



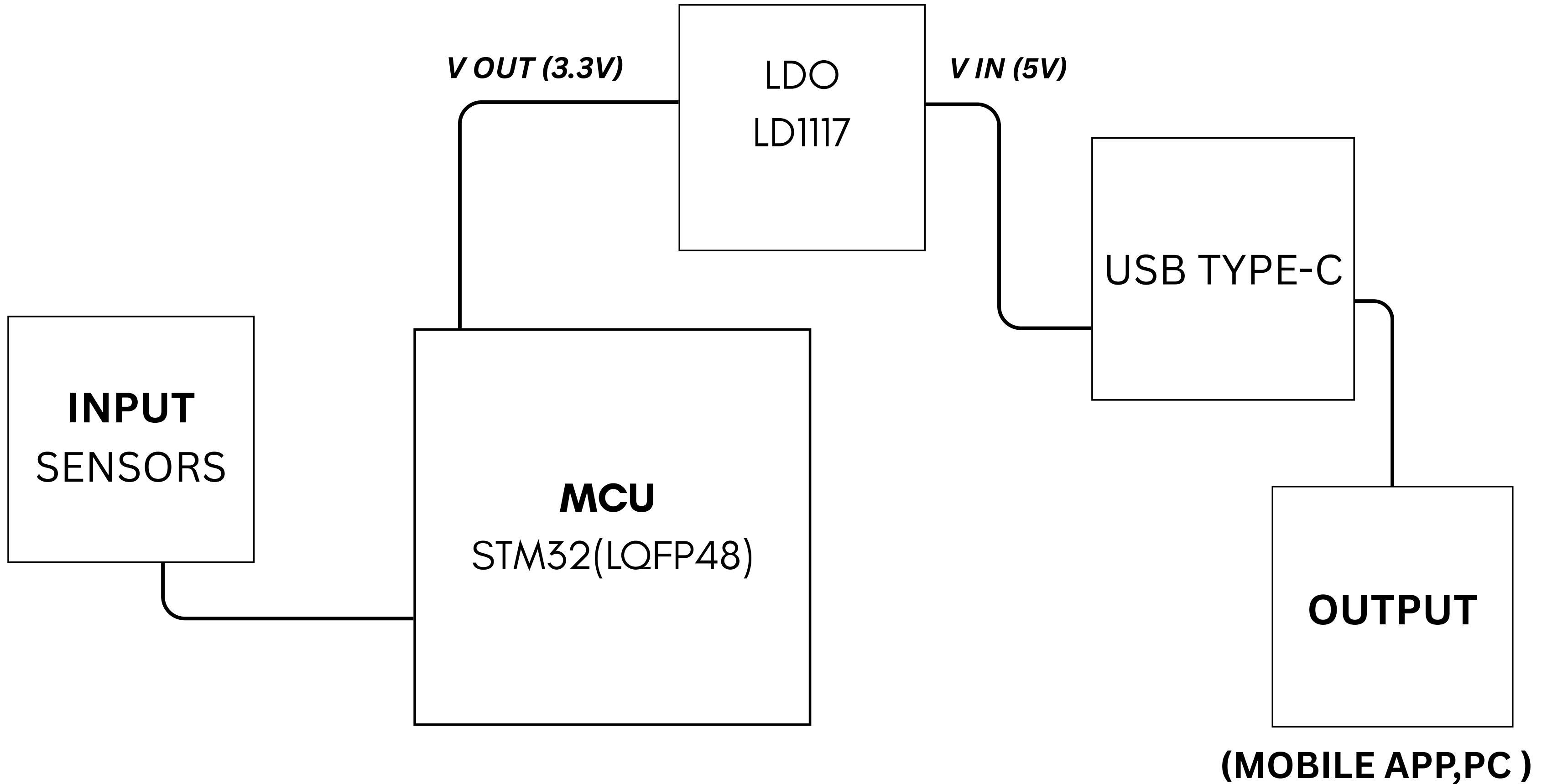
SENSOR WITH MOBILE CONNECTIVITY



PROJECT OVERVIEW

- This project focuses on building a USB-based monitoring device that can collect data from sensors, process it using a microcontroller, and share the results in real time with a mobile device.
- STM32F103C8TX (LQFP48) blue pill
- LD1117 (DPAK)
- USB C RECEPTACLE (USB2.0 14P)
- On a mobile phone, real-time readings can be monitored using applications such as Serial USB Terminal or USB Serial Monitor Lite, enabling portable and efficient environmental monitoring.

