

# Chord Mojo

## The Making Of...

What Hi-Fi? visited Chord HQ to get the story behind the company's classic portable DAC

**S**ometimes it's the little things in life that give us pleasure. Freshly washed sheets, a ray of sunshine - or maybe a pocket-sized device that makes your smartphone sound miles better, such as the Chord Mojo.

After two decades of making high-end digital-to-analogue converters (among other hi-fi components), Chord first flirted with portability with the Hugo in 2014, before entering the world of mobile DACs a year later.

The Mojo (£400) sits at the bottom of the company's DAC range - with the £8500 Chord

DAVE at the top. It's among the more recent products in Chord's 29-year history, in contrast to the renovated pump house in Maidstone the company and its 30-odd employees call home.

We meet Chord's John Franks, Managing Director and Chief Designer, and Matt Bartlett, Production Director and designer, to talk everything Mojo - from Chord's FPGA (Field Programmable Gate Array) DAC technology, to why MQA is a no-go for the brand.

### The path to portable

"We tried smaller products in the past," says Franks. "Years ago, we had a product range called Chordette, which we sold a vast number of to a global tech leader. Having done that, we realised that boutique hi-fi was going to grow.

"There were several reasons for the growth. In demographic terms, people don't get married until later now. They have these extended adolescences where they don't have their own large space, just a room with a desk with a PC on it. Making vast amounts of hi-fi was not the way to go. We needed to get to those desktops.

about 100,000 logic gates, running at 3.3W each, and they all got hot - they were dissipating about 7W each. The problem was making a mobile product, because the battery pack would've been as big as a cushion. But as each generation of chips becomes more powerful, they need less power. We're at about 0.7V now, so you can make these chips run faster and still have the processing power.

"When it became possible to put a high-performance DAC and headphone amp into a mobile product, we did. That was the Hugo."

### Finding the Mojo

"I asked Rob [Watts] whether we could make something more mobile - under £400 if possible - and retain a good quality. He said he thought he could because there had been a two-year gap and a new chip had arrived. And that chip enabled the Mojo to be produced.

"The chip is about four times as large as the chip inside the Hugo. The problem was that it would've run too warm. So Rob doubled the number of digital taps, but ran them at a lower

**"In terms of component costs and sales price, the Mojo is better value for money than anything else on the market"**

"I went to a Head-Fi show in Tokyo a few years ago, and there were guys with bits of electronics inside tobacco tin-like things. I spoke to Robert Watts [Chord's digital guru] and he said it would be difficult to make a DAC that size because of the power needed. A few days later, he said he could do it, because there was a new chip out."

### Chord's DAC chip

Chord's FPGA (Field Programmable Gate Array) DAC circuitry, meanwhile, is loaded with highly developed proprietary software - which covers everything from the conversion to filtering.

Franks has an analogy for it. "While normal DACs have maybe 100 digital taps, we have tens of thousands to reconstruct the waveform. If you had a map of Norway and 100 pins, and someone asked you to pin the coastline, you could do it. That's what a chip DAC's reconstruction of music is. But we have more pins, so you can get a more accurate waveform. We're up to a million pins in our big stuff."

Franks continues, "The first DAC we developed with Rob [Watts] dissipated about 30W. There were four FPGAs, each one with

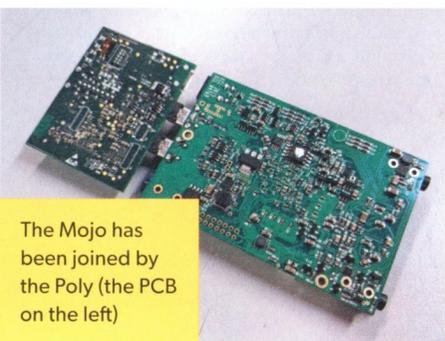
rate, reducing power consumption. With a product that size, it's all about consumption. We wanted to give it nine hours, and we got 11.

"We realised the type of headphones that would be plugged into it, so we decided to give it a more moderate filtering for a slightly warmer sound than the Hugo."

"I would argue that the Mojo is better value for money than anything else on the market," says Bartlett. "Normally you'll have £10 worth of parts in a £250 product. And the difference between component costs and sales price for Mojo is considerably smaller."

