

# ZED AUDIO LEVIATHAN

Text and Measurements by Garry Springgay // Photos by Manufacturer



**T**here may be some of you readers who are not very familiar with the name ZED Audio. Well, you may be much more familiar with it than you thought! ZED Audio began back in 1983, when pro audio engineer and hobbyist Steven Mantz decided to pull up roots from his home in South Africa and move to the United States to start a company specializing in the design and manufacturing of high quality audio amplifiers. Since then, ZED Audio has been responsible for some of the finest 12V equipment available, including the now legendary, original Hifonics amps (hence the connection to the unusual Greek names) as well as some really great gear for a few other companies who no longer exist.

The ZED amplifiers for mobile use are the culmination of over 25 years of experience in the manufacture and design of audio amplifiers. The philosophies ZED Audio uses to design and build their products don't always follow industry conventional wisdom or accepted beliefs. However, I have yet to audition one of Mr. Mantz's products that sonically disappoint. For example, ZED Audio recommends load impedances at 4 ohms or higher, although the amps I have tested will drive 2 ohms loads quite well. They also suggest that there is little "sonic magic" in cables, a position with which I wholeheartedly agree. Anyway, while I may not completely agree with everything ZED, there is something to be said for an original thinker who's willing to go against the grain and build such impressive high quality gear. For those of you who are familiar with the brand, you'll be happy to know that there are new compact high efficiency models in the works, and we're going to take a look at the largest of them, the new \$695.00 Leviathan, here and now.

## FEATURES

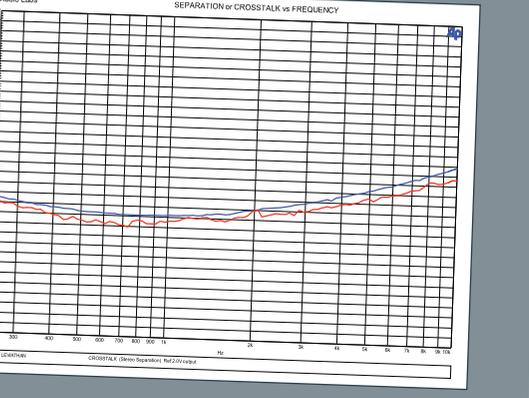
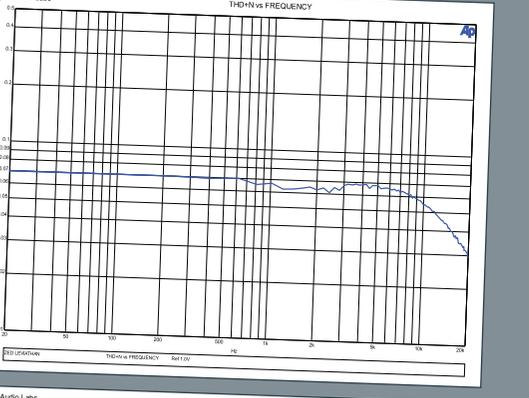
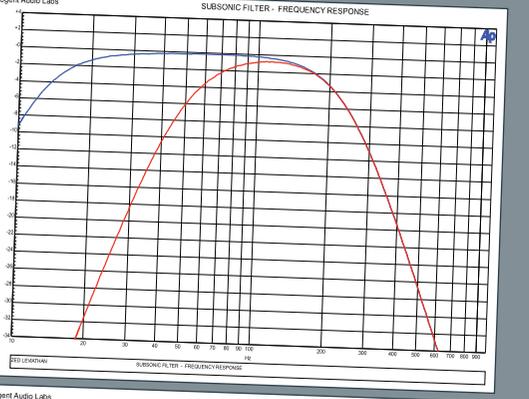
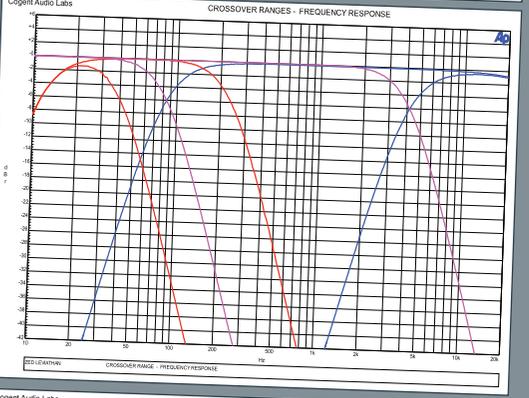
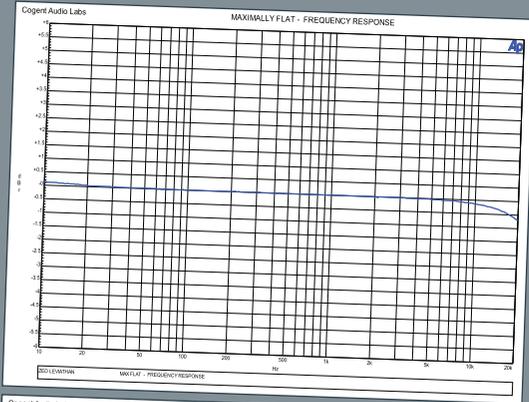
According to my dictionary, Leviathan means "huge or gargantuan." Well, at first glance you may

