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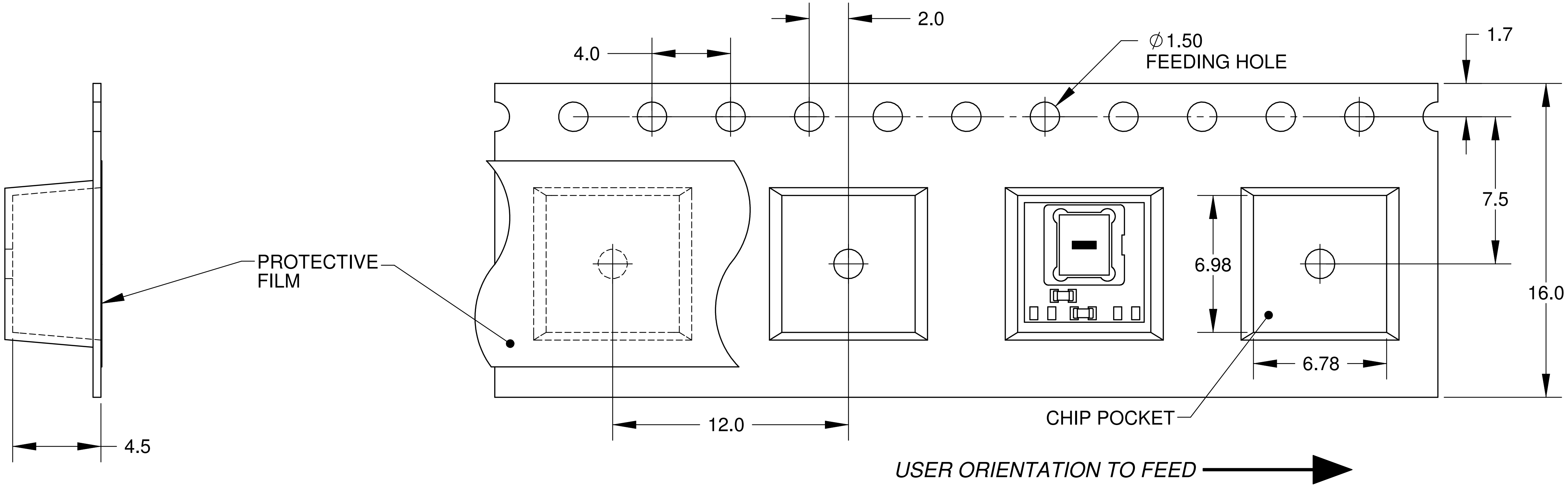
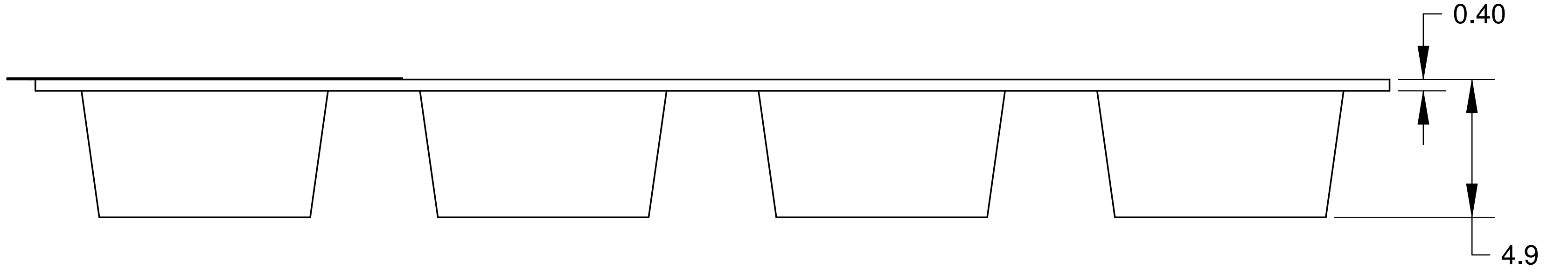
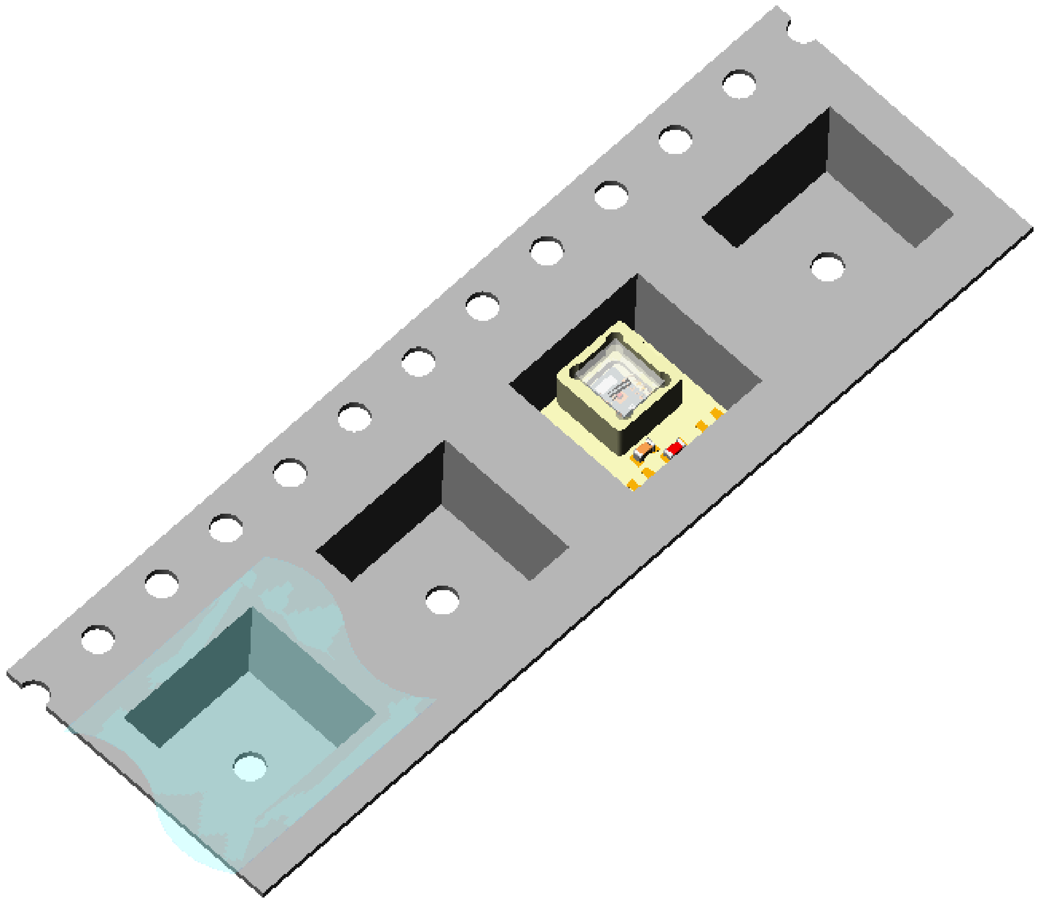
REVISIONS

| LTR | ECO | DESCRIPTION | DATE | APPROVED |
|---|---|---|---|---|
| 1 | ---- | INITIAL | 12/7/11 | SB |
|  |  |  |  |  |
|  |  |  |  |  |



