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

GB/T 33014.11-2023

**Road vehicles - Component test methods for
electrical/electronic disturbances from narrowband radiated
electromagnetic energy - Part 11: Reverberation chamber**

道路车辆 电气/电子部件对窄带辐射电磁能的抗扰性试验方法 第11部分：混响室
法

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Foreword

This document was issued on 7 September 2023 by the State Administration for Market Regulation; Standardization Administration of the PRC and takes effect on 1 April 2024.

It is a GB/T standard: recommended rather than compulsory, but it is the text a Chinese reviewer applies when assessing a submission.

1 Scope

GB/T 33014.11-2023 is the part of the road vehicle series that tests electrical and electronic components for immunity to continuous narrowband radiated fields inside a reverberation chamber, where a stirred enclosure fills the volume with a field arriving from every direction and polarization at once rather than one bearing at a time. It sets the test conditions, the chamber as the test location, and the instrumentation: an isotropic probe reading the field on three orthogonal axes, the RF signal source, the power amplifier, the transmitting and receiving antennas, the directional coupler, the power meter, the spectrum analyzer, the computer control, and the actuator and monitoring equipment that exercises the unit under test and shows whether it still behaves. The layout clause places the ground plane and grounding, the artificial network, the harness, the artificial load and both antennas. Test methods cover the plan, the procedure and the report. Normative annexes carry the work that makes the chamber trustworthy: validation under tuning mode and the chamber gain, calibration of the loading effect once absorber and the unit itself damp the chamber, and the impedance of the artificial network. An informative annex gives the function performance status classification that decides what counts as a pass. Written for component suppliers, vehicle EMC groups and the laboratories that run the chamber.

This document establishes the immunity test method for vehicle electrical/electronic components to continuous narrowband radiated electromagnetic disturbance - reverberation chamber.

This document establishes the test method for applying electromagnetic interference to the device under test (hereinafter referred to as DUT) and the wiring harness (real vehicle wiring harness or standard test wiring harness) in the reverberation chamber. During the test, the support equipment of the DUT can be arranged either inside the reverberation chamber or outside the reverberation room. The test shall be performed under the tuning mode.

This document applies to the immunity test of electrical/electronic components for M, N, O, and L category vehicles (not limited to vehicle power systems, such as spark

ignition engines, diesel engines, and electric motors).

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the version corresponding to that date is applicable to this document; for undated references, the latest version (including all amendments) is applicable to this document.

GB/T 33014.1, Road vehicles - Component test methods for electrical/electronic disturbances from narrowband radiated electromagnetic energy - Part 1: General (GB/T 33014.1-2016, ISO 11452-1:2005, MOD)

3 Terms and definitions

Terms and definitions determined by GB/T 33014.1, and the following ones are applicable to this document.

3.1

antenna characterization factor; ACF

- test temperature;
- test voltage;
- modulation system;
- dwell time;
- test signal quality.

5 Test locations

5.1 General

The test shall be carried out in a reverberation chamber.

5.2 Reverberation chamber

The reverberation chamber used to test the DUT shall be so large that its working volume can accommodate the test bench, support equipment and receiving antennas.

Note 1: Reverberation chamber size will affect the lowest usable frequency (LUF).

The working volume is usually rectangular which, however, is not essential.

The reverberation chamber shall contain at least one mechanical tuner to stir the electromagnetic field in the chamber. Based on the reverberation chamber size and working volume, the size of the mechanical tuner shall be as large as possible. In addition, the shape of each tuner shall be such that during one rotation, the reverberation chamber obtains a non-repetitive field distribution.

Note 2: The number, size and shape of tuners will affect the lowest usable frequency (LUF).

After the reverberation chamber is built, the reverberation chamber validation shall be performed according to Annex B. The field uniformity shall meet the requirements of Table B.2, and the LUF of the reverberation chamber shall be confirmed. After any major renovation, reverberation chamber validation shall be performed again. Tuner changes shall be considered a major modification.

6 Test equipment and instruments

6.1 Isotropic electric field probe

The electric field probe shall be able to measure the electrical field strength on three orthogonal axes.

6.2 RF signal source

The RF signal source shall be able to cover the specified frequency range and modulation system.

6.3 Transmitting and receiving antennas

Linear polarizing antennas that meet the transmitting and receiving frequency requirements respectively shall be used. Antenna efficiency shall be at least 75% (log-periodic antennas and horn antennas usually meet this requirement). It is allowable to use multiple antennas to cover the entire frequency range of the reverberation chamber.

6.4 Power amplifier

Power amplifiers are used to amplify radio frequency signals and provide the necessary power to the transmitting antenna to generate the specified field strength.

6.5 Spectrum analyzer