



## 1. Description

### 1.1. Project

Project Name	RCS
Board Name	custom
Generated with:	STM32CubeMX 6.0.0
Date	12/02/2023

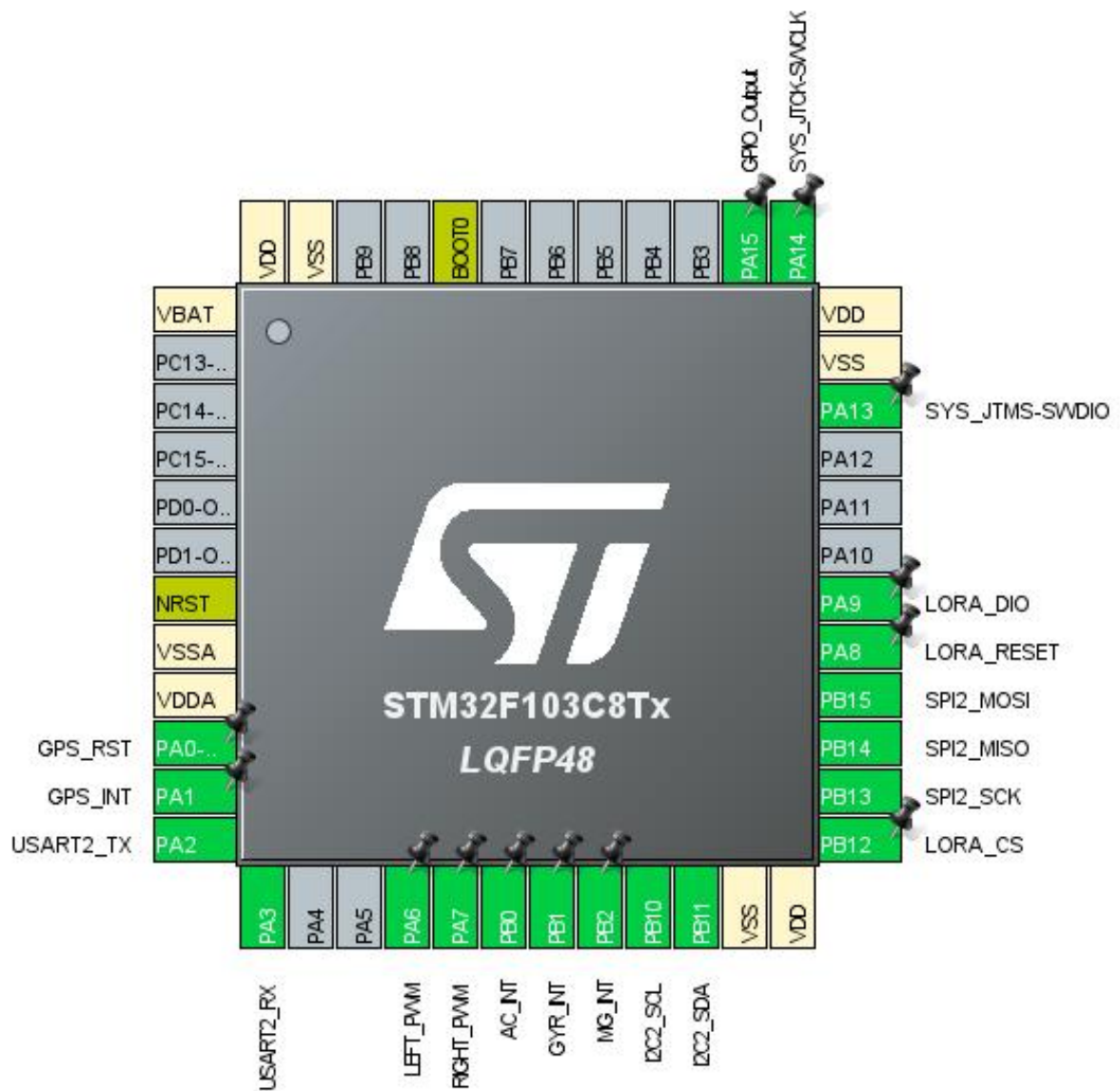
### 1.2. MCU

MCU Series	STM32F1
MCU Line	STM32F103
MCU name	STM32F103C8Tx
MCU Package	LQFP48
MCU Pin number	48

