
STM32
CubeMX

1. Description

1.1. Project

Project Name	J20ReceiverBaseSTM32F0
Board Name	custom
Generated with:	STM32CubeMX 6.0.1
Date	08/28/2020

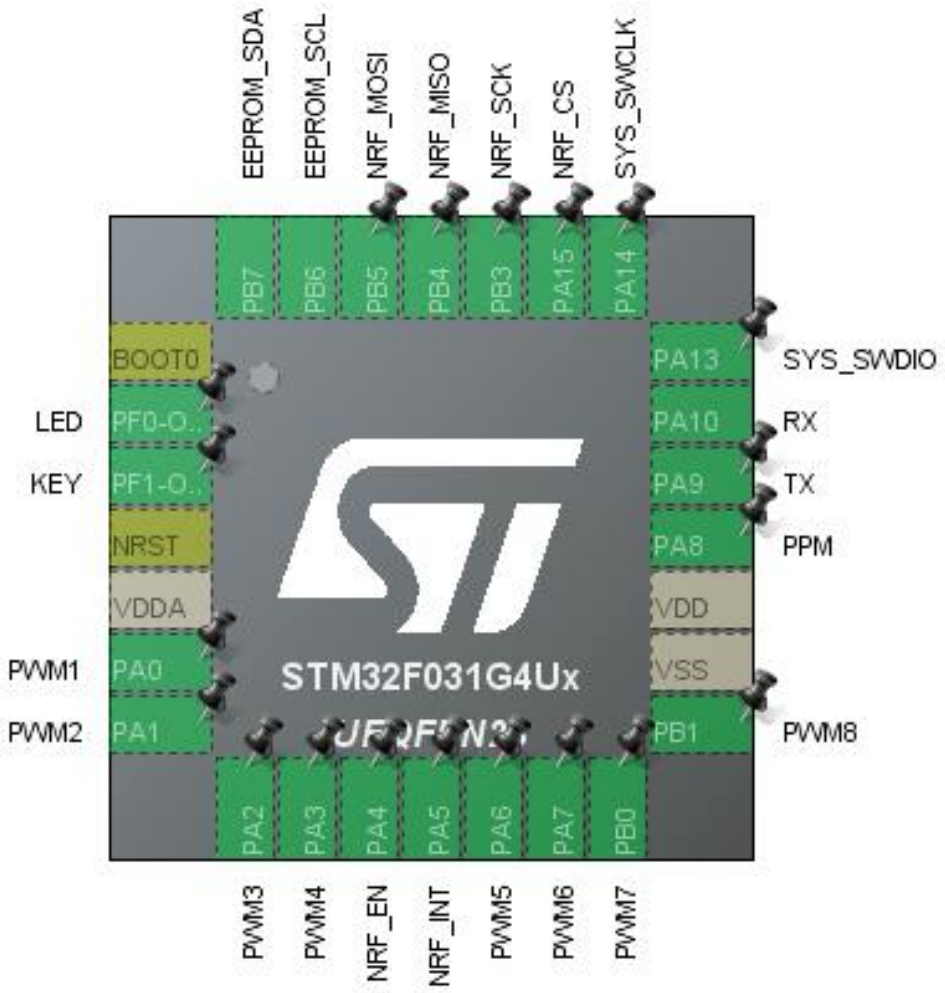
1.2. MCU

MCU Series	STM32F0
MCU Line	STM32F0x1
MCU name	STM32F031G4Ux
MCU Package	UFQFPN28
MCU Pin number	28