think the latest ZED amp was misnamed, because it's really not all that huge in size. Measuring 17.5 inches long, 9.75 inches wide and just 2.25 inches tall, the 6 channel Leviathan isn't much bigger than a lot of 4 channel designs. What is quite different though, is that this is a highly efficient full-range Class D design, and all 6 of the channels are rated for either 150 watts into 4 ohms, or 250 watts into 2 ohms. Now that's a lot of power in a relatively compact chassis! And when you think about it, there are very few quality amplifiers available with this much power for anywhere near 600 bucks.

It's a good looking amplifier, with a clear acrylic top panel that shows off the technology and build quality

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inside. The heat sink is a classically deep finned design with horizontal fins running longitudinally, and is finished in rich looking, dark gray brushed aluminum.

The RCA connections are high-zoot (bitchin') gold plated panel mounts. Power and speaker connections are fairly standard, with the typical gold plated set screw type terminals that will accept 4 gauge power and 8 gauge speaker cables.

Designed to be configurable for virtually any system requirement, the amplifier has a dizzying array of possible configurations and settings, thanks to some thoughtful engineering in the front end.

For example, instead of using 2 separate amplifiers for a 4 channel system with subwoofers, the Leviathan allows you to drive the entire system with a single chassis. And thanks to dedicated crossover functions, you don't lose any of the signal control you would normally have with a separate sub amp. But there are many other configurations as well, for example you could drive 3 woofers by bridging the 6 channels, or you could use the amplifier to drive a 3-way 2 channel system, with active crossovers on all outputs. The six inputs can be driven by 3 pairs of RCA's or you can use a traditional 4 channel input configuration and set a switch to drive the channels 5 & 6 with the available signal.

Wide adjustment bandwidth crossovers allow you to select any frequency between 80Hz and 4kHz on channels 1 through 4, and another crossover setup for channels 5 & 6 provides a range of 40 to 240Hz, which is perfectly suited to woofers. To protect woofers from over excursion, there is also a variable frequency subsonic filter. You can also create a bandpass crossover with the simple flip of a switch! All of these crossovers are true 4th order (24dB/Oct) networks, and are fairly easy to understand and adjust, thanks to the logical layout used. The editorialized owner's manual which was written by Steven Mantz himself, (you should read it for the education factor if nothing else) shows at least 15 different configurations the amp can be utilized in!

Because this is a ZED amp, one automatically expects above average sonic performance, and to that end, the Leviathan uses high performance Burr-Brown DAC's in the front end.

Other unusual features of the Leviathan include individual clipping indicators for each of the six channels, and the name ZED lights up in bright blue surface mount LED's when the amp turns on. There is also a protection LED, as well as an end panel mounted power LED.

**DESIGN**

Most of the previous five and six channel amplifiers I've seen have been relatively modest in terms of power output. This was primarily due to factors such as size and cost. The ZED Audio Leviathan seems to have overcome these obstacles by implementing their full range Class D design, and a cleverly designed power supply.

The school of thought used in the Leviathan (as well as the new 2 channel Kronos) is that the output section of any amplifier is simply a variable valve between the power supply and the speaker. Because of this, any power fluctuations in the supply will become apparent as distortion in the output. In a Class D amplifier, the output is controlled by a PWM (Pulse Width Modulated) system. The PWM amplifier utilizes a high frequency "carrier wave" which is modulated by the musical signal. This creates a series of variable width pulses, which in turn are amplified by the output section of the amplifier. This signal is sent through carefully designed filters which remove the carrier wave and re-shape the output back to an analog waveform. To accomplish all this, you need very high quality parts that are capable of very high speed >>



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switching of high current. In the Leviathan, there are 12 power supply MOSFETS each capable of 110A of current, and a pair of 29A MOSFETS for each of the six channels.

To make sure none of those devices are ever starved for energy, there is 19,000µF of power supply capacitance, and 16,400µF of secondary capacitance. The final drive from the preamp stage to the amplification stage is done in the balanced domain to prevent noise. Also to that end, the ZED amplifiers all use a fully isolated power supply to prevent ground loops and reduce the possibility of alternator noise entering the system.

## LISTENING

As my Dad used to say, “the proof is in the pudding.” All the technology in the world isn’t worth a damn if it doesn’t sound good. Because this is the first ZED amp I’ve got my hands on in several years, and because it was a full range Class D design, I was really eager to get it hooked up in my reference system and listen to it. My reference system consists of a pair of high-end bookshelf type speakers, and a subwoofer system. Because of the unique attributes the Leviathan provided, I used channels 1 & 2 to drive my bookshelf system, and I used channels 3&4 and 5&6 bridged, each driving a 4 ohm woofer in a sealed enclosure.

