

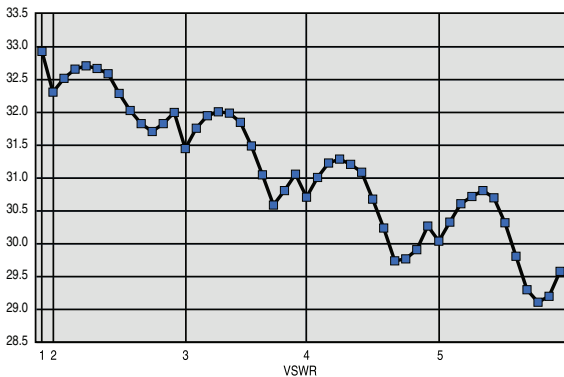
Using Impedance Tuners to Extend the Agilent 8960 Beyond 50Ω

Introduction

Mobile phones must guarantee proper functioning in non-ideal real-world environments, such as a lost or damaged antenna, usage in a tunnel or locker, being held close to the body or in a pocket surrounded by coins, etc. Each of these scenarios can be regarded as non-ideal from an RF standpoint, meaning non-50 ohm. We are able to use a single tuner to vary the VSWR magnitude and phase seen by the antenna port of the phone and test its performance in transmit and receive mode.

Transmit Load Pull

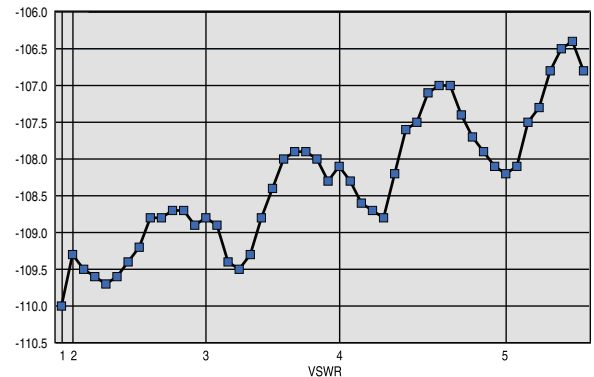
The goal of load pull in the phone's transmit mode is to measure the output power as a function of VSWR magnitude and phase. The Agilent 8960 Test Set is used in signaling mode to establish a call with a mobile phone, specify a channel/frequency (e.g., ARFCN 128 is 824 MHz uplink and 869 MHz downlink for GSM850), set the power control level (e.g., PCL 5 is 33 dBm at GSM850) and measure the power delivered from the phone. Maury MT910 series software will vary the VSWR and battery voltage as determined by the user and record the output power de-embedded to the antenna port or the FEM inside the phone. The software procedure is automated thanks to the use of a simple test sequencer which allows the user to enter a list of channels/frequencies, battery voltages, VSWR magnitudes and phases.



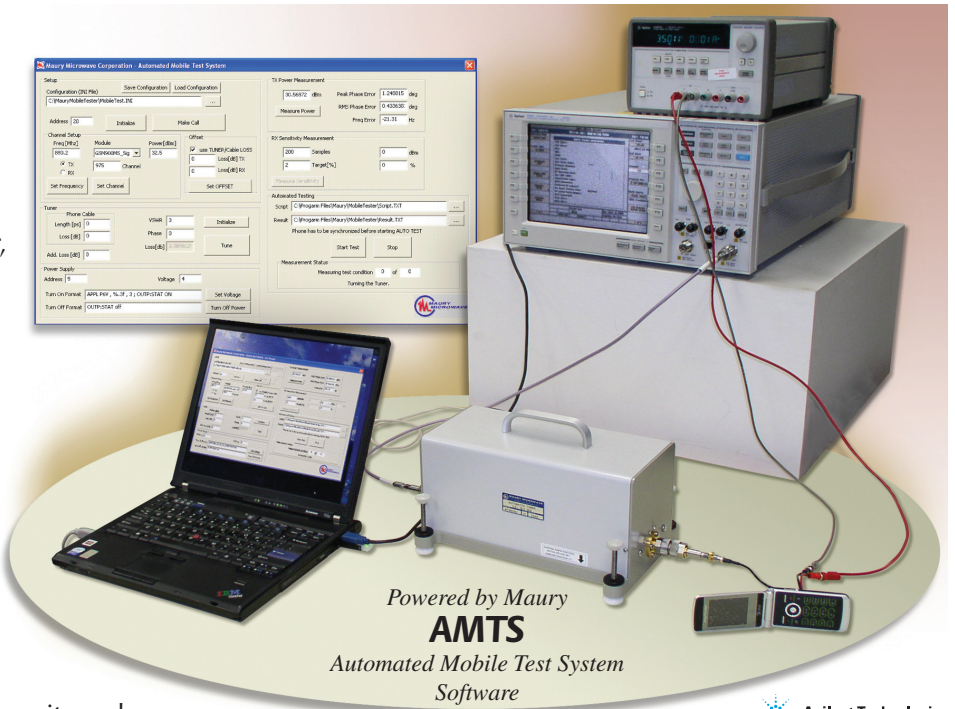
Graphical representation of TX results

Receive Load Pull

The goal of load pull in RX mode is the sensitivity-measurement of the phone; at what power level will a user-specified bit-error rate (BER) be achieved, as a function of VSWR magnitude and phase. The Agilent 8960 Test Set is used in signaling mode to establish a call with a mobile phone, specify a channel/frequency, and send a low-power burst (in the order of -105 to -110 dBm) to the phone and measure the resulting BER. Maury MT910 series software will vary the VSWR and battery voltage as determined by the user, measure the resulting BER, and vary the burst-power until the required BER is achieved.

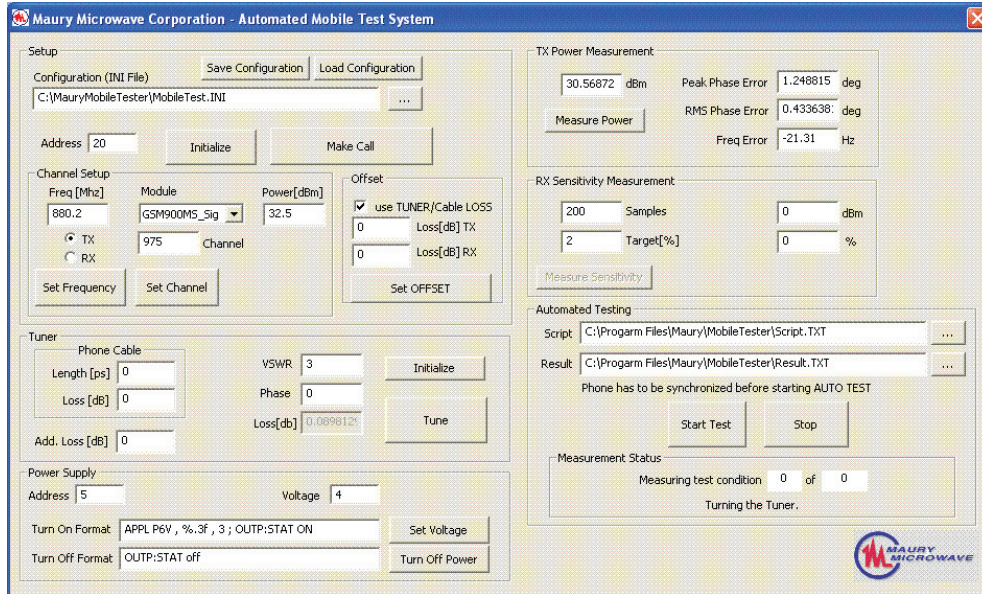


Graphical representation of RX results



Powered by Maury
AMTS
Automated Mobile Test System
Software





Maury MT910 series Automated Mobile Testing System Software

Conclusion

Maury Microwave Corporation, together with Agilent Technologies, offers a simple, fast and cost-effective solution tailored for mobile phone testing outside of the 50Ω environment. This solution automates mobile phone testing in TX/RX modes over a multitude of channels/frequencies, battery voltages and power levels.

It works by combining:

- **Maury's MT910 Series Automated Mobile Testing System software** to
 - control the system,
 - de-embed VSWR and power levels to DUT reference,
 - control variable DC supply to mimic battery voltages, and
 - automate measurements
- a **Maury MT98x Automated Tuner** which sets non-50Ω impedance
- and the **Agilent 8960 Test Set** which acts as a base station, sets active channel and power levels, and measures power and bit-error-rate.

By analyzing the test results obtained using this solution you can learn:

- What level of antenna mismatch is acceptable, based on real-life testing against your VSWR requirements
- If your mobile phone meets the minimum performance requirements under pre-defined VSWR and voltage conditions
- If your phone's performance degrades after a large VSWR sweep plan
- If thermal stability issues exist
- If your phone's design is acceptable as is, or if some components need to be redesigned
- If specific performance problems result from batch manufacturing

These are just a few of the ways you can use Maury MT910 AMTS software and ATS tuners to extend the capability of Agilent's 8960 test set beyond the 50Ω environment.