

A

A

B

B

C

C

D

D

MPPT Solar Converter

SOLAR CAR 2021

REV 1

Rev 1 Biggest Risks:
1. MCU Control Implementation
2. HV Arcing
3. Thermal

Title **COVER**

Engineer: Shelby Riggleman

Badgerloop Electrical
133 Engineering Research Building
1500 Engineering Drive
Madison, Wi 53706



Revision: 1

Date: 1/13/2022 Time: 9:56:24 PM Sheet 1 of 8

File: cover.SchDoc

Connectors

A

A

B

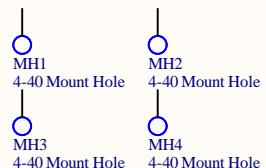
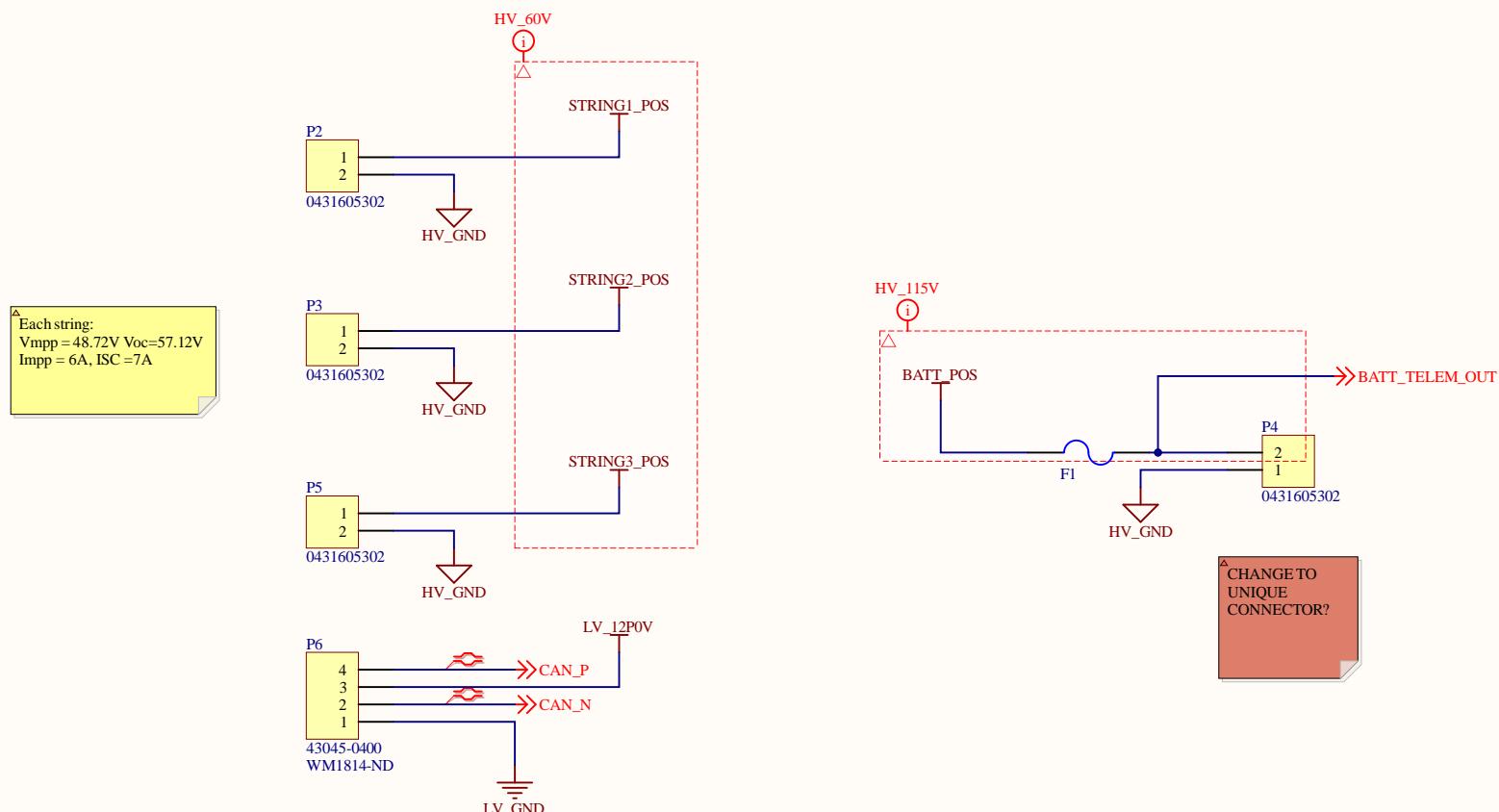
B

C

C

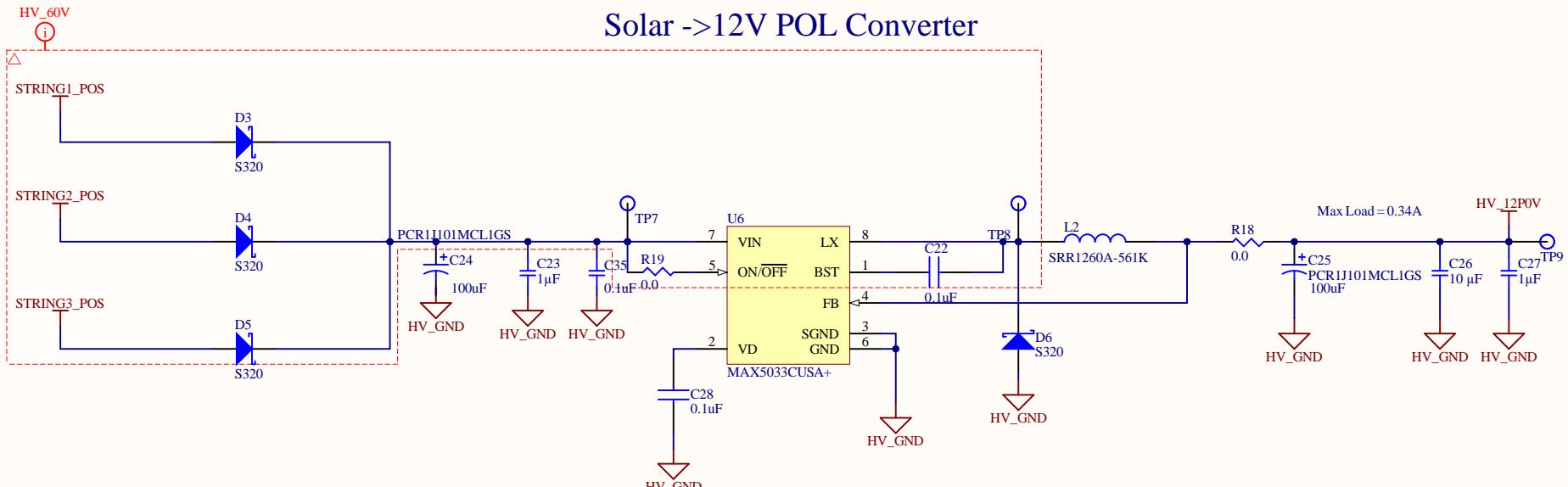
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D

