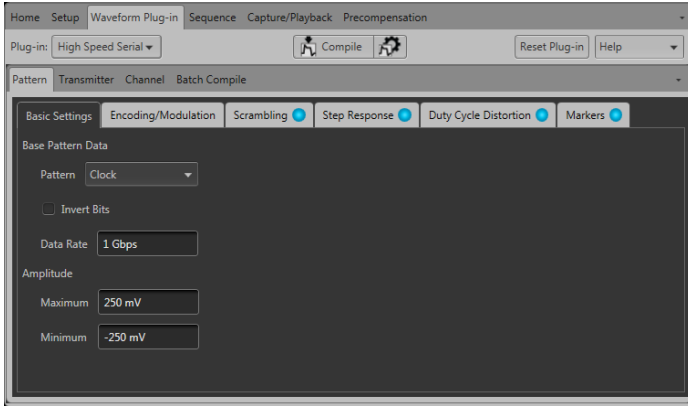# Tektronix®

Applications for AWG70000A Series and SourceXpress®

High Speed Serial Datasheet

The Tektronix High Speed Serial application plug-in enhances the capabilities of either the AWG70000A Series Arbitrary Waveform Generators or the SourceXpress® application software, adding the ability to easily create High Speed Serial waveforms with a variety of user-defined impairments and distortions.

Key features

- Jitter Generation: Up to four different sinusoidal jitters with different amplitudes, frequencies and phases can be added to a base pattern. Three independent band-limited random jitters can also be added to the base pattern.

- Inter Symbol Interference (ISI) Creation: Directly create ISI.

- S-Parameters: Scattering parameters can be directly convolved with the base pattern to recreate the channel characteristics. By applying an inverse filter, the effects of the channel can be de-embedded from the circuit. Cascading S-Parameters allows you to cascade up to six Touchstone files of the same format to emulate a cascaded channel.

- Noise: Vertical noise can be added at both near and far ends of the channel.

- Idle State: Standards like SATA call for OOB signaling which requires an idle state followed by a burst. You can directly create this idle state without using additional power dividers. Noise can also be added to these idle state waveforms.

- Batch Processing: When more than one pattern needs to be synthesized, you can use batch processing to create multiple waveforms with a combination of one random and maximum of 2 sinusoidal jitter.

- Sequencing: You can add compiled waveforms directly to existing sequences or create sequences using the Batch Compile feature.

- Marker outputs: Marker outputs can be configured to be the same as the input base pattern or to generate clocks at a user-defined frequency. You can also set the marker output to all high, all low, or trigger.

- Pre/de-emphasis and Preshoot: Provides flexibility to program the Pre/De-emphasis and Preshoot sample by sample. The preview feature facilitates you to arrive at the most optimized Pre/de-emphasis for a particular channel quickly.

- Scrambling and 8B10B encoding: The input data pattern can be scrambled by defining a polynomial. You can also encode using the 8B10B encoding option. 8B10B encoding works with D and K symbol pattern only.

- NRZ, NRZ-I, PAM, and PWM: Allows you to define the pattern duty cycle using the Pulse Width Modulation (PWM), and alternatively encode the bit stream to 4- 8- 16-PAM, NRZ, or NRZ-I.

- The easy to use graphical user interface integrates seamlessly with the Tektronix AWG70000A series user interface and the SourceXpress PC application.

- Offline Mode: Plug-ins are designed to also run on an external PC via the SourceXpress PC application, thereby reducing the time taken to synthesize large waveforms and leaving the AWG70000A instruments free for continued testing.

Simplify jitter simulations

High speed serial data signals are becoming more and more complex. The Tektroinx High Speed Serial plug-in, together with the AWG70000A series generators, simplifies the signal creation and jitter simulations to reduce overall development and test time. The software enables the creation of the waveforms required for thorough and repeatable design validation, margin/characterization and conformance testing.

Jitter generation made easy

The HSS Plug-in supports generation of jitter (Random, Periodic (Sinusoidal), Inter Symbol Interference (ISI) [1], and Duty Cycle Distortion (DCD)), and also supports Spread Spectrum Clocking (SSC) [2], pre-emphasis, and noise addition. This allows the user to create a combination of various impairments simultaneously to stress the receiver. A programmatic interface enables easy integration of the HSS-plugin into test automation systems.

