Audience ClairAudient 1+1 V5

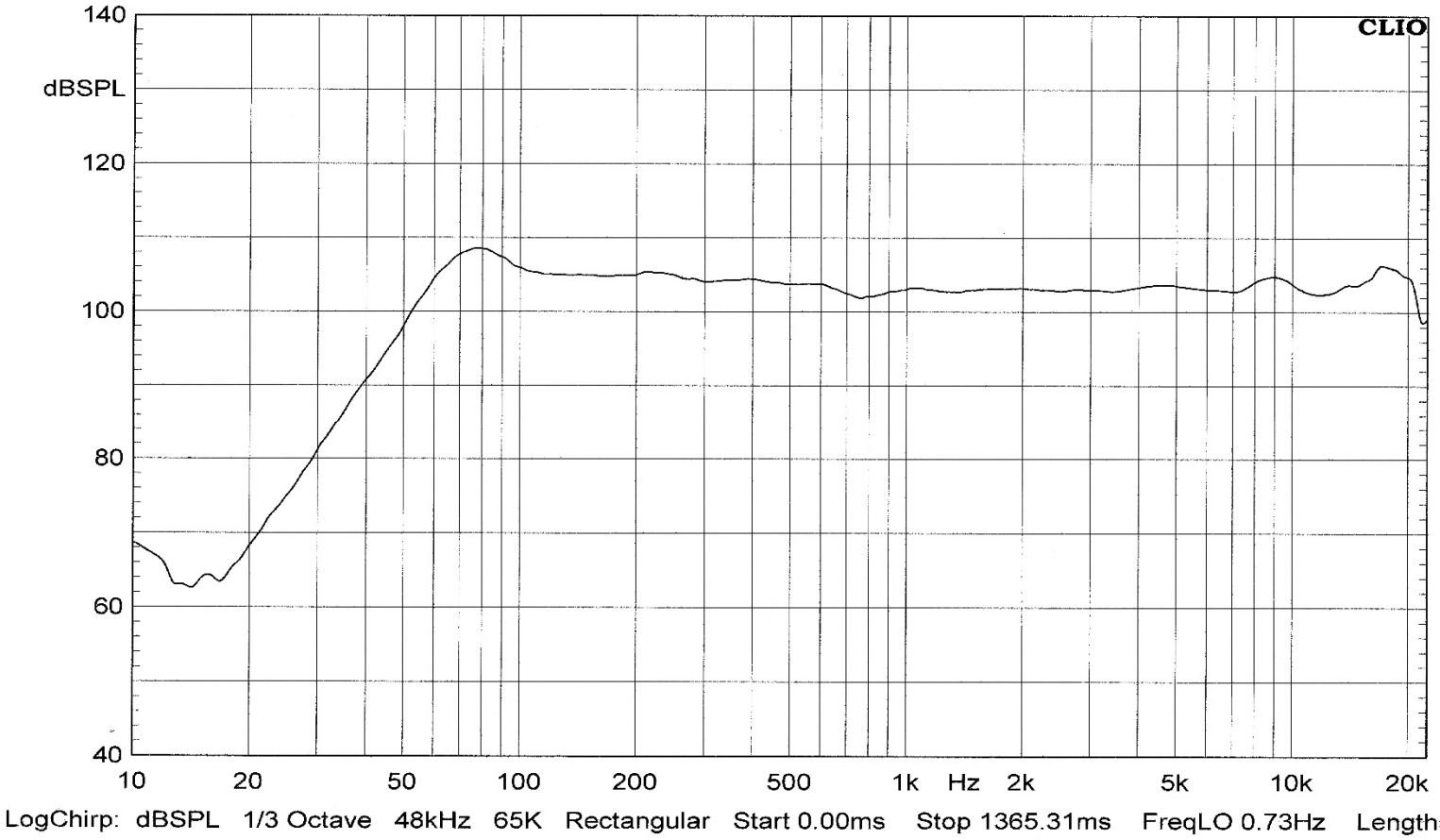
personal reference loudspeaker monitors

The Audience ClairAudient 1+1 loudspeakers have been refined over the years to the current version 5. The loudspeaker design is a bi-pole system comprised of two full range drivers, front and rear, and two passive radiators, left and right sides. The current model V5 has incorporated some significant improvements over the previous models. The V5 has a new "Voicing Circuit" that results in smoother overall response as well as baffle step compensation. The V5 also has a 40 Hz low pass filter to reduce distortion and prevent potential damage to the driver due to excessive excursion at low frequencies. It does not affect the bass response because the filter is set to work below the frequencies that the speakers can acoustically reproduce. Energy not converted to sound results in heat. The filter reduces the signal at these very low frequencies (below 40 Hz.) and reduces the heat buildup in the voice coil of the drivers. This excess heat can damage the driver and increases the resistance of the voice coil which can cause compression of the signal. The result is noticeably improved bass response down to the 40 Hz protection point.

