



VEBKO ONLINE HELP

Overcurrent Error Board 2 Part2

Category	tester
Section	Troubleshooting
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IGBTs' burning out can be another reason for an Overcurrent error of board number two.

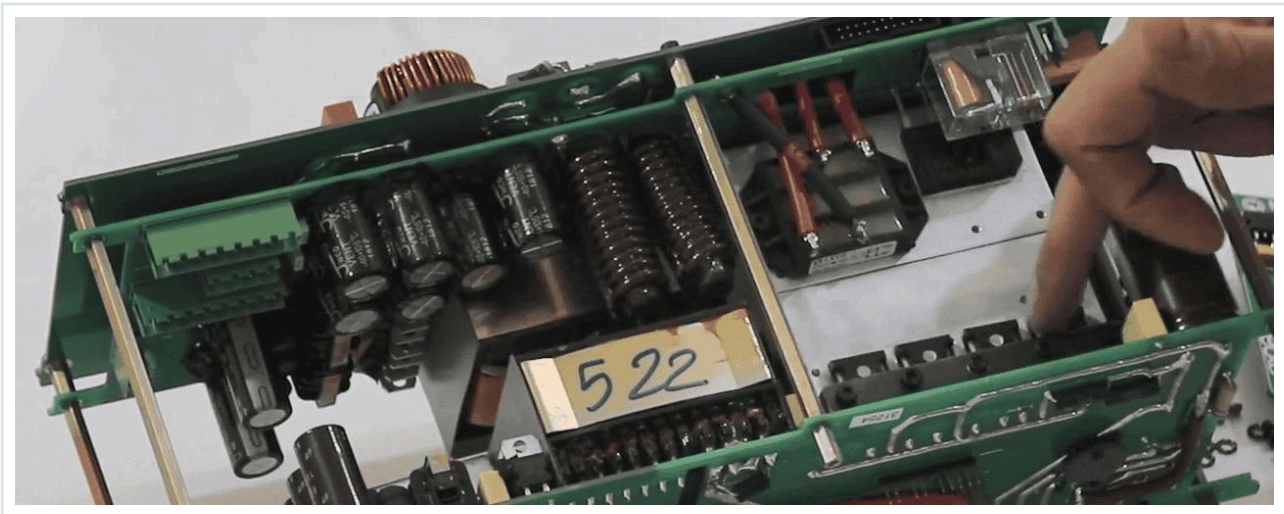


Figure 1

Here there are four IGBTs which are numbered as IGBT1, 2, 3, and 4 and they are connected to each other two by two. IGBT 1 is connected to IGBT 3 and IGBT 2 is connected to IGBT 4. In testing them if IGBT 1 is burned out, IGBT 3 will definitely be shown as burned out as well. In this case, it is possible that both of them are burned out or maybe only one of them is burned out. To detect the burned-out part, we need to remove one of the IGBTs from the circuit and test it outside the circuit. If it is healthy then the other one is burned out. But if the one outside the circuit is burned out, we test the other IGBT on the board and if it is healthy there is no problem but if it is not healthy then both IGBTs are burned out and need to be replaced.

To test an IGBT, we need to test its three pins including gate, drain and source. Between drain and source, a diode test should be connected on one side and Overload from the other side. Diode test between gate and source pins and between gate and drain pins should be Overload on the both sides and if there is a short-circuit or a value, the IGBT has been damaged. Now we test the IGBT. First between drain (the middle pin) and source (the right-side pin) which is open from one side. The negative probe is connected to drain pin while the positive probe is connected to source pin. There is 0/48 value from one side and Overload from the other. Now we take gate with drain and source, they should be both Overload and the results does not change if the probes are swapped. There must no plan to any other pins from drain. This test is the same for all pins.

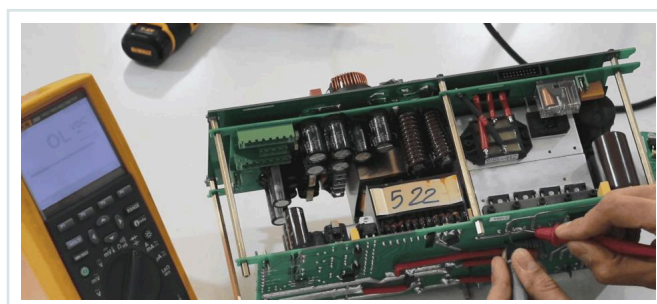


Figure 2

Now we suppose that one of these IGBTs is damaged which means that we have an Overcurrent problem of board number two. We tested the diodes and they are all healthy. So, our conclusion is that the problem must be with IGBTs. We tested the IGBTs and IGBT one and three have signs of being burned out. Now we need to find out which one is burned out and explain how to replace it.

