

AZ10EP16VS

AZ100EP16VS

ECL/PECL Differential Receiver with Variable Output Swing

FEATURES

- Silicon-Germanium for High Speed Operation
- 150ps Typical Propagation Delay
- AZ100EP16VS Functionally Equivalent to ON Semiconductor MC100EP16VS at 3.3V
- Available in a 3x3mm MLP Package
- S-Parameter (.s2p) and IBIS Model Files available on Arizona Microtek Website

PACKAGE AVAILABILITY

PACKAGE	PART NUMBER	MARKING	NOTES
SOIC 8	AZ10EP16VSD	AZM10 EP16VS	1,2,3
SOIC 8	AZ100EP16VSD	AZM100 EP16VS	1,2,3
TSSOP 8	AZ10EP16VST	AZTP EP16VS	1,2,3
TSSOP 8	AZ100EP16VST	AZHP EP16VS	1,2,3
MLP 16 (3x3)	AZ10/100EP16VSL	AZM 16S <Date Code>	1,2
MLP 16 (3x3) RoHS Compliant / Lead(Pb) Free	AZ10/100EP16VSL+	AZM+ 16S <Date Code>	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 format: "Y" or "YY" for year followed by "WW" for week.
- 3 Date code "YWW" or "YYWW" on underside of part.

DESCRIPTION

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

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 SOIC 8 and TSSOP 8 packages, and is under external user control for the MLP 16 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 EP16VS 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 described in this Data Sheet.

The EP16VS 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 EP16VS as its current sink/source capability is limited. Whenever used, the V_{REF} pin should be bypassed to ground via a 0.01 μ 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.

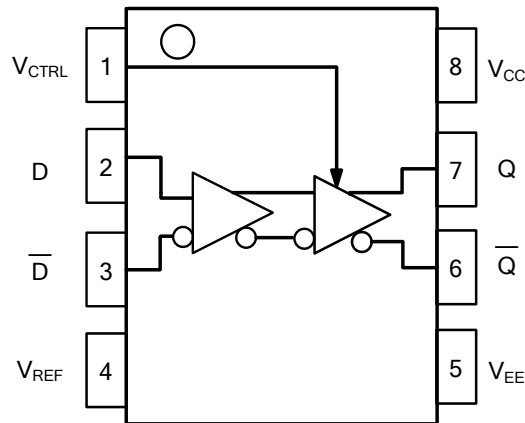
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PIN DESCRIPTION

PIN	FUNCTION
D, \bar{D}	Data Inputs
V_{CTRL}	Output Swing Control
Q, \bar{Q}	Data Outputs
V_{REF} , V_{BB}/V_{REF}	Reference Voltage Output
BOOST	Increases Output Swing when tied to V_{EE} *
V_{CC}	Positive Supply
V_{EE}	Negative Supply
NC	No Connect

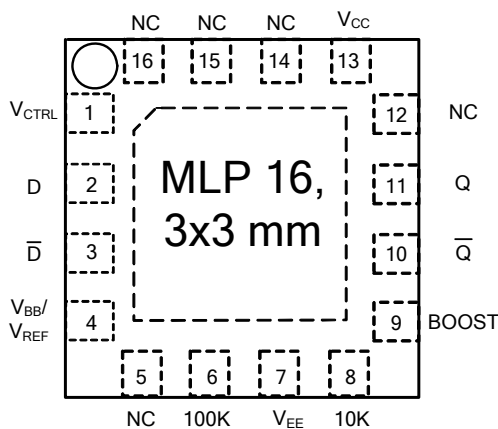
*BOOST should be tied to V_{EE} for best performance when using the variable swing feature.

LOGIC DIAGRAM AND PINOUT ASSIGNMENT



SOIC 8 & TSSOP 8

TOP VIEW



Bottom Center Pad may be left open or tied to V_{EE}

MLP 16 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 .

