Introduction to fiber optic connectors engineering essay

Engineering

Submitted toSri Lanka Institute of Information TechnologyEN12517466L. P. A. MADURANGA PONNAMPERUMAIn partial fulfillment of the requirements for theBachelor of Science Special Honors Degree in Information Technology07February 2013DECLARATION PAGEI certify that this report does not incorporate without acknowledgement, any material previously submitted for a degree or diploma in any university, and to the best of my knowledge and belief it does not contain any material previously published or written by another person, except where due reference is made in text. Name : L. P. A. MADURANGA PONNAMPERUMAStudent Registration Number: EN 12517466

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INTRODUCTION TO FIBER OPTIC CABLESFiber optic cables are use to transmit data at the speed of light. This cable type completely different than the copper cables. Fiber optic cables offer high bandwidts and low losses which allow highdata transmittion rates over long distances. There are mainly three common types of fiber optic cables. 1. Single-mode2. multymode3. granded indexThese types are mostly used in communication systems and also they have established medical, military, scanning, imaging, and sensing applications. INTRODUCTION TO FIBER OPTIC CONNECTORSTodays and future communication technology demands fast, efficient and safe performance in the data communication process. Large and complex databases all interconnected must be able to receive and transmit data without outside interferences. Fiber optic components are the right solution for complex systems. In order to achieve accurate and precise connections of

the fiber ends, very high quality ceramic components are used. Fiber optic connectors made with precision and high quality ceramic components provide a high reliability connection when used with the various adapters. PRODUCT SPECIFICATION OF FIBER OPTIC CONNECTERSOptical characteristics : Insertion LossReturn lossMechanical characteristics : engagement and separation forseFerrule withdrawal forseCable retentionDurabilityVibrationshockEnvironmental characteristics : HumidityChange of temperatureDry heatColdSalt mistMATERIALSPARTMATERIALSimplex plug housingSynthetic resin Spring Stainless steel FerruleZironicaSimplex adapter housingSynthetic resin or Zinc Alloy4 position adapter housingSynthetic resin5 position adapter housingSynthetic resinReceptacle housingZinc alloySplit sleeve Zirconia orPhosphor BronzeDust capSynthetic resinFIBER OPTIC CONNECTOR TYPESSC-SIMPLE CONNECTOR : In this simple connecter types there are two types of SC connecters. SIMPLE & DUPLEX CONNECTERSFigure - SC connecter simplex modeFigure - SC connector duplex modeTechnical data : Housing material: Plastic (UL 94V-0)Ferrule: CeramicTemperature range: -40°C to +80°CMating cycles: 1000Set with cable boot for cable Ø 0. 9 mmDust capsA push-on, pull-off type of multimode or single mode connector with a ceramic ferrule and an SFF design a simplex or a duplex plastic housing, often used for LANs and data communication. [1]

Special advantages of SC connectors

Low insertion lossLow costReliabilityEasy of useEase of installationHige return loss

SPECIAL FEATURES OF LC CONNECTORS

Flame resistant. Simplified plugs and receptacles. Three types of duplex SC connector : Flexible F typeRigid F typeRigid H typeIEC, JIS, standard comliant and intermateability test certified. FC : FIBER CONNECTORFigure -FC connecterTechnical data : Housing material: Metal, Nickel platedFerrule: CeramicTemperature range: -40°C to +80°CMating cycles: 1000Set with cable boot for cable Ø 0, 9 mmDust capsA screw on metallic connector with a ceramic ferrule; widely used with single mode fiber for active device termination and in high – vibration environment.

Special advantages of FC connecter

Reduce termination timeField installableOne piece body designPre polished ceramic ferrulesST CONNECTOR : STRAIGHT TIP CONNECTORFigure -ST connecterTechnical data : Housing material: Metal Nickel platedFerrule: CeramicTemperature range: -40°C to +80°CMating cycles: 500Set with cable boot for cable Ø 0, 9 mmDust capsA slotted bayonet (push in, twist out) type of metallic multimode or single mode fiber connector with a ceramic ferrule. Widely use in inter / intra building, data communication and also telecommunication application. Special advantages of ST connecterHigh repeatability and low attenuationField installationStandard crimp Kevlar retentionHigh performance single-mode and multy-mode connectorsLC : LUCENT CONNECTORThis connecter also have a two types, simple and duplexFigure -LC connecter simplex modeFigure -LC connector duplex modeA push on , pull off, multimode or single mode fiber type of connector containing a standard RJ 45 telephone plug housing with a ceramic ferrule in a simplex or duplex plastic housing. SFF and SFP designs are sutable for high

density interconnection and also usual for instrumentation and test equipment interconnections.

