Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Office of the Secretary Of Defense	Date: March 2023
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
Total Program Element	1,688.428	682.139	644.326	810.839	-	810.839	749.010	675.491	588.703	570.444	Continuing	Continuing
907: *Access to State-of-the-Art (SOTA) Microelectronics - Development*	1,480.946	403.724	286.658	311.120	-	311.120	222.989	220.365	220.076	224.906	Continuing	Continuing
908: *Access to Advanced Packaging and Testing - Development*	81.438	72.343	56.118	90.199	-	90.199	94.129	92.660	64.766	66.127	Continuing	Continuing
911: *Address DoD Unique Needs - Radiation Hardening and non-CMOS*	50.500	169.072	180.003	279.416	-	279.416	298.759	231.083	170.770	143.404	Continuing	Continuing
912: *Create a Quantifiably Assured-Microelectronics Pipeline*	75.544	37.000	113.547	126.081	-	126.081	133.133	131.383	133.091	136.007	Continuing	Continuing
913: *Defense Microelectronics Cross-Functional Team Funding*	0.000	0.000	8.000	4.023	-	4.023	0.000	0.000	0.000	0.000	Continuing	Continuing

Note

New Start (Y/N): No

A. Mission Description and Budget Item Justification

This Program Element (PE) supports microelectronics modernization activities that enable defense systems to keep pace with commercial microelectronics technological advances, reduce reliance on obsolete microelectronics, and mitigate the Department's reliance on sole source foundries for assured state-of-the-art (SOTA) microelectronics. It addresses the challenges of 1) having enduring access to a multiplicity of modern manufacturing processes that require commercial volumes to maintain long term viability and 2) protecting the intellectual property (IP) of the microelectronic parts that are manufactured.

Microelectronics technology is a critical enabler for the development of new systems and sustainment of fielded systems required for all four 2022 National Defense Strategy (NDS) priorities. In addition, this PE directly supports the NDS priority of building a resilient Joint Force and defense ecosystem through modernization of key capabilities and fostering pathways to adapt SOTA commercial and dual-use technologies to Defense needs. This PE also supports the NDS objective of Making the Right Technology Investments by supporting the domestic microelectronics innovation ecosystem and partnering with industry to quickly incorporate market-driven commercial advances with military-relevant capabilities.

Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Office of the Secretary Of Defense	Date: March 2023
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0604294D8Z *I Trusted and Assured Microelectronics*

This PE supports the OUSD(R&E) Microelectronics Modernization Roadmap. The primary areas of focus of this roadmap include the following: access to state-of-the-art microelectronics technology, access to advanced packaging and test; access to the best commercial design technology; quantifiable assurance and secure design; foundry access; policies, standards, and Joint Federated Assurance Center (JFAC) governing body; access to radiation hardened microelectronics; access to non-complementary metal oxide semiconductor state-of-the-art (SOTA) microelectronics for radio frequency and optoelectronic applications; education and workforce development; and supply chain awareness and security.

Recognizing that an assured supply of microelectronics is a U.S. Government (USG)-wide concern, this activity will interface with interagency partners to take into account interagency requirements, opportunities for collaboration, and strategic decisions that can be made to limit the overall cost of these requirements to the USG.

This activity is being led by the Under Secretary of Defense for Research and Engineering.

B. Program Change Summary ($ in Millions)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Previous President's Budget	704.091	647.226	662.282	-	662.282
Current President's Budget	682.139	644.326	810.839	-	810.839
Total Adjustments	-21.952	-2.900	148.557	-	148.557
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-79.400			
• Congressional Rescissions	-	-			
• Congressional Adds	-	76.500			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-21.952	-			
• Program Adjustments	-	-	148.557	-	148.557

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2022	FY 2023
Project: 907: *Access to State-of-the-Art (SOTA) Microelectronics - Development*		
Congressional Add: *Design Acceleration*	100.000	-
Congressional Add Subtotals for Project: 907	100.000	-
Project: 911: *Address DoD Unique Needs - Radiation Hardening and non-CMOS*		
Congressional Add: *GaN and GaAs RFIC technology*	25.000	25.000
Congressional Add: *Radiation-Hardened Fully-Depleted Silicon-on-Insulator Microelectronics*	18.000	38.000
Congressional Add: *Advanced Node Radiation-Hardened Fully-Depleted Silicon-on-Insulator Technology*	43.500	10.000
Congressional Add: *Magnetoresistive Random Access Memory (MRAM)*	-	3.500

Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Office of the Secretary Of Defense	Date: March 2023
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0604294D8Z *I Trusted and Assured Microelectronics*

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2022	FY 2023
Congressional Add Subtotals for Project: 911	86.500	76.500
Project: 912: *Create a Quantifiably Assured-Microelectronics Pipeline*		
Congressional Add: *Trusted Artificial Intelligence*	10.000	-
Congressional Add Subtotals for Project: 912	10.000	-
Congressional Add Totals for all Projects	196.500	76.500

Change Summary Explanation

FY 2024 increase of $148.557 million is comprised of an increase of Project 911 within this PE of $160.000 million, a realignment of $14.411 million to support the Historically Black Colleges and Universities/Minority Serving Institutions program, which is a priority of the Under Secretary of Defense for Research and Engineering (USD(R&E)), a realignment of $0.692 million to support departmental priorities, and an economic assumption increase of $3.660 million.

Exhibit R-2A, RDT&E Project Justification: PB 2024 Office of the Secretary Of Defense											Date: March 2023	
Appropriation/Budget Activity 0400 / 4					R-1 Program Element (Number/Name) PE 0604294D8Z / *Trusted and Assured Microelectronics*				Project (Number/Name) 907 / *Access to State-of-the-Art (SOTA) Microelectronics - Development*			
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
907: *Access to State-of-the-Art (SOTA) Microelectronics - Development*	1,480.946	403.724	286.658	311.120	-	311.120	222.989	220.365	220.076	224.906	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Microelectronics are critical technologies that drive the modern economy and enable the defense systems that allow warfighters to accomplish their missions. Other nations recognize the need to control the microelectronics supply chain and indigenous state-of-the-art (SOTA) manufacturing. Aggressive investments and licit and illicit actions by peer nations threaten U.S. leadership. China alone purports investment of $150 billion and a national strategy to achieve dominance in all major areas of microelectronics by 2030. Russia and China have publicly stated that advanced microelectronics, AI, and machine learning (ML) are the keys to economic and military dominance.

This project funds the operation software assurance(SwA) support to DoD programs and organizations of the Joint Federated Assurance Center (JFAC), established in National Defense Authorization Act (NDAA) Sec 937, to increase DoD's SwA by providing engineering tools, technical services, best practices, innovative technologies and other assistance to programs to detect, assess, prioritize, and mitigate vulnerabilities from malicious software and assurance against supply chain exploitation vulnerabilities. The JFAC will provide capabilities for programs to keep assessment findings throughout the life cycle of their systems for data mining (e.g., documentation on rationale for previous mitigation decisions). The collaboration between the JFAC and program offices will help mitigate existing and emerging critical threats and vulnerabilities in software to all DoD programs.

The project supports the implementation of Executive Order 14028 Improving the Nation's Cybersecurity for software assurance for critical software such as software bill of materials, and information communications technology supply chain risk management, and the PD, Cyber Roadmap for mitigation of software vulnerabilities that are cyber related.

This project includes establishment of new strategic partnerships with existing commercial state-of-the-art (SOTA) domestic foundries to develop a data-driven, risk-based approach to supply chain protection and develop the assured access, secure design, and manufacture of advanced microelectronics technology and electronic components.

Successful implementation will transition these technologies to use in DoD programs, obtain access to multiple commercial microelectronics facilities, establish secure design capabilities, and solidify a data-driven approach to supply chain protection. It also includes keeping pace with the rapid advancements in microelectronics technology and the globalization of this industry sector. It will provide the basics for updating and strengthening DoD assurance policy and includes collaborating with industry to develop data driven quantifiable standards.

Exhibit R-2A, RDT&E Project Justification: PB 2024 Office of the Secretary Of Defense		Date: March 2023
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** 907 / *Access to State-of-the-Art (SOTA) Microelectronics - Development*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Joint Federated Assurance Center (JFAC)	9.000	10.820	6.956
Description: This project's activities will advance the state of the art for trust and assurance by the federated assurance labs for both hardware and software assurance for the DoD enterprise to both accelerate the development of assurance technologies and to ensure the integrity of DoD weapon systems, information systems, and national security systems in direct support of program offices across the life cycle. JFAC is the center that bridges the various federated DoD organizations together across the Joint Services and NSA. JFAC advances the development of assurance technologies, offers scalable enterprise assurance capabilities, fosters a thriving assurance ecosystem, and provides access to leading assurance solutions to include policies, guidance, best practices, training, resources, tools, assessments, personnel, source code, and data. ***FY 2023 Plans:*** • Continue to select and procure quantities of state-of-the-art software assurance (SwA) tools; innovate and advance technology for vulnerability and subverted code detection of binary code in DoD embedded systems; evaluate high payoff open source components required to move DoD systems to the cloud using containers; technology and infrastructure support to programs to determine and mitigate exploitable vulnerabilities; map vulnerabilities and threats to SwA tool capabilities and provide assessments of how well SwA tools and techniques function directly to programs. • Execute enterprise license program procurement of SwA tools. • Continue to align expanding JFAC infrastructure to cloud native environments to support hardware assurance, deploy SwA tools, training, shared experiences, and best tool-use practice directly to programs and organizations. • Develop and make directly available to programs and organizations beyond leading edge acquisition software vulnerability mitigations, standards and technical implementation guidance, workforce training packages, and subject matter expertise. • Continue efforts to support implementation of Executive Order 14028 Improving the Nation's Cybersecurity for software assurance for critical software, and the software bill of materials. • Continue to implement Section 1655 of the FY2019 NDAA - Mitigation of risks to national security posed by providers of information technology products and services who have obligations to foreign governments. ***FY 2024 Plans:*** • Continue to Select and procure quantities of state-of-the-art software assurance (SwA) tools; innovate and advance technology for vulnerability and subverted code detection of binary code in DoD embedded systems; evaluate high payoff open source components required to move DoD systems to the cloud using containers; technology and infrastructure support to programs to determine and mitigate exploitable vulnerabilities; map vulnerabilities and threats to SwA tool capabilities and provide assessments of how well SwA tools and techniques function directly to programs. • Execute enterprise license program procurement of SwA tools. • Continue to align expanding JFAC infrastructure to cloud native environments to support hardware assurance, deploy SwA tools, training, shared experiences, and best tool-use practice directly to programs and organizations.			

Exhibit R-2A, RDT&E Project Justification: PB 2024 Office of the Secretary Of Defense		Date: March 2023
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** 907 / *Access to State-of-the-Art (SOTA) Microelectronics - Development*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
• Develop and make directly available to programs and organizations beyond leading edge acquisition software vulnerability mitigations, standards and technical implementation guidance, workforce training packages, and subject matter expertise. • Continue efforts to support implementation of Executive Order 14028 Improving the Nation's Cybersecurity for software assurance for critical software, and the software bill of materials. • Continue to implement FY2019 NDAA Section 1655 - Mitigation of risks to national security posed by providers of information technology products and services who have obligations to foreign governments ***FY 2023 to FY 2024 Increase/Decrease Statement:*** The decrease of $3.864 million between FY 2023 and FY 2024 is due to reallocation of funding from this project to other microelectronics assurance efforts covered in Project 912 of this PE.			
Title: Access to State-of-the-Art (SOTA) Microelectronics - Development	294.724	275.838	304.164
Description: Foundry Access: This activity implements multiple foundries process design kit (PDK) environments ensuring the government is not dependent on one single source for critical components. Demonstrate hardware through dedicated and multi-project wafer runs at multiple foundries. Commercial foundries generate enormous amounts of data on their processes as a best practice for quality assurance to improve reliability and increase yield. The Foundry program collects and utilizes this data to generate and allow quantitative comparison of performance and security metrics in the design and test stage of the microelectronics lifecycle, thereby mitigating risk. Rapid Access to Microelectronic Prototypes (RAMP): This activity includes verifying the ability to fabricate classified and/or export-controlled designs in on-shore commercial foundries. Funding will establish multiple strategic partnerships with existing commercial domestic microelectronics design vendors and foundries to develop a data-driven, risk-based approach to supply chain protection and demonstrate the assured manufacture of advanced electronic components. This project demonstrates the technical means for protecting IP and obfuscating the final user function from the supply chain will be realized using personalization, programmability and software, following application specific integrated circuit (ASIC) manufacturing. Efforts are on-going to update International Traffic in Arms Regulations (ITAR) and Export Administration Regulations (EAR) policy in this area. Funding supports activities to enhance the export control regime so that it maintains or strengthens current protections while enabling access to commercial capabilities, products, and IP.			

