
STM32
CubeMX

1. Description

1.1. Project

Project Name	test3
Board Name	STM32L476G-DISCO
Generated with:	STM32CubeMX 6.0.0
Date	05/30/2023

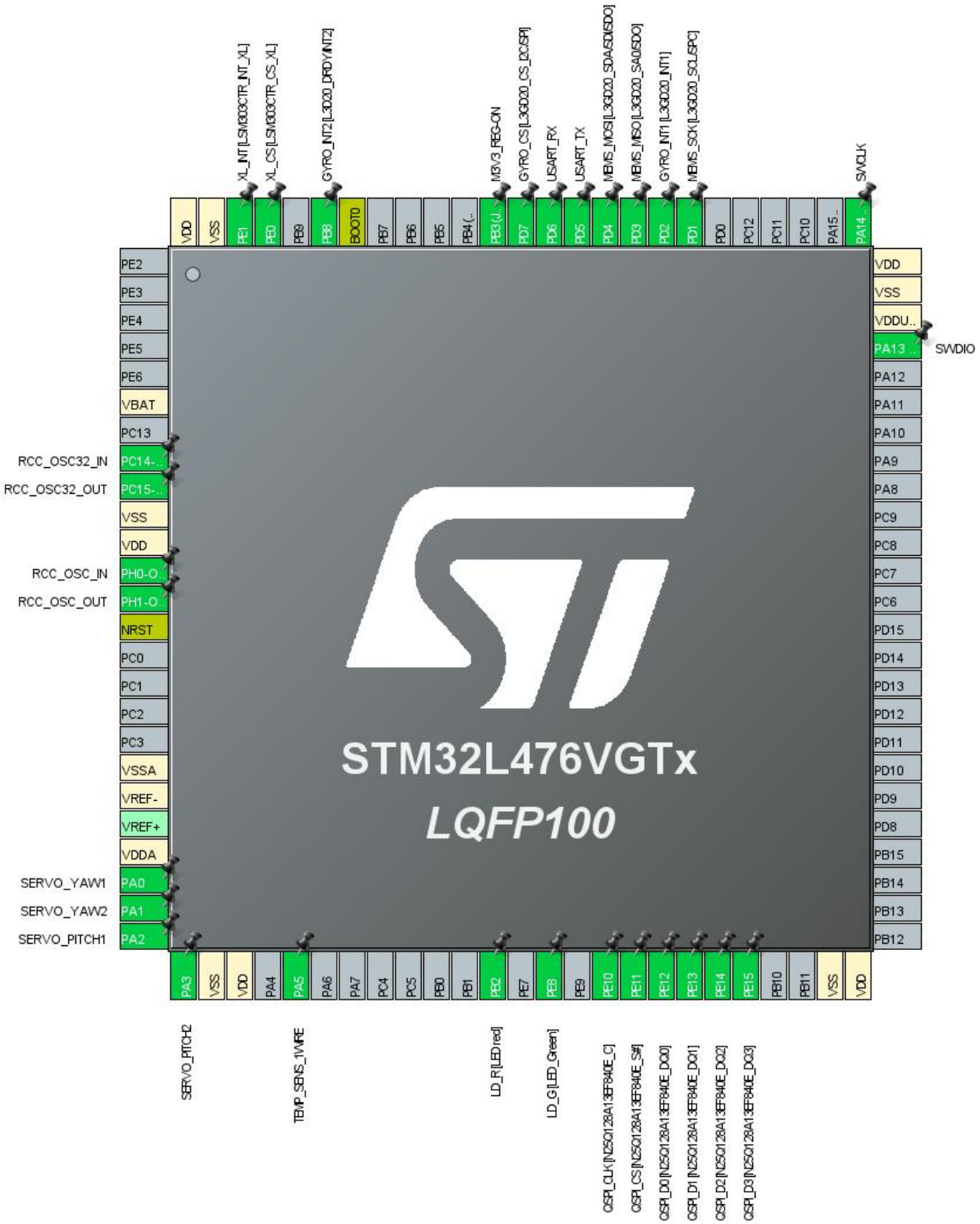
1.2. MCU

MCU Series	STM32L4
MCU Line	STM32L4x6
MCU name	STM32L476VGTx
MCU Package	LQFP100
MCU Pin number	100

