



IN ADMIRATION OF MUSIC



DALI SUB E-12 F

TECHNICAL WHITE PAPER





INTRODUCTION

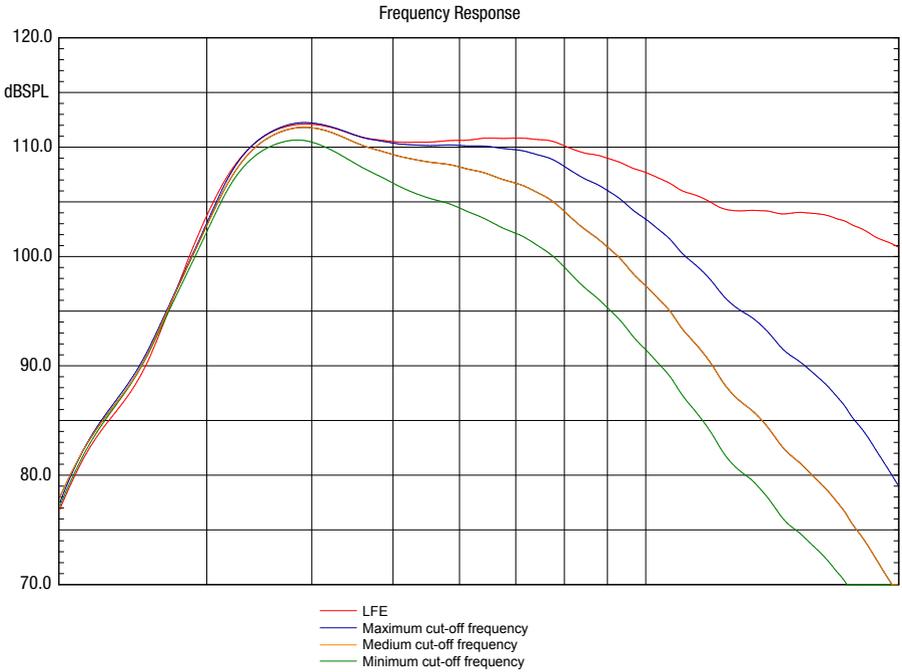
Developing a DALI subwoofer involves the same meticulous attention to detail as you will find in the development of a DALI speaker. Our R&D team consistently strive to generate the most natural, yet entertaining, sound – at any price point. That goes for the DALI SUB E-12 F as well.

Today a subwoofer is considered a natural part of any multi-channel sound system, and in many stereo systems as well. With the development of

the SUB E-12 F DALI wanted to create a true versatile product, able to competently match speakers from entry- to mid-level.

This whitepaper takes you ‘behind the scenes’ of the DALI SUB E-12 F, highlighting some of the details which – when joined together – ensure a true DALI experience.

Enjoy...



SUB E-12 F frequency response at different low-pass values.

