G-Pilot2.0 AEB 功能设计规格书

<秘密级>

编　制：_____

审　核：_____

会　签：_____

批　准：_____

吉利汽车研究院（宁波）有限公司

二零 xx 年 xx 月

更改历史/ Revision History

版本/ Version	更改描述/ Revision Description	更改日期/ Revised Date	更改人/ Revised by
1.0	初版 First Revision	2017.11.17	苗阳
1.1	1.2 前碰撞预警三级报警 TTC 修改 1.5 中速自动紧急制动 最大速度降修改(45 至 50) 1.7 AEB 系统性能验收指标最高避免碰撞速度修改(修改至 50)	2018.01.11	苗阳
1.2	1.6 新增保压优化逻辑	2018.05.18	苗阳
1.3	1.6 刹停保压逻辑优化	2018.07.09	苗阳
1.4	1.21 修改安全距离报警激活逻辑	2018.08.10	李星
1.5	1.5 修改中速紧急制动对静止目标的功能	2018.08.30	李星
1.6	1.3 增加紧急报警激活条件	2018.10.09	李星
1.7	1.6 刹停保压逻辑优化	2018.10.15	李星
1.8	1.6 优化低速自动紧急制动的抑制条件 1.21 修改安全距离报警激活逻辑 1.3 紧急报警策略更新 1.1.1 制动预填充策略更改 删除 N 档抑制 1.5 修改中速紧急制动对静止目标的功能	2018.10.24	李星
1.9	删除中速紧急制动/紧急报警的抑制条件: 在 2.5s 内驾驶员油门踏板开度斜率持续大于 4 %/s	2018.10.30	李星
2.0	1.3 紧急报警激活条件更改为 TTC 小于 2.0s “驾驶员闪避转向”的抑制/中止条件更改为“目标不在自车预测行驶轨迹” 删除预报警的中止条件“AWB 激活” 增加安全距离报警的中止/抑制条件 删除中速紧急制动的标准和增强模式 1.7 增加 NCAP 得分要求	2018.12.13	李星
2.1	1.3 紧急制动辅助功能输出的目标加速度范围最大值修改为-12m/s2 1.4 增加 紧急制动辅助功能激活条件 删除“发动机关闭”的抑制/中止条件 1.5 修改中速紧急制动的起始速度更改为 4kph 1.5 1.6 中速及低速自动紧急制动 增加中止和抑制条件 “驾驶员安全带未系”	2019.03.05	李星
2.2	1.3 增加 EBA 激活的条件(自车车速大于 30kph)	2019.03.26	李星

2.3	1.4 修改 EBA 最高工作车速为 90KPH	2019.06.17	李星
2.4	删除AEB-C的抑制条件（行驶轨迹曲率大于0.02 m-1） 删除制动预填充中止条件（制动预填充功能的最小激活时间为 0.6s） 1.7.1 KPI优化 1.2.1 增加安全距离报警的中止条件	2019.07.04	李星
2.5	1.4 紧急制动辅助激活条件由 15bar 更改为-3.75m/s2	2019.07.12	李星

说明:

1) 版本序号的编制方法为,按顺序依次增加,初始版本为 1.0。当版本排序到 1.9 时，再次更改后，版本序号更换到 2.0，后续排列序号依此类推。
2) 日期的命名按照年-月-日的顺序，具体格式见上表的示例。

Note:

1) Version No. should be increased in order. The first version No. is 1.0. If the version No. reaches 1.9 and the specification is revised once again, the version No. should be increased to 2.0.
2) Date should be in format: Year-Month-Day, see the demo in the table above.

目录

1 自动紧急制动系统（AEB，Autonomous Emergency Braking System）

功能要求

Function requirement

自动紧急制动系统（AEB）在即将发生事故的情况下通过辅助驾驶员来主动避免交通事故。通过对前方环境的监测，当驾驶员制动过晚、制动力太小或完全没有任何反应时采取报警、制动等方式，帮助驾驶员避免或减轻事故的危害，提高行驶安全性。AEB 系统包含五个模块：制动准备（BP）、前碰撞预警（FCW）、紧急制动辅助（EBA）、中速自动紧急制动（AEB-UN）和低速自动紧急制动（AEB-C）。

The goal of Automatous Emergency Braking (AEB) System is to avoid or mitigate the collision in a critical driving situation. By monitoring the front environment, the system provides assistance when the driver brakes too late, brakes with not enough force or no reaction from the driver, etc. The AEB is consist of 5 blocks: Brake Preparation(BP), Forward Collision Warning (FCW), Emergency Braking Assist (EBA), AEB-Inter Urban (AEB-UN) and AEB-City (AEB-C).

自动紧急制动系统所有子功能不应当有一个点火周期连续触发次数的限制。

All sub-functions of AEB system should NOT have limitation on activation times in one ignition cycle.

1.1 制动准备（Brake Preparation）

制动准备模块包含两项功能：1、制动预填充；2、液压制动辅助等级调整。

Brake Preparation includes two functions: 1.Brake Prefill; 2. HBA adjust.

1.1.1 制动预填充（Brake Prefill）

制动预填充功能应当控制 ESC 消除制动片和制动盘之间的间隙，在紧急制动时减少制动响应时间，缩短制动距离。

Brake prefill function shall control ESC to eliminate the gap between brake clamp and brake disc, which reduces the brake response time and hence reduce stopping distance in dangerous situation.

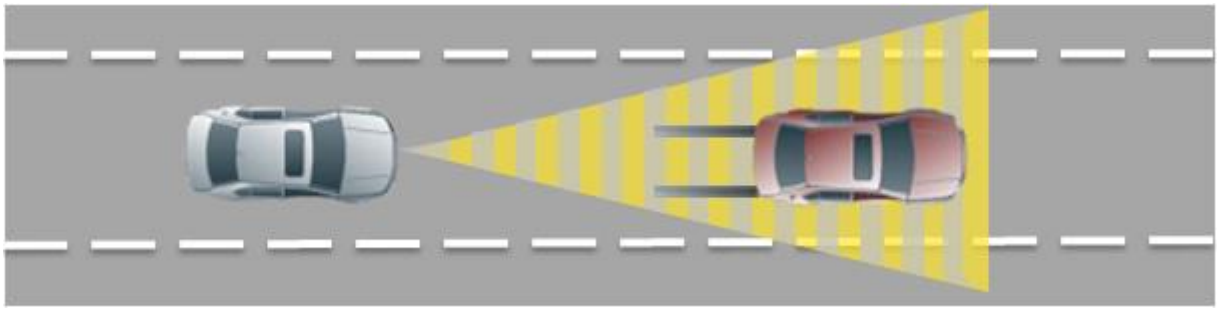
制动预填充需要在 FCW 激活后 300ms（可调）激活。

Brake prefill shall be activated 300ms (tunable) after the activation of FCW.

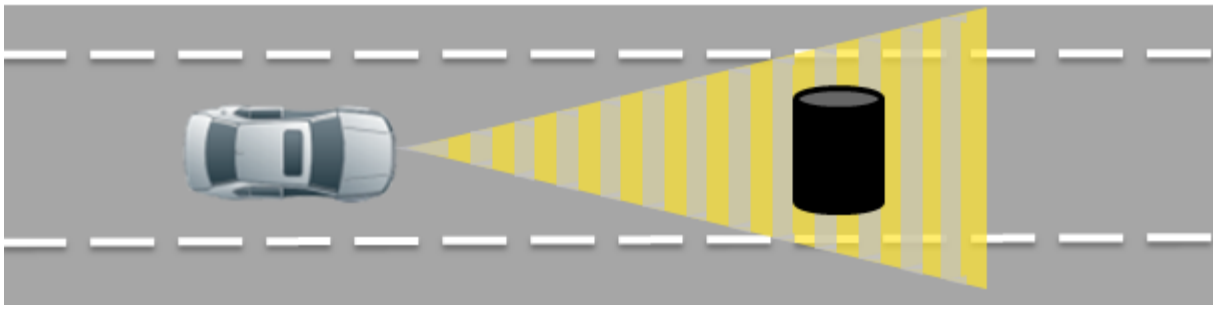
制动预填充功能适用场景及其有效工作范围为：

Applicable scenario and effective operating range of the Brake prefill function are given below:

1. 在本车道接近一个移动或停止目标，本车速度范围为 4km/h 至 150km/h；
   When vehicle is approaching a moving or stopped target, the speed range should be between 4Km/h and 150Km/h;



2. 静止目标，本车速度范围为 4Km/h 至 85Km/h。
   When vehicle is approaching a stationary target, the speed range should be between 4Km/h and 85Km/h.



