

## Triple ECL to PECL Translator

The MC100LVEL/EL90 is a triple ECL to PECL translator. The device receives either standard or low voltage differential ECL signals and translates them to either standard or low voltage differential PECL output signals. The LVEL device can handle the low voltage signals while the EL device is designed for the standard signals. It is possible to have low voltage signals on one side and standard signals on the other if the LVEL90 is used.

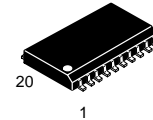
- 500ps Propagation Delays
- Fully Differential Design
- Supports both Standard and Low Voltage Operation
- 20-Lead SOIC Packaging

A  $V_{BB}$  output is provided for interfacing with single ended ECL 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 EL90 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/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 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  $V_{EE}/2$  and the D input will be pulled to  $V_{EE}$ . This condition will force the Q output to a LOW, ensuring stability.

# MC100LVEL90 MC100EL90

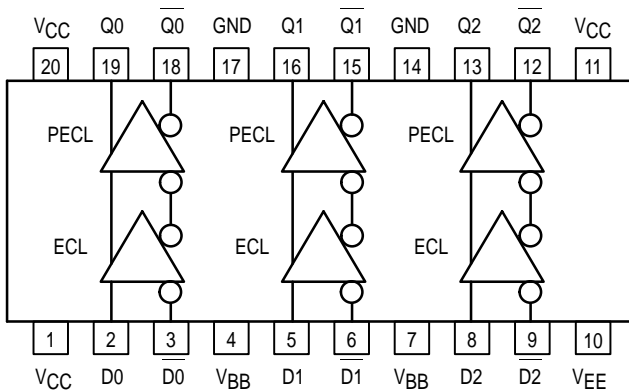


**DW SUFFIX**  
PLASTIC SOIC PACKAGE  
CASE 751D-04

### PIN NAMES

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

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



## ECL 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>EE</sub>	Power Supply Voltage EL90 LVEL90	-4.2 -3.0	-5.5 -3.8	-4.2 -3.0	-5.5 -3.8	-4.2 -3.0		-5.5 -3.8	-4.2 -3.0	-5.5 -3.8	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>PP</sub>	Minimum Peak-to-Peak Input <sup>1</sup>	150		150		150			150		mV	
V <sub>IH</sub>	Input HIGH Voltage	-1165	-880	-1165	-880	-1165		-880	-1165	-880	V	
V <sub>IL</sub>	Input LOW Voltage	-1810	-1475	-1810	-1475	-1810		-1475	-1810	-1475	V	
V <sub>BB</sub>	Reference Output	-1.38	-1.26	-1.38	-1.26	-1.38		-1.26	-1.38	-1.26	V	
I <sub>EE</sub>	Power Supply Current		8.0		8.0		6.0	8.0		8.0	mA	

1. 150mV input guarantees full logic swing at the output.

## LVPECL 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>CC</sub>	Power Supply Voltage	3.0	3.8	3.0	3.8	3.0	3.3	3.8	3.0	3.8	V	
V <sub>OH</sub>	Output HIGH Voltage <sup>1</sup>	2.215	2.42	2.275	2.42	2.275	2.35	2.42	2.275	2.42	V	V <sub>CC</sub> = 3.3V
V <sub>OL</sub>	Output LOW Voltage <sup>1</sup>	1.47	1.745	1.49	1.68	1.49	1.60	1.68	1.49	1.68	V	V <sub>CC</sub> = 3.3V
I <sub>GND</sub>	Power Supply Current		24		24		20	24		26	mA	

1. Levels will vary 1:1 with V<sub>CC</sub>.

## PECL 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>CC</sub>	Power Supply Voltage	4.75	5.25	4.75	5.25	4.75		5.25	4.75	5.25	V	
V <sub>OH</sub>	Output HIGH Voltage <sup>1</sup>	3.915	4.12	3.975	4.12	3.975	4.05	4.12	3.975	4.12	V	V <sub>CC</sub> = 5.0V
V <sub>OL</sub>	Output LOW Voltage <sup>1</sup>	3.17	3.445	3.19	3.38	3.19	3.30	3.38	3.19	3.38	V	V <sub>CC</sub> = 5.0V
I <sub>GND</sub>	Power Supply Current		24		24		20	24		26	mA	

1. Levels will vary 1:1 with V<sub>CC</sub>.

**MC100LVEL90****AC CHARACTERISTICS** ( $V_{EE} = -3.0V$  to  $-3.8V$ ;  $V_{CC} = 3.0V$  to  $3.8V$ )

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.	390 340		590 640	410 360		610 660	420 370		620 670	460 410		660 710	ps
t <sub>SKEW</sub>	Skew Output-to-Output <sup>1</sup> Part-to-Part (Diff) <sup>1</sup> Duty Cycle (Diff) <sup>2</sup>		20 25	100 200		20 25	100 200		20 25	100 200		20 25	100 200	ps
V <sub>PP</sub>	Minimum Input Swing <sup>3</sup>	150			150			150			150			mV
V <sub>CMR</sub>	Common Mode Range <sup>4</sup>	See <sup>4</sup>		-0.4	See <sup>4</sup>		-0.4	See <sup>4</sup>		-0.4	See <sup>4</sup>		-0.4	V
t <sub>r</sub> t <sub>f</sub>	Output Rise/Fall Times Q (20% – 80%)	230		500	230		500	230		500	230		500	ps

