Inverter & Charger

PC/ MPC 2-3KVA

Service Manual

Service Manual - PC/MPC Series Inverter & Charger

Contents

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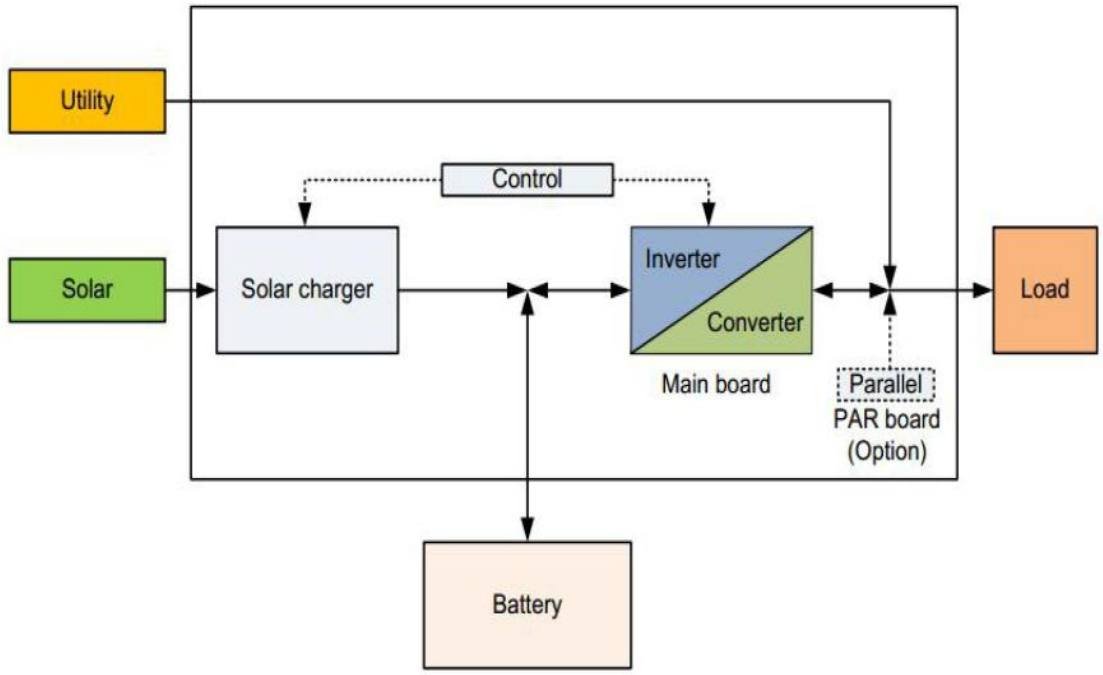
1. General Information

1.1 Brief Introduction

This manual is used as a tool of inspection and repairing guidance for PC/MPC 2-3KVA, as well as instructions of assembling and testing. It is best to have some electrical or electronic background knowledge. With this guidance, hope it will help you to check and inspect the inverter/charger first by yourself.

1.2 Basic Topology Introduction

The topology for 2KVA/3KVA shows as below:



2. Fault and Troubleshooting

No LCD display when inverter turns on		First to test battery volt to check whether it is in range of 22V-26V; If it is in the range, to switch the inverter one to check whether the unit starts. If the unit does not run yet, please disconnect all connections and open the surface panel, take out the main board, then to check and repair according to 3.6 and 3.7. If problems remains, the CPU is broken, replace the main board.
Fault 01	Fan is locked when inverter is off.	First to replace the fan, to check whether it is ok; if NO, please inspect the main board and repair according to 3.9
Fault 02	Over temperature	Please to check the main board and repair according to 3.8
Fault 03	Battery voltage is too high	Please to check first and then to repair the main board according to 3.1, 3.6 and 3.7
Fault 04	Battery voltage is too low	Please check the battery's voltage. If voltage is too low, please charge it.
Fault 05	Output short circuit or over temperature is detected by internal converter components.	First to start up the inverter by only connecting battery, if the fault is still on, please inspect the main board following 3.3 and 3.4.

