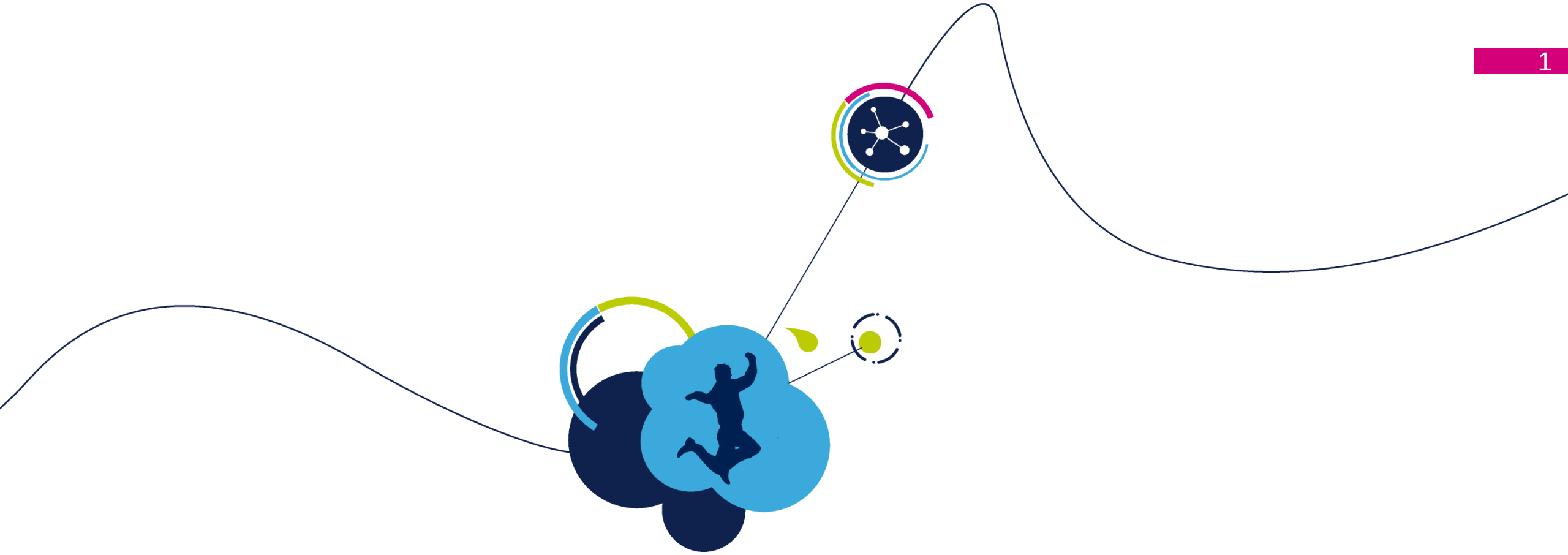
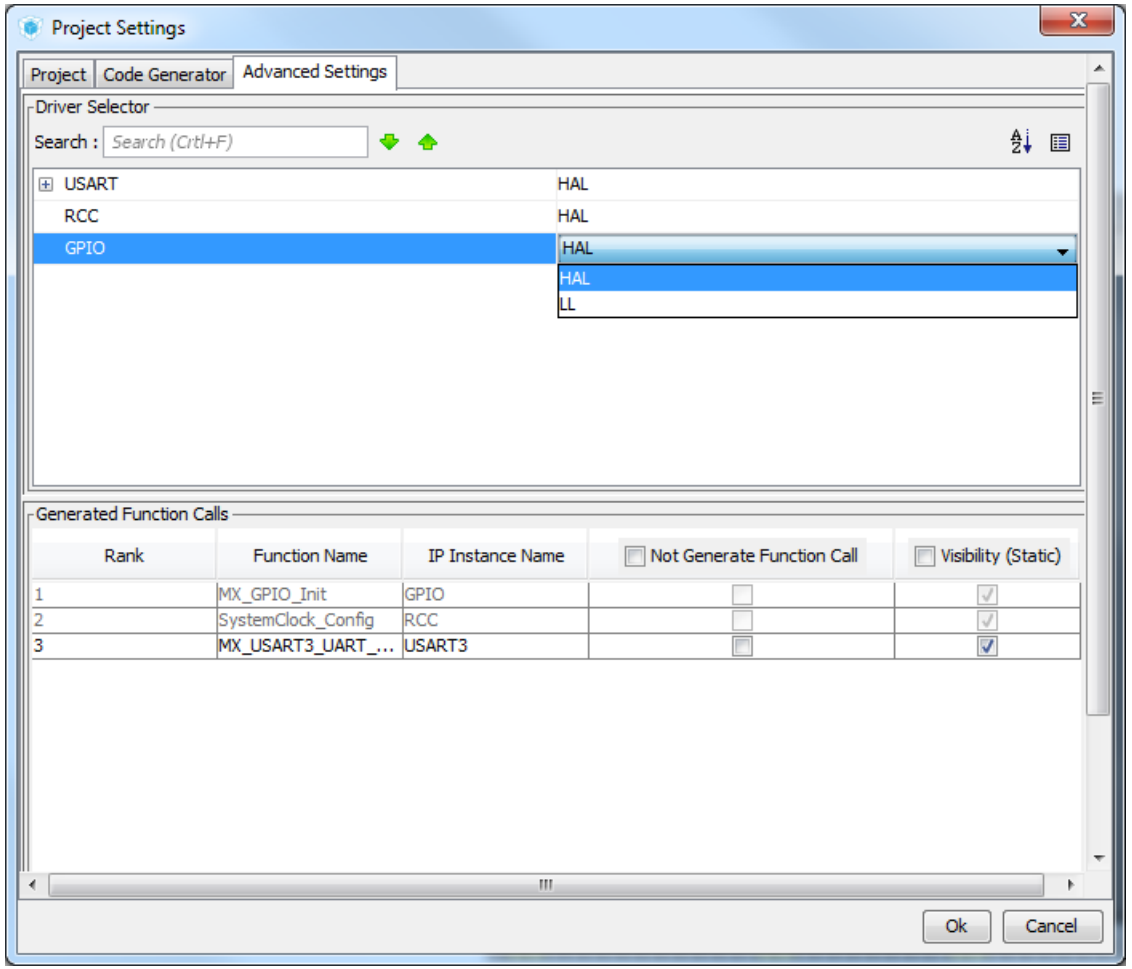


