PEAK AMPLIFICATION

SUB-500

Series

SUB-500 Subwoofer Module

SUB-500 can support 500W output in 4ohm, and it has been pre-approved for safety and EMC compliance. The SUB-500 has built-in OTP, OCP, DCP protect functions, and it is a mature and stable product. It can achieve the fast design-in and minimized time to market.

- 1 x 500W Subwoofer Amplifier Module with Integrated Power Supply
- Universal with PFC Power Supply (100VAC~240VAC)
- THD+N: 0.02% @ 1W (4Ω, 100Hz)
- Voltage Gain: 30dB
- Output Noise: 250uV
- Output Impedance: 65mΩ
- Total Efficiency: 83% @ 500W, 4Ω, 230VAC
- Standby Consumption: 0.3W
- Dimensions: 178.0 x 90.0 x 42.0mm
- Weight: 590g

SUB-500 Series

1.Power Specifications

1.1 AC Mains Power

Symbol	Parameters	Min	Typ	Max	Units
V_{AC} Range	Input Voltage	90	-	264	V_{AC}
F_{AC}	Mains Frequency Range	47	-	63	Hz
I_{AC}	Fuse Rating	-	8	-	A

1.2 Standby and Auxiliary Power

Symbol	Parameters	Min	Typ	Max	Units
V_{+8V}	Standby +8V Voltage	+7.6	-	+8.4	V
V_{+15V}	+15V_{aux} Voltage	+14	+15	+16	V
V_{-15V}	-15V_{aux} Voltage	-16	-15	-14	V
I_{+8V}	Standby +8V Voltage	-	-	600	mA
I_{+15V}	+15V_{aux} Current Rating	-	100	120	mA
I_{-15V}	-15V_{aux} Current Rating	-	100	120	mA

1.3 Power Specification

Unless otherwise specified. T_a= 25°C, f=100Hz, R_L=4Ω, 230V mains

Symbol	Parameters	Conditions	Min	Typ	Max	Units
t_{pmax}	Time of maximum rated output power [1)]	500W out not preheating	30	40	-	S
P_T	Continuous output power without thermal shutdown	Thermal stable @ T_a=25°C	-	62.5	-	W
$P_{standby}$	Standby mode power consumption	Only +8V output and no external load	-	0.3	0.35	W
P_{SMPS}	Quiescent power consumption (amplifier disabled)	Enable pin low	-	11	-	W
P_q	Quiescent power consumption (amplifier disabled)	P_O=0W	-	18	-	W
η	Total power efficiency	P_O=500W, R_L=4Ω	-	83	-	%
T_{SD}	Temperature @ thermal shutdowndisabled)		-	85	-	°C

Note 1: The module is mounted in free air.

1.4 Audio Specification

Unless otherwise specified. T_a= 25°C, f=100Hz, R_L=4Ω, 230V mains

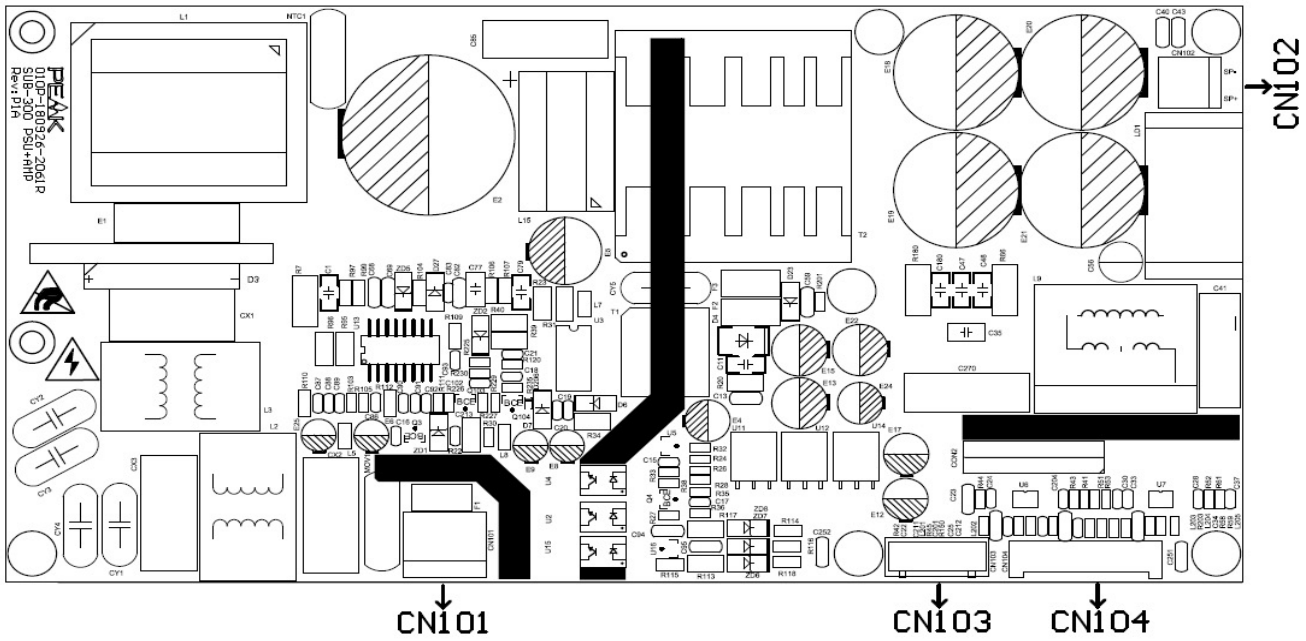
Symbol	Parameters	Conditions	Min	Typ	Max	Units
t_{pmax}	Peak output voltage	Unloaded	-	±70	-	V
$I_{out, peak}$	Peak output current	Unloaded	-	44	-	A
P_O	Output power @ 1% THD+N, 100Hz, R_L=4Ω	$100V_{AC}$~$240V_{AC}$	-	500	-	W
P_O	Output power @ 1% THD+N, 100Hz, R_L=8Ω	$100V_{AC}$~$240V_{AC}$	-	270	-	W
THD+N	THD+N @ 1W, 100Hz, R_L=4Ω	AES17 20KHz filter	-	0.02	0.03	%
V_{noise}	Output idle noise (AES17 20KHz filter)	Un-weighted A-weighted	-	340 280	-	μV
SNR	Signal to Noise Ratio (AES17 20KHz filter)abled)	Un-weighted A-weighted	-	102 104	-	dB
A_V	Voltage gain	f = 100Hz	29.5	30	30.5	dB
A_{Var}	Frequency response @ 20Hz-1KHz	R_L=4Ω R_L=8Ω	-	±0.3 ±0.3	±0.5 ±0.5	dB
Z_{in}	Input impedance			10		kΩ
Z_{out}	Output impedance	f = 100Hz		65		mΩ
Z_L	Load impedance range		4	8	∞	Ω

