



**Rocket Science  
Technologies**



*Picture for reference only, subject to actual product.*

# **Rakshak ADAS (रक्षक)**

***ADVANCED DRIVER ADVISORY SYSTEM***

**Data Sheet - v1.0 - 2025**

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# 1. Advance Driver Advisory System (ADAS)

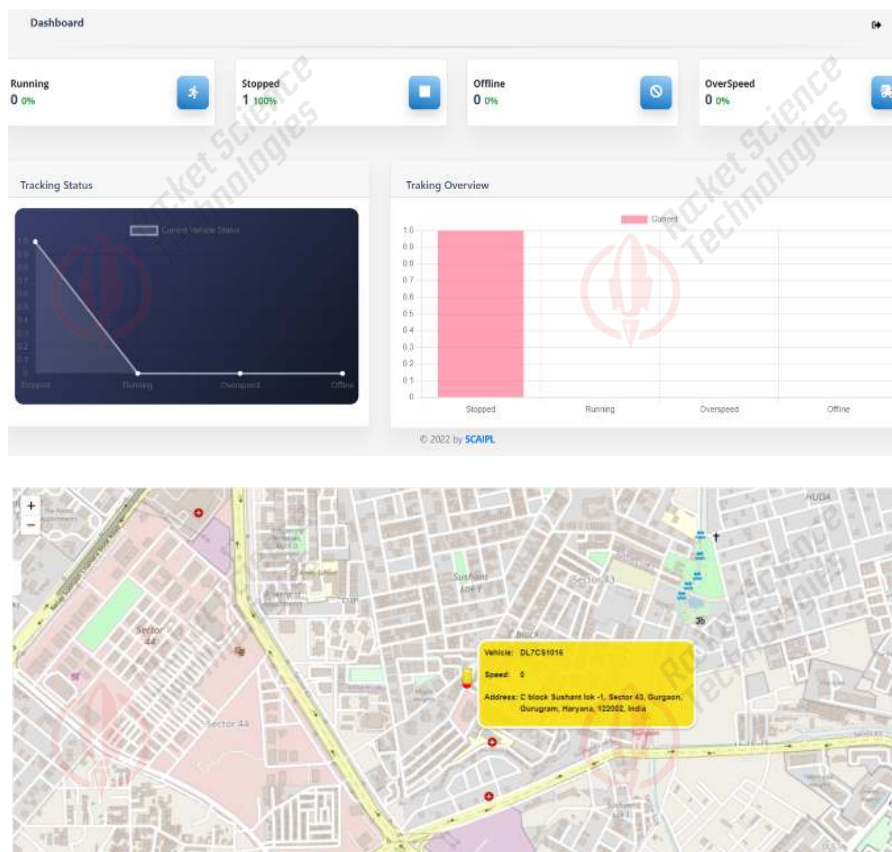
## 1.1 Overview

The ADAS will provide real time connectivity of TMC and sub-centres with the patrol and maintenance vehicles. Separate high speed multi operator embedded SIM will be provided for GPS tracker, industrial grade rugged waterproof 10” tablet, Dashcam, body cam, and LPU.

The LPU and storage will be compact in size with Fan less industrial grade controller. The system will provide live monitoring of all cameras installed in patrol and maintenance vehicles (including body cam) from TMC & sub-centres. The ADAS will aid the TMC/Sub-centre in disseminating the required information to the patrolling / maintenance team in real-time. The tablet will have GPS map to assist the driver in identifying the incident location with estimated travel time, route, alternate route, etc.

The ADAS will also provide the option to the driver of one vehicle to connect with other emergency / maintenance services vehicles of the stretch and provide option to conduct video conference call among them and with TMC/Sub-centre.

The vehicle staff will be able to log the incident/event details through the tablet.

