

How KEF made the LS60 Wireless so...



KEF
LS60 Wireless
wireless speakers

crazy slim!

Not only are KEF's towers crazy slim, these are fully active streaming speakers which could be used as a complete system in themselves.

UK-based KEF has found great success putting amplifiers inside its speakers over the last five years. First there was the highly-regarded LS50 Wireless launched in 2017, then the family baby, the little LSX, which recently got its refresh as the LSX II.

But the \$9995 LS60 Wireless floorstanders, released as part of the company's 60th anniversary celebrations (extended from 2021), are a departure. They are an extraordinarily slim tower design, and they introduce technologies which Dr. Jack Oclew-Brown, vice president of technology at KEF, says made the new design for him a "transition point" (we guess 'tipping point' would be a bad choice of words for such slim speakers) in the debate of relative merits between passive versus active speakers. Notably the LS50 Wireless had been based on an existing passive speaker, while these new floorstanders are KEF's first truly ground-up active speaker design, designed as active from the outset.

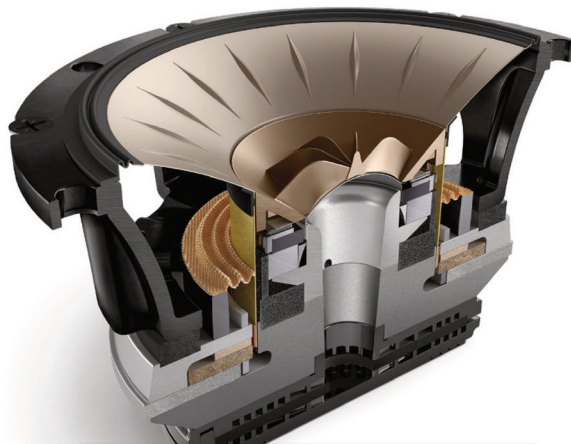
"If you're making an active speaker, it doesn't necessarily make sense to do the driver or acoustic design in the same way you would with a passive," says Dr. O-B. "You can, that's fine — but then you forgo the opportunity to do something that might potentially perform better, or give the customer more options."

Starting from scratch had some radical effects on cabinet design, and in particular how the internal processing and amplifiers could compensate for reduced cabinet volume. So let's unbox and enjoy these slim active wireless speakers, and get some more inside info from Dr. Jack as we go.

Slimming down with Uni-Q

A combination of cleverly positioned cardboard surrounds and plastic clips means you can unbox the KEF LS60 Wireless in just a few minutes. And the first thing that strikes you is how extraordinarily slim the cabinets are, just 13cm across, excluding the plinths.

"With active designs, you can either take it one of two ways," says Jack Oclew-Brown, explaining KEF's choice here. "You can take something with a conventional footprint and size, and make it perform better. Or you can try and hit the same performance in a smaller package — and for this product, that's what we've done."



Uni-Q
KEF's longstanding Uni-Q drivers place the tweeter within the midrange for various advantages, led by the imaging delivered from a single apparent source.

SUMMARY

KEF LS60 Wireless
active wireless speakers

- + Great soundstaging
- + Astonishingly slim
- + Powerful bass given their size
- All-in-one system doesn't allow future upgrading

The slimness also references one of KEF's flagship speakers, the Blade, which is designed so that all its drivers have what KEF calls a 'single apparent source'.

"The width of the bass driver is normally what determines how wide a speaker is, but by using Single Apparent Source [technology], where you put bass drivers on the side, you overcome that," explains Oclee-Brown. "Suddenly, the speaker width can be determined by the Uni-Q driver. With Blade, we were trying to create something very, very high performance, so the whole thing ends up being 200mm wide but still has nine-inch bass drivers. If we had put the bass drivers on the front, the width would have been 350mm. We tried to do the same thing here but on a different scale."

Hence the driver complement is like a mini version of KEF's Blade, including the smallest Uni-Q driver the company has ever designed, a 12th-generation of the coincident-source design which puts a tweeter inside the midrange, here a 19mm vented aluminium-dome tweeter within a 100mm aluminium cone. For this latest Uni-Q iteration KEF has added a tweeter gap damper and a new Z-Flex silicon tweeter surround to aid dispersion and reduce distortion, as well as the innovative rear absorption disc called MAT (Metamaterial Absorption Material), where multiple channels of different sizes aim to damp down sound from the rear of the tweeter; KEF claims it absorbs 99% of the tweeter backwave.

"Uni-Q is just going to continue to be the icing on the cake for KEF customers, that we can deliver cutting edge driver design but also the benefit of having a single source" says Oclee-Brown. "One of the key things here was how we make a 19mm tweeter sound like it's not limiting the output. The Metamaterial is part of that, but so are redesigned motor systems, and a silicone rubber surround so the dome can move along the way."

Uni-Core and DSP

Uni-Q allows the slimness, then, but how has KEF managed to ensure enough bass with such a slim low-volume cabinet?

