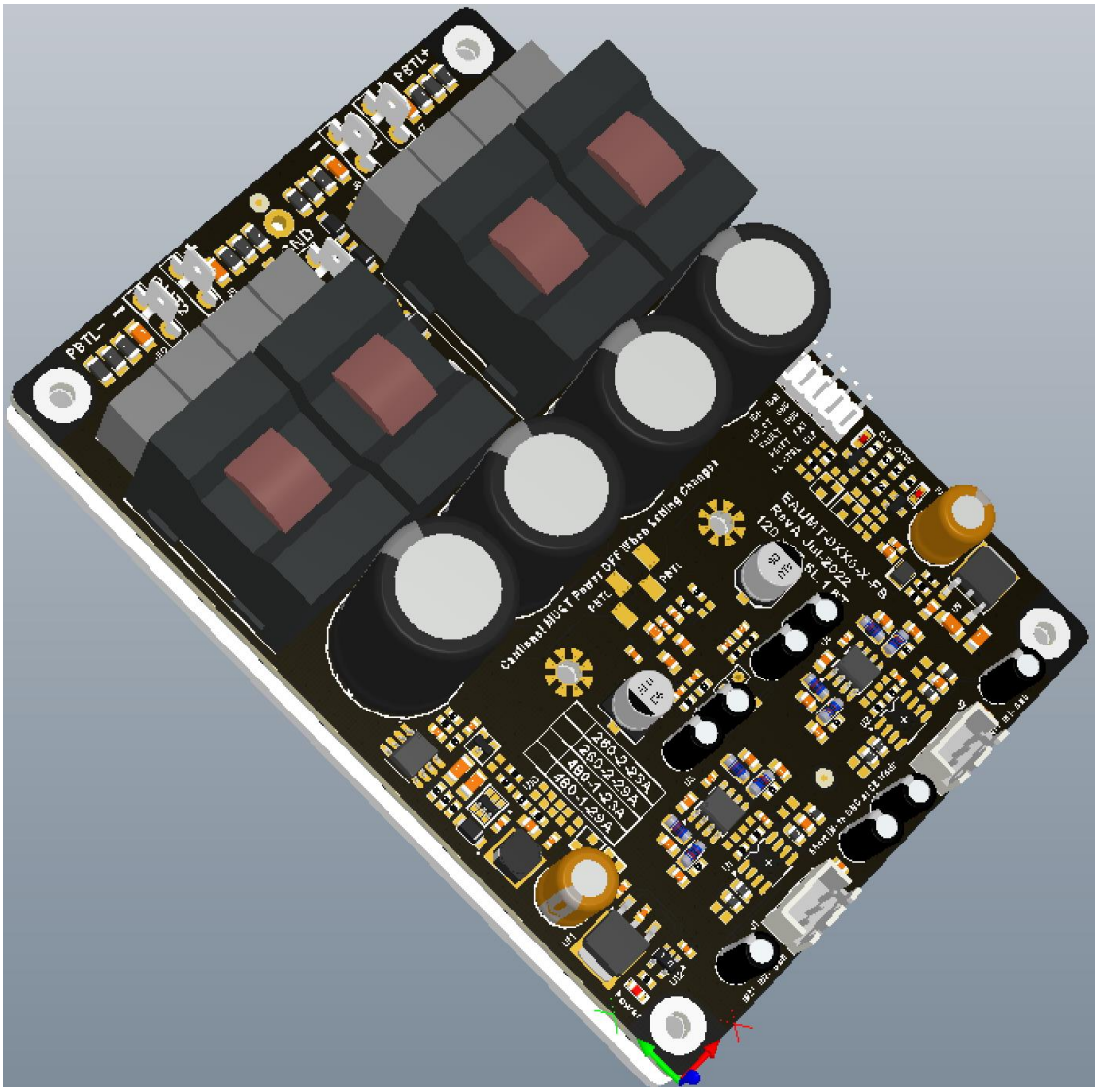
TPA32xx Audio Amplifier With Post Filter Feedback



