

Board Test Manual

megawin

TH222A Board Testing

User Manual

Version 1.4

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by Lucas

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Introduction

This user manual provides the hardware connections and firmware test procedures for TH222A board testing. The board can be used to test or emulate multi functions of **megawin** M0 MCU. These functions are including of GPIO, UART, SPI, I2C, Timer, etc. The information is useful and important at the beginning of the board testing.

TH223A board is the **megawin** M0 MCU board. User must plug the TH223A board on the TH222A board then start to prepare testing.

◆ PCB Version

1. TH222A_M0ICE Mother Board_V10
2. TH223A_MG32F02A132_U128_Q80_ICE_DB_V11

◆ Code Version

1. TH222A_Test_Project V1.0

◆ Features

1. Test ARG LED module flow.
2. Test RGB LED module flow.
3. Test DIP switch module flow.
4. Test step motor module flow.
5. Test variable resistor module flow.
6. Test rotary encoder module flow.
7. Test buzzer module flow
8. Test RC servo motor module flow.
9. Test BLE module flow.
10. Test SPI Flash module flow.
11. Test EEPROM module flow.
12. Test 4 X 4 keyboard module flow.
13. Test Two colors dot matrix LED module flow
14. Test Seven Segment Display
15. Test 16*2 LCD display module flow.

