X-COOL CONNECTION GUIDE

(Controller and Power Board)

1. Power board and Controller board Connection

- 12 Pin Connector

The power board and controller board are connected to each other with a cable through a 12 pin header.

The newly designed Version 2 ensures consistency of all nets of the 12 pin header.

The connection method is as follows.

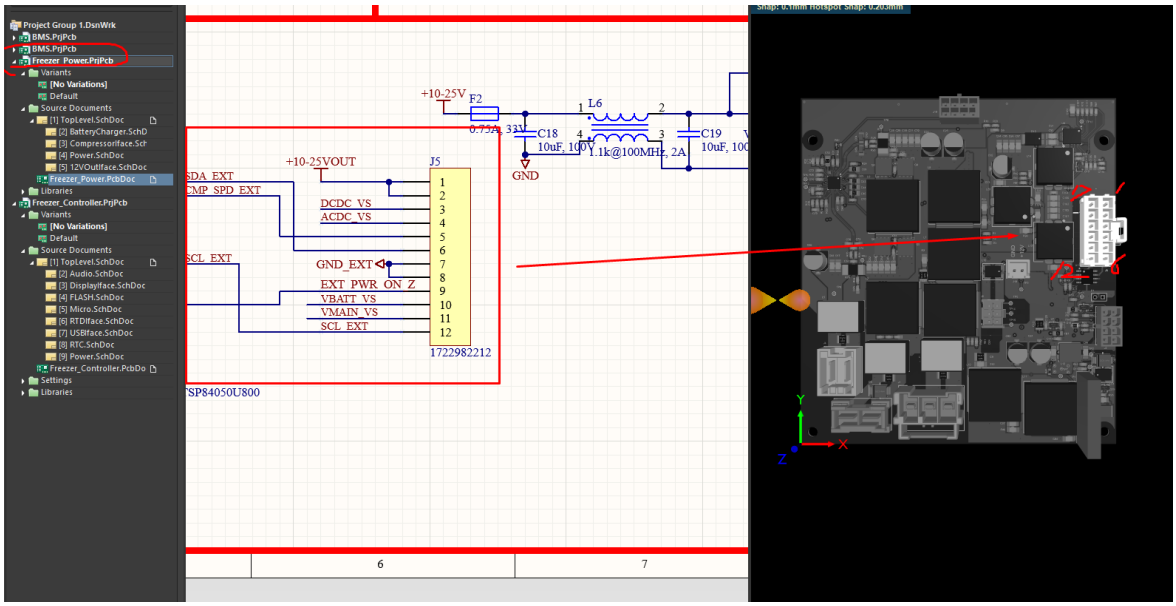


Figure 1. Power Board J5 Connector

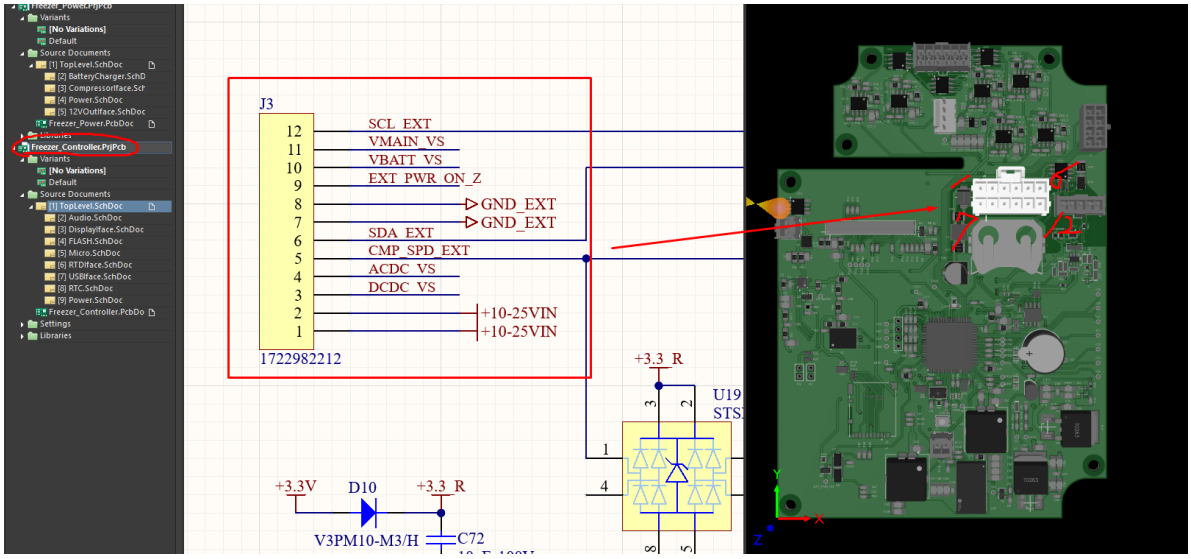


Figure 2. Controller Board J3 Connector

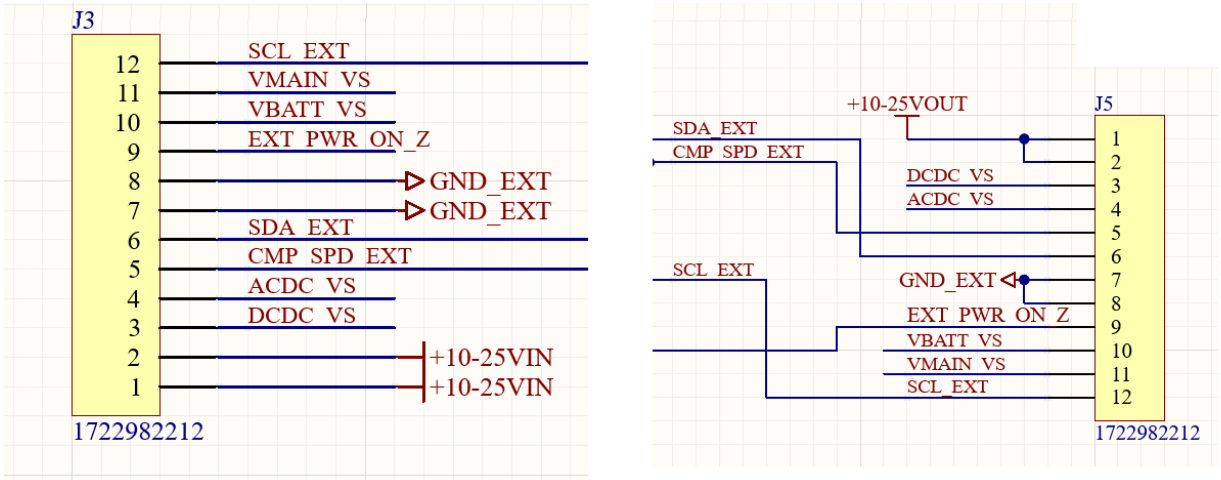


Figure 3. J3 Connector and J5 Connector

Connect as follows:

Pin Name	Controller Board J3 Connector	Power Board J5 Connector
+10-25VOUT	1	1
+10-25VOUT	2	2
DCDC_VS	3	3
ACDC_VS	4	4

