Exhibit R-2, PB 2010 Defense Logistics Agency **RDT&E Budget Item Justification**	**DATE:** May 2009
APPROPRIATION/BUDGET ACTIVITY 0400 - Research, Development, Test & Evaluation, Defense-Wide/BA 3 - Advanced Technology Development (ATD)	**R-1 ITEM NOMENCLATURE** PE 0603720S Microelectronics Technology Development and Support - DMEA

COST ($ in Millions)	FY 2008 Actual	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
Total Program Element	47.138	32.392	26.310						Continuing	Continuing
1: Defense Microelectronics Activity (DMEA)	47.138	32.392	26.310						Continuing	Continuing

A. Mission Description and Budget Item Justification

Defense Microelectronics Activity (DMEA) was established in FY 1996 by the Office of the Secretary of Defense to act as the joint DOD Center for microelectronics acquisition, transformation, and support. Microelectronics technology is a critical and essential technology for all operations within the DOD and their use is rapidly increasing. Yet, as critical as this technology is to DOD operations, the defense microelectronics market is now <0.1% share of the total market because the use of microelectronics has exploded in the commercial world, driving the semiconductor industry to supersede successive generations of microelectronics technologies with new technologies every 18 months. As a result, the semiconductor industry does not respond to DOD's unique needs of ultra-low volumes, extended availability timeframes, or unique security concerns. The DMEA mission is to design, develop, and demonstrate microelectronics concepts, advanced technologies, and applications to provide a pathway to extend the life of weapon systems and to solve operational problems (e.g., reliability, maintainability, performance, and assured supply). DMEA's capabilities make it a key tool in the intelligent and rapid development and application of advanced technologies to identified military needs. This includes implementation of advanced microelectronics research technologies providing for the development and long-term support structure necessary to ensure rapid design, fabrication, test, insertion, and support of microelectronics technologies. DMEA has developed a unique-in-the-world flexible process foundry, the Advanced Reconfigurable Manufacturing for Semiconductors (ARMS) foundry, to develop specialized microelectronic devices critical for DOD on a wide variety of process technologies and geometry node-sizes. The DMEA provides an in-house capability to support these strategically important technologies within the DOD. The DMEA applies both available leading-edge technologies and innovative applied research and development (R&D) approaches to develop solutions to current problems. DMEA's RDT&E program is comprised of a mix of studies, investigations, planning efforts, developments, fabrications, and the insertions of solutions to identified military needs. DMEA has been singled out as a unique national resource by the warfighters, industry and foreign governments. Funds are required for investments and expenses for personnel, technical and analytical support, facilities, equipment, supplies, travel, and publications.

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B. Program Change Summary ($ in Millions)

	FY 2008	FY 2009	FY 2010	FY 2011
Previous President's Budget	47.138	0.000	0.000	
Current BES/President's Budget	47.138	32.392	26.310	
Total Adjustments	0.000	32.392	26.310	
Congressional Program Reductions	0.000	0.000		
Congressional Rescissions	0.000	0.000		
Total Congressional Increases	0.000	32.480		
Total Reprogrammings	0.000	0.000		
SBIR/STTR Transfer	0.000	0.000		
Economic Assumptions		-0.088		
Departmental Guidance			26.310	

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APPROPRIATION/BUDGET ACTIVITY	**R-1 ITEM NOMENCLATURE**	**PROJECT NUMBER**
0400 - Research, Development, Test & Evaluation, Defense-Wide/BA 3 - Advanced Technology Development (ATD)	PE 0603720S Microelectronics Technology Development and Support - DMEA	1

COST ($ in Millions)	FY 2008 Actual	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
1: Defense Microelectronics Activity (DMEA)	47.138	32.392	26.310						Continuing	Continuing

A. Mission Description and Budget Item Justification

The Microelectronics Technology Development and Support funds are to design, develop, and demonstrate microelectronics concepts, technologies, and applications to extend the life of weapon systems and solve operational problems (e.g., reliability, maintainability, performance, and assured supply). This includes providing for the development and long-term support structure necessary to ensure rapid prototyping, insertion, and support of microelectronics technologies into fielded systems, particularly as the technology advances.

