by **Vance Dickason**
on **Voice Coil Test Bench**
Article

Test Bench: A New Beryllium Tweeter from BlieSMa

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This month I had the opportunity to characterize the T34B-4 34mm beryllium dome tweeter from BlieSMa. BlieSMa's first tweeter offering, the T34A-4 34 mm aluminum/magnesium alloy dome, appeared in Voice Coil's **June 2018 Test Bench**. This month, I received the company's second offering, and it seems logical that this driver, the T34B-4, is a 34 mm beryllium dome tweeter (see Photo 1). If you didn't get a chance to look at the T34A explication, BlieSMa, located in Blieskastel, Germany, was founded in January 16, 2018 by Stas Malikov. Over the last 20 years, Malikov has worked at Ultrasound Technologies, at Morel as a QC manager and a transducer engineer, and at Accuton as a production engineer for the last eight years, which is an appropriate background to start your own OEM transducer manufacturing company.

Photo 1: The BlieSMa T34B-4 high-end beryllium dome tweeter.

I have to admit that beryllium has become one of my all-time favorite dome materials, and have incorporated it into several system designs, including a ultra-high-end exercise I did for Samsung a few years back (no, this unique departure from the usual mid-fi Samsung products did not make it to the market due to the expiration of the amplifier patent that would have been incorporated into this bi-amped three-way speaker).

It is no secret that beryllium diaphragms have made their way into the high-end and pro-sound speakers, including products from manufacturers such as Magico, TAD, JBL, Focal, Paradigm, Rockport, Revel, EgglestonWorks, and Estelon to drop a few well known names. Given that, I was definitely excited to find that BlieSMa's second release was a beryllium version of the T34A. Like the T34A, the recently released T34B-4 high-end beryllium dome tweeter has a substantial feature set that includes:

- A 34 mm beryllium dome with a 32 kHz first breakup mode
- Extremely low moving mass (Mms = 0.26 grams) for better transient response and higher output
- Fully saturated neodymium motor with copper sleeve shorting ring for low nonlinear and modulation distortion
- 3 mm linear excursion and large pole vent for undistorted low-frequency operation
- Narrow surround for less "soft dome" coloration
- Flush-mounted surround and rear-mounted magnet system for flat frequency response and wide off-axis response
- Underhung voice coil wound with CCAW wire on a titanium former
- Flexible and lightweight tinsel leads from Denmark
- Cast-aluminum powder-coated faceplate
- Gold-plated terminals
- Extremely wide frequency range 1.3 kHz to 40 kHz
- 97.5 dB sensitivity

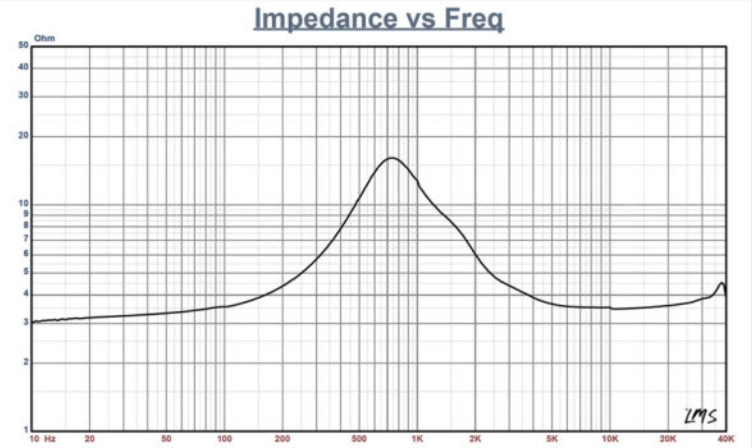

Figure 1: BlieSMa T34B-4 impedance plot.