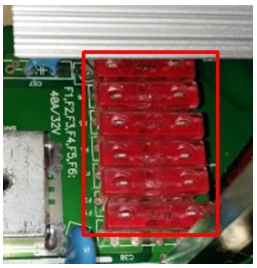
Fault 06	Output voltage is abnormal. (For 1K/2K/3K) Output voltage is too high. (For 4K/5K)	First to start up the inverter by only connecting battery, if the fault is still on, please inspect the main board following 3.3.
Fault 07	Overload time out	Please turn off the loads, and restart the inverter again.
Fault 08	Bus voltage is too high	Please check the BUS circuit of the main board according to 3.5.
Fault 09	Bus soft start failed	To check the main board following 3.1.2, 3.2.1, 4.1 and 4.2 and to repair accordingly
Fault 11	Main relay failed	Please check the relay whether work.

3. Steps to Repair

3.1 Battery Working Mode Test

3.1.1 Check DC FUSE and Capacitance

F1-F6: Fuse, F40A/32VDC UL



Positioning	Attribute	Reference Value	Failure Status
F1-F6	Resistor	0 ohm	Open

C19,C20,C39,C40: Electrolytic Capacitor, 4200uF 35V M RAD 7.5mm 105℃

If the capacitors explode, they need to be replaced.

3.1.2 DC/DC Boost Module

TR MOSEFET IRFB4110PBF 180A 100V TO-220

Positioning	Attribute	Reference Value	Failure Status
All MOSFET, 8pcs	Diode	SD:0.44V DS:OL	Short Circuit Or Explosion
Note If one or more than one of them were broken, please replace all of them. For 2K, the main board has just 6pcs MOSFETS.			

3.1.3 Divers

Note: when there are power devices or components are damaged, Divers are usually required to check.

The reference resistors listed as below.

R373,R7,R8,R9,R10,R11,R12,R13,R14,R79,R257

All the resistors are RES CHIP TF 1/4W 20 F(1206)

To use Multi-meter to measure each resistors till to find out the broken ones and to replace them, no need to change all the resistors.

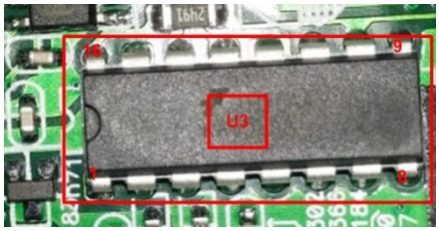
Positioning	Attribute	Reference Value	Failure Status
R373,R7,R8,R9,R10,R11, R12,R13,R14,R79,R257	Resistor	20 omh	Short Circuit Or Explosion

If resistors are need to replace, please check the diver transistors and controlling IC.

UC2,UC4: Plug-in Transistor TOSHIBA/2SC2655-Y 2A 50V

UC1,UC3: Plug-in Transistor TOSHIBA/2SA1020-Y 2A 50V

Positioning	Attribute	Reference Value	Failure Status
UC2,UC4	Diode	BE:0.58V BC:0.57V CE:0.9V	Short Circuit Or Burnt
UC1,UC3	Diode	BE:0.58V BC:1.17V CE:0.9V	



U3: IC LINEAR FAIRCHILD/KA3525A

Positioning	Attribute	Reference Value	Failure Status
U3	Resistor	Pin11-Pin12:5M Pin13-Pin12: 3.7K Pin14-Pin12: 5M	Short Circuit Or Burnt

If unable to make sure which components, we would like to suggest to replacing them all.

3.2 To Check BUS Module

3.2.1 Rectifier Diode

Rectifier Diode: D17,D18,D19,D20

D17,D18,D19,D20: FAIR./RHRP1560_NL 15A 600V

Positioning	Attribute	Reference Value	Failure Status
D17,D18,D19,D20	Diode	+to-: 0.37V -to+: OL	Short Circuit Or Broken
Note: If there is one or more than one components broken, please replace them all.			

