

 <p>IIT PALAKKAD</p>	<p>भारतीय प्रौद्योगिकी संस्थान पालक्काड  <b>Indian Institute of Technology Palakkad</b>  अहलिआ एकीकृत कैम्पस, कोज़िपारा  Ahalia Integrated Campus, Kozhipara  पालक्काड- 678557  Palakkad – 678 557</p>	<p>दूरभाषसंख्या/ Phone no:  04923 – 226 300/590/586</p> <p>ईमेल/ Email :  purchase@iitpkd.ac.in</p>
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Prof. Job Kurian  
Registrar i/c

**Ref : Semiconductor Parameter Analyser**  
**Date : 23.11.2017**

**Open Tender No: IITPKD/CIF/RP/067/2017**

**Due Date: 14.12.2017 @ 3.00 PM**

Dear Sir/Madam,

On behalf of the **Indian Institute of Technology, Temporary campus, Palakkad, Quotations are invited for “Semiconductor Parameter Analyser”**. The Specifications are given in the Annexure.

**Pre-bid meeting – The pre-bid meeting is scheduled to be held on 29.11.2017 at 10 A.M at Conference Room, Academic Block, IIT Palakkad.**

**Technical bid Opening: The Technical bid will be opened on 14.12.2017 at 3.30 P.M at Conference Room, Academic Block, IIT Palakkad.**

**Instructions to the Bidder**

- (i) **Preparation of Bids:** - The tenders should be submitted **under two-bid system (i.e.) Technical bid and Financial bid in separate envelopes**. The technical bid should consist of all technical details along with commercial terms and conditions. No prices should be included in technical bid. Financial Bid should indicate item – wise prices for the items mentioned in the technical bid. The technical and the financial bids should be put in separate covers and sealed. Both sealed covers should be put into a bigger cover. **Bids must either be spiral bound / stapled together. No loose sheets will be accepted. All pages must be numbered.**
- (ii) **The Quotations duly sealed and superscribed on the envelope with the reference No. and due date, should be addressed to the undersigned so as to reach on or before the due date stipulated above.**
- (iii) **Delivery of the tender:** - The tender shall be sent to the below-mentioned address either by post or by courier so as to reach this office before the due date and time specified in the Schedule. The offer/bid can also be dropped in the tender box on or before the due date and time specified in the schedule. **The tender box is kept in the office of the Academic Block, IIT Palakkad, Ahalia Integrated Campus, Kozhipara, Palakkad-678 557.**

- (iv) **Opening of the tender:** - The offer/Bids will be opened by a committee duly constituted for this purpose. The technical bids will be opened first and will be examined by a technical committee which will decide the suitability of the bid as per our specifications and requirements. The bidders will be invited for opening of Technical bids. **The Bidder's representative should carry authorization letter from their company empowering them to participate in the Pre-bid and tender opening meetings.** In respect of opening of financial bid, those bidders who are technically qualified only will be called.
- (v) **Prices:** - The price should be quoted in nett per unit (after breakup) and must include all packing and delivery charges indicated separately for each item. **The price indicated should be CIF/CIP Kochi.** The offer/bid should be exclusive of taxes and duties, which will be paid by the purchaser as applicable. The price should be quoted without custom duty. **The custom duty will be paid at concessional rate against duty exemption certificate.**
- (vi) **Agency Commission:** - Agency commission, if any, will be paid to the Indian agents in Rupees on receipt of the equipment and after satisfactory installation. Agency Commission will not be paid in foreign currency under any circumstances. The details should be explicitly shown in Tender even in the case of 'Nil' commission. The tenderer should indicate the percentage of agency commission to be paid to the Indian agent. **Terms of Delivery:** - The item should be supplied to our Institute as per Purchase order. The installation and commissioning should be completed as specified **by us in the attached schedule.**
- (vii) **Acceptance & Rejection:** IIT Palakkad reserves the full right to accept / reject any tender at any stage without assigning any reason.