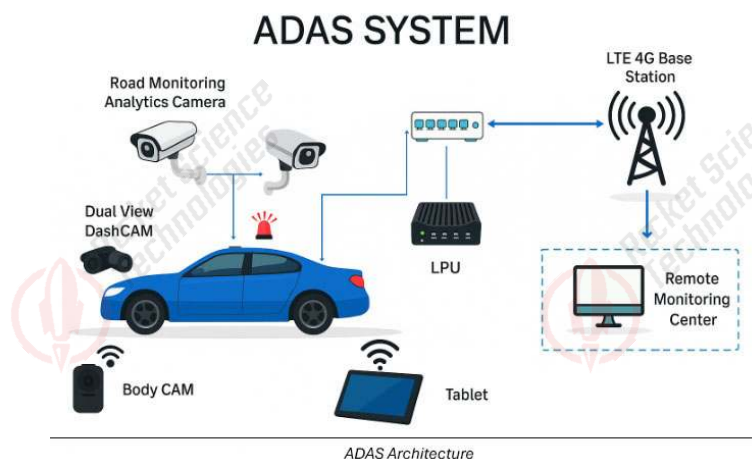


## 1.2 Solution Overview

- Event reporting via Tablet for Vehicle staff
- Dash camera for vehicle inward & outward status
- Live video monitoring & recording
- GPS Tracker for patrolling vehicles
- Body Worn Camera to record staff Behavior and evidence collection
- Vehicle top mount bullet cameras
- LPU with storage & Cabinet
- Recording of connected cameras

## 1.3 ADAS Operation

- Video recording and streaming: The real time video capture, data streaming to TMC and local storage for backups are a continuous operation on edge ADAS.
- Event detection: The Front and rear bullet cameras should be able to perform video analytics inbuilt or in LPU for face detection function activation as soon as the motion detection is triggered. The camera will detect any object addition, object removal, and line crossing. Whenever any event is triggered, the camera will record the event on 128 GB SD card also.
- GPS map operations: The Industrial tablet will be provided with a GPS map to navigate to the any incident location shared by TMC ADAS software or any desired location on the stretch as per requirement.
- Inter vehicle communication: The driver will be able to receive and make calls to other vehicles with ADAS functionality via 10” tablet.
- Master Control between edge ADAS: The central software will act as a master between the edge ADAS systems for controlling any communication between them.
- Alerts and notification handling: The system will be able to receive and send any incident or alert from or to ADAS vehicles.



## 2. Functional Requirements

### 2.1 Road Condition Detection

**Requirement:** The system shall detect and monitor road surface conditions such as potholes, cracks, damaged road surfaces, and other irregularities.

**Method:** Detection shall be achieved using cameras installed on:

- Expressway surveillance infrastructure (fixed cameras).
- Route patrolling / maintenance vehicles (front and rear cameras).

**Status:** Supported.

### 2.2 Statistical and On-Demand Reporting

**Requirement:** The system shall generate:

- Periodic Reports: Based on routine data collection. –
- On-Demand Reports: Upon request by authorized personnel.

**Responsibility:**

- Event generation: Automated by the system.
- Report preparation: To be carried out by the client based on system-generated events.

### 2.3 Real-Time Alerts

**Requirement:**

- The system shall generate immediate alerts for detected road hazards, including:
  - Cracks, potholes, damaged road surface.
- Damaged road furniture, fencing, signages.
- Issues with plantation.

Presence of dead animals or other hazardous obstructions.

**Detection Coverage:** Any object or defect within the field of view (FOV) of the front and rear cameras on patrolling vehicles.

### 2.4 Manual Logging of Road Conditions

**Requirement:** The system shall allow authorized users to manually log road condition reports.

### 3. Methods of Logging

Control Centres.  
Mobile application (tablet-based).

### 4. System Scope Summary

|                          |                                                     |     |
|--------------------------|-----------------------------------------------------|-----|
| Road condition detection | Automated detection using fixed cameras             | Yes |
| Real-time alerts         | Automated hazard alerts based on detected anomalies | Yes |
| Manual logging           | Control centre and tablet-based logging             | Yes |

### 5. Deliverables

- Integration with fixed and mobile cameras for detection.
- Event generation logic for road condition anomalies.
- Tablet application for manual logging.
- API endpoints for event and alert data access.

### 6. Event Reporting via Tablet for Vehicle Staff

Rugged and industrial grade portable device with Mobile application for live monitoring of cameras & event reporting.

#### 6.1 Tablet

We are proposing an industrial grade 10 inch tablet with IP65 water and dust resistant device with dashboard mounting and vehicle charger. Device will be equipped with 4G / Wi-Fi

#### 6.2 Software Application

Table will be loaded with application which can be used for real time monitoring of installed cameras. Separate application will be installed for event reporting and evidence capturing.



