



Indian Institute of Science Bangalore

Prof. Mayank Shrivastava
Associate Professor
Department of Electronic Systems Engineering
Indian Institute of Science Bangalore
560012, Bangalore, Karnataka, India

Inquiry Number: DESE/LU/MSA/7/2023-24

Dated: 25/05/23

Request for Quote and Specifications from Indian Original Equipment Manufacturer (OEM) or their Indian authorized distributor for the procurement of AlGaIn/GaN HEMT on Si Wafers

**Indian Institute of Science, Bangalore
(Last Date: 12/06/23)**

Dear Sir/Madam,

Kindly send your best price quotation (in INR only) for the following item with various accessories on FOR-IISc Bangalore basis on INR only to the undersigned. Your quotation should clearly indicate the terms of delivery, delivery schedule, entry tax, payment terms, etc.

Your quote should also include mode of payment and **should reach the undersigned, duly signed on or before 1000 hours (IST) on 12/06/23.**

The quote must include all details of technical specifications of the product along with the commercial terms and conditions, the bill of materials, printed technical brochure and any other supporting document. **Please enclose a compliance certificate, printed on your letter head, along with the quote.**

The commercial bid must include the price of the item in Indian currency, indicating the following separately:

- FOR price
- Freight and Insurance
- Wafer cutting charges
- Tax
- Total

The quotation should address to:

The Chairman,
Department of Electronic Systems Engineering
Indian Institute of Science, Bangalore – 560 012

Following are the major items required (see detailed specs below):

- e-mode Wafers (6" diameter): 10 Nos.
- e-mode Wafers (8" diameter): 10 Nos.

Layer Specifications:

Layer name	Description	Thickness target	Comment
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E-mail : mayank@iisc.ac.in
Phone : +91-80-2293-2732
Faculty Web : <https://faculty.dese.iisc.ac.in/mayank/>
Institute Web : <https://iisc.ac.in/>



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Substrate	150-mm Si substrate (111) 200-mm Si substrate (111)	1000 μ m or higher	Preferred is pre-doped Si
Buffer	Buffer	5 μ m or higher	Vertical breakdown data should be provided
GaN channel	GaN	175nm	Vendor should be able to customize based on our design requirement
Barrier	e-mode: AlGaN (18% Al)	e-mode: 12nm	Vendor should be able to customize (In, Al) N barriers on request based on our design requirement
Cap layer	e-mode: p-GaN	e-mode: up to 100nm p-GaN (1-2e17 cm ⁻³ , electrically activated)	Vendor should be able to customize thicknesses based on design requirements

Material Specifications

Parameter	Measurement	Units	Target
Barrier thickness	X-Ray	nm	\pm 10% or less
Barrier composition	Photoluminescence, ellipsometry	%	\pm 1% or better
Cap thickness	X-Ray	nm	\pm 10% or less
Wafer bow	Laser profilometer	μ m	\pm 50 max.
Edge exclusion		mm	5

Electrical Specifications

Parameter	Measurement	Units	Target
Electron mobility*	Hall	cm ² /V.s	d-mode: > 1800 (for 20nm AlGaN, 25%Al) e-mode: Please specify your numbers
Sheet charge density*	Hall	/cm ²	d-mode: > 9e12 e-mode: > 4.5e12



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Sheet resistivity*	Eddy current	Ohms/sq	d-mode: < 400 e-mode: < 800
Vertical breakdown voltage*	Qualified 650V (long term stress qualified)	V	> 1000
Lateral breakdown voltage* (LG-D > 20 μm)	Qualified 650V (long term stress qualified)	V	> 1200
Leakage current* (lateral, grounded substrate)	@650V, RT	nA/mm	< 100
Leakage current* (vertical)	@650V, RT	$\mu\text{A}/\text{mm}^2$	< 1

Terms and conditions:

