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FEATURE REVIEW

innovative LS50 Meta

EF's classic LS50 versus the

Metamateria

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Two-way, dual-concentric loudspeaker Made by: GP Acoustics (UK) Ltd. Maidstone, Kent Supplied by: GP Acoustics (UK) Ltd Telephone: 01622 672 261 Web: www.kef.com Price: £1000



KEF LS50 Meta

After nearly a decade in production, KEF's iconic LS50 compact monitor has been comprehensively updated. We compare the original with the latest 'Meta' variant Review: Ken Kessler & Paul Miller Lab: Paul Miller

ardly a curse, but it's still a massive challenge for any manufacturer to improve on a smash hit. I don't care if you're talking about cars, cameras or cookers - whatever the classic, the follow-up is metaphorically referred to as 'that difficult second album'. KEF faced this with the LS50 which (terrifyingly) will be ten years old in 2022. In the interim, there have been active and wireless versions of the speaker, but the passive original [HFN Jul '12] is a much-loved default purchase in the under-£1000 sector. The new LS50 with the Meta suffix (£999) is KEF's The Godfather Part II. Yes, it's really that good.

STILL MAGNIFICENT

Many of you read these reviews in the order they are printed but I would ask you, instead, to pause here. Please go directly to PM's technical description of

'Metamaterial' [p59], then the interview with design prodigy Jack Oclee-Brown [p61], followed by the Lab Report [p63]. This foreknowledge is the only way one can even begin to appreciate precisely what KEF has achieved here, and there is also the £200 price differential

between the outgoing LS50 and the LS50 Meta to address.

I emphasise here that the original remains both a magnificent and affordable speaker, while pointing out that an additional £200 in this sector is a huge percentage

increase for an entry-level or financiallyrestricted customer. I say this so as not to create anxiety in those audiophiles who think their lives have been diminished because a new model 'something' has arrived, and there are tens of thousands of owners of passive LS50s. While I've used

LS50s since they first appeared, they are one of many speakers I have for reference.

SIDE EFFECTS

To prepare for this test, I set up the standard LS50s in a system of components

relative in their value and lived with the speakers for 'Undeterred, I a week and nothing else found myself before the review samples of the LS50 Meta arrived. cranking up I won't say I had forgotten how good they are, but it the volume' had been a few months since I had last fired up

the LS50s for review purposes. That Uni-Q concentric driver is something special.

Dual- and tri-concentric units had been around for years, not least the Tannoy and later Thiel designs, when KEF first unleashed its version in 1988. The company's long-serving chief engineer

Laurie Fincham, now with THX, explained, 'When you were making a regular two- or three-way speaker, there was always a spacing between the drivers, which meant you had to

LEFT: Original LS50 [far left] featured a rose gold-coloured 130mm Uni-O array with 25mm tweeter mounted at the centre, A 12th generation Uni-Q is fitted to the LS50 Meta [near left] with changes to the motor system, suspension, surround and cone of the midrange driver. The rear tweeter duct has also been enlarged as a 'waveguide' back to the metamaterial absorber

METAMATERIAL

The headline differences between the LS50 and new 'Meta' version are driven as much by the re-engineered crossover and evolution of the Uni-Q driver as they are by KEF's novel metamaterial insert, ensuring the new speaker enjoys a smoother, cleaner response at low and mid/ presence frequencies [see Lab Report, p63]. However, the application of AMG's (Acoustic Metamaterials Group) sound absorbing matrix – attached behind the Uni-Q tweeter - has an audible and measurable impact across the vital midrange and presence bands [see CSD waterfalls, below].

The term 'metamaterial' is potentially confusing because its application here has nothing to do with a material. Instead it's a method of achieving a property - in this case sound absorption – that could not otherwise be achieved using common porous damping materials such as longhaired wool, foam or bonded-acetate fibre. These traditional damping techniques rely



make a compromise, either vertically or horizontally. So you had the problem with bookshelf speakers – were they on their side or were they standing up? They could only work well in one orientation'.

FORMING A O

Fincham credits the arrival of rare-earth magnet technology as the enabler, crucial as KEF was not considering coaxial speakers the size of Tannoy's drivers. 'A dealer told me about this new magnetic material... composed of neodymium, iron and boron. It was very small and had ten times the energy, so I was intrigued. I said, "It's so small that we can make a coaxial speaker".'

