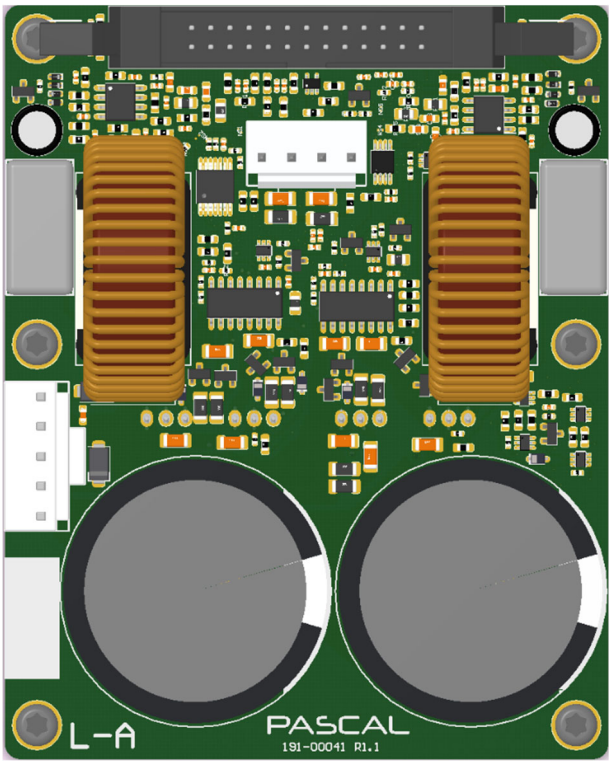
L-A2

Extension Amplifier Module

Data Sheet



L-A2 Extension Amplifier Module

Table of Contents

1 Features and description

Features

- 810 W + 810W (SE) or 1500W (BTL/100V) amplifier channel(s) using Pascal's UMAC™ technology for unmatched sonic performance.
- Full protection scheme
- Ultra-compact size
- Unmatched total system efficiency
- Multiple readouts (temperature, amplifier output voltage, clip monitor, amplifier protect/mute)
- Safety approved and verified for EMC compliance

Product summary

Parameter	Typical Value
Total Output power (1% THD+N, 1kHz @ 4Ω)	810 W + 810 W
Total system efficiency (SE, 2x400 W @ 8Ω)	89.5 %
Peak output current (CH1) (CH2)	 40 A 40 A
THD+N (1kHz @ 1W)	0.003 %
Dynamic range	120 dB(A)
Idle noise	54 µV(A)
Output resistance (1kHz)	6.5 mΩ

Description

The L-A2 extension module is a Class-D amplifier with 2 symmetric and identical high-power channels suitable for a wide product range from professional audio solutions to 100/70V constant voltage systems.

The L-A2 extension module does not contain on-board power supply, and must be supplied externally, typically from the built-in power supply on the L-PRO2S module.

The L-A2 offers an ultra-compact size with an unmatched total system efficiency to ease the integration of the modules into any audio solution.

In addition, the L-A2 module offers several readouts and controls, allowing external DSP control of the modules.

Typical applications

- Professional Audio Solutions
- Self-Powered Loudspeakers
- Installation Systems
- 100/70V Systems

2 General specifications

Data listed in the following tables are measured with the L-A2 module powered from the L-PRO2S module.

2.1 Audio specifications

Electrical Characteristics @ T_a = 25°C (unless otherwise specified)
The L-A2 extension module must be powered from the L-PRO2S module, or a module with an equivalent power supply.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{out,max}$	Peak output voltage Ch1 & Ch2	Unloaded	-	± 84.5	-	V
$I_{out,peak}$	Peak output current		-	40	-	A
P_o	Output power @ 1% THD+N, 1kHz[2] Ch1 or Ch2, single channel driven R_L=8Ω		-	410	-	W
P_o	Output power @ 1% THD+N, 1kHz[2] Ch1 or Ch2, single channel driven R_L=4Ω		-	810	-	W
P_o	Output power @ 1% THD+N, 1kHz[2] Ch1 or Ch2, single channel driven R_L=2.7Ω		-	1200	-	W
P_o	Output power @ 1% THD+N, 1kHz[2] Ch1 or Ch2, single channel driven R_L=2Ω		-	900[4]	-	W
P_o	Output power @ 1% THD+N, 1kHz[2] Ch1 and Ch2, Bridge tied load R_L=6.67Ω	230V_{AC} 120V_{AC} 100V_{AC}	-	1500 1500 1300	-	W
P_o	Output power @ 1% THD+N, 1kHz[2] Ch1 and Ch2, Bridge tied load R_L=4Ω	230V_{AC} 120V_{AC}	-	1400 1400	-	W
THD+N	THD+N @ 1W, 1kHz, R_L = 8Ω[2]			0.0028		%
$V_{noise\ SE}$	Output idle noise	Unweighted A-weighted	-	73 54	-	μV_{RMS}
$V_{noise\ BTL}$	Output idle noise	Unweighted A-weighted	-	96 75	-	μV_{RMS}
DR_{SE}	Dynamic Range	Unweighted A-weighted	-	118 120	-	dB
DR_{BTL}	Dynamic Range	Unweighted A-weighted	-	121.4 123.6	-	dB
A	Voltage gain @ 1kHz, Ch1 & Ch2	SE	-	27.6	-	dB
$A_{var\ SE}$	Frequency response variance Ch1 or Ch2 @ 20Hz – 20kHz	Open Load 8Ω 4Ω 2Ω	-	0.1 0.1 0.33 0.6	-	dB
$A_{var\ BTL}$	Frequency response variance Ch1 and Ch2 @ 20Hz – 20kHz	Open Load 6.67Ω 4Ω	-	0.1 0.3 0.6	-	dB
$BW_{up\ SE}$	Upper bandwidth @ -3dB Ch1 or Ch2	Open Load 8Ω 4Ω 2Ω	-	110 85 75 55	-	kHz
$BW_{up\ BTL}$	Upper bandwidth @ -3dB Ch1 and Ch2	Open Load 6.67Ω 4Ω	-	110 65 50	-	kHz
BW_{low}	Lower bandwidth @ -3dB Ch1 & Ch2	All loads	-	1.6	-	Hz
R_{out}	Output resistance[3] Ch1 or Ch2	1 kHz 20 kHz	-	6.5 120	-	mΩ
$V_{out,offset}$	Amplifier output DC Offset Ch1 or Ch2	8Ω	-	±1	-	mV
$IMD_{CCIF\ SE}$	Intermodulation distortion (CCIF), Ch1 or Ch2	18kHz & 19kHz Po = 10W, 8Ω	-	0.0008	-	%
$IMD_{TIM\ SE}$	Transient Intermodulation distortion (TIM), Ch1 or Ch2	Po = 10W, 8Ω	-	0.002	-	%
$IMD_{CCIF\ BLT}$	Intermodulation distortion (CCIF), Ch1 and Ch2	18kHz & 19kHz Po = 10W, 6.67Ω	-	0.0004	-	%
$IMD_{TIM\ BLT}$	Transient Intermodulation distortion (TIM), Ch1 and Ch2	Po = 10W, 6.67Ω	-	0.003	-	%

Table 2-1: Audio specifications

Note 1: Maximum total power limited by the power supply.
Note 2: Measured using the Audio Precision AES-17 filter.

Note 3: Measured using “APx Output Impedance Utility” at the mating part of the output connector, thereby including contact resistance of the connectors.
Note 4: In case sufficient cooling is available, it can be expected that the L-A2 module is able to deliver minimum 900W in 2Ω with a Crest Factor of 12dB at 40°C ambient (TA)

2.2 Input & output loading

Electrical Characteristics @ T_a = 25°C (unless otherwise specified)
The L-A2 extension module must be powered from the L-PRO2S module, or a module with an equivalent power supply.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Z_{INPUT}	Input impedance	Balanced Unbalanced	-	7.2 3.6	-	kΩ
$Z_{L\ SE}$	Loudspeaker nominal impedance range Ch1 or Ch2 Single Ended (SE)	Ch1 or Ch2	2[1]	8	∞	Ω
$Z_{L\ BTL}$	Loudspeaker nominal impedance range Ch1 – Ch2 Bridge Tied Load (BTL)	Ch1 – Ch2	4	8	∞	Ω
$Z_{L\ C\ SE}$	Maximum purely capacitive loading of amplifier output		-	-	1	µF
$Z_{L\ C\ BLT}$	Maximum purely capacitive loading of amplifier output				0.5	µF

Table 2-2: Input and output loading

Note 1: L-A2 is fully protected for $Z_L < Z_L$ Min. Connection of loads < Z_L Min is not recommended as a low load impedance in combination with the amplifier current limit will limit maxim output power.

2.3 Audio input interfacing

Electrical Characteristics @ T_a = 25°C (unless otherwise specified)
The L-A2 extension module must be powered from the L-PRO2S module, or a module with an equivalent power supply.

