

AUDIO ANALOGUE

soundpleasure

HIGH-END AUDIO ELECTRONICS
HANDCRAFTED IN ITALY

Enigma REV2.0
Multifunction audio unit

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Research & Development

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Introduction

Audio Analogue goes on in its research to solve the enigma:

"Is it possible to create a multifunction audio unit, also known as an "all in one system", with such a high sound quality that makes it comparable to the best audiophile systems?"

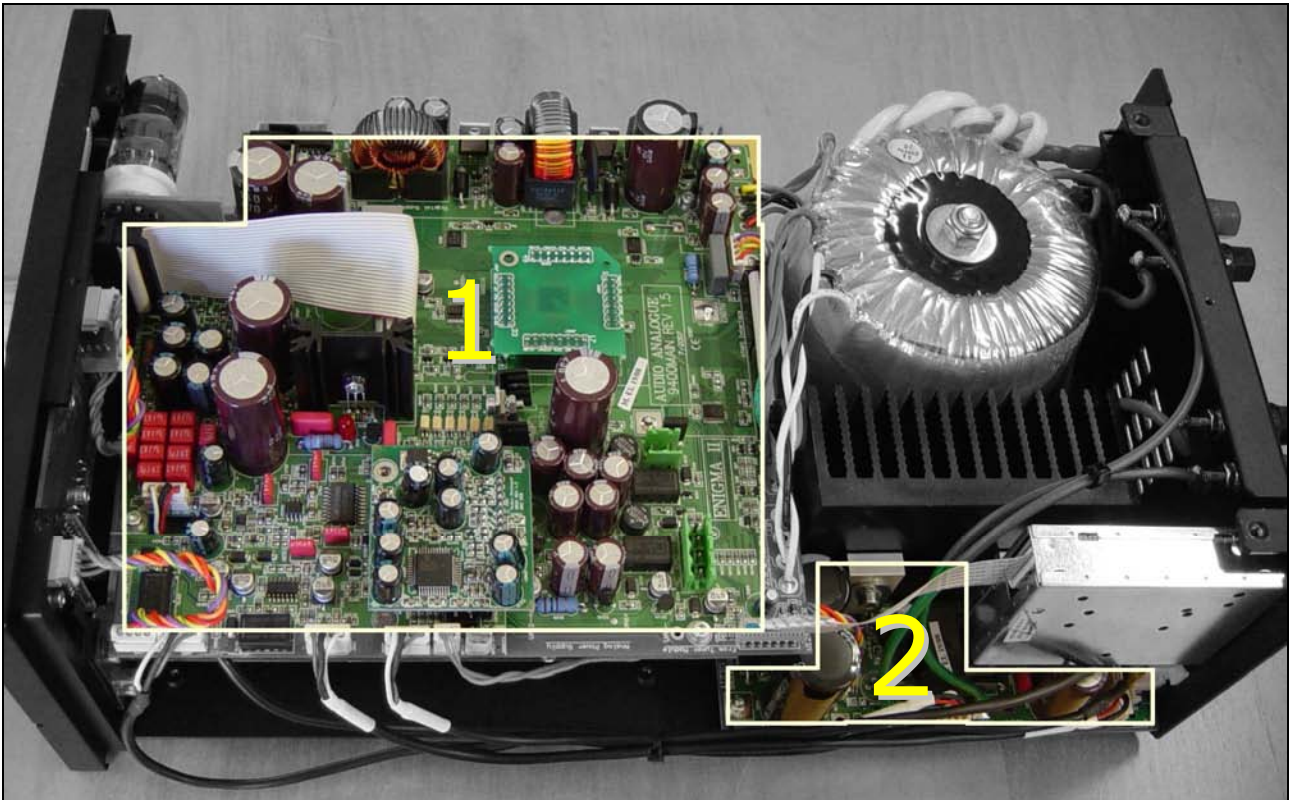
With Enigma Rev2.0 the answer is yes!

The audio chain design was chosen starting from the selection of a new Vacuum Tube Preamplifier section based on the Rossini CD Player REV2.0 output stage that gave us surprising results. The other parts were then matched to the preamplifier stage. Important changes have been implemented in every part, but especially in the power stage and DAC section. The resulting audio quality is astonishing!

