# Open32F0-D User Manual

## Contents

# 1. Overview

## 1.1. What's on board
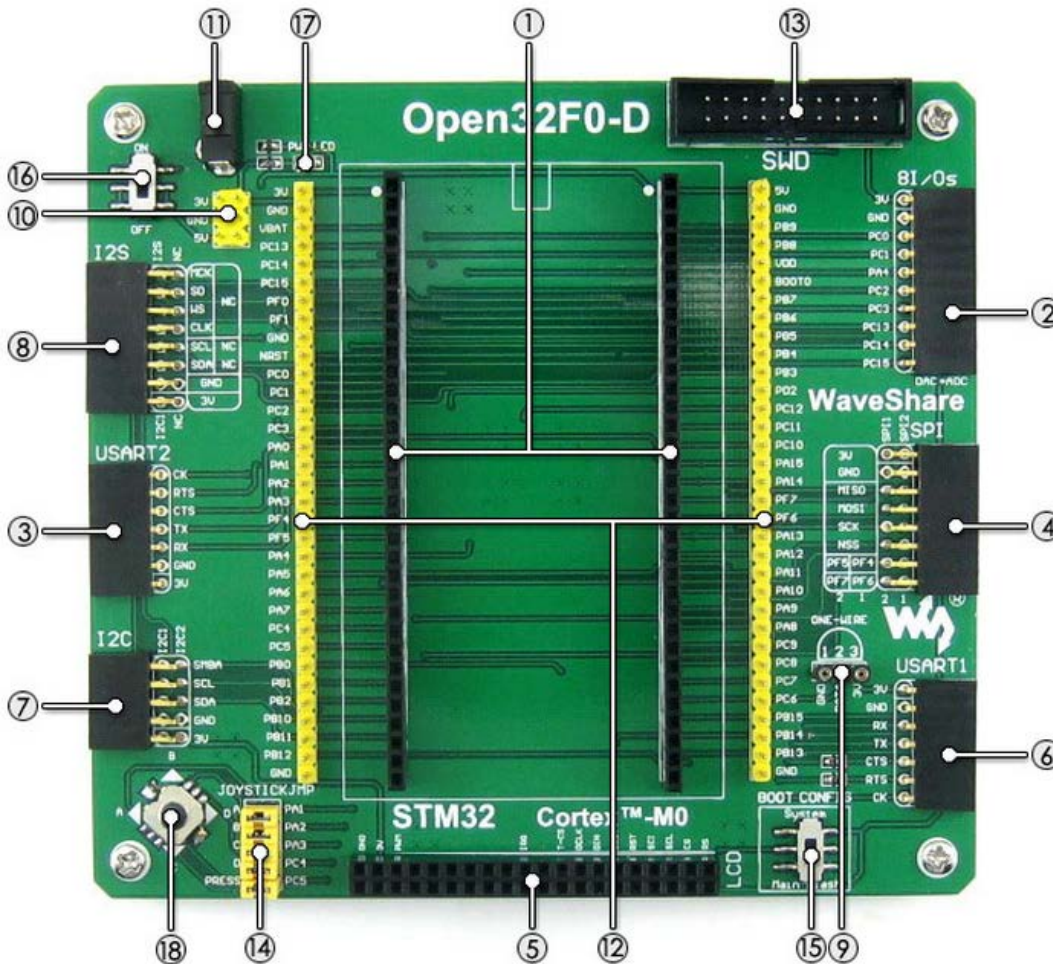


[ Core interface ]

1. **STM32F0DISCOVERY socket**
   for easily connecting the
   STM32F0DISCOVERY
2. **8I/Os + DAC + ADC interface**
   for connecting accessory boards such buttons,
   motors, AD/DA module etc.
3. **USART2 interface**
   easily connects to RS232, RS485, USB TO
   232, etc.
4. **SPI1/SPI2 interface**

[ Other interface ]

10. **5V/3.3V power input/output**
    usually used as power output, also
    common-grounding with other user board
11. **5V DC jack**
12. **MCU pins connector**
    all the MCU I/O ports are accessible on
    expansion connectors for further expansion
13. **SWD interface**
    for debugging/programming

easily connects to SPI peripherals such as DataFlash (AT45DBxx), SD card, MP3 module, etc.

5. **LCD connector**
   for connecting touch screen LCD

6. **USART1 interface**
   easily connects to RS232, RS485, USB TO 232, etc.

7. **I2C1 / I2C2 interface**
   easily connects to I2C peripherals such as I/O expander (PCF8574), FRAM (FM24CLxx), etc.

8. **I2S / I2C1 interface**
   easily connects to I2S peripherals such as audio module, etc.

9. **1-WIRE interface**
   easily connects to ONE-WIRE devices (TO-92 package), such as temperature sensor (DS18B20), electronic registration number (DS2401), etc.

