5.0 V Dual TTL to Differential PECL Translator

The MC10ELT/100ELT22 is a dual TTL to differential PECL translator. Because PECL (Positive ECL) levels are used only +5 V and ground are required. The small outline 8-lead package and the low skew, dual gate design of the ELT22 makes it ideal for applications which require the translation of a clock and a data signal.

Features

- 1.2 ns Typical Propagation Delay
- < 300 ps Typical Output to Output Skew
- PNP TTL Inputs for Minimal Loading
- Flow Through Pinouts
- Operating Range: $V_{CC} = 4.75 \text{ V}$ to 5.25 V with GND = 0 V
- No Internal Input Pulldown Resistors
- Pb-Free Packages are Available



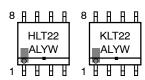
ON Semiconductor®

http://onsemi.com

MARKING DIAGRAMS*



SO-8 D SUFFIX CASE 751









H = MC10

K = MC100

A = Assembly Location

L = Wafer Lot

Y = Year

W = Work Week

■ = Pb-Free Package

(Note: Microdot may be in either location)
*For additional information, see Application Note
AND8002/D.

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 5 of this data sheet.

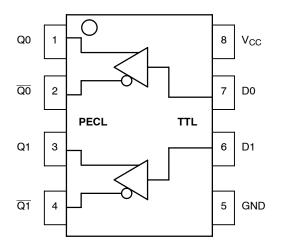


Table 1. PIN DESCRIPTION

| Pin | Function |
|-----------------|----------------------------|
| Qn, Qn | PECL Differential Outputs* |
| Dn | TTL Inputs |
| V _{CC} | Positive Supply |
| GND | Ground |

^{*}Output state undetermined when inputs are open.

Figure 1. Logic Diagram and Pinout Assignment

Table 2. ATTRIBUTES

| Characte | Value | | | | | |
|--|-----------------------------------|----------------------|--|--|--|--|
| Internal Input Pulldown Resistor | N/A | | | | | |
| Internal Input Pullup Resistor | | N/A | | | | |
| ESD Protection | Human Body Model Machine Model | > 2 kV > 200 V | | | | |
| Moisture Sensitivity, Indefinite T | ime Out of Drypack (Note 1) | Level 1 | | | | |
| Flammability Rating | Oxygen Index: 28 to 34 | UL 94 V-0 @ 0.125 in | | | | |
| Transistor Count | | 51 | | | | |
| Meets or exceeds JEDEC Spec EIA/JESD78 IC Latchup Test | | | | | | |

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

Table 3. MAXIMUM RATINGS

| Symbol | Parameter | Condition 1 | Condition 2 | Rating | Units |
|-------------------|--|---------------------|--------------------|--|----------|
| V _{CC} | Positive Power Supply | GND = 0 V | | 7 | V |
| V _{IN} | Input Voltage | GND = 0 V | | $\begin{array}{c} \text{GND} + 0.025 \leq V_{I} \\ \leq V_{CC} - 0.025 \end{array}$ | V |
| l _{out} | Output Current | Continuous Surge | | 50 100 | mA mA |
| T _A | Operating Temperature Range | | | -40 to +85 | °C |
| T _{stg} | Storage Temperature Range | | | -65 to +150 | °C |
| θJΑ | Thermal Resistance (Junction-to-Ambient) | 0 lfpm 500 lfpm | 8 SOIC 8 SOIC | 190 130 | °C/W |
| $\theta_{\sf JC}$ | Thermal Resistance (Junction-to-Case) | Standard Board | 8 SOIC | 41 to 44 | °C/W |
| $\theta_{\sf JA}$ | Thermal Resistance (Junction-to-Ambient) | 0 lfpm 500 lfpm | 8 TSSOP 8 TSSOP | 185 140 | °C/W |
| θ _{JC} | Thermal Resistance (Junction-to-Case) | Standard Board | 8 TSSOP | 41 to 44 ± 5% | °C/W |
| T _{sol} | Wave Solder | <2 to 3 sec @ 248°C | | 265 | °C |

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

Table 4. 10ELT SERIES PECL DC CHARACTERISTICS V_{CC} = 5.0 V; GND = 0.0 V (Note 2)

| | | −40°C | | 25°C | | | 85°C | | | | |
|-----------------|------------------------------|-------|------|------|------|------|------|------|------|------|------|
| Symbol | Characteristic | Min | Тур | Max | Min | Тур | Max | Min | Тур | Max | Unit |
| I _{CC} | Power Supply Current | | | 22 | | | 22 | | | 22 | mA |
| V _{OH} | Output HIGH Voltage (Note 3) | 3920 | 4010 | 4110 | 4020 | 4105 | 4190 | 4090 | 4185 | 4280 | mV |
| V _{OL} | Output LOW Voltage (Note 3) | 3050 | 3200 | 3350 | 3050 | 3210 | 3370 | 3050 | 3227 | 3405 | 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 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. Output parameters vary 1:1 with V_{CC} . V_{CC} can vary \pm 0.25 V.
- 3. Outputs are terminated through a 50 Ω resistor to V_{CC} 2.0 V.