1.3. Core(s) information

Core(s)	Arm Cortex-M4

2. Pinout Configuration



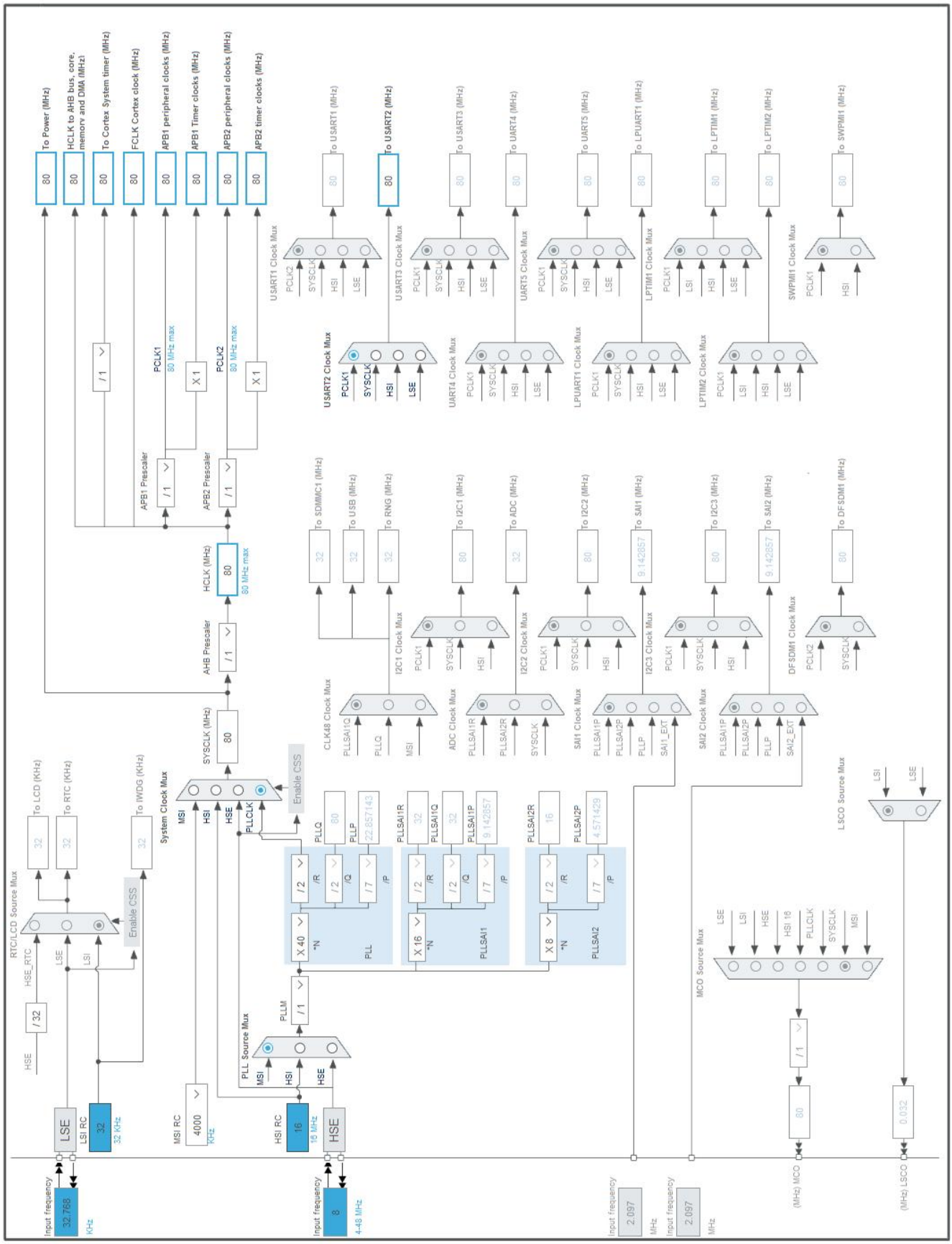
3. Pins Configuration

Pin Number LQFP100	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
6	VBAT	Power		
8	PC14-OSC32_IN (PC14)	I/O	RCC_OSC32_IN	
9	PC15-OSC32_OUT (PC15)	I/O	RCC_OSC32_OUT	
10	VSS	Power		
11	VDD	Power		
12	PH0-OSC_IN (PH0)	I/O	RCC_OSC_IN	
13	PH1-OSC_OUT (PH1)	I/O	RCC_OSC_OUT	
14	NRST	Reset		
19	VSSA	Power		
20	VREF-	Power		
22	VDDA	Power		
23	PA0	I/O	TIM2_CH1	SERVO_YAW1
24	PA1	I/O	TIM2_CH2	SERVO_YAW2
25	PA2	I/O	TIM2_CH3	SERVO_PITCH1
26	PA3	I/O	TIM2_CH4	SERVO_PITCH2
27	VSS	Power		
28	VDD	Power		
30	PA5 *	I/O	GPIO_Output	TEMP_SENS_1WIRE
37	PB2 *	I/O	GPIO_Output	LD_R [LED red]
39	PE8 *	I/O	GPIO_Output	LD_G [LED_Green]
41	PE10	I/O	QUADSPI_CLK	QSPI_CLK [N25Q128A13EF840E_C]
42	PE11	I/O	QUADSPI_NCS	QSPI_CS [N25Q128A13EF840E_S#]
43	PE12	I/O	QUADSPI_BK1_IO0	QSPI_D0 [N25Q128A13EF840E_DQ0]
44	PE13	I/O	QUADSPI_BK1_IO1	QSPI_D1 [N25Q128A13EF840E_DQ1]
45	PE14	I/O	QUADSPI_BK1_IO2	QSPI_D2 [N25Q128A13EF840E_DQ2]
46	PE15	I/O	QUADSPI_BK1_IO3	QSPI_D3 [N25Q128A13EF840E_DQ3]
49	VSS	Power		
50	VDD	Power		

Pin Number LQFP100	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
72	PA13 (JTMS-SWDIO)	I/O	SYS_JTMS-SWDIO	SWDIO
