

## Digital Video SFPs



### Features

- Digital video signals over fiber optic links
- Wide protocol support with 143 Mbps to 1.485 Gbps data rates
- HD-SDI
  - SMPTE 292M (1.4835 Gbps NTSC, 1.485 Gbps PAL/SECAM)
- SDI
  - SMPTE 259M (143/270/360 Mbps)
  - SMPTE 344M (540 Mbps)
- DVB ASI (270 Mbps)
- 75 Ohm coaxial input/output with standard BNC connector
- Front panel LED support for signal lock and CRC/EDH error
- Plug-n-Play operation
- SFP MSA (as applicable)

### Advantages

- Enables uncompressed digital video component signal transport over any standard optical transport system
- Supports standard, MSA compliant optical transceivers
- Supports digital video links over fiber optic cabling to distances of 120 km or more

### Overview

MRV's digital video SFPs are the industry's first solution designed to affordably transmit digital video component signals over fiber using standard optical transceivers. Compatible with any optical transport system – WDM platforms, digital cross-connects, etc. – these unidirectional digital video SFPs open 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
- ... and more!

SDI, HD-SDI, and DVB 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 350 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.

## Datasheet

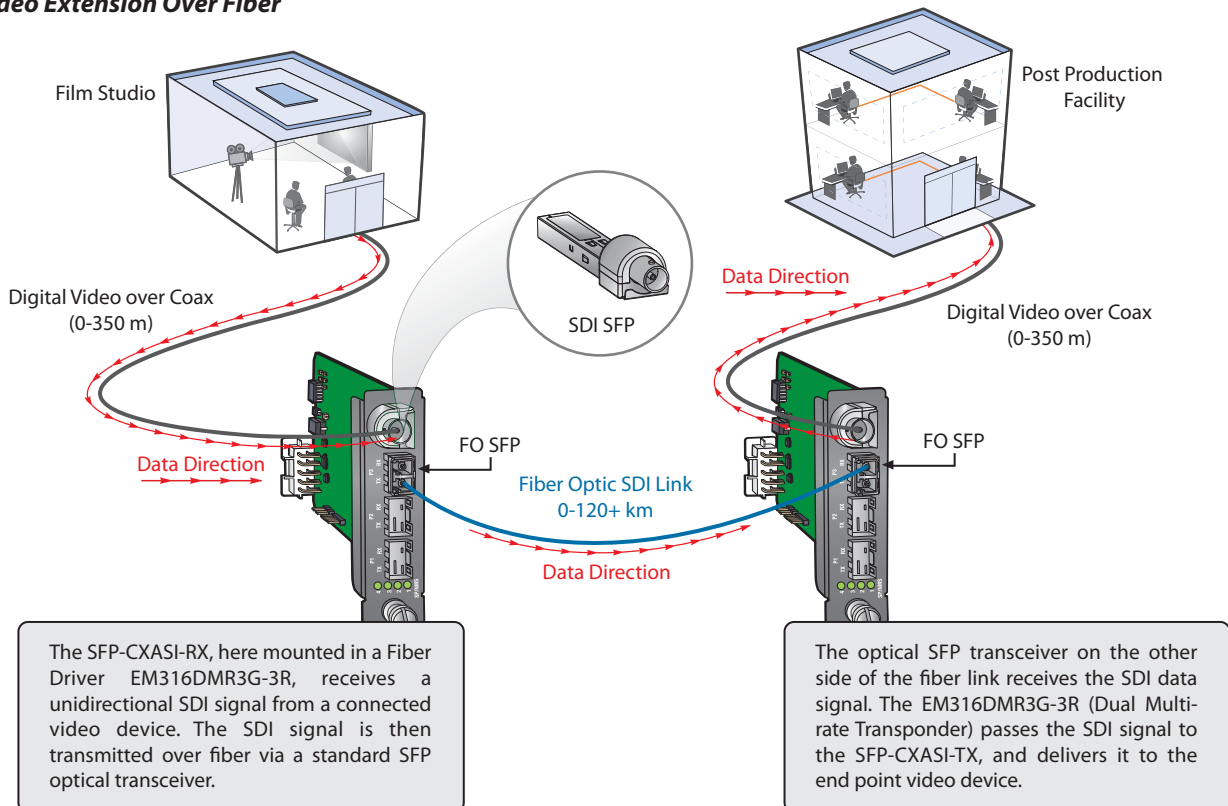
Digital video signaling includes a data scrambling algorithm for SDI and HD-SDI that is not easily transported over a standard optical transport system. This algorithm can produce a signal pattern that causes an error in standard optical systems. With a certain pattern in the video data, the scrambling 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.

