1. Test Summary

1.1 Prerequisites

Installation Conditions:

(1) DMS Camera: Install the DMS camera within a 30° angle to the driver's front right. The smaller the angle, the better. The recommended distance from the camera to the driver's face is 60–120 cm, with an optimal distance of about 80 cm. The driver's face should be centered in the camera's midline, with the upper chest visible and no obstructions.

(2) ADAS Camera: Vehicle body parameters and installation distances must be accurately measured and configured. For calibration, ensure the road ahead is straight and level, with no uphill, downhill, or curved sections. The calibration line's center should align with the lane midpoint and the horizon, and the sky should occupy the top half of the frame.

Test Conditions:

(1) Phone Use: The driver faces forward and holds a phone to their ear for longer than the set action duration.

(2) Smoking: The driver faces forward, holds a cigarette, or places a cigarette with the tip pointing down in their mouth for longer than the set action duration.

(3) Yawning: The driver faces forward and opens their mouth wide for longer than the set action duration.

(4) Eye Closure: The driver faces forward and closes their eyes for longer than the set action duration.

(5) Face Loss: After successful calibration, the driver's face is out of the camera's field of view for longer than the set action duration.

(6) Face Calibration Anomaly: The driver's face fails to be recognized.

(7) Sustained Eye Closure: The driver faces forward and keeps their eyes closed for longer than the set action duration.

(8) Frame Obstruction: The camera's view is blocked for longer than the set action duration.

(9) Sunglasses Obstruction: The driver faces forward and wears sunglasses for longer than the set action duration.

(10) Forward Collision and Close Following Distance: The vehicle reaches the set activation speed and continues to approach the vehicle ahead until the calculated pre-collision time is reached.

(11) Lane Departure: On roads with clear lane markings, the vehicle departs or changes lanes until the distance between the wheel and the lane line reaches the set threshold.

(12) Front Vehicle Start: The distance to the vehicle ahead, its stationary time, and its movement distance all meet the set values.

1.2 Test Results

Vehicle Type	Sedan	Test Weather	Clear day or night	Test Roads	Highway/urban roads Address: XXXXXXXXXXX	DMS Installation	Dashboard or Windshield	Tester	Xian Zhaoyan	Test Date	2025/04/14–17

Device Model: JC371

Lab Tests

Algorithm	Action	Test Count	True Positives	False Positives	Missed Detections	Accuracy	False Positive Rate (FPR)	False Negative Rate (FNR)
DMS	Phone Use	50	50	7	0	87.7%	12.3%	0.0%
	Smoking	27	27	10	0	73.0%	27.0%	0.0%
	Yawning	22	14	0	8	63.6%	0.0%	36.4%
	Eye Closure	40	40	0	0	100.0%	0.0%	0.0%
	Looking Around	30	30	0	0	100.0%	0.0%	0.0%
	Looking Down	25	25	0	0	100.0%	0.0%	0.0%
	Face Loss	48	40	1	8	81.6%	2.0%	16.3%
	Face Calibration Anomaly	10	9	0	1	90.0%	0.0%	10.0%
	Sustained Eye Closure	40	40	0	0	100.0%	0.0%	0.0%
	Frame Obstruction	20	3	0	17	15.0%	0.0%	85.0%
	Sunglasses Obstruction	30	30	0	0	100.0%	0.0%	0.0%
ADAS	Forward Collision	26	25	4	1	83.3%	13.3%	3.3%
	Close Following Distance	31	31	0	0	100.0%	0.0%	0.0%
	Lane Departure	28	27	2	1	90.0%	6.7%	3.3%
	Front Vehicle Start	/	/	/	/	#VALUE!	#VALUE!	#VALUE!
	Pedestrian Warning	16	16	0	0	100.0%	0.0%	0.0%

Road Tests								
Algorithm	Action	Test Count	True Positives	False Positives	Missed Detections	Accuracy	False Positive Rate (FPR)	False Negative Rate (FNR)
DMS	Phone Use	80	67	9	13	75.3%	10.1%	14.6%
	Smoking	80	36	17	44	37.1%	17.5%	45.4%
	Yawning	80	40	0	40	50.0%	0.0%	50.0%
	Eye Closure	120	120	6	0	95.2%	4.8%	0.0%
	Looking Around	160	33	8	127	19.6%	4.8%	75.6%
	Looking Down	80	4	0	76	5.0%	0.0%	95.0%
	Face Loss	80	39	0	41	48.8%	0.0%	51.3%
	Face Calibration Anomaly	40	23	0	17	57.5%	0.0%	42.5%
	Sustained Eye Closure	120	119	0	1	99.2%	0.0%	0.8%
	Frame Obstruction	80	79	0	1	98.8%	0.0%	1.3%
	Sunglasses Obstruction	40	40	0	0	100.0%	0.0%	0.0%
ADAS	Forward Collision	14	12	0	2	85.7%	0.0%	14.3%
	Close Following Distance	15	13	0	2	86.7%	0.0%	13.3%
	Lane Departure	40	40	0	0	100.0%	0.0%	0.0%
	Front Vehicle Start	/	/	/	/	#VALUE!	#VALUE!	#VALUE!
	Pedestrian Warning	40	37	0	3	92.5%	0.0%	7.5%

1.3 Test Result Evaluation

(1) Beards: A dense beard may cause false alerts for other events (e.g., sunlight falsely triggering a phone use alert). Smoking may not trigger a smoking alert and may instead trigger a phone use alert. It may also fail to trigger a yawning alert.

(2) Eye Closure: Rapid blinking may occasionally cause a false eye closure alert.

(3) Looking Around: Alert sensitivity is highly dependent on the camera's installation angle. If the camera is on the driver's left, a rightward head turn may not trigger the alert unless the angle exceeds approximately 90°.

(4) Looking Down: The alert is difficult to trigger when the driver wears a hat or has a thick beard. It is also insensitive to both small and large head-down angles, making it difficult to find a reliable trigger angle.

(5) Face Loss: The alert does not trigger when rear passengers are detected. Other DMS events are still detected normally in this case.

(6) Face Calibration Anomaly: After initially detecting and then losing the driver's face, the system sometimes reports face loss continuously instead of triggering the calibration failure alert after one minute.

(7) Forward Collision and Close Following Distance: Alerts did not trigger promptly based on the estimated time to collision. They only triggered at very close distances, such as within 15 meters of the vehicle ahead.

(8) Front Vehicle Start: This alert rarely triggers and is currently not being validated.

2. DMS Test Results

2.1 Face Calibration Anomaly

- Prerequisite: DMS calibration fails.
- Parameters: The DMS activates at speeds >30km/h. An alert triggers if the driver's face leaves the detection frame for more than one minute after calibration begins.
- Test Procedure: First, verify if the face calibration anomaly alert can be triggered. If it cannot, terminate the validation for this item. If it can, proceed with the test scenarios below.
- Test Criteria: Accuracy ≥85%, and false alert rate ≤15%.

