



PURE DIGITAL
FIBERLINK®

Designed & Manufactured by
CSI New York

3150 Series

Broadcast quality HD/SD-SDI Transmission over one single mode or multimode fiber with full SMPTE compliance and embedded audio and data signal support.

Performance Profile

A comprehensive comparison of the Pure Digital Fiberlink® 3150 Series and competitive product.

In any HD/SD-SDI signal distribution system, it is important to maintain the integrity of the HD/SD-SDI signal as it goes through various media such as fiber and copper. Fiber optic transmission presents unique and potentially catastrophic challenges to HD/SD-SDI signal distribution if not understood and compensated for in product design. It is with this in mind, that we present actual waveform data of the 3150 Series illustrating key performance specifications under typical system conditions.

Importance of the measurements demonstrated within:

Timing Jitter: This is the short-term variations of the significant instants of a digital signal from their ideal positions in time. Excessive Timing Jitter will cause pixel dropouts or synchronizing errors in downstream equipment.

Alignment Jitter: This is the deviation in time of the significant instants of the SDI signal relative to a hypothetical clock recovered from the SDI signal itself. Generally, excessive Alignment Jitter will introduce decoding errors of the SDI signal.

Eye Pattern: This image will show many characteristics of the SDI signal including: overall signal amplitude, DC offset, overshoots and undershoots and rise/fall time of the signal transitions. Generally, the larger the opening of the “eye” the more likely the signal will be decoded properly.

Rise/Fall Time: The rise and fall time of SDI transitions must be controlled and varied in accordance with the data rate of the SDI signal. Too slow, and the eye opening becomes poor resulting in false decoding of the data or poor synchronization. Too fast, and ringing of the SDI signal will occur as it propagates through a bandwidth limited distribution system. SMPTE specifies a different rise and fall time for HD-SDI and SD-SDI signals and an SDI fiber optic link must automatically adjust to each signal.

Environment

Tektronix Signal Generator connects to a HD/SD-SDI Optical Transmitter through 250 feet of 1694A coax. The Optical Transmitter transmits HD or SD SDI over a 1000 meter multimode fiber to an Optical Receiver. The Optical Receiver outputs to a Tektronix Measurement Device. All images shown are at the Receiver Output.

Signal Source:

SMPTE Color Bars generated from a Tektronix TG700

Measurement Device:

Tektronix WFM700

Input Coaxial Cable:

Belden 1694A; 250 Feet

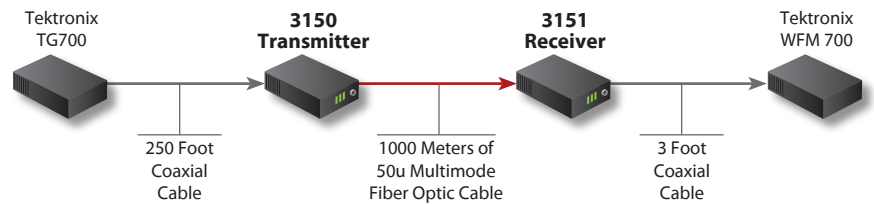
Fiber Optic Cable:

50u Multimode Fiber; 1000 meters

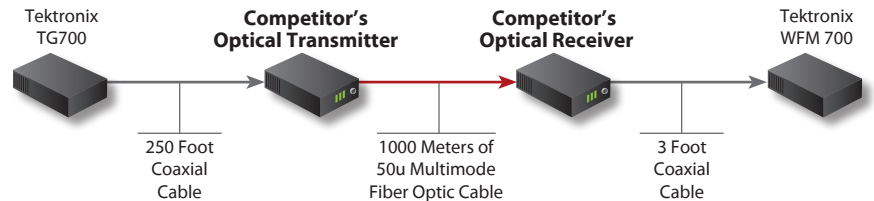
Output Coaxial Cable:

