

Test error rate with wideband signal generator

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Wireless communication development is boundless in terms of speed, capacity and bandwidth, which opens up a ubiquitous network for seamless links for mobile phones, WLAN and home electronics. With the development of communication systems, the UWB modulation signal has emerged. WLAN requires a frequency bandwidth of 101.5MHz for a carrier frequency of 4.6GHz, increasing requirements for vector modulation signal generators. Traditional modulation signal generators can only produce signals of < 80MHz modulation bandwidth. It must output the modulation signal required of the waveband by regarding the curve generator as an outside source via the upconversion technique. However, this

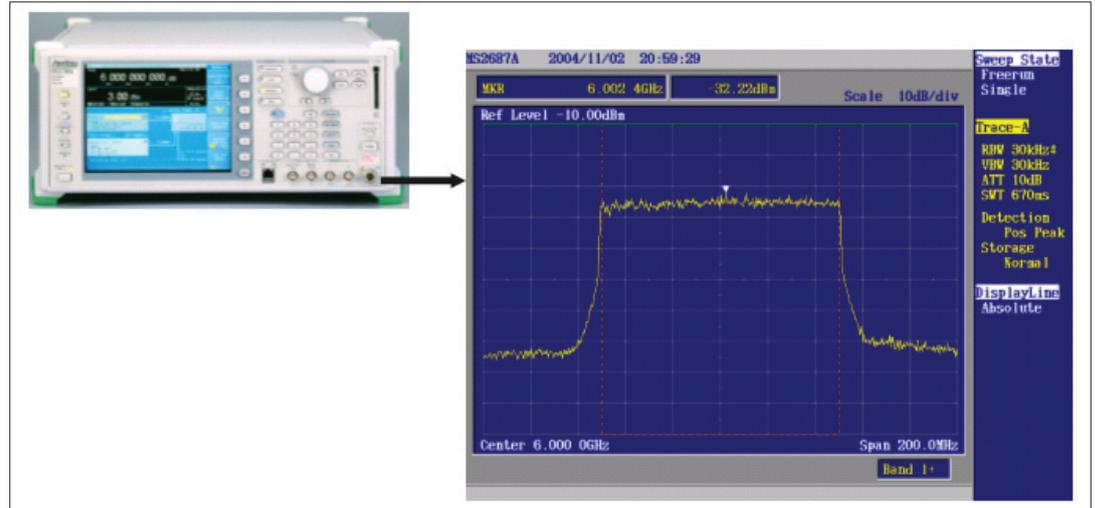


Figure 2: The middle frequency of VSF-OFCDM output is 6GHz, with 101.5MHz for modulation bandwidth.

method requires exact coordination to relieve the influence of time lag caused by signal and frequency distortion.

Anritsu's M3700A signal generator can output a wideband signal of the vector modulation bandwidth reaching up to 120MHz. It can generate 2G/3G/4G wireless communication and WLAN system signals. This effectively aids

the R&D of next-generation communication systems. Furthermore, it offers an effective solution for the development and production of base stations, direct amplifying stations, mobile phones and wireless network cards.

The M3700A wideband vector modulation signal generator can generate high-speed I/Q signals. A 100MHz local oscillation is injected in the inter-frequency signal of 800MHz via eight multiple frequency inputs. I/Q signals are modulated based on the middle frequency, then modulated again to 250KHz to 3GHz and 3-6GHz via auto-adapted level control and up-conversion technique (Figure

1). Lastly, it will output the corresponding RF signal via a step attenuator. It will also output a corresponding waveband RF signal via direct upconversion when the baseband signal is generated by a curve generator.

Covering the frequency range of 250KHz to 3GHz (which can optionally extend up to 6GHz), the built-in baseband generator provides a wideband RF modulation bandwidth of 120MHz (150MHz when an external Q signal is used). The built-in 40GB hard disk offers high-capacity waveform memory space. MG3700A has built-in double-band storage and it can superpose two different signal standards. The standard layout is 2 x 128MSamples per channel and can expand to 2 x 256MSamples per channel.

Clock rate	1kHz-20MHz
Data waveform	PN9, 11, 15, 20, 23, all 0, all 1, 0/1alternate
Measuring time	0.2 to 359,999s (99hrs, 59mins, 59s)
Resolution	0.2s

Table 1: The test rate can reach up to 20MHz.

