



**INDIAN INSTITUTE OF TECHNOLOGY, KANPUR**  
**GT ROAD, KALYANPUR, KANPUR – 208016**  
**UTTAR PRADESH, INDIA**

**TENDER REFERENCE NO.: IITK/CSE/2024-2025/34**

**BID SUBMISSION END DATE- 04-11-2024**

**TENDER DOCUMENTS**

For

**“Purchase of UMRR-96 Type 153 Automotive 4D/UHD – Raw Targets and Plug & Play Cable for UMRR-96 Type 153 (Quantity-01 Set)”**

## Tender document

**Department of Computer Science and Engineering  
Indian Institute of Technology Kanpur  
Kanpur (UP) 208016 India**

<b>Date of Publishing</b>	22-10-2024 (17.00 hrs)
<b>Bid Submission Start Date</b>	22-10-2024 (17.00 hrs)
<b>Last Date and time of submission of Bids</b>	04-11-2024 (16.00 hrs)
<b>Date and time of opening of Technical Bids</b>	05-11-2024 (16:00 hrs)
<b>Date and time of opening of Financial Bids</b>	Will be separately notified for Technically shortlisted/qualified bidders

Interested parties may view and download the tender document containing the detailed terms & conditions from the website <https://www.iitk.ac.in/new/tenders-notice>

Enquiry date:**22-10-2024**

Enquiry No: **IITK/CSE/2024-2025/34**

Quotations are invited for the purchase of **UMRR-96 Type 153 Automotive 4D/UHD – Raw Targets and Plug & Play Cable for UMRR-96 Type 153** (Quantity-01 Set).

The detailed technical specification is described below:

# 1 SENSOR SPECIFICATIONS

UMRR-96 Type 153 is a 79GHz radar sensor for multiple automotive applications that features 4D/UHD technology.

Type 153 antenna aims at short and medium range and very wide horizontal angular coverage. It features:

- A straight beam with wide field of view
- A squint beam
- Both beams are selectable for short-, medium- and long-range mode

## 1.1 MEASUREMENT PRINCIPLE

Using a patented transmit waveform, the sensor measures range, radial speed, azimuth and elevation angle, reflectivity and more parameters of multiple stationary and moving reflectors (targets) simultaneously. It is capable of ultra-high definition (4D/UHD), where UHD resolution means that the sensor features resolution (separation) in three parameters: range, Doppler and azimuth angle.

The sensor is almost unaffected by weather, temperature and lighting conditions. It withstands high shock and vibration levels, is maintenance free and made for a long lifetime.

## 4D/UHD MEASUREMENT

A 4D Doppler based radial motion detection principle is integrated:

- a) Direct unambiguous Doppler measurement (speed)
- b) Direct range measurement
- c) Direct azimuth angle measurement (horizontal angle)
- d) Direct elevation angle measurement (vertical angle) Moving reflectors can be detected as well as stationary objects.

With its multi-target capability, the sensor can *detect* many reflectors within the field of view at a time (target list = point cloud). Additionally, optional filter algorithms are implemented for certain applications for the tracking of all detected reflectors over time. Those tracking algorithms are integrated in the sensor. Multiple objects can be *tracked* simultaneously.

The result of tracking is an object list with the following parameters:

- X-position
- Y-position
- Absolute velocity
- Heading angle
- Length
- Object ID and more

In addition, status and diagnose data from the sensor are reported. The sensor optionally reports such a list of all tracked objects in every measurement cycle of typically ~55ms length. Based on all detected targets and tracked objects within the field of view an application algorithm, such as blind spot warning, lane change assist or collision warning, may be implemented.

### **ULTRA-HIGH DEFINITION RESOLUTION - OBJECT SEPARATION PERFORMANCE**

The sensor divides the field of view into range gates and performs a Doppler (speed) measurement separate for each individual range gate.

Individual reflectors are separated by detection algorithms if having either:

- A different radial speed value or
- A different range value or
- A different azimuth angular position

### **USER CONFIGURABILITY**

The operational mode, antenna selection and frequency band are user-configurable:

The sensor allows to switch between short-range mode, medium-range mode and long-range mode. The modes differ regarding the waveform and the detection performance.

