



# Ultra-High Resolution Sound

that creates overwhelming immersion

Geode Sound Inc.

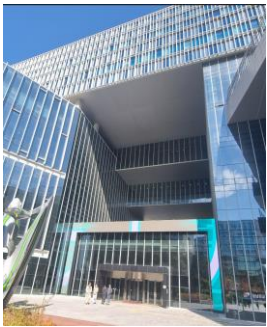
*Creates Overwhelming Immersion*



# Company Overview

- » Name: Geode Sound Inc.
- » Founded: August 30, 2021
- » CEO: Kim Jung-Bae Kim                      CTO: Yoo Dong-Ok
- » Headquarter: Pangyo, Seongnam-si, Gyeonggi-do, Korea
- » R&D / Factory: 50, Mansam-ro, Yangju-si, Gyeonggi-do, Korea
- » Employees: 10

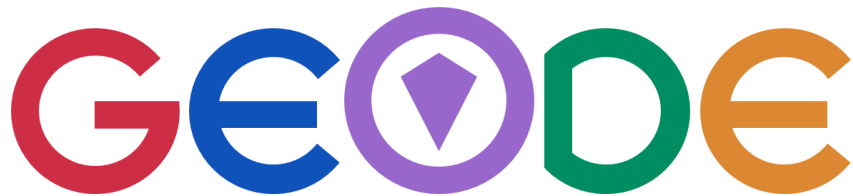
- » Homepage: [www.geodesound.com](http://www.geodesound.com)
- » Goals: Providing sound with overwhelming immersion to the world
- » Business item: Ultra-high resolution speakers and audio devices



HQ



R&D / Factory



- Geode: Crystal cluster inside a ball-shaped stone
- Vision: Make products and technology like beautiful gems

- |             |    |  |
|-------------|----|--|
| <b>2023</b> | 11 | Establishment of Tianjin branch in China                             |
|             | 09 | Participated in Samsung Electronics' 20th Core technology exhibition |
|             | 07 | Production facilities installation                                   |
|             | 06 | Research lab expansion   |
| <b>2022</b> | 04 | Completed development of MS hybrid unit drivers                      |
|             | 10 | Research lab relocation  |
|             | 06 | Investment from Woori Bank Co.                                       |
|             | 05 | Government R&D project contract                                      |
|             | 05 | Government technology development project contract                   |
|             | 04 | Corporate research lab certification                                 |
|             | 03 | Venture company certification  |
| <b>2021</b> | 01 | Investment from InterVest Co.  |
|             | 09 | Investment form SF Solutions Co.                                     |
|             | 08 | Founded Geode Sound Inc.   |



# 01. Business Introduction

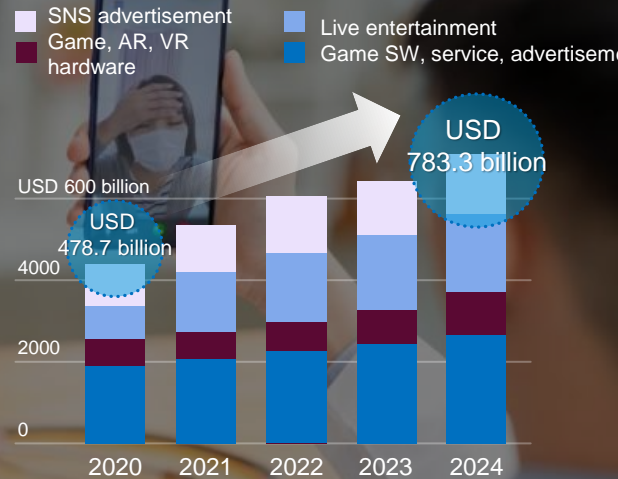


# Explosive Increase in Metaverse and Untact Services

» Lack of ultra-high resolution sound that increases immersion

## Explosive increase in metaverse and untact services

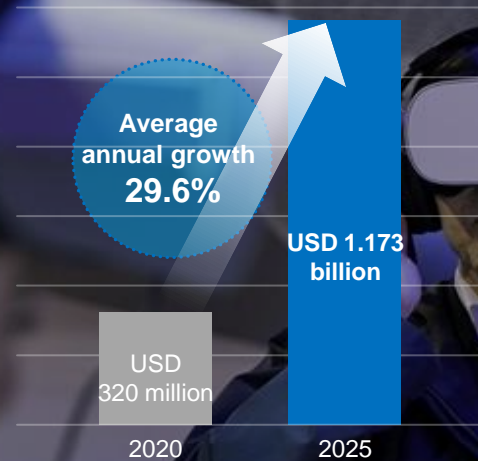
### Global metaverse market



Demand for metaverse and untact services are increasing rapidly with the development of network, graphics, and AI due to COVID-19

## The HMD (display) market is also growing

### Global HMD device market



The HMD market is growing with the development of XR technology

However lack of ultra-high resolution sound products that increase immersion in the metaverse



