

AZ10LVEL16VS AZ100LVEL16VS

ECL/PECL Differential Receiver with Variable Output Swing

FEATURES

- 250ps Propagation Delay
- High Bandwidth Output Transitions
- Operating Range of 3.0V to 5.5V
- Internal Input Pulldown Resistors
- Functionally Equivalent to ON Semiconductor MC10EL16, MC100EL16 & MC100LVEL16
- Variable Output Swing

PACKAGE AVAILABILITY

PACKAGE	PART NO.	MARKING
SOIC 8	AZ10LVEL16VSD	AZM10LVEL16VS
SOIC 8 T&R	AZ10LVEL16VSDR1	AZM10LVEL16VS
SOIC 8 T&R	AZ10LVEL16VSDR2	AZM10LVEL16VS
SOIC 8	AZ100LVEL16VSD	AZM100LVEL16VS
SOIC 8 T&R	AZ100LVEL16VSDR1	AZM100LVEL16VS
SOIC 8 T&R	AZ100LVEL16VSDR2	AZM100LVEL16VS
TSSOP 8	AZ10LVEL16VST	AZTL16VS
TSSOP 8 T&R	AZ10LVEL16VSTR1	AZTL16VS
TSSOP 8 T&R	AZ10LVEL16VSTR2	AZTL16VS
TSSOP 8	AZ100LVEL16VST	AZHL16VS
TSSOP 8 T&R	AZ100LVEL16VSTR1	AZHL16VS
TSSOP 8 T&R	AZ100LVEL16VSTR2	AZHL16VS

DESCRIPTION

The AZ10/100LVEL16VS is a differential receiver with variable output swing. The LVEL16VS has functionality and output transition times similar to the EL16, with an input that controls the amplitude of the Q/Q̄ outputs.

The operational range of the LVEL16VS control input, V_{CTRL} , is from V_{BB} (full swing) to V_{CC} (min. swing). Maximum swing is achieved by leaving the V_{CTRL} pin open or by tying it to the negative supply (V_{EE}). Simple control of the output swing can be obtained by a variable resistor between the V_{BB} and V_{CC} pins, with the wiper driving V_{CTRL} . Typical application circuits and results are described in this Data Sheet.

The LVEL16VS provides a V_{BB} output for single-ended use or a DC bias reference for AC coupling to the device. For single-ended input applications, the V_{BB} reference should be connected to one side of the D/D̄ differential input pair. The input signal is then fed to the other D/D̄ input. The V_{BB} pin can support 1.5mA sink/source current. When used, the V_{BB} pin should be bypassed to ground via a 0.01μF capacitor.

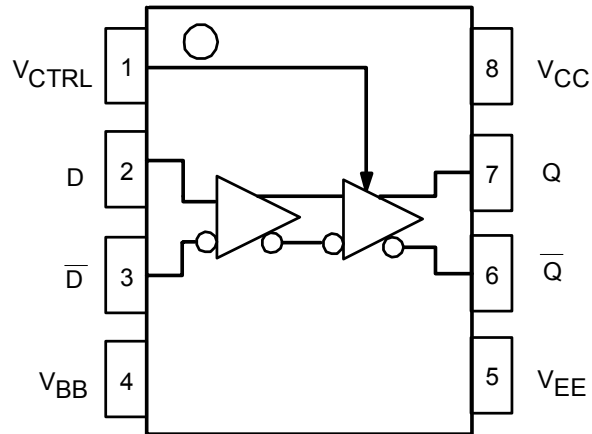
Under open input conditions internal input clamps will force the Q output LOW.

NOTE: Specifications in the 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_{BB}	Reference Voltage Output
V_{CC}	Positive Supply
V_{EE}	Negative Supply



LOGIC DIAGRAM AND PINOUT ASSIGNMENT

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 +8.0	Vdc
V_I	PECL Input Voltage ($V_{EE} = 0V$)	0 to +6.0	Vdc
V_{EE}	ECL Power Supply ($V_{CC} = 0V$)	-8.0 to 0	Vdc
V_I	ECL Input Voltage ($V_{CC} = 0V$)	-6.0 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 $-5.5V$, $V_{CC} = GND$)