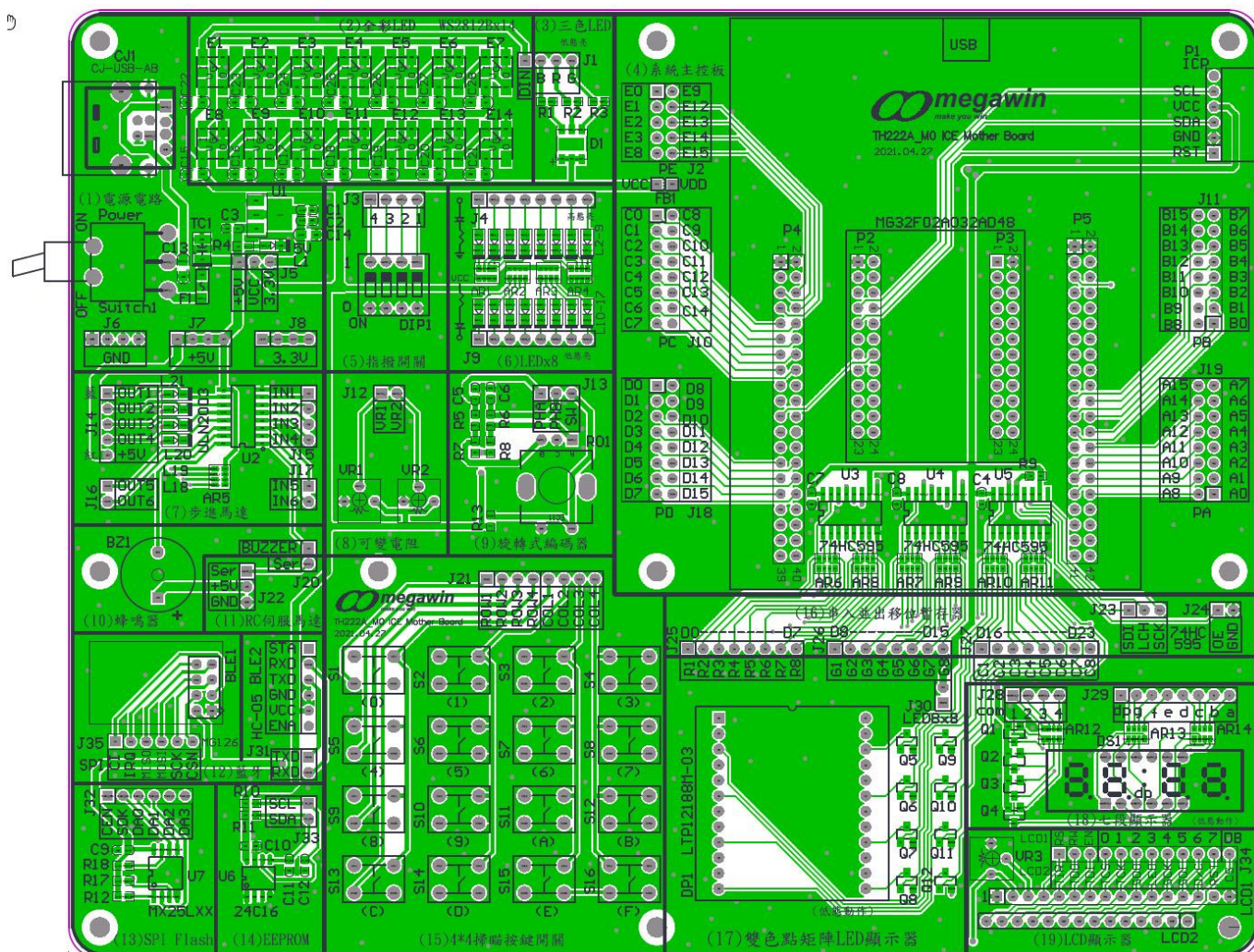
Apply To

MG32F02A128/A072/A064/U128/U064

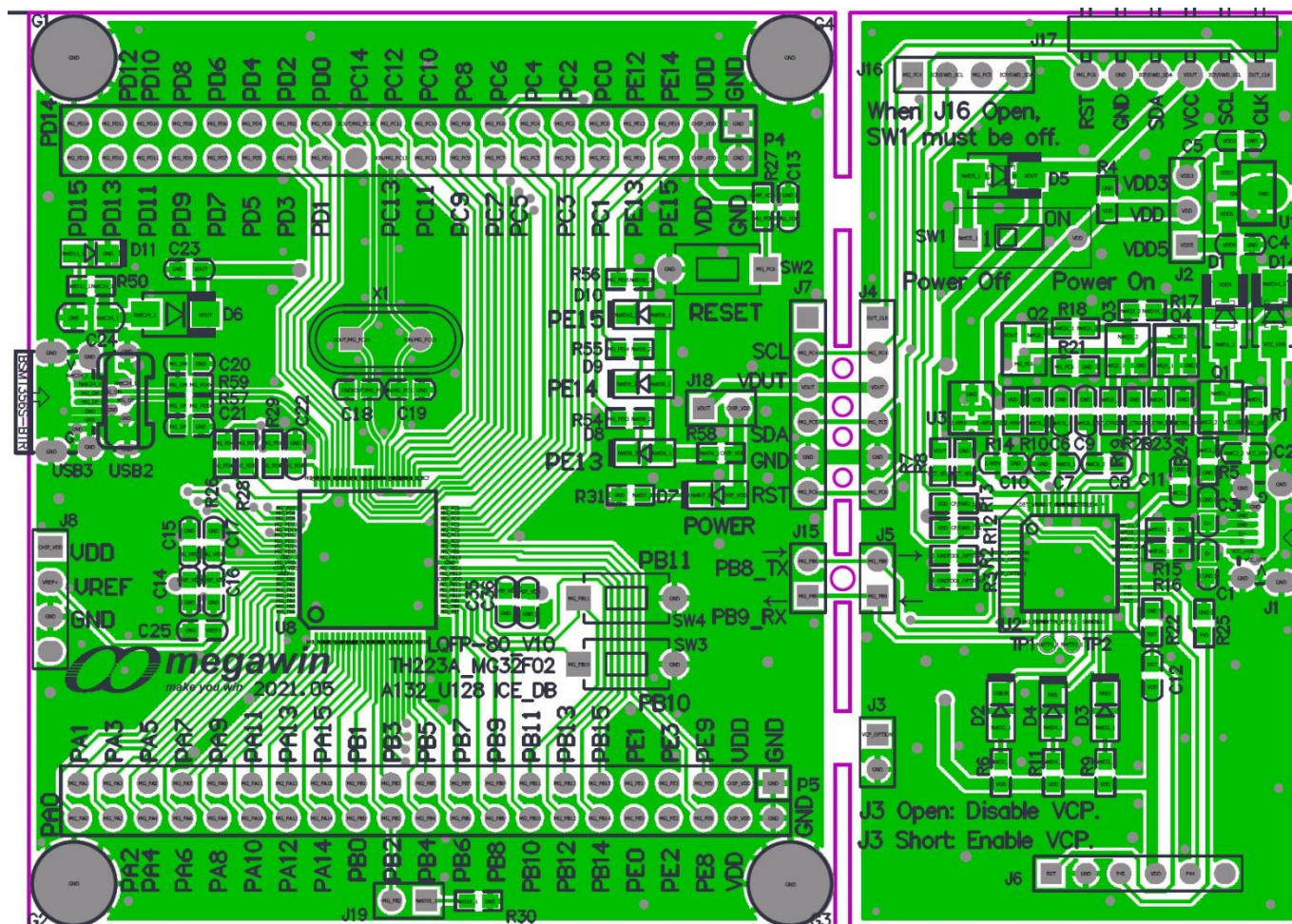
PCB Information

1. PCB Placement and Function Block Diagram

● TH222A_M0ICE Mother Board_V11

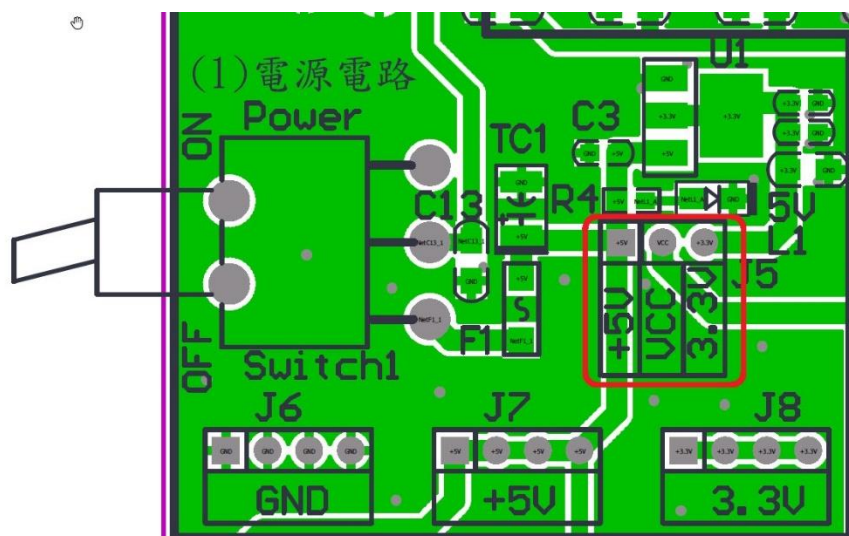


● TH223_MG32F02A132_U128_Q80_ICE_DB_V11



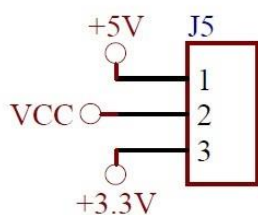
2. PCB Outline And Options

◆ TH222A_M0ICE Mother Board_V11

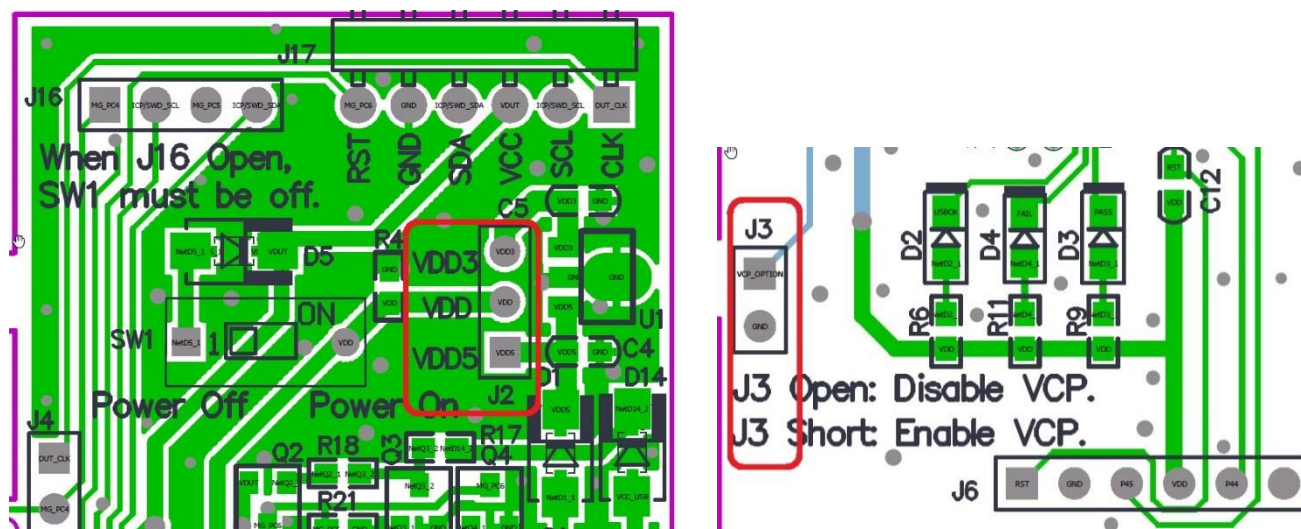


● DC Input Power Source

