1. Description

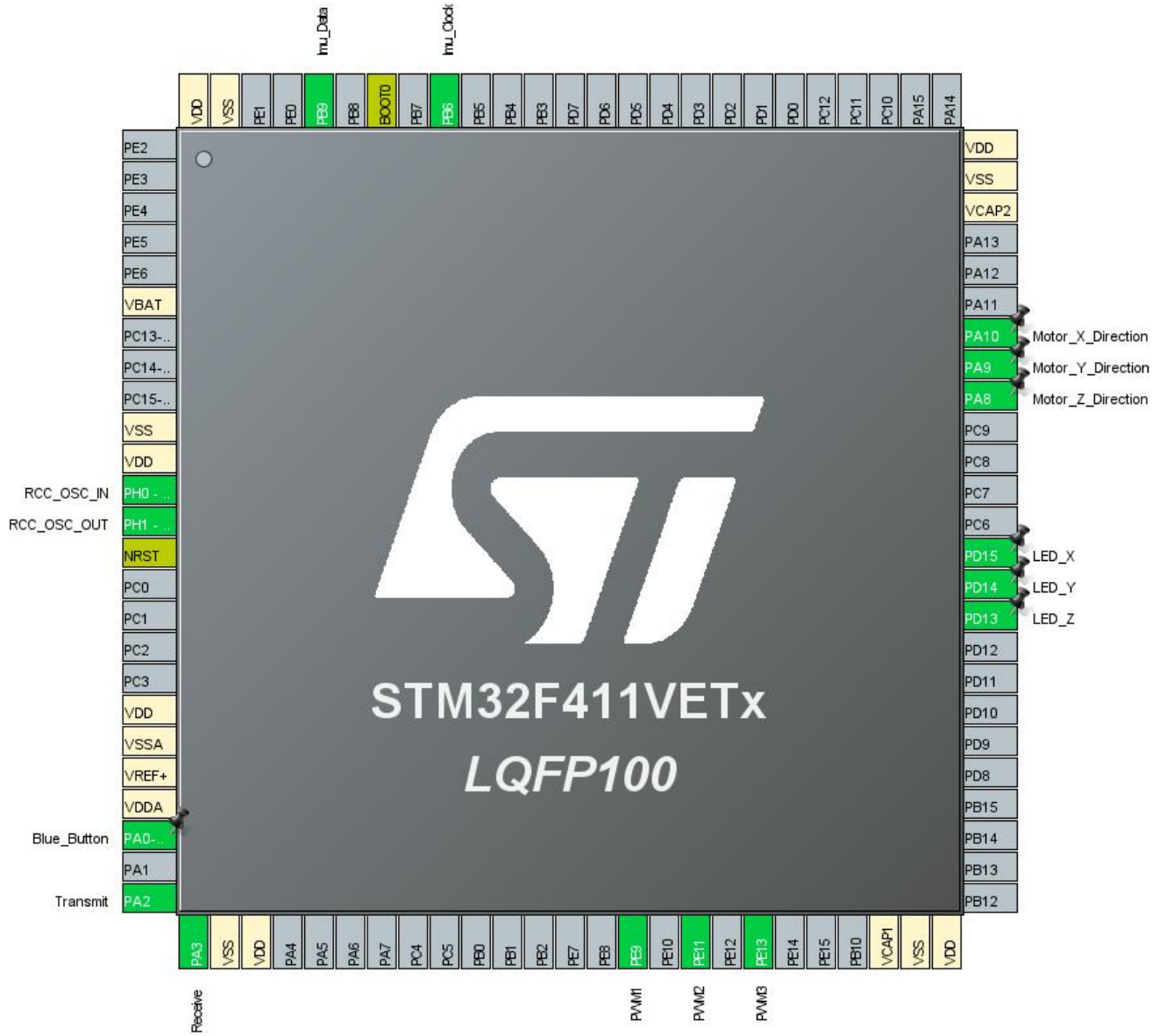
1.1. Project

Project Name	S.A.T
Board Name	custom
Generated with:	STM32CubeMX 5.6.1
Date	12/03/2020

1.2. MCU

MCU Series	STM32F4
MCU Line	STM32F411
MCU name	STM32F411VETx
MCU Package	LQFP100
MCU Pin number	100