Test Results

True Positives											
Test Scenario	1	2	3	4	5	6	7	8	9	10	Total
Dashboard install + Daytime: Face leaves detection frame for > 1 min	0	1	0	1	1	1	1	0	0	0	23
Dashboard install + Nighttime: Face leaves detection frame for > 1 min	0	1	1	1	1	1	1	0	1	0	
Windshield install + Daytime: Face leaves detection frame > 1 min	0	1	1	0	0	1	0	1	0	0	
Windshield install + Nighttime: Face leaves detection frame > 1 min	1	1	1	0	1	1	1	0	1	0	

False Positives											
Test Scenario	1	2	3	4	5	6	7	8	9	10	Total
Dashboard install + Daytime: Wearing glasses without leaving frame	N/A										0
Dashboard install + Daytime: Wearing a beard without leaving frame	0	0	0	0	0	0	0	0	0	0	
Dashboard install + Daytime:	0	0	0	0	0	0	0	0	0	0	

False Positives											
Wearing a mask without leaving frame											
Dashboard install + Daytime: Wearing a hat without leaving frame	0	0	0	0	0	0	0	0	0	0	
Dashboard install + Nighttime: Wearing glasses without leaving frame	N/A										
Dashboard install + Nighttime: Wearing a beard without leaving frame	0			0	0	0	0	0	0	0	0	0	
Dashboard install + Nighttime: Wearing a mash without leaving frame	0			0	0	0	0	0	0	0	0	0	
Dashboard install + Nighttime: Wearing a hat without leaving frame	0			0	0	0	0	0	0	0	0	0	
Windshield install + Daytime: Wearing glasses without leaving frame	N/A										
Windshield install + Daytime: Wearing a beard without leaving frame	0			0	0	0	0	0	0	0	0	0	
Windshield install + Daytime: Wearing a mask without leaving frame	0			0	0	0	0	0	0	0	0	0	
Windshield install + Daytime: Wearing a hat without leaving frame	0			0	0	0	0	0	0	0	0	0	
Windshield install + Nighttime: Wearing glasses without leaving frame	N/A										
Windshield install + Nighttime: Wearing a beard without leaving frame	0			0	0	0	0	0	0	0	0	0	
Windshield install + Nighttime: Wearing a mask without leaving frame	0			0	0	0	0	0	0	0	0	0	
Windshield install + Nighttime:	0			0	0	0	0	0	0	0	0	0	

False Positives											
Wearing a hat without leaving frame											

2.2 Face Loss Detection

- Prerequisite: DMS calibration is successful.
- Parameters: The DMS activates at speeds >30km/h. An alert triggers if the driver's face leaves the detection frame for more than 10s seconds after calibration is successful.
- Test Procedure: First, verify if the face loss alert can be triggered. If it cannot, terminate the validation. If it can, proceed with the test scenarios below.
- Test Criteria: Accuracy ≥85%, and false alert rate ≤15%.

Test Results

True Positives											
Test Scenario	1	2	3	4	5	6	7	8	9	10	Total
Dashboard install + Daytime: No rear passengers, face leaves detection frame for > 10s	1	1	1	1	1	1	1	1	1	1	39
Dashboard install + Nighttime: No rear passengers, face leaves detection frame for > 10s	1	1	1	1	1	1	1	1	1	1	
Dashboard install + Daytime: With rear passengers, face leaves detection frame for > 10s	N/A (No trigger expected)										
Dashboard install + Nighttime: With rear passengers, face leaves detection frame for > 10s											
Windshield install + Daytime: No rear passengers, face leaves detection frame for > 10s	1	1	1	1	1	1	1	0	1	1	
Windshield install + Nighttime: No rear passengers, face leaves detection frame for > 10s	1	1	1	1	1	1	1	1	1	1	
Windshield install + Daytime: With rear passengers, face leaves detection frame for > 10s	N/A (No trigger expected)										
Windshield install + Nighttime: With rear passengers, face leaves detection frame for > 10s											

False Positives											
Test Scenario	1	2	3	4	5	6	7	8	9	10	Total
Dashboard install + Daytime: Maintaining forward gaze for 10s	0	0	0	0	0	0	0	0	0	0	0
Dashboard install + Daytime: Frequent nose touching for 10s	0	0	0	0	0	0	0	0	0	0	
Dashboard install + Daytime: Looking around for 10s	0	0	0	0	0	0	0	0	0	0	
Dashboard install + Nighttime: Maintaining forward gaze for 10s	0	0	0	0	0	0	0	0	0	0	
Dashboard install + Nighttime: Frequent nose touching for 10s	0	0	0	0	0	0	0	0	0	0	
Dashboard install + Nighttime: Looking around for 10s	0	0	0	0	0	0	0	0	0	0	
Windshield install + Daytime: Maintaining forward gaze for 10s	0	0	0	0	0	0	0	0	0	0	
Windshield install + Daytime: Frequent nose touching for 10s	0	0	0	0	0	0	0	0	0	0	
Windshield install + Daytime: Looking around for 10s	0	0	0	0	0	0	0	0	0	0	
Windshield install + Nighttime: Maintaining forward gaze for 10s	0	0	0	0	0	0	0	0	0	0	
Windshield install + Nighttime: Frequent nose touching for 10s	0	0	0	0	0	0	0	0	0	0	
Windshield install + Nighttime: Looking around for 10s	0	0	0	0	0	0	0	0	0	0	

2.3 Sustained Eye Closure

- Prerequisite: DMS calibration is successful.
- Parameters: The DMS activates at speeds >30 km/h. An alert triggers when the driver's eyes are continuously closed for more than 5 seconds.
- Test Procedure: First, verify if the sustained eye closure alert can be triggered. If it cannot, terminate the validation. If it can, proceed with the test scenarios below.
- Test Criteria: Accuracy ⩾85%, and false alert rate ⩽15%.

Test Results

True Positives											
Test Scenario	1	2	3	4	5	6	7	8	9	10	Total
Dashboard install + Daytime: Wearing glasses, eyes closed for 5s	N/A										119
Dashboard install + Daytime: Wearing a beard, eyes closed for 5s	1	1	1	1	1	1	0	1	1	1	

True Positives											
Dashboard install + Daytime: Wearing a mask, eyes closed for 5s	1	1	1	1	1	1	1	1	1	1	
Dashboard install + Daytime: Wearing a hat, eyes closed for 5s	1	1	1	1	1	1	1	1	1	1	
Dashboard install + Nighttime: Wearing glasses, eyes closed for 5s	N/A										
Dashboard install + Nighttime: Wearing a beard, eyes closed for 5s	1	1	1	1	1	1	1	1	1	1	
Dashboard install + Nighttime: Wearing a mask, eyes closed for 5s	1	1	1	1	1	1	1	1	1	1	
Dashboard install + Nighttime: Wearing a hat, eyes closed for 5s	1	1	1	1	1	1	1	1	1	1	
Dashboard install + Daytime: Wearing glasses, eyes closed for 5s	N/A										
Windshield install + Daytime: Wearing a beard, eyes closed for 5s	1	1	1	1	1	1	1	1	1	1	
Windshield install + Daytime: Wearing a mask, eyes closed for 5s	1	1	1	1	1	1	1	1	1	1	
Windshield install + Daytime: Wearing a hat, eyes closed for 5s	1	1	1	1	1	1	1	1	1	1	
Windshield install + Nighttime: Wearing glasses, eyes closed for 5s	N/A										
Windshield install + Nighttime: Wearing a beard, eyes closed for 5s	1	1	1	1	1	1	1	1	1	1	
Windshield install + Nighttime: Wearing a mask, eyes closed for 5s	1	1	1	1	1	1	1	1	1	1	
Windshield install + Nighttime: Wearing a hat, eyes closed for 5s	1	1	1	1	1	1	1	1	1	1	

