

## 1. Description

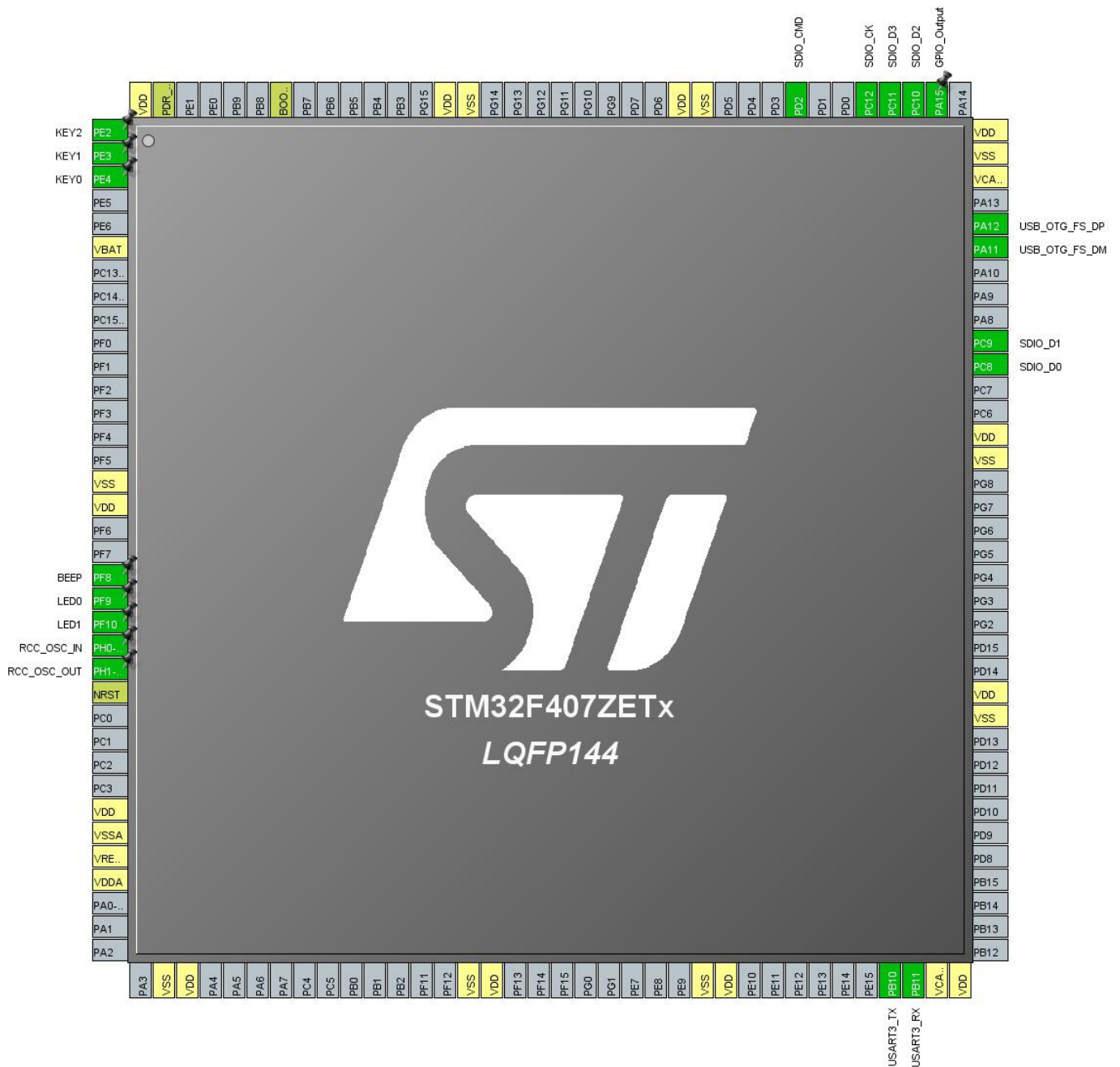
### 1.1. Project

Project Name	explorer
Board Name	custom
Generated with:	STM32CubeMX 5.0.0
Date	11/28/2018

### 1.2. MCU

MCU Series	STM32F4
MCU Line	STM32F407/417
MCU name	STM32F407ZETx
MCU Package	LQFP144
MCU Pin number	144