Belden 1694A; 3 Feet

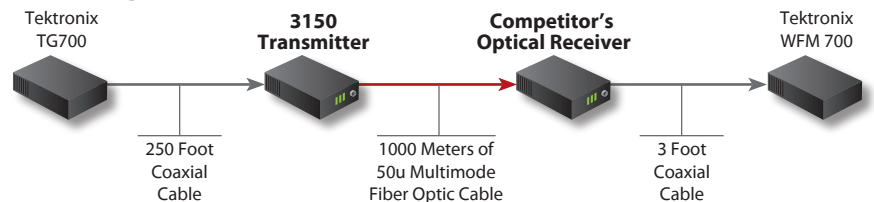
Test Configuration 1:



Test Configuration 2:

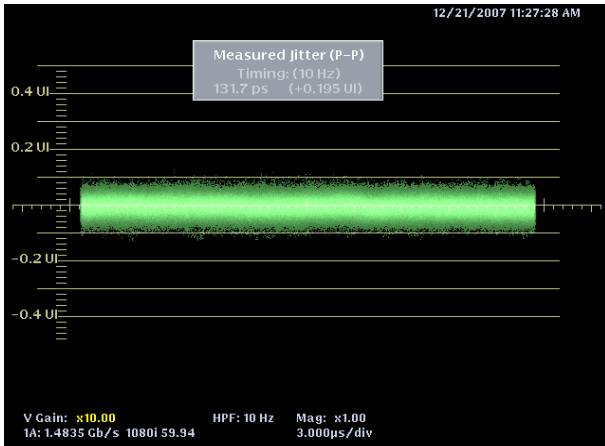


Test Configuration 3:



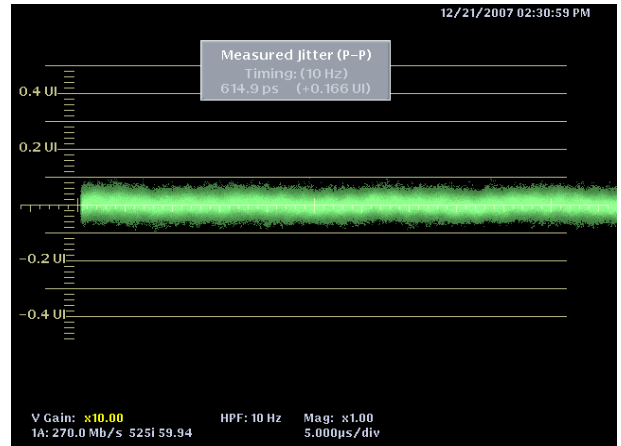
Pure Digital Fiberlink® 3150 Transmitter to a Pure Digital Fiberlink® 3151 Receiver

Timing Jitter at 1.485 Gbps



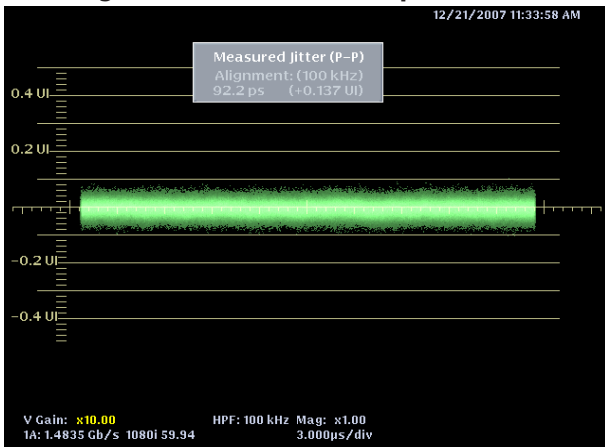
HD Timing Jitter uses a high pass filter of only 10 Hz. SMPTE spec allows for up to 1 U.I. of jitter. The 3150 link is typically less than 0.2 U.I. due to its use of reclocking circuits in both the transmitter and receiver.

