

AZ10/100EP16VS



LVPECL Differential Receiver with Variable Output Swing

www.azmicrotek.com

FEATURES

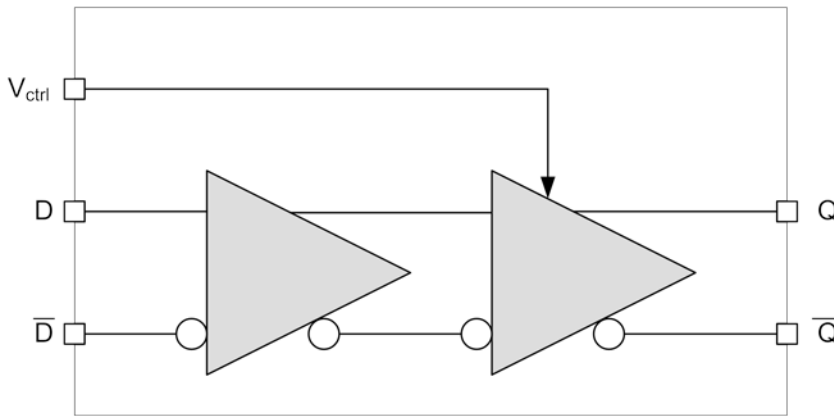
- Silicon-Germanium for high-speed operation
- 150ps typical propagation delay
- Available in a 3.0x3.0mm MLP package

DESCRIPTION

The [AZ10/100EP16VS](#) is a Silicon Germanium (SiGe) differential receiver with variable output swing. The AZ10/100EP16VS has functionality and output transition times similar to the AZ10/100EP16, with an input that controls the amplitude of the Q/Q outputs.

The AZ10/100EP16VS is functionally equivalent to the ON Semi MC100EP16VS

BLOCK DIAGRAM



APPLICATIONS

- Interfacing with very high frequency sources

PACKAGE AVAILABILITY

- MSOP8
- MLP16
- Green/RoHS Compliant/Pb-Free

Order Number	Package	Marking
AZ10EP16VSTG ¹	MSOP8	AZTPEP16VS ²
AZ100EP16VSTG ¹	MSOP8	AZHPGEP16VS ²
AZ10/100EP16VSLG ¹	MSOP16	AZMG16S 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

