

AEROSPACE PRODUCT LINE PACKAGE BROCHURE

May 2016

For general information on Analog Devices Space Qualified products please visit the following address.

<http://www.analog.com/aerospace>

For technical inquiries on Aerospace Engineering Models please email us at aero@analog.com

For Sales and Distribution contacts please visit the following address.

<http://www.analog.com/en/about-adi/corporate-information/sales-distribution.html>

COMMITMENT TO THE SPACE MARKET

Analog Devices is committed to serving the needs of the world space community by manufacturing the highest quality data conversion and signal processing products.

Analog Devices' entry into the space level market occurred in August 1990 when it acquired Precision Monolithics Inc. located in Santa Clara, California. Analog Devices' certified facilities have been supplying products for military and space applications since 1972. Analog Devices now offers state-of-the-art, data conversion and linear products to the space market place which were previously only available as commercial or military Class B products.

Analog Devices space level operations located in Greensboro, North Carolina coordinates all space level V (class S) activities, including business development, manufacturing and engineering. The addition of new products is derived from our customers' needs and the ability of these products to meet MIL-PRF-38535 QML level V requirements.

Visit our web site (<http://www.analog.com/aerospace>) or call our factory contacts for the latest Class S

updates as well as for radiation information on these and other products.

Analog Devices, Inc. Aerospace Product Line standard product is available in one or more of the following processes:

- ▶ MIL-PRF-38535, QML LEVEL V
- ▶ MIL-PRF-38535, QML R (LEVEL V with Radiation Qualification)
- ▶ MIL-PRF-38535, JAN S
- ▶ MIL-PRF-38535, Analog Devices, Inc.'s Aerospace Product Line Standard Product

See <http://www.analog.com/aerospace>. (Standard Space Level Products Program)

The table beginning on page 3 lists the standard product offered by Analog Device's Aerospace Product Line.

Product is also available in accordance with source control drawings. Please call factory for further information.

For further information see contact list on cover page.

ANALOG DEVICES SPACE LEVEL PRODUCTS

Manufacturing Locations

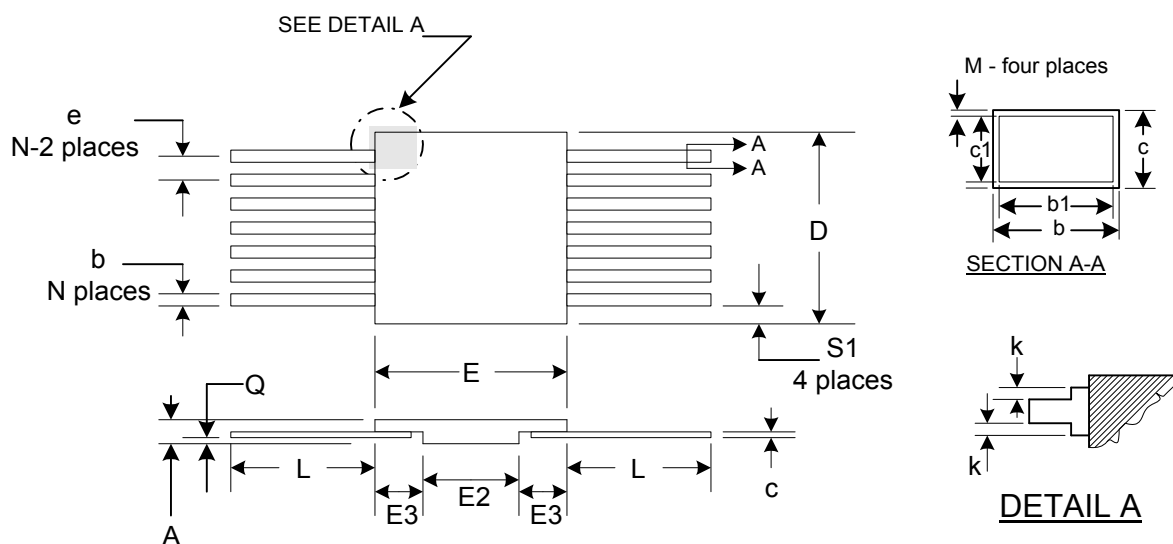
Space Level Compliance	Wafer Fab	Assembly	Screening and Quality Conformance Inspection
MIL-PRF-38535 Class V Compliant QMLV Devices	Full Wafer Lot Acceptance: • ADI Wilmington MA • ADI Limerick, Ireland • ADI Santa Clara Die Bank	ADI Phils, Inc. Cavite, Philippines	ADI Phils, Inc. Cavite, Philippines
Standard Space Products (non-QMLV)	SEM Inspection, most models: • ADI Wilmington MA • ADI Limerick, Ireland • ADI Santa Clara Die Bank • TSMC Taiwan	ADI Phils, Inc. Cavite, Philippines	ADI Phils, Inc. Cavite, Philippines
Customer Specific Special Flows	• ADI Wilmington MA • ADI Limerick, Ireland • ADI Santa Clara Die Bank • TSMC Taiwan	ADI Phils, Inc. Cavite, Philippines	ADI Phils, Inc. Cavite, Philippines

PACKAGES

The various packages offered by the Aerospace Product Line are in compliance with MIL-STD-1835. The following pages are for reference and are not guaranteed to be up to date.

