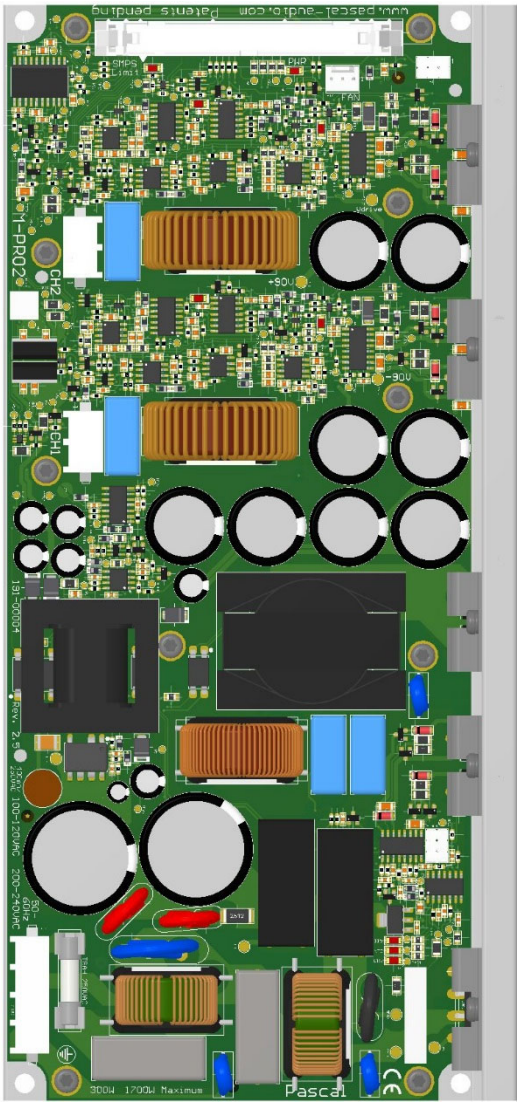
M-PRO2 Series

Data Sheet



M-PRO2

Table of Contents

1 Features and Description 3
2 General specifications 4
2.1 Absolute maximum ratings 4
2.2 Audio specifications 5
2.3 Input & Output loading 5
2.4 AC Mains & Power Loss specification 6
3 Audio measurements 7
3.1 Frequency response channel (SE) 7
3.2 Total Harmonic Distortion + Noise 7
3.3 Noise Spectrum 8
3.4 Intermodulation Distortion (CCIF, TIM) 8
3.5 Cross Talk & Output impedance 9
4 LED indicators and cable connectors 10
4.1 LED Functionality 10
4.2 LED timing during start-up & shut-down 11
4.3 M-PRO2 Connectors 11
4.4 Open Collector inputs and outputs 13
4.5 Fan Control 14
4.6 Power Up/Down timing diagram 14
5 Single Ended & Bridge Tied Load configuration 15
5.1 Single Ended (SE) configuration 15
5.2 Bridge Tied Load (BTL) configuration 16
6 Protection features 17
6.1 Over current protection 17
6.2 DC protection 17
6.3 Over-/under voltage protection 17
6.4 Mains fuse protection 17
6.5 Temperature protection 18
6.6 Standby Mode 18
6.7 High frequency protection 18
7 Readouts 19
7.1 Clip 19
7.2 Dis read/Protect 19
7.3 SMPS Limit 19
7.4 Output voltage 19
7.5 Output current 19
7.6 Temp Monitor 19
8 Mechanical specifications M-PRO2 20
9 Compliance Standards 21
9.1 Safety Compliance 21
9.2 Electro Magnetic Compliance 22
9.3 ESD Precautions 22
9.4 Changes 22

1 Features and Description

Features

- Plug-and-play integrated power package complete with all readout- and protection features for Professional applications, such as subwoofers, high power monitors and line arrays or small speaker systems. The complete integration secures optimal performance and reliability as well as shortened time to market.
- Fully protected high efficiency UREC™ switch mode power supply with auto selectable mains, enabling hassle free worldwide operation.
- Pascal proprietary UMAC™ Class D optimized amplifier power stages, with leading Power performance specification and market acknowledged audio specifications.
- Complete interface, including extensive readouts and high Auxiliary power for the most advanced DSP solutions.
- EMI and Safety compliant design.

Product Summary

Parameter	Typical Value
Output power (1% THD+N, 1kHz @ 8Ω)	1400 W
Peak output current	21 A
THD+N (1kHz @ 1W)	0.003 %
Dynamic range	120 dB(A)
Idle noise	55 µV(A)
Output impedance (1kHz)	6 mΩ

Description

The M-PRO module is a true application dedicated “power pack” for the most demanding and powerful professional speaker applications, requiring high-end sonic quality as well as true professional reliability under any condition.

The M-PRO module includes a fully integrated universal mains power supply and two high performance Class D amplification stages.

Typical Applications

- Professional Audio Solutions
- Self-Powered Loudspeakers
- MI Audio Solutions
- Consumer Audio Solutions
- Hi-Fi Audio Solutions

2 General specifications

2.1 Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{ACmax}	Maximum off-line voltage	265	V_{AC}
V_{ACmin}	Minimum off-line voltage	85	V_{AC}
f_{AC}	AC Mains frequency range	45 - 65	Hz
$I_{+15Vmax}$	Maximum +15V current draw	200	mA
$I_{-15Vmax}$	Maximum -15V current draw	-200	mA
I_{+7Vmax}	Maximum +7V current draw[1]	1000	mA
I_{Fan_max}	Maximum Fan current draw[1]	500	mA
$V_{in\_p\_max}$	Maximum peak input voltage, all channels	+/-15	V_p
$R_{load\ SE}$	Minimum loudspeaker impedance, SE-mode	4	Ω
$R_{load\ BTL}$	Minimum loudspeaker impedance, BTL-mode	8	Ω

Table 2-1: Absolute maximum ratings

Note[1]: The sum of I_{+7Vmax} and I_{Fan_max} must not exceed 1000 mA.

2.2 Audio specifications

Electrical Characteristics @ T_a = 25°C (unless otherwise specified)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{outmax_SE}	Peak output voltage, SE	R_L = 8Ω R_L = 4Ω		80		V
V_{outmax_BTL}	Peak output voltage, BTL	R_L = 8Ω		160		V
$I_{outmax\_SE/BTL}$	Peak output current, SE/BTL			21		A
P_{o_tot}	Total module output power (power supply limited)	230VAC 120VAC		1400 1350		W
P_o	Output power @ 1% THD+N 1kHz (AES17 filter), SE	R_L = 8Ω 230VAC 120VAC		 400 400		W
P_o	Output power @ 1% THD+N 1kHz (AES17 filter), SE	R_L = 4Ω 230VAC 120VAC		 800 800		W
P_o	Output power @ 1% THD+N 1kHz (AES17 filter), BTL	R_L = 8Ω 230VAC 120VAC		 1400 1350		W
THD+N	THD+N (AES17 filter)	1kHz, 1W, R_L = 8Ω		0,003		%
V_{noise_SE}	Output idle noise, SE	Unweighted A-weighted		75 55		uV_{RMS} uV_{RMS}
V_{noise_BTL}	Output idle noise, BTL	Unweighted A-weighted		140 110		uV_{RMS} uV_{RMS}
$DR_{\_SE}$	Dynamic Range, SE	Unweighted A-weighted		118 120		dB dB
$DR_{\_BTL}$	Dynamic Range, BTL	Unweighted A-weighted		118 120		dB dB
A_{SE}	Voltage gain, SE	1kHz		26		dB
A_{BTL}	Voltage gain, BTL	1kHz		32		dB
Z_{o_SE}	Absolute output impedance, SE	1kHz		6		mΩ
IMD_{CCIF_SE}	Intermodulation distortion (CCIF), SE	18.0kHz and 19.0kHz Po = 10W 8Ω, 1kHz		0.0008		%
$TIM_{\_SE}$	Transient Intermodulation distortion (TIM), SE	Po = 10W 8Ω		0.002		%

