SPIXEL™ Technology

Single compact full-range radiating source for OEM Loudspeakers

Powersoft

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Overview & Executive Summary

SPIXEL is Powersoft's compact full-range transducer technology developed for OEM loudspeaker manufacturers that need to create smaller, more efficient, more scalable and more intelligent loudspeaker products.

SPIXEL is a 2.5" driver, but its value goes far beyond its compact size. It combines high-efficiency moving-coil transducer design, extended low-frequency capability, onboard electronics and native AnyMATE integration into a single OEM technology platform.

Powersoft conceived SPIXEL to help manufacturers achieve strong output and system intelligence from a compact acoustic unit, even in applications where space, weight, speaker count, serviceability and integration constraints are critical.

The strategic value of SPIXEL is not simply that it is small. Its value lies in the way it turns a compact full-range driver into a repeatable, intelligent building block for product families, custom modules, arrays and embedded loudspeaker systems.

Principle	Meaning for OEM Manufacturers
2.5" full-range acoustic format	Supports compact loudspeaker products, embedded modules and dense acoustic layouts.
High-efficiency moving-coil transducer design	Improves the performance-to-size ratio and supports efficient use of Powersoft Class-D amplifier power.
Extreme Motor Strength principles	Helps generate useful acoustic output from a very small source and supports minimal cabinet size.
Frequency range from 100 Hz to 20 kHz	Enables full-range use in compact systems and more natural integration with sub-woofers or low-frequency modules.
AnyMATE ready	Capability to add identification, monitoring and diagnostic at speaker level through SpeakerMATE.
Visual diagnostics LED	Provides immediate local feedback for service.
Unique Transducer Identification Tag	Supports traceability, verification and lifecycle visibility of the loudspeaker element.
Fast multicontact connection	Supports faster and more practical OEM assembly and serviceability.
Low-impedance and high-impedance versions	Supports both 4 ohm and 100 ohm product designs.

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Why SPIXEL?

Professional audio has evolved rapidly in amplification, DSP and software control. Modern amplifiers are lighter, more efficient and more intelligent, while processing platforms have changed how systems are tuned, protected and managed.

The loudspeaker transducer has not evolved at the same pace. This creates a practical design gap: the system may be efficient and controllable, but the final acoustic result is still constrained by the physical behaviour of the speaker itself.

SPIXEL responds to this challenge by treating the compact driver as part of a wider system architecture. The driver, amplifier, DSP and monitoring layer are considered together, so the final product can be smaller, more predictable and easier to manage throughout its lifecycle.

For OEM manufacturers, this is relevant because many markets increasingly demand products that are:

- Smaller and less visually intrusive
- Easier to integrate into architecture, vehicles, attractions and custom products
- Capable of meaningful output from limited physical volume
- More efficient in power and material use
- Easier to commission, verify and service
- Scalable across multiple product families

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Technology Evolution

SPIXEL is part of Powersoft's broader evolution from amplifier specialist to integrated audio technology developer. This evolution can be summarized as a progressive expansion of the Company's know-how, and can be understood through the following **development steps**:

1995 High-efficiency Class-D amplification

Enabled compact, lightweight and efficient power delivery, reducing heat, weight and energy waste while increasing power density. Beyond efficiency alone, Powersoft Class-D platforms deliver high current, manage low-impedance and reactive loudspeaker loads, interact with DSP control and recover part of the reactive energy generated by the moving system.

2011 Software and DSP control / IPAL

IPAL was an important step in that direction. It used amplifier-driven control to make conventional moving-coil transducers specifically designed, to work more effectively with Class-D amplification. The amplifier was no longer only a sopurce of power. It became part of the optimization process, using zero-latency processing and control to improve the behavior of the loudspeaker system.

2013 Moving Magnet topology / M-Force

M-Force marked a more radical move. Powersoft explored a Moving Magnet architecture, reversing the conventional moving-coil paradigm and proving that the driver itself could be redesigned around modern amplification and control. M-Force was physically extreme. It demonstrated that if the amplifier had changed, the transducer could change too.