CMP_SPD_EXT	5	5
SDA_EXT	6	6
GND_EXT	7	7
GND_EXT	8	8
EXT_PWR_ON_Z	9	9
VBATT_VS	10	10
VMAIN_VS	11	11
SCL_EXT	12	12

Table 1. 12 Pin connector

- 8 Pin Connector

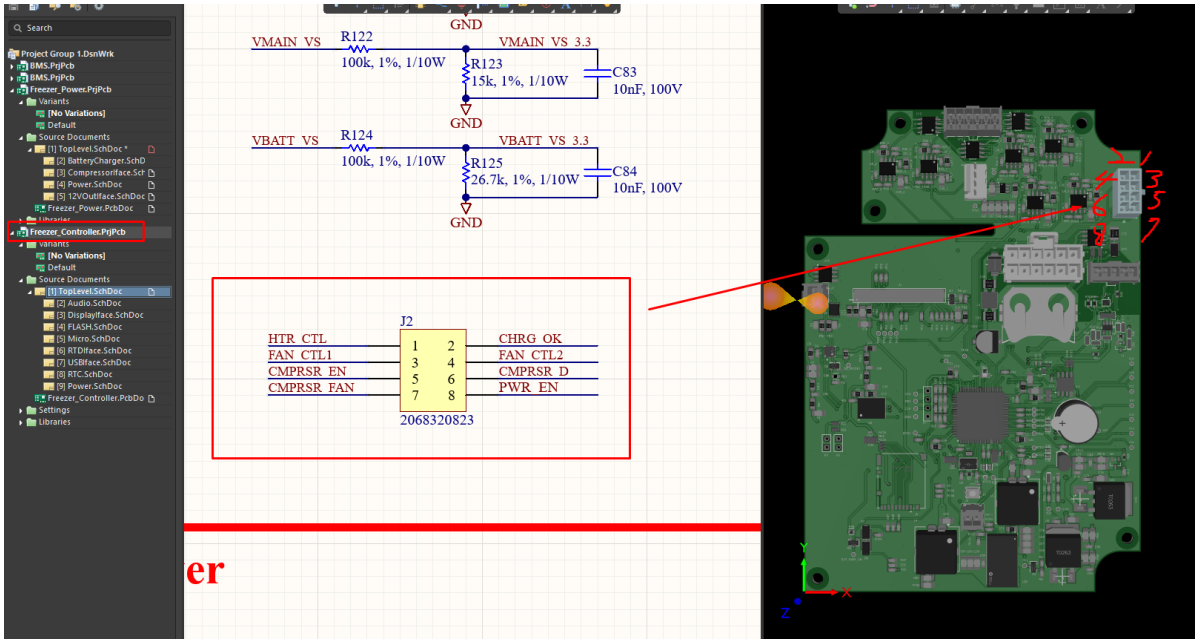


Figure 4. Controller Board J2 Connector

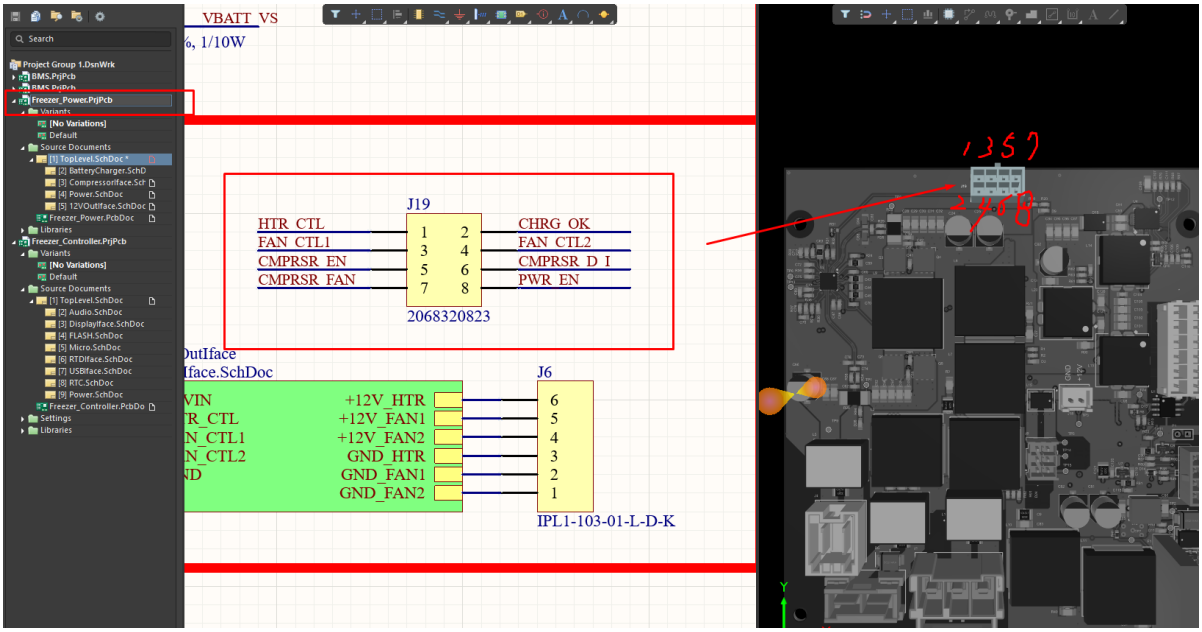


Figure 5. Power Board J19 Connector

Connect as follows:

Pin Name	Controller Board J2 Connector	Power Board J19 Connector
HTR_CTL	1	1
CHRG_OK	2	2
FAN_CTL1	3	3
FAN_CTL2	4	4
CMPRSR_EN	5	5
CMPRSR_D	6	6
CMPRSR_FAN	7	7
PWR_EN	8	8

