1. Description

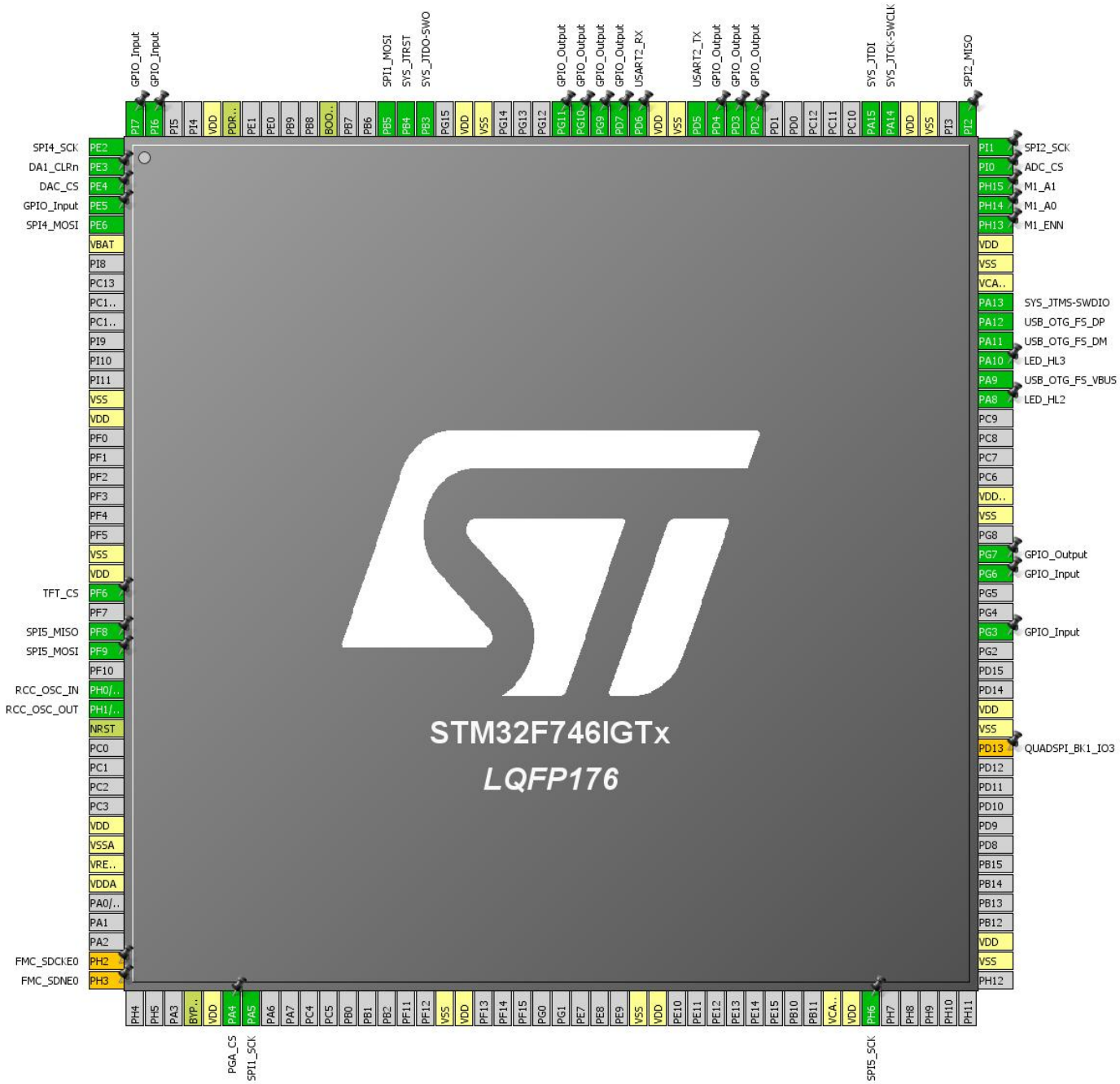
1.1. Project

Project Name	VOA_OPM
Board Name	VOA_OPM
Generated with:	STM32CubeMX 4.23.0
Date	01/22/2021

1.2. MCU

MCU Series	STM32F7
MCU Line	STM32F7x6
MCU name	STM32F746IGTx
MCU Package	LQFP176
MCU Pin number	176

