

DALI KUBIK FREE

WHITEPAPER



IN ADMIRATION OF MUSIC

INTRODUCTION



Delivering a high quality audio experience has always been the goal of DALI. With the KUBIK FREE system DALI has created an active speaker system without the need for complicated setups that offers great flexibility of connections and stays true to our goal of delivering a quality Hi-Fi experience.

The KUBIK FREE system consists of two elements: the KUBIK FREE, an active unit, and the KUBIK FREE XTRA, a passive satellite unit. The two components can be used in three possible set-ups: Using the KUBIK FREE as a standalone unit, using the KUBIK FREE and the KUBIK FREE XTRA together in a stereo setup, or by using the KUBIK FREE and KUBIK FREE XTRA in separate rooms via the umbilical type connector.

In this White Paper we will take a look at the individual parts that make up the KUBIK FREE and KUBIK FREE EXTRA. We will take you behind the scenes and dive into some of the technology that helps the KUBIK FREE system deliver the complete DALI experience to the end user. We will go through all the possible connections and finally we will take a look at some of the user scenarios we see the KUBIK FREE system being used in.

With the KUBIK FREE system DALI has created an active speaker system that will be playing music within a minute of being taken out of the box, yet provide the listener with a lifetime of quality audio experiences.

It is with great pride that DALI introduces – KUBIK FREE and KUBIK FREE XTRA



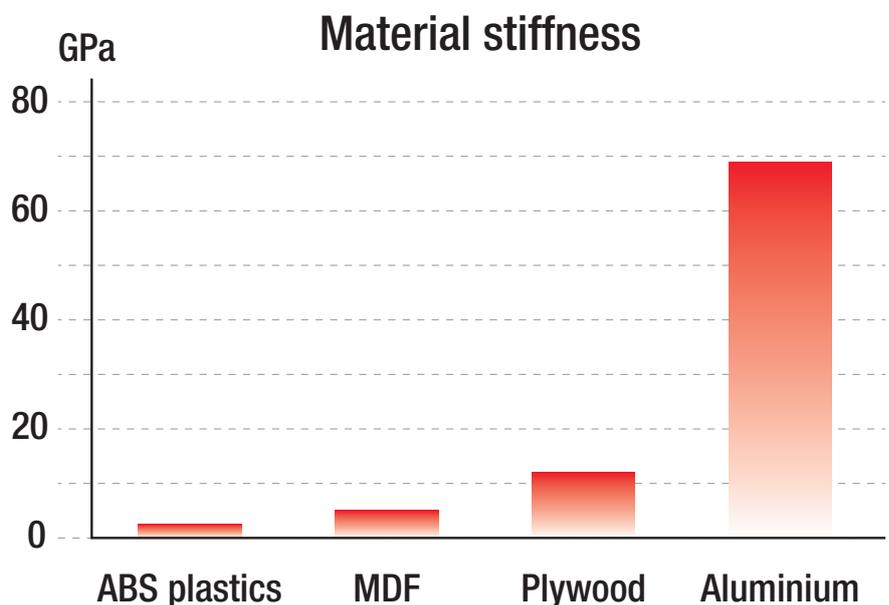
CABINET



The rigid structure of aluminium makes it possible to create elegant looking compact cabinet with a very large inner volume.

The main housing is based on a single piece of extruded aluminium. The internal strength of the aluminium gives us the opportunity to make the cabinet walls a lot thinner, than with traditional materials, and thereby gaining volume in a compact cabinet design. This can be done without losing the rigid structure that is all important to suppress unwanted resonances. Using aluminium makes it possible to not only create a compact cabinet that will be easy to place in any room, but also giving the KUBIK FREE a simple yet iconic look.

Showing a typical Young Modulus of 69 GPa aluminium is characterized by a stiffness approximately 15 – 20 times the value of MDF (Medium Density Fibreboard) – the most frequently applied cabinet material for high quality speakers.



The bottom side is constructed of a composite material and is where the main connectors are conveniently positioned. The blend of aluminium and composites enhances the cabinet's ability to eliminate resonances and other unwanted sound artefacts. Placing the connectors underneath the unit enables the flexibility to place the KUBIK FREE system on a flat surface or to hang it on the wall without the cables getting in the way. At the same time it also functions as a simple cable management system hiding the connectors from view.



