

# **EXPRESSION OF INTEREST (EOI)**

**For**  
**Identification of Established Foreign Foundry (EFF) for**  
**Establishment of IR Detector Development &**  
**Fabrication Facility in India through Transfer of**  
**Technology (ToT)**



**Instruments Research & Development Establishment (IRDE)**  
**Dehradun**  
**Defence Research & Development Organization (DRDO)**  
**Government of India, Ministry of Defence**

**June 2024**

### **Expression of Interest (EOI)**

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## **Brief introduction of Lab/Estt:**

Instruments Research & Development Establishment (IRDE) is a Lab of Defence Research & Development Organization (DRDO), under Ministry of Defence and is situated at Raipur Road, Dehradun, Uttarakhand, India – 248008. IRDE is involved in research & development in the field of Electro-Optical Instrumentation.

## **1. Objective of EOI:**

The broad objectives of Expression of Interest (EOI) For Identification of Established Foreign Foundry (EFF) for Establishment of IR Detector Fabrication Facility in India through “Transfer of Technology (ToT)” is as follows:

- This EOI is being published to get the proposal from an Established Foreign Foundry (EFF) for Establishment of IR Detector Fabrication Facility in India through Transfer of Technology (ToT).
- The Lab is in the process of firming up the RFP and pre-qualify the vendors based on their responses for this EOI and its evaluation by a Technical Assessment Committee (TAC) for the above-mentioned facility.
- Being a state-of-the-art IR detector fabrication facility, Execution of the intended ToT requires multi-disciplinary expertise from the bidders in the areas of fabrication of IR detectors of required specifications as mentioned in sub-sequent sections of the document. The EFF should have proven records of developing these detectors. It should also possess human resources which are highly skilled and capable of understanding and executing the ToT.
- This EOI will lead to issuing of RFPs to the firms found capable of executing the above-mentioned ToT. The RFP will subsequently lead to contract and contract may subsequently lead to ToT for Established Foreign Foundry (EFF) for Establishment of IR Detector Fabrication Facility in India.
- The EOI is being issued with no financial commitment; and the Ministry of Defence reserves the right to withdraw the EOI and change or vary any part thereof at any stage. The Government of India and the agency nominated by GoI (DRDO) also reserves the right to disqualify any foreign partner should it be so necessary at any stage on grounds of National Security.

## 2. Scope of Work:

- 2.1a** The main scope of work of this EOI, is to identify an EFF to manufacture IR detector (3-5  $\mu\text{m}$ , 640 x 512; pitch 10 $\mu\text{m}$  and 1280×1024 format; pitch 10 $\mu\text{m}$ ) and maintenance of all existing detectors through ToT. Though, ToT may be considered as a one-time event, support from EFF for the Fab activity is expected for a long time under agreed conditions. It is expected that full ToT will be ensured for all the sub-systems /assemblies of IR detector, by the EFF. This can be staggered in a phased manner to cater for the requirements of MWIR detectors, and additional cooler assembly, fully manufactured and tested/ qualified for integration in India, in a period of about 60 months. The total ToT would include the transfer of production technology and documentation, including FPA, use of sorted Si wafer for ROIC and assembly/supply of cooler, associated direct production machinery (excluding civil infrastructure/utility), on the Job Training (OJT) by EFF expert personnel (including required materials) at EFF's FAB facility and training by its expert personnel in India at IRFAB facility as well, IT and Logistic support. This training of ToT will assume using sources of raw materials of EFF.
- 2.1b** To establish a fabrication line for InSb based MWIR Detector through Transfer of Technology (ToT) from an Established Foreign Foundry (EFF). The development work would include:
- Establishment of a foundry for fabrication of InSb based MWIR Detector.
  - ToT of development of IR FPAs from established foreign foundry (EFF) to DRDO.
  - Establishment of state-of-the-art fabrication infrastructure and equipment for the development of IR FPAs
  - To generate a pool of trained manpower for the production of detectors.
  - To develop IR Detector/ FPA as per requirements.
  - Provision for Infrastructure for future upgrades as well as alternate technologies such as Type-II Super Lattice and XBn/ HFM will also be made.
- 2.1c** DRDO will undertake the construction of the FAB facility infrastructure in accordance with the specifications supplied by EFF. EFF will provide the required fabrication machinery, supply of materials required for training /production in India, management of the professional/ qualified manpower to undergo the training sessions at EFFs facility, and at the designated FAB facility once established.

