
STM32
CubeMX

1. Description

1.1. Project

Project Name	Pencil_Automation
Board Name	custom
Generated with:	STM32CubeMX 6.12.0
Date	09/23/2024

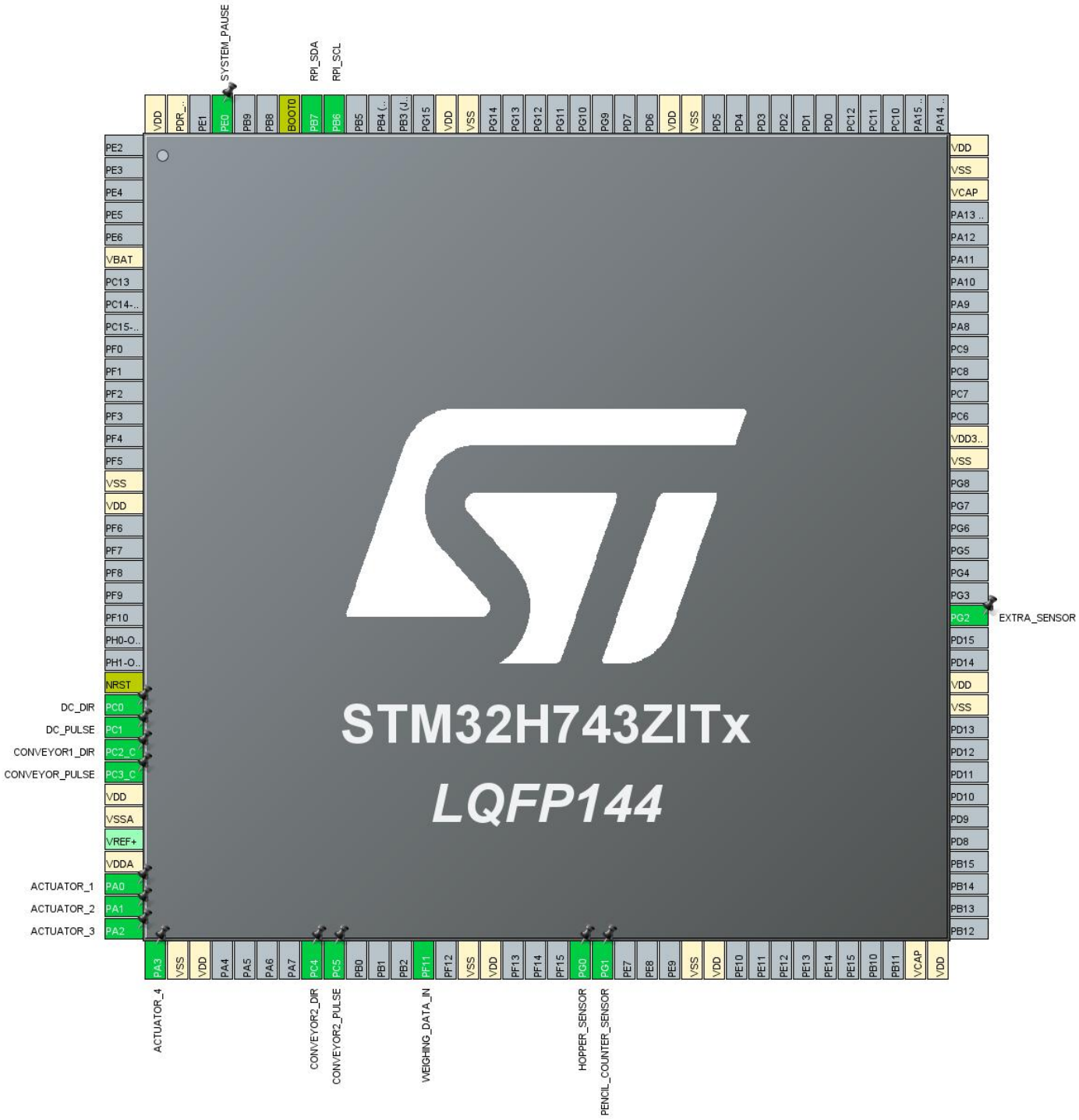
1.2. MCU

MCU Series	STM32H7
MCU Line	STM32H743/753
MCU name	STM32H743ZITx
MCU Package	LQFP144
MCU Pin number	144