Exhibit R-2A, RDT&E Project Justification: PB 2024 Office of the Secretary Of Defense		Date: March 2023
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** 907 / *Access to State-of-the-Art (SOTA) Microelectronics - Development*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Rapid Access to Microelectronic Prototypes – Commercial (RAMP-C): This project enables the DoD and the defense industrial base to collaborate with the commercial microelectronics industry to increase prototype development, demonstration, and address the war fighter's need to maintain and modernize weapon systems as the threat landscape shifts. This project enables T&AM program to demonstrate, by FY 2025, full access to U.S. commercial SOTA design, foundry, and advanced packaging capability and meet DoD's unique needs within two to three years for modernization, including for RH and photonics applications. The capability will reduce the time needed to replace microelectronics components that are generations behind the commercial sector, move away from off-shore sources for SOTA commercial integrated circuits, and accelerate the demonstration and adoption of quantifiable assurance methods throughout the microelectronics lifecycle and supply chain. Reducing the timeline by up to two years not only benefits export control and classified system protection, but also the requirements of Section 224 in FY 2020 National Defense Authorization Act for the DoD to implement commercial standards for the acquisition of assured microelectronics products. ***FY 2023 Plans:*** Foundry Access: • Continue to enhance access to SOTA fabrication ecosystem. • Maintain program of record access to assured fabrication flow and fund multi-project wafer production runs at multiple SOTA domestic sources. RAMP: Complete the RAMP prototype and establish a RAMP system operator that will allow Government acquisition programs access to a secure design and cloud capability. The RAMP operational platform will: • Continue to enhance secure design and cloud capability with new tools/techniques. • Continue to utilize traceability and provenance mechanisms to verify and vet data sources in a zero-trust architecture and enhance ability of DoD/Defense Industrial Base to design SOTA microelectronics. • Continue to quantify transition of designs to prototypes and programs of record and maintain persistence in lifecycle assurance data and intellectual property. RAMP-C:			

Exhibit R-2A, RDT&E Project Justification: PB 2024 Office of the Secretary Of Defense		Date: March 2023
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** 907 / *Access to State-of-the-Art (SOTA) Microelectronics - Development*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Continue to develop and mature a leading edge (<7nm), commercially-viable, U.S.-located domestic wafer foundry ecosystem access capability on the order of of > 26,000 wafer starts per month for design and manufacturing of quantifiably assured, dual-use commercial and DoD custom integrated circuits. This project will enable the following: • Access to a SOTA U.S. wafer foundry. • Access to commercial and critical quantifiably assured dual-use COTS integrated circuits. • Access to capabilities necessary to develop quantifiably assured custom DoD integrated circuits. • The jump-start in commercial use of the domestic foundry by key U.S. fabless companies. • Establishment of a viable design ecosystem including access to 3rd party design modules. • The reduction in the cost differential of building a U.S.-located wafer foundry verses off-shore. • The enablement of commercially-supported and enduring U.S. logic foundry capability. Design Acceleration and Transition: Accelerate DoD access to a microelectronics quantifiable assured (MQA) design and manufacturing ecosystem leveraging commercial capabilities for long-term sustainability. The following activities could be included: • Expand and accelerate Development and insertion of IP for ASIC and Chiplet security including authentication, Firmware Attestation and Decryption and SOC Interface encryption. Investments include: Providing MPW runs, EDA, simulation, and 1.) emulation tools to small business to lower barriers to access and stimulate innovation with favorable DoD intellectual properties rights and agreements 2.) Developing IP capture models and repositories to document and maintain DoD funded IP to be made accessible to future DoD programs 3.) Further maturation and demonstration of ME Commons deliverables • Development and insertion of tools and techniques for Protect of silicon IP during manufacturing and test phase, including multi-chip package (MCP) with full lifecycle MQA demonstration and maturation. • Demonstration of using COTS parts in more critical DoD applications utilizing MQA ant the inherent personalization features of the COTS device. • Accelerate MQA for DoD utilizing pilot programs for maturation of process, procedures and required technical capabilities for threat mitigation. This includes development of next generation ideas to increase the effectiveness of mitigations implemented in future updates to the LoA-1, LoA-2, or LoA-3 MQA standards.			

Exhibit R-2A, RDT&E Project Justification: PB 2024 Office of the Secretary Of Defense		Date: March 2023
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** 907 / *Access to State-of-the-Art (SOTA) Microelectronics - Development*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
• Accelerate the development and transition of secure ASIC design for DoD unique applications			
FY 2024 Plans: Foundry Access: • Continue to enhance access to SOTA fabrication ecosystem. • Maintain program of record access to assured fabrication flow and fund multi-project wafer production runs at multiple SOTA domestic sources. RAMP: Continue to mature the RAMP operational capability that will: • Continue to enhance secure design and cloud capability with new tools/techniques. • Continue to utilize traceability and provenance mechanisms to verify and vet data sources in a zero-trust architecture and enhance ability of DoD/Defense Industrial Base to design SOTA microelectronics. • Continue to quantify transition of designs to prototypes and programs of record and maintain persistence in lifecycle assurance data and intellectual property. • Continue to demonstrate rapid transition of DoD-relevant field programmable gate array-based capabilities to structured ASICs, with security capabilities to protect DoD intellectual property (IP) during manufacture. RAMP-C: A leading edge (<7nm), commercially-viable, U.S.-located domestic wafer foundry ecosystem access is established. The ecosystem will have capability on the order of > 26,000 wafer starts per month for design and manufacturing of quantifiably assured, dual-use commercial and DoD custom integrated circuits. This project will enable the following: • Access to a SOTA U.S. wafer foundry. • Access to commercial and critical quantifiably assured dual-use COTS integrated circuits. • Access to capabilities necessary to develop quantifiably assured custom DoD integrated circuits. • The jump-start in commercial use of the domestic foundry by key U.S. fabless companies. • Establishment of a viable design ecosystem including access to 3rd party design modules. • The reduction in the cost differential of building a U.S.-located wafer foundry verses off-shore. • The enablement of commercially-supported and enduring U.S. logic foundry capability. • Leverage the expertise of commercial industry to develop and demonstrate novel capabilities for design of State-of-the Art (SOTA) with assurance.			

Exhibit R-2A, RDT&E Project Justification: PB 2024 Office of the Secretary Of Defense		Date: March 2023
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** 907 / *Access to State-of-the-Art (SOTA) Microelectronics - Development*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Design Acceleration and Transition: Continue to accelerate DoD access to a microelectronics quantifiable assured (MQA) design and manufacturing ecosystem leveraging commercial capabilities for long-term sustainability. The following activities could be included: • Continue to expand and accelerate Development and insertion of IP for ASIC and Chiplet security including authentication, Firmware Attestation and Decryption and SOC Interface encryption. • Continue to develop and insert tools and techniques for Protect of silicon IP during manufacturing and test phase, including multi-chip package (MCP) with full lifecycle MQA demonstration and maturation. • Continue demonstration of using COTS parts in more critical DoD applications utilizing MQA ant the inherent personalization features of the COTS device. • Continue to accelerate MQA for DoD utilizing pilot programs for maturation of process, procedures and required technical capabilities for threat mitigation. This includes development of next generation ideas to increase the effectiveness of mitigations implemented in future updates to the LoA-1, LoA-2, or LoA-3 MQA standards. • Continue to accelerate the development and transition of secure ASIC design for DoD unique applications. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Increase is due to continued development of the RAMP and RAMP-C programs and expansion of funding for design acceleration and transition for emerging capabilities with DoD applications.			
Accomplishments/Planned Programs Subtotals	303.724	286.658	311.120

	FY 2022	FY 2023
Congressional Add: Design Acceleration	100.000	-
FY 2022 Accomplishments: Accelerated DoD access to a microelectronics quantifiable assured (MQA) design and manufacturing ecosystem leveraging commercial capabilities for long-term sustainability.		
Congressional Adds Subtotals	100.000	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Office of the Secretary Of Defense		Date: March 2023
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** 907 / *Access to State-of-the-Art (SOTA) Microelectronics - Development*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Access to SOTA Microelectronics - Development	MIPR	Defense Advanced Research Projects Agency, Air Force, Army, Navy, National Security Agency : Various	1,480.946	403.724	Mar 2022	286.658	Mar 2023	311.120	Mar 2024	-		311.120	Continuing	Continuing	-
		Subtotal	1,480.946	403.724		286.658		311.120		-		311.120	Continuing	Continuing	N/A

	Prior Years	FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	1,480.946	403.724		286.658		311.120		-		311.120	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2024 Office of the Secretary Of Defense		Date: March 2023
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** 907 / *Access to State-of-the-Art (SOTA) Microelectronics - Development*

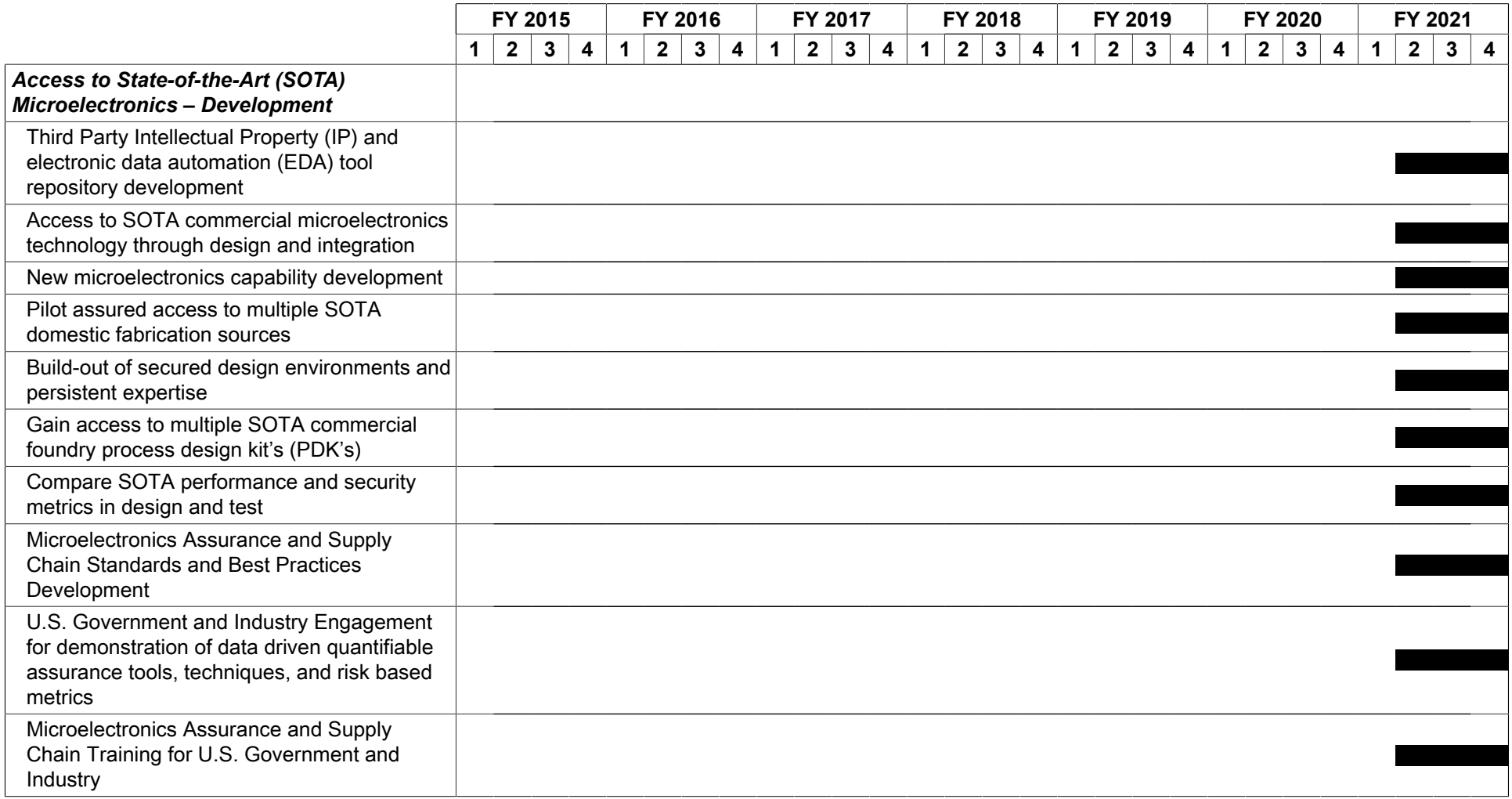
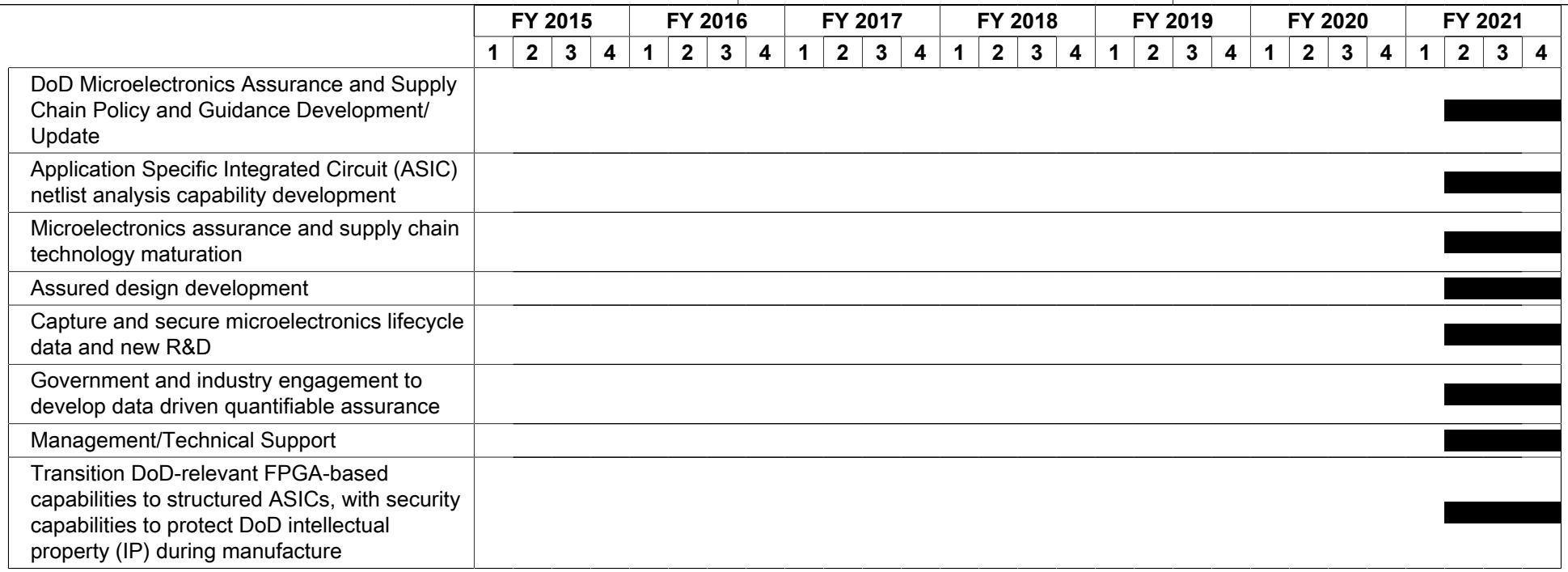