2. Pinout Configuration



3. Pins Configuration

Pin Number LQFP176	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
1	PE2	I/O	SPI4_SCK	
2	PE3 *	I/O	GPIO_Output	DA1_CLRn
3	PE4 *	I/O	GPIO_Output	DAC_CS
4	PE5 *	I/O	GPIO_Input	
5	PE6	I/O	SPI4_MOSI	
6	VBAT	Power		
14	VSS	Power		
15	VDD	Power		
22	VSS	Power		
23	VDD	Power		
24	PF6 *	I/O	GPIO_Output	TFT_CS
26	PF8	I/O	SPI5_MISO	
27	PF9	I/O	SPI5_MOSI	
29	PH0/OSC_IN	I/O	RCC_OSC_IN	
30	PH1/OSC_OUT	I/O	RCC_OSC_OUT	
31	NRST	Reset		
36	VDD	Power		
37	VSSA	Power		
38	VREF+	Power		
39	VDDA	Power		
43	PH2 **	I/O	FMC_SDCKE0	
44	PH3 **	I/O	FMC_SDNE0	
48	BYPASS_REG	Reset		
49	VDD	Power		
50	PA4 *	I/O	GPIO_Output	PGA_CS
51	PA5	I/O	SPI1_SCK	
61	VSS	Power		
62	VDD	Power		
71	VSS	Power		
72	VDD	Power		
81	VCAP_1	Power		
82	VDD	Power		
83	PH6	I/O	SPI5_SCK	
90	VSS	Power		
91	VDD	Power		
101	PD13 **	I/O	QUADSPI_BK1_IO3	

