# Keysight M8195A/M8197A Arbitrary Waveform Generator and Synchronization Module

**KEYSIGHT**
TECHNOLOGIES

# Version 4.1.0.0 Information

| Released Date: | September 17, 2020 |
|---|---|
| Operating System: | • Windows 10 (32 bit or 64 bit) |
|  | • Windows 8.1 (32 bit or 64 bit) |
| Hardware Revision: | 1.0 and 2.0 |
| File Names: | • M8195_Setup.exe |
|  | • M8197_Setup.exe |

## New Functionality

- Some minor GUI improvements.          .

## Bug Fixes

- Fix an interoperability issue: the auto selected indices in the HiSLIP and VXI-11 VISA address can now be different. This avoids conflicts with other software starting SCPI servers (e.g. Keysight Vector Signal Analysis software).
- M8195:
  - Fix an Import Waveform panel issue with multiple waveforms in a CSV file.
  - Fix several issues with encrypted files created with Keysight Signal Studio.
- M8197:
  - Fix a problem in the discovery dialog which prevented the start of AWG SFP instances.
  - Fix an interoperability issue with Keysight MD2 High-Speed Digitizer Instrument Drivers. After AWG discovery other PXIe/AXIe could end up locked.
  - Fix a timeout issue when discovering AWG modules.

## Known Issues

The default FIR filter type is now Zero-order hold for memory sample rate divider 1 and Nyquist for memory sample rate divider 2 and 4. The setting of the user-defined FIR filter coefficients has only effect after switching to FIR filter type USER.

# Version 4.0.0.0 Information

| Released Date: | April 29, 2019 |
|---|---|
| Operating System: | • Windows 10 (32 bit or 64 bit) |
| | • Windows 8.1 (32 bit or 64 bit) |
| | • Windows 7 (32 bit or 64 bit) |
| Hardware Revision: | 1.0 and 2.0 |
| File Names: | • M8195_Setup.exe |
| | • M8197_Setup.exe |

## New Functionality

- Added a Radar Panel to generate a variety of Radar signals.
    - Supports generation of RF and baseband (I/Q) Radar signals.
    - Carrier amplitude and phase can be independently set for each RF channel or IQ pair.
    - Pulse trains can be defined in terms of number of pulses, pulse repetition interval, staggering and initial and final dead times.
    - Pulse envelopes can be defined according to their width, rise and fall times, and edge shape.
    - Supported intra-pulse modulation schemes include Linear FM, Step FM, and polyphase schemes such as Barker and Frank codes.

- Added a Corrections Panel to set up waveforms, that are nearly free of linear distortions.
    - Corrections can be defined per channel or IQ pair of channels. They can be applied to all waveforms generated with Standard, Multi-Tone, Complex-Modulation, Radar, Serial Data and Import Waveform Panel.
    - Correction data from following sources can be selected: internal frequency-response tables for each channel, standard responses for high-quality cabling, externally-defined correction files and Touchstone S-Parameter files.
    - IQ impairments like IQ skew, gain imbalance and quadrature error can be corrected independently.
    - Effects of distortions can be compensated for (de-embedding), or distortions can be emulated (embedding).
    - Available correction methods are waveform pre-processing and integrated FIR Filters.

## Bug Fixes

- N/A

## Known Issues

The default FIR filter type is now Zero-order hold for memory sample rate divider 1 and Nyquist for memory sample rate divider 2 and 4. The setting of the user-defined FIR filter coefficients has only effect after switching to FIR filter type USER.

# Version 3.6.0.0 Information

| Released Date: | April 23, 2018 |
| --- | --- |
| Operating System: | • Windows 10 (32 bit or 64 bit)<br>• Windows 8.1 (32 bit or 64 bit)<br>• Windows 8 (32 bit or 64 bit)<br>• Windows 7 (32 bit or 64 bit) |
| Hardware Revision: | 1.0 and 2.0 |
| File Names: | • M8195_Setup.exe<br>• M8197_Setup.exe |

## New Functionality

- N/A

## Bug Fixes

- Fix for communication issues between M8195 and M8197 instances in systems with Keysight IO Libraries Suite newer than 18.0 (2017 Update 1)
- Fix for issues regarding import of Signal Studio generated files.

