



1. Description

1.1. Project

Project Name	STCubeGenerated
Board Name	custom
Generated with:	STM32CubeMX 6.11.1
Date	06/20/2024

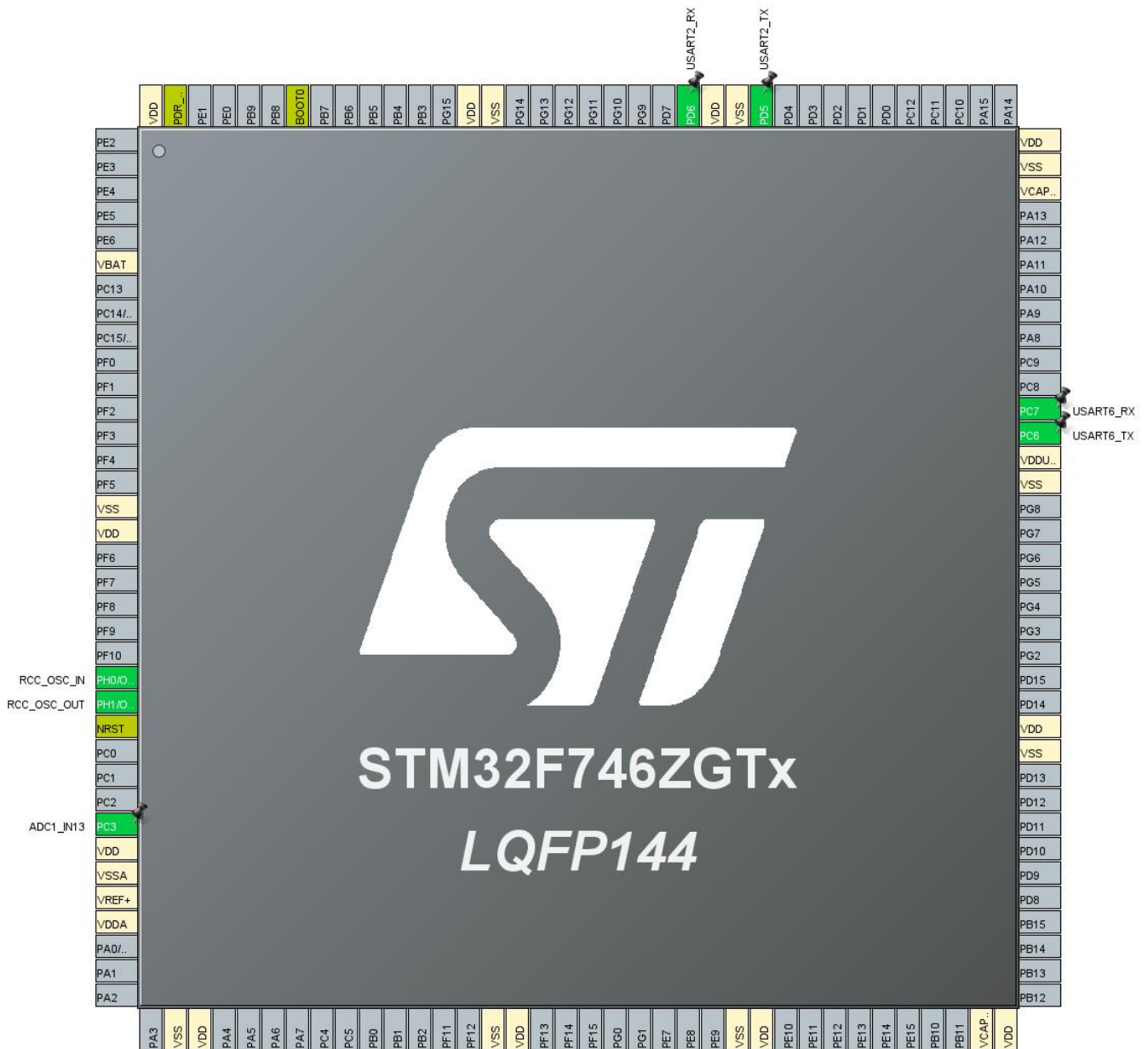
1.2. MCU

MCU Series	STM32F7
MCU Line	STM32F7x6
MCU name	STM32F746ZGTx
MCU Package	LQFP144
MCU Pin number	144

1.3. Core(s) information

Core(s)	Arm Cortex-M7
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2. Pinout Configuration