USER ORIENTATION TO FEED →





| UNLESS OTHERWISE SPECIFIED | APPROVALS | DATE |
|---|---|---|
| ALL DIMENSIONS ARE IN MILLIMETERS<br>DIM. APPLY AFTER PROCESSING<br>INTERPRET ALL GEOMETRIC TOLS.<br>PER ANSI Y14.5M-1994 | DRAWN<br>S.BUTURLIA | 12/7/11 |
|  | CHECKED<br>A.GOLDMAN | 12/7/11 |
| TOLERANCES ARE: | ENGRG. |  |
| DECIMALS:<br>.X ± .1<br>.XX ± .01<br>ANGULAR:<br>±30 MIN. | MFG ENG |  |
|  | QA |  |

SUBJECT TO CHANGE WITHOUT NOTIFICATION

MicroE Systems
Division of GSI Group

125 Middlesex Tpk.
Bedford, MA 01730

DESCRIPTION:

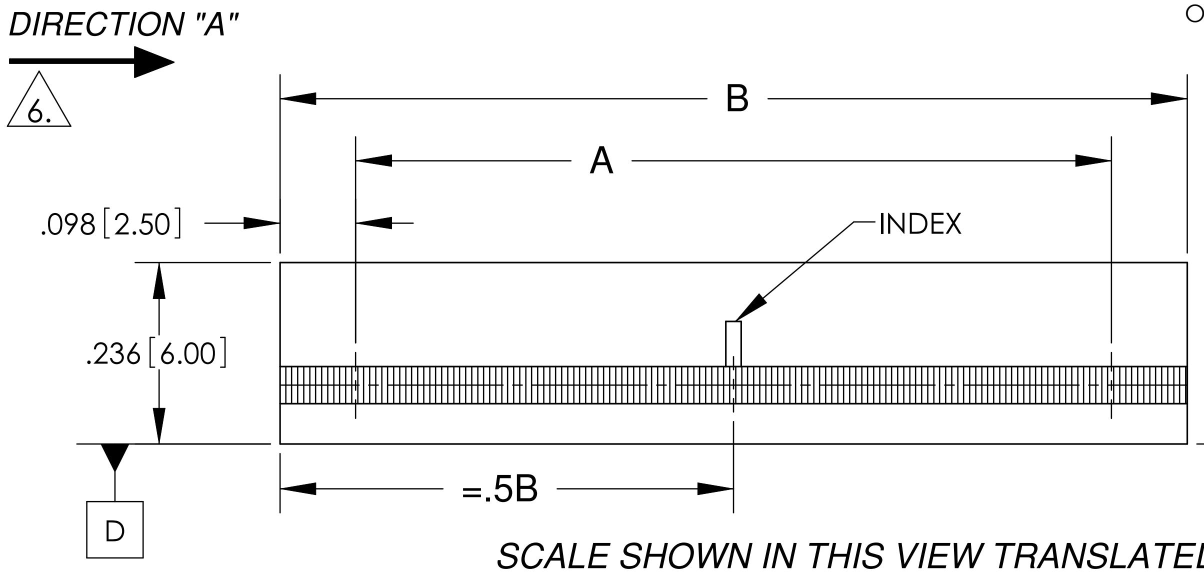
INTERFACE, PACKAGING, CUT TAPE, 6x6 CERAMIC CHIPENCODER

SIZE B
DWG. NO. ID-00390
REV. 1
SCALE:
CAD FILE:
3rd ANGLE PROJECTION
SHEET 1 OF 1

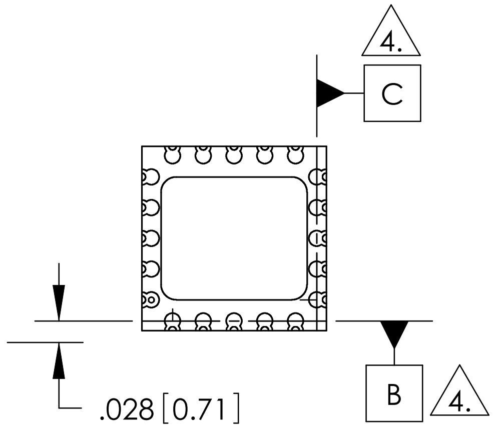
THESE DRAWINGS AND SPECIFICATIONS ARE THE PROPERTY OF MicroE Systems Corp. AND SHALL NOT BE REPRODUCED OR COPIED OR USED AS THE BASIS FOR MANUFACTURE OR SALE OF APPARATUS WITHOUT EXPRESS WRITTEN AUTHORIZATION FROM MicroE Systems Corp.

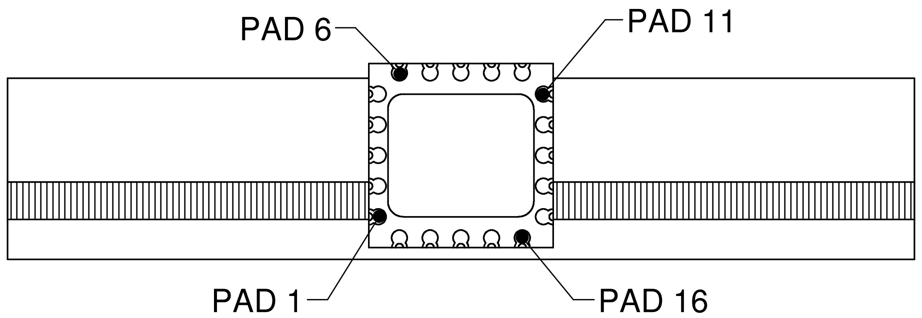
REVISIONS

| LTR | ECO | DESCRIPTION | DATE | APPROVED |
|---|---|---|---|---|
| 1 | ---- | INITIAL | 10/29/08 | VB |
| 2 | 2081 | REMOVED TBD (GRATING TO SEATING PLANE), NOTE 7. SEE ECO | 2/9/09 | VB |
| 3 | 2307 | UPDATE TABLE 1. TO INCLUDE FUNCTION CP+ ON PAD 12, SEE ECO | 1/20/11 | SB |



