NAD VISO 1

Wireless Digital Music System

THE BEST SOUNDING SMART MUSIC™ SYSTEM IN THE WORLD. PERIOD

White Paper by Greg Stidsen
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NAD purposely uses a non-technical marketing presentation to promote this unique product to customers. Music lovers need not be concerned about why the NAD VISO 1 performs so remarkably well. They should just sit back and enjoy!

Yet, the NAD VISO 1 is one of the most technically advanced music systems ever created. It combines the engineering expertise of two iconic hi-fi companies – NAD Electronics and PSB Speakers. Each company has a 40-year history with hundreds of awards and accolades. The NAD VISO 1 represents the first instance in which these two storied companies have fully integrated the development process to create a product that rises above what either could achieve alone.

Industrial Design

The design brief for the NAD VISO 1 was simple, yet daunting: Create a one-piece full-range stereo music system that takes full advantage of today's new music storage devices, iPods and smartphones, and fits gracefully into the home. We wanted a distinctive design that looked timeless rather than avant garde, so it could suit a broad range of decors. We wanted a design that could support a palette of different hues, and also stay fresh in the market place.

The precision metal ring forms the essence of structural harmony and visual simplicity. The iPod is elegantly liberated from the speaker cabinet to provide acoustic space for the hi-fi speakers nestled below. The graceful and accommodating cradle provides both portrait and landscape orientation, and allows the hand to slide behind the iPod for natural operation.

Another challenge was to make it large enough to play convincingly in the low frequencies and have enough dynamic range to fill a room with music, yet small enough to fit on a standard bookshelf. David Farrage of DF-ID in New York, used several visual tricks to reduce the perceived size of the NAD VISO 1. Except for the 'foot', there are no flat sides anywhere. The curvaceous lines reduce the visual mass while creating a harmonious and organic form. The graceful curves not only look beautiful, but also enhance the acoustic performance of the NAD VISO 1.

Internal standing waves are eliminated and music is projected at an ideal angle with high frequencies smoothly dispersed without the diffraction effects that cause problems with traditional box speakers.

Electronic Design

The NAD VISO 1 is a pure digital design. The music signal is taken from the iPod or Bluetooth receiver in digital format and remains digital right through to the speaker. Everything from the volume control to the speaker crossover to the power amplification, is performed in the digital domain, free from noise and distortion. The digital amplifier is based on NAD's Direct Digital platform debuted in the $6,000 Masters Series M2 Direct Digital Amplifier in 2009. The M2 is the first digital amplifier to utilize an active correction algorithm to compensate for non-linearity and parts tolerances, resulting in an amplifier that meets and exceeds all current amplifier benchmarks. There has never been a product in this category with amplifier performance even close to the NAD VISO 1.

Each loudspeaker in the NAD VISO 1 is directly coupled to its own amplifier channel, eliminating power-robbing passive crossover components. Since the exact load condition for each amplifier channel is known, power output can be optimized to make the most efficient use of the overall power available.

The digital engine that is the brain of the NAD VISO 1's electronics handles many other functions. We have a bit-perfect digital volume control without tracking errors or loss of stereo separation. Nor is there noise which is always present in designs using traditional variable potentiometers, even very expensive ones. Unlike virtually all other digital domain volume controls, the NAD VISO 1 does not truncate audible bits, thus maintaining full resolution of the musical signal. We have a mathematically accurate digital crossover with very steep roll-offs, and no added distortion or undesirable phase shift. This level of precision is not possible with analogue crossovers, whether passive or active. We also employ a Digital Soft Clipping™ circuit to prevent harsh distortion and possible speaker damage when playing at dance party volume levels.

Acoustic Design

The driver complement for the NAD VISO 1 is unusual, yet highly effective. Due to the small size, it was imperative to keep the driver count low, as multiple drivers cause interference and 'response lobing' that is difficult to control on such a small baffle. Lobing can destroy musical image focus and dimensionality, and results in very different frequency responses based on the orientation of the listener to the speaker. Another advantage to using fewer drivers is that we were able to spend more on superior quality drivers. In the end, we specified a pair of very advanced full-range drivers and a single high power-handling woofer. By using bi-amplification, we were able to integrate and optimize the response of these drivers to a remarkable degree.

