



Mixed-Signal Explorer

Release Notes

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Preface

NOTICE TO CUSTOMERS

All documentation becomes dated, and this manual is no exception. Microchip tools and documentation are constantly evolving to meet customer needs, so some actual dialogs and/or tool descriptions may differ from those in this document. Please refer to our website (microchip.com) to obtain the latest documentation available.

Documents are identified with a “DS” number. This number is located on the bottom of each page, in front of the page number. The numbering convention for the DS number is “DSXXXXXXXA”, where “XXXXXXX” is the document number and “A” is the revision level of the document.

For the most up-to-date information on development tools, see the MPLAB® IDE online help. Select the Help menu, and then Topics, to open a list of available online help files.

INTRODUCTION

This chapter contains general information that is useful to know before using the Mixed-Signal Explorer. Items discussed in this chapter include:

- [Document Layout](#)
- [Conventions Used in this Guide](#)
- [Recommended Reading](#)
- [The Microchip Website](#)
- [Product Change Notification Service](#)
- [Customer Support](#)
- [Document Revision History](#)
- [Index](#)

DOCUMENT LAYOUT

The release notes document layout is as follows:

- **Chapter 1. “Release Notes Overview”** – Overview of the document and document references.
- **Chapter 2. “1.1.0 Features”** – Lists features added to the 1.1.0 release.
- **Chapter 3. “1.0.0 Features”** – Lists features added to the 1.0.0 release.
- **Chapter 4. “Beta 0.4.0 Features”** – Lists features added to the Beta 0.4.0 release.
- **Chapter 5. “Beta 0.3.0 Features”** – Lists features added to the Beta 0.3.0 release.
- **Chapter 6. “Beta 0.2.0 Features”** – Lists features added to the Beta release.
- **Chapter 7. “Alpha 0.1.0 Features”** – Lists features added to the Alpha release.
- **Chapter 8. “Known issues”** – Lists known issues of the components and system.

MIXED-SIGNAL EXPLORER RELEASE NOTES

CONVENTIONS USED IN THIS GUIDE

This manual uses the following documentation conventions:

DOCUMENTATION CONVENTIONS

Description	Represents	Examples
Arial font:		
Italic characters	Referenced books	<i>MPLAB® IDE User's Guide</i>
	Emphasized text	...is the <i>only</i> compiler...
Initial caps	A window	the Output window
	A dialog	the Settings dialog
	A menu selection	select Enable Programmer
Quotes	A field name in a window or dialog	"Save project before build"
Underlined, italic text with right angle bracket	A menu path	<u><i>File > Save</i></u>
Bold characters	A dialog button	Click OK
	A tab	Click the Power tab
N'Rnnnn	A number in verilog format, where N is the total number of digits, R is the radix and n is a digit.	4'b0010, 2'hF1
Text in angle brackets < >	A key on the keyboard	Press <Enter>, <F1>
Courier New font:		
Plain Courier New	Sample source code	#define START
	Filenames	autoexec.bat
	File paths	c:\mcc18\h
	Keywords	_asm, _endasm, static
	Command-line options	-Opa+, -Opa-
	Bit values	0, 1
	Constants	0xFF, 'A'

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Italic Courier New	A variable argument	<i>file.o</i> , where <i>file</i> can be any valid filename
Square brackets []	Optional arguments	mcc18 [options] <i>file</i> [options]
Curly brackets and pipe character: { }	Choice of mutually exclusive arguments; an OR selection	errorlevel {0 1}
Ellipses...	Replaces repeated text	var_name [, var_name...]
	Represents code -supplied by user	void main (void) { ... }

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RECOMMENDED READING

This document lists the features and known limitations of the Mixed-Signal Explorer software package. Other useful documents are listed below. The following Microchip document is available and recommended as a supplemental reference resource:

- [Mixed-Signal-Explorer-User-Guide.pdf](#)

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- **Business of Microchip** – Product selector and ordering guides, latest Microchip press releases, listing of seminars and events, listings of Microchip sales offices, distributors and factory representatives

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- Distributor or Representative
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- Technical Support

Customers should contact their distributor, representative or field application engineer (FAE) for support. Local sales offices are also available to help customers. A listing of sales offices and locations is included in the back of this document, under **Worldwide Sales and Service**.

