

## Acoustic Speaker Measurement System

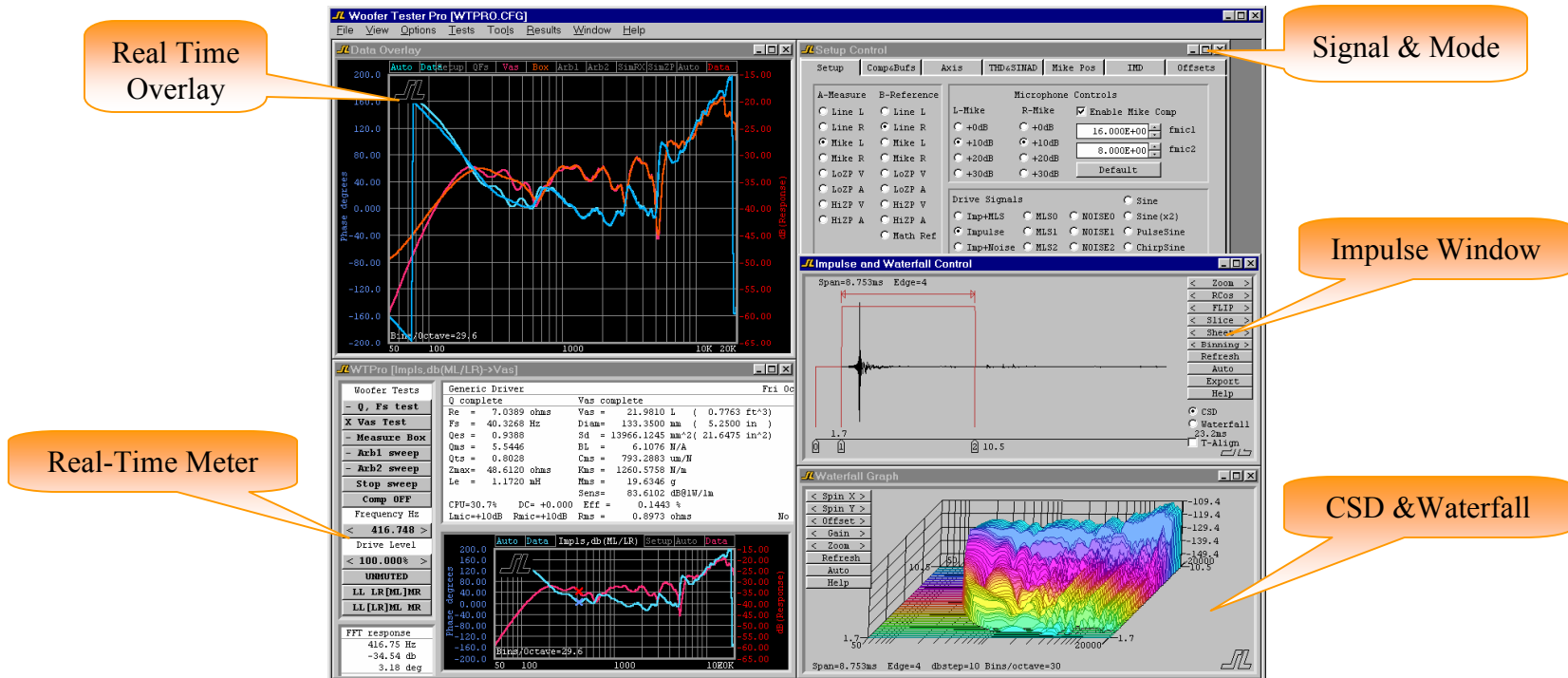


## Features

- Acoustic Real Time Analysis (RTA)
  - MLS, Noise, Impulse and Chirp signals
  - Cumulative Spectral Decay and Sliding Window Waterfall Display
  - Reject Room Reflections using Impulse Time Gating
- Swept Sine Analysis
- Room Decay Measurement
- Achieves very high signal to noise ratio using matched DSP filters
  - THD, IM and SINAD Distortion Measurement
- Interactive Crossover Design™: Simulate crossovers on your desktop
- Low Power Thiele-Small and Electrical RLC Testing
- SnapTS™ Real-Time Thiele-Small Testing
- 32 Dual Data Buffers for Testing and Overlays
- Microphone Compensation for Measurement & Reference Signals
- Mobile, USB Powered from Laptop