## Known Issues

The default FIR filter type is now Zero-order hold for memory sample rate divider 1 and Nyquist for memory sample rate divider 2 and 4. The setting of the user-defined FIR filter coefficients has only effect after switching to FIR filter type USER.

## Version 3.5.17.1 Information

| Released Date: | October 11, 2017 |
|---|---|
| Operating System: | • Windows 10 (32 bit or 64 bit)<br>• Windows 8.1 (32 bit or 64 bit)<br>• Windows 8 (32 bit or 64 bit)<br>• Windows 7 (32 bit or 64 bit) |
| Hardware Revision: | 1.0 and 2.0 |
| File Names: | • M8195_Setup.exe<br>• M8197_Setup.exe |

### New Functionality

- N/A

### Bug Fixes

- Fix for PCIe communication issue between M8195A and embedded controller or M8195A and external PC

### Known Issues

- The default FIR filter type is now Zero-order hold for memory sample rate divider 1 and Nyquist for memory sample rate divider 2 and 4. The setting of the user-defined FIR filter coefficients has only effect after switching to FIR filter type USER.

# Version 3.5.0.0 Information

| Released Date: | March 17, 2017 |
|---|---|
| Operating System: | • Windows 10 (32 bit or 64 bit)<br>• Windows 8.1 (32 bit or 64 bit)<br>• Windows 8 (32 bit or 64 bit)<br>• Windows 7 (32 bit or 64 bit) |
| Hardware Revision: | 1.0 and 2.0 |
| File Names: | • M8195_Setup.exe<br>• M8197_Setup.exe |

## New Functionality

- Import of Signal Studio generated encrypted waveform files including up-conversion to a user defined carrier frequency

## Bug Fixes

- N/A

## Known Issues

- The default FIR filter type is now Zero-order hold for memory sample rate divider 1 and Nyquist for memory sample rate divider 2 and 4. The setting of the user-defined FIR filter coefficients has only effect after switching to FIR filter type USER.

# Version 3.2.0.0 Information

| Released Date: | November 07, 2016 |
|---|---|
| Operating System: | • Windows 10 (32 bit or 64 bit)<br>• Windows 8.1 (32 bit or 64 bit)<br>• Windows 8 (32 bit or 64 bit)<br>• Windows 7 (32 bit or 64 bit) |
| Hardware Revision: | 1.0 and 2.0 |
| File Names: | • M8195_Setup.exe<br>• M8197_Setup.exe |

## New Functionality

- N/A

## Bug Fixes

- Sometimes the installer created a file named "REBOOT=ReallySuppress" and in some cases the system automatically re-started.

## Known Issues

- The default FIR filter type is now Zero-order hold for memory sample rate divider 1 and Nyquist for memory sample rate divider 2 and 4. The setting of the user-defined FIR filter coefficients has only effect after switching to FIR filter type USER.

# Version 3.1.30.3 Information

| Released Date: | October 14, 2016 |
|---|---|
| Operating System: | • Windows 10 (32 bit or 64 bit)<br>• Windows 8.1 (32 bit or 64 bit)<br>• Windows 8 (32 bit or 64 bit)<br>• Windows 7 (32 bit or 64 bit) |
| Hardware Revision: | 1.0 and 2.0 |
| File Names: | • M8195_Setup.exe<br>• M8197_Setup.exe |

## New Functionality

- N/A

## Bug Fixes

- M8195: SFP sometimes crashes when started with command line switch "/auto".
- M8195: SFP fails to start after some hardware errors caused by an unstable clock. In this case a power cycle of the AXIe chassis is necessary.
- M8195/M8197: after the system was stopped due to a clock loss, hardware is not always initialized correctly when the waveform generation is started again, so the generated waveform is not correct.
- M8195/M8197: when performing a remote controlled "stop / change sample frequency / start"-loop we may get a clock loss warning or the system may switch to configuration mode. Then "start" fails with an error message.
- M8195: when the user logs off or when the PC is re-booted or shutdown, the module hardware is not shutdown correctly. In particular, with an embedded controller a re-boot may fail until a power cycle of the AXIe chassis is done.

## Known Issues

- The default FIR filter type is now Zero-order hold for memory sample rate divider 1 and Nyquist for memory sample rate divider 2 and 4. The setting of the user-defined FIR filter coefficients has only effect after switching to FIR filter type USER.

