

1. Description

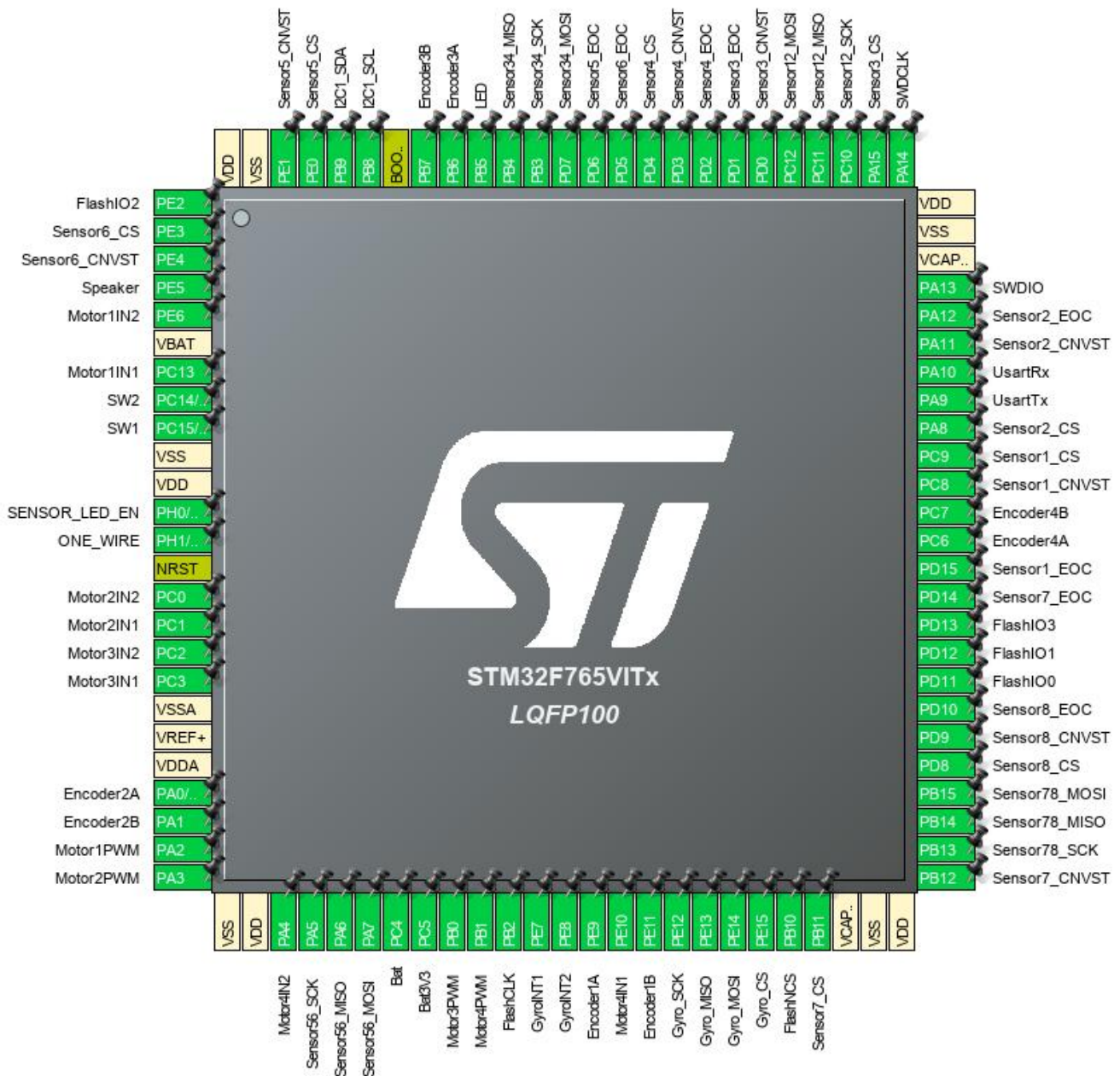
1.1. Project

Project Name	ArcticTern
Board Name	ArcticTern
Generated with:	STM32CubeMX 5.3.0
Date	09/23/2019

1.2. MCU

MCU Series	STM32F7
MCU Line	STM32F7x5
MCU name	STM32F765VITx
MCU Package	LQFP100
MCU Pin number	100

