QUICK START GUIDE

MERUS™ Audio amplifier Hat ZW with Volumio

Infineon Technologies

Product overview and features

Overview

The MERUS™ Audio amplifier is a Hardware at the Top (HAT) audio power amplifier board which brings the Infineon proprietary multilevel technology to Raspberry Pi users and makers. It is intended for loudspeaker building and wireless music streaming with minimum size and consumption, state of the art power efficiency and HD audio quality. It is equipped with the MERUS™ MA12070P class D Audio amplifier. Key features include:

- Compatible with Raspberry Pi Zero and Raspberry Pi Zero Wireless
- Compatibility with major streaming applications for Raspberry Pi (Volumio, Justboom Player, Max2play)
- No need for external or extra power supplies in addition to the 5V USB supply
- Full Hardware control, customization, and error monitoring through Linux Alsamixer

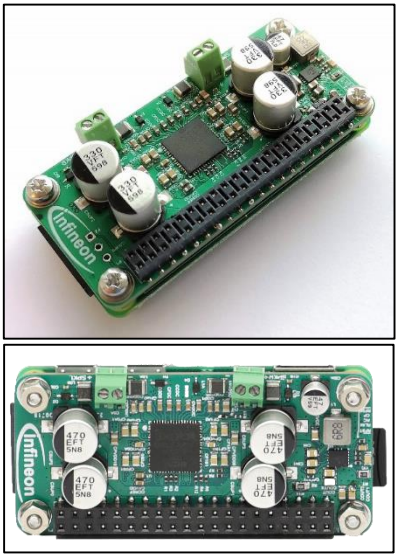


Figure 1. Overview of the MERUS™ Audio amplifier HAT ZW

General features and audio performance

Number of audio channels	2xBTL, 1xPBTL.
Audio input format	Digital (I2S)
Minimum power supply requirement (miro USB supply)	5V@2.5A DC
Minimum power supply requirement (power bank)	5V@2.1A DC 3000mAH
Output Power/ch (instantaneous peak – measured with music)	20W@4ohm
THD+N	< 0.014% 1W 1KHz RL=4ohm
Overall system efficiency	66% 1W/ch 4ohm

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System diagram

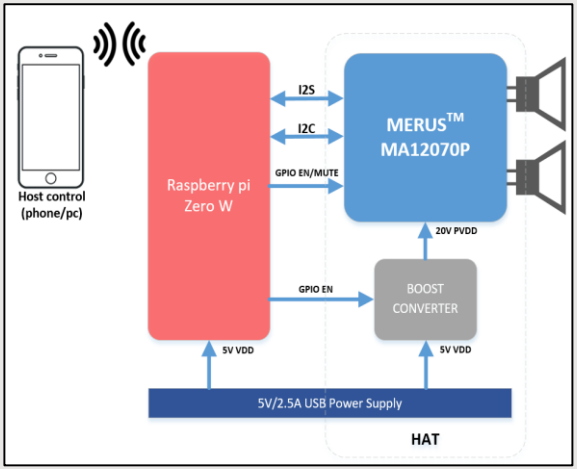


Figure 2. MERUS™ Audio amplifier HAT ZW system diagram

MERUS™ Audio amplifier HAT board

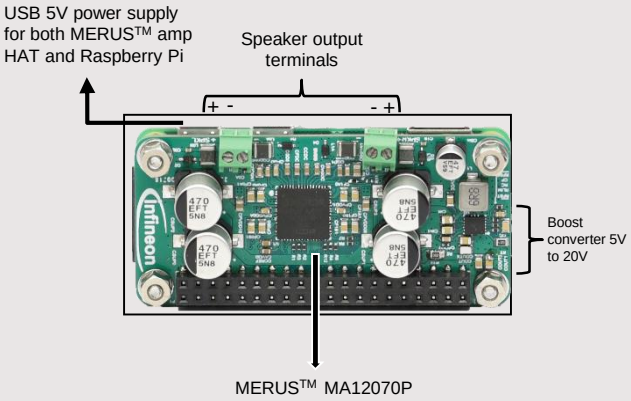


Figure 3. Top board view of MERUS™ audio amplifier HAT ZW

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Hardware setup

Attach boards

› Attach the MERUS™ HAT to the Raspberry Pi using 2.5M screws and 2.5M 4mm length spacers.

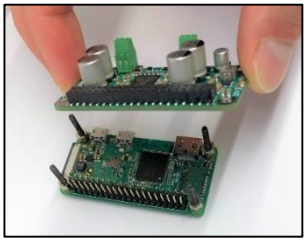


Figure 4. Assembly procedure of the Raspberry Pi + HAT

Secure assembly

› Secure both boards assembly with 2.5M spacers or nuts.