Size wasn't the only benefit. 'I also realised that with the Uni-Q, I could make a loudspeaker system that didn't have a box. What I mean by that, if you'd ever seen the earlier ones, the crossover was on the back



of the driver so you could test the whole thing separately. Much more importantly, when you put it into a cabinet, it's just four screws to connect it up and the job's done. You don't have to put a crossover in – lots of different things – all in one go.'

output, particularly from 1-3kHz

KEF has now used Uni-O drivers in all Side-by-side, it's almost impossible to

manner of loudspeakers, including the Egg lifestyle mini-speaker, but one insider tells me the technology's evolution into the 'tangerine' drivers, seen first in models like the Blade (2009), had its greatest impact in the original LS50. For the LS50 Meta, irrespective of the attention deservedly being paid to the labyrinthine metamaterial disc, the drive unit itself has been revised extensively, as has the cabinet. As PM explained, this is effectively the '12th generation' Uni-Q in just over 30 years. tell the difference, beyond the change of



on wave propagation through the material and require a depth comparable to the wavelengths involved impractical when dealing with a finite cabinet space like the LS50's. By contrast, KEF's metamaterial is a 100mm-diameter ABS disc that hosts an array of guarterwave resonators, each tuned to a specific frequency and harmonics. By controlling the size and tuning of each resonator, KEF claims to smoothly absorb sound over a usefully wide range. In practice these resonators take the form of 2mm square-section channels. realised as a computer-modelled maze, each exiting at the centre of the disc via a series of ducts. The rear output of the Uni-Q tweeter is guided directly toward these ducts and into the sound-killing resonator channels [see illustration, opposite]. Working in concert, these resonators deliver an effective absorption bandwidth of ~600Hz-5kHz beyond which traditional foam attenuation takes over. PM



the driver's colour from orange/copper to a more muted hue. I prefer this less bling-y choice, but the LS50 Black would be my preferred look. Here's where a cutaway and a view of the back help [see p61 and p63] to reveal the interior changes, as well as revisions to the back panel.

The port opening is now flush to further reduce turbulence, and the cavities in the corners for the baffle retention bolts have been eliminated. I'm not sure if these have impact on the sound, but the rear surface is now slightly domed, while a step between the rear panel and the cabinet sides has been introduced.

RISE AND SHINE

While PM measured a slight difference in sensitivity, it wasn't noticed when switching between the two, so I was able to treat the LS50 and the LS50 Meta ⊖

LOUDSPEAKER

RIGHT: 3D rendering shows the substantial cross-bracing, coupled to the low-diffraction cabinet via a 'lossy' layer – all part of KEF's constrained layer damping. Note also the soft reflex port, flared inside and out

equally in that respect. Stands were 24in tall, and the positioning was as per the instructions, firing straight ahead. I also experimented with toe-in and found that had its own virtues, but for the remarks that follow here, I stuck with KEF's preferences.

Most of the heavy listening was with open-reel tapes but vinyl and CD were used, too, and I avoided pairing these loudspeakers with crazily-priced high-end ancillaries as I do not expect anyone to spend £50k on a record deck and listen to it through a pair of speakers at £999. Those days of unbalanced stupidity in funds allocation are over. However, as I found, the LS50 Metas are so good that they will end up not just with £500-£1000 integrated amplifiers but with far more ambitious powerhouses because they *will* rise to the occasion.

HUNGRY FOR POWER

My main set-up consisted of the Technics RS1500 tape deck fed directly into a Bob Carver Crimson 275 power amp, as well as bouts with a PMC Cor integrated amplifier and an EAT E-Glo i Integrated [*HFN* Oct '20]. Vinyl playback was via an EAT B-Sharp deck [*HFN* Jul '20] with Jo N°5 cartridge [*HFN* Dec '18] with the EAR-Yoshino 834P phono stage [*HFN* Jun '94] and CDs through the Marantz CD12/DA12. Wires came from YTER and Max Townshend. Note, however, that whatever you expect for sensitivity in a sub-£1000 speaker, the LS50 Meta, like its predecessor, is power-hungry. This will not be happy with a 30W/ch integrated.

