

Game Changing DAC

THE METRUM ACOUSTICS OCTAVE DAC FROM THE NETHERLANDS DELIVERS EXTRAORDINARY PERFORMANCE FOR ITS PRICE

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Metrum Acoustics has been receiving some web attention lately, and a contact suggested that its DACs were worth examining. Upon request an *Octave* review sample appeared, almost by return. Manufactured by Dutch-based Acelec Engineering, it comes as a pair of neat and ultra compact, anodised silver alloy generic cases and is one of three Metrum models that also include the *Duo* and the *Quad*, the names referring to the number of paralleled industrial grade high speed ladder type DAC chips fitted. As is not uncommon these days, the marketing is direct sale from the manufacturer and the products arrived well packed and with full instructions. 110V versions are available too.

After some years striving to produce the perfect electrostatic loudspeaker panel, Cees Ruijtenberg, Acelec's chief engineer, long a fan of non-oversampled digital decoding, turned his attention towards designing a moderate cost DAC of this type. His aim was to step beyond the ubiquitous (and frequently worthy) implementations based on the venerable (20+ year old) Philips *TDA1541A*, a multi-bit ladder DAC chip that's still capable of very good sounds in the right hands (eg Zanden and Vertex AQ to name but two). Many modern ICs were tried before arriving at the present choice – after much searching, their discovery was described as a 'stroke of luck'. The sound quality and measured performance of the three models are said to scale commensurately with the number of paralleled DAC chips being used.

Ruijtenberg is no newcomer to electronics, and is up to date with ultrasonics and advanced digital circuits. For example, the *Octave* DAC uses a six-layer printed circuit board to achieve the optimal pulse bandwidth and grounding. And the ultra fast DACs themselves can sample at up to 15MHz if required. In conjunction with the resistive DAC ladder employed, this ensures very low levels of high frequency 'spike' energy, leading to low radio frequency interference (RFI). Consequently the designer has chosen to avoid the usual oversampling and digital filtering stages. Custom programmed IC gate arrays interface the acquired S/PDIF digital audio signals to the DAC arrays.

This DAC handles only S/PDIF type signals. In optical format it handles up to 24/96kHz sampling rate; the transformer isolated 75ohm coaxial RCA is rated to 24/176kHz (although the odd example may in fact do 196kHz, mine did not). The line output is a standard 2V from a low, direct coupled 82ohm impedance *via* single-ended RCA/phono sockets, and jitter is specified at a very low 40ps.

Better than 0.04% distortion (frequency unspecified), and in-band noise alone -130dB (ref full-scale output) are claimed. As is common for non-oversampling converters, the high frequency response is related to the sample rate, so for the 44.1kHz CD rate it is potentially -3dB at 22kHz (possibly audible for some listeners). This corner frequency raises proportionately with higher sample rate material.

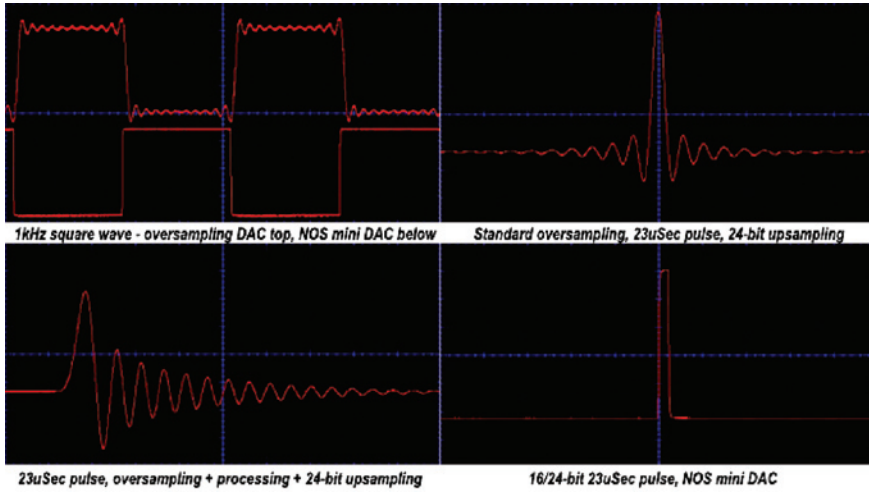
Dimensions are a diminutive 30.5x103x240mm, while the DAC and the matching separate 14VA power supply that was used weigh a combined 1.3kg. Although it's said to work fine 'right out of the box', optimum performance is achieved after a few weeks of use, which was confirmed.

Sound Quality

Meridian *200* and Marantz *CD7* units were both used as CD disc drives, while the bulk of material (including hi res up to 96kHz sampling) emanated from a Naim *UnitiServe*. While the reviewing began with modest ancillaries (cables and the like), it was clear that good things were possible and it was hard to resist using better mains, S/PDIF and signal cables in a high end audio system including an Audio Research *Reference 5*, a Krell *Evo 402e* and Wilson Audio *Sophia 3s*.

Initially noting a hint of chromium brightness and some fine grain sheen in the high treble, the Metrum was left on for a week or two. However, it also immediately delivered a strong sense of direct coupled, communicative immediacy, with a definite promise of something very special. Formal tests were then delayed, so a month had passed before it was put seriously to the test.





