



1. Description

1.1. Project

| | |
|-----------------|-------------------|
| Project Name | EX_9 |
| Board Name | custom |
| Generated with: | STM32CubeMX 6.2.1 |
| Date | 04/12/2021 |

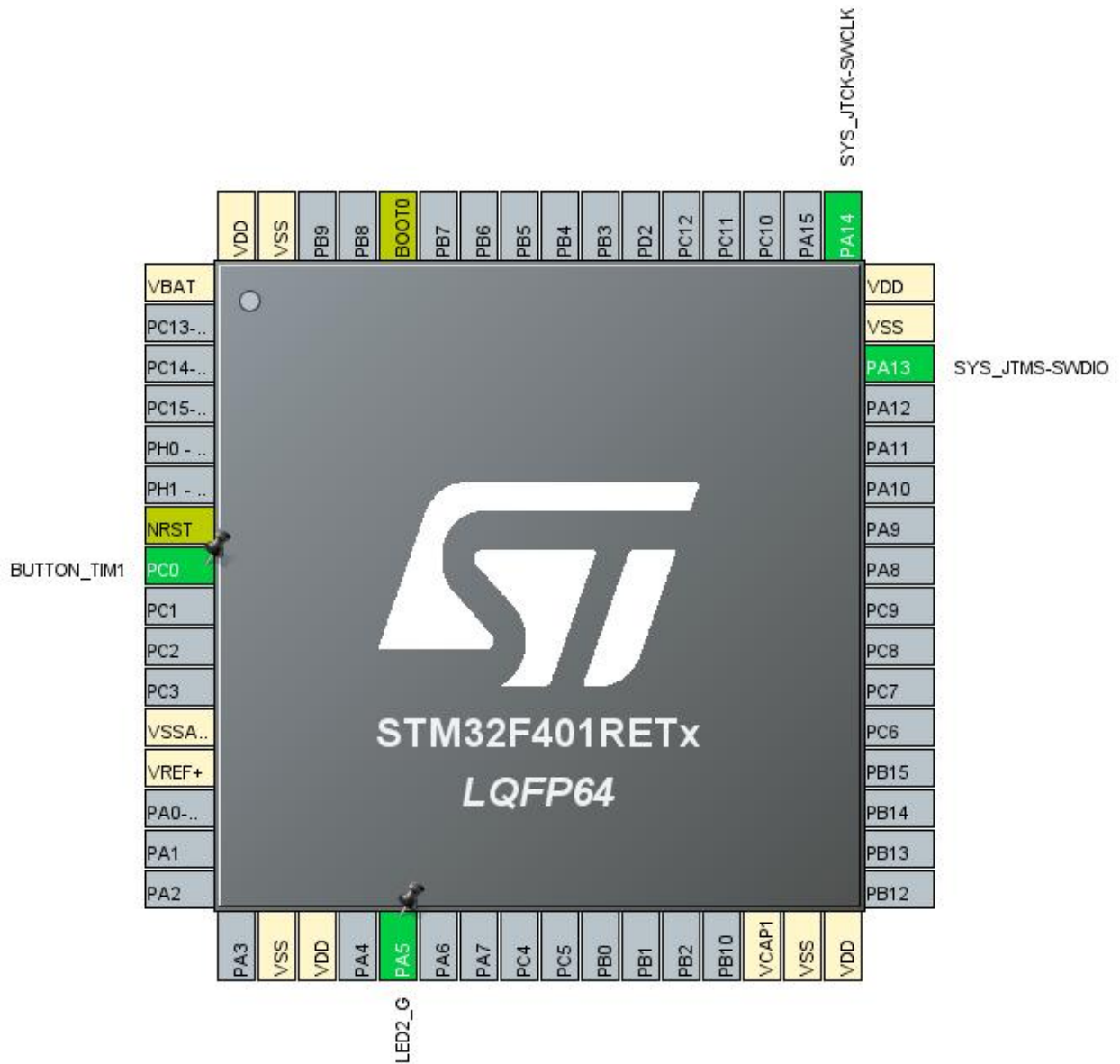
1.2. MCU

| | |
|----------------|---------------|
| MCU Series | STM32F4 |
| MCU Line | STM32F401 |
| MCU name | STM32F401RETx |
| MCU Package | LQFP64 |
| MCU Pin number | 64 |

1.3. Core(s) information

| | |
|---------|---------------|
| Core(s) | Arm Cortex-M4 |
|---------|---------------|

