

## Triple PECL to ECL Translator

The MC100LVEL/EL91 is a triple PECL to ECL translator. The MC100LVEL91 receives low voltage PECL signals and translates them to differential ECL output signals. The MC100EL91 receives standard voltage PECL signals and translates them to differential ECL output signals.

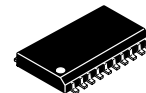
- MC100LVEL91 Supports Low Voltage Operation
- MC100LVEL91 Has 620ps Typical Propagation Delays
- MC100EL91 Supports Standard Voltage Operation
- MC100EL91 Has 670ps Typical Propagation Delays
- Fully Differential Design
- 20-lead SOIC Packaging

A  $V_{BB}$  output is provided for interfacing with single ended PECL signals at the input. If a single ended input is to be used the  $V_{BB}$  output should be connected to the D input. The active signal would then drive the D input. When used the  $V_{BB}$  output should be bypassed to ground via a  $0.01\mu F$  capacitor. The  $V_{BB}$  output is designed to act as the switching reference for the EL/LVEL91 under single ended input switching conditions, as a result this pin can only source/sink up to 0.5mA of current.

To accomplish the level translation the EL/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 plain. Both  $V_{EE}$  and  $V_{CC}$  should be bypassed to ground via  $0.01\mu F$  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.

## MC100LVEL91 MC100EL91



**DW SUFFIX**  
20-LEAD PLASTIC SOIC WIDE PACKAGE  
CASE 751D-04

### PIN NAMES

Pins	Function
Dn	PECL/LVPECL Inputs
Qn	ECL/LVECL Outputs
PECL_ $V_{BB}$	PECL Reference Voltage Output

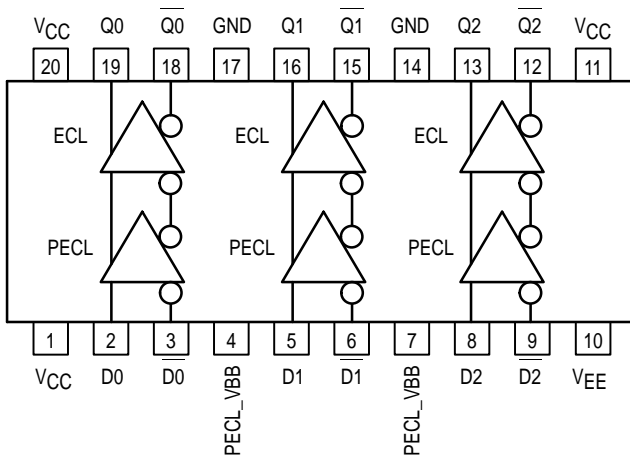


Figure 1. 20-Lead Pinout (Top View) and Logic Diagram



**LVPECL INPUT DC CHARACTERISTICS**

Symbol	Characteristic	-40°C		0°C		25°C			85°C		Unit	Condition
		Min	Max	Min	Max	Min	Typ	Max	Min	Max		
V <sub>CC</sub>	Power Supply Voltage	3.0	3.6	3.0	3.6	3.0	3.3	3.6	3.0	3.6	V	
I <sub>IH</sub>	Input HIGH Current		150		150			150		150	μA	
I <sub>IL</sub>	Input LOW Current	0.5		0.5		0.5			0.5		μA	
V <sub>IH</sub>	Input HIGH Voltage (Note 1.)	2.135	2.420	2.135	2.420	2.135		2.420	2.135	2.420	V	V <sub>CC</sub> = 3.3V
V <sub>IL</sub>	Input LOW Voltage (Note 1.)	1.49	1.825	1.49	1.825	1.49		1.825	1.49	1.825	V	V <sub>CC</sub> = 3.3V
V <sub>BB</sub>	Reference Output (Note 1.)	1.92	2.04	1.92	2.04	1.92		2.04	1.92	2.04	V	V <sub>CC</sub> = 3.3V
I <sub>GND</sub>	Power Supply Current		10		10		6.0	10		10	mA	

1. DC levels vary 1:1 with V<sub>CC</sub>.

**PECL INPUT DC CHARACTERISTICS**

Symbol	Characteristic	-40°C		0°C		25°C			85°C		Unit	Condition
		Min	Max	Min	Max	Min	Typ	Max	Min	Max		
V <sub>CC</sub>	Power Supply Voltage	4.75	5.25	4.75	5.25	4.75	5.0	5.25	4.75	5.25	V	
I <sub>IH</sub>	Input HIGH Current		150		150			150		150	μA	
I <sub>IL</sub>	Input LOW Current	0.5		0.5		0.5			0.5		μA	
V <sub>IH</sub>	Input HIGH Voltage (Note 2.)	3.835	4.120	3.835	4.12	3.835		4.12	3.835	4.120	V	V <sub>CC</sub> = 5.0V
V <sub>IL</sub>	Input LOW Voltage (Note 2.)	3.19	3.525	3.19	3.525	3.19		3.525	3.19	3.525	V	V <sub>CC</sub> = 5.0V
V <sub>BB</sub>	Reference Output (Note 2.)	3.62	3.74	3.62	3.74	3.62		3.74	3.62	3.75	V	V <sub>CC</sub> = 5.0V
I <sub>GND</sub>	Power Supply Current		11		11		6.0	11		11	mA	