False Positives											
Test Scenario	1	2	3	4	5	6	7	8	9	10	Total
Dashboard install + Daytime: Wearing glasses, not blinking for 5s	N/A										
Dashboard install + Daytime: Wearing a beard, not blinking for 5s	0	0	0	0	0	0	0	0	0	0	
Dashboard install + Daytime: Wearing a mask, not blinking for 5s	0	0	0	0	0	0	0	0	0	0	
Dashboard install + Daytime: Wearing a hat, not blinking for 5s	0	0	0	0	0	0	0	0	0	0	
Dashboard install + Daytime: Wearing glasses with rapid blinking for 5s	N/A										
Dashboard install + Daytime: Wearing a beard with rapid blinking for 5s	0	0	0	0	0	0	0	0	0	0	0
Dashboard install + Daytime: Wearing a mask with rapid blinking for 5s	0	0	0	0	0	0	0	0	0	0	
Dashboard install + Daytime: Wearing a hat with rapid blinking for 5s	0	0	0	0	0	0	0	0	0	0	
Dashboard install + Nighttime: Wearing glasses, not blinking for 5s	N/A										
Dashboard install + Nighttime: Wearing a beard, not blinking for 5s	0	0	0	0	0	0	0	0	0	0	
Dashboard install + Nighttime: Wearing a mask, not blinking for 5s	0	0	0	0	0	0	0	0	0	0	
Dashboard install + Nighttime: Wearing a hat, not blinking for 5s	0	0	0	0	0	0	0	0	0	0	

False Positives										
Dashboard install + Nighttime: Wearing glasses with rapid blinking for 5s	N/A									
Dashboard install + Nighttime: Wearing a beard with rapid blinking for 5s	0	0	0	0	0	0	0	0	0	0
Dashboard install + Nighttime: Wearing a mask with rapid blinking for 5s	0	0	0	0	0	0	0	0	0	0
Dashboard install + Nighttime: Wearing a hat with rapid blinking for 5s	0	0	0	0	0	0	0	0	0	0
Windshield install + Daytime: Wearing glasses, not blinking for 5s	N/A									
Windshield install + Daytime: Wearing a beard, not blinking for 5s	0	0	0	0	0	0	0	0	0	0
Windshield install + Daytime: Wearing a mask, not blinking for 5s	0	0	0	0	0	0	0	0	0	0
Windshield install + Daytime: Wearing a hat, not blinking for 5s	0	0	0	0	0	0	0	0	0	0
Windshield install + Daytime: Wearing glasses, not blinking for 5s	N/A									
Windshield install + Daytime: Wearing a beard with rapid blinking for 5s	0	0	0	0	0	0	0	0	0	0
Windshield install + Daytime: Wearing a mask with rapid blinking for 5s	0	0	0	0	0	0	0	0	0	0
Windshield install + Daytime: Wearing a hat with rapid blinking for 5s	0	0	0	0	0	0	0	0	0	0
Windshield install + Nighttime: Wearing glasses, not blinking for 5s	N/A									
Windshield install + Nighttime: Wearing a beard, not blinking for 5s	0	0	0	0	0	0	0	0	0	0
Windshield install + Nighttime: Wearing a mask, not blinking for 5s	0	0	0	0	0	0	0	0	0	0
Windshield install + Nighttime: Wearing a hat, not blinking for 5s	0	0	0	0	0	0	0	0	0	0
Windshield install + Nighttime: Wearing glasses with rapid blinking for 5s	N/A									
Windshield install + Nighttime: Wearing a beard with rapid blinking for 5s	0	0	0	0	0	0	0	0	0	0
Windshield install + Nighttime: Wearing a mask with rapid blinking for 5s	0	0	0	0	0	0	0	0	0	0
Windshield install + Nighttime: Wearing a hat with rapid blinking for 5s	0	0	0	0	0	0	0	0	0	0

2.4 Eye Closure

- Prerequisite: DMS calibration is successful.
- Parameters: The DMS activates at speeds >30 km/h. An alert triggers if the driver's eyes are continuously closed for more than 3 seconds.
- Test Procedure: First, verify if the eye closure alert can be triggered. If it cannot, terminate the validation. If it can, proceed with the test scenarios below.
- Test Criteria: Accuracy ⩾ 85%, and false alert rate ⩽ 15%.

Test Results

True Positives											
Test Scenario	1	2	3	4	5	6	7	8	9	10	Total
Dashboard install + Daytime: Wearing glasses, eyes closed for 3s	N/A										120
Dashboard install + Daytime: Wearing a beard, eyes closed for 3s	1	1	1	1	1	1	1	1	1	1	
Dashboard install + Daytime: Wearing a mask, eyes closed for 3s	1	1	1	1	1	1	1	1	1	1	
Dashboard install + Daytime: Wearing a hat, eyes closed for 3s	1	1	1	1	1	1	1	1	1	1	
Dashboard install + Nighttime: Wearing glasses, eyes closed for 3s	N/A										
Dashboard install + Nighttime: Wearing a beard, eyes closed for 3s	1	1	1	1	1	1	1	1	1	1	
Dashboard install + Nighttime: Wearing a mask, eyes closed for 3s	1	1	1	1	1	1	1	1	1	1	
Dashboard install + Nighttime: Wearing a hat, eyes closed for 3s	1	1	1	1	1	1	1	1	1	1	
Dashboard install + Daytime: Wearing glasses, eyes closed for 3s	N/A										
Windshield install + Daytime: Wearing a beard, eyes closed for 3s	1	1	1	1	1	1	1	1	1	1	
Windshield install + Daytime: Wearing a mask, eyes closed for 3s	1	1	1	1	1	1	1	1	1	1	
Windshield install + Daytime: Wearing a hat, eyes closed for 3s	1	1	1	1	1	1	1	1	1	1	
Windshield install + Nighttime: Wearing glasses, eyes closed for 3s	N/A										
Windshield install + Nighttime: Wearing a beard, eyes closed for 3s	1	1	1	1	1	1	1	1	1	1	
Windshield install + Nighttime: Wearing a mask, eyes closed for 3s	1	1	1	1	1	1	1	1	1	1	
Windshield install + Nighttime: Wearing a hat, eyes closed for 3s	1	1	1	1	1	1	1	1	1	1	