Yours sincerely,

Registrar, IIT Palakkad

## SCHEDULE

### Important Conditions:

- 1) The due date for the submission of the tender is **14.12.2017 @ 3.00 PM**
- 2) The offers / bids should be submitted in two-bids systems (i.e.) Technical bid and financial bid. The Technical bid should consist of all technical details / specifications only. The Financial bid should indicate item-wise price for each item and it should contain all Commercial Terms and Conditions including Taxes (separately), transportation, packing & forwarding charges, installation, guarantee, payment terms, pricing terms etc. The Technical bid and financial bid should be put in separate covers **superscribed clearly as "Technical Bid" and "Financial bid"** and sealed. Both the sealed covers should be put in a bigger cover. Open Tender for **"Semiconductor Parameter Analyser"** should be written on the left side of the Outer bigger cover and sealed.
- 3) **EMD: -EMD should be at 2% (two percent) of the tender value quoted by the bidder.** The EMD should be enclosed with the financial bid which will not be opened for Technical evaluation. Enclosing the EMD in the Technical bid will automatically **DISQUALIFY** the tenderer. EMD should be in the form of DD in favour of **"Indian Institute of Technology Palakkad" and payable at Palakkad"**. The tender without EMD would be considered as UNSOLICITED and will be REJECTED. Photo/FAX copies of the Demand Draft/Banker's pay orders will not be accepted. No interest will be paid for the EMD and the EMD will be refunded to the successful bidder on receipt of Performance Security.
- 4) **Performance Security:-** The successful bidder will be asked to submit Performance Security for an amount of 5% of the value of the contract/supply. The Performance Security may be furnished in the form of an Account Payee DD or FD Receipt from the commercial bank or Bank Guarantee from any nationalized bank of India. **Only after submission of Performance Security, Purchase Order/Work Order will be released / L.C will be opened.**
- 5) **Performance Security in the form of Bank Guarantee:-** In case the successful bidder is a foreign company and wishes to submit Performance Security in the form of Bank Guarantee, the Bank Guarantee should be routed through the Beneficiary Bank to the end user bank. Otherwise, the Indian Agent of the foreign vendor has to submit a Bank Guarantee from a Nationalized Bank of India.
- 6) The Bank Guarantee should remain valid for a period of sixty days beyond the date of completion of all contractual obligations of the supplier including the warranty obligations.

If an Indian agent is involved, the following documents must be enclosed:

- Foreign principal's proforma invoice indicating the commission payable to the Indian Agent and nature of after-sales service to be rendered by the Indian Agent.
  - Copy of the agency agreement with the foreign principal and the precise relationship between them and their mutual interest in the business.
- 7) The offer/bids should be sent only for **a system or equipment** that is available in the market and supplied to a number of customers. A list of customers in India and abroad with details must accompany the quotations. Quotations for a prototype machine will not be accepted.
  - 8) Original catalogue (not any photocopy) of the quoted model duly signed by the principals must accompany the quotation in the Technical bid. No prices should ever be included in the Technical bid.
  - 9) Compliance or Confirmation report with reference to the specifications and other terms & conditions should also be obtained from the principal.
- 10) Validity:** Validity of Quotation not less than 90 days from the due date of tender.
- 11) Delivery Schedule:-** The tenderer should indicate clearly the time required for delivery of the item. In case there is any deviation in the delivery schedule, liquidated damages clause will be enforced or penalty for the delayed supply period will be levied.
- 12) Risk Purchase Clause:-** In the event of failure of supply of the item/equipment within the stipulated delivery schedule, the purchaser has all the right to purchase the item/equipment from other sources on the total risk of the supplier under risk purchase clause.
- 13) Payment:-** No Advance payment will be made for Indigenous purchase. 100% Payment after supply and successful installation and commissioning and certification by the end user. In case of import supplies the payment will be made only through **100% Letter of Credit i.e. (50% payment will be released against shipping documents and 50% after successful installation and meeting acceptance criteria wherever the installation is being done).** **Advance payment may be considered on submission of Bank Guarantee equal to the amount of advance payment.**
- 14) On-site Installation:** - The equipment or machinery has to be installed and commissioned by the successful bidder within 15 to 20 days from the date of receipt of the **item at site of IIT Palakkad.**

- 15) Warranty/Guarantee:** - The offer should clearly specify the warranty or guarantee period for the machinery/equipment. Any extended warranty offered for the same has to be mentioned separately. (For more details please refer our Technical Specifications).
- 16) Late offer:** - The offers received after the due date and time will not be considered. The Institute shall not be responsible for the late receipt of Tender on account of Postal, Courier or any other delay.
- 17) Loading and unloading charges will be borne by the bidder/Supplier.**
- 18) Acceptance and Rejection:** - I.I.T. Palakkad has the right to accept the whole or any part of the Tender or portion of the quantity offered or reject it in full without assigning any reason.
- 19) Do not quote the optional items or additional items unless otherwise mentioned in the Tender documents / Specifications.**
- 20) Disputes and Jurisdiction:** - Any legal disputes arising out of any breach of contract pertaining to this tender shall be settled in the court of competent jurisdiction located within the city of Palakkad in Kerala.
- 21) All Amendments, time extension, clarifications etc., will be uploaded on the institute website only and will not be published in newspapers. Bidders should regularly visit the above website to keep themselves updated. No extension in the bid due date/ time shall be considered on account of delay in receipt of any document by mail.**

**Acknowledgement:-** It is hereby acknowledged that the tenderer has gone through all the conditions mentioned above and agrees to abide by them.

