KERALA STATE ELECTRONIC DEVELOPMENT

CORPORATION LIMITED

Keltron House, Vellayambalam, Thiruvananthapuram- 695033

Phone: 0471-4094444, 2724444, Fax: 0471-2724545 Email: marketing@keltron.org



Invitation

Expression of Interest

for

Establishing a Semiconductor Manufacturing Line

EOI No: KSEDC/CM/GEN/EOI/2024-25/001, Dated: 02/09/2024

Important deadline for bidders

EOI Submission: 15/10/2024 at 5:00PM

Keltron House, Vellayambalam

Trivandrum, Kerala, India - 695 033

Phone: +91-471 - 2724444, 4094444

E-mail: marketing@keltron.org

PART A

Important Dates & Time of the EOI

EOI No:	https://etenders.kerala.gov.in/
KSEDC/CM/GEN/EOI/2024-25/001	
EOI Document available on website.	06.09.2024 at 10:00 AM
EOI submission Start Date and Time (online)	07.09.2024 at 10:00 AM
EOI submission end Date and Time (online)	15.10.2024 at 10:00 AM
Pre Bid Meeting	27.09.2024 at 11.00 AM
Date & Time of opening of EOI (Technical	16.10.2024 at 10:00 AM
Bid) (online)	
Technical Evaluation	The date will be communicated after Opening of
	Pre-Qualification and Technical Bids

NOTE:-

Internet Explorer 8 to 9 and Mozilla Firefox version 45 to 49 only supports Kerala e-tender site. The bidders/ implementation partners can install any of these browsers and JRE to support the e-tendering process. If any further help is required, you are requested to contact the following Email id or Phone number.

Phone number - 0471-2577388

Email - etendershelp@kerala.gov.in

Definitions:

- KSEDC & KELTRON Same entity
- **Si**: Silicon Technology
- SiC: Silicon Carbide Technology
- GaN: Gallium Nitride Technology
- **Application**: Shall mean the documents submitted by the Applicant in response to this EOI.
- **Applicant(s)**: Shall be an individual/partnership firm/company/association of persons/JV company/partnership or consortium formed by the applicant for the purpose of implementation of the Joint Venture Project.
- Client: Shall mean Kerala State Electronic Development Corporation (KSEDC/KELTRON) represented by its Managing Director, which expression, unless repugnant to the context or meaning thereof, deemed to mean and include its successors and assignees.
- **LOA** (**Letter of Award**): Shall mean the letter issued by KELTRON to the successful bidder inviting them to sign the Contract.
- **Bid Evaluation Committee** (**BEC**): Shall mean a team of technical/financial/legal or any other experts constituted by KELTRON for evaluation of documents submitted by the applicants in response to the EOI.
- **JV**: Means the proposed Joint Venture with KELTRON.
- **GoK**: Government of Kerala.
- **GoI**: Government of India.
- Meity: Ministry of Electronics and information Technology

Expression of Interest (EOI) for Establishing a Semiconductor Manufacturing Line

I. Introduction

This Expression of Interest (EOI) invites responses from reputed organizations interested in forming a Joint Venture (JV) with Kerala State Electronic Development Corporation Ltd (KELTRON) for establishing and running a semiconductor manufacturing line in Outsourced Semiconductor Assembly and Testing (OSAT) / Assembly Testing Marking and Packaging (ATMP) mode. We are seeking partners who meet the requirements outlined in this EOI and are willing to Transfer manufacturing knowhow on a long-term basis. The objective is to enable KELTRON to transform Kerala into a manufacturing hub for semiconductors, especially power devices like IGBT, MOSFET, and Power Diodes using Si/SiC/GaN technology, starting from the wafer level.

II. About Kerala State Electronic Development Corporation Ltd (KELTRON):

Kerala State Electronic Development Corporation Ltd (KSEDC), popularly known as KELTRON, was established in 1972. Its primary vision is to become a brand leader in power Electronic products, System Integration, IT Solutions, Defence Electronics and Traffic systems. KELTRON is a diverse organization manufacturing a wide range of products, from discrete electronic components to Sub-systems and Systems in the field of Power Electronics, Electronics, Signal processing, IT and AI.

The production of these products takes place in six production centers and two subsidiary companies located across different regions of Kerala. Sales are facilitated through offices in Mumbai, Delhi, Kolkata, Chennai, Bangalore, Ahmedabad, and Trivandrum.

