



सेमी-कंडक्टर लेबोरेटरी/Semi-Conductor Laboratory

अंतरिक्ष विभाग, भारत सरकार/Department of Space, Government of India
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निविदा सूचना संख्या. एससीएल/पीटी/63

TENDER NOTICE No.: SCL/PT/63

दिनांक/ Dated: 08.07.2017

निदेशक, एससीएल के लिए एवं उनकी ओर से सेमी- कंडक्टर लेबोरेटरी के प्रमुख क्रय एवं भण्डार, निम्न के लिए दो भागों में ऑन लाइन निविदाएं आमंत्रित करते हैं।

For and on behalf of The Director, Head-Purchase & Stores, Semi-Conductor Laboratory (SCL) invites Online TWO part Tenders for the following:

क्रमसं ख्या Sr. No.	निविदा संख्या Tender Number	विवरण Description	संख्या/ Quantity
1	एससीएल/पीएस2/2017E0070001 SCL/PS2/2017E0070001 दो भाग निविदा (Two part Tender)	Transfer of Technology for Gallium Arsenide based RF and Photonics Devices	प्रस्तावित अनुरोध के अनुसार As per RFP

ऑन लाइन निविदा को दो भागों में प्रस्तुत करने की तिथि एवं समय / Date & Time of Submission of Online Tenders in TWO Parts:	शुरू/ Starts: 10.07.2017 से/ from 16:01 hrs. (IST) समाप्त/Ends: 08.08.2017 तक/ at 15:30 बजे/hrs (IST)
ऑन लाइन निविदाएं खोलने की तिथि एवं समय (तकनीकी भाग) /Date & Time of Opening of Online Tenders (Technical Part):	शुरू/Starts: 11.08.2017 से/ from 11:31 hrs. (IST) समाप्त/ Ends: 18.08.2017 को/at 17:30/बजे hrs (IST)

नोट/Note: 1. निविदा फीस तथा धरोहर राशि ऑन लाइन निविदा के लिए लागू नहीं है/Tender Fee and Earnest Money Deposit (EMD) is not applicable for on-line tenders

2. निविदा दस्तावेज को ई-निविदा पोर्टल <https://eprocure.isro.gov.in/> एससीएल की वेबसाइट www.scl.gov.in /इसरो की वेबसाइट www.isro.gov.in /सीपीपी पोर्टल <https://eprocure.gov.in> से देख/ डाउनलोड कर सकते हैं
Tender Documents can be accessed/downloaded from e-tender portal
<https://eprocure.isro.gov.in/>SCL website [www.scl.gov.in/](http://www.scl.gov.in)ISRO website www.isro.gov.in/CPP Portal
[http://eprocure.gov.in](https://eprocure.gov.in).

प्रमुख, क्रय एवं भंडार प्रभाग/Head, Purchase & Stores Division

Tender Details

Tender No: SCL/PS2/2017E0070001

Tender Date: 08/07/2017

Purchase Entity: Pur_Entity2

Tender Notice

E-Procurement Tender No. SCL/PS2/2017E0070001 dated 08.07.2017. SEMI-CONDUCTOR LABORATORY [SCL] invites ONLINE offers in TWO part system through e-tender portal <https://eprocure.isro.gov.in> for Transfer of Technology for Gallium Arsenide based RF and Photonics Devices. Tender documents can be downloaded from 10.07.2017 - 1601 hrs. to 08.08.2017 upto 1500 hrs (IST). The vendors need to get registered in the e-tender portal to access tender and submit their offer online. Vendors need to have Digital Signature Certificate as detailed on our e-portal and corporate E-mail ID to register on the above portal. Only online tenders will be accepted. No Manual/Postal/courier/e-mail/fax tender will be entertained. Please note Tender Fee and Earnest Money Deposit (EMD) shall not be applicable for tenders submitted on-line through this portal.

Vendors interested to participate in this e-Tender are required to register themselves as vendors, if not already registered, in our e-procurement portal <https://eprocure.isro.gov.in> by downloading plugins and help demos listed on the home page of the e-procurement link mentioned above to complete the vendor registration process. They can seek help from help desk 020 25315555 / 9167969601 (Email: support.isro@nextenders.com) also the home page of e-procurement portal may be accessed for any technical help for registration and subsequent process. Vendors may please note that without registering in our E-procurement portal they will not be able to quote for this tender.

Tender Attachments

Technical Write-up/Drawings

Attachment - I:

IDT001273000000000000isro05401.pdf

Attachment - II:

Attachment - III:

Attachment - IV:

Attachment - V:

Instructions to Tenderers (PT)

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1. Interested tenderers may, at their option, login to <http://eprocure.isro.gov.in> and submit offers as per details in the tender notification.
2. Request for the extension of the due date will not be considered.
3. SCL reserves the right to accept or reject any / or all the tenders in part or full without assigning any reasons thereof. The bidder is at liberty to seek information related to bidding conditions, bidding process and/or rejection of its bid.
4. In this tender either the Indian Agent on behalf of the Principal/OEM or the Principal/OEM itself can bid, but both cannot bid simultaneously for the same item. Indian agents while quoting on behalf of their principals shall provide necessary latest authorization letter obtained from their Principals/Manufacturers in their bid.

