



Flora Innovations Inc.

PRODUCT INTRODUCTION

Dragonfly™

World's first full range piezo speaker

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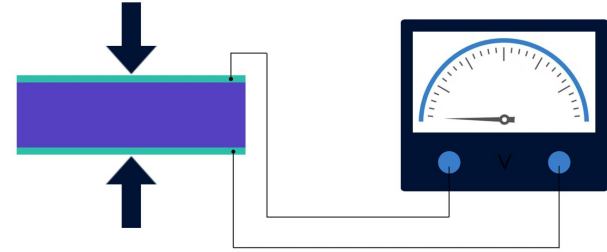
<https://flora.tech>

1. Introduction
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Introduction - Dragonfly™

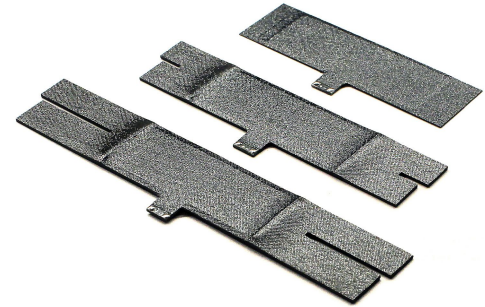
Piezo materials:

- Electrical signal induces displacement / vibration
→ *Transducer, haptic, speaker applications*
- Displacement / vibration induces electrical signal
→ *Sensor, force transducer, accelerometer applications*

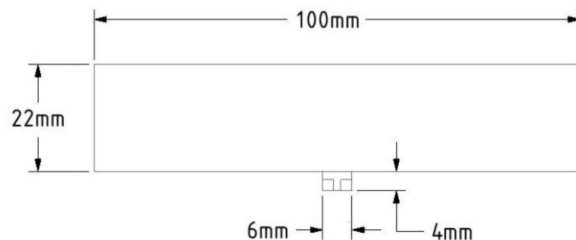


Dragonfly™

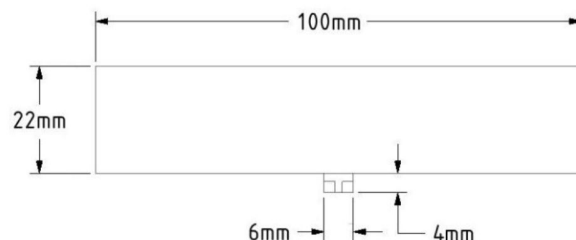
- A advanced piezo speaker (exciter)
- When sound signal (voltage) is applied, Dragonfly™ vibrates → Attaching Dragonfly™ to any panel will transform it into a sound radiating surface (loudspeaker).



Introduction - Models



DRA10022-S2



DRA10022-S4

	Unit	Tolerance	DRA10022-S2M	DRA10022-S4H	Custom model
Capacitance	μF	±15%	310	620	Dragonfly™ can be conveniently customized for different applications, size and power requirements. Please contact our engineers at contact@flora.tech to discuss.
Max voltage	V	-	-80 to +80	-80 to +80	
Power consumption*	W	±10%	0.3W	0.6W	
Frequency range	Hz	±10%	80-20 kHz	60-20 kHz	
Sensitivity**	dB	±2	88	88	
Thickness	mm	±0.1	2.5	2.5	
Mass	g	±0.2	15	45	
Operating T	C	-	-20 to 65	-20 to 65	

* Measured at 100Vp-p, 1 kHz sine signal.

** The panel speaker includes one Dragonfly™ unit attached to a 24" x 12" x 0.1" ABS panel. The measurement was performed in a normal listening room and a listening distance of 1m.

Advantages

Dragonfly™ surpasses both conventional cone speakers and other piezo speakers in every aspect.

Audio quality

Dragonfly™ is the world's first full range piezo speaker (60-20 kHz). Superior clarity and directivity compared to cone speakers.

Efficient

3x more efficient than cone speakers, thanks to high electro-mechanical energy conversion ratio of the piezo material.

Super thin

Less than 3mm thick, and thus, ideal for applications with space constraint, e.g., Display, automotive, medical devices...

Invisible

Installed behind a panel, which offers a wider range of possibilities for seamless interior designs. IP65, dust and waterproof.

