NOTICE OF
CHANGE

INCH-POUND

MIL-STD-1835B
NOTICE 3
12 April 1999

DEPARTMENT OF DEFENSE

INTERFACE STANDARD FOR
MICROCIRCUIT CASE OUTLINES

TO ALL HOLDERS OF MIL-STD-1835B:

1. THE FOLLOWING PAGES OF MIL-STD-1835B HAVE BEEN REVISED AND SUPERSEDE THE PAGES
LISTED:

NEW PAGE	DATE	SUPERSEDED PAGE	DATE
11	3 September 1996	11	REPRINTED WITHOUT CHANGE
12	12 April 1999	12	3 September 1996
13	12 April 1999	13	3 September 1996
14	12 April 1999	14	3 September 1996
23	3 September 1996	23	REPRINTED WITHOUT CHANGE
24	12 April 1999	24	3 September 1996
25	12 April 1999	25	3 September 1996
26	12 April 1999	26	3 September 1996
27	12 April 1999	27	3 September 1996
28	3 September 1996	28	REPRINTED WITHOUT CHANGE
41	12 April 1999	41	3 September 1996
42	12 April 1999	42	3 September 1996

2. THE FOLLOWING ARE PEN AND INK CHANGES WITHIN THE STANDARD:

   a. Page 2. Paragraph 2.2. Delete "Electronic Industries Association" in 2 locations and replace with "Electronic
   Industries Alliance".

   b. Page 5. Paragraph 4.7.1c. Delete "numbers 4, 5, 6, 7, 8, and 9" and replace with "numbers 4, 5, 6, 7, and
   8".

   c. Page 19. Footnote 3. Delete "Electronic Industries Association" and replace with "Electronic Industries
   Alliance".

   d. Page 19. Footnote 4. Delete "numbers 4, 5, 6, 7, 8, and 9" and replace with "numbers 4, 5, 6, 7, and 8".

3. RETAIN THIS NOTICE AND INSERT BEFORE TABLE OF CONTENTS.

4. Holders of MIL-STD-1835B will verify that page changes and additions indicated above have been entered. This
notice will be retained as a check sheet. This issuance, together with appended pages, is a separate publication.
Each notice is to be retained by stocking points until the standard is completely revised or canceled.

AMSC N/A   1 of 2   FSC 5962

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CONCLUDING MATERIAL

Custodians: Preparing activity:
    Army - CR   DLA - CC
    Navy - EC
    Air Force - 11
    NASA - NA
    DLA - CC

Review activities: (Project 5962-1826)
    Army - AR, MI, SM
    Navy - AS, CG, MC, OS, SH
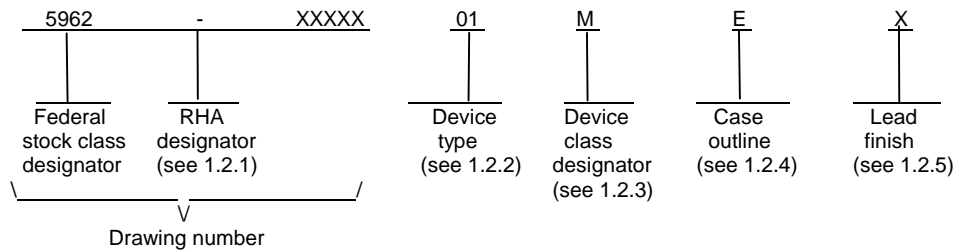   Air Force - 19, 99

Civil Agency Coordinating Activities:
    DOT-FAA(RD-650)

1. SCOPE

1.1 Scope. This drawing documents two product assurance class levels consisting of high reliability (device classes Q and M) and space application (device class V). A choice of case outlines and lead finishes are available and are reflected in the Part or Identifying Number (PIN). When available, a choice of Radiation Hardness Assurance (RHA) levels are reflected in the PIN.

1.2 PIN. The PIN is as shown in the following example:

```
   5962          -        XXXXX        01         M           E           X

 Federal        RHA                  Device     Device      Case        Lead
 stock class    designator           type       class       outline     finish
 designator     (see 1.2.1)          (see 1.2.2) designator  (see 1.2.4) (see 1.2.5)
 _____/               (see 1.2.3)
              V
        Drawing number
```

1.2.1 RHA designator. Device classes Q and V RHA marked devices meet the MIL-PRF-38535 specified RHA levels and are marked with the appropriate RHA designator. Device class M RHA marked devices meet the MIL-PRF-38535, appendix A specified RHA levels and are marked with the appropriate RHA designator. A dash (-) indicates a non-RHA device.

1.2.2 Device type(s). The device type(s) identify the circuit function as follows:

Device type	Generic number	Circuit function
01	XXXXX	XXXXXXXXXXXXXXXX

1.2.3 Device class designator. The device class designator is a single letter identifying the product assurance level as follows:

Device class	Device requirements documentation
M	Vendor self-certification to the requirements for MIL-STD-883 compliant, non-JAN class level B microcircuits in accordance with MIL-PRF-38535, appendix A
Q or V	Certification and qualification to MIL-PRF-38535

1.2.4 Case outline(s). The case outline(s) are as designated in MIL-STD-1835 and as follows:

Outline letter	Descriptive designator	Terminals	Package style
E	GDIP1-T16 or CDIP2-T16	16	Dual-in-Line
F	GDFP2-F16 or CDFP3-F16	16	Flat Package
X	CMGA2-P100G	100	Pin grid array
Y	CDIP2-T16	16	Dual-in-line
2	CQCC1-N20	20	Leadless chip carrier

1.2.5 Lead finish. The lead finish is as specified in MIL-PRF-38535 for device classes Q and V or MIL-PRF-38535, appendix A for device class M.

