

AZ10EL16VO AZ100EL16VO

ECL/PECL Oscillator Gain Stage and Buffer with Enable

FEATURES

- 250ps Propagation Delay on \bar{Q} Output
- High Voltage Gain vs. Standard EL16
- For Oscillator Applications
- Operating Range of 3.0V to 5.5V
- Available in 2x2 or 3x3mm MLP Package
- 75k Ω Enable Pull-Down Resistor

PACKAGE AVAILABILITY

PACKAGE	PART NO.	MARKING
MLP 8 (2x2x0.75)	AZ100EL16VONB	TNB
MLP 8 (2x2x0.75) T&R	AZ100EL16VONBR1	TNB
MLP 8 (2x2x0.75) T&R	AZ100EL16VONBR2	TNB
MLP 16	AZ10/100EL16VOL	AZM16J
MLP 16 T&R	AZ10/100EL16VOLR1	AZM16J
MLP 16 T&R	AZ10/100EL16VOLR2	AZM16J
SOIC 8	AZ10EL16VOD	AZM10EL16VO
SOIC 8 T&R	AZ10EL16VODR1	AZM10EL16VO
SOIC 8 T&R	AZ10EL16VODR2	AZM10EL16VO
SOIC 8	AZ100EL16VOD	AZM100EL16VO
SOIC 8 T&R	AZ100EL16VODR1	AZM100EL16VO
SOIC 8 T&R	AZ100EL16VODR2	AZM100EL16VO
TSSOP 8	AZ10EL16VOT	AZT16VO
TSSOP 8 T&R	AZ10EL16VOTR1	AZT16VO
TSSOP 8 T&R	AZ10EL16VOTR2	AZT16VO
TSSOP 8	AZ100EL16VOT	AZH16VO
TSSOP 8	AZ100EL16VOT	AZH16VO
TSSOP 8 T&R	AZ100EL16VOTR1	AZH16VO
TSSOP 8 T&R	AZ100EL16VOTR2	AZH16VO
DIE	AZ10/100EL16VOX	N/A

DESCRIPTION

The AZ10/100EL16VO is a specialized oscillator gain stage with a high gain output buffer including an enable. The Q_{HG}/\bar{Q}_{HG} outputs have a voltage gain several times greater than the Q/\bar{Q} outputs.

The EL16VO provides an enable input (\bar{EN}) that allows continuous oscillator operation. When \bar{EN} is LOW or floating (NC), input data is passed to both sets of outputs. When \bar{EN} is HIGH, the Q_{HG}/\bar{Q}_{HG} outputs will be forced LOW/HIGH respectively, while input data will continue to be passed to the Q/\bar{Q} outputs. The \bar{EN} input can be driven with an ECL/PECL signal or a full supply swing CMOS type logic signal.

The EL16VO also provides a V_{BB} output for a crystal bias node. The V_{BB} pin can support 1.5mA sink/source current. When used, the V_{BB} pin should be bypassed to ground via a 0.01 μ F capacitor.

Any used output must have an external pull down resistor. For 3.3V operation, a 180 Ω resistor to V_{EE} is recommended if an AC coupled load is present. At 5.0V, a 330 Ω resistor is recommended for the AC load case. Alternately, a 50 Ω load terminated to $V_{CC} - 2V$ may be driven directly. Unused outputs may be left floating (NC).

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

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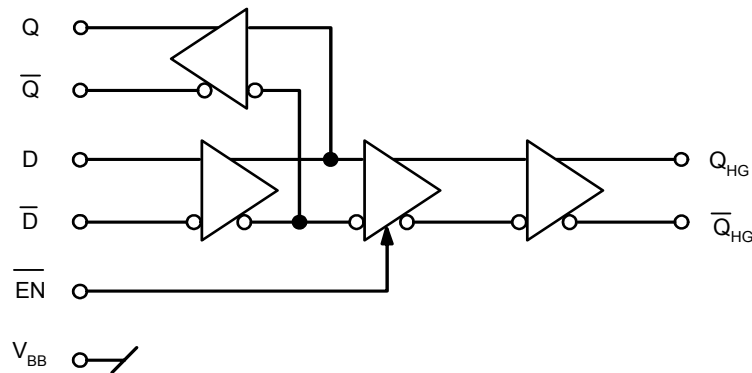
PIN DESCRIPTION