Table 2-2: Audio specifications

2.3 Input & Output loading

Electrical Characteristics @ T_a = 25°C (unless otherwise specified)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Z_{INPUT}	Input impedance	Ch1, Ch2	-	1.88	-	kΩ
Z_L	Loudspeaker nominal impedance range	Ch1, Ch2 (SE)	4		∞	Ω
Z_L	Loudspeaker nominal impedance range	Ch1 + Ch2 (BTL)	8		∞	Ω
$Z_{L,C}$	Maximal purely capacitive loading of amplifier output	SE BTL	-	-	1	µF

Table 2-3: Input & Output loading

2.4 AC Mains & Power Loss specification

Electrical Characteristics @ T_a = 25°C (unless otherwise specified)

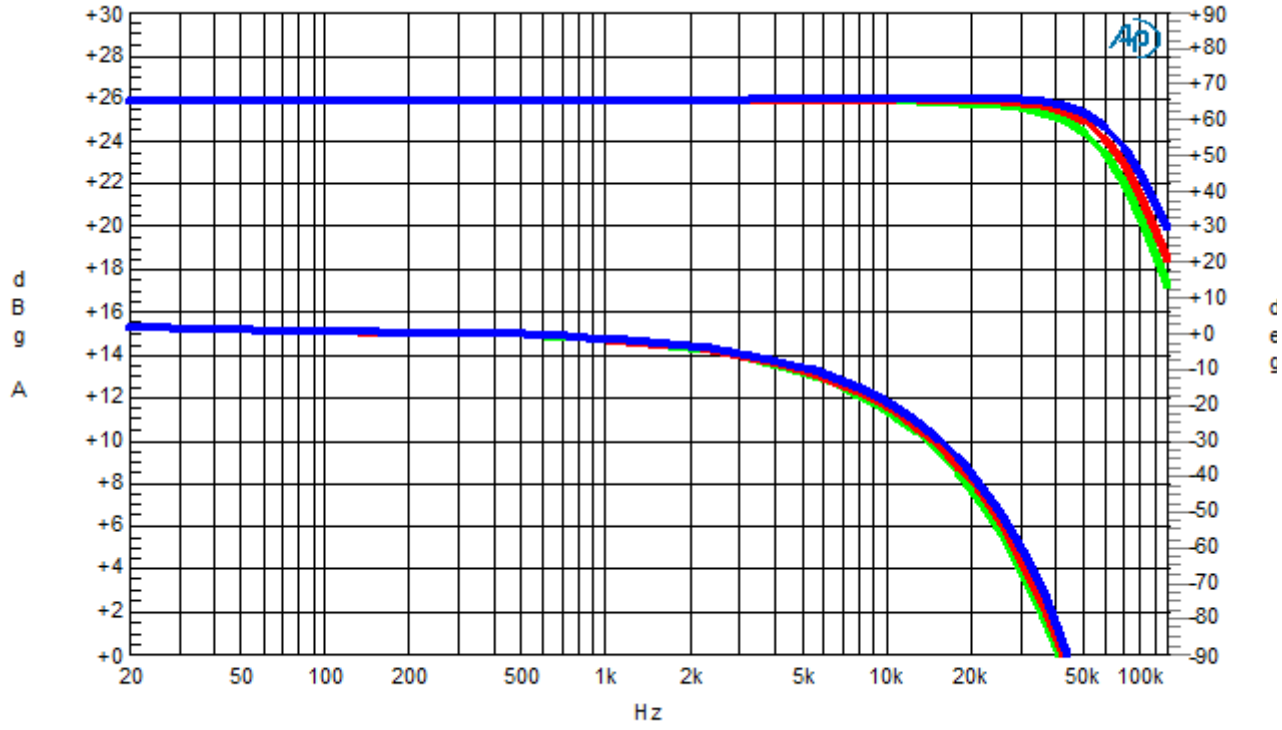
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
P_{AC_PN}	AC mains power input, 230V Pink Noise, SE	R_L = 8Ω 2x400W@8Ω R_L = 4Ω 2x800W@4Ω R_{LBTL} = 8Ω Nominal[1] ($P_{out, RMS}$ = 1/8th 2x400W for R_L = 8Ω) ($P_{out, RMS}$ = 1/8th 2x800W for R_L = 4Ω)		179 335 186		W_{RMS}
$P_{120VAC\ NS}$	AC mains power input No signal applied	Standby Mute Idle	-	3 12 23	-	W_{RMS}
$P_{230VAC\ NS}$	AC mains power input No signal applied	Standby Mute Idle	-	6 14 25	-	W_{RMS}
$V_{AC\_RANGE\ 1}$	Operational voltage range $120V_{AC}$		85		138	V_{AC}
$V_{AC\_RANGE\ 2}$	Operational voltage range 230_{AC}		170		265	V_{AC}
P_{LOSS}	Module power loss at $230V_{AC}$ Pink Noise	$R_{L1, 2}$ = 8Ω $R_{L1, 2}$ = 4Ω R_{LBTL} = 8Ω Nominal[1] ($P_{out, RMS}$ = 1/8th 2x400W for R_L = 8Ω) ($P_{out, RMS}$ = 1/8th 2x800W for R_L = 4Ω)		79 135 72		W_{RMS}
$P_{PROTECTION}$	Temperature @ thermal limiting		-	85	-	°C
T_{SD}	Temperature @ thermal shutdown	Thermal hysteresis	-	95	-	°C
I_{INRUSH}	Peak Inrush Current	$100V_{AC}$ $120V_{AC}$ $230V_{AC}$		14.1 17.0 32.5		A_{PEAK}

Table 2-4: AC Mains & Power Loss specifications

Note 1: ”8 Ohm SUB” load is channels loaded in BTL with an 18” driver bandpass subwoofer with a nominal impedance of 8 Ohm. Input signal filtered to 25Hz – 200Hz.

