Electromechanical B.U.
Industrial Automation

VFD-M

Service Manual

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The information in this manual is designed to help troubleshoot and repair for the VFD-M series AC Motor Drive. This manual describes troubleshooting, test methods and procedures, replacement components and basic wiring and test point diagram. This manual is intended for the qualified service personnel responsible for troubleshooting and repairing the AC Motor Drive. The qualified service personnel should have basic understanding of and previous experience with, electrical terminology and knowledge of the AC Motor Drive. Read this entire manual before performing any maintenance, inspection and repair to the drives.

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CHAPTER 1 GENERAL NOTES AND INSPECTION METHODS

1.1 General Notes

Check the following items before performing the maintenance and inspection of the AC motor drive:

1) Review the using conditions by customers and check whether the AC motor drive is abnormal or damaged to understand if the AC motor drive is properly used or not.
2) Be sure to inspect whether the AC motor drive is in a well-ventilated location. Check if the user does not obstruct the airflow for the cooling fan.
3) Do not allow any conductive material falling into the AC motor drive.
4) The common conditions that are resulted in malfunction or serious damage of power board are listed as follows. Please check if the following conditions exist before servicing the power board:
   - Use and/or install the AC motor drive in a location where adjacent to heat-radiating elements or in direct sunlight.
   - Use and/or install the AC motor drive in a location subjected to corrosive gases, liquids, or airborne dust or metallic particles.
   - Use and/or install the AC motor drive in a location where temperatures and humidity exceeded specification.
   - Use and/or install the AC motor drive in location where subjected to high levels of electromagnetic radiation.
   - Metallic particles, unknown liquid or greasy dirt fell into or damaged the AC motor drive.
   - Incorrect cables are connected to the input and output terminals. For example, the AC motor drive will be damaged if connecting the AC power cable to the motor terminals.
   - Incorrect power supply is connected to the AC motor drive.
   - The storage and working environment of the AC motor drive is in a location where vibration or shock exceeded specification.

   Above are the main reasons that may result in a drive malfunction or premature failure of the drive. Please remind the user to pay particular attention on the above conditions to avoid any trouble.
5) Please wear safety glasses, anti-static wrist strap or anti-static gloves or any anti-static guards.
6) To avoid danger and personal injury, disconnect the AC power and ensure that the internal capacitors have fully discharged before performing any maintenance and inspection.

1.2 Inspection Methods

1） Be sure to turn off the power and then take off the cover.

2） First glance around the internal part of the AC motor drive to see if there is any burnt part and corrosive material on any part inside. Normally, these parts are easily detected by eye.

3） There are three circuit boards combined in the AC motor drive and they are: Digital keypad, Control board and Power board. Please check whether these three parts existed in the AC motor drive.

4） Please inspect power board first because the problem of power board is the most frequently occurred. The second is control board, and then the last is digital keypad.

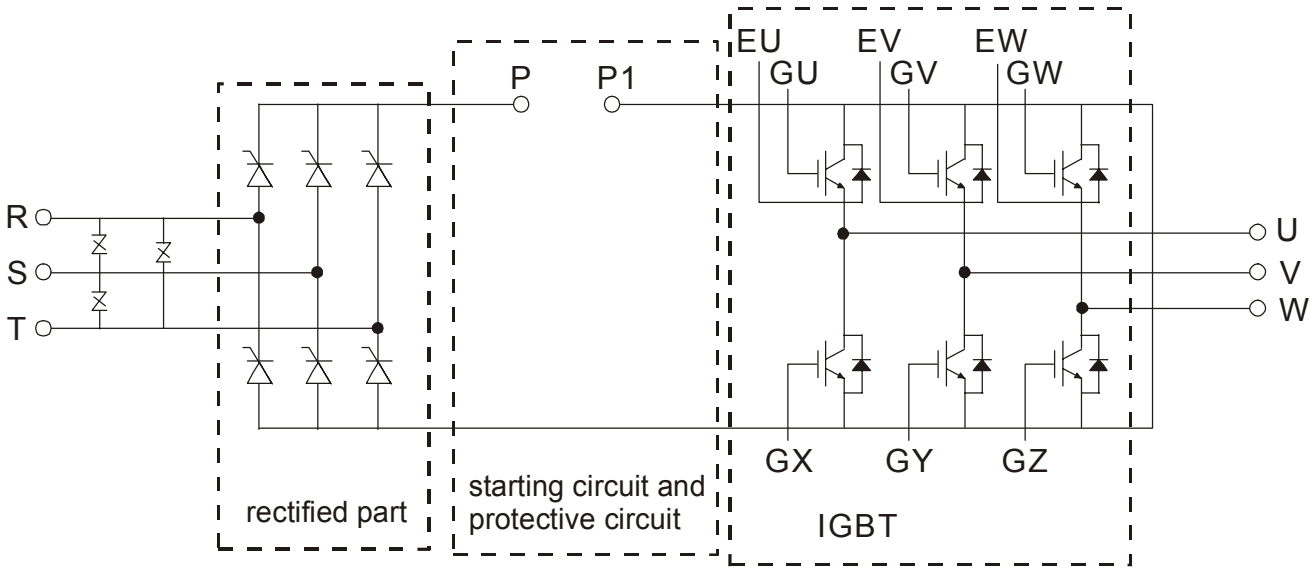
(The inspection flow: Power board → Control board → Digital Keypad)

5） Check whether the AC motor drive is well ventilated and the ambient temperature and humidity is within the range of specification. Please refer to the user manual for the details.

6） After inspecting every part of the drive, please remove the testing wire. The testing wire can be kept only when it may be continuously used in the next step.

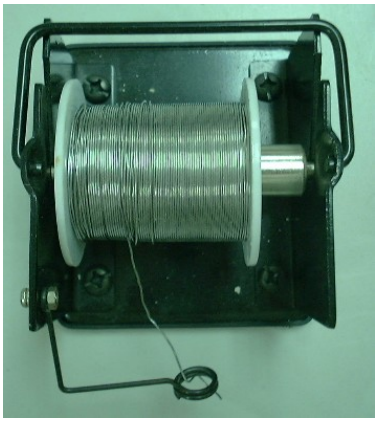
7） Be aware that there is a layer of glue over the power board, and before testing, must check whether the wire is well soldered. And if the probe is needed to test the power board, be sure to press it harder or can clean the glue by using xylem or industrial use alcohol before testing in order has proper electrical contact.

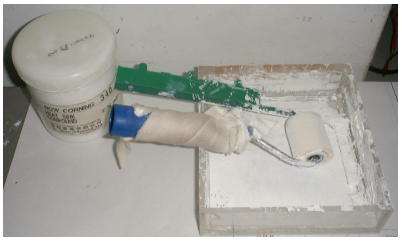
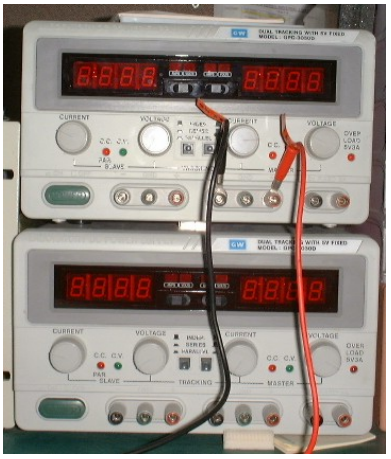
8） The figure below shows the basic wiring diagram of the AC motor drive:

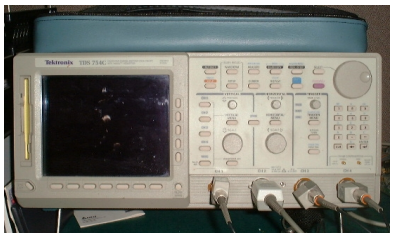


1.3 Required Tool and Equipment

The following are the required tools and equipments that Delta qualified service technician is using in the factory for servicing the AC motor drive:

Item	Tool & Equipment	Specifications/Vendors	QTY	Note
1	High voltage DC Power Supply	800VDC/2A	1unit	
2	Digital Multi Meter	Including Voltage, Current, Resistor and Diode	1unit	
3	Soldering Iron Tool	Temperature Controlled Soldering Iron: 60W	1unit	
		Soldering: whatever specification	Any	
4	Desoldering Tool	General types	Any	
		Desoldering Gun (HAKO 470)	1unit	
5	Insulated Pliers	General types	1pcs	

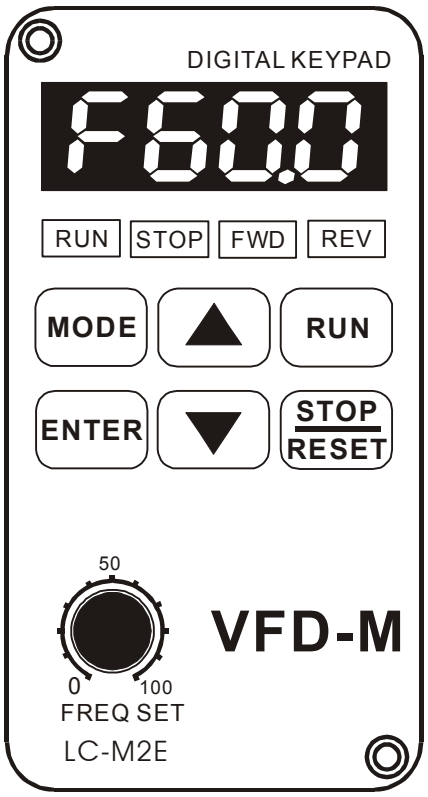
Item	Tool & Equipment	Specifications/Vendors	QTY	Note
6	Micro Nipper	Plain flat type is optimum	1pcs	
7	Philips Screwdriver	Various types	1set	
8	Flat Screwdriver	Various types	1set	
9	Socket Wrench Set	Various types	Several sets	
10	Control Board	For comparison	1pcs	
11	Digital Keypad	For comparison	1pcs	
12	Connector	For connecting boards	Several	
13	PVC Cable	Used with testing kits	Several	
14	Anti-Static Guard	General types	1pair	
15	Heat Sink Paste	Vendor: DOW CORNING 340	1can	
16	DC Power Supply	30VDC/6A	2units	
17	Tweezer	Narrow fine tip	1pcs	

Item	Tool & Equipment	Specifications/Vendors	QTY	Note
18	Digital Storage Oscilloscope	Vendor: TEXTRONIX TDS420 or the same class	1unit	
19	Normal Probe	1 : 1	1pcs	
20	Current Probe	Within 500A	1unit	
21	AC Power Supply	460VAC/20A	1unit	
22	EC Motor	75HP or above	ANY	
23	Glue for industrial usage	Sony Chemicals No: SC608LV	1can	
24	Differential Probe	50 times / 500 times	1pcs	

CHAPTER 2 TROUBLESHOOTING AND FAULT MESSAGES

This chapter helps how to troubleshoot and replace field-replaceable components as quickly as possible.

2.1 Digital Keypad



Fault Messages	Fault Analysis/Corrective Actions
LED display shows 8888	Replace the Control Board
Function keys disabled	Replace the Control Board

2.2 Control Board

Fault Messages	Fault Analysis/Corrective Actions
+10V-GND function disabled	Replace the Control Board
AFM-GND function disabled	Replace the Control Board
M0~M5-GND function disabled	Replace the Control Board
RA, RB, RC function disabled	Replace the Control Board

Fault Messages	Fault Analysis/Corrective Actions
C.F.2 function disabled	Press the RESET key. If it cannot return back to F60.0, please replace the Control Board.
Communication failure	Replace the Control Board
AVI-GND function disabled	Replace the Control Board
M01-MCM function disabled	Replace the Control Board
CF3 (OV)	Replace the Control Board
C.F3 (LV)	Replace the Control Board
CF3. (OH)	Replace the Control Board
CF.3 (U, V, W)	1. Replace the Control Board 2. If no abnormal condition is found on the Control Board, please inspect the Power Board
Incorrect signal	1. Replace the Control Board 2. If no abnormal condition is found on the Control Board, please inspect the Power Board
HPF	Replace the Control Board

2.3 Power Board

Fault Messages	Fault Analysis/Corrective Actions
No display when the power is applied	1. Check if there are any abnormal conditions on the Power Board and check whether the IGBT module is burned or damaged. 2. If no abnormal condition is found on the Power Board, please replace the Control Board.
Smoking	1. Check if the softstart resistor of the Power Board is burned or damaged. 2. If the softstart resistor is normal, please check if the IGBT is burned or damaged.
Incorrect signal	Check whether the IGBT module of the Power Board is burned, damaged
Without signal	1. Check whether the IGBT module of the Power Board is burned or damaged. 2. If no abnormal condition is found on the Power Board, please replace the Control Board.
CF3. (OH)	1. Check if the Fan is operating. 2. Check if the Thermistor Resistor is normal. 3. Check if the circuit of TH is normal.
Fan is not operating	Check if the circuit of Fan is normal.

Fault Messages	Fault Analysis/Corrective Actions
B1-B2	1. Check if the IGBT module or Braking Transistor is functioning normally. 2. Check if the corresponding Photocoupler is normal. 3. Check if the related circuit of GB is normal.
GFF	1. Check if the Current Sensor is functioning normally. 2. Check if the related circuit of GB is normal.
OC	1. Check if the Current Sensor is functioning normally. 2. Check if the IGBT module is normal. 3. Please inspect the Power Board. If no abnormal condition is found on the Power Board, please replace the Control Board.
OCC	1. Check if the Current Sensor is functioning normally. 2. Check if the IGBT module is normal.

CHAPTER 3 TEST METHODS AND PROCEDURES OF POWER BOARD

The following testing procedures for the power board of VFD-M series are equal to the testing procedures performed in the Delta factory. The testing procedures are based on the same circuit board. Although there are various models of VFD-M series, the testing procedures are all the same. Only the test value may be different. As the test value of each model will show during the testing period, please pay close attention to the tested electrode value.

Replace the power board if the actual test value is not the same as the specification listed as follows.

For more detailed test point diagrams, please refer to Chapter 6.

The IGBT module is not connected with the power board when performing the following test.

3.1 Static Test

■ Test if the circuit is short-circuit

Model Name	Test if the circuit between the test points are short-circuit
VFD002M11A, VFD004M11A VFD007M11A,	T1-GND, P2-B2, G1-G2
VFD004M21A, VFD004M23A VFD007M21A, VFD007M23A VFD015M21A/G, VFD015M23A	E1-E4, R2-R3, 19V1-19V2, P2-B2, B1-B1' U-U1, V-V1, W-W1, N1-N2, T1-TH, T2-THV T4-GND, T3-FAN
VFD004M21B, VFD007M21B VFD015M21B, VFD022M23B VFD007M43B, VFD015M43B VFD022M43B,	T3-GND P2-B2 G1-G2 T1-T
VFD021M21A, VFD037M23A VFD055M23A, VFD037M43A VFD055M43A,	WT-WT', WW-WW' WB-WB' WP2-WP2'

■ Test Circuit Resistance

Model Name	Test Point	Test Value
VFD002M11A, VFD004M11A VFD007M11A	GF-GND	8-20Ω
	TH-GND	3250~3350Ω
	GU-U, GV-V, GW-W	15±1KΩ
	GX-N, GY-N, GZ-N, GB-N	
	-15-RY1	47~53Ω
	P2-C1	330±16.5KΩ
	QS-N	1.1±0.1Ω
	RY2-RY3	120±6Ω

Model Name	Test Point	Test Value
VFD004M21A, VFD004M23A VFD007M21A, VFD007M23A VFD015M21A/G, VFD015M23A	P1-P2	8-20Ω
	G1-G2	2Ω or less
	GU-U, GV-V, GW-W	15±1KΩ
	GX-N2, GY-N2, GZ-N2	
	GB-N2	
VFD004M21B, VFD007M21B VFD015M21B, VFD022M23B	GF-GND	8~12Ω
	TH-GND	3250~3350Ω
	GU-U, GV-V, GW-W	15±1KΩ
	GX-N, GY-N, GZ-N, GB-N	
	-15-RY1	47~53Ω
	P2-C1	330K±16.5KΩ
	QS-N	1.1±0.1Ω
	P1-P2	120±6Ω
VFD007M43B, VFD015M43B VFD022M43B	GF-GND	8~12Ω
	TH-GND	3250~3350Ω
	GU-U, GV-V, GW-W	15±1KΩ
	GX-N, GY-N, GZ-N, GB-N	
	-15-RY1	47~53Ω
	P2-C1	660K±33KΩ
	QS-N	2.15±0.14Ω
	P1-P2	120±6Ω
VFD021M21A, VFD037M23A VFD055M23A	TH-GND	3250~3350Ω
	GU-EU, GV-EV, GW-EW	7.5±1KΩ
	GX-N, GY-N, GZ-N, GB-N	
	P11-T2	300K±15KΩ
	QS-N1	0.5±0.1Ω
	P1-P11	54~58Ω
VFD021M21A, VFD037M23A	-15-RY1	32.5±5Ω
VFD055M23A	-15-RY1	20.5±5Ω
VFD037M43A, VFD055M43A	TH-GND	6700~6900Ω
	GU-EU, GV-EV, GW-EW	7.5±1KΩ
	GX-N, GY-N, GZ-N, GB-N	
	P11-T2	300±15KΩ
	QS-N1	1.9±0.3Ω
	P1-P11	20~24Ω
VFD037M43A	CS1-CS11	3.48±0.10KΩ
	CS2-CS22	
	CS3-CS33	
	CS11-CS1	4.7±0.14KΩ
	CS22-CS2	
	CS33-CS3	

Model Name	Test Point	Test Value
VFD055M43A	CS1-CS11	3.16±0.10KΩ
	CS2-CS22	
	CS3-CS33	
	CS11-CS1	4.3±0.13KΩ
	CS22-CS2	
	CS33-CS3	
VFD037M43A	-15-RY1	30~35Ω
VFD055M43A	-15-RY1	47~53Ω

■ Test Diode

Model Name	Test and check if the test value is 0.6V±0.5V
VFD002M11A, VFD004M11A, VFD007M11A	C5-C2, C5-C3, C5-C4, C5-C1, QD-C6 T10-C5, -15-T6, T8-+15, VBUS-T9
VFD004M21A VFD004M23A, VFD007M21A, VFD007M23A, VFD015M21A/G, VFD015M23A,	GU-U, GV-V, GW-W GX-N, GY-N, GZ-N
VFD004M21B, VFD007M21B, VFD015M21B, VFD022M23B, VFD007M43B, VFD015M43B, VFD022M43B	C5-C2, C5-C3, C5-C4 C5-C1, C5-T5, QD-C6 T10-C5, -15-T6, T8±15, VBUS-T9
VFD021M21A, VFD037M23 VFD055M23A, VFD037M43A, VFD055M43A	QD-T1

3.2 Dynamic Test

(VFD002M11A, VFD004M11A, VFD007M11A)

■ SWITCHING POWER SUPPLY TEST

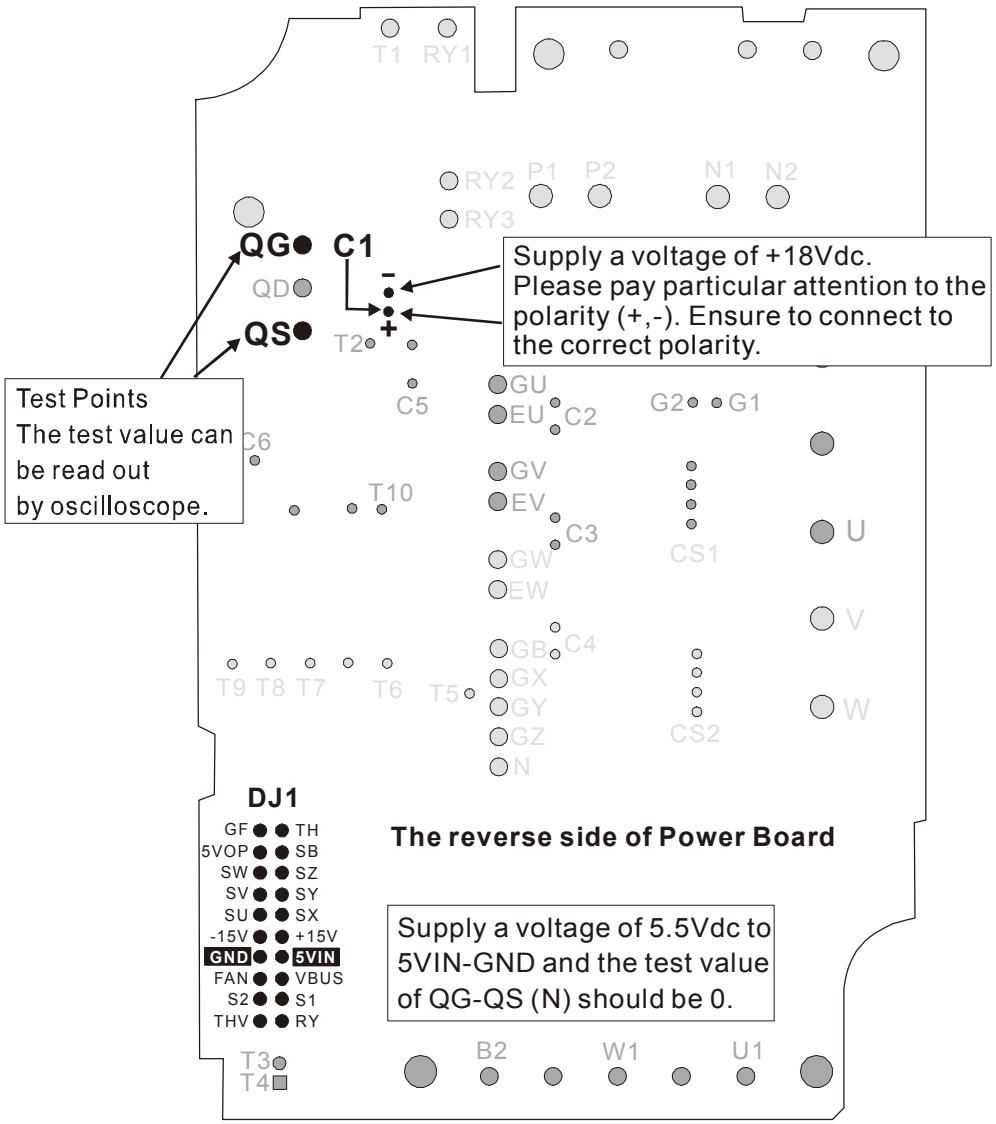
1） Supply a voltage of +18Vdc to C1 and N of DC46.

2） Test and measure the voltage of QG-QS (N) and the test value should be within 1.42±0.14V.

3） Supply a voltage of 5.5Vdc to 5VIN and GND of DJ1.

4） Test and measure the voltage of QG-QS (N) once again, and the test value should be 0.

5） Remove all the testing wires after the test.



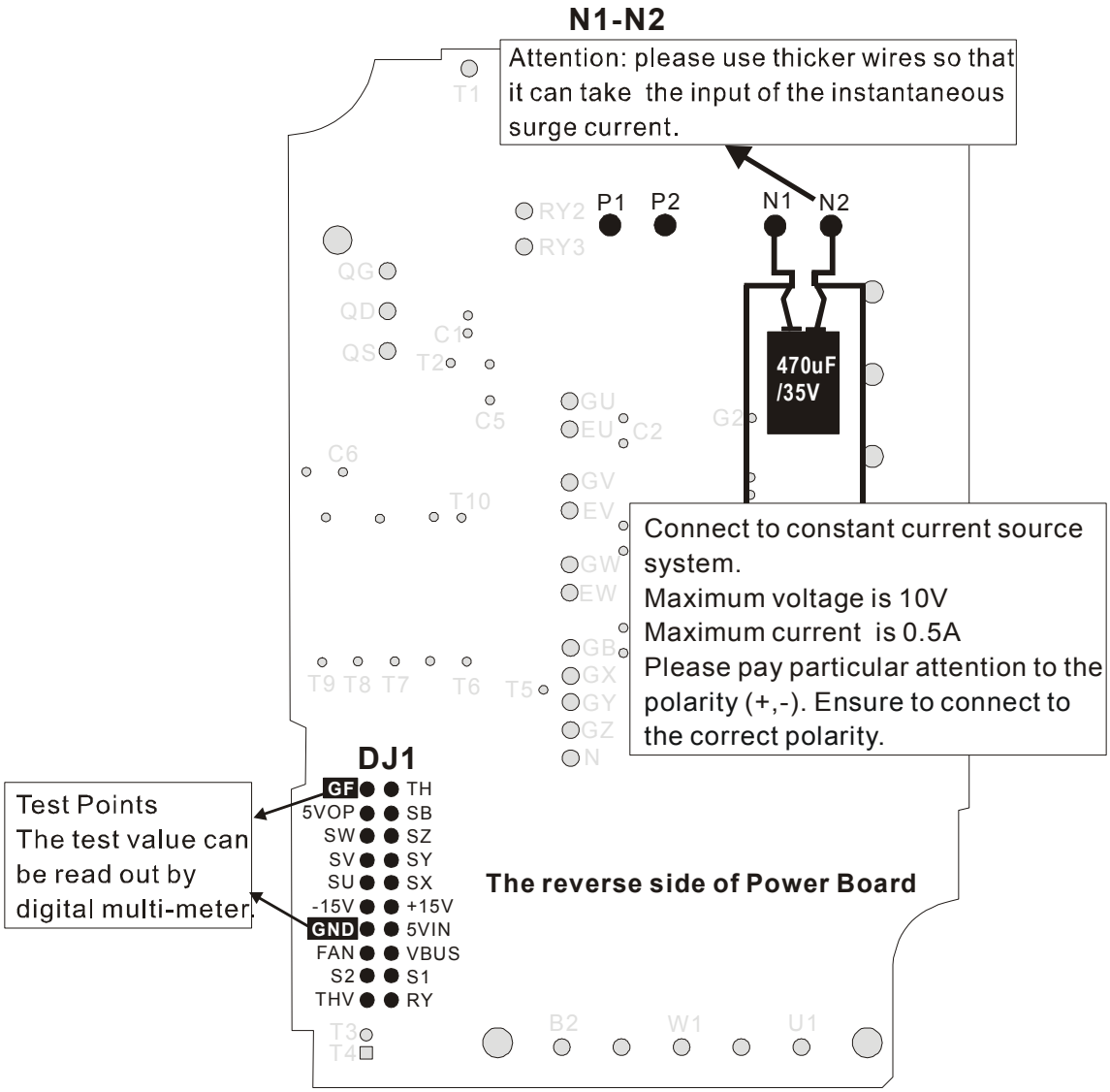
■ GROUND FAULT TEST

1） Prepare constant current source system. The maximum voltage is 10V and the maximum current is 0.5A. Connect a 470μF/35V capacitor in parallel.

2） Connect testing wires separately for N1 and N2. Supply an instantaneous surge current to N1-N2. (Notice that supplying an instantaneous surge current should be completed in 5 seconds.)

3） Test and measure the voltage of GF-GND and the test value should be a voltage of 5.6±0.5V. (Notice that the testing time can only hold few milliseconds, so please must test quickly and complete it in 5 seconds.)

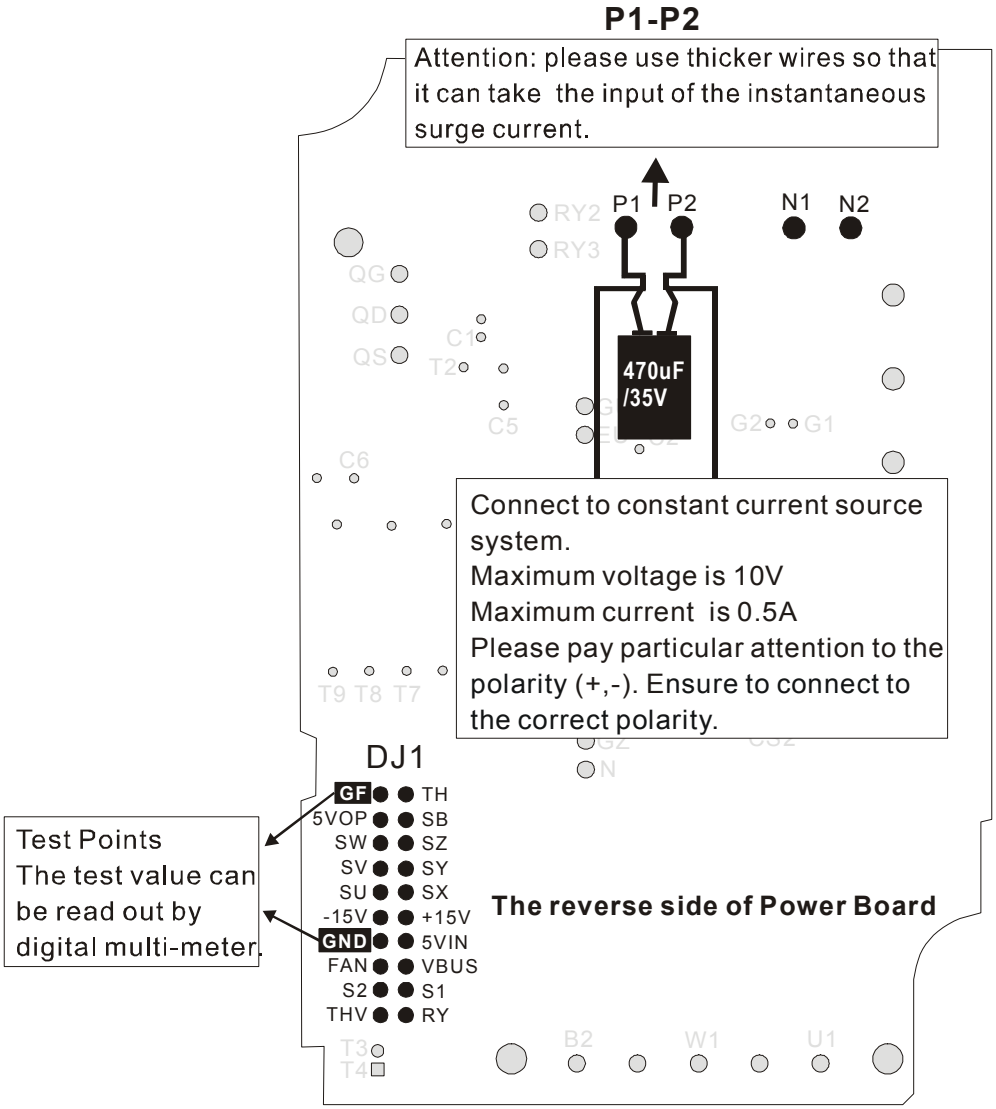
4） Remove the connecting wires between N1and N2.



5) Connect testing wires separately for P1' and P2. Supply an instantaneous surge current to P1'-P1. (Notice that supplying an instantaneous surge current should be completed in 5 seconds.)

6) Test and measure the voltage of GF-GND and the test value should be a voltage of 5.6±0.5V. (Notice that the testing time can only hold few milliseconds, so please must test quickly and complete it in 5 seconds.)

7) Remove all the testing wires after the test.

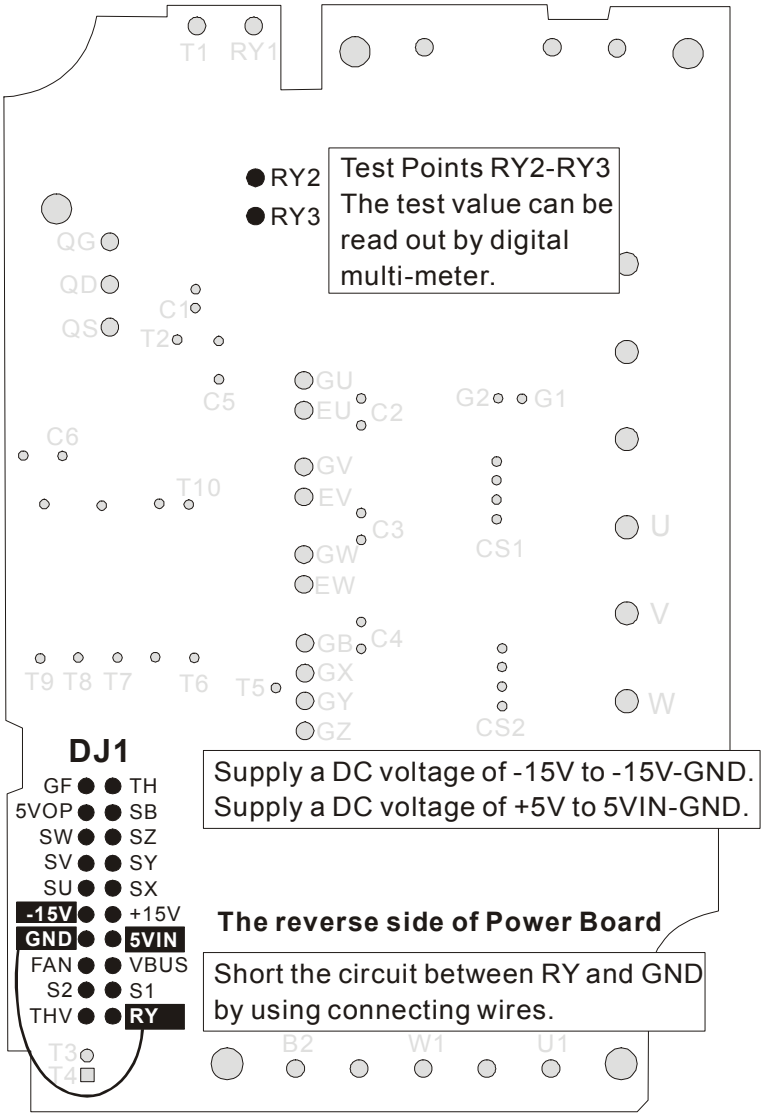


■ RELAY TEST

1） Short the circuit between RY and GND of DJ1. Supply a voltage of -15Vdc to -15V and GND of DJ1. Then, supply a voltage of +5Vdc to 5VIN and GND of DJ1.

2） Test and check if RY2-RY3 of RELAY is CLOSE (0 ~ 0.5Ω).

3） Remove all the testing wires after the test.



■ POWER TEST

1） Supply a voltage of 310Vdc to N1 and P1.