### 1.3. Core(s) information

Core(s)	Arm Cortex-M3
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## 2. Pinout Configuration

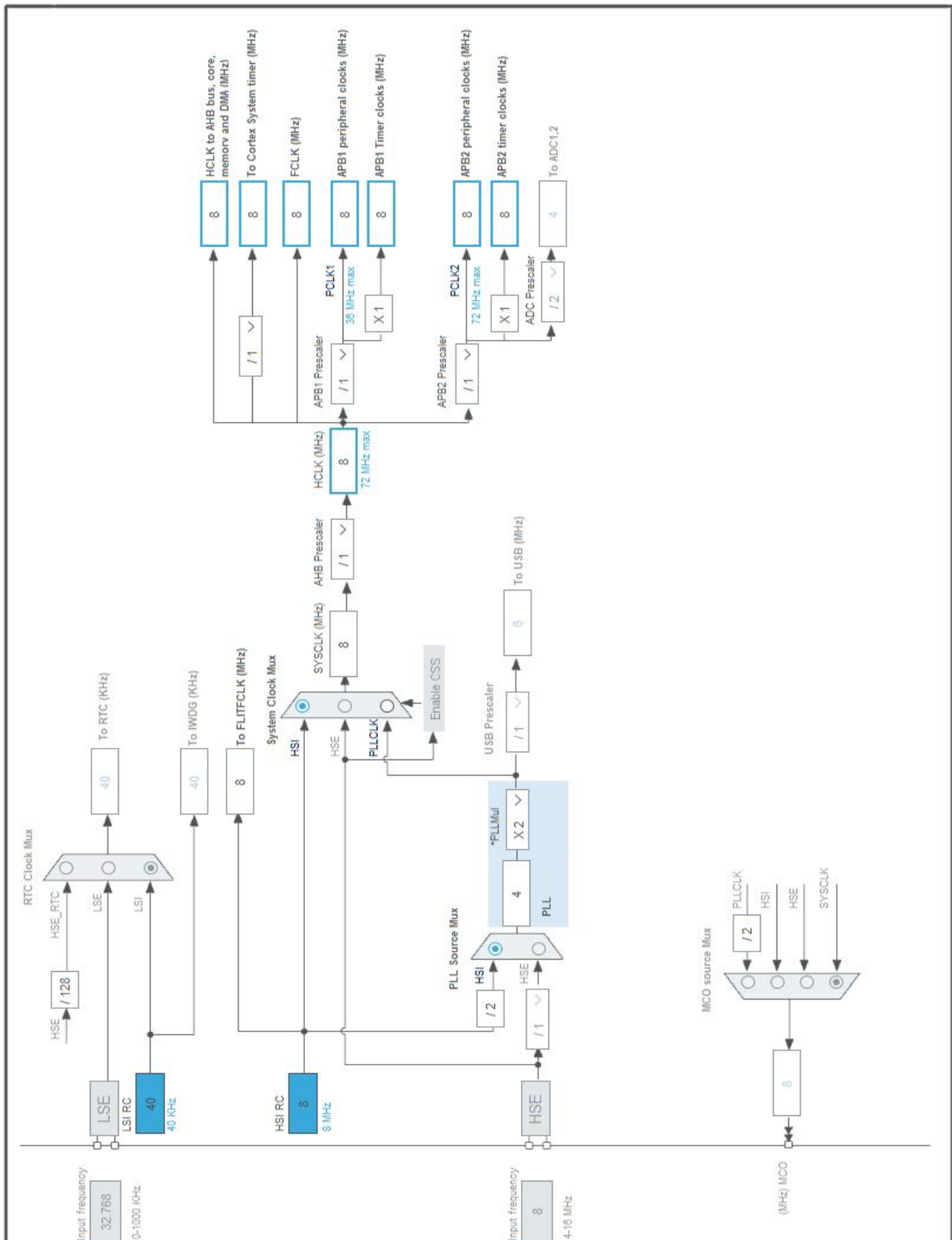


### 3. Pins Configuration

Pin Number LQFP48	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
1	VBAT	Power		
7	NRST	Reset		
8	VSSA	Power		
9	VDDA	Power		
10	PA0-WKUP *	I/O	GPIO_Output	GPS_RST
11	PA1 *	I/O	GPIO_Input	GPS_INT
12	PA2	I/O	USART2_TX	
13	PA3	I/O	USART2_RX	
16	PA6 *	I/O	GPIO_Output	LEFT_PWM
17	PA7 *	I/O	GPIO_Output	RIGHT_PWM
18	PB0 *	I/O	GPIO_Input	AC_INT
19	PB1 *	I/O	GPIO_Input	GYR_INT
20	PB2 *	I/O	GPIO_Input	MG_INT
21	PB10	I/O	I2C2_SCL	
22	PB11	I/O	I2C2_SDA	
23	VSS	Power		
24	VDD	Power		
25	PB12 *	I/O	GPIO_Output	LORA_CS
26	PB13	I/O	SPI2_SCK	
27	PB14	I/O	SPI2_MISO	
28	PB15	I/O	SPI2_MOSI	
29	PA8 *	I/O	GPIO_Output	LORA_RESET
30	PA9 *	I/O	GPIO_Input	LORA_DIO
34	PA13	I/O	SYS_JTMS-SWDIO	
35	VSS	Power		
36	VDD	Power		
37	PA14	I/O	SYS_JTCK-SWCLK	
38	PA15 *	I/O	GPIO_Output	
44	BOOT0	Boot		
47	VSS	Power		
48	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	RCS
