



## 1. Description

### 1.1. Project

Project Name	L432KC_INA229
Board Name	NUCLEO-L432KC
Generated with:	STM32CubeMX 6.3.0
Date	10/22/2021

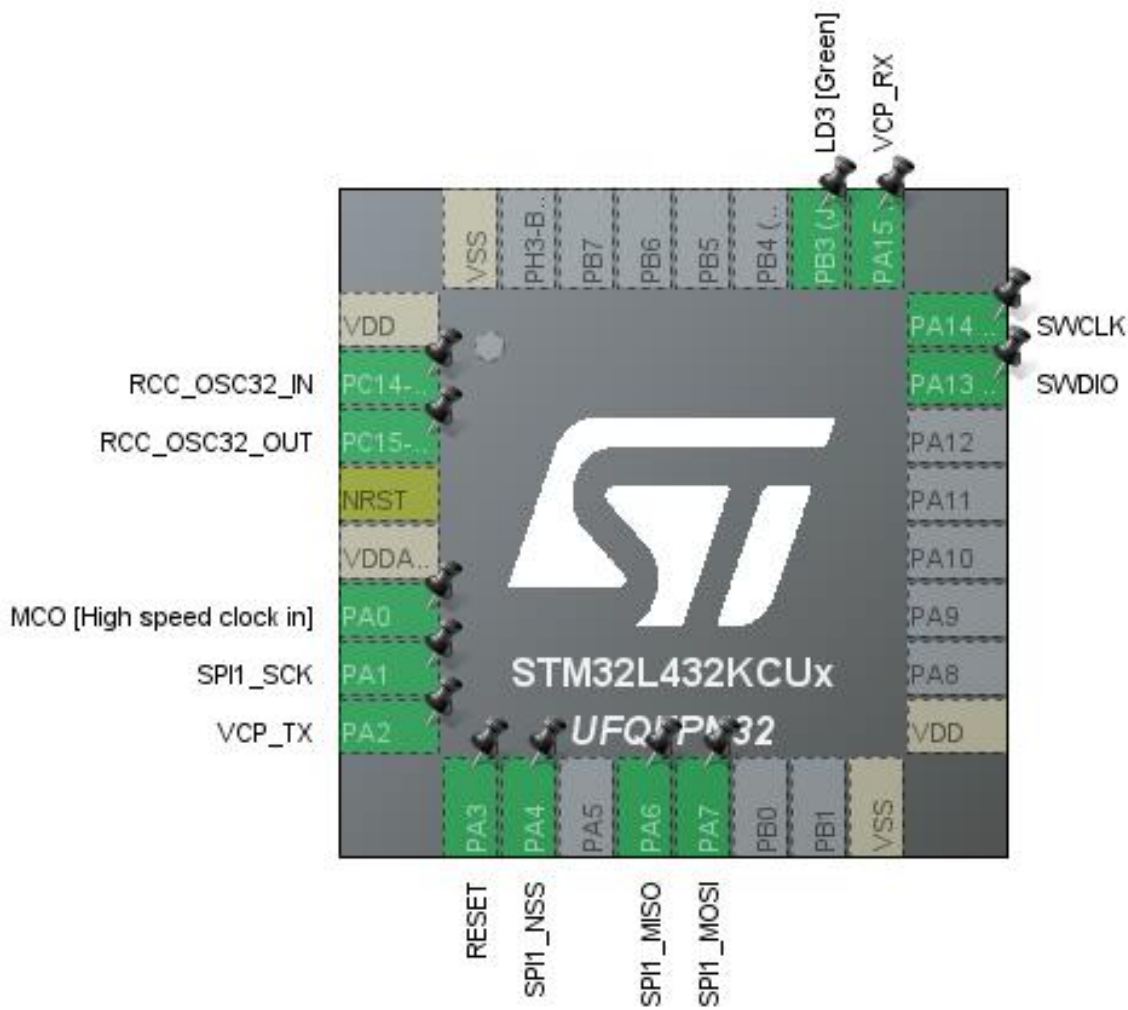
### 1.2. MCU

MCU Series	STM32L4
MCU Line	STM32L4x2
MCU name	STM32L432KCUx
MCU Package	UFQFPN32
MCU Pin number	32

