

1. Description

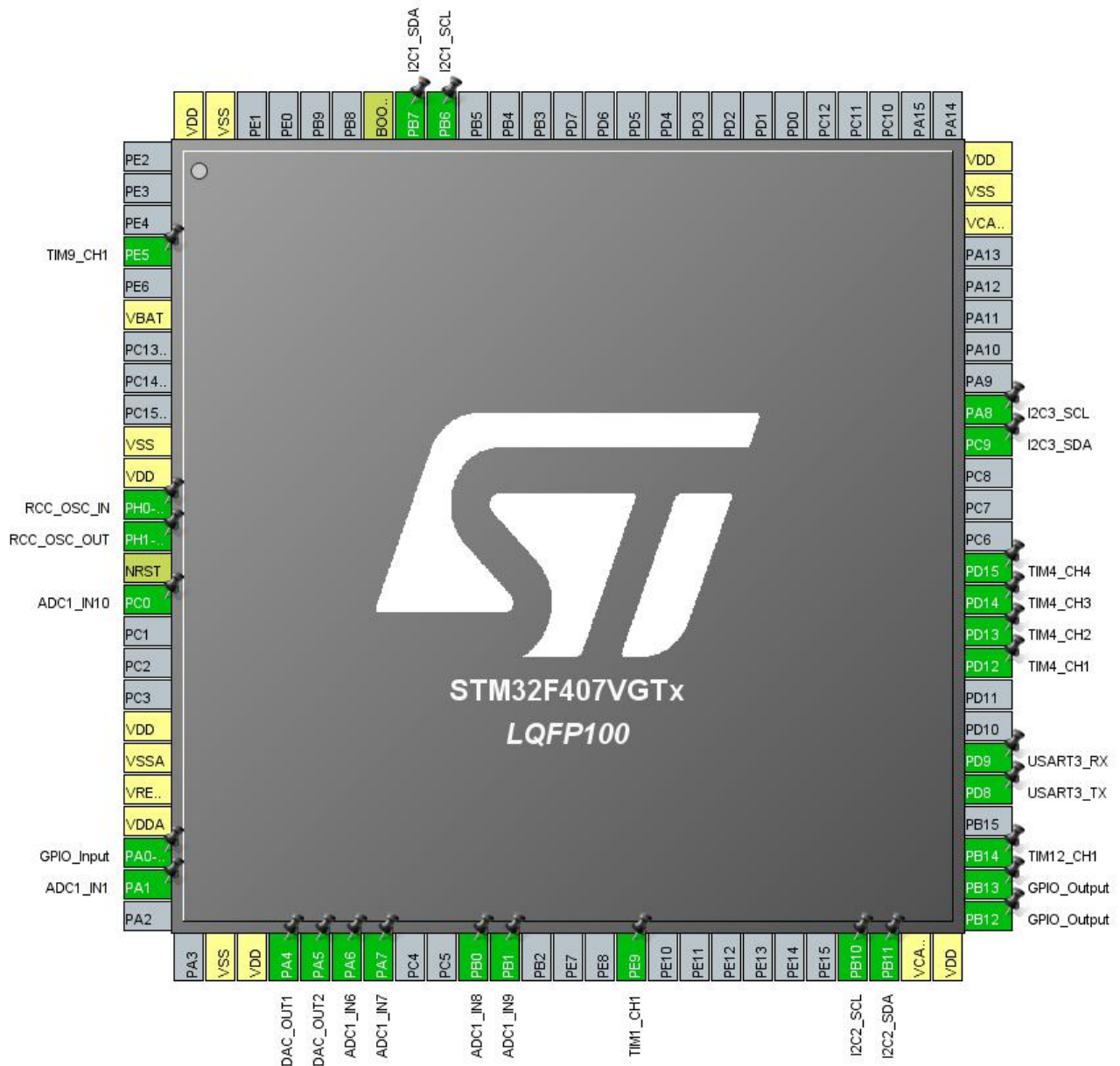
1.1. Project

Project Name	example010R3-ESC
Board Name	custom
Generated with:	STM32CubeMX 5.1.0
Date	07/02/2022