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

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

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} V _{BB} /V _{REF}	Reference Voltage ² BOOST = V _{EE}	-1700		-1500	-1670		-1470	-1650		-1450	-1600		-1400	mV
V _{BB} /V _{REF}	Reference Voltage ³ BOOST = NC	-1430		-1300	-1380		-1270	-1350		-1250	-1310		-1190	mV
I _{IH}	Input HIGH Current D,D V _{CTRL}			80 400			80 400			80 400			80 400	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

- Each output is terminated through a 50Ω resistor to V_{CC} - 2V.
- BOOST is internally bonded to V_{EE} for both the SOIC 8 and TSSOP 8 packages.
- Supported in MLP 16 package only.

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} 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} = NC BOOST = NC	1350		1650	1350		1670	1350		1670	1350		1670	mV
V _{REF} V _{BB} /V _{REF}	Reference Voltage ³ BOOST = V _{EE}	1600		1800	1630		1830	1650		1850	1700		1900	mV
V _{BB} /V _{REF}	Reference Voltage ⁴ BOOST = NC	1870		2000	1920		2030	1950		2050	1990		2110	mV
I _{IH}	Input HIGH Current D,D V _{CTRL}			80 400			80 400			80 400			80 400	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

- For supply voltages other than 3.3V, use the ECL table values and ADD supply voltage value.
- Each output is terminated through a 50Ω resistor to V_{CC} - 2V.
- BOOST is internally bonded to V_{EE} for both the SOIC 8 and TSSOP 8 packages.
- Supported in MLP 16 package only.

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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} V_{BB}/V_{REF}	Reference Voltage ² BOOST = V_{EE}	-1650		-1450	-1650		-1450	-1650	-1550	-1450	-1650		-1450	mV
V_{BB}/V_{REF}	Reference Voltage ³ BOOST = NC	-1440		-1320	-1380		-1260	-1380		-1260	-1380		-1260	mV
I_{IH}	Input HIGH Current D,D V_{CTRL}			80 400			80 400			80 400			80 400	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

- Each output is terminated through a 50 Ω resistor to $V_{CC} - 2V$.
- BOOST is internally bonded to V_{EE} for both the SOIC 8 and TSSOP 8 packages.
- Supported in MLP 16 package only.

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} $V_{CTRL} = V_{REF}$ 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} $V_{CTRL} = NC$ BOOST = NC	1410		1660	1410		1660	1410		1660	1410		1660	mV
V_{REF} V_{BB}/V_{REF}	Reference Voltage ³ BOOST = V_{EE}	1650		1850	1650		1850	1650		1850	1650		1850	mV
V_{BB}/V_{REF}	Reference Voltage ⁴ BOOST = NC	1860		1980	1920		2040	1920		2040	1920		2040	mV
I_{IH}	Input HIGH Current D,D V_{CTRL}			80 400			80 400			80 400			80 400	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

- For supply voltages other than 3.3V, use the ECL table values and ADD supply voltage value.
- Each output is terminated through a 50 Ω resistor to $V_{CC} - 2V$.
- BOOST is internally bonded to V_{EE} for both the SOIC 8 and TSSOP 8 packages.
- Supported in MLP 16 package only.

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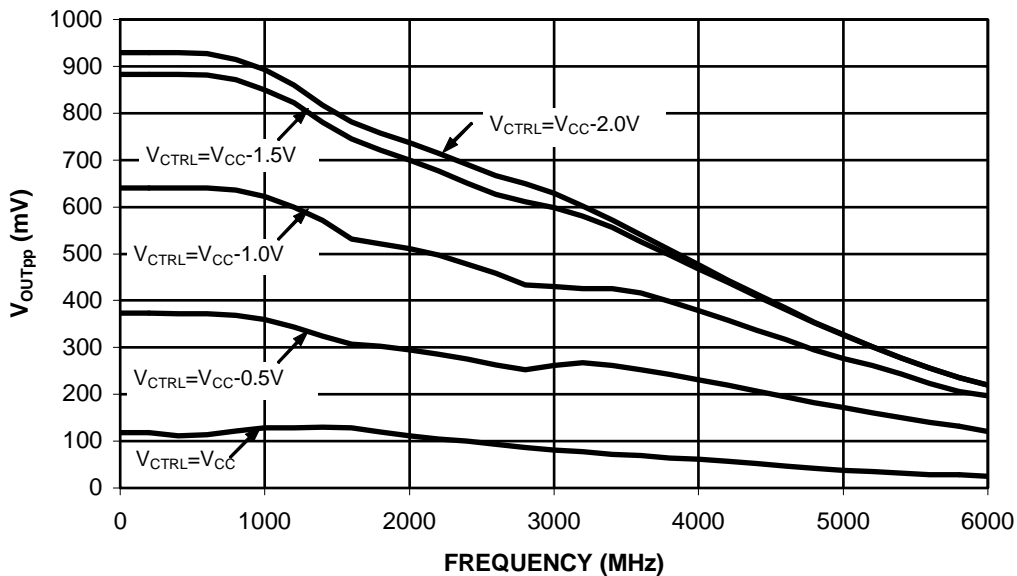
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AC Characteristics ($V_{EE} = -3.0$ to $-3.6V$, $V_{CC} = GND$, $V_{CTRL} = V_{REF}$ or $V_{EE} = GND$, $V_{CC} = +3.0V$ to $3.6V$, $V_{CTRL} = V_{REF}$)