Symbol	Parameter	Value	Unit
$In+_{max}$	Absolute maximum audio input voltage	±20	V_p
$In-_{max}$	Absolute maximum audio input voltage	±20	V_p
In+ In-	Audio input voltage (In+) – $(In-)_{max}$ for full output voltage swing	±3.5[1]	V_p

Table 2-3: Audio input voltage rating

Note 1: Internal input stage is supplied from an internal ±5V.

2.4 Thermal specification

Electrical Characteristics @ T_a = 25°C (unless otherwise specified)
The L-A2 extension module must be powered from the L-PRO2S module, or a module with an equivalent power supply.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
T_{SD}	Temperature @ thermal shutdown Thermal hysteresis = 5°C[1]		-	85	-	°C

Table 2-4: AC Mains & thermal specifications

Note 1: 5°C but minimum 10s.

2.5 Auxiliary power supply consumption

Electrical Characteristics @ T_a = 25°C (unless otherwise specified)
The L-A2 extension module must be powered from the L-PRO2S module, or a module with an equivalent power supply.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{+7.5V}$	+7.5V current			11	14	mA
I_{+15V}	+15V current			31	37	mA
I_{-15V}	-15V current			-22	27	mA
I_{VDrive}	V_{Drive} current			150	165	mA
P_{tot}	Maximum total power			2.8	3.15	W

Table 2-5: Auxiliary power supply specification

3 Audio measurements

3.1 Frequency response Ch1 and Ch2 (SE)

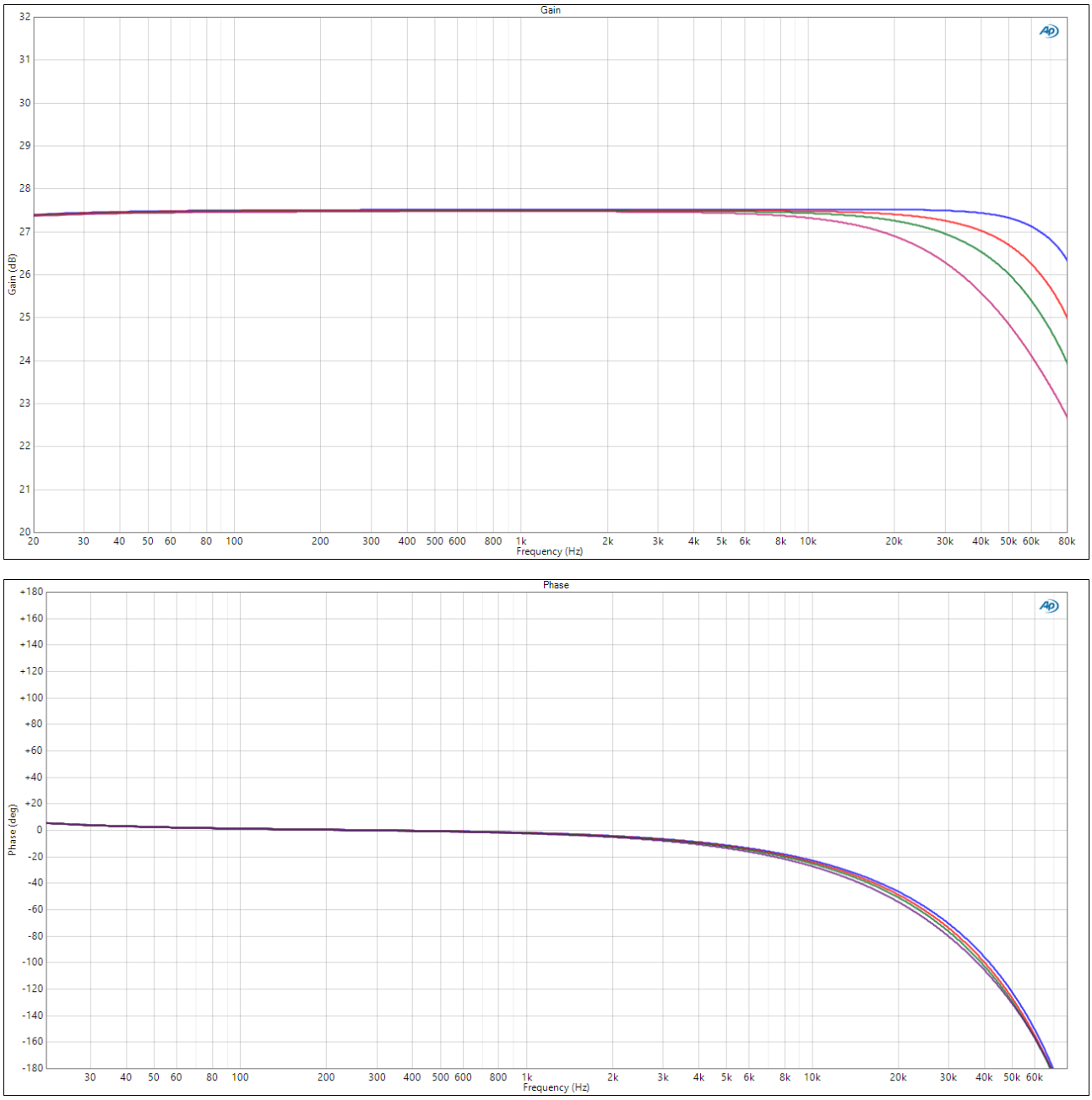


Figure 3-1: Frequency response (Top curves: Amplitude, Bottom curves: Phase)
2Ω (violet), 4Ω (green), 8Ω (red) and Open Load (blue)

3.2 Frequency response Ch1 – Ch2 (BTL)

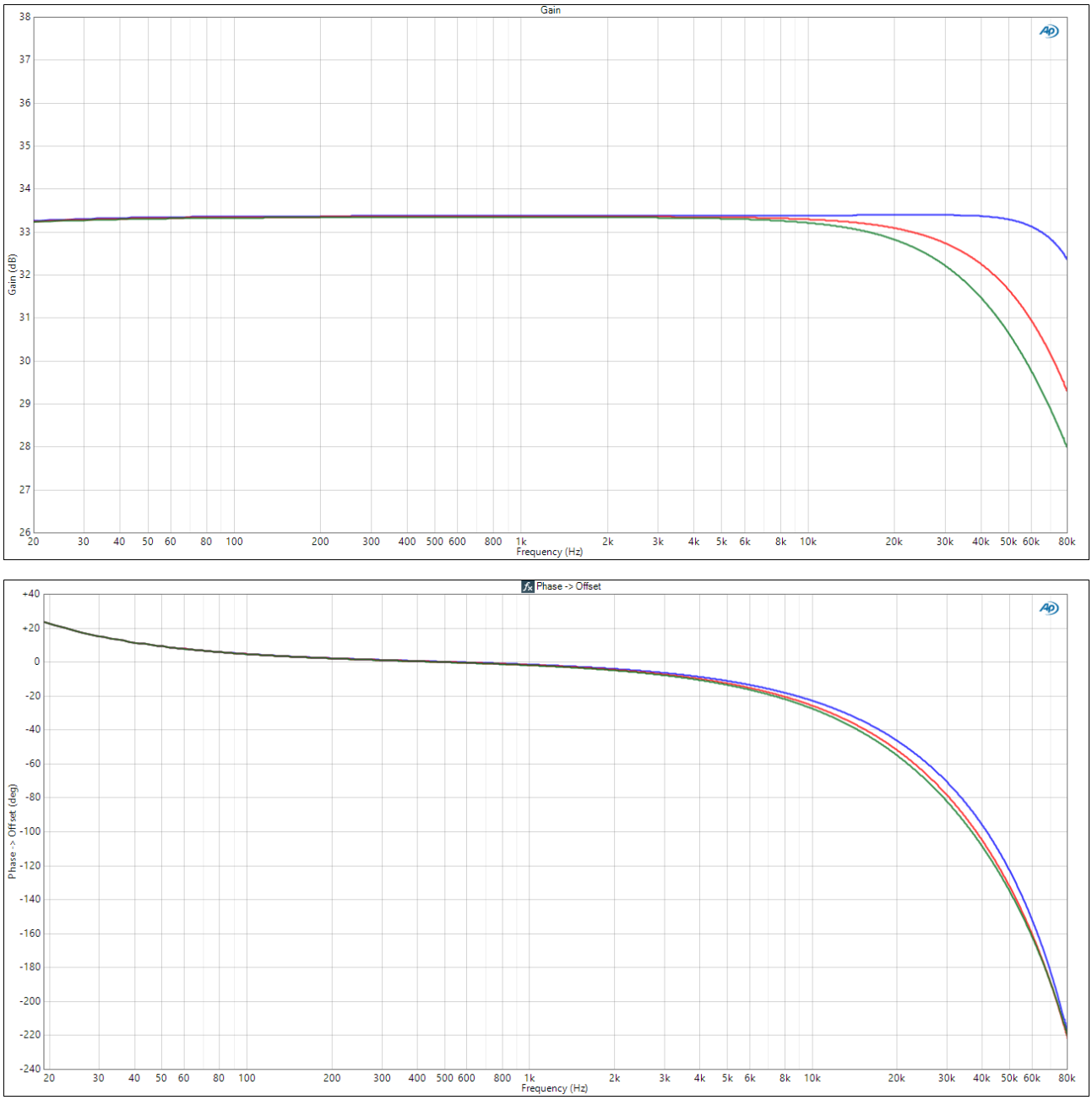


Figure 3-2: Frequency response (op curves: Amplitude, Bottom curves: Phase)
4Ω (green), 6.67Ω (red) and Open Load (blue)