These funds provide an in house technical staff of skilled and experienced microelectronics personnel working in state of the practice facilities providing technical and application engineering support for the implementation of advanced microelectronics research technologies from design through fabrication, assembly, and installation. The DMEA provides an in-house capability to support these strategically important technologies within the DOD with distinctive resources to meet DOD's requirements across the entire spectrum of technology development, acquisition, and long term support. DMEA's capabilities make it a key tool in the intelligent and rapid application of advanced technologies to add needed performance enhancements in response to the newest asymmetric threats and to modernize ageing weapon systems.

DMEA has developed a unique-in-the-world flexible process foundry for making semiconductors on a wide variety of process technologies and geometry node-sizes. The ARMS can be "flexed" on demand to fabricate integrated circuit (IC) devices on not just one, but on multiple manufacturing processes with different feature sizes and technologies. DMEA's foundry process business model is to acquire commercial process IP to host in the ARMS at much reduced cost. However, this requires keeping pace with the microelectronics industry and updating the necessary equipment and processes providing these capabilities as the technology advances. This flexibility satisfies the DMEA mission to provide microelectronics solutions, and results in 'just enough, just in time" supportability. DMEA has also been requested to make the DMEA flexible semiconductor foundry a contingency foundry for trusted integrated circuits to provide a means of supplying critical trusted integrated circuits when the industrial base is not able to provide them.

B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
DMEA Accomplishments / Plans	47.138	32.392	26.310	

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B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
FY 2008 Accomplishments: • 3-D Electronics efforts are to accomplish technology development in four areas: 3D integration of optical and digital technologies; materials development for thermal management; materials development for 3D wiring; and utilization of new interconnects and devices based on graphene. By stacking devices and interconnecting them in a 3D arrangement, a huge leap in functional density is possible. 3D integration is a cornerstone of the coming revolution in electronics. Critical enablers to fulfilling the vision of high density 3D technology are new materials for electrical interconnects electromagnetic shielding and heat removal. The FY08 efforts are development of a 3D magnetic logic system with no moving parts, fabrication/evaluation of proof-of-concept nonvolatile memories with metal/silicon, optimization/characterization of Single-Walled Carbon Nanotube (SWNT) thin film optocoupler, and demonstration of a hetero-nanocrystals concept as a floating gate for nonvolatile memory. ($0.969) • Advanced Dynamic Technology Optics Program efforts are continuing development of a new class of smart materials that will provide nanosecond switching speed shutter devices and variable index of refraction devices. These devices will be operated with a microelectronics controller system to ensure that signal processing delays within the microelectronics will not impede the speed of the device operation. The FY 2008 efforts continued system integration, field demonstration, and prototype testing of electronically tunable optical filters. ($1.162) • Advanced Surface Radar Technologies efforts are developing and adapting electronic components to new form factors thereby expanding surface ship radar electronics miniaturization and packaging methodologies to demonstrate low cost, scalable radar designs. Presently, the Navy’s surface radar systems are monolithic in their design/implementation, requiring the Service to purchase new radar systems (or extensively upgrade existing systems) for any change in the threat they face. New innovations derived from DOD airborne radar systems development are promising lower cost, modular surface ship radar designs that can be quickly and inexpensively scaled to meet the Service’s needs. In FY08, candidate electronics were evaluated for potential benefit to supporting the Navy’s next generation surface ship radar systems. ($5.325)				

