

## ▼ CLASS D AMPLIFIERS

### ▼ NILAI500DIY

#### ▶ DATASHEET

## Introduction

The Nilai500DIY is the long-awaited successor to the acclaimed NC400. Its polished shiny exterior is true reflection of what is to be found inside. The engine room houses a brand new control-loop topology that really boosts performance to the next level. It outperforms Ncore by not less than 10 times!

The module comes with a fully discrete buffer stage and on-board voltage regulators, just like the NC400 it's replacing. Together with carefully selected high-grade components, the Nilai500DIY is our best sounding amplifier to date. We have created a truly proprietary technique which sets a new benchmark for high-end audio applications and is a truly unique amplifier module for our DIY community. Combining the Nilai500DIY with the matching PS500DIY will result in the best possible ready-to-go DIY-experience to date!

## Key Features

- Ultra Low Distortion
- Very Low Idle Power
- Very Low Noise
- Very Low Output Impedance
- Incorporates Audiophile Components

## Key Specifications

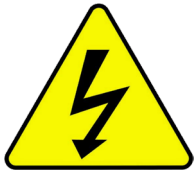
Output Power	500W (4Ω/20Hz)
THD+N	0.00015%
Output impedance	40μΩ
Frequency response	0 - 70kHz
Output Noise	9μV
Signal To Noise Ratio	134dB
Idle Power	2,25W



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## 1 Safety Precautions



This module operates at high voltages and carries hazardous voltages at accessible parts. These parts may never be exposed to inadvertent touch. Observe extreme care during installation and never touch any part of the unit while it is connected to the mains.

**Disconnect the unit from the mains and allow all capacitors to discharge for 10 minutes before handling it.**

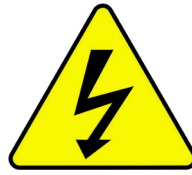


**Attention: Observe precautions for handling electrostatic sensitive devices. This module uses semiconductors that can be damaged by electrostatic discharge (ESD).**

**Damage due to inappropriate handling is not covered by warranty. This product has no user-serviceable parts.**

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water.
6. Only use attachments/accessories specified or approved by the manufacturer.
7. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally or has been dropped.
8. Don't run any cables across the top or the bottom of the module. Apply fixtures to cables to ensure that this is not compromised.
9. Observe a minimum clearance of 3mm with all possible conducting parts (housing etc.).
10. Natural convection should not be impeded by covering the module (apart from the end applications housing).
11. This product is to be used with Hypex PS500DIY module only.
12. Before using this product, ensure all cables are correctly connected and the power cables are not damaged. If you detect any damage, do not use the product.
13. Changes or modifications not expressly approved by Hypex Electronics will void compliance and therefore the user's authority to operate the equipment.
14. Service or modifications by any person or persons other than by Hypex Electronics authorized personnel voids the warranty.

## Précautions de sécurité



Ce module est sous tension secteur et certaines de ses pièces accessibles sont sous une tension dangereuse. Ces pièces doivent dans tous les cas être protégées contre contacts accidentels. Lors de l'installation, une prudence extrême s'impose. Ne jamais toucher les pièces du module quand celui-ci est relié au secteur.

**Isoler l'appareil du secteur et attendre 10 minutes pour laisser à tous les condensateurs le temps de se décharger avant de le manipuler.**



**Attention : Respecter les consignes de sécurité pour la manipulation d'appareils sensibles aux courants électrostatiques. Ce module est pourvu de semi-conducteurs qui peuvent être endommagés par les décharges électrostatiques (DES).**

**Les dommages causés par un usage non approprié sont exclus de la garantie. Ce produit ne contient aucune pièce devant être entretenue par l'utilisateur.**

## 2 Electrical Specifications

### 2.1 Recommended Operating Conditions

Parameter	Conditions	Symbol	Min	Typ	Max	Unit	Note
Input Voltage Main	Symmetric Supply +/-	HV	50	70	72	V	1)
Input Voltage Aux	Symmetric Supply +/-	$V_{AUX}$	20	23.5	25	V	1)
Input Voltage Driver	Referenced to V-	$V_{DR}$	18	23	25	V	1)
Load Impedance		$Z_{LOAD}$	1	-	-	$\Omega$	
Source Impedance		$Z_{SRC}$	-	-	1	k $\Omega$	