2） Test and check if the test value between 5VIN and GND of DJ1 is a voltage of +5.05±0.15Vdc.

3） Test and check if the test value between +15V and GND of DJ1 is a voltage of +14 ~ +16Vdc.

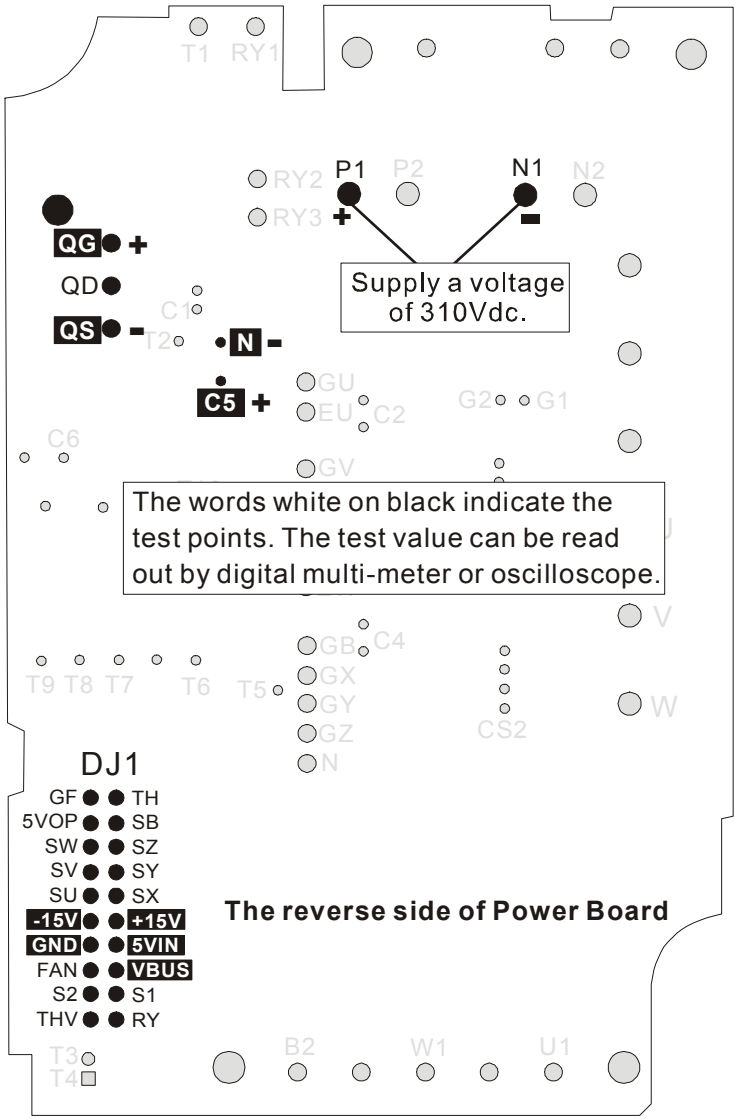
4） Test and check if the test value between -15V and GND of DJ1 is a voltage of -13.4 ~ -16Vdc.

5） Test and check if the test value between C5 and N is a voltage of +16.0 ~ +18.55Vdc.

6） Test and check if the test value between VBUS and GND of DJ1 is a voltage of -17.4 ~ -18.5Vdc.

7） Test and check if the frequency Fs of QG-QS (N) is a frequency of +24.8 ~ +37.2KHz.

8） Except the testing wires between N1 and P1 (keep it for DRIVER TEST), remove the other testing wires after the test.



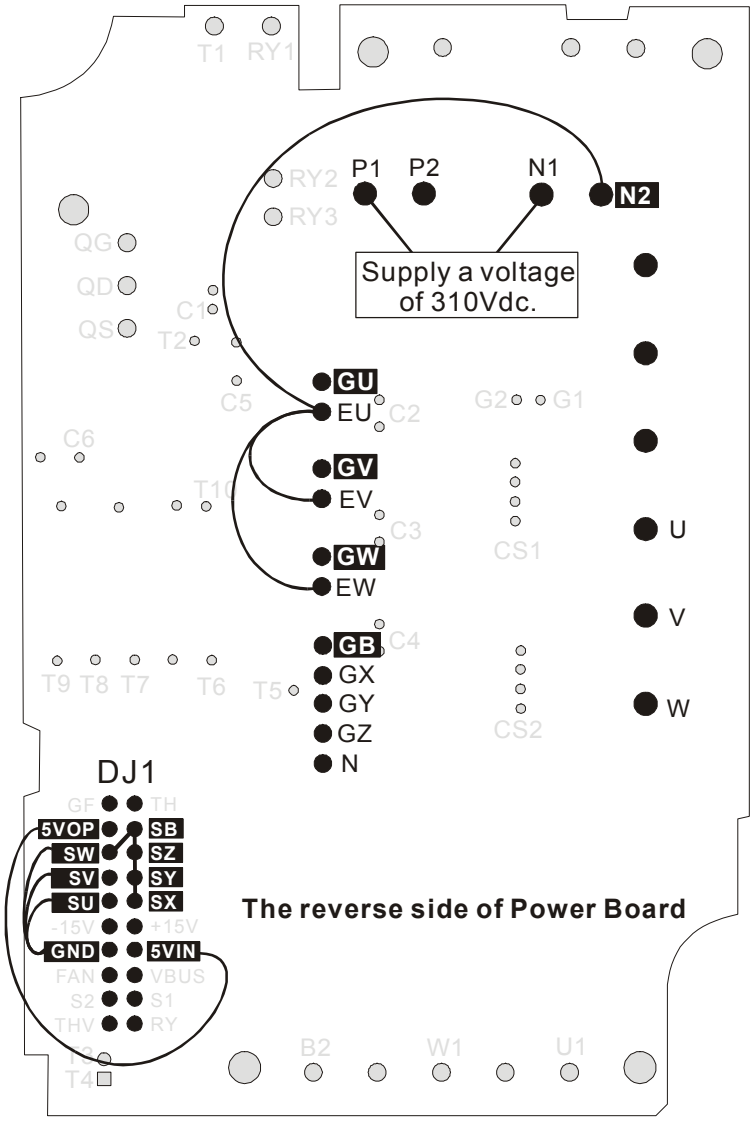
■ DRIVER TEST

1） Short the circuit between EU, EV, EW and N2 of IGBT. Short the circuit between 5VOP and 5VIN of DJ1. Connect SU, SV, SW, SX, SY, SZ, SB of DJ1 to GND. Supply a voltage of 310Vdc to N1-P1.

2） Test and measure the voltage of GU-N2, GV-N2, and GW-N2. The test value should be a voltage of 14.2 ~ 18.0Vdc.

3） Test and measure the voltage of GX-N2, GY-N2 and GZ-N2. The test value should be a voltage of 14.2 ~ 18.0Vdc.

4） Test and measure the voltage between GB and N2 and the test value should be a voltage of 15.0 ~ 19.0Vdc.



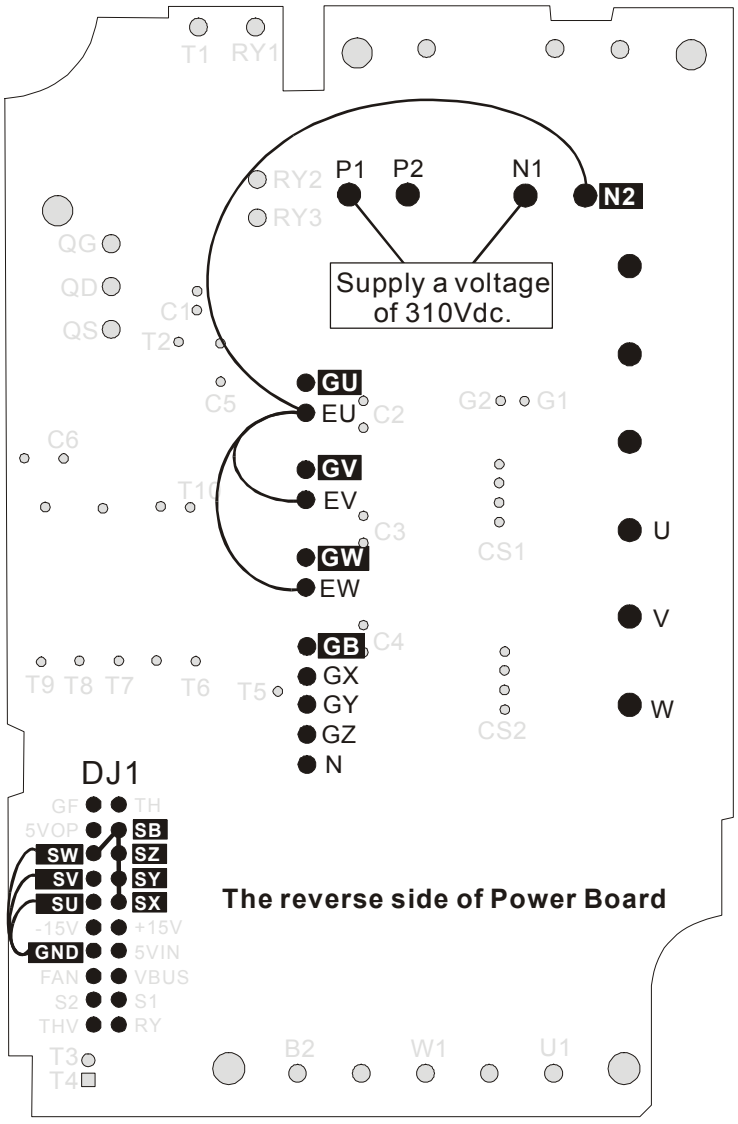
5） Open the circuit between 5VOP and 5VIN.

6） Test and measure the voltage of GU-N2, GV-N2, and GW-N2. The test value should be a voltage of 0.0±0.2Vdc.

7） Test and measure the voltage of GX-N2, GY-N2 and GZ-N2. The test value should be a voltage of 0.0±0.2Vdc.

8） Test and measure the voltage between GB and N2, and the test value should be a voltage of 0.0± 0.2Vdc.

9） Remove all the testing wires after the test.



(VFD004M21A/23A, VFD007M21A/23A, VFD015M21A/G, VFD015M23A)

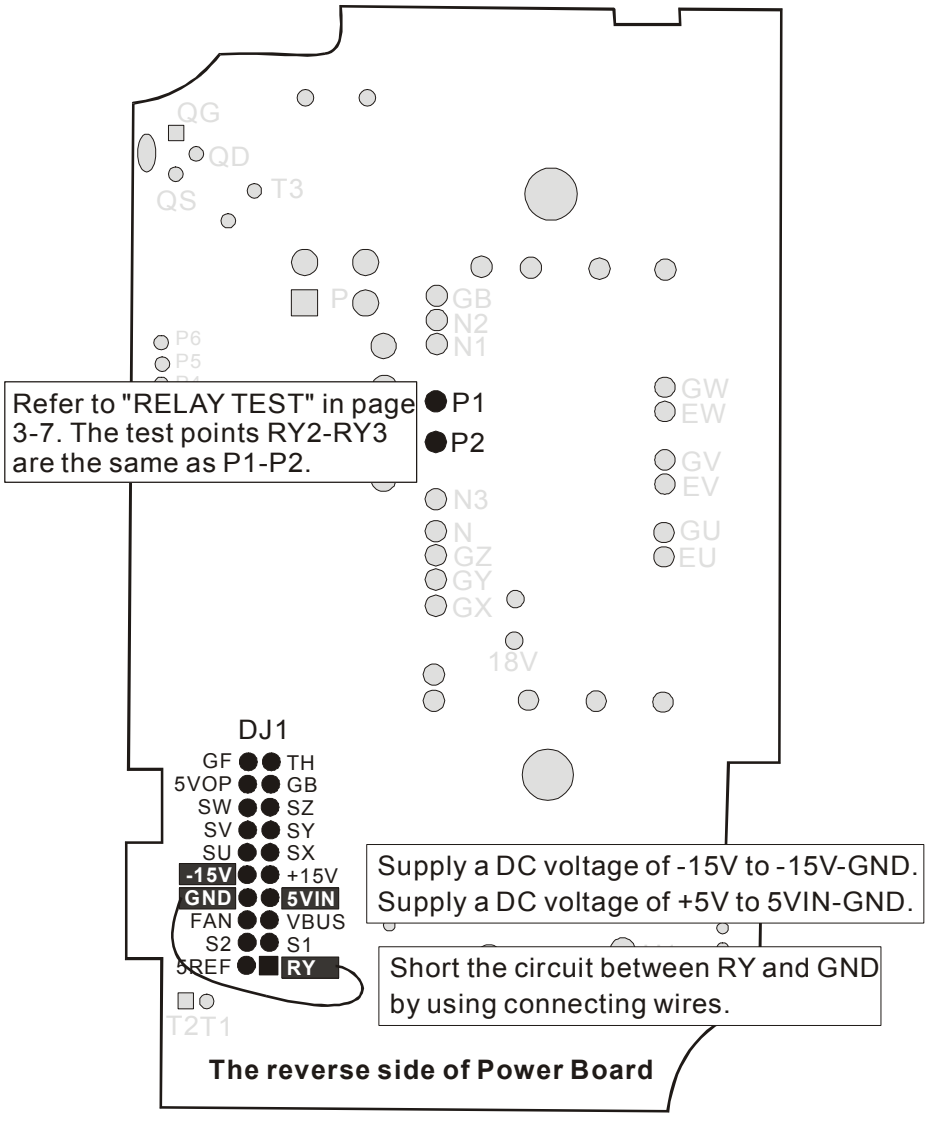
■ RELAY TEST

1） Supply a voltage of -15Vdc to -15V and GND of DJ1. Supply a voltage of +5Vdc to 5VIN and GND of DJ1.

2） Short the circuit between RY and GND of DJ1.

3） Test and check if P1-P2 of IGBT is CLOSE (0 ~ 0.5Ω).

4） Remove all the testing wire after the test.



■ IGBT DRIVE TEST

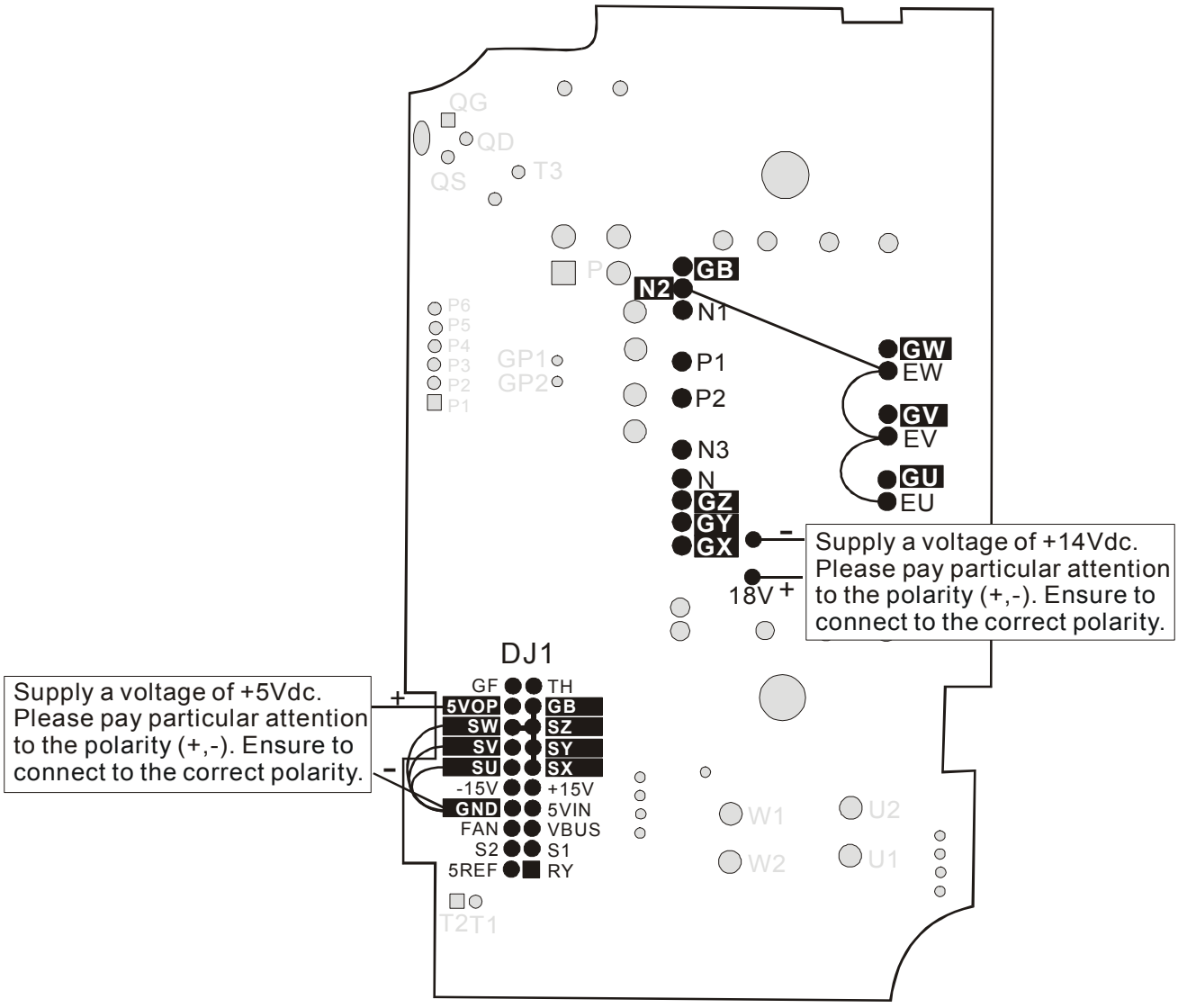
1） Short the circuit between EU, EV, EW and N2 of IGBT. Supply a voltage of 14.0Vdc to 19V1-N2 of DC3. Supply a voltage of 5Vdc to 5VOP and GND of DJ1. Short the circuit between GND and SU, SV, SW, SX, SY, SZ, GB of DJ1.

2） Test and measure the voltage of GU-N2, GV-N2, and GW-N2. The test value should be a voltage of 11.0Vdc ± 0.5V.

3） Test and measure the voltage of GX-N2, GY-N2, and GZ-N2. The test value should be a voltage of 11.5Vdc ± 0.5V.

4） Test and measure the voltage of GB-N2 and the test value should be a voltage of 13.0Vdc ±1.0V.

5） Remove all the testing wires after the test.



■ POWER TEST

1） Supply a voltage of 310Vdc to N1 and P1.

2） Test and check if the test value between 5VIN and GND is a voltage of +5.05 ±0.1Vdc.

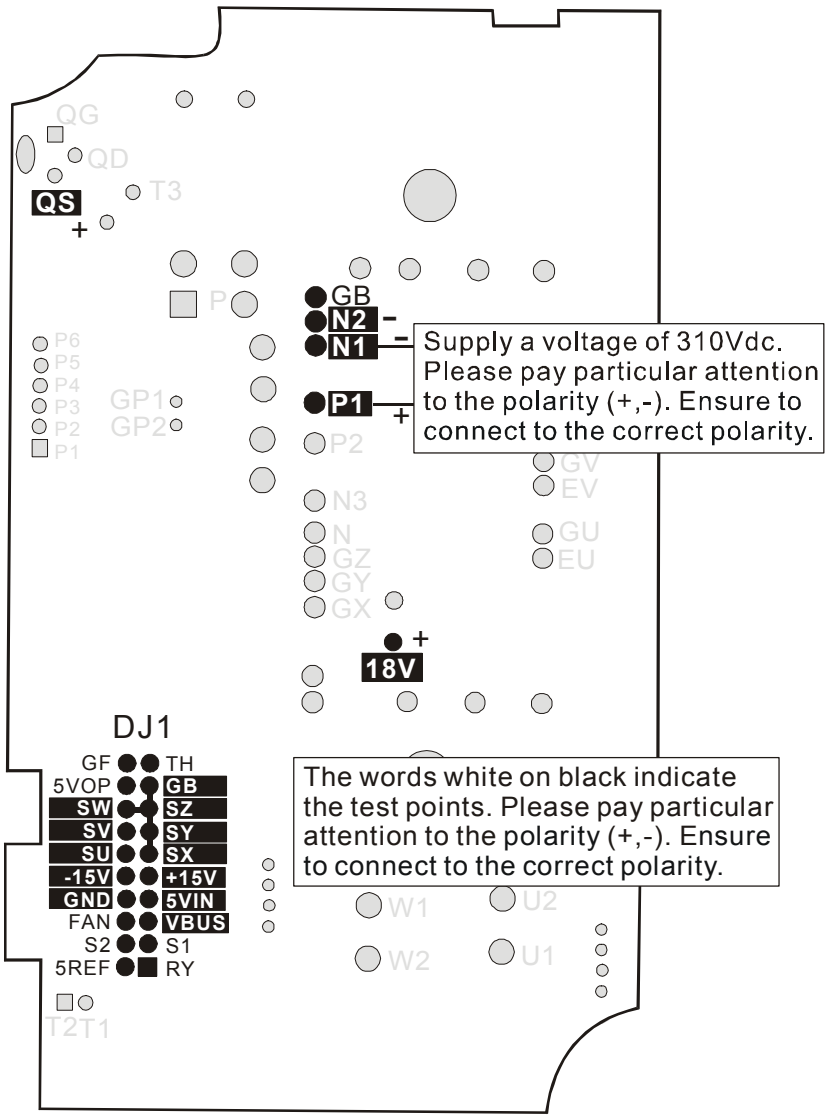
3） Test and check if the test value between +15V and GND is a voltage of +14.0 ~ 15.6Vdc.

4） Test and check if the test value between -15V and GND is a voltage of -13.4 ~ -15.5Vdc.

5） Test and check if the test value between 19V1 and N2 is a voltage of +17.0 ~ 19.55Vdc.

6） Test and check if the test value between VBUS and GND is a voltage of -17.8 ~ 0.5Vdc.

7） Test and check if the frequency between QS and N2 is a frequency of 40 ~ 65KHz.



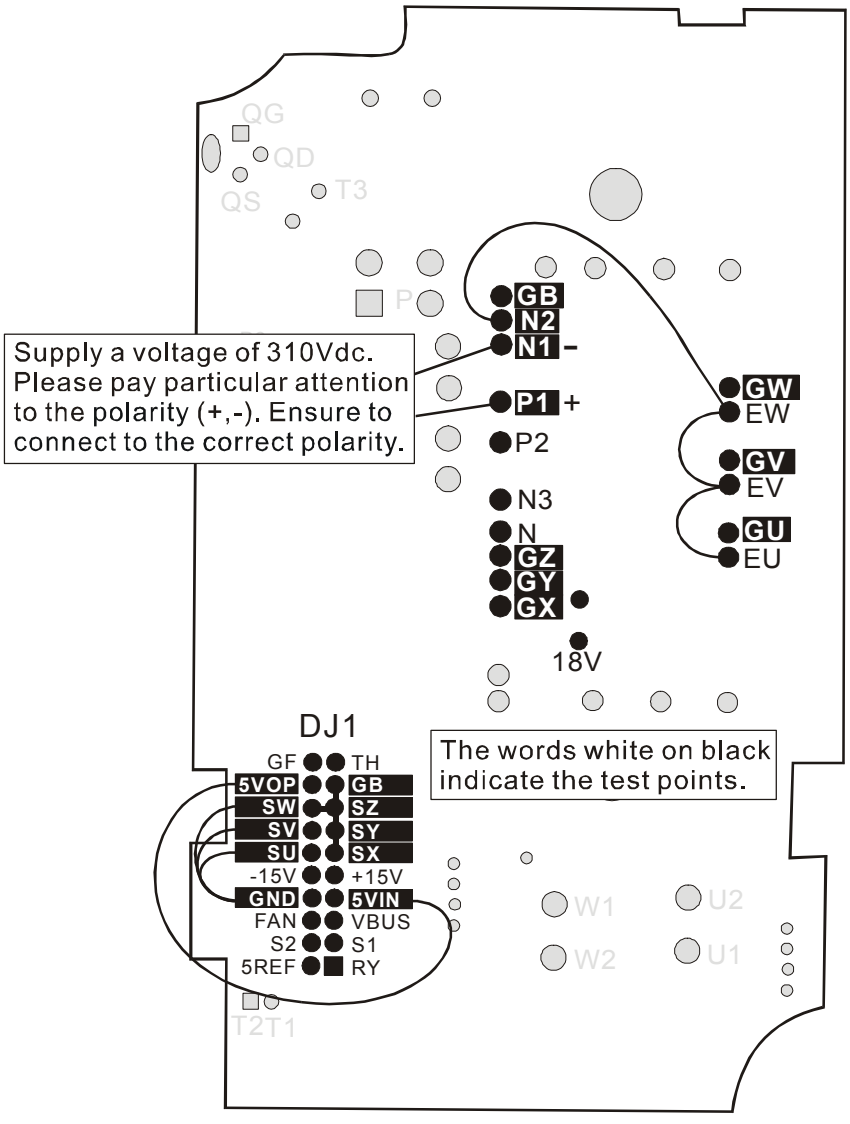
■ DRIVER TEST

1） Short the circuit between EU, EV, EW and N2 of IGBT. Short the circuit between 5VOP and 5VIN of DJ1. Connect SU, SV, SW, SX, SY, SZ, and GB of DJ1 to GND.

2） Supply a voltage of 310Vdc to N1 and P1. Test and measure the voltage between GU-N2 and the test value should be a voltage of 14.5 ~ 18.0Vdc.

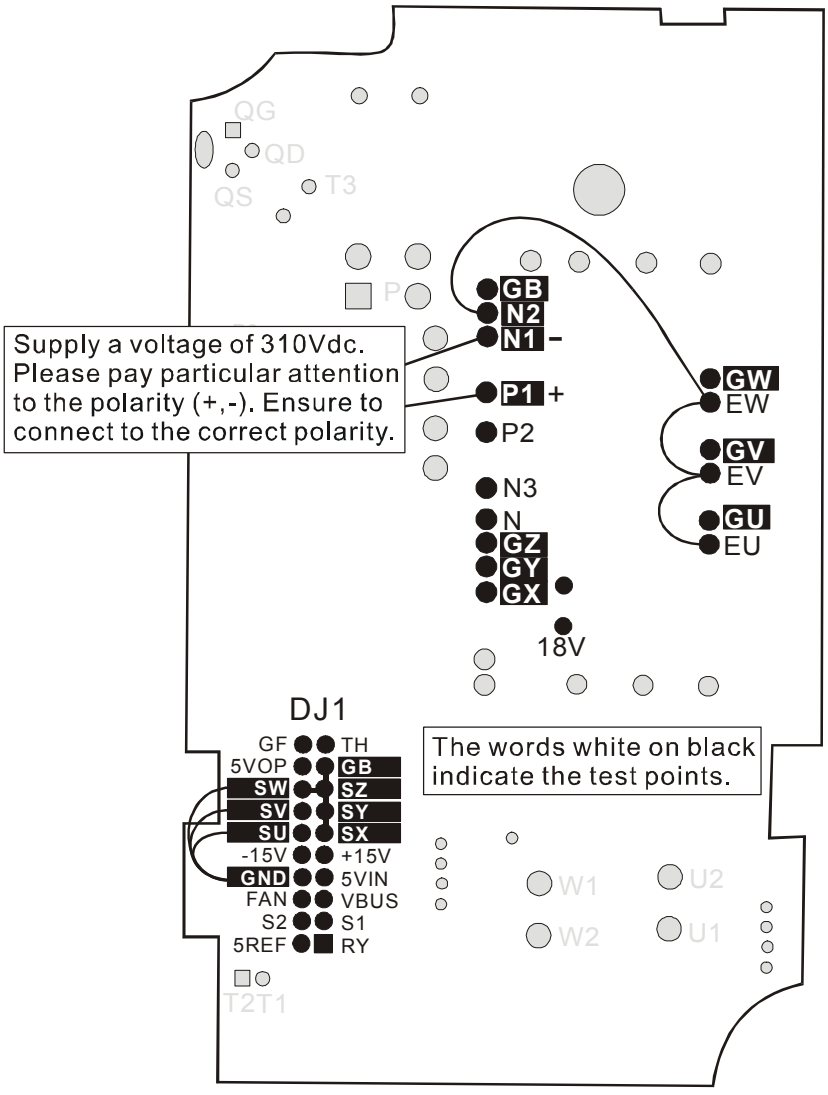
3） Test and measure the voltage of GV-N2, GW-N2, GX-N2, GY-N2, GZ-N2 and the test value should be 14.5 ~ 18.0Vdc.

4） Test and measure the voltage between GB and N2 and the test value should be 16.0 ~ 20.0Vdc.



Open the circuit between 5VOP and 5VIN.

1） Test and measure the voltage between GU and N2, and the test value should be a voltage of 0.0~0.2Vdc.
2） Test and measure the voltage between GV and N2, and the test value should be a voltage of 0.0~0.2Vdc.
3） Test and measure the voltage between GW and N2, and the test value should be a voltage of 0.0~0.2Vdc.
4） Test and measure the voltage between GX and N2, and the test value should be a voltage of 0.0~0.2Vdc.
5） Test and measure the voltage between GY and N2, and the test value should be a voltage of 0.0~0.2Vdc.
6） Test and measure the voltage between GZ and N2, and the test value should be a voltage of 0.0~0.2Vdc.
7） Test and measure the voltage between GB and N2, and the test value should be a voltage of 0.0~0.2Vdc.

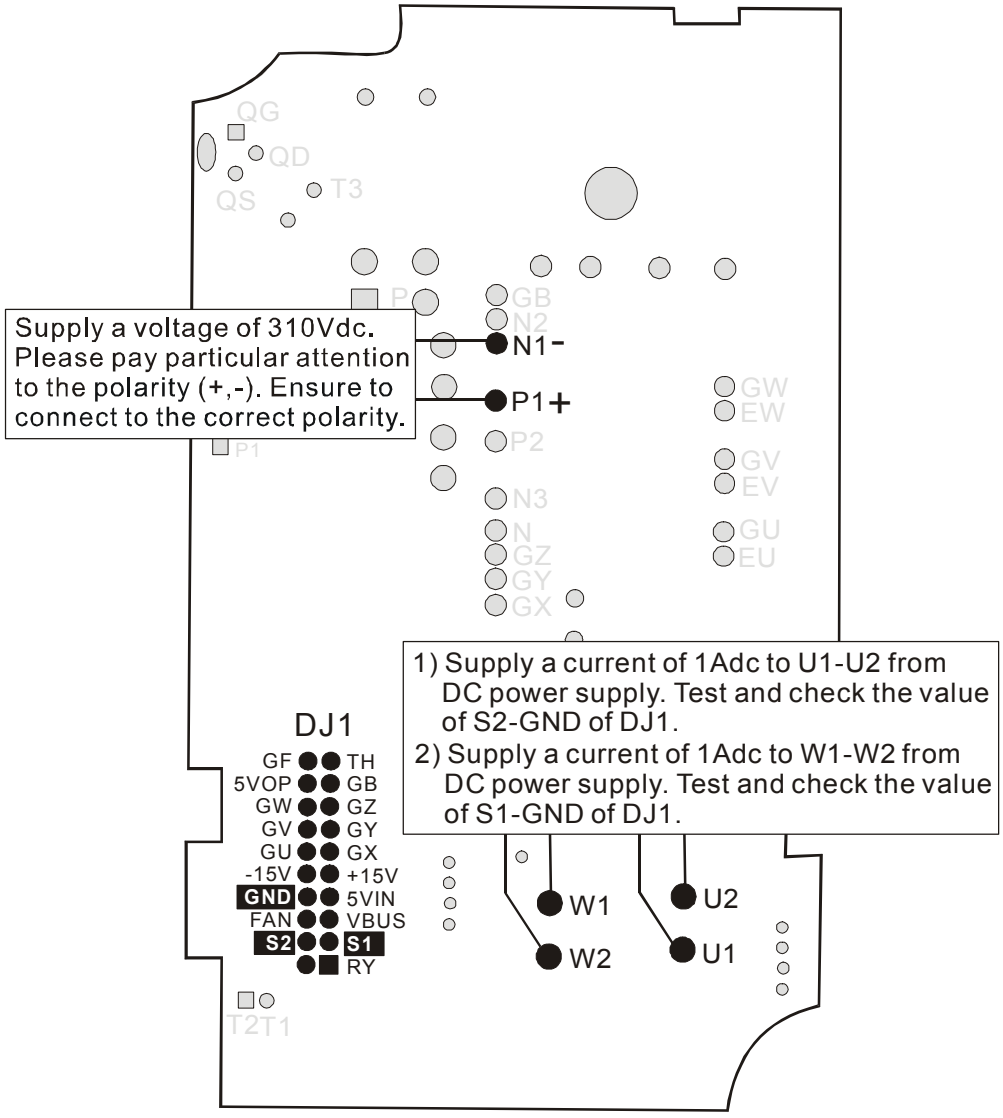


■ CURRENT SENSOR TEST

1） Supply a voltage of 310Vdc to N1 and P1. Supply a current of 1Adc to U1 and U2. Then, test and check the value of S2-GND.

2） Supply a current of 1Adc to W1 and W2. Then, test and check the value of S1-GND.

