

MC10ELT28, MC100ELT28

5 V 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: Human Body Model; >2 KV
- 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

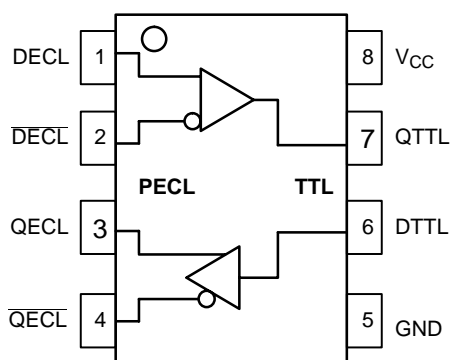


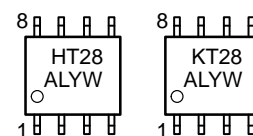
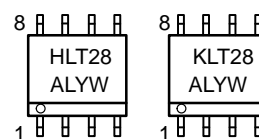
Figure 1. 8-Lead Pinout and Logic Diagram
(Top View)



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MARKING DIAGRAMS*



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

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

PIN DESCRIPTION

PIN	FUNCTION
QTTL	TTL Output
DTTL	TTL Inputs
QECL, \overline{QECL}	PECL Differential Outputs
DECL, \overline{DECL}	PECL Differential Inputs
V_{CC}	Positive Supply
GND	Ground

ORDERING INFORMATION

Device	Package	Shipping†
MC10ELT28D	SOIC-8	98 Units/Rail
MC10ELT28DR2	SOIC-8	2500 Tape & Reel
MC100ELT28D	SOIC-8	98 Units/Rail
MC100ELT28DR2	SOIC-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

†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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MAXIMUM RATINGS

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	SOIC-8 SOIC-8	190 130	°C/W °C/W
θ _{JC}	Thermal Resistance (Junction-to-Case)	Standard Board	SOIC-8	41 to 44	°C/W
θ _{JA}	Thermal Resistance (Junction-to-Ambient)	0 lfpm 500 lfpm	TSSOP-8 TSSOP-8	185 140	°C/W °C/W
θ _{JC}	Thermal Resistance (Junction-to-Case)	Standard Board	TSSOP-8	41 to 44 ± 5%	°C/W
T _{sol}	Wave Solder	< 2 to 3 sec @ 248°C		265	°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 PECL DC CHARACTERISTICS $V_{CC}= 5.0\text{ V}$; $GND= 0.0\text{ V}$ (Note 1)

Symbol	Characteristic	-40°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
V_{OH}	Output HIGH Voltage (Note 2)	3920	4010	4110	4020	4105	4190	4090	4185	4280	mV
V_{OL}	Output LOW Voltage (Note 2)	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 3)	2.2		5.0	2.2		5.0	2.2		5.0	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 lfpm. 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.

1. Input and output parameters vary 1:1 with V_{CC} . V_{CC} can vary $\pm 0.25\text{ V}$.
2. PECL outputs are terminated through a $50\ \Omega$ resistor to $V_{CC} - 2\text{ V}$.
3. V_{IHCMR} min varies 1:1 with GND , V_{IHCMR} max varies 1:1 with V_{CC} .

100ELT SERIES PECL DC CHARACTERISTICS $V_{CC}= 5.0\text{ V}$; $GND= 0.0\text{ V}$ (Note 4)

Symbol	Characteristic	-40°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
V_{OH}	Output HIGH Voltage (Note 5)	3915	3995	4120	3975	4045	4120	3975	4050	4120	mV
V_{OL}	Output LOW Voltage (Note 5)	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 6)	2.2		5.0	2.2		5.0	2.2		5.0	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 lfpm. 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.

4. Input and output parameters vary 1:1 with V_{CC} . V_{CC} can vary $\pm 0.25\text{ V}$.
5. PECL outputs are terminated through a $50\ \Omega$ resistor to $V_{CC} - 2\text{ V}$.
6. 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

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 lfpm. 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.

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	μA
I_{IHH}	Input HIGH Current	$V_{IN} = 7.0$ V			100	μA
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

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 lfpm. 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.

AC CHARACTERISTICS $V_{CC} = 4.75$ V to 5.25 V (Note 7)

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 0.6		5.5 1.2	2.0 0.9	1.2	5.5 1.5	2.0 0.6		5.5 1.35	ns
t_{PHL}	Propagation Delay @ 1.5 V DECL to QTTL DTTL to QECL	2.0 0.4		5.5 1.0	2.0 0.5	0.8	5.5 1.1	2.0 0.7		5.5 1.3	ns
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 8)	200		1000	200		1000	200		1000	mV
t_r/t_f	Output Rise Time (10–90%) Output Fall Time (10–90%)					1.6 1.1					ns ns

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 lfpm. 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.

