

Supplemental Technical Information for model

THIEL CS2.3

Coherent Source[®] Loudspeaker

This paper contains only information specific to the CS2.3 speaker system. It is intended to supplement the general technical information paper which explains our engineering philosophy, goals and techniques.

THIEL CS2.3 SPECIFICATIONS

Bandwidth (-3 dB)	35 Hz - 23 kHz
Amplitude response	37 Hz - 20 KHz ± 2 dB
Phase response	minimum $\pm 5^\circ$
Sensitivity	87 dB @ 2.8 v-1m
Impedance	4 Ω , 3 Ω minimum
Recommended Power	100-400 watts
Size (W x D x H)	11 x 15 x 41.5 inches
Weight	70 lb

Driver Complement:

Woofers

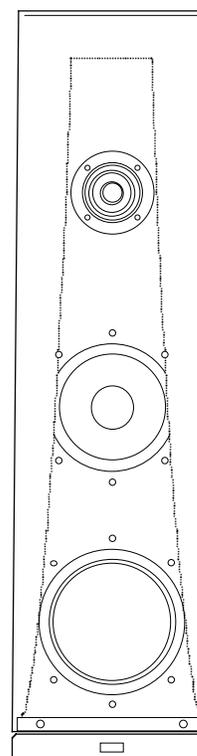
8" (6.4" radiating area) with anodized aluminum cone, cast frame, 1.7" dia. voice coil. Underhung coil (short coil/ long gap) motor system. Linear travel 0.4" pk-pk, 13 in³ linear displacement. 2.5 lb. magnet, 6 lb. total magnet structure. Copper pole sleeve, copper magnet ring. Made by THIEL.

Midrange

4.5" (2.7" radiating area) with anodized aluminum diaphragm, cast frame, 1" dia. voice coil. Underhung coil (short coil/long gap) motor system. Linear travel 1/8" pk-pk. Magnet weight of .8 lb. powers midrange and tweeter. Copper pole sleeve. Ferrofluid. Made by THIEL.

Tweeter

1" (1.2" radiating area) with anodized aluminum dome. Powered by midrange motor. Coincident with midrange.

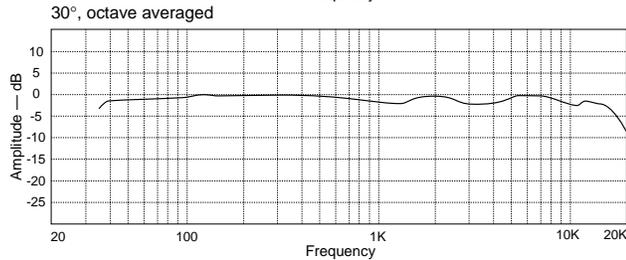
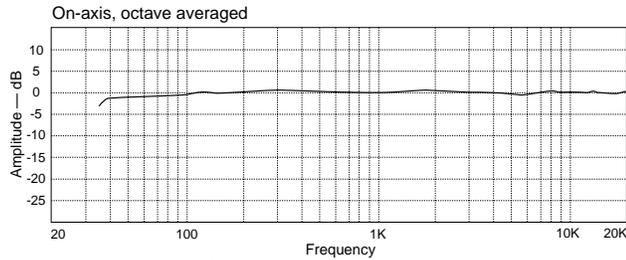
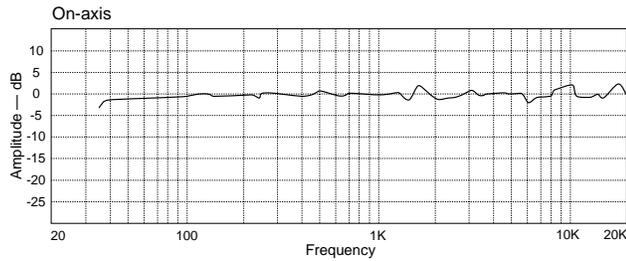


Frequency response

The graphs below show the frequency response of the CS2.3. The upper graph shows the (normal) on-axis response and illustrates the very high degree of accuracy; no frequency is under or over emphasized more than 2 dB. You can also notice the full strength bass extension to 35 Hz.

