Demo Board Manual

megawin

MG32F02U

USB+LCD Demo Set

Using Manual

Version 1.1

Date 2021/7/21

List of Contents

1. Introduction

PCB Version

MG04-04A(MG32F02U_LCD)

Features

1. 8080 LCD Display: Display picture on 240x320 LCD through EMB interface.
2. SPI LCD Display: Display picture on 240x320 LCD through SPI interface.
3. USB Device: USB 2.0 Full-Speed Device for external USB host connection.
4. Key Input Control: Detect multi-key input by SARADC and show message on LCD.
5. Shuttle Key: Detect shuttle key input by Timer QEI and show message on LCD.
6. Audio Out: Audio output from DAC output through audio amplifier.
7. RGB LED Display: Show coloring RGB LEDs by TMx or software GPIO PWM control.
8. Multi-Function Module: Phone In/Out / MA111 Module.
9. I2C Module: I2C 24Cxx EEPROM and I2C Module (Thermometer, Sensor …).
10. SPI Module: SPI Flash and SPI Module.
11. BLE Module: BLE Module through SPI/UART communication.
12. ARGB LED Display : Show addressable RGB LEDs

System Block

2. PCB Information
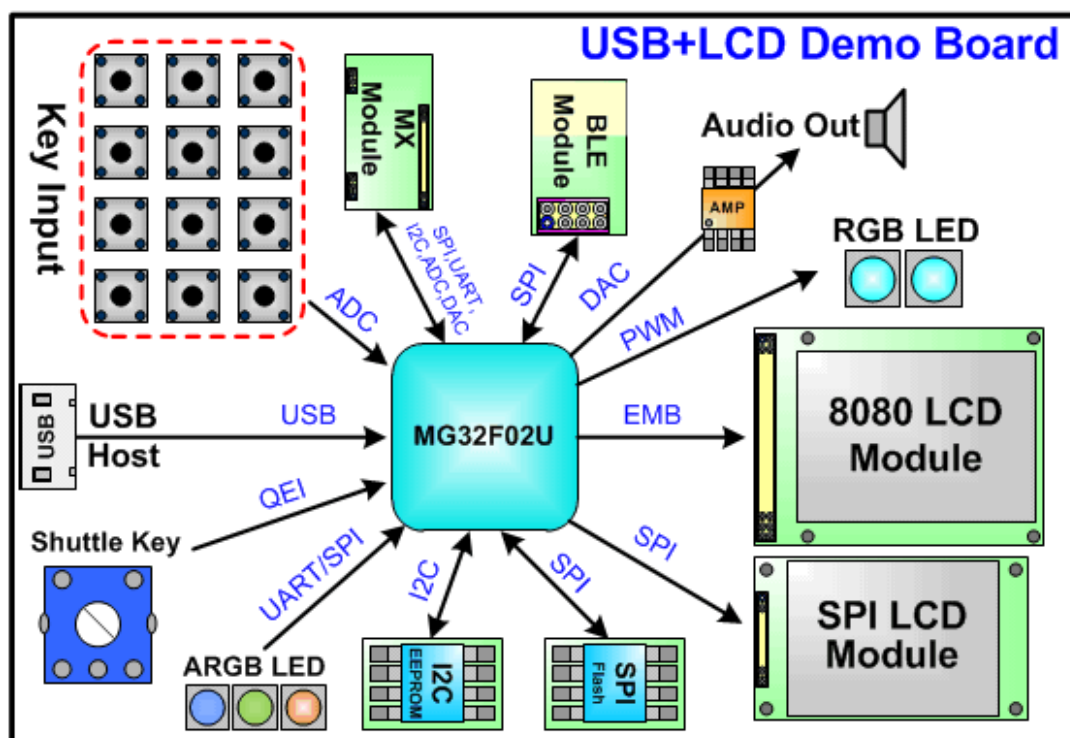
PCB Placement and Function Block Diagram

Main Board Pictures
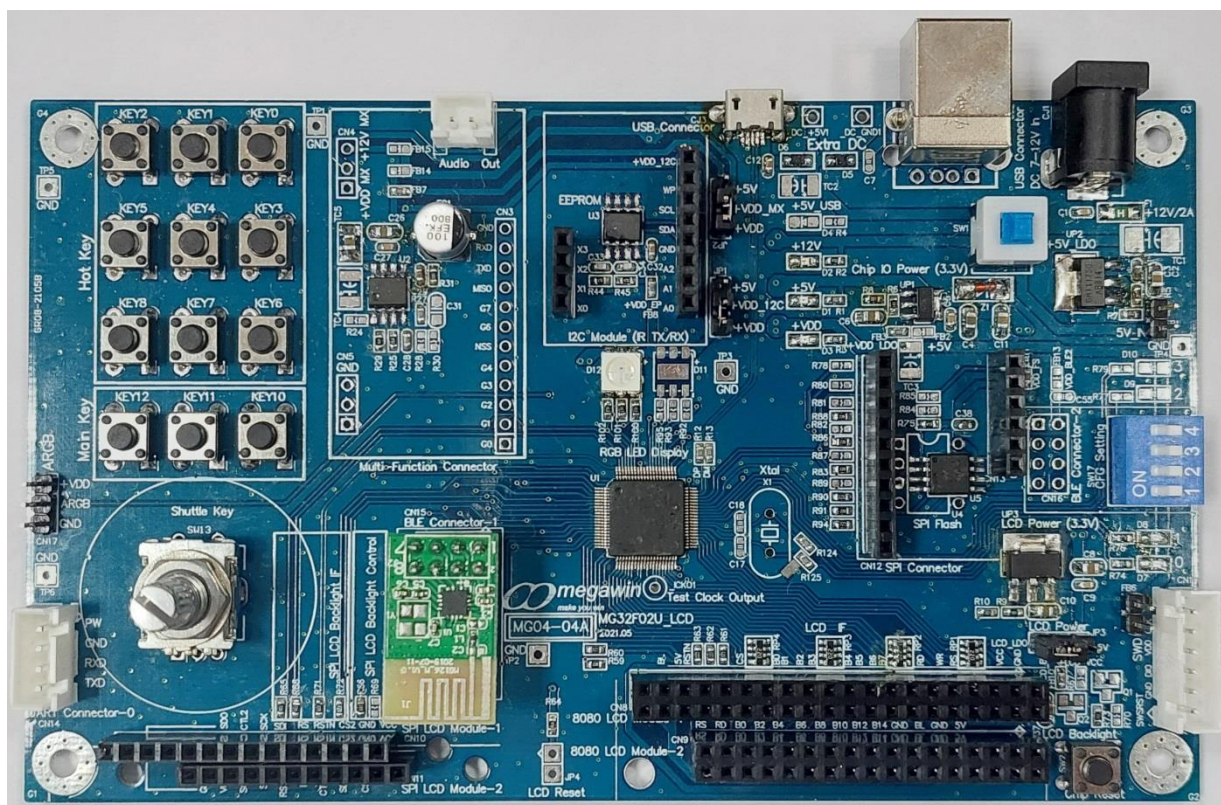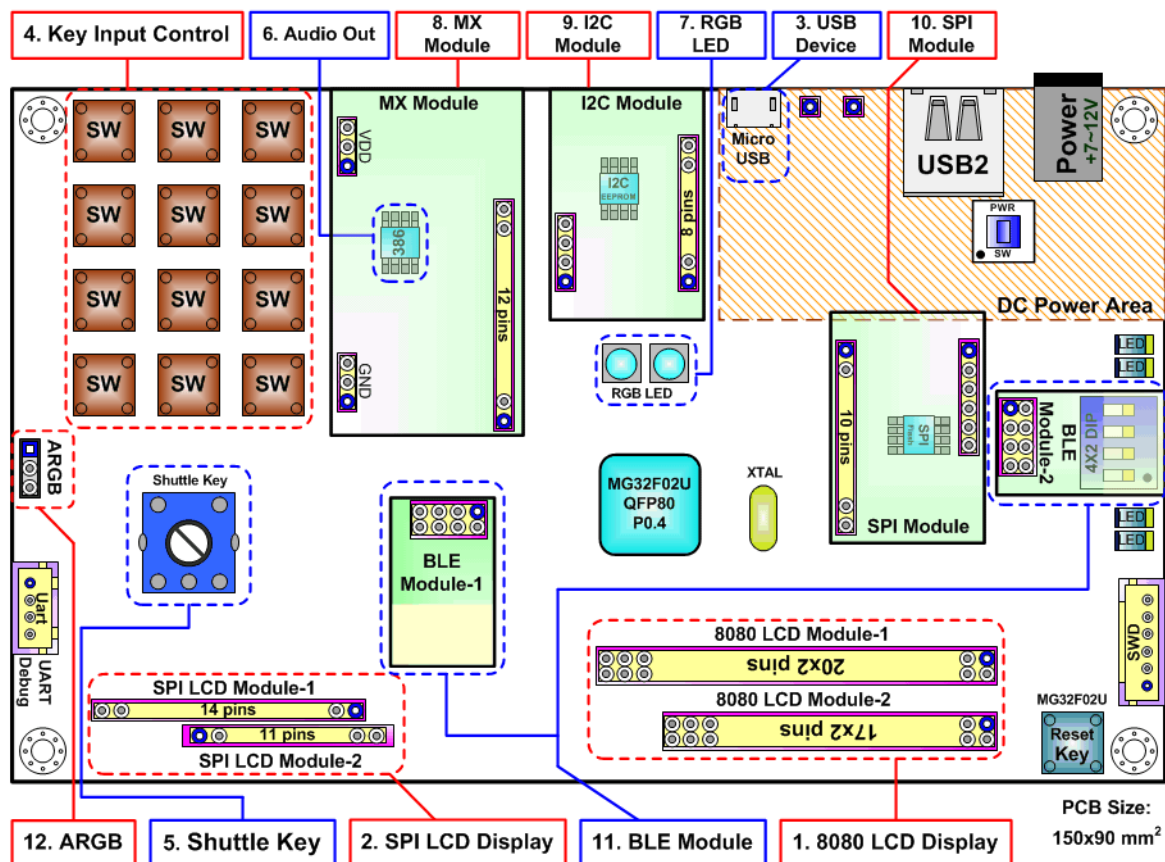
PCB Outline and Options