1.3. Core(s) information

Core(s)	ARM Cortex-M7

2. Pinout Configuration



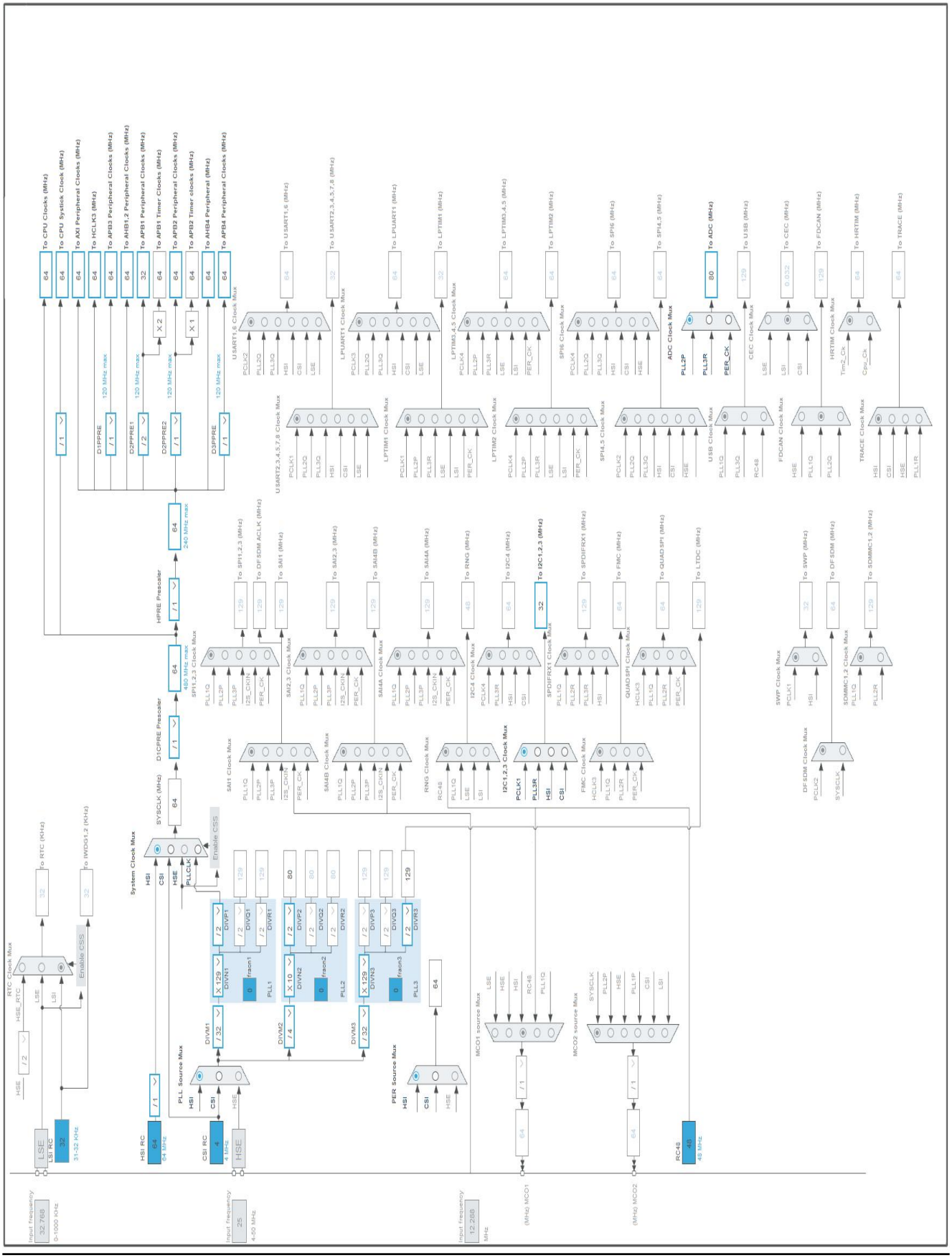
3. Pins Configuration

Pin Number LQFP144	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
6	VBAT	Power		
16	VSS	Power		
17	VDD	Power		
25	NRST	Reset		
26	PC0 *	I/O	GPIO_Output	DC_DIR
27	PC1 *	I/O	GPIO_Output	DC_PULSE
28	PC2_C *	I/O	GPIO_Output	CONVEYOR1_DIR
29	PC3_C *	I/O	GPIO_Output	CONVEYOR_PULSE
30	VDD	Power		
31	VSSA	Power		
33	VDDA	Power		
34	PA0 *	I/O	GPIO_Output	ACTUATOR_1
35	PA1 *	I/O	GPIO_Output	ACTUATOR_2
36	PA2 *	I/O	GPIO_Output	ACTUATOR_3
37	PA3 *	I/O	GPIO_Output	ACTUATOR_4
38	VSS	Power		
39	VDD	Power		
44	PC4 *	I/O	GPIO_Output	CONVEYOR2_DIR
45	PC5 *	I/O	GPIO_Output	CONVEYOR2_PULSE
49	PF11	I/O	ADC1_INP2	WEIGHING_DATA_IN
51	VSS	Power		
52	VDD	Power		
56	PG0 *	I/O	GPIO_Input	HOPPER_SENSOR
57	PG1 *	I/O	GPIO_Input	PENCIL_COUNTER_SENSOR
61	VSS	Power		
62	VDD	Power		
71	VCAP	Power		
72	VDD	Power		
83	VSS	Power		
84	VDD	Power		
87	PG2 *	I/O	GPIO_Input	EXTRA_SENSOR
94	VSS	Power		
95	VDD33_USB	Power		
106	VCAP	Power		
107	VSS	Power		

Pin Number LQFP144	Pin Name (function after reset)	Pin Type	Alternate Function(s)	Label
108	VDD	Power		
120	VSS	Power		
121	VDD	Power		
130	VSS	Power		
131	VDD	Power		
136	PB6	I/O	I2C1_SCL	RPI_SCL
137	PB7	I/O	I2C1_SDA	RPI_SDA
138	BOOT0	Boot		
141	PE0 *	I/O	GPIO_Input	SYSTEM_PAUSE
143	PDR_ON	Power		
144	VDD	Power		

