

Hazard ID	Situational Analysis													Hazard Identification			
	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)			
HA-001	OM03 - Normal Driving	OS04 - Highway	EN06 - Rain (slippery road)	SD02 - High speed		IU01 - Correctly used	Normal driving on a highway during rain (slippery road) with high speed and correctly used system.	Lane Departure Warning (LDW) function shall apply an oscillating steering torque to	DV04 - Actor effect is too much	The Lane Departure Warning function applies an oscillating torque with very high torque (above limit.)	EV00 - Collision with other vehicle.	High haptic feedback can affect driver's ability to steer as intended. The driver loose control and could collide with another vehicle or side (above limit.)	The Lane Departure Warning function applies an oscillating torque with very high torque (above limit.)	E3 - Medium probability			
HA-002	OM03 - Normal Driving	OS03 - Country Road	EN01 - Normal conditions	SD02 - High speed		IU02 - Incorrectly used	Normal driving on a country road during normal conditions with high speed and incorrectly used system.	Lane Keeping Assistance (LKA) function shall apply the	DV03 - Function is always activated	Lane Keeping function is always activated	EV00 - Collision with other vehicle.	Driver use the function as if the car was a self-driving car and loose driving attention.	The driver do not use the function properly.	E2 - Low probability			
HA-003	OM03 - Normal Driving	OS04 - Highway	EN01 - Normal conditions	SD02 - High speed		IU01 - Correctly used	Normal driving on a highway during normal conditions with high speed and correctly used system.	Lane Departure Warning (LDW) function shall apply an oscillating	DV02 - Function unexpectedly activated	The camera sensor stop working and the Lane Departure Warning function	EV00 - Collision with other vehicle.	The Lane Departure Warning continue to be activated and start executing random torque to the	The Lane Departure Warning start acting randomly when the camera sensor is not working.	E3 - Medium probability			
HA-004	OM03 - Normal Driving	OS03 - Country Road	EN01 - Normal conditions	SD02 - High speed		IU01 - Correctly used	Normal driving on a country road during normal conditions with high speed and correctly used system.	Lane Keeping Assistance (LKA) function shall apply the	DV02 - Function unexpectedly activated	The camera sensor stop working and the Lane Keeping Assistance function	EV00 - Collision with other vehicle.	The Lane Keeping Assistance continue to be activated starting executing random torque to the	The Lane Keeping Assistance start acting randomly when the camera sensor is not working.	E3 - Medium probability			

Hazardous Event Classification					Determination of ASIL and Safety Goals							
Rationale (for exposure)	Severity (of potential harm)	Rationale (for severity)	Controllability (of hazardous event)	Rationale (for controllability)	ASIL Determination	Safety Goal						
Driving on a highway with rain could happen between 1% and 10% of the time operating the vehicle.	S3 - Life-threatening or fatal injuries	Collisions at high speed could cause fatal injuries.	C3 - Difficult to control or uncontrollable	It is difficult to stay calm and react properly when the steering wheel is moving too much.	C	The oscillating steering torque from the Lane Departure Warning function shall be limited.						
The conviction between driving at a country road and misusing system should not happen often. Less than	S3 - Life-threatening or fatal injuries	Collisions at high speed could cause fatal injuries.	C3 - Difficult to control or uncontrollable	When the driver loose focus on driving, it is difficult to re-focus in the case of imminent collision.	B	The Lane Keeping Assistance function shall be time limited, and additional steering torque shall end after a given time interval						
Driving on a highway with rain could happen between 1% and 10% of the time operating the vehicle.	S3 - Life-threatening or fatal injuries	Collisions at high speed could cause fatal injuries.	C3 - Difficult to control or uncontrollable	When the driver loose control of the vehicle is very difficult to realize the situation and act accordingly.	C	The Lane Departure Warning function shall be deactivated when the camera sensor stop working.						
Driving on a highway with rain could happen between 1% and 10% of the time operating the vehicle.	S3 - Life-threatening or fatal injuries	Collisions at high speed could cause fatal injuries.	C3 - Difficult to control or uncontrollable	When the driver loose control of the vehicle is very difficult to realize the situation and act accordingly.	C	The Lane Keeping Assistance function shall be deactivated when the camera sensor stop working.						