◆ **DC Input Power Source**

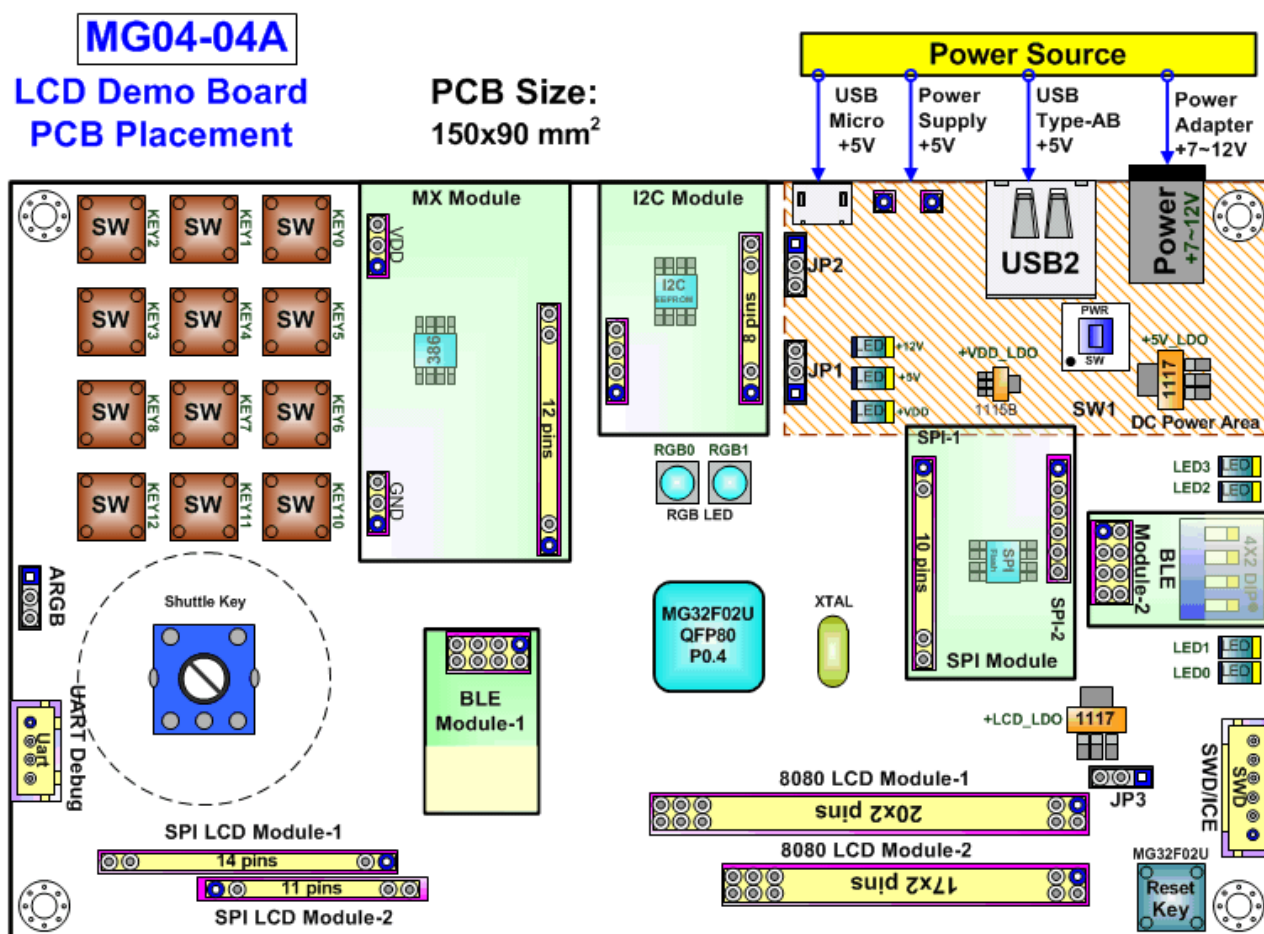User can input +5 volt DC power to the Micro USB connector, the optional A/B-type USB connector from external USB power source or on board +5V/GND connection holes from external power supply. The push button SW1 is used to turn on/off the input DC +5V power.

These is one optional +7~12 volt DC input to the DC power jack from external power adapter. The input +7~12 volt DC power can also generate the +5 volt DC power by through the optional +5V_LDO power regulator.

◆ **SWD Connector**

User can connect the MG32F02U128 MCU to the external SWD controller or debug ICE by through the SWD connector.

◆ **UART Connector**

User can connect the MG32F02U128 MCU to the external UART controller or PC COM port by through the UART Debug connector.

◆ **ARGB Connector**

User can connect the MG32F02U128 MCU to the external ARGB LED strip line.

◆ **JP1 : I2C module power option**

Pin-1,2 short : +VDD (+VDD LDO power regulator)

Pin-2,3 short : +5V

◆ **JP2 : MX module power option**

Pin-1,2 short : +VDD (+VDD LDO power regulator)
Pin-2,3 short : +5V

◆ **JP3 : LCD module power option**

Pin-1,2 short : +5V
Pin-2,3 short : +LCD_LDO (1117 LDO power regulator)

◆ **RGB LED**

There are two RGB LED parts which include one on-board RGB0 and one optional RGB1.

◆ **Mono LED**

There are four mono LED parts which include two on-board LED0/LED1 and two optional LED2/LED3.

Module Board and Components

1. MG32F02U128 : 32-Bit CM0 MCU with USB/UART/SPI/I2C/8080-LCD interfaces

2. 8080 TFT LCD Module : Display LCD with 8080 interface

ILI9325 LCD Module

8080 LCD Module-1

3.2TFT-ILI9341   (240x320)(TFT-320QVT-9341)
2.4TFT-ILI9325   (240x320)
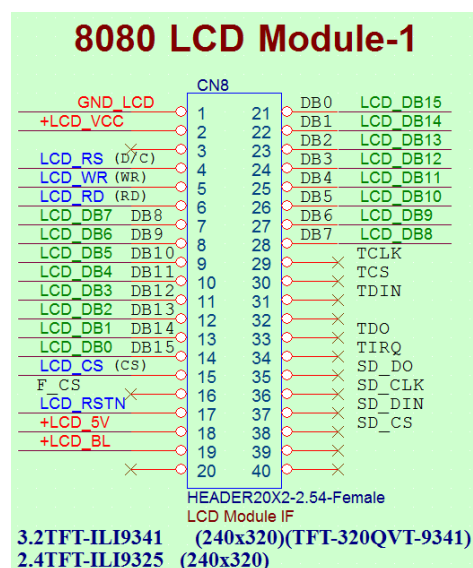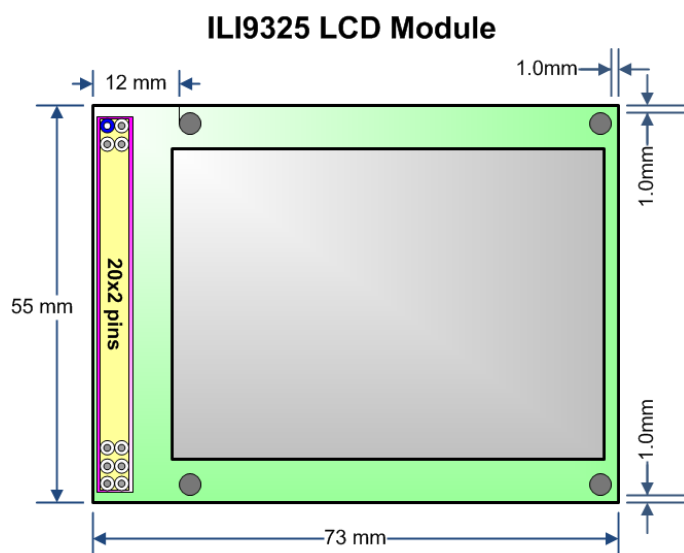
3. SPI TFT LCD Module : Display LCD with SPI interface