3.3 To Check Full-Bridge Invert Circuit

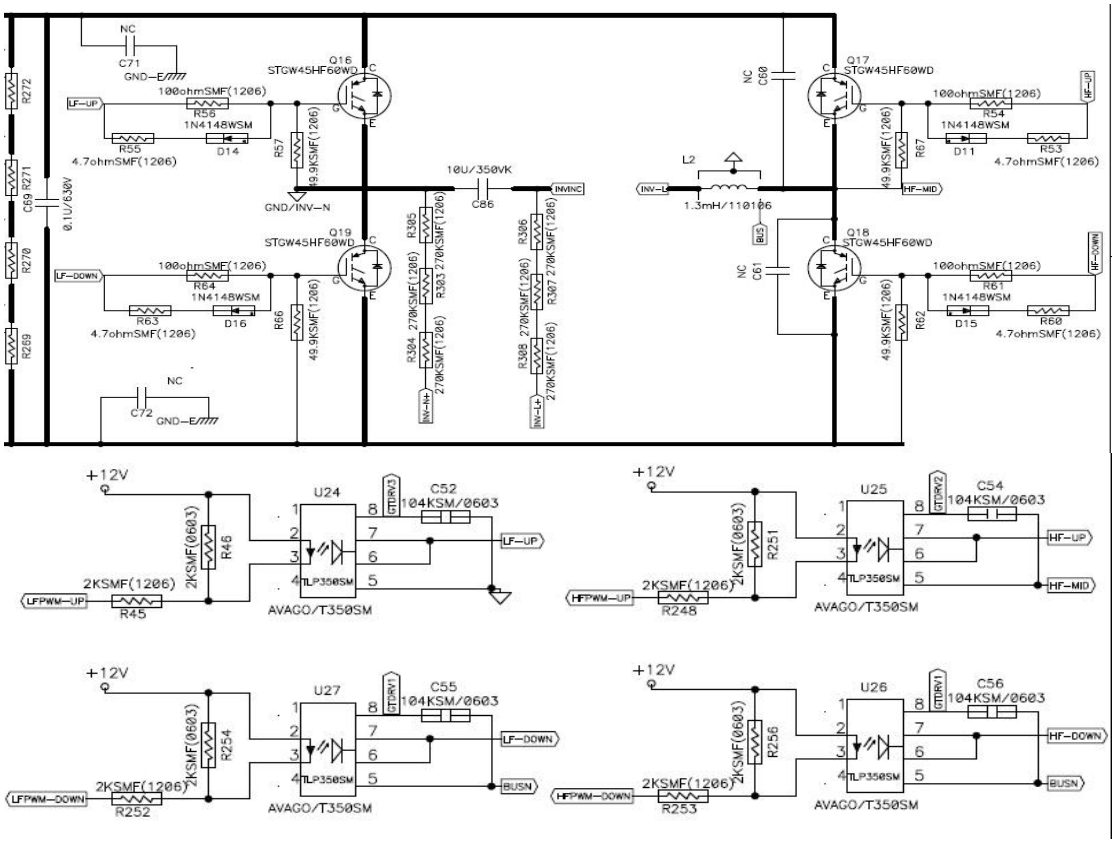
3.3.1 Power Parts

Q16,Q17,Q18,Q19: IGBT 富士 FGW50N60HD 50A600V TO-247

Positioning	Attribute	Reference Value	Failure Status
Q16,Q17,Q18,Q19	Diode	EC: 0.388V CE: OL	Short Circuit or Broken

3.3.2 To Check Drivers

INV IGBT: Q16,Q17,Q18,Q19



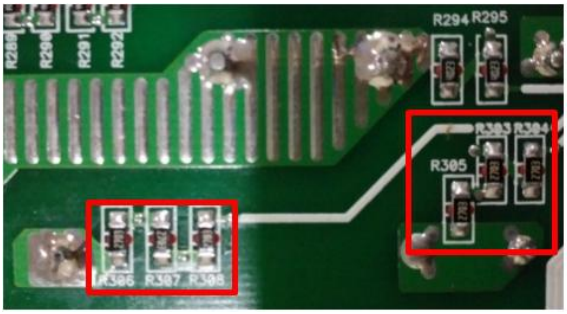
R53,R55,R60,R63: SMD Resistor CHIP TF 1/4W 4.7 F(1206)
R54,R56,R61,R64: SMD Resistor CHIP TF 1/4W 100 F(1206)
ZD2,ZD3: ZD PANJIT/DL4745 16V SMD
D10,D12: SMD Diode ROHS D PANJIT/IN4148W 0.15A 75V SMD
U24,U25,U26,U27: IC PHO AVAGO/T350-560E DIP-8 8/300 MIL SMD