User can input +5 volt DC power from the USB connect, User can select work voltage of the system according to J5 option.

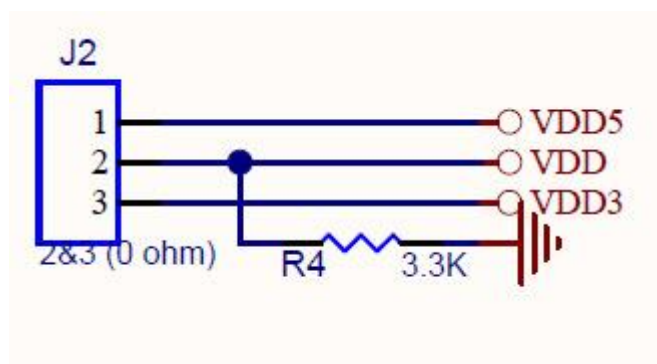


◆ TH223A_MG32F02A132_U128_Q80_ICE_DB_V11



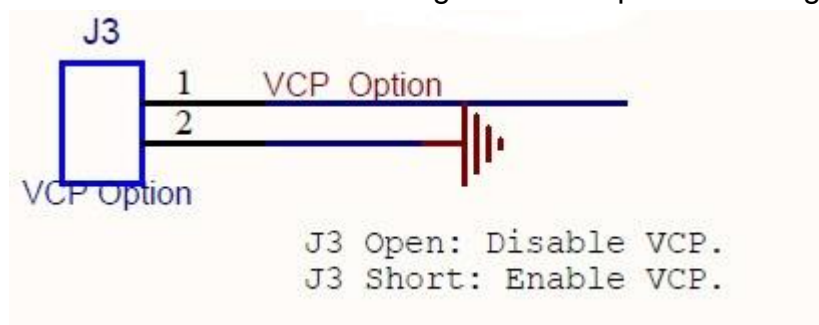
● DC Input Power Source

User can input +5 volt DC power from the Micro USB connect (J1), User can select work voltage of the system according to J2 option.



● COM Option

User can select enabling USB COM port according to J3 short to ground.



Debug Interface

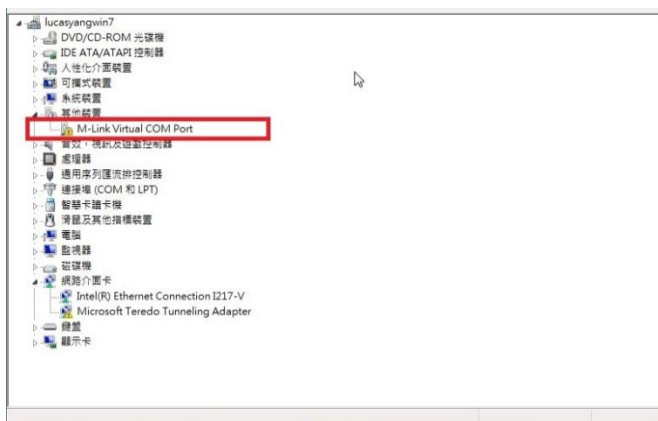
◆ Hardware Setting

- 1. Pin Connect :

