# MC100ELT23

# 5 V Dual Differential PECL to TTL Translator

The MC100ELT23 is a dual differential PECL to TTL translator. Because PECL (Positive ECL) levels are used, only +5 V and ground are required. The small outline 8-lead package and the dual gate design of the ELT23 makes it ideal for applications which require the translation of a clock and a data signal.

The PECL inputs are differential; therefore, the MC100ELT23 can accept any standard differential PECL input referenced from a $V_{CC}$ of 5.0 V.

- 3.5 ns Typical Propagation Delay
- 24 mA TTL Outputs
- Flow Through Pinouts
- The 100 Series Contains Temperature Compensation
- Operating Range $V_{CC}$ = 4.75 V to 5.25 V with GND = 0 V
- Internal Input 50 KΩ Pulldown Resistors
- Q Output Will Default LOW with Inputs Left Open or < 1.3 V

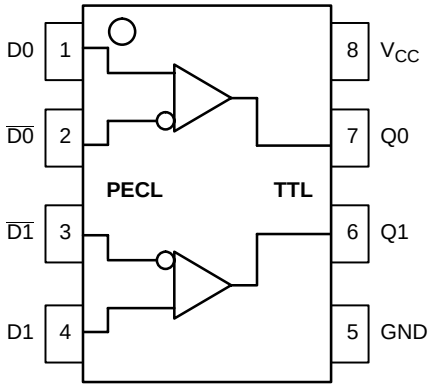


**Figure 1. 8−Lead Pinout and Logic Diagram**
(Top View)

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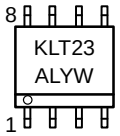
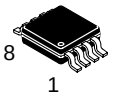
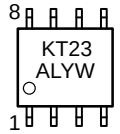
**MARKING DIAGRAMS***


**SOIC−8**
**D SUFFIX**
**CASE 751**




**TSSOP−8**
**DT SUFFIX**
**CASE 948R**




A = Assembly Location
L = Wafer Lot
Y = Year
W = Work Week

*For additional marking information, refer to Application Note AND8002/D.

**PIN DESCRIPTION**

| PIN | FUNCTION |
|---|---|
| Qn | TTL Outputs |
| Dn, $\overline{Dn}$ | PECL Differential Inputs |
| $V_{CC}$ | Positive Supply |
| GND | Ground |

**ORDERING INFORMATION**

| Device | Package | Shipping† |
|---|---|---|
| MC100ELT23D | SOIC−8 | 98 Units / Rail |
| MC100ELT23DR2 | SOIC−8 | 2500 Tape & Reel |
| MC100ELT23DT | TSSOP−8 | 98 Units / Rail |
| MC100ELT23DTR2 | TSSOP−8 | 2500 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.

## ATTRIBUTES

| Characteristics | | Value |
|---|---|---|
| Internal Input Pulldown Resistor | | 50 kΩ |
| Internal Input Pullup Resistor | | N/A |
| ESD Protection | Human Body Model<br>Machine Model | > 2 KV<br>> 400 V |
| Moisture Sensitivity, Indefinite Time Out of Drypack (Note 1) | | Level 1 |
| Flammability Rating | Oxygen Index: 28 to 34 | UL 94 V−0 @ 0.125 in |
| Transistor Count | | 91 |
| Meets or exceeds JEDEC Spec EIA/JESD78 IC Latchup Test | | |