PIN	FUNCTION
D/ \bar{D}	Data Inputs
Q/ \bar{Q}	Data Outputs
Q _{HG} / \bar{Q} _{HG}	Data Outputs w/High Gain
V _{BB}	Reference Voltage Output
\bar{EN}	Enable Input
V _{CC}	Positive Supply
V _{EE}	Negative Supply

TRUTH TABLE

\bar{EN}	Q/ \bar{Q}	Q _{HG}	\bar{Q} _{HG}
LOW or NC	Data	Data	Data
HIGH	Data	LOW	HIGH

NC = No Connect



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 ¹	-1080		-890	-1020		-840	-980		-810	-910		-720	mV	
V _{OL}	Output LOW Voltage ¹	-1950		-1650	-1950		-1630	-1950		-1630	-1950		-1595	mV	
V _{IH}	Input HIGH Voltage	D/ \bar{D}	-1230		-890	-1170		-840	-1130		-810	-1060		-720	mV
		\bar{EN}	-1230		V _{CC}	-1170		V _{CC}	-1130		V _{CC}	-1060		V _{CC}	
V _{IL}	Input LOW Voltage	D/ \bar{D}	-1950		-1500	-1950		-1480	-1950		-1480	-1950		-1445	mV
		\bar{EN}	V _{EE}		-1500	V _{EE}		-1480	V _{EE}		-1480	V _{EE}		-1445	
V _{BB}	Reference Voltage	-1430		-1300	-1380		-1270	-1370		-1250	-1310		-1190	mV	
I _{IH}	Input HIGH Current	D/ \bar{D}			60			60			60			60	μA
		\bar{EN}			150			150			150			150	
I _{IL}	Input LOW Current	0.5			0.5			0.5			0.5			μA	
I _{EE}	Power Supply Current			40			40			40			40	mA	

1. 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 ^{1,2}	2220		2410	2280		2460	2320		2490	2390		2580	mV	
V_{OL}	Output LOW Voltage ^{1,2}	1350		1650	1350		1670	1350		1670	1350		1705	mV	
V_{IH}	Input HIGH Voltage	D/ \bar{D} ¹	2070		2410	2130		2460	2170		2490	2240		2580	mV
		$\overline{\text{EN}}$	2070 ¹		V_{CC}	2130 ¹		V_{CC}	2170 ¹		V_{CC}	2240 ¹		V_{CC}	
V_{IL}	Input LOW Voltage	D/ \bar{D} ¹	1350		1800	1350		1820	1350		1820	1350		1855	mV
		$\overline{\text{EN}}$	V_{EE}		1800 ¹	V_{EE}		1820 ¹	V_{EE}		1820 ¹	V_{EE}		1855 ¹	
V_{BB}	Reference Voltage ¹	1870		2000	1920		2030	1930		2050	1990		2110	mV	
I_{IH}	Input HIGH Current	D/ \bar{D}			60			60			60			60	μA
		$\overline{\text{EN}}$			150			150			150			150	
I_{IL}	Input LOW Current	D/ \bar{D}	0.5		0.5			0.5			0.5			μA	
		$\overline{\text{EN}}$ ³	-300		-300			-300			-300				
I_{EE}	Power Supply Current			40			40			40			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. Specified with $\overline{\text{EN}}$ forced to V_{EE} .

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 ^{1,2}	3920		4110	3980		4160	4020		4190	4090		4280	mV	
V_{OL}	Output LOW Voltage ^{1,2}	3050		3350	3050		3370	3050		3370	3050		3405	mV	
V_{IH}	Input HIGH Voltage	D/ \bar{D} ¹	3770		4110	3830		4160	3870		4190	3940		4280	mV
		$\overline{\text{EN}}$	3770 ¹		V_{CC}	3830 ¹		V_{CC}	3870 ¹		V_{CC}	3940 ¹		V_{CC}	
V_{IL}	Input LOW Voltage	D/ \bar{D} ¹	3050		3500	3050		3520	3050		3520	3050		3555	mV
		$\overline{\text{EN}}$	V_{EE}		3500 ¹	V_{EE}		3520 ¹	V_{EE}		3520 ¹	V_{EE}		3555 ¹	
V_{BB}	Reference Voltage ¹	3570		3700	3620		3730	3630		3750	3690		3810	mV	
I_{IH}	Input HIGH Current	D/ \bar{D}			60			60			60			60	μA
		$\overline{\text{EN}}$			150			150			150			150	
I_{IL}	Input LOW Current	D/ \bar{D}	0.5		0.5			0.5			0.5			μA	
		$\overline{\text{EN}}$ ³	-1400		-1400			-1400			-1400				
I_{EE}	Power Supply Current			40			40			40			40	mA	

1. For supply voltages other than 5.0V, 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. Specified with $\overline{\text{EN}}$ forced to V_{EE} .

