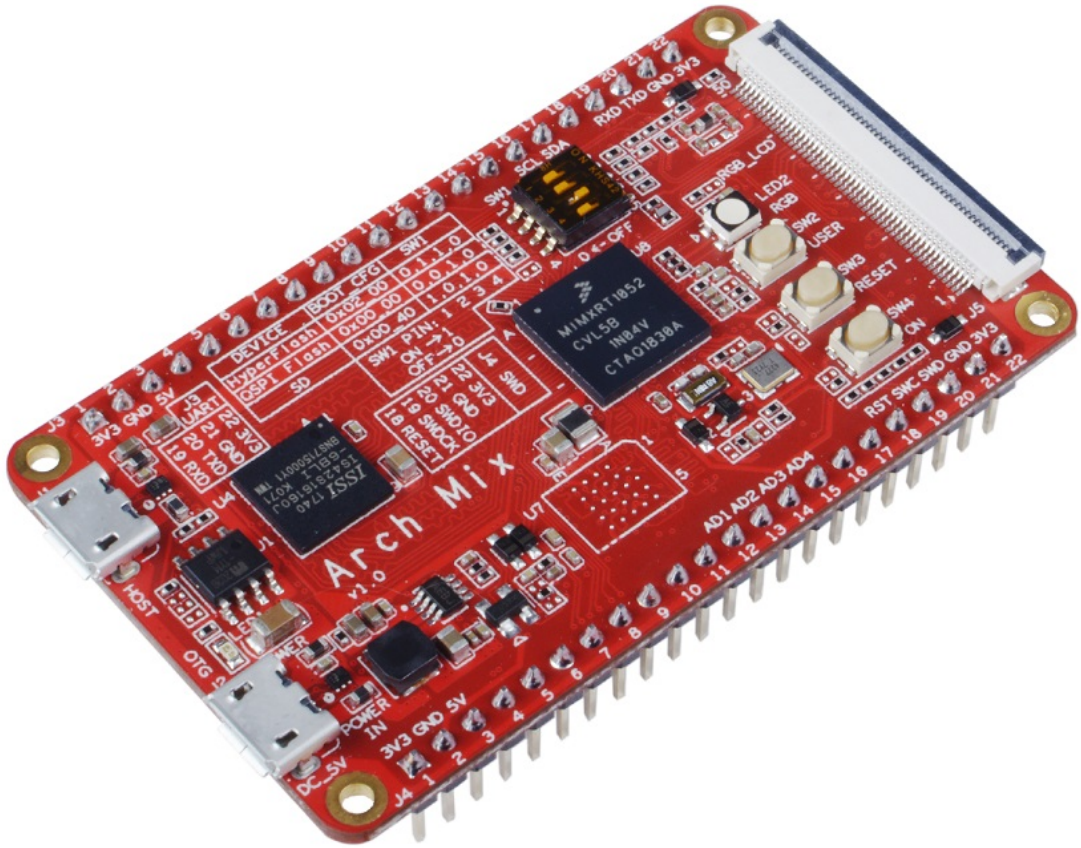
Arch Mix



Arch Mix is a thin, lightweight development board based on NXP i.MX RT1052 processor. The i.MX RT1052 is a new processor family featuring NXP's advanced implementation of the Arm Cortex®-M7 core. This development board comes pre-installed RT-Thread real-time operating system(RTOS) and built-in micro-python. Which makes it suitable for industrial control, especially for scenes with large code and high real-time application requirements.

The RTOS is an open source IoT operating system for embedded devices. The kernel has real-time multi-task scheduling, semaphore, mutex, mail box, message queue, signal etc. This is a lightweight system that loads quickly. For more detail about the RTOS, please refer to the Github Page.

Get One Now

Application Ideas

- Industrial Control
- Smart Building
- Industrial Human Machine Interfaces
- Automation & Process Control

- Robot

Feature

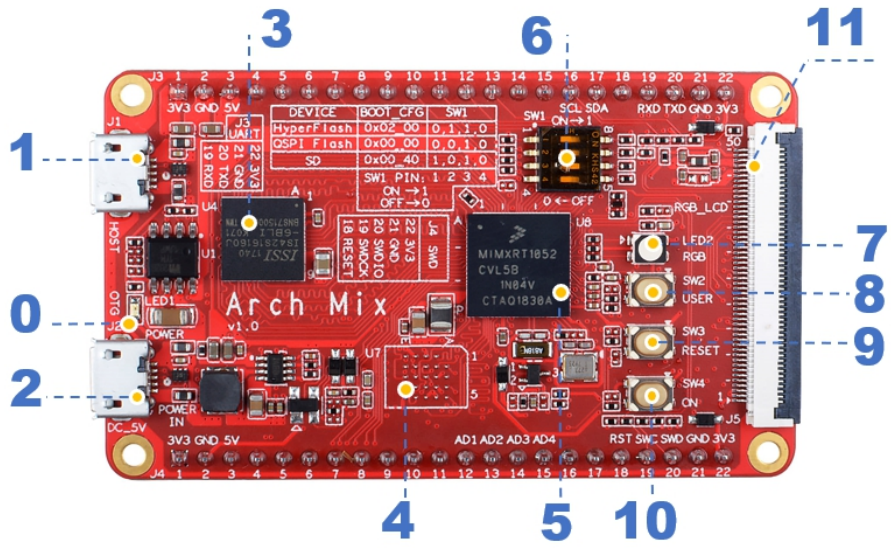
- ARM® Cortex®-M7 528MHz microcontroller(NXP i.MX RT1052)
- Comes with real-time operating system RT-Thread
- Build-in micro-python
- Ultra-fast system loading speed
- Rich peripheral interface: RMII, CAN, I2C, UART, CSI, I2S, ADC, SPDIF IN/OUT, SWD
- Smaller than other Demo boards of RT1052/1050: 67mm x 39mm

