

High-Speed Optical Video Interface for Full HD multimedia Data Transmission

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Abstract. HDMI technology is a global standard for connecting high-definition equipment. However, as the amount of data to transmit increases, the cable which is made of copper should be thicker and shorter to accommodate the increased bandwidth. Fiber-optic communication which is lossless data communication system can transmit data to longer distance. In addition, if we use fiber-optic, image compression techniques are not needed due to its large bandwidth. In this paper, we design the optical HDMI extender for long distance Full HD multimedia Data Transmission.

Keywords: HDMI, Optical, Full HD, Fiber-optic cable

1 Introduction

HDMI[1] can carry high quality multi-channel audio data and can carry all standard and high-definition consumer electronics video formats. Most important demands on optical fibers are a proper wave guiding, low loss of optical power and low distortion of the transmitted optical signals. If we use both techniques, long-distance transmission for full HD multimedia data is possible.

2 HDMI

HDMI technology is the global standard for connecting high-definition equipment. The HDMI is provided for transmitting digital television audio/video signals from blu-ray players, set-top boxes, video game machine, smart phone and other audio/video sources to television sets, projectors and other video displays. An example of the HDMI connections is shown in Figure 1.



Fig. 1. Example of the HDMI connections

3 Fiber-optic communication

Fiber-optic communication is a method of transmitting information from one place to another by sending pulses of light through a fiber-optic cable. The light forms an electromagnetic carrier wave that is modulated to carry information. An example of the fiber-optic communication system is shown in Figure 2.



Fig. 2. Example of the HDMI connections

4 Optical HDMI extender

Optical HDMI is used for long-distance transmission of images of lossless high-definition multimedia. Optical HDMI extender serializes the HDMI electrical signal [2]. A diagram of optical HDMI extenders to serialize and deserialize the signal in the SerDes (Serializer/Deserializer) are shown in Figure 3.

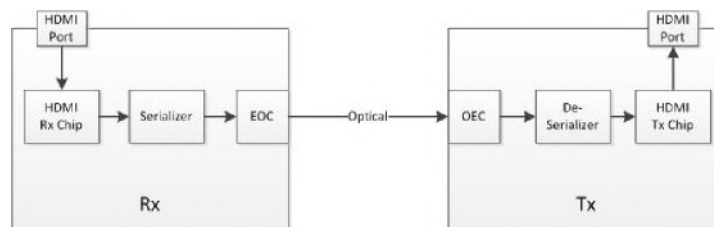


Fig. 3. Diagram of optical HDMI extender



Fig. 6. EDID test

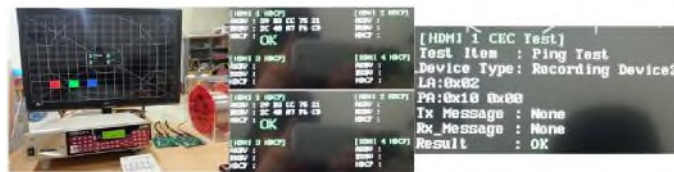


Fig. 7. HDCP and CEC test

Table 2. Test result

Resolution	OK(1920x1080p 60fps)
EDID	OK
HDCP	OK
CEC	OK
Distance	OK(1km)

6 Conclusion

Using Optical fiber for HDMI data transmission, long-distance transmission can be possible. The optical HDMI extender presented is working properly. The hardware design was verified using multi video pattern generator and full HDTV. The optical HDMI extender can send/receive the 1080P,60fps HDMI data within 1km.

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