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B. Accomplishments/Planned Program ($ in Millions)	**FY 2008**	**FY 2009**	**FY 2010**	**FY 2011**
• Forbes Field Air National Guard (ANG) Regional Defense Command Integration Center efforts are developing an architecture, concept of operations (CONOPS) and communications systems to improve mission systems, enhance ANG capabilities and correct emergency response management deficiencies, redundancies and technology gaps. Specific accomplishments include updates to the proof-of-concept design to an Operational/Deployed phase with expanded collaboration and communications systems within the Eisenhower Center working with fixed, mobile and temporary emergency response centers. ($0.968) • Foliage-penetrating Acoustically Cued Imagery Sensor (FACIS) will provide near real-time Intelligence, Surveillance and Reconnaissance (ISR) in the jungle environments. Current efforts are development of a miniature multimode sensor array subsystem, imaging subsystem, sensor controller, Line Of Sight (LOS) and non-LOS communications subsystem, and Global Positioning System (GPS) subsystems. FACIS may be cued or event driven to automatically take pictures, compress, encrypt, and transmit the image for further analysis at a remote location. Miniaturization through advanced packaging and design of the prototypes will achieve covertness for the system. Conduct further jungle environment experiments to refine the design and expand the operational characteristics of the system. ($2.327) • Superlattice Nanotechnology efforts are developing and characterizing Silicon Carbide (SiC) wafers grown from SiC templates using low-temperature processes and molecular beam epitaxy with minimum defects that will form the basis for the next generation of radio frequency and radiation-hardened microelectronics. The Specific accomplishments include infusing superlattice nanotechnology into the growth of SiC substrates; minimizing growth defects; growing crystalline, defect-free SiC-on-Silicon, utilizing superlattice and superlattice-like atomic layer growth control; producing full wafer, full thickness SiC with device-appropriate dopants for high-voltage applications; fabricating and testing large-area power devices with performance targets of 5-10 kV and 50,000 Amps. ($1.549) • Semiconductor Photomask Technology Development otherwise known as the Domestic Mask Inspection Tools and Technology (ADMITT) program are accelerating the development of state-of-the-art mask making tools and also the formation of a domestic mask blank source for future applications in the below 45 nanometer regime. Specific accomplishments include development of beta prototype				

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B. Accomplishments/Planned Program ($ in Millions)	**FY 2008**	**FY 2009**	**FY 2010**	**FY 2011**
inspection hardware necessary to evaluate the optical quality of a mask and documented reticle inspection technology candidates that may meet 22nm and 16nm wafer node sizes. An additional (non-mask) inspection need has emerged – the qualification of the patterns written by e-beam pattern generators directly on semiconductor wafers – abbreviated as MLL (Mask Less Lithography). This technology is currently being investigated and was included in the ADMITT investigation tasks. ($2.327) • University Materials Characterization and Metrology Center efforts are identifying the chemical and structural elements of materials and devices, as well as chemical, optical, electrical, and physical principles in measurement science and enabling the nanotechnology industry by providing expertise, training, and sharing diagnostics equipment. Specific accomplishments include advanced materials for semiconductor nanowire synthesis, characterization and device development for electronics, thermoelectric cooling and chemical sensing, and development of nano-scale devices and materials for computing electronics, data storage and sensors. ($1.162) • Spintronics Memory Storage Technology efforts are to achieve a breakthrough in magnetic random access memory (MRAM) technologies together with companion programs in electronics packaging and advanced materials in order to develop a technology that will be produced domestically and will transition from the lab to the battlefield in a timely and cost effective manner. The FY 2008 efforts will conduct university-based research in nanomaterials and nanodevices, investigating applications of carbon materials in spintronic devices, advanced MRAM chip and racetrack memory development, and demonstrating a nanomagnetic logic system. ($2.324) • Network Micro-Sensors Technology Testbed efforts are to establish a national testbed asset. The testbed will be utilized by military and commercial customers to develop and test large-scale sensor network protocols and applications. The availability of the testbed will make possible cost and schedule savings for future networked sensor development efforts. Specific accomplishments include fabrication, test, and integration of the hardware elements and completion of the software development necessary to implement the complete system design. The system will be demonstrated using the MircroSensor System, a wireless networked unattended ground sensor system, to populate the testbed sites. A universal interface is being designed to accommodate many different micro-sensor types. Special				

