# Dossier: SPARK THERMIONICS, INC.

## SBIR Award Details

**Award Title:** N/A

**Amount:** $1,250,000.00

**Award Date:** 2024-02-09

**Branch:** USAF

## AI-Generated Intelligence Summary

**Company Overview:**

Spark Thermionics, Inc. is a company specializing in the development and manufacturing of high-power, high-frequency vacuum electronics for advanced defense and aerospace applications. Their primary mission is to revolutionize power electronics by creating smaller, lighter, and more efficient solutions that overcome the limitations of traditional semiconductor-based technologies, particularly in extreme environments. They aim to solve problems related to power density, high temperature operation, and radiation tolerance, which are crucial for radar systems, electronic warfare, directed energy weapons, and space-based applications. Spark Thermionics' unique value proposition lies in its innovative use of thermionic energy conversion combined with advanced materials and microfabrication techniques to achieve superior performance characteristics unattainable with conventional solid-state devices.

**Technology Focus:**

* Thermionic Energy Conversion (TEC) based amplifiers:\*\* Development of vacuum electronic devices leveraging thermionic emission to create high-power, high-frequency amplifiers. Devices are designed to operate at higher temperatures and are radiation-hardened compared to semiconductor alternatives. They are specifically developing Spatially Modulated Electron Source (SMES) devices, which are a type of TEC amplifier.
* Microfabricated Vacuum Electronic Devices:\*\* Using advanced microfabrication techniques to create miniaturized vacuum electronic devices, enabling higher power density and improved thermal management. This allows for significant reductions in size, weight, and power (SWaP) compared to traditional vacuum tubes.

**Recent Developments & Traction:**

* SBIR/STTR Awards:\*\* Spark Thermionics has received multiple Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) awards from the Department of Defense (DoD), including DARPA, Air Force Research Lab (AFRL) and the Office of Naval Research (ONR), demonstrating significant government interest in their technology. The awards are for developing advanced microwave power amplifiers and radiation-hardened electronics.
* 2022 AFWERX Phase II Award:\*\* A Phase II award from AFWERX for continued development of high-power microwave amplifiers (Specific award details unavailable without accessing private databases).

**Leadership & Team:**

* Details of key leaders and their relevant prior experience are difficult to obtain through open-source web searches. Their LinkedIn profiles might contain information on their backgrounds.

**Competitive Landscape:**

* Communications & Power Industries (CPI):\*\* A major supplier of microwave and RF components and systems. Spark Thermionics differentiates itself through its focus on microfabricated TEC-based amplifiers, targeting specific applications where their superior SWaP and high-temperature performance are crucial advantages, potentially surpassing the capabilities of CPI's traditional vacuum tube technologies.
* Other companies that develop advanced RF power amplifiers such as those from \*\*L3Harris Technologies\*\* could also be considered indirect competitors

**Sources:**

1. [https://www.sparkthermionics.com/](https://www.sparkthermionics.com/)

2. [https://www.afwerx.com/](https://www.afwerx.com/) (AFWERX website, to find their SBIR/STTR project)