- 2.1d** IRFAB will manufacture, sell and maintain IR detector for the Indian govt./ armed forces/Indian industries. Export control from the IRFAB will be according to the agreement between GOI and the foreign Govt. of EFF.
- 2.1e Site identification:** Site identification in India will be done by DRDO and will be approved by the EFF.
- 2.1f Infrastructure Development:** Foreign partner will provide blue-prints of basic infrastructure which should cover the working area for fabrication, assembly, characterization and qualification of detector, clean room requirements, power requirements, etc in response to this EOI Provision for future expansion / up-gradation may be indicated. The capacity of the IRFAB facility will be according to the quantities that is required to be supplied during the ToT process.
- 2.1g Equipment Identification:** EFF will identify all the equipment required for various processing, assembly and characterization of IDCCA components at various phases. The EFF should supply all the identified equipment required for IRFAB facility. Tooling, fixtures, recommended spares etc should be identified and supplied for each phase of the ToT. EFF shall be responsible for equipment purchased and supplied to IRFAB as part of the ToT.
- 2.1h Raw Material:** Raw material for each stage to be specified. EFF should supply the raw material and recommend the source for the future. It will also ensure the continuous supply of raw material to IRFAB. Raw material qualification facility should also be established in IRFAB facility by EFF.
- 2.1i Manpower Training:** Suitable manpower will be selected for training at various stages and for different activities. Skill requirement for the manpower during different phases of the development will be defined by the EFF & IRFAB jointly. Training location, duration and expected expenditure to be borne by GOI / IRFAB Training should be incorporated by EFF in such a manner that speedy progress occurs in FAB facility establishment. Training should be provided by EFF at EFFs facility, and also at the designated IRFAB facility once established. Training videos / manuals on the process, if any, should be shared by EFF.
- 2.1j Instrumentation for Test & evaluation:** EFF will identify & supply the instrumentation for test & evaluation at various stages and at final product level. Necessary training will be incorporated by the EFF.

**2.1k Quality Control:** EFF will be responsible for the quality control of the IDDCA manufacture during different phases of development through-out the ToT schedule and for setting up QA process and training of people into quality personnel for serial production in India. Quality management system should be defined & provided by by EFF.

**2.1l Process Documentation & software code:** The EFF shall provide all the process documentation applicable for establishing and running the production process including details of various processes that are carried out, process control, tolerances, sequencing, timing etc. The software used for process control; various test & evaluation software modules will be provided at source code level in addition to the executables. Training is to be provided to IRFAB engineers & technicians in this regard. The documentation should be as per any one of the international standards.

**2.1m** Processes control systems and financial management system (Like SAP Oracle or other) shall be jointly selected by the EFF & IRFAB to best suit the overall FAB processes management and control.

**2.1n Delivery Schedule:** Timeline or different activities are defined below in Table 1:

**Table 1. Delivery Timelines**

S. No.	Activity	Timeline (in Months)
1.	Kickoff (Start of the ToT)	T0
2.	Initial FAB Layout design	7
3.	Handing-over of Technical and Infrastructure document by EFF	9
4.	Final FAB design	10
5.	FAB construction	22
6.	Infrastructure and FAB equipment	32
7.	Final FAB design review	18
8.	Training of DRDO personnel at EFF	18
9.	Procurement of all Fab Equipment	32
10.	Identification and Procurement of Raw Materials	36
11.	Installation & Training of all Fab equipment	40

12.	Testing of FAB Equipment & Raw Materials	43
13.	Finalize FAB facility, infrastructure and equipment	48
14.	FAB SETUP for IR detector production	54
15.	First detector manufacturing by IR Fab	60
16.	Training of DRDO team at IR Fab Facility	68
17.	Production of IR detectors at IR Fab	72
18.	Manufacturing of IR detectors by DRDO team	72
19.	Indigenous IR Fab	84

Detailed execution plan for meeting the above schedules is to be submitted by EFF in response to this EOI.

**2.1o Warranty:** The goods supplied by the EFF shall carry a warranty for 36 Months from the date of acceptance or from date of installation and commissioning, whichever is later, and the EFF will provide the warranty.

**2.1p Documentation:** For each phase of ToT that EFF will provide as part of the deliverables, complete know how documentation which should include process details, tooling, testing, qualification criteria, ATP, precautionary measures, handling and storage of detector, refurbishment of cooler etc. Complete documentation details as deliverables, to be provided in response to the RFP. At the start of each ToT phase process, documentation should be provided in a phased manner to satisfy the requirements. The documentation should be as per any one of the international standards.

**2.1q Product Support:** A) After the completion of ToT phases, EFF will ensure quality of product & maintenance and smooth functioning of the fabrication facility. The EFF would be bound by a condition in the contract that the EFF is in a position to provide product support in terms of maintenance, supply of raw materials, components and spares for a minimum period of **10 (Ten) years**.

B) The established fabrication facility will also function as a maintenance center for the already procured IDDCAs of similar family that exist with the Indian Govt / Armed forces. The maintenance capability should be both for existing IDDCAs of same family and new IDDCAs developed through the FAB facility.