Timing Jitter, 270 Mbps



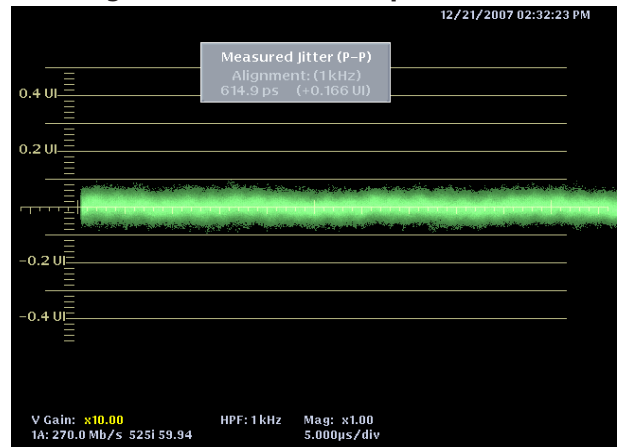
SD Timing Jitter uses a high pass filter of only 10 Hz. SMPTE spec allows for up to 0.2 U.I. of jitter. The 3150 link is typically less than 0.17 U.I.

Alignment Jitter at 1.485 Gbps



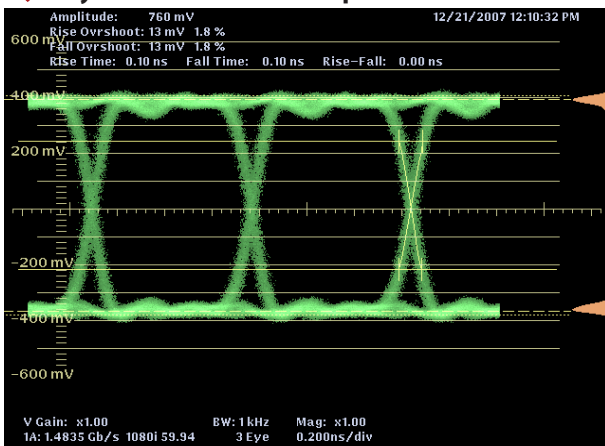
HD Alignment Jitter uses a high pass filter of 100 kHz. SMPTE spec allows for up to 0.2 U.I. of jitter. The 3150 link is typically less than 0.14 U.I.

Alignment Jitter at 270 Mbps



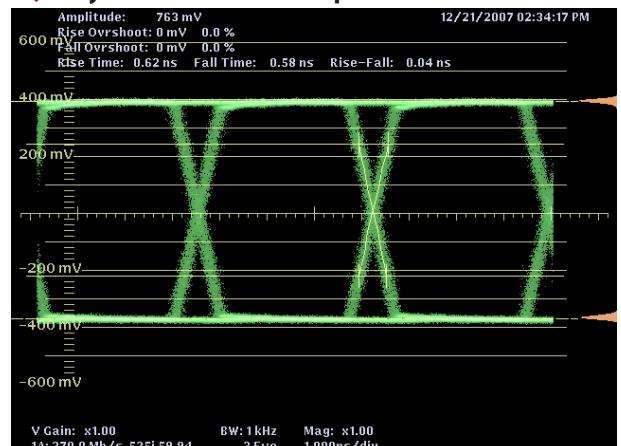
SD Alignment Jitter uses a high pass filter of 1 kHz. SMPTE spec allows for up to 0.2 U.I. of jitter. The 3150 link is typically less than 0.17 U.I.

Eye Pattern at 1.485 Gbps

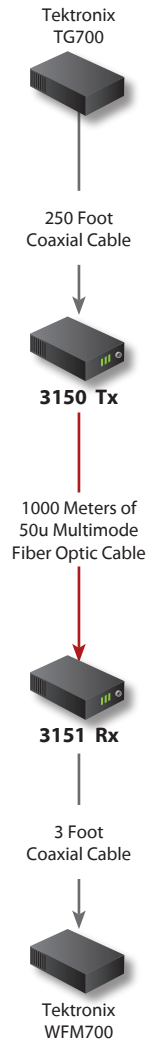


The eye pattern shows the proper rise/fall time for the HD signal. Overshoots due to reflections and poor impedance matching are almost non-existent and well within SMPTE spec.