Most of the connectors on the KUBIK FREE are conveniently hidden away in the bottom part of the unit for easy placement on a wall or a flat surface.

The wrap-around grilles are available in a choice of colours, with black, red, and white options available at launch. Six further colour options will be available shortly after, meaning end users can customise their KUBIK's to match the decor of the room.

Despite the KUBIK's compact size the aluminium housing leaves an impressive 4 litres of air for the drivers to work within. This volume enabled our acoustic engineers to give the KUBIK FREE a very large sound, and allows the KUBIK to reproduce clean, precise and natural bass.



WIDE DISPERSION



KUBIK FREE and KUBIK FREE XTRA have been designed so that the sound integrates in the best possible way with any room. Both the driver materials and the geometry applied within the KUBIK FREE system have been selected to achieve a wide dispersion pattern in the listening area.

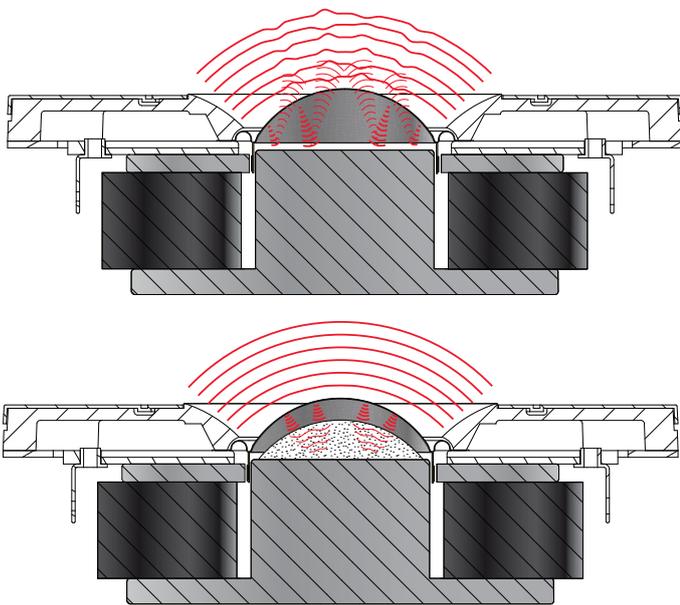
This gives you the experience of a well-integrated sound, even when listening at a significant offaxis angle, and as you are rarely placed directly in front of the loudspeaker when listening to music, this is very important. This becomes even more relevant if using the KUBIK FREE in a standalone situation where just one speaker is used to fill the entire room with music.



The wide dispersion characteristics also add to the flexibility of the KUBIK FREE system, making it possible to hang or place it flush against the wall, or position it on a table in the middle of a room. Placement of the KUBIKs close to or against a wall is however recommended for optimum bass reproduction.

The KUBIK FREE systems wide dispersion expand the optimum listening area compared to other systems and gives you the best recreation of the audio image even then you move around the room.

TWEETER



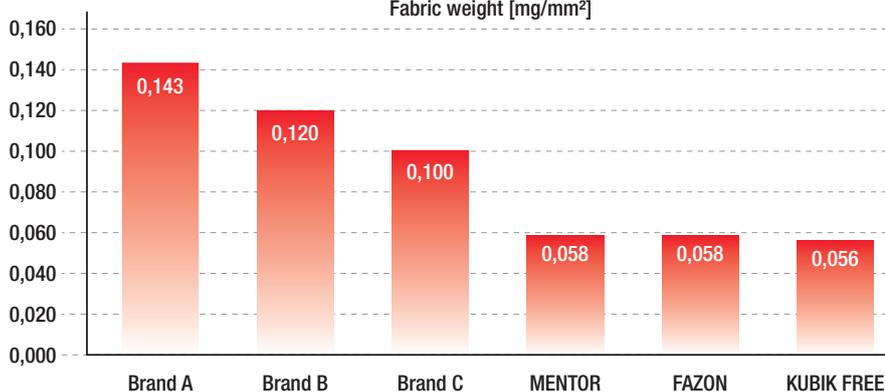
In the right light this fine fabric will reveal the soft felt damping on top of the pole piece. This damping material eliminates unwanted reflections that may occur from a traditional flat-surface pole piece, applied in simpler tweeter constructions. This is another example of the meticulous care for construction details that – altogether – allow an unfiltered reproduction of all the details in the music.