BLOCK DIAGRAM



TECHNICAL SPECIFICATIONS

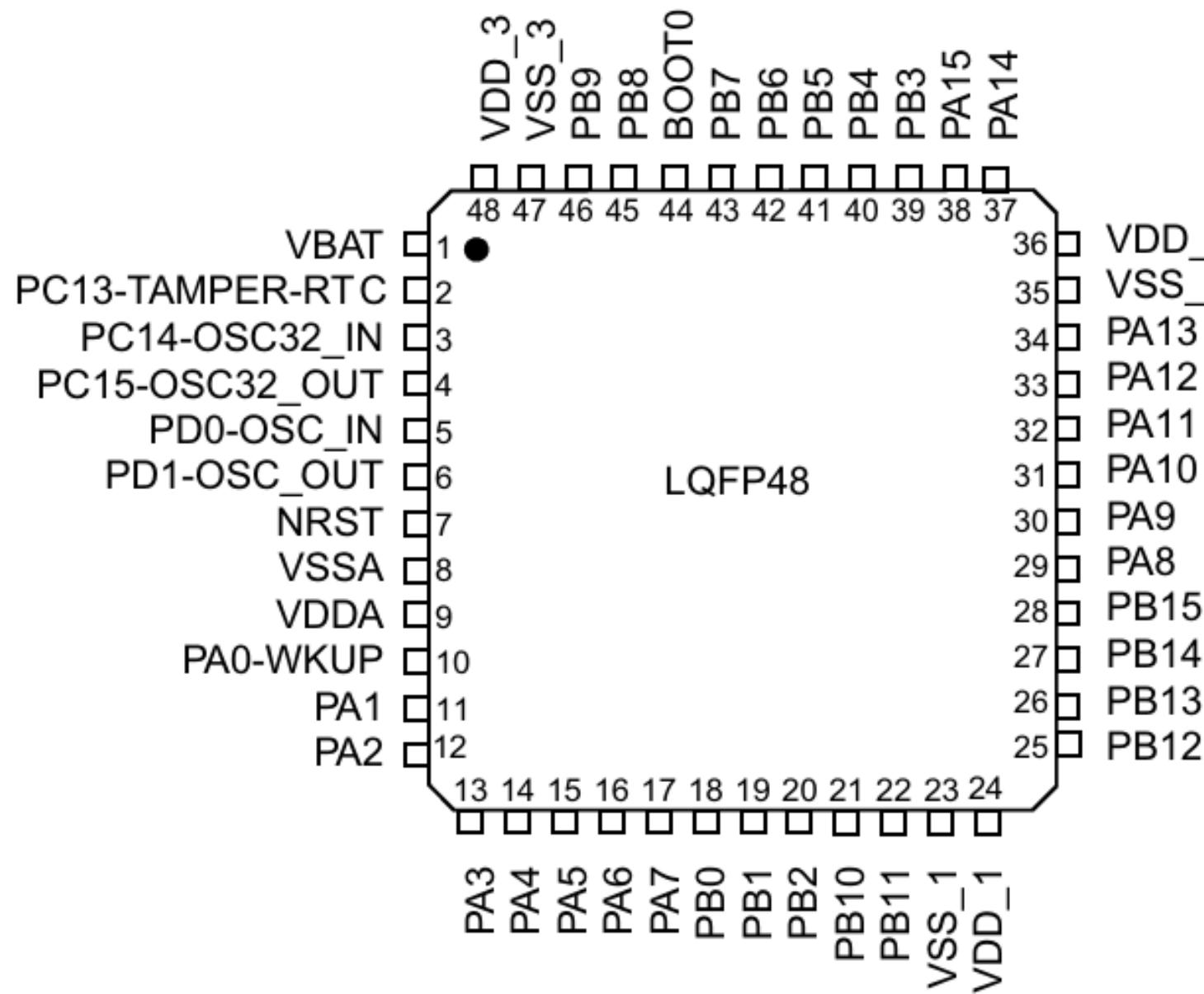
STM32F103C8TX (LQFP48)

- The STM32F103C8Tx medium-density performance line family incorporates the high-performance 32-bit RISC core
- It is operating at a 72 MHz frequency, high-speed embedded memories
- Flash memory up to 64 Kbytes and SRAM up to 20 Kbytes
- The devices operate from a 2.0 to 3.6 V power supply.
- They are available in both the -40 to +85°C temperature range and the -40 to +105 °C extended temperature range.