FIGURE 2. Example of a (scope) page from a military detail specification showing the identification/specification of case outlines (packages).

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TABLE VI. <u>Package case outline list</u>.

Descriptive package type designator	Case outline letter, Figure no., Configuration letter	1/ Dimensions reference letter	2/ θ_{JC} (°C/W)	Terminal count and row-to-row spacing (inch)	Terminal pitch (inch)	3/ EIA similar package designation
				Flat pack style 4/		
GDFP1-F10	H, 11, A	F-4	22	10	.050	MO-092 AA
CDFP2-F10	H, 11, B	F-4	"	10	"	none
CDFP3-F10	11, B	F-4A	"	10	"	MO-098 AA
GDFP1-F14	D, 11, A	F-2	"	14	"	MO-092 AB
CDFP2-F14	D, 11, B	F-2	"	14	"	none
CDFP3-F14	11, B	F-2A	"	14	"	MO-098 AB
GDFP1-F16	11, A	F-13	"	16	"	MO-070 AA
GDFP2-F16	F, 11, A	F-5	"	16	"	MO-092 AC
CDFP3-F16	F, 11, B	F-5	"	16	"	none
CDFP4-F16	11, B	F-5A	"	16	"	MO-098 AC
GDFP1-F18	11, A	F-14	"	18	"	MO-070 AB
GDFP2-F18	11, A	F-10	"	18	"	MO-092 AD
GDFP1-F20	11, A	F-15	"	20	"	MO-070 AC
GDFP2-F20	S, 11, A	F-9	"	20	"	none
CDFP3-F20	S, 11, B	F-9	"	20	"	"
CDFP4-F20	11, B	F-9A	"	20	"	"
GDFP1-F24	11, A	F-16	"	24	"	MO-070 AD
GDFP2-F24	K, 11, A	F-6	"	24	"	"
CDFP3-F24	K, 11, B	F-6	"	24	"	none
CDFP4-F24	11, B	F-6A	"	24	"	"
GDFP1-F28	11, A	F-17	"	28	"	MO-070 AE
GDFP2-F28	11, A	F-11	"	28	"	"
CDFP3-F28	11, B	F-11A	"	28	"	none
CDFP4-F28	11, B	F-12	"	28	"	"
CDFP1-F32	11, B	F-18	"	32	"	MO-115 AA
GDFP1-F48	11, A	F-19	"	48	.025	MO-146 AA
GDFP1-F56	11, A	F-20	"	56	"	MO-146 AB

See footnotes at end of table VII.

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TABLE VI. Package case outline list – Continued

Descriptive package type designator	Case outline letter, Figure no., Configuration letter	Dimensions reference letter 1/	θ_{JC} (°C/W) 2/	Terminal count and row-to-row spacing (inch)	Terminal pitch (inch)	EIA similar package designation 3/	
Dual-in-line package style 4/							
GDIP1-T8	P, 12, A	D-4	28	8, .300	.100	MS-030 AA	∗
CDIP2-T8	P, 12, C	D-4	"	8, "	"	MS-015 AA	
GDIP1-T14	C, 12, A	D-1	"	14, "	"	MS-030 AB	∗
CDIP2-T14	C, 12, C	D-1	"	14, "	"	MS-015 AB	
GDIP1-T16	E, 12, A	D-2	"	16, "	"	MS-030 AC	∗
CDIP2-T16	E, 12, C	D-2	"	16, "	"	MS-015 AC	
GDIP1-T18	V, 12, A	D-6	"	18, "	"	MS-030 AD	∗
CDIP2-T18	V, 12, C	D-6	"	18, "	"	MS-015 AD	
GDIP1-T20	R, 12, A	D-8	"	20, "	"	MS-030 AE	∗
CDIP2-T20	R, 12, C	D-8	"	20, "	"	MS-015 AE	
GDIP1-T22	W, 12, A	D-7	"	22, .400	"	MS-031 AA	∗
CDIP2-T22	W, 12, C	D-7	"	22, "	"	MS-015 BB	
GDIP1-T24	J, 12, A	D-3	"	24, .600	"	MS-032 AA, MO-103 AA	∗
CDIP2-T24	J, 12, C	D-3	"	24, "	"	MS-015 CA	
GDIP3-T24	L, 12, A	D-9	"	24, .300	"	MS-030 AF	∗
CDIP4-T24	L, 12, C	D-9	"	24, "	"	MS-015 AG	
GDIP5-T24	12, A	D-11	"	24, .400	"	none	
CDIP6-T24	12, C	D-11	"	24, "	"	MS-015 BC	
GDIP1-T28	12, A	D-10	"	28, .600	"	MS-032 AB, MO-103 AB	∗
CDIP2-T28	12, C	D-10	"	28, "	"	MS-015 CB	
CDIP3-T28	12, C	D-15	"	28, .300	"	MS-015 AH	
GDIP4-T28	12, A	D-15	"	28, "	"	MS-030 AG,	∗
GDIP1-T32	12, A	D-16	"	32, .600	"	MS-032 AC, MO-103 AD	∗
CDIP2-T32	12, C	D-16	"	32, "	"	MS-015 CC	
GDIP1-T40	Q, 12, A	D-5	"	40, "	"	MS-032 AD, MO-103 AC	∗
CDIP2-T40	Q, 12, C	D-5	"	40, "	"	MS-015 CE	
GDIP1-T48	12, A	D-14	"	48, "	"	none	
CDIP2-T48	12, C	D-14	"	48, "	"	MS-015 CF	
GDIP1-T50	12, A	D-12	"	50, .900	"	none	
CDIP2-T50	12, C	D-12	"	50, "	"	MS-015 DA	
CDIP1-T64	12, C	D-13	"	64, "	"	MS-015 DB	

