



# SY100EPT21L

3.3V Differential ECL  
LVPECL-to-LVTTL Translator

ECL Pro™

## General Description

The SY100EPT21L is a single, differential LVPECL-to-LVTTL translator using a single +3.3V power supply. Because the device uses low-voltage positive ECL (LVPECL) levels, only +3.3V and ground are required. The small-outline 8-pin SOIC package and low-skew, single-gate design make the EPT21L ideal for applications that require the translation of a clock or data signal where minimal space, low power, and low cost are critical.

$V_{BB}$  allows a differential, single-ended, or AC-coupled interface to the device. If used, the  $V_{BB}$  output should be bypassed to  $V_{CC}$  with 0.01 $\mu$ F capacitor.

Under open input conditions, the /D is biased at a  $V_{CC}/2$  voltage level and the D input is pulled to ground. This condition forces the Q output low to provide added stability.

The 100EPT is compatible with positive ECL 100K logic levels. For applications that require the smallest footprint, consider the SY89321L in ultra-small 8-pin MSOP and SOIC packages.

Data sheets and support documentation can be found on Micrel's web site at: [www.micrel.com](http://www.micrel.com).



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## Features

- Guaranteed over the industrial temperature range: –40°C to +85°C
- Pin-for-pin, plug-in replacement to MC100EPT21D/DT
- 3.3V power supply
- 1.9ns typical propagation delay
- 275MHz  $f_{MAX}$  (clock)
- Differential LVPECL inputs
- 24mA LVTTL output
- Flow-through pin configuration
- Q output defaults LOW with inputs open
- $V_{BB}$  output
- Available in 8-pin MSOP and SOIC packages

## Applications

- ASIC/FPGA interface
- Legacy interface
- Precision differential-to-general purpose, single-ended translation

## Cross Reference

Micrel	ON Semiconductor
SY100EPT21LZI	MC100EPT21D
SY100EPT21LZITR	MC100EPT21DR2
SY100EPT21LKI	MC100EPT21DT
SY100EPT21LKITR	MC100EPT21DTR2

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November 2012

M9999-112712-F  
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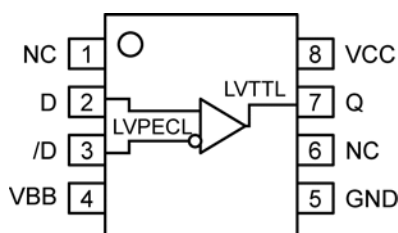
## Ordering Information<sup>(1)</sup>

Part Number	Package	Operating Range	Marking
SY100EPT21LZG <sup>(2)</sup>	8-Pin SOIC (Z8-1)	Industrial	XEP21L with Pb-Free bar-line indicator
SY100EPT21LZGTR <sup>(2, 3)</sup>	8-Pin SOIC (Z8-1)	Industrial	XEP21L with Pb-Free bar-line indicator
SY100EPT21LKG <sup>(2)</sup>	8-Pin MSOP (K8-1)	Industrial	XP21 with Pb-Free bar-line indicator
SY100EPT21LKGTR <sup>(2, 3)</sup>	8-Pin MSOP (K8-1)	Industrial	XP21 with Pb-Free bar-line indicator

### Notes:

- Contact factory for die availability. Dice are guaranteed at  $T_A = 25^\circ\text{C}$ , DC Electricals only.
- Pb-Free packages are recommended for new designs.
- Tape and Reel.

## Pin Configuration



8-Pin SOIC (Z8-1)  
8-Pin MSOP (K8-1)

## Pin Description

Pin Number	Pin Name	Pin Function
1	NC	No Connect
2, 3	D, /D	Differential LVPECL Input Pair
4	VBB	Output Reference Voltage
5	GND	Ground
6	NC	No Connect
7	Q	LVTTTL Output
8	VCC	Positive Supply

## Truth Table

D	/D	Q
L	H	L
H	L	H
Open	Open	L

### Absolute Maximum Ratings<sup>(1)</sup>

Power Supply Voltage ( $V_{CC}$ )..... -0.5V to +3.8V  
 PECL Input Voltage ( $V_{IN}$ ) ..... 0V to  $V_{CC} + 0.5V$   
 Voltage Applied to Output at HIGH State ( $V_{OUT}$ ) -0.5 to  $V_{CC}$   
 Current Applied to Output at LOW State ( $I_{OUT}$ )  
 ..... Twice the Rated  $I_{OL}$  (mA)  
 Lead Temperature (soldering, 20sec.)..... +260°C  
 Storage Temperature ( $T_s$ ) ..... -65°C to +150°C