5. If an agent submits bid on behalf of the Principal/OEM, the same agent shall not submit a bid on behalf of another Principal/OEM in the tender for the same item. If submitted, all offers submitted by the said agent shall be excluded from the procurement process.
6. The tenders of vendors who have not agreed to furnish Security Deposit and Performance Bank Guarantee as sought vide this tender shall be excluded from the procurement process.
7. The tenders of bidders where the validity of the tender is shorter than the period specified in the tender enquiry shall be excluded from the procurement process.
8. Late tenders, delayed tenders, fax quotations and e-mail quotations are not considered.
9. SCL reserves the right to verify all claims made by the bidder.
10. SCL reserves the right to change any milestone date of the tendering activity / tender schedule.
11. Tender which is not submitted in terms of instructions mentioned herein is liable to be rejected.
12. If tender opening date happens to be a public holiday, tender will be opened on the next working day and interested bidders may depute their representatives to attend the Tender Opening, with proper authorization.
13. The purchaser shall be under no obligation to accept the lowest or any tender and reserves the right of acceptance of the whole or any part of the tender or portions of the quantity offered and the tenderer shall supply the same at the rates quoted.
14. It is expressly agreed that the acceptance of the Stores Contracted for is subject to final approval in writing by the Purchaser.
15. It is to be noted that the drawings, specifications, end-use, etc., given by the purchaser, are confidential and shall not be disclosed to any third party.
16. Prices are required to be quoted according to the units indicated in the tender. When quotations are given in terms of units other than those specified in the tender form, relationship between the two sets of units must be furnished.
17. The Prices are to be mentioned both in figures as well as in words. The taxes, duties etc. are to be calculated and indicated in the column provided in online forms explicitly.
18. Bidders are expected to comply with commercial and other terms and conditions given in vendor specified terms of this tender. In case of any deviation, the reasons thereof should be clearly specified in the vendor specified terms column.
19. All available technical literature, catalogues and other data in support of the specifications and details of the items should be furnished along with the offer.

20. Samples, if called for, should be submitted free of all charges by the tenderer and the Purchaser shall not be responsible for any loss or damage thereof due to any reason whatsoever. In the event of non-acceptance of tender, the tenderer will have to remove the samples at his own expense.

21. Approximate net and gross weight of the items offered shall be indicated in your offer. If dimensional details are available the same should also be indicated in your offer.

22. Specifications: Stores offered should strictly confirm to our specifications. Deviations, if any, should be clearly indicated by the tenderer in his bid. The tenderer should also indicate the Make/Type number of the stores offered and provide catalogues, technical literature and samples, wherever necessary, along with the quotations. Test Certificates, wherever necessary, should be forwarded along with supplies. Wherever options have been called for in our specifications, the tenderer should address all such options. Wherever specifically mentioned by us, the tenderer could suggest changes to specifications with appropriate response for the same.

23. The tenderer should supply along with his tender, the name of his bankers as well as the latest Income-Tax clearance certificate duly countersigned by the Income-Tax Officer of the Circle concerned under the seal of his office, if required by the Purchaser.

24. The Purchaser reserves the right to place order on the successful tenderer for additional quantities up to 25% of the quantity offered by them at the rates quoted.

25. Subletting and Assignment: The contractor/supplier cannot sublet, transfer or assign the order/Contract or any part thereof or interests therein or benefit or advantage thereof in any manner whatsoever, to any other party save with the previous written consent of the purchaser. Such consent by the purchaser, however, shall not relieve or discharge the contractor/supplier from any obligation, duty or responsibility under the Purchase Order/ Contract.

26. The contractor/supplier shall indemnify the purchaser against Workmen Compensation Act.

27. The authority of the person submitting the tender, if called for, should be produced.

28. This being a two part tender -Technical and Commercial part separate, the Technical part should not contain Pricing information. The tenders containing Price details in Technical part will be treated as unsolicited offers and rejected.

29. The bids shall be opened as per schedule indicated in the Tender in the presence of the bidders/their authorized representatives who may like to attend the tender opening against presentation of Authorization letter.

The schedule of opening of Price bids shall be intimated separately to the technically qualified bidders only.

30. PROCEDURE FOR EVALUATION OF TENDERS:

Technical Evaluation Criteria:

Vendor meeting the eligibility criteria and basic technical specifications mentioned in SCL Tender shall be considered to be technically qualified.

Evaluation of Price Bids

The following elements shall be considered for evaluation of Priced Commercial Offer:

- a. Price quoted by the bidder in the price bid template for meeting the functionalities given in the Tender and Technical Specifications sheet. Bid shall be evaluated on overall cost basis.
- b. Compliance with the Payment Terms prescribed in this tender document. In the event, the bidder offers Payment Terms stringent than SCL prescribed Payment Terms, the bid of the bidder shall be loaded based on MCLR of SBI prevailing on the date of opening of price bids.

Terms and Conditions - Imported Items

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1. The Tenderers should submit the bids through e-procurement portal <http://eprocure.isro.gov.in> and complete in all respects with technical specifications, including pamphlets and catalogues.
2. The bid should contain the following information:-
 - a. The FCA/FOB value for import by Air Freight upto IGI Airport, New Delhi.
 - b. Agency Commission: Bidders are required to provide the following information in respect of their authorised Indian Agent, if any, alongwith technical bid as the same is mandatory as is required for consideration of the bid. Name, Address, Telephone no. , fax no., email of the Indian Agent including the contact person. A letter from the Manufacturer/supplier in the current date certifying that the said Indian Agent is their authorised Indian Agent and also indicating the responsibilities/role of the Indian Agent under the proposed purchase. Renumeration/service charges payable to the Indian Agent under the proposed purchase. The amount of agency commission included in the price and payable to Indian Agent of the contractor shall be paid directly to the Indian Agents by the Purchasers in equivalent in Indian rupees on the basis of an invoice from him applying TT buying rate of exchange ruling on the date of placement of the Purchase Order and which shall not be subject to any further exchange variations. The payment will be released to the Indian Agents within 30 days from the date of acceptance of the goods.
 - c. The earliest delivery period and country of origin of the Stores.
 - d. Bankers name and address of the contractor.
 - e. The approximate net and gross weight and dimensions of packages/cases.

f. Details of any technical service, if required for erection, assembly, commissioning and demonstration as applicable.

3. The FCA/FOB prices quoted should be inclusive of all taxes, levies, duties arising in the tenderers country.

4. The offer should be valid for a minimum period of 120 days from the due date of opening of the tender.

5. Samples, if called for should be sent free of all charges.

6. Bids will not be entertained after the due date and time.

7. Offers made by Indian Agents on behalf of their Principals, should be supported by the necessary authorization letter from their Principals.