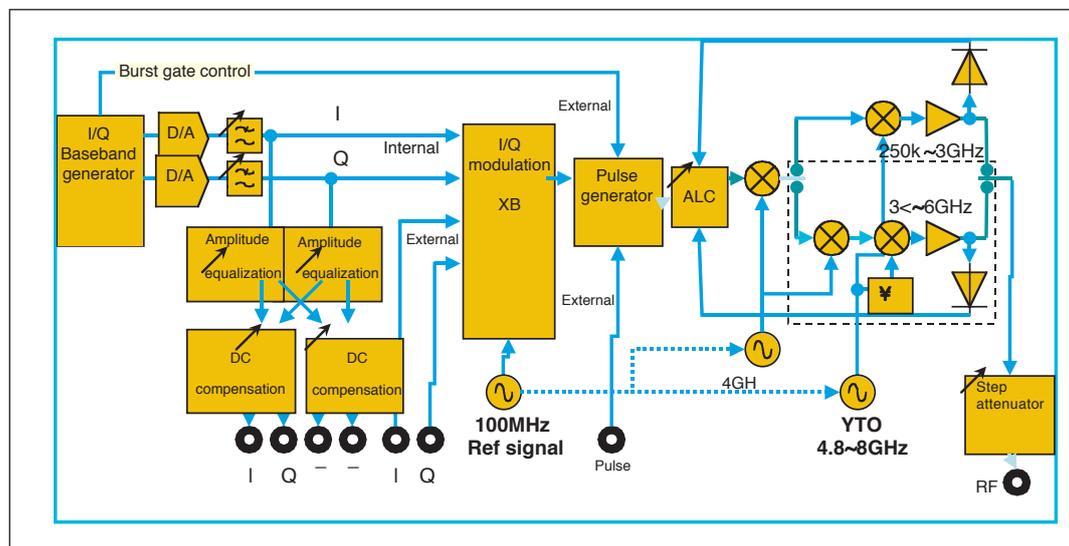


Figure 1: The wideband vector modulation signal generator can generate high-speed I/Q signals.

Waveform patterns

There is a variety of standard waveform built-in patterns, including W-CDMA, GSM/EDGE, WLAN (IEEE802.11a/b/g), CDMA2000 1X/1X EVDO, Bluetooth, GPS, PHS, PDC, additive white Gaussian noise (AWGN) and TD-SCDMA. New waveform pattern files can be loaded into the equipment via the LAN interface (Ethernet) or PC card to ensure up-to-date communication signal standards. Furthermore, it can

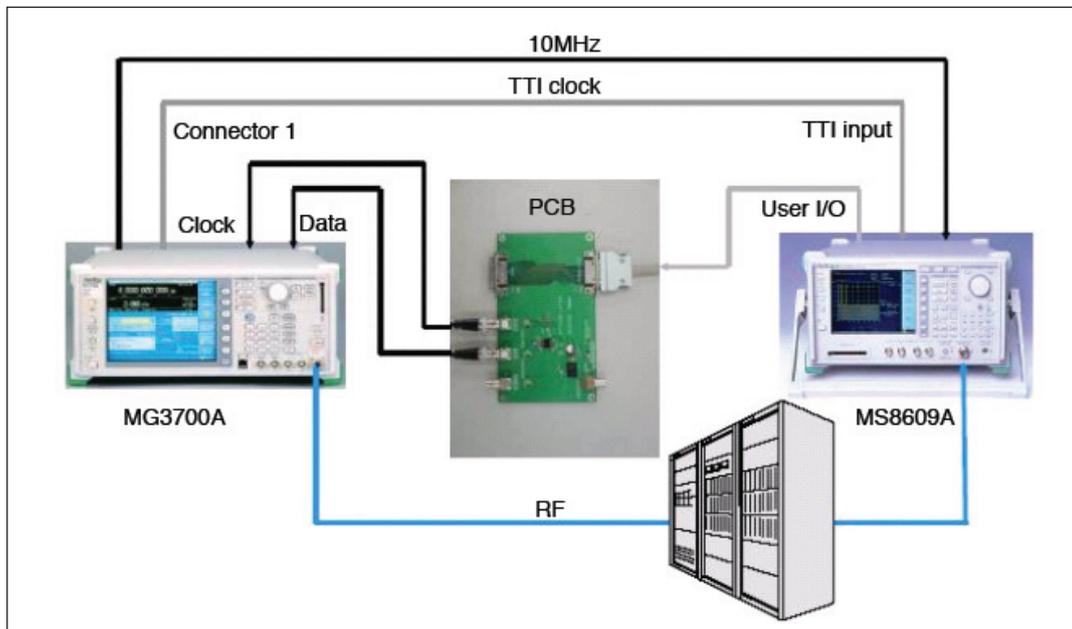


Figure 3: MG3700A has built-in ERTS and double baseband memory, which can process error-rate test.

