

UG10063

MCUXpresso IDE 11.10.0 Power Profile Guide

Rev. 3 — 1 July 2024

User guide



Document information

Information	Content
Keywords	MCUXpresso, MCUXpresso IDE
Abstract	This document describes how to use the Power Profile functionality built into MCUXpresso IDE.



1 Power Profile overview

Power Profile functionality brings together the SWO Profile and the Energy Measurement features to show which application code is consuming the most power in order to identify hot spots.

SWO tracing provides a statistical profile of the application activity by periodically sampling the program counter (PC) at the configured sample rate. This data is correlated with periodic power consumption readings provided by the Energy Measurement feature.

For more details regarding SWO Profile/Energy Measurement features, please check the SWO Trace and Energy Measurement Guides.

Power profiling is completely nonintrusive to the application – it does not affect the performance in any way. As this is a statistical profile of application activity and power consumption, you can achieve more accurate results by profiling for as long as possible.

You can find the Power Profile view in the **Analysis** menu:

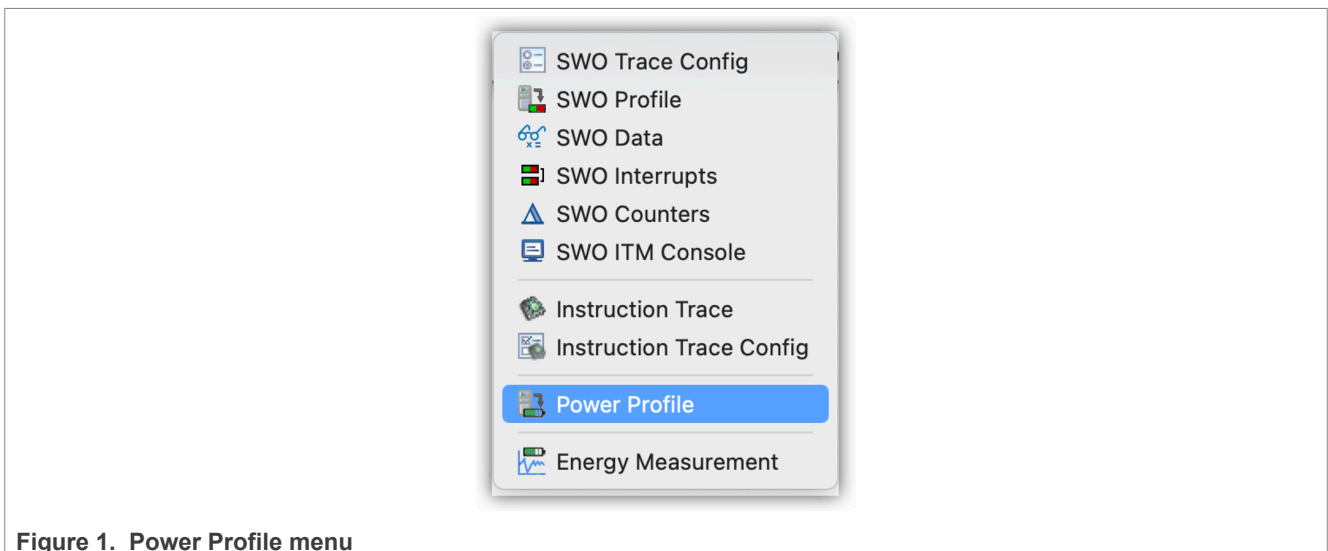


Figure 1. Power Profile menu

1.1 Debug solutions

Compatibility: The Power Profile functionality of MCUXpresso IDE requires the presence of a LinkServer debug connection to an MCU-Link Pro probe or other MCU-Link-based on-board solutions which include the power measurement circuitry. The Power Profiling functionality is not available with LPC-Link2 debug probes, other CMSIS-DAP probes, or third-party probes.

The Power Profile view is available on boards that support both Energy Measurement and SWO features.