制动预填充功能在符合以下任一情况时应被抑制激活：
Brake prefill function shall be suppressed in one of the following situations:

1. 目标不在自车预测行驶轨迹
   Target is not in the predicted driving path of ego vehicle
2. 驾驶员主动接管，满足以下任一条件：
   Driver take over control, condition is satisfied when one of the following is fulfilled:
   a) 油门开度大于 0.85；
      Throttle opening is greater than 0.85
3. 驾驶员主动制动，满足以下任一条件：
   Driver actively step on the brake, condition is satisfied when one of the following is fulfilled:
   a) 主缸压力大于 3 bar;
      Master cylinder pressure is greater than 3 bar
   b) 制动踏板信号置真；
      Brake pedal signal is set to on
4. 雷达检测到故障：电压过低/高、失明、硬件错误、信号发送/接收超时、关联系统故障等（详见 DTC 列表）；
   Camera/Radar error detected: Voltage too low/high, blindness detected, Hardware failure, Transmission error, Related ECU error (See DTC list), etc
5. 系统异常操作，满足以下任一条件：
   Exceptional Operation Situation, condition is satisfied when one of the following is fulfilled:
   a) 系统初始化;
      System initialization
   b) ESC 提示 ESP 故障信号；
      ESP error;
   c) 雷达不可用（内部硬件故障）；

Radar unavailable (internal hardware failure);

6. 车辆处于非稳定状态：DTC/TCS/VDC 激活；
   Unstable driving situation: DTC/TCS/VDC active
7. 距上一次激活时间小于 20s；
   Less than 20s after previous activation;
8. 制动预填充功能配置字关闭；
   Brake prefill function configuration is set off;
9. ESC 的 Prefill 功能不可用；
   ESC Prefill function unavailable;
10. 驾驶员通过人机界面选择“关闭功能”。
    Driver selects “Function off” via HMI

制动预填充功能激活后，应在符合以下任一情况时中止激活：

After brake prefill function is activated, function should be terminated when one of the following is fulfilled:

1. 车辆处于非稳定状态：DTC/TCS/VDC 激活；
   Unstable driving situation: DTC/TCS/VDC active
2. 雷达检测到故障：电压过低/高、失明、硬件错误、信号发送/接收超时、关联系统故障等（详见 DTC 列表）；
   Camera/Radar error detected: Voltage too low/high, blindness detected, Hardware failure, Transmission error, Related ECU error (See DTC list), etc
3. 超过最大激活时间：5s；
   Maximum activation time of 5s is exceeded;
4. 目标不在自车预测行驶轨迹
   Target is not in the predicted driving path of ego vehicle
5. 前方紧急情况解除。(无 danger level)
   No collision danger, exist due to target lost.
6. 驾驶员通过人机界面选择“关闭功能”
   Driver selects “Function off” via HMI;

1.1.2 液压制动辅助等级调整（Hydraulic Brake Assist Level Adjust）

液压制动辅助功能用于辅助驾驶员在紧急情况下的制动，该功能根据预设的参数作为判断条件，当驾驶员制动速率满足条件时，采取完全的制动来达到最优的制动距离。

Hydraulic brake assist function is used to assist driver to brake in case of emergency. According to the preset parameters, it will apply a full brake to achieve optimal brake distance when driver brake rate reaches a preset level.

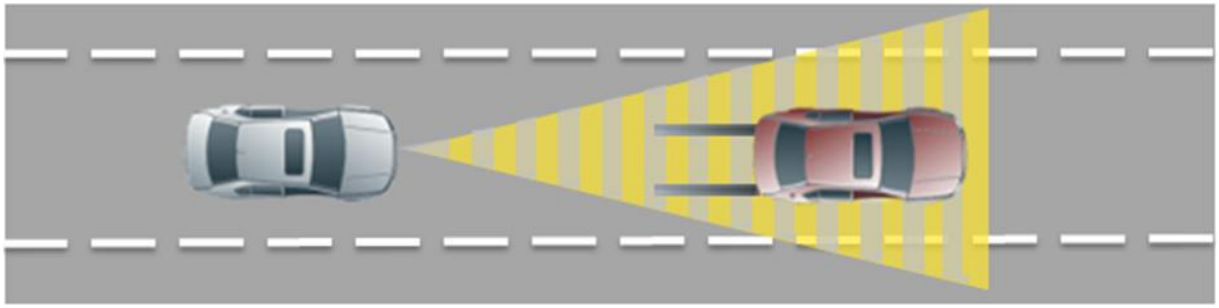
液压制动辅助等级调整功能能够根据不同的危险程度，控制 ESC 调整其 HBA 预设参数，以辅助驾驶员在紧急情况下采取完全制动来避免碰撞。

Hydraulic brake assist level adjustment function can request ESC to adjust the HBA preset parameters according to different dangerous level, which can help better to assist driver to achieve full brake in case of emergency

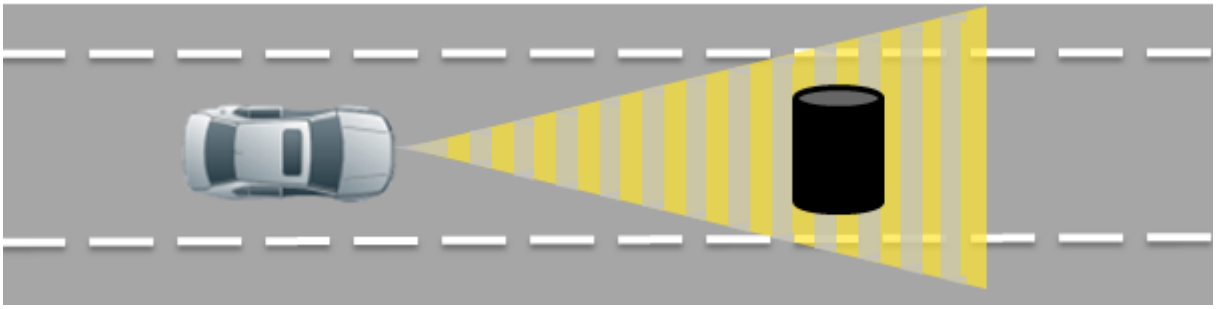
液压制动辅助等级调整功能适用场景及其有效工作范围为：

Applicable scenario and effective operating range of the Hydraulic brake assist level adjustment function are given below:

1. 在车辆道接近一个移动或停止目标，本速度度范围为 4Km/h 至 150Km/h;
   When vehicle is approaching a moving or stopped target, the speed range should be between 4Km/h and 150Km/h



2. 在车辆道接近静止目标，本速度度范围为 4Km/h 至 85Km/h。
   When vehicle is approaching a stationary target, the speed range should be between 4Km/h and 85Km/h



液压制动辅助等级调整功能在以下不同情况时调整等级以及对应的主缸压力变化率（pa/s）阈值为：

The corresponding rate of change of pressure in master cylinder for different danger level and Hydraulic brake assist level is as follow:

1. 默认值为 Level 0，HBA0=12500*15%；
   Default Level 0, HBA0=12500*15%
2. Danger Level 1 时为 Level 1, HBA1=HBA0*0.7;
   Level 1 at Danger Level 1, HBA1=HBA0*0.7;
3. Danger Level 2 时为 Level 2, HBA2=HBA0*0.5
   Level 2 at Danger Level 2, HBA2=HBA0*0.5
4. Danger Level 3 时为 Level 3,HBA3=HBA0*0.3
   Level 3 at Danger Level 3, HBA3=HBA0*0.3

液压制动辅助等级调整功能在符合以下任一情况时应被抑制激活：

Hydraulic brake assist level adjustment function shall be suppressed when one of the following condition is fulfilled:

1. 目标不在自车预测行驶轨迹
   Target is not in the predicted driving path of ego vehicle
2. 驾驶员主动接管，满足以下任一条件：

Driver take over control, condition is satisfied when one of the following is fulfilled:

a) 油门开度大于 0.85；
Throttle opening is greater than 0.85

3. 雷达检测到故障：电压过低/高、失明、硬件错误、信号发送/接收超时、关联系统故障等（详见 DTC 列表）；
Camera/Radar error detected: Voltage too low/high, blindness detected, Hardware failure, Transmission error, Related ECU error (See DTC list), etc
4. 系统异常操作，满足以下任一条件：
Exceptional Operation Situation, condition is satisfied when one of the following is fulfilled:
   a) 系统初始化；
   System initialization
   b) ESC 提示 ESP 故障信号；
   ESP error;
   c) 雷达不可用（内部硬件故障）
   Radar unavailable (internal hardware failure);
5. 车辆处于非稳定状态：DTC/TCS/VDC 激活;
Unstable driving situation: DTC/TCS/VDC active
6. 液压制动辅助等级调整功能配置字关闭；
Hydraulic brake assist level adjustment function is set off;
7. ESC 的 ABA 功能不可用；
ESC ABA function unavailable;
8. 驾驶员通过人机界面选择“关闭功能”。
Driver selects “Function off” via HMI

液压制动辅助等级调整功能激活后，应在符合以下任一情况时中止激活：
After HBA function is activated, function should be terminated when one of the following is fulfilled:

1. 雷达检测到故障：电压过低/高、失明、硬件错误、信号发送/接收超时、关联系统故障等（详见 DTC 列表）；
Camera/Radar error detected: Voltage too low/high, blindness detected, Hardware failure, Transmission error, Related ECU error (See DTC list), etc
2. 目标不在自车预测行驶轨迹
Target is not in the predicted driving path of ego vehicle
3. 前方紧急情况解除；
No collision danger, exist due to target lost
4. 驾驶员通过人机界面选择“关闭功能”。
Driver selects “Function off” via HMI

1.2 前碰撞预警（FCW，Forward Collision Warning）

前碰撞预警应当在危险情况下使制动系统进入准备状态，并通过声音、图像及振动的方式提醒驾驶员作出反应，从而降低碰撞的风险。

Forward Collision Warning (FCW) should prepare the braking system and warn the driver by acoustic, optical

and haptic to react in critical situation, hence reduce the probability of crashing.