**Note 1:** Guaranteed by PS500DIY.

### 2.2 Nilai Amplifier Specifications (connected to PS500DIY)

Parameter	Conditions	Symbol	Min	Typ	Max	Unit	Note
Peak Output Power	1kHz, THD=1%	$P_{R, 2\Omega}$	-	500	-	W	
		$P_{R, 4\Omega}$	-	575	-	W	
		$P_{R, 8\Omega}$	-	260	-	W	
Distortion	20Hz<f<20kHz, 4 $\Omega$ , P<100W	THD+N	-	0.0005	0.0006	%	
DM input impedance		$Z_{IN,DM}$	-	104	-	k $\Omega$	
Signal-To-Noise Ratio	Low gain	SNR	-	134.0	-	dB	
	Mid gain	SNR	-	129.6	-	dB	
	High gain	SNR	-	124.7	-	dB	
Output noise	Low gain	$V_N$	-	9	-	$\mu$ V	
	Mid gain	$V_N$	-	15	-	$\mu$ V	
	High gain	$V_N$	-	27	-	$\mu$ V	
Input for max power	Low gain	$V_{IN,PMAX}$	-	12	-	V <sub>rms</sub>	
	Mid gain	$V_{IN,PMAX}$	-	3.8	-	V <sub>rms</sub>	
	High gain	$V_{IN,PMAX}$	-	1.9	-	V <sub>rms</sub>	
Output Current Limit			22	23	25	A <sub>pk</sub>	
Output Impedance	f<20kHz	$Z_{OUT}$	-	-	850	$\mu\Omega$	
	f<1kHz	$Z_{OUT}$	-	-	90	$\mu\Omega$	
Input Impedance		$Z_{IN}$	-	47	-	k $\Omega$	
Power Bandwidth		PBW	35	-	-	kHz	1)
Supply Ripple Rejection		PSRR	-	80	-	dB	
Frequency Response	+0/-3dB. All loads		-	-	70	kHz	
	+0/-0.1dB. All loads		-	-	30	kHz	
Voltage Gain	J200 open	$A_{V,LOW}$	-	11.86	-	dB	
	J200 set to 1 - 2	$A_{V,MID}$	-	21.75	-	dB	
	J200 set to 2 - 3	$A_{V,HIGH}$	-	27.88	-	dB	
Idle Losses	Powerstage only	$P_0$	2.15	2.25	2.4	W	

**Note 1:** Dielectric losses in the output capacitor limit long term (>30s) full-power bandwidth to 5kHz.

## 3 Application Considerations

### 3.1 Cooling

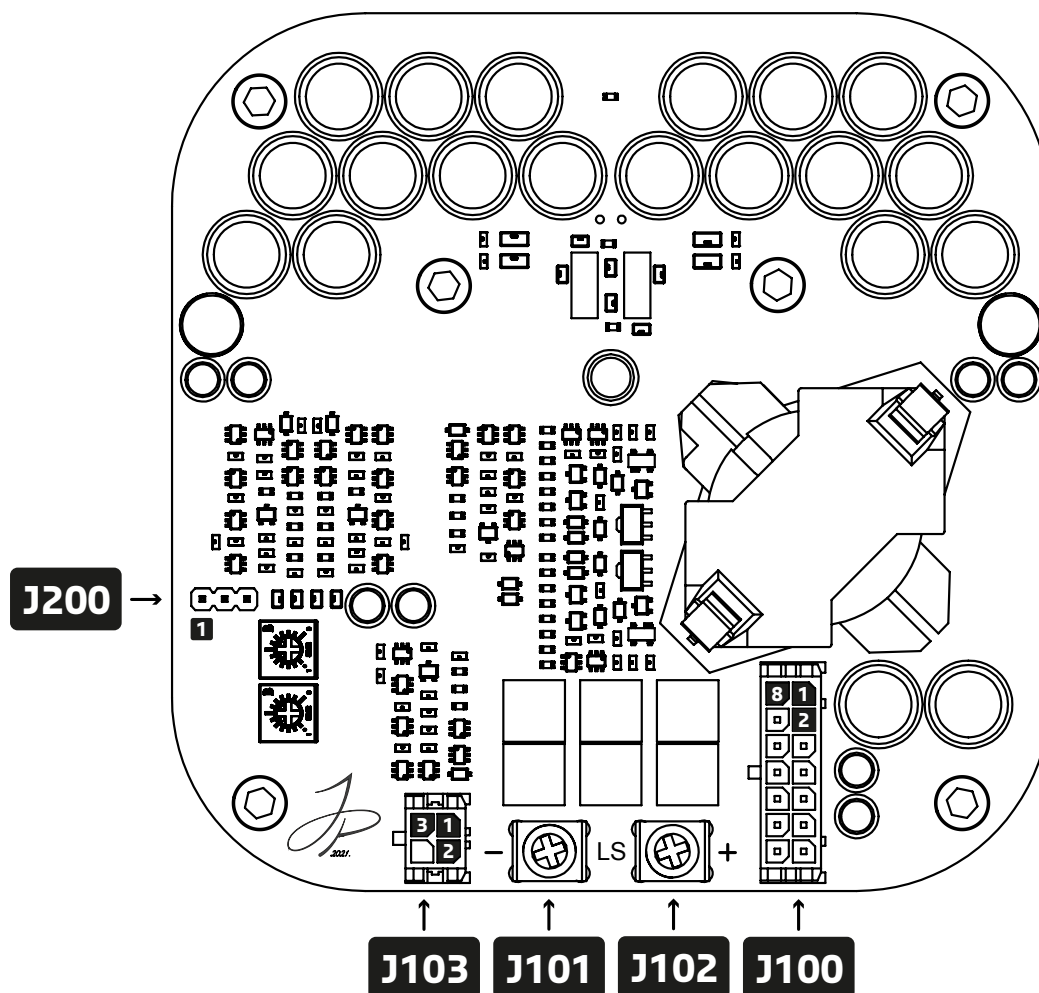
Use four M3 screws<sup>1)</sup> to fasten the Nilai500DIY to an aluminium surface of reasonable thickness (>2mm). In most cases this will be the bottom of a moderate sized aluminium housing. The Nilai500DIY runs fairly cool so no use of fans, external heatsinks or thermal paste is required.

**Note 1.** Be sure that the screws don't protrude the heatspreader to avoid damage to electrical components on the bottom side of the board.

### 3.2 Speaker Terminals

Use the supplied tool to fasten the speaker cables to screw terminals J101 and J102. Don't overtighten the screws as they are made of a soft alloy.

## 4 Connector Pinouts



## 4.1 J100 - Power Supply Connector

Pin	Direction	Function	Remarks	Note
1	Input	+VB	Amplifier main positive power supply	
2	Input	+VB	Amplifier main positive power supply	
3	-	GND	Amplifier ground	
4	-	GND	Amplifier ground	
5	Output	Amp fatal	Signals supply in case of a fatal error	1)
6	Input	+Vaux	Opamp positive power supply	
7	Input	Amplifier enable	Amplifier enable signal from power supply	2)
8	Input	-VB	Amplifier main negative power supply	
9	Input	-VB	Amplifier main negative power supply	
10	-	GND	Amplifier ground	
11	-	GND	Amplifier ground	
12	Input	Vdr	Amplifier driver voltage (referenced to -VB!)	3)
13	Input	-VAux	Opamp negative power supply	
14	-	GND	Amplifier ground	

**Note 1:** Open collector output. Is pulled low (<250mV) in the event of a fatal amplifier error.

**Note 2:** Pull to ground (<500mV) to enable the amplifier (only if PS500DIY is not used).

**Note 3:** Vdr needs to be referenced to **-VB!** If referenced to ground the amplifier will be damaged beyond repair!

## J101 - Negative Speaker Terminal

Pin	Direction	Function	Remarks
1	-	Speaker ground	Tighten screw using the supplied tool

## 4.2 J102 - Positive Speaker Terminal

Pin	Direction	Function	Remarks
1	Output	Speaker output	Tighten screw using the supplied tool

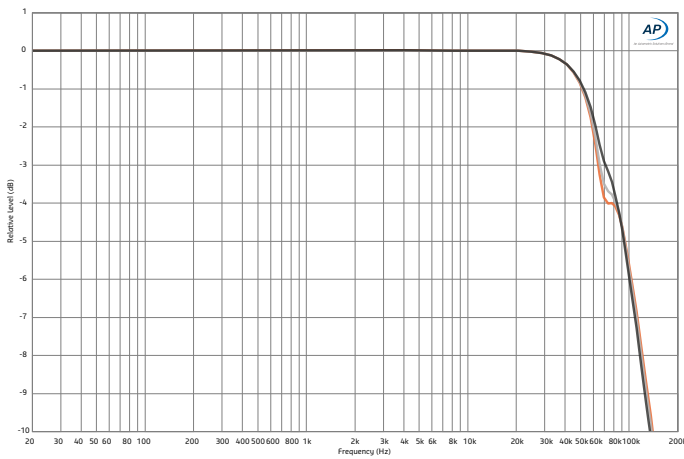
## 4.3 J103 - Signal Input Connector

Pin	Direction	Function	Remarks
1	Input	INH (+)	Non-inverting audio input
2	Input	INH (-)	Inverting audio input
3	-	GND	-
4	-	GND	-

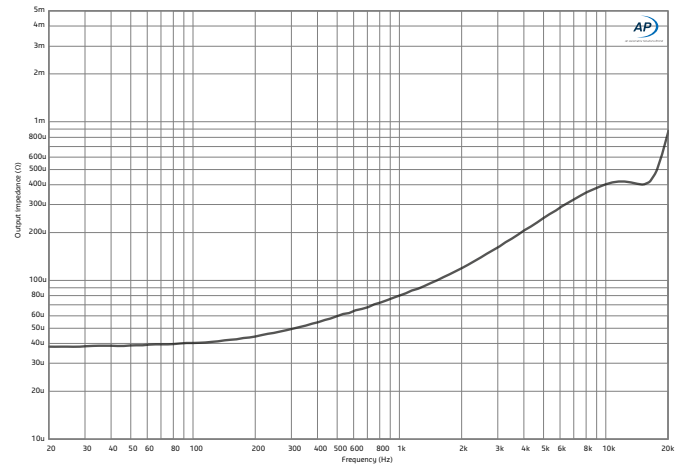
## 4.4 J200 - Input Gain Selection Jumper

Position	Function	Remarks
Open	Low gain	11.8 dB Overall gain is set to 11.8 dB (3.9x)
1 - 2	Mid gain	21.8 dB Overall gain is set to 21.8 dB (12.3x)
2 - 3	High gain	27.8 dB Overall gain is set to 27.8 dB (24.5x)

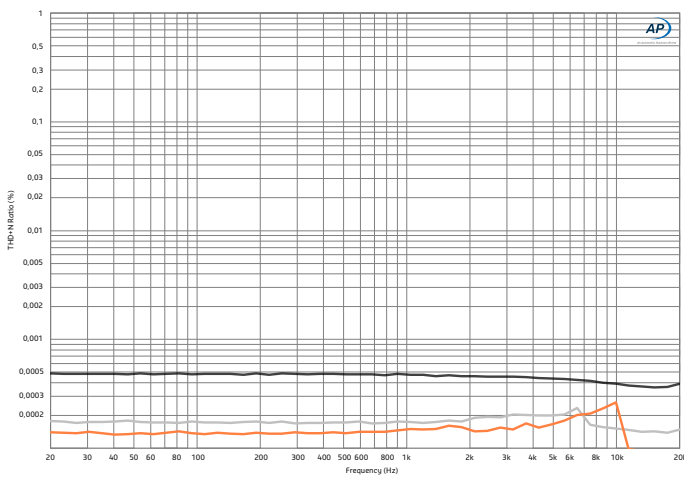
## 5 Typical Performance Graphs



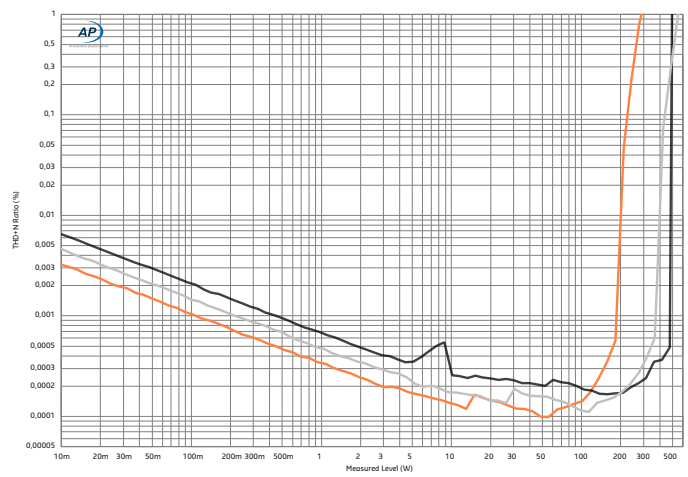
**Fig 1.** Frequency response into 4Ω, 8Ω and open circuit



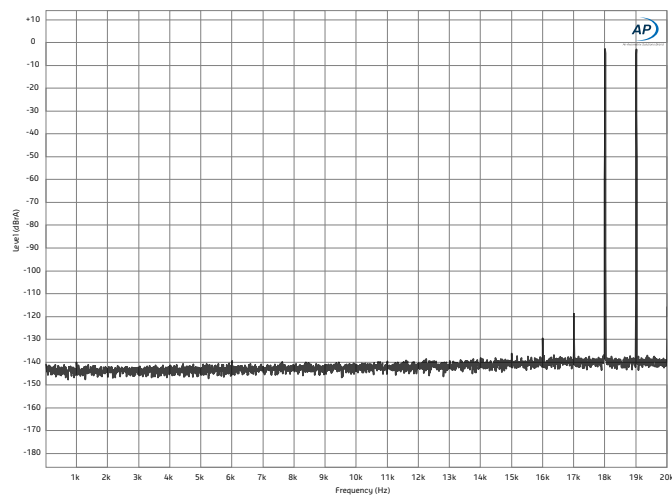
**Fig 2.** Output impedance, measured at output terminals



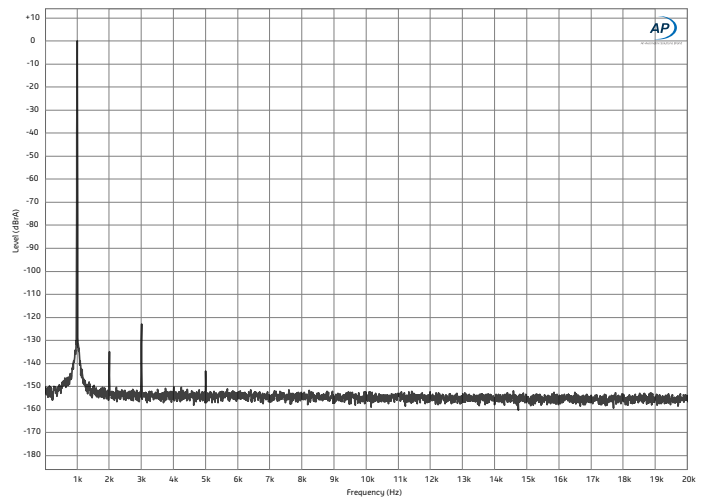
**Fig 3.** THD vs frequency at 1W, 10W and 100W into 4Ω



**Fig 4.** THD vs Power at 1kHz into 2Ω, 4Ω and 8Ω

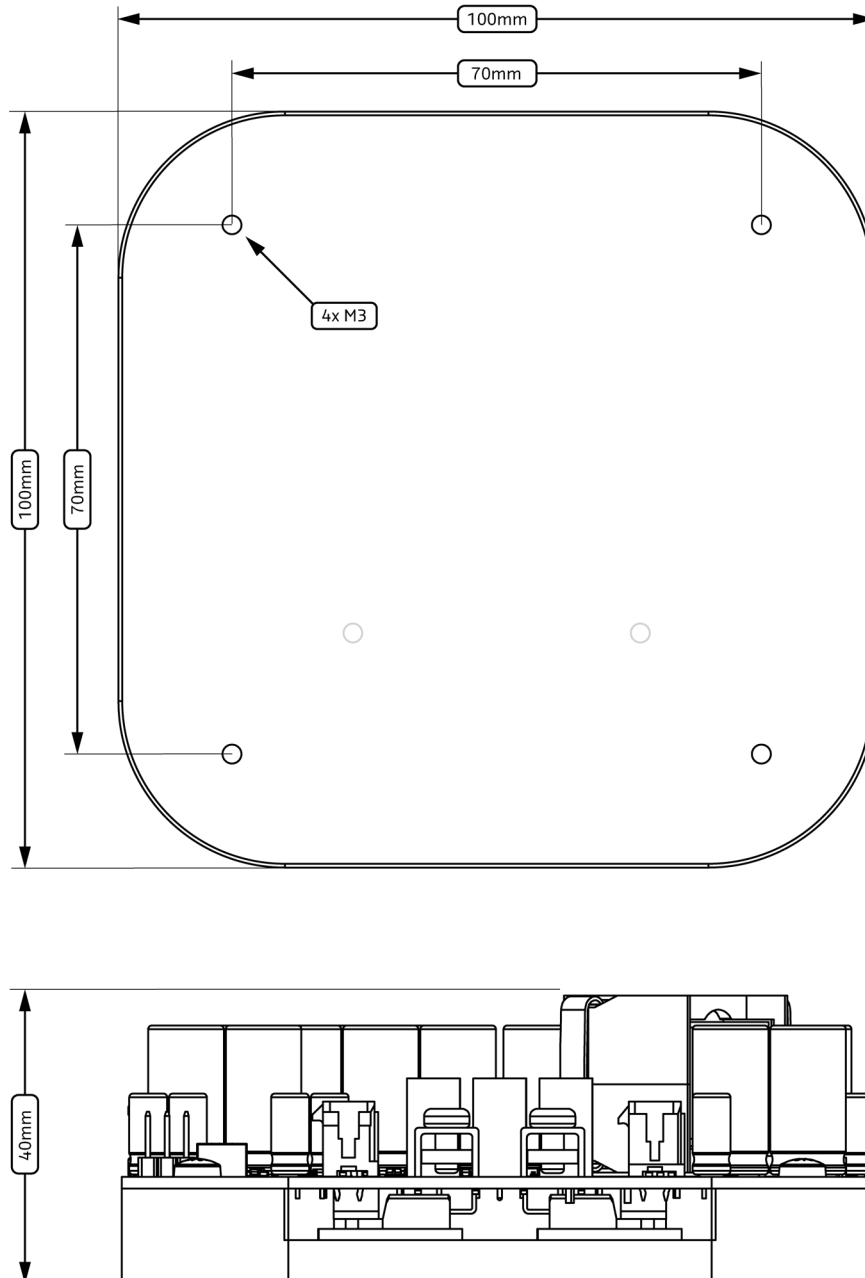


**Fig 5.** IMD 18kHz (50W) + 19k (50W) into 4Ω



**Fig 6.** FFT 1k (100W into 4Ω)

## 6 Dimensions & Drill Pattern



This image is actual size and can be used as a drilling template if printed out correctly.



## 7 Revisions

Document Revision	Module Revision	Change Log	Date
R1	Nilai500DIY 01xx	First revision	28.10.2022
R2	Nilai500DIY 01xx	Typo's corrected	07.11.2022
R3	Nilai500DIY 01xx	Output power info updated Input impedance updated IO info updated	06.10.2023

## 8 Disclaimer

**All products, product specifications and data are subject to change without notice to improve reliability, function or design or otherwise.**

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