MT2000 – Mixed-Signal Active Load Pull System (1.0 MHz to 40.0 GHz) And MT2001 System Software

DATA SHEET / 4T-095

Maury Microwave

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MT2000 – Mixed-Signal Active Load Pull System

(1.0 MHZ TO 40.0 GHZ) AND
MT2001 SYSTEM SOFTWARE

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U.S. Patent No. 8,456,175
www.anteverta-mw.com

Key Features (Typical Performance)

- Broadband system concept (e.g. 0.7-40.0 GHz)
- Re-configurable hardware; single-ended, differential and number of controlled harmonics
- High speed and dynamic range
- Embedded measurement of (Pulsed/Isothermal) DC parameters

Single tone

- "Real-time" measurement speed >1,000 power and load states per minute
- Multi-dimensional parameter sweeps
- (Pulsed/Isothermal) High Power testing
- Measurement of calibrated Voltage and Current waveforms
- Device protection included
- Waveform reconstruction

Modulated signals

- Wideband modulated signals (e.g. multi-carrier WCDMA) up to 240 MHz
- Modulated Signal Library Included
- Losses and delay of cables, probes etc. are eliminated
- Upload the s-parameters of any "virtual matching networks" and get a one-to-one agreement with your board design (also for linearity)
- Device testing with digital predistortion

General Description

This novel mixed-signal load pull system is designed to handle realistic wideband complex modulated signals with a high dynamic range and provide user defined reflection coefficients vs. frequency at the DUT reference planes.

The system concept is based on:

- IQ signal generation, synthesized with fully synchronized arbitrary waveform generators (AWG)
- Wideband A/D converters to measure the wideband reflection coefficient

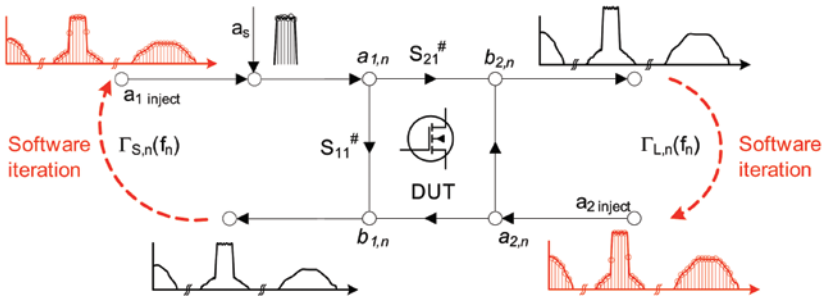


Figure 1. Principle of the Mixed-Signal Load Pull setup as a Signal-Flow diagram

Wideband Generation/Detection

The maximum modulation bandwidth is set by the bandwidth of the AWG and IQ modulators.

- Currently available with 60, 120 or 240 MHz of controlled bandwidth
- Total number of measurement points in every controlled band is >40,000 points

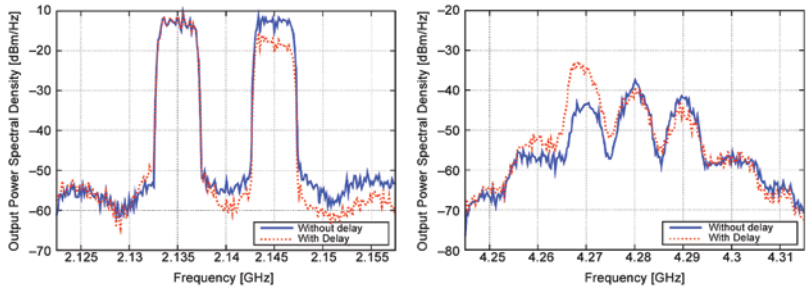


Figure 2. Output spectrum of the DUT at f0 and 2f0 tested with multi-carrier WCDMA (with and without delay compensation).

"Real-Time" Load Pull

Synchronization between signal generation and detection facilitates ultra-fast measurements.

- Independently fully controlled multidimensional Load Pull parameters sweep
- 5,760 measurement points in less than 5 minutes: 90 fundamental load states, swept load and source harmonic termination, 16 power levels

