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

# MC10ELT21, MC100ELT21

#### **Description**

The MC10ELT/100ELT21 is a differential PECL to TTL translator. Because PECL (Positive ECL) levels are used, only +5 V and ground are required. The small outline 8-lead package and the single gate of the ELT21 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**

- 3.5 ns Typical Propagation Delay
- 24 mA TTL Output
- Flow Through Pinouts
- Operating Range:  $V_{CC} = 4.75 \text{ V}$  to 5.25 V with GND = 0 V
- Q Output Will Default LOW with Inputs Left Open or < 1.3 V
- These Devices are Pb–Free, Halogen Free/BFR Free and are RoHS Compliant



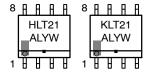
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SOIC-8 D SUFFIX CASE 751-07

#### **MARKING DIAGRAMS\***



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 <u>AND8002/D</u>.

#### **ORDERING INFORMATION**

Device	Package	Shipping <sup>†</sup>
MC10ELT21DG	SOIC-8 (Pb-Free)	98 Units / Tube
MC10ELT21DR2G	SOIC-8 (Pb-Free)	2500 / Tape & Reel
MC100ELT21DG	SOIC-8 (Pb-Free)	98 Units / Tube

†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.

## MC10ELT21, MC100ELT21

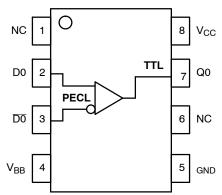


Figure 1. 8-Lead Pinout and Logic Diagram (Top View)

#### **Table 1. PIN DESCRIPTION**

Pin	Function
Q0	TTL Outputs
D0, <del>DO</del>	PECL Differential Outputs
V <sub>BB</sub>	Reference Voltage Output
V <sub>CC</sub>	Positive Supply
GND	Ground
NC	No Connect

#### **Table 2. ATTRIBUTES**

Characteristics	Value
Internal Input Pulldown Resistor	50 kΩ
Internal Input Pullup Resistor	N/A
ESD Protection Human Body Model	> 2 kV
Moisture Sensitivity, Indefinite Time Out of Drypack (Note 1)	Pb-Free Pkg
SOIC-8	Level 1
Flammability Rating Oxygen Index: 28 to 34	UL 94 V-0 @ 0.125 in
Transistor Count	81 Devices
Meets or exceeds JEDEC Spec EIA/JESD78 IC Latchup Test	<u>.</u>

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

#### **Table 3. MAXIMUM RATINGS**

Symbol	Parameter	Condition 1	Condition 2	Rating	Unit
V <sub>CC</sub>	PECL Power Supply	GND = 0 V		7	V
V <sub>IN</sub>	PECL Input Voltage	GND = 0 V	$V_{I} \leq V_{CC}$	0 to 6	V
I <sub>BB</sub>	V <sub>BB</sub> Sink/Source			±0.5	mA
TA	Operating Temperature Range			-40 to +85	°C
T <sub>stg</sub>	Storage Temperature Range			-65 to +150	°C
$\theta_{\sf JA}$	Thermal Resistance (Junction-to-Ambient)	0 lfpm 500 lfpm	SOIC-8 SOIC-8	190 130	°C/W °C/W
$\theta_{\sf JC}$	Thermal Resistance (Junction-to-Case)	Standard Board	SOIC-8	41 to 44	°C/W
T <sub>sol</sub>	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.

### MC10ELT21, MC100ELT21

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

		-40°C		25°C		85°C					
Symbol	Characteristic	Min	Тур	Max	Min	Тур	Max	Min	Тур	Max	Unit
V <sub>IH</sub>	Input HIGH Voltage (Single-Ended)	3770		4110	3870		4190	3930		4265	mV
V <sub>IL</sub>	Input LOW Voltage (Single-Ended)	3050		3500	3050		3520	3050		3555	mV
V <sub>BB</sub>	Output Voltage Reference	3.57		3.7	3.65		3.75	3.69		3.81	V
V <sub>IHCMR</sub>	Input HIGH Voltage Common Mode Range (Differential Configuration) (Note 3)	2.2		5.0	2.2		5.0	2.2		5.0	V
I <sub>IH</sub>	Input HIGH Current			255			175			175	μΑ
I <sub>IL</sub>	Input LOW Current	0.5			0.5			0.3			μΑ

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.

