

Prototype adaptor fix for CCS2 charging issue on Atto3 (and others T3 etc)

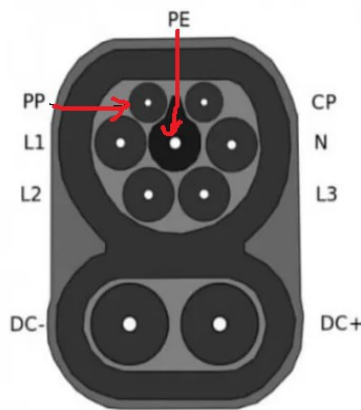
Background

Atto3 2022-2023 were sold as CCS2 compatible. However the voltage on the PP (proximity pilot) line is not within accepted limits. In particular the Atto3 will not charge at Tesla Superchargers V3/V4. There were also reports that the “Freewire” chargers also would not initiate a charge. (Not an issue now in Australia as they went bankrupt). Newer chargers based on the Tesla model (eg BP Europe) are also coming which could lead to further issues in the future.

This is conjecture on my part but it looks like other charging systems accept the low Atto3 voltage as OK or don't check at all. However it looks like Tesla is more rigorous in following the standards. Can't check as all these standards are behind firewalls. Why have a safety standard that a typical user can't check!

How to check if I have a problem.

You will need a multi-meter and a 1500 ohm resistor. Open the charging flap on your car and expose the top half of the charging port. The PP pin is top left and PE is in the middle. With your multi-meter measure the DC voltage between PP and PE. It will be about 5v or slightly less. Now put a 1500 ohm resistor between PP and PE. Ie across the multi-meter plugs. The Atto3 will measure about 0.65V. Other compliant brands will measure about 3.5v.



I am assuming the Tesla SC V3/V4 sees this low voltage as an error and won't initiate the charging.

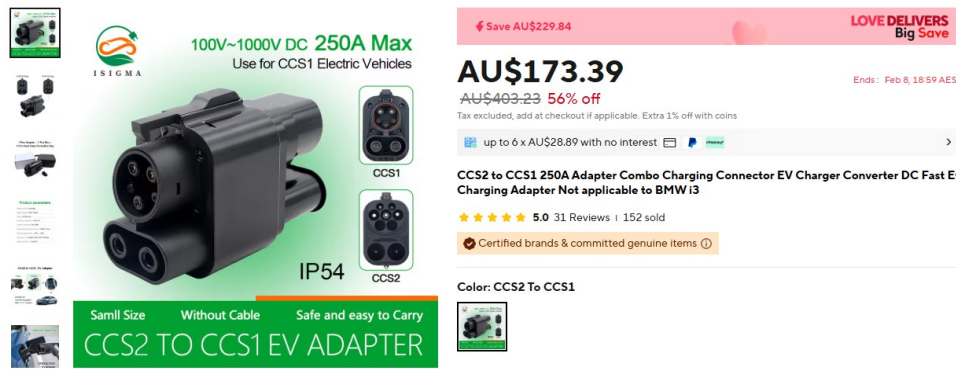
A Description of my Prototype:

Caution: This is intended as a guide only. It is intended to be used as a basis for a manufacturer to use this as a guide for designing and building a commercial device. I do not accept any liability for any damage if you build and use this device.

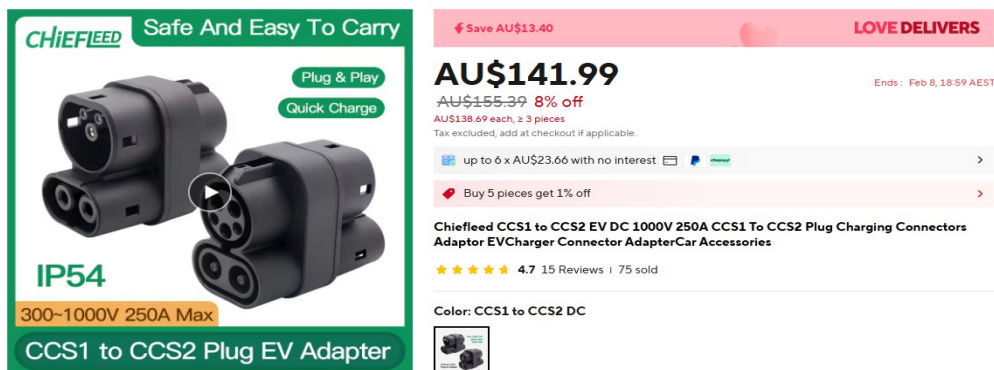
A fix involves tricking the charger to see ~3.5V while the Atto3 still see's 0.65v. I suspect there is a common voltage that is acceptable to both the Tesla SC and the Atto3 but haven't tested this. The “Seal” fix of a modified wiring harness and a resistor must use this idea.

For my prototype I have taken two commercial adaptors. A CCS2-CCS1 and CCS1-CCS2 adaptor. Join them together and you basically have an extension adaptor and can modify the PP circuitry. Adaptors were sourced through AliBaba and there details are below:

CCS2 – CCS1: There may be better or worse ones but these are what I selected.