73	VDDUSB	Power		
74	VSS	Power		
75	VDD	Power		
76	PA14 (JTCK-SWCLK)	I/O	SYS_JTCK-SWCLK	SWCLK
82	PD1	I/O	SPI2_SCK	MEMS_SCK [L3GD20_SCL/SPC]
83	PD2	I/O	GPIO_EXTI2	GYRO_INT1 [L3GD20_INT1]
84	PD3	I/O	SPI2_MISO	MEMS_MISO [L3GD20_SA0/SDO]
85	PD4	I/O	SPI2_MOSI	MEMS_MOSI [L3GD20_SDA/SDI/SDO]
86	PD5	I/O	USART2_TX	USART_TX
87	PD6	I/O	USART2_RX	USART_RX
88	PD7 *	I/O	GPIO_Output	GYRO_CS [L3GD20_CS_I2C/SPI]
89	PB3 (JTDO-TRACESWO) *	I/O	GPIO_Output	M3V3_REG-ON
94	BOOT0	Boot		
95	PB8	I/O	GPIO_EXTI8	GYRO_INT2 [L3D20_DRDY/INT2]
97	PE0 *	I/O	GPIO_Output	XL_CS [LSM303CTR_CS_XL]
98	PE1	I/O	GPIO_EXTI1	XL_INT [LSM303CTR_INT_XL]
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	test3
Project Folder	C:\Users\Hubert\STM32CubeIDE\workspace_1.4.0\Sterowniki-Robotow---
Toolchain / IDE	STM32CubeIDE
Firmware Package Name and Version	STM32Cube FW_L4 V1.16.0
Application Structure	Advanced
Generate Under Root	Yes
Do not generate the main()	No
Minimum Heap Size	0x200
Minimum Stack Size	0x400

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
Keep User Code when re-generating	Yes
Delete previously generated files when not re-generated	Yes
Set all free pins as analog (to optimize the power consumption)	No
Enable Full Assert	No