- 2. Output parameters vary 1:1 with  $V_{CC}$ .  $V_{CC}$  can vary  $\pm$  0.25 V.
- 3. V<sub>IHCMR</sub> min varies 1:1 with GND, V<sub>IHCMR</sub> max varies 1:1 with V<sub>CC</sub>.

Table 5. 100ELT SERIES PECL INPUT DC CHARACTERISTICS  $V_{CC} = 5.0 \text{ V}$ ; GND = 0.0 V (Note 4)

		-40°C		25°C		85°C					
Symbol	Characteristic	Min	Тур	Max	Min	Тур	Max	Min	Тур	Max	Unit
V <sub>IH</sub>	Input HIGH Voltage (Single-Ended)	3835		4120	3835		4120	3835		4120	mV
V <sub>IL</sub>	Input LOW Voltage (Single-Ended)	3190		3525	3190		3525	3190		3525	mV
V <sub>BB</sub>	Output Voltage Reference	3.62		3.74	3.62		3.74	3.62		3.745	V
V <sub>IHCMR</sub>	Input HIGH Voltage Common Mode Range (Differential Configuration) (Note 5)	2.2		5.0	2.2		5.0	2.2		5.0	V
I <sub>IH</sub>	Input HIGH Current			255			175			175	μΑ
I <sub>IL</sub>	Input LOW Current	0.5			0.5			0.5			μΑ

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.

- 4. Input parameters vary 1:1 with  $V_{CC}$ .  $V_{CC}$  can vary  $\pm$  0.25 V.
- 5.  $V_{IHCMR}$  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 V to 5.25 V;  $T_A$  = -40°C to 85°C)

Symbol	Characteristic	Condition	Min	Тур	Max	Unit
V <sub>OH</sub>	Output HIGH Voltage	$I_{OH} = -3.0 \text{ mA}$	2.4		(Note 6)	V
V <sub>OL</sub>	Output LOW Voltage	I <sub>OL</sub> = 24 mA			0.5	V
I <sub>CCH</sub>	Power Supply Current			20	29	mA
I <sub>CCL</sub>	Power Supply Current			22	32	mA
I <sub>OS</sub>	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.

6. Maximum level is  $V_{CC}$  – 0.7 by design.

#### MC10ELT21, MC100ELT21

#### AC CHARACTERISTICS V<sub>CC</sub> = 4.75 V to 5.25 V; GND = 0.0 V (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					100					MHz
t <sub>JITTER</sub>	Random Clock Jitter (RMS)					35					ps
t <sub>PLH</sub>	Propagation Delay @ 1.5 V	2.0		5.5	2.0		5.5	2.0		5.5	ns
t <sub>PHL</sub>	Propagation Delay @ 1.5 V	2.0		5.5	2.0		5.5	2.0		5.5	ns
V <sub>PP</sub>	Input Swing (Note 8)	200		1000	200		1000	200		1000	mV
t <sub>r</sub> /t <sub>f</sub>	Output Rise/Fall Time (10–90%)					750					ps

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.

- 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. The device has a DC gain of  $\approx$  40.

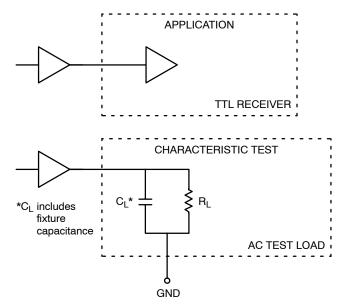


Figure 2. TTL Output Loading Used for Device Evaluation

#### **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

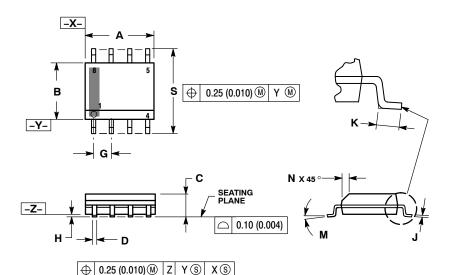
AND8090/D - AC Characteristics of ECL Devices

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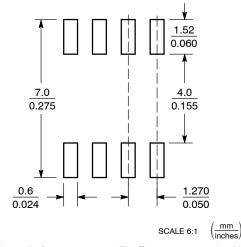
**DATE 16 FEB 2011** 



- NOTES:
  1. DIMENSIONING AND TOLERANCING PER
- ANSI Y14.5M, 1982. CONTROLLING DIMENSION: MILLIMETER.
- DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
- MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE
- 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.
- 751-01 THRU 751-06 ARE OBSOLETE. NEW STANDARD IS 751-07.

