

# MC10ELT25, MC100ELT25

## -5 V Differential ECL to TTL Translator

### Description

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.

### Features

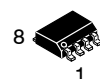
- 2.6 ns Typical Propagation Delay
- 100 MHz  $F_{MAX}$  CLK
- 24 mA TTL Outputs
- Flow Through Pinouts
- Operating Range:  $V_{CC} = 4.5$  V to 5.5 V with  $GND = 0$  V;  
 $V_{EE} = -4.2$  V to -5.7 V with  $GND = 0$  V
- Internal Input 50 K $\Omega$  Pulldown Resistors
- Q Output will default HIGH with inputs open or < 1.3 V
- Pb-Free Packages are Available



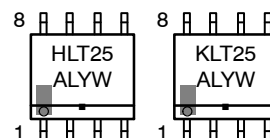
ON Semiconductor®

<http://onsemi.com>

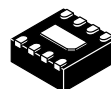
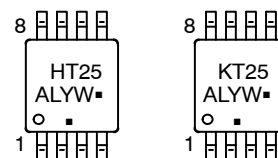
### MARKING DIAGRAMS\*



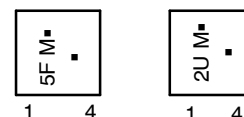
SOIC-8  
D SUFFIX  
CASE 751



TSSOP-8  
DT SUFFIX  
CASE 948R



DFN8  
MN SUFFIX  
CASE 506AA



|               |                       |
|---------------|-----------------------|
| H = MC10      | A = Assembly Location |
| K = MC100     | L = Wafer Lot         |
| 5F = MC10     | Y = Year              |
| 2U = MC100    | W = Work Week         |
| M = Date Code | ▪ = Pb-Free Package   |

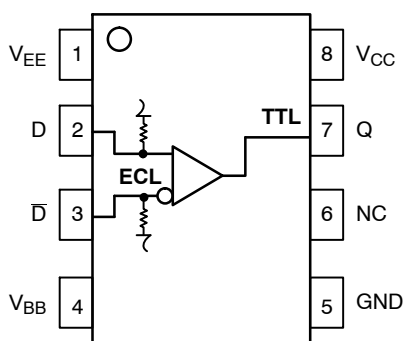
(Note: Microdot may be in either location)

\*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.

# MC10ELT25, MC100ELT25



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

**Table 1. 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   |
| EP           | (DFN8 only) Thermal exposed pad must be connected to a sufficient thermal conduit. Electrically connect to the most negative supply (GND) or leave unconnected, floating open. |