Table 2. 8 Pin Connector

2. Controller Board

- Keypad

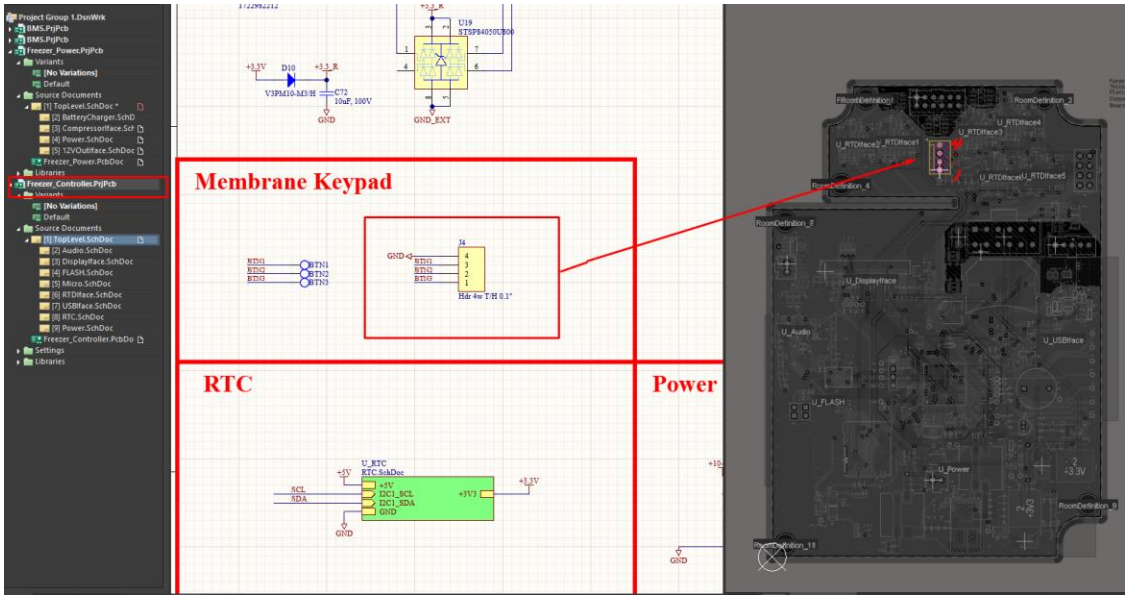


Figure 6. Controller Board Keypad

- USB Port

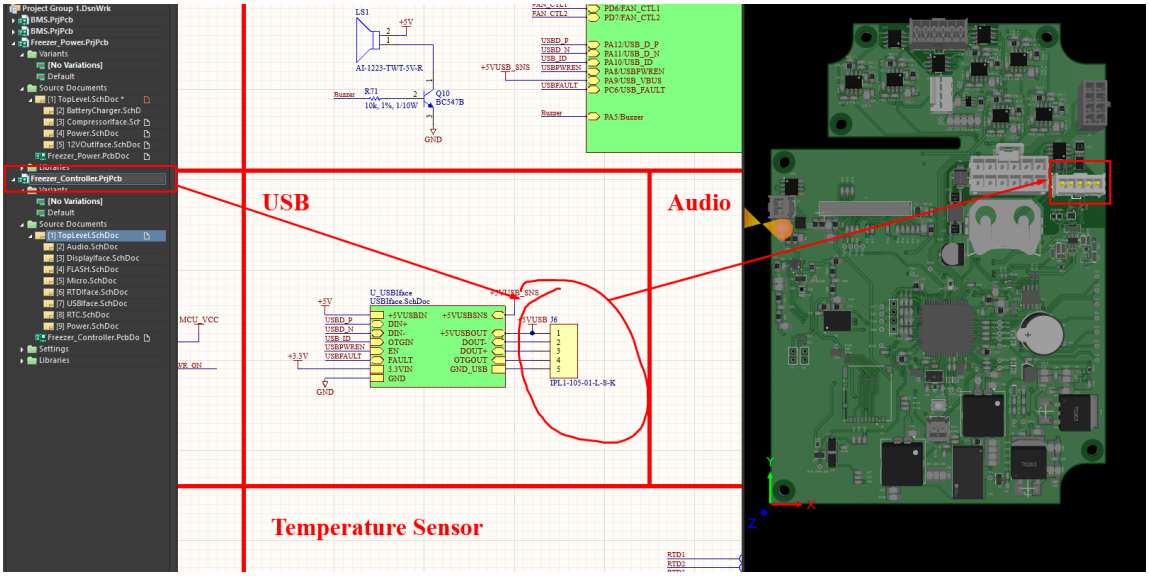


Figure 7. Controller Board USB Port

- RTD Connector

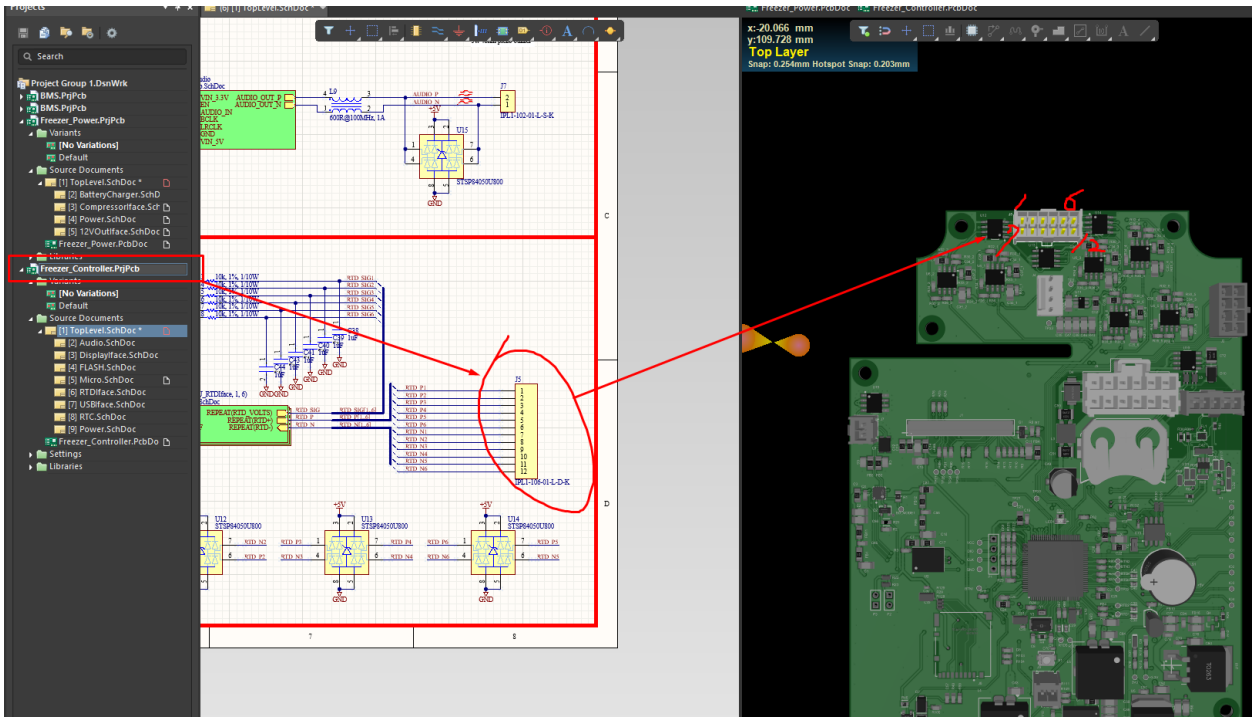


Figure 8. Controller Board RTD Connector

Currently, RTD6 is used for the temperature sensor and RTD4 is used for the Lid Switch.

Which channel to use can be modified in Firmware.

For example, if you want to use the temperature sensor RTD6 as RTD2, change line 41 of the main_app. c file to RTD2.

main.c led_signal.c led_signal.h led.h main_app.c user_diskio_sp

```
22  #include "File_Handling.h"
23  #include "ili9341.h"
24
25  #define MAIN_TASK_TICK_MS    100 //ms
26  #define RTC_TASK_TICK_MS          1000
27  #define BAT_OUT_OF_VALUE     7 //in perent
28  #define MINUTE_TO_COUNT(x) (x*60*1000/MAIN_TASK_TICK_MS) //convert minute to t
29
30  #define buzzer_lid_warning()          buzzer_togle(50, 2000, 0);
31  #define buzzer_over_temp_warning()    buzzer_togle(100, 1000, 0);
32  #define buzzer_under_temp_warning()   buzzer_togle(100, 1000, 0);
33
34  #define KP                1
35  #define KD                0
36  #define KI                0
37
38  double limit_max = 0;
39  double limit_min = 0;
40
41  #define CHAMBER_TEMPERATURES_SENSOR           RTD6
42  #define LID_SWITCH_SENSOR                     RTD4
43
44  #define LID_CLOSE_DELAY_MINS                   1
45
46  typedef enum
47  {
48      MAIN_NORMAL_STATE  = 0,
49      MAIN_WARNING_WAITING_STATE,
50  }main_state_t;
51
```

