Requirements / Specification Document

National Institute of Standards and Technology
U.S. Department of Commerce

TITLE: Comb Stabilization Modules

Requesting Laboratory / Division / Group:

Communications Technology Laboratory
Radio Frequency Technology Division
High-Speed Waveform Metrology Group (672.03)

General Statement of Need:

The requested carrier-envelope offset (f_o / fCEO) stabilization modules (quantity 2) shall support coherent operation of 1550 nm femtosecond frequency comb systems for electro-optic sampling, timing synchronization, and dual-comb waveform metrology applications. The module shall accept PM1550 femtosecond laser input through FC/APC fiber coupling with support for pulse energies between approximately 200 pJ and 1 nJ and pulse durations near 180–250 fs. The system shall provide high signal-to-noise fCEO detection (>35 dB SNR in 300 kHz RBW), integrated RF output through SMA connectivity, and internal photodetection suitable for comb offset stabilization and synchronization architectures. The module shall support stable operation for coherent frequency-comb measurements, low-noise timing distribution, and ultrafast waveform reconstruction in controlled laboratory environments, while maintaining compact form factors, low optical loss, and compatibility with dual-comb electro-optic sampling systems.

Item Specifications and Quantities:

Item 1:	Comb Offset Stabilization Module (COSMO)	
Quantity:	2 EACH	
Specifications:	1.1	For carrier-envelope offset (f_o / fCEO) detection and stabilization.
	1.2	PM1550 fiber-coupled input with FC/APC connector and slow-axis alignment for compatibility with polarization-maintaining 1550 nm femtosecond comb systems.
	1.3	Minimum required input pulse energy: 200 pJ at 1550 nm (typical operation around 150 pJ).
	1.4	Maximum supported input pulse energy: 1 nJ at 1550 nm.
	1.5	Maximum supported average optical power: 400 mW.
	1.6	Optimized for femtosecond pulse durations between approximately 180–250 fs at the module housing input.
	1.7	Integrated SMA RF output connector for extraction of carrier-envelope offset beat signal and synchronization electronics interfacing.
	1.8	Internal photodetector bandwidth specified at 100 MHz for comb offset detection and stabilization measurements.
	1.9	Carrier-envelope offset signal-to-noise ratio (fCEO SNR) greater than 35 dB measured in 300 kHz resolution bandwidth.
	1.10	Compact enclosure dimensions of approximately 57 × 35 × 17 mm supporting integration into low-noise ultrafast optical frequency-comb and dual-comb electro-optic sampling architectures.

Vendor Requirements

1. Possess at time of award/contracting an Export Control Classification Number (ECCN).

2. Possess at time of award/contracting a Unique Entity Identification Number (UEI) which registration is listed as "Active" on the GSA System for Award Management (SAM.gov).

Procurement Support Information and Ancillary Services:

Section	Requirements/Specifications
Planning Considerations ☒ N/A	☐ List any visits required to allow potential vendors to see site specific constraints. [Explain Requirements.] ☐ US citizen required on-site (foreign nationals require pre-registration 30 days prior to visit.) ☐ Vendor Representative On-Site more than three (3) days. ☐ Other Considerations: [List other considerations to ensure an accurate quote.]
Shipping & Delivery ☐ N/A	Shipping Address: ☒ NIST-Boulder Mail Stop: 672.00 325 Broadway Boulder, CO 80305 ☐ ☐ Shipping Criteria: ☐ Partial Delivery Acceptable ☐ [Enter Shipping and Delivery information by item.] ☐ Direct Delivery to OU Building Required [Explain Need for Requirement]

Building /Room Number: [Enter Building/Room Number]
☐ Building has Loading Dock
Containerization Preference: [Enter Container Type]
Other Requirements:
[List Any Other Requirement]

Delivery Date Criteria:
☒ Delivery Shall Be Competed No Later Than:
6 weeks ARO
☐ Delivery Shall Be Made No Earlier Than:
Click or tap to enter a date.
☐ Scheduled Deliveries:

Item Number	Due Date

☐ Other:
[List Other Shipping, Delivery or Special Requirements.]

Electronic Media
☐ N/A

[Enter Electronic Media Requirements by Item.]
☐ Software
☒ Electronic Manuals
☐ License Key
☐ Other:
[List Any Other Electronic Media Requirements]
☐ US Government Email Address for Software Delivery:
[Enter Address]

Installation
☒ N/A

[Enter Installation Requirements by Item]
☐ Vendor Technician on Site
☐ Rigging
☐ Uncrating / Unpackaging
☐ Removal of Packaging Material
☐ Equipment Set Up
☐ Start-Up Services
☐ Turnkey Installation
☐ Other:
[Enter Details]
NOTE: TPOC shall be the coordination POC.

