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Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Air Force **Date:** March 2023

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 3: Advanced Technology Development (ATD)</i>	R-1 Program Element (Number/Name) PE 0603605F / <i>Advanced Weapons Technology</i>
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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	-	29.585	89.024	102.997	0.000	102.997	52.172	31.961	31.115	32.180	Continuing	Continuing
633151: <i>High Power Solid State Laser Technology</i>	-	20.738	31.401	15.849	0.000	15.849	13.675	13.202	13.492	14.075	Continuing	Continuing
633152: <i>High Power Microwave Development and Integration</i>	-	8.847	57.623	87.148	0.000	87.148	38.497	18.759	17.623	18.105	0.000	246.602

A. Mission Description and Budget Item Justification

This program provides for the development, integration, demonstration, and detailed assessment of directed energy (DE) weapon technologies for potential application on Air Force platforms. These include high energy laser (HEL), high power microwaves (HPM), and other unconventional weapon generation and transmission technologies, which can support a wide range of Air Force applications. The program develops a corresponding susceptibility, vulnerability, and lethality database for directed energy weapons. Efforts in this program have been coordinated through the Department of Defense Science and Technology Executive Committee process to harmonize efforts and eliminate duplication.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver science & technology capabilities. The use of program funds in this program element would be in addition to the civilian pay expenses budgeted in program elements 0601102F, 0602102F, 0602201F, 0602202F, 0602203F, 0602204F, 0602602F, 0602605F, 0602788F, 1206601SF, and 0602298F.

This program element may include necessary expenses to support the operation and maintenance of facilities to manage, execute, and deliver science and technology capabilities.

This program is in Budget Activity 3, Advanced Technology Development because this budget activity includes development of subsystems and components and efforts to integrate subsystems and components into system prototypes for field experiments and/or tests in a simulated environment.

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B. Program Change Summary (\$ in Millions)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Previous President's Budget	31.855	98.503	114.373	0.000	114.373
Current President's Budget	29.585	89.024	102.997	0.000	102.997
Total Adjustments	-2.270	-9.479	-11.376	0.000	-11.376
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	5.000			
• Congressional Directed Transfers	0.000	-14.414			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-2.262	0.000			
• Other Adjustments	-0.008	-0.065	-11.376	0.000	-11.376

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 633151: *High Power Solid State Laser Technology*

Congressional Add: *Program increase - LIDAR CUAS automated target recognition*

Congressional Add Subtotals for Project: 633151

Congressional Add Totals for all Projects

	FY 2022	FY 2023
	-	5.000
	-	5.000
	-	5.000

Change Summary Explanation

Funding decrease is due to realignment into Program 0603032F, Future AF Integrated Technology Demonstrations, Project 630320, Air Force and higher Air Force priorities.

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Appropriation/Budget Activity 3600 / 3					R-1 Program Element (Number/Name) PE 0603605F / <i>Advanced Weapons Technology</i>				Project (Number/Name) 633151 / <i>High Power Solid State Laser Technology</i>			
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
633151: <i>High Power Solid State Laser Technology</i>	-	20.738	31.401	15.849	0.000	15.849	13.675	13.202	13.492	14.075	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project provides for the development, integration, demonstration, and detailed technical assessment of high energy laser devices, advanced imaging, and beam control technologies needed for applications such as force protection, force application, precision engagement, and aircraft protection. Laser system concept assessments to include vulnerability assessments and target effect testing are performed.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2022	FY 2023	FY 2024
Title: High Energy Laser/Beam Control	19.797	26.401	15.849
Description: Develop and demonstrate advanced beam control technologies, integrated laser systems, and aircraft protection laser technologies. Demonstrate beam control components integrated with high energy lasers for the Department of the Air Force utility.			
FY 2023 Plans: Complete the laser system, the beam control system, and the pod delivery of the Self Defense High Energy Laser Demonstrator (SHIELD) which is intended to be a flight demonstrator of a laser weapon laser system in pod form factor. Continue additional testing and demonstration activities with packaged high energy laser (HEL) and/or beam control subsystem. Initiate laser subsystems integration for a ground demonstration. Initiate assistance in the development of a high power microwave system with the military services for Directed Energy Frontline Electromagnetic Neutralization and Defeat (DEFEND) being executed in 0603605F:6633152.			
FY 2024 Plans: Continue additional testing and demonstration activities with packaged high energy laser (HEL) and/or beam control subsystem. Continue laser subsystems integration for a ground demonstration. Initiate next phase of advanced integrated technologies for compact, low-size, weight and power (SWaP) airborne laser weapon system.			
FY 2023 to FY 2024 Increase/Decrease Statement: FY 2024 decreased compared to FY 2023 by \$10.552 million. Funding decrease due to transfer of funds to accurately reflect previous allocation.			
Title: Transformational Technology Development	0.941	0.000	0.000