**SIGNATURE OF TENDERER  
ALONG WITH SEAL OF THE  
COMPANY WITH DATE**

## Technical Specifications for the Semiconductor Device Parameter Analyser

### 1. Overview :

The Semiconductor Device Parameter Analyzer should have:

- a. 4 Source Measure Units (SMUs), of which there should be:
  - i. atleast 3 High-Resolution SMUs
  - ii. atleast 1 High-Power SMU
- b. 1 Multi-Frequency Capacitance Measure Unit (MFCMU)
- c. 1 Pulse measure/Fast measurement/Waveform generator unit
- d. an upgradability and support of atleast 9 slot modules, or more
- e. ground unit with atleast  $\pm 4$  A sink current, or higher
- f. the capability to connect to standard probe stations, including but not limited to probe stations from Cascade, Lakeshore, Jenis, etc,...

### 2. Detailed Specifications :

Sl. No.	Feature	Requirement	Quantity
1.	High-Resolution SMUs	<p><b>I. Source:</b></p> <p><b>a. Range:</b></p> <ol style="list-style-type: none"> <li>i. <u>current</u>: atleast <math>\pm 10</math> pA (or lower) to <math>\pm 100</math> mA (or higher)</li> <li>ii. <u>voltage</u>: atleast <math>\pm 500</math> mV (or lower) to <math>\pm 100</math> V (or higher)</li> </ol> <p><b>b. Resolution:</b></p> <ol style="list-style-type: none"> <li>i. <u>current</u>: atleast 5 fA, or better (higher resolution)</li> <li>ii. <u>voltage</u>: atleast 25 <math>\mu</math>V, or better (higher resolution)</li> </ol> <p><b>II. Measure:</b></p> <p><b>a. Range:</b></p> <ol style="list-style-type: none"> <li>i. <u>current</u>: atleast <math>\pm 10</math> pA (or lower) to <math>\pm 100</math> mA (or higher)</li> <li>ii. <u>voltage</u>: atleast <math>\pm 500</math> mV (or lower) to <math>\pm 100</math> V (or higher)</li> </ol> <p><b>b. Resolution:</b></p> <ol style="list-style-type: none"> <li>i. <u>current</u>: atleast 1 fA, or better (higher resolution)</li> <li>ii. <u>voltage</u>: atleast 0.5 <math>\mu</math>V, or better (higher resolution)</li> </ol>	4
2.	High-Power SMU	<p><b>I. Source:</b></p> <p><b>a. Range:</b></p> <ol style="list-style-type: none"> <li>i. <u>current</u>: atleast <math>\pm 1</math> nA (or lower) to <math>\pm 1</math> A (or higher)</li> <li>ii. <u>voltage</u>: atleast <math>\pm 2</math> V (or lower) to <math>\pm 200</math> V (or higher)</li> </ol> <p><b>b. Resolution:</b></p> <ol style="list-style-type: none"> <li>i. <u>current</u>: atleast 50 fA, or better (higher resolution)</li> <li>ii. <u>voltage</u>: atleast 100 <math>\mu</math>V, or better (higher resolution)</li> </ol> <p><b>II. Measure:</b></p> <p><b>a. Range:</b></p>	