## 7. Dash Camera for Vehicle Inward & Outward Status

- Monitoring of Vehicle inside and outside activity in real time with Audio & video recording and live video streaming.
- We are proposing dashboard mount cameras with 1080P picture resolution for better and clear image quality.
- Dash cameras will be facing both inward and outward of the vehicle.



## 8. Body Camera

- Body Camera is required to record interactions of staff with traffic violators from staff's point of view.
- We are proposing Body worn cameras with built-in storage. Body worn camera can be mounted on staff's body with the help of mounting clip.
- Vehicle has GPS, Wi-Fi and 4G LTE module for seamless live video streaming. Cameras has built-in mic and speaker to record close body conversation with often.



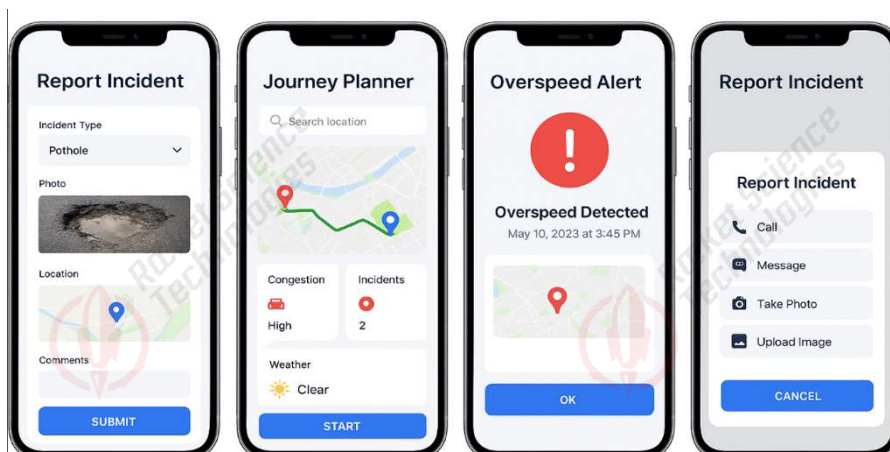
## 9. Vehicle Top Mount Camera

- Vehicle top mount camera required to monitor road condition and analytical purposes.
- We are proposing rugged bullet camera with 1080P resolution & IP67 water & dust resistant device
- Camera can record 1080P resolution @60 frames per second
- Camera has SD card mount option for local recording



## 10. ATMS Mobile Application – Functional Requirements

The Mobile Application is designed to enable road users, Expressway Traffic/Route Patrol Agencies, Enforcement Agencies, the Authority, and the Authority's Engineer to report, monitor, and respond to incidents, grievances, and other expressway-related information in real time. The application will have role-based modules and will be integrated with the ATMS systems of other Authority projects for seamless usability.



## 11. Key Features and Functional Requirements

### 11.1 Role-based Modules

The mobile application shall have separate modules based on the roles, usage, and requirements of different user categories:

- Road Users
- Expressway Traffic / Route Patrol Agencies
- Enforcement Agencies

### 11.2 Platform Availability

The mobile application shall be available on both iOS and Android platforms.

### Integration with ATMS Systems

The mobile app shall be customized and synchronized with the ATMS systems of other Authority projects to ensure that users can use the same application seamlessly across different projects.

### 11.3 Incident & Grievance Reporting

- Road users shall be able to report incidents via dropdown menus, image capture, map-based location entry, and additional text details.
- Users shall also be able to report incidents via direct calling or messaging through the app.

### 11.4 Road Condition Logging

A provision shall be available to log road conditions directly from control centers.

