

# DATA SHEET

## Fiber Optic Digital Extension Modules in 19" 1RU Frame for Indoor Broadcast

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#### **OPTICIS HQ**

Opticis Co., Ltd.

# 16Fl, Kins Tower Jeongja 331,

8 Sungnam-daero, Bundang-gu

Sungnam-si, Gyunggi-do, 463-782

South Korea

Te l: +82 (31) 719-8033

Fax: +82 (31) 719-8032

[www.opticis.com](http://www.opticis.com)

## 19" 1RU Frame & Fiber Optic Extenders

### Description

OPTICIS 19" 1RU frame is a modular and systematic fiber-optic solution providing a variety of optical extenders with the flexibility to convert and transport multi-rate SDI formats such as 3G-SDI(SMPTE-424M), HD-SDI(SMPTE-292M), SD-SDI by 8-channel of CWDM, AES-3id audio compatible with SMPTE 276 and Dolby-E, RS-232/422 and 100Base Ethernet signals over 20km.

All extenders and dual power supply modules are hot-swappable to allow system maintenance without any disruption or disconnection. Each of the various extenders are also available in a compact stand-alone type to be incorporated into any broadcast workflow from small studio and OB vans to master control room.

BR-100 can deploy 1 slot sized extender up to 16 slots and indicates the status of mounted extenders in front panel by LED; LD(Slot ID), PD status, Power and FAN alarm. Dual AC power can be changed by removing the front panel, without cutting off the power to the system. Redundant power is included.

The adaptable modules are consisted of five (5) parts as follows;

- 1) One transmitter converting digital video signal to optical multi-rate SDI formats including 3G-SDI (SMPTE-424M), HD-SDI (SMPTE-292M), SD-SDI (SMPTE-259M) and DVI-ASI by 8-channel of CWDM with an equalizer: **VT-1xx** (1 slot taken)  
One receiver converting optical signals to digital video signals including Clock and Data Recovery: **VR-100** (1 slot taken)
- 2) One transmitter converting digital audio signal to optical 8-channel of AES-3id signals by CWDM: **AT-1xx** (5 slots taken)  
One receiver converting optical signals to digital audio signals: **AR-100** (5 slots taken)
- 3) One transmitter sending digital RS-232 or 422 signals to receiver: **DX-1** (3 slots taken)  
One receiver getting digital RS-232 or 422 signals from transmitter: **DX-2** (3 slots taken)
- 4) One transmitter sending Ethernet signal(100Base) to receiver: **EX-1** (2 slots taken)  
One receiver getting Ethernet signal from transmitter: **EX-2** (2 slots taken)
- 5) One multiplexer/de-multiplexer 8-different wavelength fiber-optic inputs into 1-fiber and also divides combined signal into 8-different wavelength outputs.

(where XX refers to wavelength of transmitter: 1330, 1350, 1370, 1430, 1450, 1470, 1490 and 1510.)

The package includes as follows;

- 19" 1RU frame, BR-100
- AC power cord
- User manual
- Individual packing for each module with DC 5V adaptor

## **Features**

- ◆ Adopts up to 16 optical extenders.
- ◆ Each of the various extenders is also available in a compact stand-alone type.
- ◆ Supports redundant power for Hot swapping & Load sharing.
- ◆ Wide wavelength operation from 1330nm to 1510nm.
- ◆ Transmits signals over 20km by single-mode cable.
- ◆ Status LEDs for signal monitoring.

## **Applications**

- ◆ Incorporation of broadcast workflow from Small/Sub studio and OB Vans including remote/ENG/EFP and pre/post-production to Main studio or Master Control Room.
- ◆ Fiber optic applications with free-interference using 3G-SDI signals including medical, military, government and security purposes.

## Technical Specifications

Specifications and designs are subject to change without notice.