III. About KELTRON's Experience in Semiconductor Devices:

KELTRON has a robust track record in Power Transistor and Rectifier manufacturing. Further Keltron today is a lead manufacturer of Electrolytic capacitors having 35% of India's market share and it is also manufacturing Super capacitors. Leveraging its experience in the production of power devices and analysing the market demand for these devices in the Indian and global markets, KELTRON aims to commence the manufacturing of semiconductor devices, especially power devices such as IGBT, MOSFET, and Power Diodes (both discrete and modules) within its premises.

IV. Scope of EOI:

For the manufacturing of semiconductor devices in OSAT/ATMP mode, specifically Power Diode, IGBT, and MOSFET, using current technologies (Si/SiC/GaN), KELTRON is actively seeking a Joint Venture partner for providing technology along with investment from globally reputed and reliable organizations/technology providers. The objective is to establish a manufacturing facility at the KELTRON provided premises. The transfer of relevant manufacturing knowhow and capital investment is expected from the partner.

The Partner should give assistance in preparing feasibility study to plan a viable Power Diodes, IGBT & MOSFET encapsulation facility by way of providing appropriate inputs for identifying, sizing & and selection of equipment required for manufacturing, service plants, tools jigs & fixtures and their layout, foundations etc.

An Outsourced Semiconductor Assembly and Testing (OSAT/ATMP) model is envisioned, involving the procurement of prefabricated wafers from various sources. These wafers will then be packaged in different formats according to market demand. The production process will progress through the stages of Assembly, Testing, Marking, and Packaging (ATMP).

V. Joint Venture Partnership Guidelines:

The prospective Joint Venture (JV) partner is expected to comply with the following conditions to meet the outlined requirements:

- a. Establish a manufacturing line for the production of semiconductor devices, specifically IGBT, MOSFET, and Power Diodes, utilizing the proposed technology.
- b. JV partner needs to have experience in the business and have access to wafers required for packaging power devices in the ATMP Unit.
- c. For joint venture, land shall be provided by KELTRON for investment in establishing the semiconductor manufacturing plant. The stake holding pattern of the project for the JV partner can be upto a maximum 76%.
- d. The proposed model envisages Keltron's involvement by providing land with compound wall, Building, Water and Electricity and preliminary infrastructure, the cost of which will be treated as equity contribution from Keltron, whereas the JV partner will be responsible for meeting all expenses for providing manufacturing infrastructure, Plant & machinery,

- technology, Project funds, working capital, etc for establishing, running and the operation of the new entity.
- e. Investments for machinery, and other related infrastructure shall be the responsibility of the JV partner.
- f. KELTRON shall provide necessary support for obtaining various approvals from the Government for the implementation of the project.
- g. The JV partner shall bring in the necessary finance and technology for the plant/machinery and ensure the quality of the products or services.
- h. The Keltron and the JV partner will be jointly responsible for marketing the manufactured products. Given the advanced and mature state of the global market compared to the Indian market, the focus should be on exporting the devices packaged in India. The partner must have access to the export market, and products need to be marketed globally.
- i. Bidding through consortium is permitted, and the maximum members for consortium bidding shall be limited to three.
- j. The lock-in period of the equity contribution by the JV partner shall be 5 years. The JV partner is expected to establish and run the production line for a minimum period of five years.

KELTRON shall provide all the necessary support to the prospective JV partners to ensure timely and smooth project implementation and conduct of the business without any hindrance.

The JV partner is expected to establish the manufacturing line in adherence to the outlined process steps and transfer manufacturing know-how to KELTRON, progressively enabling independent manufacturing with after-sales support.

Sealed Expressions of Interest (EOI) are invited from globally reputed OEMs/technology providers that meet the eligibility criteria outlined in point no: **VIII**.

VI. Business Model:

KELTRON aims to enter into a long-term Manufacturing knowhow collaboration with the selected partner, meeting the pre-qualification requirements specified in Annexure – 1. This collaboration will empower KELTRON to develop in-house capabilities and establish state-of-the-art manufacturing and testing facilities for power devices, ranging from the wafer stage (IGBT Chip on Direct Copper Bonded) to IGBT, MOSFET, and Power Diodes encapsulation, utilizing advanced technology.