The full-range drivers utilize a focused neodymium magnet system and a one-inch voice coil with fibreglass former to give both high sensitivity and high power handling. There is a unique black anodized (for heat dissipation) aluminium dome/cone assembly attached to the motor, which is terminated with a soft rubber surround. Total diameter is 2.75" with a one-inch dome in the centre. This provides enough cone area to extend response down to 180Hz, yet the dome allows excellent high frequency dispersion and extension to 28kHz. These drivers have their own separate enclosures that are optimized for a low frequency cut-off of 500Hz. This allows for ideal integration with the woofer response while lowering distortion at high playback levels.

The woofer is no less special using a very powerful magnet and specially designed pole piece to improve sensitivity and lower distortion. A 1.25" voice coil moves the 5.75" cone on a high temperature fibreglass voice coil former. By carefully integrating the driver, enclosure, and amplifier, a highly effective sixth order alignment is utilized to extend anechoic bass response to below 50Hz. With the -6dB point at 33Hz, the NAD VISO 1 can literally shake the floor when fed music with solid low frequency extension.

The high frequency sound power was carefully integrated with the directional characteristics of the drivers to produce a large airy soundstage with precise instrument location. There are no phony surround sound 'tricks' employed to create this large soundstage, just precisely engineered acoustics.

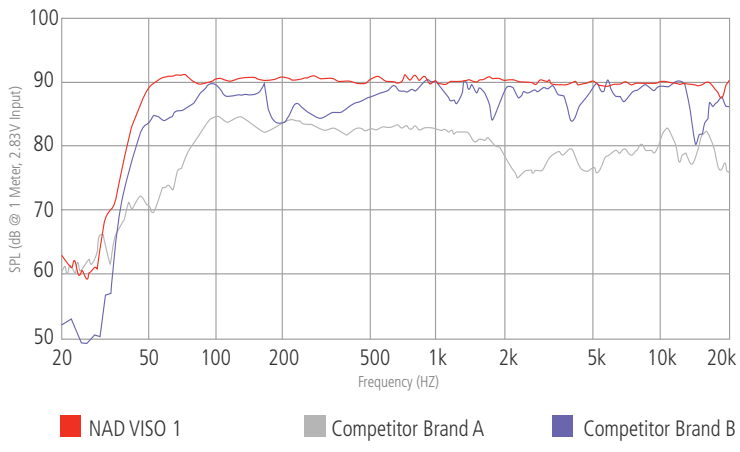
Wireless Technology

We decided to use the latest Bluetooth technology to allow wireless streaming from any Bluetooth-enabled smartphone, tablet, or laptop. Bluetooth technology has evolved rapidly in the last few years, improving range and robustness while further improving efficiency for low power consumption. But for music lovers, the most important new development in Bluetooth is aptX, a data compression codec that allows performance that equals a wired connection. The NAD VISO 1 is backward compatible to earlier Bluetooth versions and sounds remarkably good with these, especially the AAC implementation of Bluetooth used by Apple. aptX is gaining widespread market acceptance and will soon be standard on most smartphones and other portable devices.

Objective Measurements

The measurements shown at the right were made at Canada's National Research Council in Ottawa using the same methods and techniques developed over many years in the successful design of PSB Speakers. The difference in the NAD VISO 1 is the integration of amplifier with speaker, and the power of Digital Signal Processing to create ideal and very precise driver response and integration.

NAD VISO 1 Wireless Digital Music System vs. Competition



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Features and Specifications

Power Rating Total	80W (Sub - 50W, Left – 15W, Right – 15W)
Frequency Response	33Hz – 28kHz (-6dB) Anechoic, 50Hz to 20K ±1dB Anechoic
Sound Pressure Level (maximum)	100dB
NAD Direct Digital DAC/Amplifier	35 bit/844kHz, 0.005% THD
Bi-amplified System with Digital Crossover and Volume Control	
Digital Soft Clipping™	
Bluetooth aptX Wireless Hi-fidelity Receiver	2.4Ghz
Driver Complement	2 x 2.75" Full range drivers with aluminium dome/cone and dual magnetic drive 1 x 5.75" Subwoofer with symmetrical magnetic drive
Connectivity	Optical Digital Input – 32KHz to 96KHz PCM Component Video Output – Y Pb Pr USB port for software upgrades
Accessories	Remote control model VISO 1
Power Consumption	AC Power – 100V to 240V 50/60Hz 35W (1/3 Output Power) AC Idle Power – 10W
Net Dimensions (WxHxD)	480mm (18.9") x 261mm (10.25") x 300mm (11.8")
Weight	5.6kg (12.34lbs)

** Non-metric measurements are approximate. NAD Electronics will not assume any liability for errors being made by retailers, custom installers, cabinet makers, or other end users based on information contained in this document.

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