Eye Pattern at 270 Mbps

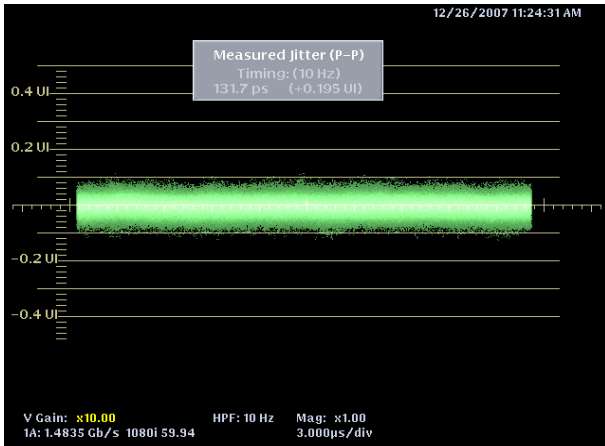


It is important that the rise/fall time of the SD signal be slower than that of the HD signal to prevent ringing when transmitted. Notice the change to the slower rise/fall time when an SD signal is present.



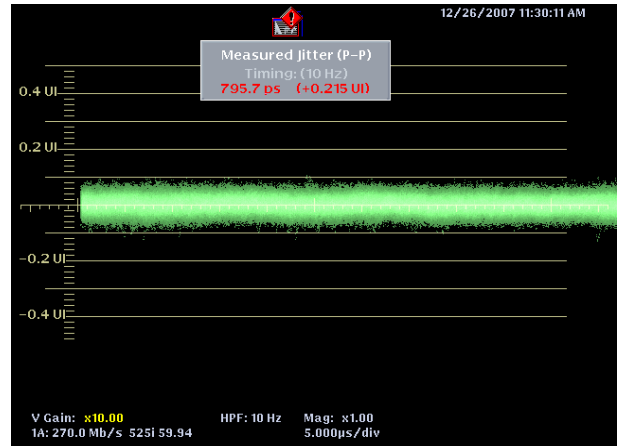
Competitor's Optical Transmitter to a Competitor's Optical Receiver

Timing Jitter at 1.485 Gbps



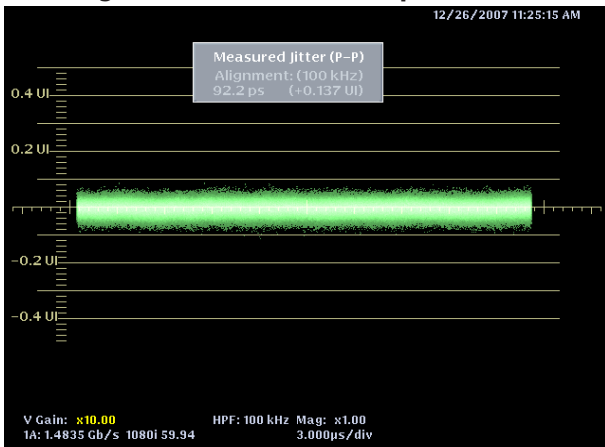
HD Timing Jitter is within spec on this competitor's link.

Timing Jitter, 270 Mbps



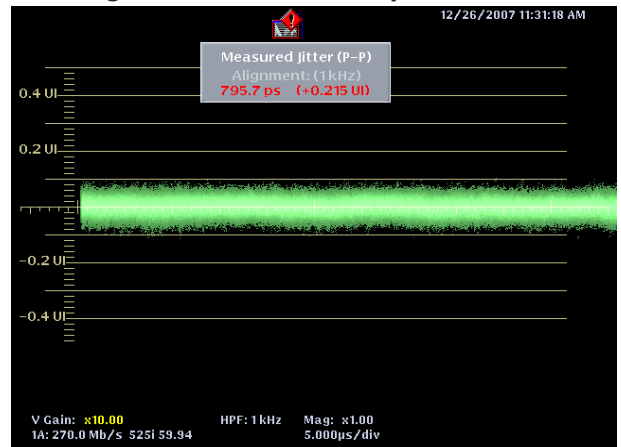
Notice that SD Timing Jitter has exceeded SMPTE spec.