See footnotes at end of table VII.

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TABLE VI. Package case outline list - Continued.

Descriptive package type designator	Case outline letter, Figure no., Configuration letter	1/ Dimensions reference letter	2/ θ_{JC} (°C/W)	Terminal count and row-to-row spacing (inch)	Terminal pitch (inch)	3/ EIA similar package designation
Can style 4/						
MACY1-X8	G, 13	A1	70	8	α, β 45°	MO-002 AL
MACY1-X10	I, 13	A2	65	10	α, β 36°	MO-006 AF
MACY1-X12	13	A3	65	12	α, β 30°	MO-006 AG
MACY1-X3	13	A4		3	α45°, β90°	TO-5, TO-39
Square leadless chip carrier style 4/						
CQCC1-N16	15	C-1	20	16	.050	MS-004 CA
CQCC2-N16	"	C-1A	"	16	"	" "
CQCC1-N20	2, "	C-2	"	20	"	MS-004 CB
CQCC2-N20	"	C-2A	"	20	"	" "
CQCC1-N24	"	C-3	"	24	"	MS-004 CH
CQCC2-N24	"	C-3A	"	24	"	" "
CQCC1-N28	3, "	C-4	"	28	"	MS-004 CC
CQCC2-N28	"	C-4A	"	28	"	" "
CQCC1-N44	"	C-5	"	44	"	MS-004 CD
CQCC1-N52	"	C-6	"	52	"	MS-004 CE
CQCC1-N68	"	C-7	"	68	"	MS-004 CF
CQCC1-N84	"	C-8	"	84	"	MS-004 CG
Rectangular leadless chip carrier style 4/						
CQCC1-N18	15	C-9	20	18	.050	MO-042 AA
CQCC2-N18	"	C-9A	"	18	"	" "
CQCC3-N18	"	C-10	"	18	"	MO-041 AC
CQCC4-N18	"	C-10A	"	18	"	" "
CQCC3-N20	"	C-13	"	20	"	MO-041 AD
CQCC4-N20	"	C-13A	"	20	"	" "
CQCC3-N28	"	C-11	"	28	"	M0-041 AA
CQCC4-N28	"	C-11A	"	28	"	" "
CQCC1-N32	"	C-12	"	32	"	MO-041 AB
CQCC2-N32	"	C-12A	"	32	"	" "
CDCC1-N4	"	C-14	"	4	"	MO-041 BA
CDCC1-N6	"	C-15	"	6	"	MO-041 BB

See footnotes at end of table VII.

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5.2.7 Coplanarity deviation. The coplanarity deviation of all terminal contact points, as defined by the device seating plane, shall be determined for surface mounted devices. Measurements shall be made from the device seating plane (see figure 9). Regardless of package size, any device with one or more terminals that exceed the specified coplanarity deviations shall constitute a failure.
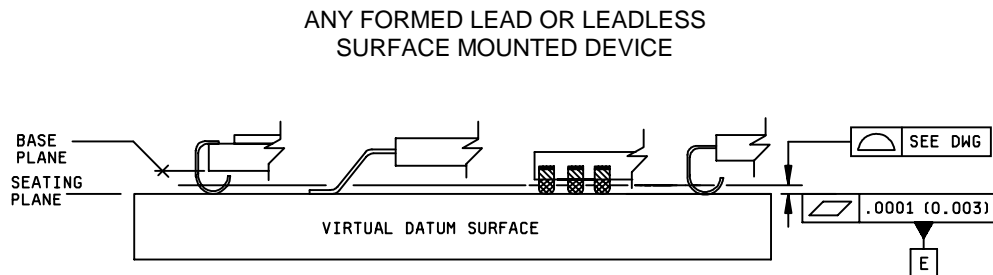
ANY FORMED LEAD OR LEADLESS
SURFACE MOUNTED DEVICE

FIGURE 9. Coplanarity deviation.