Advance topics

Agenda

- **Advance code generation options**
- Migrating STM32CubeMX project
- Power Consumption Calculator

Advanced code generation options



- Driver Selector*

  Allows customer to select HAL(default) or LL APIs for generating initialization code

- Generated Function Call

  Allows customization of initialization code

  - Re-ordering of initialization code default sequence
  - Disable generation of initialization code
  - Allows generation of function definition without “static” keyword

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Low-Layer API (LL API)

- LL APIs enable expert developer to optimize their code down to register level
- Combination of LL APIs and HAL gives developer complete flexibility in developing their application
  - Ease of use and portability of HAL APIs
  - Optimize performance, code footprint and power consumption
- LL peripheral initialization service are functionality equivalent to STM32 SPL and provide easy migration path from older SPL to STM32Cube ecosystem
- LL only support simple peripheral. Complex peripherals are not supported
  - Simple peripheral such as RCC, ADC, GPIO, I2C, SPI, TIM, USART, etc
  - Complex peripherals not supported by LL include USB, SDMMC, FSMC, etc

Agenda

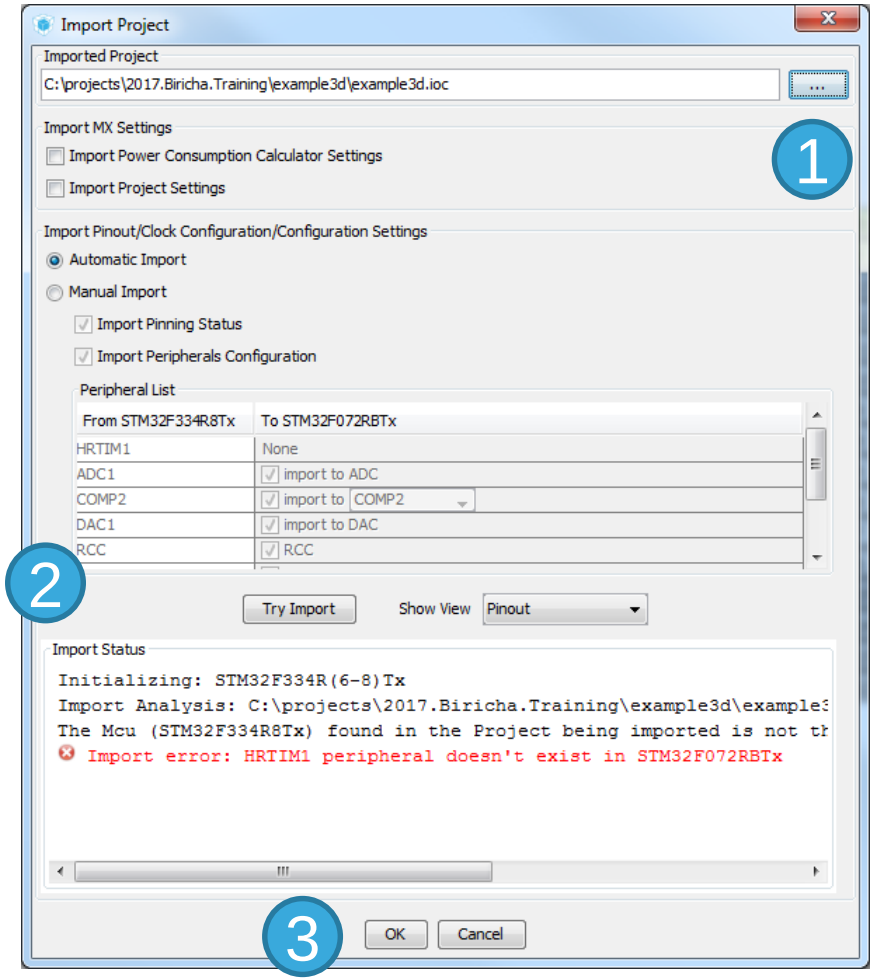
- Advance code generation options
- **Migrating STM32CubeMX project**
- Power Consumption Calculator

Migrating existing STM32CubeMX project to another STM32 MCU

- STM32CubeMX provides 2 methods for migrating
  - “Import Project” feature
  - “List Pinout Compatible MCU” feature
- Customer have selected device and want to migrate existing design to selected device
  - “Import Project” feature
- Customer have existing design and looking for pin compatible MCU
  - “List Pinout Compatible MCU” feature

“Import Project” feature

- STM32CubeMX
  - Create “New project…”
  - Select MCU you want to port into
  - Select File > Import Project …
  - The following setting will be imported
    - Pin out, Clock Configuration, Configuration
- “Import Project” dialog box
  - Select STM32CubeMX project file that you want to import into new MCU
  - Inspect import status message
  - Select OK



