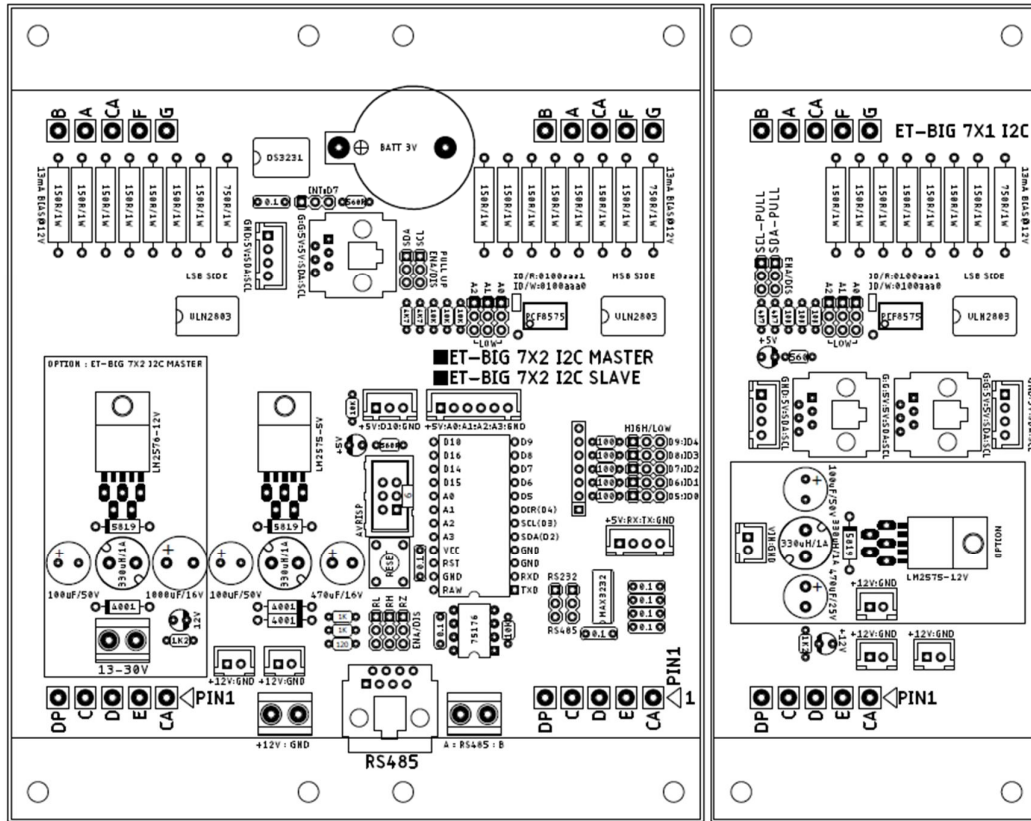


## ET-BIG 7SEG I2C SET



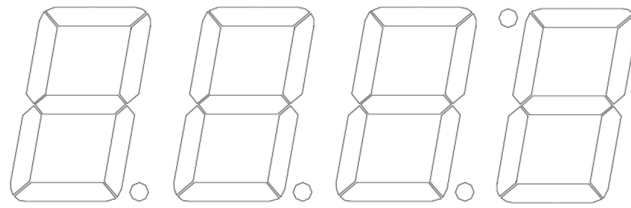
**ET-BIG 7SEG I2C** is a set of 4-inch 7SEGMENT Display that is connected to the display controller of 7SEGMENT DISPLAY by I2C BUS; and it uses CHIP PCF8575 to control the display of 7SEGMENT internal board. There are 3 versions as follows;

- ET-BIG 7X2 I2C MASTER
- ET-BIG 7X2 I2C SLAVE
- ET-BIG 7X1 I2C

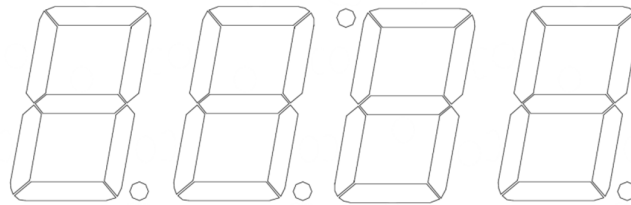
Board ET-BIG 7X2 I2C MASTER, ET-BIG 7X2 I2C SLAVE, or ET-BIG 7X1 I2C can be mixed and connected together to increase more digit of display; for example, it shows data in numeric values; Clock for showing Time of Hour, Second, Minute, or value of Temperature. If the Clock shows value of Time or Temperature, the 7SEGMENT Display can be inverted and Dot Segment can show the sign "°" or "°C".

## MANUAL OF BOARD ET-BIG 7SEG I2C SET

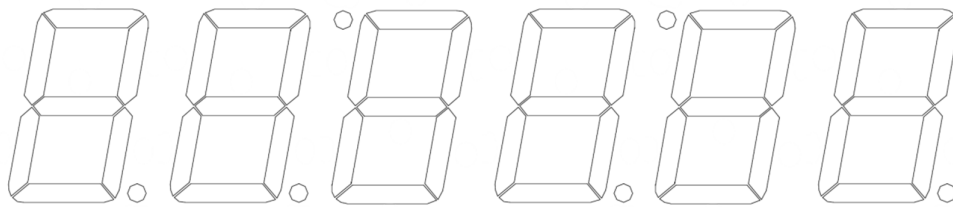
---



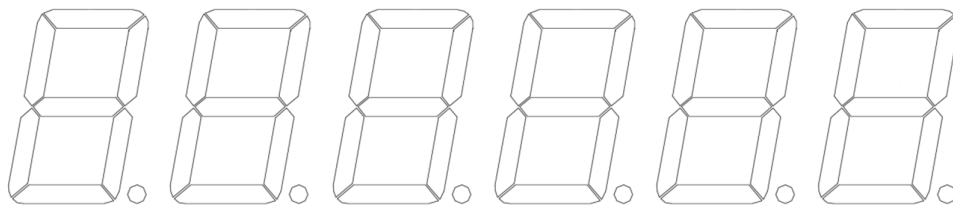
Example shows how to connect ET-BIG 7X2 I2C MASTER and ET-BIG 7X1 I2C together to show Temperature value such as 25.3°C.



