

Hazard ID	Situational Analysis				
	Operational Mode	Operational Scenario	Environmental Details	Situation Details	Other Details (optional)
HA-001	Normal Driving	Highway	Normal conditions	High speed	N/A
HA-002	Normal Driving	Highway	Normal conditions	High speed	N/A
HA-003	Normal Driving	City Road	Normal conditions	Low speed	N/A
HA-004	Normal Driving	City Road	Rain (slippery road)	Low speed	N/A

Item Usage (function)	Situation Description	Function	Deviation	Deviation Details
Correctly used	Normal driving on highway in normal conditions at high speed and correctly used	Lane Departure Warning (LDW) function shall apply an oscillating steering torque to provide the driver with haptic feedback	Actor effect is too much	The lane departure warning function applies an oscillating torque with very high torque amplitude (above the limit) and the lane departure warning function applies an oscillating torque that is above the frequency limit.
Incorrectly used	Normal driving on highway in normal conditions at high speed and incorrectly using lane keeping assistance function as autonomous function	Lane Keeping Assistance (LKA) function shall apply the steering torque when active in order to stay in ego lane	Function always activated	The lane assistance function is not limited in time duration which leads to misuse as an autonomous driving function.
Correctly used	Normal driving on city roads in normal conditions at low speed while being used correctly	Lane Departure Warning (LDW) function shall apply an oscillating steering torque to provide the driver with haptic feedback	Function unexpectedly activated	The lane departure warning function unexpectedly activates and starts oscillating the steering wheel during normal city driving.
Correctly used	Normal driving on city roads in rain (slippery road) at low speed while being correctly used	Lane Keeping Assistance (LKA) function shall apply the steering torque when active in order to stay in ego lane	Sensor detection is too late	The lane keeping assistance function does not activate in time when the road is slippery.

Hazard Identification			
Hazardous Event (resulting effect)	Event Details	Hazardous Event Description	Exposure (of situation)
Front collision with ahead traffic	Vehicle crashes into the ahead traffic with injury to driver	Loss of steering	E4 - High probability
Front collision with oncoming traffic	Vehicle crashes into oncoming traffic with injury to driver	Driving on highway at high speed and misusing the system	E4 - High probability
Front collision with ahead traffic	Vehicle crashes into ahead traffic with injury to driver	Driving on city road at low speed and partial loss of steering	E4 - High probability
Side collision with other traffic	Vehicle crashes into side traffic with no injury to driver	Driving on city road at low speed in rain	E3 - Medium probability

Hazardous Event Classification

Rationale (for exposure)	Severity (of potential harm)	Rationale (for severity)	Controllability (of hazardous event)
Driving on a highway at high speed in normal conditions occurs during almost every drive for an average driver	S3 - Life-threatening or fatal injuries	While driving on the highway, speeds are expected to be high	C3 - Difficult to control or uncontrollable
Driving on a highway at high speed in normal conditions occurs during almost every drive for an average driver	S3 - Life-threatening or fatal injuries	While driving on the highway, speeds are expected to be high	C3 - Difficult to control or uncontrollable
Driving on city streets at low speed in normal conditions occurs during almost every drive for an average driver	S1 - Light and moderate injuries	While driving on city streets, speeds are expected to be low	C0 - Controllable in general
Driving on city streets at low speed in the rain occurs once a month or more often for an average driver	S1 - Light and moderate injuries	While driving on city streets in the rain, speeds are expected to be low	C2 - Normally controllable

	Determination of ASIL and Safety Goals	
	ASIL Determination	Safety Goal
The malfunction is that the Lane Departure Warning (LDW) applied too much oscillating torque and/or frequency so the driver loses control of the vehicle. Losing steering at high speed would cause a driver to not easily be able to regain control.	C	The oscillating steering torque and frequency for the lane departure warning function shall be limited.
The malfunction is that the Lane Keeping Assistance was always on and that there was no time limit leaving the driver to take both hands off the wheel. Not steering at high speed would cause a driver to not easily be able to regain control.	C	The lane keeping assistance function shall have a time limit so that the driver may not misuse the function as a system for autonomous driving.
The malfunction is that the Lane Departure Warning (LDW) applied too much oscillating torque and/or frequency so the driver loses control of the vehicle. Losing steering at a low speed is controllable because the driver can easily apply brakes.	QM	The camera sensor ECU shall check the Lane Assistance on/off, active/inactive and malfunction warning before sending a torque request to the lane departure warning system.
The malfunction is that the Lane Departure Warning (LDW) applied too much oscillating torque and/or frequency so the driver loses control of the vehicle. Losing steering at a low speed is normally controllable because the driver can apply brakes, however, however, the slippery road adds to the time it takes to slow down and stop the vehicle.	QM	The lane keeping assistance function shall deactivate when the camera sensor stops detecting road markings and shall warn the driver that it has been deactivated.