Digital Video SFPs

Highlights

- Digital video signals over fiber optic links (Patented)
- Wide video SFP selection covering data rates from 143 Mbps to 1.485 Gbps
- 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
- Support for signal lock and CRC/EDH errors
- 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 designed to affordably transmit digital video component signals over fiber using standard optical transceivers. Compatible with any optical transport system – WDM platforms, optical/electrical cross-connects, etc. – these unidirectional digital video SFPs open a new world of cost-effective digital video deployment options including:

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

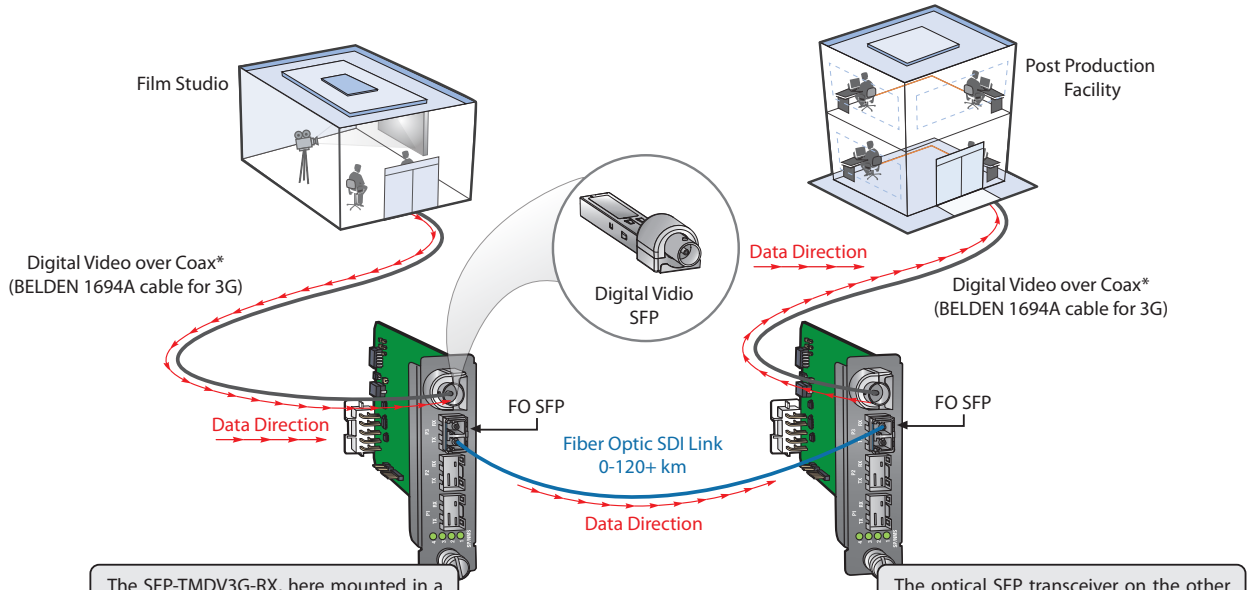
SDI, HD-SDI, and DVB are the basic standards used to transport serial component digital video data on single coaxial cable. Coaxial cable limits the link range to 350 meters between the signal source and destination for standard definition video, or to 140 meters for high definition. This distance is generally adequate for intra-building or small campus networks.

However, the advent of geographically dispersed studio campuses requires more 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. MRV's digital video SFPs easily merge digital video traffic onto these optical transport networks.

The MRV SFP-TMDV modules are designed to carry most generic digital video signals, which inherently have a duty cycle of approximately 50%. Long strings of repeating 0s or 1s in a signal cause the duty cycle to range far from 50%. These pathological digital video patterns that stress fiber optic transceivers require additional processing before transmission through a standard optical transceiver. However, the SFP3MRHDSDI and SFP5MRHDSDI digital video SFP families from MRV handle these pathological signals in a standard host module without extra processing.

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 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.



The SFP-TMDV3G-RX, here mounted in a Fiber Driver EM316DMR3G-3R, receives a unidirectional SDI signal from a connected video device. The SDI signal is then transmitted over fiber via a standard SFP optical transceiver.

The optical SFP transceiver on the other side of the fiber link receives the SDI data signal. The EM316DMR3G-3R (Dual Multi-rate Transponder) passes the SDI signal to the SFP-TMDV3G-TX, and delivers it to the end point video device.

* Coax	
Protocol	**Length**
SD (270 Mbps)	350 m
HD (1.485 Gbps)	140 m
3G (2.97 Gbps)	100 m

HD-SDI:
The new MRV digital video SFPs offer a direct and affordable solution to the problems of digital video optical transport including pathological signals. 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 SFPxMRHDSDI-RX 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 SFPxMRHDSDI-TX.

The SFPxMRHDSDI-TX, 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 pathological signals.