Example shows how to connect ET-BIG 7X2 I2C MASTER and ET-BIG 7X1 I2C together; it is used to be a Clock to show Hour-Minute.



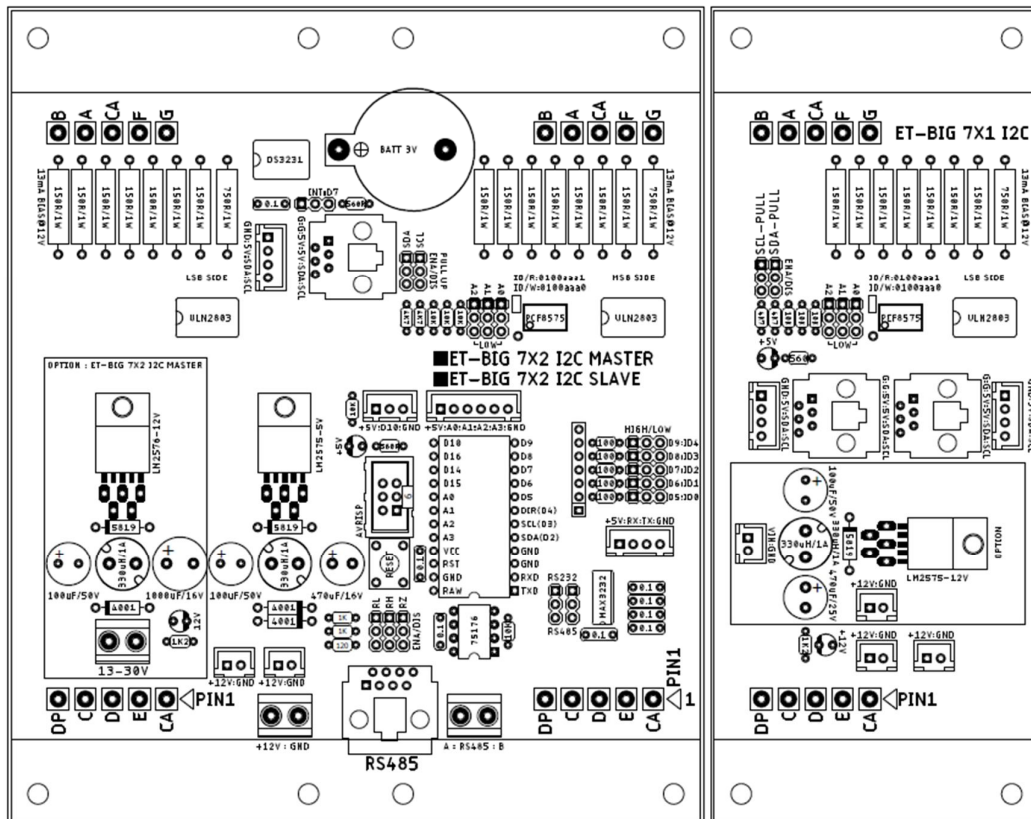
Example shows how to connect ET-BIG 7X2 I2C MASTER and ET-BIG 7X1 I2C together; it is used to be a Clock to show Hour-Minute-Second.



Example shows how to connect ET-BIG 7X2 I2C MASTER and ET-BIG 7X2 SLAVE together to show numeric values in a range of 0-999999.

# MANUAL OF BOARD ET-BIG 7SEG I2C SET

Standard Device	ET-BIG 7X2 I2C (MASTER)	ET-BIG 7X2 I2C (SLAVE)	ET-BIG 7X1 I2C (SLAVE)
4-Inch 7 SEGMENT DISPLAY	2-Digit	2-Digit	1-Digit
Connector I2C BUS RJ11 6Pin Female	1 Set	1 Set	2 Sets
Connector I <sub>2</sub> C BUS 4Pin Wafer 2.5mm.	1 Set	1 Set	2 Sets
Connector Power Supply 12V 2Pin Wafer 2.5mm.	2 Sets	2 Sets	2 Sets
Connector Power Supply 12V 2Pin Terminal 5mm.	1 Set	X	X
RTC DS3231 + Battery Backup	✓	X	X
Header mounted MCU PRO-MICRO 32U4	✓	X	X
Regulate 5V/1A(LM2575-5V)	✓	X	X
RS232 Port Communication	✓	X	X
RS485 Half Duplex Port Communication	✓	X	X



It shows feature of Board ET-BIG 7X2 MASTER / SLAVE and ET-BIG 7X1.





## ET-BIG 7X2 I2C MASTER

ET-BIG 7X2 I2C MASTER is 2-DIGIT 4-inch 7SEGMENT Display that uses CHIP PCF8575 to control the display of 7SEGMENT. It is more special because there is Circuit REGULATE 5V/1A and a part of Circuit for installing Microcontroller "PRO-MICRO 32U4" that is AVR Microcontroller No.ATMEGA32U4; it can develop program of board by C Language by using Compiler of Codevision AVR or WinAVR or Arduino, so user can use and apply this board as required according to user's requirements. As mentioned above, it uses MCU ATMEGA32U4 to control and command display of 7SEGMENT by CHIP PCF8575 via I2C BUS; moreover, there is CHIP RTC: Real Time Clock No.DS3231 provided with Battery Backup and Connector I2C BUS to extend BUS and connect to other external IC BUS devices. For example, it connects to Board Display ET-BIG 7X2 I2C SLAVE or ET-BIG 7X1 I2C to increase more digit of the display as preferred; or, it extends BUS by connecting to Board Input/Output as I2C BUS type that is supported by ETT products, for example, ET-I2C REL8 extends 8-CH Output Relay and ET-I2C DCIN8 extends DC Opto-Isolate Input 8-CH, provided with Serial Port Communication that can be used either as RS232 or RS485 as preferred.