	MILLIMETERS		INCHES		
DIM	MIN	MAX	MIN	MAX	
Α	4.80	5.00	0.189	0.197	
В	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	7 BSC	0.050 BSC		
Н	H 0.10 0.2		0.004	0.010	
J	0.19	0.25	0.007	0.010	
K	0.40 1.		0.016	0.050	
M	0 °	8 °	0 °	8 °	
N	N 0.25 0.50 0.010		0.010	0.020	
S	5.80	6.20	0.228	0.244	

#### **SOLDERING FOOTPRINT\***



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

#### **GENERIC MARKING DIAGRAM\***



XXXXX = Specific Device Code = Assembly Location = Wafer Lot

= Year = Work Week = Pb-Free Package XXXXXX AYWW AYWW Ŧ  $\mathbb{H}$ Discrete **Discrete** (Pb-Free)

XXXXXX = Specific Device Code = Assembly Location Α

= Year ww = Work Week = Pb-Free Package

\*This information is generic. Please refer to device data sheet for actual part marking. Pb–Free indicator, "G" or microdot "■", may or may not be present. Some products may not follow the Generic Marking.

#### **STYLES ON PAGE 2**

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STYLE 1: PIN 1. EMITTER 2. COLLECTOR 3. COLLECTOR 4. EMITTER 5. EMITTER 6. BASE 7. BASE 8. EMITTER	STYLE 2: PIN 1. COLLECTOR, DIE, #1 2. COLLECTOR, #1 3. COLLECTOR, #2 4. COLLECTOR, #2 5. BASE, #2 6. EMITTER, #2 7. BASE, #1 8. EMITTER, #1	STYLE 3: PIN 1. DRAIN, DIE #1 2. DRAIN, #1 3. DRAIN, #2 4. DRAIN, #2 5. GATE, #2 6. SOURCE, #2 7. GATE, #1 8. SOURCE, #1	
STYLE 5: PIN 1. DRAIN 2. DRAIN 3. DRAIN 4. DRAIN 5. GATE 6. GATE 7. SOURCE 8. SOURCE	STYLE 6: PIN 1. SOURCE 2. DRAIN 3. DRAIN 4. SOURCE 5. SOURCE 6. GATE 7. GATE 8. SOURCE	STYLE 7: PIN 1. INPUT 2. EXTERNAL BYPASS 3. THIRD STAGE SOURCE 4. GROUND 5. DRAIN 6. GATE 3 7. SECOND STAGE Vd 8. FIRST STAGE Vd	STYLE 8: PIN 1. COLLECTOR, DIE #1 2. BASE, #1 3. BASE, #2 4. COLLECTOR, #2 5. COLLECTOR, #2 6. EMITTER, #2 7. EMITTER, #1 8. COLLECTOR, #1
STYLE 9: PIN 1. EMITTER, COMMON 2. COLLECTOR, DIE #1 3. COLLECTOR, DIE #2 4. EMITTER, COMMON 5. EMITTER, COMMON 6. BASE, DIE #2 7. BASE, DIE #1 8. EMITTER, COMMON	STYLE 10: PIN 1. GROUND 2. BIAS 1 3. OUTPUT 4. GROUND 5. GROUND 6. BIAS 2 7. INPUT 8. GROUND STYLE 14: PIN 1. N-SOURCE 2. N-GATE 3. P-SOURCE	STYLE 11: PIN 1. SOURCE 1 2. GATE 1 3. SOURCE 2 4. GATE 2 5. DRAIN 2 6. DRAIN 2 7. DRAIN 1 8. DRAIN 1	STYLE 12: PIN 1. SOURCE 2. SOURCE 3. SOURCE 4. GATE 5. DRAIN 6. DRAIN 7. DRAIN 8. DRAIN