2026 Patented High Motor Strength Transducer Technologies

MM-FORCE

High Motor Strength through Moving Magnet principles, enabling ultra low profile and scalable low-frequency platforms for new OEM cabinet designs. Built around a building-block logic and inertially balanced architecture, MM-FORCE opens new possibilities for compact cabinets, modular systems and integration-driven low-frequency products.

SPIXEL

A 2.5" full-range driver platform with built-in intelligence, designed to combine High Motor Strength, compact acoustic performance and system-level communication. Built around the same building-block logic, SPIXEL supports compact, scalable and integration-ready full-range acoustic solutions for compact loudspeaker design.

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What SPIXEL Is

SPIXEL is an **ultra-compact 2.5” full-range moving-coil driver technology**, patented by Powersoft and **created for OEM integration**, enabling loudspeaker manufacturers and selected key accounts to develop compact, high-performance acoustic modules where traditional formats are too large, too limited or difficult to integrate.

By combining **full-range reproduction**, **high motor-strength** design and **system-level intelligence** through amplification, DSP, monitoring and identification capabilities, SPIXEL reduces the usual compromises of compact loudspeaker design.

With its 100 Hz - 20 kHz frequency range and scalable platform logic, SPIXEL becomes a **flexible building block** for space-efficient, performance-driven and integration-ready loudspeaker solutions

Key Features

- Smallest HMS Transducer
- Single-Source Coherence
- High SPL
- 4 Ω and 100 Ω Nominal Impedance
- Extreme Efficiency
- AnyMATE Ready
- Compact Design
- Patented Motor Design
- Patented Visual Diagnostic
- NFC Capability
- Active Performance Control



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Single-Source Coherence

In professional compact multi-driver loudspeaker designs, coherence often requires controlled geometry, crossover design, acoustic alignment, phase correction and DSP, especially when separate transducers are used to approximate point-source behaviour.

SPIXEL addresses this challenge by concentrating broad frequency reproduction into a single compact full-range radiating source. This helps reduce the acoustic fragmentation allowing voices, melodies, harmonics and tonal details to remain more closely connected because they originate from the same compact source.

Just as the human voice is perceived as one natural expression because its tones, harmonics and nuances originate from a single acoustic source, SPIXEL enables a more unified sonic image, allowing voices, melodies and musical details to be perceived as part of the same natural expression rather than as separate frequency elements.

For OEM manufacturers, SPIXEL provides a consistent acoustic foundation for compact, embedded and scalable loudspeaker products: fewer separated acoustic centres to manage, reduced dependency on complex internal multi-way integration, and a stronger basis for preserving a coherent sound identity across different product formats.

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Technology Principles

The following technology principles describe how SPIXEL translates Powersoft's transducer research into a compact, intelligent and system-oriented acoustic platform.

Rather than addressing size, efficiency, output and control as separate challenges, SPIXEL combines them within a unified design approach, enabling OEM manufacturers to **rethink loudspeaker architectures with freedom, consistency and integration efficiency.**

Compact Acoustic Density

SPIXEL concentrates a high-quality acoustic source, strong output, efficiency and system intelligence into an extremely compact 2.5" platform. Its design helps reduce the usual trade-offs of small loudspeaker products, where limited size often affects SPL, low-frequency extension and system flexibility.

Extreme Motor Strength

Motor Strength values of 11.7 N^2/W for the 4 ohm version and 9.7 N^2/W for the 100 ohm version support strong acoustic effectiveness from a 2.5" driver, helping manufacturers achieve higher efficiency performance and precise drive control within a reduced footprint.

A system-level transducer approach

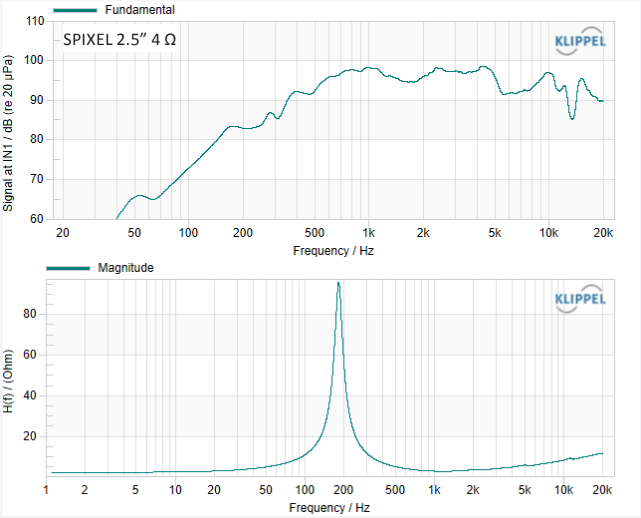
SPIXEL works as part of a complete ecosystem in which the transducer, amplifier, onboard monitoring and DSP act as a unified loop. This approach improves predictability, control and repeatability across different products and installations. For manufacturers, it supports easier integration, consistent performance and greater flexibility when designing compact, scalable loudspeaker solutions.

