Department of the Navy SBIR/STTR Transition Program

Statement A: Approved for Release. Distribution is unlimited.
NAVSEA #2016-626

Topic # N131-049
High Power Solid State Amplifiers
Daico Industries, Inc.

WHO

SYSCOM: NAVSEA

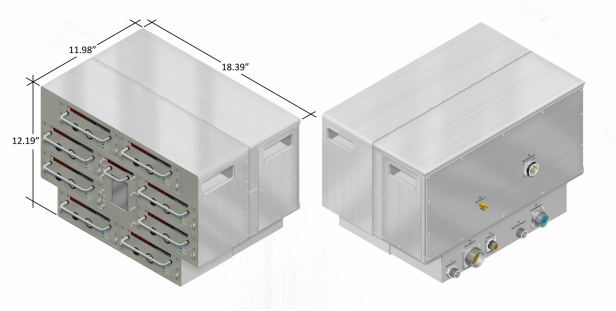
Sponsoring Program: PEO IWS

Transition Target: AN/SPS-49 RadarTechnology Refresh

TPOC:
(812)854-5264

Other transition opportunities: AN/SPY-1 Radar Technology Refresh

Notes: The Combined High Power Amplifier (CHPA) technology can be integrated into Shipboard, Ground Base and Airborne Solid State High Power Amplifier applications requiring high power level and high reliability.



WHAT

Operational Need and Improvement: There is a need for high power solid state amplifiers to replace existing troublesome and diminishing manufacturing source Klystron and Cross-Field Amplifier tubes in radar applications to increase Mean Time Between Critical Failure (MTBCF), minimize maintenance intervention and maximize operational availability.

Specifications Required: The Combined High Power Amplifier (CHPA) technology is a reliability-oriented design architecture, achieving 99.999% operational availability in the mission critical applications. This technology is a hatchable modular design and scalable in power; hundreds of kilowatts can be achieved by combining multiple CHPAs with various redundancy configurations. The CHPA architecture proves flexible and compatible with GaN, LDMOS and other technologies. Implementation of the innovative thermal removal configuration and cableless Divider Switching Combiner Unit (DSCU) combining scheme demonstrate its ultra high power density capability and cost effectiveness. The technology reduces the transmitter's physical size by 50 percent, reduces its overall weight by 20 percent and reduces its cost by 38 percent.

Technology Developed: Fully Solid State Combined High Power Amplifier (CHPA) Architecture capable of delivering scores of kilowatts of RF power with graceful degradation, higher reliability, maintainability with lower total cost of ownership. Multiple CHPAs can be combined to achieve hundreds (or thousands) of kilowatts of coherent RF power.

Warfighter Value: This technology can deliver solid state transmitter performance with zero downtime during a 6-month deployment and graceful power degradation with multiple Power Amplifier Unit (PAU) failures.

WHEN

Contract Number: N00024-16-C-4034 **Ending on:** November 17, 2017

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Refined 4.5kW PAU	Low	>4.2kW@36W per cubic inch PAU achieved	TRL7	September 2016
Cableless (7+1)DSCU	Low	2 Prototype Cableless Units Complete	TRL7	September 2016
29kW (7+1)CHPA Demo	Med	Cabled (9+1)CHPA Demonstrated	TRL7	March 2017
>55kW SSTx Demo by Combining two (7+1)CHPAs	Low	>40kW Power Level Achieved with single CHPA during DEMO	TRL7	October 2017

HOW

Projected Business Model: Daico Industries can begin low initial rate production of our high RF power output solid state SPS-49 transmitters in Q4 of 2018; with full rate production of fully qualified transmitters to start with the fifth deployed transmitter. Full rate production will be 5 transmitters per year minimum.

Company Objectives: As a transmitter manufacturer, we look to partner with an installer(s) and share depot services and are targeting SPS-49, SPY-1 and other legacy tube-based high reliability transmitter applications.

Potential Commercial Applications: Airport Surveillance Radar

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