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Article

Noise Generator Tests High Data Rate for Ka-Band SATCOM

The UFX 7000A - Ka is a precision noise generator that is well equipped for emulating noise in Ka-band satellite communication links and signal paths in digital microwave radios.

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Ka band plays an increasingly important role for high-data-rate satellite communication for commercial and military applications between satellite and local stations, as well as for satellite-to-mobile links. These include aircraft, marine vessels, and land vehicle-based systems. The available 13.5 GHz wide frequency spectrum of the Ka band provides plenty of bandwidth for high-data-rate applications.

Wildblue is a high-speed internet provider utilizing high-speed-data capacity of their Ka-band satellites to deliver fast internet connections at speeds of up to 1500 Mbps in the down-link and up to 256Kbps in the uplink connection. Satellite terminal manufacturer ViaSat Inc. said that demand for capacity of its first Ka-band satellite is so high that the company is already considering ordering a second Ka-band satellite. Hughes Communications, whose HughesNet consumer broadband service is the main competitor to ViaSat and Wildblue, said earlier this year that it has passed the 500,000 subscriber mark, a 19-percent increase in the past 12 months. Boeing announced recently that it successfully conducted its first over–the-air ground test of Ka-band satellite communications (SATCOM) phased array antenna system that will enable wideband SATCOM on aircraft, providing increased bandwidth for in-flight networking. Given these examples, it is clear that market demand for Ka-band satellite technology will continue to increase during the next decade.

High-data-rate satellite communication systems and modern digital radios require state-of-the art test solutions, like the UFX 7000A series Ka-band noise generator from Noisecom. This programmable noise source delivers ultra-flat output levels from 26.5 to 40 GHz. It is specifically designed for analysis and evaluation of high-data-rate links used in satellite communication systems. The instrument's output flatness is better than 0.5 dB peak-to-peak within specific segments of the 13.5 GHz band. The UFX 7000A - Ka delivers a maximum output power of 0dBm.

The heart of the UFX 7000A - Ka band instrument is an amplified white Gaussian noise generator containing an amplified noise source. This precise noise spectrum can be mixed with one of the two possible input signals at different levels (see figure 1). A solid-state amplifier, optimized through filtering and equalization, provides output with true Gaussian amplitude distribution. Step attenuation throughout the instrument provides a total attenuation of 0 to 79.9 dB, at a step size of 0.1 dB. The internal attenuators are selected for best amplitude flatness and have an accuracy of better than 0.25dB and a repeatability of better than 0.1dB.

UFX 7000A – Ka band noise generators come with two input and two output ports. The input signal ports allow

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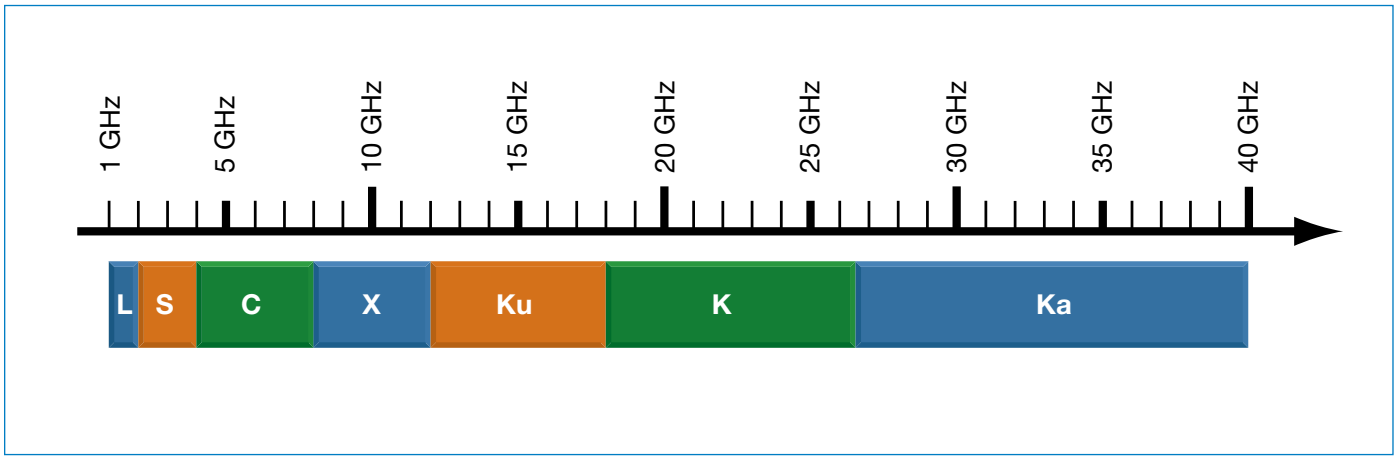

Satellite bands.

connecting sources with power levels up to 0 dBm. The signal path provides the same accuracy as the noise path: flatness of 0.5 dB peak-to-peak within certain segments of the 13.5 GHz band, allowing for most stringent tests demands. Signal sources applied at the input ports can also be controlled with the 0 to 79.9 dB step attenuators in 0.1 dB steps. The signal path attenuators offer an accuracy of better than 0.25 dB and a repeatability of 0.1 dB. The signal combiner, mixing the generated noise spectrum with the input signal, has also a flatness of +/- 0.5 dB over specific segments of the frequency range.