As mentioned above, this Board includes diverse types of supporting circuits on board, and it is more convenient and flexible to add more external devices to be connected and used together; so, developers can develop and apply this Board ET-BIG 7SEG I2C according to their own requirements. For example, Clock for showing time, Time-Switch for ON/OFF electrical appliances, Display Board for showing data, or various types of Counter device that are used as single board or multi-board in the format of network system of RS485 such as Display Board at parking area for showing and counting amount of car's entrance and exit.

# MANUAL OF BOARD ET-BIG 7SEG I2C SET

---

## **SPECIFICATIONS OF ET-BIG 7X1 I2C SLAVE**

- Have 1-Digit 4-Inch 7-SEGMENT DISPLAY with circuit to drive 7-SEGMENT; run by +12VDC
- Use PCF8575 to control the display and setup JUMPER to choose 8 Address Positions of PCF8575 independently
- Have 2 sets of Connector I2C BUS RJ11(Female 6Pin) to receive Signal I2C BUS and 5V Power Supply to control board and extend BUS to connect to the next circuit
- Have 2 sets of Connector I2C BUS 4Pin WAFER (2.5mm) to receive Signal I2C Bus and 5V Power Supply to control board and extend BUS to connect to the next circuit
- Have 2 sets of Connector 2Pin Wafer (2.5mm.) to receive +12V Power Supply and provide for 7-SEGMENT

## **SPECIFICATIONS OF ET-BIG 7X2 I2C SLAVE**

- Have 2-Digit 4-Inch 7-SEGMENT DISPLAY with circuit to drive 7-SEGMENT; run by +12VDC
- Use PCF8575 to control the display and setup JUMPER to choose 8 Address Positions of PCF8575 independently
- Have a set of Connector I2C BUS RJ11 Female 6Pin to receive Signal I2C BUS and 5V Power Supply to control circuits internal board and extend BUS to connect to the next circuit
- Have a set of Connector I2C BUS 4Pin WAFER 2.5mm. to receive Signal I2C Bus and 5V Power Supply to control circuits internal board and extend BUS to connect to the next circuit
- Have 2 sets of Connector 2Pin Wafer 2.5mm. to receive and provide 12V Power Supply and provide for 7-SEGMENT



## SPECIFICATIONS OF ET-BIG 7X2 I2C MASTER

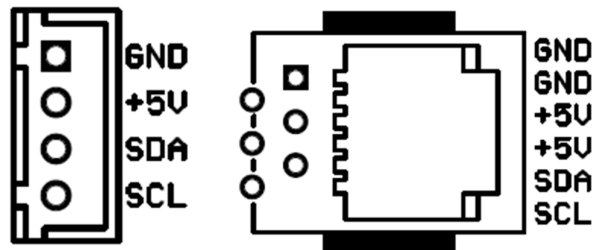
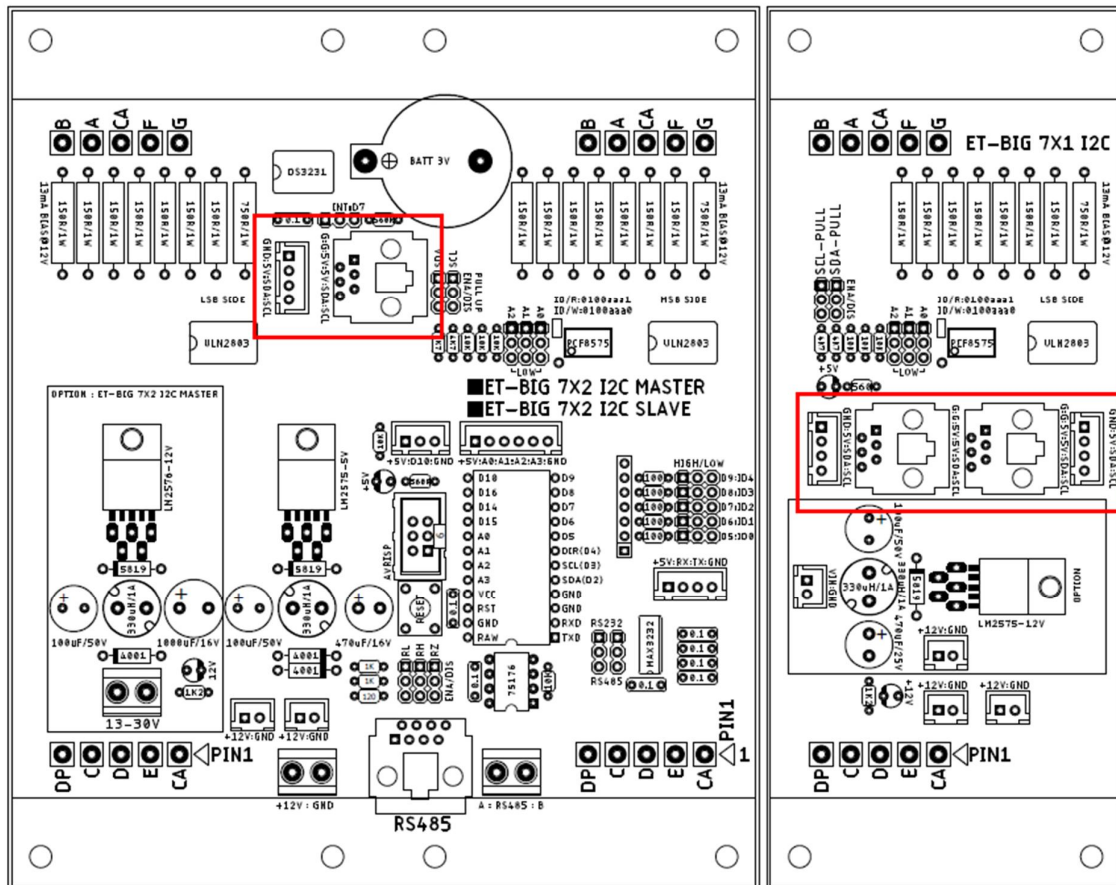
- Have 2-Digit 4-Inch 7-SEGMENT with circuit to drive 7-SEGMENT; run by +12VDC
- Use PCF8575 to control the display and setup JUMPER to choose 8 Address Positions of PCF8575 independently
- Have Circuit RTC Real Time Clock No.DS3231, provide with Battery Backup
- Have a set of Connector I2C BUS RJ11 Female 6Pin to extend and connect Signal I2C BUS and +5V Power Supply to the next circuit
- Have a set of Connector I2C BUS 4Pin WAFER 2.5mm. to extend and connect Signal I2C Bus and +5V Power Supply to the next circuit
- Have Circuit Regulate 5V/1A for providing for Circuit I2C Display and External Circuits
- Support installation of Board Microcontroller PRO-MICRO 32U4 (ATMEGA32U4)
- Have Connector IDE 6Pin under Standard of AVRISP for programming CHIP ISP if program is developed by Codevision AVR or WinAVR
- Have Circuit Line Driver Half-Duplex RS485
  - Have 1 Connector RS485 2Pin Terminal 5mm as Screw Type
  - Have 1 Connector RS485 RJ45 Female 8Pin
  - Have Jumper to Enable/Disable Circuit Fail-Safe and Terminal Resistor 120Ohm
- Have Circuit Line Driver RS232, provided with Connector RS232 Wafer 4Pin 2.5mm.
- Have Connector 3Pin Wafer to externally connect GPIO of MCU (Arduino:D10)
- Have Connector 6Pin Wafer to externally connect GPIO of MCU (Arduino:A0,A1,A2,A3).
- Have 5 sets of JUMPER to choose Logic status either to be HIGH/LOW for GPIO of MCU (Arduino:D5-D9); it is applied to setting Slave ID Code of Device in RS485
- Be used with 12VDC 1A
  - Connector 2Pin Terminal 5mm.
  - Connector 2Pin Wafer 2.5mm.



