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

GB/T 28046.4-2011

**Road vehicles -- Environmental conditions and testing for
electrical and electronic equipment -- Part 4: Climatic loads
(English Translation)**

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Table of Contents

Foreword...	3
1 Application Scope...	5
2 Normative References...	5
3 Terms and Definitions...	6
4 Operating Temperature Ranges...	6
5 Tests and Requirements...	7
6 Codes for Climatic Loads...	19
7 Protection against Dust and Water...	20

Foreword

GB/T 28046, Road Vehicles - Environmental Conditions and Testing for Electrical and Electronic Equipment - Part 4. Climatic Loads, includes 5 parts.

- Part 1. General;
- Part 2. Electrical Loads;
- Part 3. Mechanical Loads;
- Part 4. Climatic Loads;
- Part 5. Chemical Loads.

This Part is part 4 of GB/T 28046.

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

This Part was redrafted by modifying and adopting ISO 16750-4:2006, Road Vehicles - Environmental Conditions and Testing for Electrical and Electronic Equipment - Part

4 Climatic Loads.

The technical differences between this Part and ISO 16750-4:2006 and their reasons are as follows.

- in order to maintain the correspondence and intercoordination with the serial standards, "- 40°C" in the former 5.1.1.2.2 is replaced with T_{min} (it is an obvious mistake and it has been changed into T_{min} in the revision of ISO 16750-4);

-- the instructions in Article 8 of the former standard have no guiding significance, so they are deleted in this Part;

-- the requirements in the column of 5.6 in Table 4 of the former text is hard to understand, so they are modified in this Part by referring to the corresponding content of the revision of ISO 16750-4.

This Part was proposed by the National Development and Reform Commission.

This Part shall be under the jurisdiction of the National Technical Committee of Auto Standardization (SAC/TC 114).

The drafting organizations of this Part. China Automotive Technology and Research Center, Changsha Automotive Electrical Appliances Research Institute, Shanghai Institute of Quality Inspection and Technical Research, Dongfeng Commercial Vehicle Technical Centre, Shenzhen Hangsheng Electronics Co., Ltd., Shanghai Kostal-Huayang Automotive Electrical Systems Co., Ltd., Zhengzhou Yuebo Automobile Electric Appliance Co., Ltd, Suzhou 3ctest Electronic Co., Ltd., Beijing Zhongyuan Co., Ltd.

Road Vehicles - Environmental Conditions and
Testing for Electrical and Electronic Equipment -
Part 4. Climatic Loads

1 Application Scope

This Part describes the potential climatic environmental stresses and specifies tests and requirements recommended for the systems/components at the specific mounting location on/in the vehicle.

This Part applies to electric and electronic systems/components for road vehicles.

2 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition dated applies to this document. For undated references, the latest edition of the referenced documents (including all amendments) applies to this Part.

GB/T 2423.1, Environmental Testing - Part 2. Test Methods - Tests A. Cold (GB/T

2423.1 - 2008, IEC 60068-2-1.2007, IDT)

GB/T 2423.2, Environmental Testing - Part 2. Test Methods - Tests B. Dry Heat
(GB/T 2423.2 - 2008, IEC 60068-2-2. 2007, IDT)

GB/T 2423.3, Environmental Testing - Part 2. Testing Method - Test Cab. Damp
Heat, Steady State (GB/T 2423.3-2006, IEC 60068-2-78.2001, IDT)

GB/T 2423.4, Environmental Testing - Part 2. Test Method - Test Db. Damp Heat,
Cyclic (12 h +12 h Cycle) (GB/T 2423.4-2008, IEC 60068-2-30.2005, IDT)

GB/T 2423.17, Environmental Testing - Part 2. Test Method - Test Ka. Salt Mist
(GB/T 2423.17-2008, IEC 60068-2-11, IDT)

GB/T 2423.18, Environmental Testing - Part 2. Test Methods - Test Kb. Salt Mist,
Cyclic (Sodium Chloride Solution) (GB/T 2423.18, IEC 60068-2-52.1996, IDT)

GB/T 2423.22, Environmental Testing - Part 2. Test Methods - Test N. Change of
Temperature (GB/T 2423.22-2002, IEC 60068-2-14.1984, IDT)

GB/T 2423.34, Environmental Testing - Part 2. Test Methods - Test Z/Ad.

Composite Temperature/Humidity Cyclic Test (GB/T 2423.34-2005, IEC 60068-2-
38.1974, IDT)

GB/T 2423.51, Environmental Testing - Part 2. Test Methods - Test Ke. Flowing
Mixed Gas Corrosion Test (GB/T 2423.51-2000, IEC 60068-2-60, IDT)

GB/T 28046.1, Road Vehicles - Environmental Conditions and Testing for Electrical
and Electronic Equipment - Part 1. General (GB/T 28046.1-2011, ISO 16750-
1.2006, MOD)

GB/T 28046.2, Road Vehicles - Environmental Conditions and Testing for Electrical
and Electronic Equipment - Part 2. Electrical Loads (GB/T 28046.2-2011, ISO
16750-2.2006, MOD)

ISO 20653, Road Vehicles - Degrees of Protection (IP Code) - Protection of
Electrical Equipment against Foreign Objects, Water and Access

3 Terms and Definitions

For the purposes of this document, the terms and definitions given in GB/T 28046.1 apply.

4 Operating Temperature Ranges

Table 1 defines operating temperature ranges. The applicable temperature ranges shall be chosen from Table 1 and shall be given in the specification of the device under test (DUT).

duration of 24 h unless otherwise specified in the DUT specification. The operating mode of the DUT is 1.1.

5.1.1.1.3 Requirement

Functional status shall be class C as defined in GB/T 28046.1.

5.1.1.2.1 Purpose

This test simulates the exposure of the DUT to low temperatures with electrical operation, e.g. the use of the system/components at very low ambient temperature. Failure mode is electrical malfunction caused by low temperature, e.g. freezing of capacitors with liquid electrolyte.

5.1.1.2.2 Test

Perform the test according to GB/T 2423.1 cold at a temperature of T_{min} for a duration of 24 h. The operating mode of the DUT is 3.2 as defined in GB/T 28046.1.

5.1.1.2.3 Requirement

The functional status shall be class A as defined in GB/T 28046.1.

5.1.2.1.1 Purpose

This test simulates the exposure of the DUT to high temperatures without electrical operation, e.g. during the shipment of the system/component. Failure mode is insufficient heat resistance.