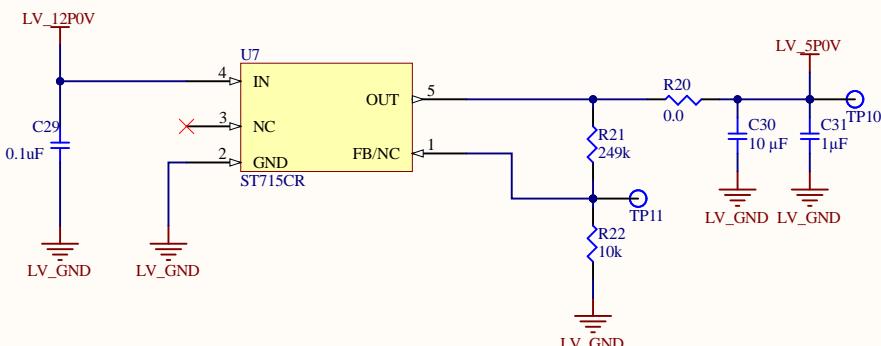


Title Connectors	
Engineer: Shelby Riggelman	Revision: 1
Date: 1/13/2022	Time: 9:56:24 PM
File: Connectors.SchDoc	Sheet 2 of 8

Point of Load Converters



LV 12V -> 5V



Title Nucleo	
Engineer: Shelby Riggleman	Revision: 1
Date: 1/13/2022	Time: 9:56:24 PM
File: POL_converter.SchDoc	Sheet 3 of 8