**Table 2. ATTRIBUTES**

| Characteristics   | Value                  |                      |
|---|------------------------|----------------------|
| Internal Input Pulldown Resistor                              | 75 k $\Omega$          |                      |
| Internal Input Pullup Resistor                                | N/A                    |                      |
| ESD Protection  | Human Body Model       | > 1 kV               |
|   | Machine Model          | > 400 V              |
| Moisture Sensitivity, Indefinite Time Out of Drypack (Note 1) | Pb Pkg                 | Pb-Free Pkg          |
|   | SOIC-8                 | Level 1              |
|   | TSSOP-8                | Level 1              |
|   | DFN8                   | Level 1              |
| Flammability Rating   | Oxygen Index: 28 to 34 | UL 94 V-0 @ 0.125 in |
| Transistor Count  | 38 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                             |
|---------------|--|--------------------|--|--------------------|----------------------------------|
| $V_{CC}$      | Positive Power Supply                    | GND = 0 V          | $V_{EE} = -5.0$ V  | 7                  | V                                |
| $V_{EE}$      | Negative Power Supply                    | GND = 0 V          | $V_{CC} = +5.0$ V  | -8                 | V                                |
| $V_{IN}$      | Input Voltage                            | GND = 0 V          |  | 0 to $V_{EE}$      | V                                |
| $I_{BB}$      | $V_{BB}$ Sink/Source                     |                    |  | $\pm 0.5$          | mA                               |
| $T_A$         | Operating Temperature Range              |                    |  | -40 to +85         | $^{\circ}$ C                     |
| $T_{stg}$     | Storage Temperature Range                |                    |  | -65 to +150        | $^{\circ}$ C                     |
| $\theta_{JA}$ | Thermal Resistance (Junction-to-Ambient) | 0 lfpm<br>500 lfpm | SOIC-8<br>SOIC-8   | 190<br>130         | $^{\circ}$ C/W<br>$^{\circ}$ C/W |
| $\theta_{JC}$ | Thermal Resistance (Junction-to-Case)    | Standard Board     | SOIC-8   | 41 to 44           | $^{\circ}$ C/W                   |
| $\theta_{JA}$ | Thermal Resistance (Junction-to-Ambient) | 0 lfpm<br>500 lfpm | TSSOP-8<br>TSSOP-8   | 185<br>140         | $^{\circ}$ C/W<br>$^{\circ}$ C/W |
| $\theta_{JC}$ | Thermal Resistance (Junction-to-Case)    | Standard Board     | TSSOP-8  | 41 to 44 $\pm 5\%$ | $^{\circ}$ C/W                   |
| $\theta_{JA}$ | Thermal Resistance (Junction-to-Ambient) | 0 lfpm<br>500 lfpm | DFN8<br>DFN8   | 129<br>84          | $^{\circ}$ C/W<br>$^{\circ}$ C/W |
| $T_{sol}$     | Wave Solder                              | Pb<br>Pb-Free      | <2 to 3 sec @ 248 $^{\circ}$ C<br><2 to 3 sec @ 260 $^{\circ}$ C | 265<br>265         | $^{\circ}$ C                     |
| $\theta_{JC}$ | Thermal Resistance (Junction-to-Case)    | (Note 2)           | DFN8   | 35 to 40           | $^{\circ}$ C/W                   |

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.

2. JEDEC standard multilayer board - 2S2P (2 signal, 2 power)

## MC10ELT25, MC100ELT25

**Table 4. 10ELT SERIES NECL INPUT DC CHARACTERISTICS**  $V_{CC} = 5.0\text{ V}$ ;  $V_{EE} = -5.0\text{ V}$ ;  $GND = 0\text{ V}$  (Note 3)

| 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) (Note 4)                          | -1230 |     | -890  | -1130 |     | -810  | -1060 |     | -720  | mV            |
| $V_{IL}$    | Input LOW Voltage (Single-Ended) (Note 4)                           | -1950 |     | -1500 | -1950 |     | -1480 | -1950 |     | -1445 | mV            |
| $V_{BB}$    | Output Voltage Reference  | -1.43 |     | -1.30 | -1.35 |     | -1.25 | -1.31 |     | -1.19 | V             |
| $V_{IHCMR}$ | Input HIGH Voltage Common Mode Range (Differential) (Notes 4 and 5) | -2.8  |     | 0.0   | -2.8  |     | 0.0   | -2.8  |     | 0.0   | V             |
| $I_{IH}$    | Input HIGH Current  |       |     | 255   |       |     | 175   |       |     | 175   | $\mu\text{A}$ |
| $I_{IL}$    | Input LOW Current   | 0.5   |     |       | 0.5   |     |       | 0.3   |     |       | $\mu\text{A}$ |

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 lfm. 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.

3. Input parameters vary 1:1 with GND.  $V_{EE}$  can vary +0.06 V to -0.5 V.

4. TTL output  $R_L = 500\ \Omega$  to GND

5.  $V_{IHCMR}$  min varies 1:1 with  $V_{EE}$ ,  $V_{IHCMR}$  max varies 1:1 with GND.

**Table 5. 100ELT SERIES NECL INPUT DC CHARACTERISTICS**  $V_{CC} = 5.0\text{ V}$ ;  $V_{EE} = -5.0\text{ V}$ ;  $GND = 0\text{ V}$  (Note 6)

| 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) (Note 7)                          | -1165 |     | -880  | -1165 |     | -880  | -1165 |     | -880  | mV            |
| $V_{IL}$    | Input LOW Voltage (Single-Ended) (Note 7)                           | -1810 |     | -1475 | -1810 |     | -1475 | -1810 |     | -1475 | mV            |
| $V_{BB}$    | Output Voltage Reference  | -1.38 |     | -1.26 | -1.38 |     | -1.26 | -1.38 |     | -1.26 | V             |
| $V_{IHCMR}$ | Input HIGH Voltage Common Mode Range (Differential) (Notes 7 and 8) | -2.8  |     | 0.0   | -2.8  |     | 0.0   | -2.8  |     | 0.0   | V             |
| $I_{IH}$    | Input HIGH Current  |       |     | 255   |       |     | 175   |       |     | 175   | $\mu\text{A}$ |
| $I_{IL}$    | Input LOW Current   | 0.5   |     |       | 0.5   |     |       | 0.5   |     |       | $\mu\text{A}$ |