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B. Accomplishments/Planned Program ($ in Millions)	**FY 2008**	**FY 2009**	**FY 2010**	**FY 2011**
consideration is being given to storage of data generated by the test bed because this data will in all likelihood be ITAR controlled. The test bed will reside on the University of Texas at Dallas (UTD) campus. ($1.549) • End to End Semiconductor Fabrication Alpha Tool efforts are to develop a novel semiconductor processing capability to manufacture semiconductors in a single tool. This new, non liquid chemical, multi-activation processing technique allows high resolution patterns of process layered material to be fabricated directly on semiconductor wafers in a single step. This industry disruptive process eliminates the need for billion dollar facilities and million dollar masks for each chip design. The specific FY 2008 accomplishments include extensive modeling and design towards the development of the Optical Column needed for the Alpha tool. Elements for the column are presently under construction. ($1.549) • Demonstrations, Test and Evaluation of Mini-Sensor efforts are to support demonstrations, operational tests and evaluations of state-of-the-art sensor technology. One technology uses microsensors to improve the military's awareness of potential threats and the defense of high-value targets. Specific accomplishments include enhancements which were requested by potential end users and implemented into the system; increase the stand-off distance between the sensor field and the human operator, integrate with other security systems use by the military, improve the detection range of the system, and improve the intruder tracking algorithm. A pilot system was installed and demonstrated for the US Customs and Border Patrol. That pilot system had enhanced miniature wireless components that collect and transmit information using very little power. It also has further enhancements e.g., beacon hopping to decrease the probability of detection and interception, base station authentication to ensure the security of the data, and integration with other data gathering systems. ($4.647) • Electronics and Materials for Flexible Sensors and Transponders (EMFST) efforts are to perform advanced research on inks for fabrication of silicon based electronic components, evaluate roll to roll assembly technologies and laser assisted electronics assembly processes for application to flexible electronics such as sensor arrays, and develop a passive transducer as an event detector. Such components can be used covertly in the war on terrorism. ($2.905)				

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B. Accomplishments/Planned Program ($ in Millions)	**FY 2008**	**FY 2009**	**FY 2010**	**FY 2011**
• Feature Size Migration efforts at DMEA provided the fabrication technology, infrastructure modifications and facilitization to build microelectronics with increased functional density using digital, analog and mixed signal processes for military systems in DMEA's foundry. ($3.877) • Rapid Prototyping / Low Rate Production of Mini-Sensor efforts are to develop and prototype advanced wireless components for U.S. government customers to facilitate their transition into operational use. Specific accomplishments include developing a covert camera system, a magnetic sensor system, RFID sensor tags, and an acoustic sensor array. The prototype hardware and software will be transitioned to a production ready status. Qualification testing, and supporting the execution of a military utility assessment is required to ensure the system is ready for transition to a military user. Military users will be consulted to ensure the system integrates into the existing C4ISR network. Training and operation material will be provided to the military user. ($3.485) • High Specific Energy Rechargeable Battery efforts are to improve the delivered energy and cycle life of Next Generation Energy Storage Devices and optimize battery cell chemistry and design to generate higher power. The DOD relies heavily on microelectronics for the effectiveness of its combat systems (Ex: Unmanned Aerial Vehicles (UAVs), unattended ground sensors, etc). These systems, inturn have increased demands for power to operate. While there has been exponential growth in integrated circuit performance since 1970, battery technology has been lagging and has reduced growth potential of digital devices. This new work, creates a new battery technology, utilizing lithium sulfur (Li-S) and implementing improvements in cell chemistry and cell design. ($1.551) • Carbon Nanotube Thin Film Near Infrared Detector efforts are to build on the revolutionary discovery of the broad spectrum bolometric response of single-walled carbon nanotube (SWNT) thin films to develop a new generation of near infrared detectors. Specific accomplishments include optimizing the temperature coefficient of resistivity which is an important parameter in the bolometric performance of these films. Techniques were developed to chemically process and functionalize the SWNT and cost-efficient procedures were developed for large scale synthesis of chemically functionalized SWNT materials. The thin film technology will be developed for the focal plane arrays. ($0.969)				