There is a holder on IGBTs one which has five screws. This holder attaches all IGBTs to the heat sink applying the same amount of pressure. To open it we need to open these five screws, and then the holder is released. Now we want to remove IGBT number one from the circuit. To do this we need a tool named desoldering suction. This too, in fact, removes the tin from the circuit so that we can easily release the pins. Now we hold the soldering iron on the first pin of the IGBT until the tin is completely melted, then using the desoldering suction, we remove the tin. We repeat this for the rest of the pins. If the tin is not completely removed, we can add some more tin and try removing the tin again. We turn the module upside down; by moving the IGBT we can easily remove it from the circuit.

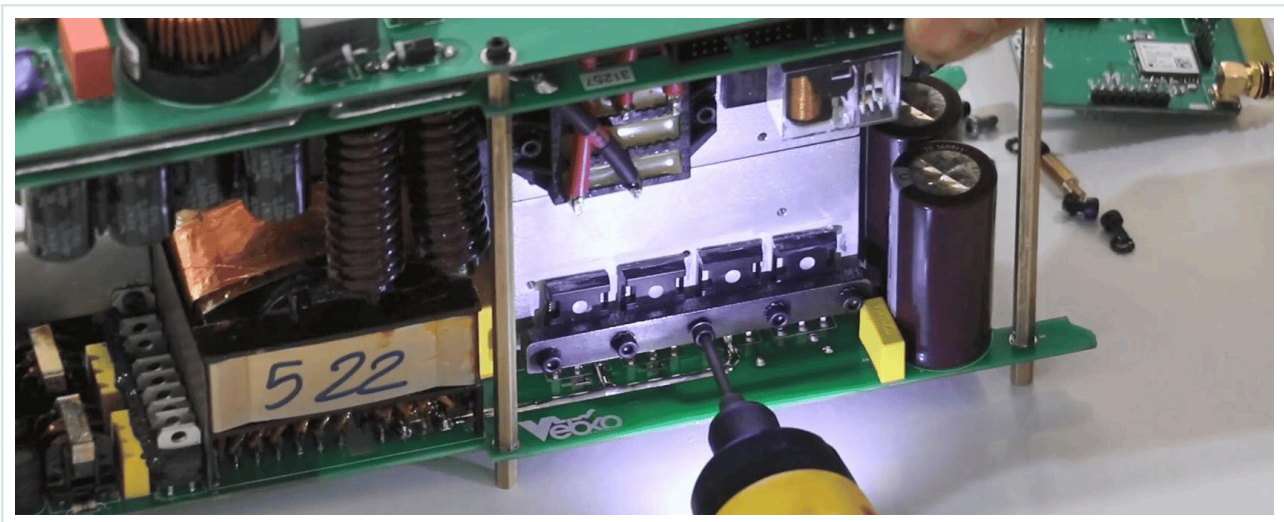


Figure 3

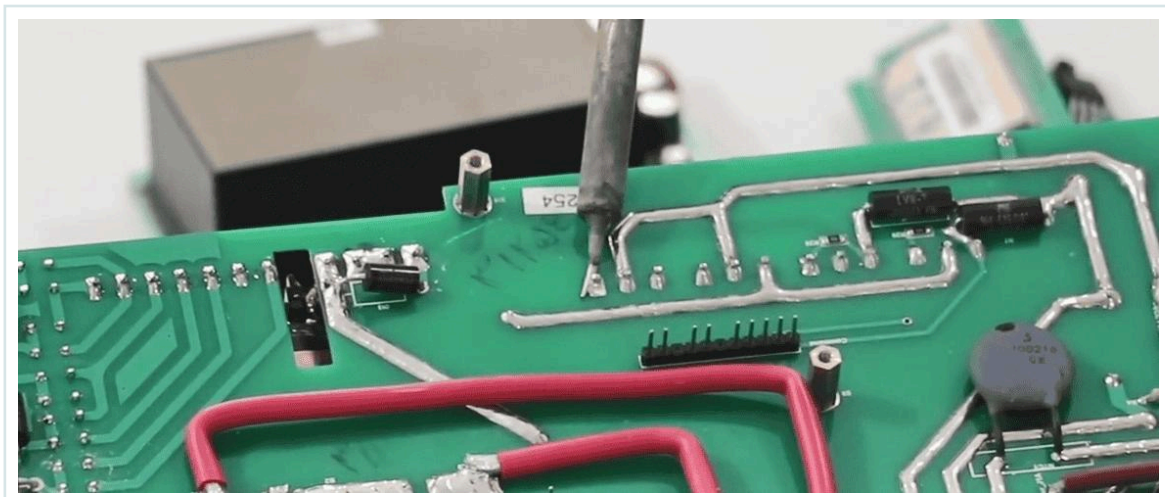


Figure 4

We test the IGBT one more time outside the circuit. The pins of the IGBT are gate, drain and source. There is a connection between drain and source from one side and the diode test shows a number but from the other side, when we