3. Pins Configuration

Pin Number LQFP144	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
6	VBAT	Power		
16	VSS	Power		
17	VDD	Power		
23	PH0/OSC_IN	I/O	RCC_OSC_IN	
24	PH1/OSC_OUT	I/O	RCC_OSC_OUT	
25	NRST	Reset		
29	PC3	I/O	ADC1_IN13	
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		
71	VCAP_1	Power		
72	VDD	Power		
83	VSS	Power		
84	VDD	Power		
94	VSS	Power		
95	VDDUSB	Power		
96	PC6	I/O	USART6_TX	
97	PC7	I/O	USART6_RX	
106	VCAP_2	Power		
107	VSS	Power		
108	VDD	Power		
119	PD5	I/O	USART2_TX	
120	VSS	Power		
121	VDD	Power		
122	PD6	I/O	USART2_RX	
130	VSS	Power		
131	VDD	Power		
138	BOOT0	Boot		
143	PDR_ON	Reset		

Pin Number LQFP144	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
144	VDD	Power		

5. Software Project

5.1. Project Settings

Name	Value
Project Name	STCubeGenerated
Project Folder	C:\Users\Tobias
Toolchain / IDE	Makefile
Firmware Package Name and Version	STM32Cube FW_F7 V1.17.1
Application Structure	Basic
Generate Under Root	No
Do not generate the main()	No
Minimum Heap Size	0x200
Minimum Stack Size	0x400

5.2. Code Generation Settings

Name	Value
STM32Cube MCU packages and embedded software	Add necessary library files as reference in the toolchain project configuration file
Generate peripheral initialization as a pair of '.c/.h' files	No
Backup previously generated files when re-generating	No
Keep User Code when re-generating	Yes
Delete previously generated files when not re-generated	Yes
Set all free pins as analog (to optimize the power consumption)	No
Enable Full Assert	No

5.3. Advanced Settings - Generated Function Calls

Rank	Function Name	Peripheral Instance Name
1	SystemClock_Config	RCC
2	MX_GPIO_Init	GPIO
3	MX_DMA_Init	DMA
4	MX_USART6_UART_Init	USART6
5	MX_USART2_UART_Init	USART2
6	MX_ADC1_Init	ADC1
7	MX_CRC_Init	CRC

1. Power Consumption Calculator report

1.1. Microcontroller Selection

Series	STM32F7
Line	STM32F7x6
MCU	STM32F746ZGTx
Datasheet	DS10916_Rev4

1.2. Parameter Selection

Temperature	25
Vdd	3.3

1.3. Battery Selection

Battery	Alkaline(9V)
Capacity	625.0 mAh
Self Discharge	0.3 %/month
Nominal Voltage	9.0 V
Max Cont Current	200.0 mA
Max Pulse Current	0.0 mA
Cells in series	1
Cells in parallel	1