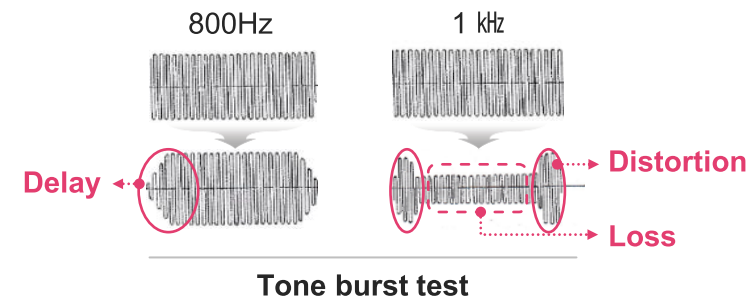
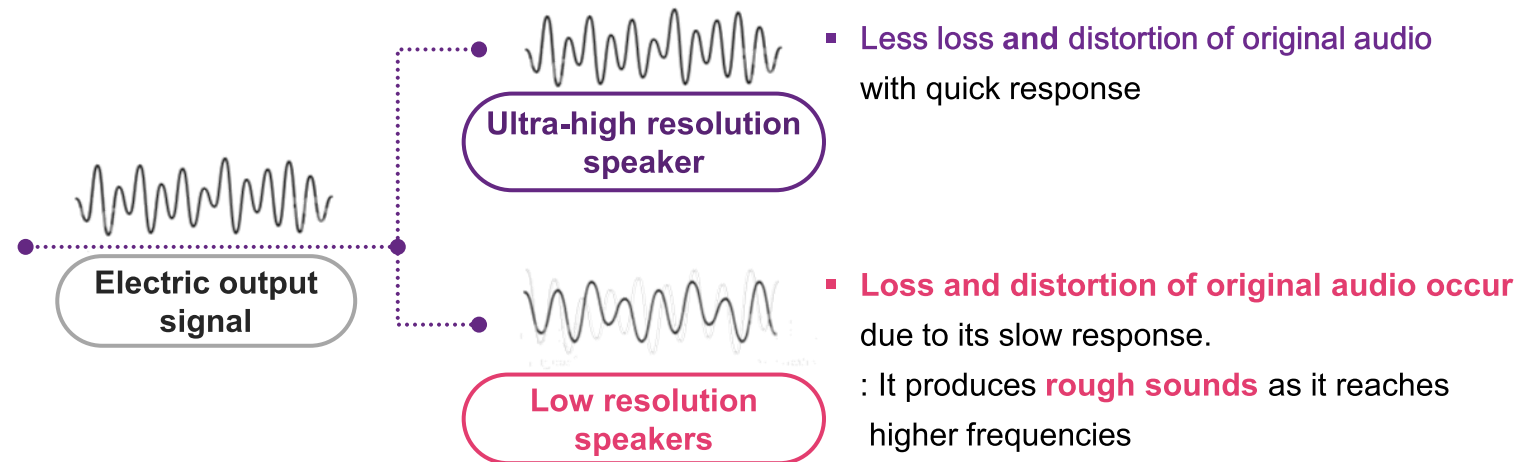
Although audio is an important factor in enhancing immersion in the metaverse, we don't have sufficient technologies and products.

# What is an Ultra-high Resolution Speaker?

- It expresses the original sound without delay, distortion, or loss across whole audible frequency band.
- It generates the unique color, texture, strength, boundaries, emotions and space of sound in a vivid way.
- You can listen to music across whole frequency bands even at low volume.
- Even small sounds are clearly separated from large sounds. → It can prevent hearing damage.

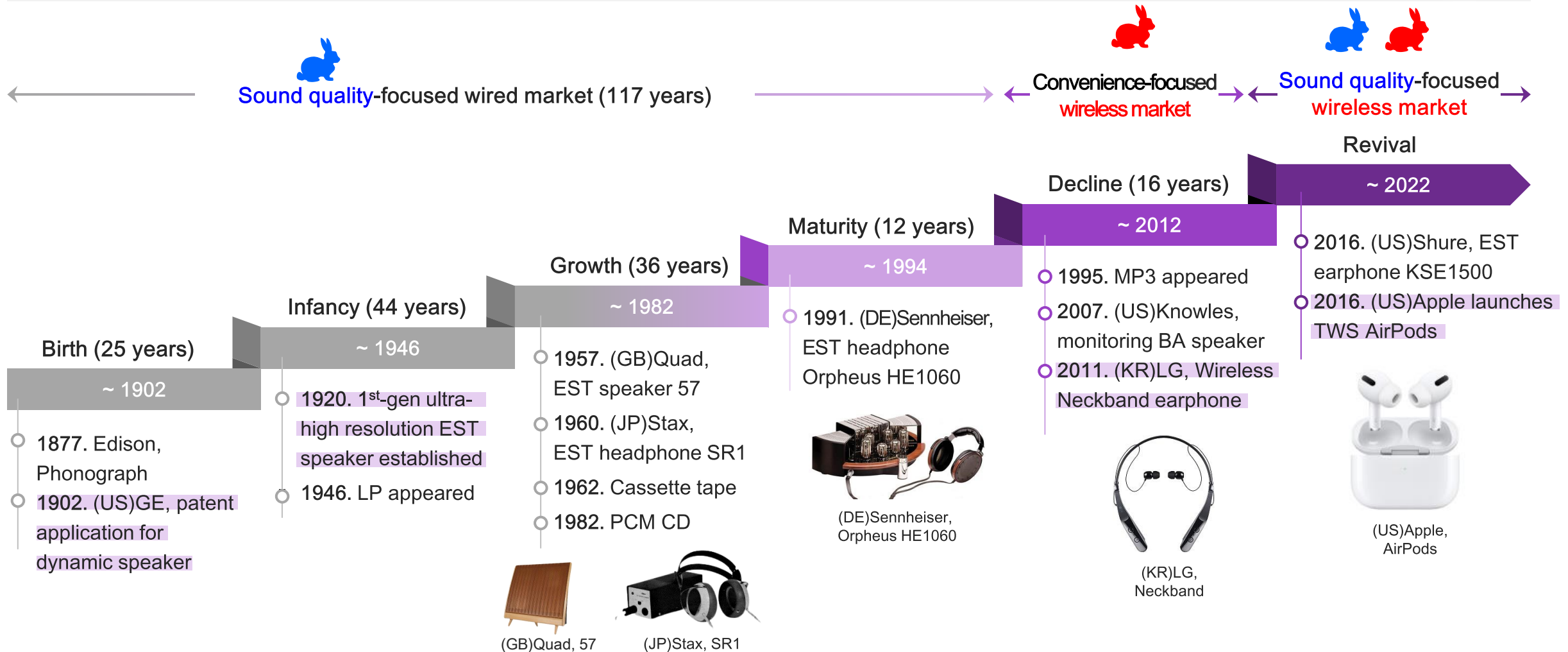


Sound player



# History of Audio Devices

» The audio market is currently moving rapidly toward the **Sound Quality-focused Wireless Market**.

