

# Standalone power converter

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Jason Foster

Lutong Ji

Yu Zhou

Nan Duan

Mohammad Alrashidi

Mentor: Arnau Rovira Sugranyes

Client: Dr. Venkata Yaramasu



# Our Purpose

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Current converters on the market are finely tuned to one specific application, we would have no ability to adjust certain parameters to fit different needs.

By building our own we can create subsystems that can be used in other converter projects

Code and Schematics can be saved and stored for future endeavors

# Breakdown

Heat Dissipation: Heat can damage components of the circuit which can cause the circuit to fail.

Power Conversion: Power generated from the source (Solar Panels) needs to be converted so that it can be stored into the battery and converted again so that it is suitable for the loads (Houses).

Switch Operation: Someone/something need to adjust the switches to ensure the converter is operating at maximum efficiency at all times

# Breakdown continued

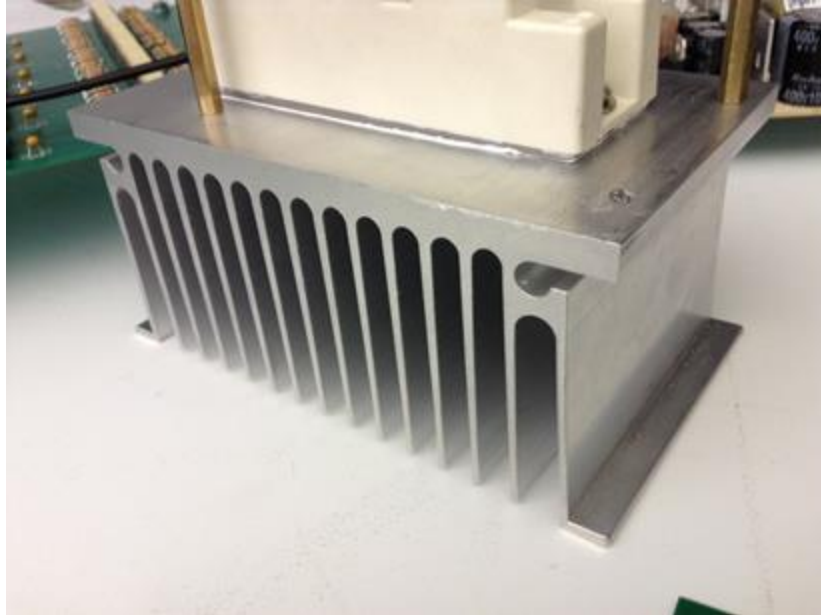
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Interfacing: For testing purposes our converter should have a way to connect to a device to run the converter under controlled conditions.

Measurements: For testing purposes/troubleshooting we need a way to measure the voltages and currents without taking the converter apart.