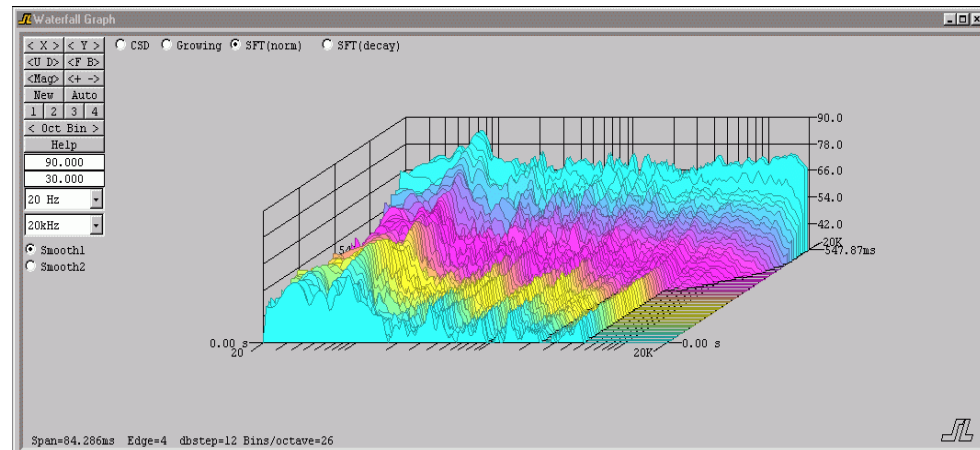
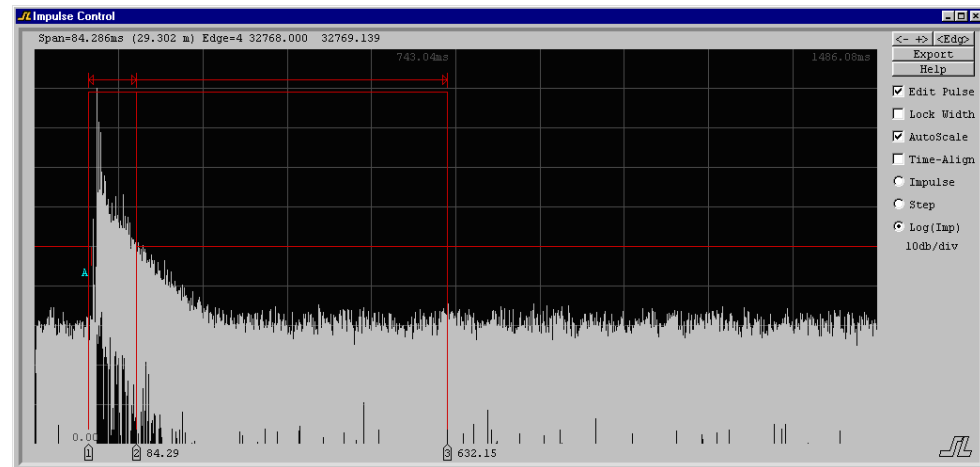
## In-Air Acoustic Response

- MLS, Noise, Impulse and Chirp: Real-Time Analysis (RTA)
- Sine and Pulsed Sine: Best noise rejection and Distortion Tests
- Reject Room Reflections using Impulse Time Gating
- Cumulative Spectral Decay and other Waterfall Plots
- Acoustic Time of Arrival to  $\mu$ Sec accuracy (fractions of mm)
- Dual Microphone alignment to further reduce room reflections



## Room Decay Measurement

- Impulse Magnitude (including Log scale to Magnify Energy Decay further out in Time)
- 4 different types of 3-D Waterfall Plots Showing Decay or Growth
- Microphone Compensation for both Measurement & Reference Signals

