



**THE DATASHEET OF  
SY10ELT28ZI**





**5V TTL-TO-DIFFERENTIAL PECL  
AND DIFFERENTIAL PECL-TO-TTL  
TRANSLATOR**

**SY10ELT28  
SY100ELT28  
FINAL**

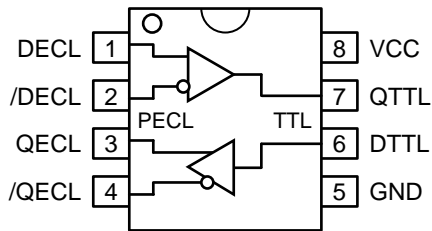
**FEATURES**

- **Guaranteed AC parameters over temperature:**
  - $f_{MAX} > 160\text{MHz}$  (TTL)
  - $< 5.5\text{ns}$  PECL-to-TTL propagation delay
  - $< 1.5\text{ns}$   $t_r / t_f$ ; PECL output
  - $< 1.3\text{ns}$  TTL-to-PECL propagation delay
- **Wide temperature range:  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$**
- **5V power supply**
- **$Q_{TTL}$  output will default low with inputs left open or  $< 1.3\text{V}$**
- **$Q_{ECL}$  output will default high with inputs left open**
- **Internal PECL input pulldown resistors**
- **Available in 8-pin MSOP and SOIC packages**

**DESCRIPTION**

The SY10/100ELT28 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 +5V and ground are required. The small outline 8-pin package and the dual translation design of the ELT28 makes it ideal for applications which are sending and receiving signals across a backplane.

**PIN CONFIGURATION/BLOCK DIAGRAM**



**TOP VIEW**

(Available in MSOP or SOIC package)

**PIN NAMES**

Pin	Function
D TTL	TTL Inputs
Q TTL	TTL Outputs
DECL, /DECL	PECL Differential Inputs
QECL, /QECL	PECL Differential Outputs
$V_{CC}$	Positive Supply
GND	Ground

**ABSOLUTE MAXIMUM RATINGS<sup>(1)</sup>**

Symbol	Rating	Value	Unit	
V <sub>CC</sub>	Power Supply Voltage	-0.5 to +7.0	V	
V <sub>IN</sub>	Input Voltage	0 to +6.0	V	
I <sub>OUT</sub>	PECL Output Current	-Continuous -Surge	50 100	mA
T <sub>A</sub>	Operating Temperature Range	-40 to +85	°C	
T <sub>store</sub>	Storage Temperature Range	-65 to +150	°C	
θ <sub>JA</sub>	Package Thermal Resistance (Junction-to-Ambient)	-Still-Air (SOIC) -500lfpm (SOIC) -Still-Air (MSOP) -500lfpm (MSOP)	160 109 206 155	°C/W  °C/W
θ <sub>JC</sub>	Package Thermal Resistance (Junction-to-Case)	(SOIC) (MSOP)	39 39	°C/W

**NOTE:**

1. Permanent device damage may occur if ABSOLUTE MAXIMUM RATINGS are exceeded. This is a stress rating only and functional operation is not implied at conditions other than those detailed in the operational sections of this data sheet. Exposure to ABSOLUTE MAXIMUM RATING conditions for extended periods may affect device reliability.

**DC ELECTRICAL CHARACTERISTICS<sup>(1)</sup>**

$$V_{CC} = +5V \pm 10\%; V_{EE} = 0V$$

Symbol	Parameter	T <sub>A</sub> = -40°C			T <sub>A</sub> = +25°C			T <sub>A</sub> = +85°C			Unit	Condition
		Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.		
V <sub>CC</sub>	Power Supply Voltage	4.75	5.0	5.5	4.75	5.0	5.5	4.75	5.0	5.5	V	
I <sub>CC</sub>	Power Supply Current	—	23	40	—	22	40	—	25	40	mA	
C <sub>IN</sub>	Input Capacitance (SOIC) (MSOP)	—	—	—	—	0.75	—	—	—	—	pF	
		—	—	—	—	1.1	—	—	—	—	pF	

**NOTE:**

1. 10/100KELT circuits 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 traverse airflow greater than 500lfpm is maintained. Input and output parameters vary 1:1 with V<sub>CC</sub>. V<sub>CC</sub> can vary ±0.25V.