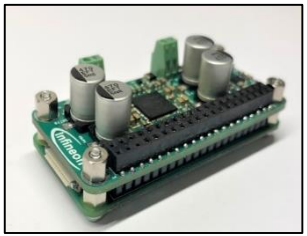


Figure 5. Completed assembly of the Raspberry Pi + HAT.

Hold

› Do not connect the power supply. Continue with the software setup.

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1 - Volumio MERUS™ amplifier image

› Download the “VolumioMerusAmp_vxx.img” image file from the Infineon MERUS™ Audio amplifier HAT github.

2 – Balena etcher

› Download balena etcher (or any other SD card image burner) from this link and open it.

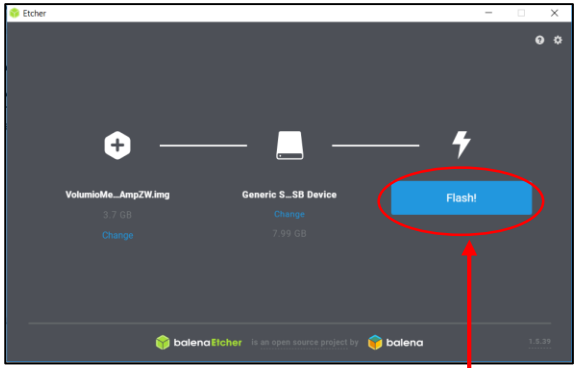


Figure 6. Using balena etcher to burn the SD card

3 – Burn the image to the SD card

› Insert your SD card in the windows, linux or macOS host machine and burn the downloaded Volumio image file into the card.

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4 – Insert SD card in the Pi

- After the burning process insert the SD card in the Raspberry Pi and turn it on.

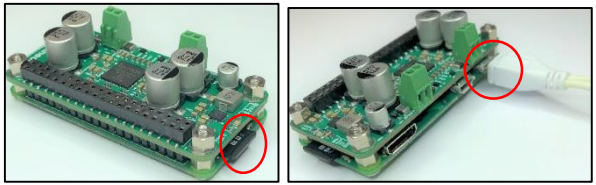


Figure 7. Assembly procedure of the Raspberry Pi + HAT

5 – Connect to volumio.local/

- connect your host machine or mobile phone to “Volumio” network and then type http://volumio.local/ into your web browser to access the configuration screen. Password is “volumio2”.

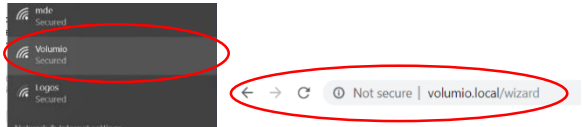


Figure 8. Assembly procedure of the Raspberry Pi + HAT

6 – Initial configuration menu

- Go through the initial configuration menu and follow the instructions in the Volumio GUI to finish your configuration. This menu will appear automatically the first time you boot the Raspberry Pi.



Figure 9. Volumio initial configuration

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7 – Insert SD card in the Pi

› Select the language, press next and then select the name of your device.

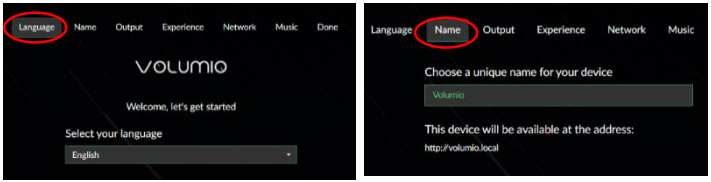


Figure 10. Volumio initial configuration: Language and name

8 – Configure output device

› Next, go to settings and **make sure the "I2S DAC" option is OFF** and in "Playback options" select "snd_rpi_merus_amp" as output device.

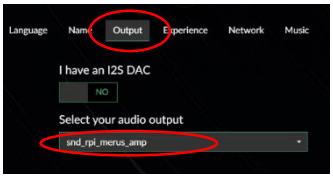


Figure 11. Volumio initial configuration: Output device

9 – Configure the network

› Continue to the network setting and select the network you want to connect the Raspberry Pi to. Optionally configure the music and finish the initial configuration.



Figure 12. Volumio initial configuration: Network

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10 – Playback options

› Go to the settings menu on the top right corner and select playback options. **Make sure the "I2S DAC" option is OFF** and in "Playback options" select "snd_rpi_merus_amp" as Output device. Press save.