2. Pinout Configuration



3. Pins Configuration

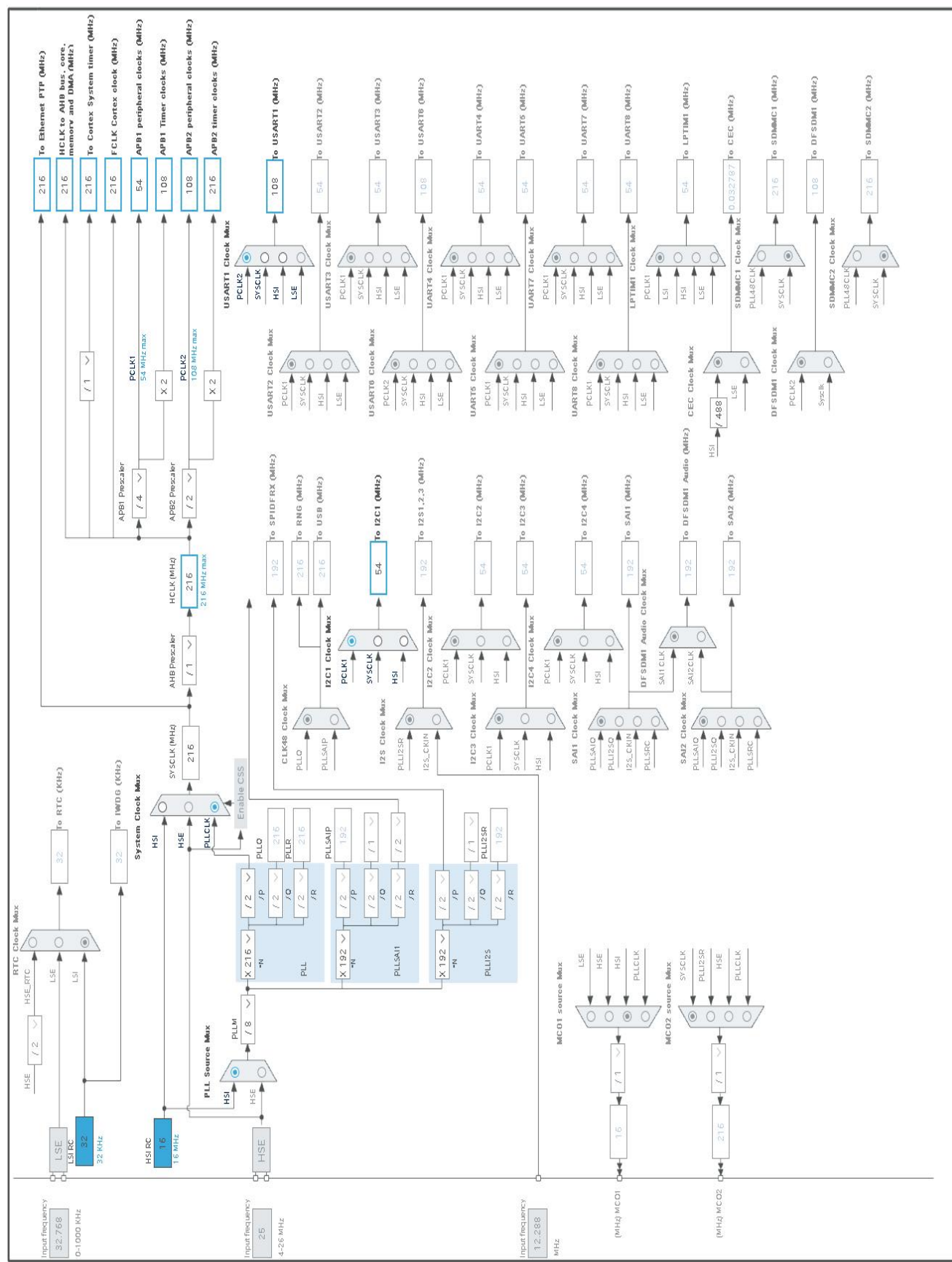
Pin Number LQFP100	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
1	PE2	I/O	QUADSPI_BK1_IO2	FlashIO2
2	PE3 *	I/O	GPIO_Output	Sensor6_CS
3	PE4 *	I/O	GPIO_Output	Sensor6_CNVST
4	PE5	I/O	TIM9_CH1	Speaker
5	PE6 *	I/O	GPIO_Output	Motor1IN2
6	VBAT	Power		
7	PC13 *	I/O	GPIO_Output	Motor1IN1
8	PC14/OSC32_IN *	I/O	GPIO_Input	SW2
9	PC15/OSC32_OUT *	I/O	GPIO_Input	SW1
10	VSS	Power		
11	VDD	Power		
12	PH0/OSC_IN *	I/O	GPIO_Output	SENSOR_LED_EN
13	PH1/OSC_OUT *	I/O	GPIO_Input	ONE_WIRE
14	NRST	Reset		
15	PC0 *	I/O	GPIO_Output	Motor2IN2
16	PC1 *	I/O	GPIO_Output	Motor2IN1
17	PC2 *	I/O	GPIO_Output	Motor3IN2
18	PC3 *	I/O	GPIO_Output	Motor3IN1
19	VSSA	Power		
20	VREF+	Power		
21	VDDA	Power		
22	PA0/WKUP	I/O	TIM5_CH1	Encoder2A
23	PA1	I/O	TIM5_CH2	Encoder2B
24	PA2	I/O	TIM2_CH3	Motor1PWM
25	PA3	I/O	TIM2_CH4	Motor2PWM
26	VSS	Power		
27	VDD	Power		
28	PA4 *	I/O	GPIO_Output	Motor4IN2
29	PA5	I/O	SPI6_SCK	Sensor56_SCK
30	PA6	I/O	SPI6_MISO	Sensor56_MISO
31	PA7	I/O	SPI6_MOSI	Sensor56_MOSI
32	PC4	I/O	ADC1_IN14	Bat
33	PC5	I/O	ADC1_IN15	Bat3V3
34	PB0	I/O	TIM3_CH3	Motor3PWM
35	PB1	I/O	TIM3_CH4	Motor4PWM
36	PB2	I/O	QUADSPI_CLK	FlashCLK

