

# Digital Video SFP

## Small Form-Factor Pluggable Transceiver

### Overview

Introducing the industry's first solution designed for the transmission of digital video component signals over fiber using standard optical transceivers. Compatible with any optical transport system – WDM platforms, digital cross-connects, etc. – the patent pending technology of the unidirectional digital video (DV) SFPs that opens a new world of cost-effective digital video deployment options.

- Link extension over new or existing fiber plant
- Wave Division Multiplexing (CWDM and DWDM)
- Link redundancy for mission critical applications
- Video distribution/multicasting

SMPT 259M (SDI), SMPT 292M (HD-SDI), and DVB ASI are the basic standards employed in the transport of serial component digital video data on single coaxial cable. Using coaxial cable between the signal source and destination limits the link range to 300 meters, or to 140 meters for high definition. This distance is generally adequate for intra-building or small campus networks.

However, the advent of geographically dispersed studio campuses requires more and more digital video data to travel across the sophisticated optical infrastructure of the metro and inter-metro network. Links of 100 kilometers or more and the use of WDM technology are increasingly common. Merging digital video traffic onto these optical transport networks is further complicated by the encoding methods for these protocols.

Digital video signaling includes a data scrambling algorithm for SDI and HD-SDI that is not easily transported over a standard optical transport system. This algorithm can produce a signal pattern that causes an error in standard optical systems. With a certain pattern in the video data, the scrambling algorithm can generate a pathological signal containing a series of up to 19 bits of the same polarity. These pathological patterns are not transportable over optical transport systems that employ "off the shelf" optical components. These components are generally designed to use an AC-balanced signal with a duty cycle of approximately 50%. That allows the optical transceiver to properly modulate the laser control loop (transmit side) and lock (PLL circuitry) its receiver.

Until now, the industry has addressed this problem by providing optical components specifically designed for use with the pathological signaling of digital video: typically DC-coupled optical transceivers. This approach requires customized transceivers for each combination of distance, wavelength, and fiber type (multi-mode or single-mode) used. Specialized solutions must also be built for WDM applications. Such designs are purely proprietary, and therefore tend to be expensive. Unfortunately, DC-coupled transceivers generally have up to 8 dB lower receive sensitivity than AC-coupled components, and they cannot be amplified in a DWDM application. This sensitivity loss reduces link range by as much as 35 kilometers.

In contrast to the situation with digital video specialty components, the optical Multi-Source Agreement (MSA) has led to a ready supply of inexpensive optical interfaces for most applications. However, the specific digital video solutions cannot use this huge selection of standard and affordable optical components. The general-purpose type of optical transport platform (multi-rate/multi-protocol transponder or repeater) simply cannot handle digital video.

### Product Overview



Digital Video SFP

The new digital video SFPs offer a direct and affordable solution to the problems of digital video optical transport. They allow the transport of SDI, HD-SDI, or DVB ASI component video signals over any optical transport system that employs MSA standard optical transceivers. The SFPxMRHSDI-RXR SFP is a unidirectional multi-rate coaxial receiver designed to support digital video signals as defined by the SDI and HD-SDI standards. It takes the digital video stream and generates a data signal that is compatible with any standard optical transport system. The signal is passed through the system to an MSA standard optical transceiver, and transports it over a fiber optic network.

At the end of the transmission link, the signal is received by another MSA standard transceiver and passed to the SFPxMRHSDI-TXR. The SFPxMRHSDI-TXR, in turn, processes the data signal and sends the resulting digital video stream to the receiving digital video device.

It has expanded its product base to include the main analog systems (NTSC and PAL) currently in use. The multi-rate digital video SFP supports both NTSC and PAL standards for standard definition high definition. The SFP-CXASI-xxR SFP is designed to support digital video signals as defined by the DVB-ASI standards.