*SCALE SHOWN IN THIS VIEW TRANSLATED IN X-AXIS OUT OF OPERATING RANGE FOR CLARITY*





*SEE TABLE 1. FOR PAD FUNCTIONS*

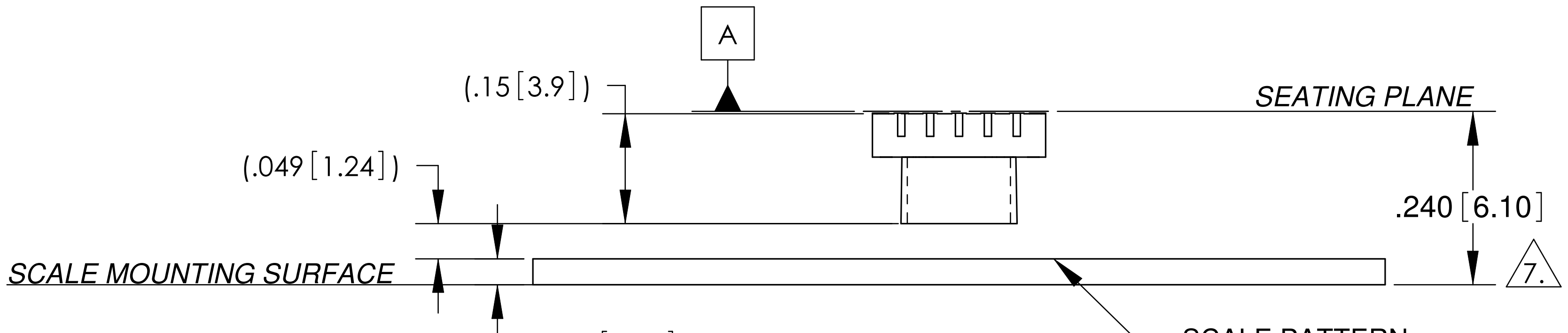
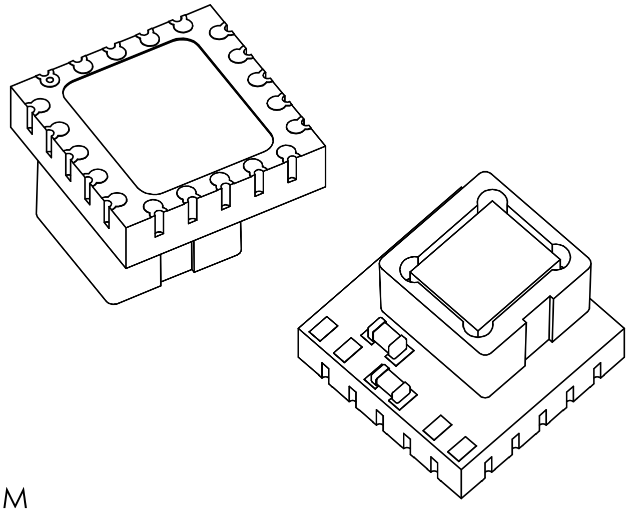
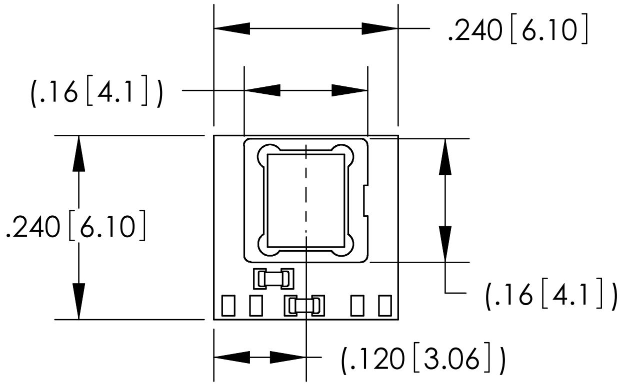


*TABLE 1.*

| PAD # | FUNCTION | PAD # | FUNCTION |
|---|---|---|---|
| 1 | **+5VD** | 11 | Reserved- Do not connect |
| 2 | Reserved- Do not connect | 12 | CP+ |
| 3 | **SIN+** | 13 | Reserved- Do not connect |
| 4 | **AN** | 14 | Reserved- Do not connect |
| 5 | **+5VA** | 15 | **INDEX WINDOW-** |
| 6 | **DC1** | 16 | **INDEX WINDOW+** |
| 7 | Reserved- Do not connect | 17 | **A-** |
| 8 | **DC2** | 18 | **A+** |
| 9 | **GND** | 19 | **B-** |
| 10 | **CA** | 20 | **B+** |





NOTES:

1. IF BENCHING PINS ARE TO BE USED, PINS MUST BE PLACED ALONG DATUM EDGE OF THE SCALE FOR PROPER ALIGNMENT.
2. HEIGHT OF SCALE BENCHING PINS NOT TO EXCEED THE THICKNESS OF THE SCALE.
3. DO NOT CONNECT TO "RESERVED" PADS. SEE TABLE 1. FOR RESERVED PADS.
4. DATUM SURFACES B & C ARE CENTERLINES OF PADS.
5. REFER TO ID-00363 FOR CHIP MOUNTING REQUIREMENTS.
6. WHEN SCALE MOVES IN DIRECTION "A" WITH RESPECT TO A STATIONARY READHEAD, OUTPUT SIGNAL A+ (PAD 18) LEADS OUTPUT SIGNAL B+ (PAD 20).
7. FOR SCALES WITH TAPE (LXXXCE-T) THE SCALE MOUNTING SURFACE MUST BE .006" FURTHER AWAY FROM SEATING PLANE OF ENCODER FOR NOMINAL Z HEIGHT. DIM = .246 [6.25]

***SCALE IDENTIFICATION AND SIZE.***

| Scale Identification | Dim. A Measured Length | Dim. B Scale Length |
|---|---|---|
| | | |
| L**XX**CE | **XX**mm-5mm | **XX**mm |
| L30CE | 30mm-5mm = 25mm | 30mm |
| (max) L130CE | 130mm-5mm = 125mm | 130mm |

*UNITS: IN. [MM]*

UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS ARE IN INCHES [MILLIMETERS]
DIM. APPLY AFTER PROCESSING
INTERPRET ALL GEOMETRIC TOLS.
PER ANSI Y14.5M-1994

TOLERANCES ARE:
DECIMALS:
.XX [.X] ±.01 [.25]
.XXX [.XX] ±.005 [.13]
ANGULAR:
±30 MIN.

| APPROVALS | | DATE |
|---|---|---|
| DRAWN | S.BUTURLIA | 10/20/08 |
| CHECKED | D.GRIMES | 10/27/08 |
| ENGRG. | | |
| MFG ENG | | |
| QA | | |