# Version 3.1.8.2 Information

| Released Date: | August 02, 2016 |
|---|---|
| Operating System: | • Windows 10 (32 bit or 64 bit)<br>• Windows 8.1 (32 bit or 64 bit)<br>• Windows 8 (32 bit or 64 bit)<br>• Windows 7 (32 bit or 64 bit) |
| Hardware Revision: | 1.0 and 2.0 |
| File Names: | • M8195_Setup.exe<br>• M8197_Setup.exe |

## New Functionality

- M8195A LabVIEW driver supporting hardware revision 2
- M8197A IVI-COM, IVI-C, MATLAB and LabVIEW driver
- Enhance SCPI API for file import by a command to enable/disable scaling of imported data.
- Default memory configuration after reset changed to a more useful setting. Channel 1 uses extended memory, channels 2, 3, and 4 use DAC internal memory. Memory Sample Rate Divider is 1.
- Simpler Memory Mode selection in SFP Output Panel.
- Increase maximum possible Crest Factor for noise generation to 16dB in Standard Waveform Panel.
- Improved setup of multi-module group in M8197 SFP
    - Button for switching between configuration and operation mode always visible and next to run/stop button
    - Pressing run button causes automatic switch to operation mode and start of signal generation.

## Bug Fixes

- M8195/M8197: fix potential AXIe backplane timing problems.
- Switch to run mode possible from M8197, when no M8195 modules are added.
- Auto-scale in waveform preview sets limits to +/-1.2 instead of +/-1.0.
- Setting the M8197 GPIO pin state, reset, and set the same pin and state again does not work.
- SCPI commands for dynamic sequence selection and setting the bit width of the Dynamic Control Port don't update the corresponding fields in the M8197 Dynamic Control Panel.
- M8195 IVI driver method ConfigureSingleChannelWithMarkers does not set the Sample Rate Divider correctly.
- Output amplitude can be set beyond limit when termination voltage is used.

## Known Issues

- The default FIR filter type is now Zero-order hold for memory sample rate divider 1 and Nyquist for memory sample rate divider 2 and 4. The setting of the user-defined FIR filter coefficients has only effect after switching to FIR filter type USER.

# Version 3.0.10.4 Information

| | |
|---|---|
| Released Date: | May 31, 2016 |
| Operating System: | • Windows 10 (32 bit or 64 bit) |
| | • Windows 8.1 (32 bit or 64 bit) |
| | • Windows 8 (32 bit or 64 bit) |
| | • Windows 7 (32 bit or 64 bit) |
| Hardware Revision: | 1.0 and 2.0 |
| File Names: | • M8195_Setup.exe |
| | • M8197_Setup.exe |

## New Functionality

- N/A

## Bug Fixes

- Wrong M8195 module list in synchronous system when same module is added twice using different VISA resource names.
- Check boxes for unavailable target channels in DAC modes 'Dual Channel Duplicate' and 'Dual Channel with Markers' not disabled correctly.
- Serial Data Waveform with Bessel-Thomson edge shape and skew not generated correctly for bit rates higher than 10 GBaud.
- Sample clock delay field in clock tab not updated when value is modified using SCPI, or when sample rate is changed using SCPI.
- Sample clock delay not being reapplied to hardware when it was changed while the signal generation was stopped.
- Fixed some minor usability issues.

## Known Issues

- The default FIR filter type is now Zero-order hold for memory sample rate divider 1 and Nyquist for memory sample rate divider 2 and 4. The setting of the user-defined FIR filter coefficients has only effect after switching to FIR filter type USER.

# Version 3.0.4.3 Information

| | |
|---|---|
| Released Date: | May 02, 2016 |
| Operating System: | • Windows 10 (32 bit or 64 bit)<br>• Windows 8.1 (32 bit or 64 bit)<br>• Windows 8 (32 bit or 64 bit)<br>• Windows 7 (32 bit or 64 bit) |
| Hardware Revision: | 1.0 and 2.0 |
| File Names: | • M8195_Setup.exe<br>• M8197_Setup.exe |

## New Functionality

- M8195A IVI-COM, IVI-C, and MATLAB drivers supporting hardware revision 2
- Serial data waveform generation enhancements with impairments
  - Spread Spectrum Clock (SSC), Periodic and Random Jitter, Duty Cycle Distortion (DCD)
  - Link emulation by addition of bandwidth limited noise, Low-Pass Filter, ISI Filter, S-Parameter Embedding and De-Embedding
  - De-Emphasis with five pre- and five post-cursor taps
- Significantly increased the performance of the waveform calculation algorithms for Serial Data Waveform and Complex Modulated Waveform Panel
- FIR filter configuration per channel
  - Predefined correction filter types for best signal quality: Low-Pass, Nyquist, Linear interpolation, Zero-order hold