1.3. Core(s) information

Core(s)	Arm Cortex-M0

2. Pinout Configuration

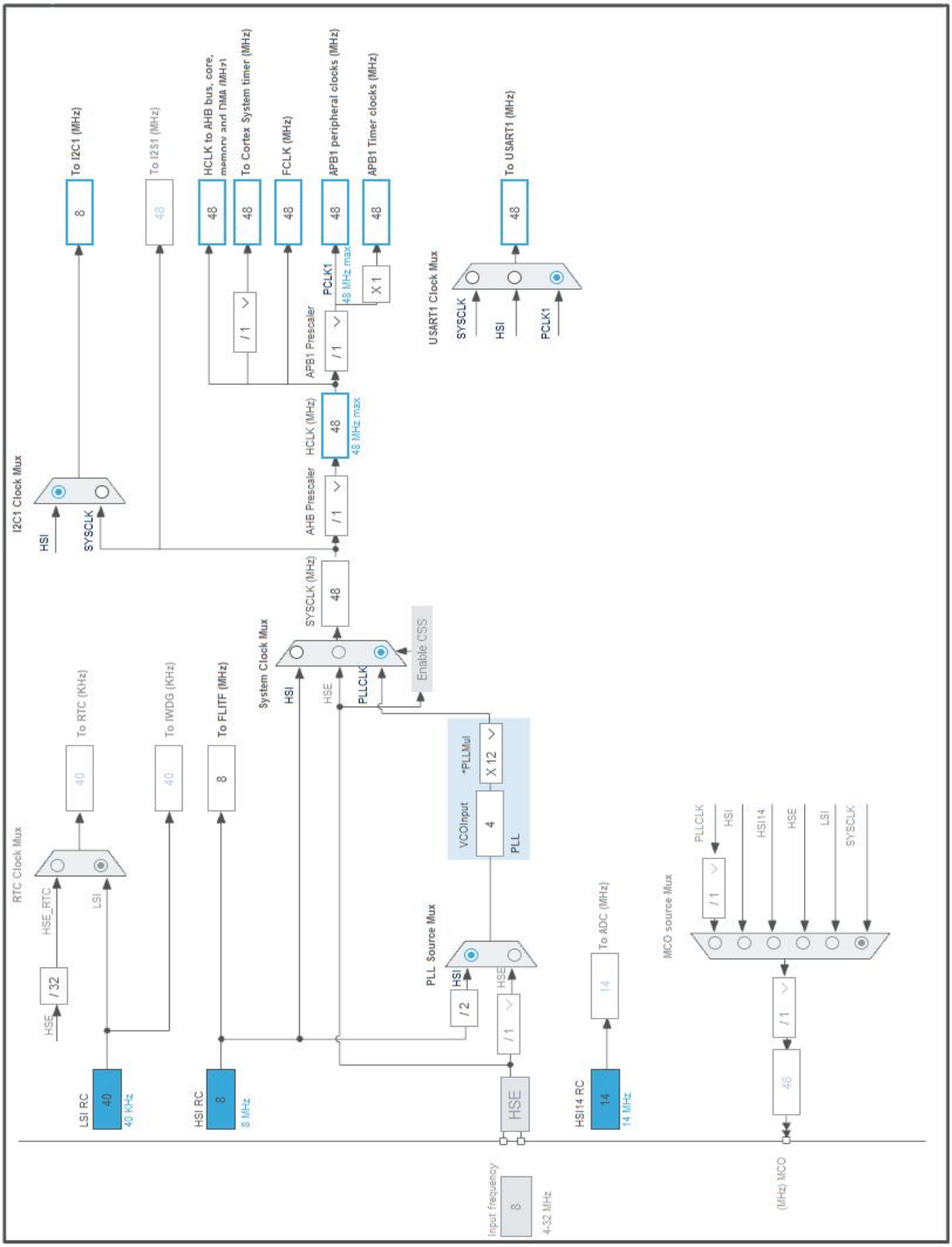


3. Pins Configuration

Pin Number UFQFPN28	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
1	BOOT0	Boot		
2	PF0-OSC_IN *	I/O	GPIO_Output	LED
3	PF1-OSC_OUT	I/O	GPIO_EXTI1	KEY
4	NRST	Reset		
5	VDDA	Power		
6	PA0	I/O	TIM2_CH1	PWM1
7	PA1	I/O	TIM2_CH2	PWM2
8	PA2	I/O	TIM2_CH3	PWM3
9	PA3	I/O	TIM2_CH4	PWM4
10	PA4 *	I/O	GPIO_Output	NRF_EN
11	PA5	I/O	GPIO_EXTI5	NRF_INT
12	PA6	I/O	TIM3_CH1	PWM5
13	PA7	I/O	TIM3_CH2	PWM6
14	PB0	I/O	TIM3_CH3	PWM7
15	PB1	I/O	TIM3_CH4	PWM8
16	VSS	Power		
17	VDD	Power		
18	PA8	I/O	TIM1_CH1	PPM
19	PA9	I/O	USART1_TX	TX
20	PA10	I/O	USART1_RX	RX
21	PA13	I/O	SYS_SWDIO	
22	PA14	I/O	SYS_SWCLK	
23	PA15 *	I/O	GPIO_Output	NRF_CS
24	PB3	I/O	SPI1_SCK	NRF_SCK
25	PB4	I/O	SPI1_MISO	NRF_MISO
26	PB5	I/O	SPI1_MOSI	NRF_MOSI
27	PB6	I/O	I2C1_SCL	EEPROM_SCL
28	PB7	I/O	I2C1_SDA	EEPROM_SDA

* The pin is affected with an I/O function

4. Clock Tree Configuration



5. Software Project

5.1. Project Settings

Name	Value
Project Name	J20ReceiverBaseSTM32F0
Project Folder	D:\1_STM32_project\J20ReceiverBaseSTM32F0
Toolchain / IDE	MDK-ARM V5.27
Firmware Package Name and Version	STM32Cube FW_F0 V1.11.0
Application Structure	Basic
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 all used libraries into the project folder
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_I2C1_Init	I2C1
5	MX_SPI1_Init	SPI1
6	MX_TIM1_Init	TIM1
7	MX_TIM2_Init	TIM2
8	MX_TIM3_Init	TIM3
9	MX_USART1_UART_Init	USART1
10	MX_TIM17_Init	TIM17

6. Power Consumption Calculator report

6.1. Microcontroller Selection

Series	STM32F0
Line	STM32F0x1
MCU	STM32F031G4Ux
Datasheet	DS10111_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