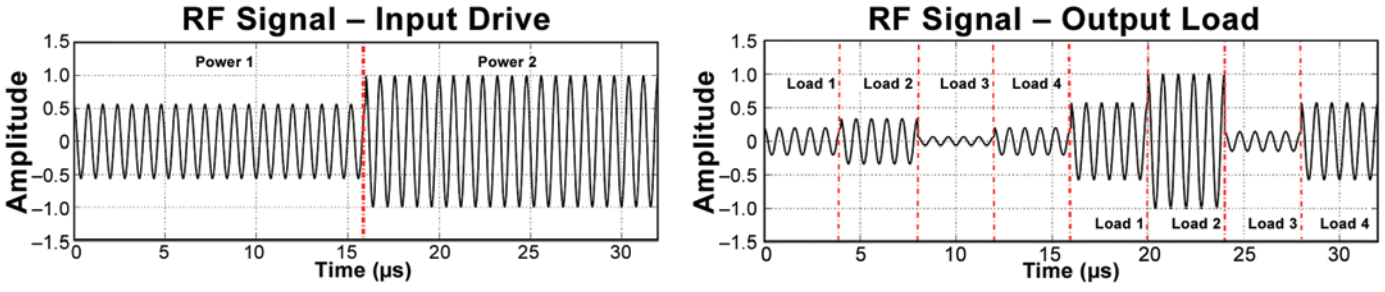
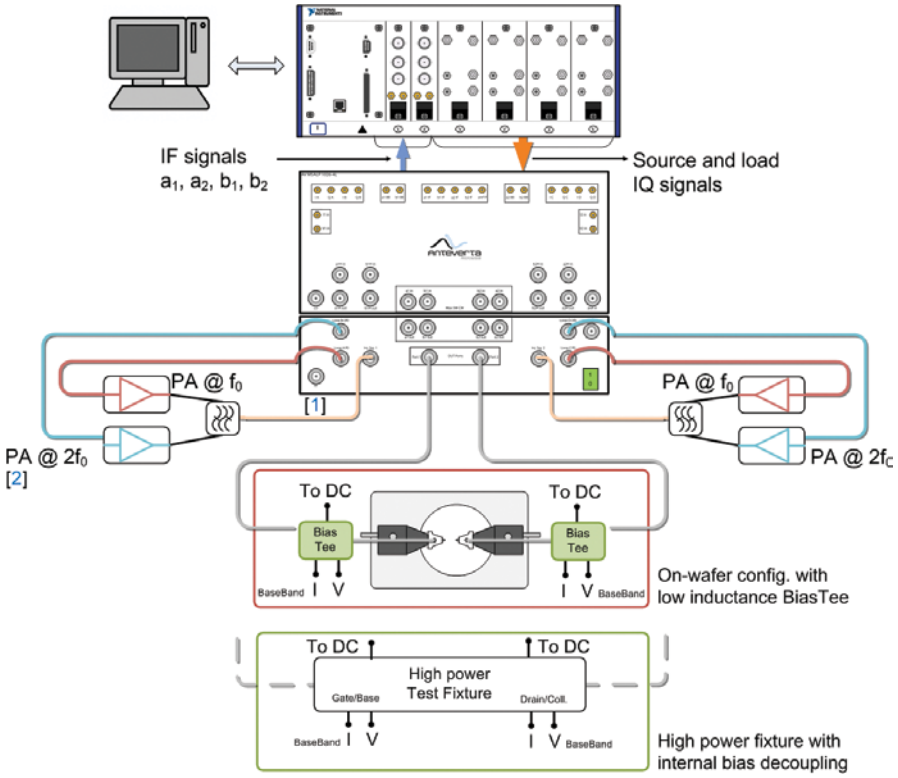


Figure 3. Injection signals as used in the "real-time" multi-dimensional parameter sweeps.

High Power/On-Wafer Configuration

The active loops are fully re-configurable (e.g., the same hardware would also support source pull at f0 and load pull at f0, 2f0 and 3f0, or true differential source and load pull at f0). See [1] in the diagram below.

The proprietary algorithm (patent pending) results in low requirements on the loop amplifiers, so linearity is no longer a problem in this regard, while their Psat should be just slightly larger than the power generated by the device under test (DUT). See [2] in the diagram at below.



MT2001 Software Modules

Module	Description
MT2001A	MT2000 POWER MEASUREMENTS (REQUIRED)
MT2001B	MT2000 MODULATED MEASUREMENTS
MT2001C	MT2000 TWO-TONE MEASUREMENTS
MT2001D	MT2000 NVNA (TIME DOMAIN ANALYSIS)
MT2001E	EXTERNAL CONTROL
MT2001F	VISUALIZATION

Suggested Reading

- A-044 – Active Harmonic Load Pull with Realistic Wideband Communications Signals.
- 5A-045 – Active Harmonic Load Pull for On-Wafer Out-of-Band Device Linearity Optimization.
- 5A-046 – A Mixed-Signal Approach for High-Speed Fully Controlled Multidimensional Load Pull Parameters Sweep.
- 5A-047 – Base-Band Impedance Control and Calibration for On-Wafer Linearity measurements
- 5A-048 – A Mixed-Signal Load Pull System for Base-Station Applications
- 5C-087 – Active Load Pull Surpasses 500 Watts!