**BADGER
LOOP**

Nucleo MCU & CAN

A

B

C

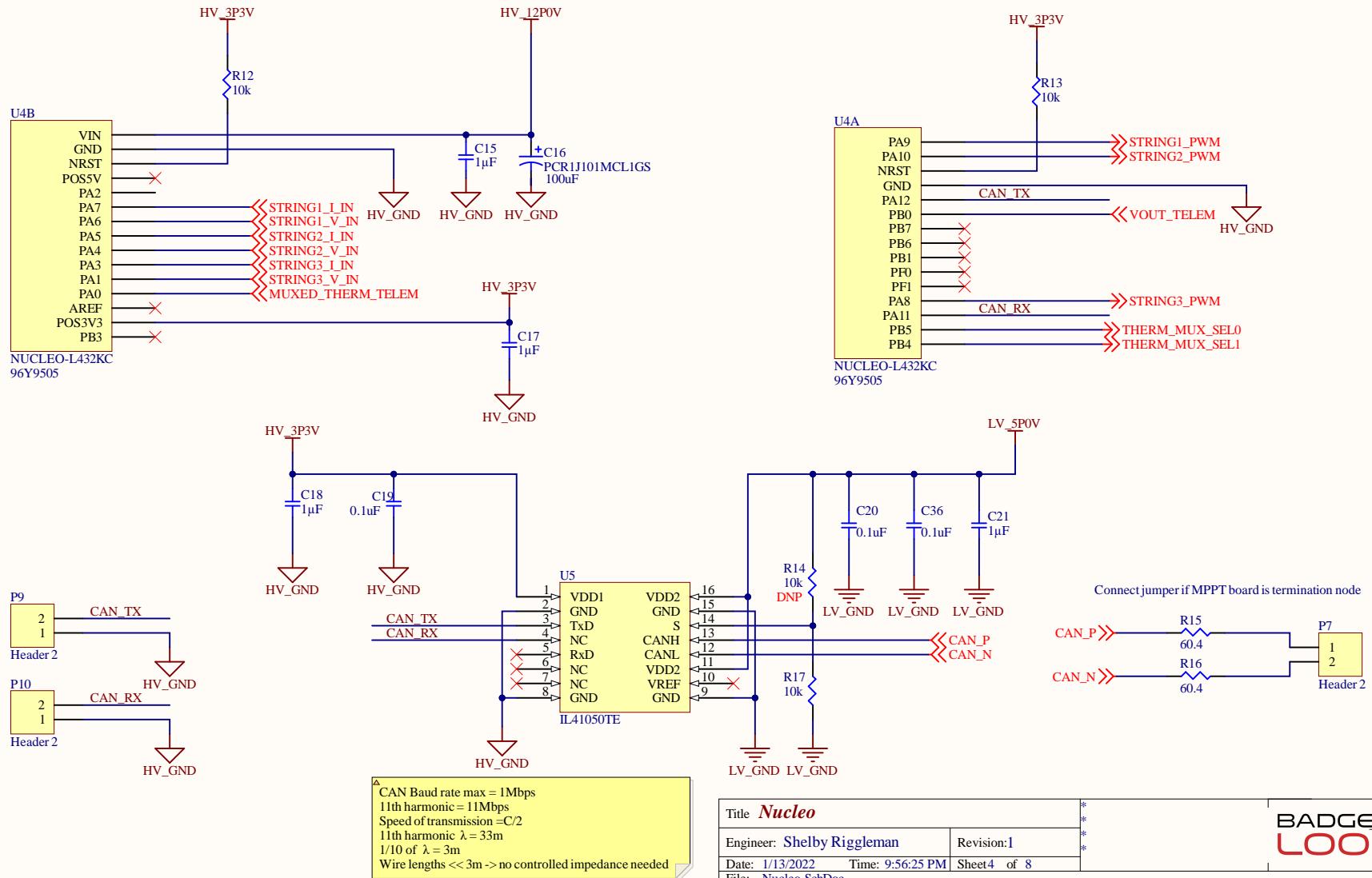
D

A

B

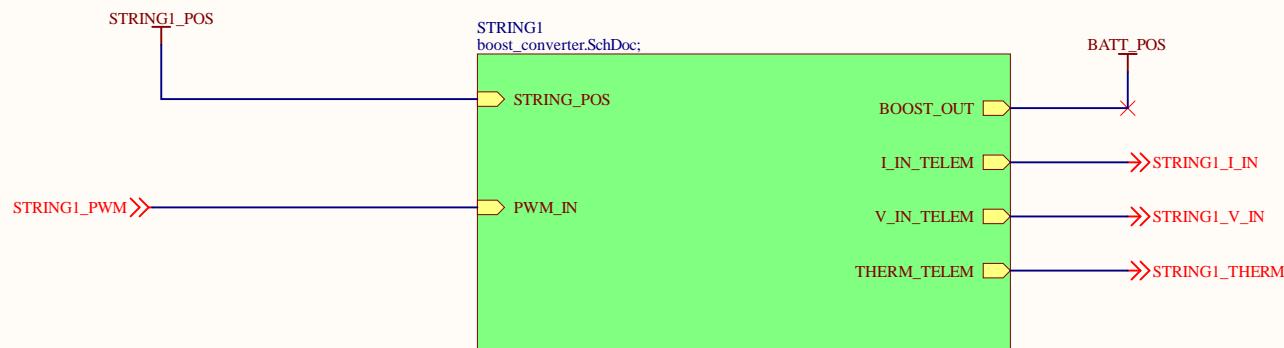
C

D



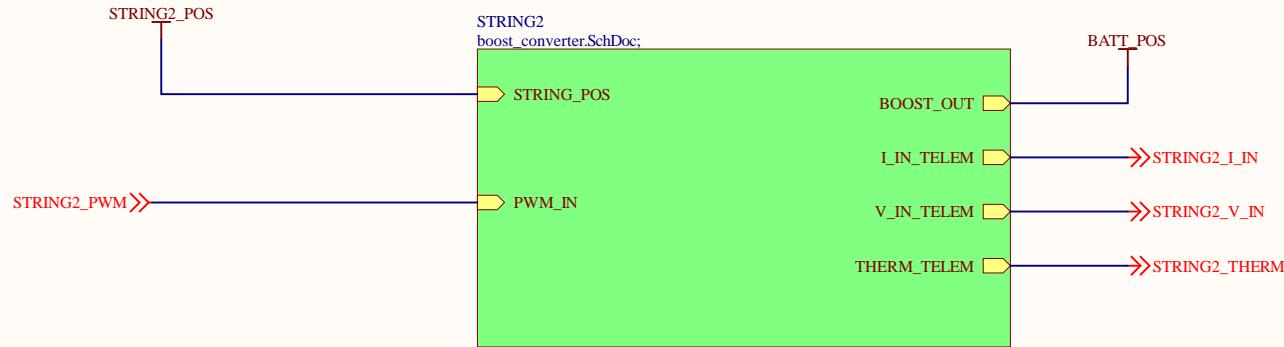
Solar Strings MPPTs

A



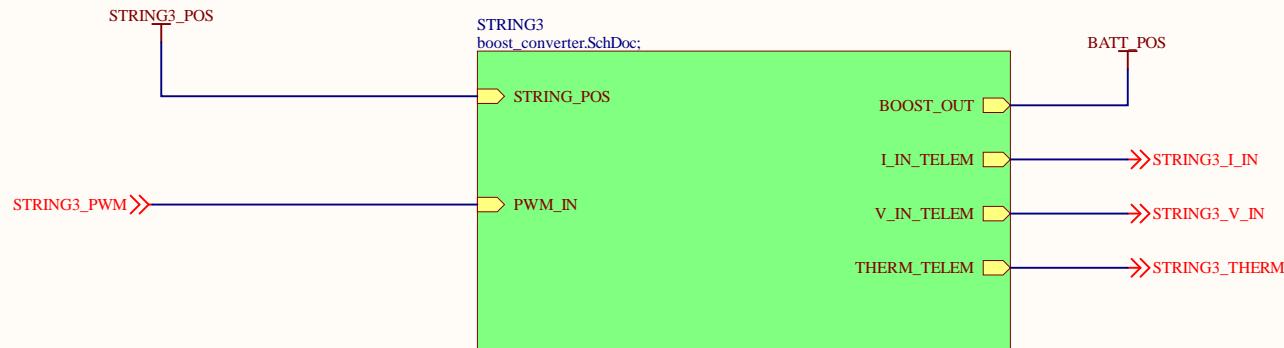
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B