Exhibit R-4, RDT&E Schedule Profile: PB 2024 Office of the Secretary Of Defense		Date: March 2023
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** 907 / *Access to State-of-the-Art (SOTA) Microelectronics - Development*



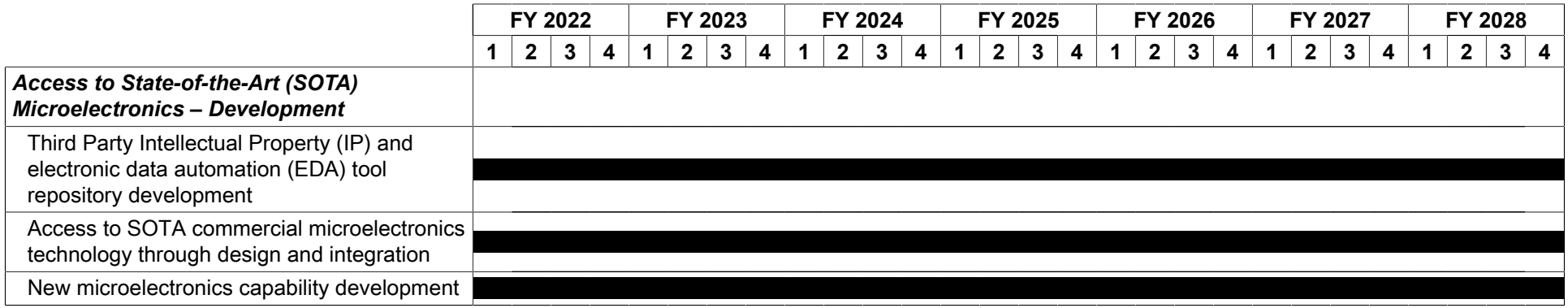


Exhibit R-4, RDT&E Schedule Profile: PB 2024 Office of the Secretary Of Defense		Date: March 2023
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** 907 / *Access to State-of-the-Art (SOTA) Microelectronics - Development*

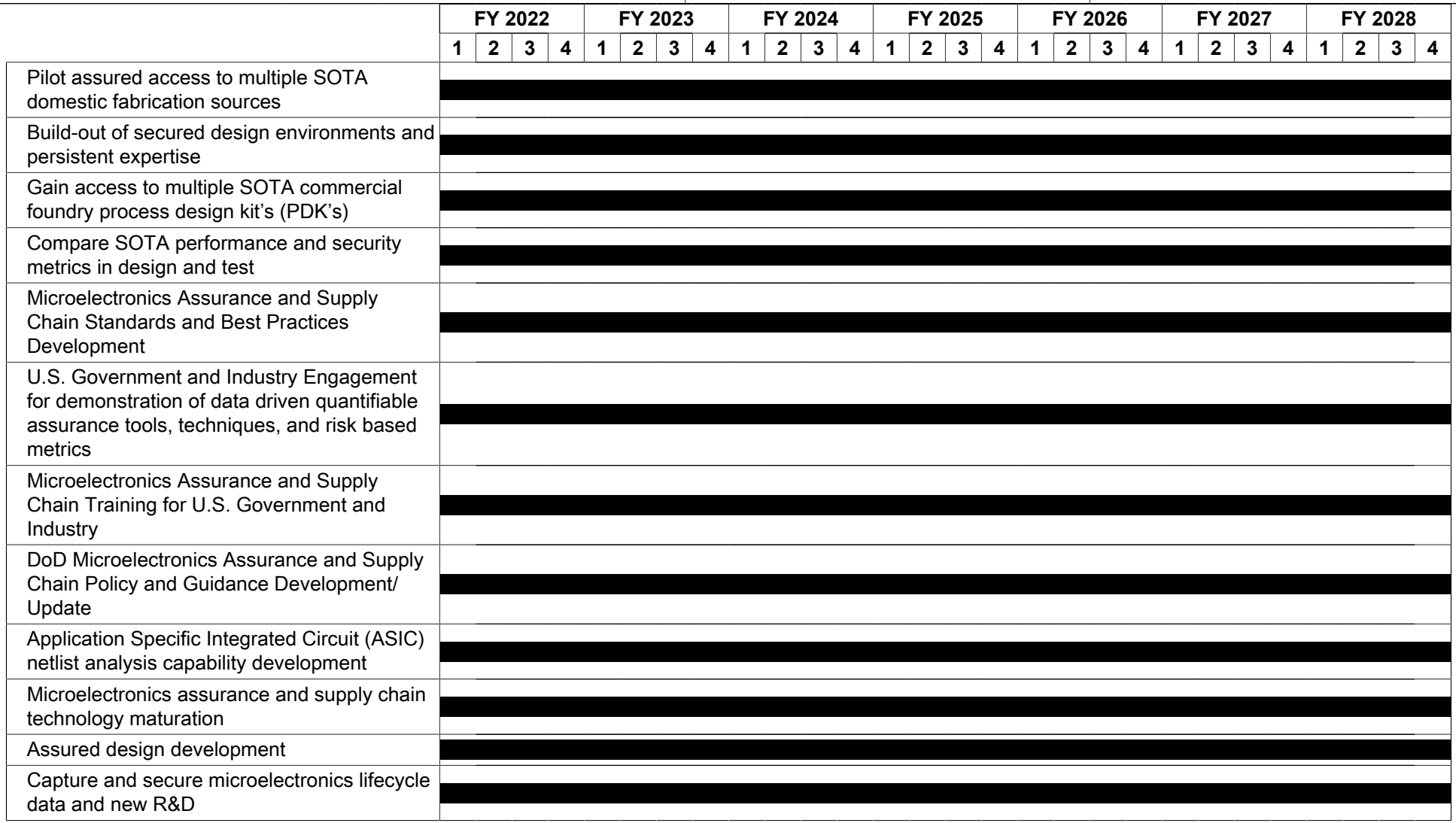


Exhibit R-4, RDT&E Schedule Profile: PB 2024 Office of the Secretary Of Defense		Date: March 2023
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** 907 / *Access to State-of-the-Art (SOTA) Microelectronics - Development*

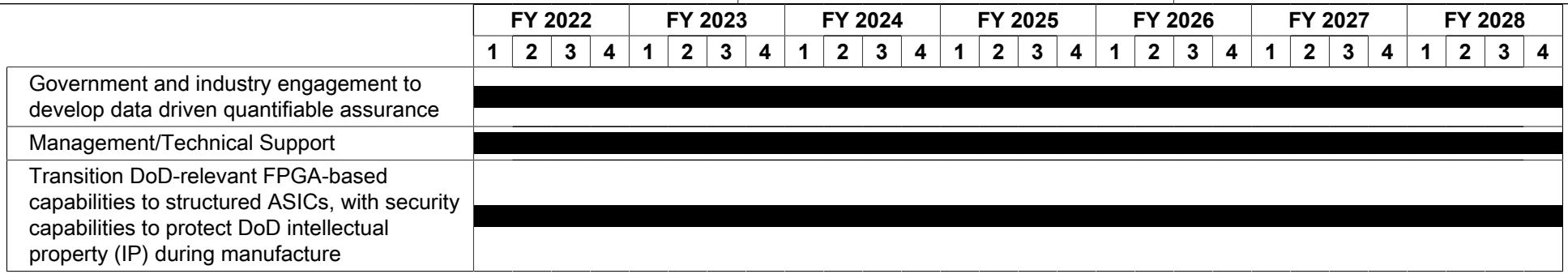


Exhibit R-4A, RDT&E Schedule Details: PB 2024 Office of the Secretary Of Defense		Date: March 2023
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** 907 / *Access to State-of-the-Art (SOTA) Microelectronics - Development*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Access to State-of-the-Art (SOTA) Microelectronics – Development				
Third Party Intellectual Property (IP) and electronic data automation (EDA) tool repository development	2	2021	4	2028
Access to SOTA commercial microelectronics technology through design and integration	2	2021	4	2028
New microelectronics capability development	2	2021	4	2028
Pilot assured access to multiple SOTA domestic fabrication sources	2	2021	4	2028
Build-out of secured design environments and persistent expertise	2	2021	4	2028
Gain access to multiple SOTA commercial foundry process design kit’s (PDK’s)	2	2021	4	2028
Compare SOTA performance and security metrics in design and test	2	2021	4	2028
Microelectronics Assurance and Supply Chain Standards and Best Practices Development	2	2021	4	2028
U.S. Government and Industry Engagement for demonstration of data driven quantifiable assurance tools, techniques, and risk based metrics	2	2021	4	2028
Microelectronics Assurance and Supply Chain Training for U.S. Government and Industry	2	2021	4	2028
DoD Microelectronics Assurance and Supply Chain Policy and Guidance Development/Update	2	2021	4	2028
Application Specific Integrated Circuit (ASIC) netlist analysis capability development	2	2021	4	2028
Microelectronics assurance and supply chain technology maturation	2	2021	4	2028
Assured design development	2	2021	4	2028
Capture and secure microelectronics lifecycle data and new R&D	2	2021	4	2028
Government and industry engagement to develop data driven quantifiable assurance	2	2021	4	2028
Management/Technical Support	2	2021	4	2028

Exhibit R-4A, RDT&E Schedule Details: PB 2024 Office of the Secretary Of Defense		Date: March 2023
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** 907 / *Access to State-of-the-Art (SOTA) Microelectronics - Development*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Transition DoD-relevant FPGA-based capabilities to structured ASICs, with security capabilities to protect DoD intellectual property (IP) during manufacture	2	2021	4	2028

Exhibit R-2A, RDT&E Project Justification: PB 2024 Office of the Secretary Of Defense			Date: March 2023
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604294D8Z / *Trusted and Assured Microelectronics*	Project (Number/Name) 908 / *Access to Advanced Packaging and Testing - Development*	

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
908: *Access to Advanced Packaging and Testing - Development*	81.438	72.343	56.118	90.199	-	90.199	94.129	92.660	64.766	66.127	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project will leverage existing commercially available expertise and capability to deliver self-sustaining digital and Radio Frequency (RF) state-of-the-art (SOTA) heterogeneous integrated packaging (SHIP), assembly, and test capability.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Access to Advanced Packaging and Testing - Development	72.343	56.118	90.199

Description: This project will utilize specialized DoD chiplets (small specialized die) in a heterogeneous integrated (HI) assembly, allowing the DoD to accelerate adoption of the most advanced microelectronics available. Working with world-class industrial partners will provide early access to proprietary information related to these technologies, giving DoD an asymmetrical advantage.

This project will deliver an on-shore microelectronic device package design, assembly, and test capability. It will provide access to dual-use SOTA heterogeneous packaged microelectronics and manufacturing processes. It will enable personalization of, and customization for supporting DoD programs. It will enable a revolutionary leap in system performance that will greatly reduce size, weight and power (SWaP) by incorporating the immense advances in SOTA commercial off the shelf (COTS) processing technologies, such as field programmable gate arrays (FPGAs), microprocessors, and Graphic Processing Units (GPUs).

FY 2023 Plans:

Establishment of a SOTA packaging and test facility capable of packaging, testing and personalization of integrated circuits in which the fully assembled and operationally functional MCP can contain ITAR regulated and/or classified information. Expand and accelerate development:

- Continue to collaborate with the Defense Industrial Base for prototype design requirements and device transition planning.
- Implementation of post-assembly personalization and operational test capabilities.
- Implement Multi-Chip Package (MCP) finish capability for additional security to protect DoD specific IP and CPI in the fully functional MCP.
- Accelerate DoD access to advanced packaging capability.
- Enable re-shoring mature manufacturing, assembly, and test from commercial product lines such as high-volume flip-chip capabilities.

