

IEEE P802.3cg

147.10 Environmental specifications

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Purpose

- The purpose of this presentation is to:
 - Fill out empty IEEE P802.3cg Clause 147.10 Environmental specifications
- Since Automotive is a required application, the initial text is drawn from IEEE 802.3bp-2016 (newest), cross-checked against IEEE 802.3bw-2015, and modified from 1000BASE-T1 to 10BASE-T1S
- Text was merged with related Clause 146 to cover Industrial environments.

General safety

147.10.1 General safety

All equipment subject to this clause shall conform to IEC 60950-1 or IEC 62368-1 (for IT and industrial applications), and to IEC 61010-1 (for industrial applications only, if required by the given application). All equipment subject to this clause and intended for motor vehicle applications shall conform to ISO 26262. All equipment subject to this clause may be additionally required to conform to any applicable local, state, or national motor vehicle standards or as agreed to between the customer and supplier.

Network safety

147.10.2 Network safety

All cabling and equipment subject to this clause is expected to be mechanically and electrically secure in a professional manner. In automotive applications, all 10BASE-T1S cabling shall be routed to provide maximum protection by the motor vehicle sheet metal and structural components, following SAE J1292, ISO 14229, and ISO 15764. In industrial applications, all 10BASE-T1S cabling shall be routed according to any applicable local, state or national standards considering all relevant safety requirements.

Environmental safety

147.10.2.1 Environmental safety

All equipment subject to this clause, when used in the automotive environment, shall conform to the potential environmental stresses with respect to their mounting location, as defined in the following specifications:

- a) General loads: ISO 16750-1
- b) Electrical loads: ISO 16750-2, ISO 7637-2:2008, and ISO 8820-1
- c) Mechanical loads: ISO 16750-3, ASTM D4728, and ISO 12103-1
- d) Climatic loads: ISO 16750-4 and IEC 60068-2-1/27/30/38/52/64/78
- e) Chemical loads: ISO 167540-5 and ISO 20653

All equipment subject to this clause, when used in the industrial environment, shall conform to the potential environmental stresses with respect to their mounting location, as defined in the following specifications, where applicable:

- a) Environmental loads: IEC 60529 and ISO 4892
- b) Mechanical loads: IEC 60068-2-6/31
- c) Climatic loads: IEC 60068-2-1/2/14/27/30/38/52/78

Automotive environmental conditions are generally more severe than those found in many industrial environments and industrial environmental conditions are generally more severe than those found in many commercial environments. The target automotive, industrial, or commercial environment(s) require careful analysis prior to implementation.

Electromagnetic compatibility

147.10.2.2 Electromagnetic compatibility

A system integrating the 10BASE-T1S PHY shall comply with all applicable local and national codes. In addition, the system may need to comply with more stringent requirements as agreed upon between customer and supplier, for the limitation of electromagnetic interference. A 10BASE-T1S PHY shall be tested according to IEC CISPR 25 test methods defined to measure the PHY's EMC performance in terms of radio frequency (RF) immunity and RF emissions.

When used in an automotive environment, a 10BASE-T1S PHY is expected to meet the following motor vehicle EMC requirements:

- a) Radiated/conducted emissions: CISPR 25, IEC 61967-1/4, and IEC 61000-4-21
- b) Radiated/conducted immunity: ISO 11452, IEC 62132-1/4, and IEC 61000-4-21
- c) Electrostatic discharge: ISO 10605 and IEC 61000-4-2/3
- d) Electrical disturbances: IEC 62215-3 and ISO 7637-2/3

When used in an industrial application a 10BASE-T1S PHY shall be tested according to the MICE classification depending on the intended electromagnetic classification (MICE E1 to MICE E3). Where applicable, testing according to IEC 61326 and NE21 test methods, which are similar to or even more severe than a MICE E3 environment, shall also be done, and the following industrial EMC requirements shall be met:

- a) Radiated/Conducted Emissions: IEC 61000-6-4
- b) Radiated/Conducted Immunity: IEC 61000-4-3 and IEC 61000-4-6
- c) Electrical Fast Transients: IEC 61000-4-4
- d) Electrostatic Discharge: IEC 61000-4-2
- e) Surge: IEC 61000-4-5

Exact test setup and test limit values may be adapted to each specific application, subject to agreement between the customer and the supplier.