Positioning	Attribute	Reference Value	Failure Status
R53,R55,R60,R63	Resistor	4.7ohm	Open Circuit or Other Value
R54,R56,R61,R64	Resistor	100 ohm	
ZD2,ZD3	Diode	+ to -: 0.22V - to +: OL	Short Circuit or Broken
D10,D12	Diode	+ to -: 0.22V - to +: OL	
U24,U25,U26,U27	Resistor	Pin2-Pin3: 2K Pin5-Pin7: 49K	Short Circuit or Broken

C150/C151: SMD Capacitors CER MT 10nF 50V J NPO 103 (0805)

Positioning	Attribute	Reference Value	Failure Status
C150/C151	Capacitors	10nF	Short Circuit or Broken

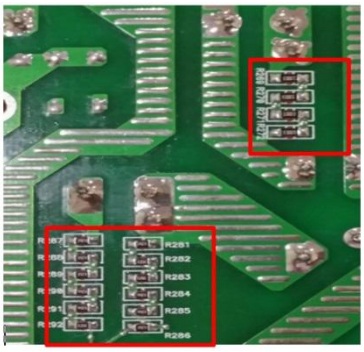
3.4 Check output circuit

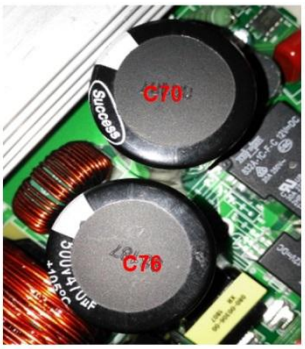


R303,R304,R305,R306,R307,R308: SMD Resistor CHIP TF 1/4W 270K(1206)
C86: Capacitors WH MKP82 350VAC 10uF J

Positioning	Attribute	Reference Value	Failure Status
R303,R304,R305,R306,R307,R308	Resistor	270K	Short Circuit or Broken
C86	Capacitors	10uF	