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 ²	-1080		-890	-1020		-840	-980		-810	-910		-720	mV
V_{OL}	Output LOW Voltage ² $V_{CTRL} = V_{BB}^1$	-1950		-1650	-1950		-1630	-1950		-1630	-1950		-1595	mV
V_{OL}	Output LOW Voltage ² $V_{CTRL} = V_{CC}$	-1220		-1030	-1200		-1020	-1190	-1150	-1020	-1190		-1000	mV
V_{IH}	Input HIGH Voltage	-1230		-890	-1170		-840	-1130		-810	-1060		-720	mV
V_{IL}	Input LOW Voltage	-1950		-1500	-1950		-1480	-1950		-1480	-1950		-1445	mV
V_{BB}	Reference Voltage	-1450		-1300	-1400		-1270	-1370		-1250	-1330		-1190	mV
I_{IH}	Input HIGH Current D, \bar{D} V_{CTRL}			150 40			150 40			150 40			150 40	μA
I_{IL}	Input LOW Current D, \bar{D} V_{CTRL}	-150 0.5			-150 0.5			-150 0.5			-150 0.5			μA
I_{EE}	Power Supply Current		18	25		18	25		18	25		21	26	mA

1. If V_{CTRL} is Open Circuit, use the V_{OH} (Max & Min) and V_{OL} ($V_{CTRL} = V_{BB}$: Max only) limits.
2. Each output is terminated through a 50Ω resistor to $V_{CC} - 2V$.

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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 ^{1,3}	2220		2410	2280		2460	2320		2490	2390		2580	mV
V_{OL}	Output LOW Voltage ^{1,3} $V_{CTRL} = V_{BB}^2$	1350		1650	1350		1670	1350		1670	1350		1705	mV
V_{OL}	Output LOW Voltage ^{1,3} $V_{CTRL} = V_{CC}$	2080		2270	2100		2280	2110	2150	2280	2110		2300	mV
V_{IH}	Input HIGH Voltage ¹	2070		2410	2130		2460	2170		2490	2240		2580	mV
V_{IL}	Input LOW Voltage ¹	1350		1800	1350		1820	1350		1820	1350		1855	mV
V_{BB}	Reference Voltage ¹	1850		2000	1900		2030	1930		2050	1970		2110	mV
I_{IH}	Input HIGH Current D, \bar{D} V_{CTRL}			150 40			150 40			150 40			150 40	μA
I_{IL}	Input LOW Current D, \bar{D} V_{CTRL}	-150 0.5			-150 0.5			-150 0.5			-150 0.5			μA
I_{EE}	Power Supply Current		18	25		18	25		18	25		21	26	mA

- For supply voltages other than 3.3V, use the ECL table values and ADD supply voltage value.
- If V_{CTRL} is Open Circuit, use the V_{OH} (Max & Min) and V_{OL} ($V_{CTRL} = V_{BB}$: Max only) limits.
- Each output is terminated through a 50 Ω resistor to $V_{CC} - 2\text{V}$.

10K PECL DC Characteristics ($V_{EE} = \text{GND}$, $V_{CC} = +5.0\text{V}$)

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 ^{1,3}	3920		4110	3980		4160	4020		4190	4090		4280	mV
V_{OL}	Output LOW Voltage ^{1,3} $V_{CTRL} = V_{BB}^2$	3050		3350	3050		3350	3050		3350	3050		3405	mV
V_{OL}	Output LOW Voltage ^{1,3} $V_{CTRL} = V_{CC}$	3780		3970	3800		3980	3810	3850	3980	3810		4000	mV
V_{IH}	Input HIGH Voltage ¹	3770		4110	3830		4160	3870		4190	3940		4280	mV
V_{IL}	Input LOW Voltage ¹	3050		3500	3050		3520	3050		3520	3050		3555	mV
V_{BB}	Reference Voltage ¹	3550		3700	3600		3730	3630		3750	3670		3810	V
I_{IH}	Input HIGH Current D, \bar{D} V_{CTRL}			150 40			150 40			150 40			150 40	μA
I_{IL}	Input LOW Current D, \bar{D} V_{CTRL}	-150 0.5			-150 0.5			-150 0.5			-150 0.5			μA
I_{EE}	Power Supply Current		18	25		18	25		18	25		21	26	mA

- For supply voltages other than 5.0V, use the ECL table values and ADD supply voltage value.
- If V_{CTRL} is Open Circuit, use the V_{OH} (Max & Min) and V_{OL} ($V_{CTRL} = V_{BB}$: Max only) limits.
- Each output is terminated through a 50 Ω resistor to $V_{CC} - 2\text{V}$.