# MANUAL OF BOARD ET-BIG 7SEG I2C SET

## CONNECTOR I2C BUS

This CONNECTOR I2C BUS is available on all board models, it is a connecting point of Signal I2C and +5V Power Supply. There are 2 types of Connector; 4Pin Wafer 2.5mm and 6Pin RJ11 Female; in this case, user can choose any type of Connector as preferred.

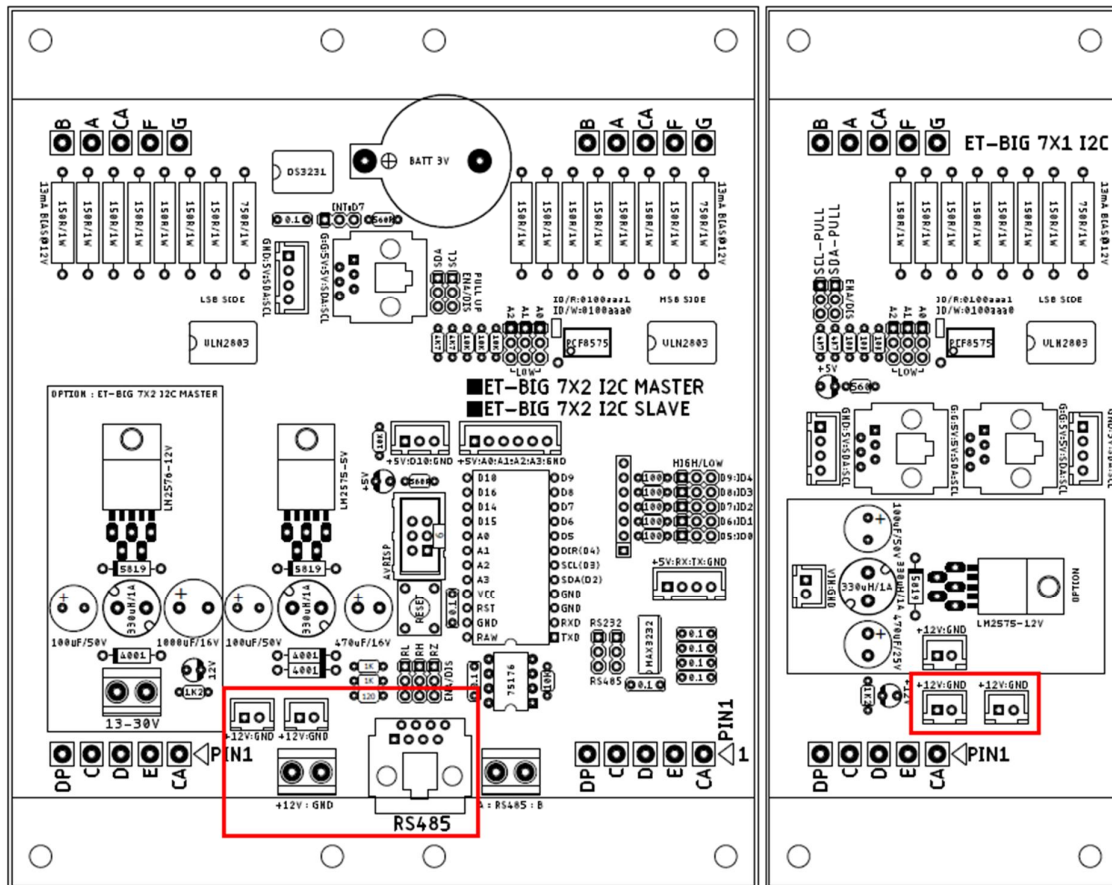


It shows Signal I2C BUS internal Connector 4Pin Wafer and 6Pin RJ11 of Board ET-BIG 7X1 and ET-BIG 7X2.