Project Folder	C:\ST\workspace_1.4.0\RCS
Toolchain / IDE	STM32CubeIDE
Firmware Package Name and Version	STM32Cube FW_F1 V1.8.4
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	SystemClock_Config	RCC
3	MX_I2C2_Init	I2C2
4	MX_SPI2_Init	SPI2
5	MX_USART2_UART_Init	USART2

## 6. Power Consumption Calculator report

### 6.1. Microcontroller Selection

Series	STM32F1
Line	STM32F103
MCU	STM32F103C8Tx
Datasheet	DS5319_Rev17

### 6.2. Parameter Selection

Temperature	25
Vdd	3.3

### 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

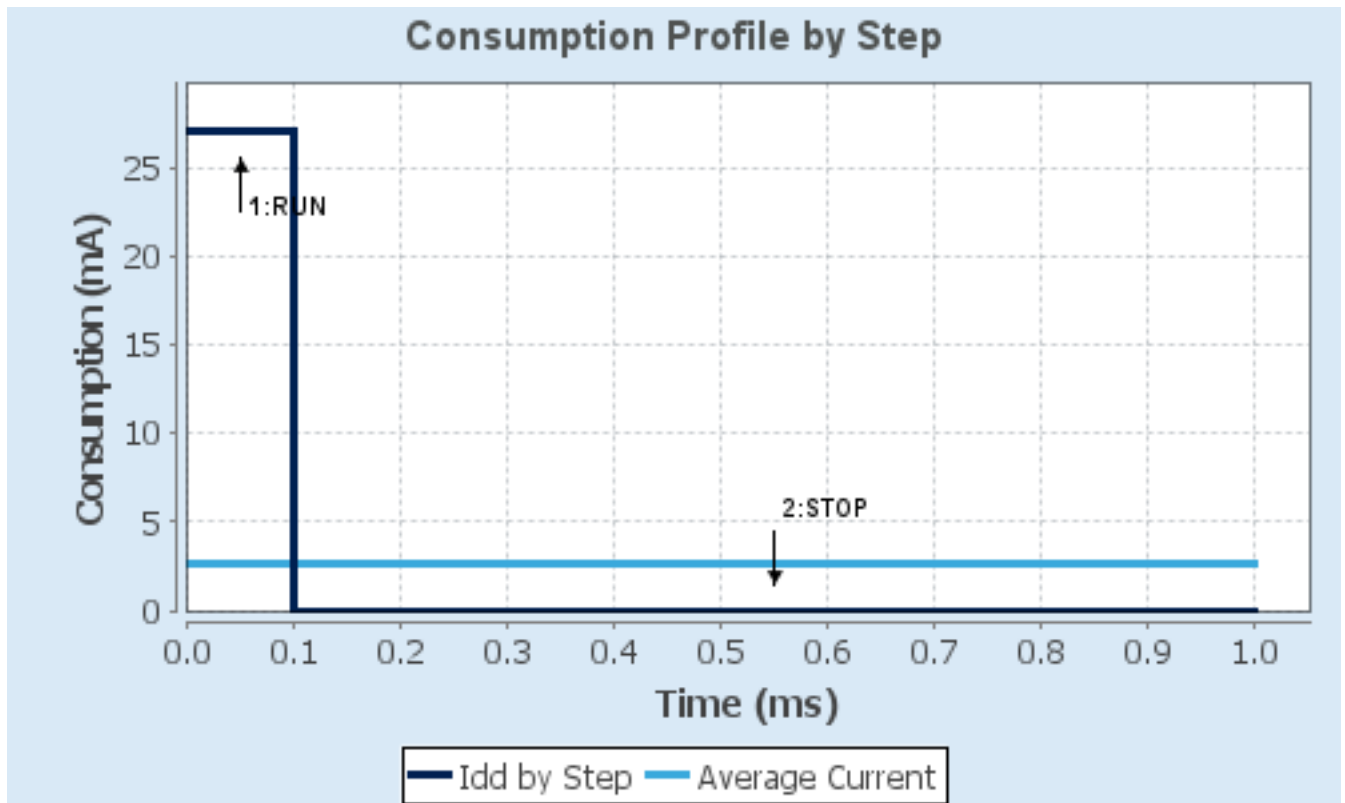
<b>Step</b>	Step1	Step2
<b>Mode</b>	RUN	STOP
<b>Vdd</b>	3.3	3.3
<b>Voltage Source</b>	Battery	Battery
<b>Range</b>	No Scale	No Scale
<b>Fetch Type</b>	FLASH	n/a
<b>CPU Frequency</b>	72 MHz	0 Hz
<b>Clock Configuration</b>	HSE PLL	Regulator LP
<b>Clock Source Frequency</b>	8 MHz	0 Hz
<b>Peripherals</b>		
<b>Additional Cons.</b>	0 mA	0 mA
<b>Average Current</b>	27 mA	14 $\mu$ A
<b>Duration</b>	0.1 ms	0.9 ms
<b>DMIPS</b>	90.0	0.0
<b>Ta Max</b>	100.1	105
<b>Category</b>	In DS Table	In DS Table