swap the probes, it shows Overload. Between gate and drain and also gate and source there should be Overload. This means that there must not be any route between gate and drain, and gate and source. We test again, the drain middle pin and source show Overload from one side and a number from the other side. Also, gate and drain, and gate and source are also Overload.

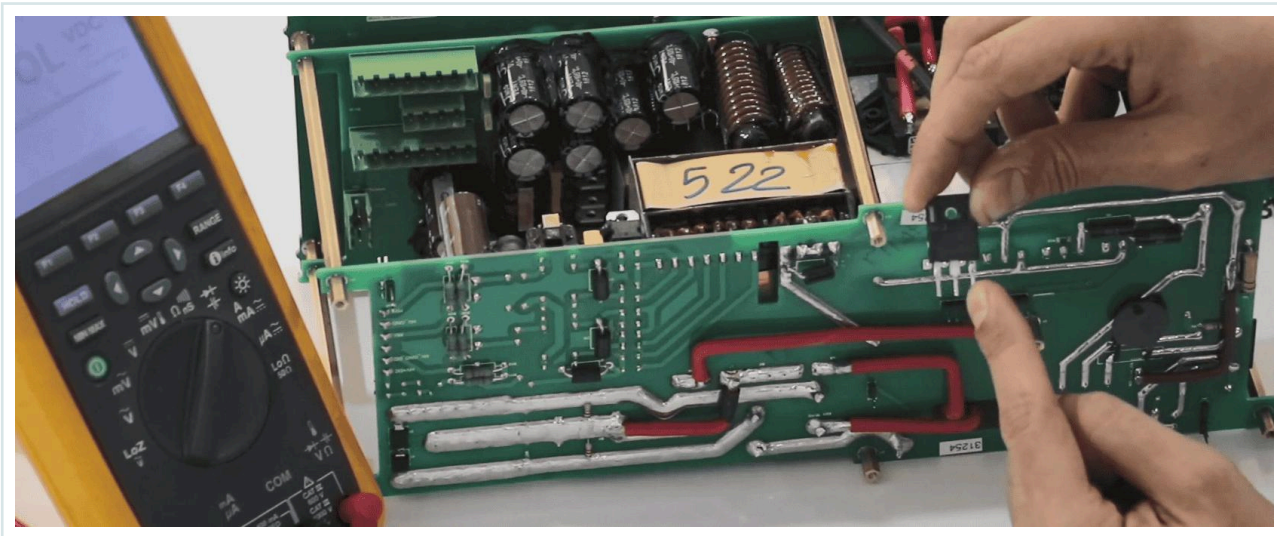


Figure 5

Now, this IGBT is healthy; supposing that there is a problem with the device, if this is healthy then definitely IGBT number three is damaged and if we take a diode test, it must prove this theory. Since now all IGBTs are healthy, it is not possible to show this., Suppose that IGBT 1 was damaged and we replaced it and now we want to put it back in its place. Now we need to remove the extra tin on its pins using a soldering iron because extra tin does not let the pins cross inside the pads. There is an insulation named mica on every heat sink and beneath every IGBT. In fact, this insulation is used to prevent any connection between the body of this MOSFET and this heat sink which is located on the switching.

