Reverse engineering of Opel Ampera/Chevy Volt Inverter

Use Information at own risk

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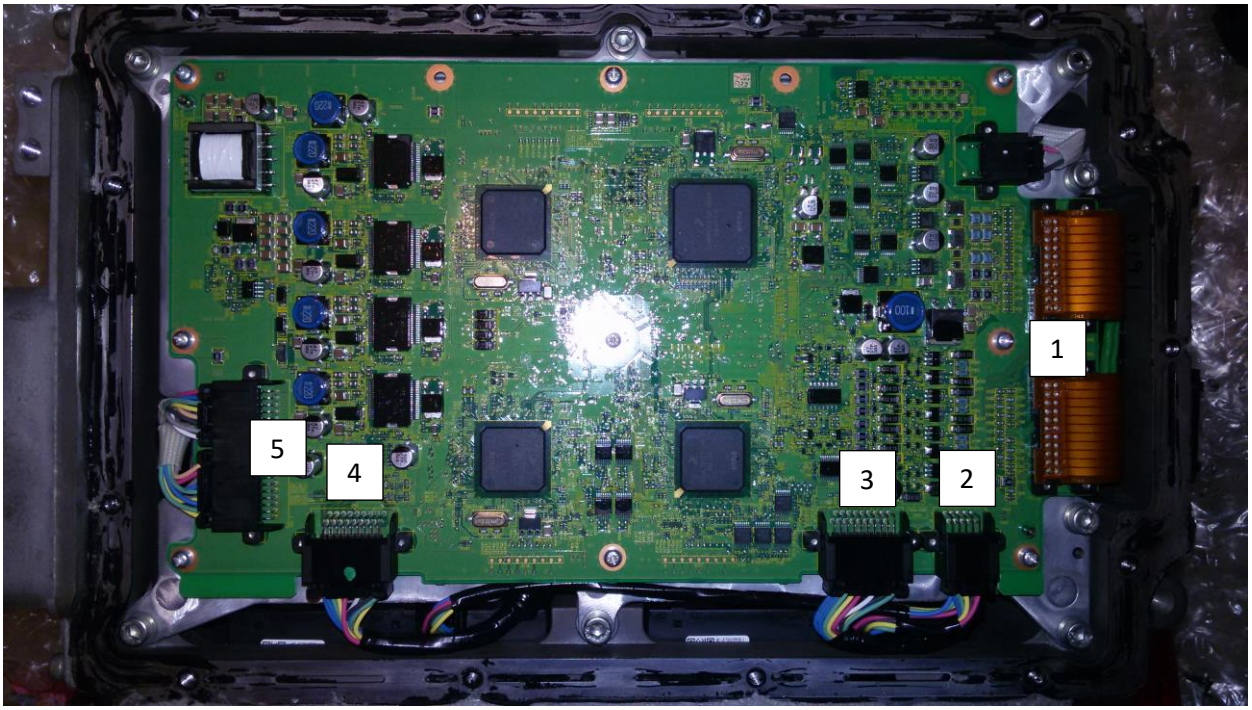
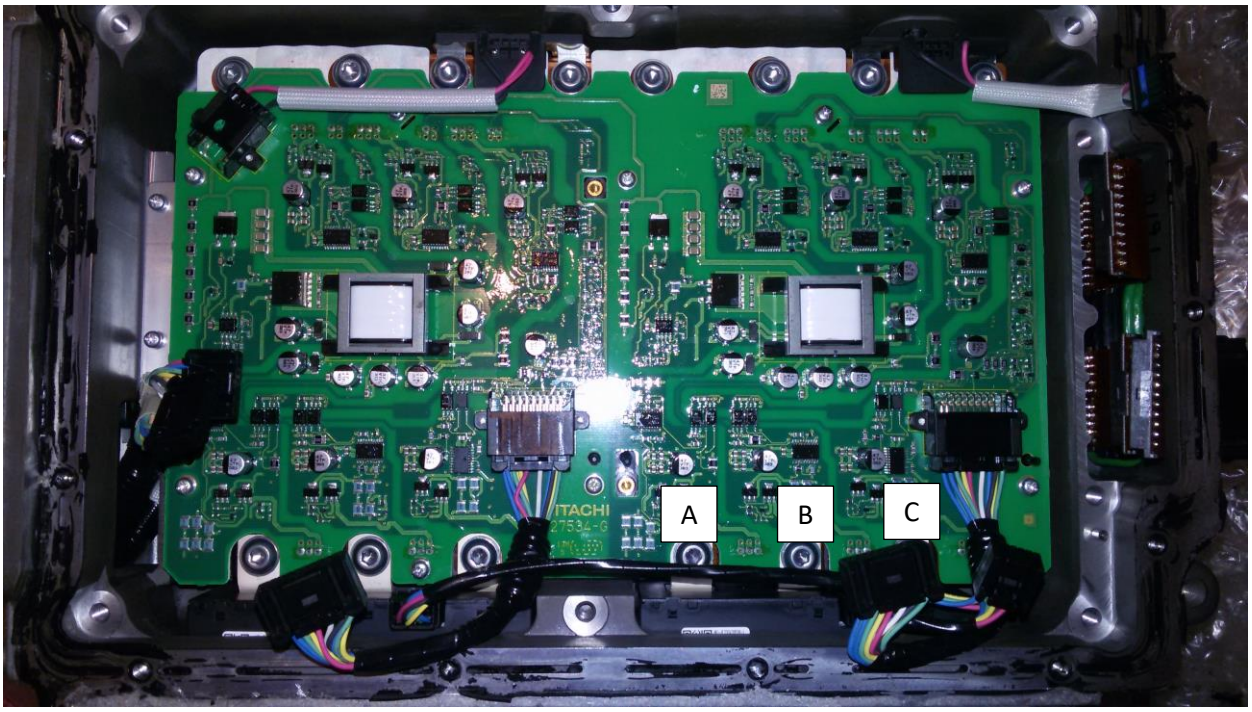
Controller board