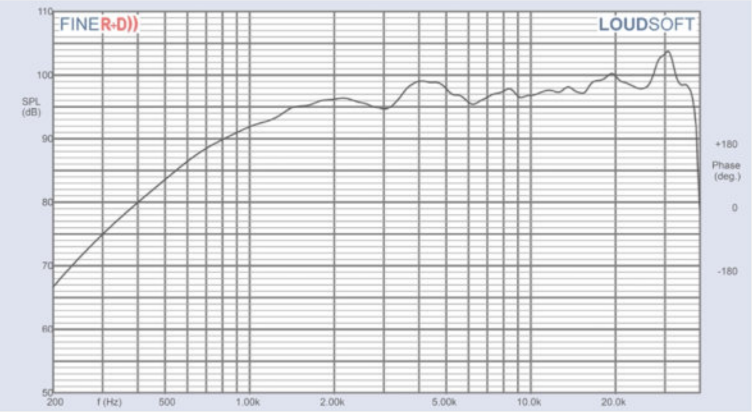

Figure 2: BlieSMa T34B-4 on-axis frequency response.

Figure 3: BlieSMa T34B-4 horizontal on- and off-axis frequency response (0° = black; 15° = blue; 30° = green; 45° = purple)

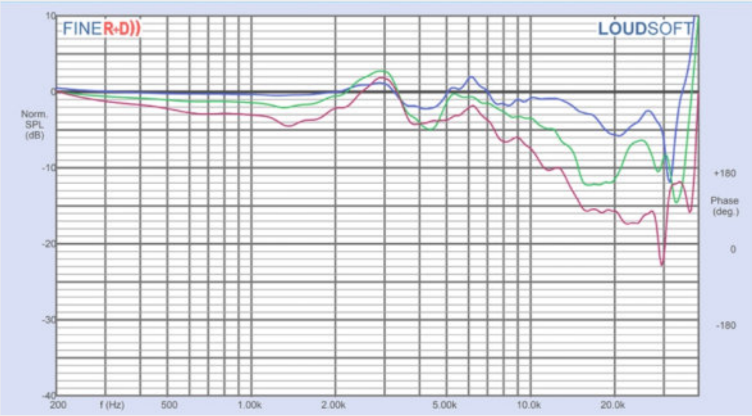

Figure 4: BlieSMa T34B-4 normalized on- and off-axis frequency response (0° = black; 15° = blue; 30° = green; 45° = purple)

I used the LinearX LMS analyzer to produce the 300-point impedance sweep shown in Figure 1. The T34B-4 impedance resonance occurs at a moderately low 737 Hz (factory spec is 790 Hz). With a 3.2 Ω DCR (Re) (factory spec is 3.3 Ω), with the minimum impedance for this tweeter measuring 3.47 Ω at 10.6 kHz.

With the impedance testing completed, I recess-mounted the T34B-4 tweeter in an enclosure that had a baffle area of 17″ × 8″ and measured the on- and off-axis frequency response. The Loudsoft FINE R+D analyzer and GRAS 46BE 1/4″ microphone (courtesy of Loudsoft and GRAS Sound & Vibration, respectively) were set up to measure the 200 Hz to 40 kHz frequency response at 2 V/0.5 m normalized to 2.83 V/1 m. Data was then taken with sweeps at 0°, 15°, 30°, and 45°. Figure 2 shows the on-axis response of the T34B-4. The on-axis curve measured ±2 dB from 1.5 kHz to 18.5 kHz, with the beryllium breakup mode at peaking at about 41 kHz.

Figure 3 gives the on- and off-axis response of the T34B-4. Figure 4 shows the off-axis curves normalized to the on-axis response. Figure 5 shows the CLIO 180° polar plot (measured in 10° increments with 1/3 octave smoothing). The two-sample SPL comparison is illustrated in Figure 6, indicating the two samples were closely matched to within 0.75 dB throughout most of its operating range, with some minor 1 dB variation at 6 kHz.

