

**LUDLUM MODEL 43-136  
ALPHA SCINTILLATOR DETECTOR**

**June 2024**

**LUDLUM MODEL 43-136  
ALPHA SCINTILLATOR DETECTOR**

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**LUDLUM MEASUREMENTS, INC**  
501 OAK STREET, P.O. BOX 810  
SWEETWATER, TEXAS 79556  
325-235-5494, FAX: 325-235-4672

## **STATEMENT OF WARRANTY**

Ludlum Measurements, Inc. warrants the products covered in this manual to be free of defects due to workmanship, material, and design for a period of twelve months from the date of delivery. The calibration of a product is warranted to be within its specified accuracy limits at the time of shipment. In the event of instrument failure, notify Ludlum Measurements to determine if repair, recalibration, or replacement is required.

This warranty excludes the replacement of photomultiplier tubes, G-M and proportional tubes, and scintillation crystals which are broken due to excessive physical abuse or used for purposes other than intended.

There are no warranties, express or implied, including without limitation any implied warranty of merchantability or fitness, which extend beyond the description of the face there of. If the product does not perform as warranted herein, purchaser's sole remedy shall be repair or replacement, at the option of Ludlum Measurements. In no event will Ludlum Measurements be liable for damages, lost revenue, lost wages, or any other incidental or consequential damages, arising from the purchase, use, or inability to use product.

## **RETURN OF GOODS TO MANUFACTURER**

If equipment needs to be returned to Ludlum Measurements, Inc. for repair or calibration, please send to the address below. All shipments should include documentation containing return shipping address, customer name, telephone number, description of service requested, and all other necessary information. Your cooperation will expedite the return of your equipment.

**LUDLUM MEASUREMENTS, INC.  
ATTN: REPAIR DEPARTMENT  
501 OAK STREET  
SWEETWATER, TX 79556**

**800-622-0828 325-235-5494  
FAX 325-235-4672**

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# LUDLUM MODEL 43-136

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## 1. GENERAL

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The Model 43-136 alpha scintillation detector is designed for alpha contamination surveys. An alpha scintillator, zinc sulfide [ZnS (Ag)], is applied to the window backup, which is covered by metalized polyester to reduce light response (causing excessive background counts). An 87.5% open, square-hole screen protects the window.

The Model 43-136 is compatible with any LMI general purpose survey meter, ratemeter, or scaler. Refer to the instrument

manual for calibration procedures.

The photomultiplier tube may easily be removed for repair. Refer to the assembly view drawing near the end of this manual for details of construction and parts.

The photomultiplier tube typically operates between 500-1200 volts, and the manufacturer recommends no more than 1500 volts.

### METALIZED POLYESTER WINDOW REPLACEMENT AND CALIBRATION

When changing the metalized polyester window on a detector, it is not necessary to recalibrate the instrument as long as a functional check is performed on the instrument and its readings are consistent with the readings before the window was replaced.

## 2. SPECIFICATIONS

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**Photomultiplier Tube:** 2.9 cm (1.1 in.) diameter

**Scintillator Material:** ZnS (Ag)

**Window:** 0.8 mg/cm<sup>2</sup> metalized polyester  
(1.2 mg/cm<sup>2</sup> recommended for outdoor use)

**Window Area:**

Active area: approximately 65.2 cm<sup>2</sup> (10.1 in<sup>2</sup>)  
Open area: approximately 57.4 cm<sup>2</sup> (8.9 in<sup>2</sup>)

**Efficiency (4 $\pi$ ):** typically 20% for <sup>239</sup>Pu

**Typical Background:** 3 cpm or less

**Detector Uniformity:** within 10% of average reading

**Operating Voltage:** 500-1200 V (1500 V maximum)

**Temperature Range:** -20 to 50 °C (-4 to 122 °F)

**Connector:** MHV

**Protective Screen:** 0.05 cm (0.02 in.) thick stainless steel square hole 0.64 cm (0.25 in.), 87.5% open. Open area is approximately 57.9 cm<sup>2</sup>.