The Enigma Rev2.0 has a new more essential design with a line input on the front to be connected to a line output of an MP3 Player such as the iPod to meet the growing interest in that kind of audio source, even in the audiophile field. Also a Mono-Out (?) output has been added to connect a passive subwoofer along with the implementation of some extremely efficient new software.

Enigma Rev.2.0 solve the enigma. It is a unique product because on the market there are certainly no other "all-in-one" systems with similar audio quality. We can assert with absolute certainty that The Enigma Rev2.0 can be favourably compared in terms of its warm soft sound with even higher more expensive true audiophile systems.

Unit description

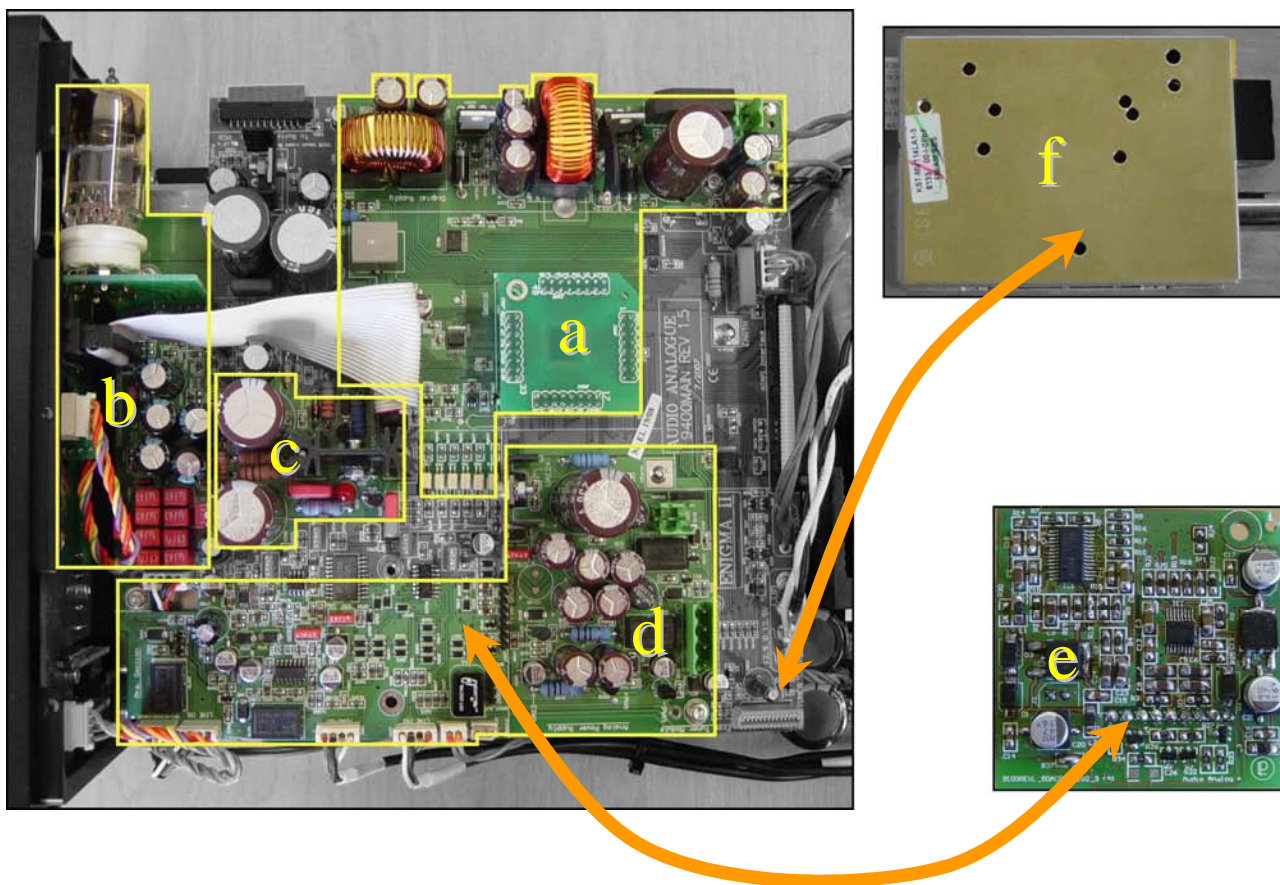


1. Top PCB
2. Bottom PCB
3. Functionality



1. TOP PCB

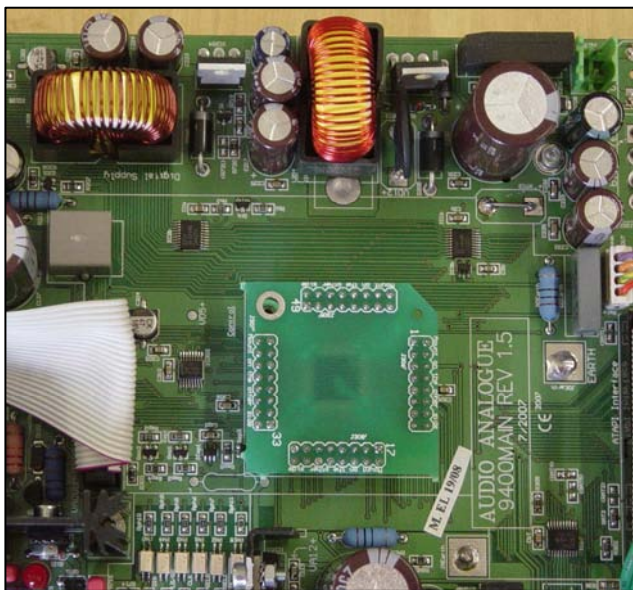
The TOP PCB is mounted on the TEAC CD-5010A CD mechanism. This mechanism is CD ROM based, which has been developed by TEAC specifically for audio applications. The staff at R&D Audio Analogue has contributed to the development of this component by performing the mechanical tests. In the CD-5010A the spin speed has been chosen to decrease the mechanical vibration to make the reading procedure stronger and reduce the jitter too. On the TOP PCB there are: the control digital circuits, their power supplies and the following analogue parts: Input selection, Volume control, DAC section, Vacuum tube Preamplifier, MonoOut section and the respective power supplies. On this board there is also the tuner module connector on which the power supply, the control signals and the audio signals are carried. The analogue and control digital circuits have been designed to be partitioned as much as possible to avoid any undesired interference between the parts. The digital and analogue grounds are obviously separated and even the control signals are transferred from the controller to the analogue parts via optoisolators. The analogue and digital grounds are separately brought to the single unit Earth point via a resistor as to reduce earth noise problems and earth interference.