Specification

Parameters	**Value**
Processor: NXP i.MX RT1052	
Platform	ARM Cortex-M7 MPCore
Frequency	528 MHz
Boot ROM	96KB
ON-Chip RAM	512KB
Memory	
SDRAM	32MB
QSPI Flash	8MB
HyperFlash(Optional)	64MB
Connectivity	
USB 2.0 Host	x1
USB 2.0 OTG, and DC 5V Power In	x1
Boot configuration DIP switch	x1
LED	Power LED x1 User RGB LED x1
Buttons	Reset button x1, On/Off button x1, User button x1
24bit RGB LCD interface	x1
Micro SD card connector	x1
RTC 3V battery connector	x1
22Pin header	RMII, CAN, I2C, UART, CSI, I2S, ADC, SPDIF IN/OUT, SWD

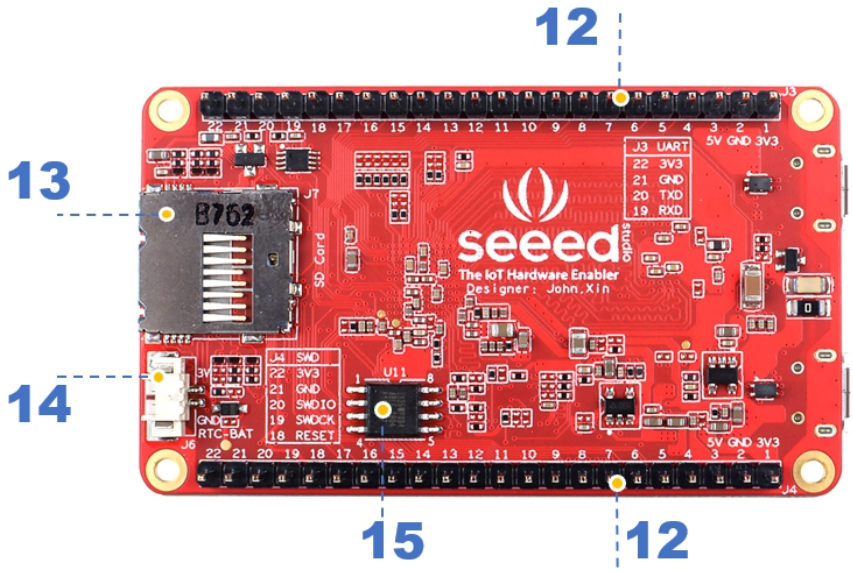
Table 1.*Specification*

Hardware Overview



0- LED1, Power LED
1- J1, USB Host*0
2- J2, USB OTG and DC Power In*0
3- U4, 32MB SDRAM
4- U7, 64MB HyperFlash*1
5- U8, CPU RT1052
6- SW1, Boot Configuration DIP Switch
7- LED2, RGB
8- SW2, User Button
9- SW3, Reset Button
10- SW4, Power ON/OFF Button*2
11- J5, RGB LCD Interface

Figure 1. *Front Hardware Overview*



12- J3 J4 , 1x22Pin Expansion PIN Header
13- J7, Micro SD Card
14- J6, RTC CR2032 BAT Connector*3
15- U11, 8MB QSPI Flash*1

Figure 2. *Back Hardware Overview*

!!!Annotation ***0** You need to power the Arch Mix by the USB OTG port. For the difference between the USB HOST and USB OTG, Please check here.

```
<font color="red"><b>*1</b></font> We provide two options for the flash, you can
use 64M HyperFlash(U7-default DNP) or 8M QSPI Flash(U11-default selection).

<font color="red"><b>*2</b></font> After the board is powered by USB OTG, you can
switch the system on and off by pressing and holding(about 3~5 seconds) this
button.

<font color="red"><b>*3</b></font> Please note that this port is a 1.25mm CR2032
Battery port, do not plug in a Li-Po battery. If you want to use the RTC function,
you can search the ‘CR2032 Battery with Wire Leads’ in the Amazon or other web.
```

Power

Please supply power through the Micro-USB **OTG** port.

!!!Danger - The input power supply voltage is 5V, can not exceed 5.5V.
- All digital and analog IO interface levels are 3.3V. Please do not input more than 3.3V, otherwise the CPU may be damaged.
- RTC's battery-powered interface(J6) can only be connected to a button battery of about 3V, and the voltage cannot exceed 3.6V.

Switch

The Arch Mix can be configured into three different boot modes: HyperFlash, QSPI Flash and SD Card. We use QSPI Flash by default, when you change the boot mode, you need to change the DIP switch to the corresponding position.

DEVICE	BOOT_CFG	SW1 four keys value
HyperFlash	0x02_00	0 , 1 , 1 , 0
QSPI Flash	0x00_00	0 , 0 , 1 , 0
SD	0x00_40	1 , 0 , 1 , 0

Table 2.*BOOT Configuration*

Button

There are three buttons on this board, please check the function table.