FEATURES

- FT- 5 V TOLERANT
- VSSA, VDDA = 2.0 to 3.6 V: external analog power supplies for ADC, reset blocks, RCs, and PLL
- All main power (VDD, VDDA) and ground (VSS, VSSA) pins must always be connected to the external power supply, in the permitted range.
- Negative injection disturbs the analog performance of the device

PIN CONFIGURATIONS



VBAT - BACKUP SOURCE	(PA8 - PA15) - IN/OUT
VSS_1 - GND/ VOLTAGE	(PB0 - PB1)- IN/OUT
SUPPLY SOURCE	PB2 - BOOT1
VSS_2- GND/VOLTAGE	(PB3 - PB6) - IN/OUT
SUPPLY SOURCE	(PB7- PB9) - IN/OUT
VSS_3- GND/VOLTAGE	PB10 - I2C,SCL
SUPPLY SOURCE	PB11- 12C,SDA
VSSA -- ANALOG GND	(PB12-PB15) - IN/OUT
VDD_1- SOURCE	PC13 - IN/OUT
VDD_2- SOURCE	PC14- OSC_IN(LSE)
VDD_3- SOURCE	PC15-OSC_OUT(LSE)
VDDA- ANALOG SUPPLY	
VOLTAGE	
NRST- RESET	
BOOT0-BOOT0	
PD0- OSC_IN	
PD1- OSC_OUT	
PA0 - ADC	
(PA1 - PA3) - IN/OUT	
PA4- SPI NSS	
PA5- SPI SCK	
PA6- SPI MISO	
PA7-SPI MOSI	

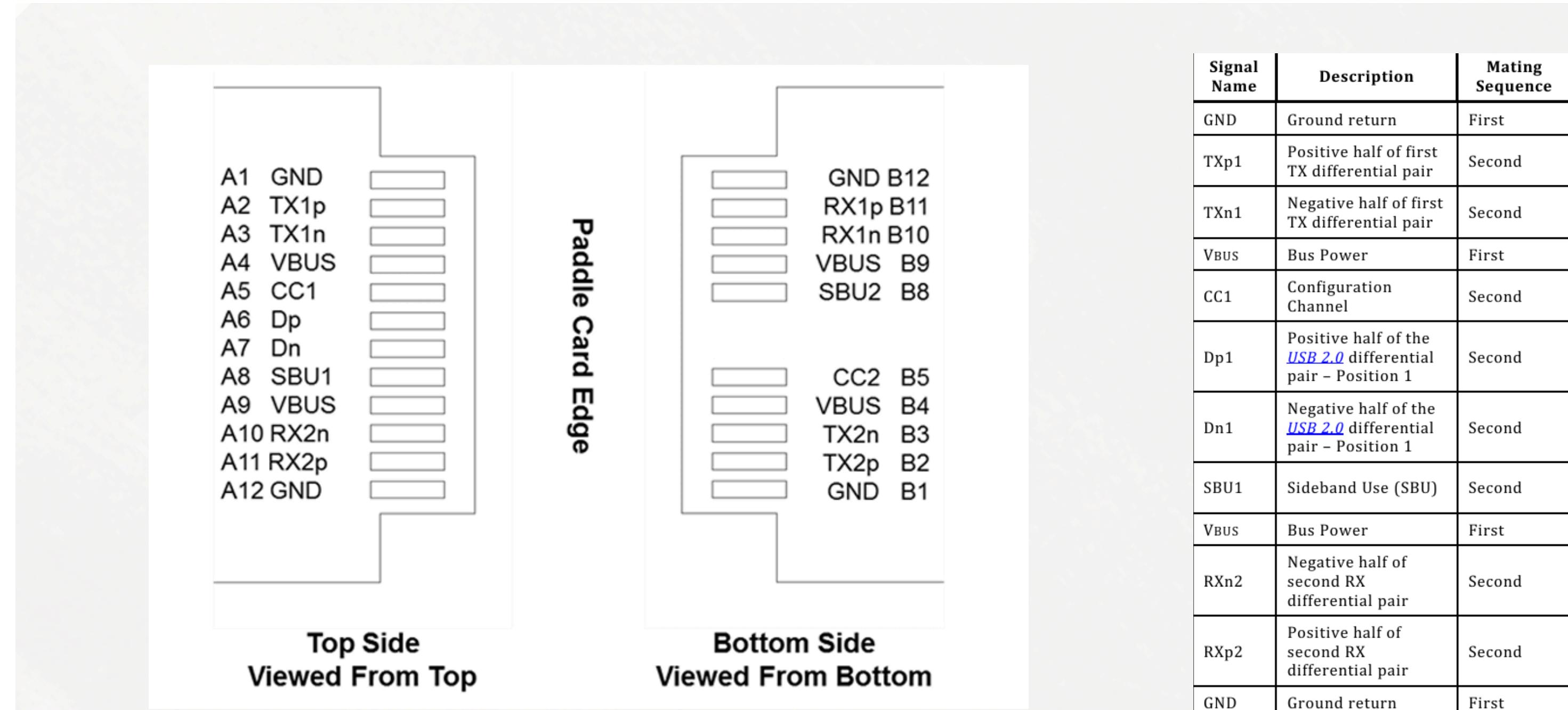
STM32 USED FOR,

- It provides a balanced mix of GPIO, communication interfaces, and power pins without the complexity of high-pin-count packages.
- Multiple SPI, I²C, UART channels, timers, ADC/DAC, all in a single package.
- LQFP is a mature, industry-standard package with excellent thermal and mechanical stability
- No hidden pads , enabling easy inspection, rework, and prototyping.
- Compact footprint leaves PCB space for power conditioning, connectors, and shielding.