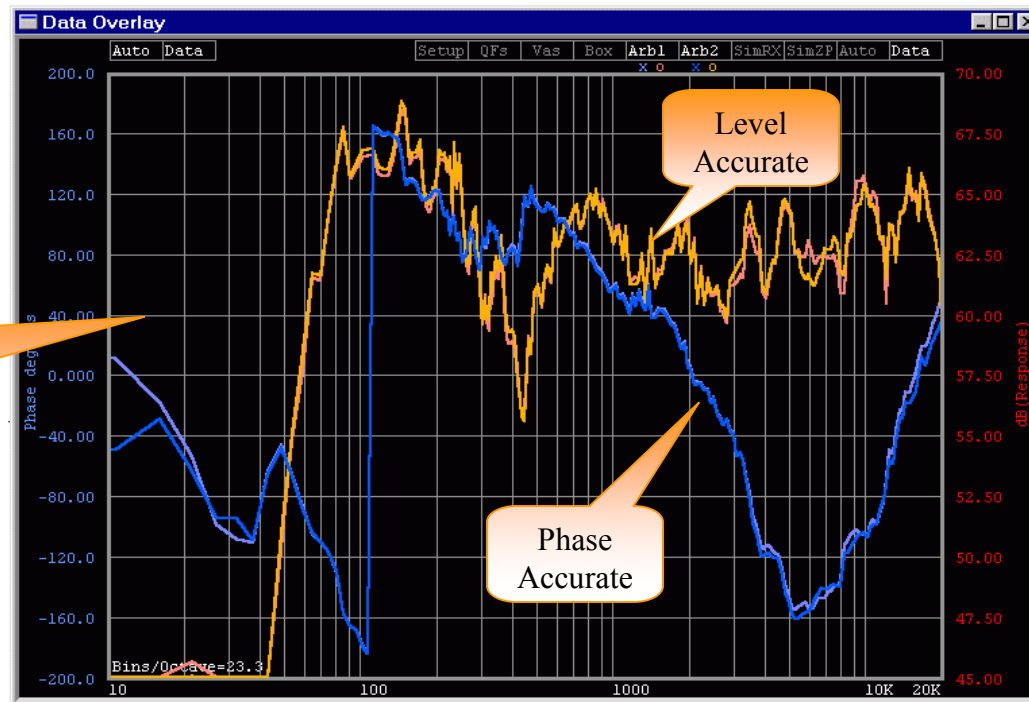


## Interactive Crossover Design™

- Real-time Crossover Testing
- Simulated vs. Real Accuracy to Fractions of a dB
- Tweeter Protection Circuitry Supported
- Measure Driver Time Alignment to mm Accuracy

Simulated  
vs  
Physical  
Crossover

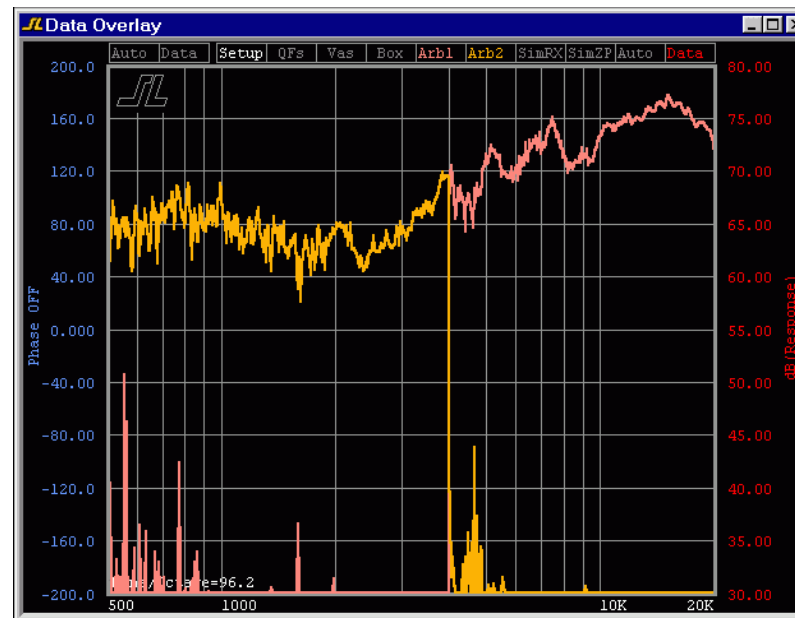
An Actual Overlay  
of Response  
Magnitude and  
Phase Plots



