

IEEE 802_3 Isolation.doc

Summary:

Spec	Isolation	
10BASE-T MAU	Frame ground and all leads: 2250VDC, 1500Vrms, 2400V pulses	
TP-PMD (100BASE-TX PMD)	Frame ground and all leads: 2250VDC, 1500Vrms, 2400V pulses	
Repeater Environment A	Segment and protective ground: 500Vrms	
Repeater Environment B	Segment and other segment(s) or protective ground: 1500Vrms	
Repeater port to port	Local isolation requirements.	

IEEE

Part 3: Carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications

9. Repeater unit for 10 Mb/s baseband networks

9.5.7 Electrical isolation

Network segments that have different isolation and grounding requirements shall have those requirements provided by the port-to-port isolation of the repeater set.

9.7 Electrical isolation

There are two electrical power distribution environments to be considered that require different electrical isolation properties.

Environment A—When a LAN or LAN segment, with all its associated interconnected equipment, is entirely contained within a single low-voltage power distribution system and within a single building.

Environment B—When a LAN crosses the boundary between separate power distribution systems or the boundaries of a single building.

The repeater unit shall comply with applicable local and national codes related to safety. See [B21].

9.7.1 Environment A requirements

Attachment of network segments via repeaters (sets) possessing internal MAUs requires electrical isolation of 500 Vrms, 1 min withstand, between the segment and the protective ground of the repeater unit. For repeater ports that connect to external MAUs via an AUI Interface, the requirement for isolation is encompassed within the isolation requirements of the basic MAU/medium standard. (See 8.3.2.1, 9.9.3.1, 10.4.2.1, 14.3.1.1, and 15.3.4.)

The repeater unit shall not require any electrical isolation between exposed AUI Interfaces or between exposed AUI Interfaces and chassis ground of the repeater unit. No isolation boundary need therefore exist at any AUI compatible interface (that is, “D” connector) provided by a repeater unit.

9.7.2 Environment B requirements

The attachment of network segments, which cross environment A boundaries, requires electrical isolation of 1500 Vrms, 1 min withstand, between each segment and all other

attached segments and also the protective ground of the repeater unit. If segments are of an electrically conductive medium, it is recommended that this isolation be provided by the use of external MAUs connected by AUI Interfaces. If internal MAUs are used for attachment to conductive media segments, then the segments shall be installed such that it is not possible for an equipment user to touch the trunk cable screen or signal conductor. A repeater of this variety requires professional installation. The requirements for interconnected electrically conducting LAN segments that are partially or fully external to a single building environment may require additional protection against lightning strike hazards. Such requirements are beyond the scope of this standard. It is recommended that the above situation be handled by the use of a nonelectrically conducting LAN segment (see 9.9 or Clause 15).

14. Twisted-pair medium attachment unit (MAU) and baseband medium, type 10BASE-T

14.3.1.1 Isolation requirement

The MAU shall provide isolation between the DTE Physical Layer circuits including frame ground and all MDI leads including those not used by 10BASE-T. This electrical separation shall withstand at least one of the following electrical strength tests.

- a) 1500 Vrms at 50 Hz to 60 Hz for 60 s, applied as specified in Section 5.3.2 of IEC 60950: 1991.
- b) 2250 Vdc for 60 s, applied as specified in Section 5.3.2 of IEC 60950: 1991.
- c) A sequence of ten 2400 V impulses of alternating polarity, applied at intervals of not less than 1 s. The shape of the impulses shall be 1.2/50 μ s (1.2 μ s virtual front time, 50 μ s virtual time of half value), as defined in IEC 60060.

There shall be no insulation breakdown, as defined in Section 5.3.2 of IEC 60950: 1991, during the test. The resistance after the test shall be at least 2 M Ω , measured at 500 Vdc.

25. Physical Medium Dependent (PMD) sublayer and baseband medium, type 100BASE-TX

25.2 Functional specifications

The 100BASE-TX PMD (and MDI) is specified by incorporating the FDDI TP-PMD standard, ANSI X3.263: 1995 (TP-PMD), by reference, with the modifications noted below. This standard provides support for Category 5 unshielded twisted pair (UTP) and shielded twisted pair (STP). For improved legibility in this clause, ANSI X3.263: 1995 (TP-PMD), will henceforth be referred to as TP-PMD.

27. Repeater for 100 Mb/s baseband networks

27.4.1 Electrical isolation

Network segments that have different isolation and grounding requirements shall have those requirements provided by the port-to-port isolation of the repeater set.

27.5.2.2 Grounding

The safety ground, or chassis ground for the repeater set, shall be provided through the main ac power cord via the third wire ground as defined by applicable local codes and

regulations. It is recommended that an external PHY to the repeater should also be mechanically grounded to the repeater unit through the power and ground signals in the MII connection and via the metal shell and shield of the MII connector if available. If the MDI connector should provide a shield connection, the shield may be connected to the repeater safety ground. A network segment connected to the repeater set through the MDI may use a shield. If both ends of the network segment have a shielded MDI connector available, then the shield may be grounded at both ends according to local regulations and ISO/IEC 11801: 1995, and as long as the ground potential difference between both ends of the network segment is less than 1 V rms. The same rules apply towards an inter-repeater link between two repeaters. Multiple repeaters should reside on the same power main; if not, then it is highly recommended that the repeaters be connected via fiber.

27.5.3 Electrical isolation

There are two electrical power distribution environments to be considered that require different electrical isolation properties:

a) Environment A. When a LAN or LAN segment, with all its associated interconnected equipment, is entirely contained within a single low-voltage power distribution system and within a single building.

b) Environment B. When a LAN crosses the boundary between separate power distribution systems or the boundary of a single building.

27.5.3.1 Environment A requirements

Attachment of network segments via repeater sets requires electrical isolation of 500 Vrms, one-minute withstand, between the segment and the protective ground of the repeater unit.

27.5.3.2 Environment B requirements

The attachment of network segments that cross Environment B boundaries requires electrical isolation of 1500 Vrms, one-minute withstand, between each segment and all other attached segments and also the protective ground of the repeater unit. The requirements for interconnected electrically conducting LAN segments that are partially or fully external to a single building environment may require additional protection against lightning strike hazards. Such requirements are beyond the scope of this standard. It is recommended that the above situation be handled by the use of nonelectrically conducting segments (e.g., fiber optic). It is assumed that any nonelectrically conducting segments will provide sufficient isolation within that media to satisfy the isolation requirements of Environment B.

ANSI X3.263:199X

FDDI TP-PMD

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8.4.1 UTP isolation requirements

The UTP-PMD shall provide isolation between frame ground and all leads of the UTP-MIC, including those not used by the AOI and AII. This electrical separation shall withstand at least one of the following electrical strength tests.

1. 1500 Vrms at 50 to 60 Hz for 60 s, applied as specified in subclause 5.3.2 of IEC 950:1991.
2. 2250 VDC for 60 s, applied as specified in subclause 5.3.2 of IEC 950:1991.
3. A sequence of ten 2400 V impulses of alternating polarity, applied at intervals of not less than 1 s. The shape of these impulses shall be 1,2/50 ms (1,2 ms virtual front time, 50 ms virtual time of half value), as defined in IEC 60.

There shall be no insulation breakdown, as defined in subclause 5.3.2 of IEC 950:1991, during the test. The resistance after the test shall be at least 2 MW, measured at 500 VDC.