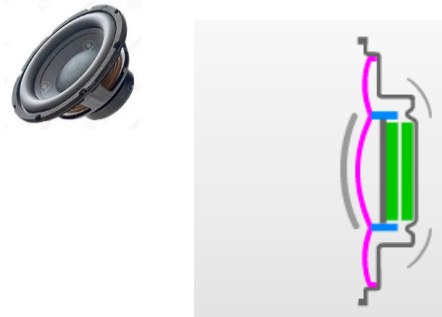


# Technical Comparison of Conventional Speakers

- Delay in the 800Hz range
  - Loss and distortion in above 1kHz
- **Not high resolution speaker**

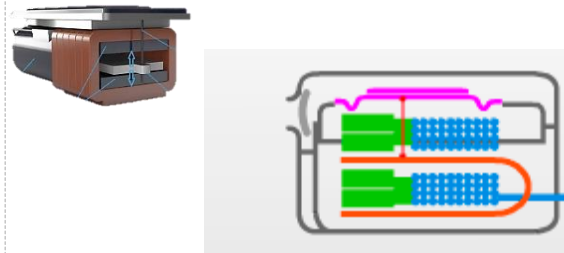
## Electro Dynamic

**Normal speakers**  
: Transmits the movement of the voice coil to the diaphragm



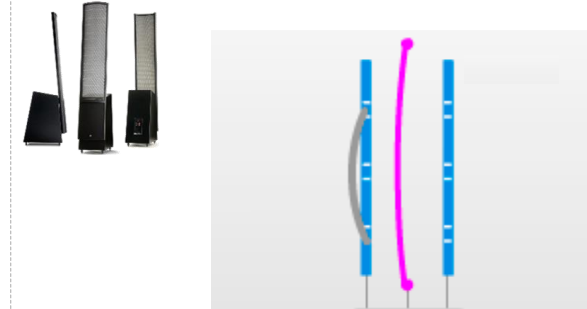
## Balanced Armature (BA)

**Hearing aid speakers**  
: Transmits the movement of the BA to the needle



## Electrostatic Tech.(EST)

**1st-gen ultra-high resolution speakers**  
: The centrally located diaphragm by static electricity vibrates directly due to electric field.