## XVR Response Tool

- Input Response using Magnitude and Phase
- Easily Define An Ultra Sharp Cutoff
- Enter an arbitrary Electronic or DSP Filter

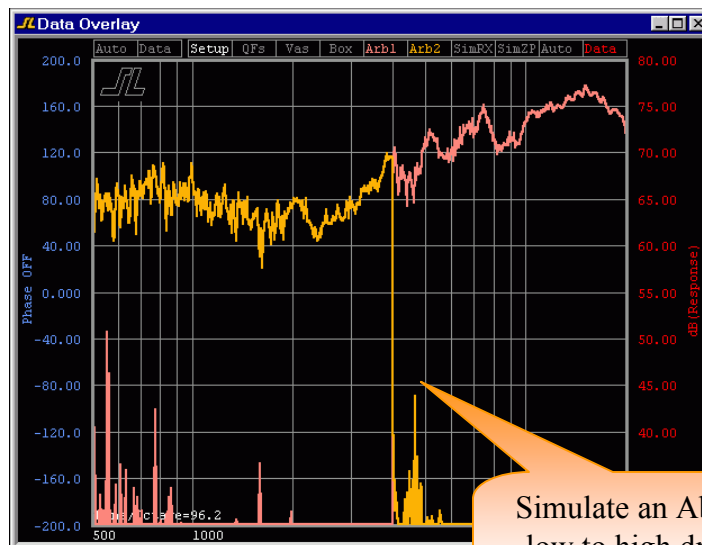
```
*****  
* High + low pass filters  
* Freq  db  phase  
*****  
RIGHT  
  1.0  -100.0  +90.0  
4990.0 -100.0  +90.0  
4995.0 -100.0  +90.0  
5000.0   0.0   +0.0  
9600.0   0.0   +0.0  
END  
*****  
LEFT  
  1.0    0.0   +0.0  
4990.0  0.0   +0.0  
4995.0 -100.0 -90.0  
5000.0 -100.0 -90.0  
9-100.0 -90.0  
END
```



## Analyzing The Crossover Point

- Accurately Measure Phase and Acoustic Distance
- Infinite Slope Tool finds Delta Phase at XO Frequency
- Phase is a Measure of Voice Coil Alignment
- Helps Decide XO Topology

Amplitude of Both Channels



Simulate an Abrupt  
low to high driver  
Crossover Point

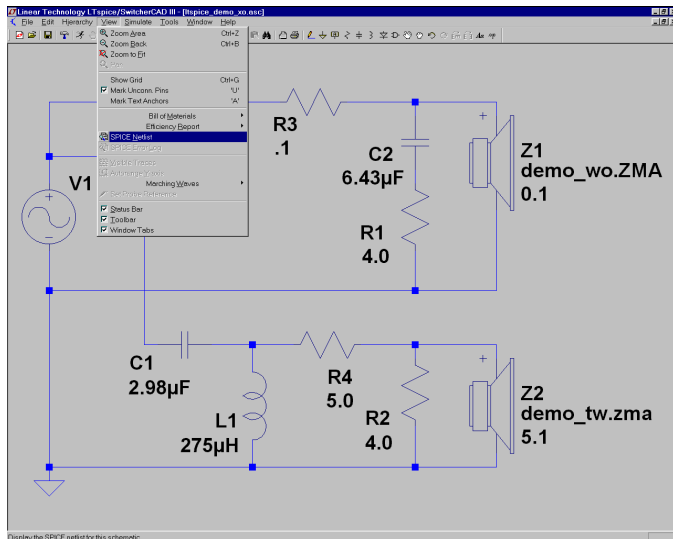
Delta Phase at XO Frequency (Distance)



