Test Bench

The New TW030WA23/24 Tweeters from Wavecor

By Vance Dickason

The next transducers I examined this month were the new Wavecor TW030WA23/24 (**Photo 1**). The A23 is the 4Ω version used for this explication, while the A24 is the 8Ω version and they are the latest editions to Wavecor's 30mm tweeter lineup. I should also note that both versions are also available without a faceplate for custom mounting (the TW030A25/26).

Voice Coil's Test Bench featured the original full rear cavity version of this 30mm tweeter, the TW030WA08, in December 2009; the non-cavity low-resonance version, the TW030WA09, in August 2012; the TW030WA12 30mm waveguide version in January 2015; and the TW030WA13/14, upon which the TW030WA23/24 is based, in April 2015.

While the TW030WA23/24 have a very similar feature set to the Wavecor TW030WA13/14 tweeters, the biggest difference is a new Graphene reinforced textile (Tetoron) 30mm soft dome. Like the TW030WA13/14, the feature set for the TW030WA23/24 includes a 30mm wide surround precision-coated cloth diaphragm optimized for high-frequency cutoff above 20kHz, internal chambers below the dome and surround, copper-clad aluminum voice coil winding with a vented voice coil former, flexible lead wires for large excursions with crossovers below 3kHz, 94dB sensitivity, black anodized motor parts for enhanced cooling including a rear mounted aluminum heatsink, a copper-clad pole piece (shorting ring), a foam mounting gasket on the face plate, plus gold-plated terminals.

Testing commenced using the LinearX LMS analyzer to produce the 300-point impedance sweep for the TW030WA23 4Ω version illustrated in **Figure 1**. The resonance for the TW030WA23 occurs at a moderately low 725Hz. Factory quoted Qts for the TW030WA13 4Ω version is 1.10 (1.24

Photo 1: Wavecor recently released the new TW030WA23/24, which are the latest editions to Wavecor's 30mm tweeter lineup. The A23 is the 4Ω version used for this explication, while the A24 is the 8Ω version.

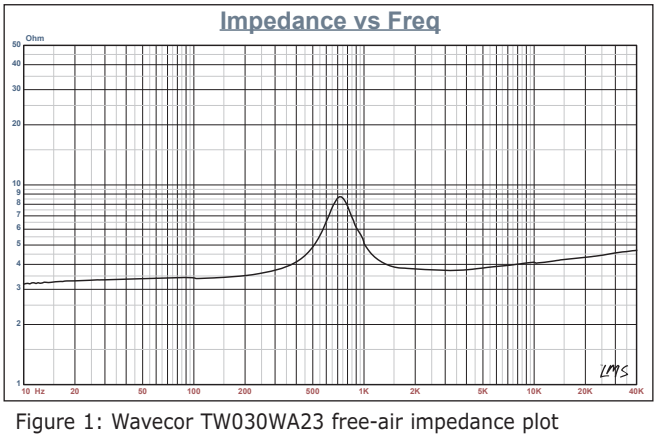

Figure 1: Wavecor TW030WA23 free-air impedance plot

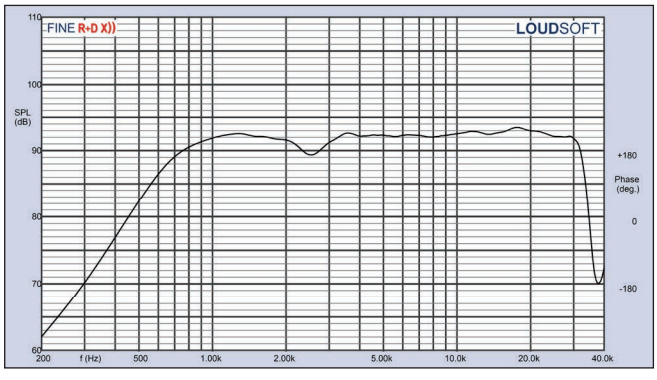

Figure 2: Wavecor TW030WA23 on-axis response

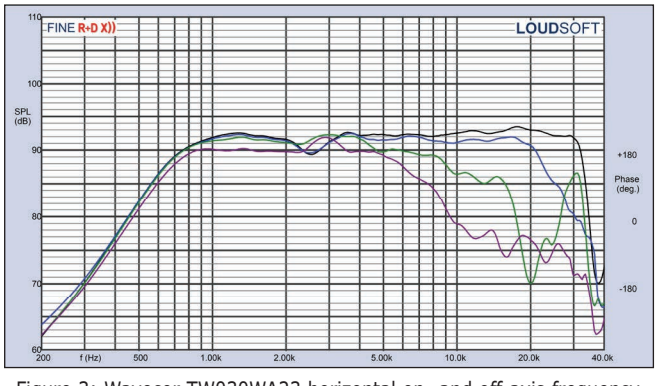

Figure 3: Wavecor TW030WA23 horizontal on- and off-axis frequency response (0° = black; 15° = blue; 30° = green; 45° = purple)

