

Service Manual

**Star T3/T3R UPS
1kVA~3kVA 220VAC**



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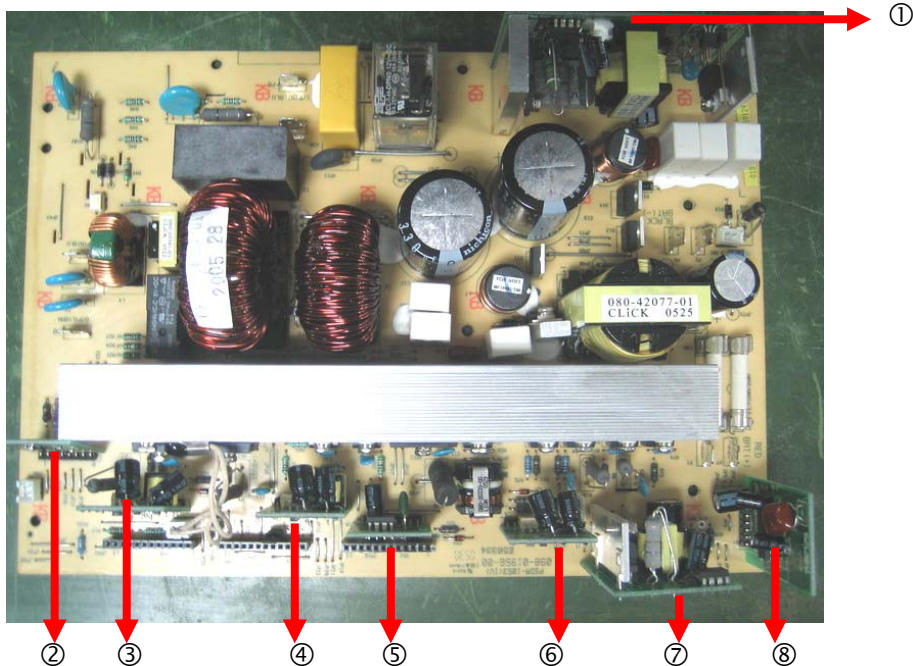
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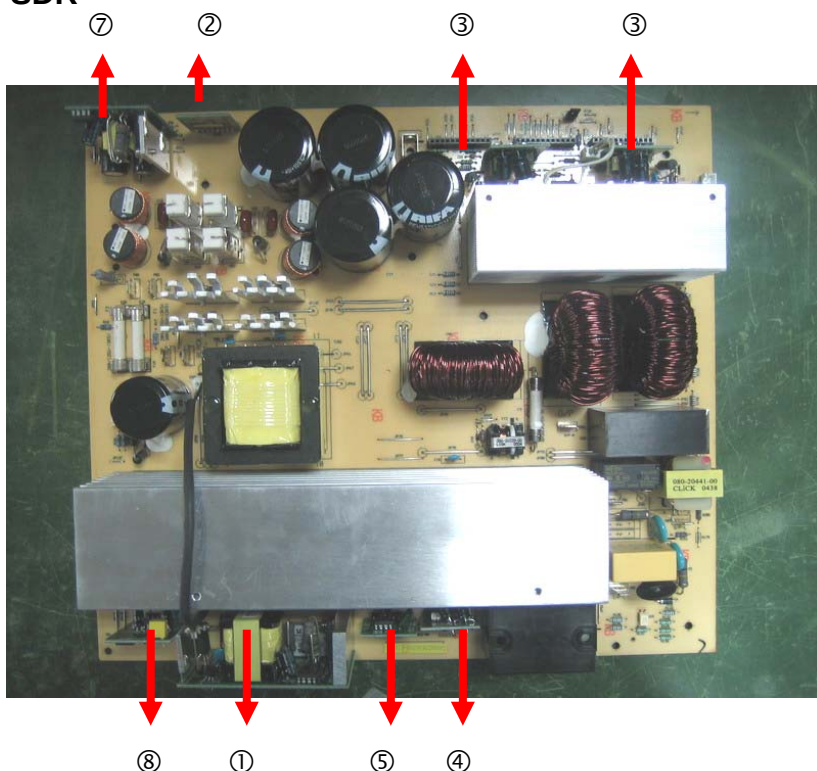
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1. PSDR Introduction

1.1 1 kVA PSDR



1.2 2/3 kVA PSDR



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1. Charger Module
2. Fan driver
3. Inverter IGBT Driver Module
4. PFC IGBT Driver Module
5. PFC Control Module
6. Boost IGBT Driver Module
7. SPS Module
8. Boost Control Module