Facility / Utility Considerations
☒ N/A

[List Site Specific Utility Considerations by Item]
☐ OFPM Work Order Numbers
[List Work Order Numbers]
☐ Power Available
Voltage: [Enter voltage] (V)
Maximum Current: [Enter max current draw] (A)
Phase: [Choose Phase]
Frequency: [Typically 60Hz] (Hz)
NEMA Plug Type: [Enter Plug Type] (i.e.: NEMA L5-20P)
Environment: [Choose Environment]
Other Power Considerations:
[List Any Other Power Considerations.]
☐ Utility Connections:
[List Relevant Available Utilities, Pressure(s) and Flowrate(s).]
☐ Other Considerations:
[List Other Considerations to Ensure an Accurate Quote.]

Inspection and Acceptance
☐ N/A

[Inspection Requirements Per Item (Who, When, What, Where)]
☐ On-Site
☒ Acceptance Not Expected to Exceed 7 Business Days
☐ Acceptance Expected to Exceed 7 Business Days:
[Duration]
☐ Inspection and Acceptance Plan:
[Explanation]
☐ Other:
[Enter Other Requirements]

Training
☒ N/A

Training Requirements (Who, When, What, Where)
☐ Number of Trainees: [Enter Number of Trainees]
☐ On-Site
☐ Off-Site Location: [Enter Location(s)]
Is Trainee Travel Required: [Choose Answer]
Scope of Training
☐ Operation ☐ Maintenance ☐ Troubleshooting
☐ Safety ☐ Other
[Enter Other Scope of Training Requirements]

	☐ Training Materials to be Provided by Government: [Describe Materials] ☐ Training Materials to be Provided by Vendor: [Describe Materials] ☐ Other [Enter Other Training Requirements] NOTE: SME shall be coordination POC.
Warranty ☐ N/A	Base Manufacturer Warranty is acceptable Warranty Length: 1-Year What is included? ☐ Labor ☐ Parts ☐ Travel ☐ Cost and Liability for Returns ☐ Other [Enter Other Requirements] ☐ 1 Option Period ☐ 2 Option Periods ☐ 3 Option Periods ☐ 4 Option Periods (Maximum)
Calibration ☒ N/A	[Describe Calibration Requirements Per Item] Calibration Plan Length: [i.e. 3 - Years] What is Included? ☐ Labor ☐ Spare Parts ☐ Consumables ☐ Travel ☐ Cost and Liability for Shipment ☐ Software Updates ☐ Manuals ☐ Other [Enter Other Requirements] ☐ Requirements: [Enter Requirements] (i.e.: On-Site Within 72 hours, etc.) ☐ 1 Option Period Length: [i.e. 1 – Year / 6 - Months] ☐ 2 Option Periods ☐ 3 Option Periods ☐ 4 Option Periods (Maximum)
Maintenance ☒ N/A	[Describe Maintenance Requirements Per Item] Maintenance Plan Length: [i.e. 3 - Years] What is Included? ☐ Labor ☐ Spare Parts ☐ Consumables ☐ Travel ☐ Cost and Liability for Shipment ☐ Software Updates ☐ Manuals ☐ Other [Enter Other Requirements] ☐ Requirements: [Enter Requirements] (i.e.: On-Site Within 72 hours, etc.) ☐ 1 Option Period Length: [i.e. 1 – Year / 6 - Months] ☐ 2 Option Periods ☐ 3 Option Periods ☐ 4 Option Periods (Maximum)
Government Furnished Material / Equipment ☒ N/A	List Any Government Furnished Material / Equipment Per Item] ☐ Samples for Testing ☐ Equipment which will leave Government Site Description: [Enter Description] Serial Number: [Enter Serial Number] NIST Property Number: [Enter NIST Property Number] ☐ Other: [Enter Other Details]
Travel ☒ N/A	[Describe any Travel Requirements Per Item] ☐ Explain: [Enter Justification / Requirement] ☐ Other: [Enter Other Requirements] NOTE TO VENDOR: To the maximum extent possible, include travel requirement estimates as part of pertinent sections above (Installation, Maintenance, Repair, etc.). Otherwise, Travel will be a separate line item, reimbursable per the Federal Travel Regulation.