## 12. Hardware Technical Specifications

### 12.1 Dash Cam



|                      |                                                                                                                                       |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| Sensor               | Dual camera system (2 MP with FOV 140° & Night Vision HD 720p, Cabin/Rear: 2 MP with FOV 140° & Night Vision Full HD 1080p)           |
| Resolution           | 1920 × 1080 (Front) + 1280 × 720 (Cabin / Rear) at 30 FPS                                                                             |
| SOS                  | Sends a distress call in case of emergency + upto 03 Number can be Store                                                              |
| Night Vision         | Equipped with IR LEDs that provide clear night vision                                                                                 |
| Battery & Charging   | Li-ion Battery with 3000mAh which lasts up to 4 hours + Charging 5V ~ 1.5A (Type-C)                                                   |
| GPS Logger           | YES (real-time tracking, speed alerts, route history with offers Historical places)                                                   |
| Storage              | Supports up to 16GB local + secure Cloud storage up to 90days                                                                         |
| SD Card              | microSD up to 512 GB                                                                                                                  |
| Angle                | Wide FOV – 140° (Front), 140° (Cabin)                                                                                                 |
| Parking Mode         | 24×7 monitoring, motion detection, collision trigger, pre-record                                                                      |
| Microphone & Speaker | YES – two-way audio & live video calling                                                                                              |
| App & Cloud          | iOS/Android app, live streaming, playback, SOS                                                                                        |
| AI Features          | AI based Face Recognition, Unknown driver detection, Harsh braking or over speeding, Engine idling with the AC on, Geo-fence breaches |
| Mounting Type        | Adhesive mount / optional suction mount                                                                                               |
| Working Temperature  | -20 °C to +70 °C                                                                                                                      |
| Connectivity         | 4GLTE (FDD 1,2,3,4,5,8 & TDD 40,41), Wi-Fi, Bluetooth                                                                                 |
| Video Calling        | YES – two-way video/audio                                                                                                             |
| Alarms & Alerts      | Over-speed, Vibration, Collision, Parking mode alerts, SOS emergency                                                                  |
| Certifications       | CE, FCC, RoHS, BIS                                                                                                                    |

\* Product information is subject to change without prior notice.

## 12.2 Body Worn Camera



|                              |                                                                                                             |
|------------------------------|-------------------------------------------------------------------------------------------------------------|
| Product                      | Body Worn Camera                                                                                            |
| Operating System             | Linux 4.9.110                                                                                               |
| Sensor                       | 5 MP CMOS image sensor                                                                                      |
| Boot Time                    | < 6 seconds (power on to recording)                                                                         |
| Lens (HOV)                   | > 140°                                                                                                      |
| Video Input                  | 1 channel (optional camera connect)                                                                         |
| Video Output / Display       | 2" Full HD LCD screen                                                                                       |
| Recording Resolution (video) | 2688×1512, 2560×1440, 2304×1296, 1920×1080, 1280×720                                                        |
| Frame Rates                  | 25 fps @ 2688×1512; 30 fps @ 2560×1440 / 2304×1296 / 1920×1080; 60/30 fps @ 1920×1080; 60/30 fps @ 1280×720 |
| Record Mode                  | Video & audio synchronization; 2 independent streams for local record and remote view                       |
| Compression                  | H.264 / H.265 / MP4                                                                                         |
| Dual Video Stream            | Supported (local record + remote view)                                                                      |
| Audio Input                  | 1× microphone; optional external intercom (2.5 mm jack for headphone/mic/PTT)                               |
| Audio Compression            | PCM (AAC optional)                                                                                          |
| Noise Reduction              | Supported                                                                                                   |
| Audio-only Recording         | Supported (one-key switch between audio-only and AV modes)                                                  |

|                          |                                                                                                |
|--------------------------|------------------------------------------------------------------------------------------------|
| Snapshot                 | JPEG (5/10/20/25 pictures simultaneously); Snapping during recording                           |
| Photo Resolution         | 1920 × 1080 up to 8640 × 4752                                                                  |
| Image (still) Resolution | 10752 × 6048 / 5376 × 3024 / 2688 × 1512                                                       |
| Storage                  | Built-in 16 GB TF (optional 32–256 GB); Encrypted storage                                      |
| IR (Night Vision)        | Up to 10 m at 0 lux (visible-shape image)                                                      |
| Flashlight               | Available (night use)                                                                          |
| Laser                    | Lock image center / pointing                                                                   |
| Two-way Intercom         | Cluster intercom between terminals; Intercom with platform (only for 4G/3G device)             |
| SOS                      | SOS key notifies platform (only for 4G/3G device)                                              |
| USB                      | 1× USB 2.0 (charging, PC communication, external HD camera)                                    |
| Protocols                | TCP/IP, RTSP, RTMP (only for 4G/3G device); AES-256 encryption                                 |
| 3G/4G                    | Built-in FDD-LTE/WCDMA/GPRS (only for 4G/3G device)                                            |
| Wi-Fi                    | Client/AP mode (optional)                                                                      |
| Bluetooth                | Bluetooth 4.0 (optional)                                                                       |
| GPS/GLONASS              | Optional; location & speed in local record and remote view; cold start < 25 s; A-GPS supported |
| G-sensor                 | Supported                                                                                      |
| Face Recognition         | Optional (deep learning; local blacklist or cloud recognition)                                 |
| OSD Burn-in              | Date, time, device ID, officer ID, location, speed                                             |
| Overwrite                | Enabled/disabled                                                                               |
| Local Playback           | Play/pause/forward/rewind; Search by time/alarm etc.                                           |
| Online Playback          | Supported (only for 4G/3G device)                                                              |
| Playback Speed           | 1x to 128x                                                                                     |
| Pre/Post Recording       | Max 10 s pre-record; 60 s post-record                                                          |
| Dewarp                   | Supported before encoding (>140°); Up to 8x digital zoom                                       |
| Safe Mode                | Limited to video/audio recording, photographing and basic operations                           |
| Record Encryption        | AES-256; encrypted videos playable only in special player                                      |
| Logs                     | Records key operations, settings, events, alarms                                               |

