CAR & HiFi

INTERNATIONAL

1/25 · 4,80 €

European Edition

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- Smart display head unit • 2 Smart subwoofers

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- Audio System Germany • ESX
- Ground Zero • Helix, Musway

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Season 2025

Spring is coming, and with it a blaze of innovations that promises to be something truly special this year. 2025 continues to be a very special year for Ground Zero, as the long-established Bavarian company is celebrating its 30th birthday! We'd like to say „Congrats" now, and anyone who would like to congratulate them will have the perfect opportunity to do so in May in the beautiful city of Salzburg/Austria. CarMedia-World will take place at the exhibition center on the Salzach River from May 16th to 18th, as in previous years, together with the Customized Tuning Show. Those interested in home hi-fi can also stop by Munich on the way, as High End will be taking place there at the same time this year. 2025 will be a year of high fidelity, and we're looking forward to it!

Elmar Michels
Editor-in-chief

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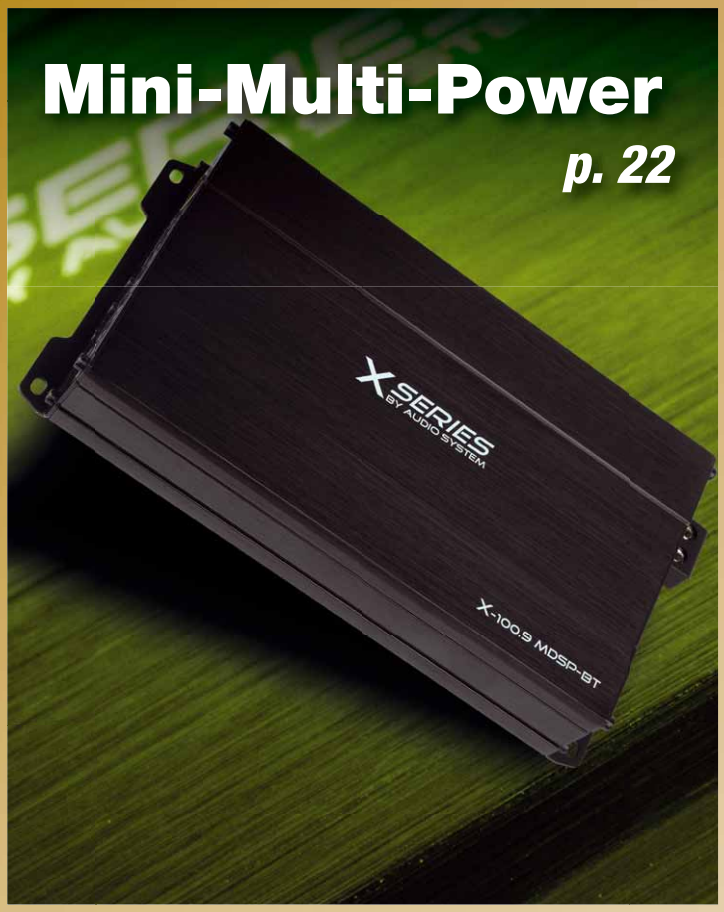
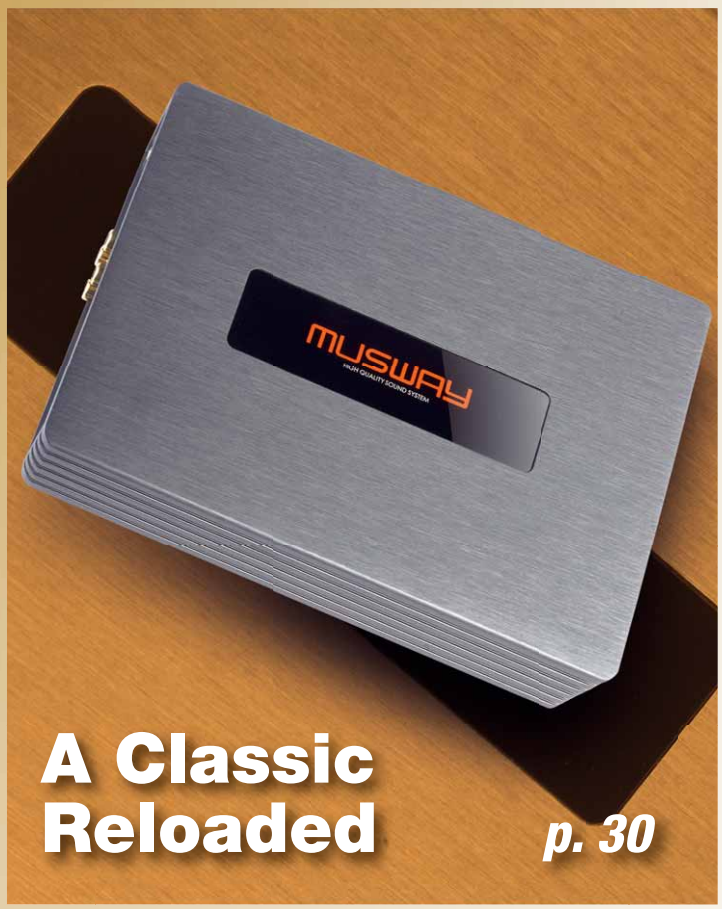


Mini-Multi-Power

p. 22



A Classic Reloaded

p. 30

They always fit

p. 36

Tests

Categories

Helix Compose Tweeters

With the Ci5 T25FM-CA, Helix presents a pair of 25mm tweeters for retrofitting high-quality car audio systems. The Ci5 T25FM-CA impresses with excellent dispersion characteristics and realistic high-frequency reproduction thanks to its ceramic-coated aluminum dome and highly efficient neodymium magnet. Its robust aluminum housing and integration-friendly design with flexible mounting options, including numerous new FlexMounts, make it ideal for OEM installations.

- ***www.audiotec-fischer.com***

NX Amplifier Series

The new NX series in miniature format from Musway represents the next generation of amplifiers with all the key attributes such as efficiency, compactness, and maximum connectivity. With over ten models, the NX line offers a full range of powerful miniature amplifiers needed for multi-channel systems with stand-alone DSPs.

- ***www.musway.de/english/***

New Helon Amplifier

In addition to the powerful mono amplifiers of the Helon series, Audio System Germany now also introduces a four-channel amplifier, the H-1400.4 D. It features Class D technology and, like all amps in this series, is also available as a 24-volt version for buses and trucks. It offers plenty of power: The H-1400.4 D is 1-ohm stable and will then deliver 4 x 350 watts.

- ***www.en.audio-system.de***

MUSWAY

THE DSP EXPERTS

Also controllable via smartphone with the MUSWAY TUNEST app

6 amplifier channels plus 8 DSP channels

BEST PRODUCT
Spitzenklasse
CAR&HiFi 1/2025

EMV-TIPP
Ungestörter Radioempfang
CAR&HiFi 1/2025

Musway M6v4
Spitzenklasse 1,1
CAR&HiFi 1/25
Preis/Leistung: hervorragend

2025 PRODUCT OF THE YEAR CAR&HiFi

M6v4 NEW

6-Channel Class D Amplifier with 8-CHannel DSP incl. ISO plug+play cable set
Now with the new Musway v4-DSP chipset with more power and better THD
6 x 80/130 Watts RMS @ 4/2 Ohms, 3 x 260 Watts RMS @ 4 Ohms bridged
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TECHNIK FÜR KLANGBEGEISTERTE

Universal for vehicles with DIN slot

Moniceiver ESX VMX900DAB tested

The Trick with the Click

The latest screen radio from ESX offers a 9-inch monitor with a sophisticated click-holder.

VERSATILITY AWARD
Upper Class
CAR&HiFi INTERNATIONAL 1/25


ESX VMX900DAB
Starten auf Am Breilingsweg
Rechts abbiegen
Rosenstraße
Heidigstraße
13:16
Ankunft
8
Min.
3,4
km
Kalender

The 9-inch monitor can be attached and removed with a single click

In the fall of 2024, ESX launched the VMX700DAB, an affordable moniceiver that impressed our testers with cutting-edge technology and a comprehensive range of features (see CAR&HIFI 6/24). The 7-inch device also won over specialist dealers and customers, quickly becoming a bestseller in Audio Design's lineup, the company behind ESX.

Detachable monitor

The new VMX900DAB is now also based on the proven technology of VMX700DAB. While the 700 is a device in standard 2-DIN format, the 900 features a modular concept. The case is in 1-DIN format and can be universally installed in various vehicles. The screen, which has touch control along with a control dial, boasts an impressive 9-inch diagonal (approximately 23 cm). Once the casing has been wired and installed, the monitor simply plugs in from the front and clicks into place. This click bracket is extremely sturdy, and the angle of the display can be adjusted as needed.

Quick access to Car Play and Android Auto

Access to many apps from your iPhone or Android cell phone

The display can be removed as quickly as it is mounted. To do this, simply press two buttons located behind the display, and you can easily pull it off. This straightforward assembly and disassembly process offers several advantages. The display can be brought into the apartment during extended periods of inactivity, and the device left in the vehicle becomes worthless to thieves. Additionally, Audio Design plans to offer displays in 10 and even 12 inches for the ESX soon, which can then be easily plugged into the same housing. Finally, in the unlikely event that the monitor is ever defective, the customer can easily remove the display and send it to the Audio Design Service. This eliminates the more labor-intensive process of removing and installing the entire device and reduces costs.

Car Play and Android Auto

As mentioned earlier, the VMX-900DAB is fundamentally based on the VMX700DAB. This indicates it also provides the same extensive range of features. It supports both Apple CarPlay and Android Auto, offering the best way to legally and safely use many smartphone apps while driving via the car radio. In addition to music players, telephony, and messaging services, the respective navigation solutions and voice controls can also be accessed in the vehicle. The built-in microphone or an external one (included) can be used for this purpose. The ESX also comes equipped with its own GPS antenna for determining location when using CarPlay or Android Auto wirelessly. Additionally, the active antenna for receiving digital radio is included.

Includes microphone, DAB, and GPS antenna

Back of the 1-DIN body

Connectors and audio

When it comes to connectivity, the 9000 matches the 700 with 2 USB ports, camera inputs, three pairs of preamp outputs, AV-in, and connections for WiFi and Bluetooth devices. You can connect and program analog steering wheel remote controls.

The moniceiver features a ten-band graphic equalizer to adjust the frequency response. Users can easily program it or choose from five presets tailored for various music genres. The balance, fader, and loudness settings are switchable. A low-pass filter, which can be set between 50 and 160 Hz, allows for subwoofer separation, and its level is also controllable.

Operation and measurements

The VMX900DAB features the same user interface as the VMX700DAB. We appreciated the clear structure and large buttons on that device. The large 9-inch monitor enhances operation, and the volume control is an added benefit.

The reasonably priced ESX VMX-700DAB impressed us with near-perfect measurement values that seemed straight out of a textbook, featuring a powerful 4.5V pre-amplifier output. Built on this technology, the VMX900DAB performs equally well on the test bench.

Conclusion

With the ESX VMX900DAB, Audio Design introduces a 9-inch monitor radio featuring a well-designed and practical click system. It also impresses with modern wireless smartphone connectivity and clean technical engineering at a pleasantly affordable price.

Dipl.-Phys. Guido Randerath

Specifications

Amplifier power	15
Output voltage/V	4.5
USB	
THD+N (%)	0.007
SNR (A)	91
Tuner	
THD+N (%)	0.028
SNR (A)	61
Crosstalk (dB)	45
Monitor size (cm)	22.8
Touchscreen	•
Dual Zone	–
Dolby Digital / Pro Logic decoder	–
Parametric/graph. EQ bands	– / 10
Crossovers	TP
Delay correction	–
Pre-outs	6
AV-in / AV-out	• / –
Digital output	–
Connection camera / navigation	2 / –
USB front / rear	– / 2
iPod control	•
Bluetooth HFP/A2DP	• / •
Other	CarPlay / Android Auto

The ESX VMX900DAB is a good fit

In vehicles with a DIN slot, installation adapters can be found at specialist retailers for many other cars. Precautions should be taken to ensure that the monitor does not block any critical vehicle controls (e.g., hazard warning lights).

ESX VMX900DAB

Price	450 Euro
Distributor	Audio Design, Kronau
Internet	www.esxnavi.de

Rating

Sound	20 %	★★★★☆
Bass	4 %	★★★½☆
Neutrality	4 %	★★★★★
Transparency	4 %	★★★★★
Three-dimensionality	4 %	★★★½☆
Dynamics	4 %	★★★★★
Image	20 %	★★★★☆
Sharpness	3,3 %	★★★★★
Brightness	3,3 %	★★★½☆
Contrast	3,3 %	★★★½☆
Color reproduction	3,3 %	★★★★★
Viewing angle	3,3 %	★★★★★
Reflection	3,3 %	★★★½☆
Lab	15 %	★★★★★
• USB	7,5 %	★★★★★
Distortion	3,75 %	★★★★★
Signal to noise ratio	3,75 %	★★★★★
• Tuner	7,5 %	★★★★★
Frequency response	1,88 %	★★★½☆
Crosstalk	1,88 %	★★★★★
Distortion	1,88 %	★★★★★
Signal to noise ratio	1,88 %	★★★★★
Practice	45 %	★★★★★
Handling	10 %	★★★★★
Features	20 %	★★★★★
Reception test	10 %	★★★★★
Processing	5 %	★★★★★

Upper class

★★★★★

CAR&HiFi INTERNATIONAL Germany 1/25

Price/performance: excellent

„Large screen with practical click-on mount“

HX SERIES
SUBWOOFER

since 1988
AUDIO SYSTEM
german sound

Audio System HX12 Flat Evo
Spitzenklasse 1,2
CAR&HiFi 6/23
Preis/Leistung: sehr gut
„Sehr performanter Flachwoofer."