Exhibit R-2A, RDT&E Project Justification: PB 2024 Office of the Secretary Of Defense		Date: March 2023
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** 908 / *Access to Advanced Packaging and Testing - Development*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
• Enable access to advanced RF packages by providing a full suite of design tools, advanced packaging platforms, and a wide selection of material choices. • Accelerate DIB and DoD maturation leveraging commercial design using developed PDKs and ADKs to design custom devices. • Accelerate DoD access to SOTA MCP products utilizing commercial packaging, assembly, and test. • Create a catalog of designs, die, chiplets, package types, etc. • Ensure Reuse and Standardization for sustainability and costs. • Accelerate and expand adoption and use in military systems to design, packaging, and assembly as a service. • Continue to enhance secure design and packaging capability with new tools/techniques. • Continued development of secure, accessible, and cost effective SOTA heterogeneous integration design, assembly and test capability. • Continue to develop advanced HI prototype platforms for productization and qualification test. • Develop packaging processes that source materials from domestic microelectronics ecosystem. • Prototype microelectronics quantitative assurance guidance for microelectronics heterogeneous integrated packaging.			
FY 2024 Plans: Continue the establishment of a SOTA packaging and test facility capable of packaging, testing and personalization of integrated circuits in which the fully assembled and operationally functional MCP can contain ITAR regulated and/or classified information. Continue to expand and accelerate development: • Continue to collaborate with the Defense Industrial Base for prototype design requirements and device transition planning. • Continue Implementation of post-assembly personalization and operational test capabilities. • Continue to Implement MPC finish capability for additional security to protect DoD specific IP and CPI in the fully functional MCP. • Continue to accelerate access. • Continue to Enable re-shoring mature manufacturing, assembly, and test from commercial product lines such as high-volume flip-chip capabilities. • Continue to enable access to advanced RF packages by providing a full suite of design tools, advanced packaging platforms, and a wide selection of material choices. • Continue to Accelerate DIB and DoD maturation leveraging commercial design using developed PDKs and ADKs to design custom devices. • Continue to Accelerate DoD access to SOTA MCP products utilizing commercial packaging, assembly, and test. • Continue to create a catalog of designs, die, chiplets, package types, etc. • Continue to Ensure Reuse and Standardization for sustainability and costs. • Continue to Accelerate and expand adoption & Use in military systems to design, packaging, and assembly as a service. • Continue to enhance secure design and packaging capability with new tools/techniques.			

Exhibit R-2A, RDT&E Project Justification: PB 2024 Office of the Secretary Of Defense		Date: March 2023
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** 908 / *Access to Advanced Packaging and Testing - Development*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
• Continued development of secure, accessible, and cost effective SOTA heterogeneous integration design, assembly and test capability. • Continue to develop Advanced HI Prototype Platforms for Productization and Qualification test. • Continue to develop, and initiate qualifications of, packaging processes that source materials from domestic microelectronics ecosystem. • Continue to prototype microelectronics quantitative assurance guidance for microelectronics heterogeneous integrated packaging. • Mature readiness of advanced HI packaging processes for initial production capability. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** The increase of $34.081 million between FY 2023 and FY 2024 will mature readiness for initial production in an on-shore microelectronic device package design, assembly, and test capability, providing access to dual use SOTA heterogeneous packaged microelectronics and manufacturing processes and enabling customization for supporting DoD programs.			
Accomplishments/Planned Programs Subtotals	72.343	56.118	90.199

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Office of the Secretary Of Defense		Date: March 2023
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** 908 / *Access to Advanced Packaging and Testing - Development*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Access to Advanced Packaging and Testing - Development	MIPR	Defense Advanced Research Projects Agency, Air Force, Army, Navy, National Security Agency : Various	81.438	72.343	Mar 2022	56.118	Mar 2023	90.199	Mar 2024	-		90.199	Continuing	Continuing	-
		Subtotal	81.438	72.343		56.118		90.199		-		90.199	Continuing	Continuing	N/A

	Prior Years	FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	81.438	72.343		56.118		90.199		-		90.199	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2024 Office of the Secretary Of Defense		Date: March 2023
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** 908 / *Access to Advanced Packaging and Testing - Development*

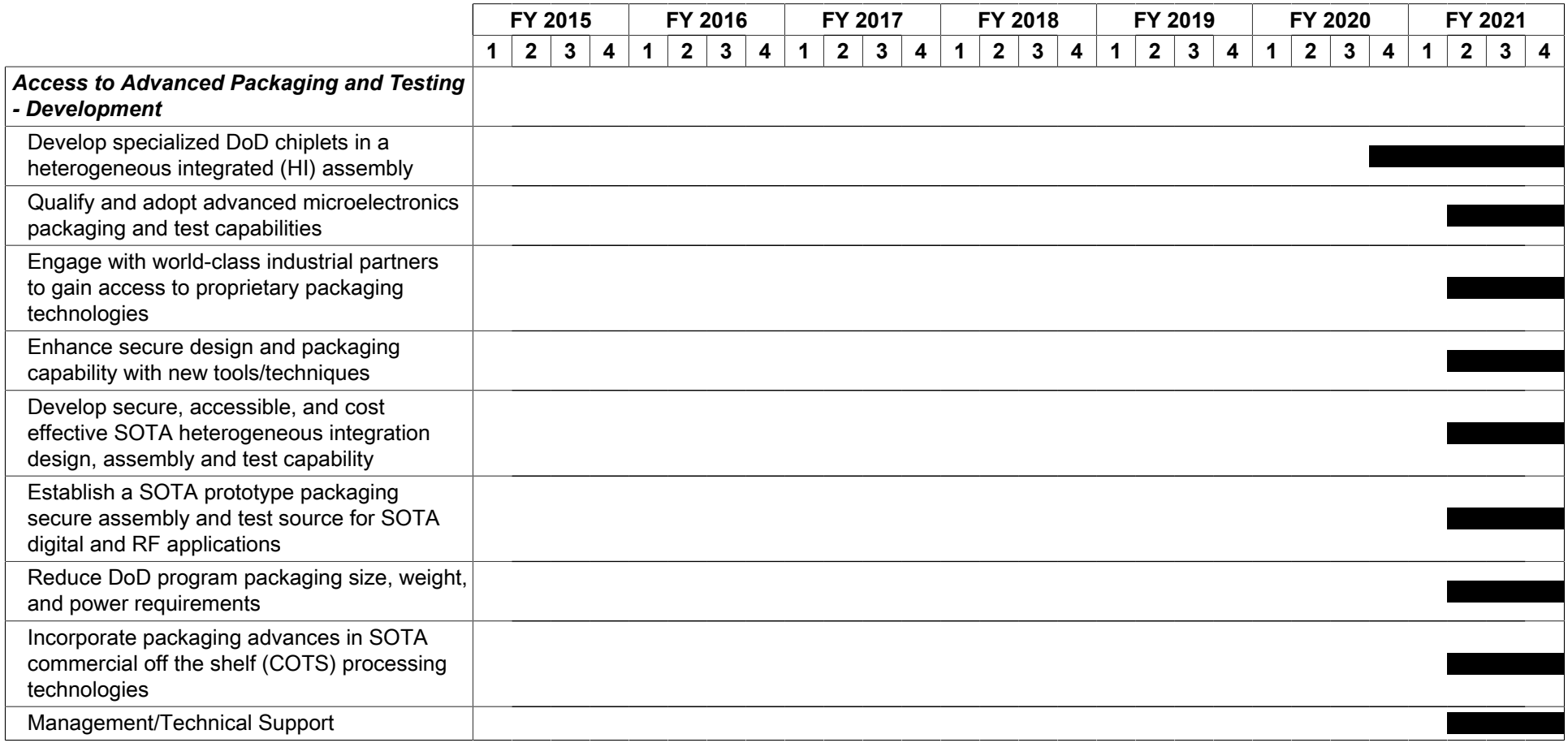


Exhibit R-4, RDT&E Schedule Profile: PB 2024 Office of the Secretary Of Defense		Date: March 2023
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** 908 / *Access to Advanced Packaging and Testing - Development*

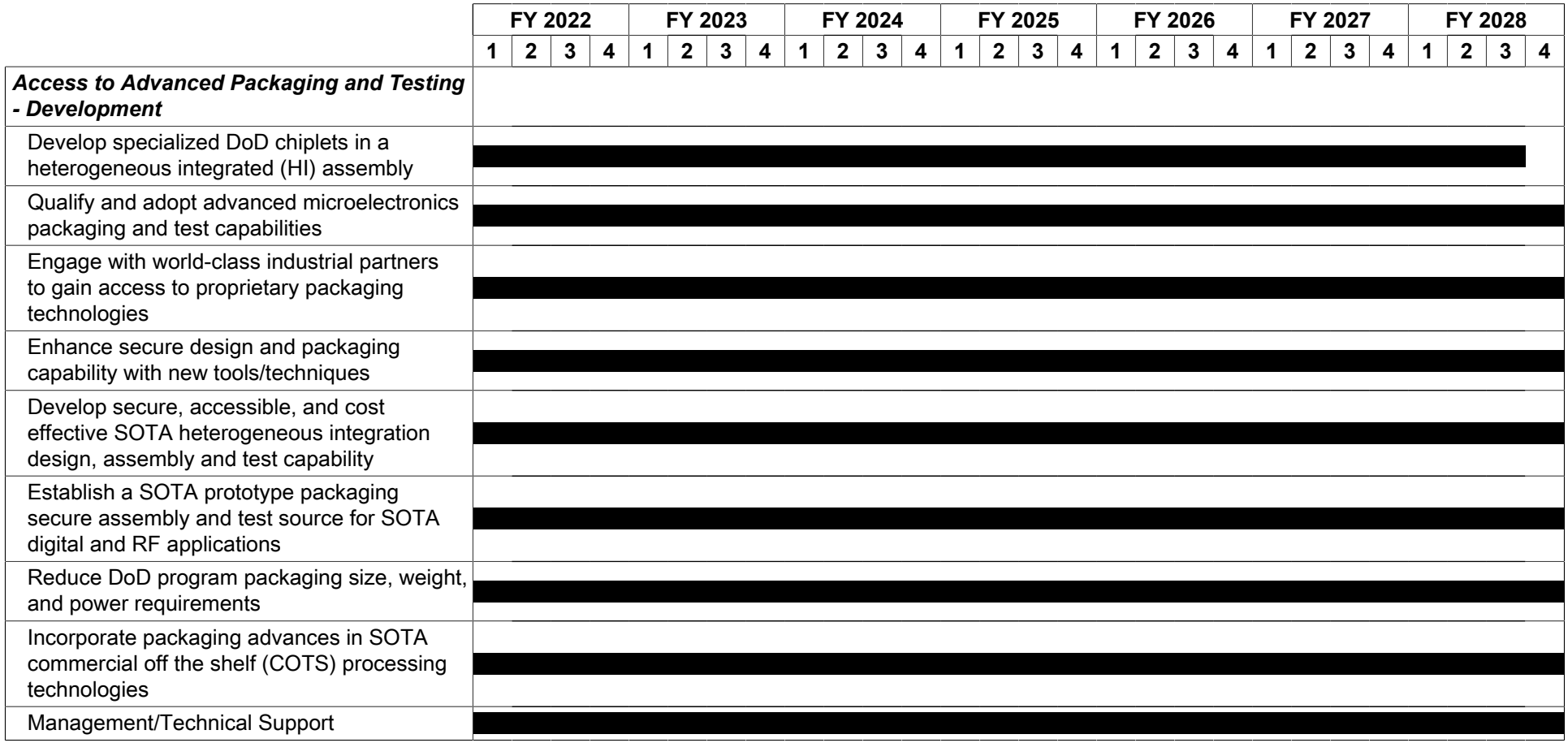


Exhibit R-4A, RDT&E Schedule Details: PB 2024 Office of the Secretary Of Defense		Date: March 2023
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** 908 / *Access to Advanced Packaging and Testing - Development*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Access to Advanced Packaging and Testing - Development				
Develop specialized DoD chiplets in a heterogeneous integrated (HI) assembly	4	2020	3	2028
Qualify and adopt advanced microelectronics packaging and test capabilities	2	2021	4	2028
Engage with world-class industrial partners to gain access to proprietary packaging technologies	2	2021	4	2028
Enhance secure design and packaging capability with new tools/techniques	2	2021	4	2028
Develop secure, accessible, and cost effective SOTA heterogeneous integration design, assembly and test capability	2	2021	4	2028
Establish a SOTA prototype packaging secure assembly and test source for SOTA digital and RF applications	2	2021	4	2028
Reduce DoD program packaging size, weight, and power requirements	2	2021	4	2028
Incorporate packaging advances in SOTA commercial off the shelf (COTS) processing technologies	2	2021	4	2028
Management/Technical Support	2	2021	4	2028

Exhibit R-2A, RDT&E Project Justification: PB 2024 Office of the Secretary Of Defense			Date: March 2023
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604294D8Z / *Trusted and Assured Microelectronics*	Project (Number/Name) 911 / *Address DoD Unique Needs - Radiation Hardening and non-CMOS*	

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
911: *Address DoD Unique Needs - Radiation Hardening and non-CMOS*	50.500	169.072	180.003	279.416	-	279.416	298.759	231.083	170.770	143.404	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project addresses the dual problems of commanding only a small market share while requiring an expansive range of unique microelectronics needs, from boutique and legacy components to state-of-the-art (SOTA) technologies. The Government must sustain specialty suppliers, given their criticality to national security. In particular, DoD needs access to a diverse microelectronics ecosystem to develop and acquire the application specific integrated circuits (ASICs) and personalized commercial off the shelf (COTS) components required for military radiation hardened and radio frequency (RF) and optoelectronic (OE) needs.

The Department frequently relies on commercial suppliers to optimize performance and reduce costs for sophisticated weapon system and secure network functionality. It is critical that DoD has reliable access to subject matter expertise, technology, and manufacturing.