3.3 Total Harmonic Distortion + Noise (THD+N) Ch1 and Ch2 (SE)

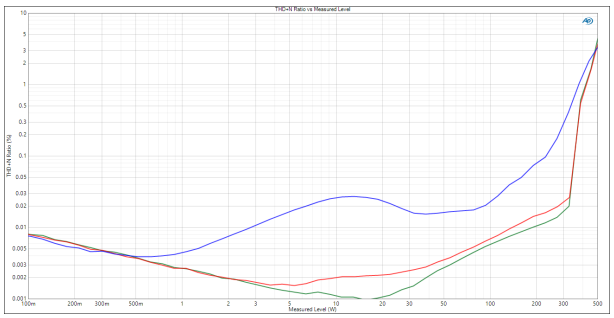


Figure 3-3: THD+N vs. Power @8Ω CH1, 230VAC/120VAC
100Hz (green), 1kHz (red), 6.67kHz (blue)

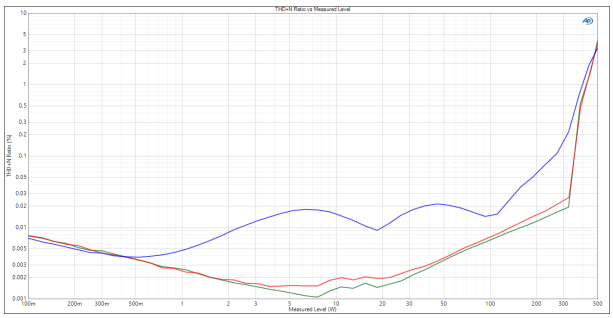


Figure 3-4: THD+N vs. Power @8Ω CH2, 230VAC/120VAC
100Hz (green), 1kHz (red), 6.67kHz (blue)

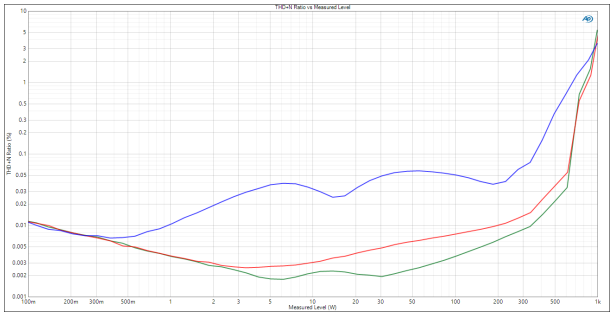


Figure 3-5: THD+N vs. Power @4Ω CH1, 230VAC/120VAC
100Hz (green), 1kHz (red), 6.67kHz (blue)

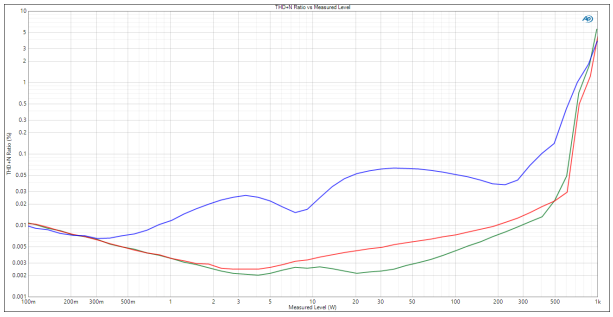


Figure 3-6: THD+N vs. Power @4Ω CH2, 230VAC/120VAC
100Hz (green), 1kHz (red), 6.67kHz (blue)

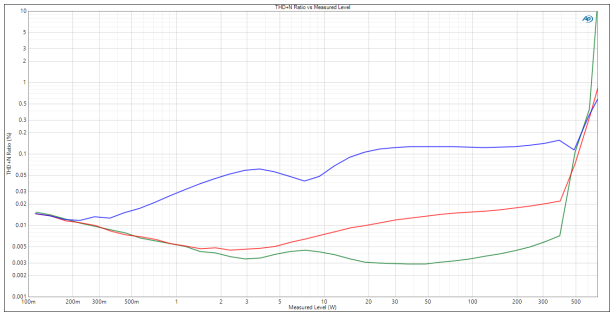


Figure 3-7: THD+N vs. Power @2Ω CH1, 230VAC/120VAC
100Hz (green), 1kHz (red), 6.67kHz (blue)

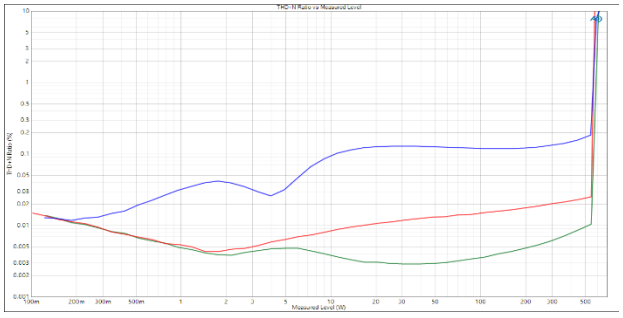


Figure 3-8: THD+N vs. Power @2Ω CH2, 230VAC/120VAC
100Hz (green), 1kHz (red), 6.67kHz (blue)

3.4 Total Harmonic Distortion + Noise (THD+N) Ch1 – Ch2 (BTL)

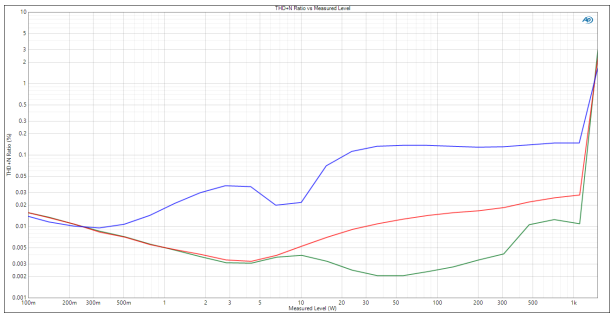


Figure 3-9: THD+N vs. Power@ 4Ω,
100Hz (green), 1kHz (red), 6.67kHz (blue)

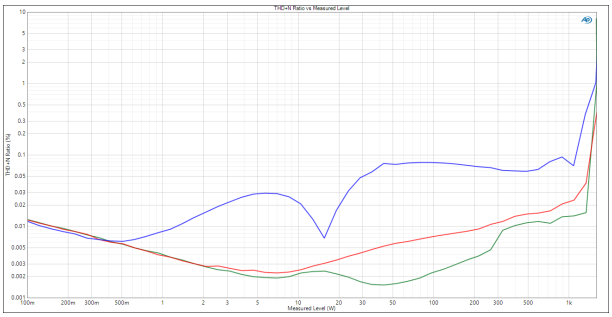


Figure 3-10: THD+N vs. Power @ 6.67Ω
100Hz (green), 1kHz (red), 6.67kHz (blue)

3.5 Noise spectrum

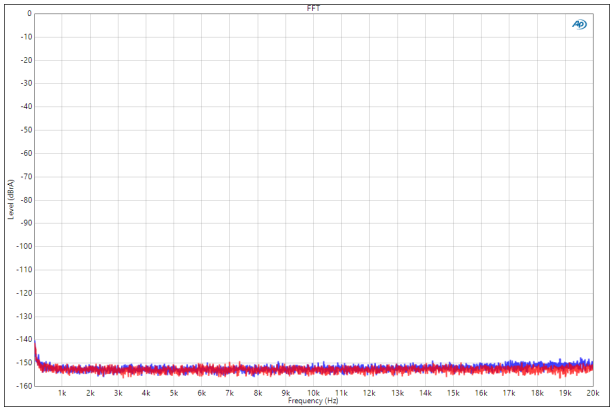


Figure 3-11: FFT idle – (SE) 8 Ω
Channel 1 (blue) & Channel 2 (red)

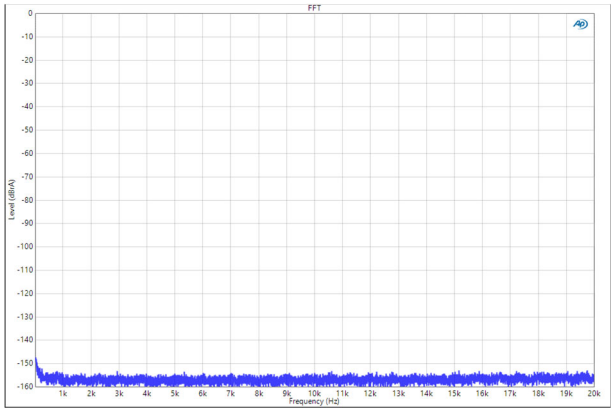


Figure 3-12: FFT idle – (BTL) 6.67 Ω
Channel 1 – Channel 2 (BTL) (blue)