2. Fault and Warning

LCD & LED Status / Audible Alarms		Possible Cause	Action
AC: OK BATT: OK TEMP Fail Fault Warning Normal    - UPS in Bypass Mode. - The alarm beeps continuously.		1. Fan fail. 2. Temperature is higher than allowed operation temperature.	1. Replace the fan. 2. Reduce ambient temperature or O/P load.
AC: OK BATT: OK Inverter Fail Fault Warning Normal    - UPS in Bypass Mode. - Fault LED lights up and the alarm beeps continuously.		1. Inverter circuit failed. 2. Inverter driver failed. 3. PFC circuit failed. 4. Output shorted	1. Replace the Inverter components or driver. 2. Replace the PFC components or driver. 3. Remove the output shorted.
AC: OK BATT: LOW Normal Mode Fault Warning Normal    - UPS in Normal Mode, but battery capacity is low. - The alarm beeps once every second for battery low.		1. Charger may break down.	1. Please replace charger board.
AC: OK BATT: OK DC_BUS Fail Fault Warning Normal    - UPS stop working. - The alarm beeps continuously.		1. Boost circuit failed. 2. Inverter circuit failed 3. PFC circuit failed 4. BUS circuit failed.	1. Replace the Boost components. 2. Replace the Inverter components. 3. Replace the PFC components. 4. Replace the BUS circuit components.

3. Troubleshooting

3.1 Quick Start

Before any check of UPS, please check the components as listed in the following table. This action could help you find problem quickly and make sure these components good or not first.

Possible Circuit Block	Coded Components	Description	Failure Mode
BAT FUSE	1K/3K: F1/F2 ;2K: F1	Fuse	Open
I/P FUSE (on PSDR)	F3,	Fuse	Open
PFC Correction	2K/3K: D16, D17, REC02 1K: D10, D11, REC1 2K/3K: Q09 ,1K: Q14	Diode	Short or open
Push-Pull Booster	2K/3K: Q04, Q05, Q06Q07 1K: Q4, Q6, Q10Q11	MOSFET	D-S short or open
	2K/3K: D05, D06, D07, D08 1K: D12, D13, D14, D15	Power Diode	Short or open
Inverter	2K/3K: Q13, Q14, Q15, Q16 1K: Q12, Q13	IGBT	C-E short or open
Charger module	Q2	MOSFET	D-S short or open
	D10,D11,D12,D13D15	Power Diode	Short or open
SPS module	Q201	MOSFET	D-S short or open
	D202,D203	Power Diode	Short or open



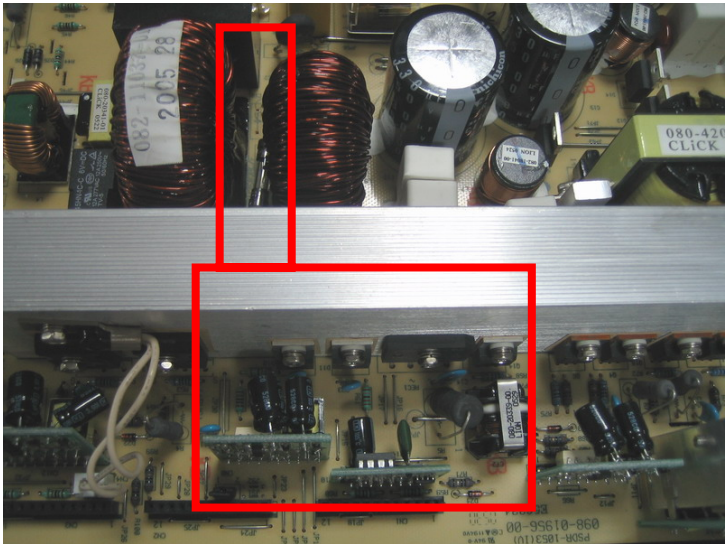
If the fuse is open, replacing fuse only, **DO NOT** mean you have solved the problem. General speaking, fuse open was caused by other failure of components; therefore, you must find the real defective components and replace them, before restart the UPS.

3. Troubleshooting

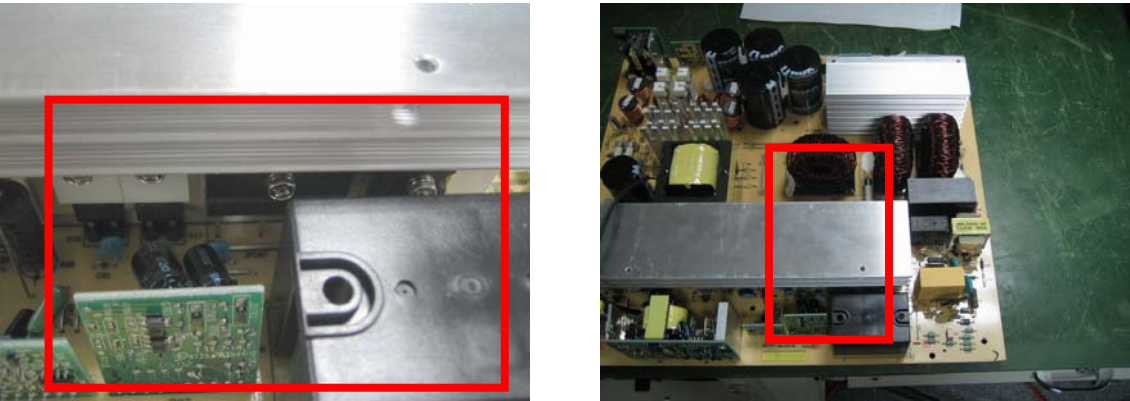
3.2 PFC Analysis:

In this section, some components you could check to see if failure occurs on PFC Correction circuit as shown below. Be aware of F3 fuse open indicates failure of this block. Please replace all faulty components before re-start the UPS.