2. Pinout Configuration

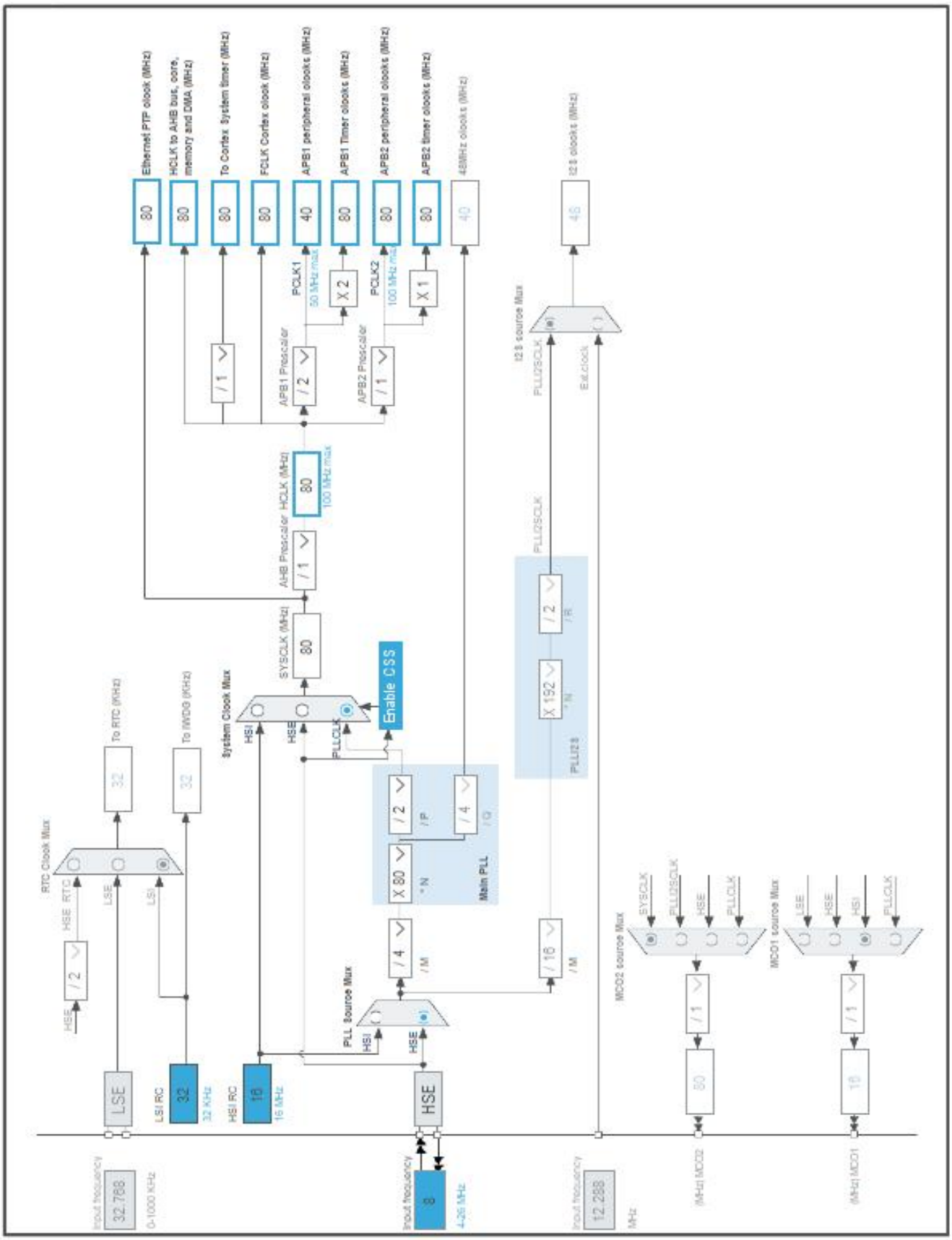


3. Pins Configuration

Pin Number LQFP100	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
6	VBAT	Power		
10	VSS	Power		
11	VDD	Power		
12	PH0 - OSC_IN	I/O	RCC_OSC_IN	
13	PH1 - OSC_OUT	I/O	RCC_OSC_OUT	
14	NRST	Reset		
19	VDD	Power		
20	VSSA	Power		
21	VREF+	Power		
22	VDDA	Power		
23	PA0-WKUP	I/O	GPIO_EXTI0	Blue_Button
25	PA2	I/O	USART2_TX	Transmit
26	PA3	I/O	USART2_RX	Receive
27	VSS	Power		
28	VDD	Power		
40	PE9	I/O	TIM1_CH1	PWM1
42	PE11	I/O	TIM1_CH2	PWM2
44	PE13	I/O	TIM1_CH3	PWM3
48	VCAP1	Power		
49	VSS	Power		
50	VDD	Power		
60	PD13 *	I/O	GPIO_Output	LED_Z
61	PD14 *	I/O	GPIO_Output	LED_Y
62	PD15 *	I/O	GPIO_Output	LED_X
67	PA8 *	I/O	GPIO_Output	Motor_Z_Direction
68	PA9 *	I/O	GPIO_Output	Motor_Y_Direction
69	PA10 *	I/O	GPIO_Output	Motor_X_Direction
73	VCAP2	Power		
74	VSS	Power		
75	VDD	Power		
92	PB6	I/O	I2C1_SCL	Imu_Clock
94	BOOT0	Boot		
96	PB9	I/O	I2C1_SDA	Imu_Data
99	VSS	Power		
100	VDD	Power		

* The pin is affected with an I/O function

4. Clock Tree Configuration



5. Software Project

5.1. Project Settings

Name	Value
Project Name	S.A.T.2020
Project Folder	D:\S.A.T. 2020\S.A.T.2020
Toolchain / IDE	STM32CubeIDE
Firmware Package Name and Version	STM32Cube FW_F4 V1.25.1

5.2. Code Generation Settings

Name	Value
STM32Cube MCU packages and embedded software	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)	No

6. Power Consumption Calculator report

6.1. Microcontroller Selection

Series	STM32F4
Line	STM32F411
MCU	STM32F411VETx
Datasheet	026289_Rev6

6.2. Parameter Selection

Temperature	25
Vdd	3.6

6.3. Battery Selection

Battery	Li-SOCL2(A3400)
Capacity	3400.0 mAh
Self Discharge	0.08 %/month
Nominal Voltage	3.6 V
Max Cont Current	100.0 mA
Max Pulse Current	200.0 mA
Cells in series	1
Cells in parallel	1