Using Power Profile with a non-compatible debug probe results in the display of an error:

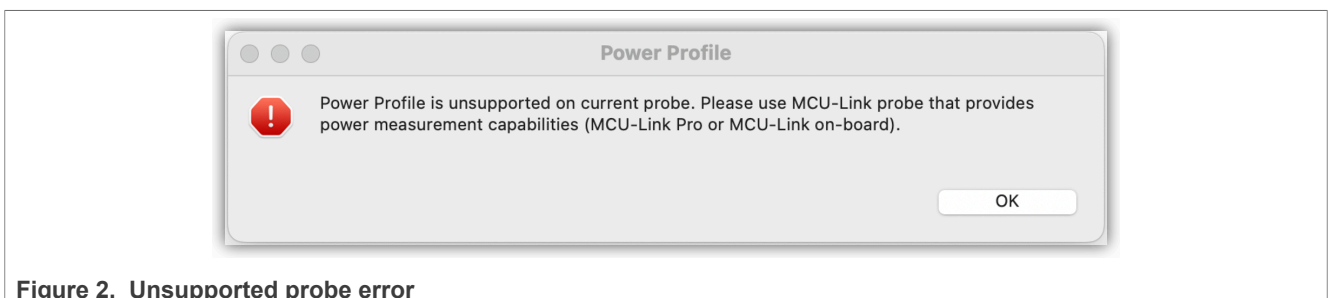
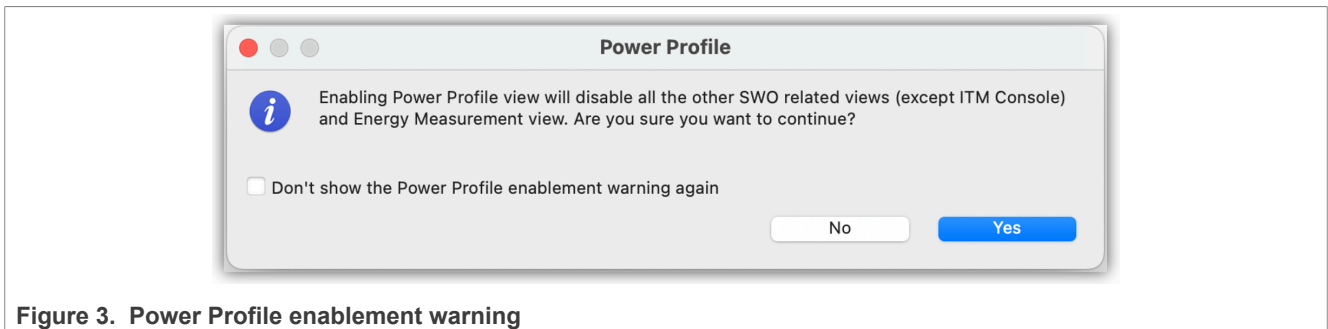


Figure 2. Unsupported probe error

Note: The Power Profile functionality requires an active debug session to capture the SWO data.

Important Note: SWO debug features are only available if supported by the **target MCU**, **target board** and the project being debugged has correct **pin muxing and clock setup**.

While the Power Profile view is running, the other SWO-related views are disabled, the only exception being the ITM Console view. A warning message appears upon enabling the Power Profile view:



1.2 MCU-Link firmware

Version V2.263 or later of the MCU-Link CMSIS-DAP firmware provided by NXP, running on MCU-Link Pro and MCU-Link on-board probes, provides the support needed to use the Power Profile functionality.






Please check the MCU-Link product page <https://www.nxp.com/pages/MCU-LINK-PRO> for the most recent firmware version and details on how to update.

2 Power Profile view

The **Power Profile view** shows a profile of the code as it is running, providing a breakdown of time spent in different functions, as well as power/energy consumption on each function.

2.1 Toolbar associated with the view

This section contains a brief description of each button in the toolbar of the view.

-  **Resume** button: starts or resumes data collection
-  **Pause** button: suspends data collection
-  **Save** button: opens a save dialog to export data in a TSV file
-  **Clear** button: clears the displayed data
-  **Configure** button: opens **SWO Config View**

2.2 Tabs

There are three different tabs that group the information:

- **Summary tab**

Showing the most relevant information.

