

## 1. Description

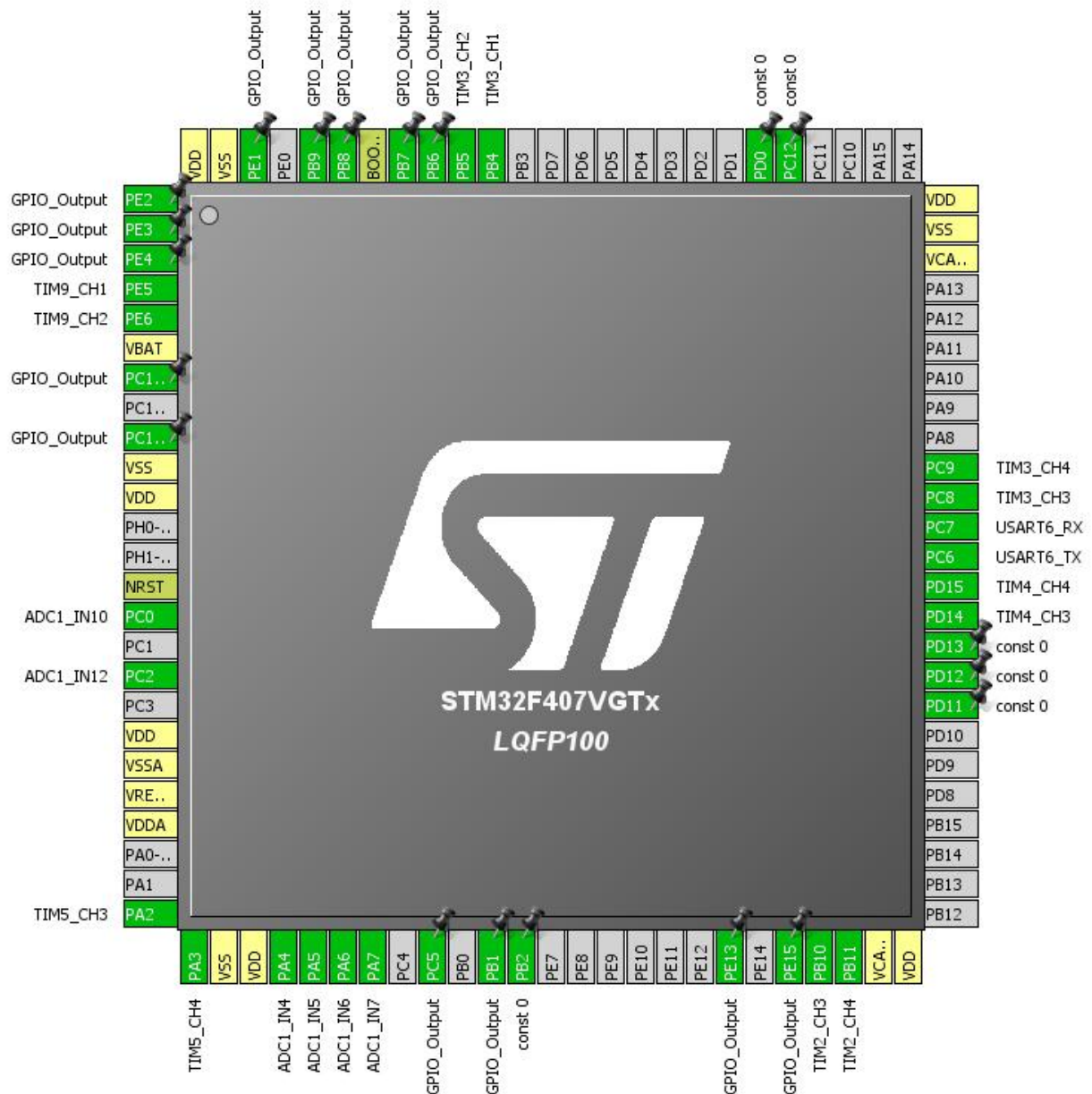
### 1.1. Project

|                 |                    |
|-----------------|--------------------|
| Project Name    | mam18              |
| Board Name      | mam18              |
| Generated with: | STM32CubeMX 4.23.0 |
| Date            | 04/21/2018         |

