

MC10ELT25, MC100ELT25

-5 V 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 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.

- 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 Ω Pulldown Resistors
- Q Output will default HIGH with inputs open or < 1.3 V

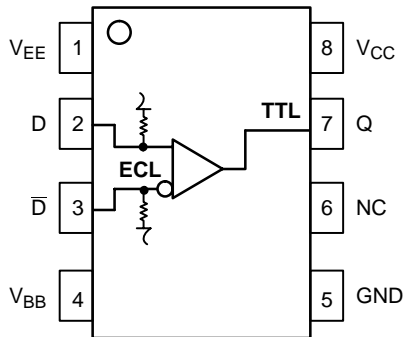


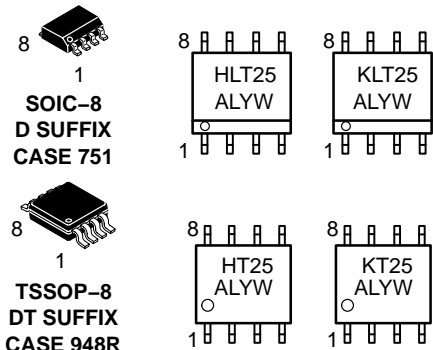
Figure 1. 8-Lead Pinout and Logic Diagram (Top View)



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MARKING DIAGRAMS*



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

*For additional marking information, refer to Application Note AND8002/D.

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

ORDERING INFORMATION

Device	Package	Shipping†
MC10ELT25D	SOIC-8	98 Units/Rail
MC10ELT25DR2	SOIC-8	2500 Tape & Reel
MC100ELT25D	SOIC-8	98 Units/Rail
MC100ELT25DR2	SOIC-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

†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.

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ATTRIBUTES

Characteristics	Value
Internal Input Pulldown Resistors	75 k Ω
Internal Input Pullup Resistors	N/A
ESD Protection Human Body Model Machine Model	> 1 kV > 400 V
Moisture Sensitivity (Note 1)	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. Refer to Application Note AND8003/D for additional information.

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			± 0.5	mA
T _A	Operating Temperature Range			-40 to +85	$^{\circ}$ C
T _{stg}	Storage Temperature Range			-65 to +150	$^{\circ}$ C
θ_{JA}	Thermal Resistance (Junction-to-Ambient)	0 lfpm 500 lfpm	SOIC-8 SOIC-8	190 130	$^{\circ}$ C/W $^{\circ}$ C/W
θ_{JC}	Thermal Resistance (Junction-to-Case)	Standard Board	SOIC-8	41 to 44	$^{\circ}$ C/W
θ_{JA}	Thermal Resistance (Junction-to-Ambient)	0 lfpm 500 lfpm	TSSOP-8 TSSOP-8	185 140	$^{\circ}$ C/W $^{\circ}$ C/W
θ_{JC}	Thermal Resistance (Junction-to-Case)	Standard Board	TSSOP-8	41 to 44 $\pm 5\%$	$^{\circ}$ C/W
T _{sol}	Wave Solder	< 2 to 3 sec @ 248 $^{\circ}$ C		265	$^{\circ}$ C

Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If stress limits are exceeded device functional operation is not implied, damage may occur and reliability may be affected. Functional operation should be restricted to the Recommended Operating Conditions.

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10ELT SERIES NECL INPUT DC CHARACTERISTICS $V_{CC} = 5.0\text{ V}$; $V_{EE} = -5.0\text{ V}$; $GND = 0\text{ V}$ (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) (Note 3)	-1230		-890	-1130		-810	-1060		-720	mV
V_{IL}	Input LOW Voltage (Single-Ended) (Note 3)	-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 3 and 4)	-2.8		0.0	-2.8		0.0	-2.8		0.0	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 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.

2. Input parameters vary 1:1 with GND. V_{EE} can vary +0.06 V / -0.5 V.

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

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

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

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 6)	-1165		-880	-1165		-880	-1165		-880	mV
V_{IL}	Input LOW Voltage (Single-Ended) (Note 6)	-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 6 and 7)	-2.8		0.0	-2.8		0.0	-2.8		0.0	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 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.

5. Input parameters vary 1:1 with GND. V_{EE} can vary +0.8 V / -0.5 V.

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

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

TTL OUTPUT DC CHARACTERISTICS $V_{CC} = 4.5\text{ V}$ to 5.5 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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AC CHARACTERISTICS $V_{CC}= 5.0\text{ V}$; $V_{EE}= -5.0\text{ V}$; $GND= 0\text{ V}$ (Note 8 and Note 9)

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 t_f	Output Rise/Fall Times QTTL 10% – 90%					1.9 2.3					ns
V_{PP}	Input Swing (Note 10)	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.

8. 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.