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100K 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 ¹	-1085	-1005	-880	-1025	-955	-880	-1025	-955	-880	-1025	-955	-880	mV
V_{OL}	Output LOW Voltage ¹	-1900	-1695	-1555	-1900	-1705	-1620	-1900	-1705	-1620	-1900	-1705	-1620	mV
V_{IH}	Input HIGH Voltage			-880	-1165		-880	-1165		-880	-1165		-880	mV
		D/ \bar{D} EN	-1165		V_{CC}	-1165		V_{CC}	-1165		V_{CC}	-1165	V_{CC}	
V_{IL}	Input LOW Voltage			-1475	-1810		-1475	-1810		-1475	-1810		-1475	mV
		D/ \bar{D} $\bar{E}N$	-1810		V_{EE}	-1475		V_{EE}	-1475		V_{EE}	-1475	V_{EE}	
V_{BB}	Reference Voltage	-1400		-1260	-1400		-1260	-1400		-1260	-1400		-1260	mV
I_{IH}	Input HIGH Current			60			60			60			60	μA
		D/ \bar{D} EN			150			150			150			
I_{IL}	Input LOW Current	0.5			0.5			0.5			0.5			μA
I_{EE}	Power Supply Current			40			40			40			46	mA

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

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}	2215	2295	2420	2275	2345	2420	2275	2345	2420	2275	2345	2420	mV
V_{OL}	Output LOW Voltage ^{1,2}	1400	1605	1745	1400	1595	1680	1400	1595	1680	1400	1595	1680	mV
V_{IH}	Input HIGH Voltage			2420	2135		2420	2135		2420	2135		2420	mV
		D/ \bar{D} ¹ $\bar{E}N$	2135		V_{CC}	2135 ¹		V_{CC}	2135 ¹		V_{CC}	2135 ¹	V_{CC}	
V_{IL}	Input LOW Voltage			1825	1490		1825	1490		1825	1490		1825	mV
		D/ \bar{D} ¹ $\bar{E}N$	1490		1825 ¹	V_{EE}		1825 ¹	V_{EE}		1825 ¹	V_{EE}	1825 ¹	
V_{BB}	Reference Voltage ¹	1900		2040	1900		2040	1900		2040	1900		2040	mV
I_{IH}	Input HIGH Current			60			60			60			60	μA
		D/ \bar{D} $\bar{E}N$			150			150			150			
I_{IL}	Input LOW Current	0.5			0.5			0.5			0.5			μA
I_{EE}	Power Supply Current	-300		40	-300		40	-300		40	-300		46	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 $V_{CC} - 2V$.
3. Specified with EN forced to V_{EE} .

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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 ^{1,2}	3915	3995	4120	3975	4045	4120	3975	4045	4120	3975	4045	4120	mV	
V_{OL}	Output LOW Voltage ^{1,2}	3100	3305	3445	3100	3295	3380	3100	3295	3380	3100	3295	3380	mV	
V_{IH}	Input HIGH Voltage	D/ \bar{D} ¹	3835		4120	3835		4120	3835		4120	3835		4120	mV
		$\overline{\text{EN}}$	3835 ¹		V_{CC}	3835 ¹		V_{CC}	3835 ¹		V_{CC}	3835 ¹		V_{CC}	
V_{IL}	Input LOW Voltage	D/ \bar{D} ¹	3190		3525	3190		3525	3190		3525	3190		3525	mV
		$\overline{\text{EN}}$	V_{EE}		3525 ¹	V_{EE}		3525 ¹	V_{EE}		3525 ¹	V_{EE}		3525 ¹	
V_{BB}	Reference Voltage ¹	3600		3740	3600		3740	3600		3740	3600		3740	mV	
I_{IH}	Input HIGH Current	D/ \bar{D} ¹			60			60			60			60	μA
		$\overline{\text{EN}}$			150			150			150			150	
I_{IL}	Input LOW Current	D/ \bar{D} ¹	0.5		0.5			0.5			0.5			0.5	μA
		$\overline{\text{EN}}$ ³	-1400		-1400			-1400			-1400			-1400	
I_{EE}	Power Supply Current			40			40			40			46	mA	

1. For supply voltages other than 5.0V, 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. Specified with $\overline{\text{EN}}$ forced to V_{EE} .