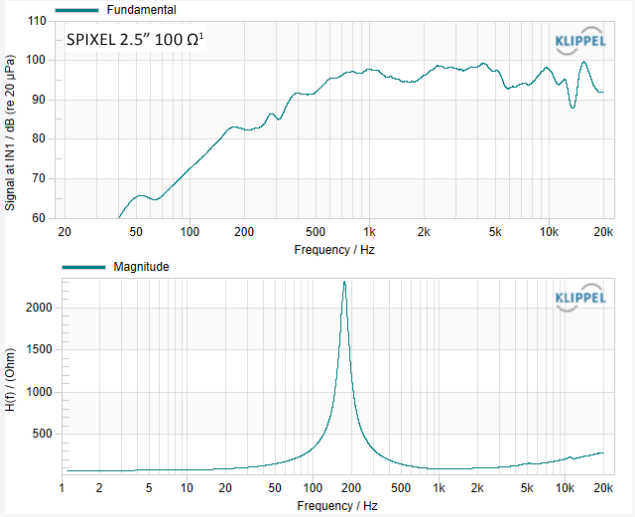
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Technical Data

Parameters*	SPIXEL 2.5” 4 Ω	SPIXEL 2.5” 100 Ω
Fs	213 Hz	200 Hz
Re	2.5 Ω	72.5 Ω
Qes	0.21	0.24
Qms	9.1	7.0
Qts	0.21	0.23
Vas	0.21 L (12.7 cu.in)	0.24 L (14.5 cu.in)
Sd	22.1 cm^2 (3.4 sq.in)	22.1 cm^2 (3.4 sq.in)
η0	0.92 %	0.77 %
Xlin	±3 mm (± 0.12”)	±3 mm (± 0.12”)
Xmech	±5 mm (± 0.19”)	±5 mm (± 0.19”)
Mms	1.9 g (0.06 oz)	1.8 g (0.06 oz)
Cms	293 µm/N	352 µm/N
Rms	0.379 kg/s	0.323 kg/s
Bl	5.4 N/A	26.5 N/A
Motor Strenght (β)	11.7 N^2/W	9.7 N^2/W
Le (10 kHz)	0.130 mH	2.423 mH
EBP	1014	833

* Thiele-Small parameters are measured after a high level 20 Hz sine wave preconditioning test.





1 Frequency response measured at 0.5 m in a 38 L sealed enclosure, with 2 V @ 4 Ω and 10 V @ 100 Ω.

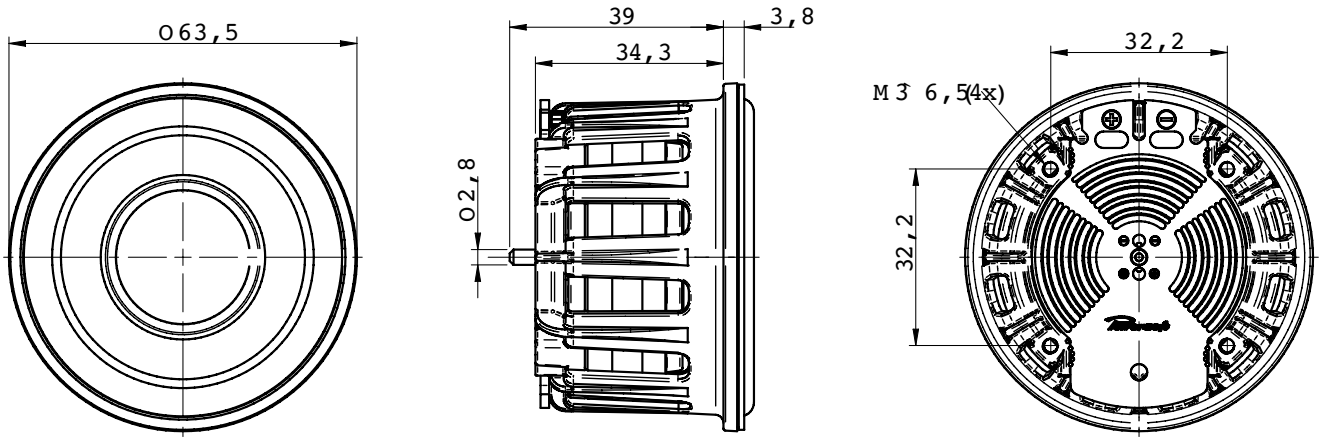
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Technical Data

