

Off-grid Inverter 4K&5K Service manual

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UPS · INVERTER · CHARGER

Table of contents

1. General information.....	3
1.1 Getting start.....	3
1.2 Basic topology introduction.....	3
1.3 Inverter family.....	4
1.4 Overview the inverter	4
2. Troubleshooting	7
2.1 How to do.....	7
2.2 Fault condition.....	7
2.3 Test step.....	10
3. Checking and measuring guide.....	13
3.1 Check the battery side components	13
3.2 Check the bus side components.....	19
3.3 Check the buck circuit.....	21
3.4 Check the INV full bridge	23
3.5 Check the bus soft start circuit (TX2: Especially for 09 fault)	25
3.6 Check the AC switching power supply circuit.....	27
3.7 Check the battery switching power supply circuit.....	29
3.8 Check the reversed protection MOSFETs on DC side	32
3.9 Check the current sharing module of control board	34
3.10 Check the NTC circuit.....	35
3.11 Check the fan driver on the main board.....	39
3.12 Check the PAR board	39
4. Assembling guide	41
4.1 INVERTER WITH PWM 4KVA/5KVA	41
4.2 INVERTER WITH MPPT 4KVA/5KVA (OLD VERISON)	50
4.3 INVERTER WITH MPPT 4KVA/5KVA (NEW VERISON)	53
4.4 INVERTER WITH MPPT and AVR 5KVA.....	57
5. Common fault case	65
5.1 DC-DC mosfet damaged.....	65
5.2 Bat SPS module damaged.....	66
5.3 MOV (Metal oxide varistors) damaged	67
5.4 AC SPS module damaged	68

1. General information

1.1 Getting start

This manual is used as a checking and repairing guide for Off-grid INVERTER with solar charger controller. Before read this manual, it's best to have some electrical or electronic background knowledge. With this guide, you can fix the inverter by yourself firstly.

There are five main parts of this guide:

General information: This part is the basic information of the inverter; you can start to know the inverter from this chapter.

Troubleshooting: This part will tell you how to do when you face a problem.

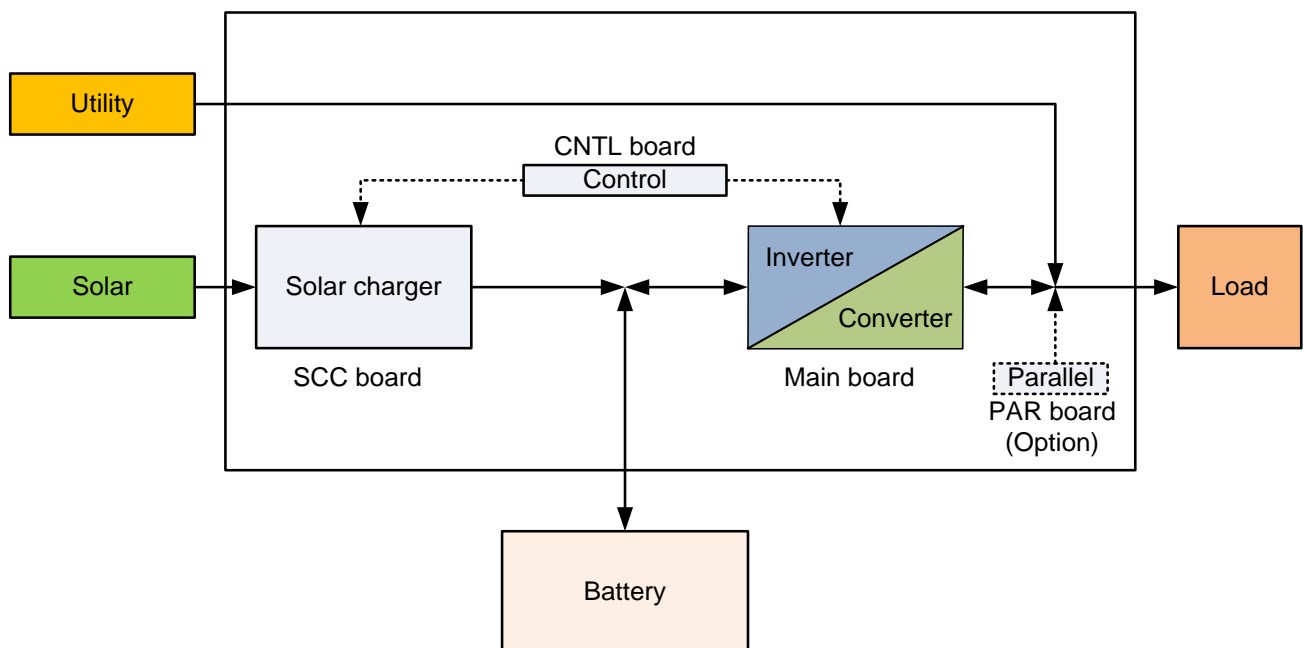
Checking and measuring guide: This part will teach you how to check or repair the inverter by measuring the critical components.

Assembling guide: This part teaches you how to take the board outside and fix the new one.

Common fault case: This part will show some actual field failure cases.

1.2 Basic topology introduction

The topology of the inverter shows as below:



Compare with UPS or normal inverter, INVERTER combines a solar charger inside. Solar charger can be a supplement for battery when there is not grid or for saving energy purpose. And with the solar charger, the inverter can have more working modes than UPS. The detail information please refer to our user manual.

1.3 Inverter family

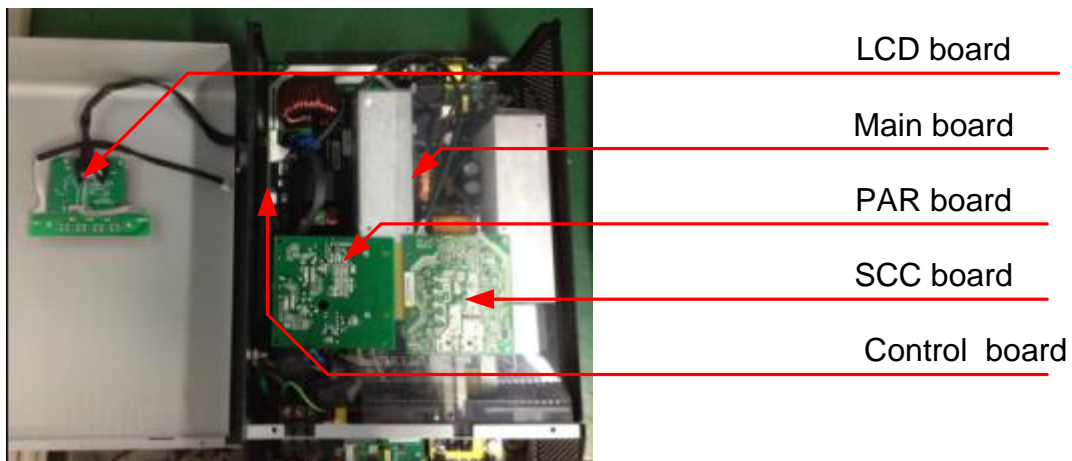
This service manual includes different models of the inverter, the table as below contains some important parameters with different models.

These models names are only neutral names; please match the real model name of your inverter to the model name in the table by comparing the typical characteristics.

Model name	Power rating	Charger type	Charger number	AVR function
Inverter with PWM 4KVA	4KVA	PWM	1	No
Inverter with PWM 5KVA	5KVA	PWM	1	No
Inverter with MPPT 4KVA	4KVA	MPPT	1	No
Inverter with MPPT 5KVA	5KVA	MPPT	1	No
Inverter with PWM and AVR 5KVA	5KVA	PWM	1	Yes
Inverter with MPPT and AVR 5KVA	5KVA	MPPT	1	Yes

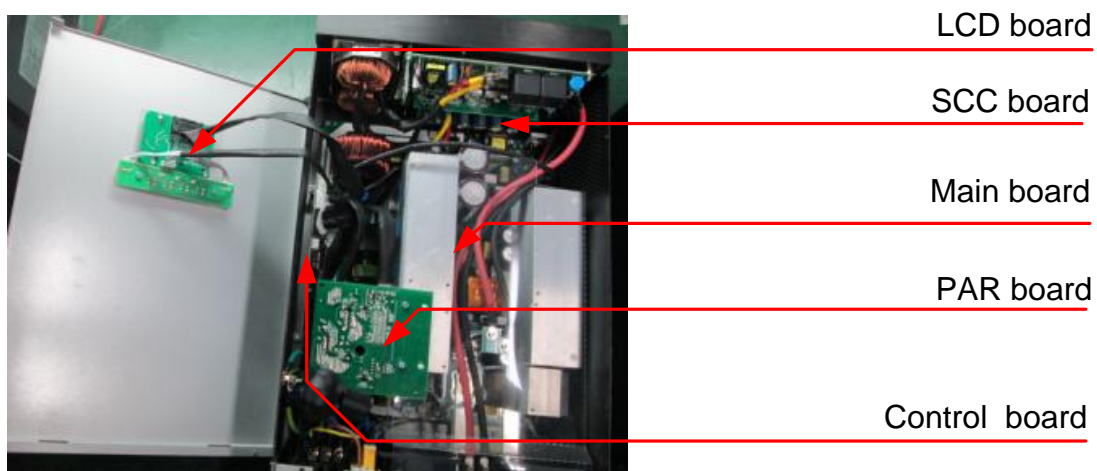
1.4 Overview the inverter

- Inverter with PWM 4KVA&5KVA

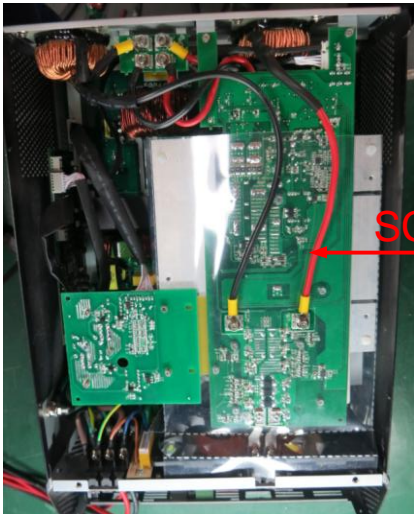


- Inverter with MPPT 4KVA&5KVA

OLD VERSION:



NEW VERSION:

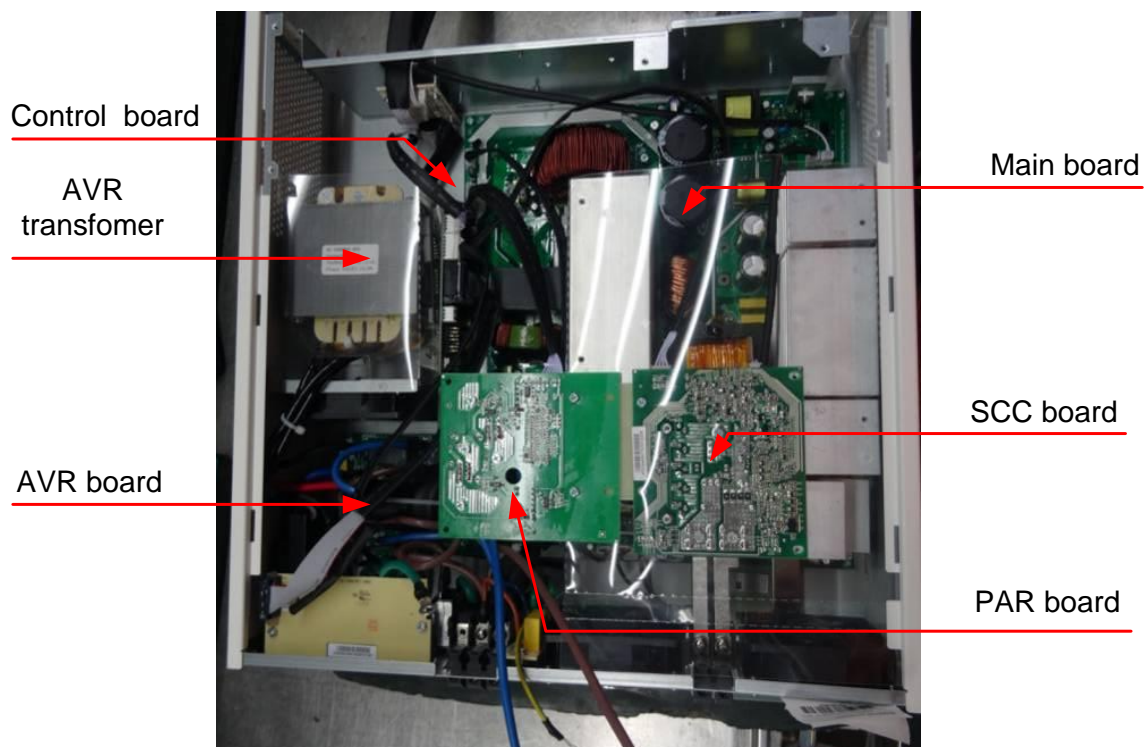


SCC board

The difference between PWM and MPPT is the SCC board. MPPT has SCC with MPPT function, PWM just has the basic SCC function. The other boards are the same. Regarding the control board, the board is the same, just the firmware is different.

The difference between OLD and NEW MPPT is the SCC BOARD. The NEW MPPT redesigns the SCC board to make the metal case the same size with PWM.

➤ Inverter with PWM and AVR 4KVA&5KVA



Control board

AVR
transformer

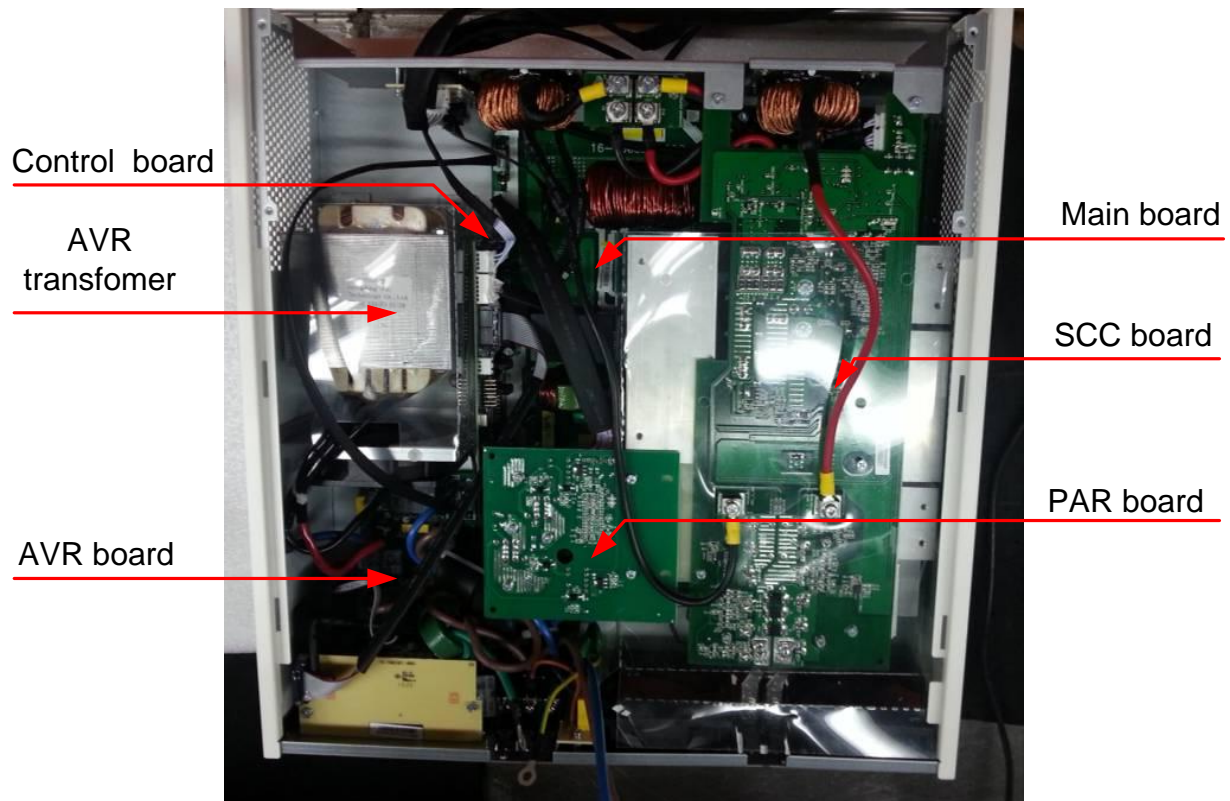
AVR board

Main board

SCC board

PAR board

- Inverter with PWM and AVR 4KVA&5KVA



2. Troubleshooting

2.1 How to do

When the inverter was faulty, normally there are two main symptoms:

- No display at all;
- Fault code or warning code on the LCD;

When the fault occurred, please help to record the fault information and follow “How to check” of part 2.2 to check the inverter, then feedback the checking result to the service center. It will be very helpful for solving the problem as soon as possible.

2.2 Fault condition

Note:

When open the top cover, please have a look first, are there any obviously damaged parts?

When take the main board out, please have a look around, are there any obviously damaged parts?

2.2.1. Not working at all/ No display

Description	The inverter couldn't startup completely.
Possible reason	1. SPS module damaged. 2. PAR board damaged.
How to check	1. Firstly, please measure the resistor between BAT+ and BAT-. If it is not shorted, only connect the inverter with battery, and press “ON” button, could the inverter startup? If not, please check the fan. 2. If the LCD couldn't light up and fan doesn't work, please disconnect all the wires and open the top cover, and then take the main board outside by following part 4. 3. Check the main board by following “3.7” 4. If the fans are working without LCD display, please open the cover, and disconnect the cable between PAR board and main board. Then check the inverter again. You can follow part “3.12” to check PAR board.
How to solve	Repair the main or PAR board or replace it directly.

2.2.2. 01 fault

Description	Fan abnormal.
Possible reason	There was something wrong with fans or the fan driver has something wrong.
How to check	Replace the fans first, if the issue still exist, please check the main board by following “3.11”.
How to solve	Replace the fan or repair the main board.

2.2.3. 02 fault

Description	Over temperature.
-------------	-------------------

SERVICE MANUAL

Inverter 4KVA/5KVA

Possible reason	The NTC is broken.
How to check	Check the inverter by following “3.10”
How to solve	Replace the NTC and resistors.

2.2.4. 03 fault

Description	Battery voltage is too high.
Possible reason	Reason1: The reverse mosfet was damaged Reason2: Firmware bug. Reason3: TX9 has something wrong.
How to check	When the fault happened, please read the battery voltage in the LCD first, and compare with the actual battery voltage. Reason1: Check the inverter by following “3.8” Reason3: Check the inverter by following “TX9 in 3.7”
How to solve	Replace the mosfet or the main board if the reason is 1 or 3. Update the firmware if the reverse mosfet was OK.

2.2.5. 06 fault

Description	Output voltage is too high
Possible reason	It depends; maybe the inverter module had something wrong.
How to check	1. Startup the inverter only with battery, will the fault come out again? If not, please provide the situation when will the fault occur? 2. If the fault repeated even without load, please check the main board by following “3.4”
How to solve	Replace the main board.

2.2.6. 08 fault

Description	Bus voltage is too high
Possible reason	Firmware bug.
How to check	Restart the inverter, will the fault repeat?
How to solve	Update the firmware

2.2.7. 09 fault

Description	Bus soft start fails.
Possible reason	DC-DC module was damaged or bus soft start module was damaged.
How to check	1. Check the main board by following “3.1.2; 3.2.1; 3.4.1”; 2. Check the main board by following “3.5”.
How to solve	Repair the main board or replace it directly.

SERVICE MANUAL

Inverter 4KVA/5KVA

2.2.8. 52 fault

Description	Bus voltage is too low
Possible reason	It depends; maybe the inverter module had something wrong.
How to check	1. Startup the inverter only with battery, will the fault come out again? If not, please provide the situation when will the fault occur? 2. If the fault repeated even without load, please check the main board by following "3.1.2 and 3.4"
How to solve	Repair the main board or replace it directly.

2.2.9. 53 fault

Description	Inverter soft start failed.
Possible reason	
How to check	1. Startup the inverter only with battery, will the fault come out again? If not, please provide the situation when will the fault occur? 2. Connect the grid and battery, could the inverter charge the battery? 3. If step 1 and 2 are both not OK, please check the main board by following "3.1.2, 3.2.1 and 3.4.1".
How to solve	Replace the main board.

2.2.10. 56 fault

Description	Battery couldn't be detected.
Possible reason	Wire connection or fuse was burnt.
How to check	1. Check the wire connection, the priority of the battery cable; 2. Check the main board by following "3.1.1 and 3.1.2".
How to solve	Repair the main board or replace it directly.

2.2.11. 57 fault

Description	Current sensor is abnormal.
Possible reason	The control board was damaged.
How to check	Check the control board by following "3.9".
How to solve	Replace the control board.

2.2.12. 58 fault

Description	Output voltage is too low.
Possible reason	
How to check	1. Startup the inverter only with battery, will the fault come out again? If not, please provide the situation when will the fault occur?

SERVICE MANUAL

Inverter 4KVA/5KVA

	2. Connect the grid and battery, could the inverter charge the battery? 3. If step 1 and 2 are both not OK, please check the main board by following “3.1.2, 3.2.1 and 3.4.1”.
How to solve	Replace the main board.

2.2.13. 72 fault

Description	Current sensor is abnormal.
Possible reason	The control board was damaged.
How to check	Check the control board by following “3.9”.
How to solve	Replace the control board.

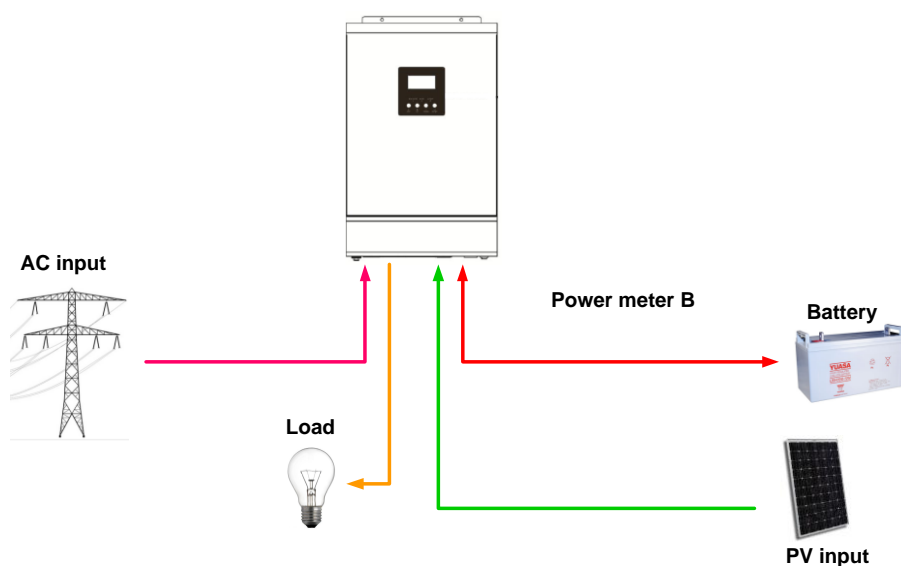
2.2.14. 85 fault

Description	Current unbalance between the inverters when working in parallel mode.
Possible reason	Most situations were due to the inappropriate wire connection
How to check	Please help to check the AC input and output, the cables of two inverters should be the same size and same length, and they should connect together to the distributor. And please also check the connectors, have they been screwed tightly?
How to solve	Modify the wire connection.

2.3 Test step

After replacing all defected components, testing steps can be adopted to verify the repair result and the reliability of the Inverter.

Set up the testing system as below:



2.3.1 Battery working mode test

2.3.1.1 Test and check

- Connect the battery and switch on the inverter.
- Wait for the inverter starts up.
- Check the LCD display of output voltage and frequency.
- Turn off the load.
- Turn on the load, and then check the output voltage and frequency again.

Note: Please pay attention to the battery capacity; don't let the battery discharge too low, you can use an inverter as a charger to charge the battery when doing this test.

2.3.1.2 Confirm

The LCD display is shown as below:



Please check the test result whether can meet with parameters listed as below:

	Voltage	Frequency
LCD	230V	50Hz

Note: The tolerance of voltage is about $\pm 1\%$, and of frequency is about $\pm 0.1\text{Hz}$.

