

LeddarVision™ LVS-2+

Comprehensive Surround-View Premium ADAS L2/L2+ Highway Assist and 5-Star NCAP 2025/GSR 2022 Low-Level Fusion and Perception Software Stack

Product Overview

LVS-2+ is a comprehensive fusion and perception software stack supporting premium surround-view L2/L2+ ADAS highway assistance and 5-star NCAP 2025/GSR 2022 safety applications. LeddarVision™ low-level fusion (LLF) and perception technology enables implementation of entry-level to premium ADAS utilizing a single architectural approach, efficiently scaling computational power with sensor additions and reducing rework efforts with sensor changes. Based on LeddarVision™ architecture, LVS-2+ efficiently extends the LVF front-view product family 1VxR sensor configuration to a 5V5R configuration, enhancing support to TJA and HWA applications, enabling automated lane changes, overtaking and extended speed range adaptive cruise control (ACC).

LVS-2+ implements a premium fusion and perception, positioning and prediction stack handling sensors' interface, offline and online calibration and diagnostics, sensor synchronization, sensor fusion, object detection and classification, extended to include unclassified objects and events (e.g., cut-in), continuous tracking and stabilization, free space detection, road model, comprehensive traffic signs detection, highway traffic light detection, vehicle odometry interface, ego-motion localization and global localization with HD Map input. Stack further provides ability to fuse external sensors such as HD Map and V2X into a single and unified environmental model, thus enhancing ADAS features support (e.g., high-curvature ramps). LVS-2+ also extends safety features support with trajectory prediction, perception decomposition, ODD analysis, sensor coverage and health monitoring.

Based on LeddarVision low-level fusion (LLF) and perception technology, LVS-2+ enables a **premium surround-view L2/L2+ and highway assist ADAS offering at lower sensor and hardware cost**. LLF technology optimally combines sensor modalities, pushing performance envelope far beyond legacy solutions and **extending object detection to over 200 m**. LVS-2+ extended **5V5R configuration** has a **single wide FoV (120°) 3 Mpx front camera, four surround 190° FoV 1.3 Mpx cameras, one medium-range front radar and four short-range front and back corner radars**. Front camera and medium-range radar extend **ACC support up to 160 km/h**. Surround cameras and rear short-range corner radars **extend support of 5-star NCAP 2025 / GSR 2022 to overtaking/reverse/dooring scenarios** and the **highway assist features enabling HWA and TJA with auto-lane change support**.

LVS-2+ superior object detection performance extends to occluded VRUs and vehicles, providing early warning in NCAP tested scenarios (e.g., occluded cyclist tests). Superior object separation and longitudinal position measurement accuracy in highway scenarios leads to higher performing ACC implementation. Inherent sensor redundancy provides a more reliable operation in presence of degraded (e.g., dirty lens), failing (e.g., failing camera) or conflicting sensors (e.g., false alarms from radars in presence of guard rails' multipath) and adverse scenarios and environments (e.g., dust, blinding light, etc.).

LVS-2+ product is part of a family of LeddarVision products targeting entry- to premium-level ADAS. A comprehensive roadmap provides growing features support for different market segments. LVF companion product family targets entry-level to premium front-view ADAS, with 1V2R to 1V5R sensor configuration, providing economical solutions to support GSR and 5-star NCAP 2025 with comprehensive perception features.

LVS-2+ B-sample is planned for Q4 2023, targeting vehicle SOP in 2026.

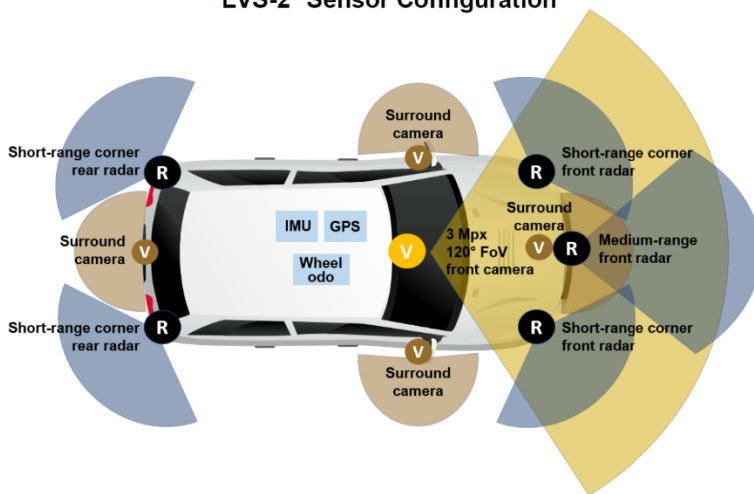
Target Applications

- Premium surround L2/L2+ ADAS and highway assist applications
- Safety: GSR 2022 and 5-star NCAP 2025 (SA, VRU), including AEB C2C & VRU, AEB evasive, FCW, LDW, LKA, ELK, BSD, LCA, LCDAS, RCW, RCTA, FCTA, SAS, TLR, TSR.
- Driving: L2/L2+ highway assist, including ACC (up to 160 km/h), LCC, ALCA, TJA, HWA (including auto-lane change support).