Name	Function	Detail
SW2	User Button	For user configure, for this development board No. 125 pin is SW2
SW3	RESET	System reset, when you press this button the system will restart
SW4	Power On/OFF	Switch the system on and off by pressing and holding(about 3~5 seconds) this button

Table 3.*Button Function table*

LCD Interface

As you can see, there is a 50 pin LCD Interface on this board, in case you need a LCD screen for this board, you can use the LCD8000 serial screen. Check the links below.

LCD from NXP
LCD from Embest

Pinout

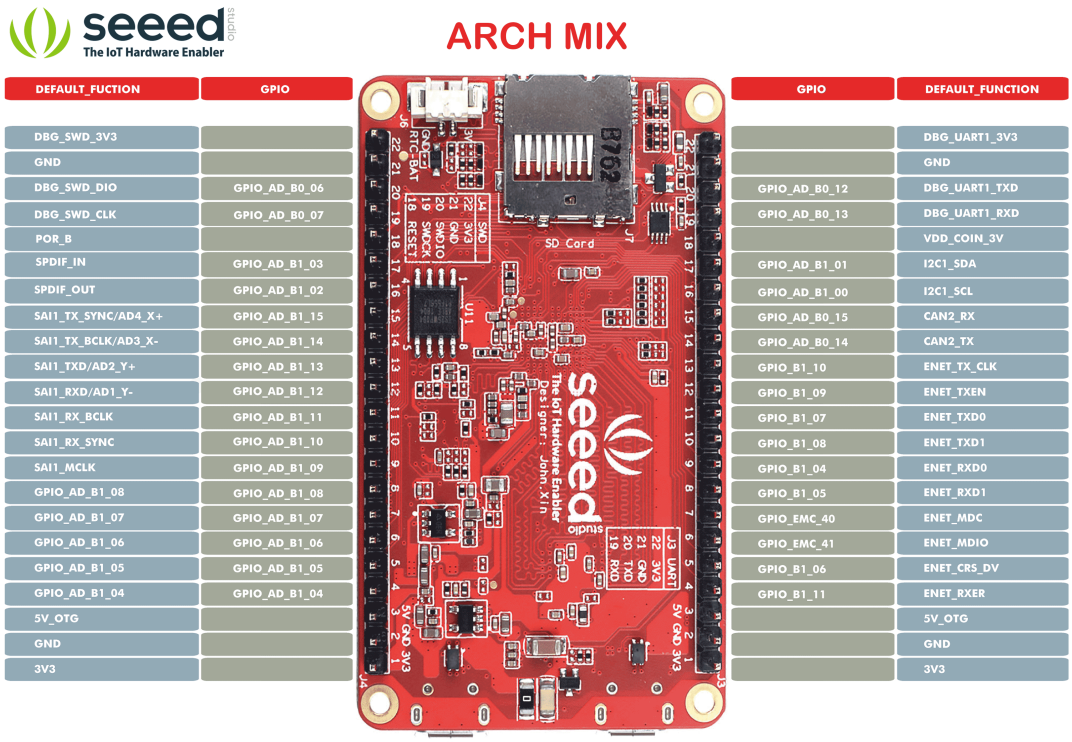


Figure 3. *Pinout, ckick the image to view the original file*

!!!Tip Most of the pins of NXP i.MX RT1050 processor have multiplexing function, you can click the attachment below to view the detailed pin multiplexing.