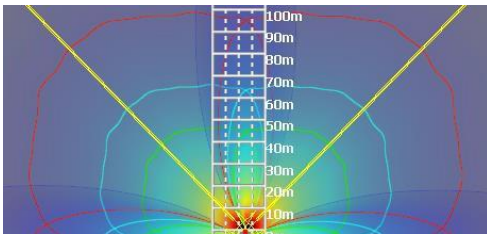
Simultaneously or independently, either straight beam with wide field of view or squint beam operation can be chosen: Both beams can be selected for short-, medium-, or long-range mode. The straight (wide) beam has its maximum range at bore sight, whereas the squint beam has its maximum range off the bore sight, for example, at ~30 degree offset to the mechanical mounting axis.

The straight (wide) beam can be used for applications like Blind Spot Detection (BSD) or Rear Cross Traffic Alert (RCTA), whereas the squint beam can be used for Lane Change Assist (LCA) and Forward Rear Collision Warning (FCW) applications.

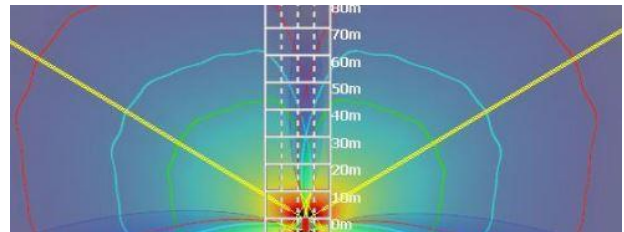
There are three user-configurable frequency bands. These frequency bands are non-overlapping in long- and medium-range mode, so that the mutual interference can be reliably avoided. In short-range mode, the bands will partly overlap.

Legend:

- Trucks
- Passenger Cars
- Motorbikes
- Pedestrians



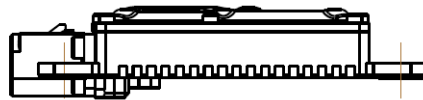
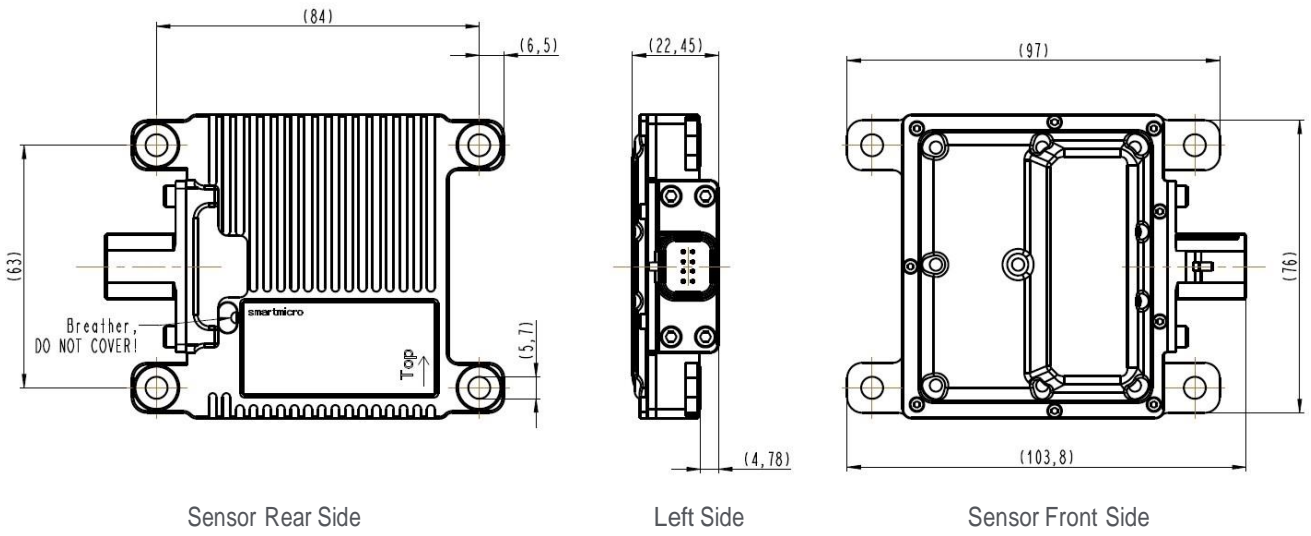
Corner sensor configuration with straight (wide) beam antenna



Two corner sensor configurations with squint beam antenna, exemplarily at 30° offset