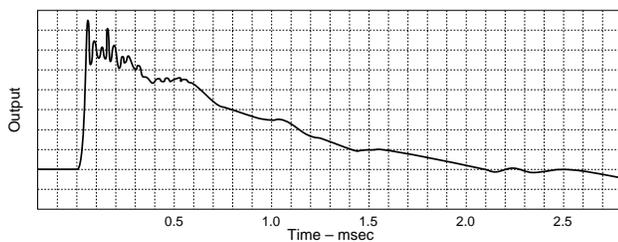
The second graph shows the on-axis, octave-averaged response. This curve is representative of the speaker's tonal balance and shows that the CS2.3 is very accurately balanced with no area of the spectrum over or under emphasized more than 0.5 dB.

The third graph shows the off-axis, octave averaged response and illustrates that the speaker's overall energy response into the room is well balanced, with no large depressions in any area of the spectrum. This high degree of uniformity is the result of the CS2.3's first order crossover system.



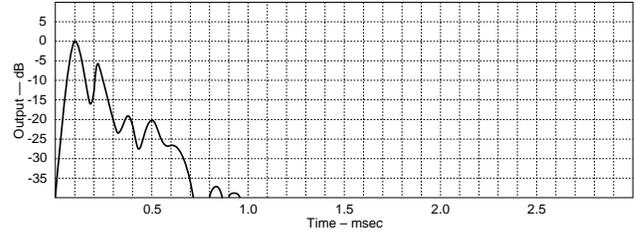
Step response

This graph shows the CS2.3's response to a step signal. You can notice that the overall triangular shape is very well preserved with the output remaining smoothly positive until 2 ms when it finally crosses due to the fact that the bass response extends to 35 Hz rather than DC. The irregularities seen in the first 100 or so microseconds are due to the tweeter diaphragm resonance at the ultrasonic frequency of about 23 kHz. Waveshape accuracy this good can only be achieved with first order crossovers and time coherent driver positioning.



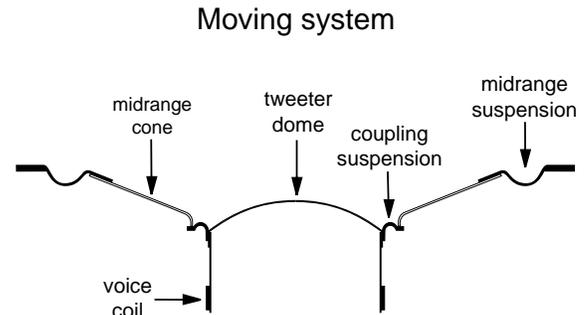
Time response

The energy-time response of the CS2.3 shows that the speaker's output quickly decays to -40 dB in less than one millisecond, demonstrating very clean inter-transient silence. This performance is the result of metal diaphragms with no resonances within their operating frequency range and very strong cabinet construction.