Arch Mix Pin Definition Table

Blcok Diagram

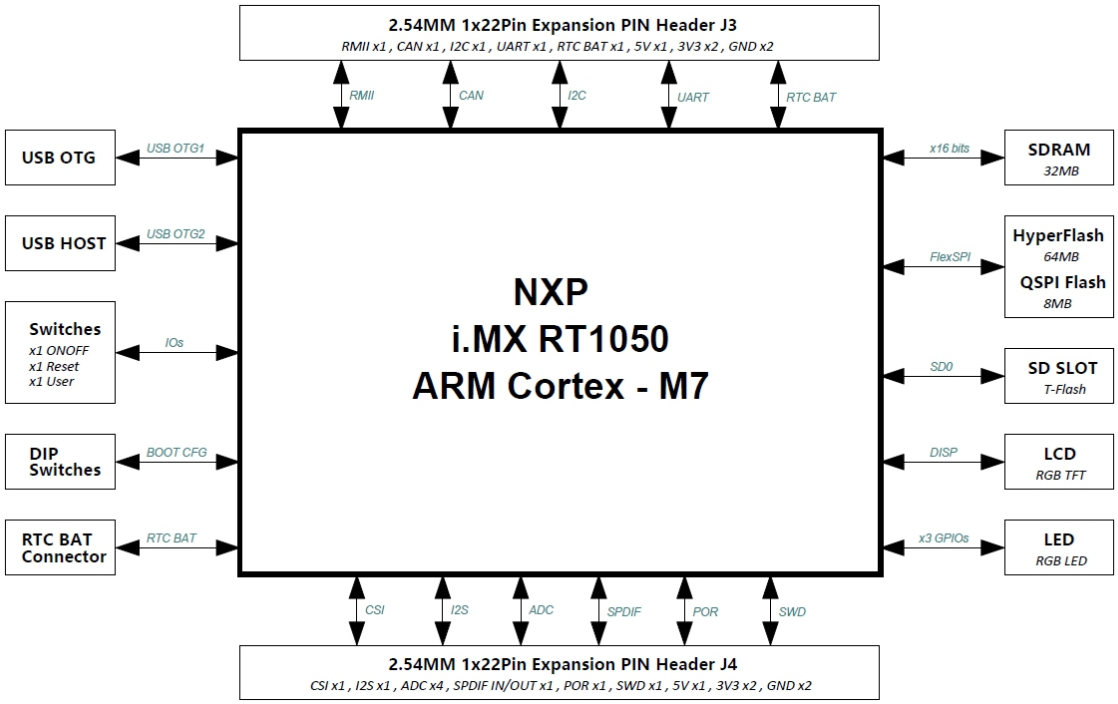
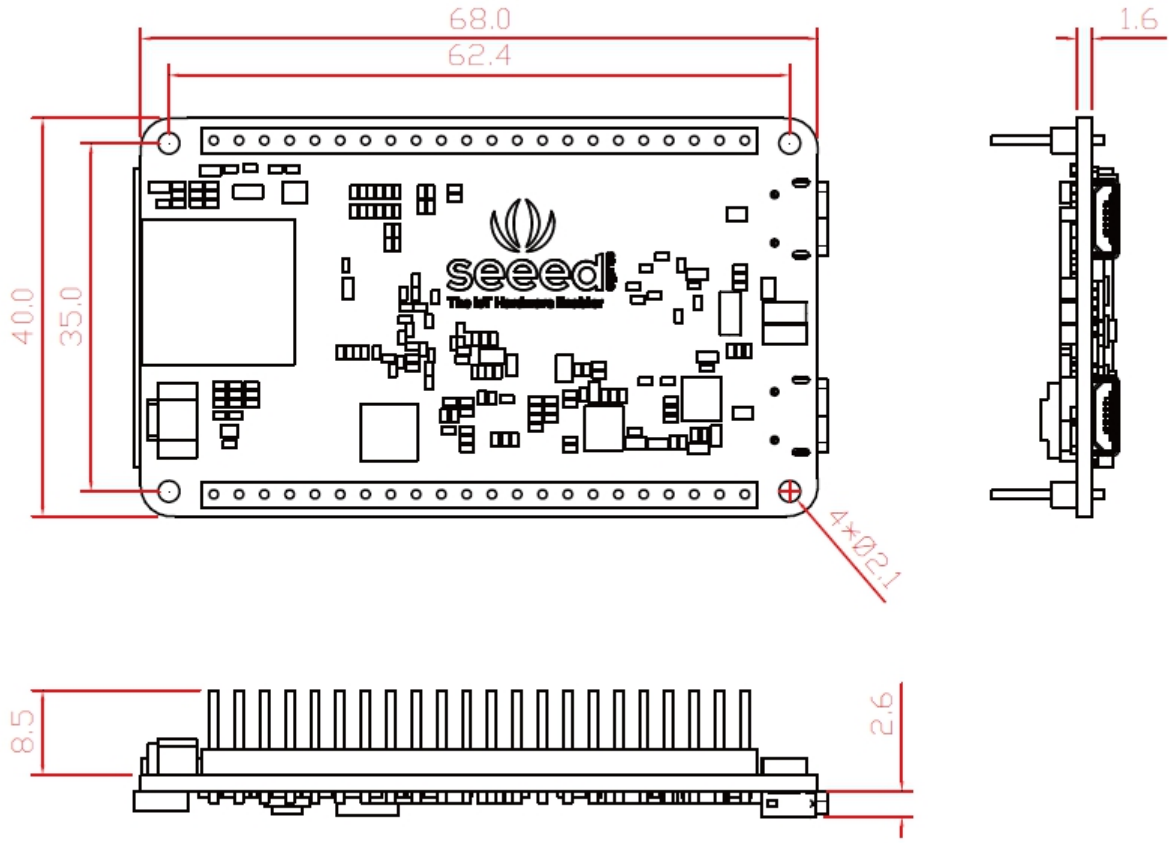


Figure 4. *Arch Mix Blcok Diagram, ckick the image to view the original file*

Dimension Diagram



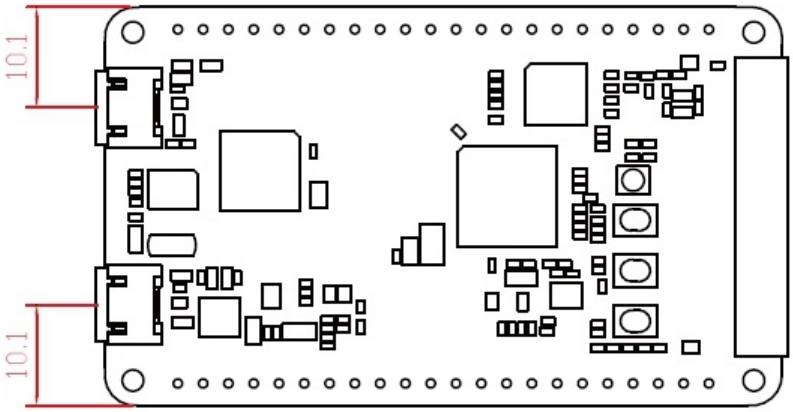


Figure 5. *Board Dimension, Unit(mm)*

Hardware Connection

Materials required

Arch Mix x1
USB to Serial (TTL) Module&Adapter x1
Micro USB Cable X1
Dual-female jumper x4

- **Step 1.** Connect Arch Mix and USB to Serial (TTL) Module&Adapter using the Dual-female jumper.

