

# MC100EL17

## 5V ECL Quad Differential Receiver

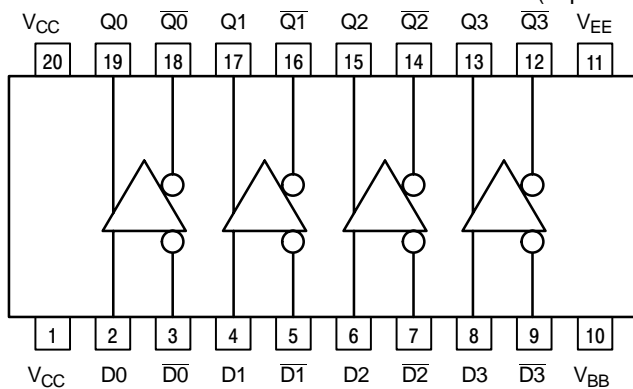
The MC100EL17 is a low-voltage, quad differential receiver. The device is functionally equivalent to the E116 device

Under open input conditions, the  $\bar{D}$  input will be biased at  $V_{CC}/2$  and the D input will be pulled down to  $V_{EE}$ . This operation will force the Q output LOW and ensure stability.

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  $\mu\text{F}$  capacitor and limit current sourcing or sinking to 0.5 mA. When not used,  $V_{BB}$  should be left open.

- 325 ps Propagation Delay
- ESD Protection: > 2 KV HBM, > 100 V MM
- The 100 series contains temperature compensation
- 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
- Q Output will Default LOW with Inputs Open or at  $V_{EE}$
- Meets or Exceeds JEDEC Spec EIA/JESD78 IC Latchup Test
- Moisture Sensitivity Level 1
- For Additional Information, see Application Note AND8003/D
- Flammability Rating: UL-94 code V-0 @ 1/8", Oxygen Index 28 to 34
- Transistor Count = 141 devices

### LOGIC DIAGRAM AND PINOUT: 20-LEAD SOIC (Top View)



\* All  $V_{CC}$  pins are tied together on the die.

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

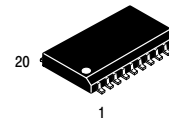
### PIN DESCRIPTION

| Pins             | Function                      |
|------------------|-------------------------------|
| $D_n, \bar{D}_n$ | ECL Differential Data Inputs  |
| $Q_n, \bar{Q}_n$ | ECL Differential Data Outputs |
| $V_{BB}$         | Reference Voltage Output      |
| $V_{CC}$         | Positive Supply               |
| $V_{EE}$         | Negative Supply               |

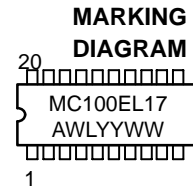


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SO-20  
DW SUFFIX  
CASE 751D



A = Assembly Location  
WL = Wafer Lot  
YY = Year  
WW = Work Week

### ORDERING INFORMATION

| Device        | Package | Shipping        |
|---------------|---------|-----------------|
| MC100EL17DW   | SO-20   | 38 Units/Rail   |
| MC100EL17DWR2 | SO-20   | 1000 Units/Reel |