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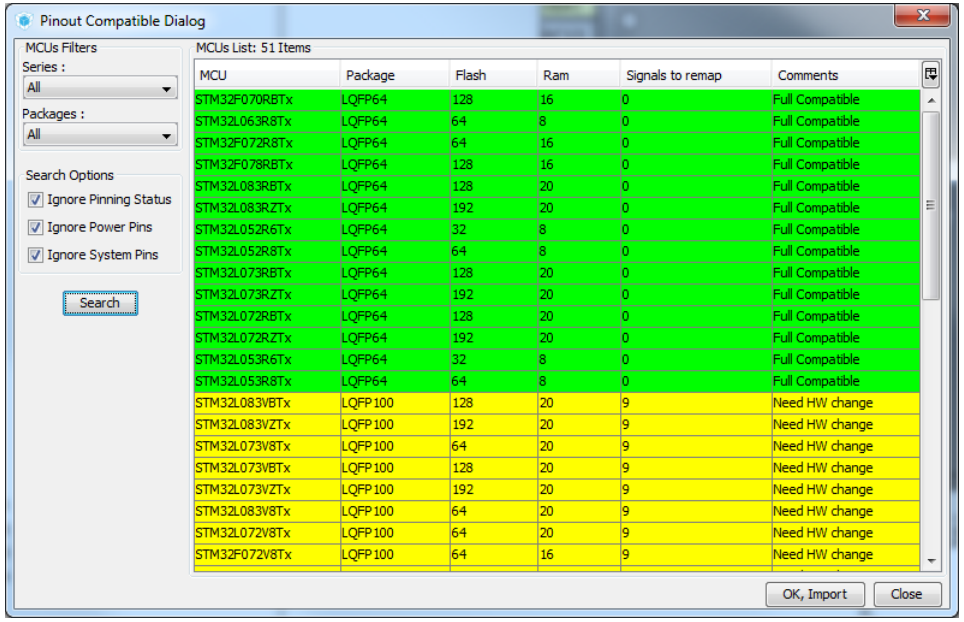
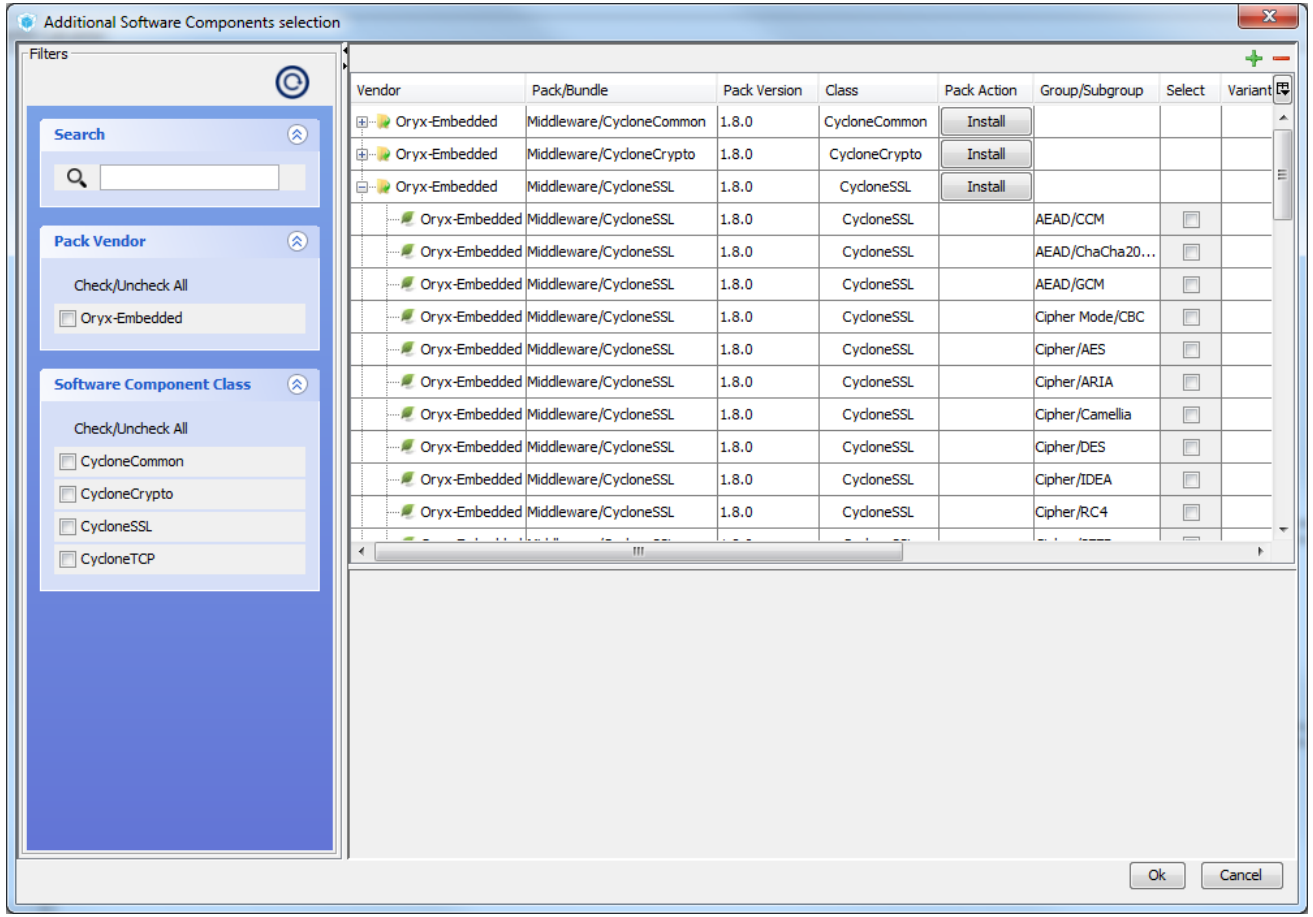
“List Pinout Compatible MCU” feature

