



Delivering Custom RF Amplifiers

BROADBAND WIRELESS | DEFENSE

As wireless technologies continue to evolve communications systems are becoming more advanced and compact. Bi-directional or multi-channel operation, small footprint, and extreme environments are just some stringent design criteria that are driving the market for custom radiofrequency amplifiers. Broadband Wireless Technologies is at the leading edge of this industry and has chosen Naprotek to support the manufacturing of their intricate and robust designs.



“When it comes to difficult and complex requirements, we know we can count on Naprotek to work with our design teams to provide the manufacturing expertise needed to realize our vision.”

Judy Comish
Vice President
Broadband Wireless Technologies

WIRELESS COMMUNICATIONS AMPLIFIERS FROM 200 MHz TO 28 GHz

UST-Aldetec Group is a consolidation of companies that provides industry-leading solutions in radiofrequency (RF) detection, frequency conversion, amplification, power management, and subassembly repair and re-engineering. Broadband Wireless Technologies, a UST-Aldetec Group Company, supplies RF and microwave amplifiers to commercial and government customers in the telecommunications, defense, aerospace, and medical industries. Using state of the art techniques, Broadband Wireless designs, develops, and manufactures a wide variety of custom wireless amplifiers including multicarrier, linearized, high-efficiency, bidirectional, and low-noise technologies.

RECOGNIZING THE PROBLEM

In wireless communications systems, using the right RF amplifiers is paramount to ensuring a high-power output signal without data degradation. Whether broadband or narrowband, high power or low noise, continuous wave (CW) or pulsed, signal integrity is critical to maximizing system performance and reliability. The variety of requirements any one system may have for RF amplifiers to meet is wide ranging and difficult for a commercial off-the-shelf (COTS) product to fulfill.

For many companies, creating a custom RF amplifier is an investment and getting the best return means finding design and manufacturing partners they can trust. Broadband Wireless specializes in the design of custom RF amplifiers that achieve the unique communications requirements of each application while at the same time meeting size, weight, power, and environmental constraints. Their team of engineers is experienced in a variety of specialized technologies including solid-state gallium nitride (GaN) and laterally-diffused metal-oxide semiconductor (LDMOS) as well as spectral modeling techniques that minimize intermodulation distortion (IMD) and adjacent channel power (ACP) through predistortion.

DEVELOPING THE SOLUTION

In the development of custom RF amplifiers, reliability and quality manufacturing go hand-in-hand. These circuits are carefully designed, modeled, and simulated to meet their functional requirements as well as to minimize long traces that can introduce unwanted stray reactance, ensure impedance matching to maximize signal power transfer and maintain stage efficiency, maximize thermal transfer between integrated circuits (IC) and the substrate, and isolate sensitive components from interference. This means that RF amplifier designs are often dense and require specialized soldering, inspection, tuning, and testing techniques to produce.

When Broadband Wireless was still a small, independently owned company they leveraged local printed circuit board fabrication houses in order to closely manage manufacturing quality. These providers were able to support benchtop designs, however, were unable to produce the complexity of some of these designs at scale. Bridging the gap, Broadband Wireless was able to forge a strategic partnership with Naprotek to support every phase from initial prototyping through streamlined assembly.

One way to meet the design specifications of a custom RF amplifier is by leveraging ball grid array (BGA) surface mounting technology, which enables significantly increased circuit density and a smaller footprint over other common techniques. Because BGA soldered connections are obscured by packaged IC's, optical inspection as an in-line process verification step simply isn't feasible. By employing 3D x-ray inspection following reflow soldering, Naprotek's technicians can quickly and non-destructively detect soldering faults. PCBA's with soldering faults can be immediately sent to rework and verified boards can continue on to their next assembly process. This enabling manufacturing technology increases the PCBA yield and reduces the overall cost.

As wireless communications technology advances, the demand for custom RF amplifiers continues to grow. For original equipment manufacturers (OEM) there are plenty of buying criteria in choosing a supplier, including compliance and certification to relevant industry standards and regulations. For regulated devices that have additional quality management and auditing requirements such as medical devices, Broadband Wireless can rely on Naprotek's established quality systems. For the defense market which has strict documentation requirements, Naprotek can create and maintain libraries to cross-reference manufacturer part numbers with end-user internal part numbers, making Broadband Wireless' fulfillment that much simpler.

ADDRESSING THE NEED

As advances are made in solid-state electronics, new developments in wireless communications are on the horizon. System architectures like massive multiple-input multiple output (MIMO) designs, wireless mesh networking, low power wide area network (LPWAN), software-defined radio (SDR), and millimeter wave technologies are still evolving at a rapid pace. For custom RF amplifier designers like Broadband Wireless, staying at the leading edge requires technological innovation and investment to succeed in this dynamic industry. Naprotek continues to invest in our state-of-the-art electronics manufacturing facilities, our RF and microwave foundry, our performance testing and microelectronics capabilities, and our team of highly-skilled engineering and manufacturing experts.



X-Ray inspection allows operators to visualize complex PCBA's they otherwise could not optically inspect. This additional verification process between assembly stages prevents soldering faults and ensures quality and reliability.



Learn more at:
naprotek.com/broadbandwireless