

# AZ10EP16

# AZ100EP16

## ECL/PECL Differential Receiver

### FEATURES

- Silicon-Germanium for High Speed Operation
- 150ps Typical Propagation Delay
- Internal Input Pulldown Resistors
- Functionally Equivalent to ON Semi MC10EP16 & MC100EP16

### PACKAGE AVAILABILITY

PACKAGE	PART NUMBER	MARKING	NOTES
SOIC 8	AZ10EP16D	AZM10EP16	1,2
SOIC 8	AZ100EP16D	AZM100EP16	1,2
TSSOP 8	AZ10EP16T	AZTEP16	1,2
TSSOP 8	AZ100EP16T	AZHEP16	1,2

1 Add R1 at end of part number for 7 inch (1K parts), R2 for 13 inch (2.5K parts) Tape & Reel.

2 Date Code "YWW" on underside of part.

### DESCRIPTION

The AZ10/100EP16 is a Silicon-Germanium (SiGe) differential receiver. The device is functionally equivalent to the AZ10/100EL16 device with higher performance capabilities. With output transition times significantly faster than the AZ10/100EL16, the EP16 is ideally suited for interfacing with high frequency sources.

The EP16 provides a  $V_{BB}$  output for single-ended use or a DC bias reference for AC coupling to the device. For single-ended input applications, the  $V_{BB}$  reference should be connected to one side of the D/D differential input pair. The input signal is then fed to the other D/D input. The  $V_{BB}$  pin can support 1.5mA sink/source current. When used, the  $V_{BB}$  pin should be bypassed to ground via a 0.01 $\mu$ F capacitor.

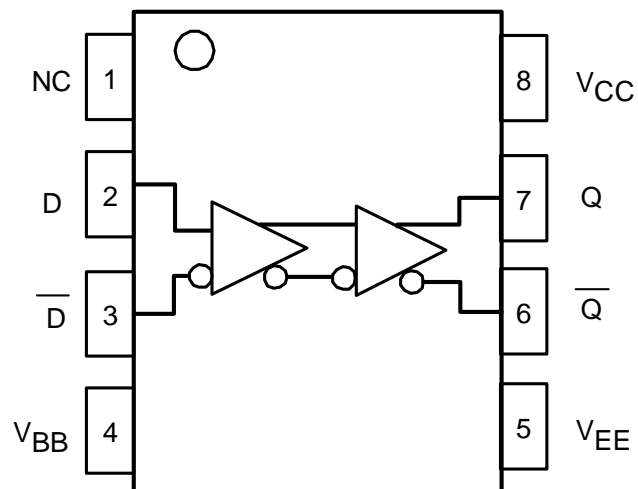
Under open input conditions internal input clamps will force the Q output LOW.

NOTE: Specifications in ECL/PECL tables are valid when thermal equilibrium is established.

### PIN DESCRIPTION

PIN	FUNCTION
D, D	Data Inputs
Q, Q	Data Outputs
$V_{BB}$	Reference Voltage Output
$V_{CC}$	Positive Supply
$V_{EE}$	Negative Supply
NC	No Connect

### LOGIC DIAGRAM AND PINOUT ASSIGNMENT



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**Absolute Maximum Ratings are those values beyond which device life may be impaired.**

Symbol	Characteristic	Rating	Unit
V <sub>CC</sub>	PECL Power Supply (V <sub>EE</sub> = 0V)	0 to +4.5	Vdc
V <sub>I</sub>	PECL Input Voltage (V <sub>EE</sub> = 0V)	0 to +4.5	Vdc
V <sub>EE</sub>	ECL Power Supply (V <sub>CC</sub> = 0V)	-4.5 to 0	Vdc
V <sub>I</sub>	ECL Input Voltage (V <sub>CC</sub> = 0V)	-4.5 to 0	Vdc
I <sub>OUT</sub>	Output Current --- Continuous --- Surge	50 100	mA
T <sub>A</sub>	Operating Temperature Range	-40 to +85	°C
T <sub>STG</sub>	Storage Temperature Range	-65 to +150	°C