HX 10 FLAT EVO
- 2x 150 WRMS
- 2 Ohm Impedance

HX 12 FLAT EVO
- 2x 200 WRMS
- 2 Ohm Impedance

KLANGTIPP
Spitzenklasse
CAR&HiFi 1/2024

Audio System HX10 Flat Evo
Spitzenklasse 1,2
CAR&HiFi 1/24
Preis/Leistung: sehr gut
„Gut gemachter Premium-Flachsubwoofer."

KLANGTIPP
Spitzenklasse
CAR&HiFi 2/2024

Audio System HX10 Evo
Spitzenklasse 1,2
CAR&HiFi 2/24
Preis/Leistung: sehr gut
„Gut ausbalancierter Subwoofer für Klangfreunde."

HX 08 EVO
- 2x 150 WRMS
- 2x 2 Ohm Impedance

HX 10 EVO
- 2x 200 WRMS
- 2x 2 Ohm Impedance

HX 12 EVO
- 2x 250 WRMS
- 2x 2 Ohm Impedance

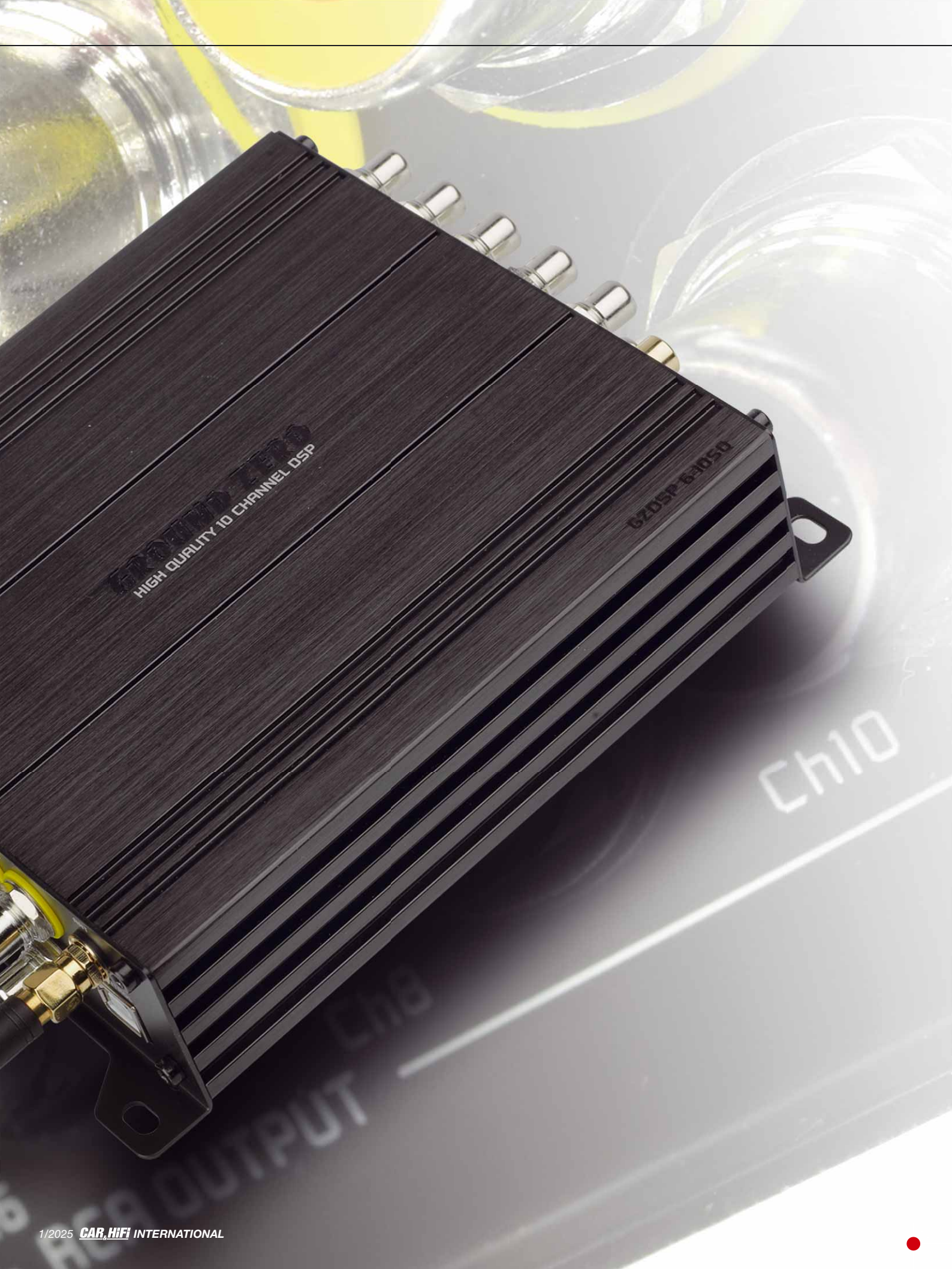
INFORMATIONEN / AUDIO SYSTEM FACHHÄNDLER FINDEN SIE UNTER:

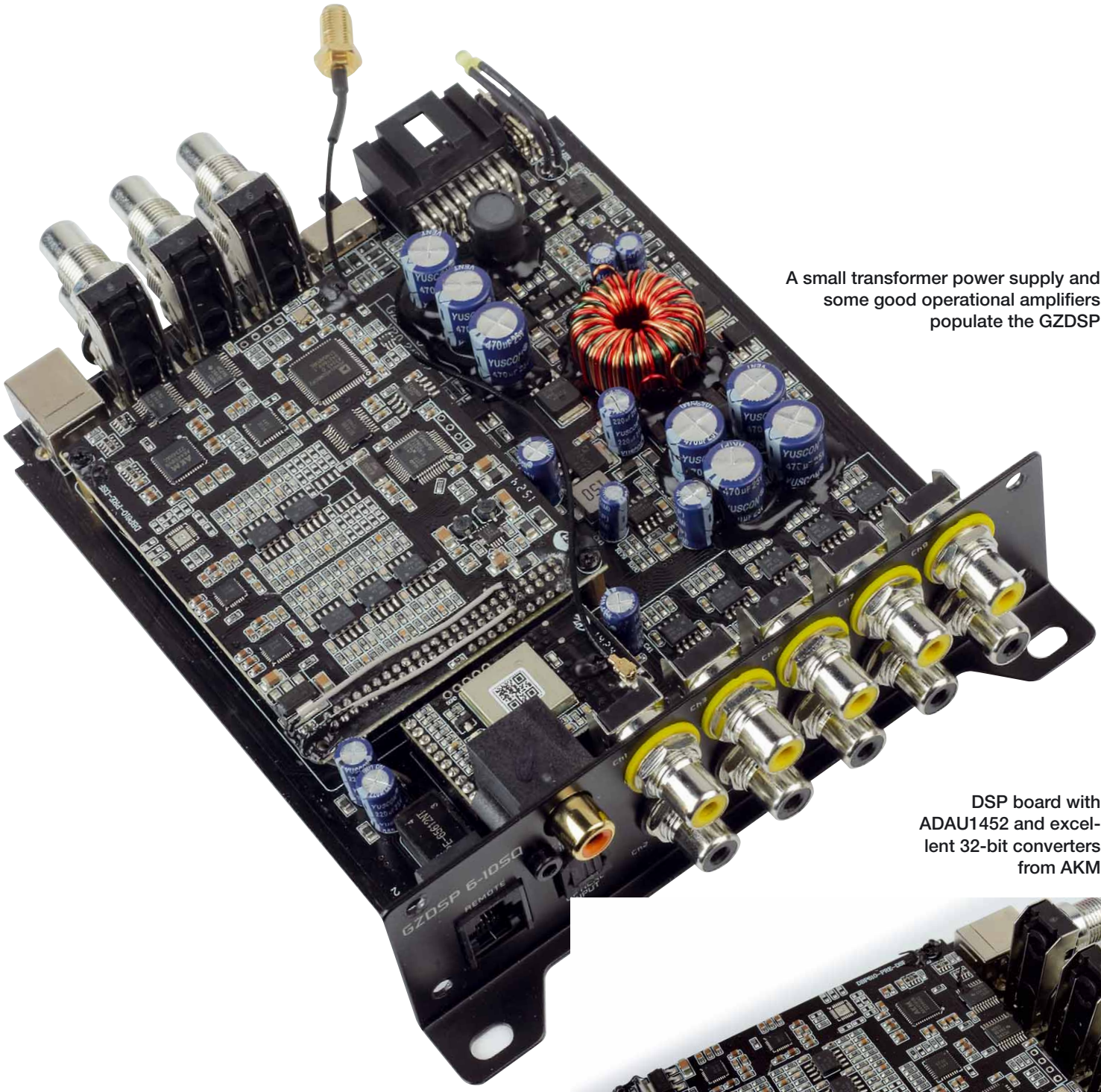
WWW.AUDIO-SYSTEM.DE

GZDSP 6-10SQ – 10-Channel DSP from Ground Zero

Sound Quality DSP

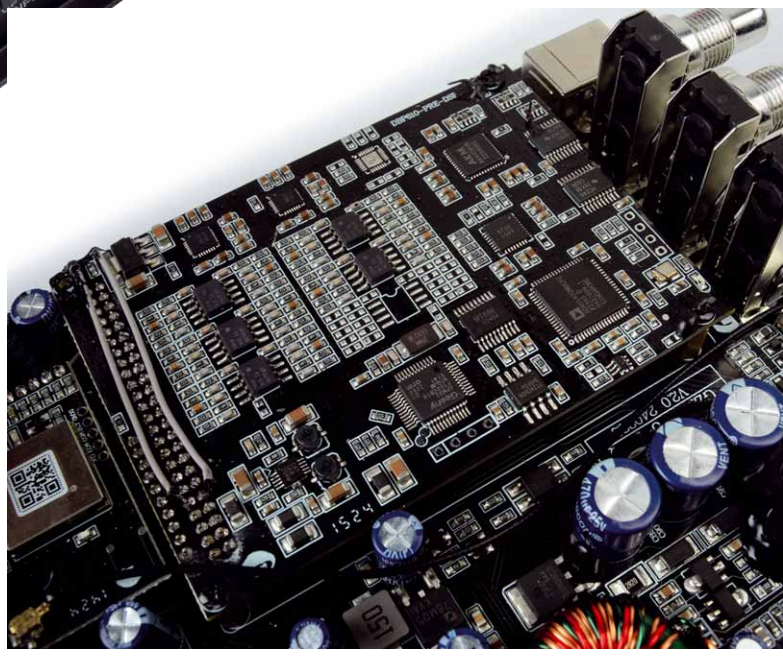
Ground Zero comes with a brand-new signal processor, the GZDSP 6-10SQ, which is uncompromisingly designed for sound quality. We'll do the test.


HIGH QUALITY 10 CHANNEL DSP
GZDSP-6150
Ch10



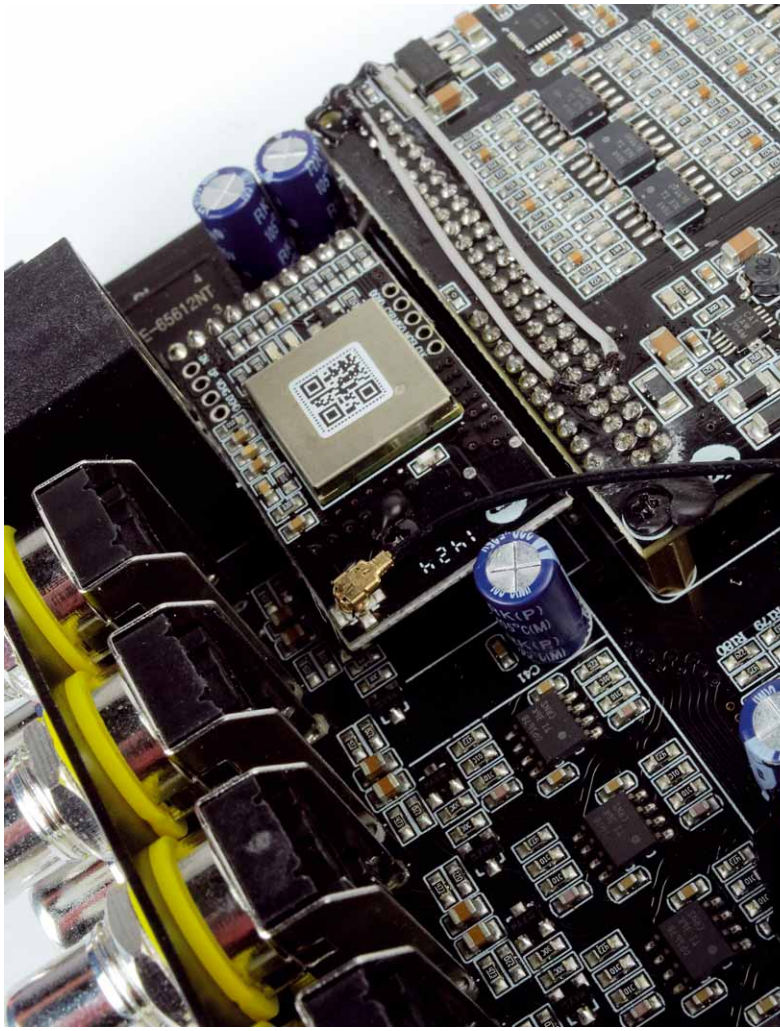
A small transformer power supply and some good operational amplifiers populate the GZDSP