Frequency Response

The following graph represents the 1+1 V5 Frequency Response. This is a real room measurement. It is a near field measurement to reduce effect of room acoustics. The room is 20 X 17 feet with an 8-foot ceiling. The floor is short pile carpeting over a slab. The room has a moderate amount of Acoustical treatment in the form of Tube Traps, absorption and diffraction materials.

The near field measurement is representative of the V5's frequency response. Since it uses full range drivers it can be accurately measured in the near field (6 inches.) A typical multi-way speaker system requires a measurement distance normally of about 1 meter so the disparate driver's response can combine acoustically. The measurement system is a CLIO pocket system with a calibrated microphone. Swept Sine Wave-Chirp system used.


CLIO
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dBSPL
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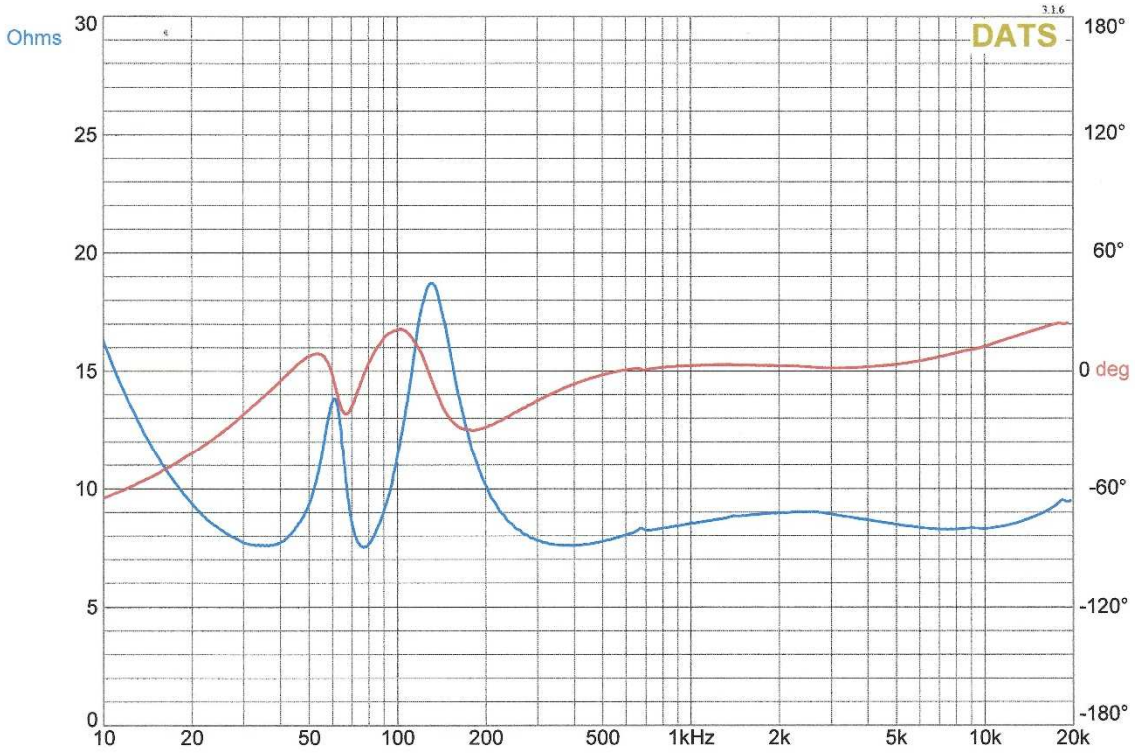
LogChirp: dBSPL 1/3 Octave 48kHz 65K Rectangular Start 0.00ms Stop 1365.31ms FreqLO 0.73Hz Length 136