- STM32CubeMX
  - Select Pinout tab
  - Select “Pinout > List Pinout Compatible MCUs”
- Pinout Compatible Dialog
  - Result
    - Bright green - exact match
    - Light green – partial match with hardware compatibility. Hardware compatibility can be ensured but some pin names could not be preserved.
    - Yellow - partial match without hardware compatibility. Not all signals can be assigned to the exact same pin location
  - Select “OK, Import”



Additional software component selection

- 3rd party software packages can be added into repository via “Managed embedded software packages”
- Once added, 3rd party code can be added to STM32CubeMX project
- Feature is based on ARM KEIL CMSIS-Pack standard



Agenda

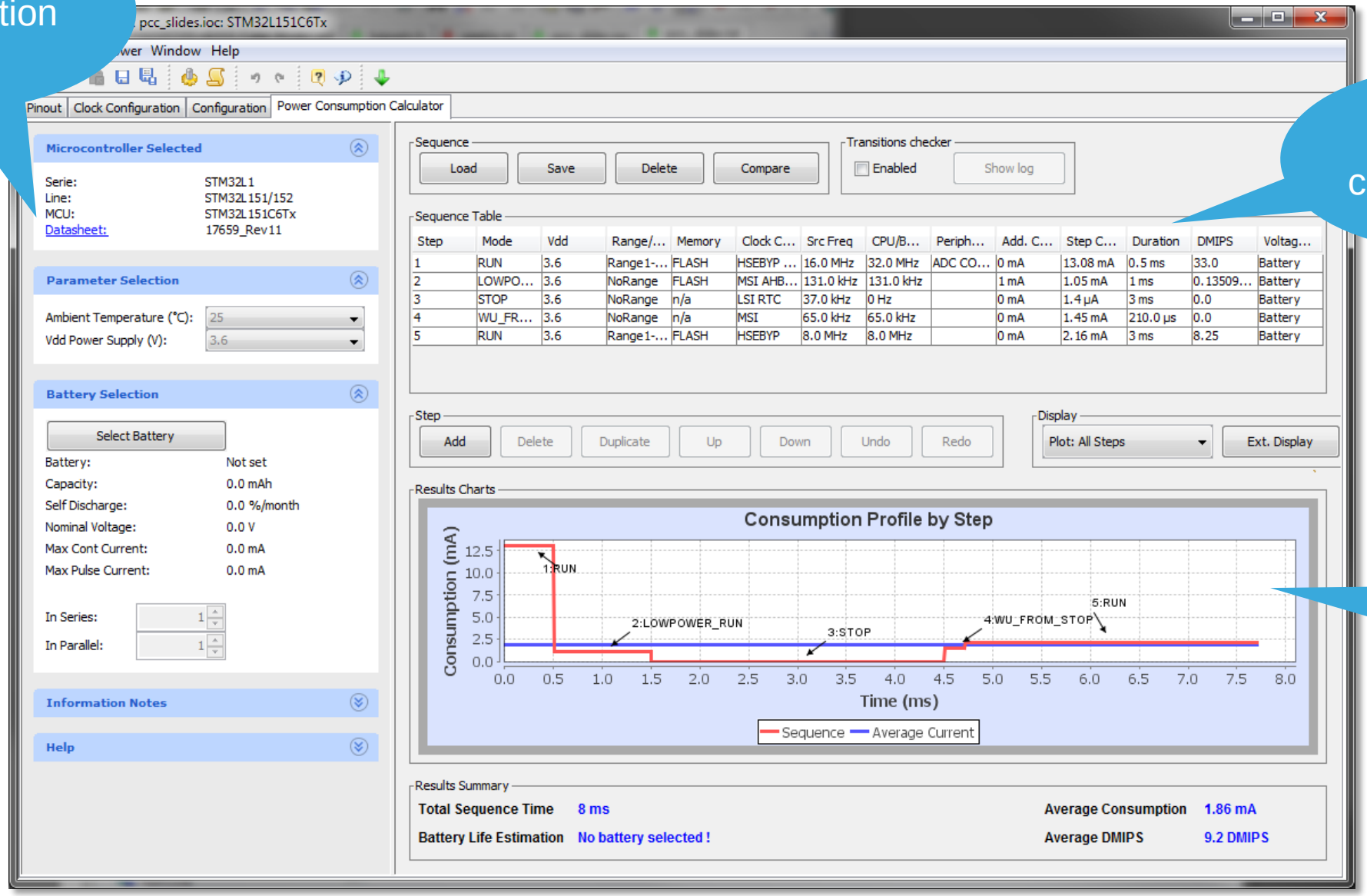
- Advance code generation options
- Migrating STM32CubeMX project
- **Power Consumption Calculator**

Introduction

- The Power Consumption Calculator (PCC) uses a database of typical values to estimate power consumption, DMIPS, and battery life of STM32 MCUs.
- GUI tool integrated into the STM32CubeMX.
- Highly configurable scenarios with validity check.
- Battery selector, or define a custom battery.
- Facilitates comparison with other MCUs or other power options.
- Import, export and generate reports.

Usage

General PCC configuration panel.



Sequence configuration.

Result overview.

