M8199A AWG Module Driver Package for M8070B

General Notes

This module driver extends M8070B System Software with the ability to control M8199A AXIe modules.

For general M8070B information refer to the respective M8070B release notes.

User Documentation

After installation of the module driver package, the user documentation can be found in folder: *C:\Program Files\Keysight\M8070B\Documentation*

- M8100SeriesUserGuide.pdf
- M8100SeriesProgrammingGuide.pdf
- M8100SeriesGettingStartedGuide.pdf
- M8100SeriesStartHere.pdf
- M8100SeriesTipsForPreventingDamage.pdf

Software Licensing

The M8199A module driver does not require any software licenses.

KEYSIGHT

Release 1.5.500.0

Release Date:	December 1st, 2023
M8070B Required:	10.0.160.6 or later
Operating System:	Windows 10
Software Prerequisites:	Same as M8070B System Software

New Functionality

- Support for new DAC revision

Bug Fixes

- Missing Modules in M8070B GUI in case multiple AXI chassis connected via PCIe.

- Trace:import SCPI command
  - Issue with large waveform
  - Issue with rounding of samples

Notes and Known Limitations

- Trace:import SCPI command: only BIN8, TXT and CSV file-formats are supported.

- When operating multiple M8199A AWG modules with the same M8008A clock module, an IQTools based calibration is required to ensure a stable skew among those M8199A modules. Detailed information for calibration can be found in the Keysight IQTools User Guide under section "*M8199A Multi-Module Skew Calibration*".

Release 1.4.10.8

Release Date:	May 9th, 2023
M8070B Required:	8.5.380.14 or later
Operating System:	Windows 10
Software Prerequisites:	Same as M8070B System Software

Bug Fixes

- Some minor bugfixes

Notes and Known Limitations

- Trace:import SCPI command: only BIN8, TXT and CSV file-formats are supported.

- With the M8008A clock module, the skew between channels will remain stable (not necessarily at zero) across sample rate changes and re-start of M8070B software.

- With the M8008A clock module, through a one-time in-system calibration, the remaining skew can be adjusted to zero. The adjustment values are stored in a persistent user calibration space on the module and are automatically applied by the module driver. This means that the skew stays at zero even after change of sample rate or re-start of M8070B software.

- Since there is a very small variation of the skew over sample rate, it is possible to further improve the accuracy by running the in-system calibration at a few different sample rates (preferably close to those that are used in the measurements later on). The corresponding skew values are all stored in the user calibration space on the module and are automatically applied by the module driver, depending on the current sample rate. If a particular sample rate has never been calibrated, the skew value is interpolated. This also means that in interleaved operation an interleave skew calibration is only required once (potentially at a few different sample rates). After that, interleave mode will simply work after change of sample rate or re-start of M8070B software without the need for an interleave skew calibration every time.

- Signal generation (NRZ, PAM4, etc.) from within the M8070B software is not yet supported.
  Workaround: Use IQtools or MATLAB for waveform generation.
  Resolution: This will be implemented in a future version of the M8070B software.

Release 1.4.7.2

Release Date:	March 23rd, 2022
M8070B Required:	8.5.380.14 or later
Operating System:	Windows 10
Software Prerequisites:	Same as M8070B System Software

New Functionality

- Increased channel delay and interleaved skew range (+/- 20ns)

- Increased maximum amplitude in remote head mode (1.2V)

- Improved synchronization between multiple modules

Bug Fixes

- Some minor bugfixes

Notes and Known Limitations

- Trace:import SCPI command: only BIN8, TXT and CSV file-formats are supported.

- With the M8008A clock module, the skew between channels will remain stable (not necessarily at zero) across sample rate changes and re-start of M8070B software.

- With the M8008A clock module, through a one-time in-system calibration, the remaining skew can be adjusted to zero. The adjustment values are stored in a persistent user calibration space on the module and are automatically applied by the module driver. This means that the skew stays at zero even after change of sample rate or re-start of M8070B software.

- Since there is a very small variation of the skew over sample rate, it is possible to further improve the accuracy by running the in-system calibration at a few different sample rates (preferably close to those that are used in the measurements later on). The corresponding skew values are all stored in the user calibration space on the module and are automatically applied by the module driver, depending on the current sample rate. If a particular sample rate has never been calibrated, the skew value is interpolated. This also means that in interleaved operation an interleave skew calibration is only required once (potentially at a few different sample rates). After that, interleave mode will simply work after change of sample rate or re-start of M8070B software without the need for an interleave skew calibration every time.

- Signal generation (NRZ, PAM4, etc.) from within the M8070B software is not yet supported.
  Workaround: Use IQtools or MATLAB for waveform generation.
  Resolution: This will be implemented in a future version of the M8070B software.

Release 1.3.35.2

Release Date:	November 23rd, 2021
M8070B Required:	8.0.200.18 or later
Operating System:	Windows 10
Software Prerequisites:	Same as M8070B System Software

Bug Fixes

- Interleaving performance issue with remote heads

Notes and Known Limitations

- Trace:import SCPI command: only BIN8, TXT and CSV file-formats are supported.