GSI
MicroE Systems®
TM

*MicroE Systems*
*Division of GSI Group*
125 Middlesex Tpk.
Bedford, MA 01730

DESCRIPTION:
INTERFACE, ENCODER,
40um SHORT LINEAR SCALE,
6 x 6 CERAMIC CHIPENCODER

SIZE B
DWG. NO. ID-00360
REV. 3
SCALE:
CAD FILE:
3rd ANGLE PROJECTION
SHEET 1 OF 1

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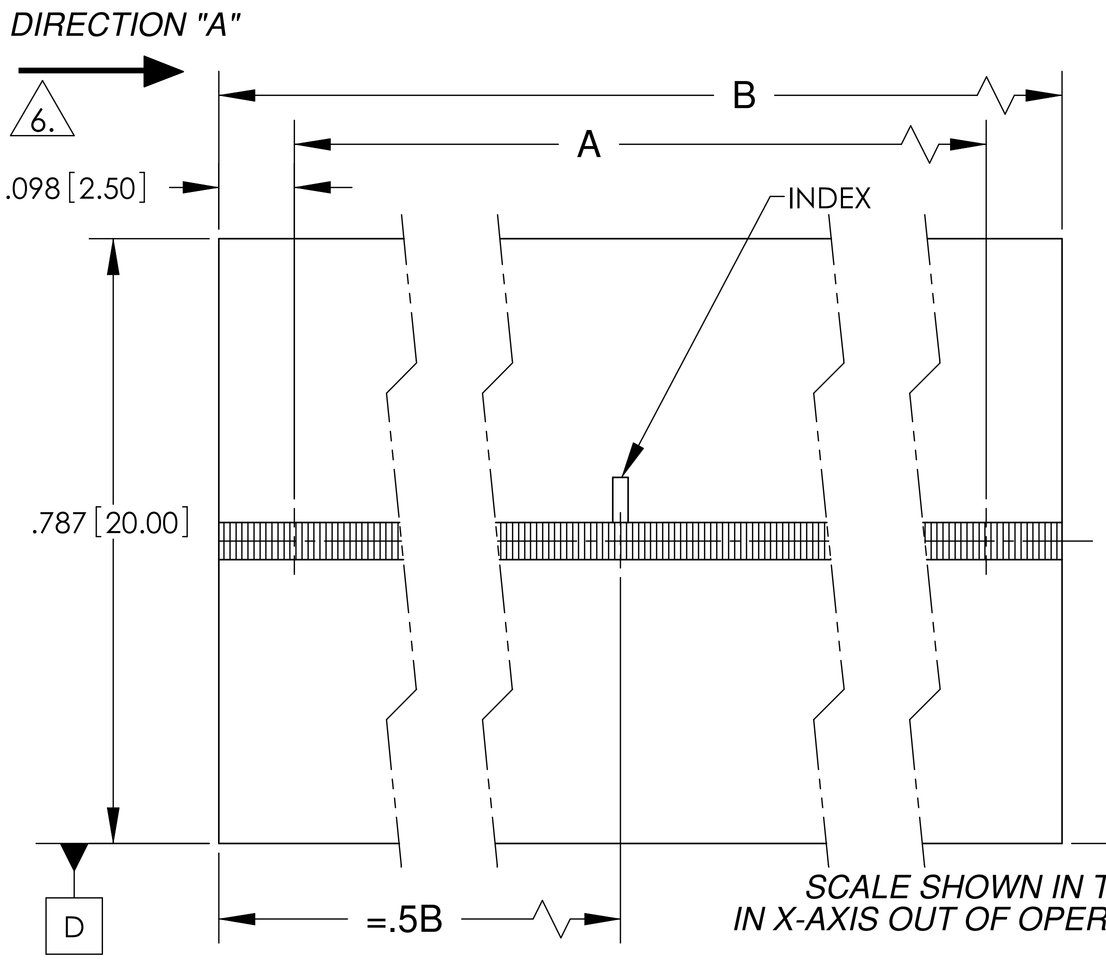
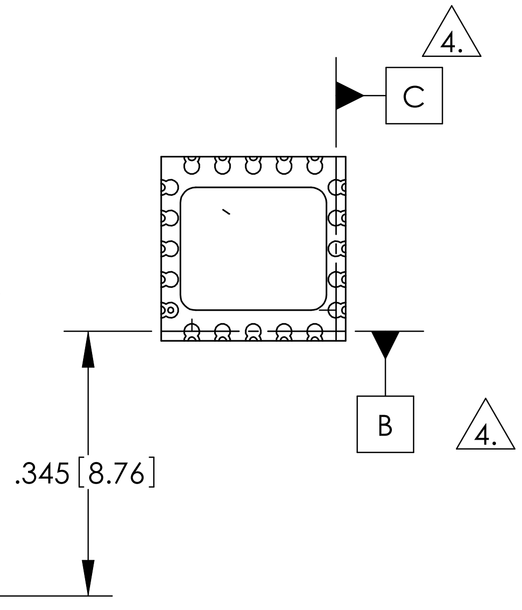
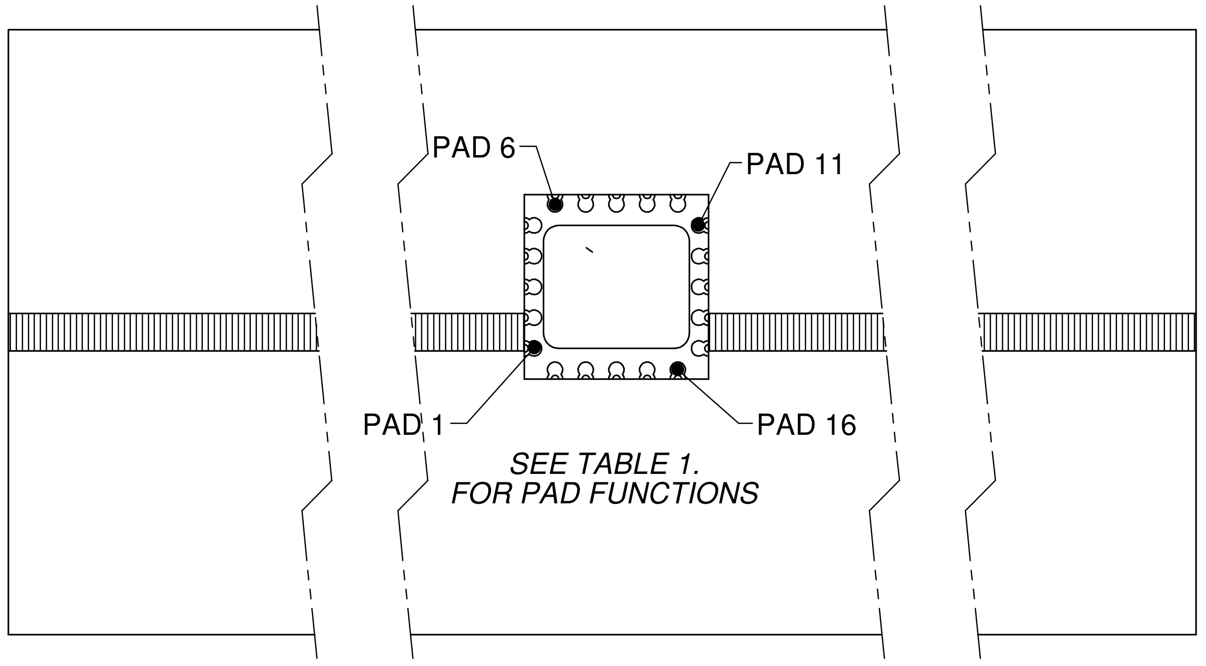
| REVISIONS | | | | |
|---|---|---|---|---|
| LTR | ECO | DESCRIPTION | DATE | APPROVED |
| 1 | ---- | INITIAL | 10/29/08 | VB |
| 2 | 2081 | UPDATED TBDs (GRATING TO SEATING PLANE), NOTE 7. SEE ECO | 2/9/09 | VB |
| 3 | 2307 | UPDATE TABLE 1. TO INCLUDE FUNCTION CP+ ON PAD 12. SEE ECO | 1/20/11 | SB |

