

AZ100EP16FE

PECL/ECL High Speed VCSEL Driver with Variable Output Swing or Limiting Amplifier

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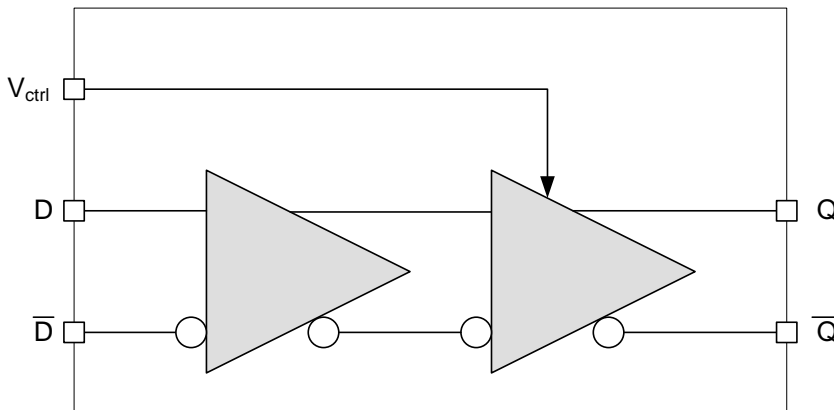
FEATURES

- Silicon-Germanium for high-speed operation
- <100ps typical rise/fall times
- Optimized for 0.622 to 2.5Gbps fiber applications

DESCRIPTION

The [AZ100EP16FE](#) is a Silicon-Germanium (SiGe) differential VCSEL driver with variable output swing or limiting post amplifier. The AZ100EP16FE is optimized for OC-12, OC-24, OC-48, Ethernet, Sonnet, Fiber Channel or related applications at data rates up to 2.5Gbps. An input controls the amplitude of the Q/Q outputs, which allows compensation for differing VCSEL characteristics.

BLOCK DIAGRAM



APPLICATIONS

- OC-12, OC-24, OC-48 Applications
- Ethernet, Sonnet Fiber Channel Applications

PACKAGE AVAILABILITY

- MSOP8
 - Green/RoHS Compliant/Pb-Free

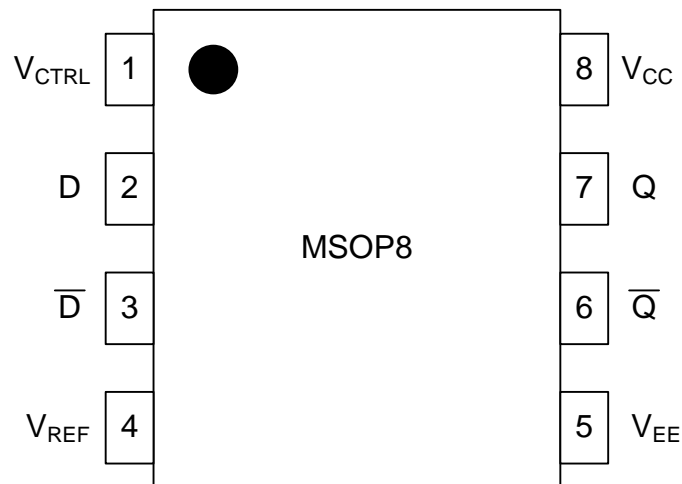
Order Number	Package	Marking
AZ100EP16FETG ¹	MSOP8	AZHPG16FE ²

¹ [Tape & Reel](#) - Add 'R1' at end of order number for 7in (1k parts), 'R2' (2.5k) for 13in

² See www.azmicrotek.com for [date code format](#)

PIN DESCRIPTION AND CONFIGURATION**Table 1 - Pin Description**

Pin	Name	Type	Function
1	V _{CTRL}	Input	Output Swing Control
2	D	Input	Data Input
3	\overline{D}	Input	Data Input
4	V _{REF}	Output	Reference Voltage Output
5	V _{EE}	Power	Negative Supply
6	\overline{Q}	Output	Data Output
7	Q	Output	Data Output
8	V _{CC}	Power	Positive Supply

**Figure 1 - Pin Configuration for MSOP8**

ENGINEERING NOTES

The operational range of the AZ100EP16FE control input, V_{CTRL} , is from V_{REF} (full swing) to V_{CC} (small swing). For post amplifier applications, maximum swing is achieved by leaving the V_{CTRL} pin open or by tying it to the negative supply pin (V_{EE}). Simple control of the output swing can be obtained by a variable resistor between the V_{REF} and V_{CC} pins, with the wiper driving V_{CTRL} . A typical application circuit is shown in Figure 2.