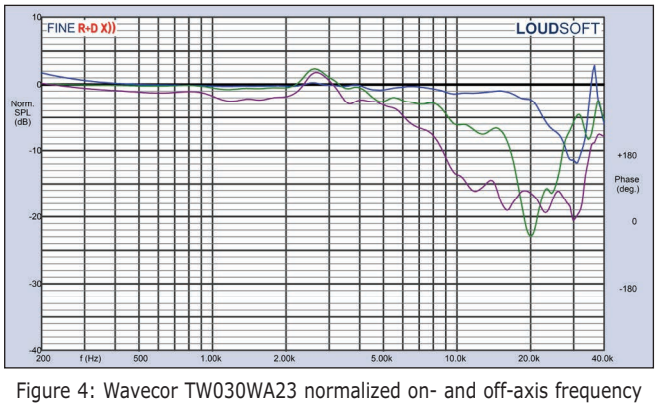

Figure 4: Wavecor TW030WA23 normalized on- and off-axis frequency response (0° = black; 15° = blue; 30° = green; 45° = purple)

for the 8Ω model). The measured DCR for the 4Ω version was 3.5Ω with a minimum impedance above resonance of 3.73Ω at 3.12kHz.

Next, I recess mounted the tweeter in an enclosure that had a baffle area of 14″×7″ and measured the horizontal on- and off-axis at 2.0V/0.5m (normalized to 2.83V/1m) from 0° on-axis to 45° off-axis using the Loudsoft FINE R+D analyzer and the GRAS 46BE microphone (supplied courtesy of Loudsoft and GRAS Sound & Vibration). **Figure 2** shows the on-axis response for the TW030WA23, which exhibited a ±2dB response from 2kHz to 33kHz. If you look at the operating range from 3kHz to 33kHz, it would be a very flat ±1.25dB.

Figure 3 depicts the on- and off-axis response of TW030WA23, with the off-axis curves normalized to the on-axis response shown in **Figure 4**. **Figure 5** shows the 180° horizontal polar plot (in 10° increments with 1/3 octave smoothing applied), generated by the CLIO Pocket analyzer and accompanying microphone (courtesy of Audiomatica SRL). Last, **Figure 6** gives the two-sample SPL comparison showing the two Wavecor TW030WA23

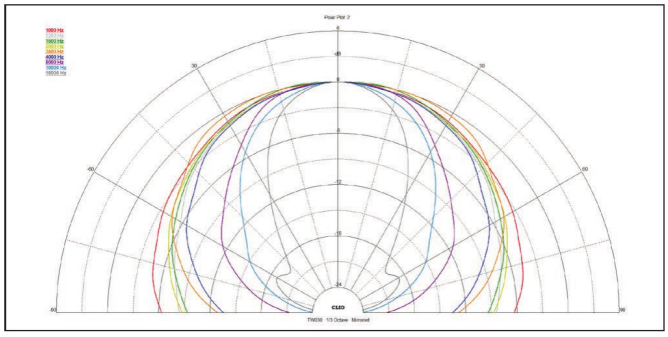

Figure 5: Wavecor TW030WA23 0° to 180° vertical plane polar plot (in 10° increments)