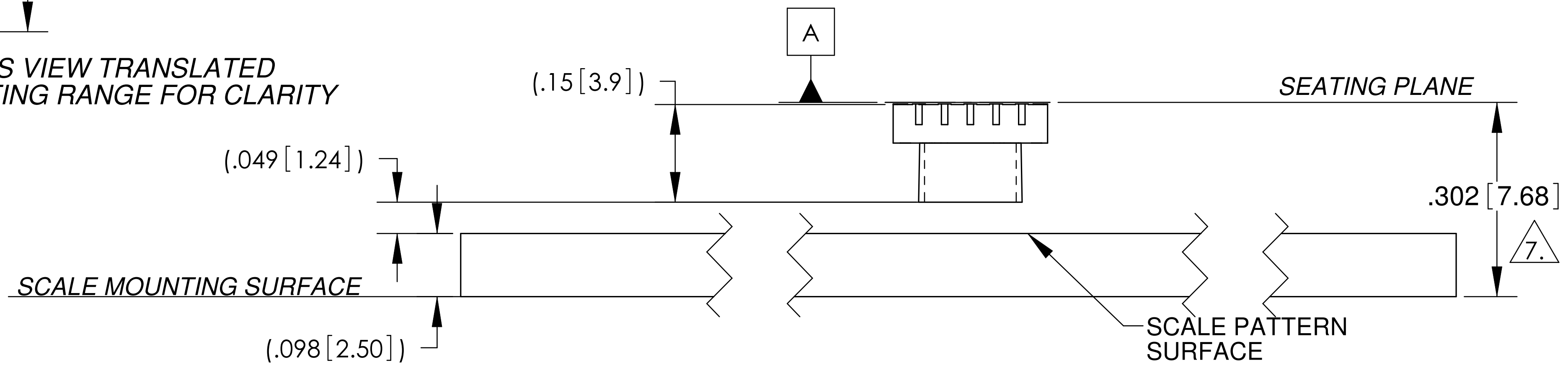


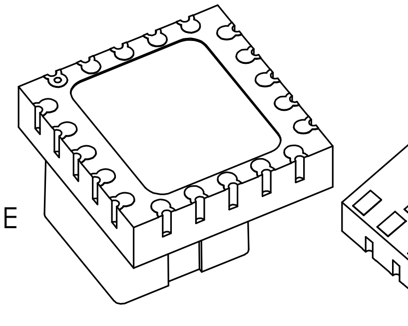
SCALE SHOWN IN THIS VIEW TRANSLATED IN X-AXIS OUT OF OPERATING RANGE FOR CLARITY





SEE TABLE 1. FOR PAD FUNCTIONS





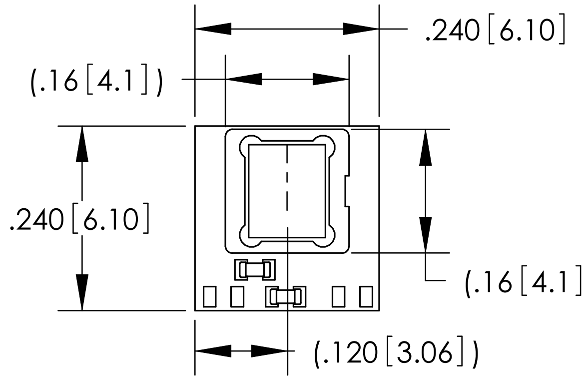


TABLE 1.

| PAD # | FUNCTION | PAD # | FUNCTION |
|---|---|---|---|
| 1 | **+5VD** | 11 | Reserved- Do not connect |
| 2 | Reserved- Do not connect | 12 | CP+ |
| 3 | **SIN+** | 13 | Reserved- Do not connect |
| 4 | **AN** | 14 | Reserved- Do not connect |
| 5 | **+5VA** | 15 | **INDEX WINDOW-** |
| 6 | **DC1** | 16 | **INDEX WINDOW+** |
| 7 | Reserved- Do not connect | 17 | **A-** |
| 8 | **DC2** | 18 | **A+** |
| 9 | **GND** | 19 | **B-** |
| 10 | **CA** | 20 | **B+** |

NOTES:

1. IF BENCHING PINS ARE TO BE USED, PINS MUST BE PLACED ALONG DATUM EDGE OF THE SCALE FOR PROPER ALIGNMENT.
2. HEIGHT OF SCALE BENCHING PINS NOT TO EXCEED THE THICKNESS OF THE SCALE.
3. DO NOT CONNECT TO "RESERVED" PADS. SEE TABLE 1. FOR RESERVED PADS.
4. DATUM SURFACES B & C ARE CENTERLINES OF PADS.
5. REFER TO ID-00363 FOR CHIP MOUNTING REQUIREMENTS.
6. WHEN SCALE MOVES IN DIRECTION "A" WITH RESPECT TO A STATIONARY READHEAD, OUTPUT SIGNAL A+ (PAD 18) LEADS OUTPUT SIGNAL B+ (PAD 20).
7. FOR SCALES WITH TAPE (LXXXCE-T) THE SCALE MOUNTING SURFACE MUST BE .006" FURTHER AWAY FROM SEATING PLANE OF ENCODER FOR NOMINAL Z HEIGHT. DIM = .308 [7.82]

SCALE IDENTIFICATION AND SIZE.

| Scale Identification | Dim. A Measured Length | Dim. B Scale Length |
|---|---|---|
| | | |
| L**XX**CE | **XX**mm-5mm | **XX**mm |
| L335CE | 335mm-5mm = 330mm | 335mm |
| (max) L625CE | 625mm-5mm = 620mm | 625mm |

UNITS: IN. [MM]

UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS ARE IN INCHES [MILLIMETERS]
DIM. APPLY AFTER PROCESSING
INTERPRET ALL GEOMETRIC TOLS.
PER ANSI Y14.5M-1994

TOLERANCES ARE:
DECIMALS:
.XX [.X] ±.01 [.25]
.XXX [.XX] ±.005 [.13]
ANGULAR:
±30 MIN.

| APPROVALS | DATE |
|---|---|
| DRAWN S.BUTURLIA | 10/20/08 |
| CHECKED D.GRIMES | 10/27/08 |
| ENGRG. | |
| MFG ENG | |
| QA | |

