Hanoi, 6th March 2020

Dear NHTSA colleagues,

In behalf of VinFast I would like to summit our feedback regarding the different test procedures proposed in **Docket No NHTSA-2019-0102** for the assessment of ADAS. In VinFast we consider safety as a priority and we will be glad to collaborate with NHTSA in the development of safer roads for US citizens.

First of all, I would like to congratulate you for the work done in the different test procedures. We know the time that this kind of studies take and the quality and detail of the procedures proposed in this docket is impressive. We hope that our comments will help to develop more robust test procedures and we remain open to collaborate with NHTSA in case further clarifications of our comments are needed.

Best regards,

VINFAST

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## 1. Can the test procedures be expected to assess adequately for the purposes of research, within practical limitations, the performance of the underlying ADAS technologies? If not, please provide specific reasons why, and suggestions for how they may be improved.

### Intersection Safety Assist (ISA)

Unfortunately, it is not possible for us to provide at this moment a detailed feedback for the test procedure proposed for ISA but we would like to point out different things.

The scenarios proposed in this procedure are too challenging for the current state of the art of the technologies. At this moment no vehicle in the market could be able to address successfully the most part of the scenarios proposed. Nevertheless, we consider that the work done for this test procedure could be a good base for the development of future test procedures.

At this moment there are already different initiatives in Europe with research institutes and industry to study and develop test procedures for this kind of situations ( MUSE , Intersection 2020 or EVADE). We think that it could be interesting to keep an eye on this work.

Stop&start situations for level 0 and 1 are too challenging because the driver is in fact accelerating and steering so it is complicated to consider that he is not attentive and the car should take the control and brake. In a first step just warning should be consider for this accident situations.

The speeds proposed for LTAP-OD scenarios are not realistic for the intersection defined in the same document.

In MUSE it was studied how the different trajectories at different speeds fitted in the intersection layout proposed by Euro NCAP ( quite similar to the one proposed by NHTSA) and it was concluded that 25 km/h will be the limit of a realistic turn to left trajectory for this intersection. In NHTSA test procedure there are scenarios in which the vehicle is going from 0 to 42 kmh.

For 25 kmh the car is already cutting maybe too much the lane of crossing traffic in an unrealistic manner (see figure below extracted from MUSE):


Figure 83 25 km/h turn left trajectory fitted inside Euro NCAP layout.

Lateral accelerations for turn left maneuvers at 25 km/h and 30 km/h (MUSE):