前碰撞预警包含三项功能：1、安全距离报警；2、预报警；3、紧急报警。

Warning module includes three functions: 1. Latent warning; 2. Pre-warning; 3. Acute warning.

前碰撞预警三级灵敏度设置

要求系统出厂默认在低灵敏度，系统需要能够记忆驾驶员选择，在下一次点火周期时默认为驾驶员上个点火周期时的选择。

The factory default setting of the FCW is at low sensitivity level and the system should be able to remember drive's selection and resume to it in next ignition cycle.

具体要求：

Specific requirements:

1. 当本次点火周期驾驶员选择关闭报警时，控制器需要记忆当前驾驶员选择的灵敏度，当本次点火周期驾驶员再次开启报警或下次点火周期系统默认开启报警时，FCW 灵敏度直接恢复到驾驶员设置的灵敏度

   When the driver selects 'WARNING OFF' in this ignition cycle, the controller should remember current sensitivity level and resume to this sensitivity directly when the driver turn on the warning during this ignition cycle or the warning is automatically turned on in next ignition cycle.
2. 当本次点火周期驾驶员选择了某个灵敏度，且直至本次行程结束未选择关闭功能或者关闭报警，下次点火周期雷达需要记忆驾驶员选择，直接选择到相应灵敏度。

   When the driver selects certain sensitivity level in this ignition cycle and did not turn off the function or the warning in current ignition cycle, radar should remember the current setting and resume directly to the same setting in next ignition cycle.

第一级---低灵敏度

Level 1---low sensitivity

按照供应商策略，较晚触发，保证正确触发率。

According to supplier's strategy, late tigger to ensure accuracy

第二级---中灵敏度

Level 2---medium sensitivity

CCRs：

30~40kph：TTC=2.5s（最晚报警时间/latest warning time）

40~50kph：TTC=2.7s（最晚报警时间/latest warning time）

50~60kph：TTC=2.9s（最晚报警时间/latest warning time）

60~70kph：TTC=3.0s（最晚报警时间/latest warning time）

＞70kph：TTC=3.1s（最晚报警时间/latest warning time）

CCRm：

40~50kph：TTC=2.3s（最晚报警时间/latest warning time）

50~60kph：TTC=2.4s（最晚报警时间/latest warning time）

60~70kph：TTC=2.5s（最晚报警时间/latest warning time）

＞70kph：TTC=2.6s（最晚报警时间/latest warning time）

第三级---高灵敏度

Level 3---high sensitivity

CCRs：

30~40kph：TTC=2.5s（最晚报警时间/latest warning time）

40~50kph：TTC=2.7s（最晚报警时间/latest warning time）

50~60kph：TTC=3.0s（最晚报警时间/latest warning time）

60~70kph：TTC=3.1s（最晚报警时间/latest warning time）

＞70kph：TTC=3.2s（最晚报警时间/latest warning time）

CCRm：

40~50kph：TTC=2.4s（最晚报警时间/latest warning time）

50~60kph：TTC=2.5s（最晚报警时间/latest warning time）

60~70kph：TTC=2.6s（最晚报警时间/latest warning time）

＞70kph：TTC=2.7s（最晚报警时间/latest warning time）

1.2.1 安全距离报警(Latent Warning)

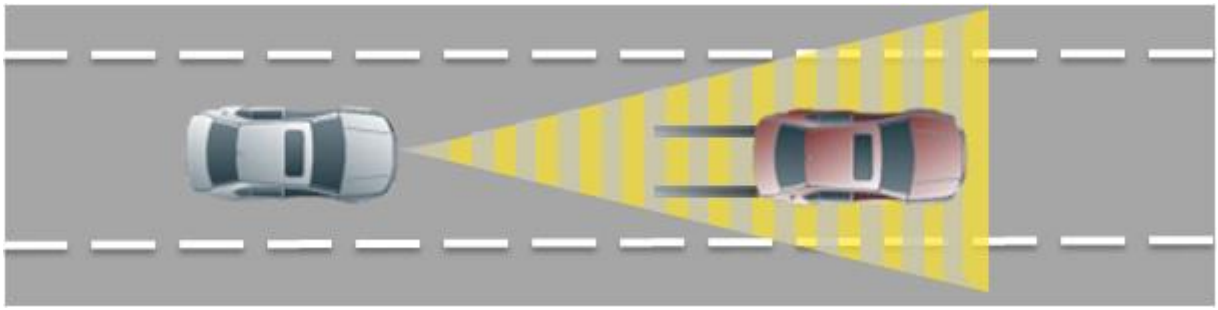
安全距离报警功能工作在非紧急状态（如果保持该状态，也不会有碰撞的风险），用于提示驾驶员跟随前车的距离过小，驾驶员应调整驾驶行为、保持合理车距。

Latent warning function works in non-emergency situation (no risk of collision if current situation is maintained) and is used to remind the driver to adjust driving behavior and keep suitable distance when vehicle is too close to the front car.

安全距离报警功能适用场景及其有效工作范围是：

Applicable scenario and effective operating range of the Latent warning function are given below:

1. 在车辆道接近一个移动目标，本速度度范围为 65Km/h 至 150Km/h；
   When vehicle is approaching a moving target, the speed range should be between 65Km/h and 150Km/h;



安全距离报警在同时满足以下条件时激活：

Latent warning shall be activated when all of the following conditions are fulfilled:

1. 与前车的相对速度的绝对值小于 2m/s；
   Absolute value of the relative speed to front vehicle is less than 2m/s;
2. 与前车的车间时距（相对距离/自车速度）小于 0.9s。
   Time headway (relative distance/said vehicle speed) is less than 0.9s.
3. 满足上述条件 5s。
   Fulfill the conditions above for 5s.

安全距离报警功能在符合以下任一情况时应被抑制激活：

Pre-warning function shall be suppressed when one of the following condition is fulfilled:

1. 目标不在自车预测行驶轨迹
   Target is not in the predicted driving path of ego vehicle
2. 驾驶员主动接管，满足以下任一条件：
   Driver take over control, condition is satisfied when one of the following is fulfilled:
   a) 油门开度大于 0.85；
      Throttle opening is greater than 0.85
3. 驾驶员通过人机界面选择“关闭报警”；
   Driver selects “Warning off” via HMI
4. ACC 激活
   ACC is activated.
5. 雷达检测到故障：电压过低/高、失明、硬件错误、信号发送/接收超时、关联系统故障等（详见 DTC 列表）；
   Camera/Radar error detected: Voltage too low/high, blindness detected, Hardware failure, Transmission error, Related ECU error (See DTC list), etc
6. 系统异常操作，满足以下任一条件：
   Exceptional Operation Situation, condition is satisfied when one of the following is fulfilled:
   a) 系统初始化；
      System initialization;
   b) ESC 提示 ESP 故障信号；
      ESP error;
7. 车辆处于非稳定状态：DTC/TCS/VDC 激活；
   Unstable driving situation: DTC/TCS/VDC active
8. 距上一次激活时间小于 20s；
   Less than 20s after previous activation;
9. 预报警功能配置字关闭。
   Pre-warning function configuration is set off;
10. 驾驶员通过人机界面选择“关闭功能”。
    Driver selects “Function off” via HMI

安全距离报警报警功能激活后，应在符合以下任一情况时中止激活：

After pre-warning function activated, function should be terminated when one of the following is fulfilled:

1. 驾驶员通过人机界面选择“关闭报警”；
   Driver selects “Warning off” via HMI;
2. 雷达检测到故障：电压过低/高、失明、硬件错误、信号发送/接收超时、关联系统故障等（详见 DTC 列表）；
   Camera/Radar error detected: Voltage too low/high, blindness detected, Hardware failure, Transmission error, Related ECU error (See DTC list), etc
3. 预报警（Pre-Warning）功能激活；
   Pre-Warning function is activated;
4. 驾驶员通过人机界面选择“关闭功能”
   Driver selects “Function off” via HMI;

5. 车速低于 60km/h
   vehicle speed is below 60km/h.
6. ACC 激活
   ACC is activated.
7. 目标不在自车预测行驶轨迹
   Target is not in the predicted driving path of ego vehicle
8. 与前车的相对速度的绝对值大于 2m/s；
   Absolute value of the relative speed to front vehicle is larger than 2m/s;
9. 与前车的车间时距（相对距离/自车速度）大于 0.9s。
   Time headway (relative distance/said vehicle speed) is larger than 0.9s.

