

# Thiel CS 3.7 Floor-Standing Speakers

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## Introduction

THIEL is one of the most well known and long lived high end speaker companies. Jim Thiel founded Thiel Audio in 1976, building his company's reputation on speakers that are time and phase coherent. All of THIEL's full range speakers have followed this recipe, including the new CS3.7. Where the CS3.7 differs is in its level of execution. The CS3.7 is almost double the price of the older CS3.6 model, and approaches or exceeds the price points of the larger CS5 and CS7 speakers of the past. While the speaker follows the same



recipe as past THIEL models, it is reinvented in almost every way. For some (at least those who haven't heard it), the increased price was a big disappointment. I call this sour grapes for people who thought they could afford the CS3.7 but then had to realize they couldn't. The CS3.7 is worth every cent, and is a strong contender versus pretty much any full-range speaker in the under-\$20k price category. MSRP: \$12,900/Pair USA, Outriggers Optional

## The Design

The CS3.7 follows many of the same design philosophies as THIEL's earlier speakers. The main premise of the design is that the multi-driver speaker must be both phase and time coherent. This means that the crossovers must introduce a minimum amount of phase shift between the driver signals, and also not introduce any time misalignment that would effect

impulse response. Imagine a snare drum hit. With a time coherent speaker, the impulse of the snare drum happens at the same time in all of the drivers. This turns out NOT to be the case with most speakers.

Crossovers typically produce both a phase shift between drivers, and cause time misalignment as well. They might measure perfectly in frequency response, but will show all manner of problems in their impulse response (yet another reason not to trust measurements blindly). THIEL uses rather complex first order crossovers that are phase coherent. When combined with the sloped front baffle, the speakers are also time coherent. In addition, the crossovers are tuned to accurately correct all the response irregularities of the driver in the cabinet. The result is a design with exceptional frequency, phase and time response, at the cost of very complex crossover networks.

The heart of the CS3.7 is the THIEL-designed and custom made coaxial midrange and tweeter driver. Very few companies design and manufacture their own drivers. This driver alone is likely responsible for a large portion of the increased cost of the CS3.7 over previous models. It's also like nothing I've ever seen before. The idea of coaxially mounting a tweeter inside the midrange to make a point source wideband driver is nothing new. What THIEL has done is re-examine how to build the midrange part of this combination. Mounting a dome tweeter in the center of a cone shaped midrange horn-loads the tweeter. This can dramatically affect its performance.

THIEL has combined the dome tweeter with a flat, ring shaped midrange diaphragm. Unfortunately, this was the hard part. A cone shaped midrange gets its strength from the cone shape. Make it flat, and maintain the required light weight, and all the strength goes away. Now the driver will not move rigidly in a piston-like way, but instead start to bend (called driver break-up). THIEL has used finite element analysis (FEA) to design a wavy-shaped ring driver that is flat as far as the tweeter is concerned, but maintains enough rigidity to avoid any breakup. In fact, the driver can be driven all the way past 20 kHz without break-up, vastly exceeding the performance of typical midrange drivers (and even many tweeters). This

diaphragm is driven with a long-gap short coil motor for extra low distortion. The penalty here is that a huge magnet is required, since only the most uniform part of the magnet's field is used. A very large rare-earth magnet is used for this duty. This midrange is absolutely a no-holds-barred assault on the state of the art for dynamic drivers, and must cost an absolute fortune to make.



The CS3.7 is equipped with one woofer and one identical looking passive radiator. Both are aluminum diaphragms like the midrange, and also are FEA-designed with a flower petal-like molded shape to maintain stiffness and avoid driver break-up. All these drivers working together result in a speaker with 32 Hz to 35 kHz frequency response +/- 3dB, 33 Hz to 26 kHz +/- 2dB. Sensitivity is a rather high 90 dB/W/m, but with a nominal 4 ohm impedance (really, lower than that as we'll see later).

