

Create GHz-speed digitizer systems with up to 16 channels

Multi-channel data acquisition made easy - at sampling speeds up to 10 GS/s!

Grosshansdorf, Germany – 25th October 2023. A new option from Spectrum Instrumentation offers a user-friendly way to create multi-channel data acquisition systems with ultrafast sampling speeds up to 10 GS/s. Called Star-Hub, the option allows up to 8 of the company's flagship PCIe digitizers (M5i.33xx series) to be connected together. Individual cards then share common clock and trigger signals, which ensures there is minimal phase delay and timing skew between all the channels. The Star-Hub option is installed by mounting a single piggyback module onto any one of the M5i series cards in the multi-channel system. Using accurately matched and shielded coax cabling, the board then distributes the clock to each module and precisely synchronizes the trigger event with the system clock.

Star-Hub can be used with any of the cards from the M5i.33xx digitizer family. Seven different models are available offering one or two channels, sampling rates from 3.2 to 10 GS/s, 12-bit vertical resolution and bandwidths from 1 to 4.7 GHz. The cards can handle a wide range of signals and feature programmable input voltage ranges, offset control, large on-board memories, advanced trigger functions and a number of different acquisition modes. Together with Star-Hub, the line-up lets you build data acquisition systems with from 2 to 16 channels, sampling at rates of up to 5 GS/s, or up to 8 channels at the maximum sampling rate of 10 GS/s.

Users can also choose to run the Star-Hub system with the digitizer cards internal clock, which offers better than ± 1 ppm accuracy, or an external clock, via a front panel SMA input connector. To minimize any channel-to-channel timing skew, there is a programmable skew adjustment available for each connected card. This feature allows time shifts up to 200 ps (10 GS/s) or 312 ps (3.2 and 6.4 GS/s) of the clock of each individual card.

It thus creates an easy way for users to correct any timing mismatches that may be present in their specific setup.

The ability to create customized multi-channel data acquisition systems, that can synchronously acquire signals in the GHz range, is ideal for a wide variety of applications. For example, they can provide a unique measurement solution in fields like communications, automated testing, aerospace and scientific experimentation, where banks of receivers, detectors, sensors or antennas are deployed.

Fast data transfer for processing and storage

Another advantage of the Star-Hub system is that each card retains its own 16 lane, Gen3, PCIe bus, that is capable of transferring data at rates up to 12.8 GB/s. This transfer speed allows continuous transfer at 6.4 GS/s in 12-bit mode, or even 10 GS/s in data-saving 8-bit mode. The bus allows the cards to shift acquired data to PC resources like memory, SSDs and GPUs at exceptionally fast speeds, even though they are all controlled by a single host processor.

Multi-channel control and display

Specifically designed for multi-channel systems, the company also has its own measurement software called SBench 6 Professional. This interactive GUI can control all the cards connected with Star-Hub. It runs on PCs, using either Windows or LINUX operating systems, and provides complete instrument control, along with display, analysis, storage and documentation capabilities. SBench 6 can handle large data files and has a number of processing tools, including a plug-in interface that allows the use of custom calculation functions. There are also cursor and parameter functions that enable cross-channel measurements, as well as variety of import and export filters.



Spectrum offers up to 16 synchronized channels with 5 GS/s speed or up to 8 synchronized channels with 10 GS/s speed

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Software Development Kit

Every M5i digitizer is also shipped with a software development kit (SDK) as standard. The SDK allows them to be programmed with almost any common language. This includes C, C++, C#, Delphi, VB.NET, J#, Python, Julia, Java, LabVIEW, and MATLAB. The SDK contains an assortment of programming examples and all the driver libraries necessary for running under a Windows or LINUX operating system.

Care-free operation

Oliver Rovini, CTO at Spectrum, said: "Providing an easy-to-use solution for the multi-channel acquisition of signals in the GHz range is something our customers have been requesting for some time. However, when using modular instruments, this is not a simple task. You need to deal with clock systems that that's designed to handle a variety of rates and typically use a phased lock loop (PLL) type architecture. Furthermore, each card has its own trigger circuitry that uses comparators to detect trigger level crossings. At the speeds we are working at, any small differences in these reference levels can easily produce unwanted jitter. The beauty of Star-Hub is that it takes care of these issues so the user doesn't have to! The setup is straight forward and, once the cards are connected together, our drivers manage all the necessary clock and trigger distribution conditions for you."

The Star-Hub option is available now and can be ordered with any new M5i.33xx series digitizer cards.

About Spectrum Instrumentation

Spectrum Instrumentation, founded in 1989, uses a unique modular concept to design and produce a wide range of more than 200 digitizers and generator products as PC-cards (PCIe and PXIe) and stand-alone Ethernet units (LXI). In 30 years, Spectrum has gained customers all around the world, including many A-brand industry-leaders and practically all prestigious universities. The company is headquartered near Hamburg, Germany, known for its 5-year warranty and outstanding support that comes directly from the design engineers. More information about Spectrum can be found at www.spectrum-instrumentation.com

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