<http://www.dscc.dla.mil/Programs/MilSpec/listdocs.asp?BasicDoc=MIL-STD-1835>

BOTTOM BRAZED FLAT PACK (CONFIGURATION B OF MIL-STD-1835)

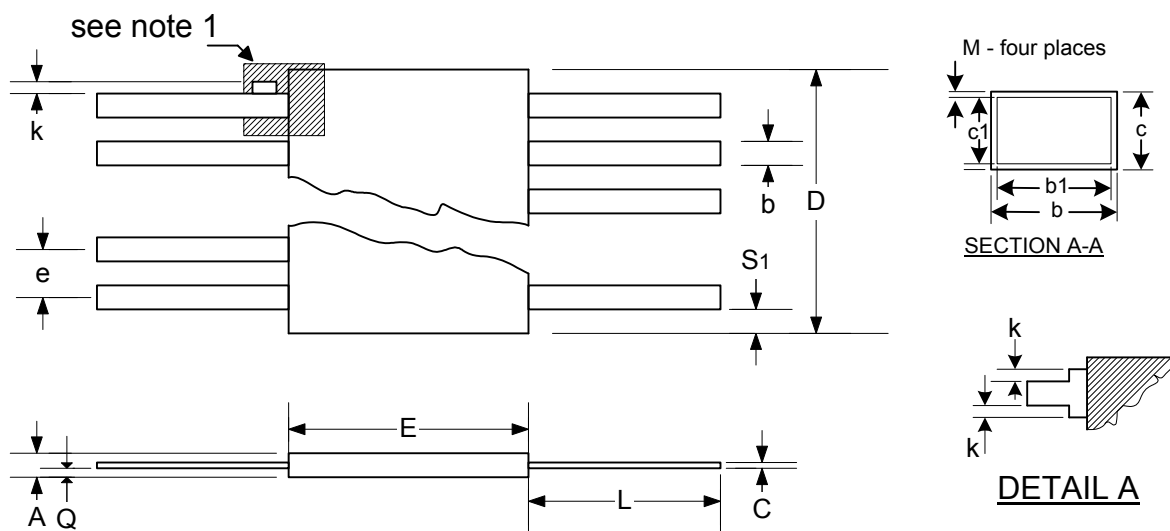


Bottom Brazed Flat Pack Dimension Table

	Note	min	max	min	max	min	max	min	max
A		0.045	0.115	0.045	0.115	0.045	0.115	0.045	0.115
b		0.015	0.022	0.015	0.022	0.015	0.022	0.015	0.022
b1		0.015	0.019	0.015	0.019	0.015	0.019	0.015	0.019
c		0.004	0.009	0.004	0.009	0.004	0.009	0.004	0.009
c1		0.004	0.006	0.004	0.006	0.004	0.006	0.004	0.006
D	3		0.290		0.39		0.44		0.74
D1									
E		0.240	0.260	0.235	0.260	0.245	0.285	0.46	0.52
E1	3		0.280		0.280		0.315		0.55
E2		0.125		0.125		0.13		0.18	
E3	7	0.03		0.03		0.03		0.03	
E4									
E5									
e		.050 BSC		.050 BSC		.050 BSC		.050 BSC	
k	2	0.008	0.015	0.008	0.015	0.008	0.015	0.008	0.015
L		0.250	0.370	0.250	0.370	0.250	0.370	0.25	0.37
Q	11	0.026	0.045	0.026	0.045	0.026	0.045	0.026	0.045
S1	6	0.005		0.005		0.005		0	

S2									
a									
M			0.0015		0.0015		0.0015		0.0015
N		10		14		16		28	

GLASS SEALED CERAMIC FLAT PACK (CONFIGURATION A OF MIL-STD-1835)