In addition to Rad Hard needs, the DoD requires access to RF and opto-electronic materials, foundries, and packaging facilities, in order to enable next generation sensors and communications. The DoD must leverage state-of-the-art microelectronic technologies driven by mega-trends such as 5G wireless and datacenters in order to combat emerging threats and deliver overmatch technology to the warfighter. At the same time, the DoD must fill the gaps which are left unaddressed by these dual-use mega-trends to satisfy mission requirements. By partnering in the maturation of state-of-the-art material sources, foundries, and packaging facilities, the DoD is able to develop the ability to tailor the dual use technology towards unique DoD applications and encourage open access design, which stimulates innovation and drives affordability. Additionally, critical investments must be made in the domestic supply chains supporting both RF Gallium Nitride (GaN) and integrated photonics in order to maintain the integrity and security of the Defense Industrial Base.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Address DoD Unique Needs Especially - Radiation Hardening and non-CMOS - Development	82.572	103.503	279.416
Description: Government-unique trusted design and manufacturing flows have been developed to enable a tier of trust for select ASIC parts; however, this approach addresses only a small subset of DoD microelectronics requirements (e.g., processors, memory, microcontrollers, field programmable gate arrays (FPGAs), and radiation-tolerant processors). DoD will partner with the intelligence community, the Department of Energy, and the National Aeronautics and Space Administration to develop radiation hardened components that permit systems to operate in space and other harsh environments. state-of-the-practice (SOTP) and state-of-the-art (SOTA) technologies will be characterized and developed in support of Radiation Hardened By Process (RHBP) and Radiation Hardened By Design (RHBD) activities in support DoD modernization			

Exhibit R-2A, RDT&E Project Justification: PB 2024 Office of the Secretary Of Defense		Date: March 2023
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** 911 / *Address DoD Unique Needs - Radiation Hardening and non-CMOS*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
programs with radiation hardened requirements. A similar situation exists for radio frequency and optical applications. These two applications reflect only a small market with unique costs and specifications, which does not inherently create incentive for industrial investment. Within RF and opto-electronics, investments will be made in RF GaN and integrated photonic material sources, foundries, and packaging facilities in order to enable low-size, weight, and power devices which broadly access the millimeter wave spectrum, while providing high-bandwidth data transmission. ***FY 2023 Plans:*** • Continue development of RHBD techniques in SOTA technologies with validated PDKs • Transition developed RH technologies into space and strategic programs. • Continue to mature large-diameter Nitrogen-Polar RF GaN material source and off-axis Silicon Carbide substrate. Foundries will assess epiwafers and provide feedback critical to baselining the N-Polar recipe. • Continue to mature towards MRL-6 multiple state-of-the-art RF GaN foundries offering open access to millimeter wave device design and advanced interconnect services. • Continue to mature towards MRL-6 multiple co-packaged optical chiplets offering high-bandwidth data transfer capabilities. • Continue to mature towards MRL-5 advanced semiconductor material production and baseline for insertion into multiple millimeter wave foundries. • Act upon industrial base assessment of the integrated photonics foundry ecosystem and mature strategic components of the domestic integrated photonics supply chain. • Demonstrate access to state-of-the-art RF GaN and integrated photonic foundries via advanced prototype demonstrators. • Mature RHBP techniques in a SOTP foundry. • Establish the first domestic production source of N-Polar GaN material, and demonstrates production of mmW devices with maximum RF power and efficiency. • Demonstrate design and process capability with radiation hard by design tested chip, TRL-6. • Two new sources of radiation hard by design enabling onboard processing capability with 100x capability improvement. • Establish a mature portfolio of domestic RF GaN foundries, which offers open access to millimeter wave technology and product transition via the DoD Advanced Packaging ecosystem. • Demonstrate advanced integrated photonics prototypes via secure access to state-of-the-art domestic foundries. • Initiate characterization, development, and demonstration of space and strategic radiation hard microelectronics technology in support of DoD modernization efforts. ***FY 2024 Plans:*** Planned activities are as follows:			

Exhibit R-2A, RDT&E Project Justification: PB 2024 Office of the Secretary Of Defense		Date: March 2023
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** 911 / *Address DoD Unique Needs - Radiation Hardening and non-CMOS*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
• Continue development of RHBD techniques in SOTA technologies with validated radiation aware PDKs and radiation hardened cell libraries • Transition developed RH technologies into space and strategic programs. • Begin to mature towards MRL-7 multiple state-of-the-art RF GaN foundries offering open access to millimeter wave device design and advanced interconnect services. • Continue to mature towards MRL-6 multiple co-packaged optical chiplets offering high-bandwidth data transfer capabilities. • Continue to mature towards MRL-5 advanced semiconductor material production and baseline for insertion into multiple millimeter wave foundries. • Establish workforce development program for RF, power, and photonics. • Demonstrate access to state-of-the-art RF GaN and integrated photonic foundries via advanced prototype demonstrators. • Continue to mature RHBP techniques in a SOTP foundry. • Increase capacity for RHBD technologies to support additional DoD programs. • Add second contractor to development effort for a strategic radiation-hardened Field Programmable Gate Array (FPGA) capability for DoD • Increase funding for Government Radiation Hardened System-on-a- Chip (GRADSoC) Phases 2 and 3 • Maintain the first domestic production source of N-Polar GaN material, and demonstrates production of mmW devices with maximum RF power and efficiency. • Demonstrate design and process capability with radiation hard by design tested chip, TRL-6. • Two new sources of radiation hard by design enabling onboard processing capability with 100x capability improvement. • Maintain a mature portfolio of domestic RF GaN foundries, which offers open access to millimeter wave technology and product transition via the DoD Advanced Packaging ecosystem. • Demonstrate advanced integrated photonics prototypes via secure access to state-of-the-art domestic foundries. • Initiate development of next generation RF GaN power technologies to increase RF power efficiency and dramatically improve thermal efficiency and management, decreasing the power load on DoD platforms. These technical advances will give superior performance in a host of critical areas including C4ISR and weapons engagement with improved probability of kill for DoD. • Initiate development of next generation RF GaN prototypes with improved performance at an affordable cost for drop in Line Replaceable Units (LRUs) in existing systems potentially without major architectural and structural redesign. • Leverage commercial developments in next generation RF GaN power technologies to adapt for DoD applications. • Initiate effort to transition emerging memory architectures for AI applications, benefiting existing Programs of Record and emerging DoD electronics systems. • Develop emerging memory architectures for future DoD edge applications for AI, with more severe power constraints as AI models grow in size and the need for rapid response means always-on is required. • Develop a two level memory (2LM) system where weights are stored in persistent memory to substantially reduce leakage power and allow larger AI models.			

Exhibit R-2A, RDT&E Project Justification: PB 2024 Office of the Secretary Of Defense		Date: March 2023
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** 911 / *Address DoD Unique Needs - Radiation Hardening and non-CMOS*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
• Initiate development of a custom intelligent data cache to enable rapid innovation for DoD workloads, freed from the memory access assumptions driven by the commercial market. • Initiate development of high voltage silicon carbide (SiC) technology for dense power delivery and high power (high voltage & high current) devices in ultra-compact, reliable, and efficient form factors. Successful development of this technology will enable improvements in output & efficiency (better power conversion with less loss for use in ship-to-shore power, DC transmission, and other integrated power systems), speed (reducing charging time for vehicles, aircraft, and other platforms from hours to minutes), and size (reducing size of high-voltage converters, drives and substations to a fraction of current volumes). • Develop capability to deliver of thick epitaxial SiC wafers at scale to enable high voltage, high current device development. • Research techniques to optimize advanced packaging design and testing for high power SiC technology. • Lay groundwork for device integration of high power SiC technology, including working with application and platform developers to integrate into higher level assemblies and mission-critical systems that require robust, energy-dense solid state power switching solutions. Continued characterization, development, and demonstration of space and strategic radiation hard microelectronics technology in support of DoD modernization efforts. These investments fund projects in the following rad hard technology areas: radiation hardened by process (RHBP) and radiation hardened by design (RHBD) to support space and strategic ASIC requirements, standalone radiation hardened components for cross -service common parts needs, as well as lab modernization in support independent validation and verification of rad hard technology. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Increase of $172.413 million between FY 2023 and FY 2024 will fund significant new initiatives for developing next generation RF GaN power technologies, emerging memory architectures, and high power silicon carbide (SiC) technology, in addition to additional increased capacity for the RHBD effort, RH FPGA, GRADSoC, and other strategic RH microelectronics efforts.			
Accomplishments/Planned Programs Subtotals	82.572	103.503	279.416

	FY 2022	FY 2023
Congressional Add: GaN and GaAs RFIC technology	25.000	25.000
FY 2022 Accomplishments: • Demonstrate production of SOTA RF GaN devices and advanced interconnect components in a production relevant environment. • Demonstrate millimeter wave device designs/IP via open access to SOTA RF GaN nodes.		
FY 2023 Plans: • Continue production demonstration of SOTA RF GaN devices and advanced interconnect components in a production relevant environment.		

	FY 2022	FY 2023
• Continue demonstration of millimeter wave device designs/IP via open access to SOTA RF GaN nodes.		
Congressional Add: Radiation-Hardened Fully-Depleted Silicon-on-Insulator Microelectronics ***FY 2022 Accomplishments:*** Complementary Metal Oxide Semiconductor (CMOS) Silicon On Insulator (SOI) technology maturation, demonstration, and qualification for use in Department of Defense Space and Strategic system applications to include radiation aware Process Development Kits (PDKs), radiation hardened cell libraries, device and circuit modeling and simulation, hardware demonstration and environmental test in DoD relevant radiation environments. ***FY 2023 Plans:*** Complementary Metal Oxide Semiconductor (CMOS) Silicon On Insulator (SOI) technology maturation, demonstration, and qualification for use in Department of Defense Space and Strategic system applications to include radiation aware Process Development Kits (PDKs), radiation hardened cell libraries, device and circuit modeling and simulation, hardware demonstration and environmental test in DoD relevant radiation environments.	18.000	38.000
Congressional Add: Advanced Node Radiation-Hardened Fully-Depleted Silicon-on-Insulator Technology ***FY 2022 Accomplishments:*** Advanced Complementary Metal Oxide Semiconductor (CMOS) Silicon On Insulator (SOI) research and development, technology maturation, and prototype demonstration for use in Department of Defense Space and Strategic system applications to include radiation aware Process Development Kits (PDKs), radiation hardened cell libraries, device and circuit modeling and simulation, hardware demonstration and environmental test in DoD relevant environments. Demonstrations to include use of advanced commercial CMOS SOI technology for use in hardened configurable logic and system in package prototypes. Development of design intellectual property (IP) generation models for critical semiconductor industrial base sustainment and growth, IP affordability, and asymmetric advantage for the DoD. ***FY 2023 Plans:*** Advanced Complementary Metal Oxide Semiconductor (CMOS) Silicon On Insulator (SOI) research and development, technology maturation, and prototype demonstration for use in Department of Defense Space and Strategic system applications to include radiation aware Process Development Kits (PDKs), radiation hardened cell libraries, device and circuit modeling and simulation, hardware demonstration and environmental test in DoD relevant environments. Demonstrations to include use of advanced commercial CMOS SOI technology for use in hardened configurable logic and system in package prototypes. Development of design intellectual property (IP) generation models for critical semiconductor industrial base sustainment and growth, IP affordability, and asymmetric advantage for the DoD.	43.500	10.000
Congressional Add: Magnetoresistive Random Access Memory (MRAM)	-	3.500

Exhibit R-2A, RDT&E Project Justification: PB 2024 Office of the Secretary Of Defense		Date: March 2023
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** 911 / *Address DoD Unique Needs - Radiation Hardening and non-CMOS*

	FY 2022	FY 2023
FY 2023 Plans: Magnetoresistive random access memory (or MRAM) technology has several aspects that make it attractive for DoD use, including a high inherent tolerance to radiation and nearly unlimited read and write endurance. Activities include: • Foster industrial competition of this technology • Accelerate ongoing development activities for MRAM, with a goal of creating more advanced and capable memory technology than is currently available.		
Congressional Adds Subtotals	86.500	76.500

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Office of the Secretary Of Defense		Date: March 2023
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** 911 / *Address DoD Unique Needs - Radiation Hardening and non-CMOS*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Address DoD Unique Needs - Development	MIPR	Defense Advanced Research Projects Agency, Air Force, Army, Navy, National Security Agency : Various	50.500	169.072	Mar 2022	180.003	Mar 2023	279.416	Mar 2024	-		279.416	Continuing	Continuing	-
		Subtotal	50.500	169.072		180.003		279.416		-		279.416	Continuing	Continuing	N/A

	Prior Years	FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	50.500	169.072		180.003		279.416		-		279.416	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2024 Office of the Secretary Of Defense		Date: March 2023
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** 911 / *Address DoD Unique Needs - Radiation Hardening and non-CMOS*