3.6 Intermodulation Distortion (CCIF, TIM) Ch1 and Ch2 (BTL)

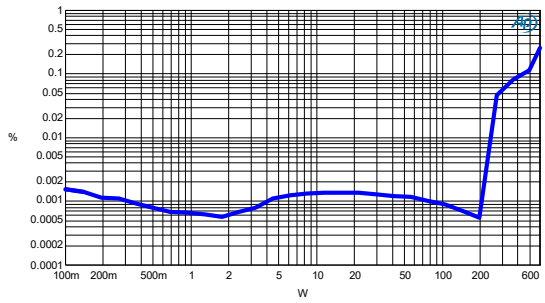


Figure 3-13: CCIF vs. Power - R_L=4Ω
Ch1(LF), f_1=18kHz, f_2 =19kHz

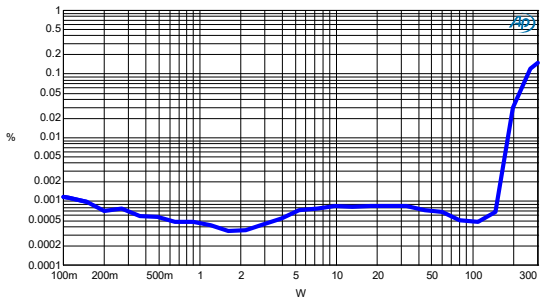


Figure 3-14: CCIF vs. Power - R_L=8Ω
Ch1(LF), f_1=18khz, f_2 =19khz

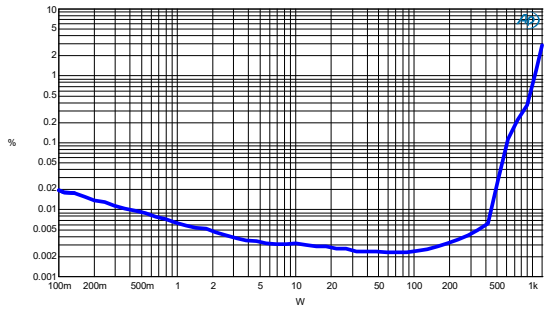


Figure 3-15: TIM vs. Power - R_L=4Ω
Ch1(LF)

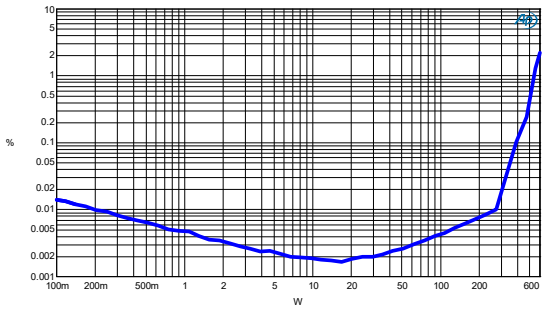


Figure 3-16: TIM vs. Power - R_L=8Ω
Ch1(LF)

3.7 Intermodulation Distortion (CCIF, TIM) Ch1 – Ch2 (BTL)

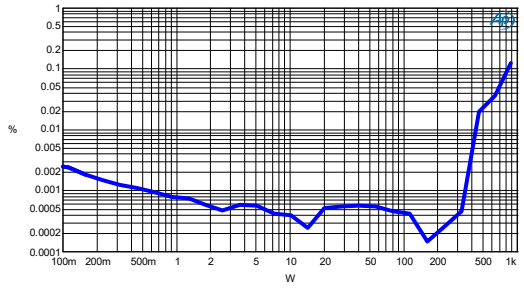


Figure 3-17 CCIF vs. Power - R_L=4Ω
Ch2(HF), f_1=18kHz, f_2 =19kHz

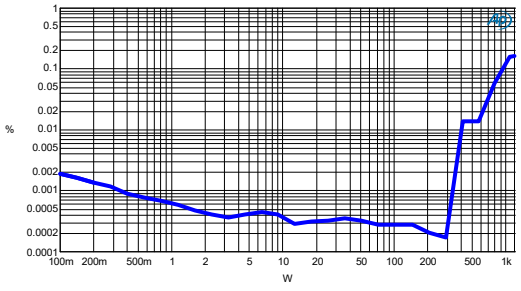


Figure 3-18 CCIF vs. Power - R_L=6.67Ω
Ch2(HF), f_1=18khz, f_2 =19khz

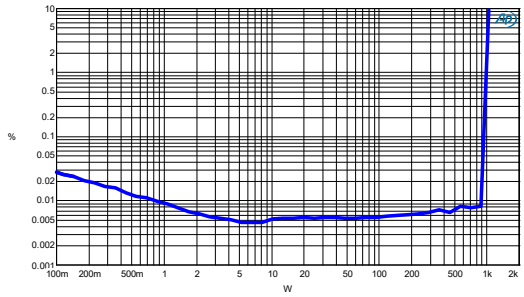


Figure 3-19 TIM vs. Power - R_L=4Ω
Ch2(HF)

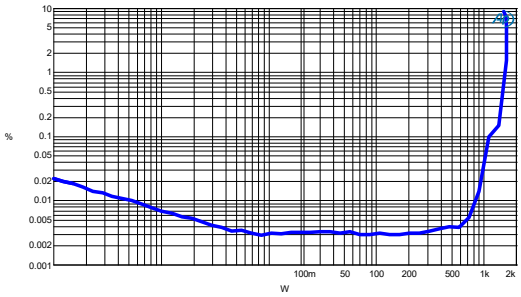


Figure 3-20 TIM vs. Power - R_L=6.67Ω
Ch2(HF)

3.8 Output resistance & cross talk

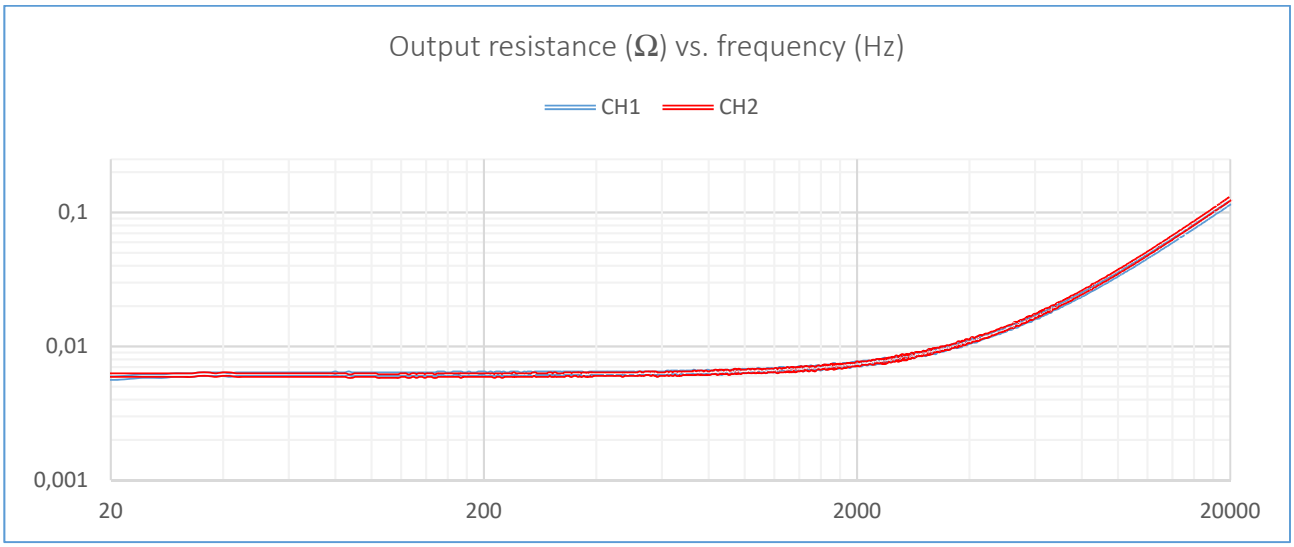


Figure 3-21: Output resistance[1] – Measurement made at the mating part of the output connector. Connector resistance thereby included.

Note 1: Measured using “APx Output Impedance Utility” at the mating part of the output connector, thereby including contact resistance of the connectors.

