

**SEMI-CONDUCTOR LABORATORY
S.A.S NAGAR, PUNJAB.**

Record of clarifications provided to the queries of the prospective bidders during the Pre-bid Conference held at SCL on February 22, 2023 in response to Public Tender Notice No. SCL/PT/06 (Tender No : SCL/PurUnit-2/SC202200026101) for Augmentation of 8 inch CMOS Wafer Fab and Embedded NVM (Single- Poly) Technology acquisition as per enclosed detailed Request for Proposal (RFP) including Scope of Work.

Vendor Name: M/s. Tower semiconductor Ltd, (TSL)

S. N.	RFP Page No section Sub-section	Query of Bidder	SCL's Reply
1	Section 3 From page 25 onwards	SCL to confirm the following: Vendor will supply consumables related to the upgrades only. Any consumable, sub-systems etc. not directly part of the upgrade and related to the tool will be responsibility of SCL.	Responsibility of vendor related to Consumables for upgrades as well as for tools has been explicitly mentioned in the RFP under section 3 Page no. 25. Further to this please refer to section 10, page 43. Noted.
2	Annexure-E 4 : TEOS Deposition Equipment (CDTS1)- 2 Nos. DxZ chambers equipment Upgrade. A Page 144	Please clarify the meaning of "No trend from 1st to 25th Wafer". Please mention the allowed variation for Marathon run.	RFP term implies that CP on each wafer shall be within control limit, i.e., <40 counts for size 0.20µm. In addition, there shall not be any systematic trend in CP from wafer number 1 to wafer number 25.
3	General-SCL fab utility systems	Sources for the utilities and supplies are under SCL's scope (electricity, inert gases, specialty gases, water, exhaust, etc.) SCL to confirm that all the utility and supplies loads have been checked and will be ready for the project (will be aligned with the requirements of existing tools plus the new tools and the tools upgradation as per RFP's scope).	Confirmed.
4	General Scope	SCL to confirm that it is under SCL responsibility to approve the pass thru routs from the dock to the CR including elevators (in terms of utilization and performance)	Confirmed. However, if any Tool/CR dismantling and reassembly is required for tool movement as per mutually finalized plan, the same shall be covered under the vendor's scope.

5	General Scope	SCL to confirm measuring and approving the existing CR raised floor characterization (weight, vibration etc.).	<p>The floor tiles are capable of carrying the following loads:</p> <ul style="list-style-type: none"> ➤ Concentrated load ≥ 650 Kg with deflection ≤ 2.0mm ➤ Uniform load ≥ 1250 Kg/sq. m with deflection ≤ 1.0mm ➤ Rolling load ≥ 200 kg/sq. m with deflection ≤ 0.5mm ➤ Ultimate load ≥ 1575 kg/6.45 sq. cm at centre <p>Vendor to carry out the assessment based on the tool vibration criteria and the tool weight distribution.</p> <p>Further it was clarified that pedestal or Sock Absorber, if required, shall be to vendor's scope.</p>
6	General Scope	<p>In case of additional Popouts will be required, who is responsible for drilling newpopouts? SCL to confirm that it is under SCL responsibility to check and to approve the location of the popout in terms of building strength.</p>	Drilling new popouts in the operational Clean room is not feasible. Existing popouts to be used by the vendor.
7	General Scope	<p>Should the contractor consider the availability of raised floor tiles and CR panels wherever it is required to add or replace them? Does SCL has spare CR tiles?</p>	Please Ref. Section 6 of RFP whereas it is clearly specified it is in vendor's scope.
8	Annexure-B,Page46	<p>SCL to share: CR layout showing new tools, tools to be relocated with grey areas be shared in AutoCAD format for our reference. This is required to workout CR area and ISO classification for Cleanroom Performance & Testing (CPT) after modification of CRs. CR reflected ceiling plan with ULPA filter locations be shared for our reference. HVAC attic layout plan and elevation(above CR ceiling layout) showing location of Filter Plenum Boxes, plenum supporting details from main truss, flexible duct connections from Plenum Boxes to Hooded ULPA filters etc be shared for our reference. Raised flooring plan and elevation be shared for routing of PCW, SS tubing,</p>	<p>Detailed drawings will be shared with the selected vendor only, during detailed engineering. Further please note that the drawings in the RFP are proposed layouts only. As per Clause 2 & 3, Section 6 of the RFP:</p> <ol style="list-style-type: none"> a) Based upon the utilities matrix and equipment layout, vendor shall carry out the detailed engineering for the required Clean room modifications and tool hook-up for various utilities. b) Vendor shall prepare & submit the detailed engineering drawings including Cleanroom modification drawings to SCL for review and approval. The