Alignment Jitter at 1.485 Gbps



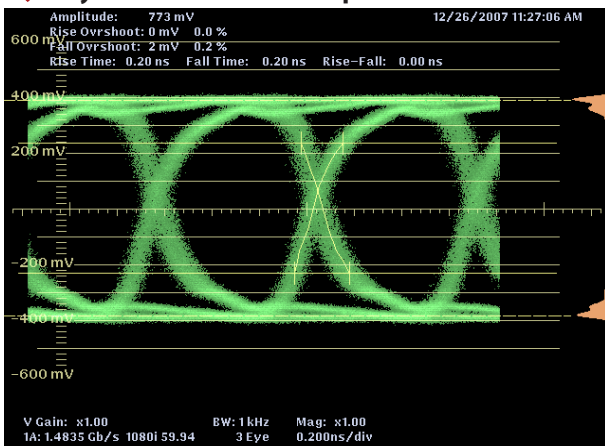
HD Alignment Jitter is within spec.

Alignment Jitter at 270 Mbps



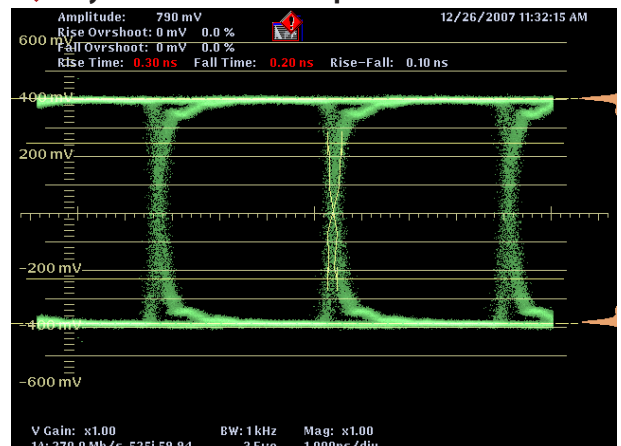
Notice that SD Alignment Jitter has exceeded SMPTE spec.

Eye Pattern at 1.485 Gbps

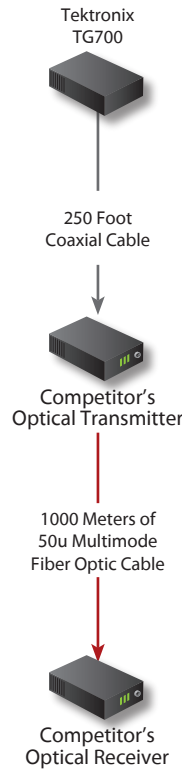


Notice the slower rise/fall time at the lowest and highest amplitudes at the receiver output.

Eye Pattern at 270 Mbps

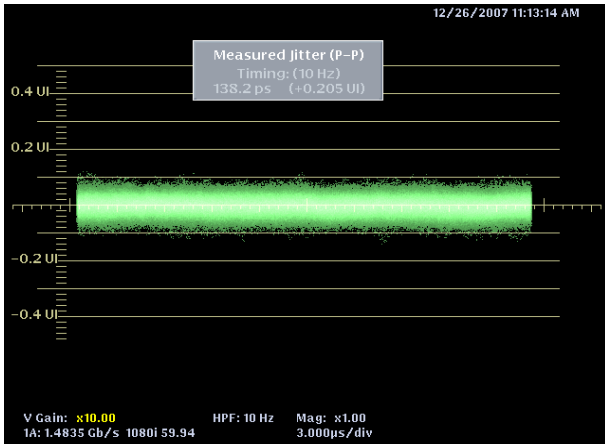


The SD rise/fall time does not change at the receiver output to the slower rate necessary for SD transmission and violates SMPTE spec as a result.