The AZ100EP16FE also provides a V_{REF} output which functions as a DC bias for input AC coupling to the device. The V_{REF} pin should be used only as a bias for the AZ100EP16FE as its current sink/source capability is limited. When used, the V_{REF} pin should be bypassed to ground via a $0.01\mu\text{F}$ capacitor.

The maximum DC output current should be kept below 16mA. Connecting each output (Q/Q) to V_{EE} with a 180Ω resistor is typically used. The load is then AC coupled from the output. DC and AC symmetrical loading of the Q/Q outputs will provide the best output wave shape.

Under open input conditions for D/D, the Q/Q outputs are not guaranteed.

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

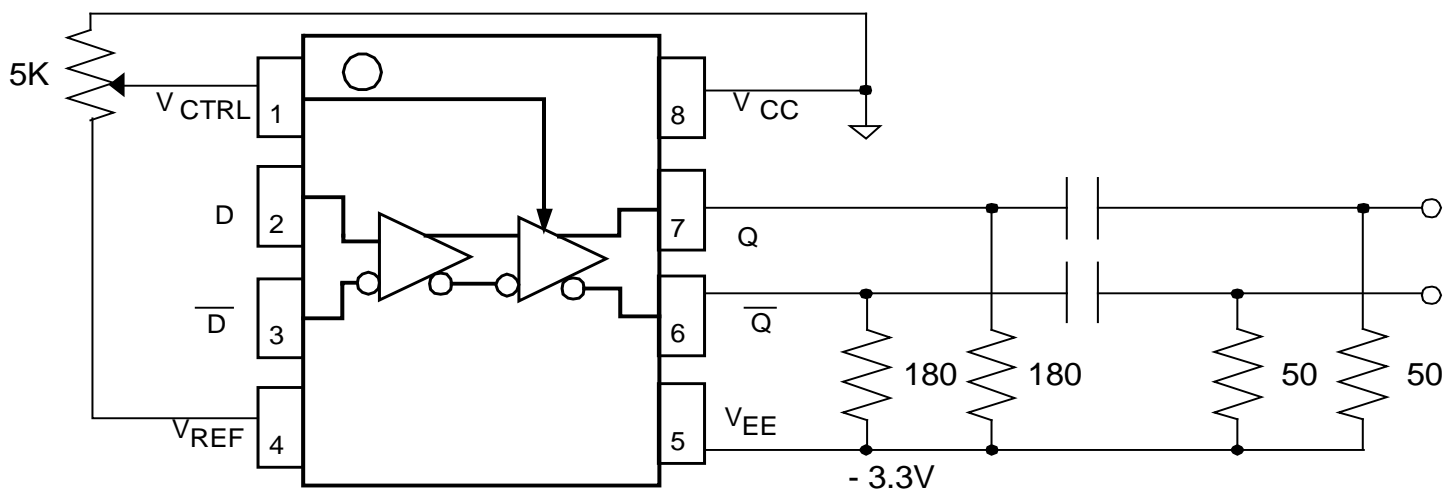


Figure 2 - AZ10/100EP16 Large Signal Performance

Typical AZ100EP16FE Voltage Output Swing at +25C, V_{EE} Nom

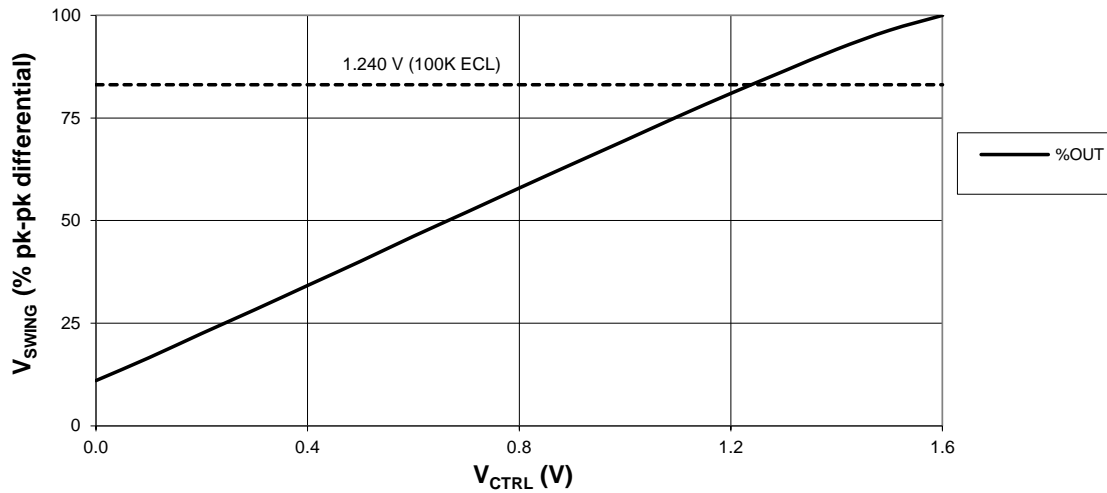


Figure 3 - Typical Voltage Output Swing at Nominal Conditions

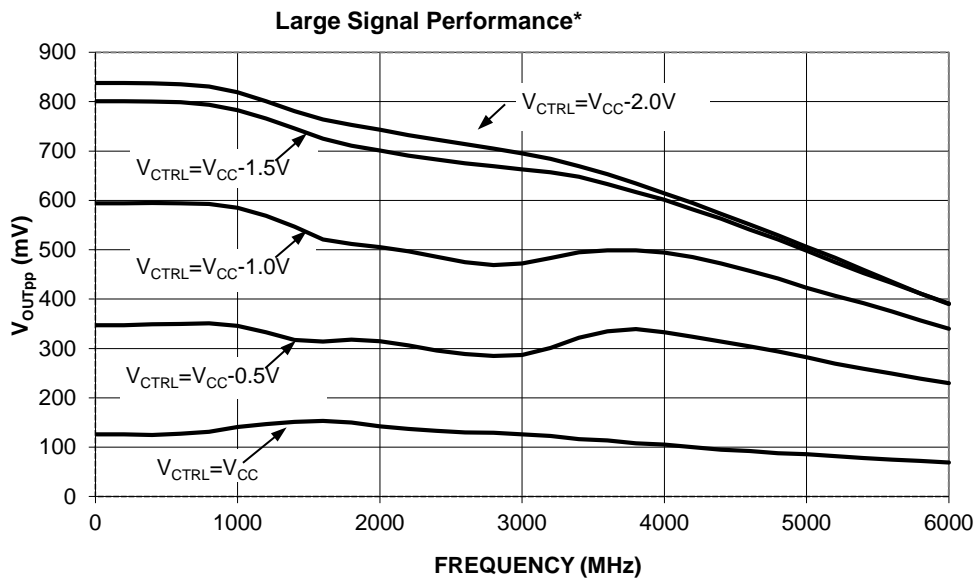


Figure 4 - Large Signal Performance

PERFORMANCE DATA**Table 2 – Absolute Maximum Ratings**

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

Symbol	Characteristic	Condition	Rating	Unit