Scrambling, PWM, 16-PAM, and 8B/10B encoding

The input data pattern can be scrambled by defining a polynomial. The user could enable the 8b/10b encoding option if the input pattern is in 8-bit word format before applying other impairments like jitter, SSC [2], and ISI [1]. Users can also define the pattern duty cycle using the Pulse Width Modulation (PWM) feature, which allows for alternatively encoding the bit stream at up to 16-PAM.

Advanced emphasis

Many standards such as PCIe require the output waveform to be Pre/De-Emphasized. The HSS Plug-in allows easy addition of Pre/De-Emphasis, including preshoot, with all other jitter parameters. Vertical noise can also be added at both near and far end of the channel.

Idle state

Standards like SATA call for OOB signaling which requires idle state followed by a burst. The user can directly create this idle state without the need of using additional power dividers. Noise and offset can also be added to these idle state waveforms. Idle state can also be defined as a part of pattern definition.

Marker outputs

Marker outputs can be configured to be the same as the input base pattern or to generate clocks at a user-defined frequency including subdata rates.

Batch processing

When more than one pattern needs to be synthesized, you can use batch processing that enables creation of multiple waveforms with a combination of random jitter and sinusoidal jitter over a broad range of frequencies.

Requirements

- Plug-in installed with SourceXpress on PC:
  - SourceXpress software version 5.2 or greater
  - PC operating systems: Windows 7 (64 bit), Windows 8 (64 bit), Windows 10 (64 bit)
- Plug-in installed on AWG70000A Series instrument:
  - AWG70000A firmware version 5.2 or greater

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[1]   This feature requires the purchase of the SSC Plug-in license.

[2]   This feature requires the purchase of the S-Parameter Plug-in license.

Ordering information

Models

HSSFL-SS01	High Speed Serial plug-in with a floating license that can be reassigned to different Tektronix instruments or PCs.
HSSNL-SS01	High Speed Serial plug-in with a node locked license tied to a single instrument or PC.
HSSPACKFL-SS01	High Speed Serial bundle includes the High Speed Serial plug-in, Spread Spectrum Clock, and S-Parameter plug-ins with a floating license that can be reassigned to different Tektronix instruments or PCs.
HSSPACKNL-SS01	High Speed Serial bundle includes the High Speed Serial plug-in, Spread Spectrum Clock, and S-Parameter plug-ins with a node locked license tied to a single instrument or PC.

Information on the High Speed Serial plug-in for SourceXpress or the AWG70000A Series along with free software download and trial licenses is available at www.tek.com/signal-generator-software/High-speed-serial-plug.

An S-Parameter license is required to enable the S-Parameter feature of the High Speed Serial application unless ordering the HSSPACK.

A Spread Spectrum Clock license is required to enable the Spread Spectrum Clock feature of the High Speed Serial application unless ordering the HSSPACK.

How to purchase

To purchase, visit the Tektronix web site to request a quote or contact your nearest sales representative.

Additional information

Refer to the SourceXpress web site (www.tek.com/sourcexpress) for information about:

- additional application plug-ins available for SourceXpress and the AWG70000A Series
- free software downloads and trial licenses

Licensing

Each application plug-in for SourceXpress and AWG70000A Series instruments requires the purchase of a license before they are fully functional. Some plug-ins may require additional licenses to unlock certain plug-in features. Licenses are managed within the Tektronix Asset Management System (Tek AMS). The Tek AMS web site address is www.tektronix.com/products/product-license. Product license management requires a login account.

There are two types of licenses available: node-locked (NL) and floating (FL).

- Node Locked Licenses provide your own copy of the application on your instrument or personal computer and are permanently assigned to a specific Hostid or product model/serial number.
- Floating licenses can be moved between different Hostids or product models.

Use the Tektronix Asset Management system to check in and check out floating licenses.

Certifications

Tektronix is registered to ISO 9001 and ISO 14001 by SRI Quality System Registrar.

Product(s) complies with IEEE Standard 488.1-1987, RS-232-C, and with Tektronix Standard Codes and Formats.

Datasheet

For Further Information. Tektronix maintains a comprehensive, constantly expanding collection of application notes, technical briefs and other resources to help engineers working on the cutting edge of technology. Please visit www.tek.com.

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