* The pin is affected with an I/O function

4. Clock Tree Configuration



1. Power Consumption Calculator report

1.1. Microcontroller Selection

Series	STM32H7
Line	STM32H743/753
MCU	STM32H743ZITx
Datasheet	DS12110_Rev8

1.2. Parameter Selection

Temperature	25
Vdd	3.0

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

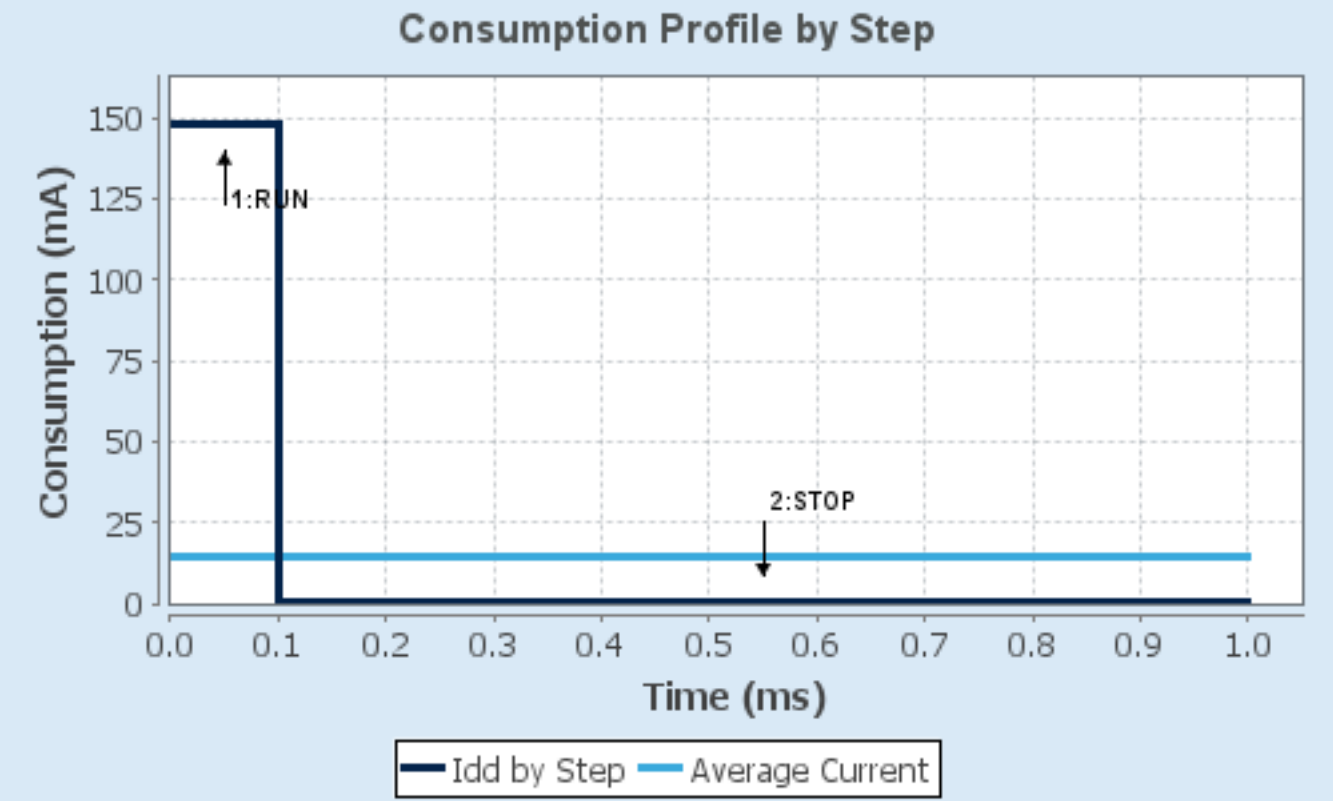
1.4. Sequence

Step	Step1	Step2
Mode	RUN	STOP
Vdd	3.0	3.0
Voltage Source	Battery	Battery
Range	VOS0: Scale0-High	SVOS5: System-Scale5
D1 Mode	DRUN/CRUN	DSTANDBY
D2 Mode	DRUN	DSTANDBY
D3 Mode	DRUN	DSTOP
Fetch Type	ITCM	NA
CPU Frequency	480 MHz	0 Hz
Clock Configuration	HSE BYP PLL	Flash-OFF
Clock Source Frequency	24 MHz	0 Hz
Peripherals		
Additional Cons.	0 mA	0 mA
Average Current	148 mA	150 µA
Duration	0.1 ms	0.9 ms
DMIPS	1027.0	0.0
Ta Max	105.46	124.98
Category	In DS Table	In DS Table

1.5. Results

Sequence Time	1 ms	Average Current	14.94 mA
Battery Life	1 day, 17 hours	Average DMIPS	1027.2001 DMIPS

1.6. Chart


Consumption Profile by Step
Consumption (mA)
150
125
100
75
50
25
0
1:RUN
2:STOP
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
Time (ms)
Idd by Step
Average Current