Technical support is available at: microchip.com/support.

DOCUMENT REVISION HISTORY

Revision E (September 2025)

- Update for adding support for Generic-I2C.
- Update for adding support for DAC families with I2C interface.
- Update for adding support for DigiPOT families.
- Update for adding support for high-speed acquisition for Delta-Sigma.
- Update for adding multiple channels support.
- Update for adding several GUI improvements and device configuration validation improvements

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Revision D (May 2025)

- Update for adding support for DAC families with SPI interface

Revision C (March 2025)

- Update for Firmware Update support.

Revision B (February 2025)

- Update for Delta-Sigma support.

Revision A (November 2024)

- Initial Release of this document.

Chapter 1. RELEASE NOTES OVERVIEW

This document describes the main features added to the Mixed-Signal Explorer release, which integrates GUI and CLI front-end components.

The main purpose of this tool is to help users to evaluate Microchip Mixed-Signal devices by using a local host or remote host connection to the target device.

This version contains support for various Microchip Mixed-Signal device families.

For package contents, supported devices and supported operating systems, see “Mixed-Signal-Explorer-User-Guide.pdf”.

Chapter 2. 1.1.0 FEATURES

The following feature support was added with this release:

Common features for GUI & CLI components:

- Added support for Generic-I2C communication mode.
- Added support for high-speed firmware acquisition mode for Delta-Sigma ADC devices.
- Improvement of Firmware version detection (without the need to have an active board connection).
- Validation of device configuration.

GUI (Graphical User Interface) component:

- Added support for the following DAC families with I2C serial interface: MCP47CXBX, MCP47CXDX
- Added support for the following DigiPOT families with selectable SPI/I2C serial interface: MCP4XU83 (including support for SPI/I2C communication with CRC Enabled)
- Added multiple channels support by using SCAN mode for Delta-Sigma ADC devices including visualizing data on the same plot or different plots.
- Improved Histogram representation that allows users to define the Histogram Plot granularity over a defined range.
- Register View improvements: added save and read buttons for groups of fields corresponding to each register.
- DAC display in Volts.
- Added VRef validation for DAC devices.
- Improvement for Firmware version check (now it's verified against the service version)
- Coloring of plot lines based on custom input

CLI (Command Line Interface) component:

- Update CLI commands to accommodate support for other types of devices: DAC, DigiPOT

Chapter 3. 1.0.0 FEATURES

The following feature support was added with this release:

GUI (Graphical User Interface) component:

- Added support for the following DAC families: MCP48CXBX and MCP48CXDX

Chapter 4. BETA 0.4.0 FEATURES

The following feature support was added with this release:

GUI (Graphical User Interface) component:

- Added Firmware Update support
- Added start of service when connecting to localhost
- Added keep zoom level when switching between tabs
- Synchronized data in Codes with the data in FFT, Histogram, Bit Analysis.
- Ordered registers in Register View: put the most used and recommended to be modified ones first
- Added save histogram to file

Chapter 5. BETA 0.3.0 FEATURES

The following feature support was added with this release:

Common features for GUI & CLI components:

- Support for multiple Delta-Sigma ADC in a Generic SPI form (MCP356xR)
- Added Histogram support for Generic SPI

GUI (Graphical User Interface) component:

- Added Register View for the Delta-Sigma ADCs with register default values read from SVD file for each ADC

Chapter 6. BETA 0.2.0 FEATURES

The following feature support was added with this release:

Common features for GUI & CLI components:

- Support for multiple ADC variants (MCP331x1)
- Support for multiple FFT windows
- Support for two mikroBUS slots

GUI (Graphical User Interface) component:

- After installing the application, typing MSEGUI in Search Bar in Windows will open Mixed-Signal Explorer GUI
- Bit analysis
- Use Serial Number to identify MCU board devices
- Data loss signaling feature
- Setting for slowdown of display refresh rate in code analysis
- Support for Light Theme

CLI (Command Line Interface) component:

- Set/Print active ADC
- Select MCU board simulated waveform

Chapter 7. ALPHA 0.1.0 FEATURES

The following feature support was added with this release:

GUI (Graphical User Interface) component:

- Local/Remote Host connection/disconnection
- Detect available devices attached to host
- Device connection/disconnection
- Single-shot acquisition mode for Codes, FFT and INL
- Continuous acquisition mode for Codes, FFT and INL
- Export signal shot analysis results in external file in Downloads
- Export 1/5/10/15/20 seconds of codes while continuous acquisition is running in external file in Downloads
- Settings which will display some GUI settings and the possibility to set them
- User Guide will be displayed upon clicking Help/GUI Help Menu
- Zooming of plots

CLI (Command Line Interface) component:

- Typing MSECLI in Search Bar in Windows will start ADC Explorer CLI
- Local/Remote Host connection/disconnection
- List available devices attached to host
- Device connection/disconnection
- Display the current system status
- Single-shot acquisition mode
- Continuous acquisition mode
- Export acquired samples in external file
- Perform Spectral analysis (FFT)
- Perform Linearity analysis (Histogram, INL/DNL)
- Export signal analysis results in external file
- Set/Print current device configuration
- Set/Print CLI application specific settings
- List/Run device specific tests
- Show user documentation
- Events logging

Additional components:

- Service needs to be started from **services.msc** prior to using this application, however if connecting to localhost the service will be started automatically by the GUI.
- Typing MSEDOS in Windows Search Bar will display User Documentation
- Typing MSERELASENOTES in Windows Search Bar will display Release Notes document

Chapter 8. KNOWN ISSUES

Algorithms limitations:

- INL algorithm input requirements:
 - Apply low input signal frequency (<15kHz, ex. 7kHz)
 - Input frequency should not be an exact submultiple of the sample rate
 - Apply full scale for INL to reflect entire scale (4V for 4.096 VREF to account for the offset)
 - Input voltage should be centered around the middle of the full-scale.
- FFT Plot:
 - Input signal should be a single full-scale sinusoid (4V for 4.096 VREF to account for the offset)
- A filter should be used for filtering input signal (to get rid of signal generator harmonics or noise) for the plots to match the datasheets.

System limitations:

- It is recommended to run the MCHP USB Bridge Service and the software for the signal generator (e.g., WaveForms) on different machines to prevent USB connection errors and disconnections of the GUI; or use a good USB hub.
- **Powering sequence:** it is recommended, in this release, to power up the ADC Evaluation Board prior to powering up the MCU board. Fix: press reset button on the Data Capture Board.
- After updating the firmware, if issues are encountered, please redo the powering sequence and restart the service.

GUI limitations:

- Zooming out of INL plots might, in some cases, contain bugs (when mixing zooms on both plots on the X-axis). Workaround: restore the plot by double-clicking and zooming in again.
- The zoom is sensitive. When zooming in, try to span the same amount of area in both directions. If not, zooming should be out of the center. Compensate with the next zoom movement (if the desired area is to the left, span more to the left next time).
- Plot overlap of axis data on vertical zooming of codes.
- Settings take half a second to reflect correctly in the GUI due to the need to communicate them over Ethernet to the service and get a reply (for example, during continuous acquisition). The plot might look weird for half a second or so because the changes are present in the GUI but still not propagated to the device. The propagation is done on a timer every half second, hence the time required for the plot and data to be in sync. The half-second timer is used so as not to spam the MCHP USB Bridge Service with TCP requests if no change is available.
 - In the case of single-shot acquisition, do another single-shot acquisition for data to be reflected properly in the plot.
 - In the case of continuous acquisition, if changes are not reflected properly on the plot, switch to another tab and then back to the desired tab. This will help synchronize the plot to the device.
- Also, changes from external sources, like CLI changes, take the same time to be reflected in the GUI. The plot might look weird for half a second or so because changes are still not present in the GUI, but they are present on the device.
 - In the case of single-shot acquisition, do another single-shot acquisition for data to be reflected properly in the plot.
 - In the case of continuous acquisition, if changes are not reflected properly on the plot, switch to another tab and then back to the desired tab. This will help synchronize the plot to the device.
- You can't change the current device during continuous acquisition. First, stop continuous acquisition.
- You can't change dropdowns in the Results Panel when continuous acquisition is on. First, stop continuous acquisition.
- There are certain scenarios where some of the data is lost. For example, when the CPU of the PCs hosting the MCHP Bridge Service/GUI is loaded to the limit. In such scenarios, a mechanism is currently in place to drop data at the service level to keep buffer integrity at least, so FFT and INL will be accurate. However, this mechanism has an issue that will be fixed in future releases. The USB Bridge Service also offers a way to not drop extra data (oscilloscope-like mode), but this is currently not supported in the backend nor GUI.
- The GUI will freeze in some cases if multiple clicks are performed at once. Please click once and, if necessary, wait for a second before doing subsequent clicks, if the action is not performed successfully the first time. If the GUI freezes, please stop it from Task Manager and restart it.
- On some systems, after screen lock/unlock the GUI display doesn't update anymore. Workaround: minimize and maximize the GUI.

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- The device can, in rare circumstances, disconnect due to Ethernet connection timeout. In such case, disconnect from host and then reconnect back.
- Sometimes, very rarely, the GUI application disconnects itself from the device when using continuous FFT tab. Workaround: disconnect from host and then reconnect back.
- If a connection to the device fails multiple time or the wrong operation mode is selected (for example "MCU Simulation Mode" or "No Operation Mode") do the following steps:
 - Disconnect all GUI, CLI instances
 - Disconnect devices
 - Restart the MCHP_USB_BRIDGE service from services.msc (you can find the services.msc if you search in the Windows search bar).
 - Reconnect devices
 - Start the GUI and connect to the device.
- Connection sometimes fails after selecting the board. This is manifested through the Operation Mode being set to "No operation mode" and underlined in red. Workaround: disconnect from the host and reconnect.
- If the selected device does not match the real device existent on DCB, then single acquisition can lock the GUI. In such cases the GUI needs to be restarted.

CLI limitations:

- FFT DC Leakage and Spectral Leakage configuration is not supported by CLI commands
- Acquisition data loss report is not available with the CLI.
- Some Delta-Sigma specific settings are not yet available in the CLI (e.g.: OSR)
- Changing SPI baud-rate for Generic-SPI is not available with the CLI.
- Read/Write operation on Delta-Sigma registers is not yet available with the CLI. This feature is available only with GUI.
- MCU Firmware update is not available with the CLI.
- Signal generation for DAC devices is not available with the CLI.
- DigiPOT specific features are not supported with the CLI.
- Multiple channels (by using SCAN mode) for Delta-Sigma ADC devices is not supported with the CLI.

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INDEX

Alphabetical order	Meaning
ADC	Analog-to-digital converter
BE	Big Endian
CLI	Command Line Interface
CSV	Comma Separated Values
DAL	Device Access Layer
DCB	Data Capture Board
DNL	Differential Nonlinearity
FFT	Fast Fourier Transform
FW	Firmware
GUI	Graphical User Interface
HW	Hardware
INL	Integral Nonlinearity
INSTALLDIR	Installation Directory
IP	Internet Protocol
ksps	Kilo-Samples Per Second
LE	Little Endian
MCHP	Microchip
MCU	Microcontroller Unit
OSR	Over Sampling Rate
S/N	Serial Number
SW	Software
Rev	Revision
PC	Personal Computer
SPI	Serial Peripheral Interface
TCP	Transmission Control Protocol
USB	Universal Serial Bus