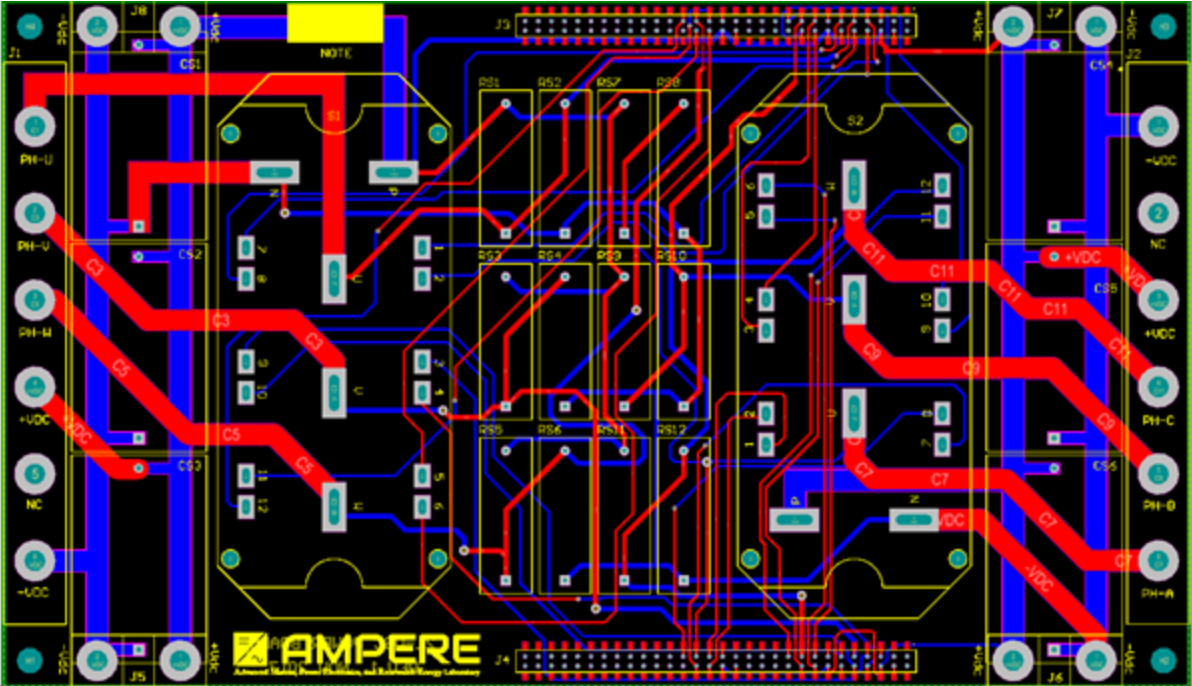
# Solutions and Costs

Stack 1: Heatsink from WakeField \$74.42



# Solutions and costs continued

Stack 2: VSC power board  
\$123.30 per board



# Solutions and costs continued

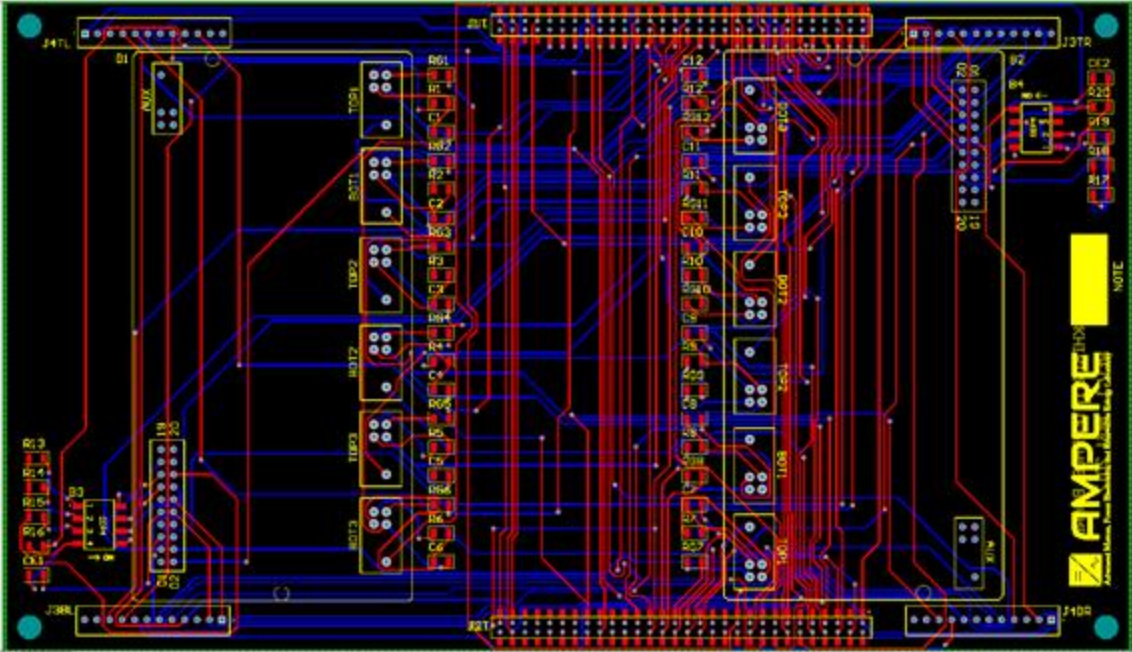
Stack 3: Gate Drivers \$103.66 (12-pack)



# Solutions and costs continued

Stack 4: Stack 4: Interface board(SKH61R)

