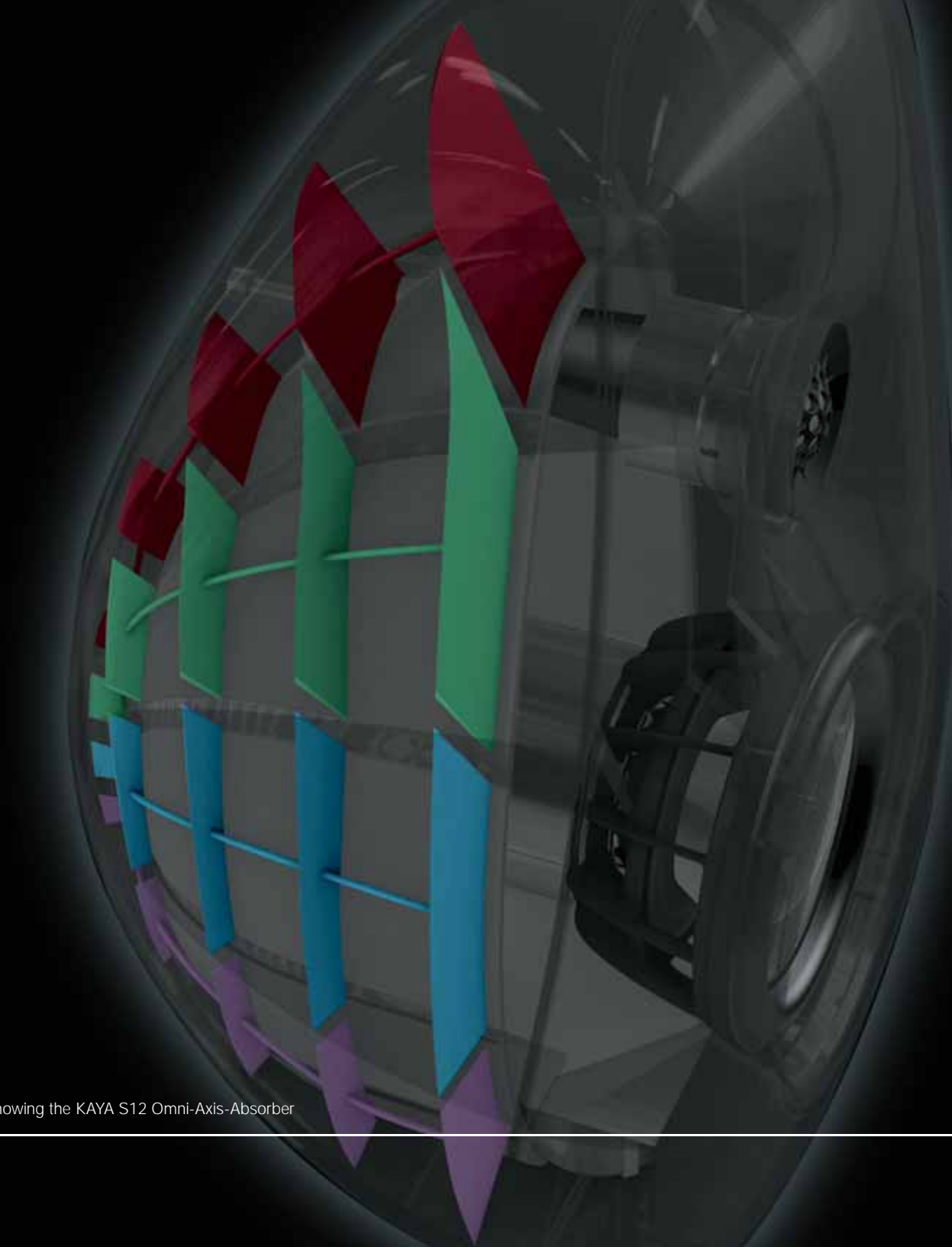


VIVID *audio*

TECHNICAL OVERTURE



CAD visualisation showing the KAYA S12 Omni-Axis-Absorber



Our aim is to  
create the cleanest  
possible window on the  
original performance

Laurence Dickie

At Vivid Audio, our team represents more than four decades of changing the way our customers experience sound. Our loudspeakers are designed to produce a perfectly transparent, symmetrical, open sound, free from colour, resonance and reflection, that connects you, the listener, seamlessly with the performer.