- 2.1r Government Regulations:** It may also be confirmed that there are no Government restrictions or limitations in the country of the supplier or countries from which sub-components are being procured and / or for the export of any part of the system being supplied. Necessary export clearance/license must be ensured by the EFF according to the EFF government regulations.
- 2.1s Product scaling up & upgradeability and variants:** The production of the IDDCA in course of time should be upgradeable to production of higher formats, lower pitch values. etc within the IRFAB facility and variants regarding Dewar cooler and F-number etc should be feasible within the ambit of this ToT itself. ToT for higher operating temperature for InSb/XBn/HFM based FPA should be done once the development is completed by EFF, as part of this contract itself.
- 2.1t Intellectual Property Right:** The foreign partner has to confirm that there are no infringements of any Patent Rights in accordance with the laws prevailing in their respective countries. IPR for detector manufacturing in India will remain with IRFAB.
- 2.1u Exit clause:** The GoI may find this project economically not viable and may ask for stage closure. In that case, the compensation to be paid by the Govt. of India (GoI) to the EFF, will cover the actual, expenses incurred. If the EFF asks for stage closure, EFF will reimburse the cost incurred to GoI.
- 2.1v Export of the product:** Export to other countries will be decided by the Management Board (MB) of IRFAB, subject always to receipt of the EFF's and its governments prior consent, including any export or other licenses as may be required for such export.
- 2.1w Product pricing:** Product pricing will be controlled by the MB of IRFAB. The product price should be competitive as per the world market. Business model for product estimated costing is to be done very carefully and should be attached with this proposal.
- 2.1x** All safety and health hazard aspects are to be taken into account as per international standards in establishing and running the Fab facility.
- 2.1y** Technical proposal received from EFF will be evaluated by a Technical Assessment Committee (TAC), which will examine the technical proposal against the projected requirements of manufacturing of the IR detector in India in the EOI & short list the prospective EFF. In case if desired, reps from EFF may be asked to be present in the TAC



meeting for presentation on the ToT proposal. In that case, EFF & its authorized representative will be intimated at least 15 days before TAC meeting for sending the bio-data for taking security clearance. TAC may also visit EFF facility to assess their capability and infrastructure to execute this ToT.

- 2.1z** After completion of Technical Assessment by TAC, the names of qualified EFF will be declared by a competent authority followed by request for techno-commercial proposals.

### **3. Technical Specifications:**

Through this ToT following three types of detectors are proposed to be fabricated in IRFAB:

- I. MWIR VGA 640 Detector with Integrated Cooler (Quantity 500 Nos/Year)
- II. MWIR VGA 640 FPA with JT Cooler (Quantity 1000 Nos/Year)
- III. MWIR 1280 HD IDDCA (Quantity 500 Nos/Year)
- IV. Maintenance of existing IR detectors

#### ***3.1 Requirements of Thermal Imaging instruments at present are as follows:***

- Clear Image (High Operability, low dead pixels, high resolution)
- Good SNR (Low NETD: temporal & Spatial)
- Good Range with high detectivity
- High frame rate (Dependent on ROIC)
- Low input power consumption and long MTTF
- Low cool down time
- Zoom: Electronic + optical
- Low size, weight & power consumption
- Low system cost

#### ***3.2 Towards meeting the above requirements Cooled Digital IDDCA's InSb (3 to 5 $\mu\text{m}$ ) is proposed to be fabricated with following components:***

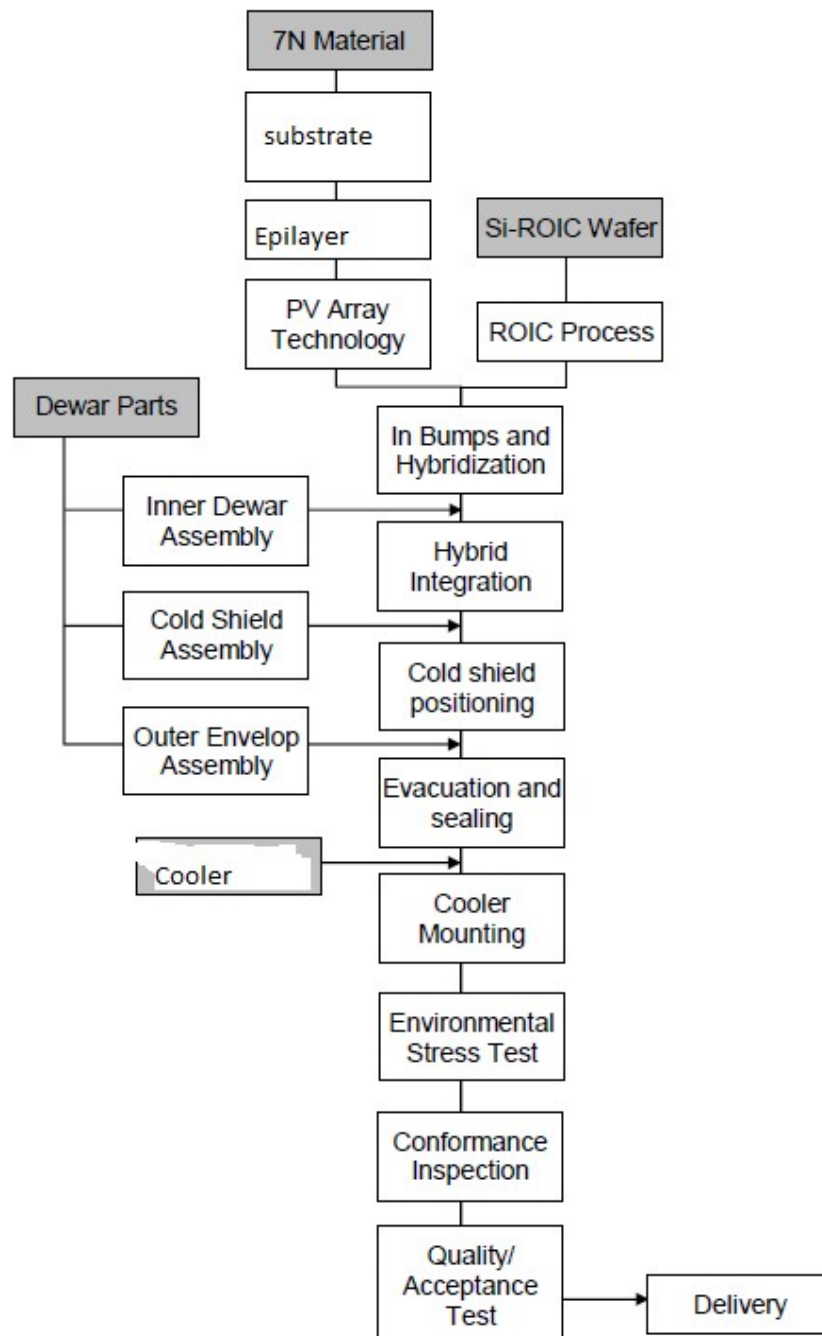
The following components are essentially required for complete digital IDDCA detector fabrication in India –

