



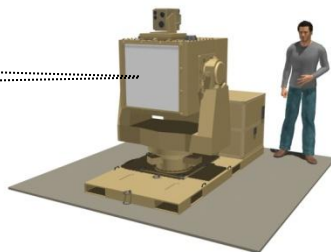
Solid State Active Denial Technology (SS-ADT)



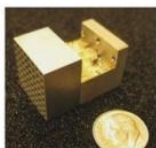
Non Lethal “repel” effect
against personnel



SS-ADT on gimbaled skid plate



Hi-Flux Heat
Exchanger
Thermal SBIR



~1" Solid State
Sub Module



3.2" 100 watt Modules
(stack to size)



Schedule

Activities	FY12	FY13	FY14	FY15	FY16
• Fabricate/Assembly of Skid Plate (non gimbed)					
• Integration					
• Demonstrate “Repel” Effect					
• Gimbal Prototype					
• Skid Plate modification & integration					
• Human Effects Testing/Safety Release					
• Technical Test					
• Support TEC-D Demo					

Purpose:

Provide the Warfighter a Non-Lethal weapon system to enhance both base protection and mounted vehicle applications. SS-ADT will temporarily incapacitate personnel targets with reversible effects, without collateral damage, without adverse environmental impacts, and minimal risk of injury. SS-ADT is suitable for crowd control with the ability to stop, deter and turn back an advancing adversary, providing an alternative to lethal force.

Product:

- Integrated stand-a-lone system on a skid plate
- Tactical engagement range capable
- HECO testing and demonstrations
- Safety release for Non-lethal operation

Payoff:

- Only Non-lethal system/technology that provides the Warfighter the full range capability of emerging requirements.
- Light weight, small footprint that is suitable for vehicle mounting or hard stand
- Force Protection – Basing

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Army SBIR Process

Topics



DoD Solicitation

Participation in all three annual solicitation periods. Topic selection very competitive across ARDEC.

Phase I



Feasibility Study
\$100K, 6 Months

\$50K Option
(Gap Funding)

~10% of proposals
submitted selected

Phase II



Prototype Development

\$1M, 2 Years

(\$50K Option
Gap Funding)

~50% invited proposals
selected

***Commercialization
Pilot Program (CPP)***

+

***Ph II Enhancement
Competitive, additional PM
SBIR \$ with Agency
contribution***

4 years from
topic
generation to
TRL 4/5 at end
of Phase II

Phase III



Commercialization

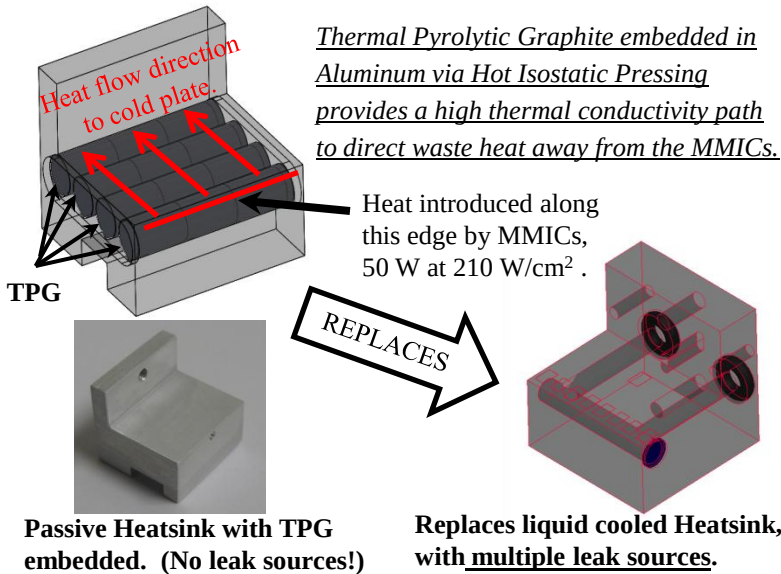
**Transition to
Federal Govt
or Private
Program**

No SBIR Funds

Phase I + Option + Phase II = \$1.15M

Phase II Enhancement = \$500K+

Backups



	Phase I w/Option	Phase II
Start Date	October 30, 2011	October 2012 (TBC)
End Date	October 31, 2012	September 2014
TRL Level	3	6
IP and Comm. Partners	In patent process; Raytheon Partnering	Defining strategy & partners for commercialization
Major Milestone	Prototype Heatsink designed, analyzed, fabricated and successfully tested demonstrating feasibility.	High fidelity Heatsink designed, analyzed, fabricated and characterized for use in SS-ADT system.