Module	PIN Connection			
Arch Mix	VCC	GND	TXD	RXD
USB to Serial Module	VCC	GND	RX	TX

Table 4.*UART connection*

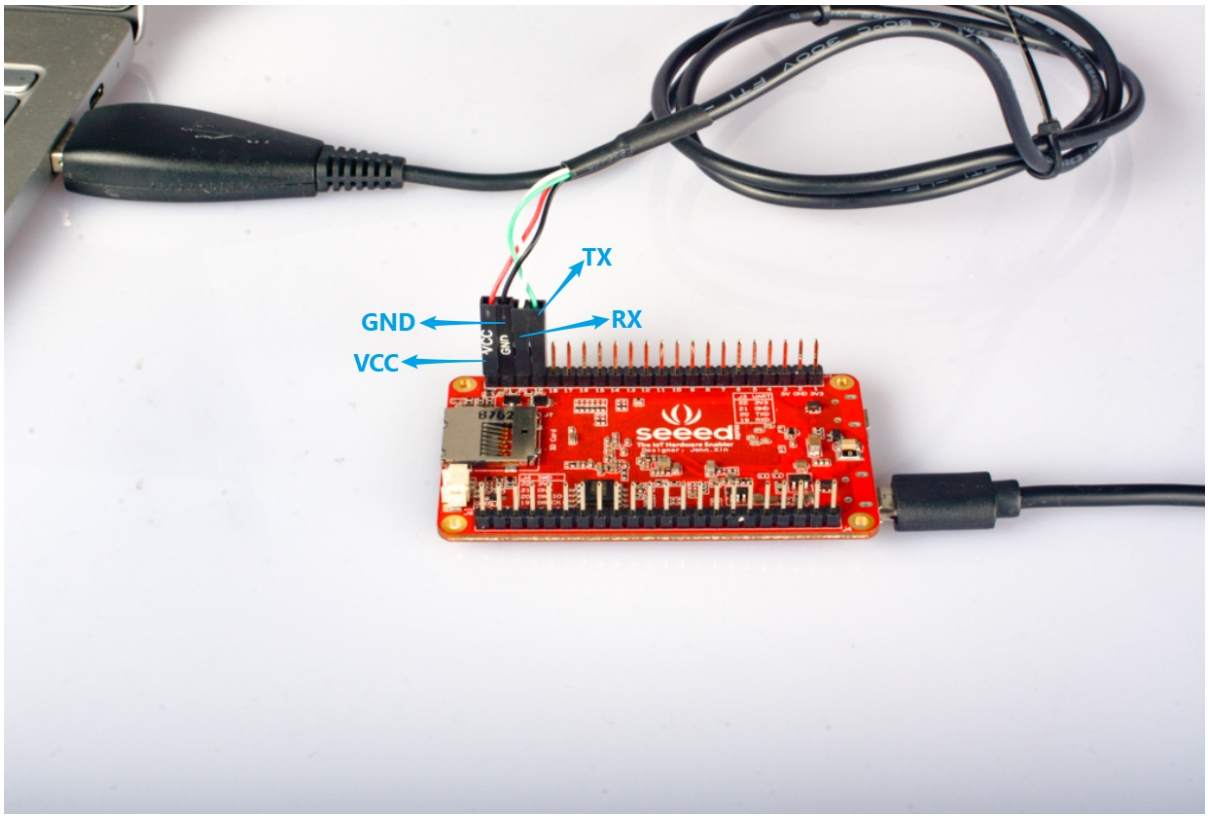


Figure 6. *UART Connection*

- **Step 2.** Plug the USB to Serial Module to your computer.
- **Step 3.** Power Arch Mix through the OTG port. The on-board Power LED will light up and RGB LED will turn green.