2. Pinout Configuration

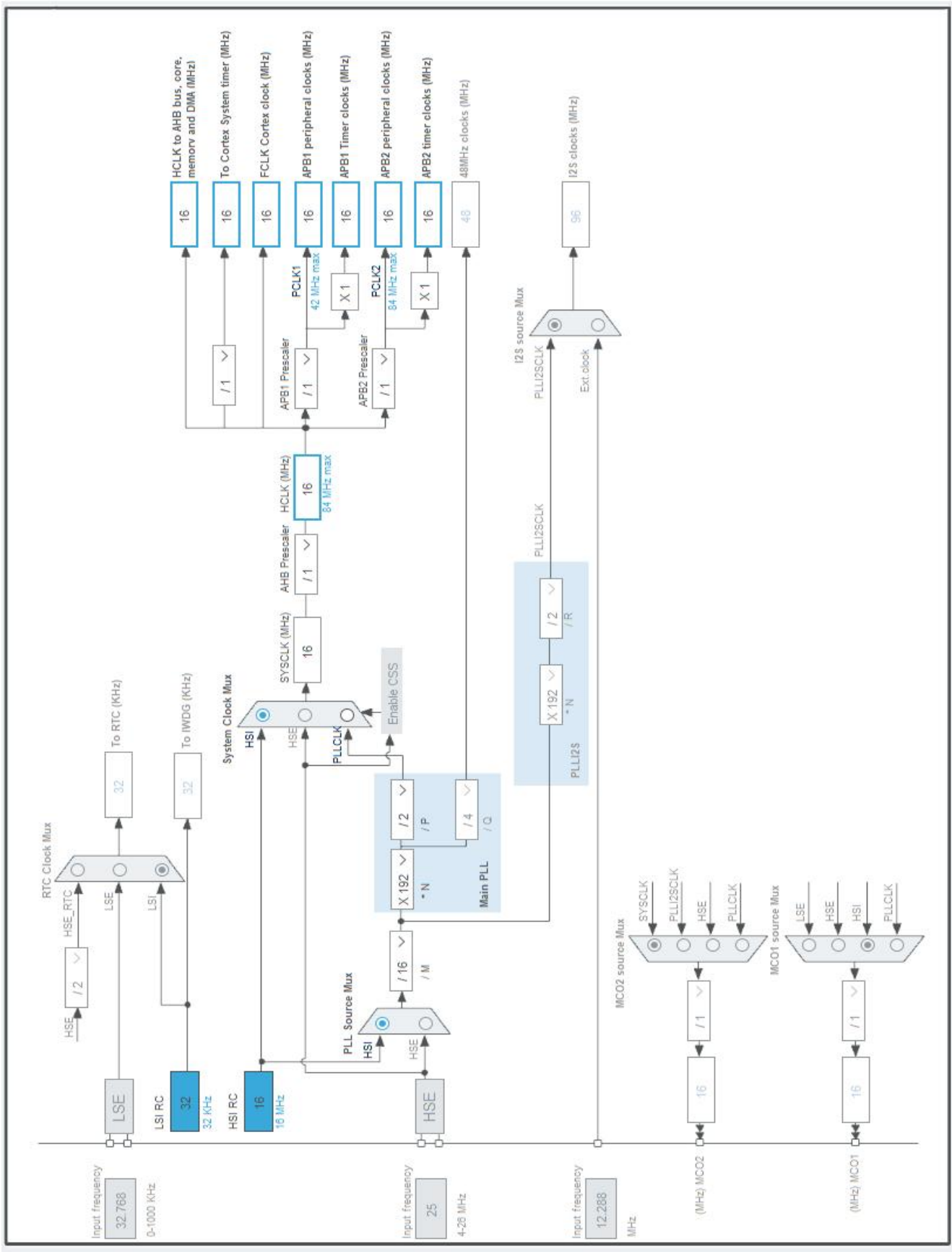


3. Pins Configuration

| Pin Number LQFP64 | Pin Name (function after reset) | Pin Type | Alternate Function(s) | Label |
|----------------------|---------------------------------------|----------|--------------------------|-------------|
| 1 | VBAT | Power | | |
| 7 | NRST | Reset | | |
| 8 | PC0 * | I/O | GPIO_Input | BUTTON_TIM1 |
| 12 | VSSA/VREF- | Power | | |
| 13 | VREF+ | Power | | |
| 18 | VSS | Power | | |
| 19 | VDD | Power | | |
| 21 | PA5 * | I/O | GPIO_Output | LED2_G |
| 30 | VCAP1 | Power | | |
| 31 | VSS | Power | | |
| 32 | VDD | Power | | |
| 46 | PA13 | I/O | SYS_JTMS-SWDIO | |
| 47 | VSS | Power | | |
| 48 | VDD | Power | | |
| 49 | PA14 | I/O | SYS_JTCK-SWCLK | |
| 60 | BOOT0 | Boot | | |
| 63 | VSS | Power | | |
| 64 | 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 | EX_9.6_Simple_timeout_application |
| Project Folder | C:\Users\LUIS ARRES\STM32CubeIDE\workspace_1.6.0\PROJECTS MOOC |
| Toolchain / IDE | STM32CubeIDE |
| Firmware Package Name and Version | STM32Cube FW_F4 V1.26.1 |
| Application Structure | Advanced |
| Generate Under Root | Yes |
| 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 | Copy only the necessary library files |
| Generate peripheral initialization as a pair of '.c/.h' files | Yes |
| 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 | MX_GPIO_Init | GPIO |
| 2 | SystemClock_Config | RCC |
| 3 | MX_TIM1_Init | TIM1 |

6. Power Consumption Calculator report

6.1. Microcontroller Selection

| | |
|-----------|---------------|
| Series | STM32F4 |
| Line | STM32F401 |
| MCU | STM32F401RETx |
| Datasheet | DS10086_Rev3 |

6.2. Parameter Selection

| | |
|-------------|-----|
| Temperature | 25 |
| Vdd | 3.3 |

6.3. Battery Selection

| | |
|-------------------|-----------------|
| Battery | Li-SOCL2(A3400) |
| Capacity | 3400.0 mAh |
| Self Discharge | 0.08 %/month |
| Nominal Voltage | 3.6 V |
| Max Cont Current | 100.0 mA |
| Max Pulse Current | 200.0 mA |
| Cells in series | 1 |
| Cells in parallel | 1 |