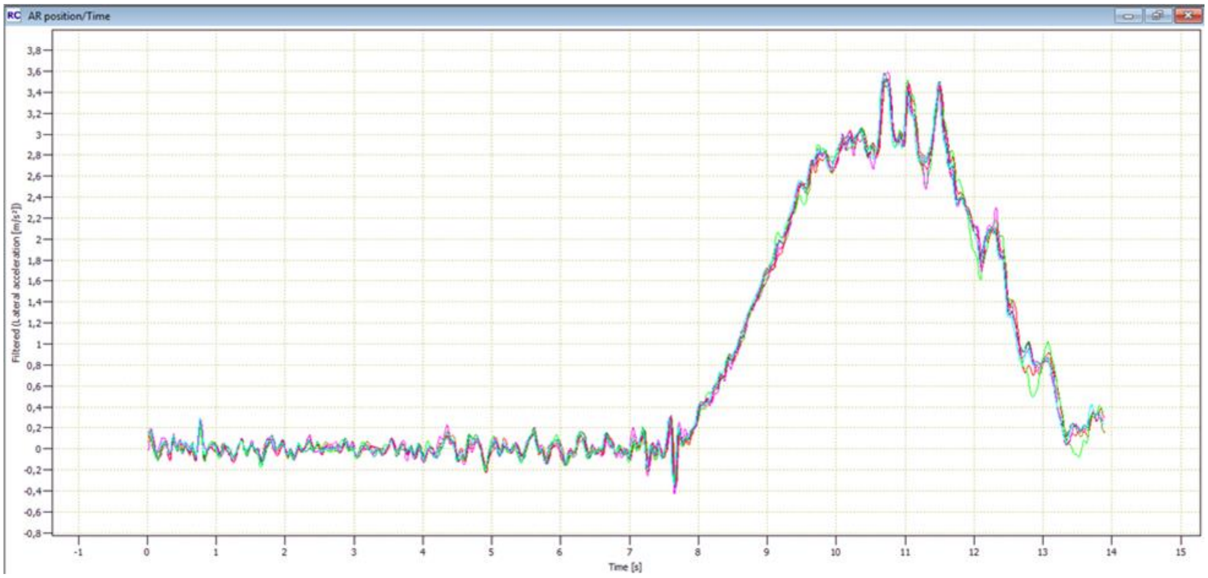



*Figure 1 25km/h*

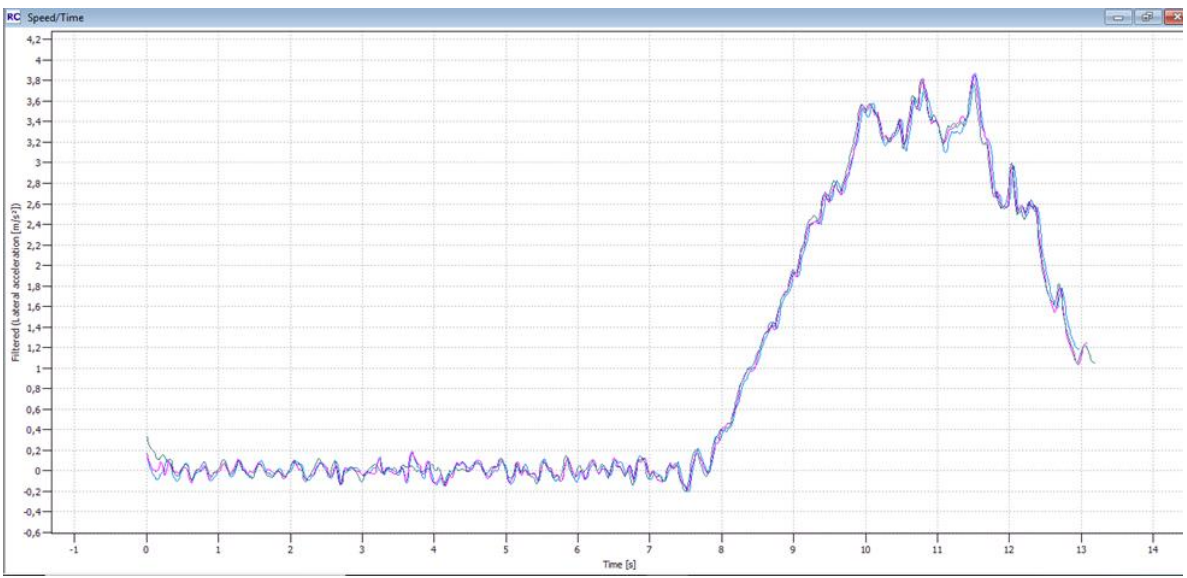



*Figure 2 30 km/h*

Lateral accelerations over 3.5 $m/s^2$ are not representative of a realistic way of turning in this kind of intersection.

We also consider that trajectories with clothoids as the ones developed in Intersection 2020 project and used in Euro NCAP CCFtap scenario should be used.

2. Do any of the draft research test procedures contain elements that may potentially confound the system operation and/or test results (*e.g.,* regarding test conduct)? If so, please indicate what those elements are and how they might be addressed and/or mitigated?

## Blind Spot Detection (BSD)

### Dimensions of POV:

While is true that we could not expect a big impact during BSD test due to this issue, we consider that for consistency of the NHTSA test procedures the dimensions of the POV should not differ within different protocols.

In this procedure it is requested to use a POV 445 to 500 cm long and 178 to 193 cm wide what will mean that it will not be possible to use the GVT (402 cm long 171 cm wide) that is proposed as POV in other test procedures of this docket. We will recommend to refer to *ISO 19206-3.*

It is true that with the current performances of the propulsion systems it will not be possible to test the Straight Lane Pass-by Test and we will need a real car but we find confusing the fact of considering that a car with the dimensions of the GVT as proposed for BSI will be not accepted for BSD.