False Positives											
Test Scenario	1	2	3	4	5	6	7	8	9	10	Total

False Positives											
Dashboard install + Daytime: Wearing glasses , not blinking for 3s	N/A										6
Dashboard install + Daytime: Wearing a beard, not blinking for 3s	0	0	0	0	0	0	0	0	0	0	
Dashboard install + Daytime: Wearing a mask, not blinking for 3s	0	0	0	0	0	0	0	0	0	0	
Dashboard install + Daytime: Wearing a hat, not blinking for 3s	0	0	0	0	0	0	0	0	0	0	
Dashboard install + Daytime: Wearing glasses with rapid blinking for 3s	N/A										
Dashboard install + Daytime: Wearing a beard with rapid blinking for 3s	0	0	0	0	0	0	0	0	0	0	
Dashboard install + Daytime: Wearing a mask with rapid blinking for 3s	0	0	0	0	0	0	0	0	0	0	
Dashboard install + Daytime: Wearing a hat with rapid blinking for 3s	0	0	0	0	0	0	0	0	0	0	
Dashboard install + Nighttime: Wearing glasses , not blinking for 3s	N/A										
Dashboard install + Nighttime: Wearing a beard, not blinking for 3s	0	0	0	0	0	0	0	0	0	0	
Dashboard install + Nighttime: Wearing a mask, not blinking for 3s	0	0	0	0	0	0	0	0	0	0	
Dashboard install + Nighttime: Wearing a hat, not blinking for 3s	0	0	0	0	0	0	0	0	0	0	
Dashboard install + Nighttime: Wearing glasses with rapid blinking for 3s	N/A										
Dashboard install + Nighttime: Wearing a beard with rapid blinking for 3s	0	0	0	0	0	0	0	0	0	0	
Dashboard install + Nighttime: Wearing a mask with rapid blinking for 3s	0	0	0	0	0	0	0	0	0	0	
Dashboard install + Nighttime: Wearing a hat with rapid blinking for 3s	0	0	0	0	0	0	0	0	0	0	
Windshield install + Daytime: Wearing glasses, not blinking for 3s	N/A										
Windshield install + Daytime: Wearing a beard, not blinking for 3s	0	0	0	0	0	0	0	0	0	0	
Windshield install + Daytime: Wearing a mask, not blinking for 3s	0	0	0	0	0	0	0	0	0	0	
Windshield install + Daytime: Wearing a hat, not blinking for 3s	0	0	0	0	0	0	0	0	0	0	
Windshield install + Daytime: Wearing glasses , not blinking for 3s	N/A										
Windshield install + Daytime: Wearing a beard with rapid blinking for 3s	0	0	0	0	0	0	0	0	0	0	
Windshield install + Daytime: Wearing a mask with rapid blinking for 3s	0	0	0	0	0	0	0	0	0	0	
Windshield install + Daytime: Wearing a hat with rapid blinking for 3s	0	0	1	0	0	0	0	1	0	0	
Windshield install + Nighttime: Wearing glasses, not blinking for 3s	N/A										
Windshield install + Nighttime: Wearing a beard, not blinking for 3s	0	0	0	0	0	0	0	0	0	0	
Windshield install + Nighttime: Wearing a mask, not blinking for 3s	0	0	0	0	0	0	0	0	0	0	
Windshield install + Nighttime: Wearing a hat, not blinking for 3s	0	0	0	0	0	0	0	0	0	0	
Windshield install + Nighttime: Wearing glasses with rapid blinking for 3s	N/A										
Windshield install + Nighttime: Wearing a beard with rapid blinking for	0	1	1	0	0	0	1	0	0	0	

False Positives											
3s											
Windshield install + Nighttime: Wearing a mask with rapid blinking for 3s	0	0	0	0	0	0	0	0	0	0	
Windshield install + Nighttime: Wearing a hat with rapid blinking for 3s	0	0	0	0	0	1	0	0	0	0	

2.5 Yawning

- Prerequisite: DMS calibration is successful.
- Parameters: The DMS activates at speeds >30 km/h. An alert triggers when the mouth opening is greater than 50% for more than 3 seconds.
- Test Procedure: First, verify if the yawning alert can be triggered. If it cannot, terminate the validation. If it can, proceed with the test scenarios below.
- Test Criteria: Accuracy ⩾ 85%, and false alert rate ⩽ 15%.

Test Results

True Positives											
Test Scenario	1	2	3	4	5	6	7	8	9	10	Total
Dashboard install + Daytime: Wearing glasses and yawning for 3s	N/A										40
Dashboard install + Daytime: Wearing a beard and yawning for 3s	N/A (No trigger expected)										
Dashboard install + Daytime: Wearing a hat and yawning for 3s	1	1	1	1	1	1	1	1	1	1	
Dashboard install + Nighttime: Wearing glasses and yawning for 3s	N/A										
Dashboard install + Nighttime: Wearing a beard and yawning for 3s	N/A (No trigger expected)										
Dashboard install + Nighttime: Wearing a hat and yawning for 3s	1	1	1	1	1	1	1	1	1	1	
Windshield install + Daytime: Wearing glasses and yawning for 3s	N/A										
Windshield install + Daytime: Wearing a beard and yawning for 3s	N/A (No trigger expected)										
Windshield install + Daytime: Wearing a hat and yawning for 3s	1	1	1	1	1	1	1	1	1	1	
Windshield install + Nighttime: Wearing glasses and yawning for 3s	N/A										
Windshield install + Nighttime: Wearing a beard and yawning for 3s	N/A (No trigger expected)										
Windshield install + Nighttime: Wearing a hat and yawning for 3s	1	1	1	1	1	1	1	1	1	1	

False Positives											
Test Scenario	1	2	3	4	5	6	7	8	9	10	Total
Dashboard install + Daytime: Speaking normally for 3s	0	0	0	0	0	0	0	0	0	0	0
Dashboard install + Daytime: Eating for 3s	0	0	0	0	0	0	0	0	0	0	
Dashboard install + Nighttime: Speaking normally for 3s	0	0	0	0	0	0	0	0	0	0	
Dashboard install + Nighttime: Eating for 3s	0	0	0	0	0	0	0	0	0	0	
Windshield install + Daytime: Speaking normally for 3s	0	0	0	0	0	0	0	0	0	0	
Windshield install + Daytime: Eating for 3s	0	0	0	0	0	0	0	0	0	0	
Windshield install + Nighttime: Speaking normally for 3s	0	0	0	0	0	0	0	0	0	0	
Windshield install + Nighttime: Eating for 3s	0	0	0	0	0	0	0	0	0	0	

2.6 Looking Around

- Prerequisite: DMS calibration is successful.
- Parameters: The DMS activates at speeds >30 km/h. An alert triggers if the driver's head is turned left or right (tentative angle: 45°–75°) for more than 3 seconds.
- Test Procedure: First, verify if the looking around alert can be triggered. If it cannot, terminate the validation. If it can, proceed with the test scenarios below.
- Test Criteria: Accuracy ⩾ 85%, and false alert rate ⩽ 15%.

Test Results

True Positives											
Test Scenario	1	2	3	4	5	6	7	8	9	10	Total
Dashboard install + Daytime: Wearing glasses and looking left for 3s	N/A										33
Dashboard install + Daytime: Wearing a beard and looking left for 3s	0	0	0	0	0	0	0	1	0	0	
Dashboard install + Daytime: Wearing a hat and looking left for 3s	1	1	0	1	1	1	0	1	1	0	
Dashboard install + Daytime: Wearing glasses and looking right for 3s	N/A										
Dashboard install + Daytime: Wearing a beard and looking right for 3s	N/A (Requires ≥ 90° head turn)										

