

# FFA001\_V3 Amplifier Module

## General Spec Sheet

Ver 0.1



FFA001\_V3 Amplifier Module

Content of this data sheet is subject to change without prior notice

# 1 Features and description

## Features

- 2x150W(SE) amplifier channel(s) using Dlt-sigma modulation technology for unmatched sonic performance
- Universal mains regulated power supply with PFC integrated
- Auxiliary power supply for external circuitry like DSP Front End solutions
- Lower standby consumption < 1W
- Wake On Music ready with selectable timing
- Full protection scheme: thermal limiter, short-circuit/overload/DC/high frequency protections
- Multiple readouts (temperature, amplifier output voltage, clip monitor, amplifier protect/mute, VAC)
- Safety approved and verified for EMC compliance (TBC)

## Product summary

Parameter	Typical Value
Total Output power (1% THD+N, 1kHz @ 4/8Ω)	150 W + 150W
Total system efficiency (SE, 150 W @ 4Ω)	82 %
Peak output current CH1 CH2	18A 18A
THD+N (1kHz, 50W@8 Ω)	0.003 %
Dynamic range	>105 dB(A)
Idle noise	155 μV(A)
Mains input voltage	85V <sub>AC</sub> - 265V <sub>AC</sub>
Standby consumption	< 1 W

## Description

The FFA001\_V3 module is 2 channel Class-D amplifiers with integrated universal mains power supply with PFC.

The FFA001\_V3 module offers an ultra-compact size with an unmatched total system efficiency, to ease the integration of the FFA001\_V3 module into any audio solution.

In addition, the FFA001\_V3 module offers a number of readouts and controls, which allow for external MCU/DSP control of the module. The built-in auxiliary power supply makes it easy to supply the DSP Front Stage.

## Typical applications

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

## 2 General specifications

### 2.1 Audio specifications

Electrical Characteristics @  $T_a = 25^\circ\text{C}$  (unless otherwise specified)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{out,max}$	Peak output voltage Ch1 & Ch2	Unloaded	-	$\pm 60$	-	V
$I_{out,peak\_CH1(LF)}$	Peak output current		-	18	-	A
$I_{out,peak\_CH2(HF)}$	Peak output current		-	18	-	A
$P_{o,tot}$	Total module output power <sup>1</sup>	230V <sub>AC</sub> 120V <sub>AC</sub>	-	300 300	-	W
$P_o$	Output power @ 1% THD+N, 1kHz <sup>2</sup> Ch1(LF), single ended $R_L=8\Omega$	230V <sub>AC</sub> 120V <sub>AC</sub>	-	150 150	-	W
$P_o$	Output power @ 1% THD+N, 1kHz <sup>2</sup> Ch1(LF), single ended $R_L=4\Omega$	230V <sub>AC</sub> 120V <sub>AC</sub>	-	150 150	-	W
$P_o$	Output power @ 1% THD+N, 1kHz <sup>2</sup> Ch2(HF), single ended $R_L=8\Omega$	230V <sub>AC</sub> 120V <sub>AC</sub>	-	150 150	-	W
$P_o$	Output power @ 1% THD+N, 1kHz <sup>2</sup> Ch2(HF), single ended $R_L=4\Omega$	230V <sub>AC</sub> 120V <sub>AC</sub>	-	150 150	-	W
THD+N	THD+N @ 1W, 1kHz, $R_L = 8\Omega$ <sup>2</sup>			0.006		%
$V_{noise\ SE}$	Output idle noise - Ch1(LF)	Unweighted A-weighted	-	220 155	-	$\mu\text{VRMS}$
A	Voltage gain @ 1kHz, Ch1 & Ch2 SE	SE		26	-	dB
$A_{var}$	Frequency response Ch1 & Ch2 @ 20Hz ~ 20kHz	$R_L = \text{Open Load}$ $R_L = 8\Omega$ $R_L = 4\Omega$	-	0 ~ +1	-	dB
$V_{out,offset}$	Amplifier output DC Offset	SE $4\Omega$	-	$\pm 20$	-	mV

Table 2-1: Audio specifications

Note 1: Maximum total power is limited by the power supply.

Note 2: Measured using the Audio Precision AES-17 filter.

