

Stark Compute Module v2.0 Architecture Introduction: Next Gen CubeSat Computing

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1 Introduction

The Stark Compute Module v2.0 represents an updated iteration of the most recent design of the Stark Compute Module, which has successfully reduced the dimensions of its gateway and compact CubeSat computing system. The system, previously measuring 5 inches by 5 inches, has now been downsized to 3.15 inches by 2.17 inches.

2 Methodology

This updated version features support for coaxial antennas and has a compact dimension of 3.15 inches by 2.17 inches. It is equipped with Arduino Uno Rev 3 GPIO pin headers to ensure shield compatibility, UART bridging, and includes the ESP32-S3-WROOM-2-N32R8V for Octo Flash support, alongside the advanced SX1262 Core1262 LF/HF LoRa Module. MicroSD support is preserved, maintaining the same signal architecture. An upcoming variant, which will be slightly larger, is expected to include an embedded mff2 eSim and a built-in dual 18650 Lithium Battery enclosure.

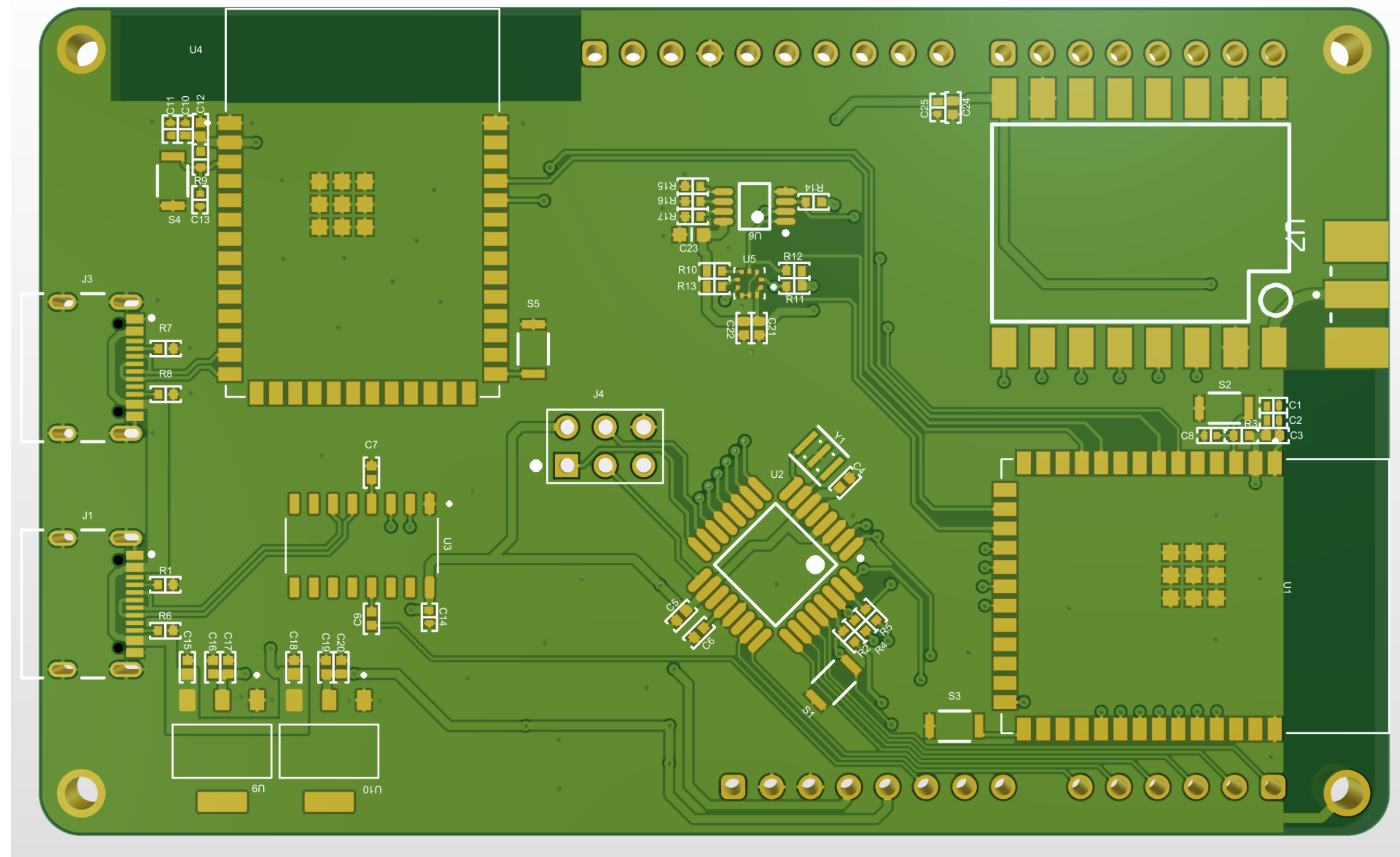


Figure 1: Stark Compute Module v2.0 PCB Layout

The importance of real-time networking should not be overlooked. The lightweight design permits the inclusion of up to four layers in the PCB, which contributes to improved signal strength during potential downtimes that may arise from weather-related disruptions. This aspect is particularly crucial when evaluating deployments in rural regions or developing countries that are encountering internet connectivity for the first time.

3 Results

The reduced size of the compute module facilitates lighter payloads for internet balloon launches and enables a more compact design for signal processing. Additionally, the components are more economical and designed to support high-frequency signal ranges. This advancement will lead to improved demonstrations, more affordable launches in the future, and enhanced support for aerostats.



Figure 2: From Test Internet Balloon Launch Deployment on Previous Architecture

4 Conclusion

The significance of weight in launch operations cannot be overstated; therefore, minimizing weight enhances coordination and performance while facilitating the transportation and production of a large quantity of boards. Additionally, this design incorporates support for octo flash, enables rapid operating system loading, and is optimized for tracking functionalities.



Figure 3: Stark Compute Module v1.0

References

- [1] Kamal, Andrew (2024), Stark Compute Module v2.0 *PCBWay*
- [2] Kamal, Andrew (2021), ChainBoard: The Next Generation Wireless Development Board *PCBWay*

Acknowledgements

The final Chainboard prototype was the v1.0 iteration for the Stark Compute Module, this iteration is v2.0 for Starkcom Global (Stark Drones)