Dimension Table for Ceramic Flat Pak

All Dimensions in Inches

Symbol	min	max	min	max	min	max	min	max	Note
N	10		14		16		24		4
A	0.045	0.090	0.045	0.085	0.045	0.085	0.045	0.090	
b	0.010	0.022	0.010	0.022	0.015	0.022	0.015	0.022	
C	0.004	0.009	0.004	0.009	0.004	0.009	0.004	0.009	
D	---	0.280	---	0.390	---	0.440	---	0.640	3
E	0.240	0.260	0.235	0.260	0.245	0.285	0.300	0.420	
e	0.05 BSC		0.050 BSC		0.05 BSC		0.05 BSC		
k	0.008	0.015	0.008	0.015	0.008	0.015	0.008	0.015	2
L	0.250	0.370	0.250	0.370	0.250	0.370	0.250	0.370	
Q	0.026	0.045	0.026	0.045	0.026	0.045	0.026	0.045	6
S1	0.005	---	0.005	---	0.005	---	0.005	---	7

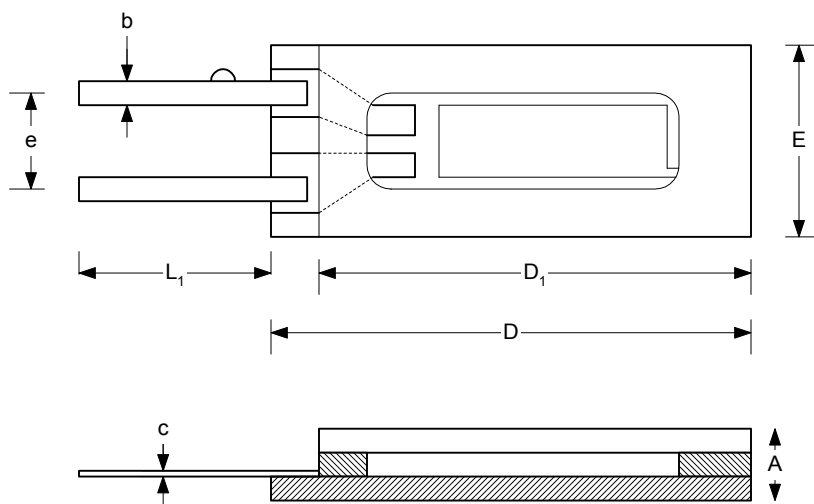
FLAT PACK NOTES:

- ¹ Index area: A notch or a pin one identification mark shall be located adjacent to pin one and shall be located within the shaded area shown. The manufacturer's identification shall not be used as a pin one identification mark. Alternatively, a tab (dimension k) may be used to identify pin one. This tab may be located on either side of terminal one as shown in detail A.
- ² If a pin one identification mark is used in addition to this tab, the minimum limit of dimension k does not apply.
- ³ This dimension allows for off-center lid meniscus, and glass overrun.
- ⁴ Dimensions b1 and c1 apply to lead base metal only. Dimension M applies to lead plating and finish thickness. The maximum limits of lead dimensions b and c or M shall be measured at the centroid of the finished lead surfaces, when solder dip or tin plate lead finish is applied.
- ⁵ N is the maximum number of terminal positions.
- ⁶ Measure dimension S1 at all four corners, see 5.2.5 of MIL-STD-1835. There is an alternative minimum limit to dimension S1, see 5.2.2 of MIL-STD-1835.
- ⁷ For bottom-brazed lead packages, no organic or polymeric materials shall be molded to the bottom of the package to cover the leads.
- ⁸ Optional, see note 1. If a pin one identification mark is used in addition to this tab, the minimum limit of dimension k does not apply.
- ⁹ Applies to leads exiting the end of the body (short side) and closest to the corners.
- ¹⁰ Lead configuration is optional within dimension E except dimensions b and c apply (see 5.2.1 of MIL-STD-1835)
- ¹¹ Dimension Q shall be measured at the point of exit (beyond meniscus) of the lead from the body. Dimension Q minimum shall be reduced by 0.0015 inch (0.038mm) maximum when solder dip lead finish is applied.
- ¹² See tables VI and VII of MIL-STD-1835 for descriptive type designators.

2 LEAD CERAMIC FLAT PACK

F-2A

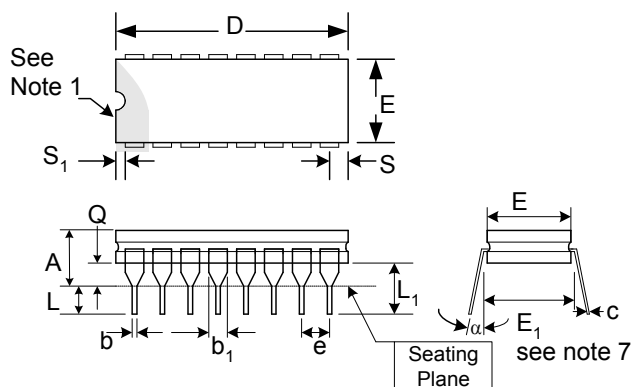
2 LEAD FLAT PAK



All Dimensions in Inches.