### Operating Ratings<sup>(2)</sup>

Power Supply Voltage ( $V_{CC}$ ) ..... -0.5V to +3.8V  
 Ambient Temperature ( $T_A$ ) ..... -40°C to +85°C  
 Package Thermal Resistance  
 SOIC ( $\theta_{JA}$ ) ..... 113°C/W  
 MSOP ( $\theta_{JA}$ ) ..... 124°C/W

### LVTTTL Output DC Electrical Characteristics

$V_{CC} = +3.3V$ ,  $GND = 0V$ ;  $T_A = -40^\circ C$  to  $+85^\circ C$ ; unless noted.

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
$I_{OS}$	Output Short Circuit Current	$V_{OUT} = 0V$	-80		-275	mA
$I_{CC}$	Power Supply Current			14	20	mA
$V_{OH}$	Output High Voltage	$I_{OH} = -3.0mA^{(3)}$	2.3			V
$V_{OL}$	Output Low Voltage	$I_{OL} = 24mA$			0.5	V

### LVTTTL Input DC Electrical Characteristics

$V_{CC} = +3.3V$ ,  $GND = 0V$ ;  $T_A = -40^\circ C$  to  $+85^\circ C$ ; unless noted.

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
$I_{IH}$	Input HIGH Current				150	$\mu A$
$I_{IL}$	Input LOW Current	D	0.5			$\mu A$
		/D	-300			$\mu A$
$V_{IH}$	Input HIGH Voltage	Note 3	2135		2420	mV
$V_{IL}$	Input LOW Voltage	Note 3	1490		1825	mV
$V_{BB}$	Reference Output	Note 3	1920	1980	2040	mV

**Notes:**

1. Permanent device damage may occur if ratings in the absolute maximum ratings section are exceeded. This is a stress rating only and functional operation is not implied for conditions other than those detailed in the operational sections of this data sheet. Exposure to absolute maximum ratings conditions for extended periods may affect device reliability.
2. The data sheet limits are not guaranteed if the device is operated beyond the operating ratings.
3. These values are for  $V_{CC} = 3.3V$ . Level Specifications will vary 1:1  $V_{CC}$ .

## AC Electrical Characteristics

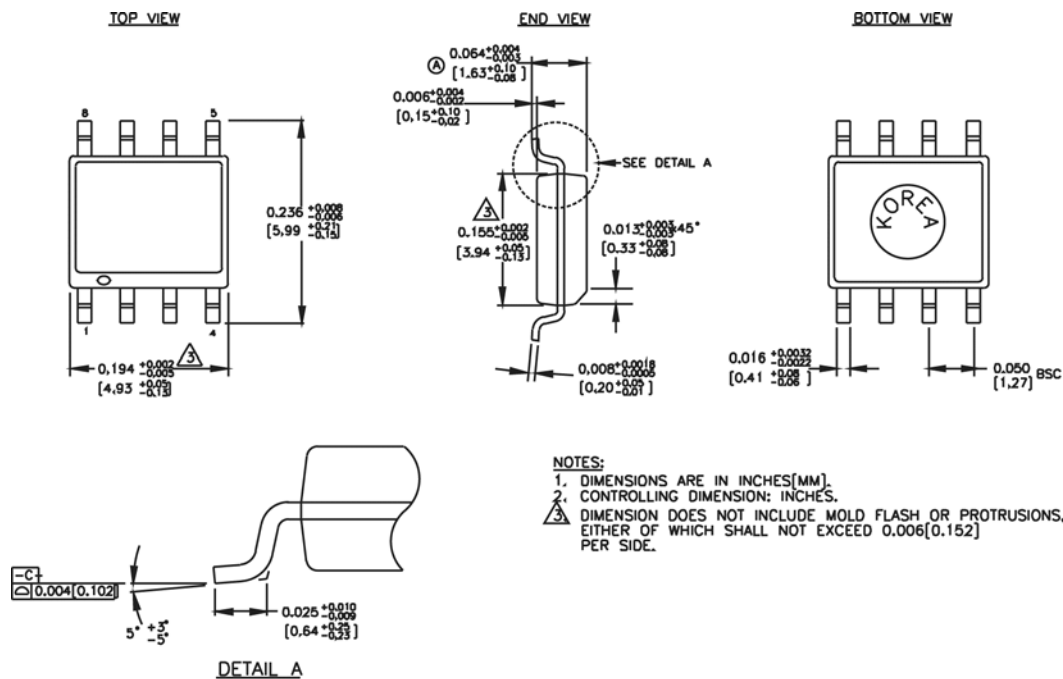
$V_{CC} = +3.0V$  to  $+3.6V$ ,  $GND = 0V$ ;  $T_A = -40^{\circ}C$  to  $+85^{\circ}C$ ; unless noted.