Disclaimer

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

Contents

1. General Description

EAUMT-0XX0-X-FB is a 1(PBTL) or 2 channel (BTL) high quality class D audio amplifier module base on TPA32xx with customized design and mainly suit for both consumer and professional project. TPA32xx is a high-performance Class-D power amplifier that enables true premium sound quality with Class-D efficiency. It features an advanced integrated feedback design and proprietary high speed gate driver error correction (PurePath™ Ultra-HD). This technology allows ultra low distortion across the audio band and superior audio quality.
By combining PFFB, improve analog input front design and upgrade higher quality components to obtain highest performance and lowest noise and distortion, this module provides an excellent audio solution that highly compact and efficiency with state-of-the-art performance.
Along with current EAUMT-0XX0-X module that released years ago, some high-end customer expects more implementation on post filter feedback and more option on DIY, a fully new and upgrade version now is your attempts and choices.

1.1 Key Features:

- 18uV (TPA3255) Output Noise (AES17,A-weighted)
- 15uV (TPA3251) Output Noise (AES17,A-weighted)
- 260W @ 1% THD+N, 1kHz, 4Ω (TPA3255)
- 140W @ 1% THD+N, 1kHz, 4Ω (TPA3251)
- 125dBA dynamic range
- BTL/PBTL configuration for best audio performance
- MELF resistor for audio path to get best performance and audio quality
- Fully compatibility one design for both BTL and PBTL (TPA3251 and TPA3255)
- 7G23B or VER2923,APG2923,HA3588 inductors compatible design
- Fully differential signal chain from input to output for lowest noise and distortion
- Extra optional input buffer for single-end input source
- On board integrated low noise analog and housekeeping power supply
- Compact size (120mm*85mm*40mm – L*W*H)
- Additional power ON/OFF reset circuit for Pop noise suppression
- Single supply voltage range 36V~51V

1.2 Applications:

- Active Loudspeakers and Power Subwoofers
- Installation audio products
- High-end stereo and multi-channel amplifiers
- Bluetooth & Wi-Fi Audio Product
- Sound bars, Docking, Radios
- Home Theater System & AVR’s

2. Audio Specifications

Symbol	Parameter	Conditions	Min	Type	Max	Unit
Po.Type 3255-PBTL	Output power @ 1%THD+N 20Hz < f < 20kHz (AES17 measurement filter)	RL = 2Ω RL = 4Ω RL = 8Ω		480 280 180		W
Po.Type 3255-BTL	Output power @ 1%THD+N 20Hz < f < 20kHz (AES17 measurement filter)	RL = 4Ω RL = 6Ω RL = 8Ω		260 180 150		W
Po.Type 3251-BTL	Output power @ 1%THD+N 20Hz < f < 20kHz (AES17 measurement filter)	RL = 4Ω RL = 6Ω RL = 8Ω		140 110 75		W
THD+N	THD+N in 4Ω	f = 1kHz, Po =5W		0.0005% 0.0007%		TPA3251 TPA3255
V_{noise}	Output referenced idle noise	A-weighted 20Hz < f < 20kHz		15 18		TPA3251 TPA3255
A_V	Nominal voltage gain(w/ AFE)	f = 1kHz		19.0 20.5		TPA3251 TPA3255
F_r	Frequency response	20Hz - 20kHz		+/-0.5	+/-1	dB
Z_{in}	Input impedance	Balance Unbalance		20 10		kΩ
Z_o	Output impedance	f = 1kHz		10		mΩ
Z_L	Load impedance range		2	4	8	Ω
Dy	Dynamic range	1%, A-weighted		125		dB
PVDD	Power supply input voltage	DC, +/-5%	34V 34V	36V 48V	38V 51V	TPA3251 TPA3255

**An Audio Precision AES17 20 kHz 7th order measurement filter is used for measurements. The frequency 6.67 kHz corresponds to the worst-case situation where both 2nd and 3rd harmonics are within the audio band.*