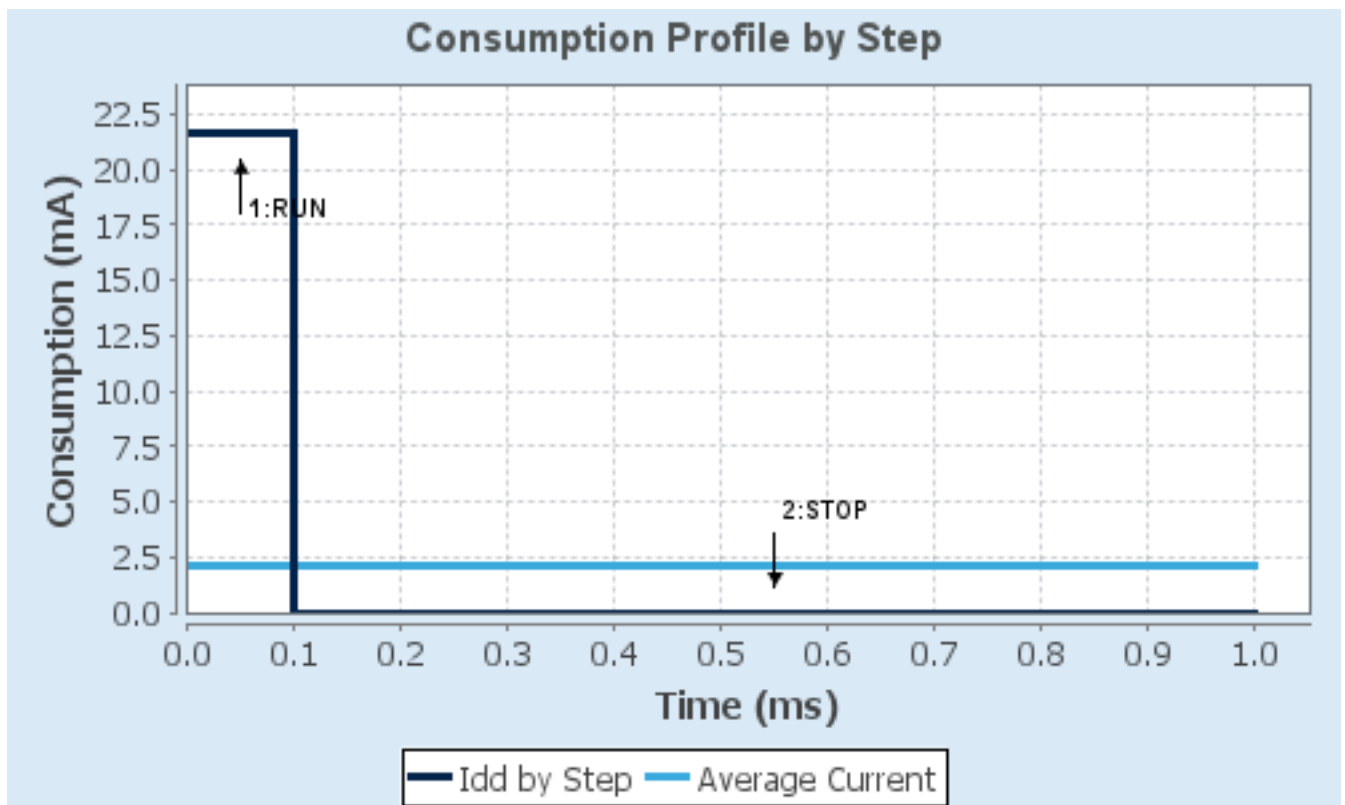
6.4. Sequence

| | | |
|-------------------------------|--------------------|-----------------------------|
| Step | Step1 | Step2 |
| Mode | RUN | STOP |
| Vdd | 3.3 | 3.3 |
| Voltage Source | Battery | Battery |
| Range | Scale2-Medium | No Scale |
| Fetch Type | FLASH/ART/PREFETCH | n/a |
| CPU Frequency | 84 MHz | 0 Hz |
| Clock Configuration | HSE PLL | Regulator_LPLV Flash-PwrDwn |
| Clock Source Frequency | 4 MHz | 0 Hz |
| Peripherals | | |
| Additional Cons. | 0 mA | 0 mA |
| Average Current | 21.6 mA | 10 μ A |
| Duration | 0.1 ms | 0.9 ms |
| DMIPS | 105.0 | 0.0 |
| Ta Max | 101.44 | 105 |
| Category | In DS Table | In DS Table |

6.5. Results

| | | | |
|---------------|------------------------------|-----------------|-------------|
| Sequence Time | 1 ms | Average Current | 2.17 mA |
| Battery Life | 2 months, 4 days, 8 hours | Average DMIPS | 105.0 DMIPS |

6.6. Chart



7. Peripherals and Middlewares Configuration

7.1. RCC

7.1.1. Parameter Settings:

System Parameters:

| | |
|-------------------|--------------------|
| VDD voltage (V) | 3.3 |
| Instruction Cache | Enabled |
| Prefetch Buffer | Enabled |
| Data Cache | Enabled |
| Flash Latency(WS) | 0 WS (1 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 Regulator Voltage Scale | Power Regulator Voltage Scale 2 |
|-------------------------------|---------------------------------|

7.2. SYS

Debug: Serial Wire