Models	Test value of S1-GND, S2-GND
VFD004M21A, VFD004M23A	0.71±0.14V
VFD007M21A, VFD007M23A VFD007M21A-Z	0.36±0.14V
VFD015M21A/G, VFD015M23A VFD015M21A-Z	0.25±0.10V



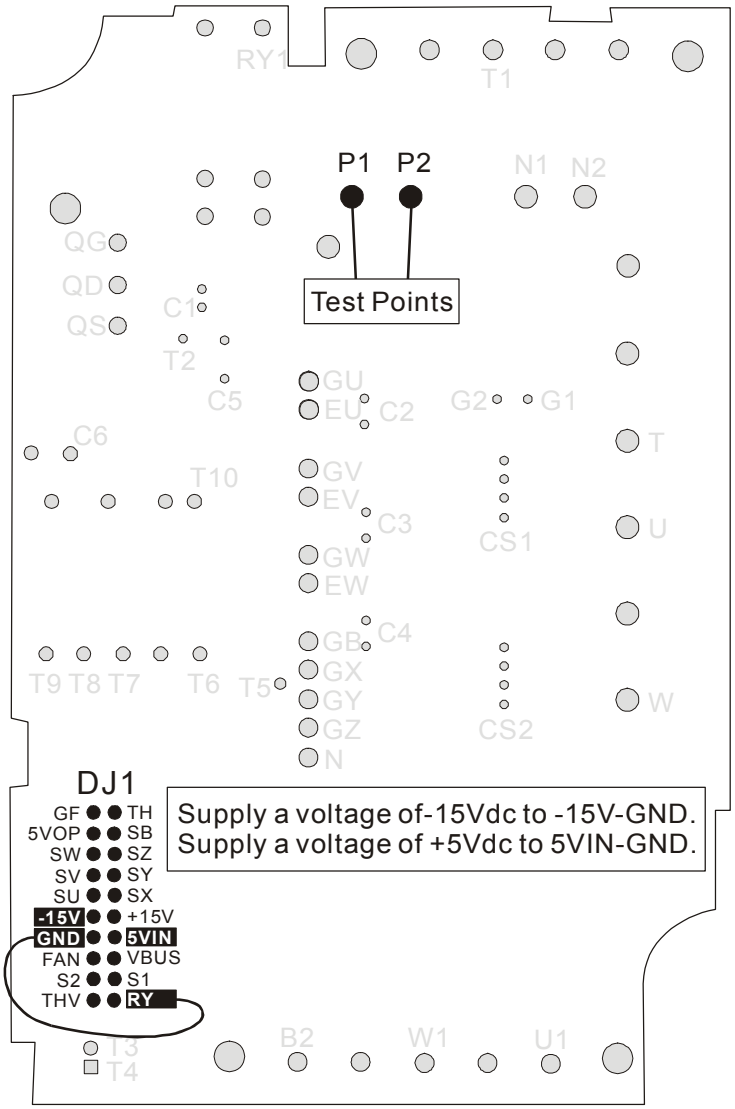
(VFD004M21B, VFD007M21B, VFD015M21B, VFD022M23B)

■ RELAY TEST

1） Supply a voltage of -15Vdc to -15V and GND of DJ1. Supply a voltage of +5Vdc to 5VIN and GND of DJ1.

2） Short the circuit between RY and GND of DJ1.

3） Test and check if P1-P2 of IGBT is CLOSE (0 ~ 0.5Ω).



■ SWITCHING POWER SUPPLY TEST

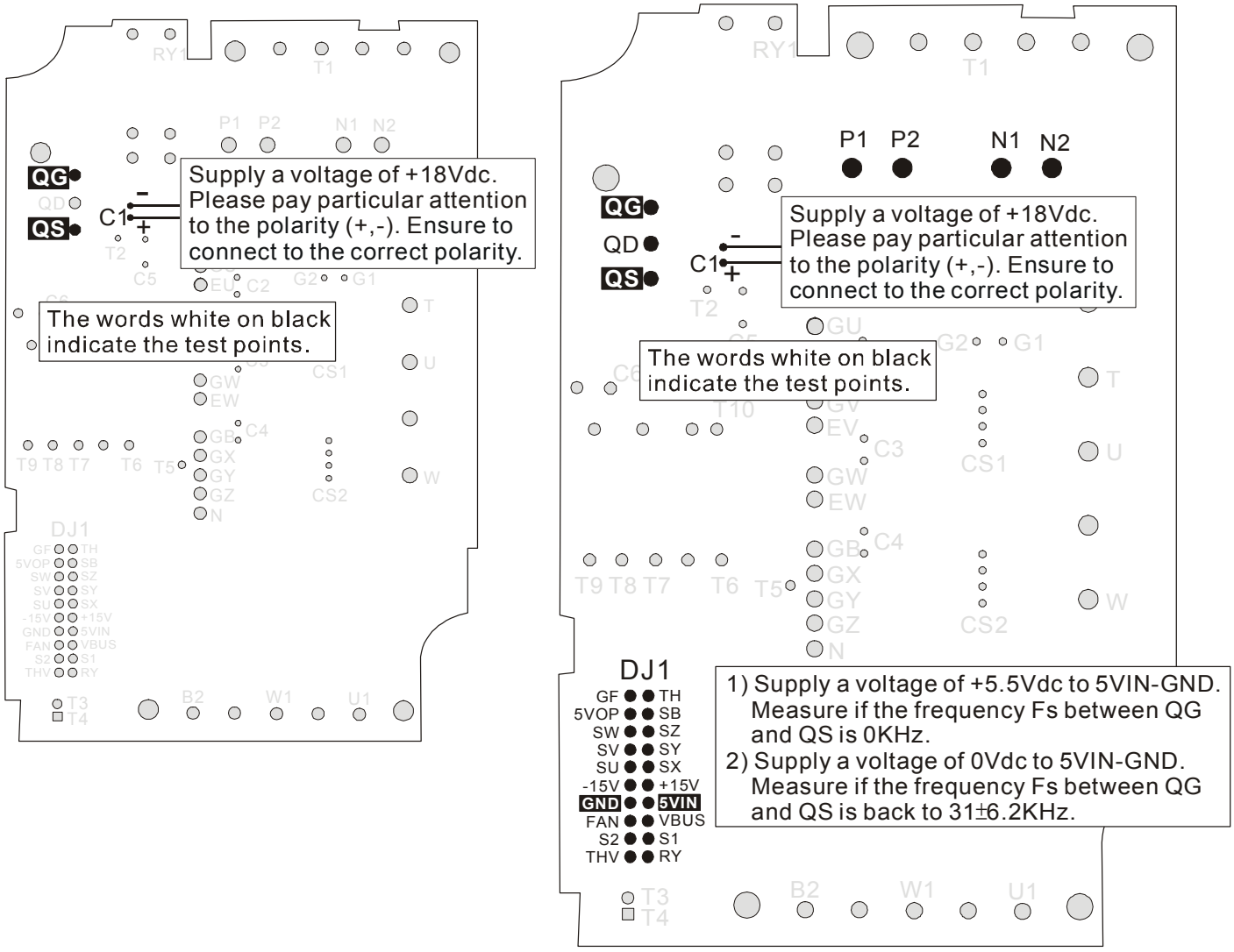
1） Supply a voltage of +18.0Vdc to C1 and N.

2） Test and measure the voltage of QG-N and the test value of frequency (Fs) should be within 31±6.2KHz.

3） Supply a voltage of 5.5Vdc to 5VIN-GND.

4） Test and measure the voltage of QG-N and the test value of frequency (Fs) should be 0Hz.

5） Remove the power of 5VIN-GND and Test and measure the voltage of QC-N. The test value of frequency (Fs) should be within 31±6.2KHz.



■ GROUND FAULT TEST

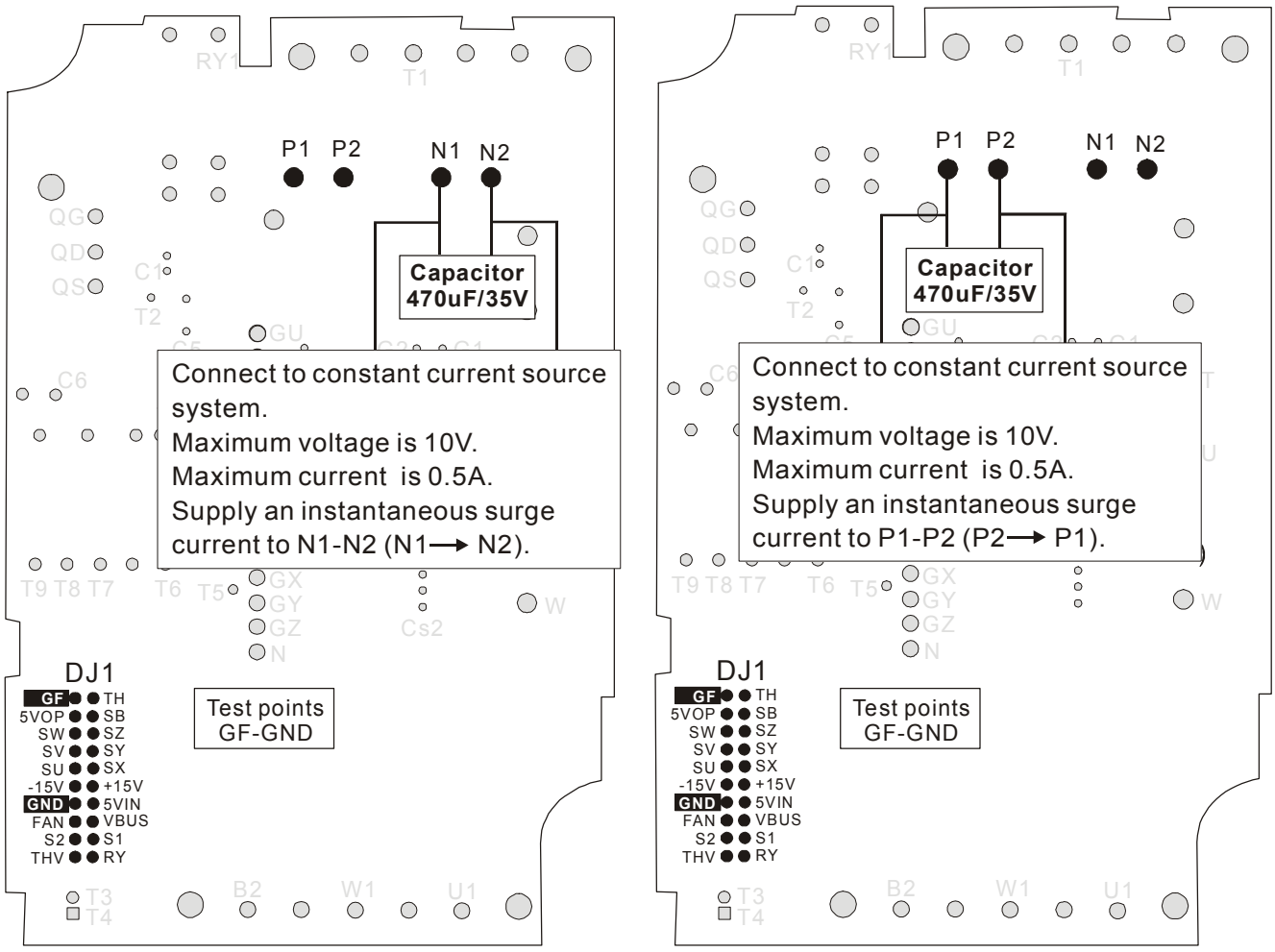
1） Prepare constant current source system. The maximum voltage is 10V and the maximum current is 0.5A. Connect a 470μF/35V capacitor in parallel.

2） Supply an instantaneous surge current to N1-N2 (N1→N2).

3） Test and measure the voltage of GF-GND and the test value should be a voltage of 5.6±0.5V. (Notice that the testing time can only hold few milliseconds, so please must test quickly and complete it in 5 seconds.)

4） Supply an instantaneous surge current to P2-P1 (P2→P1).

5） Test and measure the voltage of GF-GND and the test value should be a voltage of 5.6±0.5V. (Notice that the testing time can only hold few milliseconds, so please must test quickly and complete it in 5 seconds.)



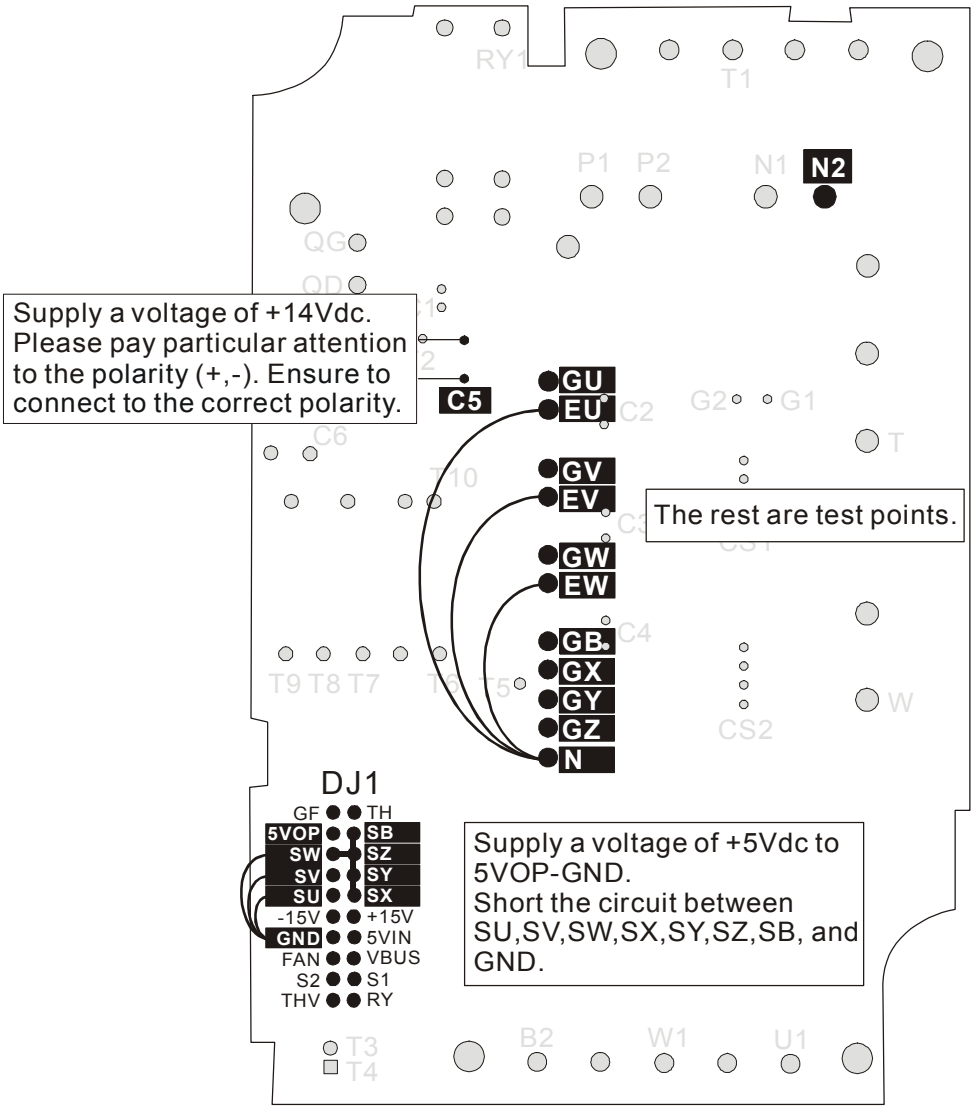
■ IGBT TEST

1） Connect EU and N, EV and N, and EW and N. Supply a voltage of +14.0Vdc to C5-N and supply a voltage of 5Vdc to 5VOP-GND. Short the circuit between SU, SV, SW, SX, SY, SZ, SB and GND.

2） Test and measure the voltage of GU-N, GV-N, and GW-N, and the test value should be a voltage of 11.0Vdc±0.5V.

3） Test and measure the voltage of GX-N, GY-N, and GZ-N, and the test value should be a voltage of 10.5Vdc±0.5V.

4） Test and measure the voltage of GB-N2 and the test value should be a voltage of 12.0Vdc±1.0V.



■ POWER TEST

1） Short the circuit between N2 and N. Supply a voltage of 310Vdc to N1-P1.

2） Test and check if the test value between 5VIN and GND is a voltage of +5.05±0.15Vdc.

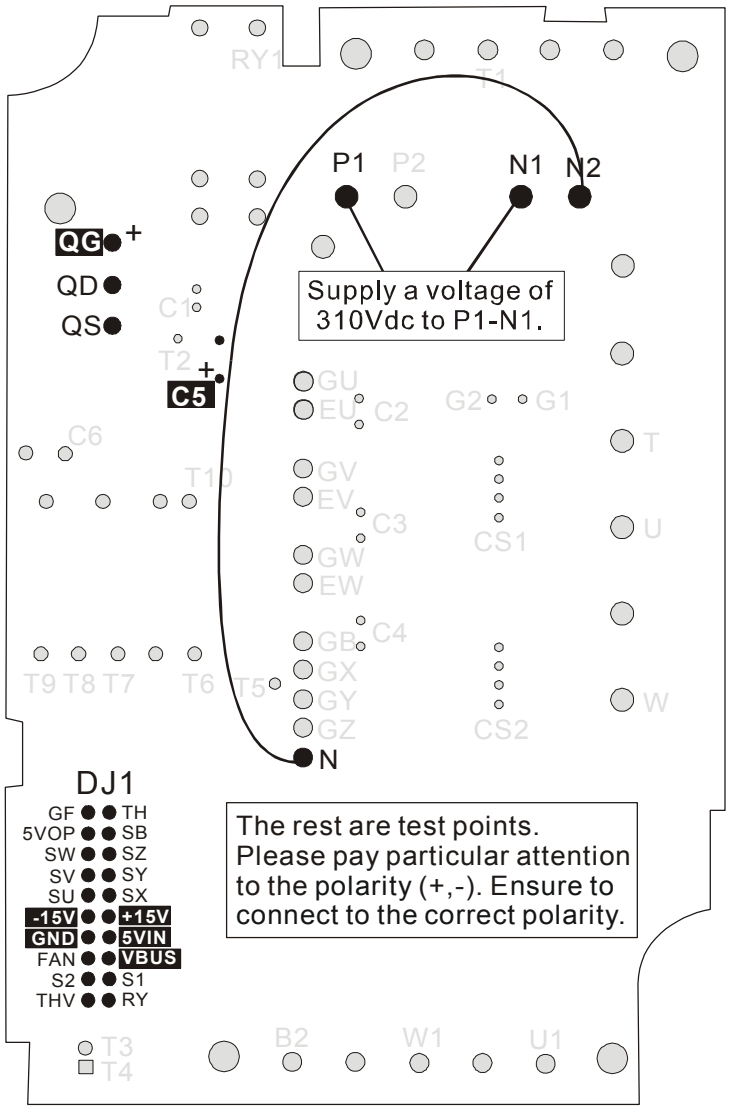
3） Test and check if the test value between +15V and GND is a voltage of +14.0 ~ 16.0Vdc.

4） Test and check if the test value between -15V and GND is a voltage of -13.4 ~ -16.0Vdc.

5） Test and check if the test value between C5 and N is a voltage of +16.0 ~ 18.55Vdc.

6） Test and check if the test value between VBUS and GND is a voltage of -17.4~-18.5Vdc.

7） Test and check if the frequency between QG and N is a frequency of 31±6.2KHz.

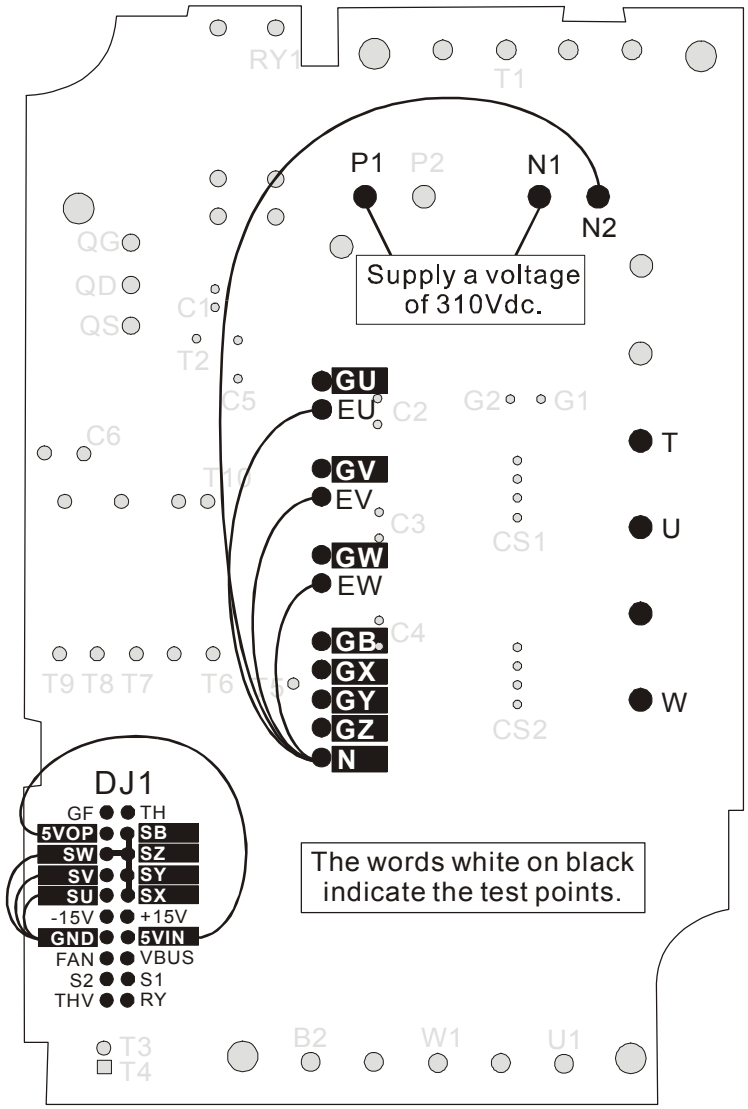


■ DRIVER TEST

1） Connect EU and N, EV and N, and EW and N. Short the circuit between 5VOP and 5VIN. Connect SU, SV, SW, SX, SY, SZ, SB to GND. Short the circuit between N2 and N. Supply a voltage of 310Vdc to N1 and P1.

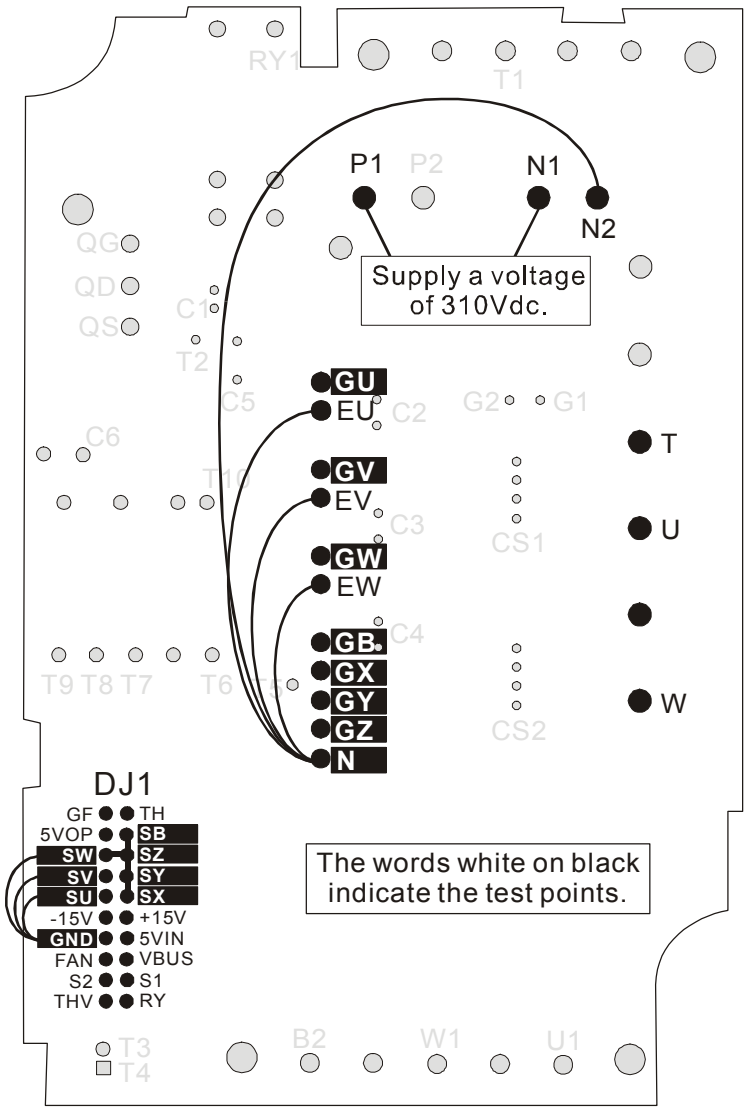
2） Test and check if the test value of GU-N, GV-N, GW-N, GX-N, GY-N, GZ-N is a voltage of 14.2 ~ 18.0Vdc.

3） Test and check if the test value of GB-N is a voltage of 15.0 ~ 19.0Vdc.



Open the circuit between 5VOP and 5VIN.

1） Test and measure the voltage of GU-N1, GV-N2, GW-N2, GY-N2, GZ-N2, GB-N2 and the test value should be 0.0 ~ 0.2Vdc.



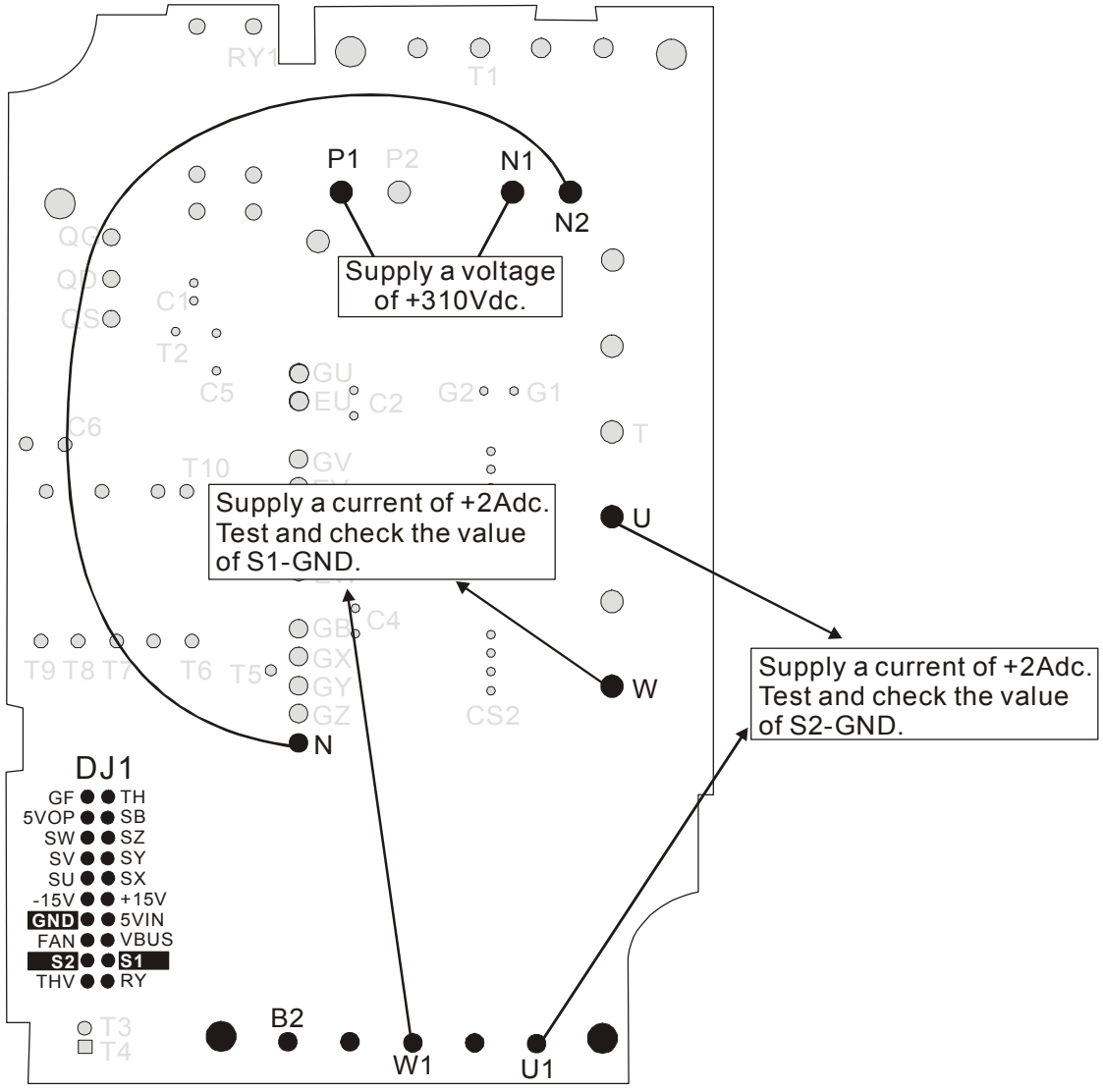
■ CURRENT SENSOR TEST

1） Short the circuit between N2 and N. Supply a voltage of 310Vdc to N1 and P1.

2） Supply a current of 2Adc to U1 and U2. Test and check the value of S2-GND.

3） Supply a current of 2Adc to W1 and W2. Test and check the value of S1-GND.

Models	Test value of S1-GND, S2-GND
VFD004M21B	1.42±0.14V
VFD007M21B	1.71±0.14V
VFD015M21B	0.505±0.1V
VFD022M23B, VFD022M23B-Z	0.356±0.1V



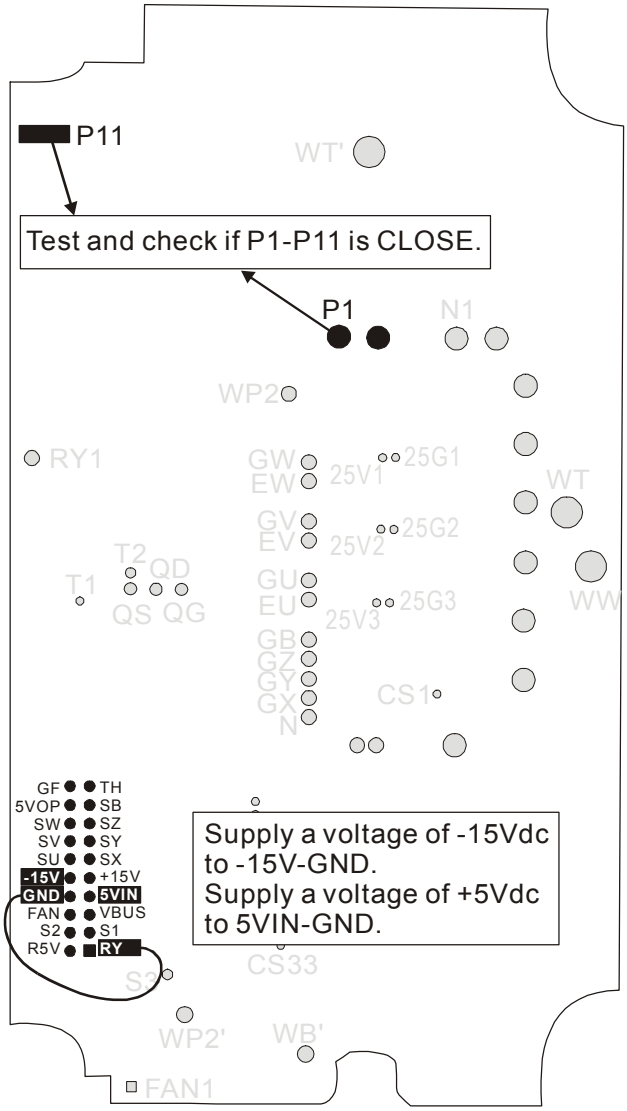
(VFD037M23A, VFD055M23A)

■ RELAY TEST

1） Supply a voltage of -15Vdc to -15V-GND. Supply a voltage of +5Vdc to 5VIN-GND.

2） Short the circuit between RY-GND.

3） Test and check if P1-P11 is CLOSE (0 ~ 0.5Ω).



■ SWITCHING POWER SUPPLY TEST

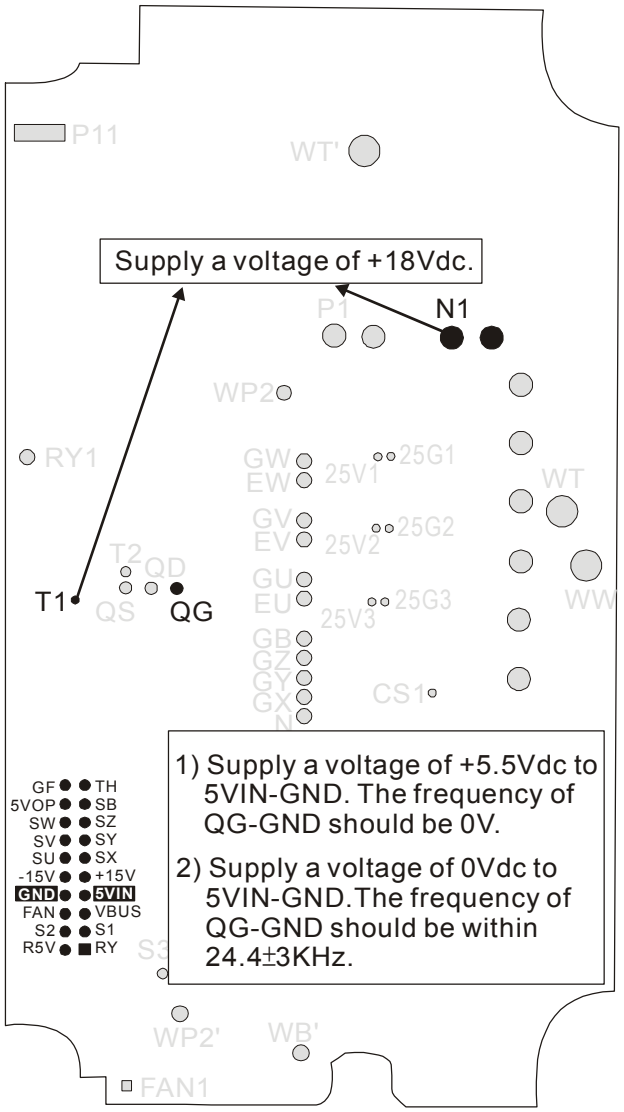
1） Supply a voltage of +18.0Vdc to T2 and N1.

2） Test and measure the voltage of QG-N1. The test value of frequency (Fs) should be within 24.4±3KHz.

3） Supply a voltage of 5.5Vdc to 5VIN and GND.

4） Test and measure the voltage of QG-N1. The test value of frequency (Fs) should be 0Hz.

5） Remove the power of 5VIN-GND. Test and measure the voltage of QC-N1 and the test value of frequency (Fs) should be within 24.4±3KHz.



