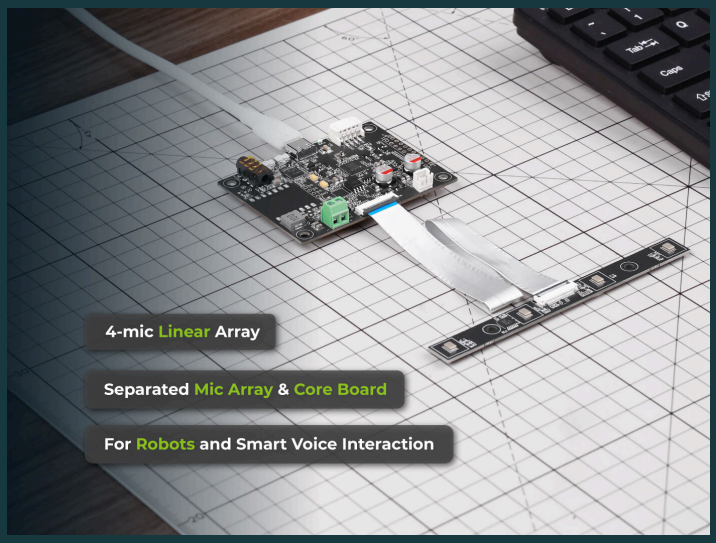
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INDUSTRIAL PRODUCT DATASHEET

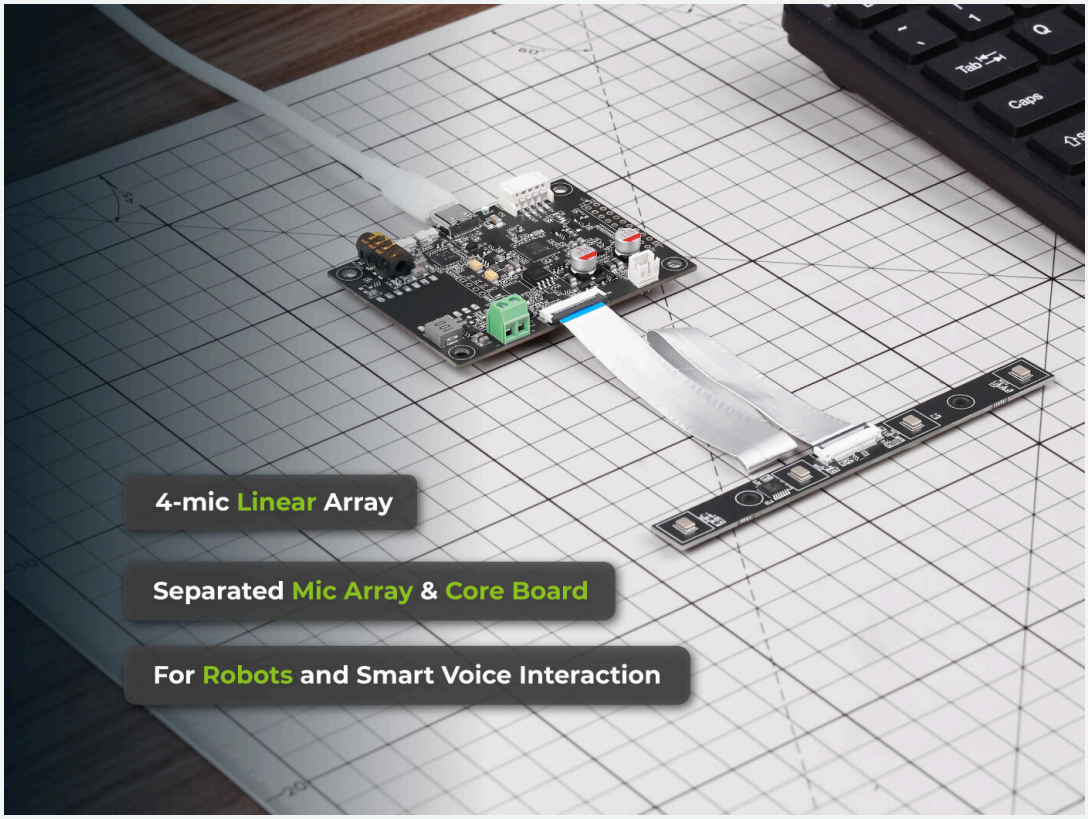
reSpeaker Flex XVF3800 Linear-4 | AI Mic Array for Robotics and Embodied AI

reSpeaker Flex XVF3800 Linear-4: compact AI microphone array with XMOS XVF3800 processing, 180° directional far-field voice capture up to 5 meters, and modular split design for robotics and embedded voice interaction.