True Positives											
Dashboard install + Daytime: Wearing a hat and looking right for 3s											
Dashboard install + Nighttime: Wearing glasses and looking left for 3s	N/A										
Dashboard install + Nighttime: Wearing a beard and looking left for 3s	1	0	0	1	0	0	0	0	1	0	
Dashboard install + Nighttime: Wearing a hat and looking left for 3s	0	0	1	0	0	0	1	1	0	1	
Dashboard install + Nighttime: Wearing glasses and looking right for 3s	N/A										
Dashboard install + Nighttime: Wearing a beard and looking right for 3s	N/A (Requires ≥ 90° head turn)										
Dashboard install + Nighttime: Wearing a hat and looking right for 3s											
Windshield install + Daytime: Wearing glasses and looking left for 3s	N/A										
Windshield install + Daytime: Wearing a beard and looking left for 3s	0	0	0	0	0	0	0	0	0	0	
Windshield install + Daytime: Wearing a hat and looking left for 3s	1	0	1	1	1	1	1	0	1	0	
Windshield install + Daytime: Wearing glasses and looking right for 3s	N/A										
Windshield install + Daytime: Wearing a beard and looking right for 3s	1	0	1	1	0	1	0	1	0	1	
Windshield install + Daytime: Wearing a hat and looking right for 3s	1	0	0	1	0	1	1	0	1	0	
Windshield install + Nighttime: Wearing glasses and looking left for 3s	N/A										
Windshield install + Nighttime: Wearing a beard and looking left for 3s	N/A (Temporarily suspended)										
Windshield install + Nighttime: Wearing a hat and looking left for 3s											
Windshield install + Nighttime: Wearing glasses and looking right for 3s	N/A										
Windshield install + Nighttime: Wearing a beard and looking right for 3s	N/A (Temporarily suspended)										
Windshield install + Nighttime: Wearing a hat and looking right for 3s											

False Positives											
Test Scenario	1	2	3	4	5	6	7	8	9	10	Total
Dashboard install + Daytime: Gazing forward for 3s	0	0	0	0	0	0	0	0	0	0	8
Dashboard install + Nighttime: Gazing forward for 3s	0	0	0	0	0	0	0	0	0	0	
Windshield install + Daytime: Gazing forward for 3s	0	0	0	0	0	0	0	0	0	0	
Windshield install + Nighttime: Gazing forward for 3s	1	1	1	1	0	1	1	1	0	1	

2.7 Looking Down

- Prerequisite: DMS calibration is successful.
- Parameters: The DMS activates at speeds >30 km/h. An alert triggers if the head-down posture (tentative angle: 45°–75°) persists for more than 3 seconds.
- Test Procedure: First, verify if the looking down alert can be triggered. If it cannot, terminate the validation. If it can, proceed with the test scenarios below.
- Test Criteria: Accuracy ⩾ 85%, and false alert rate ⩽ 15%.

Test Results

True Positives											
Test Scenario	1	2	3	4	5	6	7	8	9	10	Total
Dashboard install + Daytime: Wearing glasses, head down for 3s	N/A										4
Dashboard install + Daytime: Wearing a beard, head down for 3s	1	0	0	0	0	0	1	0	1	0	
Dashboard install + Daytime: Wearing a hat, head down for 3s	0	0	1	0	0	0	0	0	0	0	
Dashboard install + Nighttime: Wearing glasses, head down for 3s	N/A										
Dashboard install + Nighttime: Wearing a beard, head down for 3s	0	0	0	0	0	0	0	0	0	0	
Dashboard install + Nighttime: Wearing a hat, head down for 3s	0	0	0	0	0	0	0	0	0	0	
Windshield install + Daytime: Wearing glasses, head down for 3s	N/A										
Windshield install + Daytime: Wearing a beard, head down for 3s	0	0	0	0	0	0	0	0	0	0	
Windshield install + Daytime: Wearing a hat, head down for 3s	0	0	0	0	0	0	0	0	0	0	
Windshield install + Nighttime: Wearing glasses, head down for 3s	N/A										
Windshield install + Nighttime: Wearing a beard, head down for 3s	0	0	0	0	0	0	0	0	0	0	
Windshield install + Nighttime: Wearing a hat, head down for 3s	0	0	0	0	0	0	0	0	0	0	

False Positives											
Test Scenario	1	2	3	4	5	6	7	8	9	10	Total
Dashboard install + Daytime: Gazing forward for 3s	0	0	0	0	0	0	0	0	0	0	0
Dashboard install + Nighttime: Gazing forward for 3s	0	0	0	0	0	0	0	0	0	0	
Windshield install + Daytime: Gazing forward for 3s	0	0	0	0	0	0	0	0	0	0	

False Positives											
Windshield install + Nighttime: Gazing forward for 3s	0	0	0	0	0	0	0	0	0	0	

2.8 Smoking

- Prerequisite: DMS calibration is successful.
- Parameters: The DMS activates at speeds >30 km/h. An alert triggers when smoking posture persists for more than 3 seconds.
- Test Procedure: First, verify if the smoking alert can be triggered. If it cannot, terminate the validation. If it can, proceed with the test scenarios below.
- Test Criteria: Accuracy ⩾ 85%, and false alert rate ⩽ 15%.

Test Results

True Positives											
Test Scenario	1	2	3	4	5	6	7	8	9	10	Total
Dashboard install + Daytime: Wearing glasses, with unlit cigarette in mouth for 3s	N/A										36
Dashboard install + Daytime: Wearing a beard, with lit cigarette in mouth for 3s	N/A (No trigger expected)										
Dashboard install + Daytime: Wearing a hat, holding a cigarette for 3s	1	1	1	1	1	1	1	1	1	1	
Dashboard install + Nighttime: Wearing glasses, with unlit cigarette in mouth for 3s	N/A										
Dashboard install + Nighttime: Wearing a beard, with lit cigarette in mouth for 3s	N/A (No trigger expected)										
Dashboard install + Nighttime: Wearing a hat, holding a cigarette for 3s	1	1	1	1	0	1	1	1	1	0	
Windshield install + Daytime: Wearing glasses, with unlit cigarette in mouth for 3s	N/A										
Windshield install + Daytime: Wearing a beard, with lit cigarette in mouth for 3s	N/A (No trigger expected)										
Windshield install + Daytime: Wearing a hat, holding a cigarette for 3s	1	1	1	0	1	1	1	1	1	1	
Windshield install + Nighttime: Wearing glasses, with unlit cigarette in mouth for 3s	N/A										

True Positives											
Windshield install + Nighttime: Wearing a beard, with lit cigarette in mouth for 3s	N/A (No trigger expected)										
Windshield install + Nighttime: Wearing a hat, holding a cigarette for 3s	1	1	1	1	1	1	1	0	1	1	

False Positives											
Test Scenario	1	2	3	4	5	6	7	8	9	10	Total
Dashboard install + Daytime: Wearing reflective clothing, gazing forward for 3s	0	0	0	0	0	0	0	0	0	0	17
Dashboard installed + Daytime: Having a lollipop in mouth for 3s	1	1	0	0	1	0	0	1	0	1	
Dashboard installed + Daytime: Frequent nose touching for 3s	0	0	0	0	0	0	0	0	0	0	
Dashboard install + Nighttime: Wearing reflective clothing, gazing forward for 3s	0	0	0	0	0	0	0	0	0	0	
Dashboard installed + Nighttime: Having a lollipop in mouth for 3s	0	0	0	0	1	1	1	0	1	0	
Dashboard installed + Nighttime: Frequent nose touching for 3s	0	0	0	0	0	0	0	0	0	0	
Windshield install + Daytime: Wearing reflective clothing, gazing forward for 3s	0	0	0	0	0	0	0	0	0	0	
Windshield install + Daytime: Having a lollipop in mouth for 3s	1	0	0	0	1	0	1	0	1	0	
Windshield install + Daytime: Frequent nose touching for 3s	0	0	0	0	0	0	0	0	0	0	
Windshield install + Nighttime: Wearing reflective clothing, gazing forward for 3s	0	0	0	0	0	0	0	0	0	0	
Windshield install + Nighttime: Having a lollipop in mouth for 3s	1	0	1	1	0	0	0	1	0	0	
Windshield install + Nighttime: Frequent nose touching for 3s	0	0	0	0	0	0	0	0	0	0	

2.9 Phone Use

- Prerequisite: DMS calibration is successful.
- Parameters: The DMS activates at speeds >30 km/h. An alert triggers when phone use is detected for more than 3 seconds.
- Test Procedure: First, verify if the phone use alert can be triggered. If it cannot, terminate the validation. If it can, proceed with the test scenarios below.
- Test Criteria: Accuracy ⩾ 85%, and false alert rate ⩽ 15%.