Phase step here is  
Front to Back Voice  
Coil Distance

## Working with 3<sup>rd</sup> Party Schematic Entry Tools

### Schematic Entry



### ICD Netlist File (ASCII text)

```
* D:\wtpro\ltspace_demo_xo.asc
L1 N005 0 275µH
C1 N005 N001 2.98µF
R3 N002 N003 .1
V1 N001 0
Z1 N003 0 demo_wo.ZMA 0.1
Z2 N006 0 demo_tw.zma 5.1
L2 N001 N002 616µH
C2 N003 N004 6.43µF
R1 N004 0 4.0
R2 N006 0 4.0
R4 N006 N005 5.0
.end
```

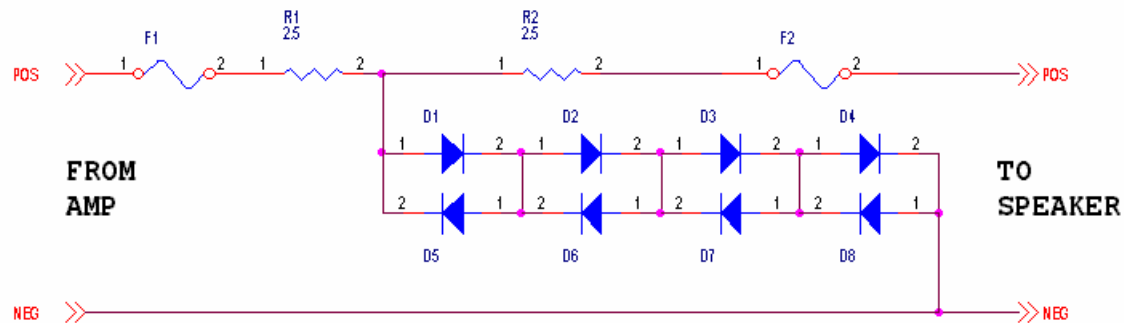
Simulate Crossover & Test  
using Real-Time Analyzer





## Support for Driver Protection Circuitry

- Avoid Damaging Tweeters and other Delicate Drivers
- Response Effects are Reversed in ICD Software

