

MC10ELT28, MC100ELT28

5 V TTL to Differential PECL and Differential PECL to TTL Translator

Description

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.

Features

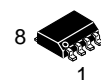
- 3.5 ns Typical PECL to TTL Propagation Delay
- 1.2 ns Typical TTL to PECL Propagation Delay
- PNP TTL Inputs for Minimal Loading
- 24 mA TTL Outputs
- Flow Through Pinouts
- Operating Range V_{CC} = 4.75 V to 5.25 V with GND = 0 V
- Q_{TTL} Output Will Default High with Inputs Left Open or < 1.3 V
- Q_{ECL} Output Will Default High with Inputs Left Open
- Internal PECL Input Pulldown Resistors
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant



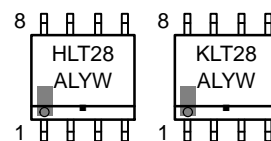
ON Semiconductor®

www.onsemi.com

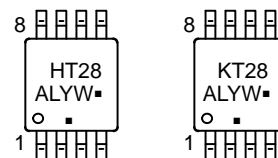
MARKING DIAGRAMS*



SOIC-8
D SUFFIX
CASE 751



TSSOP-8
DT SUFFIX
CASE 948R



H = MC10
K = MC100

A = Assembly Location
L = Wafer Lot
Y = Year
W = Work Week
▪ = 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 6 of this data sheet.

MC10ELT28, MC100ELT28

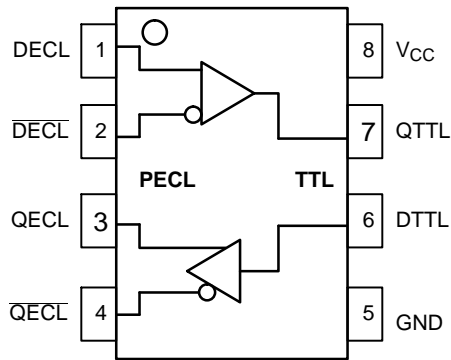


Table 1. PIN DESCRIPTION

Pin	Function
QTTL	TTL Outputs
DTTL	TTL Data Inputs
QECL, QECL	PECL Differential Outputs
DECL, DECL	PECL Differential Inputs
V _{CC}	Positive Supply
GND	Ground

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

Table 2. ATTRIBUTES

Characteristics	Value
ESD Protection Human Body Model	> 2 kV
Moisture Sensitivity, Indefinite Time Out of Drypack (Note 1)	Pb-Free Pkg
SOIC-8 TSSOP-8	Level 1 Level 3
Flammability Rating Oxygen Index: 28 to 34	UL 94 V-0 @ 0.125 in
Transistor Count	71 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		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 Pb-Free	<2 to 3 sec @ 260°C		265	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

MC10ELT28, MC100ELT28

Table 4. 10ELT SERIES PECL DC CHARACTERISTICS $V_{CC}= 5.0\text{ V}$; $GND= 0.0\text{ V}$ (Note 2)

Symbol	Characteristic	-40°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
V_{OH}	Output HIGH Voltage (Note 3)	3920	4010	4110	4020	4105	4190	4090	4185	4280	mV
V_{OL}	Output LOW Voltage (Note 3)	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 4)	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.

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

Table 5. 100ELT SERIES PECL DC CHARACTERISTICS $V_{CC}= 5.0\text{ V}$; $GND= 0.0\text{ V}$ (Note 5)

Symbol	Characteristic	-40°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
V_{OH}	Output HIGH Voltage (Note 6)	3915	3995	4120	3975	4045	4120	3975	4050	4120	mV
V_{OL}	Output LOW Voltage (Note 6)	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 7)	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.

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

Table 6. TTL OUTPUT DC CHARACTERISTICS $V_{CC} = 4.75\text{V to }5.25\text{V}$; $T_A = -40^\circ\text{C to }85^\circ\text{C}$

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			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.