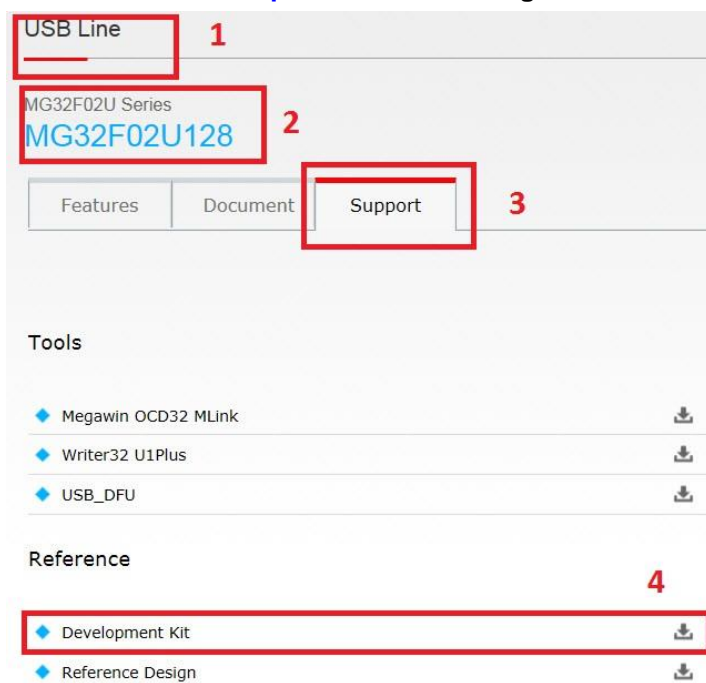
TH222A J3 short to ground.

- 2. Re-Connect J1 USB port.

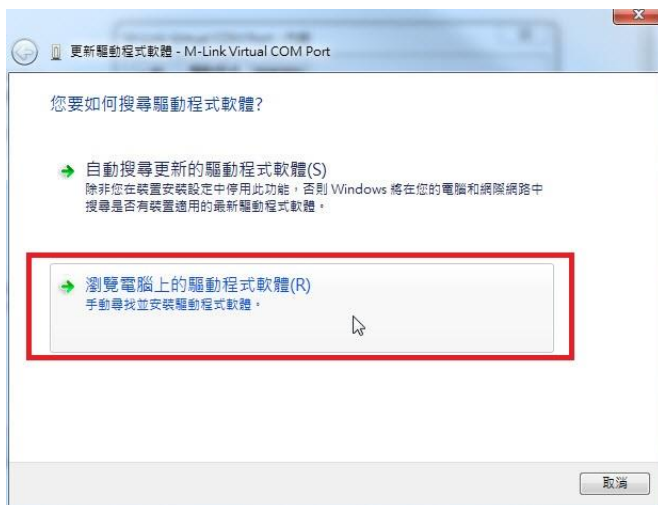
- 3. Open Device Manager to see “M-Link Virtual COM Port “.



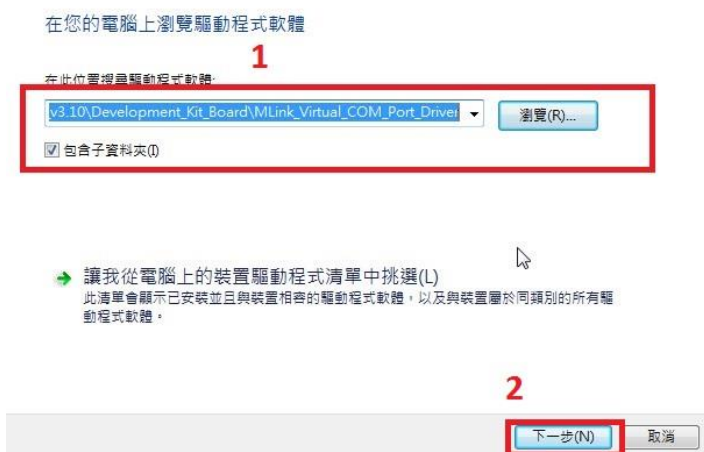
- 4. Download “Development Kit” from megawin official website.



- 5. Right Click “M-Link Virtual COM Port” to update driver.
- 6. Select “ Browse my computer for driver software”.



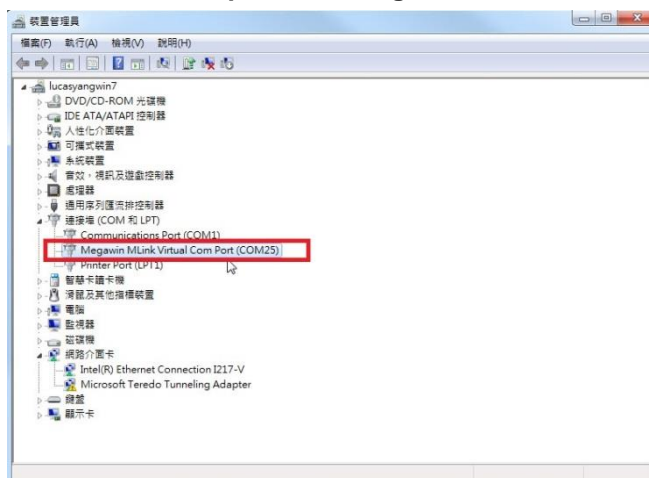
- 7. Option “MLink_Virtual_COM_Port_Driver “ from Development Kit \ Development_Kit_Board and select next step.



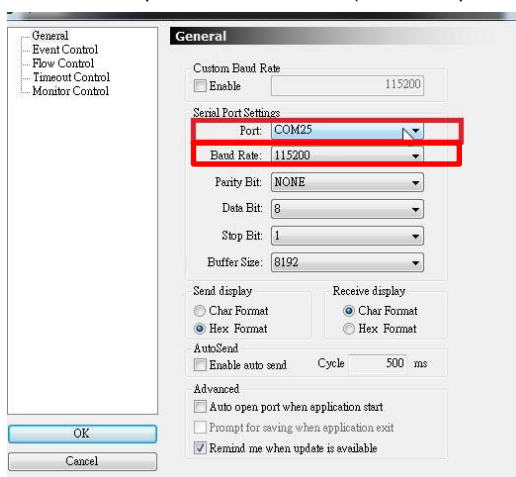
- 8. Select “Install”.



- 9. After install complete find Megawin Mink Virtual Com Port in Device Manager.



- Open the COM to use any COM application and setting Baud Rate = 115200.
 - The example use "AccessPort" (it is serial port monitoring tool).



