

1. Description

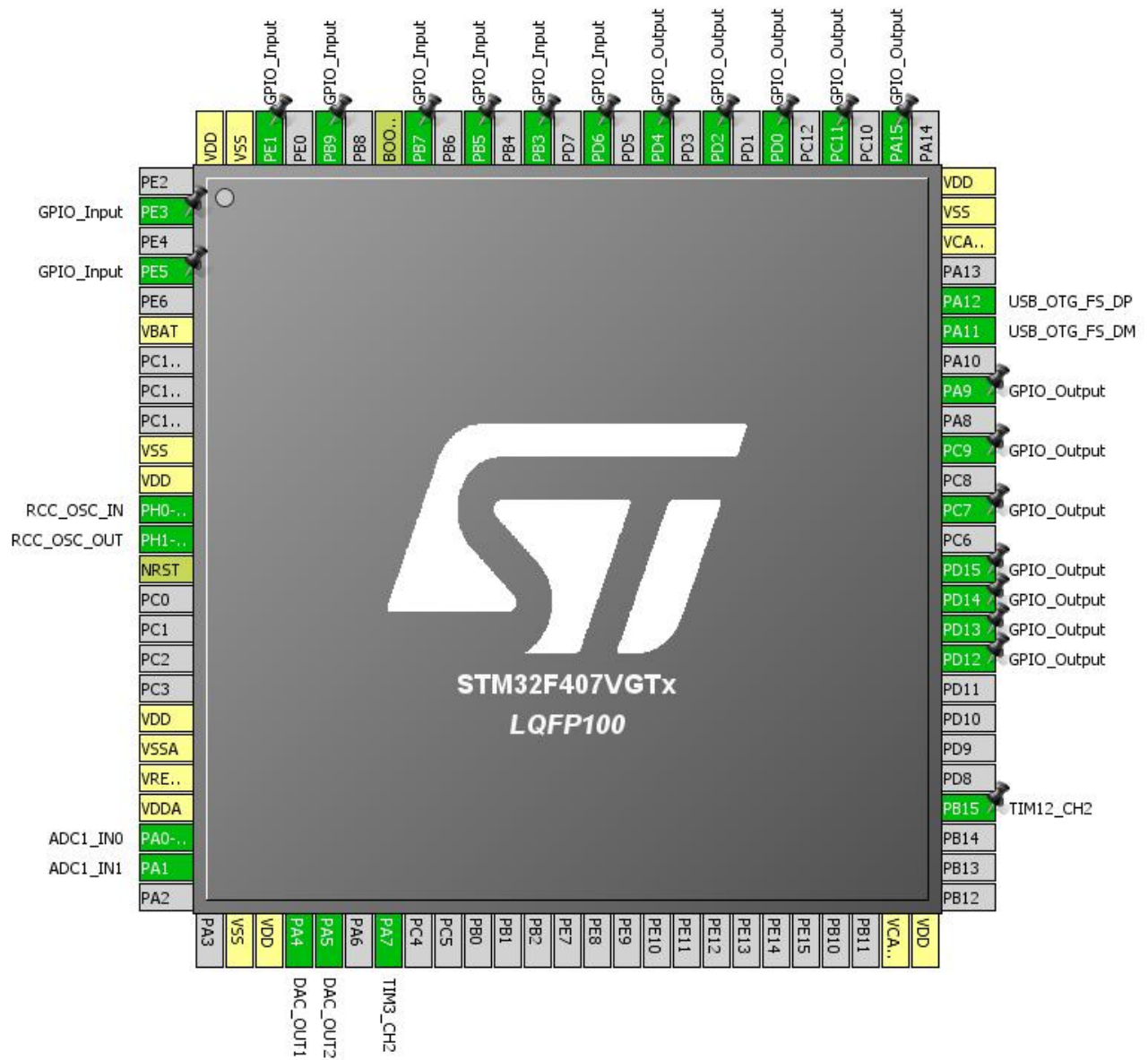
1.1. Project

Project Name	USB CARD
Board Name	USB CARD
Generated with:	STM32CubeMX 4.20.0
Date	03/12/2017

1.2. MCU

MCU Series	STM32F4
MCU Line	STM32F407/417
MCU name	STM32F407VGTx
MCU Package	LQFP100
MCU Pin number	100