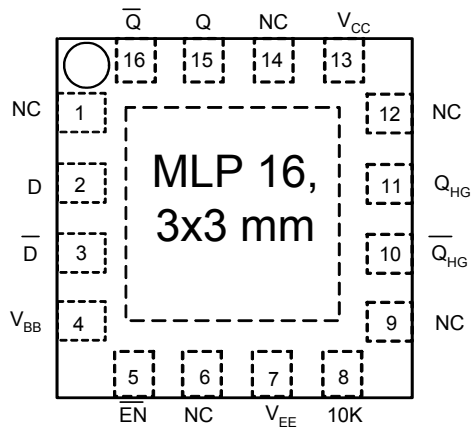
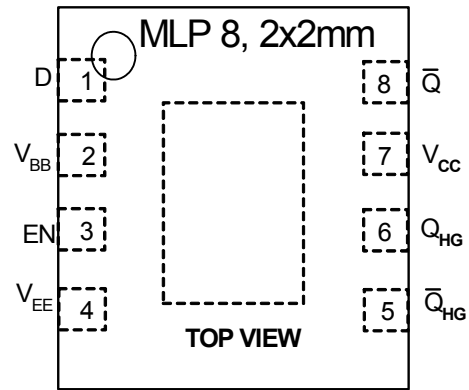
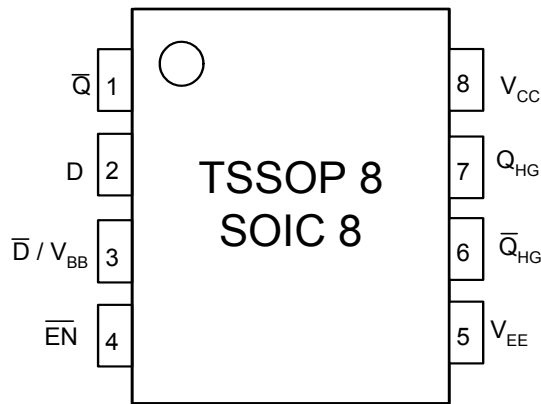
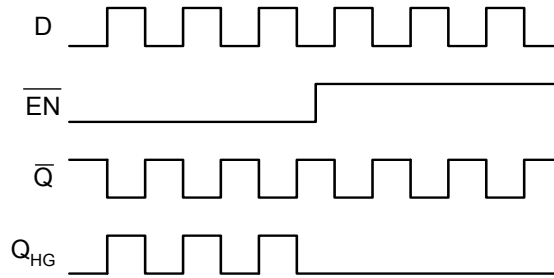
AC Characteristics ($V_{EE} = -3.0\text{V}$ to -5.5V ; $V_{CC} = \text{GND}$ or $V_{EE} = \text{GND}$, $V_{CC} = +3.0\text{V}$ to $+5.5\text{V}$)

Symbol	Characteristic	-40°C			0°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
t_{PLH}/t_{PHL}	Propagation Delay D to Q/ \bar{Q} Outputs (SE) D to Q _{HG} / \bar{Q} _{HG} Outputs (SE)			400			400			400			430	ps
				700			700			700			780	
t_{SKEW}	Duty Cycle Skew ¹ (SE)		5			5	20		5	20		5	20	ps
$V_{PP}(\text{AC})$	Minimum Input Swing ²	150			150			150			150			mV
t_r/t_f	Output Rise/Fall Times (20% – 80%)	100		350	100		350	100		350	100		350	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 are guaranteed. The device has a voltage gain of ≈ 20 to Q/ \bar{Q} outputs and a voltage gain of ≈ 100 to Q_{HG}/ \bar{Q} _{HG} outputs.