8. The details of Import License will be furnished in the Purchase Order.

9. The Authority of person submitting the tender, if called for, shall be produced.

10. Instruction/operation manual containing all assembly details including wiring diagrams should be sent wherever necessary in duplicate. All documents/correspondence should be in English Language only.

11. The Purchaser reserves the right to accept or reject the lowest or any other offer in whole or in part without assigning any reason.

12 It is expressly agreed that the acceptance of the stores contracted for is subject to final approval in writing by the Purchaser.

13 a. Part shipment is not allowed unless specifically agreed to by us.

b. As far as possible, stores should be dispatched by Indian Flagged Vessels/ Air India or through any Agency nominated by us.

14. Inspection/Test Certificates should be provided for the goods after testing it thoroughly at the Contractors works. If any inspection by Lloyds or any other testing agency is considered necessary, it shall be arranged by Contractors.

15. Where erection or assembly or commissioning is a part of the contract, it should be done immediately on notification. The Contractor shall be responsible for any loss / damages sustained due to delay in fulfilling this responsibility.

16. For items having shelf life / those with maximum shelf should be supplied, if order is placed.

Bid Templates

Eligibility Criteria and Scope of Work

Item Specifications

Sl. No	Specifications	Compliance (Yes /No)	Offered Specifications	Re
0	Eligibility Criteria:The bidder responding with an RFP shall be a competent manufacturer / developer having designed, developed and tested Gallium Arsenide technology based monolithically integrated VCSELs, photo-detectors, photovoltaic devices and MMICs. The bidder shall have established the process and have realised production quality VCSEL, photo-detectors, photovoltaic devices and MMICs. The bidder must provide supporting evidence along with the bid.			
1	The project will be implemented in three phases with multiple milestones for each phase having appropriate checkpoints. The vendor must make sure that price information from the part-II (Price) of the two-part			

	tender is not included in the part-I (Techno-Commercial) of the bid.			
2	<p>Phase 1: In the first phase, the manufacturer shall demonstrate performance of discrete devices including Enhancement and Depletion Field Effect Transistors (E-D FETs), quasi continuous wave (QCW) VCSELs (high power), VCSELs with drivers (for transceiver in communication applications), Photodetector (sensitive to 2microns) and Photovoltaic Devices. GaAs template wafers with epitaxial layers as required for the development of these devices shall be sourced by the manufacturer as an optional requirement. The manufacturer may submit separate price quote as an option. The manufacturer shall also provide design of epitaxial layer stack for MWIR (photo-response up to 5micron) photodetector with supporting simulation results.</p>			
3	<p>Phase 2: In the second phase of the project, the manufacturer shall grow requisite epitaxial stack(s) in SCL fab. The grown</p>			

	<p>epitaxial stack shall be used for demonstration of device level performance similar to those in phase 1. Using this/these epitaxial stack(s), technology demonstrator circuits shall be developed. These will include QCW VCSELS, opto-electronic transceivers, solar cell tiles, individual MWIR photodetector pixels and photodetector arrays. As part of this phase, the manufacturer shall develop and provide process development kit (PDK) for SCL fab line. As a part of this phase, the manufacturer shall also provide a preliminary architectural design of the read-out integrated circuit (ROIC).</p>			
4	<p>Phase 3: In the third phase, the manufacturer shall design, develop, manufacture and transfer process technology for monolithic IRFPA.</p>			
5	<p>Along with the bid, the manufacturer shall provide an evaluation of SCL's existing fab line and a list of equipment / characterisation facilities required for complete installation and transfer of the offered technology.</p>			

	<p>The manufacturer, if required may undertake a study of SCL's fab line for this purpose. SCL reserves the right to reject a manufacturer whose bid requires major capital investment for adapting the existing fab line to meet the requirements of the proposed technology.</p>			
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Phase 1

Item Specifications -I

Sl. No	Specifications	Compliance (Yes /No)	Offered Specifications	Re
6	<p>Phase 1 deliverables are a qualified baseline process for the manufacture of quasi continuous wave (QCW) VCSELs (high power), VCSELs with drivers (for transceiver in communication applications), VCSEL arrays, Quantum Dot Photodetector sensitive to 2µm wavelength, multi-junction solar cells and the design of the epitaxial layer stack for MWIR quantum dot photodetector.</p>			
7	<p>Deliver technology details supporting all devices considered in the project. Details should include</p>			

	complete details of all process and design modules. Following activities are to be completed.			
8	Provide list of devices offered along with complete Process Identification Document (PID) for each type of device. PID should include complete process flow, layer stack details, equipment details (including mapping of equipment to each unit step and specifications of any speciality raw materials required).			
9	Provide complete details of a technology transfer vehicle (TTV) including layout details of process monitoring structures, test structures and any products required for fabrication and evaluation of all the devices included in the technology transfer.			
10	Propose addition / modification in existing equipment set at SCL for meeting requirements of quoted process technology.			
11	Provide device design along with characterisation results of already developed			

	devices.			
12	Propose detailed training plan including photovoltaic device physics, layer stack optimization, critical parameter trade-off analysis, modelling and simulation of electrical and electro-optical performance parameters and test procedures for evaluation of device performance.			
13	Propose hands-on training plan to be provided to SCL engineers on the fabrication process including the equipment.			
14	Provide unit step development details including recipe details, metrology requirements and success criteria for unit step establishment.			
15	Provide development details for integration of unit steps into modules along with success criteria.			
16	Design of epitaxial layer stack for MWIR quantum dot photodetector to be fabricated in the second phase of the project with involvement of SCL team.			
17	Provide packaging requirement for			

	evaluation of individual devices.			
18	Provide complete test and characterisation documentation including test programs for the evaluation of all test structures in the TTV.			
19	Carry out packaging and characterisation of device test structures and evaluate against specifications.			
20	Deliver final process flow after porting the entire process flow in SCL fab.			
21	Fabricate three batches of devices utilizing the final process flow.			
22	Demonstrate performance of final packaged devices.			
23	Provide reliability test and qualification documents (if available)			
24	Specifications of the transferred devices are provided in the annexure to the RFP document.			
25	Phase 1 Milestones1) Delivery of technology transfer documentation to SCL.2) Demonstration of HFETs, VCSELs, photovoltaic devices and photodetectors as per target specifications.3)			