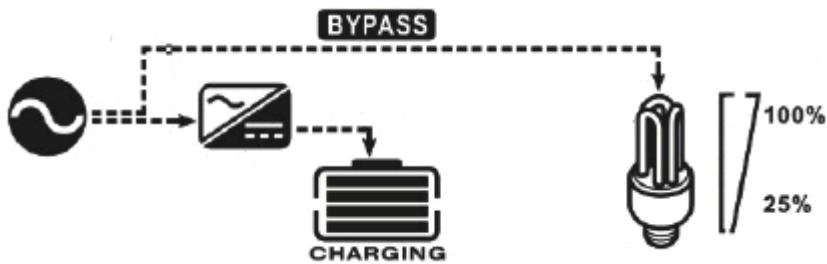
2.3.2 Line working mode test

2.3.2.1 Test and check

- Switch off the load.
- Connect the AC input.
- Wait for inverter transfer to line mode and charge the battery (LCD setting 01 is "UTI", LCD setting 16 is "SNU").
- Check the LCD to confirm that inverter is working in line mode, and the battery is charged.

2.3.2.2 Confirm

The LCD display is shown as below:



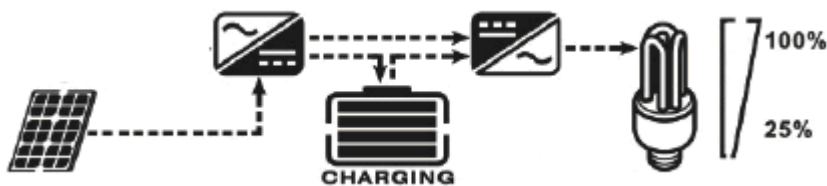
2.3.3 SCC charging

2.3.3.1 Test and check

- Turn off the AC input; the inverter will transfer to battery mode again.
- Connect the solar panels.
- Wait for PV charges the battery, and check the LCD display.

2.3.3.2 Confirm

The LCD display is shown as below:



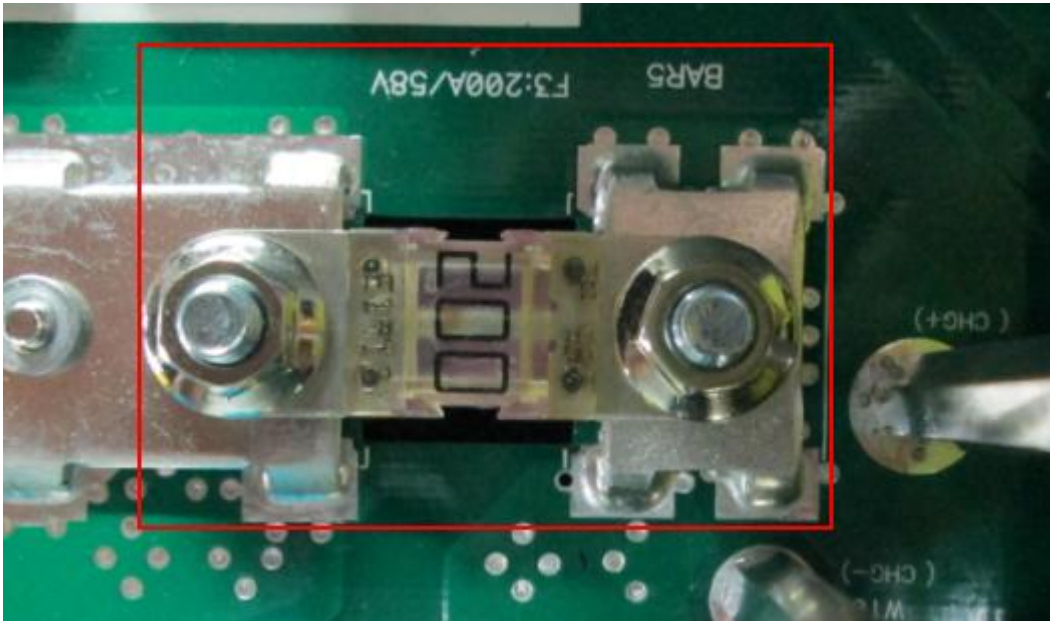
Please check the charging current, if the current is not in the reasonable range, it means solar charger controller has something wrong.

3. Checking and measuring guide

3.1 Check the battery side components

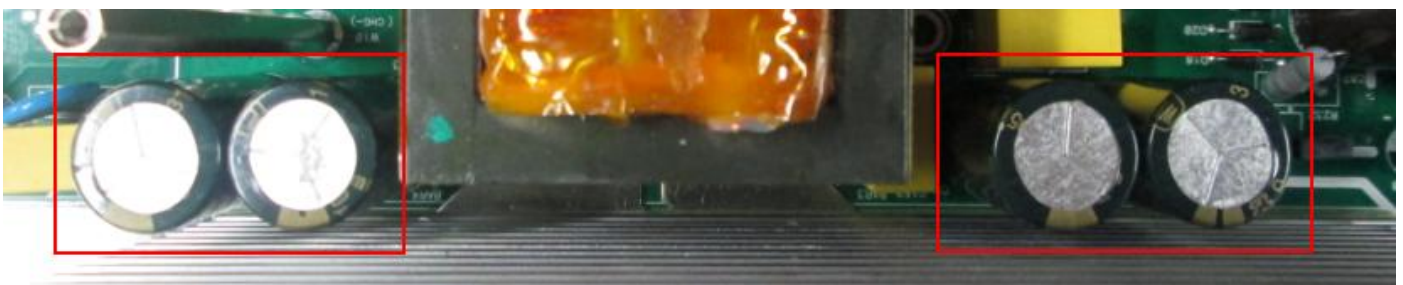
3.1.1. Fuse and capacitors

F1: 25-000148-00G (FUSE LITTELFUSE/142.5631.6202 200A 58V FAST 42*12) or 32-000065-00G
(BUS BAR COPPER 42*12*0.6)



Parts	Attribute	Reference values	Failure status
F1	Resistor	0 ohm	Open

C12/C13/C8/C9: 15-000072-00G (C-AL 3300UF 63V M RAD BULK 7.5 105°C 18*45.5)

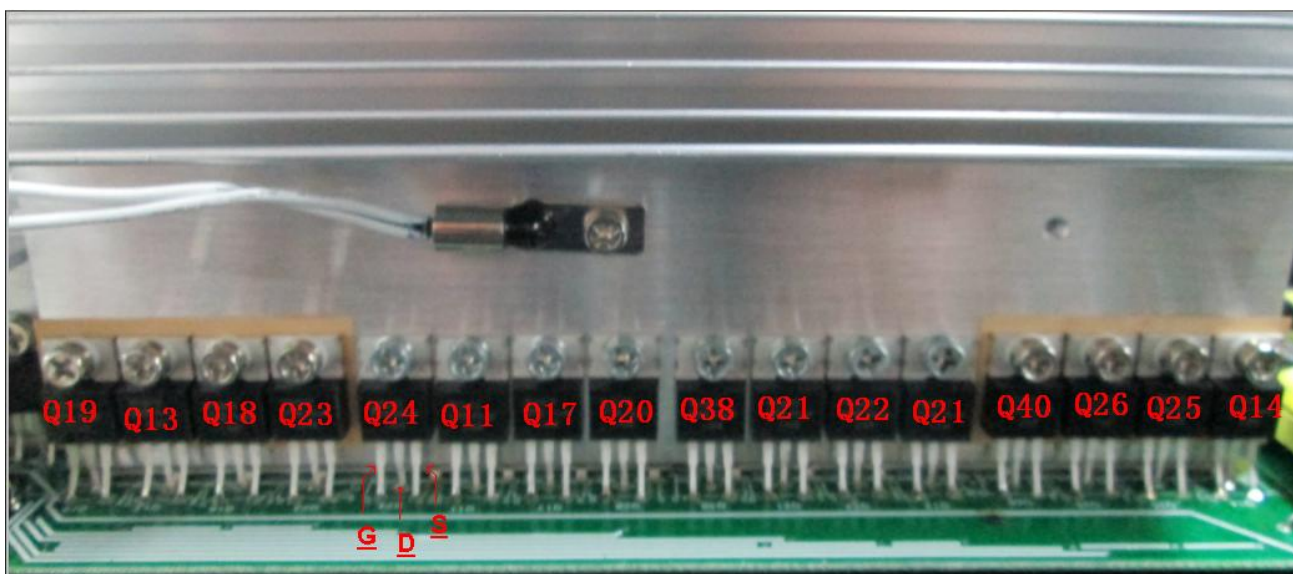


If the capacitors explode as below, they need to be replaced.



3.1.2. Power devices

DC/DC MOSFET: Q11/Q17/Q20/Q24 & Q38/Q21/Q22/Q12 & Q13/Q18/Q23/Q19 & Q40/Q26/Q25/Q14



ALL of the mosfet are 11-320110-00G (MOSFET IR/IRFB3307ZPBF 120A 75V N BULK TO-220).*

*: In the new version, they will be 11-320138-00G (MOSFET TI/CSD19505KCS 201A 80V N BULK TO-220) or 11-320117-00G (MOSFET IR/IRFB3077 210A 75V N BULK TO-220).

Parts	Attribute	Reference values	Failure status
All: IRFB3307ZPBF	Resistor ¹	GS: 11.7k GD: 250k DS: OL	Short or explosion
	Diode	SD: 0.43V DS: OL	

Note1: When you use the multimeter to measure the resistor of the transistor, because of the capacitor in the circuit, it will cause the changing of the values when you measure the DS and GD. So we recommend you measure the diode forward voltage of SD, and the resistor of GS. These two values can reflect the situation of the transistor more correctly.

Note: If one or more of them were damaged, please replace all of them.

Note: For 4K, Q19/Q24/Q38/Q40 is N/A.

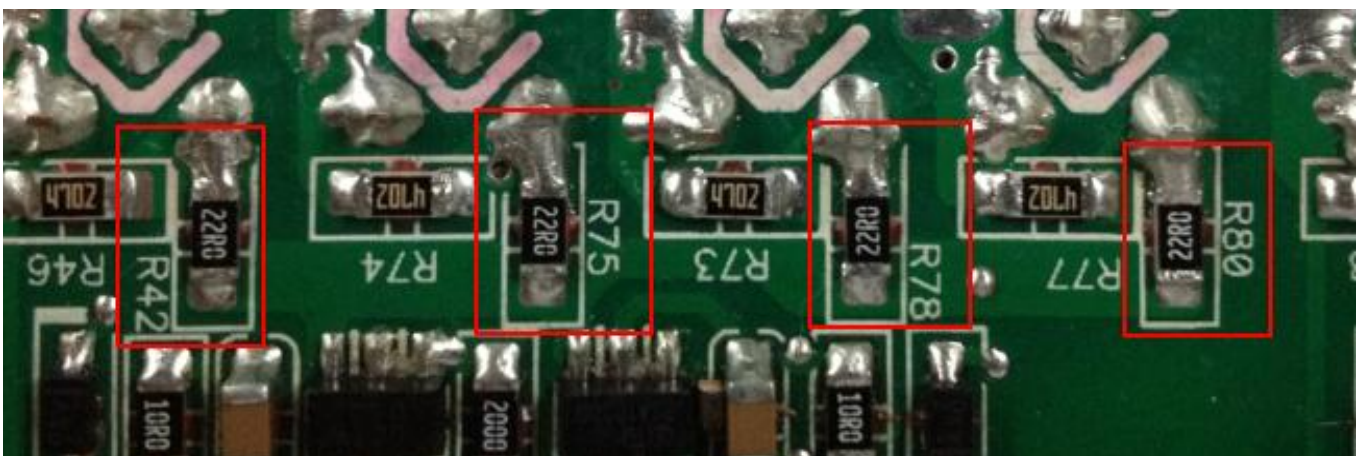
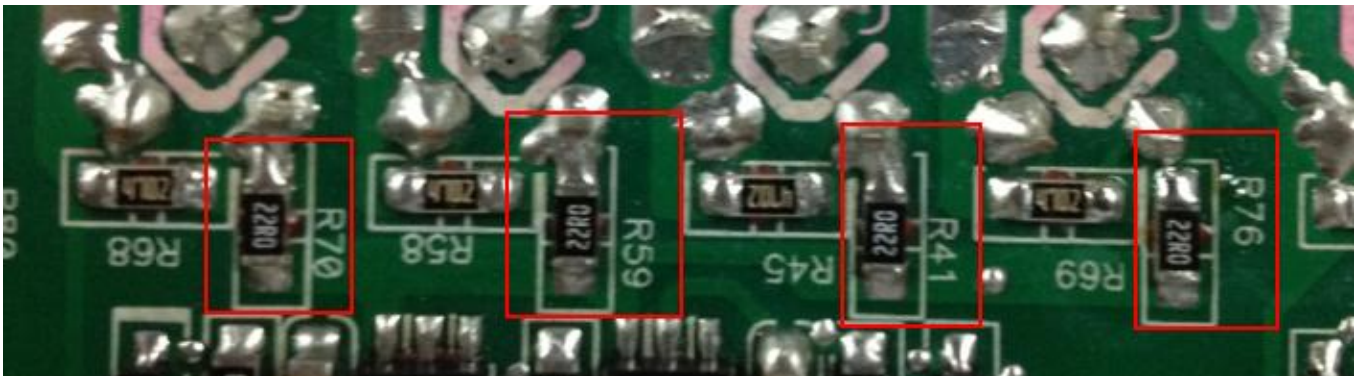
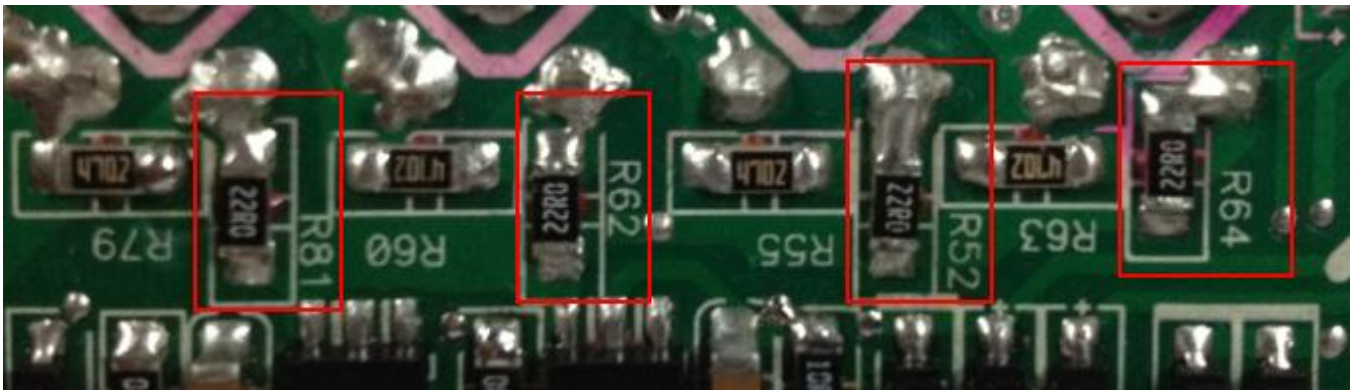
3.1.3. Drivers (This part is only used for repair checking)

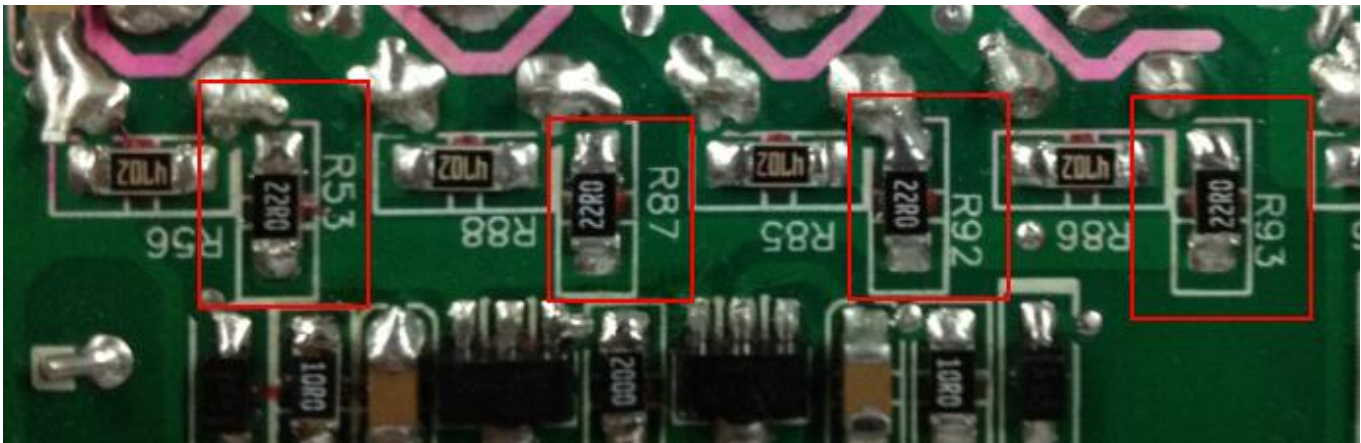
Note: Drivers usually need to be checked when users want to repair the boards. Because when power devices were damaged, the high voltage will rush to driver circuit through the gates of power devices.

The reference of the resistors list as below:

R41/R59/R70/R76/R80/R78/R75/R42/R52/R62/R81/R64/R93/R92/R87/R53

All of the resistors are 14-110022-00G (RES CHIP TF 1/4W 22 F 1206)

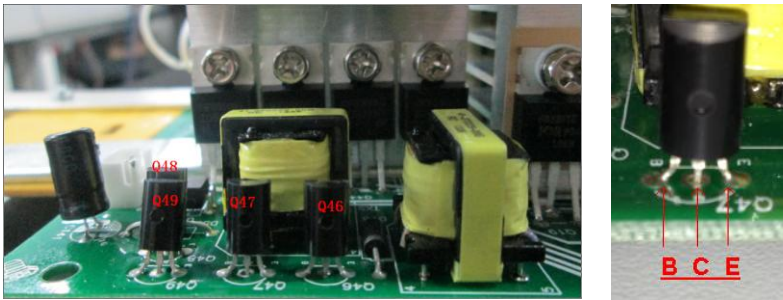




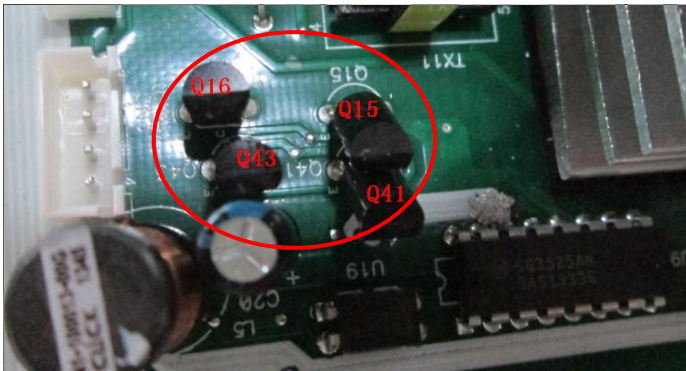
Use multimeter to measure each resistor, find the burnt resistors and replace them; don't need to replace them all.

Parts	Attribute	Reference values	Failure status
All: 22ohm	Resistor	22 ohm	Open or other values

If the resistors need to be replaced, please also check the driver transistors and control IC.



The Q46and Q48 are 11-300012-00G (TR UTC/2SC2655 2A 50V NPN TAP TO-92)
The Q47and Q49 are 11-300005-00G (TR UTC/A1020 2A 50V PNP TAP TO-92NL)



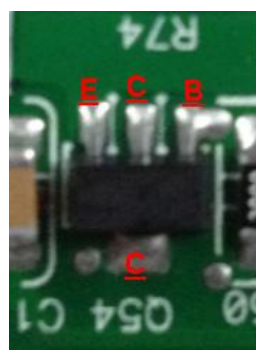
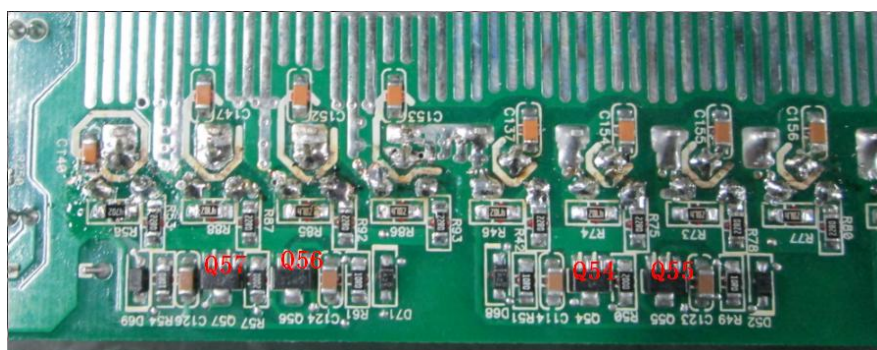
The Q41and Q43 are 11-300012-00G (TR UTC/2SC2655 2A 50V NPN TAP TO-92)
The Q15and Q16 are 11-300005-00G (TR UTC/A1020 2A 50V PNP TAP TO-92NL)

Parts	Attribute	Reference values	Failure status
Q46/Q48/Q41/Q43	Resistor	BE: 420k	Short or explosion

SERVICE MANUAL

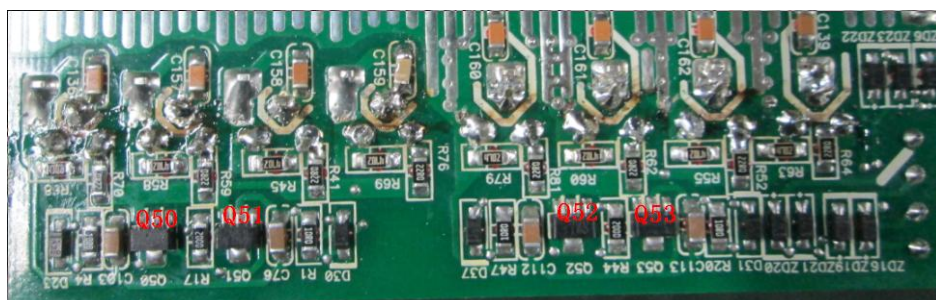
Inverter 4KVA/5KVA

		BC: 420k CE: 30k	
	Diode	BE: 0.6V BC: 0.6V CE: 2.3V	
Q47/Q49/Q15/Q16	Resistor	BE: 420k BC: 420k CE: 1.2k	Short or explosion
	Diode	BE: 0.6V BC: 2.6V CE: 0.2V	



The Q54and Q56 are 11-400011-00G (TR UTC/2SD1624 2A 50V NPN SOT-89)

The Q55and Q57 are 11-400010-00G (TR UTC/2SA1020 3A 50V PNP SOT-89)



The Q51and Q52 are 11-400011-00G (TR UTC/2SD1624 2A 50V NPN SOT-89)

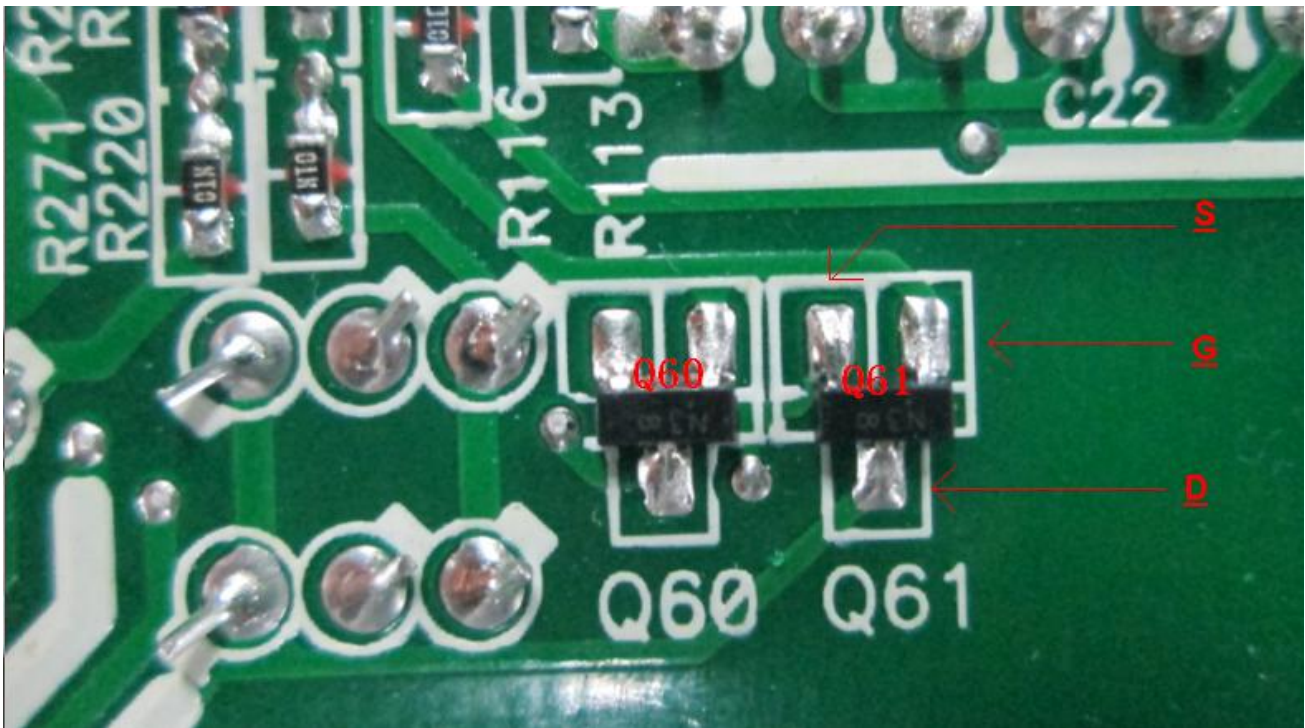
The Q50and Q53 are 11-400010-00G (TR UTC/2SA1020 3A 50V PNP SOT-89)

