New FSWX signal and spectrum analyzer with novel architecture overcomes limits of today's analysis methods

Rohde & Schwarz is set to revolutionize the field of signal and spectrum analysis with the launch of the FSWX signal and spectrum analyzer, an innovative instrument designed to overcome the limitations of current measurement methods. Featuring a groundbreaking architecture that integrates multiple input ports with advanced cross-correlation techniques, the FSWX enables entirely new measurement scenarios in RF system testing. Tailored for mobile communications, wireless, and satellite applications, it meets the growing demand for higher data rates, wider modulation bandwidths, and increased modulation orders – areas where traditional signal analyzers often struggle. The FSWX will make its debut at IMS2025 in San Francisco, marking a significant advancement in the industry.

IMS 2025, San Francisco, CA — Rohde & Schwarz introduces the brand-new FSWX signal and spectrum analyzer, the first multichannel signal and spectrum analyzer with multiple input ports, unlocking new possibilities in signal analysis. It is also the first instrument of its kind with a cutting-edge internal multi-path architecture enabling a novel cross-correlation feature. Combined with its low phase noise for high signal purity, its spurious-free dynamic range and its outstanding residual EVM, the FSWX delivers an RF performance like no other signal and spectrum analyzer in the market.

The instrument's wide internal bandwidth of 8 GHz allows for comprehensive analysis even of complex waveforms and modulation schemes. Combined with a high measurement speed and analysis tools tailored to the user's needs, the FSWX brings new levels of performance and precision to signal analysis for modern RF applications – from active RF components testing to state-of-the-art automotive radar testing to complex airborne radar scenarios and satellite test in A&D applications to the latest test challenges in WLAN and cellular technologies like 5G and beyond.

Michael Fischlein, Vice President Spectrum & Network Analyzers, EMC & Antenna Test at Rohde & Schwarz, is thrilled to introduce the new FSWX: "Our team has truly re-imagined signal and spectrum analysis technology with our new FSWX. They have come up with an innovative architecture and design to empower our customers to tackle complex measurement scenarios in the evolving landscape of wireless communications and radar technology that were previously unattainable. In other words, the FSWX makes measuring the impossible, possible." The instrument's innovative design features include multiple input ports, cross-correlation capabilities, advanced filter banks and broadband ADCs.

Multiple input ports

The multichannel FSWX offers the ability to measure multiple signal sources simultaneously, regardless of whether they operate at the same or different frequencies. With synchronous input ports, each featuring 4 GHz analysis bandwidth, users can seamlessly analyze the interactions between diverse signals. This opens up a multitude of new measurement scenarios, for instance, phase-coherent measurements of antenna arrays used in beamforming for wireless communications as well as in airborne and automotive radar sensors.

Multi-path architecture and cross-correlation

Its advanced internal multi-path architecture allows for the cross-correlation mode, a novel feature of the FSWX. A single signal input is internally split into two independent signal paths, each equipped with its own local oscillator and ADC. With this innovative design, advanced cross-correlation algorithms can be applied in the digital backend, effectively removing the inherent noise of the measurement instrument. This feature reveals spurs not easily seen without cross-correlation. It is especially helpful when, for instance, measuring Error Vector Magnitude (EVM), a critical factor in mobile communications. The added wideband noise of traditional signal and spectrum analyzers limits the accuracy and dynamic of EVM measurements. With the cross-correlation feature, however, the FSWX provides an unobstructed view of the DUT for precise EVM analysis.

The internal multi-path architecture also offers advanced triggering options. For example, users can apply an IF or RF power trigger at distinct frequencies, as the multi-path design allows for independent frequency settings for each receive path behind the splitter. This way, the FSWX can easily reveal effects between two RF signals.

Advanced filter banks and broadband ADCs

Traditionally, for preselection in the microwave range, spectrum analyzers rely on YIG filters. Since they are known for their challenging frequency response, YIG filters need to be bypassed for wideband signal analysis. The FSWX, however, employs broadband ADCs in conjunction with filter banks that span the entire operating frequency range, allowing for pre-selected signal analysis while eliminating the need for YIG filters. The filter banks provide high precision, optimizing instrument settings for specific applications and significantly reducing the risk of unwanted signal images contaminating results. For users requiring narrowband applications, a YIG filter can still be added optionally.

Innovative firmware applications

The FSWX also provides innovative firmware applications such as the CrossACT (Cross Application Control and Triggering) firmware feature. It synchronizes various measurements across different input channels, allowing for simultaneous analysis with multiple tools. This capability simplifies comparisons, such as determining whether the higher harmonics of a radar signal directly impact the EVM performance of a 5G signal.

The Linux-based operating system of the FSWX provides a high level of security and long-term support, essential features for users in security-sensitive environments. This robust operating system ensures reliability and stability, making the FSWX an ideal choice for demanding applications.

Rohde & Schwarz will present its new FSWX signal and spectrum analyzer for the first time to the public at the IEEE MTT-S International Microwave Symposium (IMS) from June 17 to 19, 2025, at the Moscone Center in San Francisco, CA, at the company's booth 1443.

For more information, visit: www.rohde-schwarz.com/product/fswx

FSWX signal and spectrum analyzer with its novel architecture allows design engineers to measure the impossible.

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