1kVA-PFC



2/3kVA-PFC



Step	Checked components	Instrument function	Reference Value	Failure Mode
1	F3	Ω	Short	Open
2	2K/3K: Q09 (GS) 1K: Q14 (GS)	Ω	46.8k Ω	Short or open
3	2K/3K: D16,D17 1K: D10,D11	DIODE	0.418	Short or open
4	2K/3K: REC02 (+,~),(~,~) 1K: REC1 (+,~),(~,~)	DIODE	0.46	Short or open



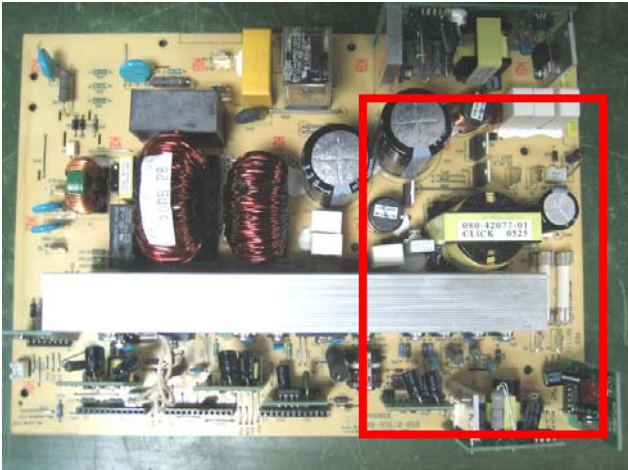
Action Item: If all above-stated components are replaced well and UPS still can't work, change PFC Module and PFC IGBT driver module.

3. Troubleshooting

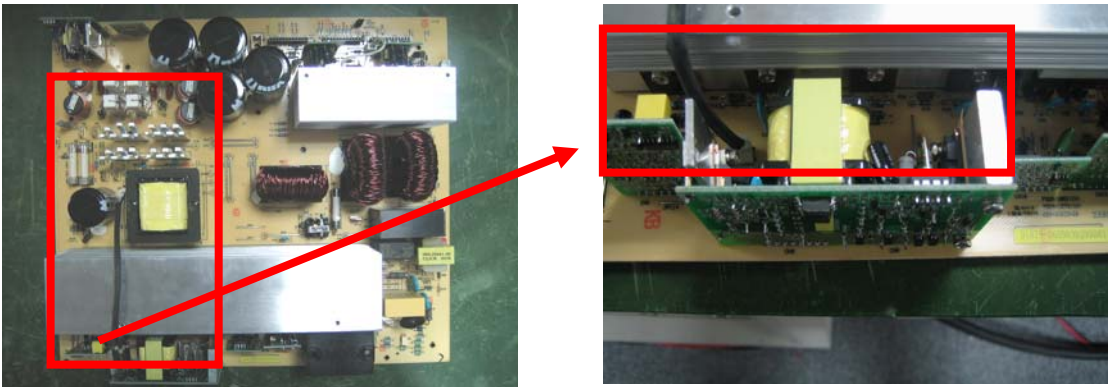
3.3 Boost Analysis

General speaking, the most distinct phenomenon of failure on this section is F1 and F2. Open finding this will be very helpful to repair them.

1kVA-Boost



2/3kVA-Boost



Step	Checked components	Instrument function	Reference Value	Failure Mode
1	F1,F2	Ω	short	open
2	2K/3K: Q04~Q07 (G.S) 1K: Q4,Q6,Q10,Q11(G.S)	Ω	23.49k Ω	short or open
3	2K/3K: D05,D06,D07,D08 1K: D12,D13,D14,D15	DIODE	0.41	short or open



Action Item:

- (1) Make sure the DC fuses with same rating as original ones for replacement. Otherwise, unpredictable danger might happen.
- (2) If all above-stated components are replaced well and UPS still can't be DC start, change Boost Control Module.