# MANUAL OF BOARD ET-BIG 7SEG I2C SET

## POWER SUPPLY

+12VDC Power Supply is used for this Board; there are 3 types of Connector; 2Pin Wafer 2.5mm and 2Pin Terminal 5mm and RJ45 8Pin Female, and user can choose any type of Connector as preferred.

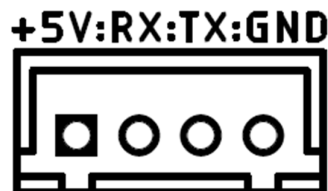
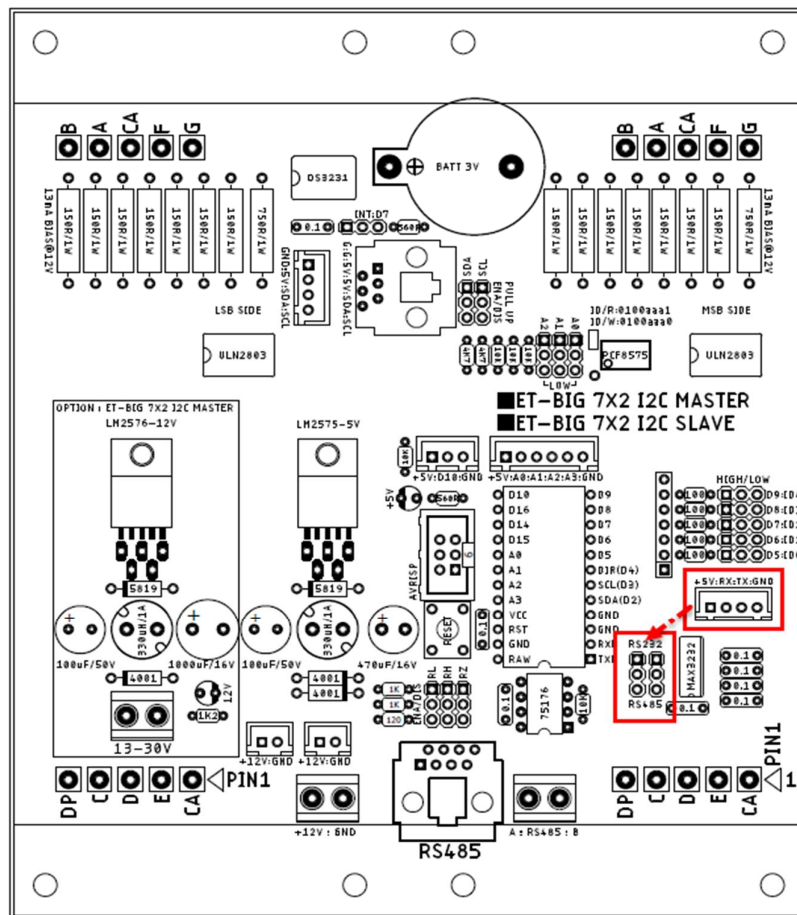


It shows feature of Connector +12V Power Supply internal Connector 2Pin Wafer, 2Pin Terminal and RJ45 of Board ET-BIG 7X1 and ET-BIG 7X2.

# MANUAL OF BOARD ET-BIG 7SEG I2C SET

## RS232

Port Communication of PRO MICRO 32U4 of Board ET-BIG 7X2 MASTER, especially in a part of Serial1, uses Serial Signal D0:D1 to be Serial Port Communication. Circuit Line Driver of Signal can be chose and setup either to be RS232 or Signal RS485 by setting Jumper; if Jumper is set as RS232, Connector type must be 4Pin Wafer 2.5mm as shown in the picture below;

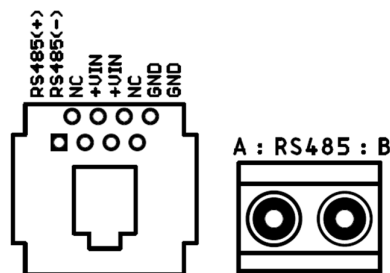
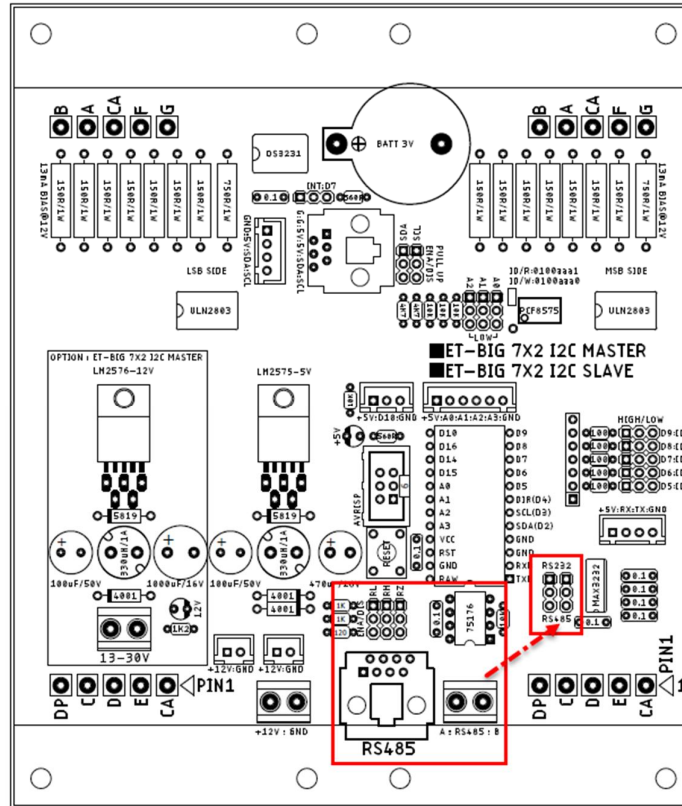


It shows position of Signal RS232 internal Connector 4Pin Wafer of Board ET-BIG 7X2 MASTER.