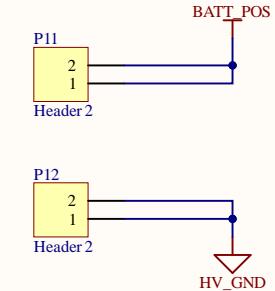
B

C



C

Debug Headers



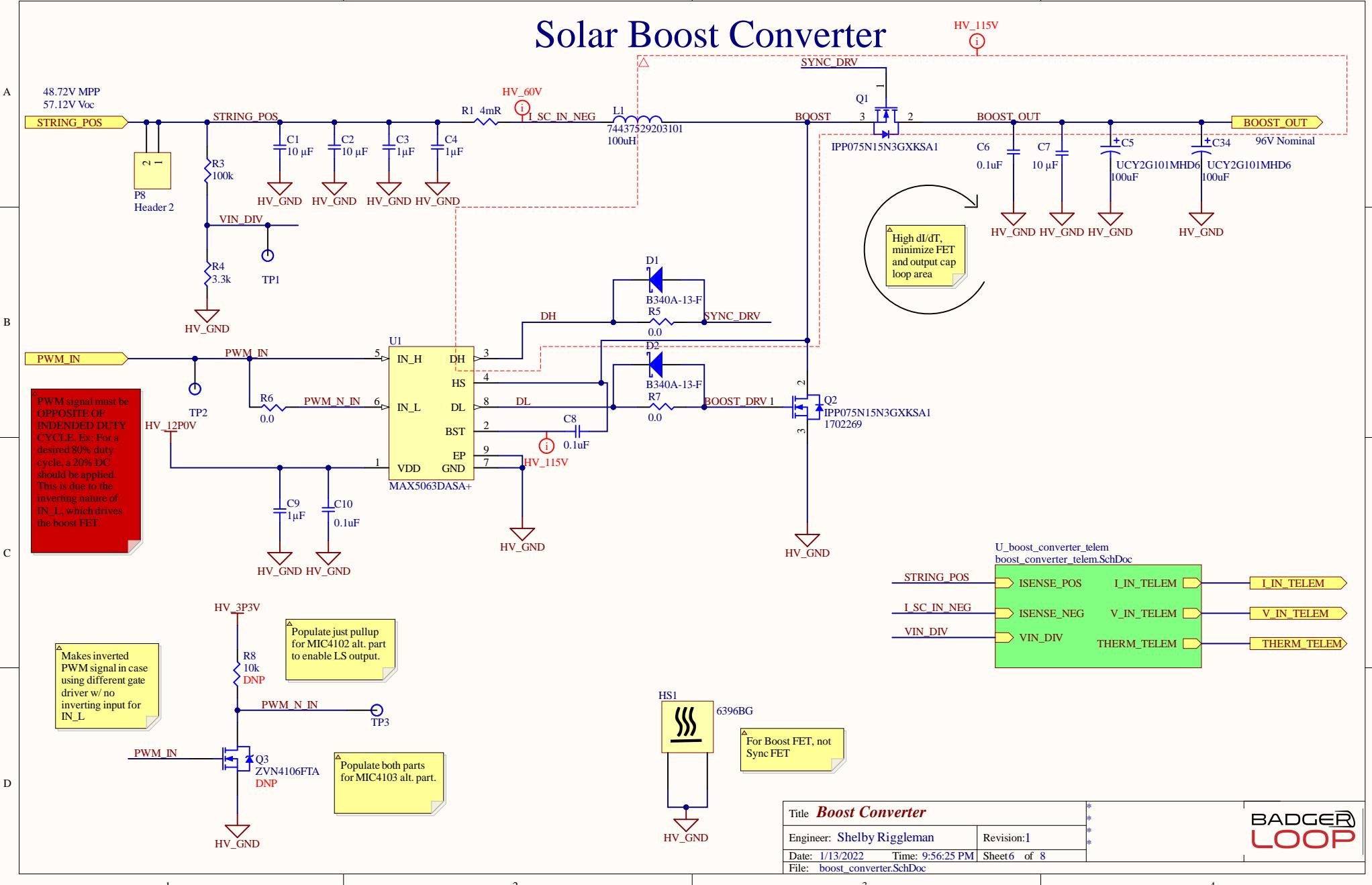
D

Title Boost Strings	
Engineer: Shelby Riggelman	Revision: 1
Date: 1/13/2022	Time: 9:56:25 PM
File: solar_boost_strings.SchDoc	Sheet 5 of 8

BADGER
LOOP

Solar Boost Converter

1 2 3 4



1

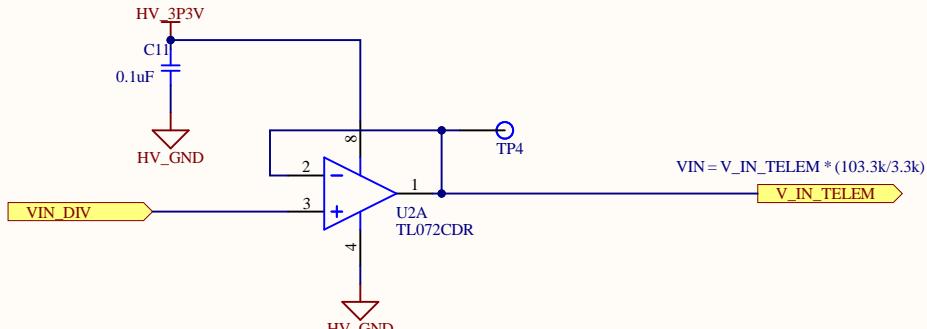
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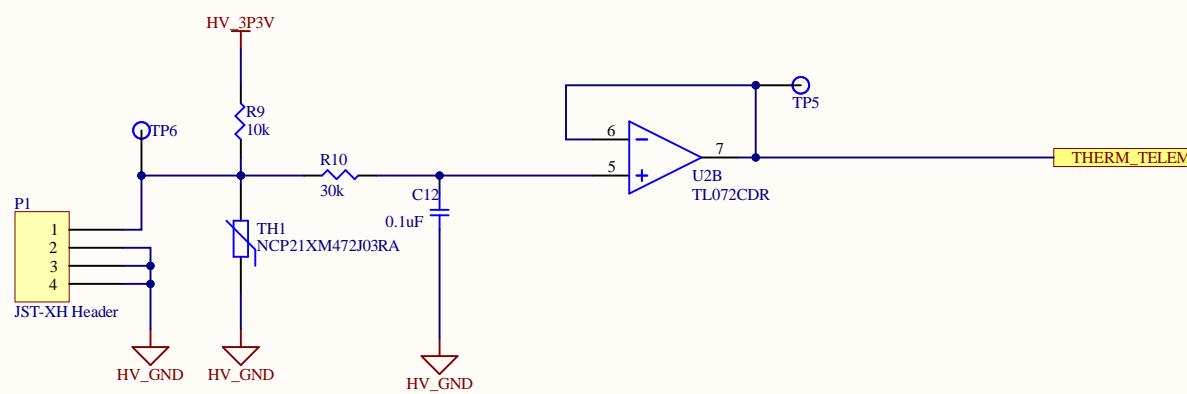
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Solar Boost Converter Telemetry