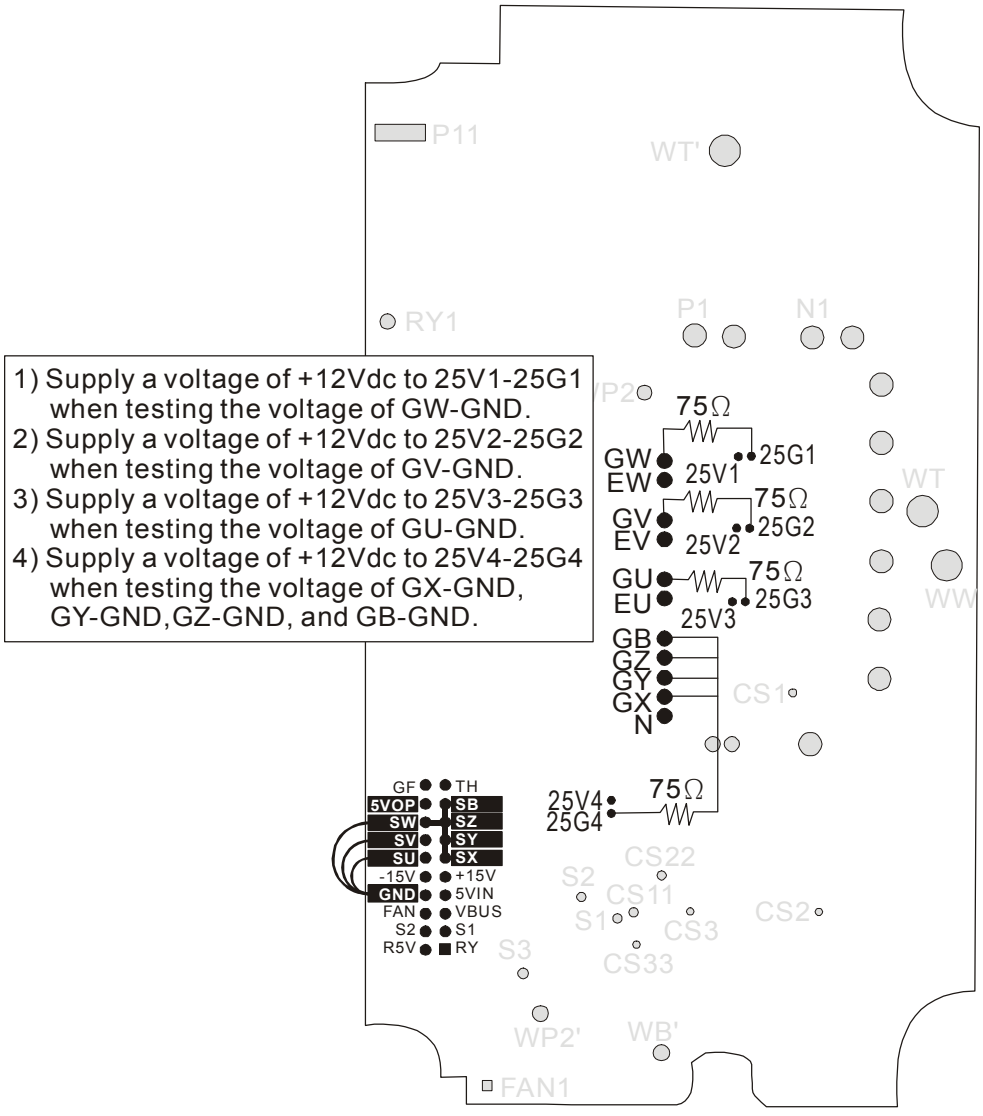
■ IGBT GATE RESISTOR TEST

1） Connect a 75Ω resistor to GW-25G1, GV-25G2, GU-25G3, GX-25G4, GY-25G4, GZ-25G4, and GB-25G4 in parallel. Supply a voltage of 5Vdc to 5VOP and GND of DJ1. Short the circuit between SU, SV, SW, SX, SY, SZ, SB and GND.

2） Supply a voltage of 12Vdc to 25V1-25G1, 25V2-25G2, 25V3-25G3 and 25V4-25G4 separately and the voltage should be increased gradually from 0Vdc to 12Vdc (completing this step in 0.5sceond).

3） Test and measure the voltage of GW-25G1, GV-25G2, GU-25G3, GX-25G4, GY-25G4, GZ-25G4 and GB-25G4. The test value should be the same as the value listed in the table below:

Models	Test Value of Vgate
VFD022M21A	5.38±0.5V
VFD037M23A	6.61±0.5V
VFD055M23A	7.68±0.5V



■ POWER TEST

1） Short the circuit between RY and GND. Connect a 30Ω(3W) resistor between 5VIN and GND in parallel. Supply a voltage of 310Vdc to P11 and N1. Test and measure the voltage between 5VIN and GND, and the test value should be a voltage of +5.05±0.1Vdc.

2） Test and measure the voltage between +15V and GND, and the test value should be a voltage of +14.0 ~ +16.5Vdc.

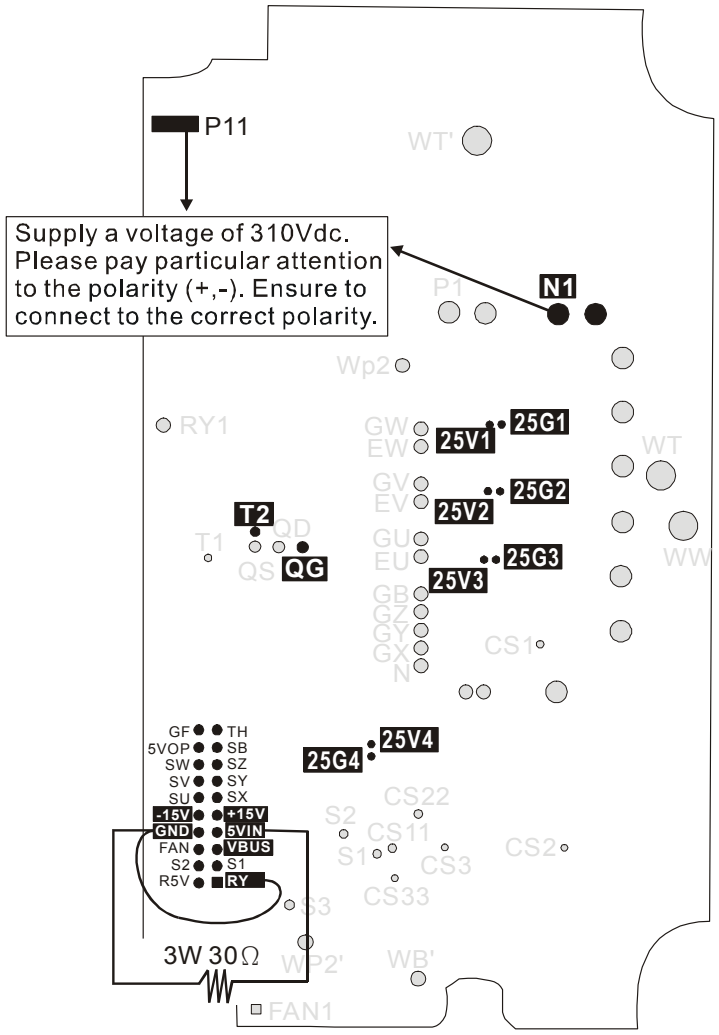
3） Test and measure the voltage between -15V and GND, and the test value should be a voltage of -14.0 ~ -16.5Vdc.

4） Test and measure the voltage of 25V1-25G1, 25V2-25G2, 25V3-25G3, and 25V4-25G4, and the test value should be a voltage of +24.0 ~ +27.0Vdc.

5） Test and measure the voltage between T2 and N1, and the test value should be a voltage of +15.5 ~ +19.0Vdc.

6） Test and measure the voltage between VBUS and GND, and the test value should be a voltage of -17.5±0.5Vdc.

7） Test and measure the frequency between QG and N1, and the frequency (Fs) should be a frequency of 24.4±3KHz.

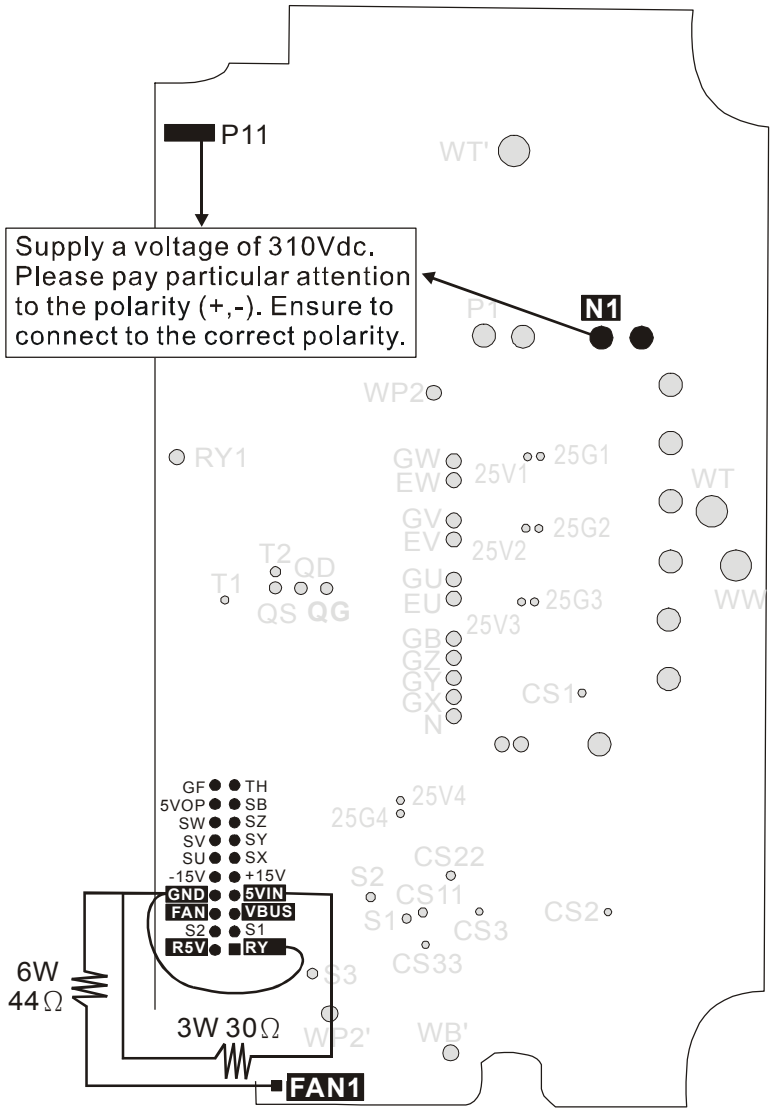


■ FAN TEST

1） Short the circuit between RY and GND. Connect a 30Ω(3W) resistor between 5VIN and GND in parallel. Supply a voltage of 310Vdc to P11 and N1. Connect a 44Ω (6W) resistor between FAN1 and GND in parallel. Supply a voltage of +5.0Vdc to R5V and GND.

2） Supply a voltage of +7.0Vdc to FAN and GND. Test and measure the voltage between FAN1 and GND, and the test value should be lower than 1V.

3） Supply a voltage of +12.8Vdc to FAN and GND, and the test value should be a voltage of 11.5~12.5V.

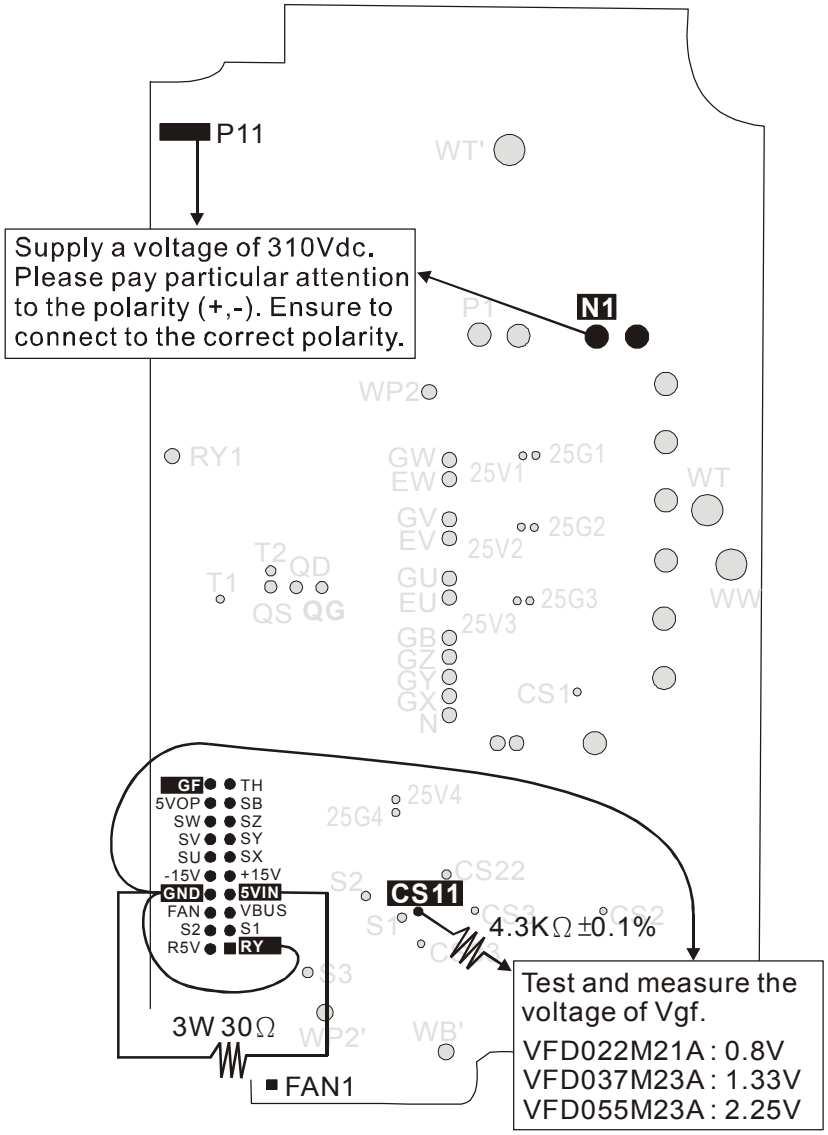


■ GROUND FAULT TEST

1） Short the circuit between RY and GND. Connect a 30Ω (3W) resistor between 5VIN and GND in parallel. Supply a voltage of 310Vdc to P11 and N1. Connect a 4.3 KΩ resistor (precision resistor) to CS11 in series. Test and measure the voltage between Vgf and GND. The normal test value of Vgf-GND is shown in the following figure. GND is Negative(-).

2） Test and measure the voltage between GF and GND. The test value should be a voltage higher than 4.5V. Remove the power of Vgf.

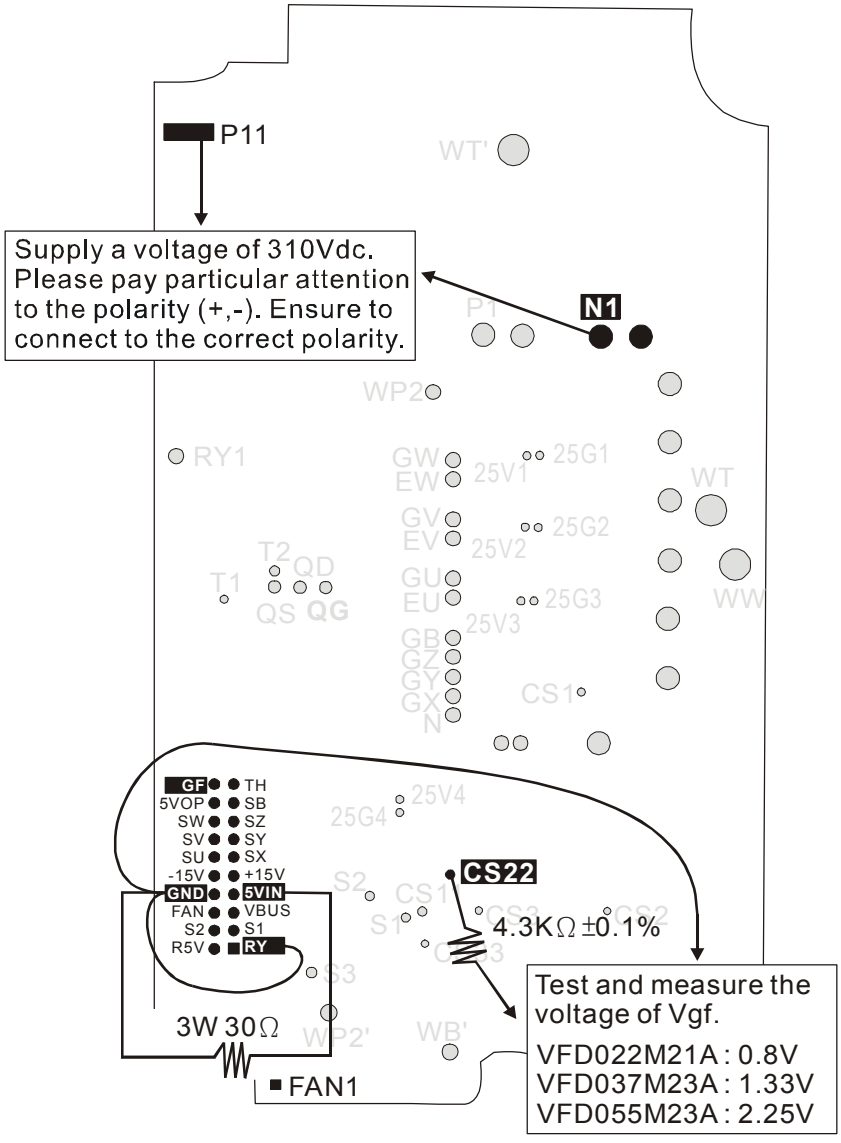
3） Test and measure the voltage between GF and GND. The test value should be a voltage lower than 0.5V.



4） Connect a 4.3 KΩ resistor (precision resistor) to CS22 in series. Test and measure the voltage between Vgf and GND. The normal test value of Vgf-GND is shown in the following figure. GND is Negative (-).

5） Test and measure the voltage between GF and GND. The test value should be a voltage higher than 4.5V. Remove the power of Vgf.

6） Test and measure the voltage between GF and GND. The test value should be a voltage lower than 0.5V.

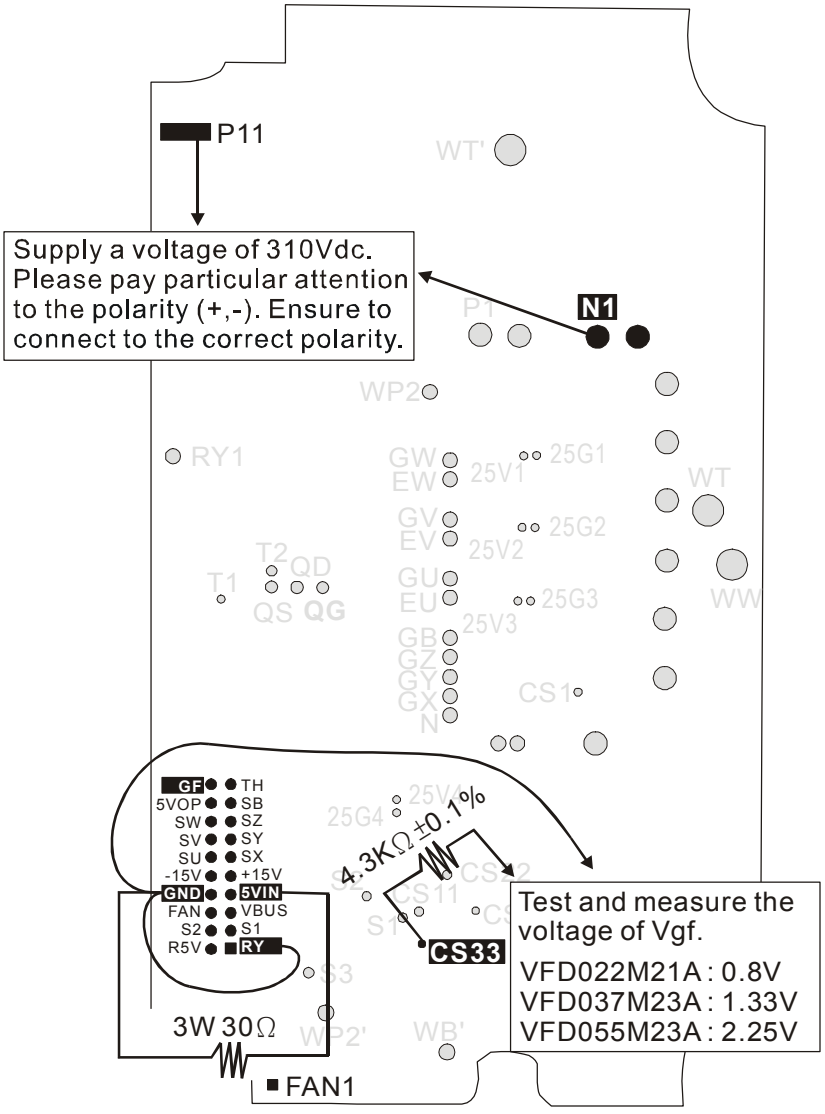


7） Connect a 4.3 KΩ resistor (precision resistor) to CS33 in series. Test and measure the voltage between Vgf and GND. The normal test value of Vgf-GND is shown in the following figure. GND is Negative (-).

8） Test and measure the voltage between GF and GND. The test value should be a voltage higher than 4.5V. Remove the power of Vgf.

9） Test and measure the voltage between GF and GND. The test value should be a voltage lower than 0.5V.

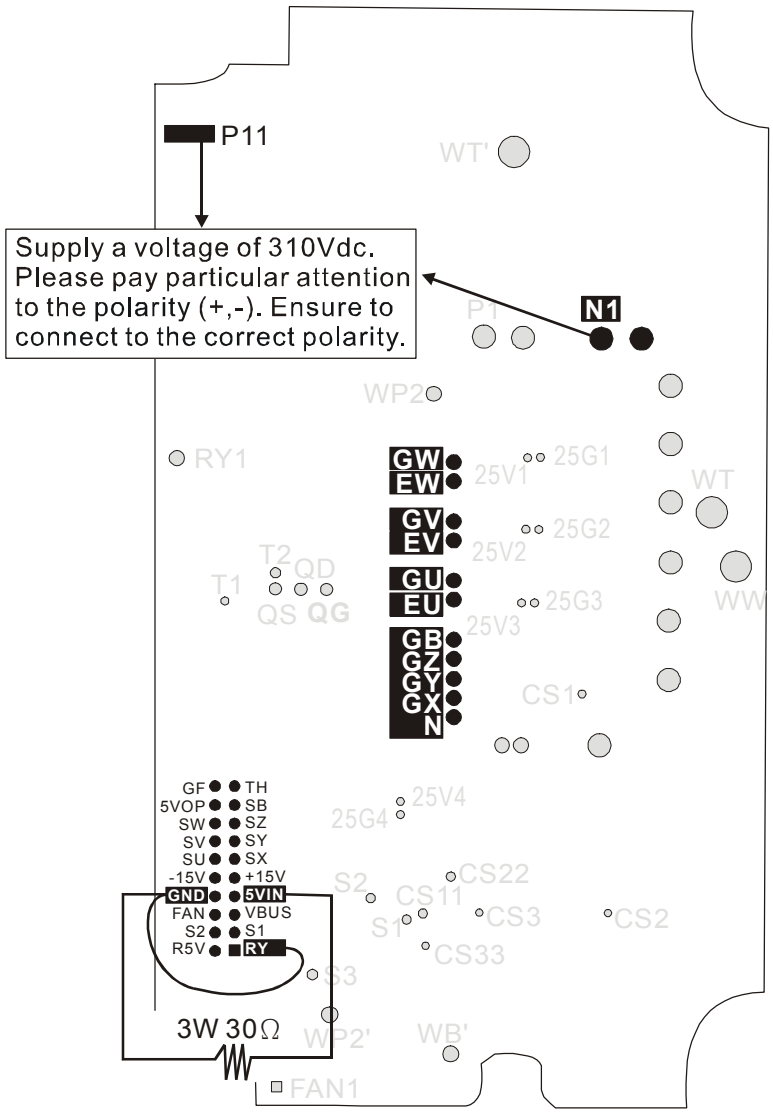
Models	Test Value of Vgate
VFD022M21A	0.8V
VFD037M23A	1.33V
VFD055M23A	2.25V



■ IGBT DRIVER TEST

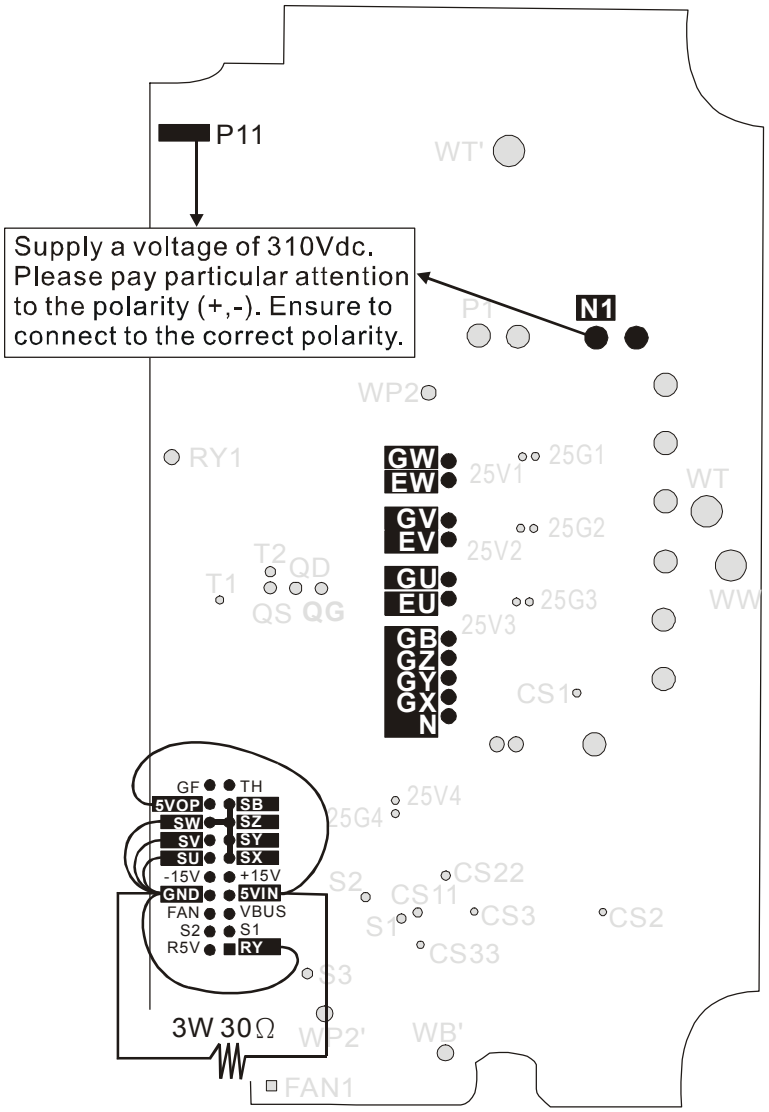
1） Short the circuit between RY and GND. Connect a 30Ω (3W) resistor between 5VIN-GND in parallel. Supply a voltage of 310Vdc to P11 and N1. Connect a 44Ω (6W) resistor between FAN1 and GND in parallel. Supply a voltage of +5.0Vdc to R5V and GND.

2） Test and measure the voltage of GU-EU, GV-EV, GW-EW, GX-N, GY-N, GZ-N, and GB-N, and the test value should be a voltage of -7.0 ~ -8.5Vdc.



3） Short the circuit between 5VOP and 5VIN. Connect SU, SV, SW, SX, SY, SZ, SB to GND.

4） Test and measure the voltage of GU-EU, GV-EV, GW-EW, GX-N, GY-N, GZ-N, GB-N and the test value should be a voltage of 14.5 ~ 17.5Vdc.



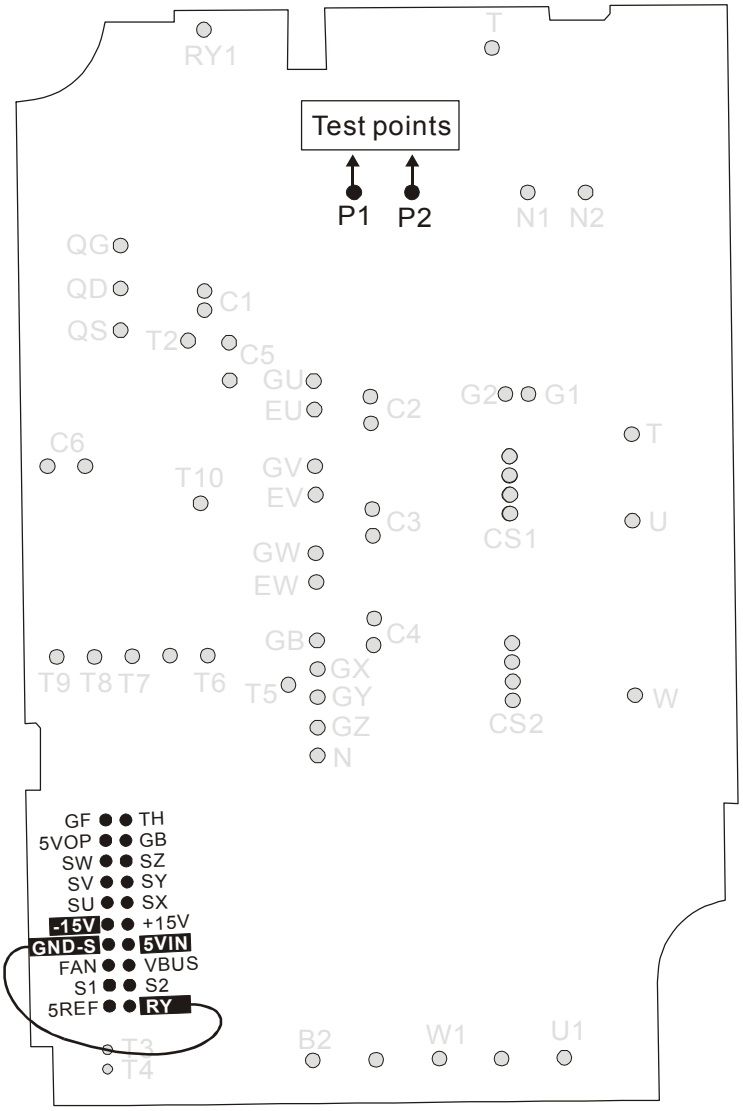
(VFD007M43B, VFD015M43B, VFD022M43B)

■ RELAY TEST

1） Supply a voltage of -15Vdc to 15V and GND. Supply a voltage of +5Vdc to 5VIN and GND.

2） Short the circuit between RY and GND.

3） Test and check if P1-P2 is CLOSE (0 ~ 0.5Ω).



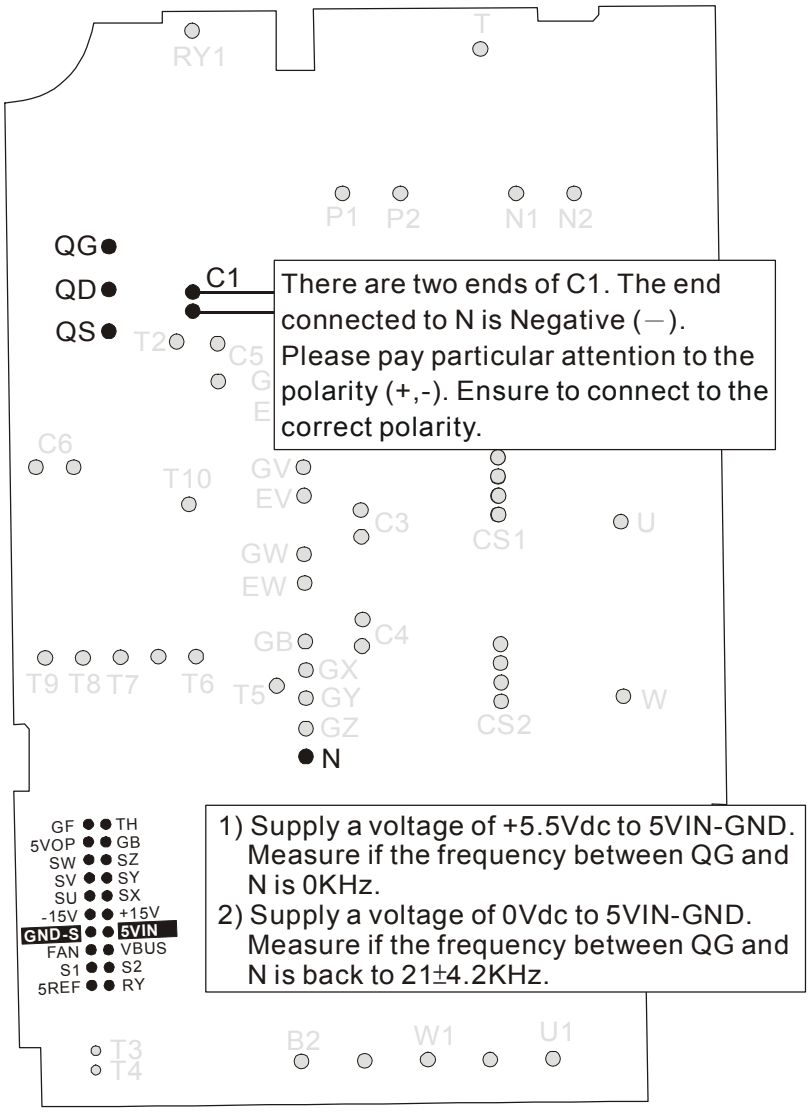
■ SWITCHING POWER SUPPLY TEST

1） Supply a voltage of +18.0Vdc to C1 and N.

2） Test and measure the voltage between QG and N. The test value should be a frequency (Fs) of 21 ±4.2KHz.

3） Supply a voltage of +5.5Vdc to 5VIN and GND of DJ1. 5VIN is Positive (＋).