Spending a week to 're-learn' the original LS50's sound proved crucial. I had grown accustomed to the surprising amounts of bass, the wide and deep soundstage, and a not-unpleasant 'bloom' to the sound that gave an illusion of added weight or warmth. They certainly



do not sound like speakers measuring only 302x200x280mm (hwd) and with essentially a 5.25in woofer. It accounts for the loudspeaker's success if the best selling-point a small speaker can have is that it sounds huge.

Of course, KEF retained all of the LS50's virtues in making the transition to LS50 Meta, and the initial exposure to the latter is one of familiarity mixed with surprise. It's like seeing a friend for the first time after a few years have passed, who, in the interim, lost a stone or spent time in a gym. Recognition is compounded with puzzlement; in this case, it was all positive, and I wisely chose my definitive bass-with-cool-vocals tester to start the proceedings.

UTTERLY UNEXPECTED

Though I do not claim to understand how sounds are chosen to be sampled by hip-hop producers and engineers, surely Levon Helm's drumming on 'Up On Cripple Creek' on The Band's eponymous second LP from 1969 [Mobile Fidelity MFSL 1-419] deserves to be ripped off by any musicians who want to inject so much funk into their tracks that the beat becomes irresistible. Abetted by Rick Danko's equally commanding bass playing, the track never fails to excite any listener eager to extract every single millisecond of joy. The original LS50 delivered enough of that to tell its G

JACK OCLEE-BROWN

Another day in lockdown, and another Zoom call, this time with Editor PM 'meeting' KEF's Head of Acoustics, Jack Oclee-Brown. Metamaterial is the buzzword [see boxout, p59], but it doesn't define the latest LS50 – that honour still goes to the Uni-Q coincident driver array with its distinctive 'Tangerine' waveguide. For example, the central tweeter is composed of aluminium alloy, not beryllium or 'diamond', and yet its breakup mode is deferred to a high 40kHz (~30kHz is typical).

'This all stems from our work on the Muon project', reveals Jack, 'a spherical dome is required to optimally load the Tangerine waveguide, but an elliptical crosssection yields greater stiffness. We combined both in the Uni-Q tweeter, and a very stiff triangular section is formed where the two parts join.

'We've evolved the Uni-Q driver and motor over its long lifetime, but one big change in the Meta is our new crossover design. The transfer function/slopes are 4th-order electrical/acoustic (combined) and yield much improved on- and off-axis smoothness.' [See Lab Report, p63.]

Will we see metamaterials in other KEF speakers? 'The timescale is uncertain but, yes, "mets" will undoubtedly move out to our other speakers', says Jack. 'More importantly, the new streaming platform used in the LS50 Wireless II will be a big part of our product story in the coming year. We are also very keen to do more than simply make a passive speaker active, and our little KC62 subwoofer gives a glimpse of what is possible.' PM





ABOVE: Put fingers gently inside the port and you'll feel a *flexible* tube fabricated from a closed-cell foam and flared inside and out to reduce turbulence. The port profile was updated for the LS50 Meta [right]

audience that this was a recording of peerless worth on every level.

What swapping to the LS50 Meta yielded was utterly unexpected. Keep in mind I remained unsure of what to anticipate, even after reading PM's and KEF's material. Within no more than ten seconds, I had identified a drier, more open upper-bass and airier percussion across the spectrum, a trace more realism in the vocals and something even harder to comprehend, for there was no loss of the warm, ear-cosseting bloom that made the original LS50 undeniably more-ish.

KILLER TEST

So convincing is the LS50 Meta that I found myself cranking up the volume to levels well above my comfort zone to find that it can fill a room far beyond any expectancy associated with size. Because the bottom octaves of 'Up On Cripple Creek' drive the track as much as anything else, turning up the levels increased the realism. And here I detected another unexpected gain when the decibels increased: the LS50 Meta appears to recreate greater image height than the LS50.

Whether or not that's an illusion, what sold me on the LS50 Meta even more was the curious behaviour from the upper midband through to the top end. Although the track is nauseatingly twee and I would normally fast-forward through it, I was caught unawares by the authenticity of the xylophone on 'Talk To The Animals' from Herb Alpert & The Tijuana Brass' *The Beat Of The Brass* [A&M AMC146 open-reel tape]. Ordinarily, I listen to Alpert's superb recordings because the punch of his trumpet is a killer test for transient attack, treble smoothness and other qualities. So explain this one to me... how is the LS50 Meta faster, with crisper transients, smoother in its decay, yet even less likely to show signs of sibilance than the already sweet-sounding LS50?