	Complete design of epitaxial layer stack for MWIR quantum dot photodetector.			
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Phase 2

Item Specifications -II

Sl. No	Specifications	Compliance (Yes /No)	Offered Specifications	Re
26	Phase 2 deliverables are successful epi stack development in SCL fab, generation of process design kit (PDK) based on the final process, preliminary architectural design of read-out IC (ROIC) for the IR FPA and demonstration of solar cell, quasi continuous-wave (QCW) VCSELs, optoelectronic transceiver and MWIR photodetector.			
27	Following activities are to be completed in the second phase of the project			
28	Development of epitaxial stack in SCL fab. Development of devices developed in phase one on SCL epitaxial stack so as to meet target specifications as demonstrated in phase 1. Development of PDK			

	including cryo temperature models for discrete devices as well as standard cell library and IPs required for the development of circuits.			
29	Photo-detector re-design, targeting the SWIR and MWIR bands (1µm to 5µm)			
30	Demonstration of multi-junction solar cell tiles of different sizes using optimised epi layer			
31	Demonstrate QCW VCSELS for high power laser applications			
32	Demonstrate transceiver through monolithic integration of VCSEL, drover, photodetector receiver and readout electronics.			
33	Phase 2 Milestones1) Optimization of epi growth at SCL including top and bottom DBR.2) Detector demonstration.3) Process finalisation and PDK development4) Demonstration of solar cell tiles5) Demonstration of QCW VCSELS and transceiver6) Result and performance review and clearance for phase 3.			

Phase 3

Item Specifications -III

Sl. No	Specifications	Compliance (Yes /No)	Offered Specifications	Re
34	Phase 3 deliverables include design of readout circuitry for monolithic integration with detector array and monolithic integration of readout circuitry with IR detector array.			
35	Phase 3 Milestones:1) Preliminary ROIC design.2) Fabrication of detector array using SCL epi stack process and demonstration of functionality by bump bonding with Si ROIC (320×256 or any other mutually acceptable array).3) Final ROIC design and clearance for monolithic integration.4) Fabrication and performance verification of monolithic IR FPA in SCL process.			

Technical Specifications - 1

Item Specifications -IV

Sl. No	Specifications	Compliance (Yes /No)	Offered Specifications	Re
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1	Enhancement and depletion HFET devices when fabricated in the same circuit along with optical devices.			
2	Gm (mS/mm) Required Spec (typical): 300 For: Gate length: 0.25microns Type: Enhancement Vg: 1V Vd: 3.3V			
3	Ft (GHz) Required Spec (typical): 95 For: Gate length: 0.25microns Type: Enhancement Vg: 1V Vd: 3.3V			
4	FMax (GHz) Required Spec (typical): 150 For: Gate length: 0.25microns Type: Enhancement Vg: 1V Vd: 3.3V			
5	Gm (mS/mm) Required Spec (typical): 350 For: Gate length: 0.25microns Type: Depletion Vg: 1V Vd: 3.3V			
6	Ft (GHz) Required Spec (typical): 95 For: Gate length: 0.25microns Type: Depletion Vg: 1V Vd: 3.3V			
7	FMax (GHz) Required Spec (typical): 150 For: Gate length: 0.25microns Type: Depletion Vg: 1V Vd: 3.3V			
8	Gm (mS/mm) Required Spec (typical): 250 For: Gate length: 0.40microns Type: Enhancement Vg: 1V Vd:			

	3.3V			
9	Ft (GHz) Required Spec (typical): 60For:Gate length: 0.40micronsType: EnhancementVg: 1VVd: 3.3V			
10	FMax (GHz) Required Spec (typical): 100For:Gate length: 0.40micronsType: EnhancementVg: 1VVd: 3.3V			
11	Gm (mS/mm) Required Spec (typical): 325For:Gate length: 0.40micronsType: DepletionVg: 1VVd: 3.3V			
12	Ft (GHz) Required Spec (typical): 60For:Gate length: 0.40micronsType: DepletionVg: 1VVd: 3.3V			
13	FMax (GHz) Required Spec (typical): 100For:Gate length: 0.40micronsType: DepletionVg: 1VVd: 3.3V			

Technical Specifications - 2

Item Specifications -V

Sl. No	Specifications	Compliance (Yes /No)	Offered Specifications	Re
14	Stand-alone enhancement and depletion HFET parameters			
15	Gm (mS/mm) Required Spec (typical): 525For:Gate			

	length: 0.25micronsType: EnhancementVg: 1VVd: 3.3V			
16	Ft (GHz) Required Spec (typical): 100For: Gate length: 0.25micronsType: EnhancementVg: 1VVd: 3.3V			
17	FMax (GHz) Required Spec (typical): 160For: Gate length: 0.25micronsType: EnhancementVg: 1VVd: 3.3V			
18	Gm (mS/mm) Required Spec (typical): 500For: Gate length: 0.25micronsType: DepletionVg: 1VVd: 3.3V			
19	Ft (GHz) Required Spec (typical): 100For: Gate length: 0.25micronsType: DepletionVg: 1VVd: 3.3V			
20	FMax (GHz) Required Spec (typical): 160For: Gate length: 0.25micronsType: DepletionVg: 1VVd: 3.3V			
21	Gm (mS/mm) Required Spec (typical): 500For: Gate length: 0.40micronsType: EnhancementVg: 1VVd: 3.3V			
22	Ft (GHz) Required Spec (typical): 65For: Gate length: 0.40micronsType: EnhancementVg: 1VVd: 3.3V			