◆ Testing Check List

Item	Check	Result
1	TH222A output "Megawin MLink Virtual Com Port" to COM application after press Reset button of TH222A.	

Function Test

1. Test ARGB LED Module Flow

◆ Hardware Setting

● Power Source Option:

PCB Name	Work Voltage (V)
TH222A VCC	5
TH223A VDD	5

● Pin Connect:

(2). ARGB Module Connect To →		(4). System Control Module	
J1	DIN	J19	PA5

◆ Code Option

In __BSP_Wizard.h check 2. ARGB option.

2. ARGB	<input checked="" type="checkbox"/>
3. RGB	<input type="checkbox"/>
7. Step Motor	<input type="checkbox"/>

◆ Testing Check List

Item	Check	Result
1	All ARGB display red color.	
2	All ARGB display green color.	
3	All ARGB display blue color.	
4	All ARGB display while color.	

2. Test RGB LED Module Flow

◆ Hardware Setting

● Power Source Option:

PCB Name	Work Voltage (V)
TH222A VCC	3.3
TH223A VDD	3.3

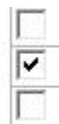
● Pin Connect

(3). RGB Module Connect To →		(4). System Control Module	
J1	LED-R	J19	PA0
J1	LED-G	J19	PA1
J1	LED-B	J19	PA2

◆ Code Option

In __BSP_Wizard.h check 3. RGB option.

2. ARGB
3. RGB
7. Step Motor



◆ Testing Check List

Item	Check	Result
1	RGB display red color.	
2	RGB display green color.	
3	RGB display blue color.	
4	RGB display while color.	

3. Test DIP Switch Flow

◆ Hardware Setting

● Power Source Option

PCB Name	Work Voltage (V)
TH222A VCC	3.3
TH223A VDD	3.3

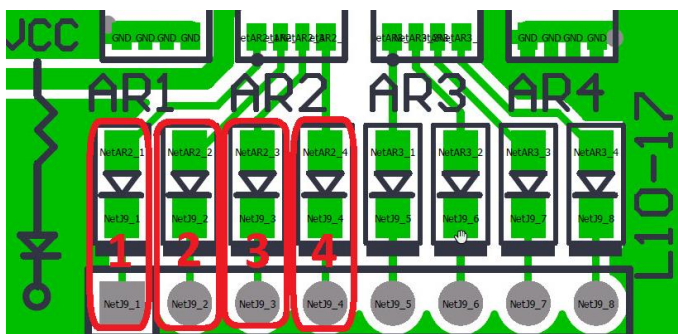
● Pin Connect

(5). DIP Switch Module Connect To →		(6). LEDX8 Module	
J3	4	J9	1
J3	3	J9	2
J3	2	J9	3
J3	1	J9	4

◆ Code Option

No.

◆ Testing Check List



Item	Check	Result
1	DIP Switch 1 ON the others OFF →LED1 ON the other LED off.	
2	DIP Switch 2 ON the others OFF →LED2 ON the other LED OFF.	
3	DIP Switch 3 ON the others OFF : →LED3 ON the other LED OFF.	
4	DIP Switch 4 ON the others OFF : →LED4 ON the other LED OFF.	

4. Test Step Motor Module Flow.

◆ Hardware Setting

● Power Source Option

PCB Name	Work Voltage (V)
TH222A VCC	3.3
TH223A VDD	3.3

● Pin Connect

(7).Step Motor Module Connect To →		(4). System Control Module	
J15	IN1	J10	PC8
J15	IN2	J10	PC9
J15	IN3	J10	PC10
J15	IN4	J10	PC11

◆ Code option

In __BSP_Wizard.h check 7. Step Motor option.

....2. ARGB

....3. RGB

....7. Step Motor



◆ Testing Check List

Item	Check	Result
1	Push TH223A SW3 button step motor counter-clockwise rotation.	
2	Push TH223A SW3 button step motor clockwise rotation.	
3	Push TH223A SW3 button step motor stop.	

5. Test Variable Resistor Module Flow

◆ Hardware Setting

● Power Source Option

PCB Name	Work Voltage (V)
TH222A VCC	3.3
TH223A VDD	3.3

● Pin Connect

(8). Variable Module Connect To →		(4). System Control Module	
J12	VR1	J19	PA6
J12	VR2	J19	PA7

◆ Code option

In __BSP_Wizard.h check 8. Variable Resistor option.



◆ Testing Check List

Item	Check	Result
1	When VR1 clockwise rotate : 1. TH223A Red LED light up 2. Seven- segment display ADC conversion value increase.(*1)	
2	When VR1 counter clockwise rotate : 1. TH223A Green LED light up 2. Seven- segment display ADC conversion value decrease.(*1)	
3	When VR2 clockwise rotate : 1. TH223A Red LED light up 2. Seven- segment display ADC conversion value increase.(*1)	
4	When VR2 counter clockwise rotate : 1. TH223A Green LED light up 2. Seven-segment display ADC conversion value decrease.(*1)	

*Note1: If enabling test seven-segment display item

6. Test Rotary Encode Module Flow

◆ Hardware Setting

● Power Source Option

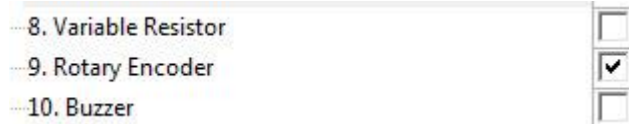
PCB Name	Work Voltage (V)
TH222A VCC	3.3
TH223A VDD	3.3

● Pin Connect

(9). Rotary Encode Module Connect To →		(4). System Control Module	
J13	SW	J18	PD13
J13	PHA	J18	PD15
J13	PHB	J18	PD14

◆ Code Option

In __BSP_Wizard.h check 9.Rotary Encoder.