**Optional Screen:** 0.05 cm (0.02 in.) thick stainless steel square hole 0.64 (0.25 in.), 65.6% open.

**Size:** 8.9 x 6.9 x 29.7 cm (3.5 x 2.7 x 11.7 in.) (H x W x L)

**Weight:** 0.43 kg (0.95 lb)

**Finish:** aluminum casting with beige powder coat

**Environmental Rating:** IP rating of 63

**3. REPLACEMENT PARTS LIST**

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<b>Reference No.</b>	<b>Description</b>	<b>Part No.</b>
	Assembly View, Drawing 393 x 232	
	<u>Assembly View, Drawing 393 x 232A</u>	

UNIT	Complete Assembly Model 43-136 Scintillator	47-3829
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<b>Part No.</b>	<b>Description</b>	<b>Qty.</b>
01-5019	Foil-netic	1 ea.
01-5026	Foil-co-nectic	1 ea.
13-7775	RECPT-SCREW MHV	1 ea.
16-8366	O-Ring	1 ea.
2393-241	Welded Body Assembly	1 ea.
2393-247	Tube Holder	1 ea.
4002-572	Photomultiplier Tube	1 ea.
4393-236	Mylar Window Assembly	1 ea.
4393-239	Window Backup w/Zinc	1 ea.
5002-570	1.125 in. 9 Stage Voltage Divider Board	1 ea.
7002-065-04	Sponge	2 ea.
7393-102	Connector Cap	1 ea.
7393-233	Gasket	1 ea.
7393-237	Face for Snap On Screen	1 ea.
7393-238	Mirror	1 ea.
7393-229	87.5% Snap On Screen	1 ea.
7393-242	65.6% Snap On Screen	1 ea.

# LUDLUM MODEL 43-136

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<u>Reference No.</u>	<u>Description</u>	<u>Part No.</u>
<u>1.125 inch Voltage Divider Board, Drawing 2 x 356</u>		
BOARD	Assembled 0.03 m (1.1 in.) Voltage Divider Board	5002-570
<b>CAPACITORS</b>		
C003	0.01 $\mu$ F, 3kV	04-5525
<b>RESISTORS</b>		
R008	1 MEG, 1/4 W, 1%	12-7844
R001-R007	10 MEG, 1/8 W, 1%	12-7996
R009	10 MEG, 1/8 W, 1%	12-7996
R101	10 MEG, 1/8 W, 1%	12-7996

**DRAWINGS AND DIAGRAMS**

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Assembly View, Drawing 393 x 232

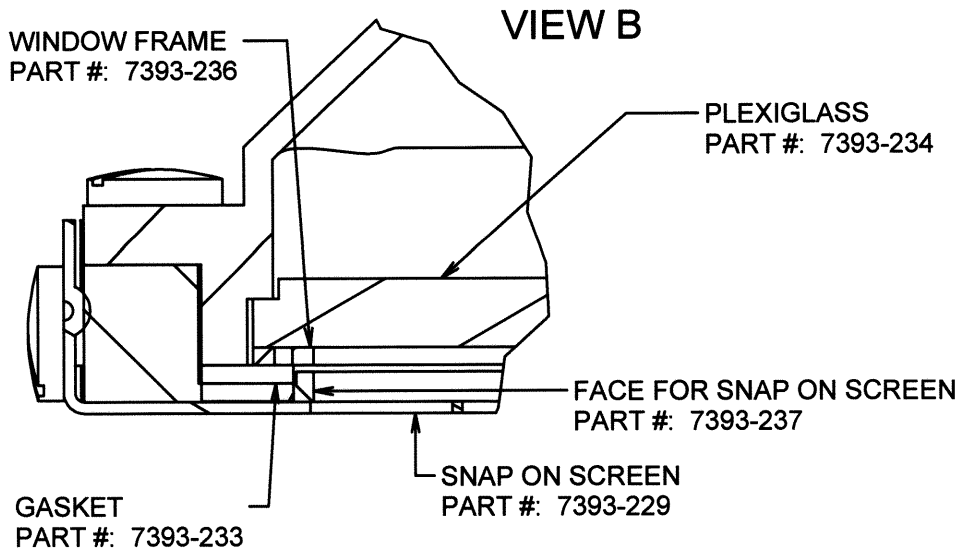
Assembly View, Drawing 393 x 232A

1.125 inch Voltage Divider Board, Drawing 2 x 356

1.125 inch Voltage Divider Board Component Layout, Drawing 2 x 357A (2 sheets)