100K ECL DC Characteristics ($V_{EE} = -3.0\text{V}$ to -5.5V , $V_{CC} = \text{GND}$)

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 ²	-1085	-1005	-880	-1025	-955	-880	-1025	-955	-880	-1025	-955	-880	mV
V_{OL}	Output LOW Voltage ² $V_{CTRL} = V_{BB}^1$	-1890		-1620	-1870		-1680	-1870	-1775	-1680	-1870		-1680	mV
V_{OL}	Output LOW Voltage ² $V_{CTRL} = V_{CC}$	-1180		-975	-1135		-990	-1135	-1065	-990	-1135		-990	mV
V_{IH}	Input HIGH Voltage	-1165		-880	-1165		-880	-1165		-880	-1165		-880	mV
V_{IL}	Input LOW Voltage	-1810		-1475	-1810		-1475	-1810		-1475	-1810		-1475	mV
V_{BB}	Reference Voltage	-1420		-1260	-1420		-1260	-1420		-1260	-1420		-1260	mV
I_{IH}	Input HIGH Current D, \bar{D} V_{CTRL}			150 40			150 40			150 40			150 40	μA
I_{IL}	Input LOW Current D, \bar{D} V_{CTRL}	-150 0.5			-150 0.5			-150 0.5			-150 0.5			μA
I_{EE}	Power Supply Current		18	25		18	25		18	25		21	26	mA

- If V_{CTRL} is Open Circuit, use the V_{OH} (Max & Min) and V_{OL} ($V_{CTRL} = V_{BB}$: Max only) limits.
- Each output is terminated through a 50 Ω resistor to $V_{CC} - 2\text{V}$.

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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 ^{1,3}	2215	2295	2420	2275	2345	2420	2275	2345	2420	2275	2345	2420	mV
V_{OL}	Output LOW Voltage ^{1,3} $V_{CTRL} = V_{BB}^2$	1410		1680	1430		1620	1430	1525	1620	1430		1620	mV
V_{OL}	Output LOW Voltage ^{1,3} $V_{CTRL} = V_{CC}$	2120		2325	2165		2310	2165	2235	2310	2165		2310	mV
V_{IH}	Input HIGH Voltage ¹	2135		2420	2135		2420	2135		2420	2135		2420	mV
V_{IL}	Input LOW Voltage ¹	1490		1825	1490		1825	1490		1825	1490		1825	mV
V_{BB}	Reference Voltage ¹	1880		2040	1880		2040	1880		2040	1880		2040	mV
I_{IH}	Input HIGH Current D, \bar{D} V_{CTRL}			150 40			150 40			150 40			150 40	μA
I_{IL}	Input LOW Current D, \bar{D} V_{CTRL}	-150 0.5			-150 0.5			-150 0.5			-150 0.5			μA
I_{EE}	Power Supply Current		18	25		18	25		18	25		21	26	mA

- For supply voltages other than 3.3V, use the ECL table values and ADD supply voltage value.
- If V_{CTRL} is Open Circuit, use the V_{OH} (Max & Min) and V_{OL} ($V_{CTRL} = V_{BB}$: Max only) limits.
- Each output is terminated through a 50 Ω resistor to $V_{CC} - 2\text{V}$.

100K PECL DC Characteristics ($V_{EE} = \text{GND}$, $V_{CC} = +5.0\text{V}$)

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 ^{1,3}	3915	3995	4120	3975	4045	4120	3975	4045	4120	3975	4045	4120	mV
V_{OL}	Output LOW Voltage ^{1,3} $V_{CTRL} = V_{BB}^2$	3110		3380	3130		3320	3130	3225	3320	3130		3320	mV
V_{OL}	Output LOW Voltage ^{1,3} $V_{CTRL} = V_{CC}$	3820		4025	3865		4010	3865	3935	4010	3865		4010	mV
V_{IH}	Input HIGH Voltage ¹	3820		4025	3865		4010	3865	3935	4010	3865		4010	mV
V_{IL}	Input LOW Voltage ¹	3835		4120	3835		4120	3835		4120	3835		4120	mV
V_{BB}	Reference Voltage ¹	3580		3740	3580		3740	3580		3740	3580		3740	V
I_{IH}	Input HIGH Current D, \bar{D} V_{CTRL}			150 40			150 40			150 40			150 40	μA
I_{IL}	Input LOW Current D, \bar{D} V_{CTRL}	-150 0.5			-150 0.5			-150 0.5			-150 0.5			μA
I_{EE}	Power Supply Current		18	25		18	25		18	25		21	26	mA