Impedance

The following graph is the Impedance (blue trace) and associated Phase Angle (Red trace) plot for the 1+1 V5. The speaker system has a nominal impedance of 8 Ohms. The low frequency area shows a rise in resistance below 40 Hz. This is a function of the Low Pass filter. After the typical resonant peaks for the active drivers and the passive radiators the graph levels off and remains very close to the system's 8 ohms rated impedance. The minimum value is 7.5 ohms at 77 Hz. Noteworthy is that from about 250 Hz to 20kHz the impedance is very close to 8 ohms and varies only +/- 1.5 ohms. This is mostly due to the simplicity of a system using full range drivers with no crossover network or tweeter/mid desperate drivers. All multiway systems will have a large variation in impedance in this range. The crossover networks and the effect of the resonances in tweeters and midranges results in large variations in impedance and phase. Most multiway systems are typically only near the nominal impedance in a very narrow frequency band. The 1+1 V5 is very near the nominal impedance for over 6 octaves (250 to 20kHz). The Voicing circuit is also partly responsible for the excellent impedance curve. The circuit interacts with the impedance of the active drivers that results in a very flat impedance plot. An impedance plot that is this consistent also means that the V5, despite its relatively moderate Sensitivity rating (87dB), is a relatively easy load for most amplifiers. The 40 Hz low pass filter also reduces some stress on amplifiers and reduces the power requirements. Dayton Audio DATS-3 system was used to produce the Impedance Graph. The Phase Angle (red trace) shows a variation of -66 degrees to +24 degrees. Most notable is that in the crucial midrange and lower treble (500 to 5kHz) the Phase Angle is ZERO.



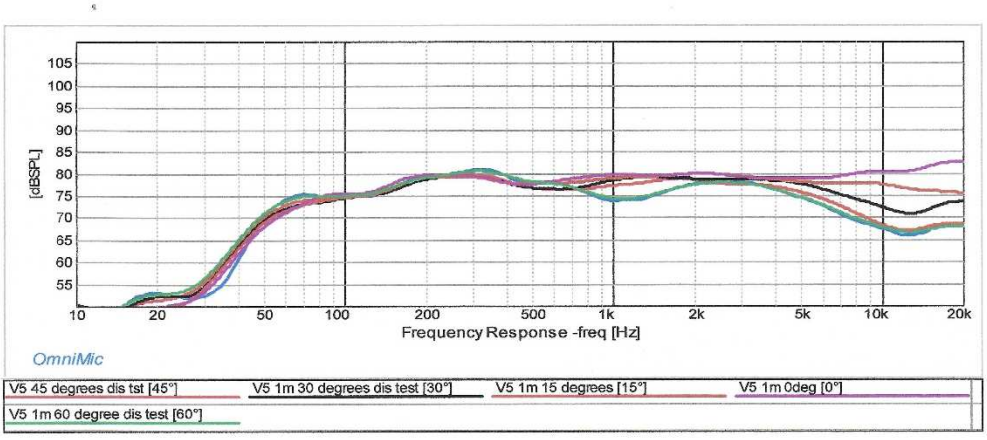
Workbench Notes:
1+1 V5 impedance plot

Audience A/V
2600 Suncrest Dr
Buford GA 30519
770-833-4126
Measurements by: Phil Ducote
Title: speaker designer