Table 5. 100ELT SERIES PECL DC CHARACTERISTICS V_{CC} = 5.0 V; GND = 0.0 V (Note 4)

| | | | -40°C | | 25°C | | 85°C | | | | |
|-----------------|------------------------------|------|-------|------|------|------|------|------|------|------|------|
| Symbol | Characteristic | Min | Тур | Max | Min | Тур | Max | Min | Тур | Max | Unit |
| I _{CC} | Power Supply Current | | | 22 | | | 22 | | | 22 | mA |
| V _{OH} | Output HIGH Voltage (Note 5) | 3915 | 3995 | 4120 | 3975 | 4045 | 4120 | 3975 | 4050 | 4120 | mV |
| V _{OL} | Output LOW Voltage (Note 5) | 3170 | 3305 | 3445 | 3190 | 3295 | 3380 | 3190 | 3295 | 3380 | 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 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.

- 4. Output parameters vary 1:1 with V_{CC} . V_{CC} can vary \pm 0.25 V.
- 5. Outputs are terminated through a 50 Ω resistor to V_{CC} 2.0 V.

Table 6. TTL INPUT DC CHARACTERISTICS $V_{CC} = 4.75 \text{ V}$ to 5.25 V; $T_A = -40 ^{\circ}\text{C}$ to $85 ^{\circ}\text{C}$

| Symbol | Characteristic | Condition | Min | Тур | Max | Unit |
|-----------------|---------------------------|--|---------------|-----|---------------------------|------|
| I _{IH} | Input HIGH Current | $V_{IN} = 2.7 \text{ V};$ $V_{IN} = (V_{CC} - 0.025) \text{ V}$ | | | 20 | μΑ |
| Іінн | Input HIGH Current | V _{IN} = 7.0 V | | | 100 | μΑ |
| I _{IL} | Input LOW Current | $V_{IN} = 0.5 \text{ V};$ $V_{IN} = (GND + 0.025) \text{ V}$ | | | -0.6 | mA |
| V _{IK} | Input Clamp Diode Voltage | I _{IN} = -18 mA | | | -1.2 | V |
| V_{IH} | Input HIGH Voltage | | 2.0 | | V _{CC} - 0.025 V | V |
| V _{IL} | Input LOW Voltage | | GND + 0.025 V | | 0.8 | V |

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.

Table 7. AC CHARACTERISTICS V_{CC} = 4.75 V to 5.25 V; GND= 0.0 V

| | | | -40°C | | 25°C | | 85°C | | | | |
|--------------------------------|---|-----|-----------|------------|------|-----------|------------|-----|-----------|------------|------|
| Symbol | Characteristic | Min | Тур | Max | Min | Тур | Max | Min | Тур | Max | Unit |
| f _{MAX} | Maximum Input Frequency | | | | | 500 | | | | | MHz |
| t _{PLH} | Propagation Delay (Note 6) 1.5 V to 50% | 0.6 | | 1.2 | 0.9 | 1.2 | 1.5 | 0.6 | | 1.35 | ns |
| t _{PHL} | Propagation Delay (Note 6) 1.5 V to 50% | 0.4 | | 1.0 | 0.5 | 0.8 | 1.1 | 0.7 | | 1.30 | ns |
| t _{skew} | Within-Device Skew (Note 7) Device-to-Device Skew (Note 8) | | 50 300 | 100 600 | | 50 300 | 100 600 | | 50 350 | 100 750 | ps |
| t _{JITTER} | CLOCK Random Jitter (RMS) | | | | | 0.5 | | | | | ps |
| t _r /t _f | Output Rise/Fall Time (20-80%) | 0.4 | | 1.6 | 0.4 | | 1.6 | 0.4 | | 1.6 | 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. Specifications for standard TTL input signal.
- 7. Skew is measured between outputs under identical transitions and conditions on any one device.
- 8. Device-to-Device Skew for identical transitions at identical V_{CC} levels.

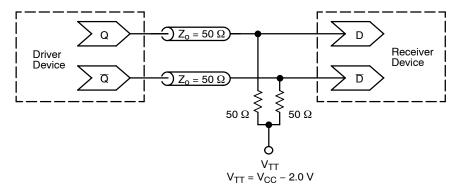


Figure 2. Typical Termination for Output Driver and Device Evaluation (See Application Note AND8020/D – Termination of ECL Logic Devices.)