DSP board with ADAU1452 and excellent 32-bit converters from AKM

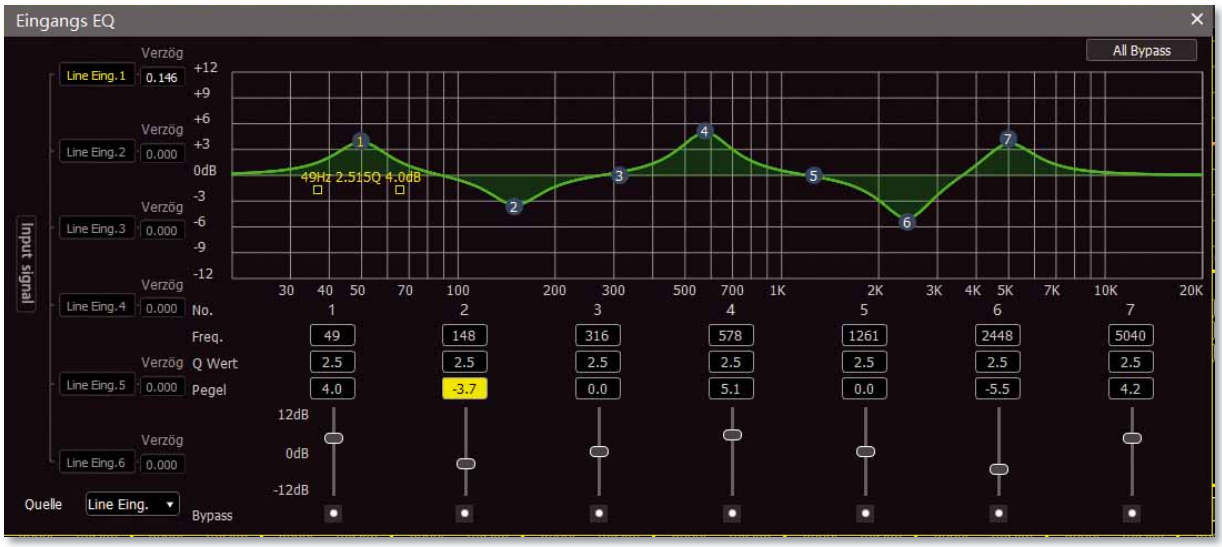


Ground Zero made a name for itself in the field of DSP in 2020 when the Egmating-based company introduced the GZDSP 4-8XII. This unit first attracted attention with its entry-level price of just 250 EUR. Now, with the GZDSP 6-10SQ, a much more ambitious device is coming onto the market that has SQ in its name and

wants to offer its features to a sound-oriented clientele. Initially, The device has six analog inputs and 10 outputs, making the DSP suitable for a wide range of vehicles and vehicle equipment. The six inputs are available as low-level in the form of RCA jacks, as are the 10 outputs, all very solidly screwed to the front of the housing with union nuts. The high-level inputs are part of a cable harness that also contains the power supply. There is a protection circuit for diagnostic head units that simulates loudspeakers and switches off after a short time so that no unnecessary power flows because the head unit is constantly pumping the dummy resistors hot. There is also an automatic switch-on via DC offset on the part of the original radio. Furthermore, a ground-lift jumper is provided to prevent humming, which can be set to ground, without ground, or 200 ohms to ground. Finally, there is a network socket for the optional remote control, which has a small display and controls the basics, such as SPL (master and sub), source selection, and the selection of the 10 presets. In addition to the analog inputs, Ground Zero offers three digital inputs: an optical and coaxial S/PDIF input for digital stereo and Bluetooth audio streaming in the best BT 5.0 quality. The Bluetooth connection can also be used to program the DSP, either with an iPhone or an Android phone. Desktop software is also available for a wired USB connection, with the Ground Zero software being one of the solutions that displays all the essential information in a single main window.

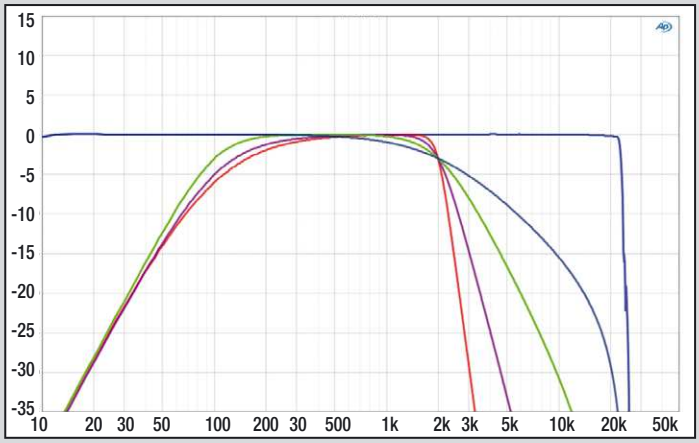


Bluetooth 5.0 is on board as standard for both programming and streaming

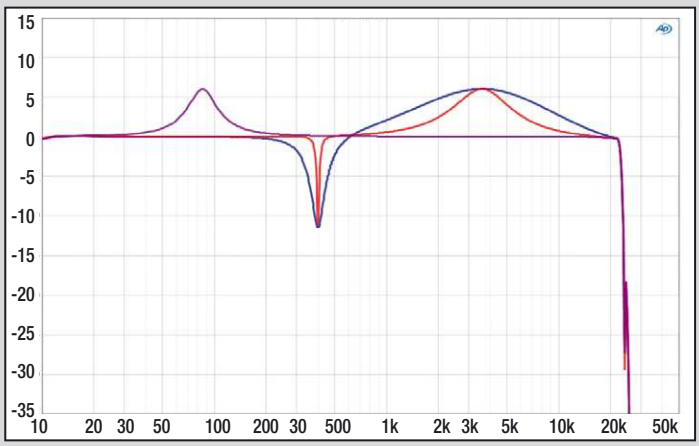


The inputs have their own time alignment and a 7-band EQ

CAR&HIFI Laboratory

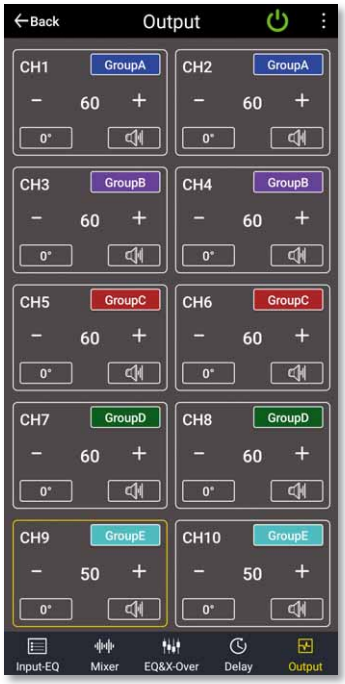


With 10 channels, many inputs, and a single-core DSP, the audio bandwidth, unfortunately, only extends to about 22 kHz. The crossovers offer up to 48 dB steepness, with a low-pass Butterworth 6 - 48 dB and a high-pass 12 dB Bessel, Butterworth, and Linkwitz.

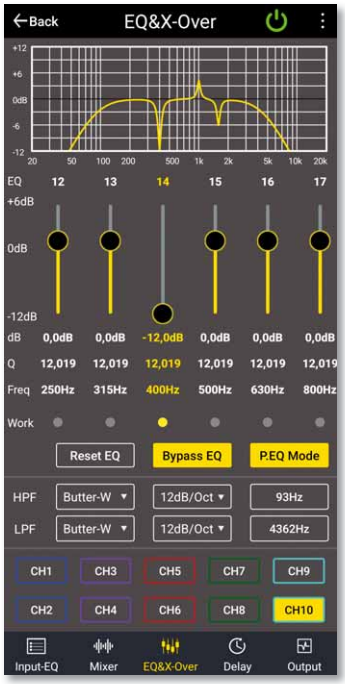


There are plenty of parametric EQ bands: 31 for each output and seven each for high-in, low-in, Bluetooth, coaxial, and Toslink.

The GZDSP offers many digital and analog sources. The RCA jacks are very well fixed with lock nuts



10 outputs in 5 possible groups are waiting for their SPLs and polarities



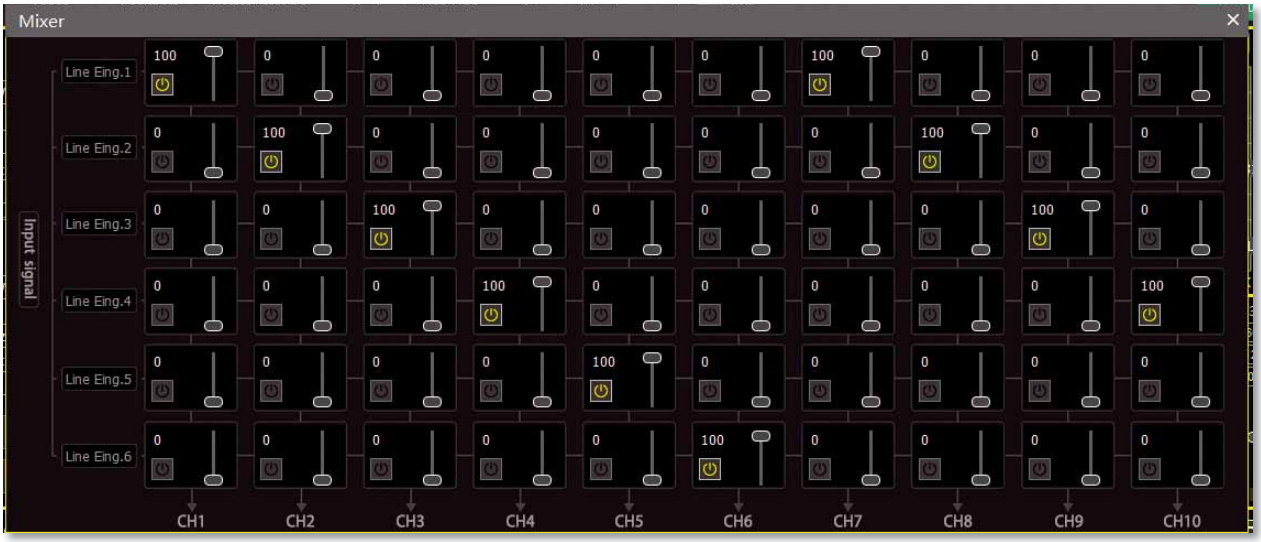
Crossovers and EQs share an app screen

Internal construction

Let's look at the inner workings of the DSP 6-10SQ, where Ground Zero has installed many excellent components. First of all, of course, in the DSP, which is located on a daughterboard "on the first floor." We have

The app works as a remote control for volume, presets, and sources

The time alignment in the app even offers a picture with (standard) speaker positions



The mixer is straightforward and, of course, available for each input

the 32-bit ARM processor, which, as a microcontroller, takes care of the interaction between the DSP components. The ADAU1452 from Analog Devices is used as the DSP chip, which is still the preferred means of achieving high-quality processing solutions. When it comes to converters, Ground Zero doesn't scrimp: only the finest 32-bit converters are good enough for the GZDSP. The DACs come from the excellent 445 series by Japanese manufacturer AKM: an AK4458 with eight channels, excellent specs such as -107 dB THD+N, and, correspondingly, even

The main window contains almost everything: output EQs, delays, crossovers, volume, etc.