**10K ECL DC Characteristics (V<sub>EE</sub> = -3.0V to -3.6V, V<sub>CC</sub> = GND)**

Symbol	Characteristic	-40°C			0°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
V <sub>OH</sub>	Output HIGH Voltage <sup>1</sup>	-1135		-885				-1070	-945	-820	-1010		-760	mV
V <sub>OL</sub>	Output LOW Voltage <sup>1</sup>	-1935		-1685				-1870	-1745	-1620	-1810		-1560	mV
V <sub>IH</sub>	Input HIGH Voltage	-1200		-885				-1150		-820	-1090		-760	mV
V <sub>IL</sub>	Input LOW Voltage	-1935		-1530				-1870		-1450	-1810		-1410	mV
V <sub>BB</sub>	Reference Voltage	-1430		-1300	-1380		-1270	-1350		-1250	-1310		-1190	mV
I <sub>IH</sub>	Input HIGH Current			175			175			175			175	µA
I <sub>IL</sub>	Input LOW Current	D	0.5		0.5		0.5				0.5			µA
		D	-150		-150		-150				-150			
I <sub>EE</sub>	Power Supply Current	20	25	33	21	26	34	21	27	35	23	29	37	mA

1. Each output is terminated through a 50Ω resistor to V<sub>CC</sub> - 2V.

**10K LVPECL DC Characteristics (V<sub>EE</sub> = GND, V<sub>CC</sub> = +3.3V)**

Symbol	Characteristic	-40°C			0°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
V <sub>OH</sub>	Output HIGH Voltage <sup>1,2</sup>	2165		2415				2230	2355	2480	2290		2540	mV
V <sub>OL</sub>	Output LOW Voltage <sup>1,2</sup>	1365		1615				1430	1555	1680	1490		1740	mV
V <sub>IH</sub>	Input HIGH Voltage <sup>1</sup>	2100		2415				2035		2480	2210		2540	mV
V <sub>IL</sub>	Input LOW Voltage <sup>1</sup>	1365		1770				1430		1850	1490		1890	mV
V <sub>BB</sub>	Reference Voltage <sup>1</sup>	1870		2000	1920		2030	1950		2050	1990		2110	mV
I <sub>IH</sub>	Input HIGH Current			175			175			175			175	µA
I <sub>IL</sub>	Input LOW Current	D	0.5		0.5		0.5				0.5			µA
		D	-150		-150		-150				-150			
I <sub>EE</sub>	Power Supply Current	20	25	33	21	26	34	21	27	35	23	29	37	mA

1. For supply voltages other than 3.3V, use the ECL table values and ADD supply voltage value.

2. Each output is terminated through a 50Ω resistor to V<sub>CC</sub> - 2V.

**100K ECL DC Characteristics (V<sub>EE</sub> = -3.0V to -3.6V, V<sub>CC</sub> = GND)**

Symbol	Characteristic	-40°C			0°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
V <sub>OH</sub>	Output HIGH Voltage <sup>1</sup>	-1085		-880	-1025		-880	-1025	-955	-880	-1025		-880	mV
V <sub>OL</sub>	Output LOW Voltage <sup>1</sup>	-1830		-1555	-1810		-1620	-1810	-1705	-1620	-1810		-1620	mV
V <sub>IH</sub>	Input HIGH Voltage	-1220		-880	-1160		-880	-1160		-880	-1160		-880	mV
V <sub>IL</sub>	Input LOW Voltage	-1830		-1540	-1810		-1480	-1810		-1480	-1810		-1480	mV
V <sub>BB</sub>	Reference Voltage	-1440		-1320	-1380		-1260	-1380		-1260	-1380		-1260	mV
I <sub>IH</sub>	Input HIGH Current			175			175			175			175	µA
I <sub>IL</sub>	Input LOW Current	D	0.5		0.5		0.5				0.5			µA
		D	-150		-150		-150				-150			
I <sub>EE</sub>	Power Supply Current	19	24	32	20	25	33	21	26	35	23	29	38	mA

1. Each output is terminated through a 50Ω resistor to V<sub>CC</sub> - 2V.

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### 100K LVPECL DC Characteristics ( $V_{EE} = \text{GND}$ , $V_{CC} = +3.3\text{V}$ )

