TRIAD RF
A COMROD COMPANY

CASE STUDY

CUBESAT

5G Supplier Finds the Right RF Manufacturer

In a continuing effort to be a leading designer and manufacturer of high-performance RF/microwave amplifiers and integrated radio systems, Triad RF Systems has been dedicated to solidifying their position in the NewSpace market and strengthening their catalogue's space heritage. One of the most recent examples was witnessed with the launch of the SpaceX Falcon 9 Transport-2 on June 30, 2021, where two different Triad amplifiers powered critical RF links for two clients, one being a global satellite 5G supplier. This partnership, culminating in the Falcon 9 orbit in the summer of 2021, began nearly two years ago.

CHALLENGE

The customer's vision is to build a global satellite constellation dedicated for "Internet-of-Things" that can provide connectivity anywhere. Because Low Earth Orbit (LEO) satellites are constrained by DC power, an elegant RF front end with RF Tx amplifier and Rx chain is required to close the required RF link, but not waste precious power. Additionally, the system must be tough enough to handle the rigors of space for a prolonged period of time.

SOLUTION

Triad RF was able to design and deliver a custom RF front end, including RF Tx amplifier as well as the required Rx chain, to sufficiently meet the customer's RF link budget, while being efficient enough to not tax the on-board power system. Triad used their flight heritage experience to choose parts that would hold up in the vacuum of space and be resilient against radiation effects.

Laying the groundwork for success.

Initial contact started when the 5G supplier reached out to Triad RF, seeking a supplier to help turn their satellite ambitions into a reality. There, the conversation started by laying down the groundwork for what was to come for both companies. The subsequent months focused on planning and designing the right custom RF amplifier, and taking the time to research the best path to maximize the customer's chances of success in space. These exercises culminated in Triad sending a tech proposal to the customer, in an effort to solidify the blueprints.

Read more about how one starts the process of developing a custom RF amplifier.

Working together to refine the solution.

The next stage involved customer feedback from the customer, with subsequent adjustments and developments made by Triad. Making sure the custom RF amplifier checked off every box needed and refining the design process to solve any issues was a major key to success. This resulted in the order being placed and the RF amplifier being built and delivered by the end of the year. But the work didn't stop there, as Triad continued to support the customer throughout satellite integration to ensure the best possible outcome.

Triad TTRM2020 amplifier

The TTRM2020 is a S-band, full duplex, bi-directional amplifier designed to help overcome critical long-distance communications issues.

The Triad TTRM2020 amplifier.

That outcome was Triad's TTRM2020 amplifier working within the customer's satellite payload. The TTRM2020 is a S-band, full duplex, bi-directional amplifier designed to help overcome critical long-distance communications issues.

We have liftoff.

The mission, whose nearly two year journey culminated at the June launch, carried two telecom payloads. The primary payload provided satellite based IoT and M2M services using low frequencies, and the secondary payload demonstrated the feasibility of using high frequencies for 5G radio links. After the launch, all functionality was confirmed with the units, which are currently orbiting and operating.

Reflecting on this process and its outcome, both Triad RF and the 5G supplier have been able to enjoy the success of their partnership. A company representative, shared his thoughts on working with Triad: "Working with Triad RF has been a very good experience for our company. The team has always been available for our comments/suggestions, and we have developed a relationship that we hope will be very long-lasting. The design is cutting-edge and the fast delivery is amazing."

"Working with Triad RF has been a very good experience for our company."

Patrick Sherlock, VP of Business Development at Triad RF, commented on this new and exciting market segment: "Working in NewSpace is both challenging and rewarding. The speed at which this industry is moving is really second to none at the moment, and it's awesome to be a part of that. The really rewarding part is working with a partner who has the vision and the plan to introduce market disrupting technology. Seeing our hardware contribute, even in a small part, to their success is really gratifying."

The future looks bright.

Since the initial delivery, Triad has delivered two follow on RF front ends for future launches. "Triad RF provides solutions that have helped us stay at the forefront of our industry and meet our mission timeline in a record pace," said the company representative, "things worked amazingly from first switch on, we will be happy to engage them for future missions."

About Triad RF

Based in East Brunswick, New Jersey, Triad RF Systems is a recognized leading designer and manufacturer of integrated radio systems, RF power amplifiers, bi-directional amplifiers, assemblies and custom multi-functional amplifier systems for unmanned systems, drones, CubeSat platforms, custom military applications, as well as electronic warfare systems. Triad RF Systems is an AS9100 Certified company with products that are proven to perform to the most demanding requirements of MIL-STD-810. Triad RF Systems has sold over 10,000 units in over 35 countries, 6 continents, and their CubeSat products have logged over a combined 16 years of Low Earth Orbit flight time.