### 1.2. MCU

|                |               |
|----------------|---------------|
| MCU Series     | STM32F4       |
| MCU Line       | STM32F407/417 |
| MCU name       | STM32F407VGTx |
| MCU Package    | LQFP100       |
| MCU Pin number | 100           |

## 2. Pinout Configuration



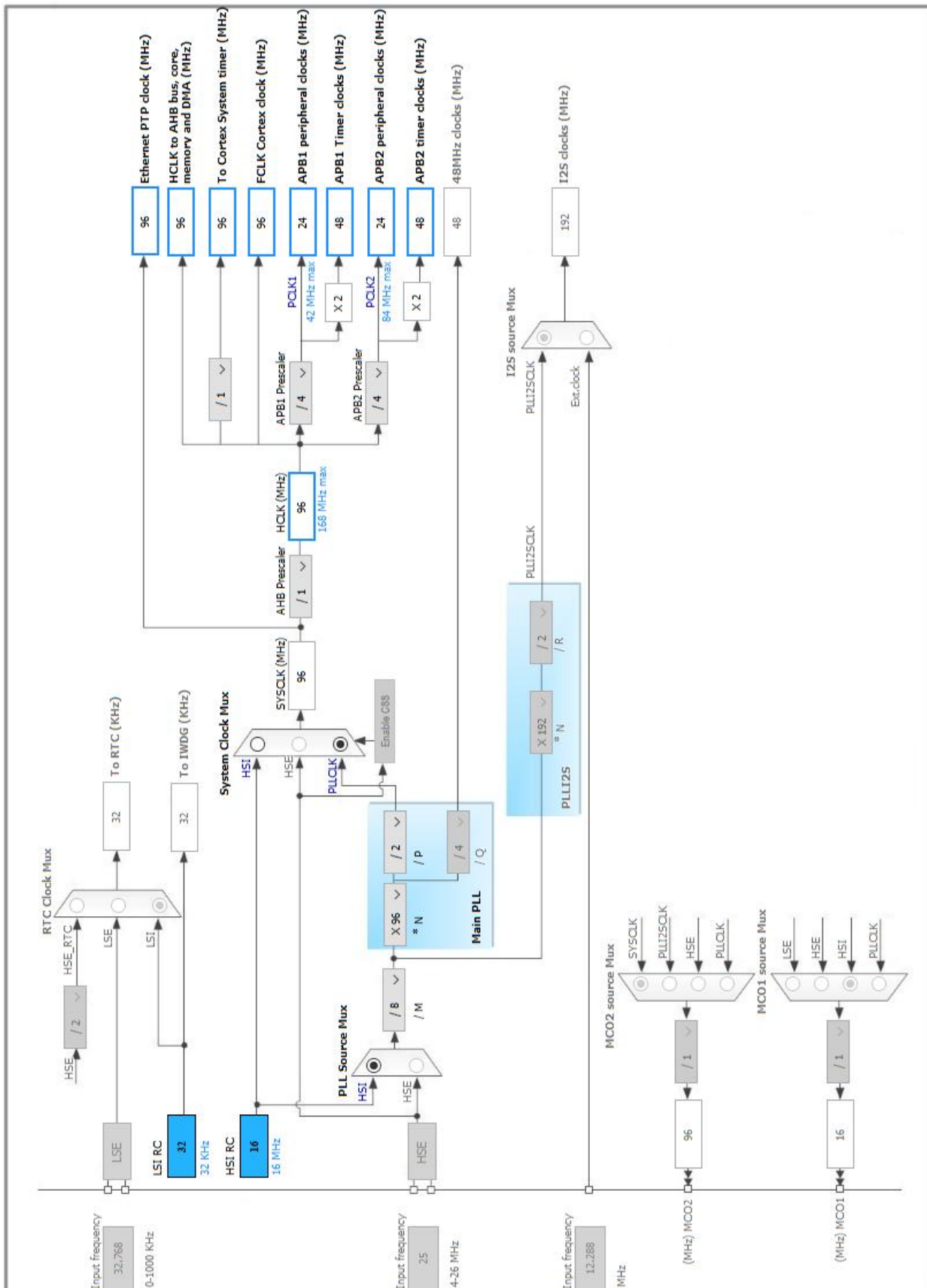
### 3. Pins Configuration

| Pin Number<br>LQFP100 | Pin Name<br>(function after<br>reset) | Pin Type | Alternate<br>Function(s) | Label   |
|-----------------------|---------------------------------------|----------|--------------------------|---------|
| 1                     | PE2 *                                 | I/O      | GPIO_Output              |         |
| 2                     | PE3 *                                 | I/O      | GPIO_Output              |         |
| 3                     | PE4 *                                 | I/O      | GPIO_Output              |         |
| 4                     | PE5                                   | I/O      | TIM9_CH1                 |         |
| 5                     | PE6                                   | I/O      | TIM9_CH2                 |         |
| 6                     | VBAT                                  | Power    |                          |         |
| 7                     | PC13-ANTI_TAMP *                      | I/O      | GPIO_Output              |         |
| 9                     | PC15-OSC32_OUT *                      | I/O      | GPIO_Output              |         |
| 10                    | VSS                                   | Power    |                          |         |
| 11                    | VDD                                   | Power    |                          |         |
| 14                    | NRST                                  | Reset    |                          |         |
| 15                    | PC0                                   | I/O      | ADC1_IN10                |         |
| 17                    | PC2                                   | I/O      | ADC1_IN12                |         |
| 19                    | VDD                                   | Power    |                          |         |
| 20                    | VSSA                                  | Power    |                          |         |