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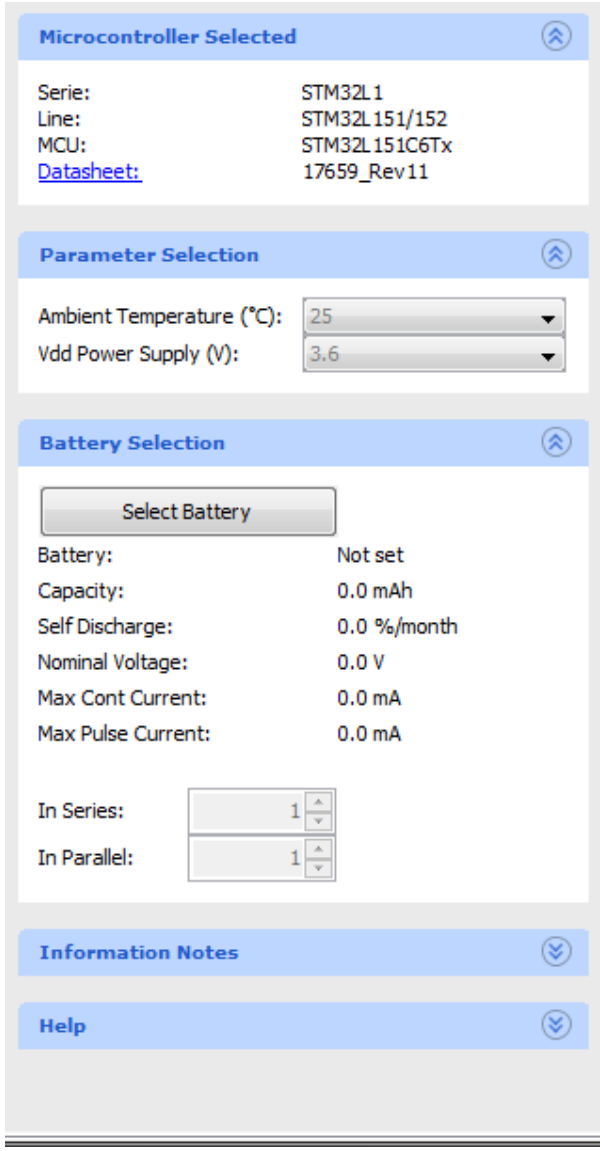
General PCC parameters

- MCU selection inherited from STM32CubeMX
  - Use the direct link to the datasheet to get more detailed information.
- Parameter selection
  - Temperature and voltage choice may be limited, depending on the selected MCU.
- Battery selection – select typical or define your own
  - Battery is defined by capacity, voltage, self discharge and current limitations.
- Information notes
  - Purpose is to warn about estimation limitations.



Building a sequence

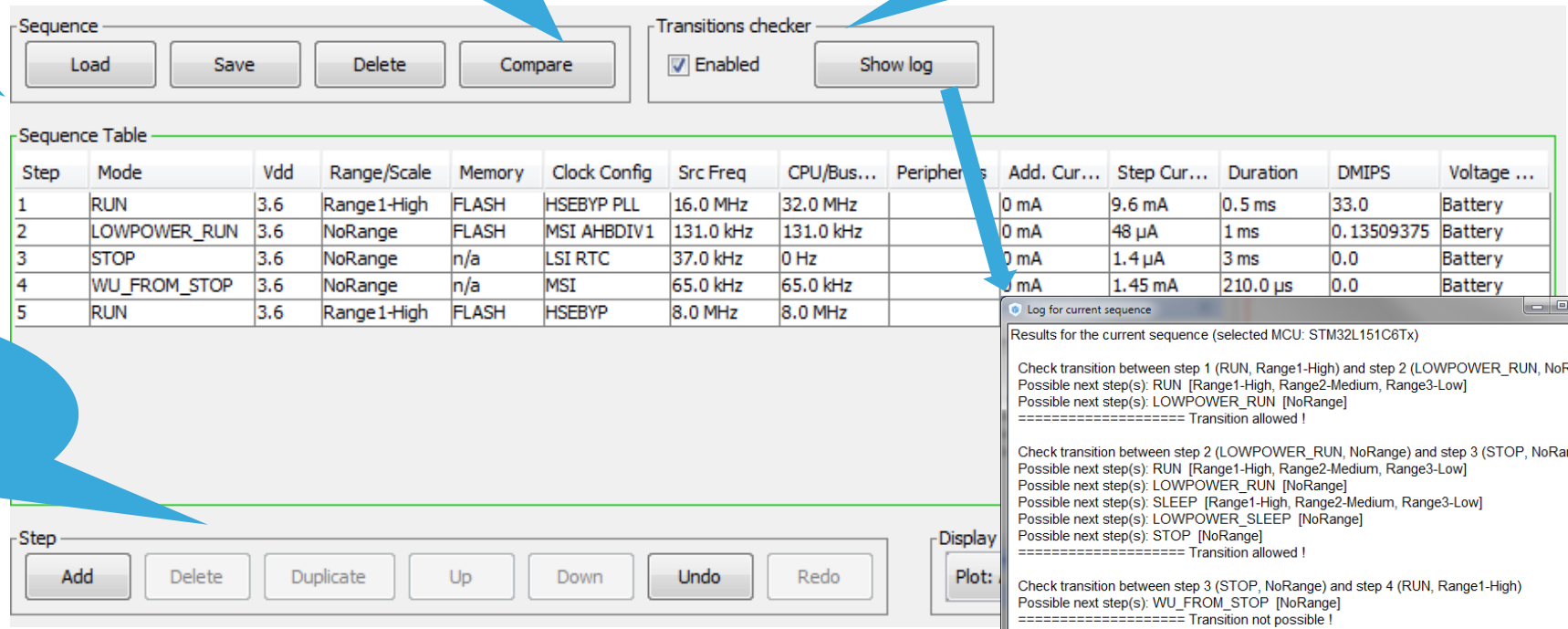
- A sequence is a set of ordered steps.