3. Board P/N

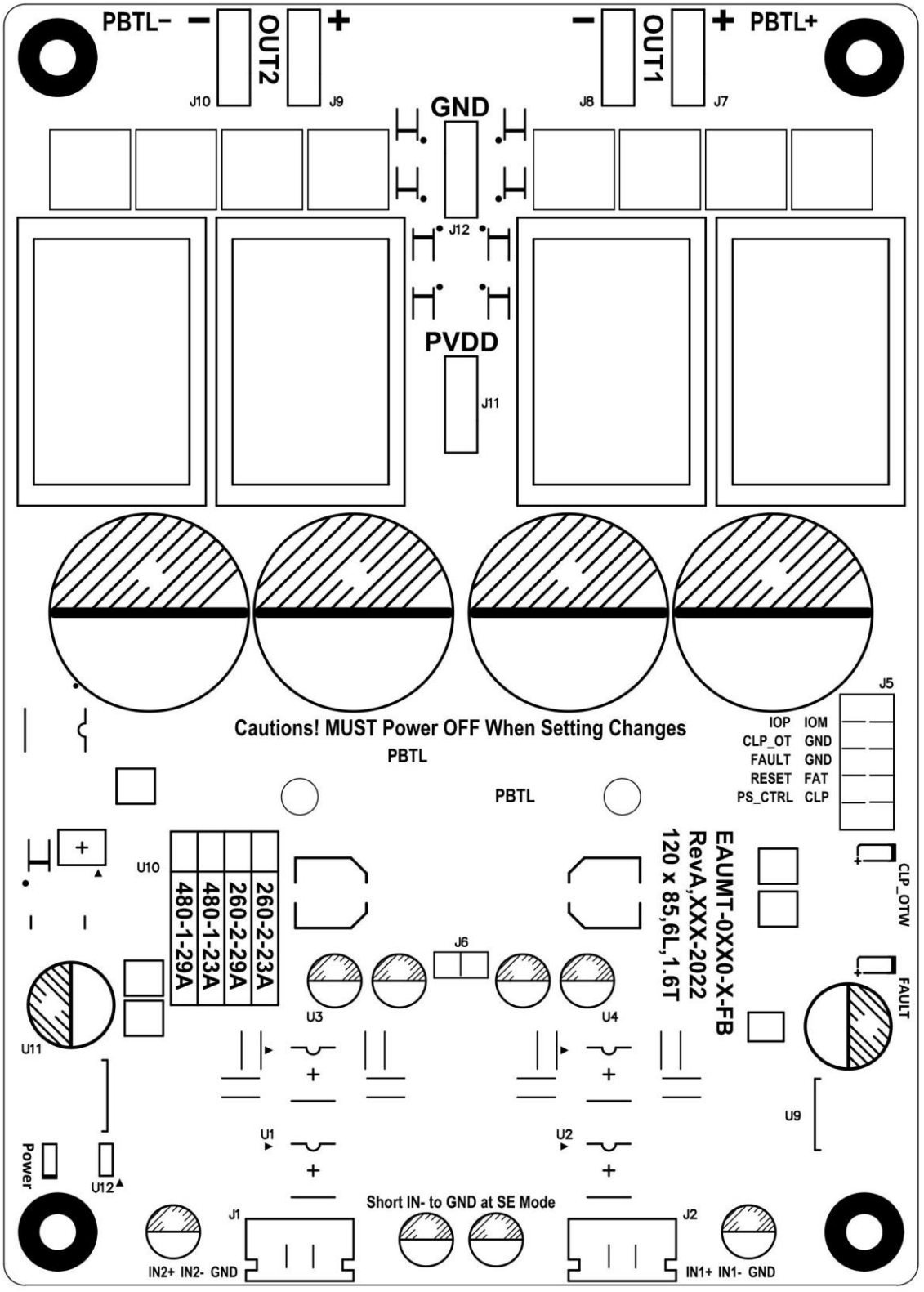
P/N	TPA32xx	Configurations	Inductors
260-2-23A	TPA3255	2 channel - BTL	7G23B
260-2-29A	TPA3255	2 channel - BTL	VER2923, HA3588,APG2923
480-1-23A	TPA3255	1 channel - PBTL	7G23B
480-1-29A	TPA3255	1 channel - PBTL	VER2923, HA3588,APG2923
140-2-23A	TPA3251	2 channel - BTL	7G23B
140-2-29A	TPA3251	2 channel - BTL	VER2923, HA3588,APG2923
-NHS postfix	All	All	No Heat-Sink

