ELSPES Inc. Achieves Breakthrough 3,500 nF/mm^2 Capacitance Density in Silicon Deep Trench Capacitor Technology

ELSPES Inc. has announced a major advancement in its deep trench capacitor (DTC) roadmap with the development of a next-generation silicon capacitor achieving a capacitance density of 3,500 nF/mm^2. This represents a 40% increase over the company's earlier 2025 milestone of 2,500 nF/mm^2, marking the highest density ever produced by ELSPES and further solidifying its leadership in high-performance silicon capacitor technology.

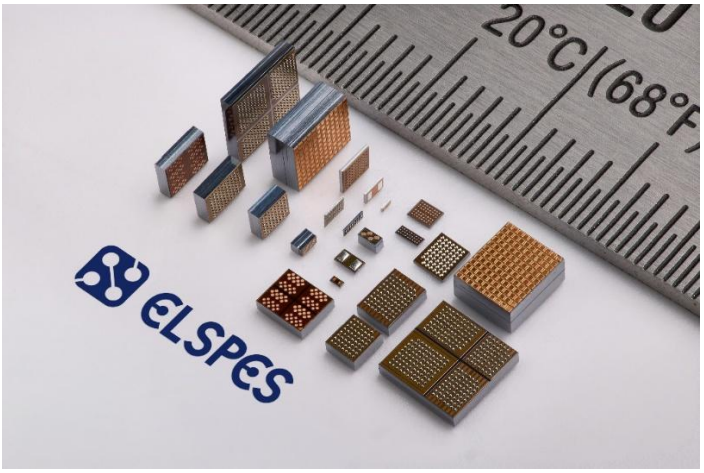

Figure 1. ELSPES Silicon Deep Trench Capacitors

The newly developed capacitor delivers up to 4,300 nF in a compact 1.2 mm × 1.0 mm footprint while maintaining a 4 V breakdown voltage. Despite the increased density, the device continues to provide exceptional electrical performance, including ESR values below 5 mΩ and ESL under 1 pH, ensuring ultra-low impedance across wide frequency ranges. These characteristics make the device particularly well suited for advanced power integrity, high-speed digital, and RF applications where both compact size and stable performance are critical.

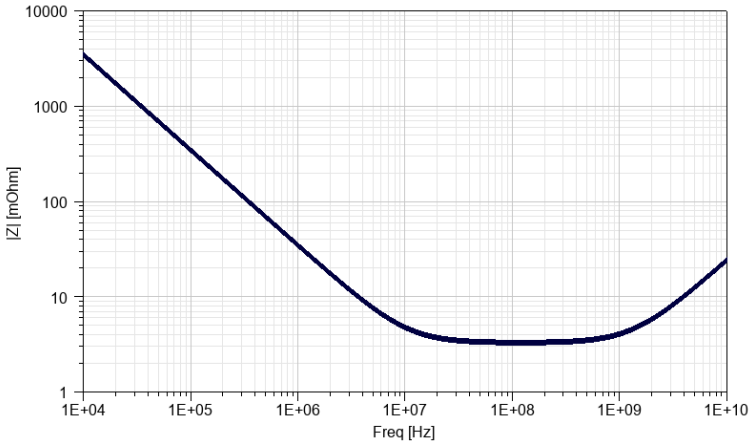

Figure 2. Impedance Performance of ELSPES 3,500 nF/mm^2 Capacitor

In addition to its electrical strength, the new capacitor demonstrates excellent stability over varying operating conditions. The temperature coefficient of capacitance (TCC) is measured at lower than 0.2%/°C, ensuring minimal variation across thermal environments, while the voltage coefficient of capacitance (VCC) remains lower than 2%/V, supporting steady operation even under fluctuating dynamic loads. These stability characteristics contribute to predictable system behavior in demanding and thermally challenging environments.

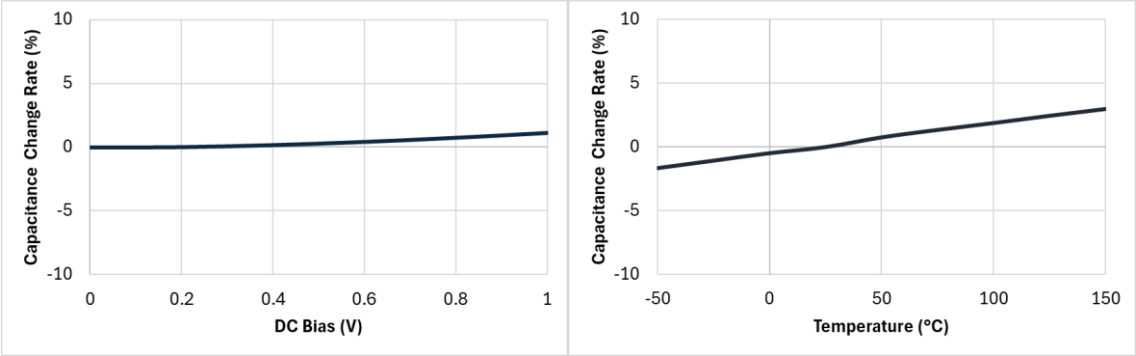

Figure 3. VCC and TCC of ELSPES 3,500 nF/mm^2 Capacitor

Long-term reliability was confirmed through time-dependent dielectric breakdown (TDDB) analysis. At an operating voltage of 1.35 V and an ambient temperature of 150°C, the capacitor exhibits a projected lifetime of more than 200 years at t0.1%. This result shows a way higher lifetime than international standard of 10 years lifetime and highlight the robustness of ELSPES's dielectric technology and demonstrate its suitability for mission-critical systems that require decades of operational stability.

ELSPES has also completed design and design-in activities with a U.S.-based customer for commercialization of this technology. The capacitor will be integrated into the customer's AI chip power delivery network, specifically within its IVR (Integrated Voltage Regulator) core module. Because the IVR is a central component responsible for high-efficiency on-package voltage regulation, the adoption of ELSPES's silicon capacitor underscores the device's ability to deliver extremely low impedance, high reliability, and stable operation under fast transient conditions. This collaboration represents a significant step forward in ELSPES's global engagement and its contribution to next-generation AI computing platforms.

The technology is enabled to support a wide range of applications spanning mobile processors, GPU and CPU modules, advanced SiPs, automotive electronics, and aerospace systems. With the achievement of 3,500 nF/mm^2 capacitance density alongside strong electrical stability and long-term reliability, ELSPES continues to advance the limits of silicon passive integration, addressing the growing demands of miniaturization and power integrity in next-generation electronic systems.