- With the M8008A clock module, the skew between channels will remain stable (not necessarily at zero) across sample rate changes and re-start of M8070B software.

- With the M8008A clock module, through a one-time in-system calibration, the remaining skew can be adjusted to zero. The adjustment values are stored in a persistent user calibration space on the module and are automatically applied by the module driver. This means that the skew stays at zero even after change of sample rate or re-start of M8070B software.

- Since there is a very small variation of the skew over sample rate, it is possible to further improve the accuracy by running the in-system calibration at a few different sample rates (preferably close to those that are used in the measurements later on). The corresponding skew values are all stored in the user calibration space on the module and are automatically applied by the module driver, depending on the current sample rate. If a particular sample rate has never been calibrated, the skew value is interpolated. This also means that in interleaved operation an interleave skew calibration is only required once (potentially at a few different sample rates). After that, interleave mode will simply work after change of sample rate or re-start of M8070B software without the need for an interleave skew calibration every time.

- Finally, the frequency and phase response of each channel (as determined by an in-system calibration) can also be stored in the user calibration space of the module. This allows other software tools (e.g., optical modulation generator) to retrieve the channel's frequency/phase response without having to run an in-system calibration.

- Signal generation (NRZ, PAM4, etc.) from within the M8070B software is not yet supported.
  Workaround: Use IQtools or MATLAB for waveform generation.
  Resolution: This will be implemented in a future version of the M8070B software.

- The Optical Modulation Generator Software (81195A) does not yet support the M8199A.
  Workaround: Use IQtools to generate digital modulation and multitone signals.
  Resolution: M8199A support for the 81195A software is expected in November 2021.

Release 1.3.7.8

Release Date:	October 28th, 2021
M8070B Required:	8.0.200.18 or later
Operating System:	Windows 10
Software Prerequisites:	Same as M8070B System Software

New Functionality

- Support for PSG as a clock source

- Trace:import SCPI command:
    - Support for marker-waveform files added
    - The example waveform files are available at *C:\Program Files\Keysight\M8070B\Modules\M8199A_ModuleDriver\WaveformDataFiles*

Bug Fixes

- Incorrect channel-skew after M8070B start-up

- Improved output-amplifier protection

Notes and Known Limitations

- Trace:import SCPI command: only BIN8, TXT and CSV file-formats are supported.

- With the M8008A clock module, the skew between channels will remain stable (not necessarily at zero) across sample rate changes and re-start of M8070B software.

- With the M8008A clock module, through a one-time in-system calibration, the remaining skew can be adjusted to zero. The adjustment values are stored in a persistent user calibration space on the module and are automatically applied by the module driver. This means that the skew stays at zero even after change of sample rate or re-start of M8070B software.

- Since there is a very small variation of the skew over sample rate, it is possible to further improve the accuracy by running the in-system calibration at a few different sample rates (preferably close to those that are used in the measurements later on). The corresponding skew values are all stored in the user calibration space on the module and are automatically applied by the module driver, depending on the current sample rate. If a particular sample rate has never been calibrated, the skew value is interpolated. This also means that in interleaved operation an interleave skew calibration is only required once (potentially at a few different sample rates). After that, interleave mode will simply work after change of sample rate or re-start of M8070B software without the need for an interleave skew calibration every time.

- Finally, the frequency and phase response of each channel (as determined by an in-system calibration) can also be stored in the user calibration space of the module. This allows other software tools (e.g., optical modulation generator) to retrieve the channel's frequency/phase response without having to run an in-system calibration.

- Signal generation (NRZ, PAM4, etc.) from within the M8070B software is not yet supported.
  Workaround: Use IQtools or MATLAB for waveform generation.
  Resolution: This will be implemented in a future version of the M8070B software.

- The Optical Modulation Generator Software (81195A) does not yet support the M8199A.
  Workaround: Use IQtools to generate digital modulation and multitone signals.
  Resolution: M8199A support for the 81195A software is expected in November 2021.

Release 1.2.117.4

Release Date:	September 10th, 2021
M8070B Required:	8.0.200.18 or later
Operating System:	Windows 10
Software Prerequisites:	Same as M8070B System Software

New Functionality

- Trace import

- Synchronous start in conjunction with M8008A up to 4 modules

- User calibration data can be stored in the module

Notes and Known Limitations

- PSG as clock source is not supported with this version of the M8199A module driver.

- With the M8008A clock module, the skew between channels will remain stable (not necessarily at zero) across sample rate changes and re-start of M8070B software.

- Through a one-time in-system calibration, the remaining skew can be adjusted to zero. The adjustment values are stored in a persistent user calibration space on the module and are automatically applied by the module driver. This means that the skew stays at zero even after change of sample rate or re-start of M8070B software.

- Since there is a very small variation of the skew over sample rate, it is possible to further improve the accuracy by running the in-system calibration at a few different sample rates (preferably close to those that are used in the measurements later on). The corresponding skew values are all stored in the user calibration space on the module and are automatically applied by the module driver, depending on the current sample rate. If a particular sample rate has never been calibrated, the skew value is interpolated. This also means that in interleaved operation an interleave skew calibration is only required once (potentially at a few different sample rates). After that, interleave mode will simply work after change of sample rate or re-start of M8070B software without the need for an interleave skew calibration every time.