** All configurations are based on materials availability according to marketing trend.*

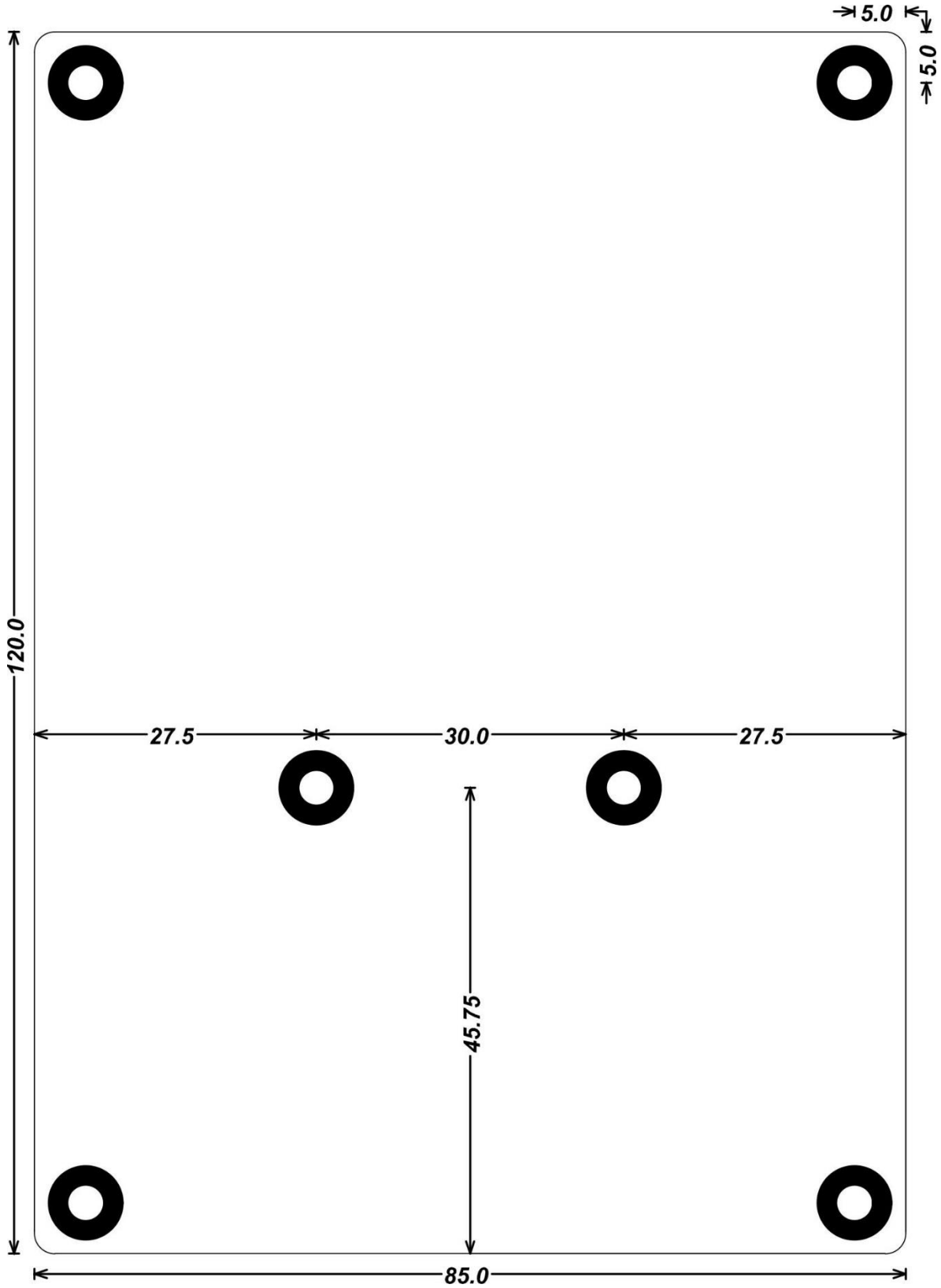
** VER2923,HA3588 are the same in performance aspect.*