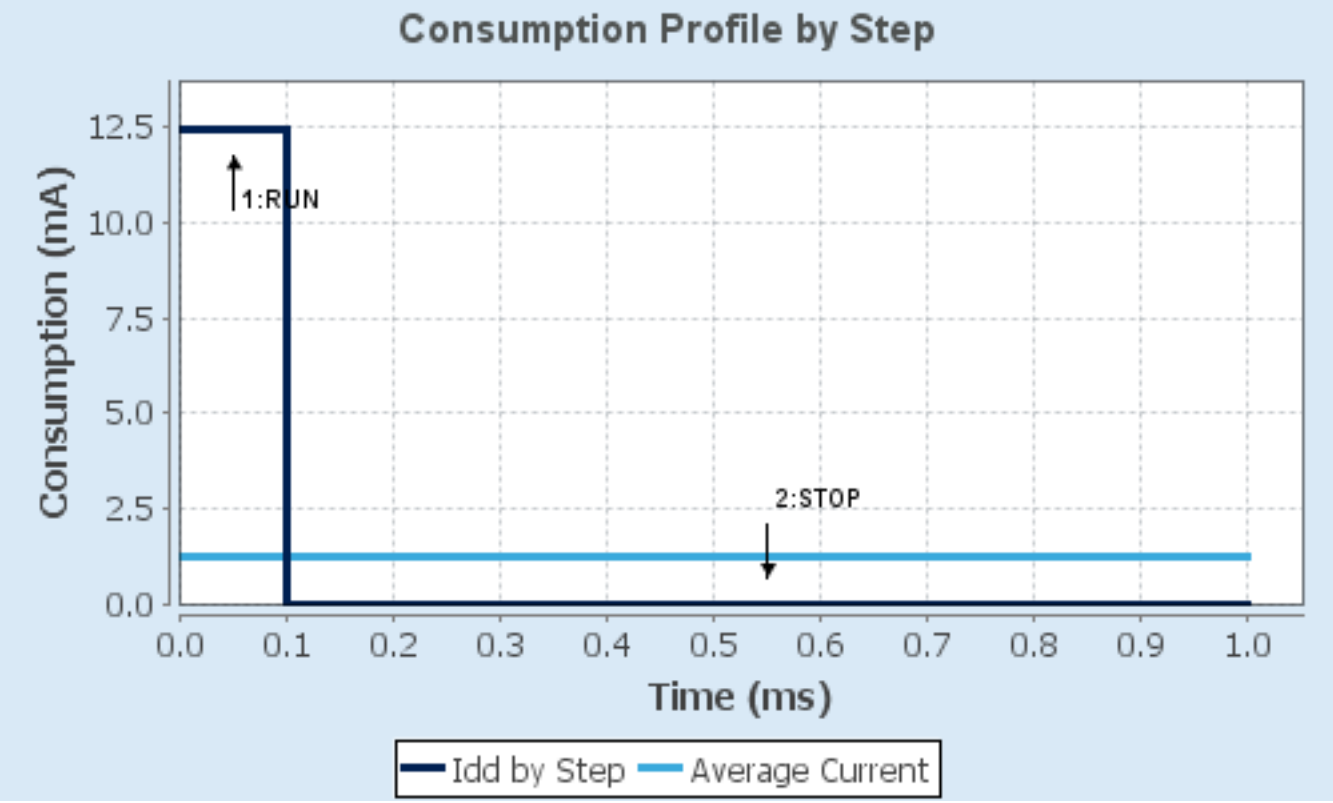
6.4. Sequence

Step	Step1	Step2
Mode	RUN	STOP
Vdd	3.6	3.6
Voltage Source	Battery	Battery
Range	No Scale	No Scale
Fetch Type	FLASH	n/a
CPU Frequency	48 MHz	0 Hz
Clock Configuration	HSE PLL	Regulator_LP
Clock Source Frequency	8 MHz	0 Hz
Peripherals		
Additional Cons.	0 mA	0 mA
Average Current	12.45 mA	6.6 µA
Duration	0.1 ms	0.9 ms
DMIPS	0.0	0.0
Ta Max	99.71	105
Category	In DS Table	In DS Table

6.5. Results

Sequence Time	1 ms	Average Current	1.25 mA
Battery Life	3 months, 21 days, 15 hours	Average DMIPS	0.0 DMIPS

6.6. Chart


Consumption Profile by Step
Consumption (mA)
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:

Timing configuration:

I2C Speed Mode	**Fast Mode ***
I2C Speed Frequency (KHz)	400
Rise Time (ns)	0
Fall Time (ns)	0
Coefficient of Digital Filter	0
Analog Filter	Enabled
Timing	**0x0000020B ***

Slave Features:

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

7.3. RCC

7.3.1. Parameter Settings:

System Parameters:

VDD voltage (V)	3.3
Prefetch Buffer	Enabled
Flash Latency(WS)	1 WS (2 CPU cycle)

RCC Parameters:

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

7.4. SPI1

Mode: Full-Duplex Master

7.4.1. Parameter Settings:

Basic Parameters:

Frame Format	Motorola
Data Size	**8 Bits ***
First Bit	MSB First

Clock Parameters:

Prescaler (for Baud Rate)	**8 ***
Baud Rate	**6.0 MBits/s ***
Clock Polarity (CPOL)	Low
Clock Phase (CPHA)	1 Edge

Advanced Parameters:

CRC Calculation	Disabled
NSSP Mode	Enabled
NSS Signal Type	Software

7.5. SYS

mode: Debug Serial Wire

Timebase Source: SysTick

7.6. TIM1

Channel1: PWM Generation CH1

7.6.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	**47 ***
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	**1500 ***
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)	**500 ***
Output compare preload	Enable
Fast Mode	Disable
CH Polarity	**Low ***
CH Idle State	Reset

7.7. TIM2

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)	**47 ***
Counter Mode	Up
Counter Period (AutoReload Register - 32 bits value)	**20000 ***
Internal Clock Division (CKD)	No Division
auto-reload preload	**Enable ***

Trigger Output (TRGO) Parameters:

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

PWM Generation Channel 1:

Mode	PWM mode 1
Pulse (32 bits value)	**1500 ***
Output compare preload	Enable
Fast Mode	Disable
CH Polarity	High

PWM Generation Channel 2:

Mode	PWM mode 1

Pulse (32 bits value)	**1500 ***
Output compare preload	Enable
Fast Mode	Disable
CH Polarity	High

