

MC100LVEL91

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

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 μ F capacitors.

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

Features

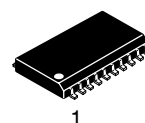
- 620 ps Typical Propagation Delay
- The 100 Series Contains Temperature Compensation
- Operating Range: $V_{CC} = 3.8$ V to 3.0 V;
 $V_{EE} = -3.0$ V to -5.5 V; GND = 0 V
- Q Output will Default LOW with Inputs Open or at GND
- Pb-Free Packages are Available*



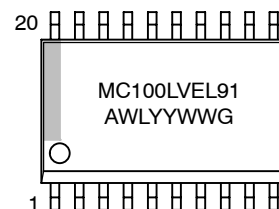
ON Semiconductor®

<http://onsemi.com>

MARKING DIAGRAM*



1
SO-20
DW SUFFIX
CASE 751D



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.

MC100LVEL91

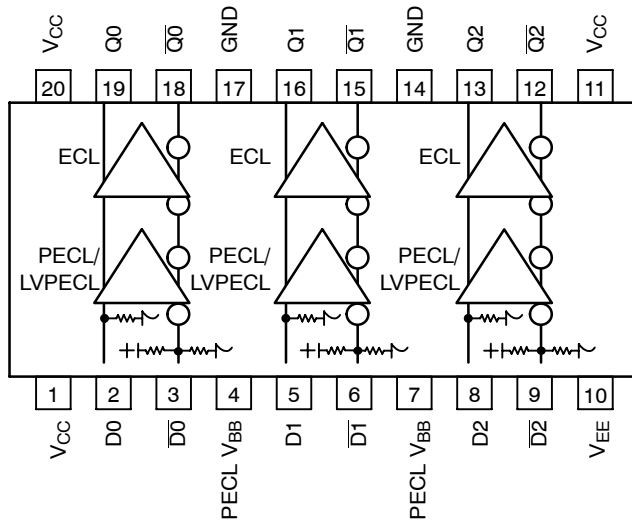


Table 1. PIN DESCRIPTION

Pin	Function
Dn, Dn̄	PECL/LVPECL Inputs
Qn, Qn̄	ECL Outputs
PECL V _{BB}	PECL Reference Voltage Output
V _{CC}	Positive Supply
V _{EE}	Negative Supply
GND	Ground

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 2. ATTRIBUTES

Characteristics	Value	
Internal Input Pulldown Resistor	75 kΩ	
Internal Input Pullup Resistor	75 kΩ	
ESD Protection	Human Body Model	> 2 kV
	Machine Model	> 100 V
	Charged Device Model	> 2 kV
Moisture Sensitivity, Indefinite Time Out of Drypack (Note 1)	Pb Pkg	Pb-Free Pkg
	Level 1	Level 3
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.

MC100LEVEL91

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 ≤ 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	1.0		2.9	0.9		2.9	0.9		2.9	V
	V _{PP} ≥ 500 mV	1.2		2.9	1.1		2.9	1.1		2.9	V
I _{IH}	Input HIGH Current			150			150			150	μA
I _{IL}	Input LOW Current	D D̄	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.

- Input parameters vary 1:1 with V_{CC}. V_{CC} can vary +0.5 / -0.3 V.
- 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.

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

MC100LVEL91

Table 6. AC CHARACTERISTICS $V_{CC} = 3.3\text{ V}$; $V_{EE} = -3.0\text{ V to }-5.5\text{ V}$; $GND = 0\text{ V}$ (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 D to Q Differential Configuration 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 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.

6. V_{CC} can vary $+0.5\text{ V} / -0.3\text{ V}$.
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 .

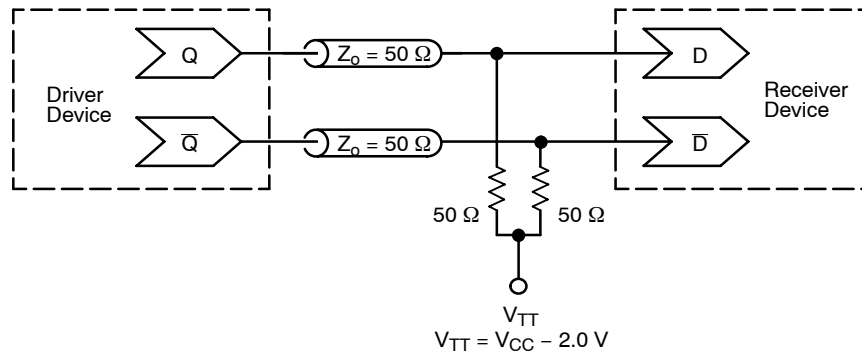


Figure 2. Typical Termination for Output Driver and Device Evaluation
(See Application Note AND8020/D – Termination of ECL Logic Devices.)

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.

MC100LVEL91

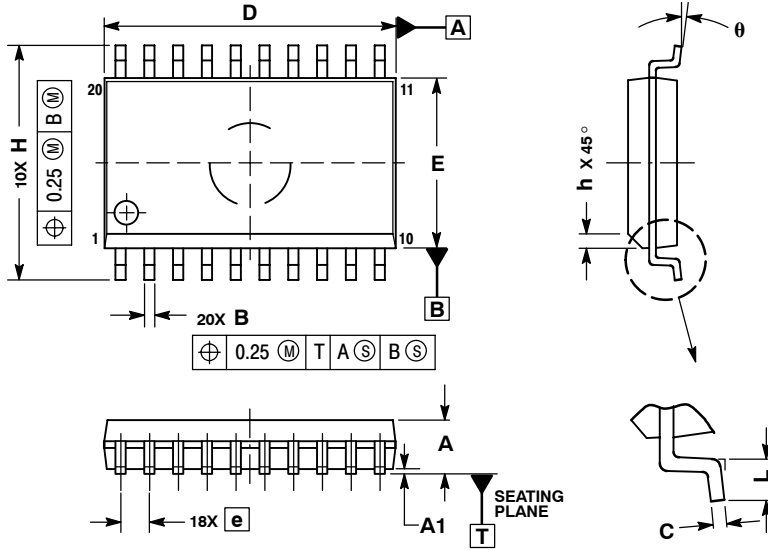
Resource Reference of Application Notes

- 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

MC100LEVEL91

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.

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°

ECLinPS is a trademark of Semiconductor Components INdustries, LLC (SCILLC).

ON Semiconductor and are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada
Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800-282-9855 Toll Free
USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81-3-5773-3850

ON Semiconductor Website: www.onsemi.com
Order Literature: <http://www.onsemi.com/orderlit>

For additional information, please contact your local Sales Representative