** 7G23B and APG2923 are China customized version also performance is the best.*

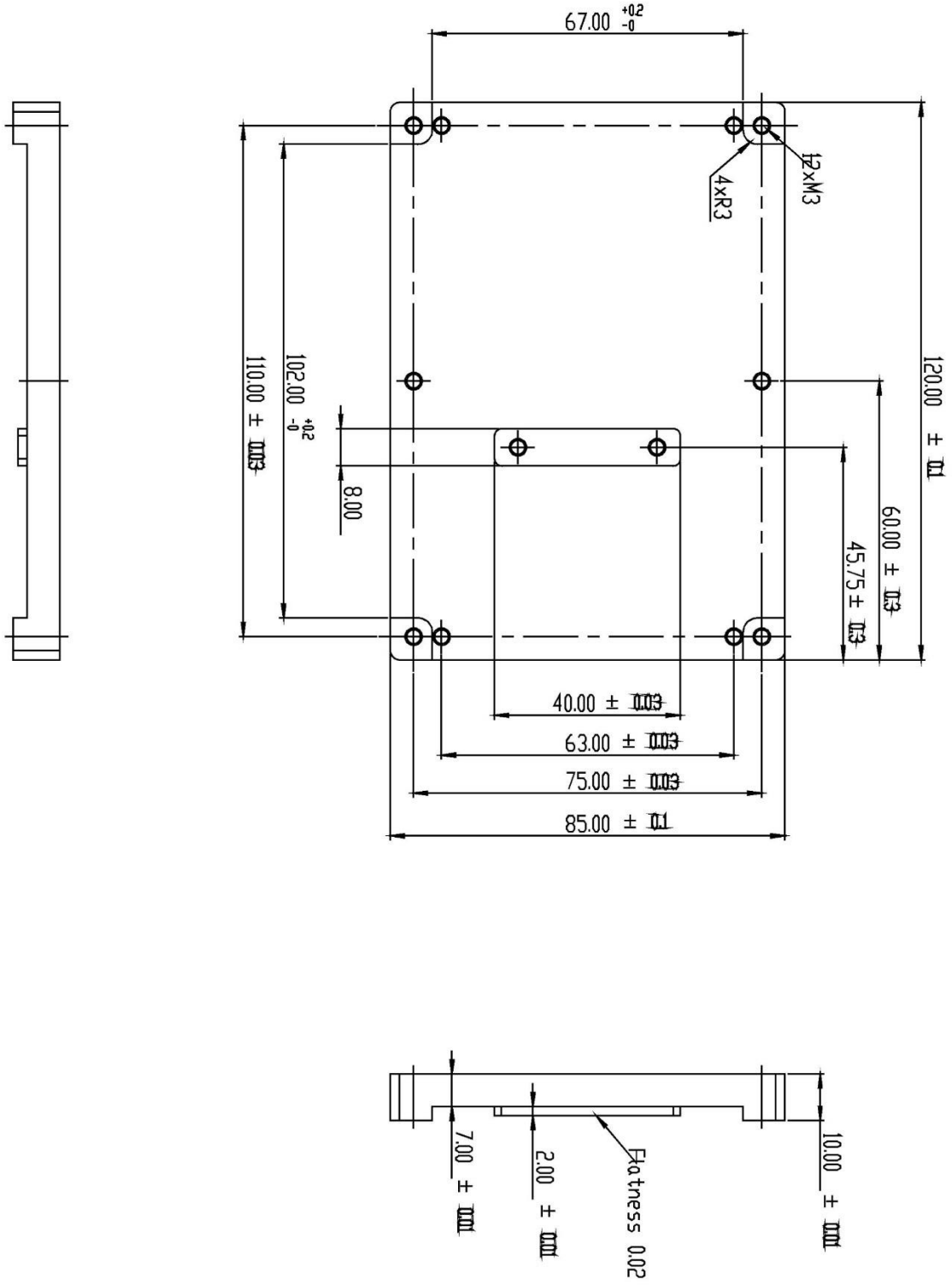
4. Board Drawing



Top view



Screws holes dimension



- *All Screw holes are M3 standard size.*

Aluminum heatsink dimension

5. Connection Diagram

5.1 Input Signal Connector Specification (J1&J2)

Type: JST2.5-3PIN			
PIN	**Function**	**Description**	**I/O Type**
1	INx+	Positive input (balanced input or single-end input)	Audio Input
2	INx-	Negative input (balanced input)	Audio Input
3	AGND	Ground of the input signal	GND
**x – mean the channel 1~2, same as below* **Short INx- to GND when in Single-end (SE) input, please note this need user post-modify*			

5.2 Output Speaker Connector Specification (J7,J8,J9,J10)

Type: FastON			
PIN	**Function**	**Description**	**I/O Type**
1	OUTx+	Positive output of power amplifier	Output
2	OUTx-	Negative output of power amplifier	Output