Timebase Source: SysTick

7.3. TIM1

Clock Source : Internal Clock

7.3.1. Parameter Settings:

Counter Settings:

| | |
|---|----------------|
| Prescaler (PSC - 16 bits value) | 999 * |
| Counter Mode | Up |
| Counter Period (AutoReload Register - 16 bits value) | 31999 * |
| 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) |

* User modified value

8. System Configuration

8.1. GPIO configuration

| IP | Pin | Signal | GPIO mode | GPIO pull/up pull down | Max Speed | User Label |
|------|------|----------------|------------------|-----------------------------|-----------|-------------|
| SYS | PA13 | SYS_JTMS-SWDIO | n/a | n/a | n/a | |
| | PA14 | SYS_JTCK-SWCLK | n/a | n/a | n/a | |
| GPIO | PC0 | GPIO_Input | Input mode | Pull-up * | n/a | BUTTON_TIM1 |
| | PA5 | GPIO_Output | Output Push Pull | No pull-up and no pull-down | Low | LED2_G |

8.2. DMA configuration

nothing configured in DMA service

8.3. NVIC configuration

8.3.1. 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 | 0 | 0 |
| TIM1 update interrupt and TIM10 global interrupt | true | 0 | 0 |
| PVD interrupt through EXTI line 16 | unused | | |
| Flash global interrupt | unused | | |
| RCC global interrupt | unused | | |
| TIM1 break interrupt and TIM9 global interrupt | unused | | |
| TIM1 trigger and commutation interrupts and TIM11 global interrupt | unused | | |
| TIM1 capture compare interrupt | unused | | |
| FPU global interrupt | unused | | |