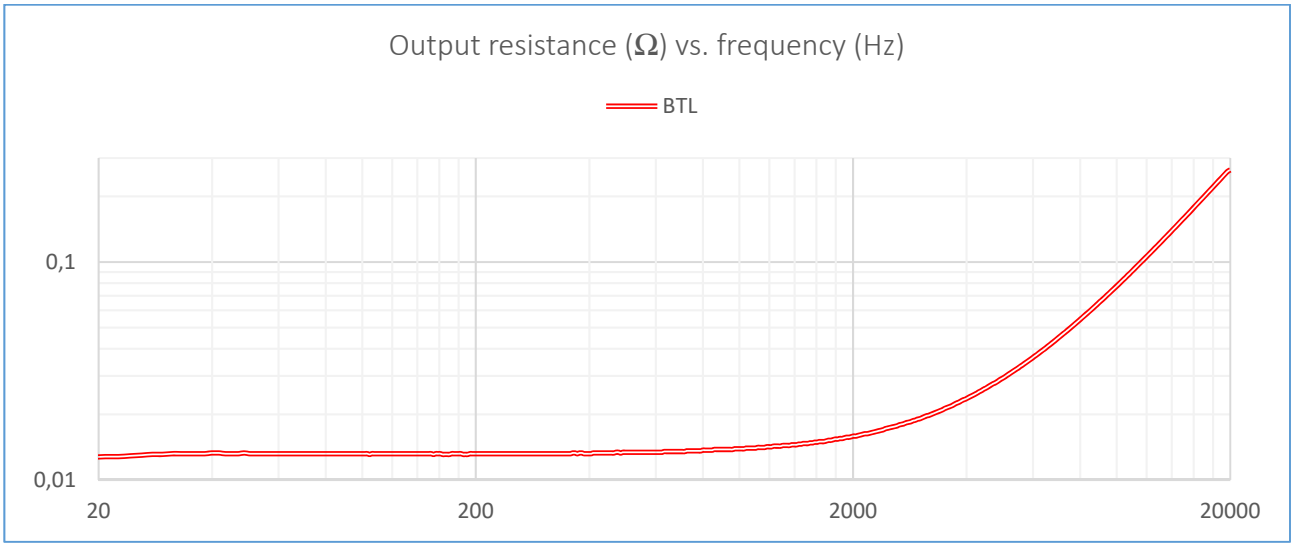


Figure 3-22: Output resistance[1] – Measurement made at the mating part of the output connector. Connector resistance thereby included.

Note 1: Measured using “APx Output Impedance Utility” at the mating part of the output connector, thereby including contact resistance of the connectors.

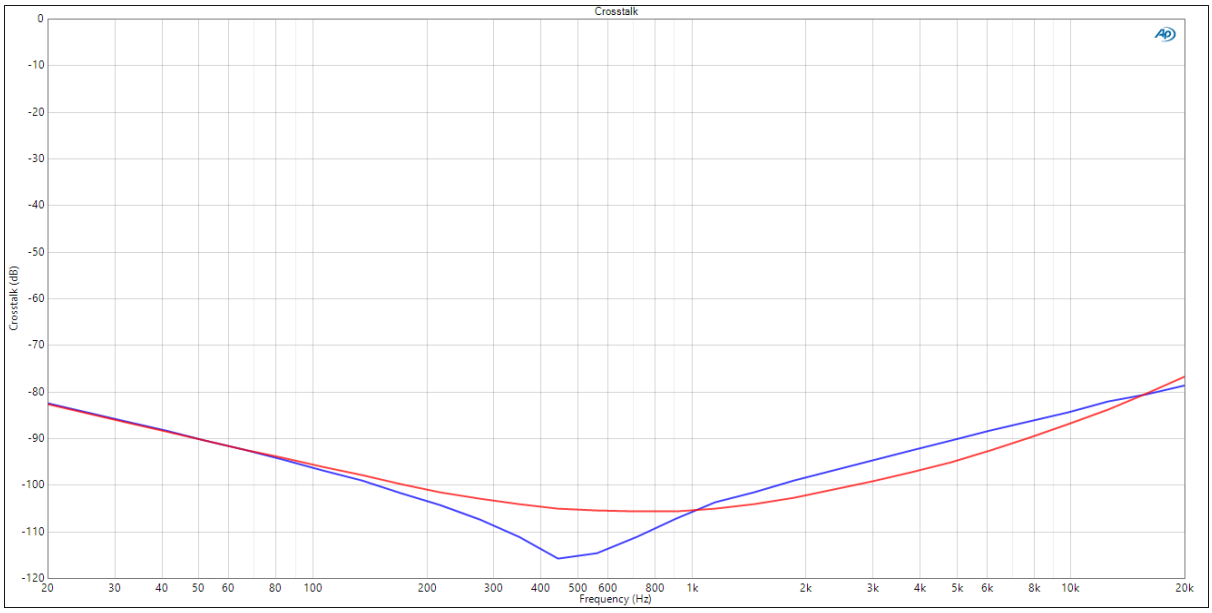


Figure 3-23: Cross talk - Ch.1 @ Po,ch2=50W 8Ω (blue), Ch.2 @ Po,ch1=50W 8Ω (red)

3.9 Output voltage vs. frequency

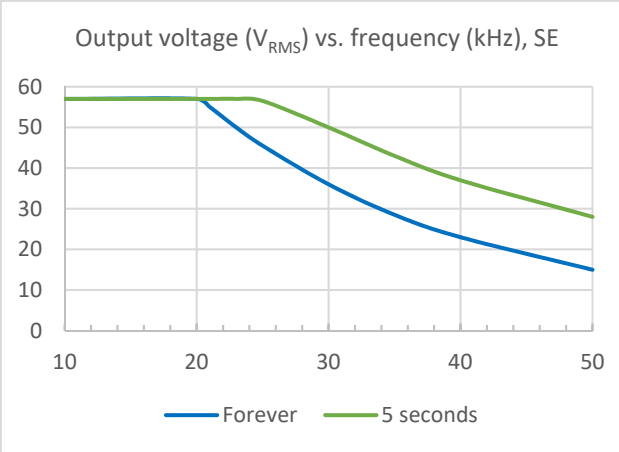


Figure 3-24: Max Vout vs. frequency vs. time (SE mode)

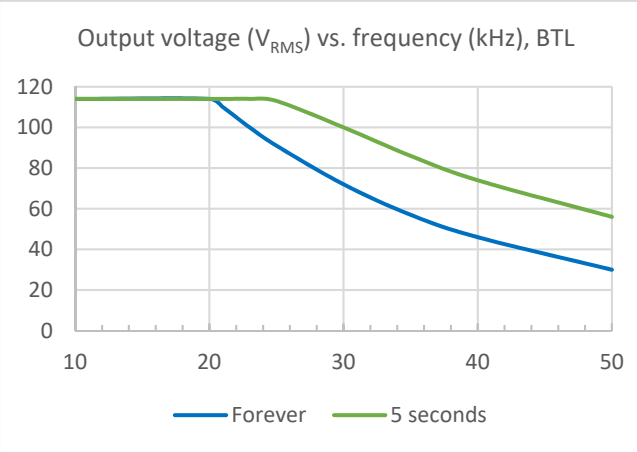


Figure 3-25: Max Vout vs. frequency vs. time (BTL mode)

4 Control and readout specification

4.1 Control pins

$\overline{\text{Mute}}$ – When muting the L-A2 module, the amplifier outputs will be disabled. It typically takes 0.5ms to disable and only 1ms to enable the amplifier. The mute function may be used with an external wake-on-music circuit to lower the mains power consumption, when the module is not in use. Even with the wake-on-music functionality used, the module will be ready to play within 1ms (typically).

$\overline{\text{Standby}}$ – With the L-A2 module in standby the power consumption is reduced.

$\overline{\text{DC\_Fault}}$ – Open-collector output. The output is active, if the L-A2 module detects DC on the amplifier output. If the L-A2 module is powered by a L-PRO2S module, the $\overline{\text{DC\_Fault}}$ (pin 15, CON701) on the L-A2 module must be connected to the Signal TimeOut (pin 14, CON701) on the L-PRO2S module.

4.2 Readout pins

The L-A2 series has various readouts to monitor the state of the module.

Amplifier Output Voltage readout – There are two amplifier output voltage readouts Vout_Monitor_Ch1 and Vout_Monitor_Ch2, one for each channel. These readouts are voltage divisions of the output signals in the range of ±10 Vp corresponding to ±82Vp at the output.

Amplifier Clip readout – There are two amplifier clip readouts, $\overline{\text{Clip\_1}}$ and $\overline{\text{Clip\_2}}$. These readouts are open-collector outputs. Each readout pin will be pulled low if the audio output voltage of the corresponding channel becomes too high compared to the internal rail voltages (Voltage Clipping), or if the amplifier reaches internal current protection. This readout may be used for signal clip/limiting indications.

$\overline{\text{Dis\_Read/Protect}}$ – This readout is an open-collector output which will be pulled low when the module is either muted or has entered an internal protection.

5 Protection features

The L-A2 has built-in protection features to protect the amplifier module against abuse/extreme use scenarios, and to protect the speaker drivers from being damaged in case of a malfunction.

Temperature – Temperature protection of the power supply and amplifiers is implemented to prevent the module from thermal runaway. When thermal protection is engaged both amplifiers are muted until the temperature has dropped 5°C, or for a minimum of 10s.

Over Current – If an amplifier output is shorted or reaches its current limit, the clip readout will be activated to allow an external limiter/DSP to limit the input signal. If the limiter is not capable of limiting the signal, the module will enter over-current protection and mute the amplifier output(s) until the internal protection timing allows the module to re-enable the amplifier(s).

DC Protection – If DC-voltage is detected at one of the amplifier outputs, the L-A2 module mutes the outputs. If DC still is present after 3 cycles, the L-A2 DC protection circuit will switch off and latch the L-PRO2S +/-85V power supply, via the connection between Signal TimeOut (pin 14, CON701) on the L-PRO2S and DC_Fault (pin 15, CON701). Resetting of the latched protection circuit requires cycling of the AC mains.