Specification	SPIXEL 2.5” 4 Ω	SPIXEL 2.5” 100 Ω
Nominal Diameter	63.5 mm (2.5”)	63.5 mm (2.5”)
Nominal Impedance	4 Ω	100 Ω
Minimum Impedance	3.2 Ω	85.8 Ω
Active power handling (typ)*	5 W	5 W
Continuous Power Handling**	50 VA	50 VA
Sensitivity***	93.9 dB SPL	92.3 dB SPL
Frequency Range	100 Hz – 20 kHz	100 Hz – 20 kHz

* Average power thermal limit measured in reference sealed box of 0.1 L 100 Hz - 20 kHz BW.
** Reference sealed box of 20.1 L 100 Hz - 20 kHz BW.
*** Applied RMS voltage is set to 2 Vrms for 4 Ω nominal impedance and 10 Vrms for 100 Ω nominal impedance

Design	
Voice Coil Diameter	25 mm (1”)
Surround Shape	Roll
Surround Material	Water/UV Treated Foam
Winding Material	4 Ω CCAW | 100 Ω Copper
Cone Shape	Curvilinear
Cone Material	Water/UV Treated Paper
Magnet Material	NdFeB
Spider	Progressive Cloth
Peak Force	±50 N



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SPIXEL as a Scalable OEM Building Block

SPIXEL is designed as a **repeatable acoustic building block,** enabling OEM loudspeaker manufacturers to develop **different product formats from a common technology** principles rather than starting from scratch each time.

This approach helps **reduce development complexity** while supporting a **more consistent sonic identity** across product ranges.

Single-driver micro module



One unit in an ultra compact enclosure or embedded product.

Manufacturer benefit
Small size, localized audio and easier integration in constrained spaces.

Slim column / line array



Multiple units stacked vertically in a narrow format.

Manufacturer benefit
Controlled vertical format, narrow footprint and better architectural integration

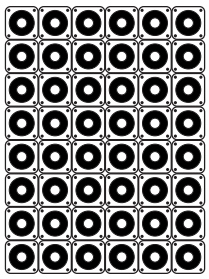
Soundbar or display-integrated array



Several units distributed horizontally as a compact linear array within the product structure.

Manufacturer benefit
Low visual impact, integration into furniture or displays and compact system design.

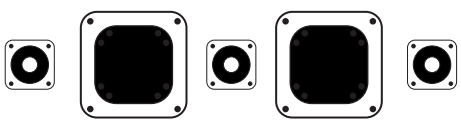
Wave Field Synthesis



Large units deployment in WFS matrices for custom designs and immersive applications

Manufacturer benefit
Predictable and controlled acoustic performance, simplified deployment and maintenance

SPIXEL + MM-FORCE Combination



SPIXEL and MM-FORCE can work together as **complementary acoustic building blocks**. SPIXEL delivers compact full-range reproduction with built-in system intelligence, while MM-FORCE adds low-frequency extension through a vibrationless, high motor-strength moving-magnet platform. Together, they help **OEM manufacturers** create **smaller**, **scalable** and **easier-to-integrate** loudspeaker systems with broader frequency coverage and more predictable behaviour.