3.5 Check the BUS circuit



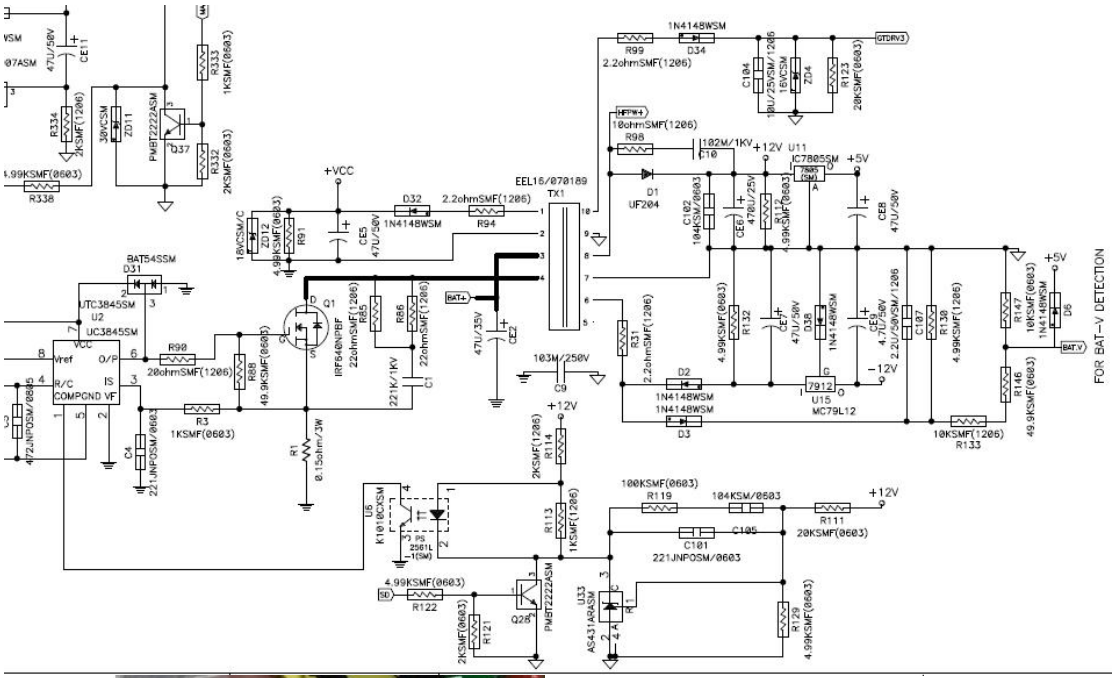


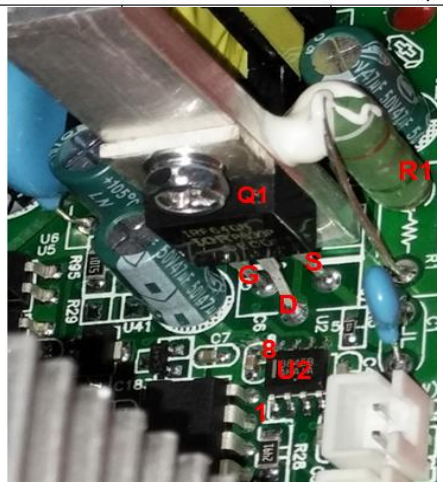
R287,R288,R289,R292,R281,R282,R283,R286: SMD Resistor CHIP TF 392K(0805)
R284,R285,R290,R291: SMD Resistor CHIP TF 442K(0805)
R269,R270,R271,R272: SMD Resistor CHIP TF 100K(1206)
C70/C76: Capacitor, 470uF 500V M RAD 105℃

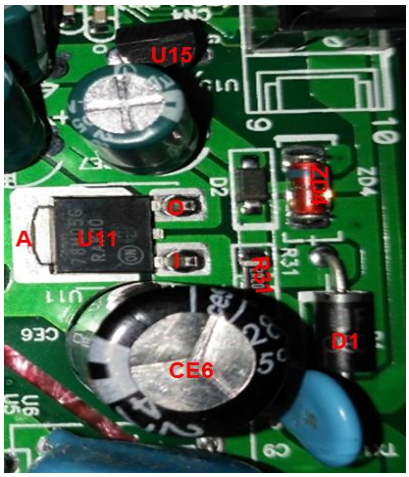
Positioning	Attribute	Reference Value	Failure Status
R287,R288,R289,R292,R281,R282,R283,R286	Resistor	392K	Short Circuit or Broken
R284,R285,R290,R291	Resistor	442K	
R269,R270,R271,R272	Resistor	100K	
C70/C76	Capacitors	470uF	

3.6 To Check Power Circuit

Q1: Plug-in Transistor MOSFET IR/IRF640NPBF18A 200V
R1: Plug-in Resistor 3WS 0.15 J Rack F4
U2: IC PWM ON/UC3845BD1R2G L-1 SMD SOP-8

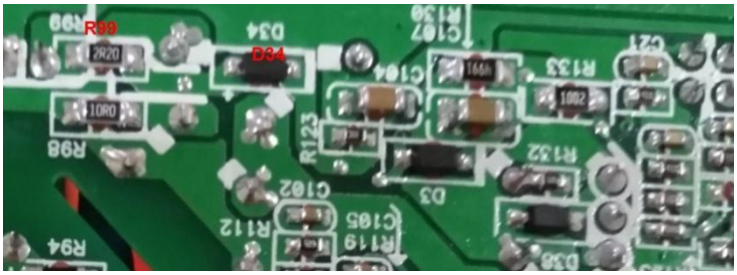






CE6: Electrolytic Capacitor 470uF 25V M 105℃
If the capacitor appears burst, please replace it.
R31: SMD Resistor CHIP TF 1/4W 2.2 F (1206)
D1: Plug-in Diode PAJIT/UF204 2A 400V ULTRAFAST AXI
ZD4: SMD Diode 16VCSM
U11: IC ON/MC78M05CDTG DPAK-3 SMD
U15: MC79L12

R94: SMD Resistor CHIP TF 1/4W 4.7 F (1206)
R90: SMD Resistor CHIP TF 1/4W 20 F(1206)
ZD12: SMD Diode 18VCSM/C

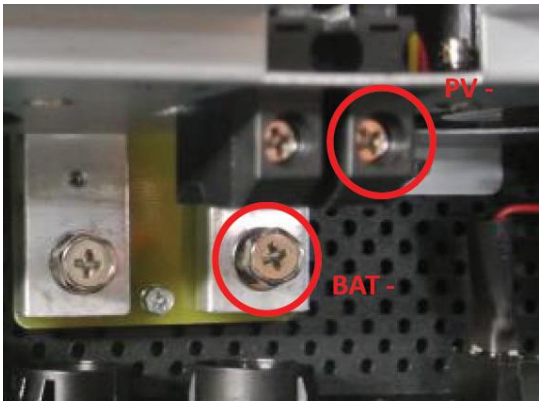


R99: SMD Resistor CHIP TF 1W 2.2 F (1206)
D34: SMD Diode ROHS D PANJIT/IN4148W 0.15A 75V SMD