- (a) FPA
- (b) Cold Shield and cold finger
- (c) Infrared Window
- (d) Dewar
- (e) Getter
- (f) Cryo – Cooler and its interface with FPA

- (g) ROIC & Proximity board with Flex harness
- (h) Ceramic Feed through unit

### 3.3 Processes Involved & technology Requirements are:

The manufacture of IDDCA calls for typical process technologies and manufacturing in respect of the following -



### 3.4 Technical Characteristics and Features of MWIR IDDCA:

The technical details provided in the proposal should be factual, comprehensive and include specifications of the offered equipment against broad requirements listed here. The production files that will be transferred by way of ToT will include all the aspects that are required to manufacture the IDDCA. The technical characteristics and features that are to be met by the ToT process should cover all the aspects in detail including the following:

- a) Setting up of facilities, infrastructure and machinery.
- b) Sourcing of raw material for detector & characterization.
- c) PV arrays manufacturing.
- d) ROIC design & manufacturing
- e) Hybridization of PV array & ROIC.
- f) Dewar manufacturing & assembly.
- g) FPA & dewar Integration and qualification.
- h) Integrated cooler manufacturing and cooler controller & qualification.
- i) Cooler dewar integration.
- j) Proximity electronics & qualification.
- K) EO testing of IDDCA.
- l) Samples qualification for environmental specifications & EMI/EMC.

**3.5** The EFF will conform to the ToT for various assembly and stages as above to the full extent.

**3.6** The IDDCA to be manufactured should be an advanced detector with high performance that will remain current for a very long time.

**3.7** The broad specifications of finished digital MWIR IDDCA with proximity electronics are as under:

**Table 2. Specification of MWIR VGA 640 Detector with Integrated Cooler**

IDDCA Parameters	Value
Detector Type	InSb Photovoltaic Array
Spectral response	3.6 to 4.9 $\mu\text{m}$
F/#	4

<b>Array Format</b>	640 x 512
<b>Pitch</b>	10 $\mu\text{m}$
<b>ROIC Digital Resolution</b>	$\geq 13$ bits
<b>Integration mode</b>	Integrate-while-read, integrate-then-read
<b>NETD</b>	$\leq 30$ mK at 50% well fill of 2Me- capacitor
<b>Residual Non Uniformity</b>	$< 0.07\%$ STD/DR at 10-80% well fill capacity
<b>Operability</b>	$> 99.5\%$
<b>Frame Rate</b>	100 Fr/sec
<b>Weight</b>	$< 400$ gms with proximity card
<b>Cooler</b>	Micro Cooler, Split Linear
<b>Cool Down time</b>	$\leq 5$ min at 25 $^{\circ}\text{C}$
<b>Operating temperature</b>	-30 $^{\circ}\text{C}$ to 71 $^{\circ}\text{C}$
<b>Storage temperature</b>	-40 $^{\circ}\text{C}$ to 71 $^{\circ}\text{C}$

**Table 3. Specification of MWIR VGA 640 FPA with JT Cooler**

<b>IDDCA Parameters</b>	<b>Value</b>
<b>Detector Type</b>	InSb Photovoltaic Array
<b>Spectral response</b>	3.6 to 4.9 $\mu\text{m}$
<b>F/#</b>	3
<b>Array Format</b>	640 x 512
<b>Pitch</b>	10 $\mu\text{m}$
<b>ROIC Digital Resolution</b>	$\geq 13$ bits
<b>Integration mode</b>	Integrate-while-read, integrate-then-read
<b>NETD</b>	$\leq 30$ mK at 50% well fill of 2Me- capacitor