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TIMING DIAGRAM



TOP VIEW

MLP 16 Package and DIE:
10K/100K Selection

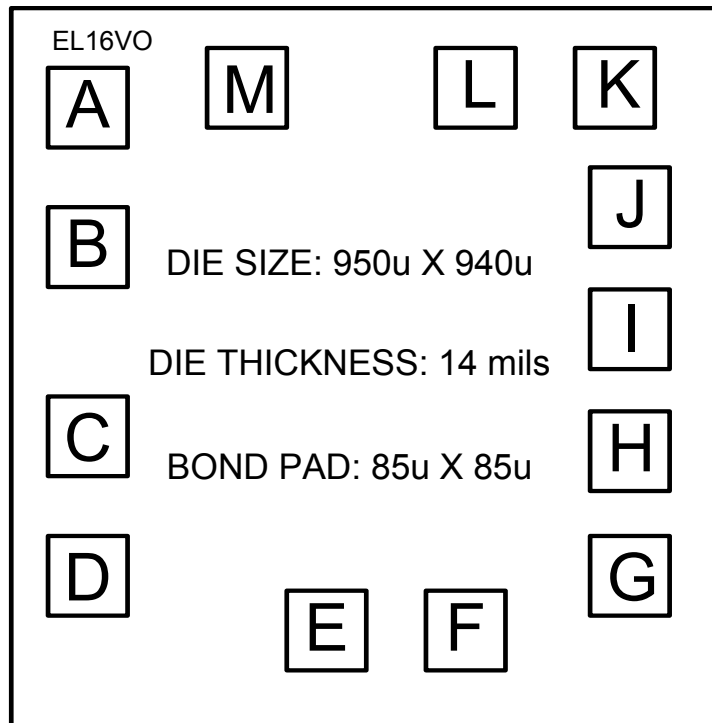
Connect pin/pad 10K to V_{EE} to select 10K operation. Float (NC) pin/pad 10K to select 100K operation. V_{EE} connection must be less than 1Ω .

Pin 6 of the MLP 16 package may be connected to pin 7 (V_{EE}) with no effect on the circuit.

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DIE PAD COORDINATES

AZ10/100EL16VO DIE:



Note: Other die thicknesses available. Contact factory for further information.

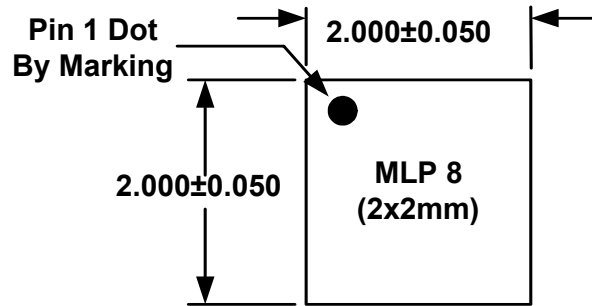
PAD CENTER COORDINATES

NAME	PAD DESIGNATION	X(Microns)	Y(Microns)
A	D	-342.5	312.5
B	\bar{D}	-342.5	144.5
C	V_{BB}	-342.5	-87.0
D	\bar{EN}	-342.5	-255.0
E	V_{EE}	-33.5	-312.5
F	10K	126.5	-312.5
G	\bar{Q}_{HG}	312.5	-248.5
H	Q_{HG}	312.5	-98.5
I	NC	312.5	51.5
J	V_{CC}	312.5	201.5
K	V_{CC}	302.5	342.5
L	Q	142.5	342.5
M	\bar{Q}	-140.5	342.5

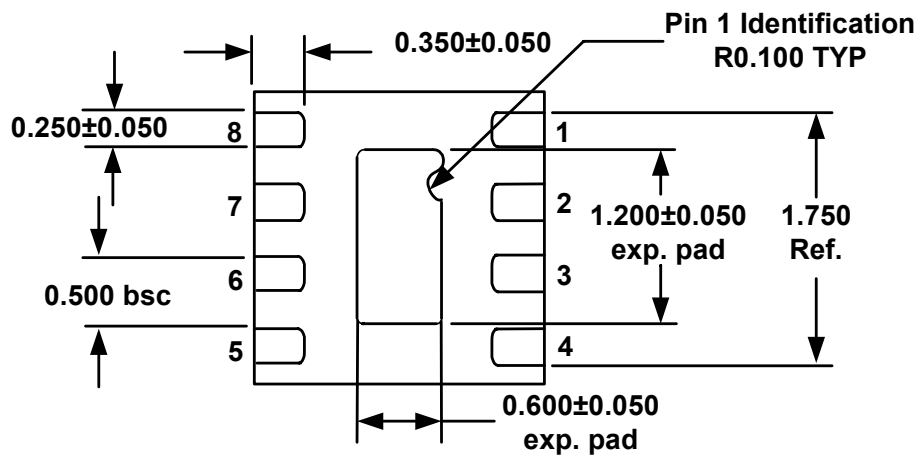
NC = No connect, leave open.