We're an engineering-led company, applying our unique acoustics expertise, technical skill and design creativity to develop truly ground-breaking products. Our customers include dedicated audiophiles, discerning music lovers, home entertainment aficionados and those who recognise, expect and demand the very best in everything.

Welcome to Vivid Audio – and the world as you've never heard it before.





## NATURE KNOWS BEST

Straight lines, right angles and flat plane surfaces are rarities in nature. That's because everything is subject to external, differential forces acting upon it, whether it's temperature, wind, water, nutrients, pressure – or sound.

The human ear evolved its complex, convoluted shape for one purpose: to capture and process sound with the optimum clarity and quality. At Vivid Audio, our own research has proved that smooth curves produce a more transparent, true-to-life sound in loudspeakers, too. So while our thinking and designs may appear somewhat unconventional, they're based on fundamental principles that Nature figured out a long, long time before we did.



## NO EDGES. NO EQUAL.

However hard you look, you won't find a straight edge or 90 degree corner anywhere on a Vivid Audio loudspeaker.

As early as the 1930s, acoustic engineers proved the rectangular box is about the worst possible shape for a speaker cabinet. For the best response and clarity, they discovered, you need smooth curved surfaces. Just like the human ear, in fact.

That insight, backed by our own research, informs the design of every Vivid Audio product. Working with cast and vacuum-infused materials, rather than flat sheet materials, allows us to create the precise profile for perfect sound quality. Internal bracing in the gaps between each driver and port reduces resonance, while our distinctive double-curved and tapered enclosures eliminate the need for bracing top-to-bottom (which is rarely effective anyway).

We appreciate that our loudspeakers look rather different to anyone else's. But that's also why they sound unlike anything you've ever heard before.



## SMOOTH SOUND DELIVERY

Since the sound you hear comes from the front of the diaphragm, we're often asked why having a cabinet with curved surfaces makes any difference.

The answer lies in how sound waves behave. Sound energy travels through the air in the form of pressure waves. As they leave a high or mid-frequency loudspeaker driver, these waves are hemispherical. In conventional rectangular loudspeakers, the wave-front is bounded by the cabinet surface (known as half-space) until it reaches the edge, where it suddenly drops into the unbounded air, or full-space, beyond. Our research shows that, acoustically, this is almost as big a shock to the sound wave as hitting a wall or other hard surface, and creates a kind of 'negative echo' effect.

Although some sound travels directly to your ears from the driver, a proportion bounces off the sharp cabinet corners en route. In a normal room, this interference produces an irregular off-axis response and sound colour, which even the cleverest crossovers and other tricks can only partially remove.

Our loudspeakers' smooth curved surfaces eliminate this hard edge, and the single, sudden point where the sound changes from half-space to full-space. Result? No interference, a smooth off-axis response and a transparent, uncoloured sound.



## A DEEP UNDERSTANDING

The big technical issue with bass units isn't the shape of the sound waves, as in mid- and high-frequency drivers: it's the sheer amount of air movement they produce. We use vented cabinets to improve low-frequency performance. Sound from the back of the driver causes air to flow in and out through a port, reducing cone excursion and distortion – but only if the air moves smoothly. In many systems, the port is simply a tube; and where it meets the cabinet wall, there's a hard edge. This creates turbulence which, at higher drive levels, can be heard as a distinct 'chuffing' sound. So in Vivid Audio loudspeakers, both the inside and outside ends of the bass ports are gently flared, smoothing the airflow and eliminating turbulence and distortion.

Another major source of resonance affects the sound from the rear of the driver which bounces between the top and bottom of the enclosure, causing certain frequencies to ring. The conventional solution is to just fill the whole space with stuffing but, while this attenuates the resonances to some extent, it also takes away the bass energy from the port. Tapered tubes directly attached to the back of the drivers are the complete solution for preventing resonances in the mid and high frequencies but the same technique applied to the bass chamber results in a very poor low frequency output.

We've developed an enclosure which combines the best of both. The reflex chamber terminates in an exponentially tapered tube which has a rate of taper (known as the cut-off frequency) four times the port tuning. This leaves the port output completely unaffected but eliminates the cabinet resonances. This (patented) enclosure design gives our loudspeakers their uniquely uncluttered bass character, while the tapered horn crowns our GIYA loudspeakers to give them their striking and distinctive outline.