## 2. Pinout Configuration



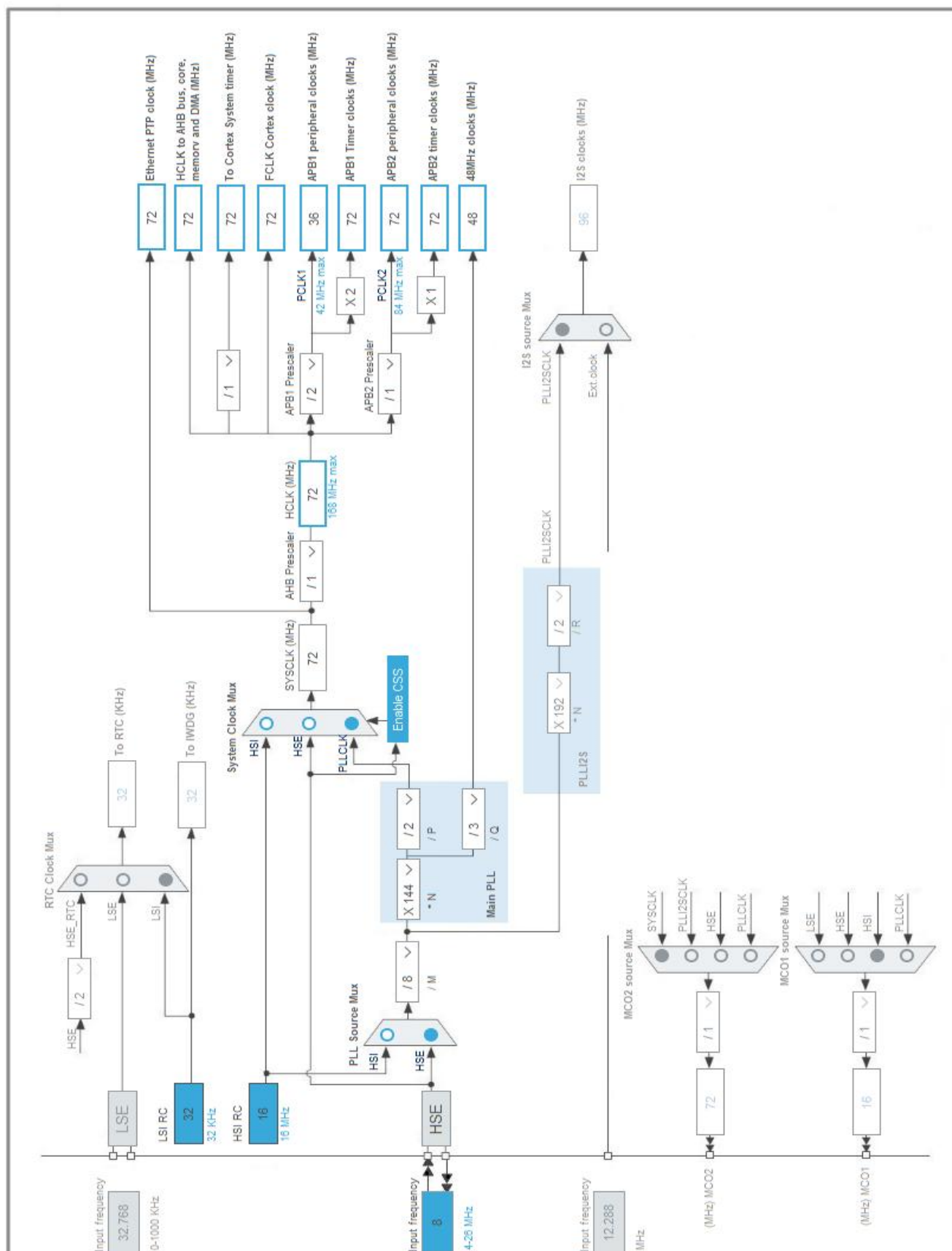
### 3. Pins Configuration

Pin Number LQFP144	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
1	PE2 *	I/O	GPIO_Input	KEY2
2	PE3 *	I/O	GPIO_Input	KEY1
3	PE4 *	I/O	GPIO_Input	KEY0
6	VBAT	Power		
16	VSS	Power		
17	VDD	Power		
20	PF8 *	I/O	GPIO_Output	BEEP
21	PF9 *	I/O	GPIO_Output	LED0
22	PF10 *	I/O	GPIO_Output	LED1
23	PH0-OSC_IN	I/O	RCC_OSC_IN	
24	PH1-OSC_OUT	I/O	RCC_OSC_OUT	
25	NRST	Reset		
30	VDD	Power		
31	VSSA	Power		
32	VREF+	Power		
33	VDDA	Power		
38	VSS	Power		
39	VDD	Power		
51	VSS	Power		
52	VDD	Power		
61	VSS	Power		
62	VDD	Power		
69	PB10	I/O	USART3_TX	
70	PB11	I/O	USART3_RX	
71	VCAP_1	Power		
72	VDD	Power		
83	VSS	Power		
84	VDD	Power		
94	VSS	Power		
95	VDD	Power		
98	PC8	I/O	SDIO_D0	
99	PC9	I/O	SDIO_D1	
103	PA11	I/O	USB_OTG_FS_DM	
104	PA12	I/O	USB_OTG_FS_DP	
106	VCAP_2	Power		
107	VSS	Power		

Pin Number LQFP144	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
108	VDD	Power		
110	PA15 *	I/O	GPIO_Output	
111	PC10	I/O	SDIO_D2	
112	PC11	I/O	SDIO_D3	
113	PC12	I/O	SDIO_CK	
116	PD2	I/O	SDIO_CMD	
120	VSS	Power		
121	VDD	Power		
130	VSS	Power		
131	VDD	Power		
138	BOOT0	Boot		
143	PDR_ON	Reset		
144	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	explorer
Project Folder	C:\other\workspace\explorer
Toolchain / IDE	Makefile
Firmware Package Name and Version	STM32Cube FW_F4 V1.22.0

### 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	STM32F407/417
MCU	STM32F407ZETx
Datasheet	022152_Rev8

### 6.2. Parameter Selection

Temperature	25
Vdd	3.3

## 7. IPs and Middleware Configuration

### 7.1. RCC

#### High Speed Clock (HSE): Crystal/Ceramic Resonator

##### 7.1.1. Parameter Settings:

###### System Parameters:

VDD voltage (V)	3.3
Instruction Cache	Enabled