# MANUAL OF BOARD ET-BIG 7SEG I2C SET

## RS485

If Signal Serial1 of Board ET-BIG 7X2 MASTER is set as RS485, the Connector type must be 2Pin Terminal 5mm. or RJ45 Female as shown in the picture below;



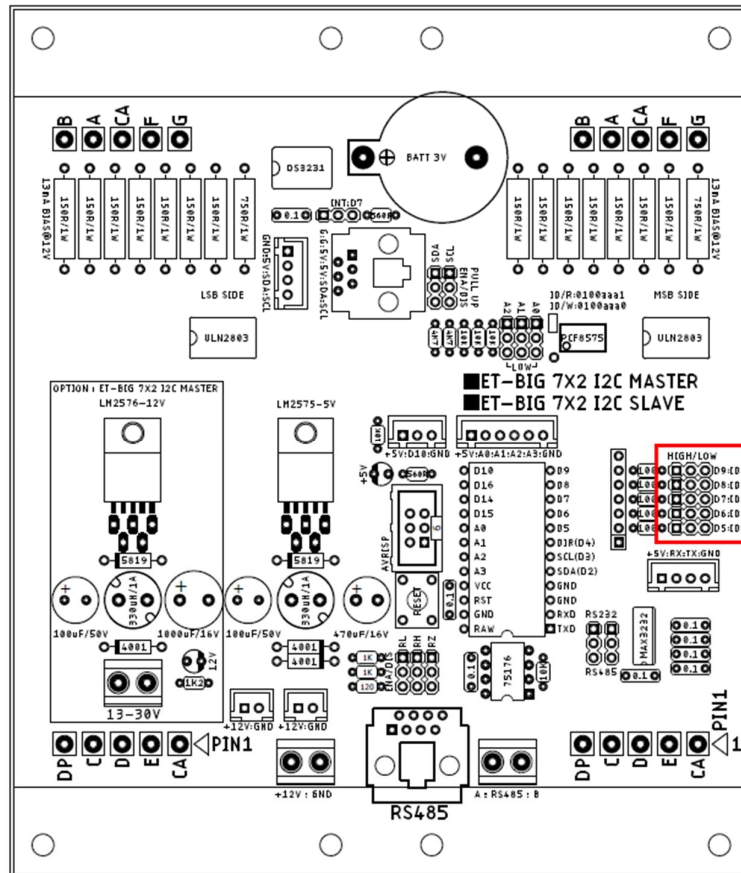
1	2	3	4	5	6	7	8
RS485(+):A)	RS485(-):B)	NC	+VIN(12V)	+VIN(12V)	NC	GND	GND

It shows arrangement of Signal RS485 internal Connector RJ45.

# MANUAL OF BOARD ET-BIG 7SEG I2C SET

## HOW TO SETUP IDE CODE BY JUMPER

If Board ET-BIG 7X2 MASTER is used as RS485, it has to set JUMPER on Board to choose Logic for Signal GPIO D5-D9; it will be applied to setup 32 positions of ID Code as shown in the picture below;



HIGH/LOW



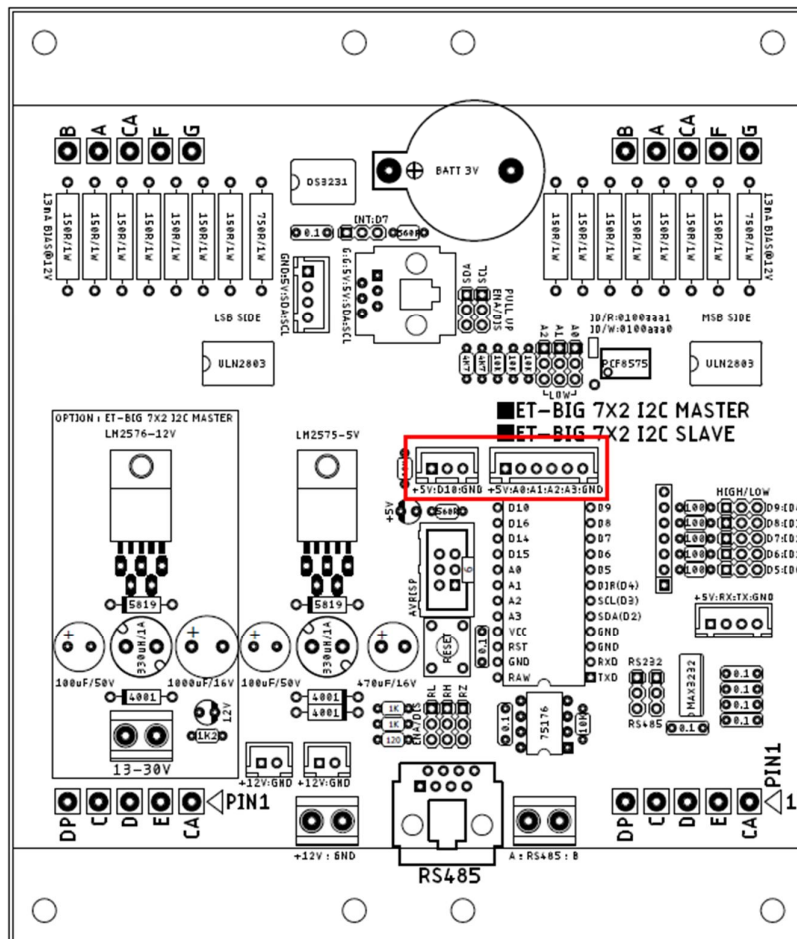
It shows how to set Jumper to setup ID Code RS485 of Board ET-BIG 7X2 MASTER.