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B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
• Self-Sensing Array Container Pre-Screening Sensor System efforts are developing a first generation trace chemical detection system suitable for applications in ISO shipping containers for homeland defense. This program will result in robust, compact, low-cost, low-power chemical sensor units for unattended sensing applications in International Standards Organization (ISO) shipping containers and other applications to enhance homeland security. Microcantilever-based Self-Sensing Array (SSA) technology is expected to provide the selectivity, sensitivity, durability, low cost, and low power needed for unattended sensors and sensor networks. Specific accomplishments include developing a combined system prototype of a chemical sensor system to be evaluated in laboratory and field tests and analyze the data. ($1.394) • Agile JTRS Integrated Circuits program has developed proof of concept voltage controlled, frequency agile filters. The goal is to develop channelizers based upon high performance chip scale acoustic resonator filters. Promising advancements in filters capable of switching through the application of a DC voltage have been made. Systems such as the Joint Tactical Radio System (JTRS) require significant frequency tunability and could make immediate use of this technology to both improve performance and reduce cost of the systems. This capability will significantly increase the ability of the military to provide high-performance and cost-effective communications systems to the warfighter. ($1.549) • Next Generation Supercomputer IA Prototype for the NRL efforts to functionally prototype the next generation of a large data, digital supercomputing information architecture at the Naval Research Laboratory Center for Computational Science. This Federated, Distributed Information Assured Architecture scales to provide an Enterprise-wide view of information as ‘single image’ based on net-centricity. It proposes to allow concurrent search, location and fusing of multifunctional data quickly in near real-time. Sustained 40-100G wide area data flows are proposed for ingestion, manipulation and visualization of data from multiple sites for processing, search, exchange, and COOP of data. ($4.388) • Small Business Innovative Research (SBIR) efforts are to use the SBIR community to address the challenges of current and emerging microelectronics issues which adversely impact the reliability, performance, maintainability, or operational life of DOD weapon systems, and to investigate opportunities for application of advanced microelectronics technologies in DOD weapon systems. DMEA will generally				

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B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
participate in one or two SIBR solicitations per year depending on the quality and quantity of responses received. The mission of the DMEA is to research current and emerging microelectronics issues, with a focus on warfighters needs, and to leverage advanced technologies to extend the life of weapon systems by improving their reliability, maintainability and performance, while addressing the problem of diminishing manufacturing sources. This mission includes providing for the development and long-term support structure necessary to ensure rapid prototyping, insertion, and support of advanced microelectronics technologies into fielded systems. • The primary effort this FY is a SBIR phase 2 effort to design, develop, and demonstrate a flexible, reconfigurable radio transceiver implemented on a microelectronic device (ASIC) that is suitable for long term operation (one year or more) on battery power. A flexible reconfigurable radio transceiver consists of a digital radio (or software radio) core and required oscillators, mixers, and amplifiers needed for specific applications. The digital radio should be easily reprogrammed to use different modulation methods. This makes it a useful building block for many different types of systems used by both military and commercial users. An ultra-low power radio is meant to be powered by batteries over long periods of time (months or years) without replacement. This makes it useful in deployed sensor array systems with possible applications in ad-hoc networks. • Additionally, FY 2008 SBIR funds will share the cost (with DARPA MTO) of a proposed enhancement to LumArray's existing NavAir Phase II SBIR to achieve nanometer-level-precision lithography with LumArray's maskless lithography system, the ZP-150, compatible with hybrid lithography, and to accelerate the development of the ZP-150B. The proposed SBIR enhancement will enable improvements to the software that controls the alignment subsystem, and innovations in the data-path software that will compensate for systematic errors in the stage motion, the spatial-light modulator, and the location of zone plates in the array of zone plates. ($1.162) *FY 2009 Plans:* • 3-D Electronics and Power efforts are to take advantage of recent advances in nanomaterials and nanodevices to begin to address the issues necessary to take the electronics industry beyond the two-dimensional silicon based devices and wiring. Development of new high density electronic materials				