1.2.2 预报警(Pre-warning)

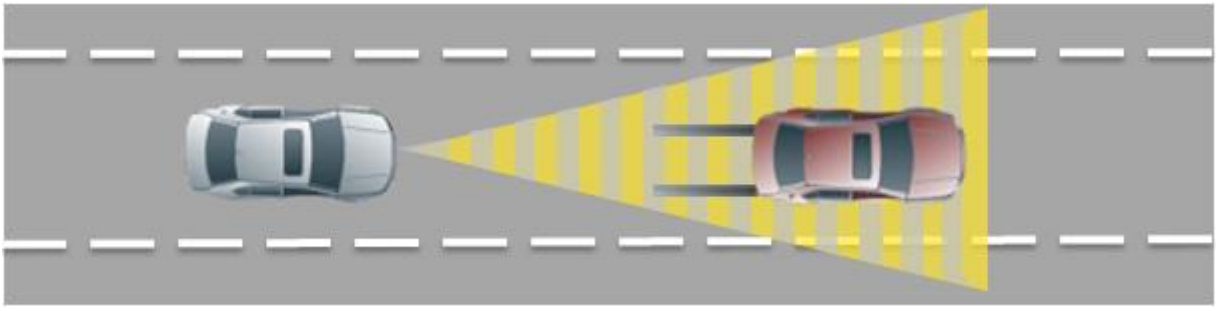
预报警功能应当在出现危险情况时，作为第一级报警首先提示驾驶员作出反应。

In dangerous situations, pre-warning function shall be the first-level warning to remind driver to react

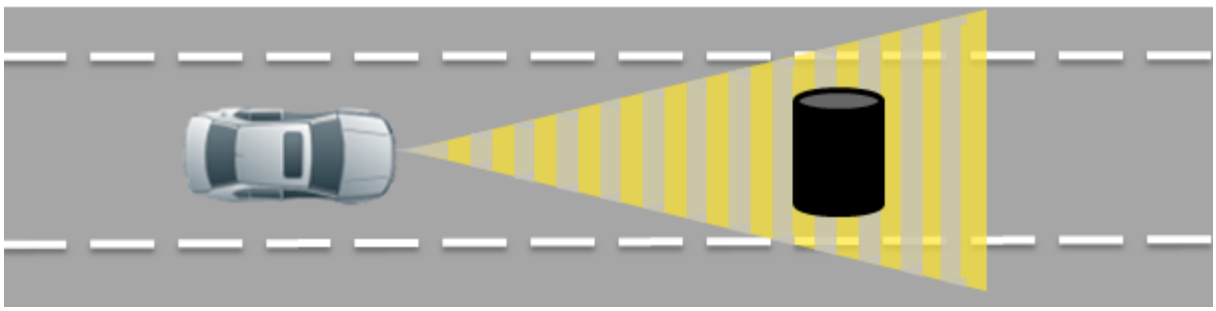
预报警报警功能适用场景及其有效工作范围是：
Applicable scenario and effective operating range of the Pre-warning function are given below:

1. 在车辆道接近移动目标，本速度度范围为 30Km/h 至 150Km/h;

   When vehicle is approaching a moving or stopped target, the speed range should be between 30Km/h and 150Km/h



2. 在车辆道接近静止目标，本速度度范围为 30Km/h 至 85Km/h。
   When the vehicle is approaching a stationary target, the speed range should be between 30Km/h to 85Km/h



预报警功能在符合以下任一情况时应被抑制激活：

Pre-warning function shall be suppressed when one of the following condition is fulfilled:

1. 目标不在自车预测行驶轨迹
   Target is not in the predicted driving path of ego vehicle
2. 驾驶员主动接管，满足以下任一条件：

   Driver take over control, condition is satisfied when one of the following is fulfilled:

   a) 油门开度大于 0.85；
      Throttle opening is greater than 0.85
3. 驾驶员主动制动，满足以下任一条件（仅在目标为静止物体时抑制预报警功能）：
   Driver actively step on the brake, condition is satisfied when one of the following is fulfilled (pre-warning function should only be suppressed for stationary object):
   a) 主缸压力大于 3 bar；
      Master cylinder pressure is greater than 3 bar
   b) 制动踏板信号置真；
      Brake pedal signal is set to on
4. ~~驾驶员通过人机界面选择“关闭报警”；~~
   Driver selects “Warning off” via HMI
5. 雷达检测到故障：电压过低/高、失明、硬件错误、信号发送/接收超时、关联系统故障等（详见 DTC 列表）；
   Camera/Radar error detected: Voltage too low/high, blindness detected, Hardware failure, Transmission error, Related ECU error (See DTC list), etc
6. 系统异常操作，满足以下任一条件：
   Exceptional Operation Situation, condition is satisfied when one of the following is fulfilled:
   a) 系统初始化；
      System initialization;
   b) ESC 提示 ESP 故障信号；
      ESP error;
   c) 雷达不可用（内部硬件故障）；
      Radar unavailable (internal hardware failure);
7. 车辆处于非稳定状态：DTC/TCS/VDC 激活；
   Unstable driving situation: DTC/TCS/VDC active
8. 距上一次预报警/紧急报警/自动紧急制动激活时间小于 20s；
   Less than 20s after previous activation of pre-warning/acute warning/automatic emergency brake;
9. 预报警功能配置字关闭。
   Pre-warning function configuration is set off;
10. 驾驶员通过人机界面选择“关闭功能”。
    Driver selects “Function off” via HMI

预报警功能激活后，应在符合以下任一情况时中止激活：

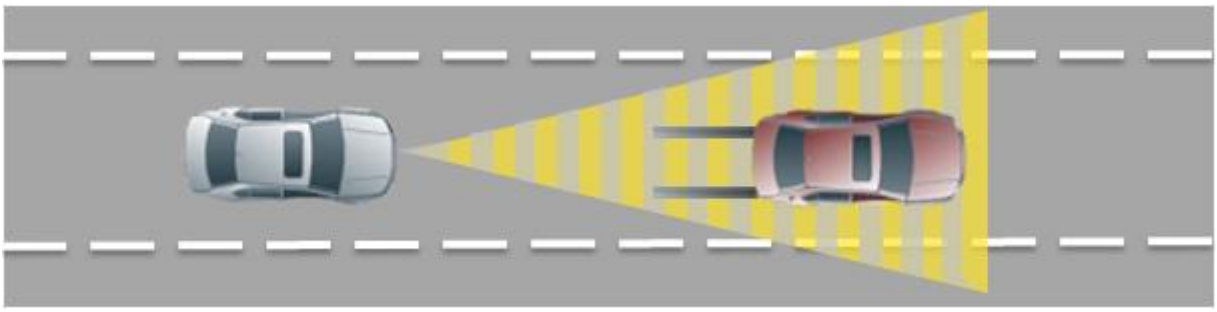
After pre-warning function activated, function should be terminated when one of the following is fulfilled:

1. 驾驶员通过人机界面选择“关闭报警”；
   Driver selects “Warning off” via HMI;
2. 雷达检测到故障：电压过低/高、失明、硬件错误、信号发送/接收超时、关联系统故障等（详见 DTC 列表）；
   Camera/Radar error detected: Voltage too low/high, blindness detected, Hardware failure, Transmission error, Related ECU error (See DTC list), etc
3. 超过最大激活时间：2s；
   Maximum activation time of 2s is exceeded;
4. 前方紧急情况解除；
   No collision danger, exist due to target lost.
5. 紧急制动辅助（Emergency Braking Assist）功能激活;
   Emergency Braking Assist function is activated.
6. 驾驶员通过人机界面选择“关闭功能”
   Driver selects “Function off” via HMI;

1.3 紧急报警(Acute Warning)

紧急报警功能应当在危险情况更紧急时，作为第二级报警提示驾驶员作出反应。
In a acuter situation, acute warning function shall be the second-level warning to remind driver to react.
紧急报警功能适用场景及其有效工作范围是：
Applicable scenario and effective operating range of the Acute warning function are given below::

1. 在车辆道接近移动目标，本速度度范围为 30Km/h 至 150Km/h。
   When vehicle is approaching a moving target, the speed range should be between 30Km/h and 150Km/h;