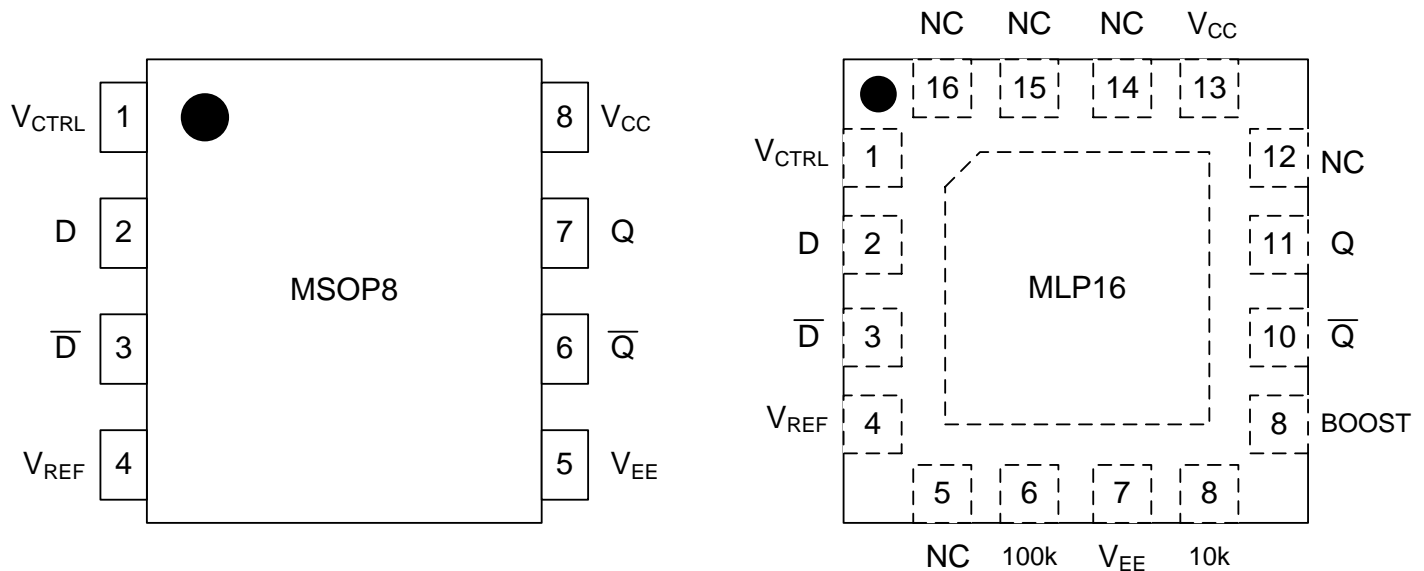


Figure 1 - Pin Configuration for MSOP8 and MLP16

NOTES FOR MLP16 PACKAGE:

10K/100K Selection - Connect pin 10K to V_{EE} and float (NC) pin 100K to select 10K operation. Connect pin 100K to V_{EE} and float (NC) pin 10K to select 100K operation.

Variable Swing Selection - Connect pin BOOST to V_{EE} to support variable swing operation. Float (NC) pins, BOOST and V_{CTRL} to disable variable swing operation.

All V_{EE} connections must be less than 1Ω .

ENGINEERING NOTES

Connecting the BOOST pin to V_{EE} increases the output swing by about 15% above standard ECL/PECL levels. The BOOST pin is internally tied to V_{EE} for the MSOP8 package, and is under external user control for the MLP16 package. When both the BOOST pin and the V_{CTRL} pin are not connected, the part operates with the standard ECL/PECL output and V_{BB} levels of the AZ10/100EP16 device. To ensure best performance, the BOOST pin should be tied to V_{EE} when the variable swing feature is used.

The operational range of the AZ10/100EP16VS control input, V_{CTRL} , is from V_{REF} (full swing) to V_{CC} (min. swing). Maximum swing is achieved by leaving the V_{CTRL} pin open or tied to 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} . Typical application circuits and results are shown in Figures below.

The AZ10/100EP16VS provides a V_{REF} (V_{BB}/V_{REF}) output for a DC bias when AC coupling to the device. The V_{REF} pin should be used only as a bias for the AZ10/100EP16VS as its current sink/source capability is limited. Whenever used, the V_{REF} pin should be bypassed to ground via a $0.01\mu\text{F}$ capacitor.

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.

Typical Large Signal Performance, AZ100EP16VS*

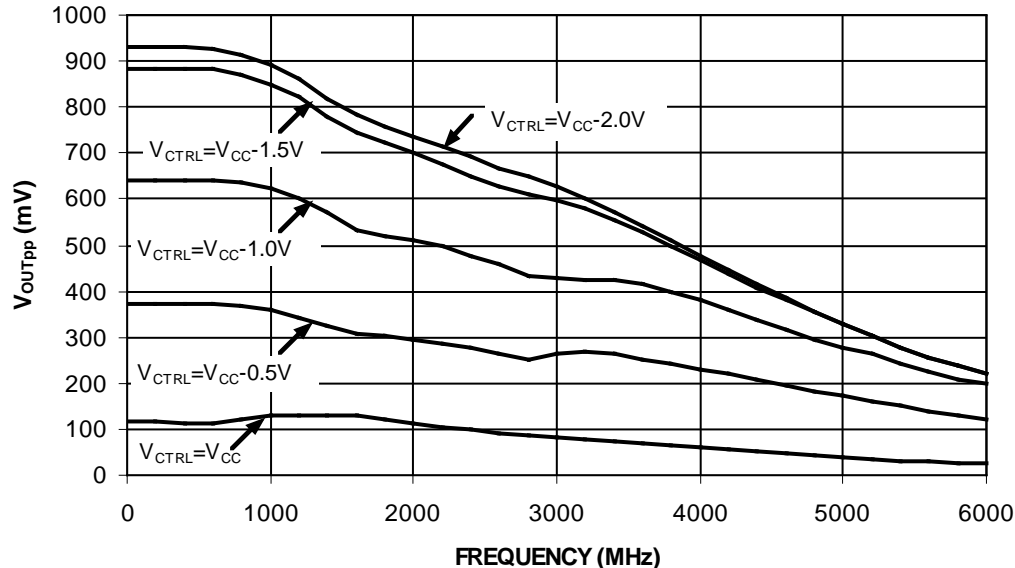


Figure 2 - AZ10/100EP16VS Large Signal Performance

*Measured using a 750mV differential input source at 50% duty cycle. Valid for MSOP8 or MLP16 with BOOST = V_{EE}