| 21                    | VREF+                                 | Power    |                          |         |
| 22                    | VDDA                                  | Power    |                          |         |
| 25                    | PA2                                   | I/O      | TIM5_CH3                 |         |
| 26                    | PA3                                   | I/O      | TIM5_CH4                 |         |
| 27                    | VSS                                   | Power    |                          |         |
| 28                    | VDD                                   | Power    |                          |         |
| 29                    | PA4                                   | I/O      | ADC1_IN4                 |         |
| 30                    | PA5                                   | I/O      | ADC1_IN5                 |         |
| 31                    | PA6                                   | I/O      | ADC1_IN6                 |         |
| 32                    | PA7                                   | I/O      | ADC1_IN7                 |         |
| 34                    | PC5 *                                 | I/O      | GPIO_Output              |         |
| 36                    | PB1 *                                 | I/O      | GPIO_Output              |         |
| 37                    | PB2 *                                 | I/O      | GPIO_Output              | const 0 |
| 44                    | PE13 *                                | I/O      | GPIO_Output              |         |
| 46                    | PE15 *                                | I/O      | GPIO_Output              |         |
| 47                    | PB10                                  | I/O      | TIM2_CH3                 |         |
| 48                    | PB11                                  | I/O      | TIM2_CH4                 |         |
| 49                    | VCAP_1                                | Power    |                          |         |
| 50                    | VDD                                   | Power    |                          |         |
| 58                    | PD11 *                                | I/O      | GPIO_Output              | const 0 |
| 59                    | PD12 *                                | I/O      | GPIO_Output              | const 0 |

