Testing WLAN Hotspots extensively

Modular test line ensures high product quality

Birkenfeld, February 24th 2015: Among other things, wireless Internet access LTE modules are responsible for providing passengers with access to WLAN functionality during long bus trips. Such WLAN hotspots ensure stable connections with the global network when traveling in luxury vehicles. One manufacturer of such modules contracted MCD Elektronik in Württemberg Germany with the development of an entire test line for production. This was an appealing job for the testing technology specialists, who implemented the test line using three individual stations. At the first station, the printed circuit boards are initially tested using the boundary scan (BSCAN) tester before they are inserted into their housing, then programmed and tested for functional capability using the integrated functional tests. At the second station, the end-of-line (EOL) tester checks the entire component construction using high-frequency tests through an interface adapter and the device-specific labels are printed and tested by re-scanning the barcodes. At the third station, image processing tests the completed devices and the code cards and labels are printed for packaging and shipping documents. While the modules are being packaged, the completeness of the associated documentation is tested and the modules are approved for shipping.

The client will supply their OEMs with various modules at various stages of construction. For this reason, there will be several printed circuit board variations, which will be mounted in various sizes of housings specific to the products. However, the same test line should be able to test all variations of the product. At MCD, the decision was to place the flat PCB in contact with the BSCAN tester using a dual-probe plate. With the EOL tester, the component has been constructed as an interchangeable unit in a HF-resistant housing and is interchangeable.

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The packaging tester was designed to be so universal that it can detect and test both variations using one universal test adapter.

Manufacturing control has been implemented using the TestManager. Before each new test step, the acceptance of the module by the preceding test is first ensured. The test results are logged using an SQL database3 and queried before starting each new test. At the same time, test reports are stored on a server in XML format, which makes seamless tracing and documentation of the batches possible.

Klaus Appel led the development of the test line at MCD and said, “We decided to use a hardware module from Göpel Electronic for the boundary scan. MCD Elektronik is a Göpel GATE partner and has maintained a long-term collaboration with this boundary scan specialist in Jena, Germany, in order to participate in the development and practical implementation of new JTAG & boundary scan products and modules as well as the integration of JTAG & boundary scans in existing test systems. Our MCD BSCAN tool monitor arose as part of this collaboration. The program serves as an artificially intelligent connection between the testing bench control system and the BSCAN hardware.”

The interchangeable unit allows for two insertion positions for various sizes of component printed circuit boards. All relevant measurement points on the printed circuit board can be reached using the probe plate. However, first the component is programmed with its firmware through a USB connection. An LED analyzer tests the LEDs for color and intensity. The buttons on the component are also tested. To do this, they are pressed by programmable pneumatic pins and their switching operation is tested. A function test checks the component’s interfaces using an appropriate counterpart. Klaus Appel said, “The BSCAN software itself has been development by MCD as well as the determination of the test cover.

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The first test station's entire test can be controlled using MCD TestManager. The operating personnel interact with TestManager using a screen and keyboard or barcode scanner.

As soon as the printed circuit board component has been mounted in the vehicle-specific housing, it can subsequently be tested by the EOL test. The components are ready for use and can be accessed using the default password from the WLAN communication interface. The component to be tested is then individually encapsulated in an HF resistant mounting so that other components cannot interfere. Two interchangeable units are available for various sizes of housings. Contact is made with HF signals so that performance measurements and various communications standards (like GSM, 3G, LTE and WLAN) can be monitored. The USB and SIM cards as well as the vehicle and USB connections are automatically contacted pneumatically. Measurement of the idle current is important as for each module that will be used in the vehicles. If the component to be tested passes the function tests, a random generator will assign a password to the component. A connected label printer will create a label with the barcode appropriate to the component. However, before the operating personnel attaches the label to the component, they will check if the label really agrees with the component using a barcode scanner.

The last station of the test line is the packaging. A camera and image processing is used to test the printing and the equipment. The light-resistant adapter is appropriate for all of the various modules. The image processing system with integrated illumination will scan the module. It tests if the prescribed front panel that has been constructed for the respective vehicle is error free, as well as if the SD card has been removed from the socket.

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A label printer and a code card printer will then generate the label for the module and the carton, as well as a code card with the individualized password for the component for the vehicle owner. The customer can make changes to the design and the label layout using the MCD label generator.

Each of the three test stations will be mounted in a standardized, universal rack. Klaus Appel said, “The mobile racks that we use can be set up as desired and are cost-effective. They can either be set up with 19” components or individually equipped with DIN rail modules, components and other elements. ESD equipment, such as an individually designed table and customer-specific paint, will also be available.”

MCD Elektronik GmbH was established in 1983 and is an owner-operated company located in Birkenfeld/Württemberg, Germany. MCD Elektronik is a manufacturer of testing systems and currently employs 70 employees. These employees develop, plan and implement entire customer-specific solutions. The systems are used worldwide by international and medium-sized companies for the production for testing of electronic and electro-mechanical components.

Pictures:

Picture 1: The entire test line for production testing of mobile WLAN hotspots.

Picture 2: The first test station has been prepared for receiving two sizes of components. Contact is made with the printed circuit board using a probe plate. The optical fiber cables for monitoring the LED displays can be seen at the top of the picture.

Picture 3: The EOL tester with the HF-resistant hood open.

Picture 4: The module to be tested has already been connected with the HF connections. The USB connection (front, right) has not yet been connected.

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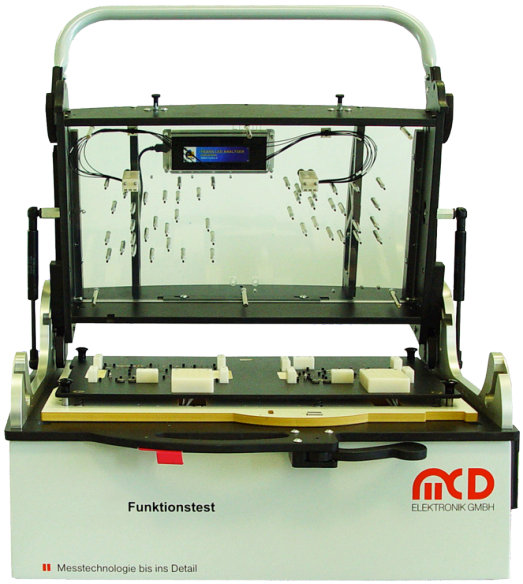

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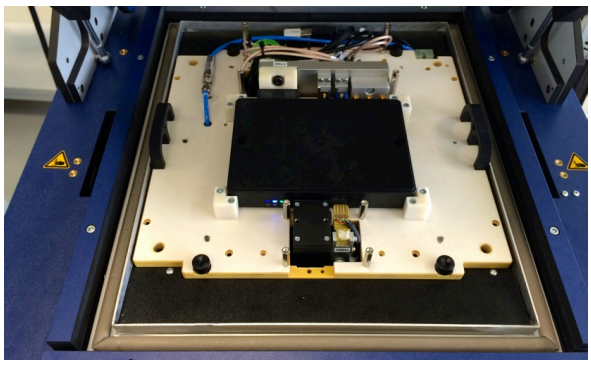

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