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

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

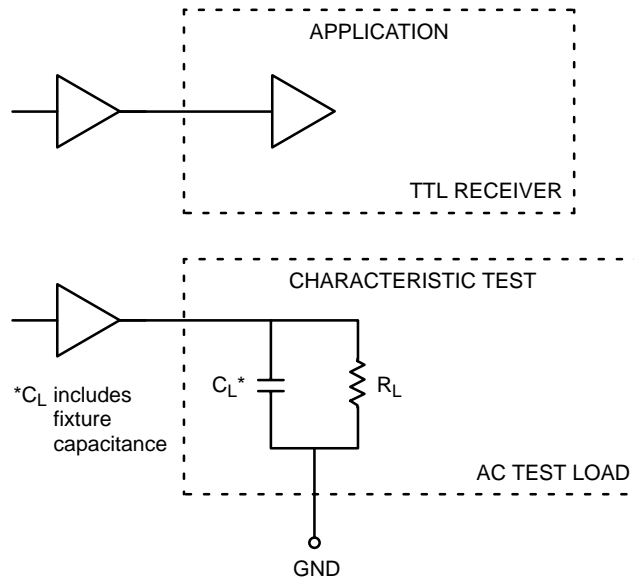


Figure 2. TTL Output Loading Used for Device Evaluation

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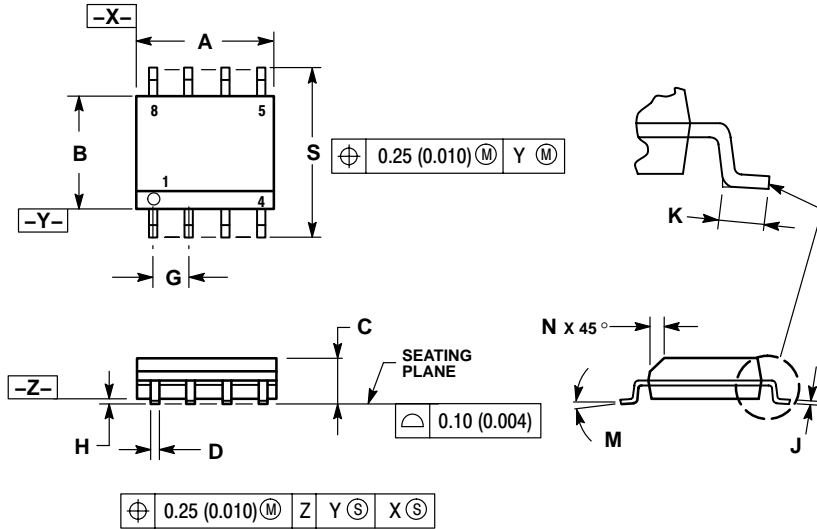
Resource Reference of Application Notes

- 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
- AND8090** – AC Characteristics of ECL Devices

MC10ELT25, MC100ELT25

PACKAGE DIMENSIONS

SOIC-8 D SUFFIX PLASTIC SOIC PACKAGE CASE 751-07 ISSUE AB

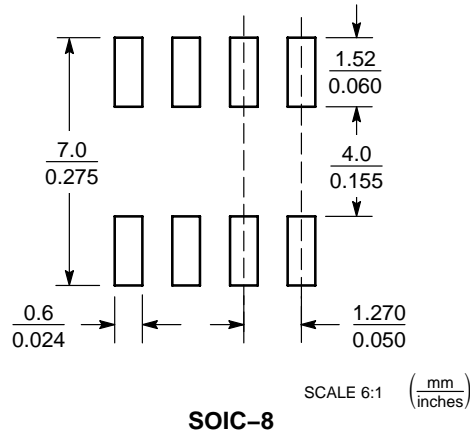


NOTES:

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

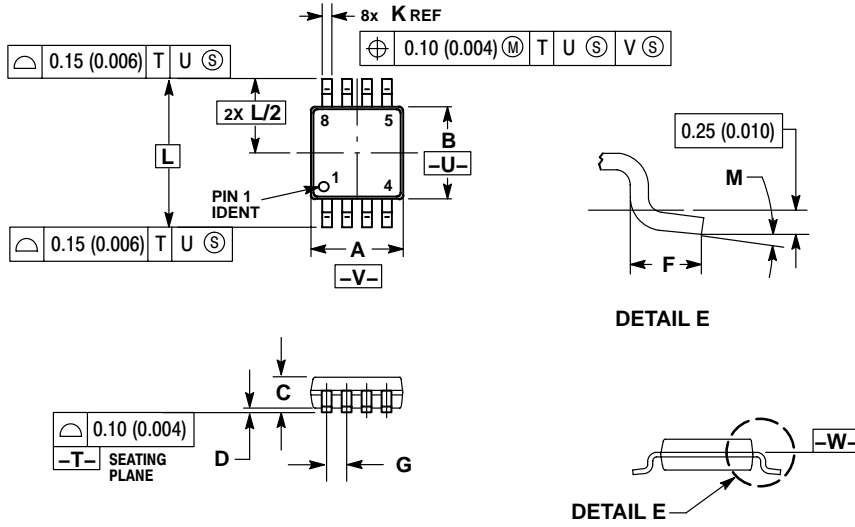


SOIC-8

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°

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