Typical AZ100EP16VS Voltage Output Swing at +25C, Nominal Supply

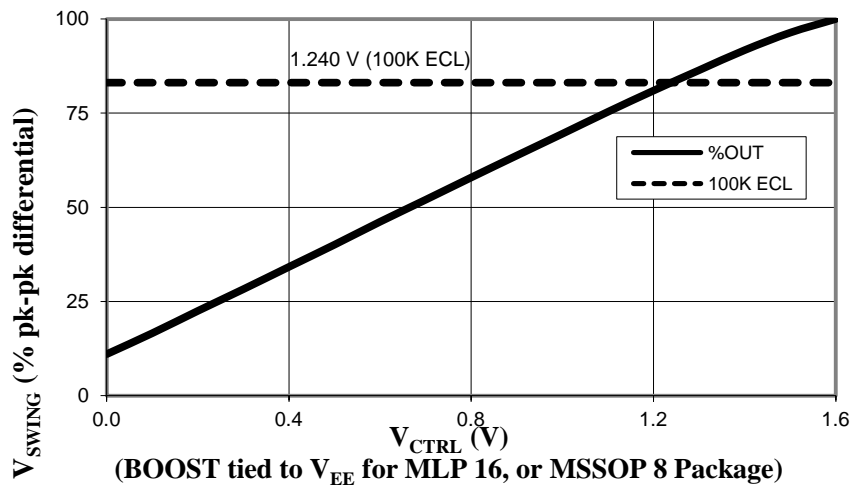


Figure 3 - Typical AZ10/100EP16VS Voltage Output Swing at nominal conditions

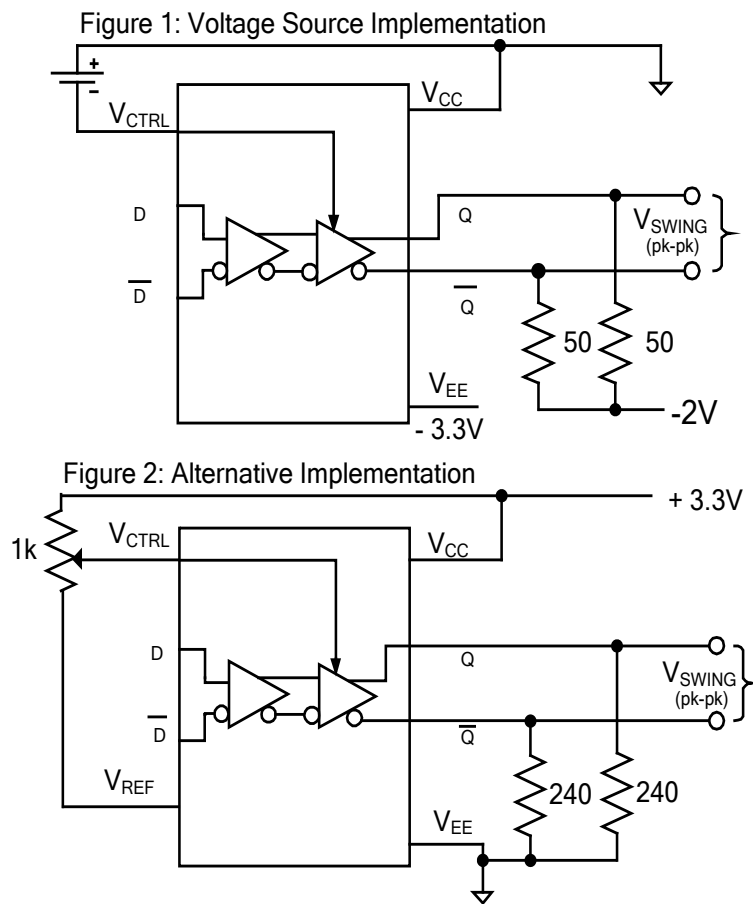


Figure 4 Typical applications

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	50	mA
		Surge	100	
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 - 10K ECL DC Characteristics**10K 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		-845	-1055		-805	-1030		-780	-970		-720	mV
V _{OL}	Output LOW Voltage ^{1,2} V _{CTRL} = V _{REF} . BOOST = V _{EE}	-2000		-1700	-2000		-1690	-2000		-1690	-2000		-1655	mV
V _{OL}	Output LOW Voltage ^{1,2} V _{CTRL} = V _{CC} . BOOST = V _{EE}	-1285		-1035	-1270		-1020	-1265		-1015	-1255		-1005	mV
V _{OL}	Output LOW Voltage ^{1,3} V _{CTRL} = NC. BOOST = NC	-1950		-1650	-1950		-1630	-1950		-1630	-1950		-1595	mV
V _{REF}	Reference Voltage ² BOOST = V _{EE}	-1700		-1500	-1670		-1470	-1650		-1450	-1600		-1400	mV
V _{REF}	Reference Voltage ³ BOOST = NC	-1430		-1300	-1380		-1270	-1350		-1250	-1310		-1190	mV
I _{IH}	Input HIGH Current - D			80			80			80			80	V
	V _{CTRL}			400	0.5		400	0.5		400	0.5		400	µA
I _{IL}	Input LOW Current	0.5			0.5			0.5			0.5			µA
