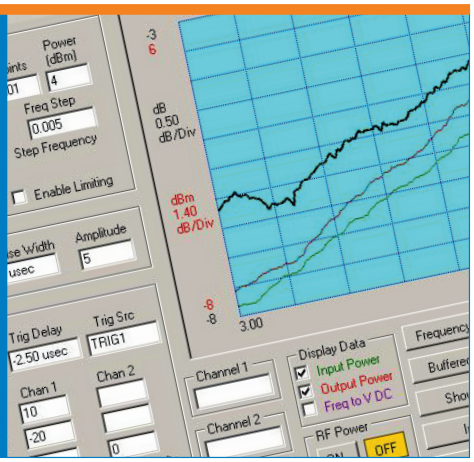
Boonton

Data Sheet

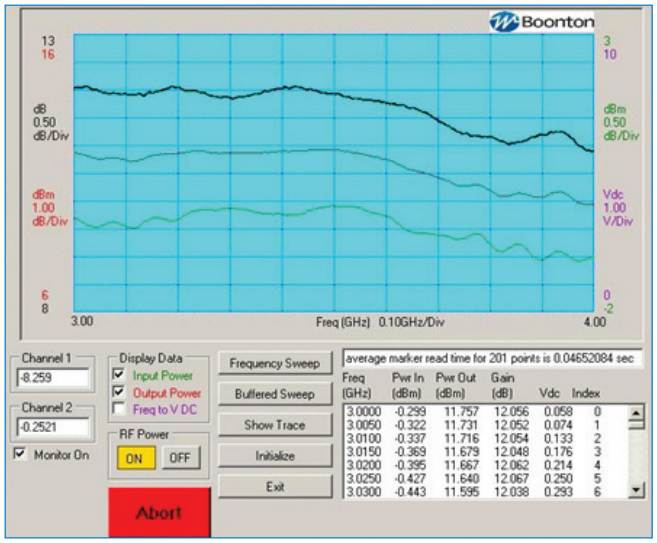
# Amplifier Test Bench




*Taking performance to a new peak*

# Amplifier Test Bench

Boonton's Amplifier Test Bench is a powerful software tool especially designed for efficient and accurate, test verification and analysis of high power or small signal RF amplifiers. The software works with Boonton 4540 and 4500B power meters and is equally suited for pulsed, continuous or random (noise-like) signals. Supported frequencies are sensor dependent and range from 10MHz to 40GHz.




## Features

- Automatic testing of RF amplifier parameters (pulsed and continuous)
- Measures gain over frequency, gain over input power and combinations.
- Measures VSWR and return loss over frequency (requires directional bridge).
- Plots frequency vs. power responses with one or multiple traces on the display.
- Measures input and output power simultaneously.
- Significant improvements in accuracy compared with average power measurements.
- Very detailed signal analysis.
- Many popular signal generators are supported and others can be easily adapted.

## Typical Test Set-up

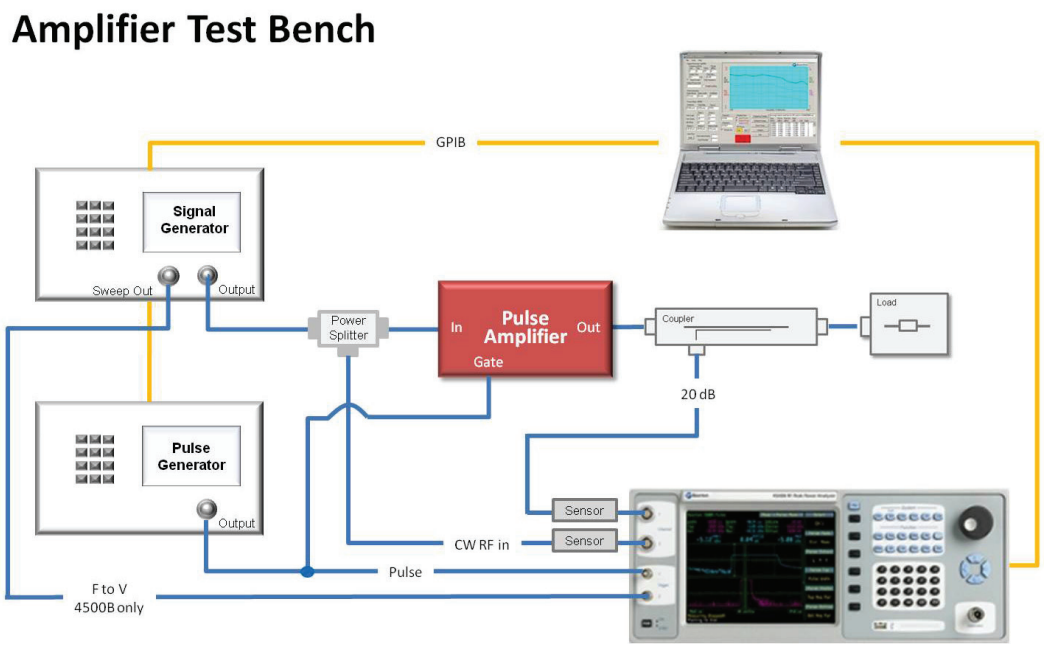



Figure 1: Typical test setup for high power, gated pulse amplifier.