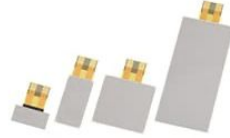
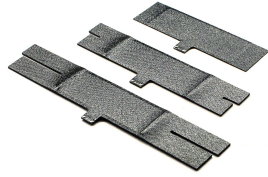
Lightweight

Weighing less than 50 grams, Dragonfly™ is 5 to 10x lighter than an electrodynamic speaker.

No EMI

Dragonfly™ utilizes piezo technology, eliminating the need for magnets and coils, resulting in an EMI-free solution.

Advantages (Cont'd)



	Dragonfly™(Link)	Other piezo speakers (Link)	Electrodynamic speaker
Frequency range (Hz)	60-20k	400-20k	40-20k
SPL (dB)	90+	85+	90+
Price (USD)	\$	\$\$ (Link)	\$\$ (Link)
Weight (gram)	20	20	200+
Power consumption (W)	2	2	10+
Thickness (mm)	<3mm	<3mm	30mm+
Integration	Easy. Invisible.	Easy. Invisible.	Needs frame. Visible.
Reliability	✓✓✓	✓✓	✓✓✓

Applications

Thanks to its full range capability, **Dragonfly™** can replace most of the conventional cone speakers in the following applications



Woofer



Mid-range

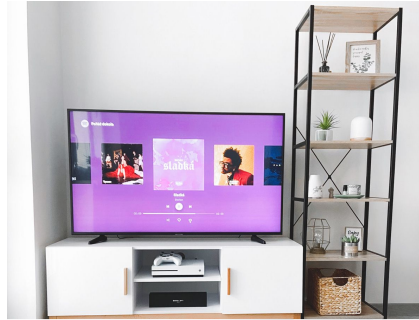


Tweeter



01. Automotive

Highly suitable for EVs due to its low profile and power consumption. Can be installed behind center control, dashboard, roof, door panel...



02. Display

Enable 3D sound, sound coming directly from the picture. Can be directly attached to the back of an OLED and microLED display



03. Aerospace

Lightweight and low profile. Its small size allows for easy installation behind various panels within an aircraft cabin.

Applications (Cont'd)



04. Medical

IP65, no EMI. Easy integration by directly attaching it to enclosure of devices, e.g., dialysis, ultrasound, patient bed...



05. Consumer

Behind-the-wall, cabinet door, canvas hidden smart speakers, home theater & stereo systems, Bluetooth speakers...



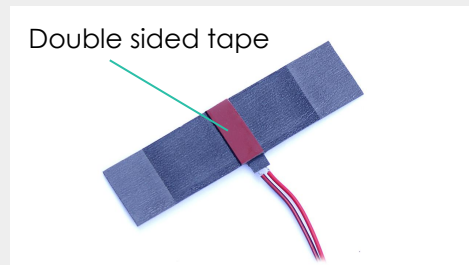
06. Other

Thin panel speakers for conference rooms, retail spaces, and churches, where a sleek design and high-quality sound are desired...

1. Mechanical

Unlike cone speakers, Dragonfly™ does not require any supporting structure. Moreover, it comes with pre-applied 3M VHB™ permanent double-sided tape, so all you need to do is remove the liner and attach it to a flat panel to create a full range speaker. Other mounting options are also available.

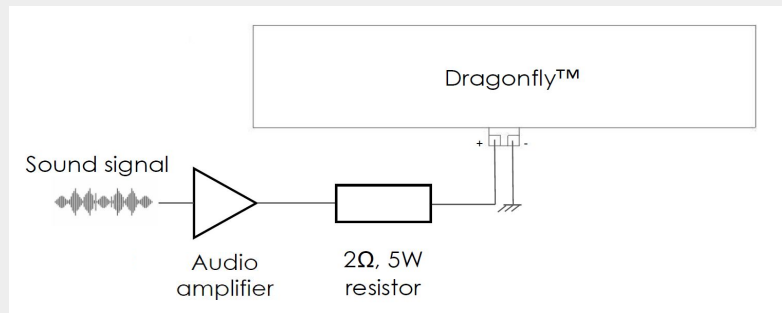
Demo video:



2. Electrical

Dragonfly™ can be connected to a regular audio amplifier such as class A, AB, and D ones. However, commercially available audio amplifiers may not be ideal for Dragonfly™ as they often provide relatively low voltage and higher power than necessary. For optimal performance, we recommend a custom amplifier.