SKU	UPDATED	PRICE
100099135	2026-10-23 09:26:31	$54.90(Excl. VAT)



Overview



The reSpeaker Flex XVF3800 Linear-4 is a compact 4-microphone linear array for 180° directional far-field voice capture up to 5 meters, powered by the XMOS XVF3800 audio processor with on-board AI acoustic algorithms including AEC, multi-beamforming, de-reverberation, DoA, dynamic noise suppression, and AGC. Its modular split design separates the core processing board from the microphone array board via a flexible FPC cable, and it supports USB plug-and-play or I2S for MCU integration, making it suitable for robotics, smart digital signage, voice assistants, and embedded voice applications.

Key Features

Explore the full reSpeaker lineup. Compare specs, find your ideal fit, and catch the latest updates & community news. Check the reSpeaker Series Landing Page

Note:

- The reSpeaker Flex with no XIAO versions (**100005504**, **100099135**) come with factory-installed **USB audio firmware.**
- The reSpeaker Flex with XIAO ESP32S3 versions (**100070894**, **100026178**) come with factory-installed **I2S firmware** for MCU integration.
- All 4 versions support **DFU mode** for users to switch the firmware.
- To ensure optimal voice pickup performance, please make sure the **Microphone Port** on the **back side** of the device is facing toward the sound source. **The microphone port is located on the side with the Seeed Studio logo printed on it**. For detailed placement guidance, please scroll down to **Feature 5** to view the illustration.

Feature 1: Innovative Modular Split Design

Separates the **core processing board** from the **microphone array board** via a flexible FPC cable, enabling easy integration in space-constrained robotics and embedded applications.

For use cases such as **desktop or humanoid robots**, the mic array board can be positioned near the sound source, while the core board can be placed elsewhere inside the device. This design helps minimize interference from internal motor and servo noise, resulting in improved voice capture performance.

Feature 2: Flexible Array Configurations

Available in two standard configurations: **4-mic circular array for 360° spatial pickup**, and **4-mic linear array for 180° directional pickup**.

- In **robotics applications**, the circular array can be mounted on the robot's head for omnidirectional voice capture.
- For **smart digital signage**, the linear array is well-suited for front-facing placement, optimizing voice pickup for typical user interactions directly in front of the display.

Feature 3: XMOS XVF3800 for Advanced AI Audio Processing

on-board AI acoustic algorithms for better sound quality. Features **AEC**, **multi-beamforming**, **de-reverberation**, **DoA**, **dynamic noise suppression**, **AGC**, delivering stable and reliable voice capture performance.

1. **AEC (Acoustic Echo Cancellation)**

AEC removes acoustic echo caused when sound played from the system is picked up again by the microphone array. AEC is critical in **full-duplex communication** systems such as **conferencing devices**, **voice assistants**, and **interactive systems**.

2. **NS (Noise Suppression)**

NS reduces unwanted background noise from captured audio. By identifying and attenuating non-speech components, such as **fan noise**, **motor and servo noise**, **ambient chatter**, **keyboard typing**, or environmental hum, NS enhances the SNR (signal-to-noise ratio) in real time.

NS is essential in voice interactive systems including **smart home** and **industrial voice control**, **voice assistants**, **educational devices**, **smart interactive terminals**, and **robots**.

Feature 4: Powerful Far-Field Voice Capture

With far-field voice capture up to 5 meters and the circular 4-microphone array (**100005504**, **100070894**) supporting precise **Direction of Arrival (DoA) detection**, the reSpeaker Flex delivers reliable voice capture and accurate sound source localization for interactive and voice-driven applications.

1. **Far-field Voice Capture Up to 5m**

This enables clear command recognition in larger spaces without requiring users to stand close to the device, making the reSpeaker Flex ideal for voice interactive setups like **smart digital signage**.