## 1.2 SENSOR DIMENSIONS

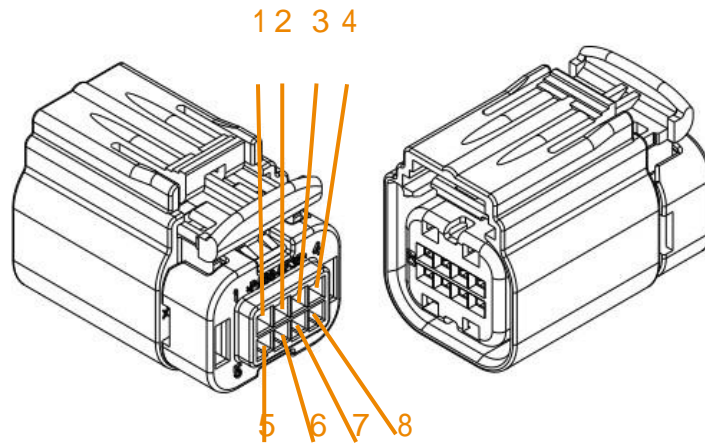
All values are given in mm.



Top Side

### 1.3 SENSOR CONNECTOR

The sensor connector is an 8-pin male (plug) connector used for automotive interconnections. A female counterpart (socket) must be used to connect with the sensor.



*View on solder cup side of socket showing the pin numbering  
(rear view of female counterpart to be connected to sensor)*

Sensor connector pin out model giving pin descriptions:

Pin No.	Function
1	GND
2	BR ETH_P
3	CAN2_H
4	CAN2_L
5	V+
6	BR ETH_N
7	CAN1_H
8	CAN1_L

Please note that in the standard configuration the sensor does have a 120 Ohms resistor on board (CAN bus termination between CAN L and CAN H) for both CAN buses. A termination (resistor) is required at both ends of a CAN bus and is not integrated into the cable.

Please note that if more than two sensors carrying a CAN resistor by default are operated in one CAN network, network issues may occur. For such networks, a sensor version without CAN resistor(s) can be provided. In typical cases, CAN2 is used for the synchronization of multiple sensors, for which the resistor within sensor must be removed. CAN1, on the other hand, provides a point-to-point connection, for which the resistor within sensor is required.

## 2 GENERAL PERFORMANCE DATA

Parameter		Long-Range Mode	Medium-Range Mode	Short-Range Mode
Operating Frequency		77...81GHz   3 center frequencies (bands)	77...81GHz   3 center frequencies (bands)	77...81GHz   3 center frequencies (bands)
Range	Min./Max. <sup>1</sup>	0.8m/120m   2.6ft/394ft	0.4m/55m   1.3ft/180ft	0.15m/19.3m   0.5ft/63ft
	Separation	< 1.2m   < 3.9ft	< 0.6m   < 2.0ft	< 0.3m   < 1.0ft
	Accuracy	< 0.5m   < 1.64ft or 1% (bigger of)	< 0.3m   < 1.0ft or 1% (bigger of)	< 0.15m   < 0.5ft or 1% (bigger of)
Speed	Min./Max.	-340...+140km/h   -211...+87mph	-340...+140km/h   -211...+87mph	-400...+140km/h   -249...+87mph
	Separation	< 0.3m/s	< 0.3m/s	< 0.3m/s
	Accuracy	< 0.15m/s	< 0.15m/s	< 0.15m/s
Angle	Field of View: Azimuth <sup>2</sup>	-50...+50° (squint beam)	-65...+65° (straight beam)	-65...+65° (straight beam)
	Field of View: Elevation <sup>2</sup>		-7.5...+7.5°	
	Separation: Azimuth		~30° (optional)	
	Accuracy: Azimuth <sup>3</sup>		≤ 1° (at <50° from bore sight)	
	Accuracy: Elevation <sup>3</sup>		≤ 2° (at <10° from bore sight)	
<b>Mechanical Details</b>				
Weight		≤ 153g   ≤ 5.4oz		
Dimensions (H/W/D)		97 x 76 x 17.7mm   3.8 x 2.99 x 0.7in (plus connector)		
<b>Further Information</b>				
Initialization Time		< 4s		
Update Cycle Time <sup>4</sup>		≤ 55ms		
Processing Latency		2-4 cycles		
Operating Voltage <sup>5</sup>		8...24V		
Power Consumption <sup>6</sup>		3.75...5W		
Bandwidth		< 2000MHz		
Max. Transmit Power (EIRP)		≤ 31dBm		
Operating & Storage Temperature		-40...+85°C   -40...+185°F		
Interfaces <sup>7</sup>		Ethernet 100Mbit (2-wire); 2xCAN V2.0b (passive)		
Connector		TE 1411001-1 series		
Shock / Vibration		100g <sub>rms</sub> / 14g <sub>rms</sub>		
Relative Humidity		0...95% (non-condensing)		
IP		67		
Pressure or Transport Altitude		0...10000m   0...32800ft		

1 Typical values; all values given for bore sight; they may vary depending on the clutter environment. Please note that the radar system can neither achieve a detection probability of 100% nor a false alarm rate equal to zero.

