



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

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**Technical requirements and test methods for on-board
positioning systems - Part 1: Satellite positioning**

车载定位系统技术要求及试验方法 第1部分：卫星定位

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Foreword

This document was drafted in accordance with the provisions of GB/T 1.1-2020 "Directives for standardization - Part

1.Rules for the structure and drafting of standardizing documents". This document is Part 1 of GB/T 45086 "Technical requirements and test methods for on-board positioning system".

GB/T 45086 has published the following parts. - Part

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1 Scope

GB/T 45086.1 is the first part of the Chinese standard for on-board positioning systems and it covers satellite positioning. A vehicle's position is no longer only a navigation convenience: it feeds the emergency call system, the insurance telematics, the road tolling, the V2X messages and, in an automated vehicle, the control loop itself, and each of those needs a stated accuracy and a stated failure behaviour rather than a best effort. The

document sets the composition and functional requirements of the on-board satellite positioning system, the performance requirements, that is the positioning accuracy in the horizontal and vertical planes, the velocity and time accuracy, the time to first fix cold and hot, the reacquisition time, the sensitivity and the continuity and availability, together with the environmental and EMC requirements, and it describes the test methods for each, including the laboratory tests with a signal simulator and the road tests. It covers BeiDou as the primary constellation alongside the others. For a carmaker or a telematics supplier selling into China, this is the specification a positioning unit is qualified against.

This document specifies the technical requirements for on-board satellite positioning systems and describes the corresponding test methods. This document applies to on-board satellite positioning systems.

2 Normative references

The contents of the following documents constitute essential clauses of this document through normative references in the text. Among them, for dated references, only the version corresponding to that date applies to this document; for undated references, the latest version (including all amendments) applies to this document.

GB/T 2828.1 Sampling procedures for inspection by attributes -- Part

1. Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection

GB/T 16422.2-2022 Plastics - Methods of exposure to laboratory light sources - Part

3 Terms and definitions

The following terms and definitions apply to this document.

3.1 On-board satellite positioning system A system installed on a vehicle that uses radio signals emitted by artificial satellites for positioning, speed measurement, timing.

3.2 Positioning accuracy The statistical value of the difference between the position output by the on-board satellite positioning system and the actual position.

3.3 Velocity accuracy The statistical value of the difference between the speed output by the on-board satellite positioning system and the actual speed.

3.4 Timing accuracy The statistical value of the difference between the time output by the on-board satellite positioning system and the universal time coordinated (UTC).

3.5 Cold start time to first fix The time required from the start of receiving satellite signals to the first normal positioning of the on-board satellite positioning system, when the ephemeris, almanac, approximate time, approximate position are unknown.

3.6 Hot start time to first fix time The time required from the wake-up time to the first normal

positioning of the on-board satellite positioning system, when the ephemeris, almanac, approximate time, approximate position are known.

4 Abbreviations

The following abbreviations apply to this document. AWGN. Add White Gaussian Noise BDS. BeiDou Navigation Satellite System CEP. Circular Error Probable Galileo. Galileo Navigation Satellite System GLONASS. Global Navigation Satellite System GNSS. Global Navigation Satellite System

5.1 Functional requirements

5.1.1 Output Perform the test in accordance with 6.3.1. Under the test conditions of this document, the output of the on-board satellite positioning system meets the following requirements.

5.1.2 Mode

5.1.2.1 General requirements The on-board satellite positioning system shall at least support BeiDou single mode. When the on-board satellite positioning system works in BeiDou multi-mode, it shall be tested according to

6.3.2.1 and shall have the function of switching to BeiDou single mode.

5.2.1.2 Dynamic positioning accuracy 5.2.1.2.1 Open sky scenario

5.2.1.3 Speed measurement accuracy 5.2.1.3.1 Open sky scenario 5.2.1.3.1.1 BeiDou multi-mode (BeiDou independent mode, BeiDou priority mode) Perform the test in accordance with 6.4.1.1.3.1 and 6.4.2.1.3.1. The speed measurement accuracy of the on-board satellite positioning system shall be better than

0.5 m/s (CEP95).

5.2.2 Time to first fix

5.2.2.1 Cold start time to first fix 5.2.2.1.1 BeiDou multi-mode (BeiDou independent mode, BeiDou priority mode) Perform the test in accordance with 6.4.1.2.1 and 6.4.2.2.1. The cold start time to first fix of the on-board satellite positioning system shall not exceed 90 s.

5.2.2.1.2 BeiDou single mode Perform the test in accordance with 6.4.2.2.1. The cold start time to first fix of the on-board satellite positioning system shall not exceed 90 s.

5.2.3 Reacquisition time

5.2.3.1 BeiDou multi-mode (BeiDou independent mode, BeiDou priority mode) Perform the test in accordance with