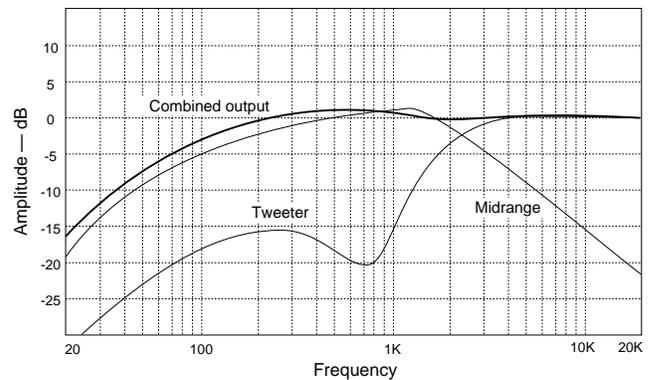


Compound driver

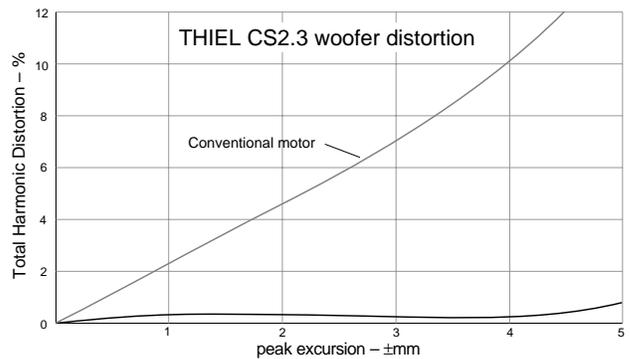
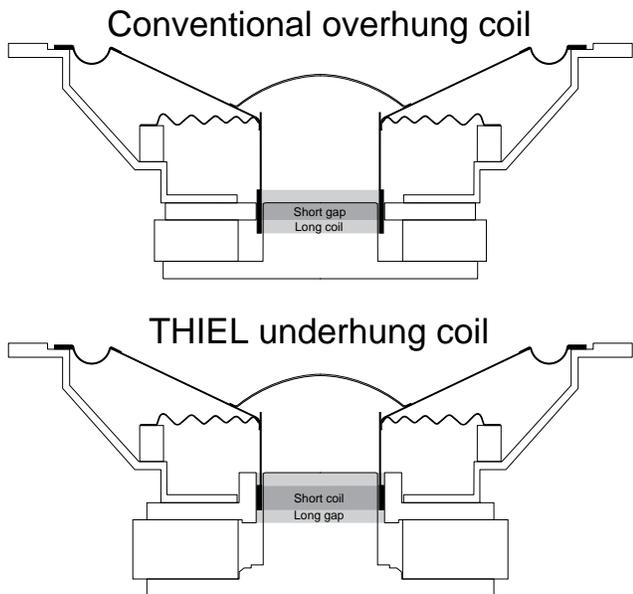
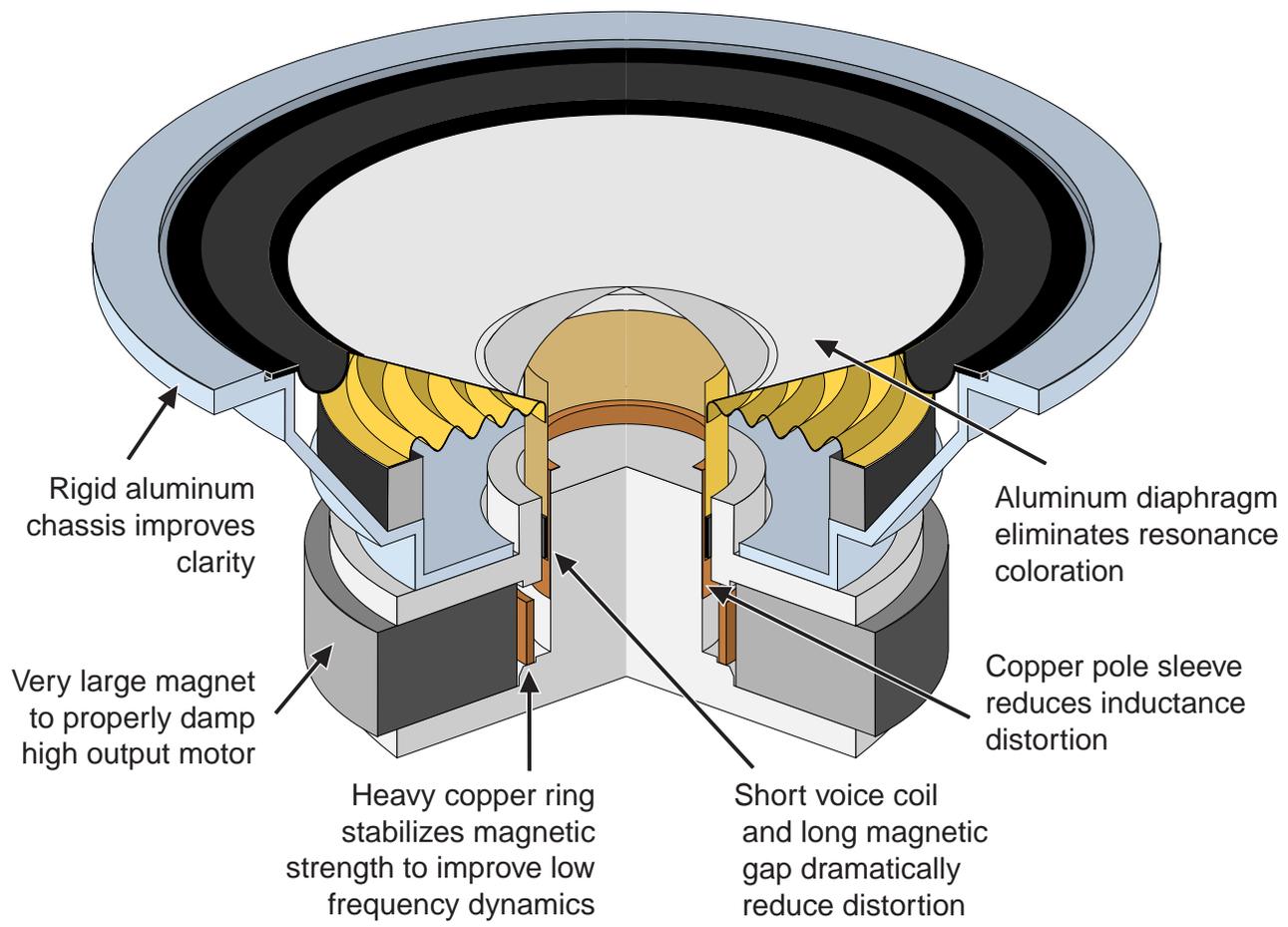
The most unusual technical feature of the CS2.3 is its use of a compound driver where the tweeter dome and the midrange cone are both driven by a single voice coil. The advantages of this unique driver are that perfectly time-coherent performance is achieved without the cost and complexity of two magnet structures or an electrical crossover network for the mid-to-tweeter transition. The design is implemented with a mechanical crossover—a “coupling” suspension between the coil and the midrange cone. By optimizing the compliance and damping of the coupling suspension and the ratios of area and mass of the two diaphragms, the driver exhibits extremely uniform response from 100 Hz to 20 kHz.