  - FIR delay per channel
  - FIR scale per channel
- Sample clock delay per channel
- Instrument Modes 'Dual Channel Duplicate' and 'Dual Channel with Markers' available with channel options 002 and 004.
- Added a command line argument to select the location of temporary files and log files: `/OutputDir <path>`
- M8197A: When [Discover] is clicked, all M8195A modules with active Soft Front Panel are added to the module list, even if they were not added in the Keysight Connection Expert before.
  A message box is shown, if a module without active Soft Front Panel is found.
- M8197A: If a M8195A module entry in the module list is double-clicked, its Soft Front Panel is brought to the front.
- Show the Wait Cursor when an action takes some time.

## Bug Fixes

- Increased the initial window size: On the first start after installation, the Soft Front Panel window was too small.
- Fixed access conflicts: If more than one M8195A Soft Front Panel was started with command line argument `/r auto` at the same time, it could happen that they tried to use the same hardware.
- Fixed corrections from file in Serial Data Panel.

## Known Issues

- The default FIR filter type is now Zero-order hold for memory sample rate divider 1 and Nyquist for memory sample rate divider 2 and 4. The setting of the user-defined FIR filter coefficients has only effect after switching to FIR filter type USER.

# Version 2.6.7.1 Information

| Released Date: | February 22, 2016 |
| --- | --- |
| Operating System: | • Windows 10 (32 bit or 64 bit) <br> • Windows 8.1 (32 bit or 64 bit) <br> • Windows 8 (32 bit or 64 bit) <br> • Windows 7 (32 bit or 64 bit) |
| Hardware Revision: | 1.0 and 2.0 |
| File Names: | • M8195_Setup.exe <br> • M8197_Setup.exe |

## New Functionality

- Added a compiled version of IQTools in …\Examples\MATLAB\iqtools_compiled, which doesn't require a MATLAB installation but only the free MATLAB Runtime.
- Allow exchange of sequence table entries during active signal generation.

## Bug Fixes

- Sequences consisting of segments with an odd number of memory vectors are not played correctly.
- Data generation works unreliable with more than 64 sequence table entries.
- Waveform transfer using the SCPI API with an 'offset' parameter greater 4G does not work.
- File import using the SCPI API with data length greater 2G does not work.
- Remote control of a multi-module system causes conflicts with SFP control.
- Exchange of waveform segments during active signal generation ("Memory Ping-Pong") not working in a multi-module system.
- Correct names for modulation schemes pi/4-QPSK and 3pi/8-8PSK (EDGE) in SFP.

# Version 2.5.7.1 Information

| Released Date: | November 27, 2015 |
|---|---|
| Operating System: | • Windows 8.1 (32 bit or 64 bit)<br>• Windows 8 (32 bit or 64 bit)<br>• Windows 7 (32 bit or 64 bit) |
| Hardware Revision: | 1.0 and 2.0 |
| File Names: | • M8195_Setup.exe<br>• M8197_Setup.exe |

## New Functionality

- Exchange of waveform segments during active signal generation ("Memory Ping-Pong") supported by the SFP.

## Bug Fixes

- Import of BIN8 file format fails.
- Setting offset and termination voltage using SCPI in one transaction not working.
- Synthesizer PLL sporadically does not lock to required frequency.
- Temporary files used for file import not always deleted correctly.
- Waveform downloads not working reliably when multiple M8195 SFP instances send data at the same time.
- "Waveform cannot be imported with current settings" message is shown sometimes although settings are valid.