2. DC levels vary 1:1 with V<sub>CC</sub>.

**ECL/LVECL OUTPUT DC CHARACTERISTICS**

Symbol	Characteristic	-40°C		0°C		25°C			85°C		Unit	Condition
		Min	Max	Min	Max	Min	Typ	Max	Min	Max		
V <sub>EE</sub>	Power Supply Voltage EL91 LVEL91	-4.2 -3.0	-5.5 -3.8	-4.2 -3.0	-5.5 -3.8	-4.2 -3.0	-4.5 -3.3	-5.5 -3.8	-4.2 -3.0	-5.5 -3.8	V	
V <sub>OH</sub>	Output HIGH Voltage	-1085	-880	-1025	-880	-1025	-955	-880	-1025	-880	mV	
V <sub>OL</sub>	Output LOW Voltage	-1830	-1555	-1810	-1620	-1810	-1705	-1620	-1810	-1620	mV	
I <sub>EE</sub>	Power Supply Current EL91 LVEL91		28 27		28 27		22 21	28 27		30 29	mA	

**MC100LVEL91****AC CHARACTERISTICS** ( $V_{EE} = -3.0V$  to  $-3.8V$ ;  $V_{CC} = 3.0V$  to  $3.6V$ )

Symbol	Characteristic	-40°C			0°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay D to Q Diff S.E.	490 440	590 590	690 740	510 460	610 610	710 760	520 470	620 620	720 770	560 510	660 660	760 810	ps
t <sub>SKEW</sub>	Skew Output-to-Output (Note 3.) Part-to-Part (Diff) (Note 3.) Duty Cycle (Diff) (Note 4.)		40 25	100 200		40 25	100 200		40 25	100 200		40 25	100 200	ps
V <sub>PP</sub>	Minimum Input Swing (Note 5.)	200			200			200			200			mV
V <sub>CMR</sub>	Common Mode Range (Note 6.) V <sub>PP</sub> < 500mV V <sub>PP</sub> ≥ 500mV	1.3 1.5		V <sub>CC-0.2</sub> V <sub>CC-0.2</sub>	1.2 1.4		V <sub>CC-0.2</sub> V <sub>CC-0.2</sub>	1.2 1.4		V <sub>CC-0.2</sub> V <sub>CC-0.2</sub>	1.2 1.4		V <sub>CC-0.2</sub> V <sub>CC-0.2</sub>	V
t <sub>r</sub> t <sub>f</sub>	Output Rise/Fall Times Q (20% – 80%)	320	400	580	320	400	580	320	400	580	320	400	580	ps

- Skews are valid across specified voltage range, part-to-part skew is for a given temperature.
- Duty cycle skew is the difference between a TPLH and TPHL propagation delay through a device.
- Minimum input swing for which AC parameters guaranteed. The device has a DC gain of ≈40.
- The CMR range is referenced to the most positive side of the differential input signal. Normal operation is obtained if the HIGH level falls within the specified range and the peak-to-peak voltage lies between V<sub>ppmin</sub> and 1V.

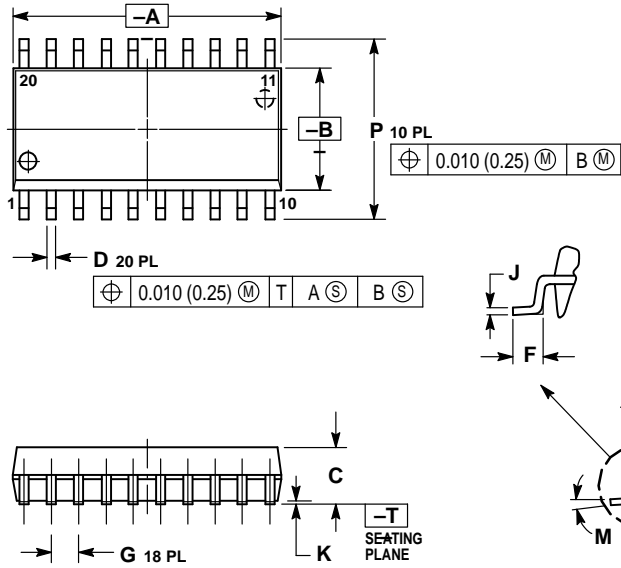
**MC100EL91****AC CHARACTERISTICS** ( $V_{EE} = -4.20V$  to  $-5.5V$ ;  $V_{CC} = 4.75V$  to  $5.25V$ )