1. Shipping: On all the items the cost of shipping up to IISc. IISc will help FedEx to take care of the customs clearance at Bangalore Airport. Please include your payment option. IISc would prefer payment after receipt of Wafers (in 30 days).
2. References: Bidders should provide details of other locations/users across the globe where similar material was delivered.
3. The lead time for the delivery of the material should preferably be less than 4 weeks from the date of receipt of our purchase order. The smallest lead time will be appreciated.
4. The validity period of the quotation should be 90 days at least.
5. The vendor should be flexible with parts delivery. We may spread the entire requirement into 3 years and ask for delivery in lots of 25 wafers (Example: Year 1: 25 e-mode Wafers + 25 d-mode Wafers, Year 2: 50 e-mode Wafers and Year 3: 75 e-mode Wafers).

Sincerely,

Prof. Mayank Shrivastava
Associate Professor
Department of Electronic System Engineering
Indian Institute of Science
Bangalore, Karnataka 560012, India
Secretary (Ms. Supria's) Contact: 9972092771
(On Behalf of Purchase Committee)



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Enclosures / Annexures

Section 1 – Eligibility Criteria for Domestic Tender

Prequalification criteria:

1. The Bidder's firm should have existence for a minimum of 3 years. (Enclose Company Registration Certificate)
2. The Bidder should belong to either class 1 or class 2 supplier distinguished by their "local content" as defined by recent edits to GFR. They should mention clearly which class they belong to in the cover letter.
 - a) Class 1 supplier: Goods and services should have local content of equal to or more than 50%.
 - b) Class 2 supplier: Goods and services should have local content of equal to or more than 20 % and less than 50%.
3. Bidders offering imported products will fall under the category of non-local suppliers. They cannot claim themselves as Class-1 local suppliers/Class-2 local suppliers by claiming the services such as transportation, insurance, installation, commissioning, training, and other sales service support like AMC/CMC, etc., as local value addition.
4. Purchase preference as defined by the recent edits to GFR (within the "margin of purchase preference") will be given to the Class-1 supplier.
5. MSME can seek exemption to some qualification criteria. IISc follows GFR2017 for such details
6. The bidder should sign and submit the declaration for Acceptance of Terms and Conditions as per - Annexure 4.
7. The Bidder must not be blacklisted/banned/suspended or have a record of any service related dispute with any organization in India or elsewhere. A declaration to this effect has to be given as per Annexure 3.

Section 2 – Terms and Conditions

A) Submission of Tender:

1. All documentations in the tender should be in English.
2. Tender should be submitted in two envelopes (two bid system).



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a. Technical Bid (Part-A) – Technical bid consisting of all technical details and check list for conformance to technical specifications.

The technical proposal should contain a technical compliance table with 5 columns.

- i. The first column must list the technical requirements, in the order that they are given in the technical requirement below.
- ii. The second column should provide specifications of the instrument/product against the requirement. Please provide quantitative responses wherever possible.
- iii. The third column should describe your compliance with a “Yes” or “No” only. Ensure that the entries in column 2 and column 3 are consistent.
- iv. The fourth column should state the reasons/explanations/context for deviations, if any.
- v. The fifth column can contain additional remarks from the OEM. You can use this opportunity to highlight technical features, qualify response of previous columns, or provide additional details, compare your solution with that of your competitors or provide details as requested in the technical requirements table below.

b. Commercial Bid (Part-B) – Indicating item-wise price for the items mentioned in the technical bid, as per the format of quotation provided in tender, and other commercial terms and conditions.

3. The technical bid and price bid should each be placed in separate sealed covers, superscripting on both the envelopes the tender no. and the due date. Both these sealed covers are to be placed in a bigger cover which should also be sealed and duly superscripted with the Tender No, Tender Description & Due Date.

4. The SEALED COVER superscripting tender number / due date & should reach **Chairman Office, Department of Electronic Systems Engineering, Indian Institute of Science, Bangalore – 560012, India** on or before due date mentioned in the tender notice. In case due date happens to be holiday the tender will be accepted and opened on the next working day. If the quotation cover is not sealed, it will be rejected.