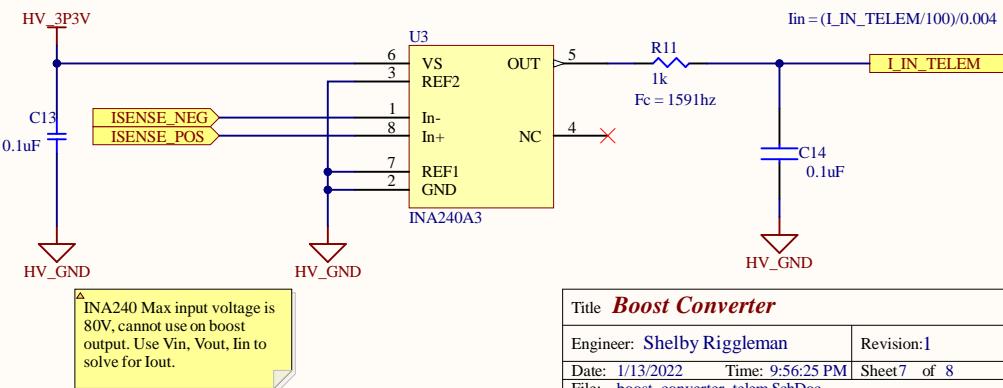
String Input Voltage



Thermistor Output



String Input Current

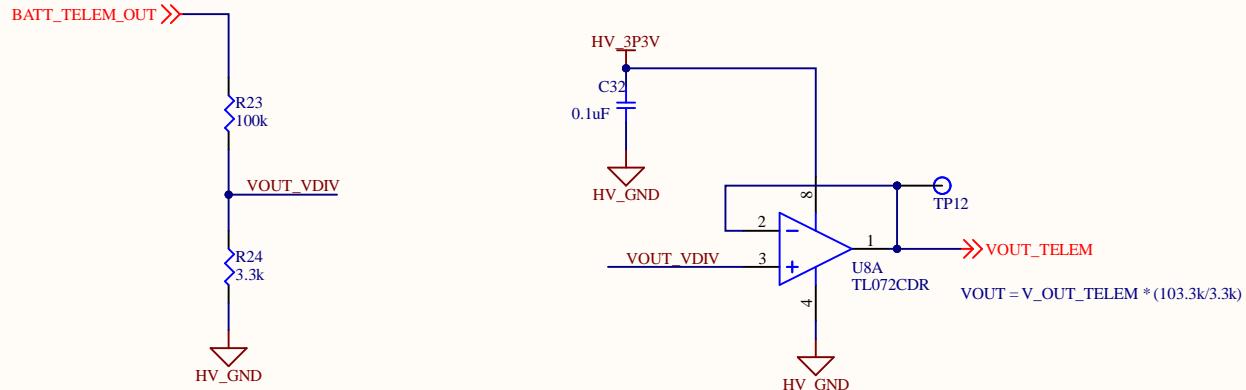


Title Boost Converter	
Engineer: Shelby Riggelman	Revision: 1
Date: 1/13/2022	Time: 9:56:25 PM
File: boost_converter_telem.SchDoc	Sheet 7 of 8

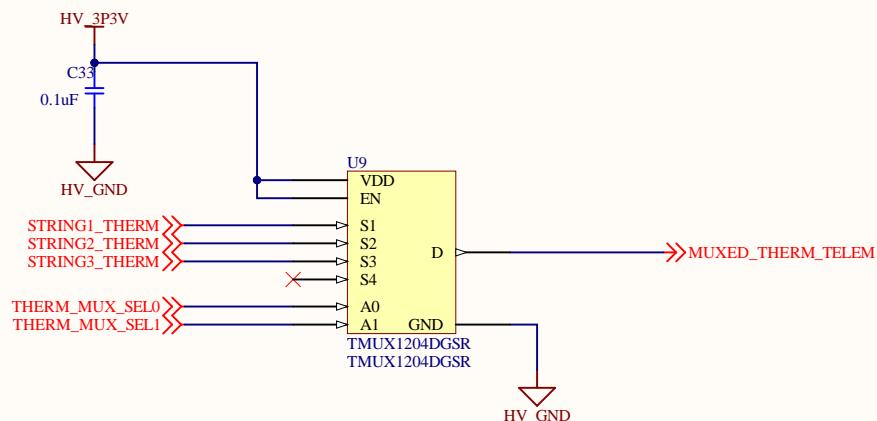
**BADGER
LOOP**

Global Telemetry

Output (Battery) Voltage



String Thermistor Telem (Muxed)