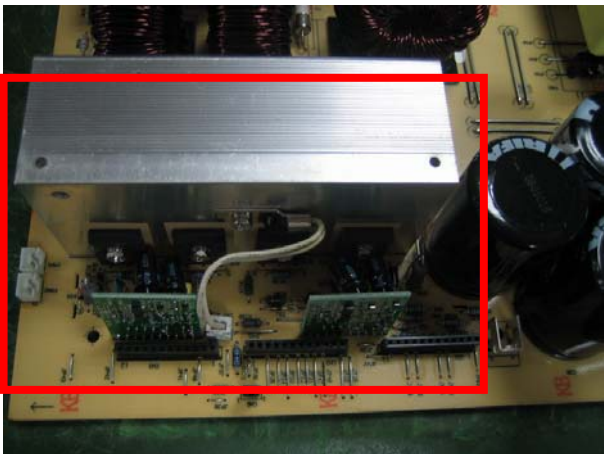
3. Troubleshooting

3.4 Inverter Analysis

1kVA-Inverter



2/3kVA-Inverter



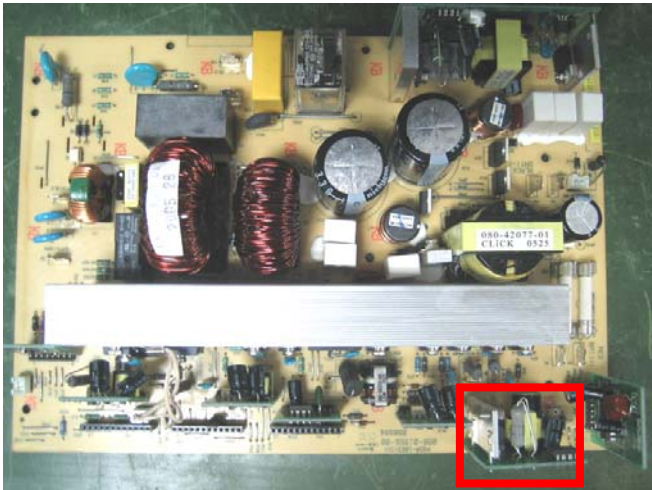
Step	Checked components	Instrument function	Reference Value	Failure Mode
1	2k/3k: Q14,Q13,Q16,Q15 (G,S) 1k: Q12,Q13 (G,S)	Ω	23.5k Ω	Short or open
2	2k/3k: D30,D31,D32,D33 1k: D21,D22	Ω	70 46.6	Short or open

Action Item: If fail condition stated in resistance [R110](#), [R106](#), [R117](#) and [R119](#) of 2/3kVA and [R53](#) and [R37](#) of 1kVA, there is high possibility that the corresponding photo couplers are damaged, change the Inverter IGBT driver module

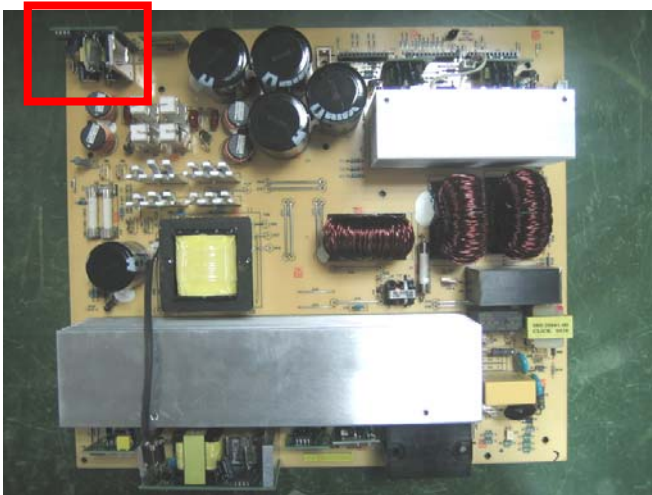
3. Troubleshooting

3.5 SPS Module Analysis

1 kVA-SPS Module



2/3 kVA-SPS Module



Step	Checked components	Instrument function	Reference Value	Failure Mode
1	Q201(S,D)	DIODE	0.42	Short or open
2	U01 (3845) PIN 5-6 PIN 5-7 PIN 5-8 PIN 6-8	Ω	46.7K 38K 4.31K 50.9K	Too low

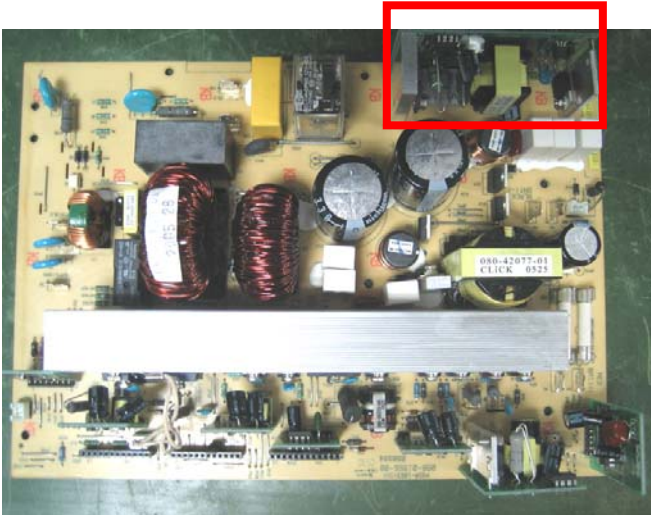


Action Item: Even If the input source connected with UPS, the UPS still does not work. The high possible cause is on SPS Module.

