

# MC100EL90

## -3.3V / -5V Triple ECL Input to PECL Output Translator

The MC100EL90 is a triple ECL to PECL translator. The device receives either -3.3 V or -5 V differential ECL signals, determined by the  $V_{EE}$  supply level, and translates them to standard +5 V differential PECL output signals.

To accomplish the level translation, the EL90 requires three power rails. The  $V_{CC}$  supply should be connected to the positive supply, and the  $V_{EE}$  pin should be connected to the negative power supply. The GND pins, as expected, are connected to the system ground plane. Both  $V_{EE}$  and  $V_{CC}$  should be bypassed to ground via 0.01  $\mu$ F capacitors.

Under open input conditions, the  $\bar{D}$  input will be biased at  $V_{EE}/2$  and the D input will be pulled to  $V_{EE}$ . This condition will force the Q output to a LOW, ensuring 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  $\mu$ F capacitor and limit current sourcing or sinking to 0.5 mA. When not used,  $V_{BB}$  should be left open.

- 500 ps Propagation Delays
- ESD Protection: >2 KV HBM, >200 V MM
- The 100 Series Contains Temperature Compensation
- Operating Range:  $V_{CC}$ = 4.75 V to 5.25 V;  
 $V_{EE}$ = -3.0 V to -5.5 V; GND= 0 V
- Internal Input Pulldown Resistors
- Q Output will Default LOW with Inputs Open or at  $V_{EE}$
- 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 = 261 devices



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### MARKING DIAGRAM\*



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

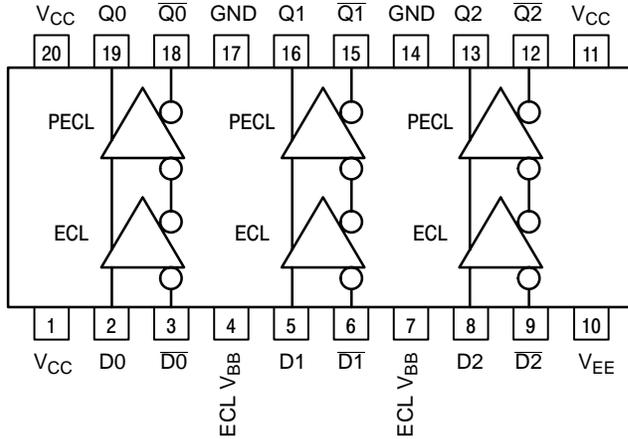
\*For additional information, see Application Note AND8002/D

### ORDERING INFORMATION

Device	Package	Shipping
MC100EL90DW	SO-20	38 Units/Rail
MC100EL90DWR2	SO-20	1000 Units/Reel

# MC100EL90

## Logic Diagram and Pinout: 20-Lead SOIC (Top View)



### PIN DESCRIPTION

PIN	FUNCTION
$D_n, \overline{D}_n$	ECL Inputs
$Q_n, \overline{Q}_n$	PECL Outputs
ECL $V_{BB}$	ECL Reference Voltage Output
$V_{CC}$	Positive Supply
$V_{EE}$	Negative Supply
GND	Ground

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

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

### MAXIMUM RATINGS (Note 1.)

Symbol	Parameter	Condition 1	Condition 2	Rating	Units
$V_{CC}$	PECL Power Supply	GND = 0 V		8 to 0	V
$V_{EE}$	NECL Power Supply	GND = 0 V		-8 to 0	V
$V_I$	NECL Input Voltage	GND = 0 V	$V_I \geq V_{EE}$	-6 to 0	V
$I_{out}$	Output Current	Continuous Surge		50 100	mA mA
$I_{BB}$	ECL $V_{BB}$ 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 500 LFPM	20 SOIC 20 SOIC	90 60	$^{\circ}\text{C}/\text{W}$ $^{\circ}\text{C}/\text{W}$
$\theta_{JC}$	Thermal Resistance (Junction to Case)	std bd	20 SOIC	30 to 35	$^{\circ}\text{C}/\text{W}$
$T_{sol}$	Wave Solder	<2 to 3 sec @ 248 $^{\circ}\text{C}$		265	$^{\circ}\text{C}$

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

# MC100EL90

## NECL INPUT DC CHARACTERISTICS $V_{CC}= 5.0\text{ V}$ ; $V_{EE}=-5.0\text{ V}$ ; $GND= 0\text{ V}$ (Note 1.)

Symbol	Characteristic	-40°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
$I_{EE}$	$V_{EE}$ Power Supply Current			8.0		6.0	8.0			8.0	mA
$V_{IH}$	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
ECL $V_{BB}$	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) (Note 2.) $V_{pp} < 500\text{ mV}$ $V_{pp} \geq 500\text{ mV}$	$V_{EE}+1.3$ $V_{EE}+1.5$		-0.4 -0.4	$V_{EE}+1.2$ $V_{EE}+1.4$		-0.4 -0.4	$V_{EE}+1.2$ $V_{EE}+1.4$		-0.4 -0.4	V 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 lpm is maintained.