In the same way, in the BSI test procedure in which there exists the option of using the GVT or a real car, we don't consider consistent that the dimensions of the surrogate target doesn't meet the dimensions of the real target.

### Micro-Doppler:

We would like to raise up the importance of Micro-Doppler effect caused by the movement of the wheels in the correct detection and identification of the POV. At this moment, the current GVT proposed in the test procedure has not turning wheels or any mechanism that simulates this effect so it is not completely representative of a real vehicle. This topic becomes especially important for scenarios at zero relative speed between SV and POV as the ones proposed in BSD and BSI test procedures.

In the same way, it is important for the detection of the pedestrian in PAEB scenarios the movement of the legs of the pedestrian. We consider that test should be conducted with a pedestrian with articulated legs movement as defined in ISO/CD 19206-2.

### Lane change maneuver:

From our point of view there is a lack of detail regarding the lane change maneuver during the Straight Lane Converge and Diverge Test trial. In the point 5.3.1 is defined that "*the POV shall perform a single lane change into the lane adjacent to the SV using a lateral velocity of 3 ft/s (1 m/s)*". It will be necessary to clear out at which point of the lane change maneuver this value is reached.

Logic will say that it's in the middle of the lane change maneuver but it will be better if this is bounded.
Furthermore, in the test validity section is written "*POV lateral velocity of during its lane changes: 0.25 to 1.5 m/s (0.8 to 4.9 ft/s)*" this leads to confusion as it could mean that a test in which the lane change maneuver has been done with a maximum lateral speed of 0.25m/s and other done at 1.5 m/s could be consider both as valid. Even if these two approaches from the side will be in fact quite different. As consequence that could mean that will not be possible to compare different systems assessed under this test procedure as the situation tested will considerably differ between cases.
We consider that a more precise definition and bounding of the lane change is necessary to assure repeatability.

A pragmatic approach could be to use a similar definition of the lane change maneuver defined in BSI test procedure but for a lateral speed of 1 m/s.

## Opposing Traffic Safety Assist (OTSA)

### TTC tolerances for test at 40.2 km/h:

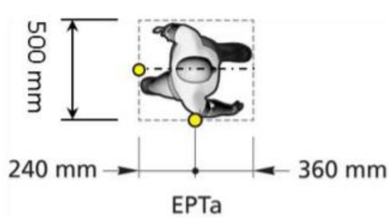
The tolerance of 0.8s for this scenario is too wide. 0.8 seconds could suppose a big difference in the assessment of the performances of the system. Even if the speed is lower than in other test cases the TTC tolerance should be the same (0.4).

## Pedestrian Automatic Emergency Braking (PAEB)

### False positive test:

For scenarios S1g and S1f more detailed information as the deceleration of the dummy when it stops and the distance at which the dummy start to decelerate are necessary.

The values of overlap proposed to evaluate a false reaction of the system are too close to the car. For example, if we consider an average car of 1.85 mm width the Pedestrian should stop at 1.85*0.75=1.39cm from the center of the car. What it means 0.46 cm from the side of the car. If we consider that the distance from the center of the pedestrian to the closest point to the car is 0.36 cm (see figure below) that will mean just 10 cm between the car and the pedestrian. Taking into account that for the width of the car side mirrors has not been considered, and that an average length of a side mirror could be around 15 or 20 cm, that will mean that with this test set up will be actually slightly hitting the dummy.