Load existing sequences and adapt them.

Compare sequences, even with different MCUs.

Check automatically if proposed power step transitions are valid.

Create new steps by adding or duplicating existingones.



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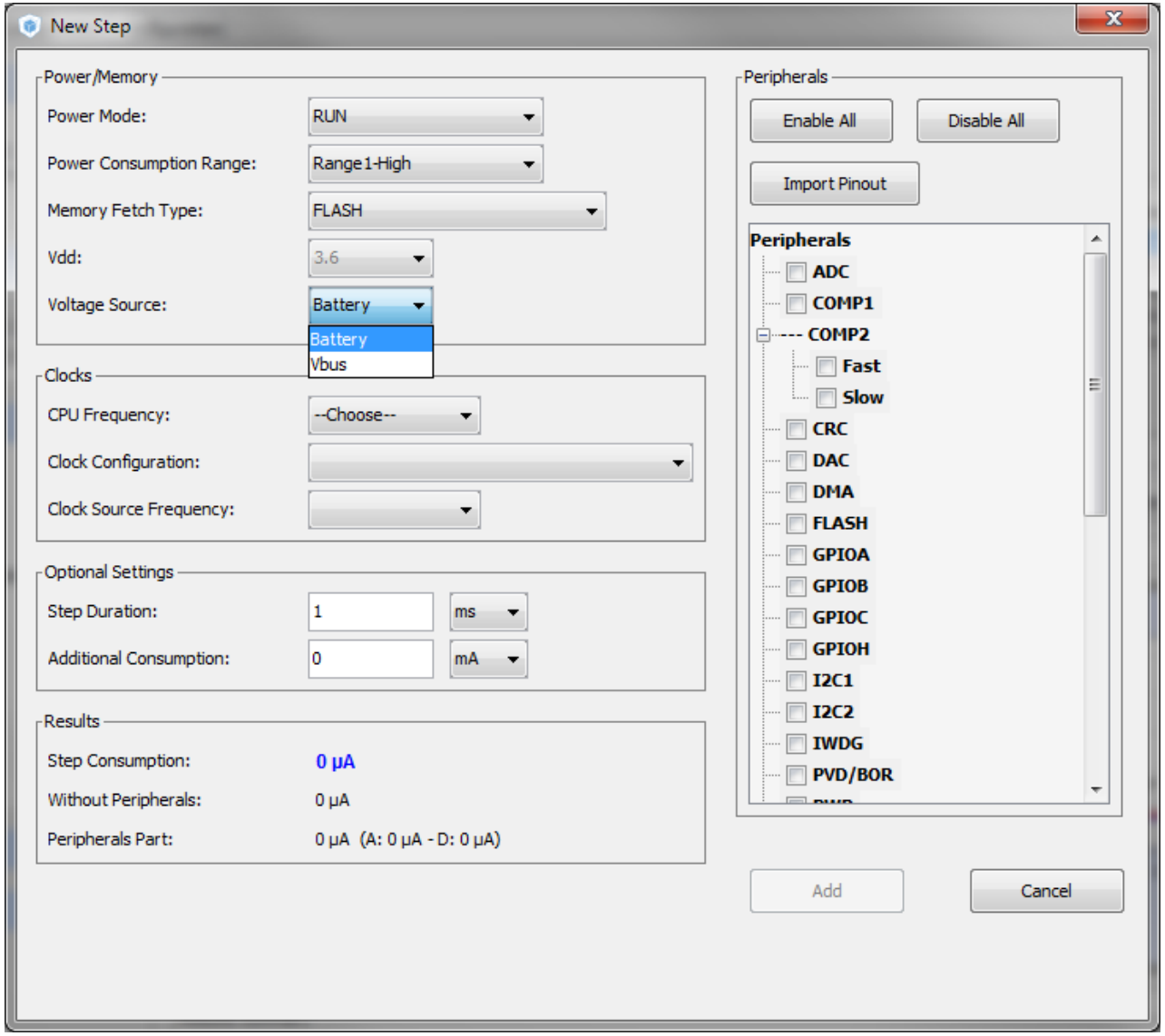
Power consumption step definition 1/2

1. Power mode selection determines availability of peripherals.
2. Regulator setting balances performance and consumption.
3. Select the memory from which the code is executed, as well as prefetch and bus options.
4. Vdd – the choice in PCC is limited compared to actual possibilities.
5. This option is present for battery life calculation purposes.



