Hazard Analysis and Risk Assessment

Hazard ID	Situational Analysis				
	Operational Mode	**Operational Scenario**	**Environmental Details**	**Situation Details**	**Other Details (optional)**
HA-001	Normal Driving	City Road	Normal Conditions	Low Speed	Night time
HA-002	Normal Driving	Highway	Normal Conditions	High Speed	Day Time
HA-003	Reverse Driving	Country Road	Fog Conditions	Low Speed	Day Time
HA-004	Degraded Driving	City Road	N/A	Limp home mode	Night time

Hazard ID					
	Item Usage (function)	Situation Description	Function	Deviation	Deviation Details
HA-001	Correctly Used	Normal Driving on a City Road in Normal Conditions at Low Speed at Night	Lane Departure Warning (LDW) function shall apply an oscillating steering torque to provide the driver with haptic feedback	Function always activated	Driver is steering the car in opposite torque in addition to the LDW function. This causes the steering to to continuously vibrate
HA-002	Correctly Used	Normal Driving on a Highway in during Rain, slippery road, at High Speed at Daytime.	Lane Keeping Assistance (LKA) function shall apply the steering torque when active in order to stay in ego lane	Function always activated	Driver is steering the car in opposite torque in addition to the LDW function. This causes the steering to to continuously vibrate
HA-003	Correctly Used	Reverse Driving on a Country Road in Fog Conditions at low speed in Day Time.	Lane Departure Warning (LDW) function shall apply an oscillating steering torque to provide the driver with haptic feedback	Function never activates	Power steering torque sensor stops operating
HA-004	Correctly Used	Degraded Driving due to loss of alternator on a city road at night. Since all vital systems are shut down during Limp Home mode to allow the car to make it home LKA will not be functional.	Lane Keeping Assistance (LKA) function shall apply the steering torque when active in order to stay in ego lane	Function never activates	Power steering torque sensor stops operating

Hazard ID	Hazard Identification			
	Hazardous Event (resulting effect)	**Event Details**	**Hazardous Event Description**	**Exposure (of situation)**
HA-001	Front collision with ahead traffic	EV-05 Front collision with ahead traffic	Continuous vibration of the wheel causes the car to go out of the lane possibly hitting another car. Worse case is hitting a car in the opposite direction	E3
HA-002	Front collision with ahead traffic	EV-05 Front collision with ahead traffic	Continuous vibration of the wheel causes the car to go out of the lane possibly hitting another car. Worse case is hitting a car in the opposite direction	E2
HA-003	Rear collision with trailing traffic	EV-03 Rear collision with trailing traffic	Total loss of LDW function	E2
HA-004	Front collision with ahead traffic	EV-05 Front collision with ahead traffic	Total loss of LKA function	E1

Hazard ID	Hazardous Event Classification			
	Rationale (for exposure)	**Severity (of potential harm)**	**Rationale (for severity)**	**Controllability (of hazardous event)**
HA-001	Medium probability 1 % to 10 % of average operating time Occurs once a month or more often for an average driver	S3	Life-threatening injuries (survival uncertain), fatal injuries More than 10 % probability of AIS 5-6	C3
HA-002	Low probability <1 % of average operating time Occurs a few times a year for the great majority of driver	S3	Life-threatening injuries (survival uncertain), fatal injuries More than 10 % probability of AIS 5-6	C3
HA-003	Low probability <1 % of average operating time Occurs a few times a year for the great majority of driver	S2	Severe and life-threatening injuries (survival probable) More than 10 % probability of AIS 3-6 (and not S3)	C2
HA-004	Very low probability Occurs less often than once a year for the great majority of drivers	S2	Severe and life-threatening injuries (survival probable) More than 10 % probability of AIS 3-6 (and not S3)	C2

Hazard ID		Determination of ASIL and Safety Goals	
	Rationale (for controllability)	**ASIL Determination**	**Safety Goal**
HA-001	Difficult to control or uncontrollable Less than 90 % of all drivers or other traffic participants are usually able, or barely able, to avoid harm	C	Limit the torque applied to the steering wheel
HA-002	Difficult to control or uncontrollable Less than 90 % of all drivers or other traffic participants are usually able, or barely able, to avoid harm	B	The Lane Keep Assist function is time limited and the additional torque ends after a time.
HA-003	Normally Controllable 90 % or more of all drivers or other traffic participants are usually able to avoid harm	QM	Alert the driver with audio and dashboard lights that the function is not working.
HA-004	Normally Controllable 90 % or more of all drivers or other traffic participants are usually able to avoid harm	QM	Alert the driver with audio and dashboard lights that the function is not working.