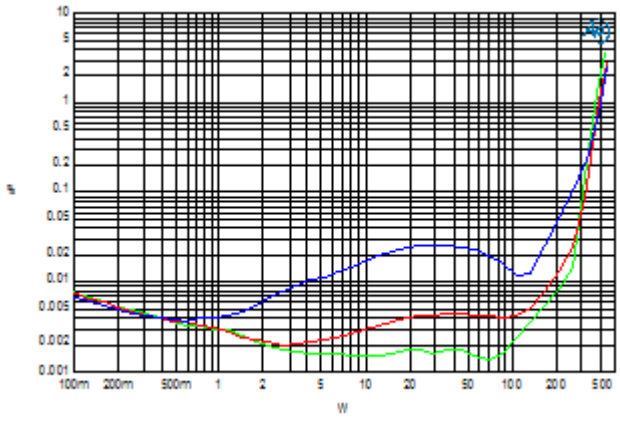
3 Audio measurements

3.1 Frequency response channel (SE)

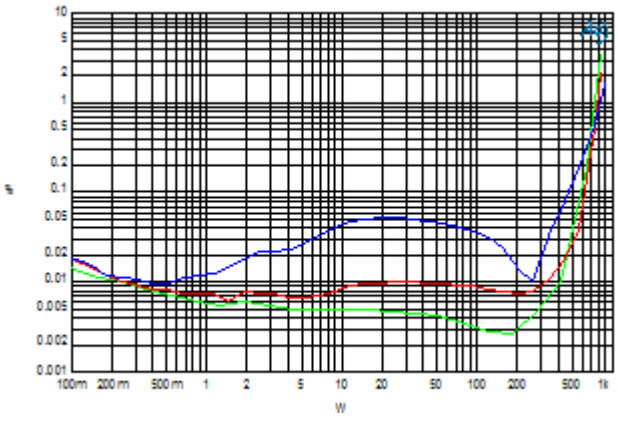


Frequency response, 4Ω (green), 8Ω (red) and open load (blue). Top – amplitude. Bottom – phase

3.2 Total Harmonic Distortion + Noise

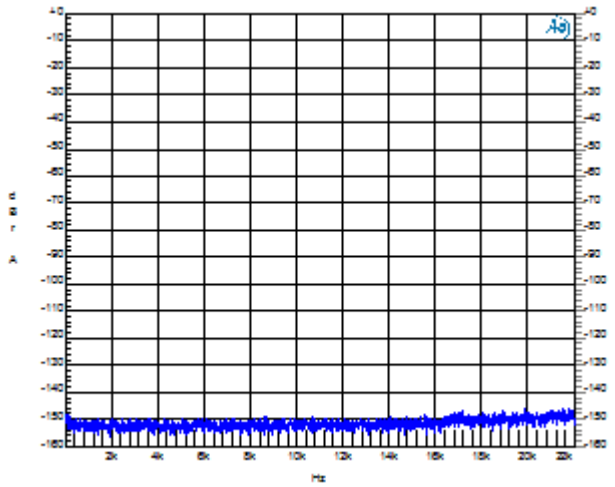


THD+N vs. Po, Channel 2 & 3, 100Hz (green), 1kHz (red), 6,67kHz (blue), 8Ω

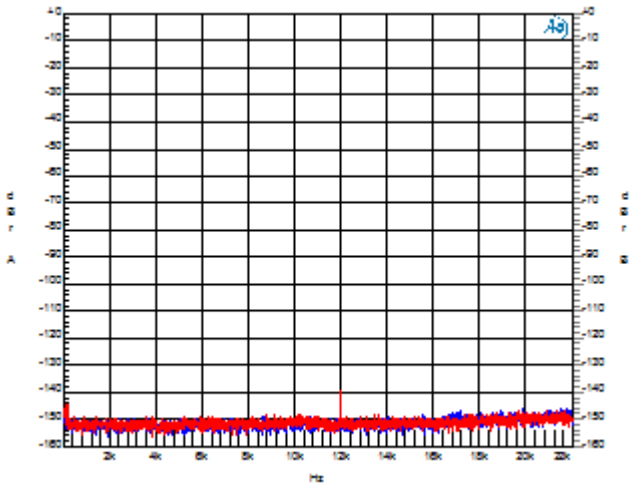


THD+N vs. Po, Channel 2 & 3, 100Hz (green), 1kHz (red), 6,67kHz (blue), 4Ω

3.3 Noise Spectrum

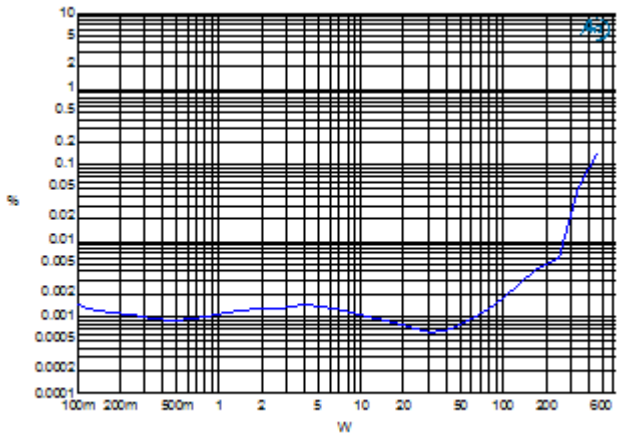


FFT, Channel 1 & 2, BTL, 8 Ohm, Idle

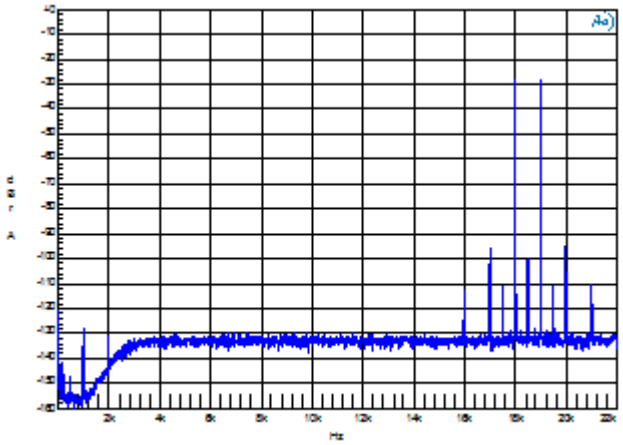


FFT, Channel 1 (Blue) & 2 (Red), SE, 4 Ohm, Idle

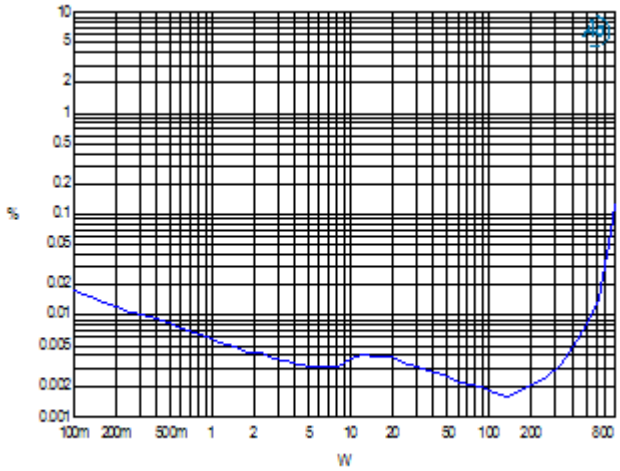
3.4 Intermodulation Distortion (CCIF, TIM)



CCIF vs power R_L=4 ohm, SE, f_1=18khz, f_2 =19khz

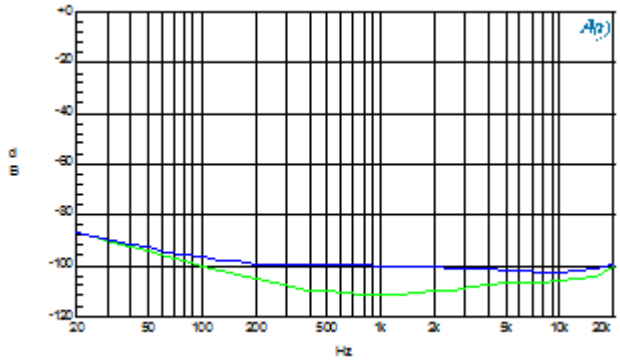


CCIF FFT, SE, f_1=18khz, f_2 =19khz, R_L=4Ohm, P_O =10W.