### Power Supply Unit

#### - General Specifications

Product	Name		Power supply frame
	Model		BR-100
Front Panel Size	19" 1RU, Standard EIA Panel		
VT-1xx and VR-100 Module installation	Quantity		Up to 16 VT-1xx and/or VR-100 modules
	Hot Swap		Support hot swap of VT-1xx/VR-100 modules
LED indicator	1 <sup>st</sup> column	ID: Indicate the existence of Transmitter	
	2 <sup>nd</sup> column	SD: Indicate the existence of Receiver	
	3 <sup>rd</sup> column	Status: Indicate the status of Transmitter, Receiver and Transceiver (For more detail, refer to appendix in user manual)	
	Power	Power ON/OFF	
	FAN	Cooling FAN Alarm	
Dual AC Power	Dual redundant AC power is included.		
Power supply	Input power range	95-240VAC 50-60Hz	
Operation Temperature	0 ~ 50 °C		
Operation Humidity	10~85%RH		
Storage Temperature	-30~70 °C		
Storage Humidity	10~95%RH		
Dimensions (WDH)	430mm x 370mm x 44mm		
Weight	5.1Kg (including 2 AC power supplies and no modules)		

### VIDEO INPUT/OUTPUT

#### - General Specifications

#### Transmitter (E-to-O converter)/Receiver module (O-to-E converter): VT-1xx/VR-100

Product		Electric/Optical Unit	Optical/Electric Unit
Model		VT-1xx	VR-100
Transmission bandwidth	SMPTE Standard	259M, 292M, 424M	
	3G-SDI	2.97Gbps (SMPTE 424M)	
	HD-SDI	1.485Gbps (SMPTE 292M)	
	SD-SDI	270Mbps (SMPTE 259M)	
	DVB Standard		
	DVB-ASI	270Mbps (Reclocked)	
Hot Swap		Hot swappable with Opticis power supply unit, BR-100	
LED indicator		Power	Red

	Status	Green (LD: Video transmitting, SD: Signal detect)
Operation Temperature	T <sub>op</sub>	0 ~ 50°C
Storage Temperature	T <sub>sto</sub>	-30 ~ 70°C
Operation Humidity	RH <sub>sto</sub>	5 ~ 85%RH

**- Operating Conditions**

	Parameter	Symbol	Minimum	Typical	Maximum	Units
Power Supply	Supply Voltage	V <sub>CC</sub>	4.5	5.0	5.5	V
	Transmitter Supply Current	I <sub>TCC</sub>	-		400	mA
	Receiver Supply Current	I <sub>RCC</sub>	-		400	mA
	Transmitter Power Dissipation	P <sub>TX</sub>	-		2	W
	Receiver Power Dissipation	P <sub>RX</sub>	-		2	W
	Power Supply Rejection (Note1)	PSR	-	50	-	mV <sub>p-p</sub>
Electrical Link	Input Signal		SMPTE 424M/292M/259M			mV <sub>p-p</sub>
	Input Impedance	Z <sub>IN</sub>	-	75	-	Ω
	Input Signal Level		720	800	880	mV <sub>p-p</sub>
	Return Loss		10		-	dB
	Propagation Delay		-		1.5	ns
	Data rate		-		3	Gbps
	Cable Equalization		-		100	
	Alignment Jitter	SMPTE424M	-	0.2	-	UI
		SMPTE292M	--	0.1	-	UI
	Timing Jitter	SMPTE424M	-	0.2	-	UI
SMPTE292M		-	0.2	-	UI	
Optical Link	Output Optical Power	P <sub>o</sub>	-	0	-	dBm
	Wavelength	λ	1330,1350,1370,1430 1450,1470,1490,1510			nm
	Spectral width in RMS	Δλ	-		0.32	nm
	Extinction Ratio	Ext	-		5	dB
	Rising Time (Note2)	T <sub>rise</sub>	-		140	ps
	Falling Time (Note2)	T <sub>fall</sub>	-		150	ps
	Jitter in p-p value	T <sub>jitter</sub>	-		80	ps

Note1. Tested with a 50mV<sub>p-p</sub> sinusoidal signal in the frequency range from 500 Hz to 500 MHz on the V<sub>CC</sub> supply with the recommended power supply filter in place. Typically less than a 0.25 dB change in sensitivity is experienced.