Software

The GZDSP offers convenient programming options via PC software and an Android or iOS app. The PC software presents all settings for the 10 channels on one screen, with only the input mixer and input EQ being outsourced. In addition to 7 EQ bands per channel for all inputs (high level, low level, coaxial, optical, and Bluetooth), there is also an input time alignment. At the outputs, we have 31 EQ bands per channel and time alignment (up to 20 ms). In the main window, a frequency response diagram provides information about the set crossovers and EQs. You can select which channels are displayed, and the EQs and crossovers can also be operated using drag and drop with the mouse. The crossovers are available in Butterworth, Bessel, and Linkwitz characteristics up to 48 dB/octave slope. The EQs are fully parametric, with settings ranging from +6 to -12 dB. However, niceties such as shelf filters or all-pass filters were missing at the time of testing, but these can be added via a software update. The channels are grouped in pairs from A to E, simplifying common settings. In addition, group E is declared as a subwoofer, which is interesting with the optional remote control (or with the app) since it can control the subwoofer level separately. Of course, you are not tied to these groupings; all channels can be assigned to any group or none. The source selection is done manually, but the Bluetooth input can be prioritized so that the system automatically switches when a signal is received. Finally, we find a global mute function, corresponding buttons for each channel, and a polarity reversal function. The Android app we used includes all the functionalities of the desktop software. After opening and Bluetooth pairing, you will find yourself in a remote control mode where the master level, subwoofer level, sources, and presets can be selected. The audio settings are hidden under Advanced Settings and are then divided into input EQ and time, mixer, EQ and crossovers, time alignment, and outputs. The overview and presentation are accomplished; the time alignment even comes with a schematic speaker display with car and speaker pictograms. You quickly get the hang of the operation; it can be programmed partly by swiping, long pressing, or direct input.

less residual noise. Since one chip is not enough, two more channels come with the AK4452, so we have the 10 exactly together. On the input side, there would have been a suitable 6-channel ADC for analog-to-digital conversion, but here we find 2 x 4 channels – well, it will do the job, of course. The GZDSP 6-10SQ scores further points with a whole range of very high-quality operational amplifiers, which must be the good originals from Texas Instruments, namely the OPA1678, which, like the converters, are characterized by particularly low-noise operation. Ground Zero is particularly proud of the deathly silence that reigns in the hi-fi system when the GZDSP 6-10SQ (in conjunction with first-class amplifiers) is connected without a signal. There is another reason for using the OPA1678, which also contributes to excellent measurement values. The Op-amp can be driven differentially, which, of course, an AK4458 is also capable of. Here, the circuit uses symmetrical signal transmission, in which (in contrast to asymmetrical transmission) any interference or noise cancels each other out. In addition to the exquisite component selection, the GZDSP boasts a particularly accomplished layout, which took some time to design and develop for sure.

Conclusion

With the GZDSP 6-10SQ, Ground Zero delivers a DSP that scores points with first-class component quality and extensive audio functions. Convenient handling and attractive features are also a given. At EUR 500, Bluetooth and streaming are included, so there is little to complain about.

Elmar Michels

Ground Zero GZDSP 6-10SQ

Price	500 Euro
Distributor	Ground Zero, Germany
Internet	ground-zero-audio.com

Specifications

Dimensions
(L x W x H in mm) 143 x 132 x 40 mm

Inputs
- 6-channel high-level with autosense
- 6-channel low-level
- Sensitivity low: 3 V high: 8 V
- 1 x S/PDIF digital coax
- 1 x S/PDIF digital optical
- 1 x digital bluetooth

Outputs
- 10-channel RCA
- Remote-out

DSP channels
- 10

DSP-Software (Android 1.15, PC V1.0.1)

Equalizer
Inputs
- param., 7 Band per channel
- 20 – 20k Hz, 1-Hz increments
- +6 – -12 dB, Q 0,4 – 28,9

Outputs
- param., 31 Band per channel
- 20 – 20k Hz, 1-Hz increments
- +6 – -12 dB, Q 0,4 – 28,9

Crossovers
- 20 – 20k Hz, Bessel, Butterworth, Linkwitz, 1-Hz increments
- Filter slope 6 - 48 dB/Okt.

Zeit und Pegel
- Samplerate 48 kHz, 7-mm increments (0,02 ms)

Inputs
- 0 – 692 cm (20 ms), 1024 samples

Outputs
- 0 – 692 cm (20 ms), 1024 samples
- Phase 0, 180°
- Adjustable level increments 0,5-dB, Mutefunktion

Features
- 10 Presets
- Smartphone app (iOS und Android) or desktop PC operation
- Bluetooth 5 music streaming
- Signal dependent switching to bluetooth
- Diagnostic circuit protection
- Ground ift/200 ohm Jumper

Optional accessories
- Wired remote control GZREM 6-10 with display (master-, sublevel, sources, setups)

CAR&HiFi INTERNATIONAL Germany 1/25

"Superbly made DSP at a fair price"

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and

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Michael E. Brieden Verlag GmbH
The Test-Specialists
Duisburg · Germany

Audio System X-100.9 MDSP-BT
– Nine-channel amplifier with thirteen-channel DSP

Mini-Multi-Power

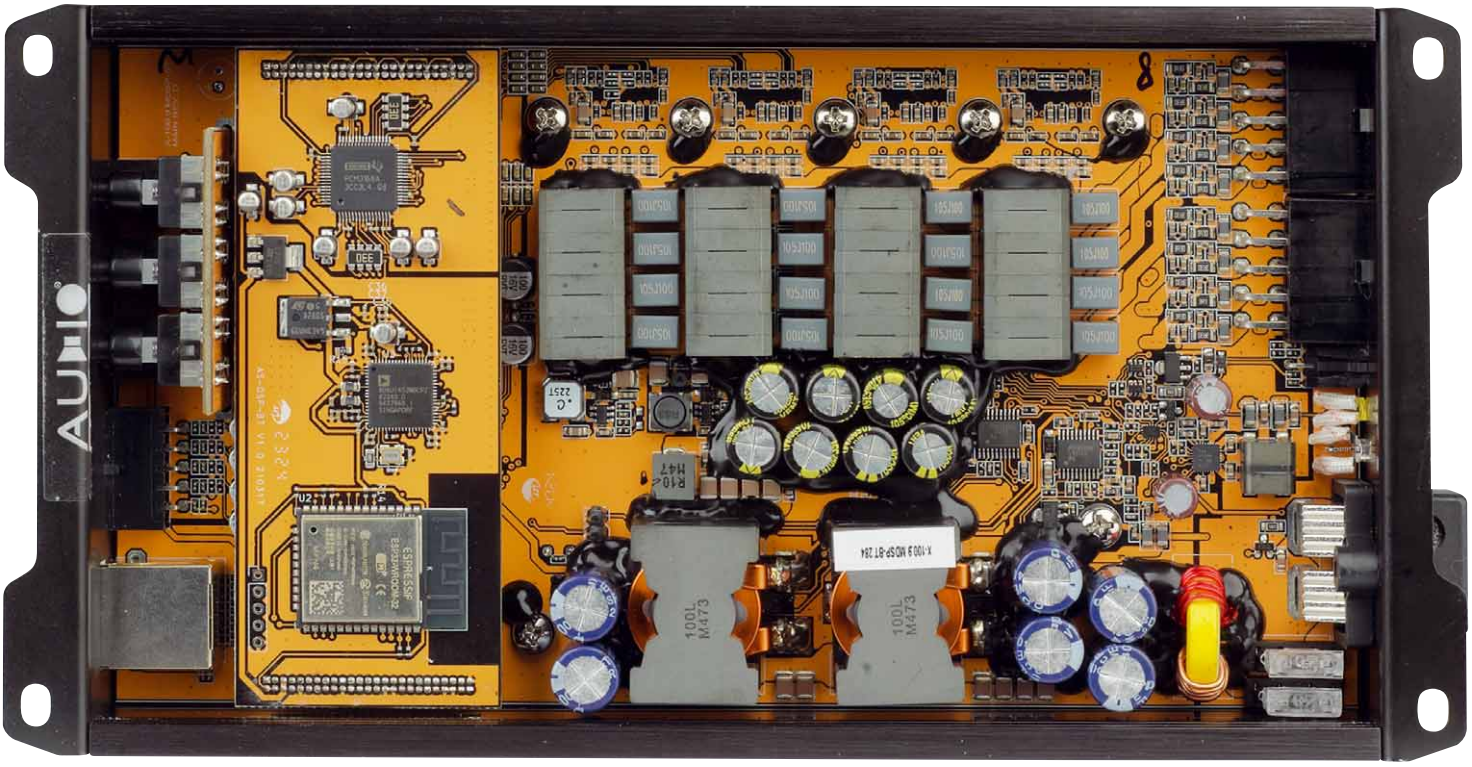
Audio System's brand new X-MDSP series DSP amplifiers are now available at specialist retailers. We test the X-100.9 MDSP-BT.

SOUND AWARD
Absolute Top Class
CAR&HiFi INTERNATIONAL 1/25

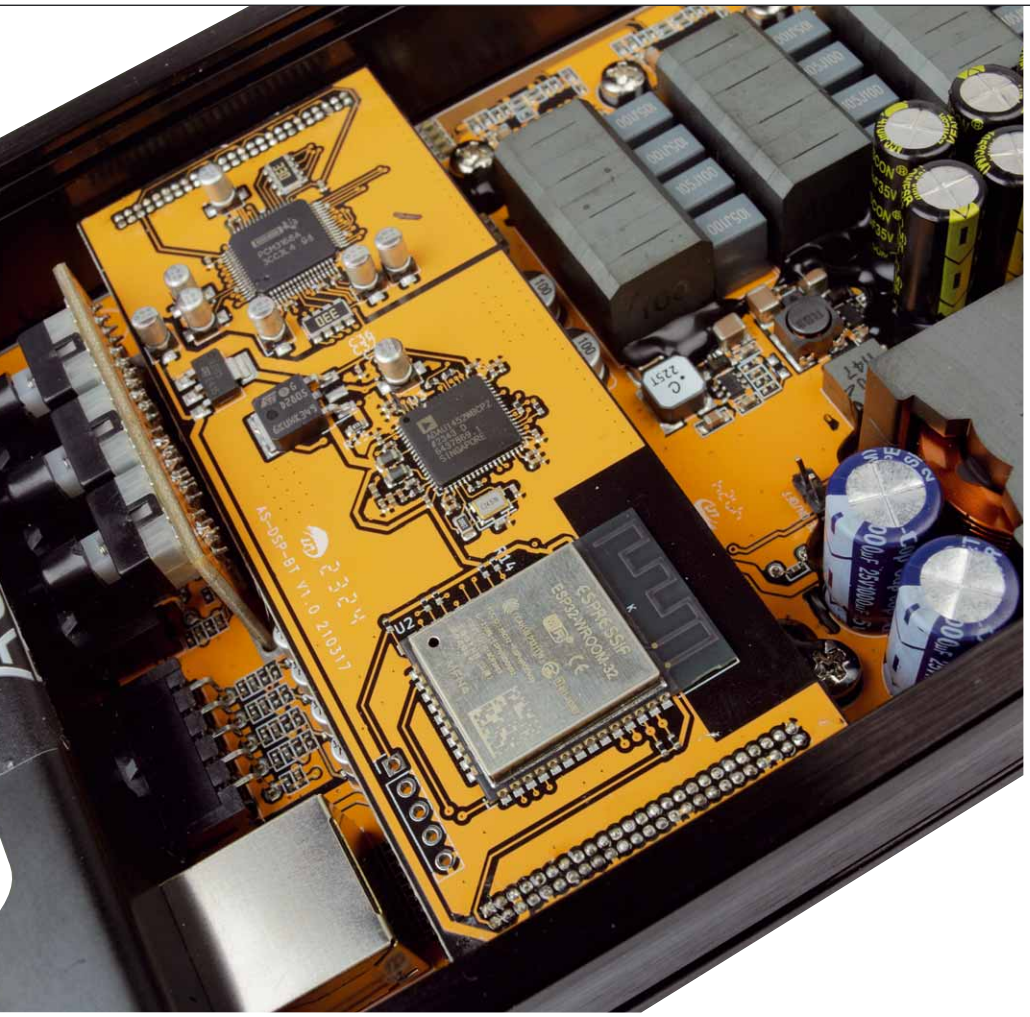

X SERIES
BY AUDIO SYSTEM
X-100.9 MDSP-BT

Except for the modern CO-40.5 DSP-BT, Audio System has only used DSP-retrofitted "normal" four-channel amplifiers in DSP amplifiers. This is changing, as several state-of-the-art amplifiers will soon be available under the X MDSP label. We have the Audio System X-100.9 MDSP-BT with nine amplifier channels in a tiny space in our editorial office. A 24V version will join it for buses and trucks, and models with five channels are also in the pipeline. The X-100.9 MDSP-BT housing is just over 19 centimeters long and a mere 11 centimeters thick. That's pretty impressive for 100 watts of channel power. It's clear that ICs of the latest generation are at work here. The amplifier is well-made and sleek all around. On one side, we find the six inputs, which can be switched in pairs from low-level to high-level using switches, and the four processed outputs, which give us 13 DSP channels. On the opposite side, we find the power terminals, the only terminals not designed as Molex connectors, and the speaker outputs. There are no controls or switches for the features; the DSP does everything. Unfortunately, there are no provisions for analog or digital AUX sources or Bluetooth, which is available for programming the signal processor. There are several optional accessories. Via the network socket, the amplifier contacts a "Grund Box" hub, which can be equipped with further accessories. There is a display and a combined controller/switch to control some functionalities. Independent of this, there is an infrared remote control, including a receiver, which can be connected either to the speaker or directly to the amplifier.