# MC100EL17

## MAXIMUM RATINGS (Note 1.)

| Symbol           | Parameter  | Condition 1                                    | Condition 2  | Rating      | Units        |
|------------------|--|--|--|-------------|--------------|
| V <sub>CC</sub>  | PECL Mode Power Supply                             | V <sub>EE</sub> = 0 V                          |  | 8           | V            |
| V <sub>EE</sub>  | NECL Mode Power Supply                             | V <sub>CC</sub> = 0 V                          |  | -8          | V            |
| V <sub>I</sub>   | PECL Mode Input Voltage<br>NECL Mode Input Voltage | V <sub>EE</sub> = 0 V<br>V <sub>CC</sub> = 0 V | V <sub>I</sub> ≤ V <sub>CC</sub><br>V <sub>I</sub> ≥ V <sub>EE</sub> | 6<br>-6     | V            |
| I <sub>out</sub> | Output Current                                     | Continuous<br>Surge                            |  | 50<br>100   | mA<br>mA     |
| I <sub>BB</sub>  | V <sub>BB</sub> Sink/Source                        |  |  | ± 0.5       | mA           |
| TA               | Operating Temperature Range                        |  |  | -40 to +85  | °C           |
| T <sub>stg</sub> | Storage Temperature Range                          |  |  | -65 to +150 | °C           |
| θ <sub>JA</sub>  | Thermal Resistance (Junction to Ambient)           | 0 LFPM<br>500 LFPM                             | 20 SOIC<br>20 SOIC   | 90<br>60    | °C/W<br>°C/W |
| θ <sub>JC</sub>  | Thermal Resistance (Junction to Case)              | std bd   | 20 SOIC  | 30 to 35    | °C/W         |
| T <sub>sol</sub> | Wave Solder  | <2 to 3 sec @ 248°C                            |  | 265         | °C           |

1. Maximum Ratings are those values beyond which device damage may occur.

## 100EL SERIES PECL DC CHARACTERISTICS V<sub>CC</sub>= 5.0 V; V<sub>EE</sub>= 0.0 V (Note 1.)

| Symbol             | Characteristic  | -40°C      |      |            | 25°C       |      |            | 85°C       |      |            | Unit |
|--------------------|---|------------|------|------------|------------|------|------------|------------|------|------------|------|
|                    |   | Min        | Typ  | Max        | Min        | Typ  | Max        | Min        | Typ  | Max        |      |
| I <sub>EE</sub>    | Power Supply Current  |            | 26   | 31         |            | 26   | 31         |            | 27   | 33         | mA   |
| V <sub>OH</sub>    | Output HIGH Voltage (Note 2.)   | 3915       | 3995 | 4120       | 3975       | 4045 | 4120       | 3975       | 4050 | 4120       | mV   |
| V <sub>OL</sub>    | Output LOW Voltage (Note 2.)  | 3170       | 3305 | 3445       | 3190       | 3295 | 3380       | 3190       | 3295 | 3380       | mV   |
| V <sub>IH</sub>    | Input HIGH Voltage (Single Ended)   | 3835       |      | 4120       | 3835       |      | 4120       | 3835       |      | 4120       | mV   |
| V <sub>IL</sub>    | Input LOW Voltage (Single Ended)  | 3190       |      | 3525       | 3190       |      | 3525       | 3190       |      | 3525       | mV   |
| V <sub>BB</sub>    | Output Voltage Reference  | 3.62       |      | 3.74       | 3.62       |      | 3.74       | 3.62       |      | 3.74       | V    |
| V <sub>IHCMR</sub> | Common Mode Range (Differential)<br>(Note 3.)<br>V <sub>PP</sub> < 500 mV<br>V <sub>PP</sub> ≥ 500 mV | 1.3<br>1.5 |      | 4.6<br>4.6 | 1.2<br>1.4 |      | 4.6<br>4.6 | 1.2<br>1.4 |      | 4.6<br>4.6 | V    |
| I <sub>IH</sub>    | Input HIGH Current  |            |      | 150        |            |      | 150        |            |      | 150        | μA   |
| I <sub>IL</sub>    | Input LOW Current   | 0.5        |      |            | 0.5        |      |            | 0.5        |      |            | μA   |

NOTE: Devices are designed to meet the DC specifications shown in the above table, after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and transverse air flow greater than 500 lpm is maintained.

1. Input and output parameters vary 1:1 with V<sub>CC</sub>. V<sub>EE</sub> can vary +0.8 V / -0.5 V.
2. Outputs are terminated through a 50 ohm resistor to V<sub>CC</sub>-2 volts.
3. V<sub>IHCMR</sub> min varies 1:1 with V<sub>EE</sub>; V<sub>IHCMR</sub> max varies 1:1 with V<sub>CC</sub>. The V<sub>IHCMR</sub> 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<sub>PPmin</sub> and 1 V.