**10K PECL DC ELECTRICAL CHARACTERISTICS<sup>(1)</sup>**

$$V_{CC} = +5.0V \pm 10\%$$

Symbol	Parameter	T <sub>A</sub> = -40°C			T <sub>A</sub> = +25°C			T <sub>A</sub> = +85°C			Unit	Condition
		Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.		
V <sub>OH</sub>	Output HIGH Voltage	3920	4010	4110	4020	4105	4190	4090	4185	4280	mV	50Ω V <sub>CC</sub> -2V
V <sub>OL</sub>	Output LOW Voltage	3050	3200	3350	3050	3210	3370	3050	3227	3405	mV	50Ω V <sub>CC</sub> -2V
V <sub>IH</sub>	Input HIGH Voltage (Single-Ended)	3770	—	4110	3870	—	4190	3940	—	4280	mV	
V <sub>IL</sub>	Input LOW Voltage (Single-Ended)	3050	—	3500	3050	—	3520	3050	—	3555	mV	
V <sub>IHCMR</sub>	Input HIGH Voltage Common Mode Range <sup>(2)</sup>	1.2	—	V <sub>CC</sub>	1.2	—	V <sub>CC</sub>	1.2	—	V <sub>CC</sub>	mV	

**NOTES:**

1. 10/100KELT circuits 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 traverse airflow greater than 500lfpm is maintained.
2. V<sub>IHCMR</sub> (Min) varies 1:1 with GND, V<sub>IHCMR</sub> (Max) varies 1:1 with V<sub>CC</sub>.

**100K PECL DC ELECTRICAL CHARACTERISTICS<sup>(1)</sup>** $V_{CC} = +5.0V \pm 10\%$ 

Symbol	Parameter	$T_A = -40^\circ\text{C}$			$T_A = +25^\circ\text{C}$			$T_A = +85^\circ\text{C}$			Unit	Condition
		Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.		
$V_{OH}$	Output HIGH Voltage	3915	3995	4120	3975	4045	4120	3975	4050	4120	mV	$50\Omega V_{CC} - 2V$
$V_{OL}$	Output LOW Voltage	3170	3305	3445	3190	3295	3380	3190	3295	3380	mV	$50\Omega V_{CC} - 2V$
$V_{IH}$	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 <sup>(2)</sup>	2.2	—	$V_{CC}$	2.2	—	$V_{CC}$	2.2	—	$V_{CC}$	V	

**NOTES:**

- 10/100KELT circuits 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 traverse airflow greater than 500lfpm is maintained.
- $V_{IHCMR}$  (Min) varies 1:1 with GND,  $V_{IHCMR}$  (Max) varies 1:1 with  $V_{CC}$ .

**TTL DC ELECTRICAL CHARACTERISTICS<sup>(1)</sup>** $V_{CC} = +5.0V \pm 10\%$ 

Symbol	Parameter	$T_A = -40^\circ\text{C}$			$T_A = +25^\circ\text{C}$			$T_A = +85^\circ\text{C}$			Unit	Condition
		Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.		
$I_{IH}$	Input HIGH Current	—	10	20	—	—	20	—	—	20	$\mu\text{A}$	$V_{IN} = 2.7V$
		—	—	100	—	—	100	—	—	100	$\mu\text{A}$	$V_{IN} = V_{CC}$
$I_{IL}$	Input LOW Current	—	—	-600	—	—	-600	—	—	-600	$\mu\text{A}$	$V_{IN} = 0.5V$
$V_{IH}$	Input HIGH Voltage	2.0	—	—	2.0	—	—	2.0	—	—	V	
$V_{IL}$	Input LOW Voltage	—	—	0.8	—	—	0.8	—	—	0.8	V	
$V_{IK}$	Input Clamp Diode Voltage	—	—	-1.2	—	—	-1.2	—	—	-1.2	V	$I_{IK} = -18\text{mA}$
$V_{OH}$	Output HIGH Voltage	2.4	2.9	—	2.4	3.4	—	2.4	3.9	—	V	$I_{OH} = -3.0\text{mA}$
$V_{OL}$	Output LOW Voltage	—	0.29	0.5	—	0.26	0.5	—	0.27	0.5	V	$I_{OL} = 24\text{mA}$
$I_{OSC}$	Output Short-Circuit Current	-175	—	-60	-175	—	-60	-175	—	-60	$\mu\text{A}$	$V_O = 0V$

**NOTES:**

- 10/100KELT circuits 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 traverse airflow greater than 500lfpm is maintained.