2. **Circular 4-Microphone Array Supports 360° DoA**

The circular 4-mic array enables accurate 360° DoA detection, allowing the reSpeaker Flex to identify where a voice is coming from. This spatial awareness enhances interaction performance, supports speaker tracking, provides a strong foundation for advanced beamforming, and allows users to interact with the robot from anywhere around it.

Feature 5: Compact Design for Embedded Applications

1. **Bottom-Firing Microphones**

The acoustic ports are positioned on the back side of the mic array board, **reducing interference from front-facing components**. This design also allows the **microphones to be placed closer to the sound source or device surface**, maximizing voice pickup performance.

- The microphone port is located on the side with the **Seeed Studio logo** printed on it.
- Please make sure the **Microphone Port (Mic Inlet / Sound Hole)** on the back side of the device is facing toward the sound source.
- For **embedded deployments** such as integrating the reSpeaker inside robots: Mount the microphone port **as close as possible to the robot's outer surface and orient it toward sound sources**. This minimizes interference from internal mechanical and electronic noise during audio capture. Cut **matching sound pickup openings on the robot casing aligned with the microphone port**. Fully sealed enclosures will degrade audio recording performance.

2. **Compact Size, Powerful Performance**

With just **44 mm mic spacing and a diameter of 73 mm for the circular array**, and **33 mm spacing with a length of 110 mm for the linear array**, the design fits easily into space-constrained embedded applications. Despite its compact size, it delivers outstanding voice capture performance, achieved through the combination of **optimized hardware design** and **acoustic tuning**.

Feature 6: Developer-Friendly Integration

The reSpeaker Flex with no XIAO versions (**100005504**, **100099135**) come with factory-installed USB firmware.

The reSpeaker Flex with XIAO ESP32S3 versions (**100070894**, **100026178**) come with factory-installed I2S firmware.

1. **Plug-and-Play via USB**: A standard USB interface enables quick connection to devices such as Raspberry Pi, NVIDIA Jetson, and PCs running Windows, Linux, or macOS, no drivers or complex setup required.
2. **I2S for MCU Integration**: Direct I2S support allows seamless integration with MCU platforms like the XIAO Series and Arduino, making it easy to build embedded voice-enabled applications with minimal hardware overhead.
3. **XIAO ESP32S3 Pre-Soldered Options**: Two variants (**100070894**, **100026178**) come with a pre-soldered XIAO ESP32S3, enabling native support for ecosystems such as ESPHome and Home Assistant. This allows developers to easily extend applications into smart home scenarios and beyond.

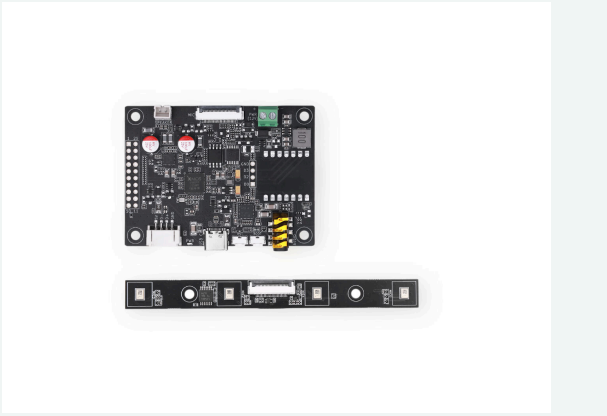
Feature 7: Fast, Scalable, and Customizable for Production

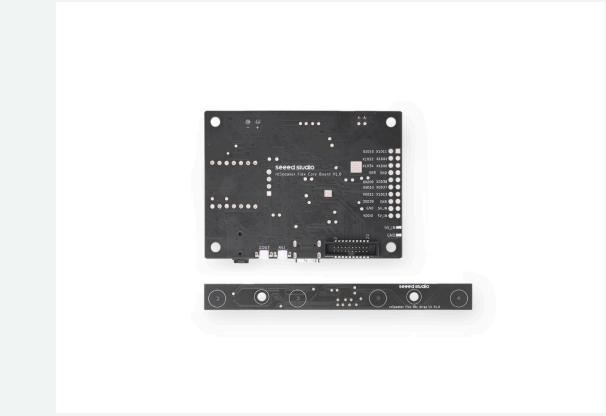
Seeed Studio offers customization services include **hardware modifications** such as adjusting the size or shape of the microphone array board to better fit space-constrained robotics and embedded voice interaction scenarios. **Algorithm tuning** is also available to further optimize audio performance. **For reference, similar approaches have been applied in open-source projects like the Reachy Mini desktop robot**.