Product Scope: The manufacturing knowhow transfer should cover a product range comprising Power Diodes, IGBT & MOSFET modules with insulated

bases and built-in Fly Wheel Diodes (FWD). Detailed specifications of the proposed technology need to be submitted in the format as per Annexure III.

VII. Scope of the Collaboration/Partnership:

The indicative scope for transferring the manufacturing knowhow is provided in Annexure-2. The collaboration aims to equip KELTRON with Manufacturing know-how related to manufacturing facilities and equipment, testers, service facilities, process technology, process control, vendor details, etc. The scope of know-how and information expected to be functional is detailed in Annexure-III.of this EOI document.

The facility may be set up with an indicative annual installed capacity of 50k-100k Power Diodes, IGBT & MOSFET modules with IRR status. The scope of this partnership also includes training KELTRON personnel at manufacturing facilities of the prospective partner.

As per GOI guidelines, OSAT manufacturing comes under the MeitY electronics manufacturing cluster (EMC 2.0) incentive scheme. Apart from this GoK will provide the necessary assistance as per industry policy. For details the following link can be followed.

https://industry.kerala.gov.in/images/pdf/2023/IND_POLICY_ENG.pdf

The scheme can be enhanced as per the project demands.

VIII. Prequalification Criteria:

To participate in the EOI, the bidder must meet the following eligibility criteria. Any deviation may result in disqualification:

S 1 No	Qualification Criteria	Documents Required
1	The bidder can be an Indian Company or a reputed Multinational Company engaged in the manufacturing and supply of semiconductor devices.	 Copy of Company Registration Certificate. Copy of PAN Card (as applicable) Copy of GST Certificate (as applicable)

2	The firm must have a minimum cumulative	Copies of the Audited	
	turnover of Rs. 300 Crores in the last three	Annual Reports containing	
	years (2021-2022, 2022-2023, and 2023-	the Balance Sheets and	
	2024).	Profit and Loss account	
		for the last 3 Financial	
		years (2021-22, 2022-23,	
		2023-24). The Turnover	
		details should be attested	
		by the Auditor	
3	As on the date of submission of bid, the	Annexure-7	
	bidder should not be blacklisted		
	/debarred/terminated by any Central / State		
	Government Organization/ Department/ PSU		
	or any other reputed organization in India.		
4	The organization must be an ISO 9000 -	Copies of valid relevant	
	certified company and possess quality	certificates to be enclosed	
	standards for the devices.		
5	Declaration letter in the bidders Letter Head	Annexure-4	
6	Company Profile	Annexure-5	
7	Power of Attorney to represent the bidder	Annexure-6	

IX. Technical Criteria:

Sl	Criteria	Documents Required
No		
1	The production line proposed should fulfil the manufacturing requirements for the specified products with the technical specifications mentioned.	

2	The firm must have experience in the installation, commissioning, warranty, and AMC of manufacturing lines for the proposed technology for at least 5 years in reputed organizations.	from end customers for the
3	Agreement for Transfer of Knowhow to KELTRON on mutually agreeable terms and conditions.	
4	Technology Scope and Compliance	Annexure-3

X. Responsibility Matrix

A broad division of responsibilities of the project between Keltron and the JV partner is depicted below.

Sl no	Activity	Responsibility	Remarks
1	Providing Required Land	Keltron	
2	Compound Wall and gate	Keltron	
3	Getting Required	Keltron/Partner	
	Government Clearance		
4	Construction of Building	Keltron	
5	Supply & Installation of required Machinery including infrastructure modifications at the building	JV Partner	
6	Identification and sourcing of required raw materials and consumables	JV Partner	
7	Project Finance	JV partner	
8	Identification of required	JV Partner	

	technology		
9	Running & maintenance of	JV partner	
	the manufacturing line		
10	Marketing the	JV partner	
	manufactured products		
11	Imparting training to the	JV partner	
	employees		
12	Environment for the smooth	Keltron	
	running of plant		

XI. Submission of EOI:

Interested parties are requested to submit their EOI online through Kerala government etenders portal: https://etenders.kerala.gov.in/

XII. Disclaimer:

This EOI is not an agreement and is neither an offer nor an invitation by KELTRON to the prospective applicant or any other person. The purpose of this EOI is to provide information that may be useful for the prospective applicants, who are required to make their own inquiries and satisfy themselves regarding the completeness and reliability of the information, and not to rely solely on the information in this document.