Note2. 20% - 80%; Measured unfiltered @ 3Gbps

**AUDIO INPUT/OUTPUT**

**- General Specifications**

**Transmitter (E-to-O converter)/Receiver module (O-to-E converter): AT-1xx/AR-100**

Product	Electric/Optical Unit	Optical/Electric Unit
Model	AT-1xx	AR-100
Standard	AES-3id-2001	
Compatibility Standard	SMPTE276 / Dolby-E	
AES Standard	32kbps,44kbps, 48kbps	
Transmission bandwidth	400Mhz	
Hot Swap	Hot swappable with Opticis power supply unit, BR-100	

LED indicator	Power	Red
	Status	Green (ST: Normal status, SD: Signal detect, Ch1~8:Audio input output status)
Operation Temperature	0~50℃	
Storage Temperature	-30~70℃	
Operation Humidity	10~85%	

- **Operating Conditions**

	Parameter	Symbol	Minimum	Typical	Maximum	Units
Power Supply	Supply Voltage	V <sub>CC</sub>	4.75	5	5.25	V
	Transmitter Supply Current	I <sub>TCC</sub>	-		300	mA
	Receiver Supply Current	I <sub>RCC</sub>	-		250	
	Transmitter Power Dissipation	P <sub>TX</sub>	-		1.5	W
	Receiver Power Dissipation	P <sub>RX</sub>	-		1.25	
	Power Supply Rejection (Note1)	PSR	-	50	-	mV <sub>p-p</sub>
Electrical Link	Input Signal	AES-3id-2001/ SMPTE276/ Dolby-E				
	Input Impedance	Z <sub>IN</sub>	-	75	-	Ω
	Input Signal Level		-	1	-	V <sub>p-p</sub>
	Output Signal Level		-	1	-	V <sub>p-p</sub>
	Sampling Rate		-		50	KHz
	Number of Channels		8			
	Connector		BNC			
	Return Loss		-20			dB
	Data rate				0.05	Gbps
Optical Link	Output Optical Power	P <sub>o</sub>	-9			dBm
	Wavelength	λ	1330,1350,1370,1430 1450,1470,1490,1510			nm
	Spectral width in RMS	Δλ	-		1	nm
	Power Budget		20			dB
	Fiber Type		Single Mode			
	Connector		SC			
	Extinction Ratio	Ext	12			dB
	Rising Time (Note2)	T <sub>rise</sub>	-		150	ps
	Falling Time (Note2)	T <sub>fall</sub>	-		150	ps
Jitter in p-p value	T <sub>jitter</sub>	-		800	ps	

**SERIAL DATA INPUT/OUTPUT**

- **General Specifications**

**Transceiver module of RS-422/232: DX-1/DX-2**

Product	Transceiver (1310nm FP-LD, 1550nm PD)	Transceiver (1550nm FP-LD, 1310nm PD)
Model	DX-1	DX-2
Standard	TIA-422 / SMPTE207M	
Transmission bandwidth	200MHZ	
Baud rate(RS232)	115200bps	
Baud rate(RS422)	10Mbps	

Hot Swap	Hot swappable with Opticis power supply unit, BR-100	
LED indicator	Power	Red
	Status	Green (SD: Signal detect, TxD: Data out, RxD: Data in)
Operation Temperature	10~85%RH	
Storage Temperature	-30~70℃	
Operation Humidity	10~85%RH	

**- Operating Conditions**

	Parameter	Symbol	Minimum	Typical	Maximum	Units
Power Supply	Supply Voltage	V <sub>CC</sub>	4.75	5	5.25	V
	Transmitter Supply Current	I <sub>TCC</sub>	-		350	mA
	Receiver Supply Current	I <sub>RCC</sub>	-		350	
	Transmitter Power Dissipation	P <sub>TX</sub>	-		1.75	W
	Receiver Power Dissipation	P <sub>RX</sub>	-		1.75	
Electrical Link	Input Signal	TIA-422 / SMPTE207M				
	Input Impedance	Z <sub>IN</sub>	-	75	-	Ω
	Input Signal Level		-		± 13	V <sub>p-p</sub>
	Data rate		-		10	Mbps
	Bit Error Rate		-		1/10 <sup>9</sup>	
	Number of Channels	1				
Optical Link	Connector	D-SUB 9Pin Female				
	Output Optical Power	P <sub>o</sub>	-9			dBm
	Wavelength	λ	1310/1550			nm
	Spectral width in RMS	Δλ	-		1	nm
	Power Budget		20		-	dB
	Connector	SC				
	Extinction Ratio	Ext	12		-	dB
	Rising Time (Note2)	T <sub>rise</sub>	-		150	ps
	Falling Time (Note2)	T <sub>fall</sub>	-		150	ps
Jitter in p-p value	T <sub>jitter</sub>	-		800	ps	

