

MC10ELT21, MC100ELT21

5 V Differential PECL to TTL Translator

Description

The MC10ELT/100ELT21 is a 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 single gate of the ELT21 makes it ideal for those applications where space, performance and low power are at a premium.

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.

The 100 Series contains temperature compensation.

Features

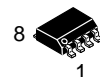
- 3.5 ns Typical Propagation Delay
- 24 mA TTL Output
- Flow Through Pinouts
- Operating Range: $V_{CC} = 4.75$ V to 5.25 V with GND = 0 V
- Q Output Will Default LOW with Inputs Left Open or < 1.3 V
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant



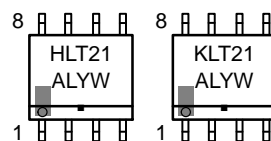
ON Semiconductor®

www.onsemi.com

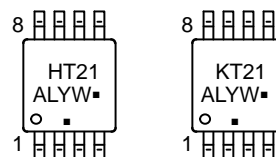
MARKING DIAGRAMS*



8
1
SOIC-8
D SUFFIX
CASE 751



8
1
TSSOP-8
DT SUFFIX
CASE 948R



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 marking information, refer to Application Note AND8002/D.

ORDERING INFORMATION

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

MC10ELT21, MC100ELT21

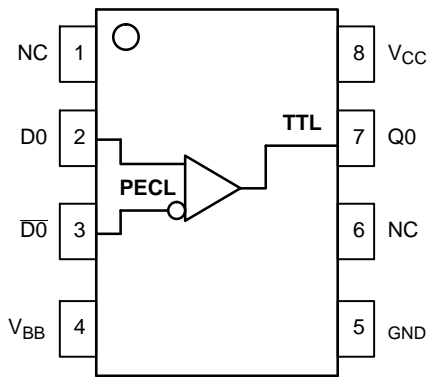


Figure 1. 8-Lead Pinout and Logic Diagram
(Top View)

Table 1. PIN DESCRIPTION

| Pin | Function |
|---------------------|---------------------------|
| Q0 | TTL Outputs |
| D0, $\overline{D0}$ | PECL Differential Outputs |
| V_{BB} | Reference Voltage Output |
| V_{CC} | Positive Supply |
| GND | Ground |
| NC | No Connect |

Table 2. ATTRIBUTES

| Characteristics | Value |
|---|----------------------|
| Internal Input Pulldown Resistor | 50 k Ω |
| Internal Input Pullup Resistor | N/A |
| ESD Protection Human Body Model | > 2 kV |
| Moisture Sensitivity, Indefinite Time Out of Drypack (Note 1) | Pb-Free Pkg |
| | SOIC-8 TSSOP-8 |
| | Level 1 Level 3 |
| Flammability Rating Oxygen Index: 28 to 34 | UL 94 V-0 @ 0.125 in |
| Transistor Count | 81 Devices |
| 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 | Unit |
|---------------|--|--------------------------------------|--------------------|-------------|--|
| V_{CC} | PECL Power Supply | GND = 0 V | | 7 | V |
| V_{IN} | PECL Input Voltage | GND = 0 V | $V_I \leq V_{CC}$ | 0 to 6 | V |
| I_{BB} | V_{BB} Sink/Source | | | ± 0.5 | mA |
| T_A | Operating Temperature Range | | | -40 to +85 | $^{\circ}\text{C}$ |
| T_{stg} | Storage Temperature Range | | | -65 to +150 | $^{\circ}\text{C}$ |
| θ_{JA} | Thermal Resistance (Junction-to-Ambient) | 0 lfpm 500 lfpm | SOIC-8 SOIC-8 | 190 130 | $^{\circ}\text{C}/\text{W}$ $^{\circ}\text{C}/\text{W}$ |
| θ_{JC} | Thermal Resistance (Junction-to-Case) | Standard Board | SOIC-8 | 41 to 44 | $^{\circ}\text{C}/\text{W}$ |
| θ_{JA} | Thermal Resistance (Junction-to-Ambient) | 0 lfpm 500 lfpm | TSSOP-8 TSSOP-8 | 185 140 | $^{\circ}\text{C}/\text{W}$ $^{\circ}\text{C}/\text{W}$ |
| T_{sol} | Wave Solder Pb-Free | <2 to 3 sec @ 260 $^{\circ}\text{C}$ | | 265 | $^{\circ}\text{C}$ |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

MC10ELT21, MC100ELT21

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

| Symbol | Characteristic | -40°C | | | 25°C | | | 85°C | | | Unit |
|-------------|--|-------|-----|------|------|-----|------|------|-----|------|---------------|
| | | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | |
| V_{IH} | Input HIGH Voltage (Single-Ended) | 3770 | | 4110 | 3870 | | 4190 | 3930 | | 4265 | mV |
| V_{IL} | Input LOW Voltage (Single-Ended) | 3050 | | 3500 | 3050 | | 3520 | 3050 | | 3555 | mV |
| V_{BB} | Output Voltage Reference | 3.57 | | 3.7 | 3.65 | | 3.75 | 3.69 | | 3.81 | V |
| V_{IHCMR} | Input HIGH Voltage Common Mode Range (Differential Configuration) (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 | | | 0.3 | | | 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.