### Structure

- Magnet
- Coil/Pole
- Diaphragm

Acoustic transduction path

**Complex**  
: coil (electrical signal)  
→ coil (motion) → diaphragm (motion)

**Complex**  
: coil (electrical signal) → BA (motion) →  
needle (motion) → diaphragm (motion)

**Simple**  
: coil (electrical signal)  
→ diaphragm (motion)

Sound generation

**Indirect**

**Indirect**

**Direct**

Loss and distortion of audio signal

**Large**

**Large**

**Small**

Ultra-high resolution sound generation

**X**

**X**

**O**

Operating voltage

**Low volt**

**Low volt**

**Very high volt**

Price

**Low cost**

**High cost**

**Very high cost**



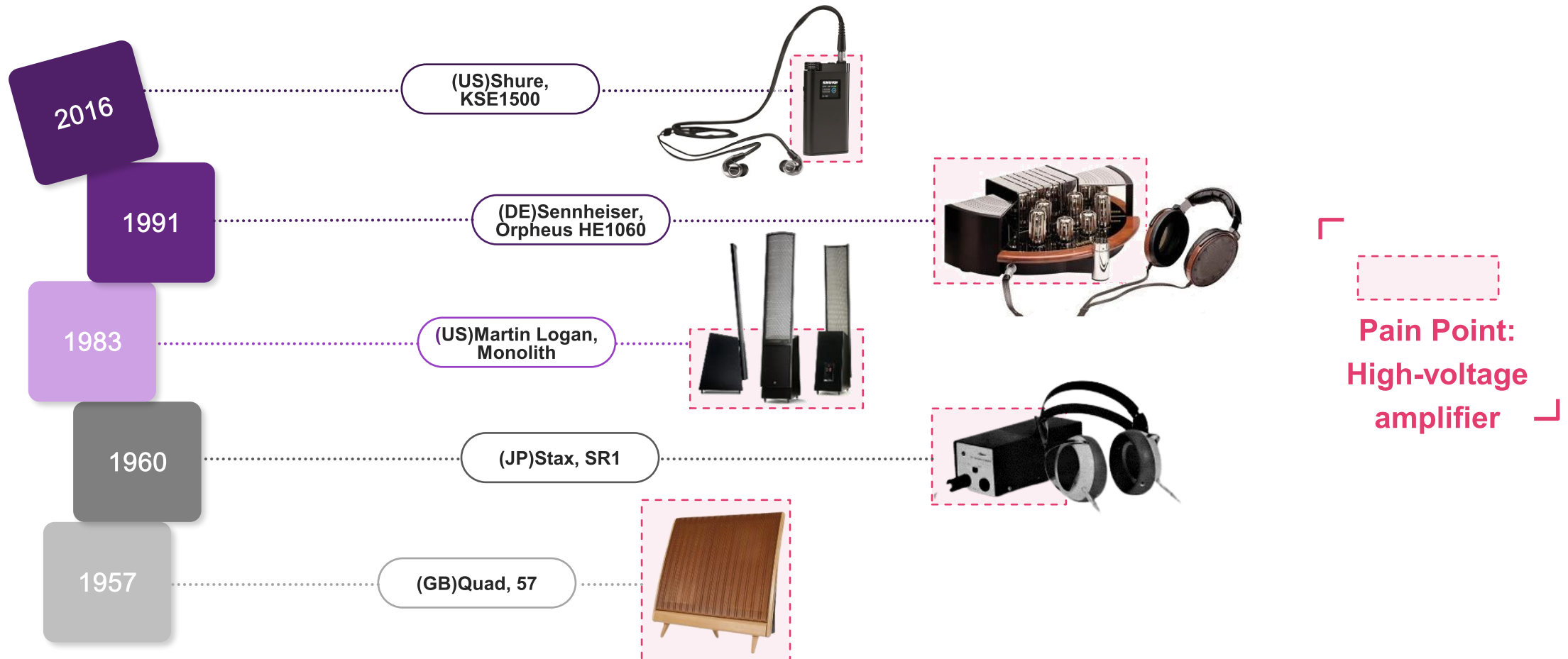


## 02. MST-based Ultra-high Resolution Speaker



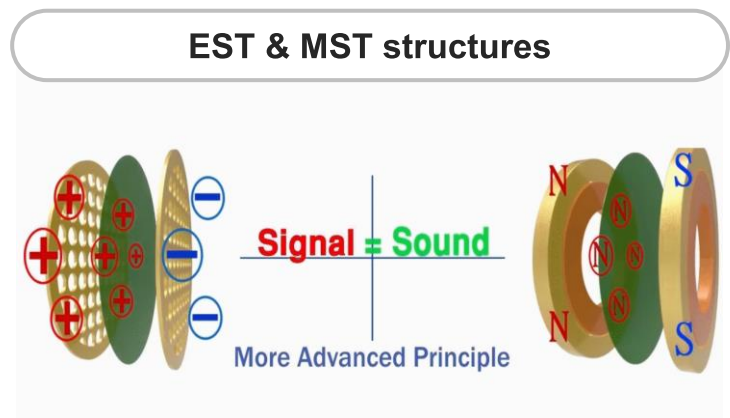
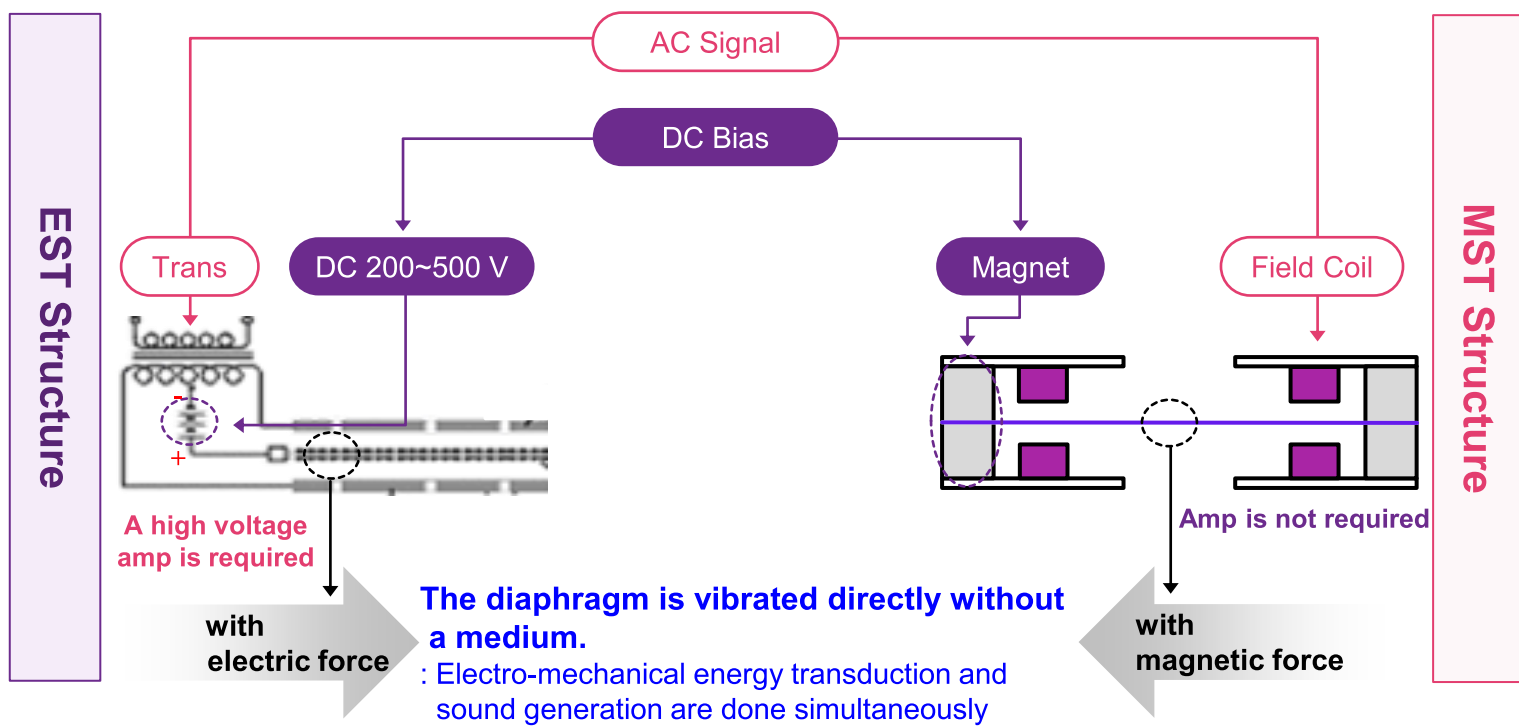
# Pain Point of EST Speakers (1<sup>st</sup>-gen ultra-high resolution speakers)

- EST(Electrostatic Tech.) speakers generate **ultra-high resolution sound** but require a **high voltage**.
- The future high-resolution sound market, where compact size is essential, will be dominated by **EST-style speakers without high-voltage amplifiers**.

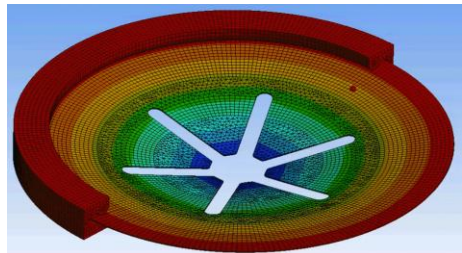


# Sound System of Geode Sound Inc.: MST (Magnetostatic Tech.)

- » Use of duality\*: Electrostatic field → Magnetostatic field: **World's first**
- » A high voltage Amp to produce electrostatic field is substituted with neodymium magnet for generating magnetostatic field.



