

# MC100EL91

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

### 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  $\mu\text{F}$  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  $\mu\text{F}$  capacitor and limit current sourcing or sinking to 0.5 mA. When not used,  $V_{BB}$  should be left open.

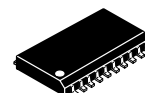
### Features

- 670 ps Typical Propagation Delay
- ESD Protection: > 2 kV Human Body Model
- The 100 Series Contains Temperature Compensation
- Operating Range:
  - ◆  $V_{CC} = 4.75 \text{ V to } 5.5 \text{ V}$
  - ◆  $V_{EE} = -4.2 \text{ V to } -5.5 \text{ V}$ ; 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



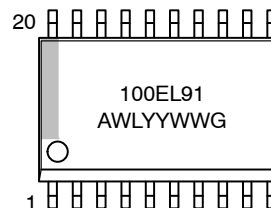
ON Semiconductor®

[www.onsemi.com](http://www.onsemi.com)



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

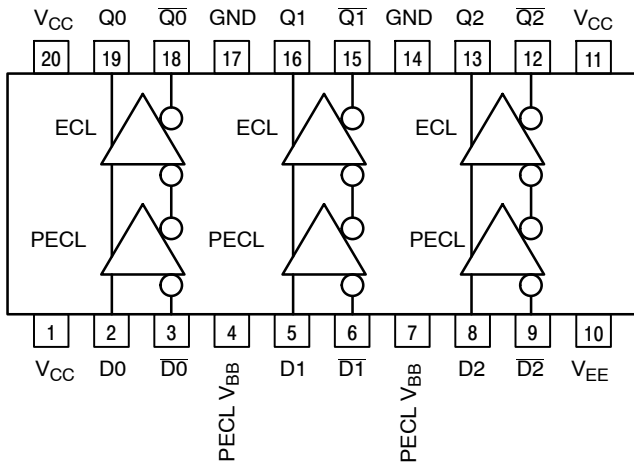
\*For additional marking information, refer to Application Note [AND8002/D](#).

### ORDERING INFORMATION

Device	Package	Shipping†
MC100EL91DWG	SOIC-20 WB (Pb-Free)	38 Units/Tube
MC100EL91DWR2G	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](#).

# MC100EL91



**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

\*\*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 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	$V_I \leq V_{CC}$	6 to 0	V
$I_{out}$	Output Current	Continuous Surge		50 100	mA
$I_{BB}$	PECL $V_{BB}$ Sink/Source			$\pm 0.5$	mA
$T_A$	Operating Temperature Range			-40 to +85	$^{\circ}\text{C}$
$T_{stg}$	Storage Temperature Range			-65 to +150	$^{\circ}\text{C}$
$\theta_{JA}$	Thermal Resistance (Junction-to-Ambient)	0 lfpm 500 lfpm	SOIC-20 WB	90 60	$^{\circ}\text{C}/\text{W}$
$\theta_{JC}$	Thermal Resistance (Junction-to-Case)	Standard Board	SOIC-20 WB	30 to 35	$^{\circ}\text{C}/\text{W}$
$T_{sol}$	Wave Solder (Pb-Free)	<2 to 3 sec @ 248 $^{\circ}\text{C}$		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.

# MC100EL91

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

Symbol	Characteristic	-40°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
$I_{CC}$	$V_{CC}$ 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) $V_{PP} < 500\text{ mV}$ $V_{PP} \geq 500\text{ mV}$	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	$\mu\text{A}$
$I_{IL}$	Input LOW Current	0.5			0.5			0.5			$\mu\text{A}$

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 lfm. 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  $V_{CC}$ .  $V_{CC} = +4.75\text{ V}$  to  $+5.2\text{ V}$ ,  $V_{EE} = -4.20\text{ V}$  to  $-5.5\text{ V}$ .
2.  $V_{IHCMR}$  min varies 1:1 with  $GND$ .  $V_{IHCMR}$  max varies 1:1 with  $V_{CC}$ .