Parts	Attribute	Reference values	Failure status
Q54/Q56/Q51/Q52	Resistor	BE: 12k BC: 260k CE: OL	Short or explosion
	Diode	BE: 0.6V	

SERVICE MANUAL

Inverter 4KVA/5KVA

		BC: 0.6V CE: OL	
Q55/Q57/Q50/Q53	Resistor	BE: 12k BC: OL CE: 277k	Short or explosion
	Diode	BE: 0.6V BC: OL CE: 1.09V	

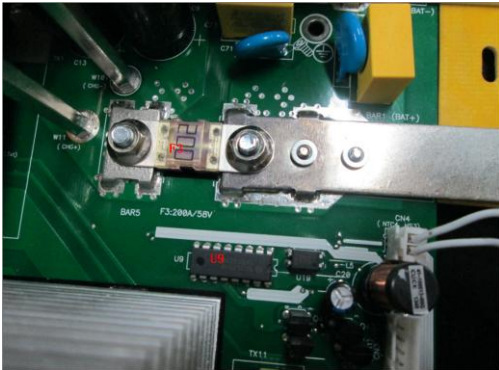


The Q60 and Q61 are 11-420007-00G (MOSFET UTC/UT3404G 5.8A 30V NPN SOT-23 SMD)

Parts	Attribute	Reference values	Failure status
Q60/Q61	Resistor	GS: 5.637k GD: 12k DS: 35k	Short or explosion
	Diode	SD: 0.184V DS: 1.2V	

SERVICE MANUAL

Inverter 4KVA/5KVA



The U9 is 11-004003-00G (IC PWM CNTL ON/SG3525ANG DIP-16)

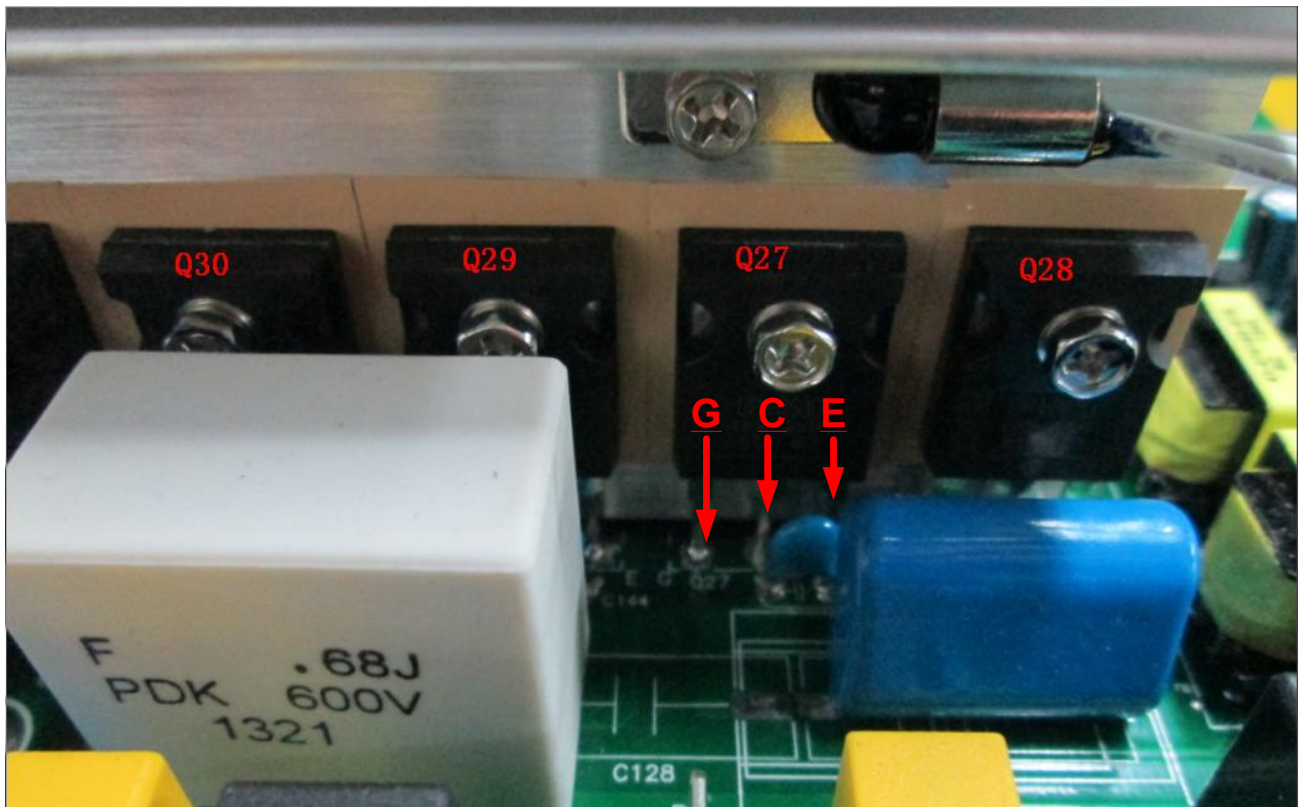
Parts	Attribute	Reference values	Failure status
U9	Resistor	PIN13 TO PIN12: 22k PIN11 TO PIN12: 432k PIN14 TO PIN12: 432k	Short or explosion

Note: If you are not sure about these components, we recommend you replacing them all.

3.2 Check the bus side components

3.2.1. Power devices

DC/DC IGBT: Q27/Q28/Q29/Q30



ALL of the IGBTs are 11-330035-00G (IGBT IRGP/4063DPBF 48A 600V NPN BULK TO-247) or

SERVICE MANUAL

Inverter 4KVA/5KVA

11-330095-00G (IGBT IR/IRGP4750DPBF 50A 650V N BULK TO-247)

Parts	Attribute	Reference values	Failure status
Q27/Q28/Q29/Q30	Resistor ¹	GE: 22 ohm GC: 181k CE: 1 Meg	Short or explosion
	Diode	EC: 0.37V CE: OL	

Note1: When you use the multimeter to measure the resistor of the transistor, because of the capacitor in the circuit, it will cause the changing of the values when you measure the CE and GE. So we recommend you measure the diode forward voltage of EC, and the resistor of GE. These two values can reflect the situation of the transistor more correctly.

Note: If one or more of them were damaged, please replace all of them.

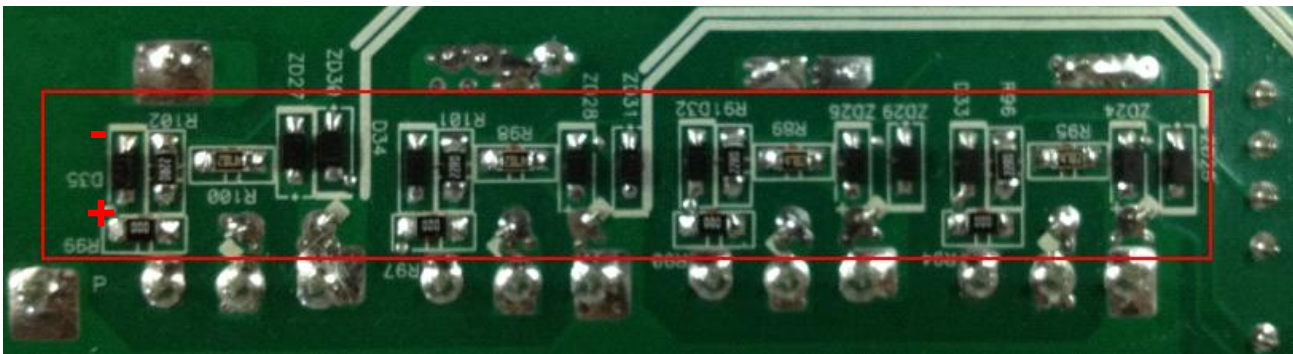
3.2.2. Drivers (This part is only used for repair checking)

Meanwhile, we also need to check the driver tubes of these power tubes.

R91/R102/R96/R101: 14-110022-00G (RES CHIP TF 1/4W 22 F 1206)

R90/R99/R94/R97: 14-110000-00G (RES CHIP TF 1/4W 0 F 1206)

D32/D35/D33/D34: 11-210001-00G (D PAJ 1N4148W 0.15A 75V SMD)



Parts	Attribute	Reference values	Failure status
R91/R102/R96/R101	Resistor	22 ohm	Open or other values
R90/R99/R94/R97	Resistor	0 ohm	
D32/D35/D33/D34 ²	Resistor	+ to -: 240k - to +: OL	Short or explosion
	Diode	+ to -: 0.6V - to +: OL	

Note2: When test the diode; please remove the R90/R99/R94/R97 from the board, or the test result is not

right.

3.3 Check the buck circuit

3.3.1. Power devices

BUCK MOSFET and Diode: Q31/Q32/D13



The Q31 and Q32 are 11-320049-00G (MOSFET ST/STW45NM60 45A 600V N BULK TO-247) or 11-330095-00G (IGBT IR/IRGP4750DPBF 50A 650V N BULK TO-247)

The D13 is 11-200007-00G (D APT/30DQ60BG 30A 600V UFST RAD TO-247 BULK) or 11-200167-00G (D FSC/FFH30S60S 30A 600V UFST RAD TO-247 BULK)*

*: In the new version (Main board: 71-500449-xxG), it will be 11-200032-00G D FC/RHRP1560 15A 600V UFST RAD BULK.

Parts	Attribute	Reference values	Failure status
Q31/Q32	Resistor	GS or GE: 23.5k GD or GC: 273k DS or CE: 800k	Short or explosion
	Diode	SD or CE: 0.44V DS or EC: OL	
D13	Resistor	+ to -: 168k	

SERVICE MANUAL

Inverter 4KVA/5KVA

		- to +: OL	
	Diode	+ to -: 0.36V - to +: OL	

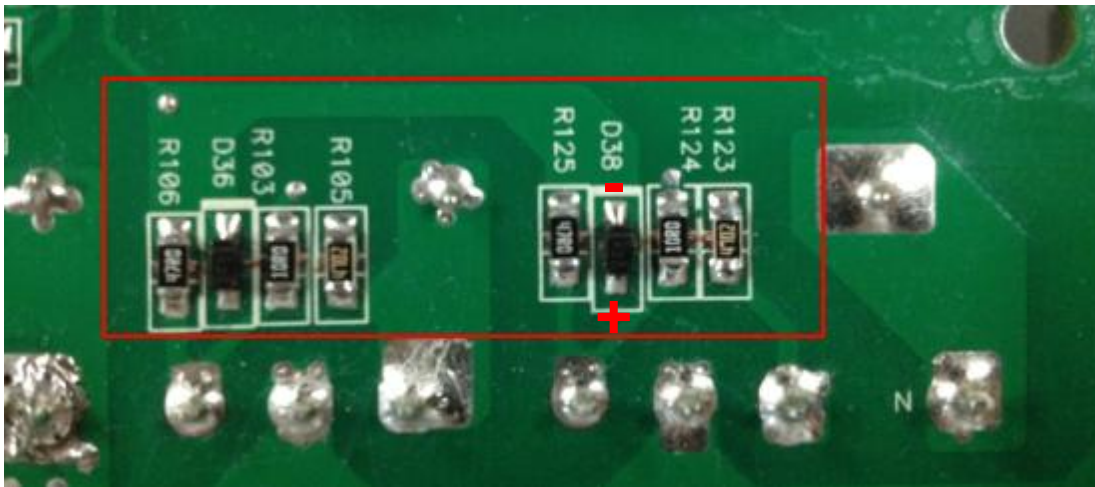
Note: If one or more of them were damaged, please replace all of them.

3.3.2. Drivers (This part is only used for repair checking)

R125/R106: 14-110047-00G (RES CHIP TF 1/4W 47 F 1206)

R124/R103: 14-110010-00G (RES CHIP TF 1/4W 10 F 1206)

D36/D38: 11-210001-00G (D PAJ 1N4148W 0.15A 75V SMD)



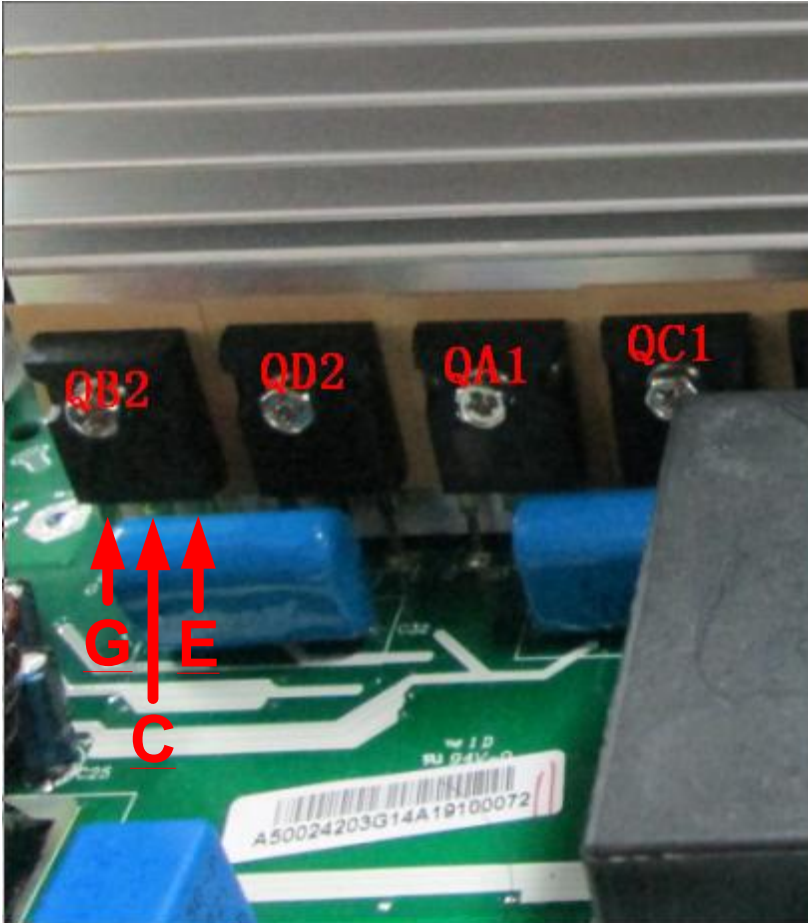
Parts	Attribute	Reference values	Failure status
R125/R106	Resistor	47 ohm	Open or other values
R124/R103	Resistor	10 ohm	
D36/D38 ¹	Resistor	+ to -: 240k - to +: OL	Short or explosion
	Diode	+ to -: 0.6V - to +: OL	

Note: When test the diode; please remove the R124/R103 from the board, or the test result is not right.

3.4 Check the INV full bridge

3.4.1. Power devices

INV IGBT: QA1/QC1/QB2/QD2



All of the IGBT are 11-330080-00G (IGBT IR/IRGP4066D-EPBF 75A 600V N BULK TO-247)

Parts	Attribute	Reference values	Failure status
QA1/QC1/QB2/QD2	Resistor	GE: 23k GC: 235k CE: 900k	Short or explosion
	Diode	EC: 0.4V CE: OL	

Note1: If one or more of them were damaged, please replace all of them.

Note2: For 4K, QA1~QD2 is 11-330035-00G (IGBT IRGP/4063DPBF 48A 600V NPN BULK TO-247)

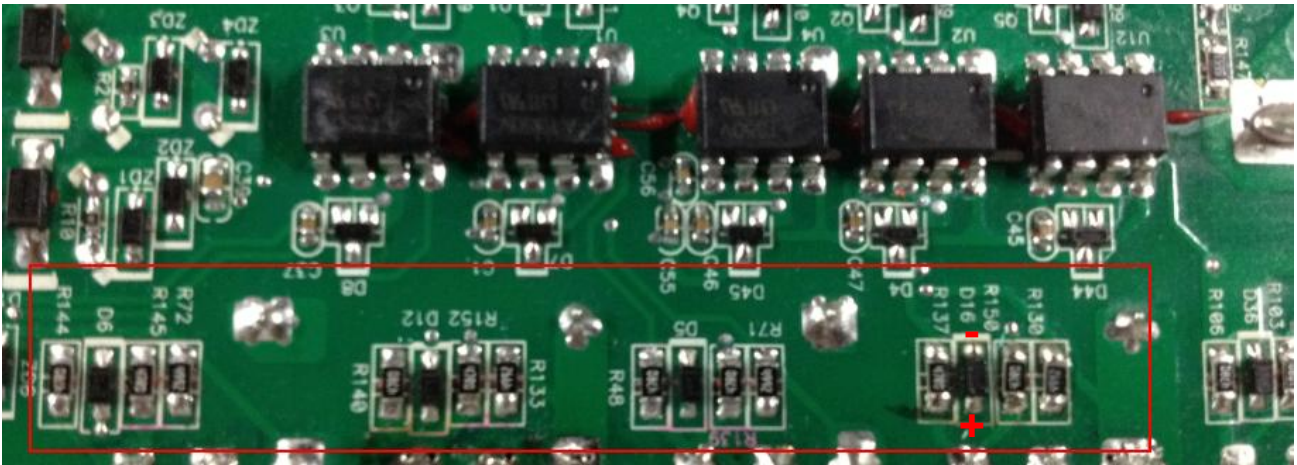
3.4.2. Drivers

R48/R144/R140/R137/R139/R145/R150/R152: 14-110047-00G (RES CHIP TF 1/4W 47 F 1206)

D5/D6/D12/D16: 11-210001-00G (D PAJ 1N4148W 0.15A 75V SMD)

SERVICE MANUAL

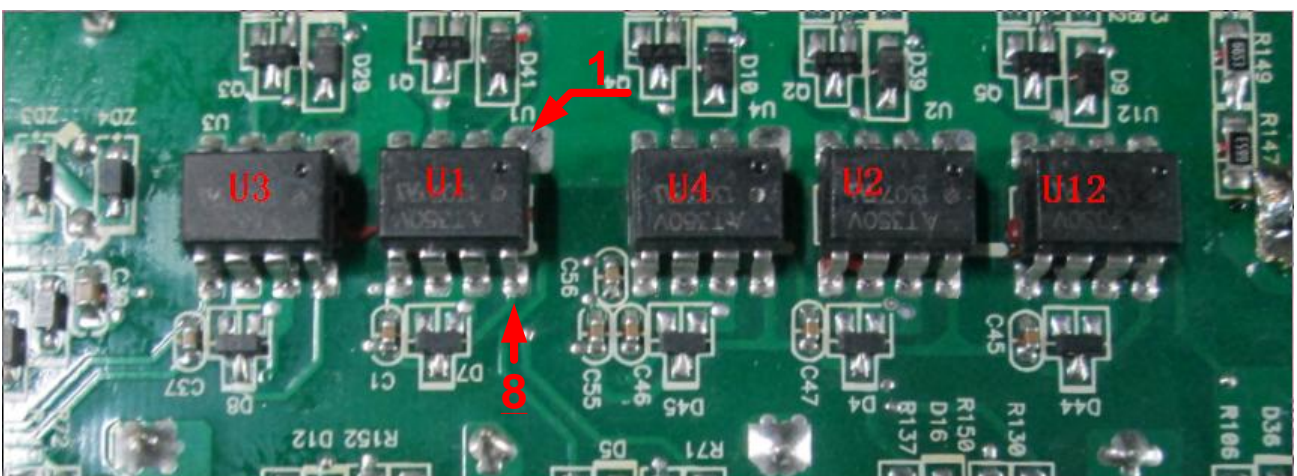
Inverter 4KVA/5KVA



Parts	Attribute	Reference values	Failure status
R48/R144/R140/R137 R139/R145/R150/R152	Resistor	47 ohm	Open or other values
D5/D6/D12/D16 ¹	Resistor	+ to -: 240k - to +: OL	Short or explosion
	Diode	+ to -: 0.6V - to +: OL	

Note 1: When test the diode; please remove the R139/R145/R150/R152 from the board, or the test result is not right.

Optocoupler: U1/U2/U3/U4/U12



ALL of the optocoupler are 11-140006-00G(IC PHO AVAGO/T350-560E DIP-8 8/300 MIL SMD)

Parts	Attribute	Reference values	Failure status
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SERVICE MANUAL

Inverter 4KVA/5KVA

U1/U2/U3/U4/U12	Resistor	PIN8 TO PIN5: 2k PIN7 TO PIN5: 2k	Short or explosion
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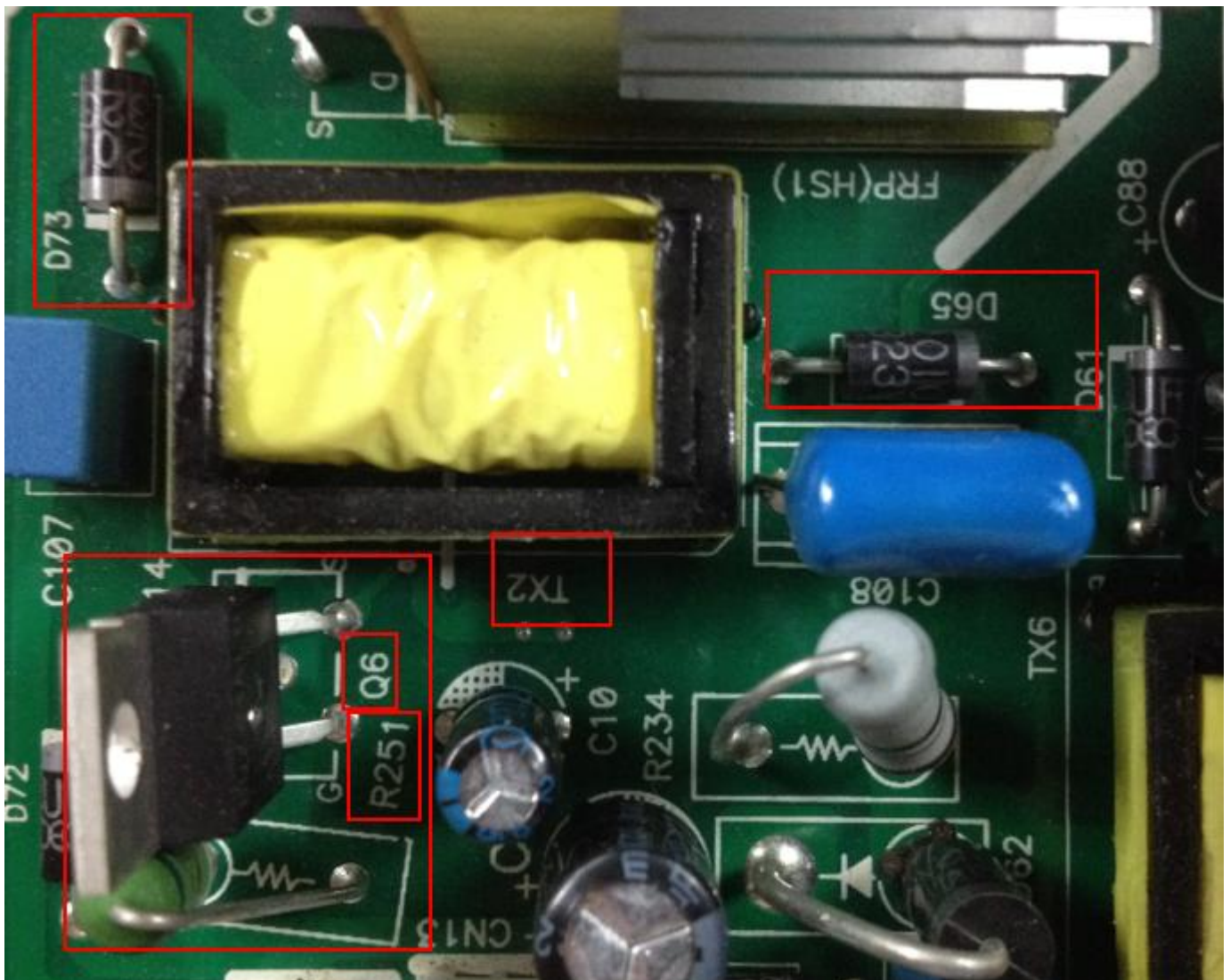
3.5 Check the bus soft start circuit (TX2: Especially for 09 fault)