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B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
and 3D-electronics technologies together with associated packaging and heat dissipation solutions are planned. ($2.334) • Agile JTRS Integrated Circuits program continues the development of voltage controlled, frequency agile, acoustic resonator filters. The ultimate goal is to develop channelizer based upon high performance chip scale acoustic resonator filters. This phase continues the development of filters capable of switching frequencies through the application of a DC voltage (i.e. being totally passive devices). Systems such as the Joint Tactical Radio System (JTRS) require significant frequency tunability and could make immediate use of this technology to both improve performance and reduce cost of the systems. This technology has the potential to provide a cost effective solution to the high-performance tuning requirements of military communication systems. ($1.556) • C-Scout Container Security System efforts are the second of three planned phases, continuing development of the Self-Sensing Array Container Pre-Screening Sensor System efforts (FY 2008) to further design, develop and test the prototype self-sensing array based system. This FY09 task will focus on further testing and development of the prototype's capabilities and enhancement of the system for biological and radiation threat detection. ($2.334) • Carbon Nanotube Thin Film Devices for Portable Power efforts will build on the revolutionary improvement of fabricating some of the fuel cell components from thin films of Carbon Nanotubes (CNTs). This breakthrough improves the performance of the fuel cells and lowers the cost so that emergency response teams and even individual soldiers could be equipped with portable power sources. In order to realize the benefits of this breakthrough, it is necessary to develop large scale fabrication techniques for producing the membrane electrode assemblies that are suitable for use in portable fuel cells. The FY 2009 funds will be used to advance material science technology of carbon nanotube manufacturing and to develop techniques for processing the thin films into the rugged membrane electrode assemblies (MEAs) that are necessary for deployment in portable fuel cells. The FY 2009 funds will also be used to modify the carbon nanotubes with Platinum (Pt) nanoparticles for incorporation into the fuel cell electrodes and demonstrate the preparation of large area thin film catalyst support layers (CSL) and gas				

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B. Accomplishments/Planned Program ($ in Millions)	**FY 2008**	**FY 2009**	**FY 2010**	**FY 2011**
diffusion electrodes (GDE) using carbon nanotube materials. The performance of the carbon nanotube based CSL and GDE will be evaluated as fuel cell components. ($1.556) • Defense Command Integration Center efforts in FY 2009 are the third phase of an initiative to enhance the emergency response system by developing the Eisenhower Center Regional Defense Command Integration Center. This phase will provide collaboration capability by designing and developing a mobile incident command vehicle with communications and GIS capabilities to aid command and control and situational awareness for emergency responders. ($0.856) • Electronics and Materials for Flexible Sensors and Transponders (EMFST) efforts are to perform advanced research and development of materials and process for printed electronics on flexible substrates, evaluate flexible electronics assembly methods for high-speed assembly process, and develop a disposable radio-frequency sensors and transponders. Such components can be used covertly in the war on terrorism. ($3.112) • Feature Size Migration efforts at DMEA are providing the fabrication technology, infrastructure modifications and facilitization to build microelectronics with increased functional density using digital, analog and mixed signal processes for military systems in DMEA's foundry. The funds for this project will be used to develop the ability to produce more complex microcircuits, to improve the efficiency of converting from one process to another in making required parts. ($1.945) • High Performance Tunable Materials efforts are to radically improve the tuning range and lower the loss of multi-octave tunable circuits for software defined radio preselectors and create the truly wideband, multi-mode radios long sought for direct communications across a variety of applications. High-throughput combinatorial methodologies will be used to create new materials in a series of short loop experiments. These experimental material combinations will allow thousands of variations to be quickly investigated. The result will be new materials for tunable applications which are had been overlooked by less sophisticated experimental approaches. ($2.334)				

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B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
• Scalable Topside Array Radar (STAR) Demonstration addresses deficiencies in the Navy's existing surface ship radar systems which are primarily monolithic in function, requiring replacing or extensively upgrading radar systems, for newly defined threats. Recent innovations in DOD airborne radar development promise lower size, weight, and cost and are adaptable modular designs that can be quickly and inexpensively scaled to meet the Navy's shipboard needs. STAR is an effort to assess elements of applicable technology and support refinements necessary to reduce the cost/risk of next generation surface ship radar systems. STAR directly supports the Navy's plan for an aggressive radar competition to help reduce the cost of next generation platforms, such as the CG(X) cruiser. Specifically, the STAR efforts are to study and analyze high power amplifier monolithic microwave integrated circuits, transmit/receive modules, receiver multi chip modules, and beam steering control modules (BSCM) for improvements in next generation radar system performance. The contractor shall analyze advanced technology microelectronic and semiconductor processes to lower unit production costs. ($0.778)				
• Semiconductor Photomask Technology efforts are further extending the capabilities of the 6XX generation inspection tools to meet the needs for advanced 193nm immersion masks and Extreme Ultraviolet Lithography (EUVL) pilot-production masks (13.5nm). Complete System Requirements Document (SRD) for all the hardware and software to inspect immersion masks. Set all system level parameters for masking techniques required using EUVL and Nano-Imprint Lithography (NIL) node geometries. This effort will begin to define all the requirements for producing equipment to manufacture masks that will produce die with geometries of less that 22nm. ($2.333)				
• Smart Bomb Microwave Radar Guidance System efforts will develop an all-weather, miniature, targeting Planned Position Indication (PPI), synthetic aperture RADAR (SAR) solution to guide smart bombs to targets. This FY 2009 task will design, develop, integrate, test and demonstrate a Smart Bomb Microwave RADAR Targeting System. ($1.945)				
• Spintronics Memory Storage Tech efforts are to take advantage of recent activities in nanomaterials, nanodevices and spintronics to bring about revolutionary advances in magnetic storage technologies. Current hard disk drives are now contending with the superparamagnetic limit which limits the magnetic grain size for recording information, and there is an opportunity to introduce new storage and logic				