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

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

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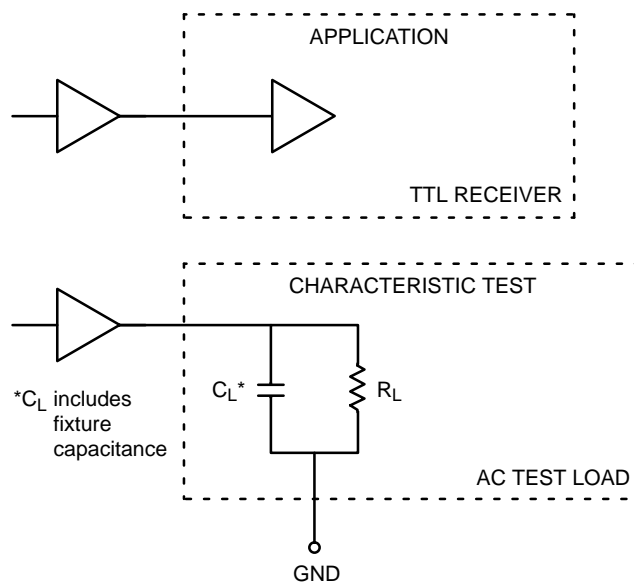


Figure 2. TTL Output Loading Used for Device Evaluation

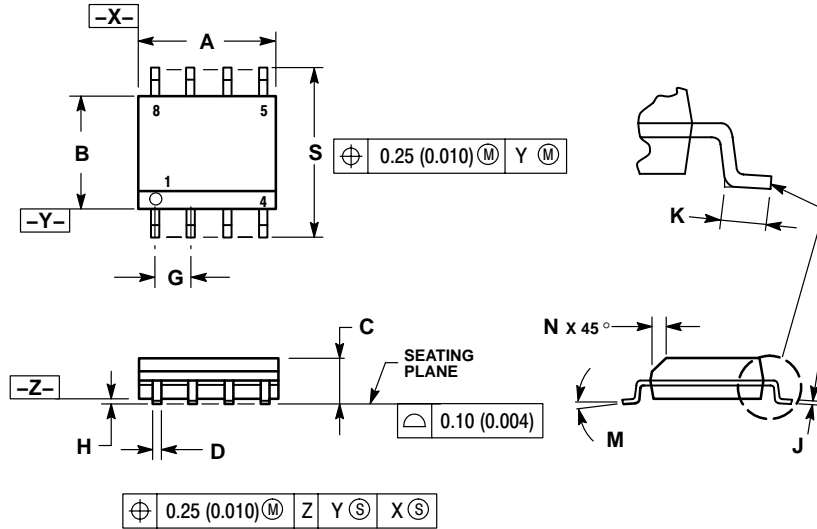
Resource Reference of Application Notes

- 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

MC10ELT28, MC100ELT28

PACKAGE DIMENSIONS

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

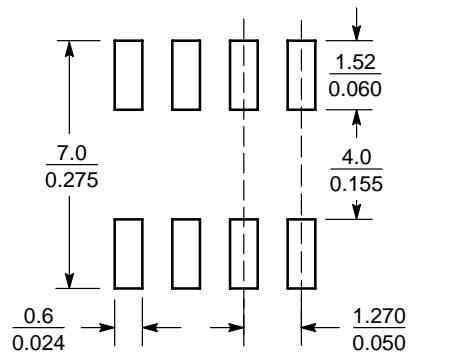


NOTES:

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



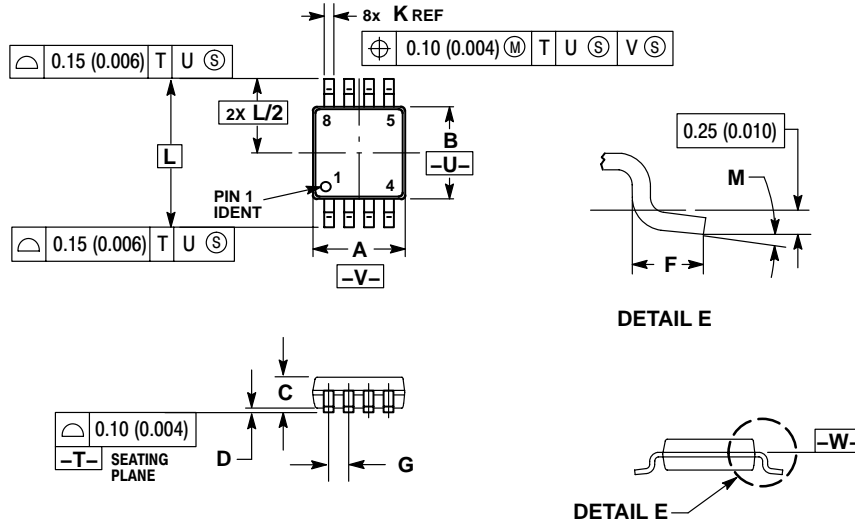
SOIC-8

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

MC10ELT28, MC100ELT28

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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