HF Protection – A high frequency protection is implemented to protect the amplifier output filter components from overload – refer to *Figure 3-24* and *Figure 3-25*. If a high frequency (and high amplitude) signal is present for a longer period, the module will enter HF protection and mute (both) amplifier output(s) until the internal protection timing allows the module to re-enable the amplifier(s).

5.1 L-A2 functional blocks

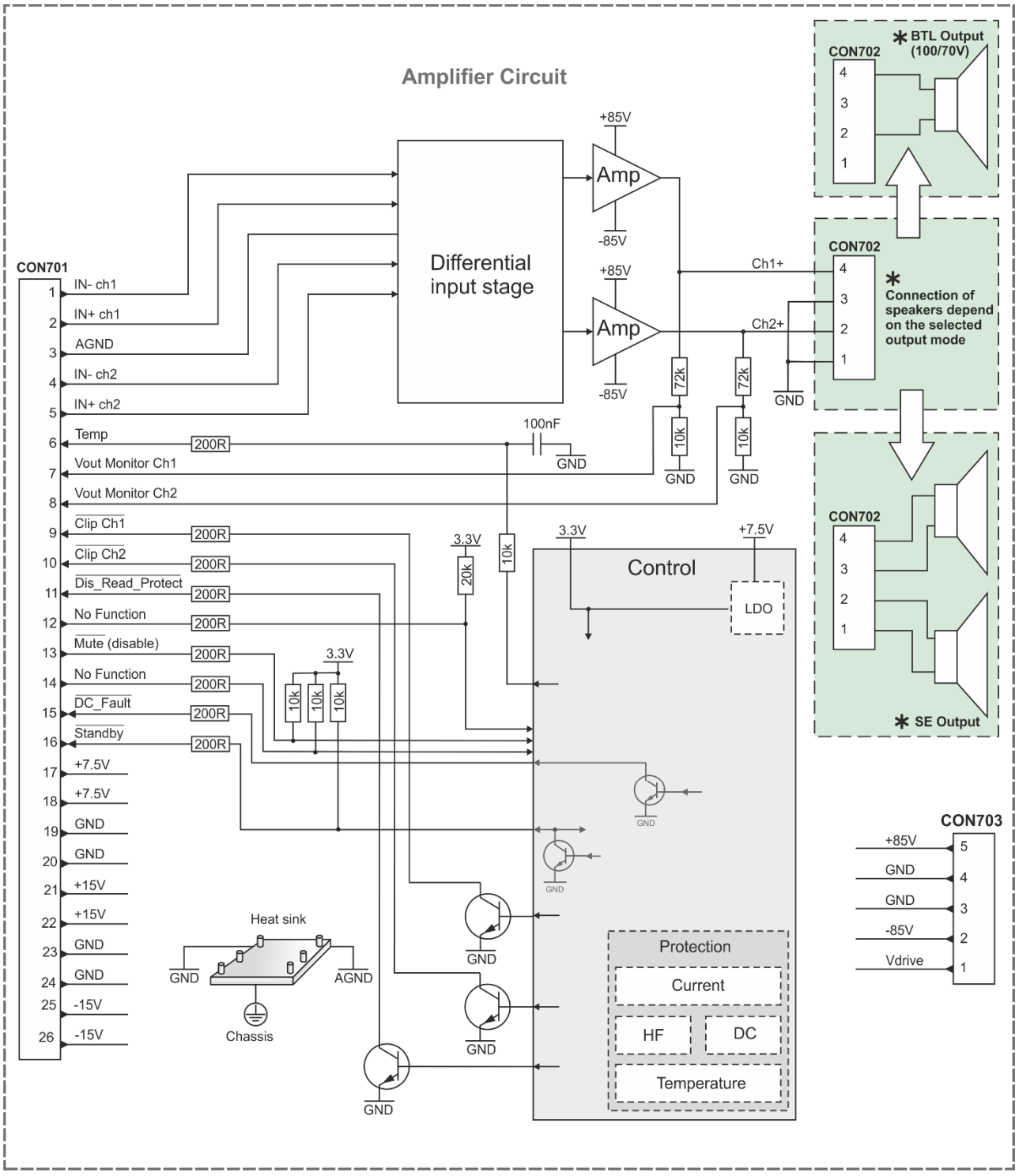


Figure 5-1: Block diagram showing L-A2 module functionality.

5.2 L-A2 Single Ended (SE) 2 channel 2 – 8 Ohm amplifier

The L-A2 extension amplifier module consists of two identical (SE) single ended output channels.

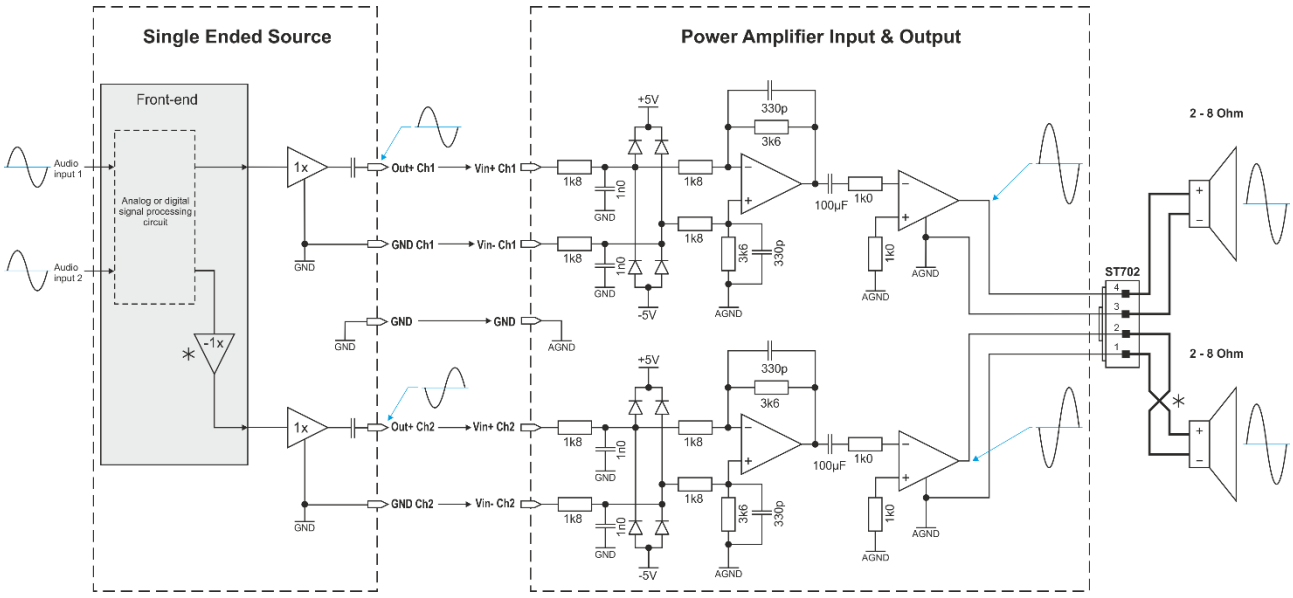


Figure 5-2: L-A2 extension amplifier module shown in Single Ended (SE) output configuration for 2 – 8 Ohm applications.

NOTICE The * marking in *Figure 5-2*, indicates that input and output of channel 2 must be inverted to reduce pumping.

5.3 L-A2 Bridge Tied Load (BTL) 4 – 8 Ohm amplifier

Alternatively, the L-A2 can be configured in Bridge Tied Load (BTL) mode, as this module contains two identical amplifier channels.

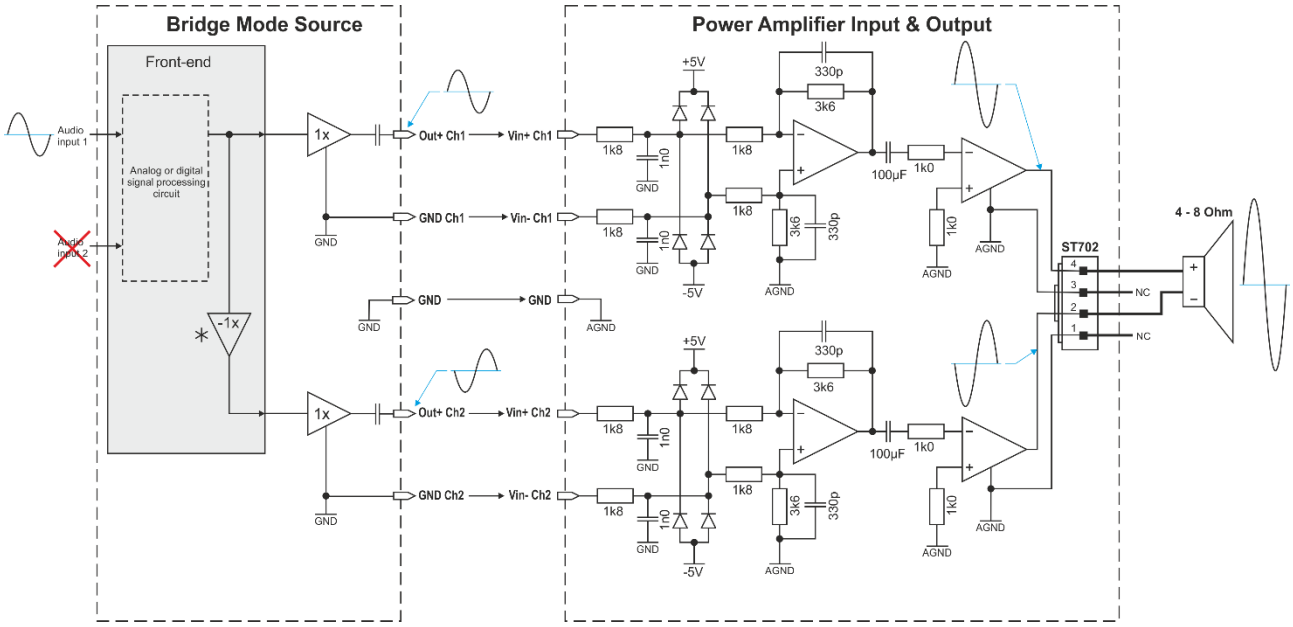


Figure 5-3: L-A2 extension amplifier module shown in Bridge Tied Load (BTL) output configuration for 4 – 8 Ohm applications.

