

Automotive Environmental Requirements

Natalie Wienckowski, General Motors

March 2018

IEEE P802.3ch & P802.3cg

Current Environmental Requirements

- 96.9 and 97.9 the *Environmental specifications* section for 100BASE-T1 and 1000BASE-T1, respectively, are identical in P802.3 D3.1 except for the fact that one mentions the 100BASE-T1 PHY and the other mentions the 1000BASE-T1 PHY.
- When Clause 97 was published, this was not identical to Clause 96 due to a comment by a commenter who didn't understand the requirement and inattention on the part of those who understood the requirements.
- It is desirable to have the Environmental specifications the same for all Automotive PHYs.
- 802.3cg has not yet determined what to include for this. Clause 146.9 (10BASE-T1L) is similar to 96.9 and 97.9, for automotive, but has added some additional requirements for industrial applications.
- 802.3cg Clause 147 (10BASE-T1S) currently does not have an Environmental specifications section.

Proposed Environmental Requirements, Section 149.9

- Modified from Section 96.9 as indicated below:

149.9 Environmental specifications

149.9.1 General safety

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

149.9.2 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 ~~100BASE-T1~~ cabling shall be routed in way to provide maximum protection by the motor vehicle sheet metal and structural components, following SAE J1292, ISO 14229, and ISO 15764.

Proposed Environmental Requirements , Section 149.9, cont'd

- Modified from Section 96.9 as indicated below:

149.9.2.1 Environmental safety

In automotive applications, all equipment subject to this clause 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 16754-5 and ISO 20653

Automotive environmental conditions are generally more severe than those found in many commercial environments. The targeted application environment(s) require careful analysis prior to implementation.

Proposed Environmental Requirements , Section 149.9, cont'd

- Modify Section 96.9 as indicated below:

96.9.2.2 Electromagnetic compatibility

A system integrating ~~the 100BASE-T1~~ a PHY intended for automotive applications 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. In automotive applications, ~~a 100BASE-T1~~ the PHY shall be tested according to CISPR 25 test methods, and shall 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

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

Proposed Environmental Requirements, cg & ch

- Clause 146: Delete all references to automotive (10BASE-T1L is not intended for automotive applications)
- Clause 147:
147.9 Environmental specifications
10BASE-T1S PHYs intended for automotive usage shall comply with Section 149.9 and all subsections of 149.9. Alternatively, may want to refer to 96.9 or copy the text as publication is expected prior to that of ch.
- Clause 149:
149.9 Environmental specifications
See previous slides
- Clause 150:
150.9 Environmental specifications
5GBASE-T1 PHYs and 10GBASE-T1 PHYs shall comply with Section 149.9 and all subsections of 149.9

Updates to Environmental Requirements in next Maintenance release

- Copy text from 149.9 to 96.9
- Delete all current text in Section 97.9 and replace with:
97.9 Environmental specifications
1000BASE-T1 PHYs shall comply with Section 96.9 and all subsections of 96.9.
- Delete text in Section 149.9 and replace with:
149.9 Environmental specifications
2.5GBASE-T1 PHYs shall comply with Section 96.9 and all subsections of 96.9.
- Potentially delete automotive related text in Section 147.9 and replace with:
147.9 Environmental specifications
10BASE-T1S PHYs intended for automotive usage shall comply with Section 96.9 and all subsections of 96.9.

A blue-tinted landscape featuring a road that recedes into the distance towards a range of mountains under a clear sky. The entire image is overlaid with a semi-transparent blue filter.

THANK YOU