ILI9341 2.2" 240x320 SPI TFT LCD

8080 LCD Module-2

4.3TFTLCD   (480x800)(ALIENTEK-NT35510)
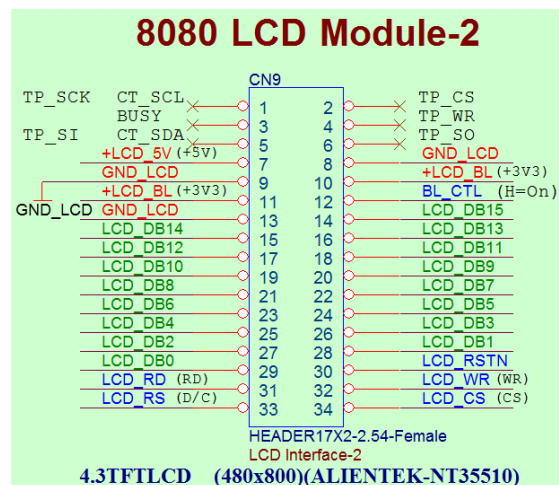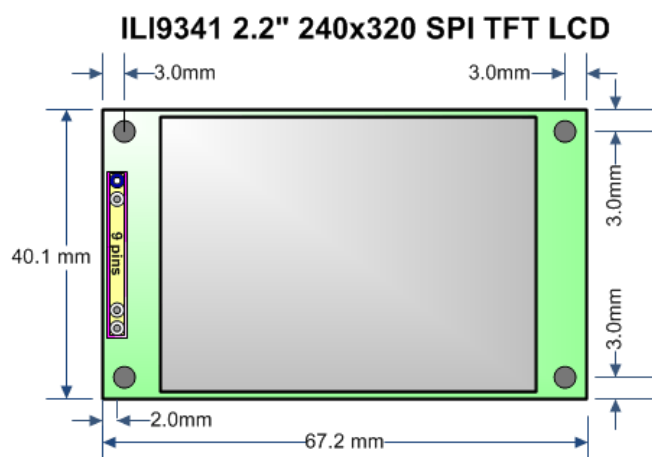
4. Multi-Function Module : Module board by UART/SPI/I2C communication interface

Muti-Fun Module

1.82mm

12 pins

25 mm
2.52mm

VDD
GND

5.08mm 4.36mm
45 mm
2.16mm

Multi-Function Connector

CN3
1 — MX_G0
2 — MX_G1 RX
3 — MX_G2 TX
4 — MX_G3
5 — MX_G4
6 — MX_NSS
7 — MX_G6 SD3
8 — MX_G7 SD2
9 — MX_MISO SD1
10 — MX_TXD SDA/SCK
11 — MX_RXD SCL/MOSI
12 — MX_G11
HEADER12
MF Connector-1
Pitch 2.54mm/Female

CN4
1 — +VDD_MX
2
3 — +12V_MX
HEADER_3
MF Connector-2
Pitch 2.54mm/Female

CN5
1
2
3 — GND
HEADER_3
MF Connector-3
Pitch 2.54mm/Female
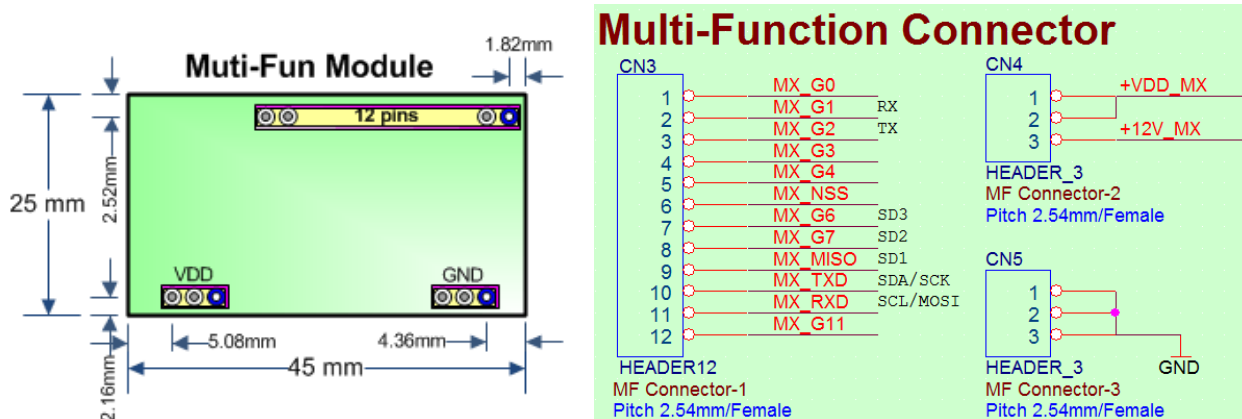
5. SPI Module : SPI flash memory to store LCD display and others raw data

SPI Module

SPI-2

20 mm 2.0mm

SPI-1

10 pins

5.0mm
30 mm
2.0mm

SPI Connector

CN12
FLASH_D5 — 1
FLASH_D6 — 2
FLASH_D7 — 3
FLASH_D4 — 4
FLASH_D1 — 5
FLASH_CEN — 6
FLASH_D2 — 7
FLASH_D3 — 8
FLASH_D0 — 9
FLASH_SCK — 10
SPI-1 Connector
HEADER10
Pitch 2.54mm/Female