## 100EL SERIES NECL DC CHARACTERISTICS V<sub>CC</sub>= 0.0 V; V<sub>EE</sub>= -5.0 V (Note 1.)

| Symbol             | Characteristic  | -40°C        |       |              | 25°C         |       |              | 85°C         |       |              | Unit |
|--------------------|---|--------------|-------|--------------|--------------|-------|--------------|--------------|-------|--------------|------|
|                    |   | Min          | Typ   | Max          | Min          | Typ   | Max          | Min          | Typ   | Max          |      |
| I <sub>EE</sub>    | Power Supply Current  |              | 26    | 31           |              | 26    | 31           |              | 27    | 33           | mA   |
| V <sub>OH</sub>    | Output HIGH Voltage (Note 2.)   | -1085        | -1005 | -880         | -1025        | -955  | -880         | -1025        | -955  | -880         | mV   |
| V <sub>OL</sub>    | Output LOW Voltage (Note 2.)  | -1830        | -1695 | -1555        | -1810        | -1705 | -1620        | -1810        | -1705 | -1620        | mV   |
| V <sub>IH</sub>    | Input HIGH Voltage (Single Ended)   | -1165        |       | -880         | -1165        |       | -880         | -1165        |       | -880         | mV   |
| V <sub>IL</sub>    | Input LOW Voltage (Single Ended)  | -1810        |       | -1475        | -1810        |       | -1475        | -1810        |       | -1475        | mV   |
| V <sub>BB</sub>    | Output Voltage Reference  | -1.38        |       | -1.26        | -1.38        |       | -1.26        | -1.38        |       | -1.26        | V    |
| V <sub>IHCMR</sub> | Common Mode Range (Differential)<br>(Note 3.)<br>V <sub>PP</sub> < 500 mV<br>V <sub>PP</sub> ≥ 500 mV | -3.7<br>-3.5 |       | -0.4<br>-0.4 | -3.8<br>-3.6 |       | -0.4<br>-0.4 | -3.8<br>-3.6 |       | -0.4<br>-0.4 | V    |
| I <sub>IH</sub>    | Input HIGH Current  |              |       | 150          |              |       | 150          |              |       | 150          | μA   |
| I <sub>IL</sub>    | Input LOW Current   | 0.5          |       |              | 0.5          |       |              | 0.5          |       |              | μA   |

NOTE: Devices are designed to meet the DC specifications shown in the above table, after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and transverse air flow greater than 500 lpm is maintained.

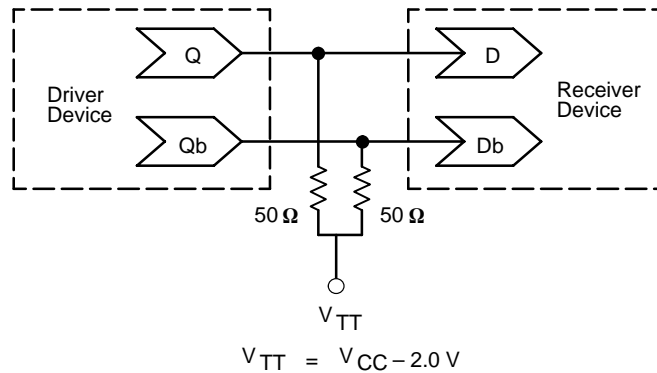
1. Input and output parameters vary 1:1 with V<sub>CC</sub>. V<sub>EE</sub> can vary +0.8 V / -0.5 V.
2. Outputs are terminated through a 50 ohm resistor to V<sub>CC</sub>-2 volts.
3. V<sub>IHCMR</sub> min varies 1:1 with V<sub>EE</sub>; V<sub>IHCMR</sub> max varies 1:1 with V<sub>CC</sub>. The V<sub>IHCMR</sub> 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<sub>PPmin</sub> and 1 V.