8.3.2. NVIC Code generation

| Enabled interrupt Table | Select for init sequence ordering | Generate IRQ handler | Call HAL handler |
|--|-----------------------------------|----------------------|------------------|
| Non maskable interrupt | false | true | false |
| Hard fault interrupt | false | true | false |
| Memory management fault | false | true | false |
| Pre-fetch fault, memory access fault | false | true | false |
| Undefined instruction or illegal state | false | true | false |
| System service call via SWI instruction | false | true | false |
| Debug monitor | false | true | false |
| Pendable request for system service | false | true | false |
| System tick timer | false | true | true |
| TIM1 update interrupt and TIM10 global interrupt | false | true | true |

* User modified value

9. System Views

9.1. Category view

9.1.1. Current

Middleware

System Core

Analog

Timers

Connectivity

Multimedia

Computing

DMA

TIM1



GPIO 

IVIC 

RCC 

SYS 

10. Docs & Resources

| Type | Link |
|--------------------|---|
| Datasheet | http://www.st.com/resource/en/datasheet/DM00102166.pdf |
| Reference manual | http://www.st.com/resource/en/reference_manual/DM00096844.pdf |
| Programming manual | http://www.st.com/resource/en/programming_manual/DM00046982.pdf |
| Errata sheet | http://www.st.com/resource/en/errata_sheet/DM00158624.pdf |
| Application note | http://www.st.com/resource/en/application_note/CD00167594.pdf |
| Application note | http://www.st.com/resource/en/application_note/CD00211314.pdf |
| Application note | http://www.st.com/resource/en/application_note/CD00249778.pdf |
| Application note | http://www.st.com/resource/en/application_note/CD00259245.pdf |
| Application note | http://www.st.com/resource/en/application_note/CD00264321.pdf |
| Application note | http://www.st.com/resource/en/application_note/CD00264342.pdf |
| Application note | http://www.st.com/resource/en/application_note/CD00264379.pdf |
| Application note | http://www.st.com/resource/en/application_note/DM00024853.pdf |
| Application note | http://www.st.com/resource/en/application_note/DM00040802.pdf |
| Application note | http://www.st.com/resource/en/application_note/DM00040808.pdf |
| Application note | http://www.st.com/resource/en/application_note/DM00042534.pdf |
| Application note | http://www.st.com/resource/en/application_note/DM00046011.pdf |
| Application note | http://www.st.com/resource/en/application_note/DM00072315.pdf |
| Application note | http://www.st.com/resource/en/application_note/DM00073742.pdf |
| Application note | http://www.st.com/resource/en/application_note/DM00073853.pdf |
| Application note | http://www.st.com/resource/en/application_note/DM00080497.pdf |
| Application note | http://www.st.com/resource/en/application_note/DM00081379.pdf |
| Application note | http://www.st.com/resource/en/application_note/DM00115714.pdf |
| Application note | http://www.st.com/resource/en/application_note/DM00129215.pdf |
| Application note | http://www.st.com/resource/en/application_note/DM00156364.pdf |
| Application note | http://www.st.com/resource/en/application_note/DM00160482.pdf |

Application note http://www.st.com/resource/en/application_note/DM00144612.pdf

Application note http://www.st.com/resource/en/application_note/DM00213525.pdf

Application note http://www.st.com/resource/en/application_note/DM00220769.pdf

Application note http://www.st.com/resource/en/application_note/DM00257177.pdf

Application note http://www.st.com/resource/en/application_note/DM00272912.pdf

Application note http://www.st.com/resource/en/application_note/DM00226326.pdf

Application note http://www.st.com/resource/en/application_note/DM00236305.pdf

Application note http://www.st.com/resource/en/application_note/DM00281138.pdf

Application note http://www.st.com/resource/en/application_note/DM00296349.pdf

Application note http://www.st.com/resource/en/application_note/DM00325582.pdf

Application note http://www.st.com/resource/en/application_note/DM00327191.pdf

Application note http://www.st.com/resource/en/application_note/DM00354244.pdf

Application note http://www.st.com/resource/en/application_note/DM00315319.pdf

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Application note http://www.st.com/resource/en/application_note/DM00395696.pdf

Application note http://www.st.com/resource/en/application_note/DM00431633.pdf

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