|                         |                                                                                                                    |
|-------------------------|--------------------------------------------------------------------------------------------------------------------|
| PC Player               | Playback on PC and data analysis                                                                                   |
| Client Software         | Remote live view, positioning, track playback, intercom, monitoring, remote commands (only for 4G/3G)              |
| Firmware Upgrade        | Via USB or Internet (only for 4G/3G device)                                                                        |
| GUI                     | Graphic User Interface                                                                                             |
| Time Sync               | GPS / Internet / PC                                                                                                |
| Charging                | Fast charging @ 2 A ( $\approx$ 2–4 hours); USB data transmission                                                  |
| Factory Reset           | Restore default settings                                                                                           |
| Indicators              | Charging, Idle, Video Record, Snap, Audio Record                                                                   |
| Battery Performance     | JEITA compliant                                                                                                    |
| Operating Temperature   | -30 °C to +60 °C                                                                                                   |
| Humidity                | 40%–95% RH                                                                                                         |
| Language                | English                                                                                                            |
| Battery Capacity (main) | Built-in 3600 mAh (optional: 2×2700 mAh or 4200 mAh)                                                               |
| Battery Backup          | $\approx$ 13 h with 3600 mAh; $\approx$ 18 h (9h + 9h) with dual 2700 mAh; Continuous 4G remote view up to 5h + 5h |
| Auxiliary Battery       | 60 mAh (device keeps working during main-battery swap)                                                             |
| Drop Test               | 2 m; MIL-STD-810; JS55555 certified                                                                                |
| Ingress Protection      | IP67                                                                                                               |
| Dimensions              | 88.3 × 59.8 × 34.4 mm                                                                                              |
| Weight                  | $\approx$ 144 g (with one main battery, without clip)                                                              |
| Certifications          | CE, FCC; BIS certified (battery)                                                                                   |