I set the main speakers high pass crossover point to 80Hz, and the subwoofer channels were set to 80Hz low pass. The subsonic filter was set to 11Hz. After a quick gain matching of the sub channels, I sat down and began my listening with a true test for any amp running a full system, the Atlanta Symphony playing Introit and Kyrie from “Requiem Opus 48”. This track is an excellent test for how well an amplifier can reproduce complex choral voices and a full symphony orchestra at the same time. The Leviathan performed perfectly, and the result was a listening experience virtually indistinguishable from my studio reference amplifier. Needless to say, I was impressed! I moved on to more current but still difficult tunes like the soft passages and reverberance in the Cowboy Junkies “Trinity Sessions”. This recording was made with the band standing around a microphone in The Church of the Holy Trinity in Toronto, Canada. The recording captured the ambience of the room, and the ZED Audio Leviathan reproduced it with almost startling clarity! The process continued with me listening for any telltale signs of a Class D design, such as high frequency harshness, or added high frequency noise. I found nothing at all to complain about! In fact, the ZED Audio Leviathan sounds very much like my expensive studio reference amplifier in many respects. Which is to say, the ZED Audio amplifier is natural and realistic sounding, with plenty of power to handle dynamics and very quiet when it was supposed to be. All in all, the Zed Audio Leviathan is a really great sounding amplifier, regardless of topology.

## ON THE BENCH

After my listening had been completed, I connected the Leviathan to the brutally honest Cogent Audio Labs test bench, and ran my normal battery of tests and measurements. I’m happy to report the ZED Audio Leviathan exceeded its rated power at both 4 and 2 ohms, and frequency response was ruler flat from below 10Hz to over 20kHz.

Signal to Noise was about average for an amplifier of this type, and crosstalk measured a very good -61dB. Distortion and noise were very low, below 0.1% at any frequency at 1 watt of power. The amplifier is well thought out, and

the layout of the PCB contributes to the overall excellent performance.

Of course the main benefit of a Class D amplifier is power efficiency, and in that regard, the ZED Audio design performs just as expected. Although no one generally quotes the efficiency of an amplifier at fractional power levels, the fact is, that’s where most of us use them. And that’s really where a design like this really shines, using about 50% less current than a traditional Class AB amp would draw at say, 10 watts per channel. As a result, the amp runs cooler, and places less of a demand on your cars charging system.

The following power measurements were obtained using industry standard methods.  
(1kHz @ 1.0% THD+N - Battery voltages shown +/- 0.2V)

## MEASURED PERFORMANCE SPECIFICATIONS

MANUFACTURERS RATED POWER	ACTUAL MEASURED POWER @ 1.0% THD+N @ 14.4V BATTERY	ACTUAL MEASURED POWER @ 1.0% THD+N @ 12.6V BATTERY
150 x 6 @ 4 Ω	177 x 6 @ 4 Ω	145 x 6 @ 4 Ω
250 x 6 @ 2 Ω	275 x 6 @ 2 Ω	224 x 6 @ 2 Ω
500 x 3 @ 4 Ω	532 x 3 @ 4 Ω	439 x 3 @ 4 Ω
Signal to Noise Ratio referenced to 2V output. (CEA-2006A) (1 watt @ 4 ohms)	-68.1dBA	
Signal to Noise Ratio referenced to full 4 ohm output.	-90.6dBA	
Distortion at rated power	0.017%	
Efficiency at 10W/Ch	58.6%	
Maximum Efficiency at full 4 ohm power per ch.	70.2%	
Idle Current	1.6A	
Input Sensitivity	286mV- 9.3V	
Maximum Current @ full power 2 ohms per ch.	168A	
Frequency Response (-3dB)	<10Hz – 34.7kHz	
High Pass Crossover	80Hz – 4kHz -24dB/Oct Linkwitz	
Low Pass Crossover	80Hz – 4kHz -24dB/Oct Linkwitz And (Ch5&6) 40 – 240Hz -24dB/Oct Linkwitz	
Subsonic Filter	11Hz – 48Hz -24dB/Oct	
Bass EQ boost	None	
Stereo Separation (Crosstalk)	-61.7dB @ 5kHz	

## CONCLUSION

I’ll admit I was skeptical when I learned this was a full range Class D amplifier, simply because I’m pretty particular about my music, and there have only been a handful of these that I actually like the sound of. Well, I’m adding the Zed Audio Leviathan to that list, because after listening to it, had I not known it was a Class D amplifier, I don’t think I would have been able to tell. The Zed Audio Leviathan sounds clean and natural, with more than enough power to drive almost any system to high SPL levels! The Zed Audio amp is well made, and the very flexible input section has been designed by someone who has clearly been in more than a few car trunks in his day. If you are looking for a reasonably priced, single chassis solution that is efficient, compact for the power it develops, and sounds great, you need look no further than the Zed Audio Leviathan. **PAS**

# ZED AUDIO

www.zedaudiocorp.com