



VEBKO ONLINE HELP

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# OC Board IGBT Test

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|-----------|------------------------|
| Category  | <b>tester</b>          |
| Section   | <b>Troubleshooting</b> |
| Language  | <b>English</b>         |
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The next element that we are going to examine is the IGBT.

It was mentioned earlier that there are four IGBTs. A diode test must be performed for the pins of these IGBTs. Every IGBT has three pins of gate, drain and source. The diode test is first performed between drain and source. If you look at the IGBT from this angle, the middle pin is drain and the right pin is source. The diode test between these pins is performed from positive to negative or from negative to positive. When the negative probe of the multimeter is placed on the drain pin and the positive side is placed on the source pin, the multimeter shows 4/8. If the probes are swapped, Overload must be displayed. The rest of the IGBTs are tested following the same procedure. In the first place, this indicates the health of the IGBT. Next, the gate pins are to be tested with drain and source which refer to the left side pin and the side pins, respectively.

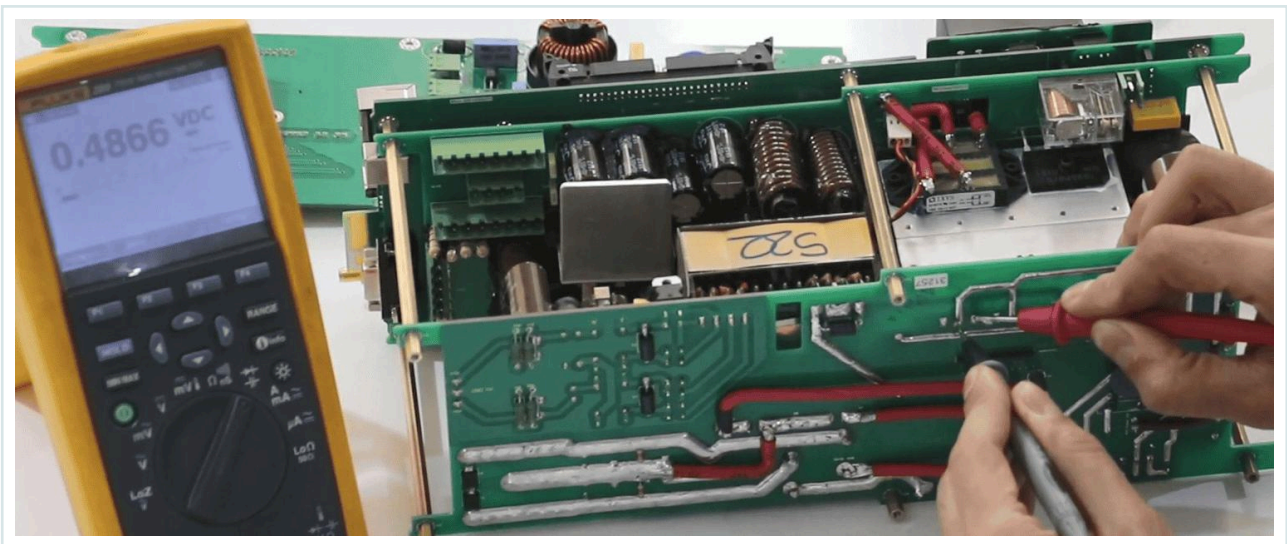


Figure 1

In this state, we should have the Overload value between every one of the pins. In fact, there should not be any connection between the gate and drain and source pins. If there is a short-circuit between these pins, the IGBT is definitely burned out. These IGBTs are shared two by two. If we number the IGBTs as 1, 2, 3 and 4, then IGBT 1 and 3 and IGBT 3 and 4 are connected. When these IGBTs are damaged, if it is assumed that the first IGBT is burned out, if the third IGBT is tested it is displayed as burned out as well. This means that their pins are short-circuited. There are two cases here where one of the IGBTs is burned out and the other is being displayed as burned out. In this case, one of them is tested by being detached from the circuit. Or maybe both of them are burned out. It is the same for the second and fourth IGBTs. If they both display signs of being burned out in the diode test, one of them is detached from the circuit (how to detach an IGBT is explained in the following) and the test is performed. If this IGBT is healthy, then the other one is burned out, otherwise the other IGBT is tested as well.