On to something less cluttered, the luscious-sounding Julie London on Julie Is Her Name [Analogue Productions APP-3006-45], every track sounding 'in the room'. Gears into reverse for the pounding 'Glad All Over' from The Dave Clark Five – All the Hits [BMG BMGCAT408DLP]. No shortage of attack, scale or sheer power. The bottleneck guitar in Keb' Mo's Peace... Back By Popular Demand [Pure Pleasure/Epic/Okeh PPAN92687] as fluid and serpentine as it should be. As you might have gathered, I love this speaker. (b)

HI-FI NEWS VERDICT

Shocking is not a word to bandy about lightly but the gains over the original LS50 are so obvious, so immediately perceived that one can only shake one's head in disbelief that this was achieved, in part, by a passive internal tweak. The LS50 Meta – especially when you consider its ~£1000 price – ticks every box for a small speaker: huge soundstage, generous bass, terrific imaging. Satisfying? Try 'supernatural'.

Sound Quality: 89%

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LAB REPORT

KEF LS50 & LS50 META

To ensure the validity of our comparisons, new samples of both the LS50 and LS50 Meta were tested 'back-to-back' under identical lab conditions. So, while the LS50's pair matching is within 1.3dB and response uniformity good to ±2.9dB and ±4.0dB [grey/orange traces, Graph 1] the new 'Meta' delivers an improved response flatness of ±2.1dB and ±2.2dB [black/red traces] with even tighter 0.5dB pair matching (all 20Hz-20kHz). The sharp Uni-Q tweeter breakup mode at 40.2kHz (+22dB re. 1kHz) cannot be avoided but this is still impressively out-of-band for an alloy dome [see interview sidebar, p61].

Sensitivity is rated at 85dB for both models but the LS50's boosted 2-6kHz band gives it an edge here, yielding 85.0dB versus 84.5dB for the LS50 Meta (averaged, 500Hz-8kHz). The new crossover also sees a change in the Meta's impedance/ phase trend above 200Hz where there's a slightly tougher upper bass/midrange load. The LS50's modulus is <80hm over a narrow 125Hz-630Hz [min. 4.090hm/213Hz; grey trace, Graph 2], while the Meta is <80hm over a broader 115Hz-980Hz [min. 3.650hm/242Hz; black trace, Graph 2]. Swings in phase angle are largely unchanged at circa –60°/+50° but the Meta's load [red trace, Graph 2] is more reactive at midrange than bass freqs.

The –6dB bandpass of the LS50's mid/bass cone is 80-650Hz, that of the Meta a wider 72Hz-900Hz, though both ports remain tuned to a sharp and clean 50Hz (–6dB bandpass of 38-80Hz, LS50; 38-85Hz, Meta). This yields a steep 4th-order roll-off but usefully low extension of 42Hz for the 'standard' LS50 and a slightly deeper 40Hz for the Meta (both –6dB re. 200Hz). Note also the generally 'flatter' more uniform bass output of the Meta [green shaded area, Graph 1]. PM



ABOVE: Response inc. nearfield summed driver/port [green], corrected to 1m at 2.83V [yellow], ultrasonic [pink]. LS50 Meta, black/red; LS50 grey/orange



ABOVE: Impedance magnitude (black/grey) and phase (red/orange) for LS50 Meta and LS50, respectively

HI-FI NEWS SPECIFICATIONS

Sensitivity (SPL/1m/2.83V – 1kHz/Mean/IEC)	84.6dB / 84.6dB / 82.4dB
Impedance modulus: minimum & maximum (20Hz–20kHz)	3.65ohm @ 220Hz 31ohm @ 93Hz
Impedance phase: minimum & maximum (20Hz–20kHz)	-62° @ 110Hz +48° @ 860Hz
Pair matching/Resp. error (200Hz–20kHz)	0.5dB/ ±2.2dB/±2.1dB
LF/HF extension (-6dB ref 200Hz/10kHz)	40Hz / 54kHz/59kHz
THD 100Hz/1kHz/10kHz (for 90dB SPL/1m)	1.2% / 0.2% / 0.7%
Dimensions (HWD) / Weight (each)	302x200x280mm / 7.8kg