		<ul style="list-style-type: none"> <li>i. <u>current</u>: atleast <math>\pm 1</math> nA (or lower) to <math>\pm 1</math> A (or higher)</li> <li>ii. <u>voltage</u>: atleast <math>\pm 2</math> V (or lower) to <math>\pm 200</math> V (or higher)</li> <li>b. <u>Resolution</u>: <ul style="list-style-type: none"> <li>i. <u>current</u>: atleast 10 fA, or better (higher resolution)</li> <li>ii. <u>voltage</u>: atleast 2 <math>\mu</math>V, or better (higher resolution)</li> </ul> </li> </ul>	
3.	<b>Ground Unit</b>	<ul style="list-style-type: none"> <li>I. Sink current: <math>\pm 4</math> A, or higher</li> <li>II. Voltage range: <math>0 \text{ V} \pm 100 \mu\text{V}</math></li> </ul>	-
4.	<b>MFCMU</b>	<p><u>C-V measurement test signal:</u></p> <ul style="list-style-type: none"> <li>I. <u>ac frequency</u>: <ul style="list-style-type: none"> <li><u>Range</u>: atleast 1 kHz (or lower) to 5 MHz (or higher)</li> </ul> </li> <li>II. <u>ac amplitude</u>: <ul style="list-style-type: none"> <li>a. <u>Range</u>: atleast 10 mV (or lower) to 100 mV (or higher): rms</li> <li>b. <u>Resolution</u>: atleast 1 mV (rms), or better (higher resolution)</li> </ul> </li> <li>III. <u>DC bias</u>: <ul style="list-style-type: none"> <li>a. <u>Range</u>: atleast <math>\pm 25</math> V, or higher</li> <li>b. <u>Resolution</u>: atleast 1 mV, or better (higher resolution)</li> </ul> </li> </ul>	1
5.	<b>I-V C-V measurement switching unit</b>	To switch between SMUs and CMU (including cables), to be able to perform I-V and C-V measurements without physically changing the connection.	-
6.	<b>I-V Sweep Mode</b>	<p><u>Atleast the following:</u></p> <ul style="list-style-type: none"> <li>a. single and double staircase sweep, pulsed sweep, staircase sweep with pulsed bias, I/V-t sampling: atleast 4000 measurement points, or more</li> <li>b. C-V sweep, C-t Sweep, C-f sweep: atleast 1000 measurement points, or more</li> <li>c. list sweep, linear and log interval, bias hold and negative hold time</li> </ul>	-
7.	<b>C-V measurement functions</b>	<ul style="list-style-type: none"> <li>I. <u>Mandatory</u>: <ul style="list-style-type: none"> <li>a. <math>C_P\text{-}G, C_P\text{-}D, C_P\text{-}Q, C_P\text{-}R_P, C_S\text{-}R_S, C_S\text{-}D, C_S\text{-}Q</math></li> <li>b. <math>R\text{-}X, G\text{-}B, Z\text{-}\theta, Y\text{-}\theta</math></li> </ul> </li> <li>II. <u>Optional</u>: <ul style="list-style-type: none"> <li>a. <math>L_P\text{-}G, L_P\text{-}D, L_P\text{-}Q, L_P\text{-}R_P, L_S\text{-}R_S, L_S\text{-}D, L_S\text{-}Q</math></li> </ul> </li> </ul>	-
8.	<b>Quasi-static C-V (QSCV) measurement</b>	QSCV measurement with leak compensation	-
9.	<b>Pulse measure/ fast measurement /waveform generator unit</b>	<p>To have the ability to do transient measurements, and NBTI, PBTI measurements.</p> <ul style="list-style-type: none"> <li>a. <u>No. of channels</u>: 2 (with the ability to obtain synchronised or independent outputs from them)</li> <li>b. <u>Frequency range</u>: atleast 1 Hz (or lower) to 50 MHz (or higher)</li> </ul>	1

		<ul style="list-style-type: none"> <li>c. <u>Pulse width programmable</u>: at least 20 ns</li> <li>d. <u>Pulse amplitude range</u>: at least <math>\pm 10</math> V, or more</li> <li>e. <u>Programmable parameters</u>: Pulse width, duty cycle, rise time, fall time, amplitude, offset</li> </ul>	
10.	<b>Data variable display and Analysis function</b>	<p>At least 20 user-defined parameters and 20 user-defined analysis functions, or more; including, but not limited to:</p> <ul style="list-style-type: none"> <li>a. Normal mode, grad mode, tangent mode, and regression mode.</li> <li>b. Automatic locating markers using the auto analysis setup.</li> <li>c. Parameter extraction capabilities.</li> </ul>	-
11.	<b>Interfaces</b>	<p><b>I. <u>Mandatory</u>:</b></p> <ul style="list-style-type: none"> <li>a. GPIB, interlock, USB, LAN, trigger in/out, digital I/O</li> <li>b. <u>User interface options</u>: Touch panel, knob, soft keys, USB, keyboard and mouse</li> </ul> <p><b>II. <u>Optional</u>:</b></p> <ul style="list-style-type: none"> <li>a. Cable and any other accessory/software to interface USB to GPIB ports to control the unit using laptop etc.,</li> </ul>	-
12.	<b>Offline software</b>	Offline desktop software for data analysis and test setup creation (the software that is used in mainframe)	-
13.	<b>Application libraries</b>	for testing FETs, BJTs, diodes, etc.,..	-
14.	<b>Test fixture unit</b>	hardware for testing packaged devices	1
15.	<b>Operating System</b>	Windows 7 or later	-
16.	<b>Control from Remote PC</b>	FLEX, VXI plug & play, built-in graphical programming environment	-
17.	<b>Support: Device modeling software, instruments, and prober</b>	<p>The equipment should be compatible with:</p> <ul style="list-style-type: none"> <li>a. device modeling software</li> <li>b. network analyzer, LCR meters, pulse generators</li> <li>c. must be able to control standard prober system, including but not limited to probe stations from Cascade, Lakeshore, Jenis, etc.,</li> </ul>	-
18.	<b>Future Upgradability</b>	<p>System should be upgradable to:</p> <ul style="list-style-type: none"> <li>i. high current device measurement (at least 40 A, or higher).</li> <li>ii. high voltage device measurement (at least 3000 V, or higher)</li> </ul>	-
19.	<b>Cables</b>	<p><b>I. <u>Mandatory</u>:</b></p> <ul style="list-style-type: none"> <li>a. The following should support low current measurements (at least below 1 pA). <ul style="list-style-type: none"> <li>i. Triaxial cables: Each SMU unit must come with at least 2 triaxial cables + 2: at least 3-m-length, or longer</li> <li>ii. Coaxial cables: at least 3-m-length, or longer</li> </ul> </li> <li>b. High-voltage (HV) triaxial cables: at least 3-m-length, or longer</li> </ul> <p><b>II. <u>Optional</u>:</b></p>	<p>10</p> <p>10</p> <p>5</p>