The cabinet is also a departure for THIEL. While maintaining the typical THIEL sloped front baffle, the CS3.7 has a much more curvilinear form than previous designs. The front baffle is a CNC-machined aluminum plate rather than typical MDF. The curved side pieces are made from a 15 layer thick laminate of hardwood laid-up to produce the curved shape. The only MDF pieces are the base and the narrow rear panel with the single set of 5-way heavy-duty binding posts. A cast aluminum "head" provides both increased rigidity and reduction of internal standing waves. The result is a cabinet that is one of the most inert I've seen. It feels like it's a solid block of concrete. While heavy at 90 lbs each, they are not anywhere near as

heavy as they could be. The inert behavior comes from good engineering, not the willy-nilly application of more mass.

Fit and finish is exactly what I expect from a pair of speakers costing as much as a new Toyota Yaris: impeccable. Quality of the wood veneers, the black chrome plated floor spikes, the 5/8" thick CNC machined and anodized aluminum Outriggers and even the boxes the speakers were delivered in show not a trace of penny pinching. It is all as good as it ever needs to be, without being excessive.

### **In Use**

I played the CS3.7s for about a week before doing any critical listening to break them in. Amplifier duties were handled initially by the 200 WPC Emotiva RPA-1 dual mono amplifier and later by the 500 WPC Emotiva XPA-1 monoblocks (review to come soon). With 90 dB sensitivity, you may think these speakers would be happy with a low power amplifier, maybe even a low powered tube amp. Don't. With an impedance of 3 ohms or less throughout most of the audio band, a serious amplifier is required. To really make them sing, a REALLY serious amplifier is best.

Some audio components jump out and smack you at you when you first listen to them. Others are like settling into a well-broken in easy chair. The CS3.7s were in the latter camp. One of the characteristics of a truly great piece of audio gear is the ability to get out of the way of the music, and the CS3.7s are currently the champ in this regard compared to every other piece of audio gear I've reviewed at Secrets. This is not to say that the CS3.7 does not excel any area of performance, but they are likely not going to jump out at you at first listen.

I was surprised by one area of the performance of the CS3.7s, and that was the bass. I did not expect what I heard, given the CS3.7s are rated to play down to only 32 Hz. The bass was the most tonally accurate and well integrated I have ever heard in my room. As I've said before in several reviews, my room is terrible below about 200 Hz. There are plenty of resonant

modes, and a big suckout at 30 Hz. Since the CS3.7s didn't go all the way down to 30 Hz, the suckout was irrelevant.

For some reason (maybe the forward firing woofers as opposed to the side firing woofers of my normal Gallo Reference 3.1s) the bass was very well integrated, smooth and relatively free of response peaks and valleys. In addition the impact and tightness of the bass was exceptional, even with electronic music with lots of low frequency energy. While Crystal Method's "Vegas" did not cause windows to buzz in their frames, the power and heft of the bass left little to be desired. Some other reviews have presented the CS3.7 as a bit bass-shy, but in my opinion you'd have to be a serious bass freak to want more. Even then, you would want to add only low frequency extension. The bass that is there is just about perfect.

While I was most surprised by the bass, that was not the best feature of the CS3.7s sound. That midrange and tweeter are nothing short of magic. The performance of the CS3.7 in the midrange and treble are world-class. The smoothness, articulation, detail retrieval and extension of the THIELs are the best I've heard in my room. That said, they are also revealing. I could easily hear the flaws in recordings and the limitations of all upstream electronics. The CS3.7s insatiable demand for current left them a bit dynamically flat when powered by the Emotiva RPA-1.

With the big XPA-1 monoblocks, they came dynamically alive, and were able to unearth far more detail in recordings. The XPA-1s are brighter than the sweet and smooth RPA-1, which could make poor quality recordings a bit grating. This was not the fault of the THIELs, though. They reproduced exactly what was there as well as anything I've heard. They also revealed changes in upstream components very clearly. The treble presentation of my Oppo DV-983H versus my Bel Canto DAC-1.1 were as clear as day. The Oppo offered much greater perceived high frequency extension and sparkle, while the Bel Canto offered superior dynamics. The extension of the Oppo, combined with the XPA-1s and the CS3.7s could be a bit unpleasant with poorly recorded material, but this was easily remedied by using the Bel

Canto for those recordings. I have yet to hear a speaker with this level of transparency that so clearly reveals both the recording and the associated electronics.