D73: 11-200026-00G (D PAJ/UF202 2A 200V UFST AXI TAP)

Q6: 11-320050-00G (MOSFET IR/IRF840 8A 500V N BULK TO-220)

R251: 14-600005-00G (RES 2W 0.62 J RAD N-IND BULK)

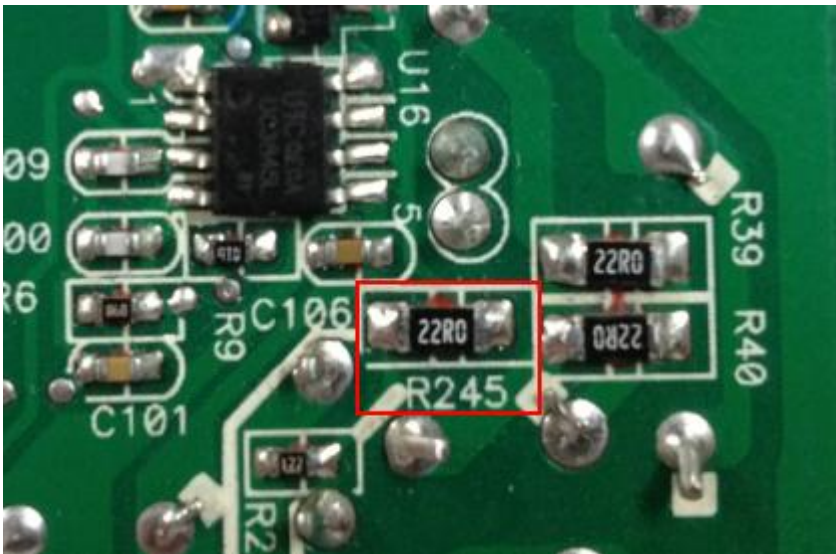
D65: 11-200023-00G (D FC/RHRP8120 8A 1200V UFST RAD BULK)



R245: 14-110022-00G (RES CHIP TF 1/4W 22 F 1206)

SERVICE MANUAL

Inverter 4KVA/5KVA

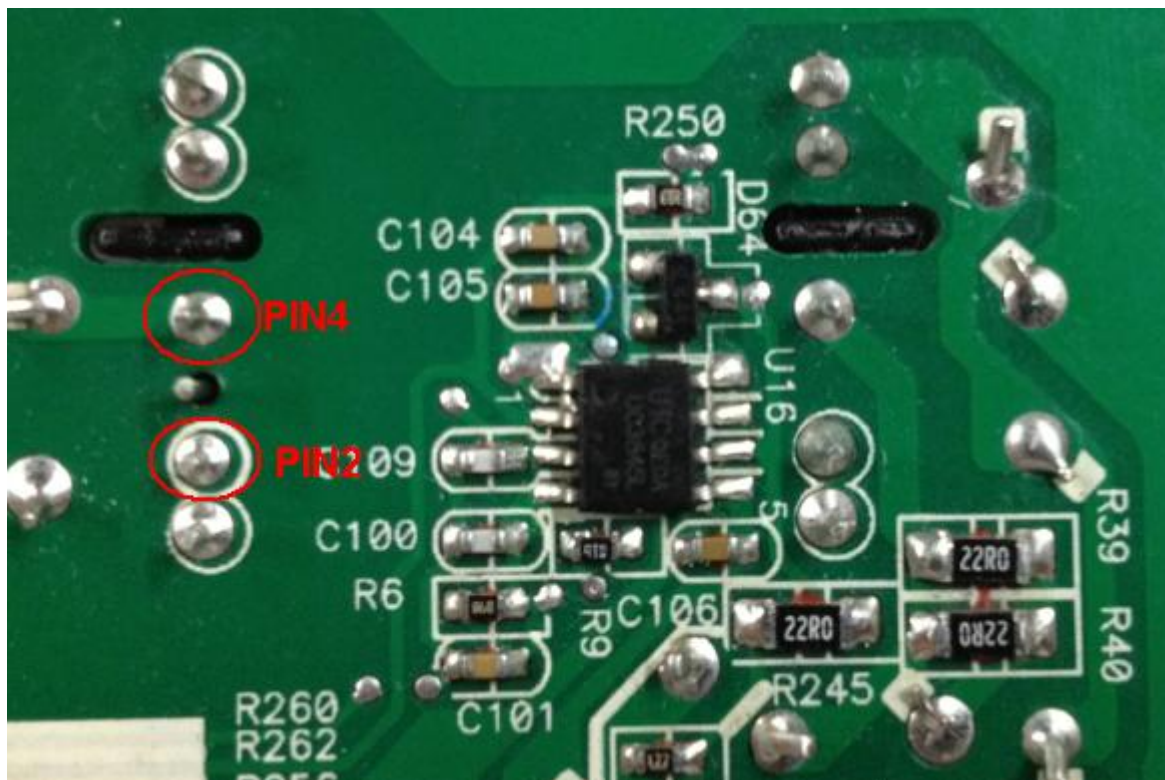


Note: If R245 is damaged, please replace U16 together.

U16: 11-104003-00G (IC PWM CNTL UTC/UC3845A 8P/SOP-8 SMD)

Parts	Attribute	Reference values	Failure status
D73	Resistor	+ to -: 300k - to +: OL	Short or explosion
	Diode	+ to -: 0.47V - to +: OL	
Q6	Resistor	GS: 1.17k GD: 30k DS: OL	Short or explosion
	Diode	SD: 0.5V DS: OL	
R251	Resistor	0.8 ohm	Open or other values
D65	Resistor	+ to -: 1 Meg - to +: 1 Meg	Short or explosion
	Diode	+ to -: 0.44V - to +: OL	
R245	Resistor	22 ohm	Open or other values
U16	Resistor	PIN7 TO PIN5: 42k PIN6 TO PIN5: 30k	Short or explosion

TX2: 41-070186-01G (TX 15:200:15 FER EEL16)



Parts	Attribute	Reference values	Failure status
TX2: 41-070186-00G	Resistor	PIN2 to PIN4: 14ohm	Short or other values
TX2: 41-070186-01G	Resistor	PIN2 to PIN4: 3~4ohm	Short or other values
<p>Note: Please check the part number of TX2 first; we have two versions, 00G and 01G.</p> <p>When 09 fault happens, and you couldn't find other damage, please check TX2!!</p>			

3.6 Check the AC switching power supply circuit

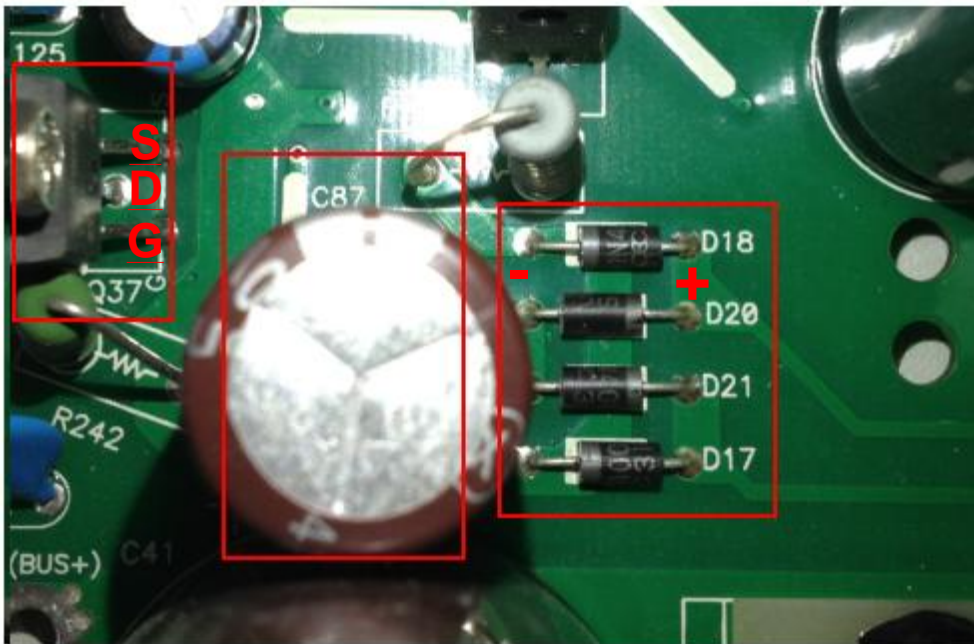
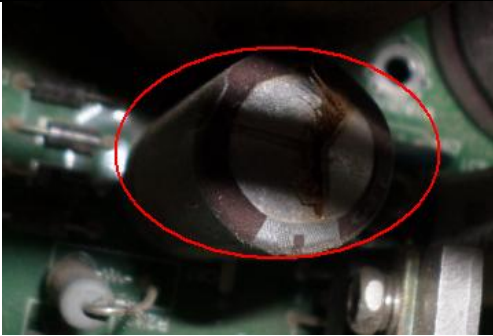
Note: This part only available for 16-500242-XXG PCB version.

D17/D18/D20/D21: 11-200004-01G (D PAJ IN4007S 1A 1000V FST AXI TAP)

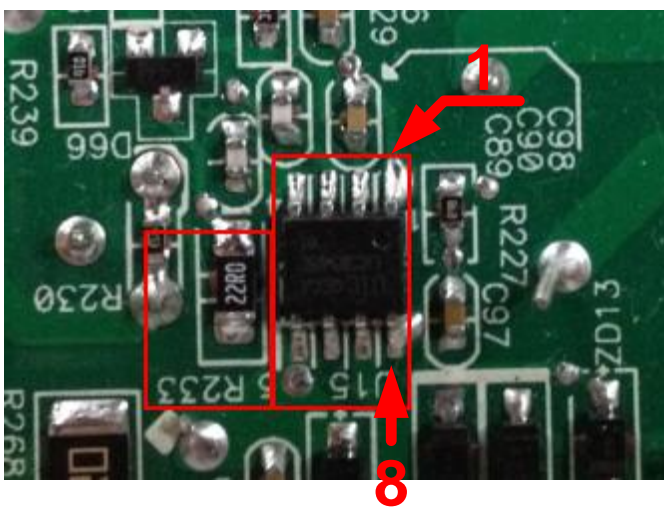
Q37: 11-320046-00G (MOSFET VISHAY/IRFBG30 3.1A 1000V N BULK TO-220)

C87: 15-000048-00G (C-AL 33UF 450V M RAD BULK 7.5 105°C JAMICON 16*32)

C87 explodes as below, it needs to be replaced.



R233: 14-110022-00G (RES CHIP TF 1/4W 22 F 1206)



Note: If R233 is damaged, please replace U15 together.

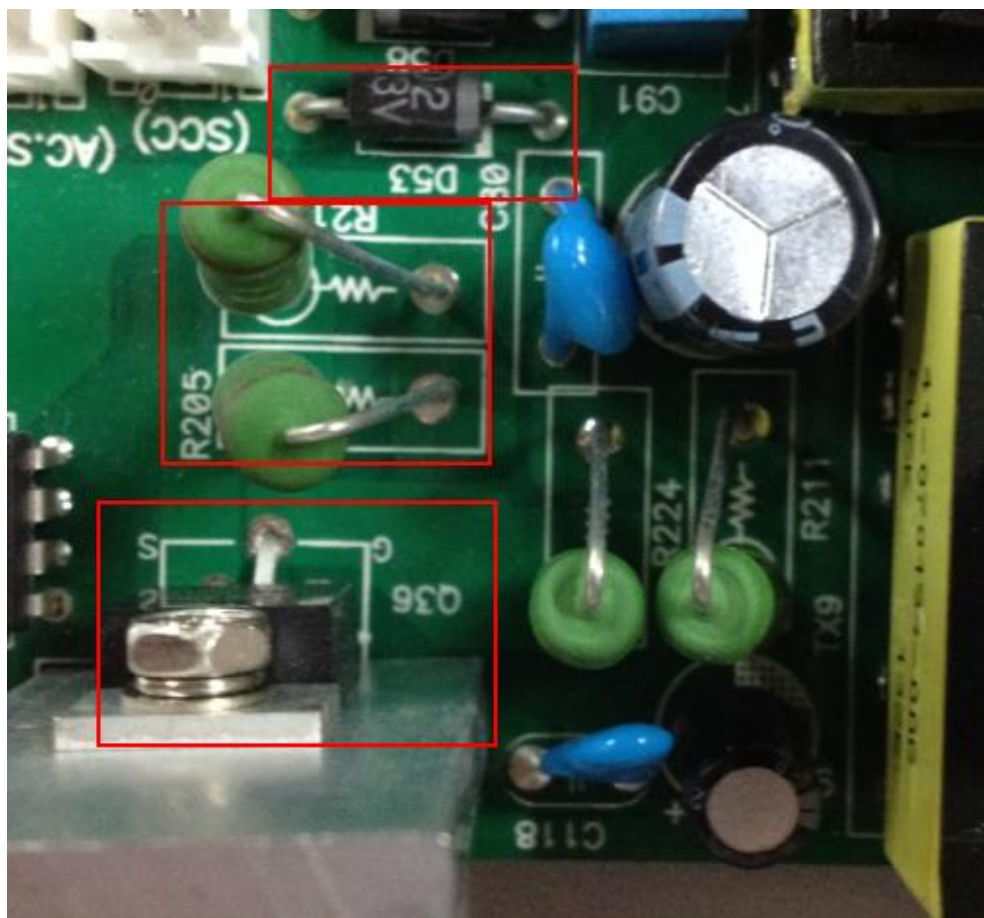
U15: 11-104003-00G (IC PWM CNTL UTC/UC3845A 8P/SOP-8 SMD)

SERVICE MANUAL

Inverter 4KVA/5KVA

Parts	Attribute	Reference values	Failure status
D17/D18/D20/D21	Resistor	+ to -: 270k - to +: 800k	Short or explosion
	Diode	+ to -: 0.57V - to +: OL	
Q37	Resistor	GS: 29k GD: 336k DS: 550k	Short or explosion
	Diode	SD: 0.5V DS: OL	
R233	Resistor	22 ohm	Open or other values
U15	Resistor	PIN7 TO PIN5: 42k PIN6 TO PIN5: 30k	Short or explosion

3.7 Check the battery switching power supply circuit



Q36: 11-320005-00G
(MOSFET IR/IRF640N
PBF 18A 200V N BULK
TO-220)

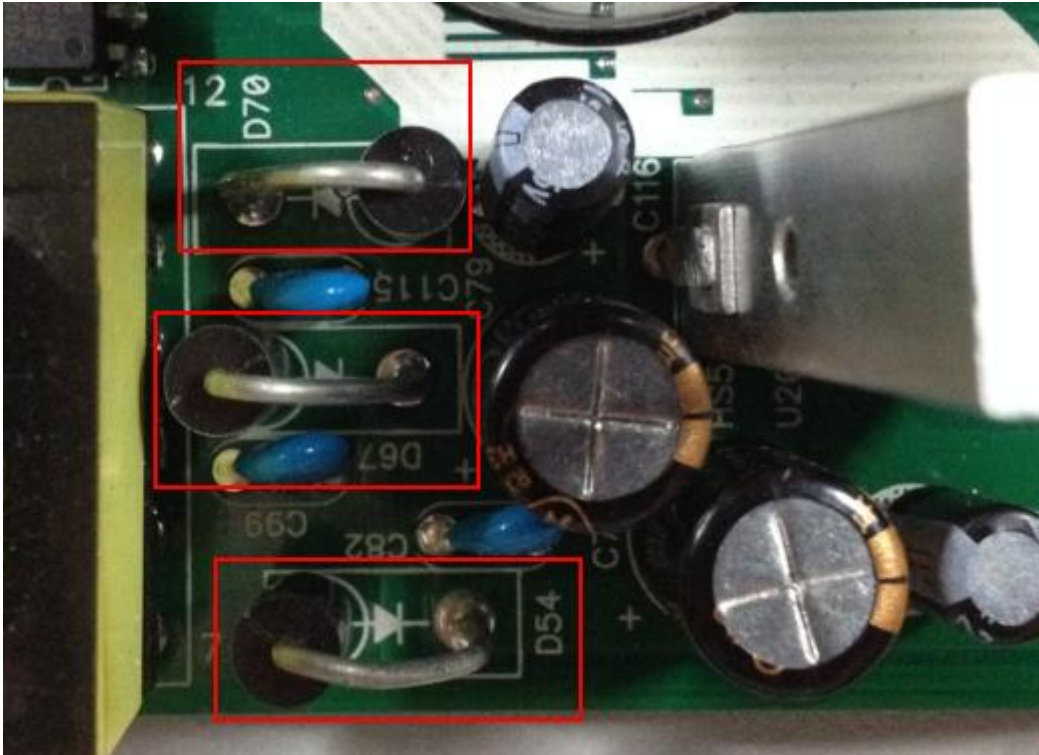
D53: 11-200026-00G
(D PAJ/UF202 2A
200V UFST AXI TAP)

R205/R215:
14-600017-00G (RES
3W 0.15 J N-IND)

In the new version,
R205 is N/A.

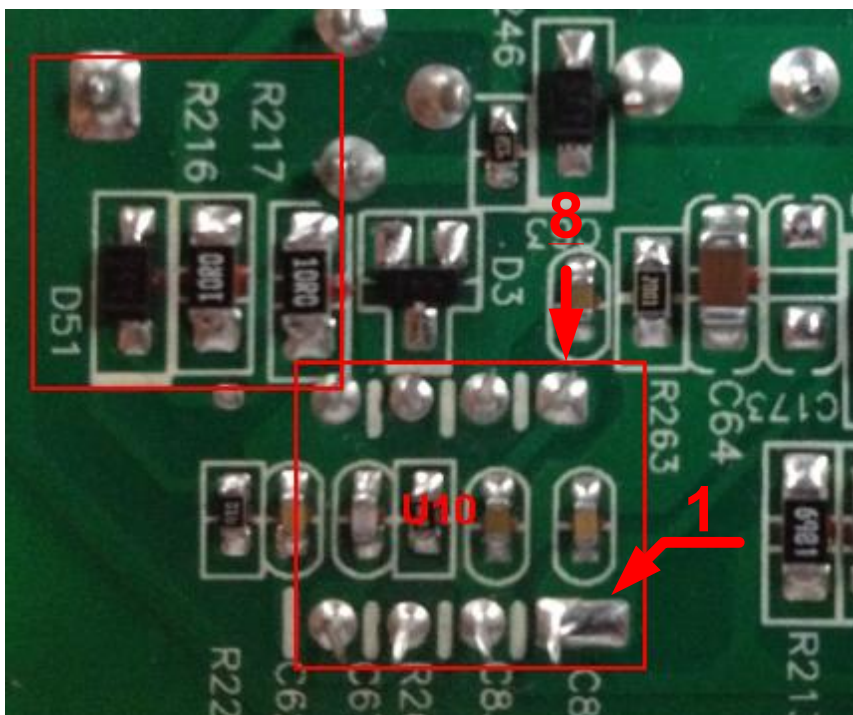
D54: 11-200093-00G
(D ON/MUR460RLG
4A 600V UFST RAD
AXI DO-201AD TAP)

D67/D70: 11-210009-00G (D PANJIT/UF302 3A 200V UFST AXI BULK) or 11-200179-00G (D IO/HER303 3A 200V UFST AXI DO-27 TAP)



R126/R217: 14-110010-00G (RES CHIP TF 1/4W 10 F 1206)

D51: 11-210001-00G (D PAJ 1N4148W 0.15A 75V SMD)



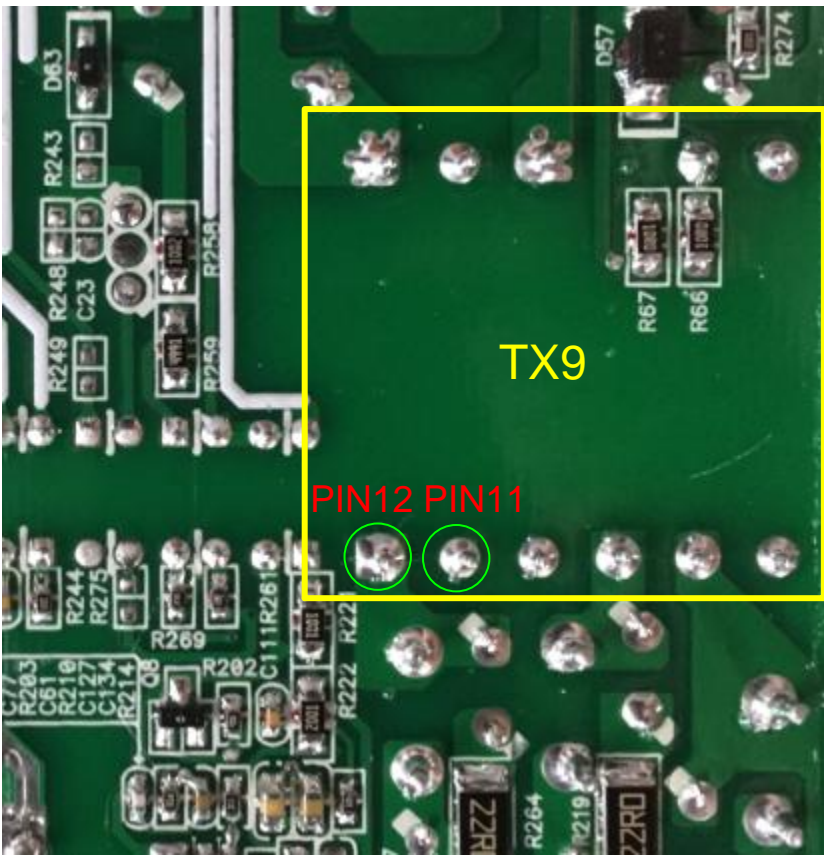
SERVICE MANUAL

Inverter 4KVA/5KVA

Note: If R126 or R127 is damaged, please replace U10 together.

U10: 11-004006-00G (IC PWM CNTL ST/UC3845B DIP-8P)

Parts	Attribute	Reference values	Failure status
D53	Resistor	+ to -: 276k - to +: OL	Short or explosion
	Diode	+ to -: 0.53V - to +: OL	
Q36	Resistor	GS: 16k GD: OL DS: OL	Short or explosion
	Diode	SD: 0.52V DS: OL	
R205/R215	Resistor	0.15 ohm	Open or other values
D54	Resistor	+ to -: 2.5k - to +: 3.9k	Short or explosion
	Diode	+ to -: 0.44V - to +: 0.68V	
D67	Resistor	+ to -: 100k - to +: 500k	Short or explosion
	Diode	+ to -: 0.43V - to +: 2.6V	
D70	Resistor	+ to -: 235.2k - to +: 2 Meg	
	Diode	+ to -: 0.43V - to +: 2.7V	
R126/R217	Resistor	10 ohm	Open or other values
D51	Resistor	+ to -: 240k - to +: OL	
	Diode	+ to -: 0.6V - to +: OL	
U10	Resistor	PIN7 TO PIN5: 2k PIN6 TO PIN5: 16k	Short or explosion

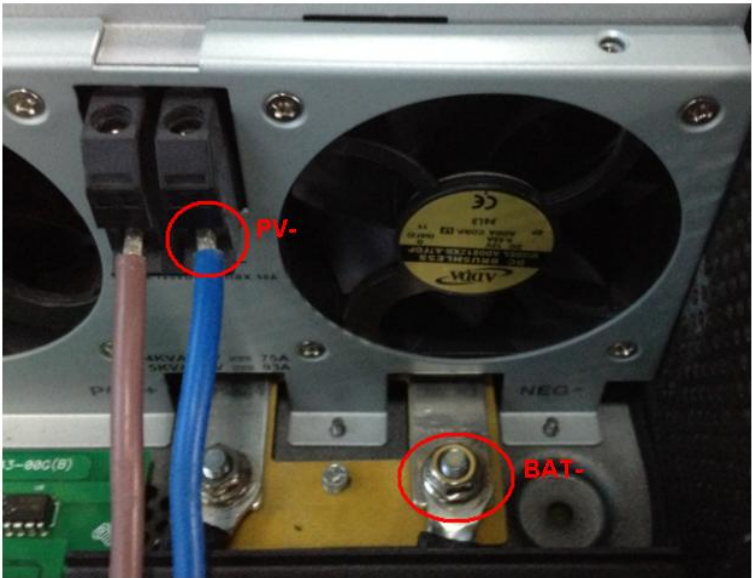


TX9: 41-070194-01G (TX 5:5:5:3: 1:6 FER EE28)

Parts	Attribute	Reference values	Failure status
TX9: 41-070194-01G	Resistor	PIN11 to PIN12: 0.5ohm	Open or other values
Note: When 03 fault happens, and you couldn't find other damage, please check TX9!!			