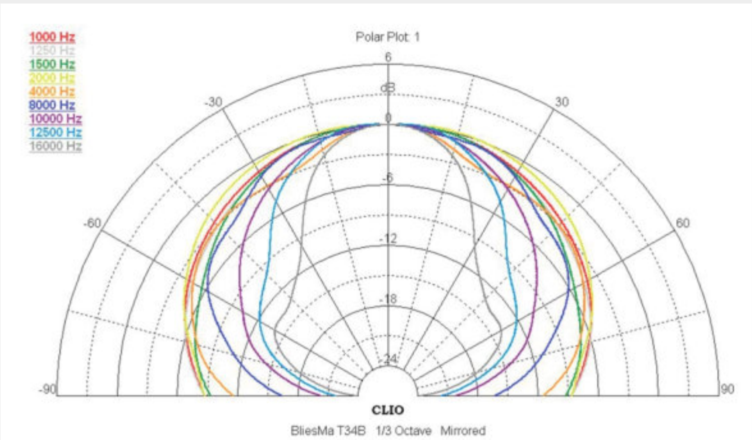

Figure 5: BlieSMa T34B-4 180° horizontal plane CLIO polar plot (in 10° increments).

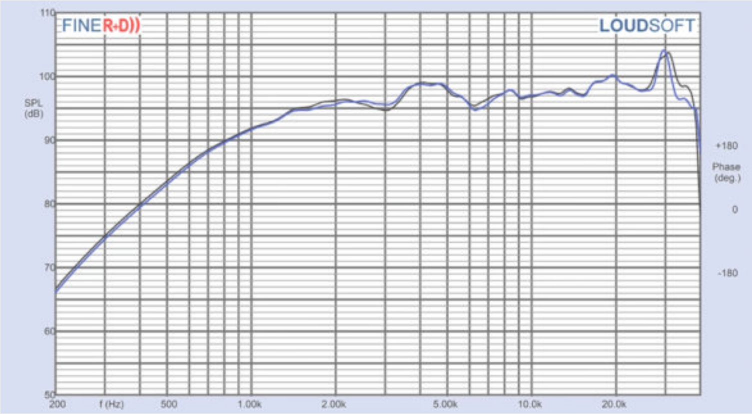

Figure 6: BlieSMa T34B-4 two-sample SPL comparison.

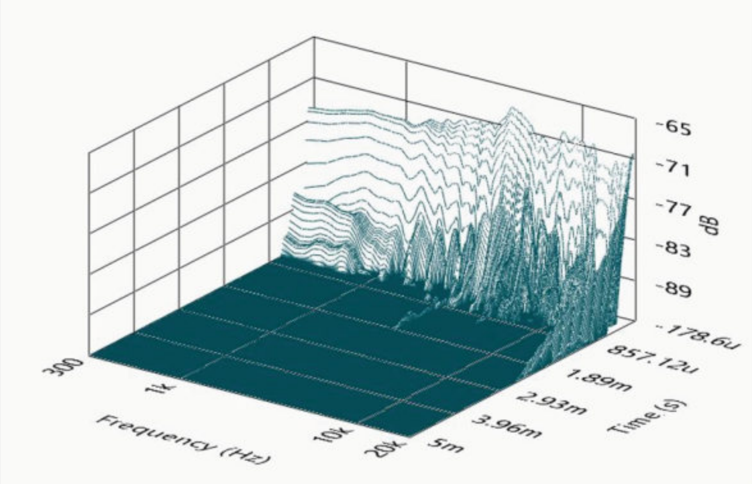

Figure 7: BlieSMa T34B-4 SoundCheck CSD waterfall plot.

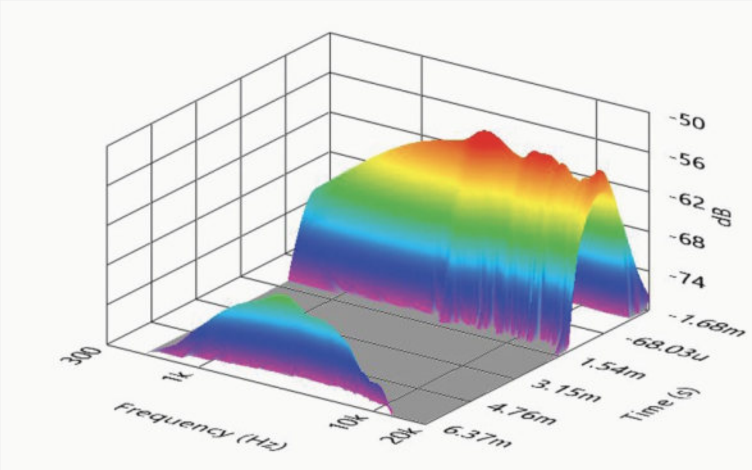

Figure 8: BlieSMa T34B-4 SoundCheck STFT surface intensity plot.