**[ Jumper/switch ]**

- **Joystick jumper**
  short the jumper to connect the joystick to default I/Os used in example code;
  open the jumper to connect the joystick to custom I/Os via jumper wires

14. **Boot mode switch**
    for configuring BOOT0 pin.

**[ Component ]**

**15. Power switch**
16. Power indicator
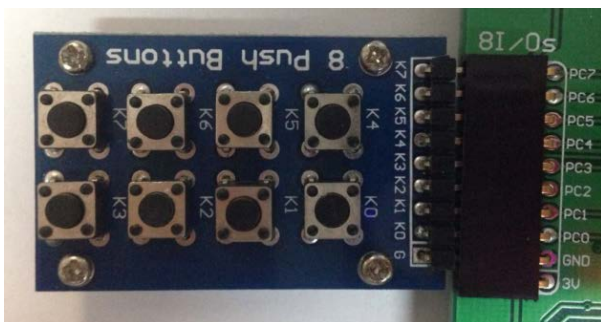17. Joystick: five positions

# 2.    Demo

➢  KEIL MDK Version：4.54
➢  Programmer/Debugger: STM32F0DISCOVERY onboard SWD
➢  Programming/Debugging interface: SWD
➢  Serial port settings:

| Select a proper COM port | |
|---|---|
| Baud rate | 115200 |
| Data bits | 8 |
| Stop bits | 1 |
| Parity bits | None |
| Flow control | None |

## 2.1.   8IOs
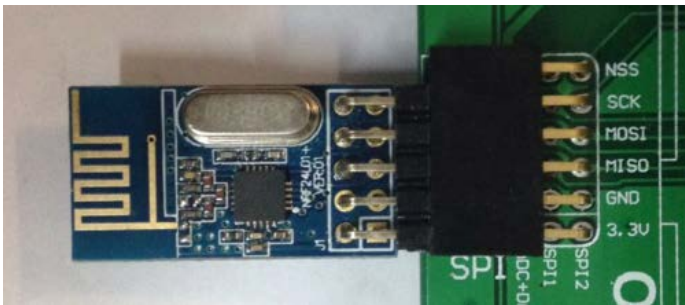
◆  Overview
   8bit I/Os demo
◆  Hardware connection



➢  Connect the RS232 board to the onboard USART1 interface
➢  Connect the 8 Push Button to the onboard 8 I/Os connector (Make sure the G pinheader is connect to the board GND pinheader)

◆  Operation and result
◆  The below information will be printed on the serial debugging assistant

```
key0
key4
key0
key1
key2
key3
key7
key6
key5
```

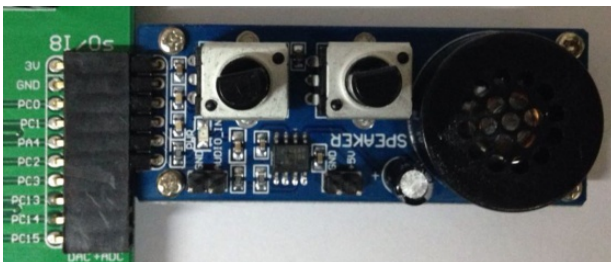## 2.2. 24L01

◆ Overview
NRF24L01 demo
◆ Hardware connection



➢ Connect the RS232 board to the onboard USART1 interface
➢ Connect the two NRF24L01 to the board via SPI interface

◆ Software configuration
Two NRF24L01 are needed for this demo, configuring as below:
When configuring as sending mode, enable: #define T_O_R    1, comment out: //#define T_O_R  0
When configuring as receiving mode, enable: #define T_O_R    0, comment out: //#define T_O_R  0.
◆ Operation and result
Message will be printed on the serial debugging assistant.

## 2.3. ADC+DMA

◆ Overview
ADC+DMA demo
◆ Hardware connection
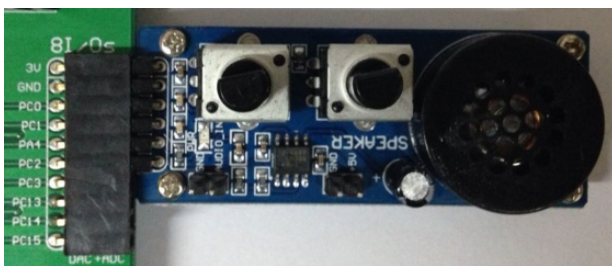


➢ Connect the RS232 board to the onboard USART1 interface
➢ Connect the Analog Test Board to the board via 8 I/Os (ADC+DAC)

◆ Operation and result
➢ Rotate the onboard potentiometer, the AD message will be printed on the serial debugging assistant:

```
Pot (RV3)  = 2,2 V
Pot (RV3)  = 1,8 V
Pot (RV3)  = 1,5 V
Pot (RV3)  = 1,1 V
Pot (RV3)  = 0,6 V
Pot (RV3)  = 0,4 V
```

