1. Description

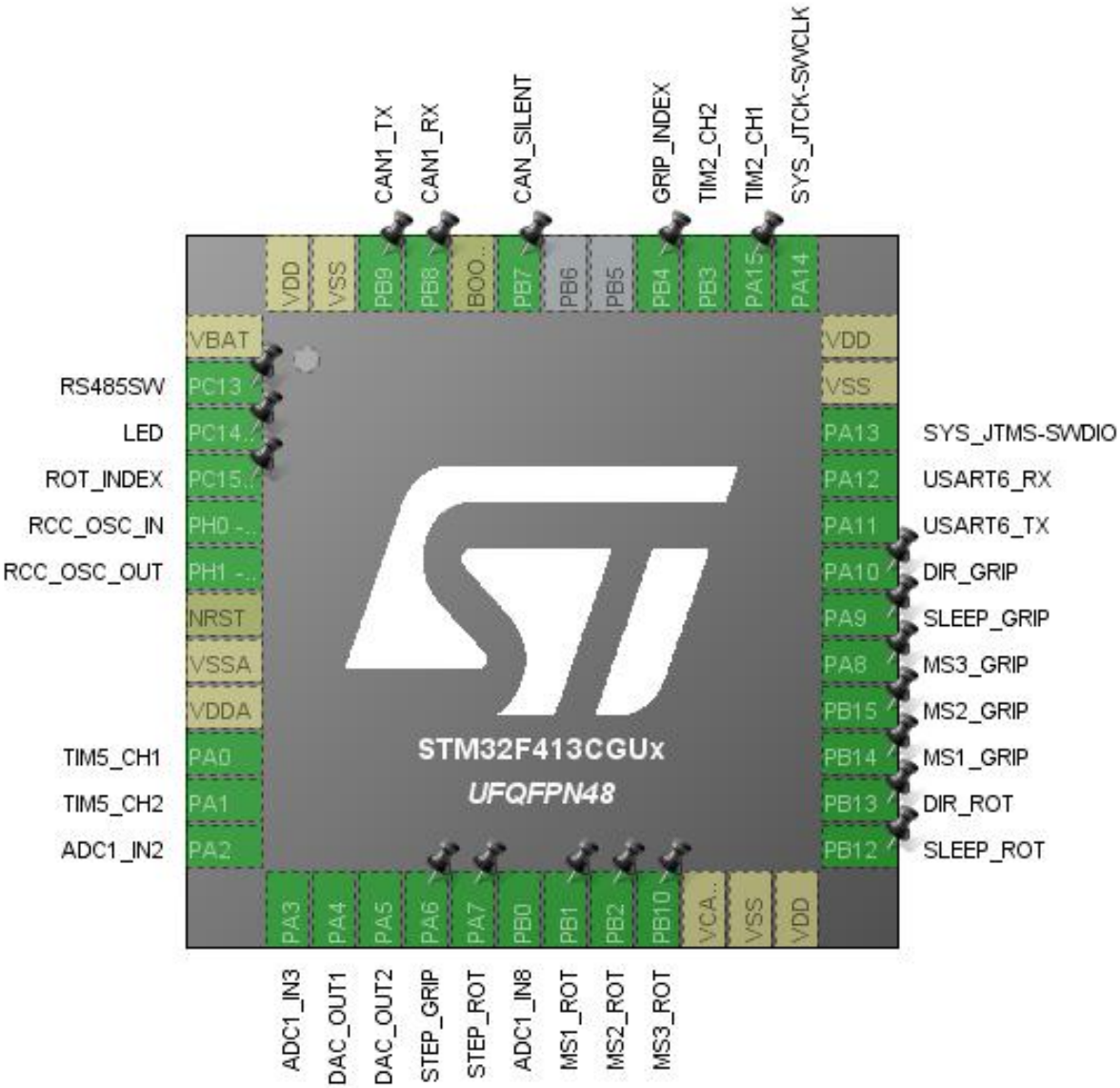
1.1. Project

Project Name	EHMD_SW
Board Name	custom
Generated with:	STM32CubeMX 5.0.1
Date	03/20/2019