3.8 Check the reversed protection MOSFETs on DC side

Before you open the closure, you can measure it as below:



SERVICE MANUAL

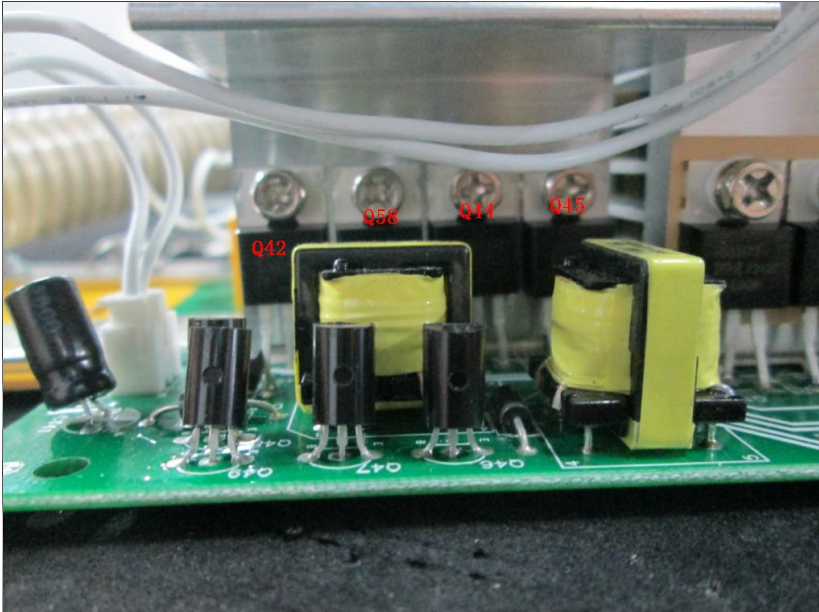
Inverter 4KVA/5KVA

Measure the resistor between the PV- and BAT-.

Parts	Attribute	Reference values	Failure status
PV- to BAT-	Resistor	>10k	Short

If it is short, you should replace the mosfet on the main board:

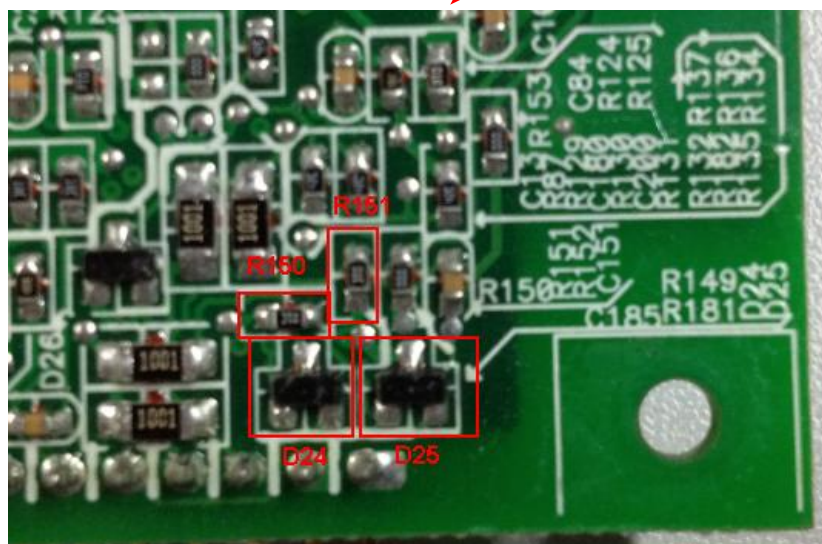
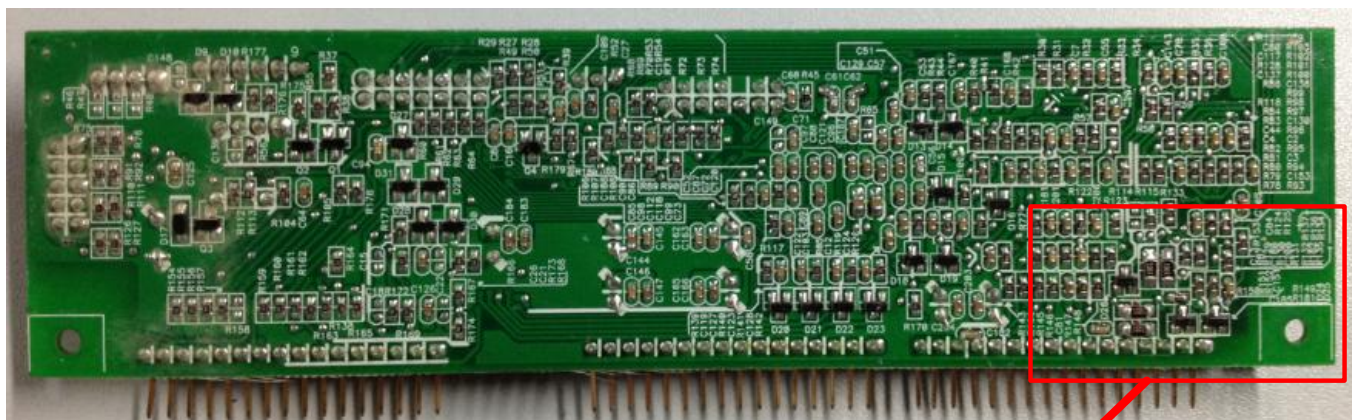
Q42/Q58/Q44/Q45: **11-320076-00G MOSFET IR/IRFB3006GPBF 195A 60V NPN BULK TO-220**



SERVICE MANUAL

Inverter 4KVA/5KVA

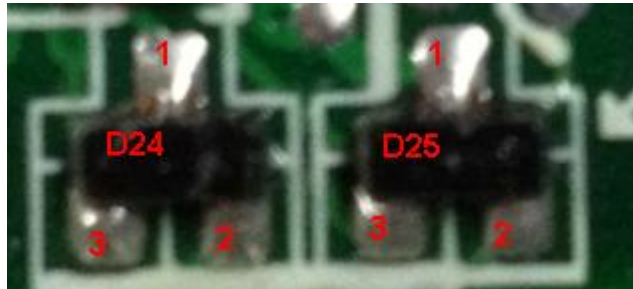
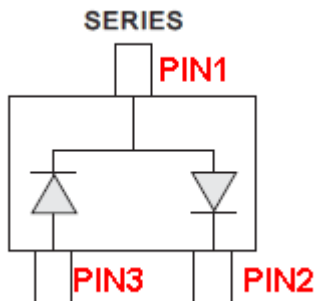
3.9 Check the current sharing module of control board



Parts	Attribute	Reference values	Failure status
R151/R150	Resistor	10 or 100 kohm	Short or other values
D24/D25	Resistor	PIN 1 to 2: >15K PIN 2 to 1: >50K PIN 1 to 3: >50K PIN 3 to 1: >15K	Short or explosion
	Diode	PIN 1 to 2: 0.287V PIN 2 to 1: 1.5V PIN 1 to 3: 1.5V	

		PIN 3 to 1: 0.287V	
--	--	--------------------	--

The pin definition of D24 and D25 shows as below:



3.10 Check the NTC circuit

There are three NTCs on the main board, one is for DC-DC heatsink, one is for transformer, and the last one is for INV heatsink.

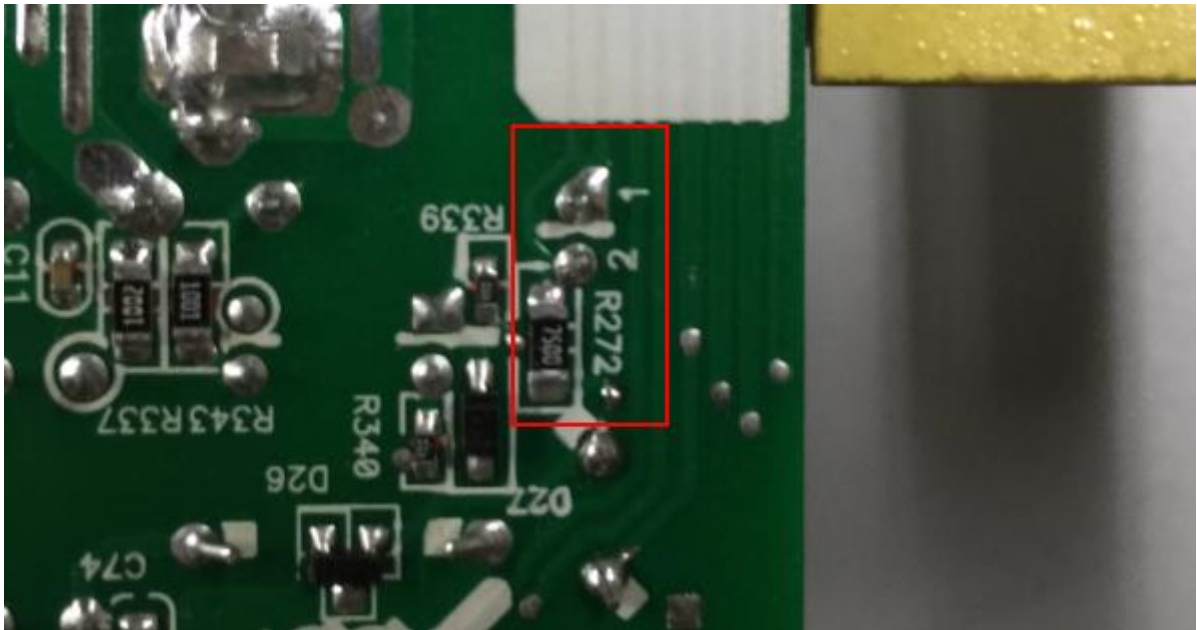
Please check these three NTCs if the inverter came out 02 error.

➤ DC-DC heatsink

The NTC is located as below:



Please measure the parts as below:



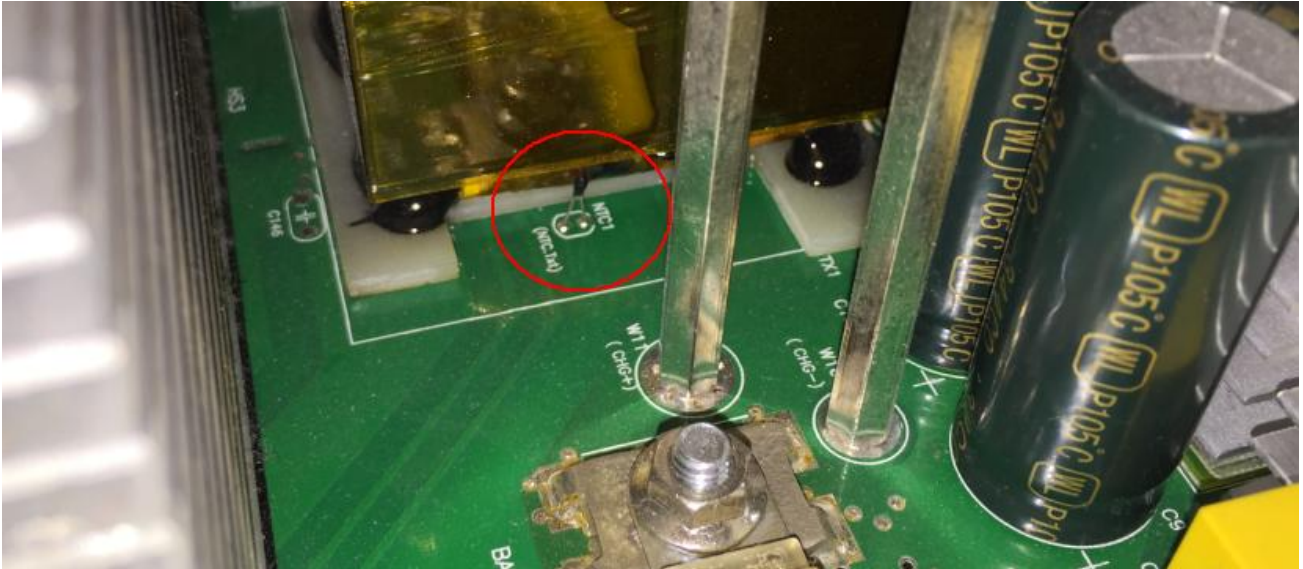
Parts	Attribute	Reference values	Failure status
R272	Resistor	700~750 ohm	Short or other values
NTC3_HS1 in CN8	Resistor	4~6k ohm	Short or other values
NTC3_HS1 separately	Resistor	15k ohm	Short or other values

Note: Please plug out the NTC from CN8, and measure the resistance of NTC directly. The result may not reflect the real value of the NTC if you measure the value on the main board. We also provide the value when NTC is plugged on the main board for reference.

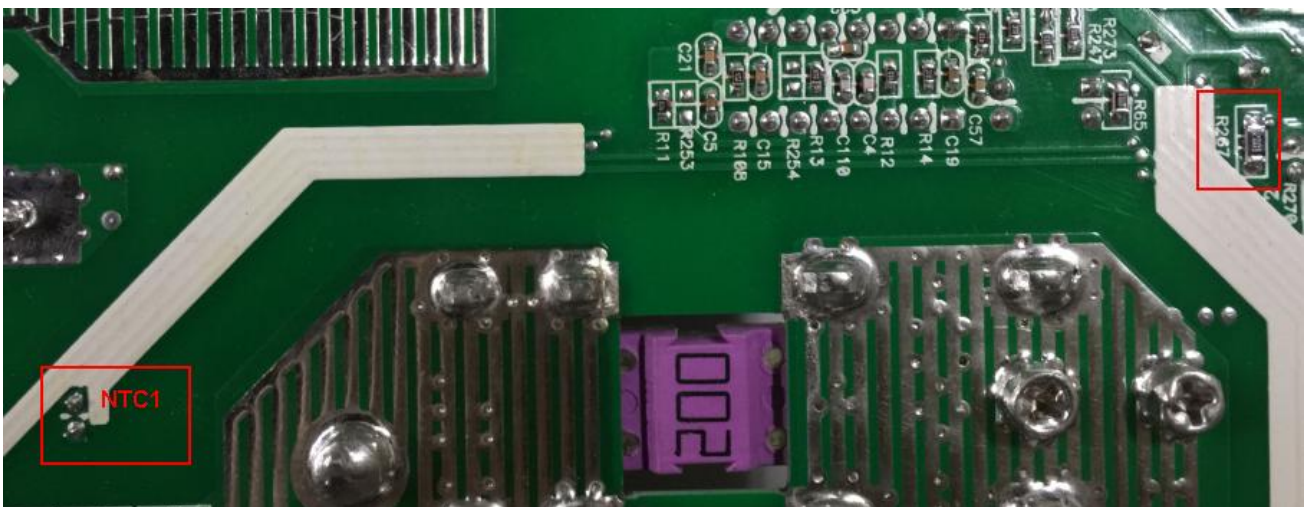
If you are not convenient to test the resistance, you can unplug the NTC, and test the inverter again. If the fault doesn't happen again, it means that this NTC is wrong.

➤ Transformer

The NTC is located as below:



Please measure the parts as below:

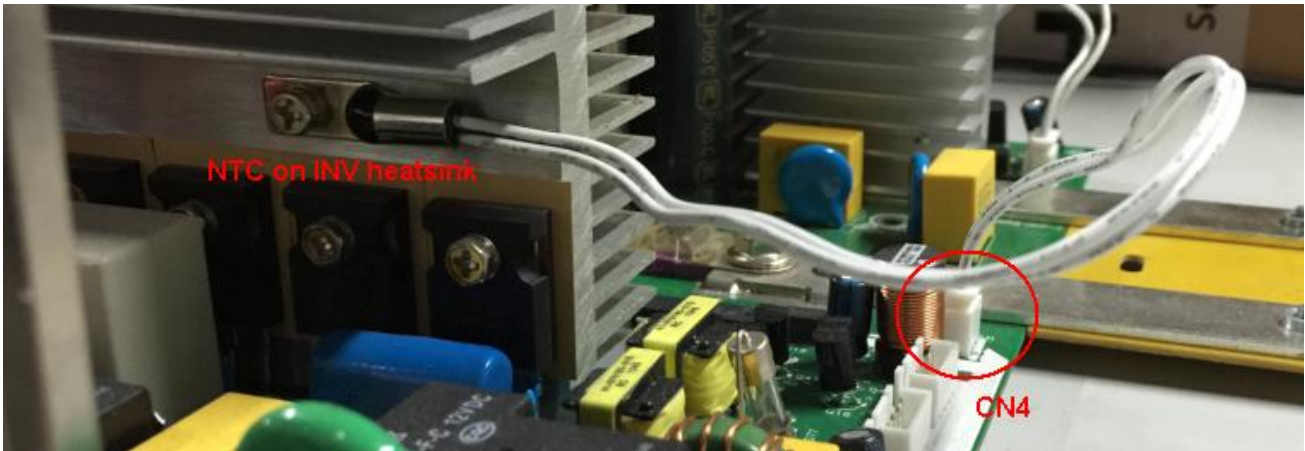


Parts	Attribute	Reference values	Failure status
R267	Resistor	1.9~2.1k ohm	Short or other values
NTC1	Resistor	8~9k ohm	Short or other values

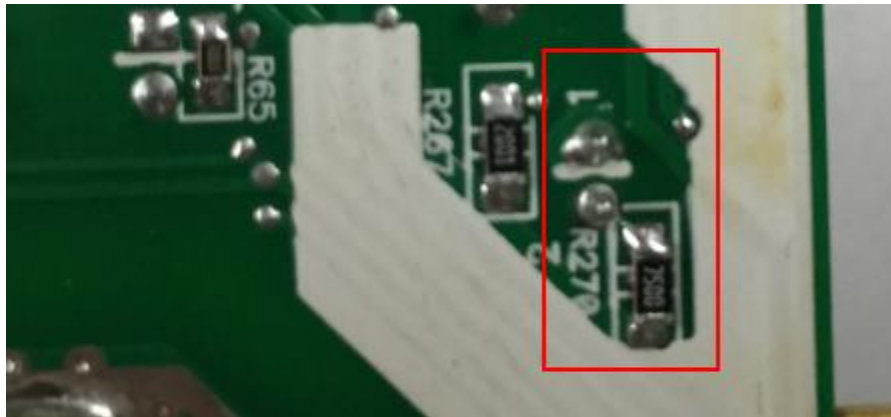
If the NTCs on the DC-DC and INV heatsink are OK, it means that NTC1 is wrong. You can also remove NTC1 from the main board for checking.

➤ INV heatsink

The NTC is located as below:



Please measure the parts as below:



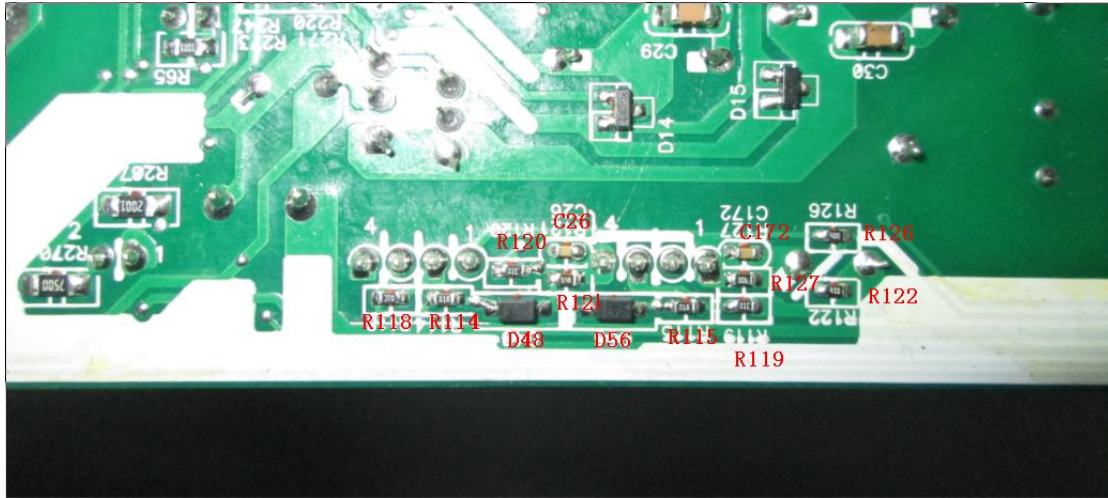
Parts	Attribute	Reference values	Failure status
R270	Resistor	700~750 ohm	Short or other values
NTC4_HS3 in CN4	Resistor	4~6k ohm	Short or other values
NTC4_HS3 separately	Resistor	15k ohm	Short or other values

Note: Please plug out the NTC from CN4, and measure the resistance of NTC directly. The result may not reflect the real value of the NTC if you measure the value on the main board. We also provide the value when NTC is plugged on the main board for reference.

If you are not convenient to test the resistance, you can unplug the NTC, and test the inverter again. If the fault doesn't happen again, it means that this NTC is wrong.

3.11 Check the fan driver on the main board

The parts of fan driver are marked as below:



Parts	Attribute	Reference values	Failure status
R118	Resistor	9.9-10k ohm	Short or other values
R114	Resistor	100 ohm	Short or other values
R120	Resistor	9.98-10k ohm	Short or other values
R121	Resistor	3.96-4.02k ohm	Short or other values
R115	Resistor	100 ohm	Short or other values
R119	Resistor	9.98-10k ohm	Short or other values
R127	Resistor	1.86-2k ohm	Short or other values
R126	Resistor	1.7-2k ohm	Short or other values
R122	Resistor	0.97-1k ohm	Short or other values
D48/D56	Resistor	+ to -: 240k - to +: OL	Short or other values
	Diode	+ to -: 0.6V - to +: OL	

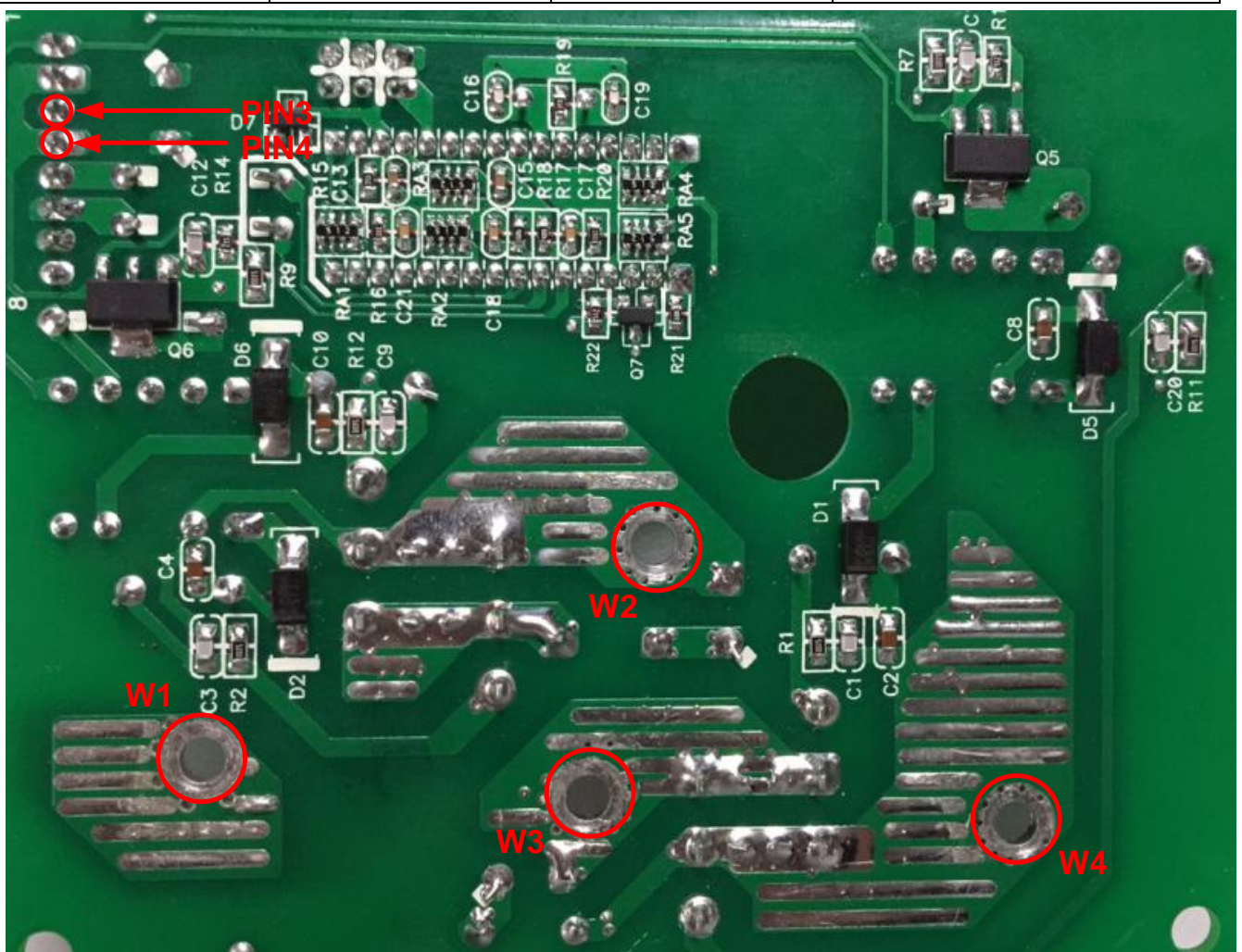
3.12 Check the PAR board

Before checking the PAR board, you can first disconnect the cable between PAR board and main board. And startup the inverter again, if the issues are eliminated, it means PAR board surely has something wrong.