As expected, the X-100 is packed full. Most of the DSP is housed on its own circuit board, with three chips dominating the layout. There's a big chunk that acts as a controller and can also do Bluetooth and WIFI, and next to it, we find two familiar faces, namely the DSP and the converter. The ubiquitous ADAU1452 from Analog Devices is used as the DSP, which has long been considered the standard and offers the very best audio capabilities. Finally, we find the PCM3168A from Burr Brown, which has also proven itself. With 6 ADCs and 8 DACs, it handles both the analog-to-digital conversion before the DSP and the digital-to-analog conversion after the processing, both at 24-bit depth. The 13 channels of the



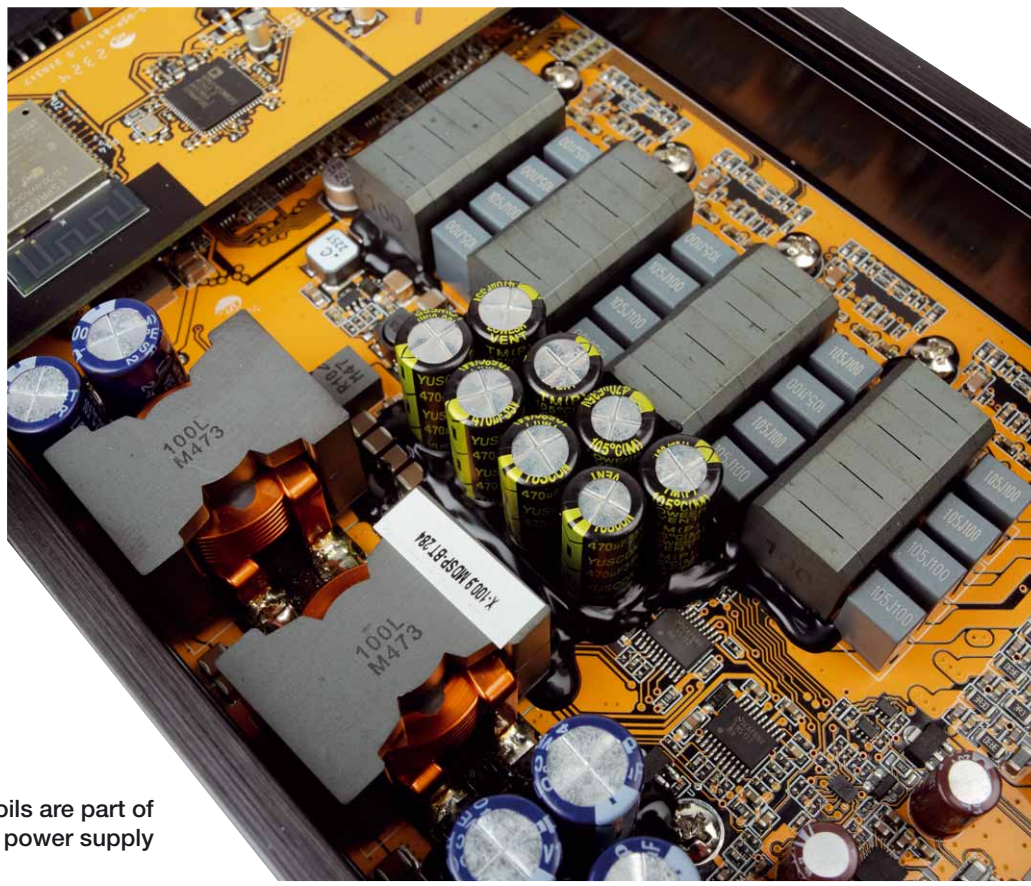
The eight large channels are distributed across four ICs. Each channel has two encapsulated coils and capacitors as a class D low-pass filter



In the foreground, the “universal weapon” ESP32, microcontroller, and Bluetooth chip in one

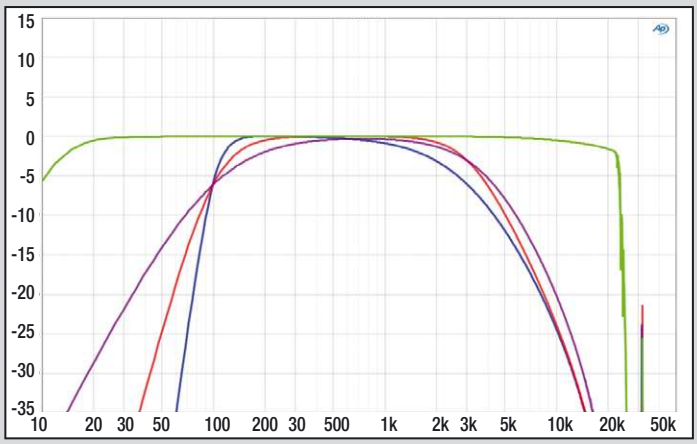
onal transformer power supplies require, along with renewed rectification afterward. Of course, amplification is done via ICs that are fixed to the heatsink with screws. Four of them, each with two channels, can be seen. The 16 Class-D filter coils and capacitors also indicate the first eight channels of the X-100.9. Number 9 is inconspicuously hidden on a chip on the bottom side of the board. This is because the 8.1 layout of the amplifier channels includes eight identical main channels and a small channel that is ideal for a center, for example, or can also serve as an additional high-level output. For subwoofers, you can use two main channels or an extra amplifier – the X-100.9 has four processed RCA outputs.

X-100.9 then require another chip, which is located on the main board, namely the PCM1681, an 8-channel DAC, so that theoretically, 16 channels could be DA converted. On the main board are several operational amplifiers for the analog inputs; the remaining space is used for amplification and the power supply. The latter is a modern step-up converter with two powerful flat wire coils. It is efficient because it converts directly from DC to DC to generate the higher operating voltage. This saves the inversion that conventi-

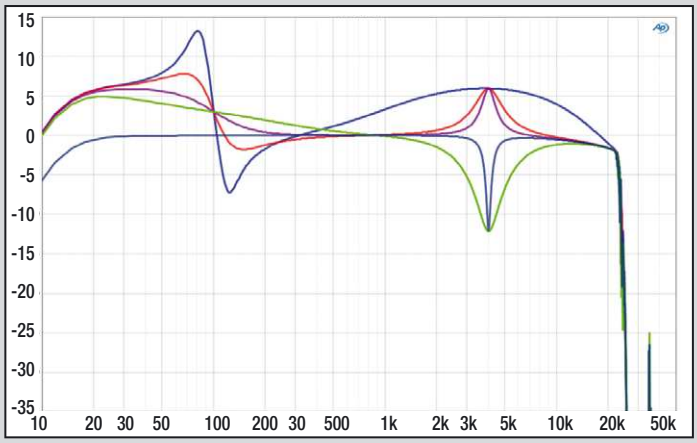


The two sizeable flat wire coils are part of the efficient DC-DC power supply

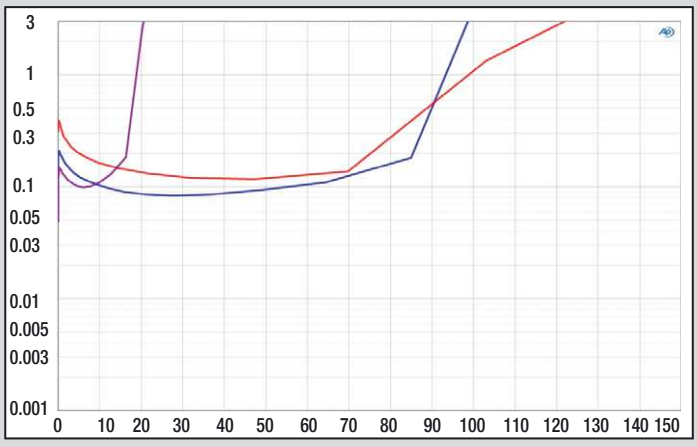
CAR&HIFI Laboratory



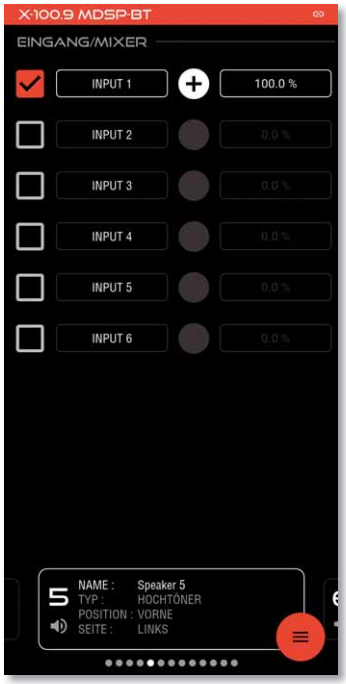
The X-100.9 MDSP-BT has an audio frequency range of about 22 kHz. The crossovers work perfectly, with a Linkwitz 12 – 48 dB high-pass filter and a 12 dB Bessel, Butterworth, and Linkwitz low-pass filter



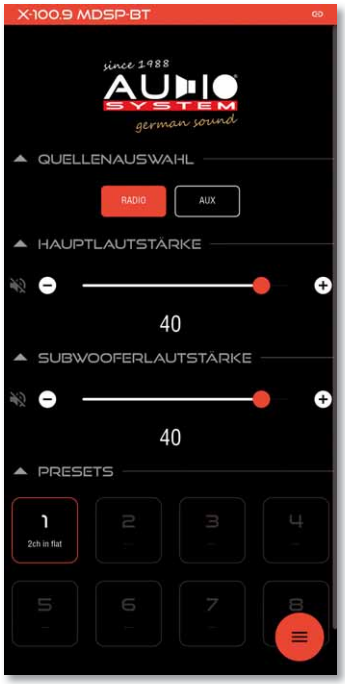
Each of the 30 EQ bands can be used as a high-shelving, low-shelving, parametric equalizer, or all-pass filter



The small channel delivers almost 20 watts, plus 8 x 100 watts, each at 4 or 2 ohms



Each channel can be classified according to speaker type, position, and side. The six inputs are then mixed in exact percentages



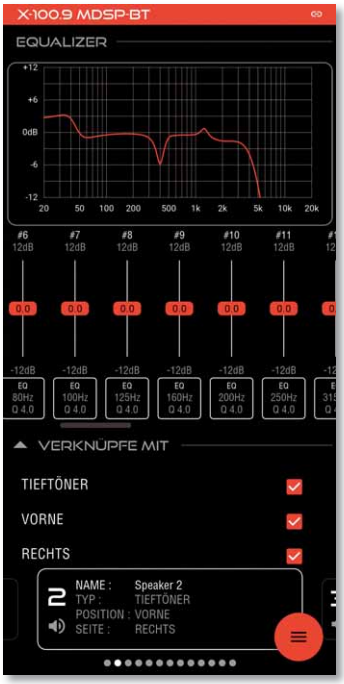
The app can be used to control the master volume and sublevel separately. Eight presets are available

Measurements and sound

Let's start with channel 9, which is the only one that is only stable at 4 ohms. Here, we measure 19.4 watts into 4 ohms, enough for a small center channel – let's consider it a nice gimmick. The X-100.9 is serious regarding the eight main channels, where it delivers almost 100 watts of channel power, even at 4 ohms. The same ap-

Software

The X-100.9 MDSP-BT is programmed exclusively via an app, which is available for both Android and iOS. The functionality is comprehensive, and the structure is clear. Anyone who has ever programmed a DSP will find their way around immediately because everything is logically arranged. Suitable for small smartphones, the control is divided into sub-items, so you only have one function on the screen at a time. The channel to be set is always displayed in the lower area, above which the selected topic changes from routing to crossovers, equalizers, delay times, and output with mute, SPL, and polarity. There are 30 EQ bands per channel, which can act as parametric EQ, high or low shelf, or as all-pass, the latter even with freely selectable Q as with EQ and shelf. The crossovers offer the characteristics of Bessel, Butterworth, and Linkwitz, which is also written on the box. According to the sampling rate of 48 kHz, there are time alignment steps of 0.02 milliseconds or 7 millimeters. At the time of testing, the setting value can be displayed in ms, cm, and samples; for countries outside the metric system, inches will be added later. This is not a problem because the amplifier can quickly be updated. New app versions are not an issue anyway; these can be found at audio-system.de.



30 fully parametric bands per channel offer all the bells and whistles; the diagram also shows the crossovers

Polarity, muting, and individual SPLs are controlled under Output

The time alignment is displayed in milliseconds, centimeters, or samples, and buttons for muting and reversing the polarity are also available

Crossovers are self explanatory. There is high pass and low pass with Butterworth, Bessel or Linkwitz filters

plies to 2 ohms, so we are more than just impressed with eight channels from this tiny package. The total harmonic distortion, including residual noise, is around 0.1%, which is not record-breaking, but it is good enough, as is the signal-to-noise ratio of 84 dB. The RCA outputs provide a good 2 volts, and there is nothing to complain about regarding functionality. The DSP runs at a sampling rate of 48 kHz so that the chip can handle the 13 channels. This automatically results in an audio bandwidth of up to 22 kHz and 0.02 milliseconds or 7 millimeters step size for the delay time adjustment. Sound-wise, the X-100.9 MDSP-BT gets going like a big one. It thunders mightily out of the speakers when the volume control is turned up, and the new X-100 doesn't show any weakness here. It plays powerfully right down to the bass cellar, where low-frequency freaks get their money's worth. The voice reproduction is clear and clean. The X-100 plays music really well, no matter which material you feed it.

Six analog inputs, nine amplifier channels, and an additional four preamplifier outputs, all in a tiny space

Conclusion

The Audio System X-100.9 MDSP-BT is an amplifier that many have been waiting for. Audio System now has a DSP amplifier with plenty of channels, tremendous power, and a very accomplished signal processor, all at a reasonable price.

Elmar Michels

Specifications

Inputs
- 6-channel high-level with autosense
- 6-channel low-level, selectable by pair
- Sensitivity low: (Master 40, Kanal 0 dB) 1,8 V

Outputs
- 4-channel RCA
- Remote-out

DSP-channels
- 13

DSP software (Android V1.0.5)

Equalizer

Outputs
- fully parametric EQ, 30 band per channel
- EQ, High-Shelf, Low-Shelf, Allpass
- 20 – 20k Hz, 1-Hz steps
- +12 – -12 dB, Q 0.25 – 12

Crossovers
- 20 – 20k Hz, Bessel, Butterworth, Linkwitz,1 Hz steps
- Filter slope 6 - 48 dB/oct.