Symbol	Characteristic	-40°C			0°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
$V_{OH}$	Output HIGH Voltage <sup>1,2</sup>	2215		2420	2275		2420	2275	2345	2420	2275		2420	mV
$V_{OL}$	Output LOW Voltage <sup>1,2</sup>	1470		1745	1490		1680	1490	1595	1680	1490		1680	mV
$V_{IH}$	Input HIGH Voltage <sup>1</sup>	2080		2420	2140		2420	2140		2420	2140		2420	mV
$V_{IL}$	Input LOW Voltage <sup>1</sup>	1470		1760	1490		1820	1490		1820	1490		1820	mV
$V_{BB}$	Reference Voltage <sup>1</sup>	1860		1980	1920		2040	1920		2040	1920		2040	mV
$I_{IH}$	Input HIGH Current			175			175			175			175	$\mu\text{A}$
$I_{IL}$	Input LOW Current													$\mu\text{A}$
		D	0.5		0.5			0.5			0.5			$\mu\text{A}$
		D	-150		-150			-150			-150			$\mu\text{A}$
$I_{EE}$	Power Supply Current	19	24	32	20	25	33	21	26	35	23	29	38	mA

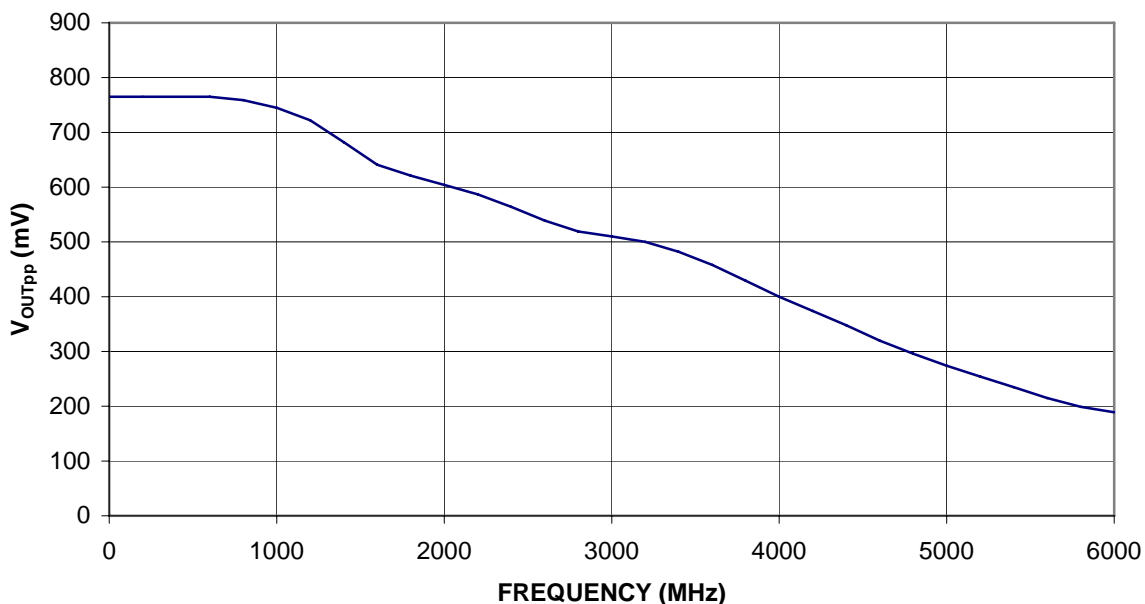
- For supply voltages other than 3.3V, use the ECL table values and ADD supply voltage value.
- Each output is terminated through a 50 $\Omega$  resistor to  $V_{CC} - 2\text{V}$ .

### AC Characteristics ( $V_{EE} = -3.0$ to $-3.6\text{V}$ , $V_{CC} = \text{GND}$ or $V_{EE} = \text{GND}$ , $V_{CC} = +3.0\text{V}$ to $+3.6\text{V}$ )

Symbol	Characteristic	-40°C			0°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
$f_{\text{max}}$	Maximum Toggle Frequency <sup>4</sup>		>4			>4			>4			>4		GHz
$t_{\text{PLH}} / t_{\text{PHL}}$	Input to Output Delay (DIFF)	100	160	240	100	160	240	100	160	240	120	190	280	ps
$t_{\text{SKEW}}$	Duty Cycle Skew <sup>1</sup> (Diff)		5			5	20		5	20		5	20	ps
$V_{\text{PP}} (\text{AC})$	Minimum Input Swing <sup>2</sup>	150			150			150			150			mV
$V_{\text{CMR}}$	Common Mode Range <sup>3</sup>	$V_{EE} + 2.0$		$V_{CC}$	$V_{EE} + 2.0$		$V_{CC}$	$V_{EE} + 2.0$		$V_{CC}$	$V_{EE} + 2.0$		$V_{CC}$	V
$t_r / t_f$	Output Rise/Fall Times Q (20% - 80%)		120	170		130	180		130	180		150	200	ps