Please check the parts as below on the PAR board:

Test point	Attribute	Reference values	Failure status
Pin 3 to Pin 4	Resistor	>100 kohm	Short or other values
W1 to W2	Resistor	>5 Meg ohm	Short or other values
W3 to W4	Resistor	>5 Meg ohm	Short or other values



4. Assembling guide

4.1 INVERTER WITH PWM 4KVA/5KVA

Remove the screws of the connector cover.



Remove the nuts of the battery connector.



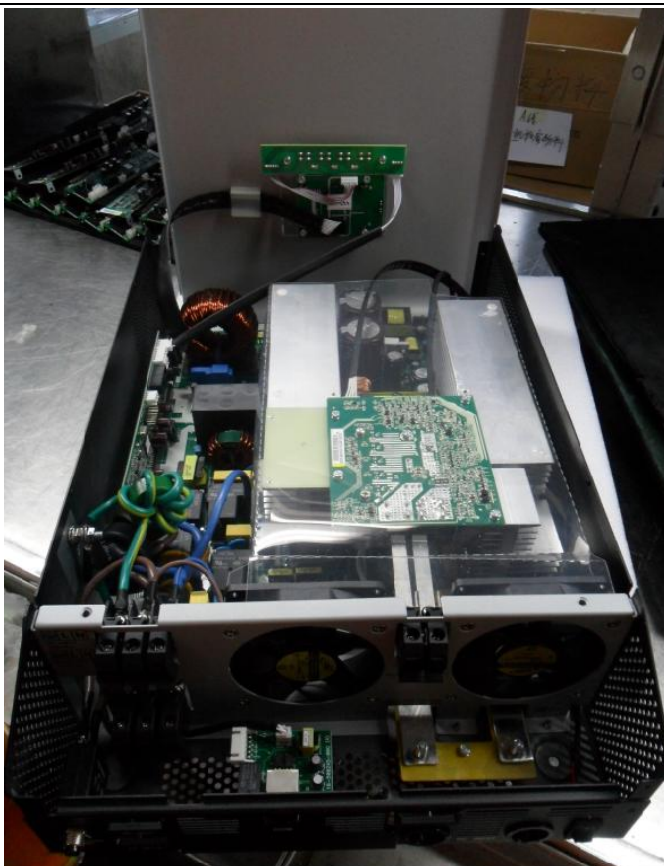
SERVICE MANUAL

Inverter 4KVA/5KVA

Remove the screws of top cover.



Take out the top cover.
(**Note:** If you just only need to replace the control board, you can replace it at this step.)



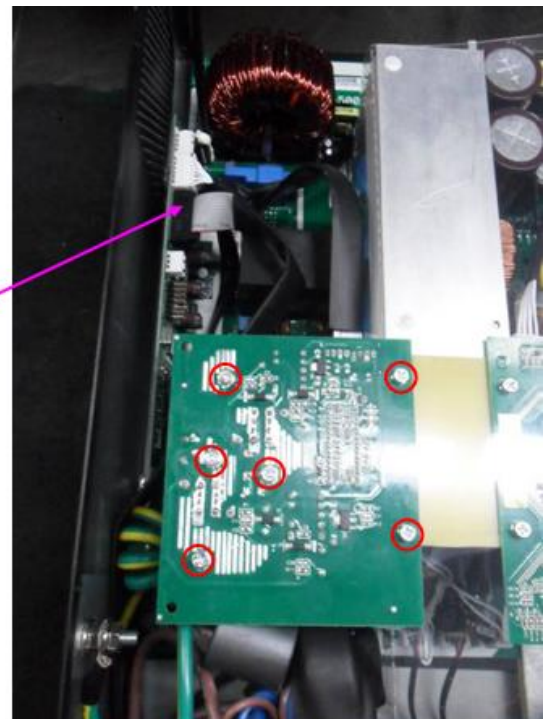
SERVICE MANUAL

Inverter 4KVA/5KVA

Remove the LCD and LED panel cables. There is the glue on the LCD cable connector, you can use a needle-nose pliers remove it slightly. Without cables on the top cover, you can place the top cover on the side.



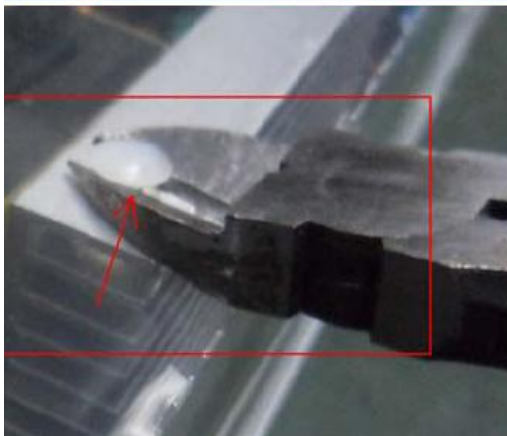
Remove the parallel power board if the inverter has.



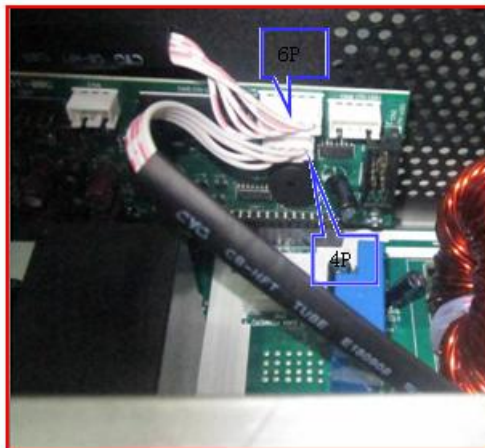
SERVICE MANUAL

Inverter 4KVA/5KVA

Remove the canoe clip of wind pipeline. Be care not to damage them. You can use an oblique mouth clamp to help you to remove the clip.



Remove the SCC board.

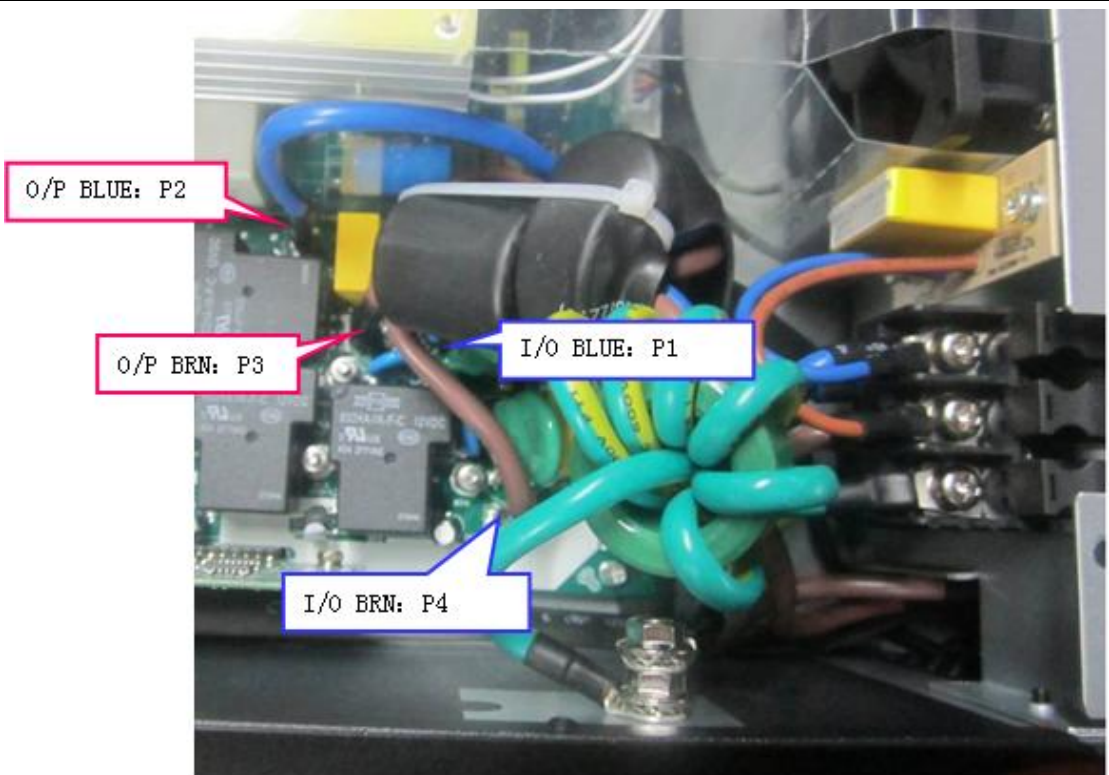


SERVICE MANUAL

Inverter 4KVA/5KVA



Remove I/P and
O/P cables.



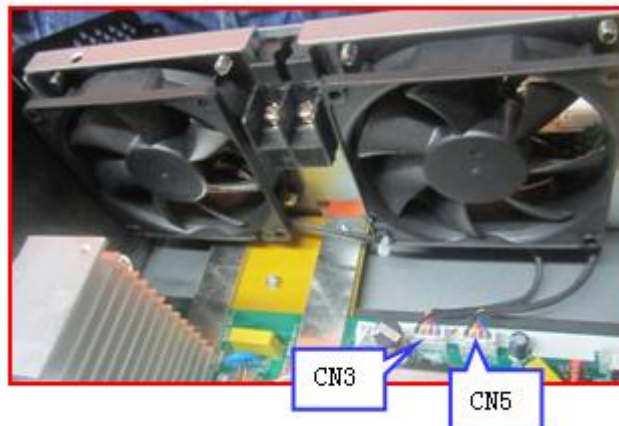
SERVICE MANUAL

Inverter 4KVA/5KVA

Remove the
ground cables.



Remove the fan
cables.

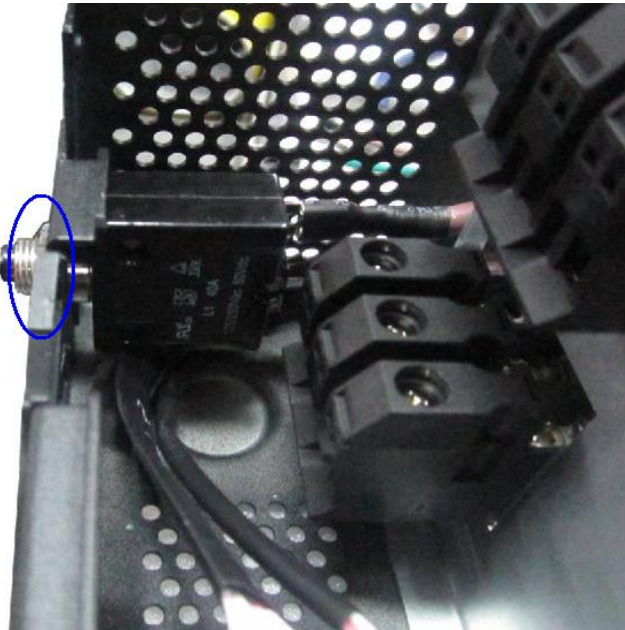


SERVICE MANUAL

Inverter 4KVA/5KVA

Remove the fuse by removed the nut outside.

(**Note:** This step can be used for replacing the fuse)

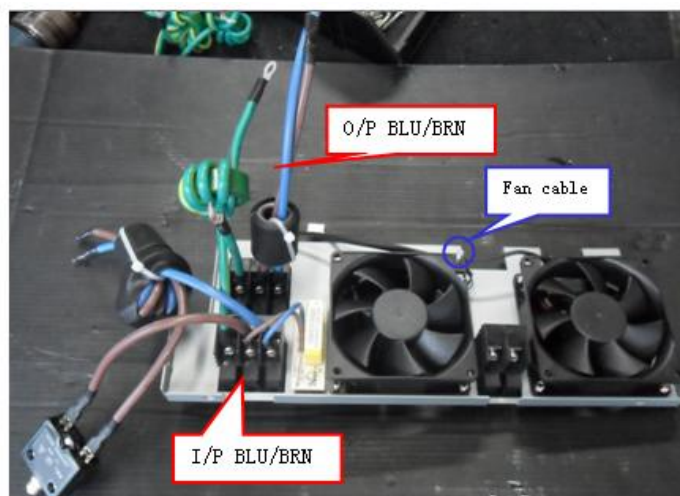


Remove the screw on the both side of the bottom cover.



Until now you can take out the connector panel from inside.

(**Note:** This step can be used for replacing the fans.)



SERVICE MANUAL

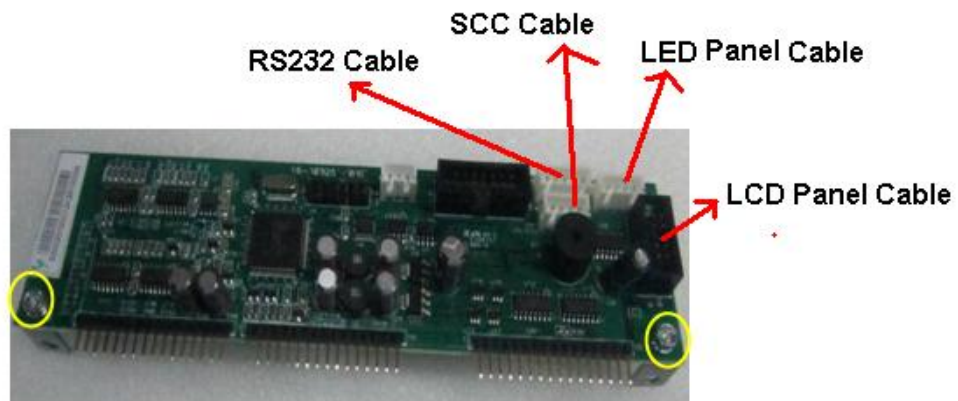
Inverter 4KVA/5KVA

Remove the screw of cntl board and unplug it.

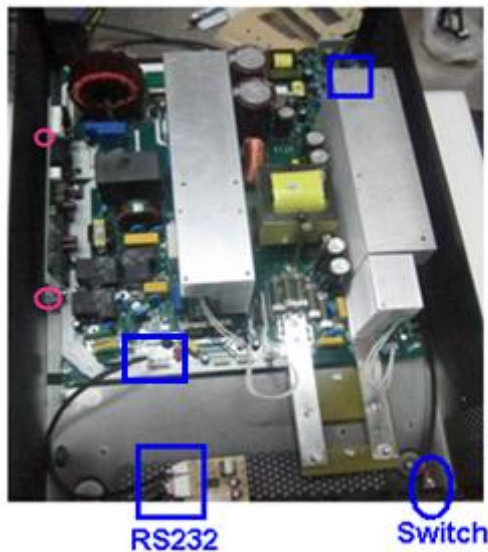


Take out the cntl board.

(Note: When put the cntl board back to the main board; please be sure that pin to pin or the cntl board may be damaged.)



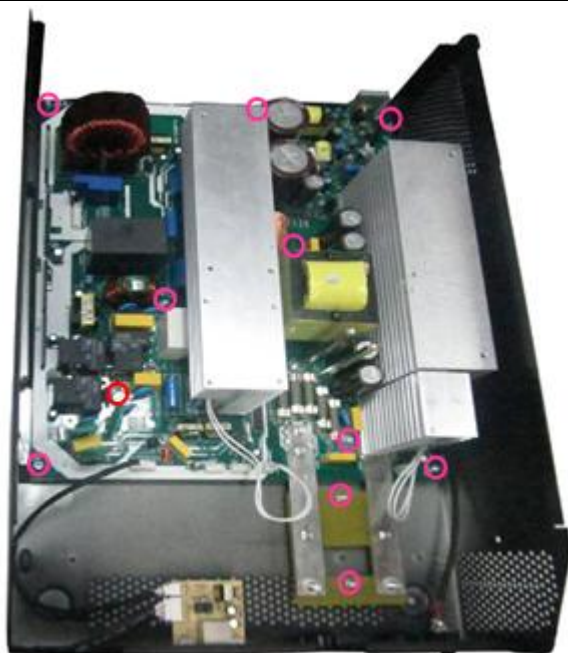
Remove the switch cable and RS232 cable on the main board.



SERVICE MANUAL

Inverter 4KVA/5KVA

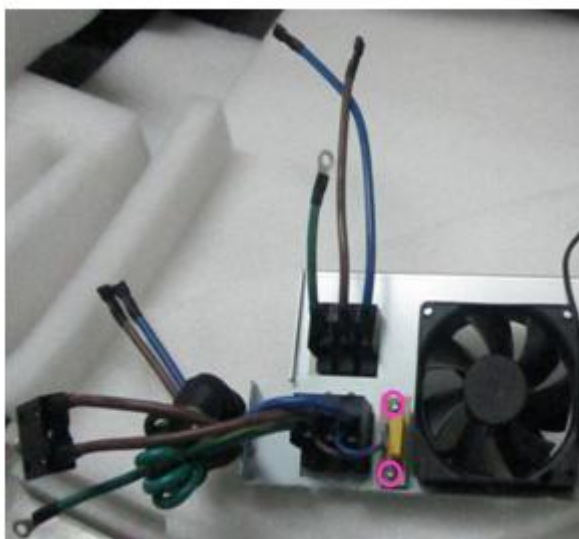
Remove the screw on the main board.



Take out the main board, and then you can put the new main board in.



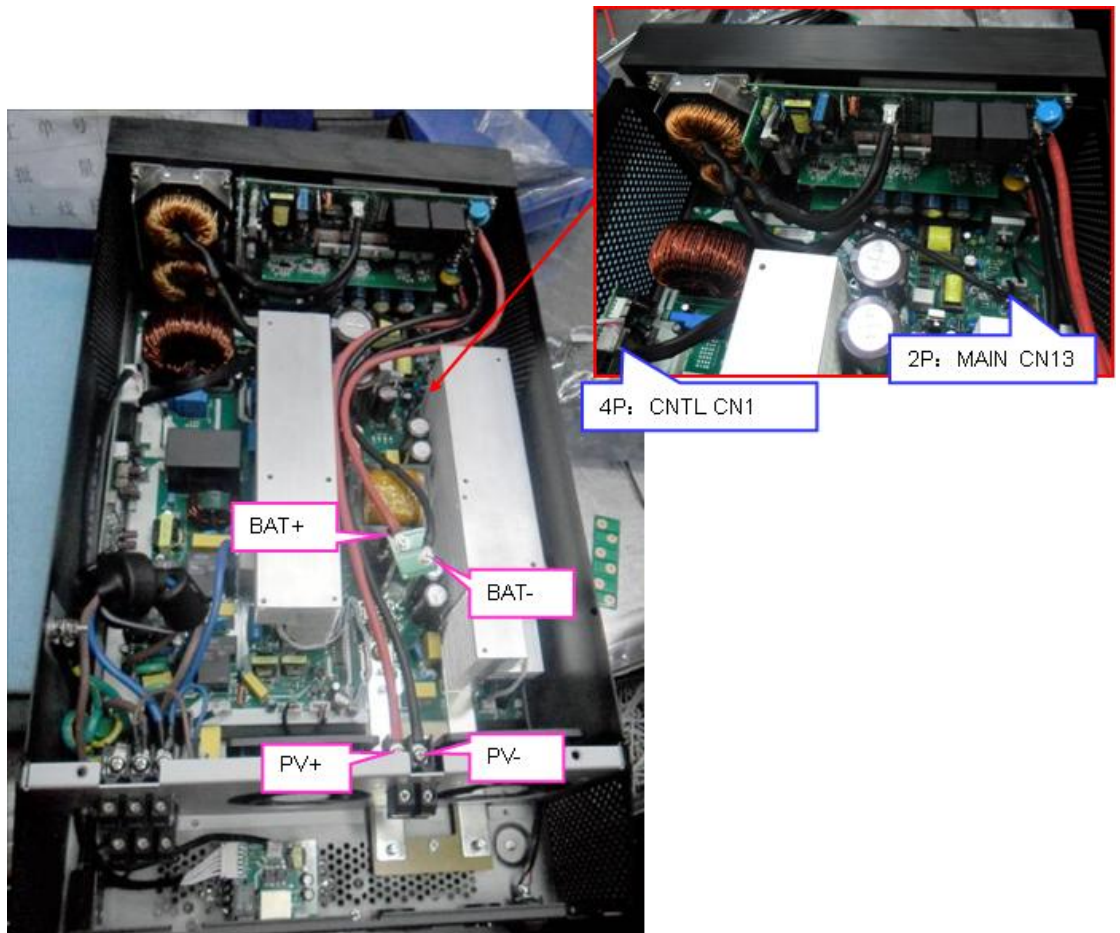
If you need to change cap board, you can follow the figure as below remove the screw of the cap board.



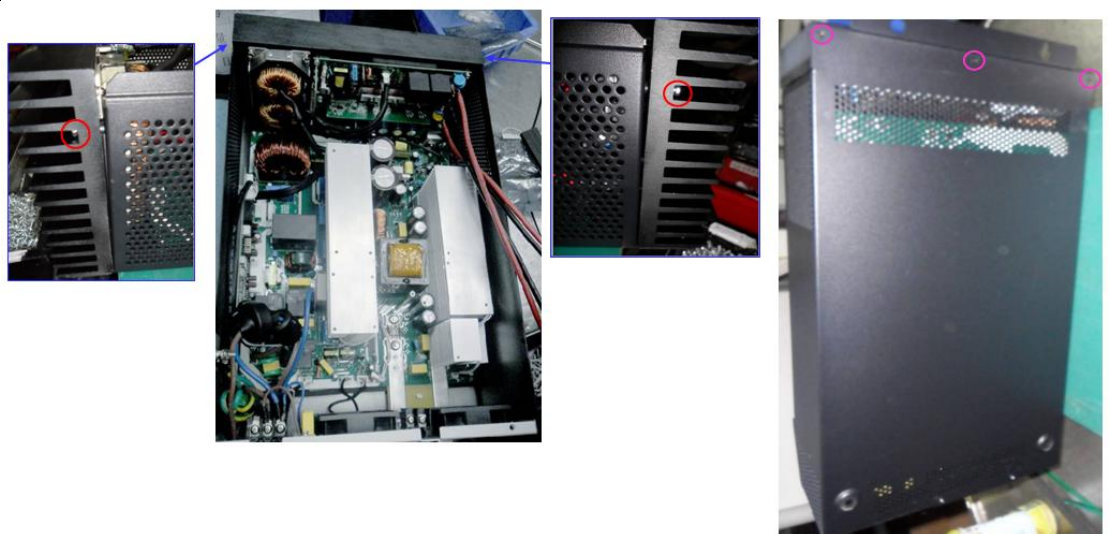
4.2 INVERTER WITH MPPT 4KVA/5KVA (OLD VERISON)

The steps are similar with INVERTER PWM 4KVA/5KVA, the difference is focused on SCC board part.
Here we only show some critical steps to tell you how to replace SCC board.

Disconnect the cables between main board and solar charger.



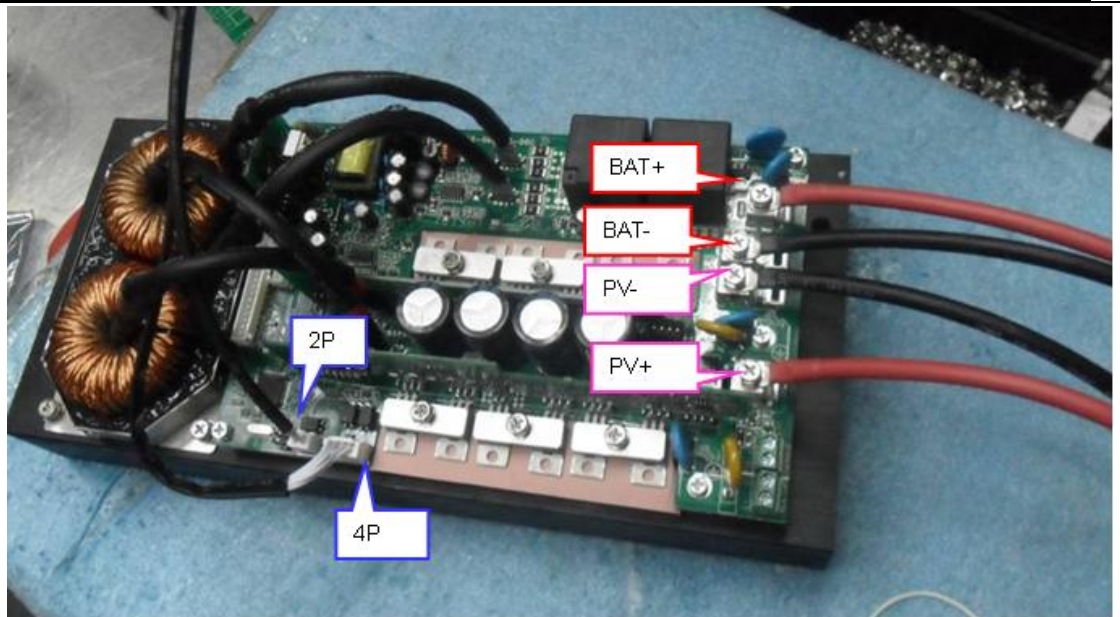
Remove the screws, and then you can take the SCC module off the inverter.