Symbol	Min	Max	Note
A	.044	.066	
b	.015	.019	
c	.0045	.0065	
D		.250	3
D ₁		.220	
E	.081	.093	3
e	.045	.055	
L ₁	.750		

CERDIP PACKAGE



# leads		8		14		16		18		20		24	
PMI ltr		Z		Y		Q		X		R		V	
ADI ltr		Q- 8		Q-14		Q-16		Q-18		Q-20		Q-24	
	Note:	min	max	min	max	min	max	min	max	min	max	min	max
Symbol	A		0.200		0.200		0.200		0.200		0.200		0.225
	B		0.014	0.023	0.014	0.023	0.014	0.023	0.014	0.023	0.014	0.023	0.023
	b ₁	2	0.030	0.070	0.030	0.070	0.030	0.070	0.030	0.070	0.030	0.070	0.070
	C		0.008	0.015	0.008	0.015	0.008	0.015	0.008	0.015	0.008	0.015	0.015
	D	4		0.405		0.785		0.840		0.960		1.060	1.290
	E	4	0.220	0.310	0.220	0.310	0.220	0.310	0.220	0.310	0.220	0.310	0.500
	E ₁	7	0.290	0.320	0.290	0.320	0.290	0.320	0.290	0.320	0.290	0.320	0.590
	E	5	0.100 BSC		0.100 BSC		0.100 BSC		0.100 BSC		0.100 BSC		0.100 BSC
	L		0.125	0.200	0.125	0.200	0.125	0.200	0.125	0.200	0.125	0.200	0.120
	L ₁		0.150		0.150		0.150		0.150		0.150		0.150
	Q	3	0.015	0.060	0.015	0.060	0.015	0.060	0.015	0.060	0.015	0.060	0.075
	S	6		0.055		0.098		0.080		0.098		0.080	0.098
	S ₁	6	0.005		0.005		0.005		0.005		0.005		0.005
	α		0°	15°	0°	15°	0°	15°	0°	15°	0°	15°	15°
Millimeter													
Symbol	A			5.08		5.08		5.08		5.08		5.08	5.72
	B		0.36	0.58	0.36	0.58	0.36	0.58	0.36	0.58	0.36	0.58	0.58
	b ₁	2	0.76	1.78	0.76	1.78	0.76	1.78	0.76	1.78	0.76	1.78	1.78
	C		0.20	0.38	0.20	0.38	0.20	0.38	0.20	0.38	0.20	0.38	0.38
	D	4		10.29		19.94		21.34		24.38		26.92	32.77
	E	4	5.59	7.87	5.59	7.87	5.59	7.87	5.59	7.87	5.59	7.87	12.70
	E ₁	7	7.37	8.13	7.37	8.13	7.37	8.13	7.37	8.13	7.37	8.13	14.99
	E	5	2.54 BSC		2.54 BSC		2.54 BSC		2.54 BSC		2.54 BSC		2.54 BSC
	L		3.18	5.08	3.18	5.08	3.18	5.08	3.18	5.08	3.18	5.08	3.05
	L ₁		3.81		3.81		3.81		3.81		3.81		3.81
	Q	3	0.38	1.52	0.38	1.52	0.38	1.52	0.38	1.52	0.38	1.52	1.91
	S	6	0.00	1.40	0.00	2.49	0.00	2.03	0.00	2.49	0.00	2.03	2.49
	S ₁	6	0.13		0.13		0.13		0.13		0.13		0.13

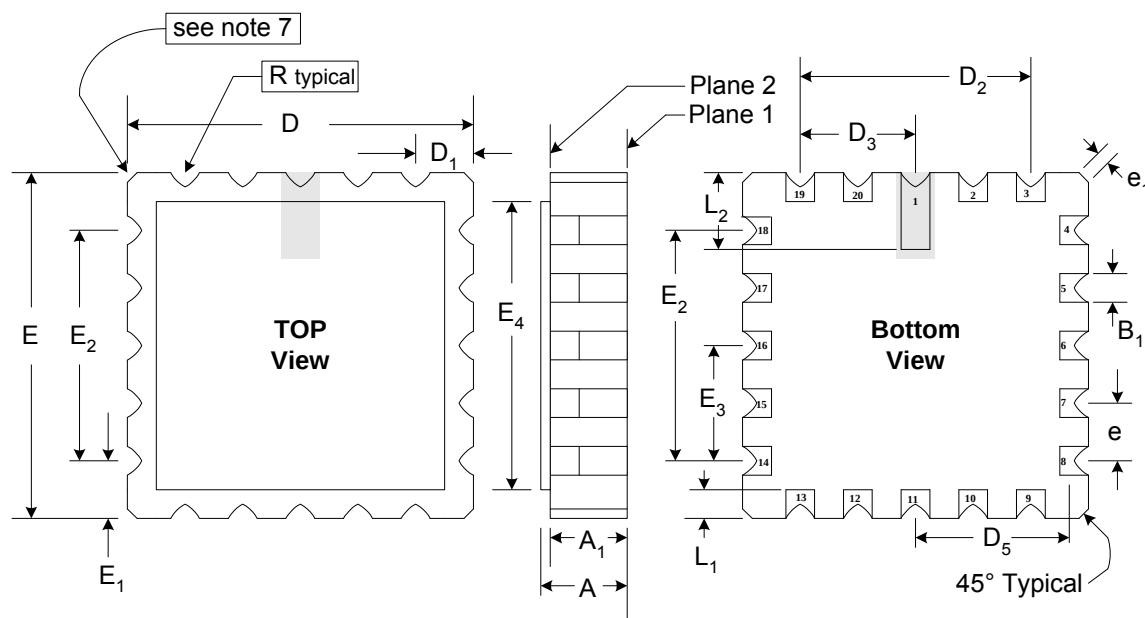
CERDIP (CONT)