"For a passive speaker, that just doesn't work at all — you end up with something with no bass," says Dr. Oclee-Brown. "But for an active, this is where you can start bending the rules. If we can make the bass drivers have more power handling and enough throw capability, we can just put bigger amps in and then use DSP to regain the bass we'd lost. Again, single apparent source works well for this because instead of having, say, one bass driver, you end up with four, so it's four drivers sharing the power, so your power handling problem starts to reduce."

"But you still need that high excursion, and the problem then is you're trying to fit two bass drivers back to back in a 12cm-wide cabinet. We spent a lot of time trying to make 6cm-deep bass drivers that would have the excursion we needed, but we were hitting our heads against a brick wall. We started to think of silly ideas to make the bass drivers slimmer — and that's when the idea of Uni-Core came up."

Not to be confused with Uni-Q, Uni-Core works by arranging two voice coils concentrically, one with a greater diameter so that the smaller one can move within the larger one (see image below). Though developed for the LS60 Wireless, the solution actually debuted in KEF's dinky 'miracle' K62 powered subwoofer last year — opposed drivers combining force cancellation (the drivers are mounted back to back) with a shared motor system and separate voice coils. Oclee-Brown spells out the theory.

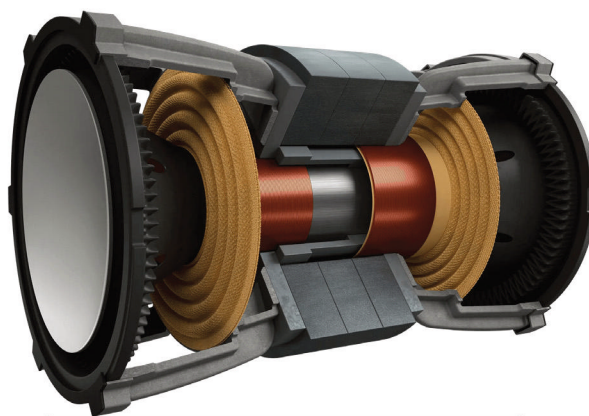
"If you take a driver and you look at what composes the depth, basically half of it is the cone, moving parts and the suspension, and the other half is the motor system. And you can't really squeeze them down without making the throw lower. Make the moving parts slimmer and they start to hit things; make the motor slimmer and the 'Xmax' [operating range] of the motor drops off."

"So, we've got two of these back to back and we were starting to think 'well, what if we try and make one motor that can drive both of the cones?' So then our width, instead of being split into kind of four, is split into three — moving parts, one motor, and then moving parts."

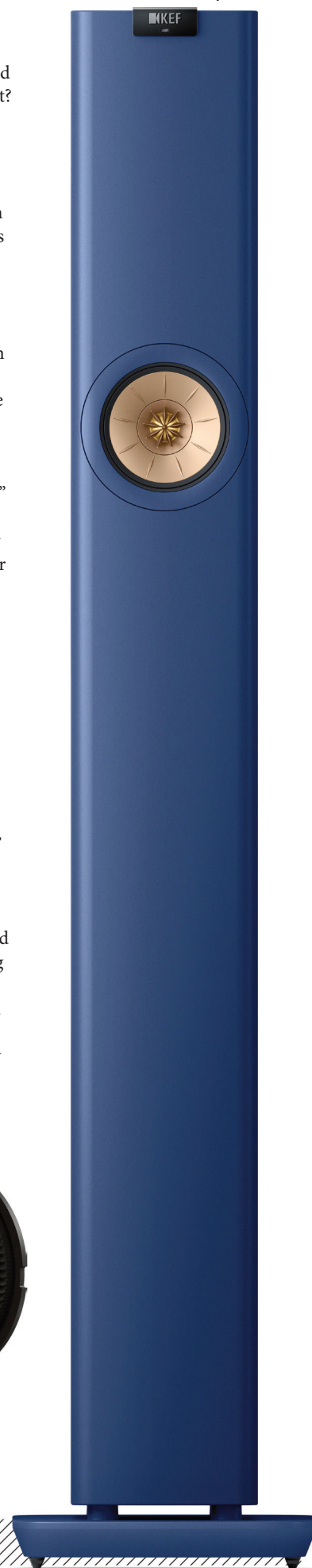
"Honestly, it was one of those things we almost rejected in the discussion stage because we were all pretty much convinced it would be a real pig to get working. It was only



Metamaterial Absorption Material (MAT)
Behind the tweeter, the MAT disc uses multiple channels of different sizes to damp down the tweeter backwave by a claimed 99%.



Uni-Core
KEF narrowed the width of two opposing drivers by combining their motor systems into one, while separate voice coils of different sizes pass through each other.



once we rejected all the other ideas that we thought we'd give this a go, and the simulations worked out better than we expected."

Each speaker uses three separate amplifiers to drive each section independently. The woofers and midrange get Class-D power of 500W and 100W respectively, while the HF section gets 100W of Class-AB. The system is kept cool by the use of heat sinks and passive cooling with air travelling from an opening between speaker base and plinth, past the main electronics module and out again through a vent close to the back panel.

Dr Jack explains that the DSP in the active design not only allows the desired bass, it flattens the response and reduces distortion.