23	FMax (GHz) Required Spec (typical): 110For:Gate length: 0.40micronsType: EnhancementVg: 1VVd: 3.3V			
24	Gm (mS/mm) Required Spec (typical): 475For:Gate length: 0.40micronsType: DepletionVg: 1VVd: 3.3V			
25	Ft (GHz) Required Spec (typical): 65For:Gate length: 0.40micronsType: DepletionVg: 1VVd: 3.3V			
26	FMax (GHz) Required Spec (typical): 110For:Gate length: 0.40micronsType: DepletionVg: 1VVd: 3.3V			

Technical Specifications - 3

Item Specifications -VI

Sl. No	Specifications	Compliance (Yes /No)	Offered Specifications	Re
27	Stand-alone pseudo-morphic HFET parameters			
28	Gm (mS/mm) Required Spec (typical): 550For:Gate length: 0.25micronsType: EnhancementVg: 1VVd: 3.3V			
29	Ft (GHz) Required Spec (typical): 100For:Gate length: 0.25micronsType: EnhancementVg: 1VVd:			

	3.3V			
30	FMax (GHz) Required Spec (typical): 160For:Gate length: 0.25micronsType: EnhancementVg: 1VVd: 3.3V			
31	Gm (mS/mm) Required Spec (typical): 650For:Gate length: 0.25micronsType: DepletionVg: 1VVd: 3.3V			
32	Ft (GHz) Required Spec (typical): 100For:Gate length: 0.25micronsType: DepletionVg: 1VVd: 3.3V			
33	FMax (GHz) Required Spec (typical): 160For:Gate length: 0.25micronsType: DepletionVg: 1VVd: 3.3V			
34	Gm (mS/mm) Required Spec (typical): 500For:Gate length: 0.40micronsType: EnhancementVg: 1VVd: 3.3V			
35	Ft (GHz) Required Spec (typical): 65For:Gate length: 0.40micronsType: EnhancementVg: 1VVd: 3.3V			
36	FMax (GHz) Required Spec (typical): 110For:Gate length: 0.40micronsType: EnhancementVg: 1VVd: 3.3V			
37	Gm (mS/mm) Required Spec (typical): 600For:Gate length: 0.40micronsType:			

	DepletionVg: 1VVd: 3.3V			
38	Ft (GHz) Required Spec (typical): 65For:Gate length: 0.40micronsType: DepletionVg: 1VVd: 3.3V			
39	FMax (GHz) Required Spec (typical): 110For:Gate length: 0.40micronsType: DepletionVg: 1VVd: 3.3V			

Technical Specifications - 4

Item Specifications -VII

Sl. No	Specifications	Compliance (Yes /No)	Offered Specifications	Re
40	VCSEL specifications - for communications applications			
41	Emission wavelength (nm)Required spec: 850 to 980 Optional: 1550 (Preferred value. Up to 940 nm is also acceptable)			
42	Emission wavelength bandwidth (nm)Required spec: 2 to 3			
43	Peak output optical power (mW)Required spec: >/= 0.5			
44	Operating temperature (deg C)Required spec: 0 to 70 or better			
45	Temperature drift of			

	central wavelength (nm/deg C)Required spec: ≤ 0.5			
46	Signal bandwidth (GHz)Required spec: ≥ 20			
47	Slope efficiency (W/A)Required spec: 0.1 to 0.2			
48	Threshold current (mA)Required spec: 1 (typical)			
49	Capacitance (fF)Required spec: ≤ 300			
50	Relative Intensity Noise (dB/Hz)Required spec: ≤ 130			
51	Laser modeRequired spec: Single or multi mode (single mode is preferred)			
52	Beam profileRequired spec: Gaussian			
53	Operating voltage (V)Required spec: 2.5			

Technical specifications - 5

Item Specifications -VIII

Sl. No	Specifications	Compliance (Yes /No)	Offered Specifications	Re
54	VCSEL specifications – Quasi-Continuous Wave			

55	Emission wavelength (nm) Required spec: 850 to 980 Optional: 1550 (Preferred value. Up to 940 nm is also acceptable)			
56	Emitter type Required spec: VCSEL (array)			
57	Emission mode Required spec: Single Mode, circular beam profile preferred (Vertical emission preferred. However, the manufacturer may propose an alternative option with edge emitter, meeting the requirements. The manufacturer shall bring out specific advantages, if any in the proposed technology. In case such an alternative option is proposed and found to be advantageous, it would be considered.)			
58	Output type Required spec: QCW, Duty cycle- 0.1% or more (30Hz)			
59	Emission wavelength bandwidth (FWHM, nm) Required spec: 2 to 3			
60	Output optical power (W) Required spec: ≥ 10			
61	Operating temperature (deg C) Required spec: 0 to 70 or better			
62	Temperature drift of			

	central wavelength (nm/deg C)Required spec: </= 0.1			
63	Power conversion Efficiency (with the operating temperature)Required spec: >/= 30%			
64	Emission areaRequired spec: 5mm x 5mm			

Technical specifications - 6

Item Specifications -IX

Sl. No	Specifications	Compliance (Yes /No)	Offered Specifications	Re
65	Quantum dot detectors			
66	Wavelength band (microns)Required specs: 1 to 5(First phase of project: 1 to 2Second phase: 1 to 5)			
67	Specific detectivity (cm Hz [^] 0.5 / W)Required specs: >/= 1e10			
68	Quantum efficiencyRequired specs: >/= 0.1			
69	Dark current for pixel of 30 micron [^] 2 (pA)Required specs: </= 100			
70	NETD (mK)Required specs: </= 30			

Technical specifications - 7

Item Specifications -X

Sl. No	Specifications	Compliance (Yes /No)	Offered Specifications	Re
71	Multi-junction Solar Cells The multi junction solar cells to be demonstrated shall belong to the space qualified InGaP / GaAs family and its variants.			
72	Minimum efficiency at one sun illumination (AM0) at 28 degC (%) Required specs: 28			
73	Basic parameters like open circuit voltage and short circuit current, as well as the maximum power point current and voltage shall be demonstrated.			