2. Software Project

2.1. Project Settings

Name	Value
Project Name	Pencil_Automation
Project Folder	C:\Users\Dhiru\STM32CubeIDE\workspace_1.16.0\Pencil_Automation
Toolchain / IDE	STM32CubeIDE
Firmware Package Name and Version	STM32Cube FW_H7 V1.11.2
Application Structure	Advanced
Generate Under Root	Yes
Do not generate the main()	No
Minimum Heap Size	0x200
Minimum Stack Size	0x400

2.2. 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	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

2.3. Advanced Settings - Generated Function Calls

Rank	Function Name	Peripheral Instance Name
1	SystemClock_Config	RCC
2	MX_GPIO_Init	GPIO
3	MX_ADC1_Init	ADC1
4	MX_I2C1_Init	I2C1

3. Peripherals and Middlewares Configuration

3.1. ADC1

IN2: IN2 Single-ended

3.1.1. Parameter Settings:

ADCs_Common_Settings:

Mode	Independent mode

ADC_Settings:

Clock Prescaler	Asynchronous clock mode divided by 2
Resolution	ADC 16-bit resolution
Scan Conversion Mode	Disabled
Continuous Conversion Mode	Disabled
Discontinuous Conversion Mode	Disabled
End Of Conversion Selection	End of single conversion
Overrun behaviour	Overrun data preserved
Left Bit Shift	No bit shift
Conversion Data Management Mode	Regular Conversion data stored in DR register only
Low Power Auto Wait	Disabled

ADC_Regular_ConversionMode:

Enable Regular Conversions	Enable
Enable Regular Oversampling	Disable
Oversampling Ratio	1
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	1.5 Cycles
Offset Number	No offset
Offset Signed Saturation	Disable

ADC_Injected_ConversionMode:

Enable Injected Conversions	Disable

Analog Watchdog 1:

Enable Analog WatchDog1 Mode	false

Analog Watchdog 2:

Enable Analog WatchDog2 Mode	false

Analog Watchdog 3:

Enable Analog WatchDog3 Mode	false

3.2. CORTEX_M7

3.2.1. Parameter Settings:

Speculation default mode Settings:

Speculation default mode	Enabled

Cortex Interface Settings:

CPU ICache	Disabled
CPU DCache	Disabled

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

Cortex Memory Protection Unit Region 8 Settings:

MPU Region	Disabled

Cortex Memory Protection Unit Region 9 Settings:

MPU Region	Disabled

Cortex Memory Protection Unit Region 10 Settings:

MPU Region	Disabled

Cortex Memory Protection Unit Region 11 Settings:

MPU Region	Disabled

Cortex Memory Protection Unit Region 12 Settings:

MPU Region	Disabled

Cortex Memory Protection Unit Region 13 Settings:

MPU Region	Disabled

Cortex Memory Protection Unit Region 14 Settings:

MPU Region	Disabled

Cortex Memory Protection Unit Region 15 Settings:

MPU Region	Disabled

3.3. I2C1

I2C: I2C

3.3.1. Parameter Settings:

Timing configuration:

Custom Timing	Disabled
I2C Speed Mode	Standard Mode
I2C Speed Frequency (KHz)	100
Rise Time (ns)	0
Fall Time (ns)	0
Coefficient of Digital Filter	0
Analog Filter	Enabled
Timing	**0x00707CBB ***

Slave Features:

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

3.4. MEMORYMAP

mode: Activated

3.5. RCC

3.5.1. Parameter Settings:

Power Parameters:

SupplySource	PWR_LDO_SUPPLY
Power Regulator Voltage Scale	Power Regulator Voltage Scale 3

RCC Parameters:

TIM Prescaler Selection	Disabled
HSE Startup Timout Value (ms)	100
LSE Startup Timout Value (ms)	5000
CSI Calibration Value	32
HSI Calibration Value	64

System Parameters:

VDD voltage (V)	3.3
Flash Latency(WS)	1 WS (2 CPU cycle)
Product revision	rev.V

PLL range Parameters:

PLL2 input frequency range	Between 8 and 16 MHz
PLL2 clock Output range	MEDIUM VCO range

3.6. SYS

Timebase Source: SysTick

*** User modified value**

4. System Configuration

4.1. GPIO configuration

IP	Pin	Signal	GPIO mode	GPIO pull/up pull down	Max Speed	User Label
ADC1	PF11	ADC1_INP2	Analog mode	No pull-up and no pull-down	n/a	WEIGHING_DATA_IN
I2C1	PB6	I2C1_SCL	Alternate Function Open Drain	No pull-up and no pull-down	Low	RPI_SCL
	PB7	I2C1_SDA	Alternate Function Open Drain	No pull-up and no pull-down	Low	RPI_SDA
GPIO	PC0	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	DC_DIR
	PC1	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	DC_PULSE
	PC2_C	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	CONVEYOR1_DIR
	PC3_C	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	CONVEYOR_PULSE
	PA0	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	ACTUATOR_1
	PA1	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	ACTUATOR_2
	PA2	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	ACTUATOR_3
	PA3	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	ACTUATOR_4
	PC4	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	CONVEYOR2_DIR
	PC5	GPIO_Output	Output Push Pull	No pull-up and no pull-down	Low	CONVEYOR2_PULSE
	PG0	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	HOPPER_SENSOR
	PG1	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	PENCIL_COUNTER_SENSOR
	PG2	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	EXTRA_SENSOR
	PE0	GPIO_Input	Input mode	No pull-up and no pull-down	n/a	SYSTEM_PAUSE

4.2. DMA configuration

nothing configured in DMA service

4.3. BDMA configuration

nothing configured in DMA service

4.4. MDMA configuration

nothing configured in DMA service

4.5. NVIC configuration

4.5.1. 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
PVD and AVD interrupts through EXTI line 16	unused		
Flash global interrupt	unused		
RCC global interrupt	unused		
ADC1 and ADC2 global interrupts	unused		
I2C1 event interrupt	unused		
I2C1 error interrupt	unused		
FPU global interrupt	unused		
HSEM1 global interrupt	unused		