**Vibration analysis of wing-shaped diaphragm**



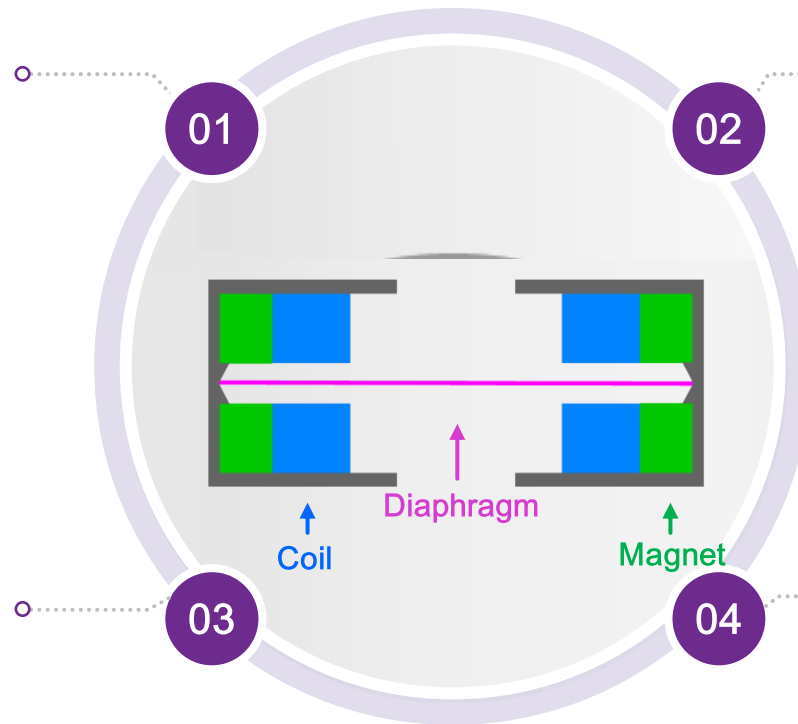
\* Duality: A theory of physics about the nature of pairing used for the reversed formation

# Summary of MST (Magnetostatic Tech.)

- » 2<sup>nd</sup>-gen ultra-high resolution speaker which can replace EST speakers.
- » It removes the high voltage Amp to reduce cost and size.
- » It can popularize the ultra-high resolution audio market.

Magnets and coils placed on the top/bottom of the diaphragm are **physically not in contact with the diaphragm.**

The diaphragm **vibrates purely with the magnetic force**, where it can generate ultra-high resolution sound in real time even by fast and fine electrical signal. This is possible as there is no obstacle prevents fast motion excluding very low mass of diaphragm.



The diaphragm is an extremely thin metal **membrane\***. The material can be magnetized quickly and also can dissipate magnetism quickly. This means it can move up and down **at high speed.**

\* Amorphous, Permalloy, Supermalloy, etc. are used.

The diaphragm itself performs electro-mechanical energy transduction and sound generation together in a single step. So it **doesn't have sound loss, distortion, and delay** that are common in conventional multi-step acoustic transducer such as dynamic speaker, BA, etc. Consequentially it realizes **very clean detailed sound.**

# Advantages of MST Speakers

» The most innovative speakers' structure in the audio device history over 144 years

01

**High-speed response:**  
conveys the feeling of the scene accurately



02

**No distortion across the whole band:**  
produces high-quality sound closest to the original



03

**No loss of medium/high tone sound:**  
builds detail sound without missing even the smallest



04

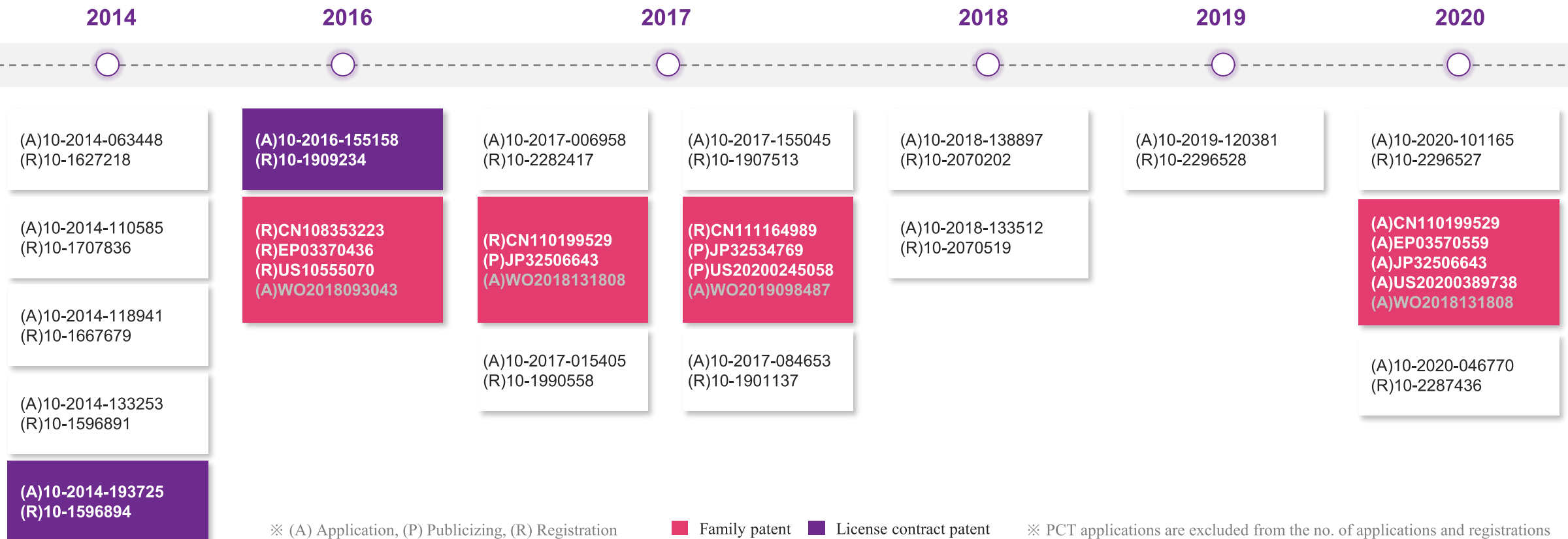
**Compact size:**  
applicable to all audio devices