# 2.4.   DAC+DMA

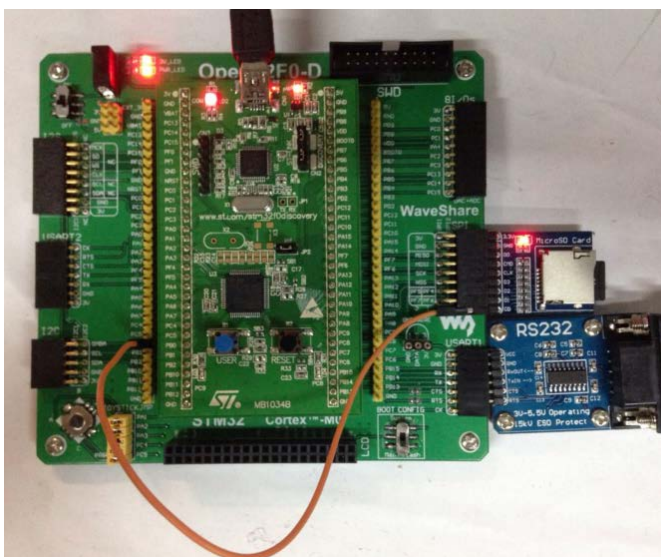◆  Overview
   DAC+DMA demo
◆  Hardware connection



> ➢ Connect the Analog Test Board to the board via 8 I/Os (ADC+DAC)
> ➢ Connect the 5V pinheaders on both the main board and the Analog Test Board via jumper wire

◆  Operation and result
   ➢ You may hear sound from the Analog Test Board when press the Reset button

# 2.5.   FATFS V0.08A-SD Card

◆  Overview
   SD_FatFS demo
◆  Hardware connection



> ➢ Connect the RS232 board to the onboard USART1 interface
> ➢ Connect the Micro SD Storage Board to the board via SDIO interface.
>   Insert the SD card to the Micro SD Storage Board socket
> ➢ Connect the CD pin on the Micro SD Storage Board to the board PB0 pin via Dupont wire.

`

◆ Operation and result

The below information will be printed on the serial debugging assistant:



```
-- SD card detected OK
Card Type               : SD V2
Card Type               : SD V2
Card Type               : SD V2
```

# 2.6.   GPIO LED

◆ Overview

LED demo

◆ Hardware connection

◆ Operation and result

The two LEDs on the Discovery board blinking

# 2.7.   GPIO LED JOYSTICK

◆ Overview

User key demo

◆ Hardware connection

◆ Operation and result

Press the User key, the LED status will change accordingly.

# 2.8.   I2C

◆ Overview

I2C EEPROM demo

◆ Hardware connection



> Connect the RS232 board to the onboard USART1 interface
> Connect the AT24/FM24 Board to the I2CX connector ( connect to I2C1 or I2C2 depends on the program)

◆ Operation and result

The below information will be printed on the serial debugging assistant:

```
transmitted data: 0x1
transmitted data: 0x2
transmitted data: 0x3
transmitted data: 0x4
transmitted data: 0x5
transmitted data: 0x6
transmitted data: 0x7
transmitted data: 0x8
transmitted data: 0x9
```

## 2.9.  I2S UDA1380 & SD_FatFS(DMA)

◆ Overview
   Audio file placed on SD Card (with FATFS)

◆ Hardware connection



➢ Connect Micro SD Storage Board to the board via SPI2 interface.
➢ Insert the SD card to the Micro SD Storage Board socket.
➢ Connect the CD pin of the Micro SD Storage Board to the board PB0 pin via DuPont wire.
➢ Put "audio.wav" file to the SD card
➢ Connect UDA1380 Board to the board via I2S connector.
➢ Connect the earphone to the UDA1380 Board via LINEOUT interface.

◆ Operation and result
You can hear music while pressing the RESET key.

## 2.10.  JOYSTICK

◆ Overview
   JOYSTICK demo
◆ Hardware connection
   Short the JOYSTICK JMP
◆ Operation and result
   The LED status will change accordingly while press the JOYSTICK .

## 2.11.  LCD22-picture

◆ Overview
   LCD demo
   This LCD is 2.2 inch resistive touch screen LCD, the resolution is 320x240, drive by mode of SPI, greatly reduce the pins, MCU with little IO can also available to drive it.

This demo shows dot, the drawing line, the drawing circle, character, etc displayed on the LCD.