The Peregrine Falcon Corporation, Pleasanton, CA

Purpose:

Reduce the size/weight/cost of advanced high power electronic weapon systems through advanced technologies for heat extraction at the microelectronics level (heat source).

Product:

- Application: Solid State Active Denial Technology (SS-ADT)
 - Challenge: liquid cooling – adds to weight/cube & reliability concerns (fluid leaks)
- SBIR Approach: embedded high conductivity Thermal Pyrolytic Graphite (TPG), removing all fluids in submodules and yielding a 90% reduction in o-ring connections
 - Deliverables:
 - High Fidelity M&S to refine TPG design (has already demonstrated a heat flux capability of 210 W/cm²)
 - Hardware demonstrator & environmental/ruggedness, characterization & operating margin laboratory tests
 - Proof Sample for integration & validation with full electronics at ADT 'Module' level

Performance Targets (achieved):

- Removal of 50W waste heat of current MMIC/submodule design while operating at the worst-case maximum coolant operating temperature of 40°C
- Carrier temperature held to 74°C (goal: 80°C max).
- Demonstrated hot isostatic press fabrication requirements & full encapsulation

Payoff:

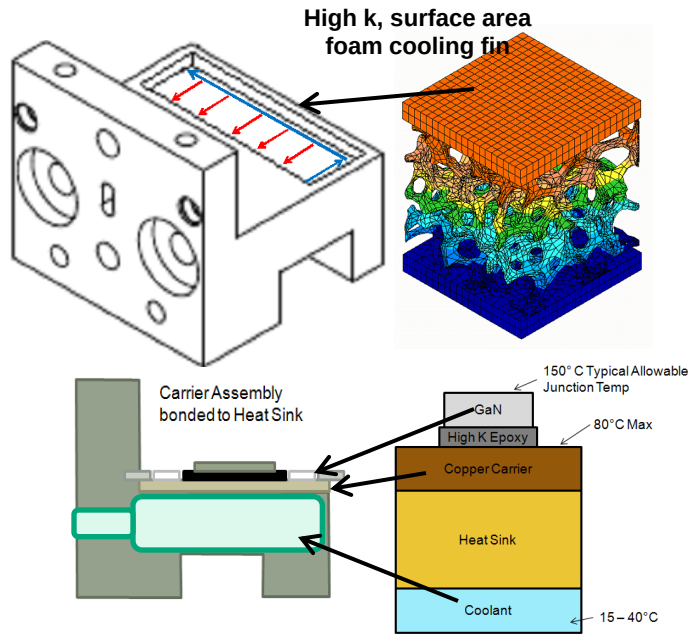
- Improved system reliability (eliminates 90% of fluid leak sources)
- Potential for reducing system/cube and a lowered Ready Power draw
- Technology well suited for leveraging into other Military & Commercial high power electronic system in need of high-flux heat transfer solutions



RDECOM

SBIR Topic # A11-082: “Novel Monolithic Microwave Integrated Circuit (MMIC) High Flux Heat Exchanger”

Unclassified



Purpose:

Reduce the size/weight/cost of advanced high power electronic weapon systems through advanced technologies for heat extraction at the microelectronics level (heat source).

Product:

- Application: Solid State Active Denial Technology (SS-ADT)
 - Challenge: liquid cooling – adds to weight/cube & reliability concerns (fluid leaks)
- SBIR Approach: high conductivity metallicized foams to permit consideration of a system design change to air-based cooling
 - Deliverables:
 - M&S of approaches to support air-based cooling
 - Hardware demonstrator (environmental/ruggedness laboratory testing)
 - Hardware Proof Sample for integration & validation with full electronics at ADT ‘Module’ level

Performance Targets (achieved):

1. Maintained 60°C coolant ΔT , removing 50W waste heat of current MMIC/submodule design at air flow rate of 1.3 ft³/min
2. Carrier temperature held to 79.8°C (goal: 80°C max).
3. Tested Copper and SiC foams in Phase I; higher conductivity potential using graphite foam planned for Phase II.

Payoff:

- Reduced system weight, system cube
- Improved system reliability (elimination of fluid & leaks)
- Technology well suited for leveraging into other Military & Commercial high power electronic system in need of high-flux heat transfer solutions

	Phase I	Phase I Option & Phase II	
Start	10/27/2011	8/15/2012	12/18/2012
End	04/30/2012	12/17/2012	12/18/2014
TRL	TRL 4	TRL 4-5	TRL 6
IP & Comm. Partners	Raytheon Partnering	Other Commercial partners	Utility Patent; Joint Dev. Agreement
Major Mile-stones	Performance targets demonstrated, single heat sink model	Higher fidelity laboratory testing; improved M&S	System integration & validation

Ultramet Corporation, Pacoima, CA,