This transparency carried on with the extremely natural and lifelike presentation of timbre, again never calling attention to the speaker. Assisting this natural sound was the ability, particularly in the midrange and treble, to extract every last ounce of detail without sounding analytical or etched. A great test for this is any well-recorded use of brushes on a snare drum. Its best if the recording is not close-miked since that will pull out too much detail and make the job for the speaker too easy.

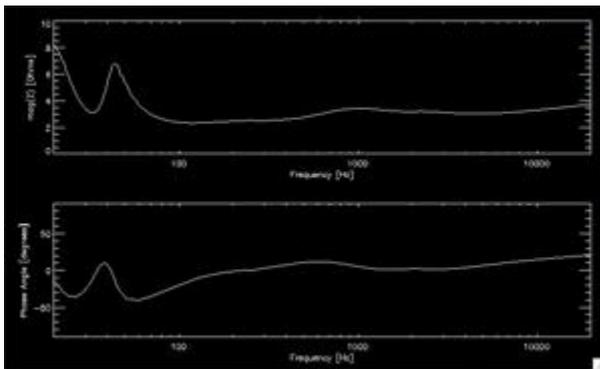
I dug out several recordings made in the 50s and 60s with non-close-miked brushes. The CS3.7s were able to make these sound realistic, capturing the sound and texture of the brushes on the head. This subtle trick is not an easy one; typically, the sound blends into white noise. Both the midrange and the tweeter were able to wring every last detail out of every recording I listened to, throughout their range. The tweeter's extension (to 26 kHz +/- 2dB, 35 kHz -3 dB) was really fantastic on well recorded material. On poorly recorded rock, with loads of digital hardness, the THIELs let you know it. Transparency has its downside. These speakers will not make bad recordings or bad upstream electronics sound good.

Another pleasant surprise was the THIEL's imaging performance. My Gallo Reference 3.1s are known as some of the best imaging speakers there are. The THIEL's gave up little or nothing to them. The soundstage was quite high, due to the high mounting location of the midrange/tweeter, but not so high as to feel unnatural. This gave the soundstage a larger feel than with the Gallos. Soundstage width might have been a touch narrower, but I can't be absolutely sure on that, as I couldn't have the two speakers set up at the same time. Soundstage depth, due to the spectacular ability to retrieve detail, was much better with the THIELs. Several recordings I thought were relatively flat, like Gomez's How We Operate gained significant soundstage depth with the CS3.7s that were gone when I reinstalled my Gallos.

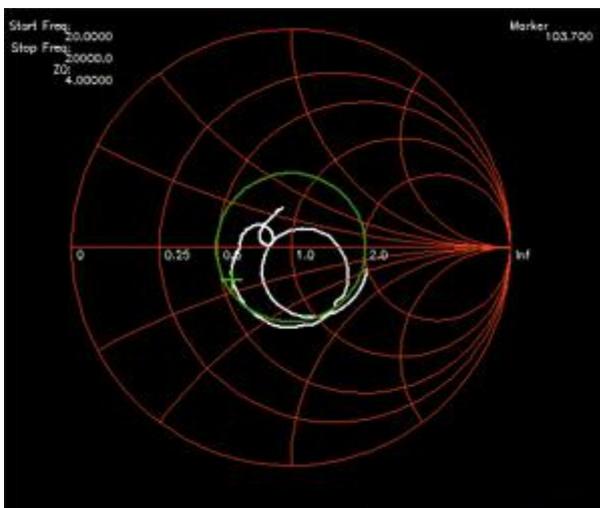
Overall, I can't give more praise to the sound of the CS3.7s. They do absolutely everything well, and have zero detectable flaws. The only possible complaint I could imagine anyone having is that they lack the bottom 12 Hz of bass. Know this. If you want to maintain the sound quality of the CS3.7s AND get that last 12 Hz of bass in a full-range speaker, you're going to have to pay WAY more than \$13,000. And have a forklift handy to move those gigantic speakers into position.

### On the Bench

I measured the CS3.7s using both a Smith and Larson Woofer Tester 2, and SpectraPlus FFT analyzer software with a Roland Edirol UA-101 24 bit 192 kHz balanced USB sound interface and an Earthworks M30BX calibrated microphone.