1. For additional information, see Application Note AND8003/D.

## MAXIMUM RATINGS

| Symbol | Parameter | Condition 1 | Condition 2 | Rating | Unit |
|---|---|---|---|---|---|
| $V_{CC}$ | Power Supply | GND = 0 V | | 7 | V |
| $V_I$ | Input Voltage | GND = 0 V | $V_I \leq V_{CC}$ | 0 to 6 | V |
| $T_A$ | Operating Temperature Range | | | −40 to +85 | °C |
| $T_{stg}$ | Storage Temperature Range | | | −65 to +150 | °C |
| $\theta_{JA}$ | Thermal Resistance (Junction−to−Ambient) | 0 lfpm<br>500 lfpm | SOIC−8<br>SOIC−8 | 190<br>130 | °C/W<br>°C/W |
| $\theta_{JC}$ | Thermal Resistance (Junction−to−Case) | Standard Board | SOIC−8 | 41 to 44 | °C/W |
| $\theta_{JA}$ | Thermal Resistance (Junction−to−Ambient) | 0 lfpm<br>500 lfpm | TSSOP−8<br>TSSOP−8 | 185<br>140 | °C/W<br>°C/W |
| $\theta_{JC}$ | Thermal Resistance (Junction−to−Case) | Standard Board | TSSOP−8 | 41 to 44 ± 5% | °C/W |
| $T_{sol}$ | Wave Solder | < 2 to 3 sec @ 248°C | | 265 | °C |

Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If stress limits are exceeded device functional operation is not implied, damage may occur and reliability may be affected. Functional operation should be restricted to the Recommended Operating Conditions.

## PECL INPUT DC CHARACTERISTICS $V_{CC}$ = 5.0 V; GND = 0.0 V (Note 2)

| | | −40°C | | | 25°C | | | 85°C | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Symbol | Characteristic | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | Unit |
| $V_{IH}$ | Input HIGH Voltage (Single−Ended) (Note 4) | 3835 | | 4120 | 3835 | | 4120 | 3835 | | 4120 | mV |
| $V_{IL}$ | Input LOW Voltage (Single−Ended) | 3190 | | 3525 | 3190 | | 3525 | 3190 | | 3525 | mV |
| $V_{IHCMR}$ | Input HIGH Voltage Common Mode Range (Differential) (Note 3) | 2.2 | | 5.0 | 2.2 | | 5.0 | 2.2 | | 5.0 | V |
| $I_{IH}$ | Input HIGH Current | | | 255 | | | 175 | | | 175 | μA |
| $I_{IL}$ | Input LOW Current | 0.5 | | | 0.5 | | | 0.5 | | | 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.

2. Input parameters vary 1:1 with $V_{CC}$. $V_{CC}$ can vary ± 0.25 V.
3. $V_{IHCMR}$ min varies 1:1 with GND, $V_{IHCMR}$ max varies 1:1 with $V_{CC}$.
4. TTL output $R_L$ = 500 Ω to GND.

**TTL OUTPUT DC CHARACTERISTICS** $V_{CC}$ = 4.75V to 5.25V; $T_A$ = −40°C to 85°C

| Symbol | Characteristic | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| $V_{OH}$ | Output HIGH Voltage | $I_{OH}$ = −3.0 mA | 2.4 | | (Note 5) | V |
| $V_{OL}$ | Output LOW Voltage | $I_{OL}$ = 24 mA | | | 0.5 | V |
| $I_{CCH}$ | Power Supply Current | | | 23 | 33 | mA |
| $I_{CCL}$ | Power Supply Current | | | 26 | 36 | mA |
| $I_{OS}$ | Output Short Circuit Current | | −150 | | −60 | mA |

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.

5. Max level is $V_{CC}$ − 0.7 V by design.

**AC CHARACTERISTICS** $V_{CC}$= 5.0 V; GND= 0.0 V (Note 6 and Note 7)

| | | −40°C | | | 25°C | | | 85°C | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Symbol | Characteristic | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | Unit |
| $f_{max}$ | Maximum Toggle Frequency | | | | | 100 | | | | | MHz |
| $t_{JITTER}$ | Random Clock Jitter (RMS) | | | | | 35 | | | | | ps |
| $t_{PLH}$ | Propagation Delay @ 1.5 V | 2.0 | | 5.5 | 2.0 | | 5.5 | 2.0 | | 5.5 | ns |
| $t_{PHL}$ | Propagation Delay @ 1.5 V | 2.0 | | 5.5 | 2.0 | | 5.5 | 2.0 | | 5.5 | ns |
| $V_{PP}$ | Input Swing (Note 8) | 200 | | 1000 | 200 | | 1000 | 200 | | 1000 | mV |
| $t_r/t_f$ | Output Rise Time (10−90%)<br>Output Fall Time (10−90%) | | | | | 1.6<br>1.1 | | | | | ns<br>ns |

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.