## Generator Support and Adaption

Amplifier Test Bench supports a variety of signal / pulse generators. Even if a particular generator is not supported by the software, Amplifier Test Bench allows creating individual instruction tables for most generators. Complex programming skills are not required and a text file template can be modified to include specific commands for additional signals sources. Devices will be added in future software releases.

## Why average power measurements are not sufficient with pulsed amplifiers

Measuring pulsed amplifiers with average power measurement equipment like RF detectors or average power sensors is common but the results may vary. These measurements require calculating the average pulse power based on the duty cycle, which can cause a large variation between the calculated and the actual pulse response.

The resulting average measurement is multiplied by the inverse duty cycle to calculate the average pulse power. Depending on the duty cycle ratio, the measured average power may be close to the sensor noise floor and cause measurement error. Duty cycles of 0.1% (1:1000) or 0.01% (1:10,000) are common in radar technology and other applications that require pulsed signals. A duty cycle of 0.1% reduces the usable dynamic range of an average sensor by 30dB and a duty cycle of 0.01% by 40dB. The remaining dynamic range might be insufficient for proper measurements. Digitizer quantization error further reduces dynamic measurement range and the accuracy of the measurement.

The assumption that pulses have a perfectly rectangular shape without overshoot or undershoot is not always true. Rising and falling edges often show anomolies in the system caused by poor power supply performance.

The solution is wide dynamic range, fast peak power measurement equipment to measure input and output pulses simultaneously to resolve signal detail. Only peak power sensors can measure the actual signal and provide accurate information about the real pulse power. Amplifier Test Bench can make these measurements with a few mouse clicks.

## Screenshots

The instrument setting of Amplifier Test Bench is easy. Basic parameters like start, stop frequency and power for the signal generator or pulse period and pulse width for the pulse generator are simply entered at the user screen.

Whether a Boonton 4540 or 4500B Power meter is used, additional settings for horizontal and vertical display scale and offset can be entered as well. To analyze a particular portion of a pulse, a time marker can be positioned on a particular interval. Multiple acquisitions are useful for long term testing or temperature variation measurements. (Figure 2).

