

MC100EL91

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

The MC100EL91 is a triple LVPECL / PECL input to ECL output translator. The device receives standard or low voltage differential PECL signals, determined by the V_{CC} supply level, and translates them to differential -5 V ECL output signals. (For translation 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 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.

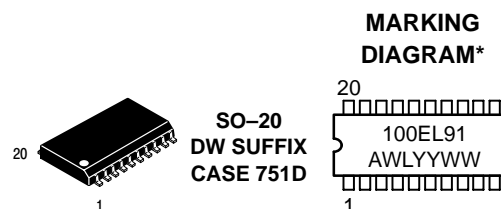
The V_{BB} pin, an internally generated voltage supply, is available to this device only. For single-ended input conditions, the unused differential input is connected to V_{BB} as a switching reference voltage. V_{BB} may also rebias AC coupled inputs. When used, decouple V_{BB} and V_{CC} via a 0.01 μ F capacitor and limit current sourcing or sinking to 0.5 mA. When not used, V_{BB} should be left open.

- 670 ps Typical Propagation Delay
- ESD Protection: >2 KV HBM
- The 100 Series Contains Temperature Compensation
- Operating Range: V_{CC} = 3.0 V to 5.25 V;
 V_{EE} = -4.2 V to -5.5 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 1
For Additional Information, see Application Note AND8003/D
- Flammability Rating: UL-94 code V-0 @ 1/8",
Oxygen Index 28 to 34
- Transistor Count = 282 devices



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A = Assembly Location
WL = Wafer Lot
YY = Year
WW = Work Week

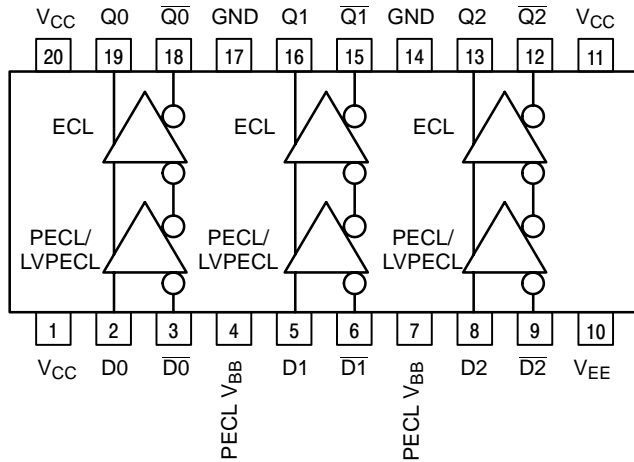
*For additional information, see Application Note
AND8002/D

ORDERING INFORMATION

| Device | Package | Shipping |
|---------------|---------|-----------------|
| MC100EL91DW | SO-20 | 38 Units/Rail |
| MC100EL91DWR2 | SO-20 | 1000 Units/Reel |

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20-Lead Pinout (Top View) and Logic Diagram



PIN DESCRIPTION

| PIN | FUNCTION |
|---------------------|-------------------------------|
| Dn, \overline{Dn} | PECL/LVPECL 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.

MAXIMUM RATINGS (Note 1.)

| Symbol | Parameter | Condition 1 | Condition 2 | Rating | Units |
|---------------|--|---------------------|--------------------|-------------|--------------|
| 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 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 | 20 SOIC 20 SOIC | 90 60 | °C/W °C/W |
| θ_{JC} | Thermal Resistance (Junction to Case) | std bd | 20 SOIC | 30 to 35 | °C/W |
| T_{sol} | Wave Solder | <2 to 3 sec @ 248°C | | 265 | °C |

1. Maximum Ratings are those values beyond which device damage may occur.

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LVPECL INPUT DC CHARACTERISTICS $V_{CC}=3.3\text{ V}$; $V_{EE}=-5.0\text{ V}$; $GND=0\text{ V}$ (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) | 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) (Note 2.) $V_{pp} < 500\text{ mV}$ $V_{pp} \geq 500\text{ mV}$ | | | | | | | | | | |
| | | 1.0 | | 2.9 | 0.9 | | 2.9 | 0.9 | | 2.9 | V |
| | | 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 | 0.5 | | | 0.5 | | | 0.5 | | | μA |

NOTE: Devices are designed to meet the DC specifications shown in the above table, after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and transverse air flow greater than 500 lfm is maintained.

- Input parameters vary 1:1 with V_{CC} . V_{CC} can vary $\pm 0.3\text{ V}$.
- V_{IHCMR} min varies 1:1 with GND. V_{IHCMR} max varies 1:1 with V_{CC} .

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.) $V_{pp} < 500\text{ mV}$ $V_{pp} \geq 500\text{ mV}$ | | | | | | | | | | V |
| | | 1.0 | | 4.6 | 0.9 | | 4.6 | 0.9 | | 4.6 | |
| | | 1.2 | | 4.6 | 1.1 | | 4.6 | 1.1 | | 4.6 | |
| I_{IH} | Input HIGH Current | | | 150 | | | 150 | | | 150 | μA |
| I_{IL} | Input LOW Current | 0.5 | | | 0.5 | | | 0.5 | | | μA |

NOTE: Devices are designed to meet the DC specifications shown in the above table, after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and transverse air flow greater than 500 lfm is maintained.