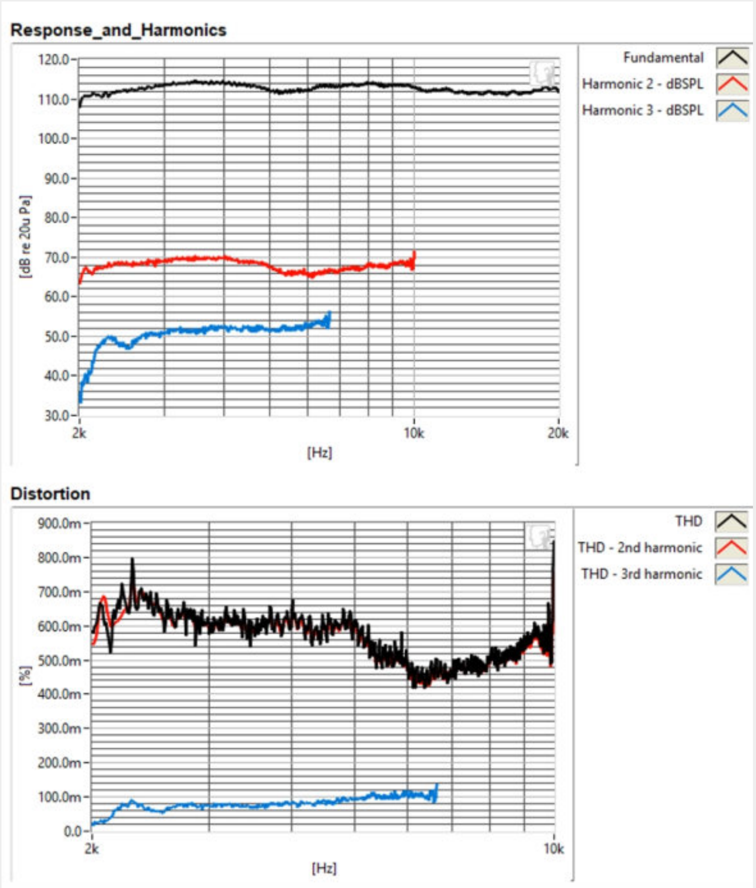

Figure 9: BlieSMa T34B-4 SoundCheck distortion plots.

The next test procedure I used was to initiate the Listen, Inc. AudioConnect analyzer along with the Listen SCM-2 (now superseded by the SCM-3) 1/4" microphone (provided courtesy of Listen, Inc.). With SoundCheck 16, I was able to measure the impulse response with the tweeter recess mounted on the test baffle. Importing the impulse response into the Listen SoundMap software resulted in the cumulative spectral decay plot (CSD) waterfall plot shown in Figure 7. Figure 8 used the same data to produce the Short Time Fourier Transform (STFT) displayed as a surface plot.

For the last objective test, I set the 1 m SPL to 94 dB (1.77 V) using a pink noise stimulus (SoundCheck has a built in generator and SLM utilities for this purpose), and measured the second (red curve) and third (blue curve) harmonic distortion at 10 cm, which is depicted in Figure 9.

As his second product to be released to the OEM driver market, Malikov is definitely developed some very compelling high-end tweeters. The fit, finish, and overall build quality look are first rate, befitting of a product intended for the high-end speaker market, not to mention the 1.5 mm Xmax (3 mm peak-to-peak)! For more information, visit the BlieSMa website at **www.bliesma.de** **VC**

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