Positioning	Attribute	Reference Value	Failure Status
Q1	Diode	SD: 0.5V ; DS: OL	Short Circuit or Broken
D1	Diode	+ to -: 0.45V ; - to +: OL	
ZD4	Diode	+ to -:0.35V ; - to +:OL	
ZD12	Diode	+ to -:0.35V ; - to +: OL	
D34	Diode	+ to -: 0.40V ; - to +: OL	
U11	Resistor	I to O to A: OL	Open Circuit or other value
R99	Resistor	2.2omh	
R1	Resistor	0.15omh	
R31	Resistor	2.2omh	
R94	Resistor	4.7omh	
R90	Resistor	20omh	
U15	Resistor	O-I: 350K; O-G: 8.7K	Short Circuit or Open Circuit

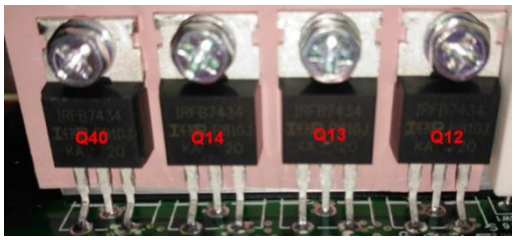
3.7 To Check MOSFETS for Reversed Protection on DC Terminal

Please open the cover and measure as follows.



Positioning	Attribute	Reference Value	Failure Status
PV – to BAT -	Resistor	>10K	Short Circuit

If in Short Circuit, Please replace MOSFET in Main Board.
Q12, Q13, Q14, Q40: MOSFET IR/IRFB7434PBF 195A 40V N BULK TO-220



3.8 To Check NTC Circuit

On Main Board, there are three NTC, one is in DC-DC Boost Heat Sink, one is under boost transformer and one is in inverting heat sink.
When 02 fault code appears, it requires to check this step, please kindly note.

3.8.1 NTC in position of HS3 plugs in position of SW1 on main board.

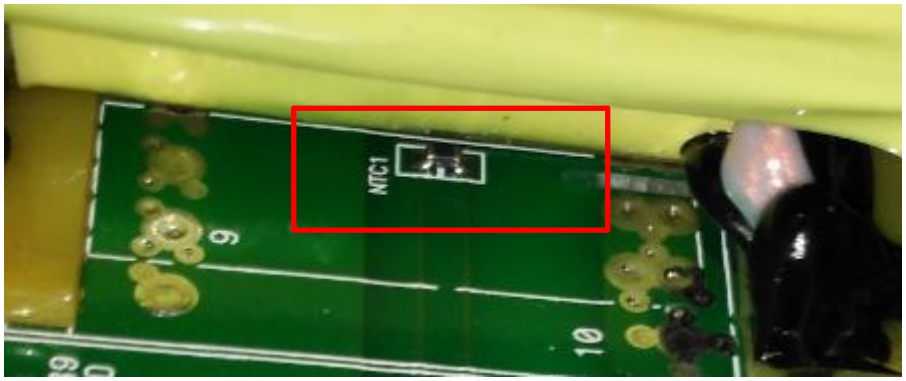
SW1: Thermistor KI66-120B5 120℃ KW

Positioning	Attribute	Reference Value	Failure Status
SW1	Resistor	0.1 ohm	Open Circuit

If it is not possible to check functioning, please make NTC short-circuit and test the inverter again; if the fault disappears, it means the NTC is wrong.