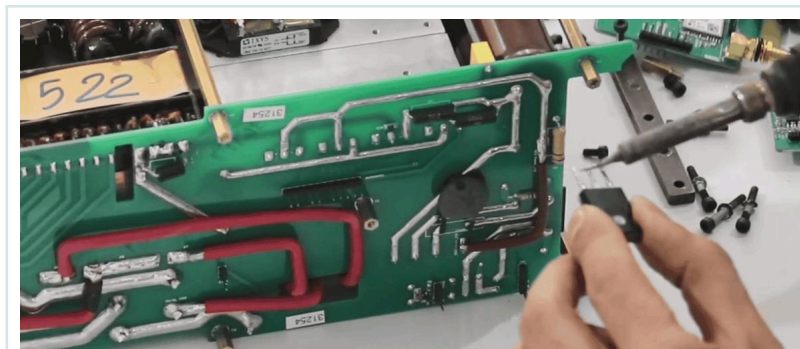


Figure 6

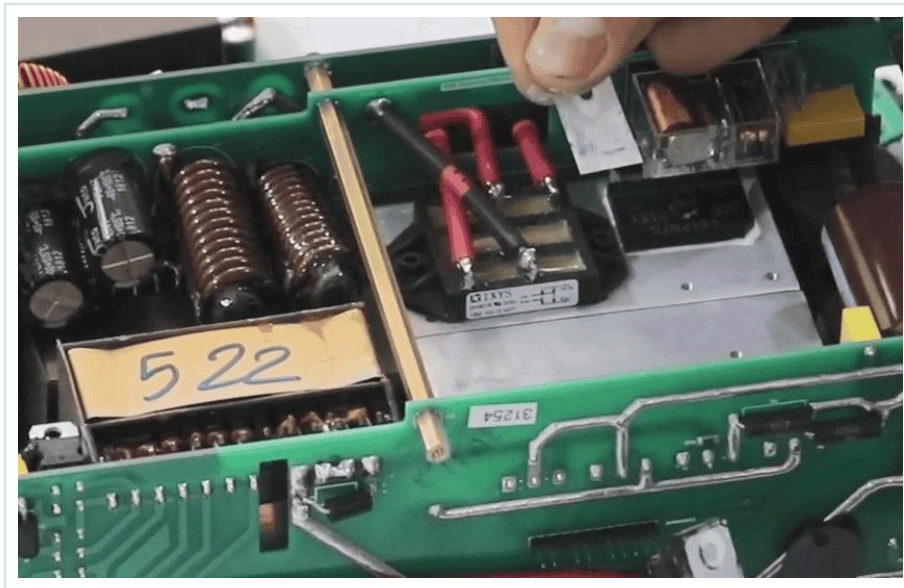


Figure 7

Before putting the IGBT back in its place we need to check its pads and make sure that there is no tin left so that we can easily install the IGBT. If there is any tin left inside the pads, we need to remove it using the desoldering suction. The holes are opened like this and this is how we put the IGBT back in its place. , Then we put the insulation back in its place meticulously. It is necessary for the height of these IGBTs to be the same because to close the holder, they all must be at the same level and with the same amount of pressure. When the IGBT is adjusted, we put tin on one of the pins like this and make sure that it is flat. Now we put tin on the other pins to stabilize them. The tin must thoroughly cover the pins. The crack you can see here needs to be evenly filled with tin.

