

RFCAT

N32

VERSION 1.3

Amplified nRF52832 dev kit for long range,
high bandwidth and mesh applications

KEY FEATURES



Skyworks RFX2401C PA &
LNA with 18.9dBm TX gain
and 11dBm RX gain



Loaded with Adafruit NRF52
bootloader supporting OTA,
FreeRTOS and Arduino



CP2102N USB to UART
bridge allowing for quick
programming and debug

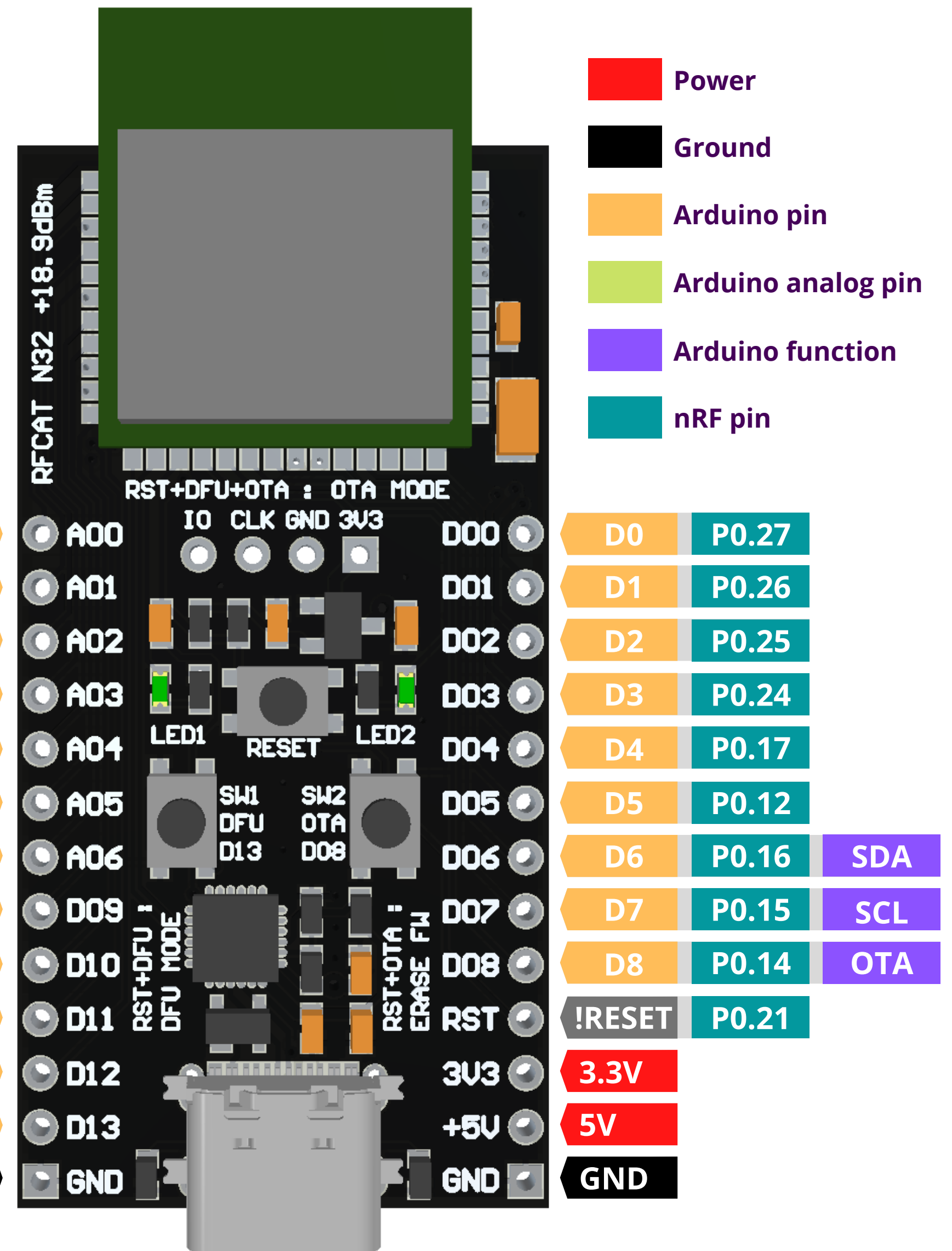


21 GPIOs, 7 ADC pins, 3
buttons and 2 LEDs for
easy interaction and debug

RF TRANSMISSION POWER COMPARISON

nRF52832	2.5mW
nRF52840	6.3mW
RFCAT N32	77.6mW

A0	AIN4	P0.28	D24
A1	AIN5	P0.29	D25
A2	AIN6	P0.30	D26
A3	AIN0	P0.02	D27
A4	AIN2	P0.04	D28
A5	AIN1	P0.03	D29
A6	AIN3	P0.05	D30
	MISO	P0.08	D9
	MOSI	P0.06	D10
	SCK	P0.07	D11
	SS	P0.01	D12
	DFU	P0.00	D13
	GND		



USB type C

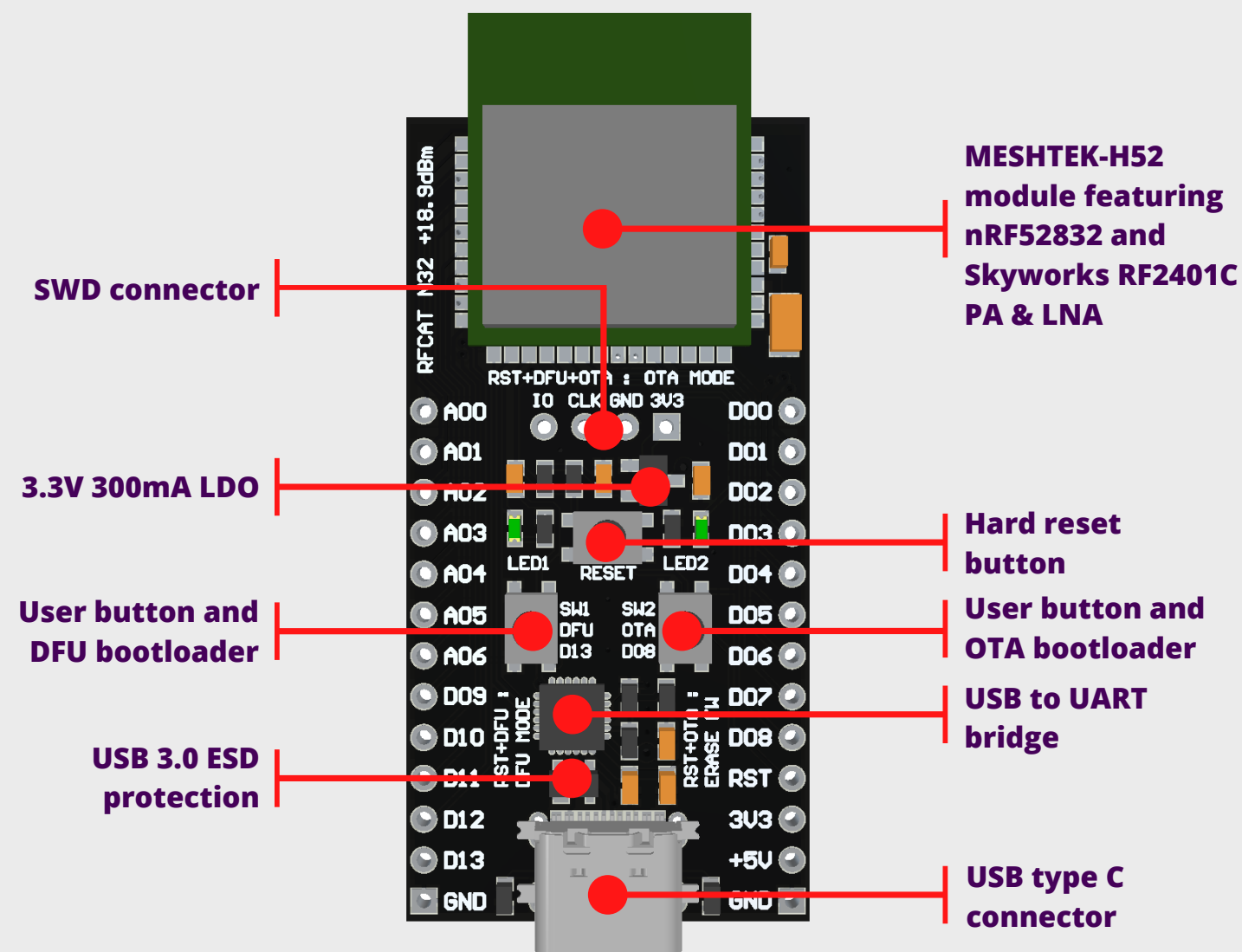


MADE WITH



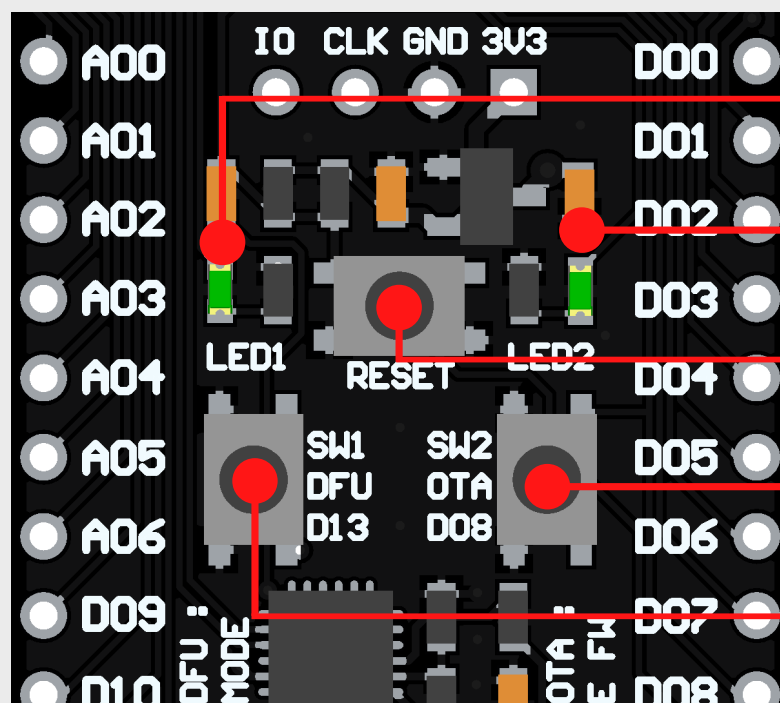
IN DENMARK

FRONT VIEW



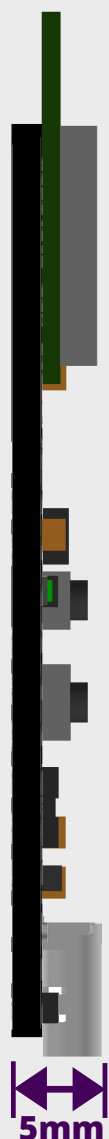
BOARD OVERVIEW

LEDS AND BUTTONS

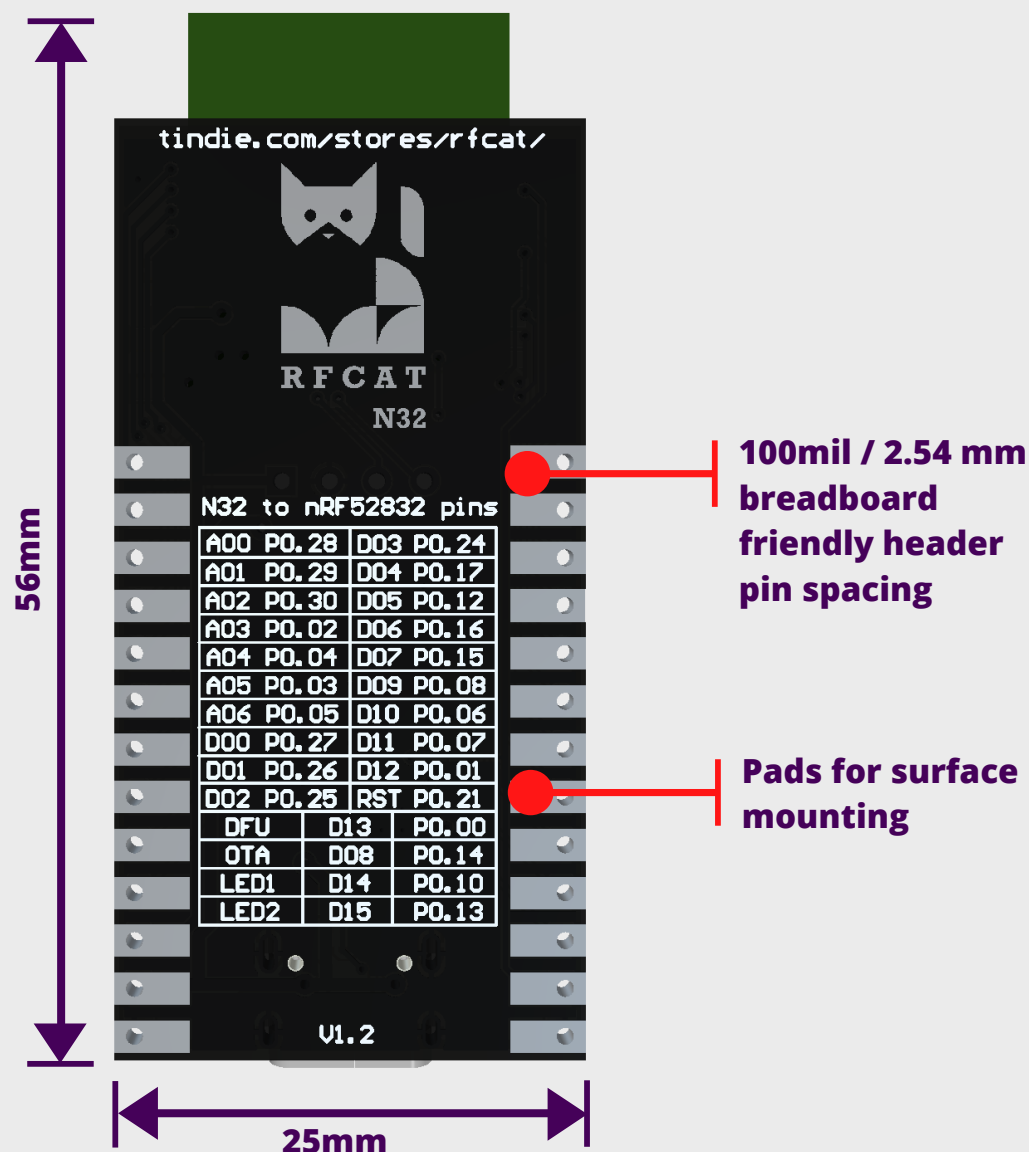


D14	P0.10	LED1 GREEN
D15	P0.13	LED2 RED
n/c	P0.21	RESET PULLED UP
D8	P0.14	OTA AND USER BTN
D13	P0.00	DFU AND USER BTN

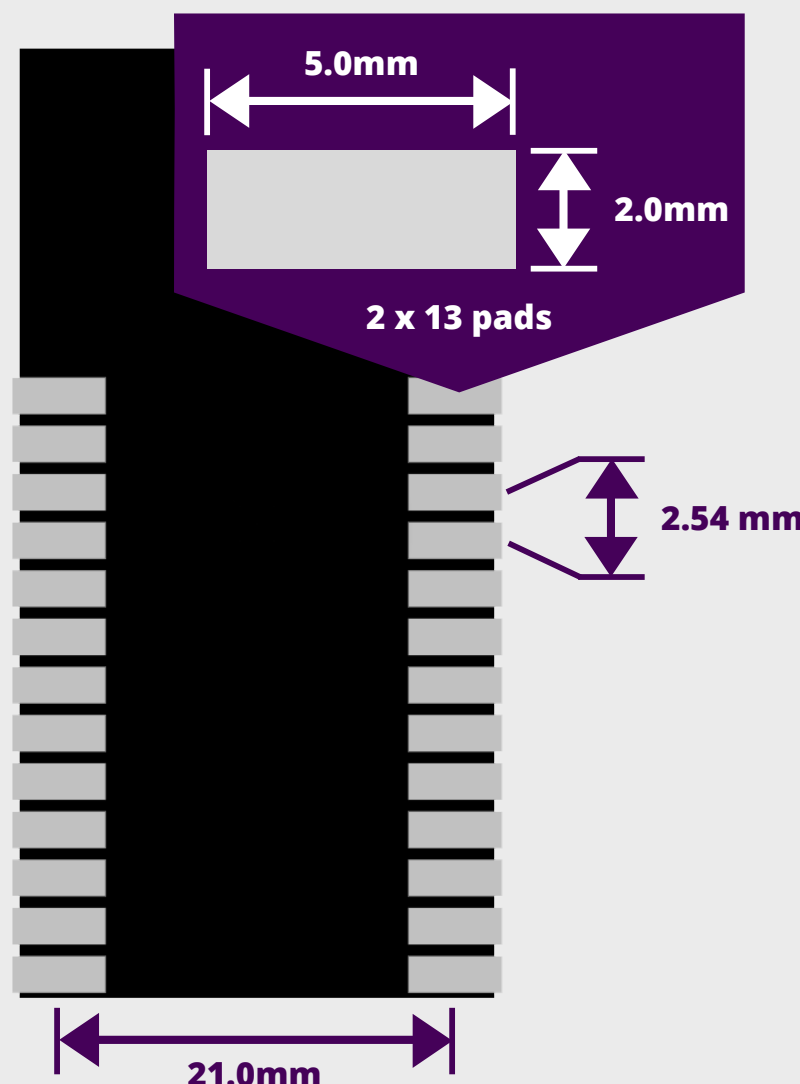
SIDE VIEW



BACK VIEW



PCB LAND PATTERN



ELECTRICAL

5V PIN

POWERED BY USB. CAN BE POWERED DIRECTLY VIA THE PIN.
MAX INPUT VOLTAGE: 5.25V

3.3V PIN

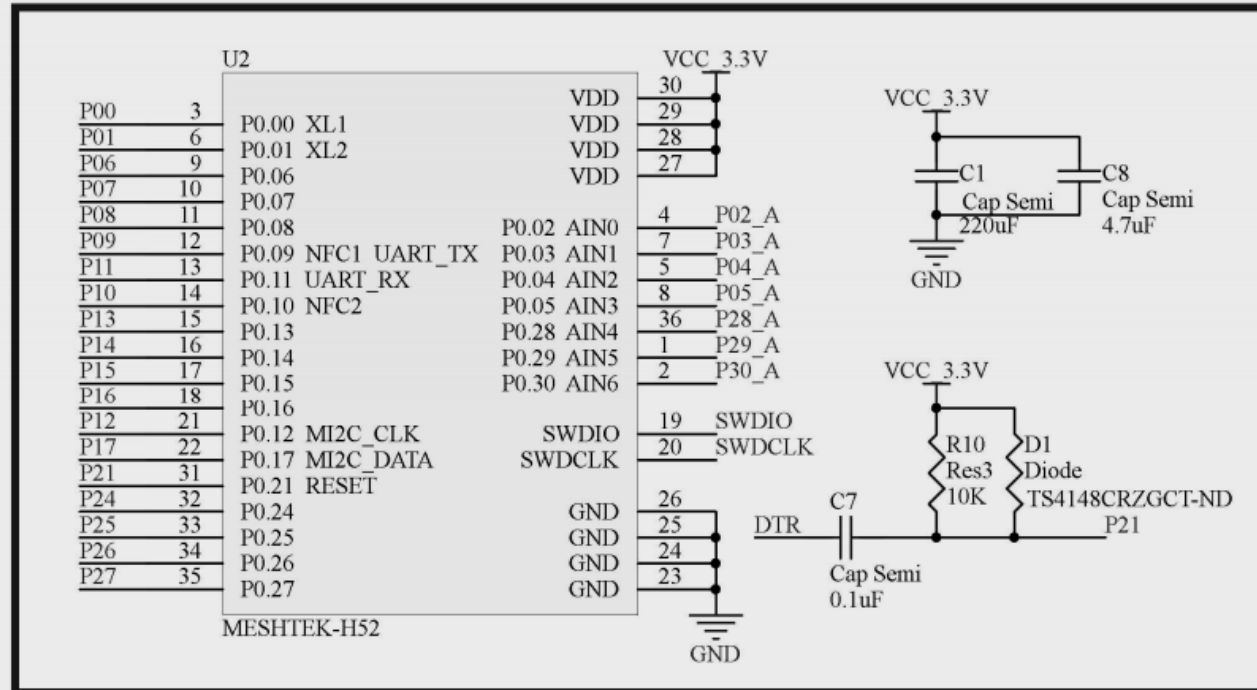
POWERED BY THE 3.3V REG. CAN BE POWERED DIRECTLY VIA THE PIN.
MAX INPUT VOLTAGE: 3.5V

GPIO PINS

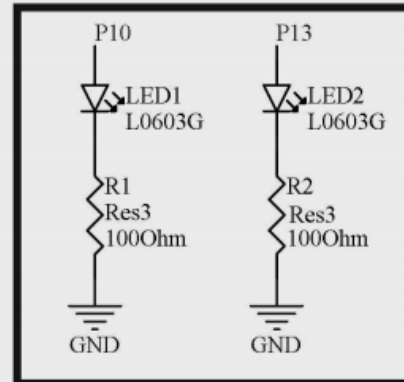
MAX 10mA PER GPIO PIN
MAX 30mA FOR ENTIRE PACKAGE
LOW POWER CONSUMPTION
USB TO SERIAL BRIDGE IS ONLY POWERED BY 5V OR USB. LOW POWER CONSUMPTION CAN BE ACHIEVED BY POWERING THE RFCAT N32 DIRECTLY BY SUPPLYING THE 3.3V PIN WITH 3.3V.

SCHEMATIC VIEW

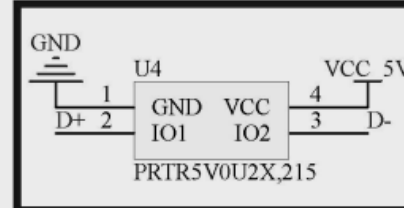
Microcontroller



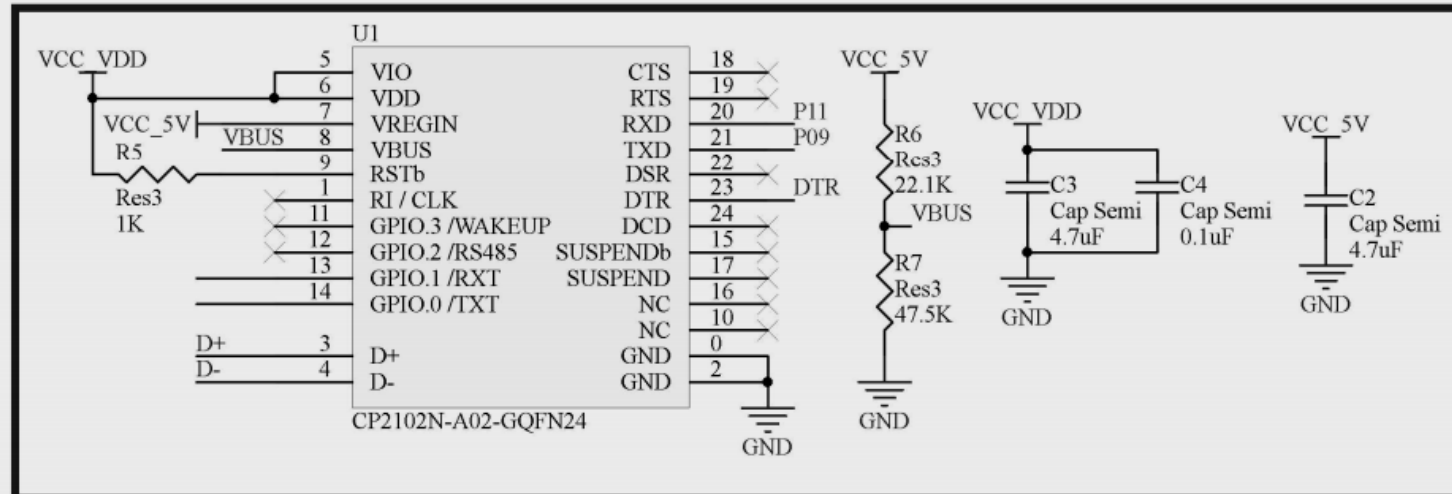
LEDs



ESD Protection

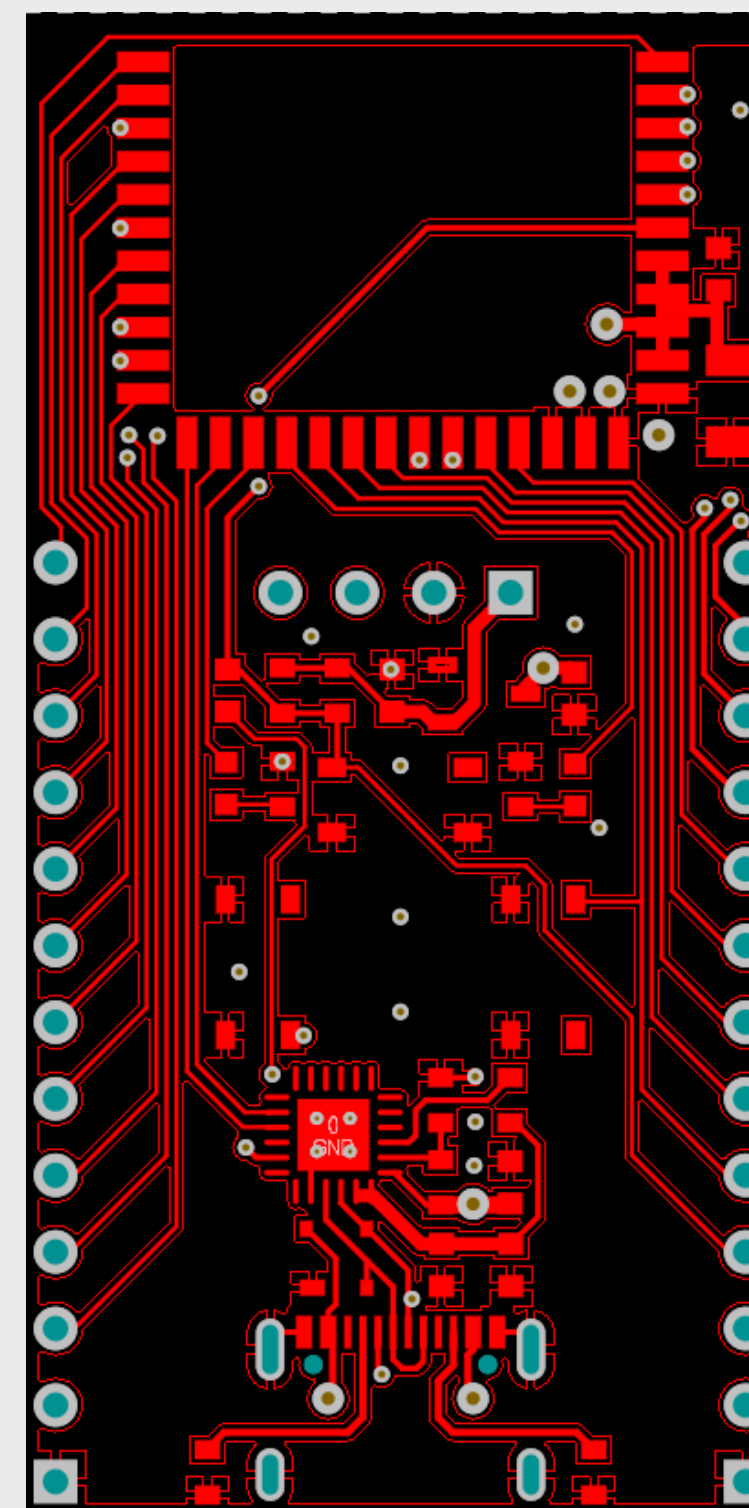


USB to UART

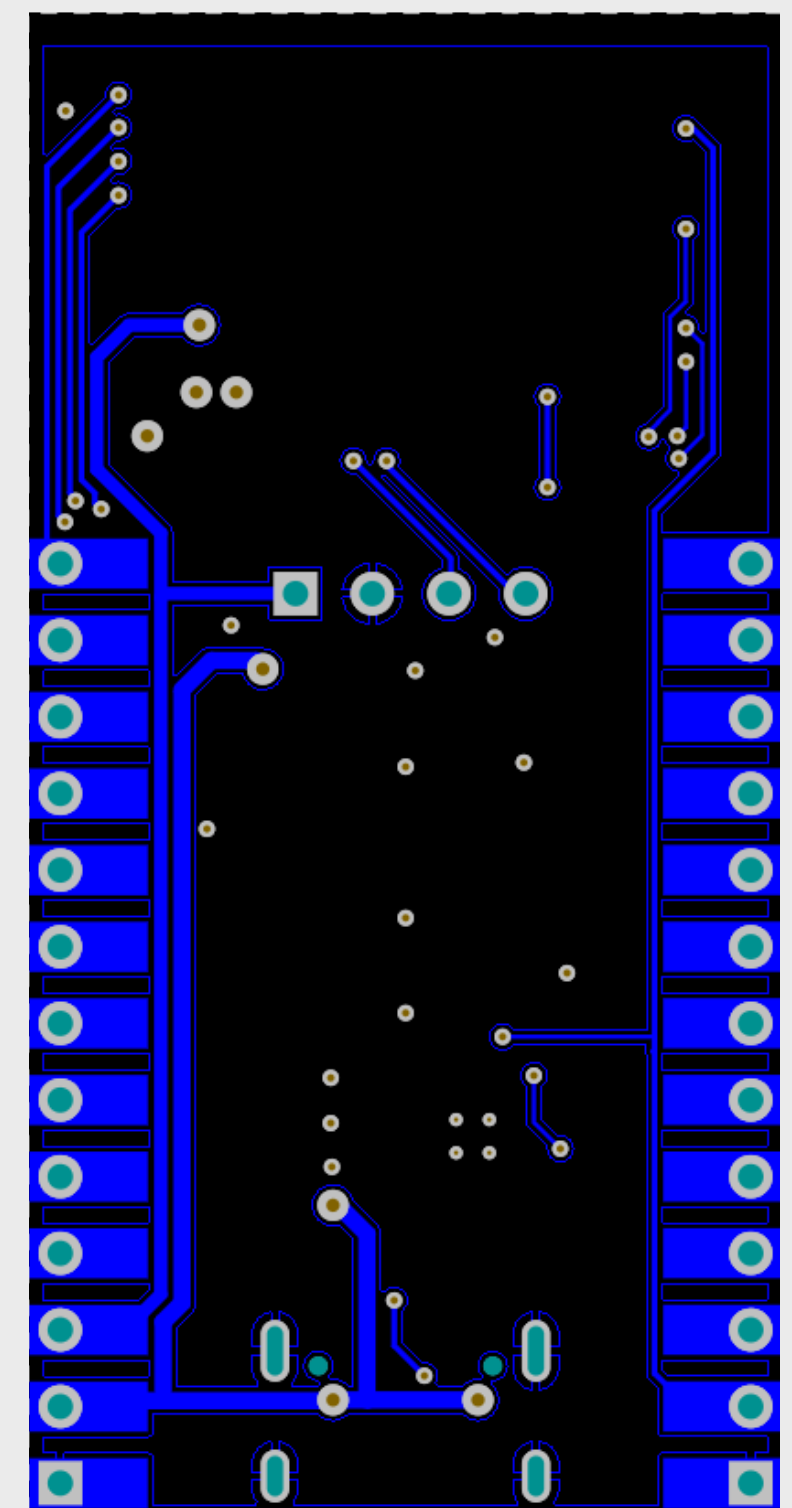


PCB VIEW

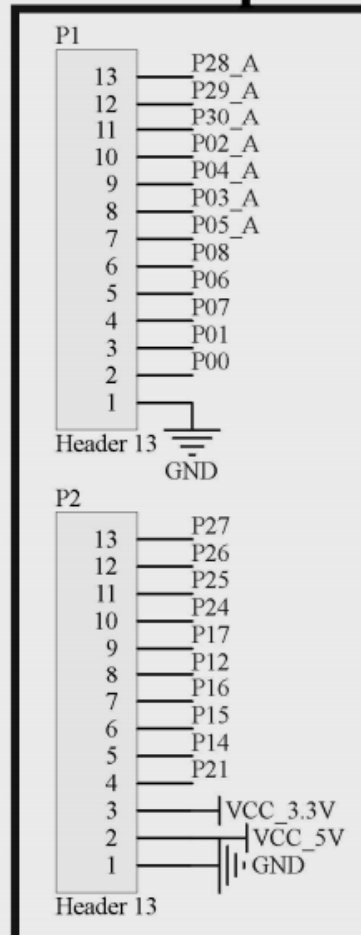
TOP VIEW



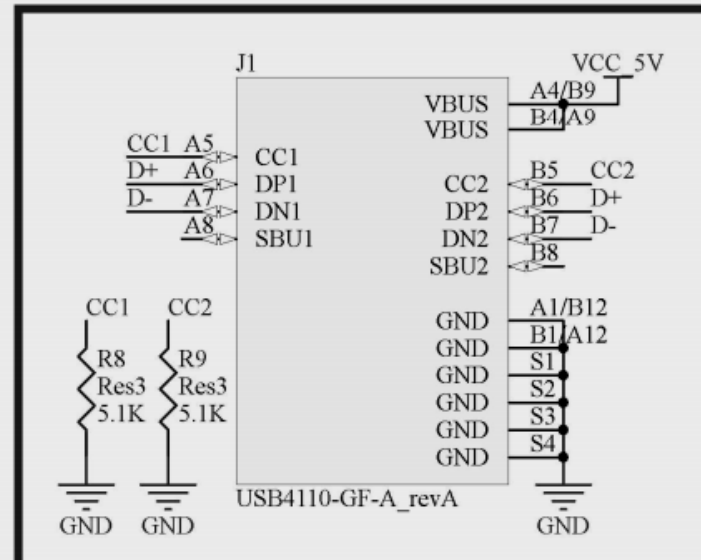
BOTTOM VIEW



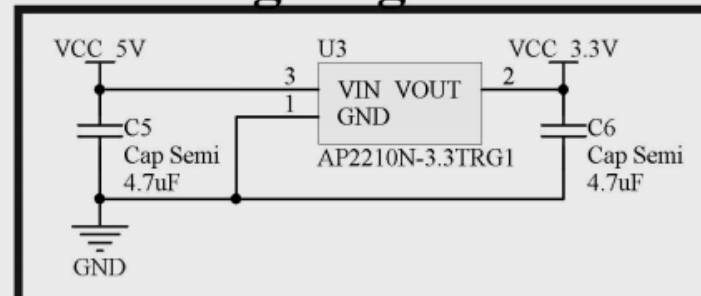
Header pins



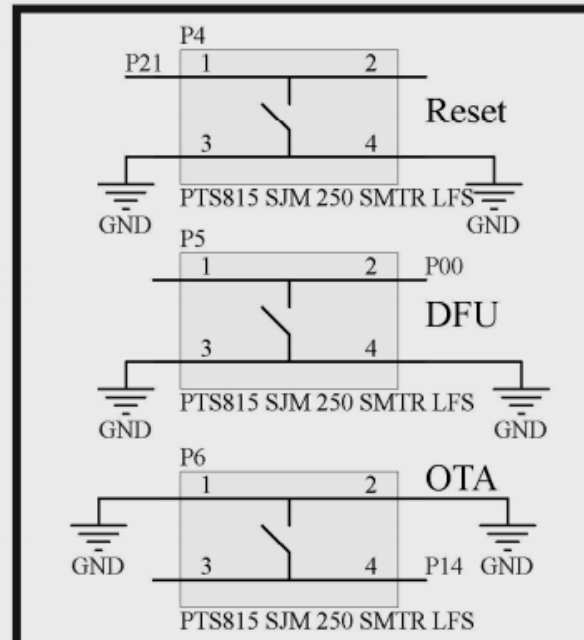
USB connector



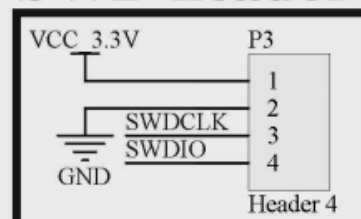
Voltage regulator



Buttons



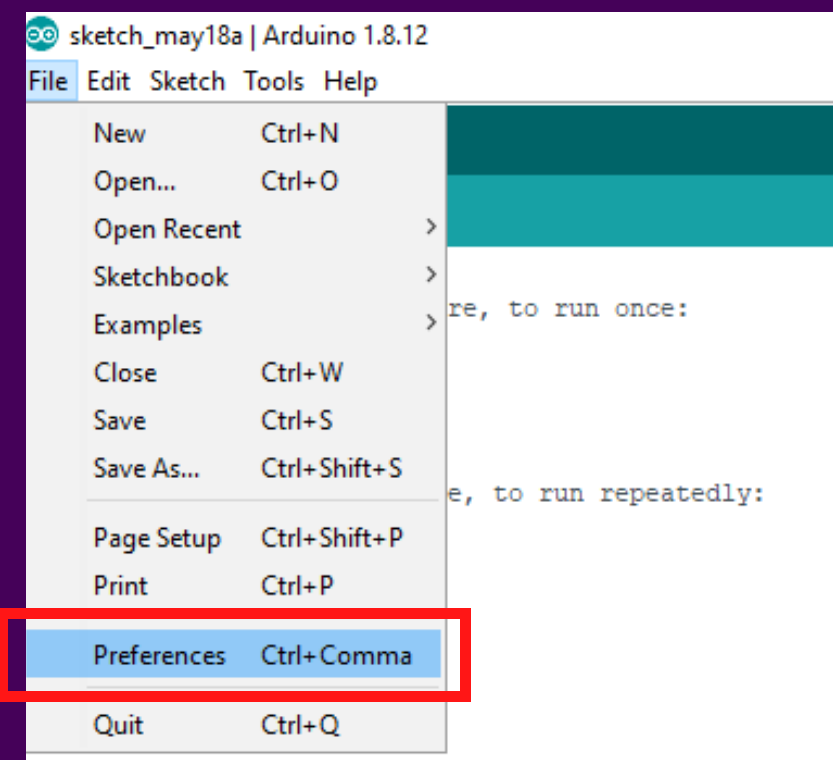
SWD header



ARDUINO SETUP

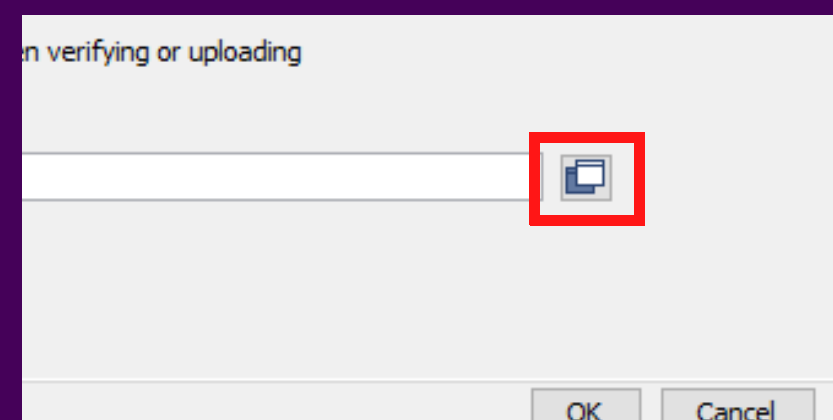
STEP 1

OPEN ARDUINO, VERSION 1.8 OR HIGHER. CLICK ON FILE, THEN CLICK ON PREFERENCES.



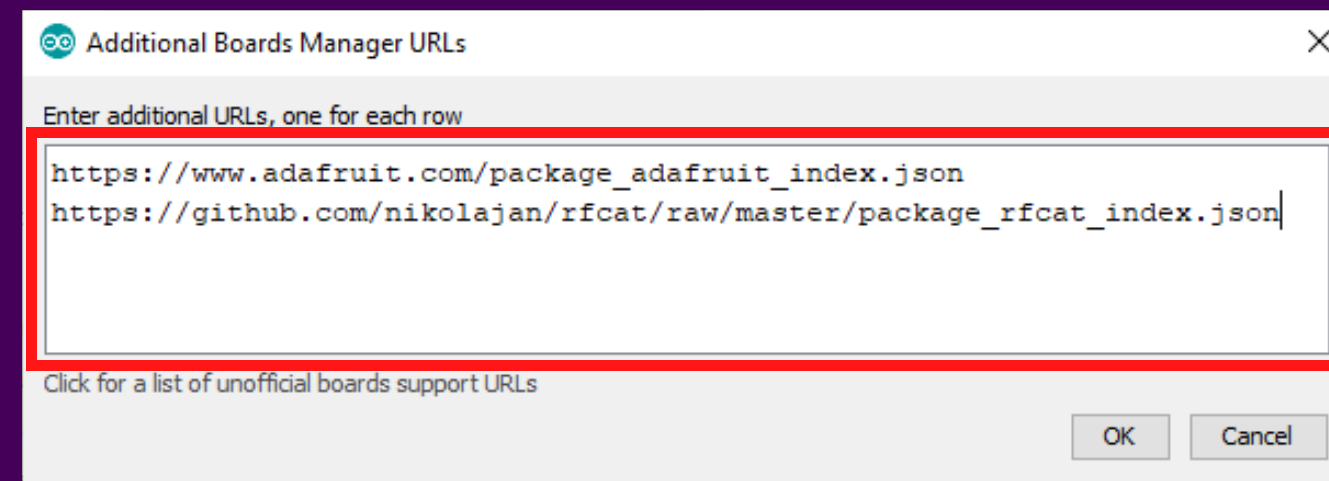
STEP 2

CLICK ON THE ICON NEXT TO ADDITIONAL BOARDS MANAGER URLS.



STEP 3

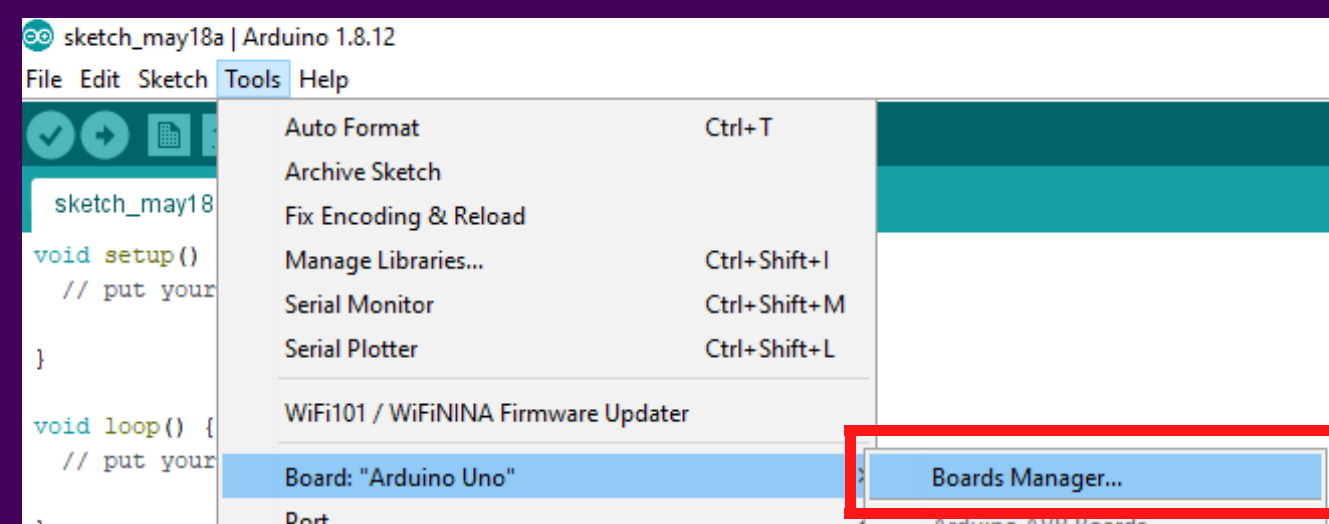
COPY AND PASTE THE URLS TO THE RIGHT INSIDE THE TEXT FIELD AND CLICK OK.



https://www.adafruit.com/package_adafruit_index.json
https://github.com/nikolajan/rfcat/raw/master/package_rfcat_index.json

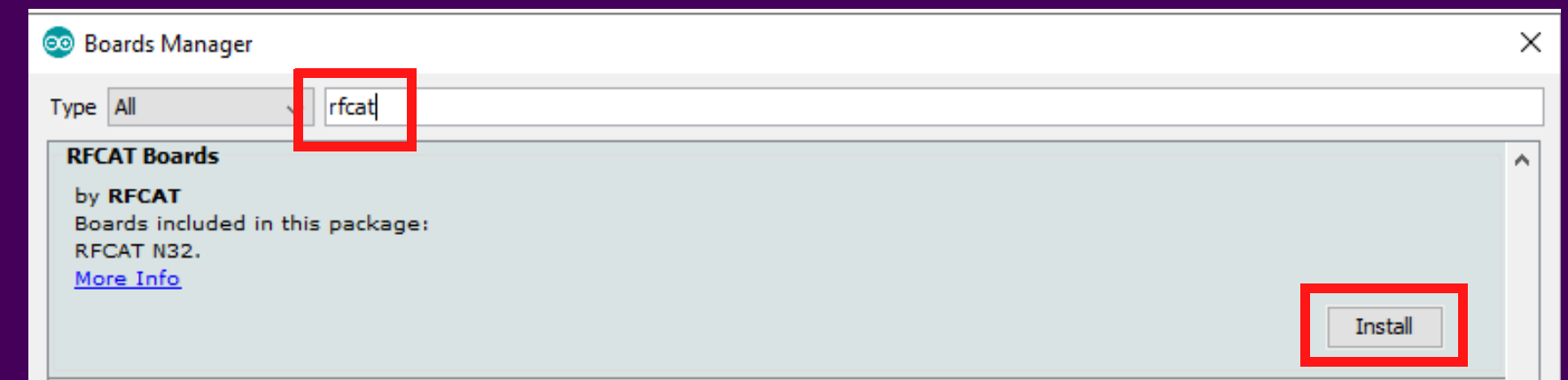
STEP 4

CLICK ON TOOLS, BOARD AND THEN BOARD MANAGER.

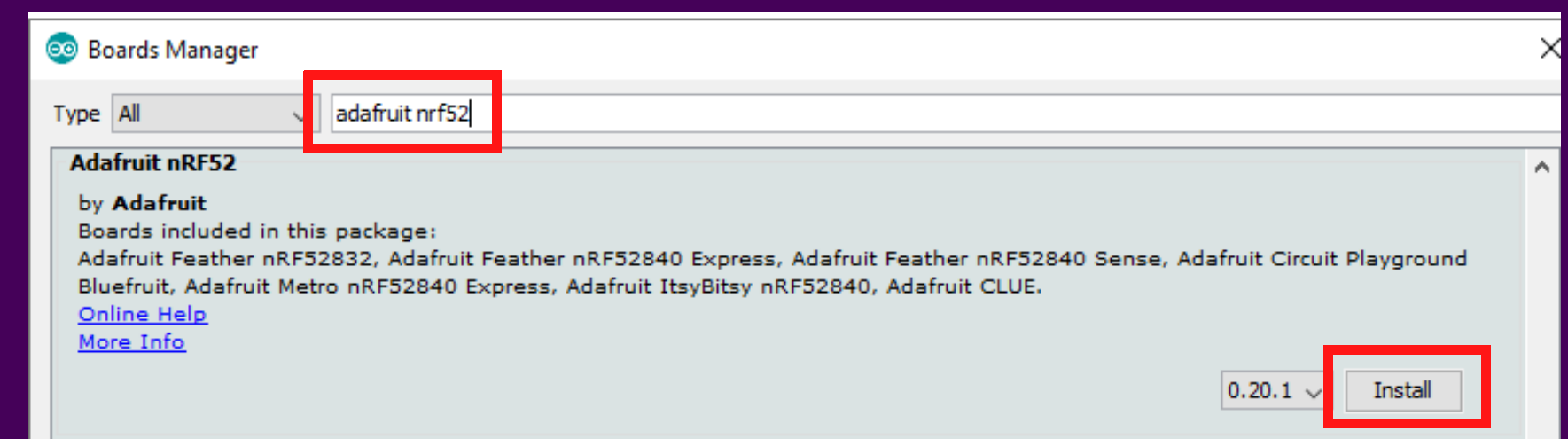


STEP 5

SEARCH FOR "RFCAT" AND CLICK INSTALL. WAIT FOR THE INSTALLER TO FINISH.



THEN SEARCH FOR "ADAFRUIT NRF52" AND CLICK INSTALL. WAIT FOR THE INSTALLER TO FINISH.

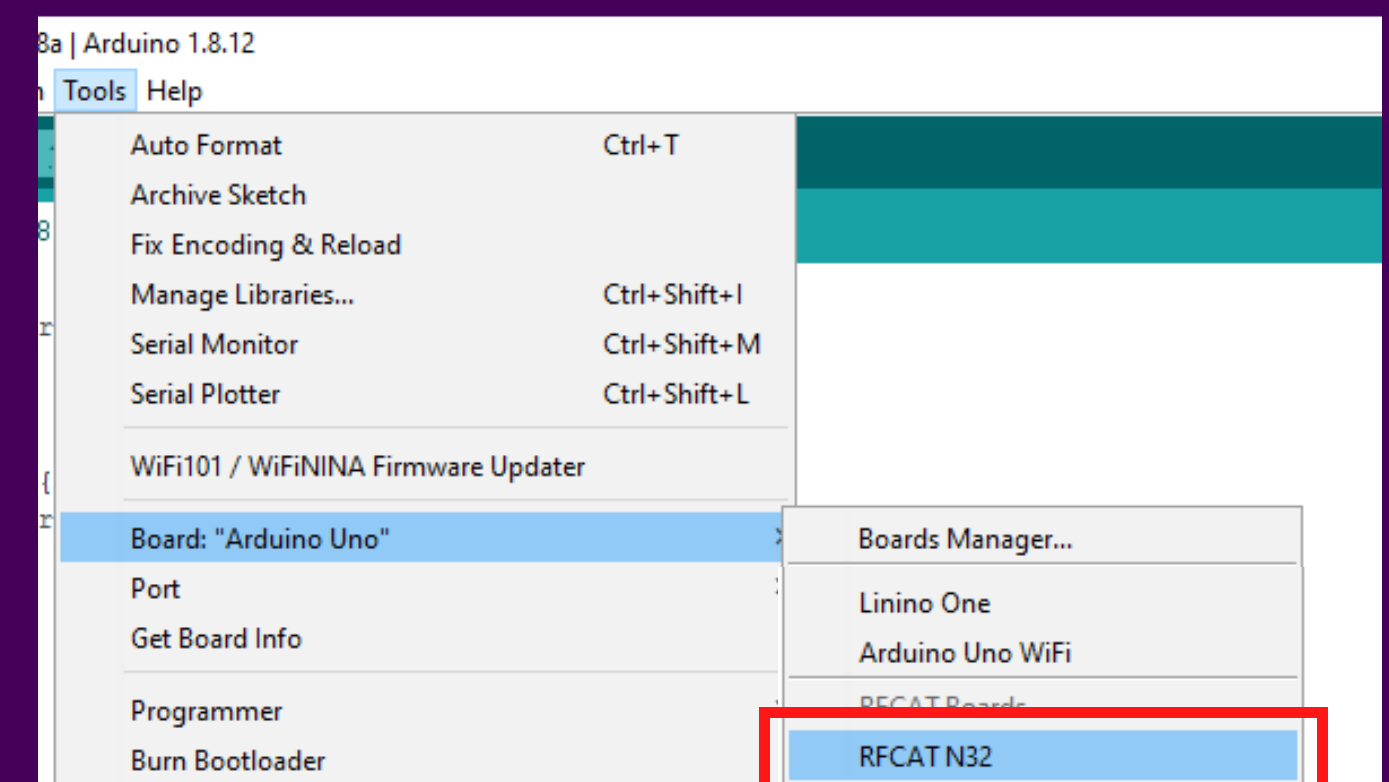


FINALLY CLOSE THE BOARDS MANAGER WINDOW.

STEP 6

CLICK ON TOOLS, BOARD AND THEN CHOOSE THE RFCAT N32 BOARD.

BE AWARE THAT THE BOARD MIGHT BE IN THE BOTTOM OF THE LIST.



All done

THE SETUP IS NOW DONE, AND YOUR ARDUINO IS CONFIGURED FOR THE RFCAT N32 BOARD. WRITE YOUR CODE AND COMPILE & UPLOAD YOUR CODE USING THE ARROW.



BOOTLOADER AND CODE

BOOTLOADER AND BUTTONS

THE RFCAT N32 COMES PRE-LOADED WITH THE ADAFRUIT NRF52 BOOTLOADER PRECONFIGURED TO MATCH THE FUNCTIONALITY OF THE RFCAT N32 HARDWARE.

THE BOARD HAS A RESET-ON-DTR SYSTEM IMPLEMENTED, WHICH ALLOWS THE MICROCONTROLLER TO ENTER DFU FIRMWARE UPDATE STATE DIRECTLY USING THE USB TO UART SYSTEM. THIS MEANS THAT YOU WILL BE ABLE TO UPLOAD FIRMWARE DIRECTLY FROM ARDUINO WITHOUT HAVING TO PERFORM A MANUAL RESET.

THE RFCAT N32 ALSO FEATURES 3 BUTTONS, WHICH HAS THE FOLLOWING FUNCTIONALITIES IN REGARDS TO THE BOOTLOADER FUNCTIONS:

RST + DFU: DFU MODE
RST + OTA: ERASE FW
RST + DFU + OTA: OTA MODE

WHEN THE BUTTONS ARE NOT USED IN COMBINATION WITH THE RESET BUTTON, THEN BOTH THE OTA AND DFU BUTTONS CAN BE USED IN THE APPLICATION CODE AS ONE SEES FIT.

THE OTA AND DFU BUTTONS DO NOT HAVE ANY PULL OR DECOUPLING. THE RESET BUTTON IS BOTH DECOUPLED AND PULLED HIGH.

PA AND LNA INITIALIZATION CODE

IN ORDER TO USE THE PA AND LNA THE FOLLOWING CODE HAS TO BE ADDED TO THE SETUP() FUNCTION. THIS CODE HAS TO BE RUN

AFTER Bluefruit.begin(); FUNCTION,
AND BEFORE startAdv(); FUNCTION.

IT IS RECOMMENDED TO RUN THE CODE AS THE FIRST THING IN THE SETUP() FUNCTION.

IF THIS CODE IS NOT ADDED THEN THE RADIO POWER OUTPUT OF THE RFCAT N32

~~WILL BE VERY LOW AND NOT USEFUL FOR ANY REAL APPLICATIONS~~

```
uint32_t err_code;
```

```
nrf_gpio_cfg_output(23);  
nrf_gpio_pin_clear(23); //  
nrf_gpio_cfg_output(22);  
nrf_gpio_pin_clear(22); //
```

```
// Configure SoftDevice PA/LNA assist
```

```
ble_opt_t opt;
```

```
memset(&opt, 0, sizeof(ble_opt_t));
```

```
// Common PA/LNA config
```

```
opt.common_opt.pa_lna.gpiote_ch_id = 0;
```

```
// GPIOTE channel
```

```
opt.common_opt.pa_lna.ppi_ch_id_clr = 1;
```

```
// PPI channel for pin clearing
```

```
opt.common_opt.pa_lna.ppi_ch_id_set = 0;
```

```
// PPI channel for pin setting
```

```
// PA config
```

```
opt.common_opt.pa_lna.pa_cfg.active_high = 1;
```

```
// Set the pin to be active high
```

```
opt.common_opt.pa_lna.pa_cfg.enable = 1;
```

```
// Enable toggling
```

```
opt.common_opt.pa_lna.pa_cfg.gpio_pin = 23;
```

```
// The GPIO pin to toggle
```

```
// LNA config
```

```
opt.common_opt.pa_lna.lna_cfg.active_high = 1;
```

```
// Set the pin to be active high
```

```
opt.common_opt.pa_lna.lna_cfg.enable = 1;
```

```
// Enable toggling
```

```
opt.common_opt.pa_lna.lna_cfg.gpio_pin = 22;
```

```
// The GPIO pin to toggle
```

```
err_code = sd_ble_opt_set(BLE_COMMON_OPT_PA_LNA, &opt);
```

```
//Serial.println(err_code); //optional
```

FIND MORE INFORMATION ON

github.com/nikolajan/rfcats

tindie.com/stores/rfcats