5.2.8 Package cavity orientation. Unless otherwise specified herein, for most packages, cavity orientation (see figure 10) is standard in the "cavity-up" position. When a particular package style includes optional cavity orientation, such as cavity-down, the cavity-down option shall be specified by adding a suffix D to the terminal- count part of the descriptive type designator (see figure 1).
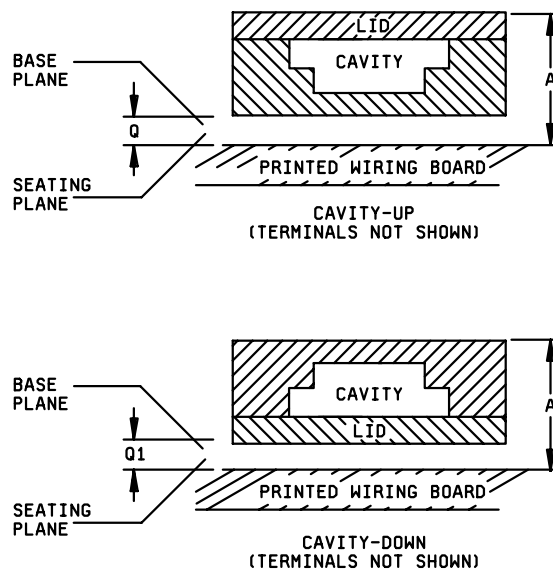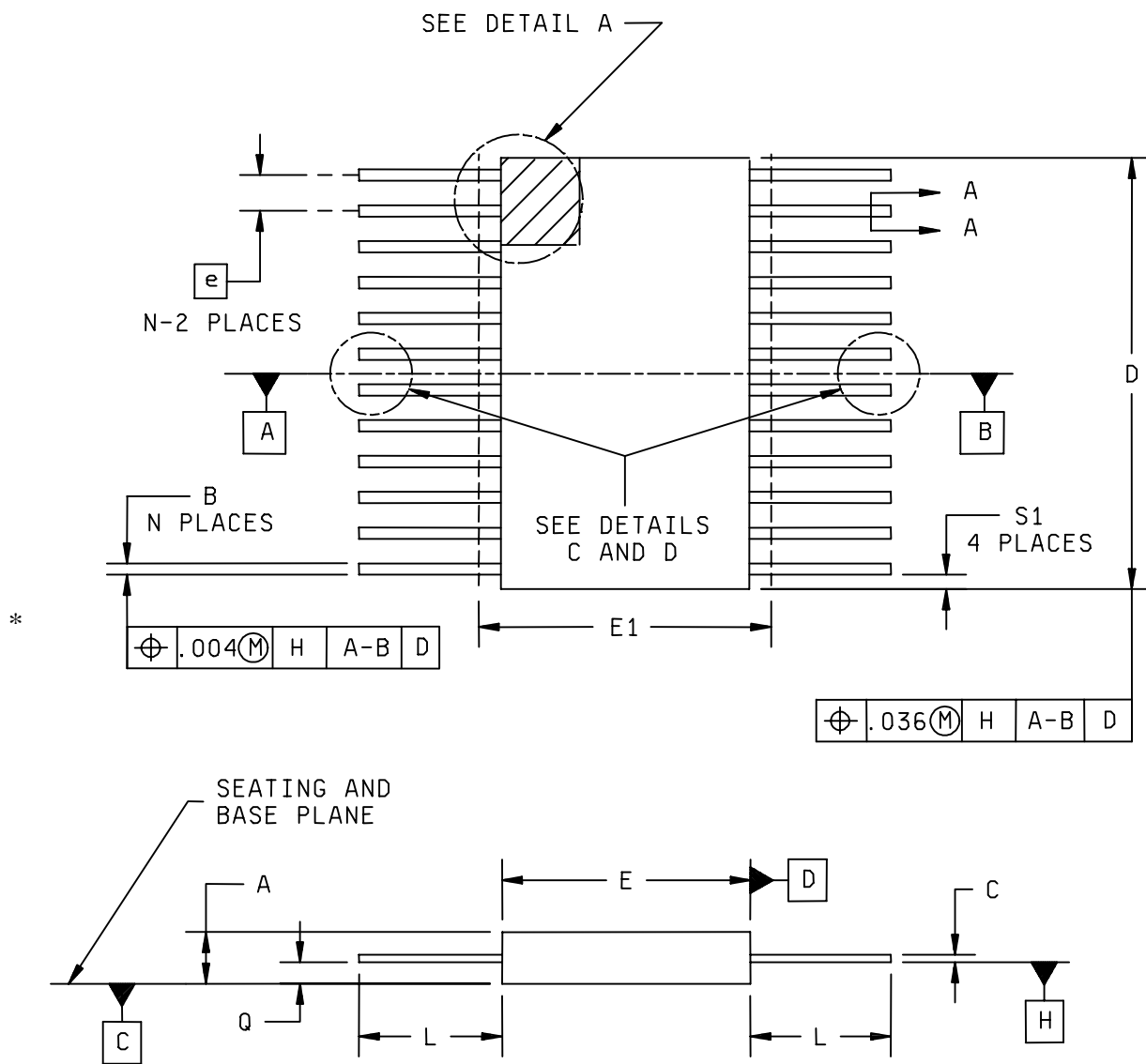
FIGURE 10. Package cavity orientation.

