

1. Description

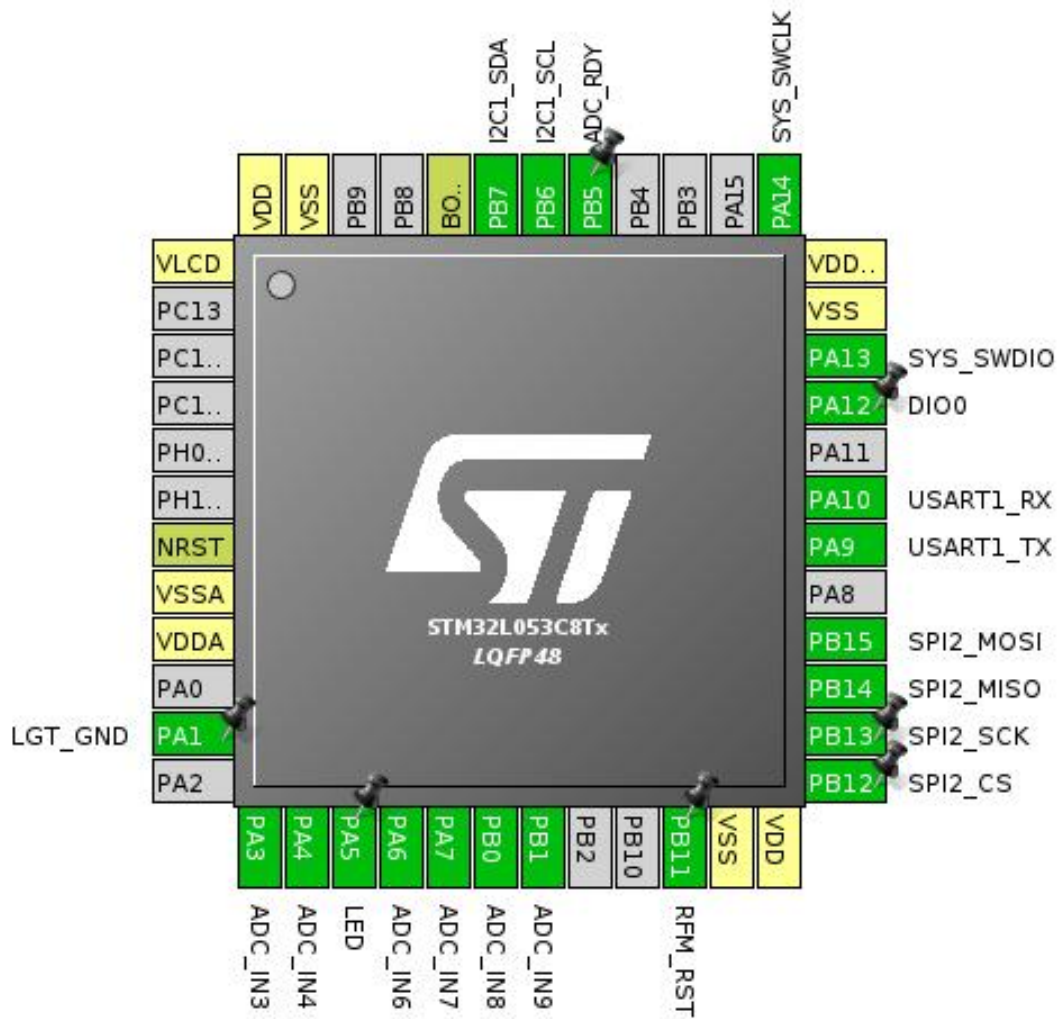
1.1. Project

| | |
|-----------------|--------------------|
| Project Name | lora_sensor |
| Board Name | lora_sensor |
| Generated with: | STM32CubeMX 4.21.0 |
| Date | 06/14/2017 |

1.2. MCU

| | |
|----------------|---------------|
| MCU Series | STM32L0 |
| MCU Line | STM32L0x3 |
| MCU name | STM32L053C8Tx |
| MCU Package | LQFP48 |
| MCU Pin number | 48 |