Available Models

Model	Modulation Bandwidth (MHz)	System RF Bandwidth (GHz)	Number of Active Tuning Loops[2]	Power[1] Handling: CW/Pulsed (W)	Typical Detection Dynamic Range (dB)	Typical Active Load Dynamic Range (dB)	Minimum Pulse Width (nS)
MT2000HF2-60	60	0.001 – 2.0	2	50/500	80	60	200
MT2000HF2-120	120						
MT2000HF2-240	240						
MT2000HF4-60	60	0.001 – 2.0	4				
MT2000HF4-120	120						
MT2000HF4-240	240						
MT2000A2-60	60	0.3 – 6.0	2	100/1000			
MT2000A2-120	120						
MT2000A2-240	240						
MT2000A4-60	60	0.3 – 6.0	4				
MT2000A4-120	120						
MT2000A4-240	240						
MT2000B2-60	60	0.4 – 18.0	2				
MT2000B2-120	120						
MT2000B2-240	240						
MT2000B4-60	60	0.4 – 18.0	4				
MT2000B4-120	120						
MT2000B4-240	240						
MT2000D2-60	60	0.5 – 26.0	2	20/200			
MT2000D2-120	120						
MT2000D2-240	240						
MT2000D4-60	60	0.5 – 26.0	4				
MT2000D4-120	120						
MT2000D4-240	240						
MT2000E2-60	60	0.7 – 40.0	2				
MT2000E2-120	120						
MT2000E2-240	240						
MT2000E4-60	60	0.7 – 40.0	4				
MT2000E4-120	120						
MT2000E4-240	240						

[1] *Higher power options are available.*

[2] *5-loop and 6-loop add-ons available.*

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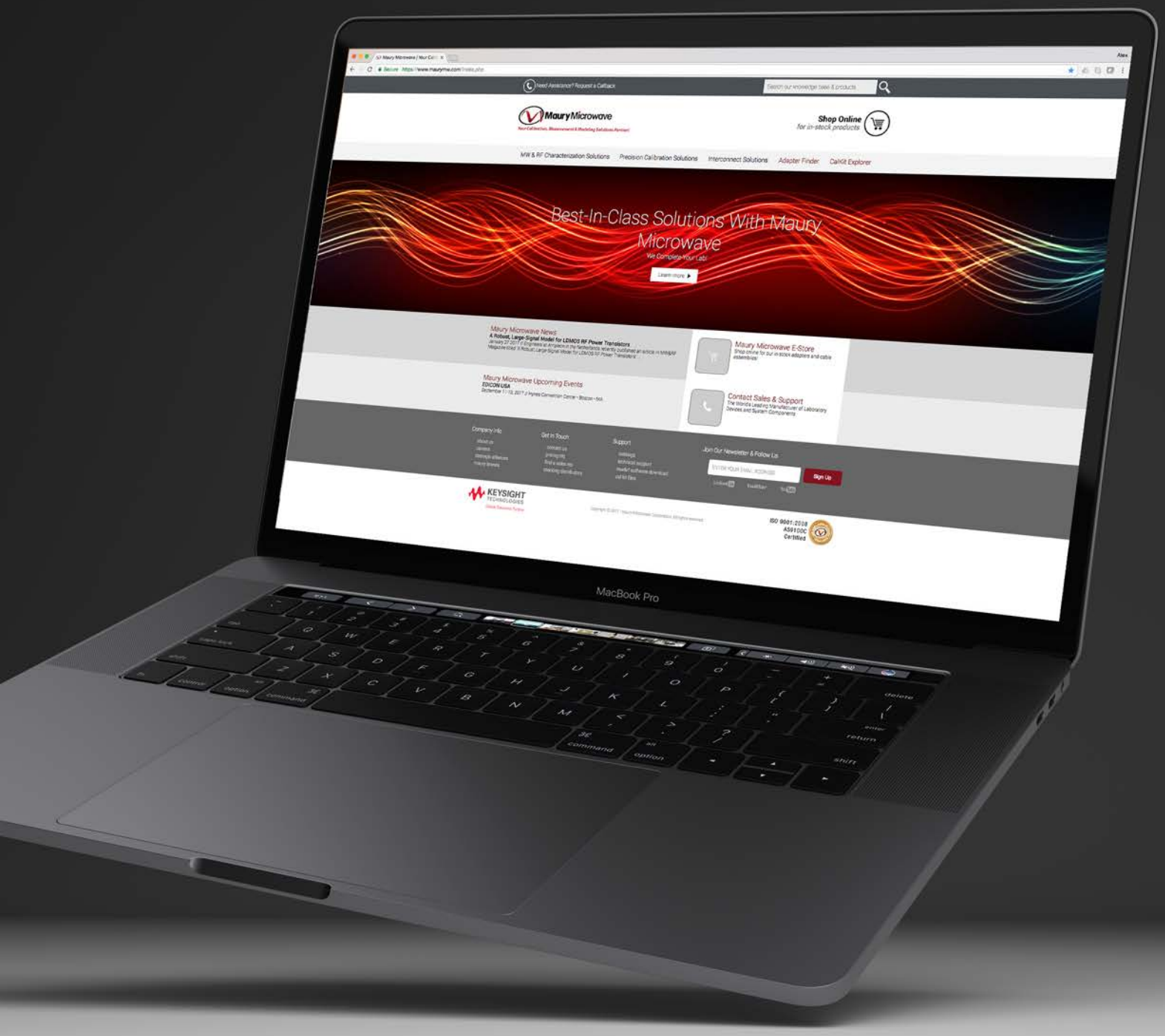
OUR PRODUCTS



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