1.5 Environment Specification

Symbol	Parameters	Conditions	Min	Typ	Max	Units
$T_{a\text{-storage}}$	Ambient Temperature	Storage	0	-	70	°C
$T_{a\text{-operation}}$	Ambient Temperature[1)]	Operation	0	-	50	°C
$T_{a\text{-heatsink}}$	Heatsink Temperature[1)]	Operation	-	-	85	°C
H	Humidity[2]	Storage	-	-	85	%

Note 1: It is recommended to add a fan or external heatsink to the system.
Note 2: The maximum humidity is 85%, non-condensing.

2.0 Connection Pinouts



2.1 AC Connector

CN101				
Pin	**Function**	**Description**	**Type**	**Note**
1	Live/Line	The mains input Live/Line AC.	Input	-
3	Neutral	The mains input Neutral AC.	Input	-

Connector type: B2P3-VH, JST

2.2 Speaker Out Connector

CN102				
Pin	Function	Description	Type	Note
1	SPK_OUT+	The hot speake output of the amplifier.	Output	-
2	SPK_OUT-	The cold speake output of the amplifier.	Output	-

Connector type: B2P3-VH, JST

2.3 DC Supply Connector

CN103				
Pin	**Function**	**Description**	**Type**	**Note**
1	-15_{Vaux}	Negative unregulated auxiliary supply (typecal -15V)	Output	-
2	GND_{15V}	Ground terminal for +15Vaux ,-15Vaux	GND	-
3	$+15V_{aux}$	Positive unregulated auxiliary supply (typical +15V)	Output	-
4	GND_{8V}	Ground terminal for +8V	GND	-
5	+8V	Standby power supply (typical +8V)	Output	-