Time and level
- Sample rate 48 kHz, 7 mm steps (0.02 ms)

Outputs
- 0 – 686 cm (20.0 ms), 960 samples
- Phase 0, 180°, mute
- Level steps 0.1 dB, Mutefunktion

Features
- 8 presets
- Smartphone App (iOS und Android)

Optional accessories
- DSP Box basic module
- DSP Control control/switch
- DSP Display
- DSP RC infra red remote control
- DSP IR infra red eye for DSP or Box

Specifications

Channels	9
Channel power 4 ohms W	8 x 94 + 1 x 19
Channel power 2 ohms W	8 x 98 + 1 x 0
Channel power 1 ohms W	–
Bridged power W	–
System power W	683
Sensitivity max. mV	1800
Sensitivity min. V	1,8
THD+N (<22 kHz) 5 W	0,125/0,098
THD+N (<22 kHz) half power	0,087/0,107
Signal-to-noise ratio dB(A)	84
Damping factor 20 Hz	54
Damping factor 80 Hz	54
Damping factor 400 Hz	53
Damping factor 1 kHz	51
Damping factor 8 kHz	14
Damping factor 16 kHz	4

Features

Low pass	20 – 20k Hz
High pass	20 – 20k Hz
Band pass	20 – 20k Hz
Bass boost	-12 – 12 dB/20 – 20k Hz
Subsonic filter	via HP
Phase shift	0, 180°/LZK, AP via DSP
High-level inputs	•
Auto turn-on	•, DC or signal
RCA output	•, 4CH, processed
Start/stop capable	• (5,5 V)
Dimensions (L x W x H in mm)	193 x 113 x 38
Others	13-channel DSP

Audio System X-100.9 MDSP-BT

Price	650 Euro
Contact	Audio Design, Germany
Internet	audio-system.de/english/

Rating

Sound	40 %	★★★★★
Bass	8 %	★★★★★
Neutrality	8 %	★★★★★
Transparency	8 %	★★★★½
Spatial imaging	8 %	★★★★★
Dynamics	8 %	★★★★★
Lab	35 %	★★★★½
Power	20 %	★★★★★
Damping factor	5 %	★½☆☆☆
Signal-to-noise ratio	5 %	★★★★½
Noise	5 %	★★½☆☆
Practice	25 %	★★★★★
Features	15 %	★★★★★
Build quality electronics	5 %	★★★★★
Build quality mechanics	5 %	★★★★½

Absolute Top Class

★★★★★

CAR&HiFi INTERNATIONAL Germany 1/25

Price/performance: very good

„Nine channels, compact and good.“

HELIX

COMPOSE

INNOVATIVE SPEAKER PLATFORM

i7 | i3 | BASIC

WWW.AUDIOTEC-FISCHER.COM/COMPOSE

„With its Compose platform, Helix presents three speaker series - Basic, i3 and i7 - and a completely new approach to the in-car entertainment market. All models in this comprehensive range of tweeters, midrange drivers, woofers and coaxial units fit universally into standardised mounting positions. Vehicle-specific FlexMount adapters for the i3 and i7 series are offered for more than a dozen car brands from Audi to Volvo, with more to come. As a result, the Compose speakers are easy to install, including matching to vehicle wiring via FlexConnect, and take acoustic conditions into account. [...] **These speaker solutions are innovative, versatile and highly desirable.**“

- Expert Imaging and Sound Association

EISA AWARD Best Product 2023-2024
IN-CAR INTEGRATION
Helix Compose Platform

Musway M6v4 – 6-channel amplifier with 8-channel DSP

A Classic Reloaded

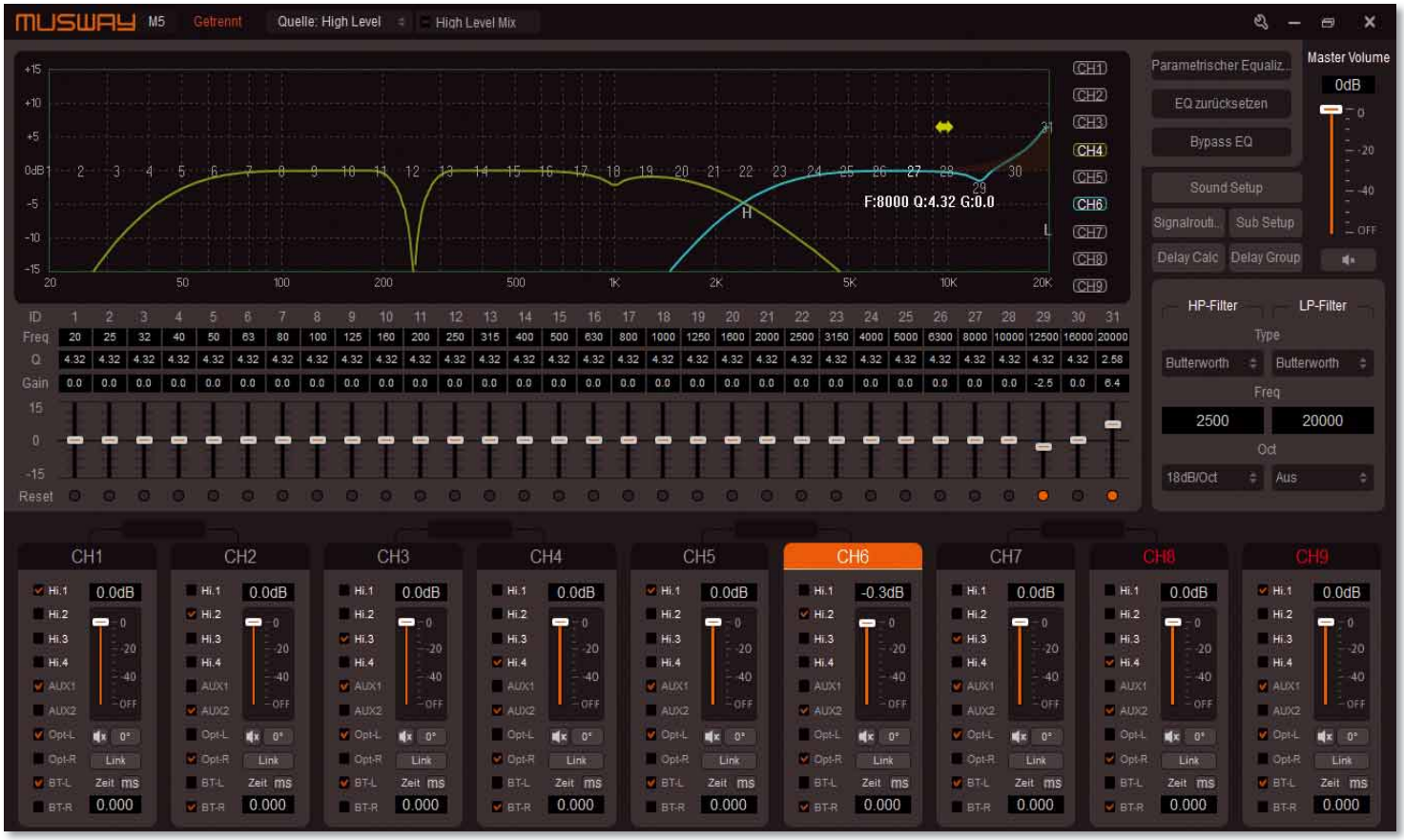
With the M6v4, Musway introduces the fourth incarnation of its successful M6 model. We take a look at what this universal tool can do.


MUSWAY
HIGH QUALITY SOUND SYSTEM

The M6 was the product with which Musway debuted in Europe—a compact amplifier with DSP, universally applicable and, above all, affordable. A lot has happened since the first version. Musway has tweaked the DSP and amplifier but kept the concept the same. Perhaps the most significant changes have recently occurred behind the scenes: vehicle compatibility, operational reliability, and compatibility have become more critical to the developers than naked amplifier power. The concept still works with the M6. We have a small amplifier that is easy to install and ideally wired with a cable harness and a small power supply for plug-and-play.

Two variants are available from your Musway dealer: the M6v4 for EUR 630, which includes an ISO wiring harness, and the M6v4 Evo for EUR 600, which comes with a mini wiring harness on loose wires. Furthermore, there are optional vehicle cable sets available for various manufacturers. The list of accessories does not end there because no fewer than three Bluetooth dongles are available: an affordable streaming dongle, one for HiRes streaming, and one that, in addition to streaming, allows wireless DSP programming. And finally, there are two RCA cable sets that would enable the speaker-level inputs to be converted to RCA for line-level signals. For this purpose, there is a corresponding jumper on the M6v4 circuit board to convert from high to low level. The standard high-level version has an EPS for vehicles with factory-installed speaker recognition, so the M6v4 is genuinely versatile.

In addition to the six line-level inputs, the M6v4 offers a pair of RCA jacks as auxiliary inputs and an optical digital input, which leaves nothing to be desired. Musway sticks to the proven concept when it comes to DSP. The assembly consists of the ADAU1452 as a DSP chip and the combined converter PCM3168A, a proven combination established in many signal processors on the mar-



The PC software shows all essential functionality in the main window

Located on the left of the daughterboard DSP.
The jumper for switching between high and low is located at the bottom

The remote control regulates the master and sub volume, subwoofer groups, and the mute function

ket. The sampling rate is 48 kHz, allowing for an audio bandwidth of up to 22 kHz – also a good standard. There are eight DSP channels, so in addition to the six built-in amplifier paths, we find two processed outputs, for example, for subwoofer applications. Three two-channel chips do the amplification; the six amplifier channels are identical, and everything is 2 ohms stable and

Digital sources can be connected via the optical input or Bluetooth dongle

Specifications

Inputs
- 6-channel high-level with autosense
- 1-channel AUX/RCA
- 1 x digital S/PDIF optical
- Sensitivity 5 V (RCA), 21 V (high level)
- 2 x gain control (high level)
- 1 x gain control (AUX)

Outputs
- 2-channel RCA (processed)
- Remote-out

DSP-channels
- 8

DSP software (V3.4 beta in test)

Equalizer

Outputs
- parametric, 31 band per channel
- 20 – 20k Hz, 1-Hz steps
- +15 – -15 dB, Q 0,1 – 10

Crossovers
- 20 – 20k Hz, Butterworth, Bessel, Linkwitz, 1-Hz steps
- Filter slope 6 - 48 dB/Okt.

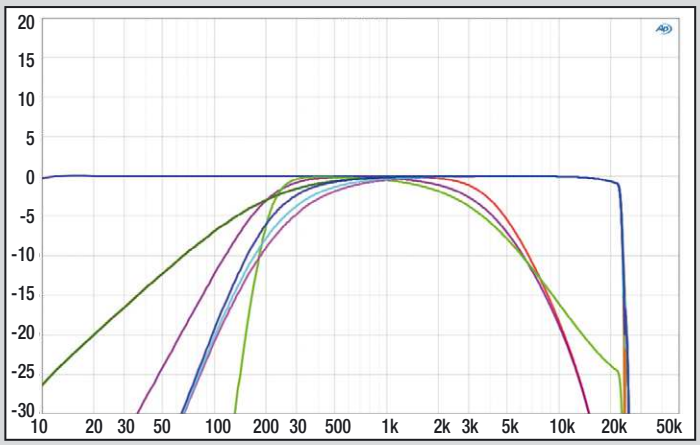
Time and level
- Sample rate 48 kHz, 7 mm steps (0.02 ms)

Outputs
- 0 – 602 cm (17.7 ms), 1024 samples
- Phase 0, 180°
- Level steps 0.1 dB, mute

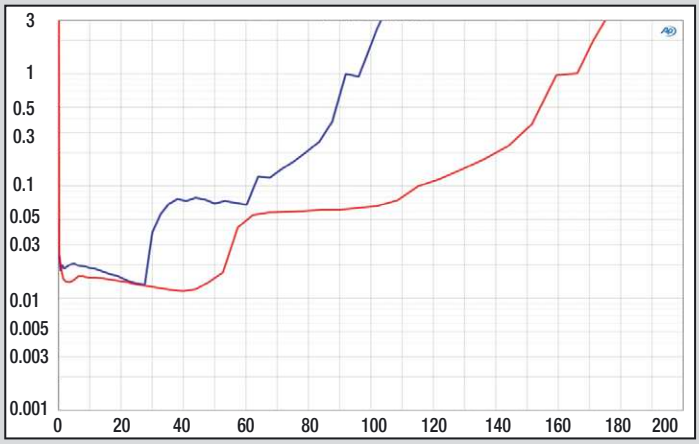
Features
- 6 presets
- Remote Out
- 2 x gain control
- EPS (Error Protection System) for diagnostic function
- Signal dependent switching to Bluetooth or S/PDIF
- Signal dependent switching to high-level for vehicle tones
- Sub setup (subwoofer channels on remote control)
- Power save mode
- Export/import setting via Whatsapp

Optional accessories
- Bluetooth dongle BTS (audiostreaming)
- Bluetooth dongle BTS-HD (hi-res streaming)
- Bluetooth dongle BTA2 (audiostreaming + app control)
- Remote controller RC1 (volume, bass level, sources, setups)
- RCA adapter MPK-RCA6, MPK-RCA6-PP für ISO
- T-harness for various vehicles (Mercedes, BMW, Audi, a.o.)