Figure 8-1 RTD Composition

- Firmware Configure

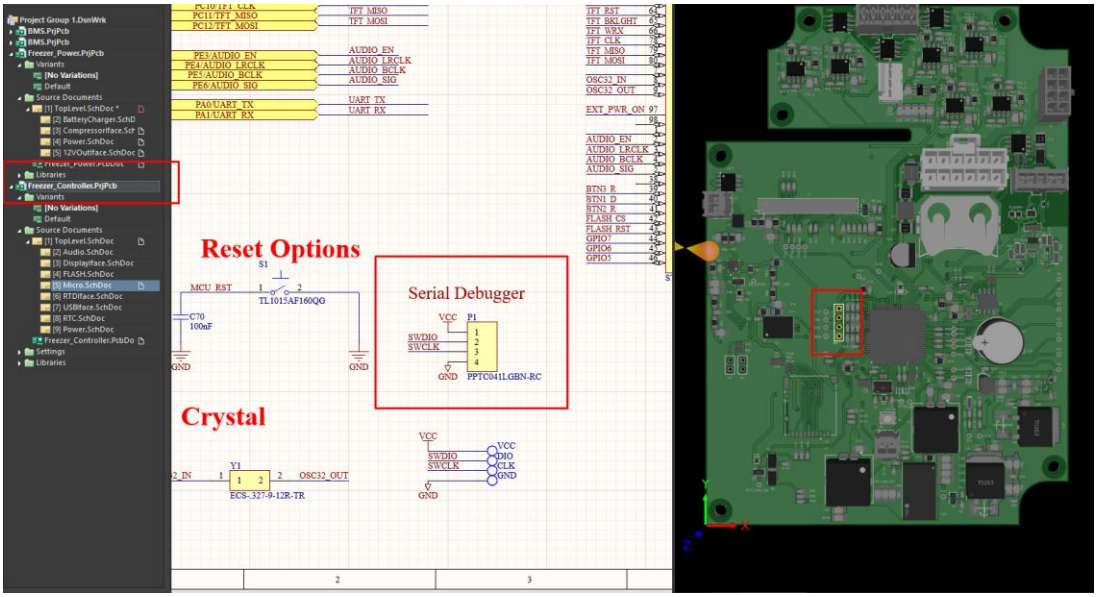
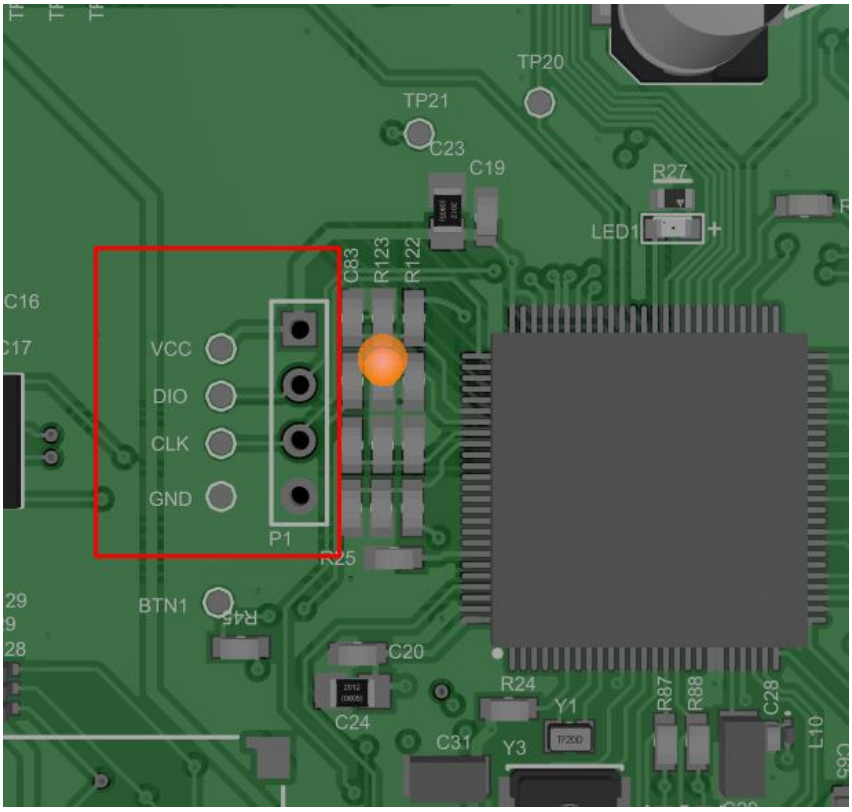


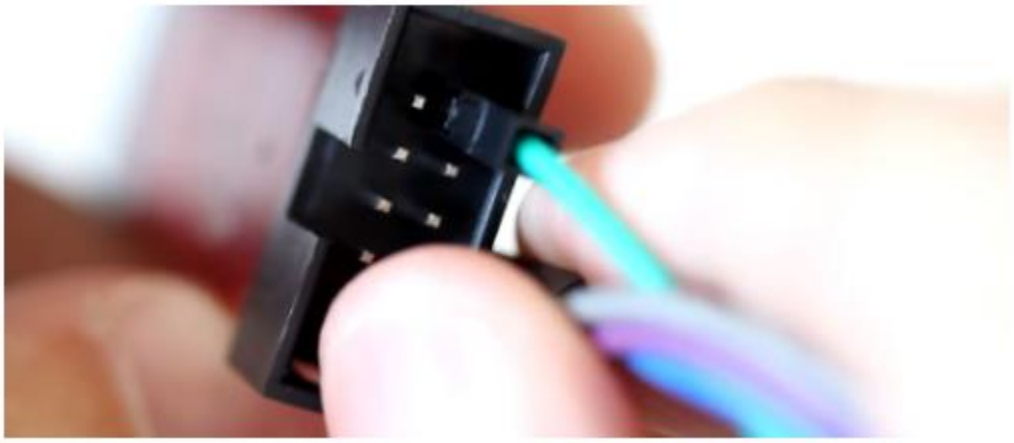
Figure 9 Firmware Configure Connector

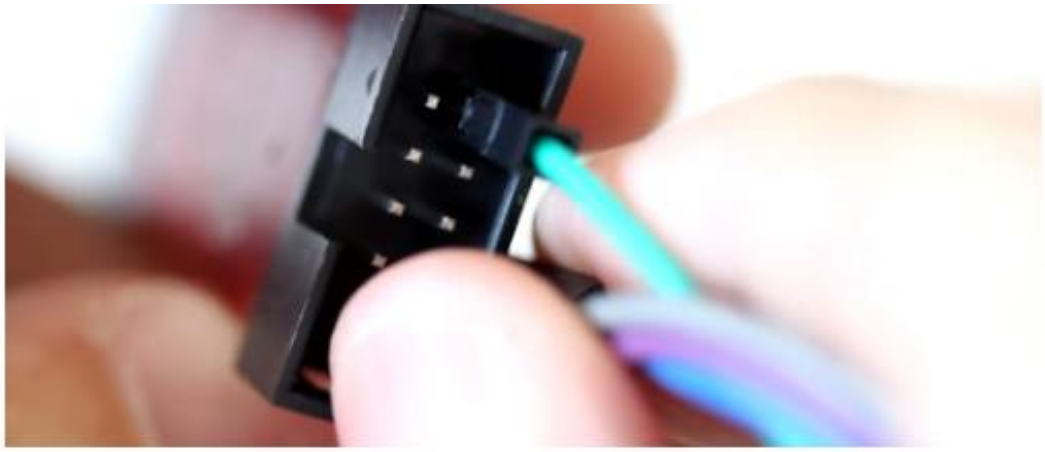
Pin names such as VCC, DIO, CLK, and GND are displayed next to the Firmware Configure Connector on the current board.

