MC100LVEL91

3.3 V Triple LVPECL Input to -3.3 V to -5.0 V ECL Output Translator

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Description

The MC100LVEL91 is a triple LVPECL input to ECL output translator. The device receives low voltage differential PECL signals, determined by the V_{CC} supply level, and translates them to differential −3.3 V to −5.0 V ECL output signals.

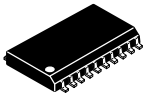
To accomplish the level translation the LVEL91 requires three power rails. The V_{CC} supply should be connected to the positive supply, and the V_{EE} pin should be connected to the negative power supply. The GND pins are connected to the system ground plane. Both V_{EE} and V_{CC} should be bypassed 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.

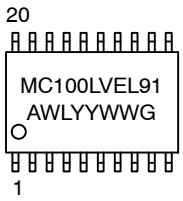
Features

- 620 ps Typical Propagation Delay
- The 100 Series Contains Temperature Compensation
- Operating Range: V_{CC} = 3.8 V to 3.0 V; V_{EE} = −3.0 V to −5.5 V; GND = 0 V
- Q Output will Default LOW with Inputs Open or at GND
- Pb−Free Packages are Available*



SO−20
DW SUFFIX
CASE 751D

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

See detailed ordering and shipping information in the package dimensions section on page 4 of this data sheet.

*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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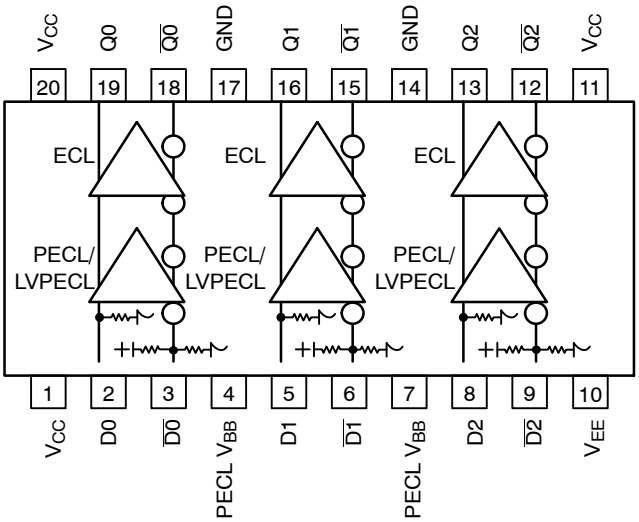

Figure 1. SO−20 Pinout (Top View) **and Logic Diagram**

* 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.

Table 1. PIN DESCRIPTION

Pin	Function
Dn, $\overline{Dn}$	PECL/LVPECL 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. ATTRIBUTES

Characteristics		Value
Internal Input Pulldown Resistor		75 kΩ
Internal Input Pullup Resistor		75 kΩ
ESD Protection	Human Body Model Machine Model Charged Device Model	> 2 kV > 100 V > 2 kV
Moisture Sensitivity, (Note 1) Pb (Indefinite Time Out of Drypack) Pb−Free		 Level 1 Level 3
		Level 1
Flammability Rating	Oxygen Index: 28 to 34	UL 94 V−0 @ 0.125 in
Transistor Count		282 Devices
Meets or exceeds JEDEC Spec EIA/JESD78 IC Latchup Test		

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

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Table 3. MAXIMUM RATINGS

Symbol	Parameter	Condition 1	Condition 2	Rating	Unit
V_{CC}	PECL Power Supply	GND = 0 V		3.8	V
V_{EE}	NECL Power Supply	GND = 0 V		−6.0	V
V_I	PECL Input Voltage	GND = 0 V	$V_I \le V_{CC}$	3.8	V
I_{out}	Output Current	Continuous Surge		50 100	mA 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 SOIC−20	90 60	°C/W °C/W
θ_{JC}	Thermal Resistance (Junction−to−Case)	Standard Board	SOIC−20	30 to 35	°C/W
T_{sol}	Wave Solder Pb Pb−Free			265 265	°C

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

Table 4. LVPECL INPUT DC CHARACTERISTICS V_{CC} = 3.3 V; V_{EE} = −3.3 V to −5.0 V; GND = 0 V (Note 2)

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)	2135		2420	2135		2420	2135		2420	mV
V_{IL}	Input LOW Voltage (Single−Ended)	1490		1825	1490		1825	1490		1825	mV
LVPECL V_{BB}	Output Voltage Reference	1.92		2.04	1.92		2.04	1.92		2.04	V
V_{IHCMR}	Input HIGH Voltage Common Mode Range (Differential Configuration) (Note 3) V_{PP} < 500 mV $V_{PP} \geqq$ 500 mV	 1.0 1.2		 2.9 2.9	 0.9 1.1		 2.9 2.9	 0.9 1.1		 2.9 2.9	 V V
I_{IH}	Input HIGH Current			150			150			150	μA
I_{IL}	Input LOW Current D $\overline{D}$	0.5 −600			0.5 −600			0.5 −600			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. 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.

2. Input parameters vary 1:1 with V_{CC}. V_{CC} can vary +0.5 / −0.3 V.
3. V_{IHCMR} min varies 1:1 with GND. V_{IHCMR} max varies 1:1 with V_{CC}.