Technical specifications - 8

Item Specifications -XI

Sl. No	Specifications	Compliance (Yes /No)	Offered Specifications	Re
74	IRFPA Specifications The detector array for demonstration of the technology will be a 320×256 element array with 30 micron square			

	pixels. The broad specifications will be as follows:			
75	Signal capacity (electrons) Required specs: $\geq 10e6$			
76	Quantum efficiency (%) Required specs: ≥ 10			
77	Dark rate at 100K (pA/pixel) Required specs: ≤ 100			
78	NETD (mK) Required specs: ≤ 50			
79	Noise floor (electrons) Required specs: ≤ 1000			
80	Operating temperature (K) Required specs: ≥ 100			
81	The above specifications are also included in the attached document titled 'Request for Proposal for Transfer of Technology for Gallium Arsenide based RF and Photonics Devices'. Please refer to that document for further explanations and clarifications.			

Vendor Specified Terms

Description	Vendor Terms
1. Definitions:	

<p>a) The term Purchaser shall mean the Director, Semi-Conductor Laboratory or his successors or assignees.</p> <p>b) The term Contractor shall mean, the person, firm or company with whom or with which the order for the supply of stores is placed and shall be deemed to include the Contractors Successors, representatives, heirs, executors and administrators unless excluded by the Contract.</p> <p>c) The term Purchase Order shall mean the communication signed on behalf of the Purchaser by an officer duly authorised intimating the acceptance on behalf of the Purchaser on the terms and conditions mentioned or referred to in the said communication accepting the Tender or offer of the Contractor for supply of stores of plant, machinery, Software or equipment or part thereof.</p> <p>d) The term Stores shall mean all that the Contractor agrees to supply under the Contract as specified in the Purchase Order including its installation, testing and commissioning or maintenance as per the specifications.</p>	
<p>2. For imported stores, prices shall be quoted on FCA nearest International airport basis.</p> <p>For indigenous stores, prices shall be quoted on F.O.R destination basis i.e. SCL, S.A.S. Nagar, Mohali, Punjab exclusive of excise duty and taxes as may be applicable.</p> <p>The rates at which the said Government levies, taxes and duties are applicable, shall be indicated separately.</p> <p>The prices of the indigenous items shall also be exclusive of transit insurance which shall be arranged by the Purchaser and shall be to Purchaser account.</p> <p>Notes:</p> <p>a) Purchaser is entitled to Excise Duty exemption as per CE Notification no. 10/97 Central Excise dated March 01, 1997 amended vide Notification No. 16/2007 Central Excise dated March 01, 2007 and would accordingly issue Excise Duty Exemption Certificate in favour of the contractor quoting in Indian Rupees. The bidder should take the</p>	

same into account while quoting the prices in Indian Rupees.

b) For imported materials, the Purchaser is entitled to issue Customs duty exemption certificate (CDEC) to the contractor under customs notification no.51/96 dated 23.07.1996 and subsequent amendments to enable the contractor to avail off the benefit of concessional rate of customs duty under this notification. CVD under this notification is nil. In addition to the above CDEC, any documentary support requested by the contractor from the purchaser for customs clearance of goods against the above CDEC shall be provided by the purchaser.

c) Please indicate the rate of GST as applicable.

3. PRICES:

Tender offering firm prices will be preferred. Where a price variation clause is insisted upon by a tenderer, quotation with a reasonable ceiling should be submitted. Such offers should invariably be supported by the base price taken into account at the time of tendering and also the formula for any such variation/s.

4. SECURITY DEPOSIT:

4.1 On acceptance of the tender, the Contractor shall submit security deposit for ten percent (10 percent) of the value of the Contract within 15 days from the date of purchase order.

Central PSUs/PSEs/Autonomous Bodies/MSEs shall be exempted from the payment of Security Deposit, and instead, an Indemnity Bond shall be shall be provided by them in lieu of the Security Deposit.

If the Contractor fails to provide the security within the period specified, such failure shall constitute a breach of the Contract, and the Purchaser shall be entitled to make other arrangements for the re-purchase of the stores contracted at the cost and risk of the Contractor.

4.2 Security Deposit shall be submitted through Demand Draft / Bankers Cheque/ fixed deposit receipt or Bank Guarantee from any of the Scheduled Banks executed on non-judicial stamp paper of appropriate value, and shall be valid for a period of sixty (60) days

beyond the date for completion of the Purchase Order/Contract.

4.3 In case the contractor fails to furnish the security deposit within the specified date or extended due date, the Purchase Order/Contract shall be cancelled, and the EMD, if any, made earlier shall be forfeited, and, in addition, appropriate penal action may also be considered.

4.4 After the Purchase Order/Contract is successfully executed in all respects, the Bank Guarantee towards Security Deposit may be discharged and retained amount and / or EMD refunded to vendors.

4.5 In the event of non-execution of the Purchase order/Contract or breach of any terms and conditions of the Purchase Order, the Security Deposit shall be forfeited.

5. Project Completion Schedule:

Vendor shall provide their compliance to project completion schedule as indicated this RFP.

6. GUARANTEE & REPLACEMENT:

(a) For one year after the completion of Phase 3 of the project, the contractor shall support the technology at SCL by providing on-site / conference call engineering support. The contractor must also support with flying wafers for the debugging of process issues as and when required within the warranty period of one year.

(b) The Contractor shall guarantee that the stores supplied shall comply fully with the specifications laid down, for material, workmanship and performance.

(c) For a period of twelve (12) months after the acceptance of the stores, if any defects are discovered therein or any defects therein found to have developed under proper use, arising from faulty stores design or workmanship, the Contractor shall remedy such defects at his own cost provided he is called upon to do so within a period of 14 months from the date of acceptance thereof by the purchaser who shall state in writing in what respect the stores or any part thereof are faulty.