MicroE Systems
Division of GSI Group
125 Middlesex Tpk.
Bedford, MA 01730

DESCRIPTION:
INTERFACE, ENCODER,
40um LONG LINEAR SCALE,
6 x 6 CERAMIC CHIPENCODER

SIZE B
DWG. NO. ID-00361
REV. 3
SCALE:
CAD FILE:
3rd ANGLE PROJECTION
SHEET 1 OF 1

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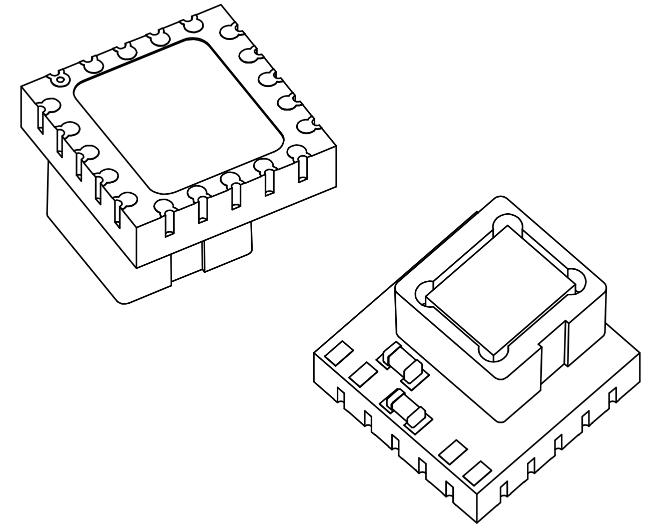
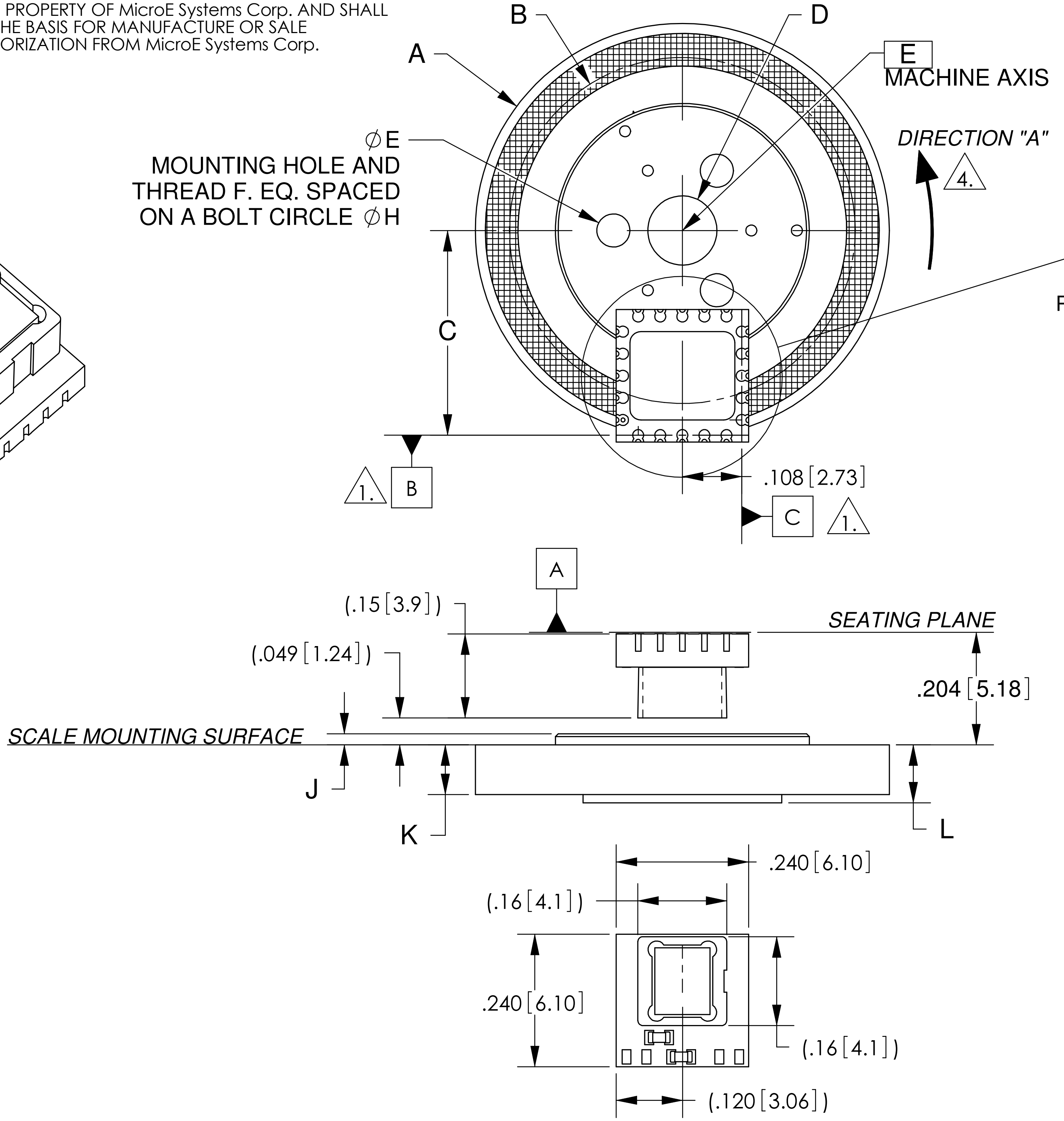
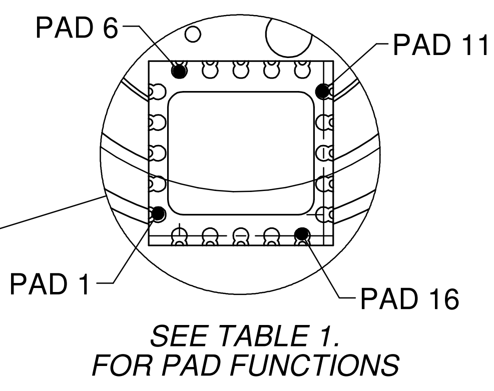
REVISIONS

| LTR | ECO | DESCRIPTION | DATE | APPROVED |
|---|---|---|---|---|
| 1 | ---- | INITIAL | 10/29/08 | VB |
| 2 | 2081 | UPDATED TBD (GRATING TO SEATING PLANE). SEE ECO | 2/9/09 | VB |
| 3 | 2307 | UPDATE TABLE 1. TO INCLUDE FUNCTION CP+ ON PAD 12. SEE ECO | 1/20/11 | SB |







*SEE TABLE 1.*
*FOR PAD FUNCTIONS*

*TABLE 1.*

| PAD # | FUNCTION | PAD # | FUNCTION |
|---|---|---|---|
| 1 | **+5VD** | 11 | Reserved- Do not connect |
| 2 | Reserved- Do not connect | 12 | CP+ |
| 3 | **SIN+** | 13 | Reserved- Do not connect |
| 4 | **AN** | 14 | Reserved- Do not connect |
| 5 | **+5VA** | 15 | **INDEX WINDOW-** |
| 6 | **DC1** | 16 | **INDEX WINDOW+** |
| 7 | Reserved- Do not connect | 17 | **A-** |
| 8 | **DC2** | 18 | **A+** |
| 9 | **GND** | 19 | **B-** |
| 10 | **CA** | 20 | **B+** |

NOTES:

1. DATUM SURFACES B & C ARE CENTERLINES OF PADS.
2. REFER TO ID-00363 FOR CHIPENCODER MOUNTING REQUIREMENTS.
3. DO NOT CONNECT TO "RESERVED" PADS. SEE TABLE 1. FOR RESERVED PADS.
4. WHEN SCALE MOVES IN DIRECTION "A" WITH RESPECT TO A STATIONARY READHEAD, OUTPUT SIGNALS A+ (PAD 18) LEADS OUTPUT SIGNAL B+ (PAD 20).

* SOME HUBS INCLUDE RELIEF TO PROVIDE SUFFICIENT CLEARANCE NOT SHOWN IN VIEW.