4） Test and measure the voltage of QG-N and the test value of frequency (Fs) should be 0Hz. Turn the voltage of VIN-GND to 0V, and the test value of frequency should be back to 21±4.2KHz.

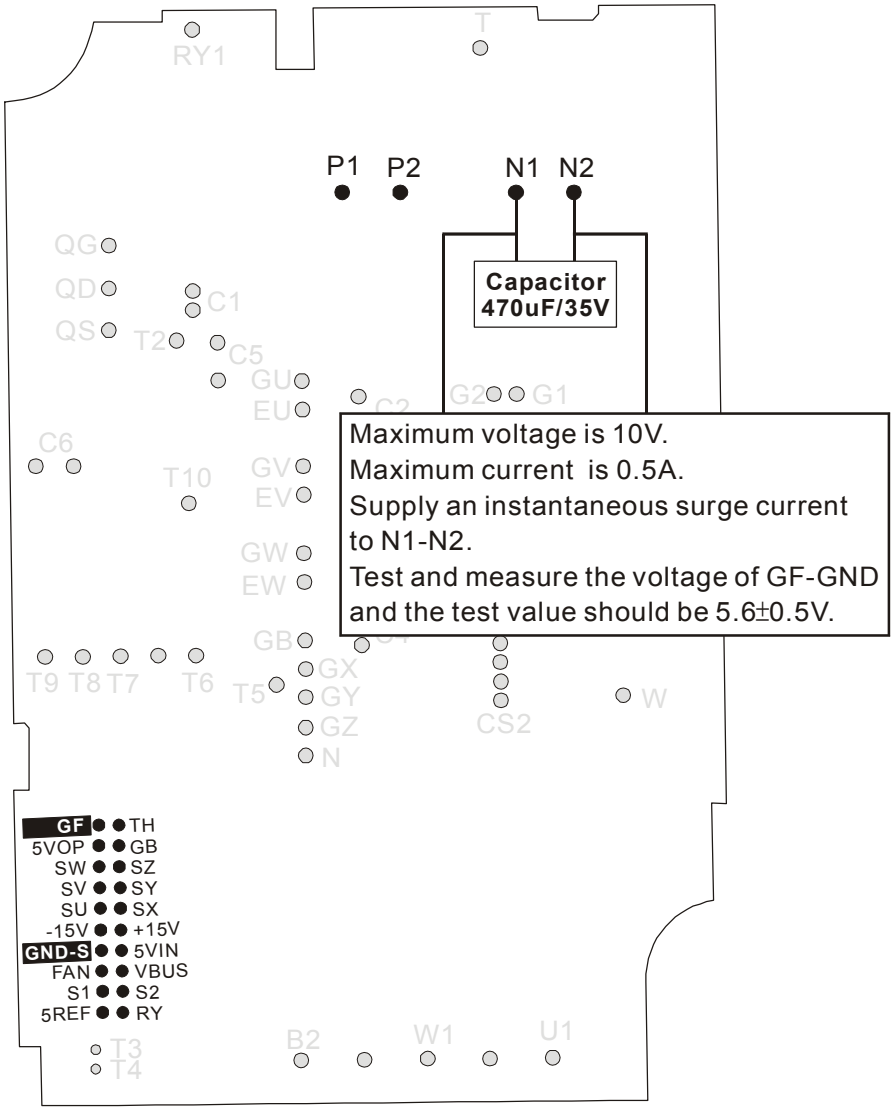


■ GROUND FAULT TEST

1） Prepare constant current source system. The maximum voltage is 10V and the maximum current is 0.5A. Connect a 470μF/35V capacitor in parallel.

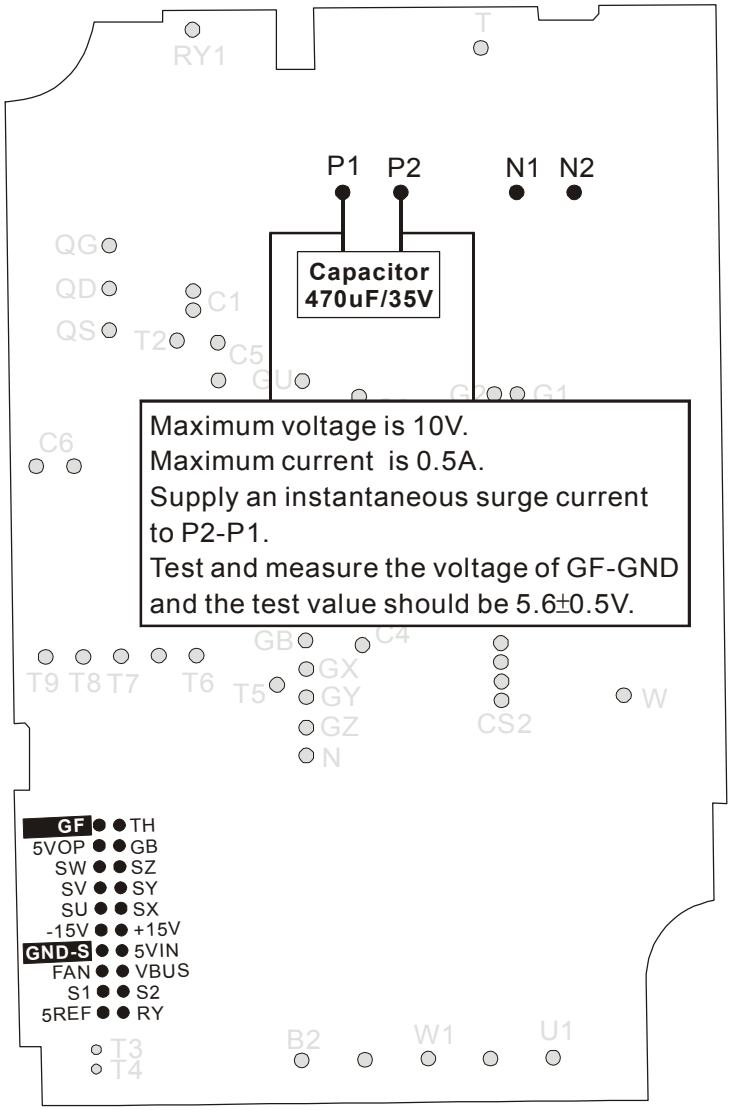
2） Supply an instantaneous surge current to N1-N2 (N1→N2).

3） Test and measure the voltage of GF-GND and the test value should be a voltage of 5.6±0.5V. (Notice that the testing time can only hold few milliseconds, so please must test quickly and complete it in 5 seconds.)



4） Supply an instantaneous surge current to P2-P1 (P2→P1).

5） Test and measure the voltage of GF-GND and the test value should be a voltage of 5.6±0.5V. (Notice that the testing time can only hold few milliseconds, so please must test quickly and complete it in 5 seconds.)



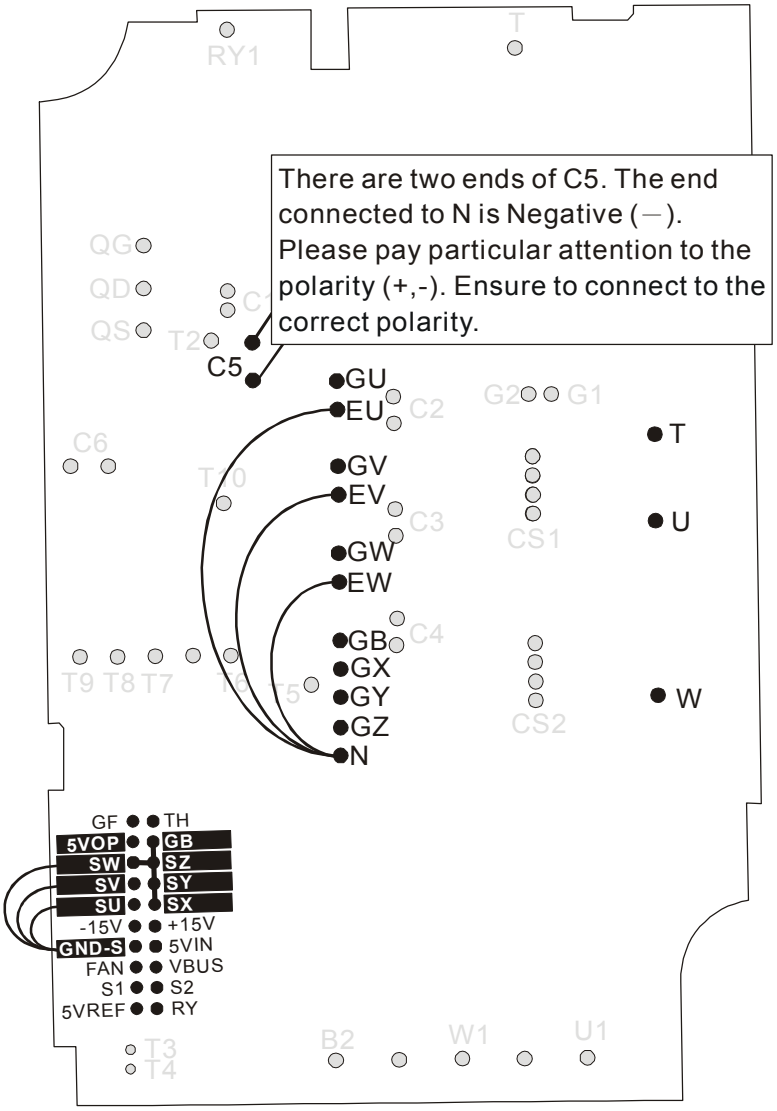
■ IGBT DRIVE TEST

1） Short-circuit EU-N, EV-N, and EW-N. Supply a voltage of +14.0Vdc to C5 and N and supply a voltage of 5Vdc to 5VOP and GND. Short the circuit between SU, SV, SW, SX, SY, SZ, GB, and GND.

2） Test and measure the voltage of GU-N, GV-N, and GW-N, and the test value should be a voltage of 11.0Vdc±0.5V.

3） Test and measure the voltage of GX-N, GY-N, and GZ-N, and the test value should be a voltage of 10.5Vdc±0.5V.

4） Test and measure the voltage of GB-N2 and the test value should be a voltage of 12.0Vdc±1.0V.



■ POWER TEST

1） Short the circuit between N2 and N. Supply a voltage of 620Vdc to N1-P1.

2） Test and measure the voltage between 5VIN and GND, and check if the test value is a voltage of +5.05±0.15Vdc.

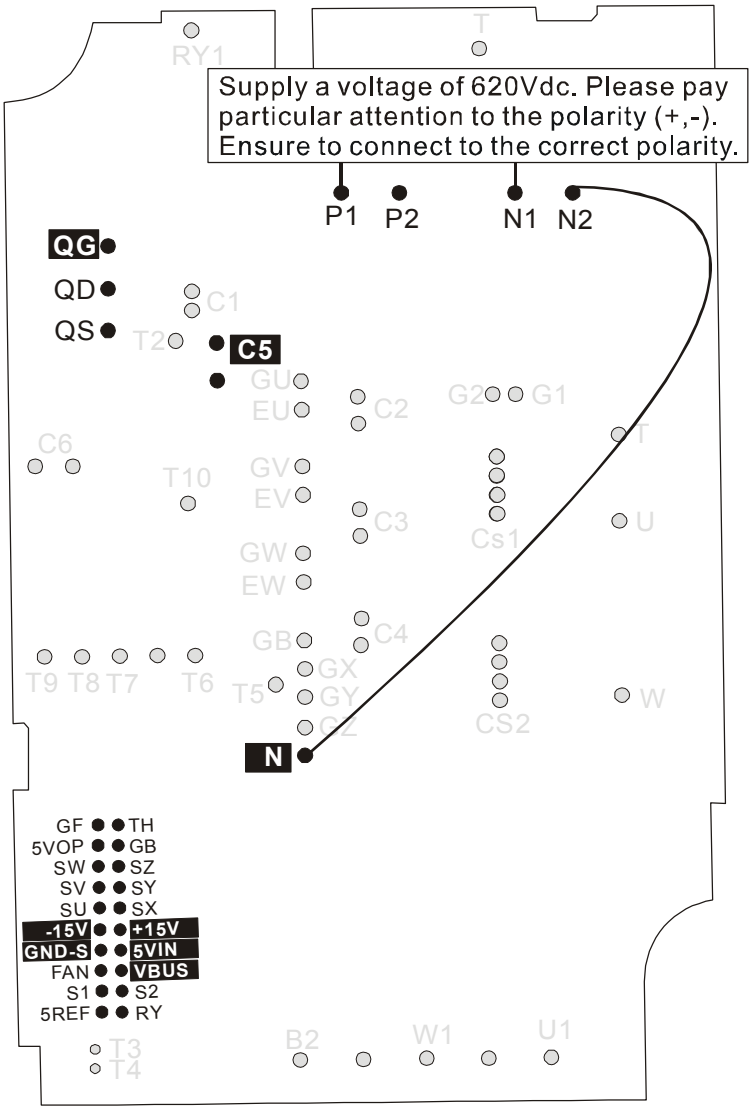
3） Test and measure the voltage between +15V and GND, and check if the test value is a voltage of +14 ~ 16Vdc.

4） Test and measure the voltage between -15V and GND, and check if the test value is a voltage of -13.4 ~ -16Vdc.

5） Test and measure the voltage between C5 and N, and check if the test value is a voltage of +16.0 ~ 18.55Vdc.

6） Test and measure the voltage between VBUS and GND, and check if the test value is a voltage of -17.4 ~ -18.5Vdc.

7） Test and measure the voltage between QG and N, and check if the test value is a frequency (Fs) of 21±4.2KHz.



■ DRIVER TEST

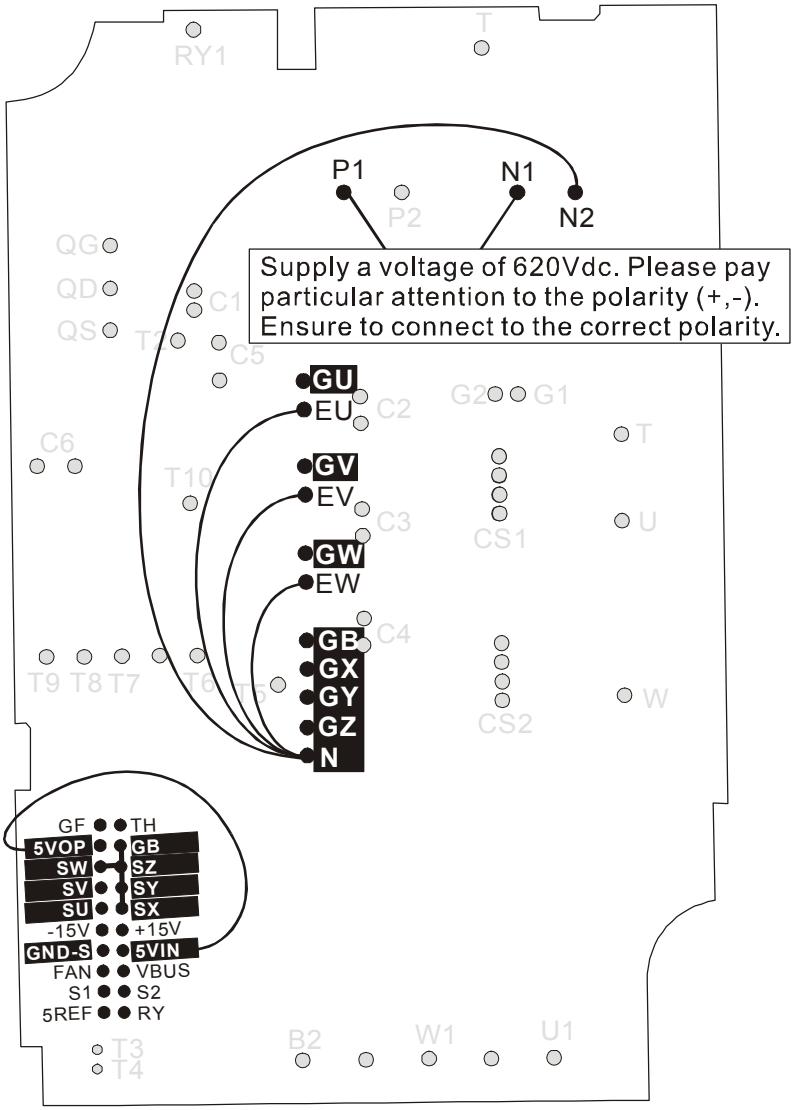
1） Short the circuit between N2 and N. Supply a voltage of 620Vdc to N1 and P1.

2） Short-circuit EU-N, EV-N, and EW-N. Short the circuit between 5VOP and 5VIN. Connect SU, SV, SW, SX, SY, SZ, GB to GND. Short the circuit between N2 and N. Supply a voltage of 620Vdc to N1 and P1.

3） Test and measure the voltage of GU-N, GV-N, GW-N, GX-N, GY-N, GZ-N and the test value should be a voltage of 14.2 ~ 18.0Vdc.

4） Test and measure the voltage between GB and N. The test value should be a voltage of 15.0 ~ 19.0Vdc.

5） Open the circuit between 5VOP and 5VIN. Test and measure the voltage of GU-N, GV-N, GW-N, GX-N, GY-N, GZ-N, GB-N and the test value should be a voltage of 0.0 ~ 0.2Vdc.



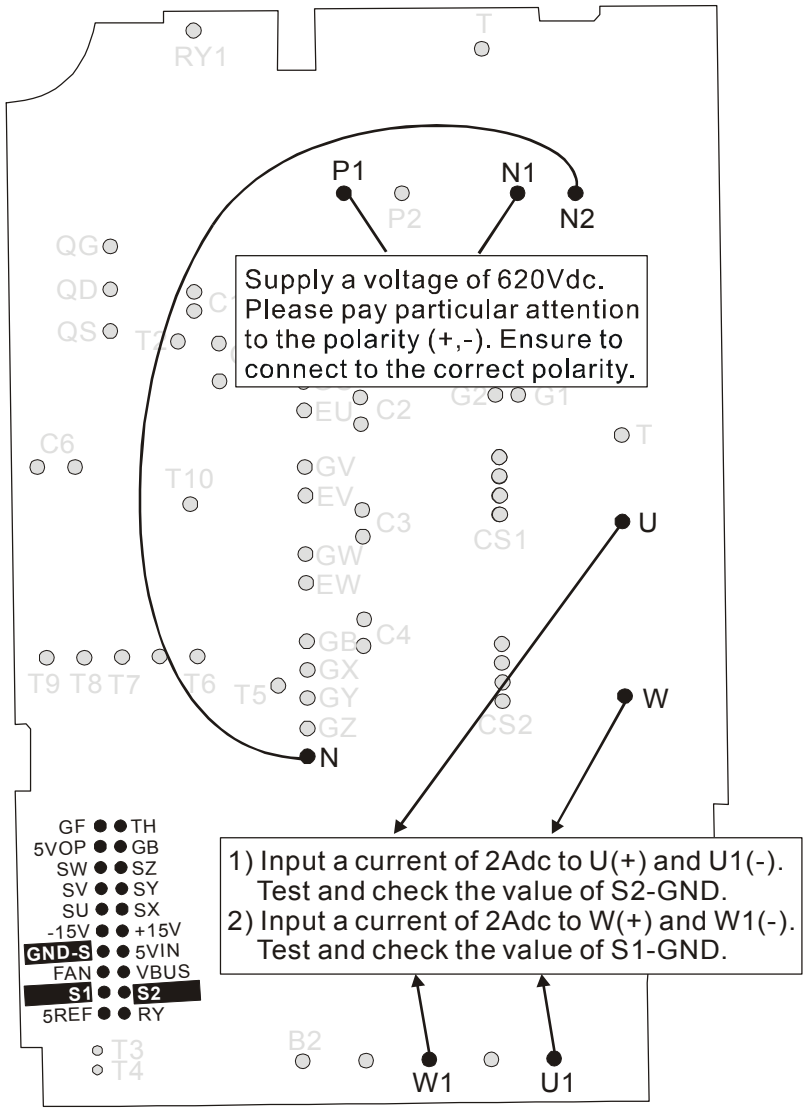
■ CURRENT SENSOR TEST

1） Short the circuit between N2 and N. Supply a voltage of 620Vdc to N1 and P1.

2） Supply a current of 2Adc to U(+) and U1(-). Test and check the value of S2-GND.

3） Supply a current of 2Adc to W(+) and W(-). Test and check the value of S1-GND.

Models	Test value of S1-GND, S2-GND
VFD007M43B	1.17±0.11V
VFD015M43B	0.88±0.17V
VFD022M43B	0.70±0.14V



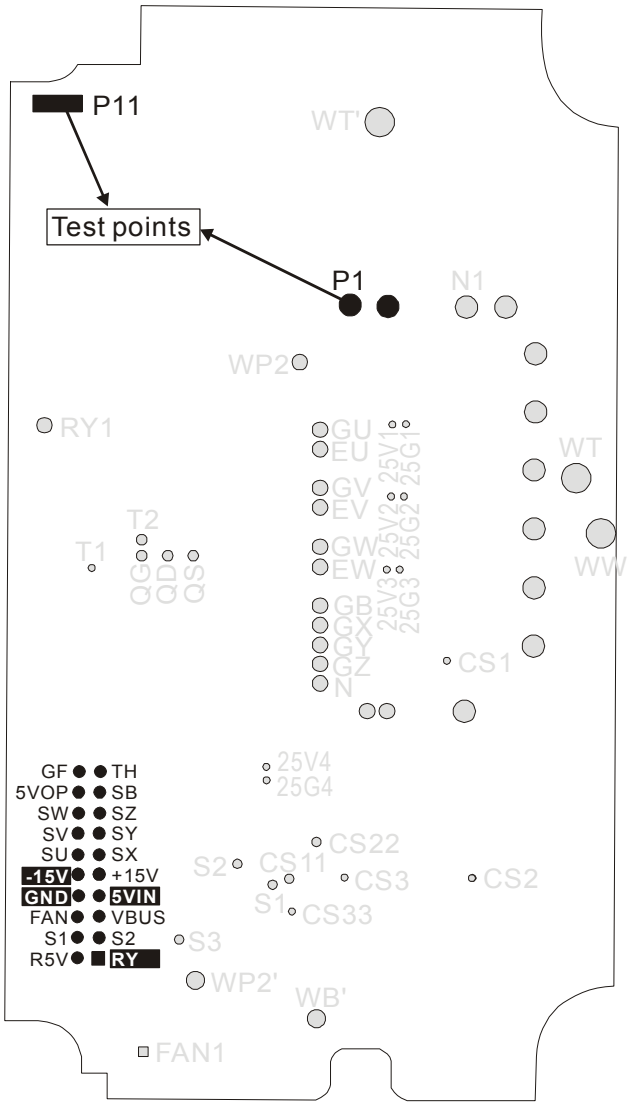
(VFD037M43A, VFD055M43A)

■ RELAY TEST

1） Supply a voltage of -15Vdc to -15V and GND. Supply a voltage of +5Vdc to 5VIN and GND.

2） Short the circuit between RY and GND.

3） Test and check if P1-P11 is CLOSE (0 ~ 0.5Ω).



■ SWITCHING POWER SUPPLY TEST

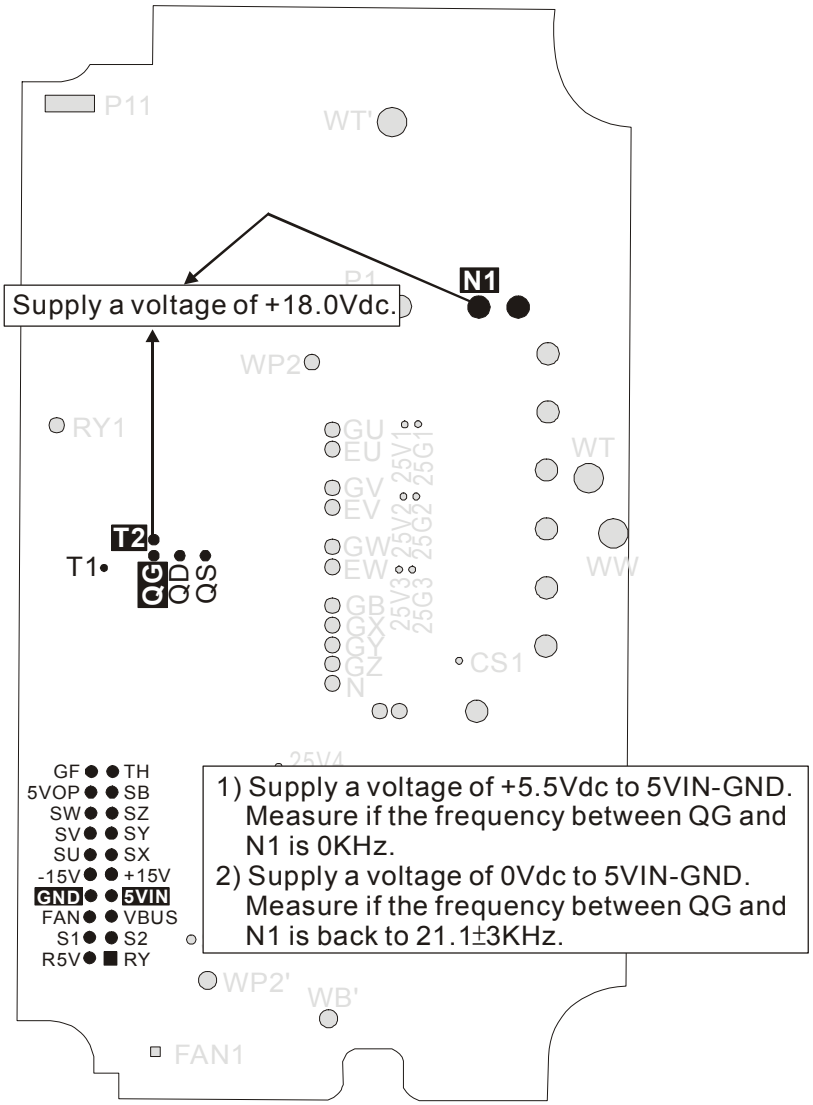
1） Supply a voltage of +18.0Vdc to T2 and N1.

2） Test and measure the voltage between QG and N1. The test value of frequency (Fs) should be within a frequency of 21.1±3KHz.

3） Supply a voltage of 5.5Vdc to 5VIN and GND.

4） Test and measure the voltage between QG and N1. The test value of frequency (Fs) should be 0Hz.

5） Remove the power of 5VIN-GND. Test and measure the voltage between QC and N1. The test value of frequency (Fs) should be within a frequency of 21.1±3KHz.



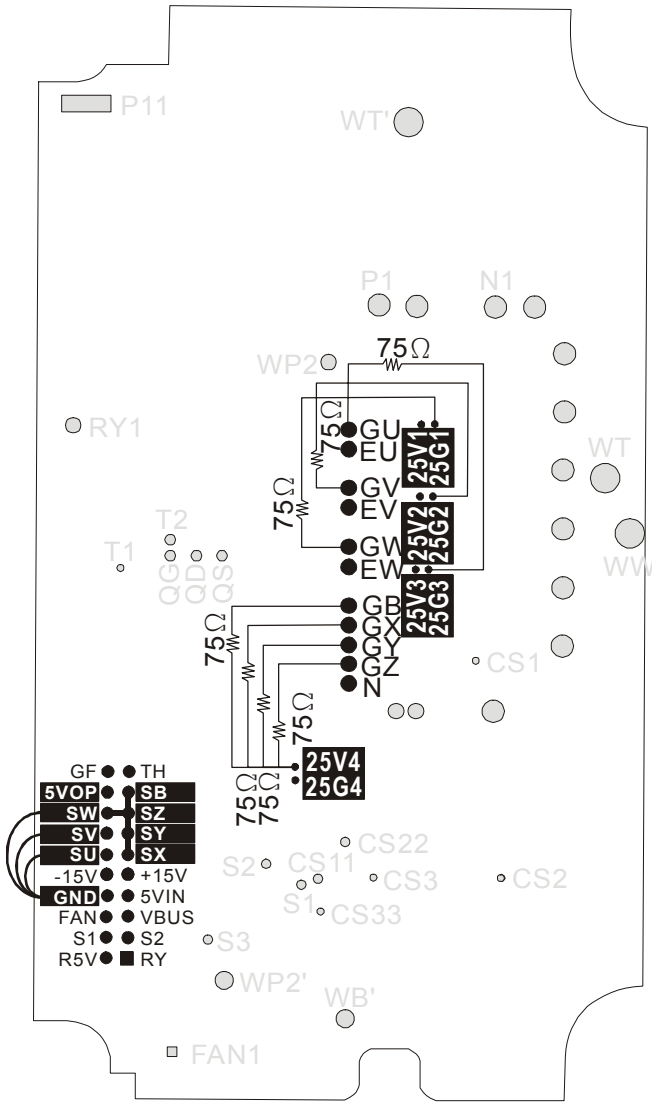
■ IGBT GATE RESISTOR TEST

1） Supply a voltage of 12Vdc to 25V1-25G1, 25V2-25G2, 25V3-25G3 and 25V4-25G4 separately and the voltage should be increased gradually from 0Vdc to 12Vdc (completing this step in 0.5sceond).

2） Supply a voltage of 5Vdc to 5VOP and GND of DJ1. Short the circuit between SU, SV, SW, SX, SY, SZ, SB and GND.

3） Connect a 75Ω resistor to GW-25G1, GV-25G2, GU-25G3, GX-25G4, GY-25G4, GZ-25G4, and GB-25G4 in parallel.

4） Test and measure the voltage of GW-25G1, GV-25G2, GU-25G3, GX-25G4, GY-25G4, GZ-25G4, GB-25G4 and the test value should be a voltage of 7.68±0.5V.



■ POWER TEST

1） Short the circuit between RY and GND. Connect a 30Ω resistor between 5VIN and GND in parallel. Supply a voltage of 620Vdc to P11 and N1.

2） Test and measure the voltage between 5VIN and GND. The test value should be a voltage of +5.05±0.1Vdc.

3） Test and measure the voltage between +15V and GND. The test value should be a voltage of +14.0 ~ +16.5Vdc.

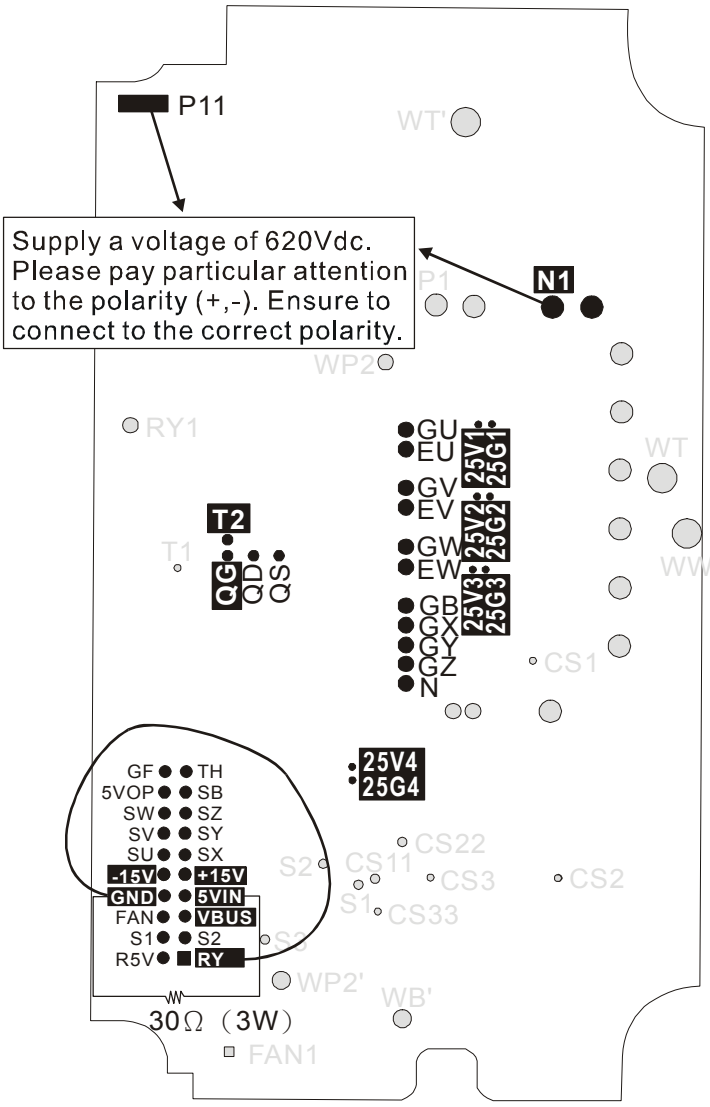
4） Test and measure the voltage of -15V and GND. The test value should be a voltage of -14.0 ~ -16.5Vdc.

5） Test and measure the voltage of 25V1-25G1, 25V2-25G2, 25V3-25G3, 25V4-25G4, and the test value should be a voltage of +24.0 ~ +27.0Vdc.

6） Test and measure the voltage between T2 and N1. The test value should be a voltage of +15.5 ~ +19.0Vdc.

7） Test and measure the voltage between VBUS and GND. The test value should be a voltage of -17.5±0.5Vdc.

8） Test and measure the voltage of QC-N1 and the test value of frequency should be a frequency (Fs) of 21.1±3KHz.