## THE HUMAN TOUCH

The sound world created by your loudspeakers is a highly personal one. So while scientific experiments, computer models and a good grasp of physics are essential in the design process, when it comes to building them, we believe there's no substitute for skilled human hands.

All our loudspeakers are built in-house by our own craftsmen. (Even the inductors in our crossovers are still wound by hand.) That obsessive attention to detail runs through everything we do. Take our coil formers, which are highly perforated to improve air flow and reduce resonance. Most people wouldn't notice it, so no other manufacturer has addressed it. But we did, and found a way to not merely reduce, but eliminate it.

We select our materials based on robust engineering and acoustic principles. For example, all our diaphragms are made from anodised aluminium alloy which gives a better combination of stiffness and density than either titanium or magnesium, and a higher price-to-performance ratio than more exotic elements. Similarly, our compact radial magnets are made from alloys of rare-earth elements, because these produce significantly stronger magnetic fields than ferrite or alnico alternatives.





THE TRUE BEAUTY COMES FROM WITHIN

SFM - Super Flux Magnets

CDP - Catenary Dome Profile

Tapered Tube Loading

Composite Sandwich Cabinet

HAC - Highly Aligned Chassis

RCP - Reaction Cancelling Ports

Highly Perforated Former

RCCM - Reaction Cancelling  
Compliant Mount

Vivid Audio Filter Network



## SUPERIOR ALL ROUND

CDP - Catenary Dome Profile



The diaphragm is a critical factor in loudspeaker performance. As it moves, it flexes, potentially creating the tinny, metallic resonance known as break-up. It's possible to reduce this effect by damping, but it's always a compromise. So, as engineers, we figured: instead of spending time and adding complexity trying to correct it, why not eliminate the problem altogether?

Our first advance was to apply a discovery made by designer Laurence Dickie more than 20 years ago. Adding a ring of high-modulus carbon fibre around the edge of the anodised aluminium alloy dome adds stiffness, and pushes break-up frequencies significantly higher. The real breakthrough came when we combined this technique with a reoptimized dome profile. Using finite element analysis (FEA) we discovered that a catenary curve – the shape naturally described by a length of chain suspended between two points – takes first break-up modes almost one octave higher than in a conventional spherical dome. This near-doubling in performance guarantees an unrivalled purity of sound, particularly in the crucial midrange band. We use this unique, patented dome profile in all Vivid Audio upper-mid and high frequency drivers.

## POINT OF FOCUS

TTL - Tapered Tube Loading



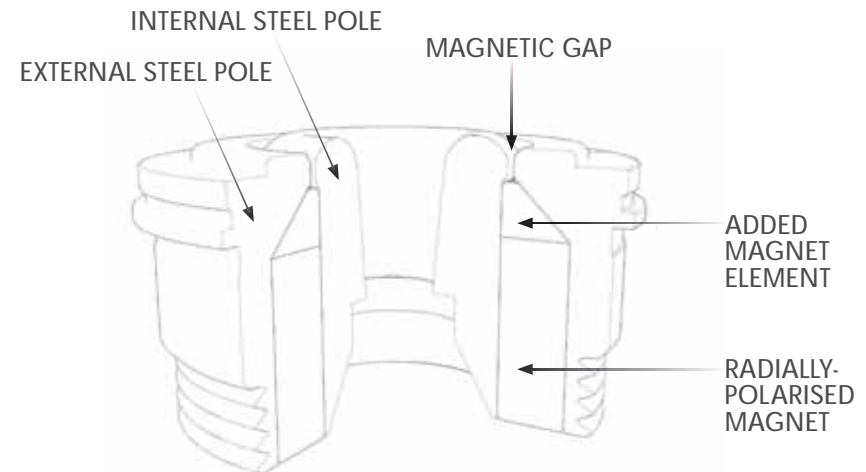
For the listener, the sound produced from the front of the loudspeaker is obviously what matters most. For us as engineers, the issue of the sound coming from the back is just as important. Unless it's contained or dissipated, it will reflect off the back wall of the cabinet and interfere with the forward radiation, adding unwanted colour and resonance.