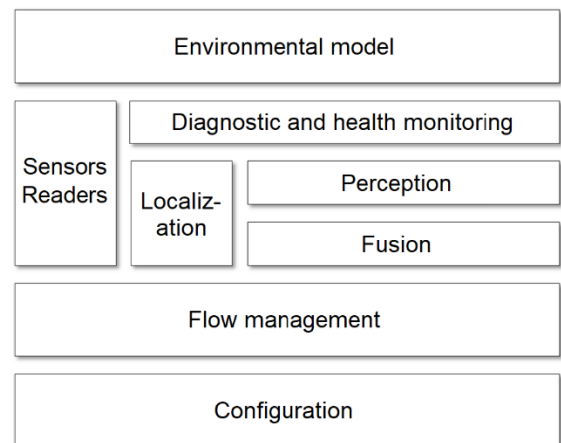
Hardware Platform

- Sensor configuration: 5V5R
- Front camera: 3 Mpx 120° FoV
- Surround cameras: Four 1.3 Mpx 190° FoV
- Front radar: One medium-range radar (Continental ARS510 or similar)
- Corner radars: Four short-range corner radars (Continental SRR520 or similar)
- SoC: TBD
- ECU: TBD

LVS-2+ Sensor Configuration



Software Functional Diagram



Software Stack Features

Fusion	Radar-camera low-level fusion Offline and online camera-to-camera radar-to-camera calibration and diagnostics
Perception	Dynamic and static 3D object detection and classification, including vehicles and VRUs, extended to surround lanes Road model: complete road model, including ego-lane and up to two adjacent L/R lanes based on lane lines detection (solid, dashed, color) and road edges; road edges modeling Speed traffic signs detection (SAS/ISA support) Object continuous tracking and stabilization, 15 FPS output
Premium perception	Unclassified object detection Event detection (e.g., cut-in) Free space detection

	Traffic signs and highway traffic light detection Fuses external sensors such as HD Map and V2X into a single and unified environmental model
Premium prediction	Detected objects trajectory prediction
Positioning	Ego-motion, GPS, IMU and vehicle dynamics-based odometry (wheels)
Premium positioning	Global localization with HD Map input
Premium safety	Global scene attributes detection for ODD analysis support Sensor coverage and health monitoring Perception decomposition
Supported ODDs	Weather: clear, light rain, fog, snow, wet road, snow on the road Illumination: day / lowlight / night with streetlights Road topography and conditions: highway, poor road marking visibility, high lane curvatures. Highway special lanes, including entrances, exits, toll, service and ramps. ODD extended to cover 5-star NCAP 2025 test scenarios
Environmental model	Objects (3D, classification), free space, road model, ego-motion data in vehicle coordinates (in global coordinates – TBD) and diagnostics (TBD)
Operating system	Linux
Interfaces	Sensors: ROS2 Vehicle odometry: CAN GPS, IMU: CAN Environmental model: ROS2, ECAL

Perception Key Performance Indicators (KPIs)

Object detection	Vehicles (CIPV): Typ. range >200 m Vehicles (rear): Typ. range 150 m (dynamic only, behind ego-vehicle) VRUs (ego-path): Typ. range 60 m Vehicles and VRUs (vehicle sides, highway): Typ. range 10 m Unclassified objects (on L/C/R lanes): TBD Ultra-low FPR (<1E-6/h) on objects in danger zone (60 km/h Vdiff) to support safety features with perception decomposition
Object measurements	Vehicle (rear-end) accuracy: typ. std longitudinal (<2%), lateral (0.5 m), orientation (2 deg) @ 150 m Vehicle (CIPV) 3D bounding box accuracy: typ. std length (0.5 m), width (0.2 m), height (0.3 m) @ 150 m
Road model	CIPV assignment to ego-lane up to 200 m with recall 95%, precision 99% Unoccluded surrounding vehicles assignment up to 100 m with recall 95%, precision 99%
Traffic signs detection	Numerical type signs with recall >95%, precision >99%
Traffic light detection	TBD
Global positioning accuracy	Ego-vehicle position <0.1 m, heading <0.2°
NCAP 2025 test scenarios	Perception shall support gaining >90% score of SA and VRU relevant tests.

LVS-2+ Features Roadmap Schedule

- SoC decision: Q1 2023
- Hardware platform: Q4 2023
- ROS2 support: 2023
- TSR for SAS/ISA support: 2023
- Extended road model: 2023
- Extended object detection: 2023
- Extended ODD: 2024
- Comprehensive TSR/TLR: 2024
- Premium perception: 2024
- Premium positioning: 2024
- Premium safety: 2024

Certifications

- ASPICE: Developed according to ASPICE L2, targeted by Q3 2024.
- ASIL-B certification targeted.

Availability

- A-sample: Available since Q4 2022
- B-sample: Q4 2023
- C-sample: Q3 2024
- Target vehicles: SOP 2026