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**NATIONAL STANDARD OF THE
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**Road vehicles - Component test methods for
electrical/electronic disturbances from narrowband radiated
electromagnetic energy - Part 4: Harness excitation methods**

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4部分：线束激励
法

(English Translation)

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1 Scope

This document describes the harness excitation method 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.

ISO 11452-1, 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 Bulk Current Injection (BCI) method uses a current probe as a transducer and the wiring harness as the secondary winding to inject current into the wire harness.

The Tubular Wave Coupler (TWC) method couples electromagnetic waves into a wire harness based on the directional coupler principle. The TWC method is applicable to the immunity test of automotive components to radiated disturbances in the GHz range (GSM band, UMTS, ISM 2.4 GHz). This method is most suitable for small (relative to the wavelength) and shielded devices under test (DUTs), because the main coupling path in these cases is the wiring harness.

The applicable frequency range of the BCI and TWC methods is a direct function of the characteristics of the transducer (current probe or tubular wave coupler), and it may be necessary to use more than one type of transducer to cover the test frequency range.

The calibration setup of the BCI test method is in accordance with Appendix A.

The transfer impedance of the test bench is shown in Appendix B.

The far-end/near-end grounding of the DUT is shown in Appendix C.

For automotive electronic system testing, the typical applicable frequency range is as follows.

-- BCI method. 100 kHz ~ 400 MHz;

-- TWC method. 400 MHz ~ 3 GHz.

The user shall specify the test severity level within the test frequency range. The recommended test severity levels are shown in Appendix D.

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 a shielded enclosure.

WARNING. Hazardous voltages and fields may be present in the test area. It shall be ensured that the requirements for the human body exposure limit of radio frequency energy are met.

6.1.1 General

The BCI method uses a current injection probe to directly couple the interference signal to the wiring harness for immunity testing. The injection probe is a current transformer through which the wiring harness of the device under test (DUT) passes. Carry out immunity tests by changing the test severity level and the frequency of the induced disturbance.

The following equipment is required.

- Ground plane;
- Current injection probe (probe set);
- Current measurement probe (probe set);
- Artificial Network (AN), High Voltage Artificial Network (HV-AN), Artificial Mains Network (AMN) and Asymmetric Artificial Network (AAN);
- Radio frequency (RF) signal generator with internal or external modulation capability;
- Power amplifier;
- Power measuring instrument. used to measure forward and reverse power;
- Current measuring equipment.

6.1.2 Injection probe

The test requires one or a group of injection probes that cover the test frequency range to couple the test signal into the DUT. Regardless of the test load, the probe (probe group) shall be able to withstand the input power corresponding to the highest test level within the test frequency range.

The saturation of the injection probe due to the test level and the DUT operating current should be considered.

6.1.3 Current measurement probe

Tubular wave couplers are used to couple disturbance signals into the test harness. It shall be able to couple the test power into the wiring harness over the entire test frequency range and shall have a sufficiently high coupling rate and rated power.

6.2.3 50 ohm load resistor

The 50 ohm load resistor is used to match the output impedance of the tubular wave coupler, and its rated power shall be greater than or equal to the applied forward power.

6.2.4 DUT stimulation and monitoring equipment

See 6.1.4.

7.1 Ground plane

The ground plane shall be copper, brass, bronze or galvanized steel at least 0.5 mm thick.

The minimum width of the ground plane shall be 1 000 mm or the projected width of the entire test setup (DUT and accessory equipment, such as the wiring harness including power cords, simulated loads on the test table and AN, excluding batteries and/or power supplies) on the horizontal plane plus 200 mm, whichever is greater.

The minimum length of the ground plane shall be.

-- For the BCI closed-loop method with power limitation, the length shall be 1

500 mm, or the projected length of the entire test setup (DUT and accessory equipment, such as the wiring harness including the power cords, simulated loads on the test table and the AN, excluding batteries and/or power supplies) on the horizontal plane plus 200 mm, whichever is greater.

-- For all other test methods in this document, the length shall be 2 000 mm or the projected length of the entire test setup (DUT and accessory equipment, such as the wiring harness including the power cord, the simulated load on the test table and the AN, excluding the battery and/or power supply) on the horizontal plane plus 200 mm, whichever is greater.

The height of the ground plane (test bench) shall be (900±100) mm above the ground.

The ground plane shall be electrically connected to the shielded enclosure, and the DC resistance shall not exceed 2.5 mohm. The distance between the edges of adjacent grounding strips shall not be greater than 300 mm, and the maximum length-to-width ratio of the grounding strip shall be 7.1.