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 lfm. 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. Input parameters vary 1:1 with GND.  $V_{EE}$  can vary +0.8 V to -0.5 V.

7. TTL output  $R_L = 500\ \Omega$  to GND

8.  $V_{IHCMR}$  min varies 1:1 with  $V_{EE}$ ,  $V_{IHCMR}$  max varies 1:1 with GND.

**Table 6. 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   |

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 lfm. 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.

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**Table 7. AC CHARACTERISTICS**  $V_{CC}= 5.0\text{ V}$ ;  $V_{EE}= -5.0\text{ V}$ ;  $GND= 0\text{ V}$  (Note 9 and Note 10)

| 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  |
| $t_{PLH}$      | Propagation Delay @ 1.5 V                | 1.7   |     | 3.6  | 1.7  |            | 3.6  | 1.7  |     | 3.6  | ns   |
| $t_{PHL}$      | Propagation Delay @ 1.5 V                | 2.6   |     | 4.1  | 2.6  |            | 4.1  | 2.6  |     | 4.1  | ns   |
| $t_{JITTER}$   | Random Clock Jitter (RMS)                |       |     |      |      | 35         |      |      |     |      | ps   |
| $t_r$<br>$t_f$ | Output Rise/Fall Times QTTL<br>10% – 90% |       |     |      |      | 1.9<br>2.3 |      |      |     |      | ns   |
| $V_{PP}$       | Input Swing (Note 11)                    | 200   |     | 1000 | 200  |            | 1000 | 200  |     | 1000 | mV   |

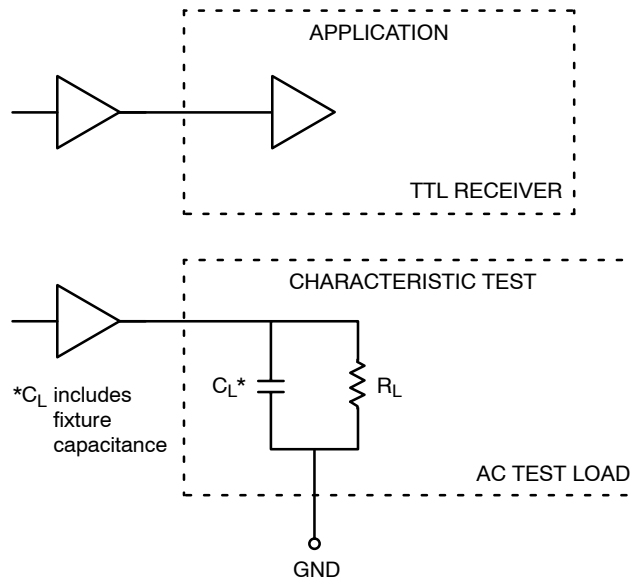
NOTE: Device will meet the specifications after thermal equilibrium has been established when mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lpm. Electrical parameters are guaranteed only over the declared operating temperature range. Functional 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.