<b>Residual Non Uniformity</b>	< 0.07% STD/DR at 10-80% well fill capacity
<b>Operability</b>	> 99.5%
<b>Frame Rate</b>	100 Fr/sec
<b>Weight</b>	< 200 gms without proximity card
<b>Cooler</b>	Joule-Thomson (JT)
<b>Cool Down time</b>	$\leq 10$ sec at 25 °C < 20 sec at 71°C
<b>Operating temperature</b>	-30°C to 71°C
<b>Storage temperature</b>	-40°C to 71°C

**Table 4. Specification of the MWIR 1280 HD IDDCA**

<b>IDDCA Parameters</b>	<b>Value</b>
<b>Detector Type</b>	InSb Photovoltaic Array
<b>Spectral response</b>	3.6 to 4.9 $\mu\text{m}$
<b>F/#</b>	3.6 or 4
<b>HD Array Format</b>	1280 x 1024
<b>Pitch</b>	10 $\mu\text{m}$
<b>ROIC Digital Resolution</b>	$\geq 13$ bits
<b>Read out Architecture</b>	Si-CMOS, 0.18 $\mu\text{m}$
<b>Integration mode</b>	Integrate-while-read, integrate-then-read
<b>NETD</b>	$\leq 25$ mK at 70% well fill of 2Me- capacitor
<b>Residual Non Uniformity</b>	< 0.07% STD/DR at 10-80% well fill capacity
<b>Operability</b>	> 99.5%
<b>Integration time</b>	0.5 $\mu\text{sec}$ to 100msec
<b>Proximity electronics board</b>	Compact board with Digital Camera Link interface SW versions: Proxy (raw data) / Video Engine
<b>Power Supply for proximity electronics board</b>	5V $\pm 10\%$

<b>Frame rate (full format)</b>	Proxy version: < 180Hz; Video Engine: < 60Hz
<b>Weight</b>	< 750gms
<b>Mechanical Interface</b>	Cooler interface Standard ruggedized Dewar Standard 100 Pin electrical board connector
<b>Cooler</b>	0.5 Watt High reliability Integral sterling micro cooler
<b>Cool Down time</b>	≤ 8 minutes for ambient of 23°C
<b>Cooler Power consumption</b>	≤ 10 Watt for Steady-state at ambient of 23°C
<b>Operating temperature</b>	-30°C to 71°C
<b>Cooler MTTF</b>	> 10,000 hours

**3.8** The EFF will ensure that the facility established by the IRFAB is scalable to higher format detectors at a later stage. Cooler variants and their integration are also to be considered and included in the proposal.

**3.9** The details of items /services required in the proposal are given below:

- Delivery of a Technical Data Package (TDP) of the licensed items.
- Delivery of Infrastructure plan and Implantation guide of production facilities, containing recommendations for installation and operations of the specific equipment.
- Manufacturing of specific tooling for production of equipment and subassemblies at the specified production rate.
- Training of Indian personnel abroad to facilitate right use of processes and equipment for introduction of variants.
- Spares, additional training requirements Process implementation and validation at Indian facilities by proposer.
- Technical Assistance to installation and industrial qualification.

**3.10 Delivery Schedule:** Details of expected delivery schedules for deliverables and services would be as given above from the effective date of contract as per Table 1 of this EOI.

## 4. Procedure for Response:

**4.1** The technical Proposal should be submitted to the undersigned at the following address:

**Director  
Instruments Research Development Establishment  
Ministry of Defence  
Raipur Road, Dehradun-248008  
Uttarakhand, India  
POC: Dr. Sudhir Khare, Sc 'G' (E-mail: [sudhirkhare.irde@gov.in](mailto:sudhirkhare.irde@gov.in);  
Ph: +91-135-2782444)**

**4.2** Any queries / clarifications sought are to be sent to this office within one week of issue of this EOI.

**4.3** The EFF may be invited for technical presentation and clarification. A notice of at least 15 days will be given for this purpose. Necessary details of the personnel to make presentation / interactions, may immediately be sent to Director, Instruments Research Development Establishment, Raipur Road, Dehradun-248008, Uttarakhand, India, to facilitate obtaining of security clearance.

**4.4** Director, IRDE will not be responsible for postal delays or server down time. Hence, it is suggested to prepare your response well in advance in order to avoid rejection due to late submission.

## 5. Instructions/Notes:

### 5.1 General

- a) All copies of documents submitted along with EOI should be clear, legible and self-certified by the authorized representative of the applicant.
- b) Lab/Estt reserves the right to physically check the original documents / certificates, the copies of which are submitted along with the EOI
- c) The applicant language of Communication for all activities connected to this EOI and tasks thereof shall be in English.
- d) Lab/Estt reserves the right to cancel this process of EOI at any time without any financial or otherwise liability and without assigning any reasons thereof.
- e) The applicant must give a declaration stating that under the existing regulations of their country, there is no bar or restrictions on the Applicant for participation in this EOI.