CN13
FLASH_CEN2 — 1
+VDD_FS — 2
FLASH_AUX — 3
FLASH_DQS — 4
FLASH_RSTN — 5
6
SPI-2 Connector
GND HEADER6
Pitch 2.54mm/Female
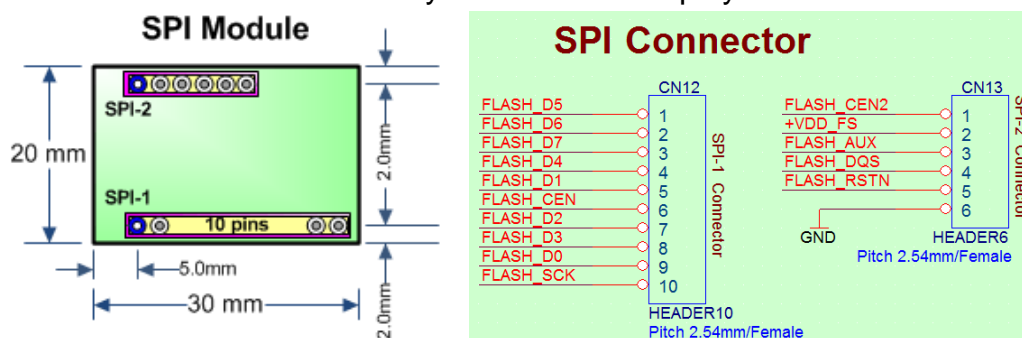
6. I2C Module : Module board by I2C communication interface

I2C Module

I2C-2

20 mm 2.0mm

8 pins I2C-1

5.0mm
30 mm
2.0mm

I2C Module (IR TX/RX)

CN6
1 — I2C_A0
2 — I2C_A1 IR_RX
3 — I2C_A2 IR_TX
4 — GND
5 — I2C_SDA (IR_RX)
6 — I2C_SCL
7 — I2C_WP (IR_TX)
8 — +VDD_I2C
HEADER8-2.54-Female
I2C-1 Connector
Pitch 2.54mm/Female

CN7
1 — I2C_AUX0
2 — I2C_AUX1
3 — I2C_AUX2
4 — I2C_AUX3
HEADER4-2.54-Female
I2C-2 Connector
Pitch 2.54mm/Female

GND
GND
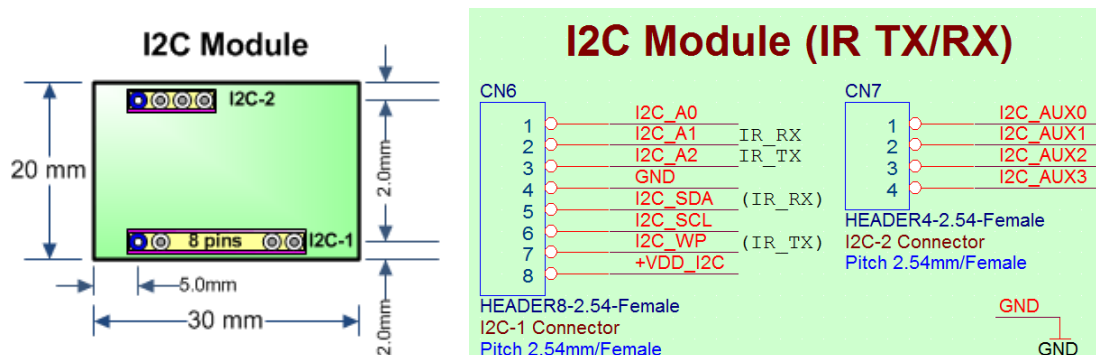
7. BLE Module : BLE module board by SPI communication interface

BLE Module

21.9 mm 1.75mm

126

13.5 mm
2.2mm

BLE Connector

+VDD_BLE +VDD
FB12 NC

CN15 NC
(CT) 1 2 — BL_NSS (CSN) FB_0603
GND BL_SCK (SCK) 3 4 — BL_MOSI (MOSI) C54
BL_MISO (MISO) 5 6 — BL_IRQ (IRQ) 1uF
7 8 NC
HEADER4X2-Female GND
BLE Interface

PCB Power Connection
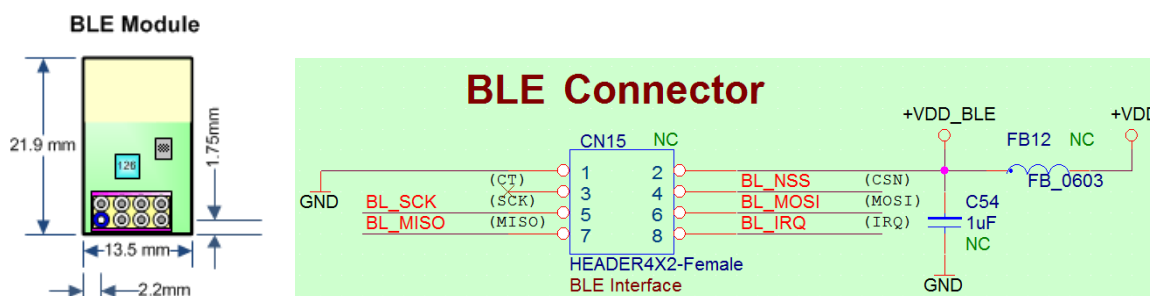
Power Connection Diagram