### 1.3. Core(s) information

Core(s)	Arm Cortex-M4
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## 2. Pinout Configuration

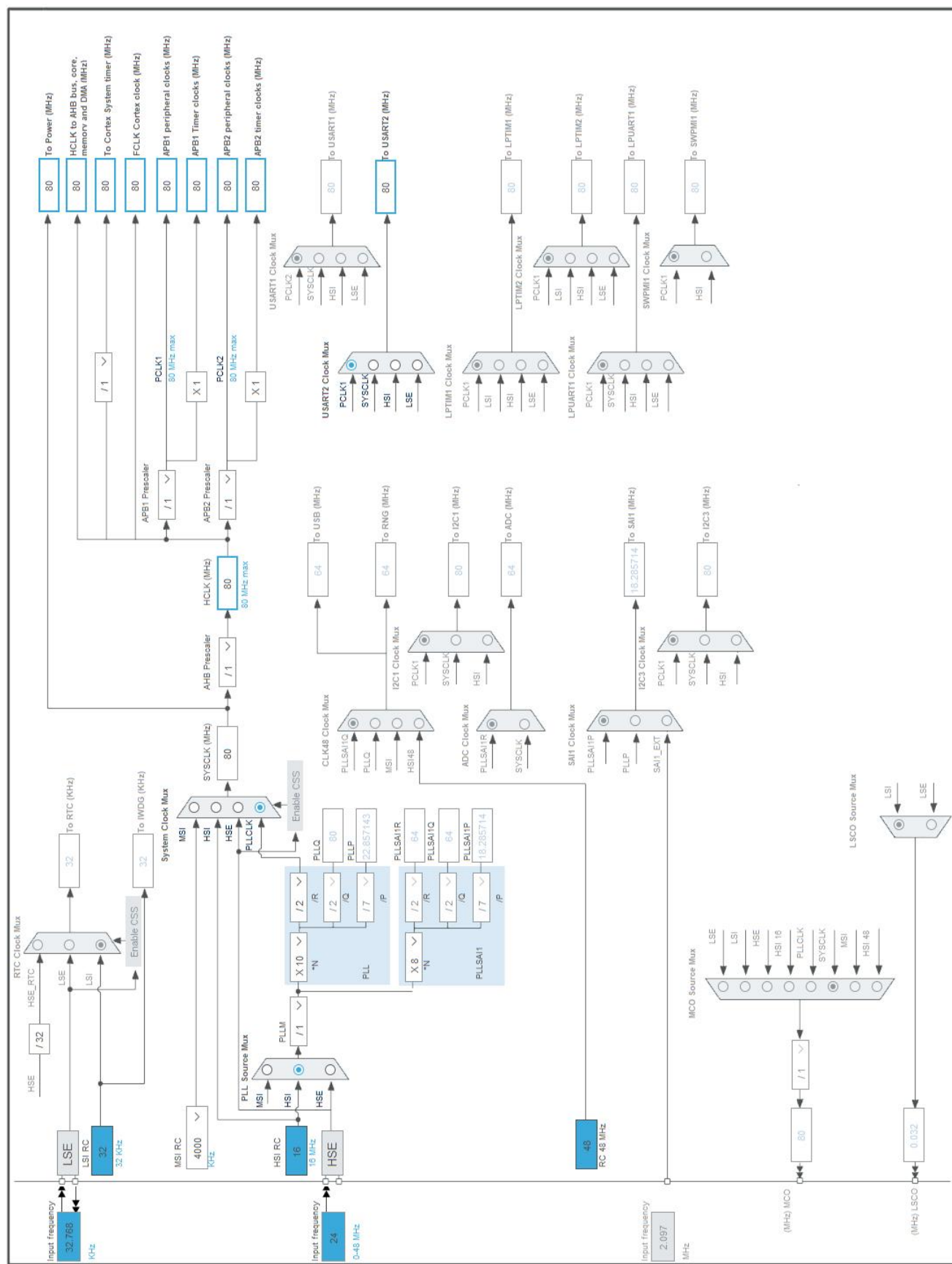


### 3. Pins Configuration

Pin Number UFQFPN32	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
1	VDD	Power		
2	PC14-OSC32_IN (PC14)	I/O	RCC_OSC32_IN	
3	PC15-OSC32_OUT (PC15)	I/O	RCC_OSC32_OUT	
4	NRST	Reset		
5	VDDA/VREF+	Power		
6	PA0	I/O	RCC_CK_IN	MCO [High speed clock in]
7	PA1	I/O	SPI1_SCK	
8	PA2	I/O	USART2_TX	VCP_TX
9	PA3 *	I/O	GPIO_Output	RESET
10	PA4 *	I/O	GPIO_Output	SPI1_NSS
12	PA6	I/O	SPI1_MISO	
13	PA7	I/O	SPI1_MOSI	
16	VSS	Power		
17	VDD	Power		
23	PA13 (JTMS-SWDIO)	I/O	SYS_JTMS-SWDIO	SWDIO
24	PA14 (JTCK-SWCLK)	I/O	SYS_JTCK-SWCLK	SWCLK
25	PA15 (JTDI)	I/O	USART2_RX	VCP_RX
26	PB3 (JTDO-TRACESWO) *	I/O	GPIO_Output	LD3 [Green]
32	VSS	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	L432KC_INA229
Project Folder	C:\Users\bakiev\Junk_Yard\PRO\ARM\L432KC_INA229
Toolchain / IDE	Makefile
Firmware Package Name and Version	STM32Cube FW_L4 V1.17.0
Application Structure	Advanced
Generate Under Root	No
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	Yes
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	Peripheral Instance Name
1	MX_GPIO_Init	GPIO
2	SystemClock_Config	RCC
3	MX_USART2_UART_Init	USART2
4	MX_DMA_Init	DMA
5	MX_SPI1_Init	SPI1
6	MX_TIM6_Init	TIM6