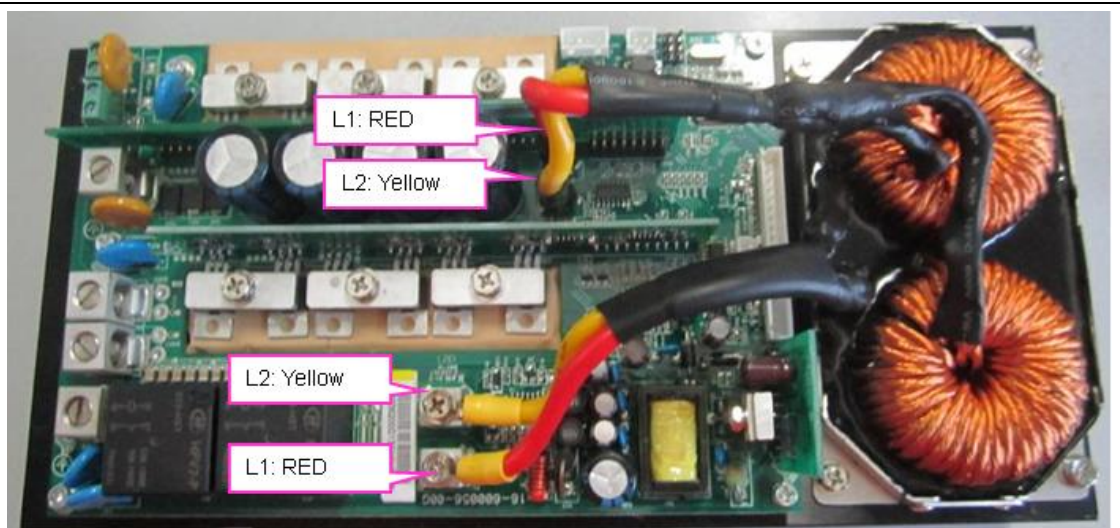
SERVICE MANUAL

Inverter 4KVA/5KVA

The figure of
SCC board



Remove the
inductor cables.



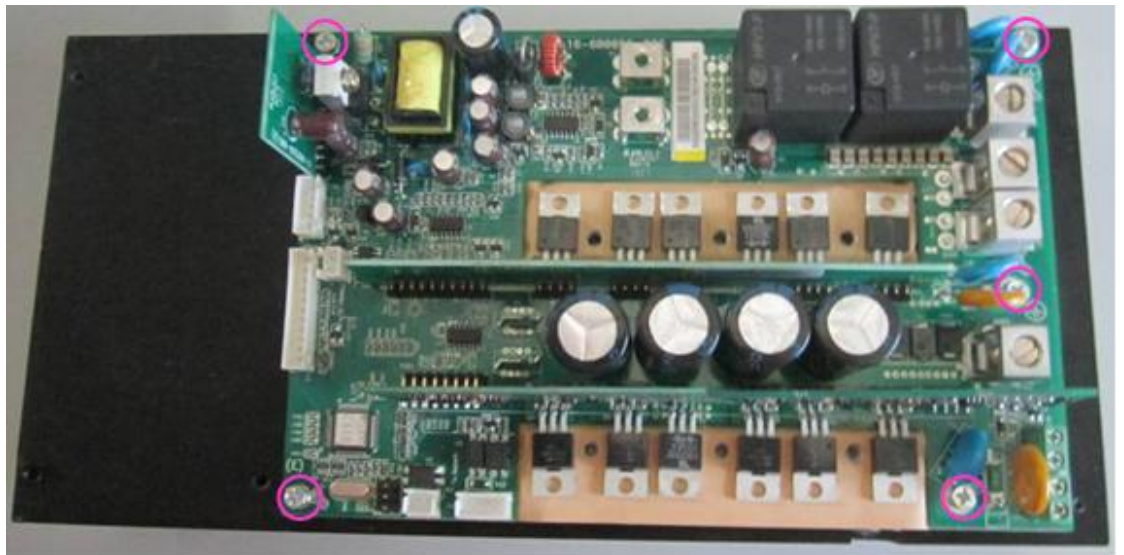
Remove the
depression bar
on the mosfet.



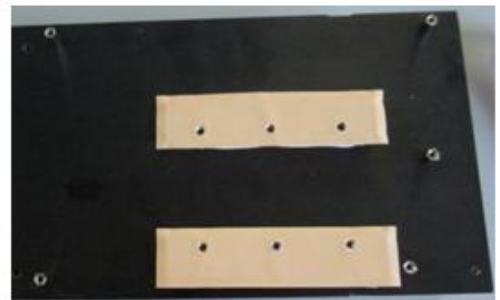
SERVICE MANUAL

Inverter 4KVA/5KVA

Remove the screws on the charger board.



Take off the charger board. Until now the finish the SCC board disassembly.



Note: If you want to replace a new charger board, before you put it on the bottom heatsink. You should follow the steps as below.

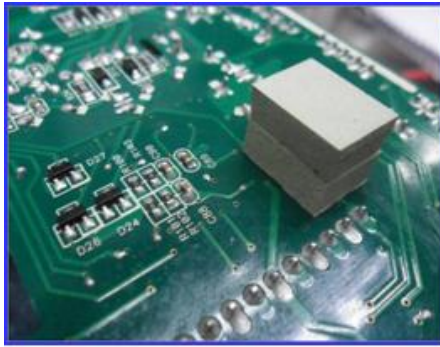
Cut off the spare PCB under the mosfet. It is best use an oblique mouth clamp to help you to remove the connection point. Be careful do not let the mosfet out of the shape.



SERVICE MANUAL

Inverter 4KVA/5KVA

Get the silicon pad from the old main board to the new main board. Keep the pad in the right position.

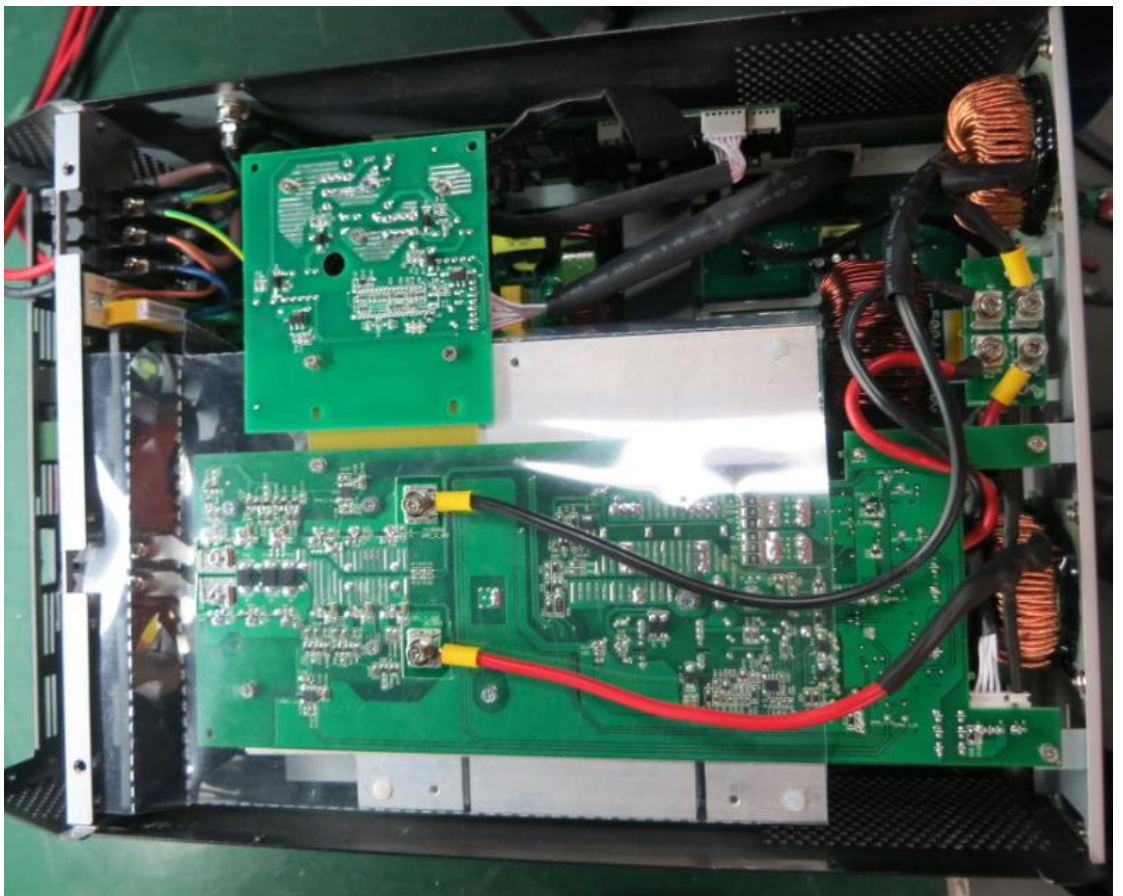


Note: When you put the depression bar on the mosfet, and ready to screw the screw, be sure the bar in the right position as below. Before you start to screw, it is best to use the other hand to hold the bar, to avoid the bar moving when fixed the screw.

4.3 INVERTER WITH MPPT 4KVA/5KVA (NEW VERISON)

The steps are similar with OLD ones, the difference is focused on SCC board part. Here we only show some critical steps to tell you how to remove SCC board.

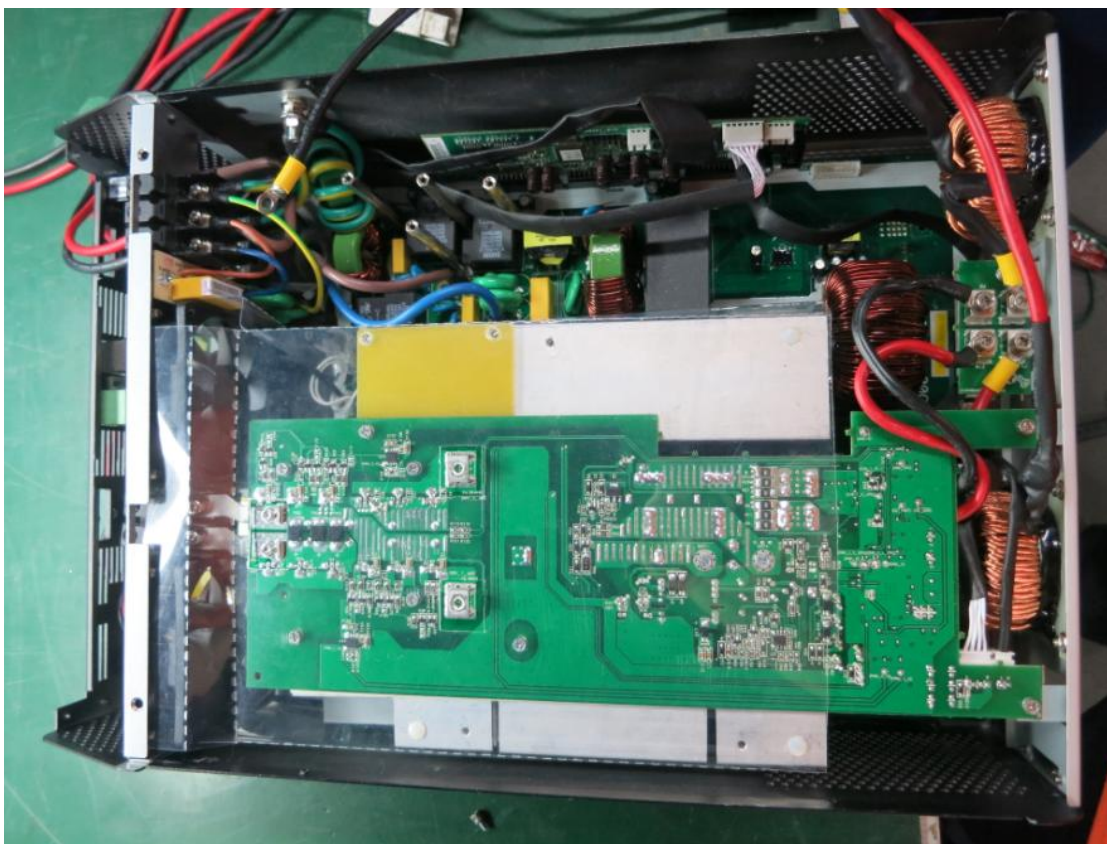
First open the top cover, the inside is showed as right.



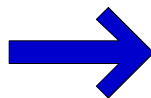
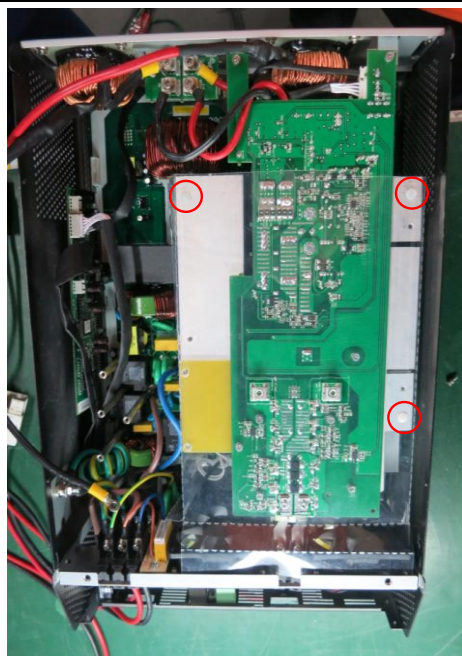
SERVICE MANUAL

Inverter 4KVA/5KVA

Remove the black and red cables on the SCC board. Remove the parallel power board also.



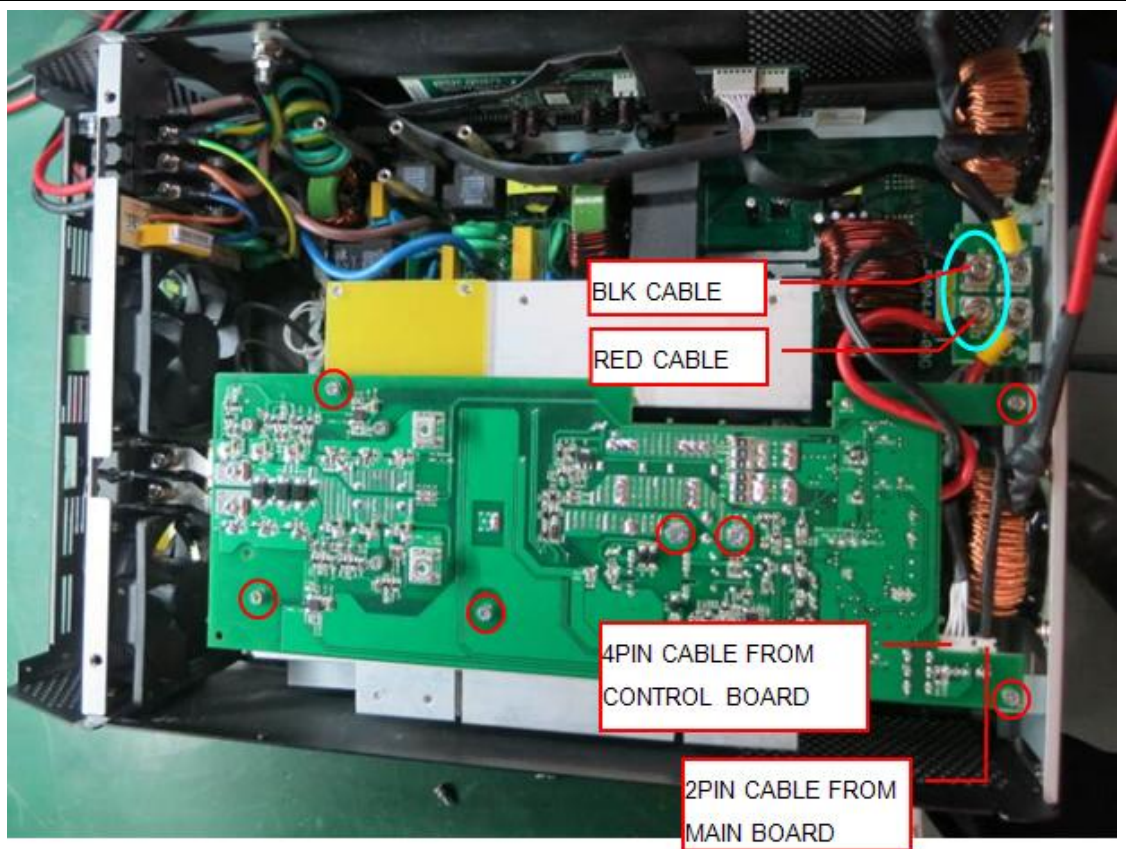
Remove the plastic screws on the air flow paper to take out the paper.



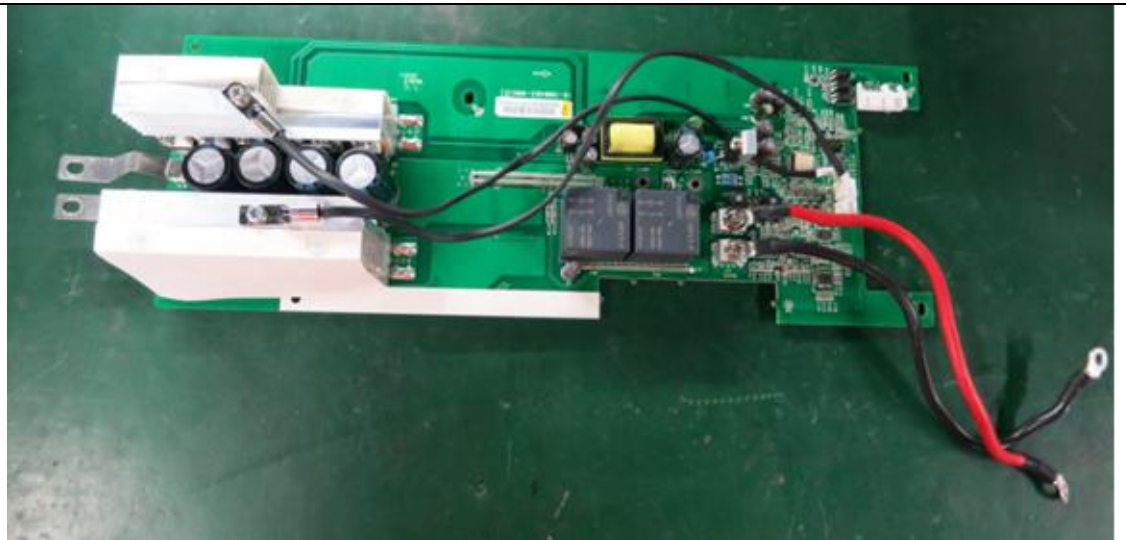
SERVICE MANUAL

Inverter 4KVA/5KVA

Remove the screws mark in red and blue. Plug out the 4 pin cable and 2 pin cable.



Take out the SCC board.



SERVICE MANUAL

Inverter 4KVA/5KVA

If you want to take the inductor pallet off, you can remove the screws showed in the figure.



After you remove the inductor pallet, the inverter is the same with PWM without SCC.



4.4 INVERTER WITH MPPT and AVR 5KVA

Remove the screws of the panel cover.



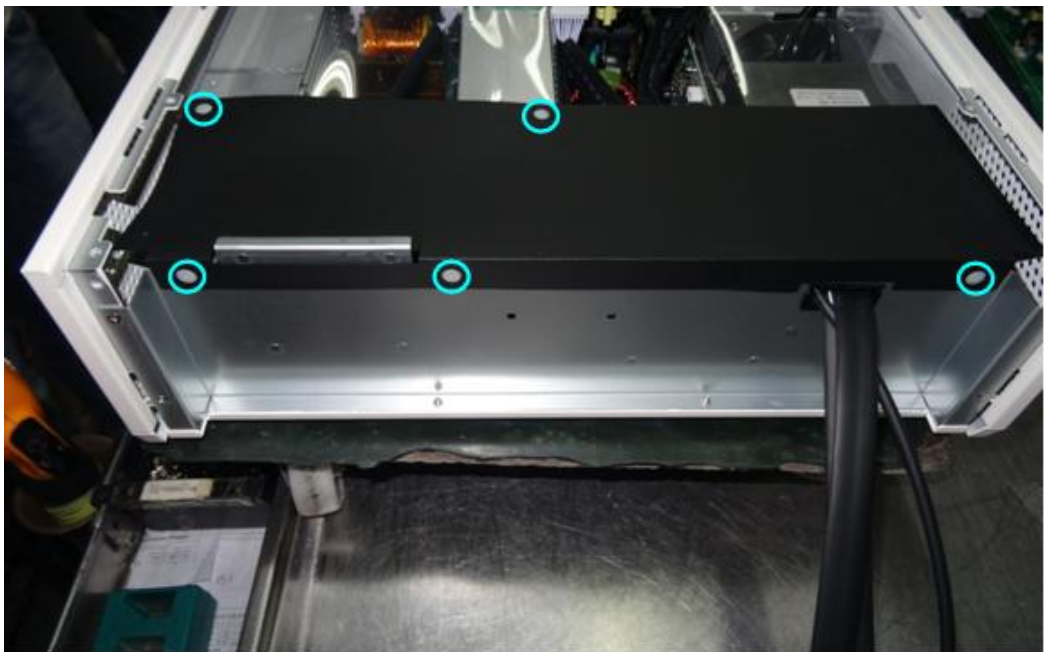
Remove the screws of top cover.



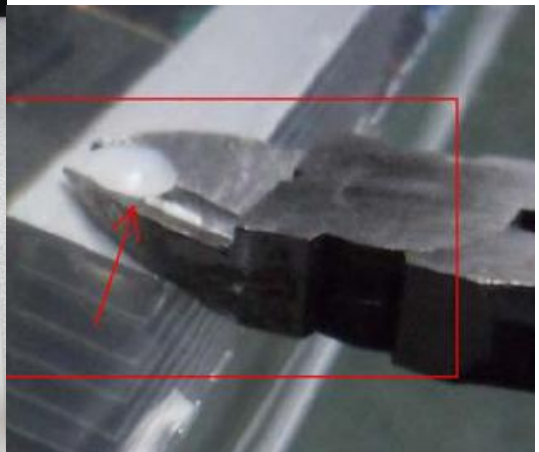
SERVICE MANUAL

Inverter 4KVA/5KVA

Remove the isolation paper.