A crucial part of the DALI sonic definition is related to the use of the soft dome tweeter module. Optimised and enhanced over many years, the soft dome tweeter is built around a powerful ferrite magnet and very narrow magnet gap.

This type of magnet enables the KUBIK FREE system to handle more power and helps disperse the heat generated around the fast moving voice coil quicker, thereby reducing power compression. This in turn allows the tweeter to reproduce high frequencies with higher accuracy, giving the KUBIK FREE system an impressively detailed sound.

Softdome material comparison

Fabric weight [mg/mm²]



Ultra-light soft dome tweeter used in the KUBIK FREE system ensures effortless and unbiased reproduction of the finest details.

The KUBIK tweeter is constructed on the basis of an ultra light-weight weave fabric. Compared to most soft dome tweeters in the market the DALI dome material is less than half the weight.

The positioning of the tweeter front plate near the dome has been optimised to create the optimal working conditions for the soft dome. The aim is to combine an extended frequency response with wide dispersion and low coloration, and improve the integration of both the tweeter and the mid/bass driver.

WOOFER



The woofer used in the KUBIK FREE system is based on a lightweight non magnetic chassis and a powerful magnet motor system working together with the classic DALI wood fibre cone to reproduce true Hi-Fi sound.

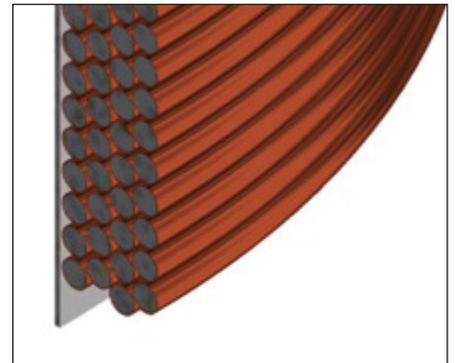
When building a high quality speaker system, high quality components are an essential part. This is why DALI only use drivers designed in house that is specifically developed for the individual loudspeaker, and to match the DALI sound philosophies.

Using a glass reinforced polymer we created a lightweight but extremely strong chassis for the 5" woofer. The nonmagnetic chassis increases the flux density in the magnet gap by 10%, adding more power and control to the magnet motor system.

The cone is connected to the chassis using a DALI low-loss surround. This give the cone undamped movement and helps retain the fine details in the audio signal even at low volumes. The

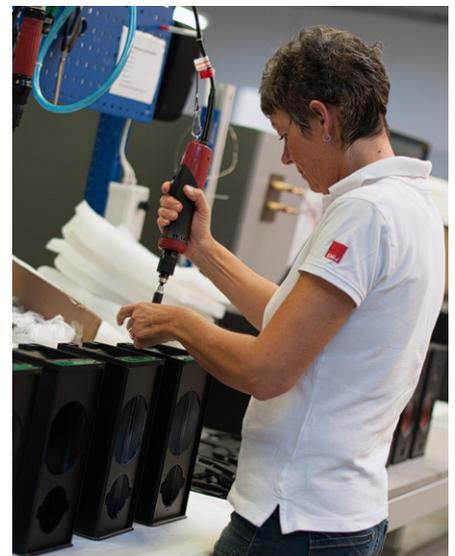
cone is made from a blend of wood fibre and paper pulp to give it a stiff, lightweight but well-behaving structure. Driving the wood fibre cone is a strong magnet motor system based around a four layer voice coil.

The decision to use a four layer voice coil is an important part of delivering the required sound pressure. Generating 17% more force than a two layer system, and 27% less electrical Q, it gives a significant improvement in control of the entire moving part of the system. To keep the voice coil light, a copper clad aluminium wire was used for the four layers. Using traditional copper wire would make the voice coil heavy, harder to control and therefore a tougher drive for the amplifier. A heavy voice coil can also cause massive loss of detail in sound reproduction.