"It's clean and you can have a lot more bass extension when it's playing quietly," he says. "It doesn't sound strained. And being closed box and having that really deep extension also changes the sound of the product, because it gives you much, much more control in the bass so you don't have the overhang that comes with the kind of roll-off. The sound characteristic of the LS60 is kind of quite different, and I think in a really, really good way."

Features & set-up

With such a narrow tower, KEF has helped stability with heavy base plates, keeping them anchored to the floor. These come attached, so your only decision is whether to attach the supplied spikes or stick with the rubber feet.

The right speaker is the 'primary' speaker, with most of the connections, along with buttons for pairing left and right speakers together and connecting Bluetooth devices.

Here also are the physical inputs: HDMI eARC, optical and coaxial, plus a pair of analogue RCA inputs. The HDMI makes the LS60s eminently suitable for flanking an AV system, of course, and during testing we connected an LG TV via HDMI, finding no latency sync problems in playback.

The speakers network by either Wi-Fi (connecting using the KEF Connect app) or using the Ethernet port. A second port lets you run the supplied Ethernet cable between both speakers for a hard-wired connection allowing native playback at 24-bit/192kHz. Without the connecting cable the system drops to wireless playback at a still-respectable 24-bit/96kHz, and notably also drops all internal processing to the same level, downsampling anything above and up to 24-bit/384kHz. There's also support for DSD256 and MQA decoding. Should you want to connect an external subwoofer or two, each speaker sports a subwoofer output.

The LS60 Wireless is driven by the same W2 wireless platform that was introduced with the LS50 Wireless II, supporting streaming via Apple AirPlay 2, Google Chromecast and Bluetooth. You've also got Amazon Music, Deezer, Qobuz, Spotify and Tidal streaming



Jauz remix of Shaed's *Trampoline*. There was an impressive level of detail and space for the intro whistle and lead vocal, its echo surround floating effortlessly in the ether until the vocal rise, a perfectly executed moment of silence — and into the track's deep dirty bassline. The KEFs managed to dispatch this with intent and force, the edges sharply drawn and with wonderful texture to the notes. When given their head, it's hard to believe a cabinet this slim can produce such impact, so much weight and power.

We loaded up the last track from the 'Inception' OST, *Time*, and the KEF system showed off its prowess through the slow build, a growing sense of scale as the delicate strings overlay the drums in the deep, then as more elements entered the mix the KEFs obliged with a huge swell of sound, no reduction of scale even at the height of the crescendo, before the halt, and drop back to the track's delicate beginnings. This was a masterful performance.

Conclusion

There are existential arguments

against wireless active speakers in general, just because they're an all-in-one solution, so you're putting all your eggs in the one basket, with none of the traditional upgrade paths of a separates system. It's the argument we used to make against mini systems in the olden days.

But the L60W is no mini system — this is real hi-fi, redefining what you can expect, especially from slim towers, with some impressive engineering backing a solid feature set, good user experience, and best of all the impressive audio quality at the price, especially when you compare it against a full system of streamer, amp and passive speakers.

So it's a triumph, despite being in some ways a first attempt at a new concept. As Dr. Jack says: "We're only just starting with this... so there are definitely things in the future which should be able to make a concept like this work even better."

We can't wait. —

Interview: Becky Roberts

services available via KEF's Connect app, which places playback controls, streaming services and internet radio at your fingertips.

But we're pleased to see also a small remote control provided, so you have basic controls for playing, pausing, skipping tracks, switching inputs and altering volume.

The app also allows Normal or Expert EQ settings, the former with basic adjustments for speaker positioning and room type, the latter more extensive tweaking including treble trim, phase correction, and bass extension.

Listening sessions

Let's not hold you in further suspense — KEF's design efforts are wildly successful, and the LS60 Wireless speakers serve up a level of sound that astounds, given the cabinet size.

The dominant first impression is the soundstaging, the integration of all those drive units as a single point of sound, with the benefit of precise imaging at the sweet spot, and indeed over quite a wide listening area.

When we streamed a Tidal Master of David Bowie's *Modern Love*, each element was layered beautifully in the soundstage as it was introduced: first the guitar, then the drums and piano, and finally the vocal. There was width and height to the sonic image that never sounded stretched or feigned.

It's a system that sounded toe-tappingly lively and enthusiastic, but retaining precision and solidity, the KEFs keeping a solid grip on the track without squeezing life out of it. Every individual piano key strike, guitar string pluck and drum beat was dispatched with gusto and self-control.

Keen to hear how the Uni-Core drivers handle low frequencies, we switched to the

SPECS

KEF LS60 Wireless

\$9995

Type: Wireless active speaker system

Drivers: Uni-Q 19mm HF vented aluminium dome inside 10cm MF aluminium cone; 2 x 5.25-inch Uni-Core Force Cancelling Driver systems

Inputs: HDMI eARC, optical, coaxial digital, RCA analogue, Ethernet, USB-A (service only), Wi-Fi

Outputs: RJ45 interspeaker, sub out

Dimensions (hwd): 109 x 21 x 39.4cm (with plinth)

Weight: 31kg

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