This manual is suitable for TT_M3HQ and TT_M4G9 development boards designed and manufactured by Thunder Software Technology Co., Ltd.

In this paper, TT_M3HQ and TT_M4G9 development boards are referred to as development boards. For TT_M3HQ and TT_M4G9, please refer to the following links for details.

Official	TT_M3HQ	https://www.thundersoft.com/index.php/iot/kit/m3hq/3-126
	TT_M4G9	https://www.thundersoft.com/index.php/iot/kit/m4g9/3-127
mbed	TT_M3HQ	https://os.mbed.com/platforms/TT-M3HQ/
	TT_M4G9	https://os.mbed.com/platforms/TT-M4G9/

For the Heart rate sensor BH1790GLC, used in this manual, please refer to the following links, referred to as the Test Sensor in this article.

Rohm Official	https://www.rohm.com/sensor-shield-support/heart-rate-sensor
mbed	https://os.mbed.com/components/BH1790GLC-Optical-Heart-Rate-Sensor/

Precautions No.1:

The final version of the development board is not equipped with the following extension connectors. If you need to use them, please solder the extension connectors or jump wire by yourself.
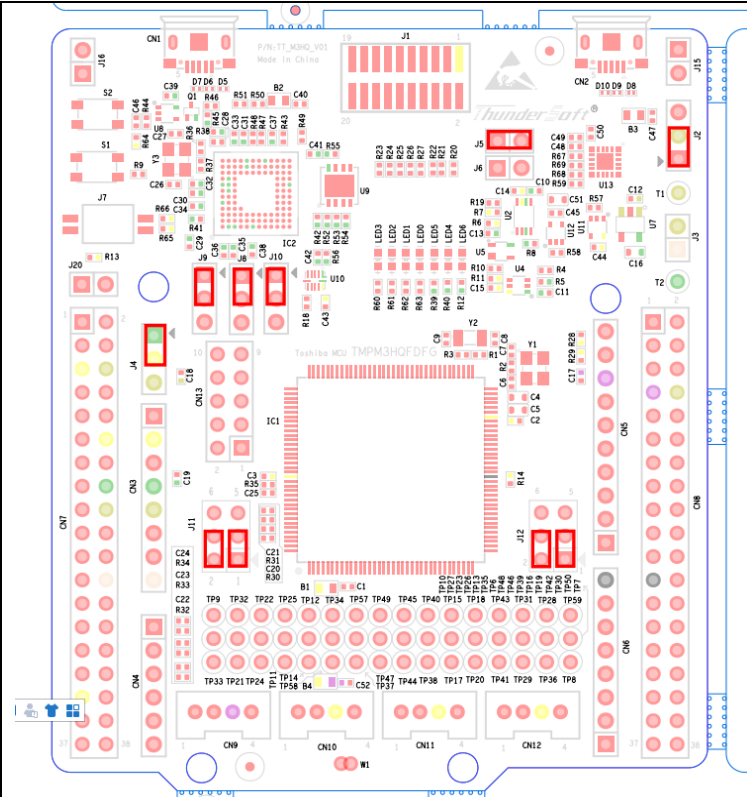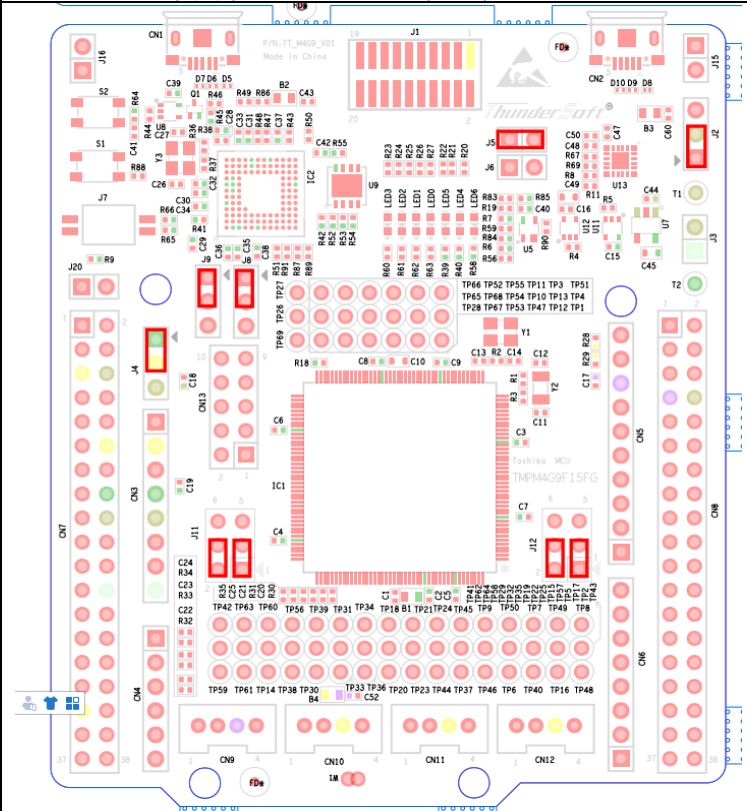
TT_M3HQ	TT_M4G9
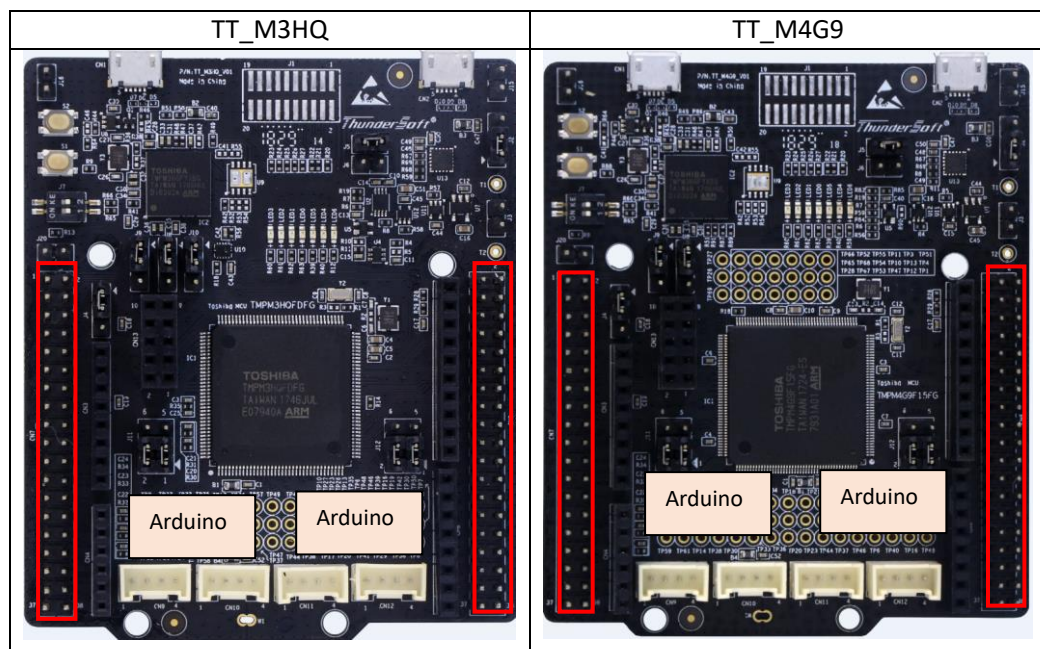
Precautions No.2:
Please confirm that the jumper caps are installed correctly as below before use.
(The jumper caps are installed according to the default state in factory. However, the
jumper caps may fall off during use, which may cause the board to fail to start.)

