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**Road vehicles - Component test methods for electrical/electronic
disturbances from narrowband radiated electromagnetic energy - Part
2: Absorber-lined shielded enclosure**

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2部分：电波暗室
法

(English Translation)

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1 Scope

This document describes the absorber-lined shielded enclosure for testing the immunity of electrical/electronic components to continuous narrowband radiated electromagnetic energy.

This document applies to electrical/electronic components for vehicles of categories M, N, O and L (not limited to vehicle powertrains, e.g., spark ignition engines, diesel engines, electric motors).

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO11452-1, Road vehicles - Component test methods for electrical disturbances from narrowband radiated electromagnetic energy - Part 1. General principles and terminology

Note: GB/T 33014.1-2016, Road vehicles - Component test methods for electrical/electronic

disturbances from narrowband radiated electromagnetic energy - Part 1. General (ISO 11452-1:2005, MOD)

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 11452-1 apply.

4 Test conditions

The applicable frequency of the absorber-lined shielded enclosure is 80 MHz ~ 18 GHz.

The user shall specify the test severity level within the frequency range. Recommended test levels and functional characteristic status classifications are shown in Appendix A.

The following standard test conditions shall comply with the provisions of ISO 11452-

1.

- test temperature;
- supply voltage;
- modulation mode;
- dwell time;
- frequency step size;
- definition of test severity levels;
- test signal quality.

5 Test site

The test shall be carried out in an absorber-lined shielded enclosure (ALSE).

ALSE is an independent electromagnetic compatibility test site established to simulate open field tests. Typically an ALSE is a shielded enclosure where all internal reflective surfaces, except the floor, are covered with absorbing materials. However, the floor may also be paved with flat ferrite tiles with a maximum thickness of no more than 25 mm.

Field strength calibration and device under test (DUT) testing shall be performed in an ALSE with the same configuration.

The reflected energy in the test area must be at least 10 dB lower than the incident energy.

Note: To achieve this goal, the absorbing material performance of walls and ceilings is generally greater than or equal to 6 dB within the operating frequency range.

IEEE STD 1128-1998 describes the test methods for evaluating absorbing materials.

6.1 General

The radiated electromagnetic field is generated using an antenna and a radio frequency (RF) energy source that can generate the required field strength. A set of antennas and multiple RF power amplifiers may be required to cover the test frequency range.

6.2 Test apparatus

6.2.1

Field generating device. An antenna that can radiate a predetermined field strength to the DUT at a certain power (including a high-power balanced-unbalanced transformer, if applicable). The structure and orientation of the field generating device shall ensure that the field strength in the polarization direction specified in the test plan is generated.

6.2.2

Field strength probe. It shall be of electrically small size (compared to the wavelength), isotropic and have three orthogonal axes. The transmission line of the probe shall be optical fiber.

6.2.3 Artificial network (AN), high-voltage artificial network (HV-AN), artificial mains

network (AMN) and asymmetric artificial network (AAN). see 7.2 and Appendix B of ISO 11452-1:2015.

6.2.4 RF signal generator. can be internally or externally modulated.

6.2.5 High-power amplifier.

6.2.6 Power meter and/or power sensor (or equivalent measuring instrument) and

bidirectional coupler. measure forward power and reverse power.

6.3 DUT actuator and monitoring equipment

The DUT shall be operated using the actuators as required by the test plan. The actuator has the smallest possible electromagnetic effect, such as plastic buttons, pneumatic actuators (plastic tubes are used for the air supply pipeline), etc.

Monitoring equipment that monitors the DUT's response to electromagnetic interference can be connected using optical fibers or high-impedance wires. If other types of connections are used, extreme care must be taken to minimize interaction between the wires. The arrangement direction, length and position of the conductors shall be recorded to ensure the reproducibility of the test results.

Any electrical connection between the monitoring equipment and the DUT may cause malfunction of the DUT, and extreme care shall be taken to avoid this effect.

7.1 Ground plane

The ground plane shall be made of copper, brass, bronze or galvanized steel with a thickness of at least 0.5 mm.

The minimum width of the ground plane shall be 1 000 mm or 200 mm greater than the projected width of the entire test setup [DUT and associated equipment (such as the test harness including power cables, simulated loads located on the test bench and AN), excluding batteries and/or power supplies] on the horizontal plane, whichever is greater.

The minimum length of the ground plane shall be 2 000 mm or 200 mm greater than the projected length of the entire test setup [DUT and associated equipment (such as the test harness including power cables, simulated loads located on the test bench and AN), excluding batteries and/or power supplies] on the horizontal plane, whichever is greater.

The height of the ground plane (test bench) from the ground is (900 ± 100) mm. The ground plane shall be electrically bonded to the shielding room casing, and the DC resistance shall not exceed 2.5 mohm. The maximum distance between the edges of adjacent grounding strips shall be 300 mm, and the maximum length-to-width ratio of the grounding strip shall be 7.1.

7.2 Power and Artificial Network (AN)

Each power line of the DUT shall be connected to the power supply through AN.

Usually the negative pole of the power supply is grounded. If the DUT uses the positive ground of the power supply, the test setup shown in the figure needs to be adjusted accordingly. The power supply is connected to the DUT through a $5\ \mu\text{H}/50\ \text{ohm}$ AN (see ISO 11452-1:2015 Appendix B schematic). The number of ANs required depends on how the DUT is installed on the vehicle.

-- Remote grounding of the DUT (vehicle power return line greater than 200 mm). Two ANs are required, one for the positive power supply and the other for the power return line (see Appendix B).

-- DUT near-end grounding (vehicle power return line no more than 200 mm).

Use one AN for the positive power supply (see Appendix B).

AN shall be installed directly on the ground plane, and the casing of AN shall overlap the ground plane. The power return line shall be connected to the ground plane between the power supply and AN. The measurement port of each AN shall be connected to a 50 ohm load.