### Video Extension Over Fiber



## Datasheet

### HD-SDI:

The new MRV 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.

The HDSDI products support main video systems (NTSC and PAL) currently in use. The multi-rate digital video SFP supports either NTSC or PAL standards for standard definition and high definition.

### CXDV:

The CXDV SFPs support SD digital video at 270 Mbps, but they do not support 1.5 Gbps.

### CXASI:

The SFP-CXASI-xxR SFP is designed to support digital video signals that do not contain pathological patterns.

Contact your nearest authorized MRV representative and visit our website at [www.mrv.com](http://www.mrv.com) for more information on the complete line of MRV solutions, including pricing and availability.

| General Specifications             | Transmitter   | Receiver                                 |
|------------------------------------|---|--|
| <b>Coaxial Interface:</b>          |   |  |
| Input/Output Connector             | BNC (x1)  | BNC (x1)                                 |
| Impedance                          | 75 Ohms (output)  | 75 Ohms (input)                          |
| Output Level                       | 800 mV  | N/A                                      |
| SFP Interface                      | Complies to SFP MSA standard  | Complies to SFP MSA standard             |
| <b>Performance:</b>                |   |  |
| CRC/EDH Error Rate                 | Better than 10 <sup>-9</sup>  | Better than 10 <sup>-9</sup>             |
| CRC/EDH Alarm <sup>1</sup>         | 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   | Yes                                      |
| <b>Temperature Range:</b>          |   |  |
| Operating                          | -5 to 50° C   | -5 to 50° C                              |
| Storage                            | -40 to 85° C  | -40 to 85° C                             |
| <b>Power Consumption:</b>          | 850 mA @ 3.3 V  | 850 mA @ 3.3 V                           |
| <b>Agency Compliance:</b>          | FCC Part 15, EMC Directive, WEEE Directive, RoHS, China RoHS, SFP MSA (as applicable) |  |

<sup>1</sup> Not available in CXASI models

## Datasheet

### SFPxMRHDSI-RX serial cable input properties:

Automatic cable equalization

- up to 140 m of Belden 1694A at 1.485 Gbps and 1.485/1.001 Gbps
- up to 350 m of Belden 694 A at 270 Mbps

Tolerates > 20 dB cable loss at half clock frequency

### SFP-CXASI-RX and SFP-CXDV-RX27 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

| Other Specifications                       | SFP5MRHDSI (TX and RX)   | SFP3MRHDSI (TX and RX)   | SFP-CXDV (TX and RX)     | SFP-CXASI (TX and RX)    |
|--|--|--|--------------------------|--------------------------|
| <b>Standards</b>                           | SMPTE 259 M (270 Mbps) and SMPTE 292 M (1.485 Gbps)  | SMPTE 259 M (270 Mbps) and SMPTE 292 M (1.485/1.001 Gbps)  | DVB ASI (270 Mbps)       | DVB ASI (270 Mbps)       |
| <b>Supported Frame &amp; Refresh Rates</b> | 720 x 486i<br>720 x 576i<br>1280 x 720p (60hz)<br>1920 x 1035i (60hz)<br>1920 x 1080sF (24hz)<br>1920 x 1080p (24hz)<br>1920 x 1080i (50hz)<br>1920 x 1080p (25hz)<br>1920 x 1080i (60hz)<br>1920 x 1080p (30hz) | 720 x 486i<br>720 x 576i<br>1280 x 720p (59.94hz)<br>1920 x 1035i (59.94hz)<br>1920 x 1080sF (23.98hz)<br>1920 x 1080p (23.98hz)<br>1920 x 1080i (59.94hz)<br>1920 x 1080p (29.97hz) | 720 x 486i<br>720 x 576i | 720 x 486i<br>720 x 576i |

The HDSI SFPs are designed to pass SMPTE-compliant digital streams, both standard and high-definition, with no errors. Non-compliant streams with serious TRS errors may cause momentary dropouts in the video picture.