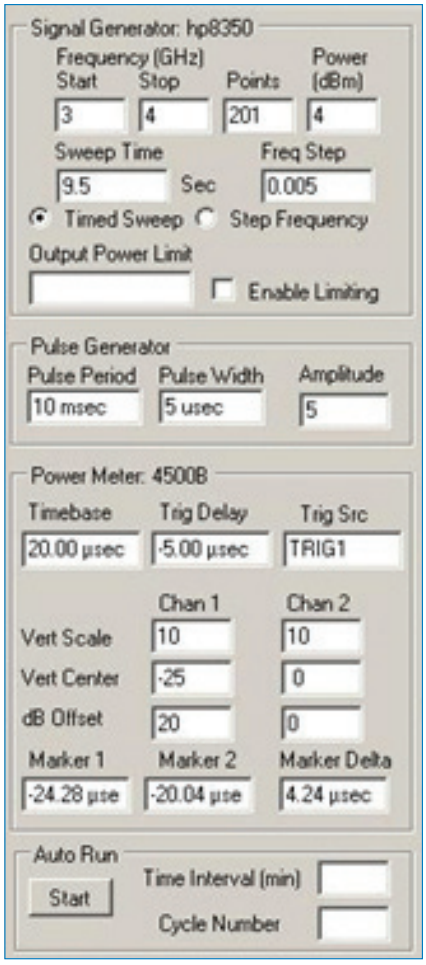



Figure 2

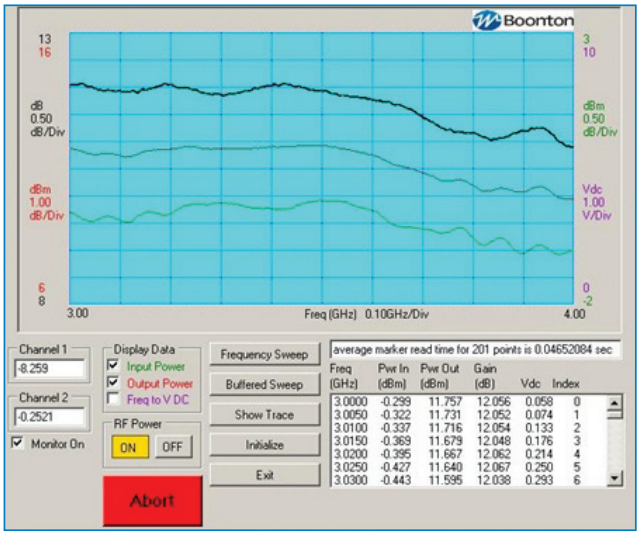



Figure 3

The measurement data can be represented in tabular or graphic format. Detailed information about every measurement point is available in the result table. The graphic in Figure 3 shows the input, the output and the gain over a frequency range of 3 GHz to 4 GHz.

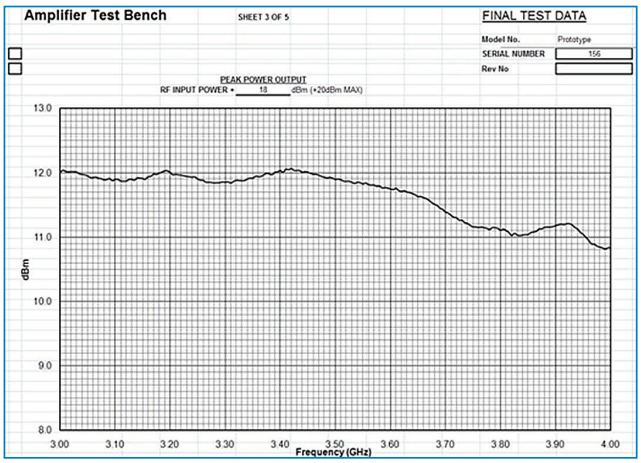
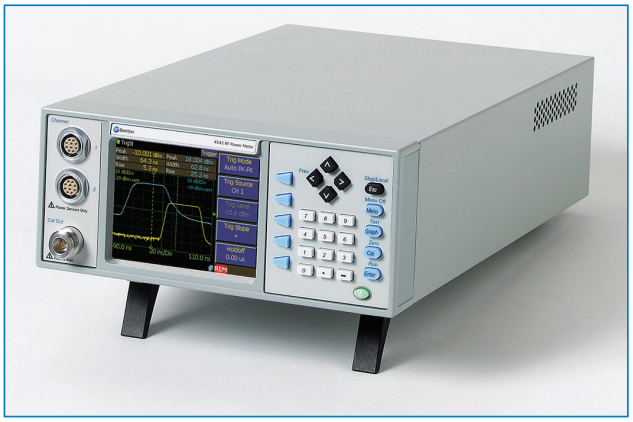



Figure 4

Documentation is often mandatory for quality or proof of the amplifier performance. Amplifier Test Bench can create plots by exporting data to Excel®. Amplifier Test bench comes with an Excel® template (Freqresponse.xls) to quickly create a plot and information like the serial number from the DUT can be automatically added to the plot (Figure 4).

Boonton 4500B Peak Power Meter



Boonton 4540 RF Power Meter

## Ordering Information

### Software Packages for Windows® W2K, XP and W7

| Model | License Information | Part Number |
|---|---|---|
| Amplifier Test Bench 1UL | 1 user license | 975 012 01A |
| Amplifier Test Bench 3UL | 3 users license | 975 012 03A |
| Amplifier Test Bench 6UL | 6 users license | 975 012 06A |
| Amplifier Test Bench 10UL | 10 users license | 975 012 10A |
| Amplifier Test Bench 25UL | 25 users license | 975 012 25A |

### Related Equipment

| Model | Frequency | Rise TIme | Dynamic Range |
|---|---|---|---|
| 4500B Peak Power Meter | 1 MHz to 40 GHz | | |
| 4540 RF Power Meter | 10 kHz to 40 GHz | | |
| 57006 Wideband Peak Power Sensor | 0.5 to 6 GHz | <7ns | -50 to +20 dBm |
| 59318 Wideband Peak Power Sensor | 0.5 to 18 GHz | <10ns | -24 to +20 dBm |
| 59340 Wideband Peak Power Sensor | 0.5 to 40 GHz | <10ns | -24 to +20 dBm |
| 57518 Wideband Peak Power Sensor | 0.1 to 18 GHz | <100ns | -40 to +20 dBm |
| 57540 Wideband Peak Power Sensor | 0.1 to 40 GHz | <100ns | -40 to +20 dBm |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