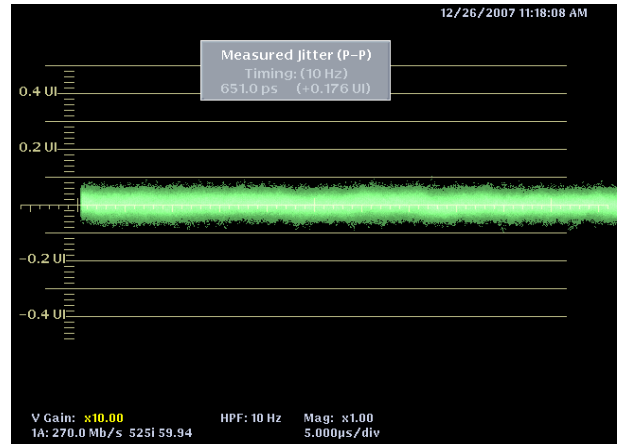
Pure Digital Fiberlink® 3150 Transmitter to a Competitor's Optical Receiver

Timing Jitter at 1.485 Gbps



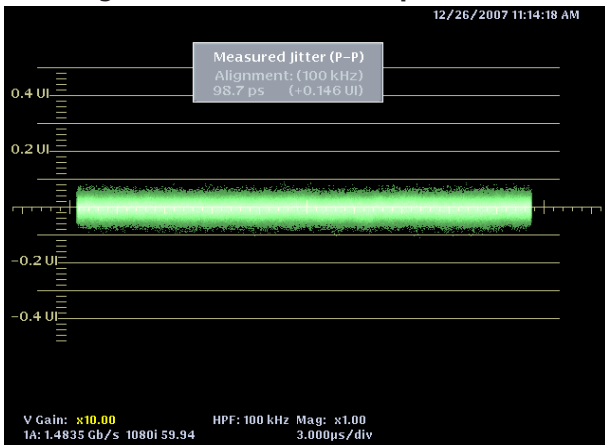
HD Timing Jitter is within spec when the 3150 Transmitter is used with a competitor's receiver.

Timing Jitter, 270 Mbps



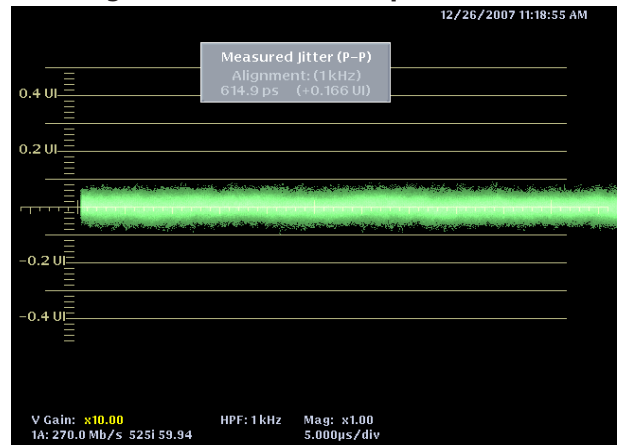
The use of a reclocker on the 3150 Transmitter insures SD Timing Jitter stays within SMPTE spec even with a competitor's receiver.

Alignment Jitter at 1.485 Gbps



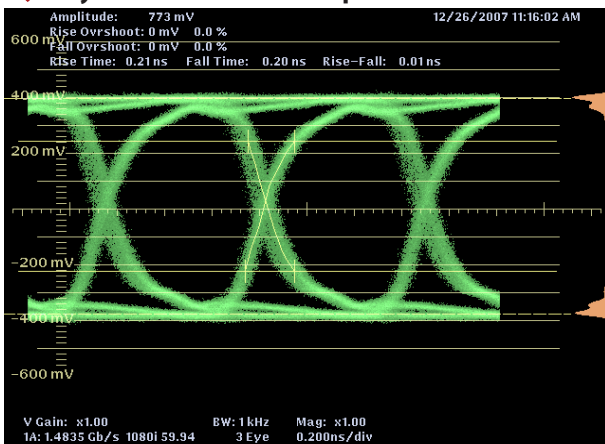
HD Alignment Jitter is within spec when the 3150 Transmitter is used with a competitor's receiver.