Test Results

True Positives											
Test Scenario	1	2	3	4	5	6	7	8	9	10	Total
Dashboard install + Daytime: Wearing glasses, phone to left ear for 3s	N/A										67
Dashboard install + Daytime: Wearing a beard, phone to right ear for 3s	1	1	1	1	1	1	0	1	1	1	
Dashboard install + Daytime: Wearing a hat, phone to mouth for 3s	1	1	1	1	0	1	1	1	1	1	
Dashboard install + Nighttime: Wearing glasses, phone to left ear for 3s	N/A										
Dashboard install + Nighttime: Wearing a beard, phone to right ear for 3s	1	1	1	1	1	1	1	1	1	1	
Dashboard install + Nighttime: Wearing a hat, phone to mouth for 3s	1	1	1	1	1	1	1	1	1	1	
Windshield install + Daytime: Wearing glasses, phone to left ear for 3s	N/A										
Windshield install + Daytime: Wearing a beard, phone to right ear for 3s	N/A (Not verified due to false alarms)										
Windshield install + Daytime: Wearing a hat, phone to mouth for 3s	1	1	1	1	1	1	1	1	1	1	
Windshield install + Nighttime: Wearing glasses, phone to left ear for 3s	N/A										
Windshield install + Nighttime: Wearing a beard, phone to right ear for 3s	1	1	1	1	1	1	1	1	1	1	

True Positives											
Windshield install + Nighttime: Wearing a hat, phone to mouth for 3s	1	1	1	0	1	1	1	1	1	1	

False Positives											
Test Scenario	1	2	3	4	5	6	7	8	9	10	Total
Dashboard install + Daytime: Wearing reflective clothing, gazing forward for 3s	0	0	0	0	0	0	0	0	0	0	9
Dashboard install + Daytime: Wearing a beard, touching head for 3s	1 N/A (False trigger when smoking)	1 N/A (False trigger when smoking)	0	0	1 N/A (False trigger when smoking)	1 N/A (False trigger when smoking)	1 N/A (False trigger when smoking)	0	1 N/A (False trigger when smoking)	0	
Dashboard install + Daytime: Wearing a hat, touching ear for 3s	0	0	0	0	0	0	0	0	0	0	
Dashboard installed + Daytime: Rear passenger on phone for 3s	0	0	0	0	0	0	0	0	0	0	
Dashboard install + Nighttime: Wearing reflective clothing, gazing forward for 3s	0	0	0	0	0	0	0	0	0	0	
Dashboard install + Nighttime: Wearing a beard, touching head for 3s	0	0	0	0	0	0	0	0	0	0	
Dashboard install + Nighttime: Wearing a hat, touching ear for 3s	0	0	0	0	0	0	0	0	0	0	

False Positives										
Dashboard installed + Nighttime: Rear passenger on phone for 3s	0	0	0	0	0	0	0	0	0	0
Windshield install + Daytime: Wearing reflective clothing, gazing forward for 3s	0	0	0	0	0	0	0	0	0	0
Windshield install + Daytime: Wearing a beard, touching head for 3s	1	0	1	1	1	1	1	1	1	1
Windshield install + Daytime: Wearing a hat, touching ear for 3s	0	0	0	0	0	0	0	0	0	0
Windshield installed + Daytime: Rear passenger on phone for 3s	0	0	0	0	0	0	0	0	0	0
Windshield install + Nighttime: Wearing reflective clothing, gazing forward for 3s	0	0	0	0	0	0	0	0	0	0
Windshield install + Nighttime: Wearing a beard, touching head for 3s	0	0	0	0	0	0	0	0	0	0
Windshield install + Nighttime: Wearing a hat, touching ear for 3s	0	0	0	0	0	0	0	0	0	0
Windshield installed + Nighttime: Rear passenger on phone for 3s	0	0	0	0	0	0	0	0	0	0

2.10 Frame Obstruction

- Prerequisite: DMS calibration is successful.
- Parameters: The DMS activates at speeds >30 km/h. An alert triggers when the camera frame is obstructed for more than 5 seconds.
- Test Procedure: First, verify if the frame obstruction alert can be triggered. If it cannot, terminate the validation. If it can, proceed with the test scenarios below.
- Test Criteria: Accuracy ⩾ 85%, and false alert rate ⩽ 15%.

Test Results

True Positives											
Test Scenario	1	2	3	4	5	6	7	8	9	10	Total
Dashboard install + Daytime: Covering the lens with a hand for 5s	1	1	1	1	1	1	1	1	1	1	79
Dashboard install + Daytime: Covering the lens with a cloth for 5s	1	1	1	1	1	1	1	1	1	1	
Dashboard install + Nighttime: Covering the lens with a hand for 5s	1	1	1	1	1	1	1	1	1	1	
Dashboard install + Nighttime: Covering the lens with a cloth for 5s	1	1	1	1	1	1	1	1	1	1	
Windshield install + Daytime: Covering the lens with a hand for 5s	1	1	1	1	1	1	1	1	1	1	
Windshield install + Daytime: Covering the lens with a cloth for 5s	1	1	1	1	1	1	1	1	0	1	
Windshield install + Nighttime: Covering the lens with a hand for 5s	1	1	1	1	1	1	1	1	1	1	
Windshield install + Nighttime: Covering the lens with a cloth for 5s	1	1	1	1	1	1	1	1	1	1	

False Positives											
Test Scenario	1	2	3	4	5	6	7	8	9	10	Total
Dashboard install + Daytime: Wearing reflective clothing, gazing forward for 5s	0	0	0	0	0	0	0	0	0	0	0
Dashboard install + Daytime: Partially covering the lens for 5s	0	0	0	0	0	0	0	0	0	0	
Dashboard install + Nighttime: Wearing reflective clothing, gazing forward for 5s	0	0	0	0	0	0	0	0	0	0	
Dashboard install + Nighttime: Partially covering the lens for 5s	0	0	0	0	0	0	0	0	0	0	
Windshield install + Daytime: Wearing reflective clothing, gazing forward for 5s	0	0	0	0	0	0	0	0	0	0	
Windshield install + Daytime: Partially covering the lens with a hand for	0	0	0	0	0	0	0	0	0	0	

False Positives											
5s											
Windshield install + Nighttime: Wearing reflective clothing, gazing forward for 5s	0	0	0	0	0	0	0	0	0	0	
Windshield install + Nighttime: Partially covering the lens for 5s	0	0	0	0	0	0	0	0	0	0	

2.11 Sunglasses Obstruction

- Prerequisite: DMS calibration is successful.
- Parameters: The DMS activates at speeds >30 km/h. An alert triggers when the driver's eyes are undetected for more than 5 seconds.
- Test Procedure: First, verify if the sunglasses obstruction alert can be triggered. If it cannot, terminate the validation. If it can, proceed with the test scenarios below.
- Test Criteria: Accuracy ⩾ 85%, and false alert rate ⩽ 15%.