** J7&J8 are for channel 1(OUT1) and J9&J10 are for channel 2(OUT2)* ** J7 and J10 are for PBTL connection*			

5.3 Power Supply Input Connector Specification (J11&J12)

Type: FastON			
PIN	**Function**	**Description**	**I/O Type**
1	PVDD	Power supply positive	Power
2	GND	Power supply ground	GND

5.4 Control Signal Connector Specification (J5)

Type: JST2.54-10PIN			
PIN	**Function**	**Description**	**I/O Type**
1	CLP	Clipping signal, can add extra LED connection	Output
2	PS_CTRL	Power on/off control of amplifier board, active low	Input
3	FAT	Fault signal, can add extra LED connection	Output
4	RESET	Device reset Input; active low	Input
5	GND	Control signal ground	GND
6	FAULT	Shutdown signal, active low	Output/OD
7	GND	Control signal ground	GND
8	CLIP_OTW	Clipping and Over-temperature warning, active low	Output/OD
9	IOM	Oscillator synchronization negative	Input/Output
10	ION	Oscillator synchronization positive	Input/Output

*OD – Open Drain

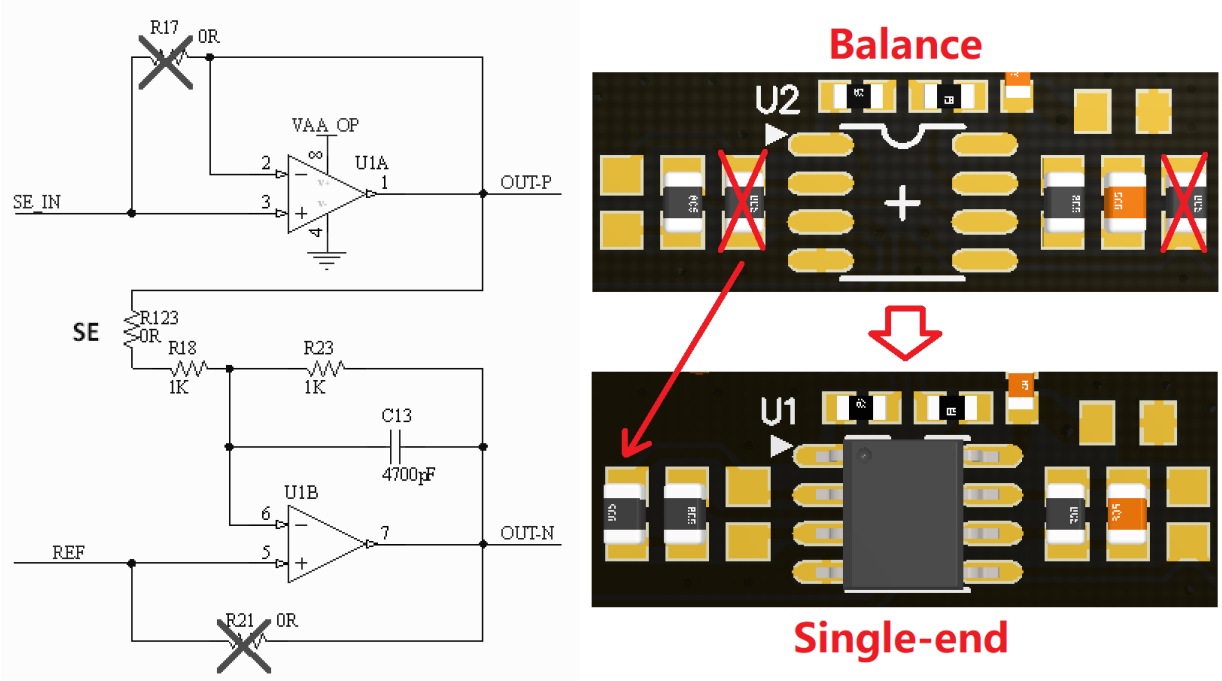
*Slave mode Detail configuration refer to datasheet 10.2.1.2.4 and section 4.6