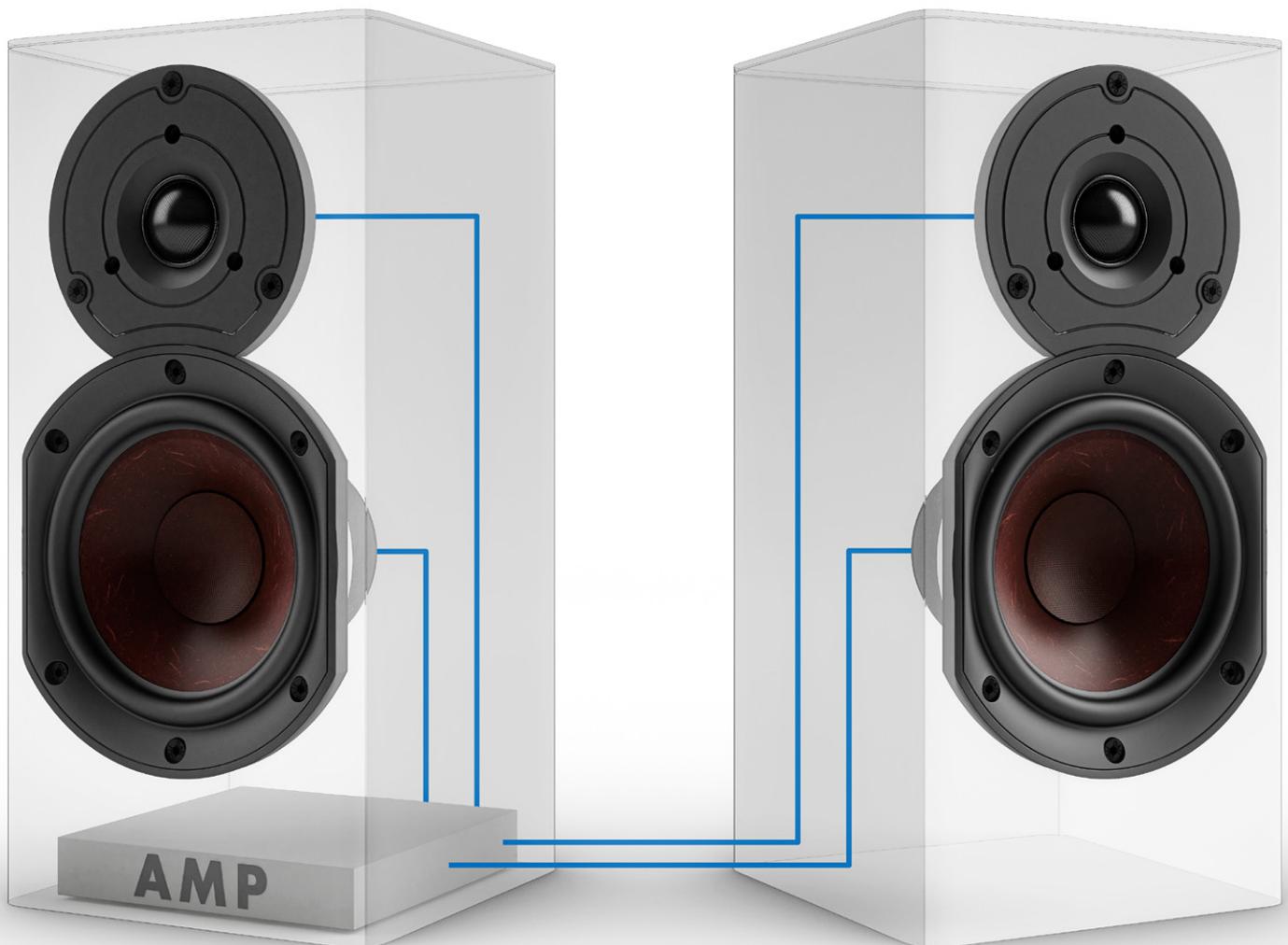


The 4-layer light-weight voice coil design is applied to create a high motor force, enabling both powerful and precise sound reproduction.

The combination of all of these low-loss technologies results in a serious improvement in bass control, reproduction of micro details, and greater transparency.



AMPLIFIER



The 4 channel stereo fully digital Class D open loop type amplifier uses a true active crossover to deliver the optimum audio signal to the individual drivers in the KUBIK FREE and the KUBIK FREE XTRA.

Picking the right amplifier for the KUBIK FREE system was no simple process. With many excellent choices available it came down to pure listening, a lot of listening. After picking the best possible solution, our R&D team set out to refine the amplifier, the power supply and the layout of the circuit board, to perfectly match the needs of the KUBIK FREE system.