- Duty cycle skew is the difference between a  $t_{\text{PLH}}$  and  $t_{\text{PHL}}$  propagation delay through a device.
- $V_{\text{PP}}$  is the minimum peak-to-peak differential input swing for which AC parameters are guaranteed.
- The  $V_{\text{CMR}}$  range is referenced to the most positive side of the differential input signal. Normal operation is obtained if the HIGH level falls within the specified range and the peak-to-peak voltage lies between  $V_{\text{PP}}(\text{min})$  and 1V.
- See Graph Below.

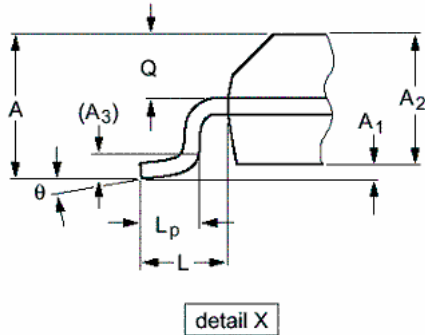
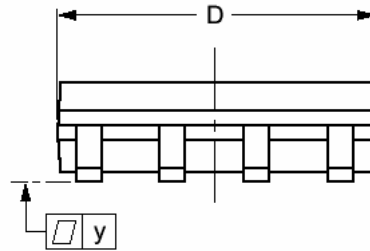
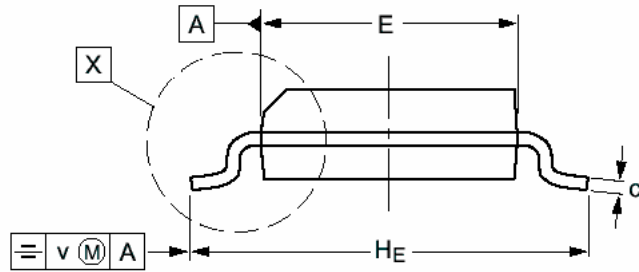
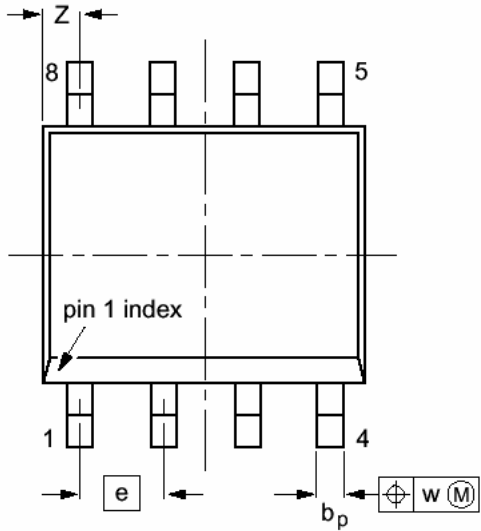
### Large Signal Performance\*



\*Measured using a 750mV differential input source at 50% duty cycle

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**PACKAGE DIAGRAM  
SOIC 8**



