MAURY

RF Device Characterization Systems

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- Advanced Device Characterization Systems
- Mixed-Signal Active Load Pull Systems
- Pulsed IV Systems

Your Complete Measurement & Modeling Solutions Partner

Maury Device Characterization Systems

Maury Microwave Has the Most Complete Selection of Load Pull Solutions! We Are Your Complete Measurement & Modeling Solutions Partner!

In This Volume:

RF Device Characterization Methods

Accurate de-embedded performance evaluation of the power, intermodulation distortion, adjacent channel power, noise and network (S-parameter) characteristics of packaged or on-wafer devices under various conditions of impedance matching is the foundation of successful design, manufacture, and use of RF and microwave devices. Maury device characterization systems support the best industry-recognized test and measurement methods.

Pitfalls To Avoid When Purchasing A Device Characterization System

An automated device characterization system can greatly simplify test and measurement operations and quickly provide reliable empirically-based data for design and modeling of new products. But finding the right system is not simple. There are mistakes to be avoided if you are to maximize return on investment, achieve your test and measurement goals, and get your products to market. Here is some valuable advice from the experts at Maury.

Device Characterization Software (IVCAD, ATSv5 and AMTSv2)

Maury IVCAD software is the newest and most advanced measurement and modeling software in the market. It supports multiple load pull techniques, performs noise parameter, DC-IV and pulsed-IV measurements, and incorporates sophisticated device modeling tools. Maury's ATS software (ATSv5) includes a comprehensive set of upgrades, improvements, and additions to the classic ATS test and measurement tools.
Maury's Automated Mobile Test System software (AMTSv2) is designed specifically to automate the testing of mobile phones in transmit and receive modes, for output power and sensitivity. It now includes support for GSM, WCDMA and CDMA2000.

Load Pull and Noise Parameter Systems

Maury offers fully integrated, automated tuner-based systems configured to operate from 0.25 to110 GHz. These complete turnkey systems can be customized to support Basic (power, gain and PAE) and Advanced Load Pull characterization (modulation, optimal ACPR, CDP, and Harmonic LP). Maury Noise Parameter systems are available in electromechanical and solid state versions that can be customized to perform on-wafer or in-fixture noise parameter characterization at frequencies from 0.25 to 110 GHz.

Automated Tuners, Controllers And Hubs

Maury USB-controlled automated tuners and hubs are described in detail, with their respective specifications and applications.

Accessories

Maury offers a number of accessories to support your test bench needs, including automated tuner controllers, noise receiver modules, diplexers and triplexers, pre-matching probe mounts, manual tuners, and automated sliding shorts.

Advanced Device Characterization Systems

Maury now offers Mixed-Signal Active Load Pull systems, and the AMCAD Engineering PIV/PLP family of Pulsed IV systems.

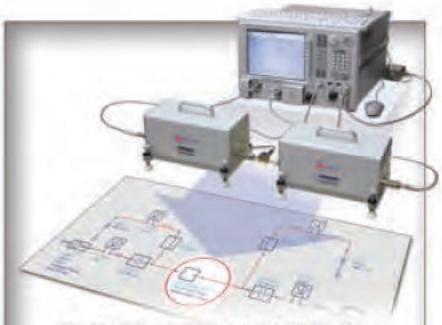
You Have Load Pull Needs – We Have You Covered!

Maury Microwave Has the Most Complete Selection of Load Pull Solutions

MAURY's Mixed-Signal Active Load Pull Allows Wideband Modulated Impedance Control for Base Station PAs

Active and Hybrid Load Pull Using PNA-X Simplifies Harmonic Tuning with Gamma = 1

Pulsed-Bias Pulsed-RF Harmonic Load Pull for GaN and Wide Band-Gap Devices



X-Parameter Modeling for First-Pass Advanced Amplifier Design at over 200W!

Ultra-Fast Noise Parameter Method Gives More Accurate Results in Less Than 1/100th the Time to 110 GHz!

Stability and Conformance Testing of Mobile Phones for GSM, CDMA, WCDMA...

Advanced Integration of On-Wafer Load Pull and Noise Parameters to 110 GHz

USB and TCP-IP Tuners for Do-It-Yourself Programing Using DLL or Direct ASCII Commands

The Most Accurate and Repeatable Manual Tuners for Simple Tuning Requirements

Maury Microwave – Your Complete Measurement & Modeling Solutions Partner

On the Web at MAURYMW.COM

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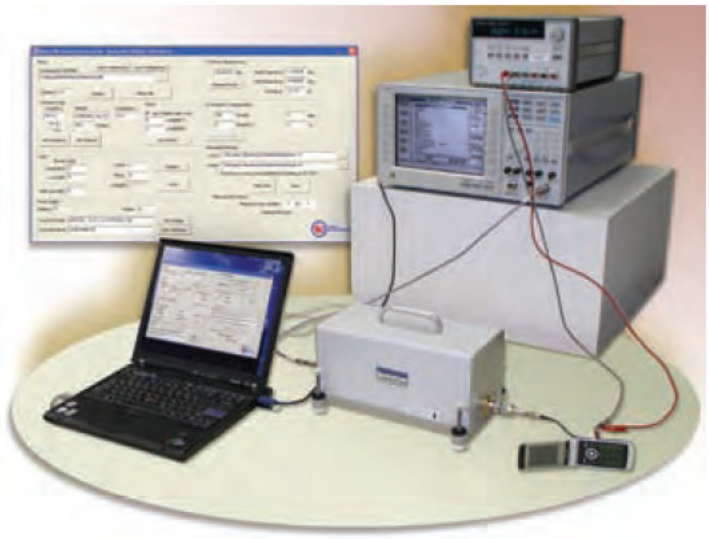
AMTSv2 Automated Mobile Test System Software

MT910 Series

Now with Support for GSM, WCDMA & CDMA2000



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-50Ω. 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.