I _{EE}	Power Supply Current	21	27	36	22	28	37	22	29	38	24	30	40	mA

¹ Each output is terminated through a 50Ω resistor to V_{CC} -2V² BOOST is internally bonded to V_{EE} for the MSOP8 packages³ Supported in MLP16 package only

Table 4 – 10K PECL DC Characteristics

10K 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 ^{1,2}	2205		2455	2245		2495	2270		2520	2330		2580	mV
V_{OL}	Output LOW Voltage ^{1,2,3} $V_{CTRL} = V_{REF}$, $BOOST = V_{EE}$	1300		1600	1300		1610	1300		1610	1300		1645	mV
V_{OL}	Output LOW Voltage ^{1,2,3} $V_{CTRL} = V_{CC}$, $BOOST = V_{EE}$	2015		2265	2030		2280	2035		2285	2045		2295	mV
V_{OL}	Output LOW Voltage ^{1,3,4} $V_{CTRL} = \text{NC}$, $BOOST = \text{NC}$	1350		1650	1350		1670	1350		1670	1350		1670	mV
V_{REF}	Reference Voltage ³ $BOOST = V_{EE}$	1600		1800	1630		1830	1650		1850	1700		1900	mV
V_{REF}	Reference Voltage ⁴ $BOOST = \text{NC}$	1870		2000	1920		2030	1950		2050	1990		2110	mV
I_{IH}	Input HIGH Current - D			80			80			80			80	μA
	V_{CTRL}			400	0.5		400	0.5		400	0.5		400	μA
I_{IL}	Input LOW Current	0.5			0.5			0.5			0.5			μA
I_{EE}	Power Supply Current	21	27	36	22	28	37	22	29	38	24	30	40	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 50 Ω resistor to $V_{CC} - 2\text{V}$