		<p>PVDF piping, CDA, PVAC, Drains, City Water, Power cables, LAN wiring etc for our reference.</p> <p>Do we have to perform Cleanroom Performance and Testing (CPT) per ISO 14644, Part-1 after modification of existing CRs. SCL to confirm.</p>	<p>drawings once approved will be named as Approved for Construction (AFC) drawings. AFC drawings will be followed for execution of the work.</p> <p>c) Vendor can visit the fab for their assessment.</p> <p>d) Clean room Performance and Testing need not to be carry out as long as the existing CR classification is maintained as verified by SCL on regular basis and same will be jointly verified by SCL team along with the vendor after the CR modification. If the CR classifications are disturbed, then the vendor needs to rectify the issue to get back the CR class.</p>
9	Annexure-B,Page47	*SCL to share "As-built" PCW layout drawing showing existing POC locations for our reference.	<p>a) "As-built" drawings will be shared with the selected vendor during detailed engineering.</p> <p>b) Vendor may visit the fab area for assessment during their pre bid conference visit.</p>
10	Annexure-B,Page49	* SCL to share "As-built" Exhaust Ducting layout showing existing POC locations both in Sub-Fab and Fab area for our reference.	<p>a) "As-built" drawings will be shared with the selected vendor during detailed engineering.</p> <p>b) Vendor may visit the fab area for assessment during their pre bid conference visit.</p>
11	Annexure-B,Page50	*SCL to share "As-built" Gas Distribution Piping layout showing existing POC locations both in Sub- Fab and Fab area for our reference.	<p>a) "As-built" drawings will be shared with the selected vendor during detailed engineering.</p> <p>b) Vendor may visit the fab area for assessment during their pre bid conference visit.</p>
12	Annexure-B,Page56	*SCL to share "As-built" PVDF Piping layout drawing showing existing POC locations both in Sub-Fab and Fab area for our reference.	<p>a) "As-built" drawings will be shared with the selected vendor during detailed engineering.</p> <p>b) Vendor may visit the fab area for assessment during their pre bid conference visit.</p>
13	Annexure-B,Page59	*SCL to share "As-built" CDA/PVAC/Drains/City Water line layout drawing showing existing POC locations both in Sub-Fab and Fab area for our reference	<p>a) "As-built" drawings will be shared with the selected vendor during detailed engineering.</p> <p>b) Vendor may visit the fab area for assessment during their pre bid conference visit.</p>

14	Annexure-B,Page60	*SCL to share "As-built" MVDBs/Vertical DBs(Normal/Emergency/UPS) feeding power supply to new Fab Tools and relocated Tools to identify spare rating feeders for our reference(PBU 871/PBU 88/DPU 85/DPU 41/DPU 81/PBU 81).* SCL to share "As-built" CR and Grey areas Lighting Layout for our reference.* SCL to share "As- built" LAN/Communication/ESD active Ionizers layout for our reference. * SCL to share "As-built" earthing layout for our reference.	a) "As-built" drawings will be shared with the selected vendor during detailed engineering. b) Vendor may visit the fab area for assessment during their pre bid conference visit.
15	Annexure-B,Page75	*SCL to share the drawing showing location of new Emergency ResponseTeam(ERT) Room to relocate 10 loop fire panel and LSS(Life Safety System) remote node from the existing ERT Room.	New ERT room will be located within a distance of 10-15 m tentatively near the main entrance. Exact Location will be decided based upon detailed engineering.
16	Annexure-B,Page75	*SCL to share the drawing showing location of existing Bosch make Paging system for modification per new Fab Tool layout etc.for our reference.	a) "As-built" drawings will be shared with the selected vendor during detailed engineering. b) Vendor may visit the fab area for assessment during their pre bid conference visit.
17	Annexure-B,Page78	*SCL to share the "As-built" drawing showing location of Main Sprinkler Header/Sub-mains for Fab area for our reference.	a) "As-built" drawings will be shared with the selected vendor during detailed engineering. b) Vendor may visit the fab area for assessment during their pre bid conference visit.
18	Annexure-B,Page79	*SCL to share the "As-built" drawing showing location of existing Safety cum Body shower(3Nos) located in Fab area along with water line, drain POC in existing Acid drain in Sub-Fab area for our reference.	a) "As-built" drawings will be shared with the selected vendor during detailed engineering. b) Vendor may visit the fab area for assessment during their pre bid conference visit.
19	Annexure-B,Page79	*SCL to share the location of Tool Exhaust in Fab Grey Area/Sub-Fab for our reference.	a) "As-built" drawings will be shared with the selected vendor during detailed engineering. b) Vendor may visit the fab area for assessment during their pre bid conference visit.
20	Annexure-B,Page80	*SCL to share the location of new POC location in 8" Quartz Cleanroom for our reference	"As-built" drawing of POCs will be shared with the selected vendor