Connector type: B5B-XH-A, JST

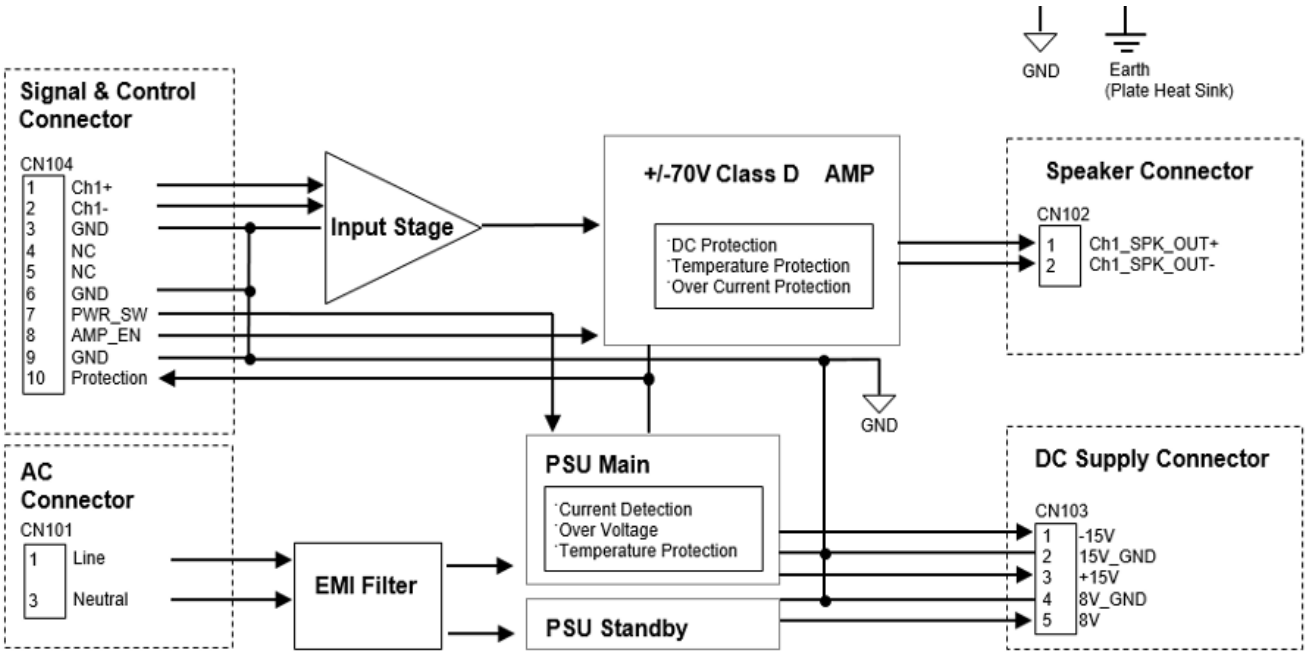
2.4 Signal and Control Connector

CN104				
Pin	**Function**	**Description**	**Type**	**Note**
1	Channel 1+	Input signal Channel 1+	Input	-
2	Channel 1-	Input signal Channel 1-	Input	-
3	GND	Ground terminal for the signal section	GND	-
4	NC	-	-	-
5	NC	-	-	-
6	GND	Ground terminal for the signal section	GND	-
7	Power Enable	The main switching mode power supply enable control. High:Main voltage and auxiliary supply enable. Low:Only standby voltage enable.	Output	-
8	Amp Enable	The amplifier enable/disable enable control. High:Amp enabled. Low:Only Amp disenable.	Input	
9	GND	Ground terminal for the signal section	GND	-
10	Protection	Amplifier protection (OTP,OCP,DCP)	Output	-

Connector type: B10B-PH-K-S, JST

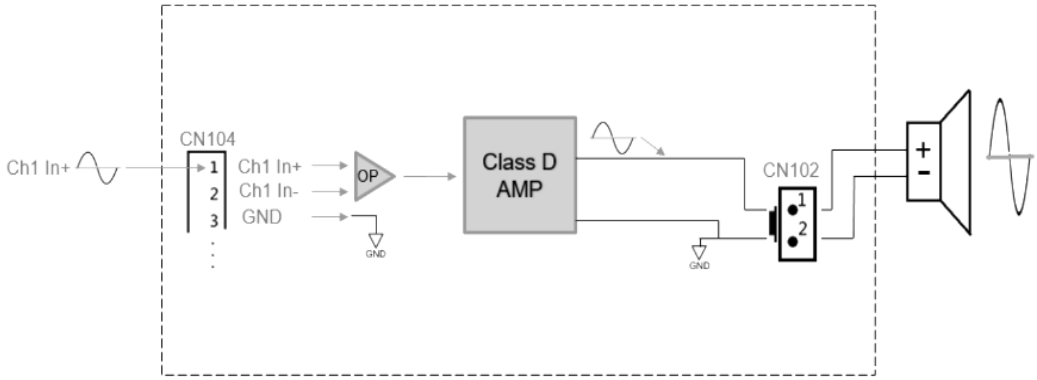
3.0 Functional Block and Applications

Below is shown a block diagram of the SUB-500



3.1 Signal Ended (SE) 1 channel Configuartion

The SUB-500 module is a one channel sigle ended class D amplifier



4.0 Pin Definition and Features

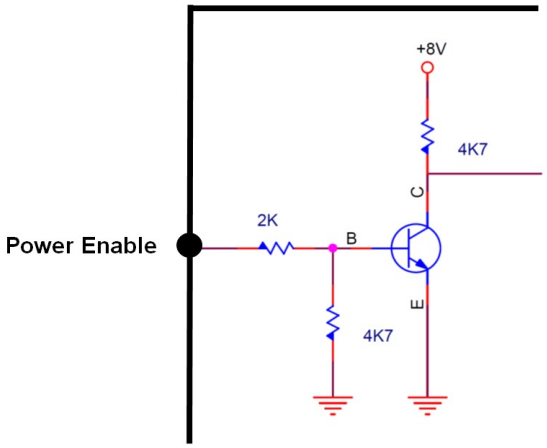
4.1 Signal Input

The differential input signal is available on the SUB-500 module. If you would like to use single-end signal input, the channel 1- should be connected to GND. When the signal input=1.5Vrms, the output power will reach the maximum output.

Symbol	Description	Min	Typ	Max	Units
Channel 1+ Channel 1-	The maximum allowable signal on these signal input pins is ±15V_p	-15	-	+15	V_p

4.2 Power Enable

When the power enable pin becomes to logic high level, the main SMPS is enabled. When the power enable pin becomes to logic low level, the main SMPS is disabled, and the module has only +8V standby power in this status.