PCB Assembly
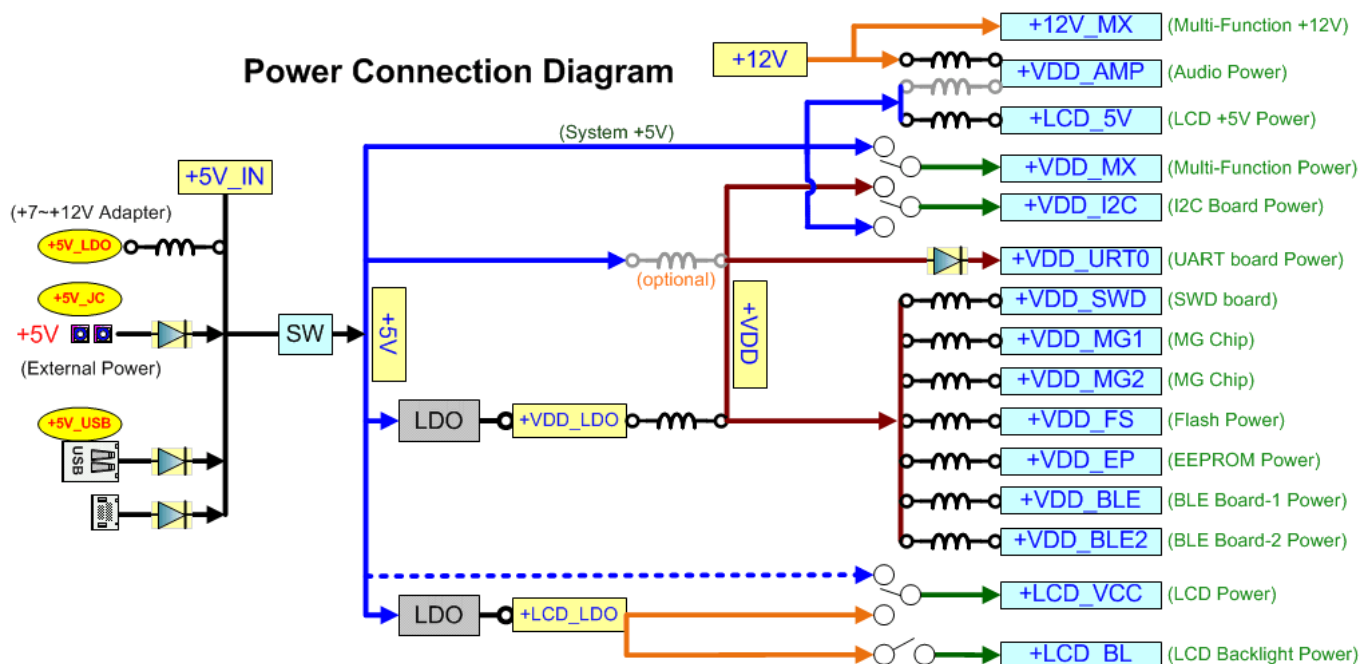
3. Key Matrix Control

Key Matrix and Shuttle Key

- The keys of A1, A2, A3, B1, B2, B3, C1, C2 and C3 are used as hot key control.
- The keys of D, E, F or Shuttle key are used for main menu control.

Key Matrix Function Mapping

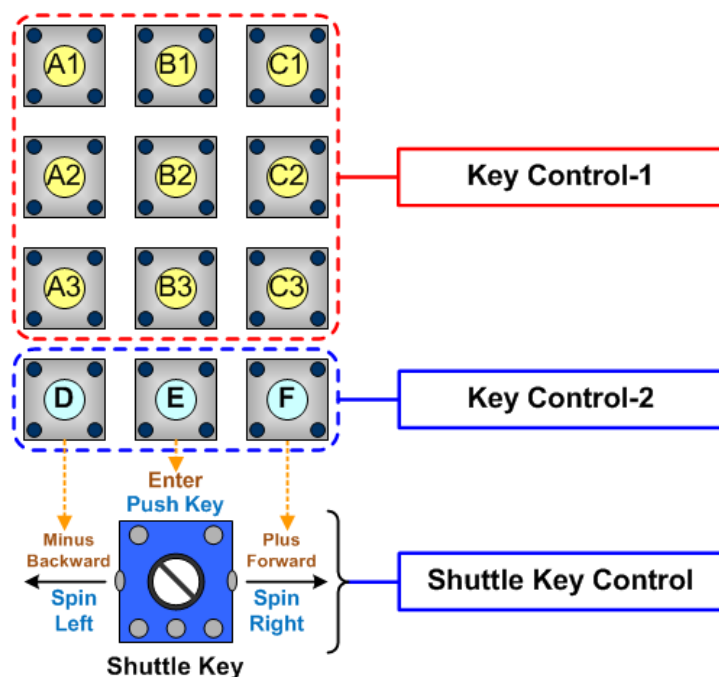|			
Hot Key Control	**A1** <RGB LED> Blinking	**B1** <RGB LED> Breathing	**C1** <RGB LED> Spectrum
	A2 <Multimedia> Minus/Forward (-)	**B2** <Multimedia> Play/Pause (▶II)	**C2** <Multimedia> Plus/Backward (+)
	A3 <Menu Jump> Return Root Menu	**B3** <Menu Jump> Jump Audio Music	**C3** <Menu Jump> Jump Audio Play
Main Key	**D** <Menu Down> Minus or Change Front (-)	**E** <Menu Enter> Function Select	**F** <Menu Up> Plus or Change Next (+)

RGB LED Display Control
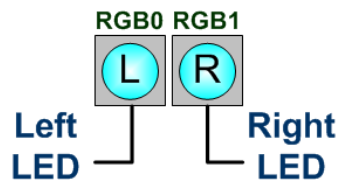
◆ **RGB LED Display Modes**

1. Spectrum
2. Breathing
3. Blinking
4. Stop (Disabled LED)

◆ **RGB LED Display Mode Setting**

User can directly set the display mode 1, 2 and 3 by pressing separated A1, B1 and C1 key for RGB LED.

Multimedia Control

User can directly control the multimedia Minus, Play/Pause and Plus by pressing separated A2, B2 and C2 key.

Menu Jump Control

User can directly jump to the Root menu, Audio menu "Music" item and Audio menu "Play" item by pressing separated A3, B3 and C3 key on LCD menu. When user presses C3 key, the LCD menu will jump to Audio menu "Play" item and play the selected music in Audio menu "Music" item selection directly.