Product Gallery







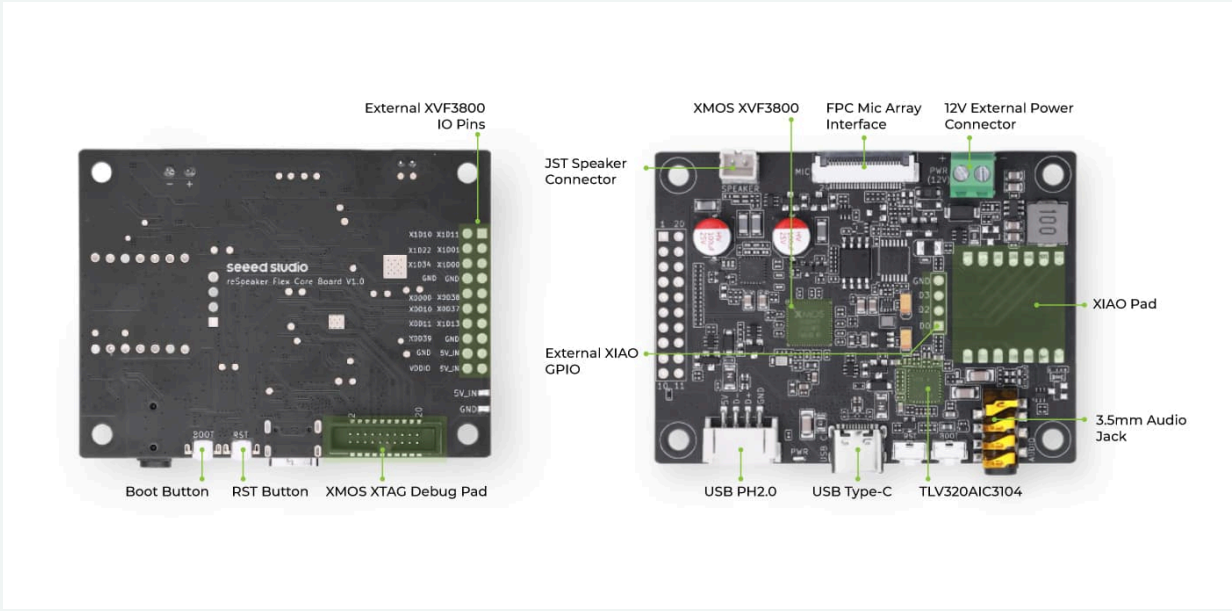


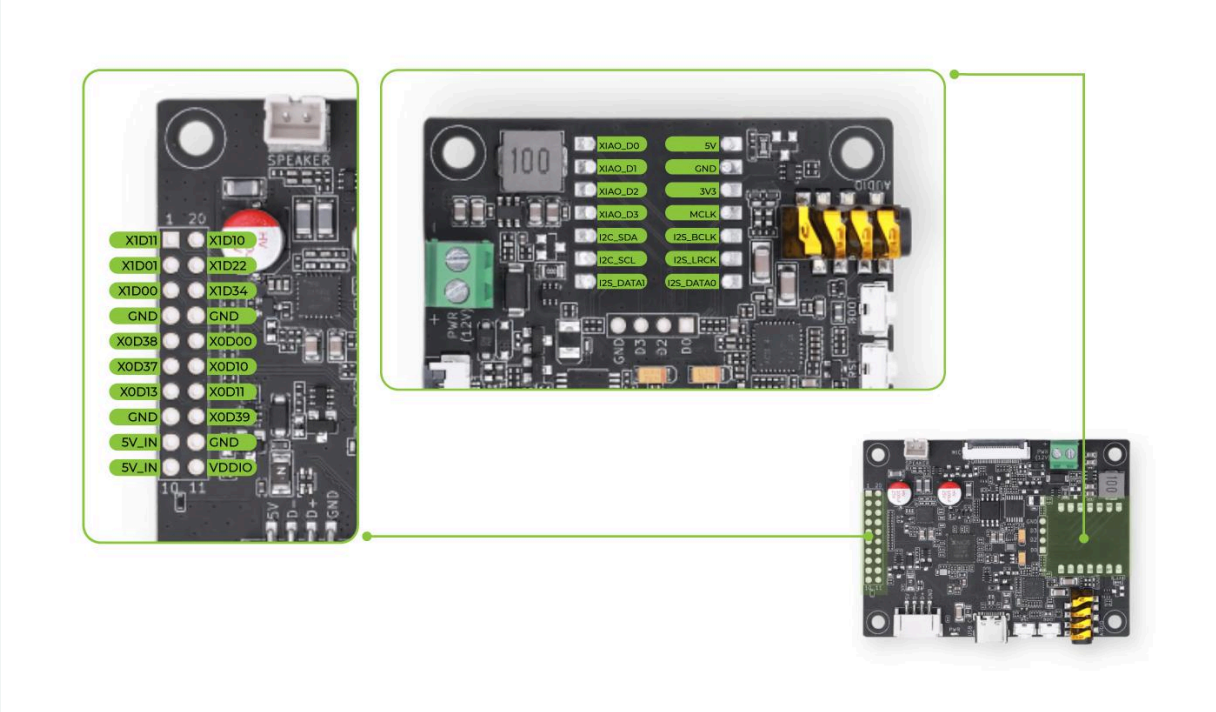
Specification

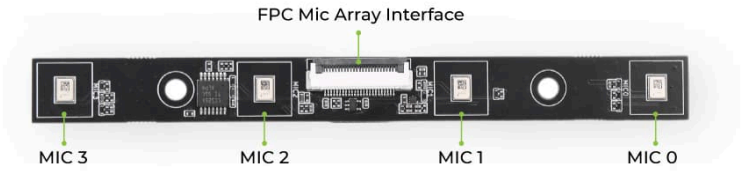
Feature	Description
Core Chip	XMOS XVF3800
Amplifier	Texas Instruments TPA3139D2, Supports 10W Speakers
Audio Algorithms	AEC, AGC, DoA, Beamforming, VAD, Noise Suppression, De-reverberation
USB Interfaces	1x USB Type-C, For external connection and debugging; 1x USB JST Connector, For internal routing and motherboard integration;
Other Interfaces	1x XIAO Compatible Pads; 1x XMOS XVF3800 XTAG Debug Pads; 1x XMOS XVF3800 io Pads;

Audio Outputs	1x 3.5mm Audio Jack; 1x 2-Pin Speaker Connector;
Power Supply	5V Input: Via USB Type-C or 5V JST Connector; 12V Input: Via 2-Pin Terminal 12V Connector;
Mic Array Interface	1x 24-Pin FPC Connector
Button	1x Reset Button; 1x Boot Button;
Maximum Sampling Rate	16kHz