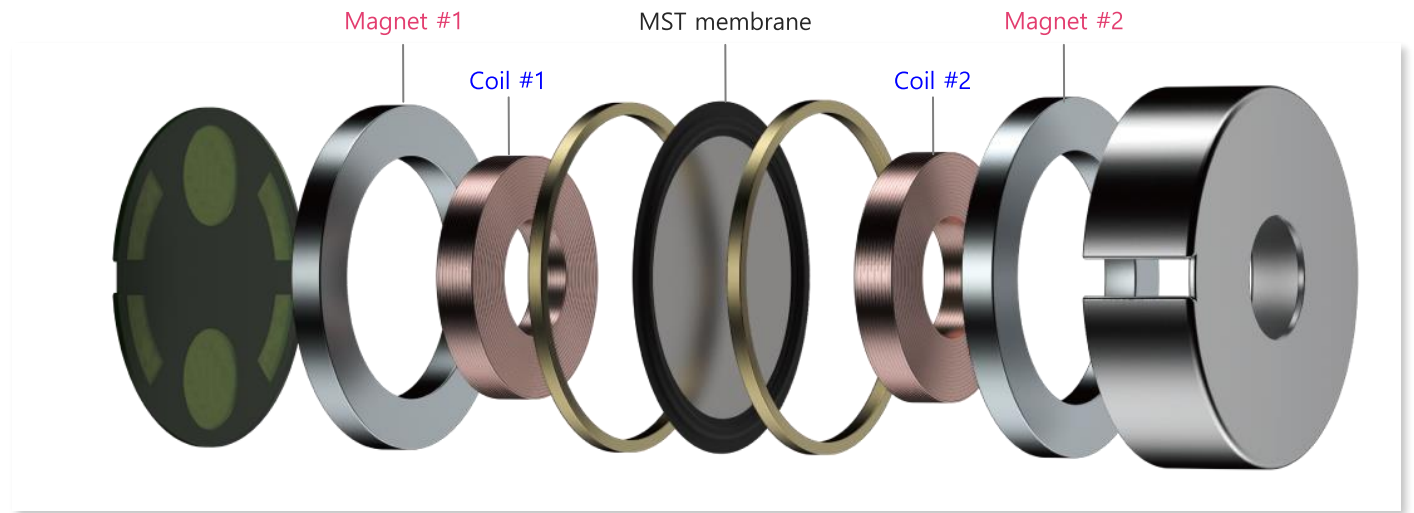
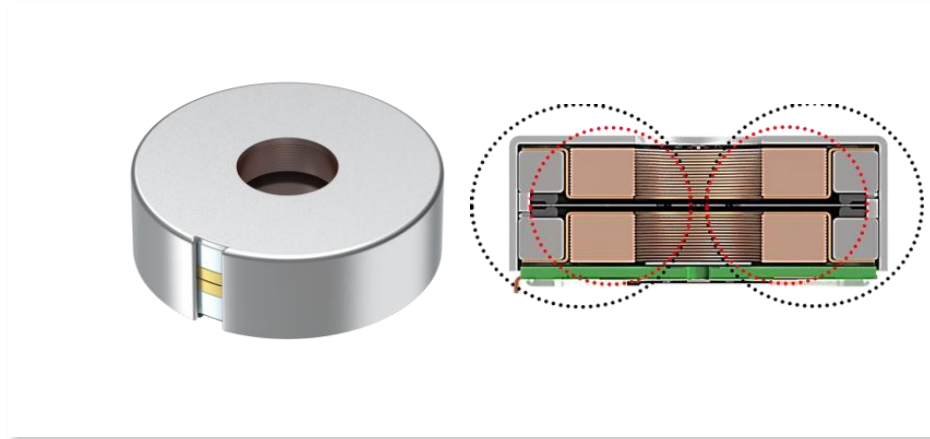
# Status of MST-related Intellectual Property Ownership

» Rights of original technology: 15 domestic patents, 4 overseas patents, and 3 domestic designs

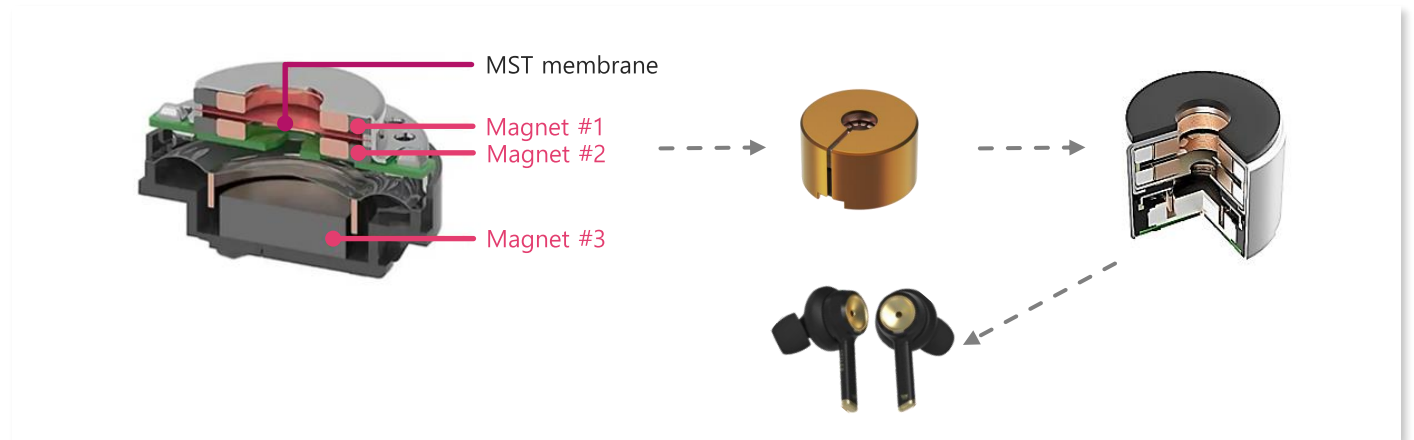
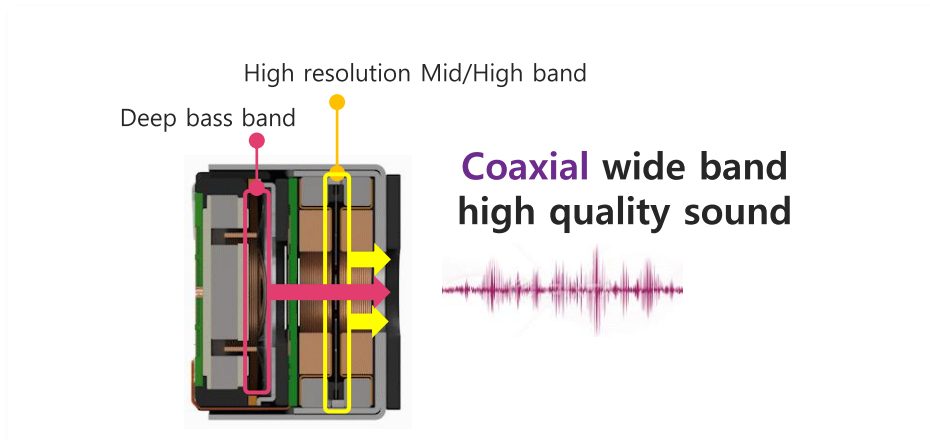