*SCALE IDENTIFICATION AND SIZE. DIMENSIONS IN INCHES [MILLIMETERS]*

| Scale Identification | Counts/ Rev | Dim. A Scale O.D. | Scale I.D. | Dim. B Optical Dia. | Dim. C Mounting Dim. | Dim. D Hub I.D. | Dim. E Mounting Hole Dia. | Thread F. | Dim. H Bolt Circle | Dim. K Scale Thickness | Dim. L Hub Relief |
|---|---|---|---|---|---|---|---|---|---|---|---|
| R1206CE | 825 | 0.472 | .250+/-.005 | 0.414 | 0.264+/-.002 | 0.1253+.0005/-.0000 | N/A | N/A | N/A | 0.036+/-.004 | 0.045 |
| | | [12.00] | [6.35+/-.13] | [10.50] | [6.71]+/-.05 | [3.182+.013/-.000] | | | | [0.91]+/-.10 | [1.14] |
| R1506CE | 1,024 | 0.572 | .250+/-.005 | 0.513 | 0.314+/-.002 | 0.1253+.0005/-.0000 | N/A | N/A | N/A | 0.036+/-.004 | 0.045 |
| | | [14.53] | [6.35+/-.13] | [13.04] | [7.98]+/-.05 | [3.182+.013/-.000] | | | | [0.91]+/-.05 | [1.14] |
| R1910CE | 1,250 | 0.750 | .375+/-.005 | 0.627 | 0.371+/-.002 | 0.1253+.0005/-.0000 | 0.047 | | 0.250 | 0.090+/-.004 | 0.105 |
| | | [19.05] | [9.53+/-0.13] | [15.92] | [9.42]+/-.05 | [3.182+.013/-.000] | [1.19] | 0-80 | [6.35] | [2.29]+/-.10 | [2.67] |
| R3213CE | 2,048 | 1.250 | .500+/-.005 | 1.027 | 0.571+/-.002 | 0.2503+.0005/-.0000 | 0.070 | | 0.370 | 0.090+/-.004 | 0.105 |
| | | [31.75] | [12.70+/-0.13] | [26.08] | [14.50]+/-.05 | [6.357+.013/-.000] | [1.78] | 2-56 | [9.40] | [2.29]+/-.10 | [2.67] |
| R5725CE | 4,096 | 2.250 | 1.000+/-.005 | 2.053 | 1.084+/-.002 | 0.5003+.0005/-.0000 | 0.136 | | 0.750 | 0.090+/-.004 | 0.105 |
| | | [57.15] | [25.40+/-0.13] | [52.15] | [27.53]+/-.05 | [12.707+.013/-.000] | [3.45] | 8-32 | [19.05] | [2.29]+/-.10 | [2.67] |
| R10851CE | 8,192 | 4.250 | 2.000+/-.005 | 4.106 | 2.111+/-.002 | 1.0003+.0005/-.0000 | 0.136 | | 1.375 | 0.090+/-.004 | 0.105 |
| | | [107.95] | [50.80+/-0.13] | [104.30] | [53.61]+/-.05 | [25.408+.013/-.000] | [3.45] | 8-32 | [34.93] | [2.29]+/-.10 | [2.67] |

*UNITS: IN. [MM]*

UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS ARE IN INCHES [MILLIMETERS]
DIM. APPLY AFTER PROCESSING
INTERPRET ALL GEOMETRIC TOLS.
PER ANSI Y14.5M-1994

TOLERANCES ARE:
DECIMALS:
.XX [.X] ±.01 [.25]
.XXX [.XX] ±.005 [.13]
ANGULAR:
±30 MIN.

| APPROVALS | DATE |
|---|---|
| DRAWN S.BUTURLIA | 10/20/08 |
| CHECKED D.GRIMES | 10/27/08 |
| ENGRG. | |
| MFG ENG | |
| QA | |

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MicroE Systems®
*MicroE Systems*
*Division of GSI Group*
125 Middlesex Tpk.
Bedford, MA 01730

DESCRIPTION:
INTERFACE, ENCODER,
40um ROTARY SCALE w/HUB,
6 x 6 CERAMIC CHIPENCODER

SIZE B | DWG. NO. ID-00362 | REV. 3
SCALE: | CAD FILE: | 3rd ANGLE PROJECTION | SHEET 1 OF 1

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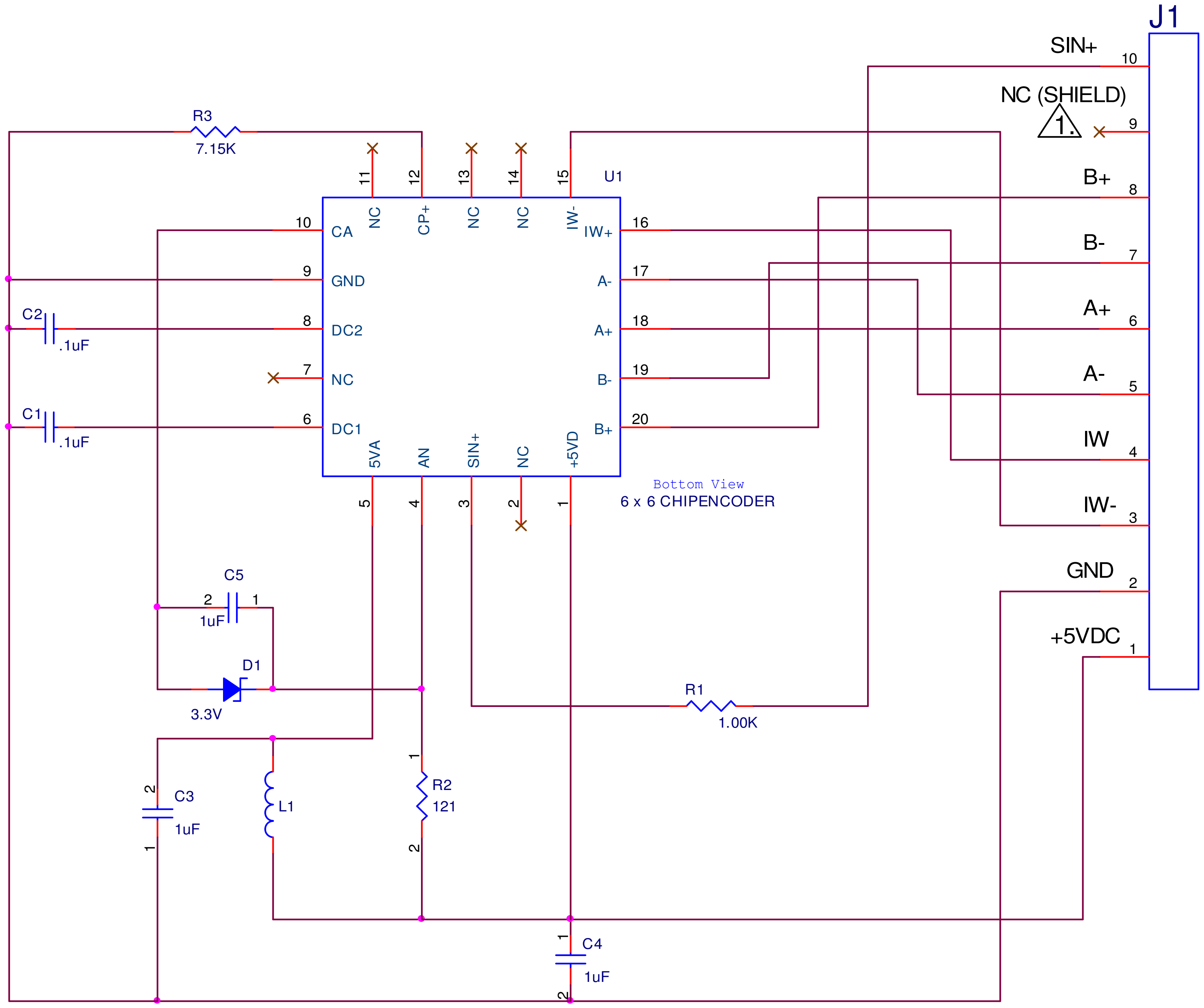
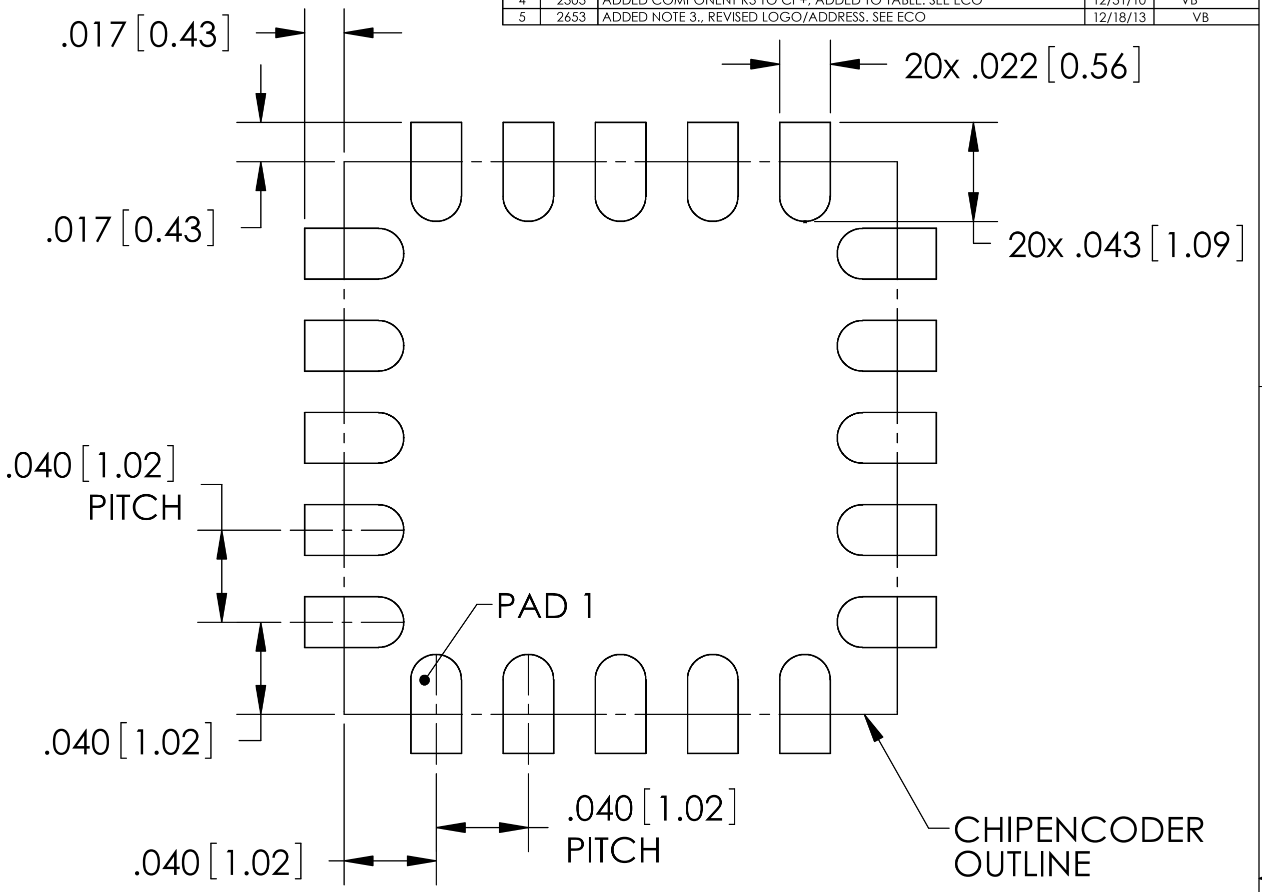
| REVISIONS | | | | |
|---|---|---|---|---|
| LTR | ECO | DESCRIPTION | DATE | APPROVED |
| 1 | ----- | INITIAL | 10/29/08 | VB |
| 2 | 2081 | ADDED VIEW OF CHIPENCODER FOR REF. TO LAND PATTERN. SEE ECO | 2/9/09 | VB |
| 3 | 2226 | INCORRECT VALUE OF COMPONENT R2, UPDATED TABLE. SEE ECO | 4/27/2010 | VB |
| 4 | 2303 | ADDED COMPONENT R3 TO CP+, ADDED TO TABLE. SEE ECO | 12/31/10 | VB |
| 5 | 2653 | ADDED NOTE 3., REVISED LOGO/ADDRESS. SEE ECO | 12/18/13 | VB |