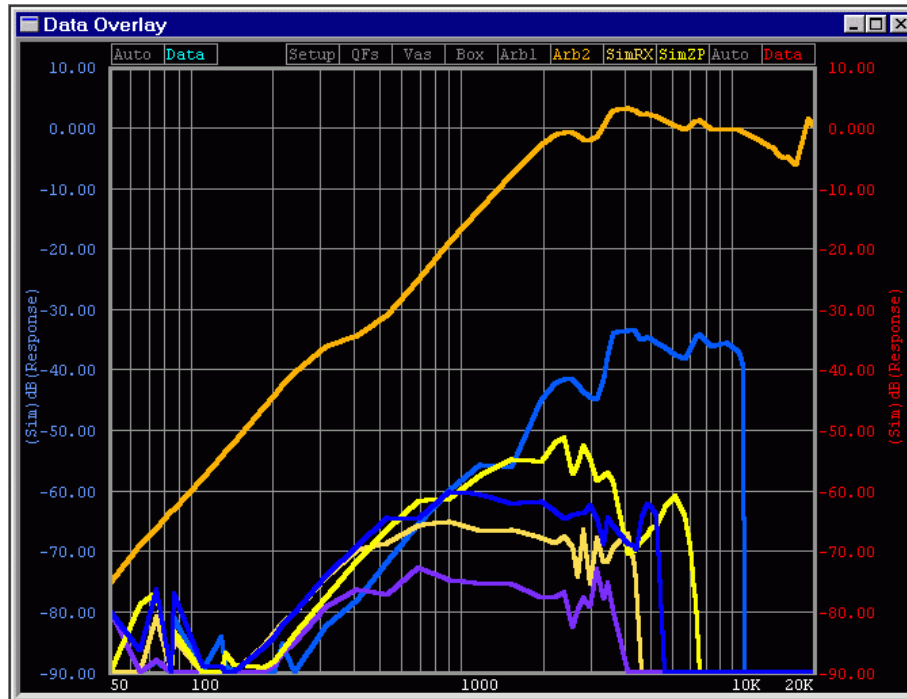


# The Speaker Tester

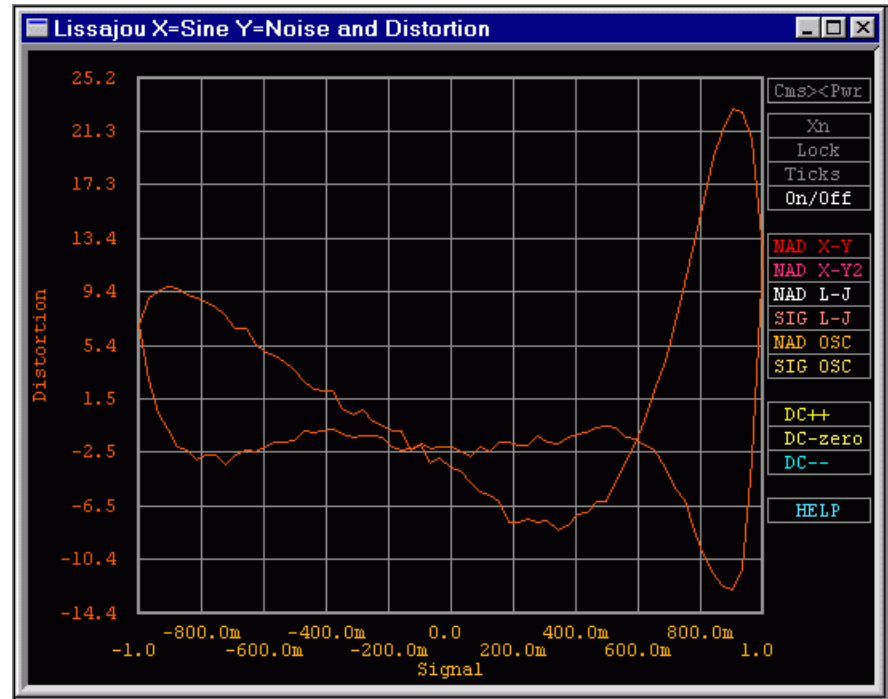
## Harmonic, Inter-Modulation & SINAD Distortion Measurement

- Measure 1<sup>st</sup> through 6<sup>th</sup> Harmonics, Relative or Absolute Level vs Frequency
- Measure Inter-modulation Distortion
- Measure Signal to Noise and Distortion Ratio (SINAD)
- View SINAD as Signal Relative To Drive Signal, Oscilloscope or Lissajoux