◆ Hardware connection
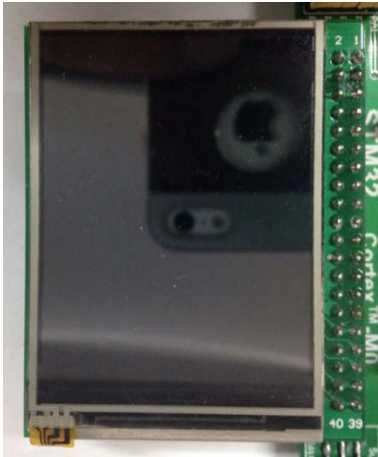


➢ Connect with 5V power via the 5VDC interface
➢ Connect ULINK2 to the board via SWD interface
➢ Connect the 2.2inch 320x240 Touch LCD (A) to the board via LCD22 interface.

◆ Operation and result
Message will be displayed on the LCD.


## 2.12. LCD22_TouchPanel

◆ Overview
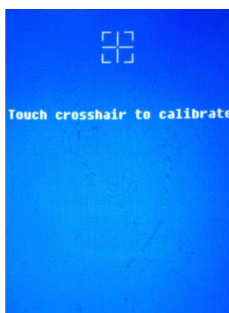LCD demo
1. Calibrate the touch screen by click  three times, and then enter into drawing board in the touch screen interface.
2. You can draw lines freely on the drawing board.

◆ Hardware connection
Connect the 2.2inch 320x240 Touch LCD (A) to the board.

◆ Operation and result
Message will be displayed on the LCD



Touch-screen
calibration
interface

◆ Application
Handheld device display

## 2.13. One-Wire

◆ Overview

One-Wire demo

◆ Hardware connection

Connect the RS232 board to the onboard USART1 interface

Connect the DS18B20 to the board via One-Wire interface

◆ Operation and result

The below information will be printed on the serial debugging assistant:

```
************************************************************
DS18B20's ID :0x28 0x76 0xfe 0x49 0x5 0x2 0x0 0x20 Temperture:8 'C
Temperture:30 'C
Temperture:29 'C
Temperture:30 'C
Temperture:29 'C
Temperture:30 'C
Temperture:29 'C
Temperture:30 'C
```

## 2.14. SPI

◆ Overview

SPI demo

◆ Hardware connection



➢ Connect the AT45DBXX DataFlash Board to the board via SPIX (to SPI1 or SPI2 depends on the program)

➢ Connect the RS232 board to the onboard USART1 interface

◆ Software configuration

The serial debugging assistant configuring:

Launch the serial debugging assistant SSCOM32, choose related COM port, set baud rate as 115200, click to open it.

◆ Operation and result

The below information will be printed on the serial debugging assistant:

```
AT45DBXX had been Init!
AT45DBXX ID is 0x1f 0x24 0x0 0x0

Write 255 byte data to buff1:
  0   1   2   3   4   5   6   7   8   9  10  11  12  13  14  15  16  17  18  19  20  21  22
 23  24  25  26  27  28  29  30  31  32  33  34  35  36  37  38  39  40  41  42  43
 44  45  46  47  48  49  50  51  52  53  54  55  56  57  58  59  60  61  62  63  64
 65  66  67  68  69  70  71  72  73  74  75  76  77  78  79  80  81  82  83  84  85
 86  87  88  89  90  91  92  93  94  95  96  97  98  99 100 101 102 103 104 105
106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122
123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139
140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156
157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173
174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190
191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207
208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224
225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241
242 243 244 245 246 247 248 249 250 251 252 253 254
```
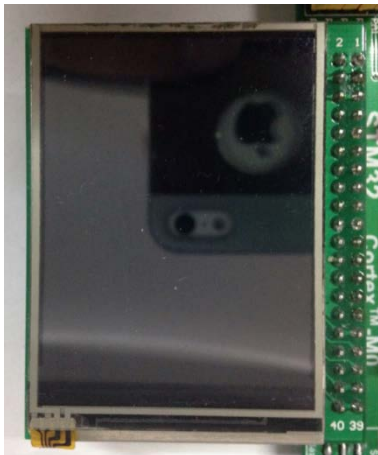
## 2.15. uCOS-II-V2.91

◆ Overview
   uCOSII demo
◆ Hardware connection
◆ Operation and result
   The two LED blinking.

## 2.16. uCOS-II-V2.91+LCD

◆ Overview
   uCOS-II-V2.91I demo
◆ Hardware connection



➢ Connect the 2.2inch 320x240 Touch LCD (A) to the board

◆ Operation and result
   ➢ Message displayed on the LCD; LED blinking.

## 2.17. USART

◆ Overview
   USART demo
◆ Hardware connection
◆ Operation and result
   The below information will be printed on the serial debugging assistant:

```
Waveshare!
Waveshare!
Waveshare!
```

# 3.  Revision history

| Version | Description | Date | Author |
|---------|-------------|------|--------|
| V1.0 | Initial revision | 2014/05/17 | Waveshare team |