*CLP and FAT is the anode of LED, and connect cathode to GND when add external LED.

5.5 Single-end input configuration

Even the board is configured as balance input for best performance, but a single-end to balance front-end input stage had been reserved for some user that only has single-end input source, but please note that this requires user modification:

- Add 1 op-amp for each channel (NE5532,LM4562,OPA1612,OPA1656,etc,SOIC-8 footprint).
- Remove 2 resistors (R17,R21 for example) and use one of them to R123 position
- Circuit implementation and change show as below:
- Balance is default configured, Single-end is after modification.



Single-end modification

5.6 Multi Board Configuration

It is recommended to set the master/slave mode when doing multi boards configuration, it can reduce interference problems while using radio receiver tuned within the AM band, detail description can refer to datasheet section 10.2.1.2.4.

Please make sure all of these changes have been done before power up the boards.

Since the board default setting is master mode, so what you should do is set the other one board in slave mode by jumper on at **J6** as show below,

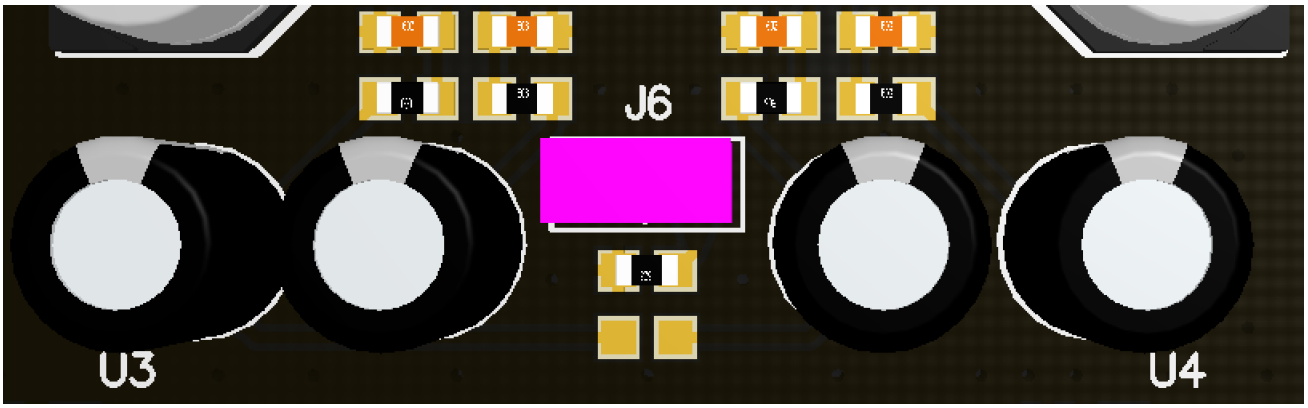
you can set slave mode 1 or slave mode 2 with just inverse the polarity.

Slave mode 1:(J5)

Connect the master OSC_I/O to the slave OSC_I/O with same polarity (IOP to IOP and IOM to IOM).