(d) If, in the opinion of the purchaser, it becomes necessary to replace or renew any defective stores such replacement or renewal shall be made by the Contractor free of all costs to the purchaser, provided the notice informing the Contractor of the defect is given by the purchaser in this regard within the said period of 14 months from the date of acceptance thereof.

(e) Should the Contractor fail to rectify the defects, the purchaser shall have the right to reject or repair or replace at the cost of the Contractor the whole or any portion of the defective stores.

(f) The decision of the purchaser notwithstanding any prior approval or acceptance or inspection thereof on behalf of the purchaser, as to whether or not the stores supplied by the Contractor are defective or any defect has developed within the said period of 12 months or as to whether the nature of the defects requires renewal or replacement, shall be final, conclusive and binding on the Contractor.

(g) PERFORMANCE BANK GUARANTEE:
 To fulfil guarantee conditions outlined in clause 6 (a) to (f) above, the Contractor shall furnish a Bank Guarantee (as per format given by purchaser) from any scheduled bank/ bank approved by the Purchaser for an amount equivalent to 10% of the value of the Contract and shall be valid for a period of 60 days beyond the expiry date of warranty period. On the performance and completion of the Contract in all respects, the Bank Guarantee will be returned to the Contractor without any interest.

(h) All the replacement stores shall also be guaranteed for a period of 12 months from the date of arrival of the stores at purchasers site.

(i) Even while the 12 months guarantee applies to all stores, in case where a greater period is called for by our specifications then such a specification shall apply in such cases the period of 14 months referred to in clause 6 (a), (b) & (c) shall be the asked for guarantee period plus two months.

7. TERMS OF PAYMENT IN CASE OF OVERSEAS SUPPLIER[S]:

7.1 Being a Department of the Government of India, the normal terms of payment are by Sight Draft.

<p>7.2 While the purchasers bank charges shall be borne by the purchaser, the contractor shall bear the bank charges payable to his banker.</p>	
<p>8. The Sight Draft will be operative on presentation of the undermentioned documents:</p> <p>a) Original Bill of Lading / Airway Bill</p> <p>b) Commercially certified invoices describing the stores delivered, quantity, unit rate and their total value, in triplicate. The invoice should indicate the discounts, if any, and Agency Commission separately.</p> <p>c) Packing List showing individual dimensions and weight of packages.</p> <p>d) Country of Origin Certificate in duplicate, wherever applicable.</p> <p>e) Test Certificate, wherever applicable.</p> <p>f) Declaration by the Seller that the contents in each case are not less than those entered in the invoices and the quality of the Stores are guaranteed as per the specifications asked for by the Purchaser.</p> <p>g) Warrantee and guarantee Certificate/s as applicable.</p>	
<p>9. TERMS OF PAYMENT IN CASE OF INDIGENOUS SUPPLIER[S]:</p> <p>9.1 Payment will be made for the accepted stores within 30 days from the date of receipt of the materials at SCL.</p> <p>9.2 While the purchaser bank charges shall be borne by the purchaser, the contractor shall bear the bank charges payable to his banker.</p>	
<p>10. Export Formalities, Taxes & Duties:</p> <p>All Licenses/Government clearances other than under Indian law, if any, required for supplying the stores shall be the responsibility of the contractor. All Licenses/Government clearances if any, required under Indian law shall be arranged by the Purchaser.</p>	

<p>Taxes, duties, levies etc. if any, applicable other than in India shall be the responsibility of the Contractor. Taxes, duties, levies etc. if any, payable under Indian Law and in India only shall be the responsibility of Purchaser.</p>	
<p>11. ADDRESS OF INDIAN AGENT:, if any</p>	
<p>12. VALIDITY:</p> <p>The tender must be valid for a minimum period of 120 days from the due date of opening of tender.</p> <p>The tender where the validity period is shorter than the period specified in the tender enquiry, shall be excluded from the procurement process.</p>	
<p>13. MODE OF DESPATCH:</p> <p>Generally, stores should be despatched through Indian Flagged Vessel / Air India or through any other Agency nominated by the purchaser whose contact details shall be indicated in the purchase order.</p> <p>A copy of the invoice and packing list should invariably be kept inside each of the packages.</p>	
<p>14. INSURANCE OF THE STORES:</p> <p>Insurance wherever necessary, will be arranged by the Purchaser. The necessity or otherwise of insurance will be as indicated in the Purchase Order/Contract.</p>	
<p>15. TECHNICAL DOCUMENTATION:</p> <p>The vendor shall provide Soft and Hard copy of all manuals. List of all</p>	

<p>manuals shall be provided along with the quote.</p> <p>All documentation shall be in English language only.</p>	
<p>16. CONTRACTORS DEFAULT LIABILITY:</p> <p>The purchaser may upon written notice of default to the Contractor terminate the Contract in whole or in part in circumstances detailed hereunder:</p> <p>a) If in the judgement of the Purchaser the Contractor fails to make delivery of Stores within the time specified in the Contract/ agreement or within the period for which extension has been granted by the Purchaser to the Contractor.</p> <p>b) If in the judgment of the Purchaser the Contractor fails to comply with any of the other provisions of this Contract.</p>	
<p>17. In the event the Purchaser terminates the Contract in whole or in part as provided in Clause 16 the Purchaser reserves the right to Purchase, upon such terms and in such a manner as he may deem appropriate, stores similar to that terminated and the Contractor shall be liable to the Purchaser for any additional costs for such similar stores and/or for liquidated damages for delay as defined in Clause 21 until such reasonable time as may be required for the final supply of stores.</p> <p>17.1 If this Contract is terminated as provided in Clause 16 the Purchaser in addition to any other rights provided in this Article, may require the Contractor to transfer title and deliver to the Purchaser under any of the following clauses in the manner and as directed by the Purchaser:</p> <p>a) Any completed stores.</p> <p>b) Such partially completed stores, drawing, information and Contract rights (hereinafter called manufacturing material) as the Contractor has specifically produced or acquired for the performance of the Contract as terminated. The Purchaser shall pay to the Contractor the Contract price for completed stores delivered to and accepted, by the</p>	

purchaser and for manufacturing material delivered and accepted.

