| Hazard ID | Situational Analysis | | | | | | | Hazard Identification | | | | | | Hazardous Event Classification | | | | | | Determination of ASIL and Safety Goals | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Operational Mode | Operational Scenario | Environmental Details | Situation Details | Other Details (optional) | Item Usage (function) | Situation Description | Function | Deviation | Deviation Details | Hazardous Event (resulting effect) | Event Details | Hazardous Event Description | Exposure (of situation) | Rationale (for exposure) | Severity (of potential harm) | Rationale (for severity) | Controllability (of hazardous event) | Rationale (for controllability) | ASIL Determination | Safety Goal |
| HA-001 | OM03 - Normal Driving | OS04 - Highway | EN06 – Rain (slippery road) | SD02 – High speed | | IU01 – Correctly used | Normal driving on a highway during rain (slippery road) With high speed and correctly used system | Lane Departure Warning (LDW) function shall apply an oscillating steering torque to provide the driver with haptic feedback | DV04 – Actor effect is too much | The LDW function applies and oscillating torque with very high torque (above limit) | EV00 – Collision with other vehicle | High haptic feedback can affect driver's ability to steer as intended. The driver could lose control of the vehicle and collide with another vehicle or with road infrastructure | The LDW function applies too high an oscillating torque to the steering wheel (above limit) | E3 - Medium probability | Driving on a highway with rain (slippery roads) may occur 1 % to 10 % of average operating time | S3 - Life-threatening or fatal injuries | Driver is driving at high speed (>40mph) | C3 - Difficult to control or uncontrolable | The instant high torque applied to the steering wheel may be higher than the instant force that a driver can apply to correct it in a short period of time. | C | The oscillating steering torque from the lane departure warning function shall be limited |
| HA-002 | OM03 - Normal Driving | OS03 – Country Road | EN01 – Normal Conditions | SD02 – High speed | | IU02 – Incorrectly used | Normal driving on country roads during normal conditions With high speed and incorrectly used system | Lane Keeping Assistance (LKA) function shall apply the steering torque when active in order to stay in ego lane | DV03 – Function always activated | The Lane Keeping function is always activated | EV00 – Collision with other vehicle | The driver could use the function as if it were a fully autonomous driving car and loose attention in the driving task. | The Lane Keeping function is always activated and has not time limit. This causes the driver to treat the function as if it were meant for fully autonomous driving | E2 - Low probability | Driving on a country road and misusing the system may not happen too often | S3 - Life-threatening or fatal injuries | Driver is driving at high speed (>40mph) | C3 - Difficult to control or uncontrolable | Driver's hands are not on the steering wheel at high speeds. A vehicle accident would not be controllable. | B | The lane keeping assistance function shall be time limited and the additional steering torque shall end after a given time interval so that the driver cannot misuse the system for autonomous driving. |
| HA-003 | OM03 - Normal Driving | OS04 - Highway | EN01 – Normal Conditions | SD02 – High speed | | IU01 – Correctly used | Normal driving on a highway during normal conditions with high speed and correctly used system | Lane Departure Warning (LDW) function shall apply an oscillating steering torque to provide the driver with haptic feedback | DV19 – Sensor detection is wrong | The camera sensor fails to detect the road lines, causing the departure warning not to be triggered (no haptic feedback or warning to the driver) | EV00 – Collision with other vehicle | The vehicle may depart inadvertently from its ego lane . No haptic feedback and warning to the driver would be applied, causing the vehicle and collide with another vehicle or with road infrastructure. | The camera sensor fails to detect the road lines, causing the departure warning not to be triggered (no haptic feedback or warning to the driver) | E3 - Medium probability | Driving on a highway may occur 1 % to 10 % of average operating time. | S3 - Life-threatening or fatal injuries | Driver is driving at high speed (>40mph) | C2 - Normally controlable | Driver may react in time and correct the steering angle towards the ego lane of the vehicle | B | The camera sensor ECU shall send a camera sensor fault signal to the Car Display ECU so that a Lane Keeping Assistant deactivated warning due to Sensor fault is shown in the Car Display. |
| HA-004 | OM03 - Normal Driving | OS03 – Country Road | EN04 – Snowfall (degraded view) | SD03 – Normal Acceleration | | IU01 – Correctly used | Normal driving on a country road during snowfall (degraded view) with normal acceleration and correctly used system | Lane Keeping Assistance (LKA) function shall apply the steering torque when active in order to stay in ego lane | DV19 – Sensor detection is wrong | Camera sensor is not able to detect road lines because of snow on the road. | EV04 – Car comes off the road | Driver does not react in a timely manner due to limited visibility. Vehicle comes out of the road | Camera sensor is not able to detect road lines because of snow on the road. | E2 - Low probability | Driving on a country road during snow may not happen too often. | S3 - Life-threatening or fatal injuries | Coming out of the road may cause collision with other vehicles, barriers, ... | C2 - Normally controlable | In normal acceleration and speed drivers may be able to react and control the car | A | Line Keeping Assistant function shall be deactivated in case of sensor fault. A warning message in the car display shall be showed. |