- f) The applicant may kindly note that shortlisted firm will be required to sign a Non-Disclosure Agreement (NDA) at a later date as required by Lab/Estt.
- g) The applicants may note that mere meeting of the minimum criteria does not entitle any company/firm/organization the right for appointment.
- h) Lab/Estt will not be responsible/ liable to any party in any way for costs associated in preparation & submission of EOI.
- i) Lab/Estt is also not obliged to share clarification related questions with other respondents than the one who seeks clarification
- j) Lab/Estt reserves the right to accept or reject any EOI proposal without signing any reasons whatsoever.
- k) This Labs/Estt reserves the right to withdraw the EOI and change or vary any part thereof or foreclose the EOI at any stage.

**5.2 Submission of Information/Documents:** Information should be submitted in the formats specified in this document. The pre-qualification documents shall be submitted as follows:

- a) Two (hard) copies with all supporting documents.
- b) One digital copy of the entire documentation.
- c) With a covering letter duly signed by the Authorized Representative of the company with the company's seal. Document in support of authorization granted to the authorized representative to be submitted.

**5.3:** Failure by the applicant to provide essential information/documents for evaluating the applicant's qualifications, or to provide timely clarification or substantiation of the supplied information, may result in the disqualification of the applicant.



## 6. Evaluation Criteria

The broad guidelines for evaluation of Proposals will be as follows:

In respect of this proposed proposal, the technical Proposal forwarded by the proposer will be evaluated with reference to the technical characteristics of the ToT as mentioned in the EOI. The compliance of Technical Proposals would be determined on the basis of the parameters specified in the EOI.

### 6.1 Compliance by firm, to be provided in their proposal:

The firm has to provide a complete compliance as per Table 5 of this document. It is requested that line entry wise compliance and the details regarding the manner and extend to which compliance is provided is to be brought out clearly in the proposal by the firm, for the following:

- a. Willingness to offer full/ in depth ToT.
- b. Superiority of material/ technology proposed with respect to (i) Stability of material, (ii) Yield of product, (iii) Cost of product & (iv) Ease of ToT.
- c. Government clearance availability for the ToT proposed.
- d. Willingness to participate in site selection & mapping.
- e. Calculation & providing of electrical, water and space requirements.
- f. Providing of building plan for supporting infrastructure  
(water treatment, power treatment, captive power plant, air-conditioning Plants, clean room maintenance, chemicals & gases storage and routing, safety mechanisms etc)
- g. Provision of specifications, preferred sources, and implementation details for water treatment, power treatment, captive power plant, air-conditioning plants, clean room maintenance, chemicals & gases storage and routing, safety mechanisms etc.
- h. Providing of building plan for IDDCA fabrication, integration, testing maintenance and storage infrastructure.
- i. Providing of Fabrication line machinery, preferred sources, installation details, operational requirements, software with source / pseudo codes, complete process documentation etc.
- j. Providing of test line machinery, preferred sources, installation details, operational requirements, software with source / pseudo codes, complete test procedure

documentation etc.

- k. Providing of raw and base materials with required purity levels, their preferred sources, ensured availability etc.
- l. Providing of Operator requirements, operator training with respect to various phases, their certification for all operations including support operations.
- m. Providing of quality control documents, overseeing and ensuring of quality product output (IDDCA).
- n. Support at fully knocked down, semi-knocked down and In-depth manufacturing stages and providing of required quantity material.
- o. Providing of specific confirmation & means for ToT for in-depth manufacturing of Focal Plane Arrays & dewars and satisfactory & proven arrangements for manufacturing of Cooler assemblies and satisfactory arrangement for realizing Read only integrated circuits (ROIC) in India.
- p. Providing of details for integration of FPA detector, dewar, ROIC, Cooler, proximity electronics etc.
- q. Provision of details regarding the yield at various stages.
- r. Provision of outline details for upgradability and scalability aspects for IDDCA.
- s. Provision of comparison details regarding currency of the technology offered, currency of the processes offered, their advantages and superiority features.
- t. Provision for technical support / consultancy and commitment for smooth functioning of the Fab facility for 10 years after warranty.
- u. Provision of commitment to offer upgrades as and when implemented at Supplier's facility.
- v. Provision for smooth, free information exchange and for exchange of technical personnel as required.
- w. Provision of line entry wise compliance to the technical specifications of EOI.
- x. Provision of full commitment to ensure the realization of Fabrication facility in time with quality output.

## **6.2. Evaluation and Acceptance Process.**

**Technical Assessment Committee (TAC):** The technical proposals forwarded by the firm will be evaluated by a TAC. TAC will examine the compliance of the offers from foreign source with the minimum requirements set forth in this document. The advantages of the technology offered, its level & current standing and the depth of ToT offered will be examined by TAC. Future augmentation, scalability,

upgradeability, ease of ToT absorption, language for communication, standards followed will also be examined by TAC. TAC will further examine the extent of variations / differences, if any, in the technical characteristics of the equipment offered by various foreign source with reference to the requirements and prepare a “Compliance Statement”. Technical and process documentation contents, quality procedures, product quality, yield etc will also be considered by TAC.

TAC, if so desires, may also visit EFF to assess their capability to get involved in the ToT process.

The recommendations of the TAC will be final and binding.