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}	Maximum Toggle Frequency ⁵		>4			>4			>4			>4		GHz
t_{PLH} / t_{PHL}	Input to Output (Diff) Delay (SE)	100	150 155	240	100	150 155	240	100	150 155	240	120	170 175	280	ps
t_{SKEW}	Duty Cycle Skew ¹ (Diff)		4	20		4	15		4	15		4	15	ps
V_{DP}	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%)		120	170		120	180		120	180		120	200	ps

- Duty cycle skew is the difference between a t_{PLH} and t_{PHL} propagation delay through a device.
- V_{PP} is the minimum peak-to-peak differential input swing for which AC parameters are guaranteed.
- 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 $1V$.
- Differential input, differential output. 240Ω to V_{EE} on Q/Q outputs, $V_{CTRL} = NC$ and $BOOST = V_{EE}$ (for MLP 16 package).
- See graph below.

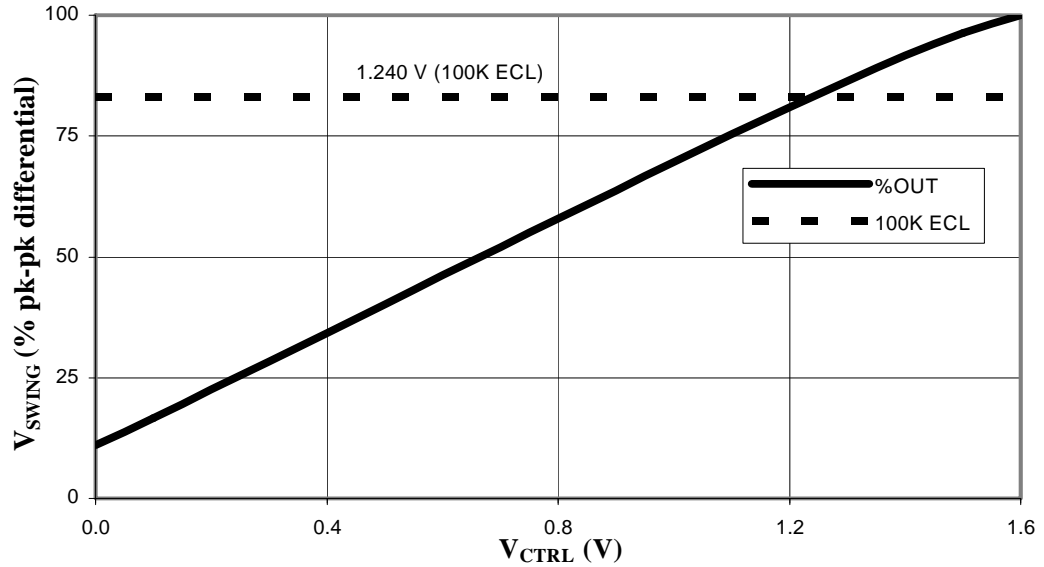
Typical Large Signal Performance, AZ100EP16VS*



*Measured using a 750mV differential input source at 50% duty cycle. Valid for SOIC 8, TSSOP 8, or MLP 16 with $BOOST = V_{EE}$.