Test Results

True Positives											
Test Scenario	1	2	3	4	5	6	7	8	9	10	Total
Dashboard install + Daytime: Wearing glasses that obscure the eyes for 5s	1	1	1	1	1	1	1	1	1	1	40
Dashboard install + Nighttime: Wearing glasses that obscure the eyes for 5s	1	1	1	1	1	1	1	1	1	1	
Windshield install + Daytime: Wearing glasses that obscure the eyes for 5s	1	1	1	1	1	1	1	1	1	1	
Windshield install + Nighttime: Wearing glasses that obscure the eyes for 5s	1	1	1	1	1	1	1	1	1	1	

False Positives											
Test Scenario	1	2	3	4	5	6	7	8	9	10	Total
Dashboard install + Daytime: Not wearing glasses, gazing forward for 5s	0	0	0	0	0	0	0	0	0	0	0

False Positives										
Dashboard install + Daytime: Wearing glasses that obscure the eyes for 5s	N/A									
Dashboard install + Nighttime: Not wearing glasses, gazing forward for 5s	0	0	0	0	0	0	0	0	0	0
Dashboard install + Nighttime: Wearing glasses that obscure the eyes, gazing forward for 5s	N/A									
Windshield install + Daytime: Not wearing glasses, gazing forward for 5s	0	0	0	0	0	0	0	0	0	0
Windshield install + Daytime: Wearing glasses that obscure the eyes, gazing forward for 5s	N/A									
Windshield install + Nighttime: Not wearing glasses, gazing forward for 5s	0	0	0	0	0	0	0	0	0	0
Windshield install + Nighttime: Wearing glasses that obscure the eyes, gazing forward for 5s	N/A									

3. ADAS Test Results

3.1 Lane Departure

- Prerequisites: The ADAS camera is correctly installed and calibrated, with the sky and ground each occupying half of the frame.
- Parameters: The ADAS activates at speeds >50 km/h. An alert triggers when the time to cross a lane marking is less than 2 seconds. The time to cross is calculated as: (Lateral distance between the vehicle and lane boundary) / (Crossing vehicle speed).
- Test Procedure: First, verify if a lane departure alert triggers when changing lanes without using a turn signal. If it does not, terminate the validation. If it does, proceed with the test scenarios below.
- Test Criteria: Accuracy ⩾ 80%, false alert rate ⩽ 20%. A human judgment error tolerance of ±5% is allowed during testing.

Test Results

True Positives											
Test Scenario	1	2	3	4	5	6	7	8	9	10	Total
Lane change to the left on a clear day (turn signal ignored)	1	1	1	1	1	1	1	1	1	1	40
Lane change to the right on a clear day (turn signal ignored)	1	1	1	1	1	1	1	1	1	1	
Lane change to the left at night (turn signal ignored)	1	1	1	1	1	1	1	1	1	1	
Lane change to the right at night (turn signal ignored)	1	1	1	1	1	1	1	1	1	1	
Lane change to the left on a cloudy day (turn signal ignored)	N/A (No test conditions)										
Lane change to the right on a cloudy day (turn signal ignored)											

False Positives											
Test Scenario	1	2	3	4	5	6	7	8	9	10	Total
Normal driving within the lane on a clear day	0	0	0	0	0	0	0	0	0	0	0
Normal driving within the lane on a cloudy day	N/A (No test conditions)										
Normal driving within the lane at night	0	0	0	0	0	0	0	0	0	0	
Lane change for overtaking on a clear day (turn signal-based filtering enabled)	N/A (Pending verification)										
Lane change for overtaking on a cloudy day (turn signal-based filtering enabled)											

False Positives		
Lane change for overtaking at night (turn signal-based filtering enabled)		

3.2 Forward Collision

- Prerequisites: The ADAS camera is correctly installed and calibrated, with the sky and ground each occupying half of the frame.
- Parameters: The ADAS activates at speeds >50 km/h. An alert triggers when the time to collision with the preceding vehicle is less than 2 seconds. The time to collision is calculated as: (Distance to the preceding car) / (Relative speed).
- Test Procedure: First, verify whether accelerating toward the preceding vehicle to reduce the time to collision below 2 seconds triggers the forward collision alert. If it does not, terminate the validation. If it does, proceed with the test scenarios below.
- Test Criteria: Accuracy ⩾ 80%, false alert rate ⩽ 20%. A human judgment error tolerance of ±5% is allowed during testing.

Test Results

True Positives											
Test Scenario	1	2	3	4	5	6	7	8	9	10	Total
Approaching the preceding vehicle on a clear day until the time to collision is met	1	0	1	0	1	1	1	1	1	1	12
Approaching the preceding vehicle on a cloudy day until the time to collision is met	N/A (No test conditions)										
Approaching the preceding vehicle at night until the time to collision is met	1	1	1	1	/	/	/	/	/	/	

False Positives											
Test Scenario	1	2	3	4	5	6	7	8	9	10	Total
Normal driving on a clear day	0	0	0	0	0	0	0	0	0	0	0
Normal driving on a cloudy day	N/A (No test conditions)										
Normal driving at night	0	0	0	0	0	0	0	0	0	0	
Approaching the preceding vehicle on a clear day, but the time to collision is not met	0	0	0	0	0	0	0	0	0	0	

False Positives											
Approaching the preceding vehicle on a cloudy day, but the time to collision is not met	N/A (No test conditions)										
Approaching the preceding vehicle at night, but the time to collision is not met	0	0	0	0	0	0	0	0	0	0	

3.3 Close Following Distance

- Prerequisites: The ADAS camera is correctly installed and calibrated, with the sky and ground each occupying half of the frame.
- Parameters: The ADAS activates at speeds >50 km/h. A close following distance alert triggers when the time to collision with the preceding vehicle is less than 2 seconds. The time to collision is calculated as: (Distance to the preceding car) / (Vehicle speed).
- Test Procedure: First, verify whether accelerating toward the preceding vehicle to reduce the time to collision below 2 seconds triggers the close following distance alert. If it does not, terminate the validation. If it does, proceed with the test scenarios below.
- Test Criteria: Accuracy ⩾ 80%, false alert rate ⩽ 20%. A human judgment error tolerance of ±5% is allowed during testing.

Test Results

True Positives											
Test Scenario	1	2	3	4	5	6	7	8	9	10	Total
Approaching the preceding vehicle on a clear day until the time to collision is met	1	1	1	1	1	1	1	1	1	1	13
Approaching the preceding vehicle on a cloudy day until the time to collision is met	N/A (No test conditions)										
Approaching the preceding vehicle at night until the time to collision is met	0	0	1	1	1	/	/	/	/	/	

False Positives											
Test Scenario	1	2	3	4	5	6	7	8	9	10	Total
Normal driving on a clear day	0	0	0	0	0	0	0	0	0	0	0
Normal driving on a cloudy day	N/A (No test conditions)										
Normal driving at night	0	0	0	0	0	0	0	0	0	0	

False Positives											
Approaching the preceding vehicle on a clear day, but the time to collision is not met	0	0	0	0	0	0	0	0	0	0	
Approaching the preceding vehicle on a cloudy day, but the time to collision is not met	N/A (No test conditions)										
Approaching the preceding vehicle at night, but the time to collision is not met	0	0	0	0	0	0	0	0	0	0	

3.4 Front Vehicle Start

- Prerequisites: The ADAS camera is correctly installed and calibrated, with the sky and ground each occupying half of the frame.
- Parameters: The ADAS activates at speeds >50 km/h. An alert triggers if the preceding vehicle is within 6 meters, has been stationary for over 5 seconds, and then moves forward by more than 0.6 meters.
- Test Procedure: First, verify whether a front vehicle start alert triggers normally. If it does not, terminate the validation. If it does, proceed with the test scenarios below.
- Test Criteria: Accuracy ⩾ 80%, false alert rate ⩽ 20%. A human judgment error tolerance of ±5% is allowed during testing.