Mechanical crossover



THIEL CS2.3 WOOFER

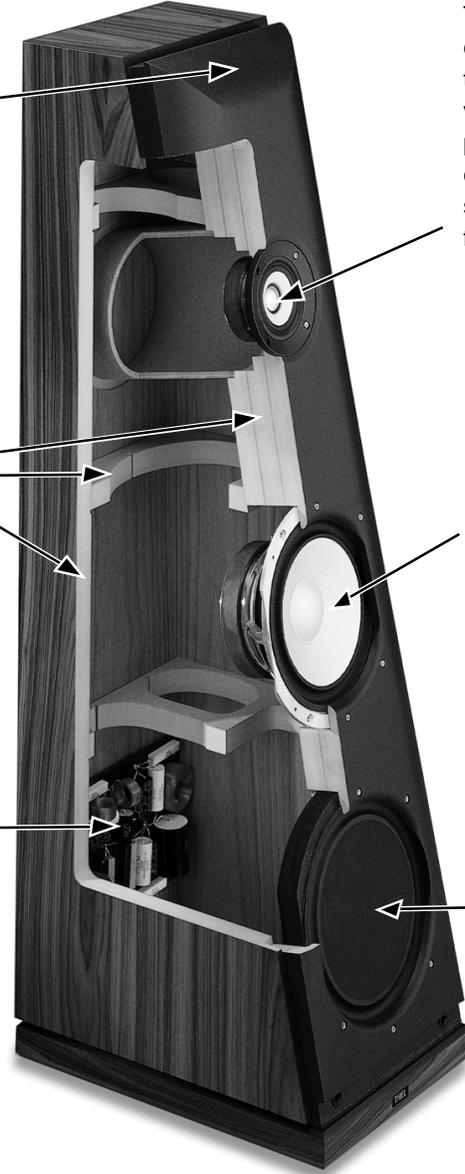


CS2.3 DESIGN FEATURES

The baffle is sloped to properly position the drivers for correct time alignment and accurate reproduction of transient musical information. The rounded edges greatly reduce unwanted diffraction for more "open" reproduction.

A 3" thick baffle, 1" cabinet walls, and internal bracing greatly increase cabinet stiffness. By reducing unwanted vibration, both clarity and imaging performance are improved.

The synthesized first-order crossover provides phase accurate transitions between drivers to preserve the recording's spatial information. The network utilizes polypropylene and custom-made polystyrene capacitors, and low-oxygen copper, air-core inductors for very low distortion and transparent reproduction.



The CS2.3's uses a unique compound midrange/tweeter where two units are driven by the same voice coil. Perfect time coherent performance is achieved without the cost and complexity of two magnet structures or an electrical network for the mid-to tweeter transition.

The 8" woofer uses a very low distortion short coil/long gap motor system, powered by a 2.5 magnet. The rigid aluminum diaphragm eliminates resonance coloration, a special copper pole sleeve reduces inductance distortion, and a heavy copper ring maintains an ultra-stable magnetic field.

The 9" passive radiator eliminates bass port resonances and noise.