### 2.2 Auxiliary power supply specification

Electrical Characteristics @  $T_a = 25^\circ\text{C}$  (unless otherwise specified)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{+12V}$	+12V voltage			12		V
$V_{+15V}$	+15V voltage			15		V
$V_{-15V}$	-15V voltage			-15		V
$V_{Drive}$	Vdrive voltage	Ref. to -60V		12		V
$I_{+12V}$	+12V current rating <sup>1</sup>		0		1000	mA
$I_{+15V}$	+15V current rating <sup>1</sup>		0		300	mA
$I_{-15V}$	-15V current rating <sup>1</sup>		-300		0	mA
$I_{VDrive}$	$V_{Drive}$ current rating <sup>1</sup>		0		200	mA
$P_{tot}$	Maximum total output power <sup>2</sup>		0		23	W

Table 2-2: Auxiliary power supply specification

Note 1: The Auxiliary power supply can't be loaded with the maximum rated load current for all four outputs simultaneously as this will violate the 23-Watt total output power limit. Use the typical Voltage levels from Table 2-2 in combination with the actual load currents to calculate the total power consumption. The calculated total power consumption must comply with the 23-Watt total output power limit

## 3. Interface Definition

### 3.1 Bill of connectors

Code	Name	Type
P1	AC Mains	JST B3P-VH or similar
P2	Output connectors	JST B4P-VH (or similar)
J1	Input connectors	IDC socket 26pin

### 3.2 P1 pinout

Pin#	Symbol	Description
1	L	AC Mains: Live input
2	n/a	Not available
3	N	AC Mains: Neutral input

### 3.3 P2 pinout

Pin#	Loudspeaker polarity	Description
1	1+	Channel 1 positive unbalanced output
2	1-	Channel 1 negative unbalanced output
3	2+	Channel 2 positive unbalanced output
4	2-	Channel 2 negative unbalanced output