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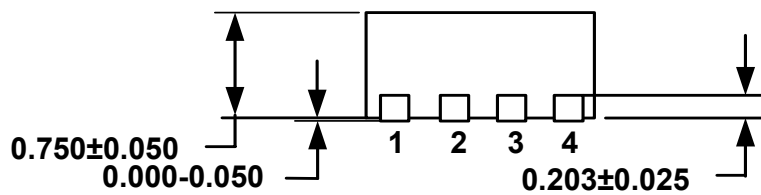
PACKAGE DIAGRAM
MLP 8 DUAL 2x2mm



TOP VIEW



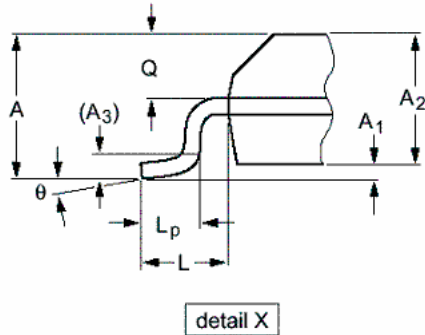
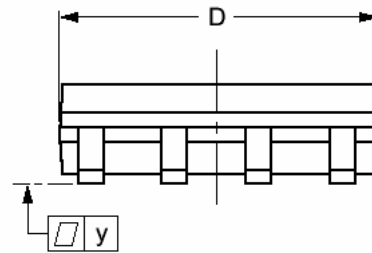
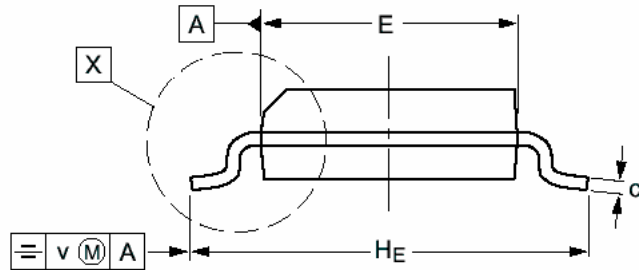
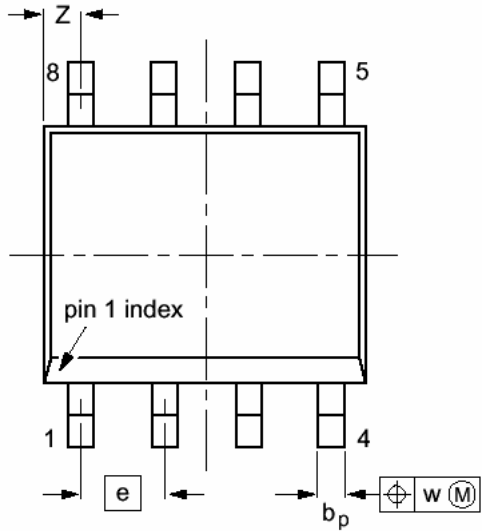
BOTTOM VIEW