USB C RECEPTACLE (USB2.0 14P)

- USB technology to serve newer computing platforms and devices as they trend toward smaller, thinner and lighter form-factors.
- Enable new and exciting host and device form-factors where size, industrial design and style are important parameters
- Enhance ease of use for connecting USB devices with a focus on minimizing user confusion for plug and cable orientation

PIN CONFIGURATION



USB C RECEPTACLE (USB2.0 14P)

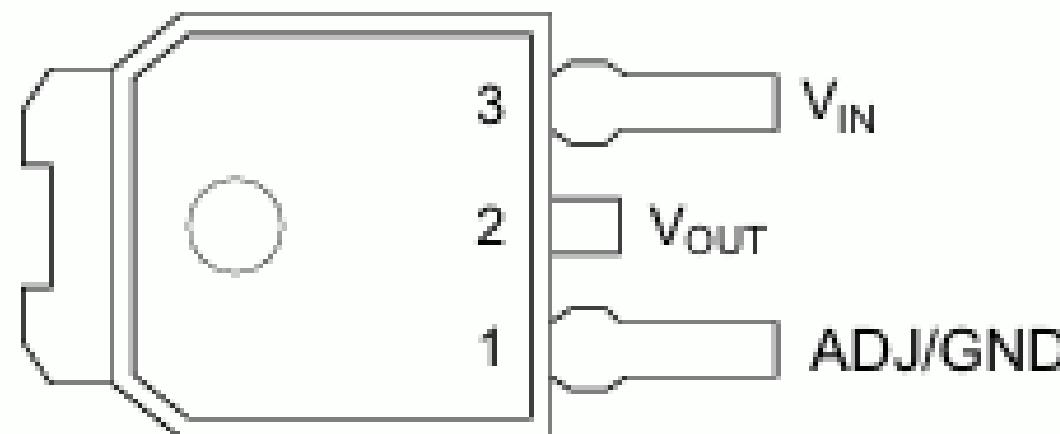
FEATURES

- This cable supports use of a USB Type-C-based device with a legacy USB 2.0 host (primarily for mobile charging and sync applications)
- USB Specification (It produces 500 mA for(5V Input) USB 2.0 ports)
- USB C 2.0 INPUT VOLTAGE-5 V
- Source-to-Sink attach/detach detection
- Detect if cable requires VCONN(Extra power 5V rail)
- USB Type-C VBUS used for current detection and usage

LD1117 (DPAK)

- The LD1117 is a low drop voltage regulator able to provide up to 800 mA of output current, available even in adjustable version ($V_{REF} = 1.25\text{ V}$) ,
- DPAK surface mount packages optimize the thermal characteristics even offering a relevant space saving effect.
- Dropout is typically 1.1V at 800 mA, meaning it works well with 5V input to deliver a stable 3.3V output – even under load.
- Built-in thermal shutdown and current limiting protect your board from damage during faults or overloads.
- Requires only a $10\text{ }\mu\text{F}$ capacitor for stability – no complex processes

PIN CONFIGURATION



DPAK

- V_{IN} -Input voltage to be regulated
- V_{OUT} -Regulated output voltage (also internally connected to the metal tab)
- ADJ/GND-Ground reference for fixed-voltage versions, or adjustment pin for variable version

APPLICATION

Smart Greenhouse Monitoring

- Continuous monitoring of temperature, gas levels (like CO₂), and pressure.
- Local alerts via buzzer or LED when values exceed safe thresholds.

IoT Environmental Nodes

- Can be deployed in multiple locations for air quality, weather, and pollution monitoring.
- Wireless modules (Bluetooth, Wi-Fi) enable real-time data transmission.
- Supports centralized dashboards or apps for monitoring trends and alerts.

Industrial Safety Systems

- Gas detection in factories, laboratories, or hazardous areas.
- Immediate local alerts via buzzers or visual indicators.
- Data logging for safety compliance and historical reporting

BILL OF MATERIALS

COMPONENTS	PRICE	MANUFACTURE
STM32F103C8TX (LQFP48)	176 rupees	GENERIC
LD1117 (DPAK)	23 rupees	STMICROELECTRONICS
USB C RECEPTACLE	208 rupees	MOLEX

REFERENCES,

- https://www.usb.org/sites/default/files/documents/usb_type-c.zip
- <http://www.st.com/st-web-ui/static/active/en/resource/technical/document/datasheet/CD00000544.pdf>
- <https://www.st.com/resource/en/datasheet/stm32f103c8.pdf>