AZ10/100EP16VS

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LVPECL Differential Receiver with Variable Output Swing

DESCRIPTION

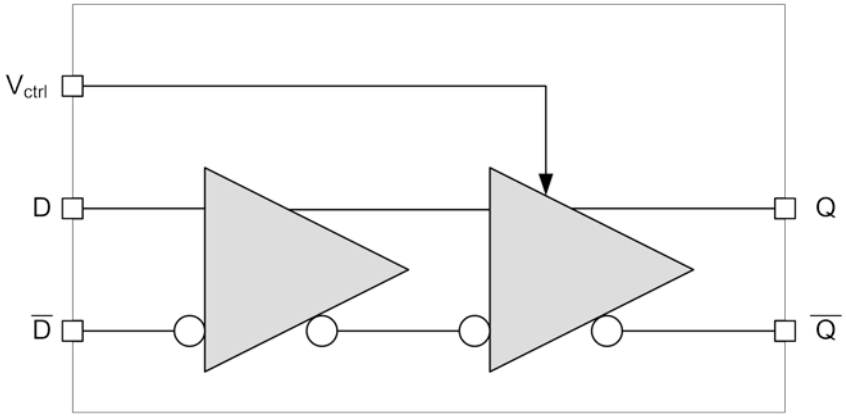
The AZ10/100EP16VS is a Silicon Germanium (SiGe) differential receiver with variable output swing. The AZ10/100EP16VS has functionality and output transition times similar to the AZ10/100EP16, with an input that controls the amplitude of the Q/$\overline{Q}$ outputs.

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

FEATURES

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

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

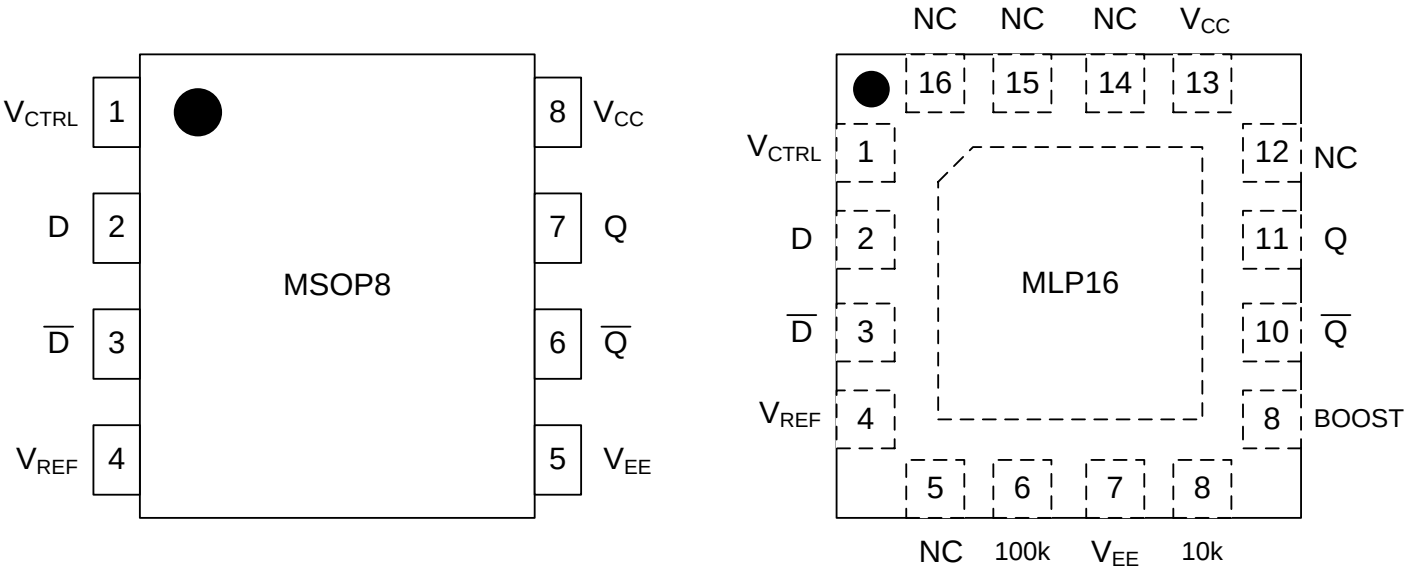


Figure 1 - Pin Configuration for MSOP8 and MLP16

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 0.01µF capacitor.