#### 6.5. Results

Sequence Time	1 ms	Average Current	2.71 mA
Battery Life	1 month, 21 days, 17 hours	Average DMIPS	61.0 DMIPS

#### 6.6. Chart





## 7. IPs and Middleware Configuration

### 7.1. GPIO

### 7.2. I2C2

#### 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

##### 7.3.1. Parameter Settings:

###### System Parameters:

VDD voltage (V)	3.3
Prefetch Buffer	Enabled
Flash Latency(WS)	0 WS (1 CPU cycle)

###### RCC Parameters:

HSI Calibration Value	16
HSE Startup Timeout Value (ms)	100
LSE Startup Timeout Value (ms)	5000

### 7.4. SPI2

#### Mode: Full-Duplex Master

##### 7.4.1. Parameter Settings:

###### Basic Parameters:

Frame Format	Motorola
Data Size	8 Bits

First Bit	MSB First
<b>Clock Parameters:</b>	
Prescaler (for Baud Rate)	2
Baud Rate	<b>4.0 MBits/s *</b>
Clock Polarity (CPOL)	Low
Clock Phase (CPHA)	1 Edge
<b>Advanced Parameters:</b>	
CRC Calculation	Disabled
NSS Signal Type	Software

## 7.5. SYS

**Debug: Serial Wire**

**Timebase Source: SysTick**

## 7.6. USART2

**Mode: Asynchronous**

### 7.6.1. Parameter Settings:

<b>Basic Parameters:</b>	
Baud Rate	115200
Word Length	8 Bits (including Parity)
Parity	None
Stop Bits	1
<b>Advanced Parameters:</b>	
Data Direction	Receive and Transmit
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
I2C2	PB10	I2C2_SCL	Alternate Function Open Drain	n/a	High *	
	PB11	I2C2_SDA	Alternate Function Open Drain	n/a	High *	
SPI2	PB13	SPI2_SCK	Alternate Function Push Pull	n/a	High *	
	PB14	SPI2_MISO	Input mode	No pull-up and no pull-down	n/a	
	PB15	SPI2_MOSI	Alternate Function Push Pull	n/a	High *	
SYS	PA13	SYS_JTMS-SWDIO	n/a	n/a	n/a	
	PA14	SYS_JTCK-SWCLK	n/a	n/a	n/a	
USART2	PA2	USART2_TX	Alternate Function Push Pull	n/a	High *	
	PA3	USART2_RX	Input mode	No pull-up and no pull-down	n/a	
GPIO	PA0-WKUP	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	GPS_RST
	PA1	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	GPS_INT
	PA6	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LEFT_PWM
	PA7	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	RIGHT_PWM
	PB0	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	AC_INT
	PB1	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	GYR_INT
	PB2	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	MG_INT
	PB12	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LORA_CS
	PA8	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LORA_RESET
	PA9	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	LORA_DIO
	PA15	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	

### 8.2. DMA configuration

nothing configured in DMA service

### 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
PVD interrupt through EXTI line 16	unused		
Flash global interrupt	unused		
RCC global interrupt	unused		
I2C2 event interrupt	unused		
I2C2 error interrupt	unused		
SPI2 global interrupt	unused		
USART2 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

\* User modified value