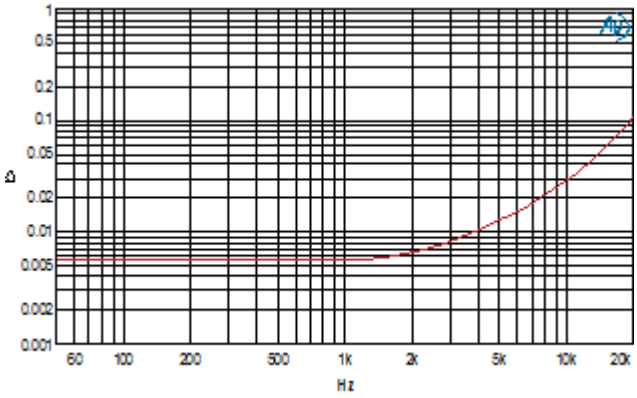


TIM vs. power, R_L=4 Ohm, SE

3.5 Cross Talk & Output impedance



Cross talk, Channel 2, $P_{o,ch1}$=100W (green), Channel 1, $P_{o,ch2}$=100W (blue)



Output impedance, SE, Iout=1ARMS

4 LED indicators and cable connectors

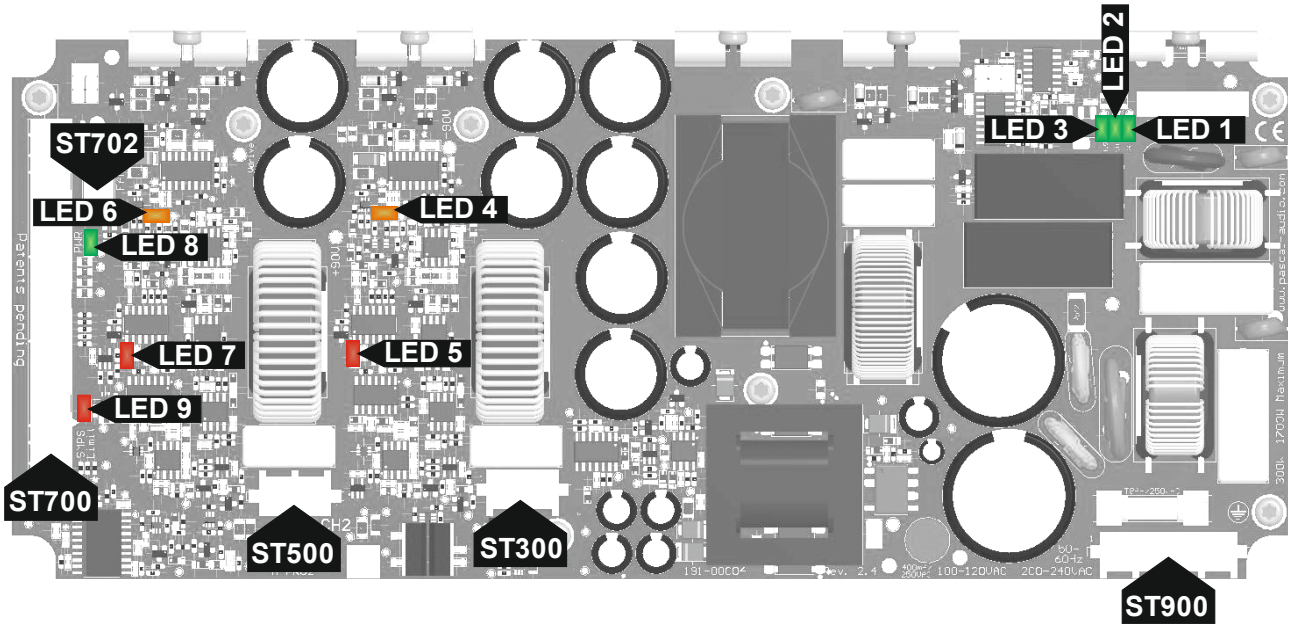


Figure 4-1: M-PRO2 connections and LED indicators

4.1 LED Functionality

LED No.	Function	Normal Operation	LED Indication	LED Indication Result
LED 1	Amplifier drive voltage (Main SMPS ON)	ON	On, Permanent Flashing	Amplifier drive voltage present, SMPS ON Main SMPS disabled (standby mode)
LED 2	Relay state	ON		Inrush limiter bypassed
LED 3	Relay state	ON OFF		Mains AC voltage: 120V_{AC} Mains AC voltage: 230V_{AC}
LED 4	Disable $_{CH1}$	OFF	ON OFF	Channel 1, Mute (Disable) or protection mode Channel 1, Enabled
LED 5	Clip Limiter$_{CH1}$	OFF	ON OFF	Channel 1, Clip limiting Channel 1, Not clipping
LED 6	Disable $_{CH2}$	OFF	ON OFF	Channel 2, Mute (Disable) or protection mode Channel 2, Enabled
LED 7	Clip Limiter$_{CH2}$	OFF	ON OFF	Channel 2, Clip limiting Channel 2, Not clipping
LED 8	Auxiliary 7V	ON	ON OFF	Auxiliary 7V present Auxiliary 7V not present
LED 9	RMS Limiting	OFF	Flashing (without audio input) Flashing (with audio input) On, Permanent	AC mains 120V/230V detection failed $P_{AC\ Mains}$ = 550W, periodical RMS limiting $P_{AC\ Mains}$ > 550W, permanent RMS limiting

Table 4-1: LED Functionality

4.2 LED timing during start-up & shut-down

During normal start-up and shut-down of the amplifier modules the LEDs will show the following timing.

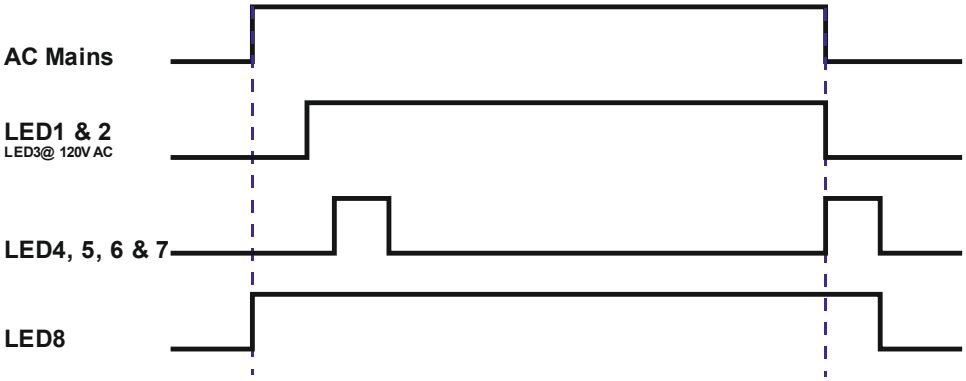


Figure 4-2: LED timing during start-up and shut-down

4.3 M-PRO2 Connectors

Details concerning the M-PRO2 Amplifier module connectors and the relating pin configuration are described in the following sub-sections.

