

# MC10ELT25, MC100ELT25

## -5V Differential ECL to TTL Translator

The MC10ELT/100ELT25 is a differential ECL to TTL translator. Because ECL levels are used, a +5 V, -5.2 V (or -4.5 V) and ground are required. The small outline 8-lead package and the single gate of the ELT25 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  $\mu$ 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.

- 2.6 ns Typical Propagation Delay
- 100 MHz  $F_{MAX}$  CLK
- 24 mA TTL Outputs
- Flow Through Pinouts
- ESD Protection: >1 KV HBM, > 400 V MM
- Operating Range:  $V_{CC}$ = 4.5 V to 5.5 V with GND= 0 V;  $V_{EE}$ = -4.2 V to -5.7 V with GND= 0 V
- Internal Input Pulldown Resistors
- Q Output will default HIGH with inputs open or < 1.3 V
- 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 = 38 devices

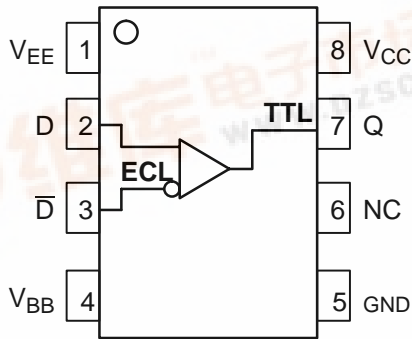


Figure 1. 8-Lead Pinout and Logic Diagram (Top View)

### PIN DESCRIPTION

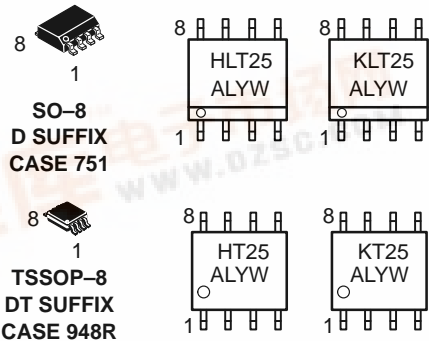
| PIN          | FUNCTION                 |
|--------------|--------------------------|
| D, $\bar{D}$ | ECL Differential Inputs  |
| Q            | TTL Output               |
| $V_{BB}$     | Reference Voltage Output |
| $V_{CC}$     | Positive Supply          |
| $V_{EE}$     | Negative Supply          |
| GND          | Ground                   |
| NC           | No Connect               |



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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         |
|----------------|---------|------------------|
| MC10ELT25D     | SO-8    | 98 Units/Rail    |
| MC10ELT25DR2   | SO-8    | 2500 Tape & Reel |
| MC100ELT25D    | SO-8    | 98 Units/Rail    |
| MC100ELT25DR2  | SO-8    | 2500 Tape & Reel |
| MC10ELT25DT    | TSSOP-8 | 98 Units/Rail    |
| MC10ELT25DTR2  | TSSOP-8 | 2500 Tape & Reel |
| MC100ELT25DT   | TSSOP-8 | 98 Units/Rail    |
| MC100ELT25DTR2 | TSSOP-8 | 2500 Tape & Reel |



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## MAXIMUM RATINGS (Note 1)