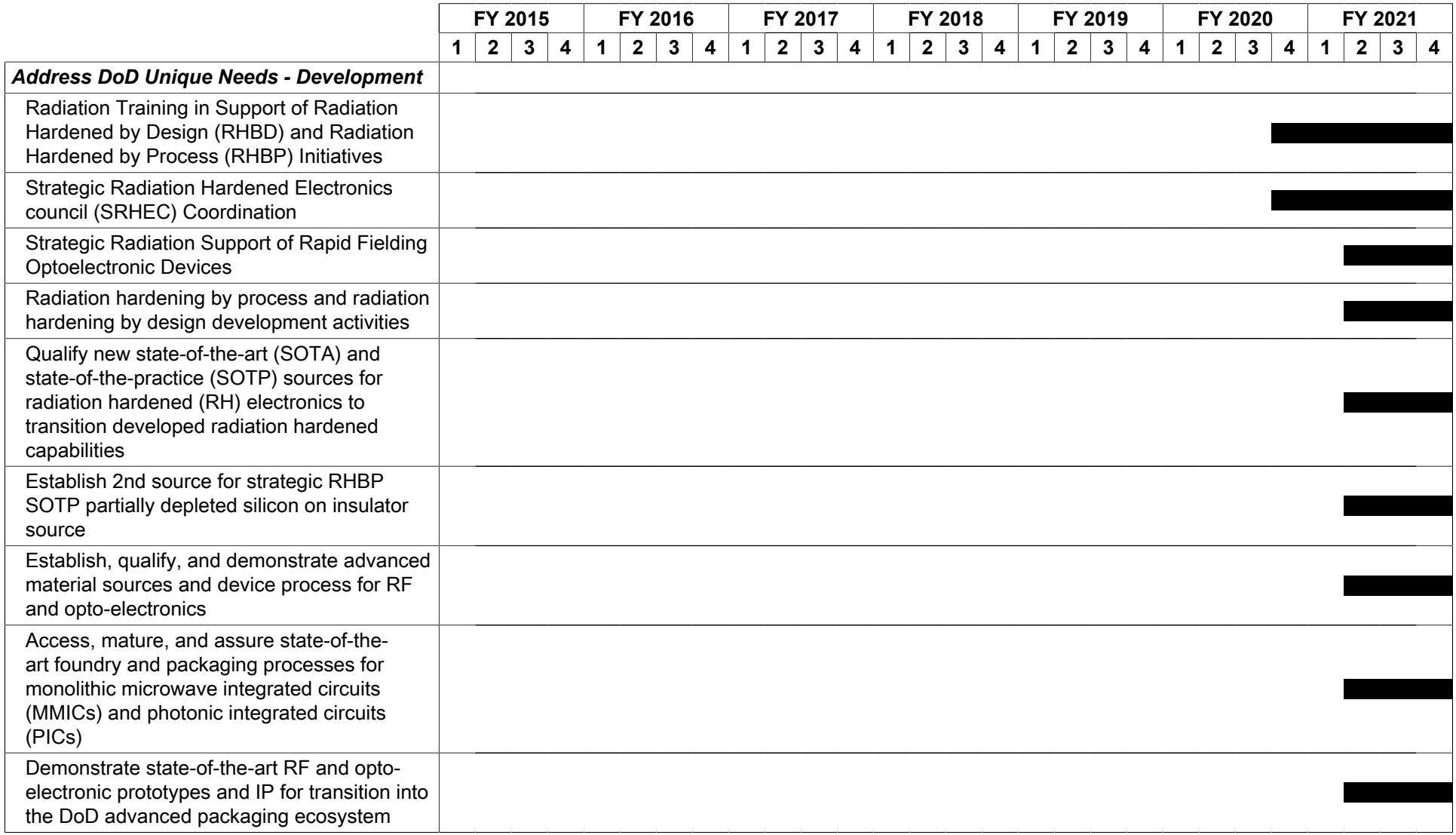


Exhibit R-4, RDT&E Schedule Profile: PB 2024 Office of the Secretary Of Defense		Date: March 2023
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** 911 / *Address DoD Unique Needs - Radiation Hardening and non-CMOS*

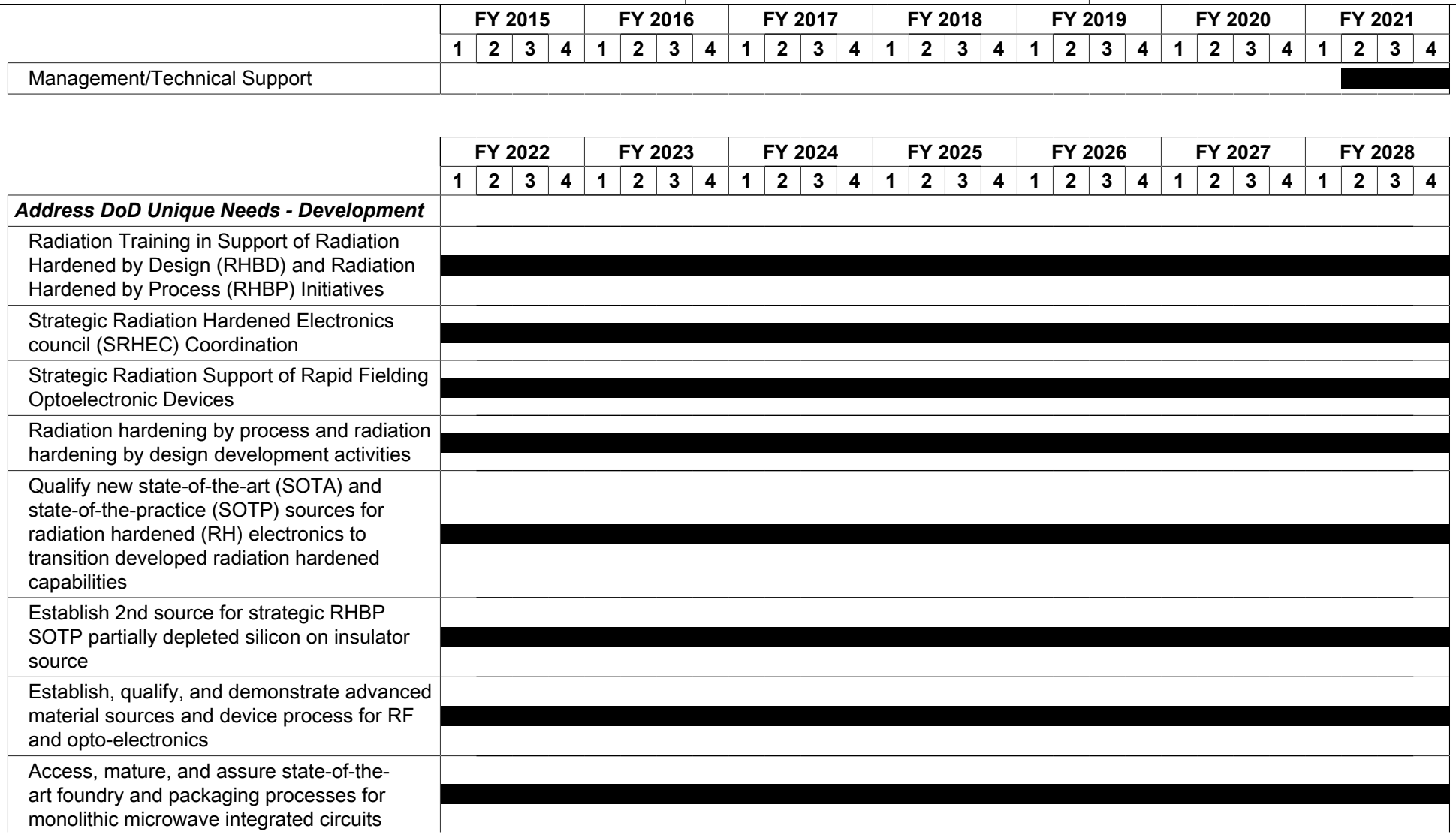


Exhibit R-4, RDT&E Schedule Profile: PB 2024 Office of the Secretary Of Defense		Date: March 2023
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** 911 / *Address DoD Unique Needs - Radiation Hardening and non-CMOS*

	FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027				FY 2028			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
(MMICs) and photonic integrated circuits (PICs)																												
Demonstrate state-of-the-art RF and opto-electronic prototypes and IP for transition into the DoD advanced packaging ecosystem																												
Management/Technical Support																												

Exhibit R-4A, RDT&E Schedule Details: PB 2024 Office of the Secretary Of Defense		Date: March 2023
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** 911 / *Address DoD Unique Needs - Radiation Hardening and non-CMOS*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Address DoD Unique Needs - Development				
Radiation Training in Support of Radiation Hardened by Design (RHBD) and Radiation Hardened by Process (RHBP) Initiatives	4	2020	4	2028
Strategic Radiation Hardened Electronics council (SRHEC) Coordination	4	2020	4	2028
Strategic Radiation Support of Rapid Fielding Optoelectronic Devices	2	2021	4	2028
Radiation hardening by process and radiation hardening by design development activities	2	2021	4	2028
Qualify new state-of-the-art (SOTA) and state-of-the-practice (SOTP) sources for radiation hardened (RH) electronics to transition developed radiation hardened capabilities	2	2021	4	2028
Establish 2nd source for strategic RHBP SOTP partially depleted silicon on insulator source	2	2021	4	2028
Establish, qualify, and demonstrate advanced material sources and device process for RF and opto-electronics	2	2021	4	2028
Access, mature, and assure state-of-the-art foundry and packaging processes for monolithic microwave integrated circuits (MMICs) and photonic integrated circuits (PICs)	2	2021	4	2028
Demonstrate state-of-the-art RF and opto-electronic prototypes and IP for transition into the DoD advanced packaging ecosystem	2	2021	4	2028
Management/Technical Support	2	2021	4	2028

Exhibit R-2A, RDT&E Project Justification: PB 2024 Office of the Secretary Of Defense			Date: March 2023
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604294D8Z / *Trusted and Assured Microelectronics*	Project (Number/Name) 912 / *Create a Quantifiably Assured-Microelectronics Pipeline*	

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
912: *Create a Quantifiably Assured-Microelectronics Pipeline*	75.544	37.000	113.547	126.081	-	126.081	133.133	131.383	133.091	136.007	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project will promote microelectronics innovation and create a quantifiably-assured Microelectronics pipeline including continuing Joint Federated Assurance Center (JFAC) strategic partnerships, assuring field programmable gate array (FPGA) devices, supplier chain awareness and security, and workforce development. It will slow and in the long-term reverse offshoring trends by fostering commercial and Government alliances to preserve the U.S. ecosystem, lower barriers to innovation and adoption, strengthen workforce expertise, ensure DoD has access to the next generation of advanced technology with quantifiable assurance throughout the product pipeline, and maintain the United States as the global source for high- end, secure, and reliable microelectronics components.

In addition, this project will develop a new data driven quantifiable assurance paradigm for supply chain protection. It will strengthen security while improving access, exposing no sensitive intellectual property (IP) to the foundry and requiring post-manufacture validation of foundry products. The enhancement will develop quantifiably assured design concepts in manufactured systems, enabling a formal risk-based approach to protection techniques. Manufactured microelectronics will be tested to ensure that IP protections meet or exceed current National Security Agency standards for IP protection, and to develop DoD's ability to detect certain malicious supply chain attacks on DoD microelectronics.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Create a Quantifiably-Assured Microelectronics Pipeline – Development	27.000	113.547	126.081
Description: DoD is investing in next-generation disruptive technology, leveraging U.S. innovation, and transitioning materials, architectures, and designs into prototype capabilities for use by multiple industrial sectors. This and additional targeted investments in workforce will begin to address long-term talent needs. In addition, the Department will continue to enhance its partnership with industry to mitigate supply chain risks. Significant increases in assurance and protection of DoD technical data and components will be achieved through improvements in design practices, modern commercial security practices, and advanced packaging and chain of custody technologies. This activity, along with continued engagements and partnerships with industry will foster necessary security features in commercial products and infrastructure that will facilitate long-term assured access for the U.S. Government to commercial advanced SOTA technology providers.			

Exhibit R-2A, RDT&E Project Justification: PB 2024 Office of the Secretary Of Defense		Date: March 2023
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** 912 / *Create a Quantifiably Assured-Microelectronics Pipeline*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
This project funds the operation hardware assurance(HwA) support to DoD programs and organizations of the Joint Federated Assurance Center (JFAC), established in National Defense Authorization Act (NDAA) Sec 937, to increase DoD's HwA by providing engineering tools, technical services, best practices, innovative technologies and other assistance to programs to detect, assess, prioritize, and mitigate vulnerabilities from hardware attacks and assurance against supply chain exploitation vulnerabilities. The JFAC will provide capabilities for programs to keep assessment findings throughout the life cycle of their systems for data mining (e.g., documentation on rationale for previous mitigation decisions). The collaboration between the JFAC and program offices will help mitigate existing and emerging critical threats and vulnerabilities in hardware available to all DoD programs. DoD is required to establish assured supply chain and operational security standards for the purchase of all (Commercial and Custom) microelectronics and protection of Intellectual Property across the entire lifecycle. ME Assurance Framework addresses FY20 NDAA Sect 224 requirement for trusted supply chain and operational security standards. Accelerate the adoption of ME Assurance Framework utilizing microelectronics quantifiable assurance with multiple DoD pilot programs. This includes developing program guidance on baseline threats and mitigations per required level of assurance. This requires working closely with commercial industry, the defense industrial base and government JFAC subject matter experts. ***FY 2023 Plans:*** Development of DoD program relevant application prototypes. • Foster education and workforce development to include Industry-University Cooperative Research Centers Program (IUCRC) models with the National Science Foundation (NSF) and other partners. • Execute radiation hardened, heterogeneous integration/advanced packaging, and System On A Chip design Public-Private-Academic Partnership (PPAP) Models. Develop Supply Chain PPAP model. Expand PPAP partners and collaborators. • Stimulate rapid maturation and transition of emerging technologies and co-development with industry for assurance and security. • Continue development of industry outreach strategy to address critical technologies identified by DoD assurance and intelligence analysis. Sharing developed technical threat information with industry partners. • Enable and accelerate maturation and adoption of Microelectronics (ME) Assurance Framework. • Increase subject matter expertise of the ME Assurance Framework at service laboratories and contractor facilities. • Mature a regulatory and policy framework to enable long-term access to assured legacy and SOTA microelectronics. o Extend access. o Evaluate, mature, and improve assurance practices. • Ensure approach is aligned as part of DoD's comprehensive systems security engineering (SSE) framework. o Trusted Systems and Networks (TSN) Analysis. o Component level – FY20 NDAA Section 224 response for custom and commercial microelectronics.			