REVISION HISTORY			
REV	DESCRIPTION	DATE	BY
1	VALID	10/27/10	DWW
2	ECF#2490	6/29/2011	CMC
3	ECF 2532	5/4/2012	MSC
4	ECF#2627	10/17/2012	ADG
5	ADDED LOCTITE 425 THREADLOCKER	2/10/2022	CMC



GASKET  
PART #: 7393-233

SNAP ON SCREEN  
PART #: 7393-229

FACE FOR SNAP ON SCREEN  
PART #: 7393-237

PLEXIGLASS  
PART #: 7393-234

VIEW B

WELDED HOUSING  
PART #: 2393-241

MIRROR  
PART #: 7393-238

SPONGE  
PART #: 7002-065-04

PM TUBE  
PART #: 4002-572

O-RING  
PART #: 16-8366

LUG  
PART #: 18-8764

13-7775  
MHV CONNECTOR

CAP CONNECTOR  
PART #: 7393-102

TUBE SHIELD  
PART #: 01-5019 AND 01-5026

17-8509  
2 EACH  
USE LOCTITE 425 THREADLOCKER  
03-6102

TUBE HOLDER ASSEMBLY  
PART #: 2393-247

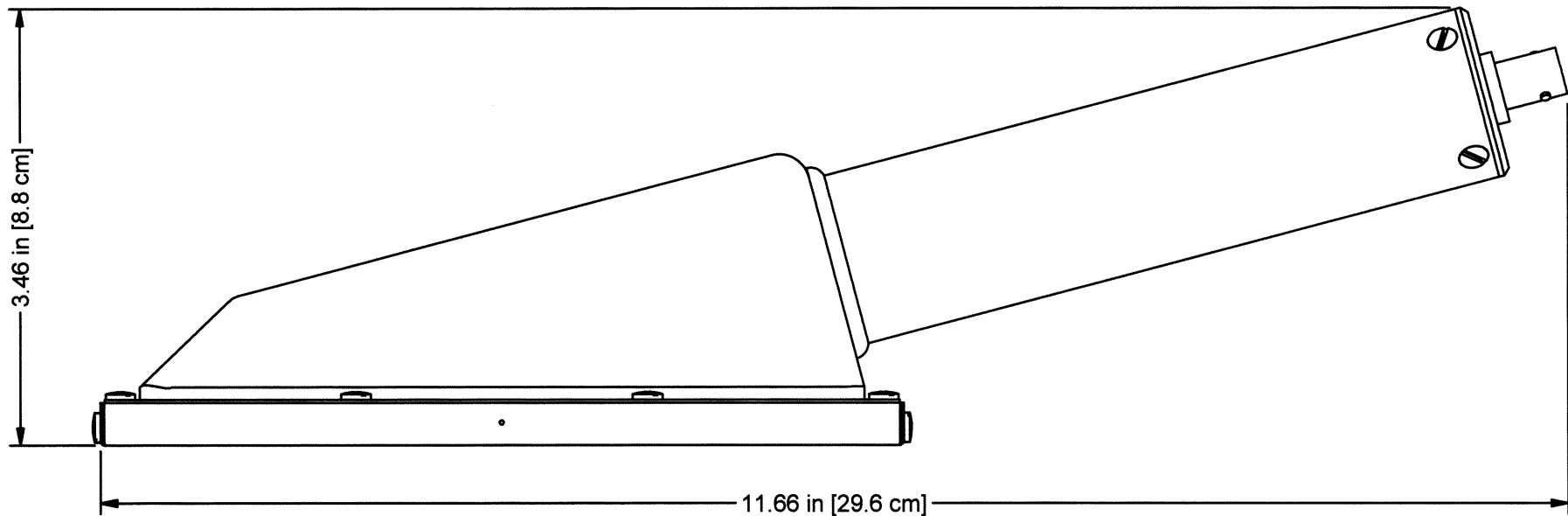
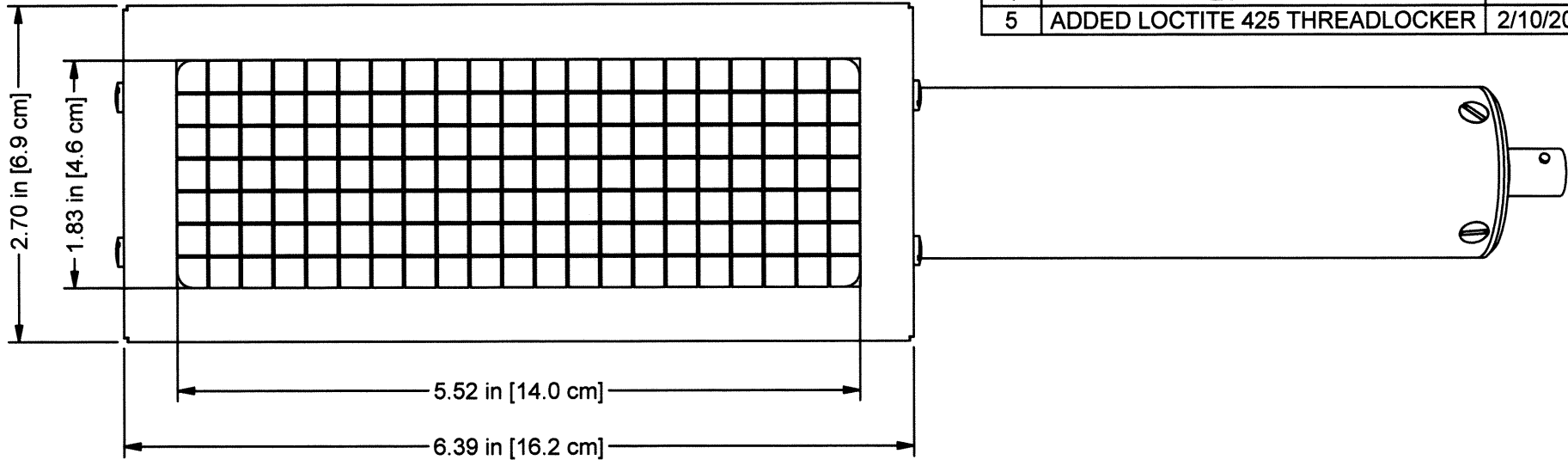
B

SECTION A-A

DWN	DATE	CHK	DATE	APP	DATE
CMC	2-10-22			J6W	2-10-22
<b>DWG NUM: 4393-232</b>				<b>SCALE: 3/4</b>	
<b>TITLE M 43-136 ASSEMBLY</b>					
LUDLUM MEASUREMENTS, INC. 501 OAK STREET SWEETWATER, TEXAS 79556			SERIES 393	SHEET 232	

