



The [Defense Business Accelerator, or DBX, Microelectronics Challenge](#) aims to revolutionize how the Department of Defense (DoD) drives the development of dual-use technology, which can be used for both civilian and military applications. (Learn more about the challenge following the story.)

DBX Awardee Story: **Soctera Amps up Power, Efficiency for Wireless Communication**

The development time and intellectual muscle gained from a DBX Award is allowing start-up Soctera to check all the boxes and maintain full management control as it ushers a more powerful and efficient power amplifier for wireless communication toward commercialization.

Based in Ithaca, NY, Soctera started in the labs of Cornell University as the graduate work of the company's two co-founders. They believed that optimizing a power amplifier's materials could increase the device's power density while simultaneously improving energy efficiency.

"Today's amplifiers take up more than half the power consumed by a wireless system," said Dr. Austin Hickman, Soctera co-founder and CEO. "They're capable of higher power performance but get so hot that you have to back them off. This is the bottleneck we're addressing. By providing a better thermal path, we can achieve a more efficient power performance and higher power density. When you have increased power density, you get more distance for the signal."

State-of-the-art power amplifiers today are typically manufactured using thick gallium nitride layers. Soctera's device uses an aluminum nitride layer that results in 10 times less material overall and 95% less gallium nitride specifically. This material reduction significantly improves thermal management that, in turn, amplifies power density because overheating is minimized. Using less gallium also increases supply chain security since China produces the vast majority of the material and is restricting its export.

"Our innovation comes from material science, as the device's design is pretty standard," Hickman said. "When you improve the material, you improve the device's fundamental behavior."

Military applications for Soctera's power amplifier include next-generation radar, satellite communications and jammers. All these systems require very high power density and also high frequency, which is hard to achieve with current technology. As frequency goes up, the distance a signal travels decreases due to the interaction with air. Soctera's device is designed to operate at higher frequencies.

"Satellite communication is also a big commercial market for Soctera, as this industry has grown rapidly due to the reduced cost to launch satellites," said Hickman. "Another commercial industry with great potential for our product is telecommunications. The upper frequency band of 5G is still largely untapped, and 6G will have even higher frequencies. We believe our power amplifier would shine in performance and efficiency for these applications."

Eliminating the Question Mark

Soctera is a fabless company, meaning it will outsource material and device production to partners that have already been identified and secured.

"We're at a crossroads, where we have our suppliers in place and are now executing to prove out our technology on a commercial scale," Hickman said. "We anticipate having the first demo device completed and available to share in mid-2025. Achieving this milestone would have been a huge question mark if we didn't receive the DBX Award."

Created by the Department of Defense and managed by the U.S. Partnership for Assured Electronics (USPAE), the DBX Awards are directed toward transformative technology that can be used by both commercial and government customers. Hickman learned about the program through a college advisor and immediately applied.

"Within about a month of applying and days after we signed the contract, we had the \$750,000 in the bank," said Hickman. "It was crazy. Most other grant programs take six to nine months between application and the money being available. One of the challenges with this delay in funding is that things shift rapidly in a start-up. What you planned to do with the money may have completely changed during the waiting period."

Not so with the DBX funds, which had flexibility for how they were spent. Soctera used a portion of the money to hire a chief technology officer (CTO), with the remainder funneled to development.

"I don't like to think about what we would have done without these funds," Hickman said. "We either wouldn't have hired a CTO or would have been forced to raise venture capital (VC) before we were ready to. Now, we can hit development milestones before we go the VC route, increasing our chances of success. The DBX Award also has allowed us to move at the development pace we want while maintaining 100% control. It's been a gamechanger for a start-up like ours."

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What is the DBX Microelectronics Challenge?

The challenge was created by the DoD Manufacturing Capability Expansion and Investment Prioritization (MCEIP) office and is administered by the U.S. Partnership for Assured Electronics (USPAE). It provides monetary awards intended to help accelerate the commercialization of vital, next-generation capabilities that also have defense applications. With the additional funding from a DBX Award, companies can get the resources needed to overcome critical manufacturing or technology development hurdles to reach full-scale production more quickly.

With the DBX Award, DoD and USPAE are helping companies build a sustainable business to ensure the supply of essential hardware for both commercial and defense needs.

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