2. Pinout Configuration



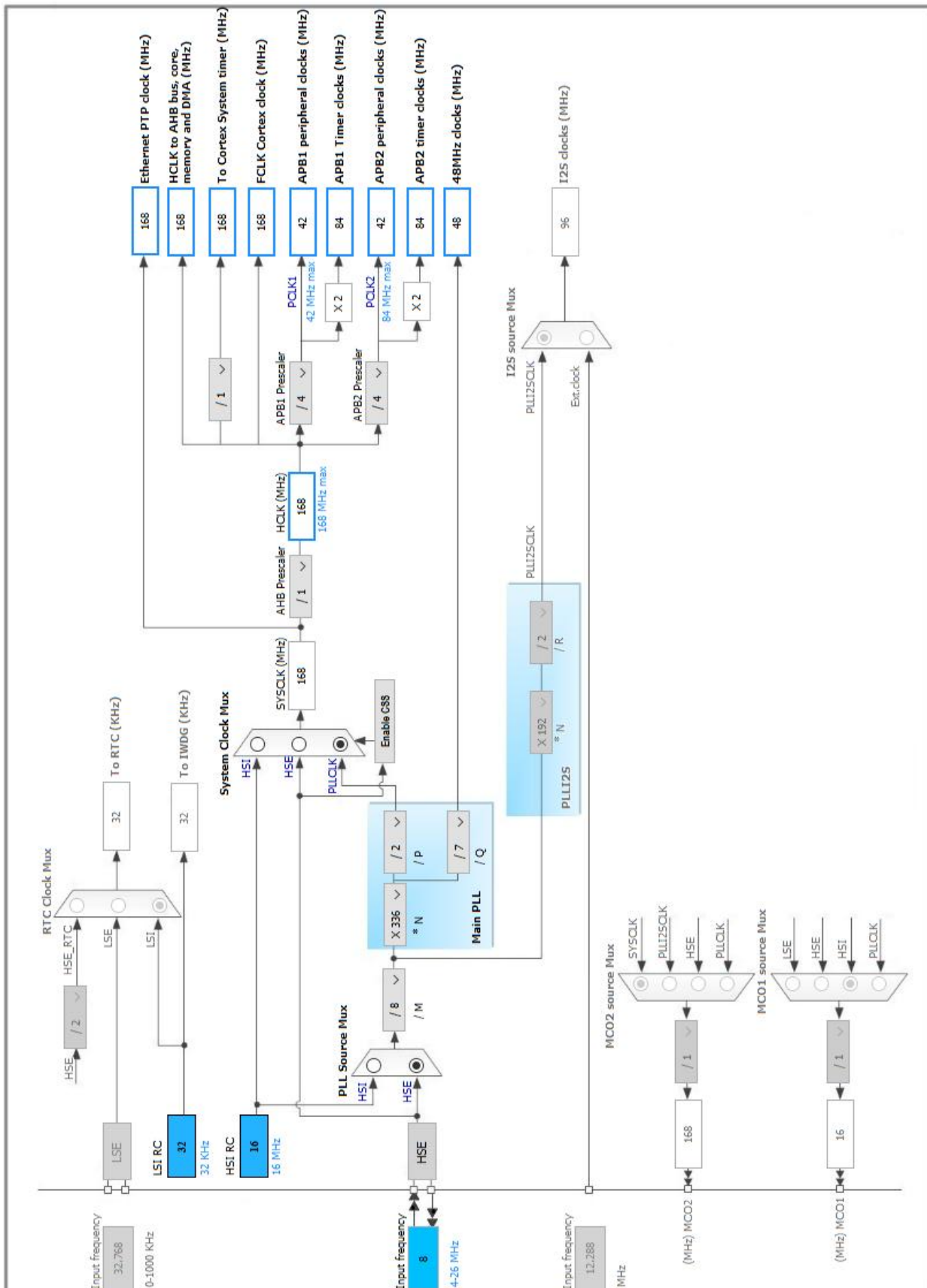
3. Pins Configuration

Pin Number LQFP100	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
2	PE3 *	I/O	GPIO_Input	
4	PE5 *	I/O	GPIO_Input	
6	VBAT	Power		
10	VSS	Power		
11	VDD	Power		
12	PH0-OSC_IN	I/O	RCC_OSC_IN	
13	PH1-OSC_OUT	I/O	RCC_OSC_OUT	
14	NRST	Reset		
19	VDD	Power		
20	VSSA	Power		
21	VREF+	Power		
22	VDDA	Power		
23	PA0-WKUP	I/O	ADC1_IN0	
24	PA1	I/O	ADC1_IN1	
27	VSS	Power		
28	VDD	Power		
29	PA4	I/O	DAC_OUT1	
30	PA5	I/O	DAC_OUT2	
32	PA7	I/O	TIM3_CH2	
49	VCAP_1	Power		
50	VDD	Power		
54	PB15	I/O	TIM12_CH2	
59	PD12 *	I/O	GPIO_Output	
60	PD13 *	I/O	GPIO_Output	
61	PD14 *	I/O	GPIO_Output	
62	PD15 *	I/O	GPIO_Output	
64	PC7 *	I/O	GPIO_Output	
66	PC9 *	I/O	GPIO_Output	
68	PA9 *	I/O	GPIO_Output	
70	PA11	I/O	USB_OTG_FS_DM	
71	PA12	I/O	USB_OTG_FS_DP	
73	VCAP_2	Power		
74	VSS	Power		
75	VDD	Power		
77	PA15 *	I/O	GPIO_Output	
79	PC11 *	I/O	GPIO_Output	