NOTICE The * marking in *Figure 5-3*, indicates that input for channel 2 must be inverted in the Front End to produce the negative swing of the bridge tied output.

5.4 L-A2 Bridge Tied Load (BTL) 100/70V Line amplifier

The same Bridge Tied Load (BTL) configuration is suitable for 100/70V Line amplifier applications.

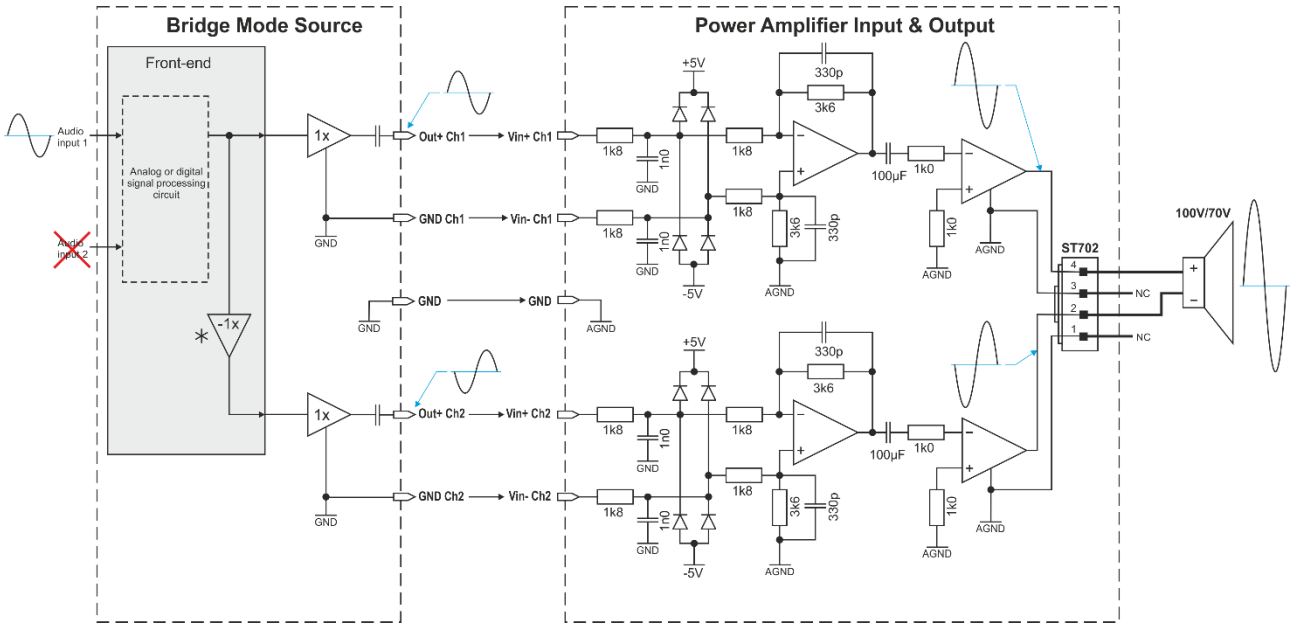


Figure 5-4: L-A2 extension amplifier module shown in Bridge Tied Load (BTL) output configuration for 100/70V applications.

NOTICE The * marking in *Figure 5-4*, indicates that input for channel 2 must be inverted in the Front End to produce the negative swing of the bridge tied output.

6 L-A2 connections

This section describes the signal, control, and DC-supply connections for the L-A2 modules.

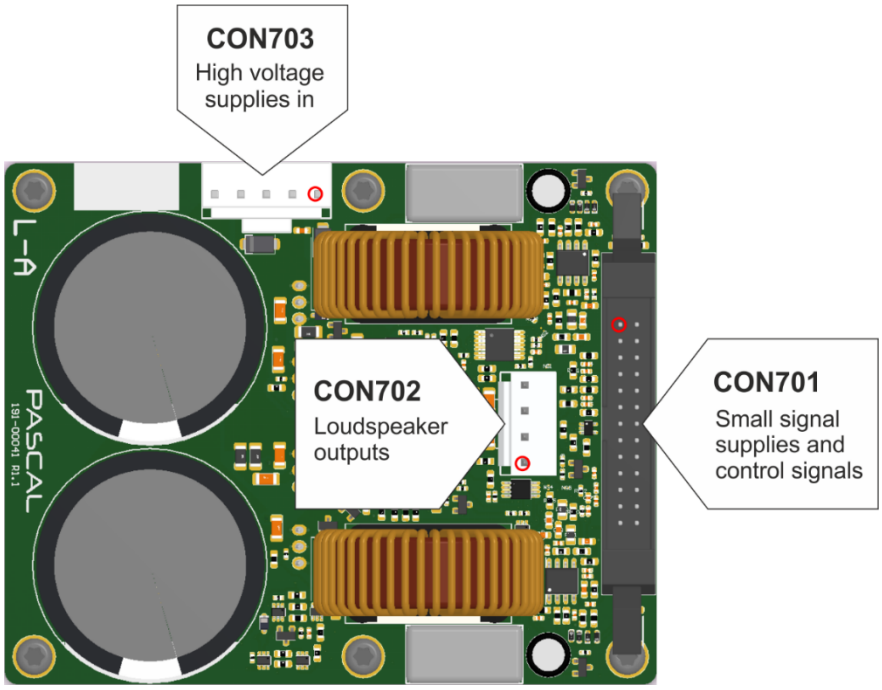


Figure 6-1: L-A2 extension amplifier module connectors – red circle indicates pin 1

6.1 Signal and Control connector

CON701			Description
Name	**Pin #**	**I/O**	
Ch1_In-	1	I	Ch1 negative signal of the balanced audio input to the L-A2 module. The maximum allowable signal on this pin is $\pm 20V_p$.
Ch1_In+	2	I	Ch1 positive signal of the balanced audio input to the L-A2 module. The maximum allowable signal on this pin is $\pm 20V_p$.
GND	3	-	This pin is a general-purpose GND. Shall be connected to Front End ground plane.
Ch2_In-	4	I	Ch2 negative audio input signal of the balanced input to the L-A2 module. The maximum allowable signal on this pin is $\pm 20V_p$.
Ch2_In+	5	I	Ch2 positive audio input signal of the balanced input to the L-A2 module. The maximum allowable signal on this pin is $\pm 20V_p$.
Temp_Out	6	O	This pin reads out, by default, the highest temperature of the two amplifier channels or the +/-85V power supply rectifier diodes in the range of 0-3.3V corresponding to 0°C-100°C. The pin will read out 3.3V when in temperature protection.
Vout_Monitor_Ch1	7	O	This pin reads out the amplifier channel 1 output voltage. The signal will be in the range $\pm 10V_p$ corresponding to $\pm 82V_p$ on the output of the amplifier. The signal has a high impedance and requires a buffer if used.
Vout_Monitor_Ch2	8	O	This pin reads out the amplifier channel 2 output voltage. The signal will be in the range $\pm 10V_p$ corresponding to $\pm 82V_p$ on the output of the amplifier. The signal has a high impedance and requires a buffer if used.
$\overline{\text{Clip\_1}}$	9	O	This pin signals an active low whenever the amplifier Ch1 is voltage clipping or current clipping
$\overline{\text{Clip\_2}}$	10	-	This pin signals an active low whenever the amplifier Ch1 is voltage clipping or current clipping
$\overline{\text{Dis\_Read/Protect}}$	11	O	This pin signals an active low whenever the amplifier channel 1 and channel 2 are disabled or in protection.
No Connect	12	-	This pin is used internally and must be left as a No Connect
$\overline{\text{Mute}}$	13	I	An open-collector must be used to actively pull this pin low whenever the module must disable/$\overline{\text{Mute}}$. When released the module is ready within (typically) 1ms.
No Connect	14	-	This pin is used internally and must be left as a No Connect
$\overline{\text{DC\_Fault}}$	15	O	If the L-A2 module is used together with a L-PRO2S module, then the DC_Fault (pin 15, CON701) on L-A2 must be connected to the Signal TimeOut (pin 14, CON701) on L-PRO2S.
$\overline{\text{Standby}}$	16	I/O	An open-collector must be used to actively pull this pin low whenever the module must enter standby mode. When released the module is ready within a few seconds.
+7.5V	17,18	I	This pin contains the +7.5V supply delivered by the L-PRO2S module.
GND	19,20	-	This pin is the +7.5V ground ref.
+15V	21,22	I	This pin contains the +15V supply delivered by the L-PRO2S module.
GND	23,24	-	This pin is the ±15V ground ref.
-15V	25,26	I	This pin contains the -15V supply delivered by the L-PRO2S module.