4.5.2. NVIC Code generation

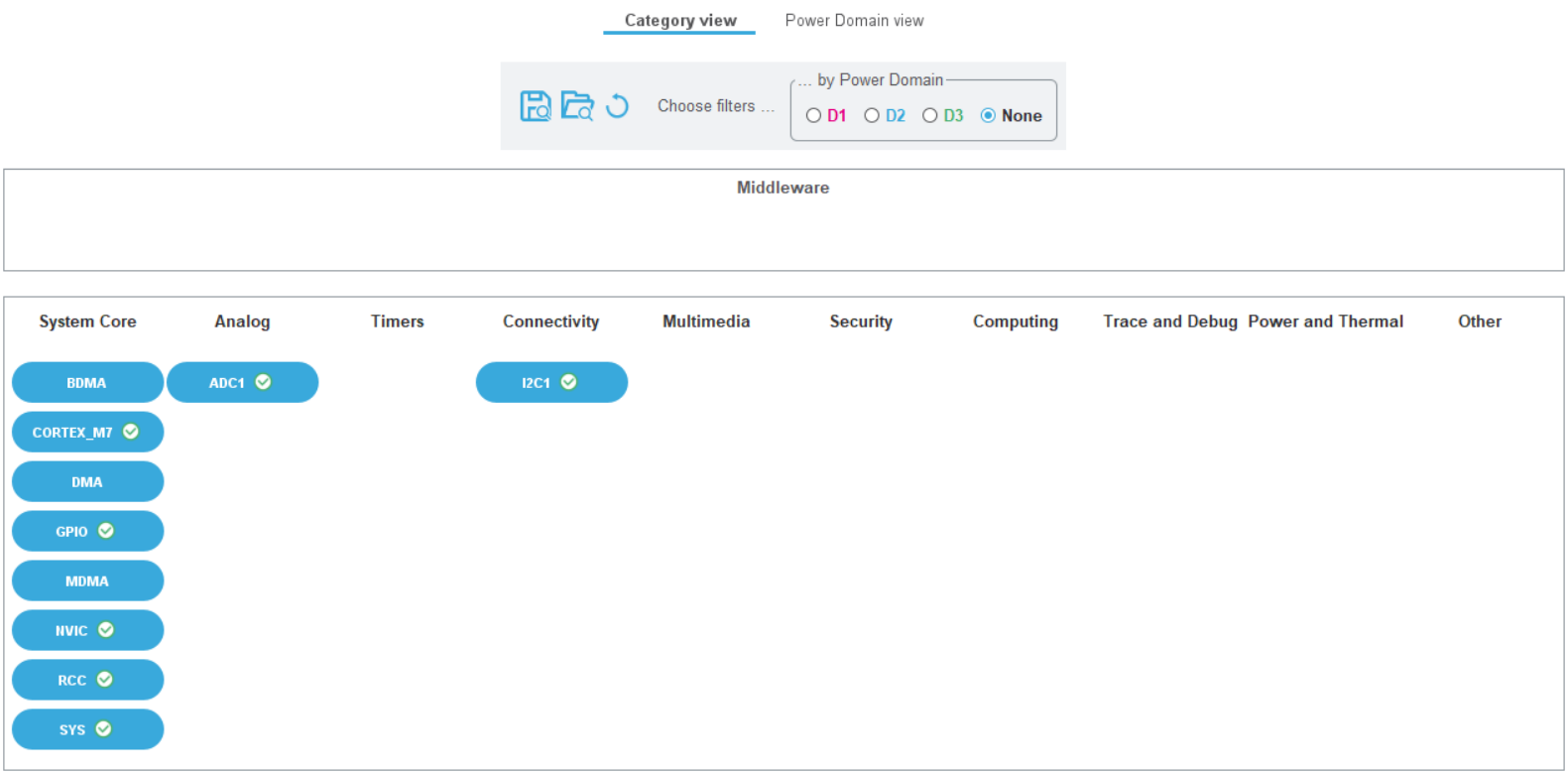
Enabled interrupt Table	Select for init sequence ordering	Generate IRQ handler	Call HAL handler
Non maskable interrupt	false	true	false
Hard fault interrupt	false	true	false
Memory management fault	false	true	false
Pre-fetch fault, memory access fault	false	true	false
Undefined instruction or illegal 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