STYLE 13: PIN 1. N.C. 2. SOURCE 3. SOURCE 4. GATE 5. DRAIN 6. DRAIN 7. DRAIN 8. DRAIN	STYLE 14: PIN 1. N-SOURCE 2. N-GATE 3. P-SOURCE 4. P-GATE 5. P-DRAIN 6. P-DRAIN 7. N-DRAIN 8. N-DRAIN	8. DHAIN 1  STYLE 15: PIN 1. ANODE 1 2. ANODE 1 3. ANODE 1 4. ANODE 1 5. CATHODE, COMMON 6. CATHODE, COMMON 7. CATHODE, COMMON 8. CATHODE, COMMON	STYLE 16: PIN 1. EMITTER, DIE #1 2. BASE, DIE #1 3. EMITTER, DIE #2 4. BASE, DIE #2 5. COLLECTOR, DIE #2 6. COLLECTOR, DIE #2 7. COLLECTOR, DIE #1 8. COLLECTOR, DIE #1
STYLE 17: PIN 1. VCC 2. V2OUT 3. V1OUT 4. TXE 5. RXE 6. VEE 7. GND 8. ACC	STYLE 18: PIN 1. ANODE 2. ANODE 3. SOURCE 4. GATE 5. DRAIN 6. DRAIN 7. CATHODE 8. CATHODE	STYLE 19: PIN 1. SOURCE 1 2. GATE 1 3. SOURCE 2 4. GATE 2 5. DRAIN 2 6. MIRROR 2 7. DRAIN 1 8. MIRROR 1	STYLE 20: PIN 1. SOURCE (N) 2. GATE (N) 3. SOURCE (P) 4. GATE (P) 5. DRAIN 6. DRAIN 7. DRAIN 8. DRAIN
6. VEE 7. GND 8. ACC STYLE 21: PIN 1. CATHODE 1 2. CATHODE 2 3. CATHODE 3 4. CATHODE 4 5. CATHODE 5 6. COMMON ANODE 7. COMMON ANODE 8. CATHODE 6	STYLE 22: PIN 1. I/O LINE 1 2. COMMON CATHODE/VCC 3. COMMON CATHODE/VCC 4. I/O LINE 3 5. COMMON ANODE/GND 6. I/O LINE 4 7. I/O LINE 5 8. COMMON ANODE/GND	STYLE 23: PIN 1. LINE 1 IN 2. COMMON ANODE/GND 3. COMMON ANODE/GND 4. LINE 2 IN 5. LINE 2 OUT 6. COMMON ANODE/GND 7. COMMON ANODE/GND 8. LINE 1 OUT	0 COLLECTOR/ANODE
STYLE 25: PIN 1. VIN 2. N/C 3. REXT 4. GND 5. IOUT 6. IOUT 7. IOUT 8. IOUT	STYLE 26: PIN 1. GND 2. dv/dt 3. ENABLE 4. ILIMIT 5. SOURCE 6. SOURCE 7. SOURCE 8. VCC	STYLE 27: PIN 1. ILIMIT 2. OVLO 3. UVLO 4. INPUT+ 5. SOURCE 6. SOURCE 7. SOURCE 8. DRAIN	STYLE 28: PIN 1. SW_TO_GND 2. DASIC_OFF 3. DASIC_SW_DET 4. GND 5. V_MON 6. VBULK 7. VBULK 8. VIN
STYLE 29: PIN 1. BASE, DIE #1 2. EMITTER, #1 3. BASE, #2 4. EMITTER, #2 5. COLLECTOR, #2 6. COLLECTOR, #2 7. COLLECTOR, #1 8. COLLECTOR, #1	STYLE 30: PIN 1. DRAIN 1 2. DRAIN 1 3. GATE 2 4. SOURCE 2 5. SOURCE 1/DRAIN 2 6. SOURCE 1/DRAIN 2 7. SOURCE 1/DRAIN 2 8. GATE 1		

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MC10H125FNG MC100EPT21MNR4G MC100EP91DWG NLSX3018MUTAG NLSV2T244MUTAG NLSX3013FCT1G
NLSX5011AMX1TCG PCA9306USG SN74GTL1655DGGR SN74AVCA406LZQSR NLSX4014DTR2G NLSX3018DTR2G
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ADG3123BRUZ ADG3245BRUZ ADG3246BCPZ ADG3308BCPZ-REEL ADG3233BRJZ-REEL7 ADG3233BRMZ ADG3241BKSZ-500RL7