Prefetch Buffer	Enabled
Data Cache	Enabled
Flash Latency(WS)	2 WS (3 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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### 7.2. SDIO

#### Mode: SD 4 bits Wide bus

##### 7.2.1. Parameter Settings:

###### SDIO parameters:

Clock transition on which the bit capture is made	Rising transition
SDIO Clock divider bypass	Disable
SDIO Clock output enable when the bus is idle	Disable the power save for the clock
SDIO hardware flow control	The hardware control flow is disabled
SDIOCLK clock divide factor	0

### 7.3. SYS

#### Timebase Source: TIM6

### 7.4. USART3

#### Mode: Asynchronous



### 7.4.1. 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

## 7.5. USB\_OTG\_FS

### Mode: Device\_Only

#### 7.5.1. 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	Disabled
Signal start of frame	Disabled

## 7.6. FREERTOS

### mode: Enabled

#### 7.6.1. Config parameters:

#### Versions:

FreeRTOS version	9.0.0
CMSIS-RTOS version	1.02

#### Kernel settings:

USE_PREEMPTION	Enabled
CPU_CLOCK_HZ	SystemCoreClock
TICK_RATE_HZ	<b>100 *</b>
MAX_PRIORITIES	7
MINIMAL_STACK_SIZE	128
MAX_TASK_NAME_LEN	16

USE_16_BIT_TICKS	Disabled
IDLE_SHOULD_YIELD	Enabled
USE_MUTEXES	Enabled
USE_RECURSIVE_MUTEXES	Disabled
USE_COUNTING_SEMAPHORES	Disabled
QUEUE_REGISTRY_SIZE	8
USE_APPLICATION_TASK_TAG	Disabled
ENABLE_BACKWARD_COMPATIBILITY	Enabled
USE_PORT_OPTIMISED_TASK_SELECTION	Enabled
USE_TICKLESS_IDLE	Disabled
USE_TASK_NOTIFICATIONS	Enabled

#### Memory management settings:

Memory Allocation	Dynamic
TOTAL_HEAP_SIZE	15360
Memory Management scheme	heap_4

#### Hook function related definitions:

USE_IDLE_HOOK	Disabled
USE_TICK_HOOK	Disabled
USE_MALLOC_FAILED_HOOK	Disabled
USE_DAEMON_TASK_STARTUP_HOOK	Disabled
CHECK_FOR_STACK_OVERFLOW	Disabled