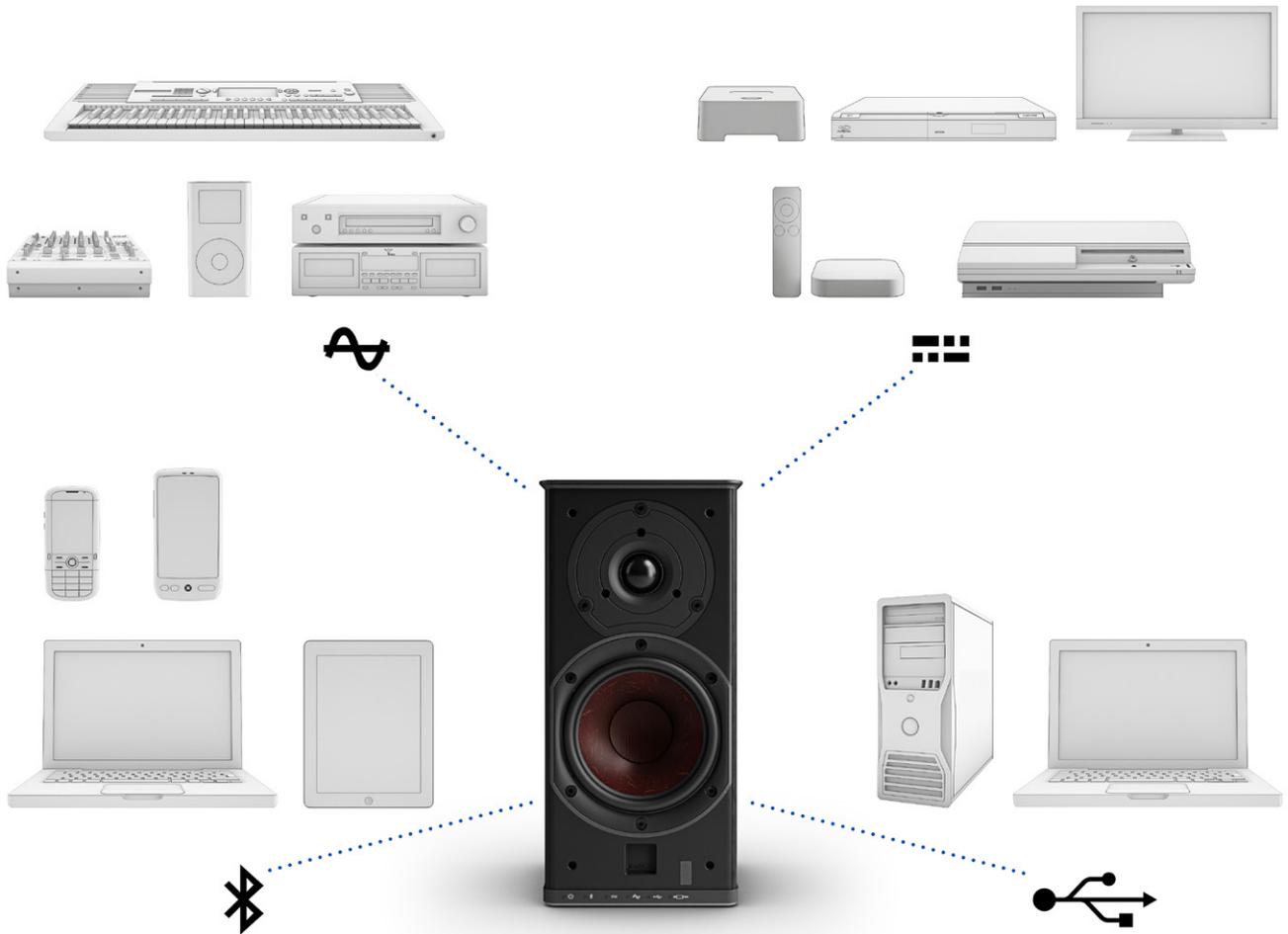
The 100 Watt Class D amplifier is a true active solution, offering a fully digital crossover, direct handling of digital sources and a high quality AD converter. The four channel stereo

amplifier (4 x 25 Watts) controls the audio signal to the woofer and the tweeter module individually. This is a major reason behind the high quality performance of the KUBIK FREE system since it makes it possible to control and optimize the audio stream perfectly for the drivers used in the KUBIK FREE system. Having that level of control lets the acoustic engineers transform every bit of information into accurate motion in the drivers.

