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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

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车辆、船和内燃机 无线电骚扰特性 用于保护车载接收机的限值和测量方法

Vehicles, Boats and Internal Combustion Engines – Radio Disturbance Characteristics - Limits and Methods of Measurement for the Protection of On-Board Receivers

(CISPR 25:2016, MOD)

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Vehicles boats and internal combustion engines – Radio disturbance characteristics - Limits and methods of measurement for the protection of on-board receivers

1 SCOPE

This Standard contains limits and procedures for the measurement of radio disturbances in the frequency range of 150 kHz to 2500 MHz. The standard applies to any electronic/electrical component intended for use in vehicles, trailers and devices. Refer to International Telecommunications Union (ITU) publications for details of frequency allocations. The limits are intended to provide protection for receivers installed in a vehicle from disturbances produced by components/modules in the same vehicle. The method and limits for a complete vehicle (whether connected to the power mains for charging purposes or not) are in Clause 5 and the methods and limits for components/modules are in Clause 6. Only a complete vehicle test can be used to determine the component compatibility with respect to a vehicle's limit.

The receiver types to be protected are, for example, broadcast receivers (sound and television), land mobile radio, radio telephone, amateur, citizens' radio, Satellite Navigation System (Beidou, GPS etc.), Wi-Fi and Bluetooth. For the purpose of this standard, a vehicle is a machine, which is self-propelled by an internal combustion engine, electric means, or both. Vehicles include (but are not limited to) passenger cars, trucks, agricultural tractors and snowmobiles. Annex A provides guidance in determining whether this standard is applicable to particular equipment.

This Standard does not include protection of electronic control systems from radio frequency (RF) emissions or from transient or pulse-type voltage fluctuations. These subjects are included in the publications of other standardization committees.

The limits in this standard are recommended and subject to modification as agreed between the vehicle manufacturer and the component supplier. This standard is also intended to be applied by manufacturers and suppliers of components and equipment which are to be added and connected to the vehicle harness or to an on-board power connector after delivery of the vehicle.

Since the mounting location, vehicle body construction and harness design can affect the coupling of radio disturbances to the on-board radio, Clause 6 of this standard defines multiple limit levels. The level class to be used (as a function of frequency band) is agreed upon between the vehicle manufacturer and the component supplier.

This standard defines test methods for use by vehicle manufacturers and suppliers, to assist in the design of vehicles and components and ensure controlled levels of on-board radio frequency emissions.

Vehicle test limits are provided for guidance and are based on a typical radio receiver using the antenna provided as part of the vehicle, or a test antenna if a unique antenna is not specified. The frequency bands that are defined are not applicable to all regions or countries of the world. For economic reasons, the vehicle manufacturer is free to identify what frequency bands are applicable to the radio services likely to be used in the vehicle.

As an example, many vehicle models will probably not have a television receiver installed; yet the television bands occupy a significant portion of the radio spectrum. Testing and mitigating noise sources in such vehicles is not economically justified.

The World Administrative Radio communications Conference (WARC) lower frequency limit in region 1 was reduced to 148.5 kHz in 1979. For vehicular purposes, tests at 150 kHz are considered adequate.

Annex E defines artificial networks used for the measurement of conducted disturbances and for tests on vehicles in charging mode.

Annex H defines a qualitative method of judging the degradation of radio communication in the presence of impulsive noise.

Annex I defines test methods for shielded power supply systems for high voltage networks in electric and hybrid vehicles.

Annex J defines methods for the validation of the ALSE and the reference ground plane used for component testing.

2 NORMATIVE REFERENCES

The following referenced documents are indispensable for the application of this document. For dated references, only the editions cited apply. For undated references, the latest editions of the normative document (including any amendments) apply.

GB/T 4365-2003 Electrotechnical Terminology - Electromagnetic Compatibility (TEC 60050-161:1990+A1: 1997+A2: 1998, IDT)

GB/T 6113.104-2016 Specification for Radio Disturbance and Immunity Measuring Apparatus and Methods - Part 1-4: Radio Disturbance and Immunity Measuring Apparatus - Ancillary Equipment - Radiated Disturbances (CISPR 16-1-4:2012, IDT)

GB/T 6113.203-2016 Specification for Radio Disturbance and Immunity Measuring Apparatus and Methods - Part 2-3: Methods of Measurement of Disturbances and Immunity - Radiated Disturbance Measurements (CISPR 16-2-3:2010, IDT)

GB/T 29259-2012 Road vehicle - Electromagnetic compatibility terminology

ISO 7637-3:2016, Road vehicles – Electrical disturbances from conduction and coupling – Part 3: Electrical transient transmission by capacitive and inductive coupling via lines other than supply lines

ISO 11452-4:2011, Road vehicles – Component test methods for electrical disturbances from narrowband radiated electromagnetic energy – Part 4: Harness excitation methods

CISPR 16-1-1:2015, Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-1: Radio disturbance and immunity measuring apparatus – Measuring apparatus

CISPR 16-1-2:2014, Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-2: Radio disturbance and immunity measuring apparatus – Coupling devices for conducted disturbance measurements

CISPR 16-2-1:2014, Specification for radio disturbance and immunity measuring apparatus and methods – Part 2-1: Methods of measurement of disturbances and immunity – Conducted disturbance measurements

SAE ARP 958.1 Rev D: 2003-02 Electromagnetic Interference Measurement Antennas; Standard Calibration Method

3 TERMS AND DEFINITIONS

For the purpose of this standard, the terms and definitions established in GB/T 4365-2003 and GB/T 29259-2012 and the followings apply.

3.1 Artificial mains network (AMN)

Network that provides a defined impedance to the EUT at radio frequencies, couples the disturbance voltage to the measuring receiver and decouples the test circuit from the supply mains.

Note 1: There are two basic types of AMN, the V-network (V-AMN) which couples the unsymmetrical voltages, and the delta-network which couples the symmetric and the asymmetric voltages separately. The terms line impedance stabilization network (LISN) and V-AMN are used.

Note 2: Network inserted in the power mains of the vehicle in charging mode or of a component (e.g. charger) which provides, in a given frequency range, a specified load impedance and which isolates the vehicle / component from the power mains in that frequency range.

3.2 Artificial network (AN)

Network inserted in the supply lead or signal/load lead of an apparatus to be tested which provides, in a given frequency range, a specified load impedance for the measurement of disturbance voltages and which may isolate the apparatus from the supply or signal sources/loads in that frequency range.

Note 1: Network inserted in the d.c power lines of the vehicle in charging mode which provides, in a given frequency range, a specified load impedance and which isolates the vehicle from the d.c power supply in that frequency range.

Note 2: It is modified in relation to GB/T 29259-2012, Definition 3.52.

3.3 Asymmetric artificial network (AAN)

Network used to measure (or inject) asymmetric (common mode) voltages on unshielded symmetric signal (e.g. telecommunication) lines while rejecting the symmetric (differential mode) signal.

Note: This network is inserted in the communication/signal lines of the vehicle in charging mode or of a component (e.g. charger) to provide a specific load impedance and/or a decoupling (e.g. between telecommunication signal and power mains).

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