Vendor Name: M/s. Applied Materials

S. N.	RFP Page No section Sub-section	Query of Bidder	SCL's Reply
1	Table 3, Page number 19 of RFP	<p>We would like you to consider Make: AMAT for the following tools. This is in Table 3 on Page number 19 of RFP- Technical document.</p> <p>S. No. 3. Dark Field Inspection</p> <p>S. No. 6. Oxide Dielectric Etcher</p>	As per specifications define in RFP- Technical Part of Tender.

Vendor Name: M/s. RenoNix Co. Ltd.

S. N.	RFP Page No section Sub-section	Query of Bidder	SCL's Reply
1	Table 3, Page number 19 of RFP	Could you tell me the approximate delivery date, warranty, work scope, payment terms?	All details such as delivery date, warranty, work scope, payment terms are mentioned in the Tender Document.

Vendor Name: M/s. SEMICON ELECTRONICS TECHNOLOGIES

S. N.	RFP Page No section Sub-section	Query of Bidder	SCL's Reply
1		<p>In the RFP, Is it common to allow for the possibility of multiple bidders for different sections?. This can be done to ensure that the best possible solution is obtained for each part of the project, and to increase competition among vendors. However, it is also possible to specify that a single bidder must provide all of the equipment, tools, and technologies required for the project. The decision of whether to have multiple bidders or a single bidder will depend on a number of factors, including the complexity of the project, the budget, and the preference of the organization issuing the RFP.</p> <p>It is important to clearly communicate the process for selecting the bidders in the RFP,</p>	As indicated in the RFP, the contractor (prime bidder) may associate with other firms having experience in similar work(s). In such case fulfillment of all the contractual obligations for successful execution of the project shall be the sole responsibility of the Contractor (prime bidder).

		<p>whether it is for a single bidder or multiple bidders. This can include information on the evaluation criteria, the selection process, and any deadlines for submitting bids. This information will help ensure that all bidders have a clear understanding of the requirements and expectations for the project and will promote a fair and transparent bidding process.</p>	
2	Section 4: Embedded Single –Poly MTP-NVM IP Acquisition	<p>Since our Erase and program mechanism is Hot carrier Inject Mode but not FN tunnelling mode like E-memory or Synopsys, Program/Erase time and endurance cycle times might be hard to predict and ensure due to the lack of real silicon data and unfamiliar with the process conditions in the first beginning. In order to fulfil with the spec requirement as below, to have one cell implant mask and NLDD block to cell is necessary .In that case we would like to know if it is possible to relax the requirement?</p> <ul style="list-style-type: none"> -Program Time* 150us (typ)for multi-bit (4-bit or higher) Program -Erase Time* 400ms (typ)for Sector(8k x 8)/Chip Erase -Endurance (P/E cycle) \geq 1,000 	Vendor to comply the RFP specifications.
3	Section 4: Embedded Single –Poly MTP-NVM IP Acquisition	<p>For this MTP, we proposed to design it as 8K32 MTP with 32*32 info + 32*32 EEPROM. Please check if it is feasible.</p>	Vendor to comply the RFP specifications.
4	Section 4: Embedded Single –Poly MTP-NVM IP Acquisition	<p>Please clarify how many will be exactly needed?</p> <p>Since required I/O: by 8, by 16,by 32, do you need 20 memory cuts for each I/O? In that case, it will be 60 memory cuts in total (3*20=60).</p> <p>Or the total number needed IP is only 20 memory cut and we could allocate their I/O freely?</p>	RFP requirement is for total 20 memory cuts as per the Annexure-I (page no. 10)..