Slave mode 2:(J5)

Inverse the polarity of OSC_I/O (IOP to IOM and IOM to IOP)



Slave mode set by Jumper J6

6 Typical Performance Characteristics

6.1 Frequency Response

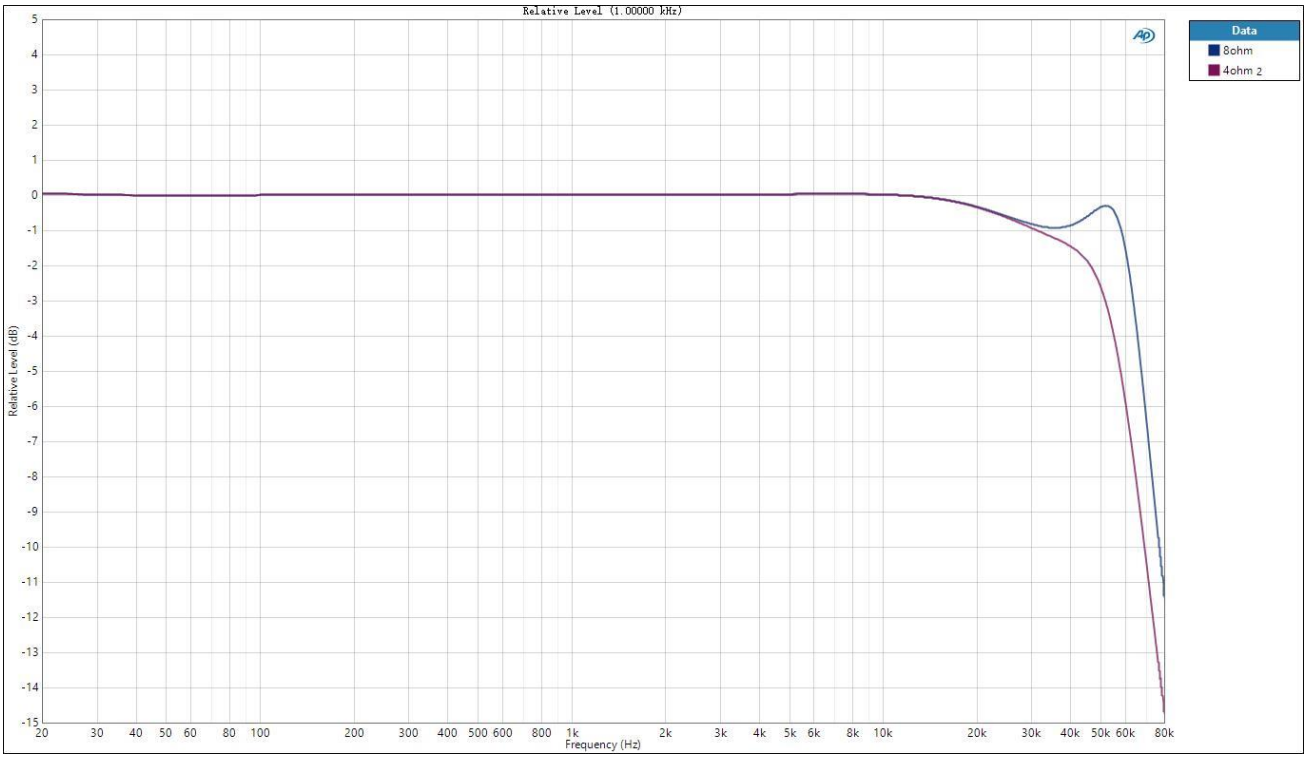


Figure 3: Frequency response

6.2 THD+N vs Output Power

Figure 6: THD+N vs Output Power in 4ohm

Figure 7: THD+N vs Output Power in 8ohm

7 Revisions

Revision	Change Logs	Date
1.0	Initial version	July,2022
1.1	Add P/N,HS drawing	Mar,2023
1.2	Rev B release for DFM improve, not impact on performance	Jan,2024
1.3	Rev C release, add decoupling cap(C117&C113=100uF/50V) option for Single-end modification to reduce hum noise	Aug,2024