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Appropriation/Budget Activity 3600 / 3	R-1 Program Element (Number/Name) PE 0603605F / <i>Advanced Weapons Technology</i>	Project (Number/Name) 633151 / <i>High Power Solid State Laser Technology</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2022	FY 2023	FY 2024
<p>Description: Continually funded effort. This funding allocation will start new and continue Transformational Technology Developments. The Transformational Technology Development program will select new projects, in alignment with mission focused areas which include, but are not limited to: Intelligent Planning and Wargaming; Battlespace Awareness; Integrated Base Defense; and Hypersonic Multi-Mission Aircraft. Investments focus on technology development efforts including, but are not limited to development and demonstration of new high energy laser devices, advanced imaging and beam control technologies, as well as assessments to enable new laser system concept development. This investment is overseen by senior representatives from Air and Space Forces who participate in the submission, initial review, and down-selection of Transformational Technology Development proposed efforts. Final selections will be reviewed by the Air Force Deputy Assistant Secretary for Science, Technology, and Engineering before a final recommendation for Congressional approval is made.</p> <p>FY 2023 Plans: Not applicable.</p> <p>FY 2024 Plans: Not applicable.</p>				
Accomplishments/Planned Programs Subtotals		20.738	26.401	15.849
		FY 2022	FY 2023	
Congressional Add: Program increase - LIDAR CUAS automated target recognition		-	5.000	
FY 2023 Plans: Conduct Congressional directed efforts.				
Congressional Adds Subtotals		-	5.000	
C. Other Program Funding Summary (\$ in Millions)				
N/A				
Remarks				
Not Applicable				
D. Acquisition Strategy				
Not Applicable				

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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
633152: <i>High Power Microwave Development and Integration</i>	-	8.847	57.623	87.148	0.000	87.148	38.497	18.759	17.623	18.105	0.000	246.602
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project develops and demonstrates high power microwave and other unconventional electromagnetic field generation and transmission technologies that can be integrated into future weapon systems to support a wide range of the Department of the Air Force missions such as air base defense or the damage/destruction of an adversary's electronic infrastructure. It also provides inputs to the susceptibility, vulnerability, and lethality databases used across the Department of Defense to understand thresholds for scalable effects of directed energy weapons.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2022	FY 2023	FY 2024
Title: High Power Microwave Technologies	3.989	57.623	87.148
Description: Develop and evaluate high power microwave and other unconventional weapon technologies for various platforms, including aerial, for applications such as counter-electronics. Develop and evaluate high power microwave technologies for non-kinetic and counter-electronic weapon applications.			
FY 2023 Plans: Continue development of high power microwave components to enable the integration into aerial platforms, ground-based systems and mobile systems. Complete high power microwave payload development for a later integration support missile defense mission under development with the Navy. Continue characterization, model, test, and evaluate current and projected blue Directed Energy weapons against relevant red assets. Initiate development of a high power microwave system with the military services for Directed Energy Frontline Electromagnetic Neutralization and Defeat (DEFEND).			
FY 2024 Plans: Continue development of high power microwave components to enable the integration into aerial platforms, ground-based systems and mobile systems. Initiate development of a high power microwave system for an integrated air and missile defense mission. Continue development of modeling tools and test capabilities to evaluate current and projected blue Directed Energy weapons against relevant red assets. Continue development of next generation high power microwave high frequency sources. Continue a high-priority base defense mission with joint high power microwave system with the Military Services for Directed Energy Frontline Electromagnetic Neutralization and Defeat (DEFEND).			
FY 2023 to FY 2024 Increase/Decrease Statement:			

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2022	FY 2023	FY 2024
FY 2024 increased compared to FY 2023 by \$29.525 million. Funding increase reflects the development and delivery of a high-priority base defense mission with joint high power microwave defense system with the military services.				
Title: Transformational Technology Development		4.858	0.000	0.000
Description: Continually funded effort. This funding allocation will start new and continue Transformational Technology Developments. The Transformational Technology Development program will select new projects, in alignment with mission focused areas which include, but are not limited to: Intelligent Planning and Wargaming; Battlespace Awareness; Integrated Base Defense; and Hypersonic Multi-Mission Aircraft. Investments focus on technology development efforts including, but are not limited to: development and demonstration of new high power microwave sources, transmission technologies, and applications, to include non-kinetic and counter-electronic. This investment is overseen by senior representatives from Air and Space Forces who participate in the submission, initial review, and down-selection of Transformational Technology Development proposed efforts. Final selections will be reviewed by the Air Force Deputy Assistant Secretary for Science, Technology, and Engineering before a final recommendation for Congressional approval is made.				
FY 2023 Plans: Effort realigned PE 0603032F Future AF Integrated Technology Demonstration, Project 630320, Air Force Vanguard, in order to provide a more complete picture of the Vanguard program.				
FY 2024 Plans: Not Applicable.				
Accomplishments/Planned Programs Subtotals		8.847	57.623	87.148
C. Other Program Funding Summary (\$ in Millions)				
N/A				
Remarks				
Not Applicable				
D. Acquisition Strategy				
Not Applicable				