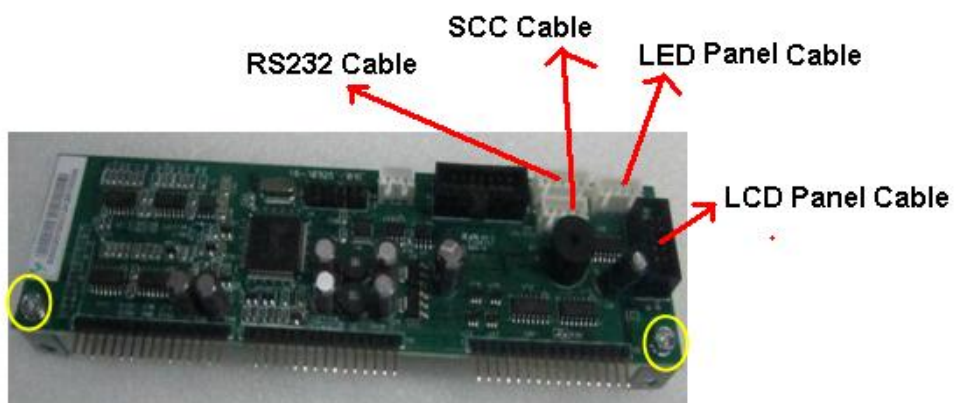
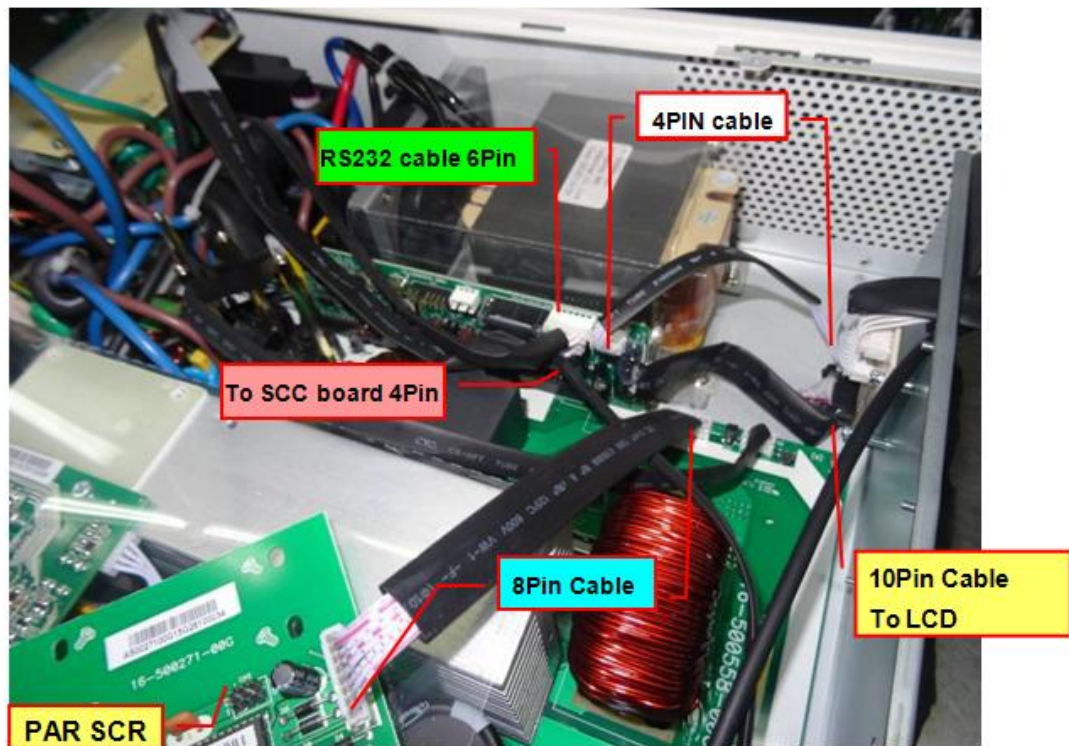
Remove the parallel power board if the inverter has. And remove the plastic nails on the air flow paper.



SERVICE MANUAL

Inverter 4KVA/5KVA

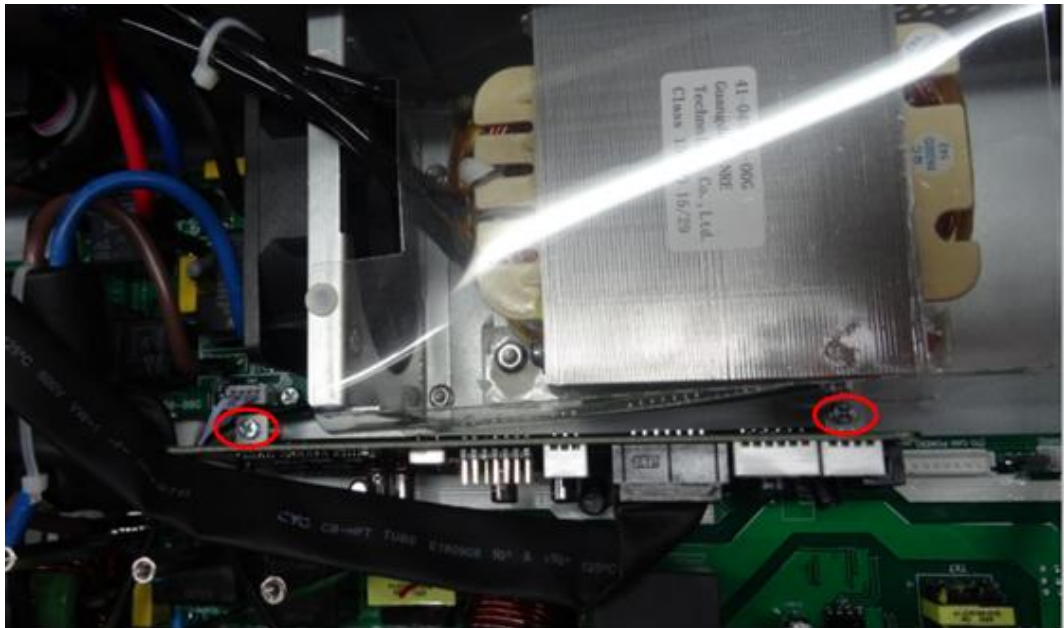
Remove the cable on the control board.



SERVICE MANUAL

Inverter 4KVA/5KVA

Remove the
control board



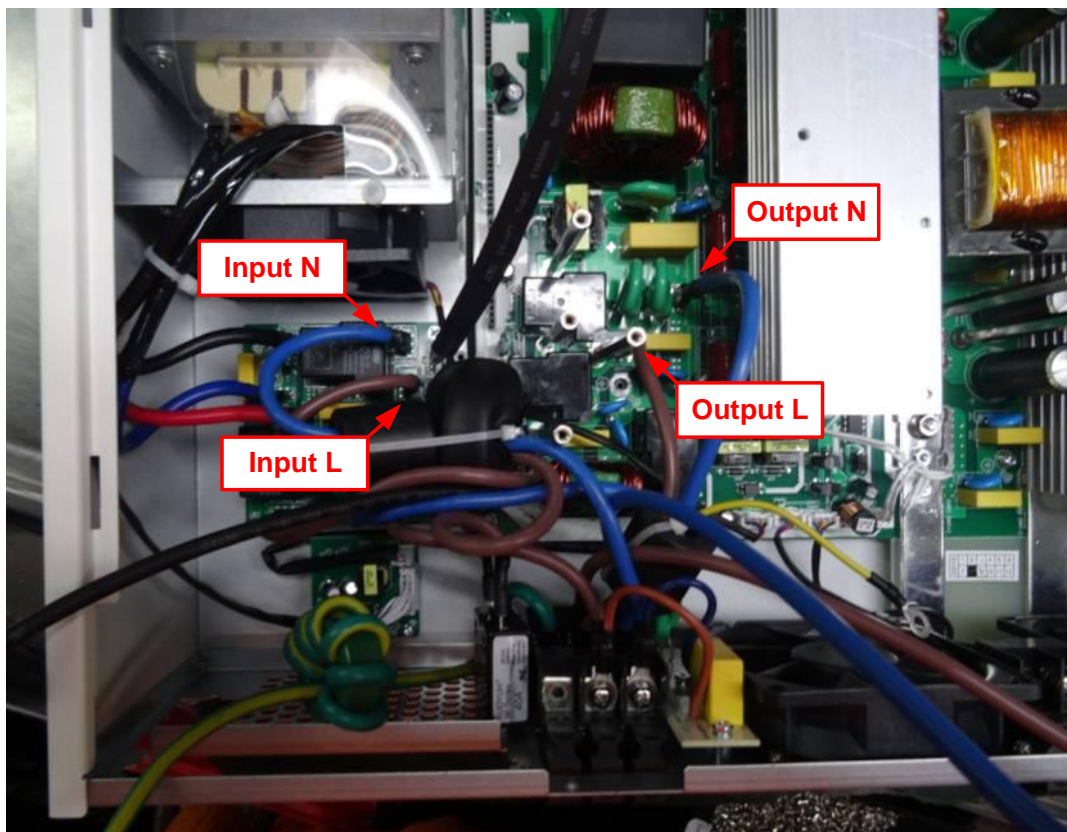
Remove the
SCC board.



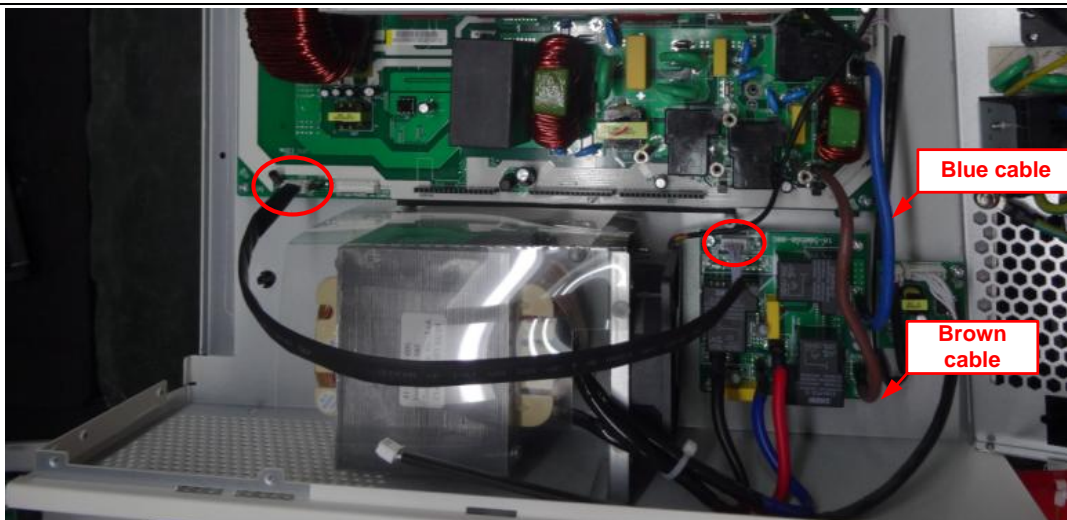
SERVICE MANUAL

Inverter 4KVA/5KVA

Remove I/P and O/P cables.



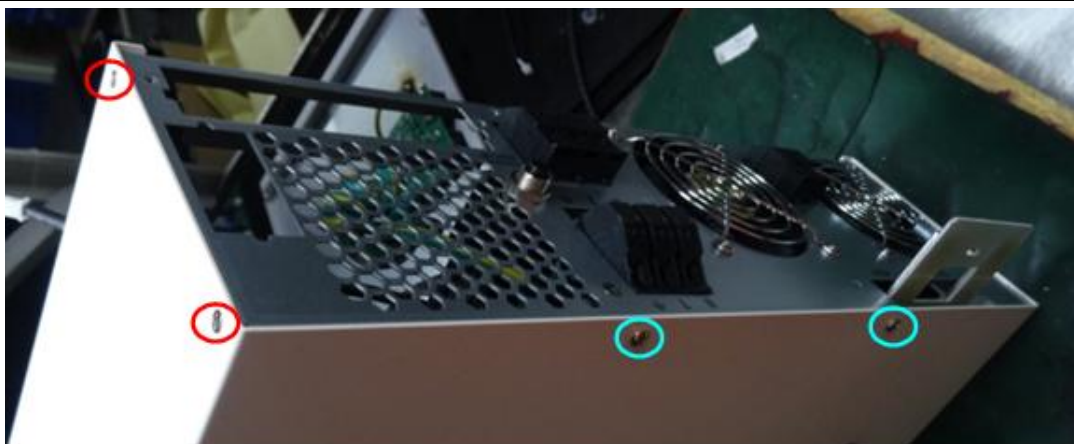
Remove the cable from main board to AVR board.



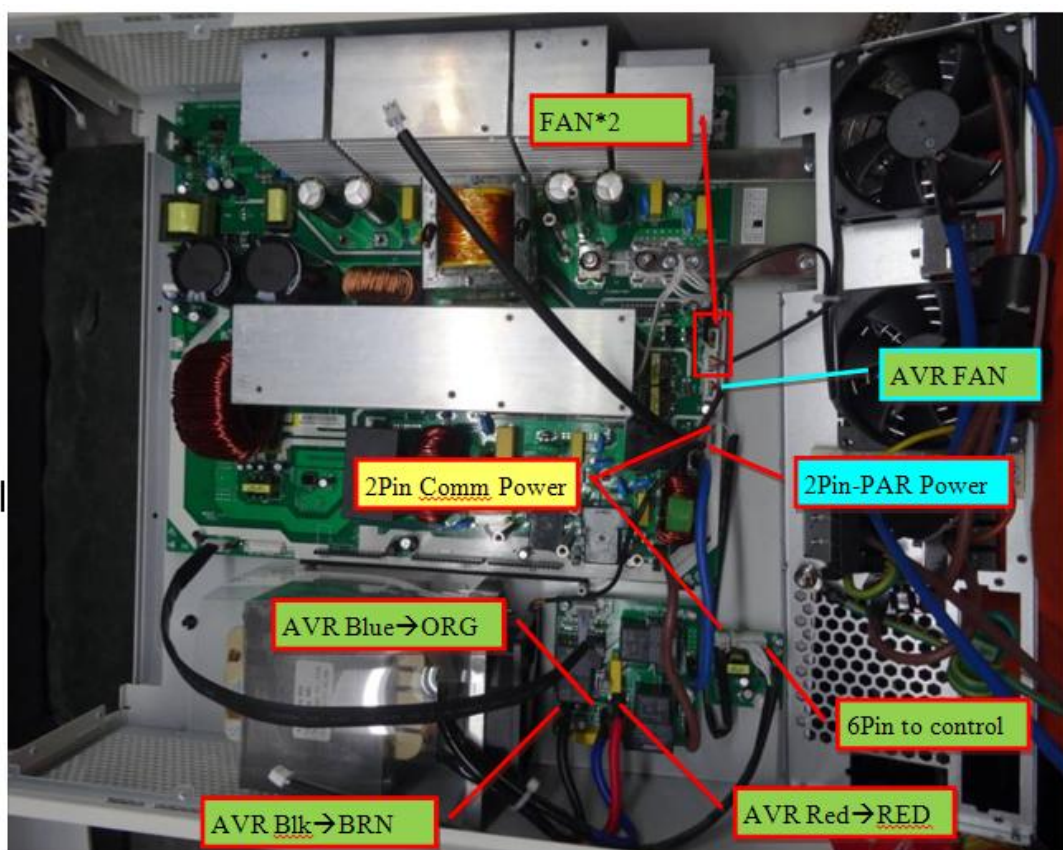
SERVICE MANUAL

Inverter 4KVA/5KVA

Remove
terminal panel.



Remove the
other cables



Remove the screw on the main board.



SERVICE MANUAL

Inverter 4KVA/5KVA

Take out the main board, and then you can put the new main board in.

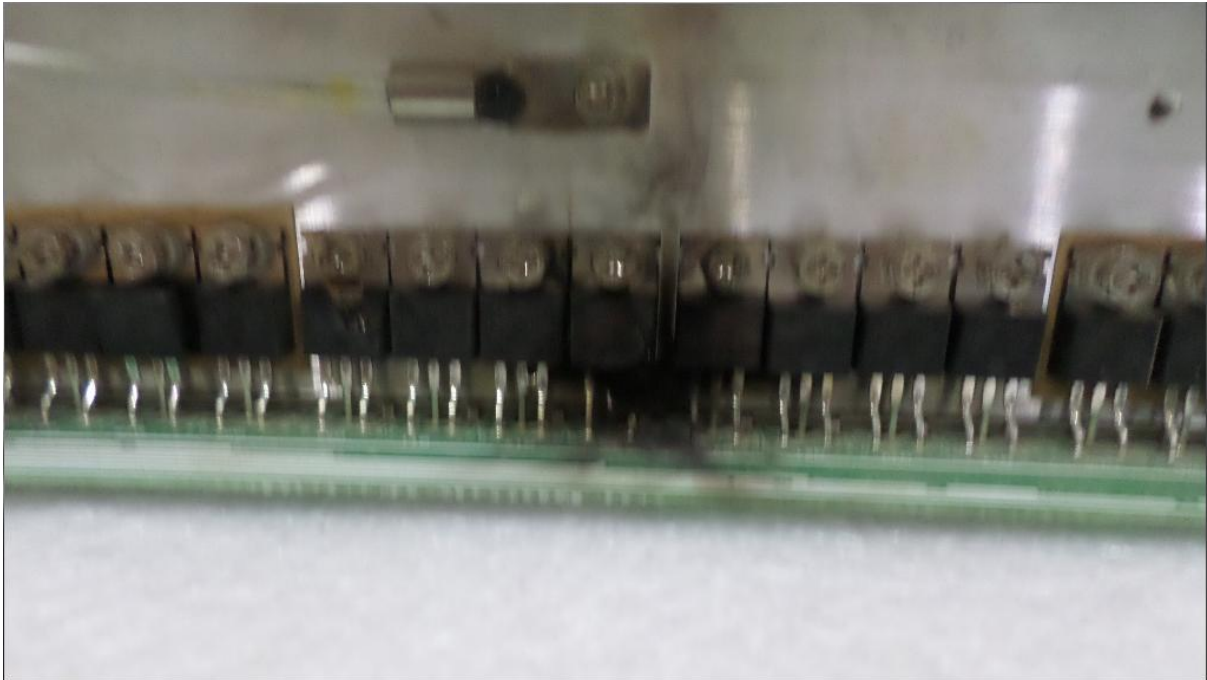


5. Common fault case

The inverter may have some obvious spoilt parts like as below; you can have some photos when you found some. And send them to us with the RMA report.

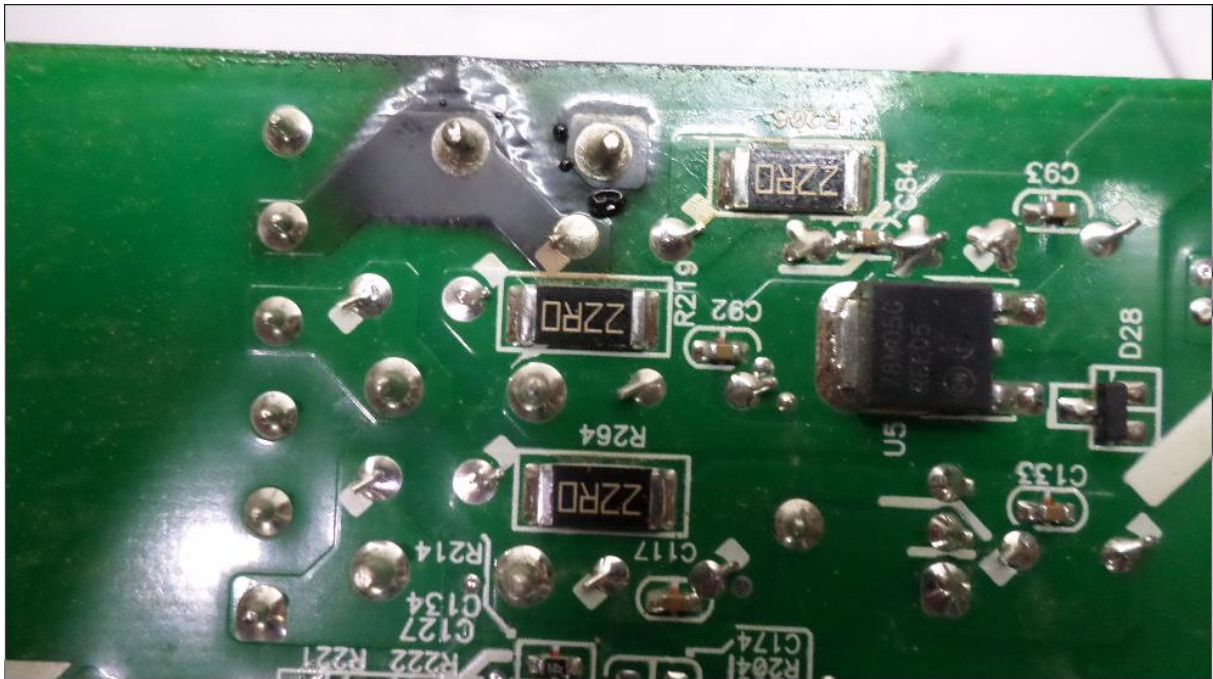
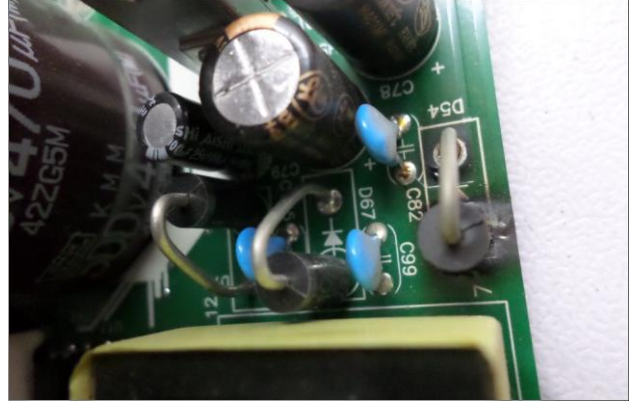
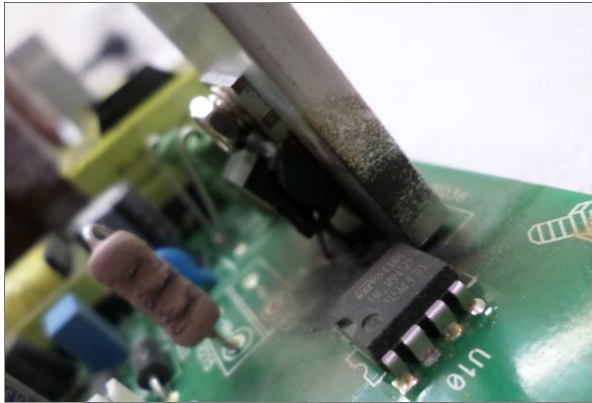
5.1 DC-DC mosfet damaged

As follow, because of the DC-DC mosfet damaged, the inverter couldn't startup completely. You should repair the main board or replace it directly.



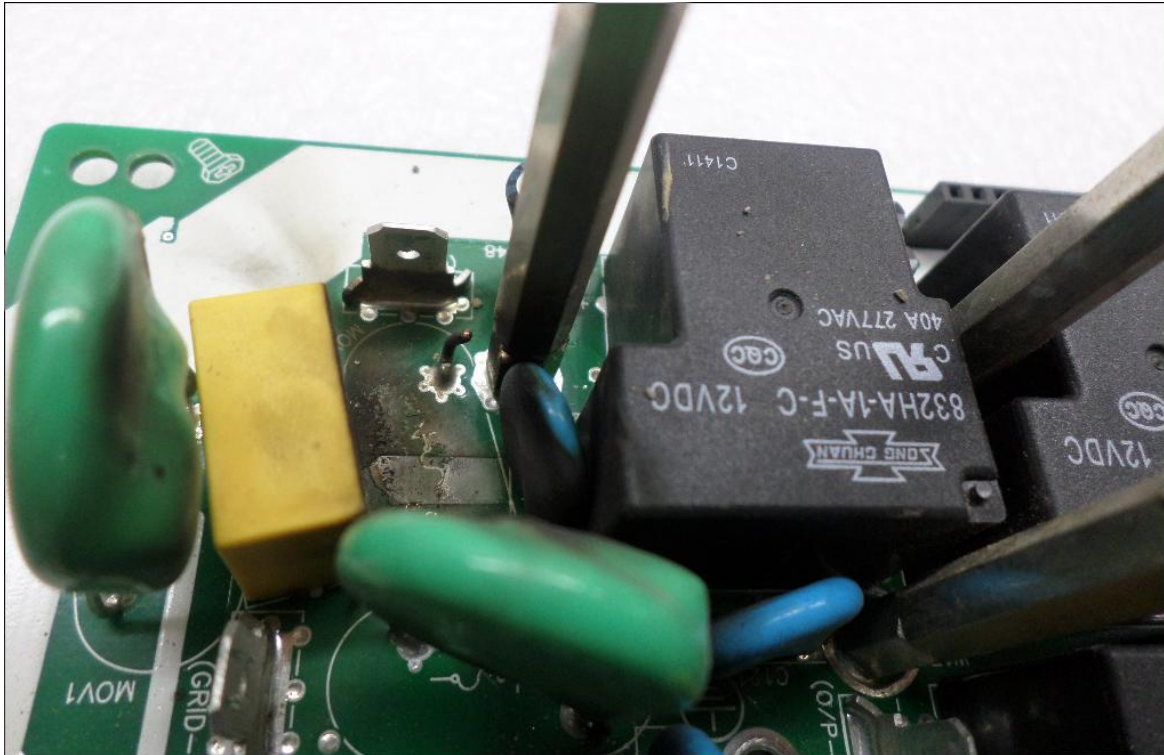
5.2 Bat SPS module damaged

As follow, because of the Bat SPS damaged, the inverter couldn't startup completely. You should change new components or replace new main board.



5.3 MOV (Metal oxide varistors) damaged

As follow, because of the MOV damaged, the inverter couldn't absorb AC surge. You should change new components.



5.4 AC SPS module damaged

As follow, because of the AC SPS damaged, the inverter couldn't AC charge when switch off. You should change new components or replace new main board.