Pin Number LQFP100	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
37	PE7	I/O	GPIO_EXTI7	GyroINT1
38	PE8	I/O	GPIO_EXTI8	GyroINT2
39	PE9	I/O	TIM1_CH1	Encoder1A
40	PE10 *	I/O	GPIO_Output	Motor4IN1
41	PE11	I/O	TIM1_CH2	Encoder1B
42	PE12	I/O	SPI4_SCK	Gyro_SCK
43	PE13	I/O	SPI4_MISO	Gyro_MISO
44	PE14	I/O	SPI4_MOSI	Gyro_MOSI
45	PE15 *	I/O	GPIO_Output	Gyro_CS
46	PB10	I/O	QUADSPI_BK1_NCS	FlashNCS
47	PB11 *	I/O	GPIO_Output	Sensor7_CS
48	VCAP_1	Power		
49	VSS	Power		
50	VDD	Power		
51	PB12 *	I/O	GPIO_Output	Sensor7_CNVST
52	PB13	I/O	SPI2_SCK	Sensor78_SCK
53	PB14	I/O	SPI2_MISO	Sensor78_MISO
54	PB15	I/O	SPI2_MOSI	Sensor78_MOSI
55	PD8 *	I/O	GPIO_Output	Sensor8_CS
56	PD9 *	I/O	GPIO_Output	Sensor8_CNVST
57	PD10	I/O	GPIO_EXTI10	Sensor8_EOC
58	PD11	I/O	QUADSPI_BK1_IO0	FlashIO0
59	PD12	I/O	QUADSPI_BK1_IO1	FlashIO1
60	PD13	I/O	QUADSPI_BK1_IO3	FlashIO3
61	PD14	I/O	GPIO_EXTI14	Sensor7_EOC
62	PD15	I/O	GPIO_EXTI15	Sensor1_EOC
63	PC6	I/O	TIM8_CH1	Encoder4A
64	PC7	I/O	TIM8_CH2	Encoder4B
65	PC8 *	I/O	GPIO_Output	Sensor1_CNVST
66	PC9 *	I/O	GPIO_Output	Sensor1_CS
67	PA8 *	I/O	GPIO_Output	Sensor2_CS
68	PA9	I/O	USART1_TX	UsartTx
69	PA10	I/O	USART1_RX	UsartRx
70	PA11 *	I/O	GPIO_Output	Sensor2_CNVST
71	PA12	I/O	GPIO_EXTI12	Sensor2_EOC
72	PA13	I/O	SYS_JTMS-SWDIO	SWDIO
73	VCAP_2	Power		
74	VSS	Power		
75	VDD	Power		