Exhibit R-2A, RDT&E Project Justification: PB 2024 Office of the Secretary Of Defense		Date: March 2023
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** 912 / *Create a Quantifiably Assured-Microelectronics Pipeline*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
• Use pilot projects to mature threat driven risk-based decision making models. • Leverages existing efforts. DoD policy, guidance, threat identification efforts, analysis and response, mitigations, technical efforts. Commercial standards and best practices. Proactive Technology Analysis. • Supports breadth of DoD microelectronics. Custom – Custom Integrated Circuit (CIC) and Field Programmable Gate Array (FPGA). Commercial – Commercial Off The Shelf (COTS) and modified commercial components.			
FY 2024 Plans: • Continue development of DoD program relevant application prototypes. • Foster education and workforce development to include Industry-University Cooperative Research Centers Program (IUCRC) models with the National Science Foundation (NSF) and other partners. • Execute radiation hardened, heterogeneous integration/advanced packaging, and System On A Chip design Public-Private-Academic Partnership (PPAP) Models. Develop Supply Chain PPAP model. Expand PPAP partners and collaborators. • Stimulate rapid maturation and transition of emerging technologies and co-development with industry for assurance and security. • Continue development of industry outreach strategy to address critical technologies identified by DoD assurance and intelligence analysis. Sharing developed technical threat information with industry partners. • Expand HwA laboratory tools and capabilities to keep pace with emerging commercial developments • Increase funding for supply chain analysis and engagement with the U.S. Semiconductor industry to mitigate supply chain threats • Enable and accelerate maturation and adoption of Microelectronics (ME) Assurance Framework. • Mature a regulatory and policy framework to enable long-term access to assured legacy and SOTA microelectronics. Extend access. Evaluate, mature, and improve assurance practices. • Ensure approach is aligned as part of DoD's comprehensive systems security engineering (SSE) framework. Trusted Systems and Networks (TSN) Analysis. Component level – FY20 NDAA Section 224 response for custom and commercial microelectronics. • Use pilot projects to mature threat driven risk-based decision making models. • Leverages existing efforts. DoD policy, guidance, threat identification efforts, analysis and response, mitigations, technical efforts. Commercial standards and best practices. Proactive Technology Analysis. • Supports breadth of DoD microelectronics.			

Exhibit R-2A, RDT&E Project Justification: PB 2024 Office of the Secretary Of Defense		Date: March 2023
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** 912 / *Create a Quantifiably Assured-Microelectronics Pipeline*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Custom – Custom Integrated Circuit (CIC) and Field Programmable Gate Array (FPGA). Commercial – Commercial Off The Shelf (COTS) and modified commercial components. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** The increase of $12.534 million between FY 2023 and FY 2024 will fund additional capacity for hardware verification and validation in DoD labs, supply chain analysis, and HwA efforts.			
Accomplishments/Planned Programs Subtotals	27.000	113.547	126.081

	FY 2022	FY 2023
Congressional Add: Trusted Artificial Intelligence	10.000	-
FY 2022 Accomplishments: The overall goal of the public-private-academic partnership (PPAP) model is to develop the workforce around Embedded Systems Security/Artificial Intelligence (ESS/AI) and its intersection with Microelectronics, Embedded Systems, and Cybersecurity by training students in the emerging area of Trusted AI. Students will be trained through research projects that will address difficult problems in AI related to trust, verifiability, risk modeling, bias, fairness, human interaction, and feedback. Human-machine Pairing for Trustworthy AI. Develop a framework to evaluate the feedback loops between human operators and Artificial Intelligence / Machine Learning (AI/ML) systems that affect decision-making and final behavior. Statistical Analysis and Measurement of Neural Networks. Facilitate the development of techniques essential to the goals of the Trusted AI project and train students in the best practices that embody these techniques, ultimately providing a knowledgeable workforce for the defense ecosystem. AI Career-Cyber Coaching for US Workers: (1) AI Development of career cyber coaching algorithms and job maps that enable users to explore job risks and possible career paths in alignment with self-reported interests and preferences along with auto-assessed skills, with a special focus on microelectronics and the specialty areas of SCALE (including but not limited to radiation hardened technologies, heterogeneous integration/ advanced packaging, supply chain awareness, embedded systems security / artificial intelligence, and system on chip); and (2) Scale-up of training of coaches to prepare them to use the algorithm as part of career counseling services so they can guide workers with maximum effect, even and especially in times of increased demand, whether in response to regional and national labor market trends, plant closures, or a pandemic.		
Congressional Adds Subtotals	10.000	-

Exhibit R-2A, RDT&E Project Justification: PB 2024 Office of the Secretary Of Defense		Date: March 2023
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** 912 / *Create a Quantifiably Assured-Microelectronics Pipeline*

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Office of the Secretary Of Defense			Date: March 2023
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604294D8Z / *Trusted and Assured Microelectronics*	Project (Number/Name) 912 / *Create a Quantifiably Assured-Microelectronics Pipeline*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Create a Resilient and Robust Microelectronics Pipeline	MIPR	Defense Advanced Research Projects Agency, Air Force, Army, Navy, National Security Agency : Various	75.544	37.000	Mar 2022	113.547	Mar 2023	126.081	Mar 2024	-		126.081	Continuing	Continuing	-
		Subtotal	75.544	37.000		113.547		126.081		-		126.081	Continuing	Continuing	N/A

	Prior Years	FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	75.544	37.000		113.547		126.081		-		126.081	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2024 Office of the Secretary Of Defense		Date: March 2023
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** 912 / *Create a Quantifiably Assured-Microelectronics Pipeline*

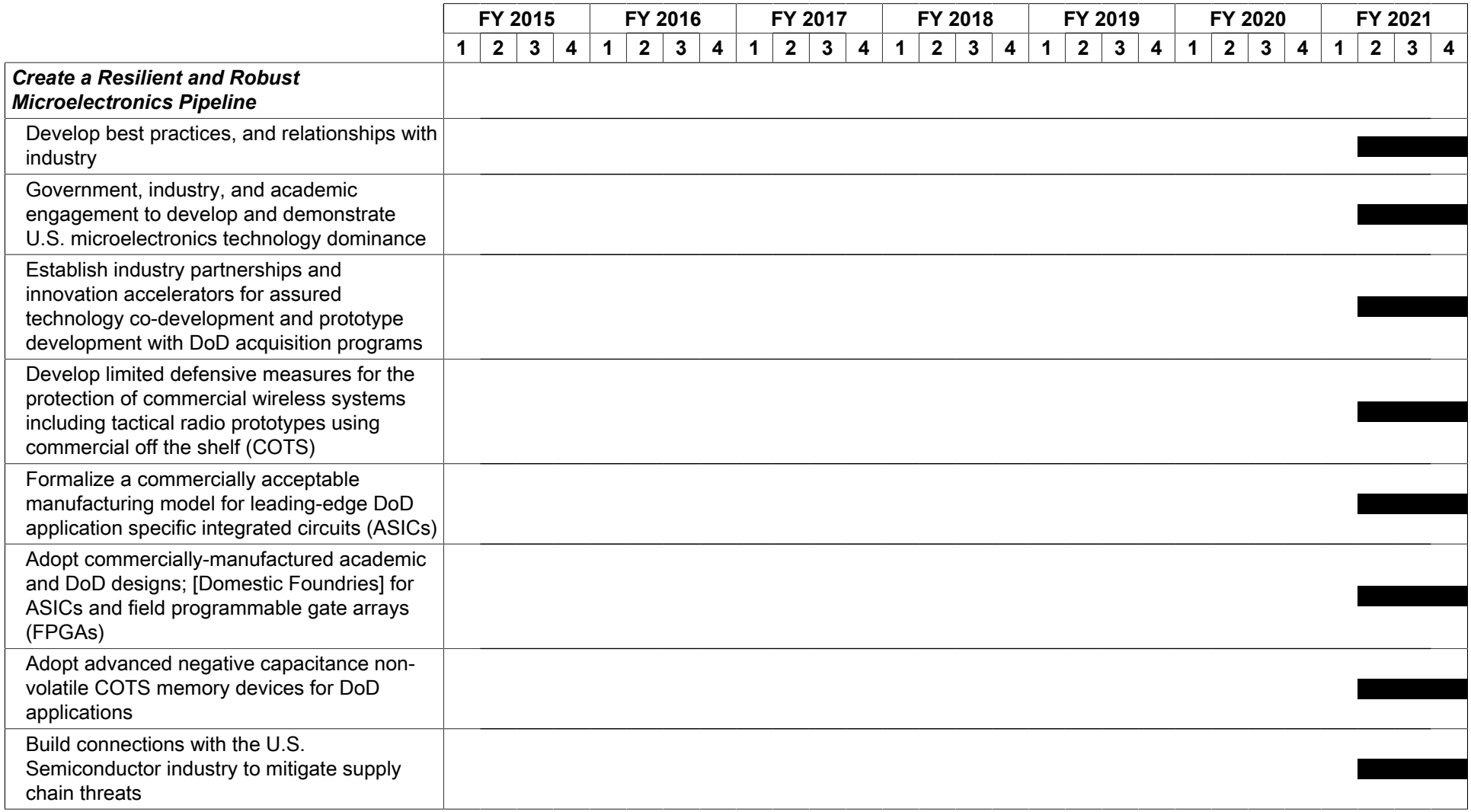
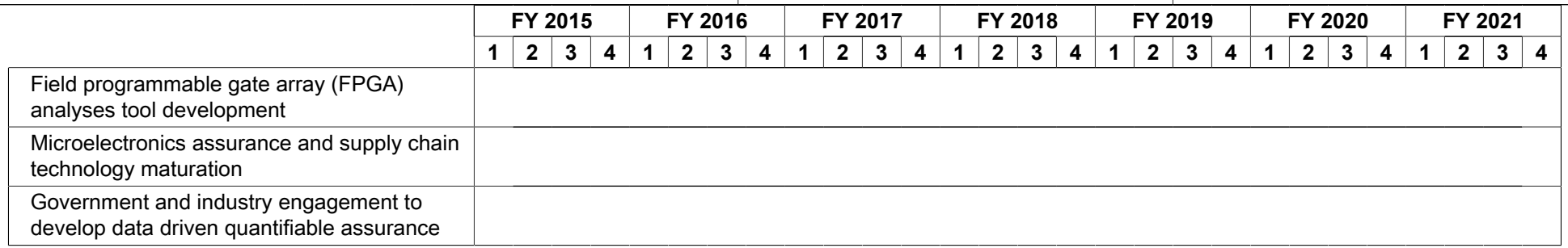


Exhibit R-4, RDT&E Schedule Profile: PB 2024 Office of the Secretary Of Defense		Date: March 2023
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** 912 / *Create a Quantifiably Assured-Microelectronics Pipeline*

	FY 2015				FY 2016				FY 2017				FY 2018				FY 2019				FY 2020				FY 2021			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Develop tools to analyze the health of the supply chain and track the health of the U.S. industry																												
Management/Technical Support																												
Development of DoD program relevant application prototypes																												
Education and Workforce Development to include Industry-University Cooperative Research Centers Program (IUCRC) models with the National Science Foundation (NSF) and other partners																												
Stimulate rapid maturation and transition of emerging technologies and co-development with industry for assurance and security																												
Microelectronics Assurance and Supply Chain Standards and Best Practices Development																												
U.S. Government and Industry Engagement for demonstration of data driven quantifiable assurance tools, techniques, and risk based metrics																												
Microelectronics Assurance and Supply Chain Training for U.S. Government and Industry																												
DoD Microelectronics Assurance and Supply Chain Policy and Guidance Development/ Update																												
Application Specific Integrated Circuit (ASIC) netlist analysis capability development																												

Exhibit R-4, RDT&E Schedule Profile: PB 2024 Office of the Secretary Of Defense		Date: March 2023
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** 912 / *Create a Quantifiably Assured-Microelectronics Pipeline*



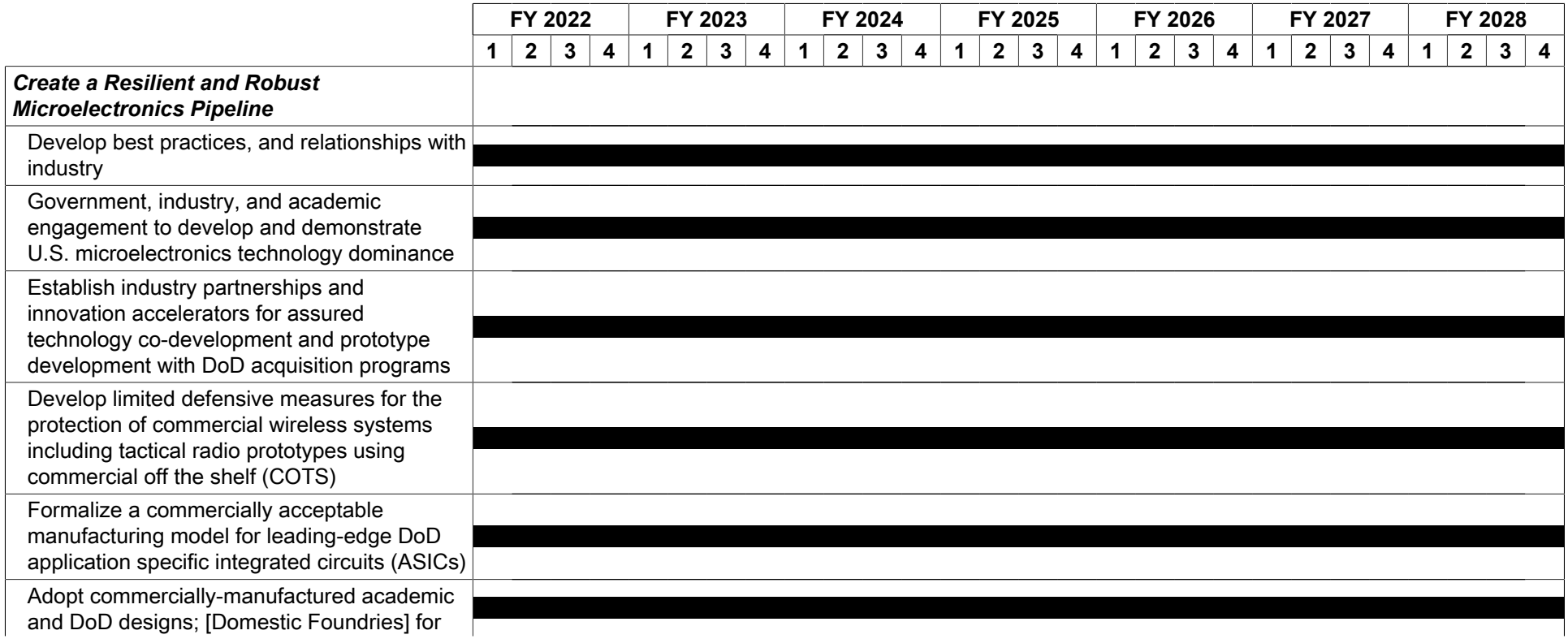


Exhibit R-4, RDT&E Schedule Profile: PB 2024 Office of the Secretary Of Defense		Date: March 2023
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** 912 / *Create a Quantifiably Assured-Microelectronics Pipeline*