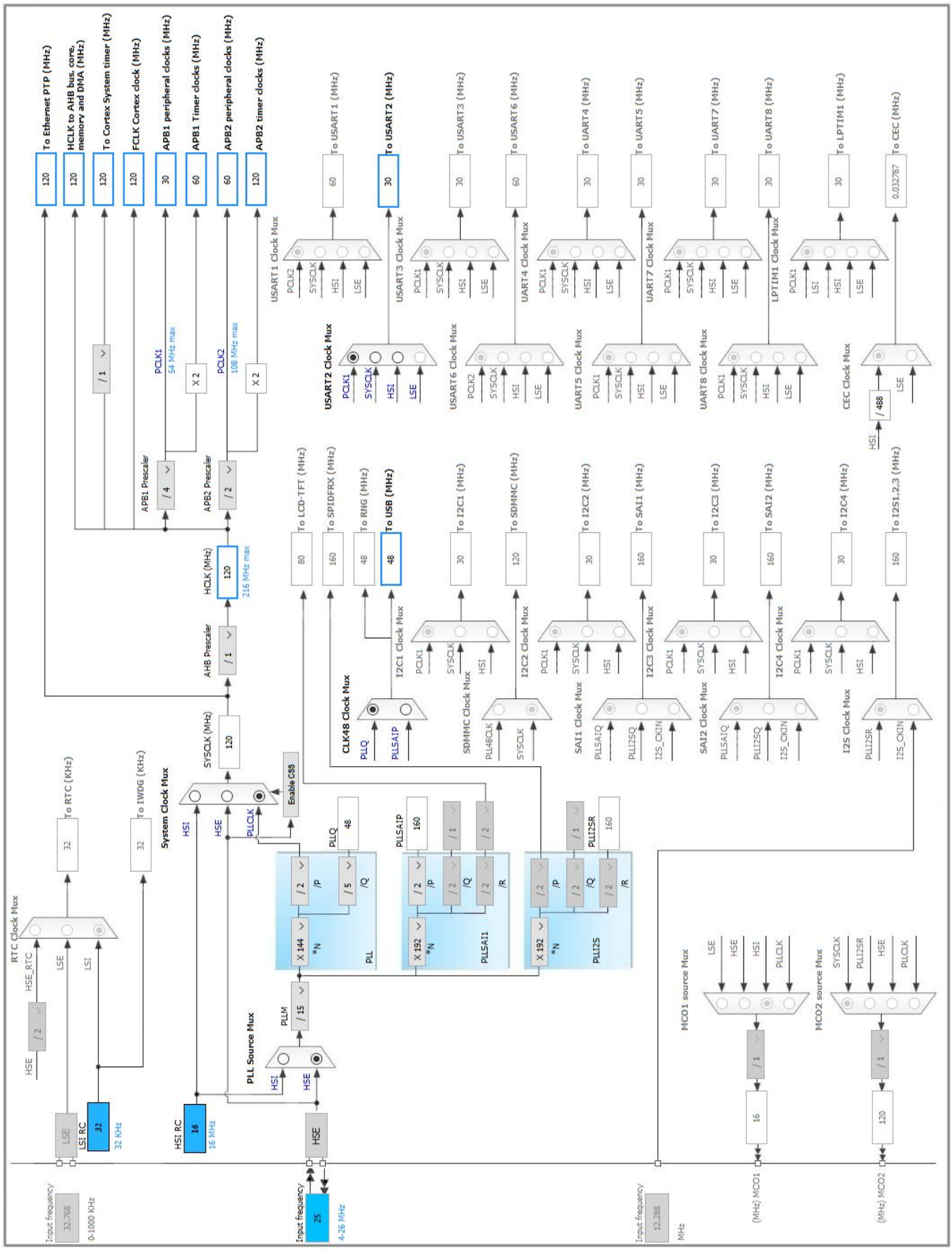
Pin Number LQFP176	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
102	VSS	Power		
103	VDD	Power		
107	PG3 *	I/O	GPIO_Input	
110	PG6 *	I/O	GPIO_Input	
111	PG7 *	I/O	GPIO_Output	
113	VSS	Power		
114	VDDUSB	Power		
119	PA8 *	I/O	GPIO_Output	LED_HL2
120	PA9	I/O	USB_OTG_FS_VBUS	
121	PA10 *	I/O	GPIO_Output	LED_HL3
122	PA11	I/O	USB_OTG_FS_DM	
123	PA12	I/O	USB_OTG_FS_DP	
124	PA13	I/O	SYS_JTMS-SWDIO	
125	VCAP_2	Power		
126	VSS	Power		
127	VDD	Power		
128	PH13 *	I/O	GPIO_Output	M1_ENN
129	PH14 *	I/O	GPIO_Output	M1_A0
130	PH15 *	I/O	GPIO_Output	M1_A1
131	PI0 *	I/O	GPIO_Output	ADC_CS
132	PI1	I/O	SPI2_SCK	
133	PI2	I/O	SPI2_MISO	
135	VSS	Power		
136	VDD	Power		
137	PA14	I/O	SYS_JTCK-SWCLK	
138	PA15	I/O	SYS_JTDI	
144	PD2 *	I/O	GPIO_Output	
145	PD3 *	I/O	GPIO_Output	
146	PD4 *	I/O	GPIO_Output	
147	PD5	I/O	USART2_TX	
148	VSS	Power		
149	VDD	Power		
150	PD6	I/O	USART2_RX	
151	PD7 *	I/O	GPIO_Output	
152	PG9 *	I/O	GPIO_Output	
153	PG10 *	I/O	GPIO_Output	
154	PG11 *	I/O	GPIO_Output	
158	VSS	Power		
159	VDD	Power		

Pin Number LQFP176	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
161	PB3	I/O	SYS_JTDO-SWO	
162	PB4	I/O	SYS_JTRST	
163	PB5	I/O	SPI1_MOSI	
166	BOOT0	Boot		
171	PDR_ON	Reset		
172	VDD	Power		
175	PI6 *	I/O	GPIO_Input	
176	PI7 *	I/O	GPIO_Input	

* The pin is affected with an I/O function

** The pin is affected with a peripheral function but no peripheral mode is activated

4. Clock Tree Configuration



5. IPs and Middleware Configuration

5.1. RCC

High Speed Clock (HSE): Crystal/Ceramic Resonator

5.1.1. Parameter Settings:

System Parameters:

VDD voltage (V)	3.3
Flash Latency(WS)	3 WS (4 CPU cycle)

RCC Parameters:

HSI Calibration Value	16
TIM Prescaler Selection	Disabled
HSE Startup Timout Value (ms)	100
LSE Startup Timout Value (ms)	5000

Power Parameters:

Power Over Drive	Disabled
Power Regulatror Voltage Scale	Power Regulator Voltage Scale 3

5.2. SPI1

Mode: Transmit Only Master

5.2.1. Parameter Settings:

Basic Parameters:

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

Clock Parameters:

Prescaler (for Baud Rate)	**256 ***
Baud Rate	**234.375 KBits/s ***
Clock Polarity (CPOL)	Low
Clock Phase (CPHA)	1 Edge

Advanced Parameters:

CRC Calculation	Disabled
NSSP Mode	**Disabled ***

NSS Signal Type	Software

5.3. SPI2

Mode: Receive Only Master

5.3.1. Parameter Settings:

Basic Parameters:

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

Clock Parameters:

Prescaler (for Baud Rate)	**256 ***
Baud Rate	**117.187 KBits/s ***
Clock Polarity (CPOL)	Low
Clock Phase (CPHA)	1 Edge

Advanced Parameters:

CRC Calculation	Disabled
NSSP Mode	**Disabled ***
NSS Signal Type	Software

5.4. SPI4

Mode: Transmit Only Master

5.4.1. Parameter Settings:

Basic Parameters:

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

Clock Parameters:

Prescaler (for Baud Rate)	**256 ***
Baud Rate	**234.375 KBits/s ***
Clock Polarity (CPOL)	Low
Clock Phase (CPHA)	1 Edge

Advanced Parameters:

CRC Calculation	Disabled
NSSP Mode	**Disabled ***
NSS Signal Type	Software

5.5. SPI5

Mode: Full-Duplex Master

5.5.1. Parameter Settings:

Basic Parameters:

Frame Format	Motorola
Data Size	4 Bits
First Bit	MSB First

Clock Parameters:

Prescaler (for Baud Rate)	2
Baud Rate	**30.0 MBits/s ***
Clock Polarity (CPOL)	Low
Clock Phase (CPHA)	1 Edge

Advanced Parameters:

CRC Calculation	Disabled
NSSP Mode	Enabled
NSS Signal Type	Software

5.6. SYS

Debug: JTAG (5 pins)

Timebase Source: SysTick

5.7. USART2

Mode: Asynchronous

5.7.1. 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

5.8. USB_OTG_FS

Mode: Device_Only

mode: Activate_VBUS

5.8.1. Parameter Settings:

Speed	Full Speed 12MBit/s
Endpoint 0 Max Packet size	64 Bytes
Enable internal IP DMA	Disabled
Low power	Disabled
Link Power Management	Disabled
VBUS sensing	Enabled
Signal start of frame	Disabled

5.9. USB_DEVICE

Class For FS IP: Communication Device Class (Virtual Port Com)

5.9.1. Parameter Settings:

Basic Parameters:

USBD_MAX_NUM_INTERFACES (Maximum number of supported interfaces)	1
USBD_MAX_NUM_CONFIGURATION (Maximum number of supported configuration)	1
USBD_MAX_STR_DESC_SIZ (Maximum size for the string descriptors)	512
USBD_SUPPORT_USER_STRING (Enable user string descriptor)	Disabled
USBD_SELF_POWERED (Enabled self power)	Enabled
USBD_DEBUG_LEVEL (USBD Debug Level)	0: No debug message
USBD_LPM_ENABLED (Link Power Management)	1: Link Power Management supported

Class Parameters:

USB CDC Rx Buffer Size	2048
USB CDC Tx Buffer Size	2048

5.9.2. Device Descriptor:

Device Descriptor:

VID (Vendor IDentifier)	1155
LANGID_STRING (Language Identifier)	English(United States)
MANUFACTURER_STRING (Manufacturer Identifier)	STMicroelectronics

Device Descriptor FS:

PID (Product IDentifier)	22336
PRODUCT_STRING (Product Identifier)	**FIBERTRADE VOA+ OPM ***
SERIALNUMBER_STRING (Serial number)	00000000001A
CONFIGURATION_STRING (Configuration Identifier)	CDC Config
INTERFACE_STRING (Interface Identifier)	CDC Interface