#### Run time and task stats gathering related definitions:

GENERATE_RUN_TIME_STATS	Disabled
USE_TRACE_FACILITY	Disabled
USE_STATS_FORMATTING_FUNCTIONS	Disabled

#### Co-routine related definitions:

USE_CO_ROUTINES	Disabled
MAX_CO_ROUTINE_PRIORITIES	2

#### Software timer definitions:

USE_TIMERS	Disabled
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#### Interrupt nesting behaviour configuration:

LIBRARY_LOWEST_INTERRUPT_PRIORITY	15
LIBRARY_MAX_SYSCALL_INTERRUPT_PRIORITY	5

### 7.6.2. Include parameters:

#### Include definitions:

vTaskPrioritySet	Enabled
uxTaskPriorityGet	Enabled
vTaskDelete	Enabled
vTaskCleanUpResources	Disabled

vTaskSuspend	Enabled
vTaskDelayUntil	Disabled
vTaskDelay	Enabled
xTaskGetSchedulerState	Enabled
xTaskResumeFromISR	Enabled
xQueueGetMutexHolder	Disabled
xSemaphoreGetMutexHolder	Disabled
pcTaskGetTaskName	Disabled
uxTaskGetStackHighWaterMark	Disabled
xTaskGetCurrentTaskHandle	Disabled
eTaskGetState	Disabled
xEventGroupSetBitFromISR	Disabled
xTimerPendFunctionCall	Disabled
xTaskAbortDelay	Disabled
xTaskGetHandle	Disabled

## 7.7. USB\_DEVICE

### Class For FS IP: Mass Storage Class

#### 7.7.1. 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

##### Class Parameters:

MSC_MEDIA_PACKET (Media I/O buffer Size)	512
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#### 7.7.2. 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)	22314
PRODUCT_STRING (Product Identifier)	STM32 Mass Storage

SERIALNUMBER_STRING (Serial number)	00000000001A
CONFIGURATION_STRING (Configuration Identifier)	MSC Config
INTERFACE_STRING (Interface Identifier)	MSC Interface

\* **User modified value**

## 8. System Configuration

### 8.1. 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	
SDIO	PC8	SDIO_D0	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PC9	SDIO_D1	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PC10	SDIO_D2	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PC11	SDIO_D3	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PC12	SDIO_CK	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
	PD2	SDIO_CMD	Alternate Function Push Pull	No pull-up and no pull-down	Very High	
USART3	PB10	USART3_TX	Alternate Function Push Pull	Pull-up	High *	
	PB11	USART3_RX	Alternate Function Push Pull	Pull-up	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	PE2	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	KEY2
	PE3	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	KEY1
	PE4	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	KEY0
	PF8	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	BEEP
	PF9	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED0
	PF10	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	LED1
	PA15	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	

## 8.2. DMA configuration

DMA request	Stream	Direction	Priority
SDIO_RX	DMA2_Stream3	Peripheral To Memory	Low
SDIO_TX	DMA2_Stream6	Memory To Peripheral	Low

### SDIO\_RX: DMA2\_Stream3 DMA request Settings:

Mode: **Peripheral Flow Control \***

Use fifo: **Enable \***

FIFO Threshold: Full

Peripheral Increment: Disable

Memory Increment: **Enable \***

Peripheral Data Width: **Word \***

Memory Data Width: Word

Peripheral Burst Size: **4 Increment \***

Memory Burst Size: 4 Increment

### SDIO\_TX: DMA2\_Stream6 DMA request Settings:

Mode: **Peripheral Flow Control \***

Use fifo: **Enable \***

FIFO Threshold: Full

Peripheral Increment: Disable

Memory Increment: **Enable \***

Peripheral Data Width: **Word \***

Memory Data Width: Word

Peripheral Burst Size: **4 Increment \***

Memory Burst Size: 4 Increment

### 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	15	0
System tick timer	true	15	0
SDIO global interrupt	true	5	0
TIM6 global interrupt, DAC1 and DAC2 underrun error interrupts	true	0	0
DMA2 stream3 global interrupt	true	5	0
USB On The Go FS global interrupt	true	5	0
DMA2 stream6 global interrupt	true	5	0
PVD interrupt through EXTI line 16	unused		
Flash global interrupt	unused		
RCC global interrupt	unused		
USART3 global interrupt	unused		
FPU global interrupt	unused		

\* User modified value

## ***9. Software Pack Report***