5.3. Advanced Settings - Generated Function Calls

Rank	Function Name	IP Instance Name
1	MX_GPIO_Init	GPIO
2	MX_DMA_Init	DMA
3	SystemClock_Config	RCC
4	MX_QUADSPI_Init	QUADSPI
5	MX_SPI2_Init	SPI2
6	MX_USART2_UART_Init	USART2
7	MX_TIM2_Init	TIM2
8	MX_TIM6_Init	TIM6
9	MX_CRC_Init	CRC

6. Power Consumption Calculator report

6.1. Microcontroller Selection

Series	STM32L4
Line	STM32L4x6
MCU	STM32L476VGTx
Datasheet	DS10198_Rev4

6.2. Parameter Selection

Temperature	25
Vdd	3.0

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

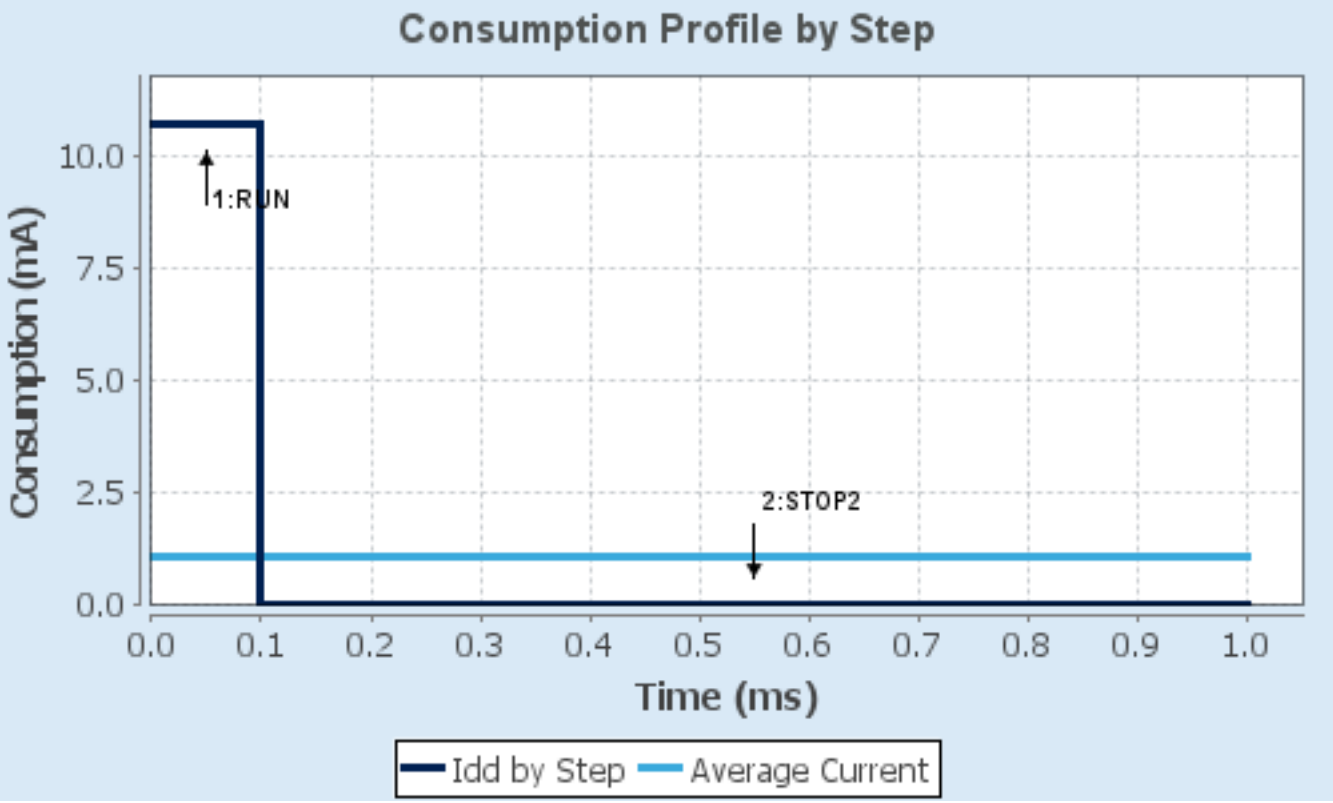
6.4. Sequence

Step	Step1	Step2
Mode	RUN	STOP2
Vdd	3.0	3.0
Voltage Source	Battery	Battery
Range	Range1-High	NoRange
Fetch Type	SRAM2	n/a
CPU Frequency	80 MHz	0 Hz
Clock Configuration	HSE PLL	ALL CLOCKS OFF
Clock Source Frequency	4 MHz	0 Hz
Peripherals		
Additional Cons.	0 mA	0 mA
Average Current	10.7 mA	1.18 µA
Duration	0.1 ms	0.9 ms
DMIPS	100.0	0.0
Ta Max	103.65	105
Category	In DS Table	In DS Table

6.5. Results

Sequence Time	1 ms	Average Current	1.07 mA
Battery Life	4 months, 10 days, 3 hours	Average DMIPS	100.0 DMIPS

6.6. Chart


Consumption Profile by Step
Consumption (mA)
10.0
7.5
5.0
2.5
0.0
1:RUN
2:STOP2
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. CRC

mode: Activated

7.1.1. Parameter Settings:

Basic Parameters:

Default Polynomial State	**Disable ***
CRC Length	**8-bit ***
CRC Generating Polynomial	X2+X1+X0
Default Init Value State	**Disable ***
Init Value For CRC computation	0

Advanced Parameters:

Input Data Inversion Mode	None
Output Data Inversion Mode	Disable
Input Data Format	Bytes

7.2. GPIO

7.3. QUADSPI

Single Bank: Quad SPI Line

7.3.1. Parameter Settings:

General Parameters:

Clock Prescaler	**1 ***
Fifo Threshold	**4 ***
