

# MC100EL17

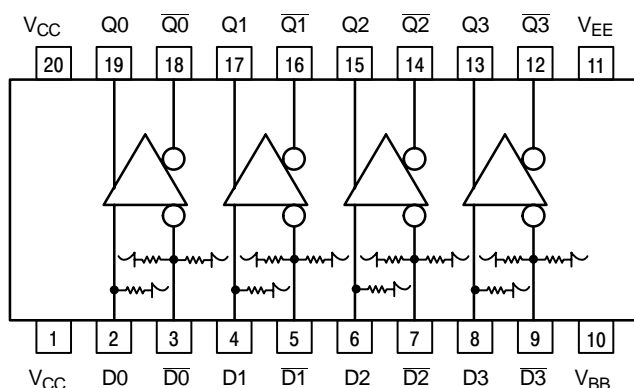
## 5V ECL Quad Differential Receiver

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
- The 100 Series Contains Temperature Compensation
- PECL Mode Operating Range:  $V_{CC} = 4.2 \text{ V}$  to  $5.7 \text{ V}$  with  $V_{EE} = 0 \text{ V}$
- NECL Mode Operating Range:  $V_{CC} = 0 \text{ V}$  with  $V_{EE} = -4.2 \text{ V}$  to  $-5.7 \text{ V}$
- Internal Input Pulldown Resistors on D Inputs, Pullup and Pulldown Resistors on  $\bar{D}$  Inputs
- Q Output will Default LOW with Inputs Open or at  $V_{EE}$



\* 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.

Figure 1. Logic Diagram and Pinout: (Top View)

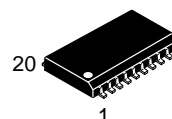
### PIN DESCRIPTION

PIN	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



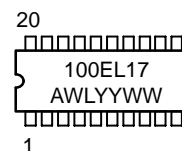
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SO-20L  
DW SUFFIX  
CASE 751D

### MARKING\* DIAGRAM



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

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

### ORDERING INFORMATION

Device	Package	Shipping†
MC100EL17DW	SO-20L	38 Units/Rail
MC100EL17DWR2	SO-20L	1000 Tape & Reel

†For additional tape and reel information, refer to Brochure BRD8011/D.

# MC100EL17

## ATTRIBUTES

Characteristics	Value
Internal Input Pulldown Resistor	75 K $\Omega$
Internal Input Pullup Resistor	75 K $\Omega$
ESD Protection	Human Body Model Machine Model Charged Device Model
	> 2 KV > 200 V > 4 V
Moisture Sensitivity, Indefinite Time Out of Drypack (Note 1)	Level 1
Flammability Rating Oxygen Index	UL 94 V-0 @ 0.125 in 28 to 34
Transistor Count	141
Meets or Exceeds JEDEC Spec EIA/JESD78 IC Latchup Test	

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

## MAXIMUM RATINGS (Note 2)

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 NECL Mode Input Voltage	V <sub>EE</sub> = 0 V V <sub>CC</sub> = 0 V	V <sub>I</sub> ≤ V <sub>CC</sub> V <sub>I</sub> ≥ V <sub>EE</sub>	6 -6	V
I <sub>out</sub>	Output Current	Continuous Surge		50 100	mA mA
I <sub>BB</sub>	V <sub>BB</sub> Sink/Source			± 0.5	mA
T <sub>A</sub>	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 500 LFPM	SO-20L SO-20L	90 60	°C/W °C/W
θ <sub>JC</sub>	Thermal Resistance (Junction-to-Case)	Standard Board	SO-20L	30 to 35	°C/W
T <sub>sol</sub>	Wave Solder	< 2 to 3 sec @ 248°C		265	°C

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

# MC100EL17

## 100EL SERIES PECL DC CHARACTERISTICS $V_{CC} = 5.0 \text{ V}$ ; $V_{EE} = 0.0 \text{ V}$ (Note 3)

Symbol	Characteristic	-40 °C			25 °C			85 °C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
$I_{EE}$	Power Supply Current		26	31		26	31		27	33	mA
$V_{OH}$	Output HIGH Voltage (Note 4)	3915	3995	4120	3975	4045	4120	3975	4050	4120	mV
$V_{OL}$	Output LOW Voltage (Note 4)	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
$V_{IHCMR}$	Common Mode Range (Differential) (Note 5) $V_{PP} < 500 \text{ mV}$ $V_{PP} \geq 500 \text{ mV}$	1.3 1.5		4.6 4.6	1.2 1.4		4.6 4.6	1.2 1.4		4.6 4.6	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: 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 lfm is maintained.

3. Input and output parameters vary 1:1 with  $V_{CC}$ .  $V_{EE}$  can vary  $+0.8 \text{ V} / -0.5 \text{ V}$ .

4. Outputs are terminated through a  $50 \Omega$  resistor to  $V_{CC} - 2.0 \text{ V}$ .

5.  $V_{IHCMR}$  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  $1 \text{ V}$ .

## 100EL SERIES NECL DC CHARACTERISTICS $V_{CC} = 0.0 \text{ V}$ ; $V_{EE} = -5.0 \text{ V}$ (Note 6)

Symbol	Characteristic	-40 °C			25 °C			85 °C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
$I_{EE}$	Power Supply Current		26	31		26	31		27	33	mA
$V_{OH}$	Output HIGH Voltage (Note 7)	-1085	-1005	-880	-1025	-955	-880	-1025	-955	-880	mV
$V_{OL}$	Output LOW Voltage (Note 7)	-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
$V_{IHCMR}$	Common Mode Range (Differential) (Note 8) $V_{PP} < 500 \text{ mV}$ $V_{PP} \geq 500 \text{ mV}$	-3.7 -3.5		-0.4 -0.4	-3.8 -3.6		-0.4 -0.4	-3.8 -3.6		-0.4 -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: 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 lfm is maintained.