To avoid overcurrent, it is advisable to incorporate a small power resistor between the speaker and the amplifier.



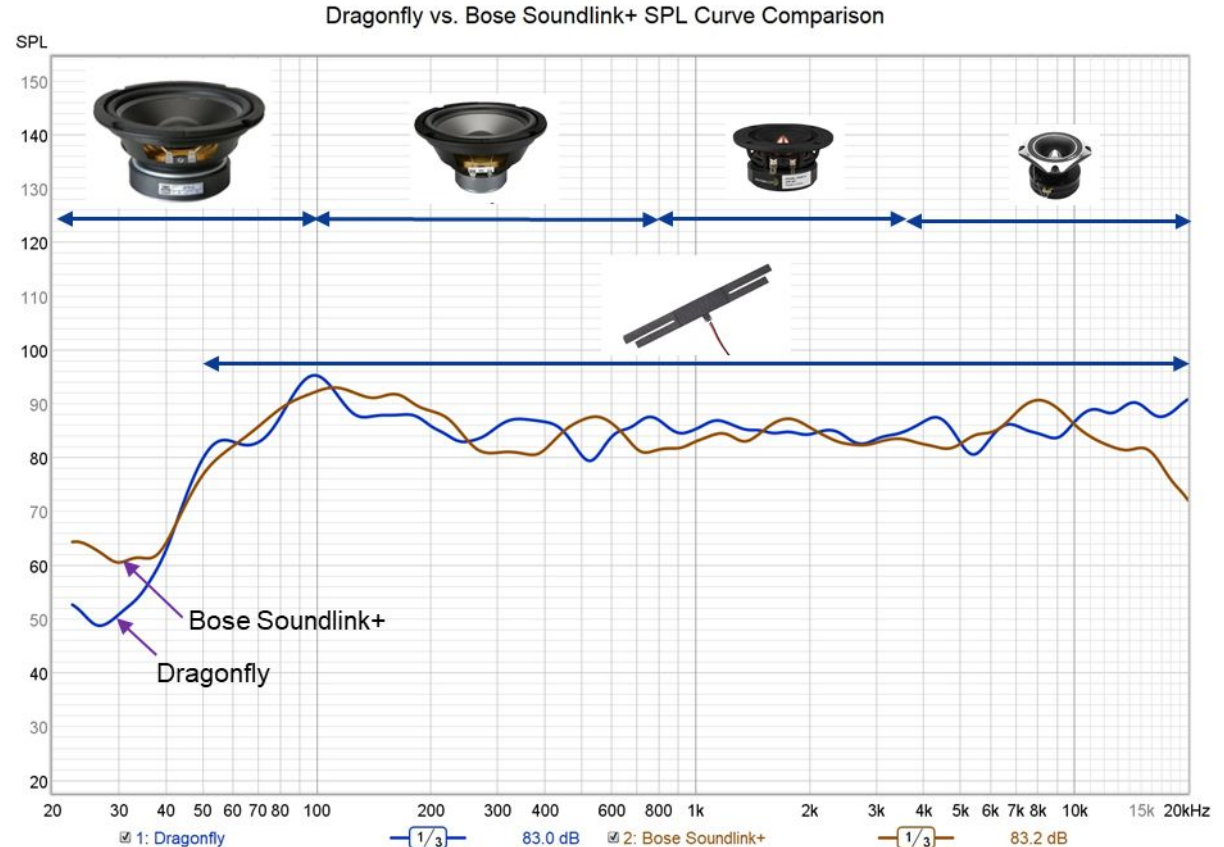
Example of AMP can be used for testing: [Boss OX1.5KM](#)
IC for custom AMP: [Inventvm's IVM6303](#)

Case Study – Dragonfly™ vs. Cone speaker (Bose SoundLink)



[Demo](#)

	Dragonfly	Bose
Freq. range	60-20 kHz	60-20 kHz
Base	★ ★	★ ★ ★ ★
Treble	★ ★ ★ ★	★ ★
Clarity	★ ★ ★ ★	★ ★
Directivity	★ ★ ★ ★	★ ★ ★ ★
Overall	★ ★ ★ ★	★ ★ ★ ★





Thank you!

Email: contact@flora.tech

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