Table 6-1: L-A2 signal and control connector

6.2 Speaker Output connector

CON702			Description
Name	**Pin #**	**I/O**	
Ch2_Out-	1	O	This pin is used for the GND signal of the channel 2 speaker.
Ch2_Out+	2	O	The amplified speaker signal of channel 2 is available on this pin.
Ch1_Out-	3	O	This pin is used for the GND signal of the channel 1 speaker.
Ch1_Out+	4	O	The amplified speaker signal of channel 1 is available on this pin.

Table 6-2 L-A2 speaker connector overview

6.3 DC-Supply connector

CON703			Description
Name	**Pin #**	**I/O**	
V_{drive}	1	I	V_{drive} voltage signal input delivered by the L-PRO2S amplifier module
-85V	2	I	The negative rail voltage delivered by the L-PRO2S amplifier module
GND	3	-	Ground
GND	4	-	Ground
+85V	5	I	The positive rail voltage delivered by the for L-PRO2S amplifier module

Table 6-3 L-A2 DC-Supply connector overview

7 Mechanical specifications

The mechanical (A) – (D) measurements listed in the table below refers to *Figure 7-1*.

Item	Min	Typical	Max
(A) Top side components	-	41.00mm	42.50mm
(B) PCB	1.90mm	2.00mm	2.10mm
(C) Bottom side components	4.30mm	4.50mm	4.85mm
(D) Baseplate	2.90mm	3.00mm	3.10mm
L-A2 module weight *(inclusive aluminum baseplate)*	-	330 g	-

Table 7-1: L-A2 mechanical specifications

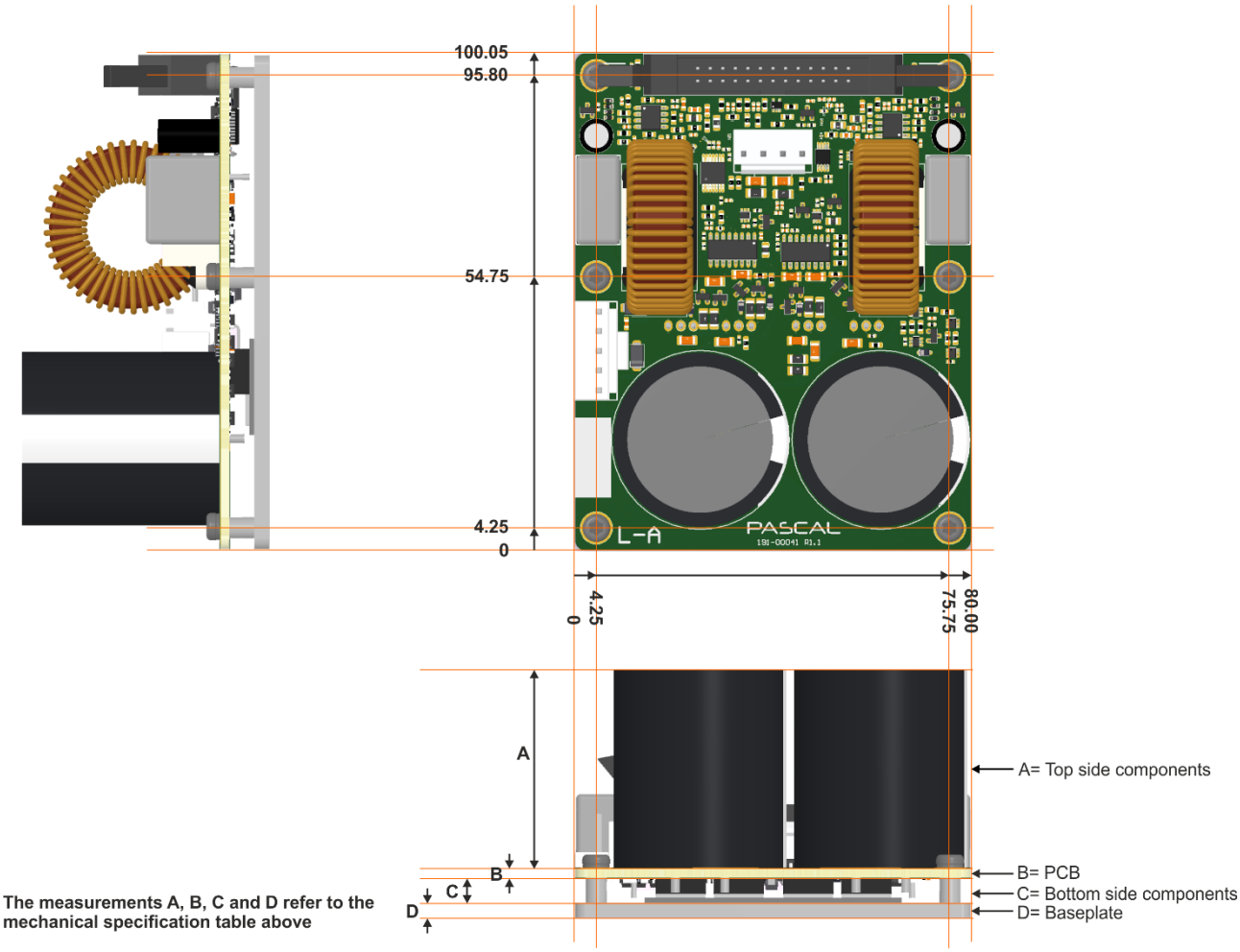


Figure 7-1: Mechanical specifications for L-A2 module

8 Regulatory compliance

The L-A2 Extension Amplifier module is designed for fast-track compliance when used in Pro Audio products marketed in EU, North America, and East Asia Region.

Whenever possible the product is pre-certified to save valuable testing time in the end-product. When pre-certification is not possible, extensive testing has been conducted to ensure that the end-product can easily apply for the following marks:

EU	CE Mark
USA + Canada	cULus listing
China	CCC mark
Korea	KC mark
Japan	PSE mark

8.1 Safety compliance

Safety Standards:
The L-A2 series is safety tested according to the following standards:

- IEC/EN 60065:2001(7th E) + A1:2005 + A2:2010
- IEC/EN/UL 62368-1:2014 (2nd E)

The L-A2 series fulfills the requirements of:

- EN 60065:2002 + A1:2006 + A11:2008 + A2:2010 + A12:2011
- EN 62368-1:2014
- CSA C22.2 NO. 62368-1-14:2014
- UL 62368:2014

The L-A2 series is evaluated against and complies with the regulations of the following countries:

60065	AR, AT, AU, BE, BY, CA, CH, CN, CZ, DE, DK, ES, EU, FI, FR, GB, GR, HU, IE, IT, JP, KR, MY, NL, NO, NZ, PL, PT, RO, SE, SG, SI, SK, UA, US
62368-1	CA, DK, FI, DE, IE, IT, NO, SE, GB, US, CENELEC common modifications

(Countries outside the CB Scheme membership may also accept the reports.)

Test procedure:

60065	L-A2 CB certificate no. E470499-A7 (UL International Demko A/S)
62368-1	L-A2 CB certificate no. E470499-A6005 (UL International Demko A/S)
c UL us	UL recognized under file no. E470499

(Full reports are available for download on Pascal Extranet)

Product safety category:
Class I *(Earthed equipment)*

Special Notice:
The L-A2 series are tested as components – the final product should always be evaluated against applicable standards.

8.2 Electro Magnetic Compliance

Pascal amplifier modules are EMI compliance tested according to the following standards:

Emission:
EN 55032:2012 with EN 55032:2012 AC 2013
EN 61000-3-2:2014
EN 61000-3-3:2013

FCC part 15 subpart B

Immunity:
EN 55103-2:2009
EN 55035:2017

Special Notice:
EMI verification measurements of the final product should be carried out to secure compliance of the final product.

8.3 ESD precautions

To retain the right to Pascal warranty on products, precautions on ESD must be taken when handling Pascal products. Handling of Pascal products should comply with the following standards:

IEC 61340-5-2: Protection of electronic devices from electrostatic phenomena. User Guide.
IEC 61340-5-1: Protection of electronic devices from electrostatic phenomena. General. Requirements.

ANSI/ESD-S20.20: Protection of Electrical and Electronic Parts, Assemblies, and Equipment.

8.4 Changes

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

8.5 CE marking

See *EC Declaration of Conformity*, available from www.pascal-audio.com/extranet

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