Figure 2

To open the IGBT, first we need to open this holder. The holder has five screws. The middle screw, the two side screws and then the other screws are unscrewed respectively and the holder is opened. Now, as an example, IGBT number one is removed from the board. To do this, we need a desoldering suction to remove the tin from the pins of the IGBT. Then we heat the pin and after the tin is completely melted, we remove it using the desoldering suction. We can do this as many times as needed for every pin until the tin is completely removed. If the tin is not completely removed, we can add some tin and then melt all of the tin on the pin and remove it again. The IGBT is removed from the board simply by giving it a shake. Now we test the IGBT outside the circuit. We repeat the pins, gain, drain and source. Between drain and source we should have 4/8 from one side, 4/8 inside the circuit and 4/5 outside the circuit. But between gate, drain and gate, the source must always have the Overload value. This IGBT here is healthy.

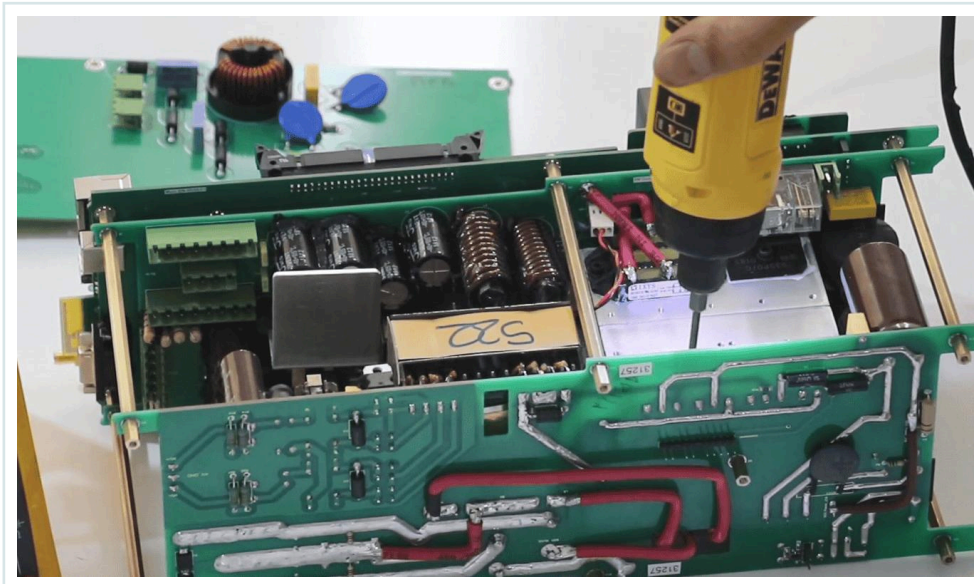


Figure 3

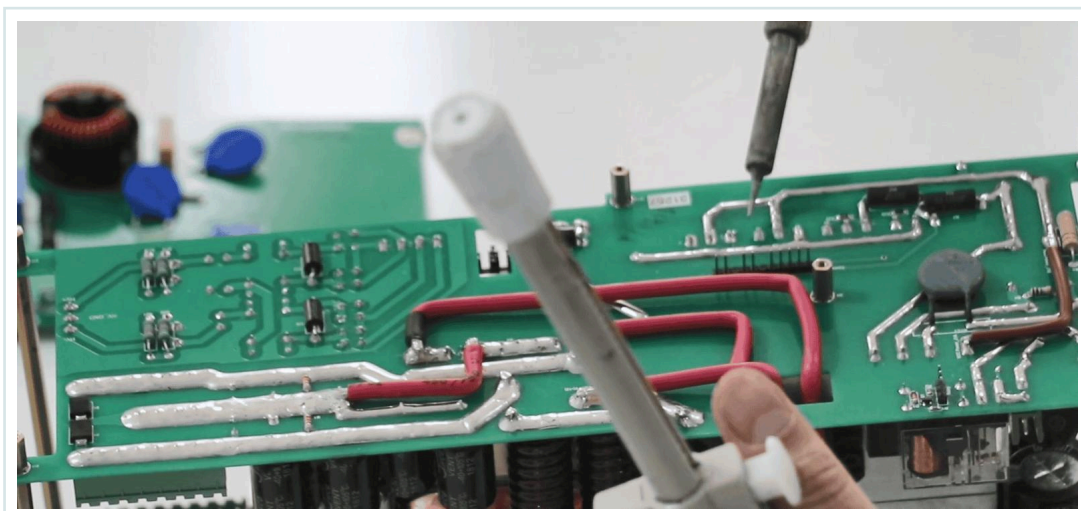


Figure 4

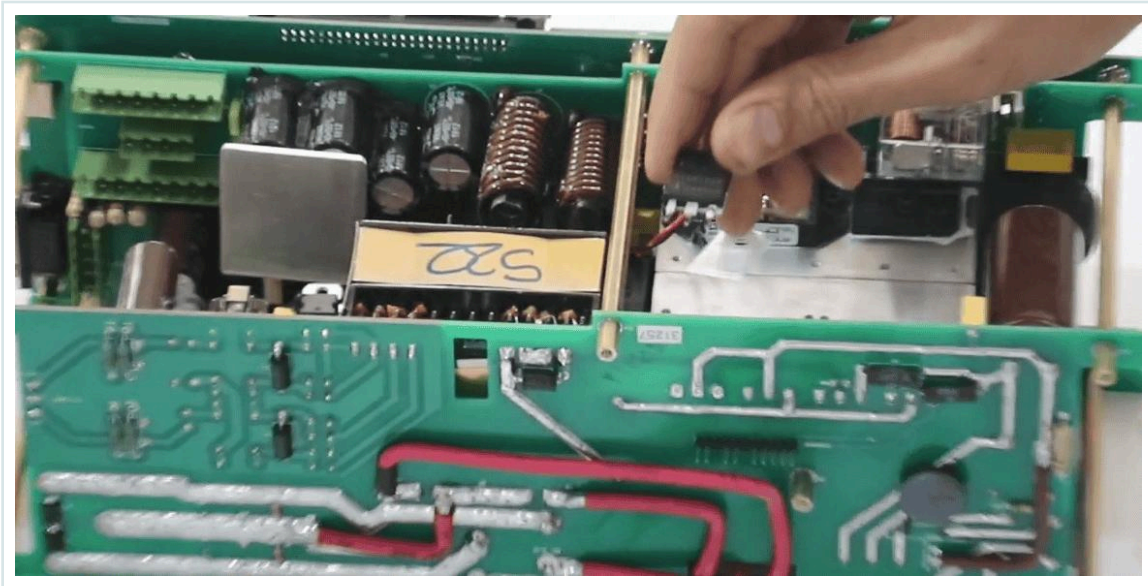


Figure 5

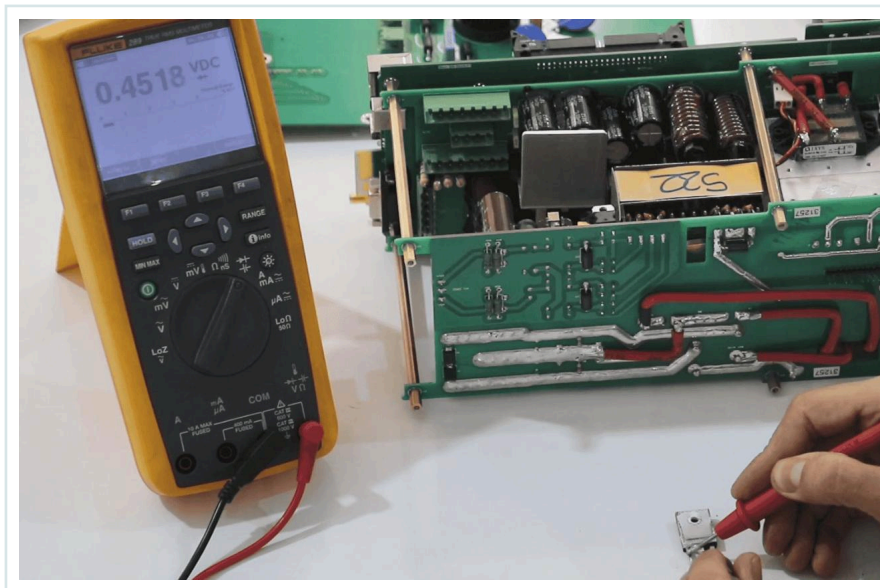


Figure 6

To reinstall the IGBT, there is insulation beneath every IGBT just like this. In fact, this insulation prevents the MOSFET body and heat sink from touching each other. This insulation must be exactly beneath the IGBT and silicon paste is used beneath the insulation. We put the insulation beneath the IGBT like this and then put the IGBT on the heat sink and then remove its pins from the pads. But before this, first the IGBT pads must be emptied from any tin. To do this, we put some tin on the pads to melt all of the tin inside. Then we remove the tin using a desoldering suction.



Figure 7

We repeat this for the next pads. Then, we remove the tin on the bases of the IGBTs. First we need to clean the tip of the soldering iron and put some flux on the pins and collect the additional tin. We repeat this for the other pins. We put the insulation talc and then install the IGBT on its extra. We put the pins of the IGBT in the pads as much as it is at the same level as the others.