TT_M3HQ	
TT_M4G9	

Operation steps：

Step1: Download the corresponding test code from the official website or mbed website, as shown below.

Step2: Compile source code

Developers can compile code in command line tools with the following commands.

| TT_M3HQ | mbed compile -t GCC_ARM -m TT_M3HQ -D TEST_BH1790GLC |
| TT_M4G9 | mbed compile -t GCC_ARM -m TT_M4G9 -D TEST_BH1790GLC |

Step3: Connect development board, Test Sensor (and LCD).
Schematic diagram of development board:

TT_M3HQ	TT_M4G9

Schematic diagram of connection:

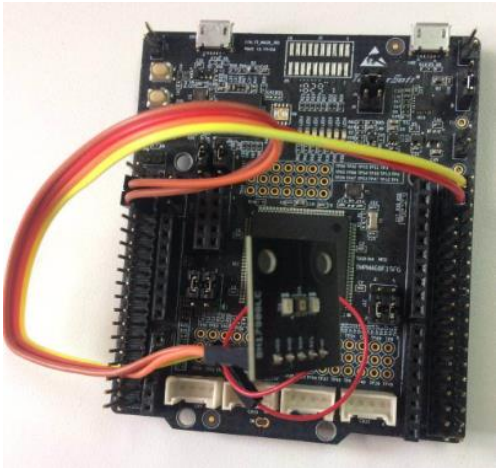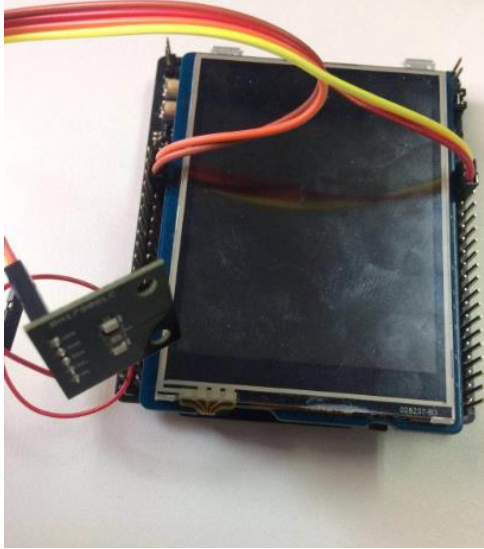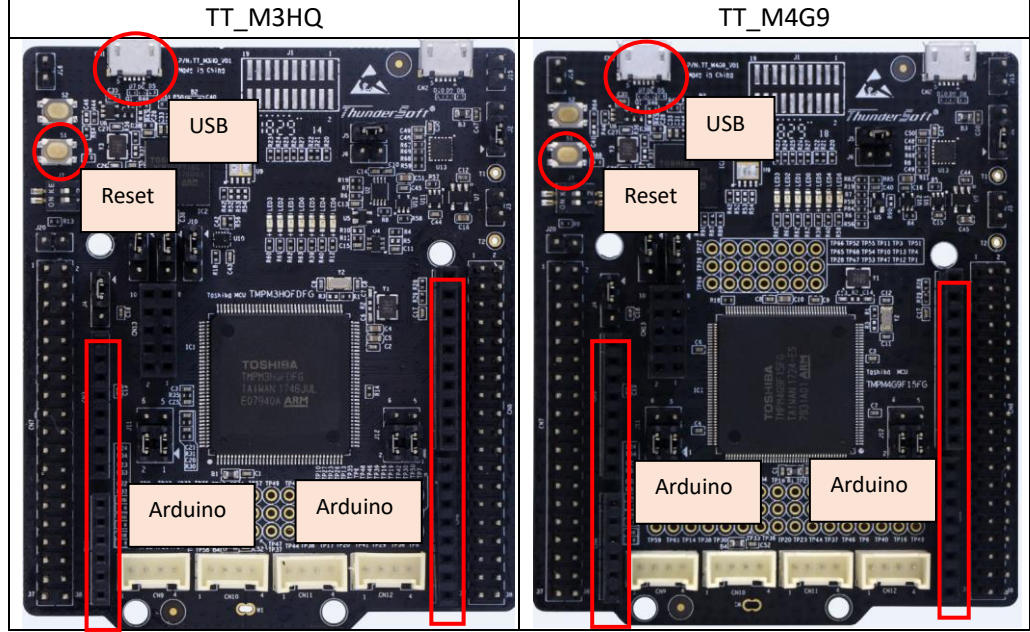| Test Sensor	Test Sensor + LCD Unit
Connect the development board and Test Sensor through DuPont line, as follows ・Test sensor 3.3v interface connects with development board CN7 pin6 ・Test sensor GND interface connects with development board CN7 pin8 ・Test sensor SCL interface connects with development board CN8 pin 3 ・Test sensor SDA interface connects with development board CN8 pin5	Connect the development board with the specified LCD through the Arduino interface, and connect the development board with the Test Sensor via the DuPont line, as follows ・Test sensor 3.3v interface connects with development board CN7 pin6 ・Test sensor GND interface connects with development board CN7 pin8 ・Test sensor SCL interface