◆ Testing Check List

Item	Check	Result
1	When pressing rotary encode SW key TH223A Yellow LED light up.	
2	When rotary encode clockwise rotate : 3. TH223A Red LED light up 3. Seven- segment display QEI value increase.(*1)	
3	When rotary encode counter clockwise rotate : 4. TH223A Green LED light up 3. Seven- segment display QEI value decrease.(*1)	

*Note1: If enabling test seven-segment display item

7. Test Buzzer Module Flow

◆ Hardware Setting

● Power Source Option

PCB Name	Work Voltage (V)
TH222A VCC	3.3
TH223A VDD	3.3

● Pin Connect

(10). Buzzer Module Connect To →		(4). System Control Module	
J20	BUZZER	J11	PB9

◆ Code Option

In __BSP_Wizard.h check 10.Buzzer.

9. Rotary Encoder
10. Buzzer
11. MicroServo9g

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◆ Testing Check List

Item	Check	Result
1	When pressing TH223A SW3 Button buzzer ring about 0.2s	

8. Test RC Servo Motor Module Flow

◆ Hardware Setting

● Power Source Option

PCB Name	Work Voltage (V)
TH222A VCC	5
TH223A VDD	5

● Pin Connect

(11). RC servo motor Module Connect To →		(4). System Control Module	
J20	Ser	J19	PA4

