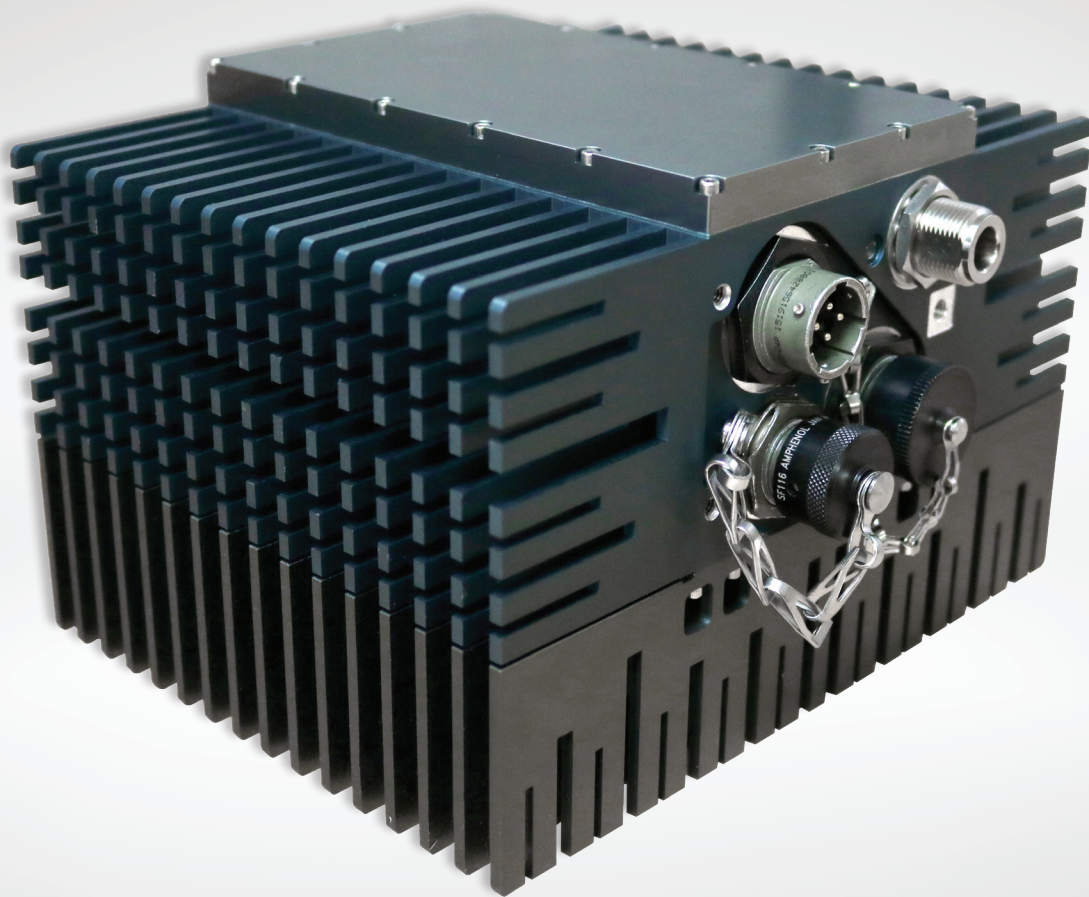


# NORSAT'S CUSTOMIZATION ADVANTAGE:

A Solution to Thermal Management Challenges



## THE CHALLENGE:

Norsat offers a range of industry-leading RF Block Upconverters (BUC) and Solid-State Power Amplifiers (SSPA) with some of the best SWAP and environmental tolerances available. However, sometimes an off the shelf BUC does not meet the demanding thermal and mechanical requirements of a specific application or project. For example, airborne applications often require the BUCs to operate and survive extreme temperatures while maintaining RF performance and reliability. BUCs inside maritime, communications-on-the-move (COTM) and airborne systems experience higher temperatures and often have restricted airflows for traditional cooling. In airborne applications, altitude exacerbates the problem since there is little air for cooling. Space is often at a premium so BUCs are expected to perform under these extreme conditions with added volume.