*** User modified value**

6. System Configuration

6.1. GPIO configuration

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
RCC	PH0/OSC_IN	RCC_OSC_IN	n/a	n/a	n/a	
	PH1/OSC_OUT	RCC_OSC_OUT	n/a	n/a	n/a	
SPI1	PA5	SPI1_SCK	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	
	PB5	SPI1_MOSI	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	
SPI2	PI1	SPI2_SCK	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	
	PI2	SPI2_MISO	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	
SPI4	PE2	SPI4_SCK	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	
	PE6	SPI4_MOSI	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	
SPI5	PF8	SPI5_MISO	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	
	PF9	SPI5_MOSI	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	
	PH6	SPI5_SCK	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	
SYS	PA13	SYS_JTMS-SWDIO	n/a	n/a	n/a	
	PA14	SYS_JTCK-SWCLK	n/a	n/a	n/a	
	PA15	SYS_JTDI	n/a	n/a	n/a	
	PB3	SYS_JTDO-SWO	n/a	n/a	n/a	
	PB4	SYS_JTRST	n/a	n/a	n/a	
USART2	PD5	USART2_TX	Alternate Function Push Pull	Pull-up	**Very High ***	
	PD6	USART2_RX	Alternate Function Push Pull	Pull-up	**Very High**	

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
					*	
USB_OTG_FS	PA9	USB_OTG_FS_VBUS	Input mode	No pull-up and no pull-down	n/a	
	PA11	USB_OTG_FS_DM	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	
	PA12	USB_OTG_FS_DP	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	
Single Mapped Signals	PH2	FMC_SDCKE0	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PH3	FMC_SDNE0	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PD13	QUADSPI_BK1_IO3	Alternate Function Push Pull	No pull-up and no pull-down	**Very High ***	
GPIO	PE3	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	DA1_CLRn
	PE4	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	DAC_CS
	PE5	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	
	PF6	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	TFT_CS
	PA4	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	PGA_CS
	PG3	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	
	PG6	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	
	PG7	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	
	PA8	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED_HL2
	PA10	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED_HL3
	PH13	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	M1_ENN
	PH14	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	M1_A0
	PH15	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	M1_A1
	PI0	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	ADC_CS
	PD2	GPIO_Output	Output Push Pull	**Pull-down ***	Low	
	PD3	GPIO_Output	Output Push Pull	**Pull-down ***	Low	
	PD4	GPIO_Output	Output Push Pull	**Pull-down ***	Low	
	PD7	GPIO_Output	Output Push Pull	**Pull-down ***	Low	
	PG9	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	
	PG10	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	
	PG11	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	
	PI6	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	
	PI7	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	

6.2. DMA configuration

DMA request	Stream	Direction	Priority
SPI1_TX	DMA2_Stream3	Memory To Peripheral	Low
SPI2_RX	DMA1_Stream3	Peripheral To Memory	Low
SPI4_TX	DMA2_Stream1	Memory To Peripheral	Low
USART2_RX	DMA1_Stream5	Peripheral To Memory	Low
USART2_TX	DMA1_Stream6	Memory To Peripheral	Low

SPI1_TX: DMA2_Stream3 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_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

USART2_RX: DMA1_Stream5 DMA request Settings:

Mode:	Normal

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

USART2_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

6.3. 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
DMA1 stream3 global interrupt	true	0	0
DMA1 stream5 global interrupt	true	0	0
DMA1 stream6 global interrupt	true	0	0
SPI1 global interrupt	true	0	0
SPI2 global interrupt	true	0	0
USART2 global interrupt	true	0	0
DMA2 stream1 global interrupt	true	0	0
DMA2 stream3 global interrupt	true	0	0
USB On The Go FS global interrupt	true	0	0
SPI4 global interrupt	true	0	0
PVD interrupt through EXTI line 16	unused		
Flash global interrupt	unused		
RCC global interrupt	unused		
FPU global interrupt	unused		
SPI5 global interrupt	unused		

*** User modified value**

7. Power Consumption Calculator report

7.1. Microcontroller Selection

Series	STM32F7
Line	STM32F7x6
MCU	STM32F746IGTx
Datasheet	027590_Rev4

7.2. Parameter Selection

Temperature	25
Vdd	3.3

8. Software Project

8.1. Project Settings

Name	Value
Project Name	VOA_OPM
Project Folder	F:\Project\voa_opm_2v0
Toolchain / IDE	MDK-ARM V5
Firmware Package Name and Version	STM32Cube FW_F7 V1.8.0

8.2. Code Generation Settings

Name	Value
STM32Cube Firmware Library Package	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
Delete previously generated files when not re-generated	Yes
Set all free pins as analog (to optimize the power consumption)	No