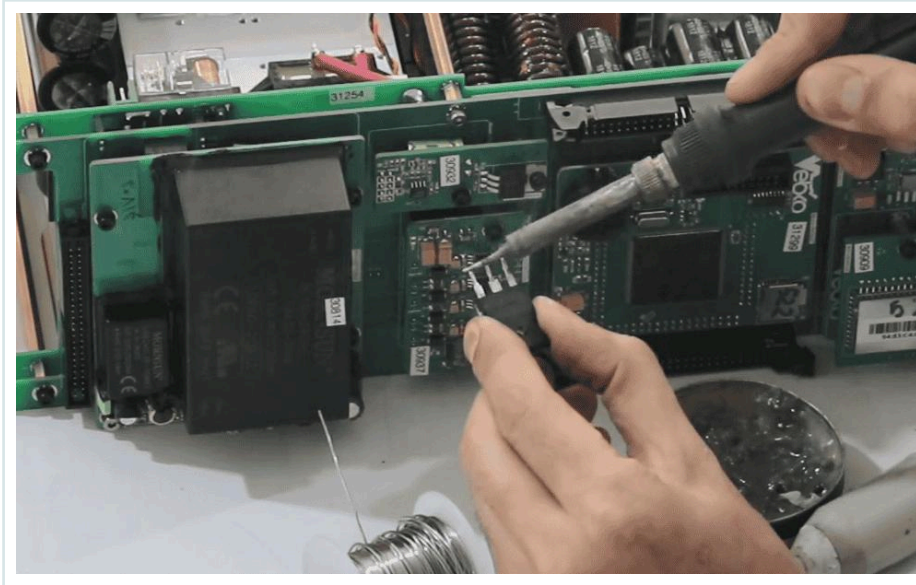


Figure 8

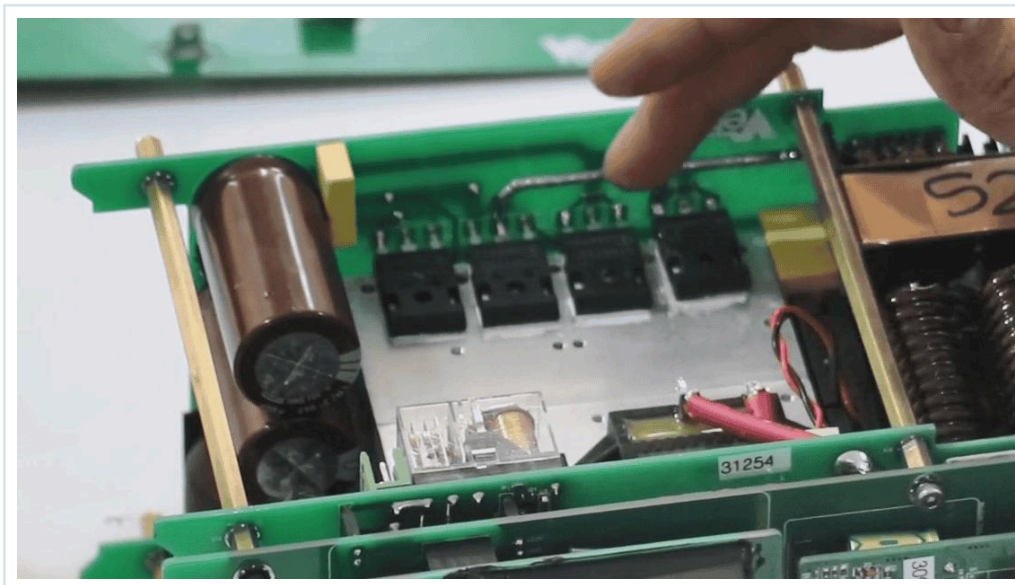


Figure 9

Adjust the IGBT and the talc beneath it, so there must not be any connection between the heat sync and MOSFET. After installing the IGBT, correctly fill the middle pin with tin so that the connection is established. Then we repeat this for the other pins. Another important point when replacing the IGBT

is that when remove the IGBT from the board, the pads may be damaged. In fact, the metalized that is inside these pads is separated. For this, put the tin on the pin from the top so that the connection with the board is thoroughly established.