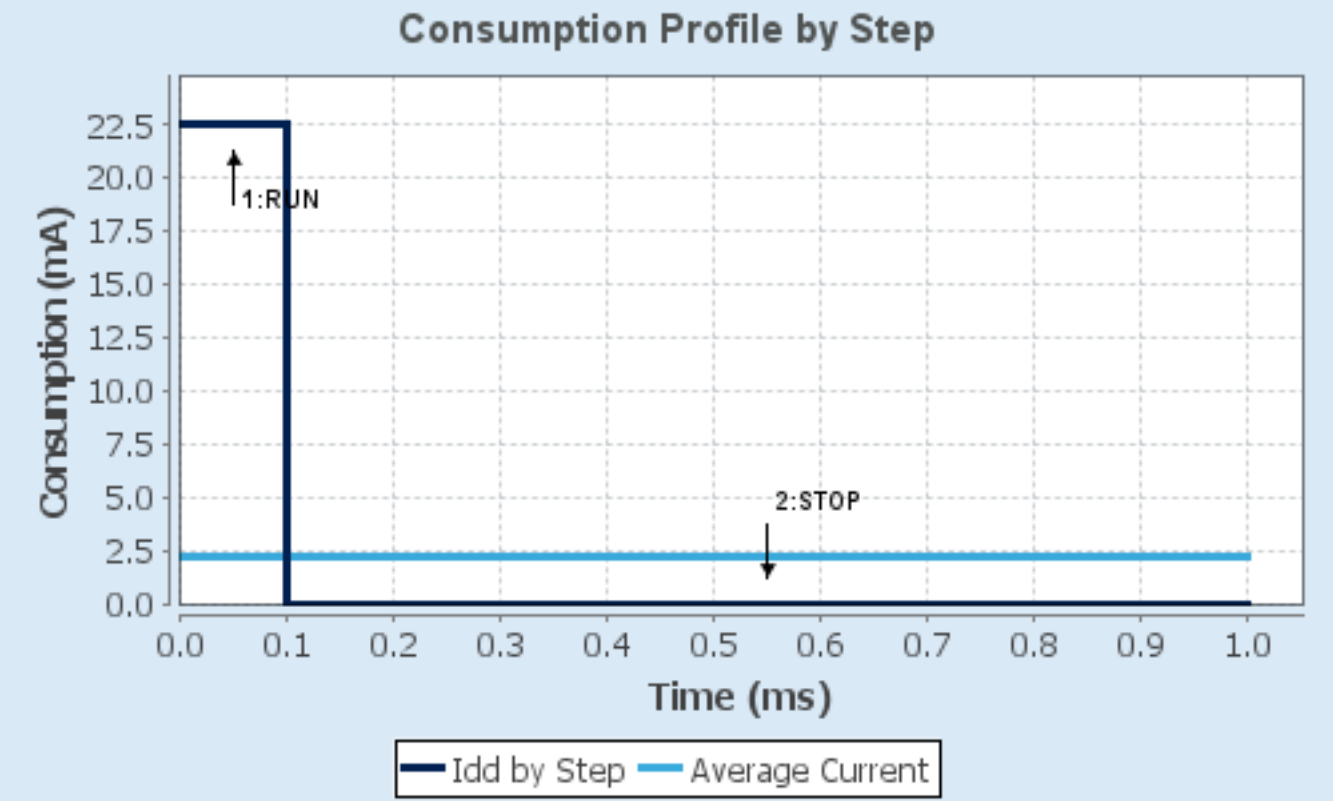
6.4. Sequence

Step	Step1	Step2
Mode	RUN	STOP
Vdd	3.6	3.6
Voltage Source	Battery	Battery
Range	Scale1-High	No Scale
Fetch Type	FLASH/ART/PREFETCH	n/a
CPU Frequency	100 MHz	0 Hz
Clock Configuration	HSE PLL	Regulator_LPLV Flash-PwrDwn
Clock Source Frequency	4 MHz	0 Hz
Peripherals		
Additional Cons.	0 mA	0 mA
Average Current	22.5 mA	10 µA
Duration	0.1 ms	0.9 ms
DMIPS	125.0	0.0
Ta Max	101.52	105
Category	In DS Table	In DS Table

6.5. RESULTS

Sequence Time	1 ms	Average Current	2.26 mA
Battery Life	2 months, 1 day, 18 hours	Average DMIPS	125.0 DMIPS

6.6. Chart


Consumption Profile by Step
Consumption (mA)
22.5
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
1:RUN
2:STOP
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
Time (ms)
Idd by Step
Average Current

7. IPs and Middleware Configuration

7.1. GPIO

7.2. I2C1

I2C: I2C

7.2.1. Parameter Settings:

Master Features:

I2C Speed Mode	Standard Mode
I2C Clock Speed (Hz)	100000

Slave Features:

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

7.3. RCC

High Speed Clock (HSE): Crystal/Ceramic Resonator

7.3.1. Parameter Settings:

System Parameters:

VDD voltage (V)	3.3
Instruction Cache	Enabled
Prefetch Buffer	Enabled
Data Cache	Enabled
Flash Latency(WS)	2 WS (3 CPU cycle)

RCC Parameters:

HSI Calibration Value	16
TIM Prescaler Selection	Disabled
HSE Startup Timout Value (ms)	100
LSE Startup Timout Value (ms)	5000

Power Parameters:

Power Regulator Voltage Scale	Power Regulator Voltage Scale 1

7.4. SYS

Timebase Source: SysTick

7.5. TIM1

Clock Source : Internal Clock

Channel1: PWM Generation CH1

Channel2: PWM Generation CH2

Channel3: PWM Generation CH3

7.5.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	**19 ***
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	**999 ***
Internal Clock Division (CKD)	No Division
Repetition Counter (RCR - 8 bits value)	0
auto-reload preload	**Enable ***

