| Hazard ID | Situation Analysis | | | | | | |
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| | Operational Mode | Operational Scenario | Environmental Details | Situation Details (optional) | Other Details (optional) | Item Usage (function) | Situation Description |
| HA-001 | OM03 - Normal Driving | OS03 - Highway | EN06-08 - Rain, Snow or Glace (slippery road) | SD02 - High speed | Daytime or nighttime driving | IU01 - Correctly used | Normal Driving on Highway during rain at high speeds |
| HA-002 | OM03 - Normal Driving | OS03 - Country Road | EN01 - Normal conditions | SD02 - High speed | Daytime or nighttime driving | IU02 - Incorrectly used | Normal Driving on during normal conditions at high speed. Driver misused LKA as an autonomous function. |
| HA-003 | OM03 - Normal Driving | OS01 - City Road | EN04 - Snowfall (degraded view) | SD03 - Low speed | Daytime or nighttime driving | IU01 - Correctly used | Normal Driving on City Road during Normal conditions with Low speed (Night time + Obstacle on the road) |
| HA-004 | OM03 - Normal driving | OS02 - City Road | EN01 - Normal conditions | SD01 - Low speed | Heavy traffic city driving condition | IU01 - Correctly used | Normal driving condition in heavy city traffic with frequent lane changes |
| HA-005 | OM03 - Normal driving | OS04 - Highway | EN02 - Sun blares (degraded view) | SD02 - High speed | Driving eastward or westward into the sun | IU01 - Correctly used | Normal highway high-speed driving condition driving into the sun. |
| HA-006 | OM03 - Normal driving | OS04 - Highway | EN03 - Fog EN04 - Snowfall (degraded view) | SD02 - High speed | Driving in fog or snowfall | IU01 - Correctly used | Normal highway high-speed driving condition driving in fog or snowfall with very low visibility of lane lines. |
| HA-007 | OM03 - Normal driving | OS09 - Road tunnel | EN01 - Normal conditions | SD02 - High speed | Driving into a tunnel from sunlight | IU01 - Correctly used | Normal highway high-speed driving condition driving into a tunnel from sunlight |
| HA-008 | OM03 - Normal driving | OS05 - Mountain Pass | EN06-08 - Rain, Snow or Glace (slippery road) | SD02 - Low speed | Driving on mountain pass when road is slippery | IU01 - Correctly used | Normal highway high-speed driving condition driving on mountain pass road with slippery road conditions |
| HA-009 | OM06 - Towing (active) | OS04 - Highway | EN06-08 - Rain, Snow or Glace (slippery road) | SD01 - Low speed | Driving on highway in rainy or snowy conditions with trailer load at back of the vehicle | IU01 - Correctly used | Normal highway high-speed driving condition with slipper road, but a heavy trailer load is at back of vehicle. |

| Hazard Identification | | | | | |
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| **Function** | **Deviation** | **Deviation Details** | **Hazardous Event (resulting effect)** | **Event Details** | **Hazardous Event Description** |
| LDW function shall apply oscillating steering torque to provide tactile / haptic feedback to the driver | DV04 - Actor effect is too much | LDW function applies more oscillating torque than needed | EV04-06 - Front collision with traffic or obstacle | Vehicle crashes into the traffic or obstacle with injury to driver | Loss of control over vehicle and loss of steering |
| LKA function shall apply the steering torque when active in order to stay in ego lane | DV03 - Function always activated | Continuous LKA for long duration will be misused as autonomous | EV04-06 - Front collision with traffic or obstacle | Vehicle crashes into the traffic or obstacle with injury to driver | Loss of control over vehicle and vehicle steering not actively managed by driver. |
| LDW function applies oscillating torque at a magnitude and frequency on steering wheel | DV19 - Sensor detection is wrong | LDW function fails to detect lane lines on the road | EV04-06 - Front collision with traffic or obstacle | Vehicle crashes into the traffic or obstacle with injury to driver | No LDW warning issued driver upon unintended departure from lane |
| LDW function applies oscillating torque at a magnitude and frequency on steering wheel | DV02 - Function unexpectedly activated | LDW function activates frequently | EV-07 - None | Driver is given multiple warnings due to lane changes in heavy traffic | Driver annoyance due to frequent LDW warning |
| LDW function applies oscillating torque at a magnitude and frequency on steering wheel | DV19 - Sensor detection is wrong | LDW function fails to detect lane lines on the road | EV04-06 - Front collision with traffic or obstacle | Vehicle crashes into the traffic or obstacle with injury to driver | No LDW warning issued driver upon unintended departure from lane |
| LDW function applies oscillating torque at a magnitude and frequency on steering wheel | DV19 - Sensor detection is wrong | LDW function fails to detect lane lines on the road due to fog, snowfall or snow covering lane lines | EV04-06 - Front collision with traffic or obstacle | Vehicle crashes into the traffic or obstacle with injury to driver | No LDW warning issued driver upon unintended departure from lane |
| LDW function applies oscillating torque at a magnitude and frequency on steering wheel | DV19 - Sensor detection is wrong | LDW function fails to detect lane lines on the road due to sudden change in lighting and exposure | EV04-06 - Front collision with traffic or obstacle | Vehicle crashes into the traffic or obstacle with injury to driver | No LDW warning issued driver upon unintended departure from lane |
| LKA function applies steering torque to keep the vehicle in the center of the lane | DV04 - Actor effect is too much | LKA function applies large mangnitude of torque due to high curvature of mountain pass roads in slipper conditions | EV03 - Car spins out of control | Vehicle spins out of control, may go off the road, hit an obstacle or worse fall off the moutain pass | LKA function applies large torque on slipper road leading to vehicle spinning out of control |
| LKA function applies steering torque to keep the vehicle in the center of the lane | DV04 - Actor effect is too much | LKA function applies large torque and to destabalizes vehicle due to trailer load | EV03 - Car spins out of control | Vehicle spins out of control, may go off the road, hit an obstacle or worse collide with oncoming traffic | LKA function applies large torque on slippery road leading to vehicle spinning out of control |