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
4	PE5	I/O	TIM9_CH1	
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		
15	PC0	I/O	ADC1_IN10	
19	VDD	Power		
20	VSSA	Power		
21	VREF+	Power		
22	VDDA	Power		
23	PA0-WKUP *	I/O	GPIO_Input	
24	PA1	I/O	ADC1_IN1	
27	VSS	Power		
28	VDD	Power		
29	PA4	I/O	DAC_OUT1	
30	PA5	I/O	DAC_OUT2	
31	PA6	I/O	ADC1_IN6	
32	PA7	I/O	ADC1_IN7	
35	PB0	I/O	ADC1_IN8	
36	PB1	I/O	ADC1_IN9	
40	PE9	I/O	TIM1_CH1	
47	PB10	I/O	I2C2_SCL	
48	PB11	I/O	I2C2_SDA	
49	VCAP_1	Power		
50	VDD	Power		
51	PB12 *	I/O	GPIO_Output	
52	PB13 *	I/O	GPIO_Output	
53	PB14	I/O	TIM12_CH1	
55	PD8	I/O	USART3_TX	
56	PD9	I/O	USART3_RX	
59	PD12	I/O	TIM4_CH1	
60	PD13	I/O	TIM4_CH2	
61	PD14	I/O	TIM4_CH3	
62	PD15	I/O	TIM4_CH4	

Pin Number LQFP100	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
66	PC9	I/O	I2C3_SDA	
67	PA8	I/O	I2C3_SCL	
73	VCAP_2	Power		
74	VSS	Power		
75	VDD	Power		
92	PB6	I/O	I2C1_SCL	
93	PB7	I/O	I2C1_SDA	
94	BOOT0	Boot		
99	VSS	Power		
100	VDD	Power		

* The pin is affected with an I/O function

5. Software Project

5.1. Project Settings

Name	Value
Project Name	example010R3-ESC
Project Folder	C:\Users\frank\STM32Cube\projects\STM32F4-Discovery-ESC\example010R3-
Toolchain / IDE	EWARM V8
Firmware Package Name and Version	STM32Cube FW_F4 V1.24.2

5.2. 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	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

6. Power Consumption Calculator report

6.1. Microcontroller Selection

Series	STM32F4
Line	STM32F407/417
MCU	STM32F407VGTx
Datasheet	022152_Rev8

6.2. Parameter Selection

Temperature	25
Vdd	3.3

7. IPs and Middleware Configuration

7.1. ADC1

mode: IN1

mode: IN6

mode: IN7

mode: IN8

mode: IN9

mode: IN10

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 Disabled

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 6 *

External Trigger Conversion Source Timer 3 Trigger Out event *

External Trigger Conversion Edge Trigger detection on both the rising and falling edges *

Rank 1

Channel Channel 1

Sampling Time 3 Cycles

Rank 2 *

Channel Channel 6 *

Sampling Time 3 Cycles

Rank 3 *

Channel Channel 7 *

Sampling Time 3 Cycles

Rank 4 *

Channel Channel 8 *

Sampling Time 3 Cycles

<u>Rank</u>	5 *
Channel	Channel 9 *
Sampling Time	3 Cycles
<u>Rank</u>	6 *
Channel	Channel 10 *
Sampling Time	3 Cycles
ADC_Injected_ConversionMode:	
Number Of Conversions	0
WatchDog:	
Enable Analog WatchDog Mode	false

7.2. DAC

mode: OUT1 Configuration

mode: OUT2 Configuration

7.2.1. Parameter Settings:

DAC Out1 Settings:

Output Buffer	Enable
Trigger	None

DAC Out2 Settings:

Output Buffer	Enable
Trigger	None

7.3. I2C1

I2C: I2C

7.3.1. Parameter Settings:

Master Features:

I2C Speed Mode	Fast Mode *
I2C Clock Speed (Hz)	400000
Fast Mode Duty Cycle	Duty cycle Tlow/Thigh = 2

Slave Features:

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

General Call address detection	Disabled
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7.4. I2C2

I2C: I2C

7.4.1. Parameter Settings:

Master Features:

I2C Speed Mode	Fast Mode *
I2C Clock Speed (Hz)	400000
Fast Mode Duty Cycle	Duty cycle Tlow/Thigh = 2

Slave Features:

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

7.5. I2C3

I2C: I2C

7.5.1. Parameter Settings:

Master Features:

I2C Speed Mode	Fast Mode *
I2C Clock Speed (Hz)	400000
Fast Mode Duty Cycle	Duty cycle Tlow/Thigh = 2

Slave Features:

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

7.6. RCC

High Speed Clock (HSE): Crystal/Ceramic Resonator

7.6.1. 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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7.7. SYS

Timebase Source: SysTick

7.8. TIM1

Clock Source : Internal Clock

Channel1: Input Capture direct mode

Channel2: Input Capture indirect mode

7.8.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	127 *
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	65535 *
Internal Clock Division (CKD)	No Division
Repetition Counter (RCR - 8 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	Reset (UG bit from TIMx_EGR)

Input Capture Channel 1:

Polarity Selection	Rising Edge
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IC Selection	Direct
Prescaler Division Ratio	No division
Input Filter (4 bits value)	0

Input Capture Channel 2:

Polarity Selection	Falling Edge *
IC Selection	Indirect
Prescaler Division Ratio	No division

7.9. TIM3

Clock Source : Internal Clock

Channel1: Output Compare No Output

7.9.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	31 *
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	5249 *
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	Output Compare (OC1REF) *

Output Compare No Output Channel 1:

Mode	Toggle on match *
Pulse (16 bits value)	0
CH Polarity	High

7.10. TIM4

Clock Source : Internal Clock

Channel1: PWM Generation CH1

Channel2: PWM Generation CH2

Channel3: PWM Generation CH3

Channel4: PWM Generation CH4

7.10.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	99 *
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	8399 *
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	Reset (UG bit from TIMx_EGR)

PWM Generation Channel 1:

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

PWM Generation Channel 2:

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

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

7.11. TIM9

mode: Clock Source

Channel1: Input Capture direct mode

Channel2: Input Capture indirect mode

7.11.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	127 *
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	65535 *
Internal Clock Division (CKD)	No Division
auto-reload preload	Disable

Input Capture Channel 1:

Polarity Selection	Rising Edge
IC Selection	Direct
Prescaler Division Ratio	No division
Input Filter (4 bits value)	0

Input Capture Channel 2:

Polarity Selection	Falling Edge *
IC Selection	Indirect
Prescaler Division Ratio	No division

7.12. TIM12

mode: Clock Source

Channel1: Input Capture direct mode

Channel2: Input Capture indirect mode

7.12.1. Parameter Settings:

Counter Settings:

Prescaler (PSC - 16 bits value)	127 *
Counter Mode	Up
Counter Period (AutoReload Register - 16 bits value)	65535 *
Internal Clock Division (CKD)	No Division
auto-reload preload	Disable

Input Capture Channel 1:

Polarity Selection	Rising Edge
IC Selection	Direct
Prescaler Division Ratio	No division
Input Filter (4 bits value)	0

Input Capture Channel 2:

Polarity Selection	Falling Edge *
IC Selection	Indirect
Prescaler Division Ratio	No division

7.13. USART3

Mode: Asynchronous

7.13.1. 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

* 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	PC0	ADC1_IN10	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	
	PA6	ADC1_IN6	Analog mode	No pull-up and no pull-down	n/a	
	PA7	ADC1_IN7	Analog mode	No pull-up and no pull-down	n/a	
	PB0	ADC1_IN8	Analog mode	No pull-up and no pull-down	n/a	
	PB1	ADC1_IN9	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	
I2C1	PB6	I2C1_SCL	Alternate Function Open Drain	Pull-up	Very High *	
	PB7	I2C1_SDA	Alternate Function Open Drain	Pull-up	Very High *	
I2C2	PB10	I2C2_SCL	Alternate Function Open Drain	Pull-up	Very High *	
	PB11	I2C2_SDA	Alternate Function Open Drain	Pull-up	Very High *	
I2C3	PC9	I2C3_SDA	Alternate Function Open Drain	Pull-up	Very High *	
	PA8	I2C3_SCL	Alternate Function Open Drain	Pull-up	Very High *	
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	
TIM1	PE9	TIM1_CH1	Alternate Function Push Pull	No pull-up and no pull-down	Low	
TIM4	PD12	TIM4_CH1	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PD13	TIM4_CH2	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PD14	TIM4_CH3	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PD15	TIM4_CH4	Alternate Function Push Pull	No pull-up and no pull-down	Low	
TIM9	PE5	TIM9_CH1	Alternate Function Push Pull	No pull-up and no pull-down	Low	
TIM12	PB14	TIM12_CH1	Alternate Function Push Pull	No pull-up and no pull-down	Low	
USART3	PD8	USART3_TX	Alternate Function Push Pull	Pull-up	Very High *	
	PD9	USART3_RX	Alternate Function Push Pull	Pull-up	Very High *	

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
GPIO	PA0-WKUP	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	
	PB12	GPIO_Output	Output Push Pull	Pull-up *	Low	
	PB13	GPIO_Output	Output Push Pull	Pull-up *	Low	

8.2. 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: **Word ***
Memory Data Width: **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
TIM3 global interrupt	true	9	0
DMA2 stream0 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		
TIM4 global interrupt	unused		
I2C1 event interrupt	unused		
I2C1 error interrupt	unused		
I2C2 event interrupt	unused		
I2C2 error interrupt	unused		
USART3 global interrupt	unused		
TIM8 break interrupt and TIM12 global interrupt	unused		
TIM6 global interrupt, DAC1 and DAC2 underrun error interrupts	unused		
I2C3 event interrupt	unused		
I2C3 error interrupt	unused		
FPU global interrupt	unused		

* User modified value

9. Software Pack Report