

AZ100EP16FE

ECL/PECL High Speed VCSEL Driver with Variable Output Swing or Limiting Amplifier

FEATURES

- Silicon-Germanium for High Speed Operation
- <100ps Typical Rise/Fall Times
- Optimized for 0.622 to 2.5Gbps Fiber Applications
- Available in a 3x3mm MLP Package

PACKAGE AVAILABILITY

PACKAGE	PART NO.	MARKING
MLP 8	AZ100EP16FEL	AZM16D
MLP 8 T&R	AZ100EP16FELR1	AZM16D
MLP 8 T&R	AZ100EP16FELR2	AZM16D
TSSOP 8	AZ100EP16FET	AZHP16FE
TSSOP 8 T&R	AZ100EP16FETR1	AZHP16FE
TSSOP 8 T&R	AZ100EP16FETR2	AZHP16FE

DESCRIPTION

The AZ100EP16FE is a Silicon-Germanium (SiGe) differential VCSEL driver with variable output swing or limiting post amplifier. The 100EP16FE is optimized for OC-12, OC-24, OC-48, Ethernet, Sonnet, Fiber Channel or related applications at data rates up to 2.5Gbps. An input controls the amplitude of the Q/Q outputs, which allows compensation for differing VCSEL characteristics.

The operational range of the 100EP16FE control input, V_{CTRL} , is from V_{REF} (full swing) to V_{CC} (small swing). For post amplifier applications, maximum swing is achieved by leaving the V_{CTRL} pin open or by tying it to the negative supply pin (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} . A typical application circuit is described in this Data Sheet.

The 100EP16FE also provides a V_{REF} output which functions as a DC bias for input AC coupling to the device. The V_{REF} pin should be used only as a bias for the 100EP16FE as its current sink/source capability is limited. When used, the V_{REF} pin should be bypassed to ground via a 0.01 μ F capacitor.

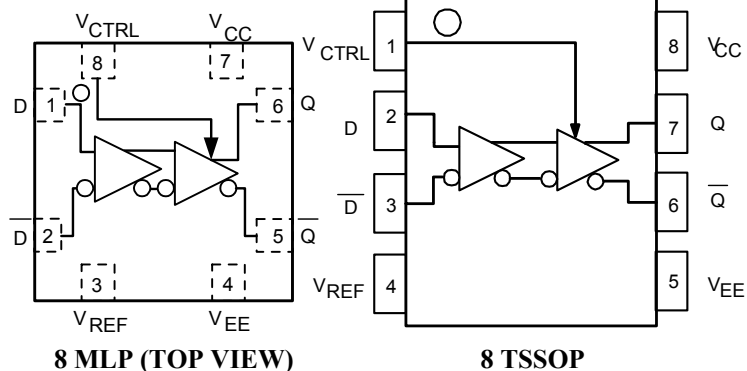
The maximum DC output current should be kept below 16mA. Connecting each output (Q/Q) to V_{EE} with a 180 Ω resistor is typically used. The load is then AC coupled from the output. DC and AC symmetrical loading of the Q/Q outputs will provide the best output wave shape.

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.

PIN DESCRIPTION

PIN	FUNCTION
D, $\bar{D}$	Data Inputs
V_{CTRL}	Output Swing Control
Q, $\bar{Q}$	Data Outputs
V_{REF}	Reference Voltage Output
V_{CC}	Positive Supply
V_{EE}	Negative Supply



AZ100EP16FE

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	22 44	mA
T_A	Operating Temperature Range	-40 to +85	°C
T_{STG}	Storage Temperature Range	-65 to +150	°C

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	-1095		-890	-1035		-870	-1000	-920	-840	-940		-760	mV
V_{OL}	Output LOW Voltage ¹ $V_{CTRL} = V_{REF}$	-1935		-1745	-1905		-1715	-1885	-1790	-1695	-1830		-1640	mV
V_{OL}	Output LOW Voltage ¹ $V_{CTRL} = V_{CC}$	-1140		-950	-1120		-930	-1100	-1005	-910	-1055		-865	mV
V_{REF}	Reference Voltage	-1700		-1500	-1700		-1500	-1700		-1500	-1700		-1500	mV
I_{IH}	Input HIGH Current $D, \bar{D}$ 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	21	28	36	22	31	38	mA

- Each output is terminated through a 180Ω resistor to V_{EE} .