ORDERING INFORMATION

| Device | Package | Shipping [†] |
|-----------------|----------------------|-----------------------|
| MC10ELT22D | SO-8 | 98 Units / Rail |
| MC10ELT22DG | SO-8 (Pb-Free) | 98 Units / Rail |
| MC10ELT22DR2 | SO-8 | 2500 Tape & Reel |
| MC10ELT22DR2G | SO-8 (Pb-Free) | 2500 Tape & Reel |
| MC10ELT22DT | TSSOP-8 | 100 Units / Rail |
| MC10ELT22DTG | TSSOP-8 (Pb-Free) | 100 Units / Rail |
| MC10ELT22DTR2 | TSSOP-8 | 2500 Tape & Reel |
| MC10ELT22DTR2G | TSSOP-8 (Pb-Free) | 2500 Tape & Reel |
| MC100ELT22D | SO-8 | 98 Units / Rail |
| MC100ELT22DG | SO-8 (Pb-Free) | 98 Units / Rail |
| MC100ELT22DR2 | SO-8 | 2500 Tape & Reel |
| MC100ELT22DR2G | SO-8 (Pb-Free) | 2500 Tape & Reel |
| MC100ELT22DT | TSSOP-8 | 100 Units / Rail |
| MC100ELT22DTG | TSSOP-8 (Pb-Free) | 100 Units / Rail |
| MC100ELT22DTR2 | TSSOP-8 | 2500 Tape & Reel |
| MC100ELT22DTR2G | TSSOP-8 (Pb-Free) | 2500 Tape & Reel |

[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

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

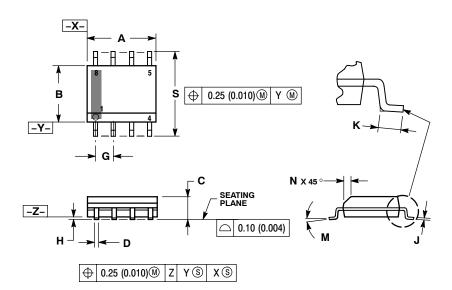
AND8020/D - Termination of ECL Logic Devices

AND8066/D - Interfacing with ECLinPS

AND8090/D - AC Characteristics of ECL Devices

PACKAGE DIMENSIONS

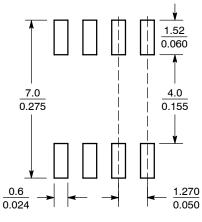
SOIC-8 NB CASE 751-07 **ISSUE AH**



- NOTES:
 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
- CONTROLLING DIMENSION: MILLIMETER.
 DIMENSION A AND B DO NOT INCLUDE
 MOLD PROTRUSION.
 MAXIMUM MOLD PROTRUSION 0.15 (0.006)
- MAXIMUM MIOLD PHOTHUSION 0.13 (0.000)
 PER SIDE.
 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.
 751-01 THRU 751-06 ARE OBSOLETE. NEW STANDARD IS 751-07.

| | MILLIN | IETERS | INC | HES | | |
|-----|--------|--------|-----------|-------|--|--|
| DIM | MIN | MAX | MIN | MAX | | |
| Α | 4.80 | 5.00 | 0.189 | 0.197 | | |
| В | 3.80 | 4.00 | 0.150 | 0.157 | | |
| С | 1.35 | 1.75 | 0.053 | 0.069 | | |
| D | 0.33 | 0.51 | 0.013 | 0.020 | | |
| G | 1.27 | 7 BSC | 0.050 BSC | | | |
| Н | 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*

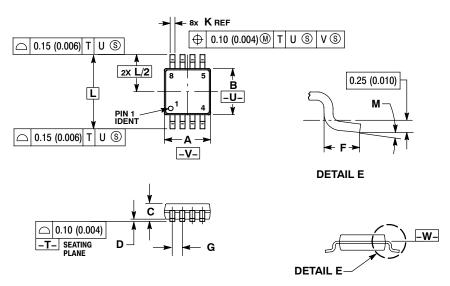


SCALE 6:1

^{*}For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

PACKAGE DIMENSIONS

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



NOTES

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

| | MILLIN | IETERS | INCHES | | | |
|-----|----------|---------|-----------|-------------|--|-----|
| DIM | MIN | MIN MAX | | MIN MAX MIN | | MAX |
| Α | 2.90 | 3.10 | 0.114 | 0.122 | | |
| В | 2.90 | 3.10 | 0.114 | 0.122 | | |
| С | 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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