REVISION HISTORY

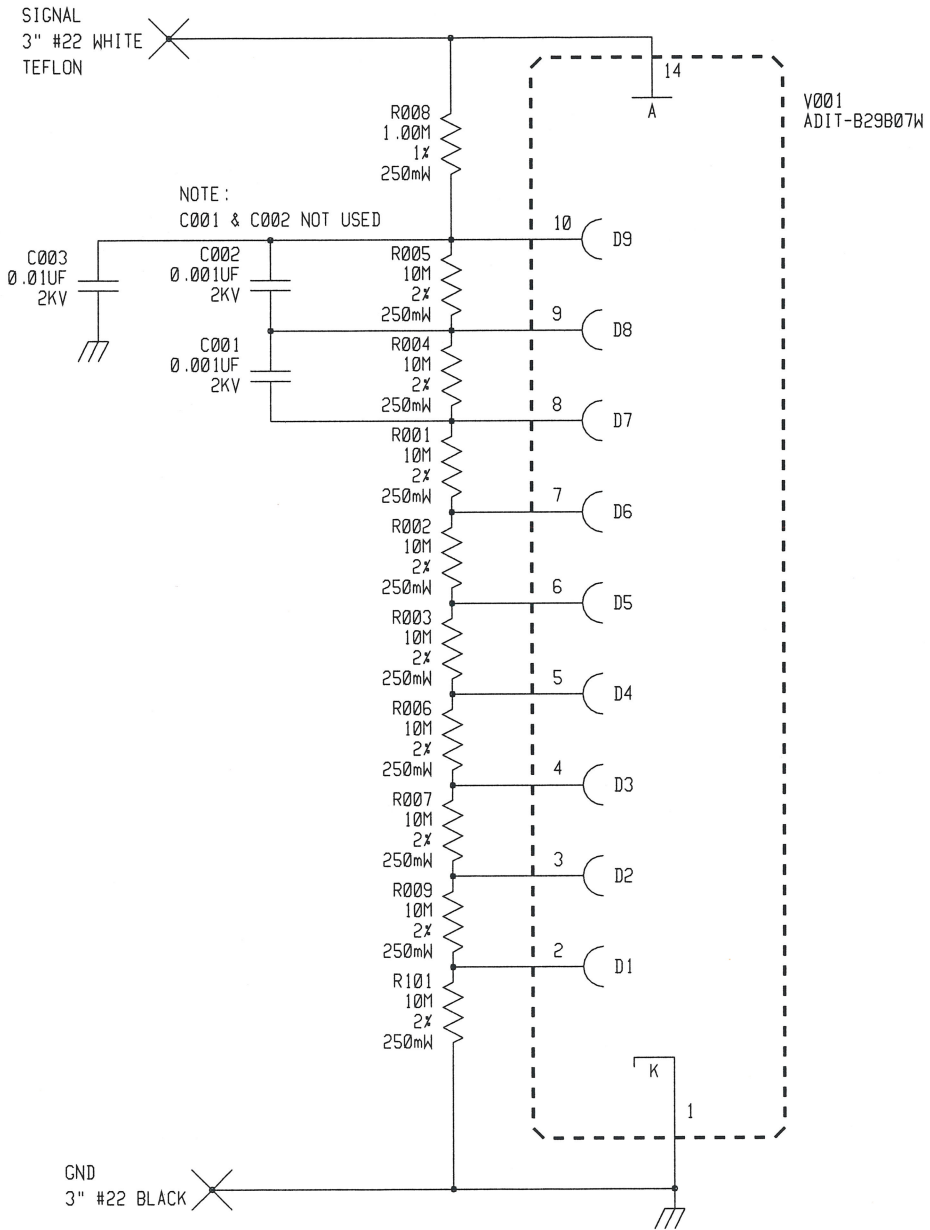
REV	DESCRIPTION	DATE	BY
1	VALID	10/27/10	DWW
2	ECF#2490	6/29/2011	CMC
3	ECF 2532	5/4/2012	MSC
4	ECF#2627	10/17/2012	ADG
5	ADDED LOCTITE 425 THREADLOCKER	2/10/2022	CMC



SCREEN:  
 OPEN AREA: 87.5%  
 MATERIAL: STAINLESS STEEL

ACTIVE AREA: 65.1 cm<sup>2</sup>

DWN	DATE	CHK	DATE	APP	DATE
CMC	2-10-22			J6W	2-10-22
<b>DWG NUM: 4393-232</b>				<b>SCALE: 3/4</b>	
<b>TITLE M 43-136 ASSEMBLY</b>					
LUDLUM MEASUREMENTS, INC. 501 OAK STREET SWEETWATER, TEXAS 79556			SERIES	SHEET	
			393	232A	