Hardware Overview






FPC Mic Array Interface
MIC 3
MIC 2
MIC 1
MIC 0

Applications

- **Robotics Integration with reSpeaker Flex:** Its compact microphone array can be placed on a robot's head, ears, forehead, chest, or even externally (e.g., on a robotic arm) to capture sound closer to the source, while the core processing board remains safely inside the device enclosure. Combined with Seeed's strong customization capabilities, it enables seamless integration into a wide range of robotic platforms, including humanoid robots, desktop robots, companion robots, service robots, and robot pets such as robot dogs. With support for ROS2, it streamlines system-level communication and development. Powered by the XMOS XVF3800 audio processor, reSpeaker Flex features on-board AI acoustic algorithms such as multi-beamforming and advanced noise suppression, enabling reliable wake word detection, speech-to-text (STT), speech-to-intent, voice command recognition, and other voice AI workflows. An upgraded design supports a 10W amplifier, enabling strong text-to-speech (TTS) performance and delivering clear, natural voice interaction even in larger spaces.
- **Add Voice Interface to LeKiwi Robot with reSpeaker Flex:** This project combines a Seeed Studio XIAO ESP32 (motor controller) with a Raspberry Pi (voice processing brain), enhanced by the reSpeaker Flex for high-quality audio capture and Voice Embeddings for smarter, more personalized voice interaction. Using natural language commands, you can drive, steer, and control the robot completely hands-free with improved accuracy and responsiveness.
- **Voice Control reBot Arm B601-DM with reSpeaker Flex:** Project URL: https://wiki.seeedstudio.com/control_rebot_arm_using_voice_with_respeaker_flex/ We built a voice-driven intelligent robot arm control system from scratch. Now with reSpeaker Flex, the reBot Arm can listen and capture your voice while identifying which direction the sound is coming from. Then it can understand what you say and understand your intention. Finally it can make corresponding actions accordingly (turn, nod, dance, wave, etc.).
- **Build Private Secured Smart Toys with reSpeaker Flex for Intuitive Voice Interaction:** Its compact and flexible microphone array can be seamlessly embedded into various toy form factors such as plush toys, educational devices, or handheld companions, allowing it to capture user's voices accurately even in dynamic and noisy environments. Leveraging the XMOS XVF3800 audio processor, reSpeaker Flex enables more responsive and engaging interactions, from voice-controlled storytelling and learning activities to conversational AI companions. With support for locally running voice agents, reSpeaker Flex enables on-device processing of voice data, helping safeguard user privacy, especially important for companion toys and child-focused applications.
- **Build Smart Voice Terminals with Seamless and Reliable Interaction:** reSpeaker Flex brings reliable and intuitive interaction to self-service kiosks, smart vending machines, and smart digital signage. Its linear microphone array options (100099135 https://www.seeedstudio.com/reSpeaker-Flex-XVF3800-Circular-4-p-6737.html, 100026178 https://www.seeedstudio.com/reSpeaker-Flex-XVF3800-Circular-4-p-6737.html) are optimized for seamless integration into narrow screen bezels (e.g., screen edges, display frame) and compact enclosures, without compromising acoustic performance. It delivers advanced noise suppression and directional far-field voice capture (up to 5m), ensuring accurate speech recognition even in acoustically challenging public and larger environments such as malls, transit hubs, and retail spaces. This enables faster, touch-free user interactions and improves overall accessibility.
- **Build Physical AI Voice Agent with reSpeaker Flex:** Through SDK and platform compatibility, reSpeaker Flex supports rapid integration with voice AI frameworks and cloud-based services, allowing devices to be quickly transformed into scalable voice agent solutions.

- **Build Smart Voice Assistants Using reSpeaker Flex:** Seamlessly integrates with Amazon Alexa, Google Assistant, Home Assistant, and other mainstream voice platforms for far-field voice control and smart home automation.
- **Smart Conference Solutions Using reSpeaker Flex:** Compatible with Microsoft Teams, Zoom, and other popular conferencing software via USB. 4-mic array supports beamforming and DoA detection to deliver clear multi-person audio pickup and real-time status feedback.
- **Industrial Voice Control:** Designed for demanding environments, reSpeaker Flex enables reliable voice command control across factories, retail, and commercial settings. With advanced noise suppression, it maintains high recognition accuracy even amid machinery noise and complex acoustic conditions, supporting efficient, hands-free operation.

Part List

reSpeaker Flex Core Board	x 1
reSpeaker Flex Linear Mic Array Board	x 1
20cm FPC Cable	x 1
Pin Connectors	x 1

Compliance & Logistics

HSCODE	8518100000
USHSCODE	8518108040
UPC	
EUHSCODE	8531202090
COO	CHINA

FCC Requirement

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) this device may not cause harmful interference, and

(2) this device must accept any interference received, including interference that may cause undesired operation.

15.21

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses, and can radiate radio frequency energy.

If not installed and used in accordance with the instructions, it may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Resource Links

- https://www.seeedstudio.com/reSpeaker-Flex-XVF3800-Linear-4-p-6738.html
- reSpeaker Flex Flyer - EN
- reSpeaker Flex Flye - CN
- XMOS XVF3800 v3.2.1
- reSpeaker Series Flyer - EN
- reSpeaker Series Flyer - CN
- reSpeaker Flex XVF3800 Circular.step
- reSpeaker Flex XVF3800 Linear.step
- reSpeaker Flex XVF3800 Core Board.step
- Amplifier

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