MC100LVEL90

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

Description

The MC100LVEL90 is a triple ECL to LVPECL 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 +3.3 V differential LVPECL output signals.

To accomplish the level translation, the LVEL90 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 μF capacitors.

Under open input conditions, the $\overline{D}$ 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 μF capacitor and limit current sourcing or sinking to 0.5 mA. When not used, V_{BB} should be left open.

Features

- 500 ps Propagation Delays
- ESD Protection: > 2 kV HBM, > 200 V MM
- The 100 Series Contains Temperature Compensation
- Operating Range: V_{CC} = 3.0 V to 3.8 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}
- 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 = 261 devices
- These Devices are Pb-Free, Halogen Free and are RoHS Compliant

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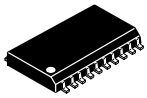
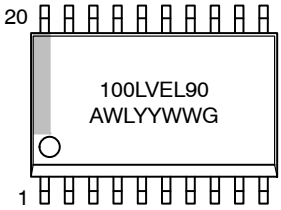


SOIC–20 WB
DW SUFFIX
CASE 751D

MARKING DIAGRAM*



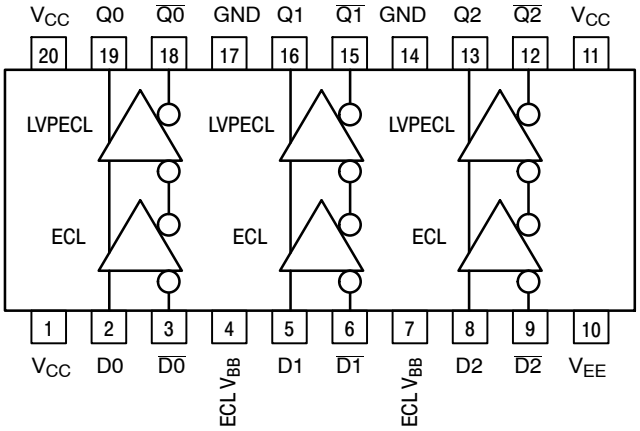
A	= Assembly Location
WL	= Wafer Lot
YY	= Year
WW	= Work Week
G	= Pb-Free Package

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

ORDERING INFORMATION

Device	Package	Shipping†
MC100LVEL90DWG	SOIC–20 WB (Pb-Free)	38 Units/Tube
MC100LVEL90DWR2G	SOIC–20 WB (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.



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

Table 1. PIN DESCRIPTION

PIN	FUNCTION
Dn, $\overline{Dn}$	ECL Inputs
Qn, $\overline{Qn}$	LVPECL Outputs
ECL V_{BB}	ECL 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	NECL Mode Input Voltage	GND = 0 V	$V_I \geq V_{EE}$	−6 to 0	V
I_{out}	Output Current	Continuous Surge		50 100	mA
I_{BB}	ECL 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			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. NECL INPUT DC CHARACTERISTICS (V_{CC}= 3.3 V; V_{EE}= −3.3 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			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) Vpp < 500 mV Vpp ≥ 500 mV	 V_{EE}+1.3 VEE+1.5		 −0.4 −0.4	 V_{EE}+1.2 VEE+1.4		 −0.4 −0.4	 V_{EE}+1.2 VEE+1.4		 −0.4	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.

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

Table 4. LVPECL OUTPUT DC CHARACTERISTICS (V_{CC}= 3.3 V; V_{EE}= −3.3 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			24		20	24			26	mA
V_{OH}	Output HIGH Voltage (Note 2)	2215	2295	2420	2275	2345	2420	2275	2345	2420	mV
V_{OL}	Output LOW Voltage (Note 2)	1470	1605	1745	1490	1600	1680	1490	1595	1680	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.

1. Output parameters vary 1:1 with V_{CC}. V_{CC} can vary +0.5 V / −0.3 V. V_{EE} can vary −3.0 V to −5.5 V.
2. Outputs are terminated through a 50 Ω resistor to V_{CC}−2 volts.