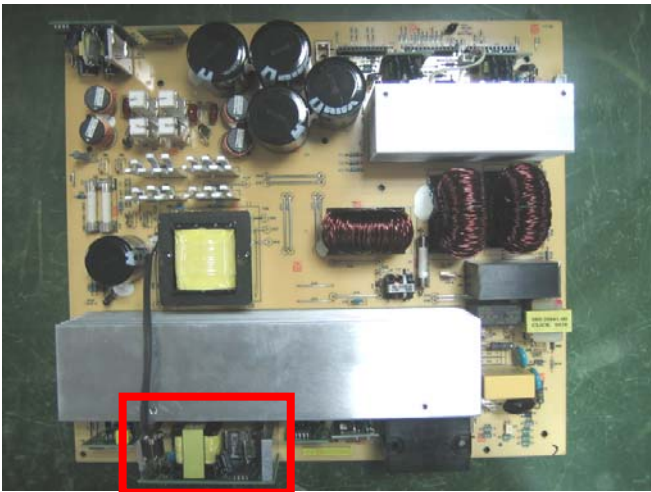
3. Troubleshooting

3.6 1A Charger Module Analysis

1 kVA-Charger Module



2/3 kVA-Charger Module



Step	Checked components	Instrument function	Reference Value	Failure Mode
1	Q2(S,D)	DIODE	0.45	Short or open
2	U07 (3845) PIN 5-6 PIN 5-7 PIN 4-8	Ω	47K 20K 7.48K	Too low
3	D10.D11,D12,D13,D15	DIODE	0.45	Short or open

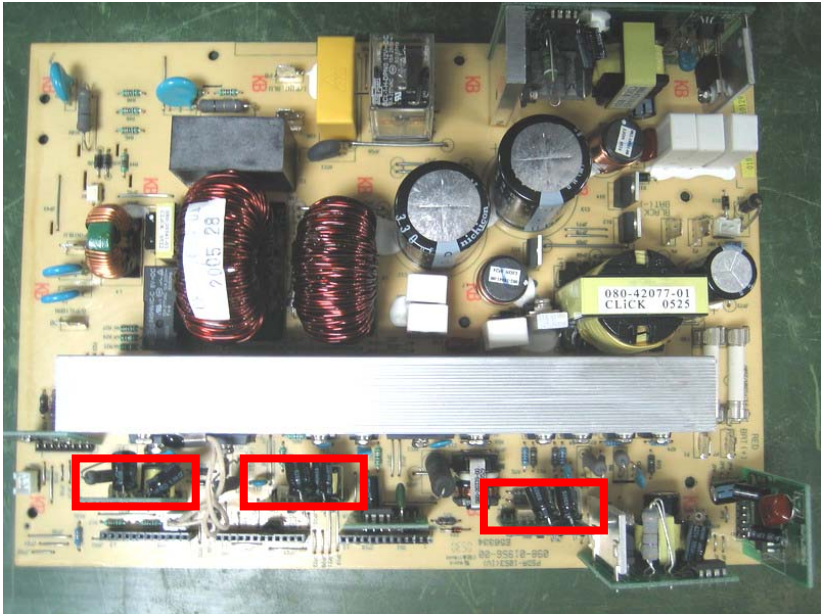


Action Item: UPS can work on bypass Mode normally when the input source connected, but it can not start-up completely. The high possible cause is on Charger Module.

