

AZ10/100EP16VS



LVPECL Differential Receiver with Variable Output Swing

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FEATURES

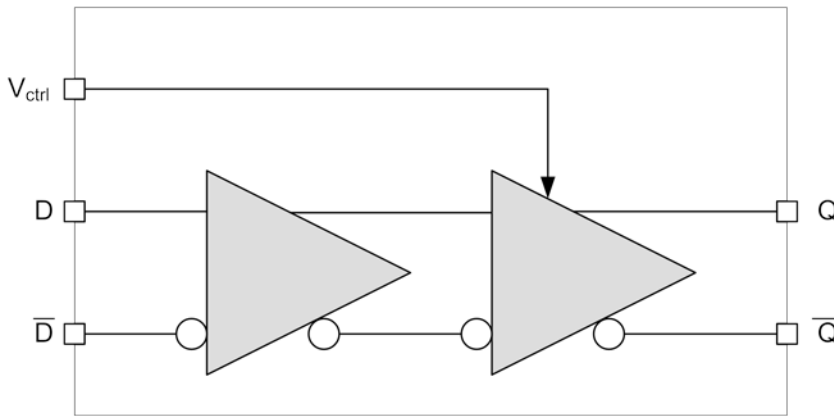
- Silicon-Germanium for high-speed operation
- 150ps typical propagation delay
- Available in a 3.0x3.0mm MLP package