Test Results

True Positives											
Test Scenario	1	2	3	4	5	6	7	8	9	10	Total
Waiting at a traffic light on a clear day, allowing the preceding vehicle to start and reach the set distance	N/A (Failed to trigger)										0
Waiting at a traffic light on a cloudy day, allowing the preceding vehicle to start and reach the set distance											
Waiting at a traffic light at night, allowing the preceding vehicle to start and reach the set distance											

False Positives											
Test Scenario	1	2	3	4	5	6	7	8	9	10	Total
Normal driving on a clear day											0

False Positives											
Normal driving on a cloudy day											
Normal driving at night											

3.5 Pedestrian Warning

- Prerequisites: The ADAS camera is correctly installed and calibrated, with the sky and ground each occupying half of the frame.
- Parameters: The default vehicle speed range to activate detection is 10–30 km/h. An alert triggers if a person approaches within 10 meters of the vehicle.
- Test Procedure: First, verify whether the pedestrian warning triggers normally. If it does not, terminate the validation. If it does, proceed with the test scenarios below.
- Test Criteria: Accuracy ⩾ 80%, false alert rate ⩽ 20%. A human judgment error tolerance of ±5% is allowed during testing.

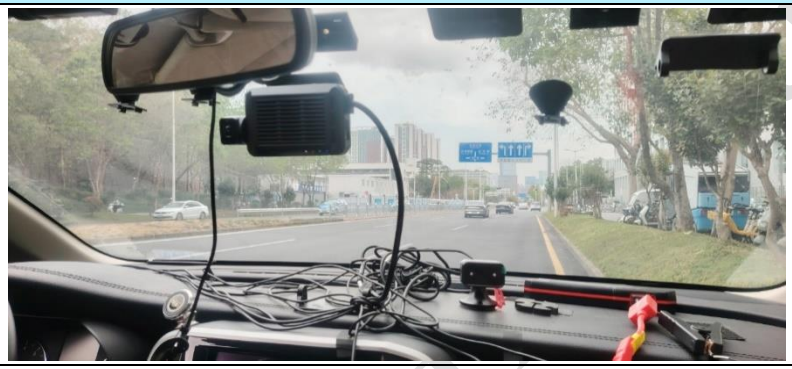
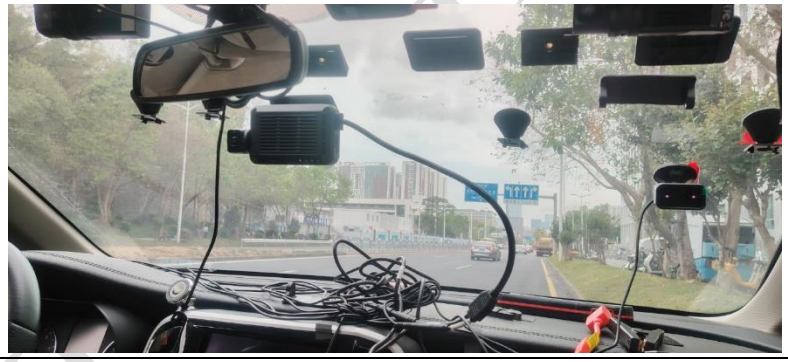
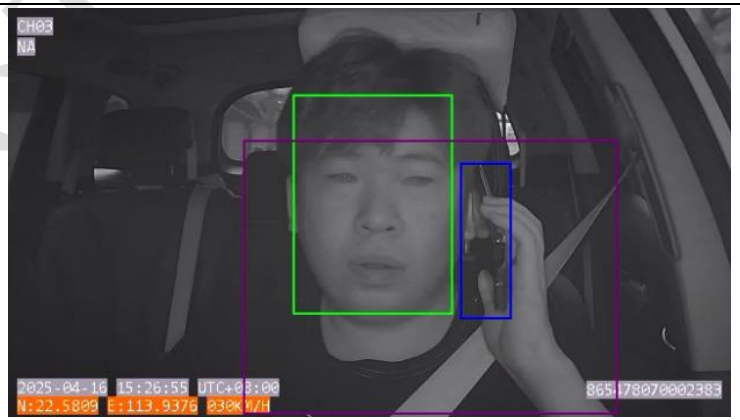
Test Results

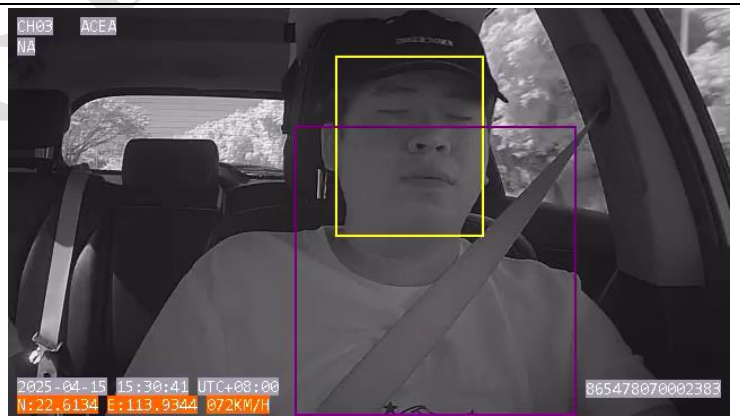
True Positives											
Test Scenario	1	2	3	4	5	6	7	8	9	10	Total
Vehicle driving straight on a clear day with a person passing within 10 meters	1	1	1	1	1	1	1	1	1	1	37
Vehicle driving straight on a cloudy day with a person passing within 10 meters	N/A (No test conditions)										
Vehicle driving straight at night with a person passing within 10 meters	1	1	1	1	1	1	1	1	1	1	
Vehicle turning on a clear day with a person passing within 10 meters	1	0	1	1	1	0	1	1	1	1	
Vehicle turning on a cloudy day with a person passing within 10 meters	N/A (No test conditions)										
Vehicle turning at night with a person passing within 10 meters	0	1	1	1	1	1	1	1	1	1	

False Positives											
Test Scenario	1	2	3	4	5	6	7	8	9	10	Total

False Positives											
Normal driving on a clear day with no pedestrians nearby	0	0	0	0	0	0	0	0	0	0	0
Normal driving on a cloudy day with no pedestrians nearby	N/A (No test conditions)										
Normal driving at night with no pedestrians nearby	0	0	0	0	0	0	0	0	0	0	

4. Test Photos

/	Photo
Device Installation Location	
DMS Camera Installation Location	
Phone Use	

/	Photo
Smoking	
Yawning	
Eye Closure	

/	**Photo**
Looking Around	
Face Loss	
Face Calibration Anomaly	

/	**Photo**
Sustained Eye Closure	
Frame Obstruction	
Sunglasses Obstruction	

/	**Photo**
Forward Collision	
Close Following Distance	
Lane Departure	

/	**Photo**
Front Vehicle Start	
Pedestrian Warning