| Symbol           | Parameter                                | Condition 1         | Condition 2              | Rating               | Units        |
|------------------|--|---------------------|--------------------------|----------------------|--------------|
| V <sub>CC</sub>  | Positive Power Supply                    | GND = 0 V           | V <sub>EE</sub> = -5.0 V | 7                    | V            |
| V <sub>EE</sub>  | Negative Power Supply                    | GND = 0 V           | V <sub>CC</sub> = +5.0 V | -8                   | V            |
| V <sub>IN</sub>  | Input Voltage                            | GND = 0 V           |                          | 0 to V <sub>EE</sub> | V            |
| I <sub>BB</sub>  | V <sub>BB</sub> Sink/Source              |                     |                          | ± 0.5                | mA           |
| TA               | Operating Temperature Range              |                     |                          | -40 to +85           | °C           |
| T <sub>stg</sub> | Storage Temperature Range                |                     |                          | -65 to +150          | °C           |
| θ <sub>JA</sub>  | Thermal Resistance (Junction to Ambient) | 0 LFPM<br>500 LFPM  | 8 SOIC<br>8 SOIC         | 190<br>130           | °C/W<br>°C/W |
| θ <sub>JC</sub>  | Thermal Resistance (Junction to Case)    | std bd              | 8 SOIC                   | 41 to 44             | °C/W         |
| θ <sub>JA</sub>  | Thermal Resistance (Junction to Ambient) | 0 LFPM<br>500 LFPM  | 8 TSSOP<br>8 TSSOP       | 185<br>140           | °C/W<br>°C/W |
| θ <sub>JC</sub>  | Thermal Resistance (Junction to Case)    | std bd              | 8 TSSOP                  | 41 to 44 ± 5%        | °C/W         |
| T <sub>sol</sub> | Wave Solder                              | <2 to 3 sec @ 248°C |                          | 265                  | °C           |

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

## 10ELT SERIES NECL DC CHARACTERISTICS V<sub>CC</sub>= 5.0 V; V<sub>EE</sub>= -5.0 V; GND= 0 V (Note 2)

| Symbol             | Characteristic   | -40°C |     |       | 25°C  |     |       | 85°C  |     |       | Unit |
|--------------------|--|-------|-----|-------|-------|-----|-------|-------|-----|-------|------|
|                    |  | Min   | Typ | Max   | Min   | Typ | Max   | Min   | Typ | Max   |      |
| V <sub>IH</sub>    | Input HIGH Voltage (Single Ended)                            | -1230 |     | -890  | -1130 |     | -810  | -1060 |     | -720  | mV   |
| V <sub>IL</sub>    | Input LOW Voltage (Single Ended)                             | -1950 |     | -1500 | -1950 |     | -1480 | -1950 |     | -1445 | mV   |
| V <sub>BB</sub>    | Output Voltage Reference                                     | -1.43 |     | -1.30 | -1.35 |     | -1.25 | -1.31 |     | -1.19 | V    |
| V <sub>IHCMR</sub> | Input HIGH Voltage Common Mode Range (Differential) (Note 3) | -2.8  |     | 0.0   | -2.8  |     | 0.0   | -2.8  |     | 0.0   | V    |
| I <sub>IH</sub>    | Input HIGH Current   |       |     | 150   |       |     | 150   |       |     | 150   | μA   |
| I <sub>IL</sub>    | 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 parameters vary 1:1 with GND. V<sub>EE</sub> can vary +0.06 V / -0.5 V.

3. V<sub>IHCMR</sub> min varies 1:1 with V<sub>EE</sub>; V<sub>IHCMR</sub> max varies 1:1 with GND.

## 100ELT SERIES NECL DC CHARACTERISTICS V<sub>CC</sub>= 5.0 V; V<sub>EE</sub>= -5.0 V; GND= 0 V (Note 4)

| Symbol             | Characteristic   | -40°C |     |       | 25°C  |     |       | 85°C  |     |       | Unit |
|--------------------|--|-------|-----|-------|-------|-----|-------|-------|-----|-------|------|
|                    |  | Min   | Typ | Max   | Min   | Typ | Max   | Min   | Typ | Max   |      |
| V <sub>IH</sub>    | Input HIGH Voltage (Single Ended)                            | -1165 |     | -880  | -1165 |     | -880  | -1165 |     | -880  | mV   |
| V <sub>IL</sub>    | Input LOW Voltage (Single Ended)                             | -1810 |     | -1475 | -1810 |     | -1475 | -1810 |     | -1475 | mV   |
| V <sub>BB</sub>    | Output Voltage Reference                                     | -1.38 |     | -1.26 | -1.38 |     | -1.26 | -1.38 |     | -1.26 | V    |
| V <sub>IHCMR</sub> | Input HIGH Voltage Common Mode Range (Differential) (Note 5) | -2.8  |     | 0.0   | -2.8  |     | 0.0   | -2.8  |     | 0.0   | V    |
| I <sub>IH</sub>    | Input HIGH Current   |       |     | 150   |       |     | 150   |       |     | 150   | μA   |
| I <sub>IL</sub>    | 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.