SIDE VIEW

Note: All dimensions are in mm

**PACKAGE DIAGRAM
SOIC 8**

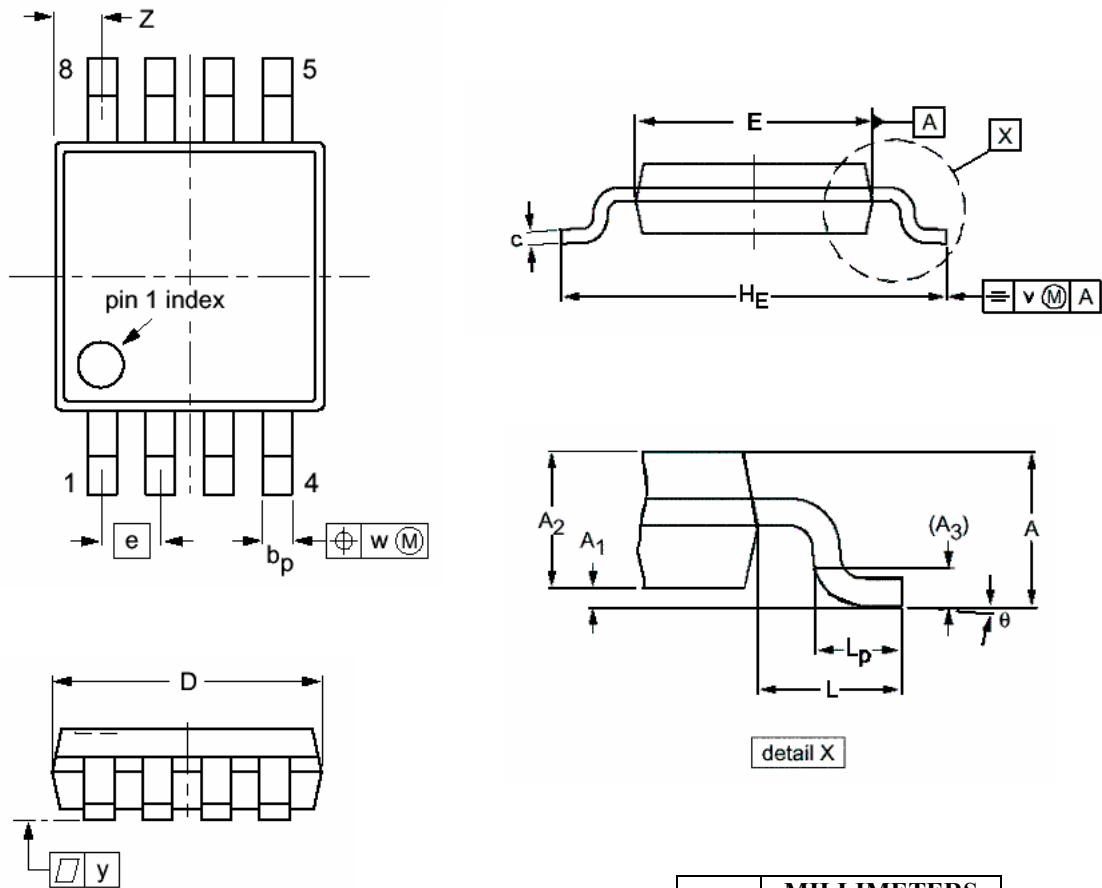


DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A		0.75		0.069
A ₁	0.10	0.25	0.004	0.010
A ₂	1.25	1.45	0.049	0.057
A ₃	0.25		0.01	
b _p	0.36	0.49	0.014	0.019
c	0.19	0.25	0.0075	0.0100
D	4.8	5.0	0.19	0.20
E	3.8	4.0	0.15	0.16
e	1.27		0.050	
H _E	5.80	6.20	0.228	0.244
L	1.05		0.041	
L _p	0.40	1.00	0.016	0.039
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