Our solution is Tapered Tube Loading (TTL) which is designed to absorb, rather than just contain, the rearward sound. The driver is coupled to a tube which narrows exponentially, and is filled with wool fibre. The taper naturally compresses the damping material, so that by the end of the tube, sound is absorbed entirely; none is reflected back through the diaphragm. TTL is now our standard solution for all Vivid Audio mid- and high-frequency units.



## AN ATTRACTIVE SOLUTION

SFM - Super Flux Magnets



One of the secrets behind our tapered tube loading technology's outstanding performance is our innovative Super Flux Magnet.

An essential requirement in the design of drivers for use with tapered tube absorbers is that they have a large central hole. The rear-mounted radial magnet facilitates this while maintaining the smallest outside diameter so the drivers can be close together. Our super-flux magnets feature a highly focussed field which give our D26 tweeter a peak flux of 2.5T – roughly twice that found on most 25mm tweeters – and an efficiency of 96dB/W.

Another small but powerful example of our attention to detail - and refusal to compromise.

## FREE TO FLOW

HVF - Highly Vented Former



To maximise magnetic flux, the gap between the coil and pole in a loudspeaker driver needs to be as narrow as possible (in ours, it's barely a third of a millimetre across). As the coil former moves up and down in this gap like a piston in a cylinder, air is compressed behind the dust dome, creating drag and damping the motion of the cone, especially at low frequencies. The simplest solution is to make a hole in the magnet pole - but this produces resonance. A more refined approach is a row of holes in the coil former. This pushes up the resonance and reduces its sharpness (or Q-factor), but creates audible noise as the air passes through the holes.

We've taken this a step further with our Highly Vented Former (HVF) in which almost half the surface area is made up of holes. This moves the resonance right out of band and lowers the Q-factor to the point where it's almost undetectable; it also eliminates air noise, offering a near-perfect solution to an age-old problem.



## FINE TUNED PERFORMANCE

HAC - Highly Aligned Chassis



In loudspeaker drivers, the magnet, suspensions, voice coil and cone assembly are all held within the chassis. The key to a good chassis design is ensuring there's nothing behind the cone which might cause resonance, reflection or any other disturbance of the sound coming from the rear of the diaphragm. Any obstacles will affect the cone's free motion, and thus the sound coming from the front of the driver.

In the early days, a chassis was little more than a pressed metal dish with holes punched in it: not surprisingly, this caused serious problems of both resonance and reflection. Today's more refined chassis (including ours) are made from diecast aluminium; however, most manufacturers use broad struts, since this simplifies the tooling.

In contrast, the 12 struts in a Vivid Audio chassis have a uniquely narrow aspect ratio, and are cleverly aligned to minimise obstruction. For example, our C125 low-mid driver has struts just 3mm wide; and with a total area of just 10% of the cone area, they're acoustically all-but invisible. As well as their narrow frontal area, they're also unusually deep. This has the added benefit of almost tripling the total chassis' radiating area, making it a highly efficient finned heatsink for the motor assembly, reducing power compression as the drive level is increased.

## BENDING NEWTON'S LAW

RCCM - Reaction Cancelling Compliant Mount

RCP - Reaction Cancelling Ports

Newton's Third Law of Motion famously states that 'every action produces an equal and opposite reaction' – a principle that applies to all mechanical systems, including loudspeaker motors.

As the cone is pushed forwards by the current in the coil, it exerts an equal and opposite force on the magnet, causing it to move. In itself, this motion is harmless: the problems arise if the driver is

coupled to the cabinet, which acts as a sounding-board and creates resonance and sound colouration.

At Vivid Audio, we approach this issue in two ways. Our mid- and high-frequency units are suspended on silicone O-rings, which decouple the driver and the cabinet, preventing them exciting structural resonances.

This technique doesn't work with bass drivers, however. To decouple such heavy units effectively, the O-ring would have to be so soft that it wouldn't support their weight. At Vivid Audio, we've developed a radically simple solution, called Reaction Cancelling Compliant Mount (RCCM). We place the drivers back-to-back on opposite side of the cabinet, with the magnets coupled together. The forces in the magnets are exactly cancelled out, so no motion is transmitted to the cabinet and all resonance is eliminated.