# leads		24		28	
PMI ltr		W		T	
ADI ltr		Q-24A		Q-28	
	Note:	min	max	min	max
Symbol	A		0.200		0.225
	b	0.014	0.023	0.014	0.023
	b ₁	2	0.030	0.070	0.070
	c		0.008	0.015	0.008
	D	4		1.280	1.490
	E	4	0.220	0.310	0.500
	E ₁	7	0.290	0.320	0.590
	e	5	0.100 BSC		0.100 BSC
	L		0.125	0.200	0.120
	L ₁		0.150		0.150
	Q	3	0.015	0.060	0.015
	S	6		0.098	0.098
	S ₁	6	0.005		0.005
	α		0°	15°	0°
Millimeter					
Symbol	A		5.08		5.72
	b		0.36	0.58	0.36
	b ₁	2	0.76	1.78	0.76
	c		0.20	0.38	0.20
	D	4		32.51	37.85
	E	4	5.59	7.87	12.70
	E ₁	7	7.37	8.13	14.99
	e	5	2.54 BSC		2.54 BSC
	L		3.18	5.08	3.05
	L ₁		3.81		3.81
	Q	3	0.38	1.52	0.38
	S	6	0.00	2.49	0.00
	S ₁	6	0.13		0.13

NOTES:

- ¹ Index area; a notch or a lead one identification mark is located adjacent to lead one and is within the shaded area shown.
- ² The minimum limit for dimension b₁ may be 0.023 (0.58 mm) for all four corner leads only.
- ³ Dimension Q shall be measured from the seating plane to the base plane.
- ⁴ This dimension allows for off-center lid, meniscus and glass overrun.
- ⁵ The basic lead spacing is 0.100 (2.54 mm) between centerlines.
- ⁶ Applies to all four corners.
- ⁷ Lead center when α is 0°. E₁ shall be measured at the centerline of the leads.

LEADLESS CHIP CARRIER



Symbol	20 Terminal LCC				28 Terminal LCC			
	Inch		Millimeter		Inch		Millimeter	
	Min	Max	Min	Max	Min	Max	Min	Max
A	0.064	0.1	1.63	2.54	0.064	0.1	1.626	2.540
A ₁	0.054	0.088	1.37	2.24	0.054	0.088	1.372	2.235
B ₁	0.022	0.028	0.56	0.71	0.022	0.028	0.559	0.711
D	0.342	0.358	8.69	9.09	0.442	0.458	11.227	11.633
D ₁	0.075 REF		1.91 REF		0.075 REF		1.91 REF	
D ₂	0.200 REF		5.08 REF		0.300 REF		7.62 REF	
D ₃	0.100 REF		2.54 REF		0.150 REF		3.81 REF	
D ₄		0.358		9.09		0.458		11.633
D ₅	0.150 BSC		3.81 BSC		0.200 BSC		5.080 BSC	
E	0.342	0.358	8.69	9.09	0.442	0.458	11.227	11.633
E ₁	0.075 REF		1.91 REF		0.075 REF		1.91 REF	
E ₂	0.200 REF		5.08 REF		0.300 REF		7.62 REF	
E ₃	0.100 REF		2.54 REF		0.150 REF		3.81 REF	
E ₄		0.358	0.00	9.09		0.458	0.000	11.633
e	0.050 BSC		1.27 BSC		0.050 BSC		1.27 BSC	
e ₁	0.015		0.38		0.015		0.381	
L ₁	0.045	0.055	1.14	1.40	0.045	0.055	1.143	1.397
L ₂	0.077	0.093	1.96	2.36	0.077	0.093	1.956	2.362
R	0.007	0.011	0.18	0.28	0.007	0.011	0.178	0.279

NOTES (LCC)

¹ A minimum clearance of 0.015" (0.381 mm) is maintained between corner terminals.