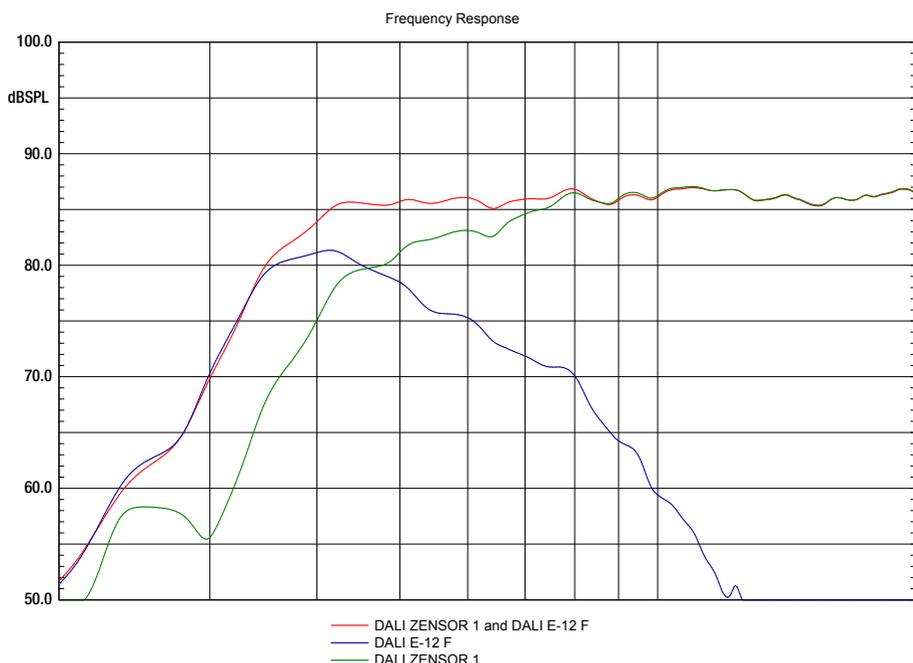
ACOUSTIC BACKGROUND

Unlike many subwoofers in the market the DALI SUB E-12 F has been engineered to perform equally well on both music and movies. It is important to us that a subwoofer is capable of rendering a performance true to the input signal. Therefore a DALI subwoofer is everything but a 'boombox'.

Over the years DALI's engineers have developed a set of sound design principles. Today these are applied in the creation of basically any DALI speaker. Naturally our subwoofers must be able to enter into any setup without sacrificing the purpose of providing wide dispersion, time coherent and low-loss performance.



You can read more about our sound design principles at www.dali-speakers.com



The DALI SUB E-12 F clearly has its heart set on high fidelity.

Properly set up it has a superior ability to integrate with the front speakers providing more than just an extension of the low frequency range. In fact a perfect subwoofer integration will increase the sonic value of any smaller front speaker by enabling it to reproduce all fundamental tones properly, both in respect to gain and phase.

This measurement displays the SUB E-12 F connected to a pair of ZENSOR 1 in stereo mode. Note the perfect phase integration and the summing of the main and sub signal.



Any risk of port noise derived from the down-firing bass vent itself is seriously reduced by its convex tapered design. Apart from the shape of the flares the vent has also undergone extensive testing, measuring and listening when it comes to dimensions and placement, in order to optimize interaction with the cabinet and woofer.

CABINET

Built on almost 30 years of knowledge in acoustics and cabinets, the solid MDF cabinet abides the tough DALI specifications.

The enclosure comes in a choice of a Black ash vinyl finish with a Satin Black baffle and a White finish with a Satin White baffle.

The Satin Black finish comes with a grille in Shadow Black and the Satin White finish with a grille in Mountain Grey.

The entire cabinet is effectively decoupled from the floor by means of a sleek aluminium base. Almost appearing to hover above the floor the distance of 30 mm eliminates any potential turbulence from the space between the cabinet and the floor itself. Still, the proximity to the floor ensures that the benefit of having a down-firing vent is maintained; a higher efficiency and more freedom in positioning.



Mountain Grey

Shadow Black

WOOFER

The DALI SUB E-12 F incorporates a large woofer with aluminium cone. This stiff, yet lightweight, material was chosen to ensure a greater transient response as you would normally expect from a subwoofer in this category. Very much in line with DALI's philosophy in building speakers, the ability to start and stop very quickly enables easy integration with the front speakers. This goes for smaller front speakers as well.

Designed to be a closed cone you will find no dust cap. Instead it is an integrated part of the cone itself. This is also a contributing factor in ensuring a piston-like behaviour. Consequently distortion is kept to an absolute minimum – especially in the low frequency area which is where the subwoofer operates.

The engine of the woofer is built around an 'oversized' ferrite magnet, and optimized for maximum flux within the voice coil gap. The reason is that it was crucial for the project team to reach a high B/L product to enable the SUB E-12 F to render the finer low frequency details of music, also at a higher sound pressure level. The measured B/L value of 14 N/Ampere is a good indication of the level of control and precision that was reached, and rarely to be found in this category at all. And the numerous listening sessions has truly convinced us that this was the right way to go.



