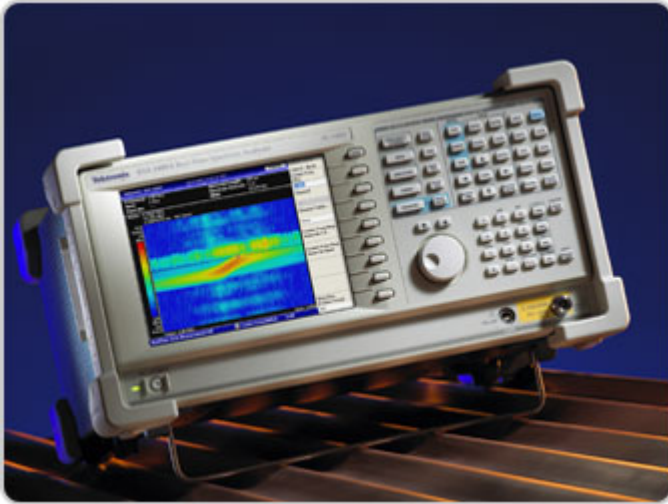


Tektronix RTSA is Key to CETECOM's RFID Test System



Solution Summary

Challenge	To develop an open testing platform to support existing and future RFID applications and technologies, covering not only conformance to RFID test standards but also RF and protocol R&D testing beyond conformance requirements.
Solution	A Tektronix RSA3408A Real-Time Spectrum Analyser forms the heart of the CETECOM RIDER test platform, providing the ability to test a wide range of frequencies, data rates and other timing parameters.
Benefits	Only the Tektronix Real-Time Spectrum Analyser offered the right combination of triggering, capturing and analysis features to acquire the desired signals at the right moment and carry out the required correlated time, frequency and modulation measurements.

Founded in 1991 as the first Andalusian Telecommunication Laboratory, CETECOM Spain has become a global supplier of testing solutions for both wired and wireless communications technologies. Its portfolio ranges from conformance, regulatory and interoperability testing services to test systems development, worldwide regulatory compliance services, training and consulting.

Compliance testing is important in the RFID sector because of the need to give to the end-user community the reliability and the necessary confidence to use this technology. By means of compliance testing, the mandatory requirements of a given device are checked assuring the fulfilment of a specific standard and therefore guaranteeing interoperability of devices from different manufacturers.

The current technical challenges for developers of RFID test systems are based on the RF and protocol characteristic of the RFID technology. In RFID communication there are high-level signals (in terms of power) transmitted by the readers and low-level backscattered signals coming from the tags. To trigger and capture both types of signals at the same time within microseconds is one of the big challenges. Furthermore, the ability to test all the protocol requirements of RFID devices requires the generation of different types of modulated signals, protocol commands and responses.

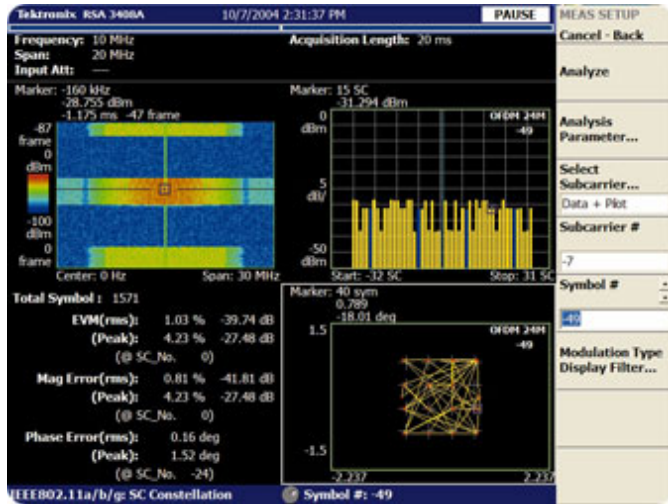
There are two main groups of key measurements involved in characterising the conformance of an RFID device: RF and protocol. For RFID interrogators, typical RF measurements required are frequency accuracy, RF envelope and power-up/power-down waveforms, while for protocol testing it is necessary to verify link timing parameters. For testing RFID tags, it is necessary to simulate the interrogator commands for communicating with a given tag. Examples of RF measurements required here are demodulation capability, duty cycle and operating frequency range. On the protocol side, among other requirements, link timing and tag states and transitions have to be checked.



From the above requirements, the most challenging issue involved in testing an RFID device is to deal with link timing constraints during the communication with the tag under test. The test system needs to be able to demodulate the tag response and issue the corresponding command in around 30 μ s. At the same time, the system has to ensure an appropriate power level for energizing the tag.