Pin Number LQFP100	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
76	PA14	I/O	SYS_JTCK-SWCLK	SWDCLK
77	PA15 *	I/O	GPIO_Output	Sensor3_CS
78	PC10	I/O	SPI3_SCK	Sensor12_SCK
79	PC11	I/O	SPI3_MISO	Sensor12_MISO
80	PC12	I/O	SPI3_MOSI	Sensor12_MOSI
81	PD0 *	I/O	GPIO_Output	Sensor3_CNVST
82	PD1	I/O	GPIO_EXTI1	Sensor3_EOC
83	PD2	I/O	GPIO_EXTI2	Sensor4_EOC
84	PD3 *	I/O	GPIO_Output	Sensor4_CNVST
85	PD4 *	I/O	GPIO_Output	Sensor4_CS
86	PD5	I/O	GPIO_EXTI5	Sensor6_EOC
87	PD6	I/O	GPIO_EXTI6	Sensor5_EOC
88	PD7	I/O	SPI1_MOSI	Sensor34_MOSI
89	PB3	I/O	SPI1_SCK	Sensor34_SCK
90	PB4	I/O	SPI1_MISO	Sensor34_MISO
91	PB5 *	I/O	GPIO_Output	LED
92	PB6	I/O	TIM4_CH1	Encoder3A
93	PB7	I/O	TIM4_CH2	Encoder3B
94	BOOT0	Boot		
95	PB8	I/O	I2C1_SCL	
96	PB9	I/O	I2C1_SDA	
97	PE0 *	I/O	GPIO_Output	Sensor5_CS
98	PE1 *	I/O	GPIO_Output	Sensor5_CNVST
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	ArcticTern
Project Folder	/home/nonoho/ownCloud/MicroMouse/product/ArcticTern/STM32CubeMX/ArcticT
Toolchain / IDE	Makefile
Firmware Package Name and Version	STM32Cube FW_F7 V1.15.0

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	STM32F7
Line	STM32F7x5
MCU	STM32F765VITx
Datasheet	029041_Rev4

6.2. Parameter Selection

Temperature	25
Vdd	3.3

7. IPs and Middleware Configuration

7.1. ADC1

mode: IN14

mode: IN15

7.1.1. Parameter Settings:

ADCs_Common_Settings:

Mode Independent mode

ADC_Settings:

Clock Prescaler PCLK2 divided by 4

Resolution 12 bits (15 ADC Clock cycles)

Data Alignment Right alignment

Scan Conversion Mode Enabled

Continuous Conversion Mode **Enabled ***

Discontinuous Conversion Mode Disabled

DMA Continuous Requests Disabled

End Of Conversion Selection EOC flag at the end of single channel conversion

ADC_Regular_ConversionMode:

Number Of Conversion 1

External Trigger Conversion Source Regular Conversion launched by software

External Trigger Conversion Edge None

Rank 1

Channel **Channel 15 ***

Sampling Time 3 Cycles

ADC_Injected_ConversionMode:

Number Of Conversions **2 ***

External Trigger Source Injected Conversion launched by software

External Trigger Edge None

Injected Conversion Mode None

Injected Rank 1

Channel Channel 14

Sampling Time **28 Cycles ***

Injected Offset 0

Injected Rank 1

Channel **Channel 15 ***

Sampling Time **28 Cycles ***

Injected Offset 0

WatchDog:

Enable Analog WatchDog Mode false

7.2. CORTEX_M7

7.2.1. Parameter Settings:

Cortex Interface Settings:

Flash Interface	AXI Interface
ART ACCELERATOR	Disabled
Instruction Prefetch	Disabled
CPU ICache	Disabled
CPU DCache	Disabled

Cortex Memory Protection Unit Control Settings:

MPU Control Mode	MPU NOT USED
------------------	--------------

7.3. I2C1

I2C: I2C

7.3.1. Parameter Settings:

Timing configuration:

I2C Speed Mode	Standard Mode
I2C Speed Frequency (KHz)	100
Rise Time (ns)	0
Fall Time (ns)	0
Coefficient of Digital Filter	0
Analog Filter	Enabled
Timing	0x20404768 *

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

7.4. QUADSPI

QuadSPI Mode: Bank1 with Quad SPI Lines

7.4.1. Parameter Settings:

General Parameters:

Clock Prescaler	2 *
Fifo Threshold	1
Sample Shifting	No Sample Shifting
Flash Size	1
Chip Select High Time	1 Cycle
Clock Mode	Low
Flash ID	Flash ID 1
Dual Flash	Disabled

7.5. SPI1

Mode: Full-Duplex Master

7.5.1. Parameter Settings:

Basic Parameters:

Frame Format	Motorola
Data Size	16 Bits *
First Bit	MSB First

Clock Parameters:

Prescaler (for Baud Rate)	8 *
Baud Rate	13.5 MBits/s *
Clock Polarity (CPOL)	High *
Clock Phase (CPHA)	2 Edge *

Advanced Parameters:

CRC Calculation	Disabled
NSS Signal Type	Software

7.6. SPI2

Mode: Full-Duplex Master

7.6.1. Parameter Settings:

Basic Parameters:

Frame Format	Motorola
Data Size	

First Bit	16 Bits * MSB First
Clock Parameters:	
Prescaler (for Baud Rate)	4 *
Baud Rate	13.5 MBits/s *
Clock Polarity (CPOL)	High *
Clock Phase (CPHA)	2 Edge *
Advanced Parameters:	
CRC Calculation	Disabled
NSS Signal Type	Software

7.7. SPI3

Mode: Full-Duplex Master

7.7.1. Parameter Settings:

Basic Parameters:	
Frame Format	Motorola
Data Size	16 Bits *
First Bit	MSB First
Clock Parameters:	
Prescaler (for Baud Rate)	4 *
Baud Rate	13.5 MBits/s *
Clock Polarity (CPOL)	High *
Clock Phase (CPHA)	2 Edge *
Advanced Parameters:	
CRC Calculation	Disabled
NSS Signal Type	Software

7.8. SPI4

Mode: Full-Duplex Master

7.8.1. Parameter Settings:

Basic Parameters:	
Frame Format	Motorola
Data Size	8 Bits *

First Bit	MSB First
Clock Parameters:	
Prescaler (for Baud Rate)	16 *
Baud Rate	6.75 MBits/s *
Clock Polarity (CPOL)	High *
Clock Phase (CPHA)	2 Edge *
Advanced Parameters:	
CRC Calculation	Disabled
NSS Signal Type	Software

7.9. SPI6

Mode: Full-Duplex Master

7.9.1. Parameter Settings:

Basic Parameters:	
Frame Format	Motorola
Data Size	16 Bits *
First Bit	MSB First
Clock Parameters:	
Prescaler (for Baud Rate)	8 *
Baud Rate	13.5 MBits/s *
Clock Polarity (CPOL)	High *
Clock Phase (CPHA)	2 Edge *
Advanced Parameters:	
CRC Calculation	Disabled
NSS Signal Type	Software

7.10. SYS

Debug: Serial Wire

Timebase Source: SysTick

7.11. TIM1

Combined Channels: Encoder Mode

7.11.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	0
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	0
Internal Clock Division (CKD)	No Division
Repetition Counter (RCR - 16 bits value)	0
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)
Trigger Event Selection TRGO2	Reset (UG bit from TIMx_EGR)

Encoder:

Encoder Mode	Encoder Mode T11
____ Parameters for Channel 1 ____	
Polarity	Rising Edge
IC Selection	Direct
Prescaler Division Ratio	No division
Input Filter	0
____ Parameters for Channel 2 ____	
Polarity	Rising Edge
IC Selection	Direct
Prescaler Division Ratio	No division
Input Filter	0

7.12. TIM2

Channel3: PWM Generation CH3

Channel4: PWM Generation CH4

7.12.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	0
Counter Mode	Up
Counter Period (AutoReload Register - 32 bits value)	0
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)

PWM Generation Channel 3:

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

PWM Generation Channel 4:

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

7.13. TIM3

Channel3: PWM Generation CH3

Channel4: PWM Generation CH4

7.13.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	0
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	0
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)

PWM Generation Channel 3:

Mode	PWM mode 1
Pulse (16 bits value)	0
Fast Mode	Disable
CH Polarity	High

PWM Generation Channel 4:

Mode	PWM mode 1
Pulse (16 bits value)	0
Fast Mode	Disable
CH Polarity	High

7.14. TIM4

Combined Channels: Encoder Mode

7.14.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	0
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	0
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)

Encoder:

Encoder Mode	Encoder Mode T11
____ Parameters for Channel 1 ____	
Polarity	Rising Edge
IC Selection	Direct
Prescaler Division Ratio	No division
Input Filter	0
____ Parameters for Channel 2 ____	
Polarity	Rising Edge
IC Selection	Direct
Prescaler Division Ratio	No division
Input Filter	0

7.15. TIM5

Combined Channels: Encoder Mode

7.15.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	0
Counter Mode	Up
Counter Period (AutoReload Register - 32 bits value)	0
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)

Encoder:

Encoder Mode	Encoder Mode T11
____ Parameters for Channel 1 ____	
Polarity	Rising Edge
IC Selection	Direct
Prescaler Division Ratio	No division
Input Filter	0
____ Parameters for Channel 2 ____	
Polarity	Rising Edge
IC Selection	Direct
Prescaler Division Ratio	No division
Input Filter	0

7.16. TIM6

mode: Activated

7.16.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	674 *
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	31 *
auto-reload preload	Disable

Trigger Output (TRGO) Parameters:

Trigger Event Selection	Reset (UG bit from TIMx_EGR)
-------------------------	------------------------------

7.17. TIM7

mode: Activated

7.17.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	134 *
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	15 *
auto-reload preload	Disable

Trigger Output (TRGO) Parameters:

Trigger Event Selection	Reset (UG bit from TIMx_EGR)
-------------------------	------------------------------

7.18. TIM8

Combined Channels: Encoder Mode

7.18.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	0
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	0
Internal Clock Division (CKD)	No Division
Repetition Counter (RCR - 16 bits value)	0
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)
Trigger Event Selection TRGO2	Reset (UG bit from TIMx_EGR)

Encoder:

Encoder Mode	Encoder Mode T11
____ Parameters for Channel 1 ____	
Polarity	Rising Edge
IC Selection	Direct
Prescaler Division Ratio	No division
Input Filter	0
____ Parameters for Channel 2 ____	
Polarity	Rising Edge
IC Selection	Direct
Prescaler Division Ratio	No division
Input Filter	0

7.19. TIM9

Channel1: PWM Generation CH1

7.19.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	31 *
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	14300 *

Internal Clock Division (CKD)	No Division
auto-reload preload	Disable
PWM Generation Channel 1:	
Mode	PWM mode 1
Pulse (16 bits value)	0
Fast Mode	Disable
CH Polarity	Low *

7.20. USART1

Mode: Asynchronous

7.20.1. 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
ADC1	PC4	ADC1_IN14	Analog mode	No pull-up and no pull-down	n/a	Bat
	PC5	ADC1_IN15	Analog mode	No pull-up and no pull-down	n/a	Bat3V3
I2C1	PB8	I2C1_SCL	Alternate Function Open Drain	Pull-up	Very High *	
	PB9	I2C1_SDA	Alternate Function Open Drain	Pull-up	Very High *	
QUADSPI	PE2	QUADSPI_BK1_IO2	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	FlashIO2
	PB2	QUADSPI_CLK	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	FlashCLK
	PB10	QUADSPI_BK1_NCS	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	FlashNCS
	PD11	QUADSPI_BK1_IO0	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	FlashIO0
	PD12	QUADSPI_BK1_IO1	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	FlashIO1
	PD13	QUADSPI_BK1_IO3	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	FlashIO3
SPI1	PD7	SPI1_MOSI	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	Sensor34_MOSI
	PB3	SPI1_SCK	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	Sensor34_SCK
	PB4	SPI1_MISO	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	Sensor34_MISO
SPI2	PB13	SPI2_SCK	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	Sensor78_SCK
	PB14	SPI2_MISO	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	Sensor78_MISO
	PB15	SPI2_MOSI	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	Sensor78_MOSI
SPI3	PC10	SPI3_SCK	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	Sensor12_SCK
	PC11	SPI3_MISO	Alternate Function Push Pull	No pull-up and no pull-down	Very High	Sensor12_MISO