# MC100EL17

**AC CHARACTERISTICS**  $V_{CC}= 5.0\text{ V}$ ;  $V_{EE}= 0.0\text{ V}$  or  $V_{CC}= 0.0\text{ V}$ ;  $V_{EE}= -5.0\text{ V}$  (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 Delay<br>D to Q<br>Diff<br>S.E.  | 330<br>280 |     | 530<br>580      | 350<br>300 |     | 550<br>600      | 360<br>310 |     | 560<br>610      | ps   |
| $t_{SKEW}$             | Skew<br>Output-to-Output (Note 2.)<br>Part-to-Part (Diff) (Note 2.)<br>Duty Cycle (Diff) (Note 3.) |            |     | 75<br>200<br>25 |            |     | 75<br>200<br>25 |            |     | 75<br>200<br>25 | ps   |
| $t_{JITTER}$           | Cycle-to-Cycle Jitter  |            | TBD |                 |            | TBD |                 |            | TBD |                 | ps   |
| $V_{PP}$               | Input Swing (Note 4.)  | 150        |     | 1000            | 150        |     | 1000            | 150        |     | 1000            | mV   |
| $t_r$<br>$t_f$         | Output Rise/Fall Times Q<br>(20% – 80%)  | 280        |     | 550             | 280        |     | 550             | 280        |     | 550             | ps   |

- $V_{EE}$  can vary +0.8 V / -0.5 V.
- Skews are valid across specified voltage range, part-to-part skew is for a given temperature.
- Duty cycle skew is the difference between a TPLH and TPHL propagation delay through a device.
- $V_{PP}(\text{min})$  is minimum input swing for which AC parameters guaranteed. The device has a DC gain of  $\approx 40$ .



**Figure 1. Typical Termination for Output Driver and Device Evaluation**  
(See Application Note AND8020 – Termination of ECL Logic Devices.)

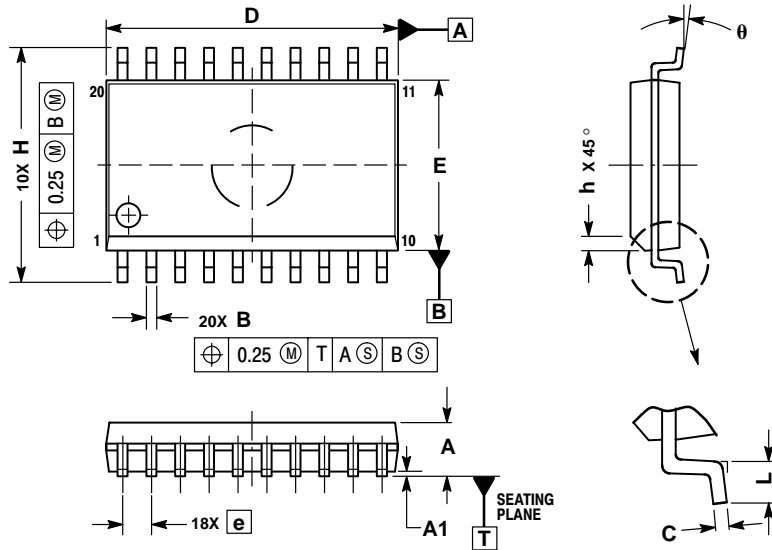
## Resource Reference of Application Notes

- AN1404** – ECLinPS Circuit Performance at Non-Standard  $V_{IH}$  Levels
- AN1405** – ECL Clock Distribution Techniques
- AN1406** – Designing with PECL (ECL at +5.0 V)
- AN1503** – ECLinPS I/O SPICE Modeling Kit
- AN1504** – Metastability and the ECLinPS Family
- AN1560** – Low Voltage ECLinPS SPICE Modeling Kit
- AN1568** – Interfacing Between LVDS and ECL
- AN1596** – ECLinPS Lite Translator ELT Family SPICE I/O Model Kit
- AN1650** – Using Wire-OR Ties in ECLinPS Designs
- AN1672** – The ECL Translator Guide
- AND8001** – Odd Number Counters Design
- AND8002** – Marking and Date Codes
- AND8020** – Termination of ECL Logic Devices

# MC100EL17

## PACKAGE DIMENSIONS

SOIC-20  
DW SUFFIX  
PLASTIC SOIC PACKAGE  
CASE 751D-05  
ISSUE F



### 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  |
| θ   | 0°          | 7°    |

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