# MST-based Sound Driver Unit Structure

## Single Driver



## Hybrid Driver



# MST-based Products: Sound Driver Unit

(C) --- Completed  
(P) --- in Progress  
(S) --- Scheduled

## Earphone

### Single

#### Full range

Φ10.6mm x 3.7T (C)

Φ9.0mm x 4.0T (P)

#### Tweeter

Φ9.0mm x 3.5T (P)

Φ6.0mm x 3.5T (P)

### Hybrid

#### Full range

Φ10.5mm x 3.9T (S)

Φ9.5mm x 5.7T (C)

Φ9.5mm x 4.1T (P)

## Headphone

### Single

#### Full range

Φ36mm x 4T (P)

Φ40mm x 4T (P)

### Hybrid

#### Full range

Φ40mm x 5.7T (P)

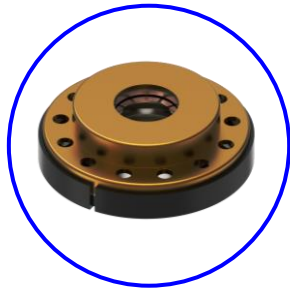
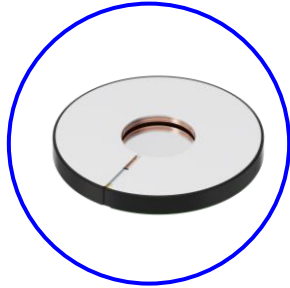
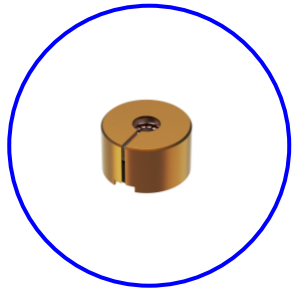
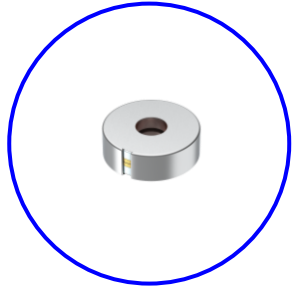
Φ40mm x 14T (C)

## MR Glasses

### Hybrid

#### Full range

Φ36mm x 18T (S)



## MST-based Products: Wired Earphone

- » Using MST hybrid driver(Ø9.5mm×T5.7mm)  
: combining delicate and precise mid-range sounds and familiar bass sounds to the public
- » Bass reflex system applied: produces deep, rich bass sounds



**Geode JADE**



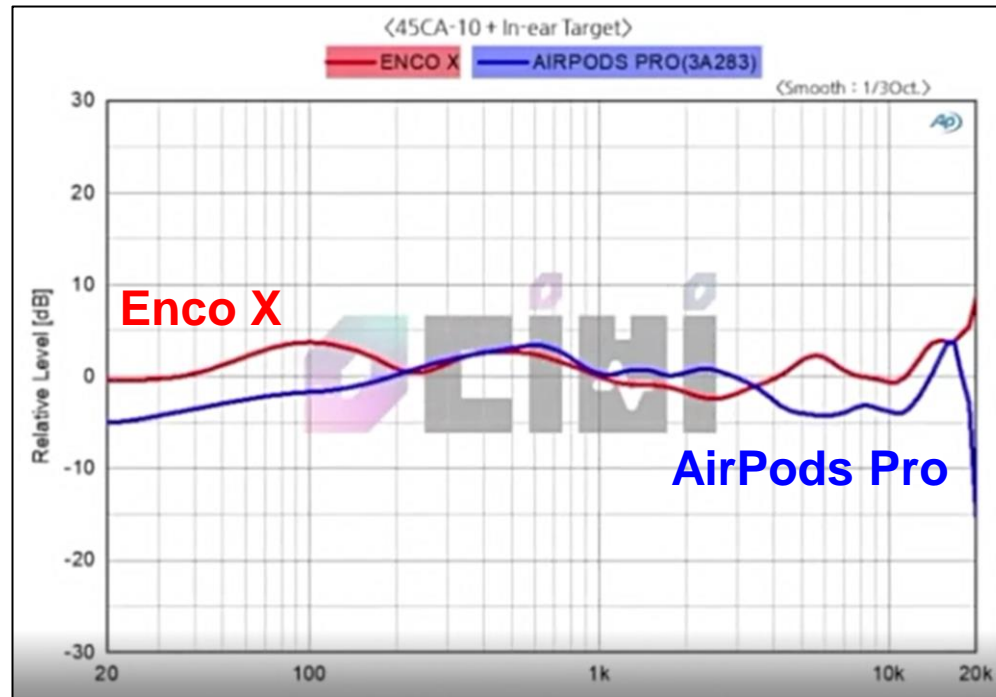
# MST-based Wireless Earphone Evaluation

- » Oppo Enco X ETI51: The wireless earphone model applied with a licensed MST patent
- » Evaluated on 0db\* (Dec. 8, 2020): [https://www.0db.co.kr/REVIEW\\_0DB/1660822](https://www.0db.co.kr/REVIEW_0DB/1660822)

\* 0db: The largest community in Korea for earphones, headphones, and speaker recommendations



[In-ear Target Frequency Response]



- 01 “The music sound blew my mind. I absolutely love the sound quality and performance.”
- 02 “The high frequencies are gorgeous and the resolution is good.”
- 03 “If I switch to AirPods after listening to Enco X, the music sounds like underwater. Enco feels so liberating.”