**AC ELECTRICAL CHARACTERISTICS**

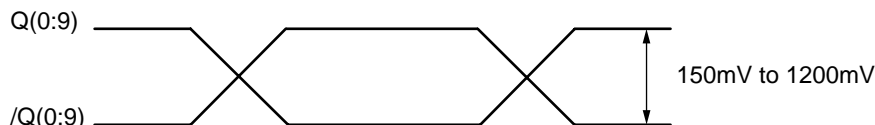
V<sub>CC</sub> = +5.0V ±10%

Symbol	Parameter		T <sub>A</sub> = -40°C			T <sub>A</sub> = +25°C			T <sub>A</sub> = +85°C			Unit	Condition
			Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.		
f <sub>MAX</sub>	Maximum Frequency <sup>(1)</sup> PECL TTL		700 160	— —	— —	700 160	— —	— —	700 160	— —	— —	MHz MHz	
t <sub>PLH</sub>	Propagation Delay	DECL → QTTL	1.5	—	5.5	1.5	—	5.5	1.5	—	5.5	ns	C <sub>L</sub> = 20pF
		DTTL → QECL	0.2	—	1.2	0.2	1.2	1.5	0.2	—	1.35	ns	50Ω to V <sub>CC</sub> -2V
t <sub>PHL</sub>	Propagation Delay	DECL → QTTL	1.5	—	5.5	1.5	—	5.5	1.5	—	5.5	ns	C <sub>L</sub> = 20pF
		DTTL → QECL	0.2	—	1.2	0.2	1.2	1.5	0.2	—	1.35	ns	50Ω to V <sub>CC</sub> -2V
V <sub>PP</sub>	PECL Input Voltage Swing <sup>(2)</sup> (Single-Ended) <sup>(3)</sup>		200	800	1000	200	800	1000	200	800	1000	mV	
t <sub>r</sub> t <sub>f</sub>	QECL Output Rise/Fall Times (20% to 80%)		0.15	—	1.5	0.15	0.3	1.5	0.15	—	1.5	ns	50Ω to V <sub>CC</sub> -2V
	QTTL Output Rise/Fall Times (10% to 90%) TTL		—	1.0	—	—	0.80	—	—	0.7	—	ns	C <sub>L</sub> = 20pF; TTL Output

**NOTES:**

- f<sub>MAX</sub> is defined as the maximum toggle frequency.
- V<sub>PP</sub> (Min) is the minimum input swing for which AC parameters are guaranteed.
- See "Timing Waveform."

**TIMING WAVEFORM**



**PRODUCT ORDERING CODE**

Ordering Code	Package Type	Operating Range	Marking Code
SY10ELT28KC	K8-1	Commercial	XL28
SY10ELT28KCTR*	K8-1	Commercial	XL28
SY100ELT28KC	K8-1	Commercial	XL28
SY100ELT28KCTR*	K8-1	Commercial	XL28
SY10ELT28ZC	Z8-1	Commercial	XEL28
SY10ELT28ZCTR*	Z8-1	Commercial	XEL28
SY100ELT28ZC	Z8-1	Commercial	XEL28
SY100ELT28ZCTR*	Z8-1	Commercial	XEL28