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Typical AZ100EP16VS Voltage Output Swing at +25C, Nominal Supply
(see Figure 1 and Figure 2)



(BOOST tied to V_{EE} for MLP 16, or SOIC 8/TSSOP 8 Package)

Figure 1: Voltage Source Implementation

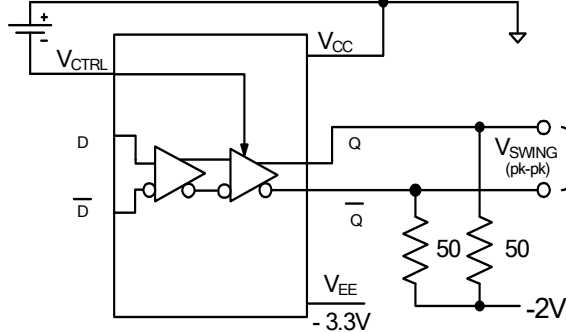
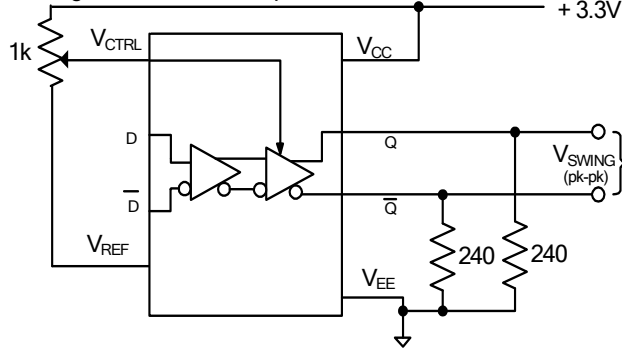
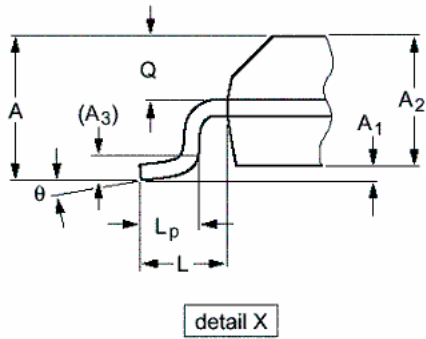
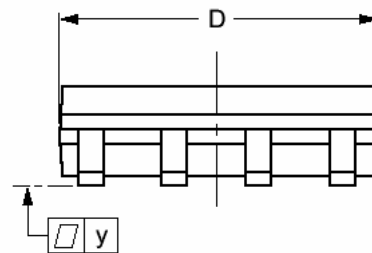
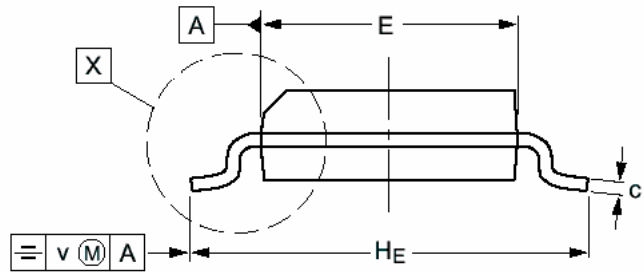
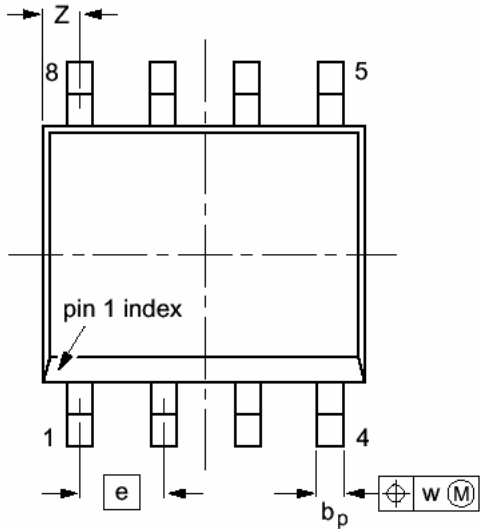