In frequency response, the Enco X made a flattened look, while the AirPods Pro had a  $\Lambda$  shape look.

This means that **MST can express the original sound as it is** without distortion or loss in entire audible frequency band.



## 03. Business Areas



# Possible Applications of MST Speakers

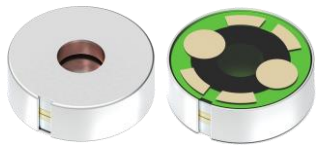
- » **TWS (True Wireless Stereo):** Produces pure sound closest to the original audio. An effective method for ANC\*
- » **Audio device for the metaverse:** Accurately conveys a sense of space. Achieves detail that doesn't miss any sound
- » **Speakers for autonomous cars:** Provides high-quality sound without vehicle noise to provide comfort for the driver

\*ANC: Active Noise Cancellation



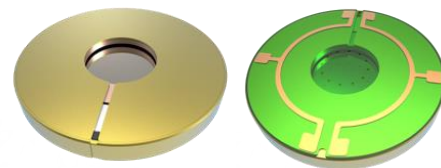
# Applicable Products by Driver Size

## Wireless Earphone



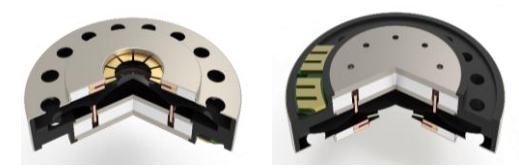
MST Sound Unit :  $\Phi 9\sim 15\text{mm}$

## Metaverse Device



MST Sound Unit :  $\Phi 20\sim 36\text{mm}$

## Wireless Headphone



MST Sound Unit :  $\Phi 36\sim 40\text{mm}$

All sizes from small to large are available:  $\Phi 6\sim 100\text{mm}$



# Production Facilities



Address: Yangju-si, Gyeonggi-do, Korea

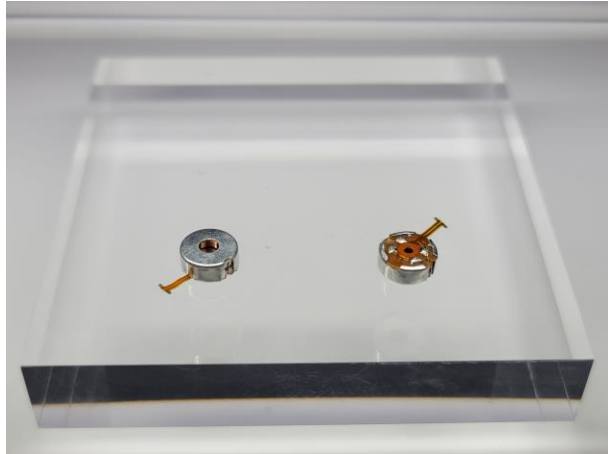
2<sup>nd</sup> Floor: Factory

3<sup>rd</sup> Floor: Research Center

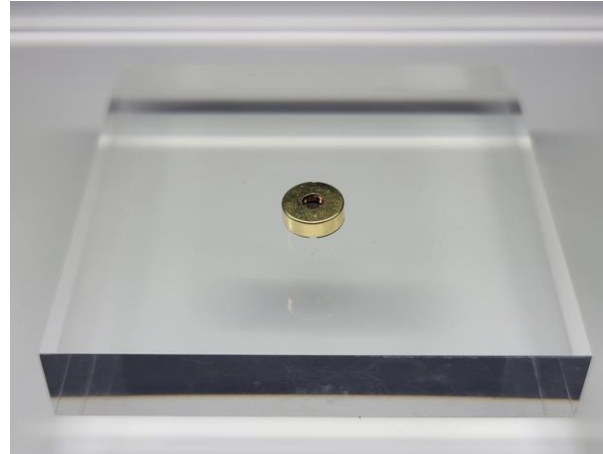


**Assembly lines, parts racks, measuring rooms, etc.**

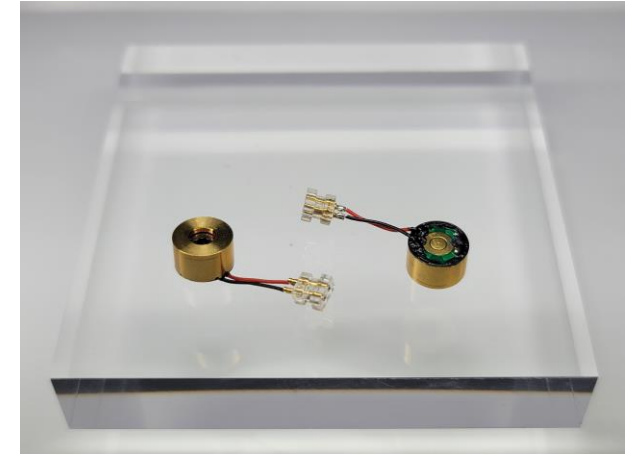
# MST Sound Driver Unit and Earphone produced in the Factory



MST Single  $\Phi 9.0\text{mm} \times 4.0\text{T}$



MST Single  $\Phi 10.6\text{mm} \times 3.7\text{T}$



MST Hybrid  $\Phi 9.5\text{mm} \times 5.7\text{T}$



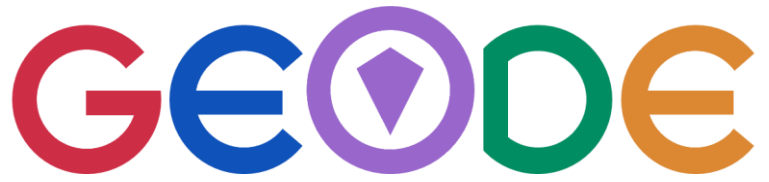
MST Single  $\Phi 40\text{mm} \times 4\text{T}$



MST Hybrid  $\Phi 40\text{mm} \times 14\text{T}$



MST Earphone



**Thank you for listening.**  
**Geode Sound Inc.**

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Email: [contact@geodesound.com](mailto:contact@geodesound.com)

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