A Switch Mode Power Supply offers consistent output, a compact size and a low heat emission. By integrating the SMPS into the KUBIK FREE the power

supply can be tightly optimised for the amplifier and the signal path between power supply and amplifier is shortened to almost zero elimination reactance. The integration also eliminates the need for a clumsy external power. At the same time the SMPS is less dependent on a steady mains supply compared to a traditional power supply, letting the KUBIK FREE system continue to work at maximum efficiency even in areas with fluctuating mains supply. With a maximum power output of 120 Watts the power supply will never become the bottleneck, and will even at peak levels be able to deliver the needed power to the amplifier.

CONNECTIONS



Bluetooth

Streaming is an important part of music enjoyment and blending this naturally into the KUBIK FREE system was at the top of the connection list. Streaming music can come from a variety of sources, but with mobile devices proving to be extremely popular, the need for a wireless connection is a must. Bluetooth is a wireless standard with almost 20 years of use in mobile and portable devices. By adding Bluetooth ver. 3.0 to the KUBIK FREE system DALI stays true to the goal of making an active speaker for everybody, and by offering the Apt-X protocol on top, even the most demanding of listeners get the best possible transfer of audio.

Optical (TOSLink) & IR Learning

When connecting an external speaker to a flat screen TV using an optical connection (TOSLink) is the best audio solution. The KUBIK FREE system not only offers an optical input, but also addresses the problem of volume control. An optical output has a fixed volume rendering the TV remote unusable to control the volume of

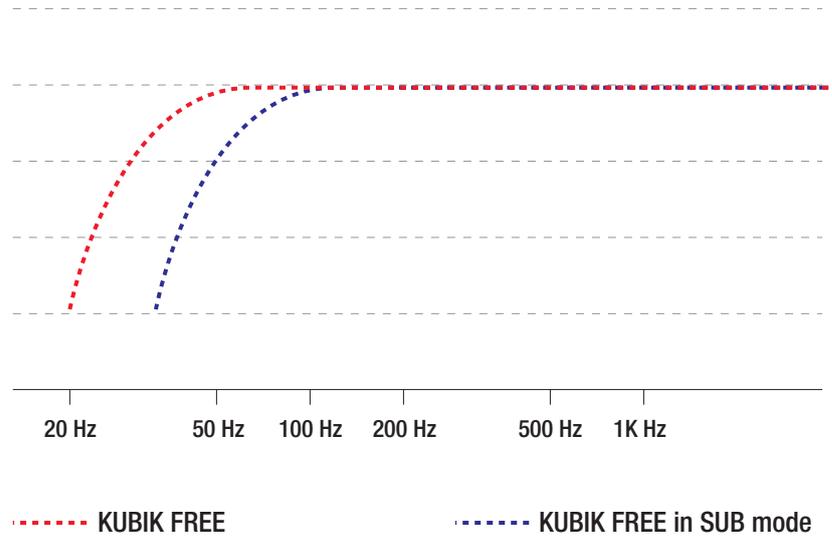
the external speakers. This is not the case on a KUBIK FREE system. Via an easy to use IR learning system built into the KUBIK FREE system, almost any remote control can be used to navigate every function. Control the volume, mute, power and source select in three easy steps. This sets the KUBIK FREE system apart for all other external TV speakers systems and makes the KUBIK FREE system easy to use and setup.



The front facing multi-functioned LED panel indicates the active input, the Bluetooth state and if the KUBIK FREE is on, off or muted.