Tweeter Response and Harmonics 1-6 on Absolute Scale



SINAD at 1 kHz Shown as Lissajoux Pattern

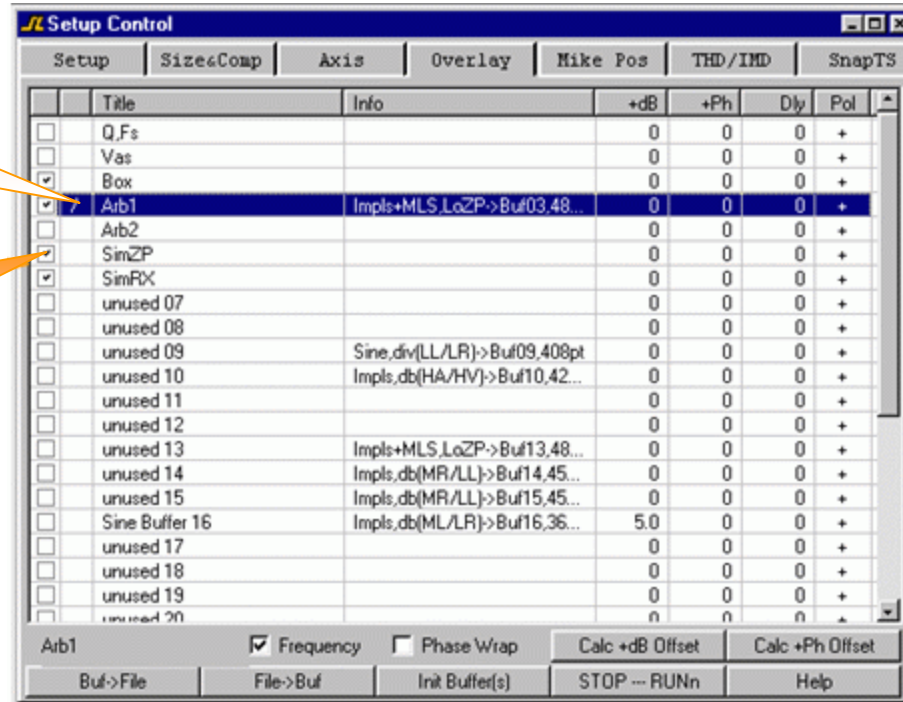


## 32 Dual Buffers for Testing & Overlays

- Each Buffer Stores Two Data Points: (Impedance, Phase, Response, Displacement, Velocity)
- Easy Setup and Control from One Place
- Set Response and Phase Offsets, Phase Wrapping and Polarity
- Tester Automatically Calculates Difference Between Measured and Desired Value

ARB1 is Data Destination from Main Control Window

Buffers Displayed in Overlay Window: Box, ARB1, SimZP and SimRX



## Tester Comparison Matrix

Feature	Woofertester 2	Speaker Tester	Woofertester Pro
Precision Thiele-Small Measurement	•	•	•
VAS Test with Phase Plug Area Calculation	•	•	•
Thiele-Small Simulator	•	•	•
Automatic Box Analysis	•	•	•
RLC Meter	•	•	•
Low Power Impedance Measurement	•	•	•
Low Power AC/DC Compression Testing	•	•	•
Sine, Impulse, MLS, Noise & Chirp Test Signals	•	•	•
32 Dual Data Buffers for Testing & Overlays	•	•	•
Sweep and Real-Time Run, Stop and RunN Control	•	•	•
Interactive Crossover Design™		•	•
Real-time Acoustic Analysis (RTA)		•	•
Room Decay Measurement		•	•
Swept Sine In-Air Acoustic Response		•	•
THD/IM/SINAD Distortion Measurement		•	•
Cumulative Spectral Decay & Waterfall Plots		•	•
FFT Display		•	•
SnapTS™ Real-Time Thiele-Small Testing		•	•
Microphone Compensation for Signal & Reference		•	•
Impulse Time Gating		•	•
High Power Thiele-Small Measurement			•
High Power Impedance			•
High Power AC/DC Compression Testing			•
Speaker Linearity Testing			•
DC Bias Testing			•
High Power Box Compression			•
Calibration Option for Measurements at Cable Ends	•	•	•
Air-Core Inductor, Zobel & Tank Calculators	•	•	•
Popup Data Labels in Graphs	•	•	•
Customizable Legends	•	•	•
Mobile, USB powered	•	•	•

Low power is up to 3mA drive

High power is up to 40V, 5A, 200 watt amplifiers

## About Smith & Larson Audio

*Smith & Larson Audio* is based in the USA and is the home of the original Woofer Tester, which was introduced in 1995. It was redesigned in 2005 and is in use by over 1000 customers worldwide. In 2006, the product line and our test capabilities expanded and now include the Speaker Tester and Woofer Tester Pro. *Smith & Larson* has over 40 years of combined experience in audio design and digital signal processing.

For a demonstration, please contact us at:

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