| Pin Number<br>LQFP100 | Pin Name<br>(function after<br>reset) | Pin Type | Alternate<br>Function(s) | Label   |
|-----------------------|---------------------------------------|----------|--------------------------|---------|
| 60                    | PD13 *                                | I/O      | GPIO_Output              | const 0 |
| 61                    | PD14                                  | I/O      | TIM4_CH3                 |         |
| 62                    | PD15                                  | I/O      | TIM4_CH4                 |         |
| 63                    | PC6                                   | I/O      | USART6_TX                |         |
| 64                    | PC7                                   | I/O      | USART6_RX                |         |
| 65                    | PC8                                   | I/O      | TIM3_CH3                 |         |
| 66                    | PC9                                   | I/O      | TIM3_CH4                 |         |
| 73                    | VCAP_2                                | Power    |                          |         |
| 74                    | VSS                                   | Power    |                          |         |
| 75                    | VDD                                   | Power    |                          |         |
| 80                    | PC12 *                                | I/O      | GPIO_Output              | const 0 |
| 81                    | PD0 *                                 | I/O      | GPIO_Output              | const 0 |
| 90                    | PB4                                   | I/O      | TIM3_CH1                 |         |
| 91                    | PB5                                   | I/O      | TIM3_CH2                 |         |
| 92                    | PB6 *                                 | I/O      | GPIO_Output              |         |
| 93                    | PB7 *                                 | I/O      | GPIO_Output              |         |
| 94                    | BOOT0                                 | Boot     |                          |         |
| 95                    | PB8 *                                 | I/O      | GPIO_Output              |         |
| 96                    | PB9 *                                 | I/O      | GPIO_Output              |         |
| 98                    | PE1 *                                 | I/O      | GPIO_Output              |         |
| 99                    | VSS                                   | Power    |                          |         |
| 100                   | VDD                                   | Power    |                          |         |

\* The pin is affected with an I/O function

## 4. Clock Tree Configuration



## 5. IPs and Middleware Configuration

### 5.1. ADC1

mode: IN4

mode: IN5

mode: IN6

mode: IN7

mode: IN10

mode: IN12

#### 5.1.1. Parameter Settings:

##### ADCs\_Common\_Settings:

Mode Independent mode

##### ADC\_Settings:

Clock Prescaler PCLK2 divided by 2

Resolution 12 bits (15 ADC Clock cycles)

Data Alignment Right alignment

Scan Conversion Mode Disabled

Continuous Conversion Mode Disabled

Discontinuous Conversion Mode Disabled

DMA Continuous Requests Disabled

End Of Conversion Selection EOC flag at the end of single channel conversion

##### ADC\_Regular\_ConversionMode:

Number Of Conversion 1

External Trigger Conversion Source Regular Conversion launched by software

External Trigger Conversion Edge None

Rank 1

Channel Channel 4

Sampling Time 3 Cycles

##### ADC\_Injected\_ConversionMode:

Number Of Conversions 0

##### WatchDog:

Enable Analog WatchDog Mode false

## 5.2. SYS

Timebase Source: SysTick

## 5.3. TIM2

Channel3: PWM Generation CH3

Channel4: PWM Generation CH4

### 5.3.1. Parameter Settings:

#### Counter Settings:

|   |             |
|---|-------------|
| Prescaler (PSC - 16 bits value)                       | 2 *         |
| Counter Mode  | Up          |
| Counter Period (AutoReload Register - 32 bits value ) | 24000 *     |
| Internal Clock Division (CKD)                         | No Division |

#### Trigger Output (TRGO) Parameters:

|                         |   |
|-------------------------|---|
| Master/Slave Mode       | Disable (no sync between this TIM (Master) and its Slaves |
| Trigger Event Selection | Reset (UG bit from TIMx_EGR)                              |

#### PWM Generation Channel 3:

|                       |            |
|-----------------------|------------|
| Mode                  | PWM mode 1 |
| Pulse (32 bits value) | 0          |
| Fast Mode             | Disable    |
| CH Polarity           | High       |

#### PWM Generation Channel 4:

|                       |            |
|-----------------------|------------|
| Mode                  | PWM mode 1 |
| Pulse (32 bits value) | 0          |
| Fast Mode             | Disable    |
| CH Polarity           | High       |

## 5.4. TIM3

Channel1: PWM Generation CH1

Channel2: PWM Generation CH2

Channel3: PWM Generation CH3

Channel4: PWM Generation CH4

### 5.4.1. Parameter Settings:

**Counter Settings:**

|   |             |
|---|-------------|
| Prescaler (PSC - 16 bits value)                       | 2 *         |
| Counter Mode  | Up          |
| Counter Period (AutoReload Register - 16 bits value ) | 24000 *     |
| Internal Clock Division (CKD)                         | No Division |