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}	2205		2410	2265		2430	2300	2380	2460	2360		2540	mV
V_{OL}	Output LOW Voltage ² $V_{CTRL} = V_{REF}$	1365		1555	1395		1585	1415	1510	1605	1470		1660	mV
V_{OL}	Output LOW Voltage ² $V_{CTRL} = V_{CC}$	2160		2350	2180		2370	2200	2295	2390	2245		2435	mV
V_{REF}	Reference Voltage	1600		1800	1600		1800	1600		1800	1600		1800	mV
I_{IH}	Input HIGH Current $D, \bar{D}$ 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	21	28	36	22	31	38	mA

- For supply voltages other than 3.3V, use the ECL table values and ADD supply voltage value.
- Each output is terminated through a 180Ω resistor to V_{EE} .

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		>6			>6			>6			>6		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_{pp}	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%)			130			130			130			130	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. The lower end of the V_{CMR} range varies 1:1 with V_{EE} and is equal to $V_{EE} + 2V$.
- Differential input, differential output. 180Ω to V_{EE} on Q/Q outputs with 50Ω AC coupled load.
- See Figure 2.

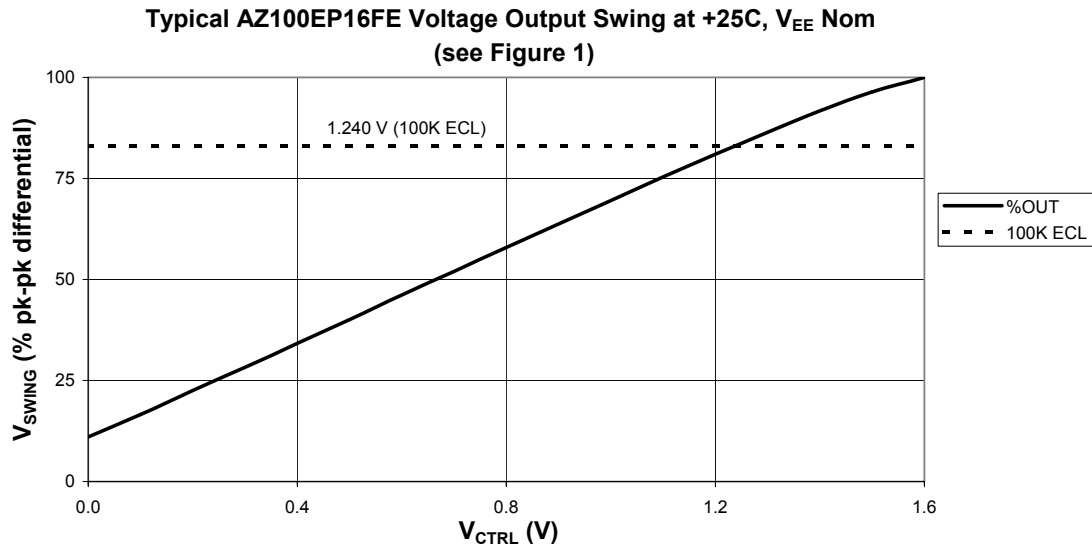


Figure 1: Typical Application

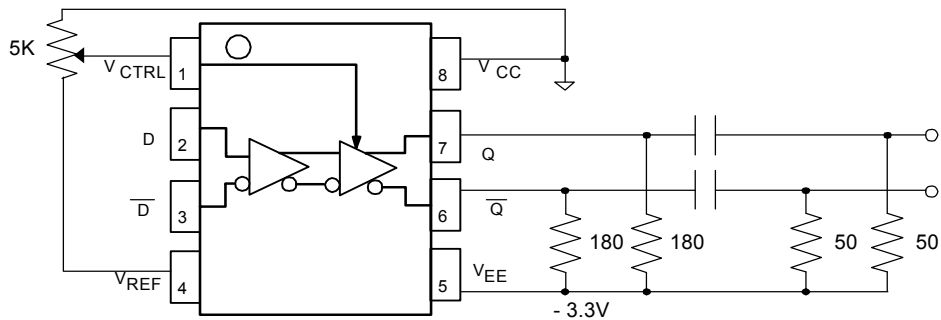
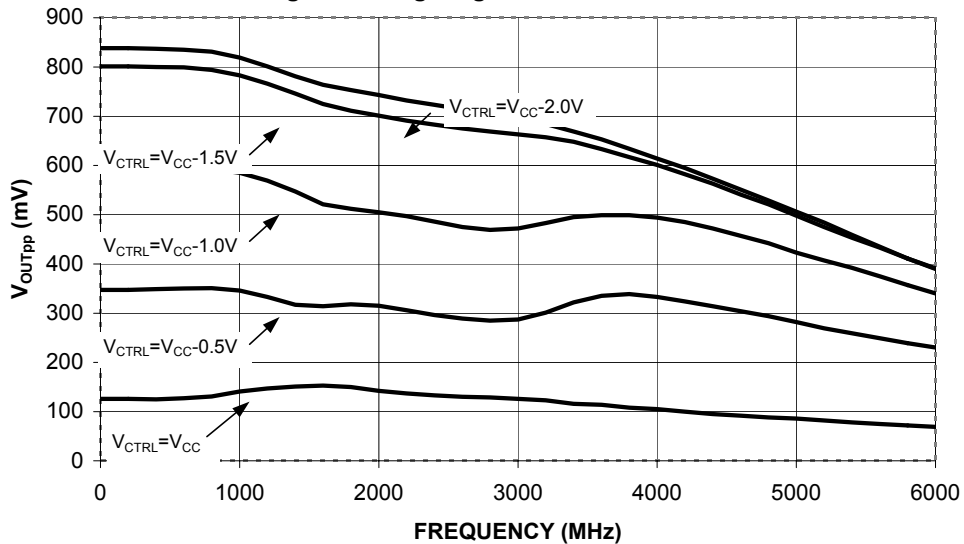
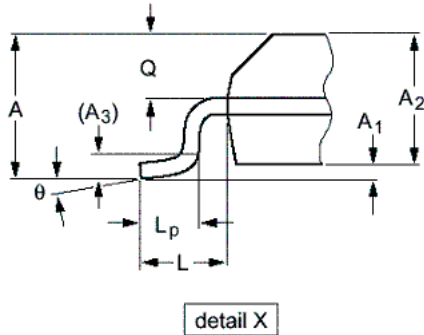
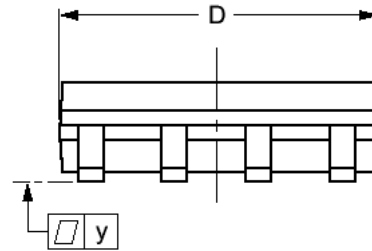
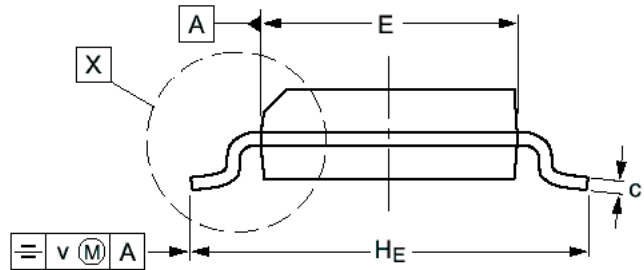
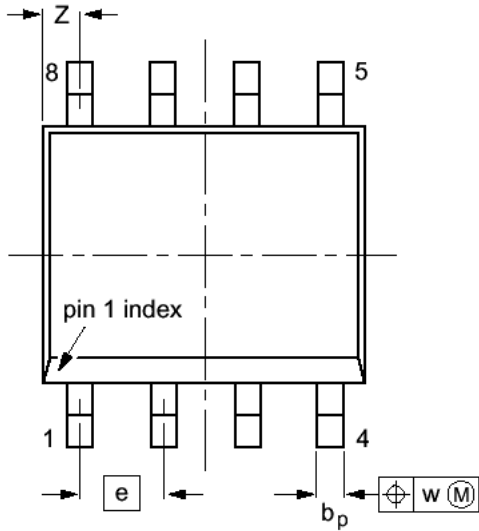


Figure 2: Large Signal Performance*



*Measured using a 750mV differential input source at 50% duty cycle.

