# **5V TTL to Differential ECL Translator**

The MC10ELT/100ELT24 is a TTL to differential ECL 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 ELT24 makes it ideal for those applications where space, performance and low power are at a premium.

The 100 Series contains temperature compensation.

- 0.8 ns t<sub>PHL</sub>, 0.95 ns t<sub>PLH</sub> Typical Propagation Delay
- PNP TTL Inputs for Minimal Loading
- Flow Through Pinouts
- Operating Range:  $V_{CC} = 4.5 \text{ V}$  to 5.5 V;  $V_{EE} = -4.2 \text{ V}$  to -5.5 V with GND = 0 V

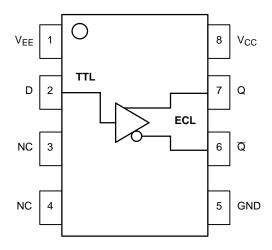


Figure 1. Logic Diagram and Pinout Assignment

### **PIN DESCRIPTION**

PIN	FUNCTION
$Q, \overline{Q}$	ECL Differential Outputs*
D	TTL Input
V <sub>CC</sub>	Positive Supply
V <sub>EE</sub>	Negative Supply
GND	Ground
NC	No Connect
1	

<sup>\*</sup> Output state undetermined when inputs are open.



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# MARKING DIAGRAMS\*









TSSOP-8 DT SUFFIX CASE 948R





 $\begin{array}{lll} H = MC10 & L = Wafer \, Lot \\ K = MC100 & Y = Year \\ A = Assembly \, Location & W = Work \, Week \end{array}$ 

# ORDERING INFORMATION

Device	Package	Shipping <sup>†</sup>
MC10ELT24D	SO-8	98 Units/Rail
MC10ELT24DR2	SO-8	2500 Tape & Reel
MC100ELT24D	SO-8	98 Units/Rail
MC100ELT24DR2	SO-8	2500 Tape & Reel
MC10ELT24DT	SO-8	98 Units/Rail
MC10ELT24DRT2	SO-8	2500 Tape & Reel
MC10ELT24DT	SO-8	98 Units/Rail
MC10ELT24DRT2	SO-8	2500 Tape & Reel

<sup>†</sup>For additional tape and reel information, refer to Brochure BRD8011/D.

<sup>\*</sup>For additional marking information, refer to Application Note AND8002/D.

# **ATTRIBUTES**

Characteristic	Value				
Internal Input Pulldown Resistor	N/A				
Internal Input Pullup Resistor	N/A				
ESD Protection	Human Body Model Machine Model	> 4 kV > 200 V			
Moisture Sensitivity, Indefinite Time Ou	t of Drypack (Note 1)	Level 1			
Flammability Rating	Oxygen Index: 28 to 34	UL 94 V-0 @ 0.125 in			
Transistor Count		51			
Meets or exceeds JEDEC Spec EIA/JESD78 IC Latchup Test					

<sup>1.</sup> For additional information, see Application Note AND8003/D.

# MAXIMUM RATINGS (Note 2)

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	$V_1 \le V_{CC}$	0 to V <sub>CC</sub>	٧
I <sub>out</sub>	Output Current	Continuous Surge		50 100	mA mA
TA	Operating Temperature Range			-40 to +85	°C
T <sub>stg</sub>	Storage Temperature Range			-65 to +150	°C
$\theta_{JA}$	Thermal Resistance (Junction-to-Ambient)	0 LFPM 500 LFPM	SO-8 SO-8	190 130	°C/W
θЈС	Thermal Resistance (Junction-to-Case)	Standard Board	SO-8	41 to 44	°C/W
$\theta_{JA}$	Thermal Resistance (Junction-to-Ambient)	0 LFPM 500 LFPM	TSSOP-8 TSSOP-8	185 140	°C/W
$\theta_{\sf JC}$	Thermal Resistance (Junction-to-Case)	Standard Board	TSSOP-8	41 to 44 ± 5%	°C/W
T <sub>sol</sub>	Wave Solder	< 2 to 3 sec @ 248°C		265	°C

<sup>2.</sup> Maximum Ratings are those values beyond which device damage may occur.

# 10ELT SERIES NECL OUTPUT DC CHARACTERISTICS $V_{CC} = 5.0 \text{ V}$ ; $V_{EE} = -5.0 \text{ V}$ ;

			-40 °C		25°C		85°C				
Symbol	Characteristic	Min	Тур	Max	Min	Тур	Max	Min	Тур	Max	Unit
I <sub>CC</sub>	V <sub>CC</sub> Power Supply Current			7.0		4.5	7.0			7.0	mA
I <sub>EE</sub>	Power Supply Current			18		12.5	18			18	mA
V <sub>OH</sub>	Output HIGH Voltage (Note 4)	- 1080	- 990	- 890	- 980	- 895	- 810	- 910	- 815	- 720	mV
V <sub>OL</sub>	Output LOW Voltage (Note 4)	- 1950	- 1800	- 1650	- 1950	- 1790	- 1630	- 1950	- 1773	- 1595	mV

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 lfpm is maintained.

- 3. Output parameters vary 1:1 with GND.  $V_{\mbox{\footnotesize{EE}}}$  can vary +0.06 V / -0.5 V.
- 4. Outputs are terminated through a 50  $\Omega$  resistor to GND 2 volts.

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

		-40 °C		25°C		85°C					
Symbol	Characteristic	Min	Тур	Max	Min	Тур	Max	Min	Тур	Max	Unit
I <sub>CC</sub>	V <sub>CC</sub> Power Supply Current			7.0		4.5	7.0			7.0	mA
I <sub>EE</sub>	Power Supply Current			18		12.5	18			18	mA
V <sub>OH</sub>	Output HIGH Voltage (Note 6)	- 1085	- 1005	- 880	- 1025	- 955	- 880	- 1025	- 955	- 880	mV
V <sub>OL</sub>	Output LOW Voltage (Note 6)	- 1830	- 1695	- 1555	- 1810	- 1705	- 1620	- 1810	- 1705	- 1620	mV

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 lfpm is maintained.