2 The total field of view is an angle interval in which reflectors can be detected; 3dB field of view is narrower.

3 Typical value; measured at target output level at bore sight, for a point reflector showing >23dB SNR. Error may increase towards larger angles. In addition to this angle error, angle may drift over temperature, typically -0.5deg to +0.5deg over specified operation temperature interval.

4 Typical value; may be longer depending on the number of detected radar targets.

5 Measured at the connector.

6 Depending on supply voltage and temperature; power consumption increases with supply voltage and with temperature.

7 Both CAN interfaces are capable of CAN(FD) by hardware (2 and 5Mbit/s), one of them is also sleep mode capable. It is recommended to use an external surge protection for power, CAN, RS485, Ethernet and other interface ports.



## Terms and Conditions

1. Quotation must be valid for 120 days.
2. All quotations must contain complete technical details of the product
3. All prices are to be FOR IIT Kanpur.
4. The vendor must provide official email address for communication and should notify that clearly in the quotation description, just referring to letterhead will not be accepted as sufficient proof of official email of communication.
5. Delivery period must be within 4 weeks from purchase order date.
6. Our standard payment terms and conditions is 100% after installation, inspection and approval.
7. The Penalty @1% per week or part thereof subject to max 10% of the delivery price will be deducted from the balance payment, if supply is not completed within aforesaid delivery period.
8. Preference will be given to only those vendors who have Service/ Repairing center stationed at Kanpur (Single point of contact in Kanpur for any service related issues)
9. No Call Locking will be entertained (in/out stationed). If at all it is required then it will be performed by local Maintenance Engineer.
10. Testing of the product onsite is mandatory
11. In no case, the suppliers shall be provided with remote access of the servers/machines.
12. It is mandatory to quote for optional items; else the quotation may be rejected.
13. Reporting time should not be more than 2 hours
14. Resolving time should not be more than 2 days
15. At any time prior to the deadline for submission of bid, the Institute may, for any reason, at its own initiative, modify the bid document by amendments. Such amendments shall be uploaded on the website through corrigendum and shall form an integral part of bid document. The relevant clauses of the bid document shall be treated as amended accordingly. It shall be the sole responsibility of the prospective bidders to check the website from time to time for any amendment in the tender document. In case of failure to get the amendments, if any, the Institute shall not be responsible for it.
16. Vendor is expected to submit only one best bid per tender specifications.
17. \*\*Only original equipment manufacturer /Authorized channel partners/Authorized system integrators having letter of support from OEM are eligible to bid.
18. A higher warranty may be given preference.
19. The Institute reserves the right for accepting and rejecting any quotation without assigning any reason thereof. Also, IIT Kanpur has the right to accept the whole or any part of the tender or portion of the quantity offered or reject it in full without assigning any reason.
20. Vendors are requested to quote only in Indian currency (Rupees). If the vendor wants to quote in an alternate currency, the vendor should seek an explicit permission from the department before sending the bid.
21. If all or any of the components of the equipment is/are to be imported, the vendor holds its full responsibility for its delivery at IIT Kanpur and that too in the stipulated time period. If for any reason the vendor does not want to deliver to IIT Kanpur, the vendor needs to seek an explicit permission from the department, before sending the bid.
22. Maximum educational discount should be offered wherever applicable.
23. Every communication must be received at IIT Kanpur within 2 business days from the date stamped on the letter if posted via conventional postal email.
24. Any communication letter if posted via conventional postal mail must also be sent on following email purchase@cse.iitk.ac.in and email of the PI (Project Investigator)/Head.
25. If taxes & duties are not quoted separately by the bidder, the final figure/price will be deemed to be inclusive of taxes & duties.

26. The basic Price/rate, GST, Packing & Forwarding charges and Freight charges must be mentioned separately & specifically. The offer quoted inclusive of Taxes, Packing & Forwarding charges and freight charges will summarily be rejected. The same is essential keeping in view the applicability of GST. The impact (%age) of GST on item./items will be admissible as applicable on the basic rate being statutory levy only during currency of Purchase Order/Contract against party's request along with necessary documents in support of their claim/amendments.