### 12.3 Vehicle Mounted Camera



|                      |                                                                                                                                                                                                                                                                    |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Model                | SC-IND22BP-I(Z)(S)                                                                                                                                                                                                                                                 |
| Image Sensor         | 1/2.8", 2MP Low Illumination Progressive Scan CMOS Sensor                                                                                                                                                                                                          |
| Effective Pixels     | 1920(H) × 1080(V)                                                                                                                                                                                                                                                  |
| Aspect Ratio         | 16:9                                                                                                                                                                                                                                                               |
| Minimum Illumination | Color: 0.001Lux @ (F1.2, AGC ON), 0.014 Lux @ (F1.4, AGC ON), 0 Lux with IR                                                                                                                                                                                        |
| S/N Ratio            | ≥ 58dB (AGC OFF)                                                                                                                                                                                                                                                   |
| Day/Night Mode       | ICR switch, Auto, Color, B&W, External Trigger                                                                                                                                                                                                                     |
| WDR                  | Up to 120 dB, TWDR (Off/ Low/ Middle/ High)                                                                                                                                                                                                                        |
| 3D DNR               | Low, MID-Low, MID, MID- HIGH, High                                                                                                                                                                                                                                 |
| IR Distance          | 3.6 mm 20–30 m;<br>6 mm 30–40 m;<br>8 mm 50–60 m;<br>2.7–13.5 mm 50–60 m;<br>5–50 mm 80–100 m                                                                                                                                                                      |
| Lens Type            | 2.7-13.5 mm Motorized Zoom Lens<br>(Optional: 3.6 mm, 6 mm, 8 mm, 5-50 mm Motorized Lens)                                                                                                                                                                          |
| Angle of View        | 3.6 mm: 75.9° (H), 47.6° (V), 83.1° (D),<br>6 mm: 50.2° (H), 29.7° (V), 56.3° (D),<br>8 mm: 38.7° (H), 22.5° (V), 44° (D),<br>2.7-13.5 mm: 93.4° to 23.5°(H), 60.9° to 13.5°(V), 100.5° to 27°(D),<br>5-50 mm: 58.6° to 6.4° (H), 35° to 3.6° (V), 66° to 7.4° (D) |
| Shutter Speed        | Auto, Slow Shutter, (1/1 sec ~ 1/100,000 sec Adjustable)                                                                                                                                                                                                           |
| Defog                | Off, Low, Middle, High                                                                                                                                                                                                                                             |
| Compression          | H.265 / H.264 / MJPEG                                                                                                                                                                                                                                              |
| H.265 Encoding       | Main Profile                                                                                                                                                                                                                                                       |
| H.264 Encoding       | Baseline / Main Profile / High Profile                                                                                                                                                                                                                             |
| Streams              | Mainstream: 2MP (1920 × 1080) @ 60fps                                                                                                                                                                                                                              |
| Resolution           | 2MP/720P/VGA                                                                                                                                                                                                                                                       |
| Frame Rate           | 1 ~ 30fps                                                                                                                                                                                                                                                          |
| Audio                | Built-In-Mic or 1 IN/1 Out                                                                                                                                                                                                                                         |
| Alarm I/O            | 1Ch Alarm IN, 1Ch Alarm Out                                                                                                                                                                                                                                        |
| Edge Storage         | Yes, Up to 2TB                                                                                                                                                                                                                                                     |
| Network Port         | RJ45 10M/100M Network Self Adjustable                                                                                                                                                                                                                              |

|                      |                                                                                                                                                                                                                          |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Protocols            | TCP / UDP, IPv4, IPv6, SSL, TLS, HTTP, HTTPS, HTTP-Base64, HTTP-Digest, DHCP, DNS, RTP, RTSP, RTSPS, RTCP, ICMP, NTP, SMTP, IGMP, SNMP (V1, V2, V3), Multicast                                                           |
| Interoperability     | ONVIF Profile S, G & T                                                                                                                                                                                                   |
| Ingress Protection   | IP67 Compliant                                                                                                                                                                                                           |
| Vandal Rating        | IK10 Compliant                                                                                                                                                                                                           |
| Operating Conditions | -40 °C ~ 70 °C Humidity 95% or Less (Non-Condensing)                                                                                                                                                                     |
| Power Supply         | DC 12V ± 10% / PoE (802.3af)                                                                                                                                                                                             |
| Power Consumption    | < 12W                                                                                                                                                                                                                    |
| Dimensions & Weight  | 264 mm (L) x 140 mm (W) x 101 mm(H), 1.3kg                                                                                                                                                                               |
| Certifications       | Safety: CE, FCC, IS 13252 (Part 1):2010, BIS Registered<br>Cyber Security Certified by STQC as per IoTSCS and meet the essential requirement issued by MeitY.<br>Reliability Certification: MTBF >1,00,000 hours at 40°C |

## 12.4 LPU



|              |                                                                        |
|--------------|------------------------------------------------------------------------|
| Processor    | Intel Core i5 (6 cores), up to 2.8GHz                                  |
| Chipset      | Integrated chipset in CPU                                              |
| Memory       | 8 GB DDR3, up to 8 GB                                                  |
| Storage      | 500 GB NVMe SSD / 2 × SATA III, 1 × mSATA                              |
| Graphics     | Integrated Intel HD Graphics 4400/5500/5000/6000 in CPU                |
| I/O Ports    | 4 × USB 3.0, 2 × LAN, 4 × COM, HDMI, VGA                               |
| Expansion    | 2 × Mini PCIe, 1 × SIM slot                                            |
| Networking   | 2 × Gigabit LAN                                                        |
| Power Supply | 12V 5A/7A/10A or 19V 3A DC, Jack 5.5 mm × 2.5 mm input with protection |

|                  |                                   |
|------------------|-----------------------------------|
| Operating System | Window 10,8,7,Ubuntu 14.04, 16.04 |
| Operating Temp   | -20 °C to + 60 °C                 |
| Storage Temp     | -40 °C to + 85 °C                 |
| Humidity         | 5%–95%, non-condensing            |
| Certifications   | CE, CCC, ISO 9001:2015            |

