BMW 5 Series

Comments

Active Driving Assistant Plus on the BMW 5-series gives the driver a moderate level of support while maintaining the impression of the driver being in control with the car assisting them. The system is readily perceived as a system to assist the driver which aligns well with the information provided.

Active Driving Assistant Plus indicates that the system is a driver-assist system, not an autonomous one and is easily understood. The limited scenarios tested provide a similar impression. Official manufacturer information on the system shows the driver taking his hands off the steering wheel, giving the wrong impression that the system can drive the car autonomously. The handbook mentions only that the system has limited performance on narrow and windy roads, but the system is not geofenced and can therefore be engaged on any road with distinct lane markings. The legally-required hands-off warning tells the driver to keep his hands on the wheel, but a slight steering input is sufficient to suppress this warning. In case of no response to the warning, the system will simply shut down but will not bring the car to a controlled stop.

Within the longitudinal scenarios, the 5-series shows a moderate level of support in the slower-moving and braking car scenarios. When approaching a stationary car at higher speeds, and in the ‘cut-in’ and ‘cut-out’ scenarios, the system offers very limited support, with the driver being primarily required to handle the situation.

Active Driving Assistant Plus provides subtle steering support resulting in a good balance between the driver and the system in the S-bend scenario. In the absence of lane markings or other vehicles to act as a guide, Active Driving Assistant Plus will change to a passive mode and will resume assistance when clear lane markings are detected.

Overall, the BMW system is a balanced assisted system that needs the driver to be primarily in control with little risk of the driver over-reliance the system.
# Human Machine Interaction

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<th>System Name</th>
<th>The system name, Active Driving Assistant Plus, clearly indicates that this is an Assist System</th>
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<td>Official Manufacturer Information</td>
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- Explained in user manual
- Feature fitted as part of the system
- Not explained in user manual
- Feature not available as part of the system

## Comments

While the user manual clearly explains the limitations of the systems and where they can operate reliably, system use is not limited as geofencing is not implemented. The role of the driver during the use of the system is also clearly stated and is in line with the system design. Specific scenarios where the driver must be primarily in control or where no system response is expected are not mentioned in the handbook. External conditions that limit system performance are described.

Enabling of the systems is performed using a button on the dashboard. Engaging the systems is simple and intuitive using a dedicated cluster of buttons on the steering wheel.

Marketing information from BMW is misleading and does not show the intended use of the system as it is stated that steering support will take over from the driver while at the same time the driver takes his hands off the steering wheel.
Adaptive Cruise Control Tests

**Approaching a stationary car**

- 60 km/h
- VEHICLE PRIMARILY IN CONTROL (Level of support may result in over reliance)
- DRIVER PRIMARILY IN CONTROL (Limited support provided by the system)

**Approaching a slower moving car**

- 90 km/h
- GOOD COOPERATION BETWEEN DRIVER AND VEHICLE (Balanced)
- NO SYSTEM SUPPORT AT ALL

**Approaching a braking car**

- VEHICLE PRIMARILY IN CONTROL
- DRIVER PRIMARILY IN CONTROL

**Car cutting-in or cutting-out ahead**

- Cut-in: VEHICLE PRIMARILY IN CONTROL
- Cut-out: DRIVER PRIMARILY IN CONTROL

**Comments**

In the scenarios tested, Active Driving Assistant Plus responds to a stationary vehicle directly ahead and the ACC function will bring the car to halt up to 60 km/h after which the AEB/FCW system is supporting the driver only up to a speed of 80 km/h. In both the slower-moving and braking lead vehicle scenarios, the car responds but does not provide full support where the emergency intervention by the system is required to avoid or further mitigate the collision. Very late or no ACC response was witnessed in the cut-in and cut-out scenarios which are critical and challenging scenarios due to the rapidly changing conditions. Late or no warning was issued to alert the driver of the possible crash in these cases.

Overall the system provides limited support in the ACC scenarios where the driver has to stay primarily in control in all scenarios.
Steering Support

Steering to avoid an obstacle

Driver avoiding obstacle
Vehicle recentring to lane

Steering in a S-curve

 Comments

In the scenarios tested, Active Driving Assistant Plus gives the impression that the driver is in control and the car is supporting them by providing steering assistance, which encourages good driver engagement. Where a driver wants to reposition the car within the lane, for example to avoid an obstacle or increase clearance to adjacent traffic, the system readily accommodates driver inputs and subsequently continues to provide steering assistance.