**Trigger Output (TRGO) Parameters:**

|                         |   |
|-------------------------|---|
| Master/Slave Mode       | Disable (no sync between this TIM (Master) and its Slaves |
| Trigger Event Selection | Reset (UG bit from TIMx_EGR)                              |

**PWM Generation Channel 1:**

|                       |            |
|-----------------------|------------|
| Mode                  | PWM mode 1 |
| Pulse (16 bits value) | 0          |
| Fast Mode             | Disable    |
| CH Polarity           | High       |

**PWM Generation Channel 2:**

|                       |            |
|-----------------------|------------|
| Mode                  | PWM mode 1 |
| Pulse (16 bits value) | 0          |
| Fast Mode             | Disable    |
| CH Polarity           | High       |

**PWM Generation Channel 3:**

|                       |            |
|-----------------------|------------|
| Mode                  | PWM mode 1 |
| Pulse (16 bits value) | 0          |
| Fast Mode             | Disable    |
| CH Polarity           | High       |

**PWM Generation Channel 4:**

|                       |            |
|-----------------------|------------|
| Mode                  | PWM mode 1 |
| Pulse (16 bits value) | 0          |
| Fast Mode             | Disable    |
| CH Polarity           | High       |

## 5.5. TIM4

**Channel3: PWM Generation CH3****Channel4: PWM Generation CH4****5.5.1. Parameter Settings:****Counter Settings:**

|                                 |     |
|---------------------------------|-----|
| Prescaler (PSC - 16 bits value) | 2 * |
|---------------------------------|-----|



|   |                |
|---|----------------|
| Counter Mode  | Up             |
| Counter Period (AutoReload Register - 16 bits value ) | <b>24000 *</b> |
| Internal Clock Division (CKD)                         | No Division    |

**Trigger Output (TRGO) Parameters:**

|                         |  |
|-------------------------|--|
| Master/Slave Mode       | Disable (no sync between this TIM (Master) and its Slaves) |
| Trigger Event Selection | Reset (UG bit from TIMx_EGR)                               |

**PWM Generation Channel 3:**

|                       |            |
|-----------------------|------------|
| Mode                  | PWM mode 1 |
| Pulse (16 bits value) | 0          |
| Fast Mode             | Disable    |
| CH Polarity           | High       |

**PWM Generation Channel 4:**

|                       |            |
|-----------------------|------------|
| Mode                  | PWM mode 1 |
| Pulse (16 bits value) | 0          |
| Fast Mode             | Disable    |
| CH Polarity           | High       |

## 5.6. TIM5

### Channel3: PWM Generation CH3

### Channel4: PWM Generation CH4

#### 5.6.1. Parameter Settings:

**Counter Settings:**

|   |                |
|---|----------------|
| Prescaler (PSC - 16 bits value)                       | <b>2 *</b>     |
| Counter Mode  | Up             |
| Counter Period (AutoReload Register - 32 bits value ) | <b>24000 *</b> |
| Internal Clock Division (CKD)                         | No Division    |

**Trigger Output (TRGO) Parameters:**

|                         |  |
|-------------------------|--|
| Master/Slave Mode       | Disable (no sync between this TIM (Master) and its Slaves) |
| Trigger Event Selection | Reset (UG bit from TIMx_EGR)                               |

**PWM Generation Channel 3:**

|                       |            |
|-----------------------|------------|
| Mode                  | PWM mode 1 |
| Pulse (32 bits value) | 0          |
| Fast Mode             | Disable    |
| CH Polarity           | High       |

**PWM Generation Channel 4:**

|      |            |
|------|------------|
| Mode | PWM mode 1 |
|------|------------|

|                       |         |
|-----------------------|---------|
| Pulse (32 bits value) | 0       |
| Fast Mode             | Disable |
| CH Polarity           | High    |

## 5.7. TIM9

### Channel1: PWM Generation CH1

### Channel2: PWM Generation CH2

#### 5.7.1. Parameter Settings:

##### Counter Settings:

|   |             |
|---|-------------|
| Prescaler (PSC - 16 bits value)                       | 2 *         |
| Counter Mode  | Up          |
| Counter Period (AutoReload Register - 16 bits value ) | 24000 *     |
| Internal Clock Division (CKD)                         | No Division |