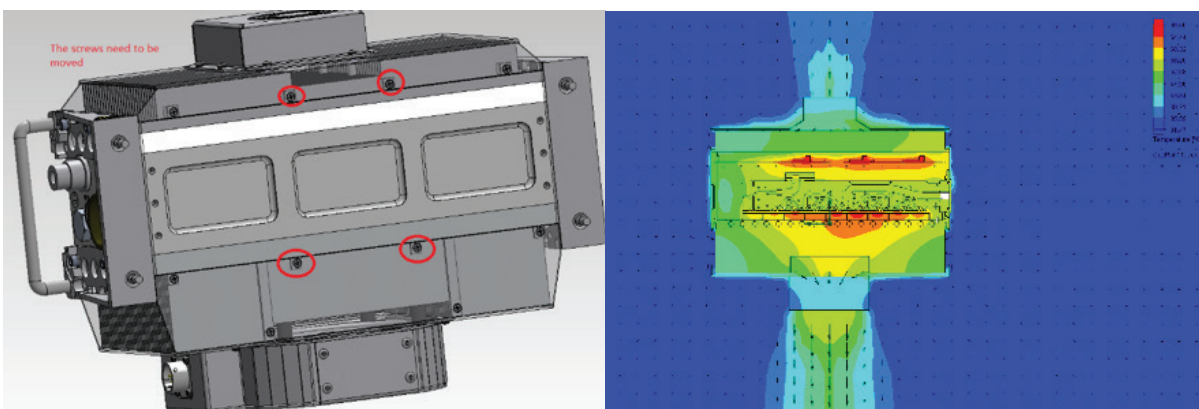


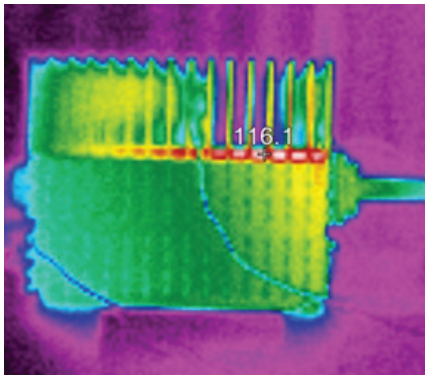
Figure 1 Custom Airborne solution – 80W ATOM BUC

## THE NORSAT SOLUTION:

The answer is to customize an off-the-shelf BUC or SSPA to meet the specific mechanical and thermal requirements. Norsat is familiar with the requirements of RTCA DO-160 and MIL STD 810 and has experience tailoring our products to meet these demanding requirements. As Norsat is the designer and manufacturer of these products, Norsat has detailed and intimate knowledge of the product and can modify the designs to meet almost any situation. Norsat can work with:

- a) Heat sink designs
- b) Heat pipes/ thermal chambers
- c) Thermal Interface Materials
- d) Materials
- e) Finishes
- f) External fans
- g) Radiation
- h) Convection cooling
- i) Orientation

Norsat will work with the customer's engineering team to understand the thermal and mechanical requirements and propose a solution. Norsat uses Computational Fluid Dynamics (CFD) Finite Element Analysis (FEA) tools to model and solves the three-dimensional heat transfer equations for the thermal management design. Iterative simulations are used to define thermal bottlenecks at the early design stage. The simulation tools provide:



- a) contour plots for temperature and fluid dynamics profiles
- b) estimates of specific temperatures such as MMIC case temperatures or power supply components
- c) heat flow
- d) airflow, pressure drops

The simulation results are verified by testing. Norsat has calibrated temperature chambers, temperature probes, and data loggers and infrared cameras.

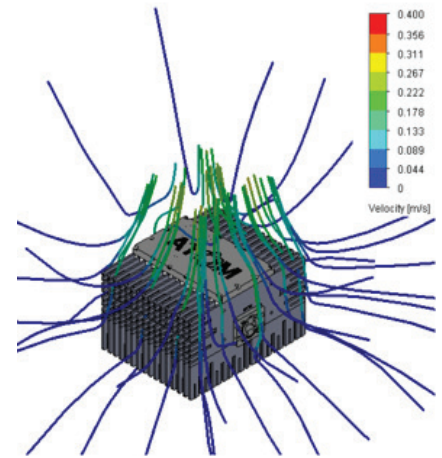


Figure 2 Thermal Simulation results for a passively cooled BUC

Norsat works with local test laboratories to verify altitude requirements and can call upon the local universities for expert advice.

## THE NORSAT ADVANTAGE

Norsat has the experience and tools required to customize the standard BUCs and SSPAs to meet the very demanding airborne, maritime and COTM thermal and mechanical requirements. Norsat works with the client to understand the requirements and uses simulation tools and test to develop and verify a design that meets the clients' requirements.

## ABOUT NORSAT

Norsat International Inc., founded in 1977, is a leading provider of innovative communication solutions that enable the transmission of data, audio and video for remote and challenging applications. Norsat's products and services include customizable satellite components, portable satellite terminals, maritime solutions and satellite networks. The company's products and services are used extensively by telecommunications services providers, emergency services and homeland security agencies, military organizations, health care providers and Fortune 1000 companies.

## CONTACT US

Norsat International Inc.  
110 - 4020 Viking Way  
Richmond, BC  
V6V 2L4 Canada

[sales@norsat.com](mailto:sales@norsat.com)  
[www.norsat.com](http://www.norsat.com)