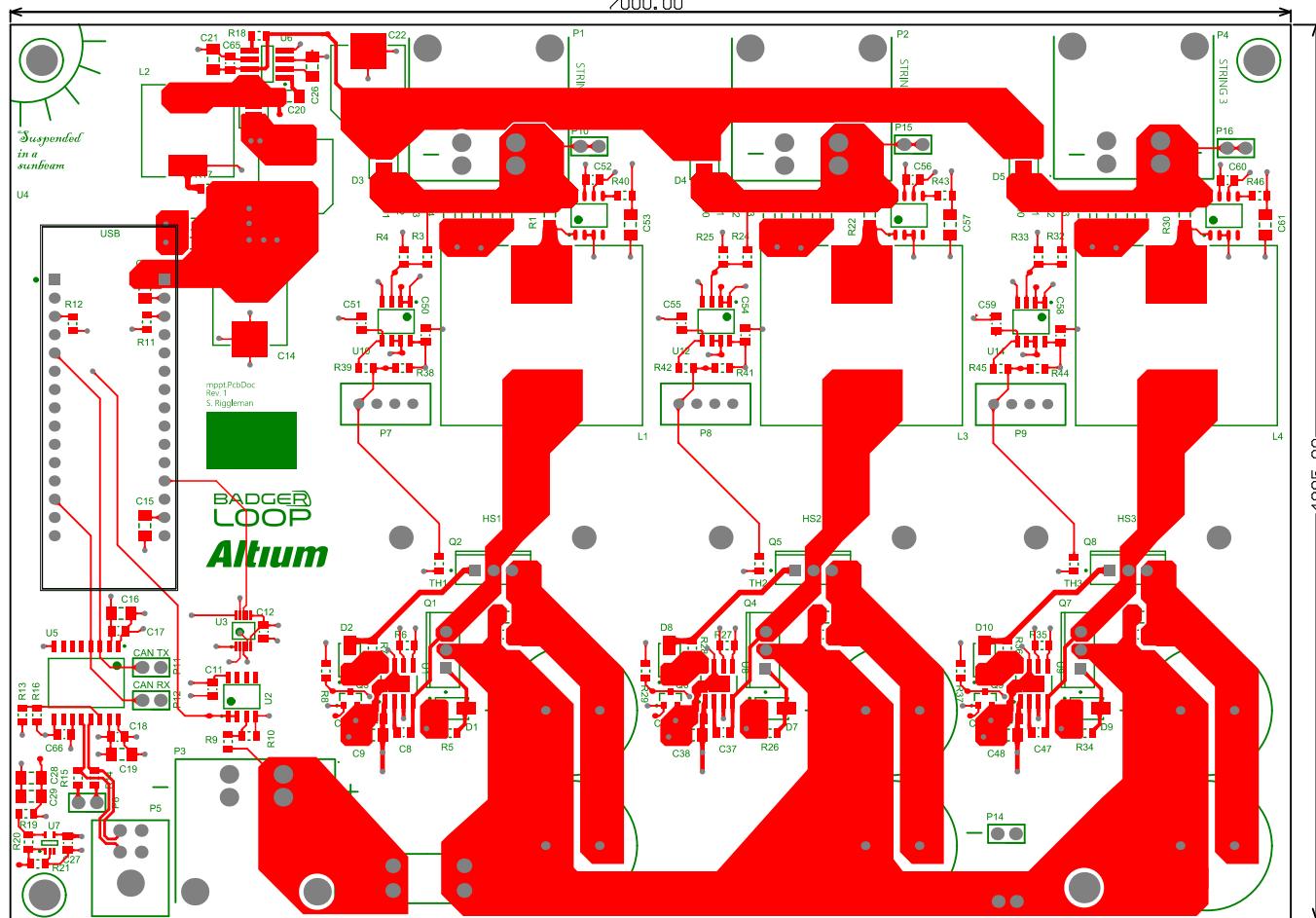
Title Nucleo	
Engineer: Shelby Riggleman	Revision:1
Date: 1/13/2022	Time: 9:56:26 PM
File: global_telem.SchDoc	Sheet 8 of 8

**BADGER
LOOP**

Layer	Name	Material	Thickness	Constant	Board Layer Stack
	Top Overlay				
	Top Solder	Solder Resist	0.40mil	3.5	
1	Top Layer		1.40mil		
Dielectric 2	PP-006	2.80mil	4.1		
2	Layer 1	CF-004	1.38mil		
Dielectric 1	FR-4	12.60mil	4.8		
3	Layer 2	CF-004	1.38mil		
Dielectric 3	PP-006	2.80mil	4.1		
4	Bottom Layer		1.40mil		
	Bottom Solder	Solder Resist	0.40mil	3.5	
	Bottom Overlay				