## 6. Power Consumption Calculator report

### 6.1. Microcontroller Selection

Series	STM32L4
Line	STM32L4x2
MCU	STM32L432KCUx
Datasheet	DS11451_Rev2

### 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

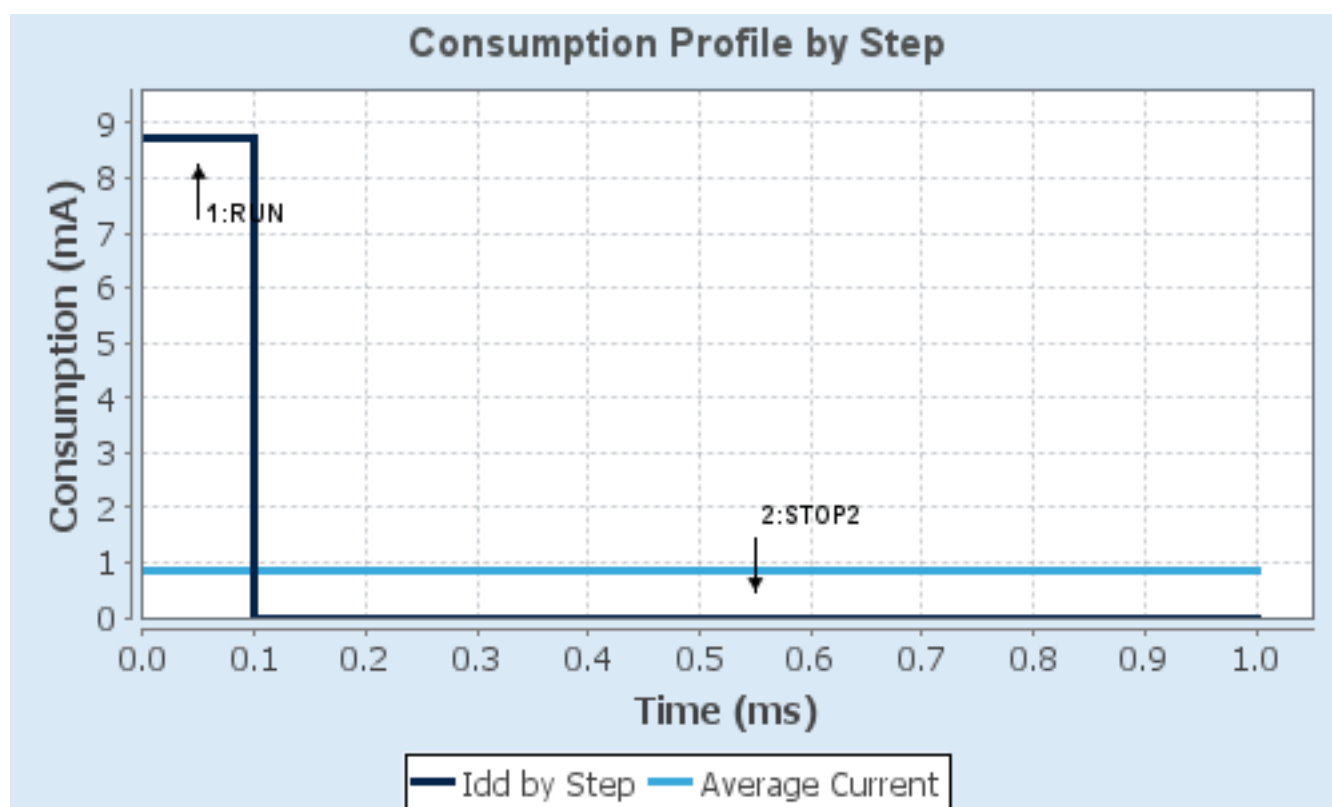
<b>Step</b>	Step1	Step2
<b>Mode</b>	RUN	STOP2
<b>Vdd</b>	3.0	3.0
<b>Voltage Source</b>	Battery	Battery
<b>Range</b>	Range1-High	NoRange
<b>Fetch Type</b>	SRAM2	n/a
<b>CPU Frequency</b>	80 MHz	0 Hz
<b>Clock Configuration</b>	HSE BYP PLL	ALL CLOCKS OFF
<b>Clock Source Frequency</b>	4 MHz	0 Hz
<b>Peripherals</b>		
<b>Additional Cons.</b>	0 mA	0 mA
<b>Average Current</b>	8.71 mA	1.06 $\mu$ A
<b>Duration</b>	0.1 ms	0.9 ms
<b>DMIPS</b>	100.0	0.0
<b>Ta Max</b>	103.98	105
<b>Category</b>	In DS Table	In DS Table

#### 6.5. Results

Sequence Time	1 ms	Average Current	871.95 $\mu$ A
Battery Life	5 months, 9 days, 16 hours	Average DMIPS	100.0 DMIPS

#### 6.6. Chart





## 7. *Peripherals and Middlewares Configuration*

### 7.1. RCC

**mode: High Speed Clock (HSE)**

**Low Speed Clock (LSE) : Crystal/Ceramic Resonator**

#### 7.1.1. Parameter Settings:

##### **System Parameters:**

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

##### **RCC Parameters:**

HSI Calibration Value	16
MSI Calibration Value	0
MSI Auto Calibration	Disabled
HSE Startup Timeout Value (ms)	100
LSE Startup Timeout Value (ms)	5000

##### **Power Parameters:**

Power Regulator Voltage Scale	Power Regulator Voltage Scale 1
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### 7.2. SPI1

**Mode: Full-Duplex Master**

#### 7.2.1. Parameter Settings:

##### **Basic Parameters:**

Frame Format	Motorola
Data Size	<b>8 Bits *</b>
First Bit	MSB First

##### **Clock Parameters:**

Prescaler (for Baud Rate)	<b>8 *</b>
Baud Rate	<b>10.0 MBits/s *</b>
Clock Polarity (CPOL)	<b>High *</b>
Clock Phase (CPHA)	<b>2 Edge *</b>