## 12.5 Tablet

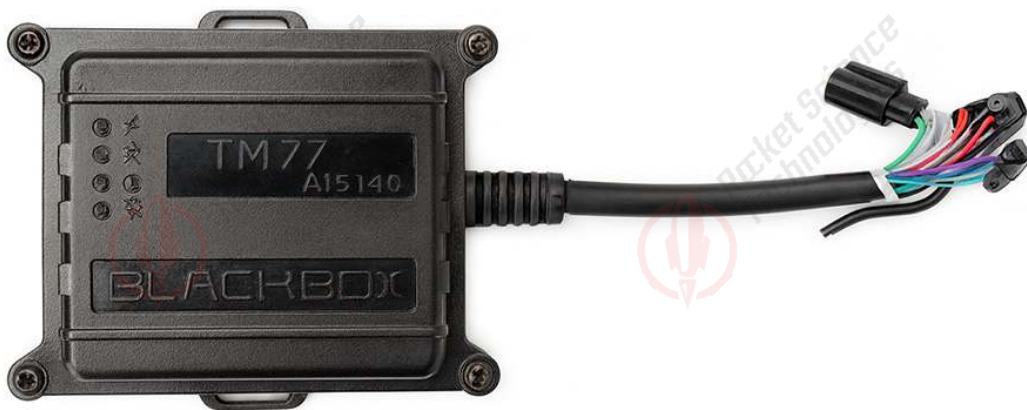
Industrial Grade Tablet Installed with ADAS application is to be mounted on the dashboard.



|           |                                                                       |
|-----------|-----------------------------------------------------------------------|
| Display   | 10.1" sunlight readable, 1200 × 920, 450 nits, capacitive multi-touch |
| Processor | MT6771                                                                |
| Memory    | 8 GB / 256GB                                                          |
| Storage   | 256 GB                                                                |
| OS        | Android 11.0                                                          |
| Wireless  | 4G LTE, 3G WCDMA, GSM, Bluetooth, WiFi                                |
| GPS       | BDS, GPS, GLONASS                                                     |
| Sensor    | Light sensor, Compass, Gravity, Acceleration, Barocceptor             |
| Camera    | Front: 5MP; Real: 13MP (Rear camera with Flash light)                 |

|                |                                                                                                                    |
|----------------|--------------------------------------------------------------------------------------------------------------------|
| Battery        | Built-in small battery: 2400 mAh, 12000 mAh; 3.8V Duration (19 hours) (Removable, support hot-swappable batteries) |
| Ports          | USB-C, MicroSD slot, Audio jack                                                                                    |
| Ruggedness     | Anti-dust & Waterproof IP65-IP67 Dropping Resistance 1.2 meter                                                     |
| Operating Temp | -20 °C to + 60 °C                                                                                                  |
| Accessories    | Docking station, hand strap, stylus                                                                                |
| Certifications | MIL-STD-810G, ISO, IP65, MSDS                                                                                      |

## 12.6 GPS Tracker



|                 |                                                                                                         |
|-----------------|---------------------------------------------------------------------------------------------------------|
| Network         | 4G LTE / 3G / 2G fallback                                                                               |
| Positioning     | GPS + GLONASS + AGPS                                                                                    |
| Inputs/Outputs  | 4 × Digital Inputs, 2 × Digital Outputs, 1 × Analog                                                     |
| Interfaces      | RS-232, RS-485, 1-Wire                                                                                  |
| Protocols       | TCP/UDP, SMS, FTP, MQTT                                                                                 |
| Backup Battery  | 600 mAh Li-ion                                                                                          |
| Power Supply    | 8–36 V DC with over-voltage protection                                                                  |
| Operating Temp  | -15 °C to + 85 °C                                                                                       |
| Accuracy        | < 2.5m CEP                                                                                              |
| Alarms & Alerts | Over-speed, Geo-fence, Ignition status, Vibration/Tamper, Power cut, Low battery, SOS, Towing detection |
| Certifications  | ARAI certified, IP65 Certified, ABS Plastic optional Polycarbonate                                      |

\* Product information is subject to change without prior notice.

\* All images are for reference purposes only. Actual products may vary.