# MANUAL OF BOARD ET-BIG 7SEG I2C SET

## SIGNAL GPIO

There are 5 allocated Signal GPIO on Board ET-BIG 7X2, user can choose and use these signals independently as follows;

- **D5** uses Connector 3Pin Wafer Male to be connecting point.
- **A0-A3** uses Connector 6Pin Wafer Male to be connecting point.

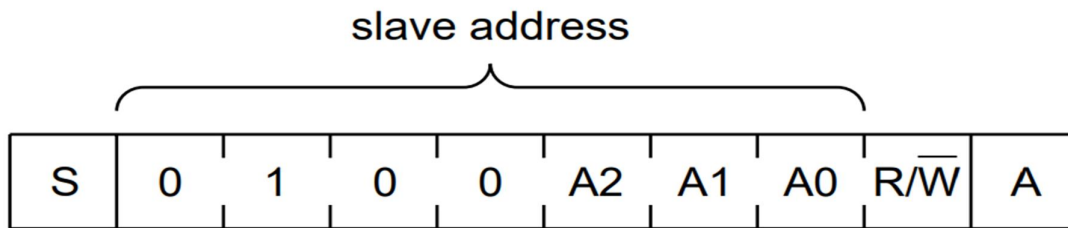


It shows feature of Signal D10 internal Connector 3Pin Wafer and feature of Signal A0-A3 internal Connector 6Pin Wafer of Board ET-BIG 7X2 MASTER.



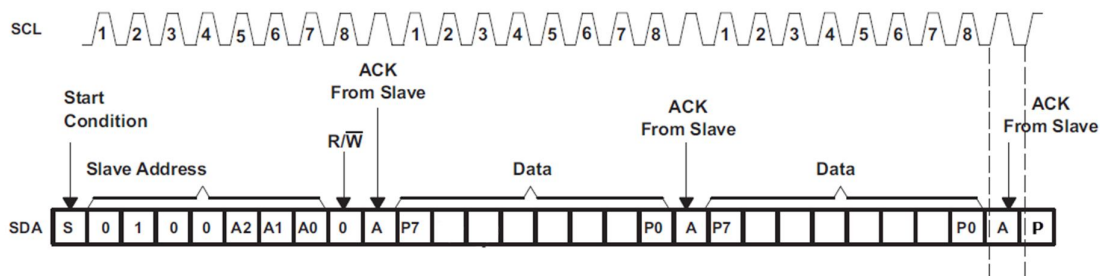
## HOW TO CONTROL DISPLAY OF BOARD ET-BIG 7SEG I2C

Board ET-BIG 7SEG I2C uses CHIP PCF8575 to control and command the display of 7 SEGMENT; it receives Signal I2C BUS in the format of Slave Device and feature of Control Byte Code for communication is shown in the picture below;



**It shows feature of Control Byte Code of PCF8575 (A0,A1,A2 is set by Jumper on board).**

It uses PCF8575 in OUTPUT Mode to control and command the display of 7SEGMENT. The communication's format starts when Master sends Start Condition and follows by 1 Byte Control Byte Code of PCF8575 for writing data. When PCF8575 received this Control Byte Code completely, it answers the command with Acknowledge Bit; next, Master can send the next data to control the display of the first digit and the second digit of 7-SEGMENT, respectively. Every Byte Data that is sent out by Master, PCF8575 always answers the command with Acknowledge Bit. When Master sends the Start Condition, followed by the Control Byte Code and 2 Byte Data, respectively and completely, it always sends Stop Condition to end the communication as shown in the picture below;