17.2 In the event the Purchaser does not terminate the Contract as provided in Clause 16, the Contractor shall continue the performance of the Contract in which case he shall be liable to the purchaser for liquidated damages for delay as set out in Clause 21 until the stores are accepted.

18. REPLACEMENT:

If the stores or any portion thereof is damaged or lost during transit, the Purchaser shall give notice to the Contractor setting forth particulars of such stores damaged or lost during transit. The replacement of such stores shall be effected by the Contractor within a reasonable time to avoid unnecessary delay in the intended usage of the Stores. In case the purchaser agrees, the price towards replacement items shall be paid by the purchaser on the basis of original price quoted in the tender or as reasonably worked out from the tender.

19. REJECTION :

In the event that any of the stores supplied by the Contractor is found defective in material or workmanship or otherwise not in conformity with the requirements of the Contract specifications, the purchaser shall either reject the stores or request the Contractor, in writing, to rectify the same. The Contractor, on receipt of such notification, shall either rectify or replace the defective stores free of cost to the purchaser. If the Contractor fails to do so, the purchaser may at his option either

- a) replace or rectify such defective stores and recover the extra cost so involved from the Contractor, or
- b) terminate the Contract for default as provided under clause 16 above, or
- c) acquire the defective stores at a reduced price considered equitable under the circumstances. The provision of this article shall not prejudice the Purchaser's rights under clause 21.

<p>20. EXTENSION OF TIME:</p> <p>If the completion of supply of stores is delayed due to reason of force majeure such as acts of god, acts of public enemy, acts of Government, fires, floods, epidemics, quarantine restriction, strikes, freight embargoes, etc., the Contractor shall give notice within 15 days to the purchaser in writing of his claim for an extension of time. The purchaser on receipt of such notice after verification, if necessary, may agree to extend the Contract delivery date as may be reasonable but without prejudice to other terms and conditions of the Contract.</p>	
<p>21. DELAY IN COMPLETION/LIQUIDATED DAMAGES:</p> <p>If the Contractor fails to deliver the stores within the time specified in the Contract or any extension thereof, the purchaser shall recover from the Contractor as liquidated damages a sum of one-half of one percent (0.5 percent) of the Contract price of the undelivered stores for each calendar week of delay. The total liquidated damages shall not exceed ten percent (10 percent) of the Contract price of the unit or units so delayed. Stores will be deemed to have been delivered only when all their component parts are also delivered. If certain components are not delivered in time, the stores will be considered as delayed until such time as the missing parts are delivered. Delivery of stores shall be complete on Installation, commissioning, Testing and Acceptance as applicable.</p>	
<p>22. PACKING:</p> <p>The Contractor shall pack and crate all stores for air/road shipment as applicable in a manner suitable for export to a tropical humid climate, in accordance with internationally accepted export practices and in such a manner so as to protect it from damage and deterioration in transit by road, rail, air or sea. The Contractors shall be held responsible for all damages due to improper packing.</p>	
<p>23. ARBITRATION:</p>	

<p>If at any time any question, dispute or difference whatsoever shall arise between the purchaser and the Contractor upon or in connection with this Contract, either party may forthwith give to the other notice in writing of the existence of such question, dispute or difference and the same shall be referred to the adjudication of two arbitrators, one to be nominated by purchaser, other by a Contractor and in the event of any difference of opinion, the arbitrators will refer the matter to the umpire. The arbitration shall be conducted in accordance with the rules and procedure for arbitration of the International Chamber of Commerce at Paris. The expenses of the arbitrators and umpire shall be paid as may be determined by them. However, the venue of such arbitration should be in India.</p> <p>In case of dispute arises with domestic/Indian suppliers, the applicable Arbitration procedure shall be as per Indian Arbitration & Conciliation Act, 1996.</p>	
<p>24. INDEMNITY:</p> <p>The Contractor shall warrant and be deemed to have warranted that all Stores supplied against this Contract are free and clean of infringement of any patent, copyright or trade mark and shall at all times indemnify the purchaser against all claims which may be made in respect of stores for infringement of any right protected by Patent, Registration of design or Trade Mark and shall take all risk of accident or damage which may cause a failure of the supply from whatever cause arising and the entire responsibility for the sufficiency of all the means used by him for the fulfilment of the Contract.</p>	
<p>25. COUNTER TERMS AND CONDITIONS OF SUPPLIERS:</p> <p>Where counter terms and conditions/printed or cyclostyled conditions have been offered by the supplier, the same shall not be deemed to have been accepted by the purchaser unless specific written acceptance thereof is obtained.</p>	
<p>26. SECURITY INTEREST:</p> <p>On each item to be delivered under this Contract, including an item of</p>	

<p>work in progress in respect of which payments have been made in accordance with the terms of the Contract, purchaser shall have a security interest in such items which shall be deemed to be released only at the time when the applicable deliverable item is finally accepted and delivered to the purchaser in accordance with the terms of the Contract. Such security interest of the purchaser shall constitute a prior charge as against any other charge or interest created in respect of such items by any entity.</p>	
<p>27. APPLICABLE LAW:</p> <p>The Contract shall be interpreted, construed and governed by the laws of India.</p>	
<p>28. Any Other Term:</p>	

Supporting Documents from Vendor

Attachment - I:

Attachment - II:

Price Bid Form

Item Description	Slab Range	Qty	UOM	Currency	Unit Price
<p>Transfer of Technology for Gallium Arsenide based RF and Photonics Devices Material code: 250296340</p>	-	1	No.	-	-

Break-up of other taxes and other costs should be specified in respective narration columns.

Sum of these Break-up values should be specified in respective value columns.

Supporting Documents from Vendor (Commercial)

Document attachment with price bid

Attachment - I:

Attachment - II: