

MC100EL90

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

Description

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 μ 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 μ 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

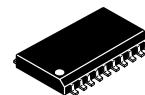
Features

- 500 ps Propagation Delays
- Operating Range:
 - ♦ V_{CC} = 4.75 V to 5.25 V
 - ♦ V_{EE} = -3.0 V to -5.5 V; GND = 0 V
- Q Output will Default LOW with Inputs Open or at V_{EE}
- Internal Input Pulldown Resistors
- ESD Protection:
 - ♦ > 2 kV Human Body Model
 - ♦ > 200 V Machine Model
- Meets or Exceeds JEDEC Spec EIA/JESD78 IC Latchup Test
- Moisture Sensitivity: Level 3 (Pb-Free)
(For Additional Information, see Application Note [AND8003/D](#))
- Flammability Rating: UL 94 V-0 @ 1.125 in,
Oxygen Index: 28 to 34
- Transistor Count = 261 Devices
- This Device is Pb-Free, Halogen Free and is RoHS Compliant



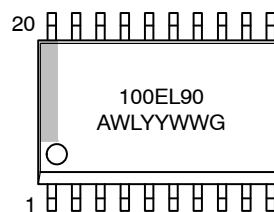
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SOIC-20 WB
DW SUFFIX
CASE 751D-05

MARKING DIAGRAM*



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
MC100EL90DWG	SOIC-20 WB (Pb-Free)	38 Units/Tube

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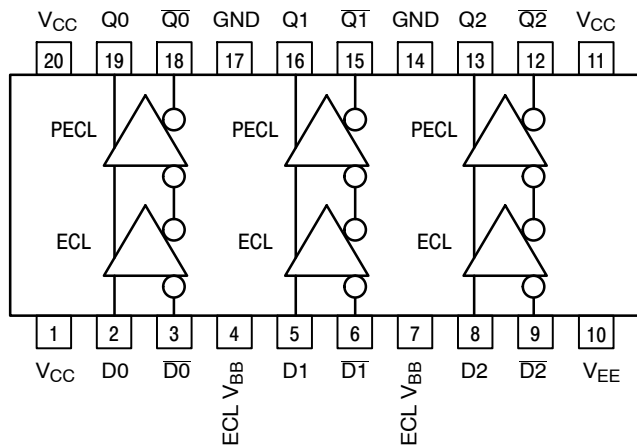


Table 1. PIN DESCRIPTION

PIN	FUNCTION
Dn, \overline{Dn}	ECL Inputs
Qn, \overline{Qn}	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.

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

Table 2. MAXIMUM RATINGS

Symbol	Parameter	Condition 1	Condition 2	Rating	Unit
V_{CC}	PECL Mode Power Supply	$V_{EE} = 0\text{ V}$		8 to 0	V
V_{EE}	NECL Mode Power Supply	$V_{CC} = 0\text{ V}$		-8 to 0	V
V_I	PECL Mode Input Voltage NECL Mode Input Voltage	$V_{EE} = 0\text{ V}$ $V_{CC} = 0\text{ V}$	$V_I \leq V_{CC}$ $V_I \geq V_{EE}$	6 to 0 -6 to 0	V
I_{out}	Output Current	Continuous Surge		50 100	mA
I_{BB}	V_{BB} Sink/Source			± 0.5	mA
T_A	Operating Temperature Range			-40 to +85	$^{\circ}\text{C}$
T_{stg}	Storage Temperature Range			-65 to +150	$^{\circ}\text{C}$
θ_{JA}	Thermal Resistance (Junction-to-Ambient)	0 lfp 500 lfp	SOIC-20 WB SOIC-20 WB	90 60	$^{\circ}\text{C}/\text{W}$
θ_{JC}	Thermal Resistance (Junction-to-Case)	Standard Board	SOIC-20 WB	30 to 35	$^{\circ}\text{C}/\text{W}$
T_{sol}	Wave Solder (Pb-Free)			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.

Table 3. PECL DC CHARACTERISTICS ($V_{CC} = 5.0\text{ V}$; $V_{EE} = -5\text{ V}$; GND = 0 V (Note 1))

Symbol	Characteristic	-40 $^{\circ}\text{C}$			25 $^{\circ}\text{C}$			85 $^{\circ}\text{C}$			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: 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 lfp. 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.

- Output parameters vary 1:1 with V_{CC} . V_{CC} can vary $\pm 0.5\text{ V}$.
- Outputs are terminated through a 50 Ω resistor to $V_{CC} - 2.0\text{V}$.