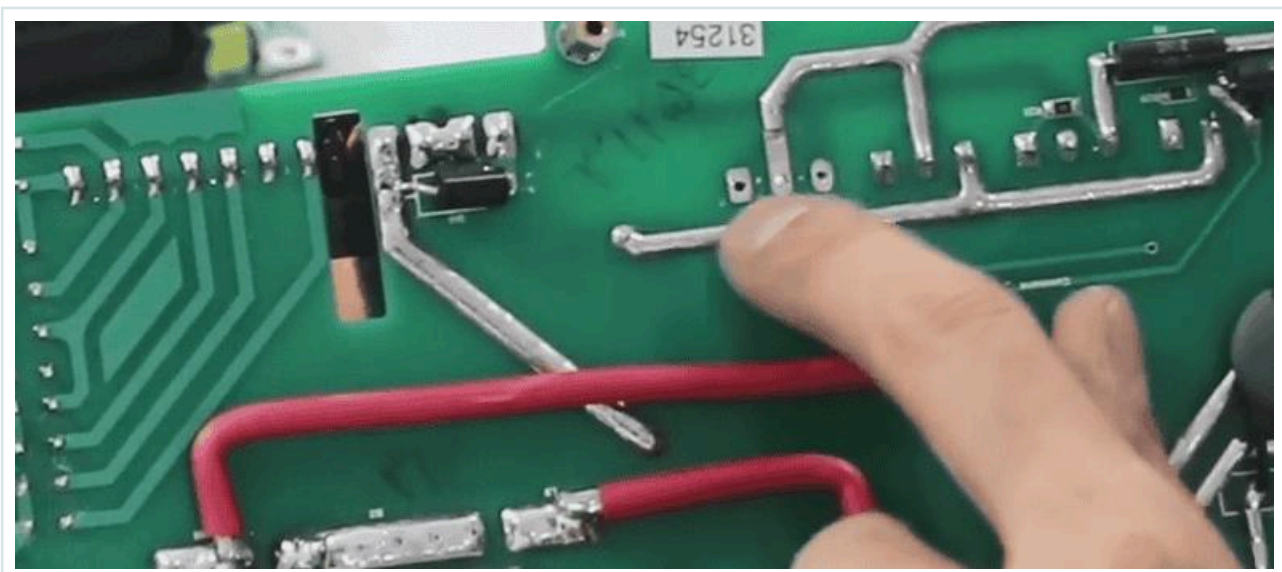


Figure 8

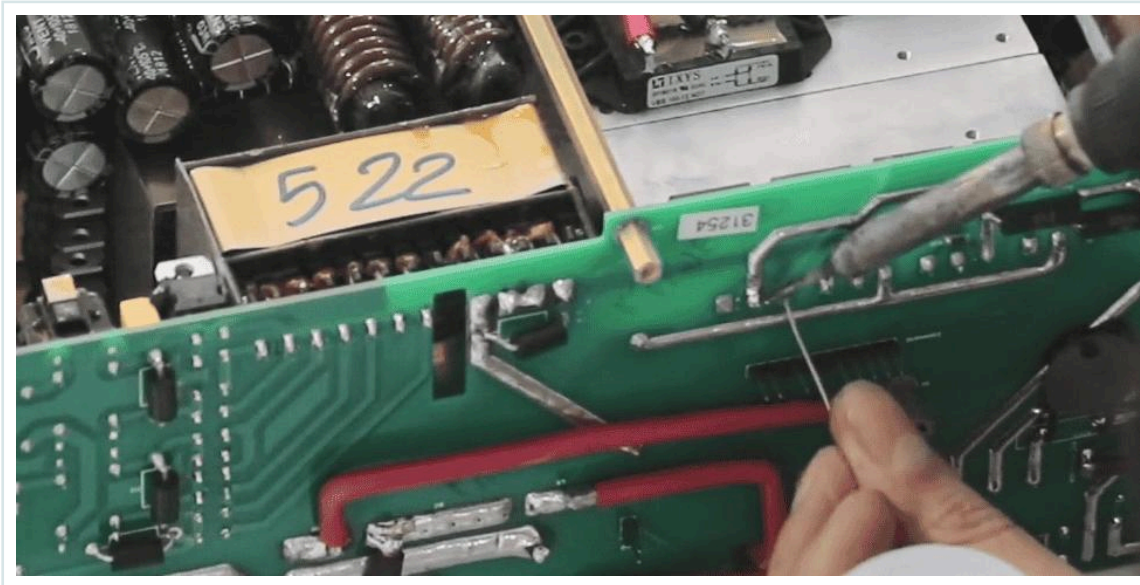


Figure 9



Figure 10

When the IGBTs are removed, there is metallized in these pads. After we remove the part, this metallized is damaged and rendered useless. In fact, the metallized is the connection between the upper and lower layer of the board. To solve this problem, we should tin-plate these pins from above. We put the tin here so that the connection between the upper pins and the upper pads is completely established, like this. After we ensure their connection, it is time to close the holder. To close the holder, we begin by fastening the middle screw. Then we put the holder back in its place and fasten the screw as long as it is reached its end but not completely fastened. Then we put the holder in a straight angle and fasten the other screws. The screws must be fastened following this exact order so that the pressure applied to the IGBTs to attach them to the heat sink is evenly distributed.