V_{CC}	PECL Power Supply	$V_{EE} = 0V$	0 to +4.5	V
V_I	PECL Input Voltage	$V_{EE} = 0V$	0 to +4.5	V
V_{EE}	ECL Power Supply	$V_{CC} = 0V$	-4.5 to 0	V
V_I	ECL Input Voltage	$V_{CC} = 0V$	-4.5 to 0	V
I_{OUT}	Output Current	Continuous	22	mA
		Surge	44	
T_A	Operating Temperature Range		-40 to +85	°C
T_{STG}	Storage Temperature Range		-65 to +150	°C
ESD_{HBM}	Human Body Model		2500	V
ESD_{MM}	Machine Model		200	V
ESD_{CDM}	Charged Device Model		2500	V

Table 3 - 100K ECL DC Characteristics**100K ECL DC Characteristics ($V_{EE} = -3.0V$ to $-3.6V$, $V_{CC} = GND$)**

Symbol	Characteristic	-40 °C			0 °C			25 °C			85 °C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
V_{OH}	Output HIGH Voltage ¹	-1095		-890	-1035		-870	-1000	-920	-840	-940		-760	mV
V_{OL}	Output LOW Voltage ¹ $V_{CTRL} = V_{REF}$	-1935		-1745	-1905		-1715	-1885	-1790	-1790	-1830		-1640	mV
V_{OL}	Output LOW Voltage ¹ $V_{CTRL} = V_{CC}$	-1140		-950	-1120		-930	-1100	-1005	-1005	-1055		-865	mV
V_{REF}	Reference Voltage	-1700		-1500	-1700		-1500	-1700		-1500	-1700		-1500	mV
I_{IH}	Input HIGH Current			80			80			80			80	μA
	D, \bar{D}			400			400			400			400	
I_{IL}	V_{CTRL}	0.5			0.5			0.5			0.5			μA
I_{EE}	Power Supply Current	20	26	35	21	27	36	21	28	36	22	31	38	mA

