

# Affordable Weapons Datalink Insertion (AWDI)

## PROBLEM/OBJECTIVE

Affordable Weapons Datalinks are required to provide rapid feedback between the weapons, forward observers, and mission control. The AWDI program is a key enabler for Joint Services interdiction requiring networked weapons capability. Weapons Datalinks (WDL) operating in these environments invariably require higher power over larger bandwidths to maximize the amount of data transmission over maximum distance.

The objective of this program was to develop, demonstrate, and implement advanced manufacturing processes and practices, reduce cost, and accelerate technology insertion into munitions programs.

## ACCOMPLISHMENTS/PAYOFF

**Process Improvement:** Air Force ManTech worked with Rockwell Collins to mature low-cost, wide-bandgap Gallium Nitride (GaN) on Silicon (Si) Monolithic Microwave Integrated Circuits (MMICs). The program looked at foundry processes to develop size, weight and power-cost chip sets for Small Form-Factor (SFF) datalinks. The GaN Si MMIC will enable higher gain and output power across a broader frequency range than existing technologies and facilitating transceiver and power amplifier SFF integration.

Initial MMIC device yields were less than 25% with known infant mortality issues and no manufacturing test capability. The program has since received a consecutive string of "Green" status ratings for maturing manufacturing processes and has increased tested die yields to greater than 95%.

**Implementation and Technology Transfer:** Rockwell Collins has transitioned devices into several Warfighter programs. GaN/Si MMIC designs have been utilized in four Multi-Chip Modules for the Multi-function Information Distribution System – Joint Tactical Radio System (MIDS-JTRS), and in two applications for the Ground Mobile Radio (GMR). The GMR includes a single multi-die design developed to handle two separate transmit and two separate receive functions in the transceiver. More than 11,000 devices were delivered to the GMR program by the end of 2010.

Design efforts for utilizing GaN devices in the F-35 operational test radio are underway. Qualification testing for production hardware is scheduled for 2011, with deliveries in 2012. A WDL technology insert has also been developed for possible implementation into the Small Diameter Bomb II (SDB-II) for wideband waveform applications.



**Expected Benefits and Warfighter Impact:** Device yields have improved dramatically over the course of the program; going from less than 25% to greater than 95% for the yield assessment MMIC set. The program achieved its cost target for WDL production, accelerated insertion of WDL/SFF products and process technologies, lowered production risks associated with new technologies, and will insure timely transition of networked WDL capabilities to the Warfighter.

## TIMELINE/MILESTONE

Start Date	August 2006
End Date	January 2010

## FUNDING

ManTech	\$5,100K
Rockwell Collins	\$4,100K

## PARTICIPANTS

AFRL ManTech, WPAFB OH  
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