### **6.3 Other Specific Requirements from EFF**

#### **6.3.1 Specific Experience**

The EFF has to provide the details of Manpower, infrastructure and experience of fabricating the above-mentioned detectors by the firm. The EFF should possess experience in executing similar activity or demonstrate proven capability in carrying out this work, as mentioned under section “Technical Specifications.

Furthermore, the EFF can specify if they have executed any ToT/contracts of a similar nature with any other establishments.

Additionally, the EFF can bring forth any other relevant points or qualifications they deem necessary.

#### **6.3.2 Willingness/Undertaking Format**

(To be enclosed as part of the Expression of Interest proposal on the letterhead of the company)

Date:

To:

The Director

Instruments R&D Establishment (IRDE)

Raipur Road

Dehradun, Uttarakhand

India – 248008

Reference: Expression of Interest No. ----- dated -----  
2024

Dear Sir,

We hereby confirm that we have confirmed the Lab/Estt EOI Document dated -----  
-----

- i. That we agree to all terms and conditions of the EOI document.
- ii. ---
- iii. ---

Yours faithfully,

[Applicant Head Signature]

### **6.3.3 Summary Sheet: Organization Structure / Legal Status / Current Contract Commitments / Works in Progress**

The Applicant firm shall submit with EOI the following organization Structure, Legal status of the applicant, Place of registration, Principal place of business, Brief on business activities undertaken by the applicant, Ownership details, Shareholder pattern, Details of manpower, including discipline and geographical location wise permanent manpower strength for providing support in execution of proposed project, Names and addresses of the present Directors and Senior management and such other relevant details as the Applicant may like to share in the following format.

- a. Corporate -----
- b. Corporate Structure -----
- c. Applicant's Technical Capacity (State total number of professional staff indicating each individual's experience/qualification):  
-----
- d. Applicant's facilities and experience  
-----

Name & Signature of authorized representative of the Applicant:

Name and Stamp of Company:

Date:

### 6.3.4 Contract/ToT Details

Applicant should provide information on their work performed recently in last five years and also the current commitments on all contracts/ToT that have been awarded, or for which a letter of intent or acceptance has been received, or for contracts approaching completion, but for which an unqualified, full completion certificate has yet to be issued in the following format.

Year	Project Name/Client	Contract No. & Date	Value of Contract	Stipulated Period of Completion	Actual Date of Completion

### 6.3.5 Financial Capability

The Applicant shall furnish complete audited annual financial year statements for the last 3 years, including balance sheets, profit & loss account statements, audit reports, and all other schedules of the immediate preceding financial year, self-certification of not being under liquidation, court receivership, or similar proceedings, for any of the past 3 financial years. The company should be a positive net worth firm for the last three years. In support of this claim, the prospective EFF needs to submit copies of the balance sheet, profit & loss account duly audited, pertaining to the previous 3 years.

Applicant should provide financial information to demonstrate the firm's capability for assessment of the financial status by Lab/Estt. If necessary, use separate sheets to provide complete banker information.

Applicant should have a positive net worth.

<b>Banker</b>	<b>Name of the Banker (s)</b>
	<b>Address of the Banker(s)</b>

	<b>Telephone</b>	<b>Contact name and title of Senior Bank official</b>
	<b>Fax</b>	<b>E-Mail</b>

### 6.3.6 Litigation/Arbitration History

Applicant should provide information on the history of court litigation or arbitration proceedings resulting from contracts executed in the last 5 years or currently under execution. The information should also be provided for any significant subcontractors.

<b>Year</b>	<b>Decree/Award for or against Applicant</b>	<b>Name of Client, Cause of Litigation, and Matter in Dispute</b>	<b>Disputed Amount (Current Value)</b>

## 7. Compliance Table

The firm has to provide the Compliance to all EOI Clauses as per following table:

**Table 5: Compliance Table**

<b>Sr. No.</b>	<b>Activity</b>	<b>Remark</b>	<b>Reasons/ Justification for non-compliance/ Suggestions (if any)</b>
<b>1.</b>	Full ToT as specified in section 3 of this document	<b>Yes/No</b>	
<b>2.</b>	Blue print for basic infrastructure	<b>Yes/No</b>	
<b>3.</b>	Equipment Identification for various processing, assembly and characterization of IDDCA components at various phases	<b>Yes/No</b>	
<b>4.</b>	Raw Material: specifications, source, availability and qualification testing	<b>Yes/No</b>	
<b>5.</b>	Manpower Training	<b>Yes/No</b>	
<b>6.</b>	Instruments for Test and Evaluation at various stages	<b>Yes/No</b>	

