Item Definition Document – Lane Keeping Assist System (LKAS) Generation 2.0

1. Overview

The Lane Keeping Assist System (LKAS) Generation 2.0 is an advanced driver assistance feature designed to help maintain vehicle position within a detected lane. It provides corrective steering input and driver alerts to prevent unintended lane departures, supporting SAE Level 2 automation when combined with adaptive cruise control. LKAS G2.0 integrates improved sensor fusion, higher fault tolerance, and enhanced human-machine interaction (HMI) for safety compliance under ISO 26262 standards.

2. Product Description

Item Name	Lane Keeping Assist System (LKAS) – Generation 2.0
Item Category	Advanced Driver Assistance System (ADAS) – Safety-Critical ECU
Primary Function	Maintain vehicle lane position using steering corrections and alerts.
Development Phase	Concept Definition & Safety Concept
ASIL Target	ASIL-D (Critical)
Hardware Platform	Embedded ECU with integrated torque motor interface and perception processor.
Software Platform	AUTOSAR Adaptive / Real-Time Linux with integrated AI perception stack.
Interfaces	Camera, Radar, CAN, LIN, Vehicle Dynamics, and HMI.
Power Supply	12V DC nominal (operating range: 9V – 16V).

3. Functional Overview

LKAS G2.0 continuously monitors the vehicle's position relative to lane boundaries using camera and radar sensors. It determines the optimal steering torque to maintain lane centering, issuing corrective input via the electric power steering (EPS) system. If lane departure is imminent, the system warns the driver via haptic steering wheel feedback and instrument cluster alerts. Redundant monitoring ensures that in the event of system failure, the driver is promptly notified and the system transitions to a safe state.

4. Preliminary Safety Goals

SG-1	Prevent unintended steering actions or excessive torque beyond system intent.
SG-2	Ensure driver awareness when LKAS assistance is unavailable or degraded.
SG-3	Prevent false lane detections or unintended activations during low-speed maneuvers.

5. Dependencies & Assumptions

- Reliable lane detection requires clear road markings and adequate lighting.
- System performance depends on continuous communication with vehicle dynamics ECU.
- The camera module is calibrated and operational; radar data provides lateral stability cues.

- Driver is assumed to have hands on the wheel at all times during operation.

6. Compliance & Standards

The LKAS G2.0 development process adheres to the following standards:
- ISO 26262:2018 (Functional Safety)
- ISO/PAS 21448:2022 (Safety of the Intended Functionality, SOTIF)
- UNECE R79 (Steering Equipment)
- ISO 23374 (Driver Monitoring Integration)