5. All queries are to be addressed to the person identified in “Section 1 – Bid Schedule” of the tender notice.

6. GST/other taxes, levies etc., are to be indicated separately. The BIDDER should mention GST Registration and PAN in the tender document (Indian Bidders only).

7. If price is not quoted in Commercial Bid as per the format provided in tender document the bid is liable to be rejected.

8. The Institute reserves the right to accept or reject any bid and to annul the bidding process and reject all bids at any time prior to the award of contract, without thereby incurring any liability to the affected bidder or bidders or any obligation to inform the affected bidder or bidders.



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9. Incomplete bids will be summarily rejected.

B) Cancellation of Tender:

Notwithstanding anything specified in this tender document, IISc Bangalore, in its sole discretion, unconditionally and without having to assign any reason, reserves the rights:

- a. To accept OR reject lowest tender or any other tender or all the tenders.
- b. To accept any tender in full or in part.
- c. To reject the tender, offer not confirming to the tender terms.

C) Validity of the Offer:

The offer shall be valid 90 Days from the date of opening of the commercial bid.

D) Evaluation of Offer:

1. The technical bid (Part A) will be opened first and evaluated.
2. Bidders meeting the required eligibility criteria as stated in Section 2 of this Document shall only be considered for Commercial Bid (Part B) opening. Further, Agencies not furnishing the documentary evidence as required will not be considered.
3. Pre-qualification of the bidders shall not imply final acceptance of the Commercial Bid. The agency may be rejected at any point during technical evaluation or during commercial evaluation. The decision in regard to acceptance and/or rejection of any offer in part or full shall be the sole discretion of IISc Bangalore, and the decision in this regard shall be binding on the bidders.
4. The award of contract will be subject to acceptance of the terms and conditions stated in this tender.
5. Any offer which deviates from the vital conditions (as illustrated below) of the tender is liable to be rejected:
 - a. Non-submission of complete offers.
 - b. Receipt of bids after due date and time and or by email / fax (unless specified otherwise).
 - c. Receipt of bids in open conditions.
6. In case any BIDDER is silent on any clauses mentioned in these tender documents, IISc Bangalore shall construe that the BIDDER had accepted the clauses as of the tender and no further claim will be entertained.
7. No revision in the terms and conditions quoted in the offer will be entertained after the last date and time fixed for receipt of tenders.
8. Lowest bid will be calculated based on the total price of all items tendered for Basic equipment along with accessories selected for installation, operation, pre-processing and post-processing, optional items, recommended spares, warranty, annual maintenance contract.



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E) Pre-requisites (if applicable):

The bidder will provide the prerequisite installation requirement of the equipment along with the technical bid.

F) Warranty (if applicable):

The complete system is to be under warranty period of minimum 1-3 years (year wise breakup value should be shown in the commercial bid) including free supply of consumables, spare parts and data analysis software from the date of functional installation. If the instrument is found to be defective, it has to be replaced or rectified at the cost of the bidder within 30 days from the date of receipt of written communications from IISc, Bangalore. If there is any delay in replacement or rectification, the warranty period should be correspondingly extended.

G) Annual Maintenance Contract (if applicable):

An annual maintenance contract for a period of at least 2 years post-warranty if the warranty is for 1 year, should be provided on completion of warranty period. The AMC costs will not be considered towards classifying the domestic nature (class 1 or class 2) of the vendor (see eligibility criteria in section 2). AMC for 1 year is sought for warranty of 2 years, and AMC will be optional for 3 year warranty.

H) Purchase Order:

1. The order will be placed on the bidder whose bid is accepted by IISc based on the terms & conditions mentioned in the tender document.
2. The quantity of the items in tender is only indicative. IISc, Bangalore reserves the right to increase /decrease the quantity of the items depending on the requirement.
3. If the quality of the product and service provided is not found satisfactory, IISc, Bangalore reserves the right to cancel or amend the contract.