Pin Number LQFP100	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
81	PD0 *	I/O	GPIO_Output	
83	PD2 *	I/O	GPIO_Output	
85	PD4 *	I/O	GPIO_Output	
87	PD6 *	I/O	GPIO_Input	
89	PB3 *	I/O	GPIO_Input	
91	PB5 *	I/O	GPIO_Input	
93	PB7 *	I/O	GPIO_Input	
94	BOOT0	Boot		
96	PB9 *	I/O	GPIO_Input	
98	PE1 *	I/O	GPIO_Input	
99	VSS	Power		
100	VDD	Power		

* The pin is affected with an I/O function

4. Clock Tree Configuration



5. IPs and Middleware Configuration

5.1. ADC1

mode: IN0

mode: IN1

5.1.1. Parameter Settings:

ADCs_Common_Settings:

Mode Independent mode

ADC_Settings:

Clock Prescaler PCLK2 divided by 2

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 **Enabled ***

End Of Conversion Selection **EOC flag at the end of all conversions ***

ADC_Regular_ConversionMode:

Number Of Conversion **2 ***

External Trigger Conversion Source Regular Conversion launched by software

External Trigger Conversion Edge None

Rank 1

Channel Channel 0

Sampling Time **480 Cycles ***

Rank **2 ***

Channel **Channel 1 ***

Sampling Time **480 Cycles ***

ADC_Injected_ConversionMode:

Number Of Conversions 0

WatchDog:

Enable Analog WatchDog Mode false

5.2. DAC

mode: OUT1 Configuration

mode: OUT2 Configuration

5.2.1. Parameter Settings:

DAC Out1 Settings:

Output Buffer	Enable
Trigger	None

DAC Out2 Settings:

Output Buffer	Enable
Trigger	None

5.3. RCC

High Speed Clock (HSE): Crystal/Ceramic Resonator

5.3.1. Parameter Settings:

System Parameters:

VDD voltage (V)	3.3
Instruction Cache	Enabled
Prefetch Buffer	Enabled
Data Cache	Enabled
Flash Latency(WS)	5 WS (6 CPU cycle)

RCC Parameters:

HSI Calibration Value	16
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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5.4. TIM2

Clock Source : Internal Clock

5.4.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	42000 *
Counter Mode	Up
Counter Period (AutoReload Register - 32 bits value)	499 *
Internal Clock Division (CKD)	No Division

Trigger Output (TRGO) Parameters:

Master/Slave Mode	Disable (no sync between this TIM (Master) and its Slaves
Trigger Event Selection	Reset (UG bit from TIMx_EGR)

5.5. TIM3

Slave Mode: External Clock Mode 1

Trigger Source: TI2FP2

5.5.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	0
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	65535 *
Internal Clock Division (CKD)	No Division
Slave Mode Controller	ETR mode 1

Trigger Output (TRGO) Parameters:

Master/Slave Mode	Disable (no sync between this TIM (Master) and its Slaves
Trigger Event Selection	Reset (UG bit from TIMx_EGR)

Trigger:

Trigger Polarity	Rising Edge
Trigger Filter (4 bits value)	15 *

5.6. TIM12

Slave Mode: External Clock Mode 1

Trigger Source: TI2FP2

5.6.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	0
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	65535 *
Internal Clock Division (CKD)	No Division
Slave Mode Controller	ETR mode 1

Trigger:

Trigger Polarity	Rising Edge
Trigger Filter (4 bits value)	15 *

5.7. USB_OTG_FS

Mode: Device_Only

5.7.1. Parameter Settings:

Speed	Device 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

5.8. USB_DEVICE

Class For FS IP: Custom Human Interface Device Class (HID)

5.8.1. Parameter Settings:

Basic Parameters:

VirtualMode	CustomHid
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)	Enabled

USBD_SELF_POWERED (Enabled self power)

Enabled

USBD_DEBUG_LEVEL (USBD Debug Level)

0: No debug message

Class Parameters:

USBD_CUSTOM_HID_REPORT_DESC_SIZE (Total length for Report descriptor (IN ENDPOINT))