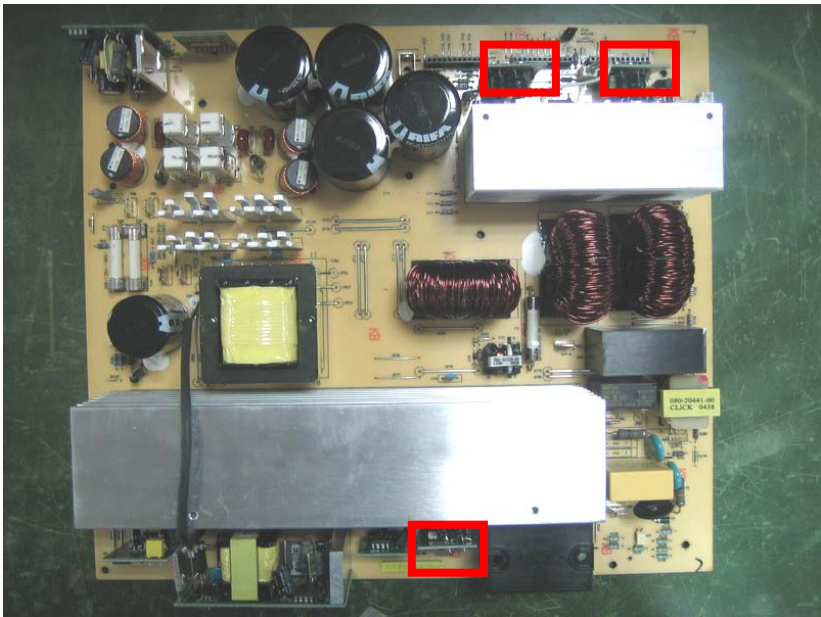
3. Troubleshooting

3.7 PFC / Boost / Inverter IGBT Driver Module Analysis

1 kVA- IGBT Driver Module



2/3 kVA- IGBT Driver Module



Step	Checked components	Instrument function	Reference Value	Failure Mode
1	U701.PIN2/PIN3	DIODE	0.54	Short or open
2	Q702(E.B,E.C) Q703(B.E,C.E)	DIODE	0.64,1.00	Short or open

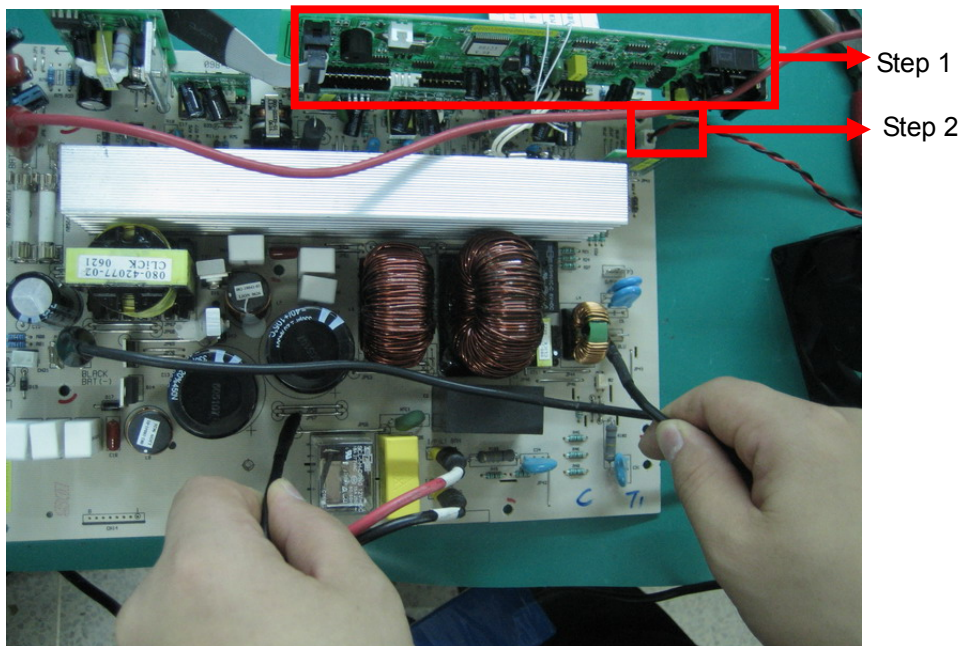
4. Final testing

After you have replaced all defective components on power stage (PSDR), please follow the steps as below.

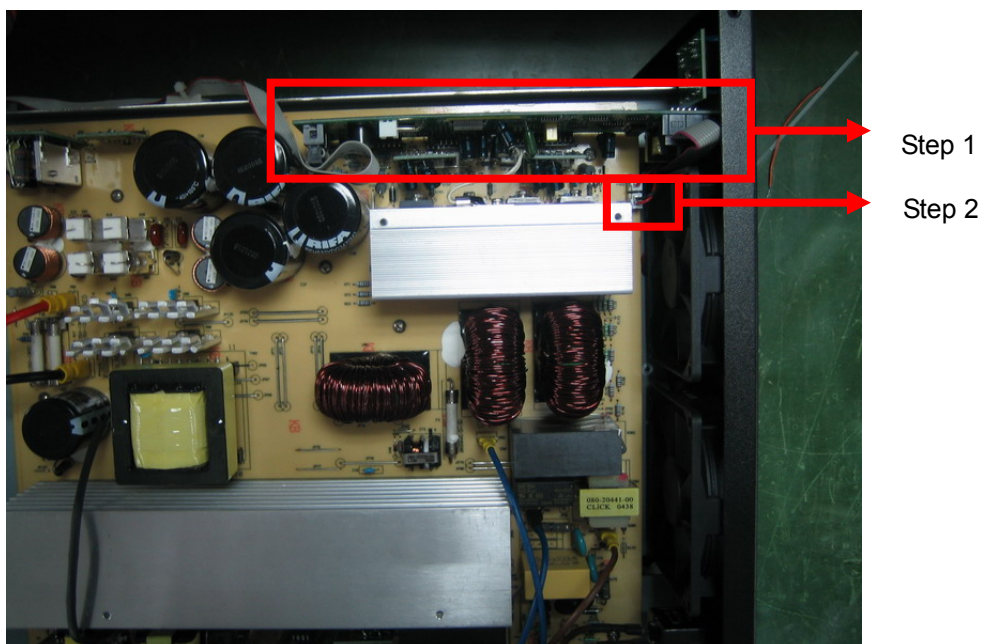
Step 1. Connect with control board.