Sections:

- a. System Control – Digital Power Supplies
- b. Vacuum tube preamplifier section
- c. Anodic power supplies
- d. Input selection, Volume control, MonoOut section, Phones Out Section
- e. Dac section
- f. Tuner Module

a. System Control – Digital Power supplies



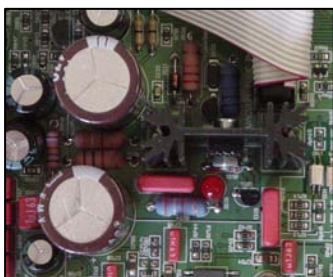
The entire unit is controlled by a microcontroller based architecture where a Bus structure has been added because of the large number of control signals required. To have the best isolation between the analogue and digital parts, optoisolators are used to carry the control signals to the analogue parts. The microcontroller has been placed into the centre of the board to reduce the overall track distances in any direction (especially for the CD Mechanism control signals) and in such a way reduce the probabilities of irradiation and interference. The digital power supply is made from a dedicated secondary stage and all the digital power supply is placed as far as possible from the lowest level sensitive analogue parts.

b. Vacuum tube preamplifier section

The preamplifier circuit is based on the Rossini CD Player Rev2.0 vacuum tube output stage that has performed very well thanks to its electrical characteristics and audio musicality. The circuit has been designed by the Audio Analogue R&D office to emphasize the sound properties of the vacuum tube and to take advantage of the solid state technology. The vacuum tube is the first phase in an inedited DC coupled low feedback three stage structure. The amount of feedback has been chosen not only on the basis of measurements but also on the basis of listening tests too. What we have tried to do is strike a balance between the vacuum tube "coloring" and solid state "cleanliness". To use this circuit as Enigma's preamplifier section we have modified it to increase the maximum allowed input signal voltage and the bandwidth. The preamp section with its low output resistance directly drive the power amp stage.