RCP - Reaction Cancelling Ports

Newton's Third Law is also obeyed at the loudspeaker ports. Here, the air rushing in and out produces an equal and opposite reaction force on the cabinet making the quality of the port output dependent on the way in which the enclosure is mounted on the floor. We seek straightforward, elegant solutions wherever possible, and so developed our Reaction Cancelling Ports (RCP), which is simply two opposing ports that cancel the cabinet reaction completely.



## AHEAD OF THE CURVE

Acoustically Designed Cabinets



As engineers, we've always been fascinated by composite materials. And it's their remarkable versatility and strength-to-weight that makes manufacturing our radically-shaped cabinets possible. We make them all entirely in-house, by hand, giving us complete control over materials, tooling, production, finishing and quality.

One of the key features (indeed, selling points) of competing systems is their sheer weight. And in loudspeakers where you have front-mounted bass drivers, a heavy base is essential to prevent the cabinet from moving around. With our Reaction Cancelling Compliant Mount, we don't require weight (even our flagship GIYA G1 Spirit weighs just 80kg) but we do need stiffness. So, we build our cabinets using a vacuum-infused glass-reinforced composite, which allows us to add rigidity exactly where it's needed.



# A BALANCED APPROACH

## Vivid Audio Filter Networks

Crossovers are essential to deliver the frequency band appropriately to the correct driver, keeping the drivers in phase and delivering a balanced sound. We use passive Linkwitz-Riley filters, developed in-house using computer-aided analysis and design, which give levels of smoothness, accuracy and phase matching once thought possible only with active systems. Unusually, and importantly, we build all our crossovers ourselves, in-house, which tests show yield better results than anything available from a third party.

In combination with our smooth, edge-free cabinets, the crossovers deliver a near-perfectly balanced, symmetrical sound. The sound field is also very broad, so while there's inevitably still a 'sweet spot' (as there always is with any stereo reproduction) where you sit in relation to the loudspeakers is far less critical than with many systems.

Fig.1

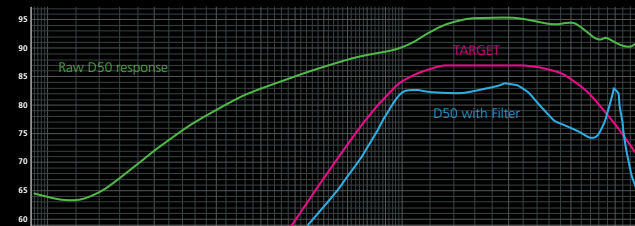


Fig.2

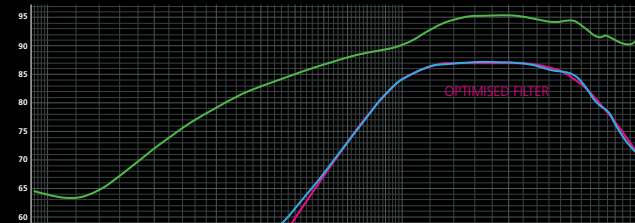


Fig.3

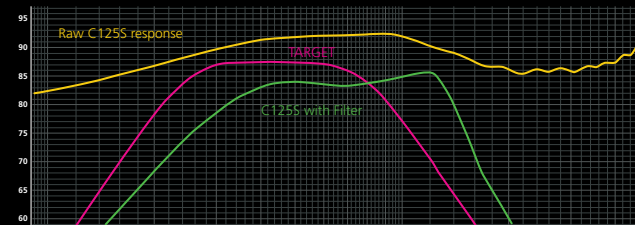


Fig.4

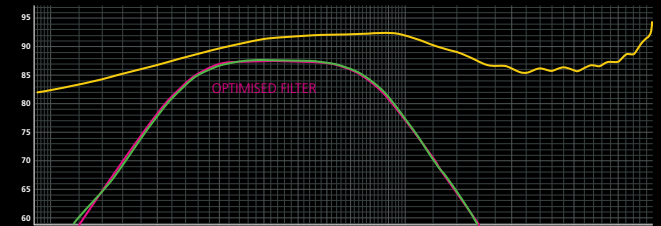
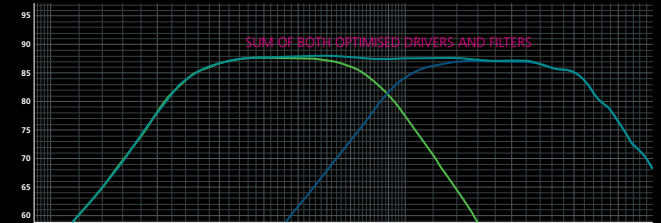