Trigger Output (TRGO) Parameters:

Master/Slave Mode (MSM bit)	Disable (Trigger input effect not delayed)
Trigger Event Selection	**Update Event ***

Break And Dead Time management - BRK Configuration:

BRK State	Disable
BRK Polarity	High

Break And Dead Time management - Output Configuration:

Automatic Output State	Disable
Off State Selection for Run Mode (OSSR)	Disable
Off State Selection for Idle Mode (OSSI)	Disable
Lock Configuration	Off

PWM Generation Channel 1:

Mode	PWM mode 1
Pulse (16 bits value)	0
Output compare preload	Enable
Fast Mode	Disable
CH Polarity	High
CH Idle State	Reset

PWM Generation Channel 2:

Mode	PWM mode 1
Pulse (16 bits value)	0
Output compare preload	Enable

Fast Mode	Disable
CH Polarity	High
CH Idle State	Reset

PWM Generation Channel 3:

Mode	PWM mode 1
Pulse (16 bits value)	0
Output compare preload	Enable
Fast Mode	Disable
CH Polarity	High
CH Idle State	Reset

7.6. TIM2

Clock Source : Internal Clock

7.6.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	**399 ***
Counter Mode	Up
Counter Period (AutoReload Register - 32 bits value)	**9999 ***
Internal Clock Division (CKD)	No Division
auto-reload preload	Disable

Trigger Output (TRGO) Parameters:

Master/Slave Mode (MSM bit)	Disable (Trigger input effect not delayed)
Trigger Event Selection	Reset (UG bit from TIMx_EGR)

7.7. TIM3

Clock Source : Internal Clock

7.7.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	**7999 ***
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	**9999 ***
Internal Clock Division (CKD)	No Division
auto-reload preload	Disable

Trigger Output (TRGO) Parameters:

Master/Slave Mode (MSM bit)	Disable (Trigger input effect not delayed)
Trigger Event Selection	Reset (UG bit from TIMx_EGR)

7.8. USART2

Mode: Asynchronous

7.8.1. Parameter Settings:

Basic Parameters:

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

Advanced Parameters:

Data Direction	**Transmit Only ***
Over Sampling	16 Samples

*** User modified value**

8. System Configuration

8.1. GPIO configuration

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
I2C1	PB6	I2C1_SCL	Alternate Function Open Drain	Pull-up	**Very High ***	Imu_Clock
	PB9	I2C1_SDA	Alternate Function Open Drain	Pull-up	**Very High ***	Imu_Data
RCC	PH0 - OSC_IN	RCC_OSC_IN	n/a	n/a	n/a	
	PH1 - OSC_OUT	RCC_OSC_OUT	n/a	n/a	n/a	
TIM1	PE9	TIM1_CH1	Alternate Function Push Pull	No pull-up and no pull-down	Low	PWM1
	PE11	TIM1_CH2	Alternate Function Push Pull	No pull-up and no pull-down	Low	PWM2
	PE13	TIM1_CH3	Alternate Function Push Pull	No pull-up and no pull-down	Low	PWM3
USART2	PA2	USART2_TX	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	Transmit
	PA3	USART2_RX	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	Receive
GPIO	PA0-WKUP	GPIO_EXTI0	External Interrupt Mode with Rising edge trigger detection	No pull-up and no pull-down	n/a	Blue_Button
	PD13	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED_Z
	PD14	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED_Y
	PD15	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED_X
	PA8	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Motor_Z_Direction
	PA9	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Motor_Y_Direction
	PA10	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Motor_X_Direction