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

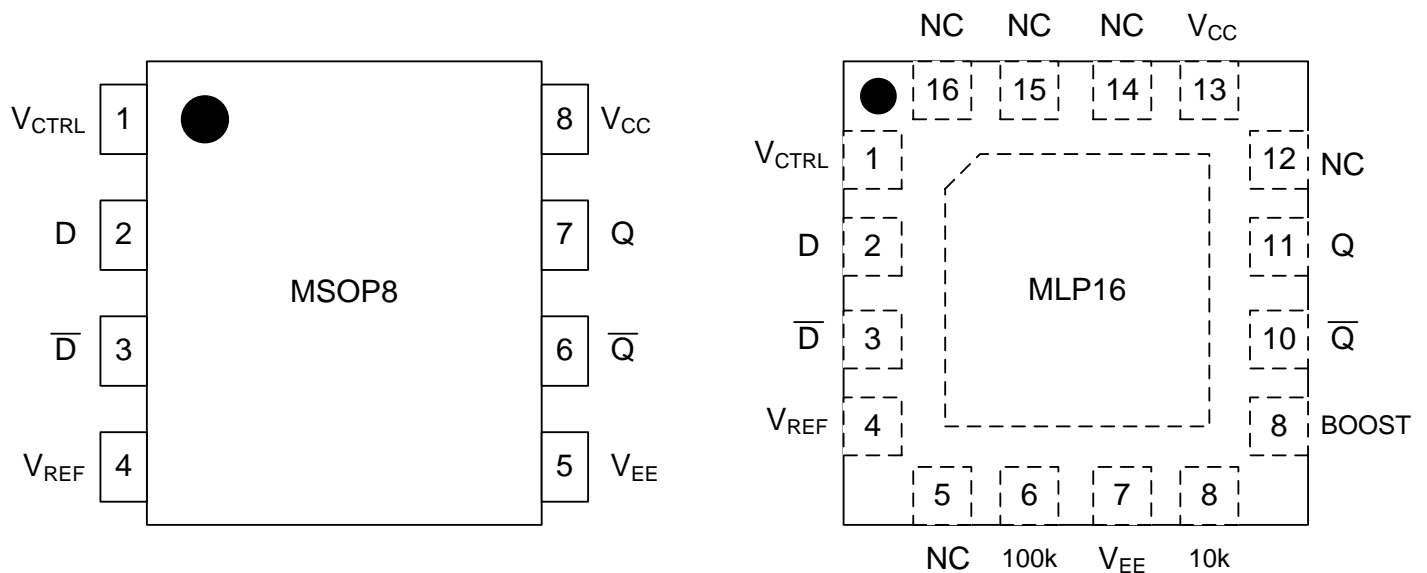


Figure 1 - Pin Configuration for MSOP8 and MLP16

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*

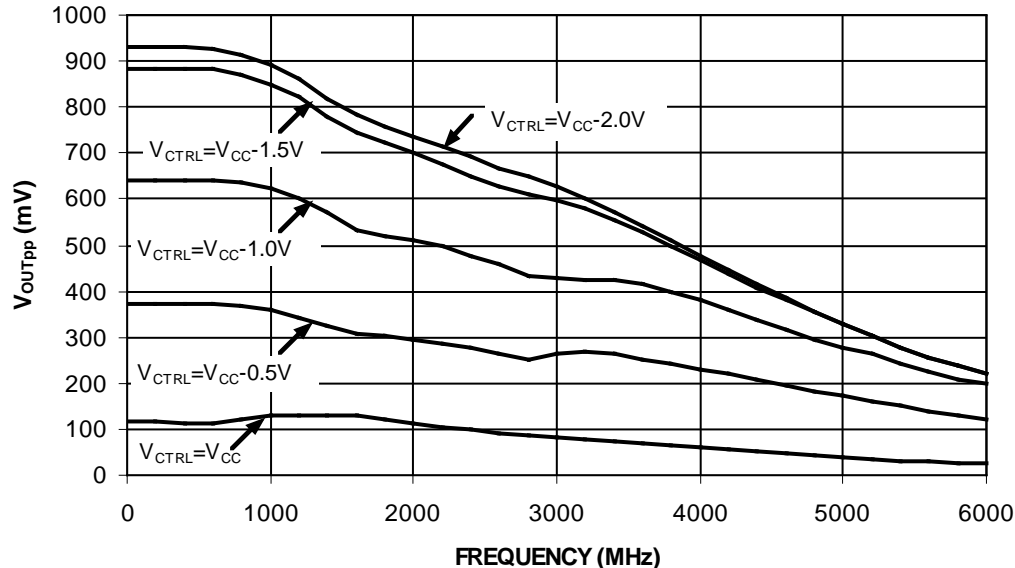


Figure 2 - AZ10/100EP16VS Large Signal Performance

*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

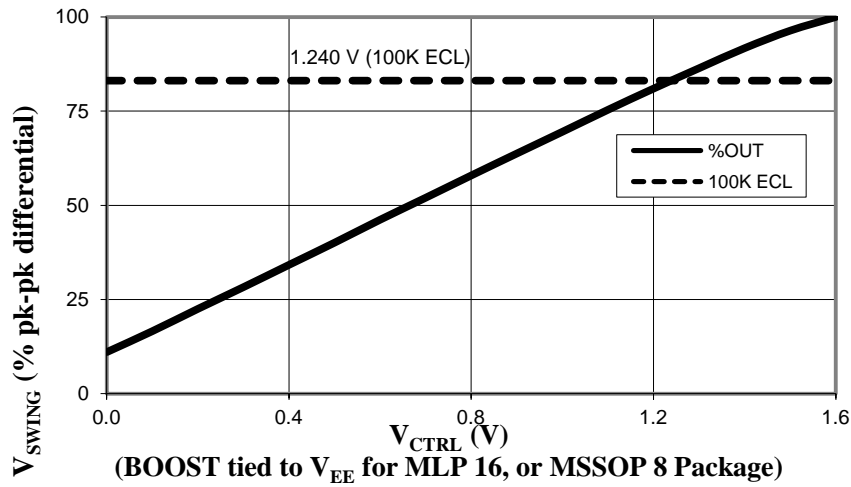


Figure 3 - Typical AZ10/100EP16VS Voltage Output Swing at nominal conditions

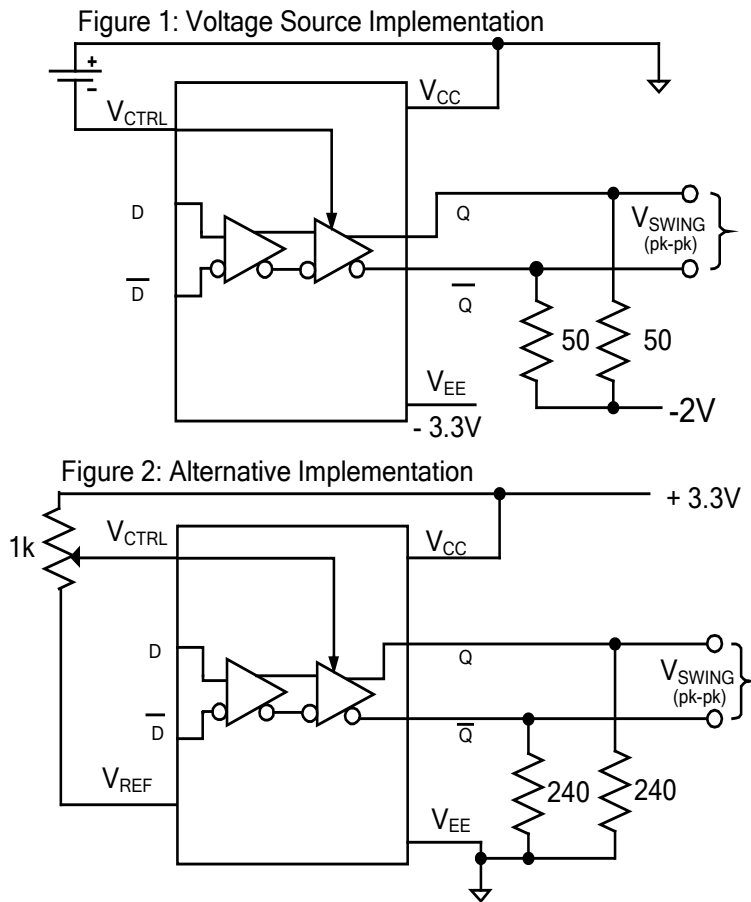


Figure 4 Typical applications

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 Characteristics10K 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 $V_{CC} - 2V$ ² 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		2360	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.