Under open input conditions for D/$\overline{D}$, the Q/$\overline{Q}$ outputs are not guaranteed.

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

Typical Large Signal Performance, AZ100EP16VS*

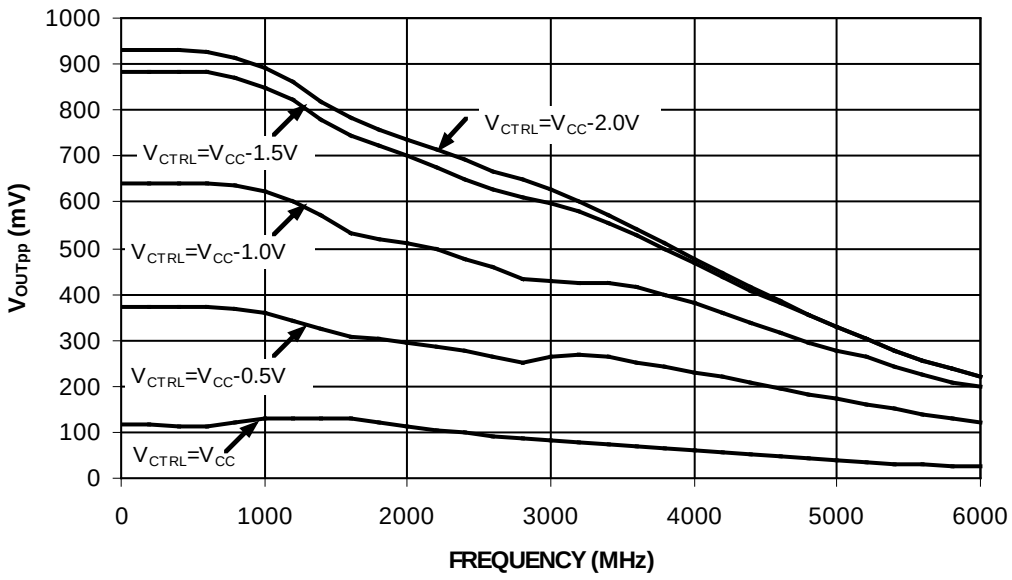


Figure 2 - AZ10/100EP16VS Large Signal Performance

*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

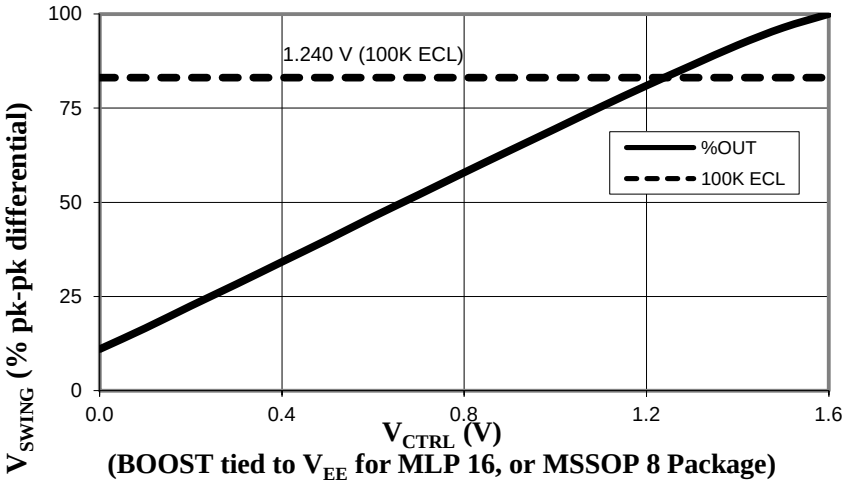


Figure 3 - Typical AZ10/100EP16VS Voltage Output Swing at nominal conditions

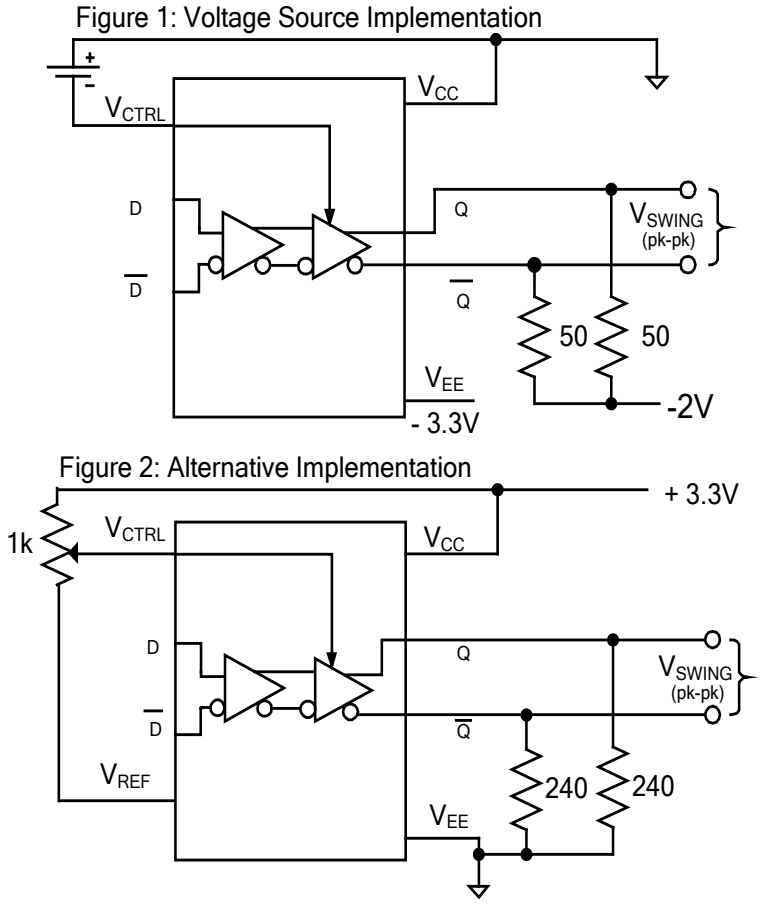


Figure 4 Typical applications

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] VCRTL = VREF. BOOST =VEE	-2000		-1700	-2000		-1690	-2000		-1690	-2000		-1655	mV
V_{OL}	Output LOW Voltage[1,2] VCRTL = VCC. BOOST =VEE	-1285		-1035	-1270		-1020	-1265		-1015	-1255		-1005	mV
V_{OL}	Output LOW Voltage[1,3] VCRTL = NC. BOOST =NC	-1950		-1650	-1950		-1630	-1950		-1630	-1950		-1595	mV
V_{REF}	Reference Voltage[2] BOOST=VEE	-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 packages

[3] Supported in MLP16 package only

Table 4 – 10K PECL DC Characteristics

10K LVPECL DC Characteristics (V_{EE} = GND, V_{CC} = +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_{OH}	Output HIGH Voltage[1,2]	2205		2455	2245		2495	2270		2520	2330		2580	mV
V_{OL}	Output LOW Voltage[1,2,3] VCRTL = VREF. BOOST =VEE	1300		1600	1300		1610	1300		1610	1300		1645	mV
V_{OL}	Output LOW Voltage[1,2,3] VCRTL = VCC. BOOST =VEE	2015		2265	2030		2280	2035		2285	2045		2295	mV
V_{OL}	Output LOW Voltage[1,3,4] VCRTL = NC. BOOST =NC	1350		1650	1350		1670	1350		1670	1350		1670	mV
V_{REF}	Reference Voltage[3] BOOST=VEE	1600		1800	1630		1830	1650		1850	1700		1900	mV
V_{REF}	Reference Voltage[4] BOOST=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 50Ω resistor to V_{CC} -2V