6. Input and output parameters vary 1:1 with  $V_{CC}$ .  $V_{EE}$  can vary  $+0.8 \text{ V} / -0.5 \text{ V}$ .

7. Outputs are terminated through a  $50 \Omega$  resistor to  $V_{CC} - 2.0 \text{ V}$ .

8.  $V_{IHCMR}$  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  $1 \text{ V}$ .

# 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 9)

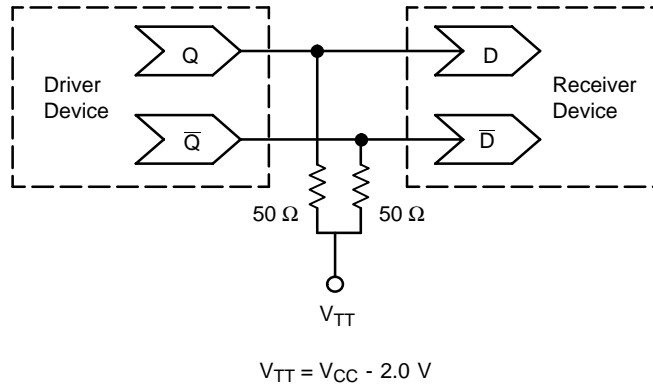
Symbol	Characteristic	-40 °C			25 °C			85 °C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
$f_{MAX}$	Maximum Toggle Frequency					1.75					GHz
$t_{PLH}$ $t_{PHL}$	Propagation Delay D to Q Diff S.E.	330 280		530 580	350 300		550 600	360 310		560 610	ps
$t_{SKEW}$	Skew Output-to-Output (Note 10) Part-to-Part (Diff) (Note 10) Duty Cycle (Diff) (Note 11)			75 200 25			75 200 25			75 200 25	ps
$t_{JITTER}$	Random Clock Jitter (RMS)					0.7					ps
$V_{PP}$	Input Swing (Note 12)	150		1000	150		1000	150		1000	mV
$t_r$ $t_f$	Output Rise/Fall Times Q (20% - 80%)	280		550	280		550	280		550	ps

9.  $V_{EE}$  can vary +0.8 V / -0.5 V.

10. Skews are valid across specified voltage range, part-to-part skew is for a given temperature.

11. Duty cycle skew is the difference between a  $t_{PLH}$  and  $t_{PHL}$  propagation delay through a device.

12.  $V_{PP}(\text{min})$  is minimum input swing for which AC parameters guaranteed. The device has a DC gain of  $\approx 40$ .



**Figure 2. Typical Termination for Output Driver and Device Evaluation  
(See Application Note AND8020 - Termination of ECL Logic Devices.)**

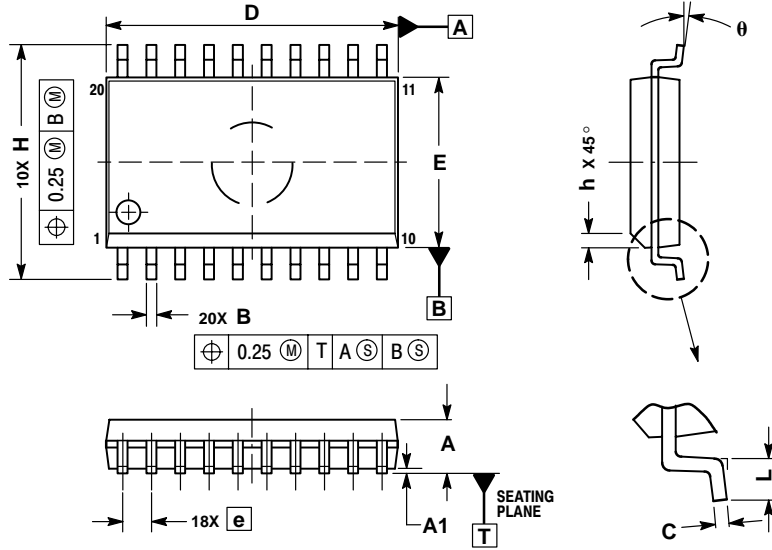
### Resource Reference of Application Notes

- |                |   |
|----------------|---|
| <b>AN1404</b>  | - ECLinPS Circuit Performance at Non-Standard $V_{IH}$ Levels |
| <b>AN1405</b>  | - ECL Clock Distribution Techniques                           |
| <b>AN1406</b>  | - Designing with PECL (ECL at +5.0 V)                         |
| <b>AN1503</b>  | - ECLinPS I/O SPICE Modeling Kit                              |
| <b>AN1504</b>  | - Metastability and the ECLinPS Family                        |
| <b>AN1560</b>  | - Low Voltage ECLinPS SPICE Modeling Kit                      |
| <b>AN1568</b>  | - Interfacing Between LVDS and ECL                            |
| <b>AN1596</b>  | - ECLinPS Lite Translator ELT Family SPICE I/O Model Kit      |
| <b>AN1650</b>  | - Using Wire-OR Ties in ECLinPS Designs                       |
| <b>AN1672</b>  | - The ECL Translator Guide                                    |
| <b>AND8001</b> | - Odd Number Counters Design                                  |
| <b>AND8002</b> | - Marking and Date Codes                                      |
| <b>AND8020</b> | - Termination of ECL Logic Devices                            |
| <b>AND8090</b> | - AC Characteristics of ECL Devices                           |

# MC100EL17

## PACKAGE DIMENSIONS


SO-20L  
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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