**ETHERNET INPUT/OUTPUT**

**- General Specifications**

**Transmitter/Receiver module of 100Base Ethernet: EX-1/EX-2**

Product	Transceiver (1310nm FP-LD, 1550nm PD)		Transceiver (1550nm FP-LD, 1310nm PD)	
Model	EX-1		EX-2	
Standard	IEEE 802.3 (100M BaseTX)			
Transmission bandwidth	125MHZ			
Baud rate	100Mbps			
Hot Swap	Hot swappable with Opticis power supply unit, BR-100			
LED indicator	Power	Red		
	Status	Green (SD: Signal detect, TP: CAT5 port link, FX: Fiber port link)		
Operation Temperature	0~50			

Storage Temperature	-30~70℃
Operation Humidity	10~85%RH

**- Operating Conditions**

	Parameter	Symbol	Minimum	Typical	Maximum	Units
Power Supply	Supply Voltage	V <sub>CC</sub>	4.75	5	5.25	V
	Transmitter Supply Current	I <sub>TCC</sub>	-		340	mA
	Receiver Supply Current	I <sub>RCC</sub>	-		340	
	Transmitter Power Dissipation	P <sub>TX</sub>	-		1.7	W
	Receiver Power Dissipation	P <sub>RX</sub>	-		1.7	
	Power Supply Rejection (Note1)	PSR	-	50	-	mV <sub>p-p</sub>
Electrical Link	Input Signal	IEEE 802.3 (100M BaseTX)				
	Speed	100				Mbps
	Duplex Mode	Half/Full Duplex., Auto-negotiation				
	Connector	RJ-45				
	Input Impedance	Z <sub>IN</sub>	-	120	-	Ω
	Input Signal Level		-	2000	-	mV <sub>p-p</sub>
	Return Loss		20			dB
Optical Link	Data rate		-		100	Mbps
	Output Optical Power	P <sub>o</sub>	-9		-	dBm
	Wavelength	λ	1310/1550			nm
	Power Budget		20			dB
	Fiber Type	Single Mode				
	Connector	SC				
	Spectral width in RMS	Δλ	-		1	nm
	Extinction Ratio	Ext	12		-	dB
	Rising Time (Note2)	T <sub>rise</sub>	-		150	ps
Falling Time (Note2)	T <sub>fall</sub>	-		150	ps	
Jitter in p-p value	T <sub>jitter</sub>	-		800	ps	

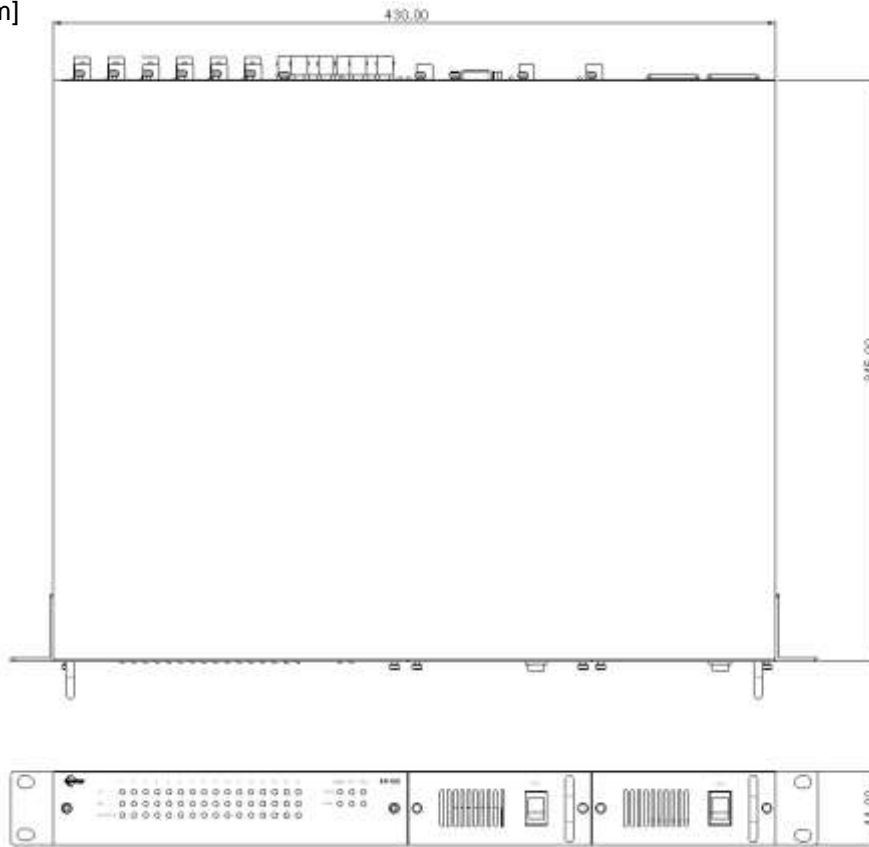
**- Recommended Specifications of Fiber-Optic Cables for all extenders**