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] VCRTL = VREF. BOOST =VEE	-1950		-1700	-1950		-1700	-1950		-1700	-1950		-1700	mV
V_{OL}	Output LOW Voltage[1,2] VCRTL = VCC. BOOST =VEE	-1200		-940	-1190		-940	-1190		-940	-1190		-940	mV
V_{OL}	Output LOW Voltage[1,3] VCRTL = NC. BOOST =NC	-1900		-1640	-1890		-1640	-1890		-1640	-1890		-1640	mV
V_{REF}	Reference Voltage[2] BOOST=VEE	-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 50Ω 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} = GND, V_{CC} = +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_{OH}	Output HIGH Voltage[1,2]	2170		2460	2210		2460	2210		2460	2210		2460	mV
V_{OL}	Output LOW Voltage[1,2,3] VCRTL = VREF. BOOST =VEE	1350		1600	1350		1600	1350		1600	1350		1600	mV
V_{OL}	Output LOW Voltage[1,2,3] VCRTL = VCC. BOOST =VEE	2100		2360	2110		2360	2110		2360	2110		23660	mV
V_{OL}	Output LOW Voltage[1,3,4] VCRTL = NC. BOOST =NC	1410		1660	1410		1660	1410		1660	1410		1660	mV
V_{REF}	Reference Voltage[3] BOOST=VEE	1650		1850	1650		1850	1650		1850	1650		1850	mV
V_{REF}	Reference Voltage[4] BOOST=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 50Ω resistor to V_{CC} -2V

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.

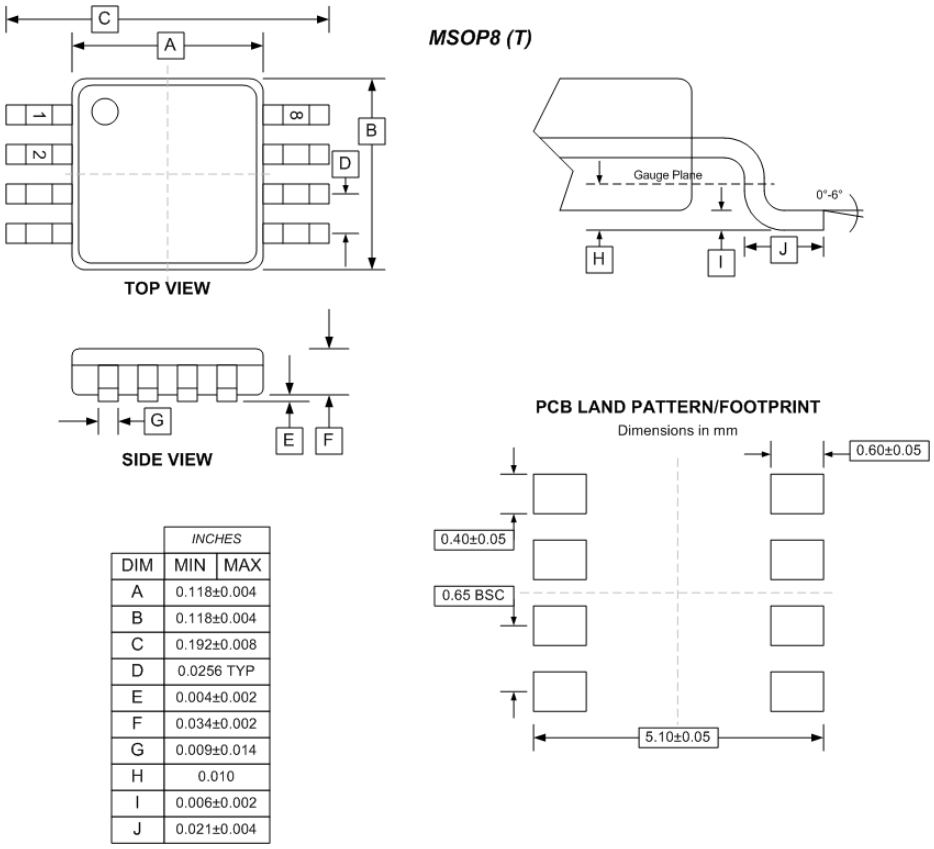
3 The V_{CMR} range is referenced to the most positive side of the differential input signal. Normal operation is obtained if the HIGH level falls within the specified range and the peak-to-peak voltage lies between V_{PP} (min) and 1V.