## 9. System Views

### 9.1. Category view

#### 9.1.1. Current

#### Middleware

#### System Core

#### Analog

#### Timers

#### Connectivity

#### Computing

DMA

I2C2 

GPIO 

SPI2 

IVIC 

USART2 

RCC 

SYS 

## 10. Docs & Resources

Type	Link
Datasheet	<a href="http://www.st.com/resource/en/datasheet/CD00161566.pdf">http://www.st.com/resource/en/datasheet/CD00161566.pdf</a>
Reference manual	<a href="http://www.st.com/resource/en/reference_manual/CD00171190.pdf">http://www.st.com/resource/en/reference_manual/CD00171190.pdf</a>
Programming manual	<a href="http://www.st.com/resource/en/programming_manual/CD00228163.pdf">http://www.st.com/resource/en/programming_manual/CD00228163.pdf</a>
Programming manual	<a href="http://www.st.com/resource/en/programming_manual/CD00283419.pdf">http://www.st.com/resource/en/programming_manual/CD00283419.pdf</a>
Errata sheet	<a href="http://www.st.com/resource/en/errata_sheet/CD00190234.pdf">http://www.st.com/resource/en/errata_sheet/CD00190234.pdf</a>
Application note	<a href="http://www.st.com/resource/en/application_note/CD00160362.pdf">http://www.st.com/resource/en/application_note/CD00160362.pdf</a>
Application note	<a href="http://www.st.com/resource/en/application_note/CD00164185.pdf">http://www.st.com/resource/en/application_note/CD00164185.pdf</a>
Application note	<a href="http://www.st.com/resource/en/application_note/CD00167326.pdf">http://www.st.com/resource/en/application_note/CD00167326.pdf</a>
Application note	<a href="http://www.st.com/resource/en/application_note/CD00167594.pdf">http://www.st.com/resource/en/application_note/CD00167594.pdf</a>
Application note	<a href="http://www.st.com/resource/en/application_note/CD00211314.pdf">http://www.st.com/resource/en/application_note/CD00211314.pdf</a>
Application note	<a href="http://www.st.com/resource/en/application_note/CD00249778.pdf">http://www.st.com/resource/en/application_note/CD00249778.pdf</a>
Application note	<a href="http://www.st.com/resource/en/application_note/CD00259245.pdf">http://www.st.com/resource/en/application_note/CD00259245.pdf</a>
Application note	<a href="http://www.st.com/resource/en/application_note/CD00264321.pdf">http://www.st.com/resource/en/application_note/CD00264321.pdf</a>
Application note	<a href="http://www.st.com/resource/en/application_note/CD00264342.pdf">http://www.st.com/resource/en/application_note/CD00264342.pdf</a>
Application note	<a href="http://www.st.com/resource/en/application_note/CD00264379.pdf">http://www.st.com/resource/en/application_note/CD00264379.pdf</a>
Application note	<a href="http://www.st.com/resource/en/application_note/DM00024853.pdf">http://www.st.com/resource/en/application_note/DM00024853.pdf</a>
Application note	<a href="http://www.st.com/resource/en/application_note/DM00032987.pdf">http://www.st.com/resource/en/application_note/DM00032987.pdf</a>
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