³ BOOST is internally bonded to V_{EE} for the MSOP8 packages

⁴ Supported in MLP16 package only

Table 5 – 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	-1130		-840	-1090		-840	-1090		-840	-1090		-840	mV
V_{OL}	Output LOW Voltage ^{1,2} $V_{CTRL} = V_{REF}$, $BOOST = V_{EE}$	-1950		-1700	-1950		-1700	-1950		-1700	-1950		-1700	mV
V_{OL}	Output LOW Voltage ^{1,2} $V_{CTRL} = V_{CC}$, $BOOST = V_{EE}$	-1200		-940	-1190		-940	-1190		-940	-1190		-940	mV
V_{OL}	Output LOW Voltage ^{1,3} $V_{CTRL} = NC$, $BOOST = NC$	-1900		-1640	-1890		-1640	-1890		-1640	-1890		-1640	mV
V_{REF}	Reference Voltage ² $BOOST = V_{EE}$	-1650		-1450	-1650		-1450	-1650	-1550	-1450	-1650		-1450	mV
V_{REF}	Reference Voltage ³ $BOOST = NC$	-1440		-1320	-1380		-1260	-1380		-1260	-1380		-1260	mV
I_{IH}	Input HIGH Current - D			80			80			80			80	μA
	V_{CTRL}			400	0.5		400	0.5		400	0.5		400	μA
I_{IL}	Input LOW Current	0.5			0.5			0.5			0.5			μA
I_{EE}	Power Supply Current	20	26	35	21	27	36	22	28	38	25	31	41	mA

¹ Each output is terminated through a 50 Ω resistor to $V_{CC} - 2V$

² BOOST is internally bonded to V_{EE} for the MSOP8 packages

³ Supported in MLP16 package only

Table 6 - 100K PECL 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 ^{1,2}	2170		2460	2210		2460	2210		2460	2210		2460	mV
V_{OL}	Output LOW Voltage ^{1,2,3} $V_{CTRL} = V_{REF}$, $BOOST = V_{EE}$	1350		1600	1350		1600	1350		1600	1350		1600	mV
V_{OL}	Output LOW Voltage ^{1,2,3} $V_{CTRL} = V_{CC}$, $BOOST = V_{EE}$	2100		2360	2110		2360	2110		2360	2110		23660	mV
V_{OL}	Output LOW Voltage ^{1,3,4} $V_{CTRL} = \text{NC}$, $BOOST = \text{NC}$	1410		1660	1410		1660	1410		1660	1410		1660	mV
V_{REF}	Reference Voltage ³ $BOOST = V_{EE}$	1650		1850	1650		1850	1650		1850	1650		1850	mV
V_{REF}	Reference Voltage ⁴ $BOOST = \text{NC}$	1860		1980	1920		2040	1920		2040	1920		2040	mV
I_{IH}	Input HIGH Current - D			80			80			80			80	μA
	V_{CTRL}			400	0.5		400	0.5		400	0.5		400	μA
I_{IL}	Input LOW Current	0.5			0.5			0.5			0.5			μA
I_{EE}	Power Supply Current	20	26	35	21	27	36	22	28	38	25	31	41	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 50 Ω resistor to $V_{CC} - 2\text{V}$

³ BOOST is internally bonded to V_{EE} for the MSOP8 packages

⁴ Supported in MLP16 package only

Table 7 - AC Characteristics

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

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 ⁴		>4			>4			>4			>4		GHz
t_{PLH}/t_{PHL}	Propagation Delay to Output	100	160	240	100	160	240	100	160	240	120	190	280	ps
t_{skew}	Duty Cycle Skew ¹		5			5	20		5	20		5	20	ps
V_{PP}	Minimum Input Swing ²	150			150			150			150			mV
V_{CMR}	Common Mode Range ⁴	$V_{EE} + 2.0$		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													dB
t_r/t_f	Output Rise/Fall Times Q (20%-80%)		120	170		130	180		130	180		150	200	ps

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

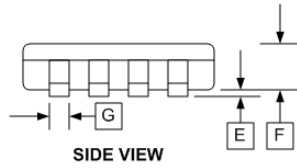
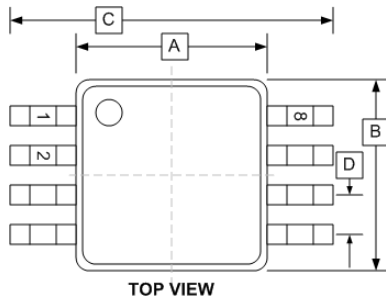
² V_{PP} is the minimum peak-to-peak differential input swing for which AC parameters guaranteed.

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.

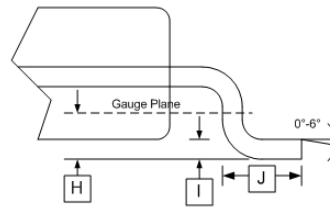
⁴ Differential input, differential output. 240Ω to V_{EE} on Q/Q⁻ outputs, $V_{CTRL} = NC$ and BOOST = V_{EE} (for MLP 16 package).