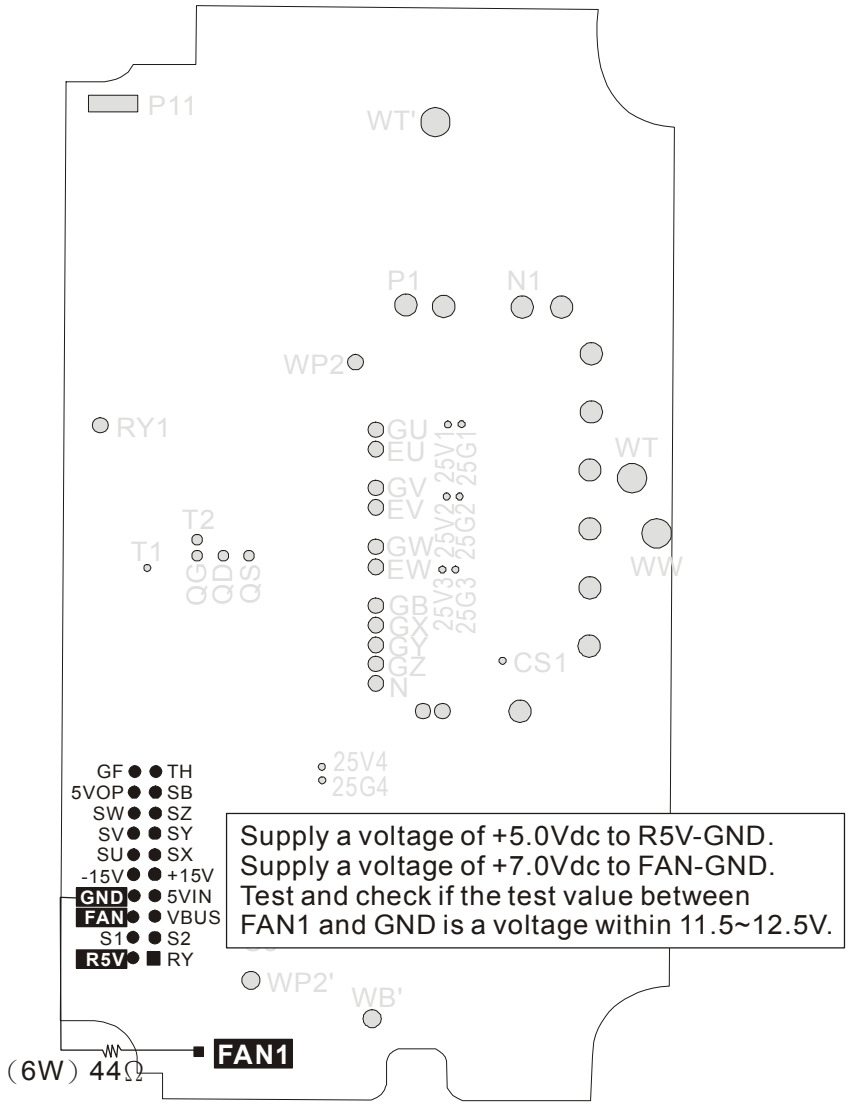

P11
Supply a voltage of 620Vdc.
Please pay particular attention
to the polarity (+,-). Ensure to
connect to the correct polarity.
N1
WT'
P1
WP2
RY1
GU
EU
25V1
25G1
GV
EV
25V2
25G2
GW
EW
25V3
25G3
GB
GX
GY
GZ
N
WT
WW
T2
T1
QG
QD
QS
CS1
25V4
25G4
GF
5VOP
SW
SV
SU
-15V
GND
FAN
S1
R5V
TH
SB
SZ
SY
SX
+15V
5VIN
VBUS
S2
RY
CS22
S2
CS11
CS3
CS2
S1
CS33
WP2'
WB'
30Ω（3W）
FAN1

■ FAN TEST

1） Short the circuit between RY and GND. Connect a 30Ω(3W) resistor between 5VIN and GND in parallel and supply a voltage of 620Vdc to P11 and N1. Connect a 44Ω(6W) resistor between FAN and GND and supply a voltage of +5.0Vdc to R5V and GND.

2） Supply a voltage of +7.0Vdc to FAN and GND. The test value between FAN1 and GND should be lower than 1V.

3） Supply a voltage of +12.8Vdc to FAN and GND. The test value between FAN1 and GND should be a voltage within 11.5 ~ 12.5V.



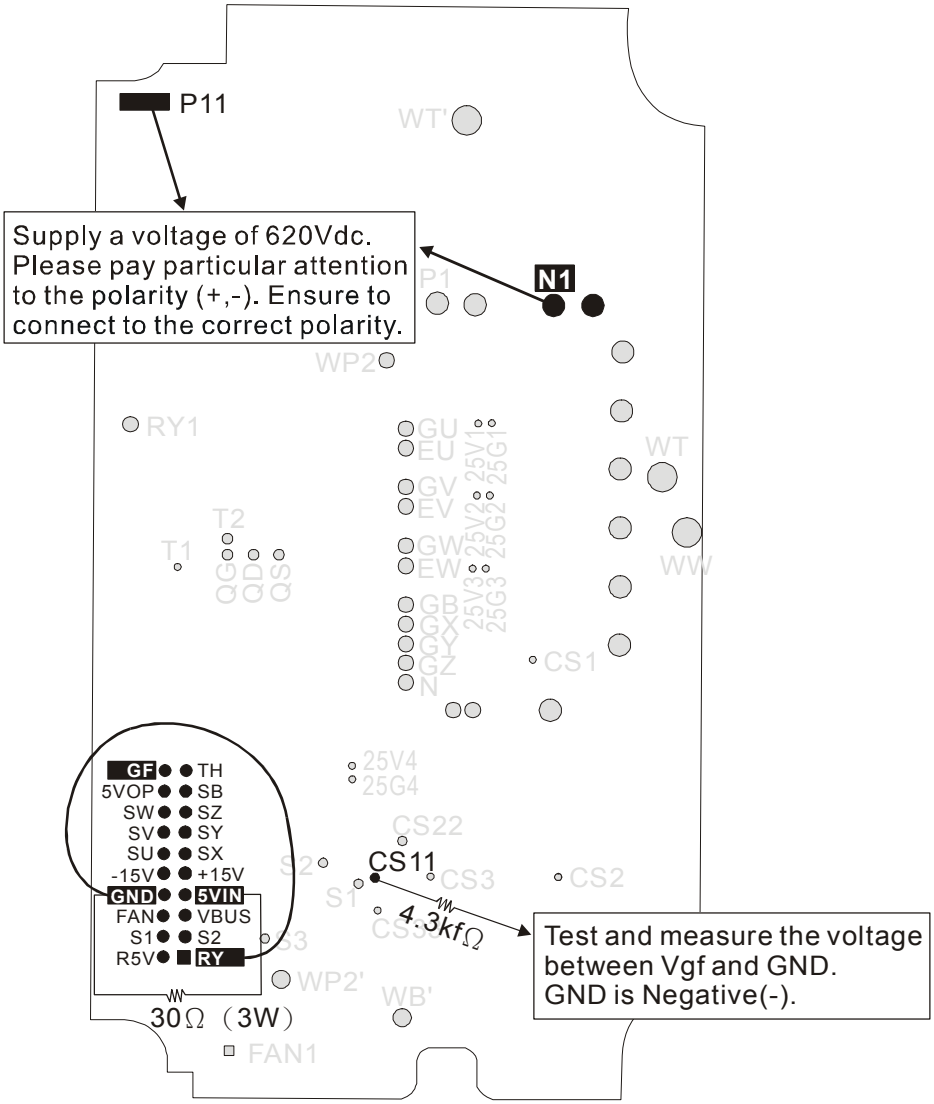
■ GROUND FAULT TEST

1） Short the circuit between RY and GND. Connect a 30Ω(3W) resistor between 5VIN and GND in parallel and supply a voltage of 620Vdc to P11 and N1.

2） Connect a 4.3KΩ resistor (precision resistor) to CS11 in series. Then, test and measure the voltage between Vgf-GND. The normal test value of Vgf is shown in the following table (in page 3-51). GND is Negative (-).

3） Test and measure the voltage between GF and GND. The test value should be a voltage higher than 4.5V. Remove the power of Vgf.

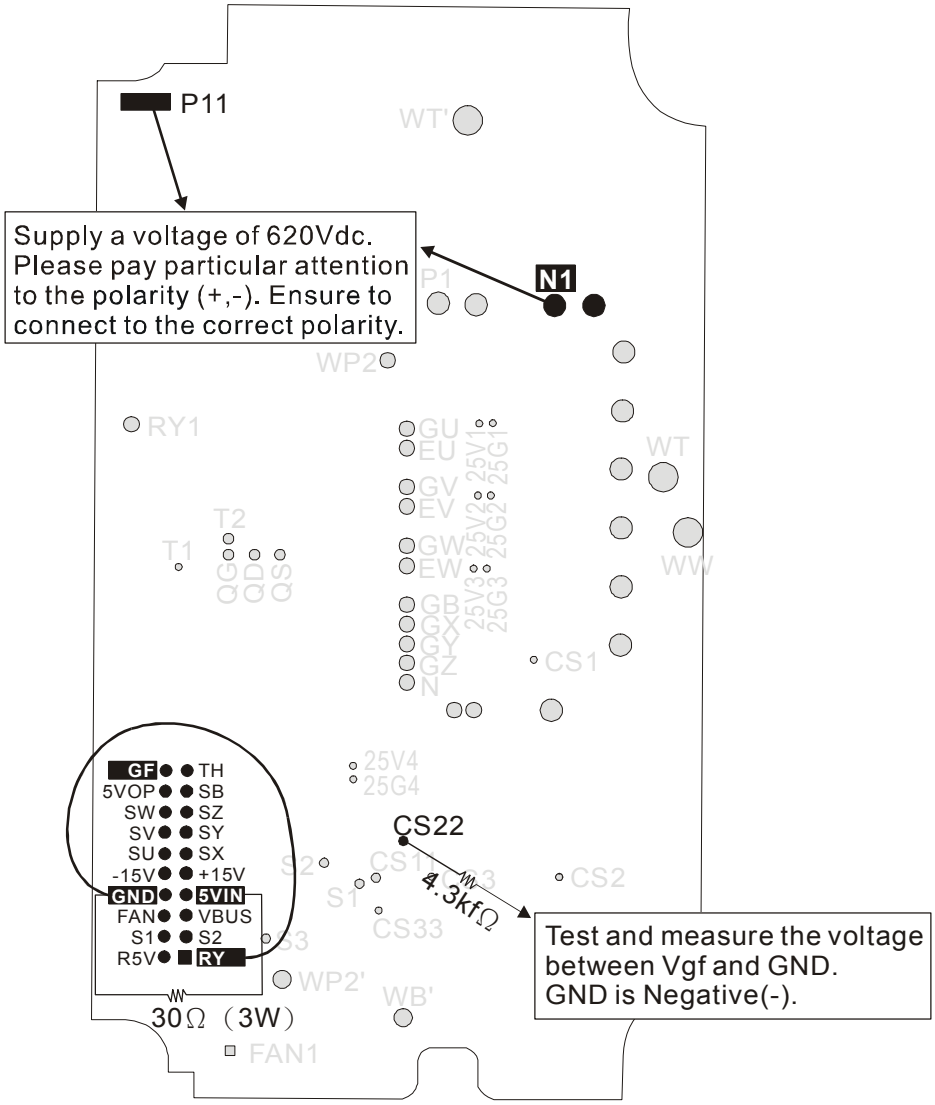
4） Test and measure the voltage between GF and GND. The test value should be a voltage lower than 0.5V.



5） Connect a 4.3KΩ resistor (precision resistor) to CS22 in series. Then, test and measure the voltage between Vgf-GND. The normal test value of Vgf is shown in the following table (in page 3-51). GND is Negative (-).

6） Test and measure the voltage between GF-GND. The test value should be a voltage higher than 4.5V. Remove the power of Vgf.

7） Test and measure the voltage between GF-GND. The test value should be a voltage lower than 0.5V.

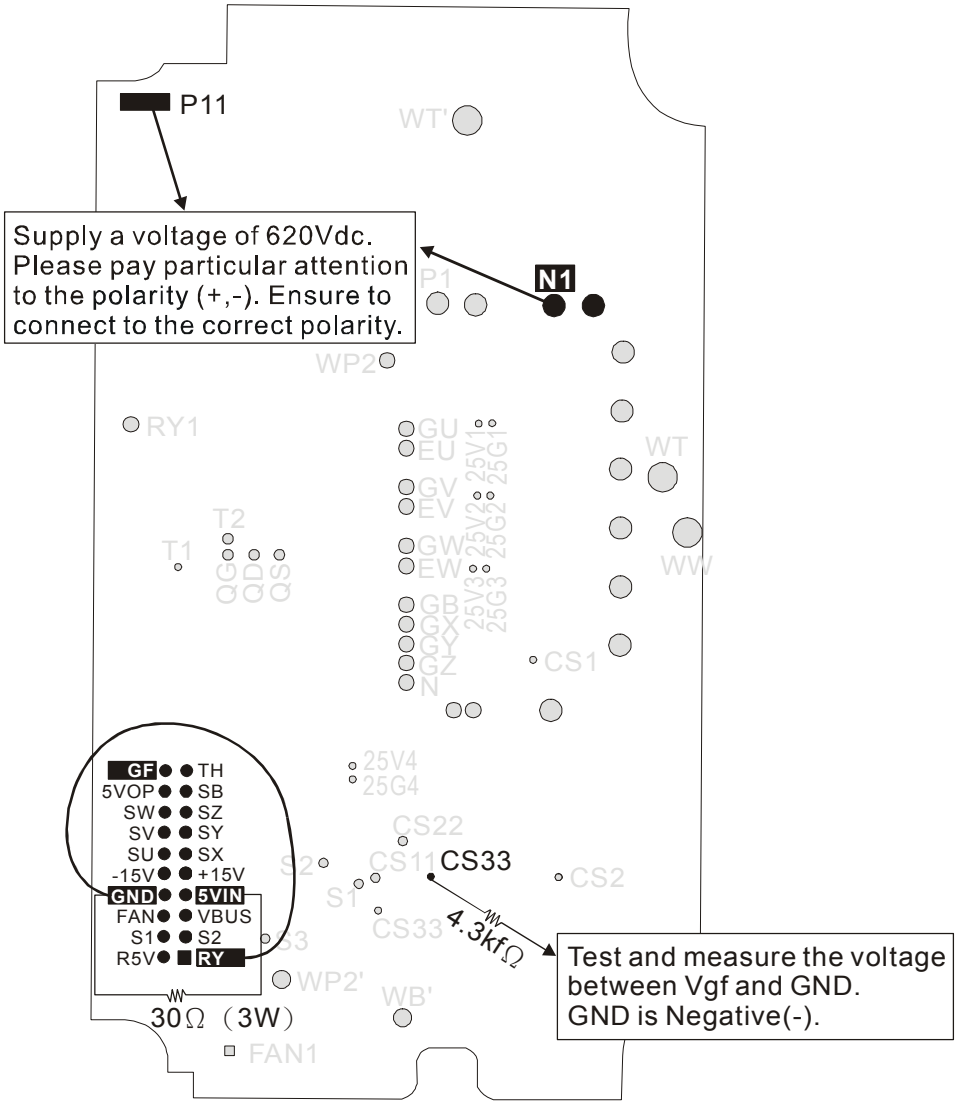


8） Connect a 4.3KΩ resistor (precision resistor) to CS33 in series. Then, test and measure the voltage between Vgf-GND. GND is Negative (-).

9） Test and measure the voltage between GF-GND. The test value should be a voltage higher than 4.5V. Remove the power of Vgf.

10） Test and measure the voltage between GF-GND. The test value should be a voltage lower than 0.5V.

Models	Test Value of Vgf-GND
VFD037M43A	1.58V
VFD055M43A	1.73V



■ IGBT DRIVER TEST

Short the circuit between RY and GND. Connect a 30Ω(3W) resistor between 5VIN and GND in parallel. Supply a voltage of 620Vdc to P11 and N1.

1） Test and measure the voltage between GU and EU, and the test value should be a voltage of -7.0~-8.5Vdc.
2） Test and measure the voltage between GV and EV, and the test value should be a voltage of -7.0~-8.5Vdc.
3） Test and measure the voltage between GW and EW, and the test value should be a voltage of -7.0~-8.5Vdc.
4） Test and measure the voltage between GX and N, and the test value should be a voltage of -7.0~-8.5Vdc.
5） Test and measure the voltage between GY and N, and the test value should be a voltage of -7.0~-8.5Vdc.
6） Test and measure the voltage between GZ and N, and the test value should be a voltage of -7.0~-8.5Vdc.
7） Test and measure the voltage between GB and N, and the test value should be a voltage of -7.0~-8.5Vdc.

Short the circuit between 5VOP and 5VIN. Connect SU, SV, SW, SX, SY, SZ, and SB to GND.

1） Test and measure the voltage between GU and EU, and the test value should be a voltage of 14.5~17.5Vdc.
2） Test and measure the voltage between GV and EV, and the test value should be a voltage of 14.5~17.5Vdc.
3） Test and measure the voltage between GW and EW, and the test value should be a voltage of 14.5~17.5Vdc.
4） Test and measure the voltage between GX and N, and the test value should be a voltage of 14.5~17.5Vdc.
5） Test and measure the voltage between GY and N, and the test value should be a voltage of 14.5~17.5Vdc.
6） Test and measure the voltage between GZ and N, and the test value should be a voltage of 14.5~17.5Vdc.
7） Test and measure the voltage between GB and N, and the test value should be a voltage of 14.5~17.5Vdc.

CHAPTER 4 REPLACEMENT COMPONENTS LIST

This chapter lists the replacement components for VFD-M series. For a complete listing of all components of VFD-M series, please contact with our local Delta sales representative.

4.1 VFD002M11A

Location	Description		Delta Part Number
External Parts	CASE COVER (R, S, T)		3305049702
	CASE COVER (U, V, W)		3305049802
	CASE COVER		3305049602
	CASE BASE		3305049504
	HEAT SINK		3341208702
	MINI JUMP		3350820201
Other Parts	ASSEMBLY : CONTROL BD		3813571203
	ASSEMBLY : POWER BD		5502210100
	ASSEMBLY : CAP BD		5502210400
	ASSEMBLY : KEYPAD		LC-M02E
	FAN		3620400711
	CABLE		3860400001
	IGBT		21635010035
POWER BD	RESISTOR	DR6, 8, 17, 36, 13, 67, 73	0341062100
		DR1A	X066000510
	RELAY	DRLY1	0720010201
	VARISTOR	DVAR1-3	0923010528
	PHOTOCOUPLER	DPH1-3, 5-8	2310033008
	FET	DQ1	242018320006
	X'FMR	DCS3	2804430100
	SPS BD	DU2	2510069210
	CURRENT SENSOR	DCS1-2	3813563103
KEYPAD	KEYPAD MYLAR		3200462701
	CASE COVER		3305028800
	CASE BASE		3305028700

4.2 VFD004M11A

Location	Description		Delta Part Number
External Parts	CASE COVER (R, S, T)		3305049702
	CASE COVER (U, V, W)		3305049802
	CASE COVER		3305049602
	CASE BASE		3305049504
	HEAT SINK		3341208702
	MINI JUMP		3350820201
Other Parts	ASSEMBLY : CONTROL BD		3813571203
	ASSEMBLY : POWER BD		5502210200
	ASSEMBLY : CAP BD		5502210500
	ASSEMBLY : KEYPAD		LC-M02E
	FAN		3620400711
	CABLE		3860400001
	IGBT		21635010035
POWER BD	RESISTOR	DR6, 8, 17, 36, 13, 67, 73	0341062100
		DR1A	X066000510
	RELAY	DRLY1	0720010201
	VARISTOR	DVAR1-3	0923010528
	PHOTOCOUPLER	DPH1-3, 5-8	2310033008
	FET	DQ1	242018320006
	X'FMR	DCS3	2804430100
	SPS BD	DU2	2510069210
	CURRENT SENSOR	DCS1-2	3813563103
KEYPAD	KEYPAD MYLAR		3200462701
	CASE COVER		3305028800
	CASE BASE		3305028700

4.3 VFD007M11A

Location	Description		Delta Part Number
External Parts	CASE COVER (R, S, T)		3305049702
	CASE COVER (U, V, W)		3305049802
	CASE COVER		3305049602
	CASE BASE		3305049504
	HEAT SINK		3341208702
	MINI JUMP		3350820201
Other Parts	ASSEMBLY : CONTROL BD		3813571203
	ASSEMBLY : POWER BD		5502210300
	ASSEMBLY : CAP BD		5502210600
	ASSEMBLY : KEYPAD		LC-M02E
	FAN		3620400711
	CABLE		3860400001
	IGBT		21635010035
POWER BD	RESISTOR	DR6, 8, 17, 36, 13, 67, 73	0341062100
		DR1A	X066000510
	RELAY	DRLY1	0720010201
	VARISTOR	DVAR1-3	0923010528
	PHOTOCOUPLER	DPH1-3, 5-8	2310033008
	FET	DQ1	242018320006
	X'FMR	DCS3	2804430100
	SPS BD	DU2	2510069210
	CURRENT SENSOR	DCS1-2	3813563103
KEYPAD	KEYPAD MYLAR		3200462701
	CASE COVER		3305028800
	CASE BASE		3305028700

4.4 VFD004M21A

Location	Description		Delta Part Number
External Parts	CASE COVER (R, S, T)		3305028602
	CASE COVER (U, V, W)		3305028502
	CASE COVER		3305028301
	CASE BASE		3305028405
	HEAT SINK		3340049701
	MINI JUMP		3350820201
Other Parts	ASSEMBLY : CONTROL BD		3813571201
	ASSEMBLY : POWER BD		3810066307
	ASSEMBLY : CAP BD		3813141400
	ASSEMBLY : KEYPAD		LC-M02E
	FAN		3620400711
	CABLE		3860400001
	IGBT		216400080102
POWER BD	RESISTOR	DR6, 8, 14-17, 36	0343153300
		DR1	X066000510
	RELAY	DRLY1	0720010201
	VARISTOR	DVAR1-3	0923010528
	CAP	DC1	1101046000
	PHOTOCOUPLER	DPH1-3, 5-8	2310033008
	FET	DQ1	242018320006
	X'FMR	DCS3	2804430100
	SPS BD	DU2	3810066702
	CURRENT SENSOR	DCS1-2	3812300703
KEYPAD	KEYPAD MYLAR		3200462701
	CASE COVER		3305028800
	CASE BASE		3305028700

4.5 VFD004M21B

Location	Description		Delta Part Number
External Parts	CASE COVER (R, S, T)		3305049701
	CASE COVER (U, V, W)		3305049802
	CASE COVER		3305049502
	CASE BASE		3305049601
	HEAT SINK		3341208702
	MINI JUMP		3350820201
Other Parts	ASSEMBLY : CONTROL BD		3813571201
	ASSEMBLY : POWER BD		3810889303
	ASSEMBLY : CAP BD		3810891800
	ASSEMBLY : KEYPAD		LC-M02E
	FAN		3620400711
	CABLE		3860400001
	IGBT		216350100035
POWER BD	RESISTOR	DR6, 8, 13, 17, 36, 67, 73	0343153100
		DR1A	X066000510
	RELAY	DRLY1	0720010201
	VARISTOR	DVAR1-3	0923010528
	CAP	DC2A, 2B	1101046000
	PHOTOCOUPLER	DPH1-3, 5-7	2310033008
		DPH8	2310015312
	FET	DQ1	242018320006
	X'FMR	DCS3	2804430100
	IC	DU2	2510069210
	CURRENT SENSOR	DCS1-2	3812300703
KEYPAD	KEYPAD MYLAR		3200462701
	CASE COVER		3305028800
	CASE BASE		3305028700

4.6 VFD004M23A

Location	Description		Delta Part Number
External Parts	CASE COVER (R, S, T)		3305028602
	CASE COVER (U, V, W)		3305028502
	CASE COVER		3305028301
	CASE BASE		3305028405
	HEAT SINK		3340049701
	MINI JUMP		3350820201
Other Parts	ASSEMBLY : CONTROL BD		3813571201
	ASSEMBLY : POWER BD		3810066307
	ASSEMBLY : CAP BD		3813141500
	ASSEMBLY : KEYPAD		LC-M02E
	FAN		3620400711
	CABLE		3860400001
	IGBT		216400080102
POWER BD	RESISTOR	DR6, 8, 14-17, 36	0343153300
		DR1A	X066000510
	RELAY	DRLY1	0720010201
	VARISTOR	DVAR1-3	0923010528
	CAP	DC1	1101046000
	PHOTOCOUPLER	DPH1-3, 5-8	2310033008
	FET	DQ1	242018320006
	X'FMR	DCS3	2804430100
	SPS BD	DU2	3810066702
	CURRENT SENSOR	DCS1-2	3812300703
KEYPAD	KEYPAD MYLAR		3200462701
	CASE COVER		3305028800
	CASE BASE		3305028700

4.7 VFD007M21A

Location	Description		Delta Part Number
External Parts	CASE COVER (R, S, T)		3305028602
	CASE COVER (U, V, W)		3305028502
	CASE COVER		3305028301
	CASE BASE		3305028405
	HEAT SINK		3340049601
	MINI JUMP		3350820201
Other Parts	ASSEMBLY : CONTROL BD		3813571201
	ASSEMBLY : POWER BD		3810066307
	ASSEMBLY : CAP BD		3813141400
	ASSEMBLY : KEYPAD		LC-M02E
	FAN		3620400711
	CABLE		3860400001
	IGBT		216400100102
POWER BD	RESISTOR	DR6, 8, 14-17, 36	0343153300
		DR1	X066000510
	RELAY	DRLY1	0720010201
	VARISTOR	DVAR1-3	0923010528
	CAP	DC1	1101046000
	PHOTOCOUPLER	DPH1-3, 5-8	2310033008
	FET	DQ1	242018320006
	X'FMR	DCS3	2804430200
	SPS BD	DU2	3810066702
	CURRENT SENSOR	DCS1-2	3812300902
KEYPAD	KEYPAD MYLAR		3200462701
	CASE COVER		3305028800
	CASE BASE		3305028700

4.8 VFD007M21B

Location	Description		Delta Part Number
External Parts	CASE COVER (R, S, T)		3305049701
	CASE COVER (U, V, W)		3305049802
	CASE COVER		3305049502
	CASE BASE		3305049601
	HEAT SINK		3341208702
	MINI JUMP		3350820201
Other Parts	ASSEMBLY : CONTROL BD		3813571201
	ASSEMBLY : POWER BD		3810889904
	ASSEMBLY : CAP BD		3810891900
	ASSEMBLY : KEYPAD		LC-M02E
	FAN		3620400711
	CABLE		3860400001
	IGBT		216350100035
POWER BD	RESISTOR	DR6, 8, 13, 17, 36, 67, 73	0343153100
		DR1A	X066000510
	RELAY	DRLY1	0720010201
	VARISTOR	DVAR1-3	0923010528
	CAP	DC2A, 2B	1101046000
	PHOTOCOUPLER	DPH1-3, 5-7	2310033008
		DPH8	2310015312
	FET	DQ5	242018320006
	X'FMR	DCS3	2804430200
	IC	DU2	2510069210
	CURRENT SENSOR	DCS1-2	3812300902
KEYPAD	KEYPAD MYLAR		3200462701
	CASE COVER		3305028800
	CASE BASE		3305028700

4.9 VFD007M23A

Location	Description		Delta Part Number
External Parts	CASE COVER (R, S, T)		3305028602
	CASE COVER (U, V, W)		3305028502
	CASE COVER		3305028301
	CASE BASE		3305028405
	HEAT SINK		3340049701
	MINI JUMP		3350820201
Other Parts	ASSEMBLY : CONTROL BD		3813571201
	ASSEMBLY : POWER BD		3810887906
	ASSEMBLY : CAP BD		3813141700
	ASSEMBLY : KEYPAD		LC-M02E
	FAN		3620400711
	CABLE		3860400001
	IGBT		216400100102
POWER BD	RESISTOR	DR6, 8, 14-17, 36	0343153100
		DR1A	0523308003
	RELAY	DRLY1	0720010201
	VARISTOR	DVAR1-3	0923010528
	CAP	DC1	1101046000
	PHOTOCOUPLER	DPH1-3, 5-8	2310033008
	FET	DQ1	242018320006
	X'FMR	DCS3	2804430100
	SPS BD	DU2	3810066702
	CURRENT SENSOR	DCS1-2	3812300902
KEYPAD	KEYPAD MYLAR		3200462701
	CASE COVER		3305028800
	CASE BASE		3305028700

4.10 VFD007M43B

Location	Description		Delta Part Number
External Parts	CASE COVER (R, S, T)		3305049701
	CASE COVER (U, V, W)		3305049802
	CASE COVER		3305049502
	CASE BASE		3305049601
	HEAT SINK		3341208702
	MINI JUMP		3350820201
Other Parts	ASSEMBLY : CONTROL BD		3813571201
	ASSEMBLY : POWER BD		3810889604
	ASSEMBLY : CAP BD		3810892200
	ASSEMBLY : KEYPAD		LC-M02E
	FAN		3620400711
	CABLE		3860400001
	IGBT		216355100035
POWER BD	RESISTOR	DR6, 8, 13, 17, 36, 67, 73	0343153100
		DR1A	X066000510
	RELAY	DRLY1	0720010201
	VARISTOR	DVAR1-3	0925510328
	CAP	DC1A, 2A, 2B	1101046000
	PHOTOCOUPLER	DPH1-3, 5-7	2310033008
		DPH8	2310015312
	FET	DQ5	242078800111
	X'FMR	DCS3	2804430100
	IC	DU2	2510069210
	CURRENT SENSOR	DCS1-2	3812300703
KEYPAD	KEYPAD MYLAR		3200462701
	CASE COVER		3305028800
	CASE BASE		3305028700

4.11 VFD015M21A

Location	Description		Delta Part Number
External Parts	CASE COVER (R, S, T)		3305028602
	CASE COVER (U, V, W)		3305028502
	CASE COVER		3305028301
	CASE BASE		3305028405
	HEAT SINK		3340049601
	MINI JUMP		3350820201
Other Parts	ASSEMBLY : CONTROL BD		3813571201
	ASSEMBLY : POWER BD		3810067206
	ASSEMBLY : CAP BD		3813141800
	ASSEMBLY : KEYPAD		LC-M02E
	FAN		3620400811
	CABLE		3860400001
	IGBT		216400150102
POWER BD	RESISTOR	DR6, 8, 14-17, 36	0343153100
		DR1	0523308003
	RELAY	DRLY1	0720010201
	VARISTOR	DVAR1-3	0923010428
	CAP	DC1	1101046000
	PHOTOCOUPLER	DPH1-3, 5-8	2310033008
	FET	DQ1	242018320006
	X'FMR	DCS3	2804430200
	SPS BD	DU2	3810066702
	CURRENT SENSOR	DCS1-2	3812300902
KEYPAD	KEYPAD MYLAR		3200462701
	CASE COVER		3305028800
	CASE BASE		3305028700

4.12 VFD015M21B

Location	Description		Delta Part Number
External Parts	CASE COVER (R, S, T)		3305049701
	CASE COVER (U, V, W)		3305049802
	CASE COVER		3305049502
	CASE BASE		3305049601
	HEAT SINK		3341208702
	MINI JUMP		3350820201
Other Parts	ASSEMBLY : CONTROL BD		3813571201
	ASSEMBLY : POWER BD		3810889404
	ASSEMBLY : CAP BD		3810892000
	ASSEMBLY : KEYPAD		LC-M02E
	FAN		3620400811
	CABLE		3860400001
	IGBT		216350150035
POWER BD	RESISTOR	DR6, 8, 13, 17, 36, 67, 73	0343153100
		DR1A	X066000510
	RELAY	DRLY1	0720010201
	VARISTOR	DVAR1-3	0923010528
	CAP	DC2A, 2B	1101046000
	PHOTOCOUPLER	DPH1-3, 5-7	2310033008
		DPH8	2310015312
	FET	DQ5	242018320006
	X'FMR	DCS3	2804430200
	IC	DU2	2510069210
	CURRENT SENSOR	DCS1-2	3812300902
KEYPAD	KEYPAD MYLAR		3200462701
	CASE COVER		3305028800
	CASE BASE		3305028700

4.13 VFD015M21G

Location	Description		Delta Part Number
External Parts	CASE COVER (R, S, T)		3305028602
	CASE COVER (U, V, W)		3305028502
	CASE COVER		3305028301
	CASE BASE		3305028405
	HEAT SINK		3340049601
	MINI JUMP		3350820201
Other Parts	ASSEMBLY : CONTROL BD		3813571201
	ASSEMBLY : POWER BD		3810067206
	ASSEMBLY : CAP BD		3813141800
	ASSEMBLY : KEYPAD		LC-M02E
	FAN		3620400811
	CABLE		3860400001
	IGBT		216400150102
POWER BD	RESISTOR	DR6, 8, 14-17, 36	0343153100
		DR1	0523308003
	RELAY	DRLY1	0720010201
	VARISTOR	DVAR1-3	0923010428
	CAP	DC1	1101046000
	PHOTOCOUPLER	DPH1-3, 5-8	2310033008
	FET	DQ1	242018320006
	X'FMR	DCS3	2804430200
	SPS BD	DU2	3810066702
	CURRENT SENSOR	DCS1-2	3812300902
KEYPAD	KEYPAD MYLAR		3200462701
	CASE COVER		3305028800
	CASE BASE		3305028700

4.14 VFD015M23A

Location	Description		Delta Part Number
External Parts	CASE COVER (R, S, T)		3305028602
	CASE COVER (U, V, W)		3305028502
	CASE COVER		3305028301
	CASE BASE		3305028405
	HEAT SINK		3340049701
	MINI JUMP		3350820201
Other Parts	ASSEMBLY : CONTROL BD		3813571201
	ASSEMBLY : POWER BD		3813141307
	ASSEMBLY : CAP BD		3813141900
	ASSEMBLY : KEYPAD		LC-M02E
	FAN		3620400711
	CABLE		3860400001
	IGBT		216400150102
POWER BD	RESISTOR	DR6, 8, 14-17, 36	0343153300
		DR1A	0523308003
	RELAY	DRLY1	0720010201
	VARISTOR	DVAR1-3	0923010528
	CAP	DC1	1101046000
	PHOTOCOUPLER	DPH1-3, 5-8	2310033008
	FET	DQ1	242018320006
	X'FMR	DCS3	2804430100
	SPS BD	DU2	3810066702
	CURRENT SENSOR	DCS1-2	3812300902
KEYPAD	KEYPAD MYLAR		3200462701
	CASE COVER		3305028800
	CASE BASE		3305028700