紧急报警激活条件：
Activation conditions for acute warning:

1. 纵向距离小于 50m
   Longitudinal distance from front target is less than 50 m
2. 横向距离小于 4m
   Lateral distance from front target is less than 4 m
3. TTC 小于 2.0s
   TTC is less than 2.0s
4. 目标车速度大于 15kph
   Target vehicle speed is higher than 15kph
5. ALatRqrd > 0.7m/s2，通过转向避撞需要的横向加速度

ALatRqrd > 0.7m/s2 (the lateral acceleration needed to avoid collision via steering)

6. 只对 Car 和 Truck 触发
   Acute warning can only be triggered when front target is car or truck

紧急报警功能要求：
AWB requirement:

1. **点刹制动的激活时刻不能早于前碰撞预警的激活时刻**
   Jerk braking cannot be activated before the activation of FCW
2. **点刹制动减速度峰值为** -1.5m/s2 (Level 1)
   The peak deceleration of jerk braking is -1.5m/s2 (Level 1)
3. **持续时间在** 200ms～300ms (Level 1)
   Time duration is 200ms～300ms (Level 1)
4. **速度降在** 5kph **以内**
   Speed drop is less than 5kph

紧急报警功能在符合以下任一情况时应被抑制激活：
Acute warning function shall be suppressed when one of the following is fulfilled:

1. 目标不在自车预测行驶轨迹
   Target is not in the predicted driving path of ego vehicle
2. 驾驶员主动接管，满足以下任一条件：
   Driver take over control, condition is satisfied when one of the following is fulfilled:
   a) 油门开度大于 0.85；
      Throttle opening is greater than 0.85
3. 驾驶员主动制动，满足以下任一条件:
   Driver actively step on the brake, condition is satisfied when one of the following is fulfilled:
   a) 主缸压力大于 3 bar；
      Master cylinder pressure is greater than 3 bar
   b) 制动踏板信号置真；
      Brake pedal signal is set to on
4. 驾驶员通过人机界面选择“关闭功能”；
   Driver selects “Function off” via HMI;
5. 雷达检测到故障：电压过低/高、失明、硬件错误、信号发送/接收超时、关联系统故障等（详见 DTC 列表）；
   Camera/Radar error detected: Voltage too low/high, blindness detected, Hardware failure, Transmission error, Related ECU error (See DTC list), etc
6. 系统异常操作，满足以下任一条件：
   Exceptional Operation Situation, condition is satisfied when one of the following is fulfilled:
   a) 系统初始化；
      System initialization;
   b) ESC 提示 ESP 故障信号；

ESP error;

c) 雷达不可用（内部硬件故障）；
Radar unavailable (internal hardware failure);

7. 车辆处于非稳定状态：DTC/TCS/VDC 激活；
Unstable driving situation: DTC/TCS/VDC active
8. 距上一次紧急报警/自动紧急制动激活时间小于 20s；
Less than 20s after previous activation of pre-warning/acute warning/automatic emergency brake;
9. 紧急报警功能配置字关闭；
Acute warning function configuration is set off;
10. ESC 的 AWB 功能不可用；
ESC AWB function unavailable;
11. 自车加速度小于-2.5 m/s²（正在减速）。
Deceleration of the said vehicle is below -2.5 m/s²

紧急报警功能激活后，应在符合以下任一情况时中止激活：
After acute warning function is activated, function should be terminated when one of the following is fulfilled:

1. 驾驶员通过人机界面选择“关闭功能”；
Driver selects “Function off” via HMI;
2. 雷达检测到故障：电压过低/高、失明、硬件错误、信号发送/接收超时、关联系统故障等（详见 DTC 列表）；
Camera/Radar error detected: Voltage too low/high, blindness detected, Hardware failure, Transmission error, Related ECU error (See DTC list), etc
3. 超过最大激活时间：1s；
Maximum activation time of 1s is exceeded
4. 车辆处于非稳定状态：DTC/TCS/VDC 激活；
Unstable driving situation: DTC/TCS/VDC active
5. 此状态下无 danger level（TTC 很大）
No danger level (TTC is very long)

1.4 紧急制动辅助（Emergency Braking Assist）

紧急制动辅助功能应当在紧急情况时，辅助制动力不足的驾驶员提供额外的制动力，从而避免或减轻碰撞的风险。

In an emergency situation, Emergency brake assist function shall provide additional brake force when there is not enough brake force from the driver, hence avoid collision or reduce the risk of collision.

紧急制动辅助功能输出的目标加速度范围：-1.3m/s² ... -12m/s²。

Range of target acceleration for emergency brake assist function: -1.3m/s² ... -12m/s².

紧急制动辅助功能激活条件：

Activation conditions for emergency brake assist function:

1. 驾驶员制动（主缸压力）产生的减速度达到-3.75m/s2
Deceleration caused by the driver (Master cylinder pressure) reaches -3.75m/s2

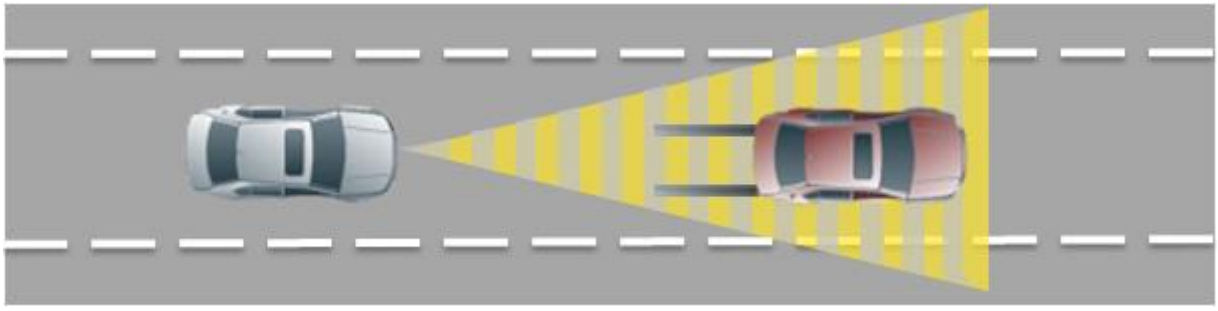
2. 整车减速度达到-2m/s2
   Vehicle deceleration value reaches -2m/s2
3. 自车车速大于 30kph
   Ego vehicle speed is above 30kph

紧急制动辅助功能适用场景及其有效工作范围是：

Emergency brake assist function application scene and effective operating range are given below:

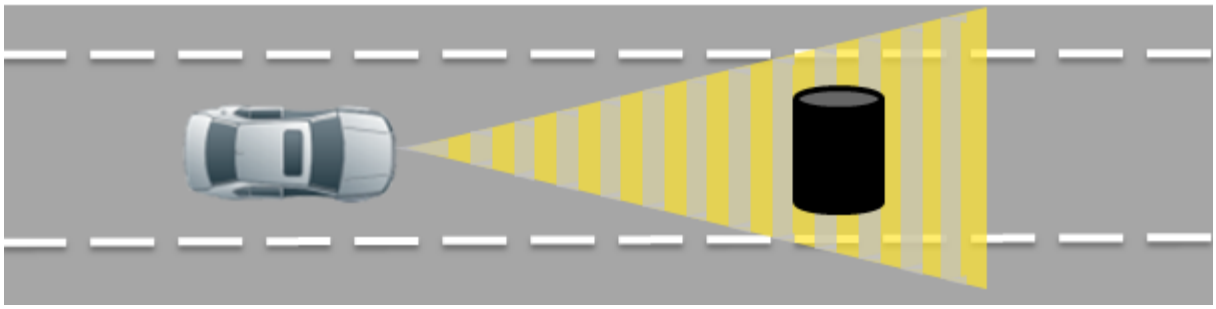
1. 在车辆道接近移动或停止目标，本速度度范围为 4Km/h 至 90Km/h；

   When vehicle is approaching a moving or stopped target, the speed range should be between 4Km/h and 90Km/h;



2. 在车辆道接近静止目标，本速度度范围为 4Km/h 至 85Km/h。

   When vehicle is approaching a stationary target, the speed range should be between 4Km/h and 85Km/h.