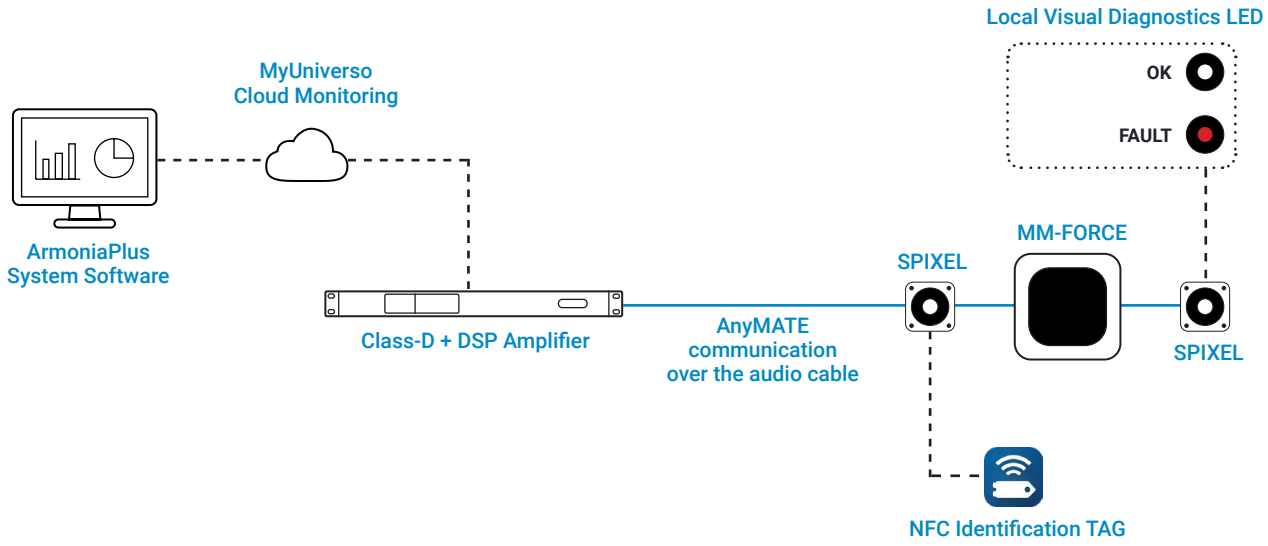
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Built-In Intelligence

SPIXEL extends its value beyond compact acoustic performance by bringing intelligence directly into the OEM loudspeaker.

The SPIXEL built-in intelligence is enhanced by the **Unique Transducer Identification Tag** and **Visual Diagnostics LED,** which make each unit identifiable, traceable and easier to service.

The Identification Tag helps verify **unit recognition, position and configuration,** while the Visual Diagnostics LED provides **immediate local status feedback** during setup, maintenance and troubleshooting..



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SPIXEL Within the Powersoft Technology Ecosystem

SPIXEL becomes more strategically relevant when positioned within the broader Powersoft technology ecosystem. Beyond its role as a compact full-range or mid-high acoustic building block, **SPIXEL can be integrated with Powersoft amplification, DSP, AnyMATE, SpeakerMATE and, where low-frequency extension is required, MM-Force.**

For **OEM manufacturers**, this means working with a **coherent technology platform** rather than combining separate components from different sources. Acoustic design, amplification, processing, diagnostics and speaker-level intelligence can be developed as part of the same system logic, r**educing integration complexity** and i**mproving predictability across different product formats**.

Powersoft Tech	Functions	Benefit for OEM manufacturers
SPIXEL	Compact full-range acoustic building block.	Enables compact, scalable and repeatable loudspeaker formats from a shared acoustic platform.
MM-FORCE	Compact low-frequency extension for systems that require additional LF capability.	Supports deeper low-frequency performance in shallow, space-constrained or reduced-volume cabinet designs.
AnyMATE	Data communication for identification, monitoring and diagnostics.	Adds intelligence over the existing loudspeaker line without additional network cabling at the speaker
Class-D and DSP	Efficient power delivery, system control, protection and amplifier-side intelligence.	Improves system reliability, power management and consistent performance across different loudspeaker architectures.
ArmoníaPlus	Software platform for design, configuration, tuning and deployment.	Simplifies setup, optimization and commissioning, reducing time from design to installation.
MyUniverso	Remote visibility, monitoring and system diagnostic	Supports remote supervision, maintenance planning and long-term product/service management

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