PWM Generation Channel 3:

Mode	PWM mode 1
Pulse (32 bits value)	**1500 ***
Output compare preload	Enable
Fast Mode	Disable
CH Polarity	High

PWM Generation Channel 4:

Mode	PWM mode 1
Pulse (32 bits value)	**1500 ***
Output compare preload	Enable
Fast Mode	Disable
CH Polarity	High

7.8. TIM3

Channel1: PWM Generation CH1

Channel2: PWM Generation CH2

Channel3: PWM Generation CH3

Channel4: PWM Generation CH4

7.8.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	**47 ***
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	**20000 ***
Internal Clock Division (CKD)	No Division
auto-reload preload	**Enable ***

Trigger Output (TRGO) Parameters:

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

PWM Generation Channel 1:

Mode	PWM mode 1
Pulse (16 bits value)	**1500 ***
Output compare preload	Enable
Fast Mode	Disable

CH Polarity	High

PWM Generation Channel 2:

Mode	PWM mode 1
Pulse (16 bits value)	**1500 ***
Output compare preload	Enable
Fast Mode	Disable
CH Polarity	High

PWM Generation Channel 3:

Mode	PWM mode 1
Pulse (16 bits value)	**1500 ***
Output compare preload	Enable
Fast Mode	Disable
CH Polarity	High

PWM Generation Channel 4:

Mode	PWM mode 1
Pulse (16 bits value)	**1500 ***
Output compare preload	Enable
Fast Mode	Disable
CH Polarity	High

7.9. TIM17

mode: Activated

7.9.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	**47999 ***
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	**9 ***
Internal Clock Division (CKD)	No Division
Repetition Counter (RCR - 8 bits value)	0
auto-reload preload	**Enable ***

7.10. USART1

Mode: Asynchronous

7.10.1. Parameter Settings:

Basic Parameters:

Baud Rate	**100000 ***
Word Length	**9 Bits (including Parity) ***
Parity	**Even ***
Stop Bits	**2 ***

Advanced Parameters:

Data Direction	Receive and Transmit
Over Sampling	16 Samples
Single Sample	**Enable ***

Advanced Features:

Auto Baudrate	Disable
TX Pin Active Level Inversion	**Enable ***
RX Pin Active Level Inversion	**Enable ***
Data Inversion	Disable
TX and RX Pins Swapping	**Enable ***
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
I2C1	PB6	I2C1_SCL	Alternate Function Open Drain	Pull-up	**High ***	EEPROM_SCL
	PB7	I2C1_SDA	Alternate Function Open Drain	Pull-up	**High ***	EEPROM_SDA
SPI1	PB3	SPI1_SCK	Alternate Function Push Pull	No pull-up and no pull-down	**High ***	NRF_SCK
	PB4	SPI1_MISO	Alternate Function Push Pull	No pull-up and no pull-down	**High ***	NRF_MISO
	PB5	SPI1_MOSI	Alternate Function Push Pull	No pull-up and no pull-down	**High ***	NRF_MOSI
SYS	PA13	SYS_SWDIO	n/a	n/a	n/a	
	PA14	SYS_SWCLK	n/a	n/a	n/a	
TIM1	PA8	TIM1_CH1	Alternate Function Push Pull	**Pull-up ***	Low	PPM
TIM2	PA0	TIM2_CH1	Alternate Function Push Pull	No pull-up and no pull-down	Low	PWM1
	PA1	TIM2_CH2	Alternate Function Push Pull	No pull-up and no pull-down	Low	PWM2
	PA2	TIM2_CH3	Alternate Function Push Pull	No pull-up and no pull-down	Low	PWM3
	PA3	TIM2_CH4	Alternate Function Push Pull	No pull-up and no pull-down	Low	PWM4
TIM3	PA6	TIM3_CH1	Alternate Function Push Pull	No pull-up and no pull-down	Low	PWM5
	PA7	TIM3_CH2	Alternate Function Push Pull	No pull-up and no pull-down	Low	PWM6
	PB0	TIM3_CH3	Alternate Function Push Pull	No pull-up and no pull-down	Low	PWM7
	PB1	TIM3_CH4	Alternate Function Push Pull	No pull-up and no pull-down	Low	PWM8
USART1	PA9	USART1_TX	Alternate Function Push Pull	No pull-up and no pull-down	**High ***	TX
	PA10	USART1_RX	Alternate Function Push Pull	No pull-up and no pull-down	**High ***	RX
GPIO	PF0-OSC_IN	GPIO_Output	Output Push Pull	**Pull-up ***	Low	LED
	PF1-OSC_OUT	GPIO_EXTI1	**External Interrupt Mode with Falling edge trigger detection**	**Pull-up ***	n/a	KEY
	PA4	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	NRF_EN
	PA5	GPIO_EXTI5	External Interrupt Mode with Rising edge trigger detection	No pull-up and no pull-down	n/a	NRF_INT
	PA15	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	NRF_CS

