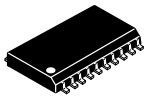
5 V Triple PECL Input to -5 V ECL Output Translator

MC100EL91



SOIC−20 WB
DW SUFFIX
CASE 751D−05

Description

The MC100EL91 is a triple PECL input to ECL output translator. The device receives standard voltage differential PECL signals, determined by the V_{CC} supply level, and translates them to differential −5 V ECL output signals. (For translation of LVPECL to −3.3 V ECL output, see MC100LVEL91.)

To accomplish the level translation, the EL91 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 are connected to the system ground plane. Both V_{EE} and V_{CC} should be bypassed to ground via 0.01 μF capacitors.

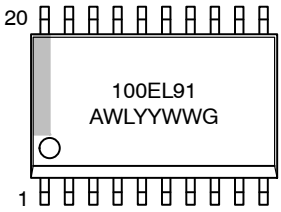
Under open input conditions, the $\overline{D}$ input will be biased at $V_{CC}/2$ and the D input will be pulled to GND. This condition will force the Q output to a low, ensuring stability.

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 μF capacitor and limit current sourcing or sinking to 0.5 mA. When not used, V_{BB} should be left open.

Features

- 670 ps Typical Propagation Delay
- ESD Protection: > 2 kV Human Body Model
- The 100 Series Contains Temperature Compensation
- Operating Range:
  - V_{CC} = 4.75 V to 5.5 V
  - V_{EE} = −4.2 V to −5.5 V; GND = 0 V
- Internal Input Pulldown Resistors
- Q Output will Default LOW with Inputs Open or at GND
- 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 @ 0.125 in, Oxygen Index: 28 to 34
- Transistor Count = 282 devices
- These Devices are Pb-Free, Halogen Free and are RoHS Compliant

MARKING DIAGRAM*



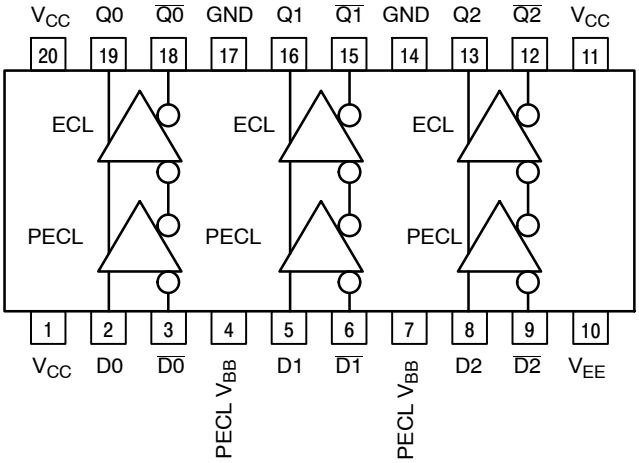
A = Assembly Location
WL = Wafer Lot
YY = Year
WW = Work Week
G = Pb-Free Package

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

ORDERING INFORMATION

Device	Package	Shipping†
MC100EL91DWG	SOIC−20 WB (Pb-Free)	38 Units/Tube
MC100EL91DWR2G	SOIC−20 WB (Pb-Free)	1,000/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.



**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 (Top View) **and Logic Diagram**

Table 1. PIN DESCRIPTION

PIN	FUNCTION
Dn, $\overline{Dn}$	PECL Inputs
Qn, $\overline{Qn}$	ECL Outputs
PECL V_{BB}	PECL Reference Voltage Output
V_{CC}	Positive Supply
V_{EE}	Negative Supply
GND	Ground

Table 2. MAXIMUM RATINGS

Symbol	Parameter	Condition 1	Condition 2	Rating	Unit
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	PECL Input Voltage	GND = 0 V	$V_I \le V_{CC}$	6 to 0	V
I_{out}	Output Current	Continuous Surge		50 100	mA
I_{BB}	PECL V_{BB} Sink/Source			± 0.5	mA
T_A	Operating Temperature Range			−40 to +85	°C
T_{stg}	Storage Temperature Range			−65 to +150	°C
θ_{JA}	Thermal Resistance (Junction-to-Ambient)	0 lfpm 500 lfpm	SOIC−20 WB	90 60	°C/W
θ_{JC}	Thermal Resistance (Junction-to-Case)	Standard Board	SOIC−20 WB	30 to 35	°C/W
T_{sol}	Wave Solder (Pb-Free)	<2 to 3 sec @ 248°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 3. PECL INPUT DC CHARACTERISTICS (V_{CC}= 5.0 V; V_{EE}= −5.0 V; GND = 0 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			11		6	11			11	mA
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
PECL 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) (Note 2) V_{PP} < 500 mV V_{PP} ≥ 500 mV	 1.3 1.5		 4.8 4.8	 1.2 1.4		 4.8 4.8	 1.2 1.4		 4.8 4.8	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.

1. Input parameters vary 1:1 with V_{CC}. V_{CC} = +4.75 V to +5.2 V, V_{EE} = −4.20 V to −5.5 V.
2. V_{IHCMR} min varies 1:1 with GND. V_{IHCMR} max varies 1:1 with V_{CC}.

Table 4. NECL OUTPUT DC CHARACTERISTICS (V_{CC}= 5.0 V to 5.0 V; V_{EE}= −5.0 V; GND= 0 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			28		22	28			30	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

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.