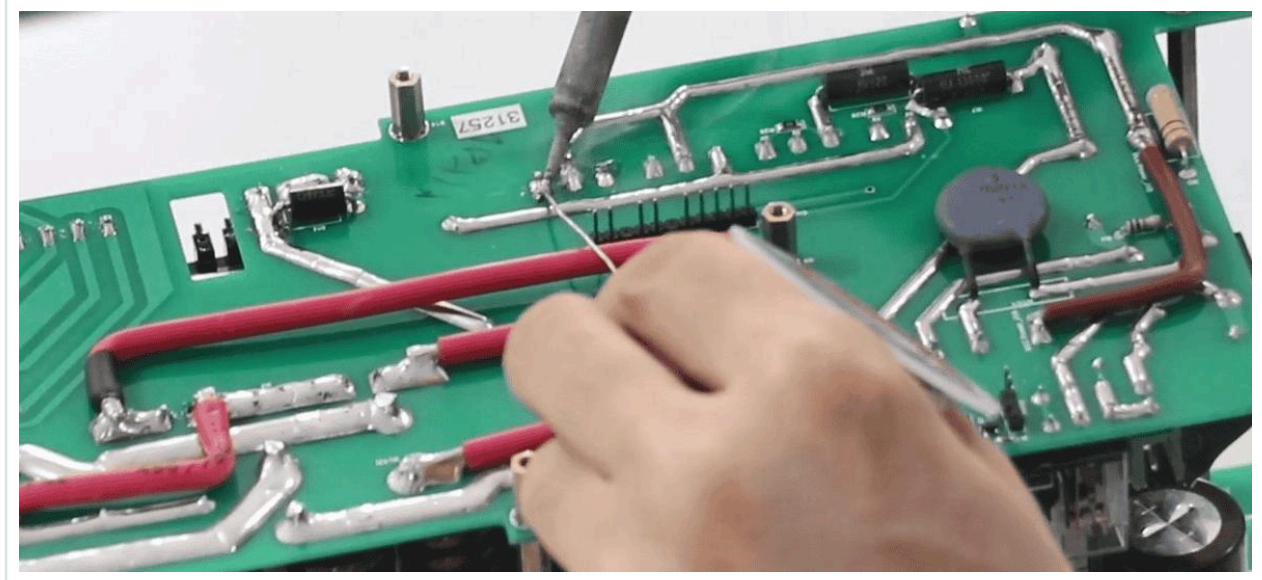


Figure 10

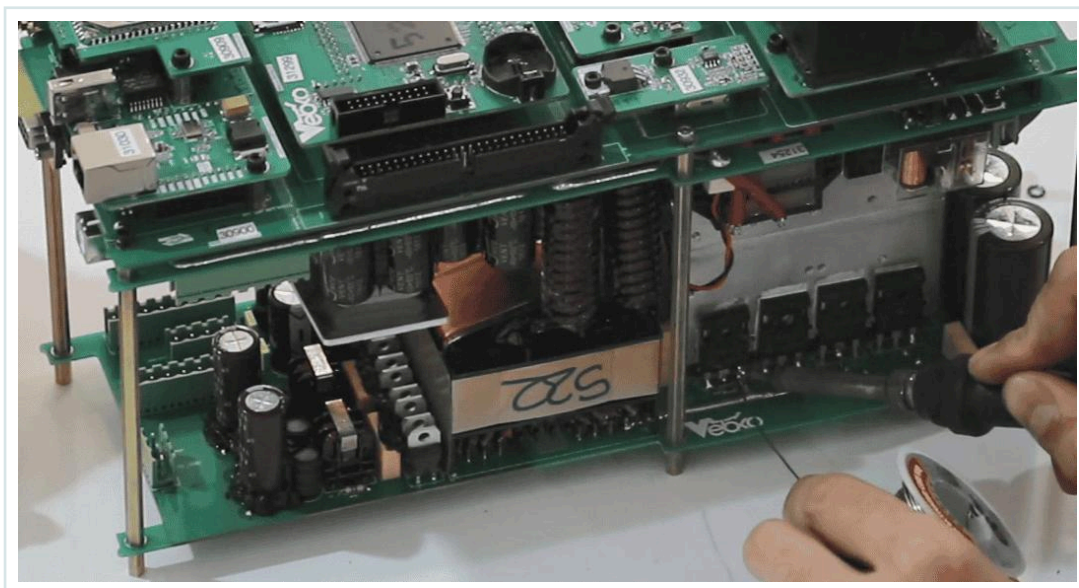


Figure 11

Then close the holder. To do so, first, fasten the middle screw because a piece of metal is putting pressure on the IGBTs and the screws must be fastened in a specific order so that this pressure is uniformly applied to all of the IGBTs. This is why you don't completely fasten the screws. Only fasten them at the end. If you are using a torque wrench for fastening the screws, set the pressure on 2.5 newtons on meter and then fasten the screw. If you are using a screwdriver, keep fastening until you feel that the screw is tight enough.