- Finally, the frequency and phase response of each channel (as determined by an in-system calibration) can also be stored in the user calibration space of the module. This allows other software tools (e.g., optical modulation generator) to retrieve the channel's frequency/phase response without having to run an in-system calibration.

- Signal generation (NRZ, PAM4, etc.) from within the M8070B software is not yet supported.
  Workaround: Use IQtools or MATLAB for waveform generation.
  Resolution: This will be implemented in a future version of the M8070B software.

- The Optical Modulation Generator Software (81195A) does not yet support the M8199A.
  Workaround: Use IQtools to generate digital modulation and multitone signals.
  Resolution: M8199A support for the 81195A software is expected in November 2021.

Release 1.1.16.6

Release Date:	June 24th, 2021
M8070B Required:	8.0.200.18 or later
Operating System:	Windows 10
Software Prerequisites:	Same as M8070B System Software

New Functionality

- Synchronous signal generation: Supported on two modules in conjunction with IQTools

- Remote Head: New hardware revision is supported

Bug Fixes

- Remote Head: Fix for Power Supply issue

- Fix software freezes and errors during start-up

- Fix signal generation start issue on secondary module

Notes and Known Limitations

- This version does not perform automatic skew calibration between channels. After each start of the M8070B software or change of sample rate, the channel-to-channel skew between any pair of channels is a random value within a +/- 3 ns window. (However, a stop/waveform download/start sequence does not change the channel-to-channel skew). Due to this limitation, interleaved operation does not work without performing a skew calibration after every change of sample rate or start of the M8070B software.
  Workaround: Perform "M8199A skew calibration" in IQtools after every change of sample rate or start of the M8070B software.
  Resolution: optionally, the M8199A limited ship release (LSR) modules can be returned to the factory to get skew calibration performed after June 2021. Automatic skew alignment will work only in conjunction with the M8008A clock module. Please contact your Keysight sales representative.

- When operating the M8199A with an external signal generator as a clock source, only one M8199A module can be operated in a synchronized fashion.
  Workaround: N/A
  Resolution: Support for dual-module synchronization with an external signal generator will be available in software update planned for April 2021. Also, up to four M8199A modules can be operated fully synchronized, once the M8008A clock module is available (June 2021).

- Signal generation (NRZ, PAM4, etc.) from within the M8070B software is not yet supported.
  Workaround: Use IQtools or MATLAB for waveform generation.
  Resolution: This will be implemented in a future version of the M8070B software.

- The Optical Modulation Generator Software (81195A) does not yet support the M8199A.
  Workaround: Use IQtools to generate digital modulation and multitone signals.
  Resolution: M8199A support for the 81195A software is expected in August 2021.

- Factory default values for frequency- and phase response corrections that are stored in the modules cannot be queried through the M8070B software.
  Workaround: Use frequency/phase response correction ("in-system calibration") in IQtools.
  Resolution: Expected in June 2021.

Release 1.0.4.1

Release Date:	March 16th, 2021
M8070B Required:	7.5.700.8 or later
Operating System:	Windows 10
Software Prerequisites:	Same as M8070B System Software

New Functionality

- Downloading waveforms in interleaving mode is now supported by the M8070B software

- Channel delay parameter range increased to +/- 2ns

Bug Fixes

- Fixed Calibration routines

- Fixed Remote Head Communication issues

Notes and Known Limitations

- This version does not perform automatic skew calibration between channels. After each start of the M8070B software or change of sample rate, the channel-to-channel skew between any pair of channels is a random value within a +/- 3 ns window. (However, a stop/waveform download/start sequence does not change the channel-to-channel skew). Due to this limitation, interleaved operation does not work without performing a skew calibration after every change of sample rate or start of the M8070B software.
  Workaround: Perform "M8199A skew calibration" in IQtools after every change of sample rate or start of the M8070B software.
  Resolution: optionally, the M8199A limited ship release (LSR) modules can be returned to the factory to get skew calibration performed after June 2021. Automatic skew alignment will work only in conjunction with the M8008A clock module. Please contact your Keysight sales representative.

- When operating the M8199A with an external signal generator as a clock source, only one M8199A module can be operated in a synchronized fashion.
  Workaround: N/A
  Resolution: Support for dual-module synchronization with an external signal generator will be available in software update planned for April 2021. Also, up to four M8199A modules can be operated fully synchronized, once the M8008A clock module is available (June 2021).

- Signal generation (NRZ, PAM4, etc.) from within the M8070B software is not yet supported.
  Workaround: Use IQtools or MATLAB for waveform generation.
  Resolution: This will be implemented in a future version of the M8070B software.

- The Optical Modulation Generator Software (81195A) does not yet support the M8199A.
  Workaround: Use IQtools to generate digital modulation and multitone signals.
  Resolution: M8199A support for the 81195A software is expected in August 2021.

- Factory default values for frequency- and phase response corrections that are stored in the modules cannot be queried through the M8070B software.
  Workaround: Use frequency/phase response correction ("in-system calibration") in IQtools.
  Resolution: Expected in June 2021.