- 5. Output parameters vary 1:1 with GND.  $V_{EE}$  can vary +0.8 V / -0.5 V.
- 6. Outputs are terminated through a 50  $\Omega$  resistor to GND 2 volts.

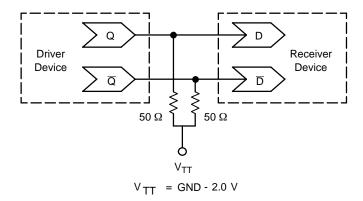
# TTL INPUT DC CHARACTERISTICS $V_{CC}$ = 4.75 V to 5.25 V; $T_A$ = -40°C to +85°C

Symbol	Characteristic	Condition	Min	Тур	Max	Unit
I <sub>IH</sub>	Input HIGH Current	V <sub>IN</sub> = 2.7 V			20	μΑ
I <sub>IHH</sub>	Input HIGH Current	V <sub>IN</sub> = 7.0 V			100	μΑ
$I_{IL}$	Input LOW Current	V <sub>IN</sub> = 0.5 V			-0.6	mA
$V_{IK}$	Input Clamp Diode Voltage	I <sub>IN</sub> = -18 mA			-1.2	V
V <sub>IH</sub>	Input HIGH Voltage		2.0			V
$V_{IL}$	Input LOW Voltage				0.8	V

# AC CHARACTERISTICS $V_{CC} = 4.75 \text{ V to } 5.25 \text{ V}; V_{EE} = -5.0 \text{ V}; \text{GND} = 0.0 \text{ V} \text{ (Note 7)}$

			-40 °C			25°C			85°C		
Symbol	Characteristic	Min	Тур	Max	Min	Тур	Max	Min	Тур	Max	Unit
f <sub>max</sub>	Maximum Toggle Frequency					400					MHz
t <sub>PLH</sub>	Propagation Delay (Note 8) 1.5 V to 50%	0.7		1.3	0.65	0.95	1.25	0.65		1.25	ns
t <sub>PHL</sub>	Propagation Delay (Note 8) 1.5 V to 50%	0.4		1.0	0.50	0.80	1.10	0.70		1.30	ns
t <sub>JITTER</sub>	Random Clock Jitter (RMS)					2.5					ps
t <sub>r</sub> /t <sub>f</sub>	Output Rise/Fall Time (20-80%)	0.25		1.25	0.25		1.25	0.25		1.25	ns

- 7.  $V_{EE}$  can vary +0.06 V / -0.5 V for 10ELT;  $V_{EE}$  can vary +0.8 V / -0.5 V for 100ELT.
- 8. Specifications for standard TTL input signal.



Typical Termination for Output Driver and Device Evaluation (See Application Note AND8020 - Termination of ECL Logic Devices.)

# **Resource Reference of Application Notes**

AN1404 - ECLinPS Circuit Performance at Non-Standard V<sub>IH</sub> 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

AND8001 - The ECL Translator Guide

AND8001 - Odd Number Counters Design

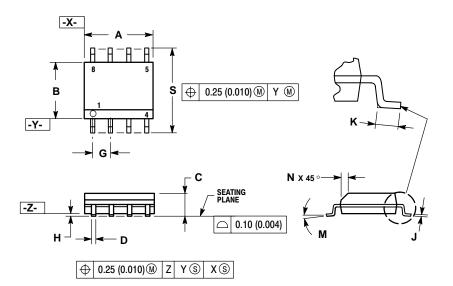
AND8002 - Marking and Date Codes

AND8020 - Termination of ECL Logic Devices

AND8090 - AC Characteristics of ECL Devices

# **PACKAGE DIMENSIONS**

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



#### NOTES:

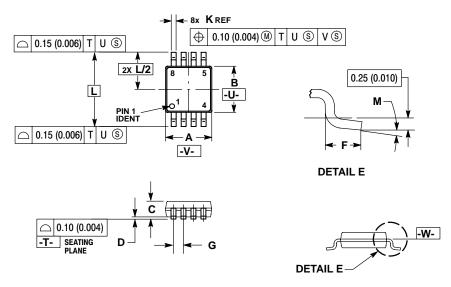
- IOTES:
  1. DIMENSIONING AND TOLERANCING PER ANSI
  Y14.5M, 1982.
  2. CONTROLLING DIMENSION: MILLIMETER.
  3. DIMENSION A AND B DO NOT INCLUDE MOLD

- PROTRUSION.
  4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER
- 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.

	MILLIN	IETERS	INCHES			
DIM	MIN	MAX	MIN	MAX		
Α	4.80	5.00	0.189	0.197		
В	3.80	4.00	0.150	0.157		
С	1.35	1.75	0.053	0.069		
D	0.33 0.51		0.013	0.020		
G	1.2	7 BSC	0.050 BSC			
Н	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		

### PACKAGE DIMENSIONS

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



- DIMENSIONS AND TOLERANCING PER ASME Y14.5M, 1994
- CONTROLLING DIMENSION: MILLIMETER.
- 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. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION.
- INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 (0.010) PER SIDE.
- TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
  DIMENSION A AND B ARE TO BE
- DETERMINED AT DATUM PLANE -W-.

	MILLIN	IETERS	INCHES			
DIM	MIN	MAX	MIN	MAX		
Α	2.90	3.10	0.114	0.122		
В	2.90	3.10	0.114	0.122		
С	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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