

**INSTRUCTIONS:**

Fill out the hazard analysis and risk assessment below.

HA-001 should be for the lane departure warning function as discussed.

HA-002 should be for the lane keeping assistance function as discussed.

Then come up with your own situations and hazards for the lane assistance function.

When finished, export your spreadsheet as a pdf file so that a reviewer can review.

Hazard ID			
	Operational Mode	Operational Scenario	Environmental Details
HA-001	OM03 - Normal Driving	OS04 - Highway	EN01 - Normal Conditions
HA-002	OM03 - Normal Driving	OS03 - Country Road	EN01 - Normal Conditions
HA-003	OM03 - Normal Driving	OS02 - City Road	EN07 - Snow (Slippery Road)
HA-004	OM03 - Normal Driving	OS01 - Any Road	EN09 - N/A

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 stance system. Fill in the HA-003 and HA-004 rows.  
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Situational Analysis		
Situation Details	Other Details (optional)	Item Usage (function)
SD02 - High Speed		IU01 - Correctly Used
SD02 - High Speed		IU02 - Incorrectly Used
SD02 - High Speed		IU01 - Correctly Used
SD06 - High Braking		IU01 - Correctly Used

Situation Description	Function	Deviation	Deviation Details
Normal Driving on Highway during rain (Slippery 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	DV04 Actor effect is too much	The LDW Function applies an oscillating Torque with very High Torque (Above Limit)
Normal Driving on Country Roads during normal conditions with High Speed, the driver is misusing the Lane Keeping Assistance Function (as an Autonomous Function)	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 Assistance Function is always activate
Normal Driving on City Road covered with Snow (Slippery Conditions) with Low Speed and Correctly Used System.	Lane Departure Warning (LDW) function shall apply an oscillating steering torque to provide the driver with haptic feedback	DV11 - Actor effect is wrong	The LDW Function applies false oscillating Torque frequently
Normal Driving on Any Roads during any conditions with High Braking, the driver correctly using the Lane Keeping Assistance Function.	Lane Keeping Assistance (LKA) function shall apply the steering torque when active in order to stay in ego lane	DV04 Actor effect is too much	The Lane Keeping Assistance Function is NOT required in such situation

**Hazard Identification**

<b>Hazardous Event (resulting effect)</b>	<b>Event Details</b>	<b>Hazardous Event Description</b>
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)
EV00 - Collision with other vehicle	Lane Keeping Assistance was always on and had no time limit, driver hands may NOT be on the wheel at high speeds, a vehicle accident would not be controllable.	The Lane Keeping Assistance Function was NOT meant for fully autonomous driving
EV03 - Car spins out of control	Lanes are not clear on icy road, which fires false LDWs	The LDW function applies wrong oscillating Torque to steering wheel
EV03 - Car spins out of control	Lane Keeping Assistance tries to apply steering Torque while Hard break, a vehicle accident would not be controllable.	The Lane Keeping Assistance Function is NOT required while Hard Breaking is performed

Hazardous		
Exposure (of situation)	Rationale (for exposure)	Severity (of potential harm)
E3 - Medium Probability	Driving on Slippery Highway (because of rain) is very frequent	S3 - Life-threatening or fatal injuries
E2 - Low Probability	(on Highway with High Speed + Misuse System) Combination	S3 - Life-threatening or fatal injuries
E1 - Very Low Probability	Once in a year or less	S3 - Life-threatening or fatal injuries
E3 - Medium Probability	Once a month or more, situation is frequent in chaotic	S2 - Severe and life- threatening injuries

Event Classification		
Rationale (for severity)	Controllability (of hazardous event)	Rationale (for controllability)
Highway Speed limits are relatively high, and crashing on high speed is life-threatening	C3 - Difficult to Control or Uncontrollable	less than 90% of all drivers were able to avoid harm in that situation
Crash on High Speed is Fatal	C3 - Difficult to Control or Uncontrollable	less than 90% of all drivers were able to avoid harm in that situation
on High Speed, Car crash is fatally harmful	C3 - Difficult to Control or Uncontrollable	less than 90% of drivers can control slippery car on icy road
on Hard break, and sudden steering may flip the car, or cause a crash on low speed	C2 - Normally Controllable	90% or more of all drivers or other traffic participants are usually able to avoid harm, we don't see cars flipping more often

Determination of ASIL and Safety Goals	
ASIL Determination	Safety Goal
ASIL C	The oscillating Torque from the Lane Departure Warning(LDW) function shall be limited
ASIL 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.
ASIL A	The oscillating Torque from the Lane Departure Warning (LDW) function shall stop when driver is trying to control the car in bad weather conditions.
ASIL A	The Lane Keeping Assistance Function shall be terminated when driver put his foot on the breaks.