Step 2. Re-plug fan wires into connector FAN1 and FAN2.

1 kVA



2/3 kVA



4. Final testing



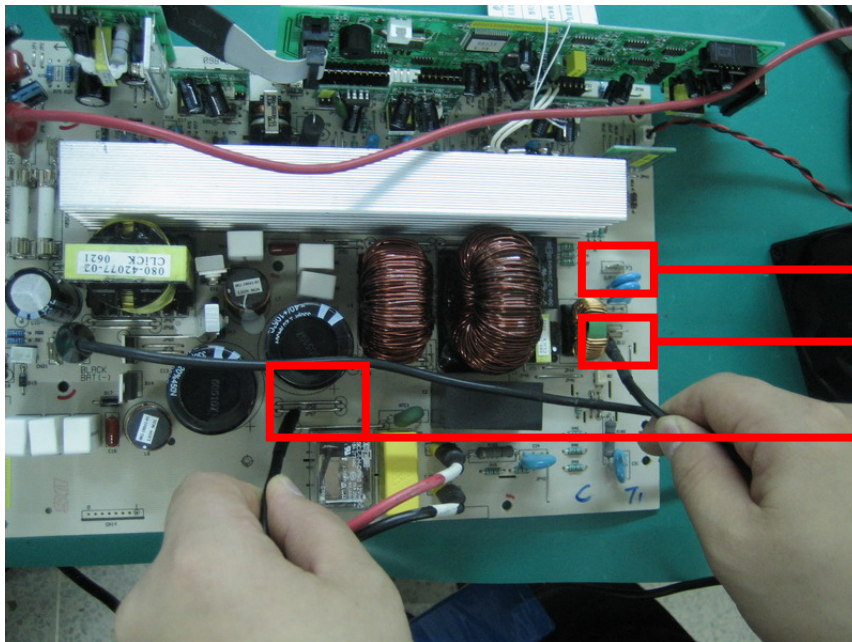
Do not connect with AC power source yet.

Step 3. Supply DC voltage (96-110Vdc/3 Amp (limited current) for 2/3kVA, 36~41Vdc/3Amp for 1k) with DC power supply via BAT(+) and BAT(-). Press the switch on front panel for more than 3 seconds, you will see "current limit" **for a short time** on the DC power supply for about only 2 seconds, then UPS should be DC start (If UPS does not start successfully, and **LCD display off, replace the above procedure**). If UPS fails to start up for several times or DC power supply is on current-limit state continuously, there must be some defective components exist. Please follow the section 3 trouble shooting to check again.

Step 4. If the UPS re-start normally, check the DC_BUS and output voltage.

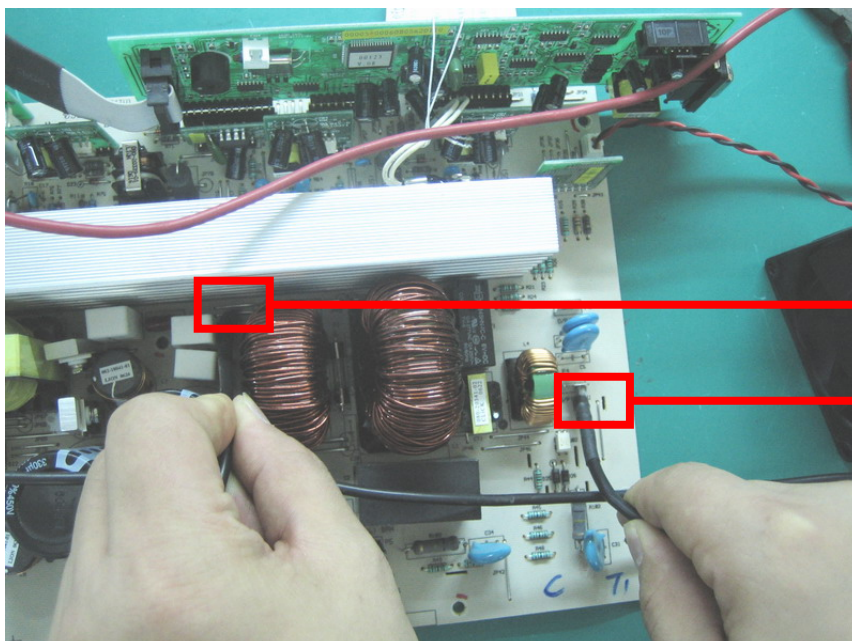
- For 1kVA, DC_BUS: +340~365 and -340~365VDC, deviation between negative and positive voltage should be within 20VDC. Output Voltage: 220/230/240 +/-2%
- For 2kVA, DC_BUS: +340~365 and -340~365VDC, deviation between negative and positive voltage should be within 20VDC. Output Voltage: 220/230/240 +/-2%
- For 3kVA, DC_BUS: +340~365 and -340~365VDC, deviation between negative and positive voltage should be within 10VDC. Output Voltage: 220/230/240 +/-2%