4.15 VFD015M43B

Location	Description		Delta Part Number
External Parts	CASE COVER (R, S, T)		3305049701
	CASE COVER (U, V, W)		3305049802
	CASE COVER		3305049502
	CASE BASE		3305049601
	HEAT SINK		3341208702
	MINI JUMP		3350820201
Other Parts	ASSEMBLY : CONTROL BD		3813571201
	ASSEMBLY : POWER BD		3810889704
	ASSEMBLY : CAP BD		3810892300
	ASSEMBLY : KEYPAD		LC-M02E
	FAN		3620400711
	CABLE		3860400001
	IGBT		216355100035
POWER BD	RESISTOR	DR6, 8, 13, 17, 36, 67, 73	0343153100
		DR1A	X066000510
	RELAY	DRLY1	0720010201
	VARISTOR	DVAR1-3	0925510328
	CAP	DC1A, 2A, 2B	1101046000
	PHOTOCOUPLER	DPH1-3, 5-7	2310033008
		DPH8	2310015312
	FET	DQ5	242078800111
	X'FMR	DCS3	2804430100
	IC	DU2	2510069210
	CURRENT SENSOR	DCS1-2	3812300902
KEYPAD	KEYPAD MYLAR		3200462701
	CASE COVER		3305028800
	CASE BASE		3305028700

4.16 VFD022M21A

Location	Description		Delta Part Number
External Parts	CASE COVER		3308004101
	CASE BODY		3308004201
	CASE BASE		3308004301
	HEAT SINK		3341401102
	MINI JUMP		3350820201
Other Parts	ASSEMBLY : CONTROL BD		3813571201
	ASSEMBLY : POWER BD		3813150303
	ASSEMBLY : CAP BD		3813150600
	ASSEMBLY : KEYPAD		LC-M02E
	FAN		3620811111
	CABLE L=135MM		3860400101
	CABLE L=170mm		3860313500
	IGBT		216350200013
POWER BD	RESISTOR	DR11, 15, 19, 23, 25, 27, 29	0343752100
		DR114	X066000210
	RELAY	DRLY1B, 2B	0720010201
	FUSE	DFUSE1	0891120224
	VARISTOR	DVAR1-2	0923010528
		DVAR3	0923011132
	CAP	DC26, 27	1101046000
	PHOTOCOUPLER	DPH4-7	2310034008
		DPH1-3	2310050117
	FET	DQ2	242018320006
		DQ1, 13	242522500005
	X'FMR	DT1	2801802301
	IC	DU4	2510069210
	CURRENT SENSOR	DCS1-3	3812301102
KEYPAD	KEYPAD MYLAR		3200462701
	CASE COVER		3305028800
	CASE BASE		3305028700

4.17 VFD022M23B

Location	Description		Delta Part Number
External Parts	CASE COVER (R, S, T)		3305049701
	CASE COVER (U, V, W)		3305049802
	CASE COVER		3305049502
	CASE BASE		3305049601
	HEAT SINK		3341208702
	MINI JUMP		3350820201
Other Parts	ASSEMBLY : CONTROL BD		3813571201
	ASSEMBLY : POWER BD		3810889504
	ASSEMBLY : CAP BD		3810892100
	ASSEMBLY : KEYPAD		LC-M02E
	FAN		3620400811
	CABLE		3860400001
	IGBT		216350200013
POWER BD	RESISTOR	DR6, 8, 14-17, 36	0343153100
		DR1A	X066000510
	RELAY	DRLY1	0720010201
	VARISTOR	DVAR1-3	0923010528
	CAP	DC2A, 2B	1101046000
	PHOTOCOUPLER	DPH1-3, 5-7	2310033008
		DPH8	2310015312
	FET	DQ5	242018320006
	X'FMR	DCS3	2804430200
	IC	DU2	2510069210
	CURRENT SENSOR	DCS1-2	3812301102
KEYPAD	KEYPAD MYLAR		3200462701
	CASE COVER		3305028800
	CASE BASE		3305028700

4.18 VFD022M43B

Location	Description		Delta Part Number
External Parts	CASE COVER (R, S, T)		3305049701
	CASE COVER (U, V, W)		3305049802
	CASE COVER		3305049502
	CASE BASE		3305049601
	HEAT SINK		3341208702
	MINI JUMP		3350820201
Other Parts	ASSEMBLY : CONTROL BD		3813571201
	ASSEMBLY : POWER BD		3810889804
	ASSEMBLY : CAP BD		3810892400
	ASSEMBLY : KEYPAD		LC-M02E
	FAN		3620400711
	CABLE		3860400001
	IGBT		216355150013
POWER BD	RESISTOR	DR6, 8, 13, 17, 36, 67, 73	0343153100
		DR1A	X066000510
	RELAY	DRLY1	0720010201
	VARISTOR	DVAR1-3	0925510328
	CAP	DC1A, 2A, 2B	1101046000
	PHOTOCOUPLER	DPH1-3, 5-7	2310033008
		DPH8	2310015312
	FET	DQ5	242078800111
	X'FMR	DCS3	2804430100
	IC	DU2	2510069210
	CURRENT SENSOR	DCS1-2	3812300902
KEYPAD	KEYPAD MYLAR		3200462701
	CASE COVER		3305028800
	CASE BASE		3305028700

4.19 VFD037M23A

Location	Description		Delta Part Number
External Parts	CASE COVER		3308004101
	CASE BODY		3308004201
	CASE BASE		3308004301
	HEAT SINK		3341401102
	MINI JUMP		3350820201
Other Parts	ASSEMBLY : CONTROL BD		3813571201
	ASSEMBLY : POWER BD		3813150403
	ASSEMBLY : CAP BD		3813156500
	ASSEMBLY : KEYPAD		LC-M02E
	FAN		3620811111
	CABLE L=170mm		3860313500
	CABLE L=135M		3860400101
	IGBT		216350300113
POWER BD	RESISTOR	DR11, 15, 19, 23, 25, 27, 29	0343153300
		DR114	X066000210
	RELAY	DRLY1B, 2B	0720010201
	FUSE	DFUSE1	0891120224
	VARISTOR	DVAR1-2	0923010528
		DVAR3	0923011132
	CAP	DC26, 27	1101046000
	PHOTOCOUPLER	DPH4-7	2310034008
		DPH1-3	2310050117
	FET	DQ2	242018320006
		DQ1, 13	242522500005
	X’FMR	DT1	2801802301
	IC	DU4	2510069210
	CURRENT SENSOR	DCS1-3	3812301202
KEYPAD	KEYPAD MYLAR		3200462701
	CASE COVER		3305028800
	CASE BASE		3305028700

4.20 VFD037M43A

Location	Description		Delta Part Number
External Parts	CASE COVER		3308004101
	CASE BODY		3308004201
	CASE BASE		3308004301
	HEAT SINK		3341401102
	MINI JUMP		3350820201
Other Parts	ASSEMBLY : CONTROL BD		3813571201
	ASSEMBLY : POWER BD		3813149903
	ASSEMBLY : CAP BD		3813156600
	ASSEMBLY : KEYPAD		LC-M02E
	FAN		3620811111
	CABLE L=135MM		3860400101
	CABLE L=170mm		3860313500
	IGBT		216355230035
POWER BD	RESISTOR	DR11, 15, 19, 23, 25, 27, 29	0343752100
		DR114	X066000210
	RELAY	DRLY1B	0720010201
	FUSE	DFUSE1	0891100624
	VARISTOR	DVAR1-3	0925510328
	CAP	DC26A, 26B, 27A, 27B	1101046000
	PHOTOCOUPLER	DPH4-7	2310034008
		DPH1-3	2310050117
	FET	DQ2	242078800111
		DQ1, 13	242522500005
	X'FMR	DT1	2801802400
	IC	DU4	2510069210
	CURRENT SENSOR	DCS1-3	3812301102
KEYPAD	KEYPAD MYLAR		3200462701
	CASE COVER		3305028800
	CASE BASE		3305028700

4.21 VFD055M23A

Location	Description		Delta Part Number
External Parts	CASE COVER		3308004101
	CASE BODY		3308004201
	CASE BASE		3308004301
	HEAT SINK		3341401102
	MINI JUMP		3350820201
Other Parts	ASSEMBLY : CONTROL BD		3813571201
	ASSEMBLY : POWER BD		3813150503
	ASSEMBLY : CAP BD		3813150600
	ASSEMBLY : KEYPAD		LC-M02E
	FAN		3620810511
	CABLE L=170mm		3860313500
	CABLE L=135M		3860400101
	IGBT		216350500013
POWER BD	RESISTOR	DR11, 15, 19, 23, 25, 27, 29	0343153300
		DR114	X066000210
	RELAY	DRLY1A	0720740201
	FUSE	DFUSE1	0891160224
	VARISTOR	DVAR1-2	0923010528
		DVAR3	0923011132
	CAP	DC26, 27	1101046000
	PHOTOCOUPLER	DPH4-7	2310034008
		DPH1-3	2310050117
	FET	DQ2	242018320006
		DQ1, 13	242522500005
	X'FMR	DT1	2801802301
	IC	DU4	2510069210
	CURRENT SENSOR	DCS1-3	3812301202
KEYPAD	KEYPAD MYLAR		3200462701
	CASE COVER		3305028800
	CASE BASE		3305028700

4.22 VFD055M43A

Location	Description		Delta Part Number
External Parts	CASE COVER		3308004101
	CASE BODY		3308004201
	CASE BASE		3308004301
	HEAT SINK		3341401102
	MINI JUMP		3350820201
Other Parts	ASSEMBLY : CONTROL BD		3813571201
	ASSEMBLY : POWER BD		3813150003
	ASSEMBLY : CAP BD		3813150900
	ASSEMBLY : KEYPAD		LC-M02E
	FAN		3620810511
	CABLE L=135MM		3860400101
	CABLE L=170mm		3860313500
	IGBT		216355250013
POWER BD	RESISTOR	DR11, 15, 19, 23, 25, 27, 29	0343752100
		DR114	X066000210
	RELAY	DRLY1B, 2B	0720010201
	FUSE	DFUSE1	0891171224
	VARISTOR	DVAR1-3	0925510328
	CAP	DC26A, 26B, 27A, 27B	1101046000
	PHOTOCOUPLER	DPH4-7	2310034008
		DPH1-3	2310050117
	FET	DQ2	242078800111
		DQ1, 13	242522500005
	X'FMR	DT1	2801802400
	IC	DU4	2510069210
	CURRENT SENSOR	DCS1-3	3812301202
KEYPAD	KEYPAD MYLAR		3200462701
	CASE COVER		3305028800
	CASE BASE		3305028700

CHAPTER 5 SCHEMATICS OF POWER BOARD

※ These schematics are only provided for maintenance, inspection and troubleshooting. Coping or reproducing any part of these schematics without written consent of Delta Electronics Inc. is prohibited.

※ This chapter describes the schematics of power board of VFD-M series. In order to ensure the correct use, please use these schematics with test point diagrams to perform any maintenance, inspection and troubleshooting.

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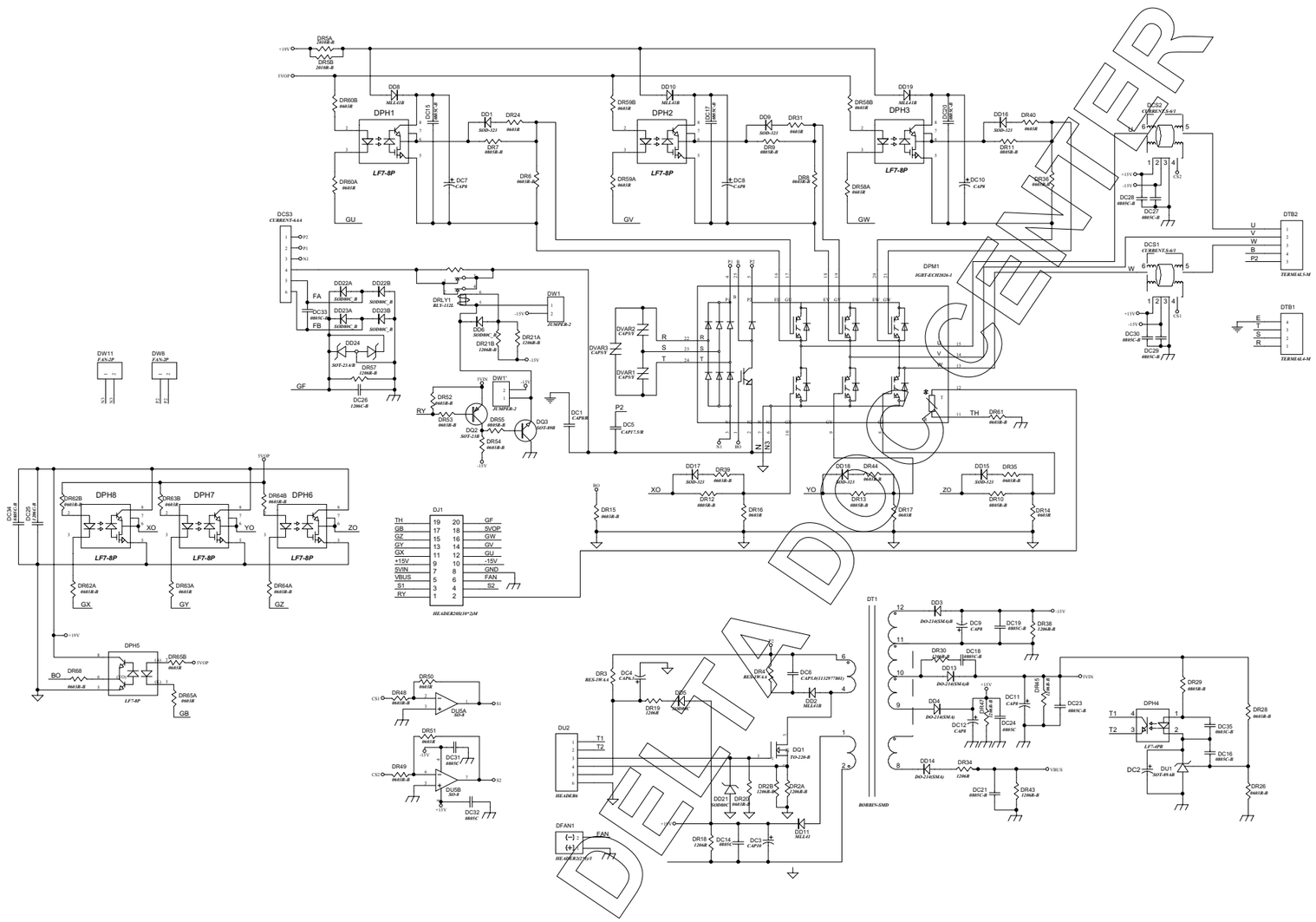

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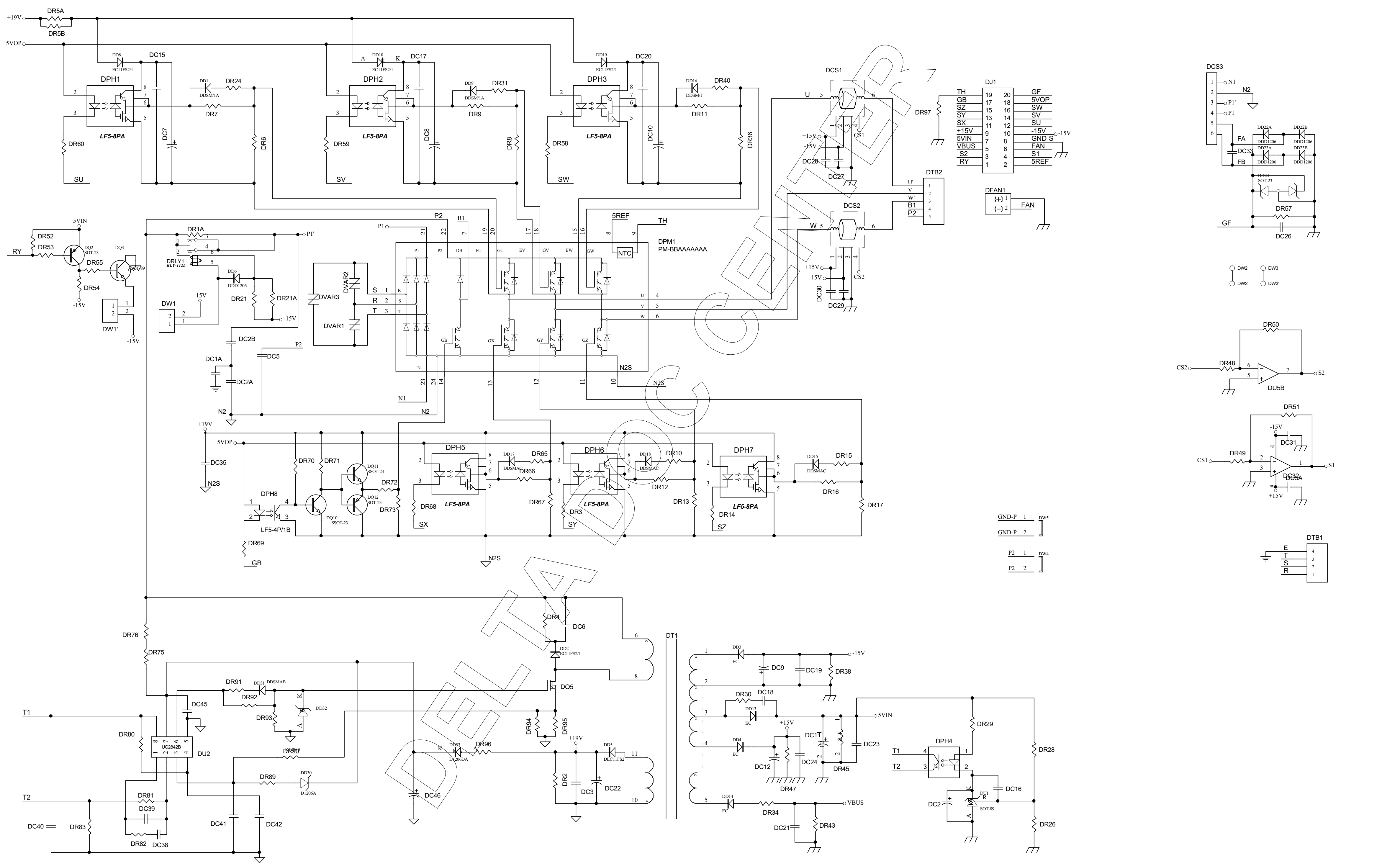

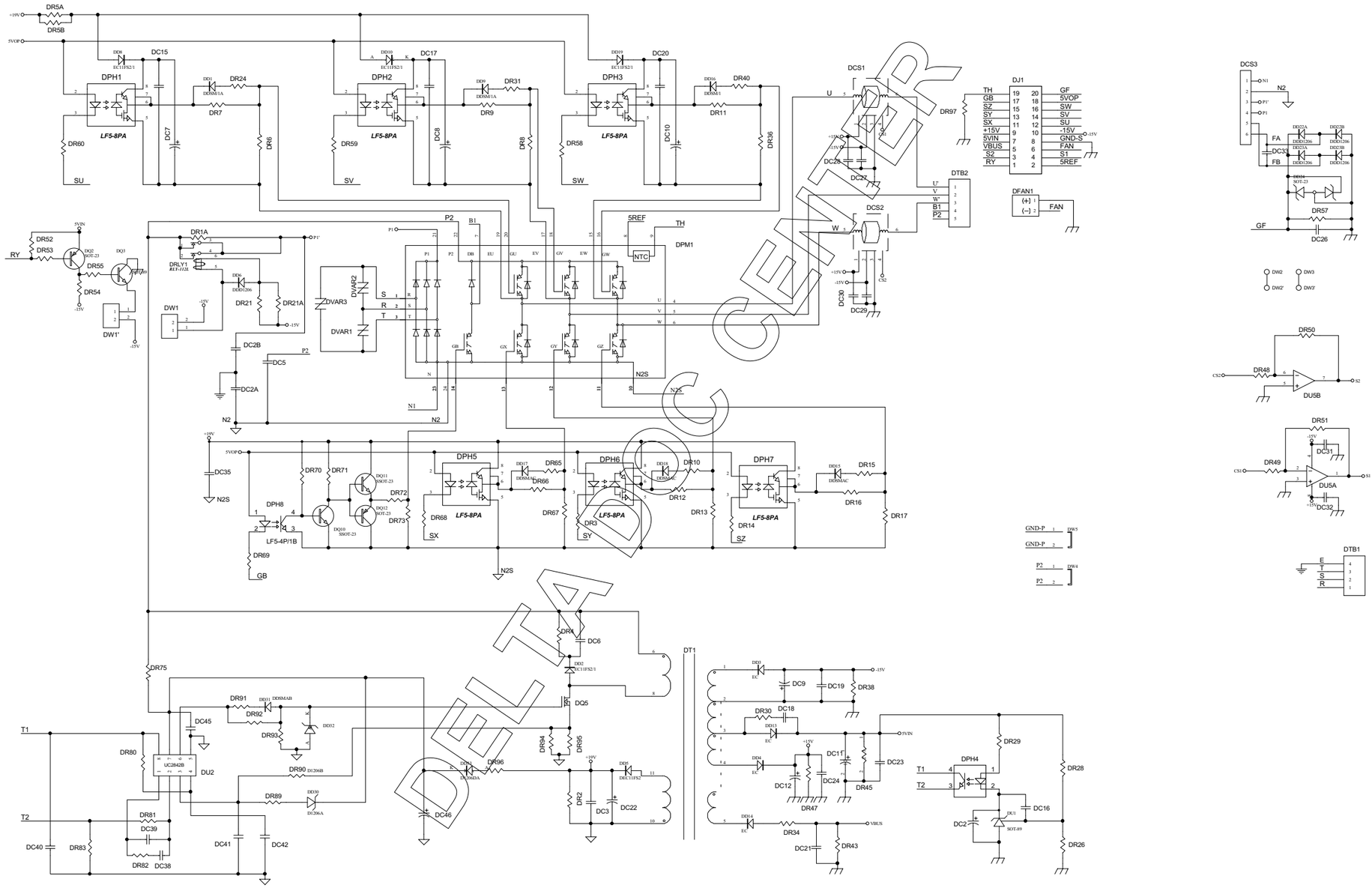

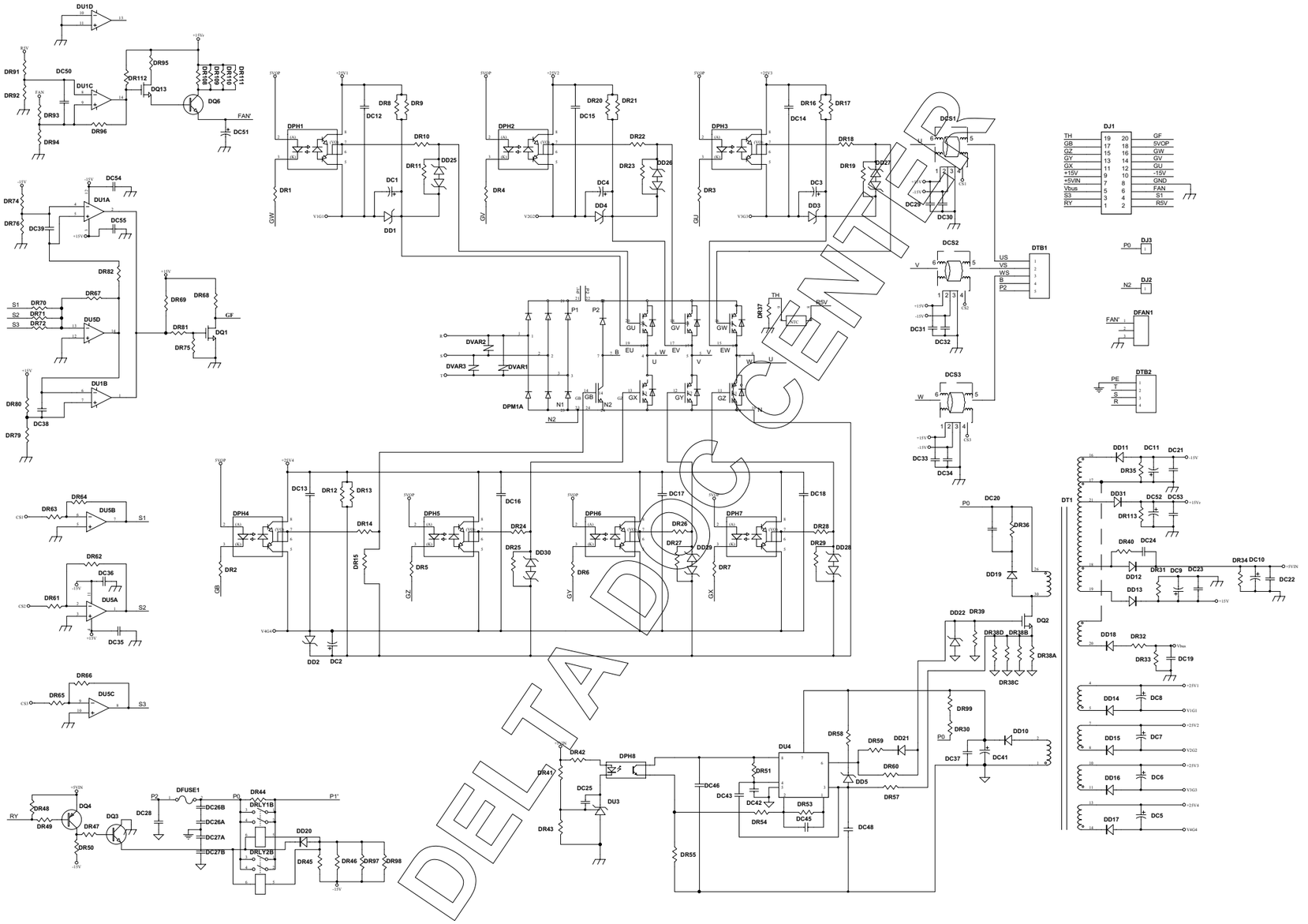

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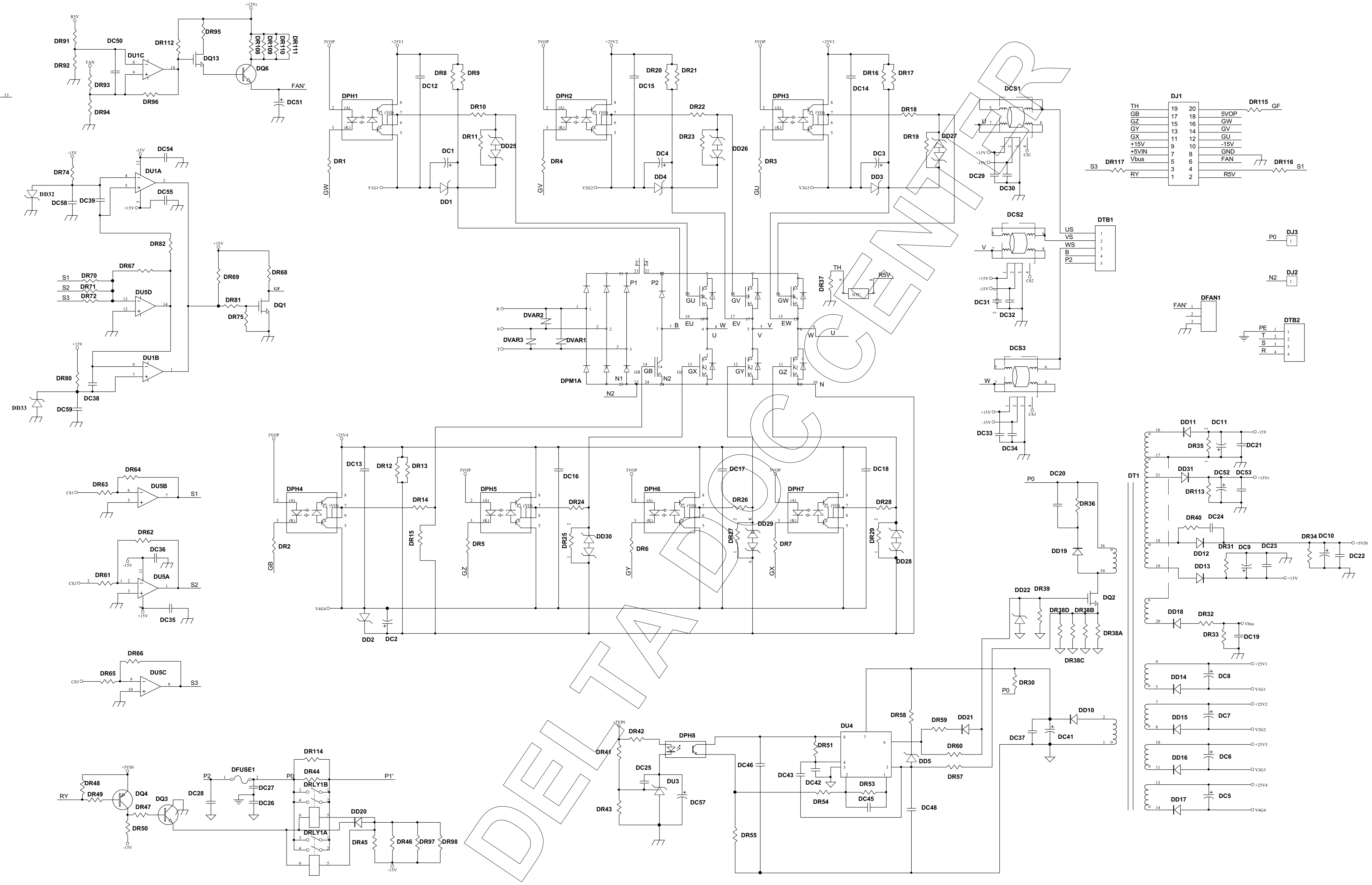

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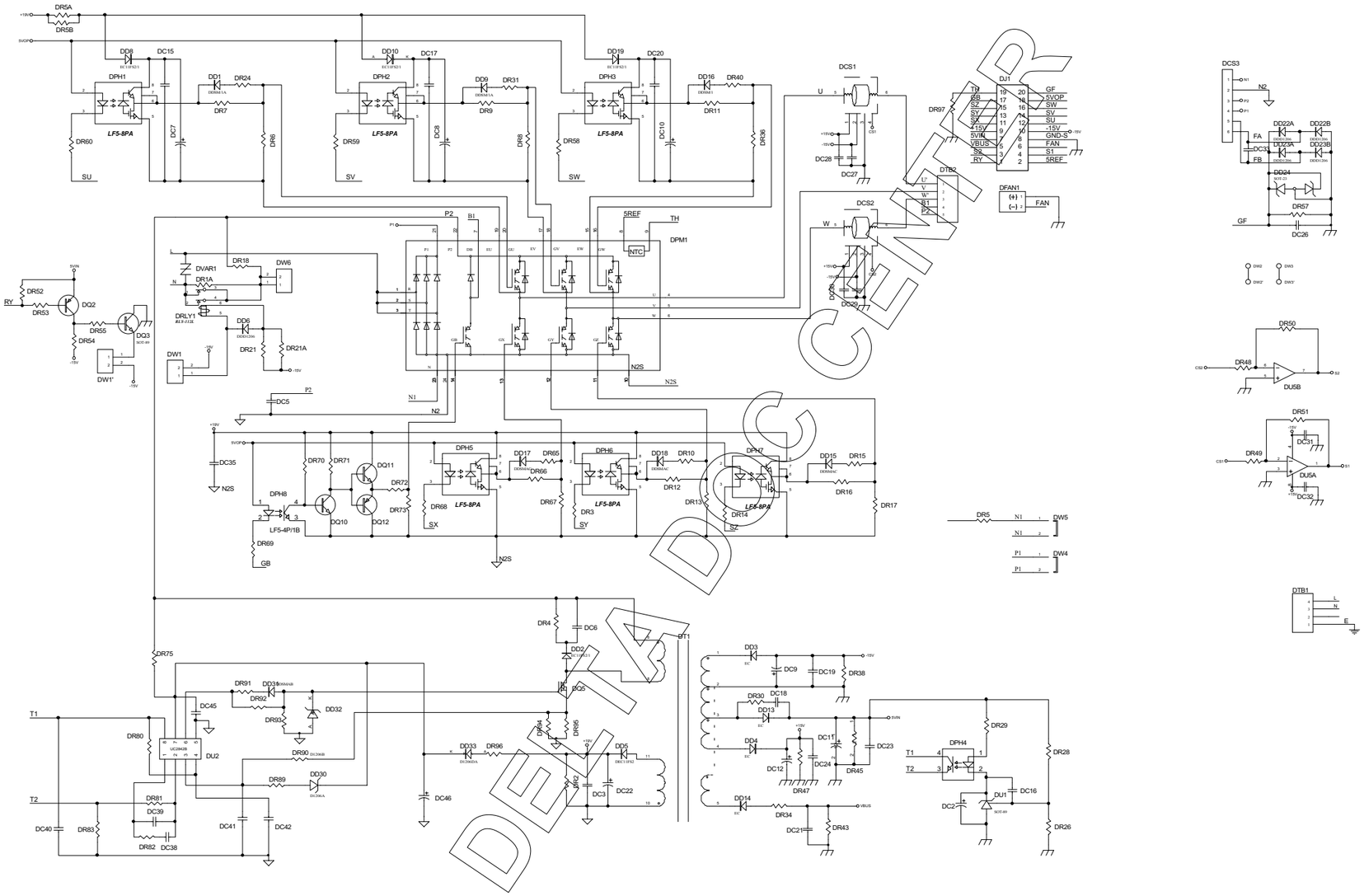
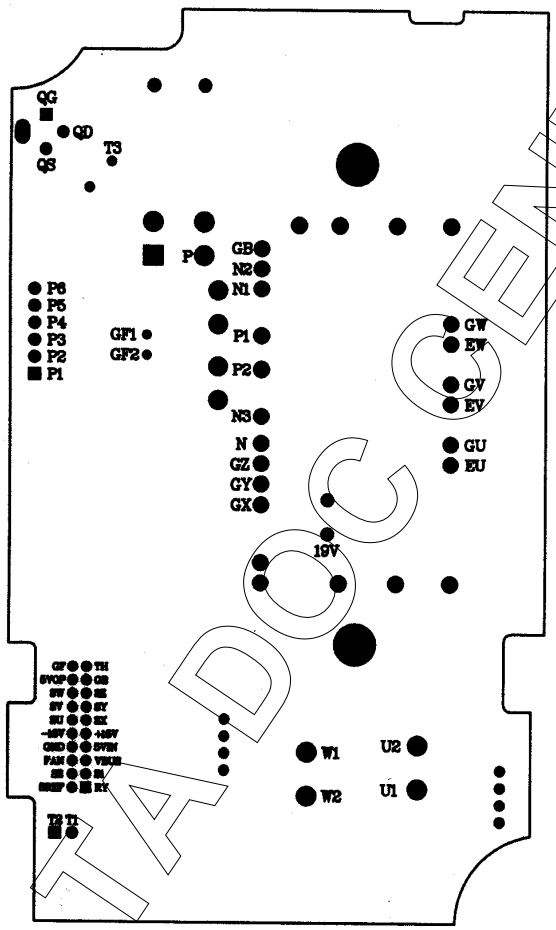
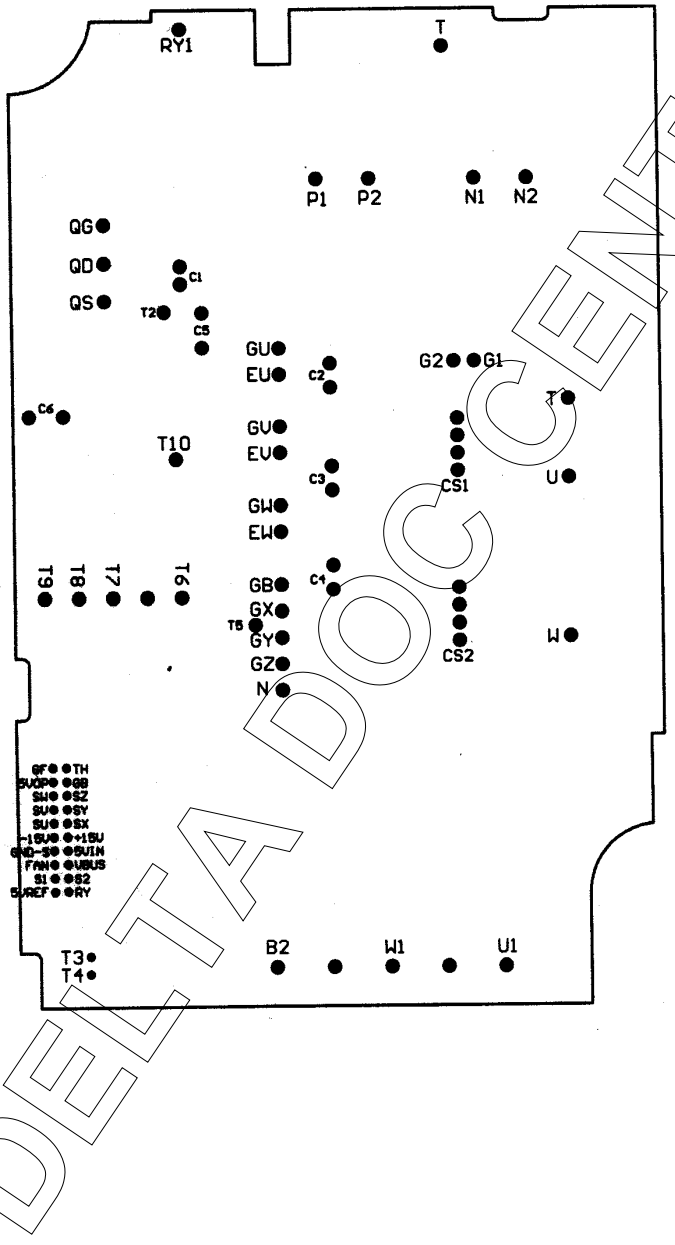