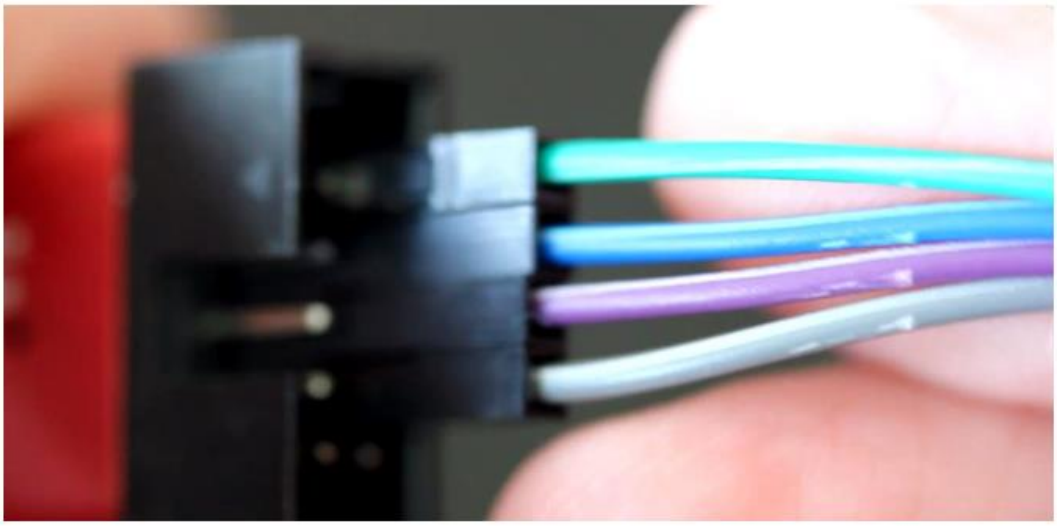


If you are using ST-LINK V2, Pin Names corresponding to ST-LINK V2 are displayed.

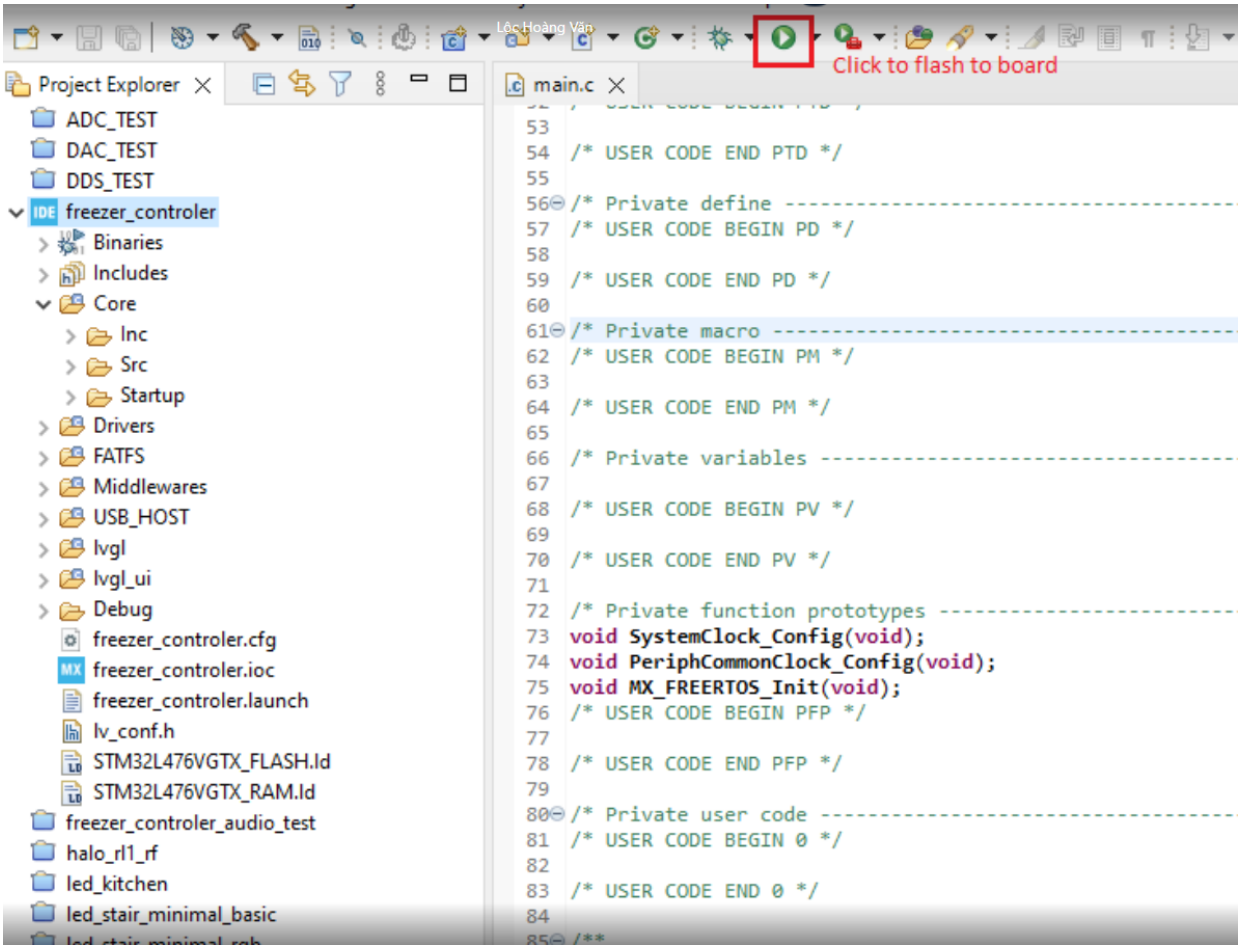
Just connect the same Net in any pair.







To configure firmware, do the following in Cube IDE.



```
Build Analyzer  Static Stack Analyzer  Cyclomatic Complexity  Progress  Search  Console
<terminated> freezer_controler [STM32 C/C++ Application] ST-LINK (ST-LINK GDB server) (Terminated Dec 7, 2023, 8:10:23 PM) [pid: 694]

File download complete
Time elapsed during download operation: 00:00:13.668


Verifying ...


Download verified successfully

Shutting down...
Exit.
```