4. LCD Display Control

LCD Display

The 8080 TFT LCD is used to show the demo functions' menu and LCD display demo patterns on the EMB connector. The SPI TFT LCD is used to show the demo information about hardware and firmware on the SPI LCD connector.
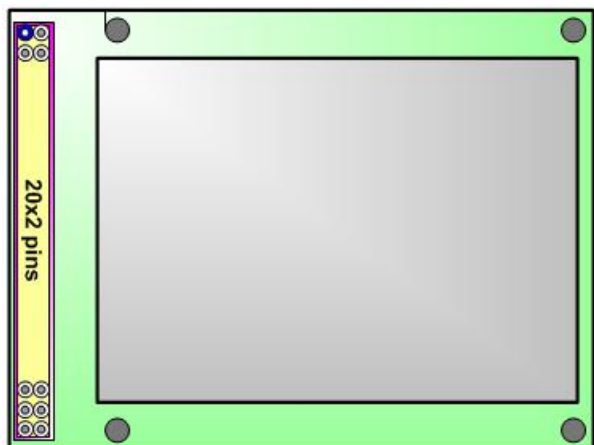
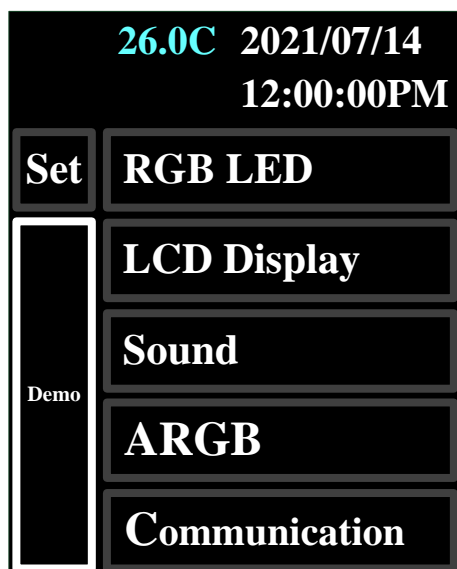**8080 TFT LCD Module**   **SPI TFT LCD Module**

Root Main Menu

User can press the keys of D, F or rotate the Shuttle key to select the function item. Press the key of E or the Shuttle key to enter the sub menu of selected function item.

LCD Display Auto Demo

User can select the 'Demo' to run the LCD auto display pattern showing on the 8080 interface TFT LCD.

The LCD demo PCB is automatically sequential showing the patterns of the display mode list after power on.

◆ **LCD Display Modes/Patterns**

1. Megawin Logo
2. MCU Feature Diagrams
3. Text
4. Gray Bar
5. Color Bar 1
6. Color Bar 2
7. Random Line
8. Random Rectangle
9. Random Circle
10. Random Geometry
11. Random Text

◆ **LCD Display Pattern Change**

User can change the screen display to front pattern or next pattern by pressing the D or F key when the display is freezing.

RGB LED Menu

This menu is used to demo on board RGB LED(s).

It is the same operation as Main Menu that user can select the sub function item and press the key of E or the Shuttle key to execute selected function item. Also user can select 'Back Return' to return Main Menu.
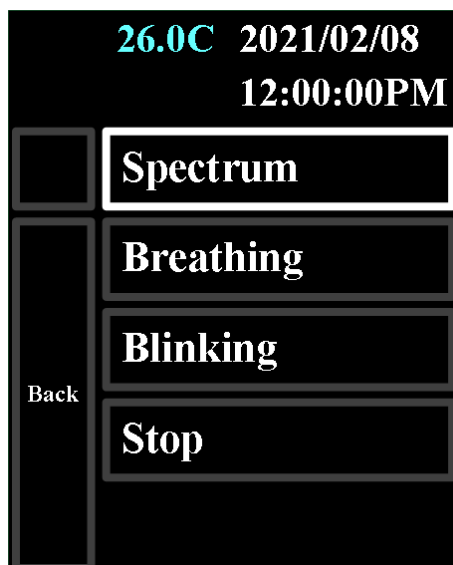
LCD Display Menu

This menu is used to demo the EMB LCD on the EMB connector.

It is the same operation as Main Menu that user can select the sub function item and press the key of E or the Shuttle key to execute selected function item. Also user can select 'Back Return' to return Main Menu.

```
26.0C  2021/02/08
       12:00:00PM
┌─────────────────────┐
│ Feature             │
├──────┬──────────────┤
│      │ Geometic     │
│      ├──────────────┤
│      │ Font         │
│ Back ├──────────────┤
│      │ Logo         │
│      └──────────────┤
└─────────────────────┘
```

Sound Menu

This menu is used to demo the MCU embedded DAC output function by through on board audio amplifier.
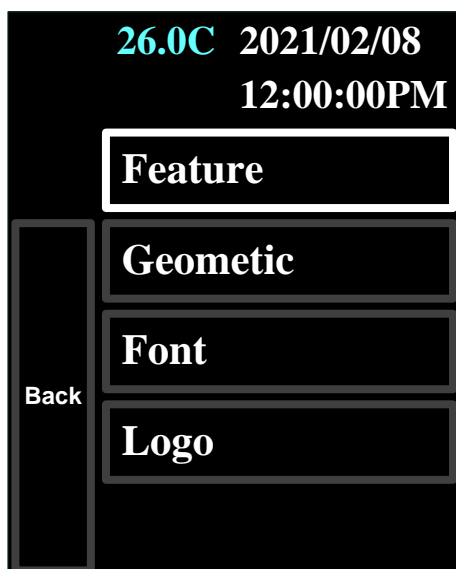
It is the same operation as Main Menu that user can select the sub function item and press the key of E or the Shuttle key to execute selected function item. Also user can select 'Back Return' to return Main Menu.

```
26.0C  2021/02/08
       12:00:00PM
┌─────────────────────┐
│ Music          1    │
├──────┬──────────────┤
│      │ Play         │
│      ├──────────────┤
│      │ Stop         │
│ Back ├──────────────┤
│      │ Volume    1  │
│      └──────────────┤
└─────────────────────┘
```