¹ Each output is terminated through a 180Ω resistor to V_{EE}

Table 4 - 100K LVPECL DC Characteristics

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 ¹	2205		2410	2265		2430	2300	2380	2460	2360		2540	mV
V_{OL}	Output LOW Voltage ¹ $V_{CTRL} = V_{REF}$	1365		1555	1395		1585	1415	1510	1605	1470		1660	mV
V_{OL}	Output LOW Voltage ¹ $V_{CTRL} = V_{CC}$	2160		2350	2180		2370	2200	2295	2390	2245		2435	mV
V_{REF}	Reference Voltage	1600		1800	1600		1800	1600		1800	1600		1800	mV
I_{IH}	Input HIGH Current			80			80			80			80	μA
	D, \bar{D}			400			400			400			400	
I_{IL}	V_{CTRL}	0.5			0.5			0.5			0.5			μA
I_{EE}	Power Supply Current	20	26	35	21	27	36	21	28	36	22	31	38	mA

¹ Each output is terminated through a 180Ω resistor to V_{EE}

Table 5 - AC Characteristics

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

Symbol	Characteristic	-40 °C			0 °C			25 °C			85 °C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
f_{max}	Max Toggle Frequency ⁵		>6			>6			>6			>6		GHz
t_{PLH}/t_{PHL}	Propagation Delay to Output (Diff/SE)	100	150	240	100	150	240	100	150	240	120	170	280	ps
			155			155			155			175		ps
t_{skew}	Duty Cycle Skew ¹		4	20		4	15		4	15		4	15	ps
V_{PP}	Minimum Input Swing ²	150			150			150			150			mV
V_{CMR}	Common Mode Range ³	$V_{EE} + 2.0$		V_{CC}	$V_{EE} + 2.0$		V_{CC}	$V_{EE} + 2.0$		V_{CC}	$V_{EE} + 2.0$		V_{CC}	V
A_v	Small Signal Gain ⁴							28						dB
t_r/t_f	Output Rise/Fall Times Q (20%-80%)			130		130	130			130			130	ps

¹ Duty cycle skew is the difference between a t_{PLH} and t_{PHL} propagation delay through a device.

² V_{PP} is the minimum peak-to-peak differential input swing for which AC parameters guaranteed.

³ The V_{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_{PP} (min) and 1V. The lower end of the V_{CMR} range varies 1:1 with V_{EE} and is equal to $V_{EE} + 2\text{V}$

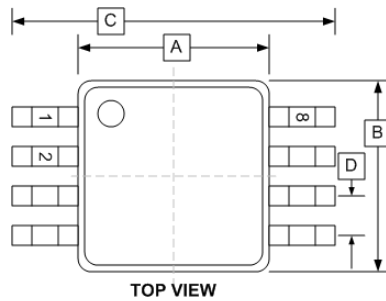
⁴ See Figure 4

PACKAGE DIAGRAM

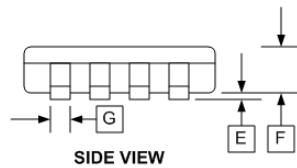
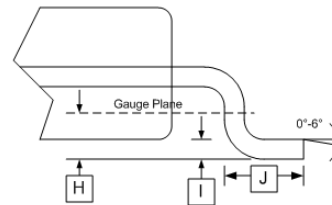
MSOP8

Green/RoHS compliant/Pb-Free

MSL=1

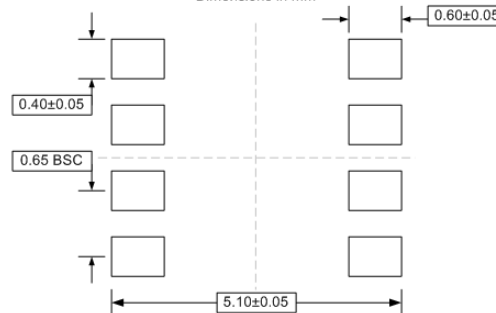


MSOP8 (T)



PCB LAND PATTERN/FOOTPRINT

Dimensions in mm



DIM	INCHES	
	MIN	MAX
A	0.118±0.004	
B	0.118±0.004	
C	0.192±0.008	
D	0.0256 TYP	
E	0.004±0.002	
F	0.034±0.002	
G	0.009±0.014	
H	0.010	
I	0.006±0.002	
J	0.021±0.004	

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