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

5 See Figure 2

PACKAGE DIAGRAM

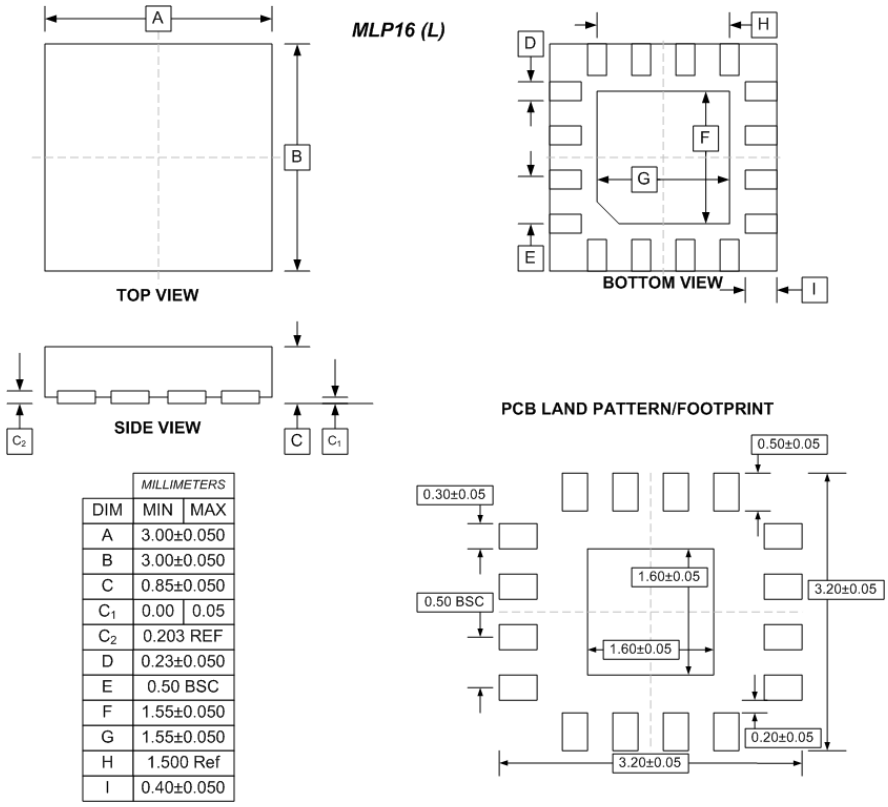
MSOP8
Green/RoHS compliant/Pb-Free
MSL=1



	INCHES	
DIM	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



	MILLIMETERS	
DIM	MIN	MAX
A	3.00±0.050	
B	3.00±0.050	
C	0.85±0.050	
C_1	0.00	0.05
C_2	0.203 REF	
D	0.23±0.050	
E	0.50 BSC	
F	1.55±0.050	
G	1.55±0.050	
H	1.500 Ref	
I	0.40±0.050	