Supplied by Metrum and verified in our lab. By avoiding the usual digital filtering, the Metrum delivers perfect pulses and square waves with no overshoot, or pre- or post-ringing. The legends are self explanatory.

It was not found wanting. In fact the *Octave* was so good it was able to give the reference MSB *Platinum IV Signature* DAC a close run if the latter was not properly set up with the right cables and interfaces. And at a fraction of the cost. In a good system, the *Octave* consistently delivers the kind of open, honest and joyful sound that makes you smile.

Quite simply it is up there with the great audiophile DACs, with a sound quality which is quite evenly maintained over the whole frequency range. Indeed, without that well tuned MSB model around as a reminder, one could be forgiven for thinking that Metrum's *Octave* was one of the best DACs around.

I'm getting ahead of myself here because that performance was achieved after some enthusiastic tuning of the supports and cables for the *Octave* set-up, to explore the inherent potential. Some products hit a standard, can be system tuned a little, and stop right there. However this unassuming little Metrum device is inherently so good, such system housekeeping brings significant rewards. (Note that the numeric ratings are for the as is, 'plonked on the table' condition for the sake of comparability).

No messing about, the score came out at an incredible 185, which is true reference class, mixing with audiophile devices at 15 times the price! And it scored 205 on 24-bit/96kHz material. Initially doubting our findings, we worked hard to try and fault it, which proved very hard to do because the *Octave* is generally upbeat, engaging, direct, detailed spacious, fine grained, neutral and dynamic, with very good timing and musical flow. It doesn't sound contrived, over-processed or 'messed about with'; it simply works.

Compared with truly exotic stuff like the MSB *Platinum IV Signature* there's a tinge of extra sibilance and a slightly lightweight bass. Tune-playing is a shade less clear in the bass, and it also sounds a little 'forward' in the upper range, but without a trace of hardness or 'filter' type ringing, and with only slightly less than excellent depth and focus. However, micro

dynamics are excellent, as is the low level detail, and it consistently sounds natural and musical.

Better mains cable, and pointy rigid supports for the power supply and DAC, bypassing those little rubber stick on feet (which I increasingly regard as a menace to sound quality), and you would be forgiven for thinking that it was now perfected. The big MSB still has the dynamic and rhythmic edge, but the gap had certainly narrowed. What an amazing result. Most times we did not need to turn the Metrum *Octave* off. And most of our comparative opinion was derived using straight 16-bit/44.1kHz CD-type material, with no processing in the chain.

I tried higher res material (recorded *via* USB into the Naim *UnitiServe*) and streamed it from the S/PDIF output. I could not lock 192kHz, but 24-bit/96kHz material sounded just fine, and was clearly better than 16-bit/44.1kHz if the original sources were good enough. 24-bit/44.1kHz material also showed the expected gain in quality. Very good focus and image depth were consistent features of the sound quality.

Lab Report

Output was close to standard at 2.14V with very good channel balance (within 0.012dB), while the low 88ohm output impedance means that it's also load and cable tolerant. Even at CD sampling rate, the frequency response was fine: -0.15 dB at 10Hz, a hardly audible -2.3dB down at 20kHz, and only -1.8dB at 20kHz with 48kHz sampling; it will be quite flat for 98kHz rates and above. Channel separation was fine: 120dB at 20Hz, 104dB at 1kHz and 91dB at 20kHz.

The actual resolution is about 18-bit, which is not unexpected, and rather better than the old Philips-based designs, and it typically remains very accurate down to -110dB for dithered digital levels up to 18-bit/48kHz. There's a small resolution fold-back for greater than 18-bit inputs, for example -100dB input gives -97dB at 24-bit input without any improvement at lower levels. The residual noise floor is fine at -125dB, but there's input related grass/noise and harmonics at about -73dB (see the 1kHz high resolution distortion spectrum). Of course it would look better without these lower level signals, and many DACs do avoid them, but there is little evidence that we can hear them. In fact this DAC sounds so natural even on the most awkward sounds, the result suggests that at this low level we really do not hear them.

Total harmonic distortion is an unexceptional -60dB (0.1%), this summing a spread spectrum of noise, while signal related harmonics show second at -78dB, third at -75dB plus the rest. The usual (for this type of DAC) up-band spread of signals multiplied with the sample rate are visible. High frequency intermodulation tests gave a similarly satisfactory result, *ie* -65dB for 0dB and -10dB modulation.

With the expanded spectrum to view jitter and sideband spurious, a chain of signals was again present at -100dB or so, but the main fundamental was very pure with steep slopes, a good jitter sign. RFI (radio frequency interference) at the output was modest, with stuff at 1MHz and 5MHz at -55dB, and then a pretty clean result over the rest of the range to 1500MHz, which is actually quite a good result. I checked the square wave claim and its phase is linear, with perfect square waves and no pre- or post-ringing. (See square wave images.)