\$39.78 per board

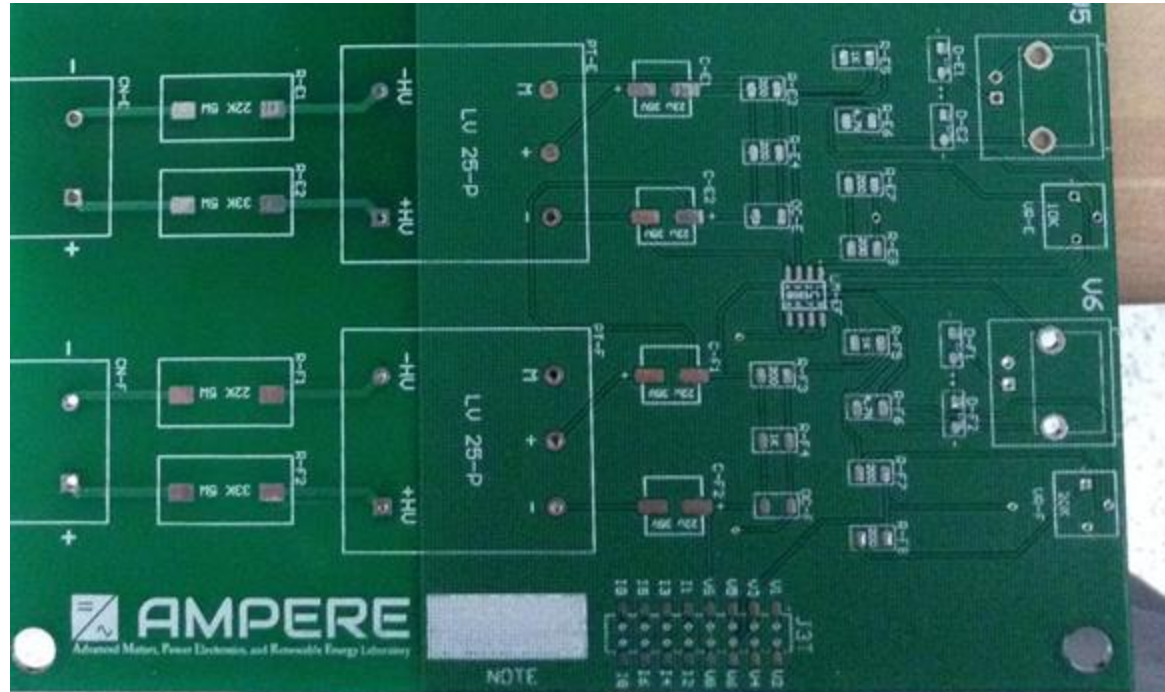




# Solutions and costs continued

Stack 5: Voltage Sensors

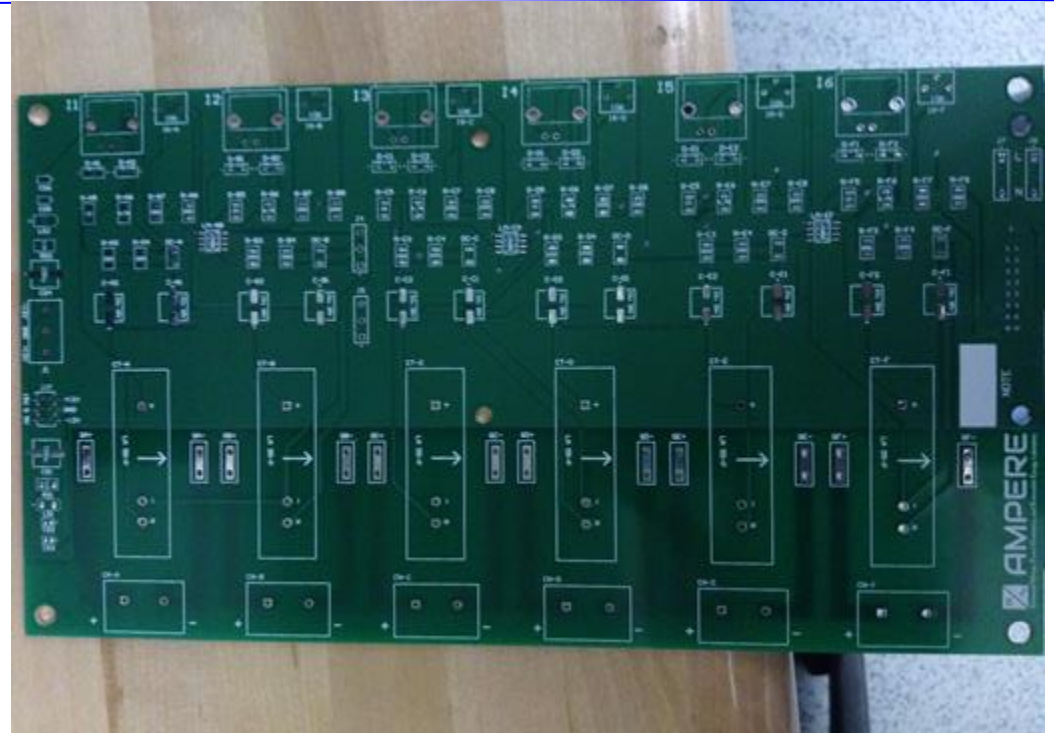
\$26.52 per board



# Solutions and costs continued

Stack 6: Current Sensors

\$26.52 per board



# Solutions and costs continued

Miscellaneous parts: \$787.64

Quantity	Part Number	Description	Unit Price
2	277-10189-ND	DIN RAIL 35MMX7.5MM SLOTTED 1M	2.78
100	WM13557-ND	CONN QC RCPT 18-22AWG 0.110	0.0945
4	Z5187-ND	SWITCH SLIDE DIP SPST 25MA 24V	1.61
10	296-14911-1-ND	IC BUS TRANSCEIVER 8BIT 24SOIC	1.003
20	S5700-ND	CONN FEMALE 60POS DL .1" TIN SMD	4.983
25	2N7002WCT-ND	MOSFET N-CH 60V 115MA SOT-323	0.397
8	S5678-ND	CONN FEMALE 16POS DL .1" TIN SMD	1.89
16	S5673-ND	CONN FEMALE 6POS DL .1" TIN SMD	0.842
35	570-1048-ND	ICL 30 OHM 20% 5A 22MM	1.482
50	732-10411-ND	HEX STANDOFF M6 STEEL 12MM	1.0296
100	952-2672-ND	BRIDGE PIN 0.7MM X 15MM	0.1534

Quantity	Part Number	Description	Unit Price
1	C0973AG-50-ND	CABLE 5COND 22AWG GRY SHLD 50'	56.89
1	732-10394-ND	HEX STANDOFF M5 STEEL 8MM	0.8
8	A117623-ND	80 MODII HDR DRST UNSHRD STKG	20.31
100	732-10485-ND	HEX STANDOFF M5 STEEL 40MM	0.7623
2	SMD291AX250T3-ND	SOLDER PASTE SN63/PB37 250G	41.95
1	SMD291AX-ND		14.99
25	255-2099-5-ND	RELAY GEN PURPOSE SPST 20A 12V	3.28
25	1727-4831-1-ND	DIODE ARRAY GP 100V 175MA SOT323	0.204
10	455-2930-ND	CONN HEADER VA VERT 2 POS 7.92MM	0.208
6	A19475-ND	CONN HEADER VERT 12POS .100 TIN	0.61
6	A30941-ND	CONN RECEPT 12POS 24AWG MTA100	0.85
1	WM15682-5-ND	CABLE (4X2X0.38+4X0.5) WSOR 5M	60.41
40	S1012E-05-ND	CONN HEADER .100 SINGL STR 5POS	0.423

# Prototyping Plans

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Develop Simulink simulations for the DSpace environment for the components we need to test.

By having each board contain one of our subsystems testing is simplified to connecting a single board into DSpace and uploading the Matlab Simulink model.

DSpace License: \$2,950 per year

DSpace Hardware: \$12,000

# Recap

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We need to implement a design that can properly dissipate heat, provide voltage and current measurements, connect to DSpace for testing, and be able to change the switching state without human interaction.

We have selected to split our substations into stacks, each stack will contain a separate subsystem and the stacks will be placed on top each other utilizing spacers to separate stacks.

This way each subsystem can be tested through DSpace separately after connecting to the interfacing board.

# Conclusion

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Our team will be able to create a six stack converter for our client Dr. Yaramasu.

By using the parts previously listed we will implement our subsystems within a stack.

The heatsink will pull heat off the converter board, the gate drivers will control the converter board, the current and voltage measurement boards will allow us to read internal/external signals and the interface board will let DSpace communicate with each subsystem for tests.