| Hazardous Event Classification | | | | | |
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| **Exposure (of situation)** | **Rationale (for exposure)** | **Severity (of potential harm)** | **Rationale (for severity)** | **Controllability (of hazardous event)** | **Rationale (for controllability)** |
| E3 - Medium probability | Rainy conditions prevail over only 3-4 months in an year. People driving in these conditions on highway is medium probability | S3 - Severe and life-threatning injuries | Highway speeds are high high and collission with oncoming traffic can lead to major injury | C3 - Difficult to control or uncontrollable | Driver may not be able to assume sudden control in a stable manner due to poor surface conditions. |
| E2 - Low probability | Probability of lane departure due to inadequate driver attention is low. | S3 - Severe and life-threatning injuries | Highway speeds are high high and collission with oncoming traffic can lead to major injury | C3 - Difficult to control or uncontrollable | The driver is not paying attention for a long duration and is unlikely to regain control in a timely manner, leading to unstable vehicle conditions. |
| E2 - Low probability | Driving in snow on uncleared roads is rare event in an year | S2 - Severe and life-threatening injuries | In city speed can be high and collission with oncoming traffic can lead to major injury | C3 - Difficult to control or uncontrollable | Driver may not be able to assume sudden control in a stable manner due to snow that may lead to instability in vehicle. |
| E3 - Medium probability | City driving and lane change in low speed are common in few markets | S0 - No injuries | Speeds in heavy city traffic are very low | C0 - Controllable in general | Driver can gain contorl of vehicle at the low city (heavy) traffic |
| E3 - Medium probability | Highway speeds have very low time for reaction and risk is too high | S3 - Severe and life-threatning injuries | Possibility of collision with on-coming traffic at highway speeds | C3 - Difficult to control or uncontrollable | At high speeds driver may not gain steady control of the vehicle |
| E4 - High probability | Many people and many regions drive on highways in foggy or snowy conditions. Highway speeds have very low time for reaction and risk is too high. | S3 - Severe and life-threatning injuries | Possibility of collision with on-coming traffic at highway speeds | C3 - Difficult to control or uncontrollable | At high speeds driver may not gain steady control of the vehicle |
| E3 - Medium probability | Highway speeds have very low time for reaction and risk is too high | S3 - Severe and life-threatning injuries | Possibility of collision with on-coming traffic at highway speeds | C3 - Difficult to control or uncontrollable | At high speeds driver may not gain steady control of the vehicle |
| E2 - Low probability | Mountain pass driving in slippery conditions is a rare event | S3 - Severe and life-threatning injuries | Loss of control of vehicle on mountain pass could lead to vehicle going off the road, hitting obstacle or falling off the mountain. | C3 - Difficult to control or uncontrollable | Difficult to regain control of vehicle in slipper conditions |
| E2 - Low probability | Trailer loads are not used frequently especially when driving conditions are not too good | S3 - Severe and life-threatning injuries | Loss of control of vehicle on highway could lead to vehicle going off the road, hitting obstacle or colliding with oncoming traffic. | C3 - Difficult to control or uncontrollable | Difficult to regain control of vehicle in slippery conditions with trailer load at the back of the vehicle. |

| Determination of ASIL and Safety Goals | |
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| **ASIL Determination** | **Safety Goal** |
| ASIL C | LDW oscillating torque magnitude should be limited below a pre-defined value. |
| ASIL B | LKA function will be limited by time. Its application will not continue after pre-determined time limit. |
| ASIL A | LDW function will disable and issue warning if lane lines are not visisble |
| QM | Disable LDW in very low speed congested traffic condition and warn driver (e.g. could use google maps traffic data too) |
| ASIL C | LDW function will disable and issue warning if lane lines are not visisble due to sun glare |
| ASIL D | LDW function will disable and issue warning if lane lines are not visisble due to fog or snow fall |
| ASIL C | LDW function will disable and issue warning if lane lines are not visisble due to fog or snow fall |
| ASIL B | LKA function can take inputs from chassis ECU (IMU or wheel spin data) on grade and temperature information and disable application of torque if snowy, slippery conditions are detected. |
| ASIL B | LKA function can use data from body ECU, chassis ECU to determine if trailer load is hooked. LKA will disable and issue warning to driver. |