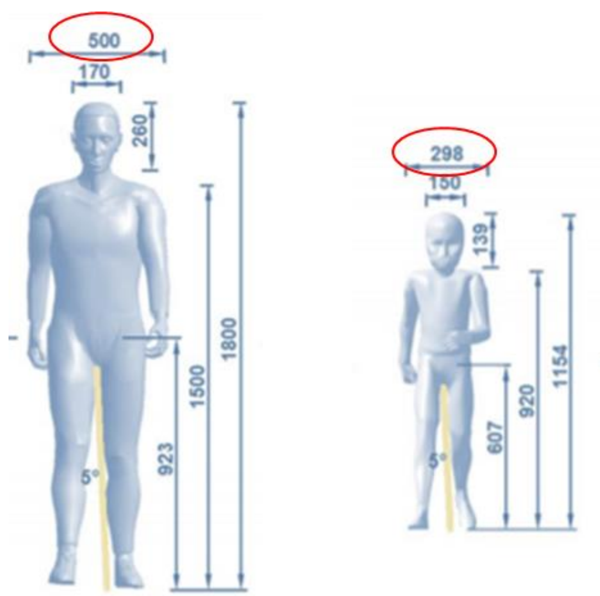
We consider that It is also important to realize about the fact that this kind of systems works with prediction of trajectories. It is not just important for the activation where the dummy is at a precise moment but where it will be if he continue to move with this cap and this speed. In the proposed test set up with an impact foreseen a 50% the dummy will be stopping at a TTC around 0.98s, too close to the usual timing of activation of an AEB in this kind of situation.

For the 125% false positive scenario it will be important to define a criterion. As we are working with almost accident situation a small deceleration could be maybe not consider as a false activation but as a safer mode of operation.

## Zero Position:

The following statement is not completely true as the difference of the zero position between Adult and Child could be not negligible. We consider that it will be important to specify that the zeroing should be re-done when we pass from the adult dummy to child dummy.

*"The front-most location of the SV shall be positioned such that it just contacts the PTM. This is the "zero position." The zero position does not change based on different overlap test conditions. The arms of the PTM are not to be considered contact points. "*




## Lateral deviation from Path Longitudinal Scenario:

*We consider that the lateral tolerances for the lateral deviation from path for both, vehicle and pedestrian, should be much smaller or more clearly defined than the ones proposed in the current version (paragraph 9.2.5.1):*

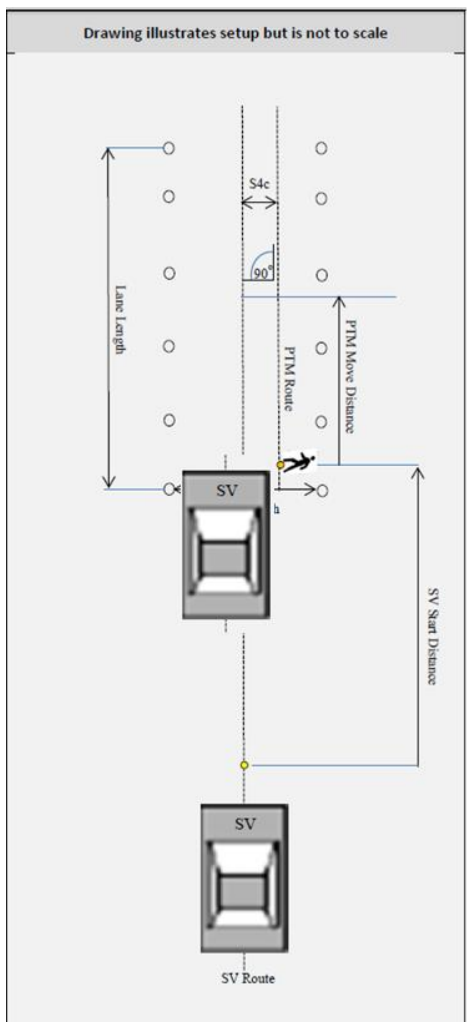
*Car:*

*"The driver shall use the least amount of steering input necessary to maintain SV position in the center of the test lane. The test lane is a guide for the driver to control the lateral deviation of the SV. If it is observed that the SV tires crossed the boundary of the test lane on either side the test should be repeated. The test lane is the width of the SV plus 42 cm (16.5 in)."*

*Pedestrian:*

*Lateral deviations induced by wind, equipment, or surface conditions should be monitored.*

For this scenario, with a low overlap, small lateral deviations in the paths could suppose a not activation of the system. Taking into account the current tolerances we could even find the situation in which the pedestrian is not even in the path of the SV. That will suppose an important dispersion in the results.



Drawing illustrates setup but is not to scale

3. Are the draft research test procedures clearly written, understandable, and executable? If not, please provide specific areas for which clarification is necessary, and suggestions for how they may be improved.