Horizontal Dispersion

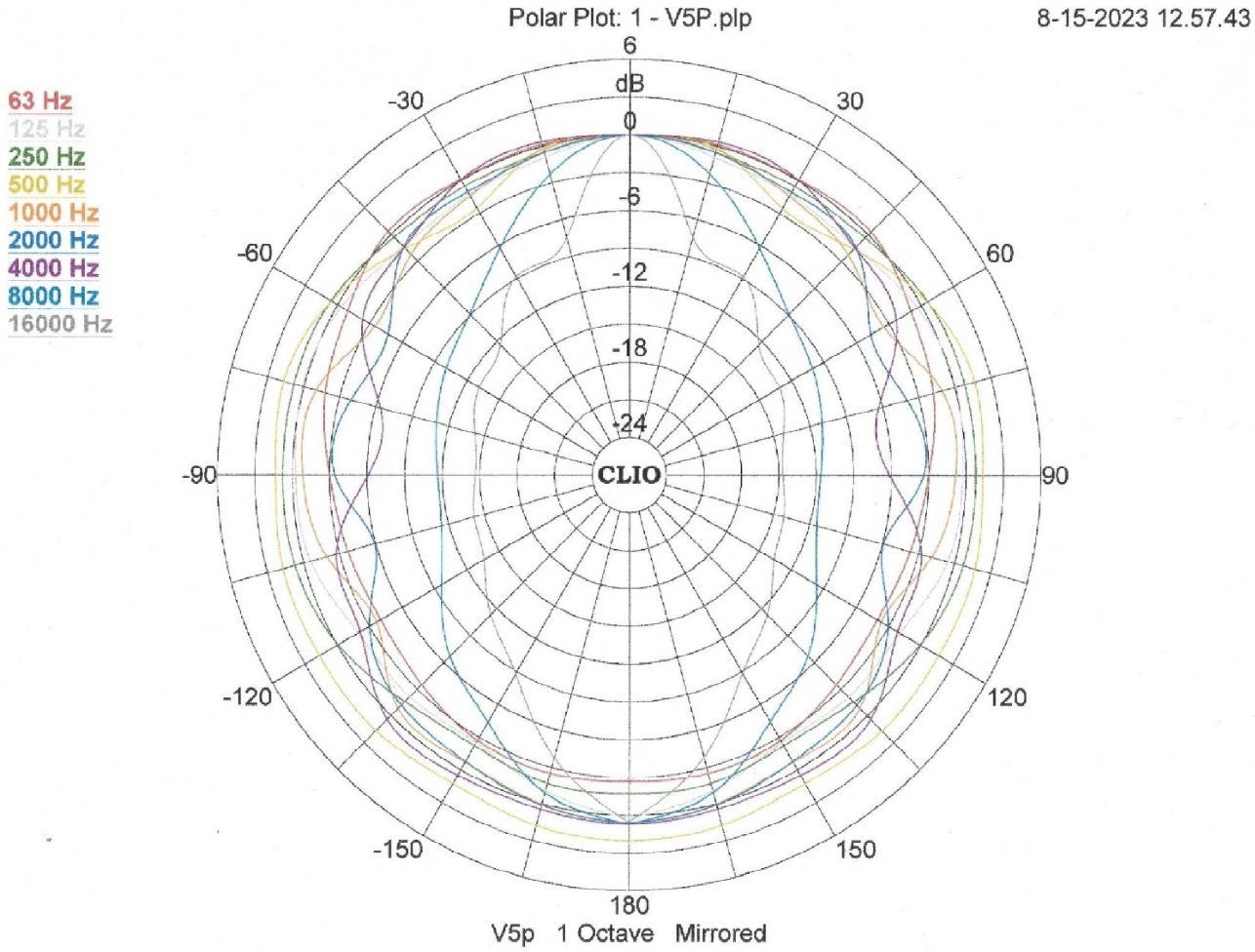
The plot below shows the Horizontal Dispersion Plot of the 1+1 V5. This was taken at 1 Meter. Each trace represents the response at 0,15, 30, 45, and 60 degrees from the Axis of the speaker. A Vertical Plot was not done because it would have been identical. This graph shows a family of Off Axis Frequency Response curves that indicate the Directivity of the speaker system. The deviation of the Frequency Response curves for each angle is an indication of Off Axis Response. Each trace is separated by 15 degrees. The curves track together very well and don't significantly divulge until 5kHz. The graph indicates a very good Off-Axis Response. This shows the advantage of a full-range driver system. Since all the sound originates from the same point there are not as many variations as would be seen by a multiway speaker. There are also no phase cancellation effects at different angles as occurs with a multiway speakers. Systems using multiple drivers separated in space and with their own different dispersion patterns typically result in a much more varied dispersion pattern.

The Plot was done with a Dayton Audio Omni Mic System with an Omni Mic calibrated Microphone using Swept Sine Waves.