Special advantages of LC connectors:

Doubles fiber dencity in shelves and outlets-lowering system costAllows easy disengagement in dense spaceAssures high repeatability, maintains transmit/recive directionHelps minimize transmission problemsImproves durability and reduces connect earrangement effortReduce installation time for field mountable connectors5. MU CONNECTOR : Figure - MU connectorMu connectors are basically made by fiber connector with plastic housing and ceramic ferrule. SFF and SFP designs with packaging density that grateter than the SC connector and also smaller. . These connectors are widely use useful for board-mounted applications and high density interconnections.

Special advantages of MU connectors:

Smooth transition from the FCHigher packaging densityExcellent performanceWide application rangeEnough EMI protection6. MTRJ CONNECTOR : MT FERRULE REGISTER JACKLATCHFigure - MTRJ connecterMT-RJ connectors is a small form factor connecter that was designed to meet fiber optic monolithic ferrule plastic composite. This connecter much like the copper RJ-45 jack. This connector widely use for both local and metropolitan area networks, particulary with high density interconnection.

Special advantages of MT-RJ connectors

Fiber protection, the connector crimp on mechanism shall protect the bare fibers from the air or waterborne contaminants and shall secure the fibers in the ferrule micro holes. The connector shall have a latching mechanism to

hold the connector into the adapter. The connector shall not require index matching material between connecter endfaces. 7. 3M TM VOLITION FIBER OPTIC CONNECTORFigure -3M TM VOLITIONBasically this cable contains two parts. Horizontal and Backbone cable. the horizontal cable provides the phhsical link between the fiber connector patch panel in the floor distributor and the fiber connecter in the outlet. Both unitube and tight buffer fiber cables are available and jacket can be PE for outdoor.

Special advantages of 3M TM VOLITION FIBER OPTIC Connector

Minimizing weight and eases cable installationComplete range of cableFast and accurate fiber idenficationNo small loose parts. Fast easy installationExcellent pull out strengthDesigned to eliminate the need io touch bare fiberOne of the industry leaders in mechanical and optical performanceLight rodent protection. 8. EC2000 CONNECTORFigure -EC2000 connectorThis connector mostly preferred for single mode fiber oparetion and also exhibits a push-pull latching mechanism, and integrates a protective cap over the ferrule, which acts as a dust shield and shields users from laser emissions. The protective cap is loaded with an integrated spring to ensure proper closing of the cap. SFF and SFP designs similar to the SC type but also contains an eye protection safety cover built the end face. 9. MTP CONNECTOR : MULTIPLE TERMINATION PUSH-PULL LATCHFigure -MTP connecterThese type of connectors for multifiber ribbon cable based on multiple MT-RJ connecters in plastic housing. The same style of monolithic ferrule provides a basis for other connectors. This connectors provide an intuitive push-pull latching mechanism for easy insertion. This connectors

used for high density inter connections. 10. MPO CONNECTORFigure -MPO connecterThe MPO connector houses an MT ferrule, and so can provide for upwards of twelve fibers in a single connector. Like an MPO connectors operate with a simple push-pull latching mechanism and intuitive insertion. MPO application: Patch cords and Fan-Out assembliesATM and DWDM high speed communication systemsMultimediaCATV and VideoData Telecommunication NetworksIndustrial11. SMC CONNECTORFigure - SMC connectorSmc connectors easily terminate buffered or non-buffered ribbon fiber. This connecter has been submitted for review as an industry standard connector. SMC has three different body lengths available, depending on size considerations. The plastic moulded body uses side-mounted locking clips to hold the connector in place. SUMMERYFC0. 50-1. 00 dB 0. 20 dB SM, MM Datacom, TelecommunicationsFDDI0. 20-0. 70 dB 0. 20 dB SM, MM Fiber Optic NetworkLC0. 15 db (SM)0. 10 dB (MM) 0. 2 dB SM, MM High Density InterconnectionMT Array0. 30-1. 00 dB 0. 25 dB SM, MM High Density InterconnectionSC0. 20-0. 45 dB 0. 10 dB SM, MM DatacomSC Duplex0. 20-0. 45 dB 0. 10 dB SM, MM DatacomSTTyp. 0. 40 dB(SM)Typ. 0. 50 dB(MM)Typ. 0. 40 dB(SM)Typ. 0. 20 dB(MM)SM, MM Inter-/Intra-Building, Security, NavyREFERANCEx[1]ABDUL AL-AZZAWI, FIBER OPTICS PRINCIPLES AND PRACTICES. USA: CRC PRESS, 2007. x