- For supply voltages other than 5.0V, use the ECL table values and ADD supply voltage value.
- If V_{CTRL} is Open Circuit, use the V_{OH} (Max & Min) and V_{OL} ($V_{CTRL} = V_{BB}$: Max only) limits.
- Each output is terminated through a 50 Ω resistor to $V_{CC} - 2\text{V}$.

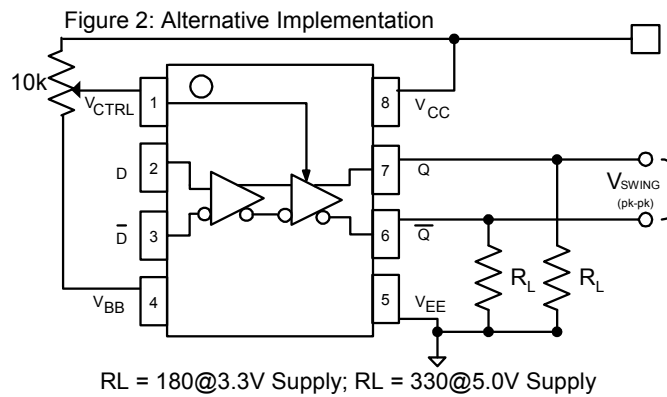
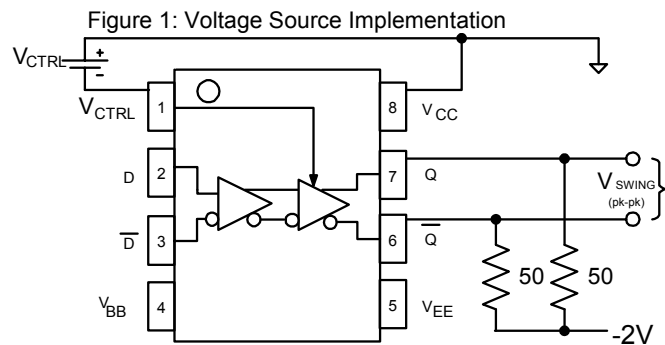
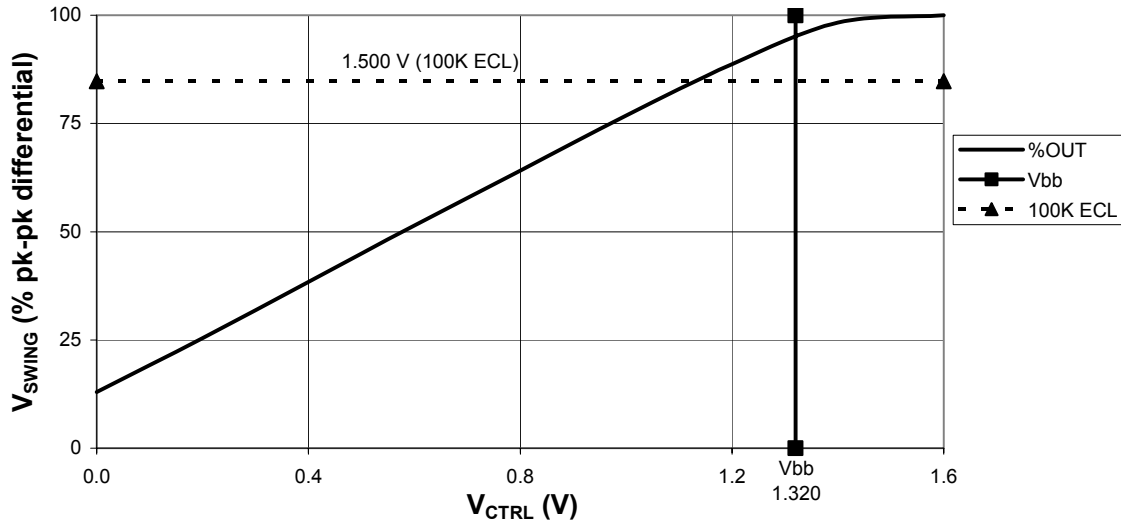
AC Characteristics ($V_{EE} = -3.0\text{V}$ to -5.5V ; $V_{CC} = \text{GND}$; $V_{CTRL} = V_{BB}$ or $V_{EE} = \text{GND}$; $V_{CC} = +3.0\text{V}$ to $+5.5\text{V}$; $V_{CTRL} = V_{BB}$)