紧急制动辅助功能在符合以下任一情况时应被抑制激活：

Emergency brake assist function shall be suppressed when one of the following condition is fulfilled:

1. 目标不在自车预测行驶轨迹
   Target is not in the predicted driving path of ego vehicle
2. 驾驶员油门开度大于 0.1；
   Throttle opening is greater than 0.1
3. 驾驶员通过人机界面选择“关闭功能”；
   Driver selects “Function off” via HMI;
4. 雷达检测到故障：电压过低/高、失明、硬件错误、信号发送/接收超时、关联系统故障等（详见 DTC 列表）；
   Camera/Radar error detected: Voltage too low/high, blindness detected, Hardware failure, Transmission error, Related ECU error (See DTC list), etc
5. 系统异常操作，满足以下任一条件：

Exceptional Operation Situation, condition is satisfied when one of the following is fulfilled:

a) 系统初始化；
System initialization;

b) ESC 提示 ESP 故障信号；
ESP error;

c) 雷达不可用（内部硬件故障）；
Radar unavailable (internal hardware failure);

6. 车辆处于非稳定状态：DTC/TCS/VDC 激活；
Unstable driving situation: DTC/TCS/VDC active
7. 距上一次紧急制动辅助功能激活时间小于 20s；
Less than 20s after previous activation of emergency brake function;
8. 紧急制动辅助功能配置字关闭。
Emergency brake assist function is set off;

紧急制动辅助功能激活后，应在符合以下任一情况时中止激活：

After emergency brake assist function is activated, function should be terminated when one of the following is fulfilled:

1. 驾驶员通过人机界面选择“关闭功能”；
Driver selects “Function off” via HMI;
2. 雷达检测到故障：电压过低/高、失明、硬件错误、信号发送/接收超时、关联系统故障等（详见 DTC 列表）；
Camera/Radar error detected: Voltage too low/high, blindness detected, Hardware failure, Transmission error, Related ECU error (See DTC list), etc
3. EBA 目标加速度值大于-1m/s² ($\geq -1\mathrm{m/s^2}$)；；
Target deceleration of EBA greater than -1m/s² ($\geq -1\mathrm{m/s^2}$);
4. 制动压力小于 5 Bar；
Brake pressure below 5 Bar;
5. 目标不在自车预测行驶轨迹
Target is not in the predicted driving path of ego vehicle
6. 驾驶员释放制动踏板；
Driver releases brake pedal;
7. 驾驶员油门开度大于 0.1。
Throttle opening is greater than 0.1

1.5 中速自动紧急制动（AEB-IU）

中速自动紧急制动功能应当在预碰撞报警功能后，驾驶员依然没有反应采取措施的情况下，主动控制制动系统施加制动力，增加驾驶员的反应时间并减少相对速度。

If driver fails to give any response even after pre-collision warning, AEB-IU function shall actively control brake system to apply brake force to reduce relative speed with the front vehicle and give driver more response time.

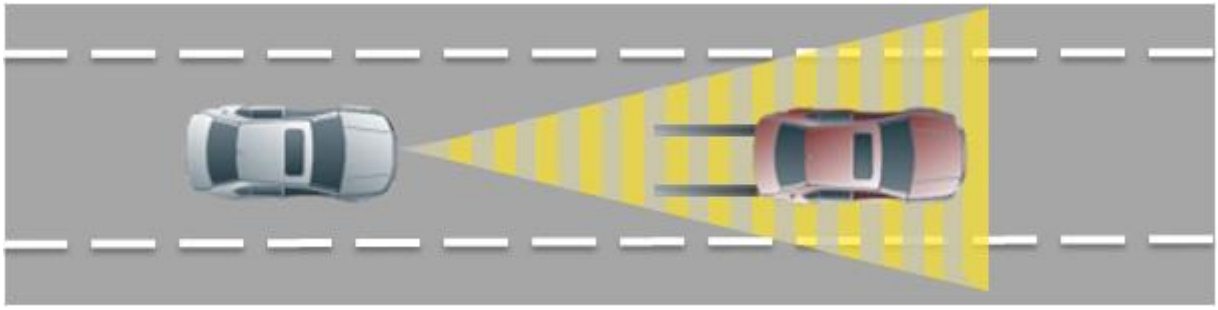
中速自动紧急制动功能输出的目标加速度范围：-1.5m/s² ... -6m/s²。

Range of target acceleration for AEB-IU function: -1.5m/s² ... -6m/s².

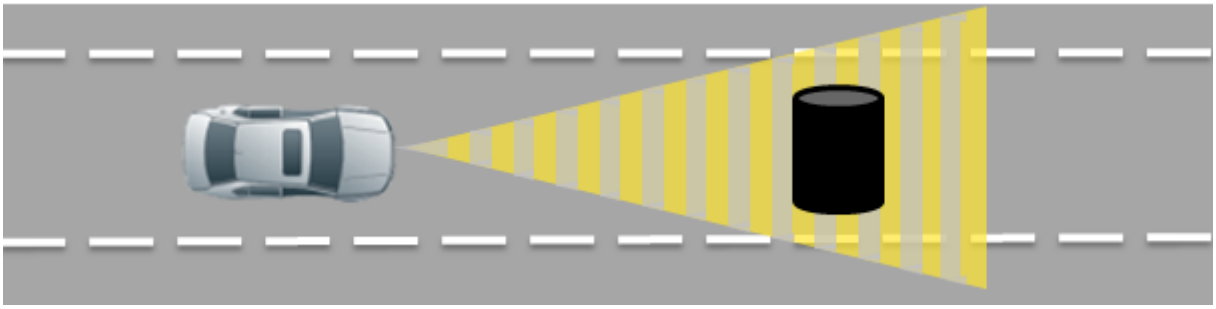
中速自动紧急制动功能适用场景及其有效工作范围是：

Applicable scenario and effective operating range of the AEB-IU function are given below:

1. 在车辆道接近移动或停止的目标，本速度度范围为 4Km/h 至 150Km/h。
   When vehicle is approaching a moving or stopped target, the speed range should be between 30Km/h and 150Km/h;



2. 在车辆道接近静止目标，本速度度范围为 4Km/h 至 80Km/h。(需摄像头确认)
   When vehicle is approaching a stationary target, the speed range should be between 30Km/h and 80Km/h (camera is required)



中速自动紧急制动功能在符合以下任一情况时应被抑制激活：

AEB-IU function shall be suppressed when one of the following condition is fulfilled:

1. 目标不在自车预测行驶轨迹
   Target is not in the predicted driving path of ego vehicle
2. 驾驶员主动接管，满足以下任一条件：
   Driver take over control, condition is satisfied when one of the following is fulfilled:
   a) 油门开度大于 0.85；
      Throttle opening is greater than 0.85
3. 驾驶员主动制动，满足以下任一条件：
   Driver actively step on the brake, condition is satisfied when one of the following is fulfilled:
   a) 主缸压力大于 3 bar;
      Master cylinder pressure is greater than 3 bar
   b) 制动踏板信号置真；
      Brake pedal signal is set to on
4. 驾驶员通过人机界面选择“关闭功能”；
   Driver selects “Function off” via HMI;
5. 雷达检测到故障：电压过低/高、失明、硬件错误、信号发送/接收超时、关联系统故障等（详见 DTC 列表）；
   Camera/Radar error detected: Voltage too low/high, blindness detected, Hardware failure, Transmission

error, Related ECU error (See DTC list), etc

6. 系统异常操作，满足以下任一条件：
   Exceptional Operation Situation, condition is satisfied when one of the following is fulfilled:
   a) 系统初始化；
      System initialization;
   b) ESC 提示 ESP 故障信号；
      ESP error;
   c) 雷达不可用（内部硬件故障）；
      Radar unavailable (internal hardware failure);
7. 车辆处于非稳定状态：DTC/TCS/VDC 激活；
   Unstable driving situation: DTC/TCS/VDC active
8. 距上一次中速紧急制动功能激活时间小于 20s；
   Less than 20s after previous activation of AEB-IU;
9. 中速自动紧急制动功能配置字关闭；
   AEB-UN function is set off;
10. 驾驶员安全带未系
    Driver seat belt is not fastened

中速自动紧急制动激活后，应在符合以下任一情况时中止激活：
After AEB-UN function is activated, function should be terminated when one of the following is fulfilled:

1. 目标不在自车预测行驶轨迹
   Target is not in the predicted driving path of ego vehicle
2. 驾驶员油门开度大于 0.85；
   Throttle opening is greater than 0.85
3. 驾驶员通过人机界面选择“关闭功能”；
   Driver selects “Function off” via HMI;
4. 雷达检测到故障：电压过低/高、失明、硬件错误、信号发送/接收超时、关联系统故障等（详见 DTC 列表）；
   Camera/Radar error detected: Voltage too low/high, blindness detected, Hardware failure, Transmission error, Related ECU error (See DTC list), etc
5. 超过最大激活时间：4s (中速自动紧急制动（AEB-P）加低速自动紧急制动（AEB-M）的激活时间)；
   Maximum activation time of 4s is exceeded (total activation time of AEB-P and AEB-M);
6. 车辆处于非稳定状态：DTC/TCS/VDC 激活；
   Unstable driving situation: DTC/TCS/VDC active
7. 车速下降大于 50 km/h。
   Speed drop above 50 km/h.
8. 驾驶员安全带未系
   Driver seat belt is not fastened

1.6 低速自动紧急制动（AEB-CITY, AEB-C）

低速自动紧急制动功能应当在较低速度时，对即将要发生碰撞的紧急情况，主动控制制动系统进行全力制动，以避免或减轻碰撞对驾驶员的伤害。

AEB-C shall actively control brake system to provide full brake for incoming collision when vehicle is at low speed, thus avoiding collision or minimize the injury for driver.