⁵ See Figure 2

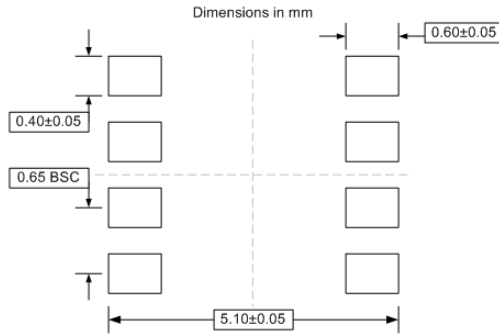
PACKAGE DIAGRAM
MSOP8
Green/RoHS compliant/Pb-Free
MSL=1



MSOP8 (T)

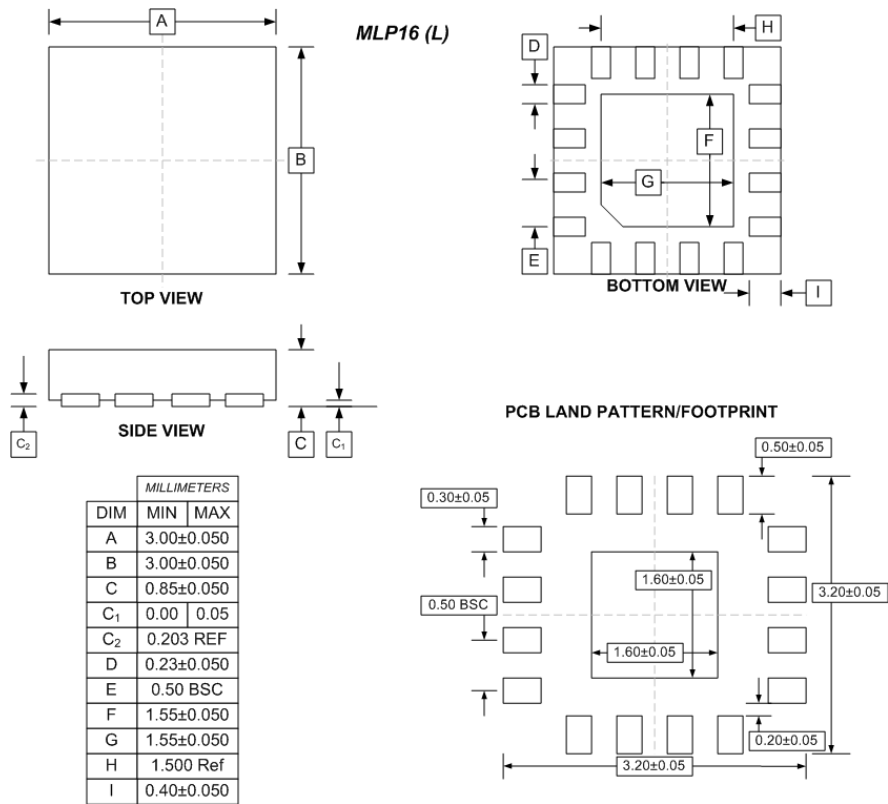


PCB LAND PATTERN/FOOTPRINT



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	

PACKAGE DIAGRAM
MLP16
Green/RoHS compliant/Pb-Free
MSL=1



Arizona Microtek, Inc. reserves the right to change circuitry and specifications at any time without prior notice. Arizona Microtek, Inc. makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Arizona Microtek, Inc. assume any liability arising out of the application or use of any product or circuit and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Arizona Microtek, Inc. does not convey any license rights nor the rights of others. Arizona Microtek, Inc. products are not designed, intended or authorized for use as components in systems intended to support or sustain life, or for any other application in which the failure of the Arizona Microtek, Inc. product could create a situation where personal injury or death may occur. Should Buyer purchase or use Arizona Microtek, Inc. products for any such unintended or unauthorized application, Buyer shall indemnify and hold Arizona Microtek, Inc. and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Arizona Microtek, Inc. was negligent regarding the design or manufacture of the part.