- Output 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} .

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

| Symbol | Characteristic | -40°C | | | 25°C | | | 85°C | | | Unit |
|-------------|--|-------|-----|------|------|-----|------|------|-----|-------|---------------|
| | | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | |
| 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 |
| V_{BB} | Output Voltage Reference | 3.62 | | 3.74 | 3.62 | | 3.74 | 3.62 | | 3.745 | V |
| V_{IHCMR} | Input HIGH Voltage Common Mode Range (Differential Configuration) (Note 5) | 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.

- 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} .

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

| Symbol | Characteristic | Condition | Min | Typ | Max | Unit |
|-----------|------------------------------|---------------------------|------|-----|----------|------|
| V_{OH} | Output HIGH Voltage | $I_{OH} = -3.0\text{ mA}$ | 2.4 | | (Note 6) | V |
| V_{OL} | Output LOW Voltage | $I_{OL} = 24\text{ mA}$ | | | 0.5 | V |
| I_{CCH} | Power Supply Current | | | 20 | 29 | mA |
| I_{CCL} | Power Supply Current | | | 22 | 32 | 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.

- Maximum level is $V_{CC} - 0.7$ by design.

MC10ELT21, MC100ELT21

AC CHARACTERISTICS $V_{CC} = 4.75\text{ V to }5.25\text{ V}$; $GND = 0.0\text{ V}$ (Note 7)

| Symbol | Characteristic | -40°C | | | 25°C | | | 85°C | | | Unit |
|--------------|--------------------------------|-------|-----|------|------|-----|------|------|-----|------|------|
| | | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | |
| 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/Fall Time (10–90%) | | | | | 750 | | | | | ps |

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.

7. $R_L = 500\ \Omega$ to GND and $C_L = 20\text{ pF}$ to GND. Refer to Figure 2.

8. $V_{PP}(\text{min})$ is the minimum input swing for which AC parameters are guaranteed. The device has a DC gain of ≈ 40 .

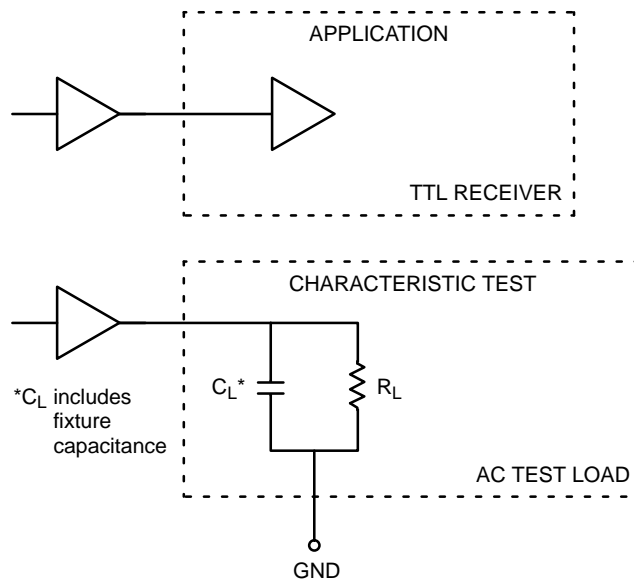


Figure 2. TTL Output Loading Used for Device Evaluation

MC10ELT21, MC100ELT21

ORDERING INFORMATION

| Device | Package | Shipping† |
|-----------------|----------------------|--------------------|
| MC10ELT21DG | SOIC-8 (Pb-Free) | 98 Units / Rail |
| MC10ELT21DR2G | SOIC-8 (Pb-Free) | 2500 / Tape & Reel |
| MC10ELT21DTG | TSSOP-8 (Pb-Free) | 100 Units / Rail |
| MC10ELT21DTR2G | TSSOP-8 (Pb-Free) | 2500 / Tape & Reel |
| MC100ELT21DG | SOIC-8 (Pb-Free) | 98 Units / Rail |
| MC100ELT21DR2G | SOIC-8 (Pb-Free) | 2500 / Tape & Reel |
| MC100ELT21DTG | TSSOP-8 (Pb-Free) | 100 Units / Rail |
| MC100ELT21DTR2G | 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 Specifications Brochure, BRD8011/D.

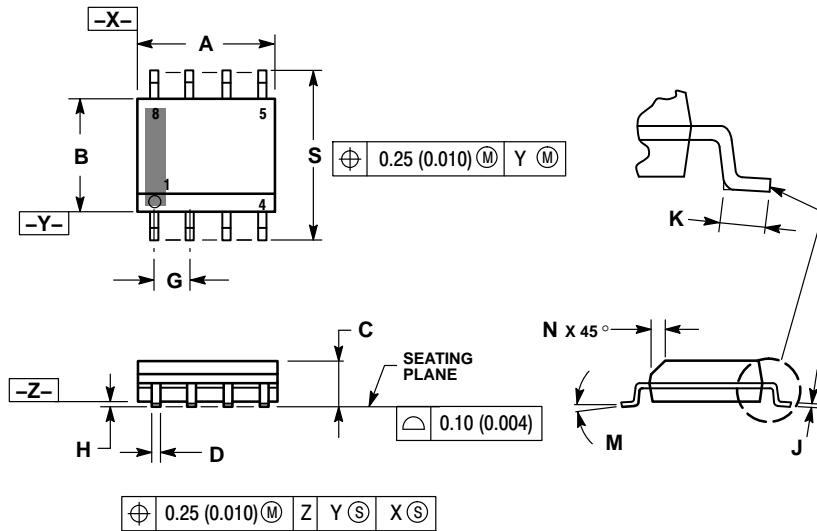
Resource Reference of Application Notes

- 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

MC10ELT21, MC100ELT21

PACKAGE DIMENSIONS

SOIC-8 NB
CASE 751-07
ISSUE AK

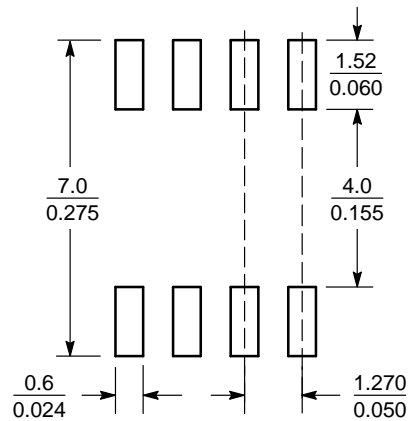


NOTES:

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.

| DIM | MILLIMETERS | | INCHES | |
|-----|-------------|------|-----------|-------|
| | 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*



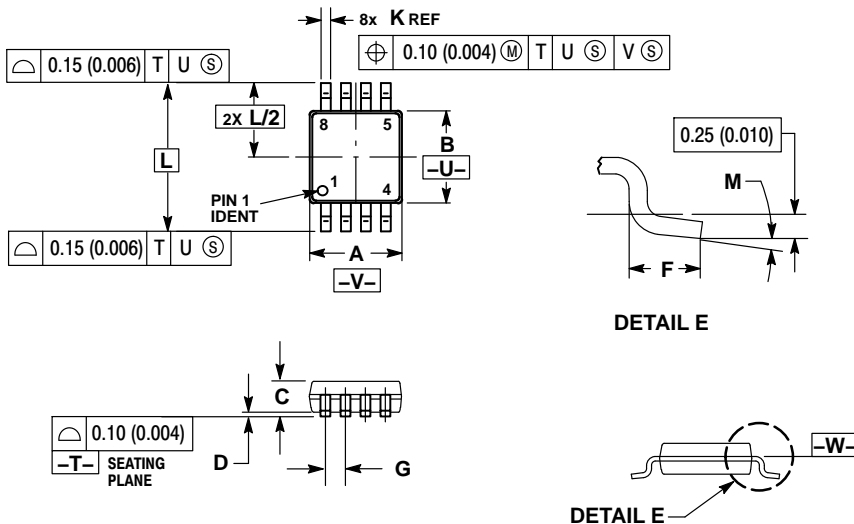
SCALE 6:1 $\left(\frac{\text{mm}}{\text{inches}}\right)$

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

MC10ELT21, MC100ELT21

PACKAGE DIMENSIONS


TSSOP-8
DT SUFFIX
CASE 948R-02
ISSUE A



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 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 -V-.

| DIM | MILLIMETERS | | INCHES | |
|-----|-------------|------|-----------|-------|
| | 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° |

ECLinPS is a trademark of Semiconductor Components Industries, LLC (SCILLC).

ON Semiconductor and the  are registered trademarks of Semiconductor Components Industries, LLC (SCILLC) or its subsidiaries in the United States and/or other countries. SCILLC owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of SCILLC's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC 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 special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC 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. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC 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 SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC 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 SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor
19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA
Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada
Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800-282-9855 Toll Free
USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81-3-5817-1050

ON Semiconductor Website: www.onsemi.com

Order Literature: <http://www.onsemi.com/orderlit>

For additional information, please contact your local Sales Representative