MC10ELT28, MC100ELT28

Table 7. TTL INPUT DC CHARACTERISTICS $V_{CC} = 4.75\text{ V to }5.25\text{ V}$; $T_A = -40^\circ\text{C to }85^\circ\text{C}$

Symbol	Characteristic	Condition	Min	Typ	Max	Unit
I_{IH}	Input HIGH Current	$V_{IN} = 2.7\text{ V}$			20	μA
I_{IHH}	Input HIGH Current	$V_{IN} = 7.0\text{ V}$			100	μA
I_{IL}	Input LOW Current	$V_{IN} = 0.5\text{ V}$			-0.6	mA
V_{IK}	Input Clamp Diode Voltage	$I_{IN} = -18\text{ mA}$			-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.

Table 8. AC CHARACTERISTICS $V_{CC} = 4.75\text{ V to }5.25\text{ V}$ (Note 8)

Symbol	Characteristic	-40°C			25°C			85°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		5.5	2.0		5.5	2.0		5.5	ns
		0.6		1.2	0.9	1.2	1.5	0.6		1.35	
t_{PHL}	Propagation Delay @ 1.5 V DECL to QTTL DTTL to QECL	2.0		5.5	2.0		5.5	2.0		5.5	ns
		0.4		1.0	0.5	0.8	1.1	0.7		1.3	
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 9)	200		1000	200		1000	200		1000	mV
t_r/t_f	Output Rise Time (10% – 90%) Output Fall Time (10% – 90%)					1.6					ns ns
						1.1					

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.

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

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

MC10ELT28, MC100ELT28

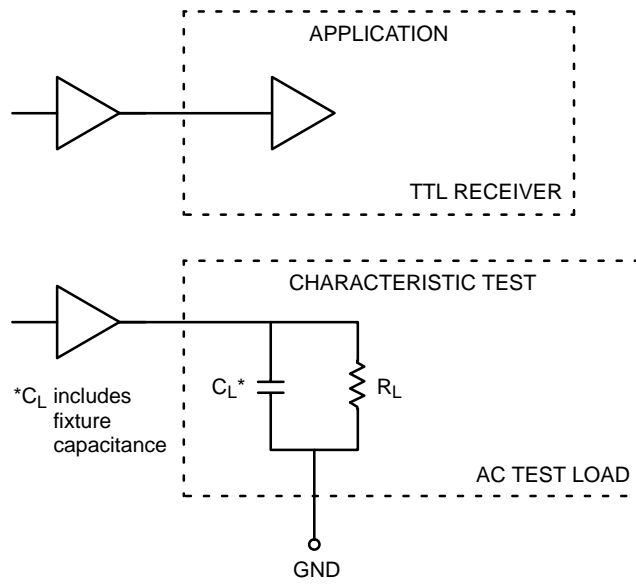


Figure 2. TTL Output Loading Used for Device Evaluation

MC10ELT28, MC100ELT28

ORDERING INFORMATION

Device	Package	Shipping†
MC10ELT28DG	SOIC-8 (Pb-Free)	98 Units / Rail
MC10ELT28DR2G	SOIC-8 (Pb-Free)	2500 / Tape & Reel
MC10ELT28DTG	TSSOP-8 (Pb-Free)	100 Units / Rail
MC10ELT28DTR2G	TSSOP-8 (Pb-Free)	2500 / Tape & Reel
MC100ELT28DG	SOIC-8 (Pb-Free)	98 Units / Rail
MC100ELT28DR2G	SOIC-8 (Pb-Free)	2500 / Tape & Reel
MC100ELT28DTG	TSSOP-8 (Pb-Free)	100 Units / Rail
MC100ELT28DTR2G	TSSOP-8 (Pb-Free)	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.