Function	Power Consumption	Time	Energy Consumption	Energy Consumption %	Coverage %
__aeabi_dadd	59.88mW	4.572s	76.06µWh	8.87%	68.38%
f2	59.88mW	2.445s	40.67µWh	4.74%	100.00%
HAL_UartSendBlocking	61.03mW	40.359ms	684.2nWh	0.08%	78.57%
DbgConsole_Printf	63.7mW	2.157ms	38.17nWh	0.00%	89.29%
__bhs_ui2d	59.88mW	2.959s	49.22µWh	5.74%	91.43%
USART_WriteBlocking	61.29mW	5.957s	101.4µWh	11.83%	88.24%
f1	70.84mW	6.362s	125.1µWh	14.60%	100.00%
__aeabi_ddiv	59.9mW	26.816s	446.1µWh	52.04%	74.34%
DbgConsole_Putchar	61.13mW	27.436ms	465.9nWh	0.05%	86.36%
main	64.56mW	1.120ms	20.07nWh	0.00%	33.33%
__aeabi_i2d	59.88mW	1.018s	16.92µWh	1.97%	88.89%
CLOCK_SetFLASHAccessCycle	61.05mW	6.827µs	115.7pWh	0.00%	3.85%
DbgConsole_PrintfFormattedDz	61.49mW	32.857ms	561.2nWh	0.07%	11.64%

Figure 4. Power Profile Summary tab

• **Details tab**

Providing all the detailed information.

Function	Power Consum Min	Max	Time	Time %	Energy Consum	Energy Consu	Coverage %	Start	End	Coverage bitmap	
__aeabi_dadd	59.88mW	57.76mW	74.29mW	4.572s	9.10%	76.06µWh	8.87%	68.38%	0x2154	0x2266	1111111110000000
f2	59.88mW	57.76mW	74.29mW	2.445s	4.87%	40.67µWh	4.74%	100.00%	0x2540	0x25b8	111111111111111111
HAL_UartSendBlocking	61.03mW	58.12mW	73.48mW	40.359ms	0.08%	684.2nWh	0.08%	78.57%	0x1928	0x198a	11111111100011100
DbgConsole_Printf	63.7mW	60.22mW	71.61mW	2.157ms	0.00%	38.17nWh	0.00%	89.29%	0x38c	0x3ca	11111111000111111
__bhs_ui2d	59.88mW	57.76mW	74.29mW	2.959s	5.89%	49.22µWh	5.74%	91.43%	0x2cf2	0x2d36	11111111101111111
USART_WriteBlocking	61.29mW	58.12mW	74.29mW	5.957s	11.86%	101.4µWh	11.83%	88.24%	0x15f0	0x167a	1111111111000111
f1	70.84mW	57.93mW	75.05mW	6.362s	12.66%	125.1µWh	14.60%	100.00%	0x24f8	0x253e	11111111111111111
__aeabi_ddiv	59.9mW	57.76mW	74.29mW	26.816s	53.38%	446.1µWh	52.04%	74.34%	0x1e70	0x1fa6	11111111111111111
DbgConsole_Putchar	61.13mW	58.13mW	73.64mW	27.436ms	0.05%	465.9nWh	0.05%	86.36%	0x3cc	0x3fa	1111111000111111
main	64.56mW	58.03mW	71.08mW	1.120ms	0.00%	20.07nWh	0.00%	33.33%	0x7b8	0x7ea	00000000000000C
__aeabi_i2d	59.88mW	57.76mW	74.29mW	1.018s	2.03%	16.92µWh	1.97%	88.89%	0x2d38	0x2d48	111111110
CLOCK_SetFLASHAcces	61.05mW	61.05mW	61.05mW	6.827µs	0.00%	115.7pWh	0.00%	3.85%	0x25e6	0x2618	00000000000100
DbgConsole_PrintfForm	61.49mW	58.19mW	74.29mW	32.857ms	0.07%	561.2nWh	0.07%	11.64%	0x3fc	0x7b6	11111111111111111

Figure 5. Power Profile Details tab

Where:

- **Function** - Name of the function
- **Power Consumption** - Average power consumption of the function
- **Min** - Minimum power consumption of the function
- **Max** - Maximum power consumption of the function
- **Time** - Total amount of time spent in the function
- **Time %** - Percentage of total time spent in the function
- **Energy Consumption** - Total energy consumption of the function
- **Energy Consumption %** - Percentage of total energy consumption of the function

Note: For more detailed information on SWO data (such as: "Coverage %", "Start", "End", and "Coverage Bitmap"), please check the SWO Trace Guide.