Blind Spot Detection (BSD)

It will be appreciated a definition of how the lateral distance between POV and SV is calculated. From our understanding is the lateral distance between the outer parts of the car but a more explicit definition in the document will be appreciated.

Blind Spot Intervention (BSI)

In paragraph 2.0 it is said:

*"At no time shall the SV contact the POV during the conduct of any trial described in this document."*

But in paragraphs 5.3.5.5 and 5.3.6.4 it said:

*"For trials where BSI does not intervene, the valid test interval ends when the SV impacts the POV."*

It will be necessary to clarify if during the test it is requested to go up to the impact or not and, in case it is decided to avoid always the impact to protect the car and test equipment, it will be necessary to define which is the criteria to consider that test it is finished and the system failed. Something similar to the criteria defined in OTA test procedure, paragraph 5.3.6.3.2 could be enough.

How it will be possible to fulfill the criteria of 5.3.5.5 and 5.3.6.4 when not using the surrogate target?

Pedestrian Automatic Emergency Braking (PAEB)

For each scenario it should be necessary to add the following statement (present already in other test procedures of this docket):

*"If any load has been placed on the SV front passenger seat (e.g., for instrumentation), the vehicle's front passenger seat belt must be latched. "*

4. Are the ranges of test speeds, speed combinations, and/or speed increments specified within each draft research test procedure reasonable? If not, please provide any data or evidence to support any claim of unreasonableness from a research perspective.

Opposing Traffic Safety Assist (OTSA)

We would like to have more details regarding how the speeds and TTC have been chosen, does this data come from an accidentology study of this kind of accidents in US?

The speeds for unintentional lane change seems similar to the ones that we can find in Europe. For the intentional scenario, the high speeds are also representative of the accident speeds that we find in Europe, just the SV speed of 40.2 km/h doesn't seem representative of a situation in which a car is overtaking a precedent car. The closest speed found in GIDAS for this kind of scenario will be 55 km/h (based in a recent study of Head On scenarios done by UTAC CERAM and presented at Euro NCAP).

From real world experience we could expect that in the case of an intentional lane of change the TTC at which the driver starts the maneuver is bigger than in the case of the unintentional. For the intentional lane change the driver is supposed to be attentive and looking into the lane that he is going to go into so the origin of the accident could be a misjudgment of the speed of the oncoming traffic, a lack of visibility due to the precedent vehicle or that the oncoming traffic is too far away. In unintentional lane change as it is due to inattention of the driver the TTCs could be lower.

In the test procedure is proposed the opposite, a bigger TTC for unintentional than for intentional, so we would like to know, if possible, which is the reason.

After a fast analysis of the parameters of the test procedure we believe that the values of TTC are more related with the initial lateral offset of the SV that with a TTC of intrusion in the opposite lane. Looking at the values of lateral offset for the VUT at the beginning of the test, we consider that these values should be revised, mainly by adapting the turning radius at the different speeds. The radius at 40.2 kmh should be different to the one at 72.4 kmh for a same lateral speed.

For example, in the case of intentional lane change at 40.2 km/h the initial lateral offset of the VUT in reference to the mid line is around 2.8 m (D1+D2) this will mean that the right wheel of the car will be almost on the right lane. This situation doesn't seem realistic and may affect to the correct working of the system.

In any case, as far as in this test procedure is proposed to deactivate LKA systems for the evaluation of the OTA, It should be possible to do the test. But if the LKA system would had been activated this method will be impossible to apply as the system will be continuously correcting the trajectory of the car before the beginning of the test.

In the case of the test with LCC activated, in which the car should be in the center of the lane at the beginning of turning, we think that the TTCs of activation of the turning signal should be revised as they could result in higher TTC of lane intrusion that in Level 0 and Level 1 cases.

## 7. Are there existing, alternative test procedures for the ADAS technologies identified in this notice that NHTSA should consider? If so, please identify them and provide any comparisons/contrasts that might be useful to the agency.

### Traffic Jam Assist (TJA)

Recently it has been drafted by UN-ECE a test procedure to evaluate ALKS in traffic jam situations. We consider that this work could be a good input for NHTSA test procedures.