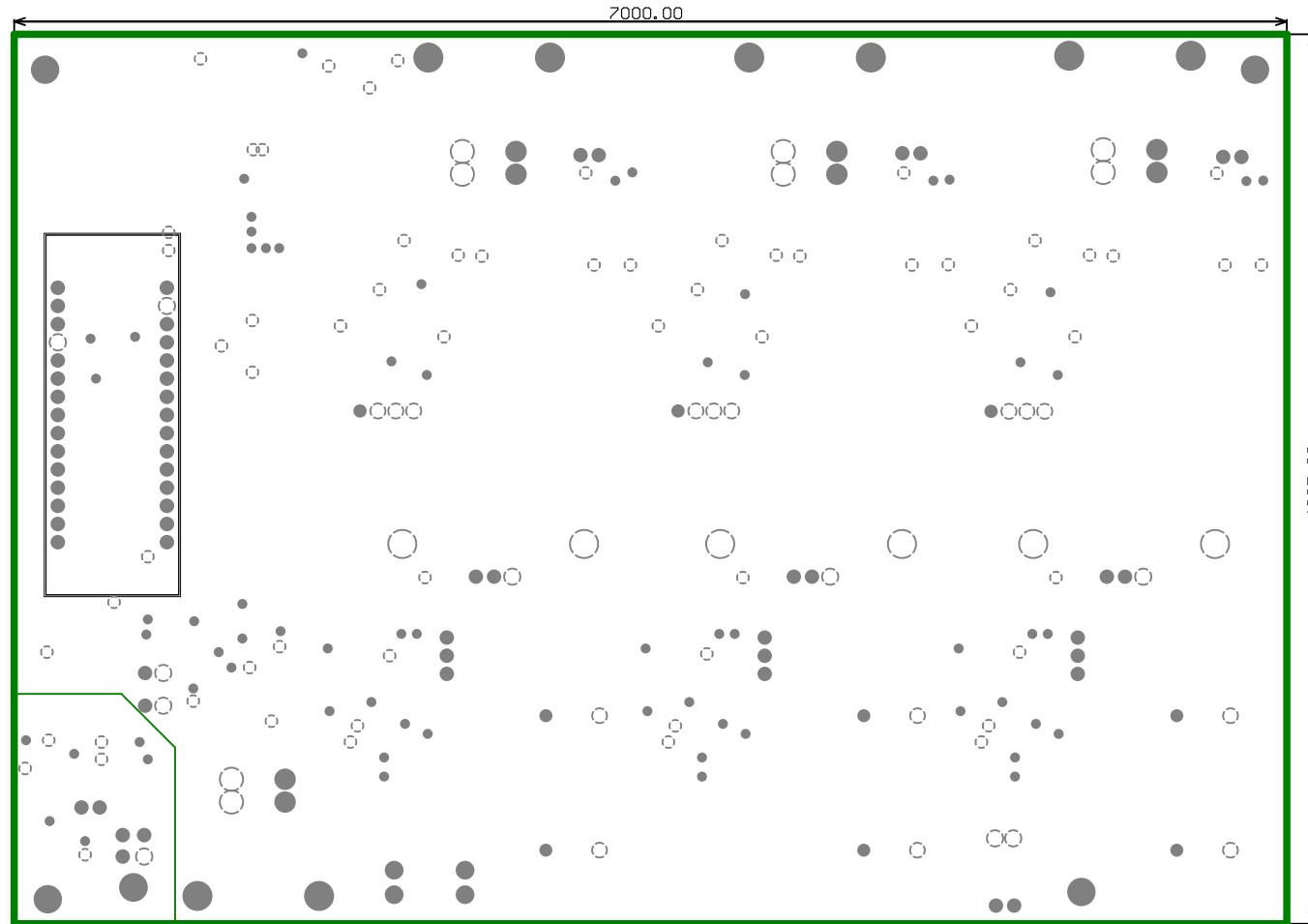
Total board thickness: 24.56mil

7000.00



Layer	Name	Material	Thickness	Constant	Board Layer Stack
	Top Overlay				
	Top Solder	Solder Resist	0.40mil	3.5	
1	Top Layer		1.40mil		
	Dielectric 2	PP-006	2.80mil	4.1	
2	Layer 1	CF-004	1.38mil		
	Dielectric 1	FR-4	12.60mil	4.8	
3	Layer 2	CF-004	1.38mil		
	Dielectric 3	PP-006	2.80mil	4.1	
4	Bottom Layer		1.40mil		
	Bottom Solder	Solder Resist	0.40mil	3.5	
	Bottom Overlay				