Polar Plot

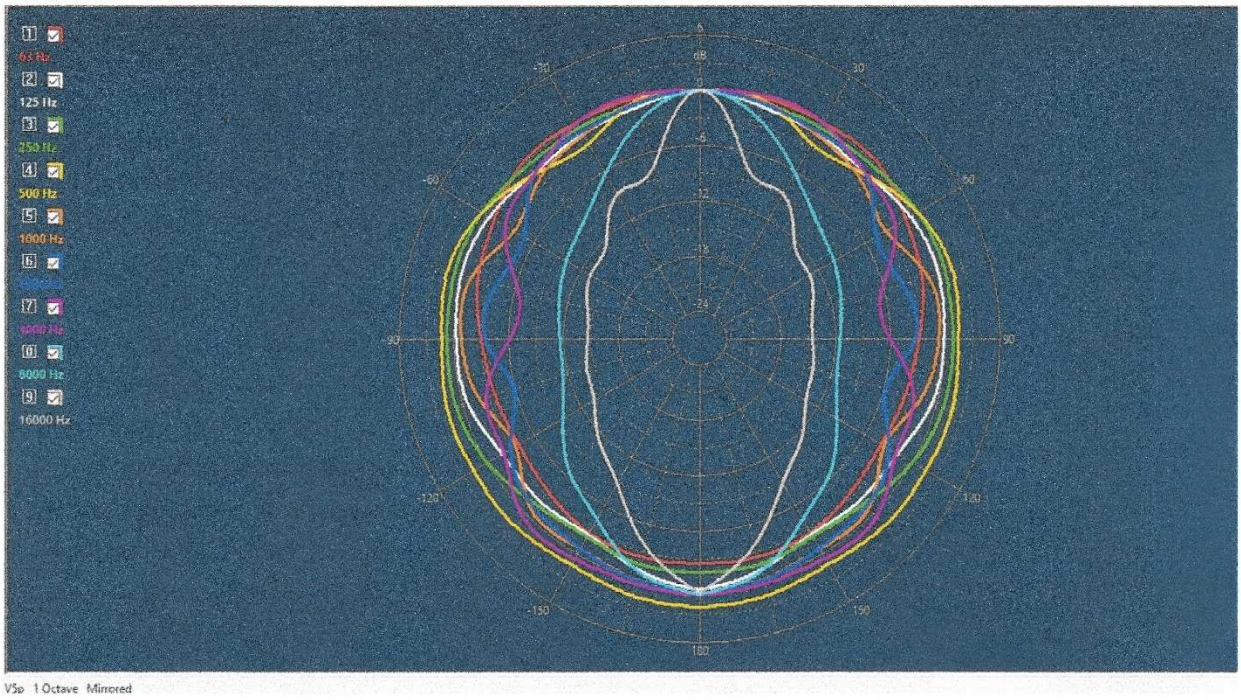
Below is the graph of the Polar Plot of the 1+1 V5. This is also a horizontal dispersion plot that defines the speaker systems Directivity and Angular Coverage. A vertical plot was not done since it would be identical. The Polar Plot is a 360-degree measurement that shows a pattern of how different frequencies separated by octaves are dispersed around the speaker. The Polar Plot is an indicator of Off Axis Response. This again shows the advantage of a full range speaker system as the patterns are very consistent and uniform and imply a very good Off Axis response. The patterns are continuous with no lobing effects. Most multiway loudspeaker systems would show more irregularities. The plot was developed using the CLIO pocket system with a calibrated microphone. The graph was developed by taking swept sine waves (Chirp setup) at 1 Meter in 15-degree intervals around the speaker. The speaker is in the middle of the room. Since this is a 360-degree plot of a bipolar speaker system the effects of the room acoustics are also part of the response. At low frequencies the circular pattern indicates omnidirectional characteristics. As the frequencies increase the patterns become more oval showing the natural beaming effect that is dependent on the size of the radiating surface.