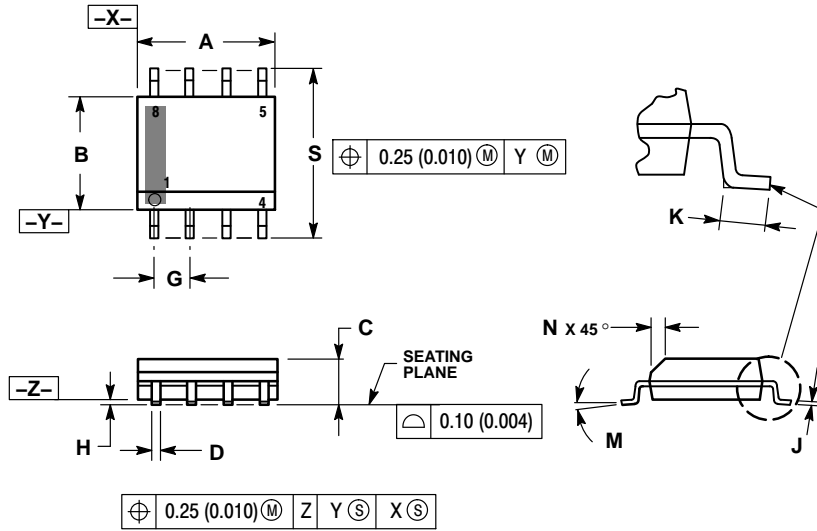
Resource Reference of Application Notes

- 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

MC10ELT28, MC100ELT28

PACKAGE DIMENSIONS

SOIC-8 NB
CASE 751-07
ISSUE AK

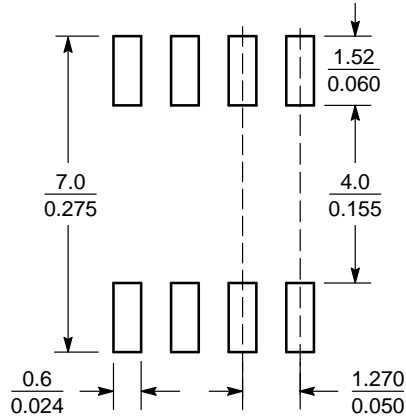


NOTES:

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*



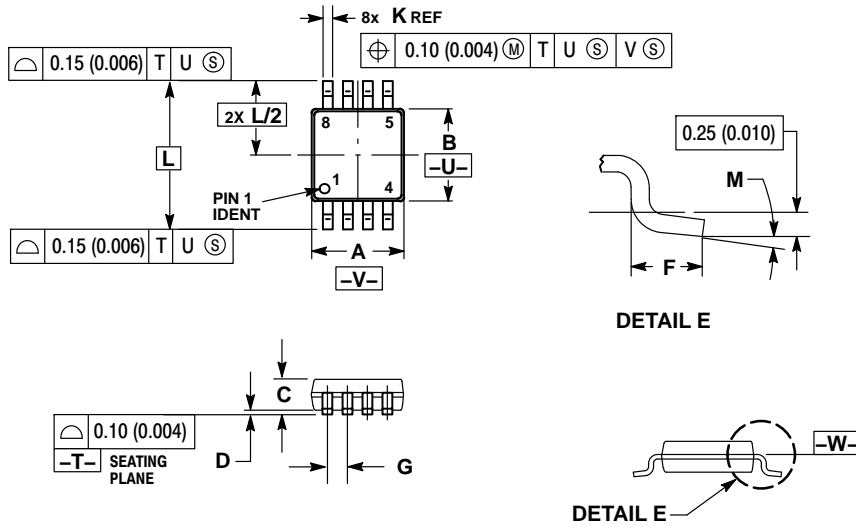
SCALE 6:1 $\left(\frac{\text{mm}}{\text{inches}}\right)$

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

MC10ELT28, MC100ELT28

PACKAGE DIMENSIONS


TSSOP-8
DT SUFFIX
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 -V-.

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°

ECLinPS is a trademark of Semiconductor Components Industries, LLC (SCILLC).

ON Semiconductor and the  are registered trademarks of Semiconductor Components Industries, LLC (SCILLC) or its subsidiaries in the United States and/or other countries. SCILLC owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of SCILLC's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor
19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA
Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada
Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800-282-9855 Toll Free
USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81-3-5817-1050

ON Semiconductor Website: www.onsemi.com

Order Literature: <http://www.onsemi.com/orderlit>

For additional information, please contact your local Sales Representative