## Electrical Interface:

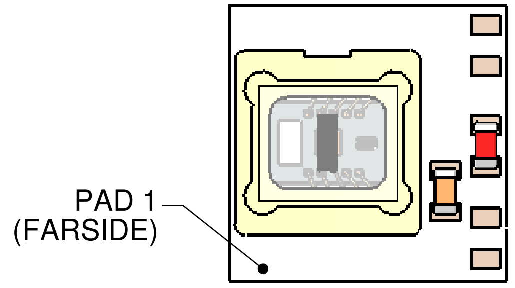
The ChipEncoder CE-0XC must be interfaced to subsequent electronics in the following manner to ensure proper system performance. All passive components must be located directly adjacent to the pads to which they are connected.

| ***Designation*** | ***Description*** | ***Manufacturer P/N or Equivalent*** |
|---|---|---|
| C1, C2 | Capacitor, Ceramic, 0.1uF, 10V, ±10%, 0402 | Panasonic - ECJ-0EB1A104K |
| C3, C4, C5 | Capacitor, Ceramic, 1.0uF, 10V, ±10%, 0603 | Panasonic - ECJ-1VB1A105K |
| D1 | Diode, ESD Protection TVS, ASD, 102W 3.3V SOD-923 | ON Semiconductor - ESD9x3.3ST5G |
| J1 | Connector, FFC/FPC, 1.00mm Pitch, 10 Position | Molex - 52207-1085 |
| L1 | EMI Filter, 600 Ohms @ 100MHz, 200mA, 0603 | Murata - BLM18AG601SN1D |
| R1 | Resistor, Thick Film Chip, 1.00K, 1/16W, ±1%, 0402 | Panasonic - ERJ-2RKF1001X |
| R2 | Resistor, Thick Film Chip, 121 OHM, 1/16W, ±1%, 0402 | Panasonic - ERJ-2RKF1210X |
| R3 | Resistor, Thick Film Chip, 7.15K, 1/10W, ±1%, 0402 | Panasonic - ERJ-2RKF7151X |





***COMPONENT SIDE OF BOARD***



***TOP VIEW OF CHIPENCODER***

NOTES:

1. GROUND AT RECEIVER.

2. OPTIONAL PROTECTION DEVICES (R2 & D1) FOR HIGH ESD ENVIRONMENTS. REPLACE R2 WITH A SHORT IF NOT USED.

3. DO NOT USE ANY PCB WASHING TECHNIQUES ON THE CHIPENCODER.

UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS ARE IN INCHES [MILLIMETERS]
DIM. APPLY AFTER PROCESSING
INTERPRET ALL GEOMETRIC TOLS.
PER ANSI Y14.5M-1994

TOLERANCES ARE:
DECIMALS:
.XX [.X] ±.01 [.25]
.XXX [.XX] ±.005 [.13]
ANGULAR:
±30 MIN.

| APPROVALS | DATE |
|---|---|
| DRAWN S.BUTURLIA | 10/22/08 |
| CHECKED D.GRIMES | 10/22/08 |
| ENGRG. | |
| MFG ENG | |
| QA | |

MicroE Systems®
125 Middlesex Tpk.
Bedford, MA 01730

DESCRIPTION:
LAND PATTERN & ELECTRICAL
INTERFACE REQUIREMENTS,
6 x 6 CERAMIC CHIPENCODER

*SUBJECT TO CHANGE WITHOUT NOTIFICATION*

SIZE B
DWG. NO. ID-00363
REV. 5
SCALE:
CAD FILE:
3rd ANGLE PROJECTION
SHEET 1 OF 1