1. Input connectors
2. Current sensor connector
3. HV stage 1
4. HV stage 2
5. AUX HV control

Currently unknown what exactly is in the inverter besides the two power stages, I believe that the control for the heater and AC compressor is located under the HV driver stages, these are controller by the connectors labelled 5.

Powerstages



Each HV stage is standalone, only shared connection is the HV bus.

A few technical points about the stage design

1. HV bus is used to create the IGBT driver voltages
2. Requires roughly 30V to be operational
3. Optocoupler inputs, inputs are ***high when not active***
4. Fault feedback
5. Three temperature sensors

To control a bottom or top gate the corresponding wire needs to be pulled to ground.

System is thus ***Active LOW***

Connector HV Stage Layout

JST connector 18 pin 2.0mm spacing offset between rows

9	8	7	6	5	4	3	2	1
blue	green	yellow	red	-	white	-	black	green
18	17	16	15	14	13	12	11	10
blue	green	yellow	-	-	-	-	blue	yellow

pin	color	function	
1	green		Temp B
2	black	ground	
3	-		
4	white		
5	-		
6	red	power	+5V
7	yellow		Top gate A
8	green		Top gate B
9	blue		Top gate C
10	yellow		Temp A
11	blue		Temp C
12	-		
13	-		
14	-		
15	-		
16	yellow		bottom gate A
17	green		bottom gate B
18	blue		bottom gate C

Current Sensor

Three phase current sensor

pins		
1	blue	phase cur C
2	green	phase cur B
3	yellow	phase cur A
4	black	gnd
5	red	+5V
6		

2.5V resting voltage output, range of 700amps (guess based on name). This would yield 2v for measurement range.

2.85mv/A

Below is results from test with 20 windings through the sensor. Assumption thus deemed correct.