Sample Shifting	**Sample Shifting Half Cycle ***
Flash Size	**23 ***
Chip Select High Time	1 Cycle
Clock Mode	Low

7.4. RCC

High Speed Clock (HSE): Crystal/Ceramic Resonator

Low Speed Clock (LSE) : Crystal/Ceramic Resonator

7.4.1. Parameter Settings:

System Parameters:

VDD voltage (V)	3.3
Instruction Cache	Enabled
Prefetch Buffer	**Enabled ***
Data Cache	Enabled
Flash Latency(WS)	4 WS (5 CPU cycle)

RCC Parameters:

HSI Calibration Value	16
MSI Calibration Value	0
MSI Auto Calibration	Enabled
HSE Startup Timout Value (ms)	100
LSE Startup Timout Value (ms)	5000
LSE Drive Capability	LSE oscillator low drive capability

Power Parameters:

Power Regulator Voltage Scale	Power Regulator Voltage Scale 1

7.5. SPI2

Mode: Full-Duplex Master

7.5.1. Parameter Settings:

Basic Parameters:

Frame Format	Motorola
Data Size	4 Bits
First Bit	MSB First

Clock Parameters:

Prescaler (for Baud Rate)	2
Baud Rate	**40.0 MBits/s ***
Clock Polarity (CPOL)	Low
Clock Phase (CPHA)	1 Edge

Advanced Parameters:

CRC Calculation	Disabled
NSSP Mode	Enabled
NSS Signal Type	Software

7.6. SYS

Debug: Serial Wire

Timebase Source: SysTick

7.7. TIM2

Clock Source : Internal Clock

Channel1: PWM Generation CH1

Channel2: PWM Generation CH2

Channel3: PWM Generation CH3

Channel4: PWM Generation CH4

7.7.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	**259 ***
Counter Mode	Up
Counter Period (AutoReload Register - 32 bits value)	**6399 ***
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 TRGO	Reset (UG bit from TIMx_EGR)

Clear Input:

Clear Input Source	Disable

PWM Generation Channel 1:

Mode	PWM mode 1
Pulse (32 bits value)	0
Output compare preload	Enable
Fast Mode	Disable
CH Polarity	High

PWM Generation Channel 2:

Mode	PWM mode 1
Pulse (32 bits value)	0
Output compare preload	Enable
Fast Mode	Disable
CH Polarity	High

PWM Generation Channel 3:

Mode	PWM mode 1
Pulse (32 bits value)	0
Output compare preload	Enable

Fast Mode	Disable
CH Polarity	High

PWM Generation Channel 4:

Mode	PWM mode 1
Pulse (32 bits value)	0
Output compare preload	Enable
Fast Mode	Disable
CH Polarity	High

7.8. TIM6

mode: Activated

7.8.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	**79 ***
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	**9999 ***
auto-reload preload	Disable

Trigger Output (TRGO) Parameters:

Trigger Event Selection	Reset (UG bit from TIMx_EGR)

7.9. USART2

Mode: Asynchronous

7.9.1. 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
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**

8. System Configuration

8.1. GPIO configuration

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
QUADSPI	PE10	QUADSPI_CLK	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	QSPI_CLK [N25Q128A13EF840E_C]
	PE11	QUADSPI_NCS	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	QSPI_CS [N25Q128A13EF840E_S#]
	PE12	QUADSPI_BK1_IO0	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	QSPI_D0 [N25Q128A13EF840E_DQ0]
	PE13	QUADSPI_BK1_IO1	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	QSPI_D1 [N25Q128A13EF840E_DQ1]
	PE14	QUADSPI_BK1_IO2	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	QSPI_D2 [N25Q128A13EF840E_DQ2]
	PE15	QUADSPI_BK1_IO3	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	QSPI_D3 [N25Q128A13EF840E_DQ3]
RCC	PC14-OSC32_IN (PC14)	RCC_OSC32_IN	n/a	n/a	n/a	
	PC15-OSC32_OUT (PC15)	RCC_OSC32_OUT	n/a	n/a	n/a	
	PH0-OSC_IN (PH0)	RCC_OSC_IN	n/a	n/a	n/a	
	PH1-OSC_OUT (PH1)	RCC_OSC_OUT	n/a	n/a	n/a	
SPI2	PD1	SPI2_SCK	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	MEMS_SCK [L3GD20_SCL/SPC]
	PD3	SPI2_MISO	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	MEMS_MISO [L3GD20_SA0/SDO]
	PD4	SPI2_MOSI	Alternate Function Push Pull	No pull-up and no pull-down	**Very High** *	MEMS_MOSI [L3GD20_SDA/SDI/SDO]
SYS	PA13 (JTMS-SWDIO)	SYS_JTMS-SWDIO	n/a	n/a	n/a	SWDIO
	PA14 (JTCK-SWCLK)	SYS_JTCK-SWCLK	n/a	n/a	n/a	SWCLK

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
TIM2	PA0	TIM2_CH1	Alternate Function Push Pull	No pull-up and no pull-down	Low	SERVO_YAW1
	PA1	TIM2_CH2	Alternate Function Push Pull	No pull-up and no pull-down	Low	SERVO_YAW2
	PA2	TIM2_CH3	Alternate Function Push Pull	No pull-up and no pull-down	Low	SERVO_PITCH1
	PA3	TIM2_CH4	Alternate Function Push Pull	No pull-up and no pull-down	Low	SERVO_PITCH2
USART2	PD5	USART2_TX	Alternate Function Push Pull	**Pull-up ***	**Very High ***	USART_TX
	PD6	USART2_RX	Alternate Function Push Pull	**Pull-up ***	**Very High ***	USART_RX
GPIO	PA5	GPIO_Output	**Output Open Drain ***	**Pull-up ***	Low	TEMP_SENS_1WIRE
	PB2	GPIO_Output	Output Push Pull	**Pull-up ***	**Very High ***	LD_R [LED red]
	PE8	GPIO_Output	Output Push Pull	**Pull-up ***	**Very High ***	LD_G [LED_Green]
	PD2	GPIO_EXTI2	**External Event Mode with Rising edge trigger detection ***	No pull-up and no pull-down	**n/a**	GYRO_INT1 [L3GD20_INT1]
	PD7	GPIO_Output	Output Push Pull	No pull-up and no pull-down	**Very High ***	GYRO_CS [L3GD20_CS_I2C/SPI]
	PB3 (JTDO-TRACESWO)	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	M3V3_REG-ON
	PB8	GPIO_EXTI8	**External Event Mode with Rising edge trigger detection ***	No pull-up and no pull-down	n/a	GYRO_INT2 [L3D20_DRDY/INT2]
	PE0	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	XL_CS [LSM303CTR_CS_XL]
	PE1	GPIO_EXTI1	**External Event Mode with Rising edge trigger detection ***	No pull-up and no pull-down	n/a	XL_INT [LSM303CTR_INT_XL]