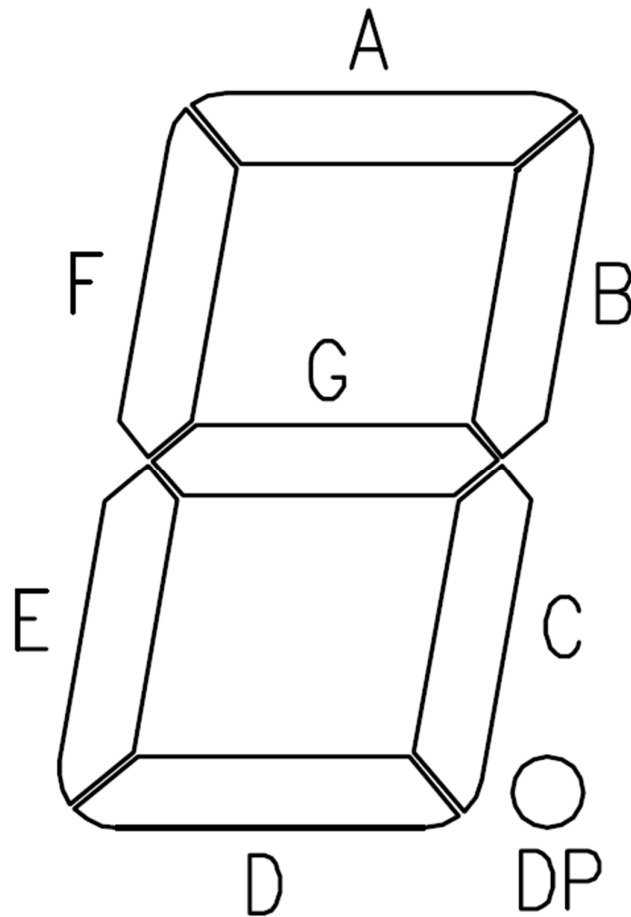


**Picture shows how to command 7SEGMENT DISPLAY of PCF8575 (A0,A1,A2 is set by Jumper on board).**



## BIT DATA FOR CONTROL OF 7-SEGMENT DISPLAY

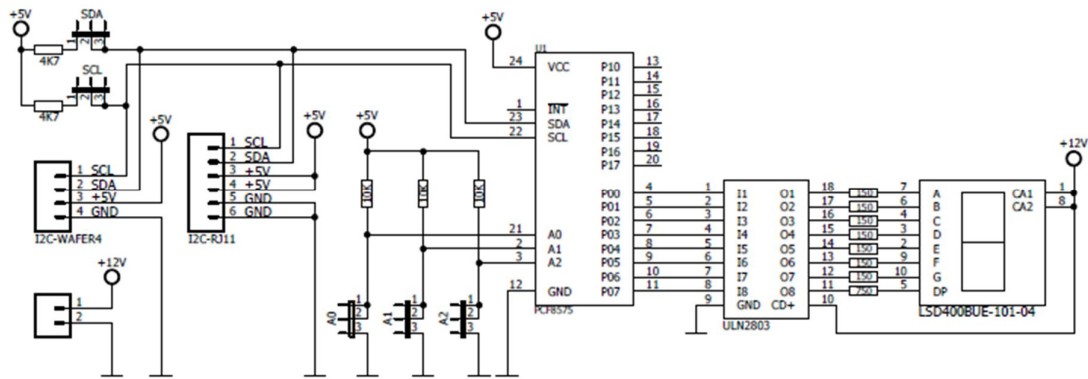
It uses 1 Byte Data to control each digit of display of 7-SEGMENT; the HIGH Data made the LED Display lit up; but, the LOW Data made the LED Display turned off. It uses BIT D0-D6 to control the display of SEGMENT A-G in alphabetical order; and it uses BIT D7 to control the display of SEGMENT-DP as follows;



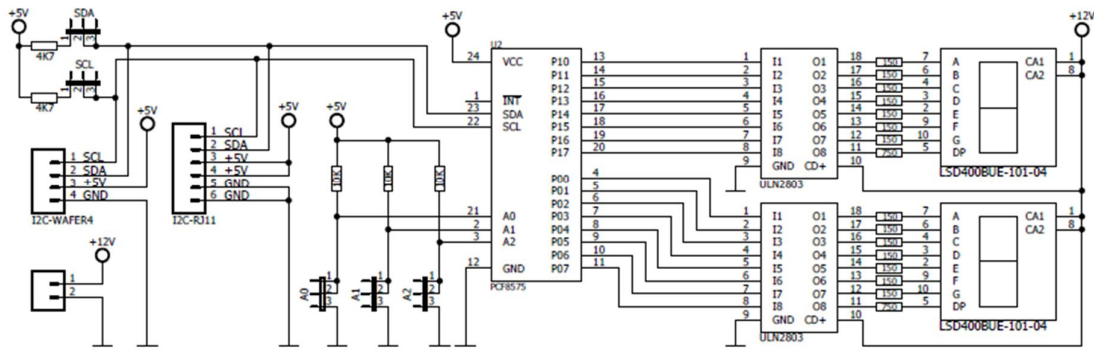
7 SEGMENT	DP	G	F	E	D	C	B	A
Data Byte	D7	D6	D5	D4	D3	D2	D1	D0

Table shows position of Bit Data to control the display of 7SEGMENT.

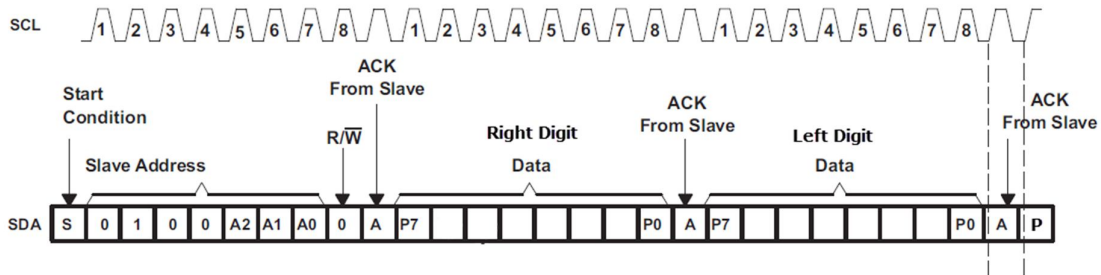
# MANUAL OF BOARD ET-BIG 7SEG I2C SET



Picture shows Circuit in the part of Display of ET-BIG 7X1 I2C.



Picture shows Circuit in the part of Display of ET-BIG 7X2 I2C.



It shows how to command 7-SEGMENT Display of Board ET-BIG 7SEG I2C.

# MANUAL OF BOARD ET-BIG 7SEG I2C SET

---

## Example of writing program by Arduino

```
#include <Wire.h>                                // I2C Bus

void setup()
{
    Wire.begin();                                // Initial I2C Bus
}

void loop()
{
    Wire.beginTransmission(0x20);                // Begin Write PCF8575 = 0100,000+(0:W)
    Wire.write(0x3F);                            // Right Digit Display "0" : 00111111
    Wire.write(0x30);                            // Left Digit Display "1" : 00110000
    Wire.endTransmission();                      // End I2C

    delay(1000);

    Wire.beginTransmission(0x20);                // Begin Write PCF8575 = 0100,000+(0:W)
    Wire.write(0x00);                            // Right Digit Clear Display
    Wire.write(0x00);                            // Left Digit Clear Display
    Wire.endTransmission();                      // End I2C

    delay(1000);
}
```

**It shows an example program to command the display of ET-BIG 7SEG I2C.**