3.8.2 NTC1 under Transformer

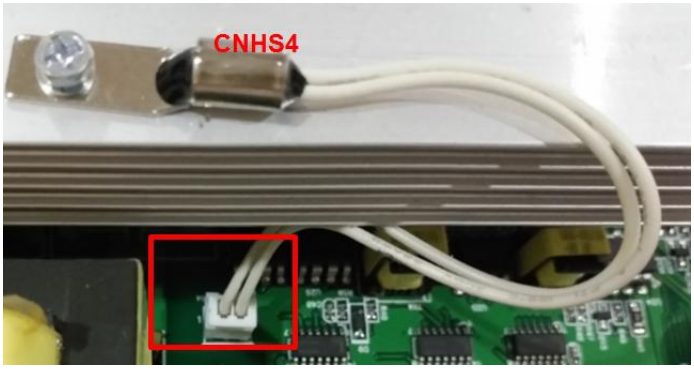
NTC1: Thermistor NTC 47K 240mW SMD 0805



Positioning	Attribute	Reference Value	Failure Status
NTC1	Resistor	5.6K ohm	Short Circuit or Open Circuit

3.8.3 NTC in CNHS4

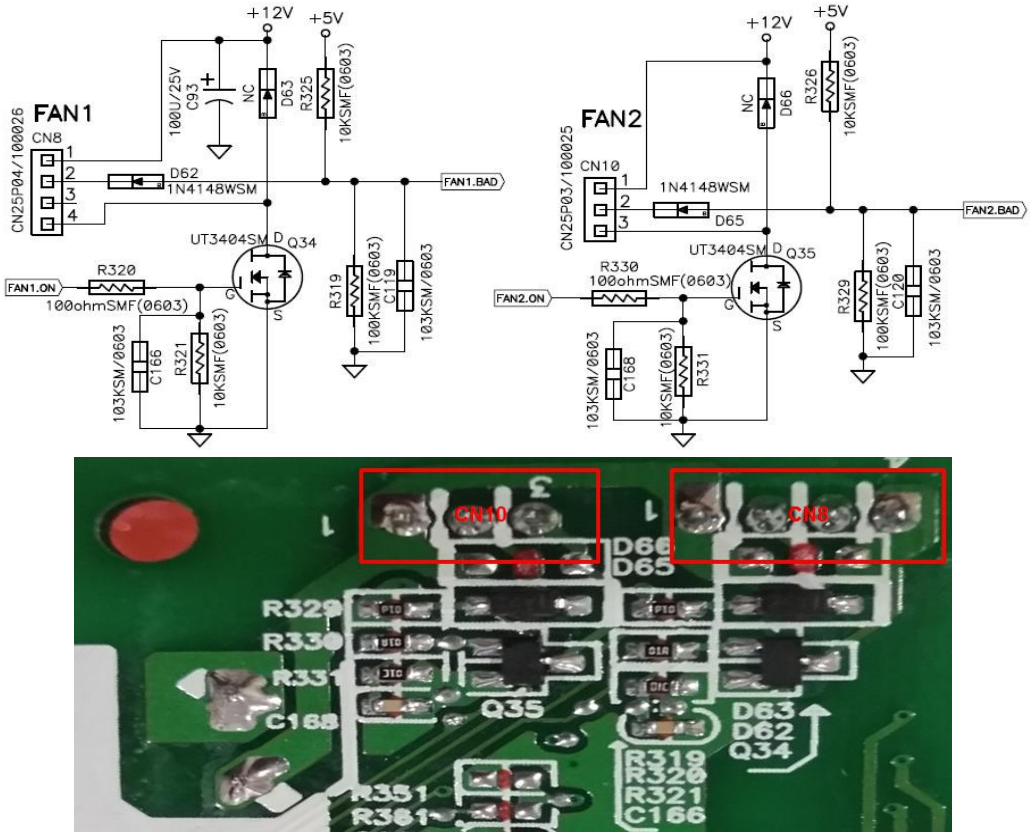
NTC_CNHS4: Thermistor NTC 15K 2.5mA KW



Positioning	Attribute	Reference Value	Failure Status
NTC_CNHS4	Resistor	12.4K ohm	Short Circuit or Open Circuit

If it is not possible to check functioning, please make NTC short-circuit and test the inverter again; if the fault disappears, it means the NTC is wrong.