64 *

USBD_CUSTOMHID_OUTREPORT_BUF_SIZE (Maximum report buffer size (OUT ENDPOINT))

64 *

5.8.2. Device Descriptor:

Device Descriptor:

VID (Vendor Identifier)

1010 *

LANGID_STRING (Language Identifier)

English(United States)

MANUFACTURER_STRING (Manufacturer Identifier)

DHBK - minhht57 *

Device Descriptor FS:

PID (Product Identifier)

1996 *

PRODUCT_STRING (Product Identifier)

USB CARD - minhht57 *

SERIALNUMBER_STRING (Serial number)

00000000001A

CONFIGURATION_STRING (Configuration Identifier)

Custom HID Config

INTERFACE_STRING (Interface Identifier)

USB Custom HID 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
ADC1	PA0-WKUP	ADC1_IN0	Analog mode	No pull-up and no pull-down	n/a	
	PA1	ADC1_IN1	Analog mode	No pull-up and no pull-down	n/a	
DAC	PA4	DAC_OUT1	Analog mode	No pull-up and no pull-down	n/a	
	PA5	DAC_OUT2	Analog mode	No pull-up and no pull-down	n/a	
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	
TIM3	PA7	TIM3_CH2	Alternate Function Push Pull	Pull-down *	High *	
TIM12	PB15	TIM12_CH2	Alternate Function Push Pull	Pull-down *	High *	
USB_OTG_FS	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 *	
GPIO	PE3	GPIO_Input	Input mode	Pull-up *	n/a	
	PE5	GPIO_Input	Input mode	Pull-up *	n/a	
	PD12	GPIO_Output	Output Push Pull	No pull-up and no pull-down	High *	
	PD13	GPIO_Output	Output Push Pull	No pull-up and no pull-down	High *	
	PD14	GPIO_Output	Output Push Pull	No pull-up and no pull-down	High *	
	PD15	GPIO_Output	Output Push Pull	No pull-up and no pull-down	High *	
	PC7	GPIO_Output	Output Push Pull	No pull-up and no pull-down	High *	
	PC9	GPIO_Output	Output Push Pull	No pull-up and no pull-down	High *	
	PA9	GPIO_Output	Output Push Pull	No pull-up and no pull-down	High *	
	PA15	GPIO_Output	Output Push Pull	No pull-up and no pull-down	High *	
	PC11	GPIO_Output	Output Push Pull	No pull-up and no pull-down	High *	
	PD0	GPIO_Output	Output Push Pull	No pull-up and no pull-down	High *	
	PD2	GPIO_Output	Output Push Pull	No pull-up and no pull-down	High *	
	PD4	GPIO_Output	Output Push Pull	No pull-up and no pull-down	High *	
	PD6	GPIO_Input	Input mode	Pull-up *	n/a	
	PB3	GPIO_Input	Input mode	Pull-up *	n/a	

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
	PB5	GPIO_Input	Input mode	Pull-up *	n/a	
	PB7	GPIO_Input	Input mode	Pull-up *	n/a	
	PB9	GPIO_Input	Input mode	Pull-up *	n/a	
	PE1	GPIO_Input	Input mode	Pull-up *	n/a	

6.2. DMA configuration

DMA request	Stream	Direction	Priority
ADC1	DMA2_Stream0	Peripheral To Memory	Low

ADC1: 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

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
ADC1, ADC2 and ADC3 global interrupts	true	0	0
TIM2 global interrupt	true	0	0
TIM3 global interrupt	true	0	0
TIM8 break interrupt and TIM12 global interrupt	true	0	0
DMA2 stream0 global interrupt	true	0	0
USB On The Go FS global interrupt	true	0	0
PVD interrupt through EXTI line 16	unused		
Flash global interrupt	unused		
RCC global interrupt	unused		
TIM6 global interrupt, DAC1 and DAC2 underrun error interrupts	unused		
FPU global interrupt	unused		

* User modified value

7. Power Consumption Calculator report

7.1. Microcontroller Selection

Series	STM32F4
Line	STM32F407/417
MCU	STM32F407VGTx
Datasheet	022152_Rev7

7.2. Parameter Selection

Temperature	25
Vdd	3.3

8. Software Project

8.1. Project Settings

Name	Value
Project Name	USB CARD
Project Folder	D:\OneDrive\Project\DLDKMT\USB CARD
Toolchain / IDE	MDK-ARM V5
Firmware Package Name and Version	STM32Cube FW_F4 V1.15.0

8.2. Code Generation Settings

Name	Value
STM32Cube Firmware Library Package	Copy only the necessary library files
Generate peripheral initialization as a pair of '.c/.h' files	No
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