1 kVA



Output Voltage: 220/230/240 +/-2%

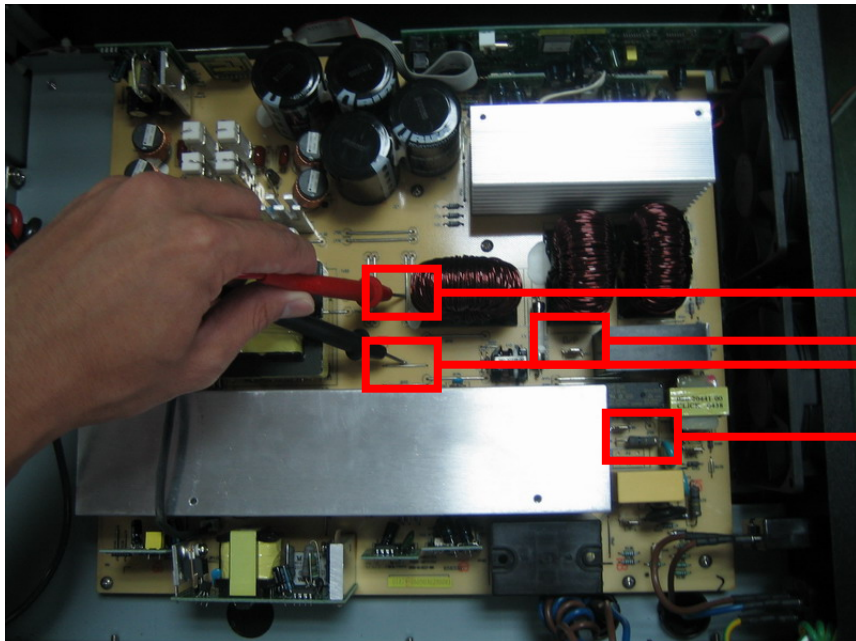
-
DC_BUS: + 340~365VDC
+



+
DC_BUS: - 340~365VDC
-

4. Final testing

2/3 kVA

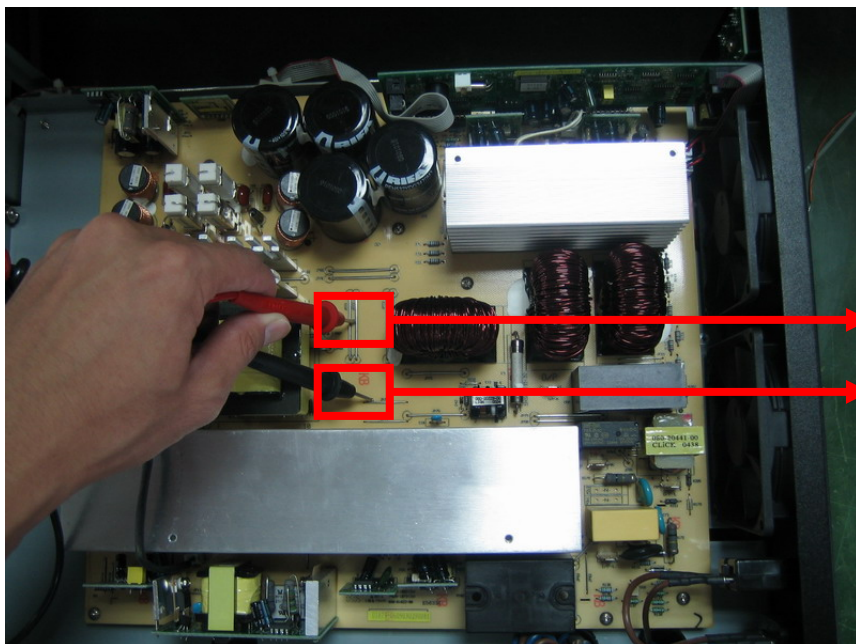


+

DC_BUS: + 340~365VDC

-

Output Voltage: 220/230/240 +/-2%



+

DC_BUS: - 340~365VDC

-

Step 5. Connect with AC power source, then follow the step3 and step4 to check the DC_BUS and output voltage again. If UPS fails to start up for several times, there must be some defective components exist. Please follow section 3 trouble shooting to check again.