**27. Two-bid system:**

1. Sealed quotations are invited Technical bid & financial bid from reputed, eligible & resourceful bidders for supply, installation of Server, etc. complete in all respect. The sealed envelopes with the quotes should be super scribed mentioning whether it is a technical or financial bid.
2. If the financial Bid is included in the Technical Bid, then the quotation will be rejected.

**1. Note: Document Required**

- i. Certificate of GST and Bank details.
- ii. Work experience.
- iii. Our Technical Sheet duly signed and stamped by the firm.
- iv. Specifications/brochures & tender acceptance letter on Appendix 1-3.

Scanned copy of No Deviation Certificate (This certificate is to state that there shall be No Deviation in your bid as compared to what we have asked for in our tender document both technically and otherwise. This is to be written on your letter head and signed stamped as well.

- v. Past Performance
- vi. Experience Criteria
- vii. Bidder Turnover

**2.** For any queries kindly Contact: **0512-259-6344** or Email: [purchase@cse.iitk.ac.in](mailto:purchase@cse.iitk.ac.in)

**Quotations should be in the name of: -**

**Dr. Amitangshu Pal**

Department of Computer Science and Engineering  
Indian Institute of Technology Kanpur  
Kanpur 208 016, India

**Mailing Address:**

**Nagendra Yadav**  
**RM-510, Rajeev Motwani Building**  
**Department of Computer Science & Engineering**  
**Indian Institute of Technology Kanpur**  
**Kanpur 208 016, India**

**TENDER ACCEPTANCE LETTER**  
**(To be given on Company Letter Head)**

Date: \_\_\_\_\_

To,

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Sub: Acceptance of Terms & Conditions of Tender.

Tender Reference No: \_\_\_\_\_

Name of Tender / Work: - \_\_\_\_\_

Dear Sir,

1. I / We have downloaded / obtained the tender document(s) for the above mentioned 'Tender/Work' from the web site(s) namely:

\_\_\_\_\_ as per your advertisement, given in the above mentioned website(s).

2. I / We hereby certify that I / we have read the entire terms and conditions of the tender documents from Page No. \_\_\_\_\_ to \_\_\_\_\_ (including all documents like annexure(s), schedule(s), etc .), which form part of the contract agreement and I / we shall abide hereby by the terms / conditions / clauses contained therein.

3. The corrigendum(s) issued from time to time by your department/ organisation too have also been taken into consideration, while submitting this acceptance letter.

4. I / We hereby unconditionally accept the tender conditions of above mentioned tender document(s) / corrigendum(s) in its totality / entirety.

5. I / We do hereby declare that our Firm has not been blacklisted/ debarred/ terminated/ banned by any Govt. Department/Public sector undertaking.

6. I / We certify that all information furnished by our Firm is true & correct and in the event that the information is found to be incorrect/untrue or found violated, then your department/ organisation shall without giving any notice or reason therefore or summarily reject the bid or terminate the contract, without prejudice to any other rights or remedy including the forfeiture of the full said earnest money deposit absolutely.

**Yours Faithfully,**  
**(Signature of the Bidder, with Official Seal)**

**Declaration for Local Content**

**(To be given on Company Letter Head - For tender value below Rs.10 Crores)  
(To be given by Statutory Auditor/Cost Auditor/Cost Accountant/CA for tender value  
above Rs.10 Crores)**

Date: \_\_\_\_\_

To,  
The Director,  
Indian Institute of Technology Kanpur,  
GT Road, Kalyanpur, Kanpur -208016

Sub: Declaration of Local content

Tender Reference No: \_\_\_\_\_

Name of Tender / Work: - \_\_\_\_\_

1. Country of Origin of Goods being offered: \_\_\_\_\_
2. We hereby declare that items offered has \_\_\_\_% local content.

“*Local Content*” means the amount of value added in India which shall, be the total value of the item being offered minus the value of the imported content in the item (including all customs duties) as a proportion of the total value, in percent.

“\*False declaration will be in breach of Code of Integrity under Rule 175(1)(i)(h) of the General Financial Rules for which a bidder or its successors can be debarred for up to two years as per Rule 151 (iii) of the General Financial Rules along with such other actions as may be permissible under law.”

**Yours Faithfully,  
(Signature of the Bidder, with Official Seal)**