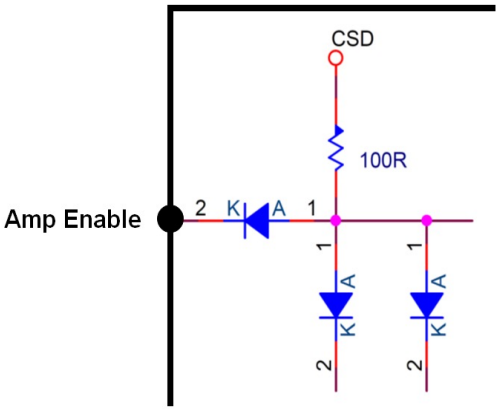


Symbol	Function	Description	Min	Typ	Max	Units
Power Enable	SMPS enable	Logic High Level	3	3.3	8	V
	SMPS in standby	Logic Low Level	-	-	0.6	V

4.3 AMP Enable

The Amp enable pin can enable/disable the amplifier. If the pin is left un-connected, there is a pull high resister internally. At this status, the level of this pin is around 5V and the amplifier is enabled. If the pin is pulled low (0V) externally, the amplifier will be disabled.

The Amp enable pin will also be pulled low by the internal protection circuitry if the amplifier temperature becomes too high or a mains under-voltage is detected. This pin is bidirectional.

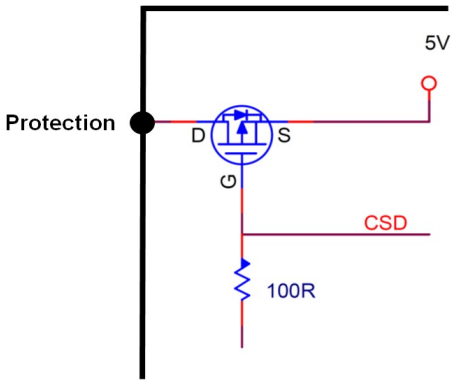


Symbol	Function	Description	Min	Typ	Max	Units
AMP Enable	Amp enable	Logic High Level	3	4.6	8	V
	Amp disable	Logic Low Level	-	-	0.6	V

4.4 Protection

This pin is floating during normal operation, but it will change to a high level (5V) if a short circuit is detected on the speaker output terminals.

This pin is also activated by other protection features such as the over temperature protection. If any of these protection features are activated, the pin will be pulled high internally. This pin is only an output.



Symbol	Function	Description	Min	Typ	Max	Units
Protection	Amp Protection	Logic High Level	3	4.6	5.5	V
	Amp normal operation	Logic Low Level	-	0	0.6	V

4.5 Protection Features

The SUB-500 built-in protection feature to protect the amplifier module against the extreme use scenarios or other abnormal situations.

- **Over Temperature Protection**

A separate PTC resistor is placed in close the MOSFET of the amplifier channels. If the resistor temperature rises above 85°C, the OTP is activated. When the OTP is activated, the amplifier will be closed, and the protection pin will be pulled high. It will recover once the temperature at the PTC has dropped sufficiently.

- **Over Current Protection**

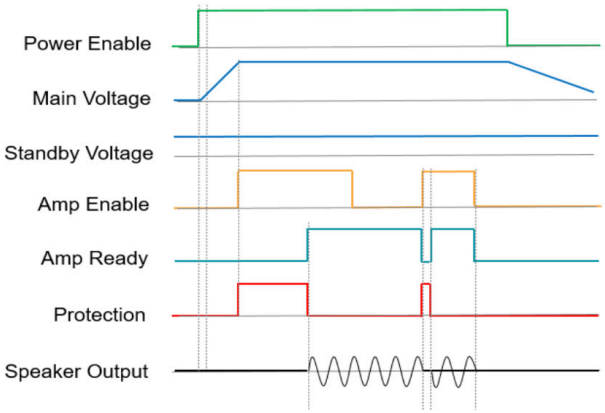
If the amplifier output is shorted or reaches its current limit, the amplifier will enter the over current protection and close all amplifier output channels until the internal protection timing (400ms) allows the amplifier to re-enable the amplifier.

- **DC Protection**

If there is DC at the output of the amplifier, the amplifier will be muted until the DC is removed.