6. $V_{CC}$ can vary ± 0.25 V.
7. TTL output $R_L$ = 500 Ω to GND, and $C_L$ = 20 pF to GND. Refer to Figure 2.
8. $V_{PP}$(min) is the minimum input swing for which AC parameters are guaranteed. The device has a DC gain of ≈ 40.

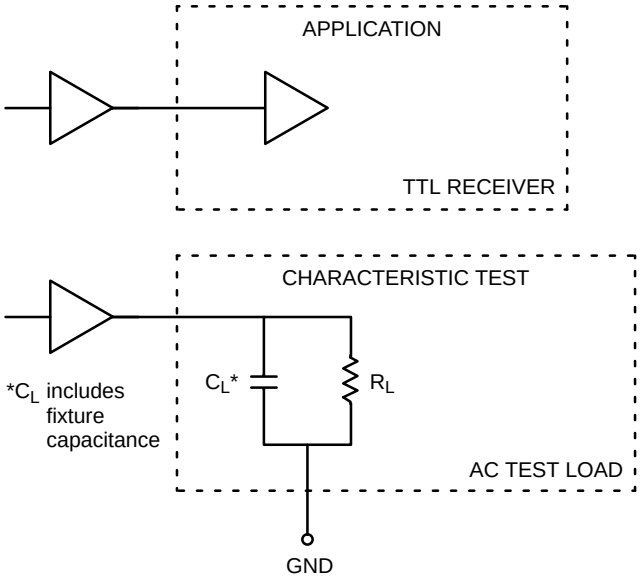


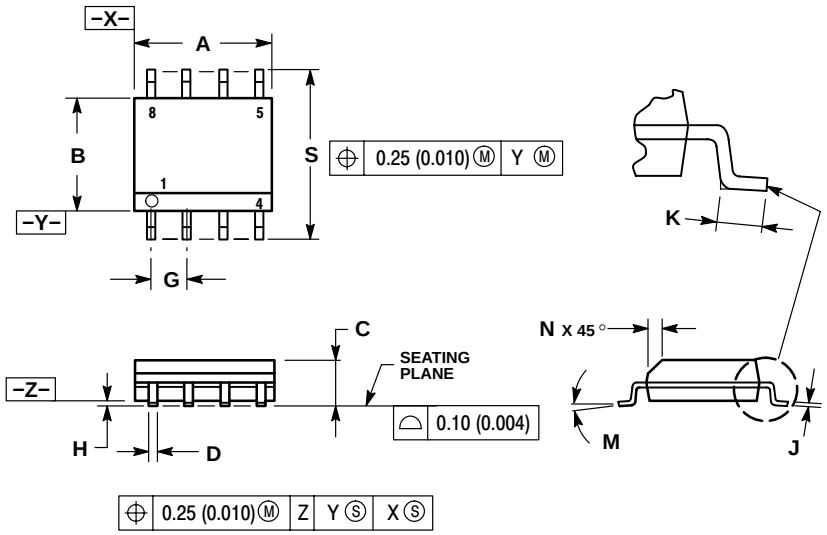

**Figure 2. TTL Output Loading Used for Device Evaluation**

### 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 |
| **AND8090** | − | AC Characteristics of ECL Devices |

## PACKAGE DIMENSIONS

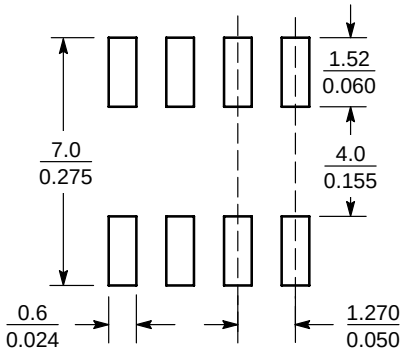
**SOIC−8**
**D SUFFIX**
PLASTIC SOIC PACKAGE
CASE 751−07
ISSUE AB




NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.
6. 751−01 THRU 751−06 ARE OBSOLETE. NEW STANDARD IS 751−07.

| | MILLIMETERS | | INCHES | |
|---|---|---|---|---|
| DIM | MIN | MAX | MIN | MAX |
| A | 4.80 | 5.00 | 0.189 | 0.197 |
| B | 3.80 | 4.00 | 0.150 | 0.157 |
| C | 1.35 | 1.75 | 0.053 | 0.069 |
| D | 0.33 | 0.51 | 0.013 | 0.020 |
| G | 1.27 BSC | | 0.050 BSC | |
| H | 0.10 | 0.25 | 0.004 | 0.010 |
| J | 0.19 | 0.25 | 0.007 | 0.010 |
| K | 0.40 | 1.27 | 0.016 | 0.050 |
| M | 0 ° | 8 ° | 0 ° | 8 ° |
| N | 0.25 | 0.50 | 0.010 | 0.020 |
| S | 5.80 | 6.20 | 0.228 | 0.244 |

## SOLDERING FOOTPRINT

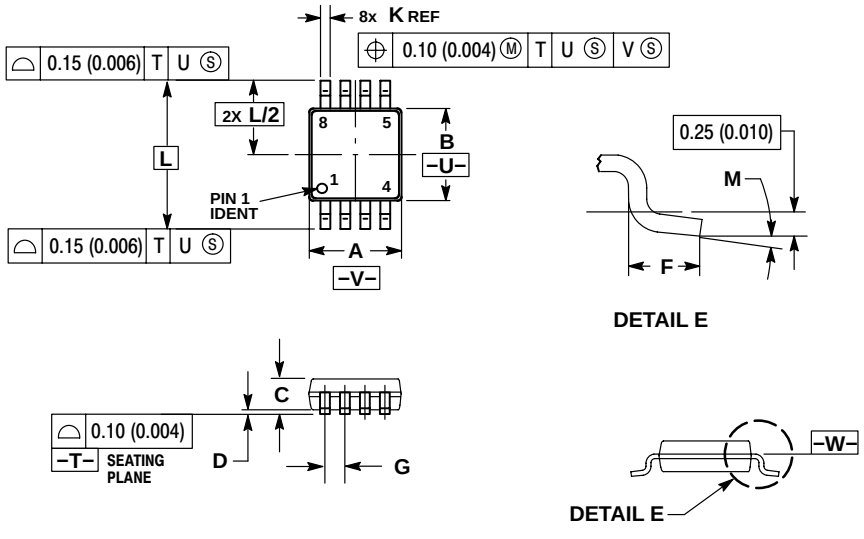



SCALE 6:1 $\left(\frac{\text{mm}}{\text{inches}}\right)$

**SOIC−8**

## PACKAGE DIMENSIONS

**TSSOP−8**
**DT SUFFIX**
PLASTIC TSSOP PACKAGE
CASE 948R−02
ISSUE A




NOTES:
1. DIMENSIONS AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A DOES NOT INCLUDE MOLD FLASH. PROTRUSIONS OR GATE BURRS. MOLD FLASH OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
4. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 (0.010) PER SIDE.
5. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
6. DIMENSION A AND B ARE TO BE DETERMINED AT DATUM PLANE −W−.

| | MILLIMETERS | | INCHES | |
|---|---|---|---|---|
| DIM | MIN | MAX | MIN | MAX |
| A | 2.90 | 3.10 | 0.114 | 0.122 |
| B | 2.90 | 3.10 | 0.114 | 0.122 |
| C | 0.80 | 1.10 | 0.031 | 0.043 |
| D | 0.05 | 0.15 | 0.002 | 0.006 |
| F | 0.40 | 0.70 | 0.016 | 0.028 |
| G | 0.65 BSC | | 0.026 BSC | |
| K | 0.25 | 0.40 | 0.010 | 0.016 |
| L | 4.90 BSC | | 0.193 BSC | |
| M | 0° | 6° | 0° | 6° |



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