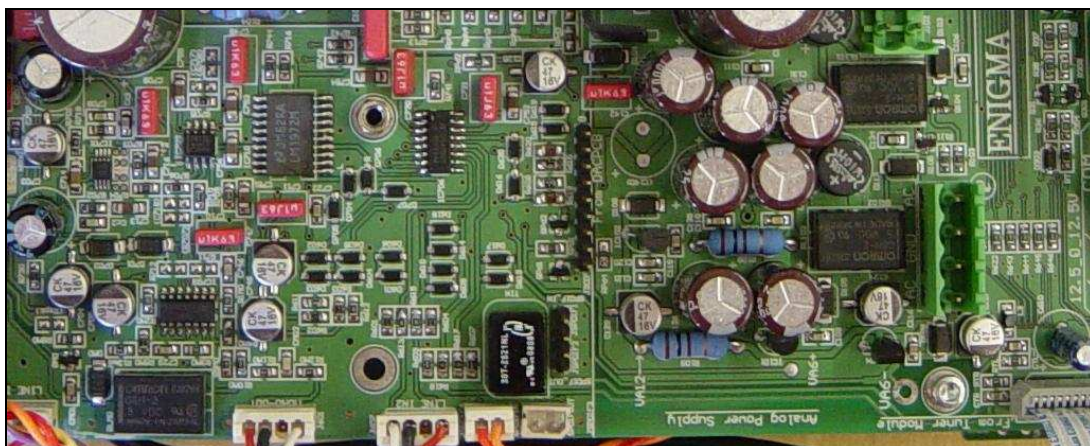
c. Anodic power supply



The vacuum tube preamp stage that we have used is not based on a differential input so the noise on the anodic supply is not reduced by the circuit itself. That is why we have worked on the anodic power supply to make it as clean as possible. The voltage for the anodic power supply is obtained by a high voltage dedicated secondary and then regulated with a voltage regulator made of discrete components. The regulator output is then filtered by a RC filter with a very low time constant (less then 1.24!). At the end no interference between 50/100Hz is visible on the pre output

frequency spectrum. The voltage supplies of the two channels are also separately bypassed to enlarge the listening stage.

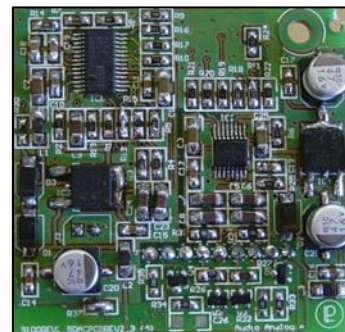
d. Input selection, Volume control, MonoOut section, Phones Out Section



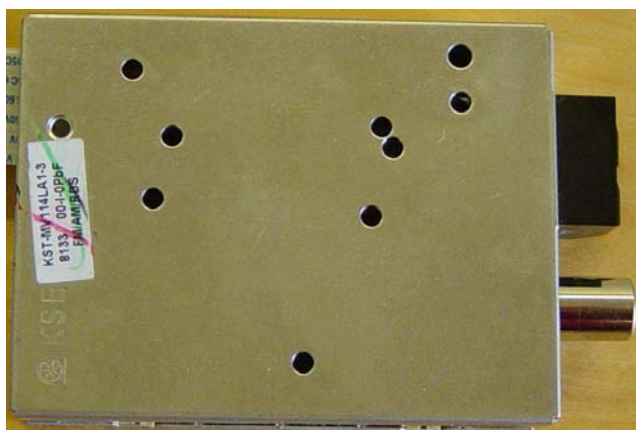
These parts are all realized with SMD components to take advantage of all available space and reduce the Track's length. Every Integrated power supply has been bypassed using high quality capacitors for high frequency efficient bypassing (see the "distributed" high quality "Red" Wima Capacitors on the board...). The volume control is bufferless for the best sound transparency. We have used low noise and low distortion input selector circuits. All the signals to different sections have been arranged to eliminate any loading effects between the stages. These parts have their power supply coming from a separated secondary stage which is used also to implement the Tuner module supply and the preregulated DAC section Power supplies.

e. DAC Section

The new DAC PCB use a Burr Brown 24-bit, 192KHz, Enhanced multi level Delta Sigma DAC and a low jitter recovered system clock (50pS!), 96KHz, 24 bit Receiver also from Burr Brown. The DAC Section is realized on a separated board to avoid any unwanted interference due to high frequency digital signals. The power supplies for the receiver and the DAC are taken from the regulated voltages of the TOP PCB and are stabilized "in loco" on the DAC PCB with a dedicated voltage regulator for each power supply. We have used a really high level performance overall conversion circuit, in fact we have reached a THD + N (with a 20Hz-20KHz noise filter) of less than 0.003% for a 0dB digital pure sinewave track.