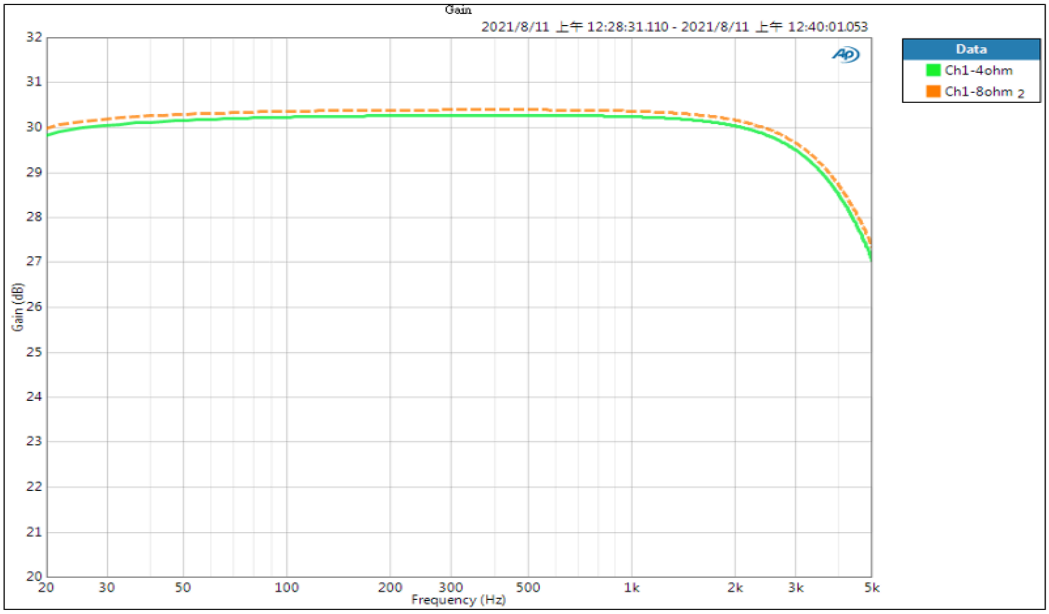
4.6 Timing and ControlT

The operation and sequence plot of SUB-500



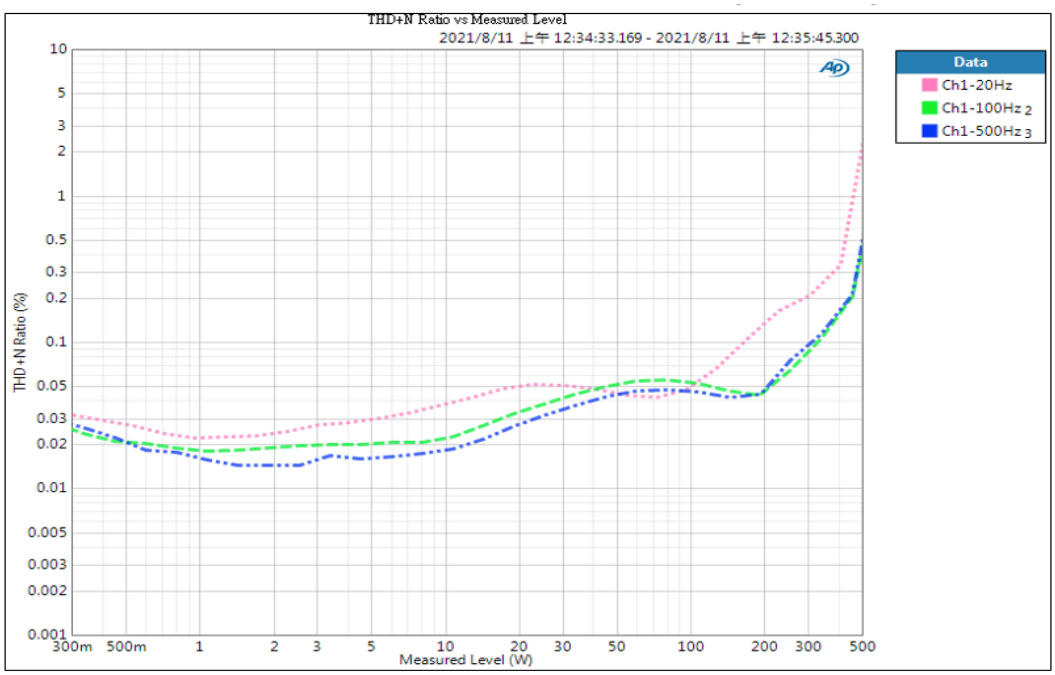
5.0 Audio Measurements

5.1 Frequency Respones

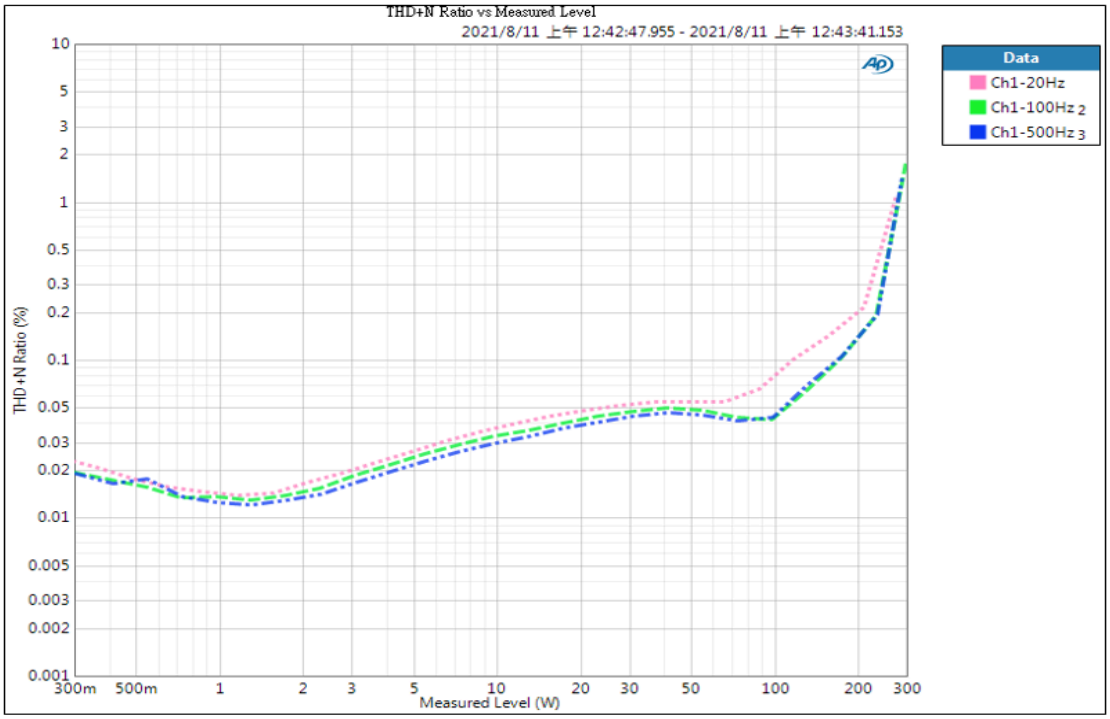


Frequency Response in 4Ω(Green) and 8Ω(Orange)