4.3.1 AC Mains connector (ST900)

ST900			**Description**
Name	**Pin #**	**I/O**	
AC Live	Pin 1		AC mains Live input
AC Neutral	Pin 2		AC mains Neutral input
	Pin 3		No connection
Earth	Pin 4		Earthing of module, electrical contact to heat sink

Table 4-2: AC Mains (ST900) connector

4.3.2 Speaker Output (ST300)

ST300			**Description**
Name	**Pin #**	**I/O**	
+$Ch1_{Out}$	Pin 1	Output	Amplifier channel 1, Out+
- $Ch1_{Out}$ (GND)	Pin 2	(GND)	Amplifier channel 1, GND

Table 4-3: Speaker output (ST300) connector

4.3.3 Speaker Output (ST500)

ST500			**Description**
Name	**Pin #**	**I/O**	
- $Ch2_{Out}$ (GND)	Pin 1	(GND)	Amplifier channel 2, GND
+$Ch2_{Out}$	Pin 2	Output	Amplifier channel 2, Out+

Table 4-4: Speaker output (ST500) connector

4.3.4 Input & Output (ST700)

ST700			Description
Name	**Pin #**	**I/O**	
Signal Shield	Pin 1		Connect to analog GND at Front end
Signal return Channel 1	Pin 2	Input, SGND	Connect to ch1 signal source GND at Front end[3]
Signal input channel 1	Pin 3	Input	4 V peak correspond to full output voltage, 26dB gain[3]
Signal Shield	Pin 4		Connect to analog GND at Front end
Signal return Channel 2	Pin 5	Input, SGND	Connect to ch2 signal source GND at Front end[3]
Signal input channel 2	Pin 6	Input	4 V peak correspond to full output voltage, 26dB gain[3]
Signal Shield	Pin 7		Connect to analog GND at Front end
Not Connected	Pin 8		
Not Connected	Pin 9		
Signal Shield	Pin 10		Connect to analog GND at Front end
V Out monitor channel 1	Pin 11	Output	+/- $10V_p$ correspond to +/- 80V on output
V Out monitor channel 2	Pin 12	Output	+/- $10V_p$ correspond to +/- 80V on output
Not Connected	Pin 13		
I Out monitor channel 1	Pin 14	Output	+/- $10V_p$ correspond to +/- 20A on output
I Out monitor channel 2	Pin 15	Output	+/- $10V_p$ correspond to +/- 20A on output
Not Connected	Pin 16		
Temp monitor	Pin 17	Output	0-10V correspond to 0 – 100 Degrees Celsius
GND (ref +/-15V)	Pin 18	GND	
GND (ref +/-15V)	Pin 19	GND	
Clip channel 1	Pin 20	Output, Active low	Open collector[2]
Clip channel 2	Pin 21	Output, Active low	Open collector[2]
Not Connected	Pin 22		
GND (ref +/-15V)	Pin 23	GND	
Dis read/Protect	Pin 24	Output, Active Low	Indicates amp channels switched off Open collector[2]
GND (ref +/-15V)	Pin 25	GND	
Disable (Mute)	Pin 26	Input, Active low	Switches all amp channels off[3]
Not used (Do not connect)	Pin 27		Floating (Do not connect)
SMPS Limit	Pin 28	Output, Active Low	Indication before SMPS limiting Open collector[2]
Temp reduction off	Pin 29	Input, Active low	Disables soft volume reduction at high temp[2]
Sleep mode	Pin 30	Input, Active low	Shuts down all power circuitry - except +7V[2]
+7V	Pin 31	Output	Maximum current 1.0A[1] (available also in sleep mode)
+7V	Pin 32	Output	
GND (ref +/-15V)	Pin 33	GND	
GND (ref +/-15V)	Pin 34	GND	
+15 V	Pin 35	Output	+15V (not available also in sleep mode)
+15 V	Pin 36	Output	
GND (ref +/-15 V)	Pin 37	GND	
GND (ref +/-15 V)	Pin 38	GND	
-15 V	Pin 39	Output	-15V (not available also in sleep mode)
-15 V	Pin 40	Output	

Table 4-5: Input and Output (ST700) connector

Note[1]: The sum of I_{+7Vmax} and I_{Fan_max} must not exceed 1000 mA.
Note[2]: See section 4.4 for details.
Note[3]: See section 5 for details

4.3.5 Fan Output (ST702)

ST702			Description
Name	**Pin #**	**I/O**	
GND	Pin 1	GND	
Fan output	Pin 2	Output	Output for 5V fan, Max 500mA[1]
GND	Pin 3	GND	

Table 4-6: Fan output (ST702) connector

Note[1]: The sum of I_{+7Vmax} and I_{Fan_max} must not exceed 1000 mA.

4.4 Open Collector inputs and outputs

All inputs and outputs are implemented as shown in the figures below.

The 470Ω resistor is inserted to protect the open collector transistor and the 47pF capacitor has been implemented as EMI filtering.

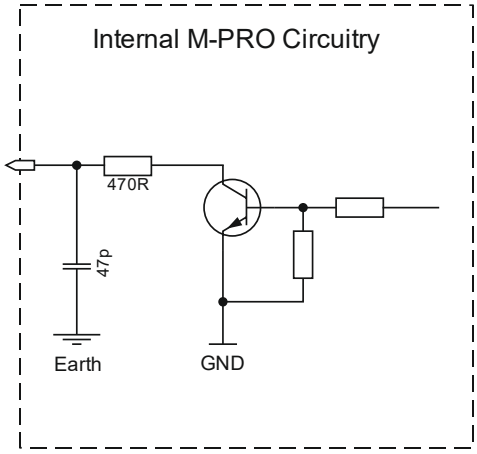


Figure 4-3: Open Collector Output from M-PRO2 module

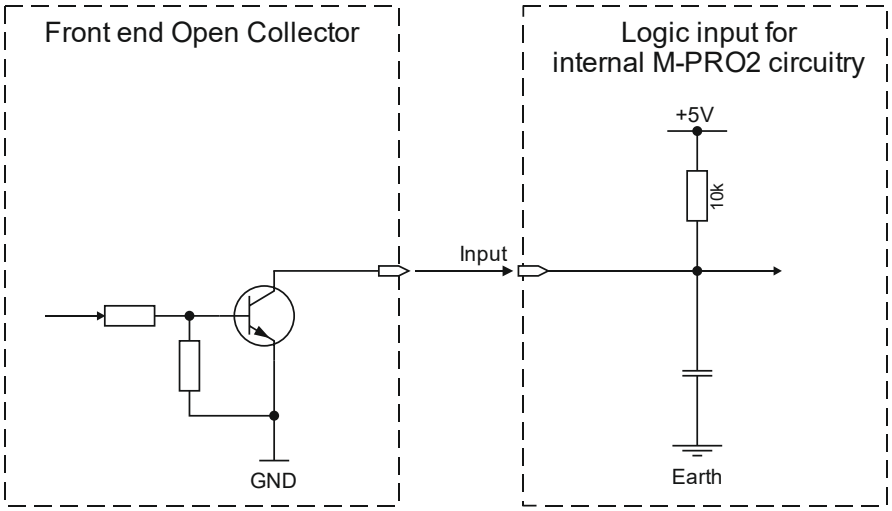


Figure 4-4: Open Collector Output from front-end used as Input for M-PRO2

High and Low voltage levels for logic input.