8.2. DMA configuration

DMA request	Stream	Direction	Priority
QUADSPI	DMA1_Channel5	Memory To Peripheral	Low

QUADSPI: DMA1_Channel5 DMA request Settings:

Mode:	Normal
Peripheral Increment:	Disable
Memory Increment:	**Enable ***
Peripheral Data Width:	Byte
Memory Data Width:	Byte

8.3. NVIC configuration

8.3.1. NVIC

Interrupt Table	Enable	Preenmption Priority	SubPriority
Non maskable interrupt	true	0	0
Hard fault interrupt	true	0	0
Memory management fault	true	0	0
Prefetch 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
DMA1 channel5 global interrupt	true	0	0
TIM6 global interrupt, DAC channel1 and channel2 underrun error interrupts	true	0	0
PVD/PVM1/PVM2/PVM3/PVM4 interrupts through EXTI lines 16/35/36/37/38	unused		
Flash global interrupt	unused		
RCC global interrupt	unused		
TIM2 global interrupt	unused		
SPI2 global interrupt	unused		
USART2 global interrupt	unused		
QUADSPI global interrupt	unused		
FPU global interrupt	unused		

8.3.2. NVIC Code generation

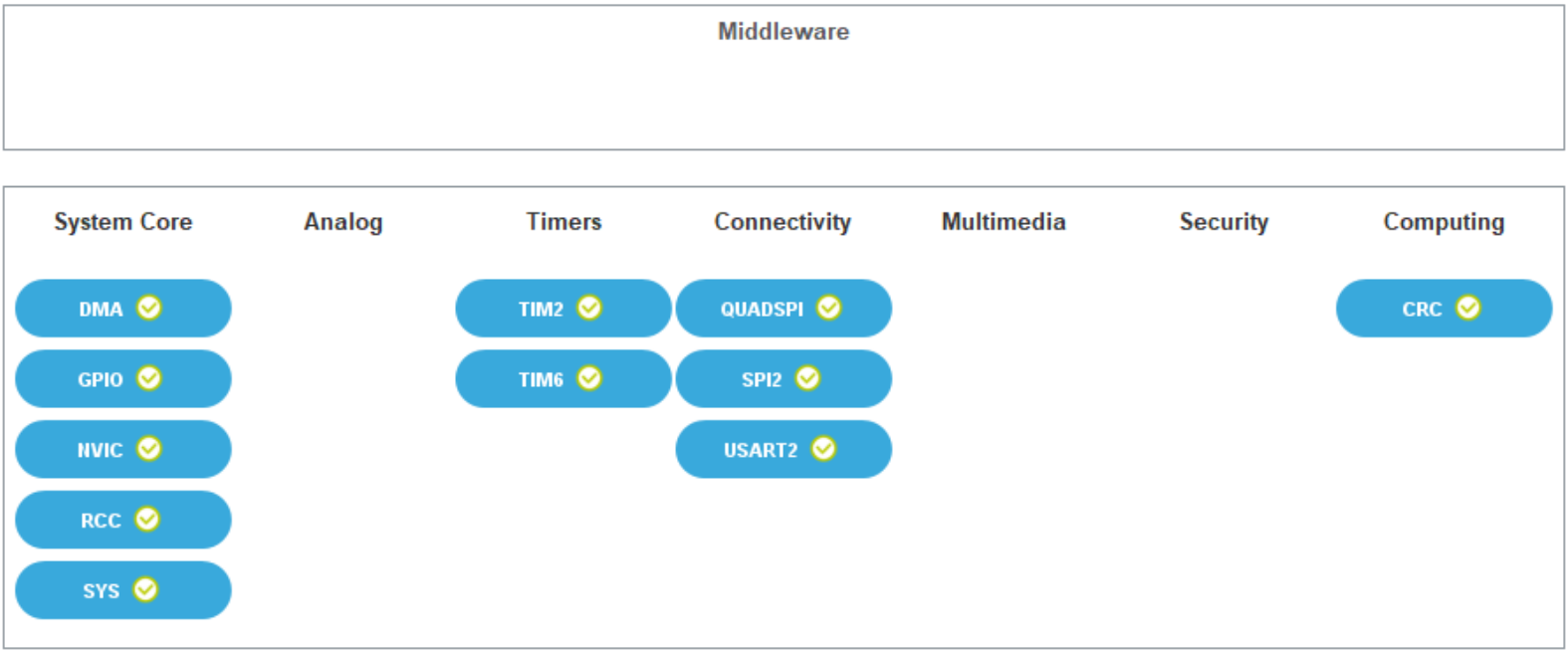
Enabled interrupt Table	Select for init sequence ordering	Generate IRQ handler	Call HAL handler
Non maskable interrupt	true	true	false
Hard fault interrupt	true	true	false
Memory management fault	true	true	false
Prefetch fault, memory access fault	true	true	false
Undefined instruction or illegal state	true	true	false
System service call via SWI instruction	true	true	false
Debug monitor	true	true	false
Pendable request for system service	true	true	false
System tick timer	true	true	true
DMA1 channel5 global interrupt	true	true	true
TIM6 global interrupt, DAC channel1 and channel2 underrun error interrupts	true	true	true