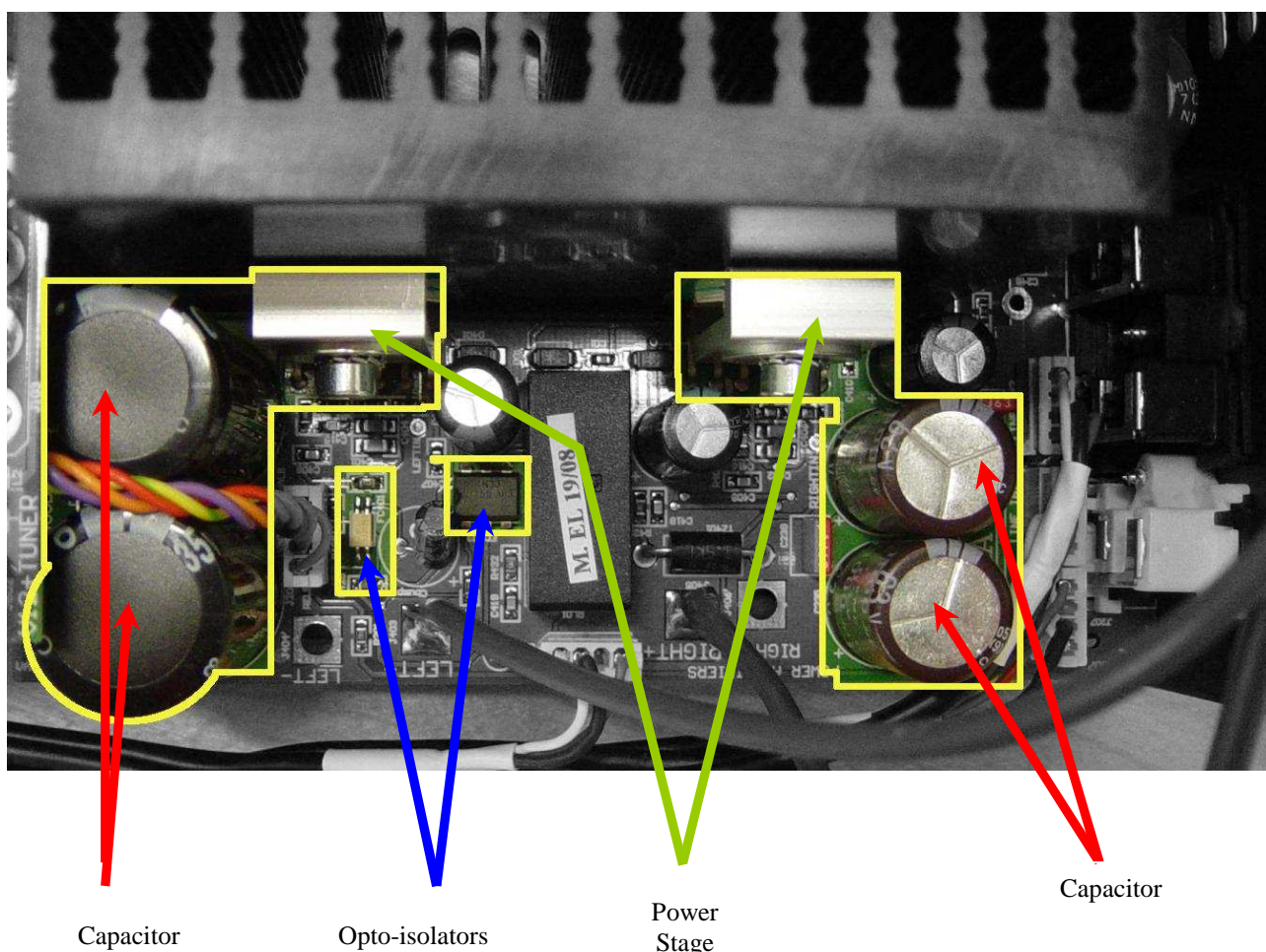
f. Tuner Module



The Tuner Module used is a Sanyo technology based one with electronic tuning and a AM/FM PLL Frequency Synthesizer capable of matching all the AM and FM frequency range used in the various countries. The tuner Module is shielded and kept separated to all the other parts of the unit, the audio signals are low pass filtered as they arrive on the TOP PCB to block every radiofrequency component.