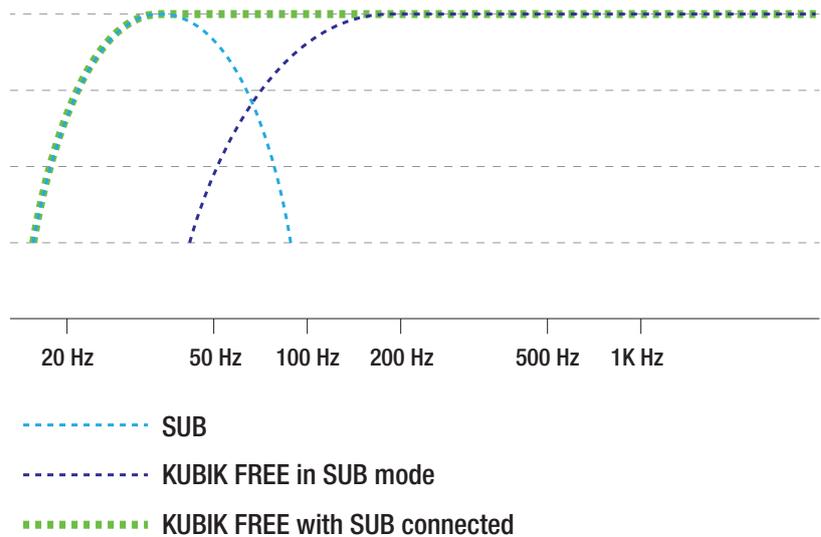
Subwoofer

If using the KUBIK FREE system in larger room or in a TV environment extra bass can improve the audio experience greatly. The KUBIK FREE lets you connect any active subwoofer directly. Connecting a subwoofer is automatically detected and the audio settings of the KUBIK FREE changes so the amplifier automatically sets the crossover point so anything below 80Hz is diverted to the Sub. This is very important since it will increase the maximum SPL from the KUBIK FREE system substantially.



Analogue

The KUBIK FREE system offers two means of analogue input. A RCA (AUX) connector is placed underneath the unit along with the other inputs, and a 3.5mm stereo mini-jack connector that is placed conveniently on the control panel on the side of the KUBIK FREE. The mini-jack input can be used to quickly connect a mobile audio source, such as an iPod or any other MP3 player, to the KUBIK FREE system. Whenever a mini-jack connector is inserted into the KUBIK FREE system it automatically switches to that input source, making it easy and simple to quickly play music from a visiting music player.



USB

If playing audio from a PC or Mac, using the KUBIK FREE system as an external speaker is possible via the USB audio connector. Offering an easy and driver free interface to the PC or Mac it is the perfect choice for your desktop audio system.

a USB charging output onto the back panel of the KUBIK FREE. This lets you charge phones and even tablets whilst enjoying your music.

USB Charge & KUBIK FREE XTRA connector

Streaming music via Bluetooth from a phone or tablet can lead to a quicker drain on the battery. With this in mind, DALI chose to integrate

Connecting a KUBIK FREE XTRA is done via the special connector in the bottom of the KUBIK FREE. The 6 wire connector cable transfers the signal to the woofer and tweeter module individually utilizing the active crossover in the KUBIK FREE, and also powers the indicator LED for easy access to a visual status check of the KUBIK FREE system.



APPLICATION



DALI KUBIK FREE and DALI KUBIK FREE XTA in Black together with the DALI FAZON SUB1.

The flexibility and connectivity of the KUBIK FREE system is so broad that you can think up an almost unlimited way to use it, but there are a couple of environments that warrant a mention here:

Living rooms are still one of the most frequent places to listen to music and enjoy movies. Setting up a KUBIK stereo system in the living room is a perfect way of getting the most from your audio sources and getting rid of complicated and bulky audio systems.

Flat screen TV's have very little space for decent speakers and most often the sound is awful. The KUBIK FREE stereo system gives back the full enjoyment of all TV moments by delivering controlled bass in movies, clear and understandable voices when watching the news and a perfect harmony of both when enjoying any type of concert or musical performance.

Kitchens have evolved into the main meeting place in many households over the years, and enjoying great sounding music while working or socializing can

be an important part of the experience. Using the KUBIK FREE as a standalone system makes it very easy to place and using the Bluetooth connection from a phone or tablet makes playing music extremely convenient. In bigger kitchens where a stereo set up of the KUBIK FREE system is possible, connecting a steaming device directly to the KUBIK FREE can add to both the ease of use and to the audio quality.

DALI's goal of creating an elegant looking high quality sounding active speaker is very much achieved with KUBIK FREE system. Adding the wide selection of connections and the flexibility of the KUBIK FREE system makes finding a use for it very easy and even fun. With the KUBIK FREE and the KUBIK FREE XTRA, DALI has set the bar in the high-end lifestyle active speaker segment and we invite you will follow us there for endless hours of easy enjoyment.