5.2 Total Harmonic Distortion + Noise (THD+N)

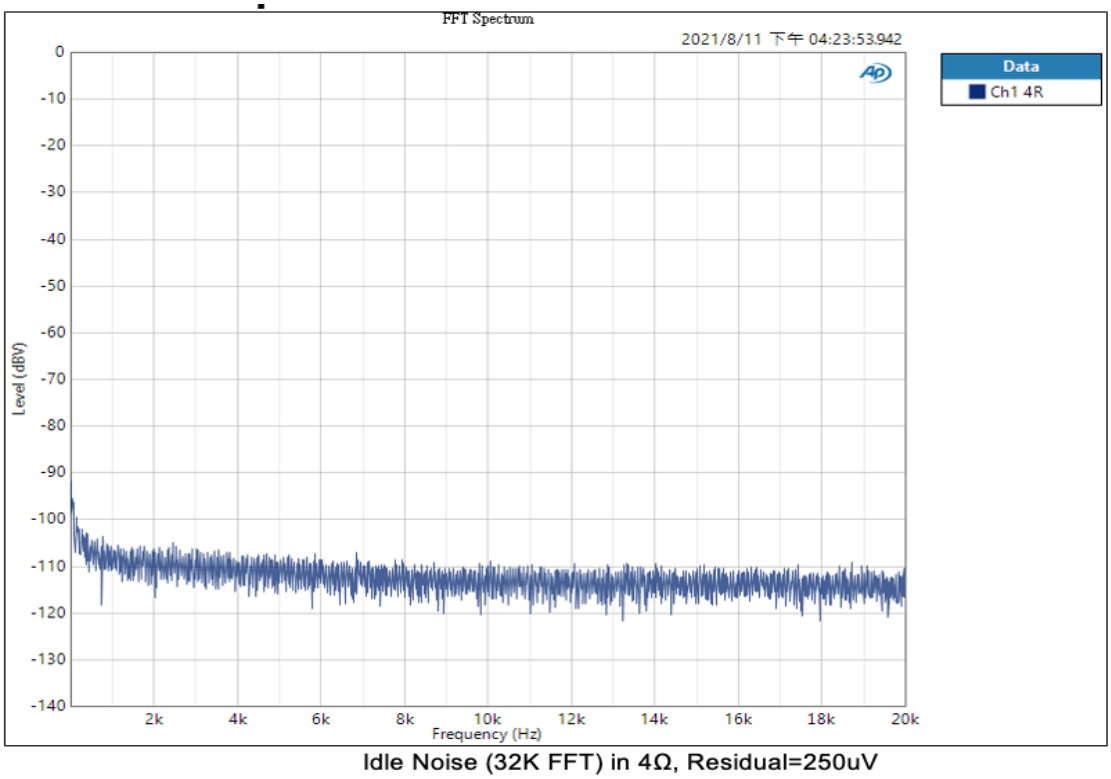


THD+N vs. Power at 20Hz(Pink), 100Hz(Green), 500Hz(Blue)in 4Ω

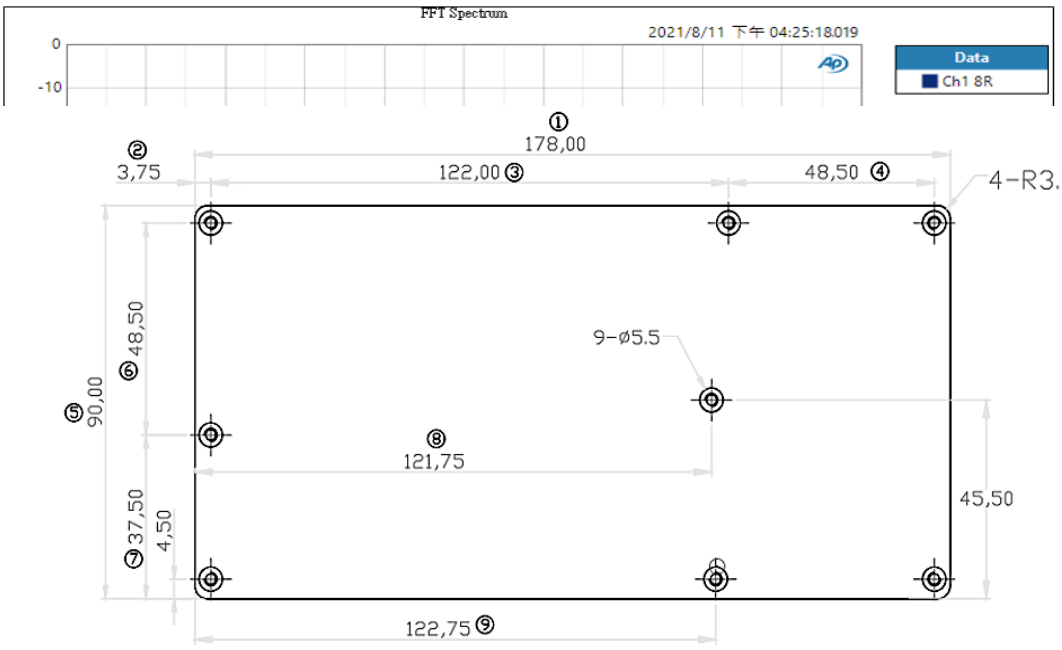


THD+N vs. Power at 20Hz(Pink), 100Hz(Green), 500Hz(Blue)in 8Ω

5.3 Noise Spectrum