Table 5. AC CHARACTERISTICS (V_{CC} = 3.0 V to 3.8 V; V_{EE}= −3.0 V to −5.5 V; GND = 0 V)

Symbol	Characteristic	−40°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
fmax	Maximum Toggle Frequency		560			650			700		MHz
t_{PLH} t_{PHL}	Propagation Delay Diff D to Q 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 (Diff) (Note 1) Duty Cycle (Diff) (Note 2)		 20 25	 100 200		 20 25	 100 200		 20 25	 100 200	ps
tJITTER	Random Clock Jitter		TBD			TBD			TBD		ps
V_{PP}	Input Voltage Swing (Differential Configuration) (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 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.

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} (min) is swing measured single-ended on each input in differential configuration. The device has a DC gain of ≈40.

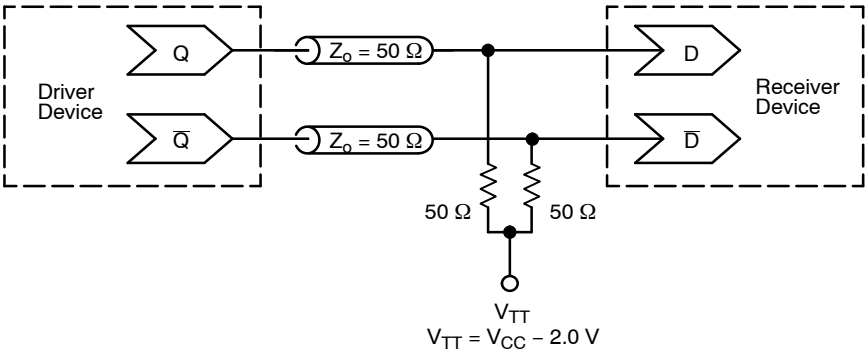


Figure 2. Typical Termination for Output Driver and Device Evaluation (See Application Note AND8020/D − Termination of ECL Logic Devices.)

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

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

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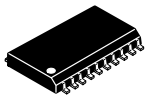
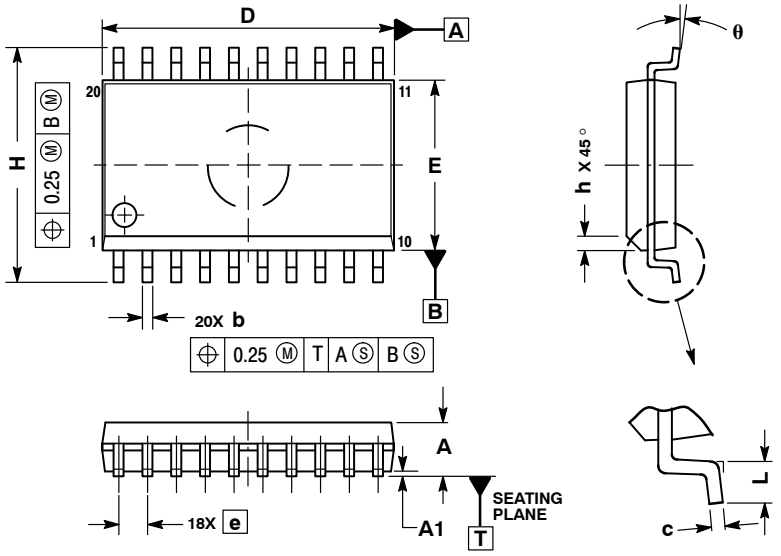


SCALE 1:1

SOIC–20 WB
CASE 751D–05
ISSUE H

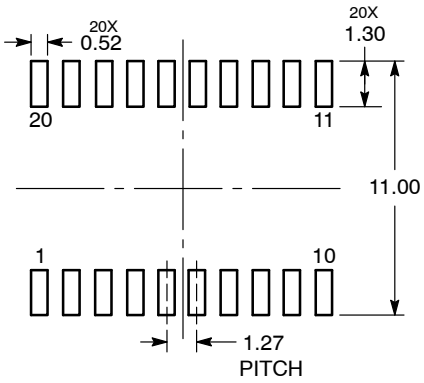
DATE 22 APR 2015



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°

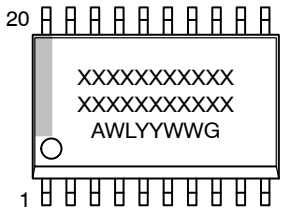
RECOMMENDED SOLDERING FOOTPRINT*



DIMENSIONS: MILLIMETERS

*For additional information on our Pb–Free strategy and soldering details, please download the ON Semiconductor 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.

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