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
					*	
	PC12	SPI3_MOSI	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	Sensor12_MOSI
SPI4	PE12	SPI4_SCK	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	Gyro_SCK
	PE13	SPI4_MISO	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	Gyro_MISO
	PE14	SPI4_MOSI	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	Gyro_MOSI
SPI6	PA5	SPI6_SCK	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	Sensor56_SCK
	PA6	SPI6_MISO	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	Sensor56_MISO
	PA7	SPI6_MOSI	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	Sensor56_MOSI
SYS	PA13	SYS_JTMS-SWDIO	n/a	n/a	n/a	SWDIO
	PA14	SYS_JTCK-SWCLK	n/a	n/a	n/a	SWDCLK
TIM1	PE9	TIM1_CH1	Alternate Function Push Pull	No pull-up and no pull-down	Low	Encoder1A
	PE11	TIM1_CH2	Alternate Function Push Pull	No pull-up and no pull-down	Low	Encoder1B
TIM2	PA2	TIM2_CH3	Alternate Function Push Pull	No pull-up and no pull-down	Low	Motor1PWM
	PA3	TIM2_CH4	Alternate Function Push Pull	No pull-up and no pull-down	Low	Motor2PWM
TIM3	PB0	TIM3_CH3	Alternate Function Push Pull	No pull-up and no pull-down	Low	Motor3PWM
	PB1	TIM3_CH4	Alternate Function Push Pull	No pull-up and no pull-down	Low	Motor4PWM
TIM4	PB6	TIM4_CH1	Alternate Function Push Pull	No pull-up and no pull-down	Low	Encoder3A
	PB7	TIM4_CH2	Alternate Function Push Pull	No pull-up and no pull-down	Low	Encoder3B
TIM5	PA0/WKUP	TIM5_CH1	Alternate Function Push Pull	No pull-up and no pull-down	Low	Encoder2A
	PA1	TIM5_CH2	Alternate Function Push Pull	No pull-up and no pull-down	Low	Encoder2B
TIM8	PC6	TIM8_CH1	Alternate Function Push Pull	No pull-up and no pull-down	Low	Encoder4A
	PC7	TIM8_CH2	Alternate Function Push Pull	No pull-up and no pull-down	Low	Encoder4B
TIM9	PE5	TIM9_CH1	Alternate Function Push Pull	No pull-up and no pull-down	Low	Speaker
USART1	PA9	USART1_TX	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	UsartTx
	PA10	USART1_RX	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	UsartRx
GPIO	PE3	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Sensor6_CS
	PE4	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Sensor6_CNVST
	PE6	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Motor1IN2

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
	PC13	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Motor1IN1
	PC14/OSC3_2_IN	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	SW2
	PC15/OSC3_2_OUT	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	SW1
	PH0/OSC_IN	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	SENSOR_LED_EN
	PH1/OSC_OUTPUT	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	ONE_WIRE
	PC0	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Motor2IN2
	PC1	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Motor2IN1
	PC2	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Motor3IN2
	PC3	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Motor3IN1
	PA4	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Motor4IN2
	PE7	GPIO_EXTI7	External Interrupt Mode with Rising edge trigger detection	No pull-up and no pull-down	n/a	GyroINT1
	PE8	GPIO_EXTI8	External Interrupt Mode with Rising edge trigger detection	No pull-up and no pull-down	n/a	GyroINT2
	PE10	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Motor4IN1
	PE15	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Gyro_CS
	PB11	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Sensor7_CS
	PB12	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Sensor7_CNVST
	PD8	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Sensor8_CS
	PD9	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Sensor8_CNVST
	PD10	GPIO_EXTI10	External Interrupt Mode with Rising edge trigger detection	No pull-up and no pull-down	n/a	Sensor8_EOC
	PD14	GPIO_EXTI14	External Interrupt Mode with Rising edge trigger detection	No pull-up and no pull-down	n/a	Sensor7_EOC
	PD15	GPIO_EXTI15	External Interrupt Mode with Rising edge trigger detection	No pull-up and no pull-down	n/a	Sensor1_EOC
	PC8	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Sensor1_CNVST
	PC9	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Sensor1_CS
	PA8	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Sensor2_CS
	PA11	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Sensor2_CNVST
	PA12	GPIO_EXTI12	External Interrupt Mode with Rising edge trigger detection	No pull-up and no pull-down	n/a	Sensor2_EOC
	PA15	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Sensor3_CS
	PD0	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Sensor3_CNVST
	PD1	GPIO_EXTI1	External Interrupt Mode with Rising edge trigger detection	No pull-up and no pull-down	n/a	Sensor3_EOC
	PD2	GPIO_EXTI2	External Interrupt Mode with Rising edge trigger detection	No pull-up and no pull-down	n/a	Sensor4_EOC
	PD3	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Sensor4_CNVST