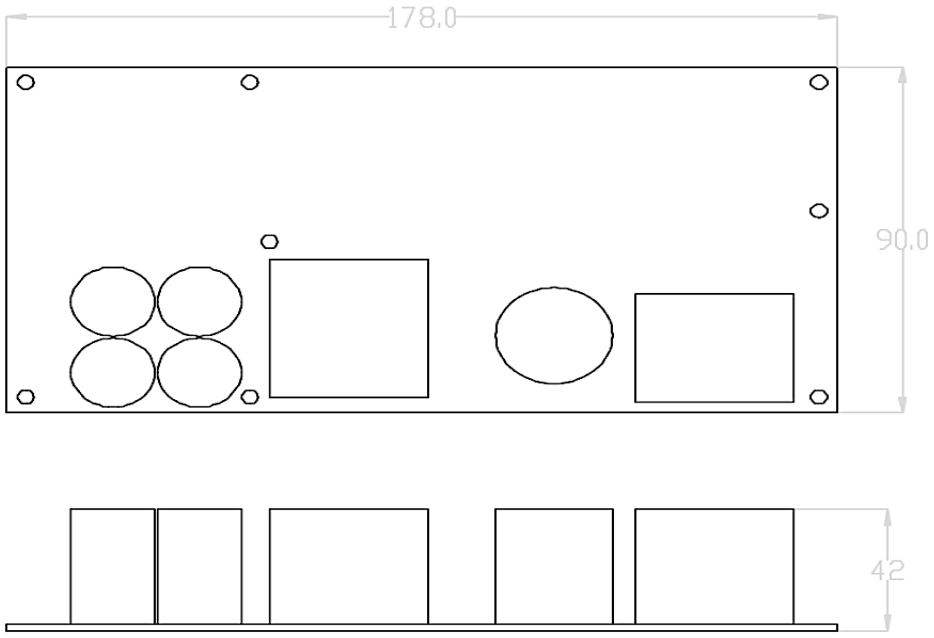


Idle Noise (32K FFT) in 4Ω, Residual=250uV



Idle Noise (32K FFT) in 8Ω, Residual=250uV

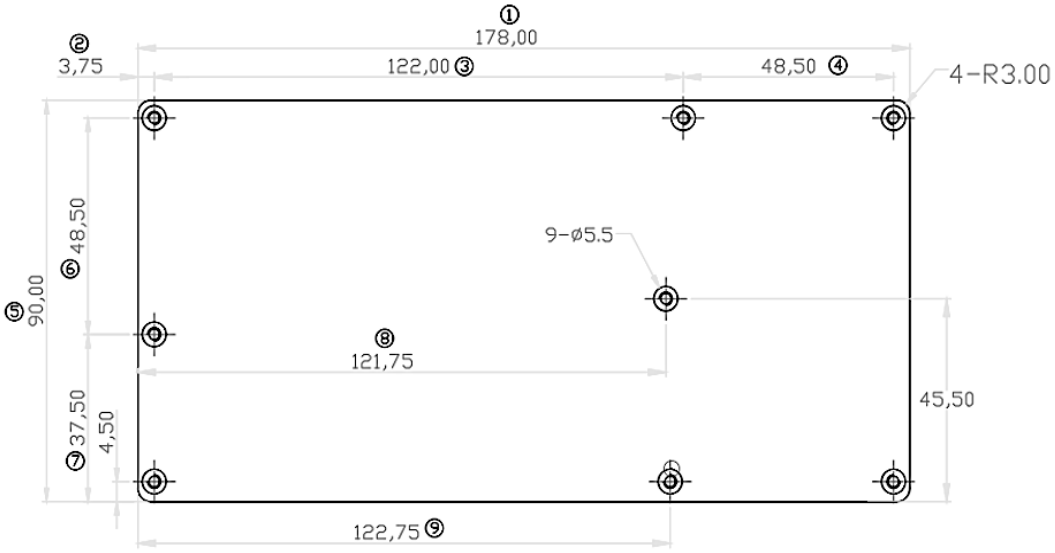
6.0 Dimensions



t:mm

6.1 Drill Pattern

All dimensions are in mm. The screw size is M3.



