

ICS 43.040.10

CCS T 36



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

GB/T 19951-2019

Replacing GB/T 19951-2005

**Road vehicles - Disturbances test methods for
electrical/electronic component from electrostatic discharge**

道路车辆 电气/电子部件对静电放电抗扰性的试验方法

Issued on: June 4, 2019

Implemented on: January 1, 2020

**Issued by: State Administration for Market Regulation;
Standardization Administration of China**

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Foreword

This document was drafted in accordance with the rules given in GB/T 1.1-2009.

This document is a modified adoption (MOD) of ISO 10605:2008 "Road vehicles - Test methods for electrical disturbances from electrostatic discharge", including Amendment 1:2014 and Technical Corrigendum 1:2010, prepared by the redrafting method.

This document replaces GB/T 19951-2005. Compared with that edition, the main changes are as follows:

- the terms have been adjusted (Clause 3);
- test conditions, test location and discharge modes have been added (Clauses 4, 5 and 7);
- the requirements for the test apparatus have been substantially revised - output voltage, discharge resistance, and a reduced number of specified apparatus types (Clause 6);

- the test methods have been substantially revised, including the powered-up component test and the vehicle test (Clauses 8 and 10);
- the evaluation of results and the test report have been revised (Clauses 8, 9 and 11);
- Annex B on current target design, Annex D on the selection of the component discharge test method, and Annex E on the optional powered-up set-up and procedure have been added;
- the function performance status classification (FPSC) has been moved to an informative annex, Annex C, having been Annex B in the 2005 edition.

Compared with ISO 10605:2008 the technical differences are as follows: ISO 7637-1 and ISO 11452-1 have been removed from the normative references and GB/T 29259-2012 has been added; the ISO terms 3.5, 3.6, 3.7 and 3.10 - electrostatic discharge, human body model, reference plane and ESD generator - have been deleted because GB/T 29259-2012 already defines them; Figure 3, showing the contact discharge waveform parameters, has been added below Table 2 to clarify t1 and t2; 9.3.7 has been added, making the post-test functional requirements part of the judgement of results; and 6.3.2 of the ISO document has been deleted as redundant and misleading.

This document was proposed by the Ministry of Industry and Information Technology and is under the jurisdiction of the National Technical Committee of Auto Standardization (SAC/TC 114). The main drafting organization is the China Automotive Technology and Research Center (CATARC), with Suzhou 3C-Test Electronic, the China Electronics Standardization Institute, the Changchun Automotive Test Center, Shanghai Volkswagen, FAW-Volkswagen, Chery, Great Wall Motor and others among the drafting bodies, and Bosch, Toyota, BMW, Mercedes-Benz, Volkswagen, Ford, Jaguar Land Rover, Daimler and Peugeot Citroën among the participating ones.

This is the second edition of GB/T 19951, first issued in 2005.

1 Scope

This document specifies the test methods for evaluating the immunity of electrical and electronic components of road vehicles to electrostatic discharge: discharge occurring during assembly, discharge from service personnel, and discharge from vehicle occupants. It covers both component-level and vehicle-level tests.

It applies to components fitted to vehicles of categories M, N, O and L, whatever the means of propulsion - petrol, diesel or electric.

2 Normative references

The following document is normatively referenced in this document and is indispensable for its application. For the dated reference, only the version corresponding to that date applies.

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

3 Terms and definitions

The terms and definitions given in GB/T 29259-2012 apply, together with the following: 3.1 device under test (DUT); 3.2 air discharge; 3.3 contact discharge; 3.4 direct discharge; 3.5 indirect discharge; 3.6 surface; 3.7 holding time; 3.8 horizontal coupling plane (HCP).

4 Test conditions

Tests shall be carried out at an ambient temperature of $25\text{ °C} \pm 10\text{ °C}$ and a relative humidity between 20 % and 60 %, with 20 °C and 30 % relative humidity preferred. The test levels are specified by the user; guidance on severity levels is given in Annex C.

5 Test location

The test shall be performed in a laboratory meeting the ambient conditions of Clause 4. Shielded or anechoic enclosures may be used but are not required. The transient fields produced during the test may disturb equipment in the vicinity.

6 Test apparatus and instrumentation

6.1 ESD generator. The generator shall be capable of at least 10 discharges per second. The discharge return cable shall be 2 m long, and may be up to 3 m where compliance of the waveform is guaranteed.

The generator parameters of Table 1 are: contact discharge from 2 kV to 15 kV and air discharge from 2 kV to 25 kV, with an accuracy of 5 % or better, both polarities, a rise time between 0.7 ns and 1.0 ns, a holding time of at least 5 s, energy storage capacitances of 150 pF and 330 pF, and discharge resistances of 330 Ω and 2 000 Ω .

6.2 Discharge electrodes. The contact discharge electrode is of stainless steel, as shown in Figure 1. The air discharge electrode is as shown in Figure 2, with a larger tip for voltages above 15 kV.

7 Discharge modes

Two discharge modes are used, contact and air. Guidance on choosing between them for component testing is given in Annex D.

8 Component test method (DUT powered-up test)

The energy storage capacitance is 330 pF or 150 pF according to where the component is fitted in the vehicle, with a discharge resistance of 330 Ω . The generator shall be verified periodically in accordance with Annex A.

9 Component test method (DUT unpowered test)

This test simulates the discharge from a person handling the component during assembly or service. Contact discharge is applied to all pins and contacts, and air discharge to the surfaces that can be touched.

9.3.7 After the test, the functional requirements of the component form part of the judgement of the result.

10 Vehicle test method

For areas accessible from inside the vehicle the energy storage capacitance is 330 pF, with a discharge resistance of 330 Ω or 2 k Ω . Contact mode is used on conductive surfaces and air mode on non-conductive surfaces.

11 Test report

The report shall record the equipment used, the test levels, the area tested, the systems involved, the discharge points, the environmental conditions, the grounding arrangement, the operating mode of the device under test and how it was monitored, and any interactions observed.

Annexes

Annex A (normative) gives the verification procedure for the ESD generator. Annex B gives guidelines for the design of the current target. Annex C gives the function performance status classification (FPSC) and example severity levels, referring to GB/T 33014.1 for consistency with the EMC immunity series. Annex D gives guidance on selecting the discharge test method for components. Annex E gives an optional test set-up and procedure for the powered-up component test.