##### PWM Generation Channel 1:

|                       |            |
|-----------------------|------------|
| Mode                  | PWM mode 1 |
| Pulse (16 bits value) | 0          |
| Fast Mode             | Disable    |
| CH Polarity           | High       |

##### PWM Generation Channel 2:

|                       |            |
|-----------------------|------------|
| Mode                  | PWM mode 1 |
| Pulse (16 bits value) | 0          |
| Fast Mode             | Disable    |
| CH Polarity           | High       |

## 5.8. USART6

### Mode: Asynchronous

#### 5.8.1. 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           |

\* User modified value

## 6. System Configuration

### 6.1. GPIO configuration

| IP     | Pin                | Signal      | GPIO mode                    | GPIO pull/up pull down      | Max Speed      | User Label |
|--------|--------------------|-------------|------------------------------|-----------------------------|----------------|------------|
| ADC1   | PC0                | ADC1_IN10   | Analog mode                  | No pull-up and no pull-down | n/a            |            |
|        | PC2                | ADC1_IN12   | Analog mode                  | No pull-up and no pull-down | n/a            |            |
|        | PA4                | ADC1_IN4    | Analog mode                  | No pull-up and no pull-down | n/a            |            |
|        | PA5                | ADC1_IN5    | Analog mode                  | No pull-up and no pull-down | n/a            |            |
|        | PA6                | ADC1_IN6    | Analog mode                  | No pull-up and no pull-down | n/a            |            |
|        | PA7                | ADC1_IN7    | Analog mode                  | No pull-up and no pull-down | n/a            |            |
| TIM2   | PB10               | TIM2_CH3    | Alternate Function Push Pull | No pull-up and no pull-down | Low            |            |
|        | PB11               | TIM2_CH4    | Alternate Function Push Pull | No pull-up and no pull-down | Low            |            |
| TIM3   | PC8                | TIM3_CH3    | Alternate Function Push Pull | No pull-up and no pull-down | Low            |            |
|        | PC9                | TIM3_CH4    | Alternate Function Push Pull | No pull-up and no pull-down | Low            |            |
|        | PB4                | TIM3_CH1    | Alternate Function Push Pull | No pull-up and no pull-down | Low            |            |
|        | PB5                | TIM3_CH2    | Alternate Function Push Pull | No pull-up and no pull-down | Low            |            |
| TIM4   | PD14               | TIM4_CH3    | Alternate Function Push Pull | No pull-up and no pull-down | Low            |            |
|        | PD15               | TIM4_CH4    | Alternate Function Push Pull | No pull-up and no pull-down | Low            |            |
| TIM5   | PA2                | TIM5_CH3    | Alternate Function Push Pull | No pull-up and no pull-down | Low            |            |
|        | PA3                | TIM5_CH4    | Alternate Function Push Pull | No pull-up and no pull-down | Low            |            |
| TIM9   | PE5                | TIM9_CH1    | Alternate Function Push Pull | No pull-up and no pull-down | Low            |            |
|        | PE6                | TIM9_CH2    | Alternate Function Push Pull | No pull-up and no pull-down | Low            |            |
| USART6 | PC6                | USART6_TX   | Alternate Function Push Pull | Pull-up                     | Very High<br>* |            |
|        | PC7                | USART6_RX   | Alternate Function Push Pull | Pull-up                     | Very High<br>* |            |
| GPIO   | PE2                | GPIO_Output | Output Push Pull             | No pull-up and no pull-down | Low            |            |
|        | PE3                | GPIO_Output | Output Push Pull             | No pull-up and no pull-down | Low            |            |
|        | PE4                | GPIO_Output | Output Push Pull             | No pull-up and no pull-down | Low            |            |
|        | PC13-<br>ANTI_TAMP | GPIO_Output | Output Push Pull             | No pull-up and no pull-down | Low            |            |
|        | PC15-<br>OSC32_OUT | GPIO_Output | Output Push Pull             | No pull-up and no pull-down | Low            |            |
|        | PC5                | GPIO_Output | Output Push Pull             | No pull-up and no pull-down | Low            |            |
|        | PB1                | GPIO_Output | Output Push Pull             | No pull-up and no pull-down | Low            |            |
|        | PB2                | GPIO_Output | Output Push Pull             | <b>Pull-down *</b>          | Low            | const 0    |
|        | PE13               | GPIO_Output | Output Push Pull             | No pull-up and no pull-down | Low            |            |