低速自动紧急制动功能输出的目标加速度范围：-1.5m/s² ... -10m/s²。

AEB-C target acceleration is -1.5 m/s2 to -10 m/s2.

自动紧急制动系统将车辆刹停后，雷达判断当前速度小于 3kph, 发送 FRS_AEB_VehicleHold 信号给 ESP（发送该信号期间即使目标存在概率低于识别为风险目标的阈值，也将继续发送 hold 请求（信号持续 3s），除非驾驶员有主动接管意愿，即转向、油门、制动满足驾驶员接管逻辑）

1. ESP 收到 FRS_AEB_VehicleHold 信号（连续收到 100ms），并判定车辆处于 standstill 状态.
2. ESP 收到 FRS_AEB_VehicleHold 信号（连续收到 100ms），若在 FRS_AEB_VehicleHold 置真过程中，AEB 减速请求信号由 on 变更为 off 状态，则 ESP 需要调整轮缸压力缓慢泄压*，并判定车辆处于 standstill 状态. （*缓慢泄压为将单个轮缸的泄压斜率调整为 50bar/s）

AVH 功能激活保持车辆静止（即使驾驶员已主动关闭 AVH 功能），AVH 激活后按 AVH 自有逻辑执行退出条件或保压 10 分钟后 EPB 接管（AVH 接管后控制器不在做相关逻辑判断）。

When the vehicle is stopped by AEB, radar will send signal, FRS_AEB_VehicleHold to ESP when the vehicle speed is less than 3kph. During the period of signal transmission, request for vehicle hold will still be sent even when the probability of risk target is lower than the threshold value unless the driver wish to take over control, i.e. steering, step on gas pedal or the braking logic is satisfied

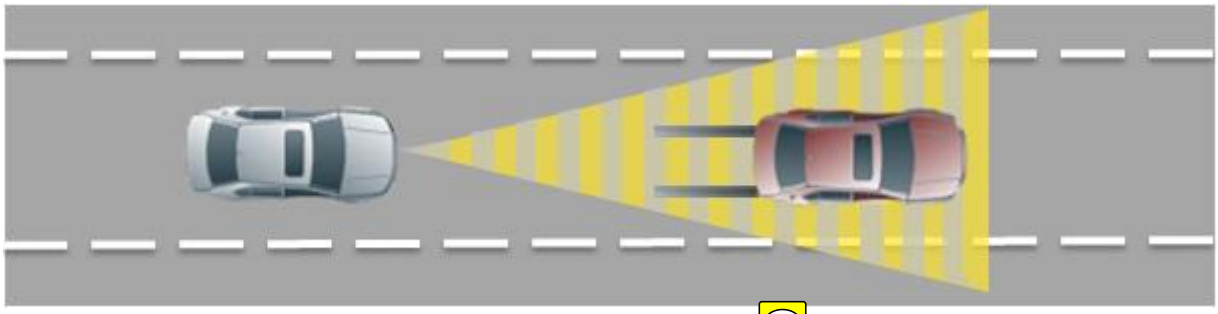
1. ESP receives signal, FRS_AEB_VehicleHold for 100ms continuously and detect the ego vehicle is standstill
2. ESP receives signal, FRS_AEB_VehicleHold for 100ms continuously and if the AEB deceleration demand signal changes from on to off during the period when signal，FRS_AEB_VehicleHold is true, ESP shall change the pressure change (decrease) rate for each single wheel cylinder to 50bar/s and then detect the ego vehicle is standstill

AVH function will be activated to hold vehicle standstill (even if driver has turned off the AVH function). Once AVH function is activated, it will exit according to its own logic or maintain the pressure for 10 mins before EPB takes over control (Radar will not perform related logical judgement once AVH takes over control).

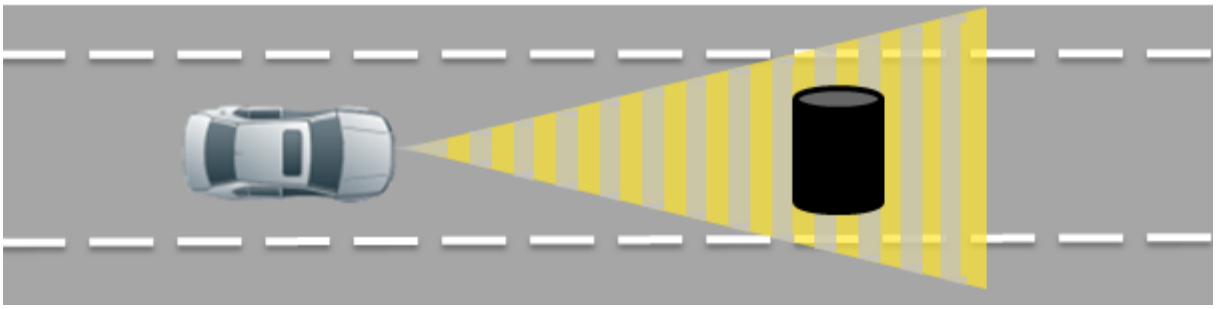
低速自动紧急制动功能适用场景及其有效工作范围是：

Applicable scenario and effective operating range of the AEB-C function are given below:

1. 在车辆道接近移动目标，本速度度范围为 4Km/h 至 80Km/h；
   When vehicle is approaching a moving target, the speed range should be between 4Km/h and 80Km/h



2. 在车辆道接近静止目标，本速度度范围为 4Km/h 至 50Km/h。
   When vehicle is approaching a stationary target, the speed range should be between 4Km/h and 50Km/h



低速自动紧急制动功能在符合以下任一情况时应被抑制激活：
AEB-C function shall be suppressed when one of the following condition is fulfilled:

1. 目标不在自车预测行驶轨迹
   Target is not in the predicted driving path of ego vehicle
2. 驾驶员主动接管，满足以下任一条件：
   Driver take over control, condition is satisfied when one of the following is fulfilled:
   a) 油门开度大于 0.85；
      Throttle opening is greater than 0.85
3. 驾驶员主动制动，自车减速度小于-2.5m/s² (例如：-3m/s2) 且满足以下任一条件：
   Driver actively step on the brake, meaning the deceleration of said vehicle is less than -2.5m/s² (eg：$-3.5\mathrm{m/s^2}$) and when one of the following condition is fulfilled:
   a) 主缸压力大于 3 bar;
      Master cylinder pressure is greater than 3 bar
   b) 制动踏板信号置真；
      Brake pedal signal is set to on
4. 驾驶员通过人机界面选择“关闭功能”；
   Driver selects “Function off” via HMI;
5. 雷达检测到故障：电压过低/高、失明、硬件错误、信号发送/接收超时、关联系统故障等（详见 DTC 列表）；
   Camera/Radar error detected: Voltage too low/high, blindness detected, Hardware failure, Transmission error, Related ECU error (See DTC list), etc
6. 系统异常操作，满足以下任一条件：
   Exceptional Operation Situation, condition is satisfied when one of the following is fulfilled:
   a) 系统初始化；
      System initialization;

b) ESC 提示 ESP 故障信号；
ESP error;
c) 雷达不可用（内部硬件故障）；
Radar unavailable (internal hardware failure);

7. 车辆处于非稳定状态：DTC/TCS/VDC 激活；
Unstable driving situation: DTC/TCS/VDC active
8. 距上一次低速紧急制动功能激活时间小于 20s；
Less than 20s after previous activation of AEB-C;
9. 低速自动紧急制动功能配置字关闭；
AEB-C function is set off;
10. 驾驶员安全带未系
Driver seat belt is not fastened

低速自动紧急制动激活后，应在符合以下任一情况时中止激活：
After AEB-C function is activated, function should be terminated when one of the following is fulfilled:

1. 目标不在自车预测行驶轨迹
Target is not in the predicted driving path of ego vehicle
2. 驾驶员油门开度大于 0.85；
Throttle opening is greater than 0.85
3. 驾驶员通过人机界面选择“关闭功能”；
Driver selects “Function off” via HMI;
4. 雷达检测到故障：电压过低/高、失明、硬件错误、信号发送/接收超时、关联系统故障等（详见 DTC 列表）；
Camera/Radar error detected: Voltage too low/high, blindness detected, Hardware failure, Transmission error, Related ECU error (See DTC list), etc
5. 超过最大激活时间：4s (中速自动紧急制动（AEB-P）加低速自动紧急制动（AEB-M）的激活时间)；
Maximum activation time of 4s is exceeded (total activation time of AEB-P and AEB-M);
6. 车辆处于非稳定状态：DTC/TCS/VDC 激活；
Unstable driving situation: DTC/TCS/VDC active
7. 驾驶员安全带未系
Driver seat belt is not fastened

中速自动紧急制动加低速自动紧急制动的最大激活时间为 4s。
Max. activation time of AEB-P and AEB-M (together) is 4s.