² Electrical connection is required on plane 1. Metallization is optional on plane 2. However, if plane 2 is metallized it must be electrically connected.

³ A minimum clearance of 0.20" (0.508 mm) is maintained between overall dimensions $D_4 \times E_4$ and all other features, including metallization, chamfers and edges.

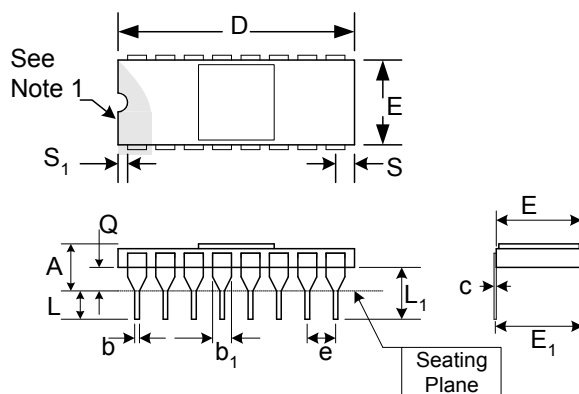
⁴ Non-electrical features for No. 1 terminal identification, optical orientation of handling purposes shall be within the shaded area shown on plane 2.

⁵ Dimension A controls the overall package thickness.

⁶ Length of pad metallization may increase only toward package periphery.

⁷ When space is available, the index corner may be metallized on either or both planes 1 and 2. The package edge at the index corner shall not be metallized.

SIDEBRAZED PACKAGE



# leads			8		14		16		18		20		24	
PMI ltr			ZB		YB		QB		XB		RB		VB	
ADI ltr			D- 8		D-14		D-16		D-18		D-20		D-24	
		Note:	min	max	min	max	min	max	min	Max	min	max	min	max
Symbol	A			0.200		0.200		0.200		0.200		0.200		0.225
	b		0.014	0.023	0.014	0.023	0.014	0.023	0.014	0.023	0.014	0.023	0.014	0.023
	b ₁	2	0.030	0.070	0.030	0.070	0.030	0.070	0.030	0.070	0.030	0.070	0.030	0.070
	c		0.008	0.015	0.008	0.015	0.008	0.015	0.008	0.015	0.008	0.015	0.008	0.015
	D	4		0.405		0.785		0.840		0.960		1.060		1.290
	E	4	0.220	0.310	0.220	0.310	0.220	0.310	0.220	0.310	0.220	0.310	0.500	0.610
	E ₁	7	0.290	0.320	0.290	0.320	0.290	0.320	0.290	0.320	0.290	0.320	0.590	0.620
	e	5	0.100 BSC				0.100 BSC		0.100 BSC		0.100 BSC		0.100 BSC	
	L		0.125	0.200	0.125	0.200	0.125	0.200	0.125	0.200	0.125	0.200	0.120	0.200
	L ₁		0.150		0.150		0.150		0.150		0.150		0.150	
	Q	3	0.015	0.060	0.015	0.060	0.015	0.060	0.015	0.060	0.015	0.060	0.015	0.075
	S	6		0.055		0.098		0.080		0.098		0.080		0.098
	S ₁	6	0.005		0.005		0.005		0.005		0.005		0.005	
	α		0°	15°	0°	15°	0°	15°	0°	15°	0°	15°	0°	15°
Millimeter														
Symbol	A			5.08		5.08		5.08		5.08		5.08		5.72
	b		0.36	0.58	0.36	0.58	0.36	0.58	0.36	0.58	0.36	0.58	0.36	0.58
	b ₁	2	0.76	1.78	0.76	1.78	0.76	1.78	0.76	1.78	0.76	1.78	0.76	1.78
	c		0.20	0.38	0.20	0.38	0.20	0.38	0.20	0.38	0.20	0.38	0.20	0.38
	D	4		10.29		19.94		21.34		24.38		26.92		32.77
	E	4	5.59	7.87	5.59	7.87	5.59	7.87	5.59	7.87	5.59	7.87	12.70	15.49
	E ₁	7	7.37	8.13	7.37	8.13	7.37	8.13	7.37	8.13	7.37	8.13	14.99	15.75
	e	5	2.54 BSC		2.54 BSC		2.54 BSC		2.54 BSC		2.54 BSC		2.54 BSC	
	L		3.18	5.08	3.18	5.08	3.18	5.08	3.18	5.08	3.18	5.08	3.05	5.08
	L ₁		3.81	0.00	3.81	0.00	3.81	0.00	3.81	0.00	3.81	0.00	3.81	0.00
	Q	3	0.38	1.52	0.38	1.52	0.38	1.52	0.38	1.52	0.38	1.52	0.38	1.91
	S	6		1.40		2.49		2.03		2.49		2.03		2.49
	S ₁	6	0.13		0.13		0.13		0.13		0.13		0.13	

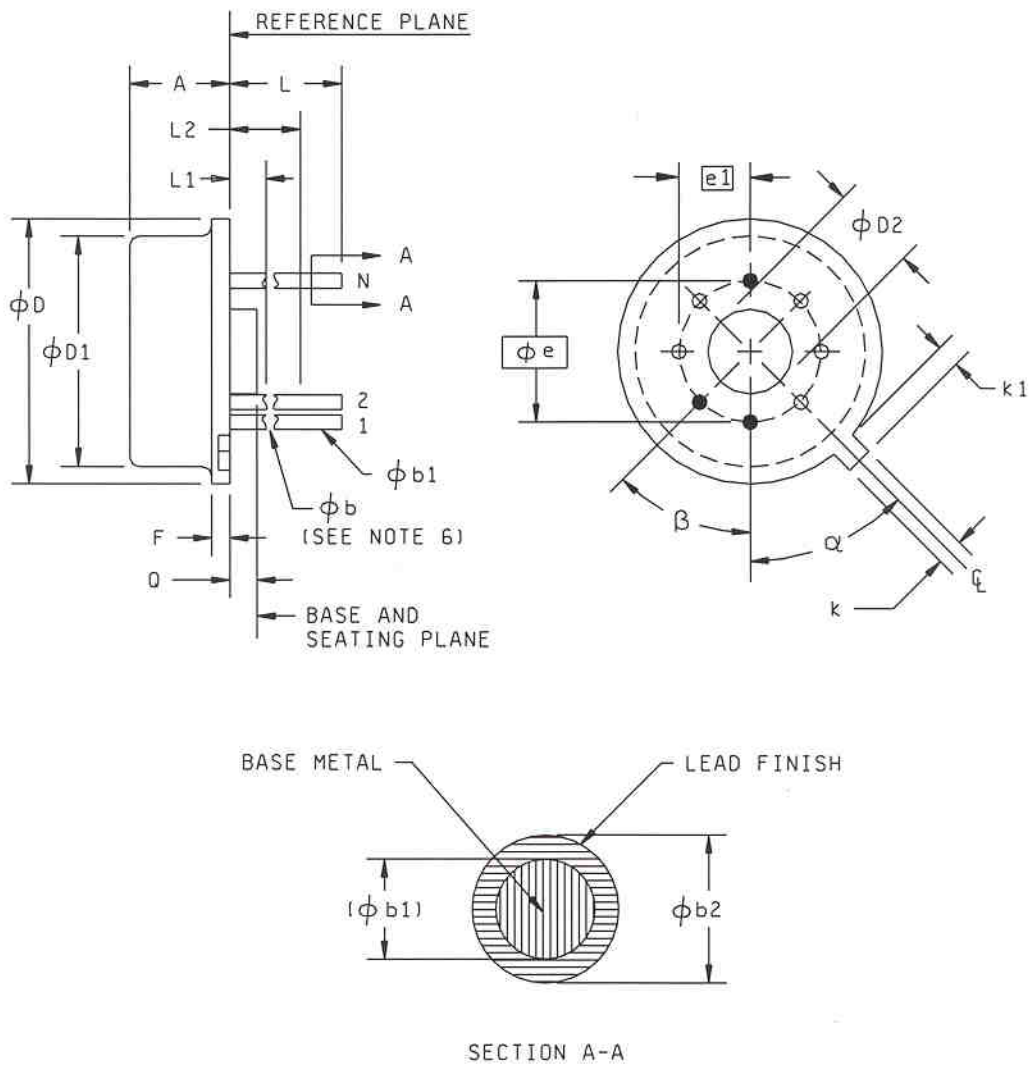
SIDEBRAZED (CONT)