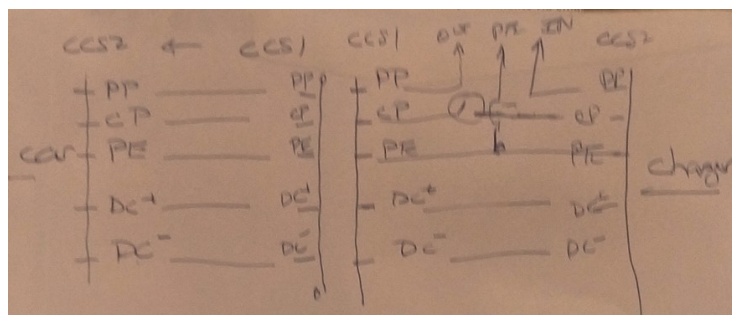
CCS1 – CCS2:



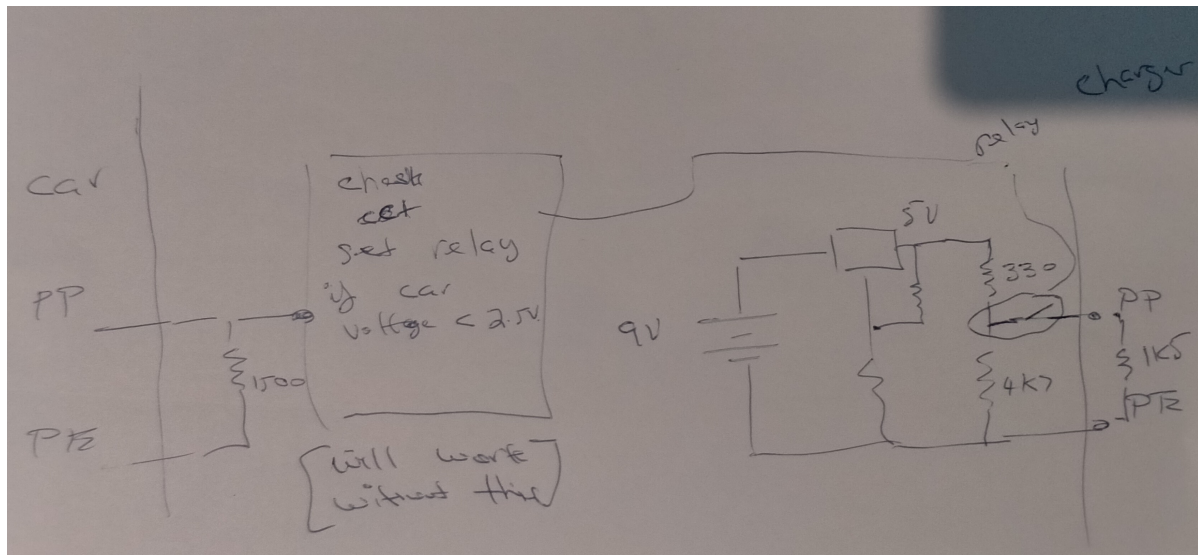
The PP line on both adaptors need to be modified accordingly. Starting with the CCS1 → CCS2 adaptor. You need to unscrew the case. There will be a 1500 ohm resistor from the PP to PE pins. I removed this resistor with the intention of adding this resistor to the control board. However you could leave it if you prefer. The PP pin on the CCS1 end was not connected. I soldered in a wire to join the PP pins at both ends. So all the pins are straight through. This adaptor was full of a high density type foam which made things slightly difficult.

I next modified the CCS2-CCS1 adaptor. The CCS1 end has a couple of resistors from the PP line to PE. I removed them. Everything else was straight through. The CP line goes through a switch which is activated when the CCS1 ends are joined. Pressing this button open circuits the CP line for a quick shutdown if necessary. In this adaptor I didn't bother replacing the AC pins as they are not used. I also noticed that the adaptor had a thermal cut-off on the CP line which is a good thing. From this adaptor I led out 3 lines. The PP line on the car side. A wire soldered to the PE line and a wire from the PP line on the charger side. These are used on the control board.

Here is a circuit of what we have so far:



The next thing is the circuit board. As mentioned earlier we want to see 3.5v at the charger end and 0.65v at the car end. The car end is easy. Just a 1500 ohm resistor from PP to PE. At the charger end we are emulating a car. We need a 5v power supply. I use a 9v battery and an LM337 regulator feeding a resistor chain.



In this prototype I monitor the voltage on the car end PP line. If it is around 0.65v I set a relay at the charger end. If this relay is not set then the charger will think it is not connected and nothing will happen. In this case I used an Arduino which is overkill but is easy. Next prototype still under development will use a comparator and transistor to drive the relay.

This check is probably not necessary. I think it is a good thing for everything to stop if the pp line is lost at the car end. However if this happened the cp line would also have been lost so things will stop anyway.

The electronics was mounted in a small plastic box.

Testing

First test was on a local 30KW local non-Tesla charger with a nearly fully charged car. So we never went over about 20Kw. The circuit will work on any charger and it worked. I was interested in whether the “cheap” Chinese adaptors would handle real world currents. Weren't even warm.

Next tested on Tesla V4 supercharger. Connected OK and charged. Couple of air punches and self-congratulations. Car at about 45%. Charging was up-to 89Kw. The adaptors again didn't get warm.

I only tested on the one Tesla station so it was by no means exhaustive testing. But enough to show me how simple a solution could be.

Improvements:

The CCS2->CCS1 adaptor doesn't have a lock on the charger side. I may look into 3d printing something.

Obviously a CCS2->CSS2 adaptor would be much better.

Brickbats

BYD for this whole sorry saga. I'm not upset for there initial oversight. CCS2 is not a charging standard in China and there tests on CCS2 chargers didn't show up the issue. However it all goes downhill from there when trying to get a fix through BYD Australia. Customer care was just falsehoods, obfuscation and pure fantasy. Eventually they did admit to me they weren't going to address the issue. Feel its fairly sad they wouldn't help fix such a relatively simple oversight! Even the local dealer could have made a similar solution to this with a ready market and probably made a profit. Rather they spent there time talking around the problem, sending out spurious customer care emails. Anything but initiating a fix whether free or paid! Makes me wonder how you run a business with this mentality.