Table 5. NECL OUTPUT DC CHARACTERISTICS V_{CC} = 3.3 V; V_{EE} = −3.3 V to −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	
I_{EE}	V_{EE} Power Supply Current			27		21	27			29	mA
V_{OH}	Output HIGH Voltage (Note 5)	−1085	−1005	−880	−1025	−955	−880	−1025	−955	−880	mV
V_{OL}	Output LOW Voltage (Note 5)	−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. 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.

4. Output parameters vary 1:1 with GND. V_{CC} can vary +0.3 V / −0.5 V.
5. All loading with 50 Ω resistor to GND − 2.0 V.

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Table 6. AC CHARACTERISTICS V_{CC} = 3.3 V; V_{EE} = −3.0 V to −5.5 V; GND = 0 V (Note 6)

Symbol	Characteristic	−40°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
f_{max}	Maximum Toggle Frequency		600			600			600		MHz
t_{PLH} t_{PHL}	Propagation Delay Differential Configuration D to Q Select−Ended	490 440	590 590	690 740	520 470	620 620	720 770	560 510	660 660	760 810	ps
t_{SKEW}	Skew Output−to−Output (Note 7) Part−to−Part (Differential Configuration) (Note 7) Duty Cycle (Differential Configuration) (Note 8)		 40 25	 100 200 		 40 25	 100 200 		 40 25	 100 200 	ps
V_{PP}	Input Swing (Note 9)	200		1000	200		1000	200		1000	mV
t_r t_f	Output Rise/Fall Times Q (20% − 80%)	320	400	580	320	400	580	320	400	580	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. 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.

6. V_{CC} can vary +0.5 V / −0.3 V.
7. Skews are valid across specified voltage range, part−to−part skew is for a given temperature.
8. Duty cycle skew is the difference between a T_{PLH} and T_{PHL} propagation delay through a device.
9. V_{PP}(min) is the minimum input swing for which AC parameters are guaranteed. The device has a DC gain of ≈ 40.

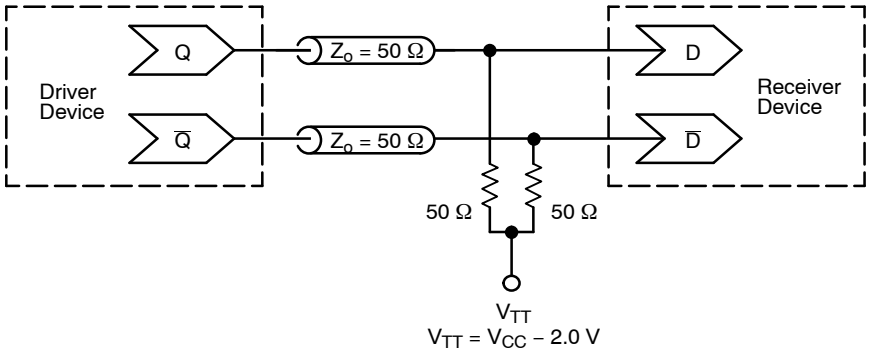

Figure 2. Typical Termination for Output Driver and Device Evaluation (See Application Note AND8020/D − Termination of ECL Logic Devices.)

ORDERING INFORMATION

Device	Package	Shipping†
MC100LVEL91DW	SO−20	38 Units / Rail
MC100LVEL91DWG	SO−20 (Pb−Free)	38 Units / Rail
MC100LVEL91DWR2	SO−20	1000 / Tape & Reel
MC100LVEL91DWR2G	SO−20 (Pb−Free)	1000 / 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.

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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

AN1642/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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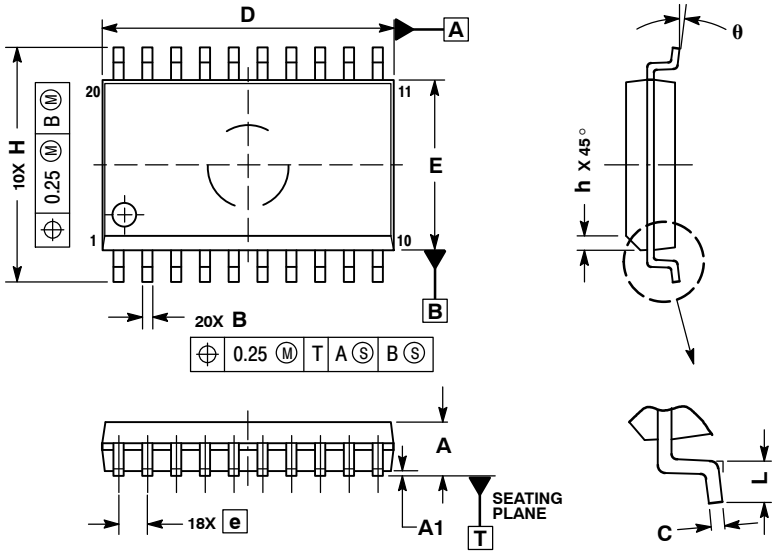
PACKAGE DIMENSIONS

SO−20 WB
DW SUFFIX
PLASTIC SOIC PACKAGE
CASE 751D−05
ISSUE G



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°

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