Neither KELTRON nor their employees, consultants, advisors, or agencies make any representation or warranty as to the accuracy, adequacy, correctness, completeness, or reliability of the EOI and any assessment, assumption, statement, nor information contained therein or deemed to form part of this EOI. Each prospective applicant should conduct its own investigations and analysis and check the accuracy, adequacy, correctness, completeness, or reliability of the information in this EOI document and obtain independent advice from appropriate sources before submission of the application against this EOI. KELTRON may, in its absolute discretion but without being under any obligation to do so, update, amend, or supplement the information, assessment, or assumptions contained in this EOI.

Neither KELTRON nor their employees, consultants, advisors, or agencies will have any liability to any prospective applicant or any other person under the law of contract for any loss, expense, or damage which may arise from or be incurred or suffered in connection with anything contained in this EOI document.

KELTRON reserves the right to reject any or all of the applications submitted in response to this EOI document at any stage without assigning any reason whatsoever. KELTRON also reserves the right to hold, withdraw, or cancel the process at any stage under intimation to the applicants who submit the application against this EOI.

KELTRON reserves the right to modify, amend, or add to any or all of the provisions of this EOI document or cancel the present invitation and call for fresh invitations. Neither KELTRON nor their employees, consultants, advisors, or agencies will have any liability in case of non-receipt of any correspondence from them to the applicants due to postal delays. The applicable laws for the purpose are the laws of INDIA. Courts of Trivandrum will have jurisdiction concerning or arising out of this EOI document.

PART – B

TO BE FILLED IN BY THE RESPECTIVE FIRM/COMPANY

Sl No	Description		
	Whether prospective collaborator is an original manufacturer of Power		
	Diodes, IGBT & MOSFET modules for past 10 years through encapsulation		
1	of Power Devices chips. Kindly indicate the no of years of experience		
	Whether prospective collaborator has manufactured cumulatively 50,000 or		
	above nos of Power Devices/ modules of various ratings in the last 5 years.		
	Kindly indicate the nos. of modules of various ratings supplied by		
2	prospective collaborator.		
	Whether prospective collaborator has in house Power Devices (Power		
	Diodes, IGBT &MOSFET) encapsulation facility from chip to module. If		
3	Yes, provide broad details thereof.		
	Details of applications for which collaborator has supplied Power Devices to		
4	at least 1 country outside its country of origin. If yes, provide details thereof.		
	Details of manufacturing lines established for the manufacturing power		
5	devices with the proposed technology for the last 5 years.		
	Whether the firm/organization is certified for ISO 9000 and other QMS		
6	standard. (Details can be attached)		

Indicative Scope of Knowhow Transfer

	Establishing manufacturing line with all test equipment for the manufacturing of		
	power devices from prefabricated wafer.		
a	Licensing & Transfer State -of- the art technology relating to manufacture,		
	assembly, quality control, quality assurance, testing of Power Diodes, IGBT&		
	MOSFET modules		
b	Information to enable sourcing by KELTRON of all types substrate/wafers, required		
	to be used in Power Diodes, IGBT& MOSFET module encapsulation, as per the		
	present design of the OEM.		
c	Information to enable KELTRON to source/procure all the items, which the OEM		
	sources from outside (not manufactured by OEM) as well as those manufactured in		
	house for use in IGBT, MOSFET & Other Power devices encapsulation facilities.		
d	Improvements/modifications/developments/up-gradations carried out by the OEM		
	over the duration of the manufacturing knowhow transfer agreement for taking care		
	of new market requirements and obsolescence of components used in the system.		
e	Assistance in establishing manufacturing & test facilities, production of prototype at		
	new facility and its testing, as well as approval of prototype / type testing. For this		
	purpose, collaborator shall depute its experts for agreed number of man-days as		
	required by KELTRON.		
f	Training of KELTRON personnel at KELTRON & prospective collaborator's		
	facilities and any services required by KELTRON.		

SIGNATURE

Format For Furnishing Compliance

Prospective collaborator shall indicate its response on right side column.