One of the inherent abilities of pure aluminium is an extreme rigidity, measuring a Young's modulus of 69 GPa. In comparison the typical paper cone material measures 4 GPa.



The woofer for the SUB E-12 F was developed from scratch by DALI's acoustic engineers.

The voice coil is 26.5 mm long, and built for long excursions. It is vented to ensure aircooling to the system, and the coil itself. Venting this 4-layer voice coil keeps the temperature down, and the benefit is a stable impedance response.

Also the pole piece is vented for maximum cooling. Here the venting has another purpose too; it reduces internal compression in the motor

system. This ensures free movement of the cone without any over-/underpressure affecting the performance.

Adhering to the low-loss sound design principle, the surround of the woofer is built to allow long and linear excursion. The oversized suspension is designed to allow both weak and strong transients to turn into undistorted acoustic signals.



The high-efficiency amplifier needs no external heat sink

AMPLIFIER

The integrated 170 Watt RMS Class D amplifier is a highly linear construction. The DALI SUB E-12 F will follow and render the required signal with an absolute minimum of bias. Designed not only for continuous power, but also for peak power, this subwoofer is able to deliver 220 Watt Peak Power. This is very relevant when it comes to both movie and music signals.

Switchmode power supply is part of the reason for very low power consumption - only 0.4 Watt in stand-by mode. And the amplifier displays an impressive efficiency of 70%. In unison the high-efficiency amplifier section and power supply construction generate an absolute minimum of heat loss. For that reason you will find no external heat sink on this subwoofer.

To improve sound reproduction in general, and to ensure that this subwoofer is able to perform under difficult circumstances, a limiter has been incorporated in the amplifier section.

The integrated limiter works in two areas: It compares the input signal amplitude to the potential output signal level, and it compares the available supply voltage from the power supply to the expected output signal. If any of these comparisons show that there will be a problem then the limiter will cut the signal in a soft manner and without affecting peak power.

Fitted with controls for gain, cut-off frequency, and phase, the DALI SUB E-12 F will adapt to any front speaker and room acoustics. And with a choice of LFE and LINE inputs it can be connected to almost any amplifier, receiver or processor.



APPLICATION

The front grille is held in place by concealed magnets, making it easy to remove it from the baffle. With the grille fitted the subwoofer discreetly blends into most domestic environments with its stylish Satin Black front baffle. Removing the grille reveals the impressive woofer with a laser-engraved DALI logo. Available in Satin Black and Satin White finishes, the SUB E-12 F is the natural companion for many DALI speakers. It will complement any OBERON and OPTICON MK2 system.

The Satin Black finish includes a Shadow Black grille and the Satin White finish a Mountain Grey grille.

And importantly; the design, technology, and construction of this subwoofer makes it a perfect upgrade of a speaker system of another brand. Whether it's a 2.1-, 5.1- or 7.2-channel system – or something in between – the DALI SUB E-12 F will take natural sound one step further.



TABLE 2 - DALI SUB E-12 F TECHNICAL SPECIFICATIONS

DALI SUB E-12 F	
Frequency Range [+/- 3] dB [Hz]	28 - 190
Input Impedance [kohm]	25
Maximum SPL [dB]	112
Crossover Frequencies [Hz]	40 - 120
Low Frequency Driver(s)	1 x 12" long stroke
Enclosure Type	Bass reflex
Bass Reflex Tuning Frequency [Hz]	36.0
Connection Input(s)	RCA, Stereo (low-pass filtered) LFE (Mono)
Recommended Placement	Floor, near wall or corner
Magnetic Shielding	No
Max. Amplifier Power Output [RMS Watts]	220
Continuous IEC Power Output [RMS Watts]	170
Max. Power Consumption [Watts]	250
Dimensions (H x W x D) [mm]	370 x 340 x 380
Dimensions (H x W x D) [inches]	14.6 x 13.4 x 15.0
Weight [kg/lb]	14.7/32.4

All technical specifications are subject to change without notice.



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Designed and Manufactured in Denmark | www.dali-speakers.com