**Table 4. NECL OUTPUT DC CHARACTERISTICS** ( $V_{CC} = 5.0\text{ V}$  to  $5.0\text{ V}$ ;  $V_{EE} = -5.0\text{ V}$ ;  $GND = 0\text{ V}$  (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			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 lfm. 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  $GND$ .  $V_{CC} = +4.75\text{ V}$  to  $+5.2\text{ V}$ ,  $V_{EE} = -4.20\text{ V}$  to  $-5.5\text{ V}$ .
2. Outputs are terminated through a  $50\ \Omega$  resistor to  $GND - 2.0\text{ V}$

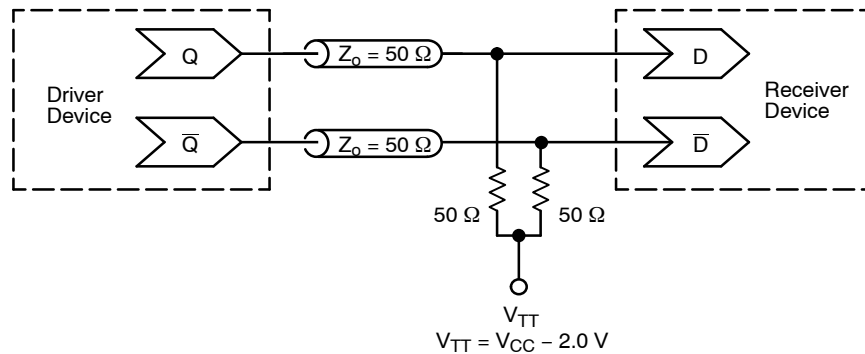
# MC100EL91

**Table 5. AC CHARACTERISTICS** ( $V_{CC} = 5.0\text{ V}$ ;  $V_{EE} = -5.0\text{ V}$ ;  $GND = 0\text{ V}$  (Note 4))

Symbol	Characteristic	-40°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
$f_{\text{max}}$	Maximum Toggle Frequency		700			700			700		MHz
$t_{\text{PLH}}$ $t_{\text{PHL}}$	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
$t_{\text{SKEW}}$	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
$t_{\text{JITTER}}$	Random Clock Jitter @ 700 MHz		1.2			1.2			1.2		pS(RMS)
$V_{\text{PP}}$	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 lfm. 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  $t_{\text{PLH}}$  and  $t_{\text{PHL}}$  propagation delay through a device.
3.  $V_{\text{PP}}(\text{min})$  is the minimum input swing for which AC parameters are guaranteed. The device has a DC gain of  $\approx 40$ .
4.  $V_{\text{CC}} = +4.75\text{ V}$  to  $+5.2\text{ V}$ ,  $V_{\text{EE}} = -4.20\text{ V}$  to  $-5.5\text{ V}$ . Outputs are terminated through a  $50\ \Omega$  resistor to  $GND - 2.0\text{ V}$ .



**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

# MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS



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.

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°

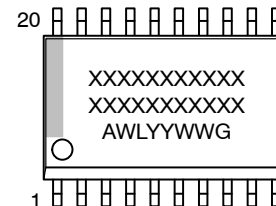
RECOMMENDED  
SOLDERING FOOTPRINT\*



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.

GENERIC  
MARKING DIAGRAM\*



- XXXXXX = 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.

DOCUMENT NUMBER:	98ASB42343B	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	SOIC-20 WB	PAGE 1 OF 1

onsemi and ONSEMI are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries. onsemi reserves the right to make changes without further notice to any products herein. onsemi makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does onsemi 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. onsemi does not convey any license under its patent rights nor the rights of others.

**onsemi**, **Onsemi**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at [www.onsemi.com/site/pdf/Patent-Marking.pdf](http://www.onsemi.com/site/pdf/Patent-Marking.pdf). **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** 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. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** 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. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** 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 **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

## ADDITIONAL INFORMATION

### TECHNICAL PUBLICATIONS:

Technical Library: [www.onsemi.com/design/resources/technical-documentation](http://www.onsemi.com/design/resources/technical-documentation)  
onsemi Website: [www.onsemi.com](http://www.onsemi.com)

### ONLINE SUPPORT: [www.onsemi.com/support](http://www.onsemi.com/support)

For additional information, please contact your local Sales Representative at [www.onsemi.com/support/sales](http://www.onsemi.com/support/sales)