The Maury Automated Mobile Test System Software (AMTSv2) is a standalone application designed specifically to automate the testing of mobile phones in transmit and receive modes, for output power and sensitivity respectively, as a function of VSWR magnitude and phase.

What AMTSv2 Can Do For You

AMTSv2 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
- Agilent's or Rohde & Schwarz's Wireless Communications Test Set, which (acting 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 your mobile phone testing capability beyond the 50Ω environment.

Available Models

Model	Description (See details on page 2 of 2)
MT910*	Mobile Phone Tester
MT910A	GSM Standard
MT910B	WCDMA Standard
MT910C	CDMA2000 Standard

* MT910 requires at least one standard (MT910A, MT910B, or MT910C).

MT910: Mobile Phone Tester

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. A Wireless Communication 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 at given VSWR magnitude and phase.

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. A Wireless Communication 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 burst-power until the required BER is achieved.

Manual Testing — Simple manual testing is achieved by entering single values of channel/frequency, battery voltage, VSWR magnitude and phase.

Test Automation — The measurement routine is automated thanks to the use of an advanced graphic test sequencer which allows the user to enter a list of channels/frequencies, battery voltages, VSWR magnitudes and phases.

Compatible Instruments — Agilent 8960, R&S CMU200, R&S CMW500 (under development).

MT910A: GSM Standard

Adds GSM Standard to MT910 Mobile Phone Tester

Supported Technology: GSM 850,900,1800,1900.

Measurements Supported:

- TX power – Transmit Power
- Modulation – Frequency Error & Phase Error (RMS & PEAK)
- Spectrum – due to Modulation [23 frequencies]
  – due to Switching [9 frequencies]
- Sensitivity (search algorithm w/adjustable start level)
  – 2.439% RBER

MT910B: WCDMA Standard

Adds WCDMA Standard to MT910 Mobile Phone Tester

Supported Technology: WCDMA Bands I, II, V, VI, VIII

Measurements Supported:

- TX power – Transmit Power
- Modulation – Freq Error, MAG Error, Phase Error, EVM (Avg)
- Spectrum – ACLR at 5 and 10 MHz [+ and –]
- Sensitivity (search algorithm w/adjustable start level)
  – 0.1% BER

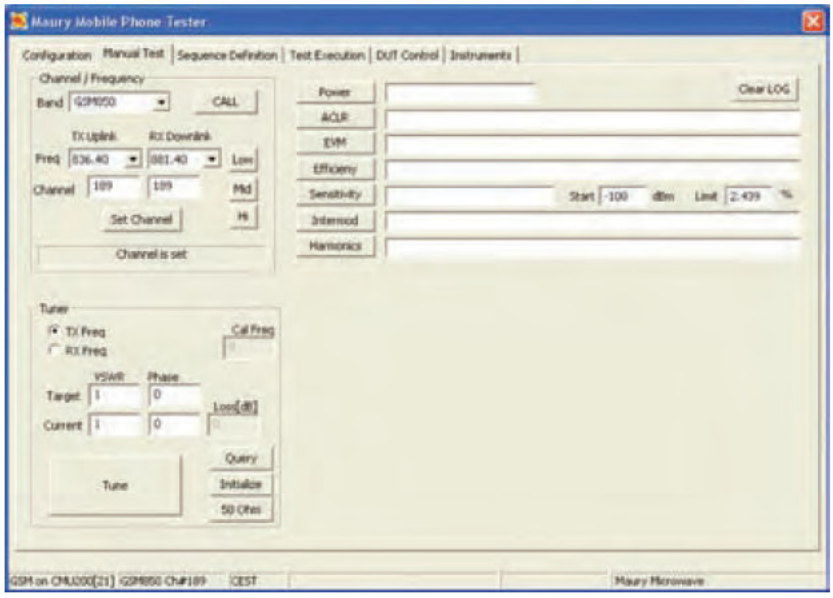
MT910C: CDMA2000 Standard

Adds CDMA2000 Standard to MT910 Mobile Phone Tester

Supported Technology: CDMA2000 BC0, BC1

Measurements Supported:

- TX power – Transmit Power
- Modulation – Carrier Frequency Error, Waveform Quality
- Spectrum – ACP at 870, 885, 900 & 1,980 MKz [+ and –]
- Sensitivity (search algorithm w/adjustable start level)
  – 0.5% FER with Confidence Level >95%



Maury MT910 series Automated Mobile Testing System Software