		<b>a. GPIB cable of atleast 2-m-length (refer 11.II.a)</b>	2
20.	<b>Adaptors/ Connectors</b>	<b>I. <u>Mandatory:</u></b> <b>a.</b> The following connectors should support low current measurements (atleast below 1 pA). <b>i.</b> Triax to BNC connectors: <b>1.</b> Triax(M) to BNC(F) connectors <b>2.</b> Triax(F) to BNC(M) connectors <b>3.</b> Triax(F) to BNC(F) connectors <b>ii.</b> BNC tee connectors <b>iii.</b> Banana connectors <b>b.</b> High-current (HC) banana connectors  <b>II. <u>Optional:</u></b> <b>a.</b> GPIB adapter (refer 11.II.a, and 19.III)	5 10 5 10 10 5  2
21.	<b><u>Optional:</u> Device modeling software</b>	Provide device modeling software	-

## Who can participate in the bid?

Only those bidders fulfilling the following criteria should respond to the tender.

1. The bidder should be either an Original Equipment Manufacturer (OEM) of semiconductor parameter analyser or should be an authorized representative (provide documentary proof) of an OEM.
2. The bidder should be a company registered under the Companies Act, 1956/2013 OR a Limited Liability Partnership/a registered partnership firm OR a sole-proprietorship entity. Appropriate Registration incorporation certificate must be submitted.
3. The bidder must have a registered office in Karnataka/Tamil Nadu/Telangana/Andhra Pradesh/Maharashtra or Kerala. Certificate of registration for the offices to be provided.
4. The bidder must also have a service center in Karnataka/Tamil Nadu/Telangana/Andhra Pradesh or Kerala. Certificate of registration for the centers to be provided. Details about scope of service activities provided by the service centres must be provided. The contact details of the service engineers must be provided.
5. The bidder must be in existence in the business of semiconductor parameter analyser or allied fields for a minimum period of 5 previous financial years (before or since 01 April 2012). Documentary evidences of experience must be provided.
6. The bidder should have implemented orders of semiconductor parameter analyser worth exceeding INR 25 lakhs during previous three financial years (01 April 2014 – 31 March 2017). Copies of the most recent purchase orders and certificates of successful implementation must be included. Copies of financial statements or evidence of turnover must be furnished.
7. The bidder should have documentary evidence of having supplied at least 1 no. of semiconductor parameter analyser to a Centrally Funded Technical Institution (e.g., IIT, NIT, IISc, IISER, etc.) in the recent past. The bidder must provide a certificate of satisfactory performance of the supplied equipment from the institute to which they have recently supplied. Contact details of the faculty-in-charge of the installed setup must also be provided.
8. The bidder must provide detailed specification of each equipment/item. Model numbers, data sheets and brochures must be included for each quoted equipment/accessories/item. Specifications corresponding to quoted model number must be available publicly via OEM's website for scrutiny. If not, bid can be disqualified on technical grounds.
- 9. Compliance sheet for the technical specification and OEM Brochure have to be attached along with the Technical bid. Vendor has to fill the compliance sheet and mention page number or reference number in OEM brochure. Unfilled/partially filled sheets lead to disqualification.**
- 10. Service and warranty for a minimum period of three years for the equipment must be provided. AMC for additional three years must be quoted separately.**