ARGB Menu

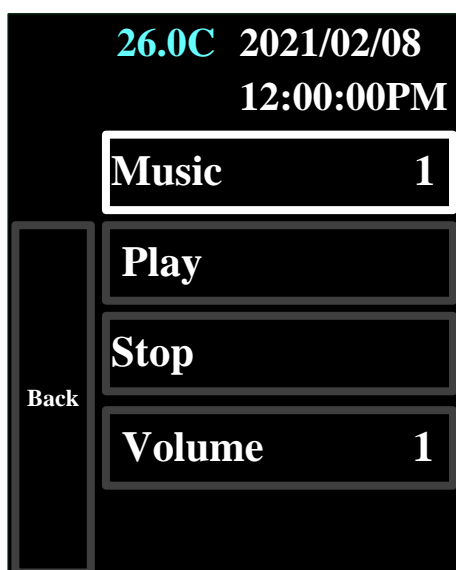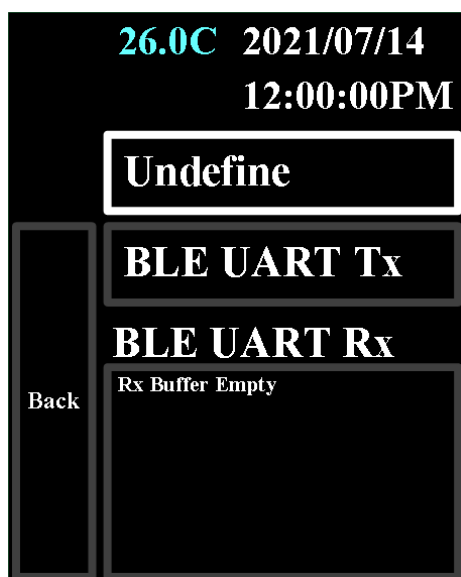This menu is used to demo the ARGB LED on the ARGB connector.

It is the same operation as Main Menu that user can select the sub function item and press the key of E or the Shuttle key to execute selected function item. Also user can select 'Back Return' to return Main Menu.

```
26.0C  2021/02/08
            12:00:00PM
       ┌──────────────────┐
       │ Static           │
       ├──────────────────┤
       │ Breath           │
       ├──────────────────┤
 Back  │ Wdrop            │
       ├──────────────────┤
       │ Moving 1         │
       ├──────────────────┤
       │ Moving 2         │
       └──────────────────┘
```

Communication Menu

This menu is used to enable and demo:

> (1) 'USB Multimedia': enable to do as Multimedia device and connect to the USB host by through the USB connector.
>
> (2) 'BLE UART Tx': enable the BLE module as UART Tx device on the BLE connector.
>
> (3) 'BLE UART Rx': enable the BLE module as UART Rx device on the BLE connector.

```
26.0C  2021/07/14
            12:00:00PM
       ┌──────────────────┐
       │ Undefine         │
       ├──────────────────┤
       │ BLE UART Tx      │
       ├──────────────────┤
       │ BLE UART Rx      │
 Back  │ Rx Buffer Empty  │
       │                  │
       │                  │
       └──────────────────┘
```

Set Menu

This menu is used to set:

(1) 'Idle Time': the idle time-out time. When the idle time is time-out, the LCD will be auto entering the auto Demo mode.

(2) 'Thermal DS1621': Select thermal detection device DS1612 or LM35DZ.

(3) 'Sync PC Time': MCU code update by through USB (DFU mode).

It is the same operation as Main Menu that user can select the sub function item and press the key of E or the Shuttle key to execute selected function item. Also user can select 'Back Return' to return Main Menu.
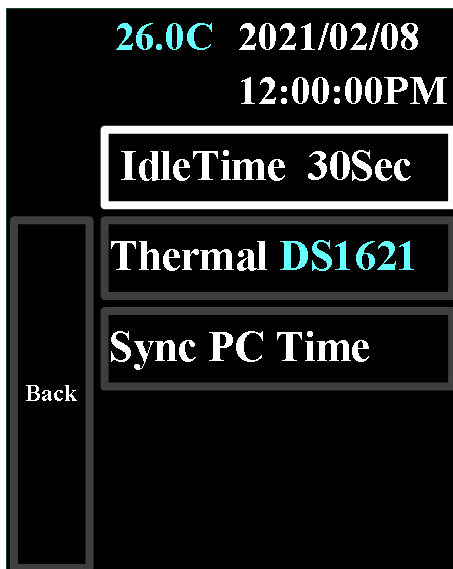
5. Test List

8080 TFT LCD Module List

1. ILI9325 : 240x320 TFT LCD

2. ILI9341 : 240x320 TFT LCD

3. NT35510 : 480x800 TFT LCD

SPI TFT LCD Module List

1. ILI9341 : 240x320 TFT LCD

Multi-Function Module List

1. DB05-04(Audio_InOut) : Micro Phone In /Audio Out (In/Out Amplifier LM358/LM386)

SPI Module List

1. DB01-02(SPI4_Flash) : SPI 4-Line Flash Board

I2C Module List

1. DB01-07(I2C_EEPROM) : I2C EEPROM Board
2. DB06-01(IR_TRX) : IR TX/RX Board
3. DB06-02A(Thermometer) : Thermometer(DS1621+LM35DZ)

BLE Module List

1. MacroGiga : MG126 BLE module

SPI Flash Part List

1. MXIC MX25L3206E 32M-bit
2. MXIC MX25L12835F 128M-bit
3. MXIC MX25R512F 512K-bit
4. Winbond W25Q16BV 16M-bit

ARGB Part List

1. Worldsemi : WS2812B

6. Revision History

Revision V1.1 (2021_0721)	Chapter
1	Update MG04-04A PCB diagrams.	
2	Add BLE module, ARGB module functions	
3	Add "LCD Display Auto Demo" section	4
4	Add "ARGB", "Communication" display menu on LCD	4
Revision V1.0 (2021_0423)	**Chapter**
1	Initial version	