5.2.9 Package drawings. Detailed package drawings and dimensional requirements shall be as specified on figures 11 through 23.
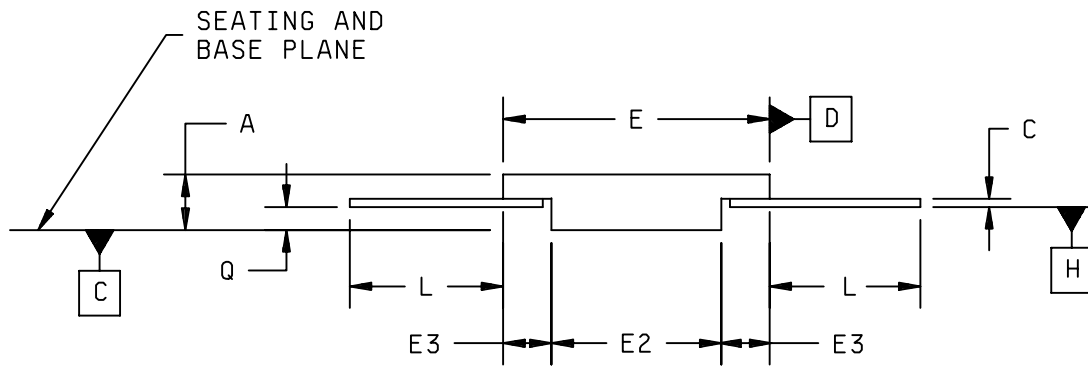
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23

SEE DETAIL A

N-2 PLACES

A

B

N PLACES

SEE DETAILS
C AND D

S1
4 PLACES

E1

D

*

⊕ .004 Ⓜ H A-B D

⊕ .036 Ⓜ H A-B D

SEATING AND
BASE PLANE

A

E D

C

Q

C

L

L

H

Configuration A
Ceramic, glass sealed

FIGURE 11. Flat pack style.

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24

SEE DETAIL A

N-2 PLACES

e

A

B
N PLACES

*

⌖ | .010 Ⓜ | H | A-B | D

SEE DETAILS
C AND D

E1

A
A

D

B

S1
4 PLACES

⌖ | .036 Ⓜ | H | A-B | D

SEATING AND
BASE PLANE

A

C

Q

L

E3

E

E2

L

E3

D

C

H
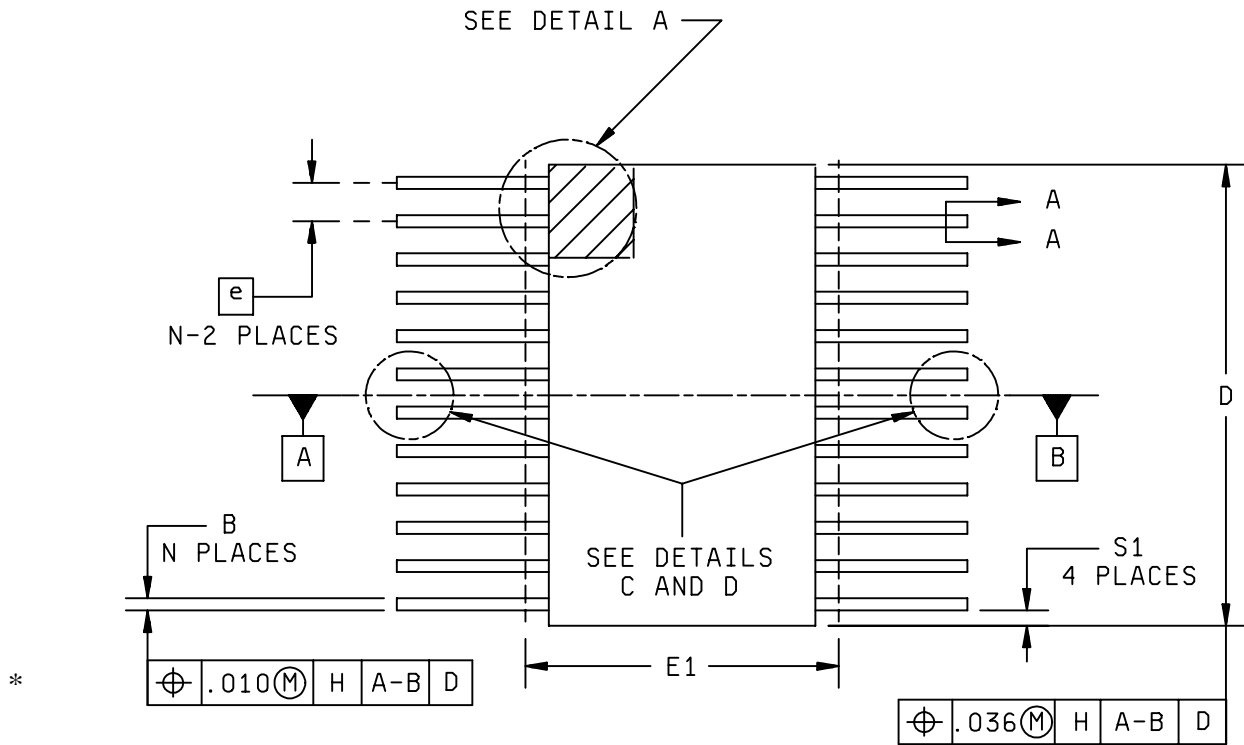
Configuration B
Ceramic, metal-sealed, bottom-brazed leads

FIGURE 11. Flat pack style - Continued.

