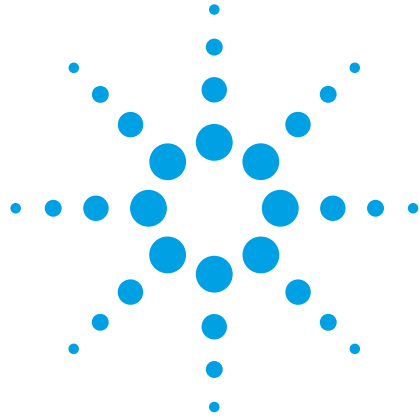


# Accelerate Wireless Mobile Device Design Validation with Automated Test Solutions

## Application Note



### Overview

The increasing complexity of the latest wireless mobile devices and urgency to get them to market in less time place unprecedented demands across the organization developing them. This is no truer than in the Design Validation (DV) test group. DV test groups must find faster, more efficient alternatives to today's laborious manual testing moving forward. One key way is to automate DV testing. Crucial battery drain measurement tests are perfect candidates due to the complexity and time for validating them under all the device's various operating conditions and settings. Flexible software and hardware test platforms that can be readily set up and configured as needed make dramatic improvements in test time and efficiency during design validation.

### Problem

Good design validation of wireless mobile devices dictates thorough testing of most all attributes and features, in a multitude of combinations, to uncover any problems and to ascertain if the design is in compliance. Battery drain is of primary concern due to its direct impact on the device's run time and strong indicator of hidden design issues. One representative example is the need to validate battery current drain for all of a device's RF output power levels and transmit channels, for an extended time period at each setting.

The problem is this can run into thousands of current drain measurements needing to be taken, each at a different device setting. This can literally take a test technician weeks to perform manually. While developing an automated set up to perform this alone is surmountable, the need for performing many other similar tests and modify them on a moment's notice calls for a much more flexible and capable solution.



## Solution

The Agilent 14565B software for battery drain measurement and analysis can now be called and controlled from many other programs and environments for automating testing, greatly accelerating the design validation of wireless mobile devices. When matched with Agilent's E65xx series Wireless Test Manager (WTM) a capable solution for RF and DC stimulus and measurement is created. This solution is depicted in Figure 1.

- The E65xx series WTM software serves as a test executive for the Agilent E5515C Wireless Communications Test Set and 14565B software acting as a virtual instrument.
- The E65xx series WTM software features a complete set of high level test steps for RF testing, and DC testing when the 14565B is integrated, greatly easing programming effort.
- The 14565B software in turn works with the Agilent 66319B/D Mobile Communications DC Source as a solution for making advanced battery drain measurements and analysis.
- The E5515C Wireless Communications Test Set and 66319B/D Mobile Communications DC Source provide the specialized RF and DC stimulus and measurements as needed for the wireless mobile Device Under Test (DUT).

## Quickly construct a test plan using high level test steps

The E65xx series WTM software features a complete set of high level test steps for advanced RF and DC testing. While the 14565B software can be controlled from a variety of programs and environments, it also includes a WTM dedicated driver featuring WTM-type test steps. Programming effort is greatly reduced, often to no more than dragging and dropping the test steps to create a test plan of desired sequence, setting test parameters and specifications as needed, and then running the test plan. The ability