Flash firmware ok

- AUDIO Connector

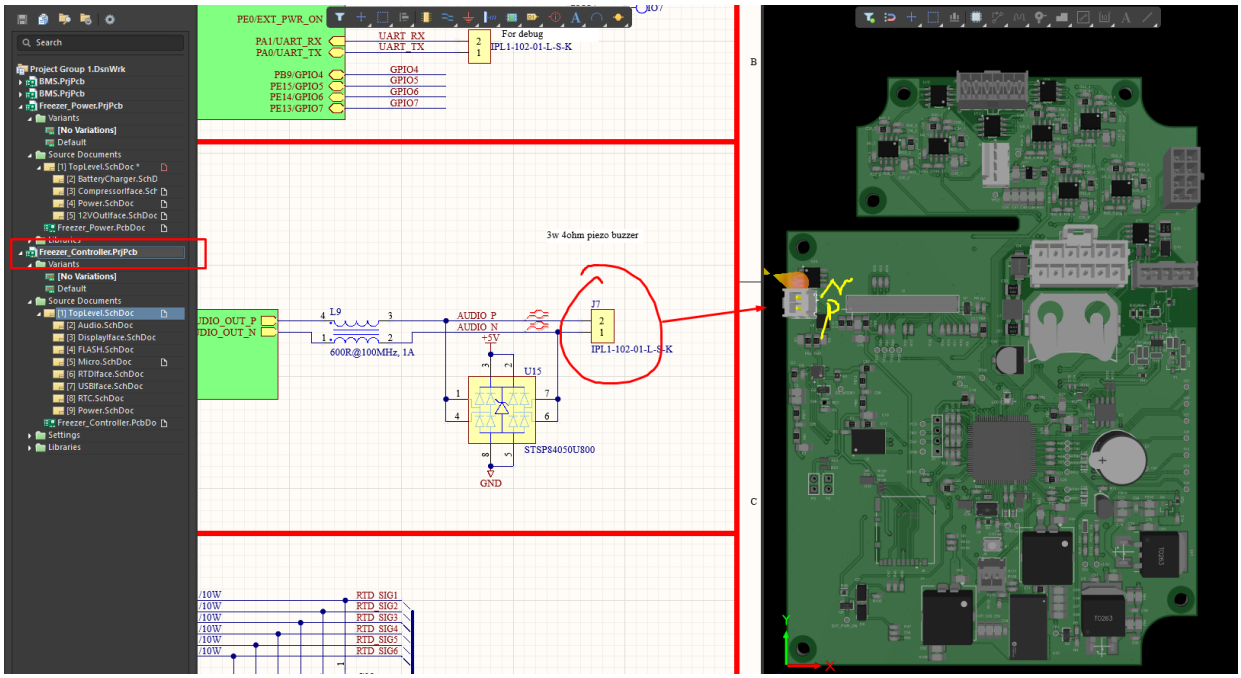
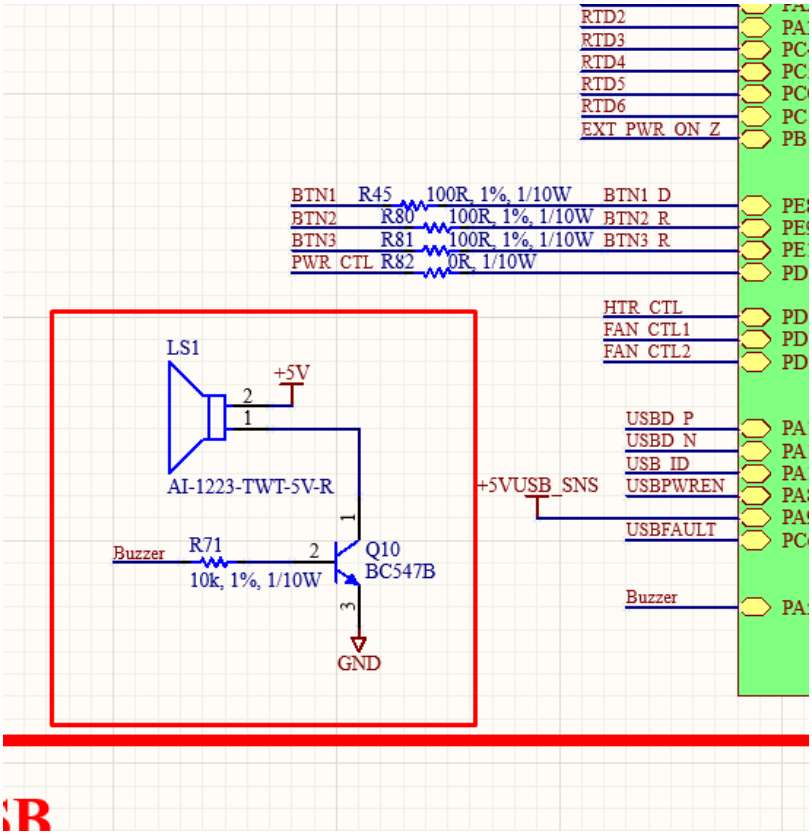


Figure 10. Audio Connector

You can also connect a 3W@4Ohm Piezo Buzzer, but since a small-sized buzzer is connected to the board, it can be ignored for now.


RTD2
RTD3
RTD4
RTD5
RTD6
EXT_PWR_ON_Z
BTN1 R45 100R, 1%, 1/10W BTN1_D
BTN2 R80 100R, 1%, 1/10W BTN2_R
BTN3 R81 100R, 1%, 1/10W BTN3_R
PWR_CTL R82 0R, 1/10W
HTR_CTL
FAN_CTL1
FAN_CTL2
USBD_P
USBD_N
USB_ID
USBPWREN
USBFAULT
Buzzer
LS1
+5V
AI-1223-TWT-5V-R
+5VUSB_SNS
R71
10k, 1%, 1/10W
Q10
BC547B
GND

3. Power Board

- Compressor Connector

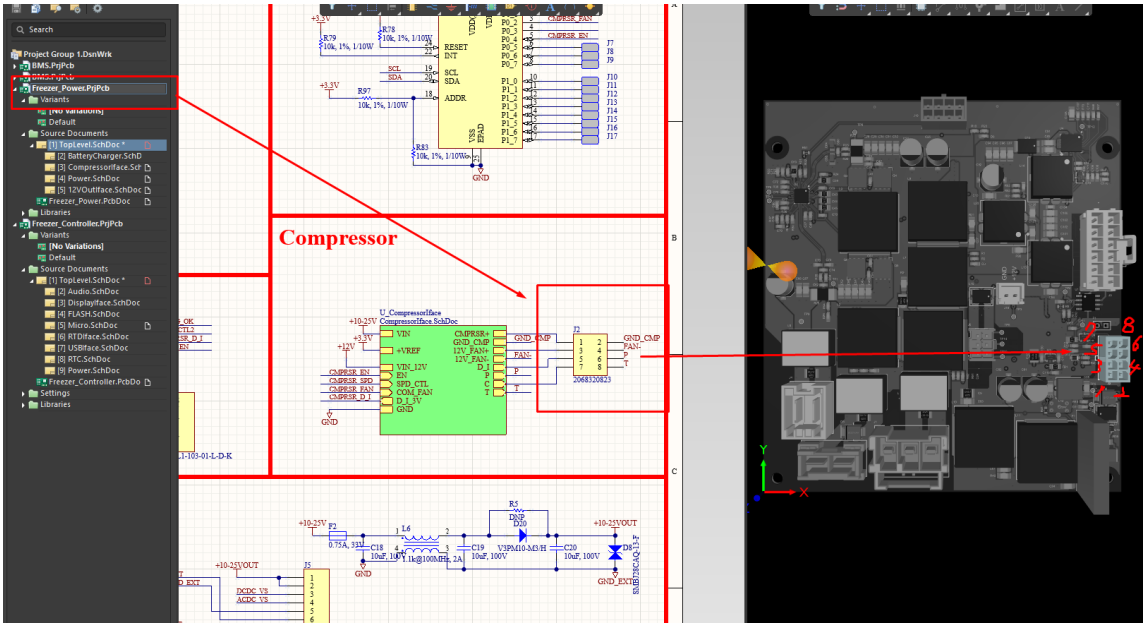
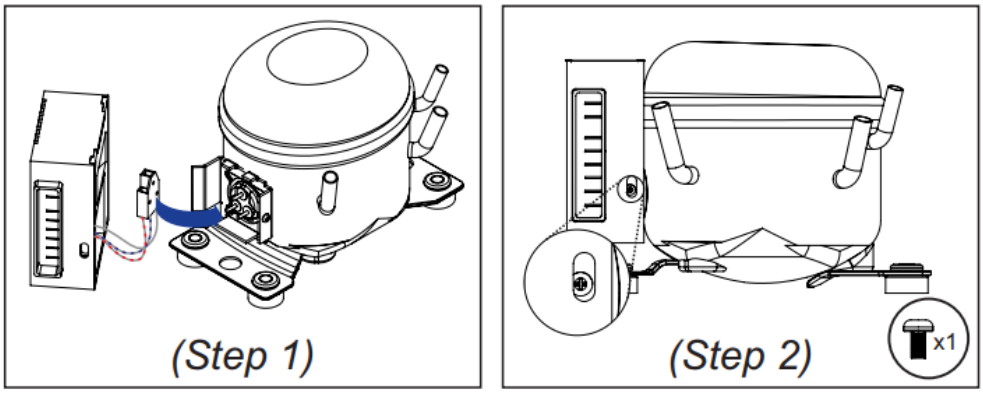