4. Input parameters vary 1:1 with GND. V<sub>EE</sub> can vary +0.8 V / -0.5 V.

5. V<sub>IHCMR</sub> min varies 1:1 with V<sub>EE</sub>; V<sub>IHCMR</sub> max varies 1:1 with GND.

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### TTL OUTPUT DC CHARACTERISTICS $V_{CC} = 4.5\text{ V to }5.5\text{ V}; T_A = -40^\circ\text{C to }+85^\circ\text{C}$

| Symbol    | Characteristic                | Condition                 | Min  | Typ | Max | Unit |
|-----------|-------------------------------|---------------------------|------|-----|-----|------|
| $V_{OH}$  | Output HIGH Voltage           | $I_{OH} = -3.0\text{ mA}$ | 2.4  |     |     | V    |
| $V_{OL}$  | Output LOW Voltage            | $I_{OL} = 24\text{ mA}$   |      |     | 0.5 | V    |
| $I_{CCH}$ | Power Supply Current          |                           |      | 11  | 16  | mA   |
| $I_{CCL}$ | Power Supply Current          |                           |      | 13  | 18  | mA   |
| $I_{EE}$  | Negative Power Supply Current |                           |      | 15  | 21  | mA   |
| $I_{OS}$  | Output Short Circuit Current  |                           | -150 |     | -60 | mA   |

### AC CHARACTERISTICS $V_{CC} = 5.0\text{ V}; V_{EE} = -5.0\text{ V}; GND = 0\text{ V}$ (Note 6 and Note 7)

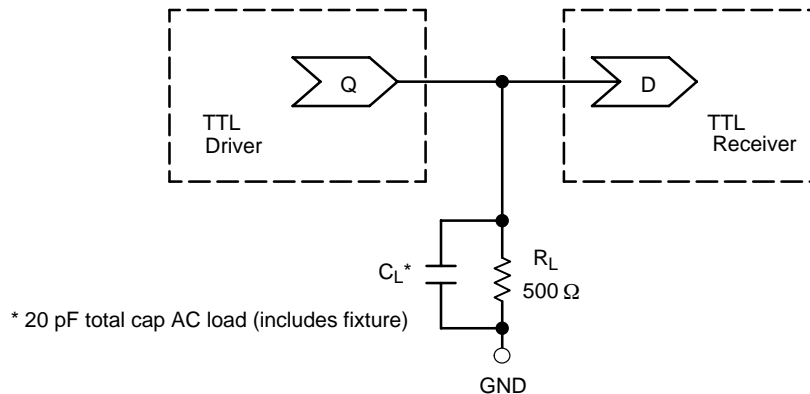
| Symbol         | Characteristic   | -40°C |     |      | 25°C |            |      | 85°C |     |      | Unit |
|----------------|--|-------|-----|------|------|------------|------|------|-----|------|------|
|                |  | Min   | Typ | Max  | Min  | Typ        | Max  | Min  | Typ | Max  |      |
| $f_{max}$      | Maximum Toggle Frequency   |       | 100 |      |      | 100        |      |      | 100 |      | MHz  |
| $t_{PLH}$      | Propagation Delay @ 1.5 V $C_L = 20\text{ pF}$                                     | 1.7   |     | 3.6  | 1.7  |            | 3.6  | 1.7  |     | 3.6  | ns   |
| $t_{PHL}$      | Propagation Delay @ 1.5 V $C_L = 20\text{ pF}$                                     | 2.6   |     | 4.1  | 2.6  |            | 4.1  | 2.6  |     | 4.1  | ns   |
| $t_{JITTER}$   | Cycle-to-Cycle Jitter  |       | TBD |      |      | TBD        |      |      | TBD |      | ps   |
| $t_r$<br>$t_f$ | Output Rise/Fall Times QTTL $C_L = 20\text{ pF}$<br>10% – 90% $C_L = 20\text{ pF}$ |       |     |      |      | 1.9<br>2.3 |      |      |     |      | ns   |
| $V_{PP}$       | Input Swing (Note 8)   | 200   |     | 1000 | 200  |            | 1000 | 200  |     | 1000 | mV   |

6.  $V_{CC}$  can vary  $\pm 0.25\text{ V}$ .