# leads			24		28		40		48	
PMI ltr			WB		TB					
ADI ltr			D-24A		D-28		D-40		D-48	
	Note:		min	max	min	max	min	max	min	max
Symbol	A			0.200		0.225		0.225		0.225
	b		0.014	0.023	0.014	0.023	0.014	0.026	0.014	0.026
	b ₁	2	0.030	0.070	0.030	0.070	0.045	0.065	0.045	0.065
	c		0.008	0.015	0.008	0.015	0.008	0.015	0.008	0.015
	D	4		1.280		1.490		2.096	2.376	2.424
	E	4	0.220	0.310	0.500	0.610	0.500	0.610	0.500	0.610
	E ₁	7	0.290	0.320	0.590	0.620	0.590	0.630	0.520	0.630
	e	5	0.100 BSC		0.100 BSC		0.100 BSC		0.100 BSC	
	L		0.125	0.200	0.120	0.200	0.125	0.200	0.125	0.200
	L ₁		0.150		0.150		0.140		0.140	
	Q	3	0.015	0.060	0.015	0.075	0.015	0.070	0.015	0.070
	S	6		0.098		0.098		0.098		0.098
	S ₁	6	0.005		0.005		0.005		0.005	
	α		0°	15°	0°	15°	0°	15°	0°	15°
Millimeter										
Symbol	A			5.08		5.72		5.72		5.72
	b		0.36	0.58	0.36	0.58	0.36	0.66	0.36	0.66
	b ₁	2	0.76	1.78	0.76	1.78	1.14	1.65	1.14	1.65
	c		0.20	0.38	0.20	0.38	0.20	0.38	0.20	0.38
	D	4		32.51		37.85		53.24		61.57
	E	4	5.59	7.87	12.70	15.49	12.70	15.49	12.70	15.49
	E ₁	7	7.37	8.13	14.99	15.75	14.99	16.00	13.21	16.00
	e	5	2.54 BSC		2.54 BSC		2.54 BSC		2.54 BSC	
	L		3.18	5.08	3.05	5.08	3.18	5.08	3.18	5.08
	L ₁		3.81	0.00	3.81	0.00	3.56	0.00	3.56	0.00
	Q	3	0.38	1.52	0.38	1.91	0.38	1.78	0.38	1.78
	S	6		2.49		2.49		2.49		2.49
	S ₁	6	0.13		0.13		0.13		0.13	

NOTES:

- ¹Index area; a notch or a lead one identification mark is located adjacent to lead one and is within the shaded area shown.
- ²The minimum limit for dimension b₁ may be 0.023 (0.58 mm) for all four corner leads only.
- ³Dimension Q shall be measured from the seating plane to the base plane.
- ⁴This dimension allows for off-center lid, meniscus and glass overrun.
- ⁵The basic lead spacing is 0.100 (2.54 mm) between centerlines.
- ⁶Applies to all four corners.
- ⁷Lead center when α is 0°. E₁ shall be measured at the centerline of the leads.

TO CAN



TO CAN (CONT)

1	Dimensions in Inches 2											
	A1			A2			A3			A4		
Symbol	Min	Max	Note	Min	Max	Note	Min	Max	Note	Min	Max	Note
A	0.165	0.185		0.165	0.185		0.165	0.185		0.240	0.260	
Φb	0.016	0.019	1	0.016	0.019	1	0.016	0.019	1	0.016	0.019	1
Φb1	0.016	0.021	1	0.016	0.021	1	0.016	0.021	1	0.016	0.021	1
Φb2	0.016	0.024		0.016	0.024		0.016	0.024		0.016	0.024	
ΦD	0.335	0.375		0.335	0.375		0.335	0.375		0.350	0.370	
ΦD1	0.305	0.335		0.305	0.335		0.305	0.335		0.315	0.335	
ΦD2	0.110	0.160		0.110	0.160		0.110	0.160				
e	0.200 BSC			0.230 BSC			0.230 BSC			0.200 BSC		
e1	0.100 BSC			0.115 BSC			0.115 BSC			0.100 BSC		
F	---	0.040		---	0.040		---	0.040		0.009	0.125	
k	0.027	0.034		0.027	0.034		0.027	0.034				
k1	0.027	0.045	3	0.027	0.045	3	0.027	0.045	3	0.029	0.040	3
L	0.500	0.750	1	0.500	0.750	1	0.500	0.750	1	0.500	0.750	1
L1	---	0.050	1	---	0.050	1	---	0.050	1	---	0.050	1
L2	0.250	---	1	0.250	---	1	0.250	---	1	0.250	---	1
Q	0.010	0.045		0.010	0.045		0.010	0.045				2
α	45°BSC			36°BSC			30°BSC			45°BSC		
β	45°BSC			36°BSC			30°BSC			90°BSC		
N	8			10			12			3		

¹ (All leads) Φb applies between L1 and L2. Φb1 applies between L2 and 0.500 from the reference plane. Diameter is uncontrolled in L1 and beyond 0.500 from the reference plane.

² The package feature described by dimension symbols ΦD2 and Q does not exist for variation A4; therefore the reference base, and seating planes are the same for this variation.

³ Measured from the maximum diameter of the product.

⁴ α is the basic spacing from the centerline of the tab t terminal 1 and is the basic spacing of each lead or lead position (N-1 places) from a, looking at the bottom of the package.

⁵ N is the maximum number of terminal positions.

⁶ Leads having a maximum diameter 0.019 inches measured in gauging plane 0.054 +0.001 –0.000 inches below the base plane of the product shall be within 0.007 of their true position relative to a maximum width tab.

⁷ This style package may be measured by direct methods or by gauge.

⁸ See table VI for descriptive type designators.