Figure 2: Alternative Implementation



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PACKAGE DIAGRAM
SOIC 8

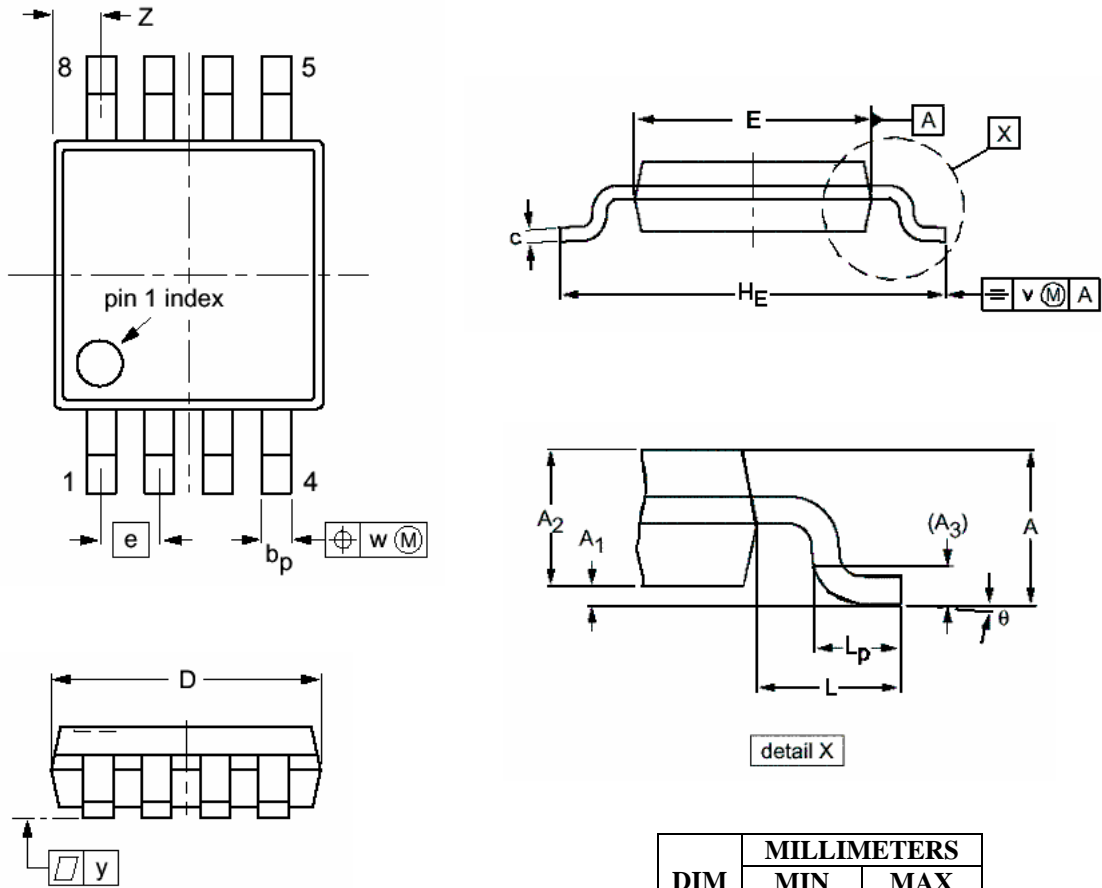


DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A		1.75		0.069
A ₁	0.10	0.25	0.004	0.010
A ₂	1.25	1.45	0.049	0.057
A ₃	0.25		0.01	
b _p	0.36	0.49	0.014	0.019
c	0.19	0.25	0.0075	0.0100
D	4.8	5.0	0.19	0.20
E	3.8	4.0	0.15	0.16
e	1.27		0.050	
H _E	5.80	6.20	0.228	0.244
L	1.05		0.041	
L _p	0.40	1.00	0.016	0.039
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.

**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
A		1.10
A₁	0.05	0.15
A₂	0.80	0.95
A₃	0.25	
b_p	0.25	0.45
c	0.15	0.28
D	2.90	3.10
E	2.90	3.10
e	0.65	
H_E	4.70	5.10
L	0.94	
L_p	0.40	0.70
v	0.10	
w	0.10	
y	0.10	
Z	0.35	0.70
θ	0°	6°

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