connects with development board CN8 pin 3 ・Test sensor SDA interface connects with development board CN8 pin5 ※：LCD is the designated LCD of the Thunder Software Technology Co., Ltd.Please refer to「LCD HX8347D Manual.doc」

Step4:Burn .bin file：
After connecting the development board and PC through USB, the following symbols appear.

TT_M3HQ	TT_M4G9
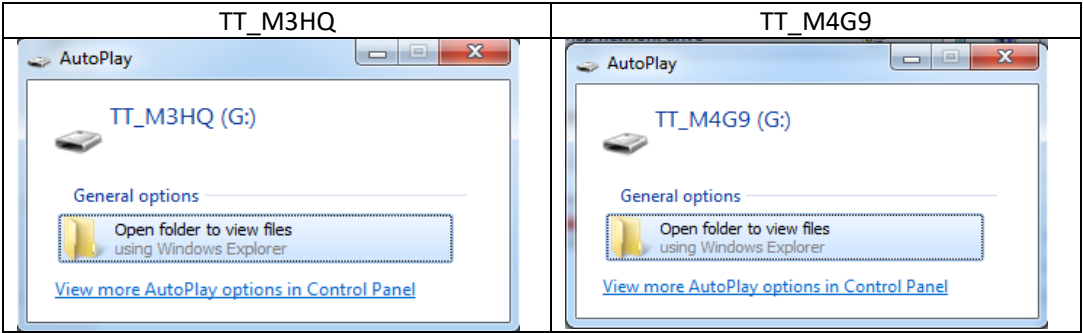
Then drag and drop (or copy) the .bin file compiled in Step2 to the corresponding symbols. After the drag and drop (copy) is completed, press the reset key, and the following output will appear.

	Serial port Log output	LCD output
Output format	Welcome to Thundersoft TT_M3HQ sensor1 id = 0xxx sensor2 id = 0xxx sensor3 id = 0xxx sensor1 data = sensor2 data = sensor3 data =	Welcome to Thundersoft TT_M3HQ sensor1 id = 0xxx sensor2 id = 0xxx sensor3 id = 0xxx sensor1: data sensor2: data sensor3: data
Output example	Welcome to Thundersoft TT_M4G9 BH1790GLC Decide Id = 0xd BH1790GLC data = 3310,3371 BH1790GLC data = 3835,4004 BH1790GLC data = 4110,4018 BH1790GLC data = 3995,3972 BH1790GLC data = 4172,4064 BH1790GLC data = 4164,4098 BH1790GLC data = 3961,3926	

The developer can compile and write the program to the development board through IAR / KEIL after getting the code. This article will not introduce the use of IAR and KEIL, so the developer can debug it by himself.