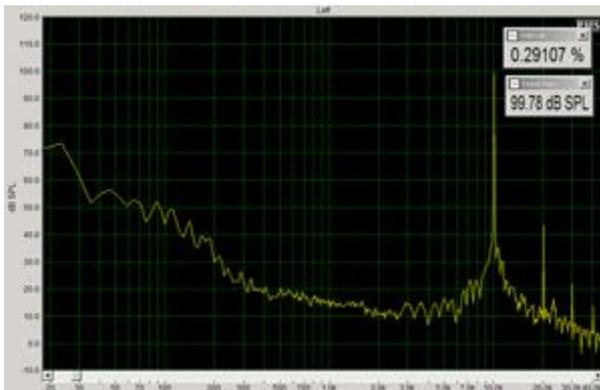


THIEL CS3.7 impedance magnitude and phase as measured with a Smith & Larson Woofer Tester 2.

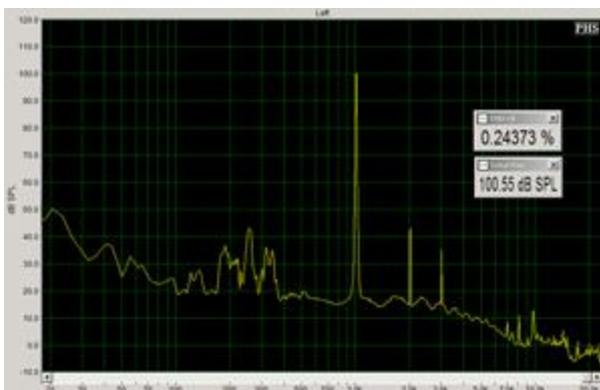


THIEL CS3.7 impedance plotted on a Smith Chart normalized to 4 ohms. The green plus is the marker, at 103.7 Hz.

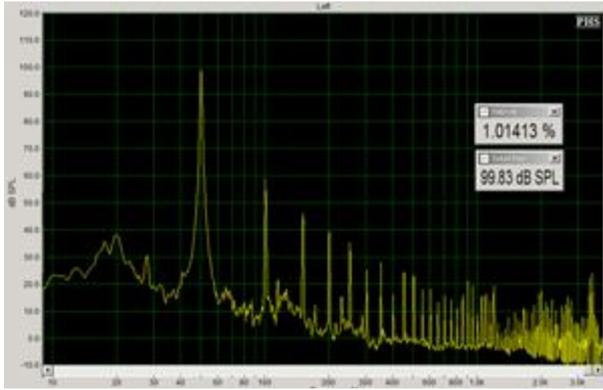
Impedance is shown in two formats, the traditional magnitude and phase plot, and the Smith chart style plot I have discussed before in our Technical Articles section. The results clearly show why a very powerful amplifier stable into low impedances is essential. From 100 Hz to 20 kHz, the impedance is around 3 Ohms. Minimum impedance of 2.3 Ohms occurs at about 120 Hz. Luckily, these low impedances are paired with very small phase angle (i.e. those low impedances are almost entirely resistive, with very little capacitance or inductance). Looking at the Smith chart, almost the entire frequency range is in a very small part of the plot near 3 Ohms real impedance. The green cross denotes 100 Hz. The rest of the frequency range from 100 Hz to 20 kHz is in the small loop just above the green cross. The rest of the trace below and to the right of the green cross is entirely at low frequencies from 20 Hz to 100 Hz.



THIEL CS3.7 THD spectrum of a 10 kHz sine wave.

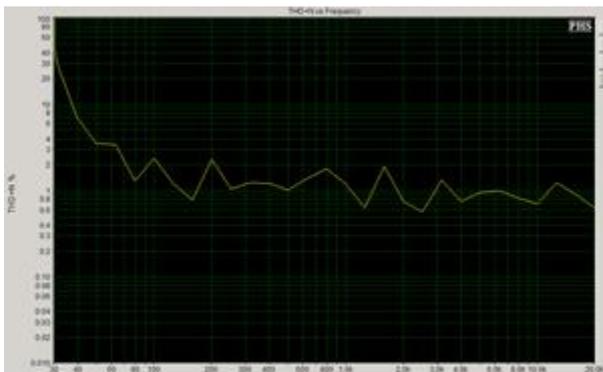


THIEL CS3.7 THD spectrum of a 1 kHz sine wave.