1.2. MCU

MCU Series	STM32F4
MCU Line	STM32F413/423
MCU name	STM32F413CGUx
MCU Package	UFQFPN48
MCU Pin number	48

2. Pinout Configuration



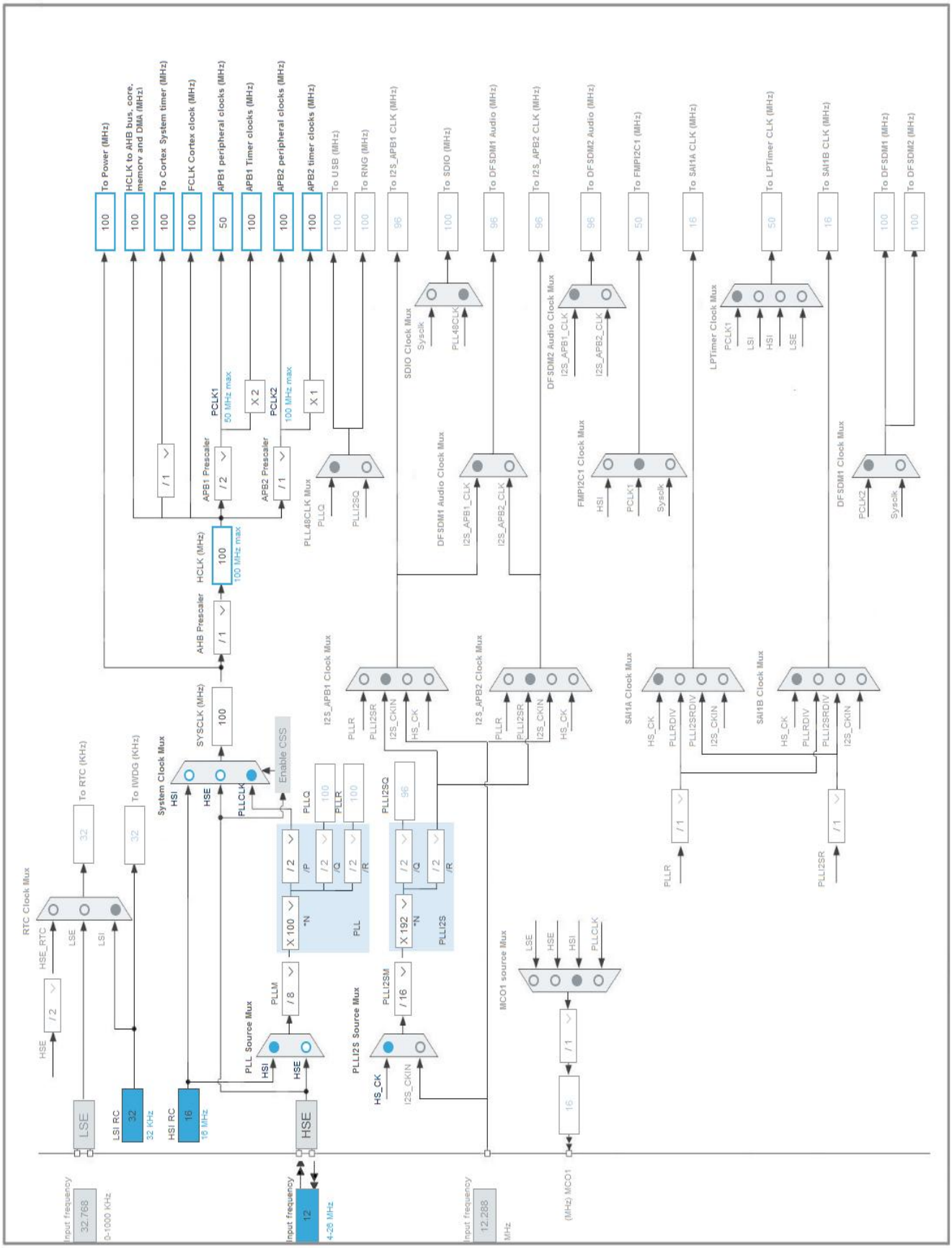
3. Pins Configuration

Pin Number UFQFPN48	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
1	VBAT	Power		
2	PC13 *	I/O	GPIO_Output	RS485SW
3	PC14-OSC32_IN *	I/O	GPIO_Output	LED
4	PC15-OSC32_OUT *	I/O	GPIO_Input	ROT_INDEX
5	PH0 - OSC_IN	I/O	RCC_OSC_IN	
6	PH1 - OSC_OUT	I/O	RCC_OSC_OUT	
7	NRST	Reset		
8	VSSA	Power		
9	VDDA	Power		
10	PA0	I/O	TIM5_CH1	
11	PA1	I/O	TIM5_CH2	
12	PA2	I/O	ADC1_IN2	
13	PA3	I/O	ADC1_IN3	
14	PA4	I/O	DAC_OUT1	
15	PA5	I/O	DAC_OUT2	
16	PA6 *	I/O	GPIO_Output	STEP_GRIP
17	PA7 *	I/O	GPIO_Output	STEP_ROT
18	PB0	I/O	ADC1_IN8	
19	PB1 *	I/O	GPIO_Output	MS1_ROT
20	PB2 *	I/O	GPIO_Output	MS2_ROT
21	PB10 *	I/O	GPIO_Output	MS3_ROT
22	VCAP_1	Power		
23	VSS	Power		
24	VDD	Power		
25	PB12 *	I/O	GPIO_Output	SLEEP_ROT
26	PB13 *	I/O	GPIO_Output	DIR_ROT
27	PB14 *	I/O	GPIO_Output	MS1_GRIP
28	PB15 *	I/O	GPIO_Output	MS2_GRIP
29	PA8 *	I/O	GPIO_Output	MS3_GRIP
30	PA9 *	I/O	GPIO_Output	SLEEP_GRIP
31	PA10 *	I/O	GPIO_Output	DIR_GRIP
32	PA11	I/O	USART6_TX	
33	PA12	I/O	USART6_RX	
34	PA13	I/O	SYS_JTMS-SWDIO	
35	VSS	Power		
36	VDD	Power		

Pin Number UFQFPN48	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
37	PA14	I/O	SYS_JTCK-SWCLK	
38	PA15	I/O	TIM2_CH1	
39	PB3	I/O	TIM2_CH2	