1.7 性能要求 (Performance requirement)

AEB系统功能安全等级要求为ASIL-B

AEB system function safety level requirement is ASIL-B

AEB系统应满足C-NCAP2018的测试要求且得分不低于10.5（不包含ESC部分的得分）

AEB system shall fulfill the test requirements in C-NCAP2018 and the score shall not be lower than 10.5 (Exclude the score for ESC part)

1.7.1 AEB 系统性能验收指标 (AEB system performance acceptation index)

表1 AEB 系统性能验收指标

Table 1 AEB system performance acceptation index

功能描述	性能项	KPI
C-NCAP CCRs 场景	40kph 以下正确避撞概率	≥90%（单雷达 single radar） ≥97%（有数据融合 with data fusion）
	75kph 以下正确预警概率	≥90%（单雷达 single radar） ≥97%（有数据融合 with data fusion）
C-NCAP CCRm 场景	60kph 以下正确避撞概率	≥90%（单雷达 single radar） ≥97%（有数据融合 with data fusion）
	75kph 以下正确预警概率	≥90%（单雷达 single radar） ≥97%（有数据融合 with data fusion）
C-NCAP CCRb 场景	40m 正确避撞概率	≥90%（单雷达 single radar） ≥97%（有数据融合 with data fusion）
	12m 正确避撞概率	≥90%（单雷达 single radar） ≥97%（有数据融合 with data fusion）
AEB 对静止目标自动紧急制动	最高工作速度	≥80km/h
	最低工作速度	≤5km/h
	最大速度降	≥50 km/h
	误触发率	20 万公里小于 1 次
AEB 对运动目标自动紧急制动	最高工作速度	≥150km/h
	最低工作速度	≤5km/h
	最大速度降	≥50 km/h
	误触发率	20 万公里小于 1 次
前碰撞预警	最高工作速度	≥150km/h
	最低工作速度	≤30km/h
	误触发率	2000 公里小于 1 次
静止目标紧急制动辅助	最高工作速度	≥80km/h

	最低工作速度	≤5km/h
	误触发率	20 万公里小于 1 次
运动目标紧急制动辅助	最高工作速度	≥150km/h
	最低工作速度	≤5km/h
	误触发率	20 万公里小于 1 次

1.8 PEBS (功能开关定义)

Category 功能分类	Switch Off Warning “报警关闭”	Switch Off Brake “功能关闭”
Prefill 制动预加紧功能	-	OFF 关闭
HBA 液压辅助系统	-	OFF 关闭
Latent-warning 安全距离报警	OFF 关闭	OFF 关闭
Pre-warning 预报警	OFF 关闭	OFF 关闭
Acute-warning 紧急报警	-	OFF 关闭
AEB-IU 部分自动紧急制动	-	OFF 关闭
AEB-C 低速自动紧急制动	-	OFF 关闭
EBA 紧急制动辅助	-	OFF 关闭

1.9 适用性要求 (Suitability requirement)

1.9.1 预期使用和误用 (Intended use and misuse)

为了避免 AEB 功能被驾驶员滥用，增加驾驶员对该功能的理解，建议在编制用户使用手册时按照以下建议列表为驾驶员提供 AEB 功能的相关信息：

In order to prevent AEB function from being misused by driver and improve driver’s understanding of the function, it is suggested to provide driver with AEB function information according to the recommended list below when formulating user’s manual:

1. 驾驶员需要对如何驾驶以及如何避免危险情况发生负责；

Driver shall be responsible for how to drive vehicle and how to avoid a dangerous situation;

2. AEB 功能可以在特别的危险情况下辅助驾驶员，但驾驶员不能过分依赖该系统的帮助；
   AEB may assist driver under specific dangerous situation, while driver cannot have over-reliance on the system;
3. 恶劣的天气条件，如大雨，下雪等，会导致系统功能下降。在这种情况下相关目标将无法被系统探测到或被探测到的时间过晚。
   Bad weather conditions, such as heavy rain, snow etc., can lead to reduction in system performance. Under these conditions, relevant objects will not be detected or detected late by the system.
4. AEBS 功能在通常条件下处在后台工作状态，不会被驾驶员察觉，因此如果相关目标被系统探测到也不会对驾驶员显示；
   The AEBS functions normally works in the background and will not be noticed by the driver. Therefore if a relevant object has been detected by the system, it will not be shown to the driver.
5. 出于系统固有的限制，误触发是不可避免可能会发生的；
   Due to inherent system limitations, false activation of the system is inevitable.
6. 请注意传感器不可能在所有情况下都探测到前方的危险障碍物；
   Please note that the sensor is not always able to detect all objects which may represent a potential hazard (accident risk).
7. 某些目标会对雷达的探测造成影响和削弱，如公路防护栏、隧道入口、大雨或冰雪，进而影响 AEBS 的相关功能；
   Reflecting objects, such as crash barriers, the entrance of a tunnel, heavy rain or snow can impact the function of the radar sensor and the ability of the system to detect a collision risk.
8. 某些 AEBS 功能会用到附加的车身周边传感器信息（如视频等），所有的传感器都需要进行物体探测从而达到最佳性能，当系统性能下降时，驾驶员将无法得知；
   Some AEBS functions use information from additional sensors on the vehicle. Both sensors have to detect the object to provide full performance. The difference between full and reduced system performance is not visible by the driver.
9. AEBS 功能的设计初衷是用来对同车道同方向的正在行驶的目标在常规的交通情况下进行反应，在满足一定条件及速度范围时，AEBS 系统也可以对车辆道静止目标进行反应；
   The AEBS functions are designed to react in specific situations in typical traffic scenarios with objects driving in the same lane and same direction. The AEBS system reacts also on stationary objects in the same lane.
10. 系统不会对动物、迎面而来及横穿的车辆进行反应；
    The system is not designed to react on animals, incoming or crossing traffic.
11. 出于安全原因考虑，AEBS 功能的实现需要有 ESC 系统的支持；
    Due to safety reason, the AEBS functions require an active ESC system.
12. AEBS 对相关目标作出反应的前提是，该目标必须在雷达传感器的视野中且被识别。对于切入目标、自身车辆变道后才探测的目标以及急转弯道路中的目标，AEBS 性能将受到很大限制；
    To react to a object, it has to be in the field of view of the radar sensor and the object has to be classified as relevant. The performance will be severely limited for cut in objects, new objects that appears only after a lane change of vehicle or object in narrow winding roads.
13. 受到强烈震动或轻微撞击时雷达的校准将会被影响，这将降低系统性能或增加误触发率，雷达的安装位置需要进行检查或重新进行校准；
    The calibration of the radar sensor could be affected by strong shocks or light collisions. This could lower

the systems performance or increase the false positive rate. Recalibration of the radar or a check of the radar position will be needed and should be performed by an authorized dealer.

14. 雷达系统需要特殊性能以探测相关目标，当受到环境的影响时探测将受到干扰/性能下降，例如在电磁场干扰下或目标自身原因；
    The radar system requires specific feature to detect relevant objects. The ability of detection could be disturbed/reduced by environmental influence, for example by an electrical field or by the object itself. Objects with small radar reflection properties may not be detected or detected by the system with time delay.
15. 雷达系统安装在车辆前方，雷达传感器视野内不允许有其他障碍物；
    The radar system is mounted in the front of the car. There should be no obstacles in the field of view of the radar for it to work properly.
16. 在这种安装位置下，雷达会受到尘土和积雪的影响，当雷达被积雪完全覆盖时系统有可能关闭，在这种情况下，相关信息会通过人机界面传达给驾驶员。
    Because of the mounting position, the system performance could be affected by dust and snow. A shut down of the system could happen especially in winter where the sensor could be fully covered by snow. In this case, the deactivation of the system will be displayed to the driver.
17. 在以下情况中，功能会受限制：
    The functionality of the system is restricted in certain situations:
    - 目标直到出现在传感器的探测范围内才能被探测到 ；
      Objects cannot be detected until they are within the detect range of the sensor.
    - 当目标过近的变道或者切入时，系统探测前方目标的能力受限制；
      The ability of the system to detect objects in front is limited when they are too close, travelling out of lane or moving into your lane.
    - 不能被清楚识别的汽车，例如摩托车或者过马路的行人，以及底盘高的汽车经常被识别过晚，或者不能被识别。
      Vehicles that are not clearly reccgnised, e.g. a motorcycle or cyclist travelling in front of you and vehicles with high chassis, are often identified with time delay or can not be detected at all.