7.	Quality control at each stage	Yes/No	
8.	Process documentation and software	Yes/No	
9.	Delivery schedule for documentation and fabrication & testing of IDDCA at each stage	Yes/No	
10.	Infrastructure schedule for establishment and training	Yes/No	
11.	Warranty of goods supplied by EFF	Yes/No	
12.	Documentation for each stage of the deliverables, complete know how documentation which should include process details, tooling, testing, qualification criteria, ATP, precautionary measures, handling and storage of detector, refurbishment of cooler etc.	Yes/No	
13.	Product Support upto 10 years after completion of ToT	Yes/No	
14.	Govt Regulations: No Government restrictions or limitations in the country of the supplier or countries from which sub-components are being procured	Yes/No	
15.	Intellectual Property Rights	Yes/No	
16.	IR detector components: a) FPA b) ROIC c) Cold finger & Dewar design as per required f# d) Proximity Electronics e) Sterling/JT cooler with integration f) Customization in pixel pitch & array format g) Facility can be extended for T2SL & XBn/ HFM detectors	Yes/No	
17.	Processes a) PV array fabrication Technology b) Device mounting on dewar and assembly c) Dewar envelope design, manufacturing and assembly	Yes/No	

	d) Hybridization and packaging of FPA & ROIC (flip chip bonding) e) Cryo Cooler assembly & Integration f) Infrared Window Design, fabrication and Assembly g) Cold shield Design, Assembly & Ceramic feed through assembly & testing h) Cold finger & getter design, assembly, testing and integration i) FPA & Dewar Integration j) Silicon readout technology k) Performance evaluation and Environmental Testing l) Quality Control m) Manpower Training		
<b>18.</b>	Blue prints of basic infrastructure should cover a) Working area for fabrication, assembly, characterization and qualification of complete IDDCA assembly. b) Clean room requirements c) Power & water supply requirements	<b>Yes/No</b>	
<b>19.</b>	Setting up of facilities, infrastructure and machinery a) Sourcing of raw material for detector & characterization. b) PV arrays manufacturing. c) ROIC design & manufacturing/purchasing. The Read out (ROIC) wafer should be supplied by EFF based on their verified design. d) Hybridization of PV array & ROIC. e) Dewar manufacturing & assembly. f) FPA & dewar Integration and qualification.	<b>Yes/No</b>	



	g) Integrated cooler manufacturing and cooler controller & qualification. h) Cooler dewar integration. i) Proximity electronics & qualification. j) EO testing of IDDCA. k) Samples qualification for environmental specs & EMI/EMC.		
<b>20.</b>	Compliance to the Detector Specifications as mentioned under section 3.7 Table 2, Table 3 & Table 4.	<b>Yes/No</b>	
<b>21.</b>	Techniques for change of F# wherever required, should also be part of ToT.	<b>Yes/No</b>	
<b>22.</b>	The EFF should ensure that the facility established by the IRFAB is scalable to higher format detectors at a later stage.	<b>Yes/No</b>	
<b>23.</b>	The details of items /services required a) Delivery of a Technical Data Package (TDP) of the licensed items. b) Delivery of Infrastructure plan and Implantation guide of production facilities, containing recommendations for installation and operations of the specific equipment. c) Manufacturing of specific tooling for production of equipment and subassemblies at the specified production rate. d) Training of Indian personnel at EFF to facilitate right use of processes and equipment. e) Training of Indian personnel at IRFAB facility to facilitate right use of processes and equipment. f) Process implementation and validation at Indian facilities by proposer. g) Technical Assistance to installation and industrial qualification.	<b>Yes/No</b>	
<b>24.</b>	Name/Type of item/services/ description of stores	<b>Yes/No</b>	

	<p>during the phase of Fab facility establishment:</p> <p>a. Setting up production facilities including monitoring/ support by proposer for production of IDDCA.</p> <p>b. Setting up of infrastructure at user's premises.</p> <p>d. Per production line capacity should be specified along with expected yield, so that the buyer can decide on the number of production lines that are required to meet the annual requirements.</p> <p>e. Integration, storage and testing facility requirements as per yield from production line is also to be clearly brought out. This shall include spares, documents, training, commissioning etc.,</p> <p>f. The technical Proposal should contain Statement of Work (SOW) to be submitted by the proposer in response to Scope of work specified.</p> <p>g. Complete Transfer of technology up to in depth manufacturing of digital IDDCA for all its components is a must along with algorithms &amp; source code, production tools and support for setting up production facility.</p>		
<b>25.</b>	<p>Name/Type of item/services/ description of stores during production phase / Post-Fab establishment &amp; support phase:</p> <p>a. Ensuring of quality of the product.</p> <p>b. Ensuring the committed yield of the product.</p> <p>c. Establishment of maintenance facilities for the product, including warranty support.</p> <p>d. Support for scaling up.</p> <p>e. Support for up-gradation of facilities.</p> <p>f. support for problems encountered in smooth functioning of the Fab facility, if any.</p> <p>g. Support for introduction of variants.</p> <p>h. Spares, additional training requirements, if any.</p>	<b>Yes/No</b>	

	i. Support for obsolescence management		
<b>26.</b>	Export license	<b>Yes/No</b>	
<b>27.</b>	Inspection details	<b>Yes/No</b>	
<b>28.</b>	Product support for 10 years	<b>Yes/No</b>	
<b>29.</b>	Engineering Support Package (ESP)	<b>Yes/No</b>	
<b>30.</b>	Compliance for items listed in section 6.1 of this document	<b>Yes/No</b>	