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25

SEE DETAIL B

N-2 PLACES

e

A

A

A

B

B
N PLACES

SEE DETAILS
C AND D

D1

S1
4 PLACES

* | ⊕ | .004 Ⓜ | H | A-B | D |

E5

| ⊕ | .036 Ⓜ | H | A-B | D |

SEATING AND
BASE PLANE

*

A

E4

D

C

C

Q

L

L

H
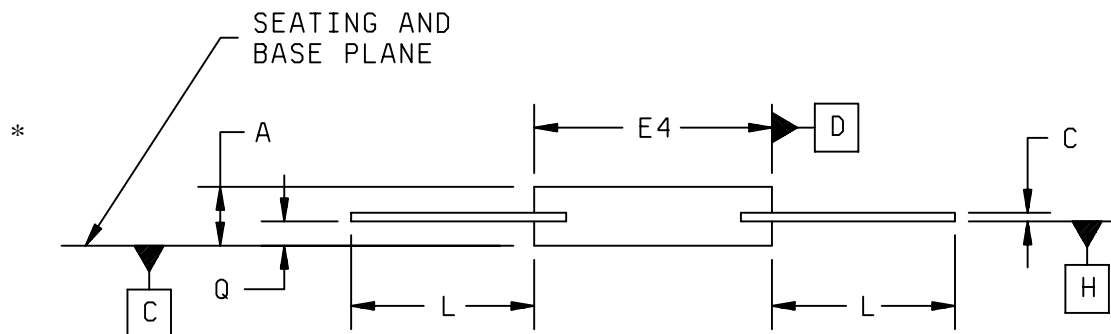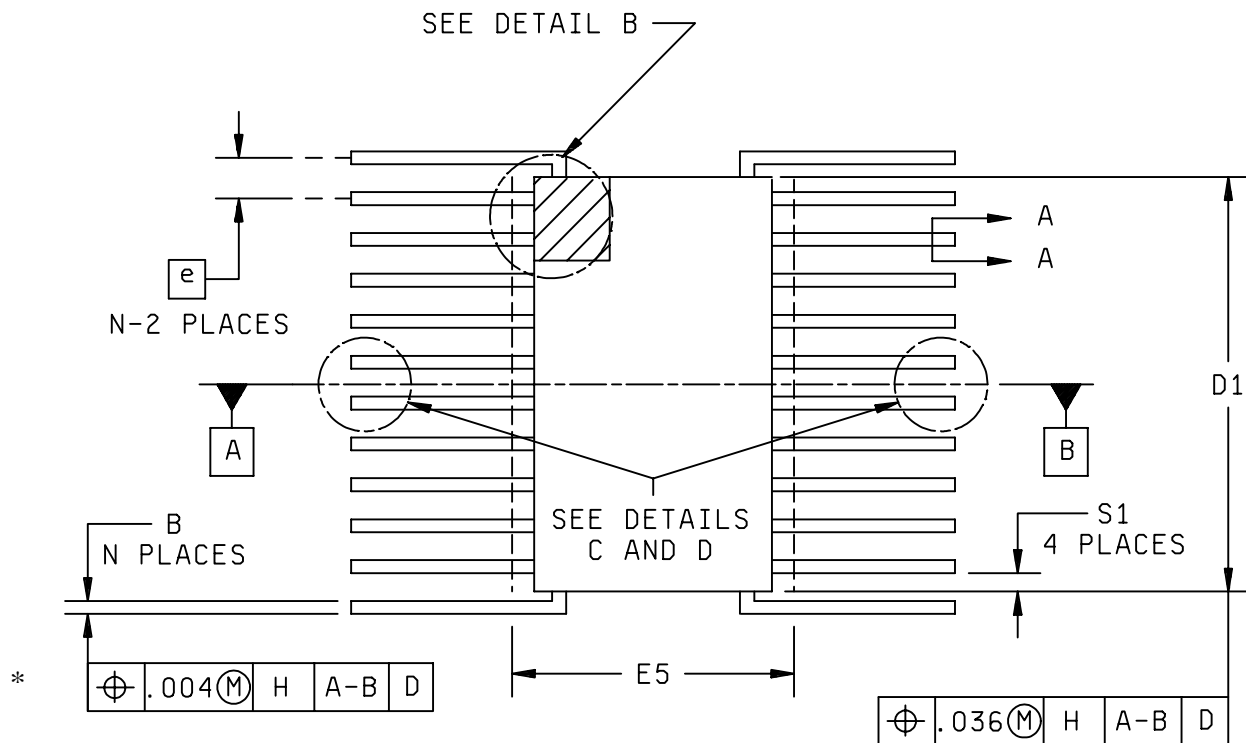
Configuration C
Ceramic, glass sealed, spider leads