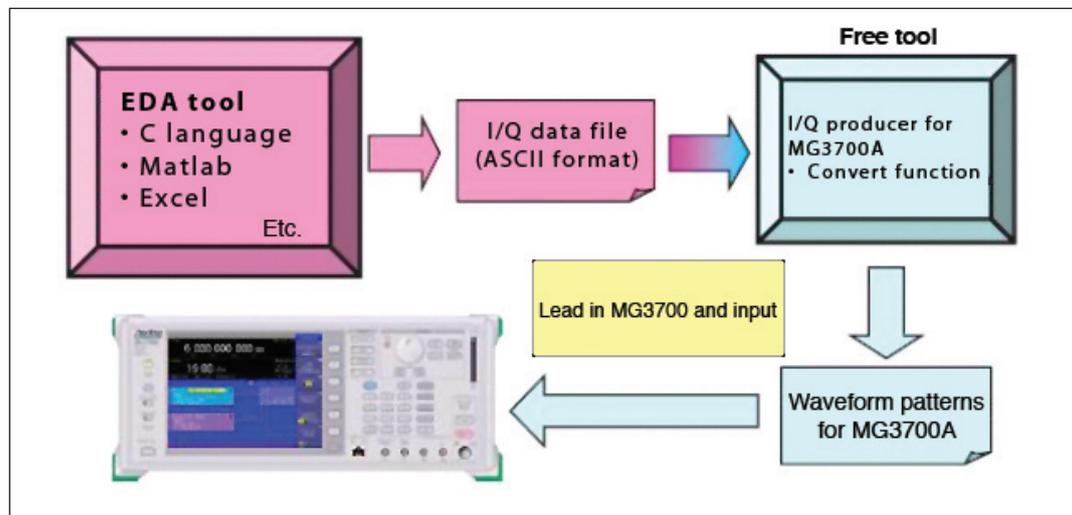


Figure 4: New waveform pattern files can be loaded into the equipment by converting any I/Q-sampled data generated by EDA tools into the MG3700A pattern via the IQproducer TM software.

convert any I/Q-sampled data generated by EDA tools such as Matlab into MG3700A pattern via the IQproducer software.

BER measurement, an essential test parameter in communication systems, is also included as a standard feature. The waveform addition function can digitally combine two signals (e.g. desired and interference waves) and output them as one signal. As a result, reception characteristic tests

that previously required a set of two signal generators and one BER measurement can be accomplished by a single MG3700A.

The built-in baseband generator provides a wideband RF modulation bandwidth of 120MHz. Covering modulation bandwidths except UWB, the MG3700A can output a digital modulation signal (VSF-orthogonal frequency code division multiple-address

[OFCDM]) with a bandwidth of 101.5MHz, as required for 4G mobile-phone systems.

Custom waveform memory capacity is important to enhance general-purpose measurement as a custom waveform signal generator. A maximum of 512MSamples per channel of custom waveform memory can store a wide variety of waveform patterns, which can be selected quickly for efficient verification of

multiple system equipment.

The waveform addition function digitally combines two signals, either desired wave and interference wave, or desired wave and AWGN, and then outputs it. This prevents the need for a second signal generator and level-ratio adjustments of the two signals, saving time and money.

The built-in error rate test system (ERTS) and double-band memory can process error rate test under conditions of added interference. The test rate can reach up to 20MHz and the testing time can last for up to 100hrs, satisfying test engineers' requirements.

In 4G communication systems R&D, MG3700A outputs ultrawide modulation bandwidth. The mid-frequency of VSF-OFCDM output is 6GHz, with 101.5MHz for modulation bandwidth. The result is shown in a frequency spectrograph in **Figure 2**.

Error rate reflects receptivity and interference rejection of communications equipment. MG3700A has built-in ERTS and double baseband memory, which can process ERTS under interference conditions.

Steps in generating random waveform output are as follows:

1. Generate the corresponding baseband signal file using EDA tools (Matlab, C/C++ and Excel).
2. Convert the baseband file into discriminating waveform of MG3700A using the conversion function of IQproducer.
3. Connect to the MG3700A using the transmission function of IQproducer.
4. Load the converted file into the internal hard disk of MG3700A, then invoke and output the corresponding waveform.