2. Pinout Configuration

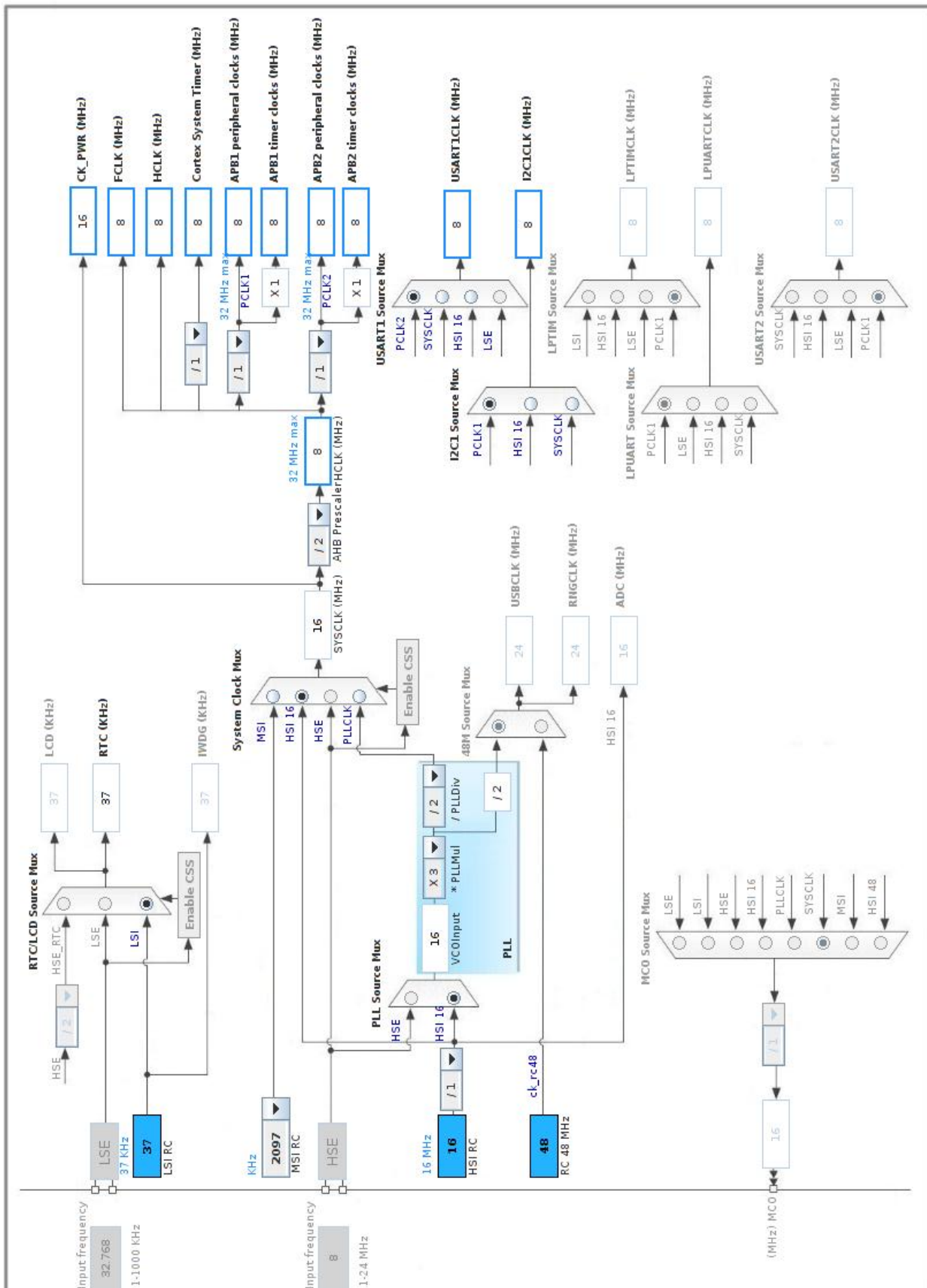


3. Pins Configuration

| Pin Number LQFP48 | Pin Name (function after reset) | Pin Type | Alternate Function(s) | Label |
|----------------------|---------------------------------------|----------|--------------------------|---------|
| 1 | VLCD | Power | | |
| 7 | NRST | Reset | | |
| 8 | VSSA | Power | | |
| 9 | VDDA | Power | | |
| 11 | PA1 * | I/O | GPIO_Output | LGT_GND |
| 13 | PA3 | I/O | ADC_IN3 | |
| 14 | PA4 | I/O | ADC_IN4 | |
| 15 | PA5 * | I/O | GPIO_Output | LED |
| 16 | PA6 | I/O | ADC_IN6 | |
| 17 | PA7 | I/O | ADC_IN7 | |
| 18 | PB0 | I/O | ADC_IN8 | |
| 19 | PB1 | I/O | ADC_IN9 | |
| 22 | PB11 * | I/O | GPIO_Output | RFM_RST |
| 23 | VSS | Power | | |
| 24 | VDD | Power | | |
| 25 | PB12 * | I/O | GPIO_Output | SPI2_CS |
| 26 | PB13 | I/O | SPI2_SCK | |
| 27 | PB14 | I/O | SPI2_MISO | |
| 28 | PB15 | I/O | SPI2_MOSI | |
| 30 | PA9 | I/O | USART1_TX | |
| 31 | PA10 | I/O | USART1_RX | |
| 33 | PA12 | I/O | GPIO_EXTI12 | DIO0 |
| 34 | PA13 | I/O | SYS_SWDIO | |
| 35 | VSS | Power | | |
| 36 | VDD_USB | Power | | |
| 37 | PA14 | I/O | SYS_SWCLK | |
| 41 | PB5 | I/O | GPIO_EXTI5 | ADC_RDY |
| 42 | PB6 | I/O | I2C1_SCL | |
| 43 | PB7 | I/O | I2C1_SDA | |
| 44 | BOOT0 | Boot | | |
| 47 | VSS | Power | | |
| 48 | VDD | Power | | |

* The pin is affected with an I/O function

4. Clock Tree Configuration



5. IPs and Middleware Configuration

5.1. ADC

mode: IN3