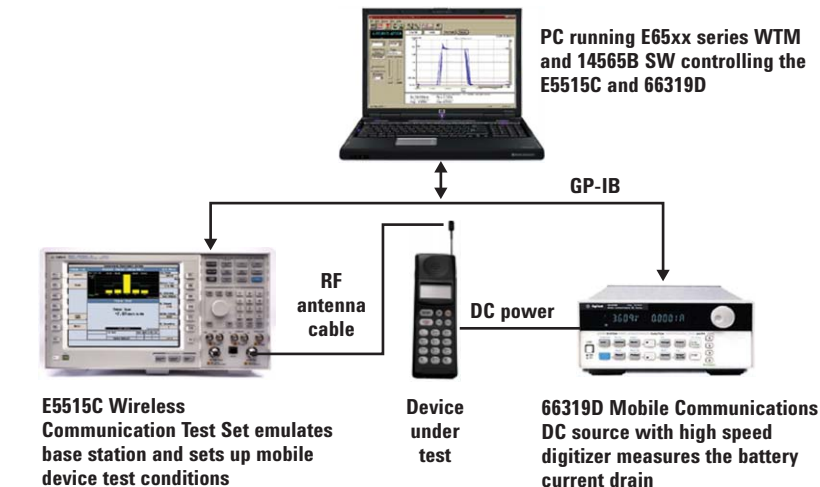


Figure 1. Solution for automated RF and DC testing of wireless devices during DV

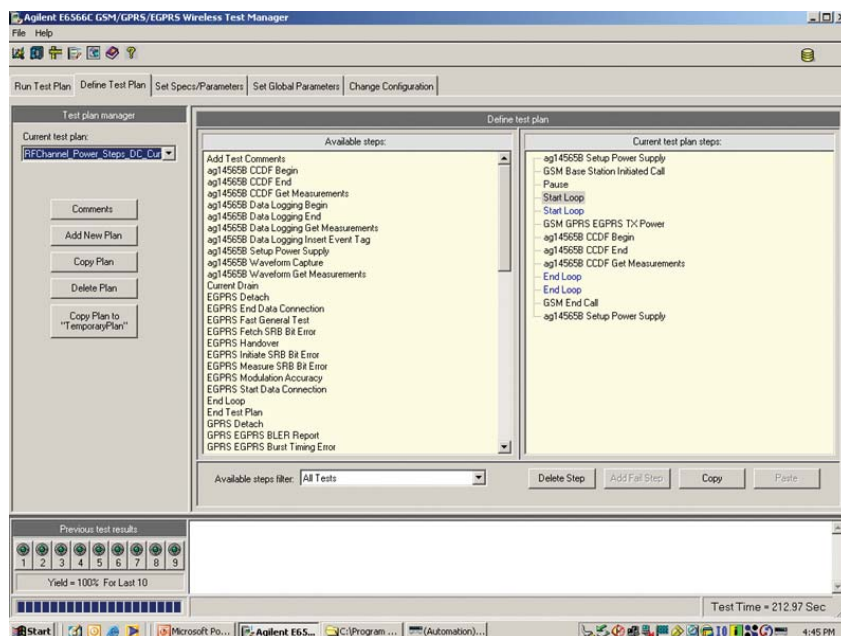


Figure 2. Constructing the test plan in E65xx series WTM

also exists to develop one's own special test steps for unique test needs, when required, making for a very flexible and capable solution.

A test plan shown in Figure 2 was quickly constructed in WTM for the following:

- Apply DC power to the DUT
- Establish call with the DUT
- Wait for backlight to turn off
- Start loop for RF channel settings
  - Start loop for RF transmit power level settings
    - Make an RF power measurement
    - Make an extended DC current drain measurement using ag14565B test steps
  - End loop for RF transmit power level settings
- End loop for RF channel settings
- End call with DUT
- Remove DC power to the DUT

## Running the test plan

Once the test plan, specifications and parameters are all set the test plan can be run. Test results are shown in Figure 3. Here, the actual RF output power and DC current drain Complementary Cumulative Distribution Function (CCDF) data were returned for each RF test condition. The 14565B is automatically started, set to and runs in its CCDF mode in the background as depicted in Figure 4. The CCDF results provide additional statistical information about the current drain characteristics. After starting, all testing runs to completion without needing further intervention. The test technician is free to take care of other tasks.

## Summary of Results

The laborious task of performing manual DV testing is greatly reduced by making use of an automated test system with flexibility and capability to be rapidly set up and configured in software. In the example presented here, the task of making RF output and DC current drain measurements for various combinations of RF power level and channel settings on a wireless mobile device literally took weeks of a technician's time to manually perform. Alternatively, the automated test system depicted in Figure 1 was set up using Agilent software and hardware. Instead of taking weeks, the entire task took only hours to accomplish, resulting in dramatic improvements in DV testing time and efficiency.