Ordering Code	Package Type	Operating Range	Marking Code
SY10ELT28KI <sup>(1)</sup>	K8-1	Industrial	XL28
SY10ELT28KITR* <sup>(1)</sup>	K8-1	Industrial	XL28
SY100ELT28KI <sup>(1)</sup>	K8-1	Industrial	XL28
SY100ELT28KITR* <sup>(1)</sup>	K8-1	Industrial	XL28
SY10ELT28ZI <sup>(1)</sup>	Z8-1	Industrial	XEL28
SY10ELT28ZITR* <sup>(1)</sup>	Z8-1	Industrial	XEL28
SY100ELT28ZI <sup>(1)</sup>	Z8-1	Industrial	XEL28
SY100ELT28ZITR* <sup>(1)</sup>	Z8-1	Industrial	XEL28

\*Tape and Reel

**Note 1.** Recommended for new designs.

**TERMINATION RECOMMENDATIONS**

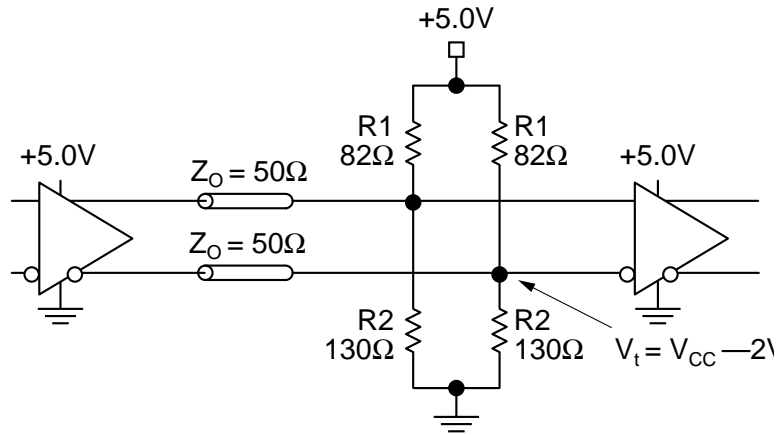


Figure 1. +5V PECL Parallel Termination-Thevenin Equivalent

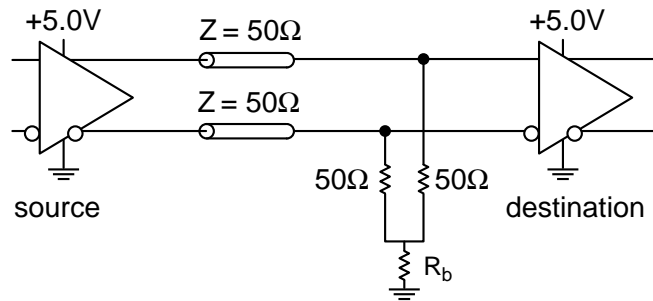
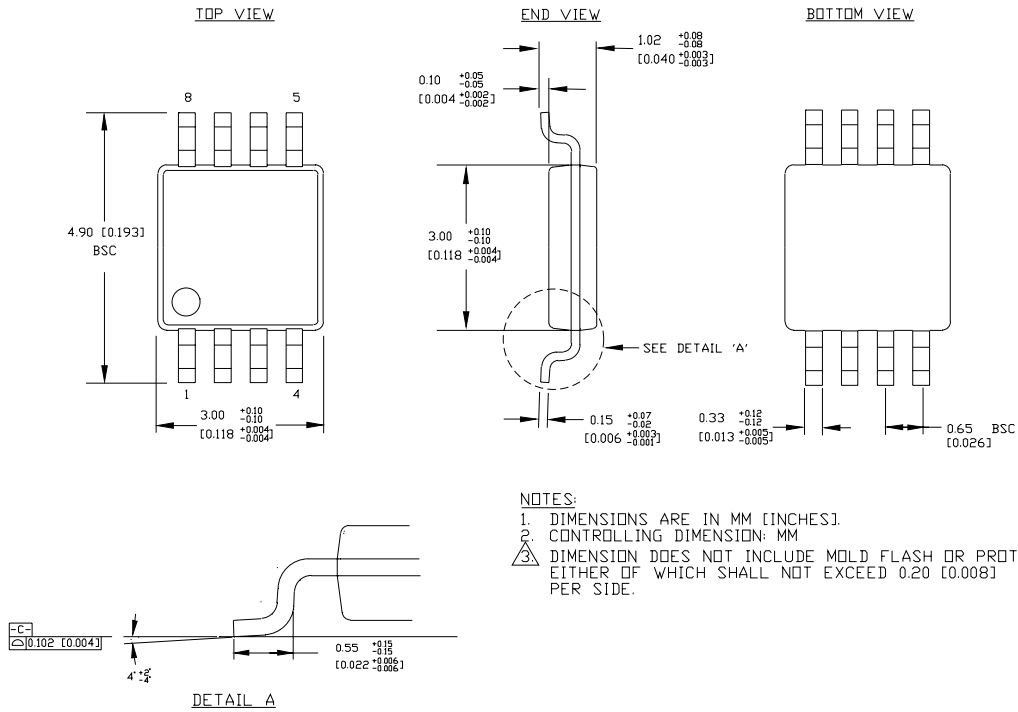