I) Delivery, Installation and Training (if applicable):

The bidder shall provide the lead time to delivery, installation and made functional at IISc, Bangalore from the date of receipt of purchase order. The system should be delivered, installed and made functional within 90 days from the date of receipt of purchase order. The supply of the items will be considered as effected only on satisfactory installation and inspection of the system and inspection of all the items and features/capabilities tested by the IISc, Bangalore. After successful installation and inspection, the date of taking over of entire system by the IISc, Bangalore shall be taken as the start of the warranty period. No partial shipment is allowed. The bidder should also arrange for technical training to the local facility technologists and users.



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J) Payment Terms:

100% payments (except AMC) will be released after completion delivery and satisfactory installation subject to TDS as per rules. AMC cost (if ordered), after completion of warranty period) will be released on half-yearly basis at the end of each six months subject to satisfactory services. The AMC will be comprehensive. Price basis must be on FOR-IISc Bangalore basis only. As per GFR no advance payment can be made to domestic vendors, unless an equal amount of bank guarantee is provided.

K) Statutory Variation:

Any statutory increase in the taxes and duties subsequent to bidder's offer, if it takes place within the original contractual delivery date, will be borne by IISc, Bangalore subject to the claim being supported by documentary evidence. However, if any decrease takes place the advantage will have to be passed onto IISc, Bangalore.

L) 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 Bangalore, India.

M) General:

1. All amendments, time extension, clarifications etc., within the period of submission of the tender will be communicated electronically. No extension in the bid due date/time shall be considered on account of delay in receipt of any document(s) by mail.
2. The bidder may furnish any additional information, which is necessary to establish capabilities to successfully complete the envisaged work. It is, however, advised not to furnish superfluous information.
3. The bidder may visit the installation site before submission of tender, with prior intimation.
4. Any information furnished by the bidder found to be incorrect, either immediately or at a later date, would render the bidder liable to be debarred from tendering/taking up of work in IISc, Bangalore.

Section 3 - Technical Bid

The technical bid should furnish all requirements of the tender along with all annexures in this section and submitted to

The Chairman,



Indian Institute of Science Bangalore

Prof. Mayank Shrivastava
Associate Professor
Department of Electronic Systems Engineering
Indian Institute of Science Bangalore
560012, Bangalore, Karnataka, India

Attn: Prof. Mayank Shrivastava
Department of Electronic Systems Engineering,
Indian Institute of Science
Bangalore – 560012, India

Annexure-1:

Details of the Bidder

The bidder must provide the following mandatory information & attach supporting documents wherever mentioned:

Sl. No	Items	Details
1	Name of the Bidder	
2	Nature of Bidder (Attach attested copy of Certificate of Incorporation/ Partnership Deed)	
3	Registration No/ Trade License, (attach attested copy)	
4	Registered Office Address	
5	Address for communication	
6	Contact person- Name and Designation	
7	Telephone No	
8	Email ID	
9	Website	
10	PAN No. (attach copy)	
11	GST No. (attach copy)	



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Signature of the Bidder

Name
Designation, Seal

Date:

Annexure-2:

Declaration regarding experience

To,
The Chairman,
Department of Electronic Systems Engineering,
Indian Institute of Science,
Bangalore – 560012, India

Ref: Tender No: XXXXXXXXXX

Dated: XXXXX

Supply and/or installation of <Item Name> at Prof. Mayank Shrivastava's Lab, Department of ESE, IISc Bangalore

Sir,

I've carefully gone through the Terms & Conditions contained in the above-referred tender. I hereby declare that my company/firm has ---- years of experience in supplying and/or installing <Item Name>.