| IP | Pin  | Signal      | GPIO mode        | GPIO pull/up pull down      | Max Speed | User Label |
|----|------|-------------|------------------|-----------------------------|-----------|------------|
|    | PE15 | GPIO_Output | Output Push Pull | No pull-up and no pull-down | Low       |            |
|    | PD11 | GPIO_Output | Output Push Pull | <b>Pull-down *</b>          | Low       | const 0    |
|    | PD12 | GPIO_Output | Output Push Pull | <b>Pull-down *</b>          | Low       | const 0    |
|    | PD13 | GPIO_Output | Output Push Pull | <b>Pull-down *</b>          | Low       | const 0    |
|    | PC12 | GPIO_Output | Output Push Pull | <b>Pull-down *</b>          | Low       | const 0    |
|    | PD0  | GPIO_Output | Output Push Pull | <b>Pull-down *</b>          | Low       | const 0    |
|    | PB6  | GPIO_Output | Output Push Pull | No pull-up and no pull-down | Low       |            |
|    | PB7  | GPIO_Output | Output Push Pull | No pull-up and no pull-down | Low       |            |
|    | PB8  | GPIO_Output | Output Push Pull | No pull-up and no pull-down | Low       |            |
|    | PB9  | GPIO_Output | Output Push Pull | No pull-up and no pull-down | Low       |            |
|    | PE1  | GPIO_Output | Output Push Pull | No pull-up and no pull-down | Low       |            |

## 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           |
| Memory management fault                        | true   | 0                    | 0           |
| Pre-fetch fault, memory access fault           | true   | 0                    | 0           |
| Undefined instruction or illegal state         | true   | 0                    | 0           |
| System service call via SWI instruction        | true   | 0                    | 0           |
| Debug monitor                                  | true   | 0                    | 0           |
| Pendable request for system service            | true   | 0                    | 0           |
| System tick timer                              | true   | 0                    | 0           |
| PVD interrupt through EXTI line 16             | unused |                      |             |
| Flash global interrupt                         | unused |                      |             |
| RCC global interrupt                           | unused |                      |             |
| ADC1, ADC2 and ADC3 global interrupts          | unused |                      |             |
| TIM1 break interrupt and TIM9 global interrupt | unused |                      |             |
| TIM2 global interrupt                          | unused |                      |             |
| TIM3 global interrupt                          | unused |                      |             |
| TIM4 global interrupt                          | unused |                      |             |
| TIM5 global interrupt                          | unused |                      |             |
| USART6 global interrupt                        | unused |                      |             |
| FPU global interrupt                           | unused |                      |             |

\* User modified value

## ***7. Power Consumption Calculator report***

### 7.1. Microcontroller Selection

|           |               |
|-----------|---------------|
| Series    | STM32F4       |
| Line      | STM32F407/417 |
| MCU       | STM32F407VGTx |
| Datasheet | 022152_Rev8   |

### 7.2. Parameter Selection

|             |     |
|-------------|-----|
| Temperature | 25  |
| Vdd         | 3.3 |

## 8. Software Project

### 8.1. Project Settings

| Name                              | Value   |
|-----------------------------------|---|
| Project Name                      | mam18   |
| Project Folder                    | C:\Users\bmare\Documents\GitHub\MAM-STM\atollic\mam18 |
| Toolchain / IDE                   | TrueSTUDIO  |
| Firmware Package Name and Version | STM32Cube FW_F4 V1.18.0                               |

### 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   | No                                    |
| 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) | No                                    |