$V_{EE}$  can vary  $+0.06\text{ V} / -0.5\text{ V}$  for 10ELT;  $V_{EE}$  can vary  $+0.8\text{ V} / -0.5\text{ V}$  for 100ELT.

7. All loading with 500 ohms to GND,  $C_L = 20\text{ pF}$ .

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



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

## MC10ELT25, MC100ELT25

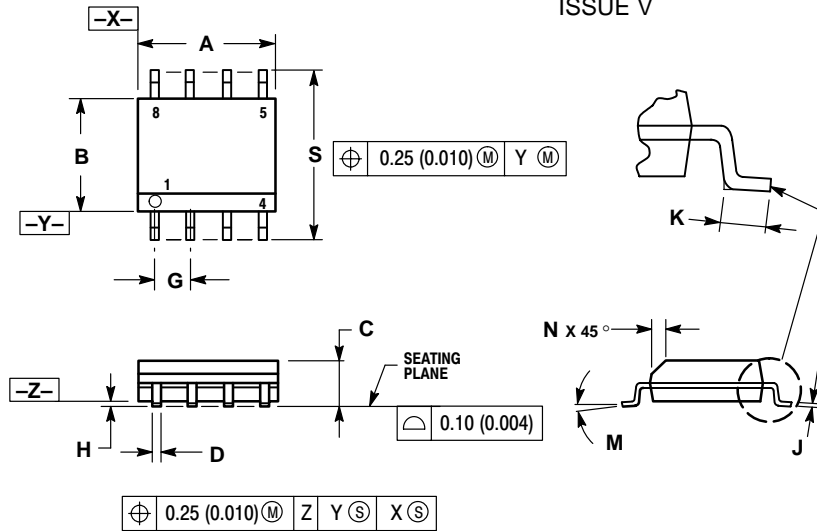
### Resource Reference of Application Notes

- 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

# MC10ELT25, MC100ELT25

## PACKAGE DIMENSIONS

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



### NOTES:

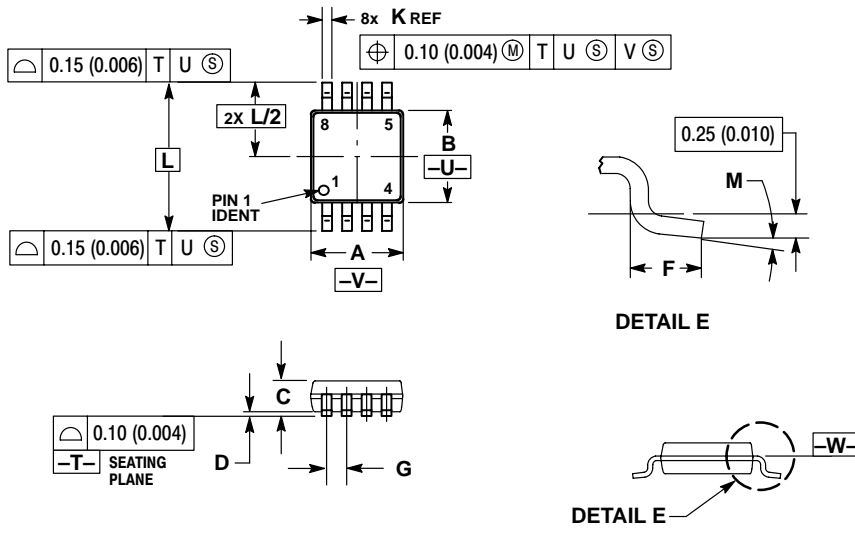
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

| 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 |

# MC10ELT25, MC100ELT25

## 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°    |

MC10ELT25, MC100ELT25

**Notes**

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