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Automotive transmission control unit

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Foreword

This document is drafted in accordance with the provisions of GB/T 1.1—2020 Directives for Standardization - Part 1: Structure and Drafting Rules for Standardization Documents.

Attention is drawn to the fact that some contents of this document may involve patents. The issuing body of this document shall not be liable for identifying any such patents.

This document is proposed and under the jurisdiction of the National Technical Committee of Standardization for Automobiles (SAC/TC 114).

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Automotive transmission control unit

1 Scope

This document stipulates the terms and definitions, technical requirements, test methods and inspection rules for automotive transmission control units.

This document applies to automatic transmission control units for motor vehicles.

2 Normative References

The contents of the following documents constitute essential provisions of this document through normative reference in the text. For dated referenced documents, only the version corresponding to the stated date applies to this document. For undated referenced documents, the latest version (including all amendment sheets) applies to this document.

GB/T 2423.3 Environmental Testing - Part 2: Test Methods - Test Cab: Steady Damp Heat Test

GB/T 2423.34—2012 Environmental Testing - Part 2: Test Methods - Test Z/AD: Combined Temperature and Humidity Cycle Test

GB/T 14762—2008 Limits and Measurement Methods for Exhaust Pollutant Emissions from Gasoline Engines and Motor Vehicles for Heavy-Duty Applications (China Stage III and IV)

GB/T 17691—2018 Limits and Measurement Methods for Pollutant Emissions from Heavy-Duty Diesel Vehicles (China Stage VI)

GB/T 18352.6—2016 Limits and Measurement Methods for Pollutant Emissions from Light-Duty Vehicles (China Stage VI)

GB/T 18655 Road Vehicles, Vessels and Internal Combustion Engines - Radio Disturbance Characteristics - Limits and Measurement Methods for the Protection of On-Board Receivers

GB/T 19951—2019 Road Vehicles - Test Methods for Electrostatic Discharge Immunity of Electrical/Electronic Components

GB/T 21437.2 Road Vehicles - Test Methods for Electromagnetic Disturbances of Electrical/Electronic Components Caused by Conduction and Coupling - Part 2: Conducted Emission and Immunity of Electromagnetic Transients Along Power Supply Lines

GB/T 21437.3 Road Vehicles - Test Methods for Electromagnetic Disturbances of Electrical/Electronic Components Caused by Conduction and Coupling - Part 3: Immunity to Electromagnetic Transients Coupled to Non-Power Supply Lines

GB/T 28046.1 Road Vehicles - Environmental Conditions and Testing for Electrical and Electronic Equipment - Part 1: General Provisions

GB/T 28046.2—2019 Road Vehicles - Environmental Conditions and Testing for Electrical and Electronic Equipment - Part 2: Electrical Loads

GB/T 28046.3—2011 Road Vehicles - Environmental Conditions and Testing for Electrical and Electronic Equipment -

Part 3: Mechanical Loads

GB/T 28046.4—2011 Road Vehicles - Environmental Conditions and Testing for Electrical and Electronic Equipment - Part 4: Climatic Loads

GB/T 28046.5 Road Vehicles - Environmental Conditions and Testing for Electrical and Electronic Equipment - Part 5: Chemical Loads

GB/T 30038 Road Vehicles - Degree of Protection (IP Code) - Protection of Electrical Equipment Against Solid Objects, Water and Contact

GB/T 33014.1 Road Vehicles - Test Methods for Immunity of Electrical/Electronic Components to Narrowband Radiated Electromagnetic Energy - Part 1: General Provisions

GB/T 33014.2 Road Vehicles - Test Methods for Immunity of Electrical/Electronic Components to Narrowband Radiated Electromagnetic Energy - Part 2: Anechoic Chamber Method

GB/T 33014.4 Road Vehicles - Test Methods for Immunity of Electrical/Electronic Components to Narrowband Radiated Electromagnetic Energy - Part 4: Bulk Current Injection (BCI) Method

GB/T 33014.9 Road Vehicles - Test Methods for Immunity of Electrical/Electronic Components to Narrowband Radiated Electromagnetic Energy - Part 9: Portable Transmitter Method

GB/T 34590 (All Parts) Road Vehicles - Functional Safety

GB/T 42284.3—2022 Road Vehicles - Environmental Conditions and Testing for Electrical and Electronic Equipment for Electric Vehicle Drive Systems - Part 3: Mechanical Loads

QC/T 1077 Terms and Definitions for Classification of Automatic Control Transmissions for Motor Vehicles

ISO/SAE 21434 Road Vehicles - Cybersecurity Engineering

3 Terms and Definitions

The terms and definitions specified in GB/T 28046.1 and QC/T 1077 as well as the following ones apply to this document.

3.1 automotive transmission control unit (TCU)

The electronic control unit for an automotive transmission.

3.2 equivalence classes test

All input data are divided into several parts (subsets), and a small number of representative data are selected from each subset as test cases.

3.3 fault tolerant time interval

The minimum time interval from the occurrence of an internal fault in an item to the potential occurrence of a hazardous event when the safety mechanism is not activated.

[Source: GB/T 34590.1—2022, 3.61]

4 Technical Requirements

4.1 General Requirements

4.1.1 Appearance and Dimensions

The appearance and dimensions of a TCU shall meet the following requirements:

- a) The external shape and dimensions of the product shall comply with the requirements of the product drawings.
- b) The product marking shall be correct and legible, and comply with the requirements of the product drawings.

4.1.2 Operating Conditions

Unless otherwise specified, the operating temperature range and operating voltage range of a TCU are shown in Table 1 and Table 2 below.

Table 1 Operating Temperature

Mounting Location	Minimum Operating Temperature (T_{\min})	Maximum Operating Temperature (T_{\max})
On the transmission in the engine compartment	-40 °C	110 °C
In the engine compartment, away from the engine and transmission	-40 °C	105°C
Inside the transmission	-40 °C	140 °C (in oil), 115 °C (other areas)

Table 2 Operating Voltage

Power Supply System	Minimum Supply Voltage (U_{\min})	Maximum Supply Voltage (U_{\max})
12 V System	9 V	16 V
24 V System	16 V	32 V