8.2. DMA configuration

DMA request	Stream	Direction	Priority
TIM1_CH1	DMA1_Channel2	Memory To Peripheral	**Medium ***

TIM1_CH1: DMA1_Channel2 DMA request Settings:

Mode:	**Circular ***
Peripheral Increment:	Disable
Memory Increment:	**Enable ***
Peripheral Data Width:	Half Word
Memory Data Width:	**Word ***

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
System service call via SWI instruction	true	0	0
Pendable request for system service	true	0	0
System tick timer	true	0	0
DMA1 channel 2 and 3 interrupts	true	0	0
TIM1 capture compare interrupt	true	1	0
TIM17 global interrupt	true	1	0
USART1 global interrupt / USART1 wake-up interrupt through EXTI line 25	true	2	0
PVD interrupt through EXTI line 16	unused		
Flash global interrupt	unused		
RCC global interrupt	unused		
EXTI line 0 and 1 interrupts	unused		
EXTI line 4 to 15 interrupts	unused		
TIM1 break, update, trigger and commutation interrupts	unused		
TIM2 global interrupt	unused		
TIM3 global interrupt	unused		
I2C1 event global interrupt / I2C1 wake-up interrupt through EXTI line 23	unused		
SPI1 global interrupt	unused		

8.3.2. NVIC Code generation

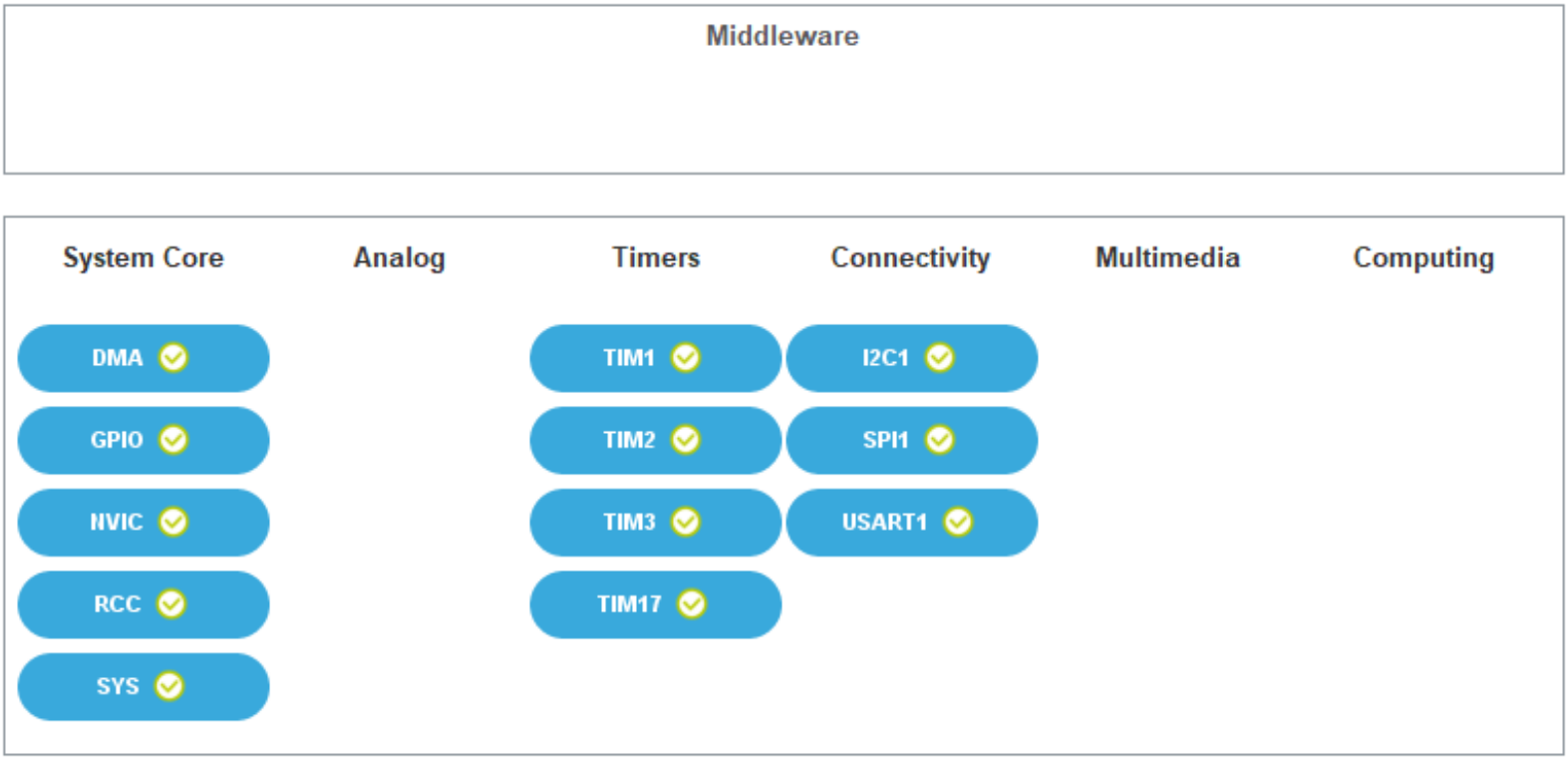
Enabled interrupt Table	Select for init sequence ordering	Generate IRQ handler	Call HAL handler
Non maskable interrupt	true	true	false
Hard fault interrupt	true	true	false
System service call via SWI instruction	true	true	false
Pendable request for system service	true	true	false
System tick timer	true	true	true
DMA1 channel 2 and 3 interrupts	true	true	true
TIM1 capture compare interrupt	true	true	true
TIM17 global interrupt	true	true	true
USART1 global interrupt / USART1 wake-up interrupt through EXTI line 25	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/DM00104043.pdf