Symbol	Characteristic	-40°C			0°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay D to Q (Note 11.) Diff S.E.	540 490	640 640	740 790	560 510	660 660	760 810	570 520	670 670	770 820	610 560	710 710	810 860	ps
t <sub>SKEW</sub>	Skew Output-to-Output (Note 7.) Part-to-Part (Diff) (Note 7.) Duty Cycle (Diff) (Note 8.)		40 25	100 200		40 25	100 200		40 25	100 200		40 25	100 200	ps
V <sub>PP</sub>	Minimum Input Swing (Note 9.)	200			200			200			200			mV
V <sub>CMR</sub>	Common Mode Range (Note 10.) V <sub>PP</sub> < 500mV V <sub>PP</sub> ≥ 500mV	1.3 1.5		V <sub>CC-0.2</sub> V <sub>CC-0.2</sub>	1.2 1.4		V <sub>CC-0.2</sub> V <sub>CC-0.2</sub>	1.2 1.4		V <sub>CC-0.2</sub> V <sub>CC-0.2</sub>	1.2 1.4		V <sub>CC-0.2</sub> V <sub>CC-0.2</sub>	V
t <sub>r</sub> t <sub>f</sub>	Output Rise/Fall Times Q (20% – 80%)	320	400	580	320	400	580	320	400	580	320	400	580	ps

- Skews are valid across specified voltage range, part-to-part skew is for a given temperature.
- Duty cycle skew is the difference between a TPLH and TPHL propagation delay through a device.
- Minimum input swing for which AC parameters guaranteed. The device has a DC gain of ≈40.
- The CMR range is referenced to the most positive side of the differential input signal. Normal operation is obtained if the HIGH level falls within the specified range and the peak-to-peak voltage lies between V<sub>ppmin</sub> and 1V.
- The MC100EL91 design has different propagation delays compared to the MC100LVEL91 due to differences in the translation structure.

OUTLINE DIMENSIONS

DW SUFFIX  
PLASTIC SOIC PACKAGE  
CASE 751D-04  
ISSUE E



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: MILLIMETER.
  3. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
  4. MAXIMUM MOLD PROTRUSION 0.150 (0.006) PER SIDE.
  5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.13 (0.005) TOTAL IN EXCESS OF D DIMENSION AT MAXIMUM MATERIAL CONDITION.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	12.65	12.95	0.499	0.510
B	7.40	7.60	0.292	0.299
C	2.35	2.65	0.093	0.104
D	0.35	0.49	0.014	0.019
F	0.50	0.90	0.020	0.035
G	1.27 BSC		0.050 BSC	
J	0.25	0.32	0.010	0.012
K	0.10	0.25	0.004	0.009
M	0°	7°	0°	7°
P	10.05	10.55	0.395	0.415
R	0.25	0.75	0.010	0.029

Motorola reserves the right to make changes without further notice to any products herein. Motorola makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Motorola 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 consequential or incidental damages. "Typical" parameters which may be provided in Motorola 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. Motorola does not convey any license under its patent rights nor the rights of others. Motorola 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 Motorola product could create a situation where personal injury or death may occur. Should Buyer purchase or use Motorola products for any such unintended or unauthorized application, Buyer shall indemnify and hold Motorola 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 Motorola was negligent regarding the design or manufacture of the part. Motorola and are registered trademarks of Motorola, Inc. Motorola, Inc. is an Equal Opportunity/Affirmative Action Employer.

Mfax is a trademark of Motorola, Inc.

How to reach us:

USA/EUROPE/Locations Not Listed: Motorola Literature Distribution;  
P.O. Box 5405, Denver, Colorado 80217. 1-303-675-2140 or 1-800-441-2447

JAPAN: Nippon Motorola Ltd.: SPD, Strategic Planning Office, 4-32-1,  
Nishi-Gotanda, Shinagawa-ku, Tokyo 141, Japan. 81-3-5487-8488

Customer Focus Center: 1-800-521-6274

Mfax™: RMFAX0@email.sps.mot.com – TOUCHTONE 1-602-244-6609  
Motorola Fax Back System – US & Canada ONLY 1-800-774-1848  
– http://sps.motorola.com/mfax/

ASIA/PACIFIC: Motorola Semiconductors H.K. Ltd.; 8B Tai Ping Industrial Park,  
51 Ting Kok Road, Tai Po, N.T., Hong Kong. 852-26629298

HOME PAGE: http://motorola.com/sps/