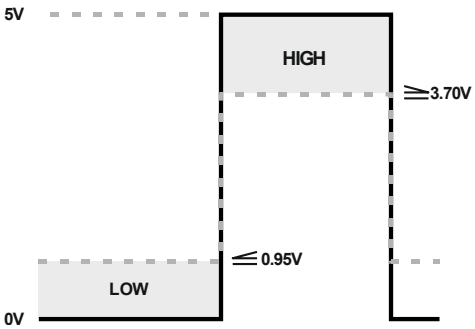


Figure 4-5: High and Low voltage levels for logic input.

4.5 Fan Control

The fan control thermal limits can be seen from the table below. The fan control signal can be used for a 5V fan.

Fan threshold		
Parameter	**T_{ON} (°C)**	**T_{Off} (°C)**
$T_{Powerstage}$	60	50

Table 4-7: Fan control

4.6 Power Up/Down timing diagram

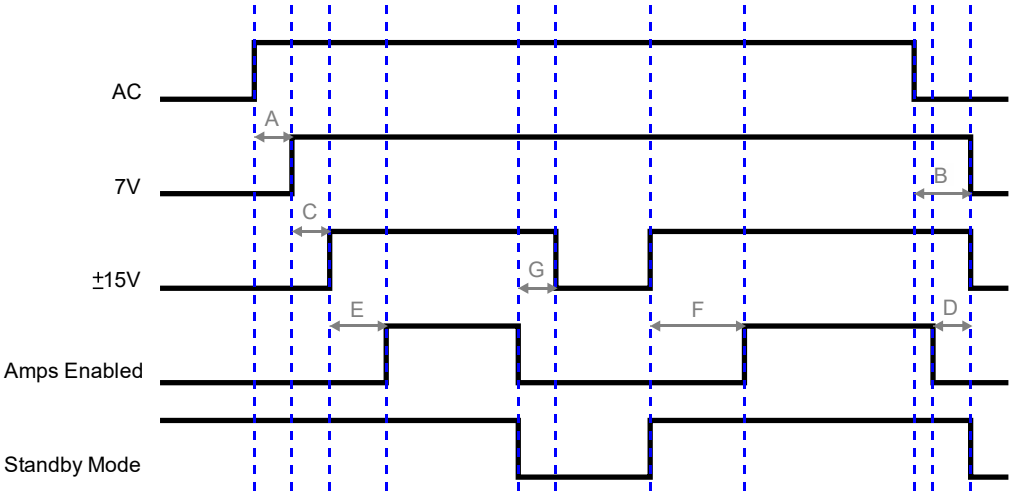


Figure 4-6: Power Up/Down timing diagram

The table below contains the timing in relation to the *Figure 4-6* above.

Parameter	**Min**	**Typ**	**Max**	**Condition**
A	100ms	160ms	700ms	+/-15V and +7V, loaded with DEMO I/O board
B	0ms	3500ms		+/-15V and +7V, loaded with DEMO I/O board
C	2000ms	2300ms	2700ms	+/-15V and +7V, loaded with DEMO I/O board
D	0ms	2000ms		+/-15V and +7V, loaded with DEMO I/O board
E	2000ms		4500ms	+/-15V and +7V, loaded with DEMO I/O board
F	4000ms	4800ms	6500ms	+/-15V and +7V, loaded with DEMO I/O board
G	135ms		180ms	+/-15V and +7V, loaded with DEMO I/O board

Table 4-8: Power Up/Down timing specifications

5 Single Ended & Bridge Tied Load configuration

5.1 Single Ended (SE) configuration

The figure below shows the M-PRO2 Amplifier configured in SE mode.

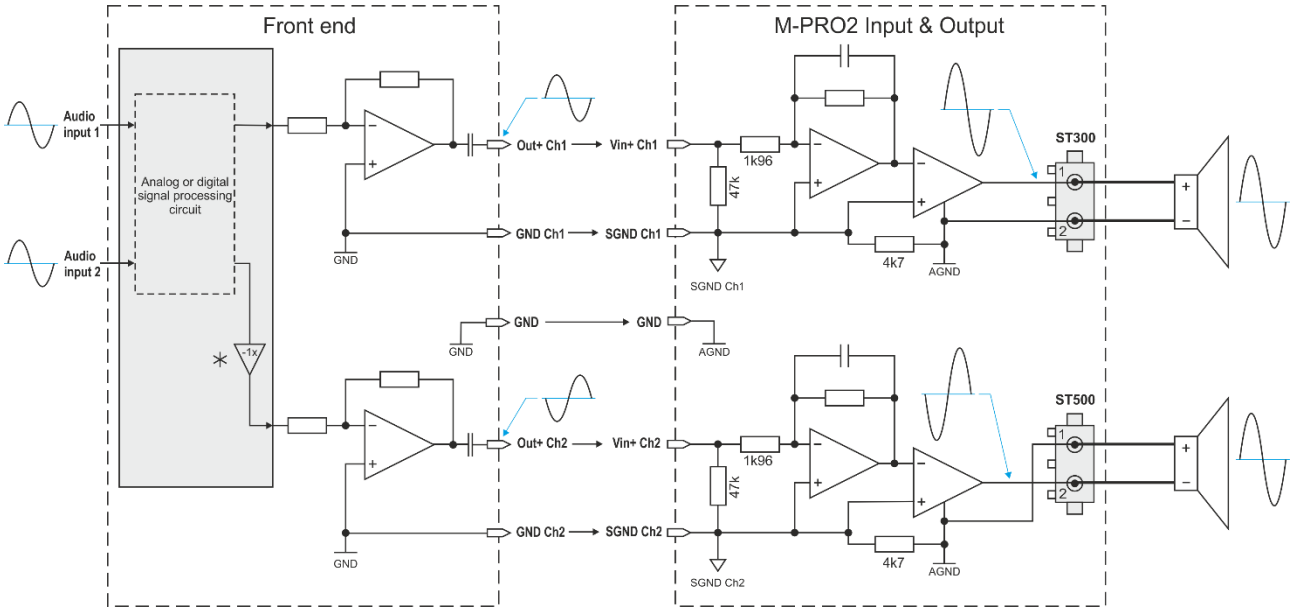


Figure 5-1: Single Ended mode, input & configuration

NOTICE The * marking in *Figure 5-1* indicates that to reduce pumping channel 2 signal must be inverted at the Front end. The inverted polarity at the speaker output connector (ST500) ensures correct phase of the speaker signal, too.