Reference manual	http://www.st.com/resource/en/reference_manual/DM00031936.pdf
Programming manual	http://www.st.com/resource/en/programming_manual/DM00051352.pdf
Errata sheet	http://www.st.com/resource/en/errata_sheet/DM00104233.pdf
Application note	http://www.st.com/resource/en/application_note/CD00160362.pdf
Application note	http://www.st.com/resource/en/application_note/CD00167594.pdf
Application note	http://www.st.com/resource/en/application_note/CD00211314.pdf
Application note	http://www.st.com/resource/en/application_note/CD00249778.pdf
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Application note	http://www.st.com/resource/en/application_note/DM00072315.pdf
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Application note	http://www.st.com/resource/en/application_note/DM00210690.pdf
Application note	http://www.st.com/resource/en/application_note/DM00220769.pdf
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Application note	http://www.st.com/resource/en/application_note/DM00188145.pdf
Application note	http://www.st.com/resource/en/application_note/DM00327191.pdf
Application note	http://www.st.com/resource/en/application_note/DM00355687.pdf
Application note	http://www.st.com/resource/en/application_note/DM00354244.pdf
Application note	http://www.st.com/resource/en/application_note/DM00315319.pdf
Application note	http://www.st.com/resource/en/application_note/DM00380469.pdf
Application note	http://www.st.com/resource/en/application_note/DM00395696.pdf
Application note	http://www.st.com/resource/en/application_note/DM00445657.pdf
Application note	http://www.st.com/resource/en/application_note/DM00493651.pdf
Application note	http://www.st.com/resource/en/application_note/DM00483659.pdf
Application note	http://www.st.com/resource/en/application_note/DM00536349.pdf