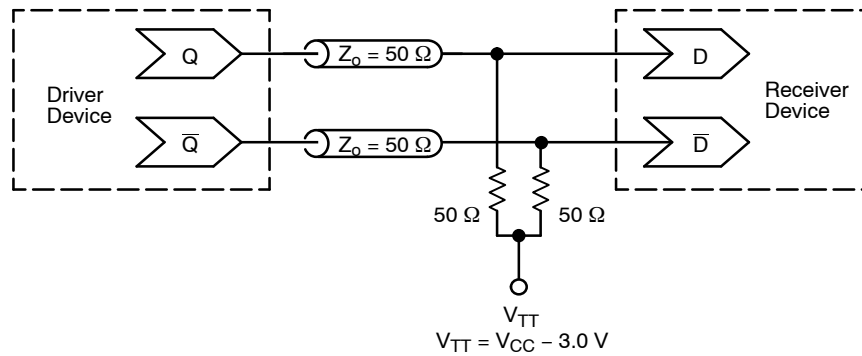


**Figure 2. Typical Termination for Output Driver and Device Evaluation**  
(See Application Note [AND8020/D](#) – Termination of ECL Logic Devices)

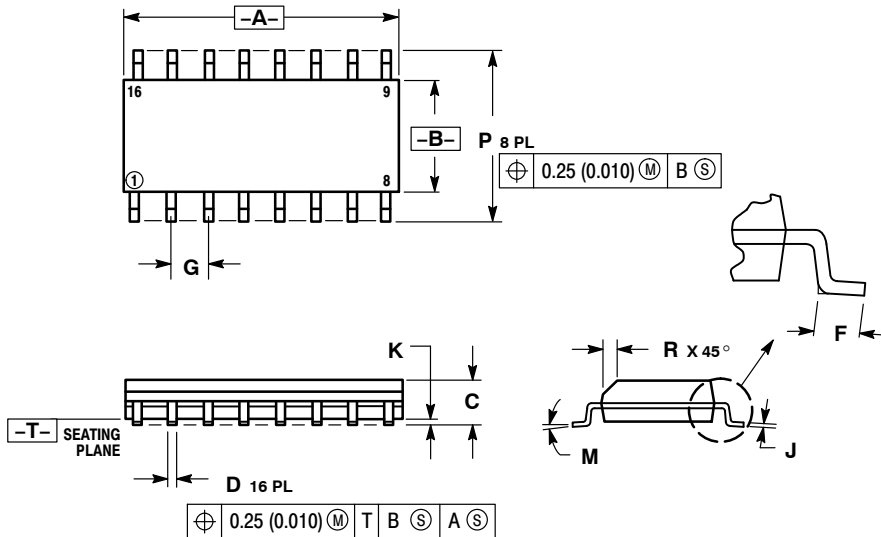
### Resource Reference of Application Notes

- 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

# MC10EL57, MC100EL57

## PACKAGE DIMENSIONS

SOIC-16  
D SUFFIX  
CASE 751B-05  
ISSUE K

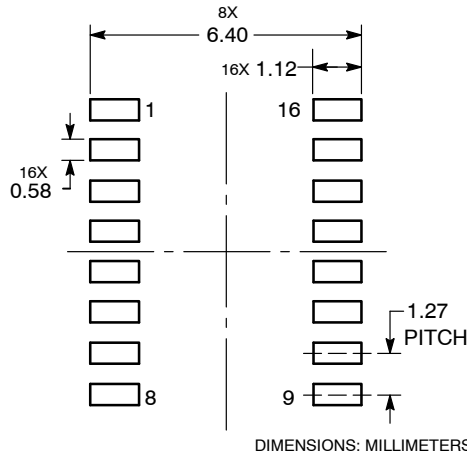


### NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS 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.

| DIM | MILLIMETERS |       | INCHES    |       |
|-----|-------------|-------|-----------|-------|
|     | MIN         | MAX   | MIN       | MAX   |
| A   | 9.80        | 10.00 | 0.386     | 0.393 |
| B   | 3.80        | 4.00  | 0.150     | 0.157 |
| C   | 1.35        | 1.75  | 0.054     | 0.068 |
| D   | 0.35        | 0.49  | 0.014     | 0.019 |
| F   | 0.40        | 1.25  | 0.016     | 0.049 |
| G   | 1.27 BSC    |       | 0.050 BSC |       |
| J   | 0.19        | 0.25  | 0.008     | 0.009 |
| K   | 0.10        | 0.25  | 0.004     | 0.009 |
| M   | 0°          | 7°    | 0°        | 7°    |
| P   | 5.80        | 6.20  | 0.229     | 0.244 |
| R   | 0.25        | 0.50  | 0.010     | 0.019 |

## SOLDERING FOOTPRINT



DIMENSIONS: MILLIMETERS

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