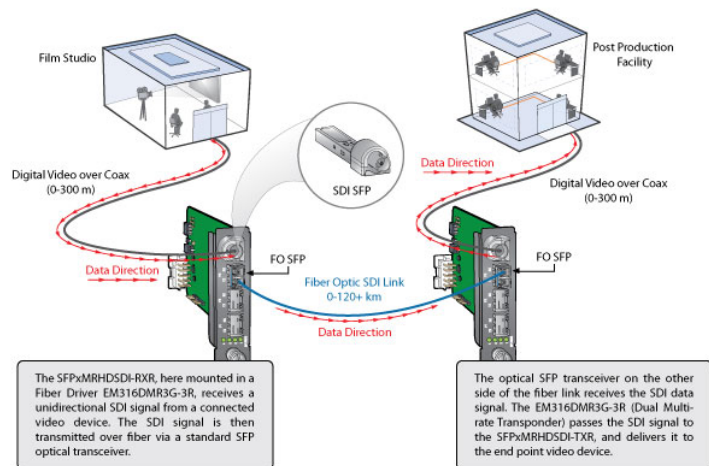
### Features

- Digital video signals over fiber optic links
- Multiple protocol support:
  - SMPTE 259M (270 Mbps)
  - SMPTE 259M (360 Mbps)
  - SMPTE 344M (540 Mbps)
  - SMPTE 292M/HDTV (1.485 Gbps and 1.485/1.001 Gbps)
  - DVB ASI (270 Mbps)
- Patent pending technology
- 75 ohm coaxial output
- Standard BNC connector
- Front panel LED support for signal lock and CRC/EDH error
- Plug-n-Play operation
- Optional device management
- SFPxMRHSDI-RXR (serial cable input) properties:
  - Automatic cable equalization up to 140 m of Belden 1694A at 1.485 Gbps and 1.485/1.001 Gbps and up to 350 m of Belden 694 A at 270 Mbps
  - Tolerates > 20 dB cable loss at half clock frequency
- SFP-CXASI-RXR (serial cable input) properties:
  - Automatic cable equalization up to 350 m of Belden 1694 A at 270 Mbps
  - Tolerates > 20 dB cable loss at half clock frequency
- MSA SFP interface compliance
- Compliance: RoHS, China RoHS, WEEE Directive

### Advantages

- Allows uncompressed digital video component signals to be transported over any standard optical transport system
- Allows the use of standard optical transceivers (MSA compliance)
- Enables digital video links to be created over fiber optic cabling to distances of 120 km or more

## Video Extension Over Fiber



General Specification	Transmitter	Receiver
<b>Coaxial Interface</b>		
Input/Output Connector	BNC (x1)	BNC (x1)
Impedance	75 ohms (output)	75 ohms (input)
Output Level	800mV	N/A
SFP Interface	Complies to SFP MSA standard	Complies to SFP MSA standard
<b>Performances</b>		
CRC/EDH Error Rate	Better than 10 <sup>-9</sup>	Better than 10 <sup>-9</sup>
CRC/EDH Alarm	Digital Diagnostics LED/SNMP trap status	Digital Diagnostics LED/SNMP trap status
<b>Status and Control Signals</b>		
RX LOS	N/A	Yes
TX Disable	Yes	N/A
Auto Cable Equalization Disable	N/A	Yes
<b>Temperature Range</b>		
Operating	0 to 50° C	0 to 50° C
Storage	-45 to 85° C	-45 to 85° C
<b>Power Consumption</b>		
	850 mA @ 3.3 V	850 mA @ 3.3 V

### Ordering Information

Model	Protocol	Data Rate	Connector	Impedance (Ohm)	Output (mV)	Max Coaxial Length (m) *
SFP-CXDV-TX27	Unidirectional Digital Video SDI SFP Transmitter	270 Mbps	BNC	75	800	-
SFP-CXDV-RX27	Unidirectional Digital Video SDI SFP Receiver	270 Mbps	BNC	75	-	350
SFP5MRHDSDI-TX	Unidirectional SDI/HD-SDI SFP Transmitter	270 Mbps/1.485 Gbps	BNC	75	800	-
SFP5MRHDSDI-RX	Unidirectional SDI/HD-SDI SFP Receiver	270 Mbps/1.485 Gbps	BNC	75	-	350@270 Mbps 140@1.485 Gbps
SFP3MRHDSDI-TX	Unidirectional SDI/HD-SDI SFP Transmitter	270 Mbps/1.485/1.001 Gbps	BNC	75	800	-
SFP3MRHDSDI-RX	Unidirectional SDI/HD-SDI SFP Receiver	270 Mbps/1.485/1.001 Gbps	BNC	75	-	300@270 Mbps 140@1.4835 Gbps
SFP-CXASI-TX	Unidirectional DVB-ASI SFP Transmitter	270 Mbps	BNC	75	800	-
SFP-CXASI-RX	Unidirectional DVB-ASI SFP Receiver	270 Mbps	BNC	75	-	350

\* Distance may vary based on properties of the transponder

Source: Product Datasheet from MRV Manufacturer

### About Cell Technology

Cell Technology headquartered at Hong Kong SAR, a network & security technology provider specializes in design, develop and deliver innovative and intelligent IP packet processing platform into software and hardware appliances. Cell product solutions including Cell IPS, UTM, CMC, Janus, TMS, NetsVision and NetsAccess address the business needs that optimize the IP network performance, secure the network security and resiliency, and manage the quality of IP services. For more information, please visit [www.cell-technology.net](http://www.cell-technology.net).