Polar Plot: 1 - V5P.plp
8-15-2023 12.57.43
63 Hz
125 Hz
250 Hz
500 Hz
1000 Hz
2000 Hz
4000 Hz
8000 Hz
16000 Hz
6
dB
0
-6
-12
-18
-24
-30
30
-60
60
-90
90
-120
120
-150
150
180
CLIO
V5p 1 Octave Mirrored

File: V5P.plp

Polar Plot 2

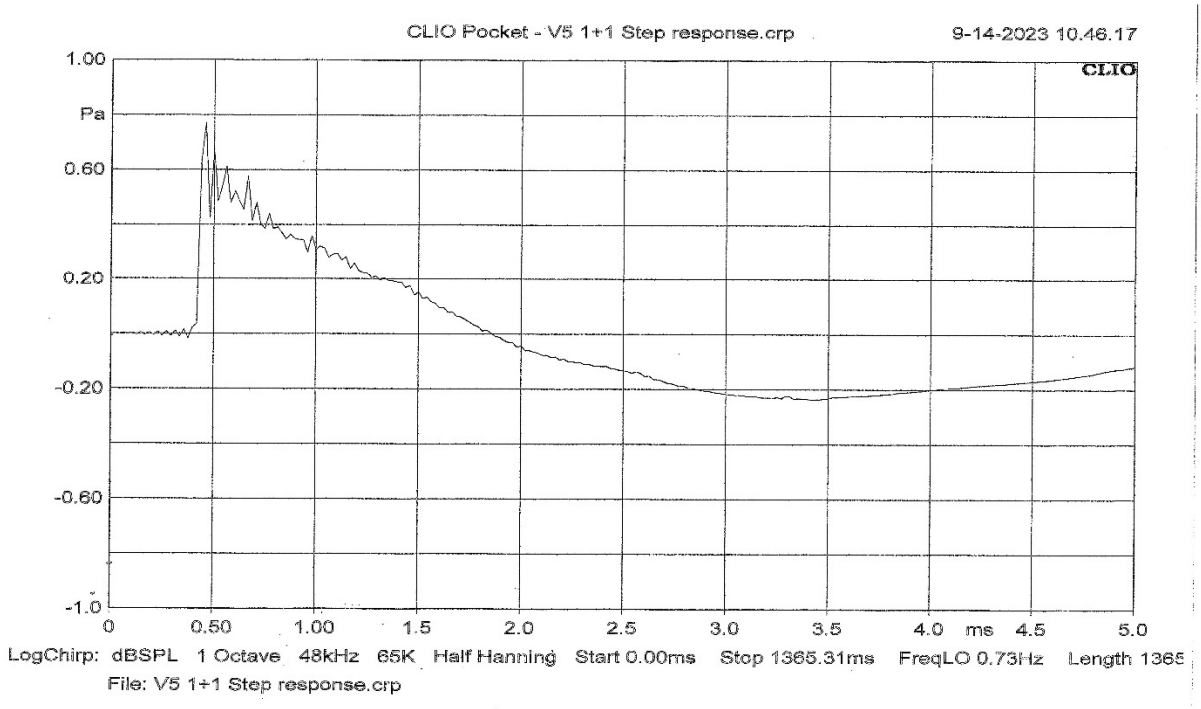
The Polar Plot below is the same graph but processed to improve clarity.



Step Response.

The graph below is the Step Response of the 1+1 V5. The Step Response is an indication of the time coherency of the speaker system. It is derived from the Transient Response. The response shows an advantage of a Single Driver system over a multiway speaker system. A Single Driver system typically exhibits very good performance in the time domain since all the sound originates from one point. A multiway system will show different arrival times for the separate drivers. Differences in Acoustic Centers of disparate drivers and phase shift in crossover networks result in time shifts and show up on Step Response. These

time shifts manifest themselves as individual Step Responses for each driver separated in time. An ideal response would be a right triangle. The 1+1 V5 Step Response is very close to an ideal response. The Step Response is a near field measurement; however, the Room Acoustics still have some effect on the results. The Step Response was generated using the CLIO pocket system.



Cumulative Spectral Delay (CSD) Waterfall plot.

Below is the CSD analysis of the 1+1 V5 in a near field setup. The waterfall plot is often used to identify resonances in the system. The waterfall plot of the 1+1 V5 shows very few significant resonances. One centered at 9kHz and the other at 18kHz. Obviously Harmonically related. These resonances indicate cone breakup typically found with metal cone drivers. The resonances are in narrow bands and at relatively low levels as compared to the baseline response. The drivers in the V5 incorporate a proprietary dust cap which provides constrained layer damping designed to suppress the resonances caused by cone breakup. The waterfall plot indicates its effectiveness as the resonances appear to be well damped. The plot was developed using the CLIO pocket system.