Symbol	Characteristic	-40°C			0°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
t_{PLH} / t_{PHL}	Input to Output Delay (DIFF) (SE)		250		175	250	325	175	250	325	205	280	355	ps
t_{SKEW}	Duty Cycle Skew ¹ (Diff)		5			5	20		5	20		5	20	ps
$V_{PP}(\text{AC})$	Minimum Input Swing ²	150			150			150			150			mV
V_{CMR}	Common Mode Range ³ $V_{PP} < 500\text{mV}$ $V_{PP} \geq 500\text{mV}$	$V_{EE} +$ 1.2 1.5		$V_{CC} -$ 0.4 0.4	$V_{EE} +$ 1.1 1.4		$V_{CC} -$ 0.4 0.4	$V_{EE} +$ 1.1 1.4		$V_{CC} -$ 0.4 0.4	$V_{EE} +$ 1.1 1.4		$V_{CC} -$ 0.4 0.4	V
t_r / t_f	Output Rise/Fall Times Q (20% - 80%)	100		260	100		260	100		260	100		260	ps

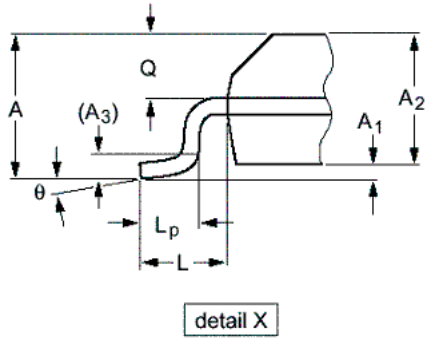
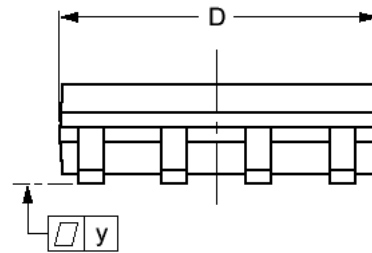
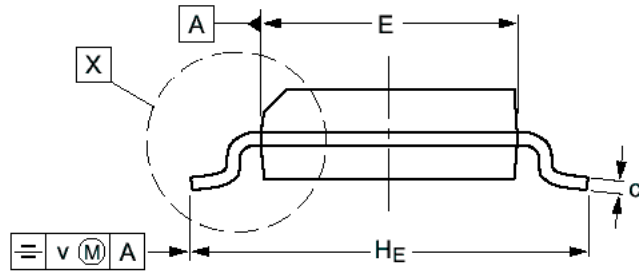
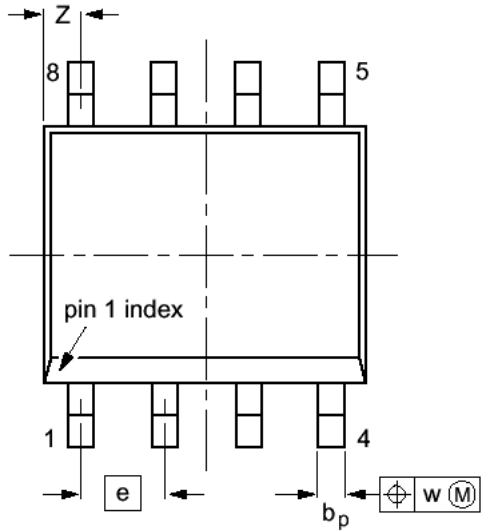
- Duty cycle skew is the difference between a t_{PLH} and t_{PHL} propagation delay through a device.
- V_{PP} is the minimum peak-to-peak differential input swing for which AC parameters are guaranteed.
- The V_{CMR} range is referenced to the most positive side of the differential input signal. Normal operation is obtained if the HIGH level falls within the specified range and the peak-to-peak voltage lies between $V_{PP}(\text{min})$ and 1V.