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Table 4. NECL DC CHARACTERISTICS ($V_{CC} = 5.0\text{ V}$; $V_{EE} = -5\text{ V}$; $GND = 0\text{ V}$ (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 Configuration) (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
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 lpm. 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 parameters vary 1:1 with GND. V_{EE} can vary $-3.0\text{ V} / -5.5\text{ V}$.
2. V_{IHCMR} min varies 1:1 with V_{EE} . V_{IHCMR} max varies 1:1 with GND.

Table 5. AC CHARACTERISTICS ($V_{CC} = 4.5\text{ to }5.5\text{ V}$; $V_{EE} = -3.0\text{ to }-5.5\text{ V}$; $GND = 0\text{ V}$)

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 Configuration) (Note 1) Duty Cycle (Differential Configuration) (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

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 lpm. 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. 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 ≈ 40 .

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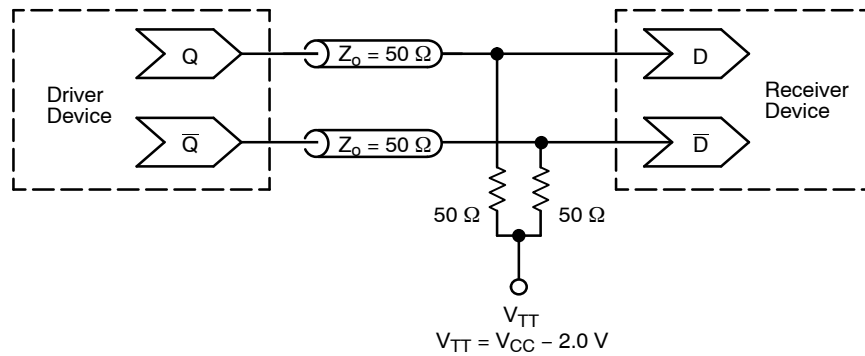


Figure 2. Typical Termination for Output Driver and Device Evaluation
(See Application Note [AND8020/D](#) – Termination of ECL Logic Devices)

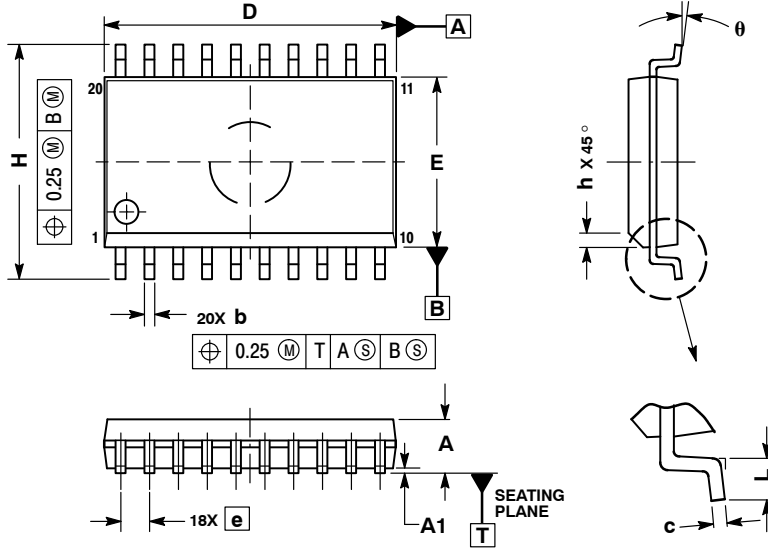
Resource Reference of Application Notes

- 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

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PACKAGE DIMENSIONS

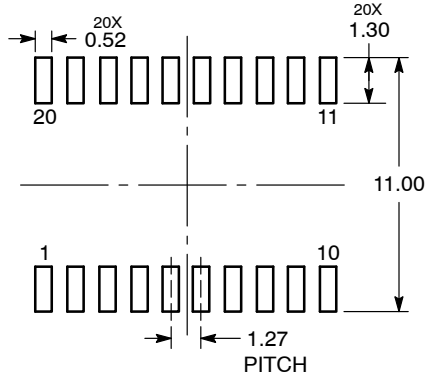
SOIC-20 WB
DW SUFFIX
CASE 751D-05
ISSUE H



- 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°

RECOMMENDED SOLDERING FOOTPRINT*




DIMENSIONS: MILLIMETERS

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

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