Sl no	Description	Response/Counter proposal (if any)
1.0	TECHNOLOGY SCOPE Transfer manufacturing Technology for Power Devices encapsulation from chip on direct copper bonded	
	(substrate) to module.	
2.0	RANGE OF DEVICES TO BE HANDLED a. IGBT	
	Wafer Size	
	Die Size	
	Dies per Wafer	
	IGBT	
	No of Bonding wires	
	Lead frame Design	
	Wafer per month	
	Wafer per day	
	No of Dies or packages per day	
	Power capacity	
	b. MOSFET	
	Wafer Size	
	Die Size	
	Dies per Wafer	
	MOSFETs	
	No of Bonding wires	
	Lead frame Design	
	Power Capacity	
	Wafer per month	
	Wafer per day	
	No of Dies or packages per day	
	c. Power Diodes	
	Wafer Size	
	Die Size	
	Dies per Wafer	
	MOSFETs	
	No of Bonding wires	
	Lead frame Design	
	Power Capacity	
	Wafer per month	
	Wafer per day	
	No of Dies or packages per day	
	Working hours or (24x7 operations)	

3.0		
3.1	Information Coope to be severed under Manufacturing	
3.1	Information Scope to be covered under Manufacturing	
	knowhow Transfer	
	Note: For the following clauses 3.1 to 3.7 Acceptance	
	(Yes/No) or counter proposal (if NO) shall be expressed	
3.2	Furnishing information regarding Bill of Materials	
	(BOM) for all types of devices covered under product	
	range/scope.	
3.3	Furnishing Information regarding recommended vendor	
	list for all the individual components of devices proposed	
3.4	Furnishing process technology information including	
	manufacturing instructions, routine/Type test as per	
	Quality plan protocols.	
3.5	Furnishing technical information and recommended	
	vendor list for the manufacturing and testing equipment's	
	& tools, Jigs & Fixtures and accessories.	
3.6	Furnishing technical information on service / utility	
	facilities.	
3.7	Furnishing information related to improvements,	
	modifications and additions in product variants and	
	processing technology during the terms of agreement.	
4.0	Furnishing information related applications/interfacing of	
	power devices in various power electronic circuits	
	including failure analysis methods.	
4.1	Training for mutually agreed KELTRON Engineers, man-	
1.1	days.	
	Scope of the training shall include Engineering (Process	
	& Application), manufacturing, Quality assurance and	
	testing of the product.	
4.1.1	Deputation of experts to KELTRON works for the	
7.1.1	following technical support from technology partner.	
4.1.2	Technical support to KELTRON during Installation &	
7.1.2	Commissioning of manufacturing & Testing facilities.	
4.1.3		
4.1.3		
	demonstration of production runs through the complete	
	manufacturing cycle (From input materials to finished	
	product IGBT & MOSFET module) using manufacturing	
111	facilities commissioned at KELTRON.	
4.1.4	Technical Support to KELTRON by way of	
	demonstration of Routine Tests (As per relevant	
	international standard / test protocol) of power devices	
4.2	using the test facilities commissioned at KELTRON.	
4.2	Technical support to KELTRON on Type Test (As per	
	relevant international standard / test protocol) of power	
	devices manufactured at KELTRON, either at	
	collaborator's facilities or any other testing labs.	
4.3	Technical support to KELTRON for measuring	
	KELTRON modules at Collaborator's works for the	
	purpose of verification & validation of KELTRON	
	measurements (Routine tests).	

4.4	Technical support/ guidance to KELTRON on trouble	
	shooting, process control, etc on any manufacturing	
	related problems encountered during the period of	
	collaboration agreement.	
5.0	Whether prospective collaborator owns the IPRs for	
	Power device encapsulation technology being proposed	
	for transfer under the TCA, or have unencumbered right	
	from the owner of IPRs to sub-license technology	

SIGNATURE

[COVERING LETTER – ON BIDDER'S LETTERHEAD]