5.2 Bridge Tied Load (BTL) configuration

The figure below shows the M-PRO2 Amplifier configured in BTL mode.

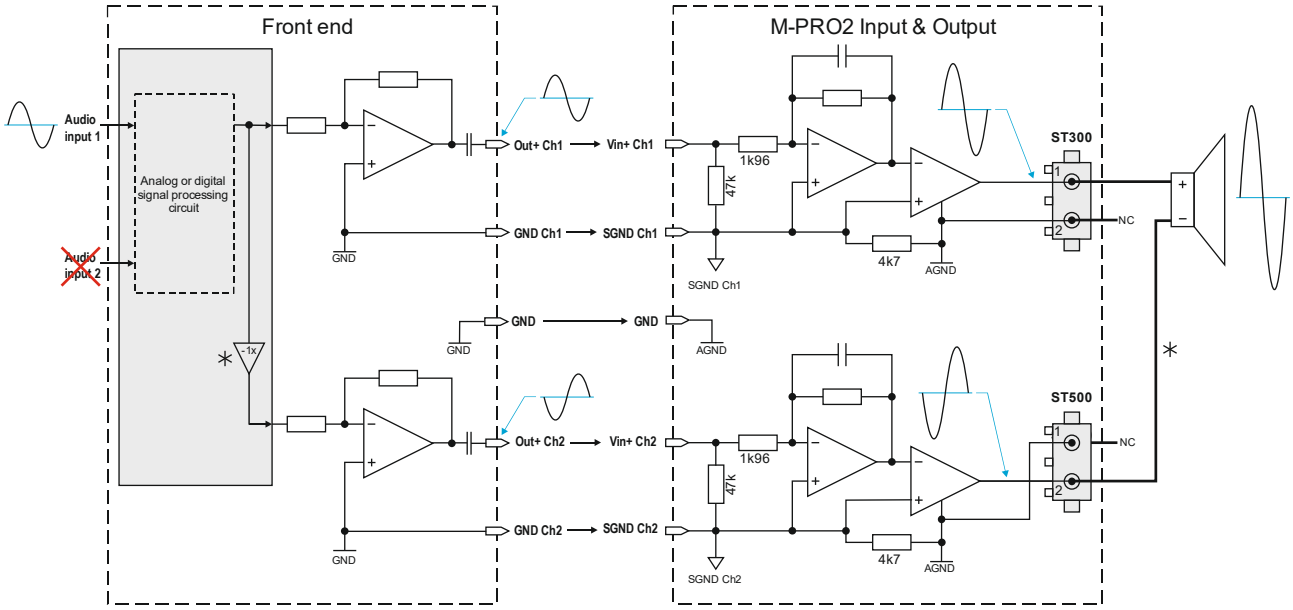


Figure 5-2: Bridge Tied Load mode, input & output configuration

NOTICE

The * marking in *Figure 5-2* indicates that both M-PRO2 input channels are fed with the same input signal, although input to channel 2 is inverted to produce the negative voltage swing needed for BTL operation of the speaker. The two channels with opposite phase, produces in conjunction the doubled voltage swing over the speaker.

6 Protection features

6.1 Over current protection

Both amplifier output channels are over current protected. Current clipping is engaged when the amplifier channels exceed their specified peak output current of 21 Ampere. When the current protection is active, it can be seen as the output voltage of the amplifier being clipped.

If the current output of an amplifier channel exceeds its specified peak current, e.g. in case of a short circuit of the output, the amplifier will protect itself by muting (disabling) the output. The muting (disabling) state will typically last for 1 second. Hereafter – it automatically restarts, if the reason that activated the protection is ceased.

6.2 DC protection

The M-PRO module has a built-in DC protection circuit that will attenuate any DC signals on the amplifier outputs, either produced by an input signal containing a DC signal or by malfunction of the amplifier.

In case of an input signal containing a DC, or if an amplifier is malfunctioning, the DC protection circuit will prevent the loudspeakers connected to the output from damage. If the DC-protection circuit cannot attenuate an amplifier DC output signal sufficiently, the amplifier module will then Mute (Disable) and restart 3 times before latching. When the module is latched, the main power supply is locked in standby mode – and the power must be switched off and on again in order to reset the latching mode.

6.3 Over-/under voltage protection

The M-PRO has a built-in over- and under voltage protection, that monitors whether the offline voltage exceeds or drops below the specified upper and lower operational AC voltages. Exceeding $265V_{AC}$ for a longer period of time may damage the power supply permanently.

6.4 Mains fuse protection

A circuitry protecting the product's Mains power fuse is implemented in the M-PRO module. The fuse protection circuit monitors and regulates the RMS current, so that it never will exceed the fuse breaking current.

The existence of the Mains power fuse protection also removes the risk of compromising safety in situations of overload.

Under normal circumstances the Mains power fuse should never be replaced. In case the Mains power fuse is blown – the product shall be returned to Pascal A/S, according to Pascal RMA procedures.

6.5 Temperature protection

Temperature protection of power stages, transformers and heat sinks can be used in two different configurations:

1. Thermal limiter “ON”: Limiting is engaged after the power stages and the transformer or heat sink temperature have reached their specified thermal limiting temperatures.

   After limiting is engaged, the amplifier will find its thermal equilibrium.

2. Thermal limiter “OFF”: The amplifier Mutes (Disables) for a period of time and will automatically restart, after the power stage, transformer or heat sink temperature have reached the specified thermal start-up temperature.

6.6 Standby Mode

This function is designed as a special feature for installation purposes.

When the amplifier is put into Standby Mode (Sleep Mode), major circuitry parts are powered down, which leads to the low AC Mains power input specification of only a few Watt.

The +7V supply rail is still active, which enables a possible network/DSP to remotely power up the amplifier again.

6.7 High frequency protection

A high frequency protection is implemented in order to protect filter components from overload.

The high frequency protection algorithm has been implemented to protect the amplifier from excessive HF signals on the amplifier outputs.

The amplifiers have a full power bandwidth of 20kHz, which will be allowed for unlimited time, 30kHz full power is allowed for 2 seconds before protection becomes active.

7 Readouts

7.1 Clip

When the amplifier output peak voltage or current exceeds the specified values, the amplifier channel will start clipping the Voltage/Current. Clipping indication has been implemented for each amplifier channel. Clip indication for channel 1 and 2 can be monitored from ST700, Pin 20 and 21.

7.2 Dis read/Protect

The Dis read/protect indication is based on an open collector, indicating if any of the amplifier channels or the power supply is in Muted (Disabled) Mode or in protect mode. This indicates either an external shutdown or an on-board protection condition. Dis Read/Protect can be monitored from ST700 pin 24.