TMDV:
The SFP-TMDV-xx SFPs support any digital video signal from 143 Mbps to 1.485 Gbps that does not contain pathological patterns.

CXASI:
The SFP-CXASI-xx SFPs support DVB-ASI at 270 Mbps, as well as transparently signals up to HD-SDI 1.485G, as long as they do not contain pathological signals.

General Specifications	Transmitter	Receiver
Coaxial Interface:		
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
Performance:		
CRC/EDH Error Rate	Better than 10^{-9}	Better than 10^{-9}
CRC/EDH Alarm[1]	Digital Diagnostics LED/SNMP trap status	Digital Diagnostics LED/SNMP trap status
Status and Control Signals:		
RX LOS	N/A	Yes
TX Disable	Yes	Yes
Temperature Range:		
Operating Case Temperature	-5 to 70º C	-5 to 70º C
Storage Temperature	-40 to 85º C	-40 to 85º C
Power Consumption:	850 mA @ 3.3 V	850 mA @ 3.3 V

[1] Not available in TMDV models

SFPxMRHDSDI-RX and SFP-TMDV-RX serial cable input properties:

Automatic cable equalization
- up to 140 m of Belden 1694 A at 1.485 Gbps and 1.485/1.001 Gbps
- up to 350 m of Belden 1694 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	SFP5MRHDSDI (TX and RX)	SFP3MRHDSDI (TX and RX)	SFP-CXDV (TX and RX)	SFP-TMDV (TX and RX)	SFP-CXASI (TX and RX)
Standards	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)	Transparent (143 Mbps-1.485 Gbps)	DVB ASI (270 Mbps) Transparent (143 Mbps-1.485 Gbps)
Supported Frame & Refresh Rates	720 x 486i 720 x 576i 1280 x 720p (60hz) 1920 x 1035i (60hz) 1920 x 1080sF (24hz) 1920 x 1080p (24hz) 1920 x 1080i (50hz) 1920 x 1080p (25hz) 1920 x 1080i (60hz) 1920 x 1080p (30hz)	720 x 486i 720 x 576i 1280 x 720p (59.94hz) 1920 x 1035i (59.94hz) 1920 x 1080sF (23.98hz) 1920 x 1080p (23.98hz) 1920 x 1080i (59.94hz) 1920 x 1080p (29.97hz)	720 x 486i 720 x 576i	Any framed refresh rate	N/A

The HDSDI 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.

AVAILABLE BY SPECIAL ORDER

Ordering Information (use in pairs as shown)

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

* Distances may vary based on properties of the transponder.

Datasheet

Ordering Information (use in pairs as shown)

Model	Function/ Protocol	Supported Data Rate	Connector	Impedance (Ohms)	Output Level (mV)	Max. Coaxial Cable Length (m) *
SFP5MRHDSDI-TX	Unidirectional SDI/HD-SDI SFP **Transmitter** (PAL/SECAM)	270 Mbps/ 1.485 Gbps	BNC	75	800	300 @ 270 Mbps 140 @ 1.485 Gbps
SFP5MRHDSDI-RX	Unidirectional SDI/HD-SDI SFP **Receiver** (PAL/SECAM)				-	
SFP3MRHDSDI-TX	Unidirectional SDI/HD-SDI SFP **Transmitter** (NTSC)	270 Mbps/ 1.485/1.001 Gbps	BNC	75	800	300 @ 270 Mbps 140 @ 1.4835 Gbps
SFP3MRHDSDI-RX	Unidirectional SDI/HD-SDI SFP **Receiver** (NTSC)				-	
SFP-CXDV-TX27	Unidirectional Digital Video SDI SFP **Transmitter**	270 Mbps	BNC	75	800	350
SFP-CXDV-RX27	Unidirectional Digital Video SDI SFP **Receiver**				-	
SFP-TMDV-TX	Unidirectional digital video SFP **Transmitter**	143 Mbps to 1.485 Gbps	BNC	75	800	350 @ 270Mbps 140 @ 1.485Gbps
SFP-TMDV-RX	Unidirectional digital video SFP **Receiver**				-	
SFP-CXASI-TX	Unidirectional DVB-ASI SFP **Transmitter**	143 Mbps to 1.485 Gbps	BNC	75	800	350 @ 270Mbps 140 @ 1.485Gbps
SFP-CXASI-RX	Unidirectional DVB-ASI SFP **Receiver**				-	

* Distances may vary based on properties of the transponder.

Regulatory and Industry Compliances

RoHS Directive; China RoHS; California RoHS Law, REACH Directive SVHC; WEEE Directive

The Quality Management System is certified to ISO 9001 by QMI-SAI Global

The Environmental Management System is in compliance with ISO 14001

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

MRV has more than 50 offices throughout the world. Addresses, phone numbers and fax numbers are listed at www.mrv.com. Please e-mail us at **info@mrv.com** or call us for assistance.

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