Fig.5





## GIYA RANGE

### THE ULTIMATE EXPERIENCE

Our flagship GIYA range is the choice of committed audiophiles and connoisseurs worldwide. The radical shape is defined by proven acoustic principles taken to their logical conclusions, untethered by conventional wisdom and construction techniques. Every element of the design is the products of pioneering innovation, from our patented hand-built drive units to our advanced vacuum infused composite enclosure. Every detail has been considered and refined in our relentless quest to eliminate resonances and reflections – and enhance your listening pleasure.

On this page: Vivid Audio GIYA G1 SPIRIT - dimensions: 1600mm (H) x 440mm (W) x 820mm (D)



## KAYA RANGE

### NEW DIMENSIONS

### IN LISTENING PLEASURE.

KAYA loudspeakers could only be made by Vivid Audio. Those curvaceous profiles. The patented technology. Above all, that astonishing sound quality, free from all resonance and coloration, that opens the window wide on the performance. And of course, they're completely revolutionary, in their own understated way. Smooth, clean lines, and a detailed, focused sound that draws you in, holds your attention. Easy to live with. Truly life-enhancing.



On this page: Vivid Audio KAYA 90 - dimensions: 1202mm (H) x 370mm (W) x 540mm (D)



## B1 DECADE

### ENTER OUR WORLD

We broke new ground when we launched the original B1 loudspeaker back in 2005. Now, everything we've learned since has gone into the new B1 Decade.

Drawing on 10 years of knowledge, experience and R&D, the B1 Decade represents another huge step forward in design and sound quality. As part of the Vivid Audio family, it incorporates materials and technology from our revolutionary GIYA series, bringing our ultimate levels of clarity and performance to a wider audience.

On this page: Vivid Audio OVAL B1 DECADE - dimensions: 1095mm (H) x 265mm (W) x 375mm (D); Base: 420mm (D)

## THE CURRENT RANGE

2020



GIYA G1 Spirit  
4-WAY, 5 DRIVER



GIYA G1 Series 2  
4-WAY, 5 DRIVER



GIYA G2 Series 2  
4-WAY, 5 DRIVER



GIYA G3 Series 2  
4-WAY, 5 DRIVER



GIYA G4 Series 2  
4-WAY, 5 DRIVER



KAYA 90  
3-WAY, 6 DRIVER



KAYA 45  
3-WAY, 4 DRIVER



KAYA 25  
2-WAY, 2 DRIVER



KAYA C35  
3-WAY, 4 DRIVER



KAYA S12  
2-WAY, 2 DRIVER



Limited Edition  
OVAL B1 Decade  
3.5-WAY, 4 DRIVER

### OVER TO YOU...

At Vivid Audio, our goal is to create and build the world's finest high-end loudspeaker systems. Although we're an engineering-led company, we're also industrial designers. So while our loudspeakers' form is always ultimately driven by function, we bring meaning and emotion to our designs, transcending their physical structures and material properties.

In our view, much of today's technology is overcomplicated, or incorporates features and capabilities that reflect the maker's ambitions more than the customer's genuine need or desire. Our philosophy is centred on clarity of thought, purity of purpose and reasoned engineering decisions. Through careful analysis, considered design and proven manufacturing methods, our loudspeakers are refined, elegant and unfussy, with all their constituent parts perfectly and seamlessly integrated.

Every Vivid Audio loudspeaker cabinet is hand finished using an elaborate process to ensure long-lasting beauty and quality. All speakers are available in two standard colours - Pearl White and Piano Black. But with our in-house paint mixing and spray facilities, we can supply your speakers in (almost literally) any automotive colour you wish.



# GLOBAL NETWORK

## Vivid Audio Distributors

### HEARD AROUND THE WORLD

Vivid Audio has been an international company from the very start. Founded by two engineers – one South African, one British – our production facilities are in Durban, while our design, technical and admin functions are based near Brighton.

Today, we have distributors in almost 40 countries across five continents, and discerning customers worldwide. To find out more about us and our engineering approach, and to experience our remarkable products for yourself, please contact your local Vivid Audio specialist.

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