CAR&HIFI Laboratory



The cut-off frequency is 22 kHz due to the sample rate, and the crossovers are programmed sloppily: high pass at 200 Hz (But, Bes, Lin) and low pass at 3 kHz



The M6v4 delivers almost 100 watts at just 4 ohms, and the distortion of 0.015 % is impressively low, especially in the first third of the power range

Master and sub levels in the Android app

EQ settings in the Android app

bridgeable. Musway promises an increase in power and a general improvement in performance. Among other things, the new Infineon controller is responsible for this, as it controls the "life-supporting" functions of the amplifier. This allows the M6v4 to monitor and adjust temperature, current consumption, undervoltage and overvoltage, power supply function, and impedance.

Software

All Musway DSPs can be programmed using PC desktop software or an Android app, the latter in conjunction with the optional BTA2 accessory. Except for routing and minor details, all relevant settings can be found in one window. When routing, it is essential to note that it is not enough to meter the inputs in the routing matrix; the correct checkmark(s) must also be set in the main window. There are bandpass crossovers for all channels up to 48 dB/octave in three characteristics. Programming the crossovers is a bit of a hassle, e.g., with odd orders for Linkwitz or varying attenuation at the set crossover frequency. However, the crossovers work in principle. The EQ bands can be set fully parametrically, and there is also time alignment of the outputs in 0.02 ms or 7 mm steps. Conveniently, the time or path is displayed precisely and in plain text, without any frills such as coarse and fine adjustment. The frequency window clearly shows what is happening, and the EQs are also easy to operate (also via the keyboard). The grouping of channels is well solved; a bridge circuit can also be displayed, and up to four channels can be combined into a subwoofer group, which is then recognized by the optional remote control. The extras are few, but they are important. We have a power-saving cut-off for Can vehicles, a setting for switching through vehicle sounds, and an auto-mute function to prevent crackling. Furthermore, the M12 offers an input pin for the reverse gear, which feeds in the vehicle sounds. This means that the Musway software is not the most complete on the market, but in most cases, it enables problem-free operation. A big plus point is the Musway „Tunest" app, which, in conjunction with the BTS2, allows complete DSP programming and enables remote control functions such as master and sublevel, source selection, and source selection.

Measurements and sound

On the test bench, we can immediately confirm the power regimen that gives the v4 a good deal of extra power compared to the v3, namely 96 watts at 4 ohms and 166 watts at 2 ohms, clearly setting the M6v4 apart. But it not only scores in terms of maximum power but also distortion. Especially at lower power levels, essential for sound quality, the distortion is now an entire order of magnitude lower – an outstanding achievement. Sound-wise, the clarity of the reproduction is pleasing; the music sounds well-balanced and tidy. Overall, the M6v4 is very mature and without gimmicks and is recommended for all styles, from jazz or chamber music to rock. You will not find any serious weaknesses; in practice, the DSP is responsible for the much more relevant conditions in the vehicle anyway.

Conclusion

With the M6v4, Musway offers a universal tool for expert sound in vehicles. The price is still fair, even with the numerous accessory options. And the performance and power leave nothing to be desired.

Elmar Michels

Eine von drei Bluetooth-Quellen: Das BT-HD kann Audiostreaming in HiRes-Qualität

Specifications

Channels	6
Channel power 4 ohms W	6 x 96
Channel power 2 ohms W	6 x 166
Channel power 1 ohms W	–
Bridged power W	3 x 332
System power W	690
Sensitivity max. mV	750
Sensitivity min. V	2.2
THD+N (<22 kHz) 5 W	0,019
THD+N (<22 kHz) half power	0,075
Signal-to-noise ratio dB(A)	891
Damping factor 20 Hz	72
Damping factor 80 Hz	72
Damping factor 400 Hz	72
Damping factor 1 kHz	67
Damping factor 8 kHz	12
Damping factor 16 kHz	3

Features

Low pass	20 – 20k Hz
High pass	20 – 20k Hz
Band pass	20 – 20k Hz
Bass boost	-15 – 12 dB/20 – 20k Hz
Subsonic filter	via HP
Phase shift	0, 180°/LZK via DSP
High-level inputs	•
Auto turn-on	•, DC
Cinchausgänge	•, 2CH, processed
Start/stop capable	– (7,6 V)
Dimensions (L x W x H in mm)	200 x 150 x 45
Others	8-channel DSP

Musway M6v4

Price	600 Euro
Contact	Audio Design, Germany
Internet	www.musway.de/english/

Rating

Sound	40 %	★★★★★
Bass	8 %	★★★★★
Neutrality	8 %	★★★★★
Transparency	8 %	★★★★☆
Spatial imaging	8 %	★★★★★
Dynamics	8 %	★★★★★
Lab	35 %	★★★★☆
Power	20 %	★★★★★
Damping factor	5 %	★★☆☆☆
Signal-to-noise ratio	5 %	★★★★☆
Noise	5 %	★★★★☆
Practice	25 %	★★★★★
Features	15 %	★★★★★
Build quality electronics	5 %	★★★★☆
Build quality mechanics	5 %	★★★★★

Top Class

★★★★½

CAR&HiFi INTERNATIONAL Germany 1/25

Price/performance: very good

„A universally deployable six-channel solution at a fair price.“


SOUND AWARD
Upper Class
CAR & HiFi
INTERNATIONAL 1/25

Helix IQ W8-DVC2 + IQ W10-DVC2: smart subwoofers that adapt to the cabinet

They always fit

With the IQ series, Helix is preparing to launch particularly “smart” subwoofers. We take a look at the eight- and ten-inch models and explain how.

The newly designed die-cast baskets are more than just reassuringly dimensioned

The IQ woofers from Helix are not just a new series of beautifully crafted subwoofer chassis; they come with a feature that, to our knowledge, is not available anywhere else in the car audio world. The IQ W8-DVC2, IQ W10-DVC2 and IQ W12-DVC2 models have been announced in the sizes of 8, 10 and 12 inches, each with 2 x 2 ohms dual voice coils. The two smaller models are in our editorial office for testing. Before we take a closer look at the new TMS system, let us examine the design of the woofers. First and foremost, these are very solidly made subwoofers that are not exactly cheap at 400 and 450 euros respectively, but they are not outrageously expensive either. In return, you get very solid die-cast aluminum baskets that will certainly survive the next world war unscathed. The large-sized drives with double ferrite and two-and-a-half-inch voice coils made of thick copper wire inspire confidence in their power handling. The pole plates are beautifully crafted so that they fit flush on the magnet, and large pole piece vents ensure adequate ventilation, as do the huge ventilation windows under the centering spiders. A laminate made of fiberglass mats with an internal matrix is used for the diaphragms; the outer edge of the diaphragms is flanged, which gives the structure additional stability. The highlight of the IQ Woofer comes to light when you remove the dust cap, revealing a cavity where additional masses can be screwed. Three discs are included, each weighing 52 grams, so that the membrane weight can be increased by 52, 104 and 156 grams. Of course, this measure has a decisive influence on the behavior of the subwoofer, but why do such a thing? Basically, it makes sense intuitively that a heavier mass plays at a lower frequency. This is because the resonance frequency of a vibrating system also depends on the mass and larger masses lead to lower frequencies. Roughly speaking, you can choose whether to install a hip-hop subwoofer with a powerful low bass or a

Sturdy, optically and mechanically well-integrated grilles are included

crisp woofer for techno or rock music. In practice, one possible scenario is: once the spare wheel well has been converted into a housing, the volume can be determined and then a Helix IQ woofer can be used to set exactly the right weight with the additional masses. This way, the given volume is optimally used to get a low lower cut-off frequency out of the woofer. Or conversely: you consider how low the woofer should play for which type of music and calculate the appropriate housing with the desired additional mass.

Tuneable Mass System

Helix calls this whole thing TMS (Tuneable Mass System) and we adopt it here in tables and text with TM = additional mass, so 1 TM = woofer with an additional weight of 52 grams, etc. For our test, we first measured both woofers with and without additional masses, thus determining the Thiele-Small parameters with our measuring system. These then serve as the basis for box calculations, which we did diligently for closed and bass-reflex housings. We measured the IQ W8-DVC (0 TM to 3 TM) and the IQ W10-DVC2 four times, each in a closed and bass-reflex enclosure. The results in the table show that the woofer with additional mass can be tuned significantly lower but requires more volume and is less efficient. The sound pressure at 1 watt amplifier power and the efficiency in percent are the values calculated by the measuring system. However, we also see that there is a

The double voice coils are connected via spring loaded terminals, in case of the IQ W8 hidden by the motor

Specifications

Basket diameter	22,6 cm
Mounting diameter	20,0 cm
Mounting depth	11,5 cm
Magnet diameter	15,5 cm
Weight	6,4 kg
Nominal impedance	2 x 2 Ohm
DC resistance Rdc	3,64 Ohm
Coil inductivity Le	2,25 mH
Coil diameter	64 mm
Membrane surface	222 cm²
Resonance frequency fs	45 Hz
Mechanical Q-Factor Qms	5,00
Electrical Q-factor Qe	0,53
Overall Q-factor Qts	0,48
Equivalent volume Vas	6,3 l
Moved mass Mms	123 g
Rms	7,86 kg/s
Cms	0,09 mm/N
B x l	14,82 Tm
SPL 1 W, 1 m	83 dB
Recommended power	100 – 300 W
Test cabinet	BR 21,5 l
Reflex tunnel (d x l)	7 x 24 cm

Helix IQ W8-DVC2

Price	400 Euro
Contact	Audiotec Fischer, Germany
Internet	www.audiotec-fischer.com

Rating

Sound	50 %	★★★★★
Low frequency extension	12,5 %	★★★★★
Sound pressure	12,5 %	★★★★½
Sound purity	12,5 %	★★★★★
Dynamics	12,5 %	★★★★★
Lab	30 %	★★½☆☆
Frequency response	10 %	★★★★★
Efficiency	10 %	★½☆☆☆
Max. SPL	10 %	★★½☆☆
Build quality	20 %	★★★★★

Upper Class

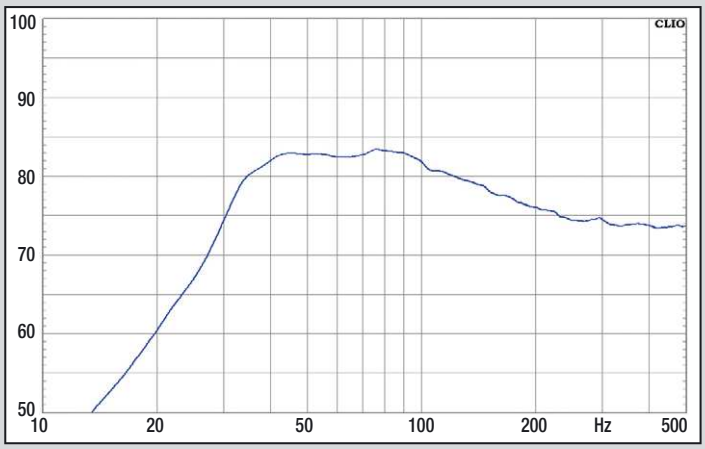
★★★★☆

CAR&HiFi INTERNATIONAL Germany 1/25

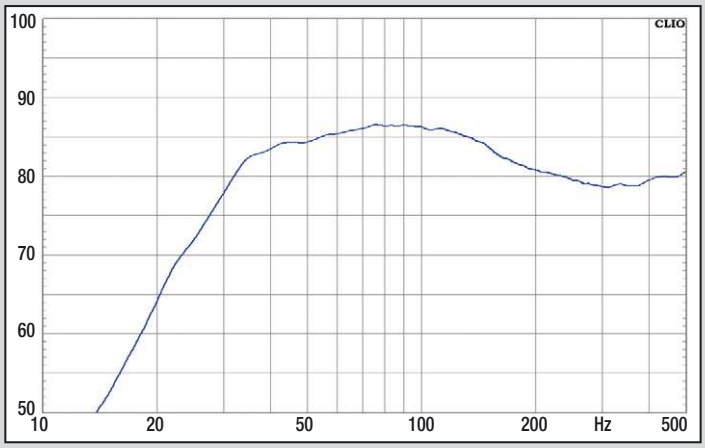
Price/performance: very good

"Customizable? Wonderful! Helix has invented smart subwoofers."