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APPROPRIATION/BUDGET ACTIVITY 0400 - Research, Development, Test & Evaluation, Defense-Wide/BA 3 - Advanced Technology Development (ATD)	R-1 ITEM NOMENCLATURE PE 0603720S Microelectronics Technology Development and Support - DMEA			PROJECT NUMBER 1

B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
devices and new architectures that can combine these functions. Exploration of the use of multilevel recording techniques, nanomagnetic logic devices, spin momentum transfer devices, high performance tunnel barriers and new carbon materials in order to implement advanced spintronics memory technologies are planned. ($2.334) • Superlattice Nanotechnology efforts will facilitate the development of a large SiC epitaxial substrate with processes comparable in cost to standard silicon wafers. This cost reduction will impact the use of SiC devices in military applications such as high power switches for power distribution (free electron lasers, high power radars, electromagnetic gun, electromagnetic launchers, solid state lasers, and commercial), high power radio frequency transistors, light emitting diodes, and radiation hard electronics. During earlier phases of this program, processes for the fabrication of SiC films on silicon substrates were demonstrated and samples were successfully fabricated and characterized. This phase builds upon the results of previous phases to perfect the growth of AIN on Si and Sapphire, subsequent growth of SiC on AIN on Si and Sapphire, further evaluate the possibility of ALD and low energy deposition growth of SiC on 111 Si, select the preferred growth and material system, and fabricate, test, and evaluate SiC power devices in the 2KV/20K AMP range. ($1.945) • Tunable MicroRadio for Military Systems are to develop RF technology and packaging capabilities for innovative broadband, tunable RF front end subsystem to provide a more fully integrated, miniaturized RF MicroRadio System. This system will ultimately be capable of multi-band and multi-mode operation in a single RF module for Department of Defense and commercial applications. FY09 will focus on packaging design and demonstration, functional RF circuit block design and demonstration, modeling tools and RF characterization capabilities. ($4.667) • X-Band/W-Band Solid State Power Amp efforts will develop solid state power amplifiers as the facilitating replacement technology for traveling wave tubes (TWTs) in X-Band and W-Band RADAR systems. Solid state power amplifiers are a potential enabling technology to replace TWTs, and will facilitate better RADAR performance via more rugged, compact, efficient and reliable X-Band and W-Band RADAR transmitters. This FY 2009 effort will design, develop, integrate, bench test and demonstrate first generation prototype X-Band / W-Band RADAR solid state power amplifiers. ($1.556)				

Exhibit R-2a, PB 2010 Defense Logistics Agency RDT&E Project Justification	DATE: May 2009

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B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
• Unmanned Aerial Vehicle (UAV) Situational Awareness efforts are to design, develop, and test an integrated system that will fuse data from sensor systems such as radar, infrared (IR), and optical sensors, with GPS maps and global information, in near real-time. In addition to the fusion of the sensors, a three dimensional location of targets and obstacles will be created, and updated frequently, to result in a data base that is available to provide inputs to the flight control director, which is part of the flight control system onboard the UAV, as well as transmit situational awareness information to a ground-based Command Center. The system shall provide significant near-real time situational awareness/data fusion and will be applicable across a broad spectrum of Department of Defense operational users. ($1.000)				

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A