Hazard & Risk Analysis Definitions

Operational Mode			Reference
ID	Mode	Remarks	
OM01	Parked	Car is parked, ignition is off	OM01 - Parked
OM02	Ignition on	Car is parked, ignition is on	OM02 - Ignition on
OM03	Normal driving	Car is driving	OM03 - Normal driving
OM04	Backward driving	Car is driving	OM04 - Backward driving
OM05	Degraded driving	Limp home mode	OM05 - Degraded driving
OM06	Towing (active)	Towing another car	OM06 - Towing (active)
OM07	Towing (passive)	Being towed by another car	OM07 - Towing (passive)
OM08	Service	Vehicle is in repair garage	OM08 - Service
OM09	N/A	not applicable or not relevant	OM09 - N/A
Operational Scenario			Reference
ID	Scenario	Remarks	
OS01	Any Road	road type	OS01 - Any Road
OS02	City Road	road type	OS02 - City Road
OS03	Country Road	road type	OS03 - Country Road
OS04	Highway	road type	OS04 - Highway
OS05	Mountain Pass	road type	OS05 - Mountain Pass
OS06	Off Road	road type	OS06 - Off Road
OS07	Road with gradient	road attribute	OS07 - Road with gradient
OS08	Road with bumps	road attribute	OS08 - Road with bumps
OS09	Road tunnel	road attribute	OS09 - Road tunnel
OS10	Road with construction site	road attribute	OS10 - Road with construction site
OS11	N/A	not applicable or not relevant	OS11 - N/A
Situation Details			Reference
ID	Scenario	Remarks	
SD01	Low speed	driving attribute	SD01 - Low speed
SD02	High speed	driving attribute	SD02 - High speed
SD03	Normal acceleration	driving attribute	SD03 - Normal acceleration
SD04	High acceleration	driving attribute	SD04 - High acceleration
SD05	Normal braking	driving attribute	SD05 - Normal braking
SD06	High braking	driving attribute	SD06 - High braking
SD07	N/A	not applicable or not relevant	SD07 - N/A
Item Usage			Reference
ID	Mode	Remarks	
IU01	Correctly used	Intended usage	IU01 - Correctly used
IU02	Incorrectly used	Unintended usage (foreseeable)	IU02 - Incorrectly used
IU03	N/A	not applicable or not relevant	IU03 - N/A
Environmental Details			Reference
ID	Scenario	Remarks	
EN01	Normal conditions	weather attribute	EN01 - Normal conditions
EN02	Sun blares (degraded view)	weather attribute	EN02 - Sun blares (degraded view)
EN03	Fog (degraded view)	weather attribute	EN03 - Fog (degraded view)
EN04	Snowfall (degraded view)	weather attribute	EN04 - Snowfall (degraded view)
EN05	Cross-wind (lateral force)	weather attribute	EN05 - Cross-wind (lateral force)
EN06	Rain (slippery road)	road attribute	EN06 - Rain (slippery road)
EN07	Snow (slippery road)	road attribute	EN07 - Snow (slippery road)
EN08	Glaze (slippery road)	road attribute	EN08 - Glaze (slippery road)
EN09	N/A	not applicable or not relevant	EN09 - N/A

Exposure													
ID	Description	Duration (of situation)	Frequency (of situation)	Reference									
E0	Incredible			E0 - Incredible									
E1	Very low probability	Not specified	Occurs less often than once a year for the great majority of drivers	E1 - Very low probability									
E2	Low probability	<1 % of average operating time	Occurs a few times a year for the great majority of drivers	E2 - Low probability									
E3	Medium probability	1 % to 10 % of average operating time	Occurs once a month or more often for an average driver	E3 - Medium probability									
E4	High probability	>10 % of average operating time	Occurs during almost every drive on average	E4 - High probability									
Severity													
ID	Description	Remarks	Probability of injuries	Reference									
S0	No injuries	No injuries	AIS 0 and less than 10 % probability of AIS 1-6	S0 - No injuries									
S1	Light and moderate injuries	Light and moderate injuries	More than 10 % probability of AIS 1-6 (and not S2 or S3)	S1 - Light and moderate injuries									
S2	Severe and life-threatening injuries	Severe and life-threatening injuries (survival probable)	More than 10 % probability of AIS 3-6 (and not S3)	S2 - Severe and life-threatening injuries									
S3	Life-threatening or fatal injuries	Life-threatening injuries (survival uncertain), fatal injuries	More than 10 % probability of AIS 5-6	S3 - Life-threatening or fatal injuries									
Controllability													
ID	Description	Remarks		Reference									
C0	Controllable in general	Controllable in general		C0 - Controllable in general									
C1	Simply controllable	99 % or more of all drivers or other traffic participants are usually able to avoid harm		C1 - Simply controllable									
C2	Normally controllable	90 % or more of all drivers or other traffic participants are usually able to avoid harm		C2 - Normally controllable									
C3	Difficult to control or uncontrollable	Less than 90 % of all drivers or other traffic participants are usually able, or barely able, to avoid harm		C3 - Difficult to control or uncontrollable									

	Controllability	Exposure	Severity			
			S0	S1	S2	S3
	C1	E1	QM	QM	QM	QM
		E2	QM	QM	QM	QM
		E3	QM	QM	QM	A
		E4	QM	QM	A	B
	C2	E1	QM	QM	QM	QM
		E2	QM	QM	QM	A
		E3	QM	QM	A	B
		E4	QM	A	B	C
	C3	E1	QM	QM	QM	A
		E2	QM	QM	A	B
		E3	QM	A	B	C
		E4	QM	B	C	D