Figure 11. Compressor Connector



Compressor Diagram

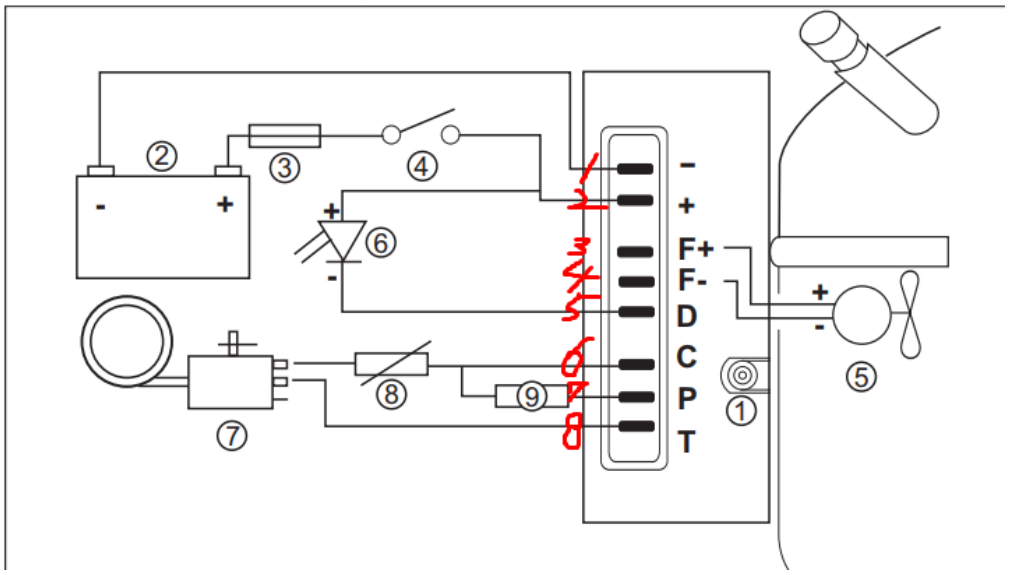


Figure 11-1 *NL25-C3* Compressor Driver Number

Connect as follows:

Pin Name	Power Board J2 Connector	*NL25-C3* Compressor Driver
CMPRSR+	1	2
GND_CMP	2	1
12V_FAN+	3	3
FAN-	4	4
D_I	5	4
P	6	7
C	7	6

T	8	8

- Fan and Heater Connector

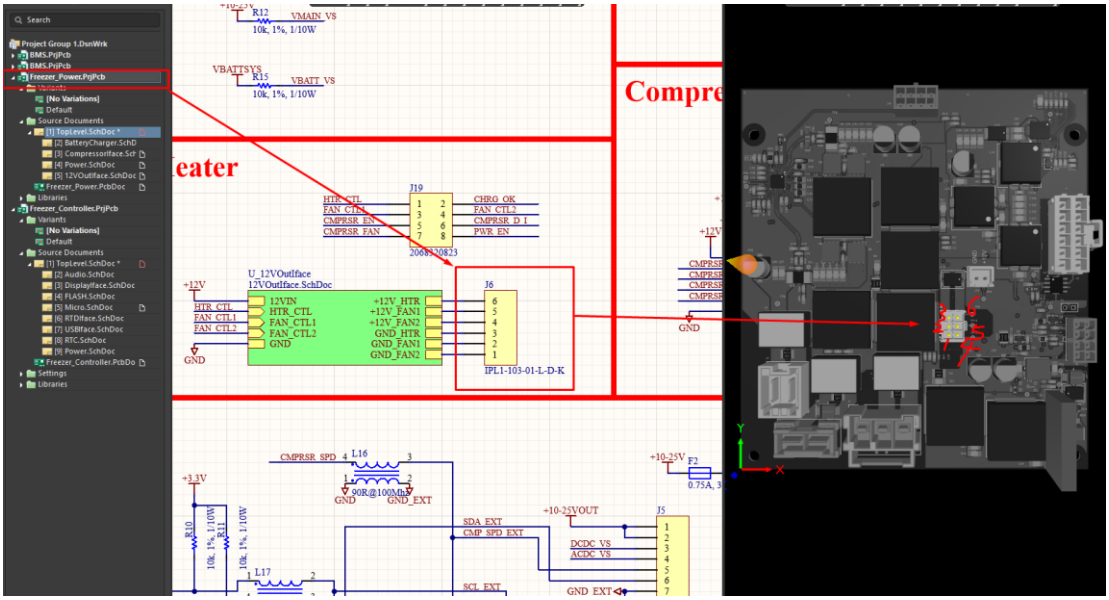
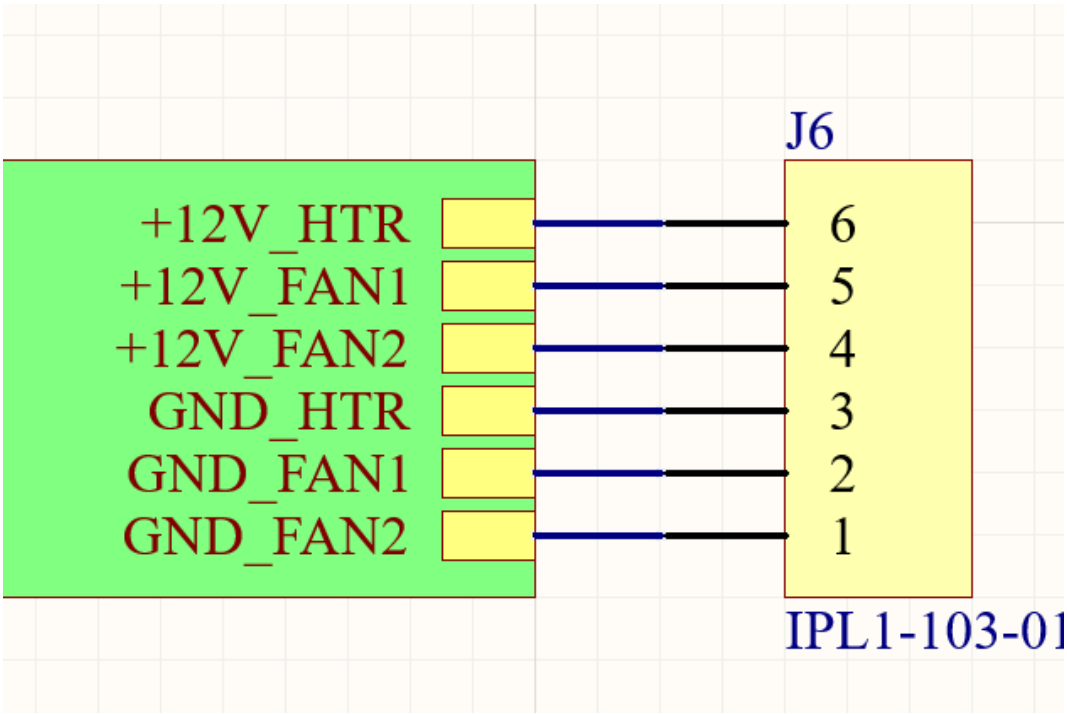


Figure 12. Fan and Heater Connector

The pin names are:



- AC/DC, DC/DC, Battery Connector

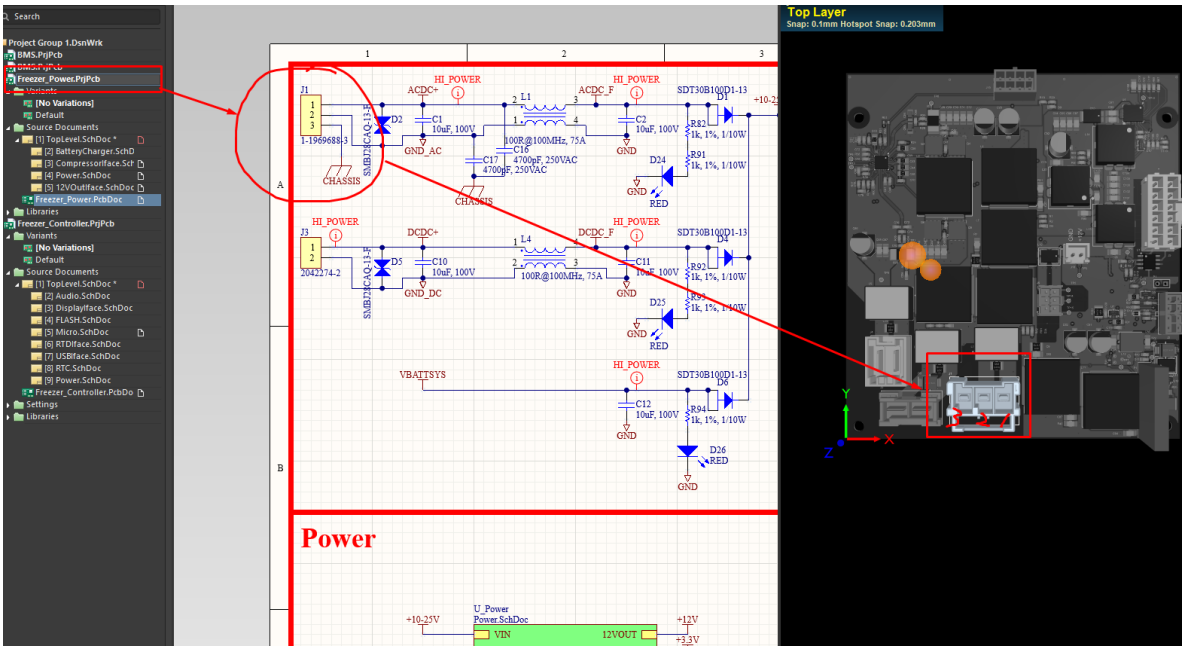


Figure 13. AC/DC Connector (PIN #1 (+) and PIN#2 (-))

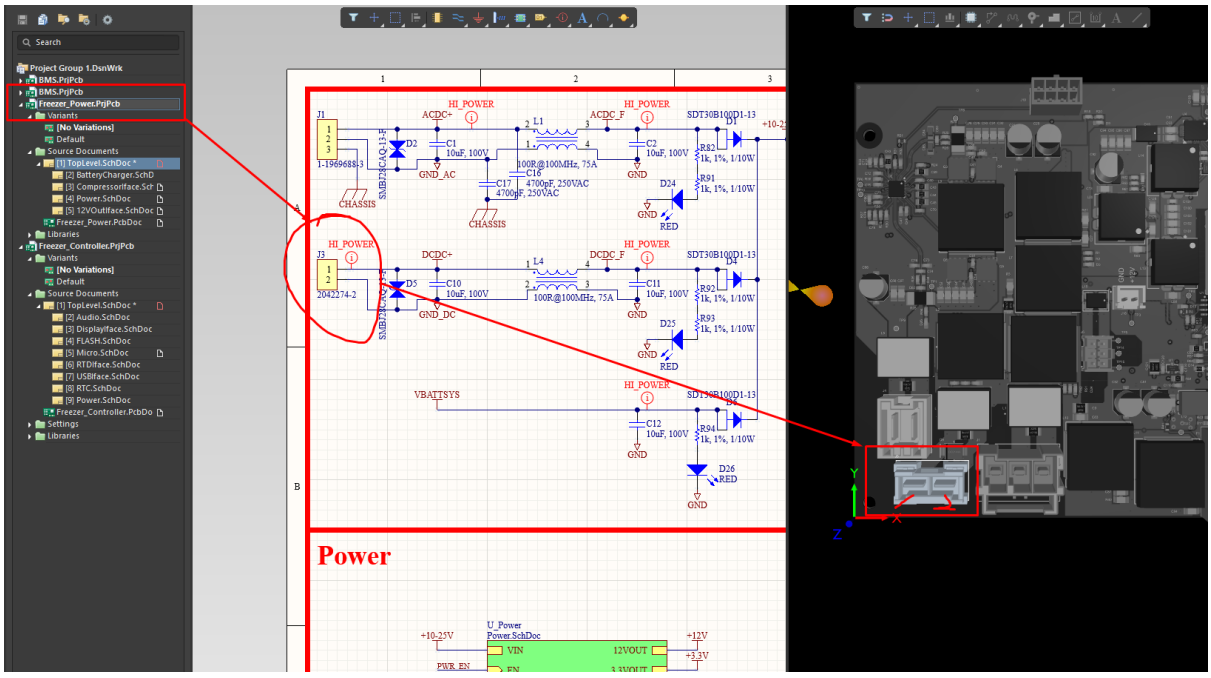


Figure 14. DC/DC Connector (PIN #1 (+) and PIN #2 (-))

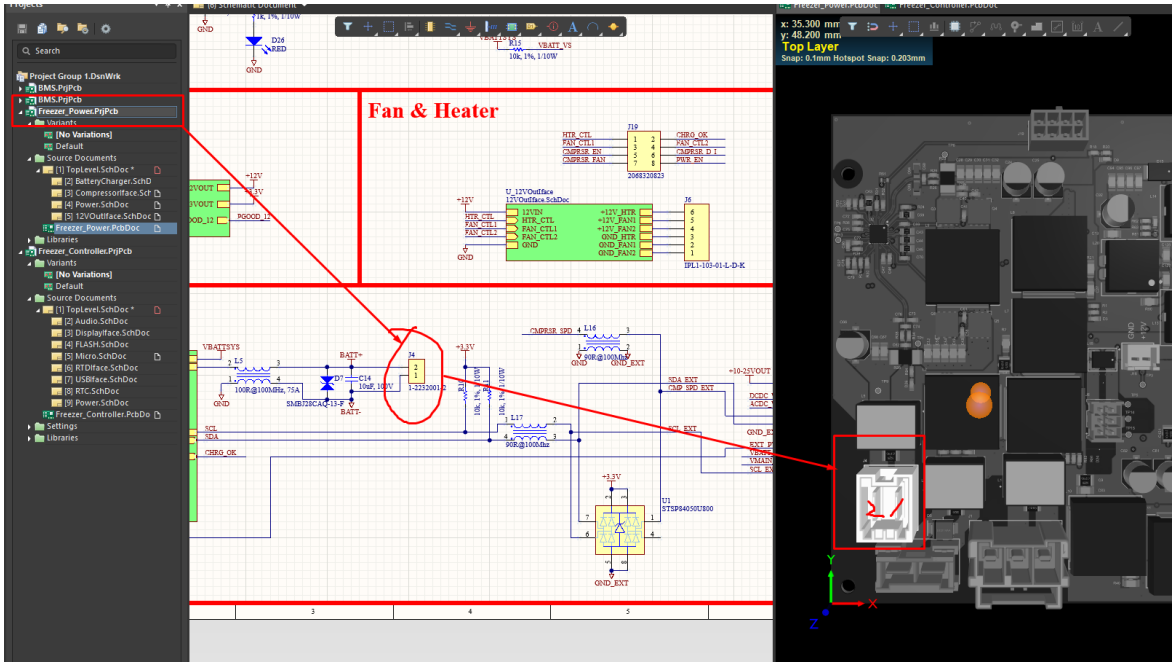


Figure 15. Battery Connector (PIN #2 (+) and PIN#1 (-))