Double-clicking on a row jumps to the corresponding function definition in the source code. Clicking on a column title sorts by that column. Clicking a second time reverses the sorting order.

• **Config tab**

Displays configuration options for power profile and allows editing them.

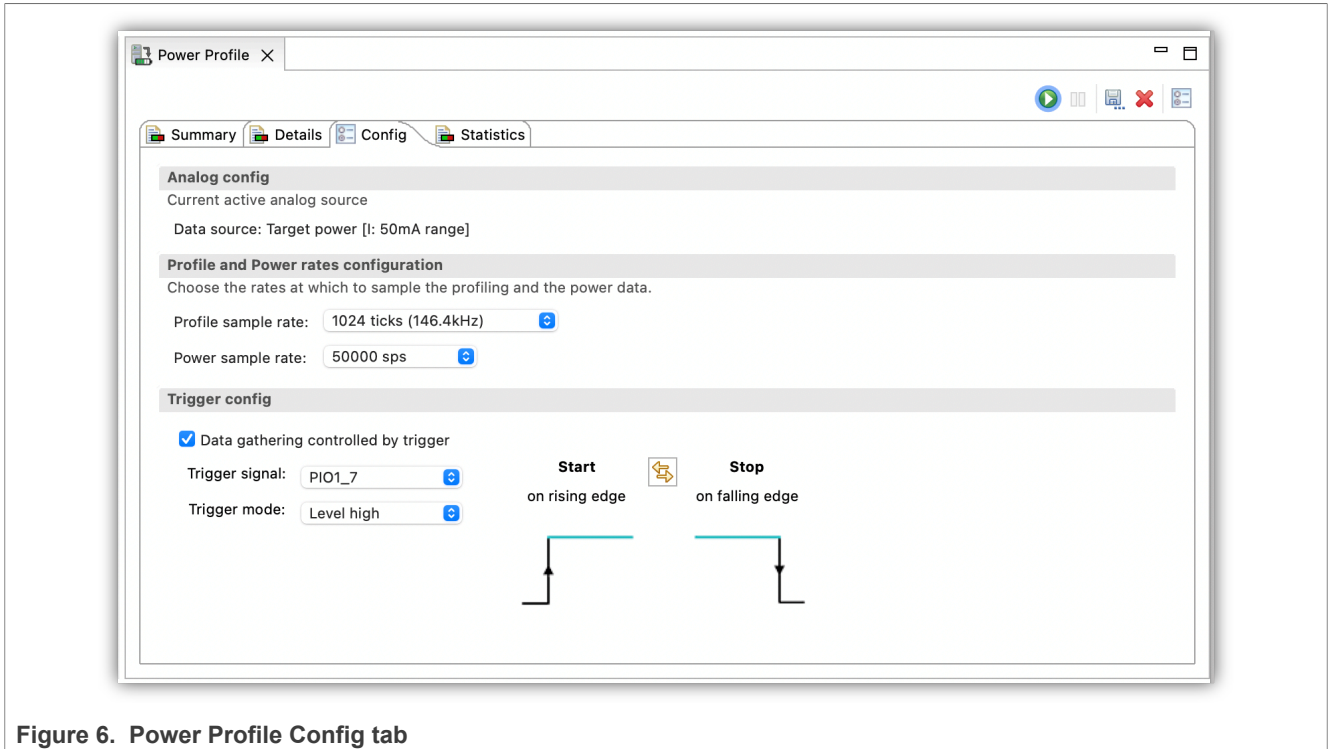


Figure 6. Power Profile Config tab

Analog config section displays the data source and the maximum current range if using V3.xxx or later of the MCU-Link CMSIS-DAP firmware provided by NXP.

Profile and Power rates configuration section allows profile and power sample rates to be chosen from the existing dropdown lists of values.