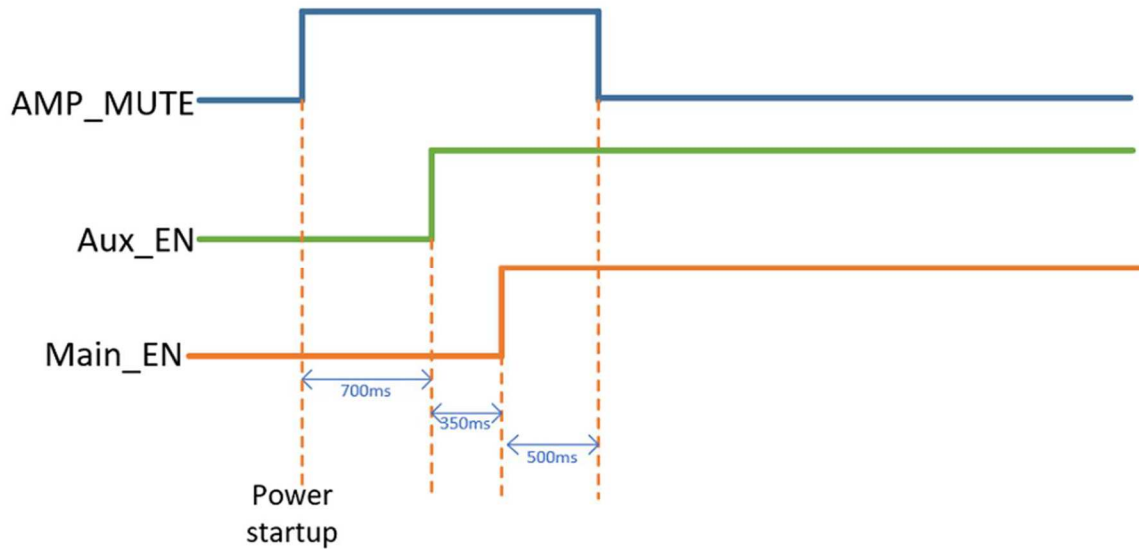
### 3.3 J1 pinout

Pin#	Name	I/O	Description
1	CH1_IN-	I	CH1 negative audio input signal of the balanced input
2	CH1_IN+	I	CH1 positive audio input signal of the balanced input
3	GND		This pin is a general-purpose GND. Shall be connected to Front End ground plane.
4	CH2_IN-	I	Ch 2 negative audio input signal of the balanced input
5	CH2_IN+	I	Ch 2 positive audio input signal of the balanced input
6	Temp/Vac_Out	o	This pin reads out by default the highest temperature of the two amplifier channels in the range of 0-3.3V corresponding to 0 C-100 C. The pin will readout 3V3. when in temperature protection. This pin can alternatively be used to read out the AC mains voltage from 85-265VAC is expressed as a DC voltage from 0.213V to 2.925V. Temp/VAC Set via pin 15 is used to select either temperature (default) or AC mains readout.
7	Vout_Monitor_Ch1	O	This pin reads out the amplifier channel 1 output voltage. The signal will be in the range $\pm 10Vp$ corresponding to $\pm 60Vp$ on the output of the amplifier. The signal has a high impedance and requires a buffer if used.
8	Vout_Monitor_Ch2	O	This pin reads out the amplifier channel 2 output voltage. The signal will be in the range $\pm 10Vp$ corresponding to $\pm 60Vp$ on the output of the amplifier. The signal has a high impedance and requires a buffer if used.
9	/Clip1	O	This pin signals an active low whenever the amplifier Ch1 is voltage clipping or current clipping
10	/Clip2	O	This pin signals an active low whenever the amplifier Ch2 is voltage clipping or current clipping
11	/Dis_Read/Protect	o	This pin signals an active low whenever the amplifier channel 1 and channel 2 are disabled or in protection
12			
13	/Mute	I	An open-collector must be used to actively pull this pin low, whenever the module must disable/Mute.
14			
15	T-V_Sel/SMPS_OL		It will be an input pin where it is possible to select either temperature or AC mains readout for the signal Temp/Vac Mon (pin 6). If pin 15 is left unconnected, the internal pull-up will by default select, temperature as the read out on pin 6. If pin 15 is actively pulled low by an open collector, the mains RMS voltage will be the readout on pin 6.
16	/Standby	I	An open-collector must be used to actively pull this pin low, whenever the module must enter standby mode.
17,18	+12V		This pin may be used to supply external circuitry.
19,20	GND		This pin is the +12V ground return.
21,22	+15V		This pin may be used to supply external circuitry.
23,24	GND		This pin is the $\pm 15V$ ground return.
25,26	-15V		This pin may be used to supply external circuitry.

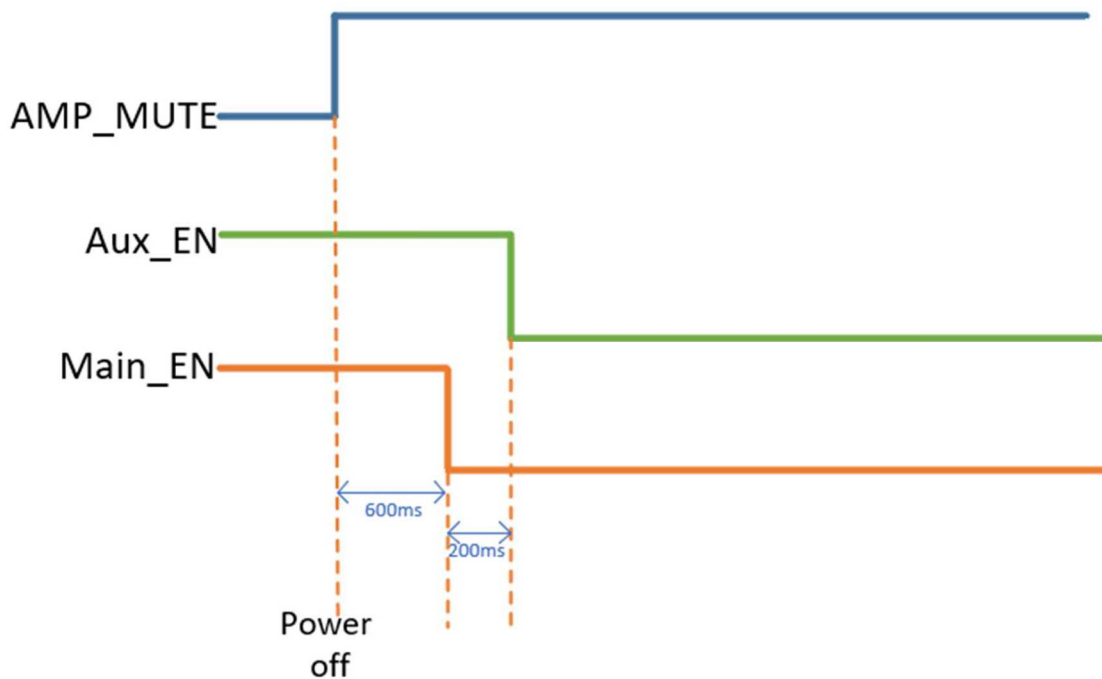
## 4.Board control and timing overview

To eliminate the power on/off “pop” noise from the amplifier output, FFA001\_V3 module runs with below startup and power off sequence.