*** User modified value**

9. System Views

9.1. Category view

9.1.1. Current



10. Docs & Resources

Type	Link
Datasheet	http://www.st.com/resource/en/datasheet/DM00108832.pdf
Reference manual	http://www.st.com/resource/en/reference_manual/DM00083560.pdf
Programming manual	http://www.st.com/resource/en/programming_manual/DM00046982.pdf
Errata sheet	http://www.st.com/resource/en/errata_sheet/DM00111498.pdf
Application note	http://www.st.com/resource/en/application_note/CD00160362.pdf
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Application note	http://www.st.com/resource/en/application_note/DM00156964.pdf
Application note	http://www.st.com/resource/en/application_note/DM00150423.pdf
Application note	http://www.st.com/resource/en/application_note/DM00209748.pdf

Application note	http://www.st.com/resource/en/application_note/DM00125306.pdf
Application note	http://www.st.com/resource/en/application_note/DM00141025.pdf
Application note	http://www.st.com/resource/en/application_note/DM00144612.pdf
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Application note	http://www.st.com/resource/en/application_note/DM00216518.pdf
Application note	http://www.st.com/resource/en/application_note/DM00220769.pdf
Application note	http://www.st.com/resource/en/application_note/DM00228015.pdf
Application note	http://www.st.com/resource/en/application_note/DM00227538.pdf
Application note	http://www.st.com/resource/en/application_note/DM00257177.pdf
Application note	http://www.st.com/resource/en/application_note/DM00269143.pdf
Application note	http://www.st.com/resource/en/application_note/DM00272912.pdf
Application note	http://www.st.com/resource/en/application_note/DM00223574.pdf
Application note	http://www.st.com/resource/en/application_note/DM00226326.pdf
Application note	http://www.st.com/resource/en/application_note/DM00236305.pdf
Application note	http://www.st.com/resource/en/application_note/DM00260952.pdf
Application note	http://www.st.com/resource/en/application_note/DM00263732.pdf
Application note	http://www.st.com/resource/en/application_note/DM00269146.pdf
Application note	http://www.st.com/resource/en/application_note/DM00296349.pdf
Application note	http://www.st.com/resource/en/application_note/DM00327191.pdf
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Application note	http://www.st.com/resource/en/application_note/DM00355687.pdf
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Application note	http://www.st.com/resource/en/application_note/DM00660597.pdf
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