| 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 | Normal Driving | Highway | Normal Conditions | High Speed | | Correctly Used | Typical use case: Normal driving on a highway at high speed under optimal driving conditions with activated Lane Departure Warning function | Lane Departure Warning (LDW) function shall apply an oscillating steering torque to provide the driver with haptic feedback | Actor effect is too much | The LDW function applies an oscillating torque with very high torque (above limit) | 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 from the side with another vehicle or with road infrastructure | Loss of control over vehicle | E3 Medium Probability: Occurs once a month or more often for an average driver | Driving on highways with high speed is a common scenario for e.g. commuters which would lead to an exposure of E4, but a lot of vehicles are used for inner city traffic, so exposure E3 is chosen | S3 Life-threatening or fatal injuries | Although most vehicles contain safety equipment like airbags, collisions at high speed lead often to severe injuries | C3 Difficult to control or uncontrollable | At high speeds the car is likely to lose stability due to abrupt movements of the steering wheel | C | The oscillating steering torque from the lane departure warning function shall be limited. |
| HA-002 | Normal Driving | Country Road | Normal Conditions | High Speed | | Incorrectly used | Typical use case: Normal driving on country road road under optimal driving conditions with activated Lane Keeping Assistance Function | Lane Keeping Assistance (LKA) function shall apply the steering torque when active in order to stay in ego lane | Function always activated | The LKA function is always active and driver misuses the system by taking off both hands from steering wheel | Collision with other vehicle | Because both hands are off the steering wheel the driver can't control the vehicle and the vehicle collides from the side with another vehicle or with road infrastructure | Loss of control over vehicle | E2 Low Probability: Occurs a few times a year for the great majority of drivers | As country roads have more intersections (compared with highways) and are often curvy, drivers are not too often tempted to misuse the LKA function as autopilot | S3 Life-threatening or fatal injuries | on country roads speeds are often as high as on highways | C3 Difficult to control or uncontrollable | Since the driver has both hands off the steering wheel, he/she can't react fast enough to steer the vehicle in a safe direction | B | The LKA function shall be time limited and the additional torque shall end after a given time interval so that the driver cannot misuse the system for autonomous driving. |
| HA-003 | Normal Driving | Highway | Fog (degraded view) | High Speed | | Correctly Used | Rather seldom use case: Normal driving on a highway at high speed under degraded view conditions by fog with activated Lane Departure Warning function | Lane Departure Warning (LDW) function shall apply an oscillating steering torque to provide the driver with haptic feedback | Actor effect is too much | The LDW function applies an oscillating torque with very high torque (above limit) | 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 from the side with another vehicle or with road infrastructure | Loss of control over vehicle | E1 Very Low Probability: Occurs less often than once a year for the great majority of drivers | Most drivers reduce voluntarily the speed under bad visibility conditions, although sometimes drivers can be surprised by fog banks | S3 Life-threatening or fatal injuries | speeds on highways are often high | C3 Difficult to control or uncontrollable | At high speeds the car is likely to lose stability due to abrupt movements of the steering wheel | A | The oscillating steering torque from the lane departure warning function shall be limited, the LDW function shall not be available under poor visibility conditions |
| HA-004 | Normal Driving | Country Road | Snow (slippery road) | High Speed | | Incorrectly used | Rather seldom use case: Normal driving on country road under slippery road conditions because of snow with activated Lane Keeping Assistance Function | Lane Keeping Assistance (LKA) function shall apply the steering torque when active in order to stay in ego lane | Function always activated | The LKA function is always active and driver misuses the system by taking off both hands from steering wheel | Collision with other vehicle | Because both hands are off the steering wheel the driver can't control the vehicle and the vehicle collides from the side with another vehicle or with road infrastructure | Loss of control over vehicle | E1 Very Low Probability: Occurs less often than once a year for the great majority of drivers | Most drivers reduce voluntarily the speed under slippery road conditions, although sometimes drivers can be surprised by snow covered sections of road | S3 Life-threatening or fatal injuries | speeds on highways are often high | C3 Difficult to control or uncontrollable | Addional difficulty of slippery road to the hands off scenario | A | The LKA function shall be time limited and the additional torque shall end after a given time interval so that the driver cannot misuse the system for autonomous driving. Additionally the temperature and the traction of the road should be checked so that the LKA function can't be activated at low temperatures and slippery road. |