8.2. DMA configuration

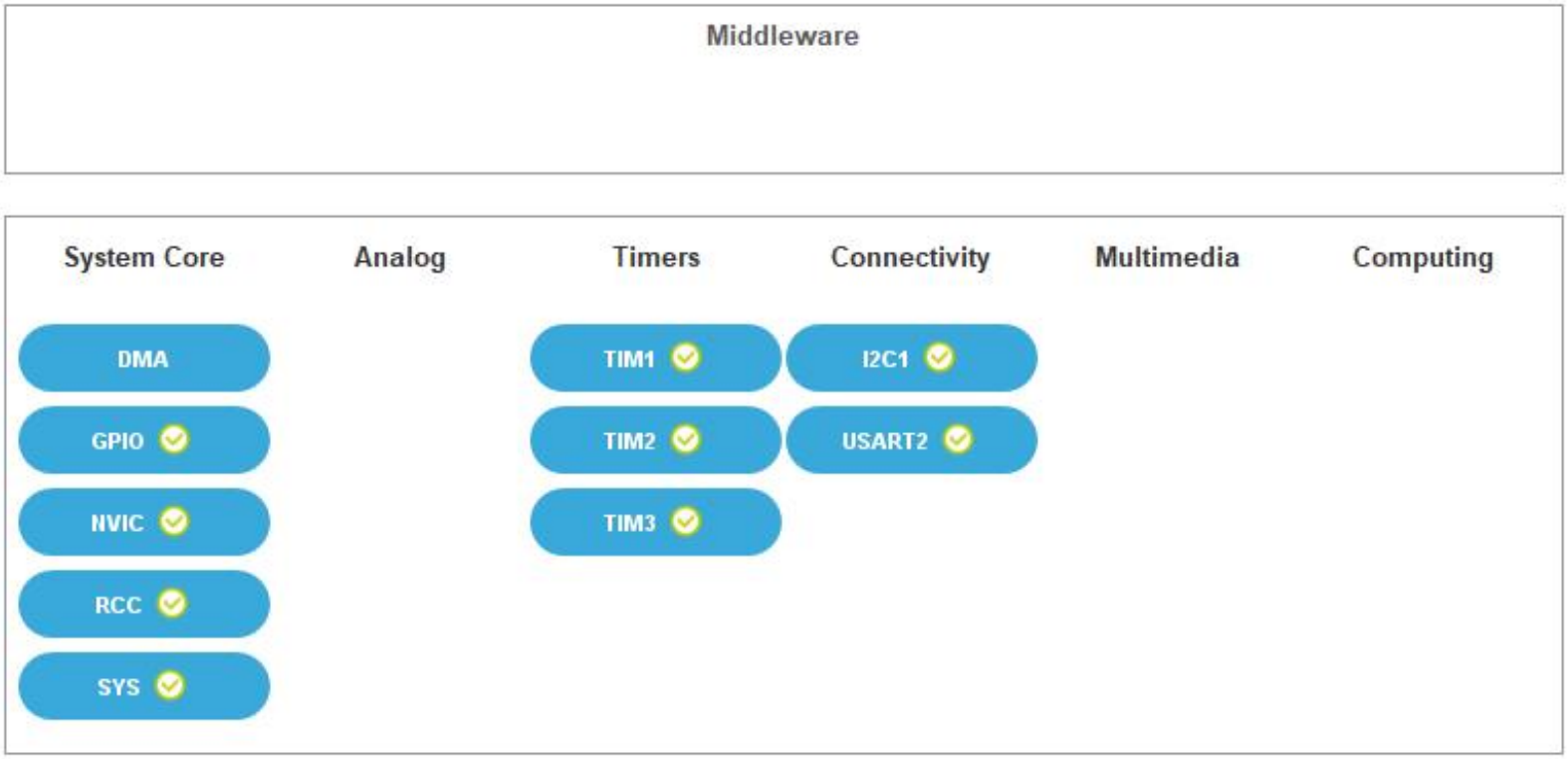
nothing configured in DMA service

8.3. 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
EXTI line0 interrupt	true	0	0
TIM2 global interrupt	true	0	0
USART2 global interrupt	true	0	0
PVD interrupt through EXTI line 16	unused		
Flash global interrupt	unused		
RCC global interrupt	unused		
TIM1 break interrupt and TIM9 global interrupt	unused		
TIM1 update interrupt and TIM10 global interrupt	unused		
TIM1 trigger and commutation interrupts and TIM11 global interrupt	unused		
TIM1 capture compare interrupt	unused		
TIM3 global interrupt	unused		
I2C1 event interrupt	unused		
I2C1 error interrupt	unused		
FPU global interrupt	unused		

*** User modified value**

9. Predefined Views - Category view : Current



10. Software Pack Report