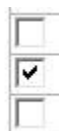
◆ Code Option

In __BSP_Wizard.h check 11. RC Servo Motor.

```

10. Buzzer
11. RC Servo Motor
12. BLE

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◆ Testing Check List

Item	Check	Result
1	Right-left turning of Micro Servo 9g	

9. Test BLE Module Flow

◆ Hardware Setting

● Power Source Option

PCB Name	Work Voltage (V)
TH222A VCC	3.3
TH223A VDD	3.3

● Pin Connect

(12). BLE Module Connect To →		(4). System Control Module	
J35	IRQ	J2	PE0
J35	MISO	J2	PE1
J35	MOSI	J2	PE3
J35	SCK	J2	PE2
J35	CSN	J2	PE8

◆ Code Option

In __BSP_Wizard.h check 12. BLE

11. RC Servo Motor
12. BLE



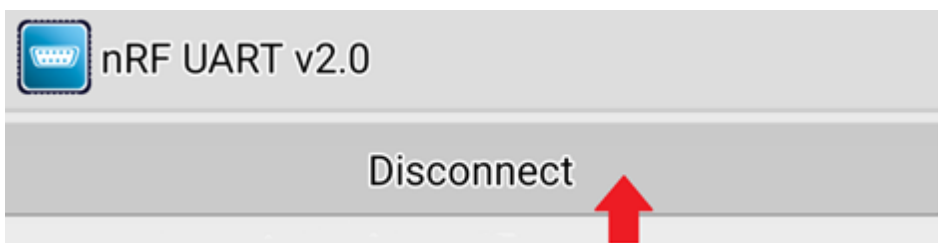
◆ Testing Check List

● Predecessor Activity

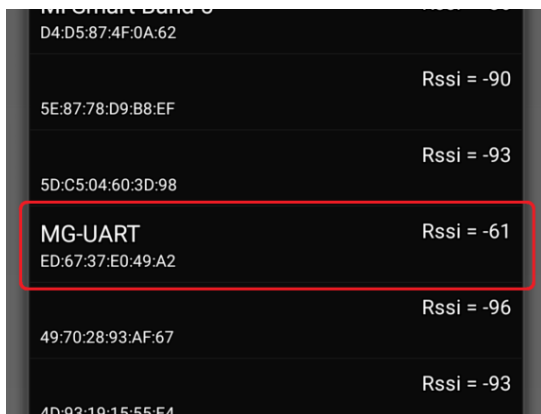
1. Download cell phone App and opening it.



2. Press the Disconnect.

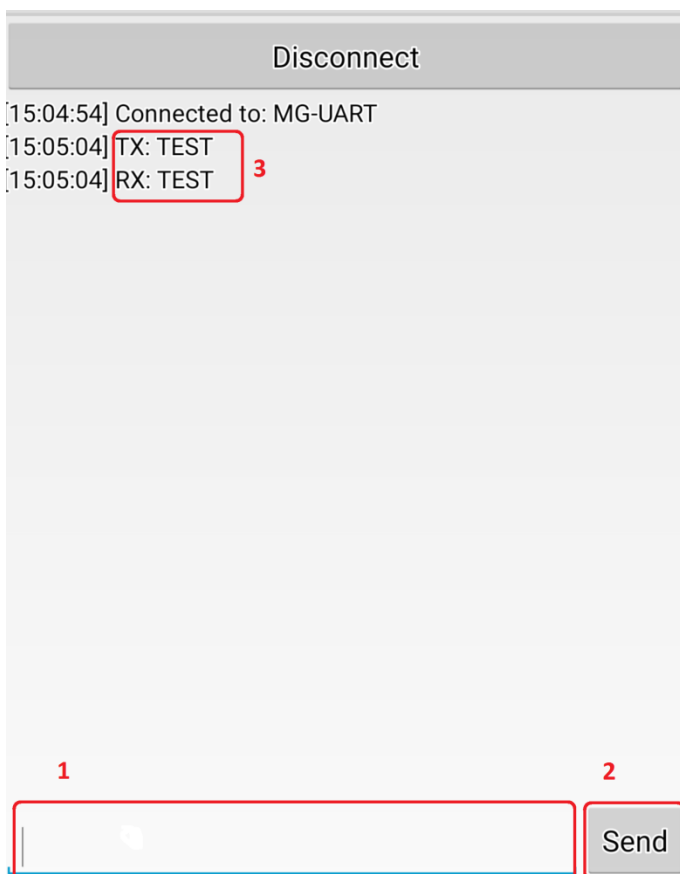


3. Select MG-UART



● Check Form

Item	Check	Result
1	TH2223A : 1. BLE connects: Green LED twinkle. 2. BLE disconnect: Red LED twinkle.	
2	After (1) input string and pressing (2) "Send" see (3) 1. TX: "String" (In (1) input string). 2. RX: "String" (In (1) input string).	



10. Test SPI Flash Module Flow

◆ Hardware Setting

● Power Source Option

PCB Name	Work Voltage (V)
TH222A VCC	3.3
TH223A VDD	3.3

● Pin Connect

(13). SPI Flash Module Connect To →		(4). System Control Module	
J32	CEN	J18	PD0
J32	SDK	J18	PD1
J32	DA0	J18	PD2
J32	DA1	J18	PD7
J32	DA2	J18	PD8
J32	DA3	J18	PD3

◆ Code Option

In __BSP_Wizard.h check 13. SPI Flash

12. BLE	<input type="checkbox"/>
13. SPI Flash	<input checked="" type="checkbox"/>
14. EEPROM	<input type="checkbox"/>

◆ Testing Check List

Item	Check	Result
1	Press TH223A SW4 button and seeing TH223A red and green LED Status. 1. If Green LED light up, SPI flash module test pass. 2. If Red LED light up, SPI flash module test fail.	

11. Test EEPROM Module Flow

◆ Hardware Setting

● Power Source Option

PCB Name	Work Voltage (V)
TH222A VCC	3.3
TH223A VDD	3.3

● Pin Connect

(14). EEPROM Module Connect To →		(4). System Control Module	
J33	SCL	J19	PA8
J33	SDA	J19	PA10

◆ Code Option

In __BSP_Wizard.h check 14. EEPROM

☐ 13. SPI Flash
☒ 14. EEPROM
☐ 15. 4 X 4 Keyboard



◆ Testing Check List

Item	Check	Result
1	Press TH223A SW4 button and seeing TH223A red and green LED Status. 1. If Green LED light up, EEPROM module test pass. 2. If Red LED light up, EEPROM module test fail.	

12. Test 4 X 4 Keyboard Module Flow

◆ Hardware Setting

● Power Source Option

PCB Name	Work Voltage (V)
TH222A VCC	3.3
TH223A VDD	3.3

● Pin Connect

(15). 4X4 Keyboard Module Connect To →		(4). System Control Module	
J21	ROW1	J10	PC0
J21	ROW2	J10	PC1
J21	ROW3	J10	PC2
J21	ROW4	J10	PC3
J21	COL1	J10	PC7
J21	COL2	J10	PC12
J21	COL3	J10	PC13
J21	COL4	J10	PC14

◆ Code Option

In __BSP_Wizard.h check 15. 4 X 4 keyboard.

.....14. EEPROM

.....15. 4 X 4 Keyboard

.....17. 2 Color Dot Matrix LED



◆ Testing Check List

Item	Check	Result
1	Press (0) ~ (F) key : 1. If make any key TH223A yellow LED light up. 2. BLE App receive 0 ~ F value according to button number.(*1)	

*Note1: If enabling test BLE item

13. Test Two Color Dot Matrix LED Module Flow

Test two color dot matrix LED, serial-in / serial or parallel-out shift register and LEDX8 modules at the same time.

◆ Hardware Setting

● Power Source Option

PCB Name	Work Voltage (V)
TH222A VCC	3.3
TH223A VDD	3.3

● Pin Connect

(16) Shift register module Connect To →		(4). System Control Module	
J23	SDI	J11	PB12
J23	LCH	J11	PB13
J23	SCK	J11	PB14
J24	OE	J11	PB15
(16) Shift register module Connect To →		(6) LED X 8 Module	
J25	R1	J9	1
J25	R2	J9	2
J25	R3	J9	3
J25	R4	J9	4
J25	R5	J9	5
J25	R6	J9	6
J25	R7	J9	7
J25	R8	J9	8
J26	G1	J4	1
J26	G2	J4	2
J26	G3	J4	3
J26	G4	J4	4
J26	G5	J4	5
J26	G6	J4	6
J26	G7	J4	7
J26	G8	J4	8

◆ Code Option

In __BSP_Wizard.h check 17. 2 Color Dot Matrix LED.