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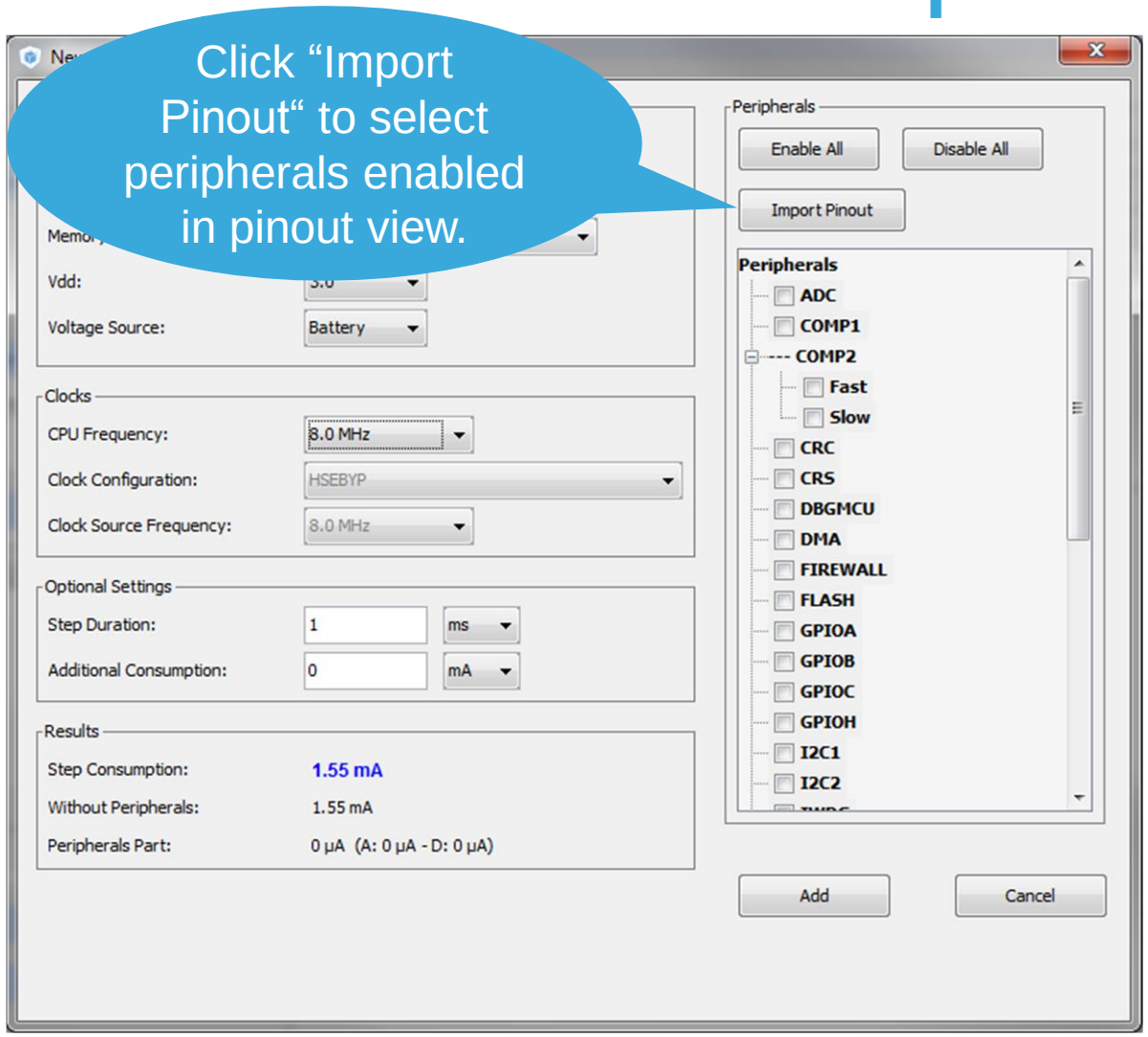
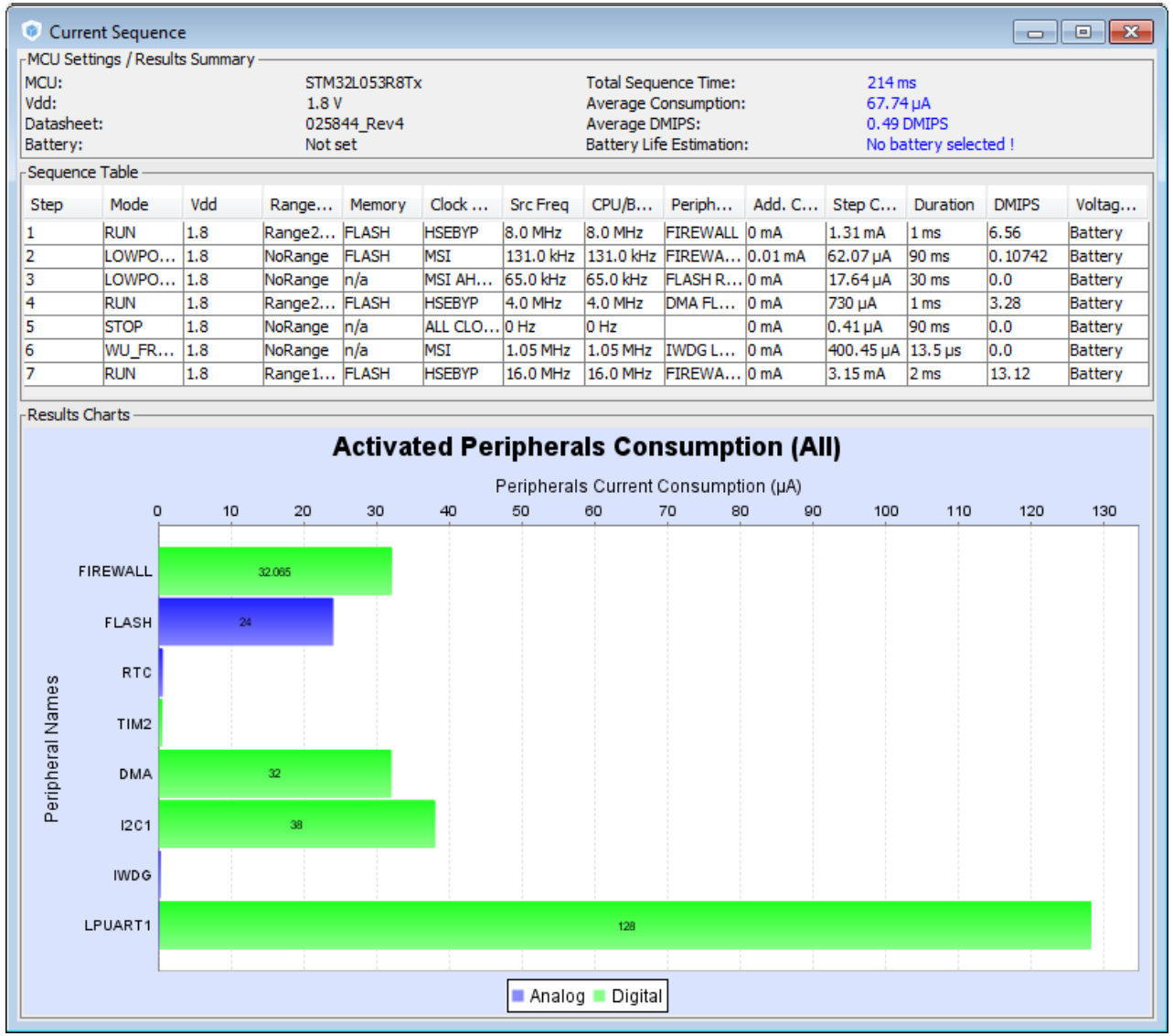
Power consumption step definition 2/2