Vendor Name: M/s Synopsys

S. N.	RFP Page No section Sub-section	Query of Bidder	SCL's Reply
1	Page 28, Section 4A, S.N.7.	Small sizes will not be area or power efficient if built in the same architecture as large sizes. We request that this requirement be split in to multiple NVMIPs for appropriate size ranges.	SCL requirement of Memory Cut size 64b to 256Kb or higher has to be through single NVM IP.
2	Page 29, Section 4A, S.N.22.	Please provide the list and associated expected applications.	The list of 20 memory cuts of varying density between 64b and 256Kb (or higher) is attached as Annexure-I.
3	Page 29, Section 4B.	Only SCL can and shall provide test chips fabricate don their required process. Please confirm.	RFP clause mentions that Vendor shall provide GDS (alongwith documentation) of the following to SCL: <ul style="list-style-type: none"> - Qualification Macro - PCM (Process Control Monitor) specific to NVM - Test chips related to electrical characterization and reliability
4	Page 30, Section 4F(iii).	Synopsys may provide the list of test-resources required.	SCL has following test resources as listed below. <ol style="list-style-type: none"> 1. Teradyne Ultra flex 2. Advantest 93K <p>The above shall be sufficient for testing purposes. Any other resource if required shall be arranged by vendor.</p>

Vendor Name: M/s. Yield Microelectronics Corporation (YMC)

S. N.	RFP Page No section Sub-section	Query of Bidder	SCL's Reply
1	III Scope of RFP	We would like to know if this bid is only planned to engage one contractor for the whole task requirement as indicated in the RFP or several bidders are also acceptable and could choose the part of task that they are expertized.	As indicated in the RFP, the contractor (prime bidder) may associate with other firms having experience in similar work(s). In such case fulfilment of all the contractual obligations for successful execution

		As we are vendor of NVM IP, only specialize to providing MTP solutions to customers and only want to get the bid and focus on the part of NVM development on 180nm CMOS process.	of the project shall be the sole responsibility of the Contractor (prime bidder).
2	Section 4: Embedded Single –Poly MTP-NVM IP Acquisition	Since our Erase and program mechanism is Hot carrier Inject Mode but not FN tunnelling mode like E-memory or Synopsys, Program/Erase time and endurance cycle times might be hard to predict and ensure due to the lack of real silicon data and unfamiliar with the process conditions in the first beginning. In order to fulfil with the spec requirement as below, to have one cell implant mask and NLDD block to cell is necessary. In that case we would like to know if it is possible to relax the requirement? -Program Time* 150us (typ)for multi-bit (4-bit or higher) Program -Erase Time* 400ms (typ)for Sector(8k x 8)/Chip Erase -Endurance (P/E cycle) \geq 1,000	Vendor to comply the RFP specifications.
3	Section 4: Embedded Single –Poly MTP-NVM IP Acquisition	Please clarify how many will be exactly needed? Since required I/O: by 8, by 16,by 32, do you need 20 memory cuts for each I/O? In that case, it will be 60 memory cuts in total (3*20=60). Or the total number needed IP is only 20 memory cut and we could allocate their I/O freely?	RFP requirement is for total 20 memory cuts as per the Annexure-I (page no. 9).

Annexure-I (List of NVM Cuts)**Required Single-Poly MTP NVM Cuts****Required ECC
Function**

1- Bit Correction

S. No	No. of Address	Data width (Without ECC)	Density (Without ECC) Kilobit (Kb)
1	8	8	64 (0.0625Kb)
2	16	8	128(0.125 Kb)
3	32	8	256 (0.25Kb)
4	256	8	2048 (2Kb)
5	512	8	4096 (4Kb)
6	1024	8	8192 (8Kb)
7	2048	8	16384 (16Kb)
8	8192	8	65536 (64Kb)
9	32768	8	262144 (256Kb)
10	256	16	4096 (4Kb)
11	512	16	8192 (4Kb)
12	1024	16	16384 (16Kb)
13	2048	16	32768 (32Kb)
14	4096	16	65536 (64Kb)
15	8192	16	131072 (128Kb)
16	512	32	16384 (16Kb)
17	1024	32	32768 (32Kb)
18	2048	32	65536 (64Kb)
19	4096	32	131072 (128Kb)
20	8192	32	262144 (256Kb)

Further, refer Annexure - E, S. No. 24 & 25 at Page No. 132-133 and Annexure - K, S. No. 24 & 25 at page no. 219 of RFP-Technical Part of Tender, it is clarified that against equipment namely SEM Review Station (YESR1), equipment model Number may be read as "SEMVISION " (instead of "AXIOSPRINT") and against equipment namely Optical Review Station (YEOR1) equipment model number for may be read as "AXIOSPRINT " (instead of "SEMVISION").

Important Instructions to Bidders:

This being a two part tender-Technical and Commercial part separate, the technical part should not contain any pricing information.

General Comments:

1. Vendors expressed satisfaction on the response/clarifications provided to all their queries.
2. The prospective bidders must take the responses / clarifications as recorded herein into account while submitting the bid to SCL.

Head, P&S