THIEL CS3.7 THD spectrum of a 50 Hz sine wave.

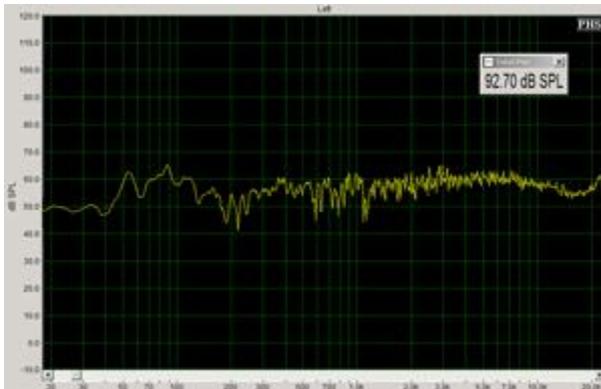
Harmonic distortion was measured at 50 Hz on the woofer axis, and at 1 kHz and 10 kHz on the coaxial tweeter and midrange axis at a distance of 1 foot. Absolute SPL calibration was performed at 1 kHz using a Radio Shack SPL meter. THD+N was at approximately 0.25% at 10 kHz and 1 kHz, and climbed to 1% at 50 Hz. These are very low numbers, particularly at higher frequencies. At 50 Hz, the number is contaminated by background noise; I had to wait until my forced air heating cycled off to make the measurement, but there was still measurable noise from the street outside and from kitchen appliances etc. THD+N vs frequency was also measured in 1/3 octave bins. The rapid rise at low frequency is due to a lack of signal as the bass rolls off, not due to a real increase in THD. This shows a very flat spectrum around 1% for most of the audio band.



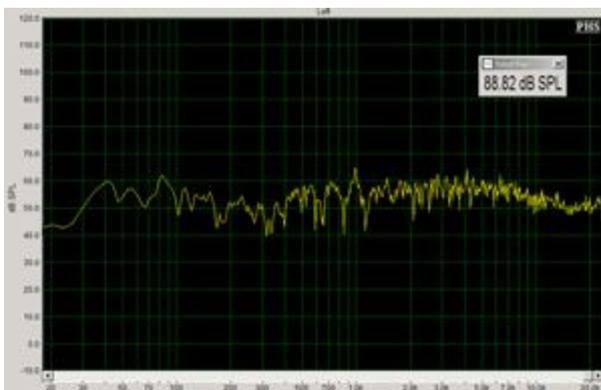
THIEL CS3.7 THD+N versus frequency from 30 Hz to 20 kHz.

Frequency response was measured at 1m and 2m distance from the speaker at listening height (about 6" below the coaxial midrange/tweeter). The response is admirably flat, given that the

speaker was measured in a normal living room. Many of the room effects seen in the 1m trace are absent in the 2m trace.



In-room frequency response measured at a distance of 1m on the listening axis.



In-room frequency response measured at a distance of 2m on the listening axis.

## Conclusions

Many people spend their time in this hobby trying to get “more.” But once you reach a certain level, the quest is for less: less coloration, less distortion, fewer flaws. The THIEL CS3.7s are already at a place where there’s little more to ask for, aside from 12 Hz more bass extension. Where they excel is in the “less” department. They are, as far as I can tell, flawless in their transparency and musical presentation. They’re as close to tonally invisible as I’ve heard so far in my room. Combine that with world class imaging and soundstaging, and plenty of bass power and extension for all but the most committed bass nuts. The result is an exceptional speaker that should be at the top of the audition list for anyone looking for a \$10,000+ speaker. Just remember to bring a serious amplifier, and make sure ALL the other electronics are up to the level of the CS3.7s. I will be sorry to have them leave my room. As with some other equipment I have reviewed, there’s no chance I personally can afford to keep them. I am sure jealous of anyone who can!

Gropi, Chris: Thiel CS3.7 Floor-Standing Speakers, 18.01.2009, in: Home Theater Hifi: <http://www.hometheaterhifi.com/two-channel-speakers/518-a-secrets-speaker-review.html?showall=1>