The output ports on the UFX 7000A - Ka band noise generator have two modes: active and standby. In active mode, noise/signal power is available at the port, but it is terminated into an RF load in standby mode. Isolation between the switchable output ports is at least 30 dB. Depending on the application, the output signals can consist only of noise or of signals mixed with precise amounts of white Gaussian noise. Many applications require exactly the signal / noise spectrum delivered by the UFX 7000A – Ka. These include bit-error-rate testing (BER), determining high-frequency, and high-data-rate satellite communication. Varying noise and signal levels are used to analyze communication links under degrading conditions and to test receiver sensitivity. Tests typical for this application include signal-to-noise ratios (SNR), carrier-to-noise ratios (CNR) and bit-energy-to-noise ratios (Eb/No).

UFX 7000A - Ka band noise generators are manually operated via touch screen soft-keys, but are also fully programmable through Ethernet or optional GPIB interface. This particular model is optimized for use in the Ka band from 26.5 to 40GHz. Noisecom can supply other instruments with similar accuracy can be supplied for a variety of frequency bands.

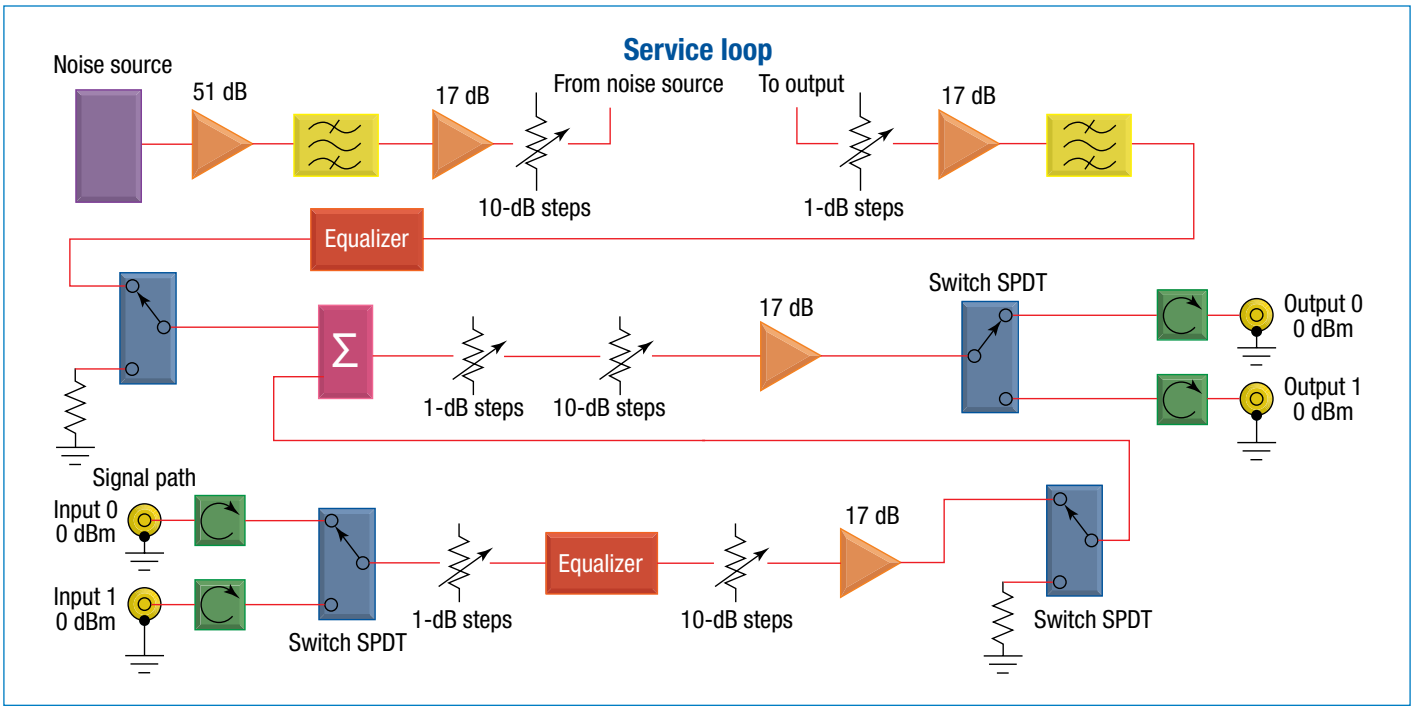

Figure 1: The UFX 7000A – Ka band noise generator provides precisely controlled noise levels for testing commercial and satellite communication systems from 26.5 to 40 GHz.

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