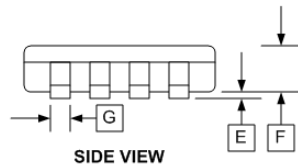
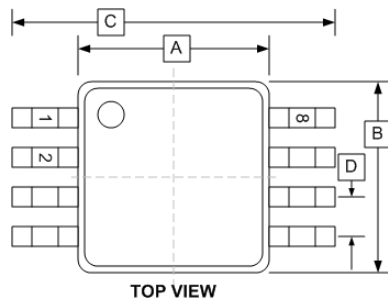
² V_{PP} is the minimum peak-to-peak differential input swing for which AC parameters guaranteed.

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.

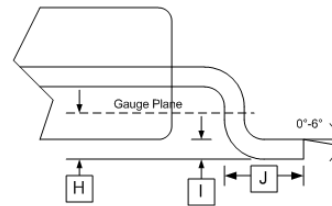
⁴ Differential input, differential output. 240 Ω to V_{EE} on Q/Q⁻ outputs, $V_{CTRL} = NC$ and BOOST = V_{EE} (for MLP 16 package).

⁵ See Figure 2

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

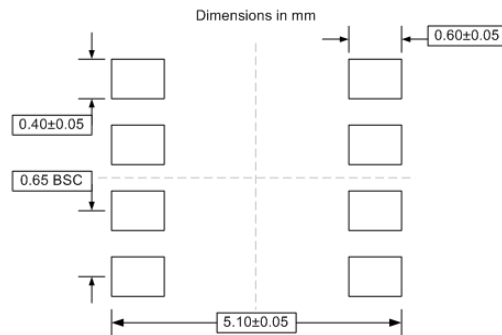


MSOP8 (T)

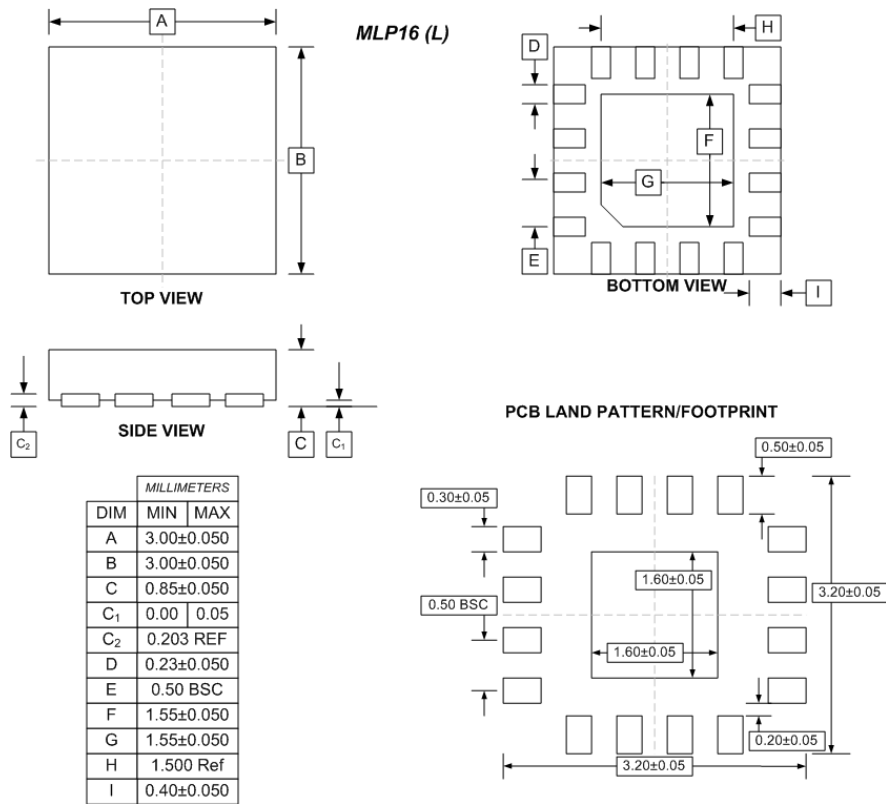


DIM	INCHES	
	MIN	MAX
A	0.118±0.004	
B	0.118±0.004	
C	0.192±0.008	
D	0.0256 TYP	
E	0.004±0.002	
F	0.034±0.002	
G	0.009±0.014	
H	0.010	
I	0.006±0.002	
J	0.021±0.004	

PCB LAND PATTERN/FOOTPRINT



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



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