Due to the statistical nature of profiling, choosing higher sampling rates can produce more accurate results, but this can lead to overloading the trace and analog data channel. You can use the Statistics tab to guide the selection of sample rates. As a general rule, you should aim for a profile rate as high as possible, but which does not cause any SWO Overflow packets and very low SWO Lost Buffers.

For more details regarding profile/power rate configuration, please check the SWO Trace/Energy Measurement Guides.

Trigger config section is visible only when connected to MCU-Link probes. This section is used to configure the trigger mode (level-based or pulse-based) and start/stop conditions. Both the power profile and the energy measurement view have trigger config user interface but they each keep their own settings.

For more details regarding GPIO trigger configuration, please check the Energy Measurement Guide ("Data filtering using GPIO trigger configuration" section).

- **Statistics tab**

Provides a low-level usage rate for different parts of the SWO pipeline and analog data.

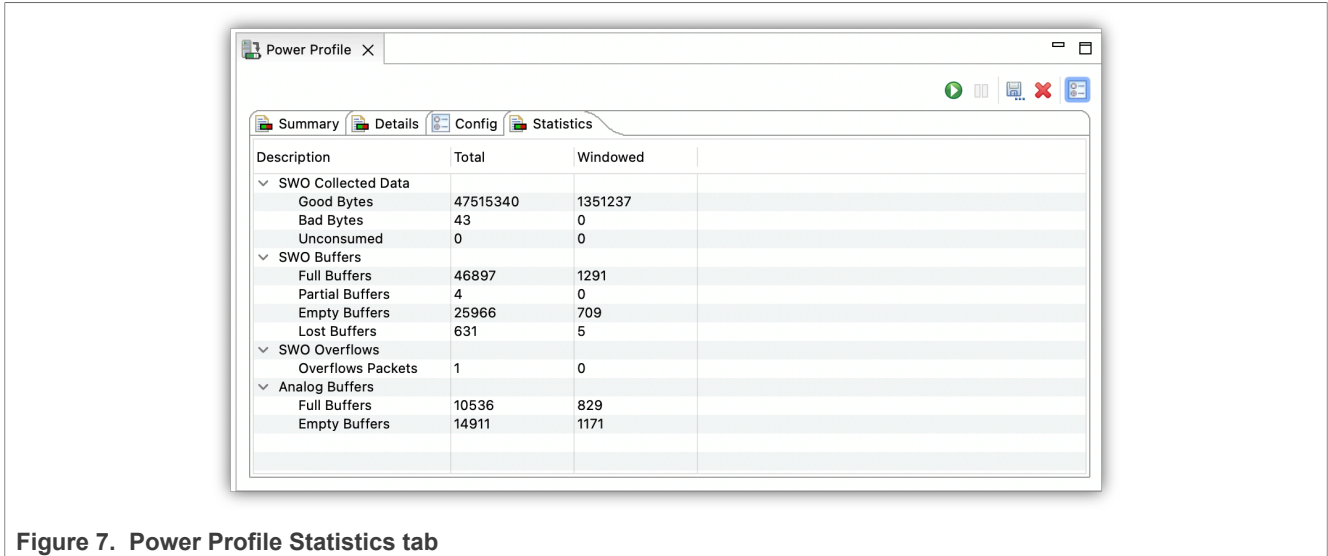


Figure 7. Power Profile Statistics tab

For more detailed information on SWO/analog statistics, please check the SWO Trace/Energy Measurement Guides.

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4 Revision history

Table 1. Revision history

Document ID	Release date	Description
UG10063 v.3	1 July 2024	11.10.0 - major release version update. See chapter 2 from <i>MCUXpresso IDE User Guide</i> for details.

Table 1. Revision history...continued

Document ID	Release date	Description
UG10063 v.2	17 January 2024	11.9.0 - major release version update. See chapter 2 from <i>MCUXpresso IDE User Guide</i> for details.
UG10063 v.1	31 July 2023	11.8.0 - major release version update. See chapter 2 from <i>MCUXpresso IDE User Guide</i> for details.

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Date of release: 1 July 2024
Document identifier: UG10063