3.9 To Check Fan Drive Circuit

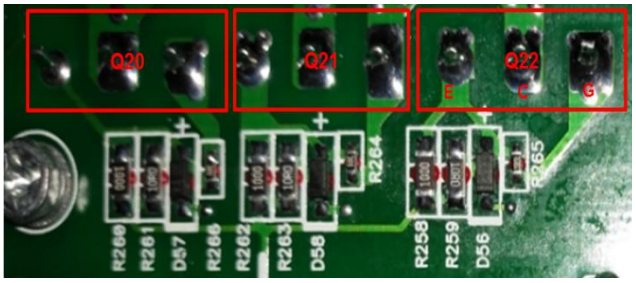


Positioning	Attribute	Reference Value	Failure Status
R319/R329	Resistor	100K ohm	Short Circuit or Other Value
R321/R325/R326/R331		10K ohm	
R320/R330		100 ohm	
D62/D65	Diode	+ to - : 0.6V; - to +: OL	Short Circuit or Burst
Q34/Q35		SD: 0.5V; DS: OL	

4.0 To Check AC Charging Circuit

4.1 To Check Power Components

Q20,Q21,Q22: MOSFET SLW/SVF3878PN 9A 900V(士兰微)

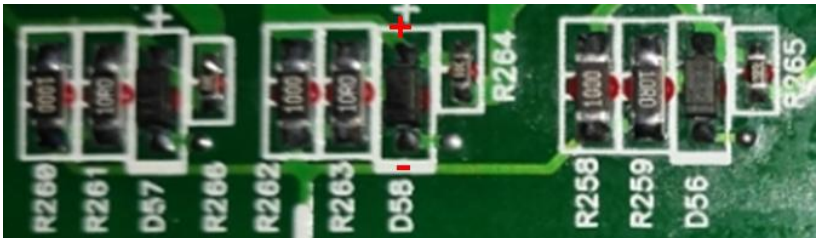


Positioning	Attribute	Reference Value	Failure Status
Q20,Q21,Q22	Diode	EC: 0.38V CE: OL	Short Circuit or Broken

Note: If there is one or more than one components broken, please replace them all.

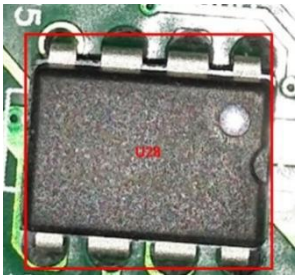
4.1.1 Drivers

R259,R261,R263: SMD Resistor CHIP TF 1/4W 10 F(1206)
R258,R260,R262: SMD Resistor CHIP TF 1/4W 100 F (1206)
D56/D57/D58: SMD Diode ROHS D PANJIT/IN4148W 0.15A 75V SMD



Positioning	Attribute	Reference Value	Failure Status
R259,R261,R263	Resistor	10 ohm	Open Circuit or Other Value
R258,R260,R262	Resistor	100 ohm	
D56/D57/D58	Diode	EC: 0.6V CE: OL	Short Circuit or Broken
Note: When test diodes, please remove R259, R261, R263, otherwise the test result is not right.			

UC3843: U28

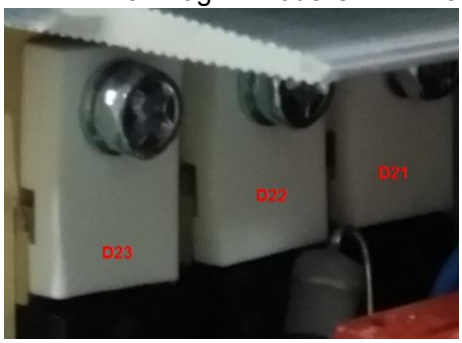


Positioning	Attribute	Reference Value	Failure Status
U28(UC3843)	Resistor	Pin7-Pin5: 42K ; Pin6-Pin5: 30K	Short Circuit or Broken

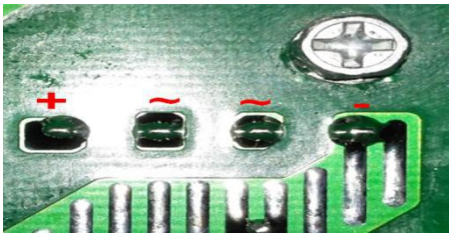
4.2 To Check Rectifier Circuit

4.2.1 Charging Circuit

D21/D22/D23: Plug-in Diode ON/MBR30200C 30A 200V SCKY RAD BULK



REC1: D.GI/GBUM8M 8A 1000V BRIDGE



Positioning	Attribute	Reference Value	Failure Status
D21/D22/D23	Diode	P to N: 0.44V ; N to P: OL	Short Circuit or Broken
REC1	Diode	～ to +: 0.50V ; + to ～: OL - to ～: 0.50; ～ to -: OL	