- Clock
  - Frequency choice is limited by power consumption range
  - Available clock configurations depend on available data and other settings
- Peripherals
  - Choose clock gating to peripherals.
  - Import selection from pinout tab.
- Optional settings
  - Additional consumption is represented by estimated pin load

Sequence consumption profile display

- Possible to detach the charts to external display for presentation purposes
- Several different views selectable
  - Plot current vs time
  - Pie chart
  - Consumption of peripherals



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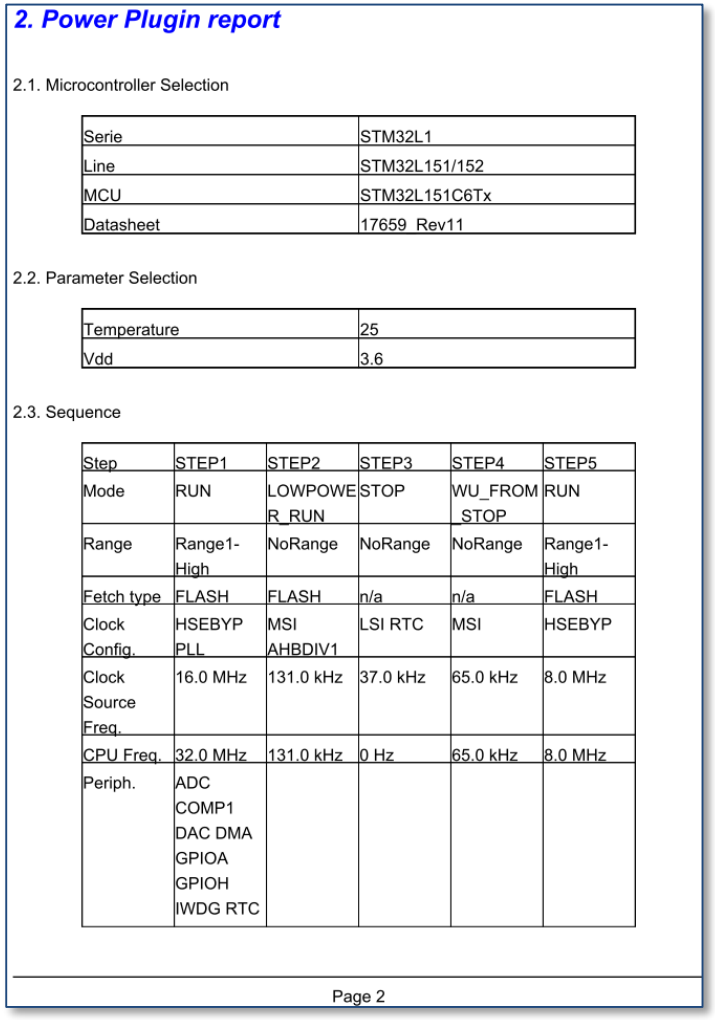
Output and generating report



2. Power Plugin report

2.1. Microcontroller Selection

Serie	STM32L1
Line	STM32L151/152
MCU	STM32L151C6Tx
Datasheet	17659_Rev11

2.2. Parameter Selection

Temperature	25
Vdd	3.6

2.3. Sequence

Step	STEP1	STEP2	STEP3	STEP4	STEP5
Mode	RUN	LOWPOWER_RUN	STOP	WU_FROM_STOP	RUN
Range	Range1-High	NoRange	NoRange	NoRange	Range1-High
Fetch type	FLASH	FLASH	n/a	n/a	FLASH
Clock Config.	HSEBYP PLL	MSI AHBDIV1	LSI RTC	MSI	HSEBYP
Clock Source Freq.	16.0 MHz	131.0 kHz	37.0 kHz	65.0 kHz	8.0 MHz
CPU Freq.	32.0 MHz	131.0 kHz	0 Hz	65.0 kHz	8.0 MHz
Periph.	ADC COMP1 DAC DMA GPIOA GPIOH IWDG RTC				

Page 2

- An optional step is to generate a PDF report.
- The PDF report is also available without PCC.
- Complete project includes these files :
  - Project.ioc
  - Project.pcs
  - Project.pdf
  - Project.txt
  - Project.jpg
  - … and the generated project for a supported development environment.