1. Output parameters vary 1:1 with GND. V_{CC} = +4.75 V to +5.2 V, V_{EE} = −4.20 V to −5.5 V.
2. Outputs are terminated through a 50 Ω resistor to GND − 2.0 V

Table 5. AC CHARACTERISTICS (V_{CC}= 5.0 V; V_{EE}= −5.0 V; GND= 0 V.) (Note 4)

Symbol	Characteristic	−40°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
f_{max}	Maximum Toggle Frequency		700			700			700		MHz
t_{PLH} t_{PHL}	Propagation Delay D to Q Differential Single-Ended.	 540 490	 640 640	 740 790	 570 520	 670 670	 770 820	 610 560	 710 710	 810 860	ps
t_{SKEW}	Skew Output-to-Output (Note 1) Part-to-Part (Differential) (Note 1) Cycle (Differential) (Note 2)		 40 25	 100 200		 40 25	 100 200		 40 25	 100 200	ps
t_{JITTER}	Random Clock Jitter @ 700 MHz		1.2			1.2			1.2		pS(RMS)
V_{PP}	Input Swing (Note 3)	200		1000	200		1000	200		1000	mV
t_r t_f	Output Rise/Fall Times Q (20% − 80%)	270	400	530	270	400	530	270	400	530	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 lfpm.

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 t_{PLH} and t_{PHL} propagation delay through a device.
3. V_{PP}(min) is the minimum input swing for which AC parameters are guaranteed. The device has a DC gain of ≈40.
4. V_{CC} = +4.75 V to +5.2 V, V_{EE} = −4.20 V to −5.5 V. Outputs are terminated through a 50 Ω resistor to GND − 2.0 V.

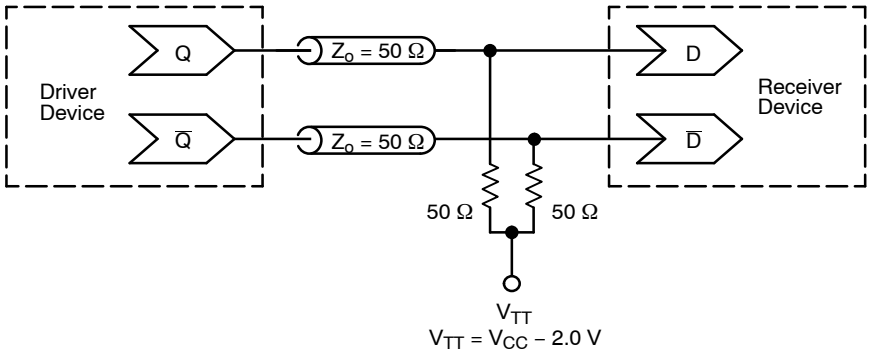


Figure 2. Typical Termination for Output Driver and Device Evaluation (See Application Note AND8020/D − Termination of ECL Logic Devices.)

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

SOIC−20 WB
CASE 751D−05
ISSUE H

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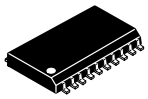
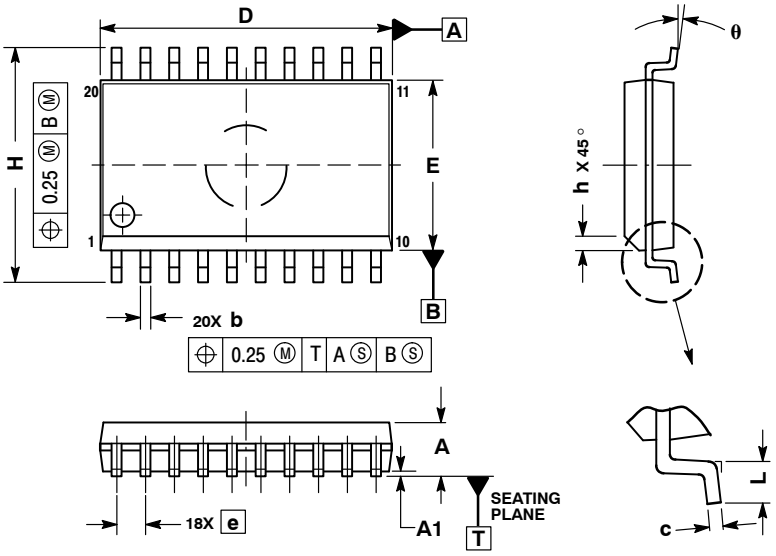


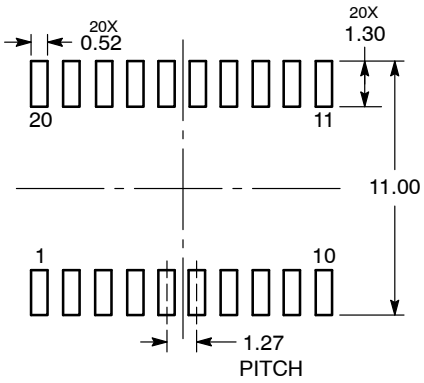
SCALE 1:1



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.

	MILLIMETERS	
DIM	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°

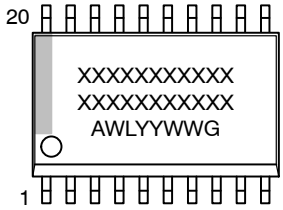
RECOMMENDED SOLDERING FOOTPRINT*



DIMENSIONS: MILLIMETERS

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

GENERIC MARKING DIAGRAM*



XXXXX = Specific Device Code
A = Assembly Location
WL = Wafer Lot
YY = Year
WW = Work Week
G = Pb−Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, “G” or microdot “▪”, may or may not be present. Some products may not follow the Generic Marking.

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