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Typical Voltage Output Swing at +25C, V_{CC} Nom (see Figure 1 and Figure 2)



**PACKAGE DIAGRAM
SOIC 8**

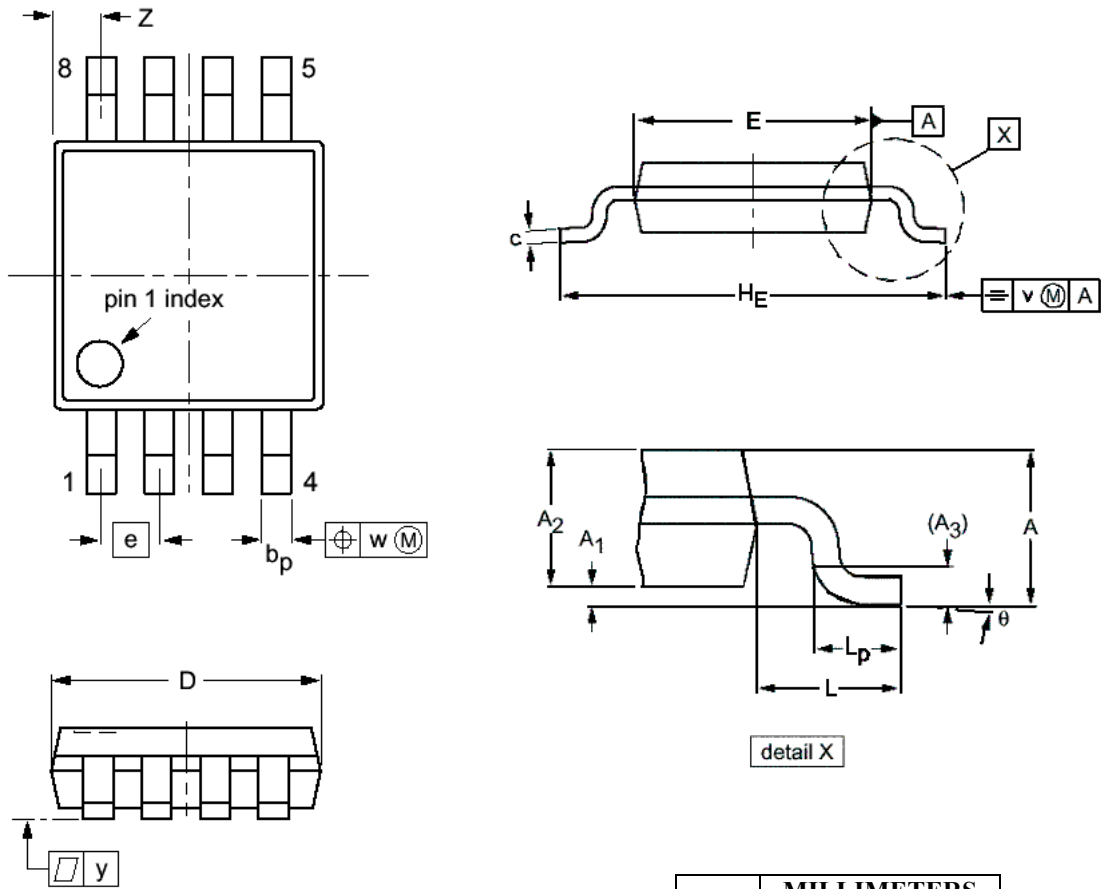


DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A		1.75		0.069
A ₁	0.10	0.25	0.004	0.010
A ₂	1.25	1.45	0.049	0.057
A ₃	0.25		0.01	
b _p	0.36	0.49	0.014	0.019
c	0.19	0.25	0.0075	0.0100
D	4.8	5.0	0.19	0.20
E	3.8	4.0	0.15	0.16
e	1.27		0.050	
H _E	5.80	6.20	0.228	0.244
L	1.05		0.041	
L _p	0.40	1.00	0.016	0.039
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
A ₁	0.05	0.15
A ₂	0.80	0.95
A ₃	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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