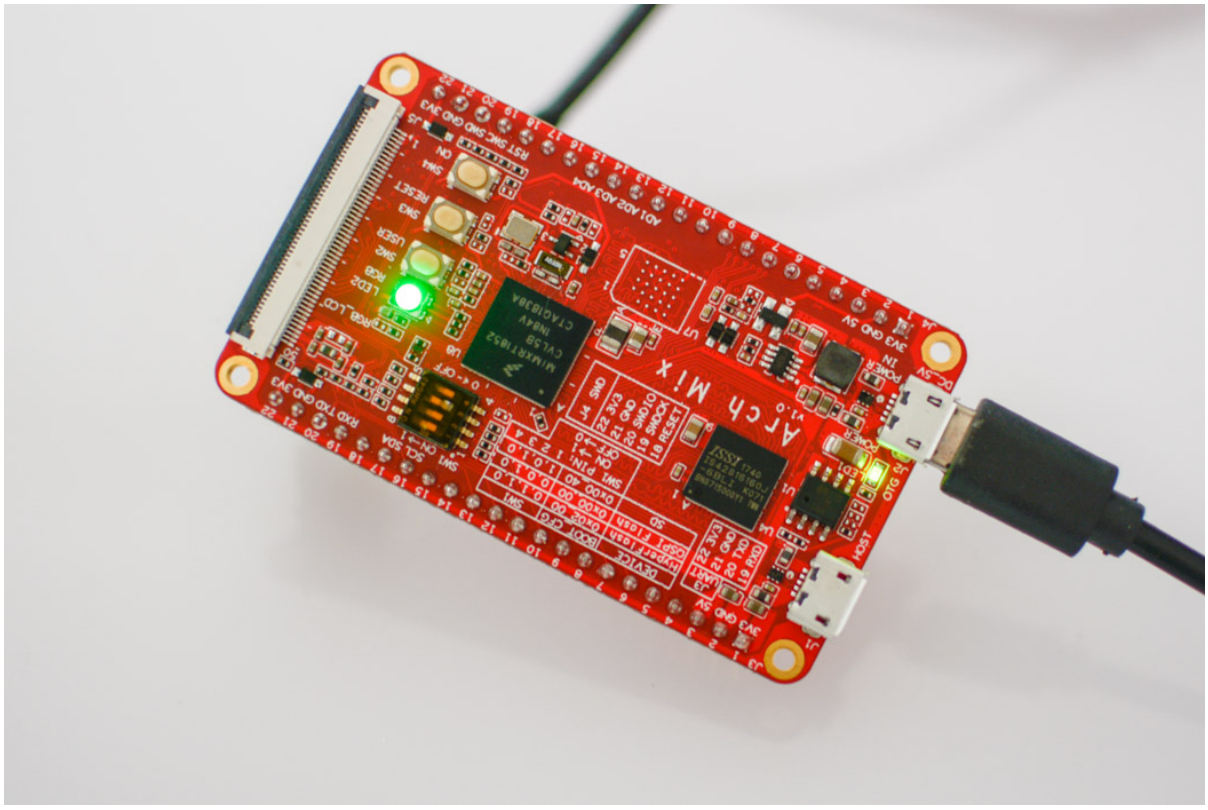


Figure 7. *Power On*

- **Step 4.** Open your **Computer Management**, find **Device Manager**. You will see The **RT-Thread Debug Bridge** and the correponding COM port, keep in mind the COM port number. As you can see, this tutorial is COM8.

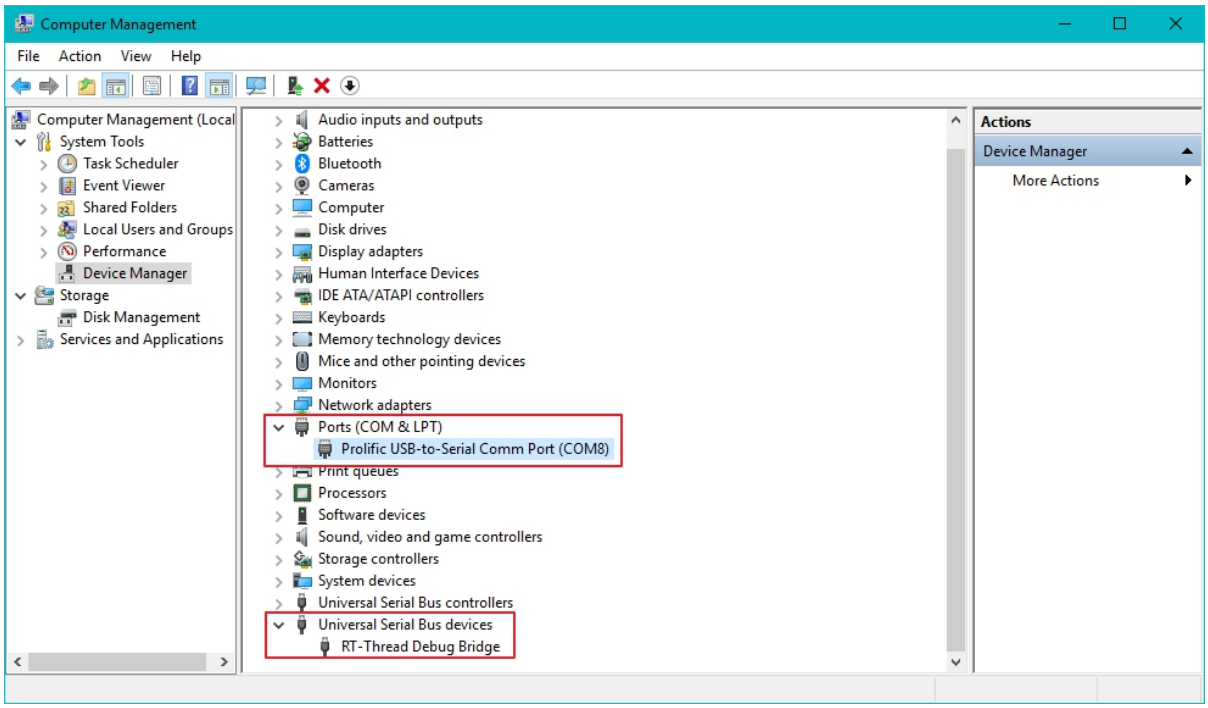


Figure 8. *Check the COM port, ckick the image to view the original file*

- **Step 5.** Use the serial port tool (For example: Putty) to read the serial port data. Select the corresponding port, set the baud rate to **115200**.