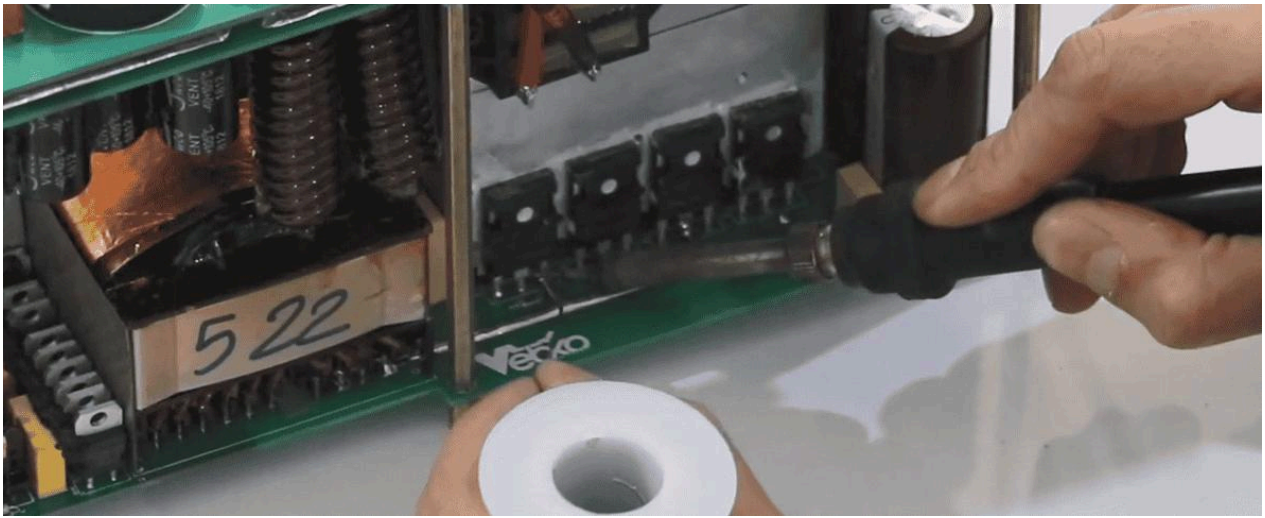


Figure 11

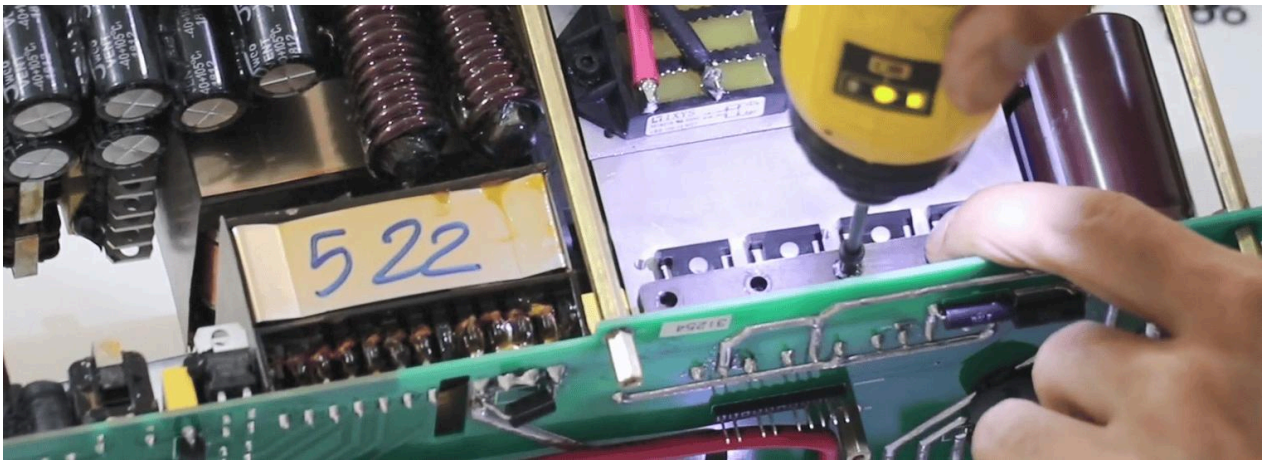


Figure 12

Now we want to make sure that there is no body connection between the IGBT and heat sink. We set the multimeter at ohm mode. We take an IGBT test from the middle pin of IGBT and the heat sink should be Overload. Then we test all IGBTs following the same procedure to ensure that there is no connection. So here the replacement of the IGBT ends and now we can close the Main Switching and take a test to see whether the problem has been solved or not.



Figure 13

[jg1]Overcurrent_Error_Of_Board2_Part2