# Version 2.5.0.0 Information

| Released Date: | November 19, 2015 |
|---|---|
| Operating System: | • Windows 8.1 (32 bit or 64 bit)<br>• Windows 8 (32 bit or 64 bit)<br>• Windows 7 (32 bit or 64 bit) |
| Hardware Revision: | 1.0 and 2.0 |
| File Names: | • M8195_Setup.exe<br>• M8197_Setup.exe |

## New Functionality

- Support for M8197A synchronization module.
- Support for synchronization of multiple M8195A modules.
- Dynamic sequencing
- Marker support from SFP

# Version 2.0.20.2 Information

| | |
|---|---|
| Released Date: | November 04, 2015 |
| Operating System: | • Windows 8.1 (32 bit or 64 bit)<br>• Windows 8 (32 bit or 64 bit)<br>• Windows 7 (32 bit or 64 bit) |
| Hardware Revision: | 1.0 and 2.0 |
| File Name: | M8195_Setup.exe |

## New Functionality

- User's Guide: Added several abstracts and block diagrams.

## Bug Fixes

- Sporadic failure to restore saved configuration.
- The SFP sporadically failed to fully initialize. As a result, e.g. the Run button and error pane was not fully functional.
- Marker generation in combination with complex sequencing.
- Stopping signal generation fails, when currently used external clock is disconnected during signal generation.

# Version 2.0.3.0 Information

| | |
|---|---|
| Released Date: | October 09, 2015 |
| Operating System: | • Windows 8.1 (32 bit or 64 bit)<br>• Windows 8 (32 bit or 64 bit)<br>• Windows 7 (32 bit or 64 bit) |
| Hardware Revision: | 1.0 and 2.0 |
| File Name: | M8195_Setup.exe |

## New Functionality

- The M8195A is available in two different hardware revisions. Refer to the data sheet of the M8195A for the differences between Revision 1 and Revision 2. This is the initial software version for Revision 2 instruments. This software also supports Revision 1 instruments.

# Version 1.3.1.1 Information

| Released Date: | 31 July 2015 |
| --- | --- |
| Operating System: | • Windows 8.1 (32 bit or 64 bit) <br> • Windows 8 (32 bit or 64 bit) <br> • Windows 7 (32 bit or 64 bit) |
| Hardware Revision: | 1.0 |
| File Name: | M8195_Setup.exe |

## New Functionality

• Added optional parameters for output amplitude and sample rate to the SCPI query for the frequency and phase response data.

# Version 1.3.0.0 Information

| Released Date: | 11 May 2015 |
| --- | --- |
| Operating System: | • Windows 8.1 (32 bit or 64 bit) <br> • Windows 8 (32 bit or 64 bit) <br> • Windows 7 (32 bit or 64 bit) |
| Hardware Revision: | 1.0 |
| File Name: | M8195_Setup.exe |

## New Functionality

• M8195A IVI-COM, IVI-C, MATLAB, and LabVIEW driver.

## Bug Fixes

• CSV and MAT89600 files with data for multiple channels are not imported correctly.
• Sometimes the Soft Front Panel was not displayed after an instrument was selected and the Splash Screen was closed, even though the process AgM8195SFP.exe was visible in the Task Manger.

# Version 1.2.0.0 Information

| | |
|---|---|
| Released Date: | 05 February 2015 |
| Operating System: | • Windows 8.1 (32 bit or 64 bit) |
| | • Windows 8 (32 bit or 64 bit) |
| | • Windows 7 (32 bit or 64 bit) |
| Hardware Revision: | 1.0 |
| File Name: | M8195_Setup.exe |

## New Functionality

- Serial data waveform generation (NRZ, RZ, and PAM) including built-in and user-defined amplitude and phase corrections.

# Version 1.1.0.0 Information

| | |
|---|---|
| Released Date: | 03 November 2014 |
| Operating System: | • Windows 8.1 (32 bit or 64 bit) |
| | • Windows 8 (32 bit or 64 bit) |
| | • Windows 7 (32 bit or 64 bit) |
| Hardware Revision: | 1.0 |
| File Name: | M8195_Setup.exe |

## New Functionality

- Multi-tone waveform generation (equally and arbitrary spaced tones) including notches and user-defined amplitude and phase corrections.

- Complex modulated waveform generation (ASK, PSK, QAM, MSK, APSK, STAR, VSB, FSK, and user-defined modulation schemes) including user-defined amplitude and phase corrections.

## Version 1.0.0.0 Information

| | |
|---|---|
| Released Date: | 24 September 2014 |
| Operating System: | • Windows 8.1 (32 bit or 64 bit)<br>• Windows 8 (32 bit or 64 bit)<br>• Windows 7 (32 bit or 64 bit) |
| Hardware Revision: | 1.0 |
| File Name: | M8195_Setup.exe |

## Initial Release

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