FIGURE 11. Flat pack style - Continued.
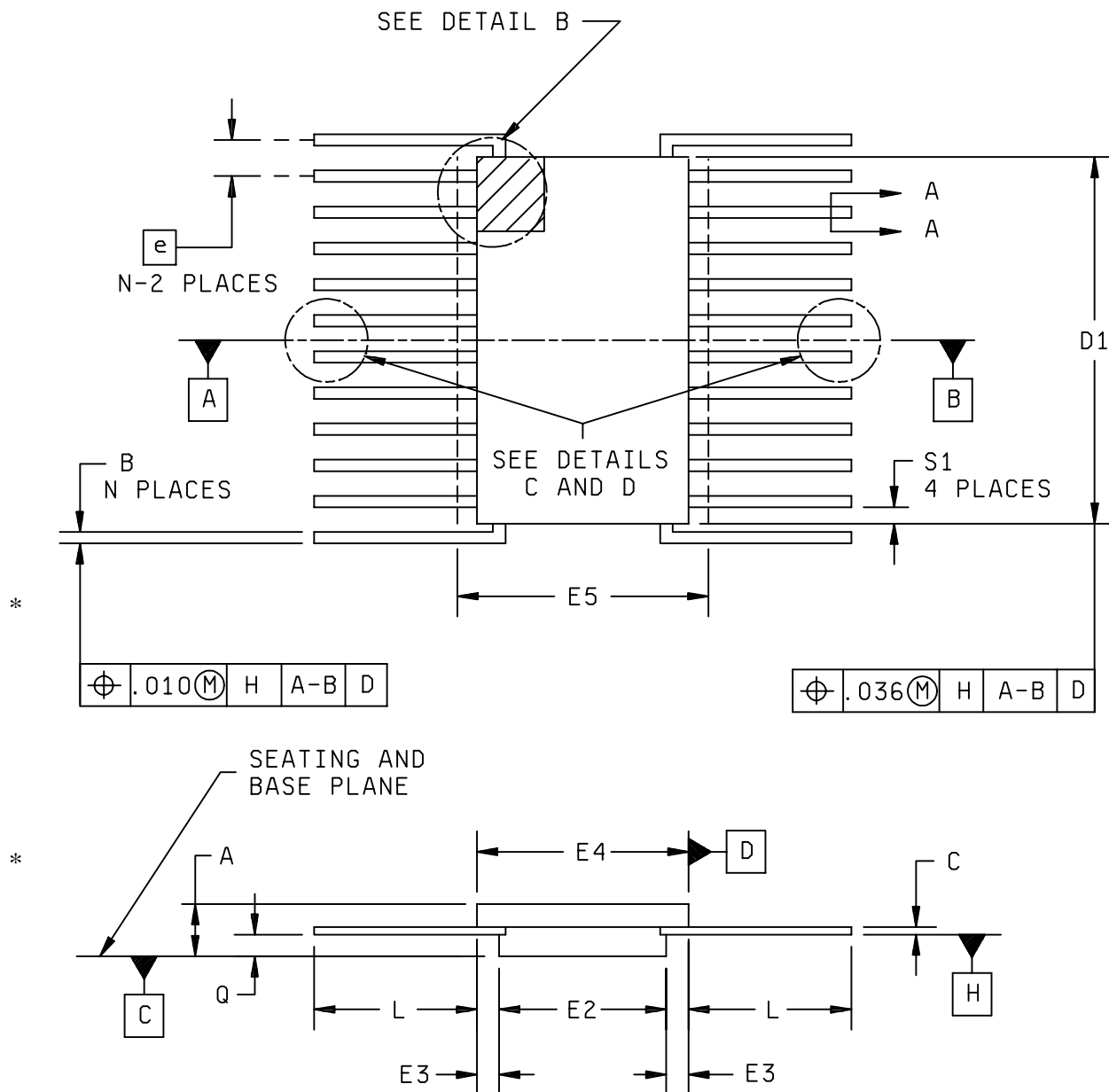
Configuration D
Ceramic, metal-sealed, bottom-brazed spider leads

FIGURE 11. Flat pack style - Continued.

DETAIL A

DETAIL B

BASE METAL
LEAD FINISH

M (4 PLS)

c1

(c)

M

M

b1

M

(b)

SECTION A-A

e/2

X

X = A OR B

X

X = A OR B

EVEN NUMBER OF LEADS PER SIDE
DETAIL C

ODD NUMBER OF LEADS PER SIDE
DETAIL D
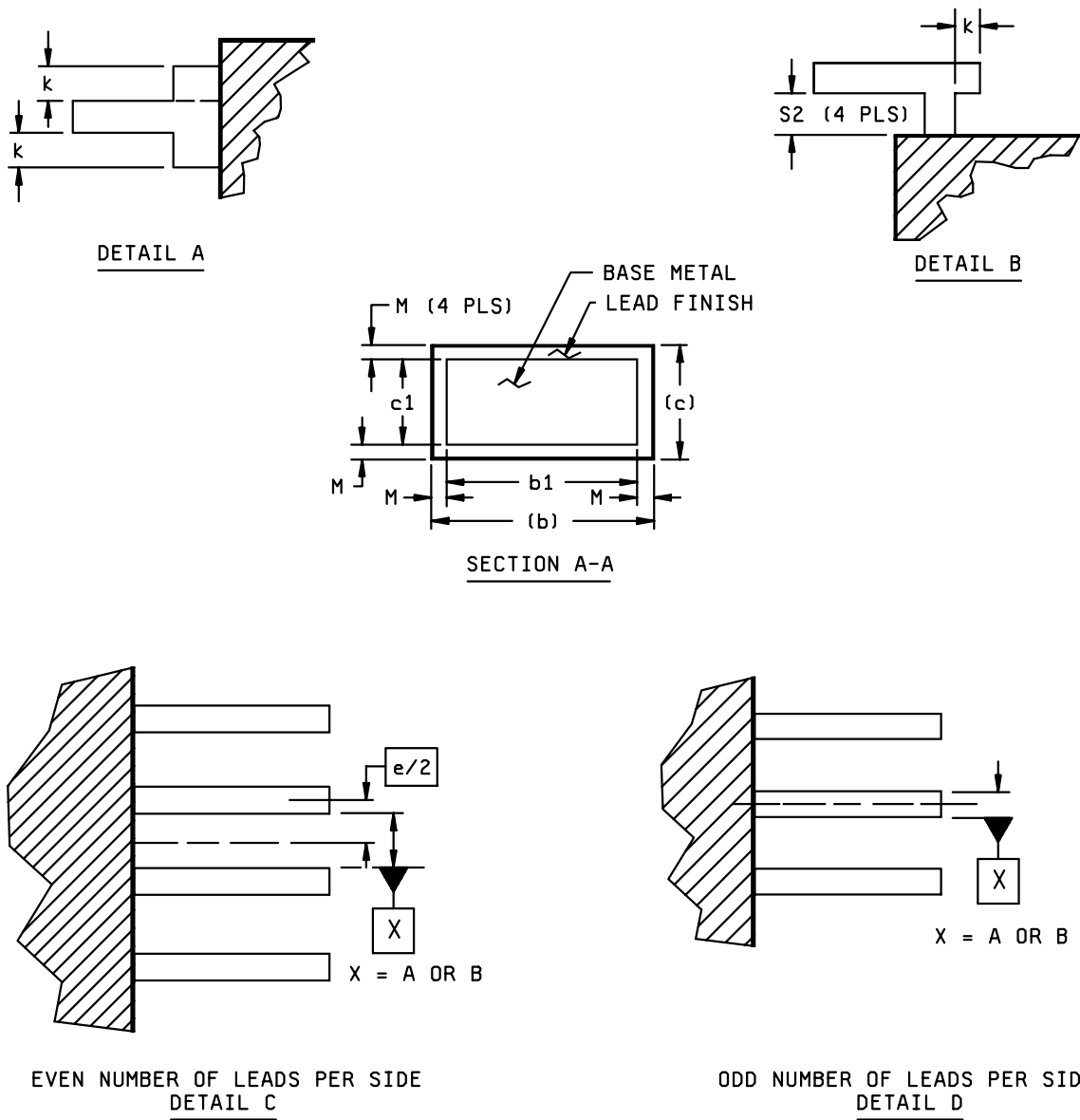
FIGURE 11. Flat pack style - Continued.

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1/	F-19 Config. A				F-20 Config. A			
Symbol	Min	Nom	Max	Note	Min	Nom	Max	Note
A	.075	.098	.120		.075	.098	.120	
b	.008	.010	.014		.008	.010	.014	
b1	.008	.010	.012		.008	.010	.012	
c	.004	.006	.009		.004	.006	.009	
c1	.004	.005	.006		.004	.005	.006	
D	---	---	.640	3	---	---	.740	3
D1								
E	.370	.380	.390		.370	.380	.390	
E1	---	---	.410	3	---	---	.410	3
E2								
E3								
E4								
E5								
e	.025 BSC				.025 BSC			
k	.003	.005	.007	2	.003	.005	.007	2
L	.250	.310	.370		.250	.310	.370	
Q	.026	.035	.045	11	.026	.035	.045	11
S1	.005	---	---	6	.005	---	---	
S2								
α								
M	---	---	.0015		---	---	.0015	
N	48				56			
Note	1, 12, 13							

The title row above the table reads: Variations (all dimensions shown in inches)

(Symbol marked with * in left margin)

1/ Symbols in this column that are not on a configuration drawing are not applicable to that configuration; this is further noted when a line is blank in the MIN MAX columns.

FIGURE 11. Flat pack style – Continued.

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1/	F-19 Config. A				F-20 Config. A			
Symbol	Min	Nom	Max	Note	Min	Nom	Max	Note
A	1.91	2.49	3.01		1.91	2.49	3.01	
b	0.20	0.25	0.36		0.20	0.25	0.36	
b1	0.20	0.25	0.30		0.20	0.25	0.30	
c	0.10	0.15	0.23		0.10	0.15	0.23	
c1	0.10	0.13	0.15		0.10	0.13	0.15	
D	---	---	16.26	3	---	---	18.80	3
D1								
E	9.40	9.65	9.91		9.40	9.65	9.91	
∗ E1	---	---	10.41	3	---	---	10.41	3
E2								
E3								
E4								
E5								
∗ e	0.64 BSC				0.64 BSC			
k	0.08	0.13	0.18	2	0.08	0.13	0.18	2
L	6.35	7.87	9.40		6.35	7.87	9.40	
Q	0.66	0.89	1.14	11	0.66	0.89	1.14	11
S1	0.25	---	---	6	0.25	---	---	6
S2								
α								
M	---	---	0.04		---	---	0.04	
N	48				56			
Note	1, 12, 13							

Variations (all dimensions shown in millimeters)

1/ Symbols in this column that are not on a configuration drawing are not applicable to
   that configuration; this is further noted when a line is blank in the MIN MAX columns.

FIGURE 11. Flat pack style – Continued.

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