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

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

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

11.  $V_{PP}(\text{min})$  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

### ORDERING INFORMATION

| Device          | Package              | Shipping†          |
|-----------------|----------------------|--------------------|
| MC10ELT25D      | SOIC-8               | 98 Units / Rail    |
| MC10ELT25DG     | SOIC-8<br>(Pb-Free)  | 98 Units / Rail    |
| MC10ELT25DR2    | SOIC-8               | 2500 / Tape & Reel |
| MC10ELT25DR2G   | SOIC-8<br>(Pb-Free)  | 2500 / Tape & Reel |
| MC10ELT25DT     | TSSOP-8              | 100 Units / Rail   |
| MC10ELT25DTG    | TSSOP-8<br>(Pb-Free) | 100 Units / Rail   |
| MC10ELT25DTR2   | TSSOP-8              | 2500 / Tape & Reel |
| MC10ELT25DTR2G  | TSSOP-8<br>(Pb-Free) | 2500 / Tape & Reel |
| MC10ELT25MNR4   | DFN8                 | 1000 / Tape & Reel |
| MC10ELT25MNR4G  | DFN8<br>(Pb-Free)    | 1000 / Tape & Reel |
| MC100ELT25D     | SOIC-8               | 98 Units / Rail    |
| MC100ELT25DG    | SOIC-8<br>(Pb-Free)  | 98 Units / Rail    |
| MC100ELT25DR2   | SOIC-8               | 2500 / Tape & Reel |
| MC100ELT25DR2G  | SOIC-8<br>(Pb-Free)  | 2500 / Tape & Reel |
| MC100ELT25DT    | TSSOP-8              | 100 Units / Rail   |
| MC100ELT25DTG   | TSSOP-8<br>(Pb-Free) | 100 Units / Rail   |
| MC100ELT25DTR2  | TSSOP-8              | 2500 / Tape & Reel |
| MC100ELT25DTR2G | TSSOP-8<br>(Pb-Free) | 2500 / Tape & Reel |
| MC100ELT25MNR4  | DFN8                 | 1000 / Tape & Reel |
| MC100ELT25MNR4G | DFN8<br>(Pb-Free)    | 1000 / 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.

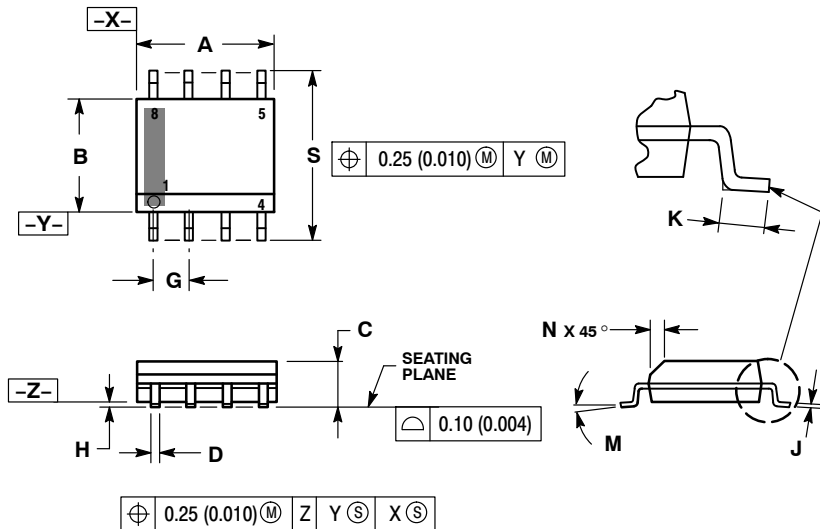
#### Resource Reference of Application Notes

- 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

# MC10ELT25, MC100ELT25

## PACKAGE DIMENSIONS

SOIC-8 NB  
CASE 751-07  
ISSUE AH

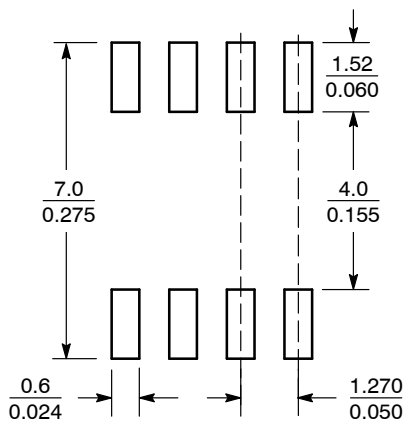


NOTES:

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\*



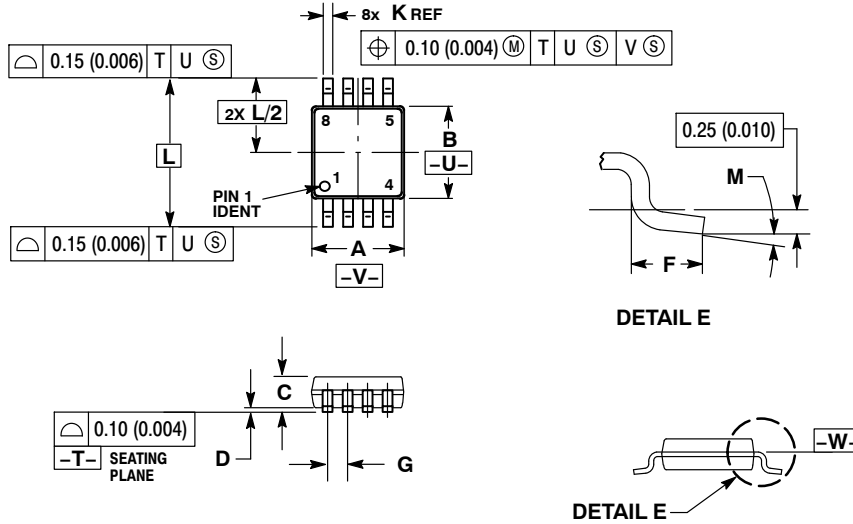
SCALE 6:1 ( $\frac{\text{mm}}{\text{inches}}$ )

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

# MC10ELT25, MC100ELT25

## PACKAGE DIMENSIONS

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



### NOTES:

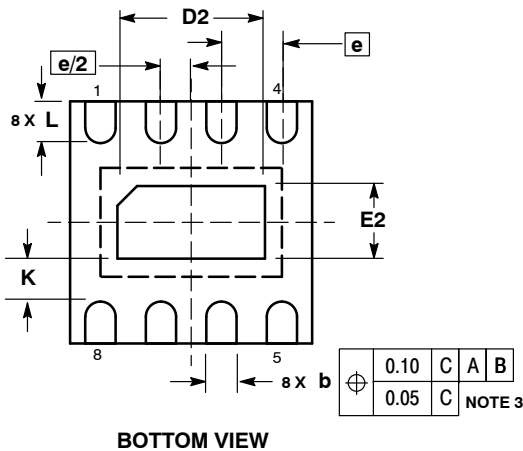
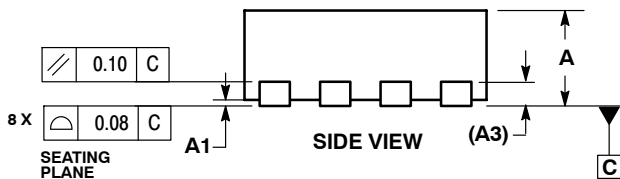
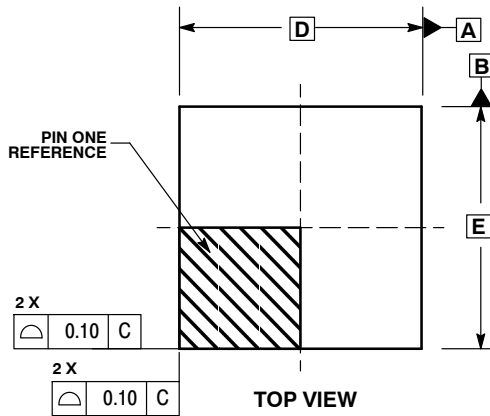
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A DOES NOT INCLUDE MOLD FLASH. PROTRUSIONS OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
4. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL 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

## PACKAGE DIMENSIONS

DFN8  
CASE 506AA-01  
ISSUE D



NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994 .
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.25 AND 0.30 MM FROM TERMINAL.
4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.

| DIM | MILLIMETERS |      |
|-----|-------------|------|
|     | MIN         | MAX  |
| A   | 0.80        | 1.00 |
| A1  | 0.00        | 0.05 |
| A3  | 0.20 REF    |      |
| b   | 0.20        | 0.30 |
| D   | 2.00 BSC    |      |
| D2  | 1.10        | 1.30 |
| E   | 2.00 BSC    |      |
| E2  | 0.70        | 0.90 |
| e   | 0.50 BSC    |      |
| K   | 0.20        | ---  |
| L   | 0.25        | 0.35 |

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