

Fast Measurements with Real-time Spectrum Analyzers for EMC Testing

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<https://www.emc-directory.com/community/fast-measurements-with-real-time-spectrum-analyzers-for-emc-testing>

Real-Time Spectrum Analyzers (RTSA) are a type of spectrum analyzers that provide instant visualization of the RF signals in the frequency domain (amplitude against frequency). Their high speed offers instant and continuous insights into the frequency spectrum which allows swift detection and analysis of signals in real-time. Combining this with an interface (say USB) that can communicate with an external PC, we get RTSAs that can transfer and store measurement data directly on a PC for further extensive evaluation.

This makes real-time spectrum analyzers efficient tools, particularly in fast-paced environments where timely signal identification is crucial. In this section, we will go through the benefits of fast measurements that come with real-time spectrum analyzers for EMC testing.

Modularity and high sweep speeds are crucial

Whether spectrum monitoring, RF and microwave measurements, EMC tests or WLAN analysis: current wireless applications require precise measurements in larger frequency ranges in a shorter time. The equipment used must take this into account. At the same time, the time factor is playing an increasingly important role in all types of measurements, as it has a direct impact on costs.



USB-based real-time spectrum analyzers offer various advantages here. On the one hand, they are inexpensive to purchase and space-saving to use. On the other hand, the direct streaming of the digitized measurement data allows for seamless storage on the PC used, enabling every conceivable type of subsequent detailed analysis. Limitations are only to be expected due to the PC performance; however, this is renewed more frequently than the actual measuring equipment. In addition, the functions of such software-based devices can be expanded almost at will by simply upgrading the modular analysis software.

The most recent example is the adaptation of the frequency spectrum for EMC measurements. CISPR 16-2-3 now stipulates that devices for measuring radio interference voltages and currents must cover the entire frequency range from 9 kHz to 1 GHz. Real-time spectrum analyzers with extremely high sweep speeds are essential in order to be able to examine this reliably and yet efficiently. Basically, the faster the better. There are currently analyzers on the market that offer sweep speeds of 3THz/s and more. This enables every tester to reliably detect even very short pulses that would otherwise be undetectable. This is made possible, among other things, by a new process that interconnects two independent inputs in such a way that they can be used in series. This speeds up the measurements considerably, which saves an enormous amount of time and money.

The EMC measurement image, for example, shows a broadband and yet very fast analysis of a fictitious module during development. The tester has already configured the two limit values (limits) required for its measurement, which in the case of the software shown here is conveniently possible using defined default settings. In the application shown here, measurements are required for EN 55015 (red) and EN 61800-3 (blue). The results from the entire frequency spectrum are displayed clearly and concisely. It is obvious at which frequency the respective limit is exceeded. In addition, the tester can check this almost in real time using a separate table: in the last two columns, the respective frequencies are displayed in a different color (left EN 55015), right EN 61800-3) if the limits are exceeded. As 18 frequencies are above the limit value in this example, it can be concluded that more than one defective component is the cause and therefore the module in question must be reworked

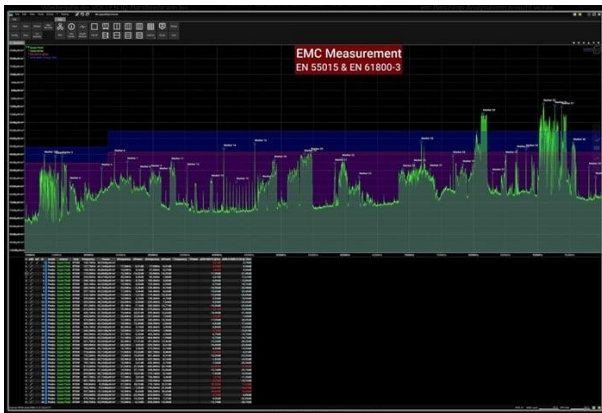


Figure 1 - EMC Measurements - EN 55015 & EN 61800-3

In addition to the analyzer and software, the antennas used also play a major role in carrying out measurements cost-effectively. An antenna is always particularly good if it is adapted to the frequency range relevant for the respective application. However, antennas that can be used across a wide band are ideal. It is then possible to carry out measurements in the range from 9 KHz to 1 GHz without having to change equipment during the measurement process. Even if the broadband antenna is twice as expensive as the one designed for a specific frequency, the investment pays for itself. After all, changeover times and new settings of the analyzer cost time as well as nerves. In addition, changing the measurement setup is always a potential

source of error.

In summary, it can be said that modern and fast USB-based real-time spectrum analyzers offer considerably more flexibility than classic benchtop systems. In addition, the equipment can be easily adapted to increased requirements.