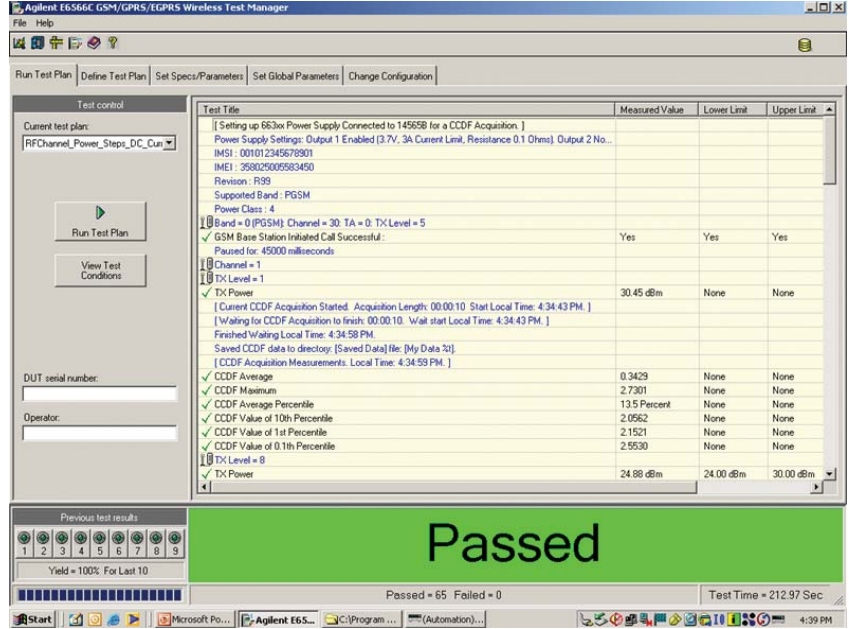


Figure 3. Running the test plan and displaying results in E65xx series WTM

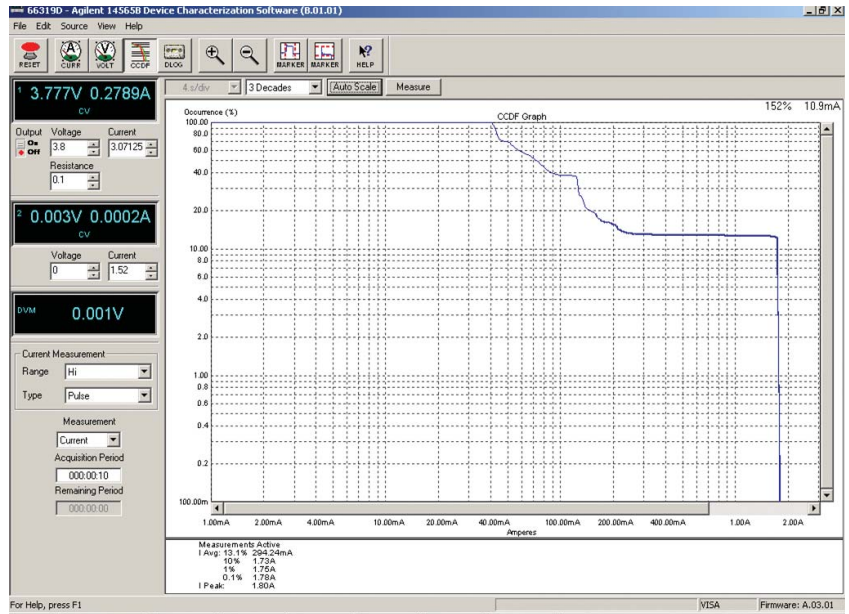


Figure 4. 14565B CCDF measurement and analysis mode running in background

## Related applications

- Wireless Network Interface Card testing
- Wireless mobile device application software regression testing
- Setting specifications for wireless mobile device battery current drain
- Wireless mobile device use-model operating time benchmarking

## Related products

- 14565B Device Characterization Software
- E65xx Series Wireless Test Manager Software
- 66319B/D or 66321B/D Mobile Communications DC Sources
- E5515C Wireless Communications Test Set

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