Figure 2. +5V PECL Three-Resistor "Y-Termination"

**Notes:**

1. Power-saving alternative to 4-resistor, Thevenin termination.
2. Place termination resistors as close to destination inputs as possible.
3.  $R_b$  resistor sets the DC bias voltage, equal to  $V_t$ . For 5.0V supply,  $R_b$  value is 110Ω.

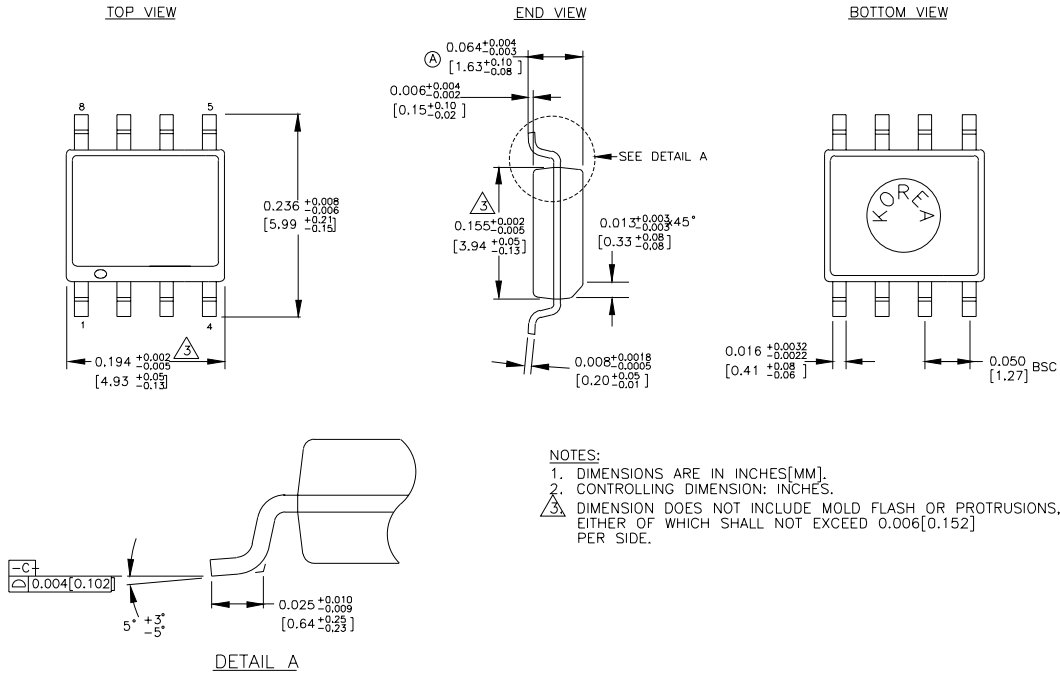
**8 LEAD MSOP (K8-1)**



NOTES:  
 1. DIMENSIONS ARE IN MM [INCHES].  
 2. CONTROLLING DIMENSION: MM  
 3. DIMENSION DOES NOT INCLUDE MOLD FLASH OR PROTRUSIONS, EITHER OF WHICH SHALL NOT EXCEED 0.20 [0.008] PER SIDE.

Rev. 01

**8 LEAD SOIC .150" WIDE (Z8-1)**



Rev. 03

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