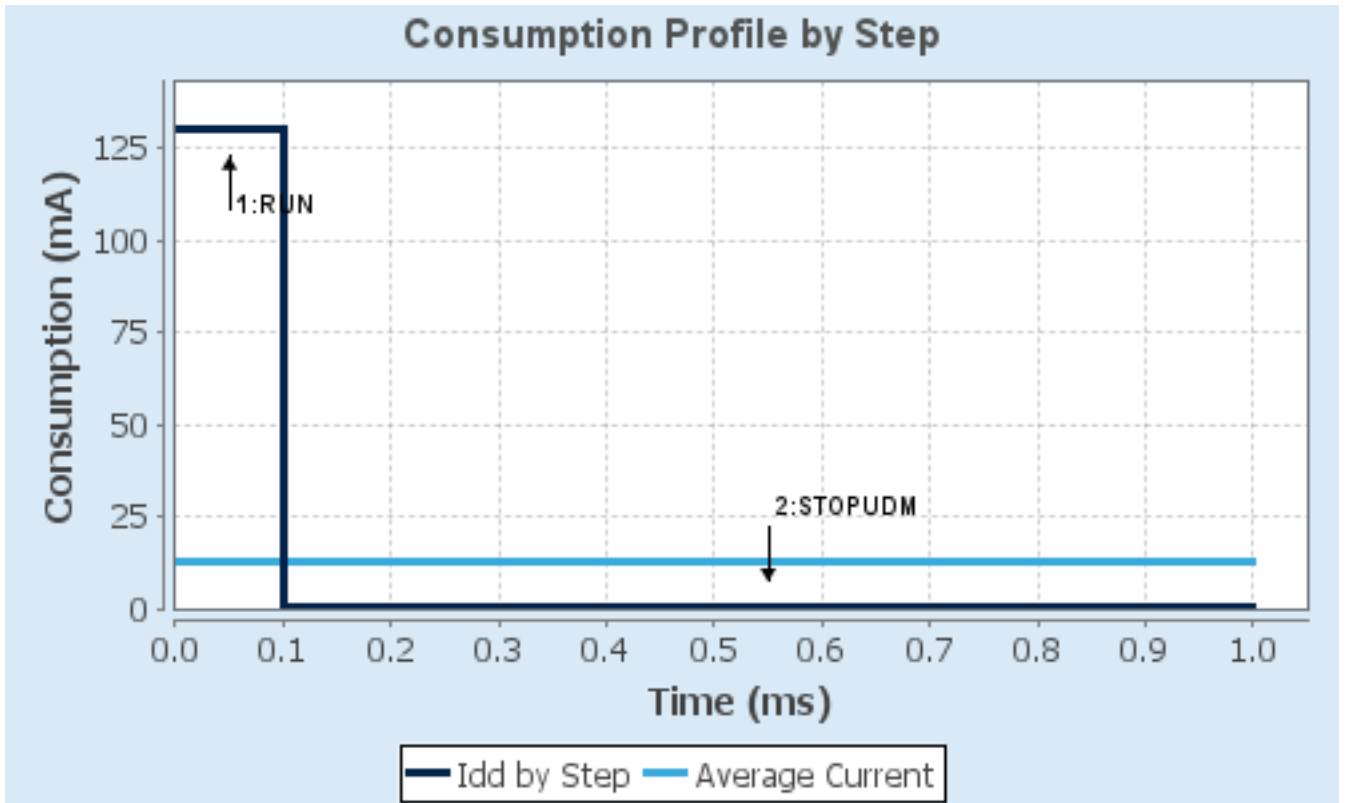
1.4. Sequence

Step	Step1	Step2
Mode	RUN	STOP UDM (Under Drive)
Vdd	3.3	3.3
Voltage Source	Battery	Battery
Range	Scale1-High	No Scale
Fetch Type	ITCM/FLASH/REGON	n/a
CPU Frequency	216 MHz	0 Hz
Clock Configuration	HSE PLL	Regulator LP Flash-PwrDwn
Clock Source Frequency	4 MHz	0 Hz
Peripherals		
Additional Cons.	0 mA	0 mA
Average Current	130 mA	100 μ A
Duration	0.1 ms	0.9 ms
DMIPS	462.0	0.0
Ta Max	87.84	104.99
Category	In DS Table	In DS Table

1.5. Results

Sequence Time	1 ms	Average Current	13.09 mA
Battery Life	1 day, 23 hours	Average DMIPS	462.24005 DMIPS

1.6. Chart



2. Peripherals and Middlewares Configuration

2.1. ADC1

mode: IN13

2.1.1. 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 Disabled

Continuous Conversion Mode Disabled

Discontinuous Conversion Mode Disabled

DMA Continuous Requests Disabled

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

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 13

Sampling Time **56 Cycles ***

ADC_Injected_ConversionMode:

Number Of Conversions 0

WatchDog:

Enable Analog WatchDog Mode false

2.2. CORTEX_M7

2.2.1. Parameter Settings:

Speculation default mode Settings:

Speculation default mode Disabled

Cortex Interface Settings:

Flash Interface AXI Interface

ART ACCELERATOR Disabled

Instruction Prefetch **Enabled ***

CPU ICache **Enabled ***

CPU DCache **Enabled ***

Cortex Memory Protection Unit Control Settings:

MPU Control Mode **Background Region Privileged accesses only + MPU Disabled during hard fault, NMI and FAULTMASK handlers ***

Cortex Memory Protection Unit Region 0 Settings:

MPU Region **Enabled ***

MPU Region Base Address **0x0 ***

MPU Region Size **4GB ***

MPU SubRegion Disable **0x87 ***

MPU TEX field level level 0

MPU Access Permission ALL ACCESS NOT PERMITTED

MPU Instruction Access **DISABLE ***

MPU Shareability Permission **ENABLE ***

MPU Cacheable Permission DISABLE

MPU Bufferable Permission DISABLE

Cortex Memory Protection Unit Region 1 Settings:

MPU Region Disabled

Cortex Memory Protection Unit Region 2 Settings:

MPU Region Disabled

Cortex Memory Protection Unit Region 3 Settings:

MPU Region Disabled

Cortex Memory Protection Unit Region 4 Settings:

MPU Region Disabled

Cortex Memory Protection Unit Region 5 Settings:

MPU Region Disabled

Cortex Memory Protection Unit Region 6 Settings:

MPU Region Disabled

Cortex Memory Protection Unit Region 7 Settings:

MPU Region Disabled

2.3. CRC

mode: Activated

2.3.1. Parameter Settings:

Basic Parameters:

Default Polynomial State Enable

Default Init Value State	Enable
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Advanced Parameters:

Input Data Inversion Mode	None
Output Data Inversion Mode	Disable
Input Data Format	Bytes

2.4. RCC

High Speed Clock (HSE): BYPASS Clock Source

2.4.1. Parameter Settings:

System Parameters:

VDD voltage (V)	3.3
Flash Latency(WS)	7 WS (8 CPU cycle)

RCC Parameters:

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

Power Parameters:

Power Over Drive	Enabled
Power Regulator Voltage Scale	Power Regulator Voltage Scale 1

2.5. SYS

Timebase Source: TIM6

2.6. USART2

Mode: Asynchronous

2.6.1. 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

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

2.7.1. Parameter Settings:

Baud Rate	115200
Word Length	8 Bits (including Parity)
Parity	None
Stop Bits	1

Data Direction	Receive and Transmit
Over Sampling	16 Samples
Single Sample	Disable

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

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3. System Configuration

3.1. GPIO configuration

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
ADC1	PC3	ADC1_IN13	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	
USART2	PD5	USART2_TX	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	
	PD6	USART2_RX	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	
USART6	PC6	USART6_TX	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	
	PC7	USART6_RX	Alternate Function Push Pull	No pull-up and no pull-down	Very High *	

3.2. DMA configuration

DMA request	Stream	Direction	Priority
USART6_RX	DMA2_Stream1	Peripheral To Memory	Medium *
USART6_TX	DMA2_Stream6	Memory To Peripheral	Medium *
USART2_RX	DMA1_Stream5	Peripheral To Memory	Low
USART2_TX	DMA1_Stream6	Memory To Peripheral	Low

USART6_RX: DMA2_Stream1 DMA request Settings:

Mode: **Circular ***
 Use fifo: **Enable ***
 FIFO Threshold: Full
 Peripheral Increment: Disable
 Memory Increment: **Enable ***
 Peripheral Data Width: Byte
 Memory Data Width: Byte
 Peripheral Burst Size: Single
 Memory Burst Size: Single

USART6_TX: DMA2_Stream6 DMA request Settings:

Mode: Normal
 Use fifo: **Enable ***
 FIFO Threshold: Full
 Peripheral Increment: Disable
 Memory Increment: **Enable ***
 Peripheral Data Width: Byte
 Memory Data Width: Byte
 Peripheral Burst Size: Single
 Memory Burst Size: Single

USART2_RX: DMA1_Stream5 DMA request Settings:

Mode: **Circular ***
 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

3.3. NVIC configuration

3.3.1. NVIC

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	15	0
DMA1 stream5 global interrupt	true	0	0
DMA1 stream6 global interrupt	true	0	0
USART2 global interrupt	true	0	0
TIM6 global interrupt, DAC1 and DAC2 underrun error interrupts	true	15	0
DMA2 stream1 global interrupt	true	0	0
DMA2 stream6 global interrupt	true	0	0
USART6 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		
FPU global interrupt	unused		

3.3.2. NVIC Code generation

Enabled interrupt Table	Select for init sequence ordering	Generate IRQ handler	Call HAL handler
Non maskable interrupt	false	false	false
Hard fault interrupt	false	false	false
Memory management fault	false	false	false
Pre-fetch fault, memory access fault	false	false	false
Undefined instruction or illegal state	false	false	false
System service call via SWI instruction	false	false	false
Debug monitor	false	false	false
Pendable request for system service	false	false	false
System tick timer	false	false	true
DMA1 stream5 global interrupt	false	true	true
DMA1 stream6 global interrupt	false	true	true

Enabled interrupt Table	Select for init sequence ordering	Generate IRQ handler	Call HAL handler
USART2 global interrupt	false	true	true
TIM6 global interrupt, DAC1 and DAC2 underrun error interrupts	false	true	true
DMA2 stream1 global interrupt	false	true	true
DMA2 stream6 global interrupt	false	true	true
USART6 global interrupt	false	true	true