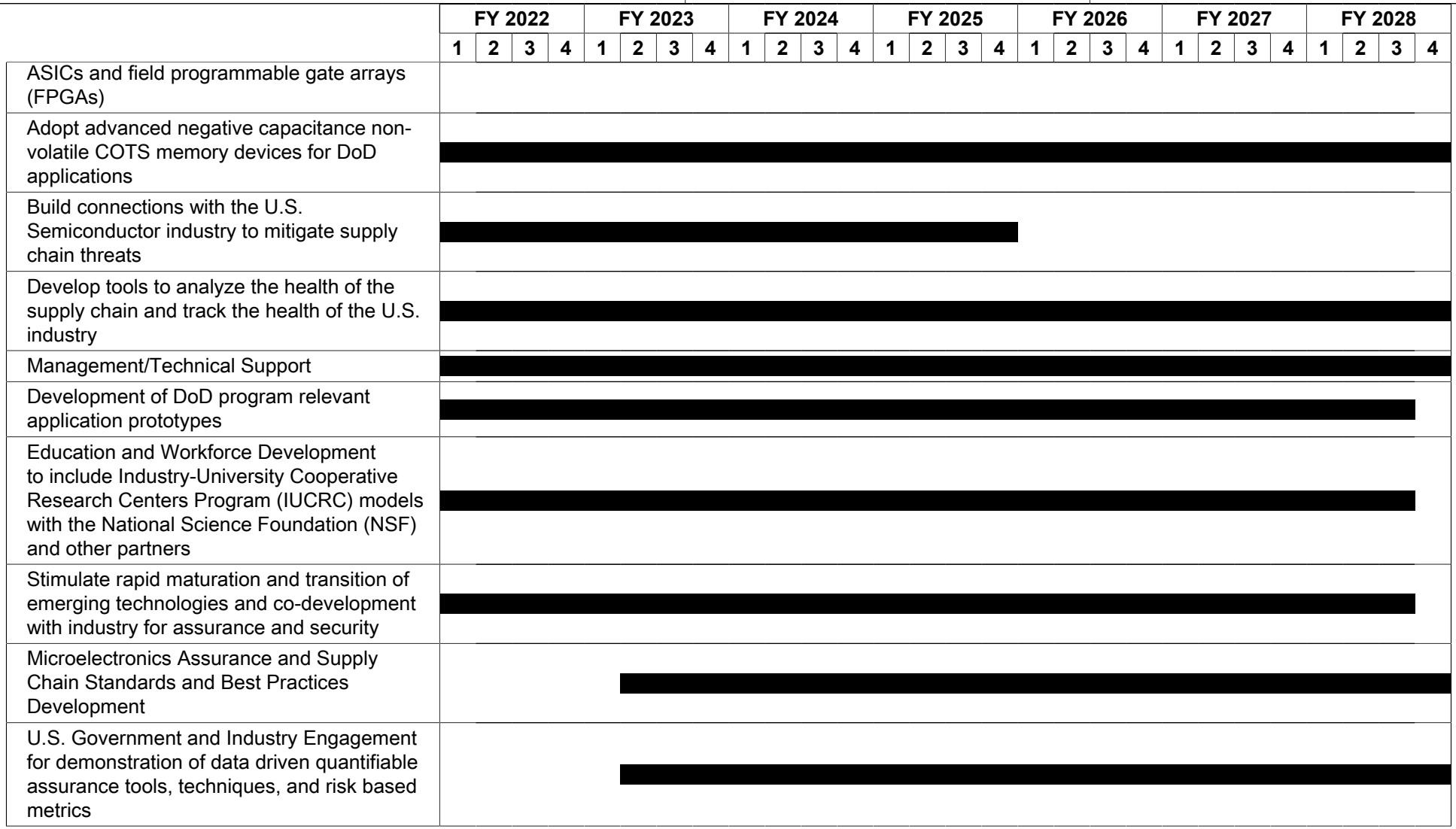


Exhibit R-4, RDT&E Schedule Profile: PB 2024 Office of the Secretary Of Defense		Date: March 2023
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** 912 / *Create a Quantifiably Assured-Microelectronics Pipeline*

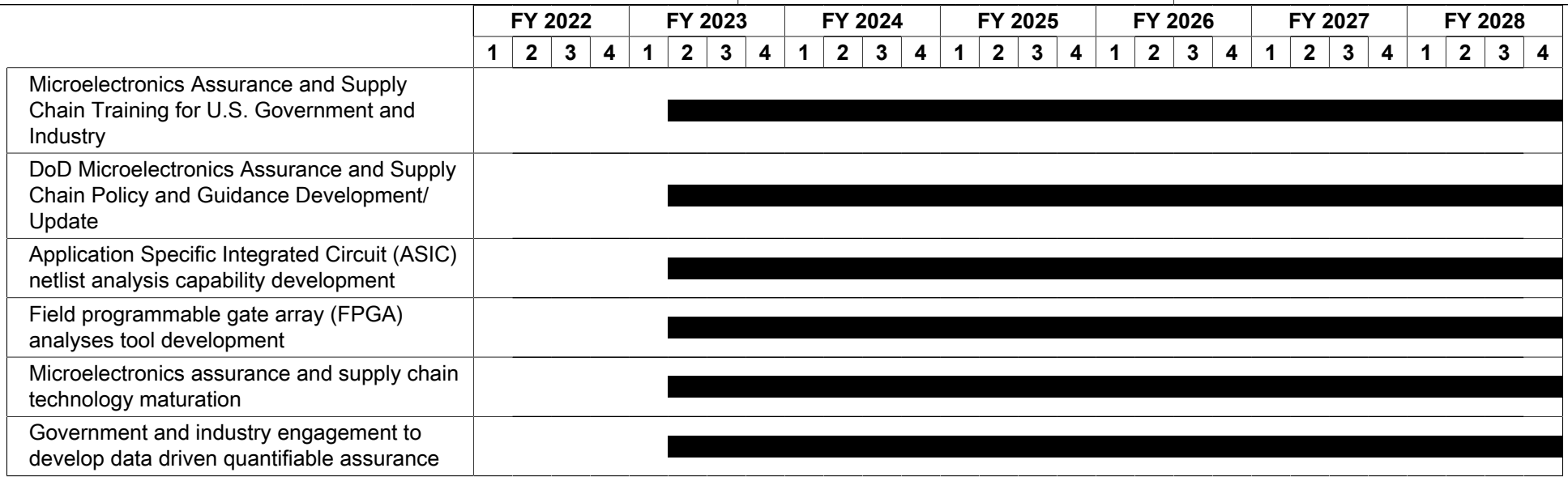


Exhibit R-4A, RDT&E Schedule Details: PB 2024 Office of the Secretary Of Defense		Date: March 2023
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** 912 / *Create a Quantifiably Assured-Microelectronics Pipeline*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Create a Resilient and Robust Microelectronics Pipeline				
Develop best practices, and relationships with industry	2	2021	4	2028
Government, industry, and academic engagement to develop and demonstrate U.S. microelectronics technology dominance	2	2021	4	2028
Establish industry partnerships and innovation accelerators for assured technology co-development and prototype development with DoD acquisition programs	2	2021	4	2028
Develop limited defensive measures for the protection of commercial wireless systems including tactical radio prototypes using commercial off the shelf (COTS)	2	2021	4	2028
Formalize a commercially acceptable manufacturing model for leading-edge DoD application specific integrated circuits (ASICs)	2	2021	4	2028
Adopt commercially-manufactured academic and DoD designs; [Domestic Foundries] for ASICs and field programmable gate arrays (FPGAs)	2	2021	4	2028
Adopt advanced negative capacitance non-volatile COTS memory devices for DoD applications	2	2021	4	2028
Build connections with the U.S. Semiconductor industry to mitigate supply chain threats	2	2021	4	2025
Develop tools to analyze the health of the supply chain and track the health of the U.S. industry	2	2021	4	2028
Management/Technical Support	2	2021	4	2028
Development of DoD program relevant application prototypes	2	2021	3	2028
Education and Workforce Development to include Industry-University Cooperative Research Centers Program (IUCRC) models with the National Science Foundation (NSF) and other partners	2	2021	3	2028
Stimulate rapid maturation and transition of emerging technologies and co-development with industry for assurance and security	2	2021	3	2028

Exhibit R-4A, RDT&E Schedule Details: PB 2024 Office of the Secretary Of Defense		Date: March 2023
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** 912 / *Create a Quantifiably Assured-Microelectronics Pipeline*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Microelectronics Assurance and Supply Chain Standards and Best Practices Development	2	2023	4	2028
U.S. Government and Industry Engagement for demonstration of data driven quantifiable assurance tools, techniques, and risk based metrics	2	2023	4	2028
Microelectronics Assurance and Supply Chain Training for U.S. Government and Industry	2	2023	4	2028
DoD Microelectronics Assurance and Supply Chain Policy and Guidance Development/Update	2	2023	4	2028
Application Specific Integrated Circuit (ASIC) netlist analysis capability development	2	2023	4	2028
Field programmable gate array (FPGA) analyses tool development	2	2023	4	2028
Microelectronics assurance and supply chain technology maturation	2	2023	4	2028
Government and industry engagement to develop data driven quantifiable assurance	2	2023	4	2028

Exhibit R-2A, RDT&E Project Justification: PB 2024 Office of the Secretary Of Defense			Date: March 2023
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604294D8Z / *Trusted and Assured Microelectronics*	Project (Number/Name) 913 / *Defense Microelectronics Cross-Functional Team Funding*	

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
913: *Defense Microelectronics Cross-Functional Team Funding*	0.000	0.000	8.000	4.023	-	4.023	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Microelectronics components are the foundation of modern military systems. The Department of Defense (DoD) is exposed to various vulnerabilities that threaten the ability to source microelectronics needed to sustain programs of record. In order to prepare the Department for Great Power Competition, the DoD must take action to ensure access to the microelectronic components needed to sustain our defense programs and systems effectively and affordably. The Department also needs a better strategy to transition leading edge technology developed by both government and industry to DoD programs of record, to ensure the Department maintains a competitive edge.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Defense Microelectronics Cross-Functional Team Funding	-	8.000	4.023
Description: A Cross-Functional Team (CFT) was established effective January 2021 to develop a DoD strategy and implementation and transition plan to minimize vulnerabilities within the Department's microelectronic supply chain. The transition plan will be comprehensive, and include a budget plan. The CFT will function as an advisory body to the Deputy Secretary of Defense (DSD), the Under Secretary of Defense for Research and Engineering (USD(R&E)), the Under Secretary of Defense for Acquisition and Sustainment (USD(A&S)) to strengthen the domestic microelectronics supply chain. ***FY 2023 Plans:*** The CFT will continue to detail subject matter experts from the Services to the CFT, and execute contracts for studies to supply the analysis necessary to inform the DoD strategy development. The CFT will complete the development of the initial DoD strategy, and develop recommendations on roadmaps to execute. ***FY 2024 Plans:*** The CFT will continue to detail subject matter experts from the Services to the CFT, and execute contracts for studies to supply the analysis necessary to inform the DoD strategy development. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** The decrease of $3.977 million between FY 2023 and FY 2024 is due to a scheduled ramp down of this project to complete operations in FY 2024.			
Accomplishments/Planned Programs Subtotals	-	8.000	4.023

Exhibit R-2A, RDT&E Project Justification: PB 2024 Office of the Secretary Of Defense		Date: March 2023
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** 913 / *Defense Microelectronics Cross-Functional Team Funding*

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Office of the Secretary Of Defense		Date: March 2023
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** 913 / *Defense Microelectronics Cross-Functional Team Funding*

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Defense Microelectronics Cross-Functional Team Funding	MIPR	TBD : TBD	-	-		8.000	Apr 2023	4.023	Apr 2024	-		4.023	Continuing	Continuing	-
		Subtotal	-	-		8.000		4.023		-		4.023	Continuing	Continuing	N/A

	Prior Years	FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	-		8.000		4.023		-		4.023	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2024 Office of the Secretary Of Defense		Date: March 2023
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** 913 / *Defense Microelectronics Cross-Functional Team Funding*

	FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027				FY 2028			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Defense Microelectronics Cross-Functional Team Funding																												
Program Support						[redacted]																						

Exhibit R-4A, RDT&E Schedule Details: PB 2024 Office of the Secretary Of Defense		Date: March 2023
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604294D8Z / *Trusted and Assured Microelectronics*	**Project (Number/Name)** 913 / *Defense Microelectronics Cross-Functional Team Funding*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Defense Microelectronics Cross-Functional Team Funding				
Program Support	2	2023	4	2024