### 4.1 Start-up power sequence



### 4.2 Power off sequence.

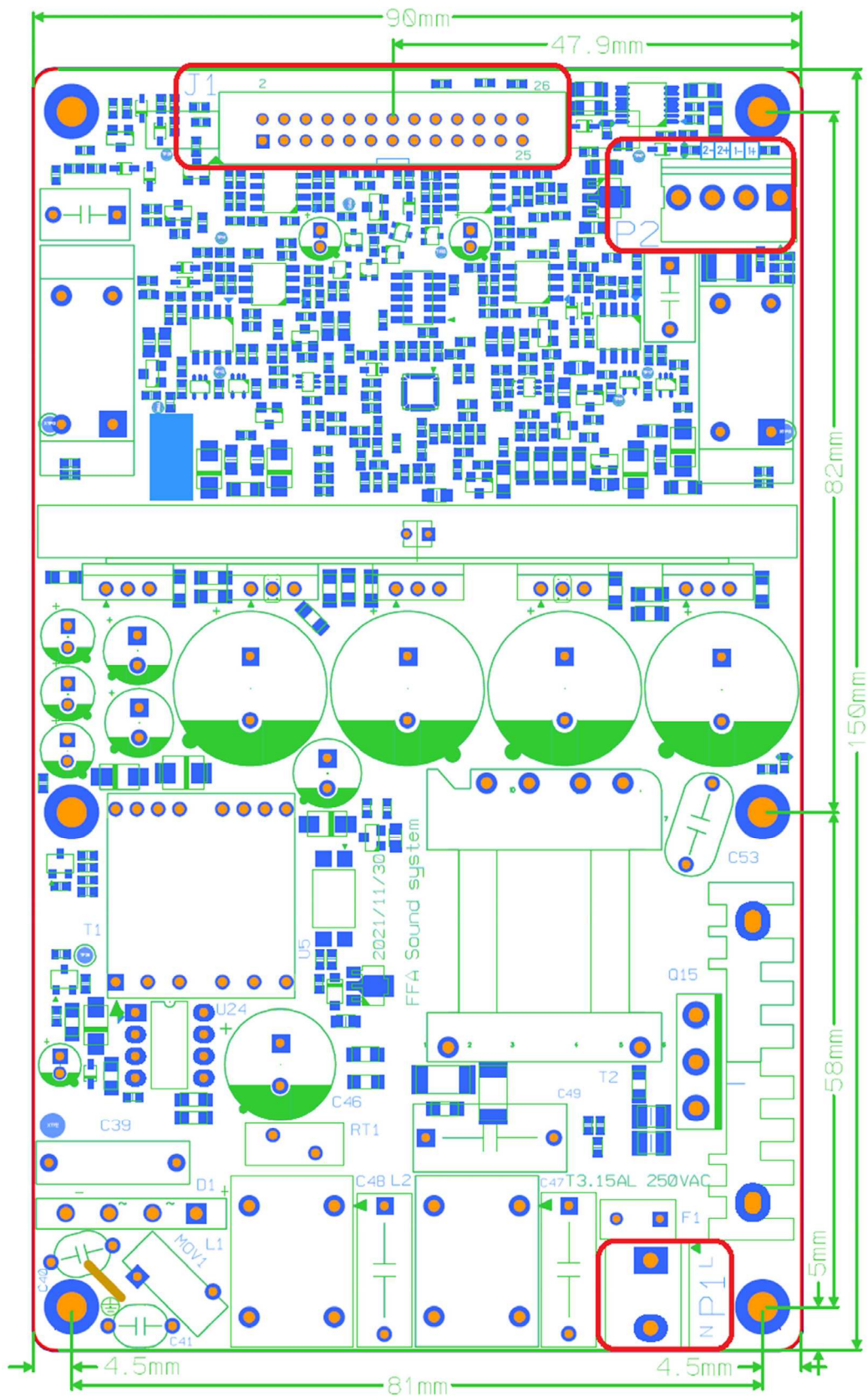


#### Notes:

AMP\_MUTE : Activate the CH1/CH2 PWM signal, “H” means disable the PWM signal;  
Aux\_EN: Activate the +/-15V to supply the external circuit, “H” means enable the aux voltage;  
Main\_EN: Activate the +/-60V to supply the amplifier power stage, “H” means enable the main voltage;



## 5. Mech Size



Notice:

FFA001\_V3 model is continuously undergoing smaller changes to improve the performance or to comply with manufacturing and quality requirements. Therefore, specifications in this datasheet might be subject to change.