Conclusions

Lacking digital signal processing, the usual replay filter ‘echo’ artefacts are absent, resulting in a very truthful and articulate sound, which is particularly evident on piano. In any case all types of music are handled equally well, so there are no reservations in this department, and it was consistently upbeat, informative and entertaining. As previously found with other non-oversampled DACs, the spurious signals identified in the lab tests did not appear to affect the various items of hi-fi equipment that were used: had

this occurred, the sound quality could not have been as good. In other respects it measured well and has good output matching, even suitable for passive pre-amps. Fundamentally, the Metrum *Octave* has high resolution and flat frequency responses.

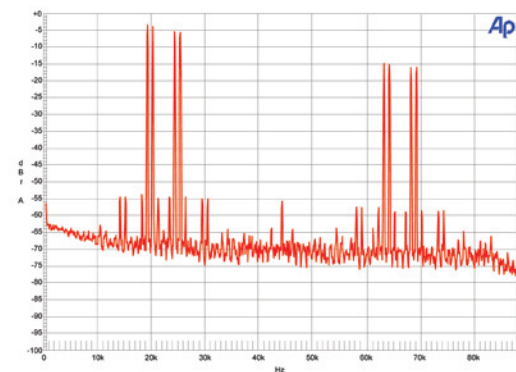
A firm Recommendation is assured for such a high sound quality level irrespective of price, while the latter is so keen as to make this DAC a real game changing bargain.



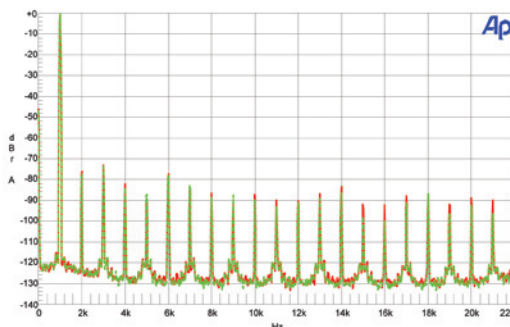
DAC TEST RESULTS

Make Metrum	Date: 4/11/2011		
Model Octave	Ser. No. 0435		
Distortion, THD inc noise 16 bit	20Hz	1kHz	20kHz
	@ 0dB	-62 dB	-60.5 dB
	@ -10dB	n/a dB	-62.3 dB
			n/a dB
Channel separation	120 dB	104 dB	91 dB
Frequency response	-0.12 dB	0 dB	-2.4dB -0.2dB, 10kHz
Intermodulation Distortion			
19kHz/20kHz 1:1	0dB output	1kHz difference tone, -65dB	
		-65 dB	
Signal-to-noise ratios, ref 0dB	A wtd	CCIR 1k	Unwtd
	24bit/ 16bit	118	110
			105 dB
Channel Balance (R ch is ref)	0.01 dB	0 dB	0.012 dB
Linearity ref 0dB		-70dB	+0.15 dB
	-80dB	+0.2 dB	
	-90dB	+0.4 dB	
	-100dB	+0.5 dB	
Maximum output, 100k Ohm load	2.15	V (SE)	
Output impedance	88 Ohms		
DC offset	Left 7.7 mV	Right 3.8 mV	
Size per unit W x H x D	103mm	30.5mm	240mm
Price	approx £800 direct sale, mail order		

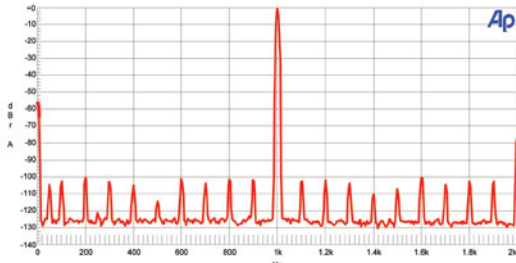
Metrum Octave DAC 19/20kHz 0dB I/M 24bit



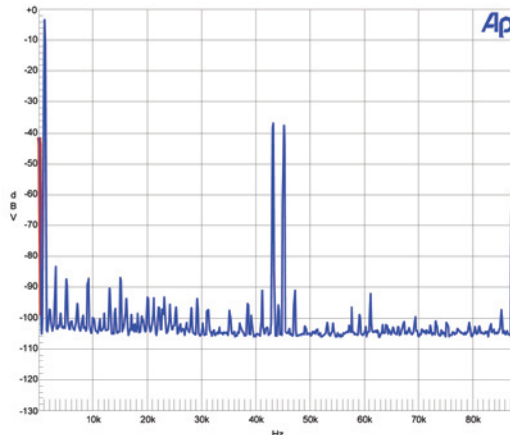
Metrum Octave 1kHz 0dB spectrum coax



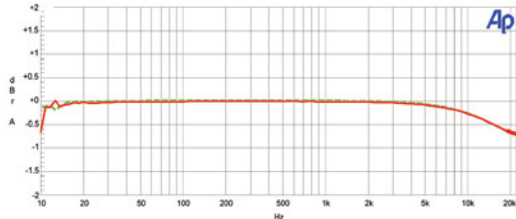
Metrum Octave 1kHz 0dB jitter sideband spectrum coax



Metrum Octave DAC 16 bit -10dB 1kHz



Metrum Octave 48kHz frequency response L, R



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