40	PB4 *	I/O	GPIO_Input	GRIP_INDEX
43	PB7 *	I/O	GPIO_Output	CAN_SILENT
44	BOOT0	Boot		
45	PB8	I/O	CAN1_RX	
46	PB9	I/O	CAN1_TX	
47	VSS	Power		
48	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	EHMD_SW
Project Folder	C:\Users\bg0ffv\Documents\EHMD_SW
Toolchain / IDE	TrueSTUDIO
Firmware Package Name and Version	STM32Cube FW_F4 V1.23.0

5.2. 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

6. Power Consumption Calculator report

6.1. Microcontroller Selection

Series	STM32F4
Line	STM32F413/423
MCU	STM32F413CGUx
Datasheet	029162_Rev5

6.2. Parameter Selection

Temperature	25
Vdd	3.6

7. IPs and Middleware Configuration

7.1. ADC1

mode: IN2

mode: IN3

mode: IN8

7.1.1. Parameter Settings:

ADC_Settings:

Clock Prescaler	PCLK2 divided by 4
Resolution	12 bits (15 ADC Clock cycles)
Data Alignment	Right alignment
Scan Conversion Mode	Disabled
Continuous Conversion Mode	Disabled
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 2
Sampling Time	3 Cycles

ADC_Injected_ConversionMode:

Number Of Conversions	0

WatchDog:

Enable Analog WatchDog Mode	false

7.2. CAN1

mode: Mode

7.2.1. Parameter Settings:

Bit Timings Parameters:

Prescaler (for Time Quantum)	16
Time Quantum	**320.0 ***
Time Quanta in Bit Segment 1	**16 Times ***
Time Quanta in Bit Segment 2	**2 Times ***

ReSynchronization Jump Width	**2 Times ***

Basic Parameters:

Time Triggered Communication Mode	Disable
Automatic Bus-Off Management	Disable
Automatic Wake-Up Mode	Disable
No-Automatic Retransmission	Disable
Receive Fifo Locked Mode	Disable
Transmit Fifo Priority	Disable

Advanced Parameters:

Operating Mode	Normal

7.3. DAC

mode: OUT1 Configuration

mode: OUT2 Configuration

7.3.1. Parameter Settings:

DAC Out1 Settings:

Output Buffer	Enable
Trigger	None

DAC Out2 Settings:

Output Buffer	Enable
Trigger	None

7.4. RCC

High Speed Clock (HSE): Crystal/Ceramic Resonator

7.4.1. Parameter Settings:

System Parameters:

VDD voltage (V)	3.3
Instruction Cache	Enabled
Prefetch Buffer	Enabled
Data Cache	Enabled
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 Regulatror Voltage Scale	Power Regulator Voltage Scale 1

7.5. SYS

Debug: Serial Wire

Timebase Source: SysTick

7.6. TIM1

Trigger Source: ITR0

7.6.1. 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 - 8 bits value)	0
Slave Mode Controller	Slave mode 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)

7.7. TIM2

Combined Channels: Encoder Mode

7.7.1. 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

Trigger Output (TRGO) Parameters:

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

Encoder:

Encoder Mode	Encoder Mode TI1
____ 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

7.8. TIM5

Combined Channels: Encoder Mode

7.8.1. 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

Trigger Output (TRGO) Parameters:

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

Encoder:

Encoder Mode	Encoder Mode TI1
____ 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

7.9. USART6

Mode: Asynchronous

7.9.1. 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	PA2	ADC1_IN2	Analog mode	No pull-up and no pull-down	n/a	
	PA3	ADC1_IN3	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	
CAN1	PB8	CAN1_RX	Alternate Function Push Pull	No pull-up and no pull-down	**High ***	
	PB9	CAN1_TX	Alternate Function Push Pull	No pull-up and no pull-down	**High ***	
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	
SYS	PA13	SYS_JTMS-SWDIO	n/a	n/a	n/a	
	PA14	SYS_JTCK-SWCLK	n/a	n/a	n/a	
TIM2	PA15	TIM2_CH1	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PB3	TIM2_CH2	Alternate Function Push Pull	No pull-up and no pull-down	Low	
TIM5	PA0	TIM5_CH1	Alternate Function Push Pull	No pull-up and no pull-down	Low	
	PA1	TIM5_CH2	Alternate Function Push Pull	No pull-up and no pull-down	Low	
USART6	PA11	USART6_TX	Alternate Function Push Pull	Pull-up	**High ***	
	PA12	USART6_RX	Alternate Function Push Pull	Pull-up	**High ***	
GPIO	PC13	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	RS485SW
	PC14-OSC32_IN	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED
	PC15-OSC32_OUT	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	ROT_INDEX
	PA6	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	STEP_GRIP
	PA7	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	STEP_ROT
	PB1	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	MS1_ROT
	PB2	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	MS2_ROT
	PB10	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	MS3_ROT
	PB12	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	SLEEP_ROT
	PB13	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	DIR_ROT
	PB14	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	MS1_GRIP
	PB15	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	MS2_GRIP

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
	PA8	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	MS3_GRIP
	PA9	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	SLEEP_GRIP
	PA10	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	DIR_GRIP
	PB4	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	GRIP_INDEX
	PB7	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	CAN_SILENT

8.2. DMA configuration

nothing configured in DMA service

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
PVD interrupt through EXTI line 16	unused		
Flash global interrupt	unused		
RCC global interrupt	unused		
ADC1 global interrupt	unused		
CAN1 TX interrupts	unused		
CAN1 RX0 interrupts	unused		
CAN1 RX1 interrupt	unused		
CAN1 SCE interrupt	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		
TIM5 global interrupt	unused		
TIM6 global interrupt, DAC1 and DAC2 underrun error interrupts	unused		
USART6 global interrupt	unused		
FPU global interrupt	unused		

*** User modified value**

9. Software Pack Report