7.3 SMPS Limit

In order to protect the power supply from overload, a power supply limiter is set. SMPS limit indication is based on an open collector and can be monitored from ST700 pin 28. The timing of the SMPS limit engagement can be seen below:

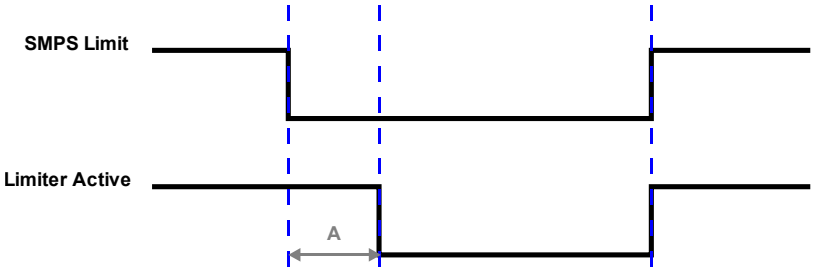


Figure 7-1: SMPS limit, A = Typically 1 sec.

7.4 Output voltage

Output voltage is measured on channel 1 and 2 and supplied as a bi-directional sinusoidal voltage output. Output voltage for channel 1 and 2 can be measured on ST700 pin 11 and 12.

7.5 Output current

Output current is measured on channel 1 and 2 and supplied as a bi-directional sinusoidal voltage output. Output current for channel 1 and 2 can be monitored on ST700 pin 14 and 15.

7.6 Temp Monitor

Temperature monitoring is made at several points in the amplifier and power supply. The maximum temperature of any measurement point is provided as the Temp Monitor, which can be monitored on ST700 pin 17.

8 Mechanical specifications M-PRO2

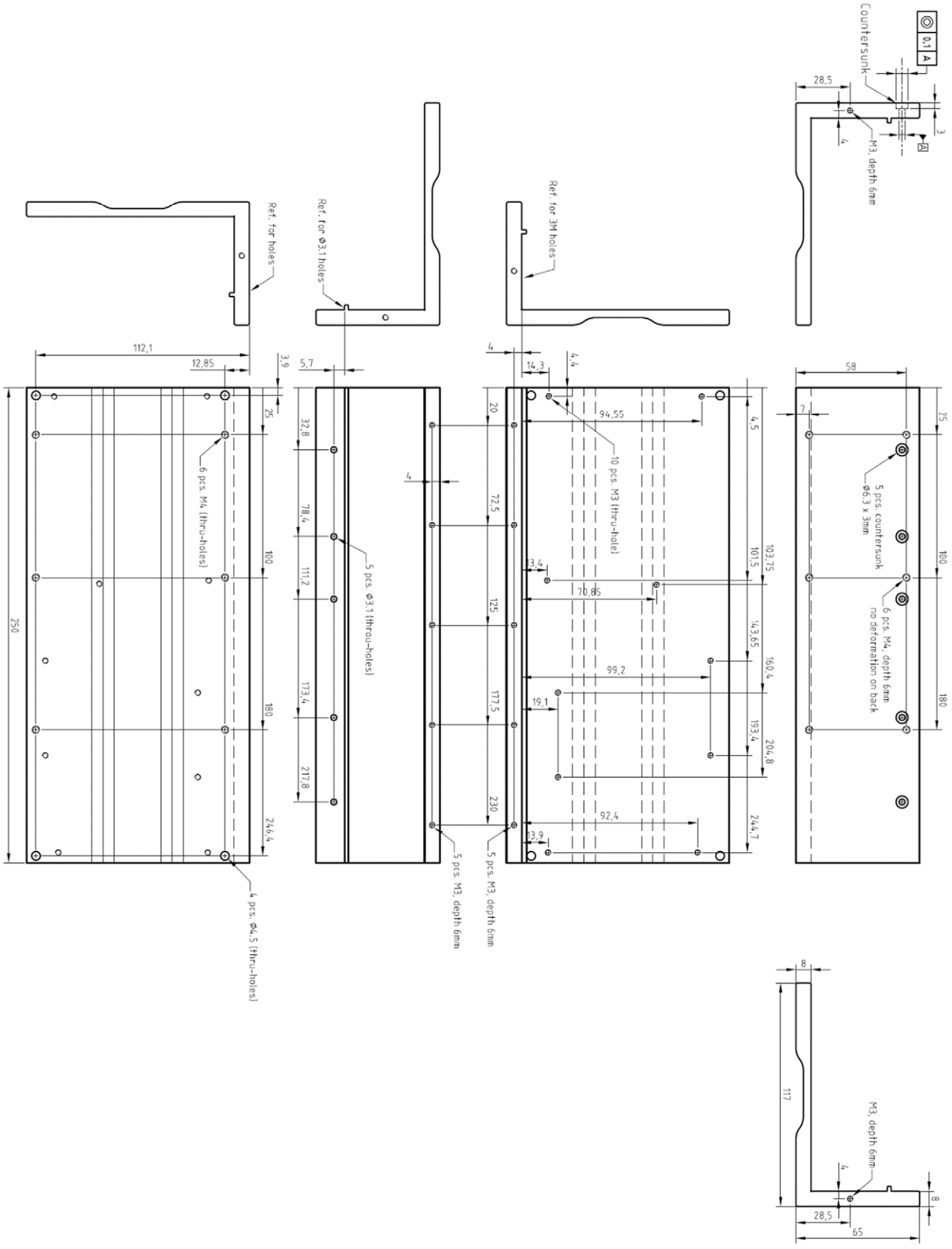


Figure 8-1: Mechanical dimensions for M-PRO2 heat sink – All dimensions in mm

9 Compliance Standards

9.1 Safety Compliance

The M-PRO2 is safety tested, according to the following standards:

IEC 60065:2001(7th E) + A1:2005 + A2:2010

The M-PRO2 fulfills the requirements of:

UL 60065 7th Ed. Revised 2007-12-11, CAN/CSA C22.2 No. 60065-03, EN 60065:2002 + A1:2006 + A11:2008 + A2:2010 + A12:2011

The M-PRO2 is evaluated against and complies with the regulations of the following countries:

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 *(Countries outside the CB Scheme membership may also accept this report.)*

Test procedure:

CB Scheme
M-PRO2 CB certificate no. E470499-A5. (UL International Demko A/S). *(Full report is available for download on Pascal Extranet)*

Product safety category:
Class 1 (Earthed equipment)

The M-PRO2 is tested as a component, the final product should always be evaluated against applicable standards.

IEC 62368-1 information:

When approving a final product to IEC/UL/EN 62368-1 2nd E. It is possible to use components approved to IEC 60065 8th E. For the M-PRO2 there is no difference in requirements between 60065 7th and 8th E.

9.2 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 61000-3-3:2013

Immunity:
EN 55103-2:2009

The M-PRO2 complies with A-limits on radiated and conducted emission when installed properly as described in the Application Manual covering the M-PRO & X-PRO Series.

If you decide that your end-product should comply with A-limits – then it is mandatory that you insert a notification, displaying this type of compliance in the user manual for the end-product. See M-PRO & X-PRO Series Application Manual for example on such notification.

If you decide that your end-product should comply with B-limits, this is possible, although compliance may require additional engineering and EMC measures to fulfil the B-limits. In case your end-product complies with B-limits – there will be no need for notification in the user manual.

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

9.3 ESD Precautions

In order 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-S20.20-1999: Protection of Electrical and Electronic Parts, Assemblies and Equipment.

9.4 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 might be subject to change.

For further information

www.pascal-audio.com

Or contact us at:
Info@pascal-audio.com
Phone: +45 3699 1944

Pascal A/S
Ellekaer 6
2730 Herlev
Denmark