* User modified value

4. System Views

4.1. Category view

4.1.1. Current

Middleware

System Core

CORTEX_M7 

DMA 

GPIO 

IVIC 

RCC 

SYS 

Analog

ADC1 

Timers

Connectivity

USART2 

USART6 

Multimedia

Security

Computing

CRC 

5. Docs & Resources

Type	Link
BSDL files	https://www.st.com/resource/en/bsdl_model/stm32f7_bsdl.zip
IBIS models	https://www.st.com/resource/en/ibis_model/stm32f7_ibis.zip
System View Description	https://www.st.com/resource/en/svd/stm32f7-svd.zip
Presentations	https://www.st.com/resource/en/product_presentation/stm32-stm8_embedded_software_solutions.pdf
Presentations	https://www.st.com/resource/en/product_presentation/stm32_eval_tools_portfolio.pdf
Presentations	https://www.st.com/resource/en/product_presentation/stm32_stm8_functional-safety-packages.pdf
Presentations	https://www.st.com/resource/en/product_presentation/stm32-stm8_software_development_tools.pdf
Presentations	https://www.st.com/resource/en/product_presentation/microcontrollers-stm32-family-overview.pdf
Brochures	https://www.st.com/resource/en/brochure/brstm32f7.pdf
Brochures	https://www.st.com/resource/en/brochure/products-and-solutions-for-plcs-and-smart-i-os.pdf
Flyers	https://www.st.com/resource/en/flyer/flstm32nucleo.pdf
Flyers	https://www.st.com/resource/en/flyer/flstmcsuite.pdf
Flyers	https://www.st.com/resource/en/flyer/flstm32trust.pdf
Flyers	https://www.st.com/resource/en/flyer/flstm32gui.pdf
Application Notes	https://www.st.com/resource/en/application_note/an1181-electrostatic-discharge-sensitivity-measurement-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an1709-emc-design-guide-for-stm8-stm32-and-legacy-mcus-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an2606-stm32-microcontroller-system-memory-boot-mode-stmicroelectronics.pdf
Application Notes	https://www.st.com/resource/en/application_note/an2639-soldering-recommendations-and-package-information-for-leadfree-ecopack-mcus-

and-mpus-stmicroelectronics.pdf

- Application Notes https://www.st.com/resource/en/application_note/an2867-oscillator-design-guide-for-stm8afals-stm32-mcus-and-mpus-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an3126-audio-and-waveform-generation-using-the-dac-in-stm32-products-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an3154-can-protocol-used-in-the-stm32-bootloader-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an3155-usart-protocol-used-in-the-stm32-bootloader-stmicroelectronics.pdf
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- Application Notes https://www.st.com/resource/en/application_note/an4013-stm32-crossseries-timer-overview-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an4031-using-the-stm32f2-stm32f4-and-stm32f7-series-dma-controller-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an4221-i2c-protocol-used-in-the-stm32-bootloader-stmicroelectronics.pdf
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- Application Notes https://www.st.com/resource/en/application_note/an4277-using-stm32-device-pwm-shutdown-features-for-motor-control-and-digital-power-conversion-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an4286-spi-protocol-used-in-the-stm32-bootloader-stmicroelectronics.pdf
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- Application Notes https://www.st.com/resource/en/application_note/an4655-virtually-increasing-the-number-of-serial-communication-peripherals-in-stm32-applications-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an4660-migration-of-

microcontroller-applications-from-stm32f42xxxf43xxx-devices-to-stm32f7-series-devices-stmicroelectronics.pdf

- Application Notes https://www.st.com/resource/en/application_note/an4661-getting-started-with-stm32f7-series-mcu-hardware-development-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an4676-stm32f7-series-peripheral-interconnections-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an4731-stm32cube-mcu-package-examples-for-stm32f7-series-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an4750-handling-of-soft-errors-in-stm32-applications-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an4759-using-the-hardware-realtime-clock-rtc-and-the-tamper-management-unit-tamp-with-stm32-microcontrollers-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an4776-generalpurpose-timer-cookbook-for-stm32-microcontrollers-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an4803-highspeed-si-simulations-using-ibis-and-boardlevel-simulations-using-hyperlynx-si-on-stm32-mcus-and-mpus-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an4839-level-1-cache-on-stm32f7-series-and-stm32h7-series-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an4850-stm32-mcus-spreadspectrum-clock-generation-principles-properties-and-implementation-stmicroelectronics.pdf
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- Application Notes https://www.st.com/resource/en/application_note/an4936-migration-of-microcontroller-applications-from-stm32f7-series-to-stm32h743753-line-stmicroelectronics.pdf
- Application Notes https://www.st.com/resource/en/application_note/an4946-migration-of-microcontroller-applications-between-stm32f72xxxf73xxx-and-stm32f74xxxf75xxx-microcontrollers-stmicroelectronics.pdf

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& Software

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for related Tools & Software with-stemwin-library-stmicroelectronics.pdf

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