Alignment Jitter at 270 Mbps



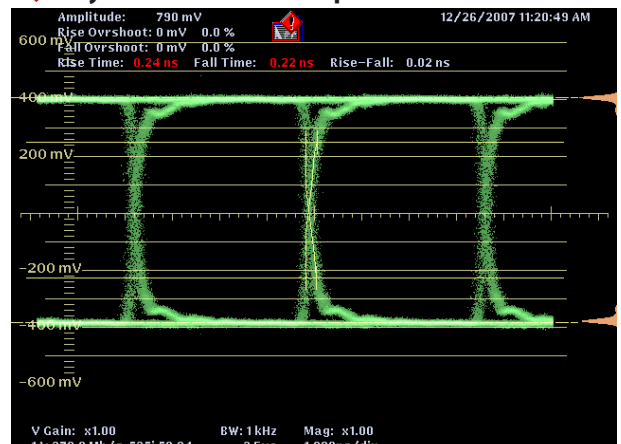
The use of a reclocker on the 3150 Transmitter insures SD Alignment Jitter stays within SMPTE spec even with a competitor's receiver.

Eye Pattern at 1.485 Gbps

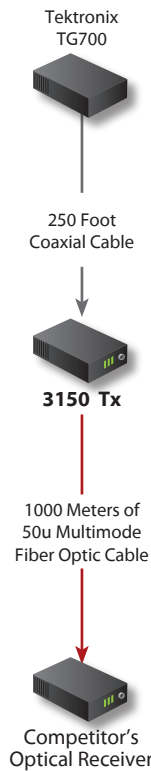


The slower rise/fall time at the lowest and highest amplitudes at the receiver output is still present on the competitor's receiver.

Eye Pattern at 270 Mbps



The SD rise/fall time does not change at the competitor's receiver output to the slower rate necessary for SD transmission and violates SMPTE spec as a result.





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CSI New York

3150 Series Performance Profile

Learn more about the revolutionary Pure Digital Fiberlink[®] 3150 Series online at commspecial.com/3150



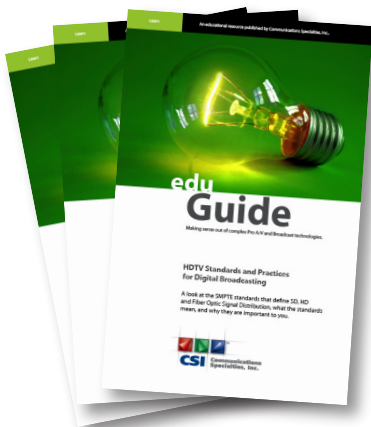
Learn more about our other HD-SDI products, such as the Scan Do[®] HD DVI to HD/SD-SDI Scan Converter.

Go online to commspecial.com/1297



Learn more about HD-SDI and other Broadcast Technologies with CSI's comprehensive series of eduGuides.

Available online at commspecial.com



Conclusions

As you can see, not all HD/SD-SDI fiber optic transmission systems are created for use in professional or broadcast environments. In fact, many of the products available fail to meet SMPTE specifications, or they meet these specifications only in the most optimal of test conditions, not in real-world, mission critical environments.

Engineers and end-users alike must carefully evaluate products in realistic, strenuous test environments. Only when the evaluation product is put to the test can an intelligent and informed decision be made.

Communications Specialties is proud of the products we design and manufacture. We encourage users to put our products to the test as well. We offer this with confidence because CSI has a long history of designing broadcast-quality fiber optic transmission systems.

If you would like to receive a demonstration of the Pure Digital Fiberlink[®] 3150 Series, or would like to learn more about Pure Digital Fiberlink[®], please contact us today.



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