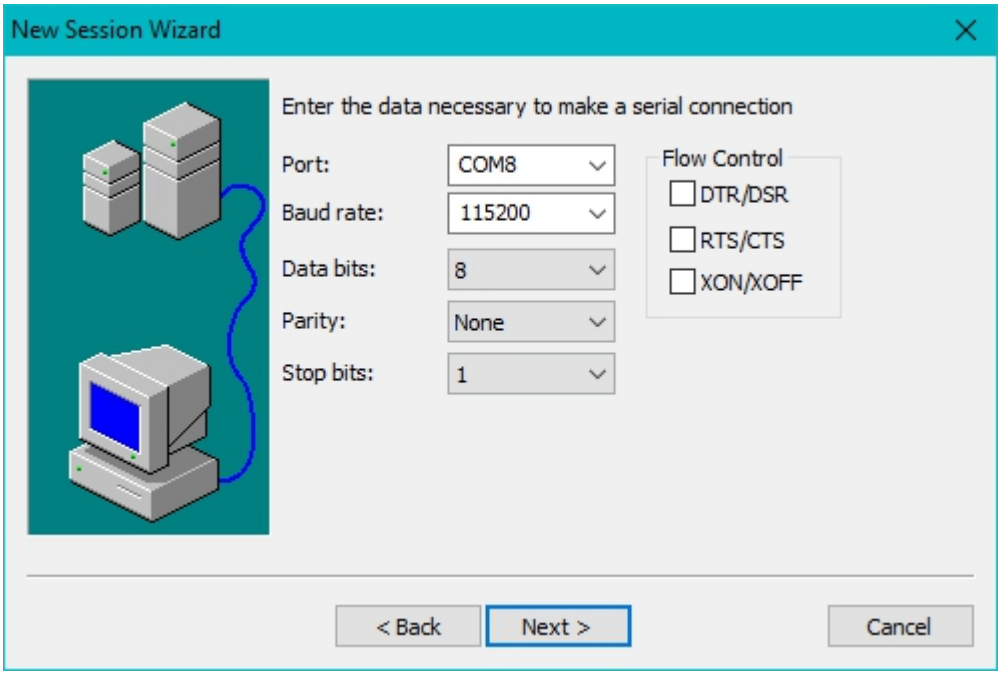


Figure 9. *Configure the serial tool*

- **Step 6.** Press the **Reset** button, to refresh the serial output.

This development board comes pre-installed RT-Thread real-time operating system(RTOS) and built-in micro-python, so when you follow the steps above to connect the hardware and power on the system, you will see the system log. The RTOS is a lightweight system which loads very quickly, one or two seconds later, the system starts up and you will see the following interface:

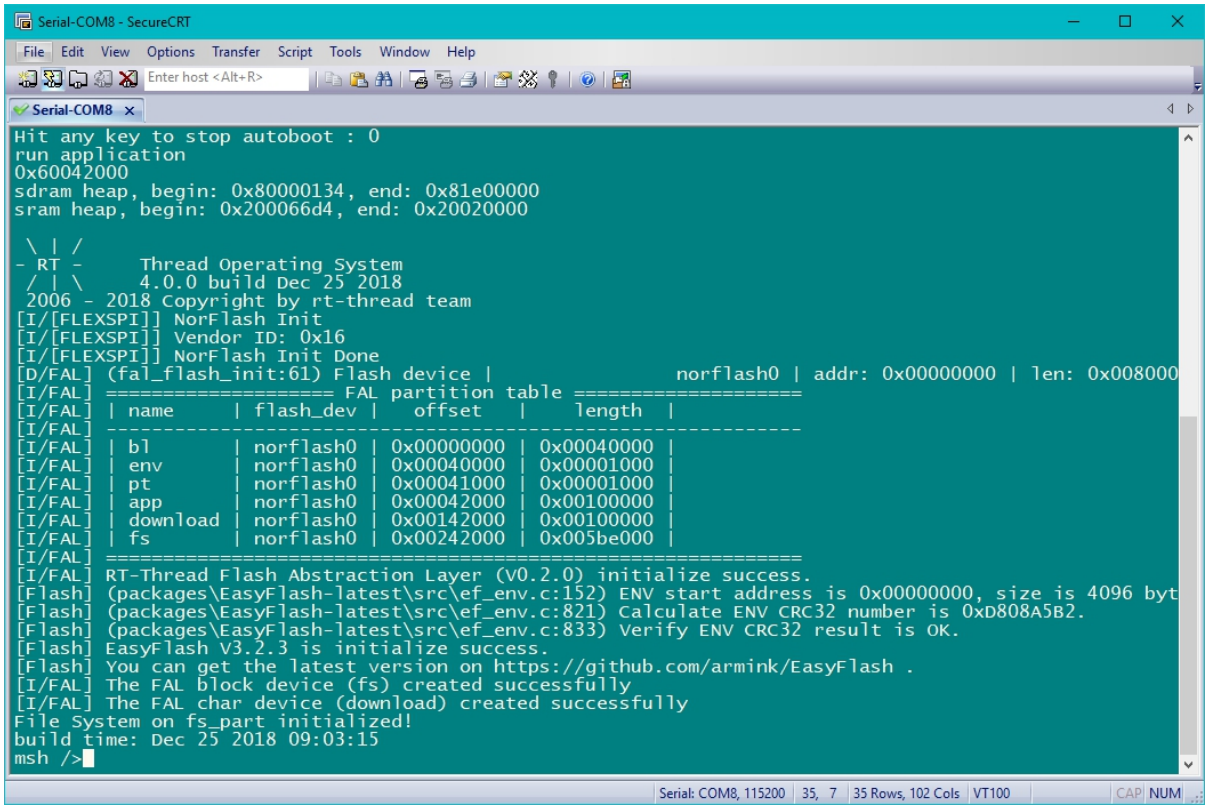


Figure 10. *RTOS Startup Interface*

Running MicroPython

Enter `python` in the Finsh/MSH command line to enter MicroPython's interactive command line -- REPL(Read-Evaluate-Print-Loop). You can see the following interface on the terminal:

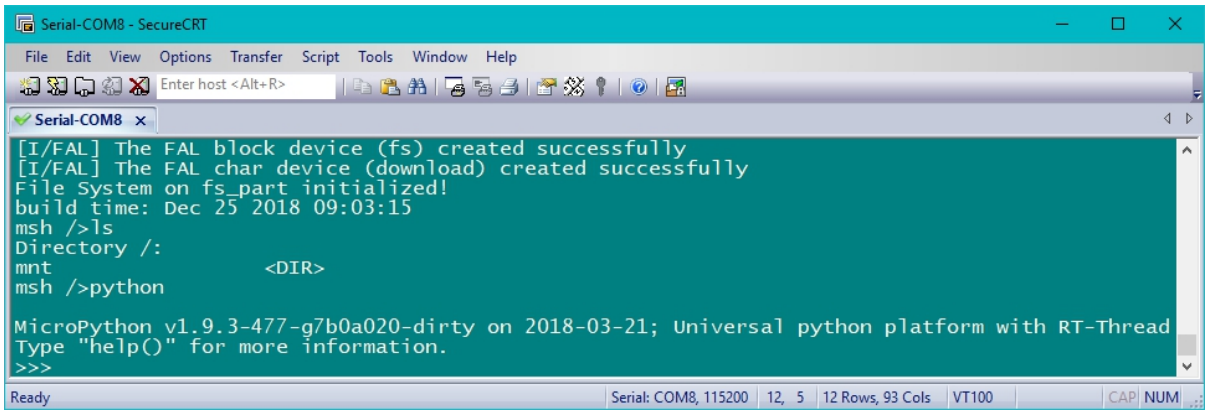


Figure 11. *Enter the REPL(Read-Evaluate-Print-Loop)*

You can tap ++ctrl+d++ or input `quit()` or `exit()` to exit REPL and return to RT-Thread Finsh/MSH.

Paste Mode

MicroPython is a lean and efficient implementation of the Python 3 programming language that includes a small subset of the Python standard library and is optimised to run on microcontrollers and in constrained environments.

- MicroPython has a special paste mode than the normal python interactive environment, which can be used to paste multiple lines of python code at a time.
- At the command line prompt, press ++ctrl+e++, and the prompt will appear: paste mode;
- ++ctrl+c++ to cancel, ++ctrl+d++ to finish. After pasting the code you need to run, press ++ctrl+d++ to exit the paste mode and the code you enter will be executed automatically.

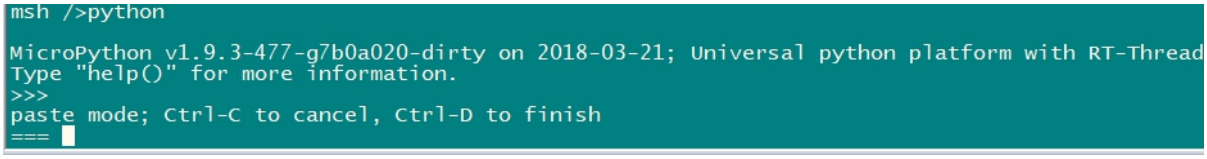


Figure 12. *Paste Mode*

MicroPython Demo

Flashing Light

As you can see there is a RGB LED on this board, usually this LED shows green. This demo will show you how to control the RGB LED.

!!!Note The RGB LED connected to the No. 52 pin of RT1052 chip.

- You can press ++ctrl+e++ to enter paste mode.
- Then paste the following code block into the command line.
- Press the ++ctrl+d++ to exit the paste mode and the code you enter will be executed automatically

```
import time
from machine import Pin

LED = Pin(("LED1", 52), Pin.OUT_PP)          #Set pin 52 to output mode
while True:
    LED.value(1)
    time.sleep_ms(500)
    LED.value(0)
    time.sleep_ms(500)
```

Now you will see the RGB LED flashing.

Button Light

Beside the RGB LED, you can find a USER button, this demo will show you how to use the USER button to control the RGB LED.

!!!Note - The RGB LED connected to the No. 52 pin of RT1052 chip.
- The button connected to the No. 152 pin of RT1052 chip.

- You can press ++ctrl+e++ to enter paste mode.
- Then paste the following code block into the command line.
- Press the ++ctrl+d++ to exit the paste mode and the code you enter will be executed automatically

```
from machine import Pin

led = Pin(("LED1", 52), Pin.OUT_PP)
key = Pin(("KEY", 125), Pin.IN, Pin.PULL_UP) #Set pin 125 to pull-up input mode
while True:
    if key.value():
        led.value(0)
    else:
        led.value(1)
```

Now the code is running, the RGB LED will turn yellow, and when you press and hold the USER button, the RGB LED will turn green.

Resources

- **[ZIP]** Arch Mix Eagle file
- **[PDF]** PDF Format Wiki
- **[PDF]** i.MX RT1050 Datasheet
- **[PDF]** Dimension Diagram
- **[xlsx]** Arch Mix_v1.0_Pin Function

Tech Support

Please submit any technical issue into our forum or drop mail to techsupport@seeed.cc.