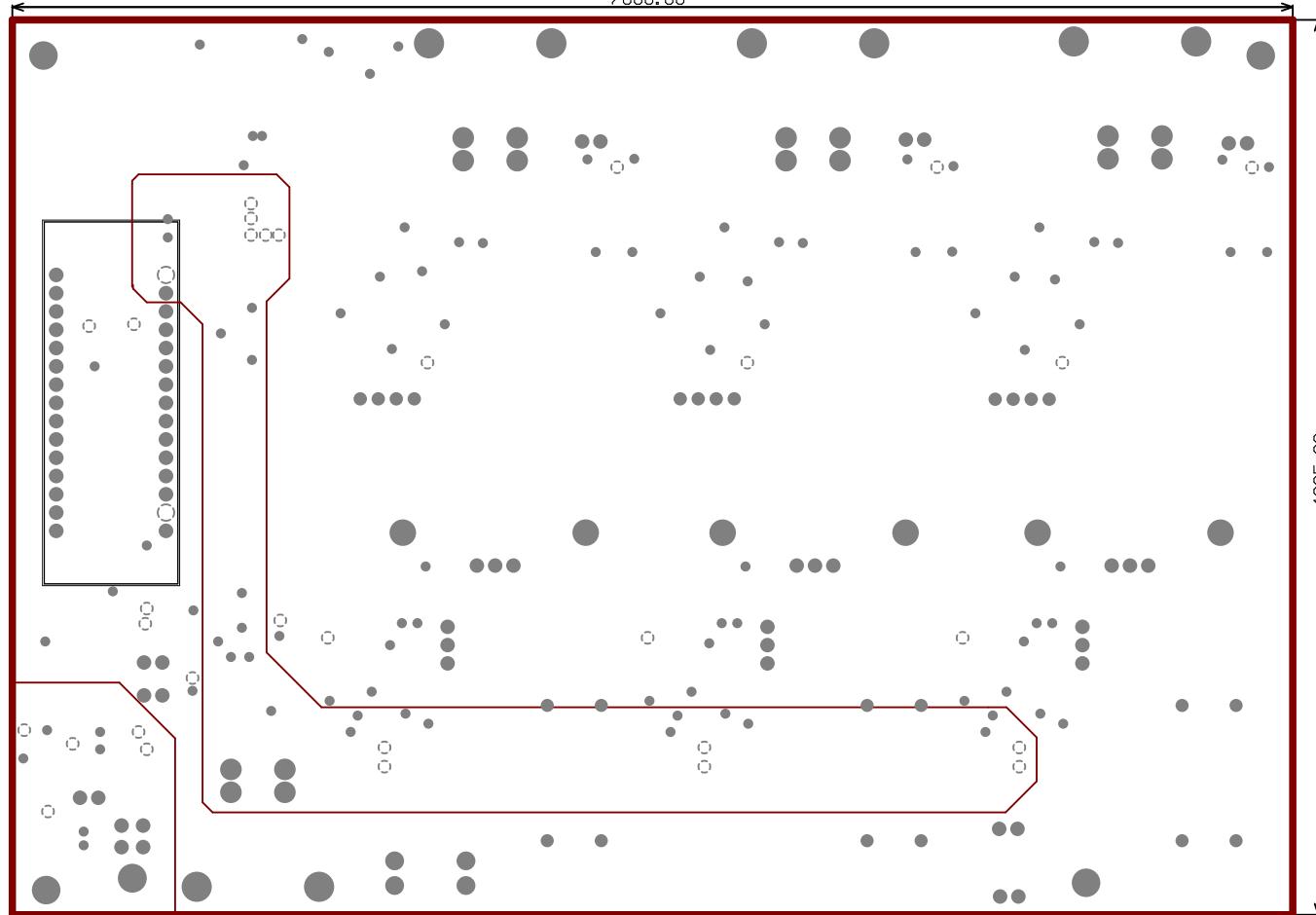
Total board thickness: 24.56mil



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	Top Overlay				
	Top Solder	Solder Resist	0.40mil	3.5	
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	Dielectric 3	PP-006	2.80mil	4.1	
4	Bottom Layer		1.40mil		
	Bottom Solder	Solder Resist	0.40mil	3.5	
	Bottom Overlay				

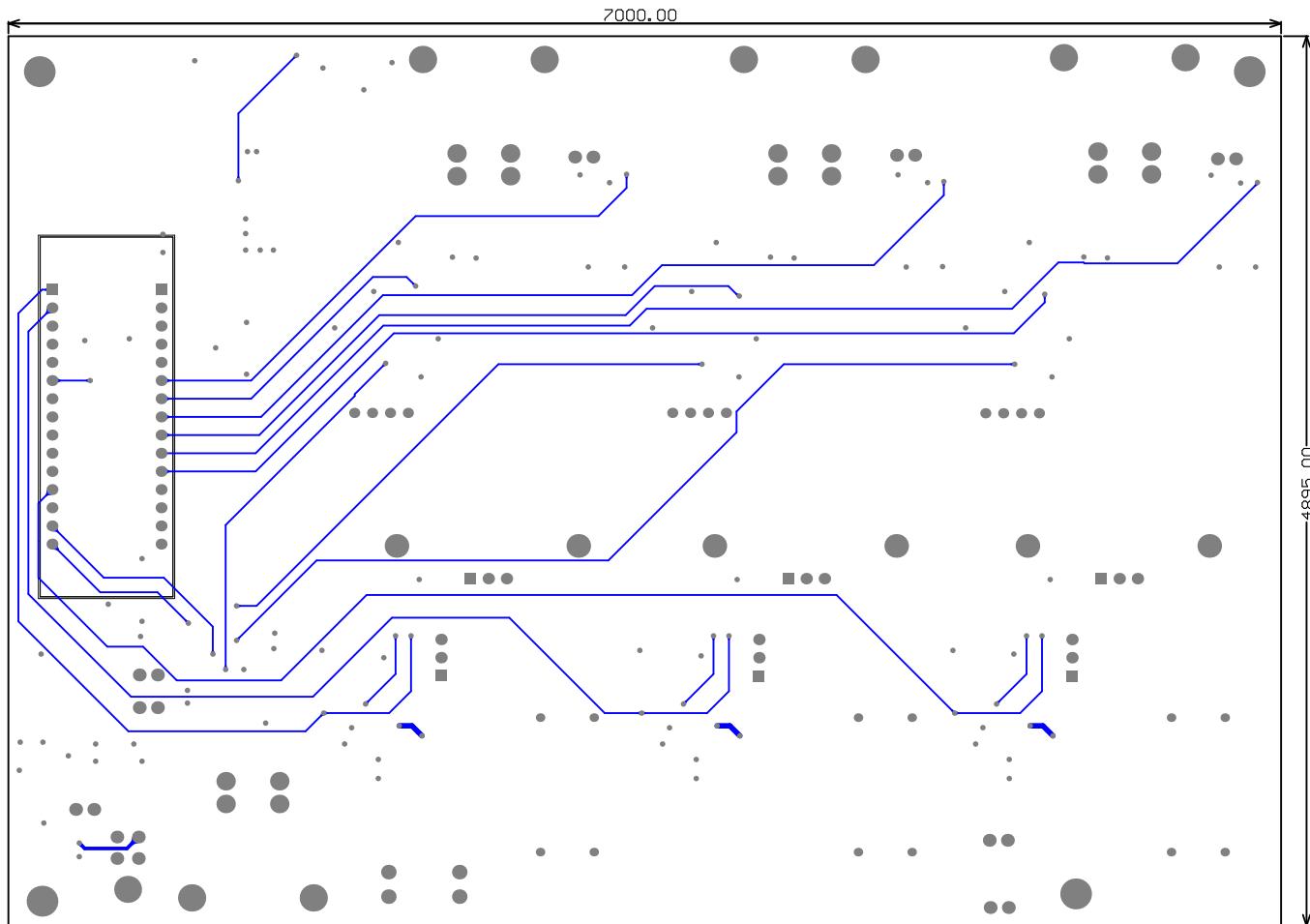
Total board thickness: 24.56mil

2000.00



Layer	Name	Material	Thickness	Constant	Board Layer Stack
	Top Overlay				
	Top Solder	Solder Resist	0.40mil	3.5	
1	Top Layer		1.40mil		
	Dielectric 2	PP-006	2.80mil	4.1	
2	Layer 1	CF-004	1.38mil		
	Dielectric 1	FR-4	12.60mil	4.8	
3	Layer 2	CF-004	1.38mil		
	Dielectric 3	PP-006	2.80mil	4.1	
4	Bottom Layer		1.40mil		
	Bottom Solder	Solder Resist	0.40mil	3.5	
	Bottom Overlay				

Total board thickness: 24.56mil



Layer	Name	Material	Thickness	Constant	Board Layer Stack
	Top Overlay				
	Top Solder	Solder Resist	0.40mil	3.5	
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4	Bottom Layer		1.40mil		
	Bottom Solder	Solder Resist	0.40mil	3.5	
	Bottom Overlay				

Total board thickness: 24.56mil

7000.00