(Signature of the Bidder)

Printed Name
Designation, Seal

Date:



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Annexure-3:

Declaration regarding track record

To,
The Chairman,
Department of Electronic Systems Engineering
Indian Institute of Science,
Bangalore – 560012, India

Ref: Tender No: XXXXXXXX

Dated: XXXXX

Supply and/or installation of <Item Name> at Prof. Mayank Shrivastava's Lab, Department of ESE, IISc Bangalore

Sir,

I've carefully gone through the Terms & Conditions contained in the above referred tender. I hereby declare that my company/ firm is not currently debarred /blacklisted by any Government / Semi Government organizations/institutions in India or abroad. I further certify that I'm competent officer in my company / firm to make this declaration.

Or

I declare the following

Sl.No	Country in which the company is Debarred /blacklisted / case is Pending	Blacklisted / debarred by Government / Semi Government/Organizations /Institutions	Reason	Since when and for how long

(NOTE: In case the company/firm was blacklisted previously, please provide the details regarding period for which the company/firm was blacklisted and the reason/s for the same).

Yours faithfully

(Signature of the Bidder)

Name

Designation, Seal

Date:



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Annexure – 4:

Declaration for acceptance of terms and conditions

To,
The Chairman,
Department of Electronic Systems Engineering
Indian Institute of Science,
Bangalore – 560012, India

Ref: Tender No: XXXXXX

Dated: XXXX

Supply and/or installation of <Item Name> at Prof. Mayank Shrivastava's Lab, Department of ESE, IISc Bangalore

Sir,

I've carefully gone through the Terms & Conditions as mentioned in the above referred tender document. I declare that all the provisions of this tender document are acceptable to my company. I further certify that I'm an authorized signatory of my company and am, therefore, competent to make this declaration.

Yours faithfully,

(Signature of the Bidder)

Name
Designation, Seal

Date:

Annexure – 5:

Details of items quoted:

- Company Name
- Product Name
- Part / Catalogue number



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- d. Product description / main features
- e. Detailed technical specifications
- f. Remarks

Instructions to bidders:

1. Bidder should provide technical specifications of the quoted product/s in detail.
2. Bidder should attach product brochures along with the technical bid.
3. Bidders should clearly indicate compliance or non-compliance of the technical specifications provided in the tender document.

Section 4 – Commercial Bid

The commercial bid should be furnished with all requirements of the tender with supporting documents as mentioned under:

S.No	Description	Cat. Number	Quantity	Unit Price	Sub total
1	Essential items noted in the technical specification				
1.a	...(details of essential items)				



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1.b	...				
2	Optional items noted in the technical specification				
2.a	...(details of essential items)				
2.b	...				
3	Accessories for operation and installation				
4	All Consumables, spares and software to be supplied locally				
5	Warranty (3 years)				
6	AMC 2 years beyond warranty				
7	Cost of Insurance and Airfreight				
8	CIP/CIF IISc, Bengaluru				

Any additional items

S.No	Description	Cat. Number	Quantity	Unit Price	Sub total

Addressed to
The Chairperson,
Attn: Prof. Mayank Shrivastava
Department of Electronic Systems Engineering
Indian Institute of Science, Bangalore – 560012, India
Section 5 – Checklist

(This should be enclosed with technical bid- Part A)
The following items must be checked before the Bid is submitted:

1. Sealed Envelope “A”: Technical Bid

1. Section 3- Technical Bid (each page signed by the authorized signatory and sealed) with the below



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annexures:

- a. Annexure 1: Bidders details
 - b. Annexure 2: Declaration regarding experience
 - c. Annexure 3: Declaration regarding clean track record
 - d. Annexure 4: Declaration for acceptance of terms and conditions
 - e. Annexure 5: Details of items quoted
2. Copy of this tender document duly signed by the authorized signatory on every page and sealed.

2. Sealed Envelope “B”: Commercial Bid
Section 4: Commercial Bid

Your quotation must be submitted in two envelopes: Technical Bid (Envelope A) and Commercial Bid (Envelope B) superscribing on both the envelopes with Tender No. and due date and both of these in sealed covers and put in a bigger cover which should also be sealed and duly super scribed with Tender No., Tender description & Due Date