

MC10ELT28, MC100ELT28

5V TTL to Differential PECL and Differential PECL to TTL Translator

The MC10ELT/100ELT28 is a differential PECL to TTL translator and a TTL to differential PECL translator in a single package. Because PECL (Positive ECL) levels are used, only +5 V and ground are required. The small outline 8-lead package and the dual translation design of the ELT28 makes it ideal for applications which are sending and receiving signals across a backplane.

The 100 Series contains temperature compensation.

- 3.5 ns Typical PECL to TTL Propagation Delay
- 1.2 ns Typical TTL to PECL Propagation Delay
- PNP TTL Inputs for Minimal Loading
- 24 mA TTL Outputs
- Flow Through Pinouts
- ESD Protection: >2 KV HBM
- Operating Range V_{CC} = 4.75 V to 5.25 V with GND = 0 V
- Q_{TTL} Output Will Default High with Inputs Left Open or < 1.3 V
- Q_{ECL} Output Will Default High with Inputs Left Open
- Internal PECL Input Pulldown Resistors
- 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 V-0 @ 0.125 in, Oxygen Index: 28 to 34
- Transistor Count = 71 devices

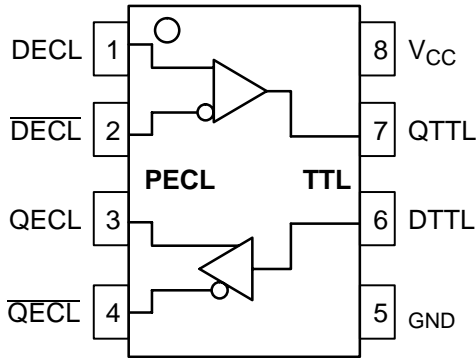


Figure 1. 8-Lead Pinout and Logic Diagram (Top View)

PIN DESCRIPTION

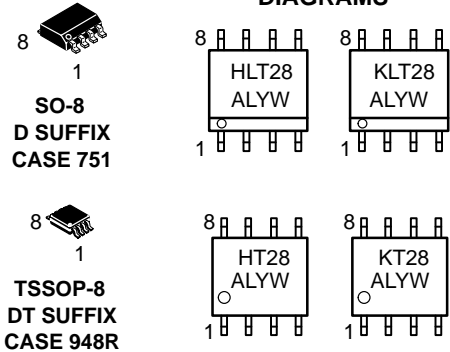
| PIN | FUNCTION |
|----------------------------------|---------------------------|
| QTTL | TTL Output |
| DTTL | TTL Inputs |
| Q_{ECL} , $\overline{Q_{ECL}}$ | PECL Differential Outputs |
| $DECL$, \overline{DECL} | PECL Differential Inputs |
| V_{CC} | Positive Supply |
| GND | Ground |



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MARKING DIAGRAMS*



H = MC10 L = Wafer Lot
 K = MC100 Y = Year
 A = Assembly Location W = Work Week

*For additional information, see Application Note AND8002/D

ORDERING INFORMATION

| Device | Package | Shipping |
|----------------|---------|------------------|
| MC10ELT28D | SO-8 | 98 Units/Rail |
| MC10ELT28DR2 | SO-8 | 2500 Tape & Reel |
| MC100ELT28D | SO-8 | 98 Units/Rail |
| MC100ELT28DR2 | SO-8 | 2500 Tape & Reel |
| MC10ELT28DT | TSSOP-8 | 98 Units/Rail |
| MC10ELT28DTR2 | TSSOP-8 | 2500 Tape & Reel |
| MC100ELT28DT | TSSOP-8 | 98 Units/Rail |
| MC100ELT28DTR2 | TSSOP-8 | 2500 Tape & Reel |

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MAXIMUM RATINGS (Note 1)

| Symbol | Parameter | Condition 1 | Condition 2 | Rating | Unit |
|------------------|--|----------------------|----------------------------------|---------------|--------------|
| V _{CC} | Positive Power Supply | GND = 0 V | | 7 | V |
| V _{IN} | Input Voltage | GND = 0 V | V _I ≤ V _{CC} | 0 to 6 | V |
| I _{out} | PECL 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 |
| θ _{JA} | Thermal Resistance (Junction-to-Ambient) | 0 LFPM 500 LFPM | 8 SOIC 8 SOIC | 190 130 | °C/W °C/W |
| θ _{JC} | Thermal Resistance (Junction-to-Case) | std bd | 8 SOIC | 41 to 44 | °C/W |
| θ _{JA} | Thermal Resistance (Junction-to-Ambient) | 0 LFPM 500 LFPM | 8 TSSOP 8 TSSOP | 185 140 | °C/W °C/W |
| θ _{JC} | Thermal Resistance (Junction-to-Case) | std bd | 8 TSSOP | 41 to 44 ± 5% | °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.

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

| Symbol | Characteristic | -40 °C | | | 25 °C | | | 85 °C | | | Unit |
|--------------------|--|--------|------|------|-------|------|------|-------|------|------|------|
| | | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | |
| 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 |
| V _{IH} | Input HIGH Voltage (Single-Ended) | 3770 | | 4110 | 3870 | | 4190 | 3940 | | 4280 | mV |
| V _{IL} | Input LOW Voltage (Single-Ended) | 3050 | | 3500 | 3050 | | 3520 | 3050 | | 3555 | mV |
| V _{IHCMR} | Input HIGH Voltage Common Mode Range (Differential) (Note 4) | 2.2 | | 5.0 | 2.2 | | 5.0 | 2.2 | | 5.0 | V |
| I _{IH} | Input HIGH Current | | | 150 | | | 150 | | | 150 | μA |
| I _{IL} | Input LOW Current | 0.5 | | | 0.5 | | | 0.3 | | | 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 lpm is maintained.

2. Input and output parameters vary 1:1 with V_{CC}. V_{CC} can vary ± 0.25 V.

3. PECL outputs are terminated through a 50 ohm resistor to V_{CC}-2 volts.

4. V_{IHCMR} min varies 1:1 with GND, V_{IHCMR} max varies 1:1 with V_{CC}.

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

| Symbol | Characteristic | -40 °C | | | 25 °C | | | 85 °C | | | Unit |
|--------------------|--|--------|------|------|-------|------|------|-------|------|------|------|
| | | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | |
| V _{OH} | Output HIGH Voltage (Note 6) | 3915 | 3995 | 4120 | 3975 | 4045 | 4120 | 3975 | 4050 | 4120 | mV |
| V _{OL} | Output LOW Voltage (Note 6) | 3170 | 3305 | 3445 | 3190 | 3295 | 3380 | 3190 | 3295 | 3380 | mV |
| 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 _{IHCMR} | Input HIGH Voltage Common Mode Range (Differential) (Note 7) | 2.2 | | 5.0 | 2.2 | | 5.0 | 2.2 | | 5.0 | 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 lpm is maintained.

5. Input and output parameters vary 1:1 with V_{CC}. V_{CC} can vary ± 0.25 V.

6. PECL outputs are terminated through a 50 ohm resistor to V_{CC} - 2 volts.

7. V_{IHCMR} min varies 1:1 with GND, V_{IHCMR} max varies 1:1 with V_{CC}.

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

| Symbol | Characteristic | Condition | Min | Typ | Max | Unit |
|-----------|------------------------------|--------------------|------|-----|-----|------|
| V_{OH} | Output HIGH Voltage | $I_{OH} = -3.0$ mA | 2.4 | | | V |
| V_{OL} | Output LOW Voltage | $I_{OL} = 24$ mA | | | 0.5 | V |
| I_{CCH} | Power Supply Current | | | 27 | 40 | mA |
| I_{CCL} | Power Supply Current | | | 29 | 42 | mA |
| I_{OS} | Output Short Circuit Current | | -150 | | -60 | mA |

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

| Symbol | Characteristic | Condition | Min | Typ | Max | Unit |
|-----------|---------------------------|-------------------|-----|-----|------|---------|
| I_{IH} | Input HIGH Current | $V_{IN} = 2.7$ V | | | 20 | μ A |
| I_{IHH} | Input HIGH Current | $V_{IN} = 7.0$ V | | | 100 | μ A |
| I_{IL} | Input LOW Current | $V_{IN} = 0.5$ 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 |
| V_{IL} | Input LOW Voltage | | | | 0.8 | V |

AC CHARACTERISTICS $V_{CC} = 4.75$ V to 5.25 V (Note 8.)

| Symbol | Characteristic | $-40^{\circ}C$ | | | $25^{\circ}C$ | | | $85^{\circ}C$ | | | Unit |
|------------|---|----------------|-----|------|---------------|-----|------|---------------|-----|------|------|
| | | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | |
| f_{max} | Maximum Toggle Frequency | | TBD | | | 100 | | | TBD | | MHz |
| t_{PLH} | Propagation Delay @ 1.5 V DECL to QTTL DTTL to QECL | 2.0 | | 5.5 | 2.0 | | 5.5 | 2.0 | | 5.5 | ns |
| | | 0.6 | | 1.2 | 0.9 | 1.2 | 1.5 | 0.6 | | 1.35 | |
| t_{PHL} | Propagation Delay @ 1.5 V DECL to QTTL DTTL to QECL | 2.0 | | 5.5 | 2.0 | | 5.5 | 2.0 | | 5.5 | ns |
| | | 0.4 | | 1.0 | 0.5 | 0.8 | 1.1 | 0.7 | | 1.3 | |
| t_r, t_f | Rise/Fall Times (20% - 80%) QECL | 0.15 | | 1.5 | 0.15 | | 1.5 | 0.15 | | 1.5 | ns |
| V_{PP} | PECL Input Swing (Note 9) | 200 | | 1000 | 200 | | 1000 | 200 | | 1000 | mV |
| t_r/t_f | Output Rise Time (10-90%) Output Fall Time (10-90%) | | | | | 1.6 | | | | | ns |
| | | | | | | 1.1 | | | | | ns |

8. $R_L = 500 \Omega$ to GND and $C_L = 20$ pF to GND. Refer to Figure 2.

9. $V_{PP}(\min)$ is the minimum input swing for which AC parameters are guaranteed.

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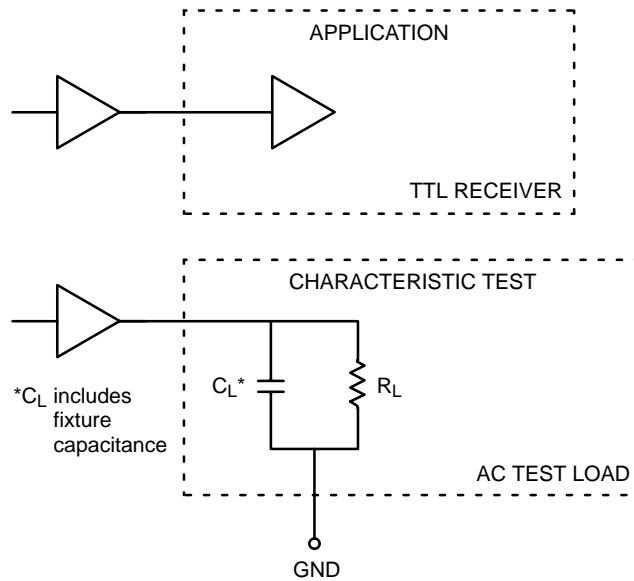


Figure 2. TTL Output Loading Used for Device Evaluation

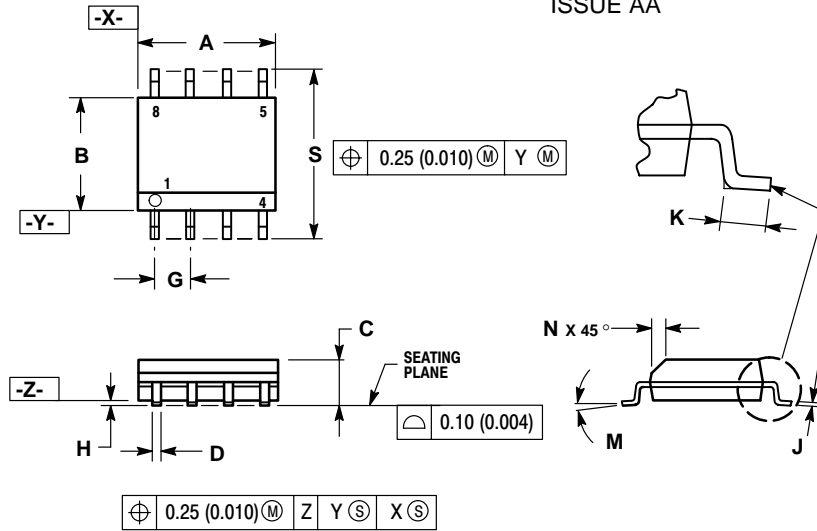
Resource Reference of Application Notes

- 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

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PACKAGE DIMENSIONS

SO-8 D SUFFIX PLASTIC SOIC PACKAGE CASE 751-07 ISSUE AA



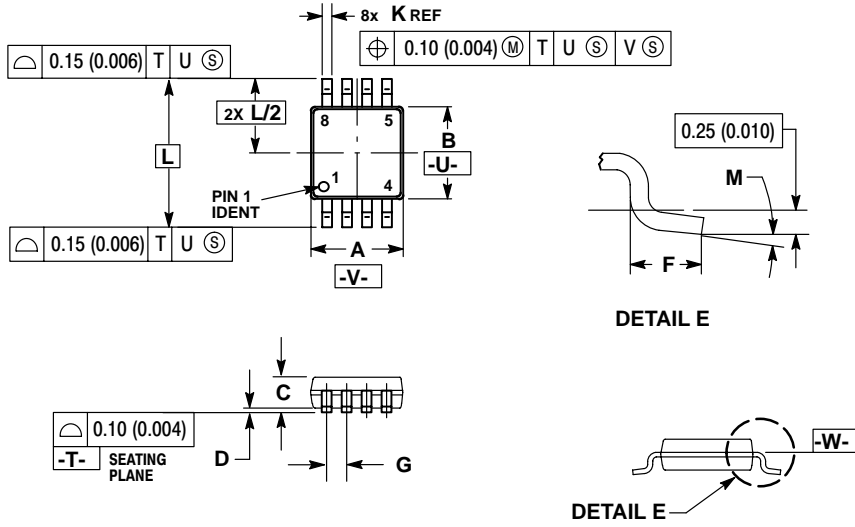
- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: MILLIMETER.
 3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
 4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
 5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (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 |

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PACKAGE DIMENSIONS

TSSOP-8
DT SUFFIX
PLASTIC TSSOP PACKAGE
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 -W-.

| 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° |

Notes

MC10ELT28, MC100ELT28

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