CAR&HIFI Laboratory

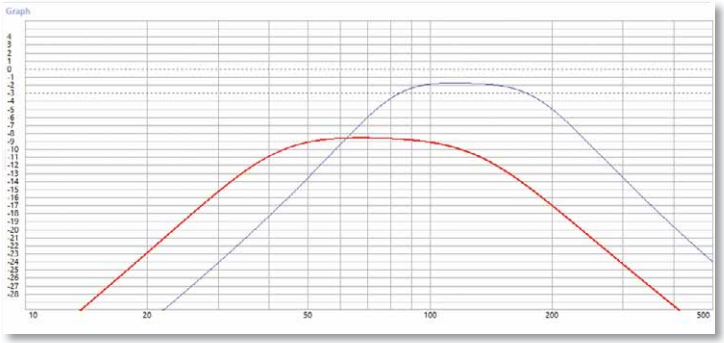


In 21.5 liters and tuned to 47 Hz, the W8 performs up to a good 40 Hz



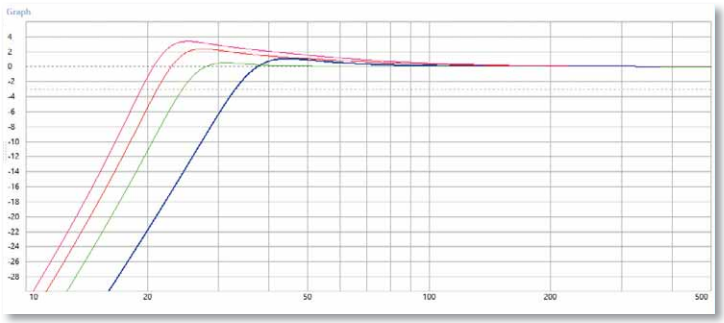
The W10 is tuned to 39 Hz in 30 liters, at 1 W we measure 86 dB of sound pressure

wealth of sensible and great housings for our two IQs; you do not get that with any other woofer on the market. The eight-inch model works as an unobtrusive and super-low closed subwoofer with 2 or 3 TM in 15 to 25 liters. The IQ W10 can be tuned as a crisp rock woofer in a vented housing with just under 30 liters or as a dark bass in double the volume with 2 or 3 TM. Here come the box simulations, but first, let us briefly explain the basic behavior of a loudspeaker. Every loudspeaker, whether tweeter or subwoofer, behaves like a bandpass. It has a design-given transmission band, where the designer can choose whether to give it a lot of efficiency and a narrow band, or a wider band with less efficiency. With subwoofers, the housing is extremely important because it regulates the lower end of the frequency range.



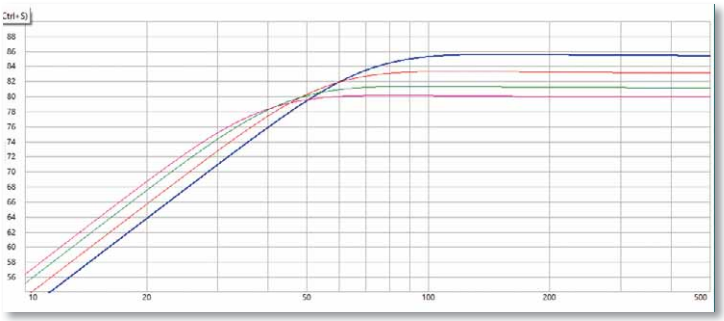
A bandpass speaker: either loud, narrow and high, or quiet, wide and low

We simulated the IQ W10-DVC2 in a bass reflex box and found the following volumes of 30 to 59 liters for the versions with and without 1, 2 and 3 TM. Of course, this is not set in stone. It looks great just by looking at the frequency responses.



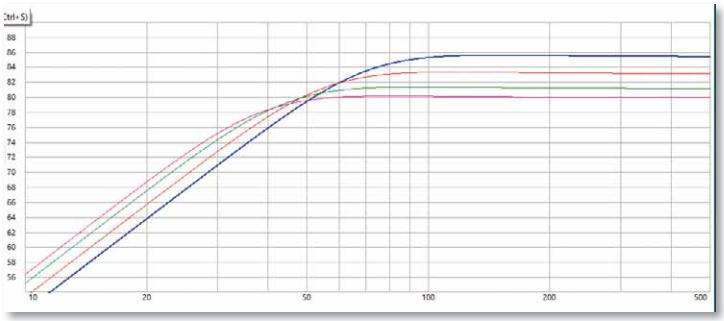
The IQ W10-DVC2 in bass reflex housings 0 TM 30 l, 1 TM 42 l, 2 TM 52 l and 3 TM 59 l. Sound pressure levels normalized to 0 dB

However, if the characteristic sound pressures are also simulated, it becomes clear that up to 6 dB of sound pressure is lost, which must be compensated for by quadrupling the power supply. This is also one reason (in addition to the practical tube lengths) why we would increase the sound pressure in our simulations by overshooting. Smooth frequency responses would mean lower tunings and longer reflex tubes.



IQ W10-DVC2 in bass-reflex housings 0 TM 30 l,1 TM 42 l, 2 TM 52 l and 3 TM 59 l. Sound pressure levels simulated on the basis of the TSP

We then do the same with closed housings.



IQ W10-DVC2 in closed housings with 0.8 installation quality. 0 TM 10 l, 1 TM 14 l, 2 TM 19.7 l and 3 TM 26.5 l. Sound pressure levels simulated on the basis of TSP

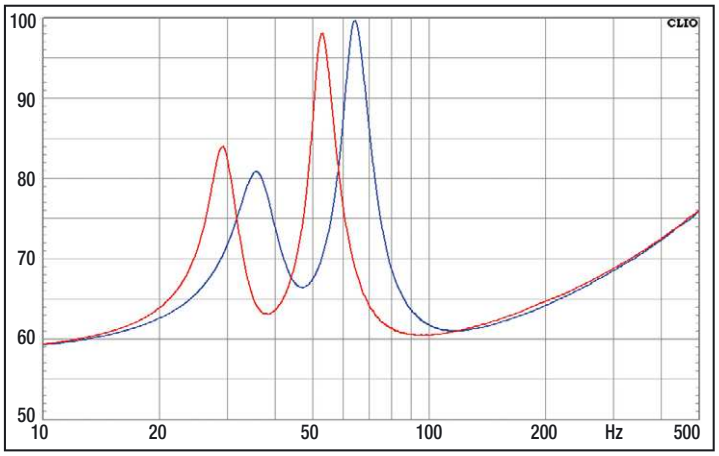
The situation is similar for the IQ W8-DVC2; our (reasonably) useful housings range from a sealed 5 liters to a reflex box with 40 liters. There is something for everyone, so have fun installing them in a wide variety of vehicles!

Measurements and sound

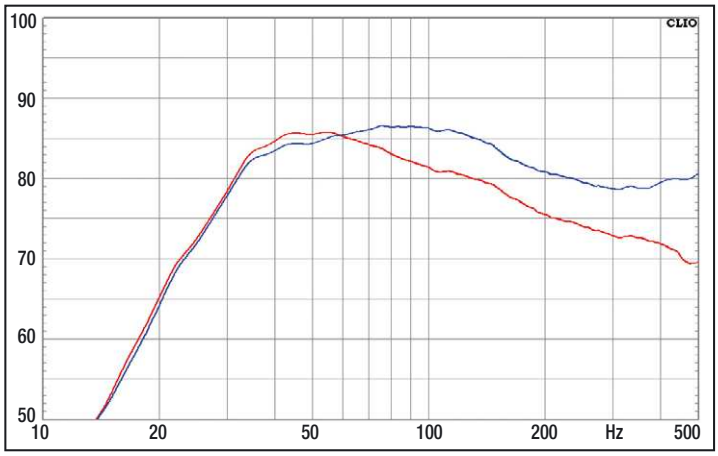
Let us first take a look at the table with the measured Thiele-Small parameters. While some parameters such as Cms (diaphragm suspension stiffness) or Qms (mechanical quality factor) remain constant, we can see how some variables change. Motor strength (B*l) and Vas (equivalent volume) only change due to measurement inaccuracies. And even the most logical change, namely in the moving mass Mms, is only about 52 grams, which is due to the fact that the measuring system "only" records an impedance curve (strictly speaking two) and then extrapolates the parameters from the maximum (resonance frequency) and curve width (quality of resonance). But it is quite clear that the moving mass increases while the resonance frequency decreases, which is another reason for the woofer with additional mass playing at lower frequencies. The electrical quality also increases, which then leads to increased volume requirements.

Of course, we experimented a little during the test, although we did not set up all the variants. We learned that you should stay away from unnecessary additional masses if you are also not modifying the housing. We operated the IQ W10-DVC2 in a 30-liter test housing without TM (good) and with 2 TM (bad). The lower cut-off frequency is determined by the housing; the 2 TM does not play a Hz lower but loses up to 5 dB.

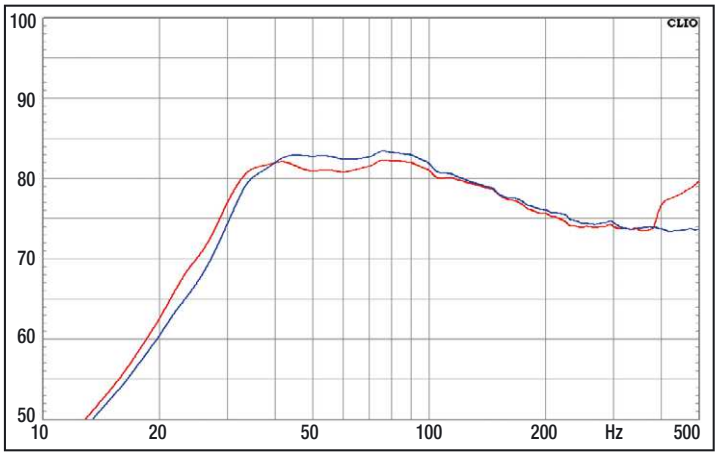
It only becomes a shoe when you adjust the tuning of the housing. Here we have the IQ W8-DVC2 in a 21.5-liter housing, with either 0 TM with a short pipe or 1 TM with a long pipe.



IQ W8-DVC2 in 21.5 l bass reflex with 0 TM and 24 cm pipe (blue) and 1 TM and 30 cm pipe (red). Impedance curve with tuning (minima of the curves) at 47 and 38 Hz



IQ W10-DVC2 in 30 l bass reflex with 0 TM 30 l (blue) and 2 TM (red)



IQ W8-DVC2 in 21.5 l bass reflex with 0 TM and 24 cm pipe (blue) and 1 TM and 30 cm pipe (red). The lower tuned 1 TM plays as low as the W10 with 0 TM

The trick with TMS: there is space for up to three additional masses under the dust cap of the IQ woofer

In our test housings, both woofers were tuned without additional mass. This should be the best solution for many users, as the housings are the most compact and have the highest efficiency. You only want additional weight for sound reasons in the rarest of cases, namely when the woofer is supposed to shine in the low bass range. It is not without reason that designers of high-end sound quality woofers like to save unnecessary weight... In any event, the Helix IQ woofers can handle their additional mass, with their powerful drives with 64-millimeter voice coils, they also provide the necessary power handling. In the test, the small IQ W8-DVC2 then plays very agilely without neglecting the beefy bass. The low frequency range is quite sufficient for most listeners. The IQ W10-DVC2 generates a bit more pressure, but it can also play super cleanly and delivers plenty of low bass. Almost better than its little brother, it excels at fast bass runs and cuts a fine figure, in particular with SQ disciples.

Conclusion

Helix already has smart amplifiers that can be adapted to any vehicle, as well as smart speakers in the Compose series that are both universal and vehicle specific. And now, with the IQ subwoofers, low-frequency specialists are also being added, which can be operated quite smartly in a wide range of housings. If you want, you can tune the IQs down until the doctor arrives; if you do not want to, you simply have excellent subwoofers.

Elmar Michels

Both motors work with 64 mm coils, but the IQ W10 has larger magnet rings

Specifications

Basket diameter	27,5 cm
Mounting diameter	25,1 cm
Mounting depth	15,0 cm
Magnet diameter	17,5 cm
Weight	8,2 kg
Nominal impedance	2 x 2 Ohm
DC resistance Rdc	3,73 Ohm
Coil inductivity Le	2,65 mH
Coil diameter	64 mm
Membrane surface	363 cm²
Resonance frequency fs	40 Hz
Mechanical Q-Factor Qms	5,89
Electrical Q-factor Qe	0,48
Overall Q-factor Qts	0,45
Equivalent volume Vas	18,5 l
Moved mass Mms	154 g
Rms	6,76 kg/s
Cms	0,10 mm/N
B x l	16,81 Tm
SPL 1 W, 1 m	86 dB
Recommended power	100 – 300 W
Test cabinet	BR 30 l
Reflex tunnel (d x l)	10 x 30 cm

Helix IQ W10-DVC2

Price	450 Euro
Contact	Audiotec Fischer, Germany
Internet	www.audiotec-fischer.com

Rating

Sound	50 %	★★★★★
Low frequency extension	12,5 %	★★★★★
Sound pressure	12,5 %	★★★★★
Sound purity	12,5 %	★★★★★
Dynamics	12,5 %	★★★★★
Lab	30 %	★★★☆☆
Frequency response	10 %	★★★★★
Efficiency	10 %	★★½☆☆
Max. SPL	10 %	★★★½☆
Build quality	20 %	★★★★★

Upper Class

★★★★☆

CAR&HiFi INTERNATIONAL Germany 1/25

Price/performance: very good

"Customizable? Wonderful! Helix has invented smart subwoofers."

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· **Top Class** – Products for higher demands with excellent performance, sound, and processing quality

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The star rating provides comprehensive and concise orientation when searching for devices for your in-car entertainment. However, depending on your situation and application, the device with the best star rating is not automatically the best fit for you. For example, an amplifier may score very well overall but may be difficult to connect to your car radio. So additional effort has to be considered for integration or a different model might be the better choice. Therefore, you should additionally consult the detailed information provided in the text of the test reports.

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