

# 5633 HV Amplifier

## Features

- 32-channel amplifier
- 5x gain,  $\pm 50V$  output voltage
- 12MHz/gain bandwidth
- 21V/ $\mu s$  slew rate
- Overtemperature protection
- Connectors compatible with 5432 Zotino and 5632 Fastino

## Applications

- Amplified low-frequency arbitrary waveform generation
- High-voltage driving DC electrodes in ion traps
- Can be used as mezzanine for
  - 5432 Zotino
  - 5632 Fastino

## General Description

The 5633 HV Amplifier card is a 4hp EEM module and part of the Sinara open hardware family. It acts as a mezzanine to compatible Sinara cards, amplifying the output of cards such as 5432 DAC Zotino and 5632 DAC Fastino by  $\pm 50V$  (5x gain).

5633 HV Amplifier provides 32 channels of amplification. It uses the same connectors as 5432 Zotino and 5632 Fastino, allowing for direct mezzanine attachment, and for ease of use provides the same output interface, four internal IDC connectors and a front-panel HD68 connector.

5633 HV Amplifier features overtemperature protection both for individual channels and entire board. If safe thresholds are crossed, channels will be disabled individually or board at a whole disabled as necessary.

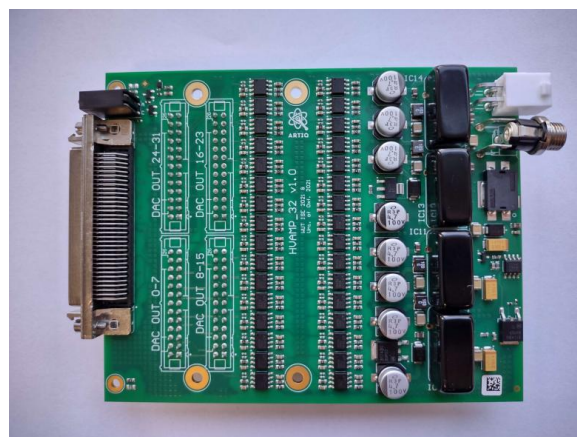


Figure 1: HV Amplifier card



Figure 2: HV Amplifier front panel

## Source

5633 HV Amplifier, like all the Sinara hardware family, is open-source hardware, and design files (schematics, PCB layouts, BOMs) can be found in detail at the repository [https://github.com/sinara-hw/HVAMP\\_32](https://github.com/sinara-hw/HVAMP_32).

## Electrical specifications

These specifications are based on the datasheet of the amplifier (LTC6090<sup>1</sup>) and various information from the Sinara wiki<sup>2</sup>.

Table 1: Electrical Characteristics

Parameter	Min.	Typ.	Max.	Unit	Conditions
Gain		5		V/V	
Output voltage	- 50		50	V	
Slew rate		21		V/ $\mu$ s	
Bandwidth		12		MHz/gain	
		2.4		MHz	at 5x gain

5633 HV Amplifier requires a 12V power supply, accepted through either Molex or barrel connectors at the back of the board.

## LEDs

5633 HV Amplifier provides four indicator LEDs in the front panel, respectively 3V (3.3V power status) HV (high voltage power status) COT (channel overtemperature, channel disabled), and BOT (board overtemperature, board shut down).

## Ordering Information

To order, please visit <https://m-labs.hk> and choose 5633 HV Amplifier in the ARTIQ/Sinara hardware selection tool. Cards can be ordered as part of a fully-featured ARTIQ/Sinara crate or standalone through the 'Spare cards' option. Otherwise, orders can also be made by writing directly to <mailto:sales@m-labs.hk>.

Information furnished by M-Labs Limited is provided in good faith in the hope that it will be useful. However, no responsibility is assumed by M-Labs Limited for its use. Specifications may be subject to change without notice.

<sup>1</sup><https://www.analog.com/media/en/technical-documentation/data-sheets/6090fe.pdf>

<sup>2</sup>[https://github.com/sinara-hw/HVAMP\\_32/wiki](https://github.com/sinara-hw/HVAMP_32/wiki)