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. Minimum input swing for which AC parameters guaranteed. The device has a DC gain of  $\approx 40$ .
4. 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  $V_{ppmin}$  and 1V.  $V_{CMRmin}$  depends on  $V_{EE}$ ,  $V_{PP}$  and temperature. At  $V_{PP} < 500mV$  and  $-40^\circ C$ ,  $V_{CMR}$  is  $V_{EE} + 1.3V$ ; and for  $0-85^\circ C$ ,  $V_{CMR}$  is  $V_{EE} + 1.2V$ . At  $V_{PP} \geq 500mV$  and  $-40^\circ C$ ,  $V_{CMR}$  is  $V_{EE} + 1.5V$ ; and for  $0-85^\circ C$ ,  $V_{CMR}$  is  $V_{EE} + 1.4V$ .

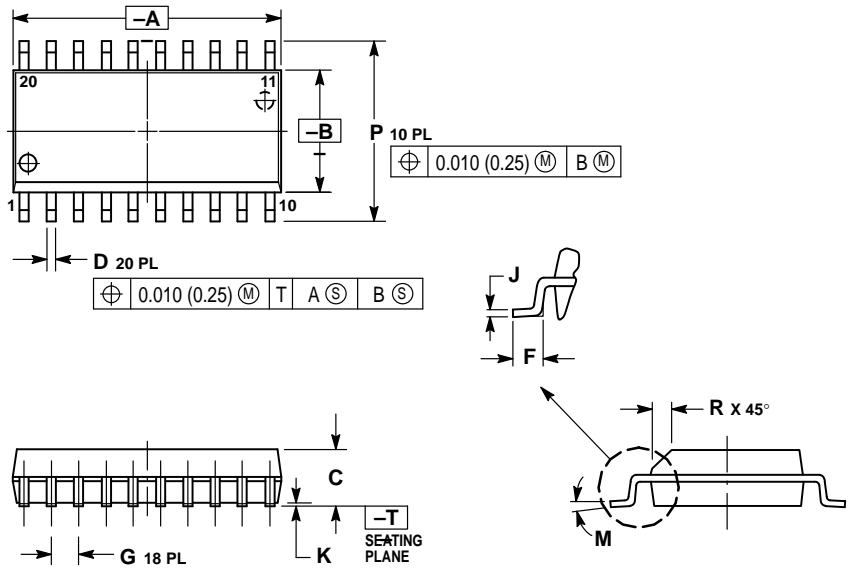
**MC100EL90****AC CHARACTERISTICS** ( $V_{EE} = -4.20V$  to  $-5.5V$ ;  $V_{CC} = 4.5V$  to  $5.5V$ )

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.	390 340		590 640	410 360		610 660	420 370		620 670	460 410		660 710	ps
t <sub>SKEW</sub>	Skew Output-to-Output <sup>1</sup> Part-to-Part (Diff) <sup>1</sup> Duty Cycle (Diff) <sup>2</sup>		20 25	100 200		20 25	100 200		20 25	100 200		20 25	100 200	ps
V <sub>PP</sub>	Minimum Input Swing <sup>3</sup>	150			150			150			150			mV
V <sub>CMR</sub>	Common Mode Range <sup>4</sup>	See <sup>4</sup>		-0.4	See <sup>4</sup>		-0.4	See <sup>4</sup>		-0.4	See <sup>4</sup>		-0.4	V
t <sub>r</sub> t <sub>f</sub>	Output Rise/Fall Times Q (20% – 80%)	230		500	230		500	230		500	230		500	ps

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. Minimum input swing for which AC parameters guaranteed. The device has a DC gain of  $\approx 40$ .
4. 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  $V_{ppmin}$  and 1V.  $V_{CMRmin}$  depends on  $V_{EE}$ ,  $V_{PP}$  and temperature. At  $V_{PP} < 500mV$  and  $-40^\circ C$ ,  $V_{CMR}$  is  $V_{EE} + 1.3V$ ; and for  $0-85^\circ C$ ,  $V_{CMR}$  is  $V_{EE} + 1.2V$ . At  $V_{PP} \geq 500mV$  and  $-40^\circ C$ ,  $V_{CMR}$  is  $V_{EE} + 1.5V$ ; and for  $0-85^\circ C$ ,  $V_{CMR}$  is  $V_{EE} + 1.4V$ .

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.

**How to reach us:**  
**USA/EUROPE/Locations Not Listed:** Motorola Literature Distribution;  
 P.O. Box 20912; Phoenix, Arizona 85036. 1-800-441-2447 or 602-303-5454

**JAPAN:** Nippon Motorola Ltd.; Tatsumi-SPD-JLDC, 6F Seibu-Butsuryu-Center,  
 3-14-2 Tatsumi Koto-Ku, Tokyo 135, Japan. 03-81-3521-8315

**MFAX:** RMFAX0@email.sps.mot.com – TOUCHTONE 602-244-6609  
**INTERNET:** http://Design-NET.com

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