2. Bottom PCB

On the bottom PCB placed in the rear part of the unit there are the power amps and their power supply. The power amplifier stages are based on the National Semiconductors integrated component LM3886 which has been used in a lot of audiophile quality audio equipment (such as the Jeff Rowland Concentra Integrated Amplifier). That component is a very reliable one with a lot of inner integrated protections which work with no interference to the sound quality. The LM3886 is protected against over-current and short-circuits and has two different temperature protection systems, one based on the average temperature and the other sensing the immediate temperature. The frequency response of the power stage has been matched with the Preamplifier circuit so we have added a lot of capacitance to supply a good charge reserve and have the correct low frequency response while we have increased the high frequency band limit to not damage the high frequency performance of the preamplifier. The reserve capacitors have been placed close to the power stages for a more efficient charge exchange. There are as much as 15000 μ F on either the positive or negative power supply for a total of 30000 μ F, just for the power stages! The control signals from the TOP PCB to the Power stages as for the TOP PCB are passed through optoisolators to leave the analogue and digital grounds separated.



All the components used are high quality and low tolerance and have been chosen after electrical tests and listening sessions. The Board that is often a neglected "componet" has been designed in respect of all noise reduction techniques especially for the current return parts and power supply traces.

3. Functionality

The Enigma Rev2.0 has been implemented with new highly efficient software to which a lot of extremely useful functions have been added with a complete manager menu. Some examples:

- Balancing: to balance the channel's levels with a 1dB step scale.
- Autoplay: if enabled, when the unit is turned on the CD is automatically played.
- Sleep: if enabled the unit turns off after 15, 30, 45, 60 minutes.
- Volume recall: if enabled the volume when the unit is turned on is automatically arranged to the value set in the Volume recall voice in the menu.
- Selectable volume scale: it is possible to choose between 4 different volume scales to match the unit with the loudspeaker's sensibility.
- Selectable Tuner bands: it is possible to set the frequency limits of the AM and FM bands to match them with the limit of the nation where the unit is working.

Enabling the Autoplay and Volume recall functions the unit, when turned on, automatically plays a CD with the desired volume level only after the heating tube procedure has finished.

Technical Data

Dimensions	(Nota 1)	125 x 210 x 400 mm
		4,9 x 8,3 x 15,7 "
Weight		9,3 kg
		20,5 Lbs
Line Gain		12dB
Power Amp Gain		26dB
Line Input impedance		40KOhm
Power on 80hm load, Input Line2 (Note 6)		10W @ 0.01% THD + N
		40W @ 0.016% THD + N
		45W @ 0.019% THD + N
Frequency response	(Note 2)	110KHz
Response to a Square Signal	(Note 4)	Vout: 50Vpp
		Rise time: 3.3uS
Signal Noise Ratio	(Note 3)	95 dB (A weighted)
		90dB (No filter)
Noise level	(Nota 5)	-100dB
DAC Section		DAC: Burr Brown Enh.Multi. Sigma Delta PCM1781
		Receiver: Burr Brown DIR9001
		Full Scale Output = 3.9Vpp
Tuner Section		AM: Signal Noise ratio =49dB min.
		FM: Signal Noise Ratio = 72dB min.
		Electr.Tuning: SANYO LA1837
		AM/FM PLL Freq. Synth: SANYO LC7213
Dynamic Range	(Nota 8)	96dB
ENOB	(Note 7)	15.65Bit
Inputs		2LineUnbalanced Input + 1 Front Line Input
Outputs		1 Stereo MomoOut + Front HeadPhone Out

Notes:

Nota 1 - Height x Width x Depth (H x W x D)

Nota 2 - Attenuation 0dB, -3dB Band

Nota 3 - Attenuation: 0dB A weighted referred to 8 Ohm load nominal power

Nota 4 - 1KHz input signal, two piloted channels

Nota 5 - Band limits 0Hz-40KHz

Nota 6 - Band limits 0Hz-22KHz

Note 8 - ENOB = Effective number of Bits

Nota 7 - Measurement conditions: Source Selected CD Player, Volume = 0dB attenuation,
Signal = - 60dB, 1KHz pure sinewave track; Dynamic Range = measured THD + N value with a
20Hz-22KHz filter (no other filter!) in the described conditions + 60dB.