*** User modified value**

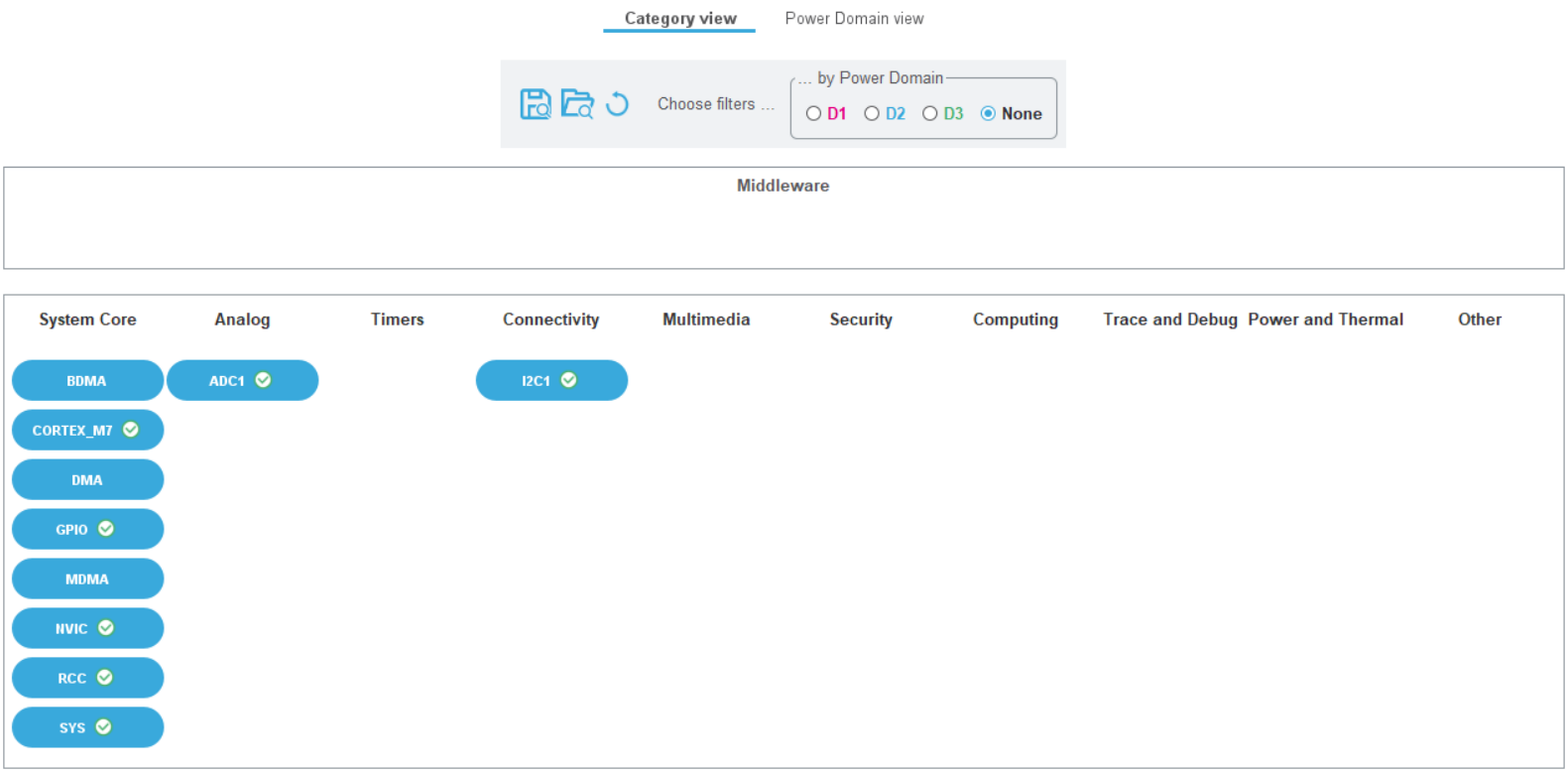
5. System Views

5.1. Category view

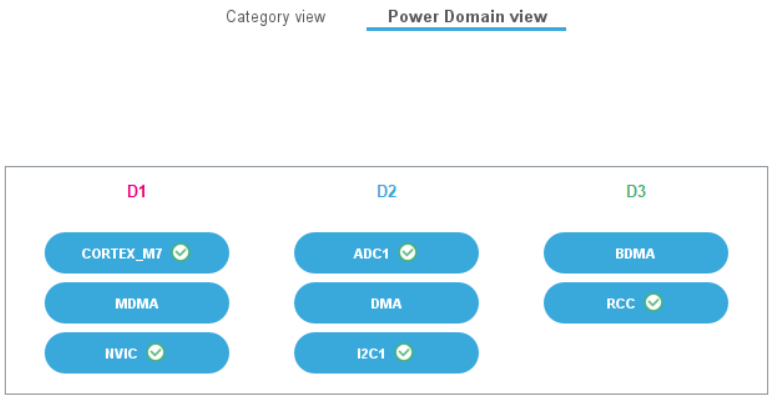
5.1.1. Current



5.1.2. Without filters



5.2. Power Domain view



6. Docs & Resources

Type	Link