7.0 Compliance

7.1 Safety Compliance

Safety Standards:

The SUB-500 has been pre-approved for safety by ETL to ease the design-in procedure and complies with the following standards:

- Europe: IEC 62368-1:2018, EN IEC 62368-1:2020+A11:2020.
- United Kingdom: BS EN IEC 62368-1:2020+A11:2020.
- US: UL 62368-1:2019 (3rd edition).
- CA: CSA-C22.2 No. 62368-1:2019 (3rd edition).

The SUB-500 is evaluated against and complies with the regulations of the following countries:
Group differences, special national deviations of all CENELEC countries, United States of America, Australia, and New Zealand have been checked.
Explanation of CENELEC countries: Austria (AT), Belgium (BE), Bulgaria (BG), Croatia (HR), Cyprus (CY), Czech Republic (CZ), Denmark (DK), Estonia (EE), Finland (FI), France (FR), Germany (DE), Greece (GR), Hungary (HU), Iceland (IS), Ireland (IE), Italy (IT), Latvia (LV), Lithuania (LT), Luxembourg (LU), Malta (MT), Netherlands (NL), Norway (NO), Poland (PL), Portugal (PT), Romania (RO), Serbia(SE), Spain (ES), Slovakia (SK), Slovenia (SI), Sweden (SE), Switzerland (CH), Turkey(TK) and United Kingdom (GB),
All country differences listed in the CB Bulletin are covered by the Common Modifications.

Test procedure:

- CB certificate no. SG ITS-27861, CB report no.210900080TPE-001 (Intertek Test Services.)
- cETLus recognized under control no. 2001310.

Product safety category:

Class I (With earthed equipment)

Special Notice:

The SUB-500 is tested as components – the final product should always be evaluated against applicable standards.

8.2 Electro Magnetic Compliance

This amplifier modules are EMI compliance tested according to the following standards.

Emission:

- EN 55032:2015 + A11:2020; BS EN 55032:2015 + A11:2020 Conducted & Radiated(Class B)
- EN 61000-3-2:2019; BS EN IEC 61000-3-2:2019 Harmonic current emissions
- EN 61000-3-3:2013 + A1:2019; BS EN IEC 61000-3-3:2019 Voltage fluctuations & flicker
- FCC part 15 subpart B
- ICES-003 issue 7

Immunity:

- EN 55035:2017 + A11:2020; BS EN 55035:2017 + A11:2020

Electrostatic Discharge	IEC 61000-4-2	4kV Contact Discharge / 8kV Air Discharge
Radiated Electromagnetic Filed	IEC 61000-4-3	80 ~ 1000MHz, 1800MHz, 2600MHz, 3500MHz, 5000MHz,
EFT/Bursts	IEC 61000-4-4	±1.0KV
Surges	IEC 61000-4-5	±1 kV Line to Line / ±2 kV Line to Earth
Conducted Immunity	IEC 61000-4-6	0.15 ~ 10MHz, 3Vrms, 10 ~ 30MHz, 3~1Vrms, 30MHz, 3Vrms 80% AM
Voltage Dips and Interruptions	IEC 61000-4-11	Reduction for >95% (Criteria B) Reduction for 30% (Criteria C) Reduction for >95% (Criteria C)

Special Notice:

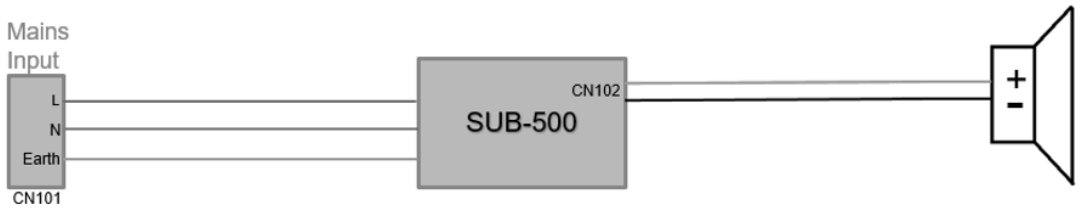
- EMI verification measurements of the final product should be carried out, in order to secure compliance of the final product.

8.3 Changes

PEAK Products are continuously undergoing smaller changes to improve the performance or to comply with manufacturing and quality requirements. Therefore, specifications in this data sheet might be subject to change.

9.0 How to ensure EMC compliance

The input signal is RMS delivering 1/8th of 500W (62.5W)



10.0 Revisions

Document Revision	Module Version	Change Log	Date
01	P1A	Release version	12th Aug. 2021
02	P1B	Mainly EMC changes	15th Nov. 2021
1.1	P1B	1.Add the chapter 5: Functional Block and applications. 2.Add the chapter 6.6: Timing and Control. 3.Add the chapter 9: Compliance. 4.Add the chapter10: How to ensure EMC compliance.	6th Feb. 2023
1.2	P1B	1.Modified the spec. of aux power. 2.Modified the frequency response variance	22th Aug. 2023
1.3	P1B	1. Modified the values in the table in Chapter 1.4	23th Oct. 2025