UPDATED	-		LUDLUM MEASUREMENTS INC.			
DR	CKB	25-NOV-97	TITLE : 1.125" VOLTAGE DIVIDER 9 STAGE			
DSGN	RC	25-NOV-97	BOARD# 5002-570			
APPD	R35	26 Jun 12	SIZE	MODEL	SERIES	SHEET
NEXT HIGHER ASSY.			C	1.125"	2	356
15:23:28		25-Jun-12	SB002570		SHEET 1 OF 1	

A

B

C

D

1

1

6" WHITE WIRE

2

2

Top Layer (Scale 4:1)

\*C002

\*C001

3

3

R001

C003

0.01UF

R004

R008

4

4

R002

5002-570

R101

R003

5

5

R009

R006

R007

\*C001 AND C002 NOT PLACED

6" BLACK WIRE

6


6

A

B

C

D

 <b>LUDLUM MEASUREMENTS</b>				
Part: 5002-570		Model: 1.125"		
Desc: 1.125" Voltage Divider 9 Stage				
Design: RC	Date: 11/25/97	Rev:	1	
Drawn: PAB	Date: 1/19/2023	SHEET	SERIES	SHEET
Apr: RDS	Date: 19 Jan 23	1 of 3		
\\freedom\pcb\Projects\LM\VoltageDividers\5002-570\Rev1			2	357A

A

B

C

D

1

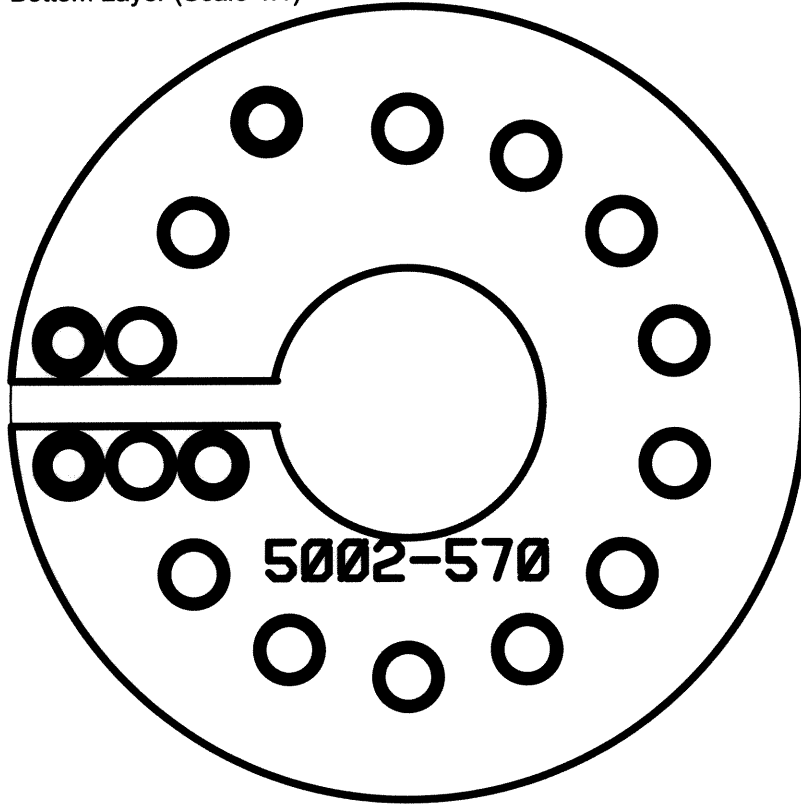
1



Bottom Layer (Scale 4:1)

2

2



3

3

4

4



5

5

6


6

A

B

C

D

 <b>LUDLUM MEASUREMENTS</b>				
Part: 5002-570		Model: 1.125"		
Desc: 1.125" Voltage Divider 9 Stage				
Design: RC	Date: 11/25/97	Rev:	1	
Drawn: PAB	Date: 1/19/2023	SHEET	SERIES	SHEET
Apr: <i>RDS</i>	Date: <i>19 Jan 23</i>	2 of 3		
\\freedom\pcb\Projects\LMI\VoltageDividers\5002-570\Rev1			2	357A