To achieve these aims, one of the key issues that developers of RFID test systems need to address is the ability to catch the desired signals at the right moment by means of a comprehensive triggering system. The test system must also have enough capacity to capture different signals

simultaneously, as well as being able to make time- and frequency-domain measurements at the same time. A further requirement is the ability to generate the necessary signals based on the different RFID air-interface protocols. This key goal is achieved by the RIDER Signalling Unit, a hardware device developed by Cetecom in order to generate the necessary commands and decode the tag under test responses for testing the RFID protocol requirements.



With these requirements in mind, the CETECOM team investigated several different approaches to develop the right test solution, taking into account such areas as hardware and software complexity and cost in addition to the basic performance requirements. At this stage, it became apparent that some conventional solutions did not include sufficient analysis tools, which meant that great effort would have been necessary in developing custom signal-analysis software. On the other hand, more powerful solutions would have increased the system cost without necessarily saving any time in the overall test process.

These considerations led to CETECOM selecting the Tektronix RSA3408A Real-Time Spectrum Analyser as the basis of its RIDER RFID test system. The RSA3408A is designed to capture a continuous time record of changing RF events, allowing time-correlated analysis in the frequency, time and modulation domains. In effect showing how the frequency and amplitude of the RF signal change over time.

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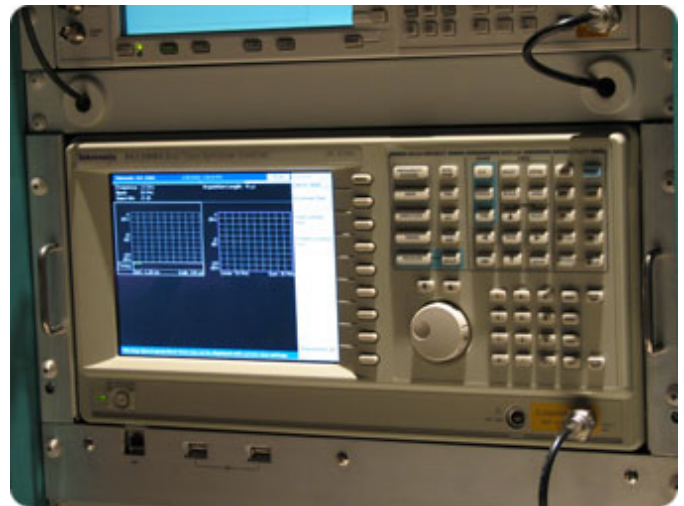
- Angel Romero, RFID Product Manager, Cetecom

From CETECOM's point of view, the instrument's 36 MHz frequency mask trigger makes it possible to trigger on the initial transmitted signal from the reader and capture both the transmit and receive signals seamlessly into memory. As a result, a complete analysis over time can be made without the need to make multiple acquisitions, providing a unique

understanding of time-varying RF signals. "This combination of capabilities, coupled with the high quality and reasonable price, has enabled us to create an industry-leading test solution," says Angel Romero, RFID Product Manager at CETECOM. "Using the Tektronix RTSA as the basis of our RIDER test system was a key factor in helping us to finish the system development on time."

In September 2004, CETECOM signed an agreement with MET Laboratories Inc., a leading test body in the United States, to provide them with the test platform for the official EPCglobal Generation-2 Hardware Certification program. The final version of the EPC Generation-2 standard was ratified in December 2004, and in August 2005 CETECOM was able to deliver, set up and validate its first RIDER test system for the US laboratory. Since then, every EPC Generation-2 compliant device has been tested with the RIDER test system.

The RIDER Test System is now the official test platform used by MET Laboratories in US for the EPCglobal Generation-2 hardware certification program, and is the only test system in the world capable of testing the complete EPC Generation-2 RF and protocol requirements. "In the RIDER test system, we have integrated the best-in-class general-purpose test instrument in the shape of the Tektronix RSA3408A," comments Angel Romero. "And this has made it possible to develop the necessary hardware and software tools needed to test the mandatory compliance requirements for the most important RFID standards, frequencies and related technologies."



For the future, the RIDER test system has been designed as an open testing platform to support existing and future RFID applications and technologies, covering not only Conformance RFID Test Standards (EPC Gen-2, EPC Gen-1, mobile RFID and NFC standards) but also RF and protocol R&D testing beyond conformance requirements.

CETECOM continues to work closely with the EPCglobal Performance working group to develop a test platform incorporating Tektronix Real-Time Spectrum Analyzers for testing the performance of RFID tags under specific conditions.