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
$t_{PD}$	Propagation Delay	$C_L = 20pF$	1.5	1.9	2.5	ns
$t_{skpp}$	Part-to-Part Skew	$C_L = 20pF^{(1, 2)}$			0.5	ns
$f_{MAX}$	Maximum Input Frequency		275			MHz
$V_{CMR}$	Common Mode Range		1.2		$V_{CC}$	V
$V_{PP}$	Minimum Peak-to-Peak Input	Note 4	100			mV
$t_r, t_f$	Output Rise/Fall Time (1.0V to 2.0V)	$C_L = 20pF$	0.5		1.0	ns

### Notes:

1. Part-to-part skew considering HIGH-to-HIGH transitions at common  $V_{CC}$  level.
2. These parameters are guaranteed but not tested.
3. The  $f_{MAX}$  value is specified as the minimum guaranteed maximum frequency. Actual operational maximum frequency may be greater.
4. 100mV input guarantees full logic at output.

# Package Information<sup>(1)</sup>



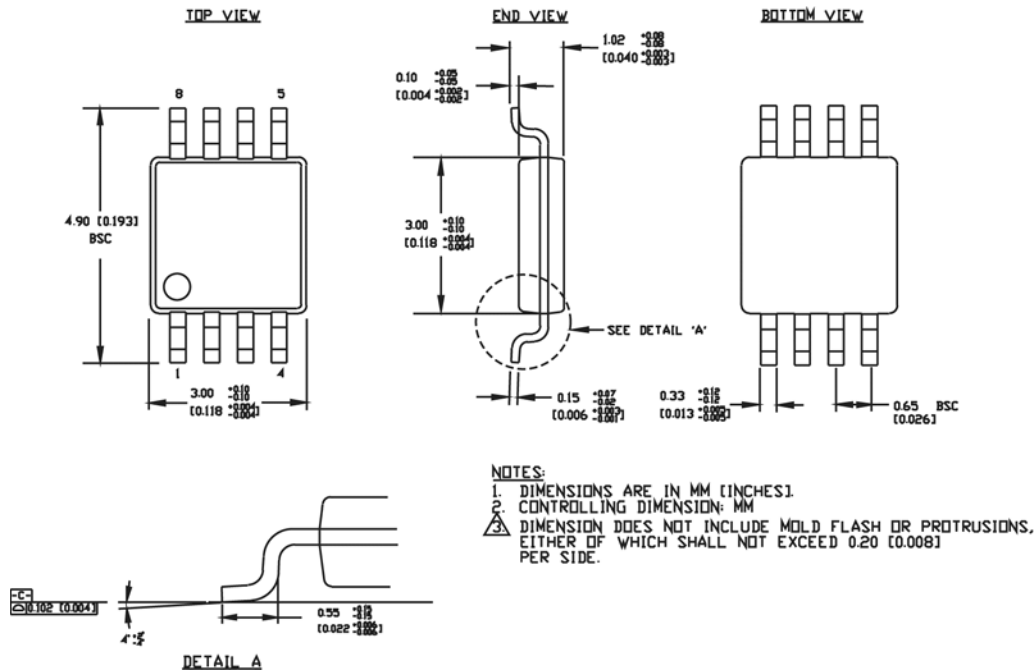
Rev. 03

## 8-Pin Plastic SOIC (Z8-1)

**Note:**

1. Package information is correct as of the publication date. For updates and most current information, go to [www.micrel.com](http://www.micrel.com).

Package Information (Continued)



Rev.01

8-Pin MSOP (K8-1)

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