Requirements / Specification Document

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

TITLE: Spatial Light Modulator

Requesting Laboratory / Division / Group:

Communications Technology Laboratory
Radio Frequency Technology Division
RFTD HQ Group (672.00)

General Statement of Need:

The requested spatial light modulator (SLM) system shall provide programmable wavefront and phase modulation of coherent optical beams to support advanced electro-optic sampling (EOS), ultrafast optical waveform metrology, and optical beam shaping applications. The system shall enable dynamic control of the spatial phase and amplitude of laser beams to generate arbitrary illumination patterns, optimize optical focusing into photonic and microelectronic structures, and compensate for optical aberrations within complex measurement systems. The SLM shall provide high spatial resolution, high phase stability, and computer-controlled operation with software interfaces compatible with automated laboratory control. The system shall support operation over the wavelength range used for EOS measurements, including near-infrared telecommunications wavelengths, while maintaining high optical efficiency and low wavefront distortion. The SLM is required to support development of SI-traceable electro-optic waveform measurements, spatially resolved electric-field characterization, adaptive optical alignment, and precision optical beam engineering for advanced photonic, semiconductor, and ultrafast metrology applications.

Item Specifications and Quantities:

Item 1:	Spatial Light Modulator	
Quantity:	1 EACH	
Specifications:	1.1	Reflective Liquid Crystal on Silicon (LCOS) spatial light modulator providing phase-only modulation of coherent optical beams.
	1.2	Optimized for operation over the 1000 nm to 1550 nm wavelength range.
	1.3	Provide continuous programmable phase modulation of greater than 2π radians at the specified operating wavelength.

	1.4	Minimum active resolution of 1272 × 1024 pixels.
	1.5	Maximum pixel pitch of 12.5 µm.
	1.6	Minimum effective modulation area of 15.9 mm × 12.8 mm.
	1.7	Minimum optical fill factor of 96%.
	1.8	Minimum optical efficiency of 80% at 1550 nm.
	1.9	Support spatial frequencies up to at least 40 line pairs/mm.
	1.10	Rise time not greater than 30 ms and fall time not greater than 140 ms.
Item 2:	Multi-Demodulator	
Quantity:	1 EACH	
Specifications:	2.1	Extends the total number of demodulators to 8.
	2.2	Extends the total number of internal oscillators to 8.

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
ATTN: To be provided
MAIL STOP:
325 Broadway
Boulder, CO 80305

☐ NIST-Gaithersburg
ATTN:
Mail Stop:
100 Bureau Dr
Gaithersburg MD 20899

☐ [Alternate Shipping Address]

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:
Click or tap to enter a date.

☐ 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: 12 months 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	[Describe any Travel Requirements Per Item]
☒ N/A	☐ 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.