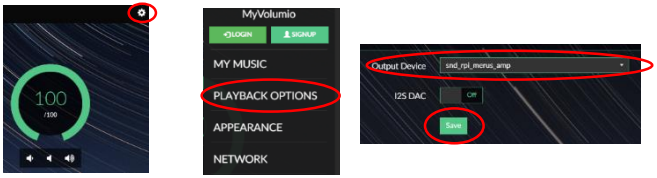


Figure 13. Volumio settings menu: Playback options

11 – Volume options

› In Volume options select "Software" as Mixer type to allow the protection mechanisms of the HAT to work properly. Press save.

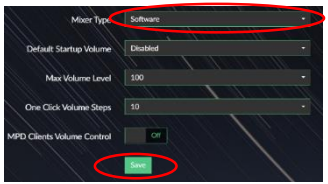


Figure 14. Volumio settings menu: Volume options

12 – Audio resampling

› In the Audio resampling section turn on the audio resampling option. Select "24" as target bit depth, "native" as target sample rate. Press save.



Figure 15. Volumio settings menu: Audio resampling

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13 – Enable SSH

› Type “<your_raspberry_pi_ip_address>/DEV” or “volumio.local/DEV” on your host machine’s web browser and press “ENABLE” under the SSH section. There will be no output warning or message after enabling the SSH option.

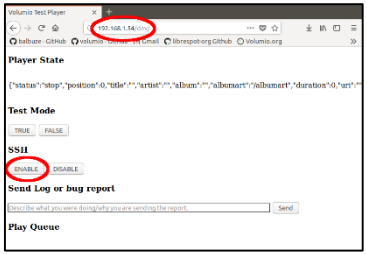
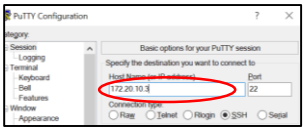


Figure 16. Enable SSH in volumio.local/dev

14 – Connect trough SSH

› Download putty and login trough ssh into the Raspberry Pi with the Raspberry Pi address in the host name address. Click “open” and then “yes”. Then login with “volumio” as user and “volumio” as password.



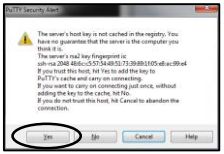


Figure 17. Connecting trough SSH in putty

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15 – Alsamixer and limiter settings

- Type alsamixer on the command line and acces the MA12070P control mixer to set the protection limiter level of the device. Usually a -15dB setting will be a good starting point for 4ohm nominal impedance speakers. It is strongly recommended to go through the user's guide section, where this topic is covered, to correctly configure the limiter threshold level. Press escape to exit the mixer.

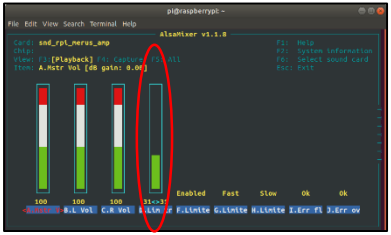


Figure 18. MERUS™ HAT Alsamixer

16 – Turn off and reboot

- Turn off the Raspberry Pi by disconnecting the power supply. Connect the loudspeakers to the terminal blocks and turn on the Raspberry Pi again.

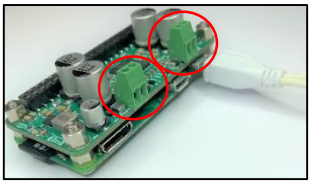


Figure 19. MERUS™ HAT terminal blocks for loudspeaker connection

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17 – Playing audio from Volumio GU

› Go to the Volumio GUI by typing “<your_raspberry_pi_ip_address>/DEV” or “volumio.local/DEV” on your host machine’s web browser. Select browse to select any music or radio stations and press play. Be careful with the volume the first time you play.

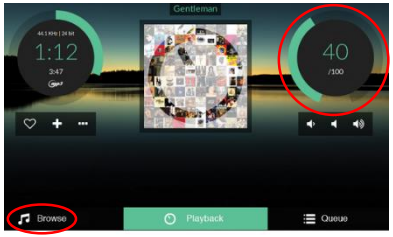


Figure 20. Volumio GUI’s main screen (playback).

18 – Playing audio with Airplay

› Open any Airplay compatible device/app such as Spotify and select your device from the list to play music from the HAT.

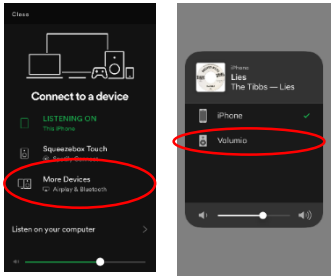


Figure 21. Selecting Volumio device on Spotify with Airplay.

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