1. Input parameters vary 1:1 with GND.  $V_{EE}$  can vary -3.0 V / -5.5 V.
2.  $V_{IHCMR}$  min varies 1:1 with  $V_{EE}$ .  $V_{IHCMR}$  max varies 1:1 with GND.

## PECL OUTPUT DC CHARACTERISTICS $V_{CC}= 5.0\text{ V}$ ; $V_{EE}=-5.0\text{ V}$ ; $GND= 0\text{ V}$ (Note 1.)

Symbol	Characteristic	-40°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
$I_{CC}$	$V_{CC}$ Power Supply Current			24		20	24			26	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

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.

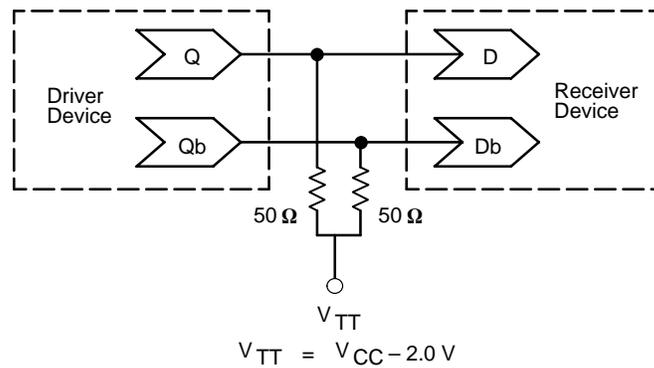
1. Output parameters vary 1:1 with  $V_{CC}$ .  $V_{CC}$  can vary  $\pm 0.5\text{ V}$ .
2. Outputs are terminated through a 50 ohm resistor to  $V_{CC}-2$  volts.

## AC CHARACTERISTICS $V_{CC}= 4.5\text{ V}$ to $5.5\text{ V}$ ; $V_{EE}=-3.0\text{ V}$ to $-5.5\text{ V}$ ; $GND= 0\text{ V}$

Symbol	Characteristic	-40°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
$f_{max}$	Maximum Toggle Frequency		560			650			700		MHz
$t_{PLH}$ $t_{PHL}$	Propagation Delay D to Q Differential S.E.	390 340		590 640	420 370		620 670	460 410		660 710	ps
$t_{SKEW}$	Skew Output-to-Output (Note 1) Part-to-Part (Differential) (Note 1) Duty Cycle (Differential) (Note 2)		20 25	100 200		20 25	100 200		20 25	100 200	ps
$t_{JITTER}$	Cycle-to-Cycle Jitter		TBD			TBD			TBD		ps
$V_{PP}$	Input Swing (Note 3)	150		1000	150		1000	150		1000	mV
$t_r$ $t_f$	Output Rise/Fall Times Q (20% - 80%)	230		500	230		500	230		500	ps

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

## MC100EL90



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

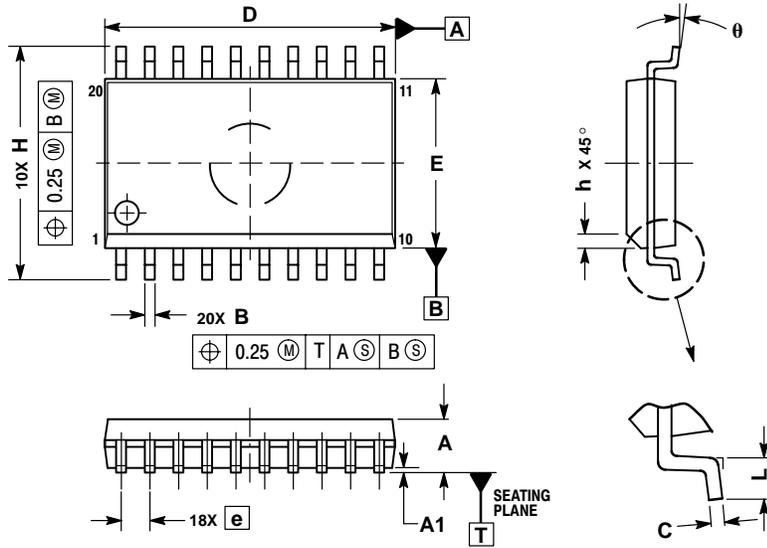
### Resource Reference of Application Notes

- 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

# MC100EL90

## PACKAGE DIMENSIONS

SO-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
$\theta$	0°	7°

**Notes**

**Notes**

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