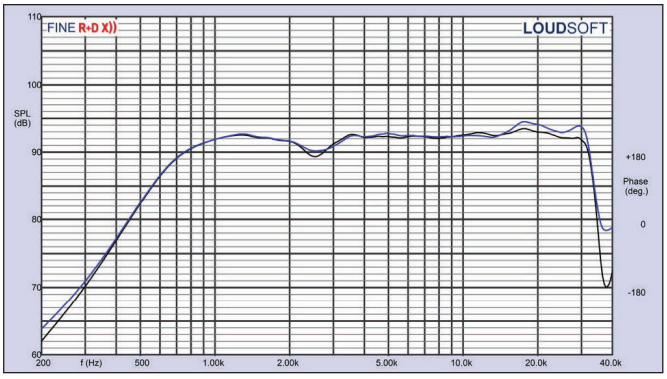

Figure 6: Wavecor TW030WA23 two-sample SPL comparison

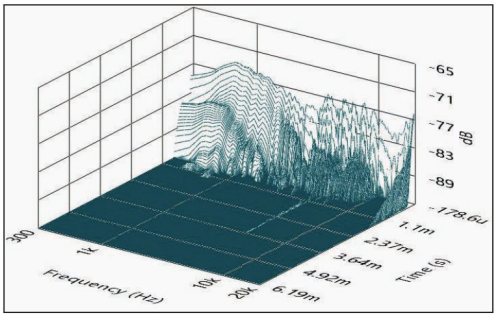

Figure 7: Wavecor TW030WA23 SoundCheck CSD waterfall plot

samples to be closely matched within ≤1dB throughout the drivers operating range to 15kHz, and within 1dB to 2dB from 15kHz to 33kHz.

For the next test procedure, I used the Listen SoundCheck software and the AudioConnect analyzer and SCM ¼" microphone to measure the impulse response with the tweeter recess mounted on the test baffle. Importing this data for the TW030WA23 into the Listen SoundMap software produced the cumulative spectral decay (CSD) waterfall plot shown in **Figure 7**. **Figure 8** depicts the Short Time Fourier Transform (STFT) displayed as a color variegated surface plot.

For the final test procedure, I set the 1m SPL to 94dB (3.4V for the 4Ω version) using a pink noise stimulus and measured the second and third harmonic distortion at 10cm. The data depicted in **Figure 9** demonstrates very low third harmonic content.

As with the entire series of 30mm tweeters, Wavecor has fielded another nice high-end product for the home audio or studio monitor markets. I have worked with Wavecor on a very high-end loudspeaker project for a very large manufacturer (Samsung), and all I can say is that from personal experience, this is an excellent company with which to work. For more information, visit www.wavecor.com. ***VC***

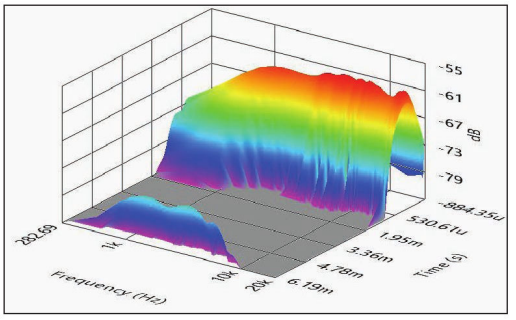

Figure 8: Wavecor TW030WA23 SoundCheck STFT surface intensity plot

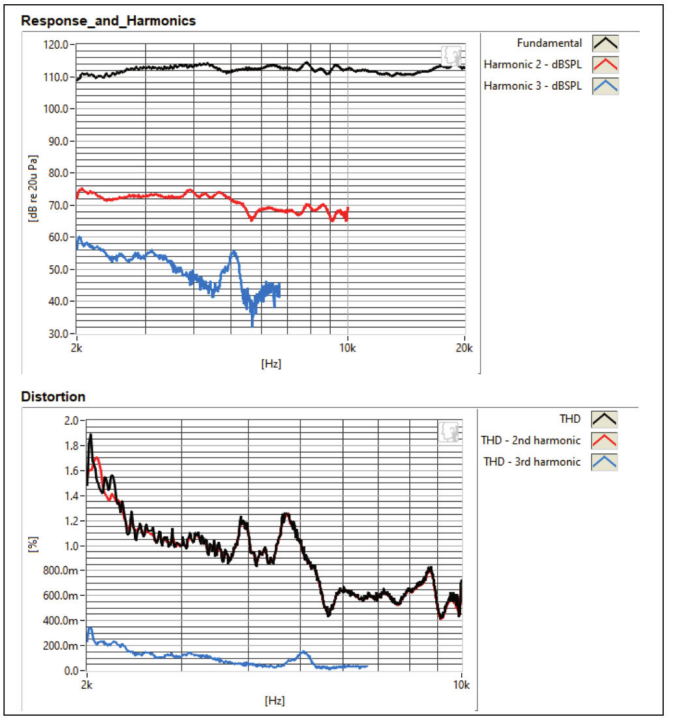

Figure 9: Wavecor TW030WA23 SoundCheck distortion plots