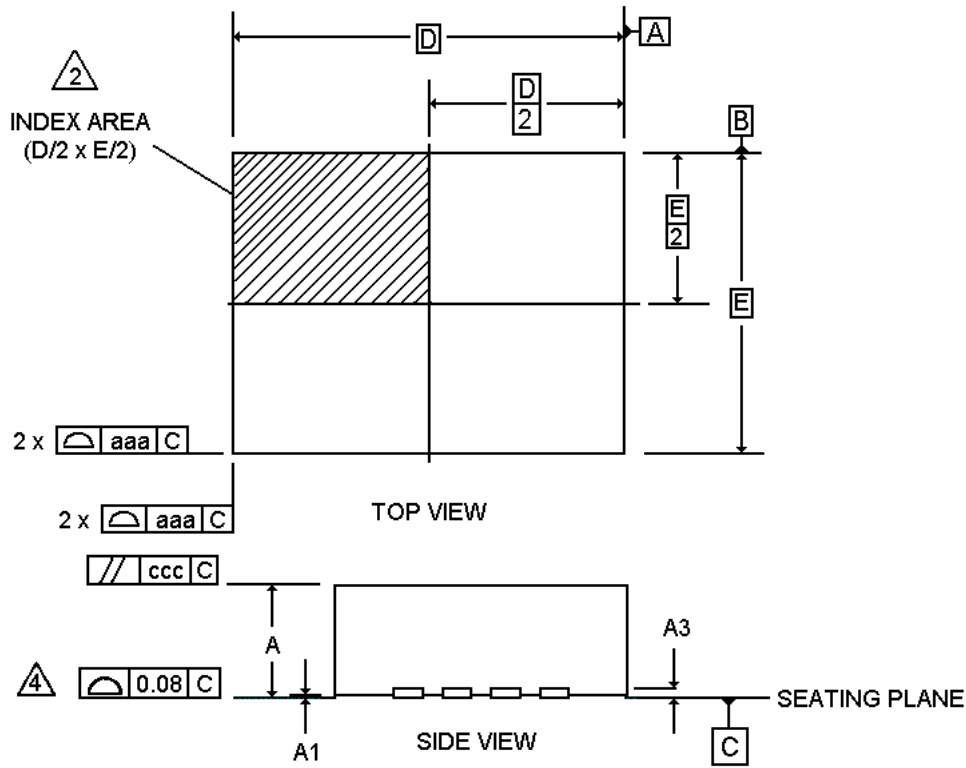


NOTES:

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°

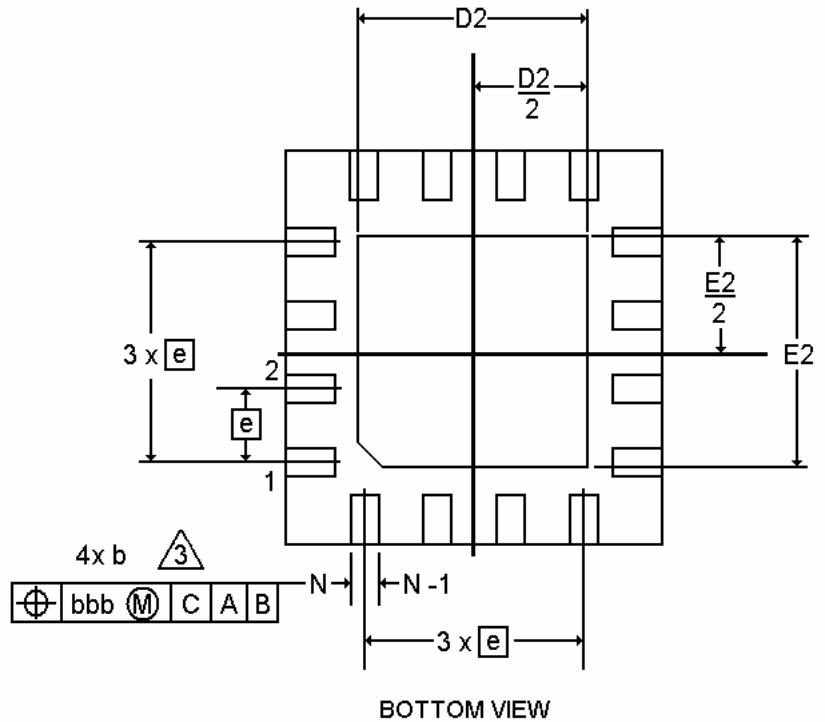
**PACKAGE DIAGRAM
MLP 16**



NOTES

1. DIMENSIONING AND TOLERANCING CONFORM TO ASME T14-1994.
2. THE TERMINAL #1 AND PAD NUMBERING CONVENTION SHALL CONFORM TO JESD 95-1 SPP-012.
3. DIMENSION *b* APPLIES TO METALLIZED PAD AND IS MEASURED BETWEEN 0.25 AND 0.30mm FROM PAD TIP.
4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.

DIM	MILLIMETERS	
	MIN	MAX
A	0.80	1.10
A1	0.00	0.05
A3	0.25 REF	
<i>b</i>	0.225	0.275
D	2.90	3.10
D2	1.65	1.95
E	2.90	3.10
E2	1.65	1.95
<i>e</i>	0.50 BSC	
L	0.35	0.45
aaa	0.25	
bbb	0.10	
ccc	0.10	



AZ10EL16VO
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