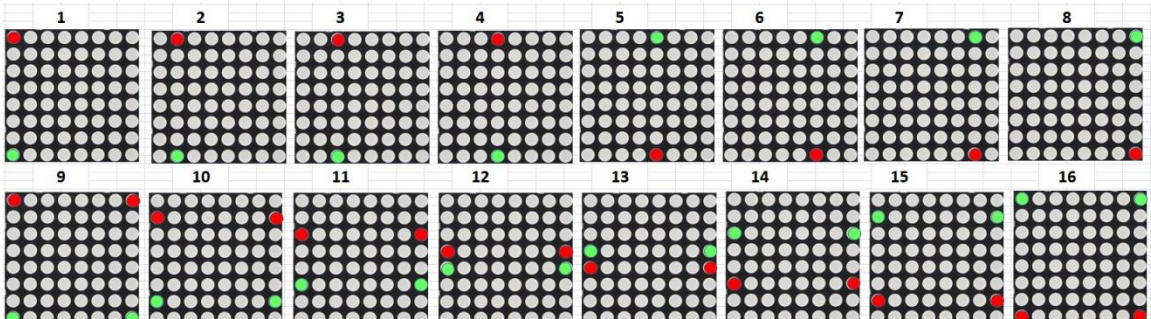
....15. 4 X 4 Keyboard

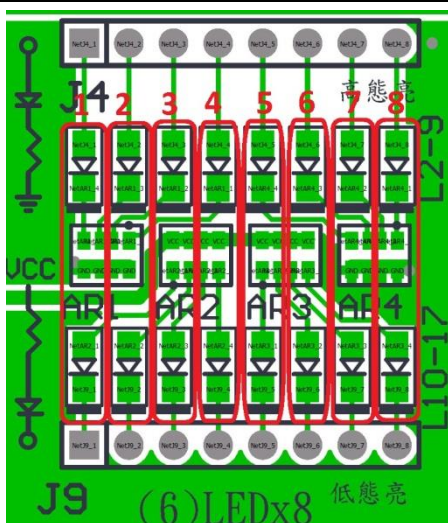
....17. 2 Color Dot Matrix LED

....18. Seven Segment Display



◆ Testing Check List

Item	Check	Result
1	Display loop in the sequence: 	



Item	Check	Result
2	LED 1/5 light on the other LED light off.	
3	LED 2/6 light on the other LED light off.	
4	LED 3/7 light on the other LED light off.	
5	LED 4/8 light on the other LED light off.	
6	All LED light off.	

14. Test Seven Segment Display Module Flow

◆ Hardware Setting

● Power Source Option

PCB Name	Work Voltage (V)
TH222A VCC	3.3
TH223A VDD	3.3

● Pin Connect

(18). Seven Segment display Module Connect To →		(4). System Control Module	
J28	COM1	J19	PA12
J28	COM2	J19	PA13
J28	COM3	J19	PA14
J28	COM4	J19	PA15
J29	dp	J11	PB7
J29	g	J11	PB6
J29	f	J11	PB5
J29	e	J11	PB4
J29	d	J11	PB3
J29	c	J11	PB2
J29	b	J11	PB1
J29	a	J11	PB0

◆ Code Option

In __BSP_Wizard.h check 17. 2 Color Dot Matrix LED.













...17. 2 Color Dot Matrix LED

...18. Seven Segment Display

...19. LCD (LCM 16 x 2)

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◆ Testing Check List

Item	Check	Result
1	<p>Display loop in the sequence.</p> <div><div><div>1</div></div><div>2</div></div> <div><div>3</div></div> <div>4</div>  <div><div>5</div></div> <div>6</div>  <div><div>7</div></div> <div>8</div>  <div><div>9</div></div> <div>10</div>  <div><div>11</div></div> <div>12</div> 	

5



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15. Test 16X2 LCD Display Module Flow

◆ Hardware Setting

● Power Source Option

PCB Name	Work Voltage (V)
TH222A VCC	3.3
TH223A VDD	3.3

● Pin Connect

(19). LCD Display Module Connect To →		(4). System Control Module	
LCD1	RS	J19	PA3
LCD1	RW	J19	PA9
LCD1	EN	J19	PA11
LCD1	DB0	J18	PD4 (*1)
LCD1	DB1	J18	PD5 (*1)
LCD1	DB2	J18	PD9
LCD1	DB3	J18	PD10
LCD1	DB4	J18	PD11
LCD1	DB5	J18	PD12
LCD1	DB6	J2	PE9
LCD1	DB7	J2	PE12

Note1: TH223A's PD4/PD5 pins are able to do as USB_DP / USB_DM function or GPIO function. When use PD4/PD5 as GPIO function, user needs to weld R26 / R28 on TH223A.

◆ Code Option

In __BSP_Wizard.h check 17. 2 Color Dot Matrix LED.

- 17. 2 Color Dot Matrix LED
- 18. Seven Segment Display
- 19. LCD (LCM 16 x 2)



◆ Testing Check List

Item	Check	Result
1	LCD 1 line display = "Megawin Product"	
2	LCD 2 line display = "MG32F02U128" (*1)	

Note1: Display device name according to (4) system control board MCU ID.

Test List

- ◆ **ARGB Module List**
 - 1. WS2812B
- ◆ **RGB Module List**
 - 1. GTG5050RGBBC
- ◆ **Step Motor Module List**
 - 1. 24BYJ48-HuaNing
- ◆ **Rotary Encode Module List**
 - 1. EC11
- ◆ **Buzzer**
 - 1. HYDZ12095-5V
- ◆ **RC Servo Motor Module List**
 - 1. SG90
- ◆ **Variable Resistor Module List**
 - 1. GF063P1
- ◆ **BLE Module List**
 - 1. BLE_Module_0603A_V1.0
- ◆ **SPI Flash**
 - 1. MX25R6435F
- ◆ **EEPROM Module List**
 - 1. AT24C16AN
- ◆ **Shift Register Module List**
 - 1. 74HC595D
- ◆ **2 Color 8x8 Dot Matrix LED Module List**
 - 1. CMD-3881320
- ◆ **Seven Segment Display**
 - 1. SR410281N
- ◆ **LCD Module List**
 - 1. C1602G-5V

Revision History

Revision V1.0 (2021_0616)		Chapter
1	Initial version	
Revision V1.1 (2021_0804)		Chapter
1	Modify pin connect description error in 16x2 LCD Display function test.	CH15
2	Change ARGB power source from 3.3V to 5V	CH1
3	Modify power source description error in TH222A_M0ICE Mother Board_V11 of PCB Outline And Options	
Revision V1.2 (2021_0809)		Chapter
1	Modify pin connect description error in 16x2 LCD Display function test.	CH15
Revision V1.3 (2021_0813)		Chapter
1	Add note description for PD4 / PD5	CH15
Revision V1.4 (2021_1006)		Chapter
1	Modify description that Rotary Encode module PHA and PHB connect pin	CH6
2	Modify description that Buzzer module BUZZER pin connect	CH7
3	Modify description that seven Segment display module a ~ dp pin connect	CH14