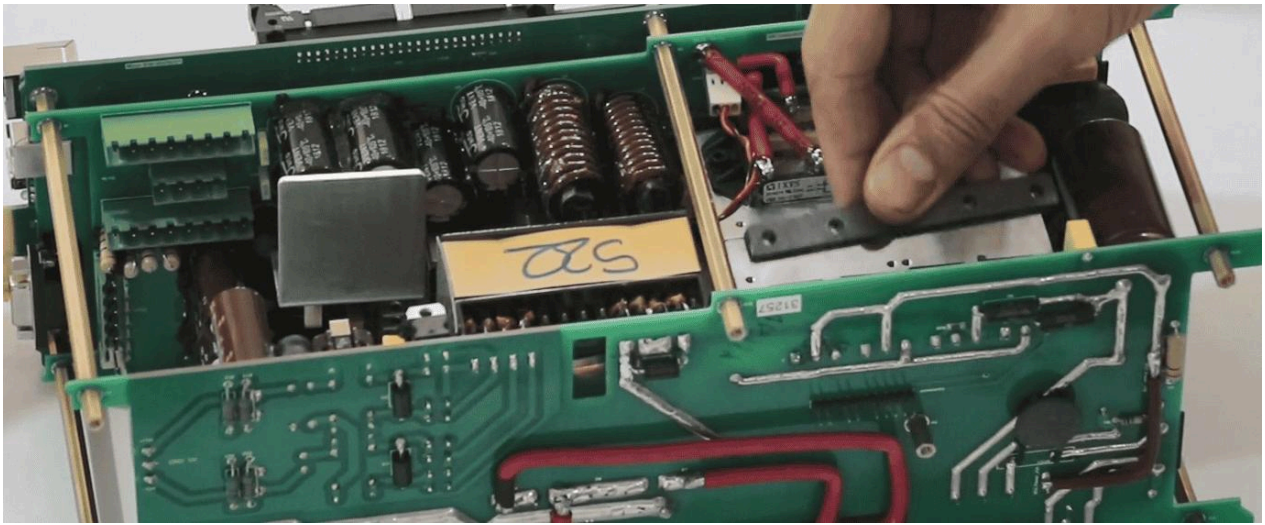


Figure 12

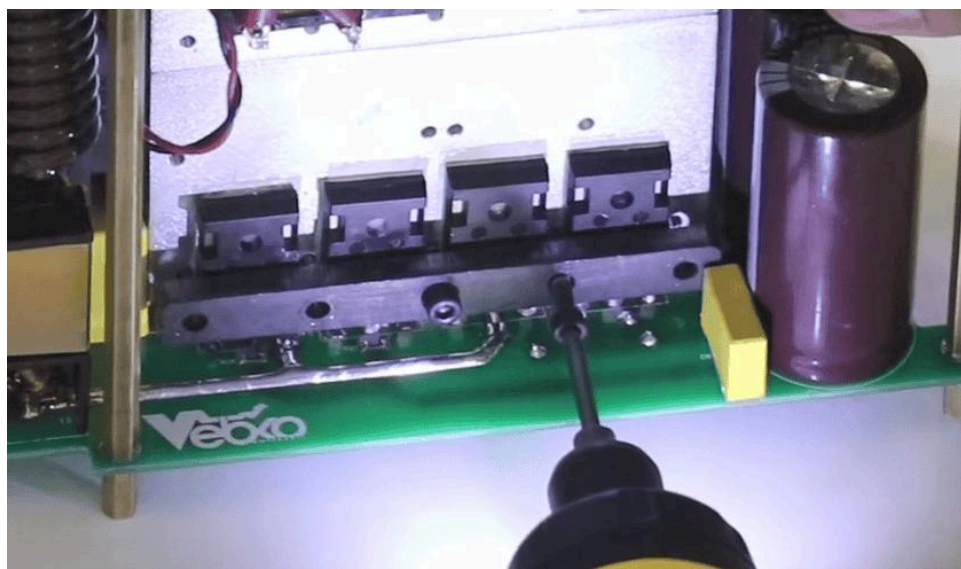


Figure 13

After closing the holder, to ensure that there is no connection, put the multimeter in the ohm mode and check the middle pin of every IGBT with the body of the heat sink. It must be Overload in all states. So replacing the IGBT ends here.

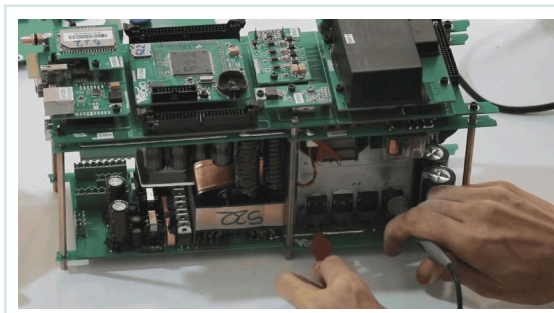


Figure 14

[jg1]OC\_Board\_IGBT\_TEST