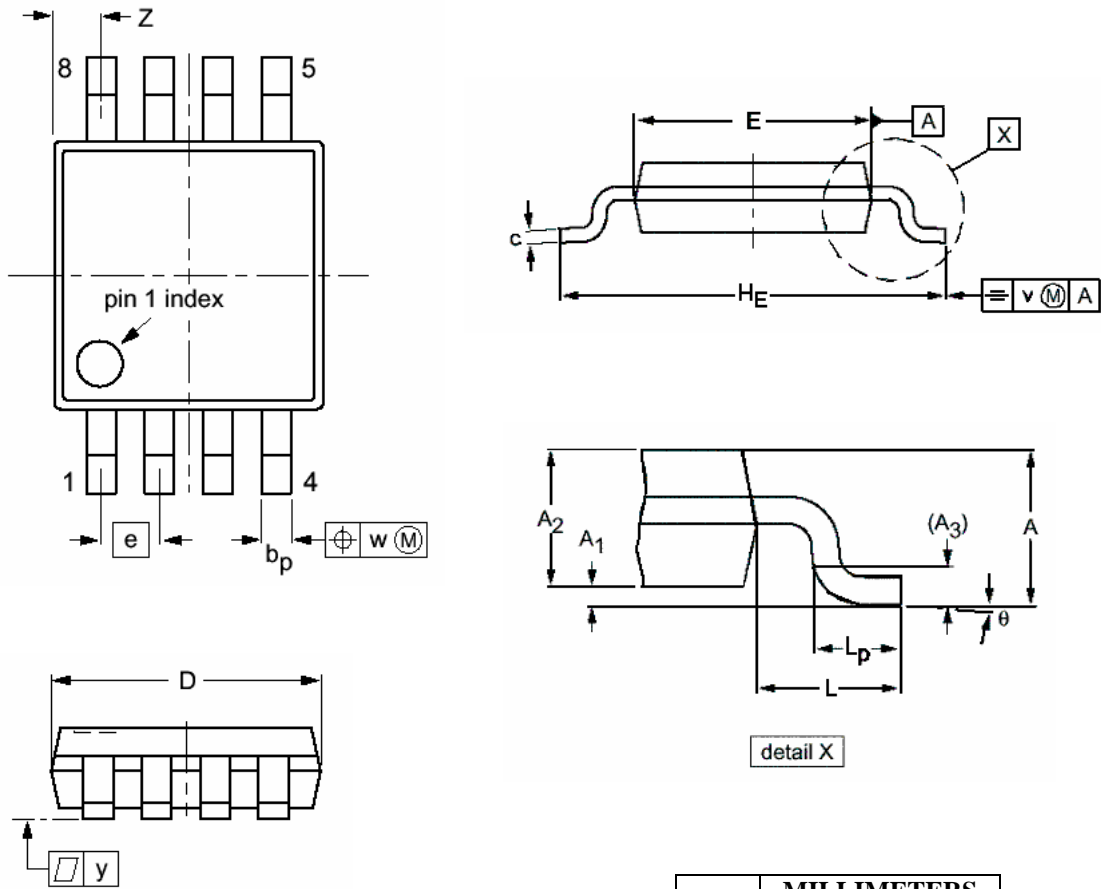
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A		1.75		0.069
A <sub>1</sub>	0.10	0.25	0.004	0.010
A <sub>2</sub>	1.25	1.45	0.049	0.057
A <sub>3</sub>	0.25		0.01	
b <sub>p</sub>	0.36	0.49	0.014	0.019
c	0.19	0.25	0.0075	0.0100
D	4.8	5.0	0.19	0.20
E	3.8	4.0	0.15	0.16
e	1.27		0.050	
H <sub>E</sub>	5.80	6.20	0.228	0.244
L	1.05		0.041	
L <sub>p</sub>	0.40	1.00	0.016	0.039
Q	0.60	0.70	0.024	0.028
v	0.25		0.01	
w	0.25		0.01	
y	0.10		0.004	
Z	0.30	0.70	0.012	0.028
θ	0°	8°	0°	8°

NOTES:

1. DIMENSIONS D AND E DO NOT INCLUDE MOLD PROTRUSION.
2. MAXIMUM MOLD PROTRUSION FOR D IS 0.15mm.
3. MAXIMUM MOLD PROTRUSION FOR E IS 0.25mm.

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**PACKAGE DIAGRAM  
TSSOP 8**



- NOTES:
1. DIMENSIONS D AND E DO NOT INCLUDE MOLD PROTRUSION.
  2. MAXIMUM MOLD PROTRUSION FOR D IS 0.15mm.
  3. MAXIMUM MOLD PROTRUSION FOR E IS 0.25mm.

DIM	MILLIMETERS	
	MIN	MAX
<b>A</b>		1.10
<b>A<sub>1</sub></b>	0.05	0.15
<b>A<sub>2</sub></b>	0.80	0.95
<b>A<sub>3</sub></b>	0.25	
<b>b<sub>p</sub></b>	0.25	0.45
<b>c</b>	0.15	0.28
<b>D</b>	2.90	3.10
<b>E</b>	2.90	3.10
<b>e</b>	0.65	
<b>H<sub>E</sub></b>	4.70	5.10
<b>L</b>	0.94	
<b>L<sub>p</sub></b>	0.40	0.70
<b>v</b>	0.10	
<b>w</b>	0.10	
<b>y</b>	0.10	
<b>Z</b>	0.35	0.70
<b>θ</b>	0°	6°

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