Ref:		Date:
To, The Managing Direct Keltron House, Vella Trivandrum, Kerala,	ayambalam	
Sir,		
I/We have carefully g	gone through the EOI document and hereby irr	revocably declare that:
financial details,	tion related to our Company/Firm, manpower, list of products/ solutions offered etc. providration / modifications.	
2. All the provision	ons of this EOI Document are acceptable to terms and conditions as mentioned in the EOI of	
3. My Company/Fi	Firm has not been debarred / black listed by ganizations in India/Public Sector Undertaking	any Government / Sem
	n contained in the proposal is complete and	d accurate in all materia
5. I/We undertake to fact which ten acknowledge and connection with	to notify the KELTRON promptly upon becomeds to render Bidder's proposal misleading agrees that any material misrepresentation Bidder's proposal might result in its infrom the bidding process.	ing or inaccurate. I/We on or warranty made in
	ge and agrees that KELTRON has the right no nal interest, security or public policy.	ot to qualify any Bidder or
	designation) further certify that I am an amount, therefore, competent to make this declaration	
Yours faithfully, (Signature of the Bid	lder/Authorized Signatory)	
Name: Title:		

COMPANY PROFILE

1.	Name of the Company/firm	
2.	Registered office address with phone number, e-mail Id and web address:	
3.	Date of Incorporation & Corporate Identity Number (CIN)	
4.	Pan number of the Company /firm:	
5.	GST number of the Company /firm:	
6.	Authorized capital:	
7.	Paid-up /working capital	
8.	Turnover for the last 3 years	
9.	Income Tax Clearance Certificate	
10.	Name of Managing Director with DIN	
11.	Names of directors with DIN: (attach separate sheet, if required)	

12.	Factory address with phone number and e-mail id:	
13.	Industrial licence no. & Date of Establishment.	
14.	Details Of The Factory/ Office:	
	a) Land & Building: owned or leased	
	b) Main items of machinery/equipment & test/inspection facilities available (Attach Separate Sheet, if required)	
15.	Man Power Strength:	
	A) Technical:	
	Key technical personnel qualification and experience in relevant field	
	B) Non-Technical:	
16.	List of products Manufactured/ Solution Offered	
17.	If ISO certified or having any other certification, mention the standards (Attach separate sheet if required)	
	(Enclosed copy of relevant Certificates.)	
18.	Bankers Name and Address	
19.	Collaboration and technical know-how agreement with foreign firms if any? if "yes", give details	
20.	Addresses of contact person(s)with phone number and email id:	

21.	General remarks: (give any observations not already covered)	
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DECLARATION

1. I do hereby declare that the entries made in this application form are true and correct to the best of my knowledge.

2.	•	subsequent changes in the constitution or of the answers now given in this application LTRON.
For	or	
	ace: ate:	Signature of authorized signatory Designation:
		(Official Seal)

FORMAT FOR POWER OF ATTORNEY TO REPRESENT BIDDER

(To be on non-judicial stamp paper of appropriate value as per Stamp Act relevant to place of execution.)

WHEREAS									
					by			_	
We			(nan	ne and ad	ldress of t	he regist	ered offic	ce) do her	eby
constitute, app	oint and	authorize l	Mr. /			(name ar	nd reside	ntial addr	ess)
who is	oresently	employe	ed with	n us	and h	olding	the p	osition	of
						_	-		
all such acts,					•				
Project, includ		_	•						
to KELTRON		_				-	-		
KELTRON in								dealing v	V 1011
RELITION	all illatte	ns in comic	CHOII WILI	l our ora	ioi tiio sai	ia i roject	•		
The attorney	has been	n duly auth	norized a	nd vested	d with re	anisite n	owers to	submit	and
execute the afe		•							uma
execute the ar	oresura a	ocuments a	na ao an	inings no	cossury 10	1 our ora	to REET	ROIV.	
We hereby ag	gree to r	atify all ac	ts. deeds	and thir	ngs lawfu	llv done	by our	said attor	nev
pursuant to th	-	•			_	•	•		•
attorney shall			•			_	,		
		,				<i>J</i>			
For									
Name:									
Title:									
Title.									
(Office seal)									
(Office scar)									

(To be printed on Rs.100/- non judicial stamp paper)

AFFIDAVIT FOR NOT BEING BLACKLISTED

address with PIN) does hereby solemnly M/s[Name of the company	gedyears, residing at (Full postal affirm and declare on oath for and on behalf of affirm] a company registered under Companies Act m having its registered office at
	/Firm as
	debarred / black listed by any Government / Semi ublic Sector Undertakings of the Central and State
I do hereby solemnly affirm that the above knowledge and belief and nothing material	re statements are true and correct to the best of my has been concealed there from.
For and on behalf of M/s[]	Name of the Company/Firm]
Verified on this day of 2024	
	Deponent
	Name:
	Design:
[Office seal]	