mode: IN4

mode: IN6

mode: IN7

mode: IN8

mode: IN9

mode: Temperature Sensor Channel

mode: Vrefint Channel

5.1.1. Parameter Settings:

ADC_Settings:

| | |
|-------------------------------|-------------------------------------|
| Clock Prescaler | Synchronous clock mode divided by 2 |
| Resolution | ADC 12-bit resolution |
| Data Alignment | Right alignment |
| Scan Direction | Forward |
| Continuous Conversion Mode | Disabled |
| Discontinuous Conversion Mode | Disabled |
| DMA Continuous Requests | Disabled |
| End Of Conversion Selection | End of single conversion |
| Overrun behaviour | Overrun data preserved |
| Low Power Auto Wait | Disabled |
| Low Frequency Mode | Disabled |
| Auto Off | Disabled |
| Oversampling Mode | Disabled |

ADC_Regular_ConversionMode:

| | |
|------------------------------------|---|
| Sampling Time | 1.5 Cycles |
| External Trigger Conversion Source | Regular Conversion launched by software |
| External Trigger Conversion Edge | None |

WatchDog:

| | |
|-----------------------------|-------|
| Enable Analog WatchDog Mode | false |
|-----------------------------|-------|

5.2. I2C1

I2C: I2C

5.2.1. Parameter Settings:

Timing configuration:

| | |
|-------------------------------|---------------------|
| I2C Speed Mode | Standard Mode |
| I2C Speed Frequency (KHz) | 100 |
| Rise Time (ns) | 0 |
| Fall Time (ns) | 0 |
| Coefficient of Digital Filter | 0 |
| Analog Filter | Enabled |
| Timing | 0x2000090E * |

Slave Features:

| | |
|----------------------------------|----------|
| Clock No Stretch Mode | Disabled |
| General Call Address Detection | Disabled |
| Primary Address Length selection | 7-bit |
| Dual Address Acknowledged | Disabled |
| Primary slave address | 0 |

5.3. RTC

mode: Activate Clock Source

mode: Activate Calendar

WakeUp: Internal WakeUp

5.3.1. Parameter Settings:

General:

| | |
|-------------------------------|---------------|
| Hour Format | Hourformat 24 |
| Asynchronous Predivider value | 127 |
| Synchronous Predivider value | 255 |

Calendar Time:

| | |
|--|----------------------|
| Data Format | BCD data format |
| Hours | 0 |
| Minutes | 0 |
| Seconds | 0 |
| Day Light Saving: value of hour adjustment | Daylightsaving None |
| Store Operation | Storeoperation Reset |

Calendar Date:

| | |
|----------|---------|
| Week Day | Monday |
| Month | January |
| Date | 1 |
| Year | 0 |

Wake UP:

| | |
|-----------------|---------------|
| Wake Up Clock | 1 Hz * |
| Wake Up Counter | 0 |

5.4. SPI2

Mode: Full-Duplex Master

5.4.1. Parameter Settings:

Basic Parameters:

| | |
|--------------|-----------|
| Frame Format | Motorola |
| Data Size | 8 Bits |
| First Bit | MSB First |

Clock Parameters:

| | |
|---------------------------|-------------------------|
| Prescaler (for Baud Rate) | 8 * |
| Baud Rate | 1000.0 KBits/s * |
| Clock Polarity (CPOL) | Low |
| Clock Phase (CPHA) | 1 Edge |

Advanced Parameters:

| | |
|-----------------|----------|
| CRC Calculation | Disabled |
| NSS Signal Type | Software |

5.5. SYS

mode: Debug Serial Wire

Timebase Source: SysTick

5.6. USART1

Mode: Asynchronous

5.6.1. Parameter Settings:

Basic Parameters:

| | |
|-------------|------------------------------------|
| Baud Rate | 115200 |
| Word Length | 8 Bits (including Parity) * |
| Parity | None |
| Stop Bits | 1 |

Advanced Parameters:

| | |
|----------------|----------------------|
| Data Direction | Receive and Transmit |
| Over Sampling | 16 Samples |
| Single Sample | Disable |

Advanced Features:

| | |
|-------------------------------|---------|
| Auto Baudrate | Disable |
| TX Pin Active Level Inversion | Disable |
| RX Pin Active Level Inversion | Disable |
| Data Inversion | Disable |
| TX and RX Pins Swapping | Disable |
| Overrun | Enable |
| DMA on RX Error | Enable |
| MSB First | Disable |

* User modified value

6. System Configuration

6.1. GPIO configuration

| IP | Pin | Signal | GPIO mode | GPIO pull/up pull down | Max Speed | User Label |
|--------|------|-------------|--|-----------------------------|----------------|------------|
| ADC | PA3 | ADC_IN3 | Analog mode | No pull-up and no pull-down | n/a | |
| | PA4 | ADC_IN4 | Analog mode | No pull-up and no pull-down | n/a | |
| | PA6 | ADC_IN6 | Analog mode | No pull-up and no pull-down | n/a | |
| | PA7 | ADC_IN7 | Analog mode | No pull-up and no pull-down | n/a | |
| | PB0 | ADC_IN8 | Analog mode | No pull-up and no pull-down | n/a | |
| | PB1 | ADC_IN9 | Analog mode | No pull-up and no pull-down | n/a | |
| I2C1 | PB6 | I2C1_SCL | Alternate Function Open Drain | Pull-up | Very High * | |
| | PB7 | I2C1_SDA | Alternate Function Open Drain | Pull-up | Very High * | |
| SPI2 | PB13 | SPI2_SCK | Alternate Function Push Pull | No pull-up and no pull-down | Very High * | |
| | PB14 | SPI2_MISO | Alternate Function Push Pull | No pull-up and no pull-down | Very High * | |
| | PB15 | SPI2_MOSI | Alternate Function Push Pull | No pull-up and no pull-down | Very High * | |
| SYS | PA13 | SYS_SWDIO | n/a | n/a | n/a | |
| | PA14 | SYS_SWCLK | n/a | n/a | n/a | |
| USART1 | PA9 | USART1_TX | Alternate Function Push Pull | Pull-up | Very High * | |
| | PA10 | USART1_RX | Alternate Function Push Pull | Pull-up | Very High * | |
| GPIO | PA1 | GPIO_Output | Output Push Pull | No pull-up and no pull-down | Low | LGT_GND |
| | PA5 | GPIO_Output | Output Push Pull | No pull-up and no pull-down | Low | LED |
| | PB11 | GPIO_Output | Output Push Pull | No pull-up and no pull-down | Low | RFM_RST |
| | PB12 | GPIO_Output | Output Push Pull | No pull-up and no pull-down | Low | SPI2_CS |
| | PA12 | GPIO_EXTI12 | External Interrupt Mode with Rising edge trigger detection | No pull-up and no pull-down | n/a | DIO0 |
| | PB5 | GPIO_EXTI5 | External Interrupt Mode with Rising edge trigger detection | No pull-up and no pull-down | n/a | ADC_RDY |

6.2. DMA configuration

nothing configured in DMA service

6.3. NVIC configuration

| Interrupt Table | Enable | Preenmption Priority | SubPriority |
|--|--------|----------------------|-------------|
| Non maskable interrupt | true | 0 | 0 |
| Hard fault interrupt | true | 0 | 0 |
| System service call via SWI instruction | true | 0 | 0 |
| Pendable request for system service | true | 0 | 0 |
| System tick timer | true | 0 | 0 |
| RTC global interrupt through EXTI lines 17, 19 and 20 and LSE CSS interrupt through EXTI line 19 | true | 0 | 0 |
| EXTI line 4 to 15 interrupts | true | 0 | 0 |
| PVD interrupt through EXTI line 16 | unused | | |
| Flash and EEPROM global interrupt | unused | | |
| RCC and CRS global interrupt | unused | | |
| ADC1, COMP1 and COMP2 interrupts (COMP interrupts through EXTI lines 21 and 22) | unused | | |
| I2C1 event global interrupt / I2C1 wake-up interrupt through EXTI line 23 | unused | | |
| SPI2 global interrupt | unused | | |
| USART1 global interrupt / USART1 wake-up interrupt through EXTI line 25 | unused | | |

* User modified value

7. Power Consumption Calculator report

7.1. Microcontroller Selection

| | |
|-----------|---------------|
| Series | STM32L0 |
| Line | STM32L0x3 |
| MCU | STM32L053C8Tx |
| Datasheet | 025844_Rev6 |

7.2. Parameter Selection

| | |
|-------------|------|
| Temperature | 25 |
| Vdd | null |

8. Software Project

8.1. Project Settings

| Name | Value |
|-----------------------------------|---|
| Project Name | lora_sensor |
| Project Folder | /home/peter/repos/solar/Mk3/stm32/lora_sensor |
| Toolchain / IDE | SW4STM32 |
| Firmware Package Name and Version | STM32Cube FW_L0 V1.9.0 |

8.2. Code Generation Settings

| Name | Value |
|---|---------------------------------------|
| STM32Cube Firmware Library Package | Copy only the necessary library files |
| Generate peripheral initialization as a pair of '.c/.h' files | Yes |
| Backup previously generated files when re-generating | No |
| Delete previously generated files when not re-generated | Yes |
| Set all free pins as analog (to optimize the power consumption) | Yes |