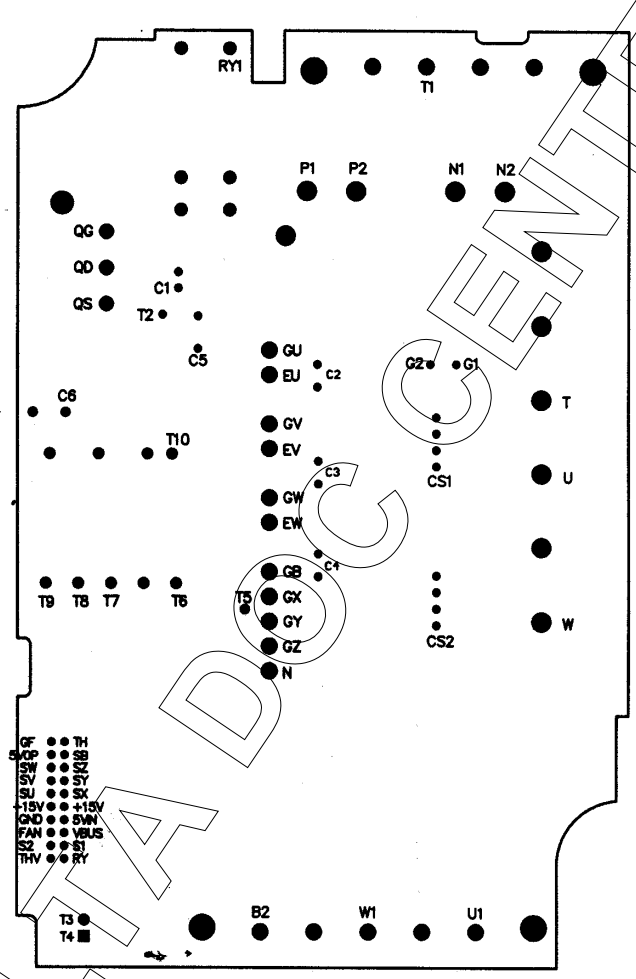
CHAPTER 6 TEST POINT DIAGRAMS

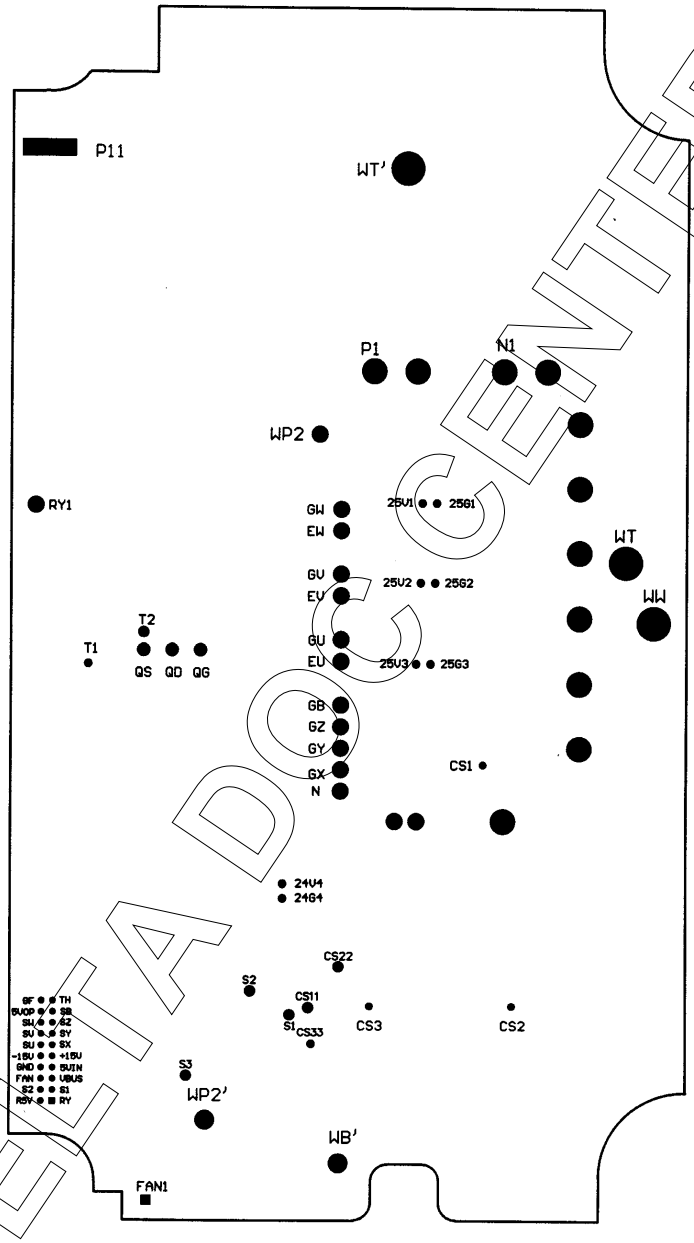
※ These test point diagrams are only provided for maintenance, inspection and troubleshooting. Coping or reproducing any part of these test point diagrams without written consent of Delta Electronics Inc. is prohibited.

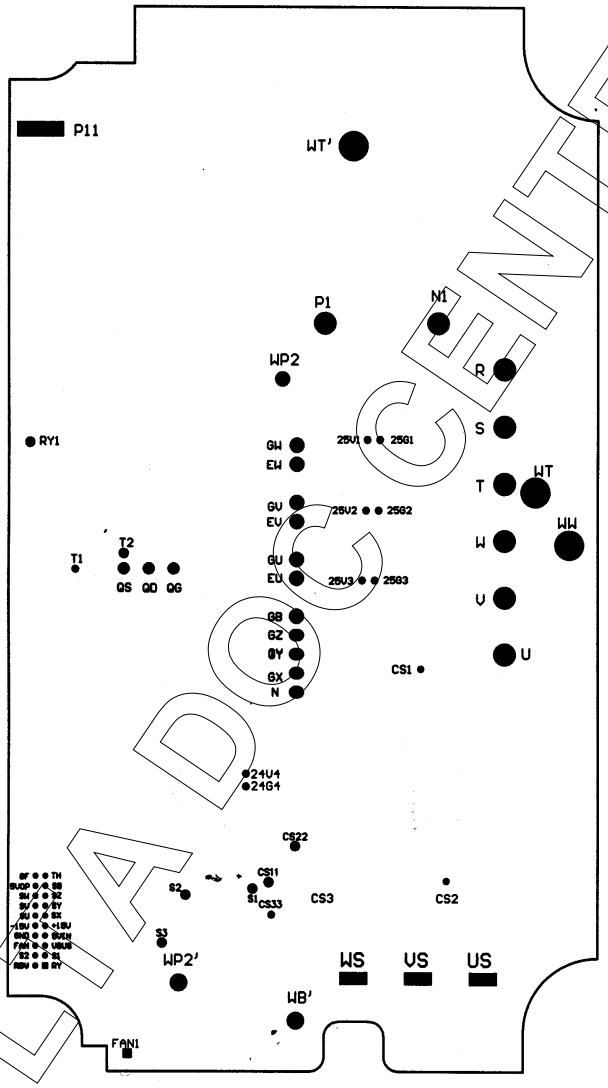
※ This chapter describes the test point diagrams of VFD-M series. It helps user to search the correct position of each test point more quickly. Please use these test point diagrams with the schematics to perform any maintenance, inspection and troubleshooting to ensure the correct use.

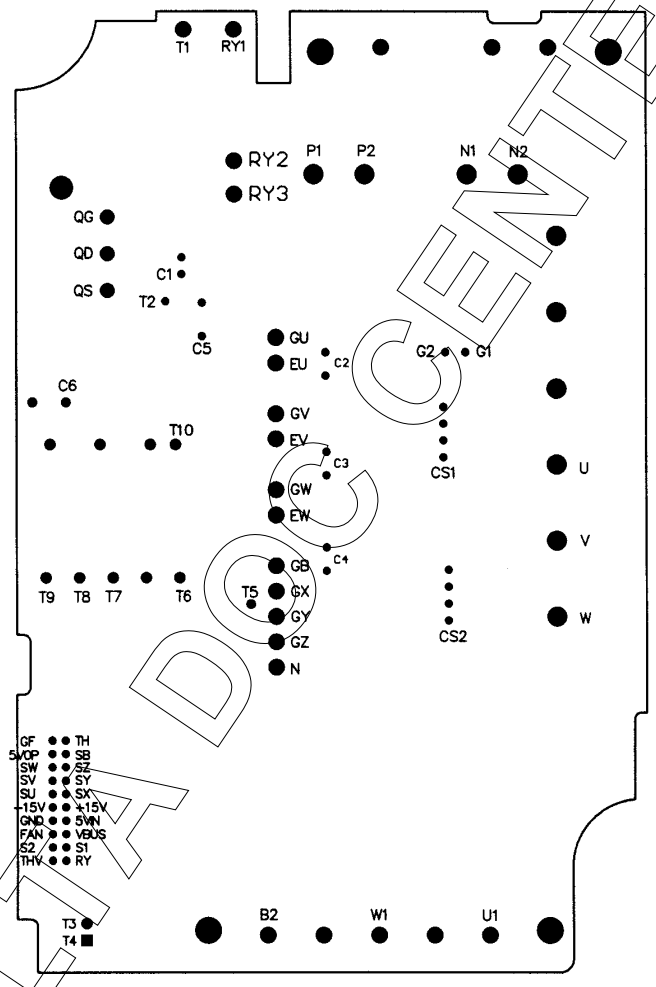












CHAPTER 7 IGBT REMOVING AND INSTALLING NOTES

Please read this chapter prior to remove and install the IGBT.

1） Do not apply power to the drive when removing and installing the IGBT.

2） When removing the IGBT, do not peel off the solder hole that is connected to terminal of the IGBT on the power board. Failure to observe this precaution may cause the danger or result in personal injury.

3） After removing the IGBT, ensure to clean all the heat sink paste on the HEAT SINK. Then, thinly and equally paste with a layer of heat sink paste on the HEAT SINK again. The rear of IGBT also needs to be pasted with a thin layer of heat sink paste.

4） Installing IGBT:

Step 1: Attach the IGBT to the HEAT SINK and tighten all necessary screws gently.

Step 2: Place the power board on the IGBT and align the power board with the IGBT.

Step 3: Make sure all terminals of IGBT are in the correct position.

Step 4: Then, tighten all necessary screws.

Step 5: Ensure that all the screws are tight and secure.

Step 6: Solder the IGBT on the power board correctly.

5） Do not touch any terminal of the IGBT with your bare hands. Please wear anti-static wrist strap or anti-static gloves or any anti-static guards when servicing the IGBT.

6） IGBT must be attached to HEAT SINK firmly and tightly. Otherwise, it may result in IGBT over-heat.

CHAPTER 8 EXAMINATION PROCEDURES OF CONTROL BOARD TEST KIT

This control board test kit is designed for examining the control board of Delta AC motor drive (VFD-B, M, S, V, L2 series). In order to avoid damaging on other products and the test kit itself, please do not use it to test other products except the control board of Delta AC motor drive.

Before examining the control board, please examine the test kit and ensure it can operate properly. Then, start to examine the control board by the following examination procedure:

8.1 Examination Procedures

1） Perform the wiring shown as the Figure 8.1 below. Please ensure all wires are connected to the correct polarity of the terminals. For testing the control board of VFD-M series, the potentiometers SPS VOLTAGE, TH2, VDC and VCN shown on the Figure 8.1 will not be used.

Figure 8.1

2） When the test kit is ready to operate, before examining the control board, please adjust all the potentiometers to the normal position (VBUS is adjusted to). Please refer to Figure 8.2.

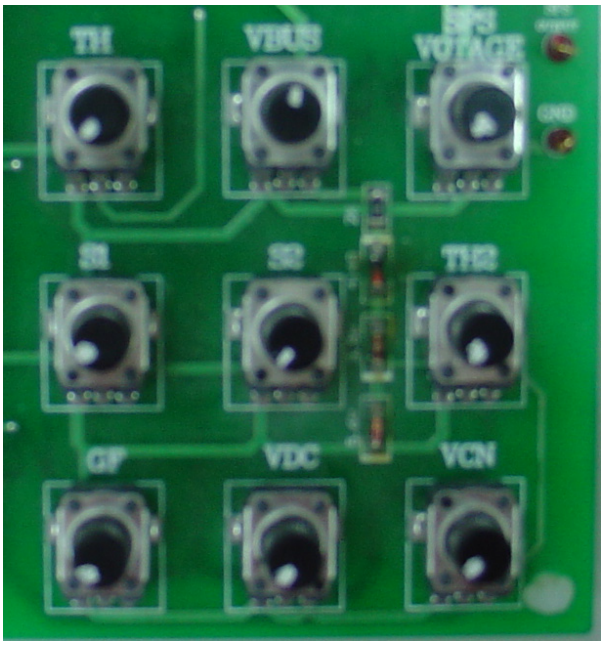


Figure 8.2

3） When the control board is placed on the test kit and the power is on, please record all the parameters set by the user first to understand how the user operate the drive.

4） Examine and record the last three fault messages of the parameters.

5） Check all the function keys on the keypad and ensure that they all function properly. Function keys are: RUN, STOP/RESET, MODE, ▲, ▼, ENTER.

6） Confirm the protection function of the control board to ensure that it is normal and can function properly.

8.2 Individual Function Test

■ Lu/Ou (Lv /ov)

Power on the control board test kit and then turn the potentiometer 'VBUS' to ↖. The fault message 'Lv' should be displayed on the LCD display (refer to Figure 8.3). Power off the drive and restart it to power on, it is normal if the fault message 'cF3' show on the LCD display (refer to Figure 8.4). When the fault is detected and the fault message show on the LCD display, turn the potentiometer to the normal position and press STOP RESET key. Then, the fault can be cleared and the LCD display will return to the normal condition.

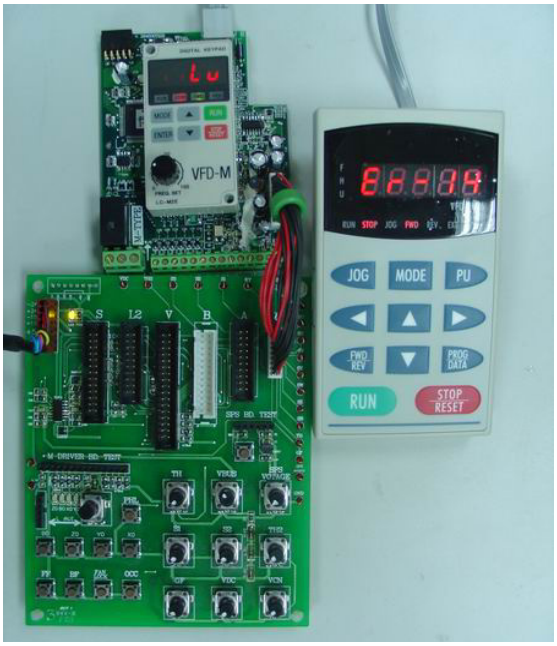


Figure 8.3

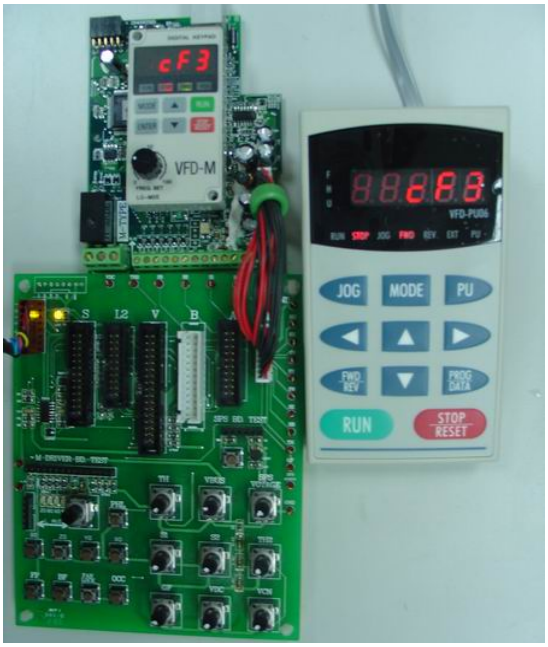


Figure 8.4

Power on the control board test kit and then turn the potentiometer 'VBUS' to ↗. The fault message 'ov' should be displayed on the LCD display (refer to Figure 8.5). Power off the drive and restart it to power on, it is normal if the fault message 'ov' show on the LCD display (refer to Figure 8.6). When the fault is detected and the fault message show on the LCD display, turn the potentiometer to the normal position and press STOP RESET key. Then, the fault can be cleared and the LCD display will return to the normal condition.

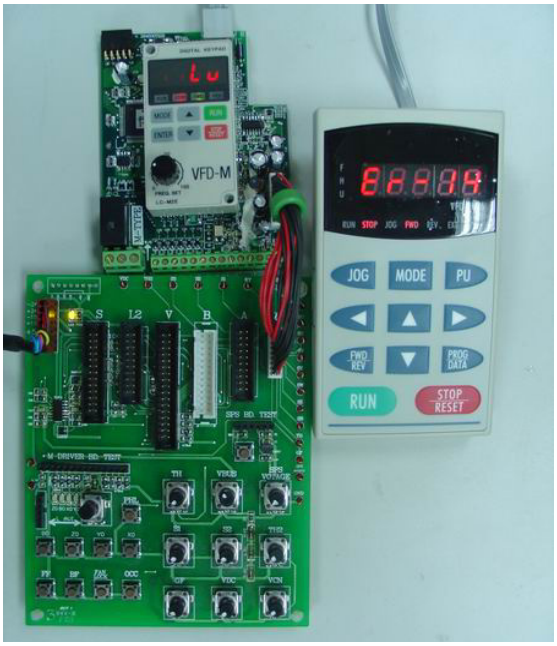


Figure 8.5

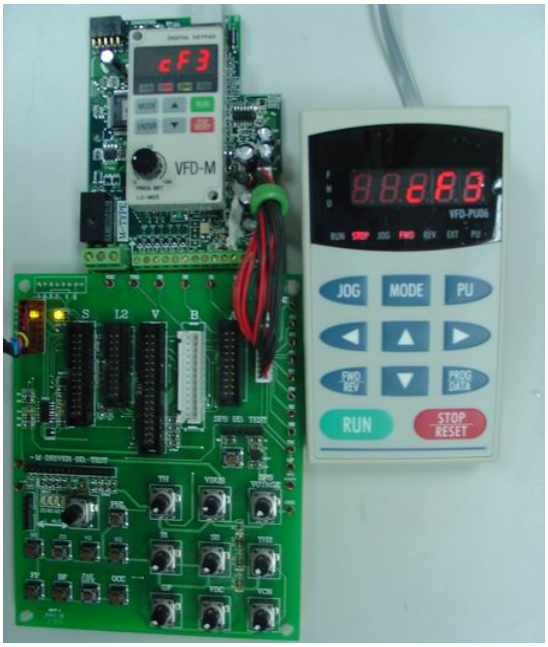


Figure 8.6

■ oC (oc)

When turning the potentiometer 'S1' to ◷. The fault message 'oc' should be displayed on the LCD display (refer to Figure 8.7). Power off the drive and restart it to power on, it is normal if the fault message 'cF3' show on the LCD display (refer to Figure 8.8). When the fault is detected and the fault message show on the LCD display, turn the potentiometer to the normal position and press STOP RESET key. Then, the fault can be cleared and the LCD display will return to the normal condition.

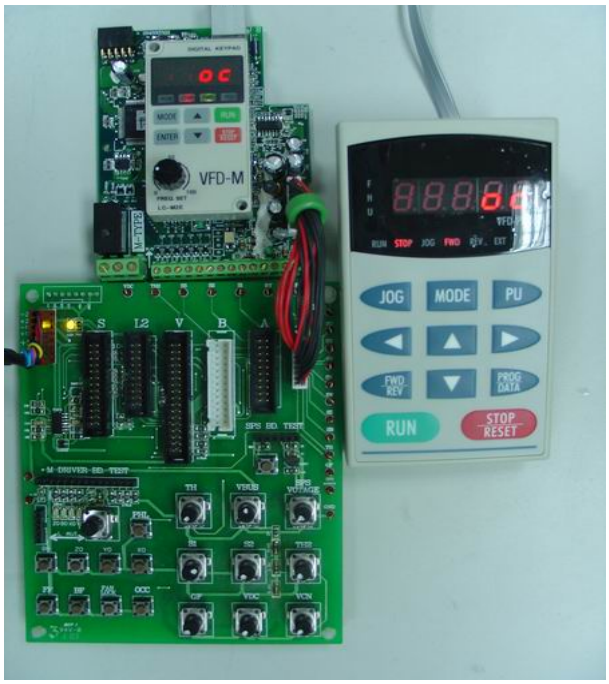


Figure 8.7

Figure 8.8

When turning the potentiometer 'S2' to . The fault message 'oc' should be displayed on the LCD display (refer to Figure 8.9). Power off the drive and restart it to power on, it is normal if the fault message 'cF3' show on the LCD display (refer to Figure 8.10). When the fault is detected and the fault message show on the LCD display, turn the potentiometer to the normal position and press STOP RESET key. Then, the fault can be cleared and the LCD display will return to the normal condition.

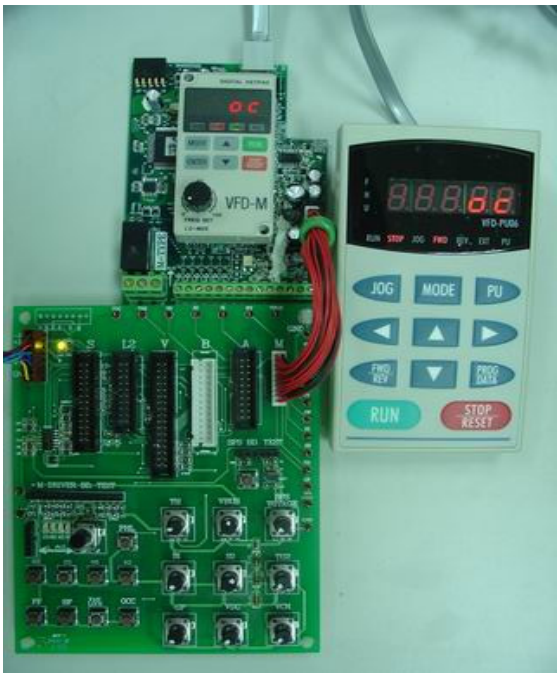


Figure 8.9

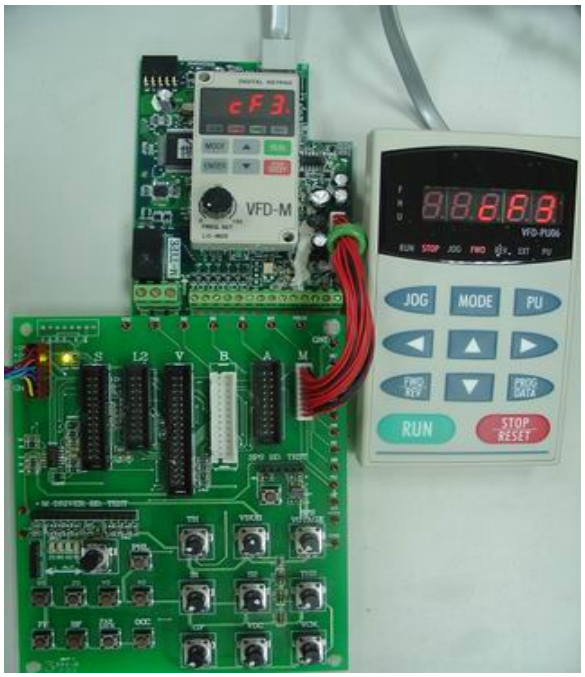


Figure 8.10

■ GFF (Ground Fault)

When turning the potentiometer 'GF' to . The fault message 'GFF' should be displayed on the LCD display (refer to Figure 8.11). Power off the drive and restart it to power on, it is normal if the fault message 'HPF' show on the LCD display (refer to Figure 8.12). When the fault is detected and the fault message show on the LCD display, turn the potentiometer to the normal position and press STOP RESET key. Then, the fault can be cleared and the LCD display will return to the normal condition.

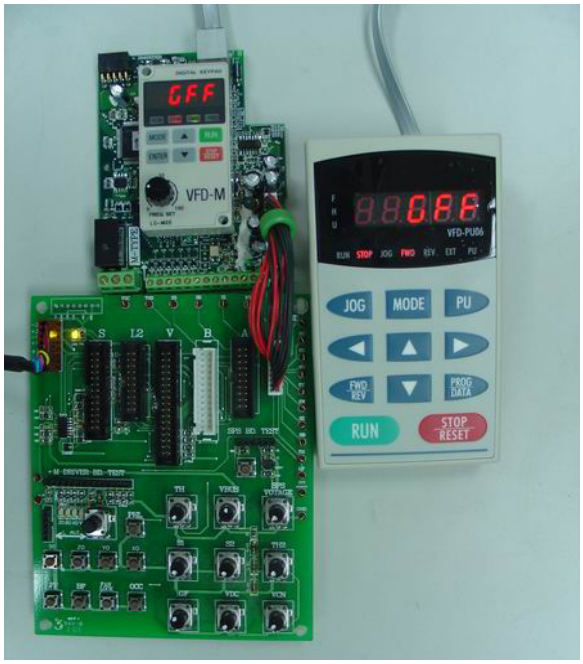


Figure 8.11

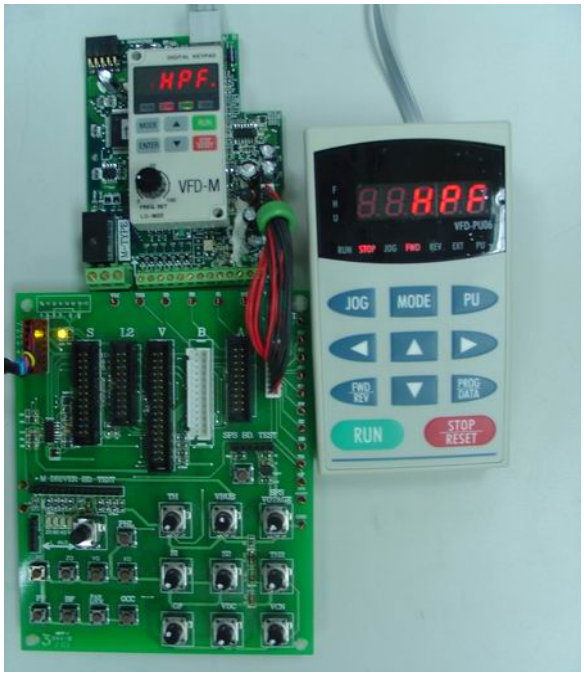


Figure 8.12

- oH (oH)

When turning the potentiometer 'TH' to ↘. The fault message 'oH' should be displayed on the LCD display (refer to Figure 8.13). Power off the drive and restart it to power on, it is normal if the fault message 'c.F.3.' show on the LCD display (refer to Figure 8.14). When the fault is detected and the fault message show on the LCD display, turn the potentiometer to the normal position and press STOP RESET key. Then, the fault can be cleared and the LCD display will return to the normal condition.

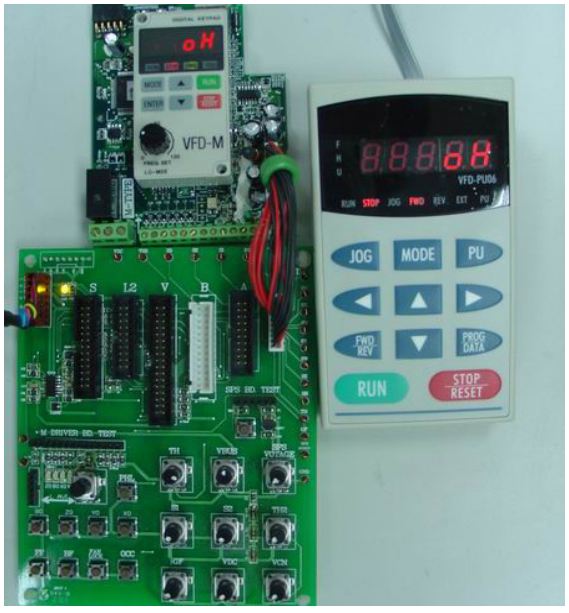


Figure 8.13

Figure 8.14

■ SU-GND, SV-GND, SW-GND, SX-GND, SY-GND, SZ-GND

Use the test points SU, SV, SW, SX, SY, SZ and GND on the control board test kit to perform the test.

Press RUN key on the keypad, test and measure if there is an output signal between SU-GND, SV-GND, SW-GND, SX-GND, SY-GND and SZ-GND shown as Figure 8.15.

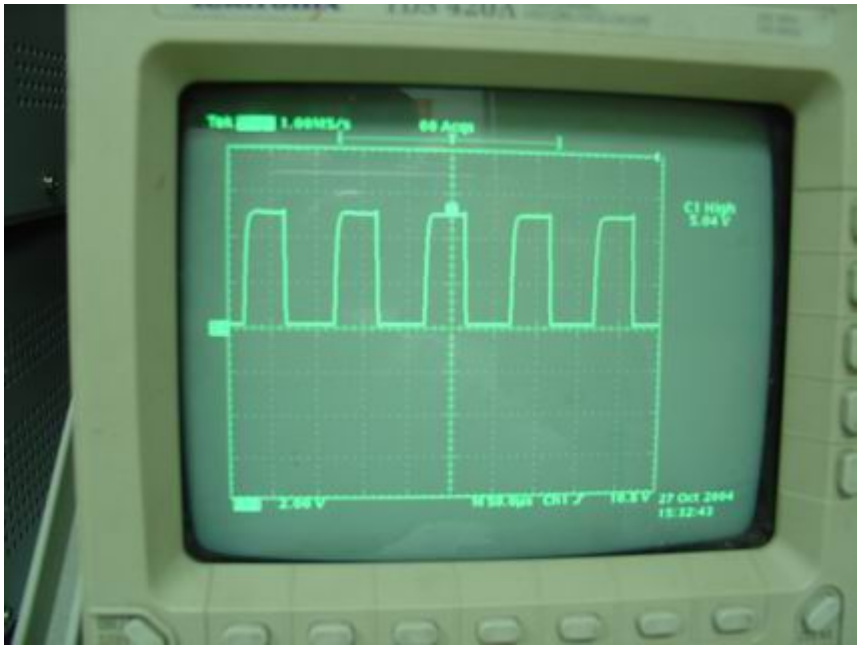


Figure 8.15