### A mobile/hi-fi hybrid

"When we launched the Mojo, there were 4bn smartphones in use around the world. That was our target market, not audiophiles. But we've done pretty well in the audiophile market too, as people use it in a system. It's the most affordable way into Chord ownership. We haven't really got across to the downloading, music-loving ordinary guy - and that's what we've got to do. It's hard for a company that isn't Apple to access those markets. Part of the challenge is explaining what a DAC is."



The Mojo has been joined by the Poly (the PCB on the left)

Beam me up: Chord's HQ is located in a converted pump house near Maidstone. It was here that the concept of the Chord Mojo DAC was conceived, as well as the rechargeable Chord Hugo



So would Chord have changed anything to make the Mojo a more conventional hi-fi item? "No, I don't think we would," says Bartlett. "We physically couldn't get RCAs in there and keep the battery the same size. The battery can be kept fully charged as long as you turn it off when it's not being used. That's the only advice we'd give to prolong everything."

### The Poly partnership

Last year, Chord released a streaming module (the £500 Poly) that attaches directly to the Mojo to gift it DLNA streaming, AirPlay, Bluetooth and microSD card playback.

"With the Poly module, the Chord Mojo is now the product we always envisaged it to be," says Franks. "Originally I felt that the Poly would connect to a phone, but the problem was you always needed a cable. And it occurred to me that it'd be good if we could have an SD card and not use up a phone's memory. But then we'd need a display, so wouldn't it be good if we could throw all information controlling

the SD card up to the phone? You'd need Bluetooth or wi-fi control, or why not both? The idea came to this fairly quickly.

"We had to develop 10-layer circuit boards with tracks within tracks, planes within planes. It's a unique product that has had to settle into a wi-fi ecology. We had to keep changing and updating the software to make it sit into this 10,000-router world.

"We thought people would configure it and leave it as it was, and not want to continuously tweak it and change settings. So we developed an app." Which begs the question, is a streaming module for Hugo 2 on the horizon? Our fingers are firmly crossed.

### No way, MQA

With many DAC purveyors such as AudioQuest, Audiolab, Meridian and dCS supporting MQA (Master Quality Authenticated) - essentially a technology that can package hi-res music into files small enough to stream and download, could this be next for Chord's products?

"We've looked at MQA, and it's not for us," says Franks. "It's a clever idea as a packing system, but it solves a problem that's not there now. We thought it was inferior to what we were doing, so we haven't touched it."

Bartlett adds: "We would happily integrate MQA into our products if there was a proven benefit, but as yet it's not worth pursuing."

### Pushing price points?

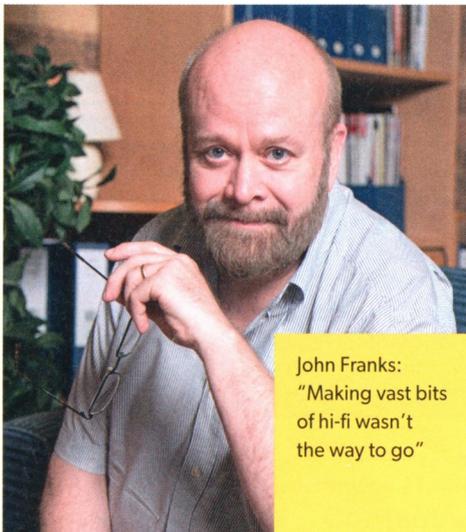
One way to get into the pockets of the 'ordinary guy' would be to compete in the budget market.

"We have sound-quality standards to adhere to," says Bartlett. "To produce a product at a lower cost than Mojo, we'd have to do something quite drastic. We wouldn't put a \$5 chip in there. So would customers accept a product that had, say, a two-hour battery life? One without all of the inputs and outputs?"

Franks adds. "It's like John Ruskin said, 'there is hardly anything that someone cannot make a little worse and sell a little cheaper'. It's unwise to pay too much, but it's worse to pay too little."



Matt Bartlett: "We have to get across to the ordinary guy"



John Franks: "Making vast bits of hi-fi wasn't the way to go"



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