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
	PD4	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Sensor4_CS
	PD5	GPIO_EXTI5	External Interrupt Mode with Rising edge trigger detection	No pull-up and no pull-down	n/a	Sensor6_EOC
	PD6	GPIO_EXTI6	External Interrupt Mode with Rising edge trigger detection	No pull-up and no pull-down	n/a	Sensor5_EOC
	PB5	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED
	PE0	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Sensor5_CS
	PE1	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	Sensor5_CNVST

8.2. DMA configuration

DMA request	Stream	Direction	Priority
I2C1_TX	DMA1_Stream6	Memory To Peripheral	Low
SPI2_RX	DMA1_Stream1	Peripheral To Memory	High *
SPI3_RX	DMA1_Stream0	Peripheral To Memory	High *
QUADSPI	DMA2_Stream2	Memory To Peripheral	Medium *
SPI1_RX	DMA2_Stream0	Peripheral To Memory	High *
SPI6_RX	DMA2_Stream6	Peripheral To Memory	High *
SPI4_RX	DMA2_Stream3	Peripheral To Memory	High *
SPI4_TX	DMA2_Stream1	Memory To Peripheral	High *
USART1_TX	DMA2_Stream7	Memory To Peripheral	Low
ADC1	DMA2_Stream4	Peripheral To Memory	Low

I2C1_TX: DMA1_Stream6 DMA request Settings:

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

SPI2_RX: DMA1_Stream1 DMA request Settings:

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

SPI3_RX: DMA1_Stream0 DMA request Settings:

Mode: **Circular ***
 Use fifo: Disable
 Peripheral Increment: Disable
 Memory Increment: **Enable ***

Peripheral Data Width: Half Word
Memory Data Width: Half Word

QUADSPI: DMA2_Stream2 DMA request Settings:

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

SPI1_RX: DMA2_Stream0 DMA request Settings:

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

SPI6_RX: DMA2_Stream6 DMA request Settings:

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

SPI4_RX: DMA2_Stream3 DMA request Settings:

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

SPI4_TX: DMA2_Stream1 DMA request Settings:

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

USART1_TX: DMA2_Stream7 DMA request Settings:

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

ADC1: DMA2_Stream4 DMA request Settings:

Mode:	Normal
Use fifo:	Disable
Peripheral Increment:	Disable
Memory Increment:	Enable *
Peripheral Data Width:	Half Word
Memory Data Width:	Half Word

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 line1 interrupt	true	3	0
EXTI line2 interrupt	true	3	0
DMA1 stream0 global interrupt	true	7	0
DMA1 stream1 global interrupt	true	7	0
DMA1 stream6 global interrupt	true	7	0
EXTI line[9:5] interrupts	true	3	0
EXTI line[15:10] interrupts	true	3	0
TIM6 global interrupt, DAC1 and DAC2 underrun error interrupts	true	1	0
TIM7 global interrupt	true	1	0
DMA2 stream0 global interrupt	true	0	0
DMA2 stream1 global interrupt	true	0	0
DMA2 stream2 global interrupt	true	0	0
DMA2 stream3 global interrupt	true	0	0
DMA2 stream4 global interrupt	true	0	0
DMA2 stream6 global interrupt	true	0	0
DMA2 stream7 global interrupt	true	0	0
PVD interrupt through EXTI line 16		unused	
Flash global interrupt		unused	
RCC global interrupt		unused	
ADC1, ADC2 and ADC3 global interrupts		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	
TIM2 global interrupt		unused	
TIM3 global interrupt		unused	
TIM4 global interrupt		unused	

Interrupt Table	Enable	Preenmption Priority	SubPriority
I2C1 event interrupt		unused	
I2C1 error interrupt		unused	
SPI1 global interrupt		unused	
SPI2 global interrupt		unused	
USART1 global interrupt		unused	
TIM8 break interrupt and TIM12 global interrupt		unused	
TIM8 update interrupt and TIM13 global interrupt		unused	
TIM8 trigger and commutation interrupts and TIM14 global interrupt		unused	
TIM8 capture compare interrupt		unused	
TIM5 global interrupt		unused	
SPI3 global interrupt		unused	
FPU global interrupt		unused	
SPI4 global interrupt		unused	
SPI6 global interrupt		unused	
QUADSPI global interrupt		unused	

* User modified value

9. Software Pack Report