- Input parameters vary 1:1 with V_{CC} . V_{CC} can vary $\pm 0.25\text{ V}$.
- V_{IHCMR} min varies 1:1 with GND. V_{IHCMR} max varies 1:1 with V_{CC} .

NECL OUTPUT DC CHARACTERISTICS $V_{CC}=3.3\text{ V}$ to 5.0 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: Devices are designed to meet the DC specifications shown in the above table, after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and transverse air flow greater than 500 lfm is maintained.

- Output parameters vary 1:1 with GND. V_{EE} can vary $\pm 0.8\text{ V}$ / -0.5 V .
- Outputs are terminated through a 50 ohm resistor to GND—2 volts.

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AC CHARACTERISTICS $V_{CC}= 3.0\text{ V to }5.5\text{ V}$; $V_{EE}= -4.2\text{ V to }-5.5\text{ V}$; $GND= 0\text{ V}$:

| Symbol | Characteristic | -40°C | | | 25°C | | | 85°C | | | Unit |
|------------------------|--|------------|------------|------------|------------|------------|------------|------------|------------|------------|------|
| | | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | |
| f_{\max} | Maximum Toggle Frequency | | TBD | | | TBD | | | TBD | | GHz |
| t_{PLH} t_{PHL} | Propagation Delay D to Q Diff S.E. | 540 490 | 640 640 | 740 790 | 570 520 | 670 670 | 770 820 | 610 560 | 710 710 | 810 860 | ps |
| t_{SKEW} | Skew Output-to-Output (Note 1.) Part-to-Part (Diff) (Note 1.) Duty Cycle (Diff) (Note 2.) | | 40 25 | 100 200 | | 40 25 | 100 200 | | 40 25 | 100 200 | ps |
| t_{JITTER} | Cycle-to-Cycle Jitter | | TBD | | | TBD | | | TBD | | ps |
| V_{PP} | Input Swing (Note 3.) | 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 |

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 the minimum input swing for which AC parameters are guaranteed. The device has a DC gain of ≈ 40 .

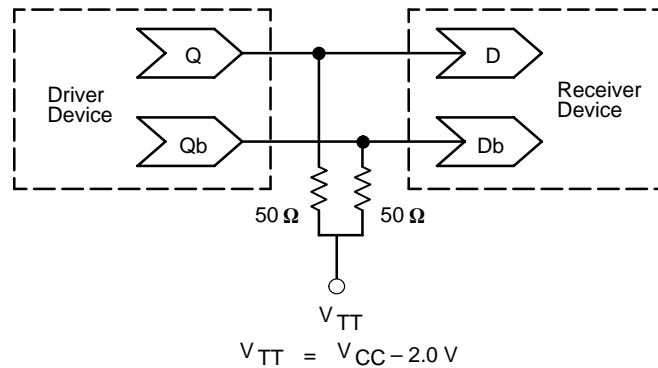


Figure 1. Typical Termination for Output Driver and Device Evaluation
(See Application Note AND8020 – Termination of ECL Logic Devices.)

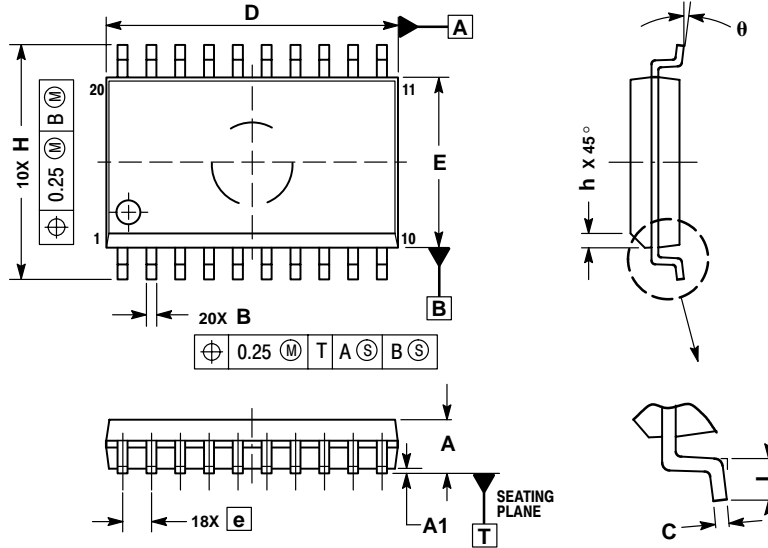
Resource Reference of Application Notes

- AN1404** – ECLinPS Circuit Performance at Non-Standard V_{IH} Levels
- AN1405** – ECL Clock Distribution Techniques
- AN1406** – Designing with PECL (ECL at +5.0 V)
- AN1503** – ECLinPS I/O SPICE Modeling Kit
- AN1504** – Metastability and the ECLinPS Family
- AN1560** – Low Voltage ECLinPS SPICE Modeling Kit
- AN1568** – Interfacing Between LVDS and ECL
- AN1596** – ECLinPS Lite Translator ELT Family SPICE I/O Model Kit
- AN1650** – Using Wire-OR Ties in ECLinPS Designs
- AN1672** – The ECL Translator Guide
- AND8001** – Odd Number Counters Design
- AND8002** – Marking and Date Codes
- AND8020** – Termination of ECL Logic Devices

MC100EL91

PACKAGE DIMENSIONS

SO-20
DW SUFFIX
PLASTIC SOIC PACKAGE
CASE 751D-05
ISSUE F




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° |

Notes

Notes

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