PACKAGE DIAGRAM SOIC 8

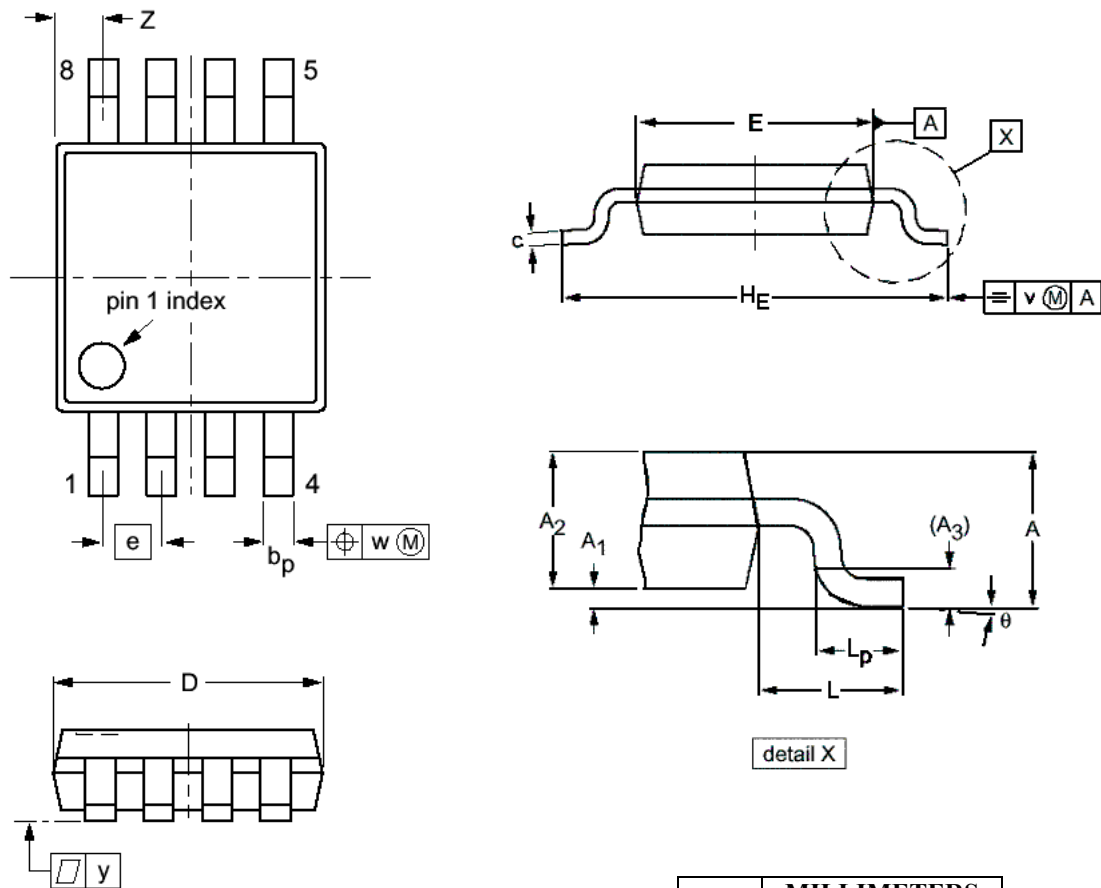


NOTES:

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		INCHES	
	MIN	MAX	MIN	MAX
A	1.35	1.75	0.053	0.069
A ₁	0.10	0.25	0.004	0.010
A ₂	1.28	1.57	0.050	0.062
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	4.80	5.0	0.19	0.20
E	3.80	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	1.27	0.016	0.050
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°