##### **Advanced Parameters:**

CRC Calculation	Disabled
NSS Signal Type	Software

### 7.3. SYS

**Debug: Serial Wire**

**Timebase Source: SysTick**

### 7.4. TIM6

**mode: Activated**

#### 7.4.1. Parameter Settings:

##### **Counter Settings:**

Prescaler (PSC - 16 bits value)	<b>79 *</b>
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value )	<b>200 *</b>
auto-reload preload	<b>Enable *</b>

##### **Trigger Output (TRGO) Parameters:**

Trigger Event Selection	<b>Enable (CNT_EN) *</b>
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### 7.5. USART2

**Mode: Asynchronous**

#### 7.5.1. 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**

## 8. System Configuration

### 8.1. GPIO configuration

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
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	
	PA0	RCC_CLK_IN	n/a	n/a	n/a	MCO [High speed clock in]
SPI1	PA1	SPI1_SCK	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	
	PA6	SPI1_MISO	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	
	PA7	SPI1_MOSI	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	
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
USART2	PA2	USART2_TX	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	VCP_TX
	PA15 (JTDI)	USART2_RX	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	VCP_RX
GPIO	PA3	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	RESET
	PA4	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	SPI1_NSS
	PB3 (JTDO-TRACESW0)	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LD3 [Green]

## 8.2. DMA configuration

DMA request	Stream	Direction	Priority
USART2_TX	DMA1_Channel7	Memory To Peripheral	Low
SPI1_RX	DMA1_Channel2	Peripheral To Memory	Low
SPI1_TX	DMA1_Channel3	Memory To Peripheral	Low

### USART2\_TX: DMA1\_Channel7 DMA request Settings:

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

### SPI1\_RX: DMA1\_Channel2 DMA request Settings:

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

### SPI1\_TX: DMA1\_Channel3 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 channel2 global interrupt	true	0	0
DMA1 channel3 global interrupt	true	0	0
DMA1 channel7 global interrupt	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		
SPI1 global interrupt	unused		
USART2 global interrupt	unused		
TIM6 global interrupt, DAC channel1 and channel2 underrun error interrupts	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	false	true	false
Hard fault interrupt	false	true	false
Memory management fault	false	true	false
Prefetch fault, memory access fault	false	true	false
Undefined instruction or illegal state	false	true	false
System service call via SWI instruction	false	true	false
Debug monitor	false	true	false
Pendable request for system service	false	true	false
System tick timer	false	true	true
DMA1 channel2 global interrupt	false	true	true
DMA1 channel3 global interrupt	false	true	true
DMA1 channel7 global interrupt	false	true	true

**\* User modified value**



## 9. System Views

### 9.1. Category view

#### 9.1.1. Current

Middleware						
System Core	Analog	Timers	Connectivity	Multimedia	Security	Computing
DMA ✓		TIM6 ✓	SPI1 ✓			
GPIO ✓			USART2 ✓			
NVIC ✓						
RCC ✓						
SYS ✓						

## 10. Docs & Resources

Type	Link
Datasheet	<a href="http://www.st.com/resource/en/datasheet/DM00257205.pdf">http://www.st.com/resource/en/datasheet/DM00257205.pdf</a>
Reference manual	<a href="http://www.st.com/resource/en/reference_manual/DM00151940.pdf">http://www.st.com/resource/en/reference_manual/DM00151940.pdf</a>
Programming manual	<a href="http://www.st.com/resource/en/programming_manual/DM00046982.pdf">http://www.st.com/resource/en/programming_manual/DM00046982.pdf</a>
Errata sheet	<a href="http://www.st.com/resource/en/errata_sheet/DM00218221.pdf">http://www.st.com/resource/en/errata_sheet/DM00218221.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/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>
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