**Datasheet**
**Ordering Information (use in pairs as shown)**

| Model                | Function/<br>Protocol  | Supported<br>Data Rate        | Connector | Impedance<br>(Ohms) | Output Level<br>(mV) | Max. Coaxial<br>Cable<br>Length (m) <sup>2</sup> |
|----------------------|--|-------------------------------|-----------|---------------------|----------------------|--|
| <b>SFP5MRHSDI-TX</b> | Unidirectional SDI/<br>HD-SDI SFP Transmitter<br>(PAL/SECAM) | 270 Mbps/1.485<br>Gbps        | BNC       | 75                  | 800                  | -  |
| <b>SFP5MRHSDI-RX</b> | Unidirectional SDI/<br>HD-SDI SFP Receiver<br>(PAL/SECAM)    | 270 Mbps/1.485<br>Gbps        | BNC       | 75                  | -                    | 300 @270 Mbps<br>140 @1.485 Gbps                 |
| <b>SFP3MRHSDI-TX</b> | Unidirectional SDI/<br>HD-SDI SFP Transmitter<br>(NTSC)      | 270 Mbps/<br>1.485/1.001 Gbps | BNC       | 75                  | 800                  | -  |
| <b>SFP3MRHSDI-RX</b> | Unidirectional SDI/<br>HD-SDI SFP Receiver<br>(NTSC)         | 270 Mbps/<br>1.485/1.001 Gbps | BNC       | 75                  | -                    | 300 @270 Mbps<br>140 @1.4835 Gbps                |
| <b>SFP-CXDV-TX27</b> | Unidirectional Digital<br>Video SDI SFP Transmitter          | 270 Mbps                      | BNC       | 75                  | 800                  | -  |
| <b>SFP-CXDV-RX27</b> | Unidirectional Digital<br>Video SDI SFP Receiver             | 270 Mbps                      | BNC       | 75                  | -                    | 350  |
| <b>SFP-CXASI-TX</b>  | Unidirectional DVB-ASI<br>SFP Transmitter                    | 270 Mbps                      | BNC       | 75                  | 800                  | -  |
| <b>SFP-CXASI-RX</b>  | Unidirectional DVB-ASI<br>SFP Receiver                       | 270 Mbps                      | BNC       | 75                  | -                    | 350  |

**AVAILABLE BY SPECIAL ORDER**
**Ordering Information (use in pairs as shown)**

| Model                  | Function/<br>Protocol                               | Supported<br>Data Rate | Connector | Impedance<br>(Ohms) | Output Level<br>(mV) | Max. Coaxial<br>Cable<br>Length (m) <sup>2</sup> |
|------------------------|---|------------------------|-----------|---------------------|----------------------|--|
| <b>SFP-3654-SDI-TX</b> | Unidirectional Digital Video<br>SDI SFP Transmitter | 360/540 Mbps           | BNC       | 75                  | 800                  | -  |
| <b>SFP-3654-SDI-RX</b> | Unidirectional Digital Video<br>SDI SFP Receiver    | 360/540 Mbps           | BNC       | 75                  | -                    | 275 @360 Mbps<br>200 @540 Mbps                   |

<sup>2</sup> Distances may vary based on properties of the transponder.

MRV has more than 50 offices throughout the world. Addresses, phone numbers and fax numbers are listed at [www.mrv.com](http://www.mrv.com).  
Please e-mail us at [sales@mrv.com](mailto:sales@mrv.com) or call us for assistance.

MRV Los Angeles  
20415 Nordhoff St.  
Chatsworth, CA 91311  
800-338-5316  
818-773-0900

MRV Boston  
295 Foster St.  
Littleton, MA 01460  
800-338-5316  
978-952-4700

MRV International  
Business Park Moerfelden  
Waldeckerstrasse 13  
64546 Moerfelden-Walldorf  
Germany  
Tel. (49) 6105/2070  
Fax (49) 6105/207-100

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