PACKAGE DIAGRAM TSSOP 8

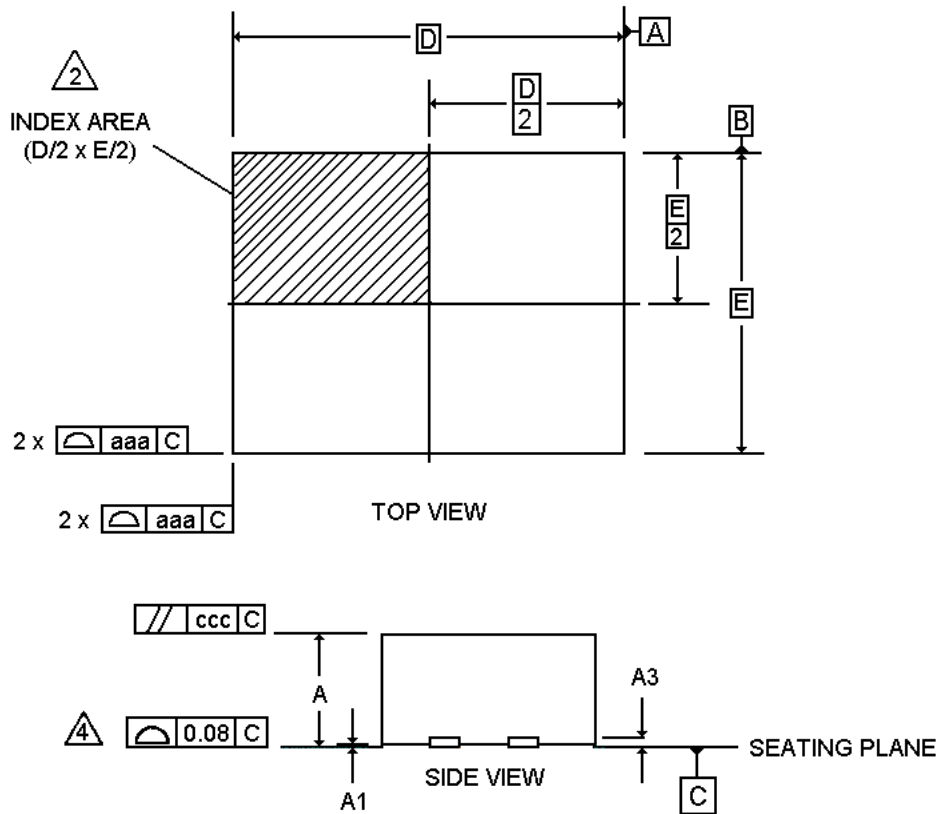


NOTES:

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	0.75	0.95
A ₃	0.25	
b _p	0.22	0.40
c	0.13	0.23
D	2.90	3.10
E	2.90	3.10
e	0.65	
H _E	4.75	5.05
L	0.95	
L _p	0.40	0.70
v	0.10	
w	0.08	
y	0.10	
Z	0.38	0.64
θ	0°	6°

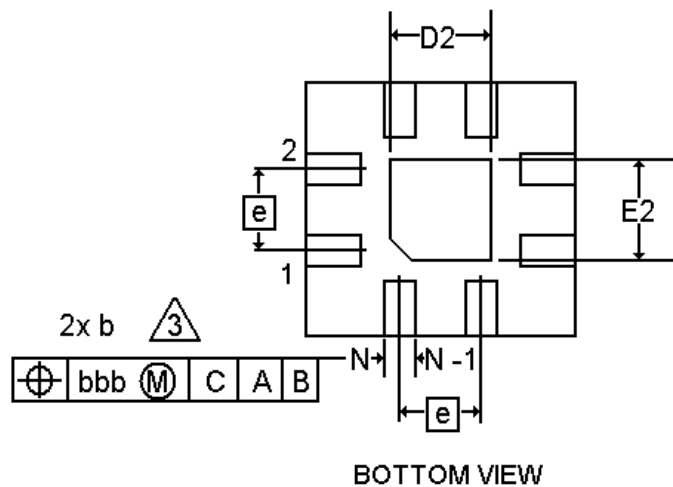
PACKAGE DIAGRAM MLP 8



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	0.08	1.00
A1	0.00	0.05
A3	0.25 REF	
b	0.23	0.38
D	2.90	3.10
D2	0.25	1.95
E	2.90	3.10
E2	0.25	1.95
e	0.65 BSC	
L	0.30	0.50
aaa	0.25	
bbb	0.10	
ccc	0.10	



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