Parameters	Conditions	Specifications
Fiber Type	Glass single-mode Fiber	9.5 ± / 125 ± 2μm
Modal Bandwidth	λ = 1310~1510nm	Min. 400 MHz km
Fiber Cable Attenuation	λ = 1310~1510nm	>0.3dBdB/km
No. of Ferrules	SC Connector	1 ferrules
Skew		2%
Insertion Attenuation		1.6%
Total Optical Attenuation		30mm

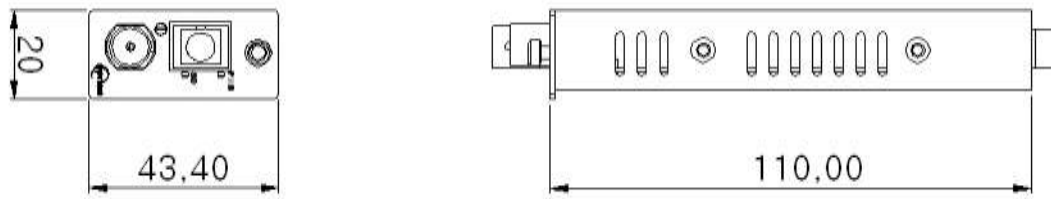


**Drawing of Modules**

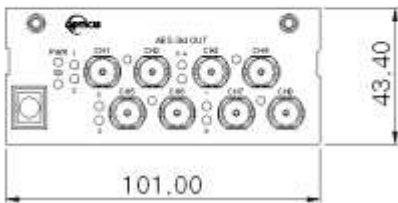
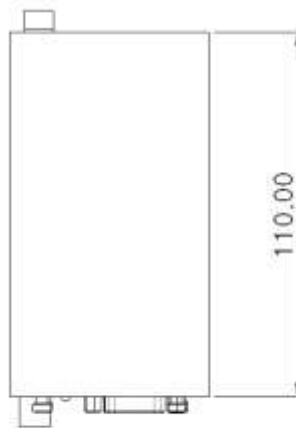
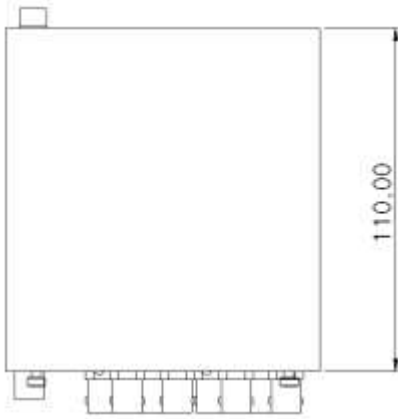
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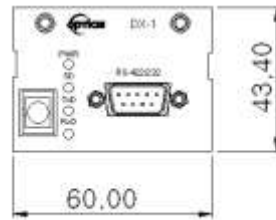
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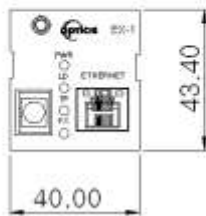
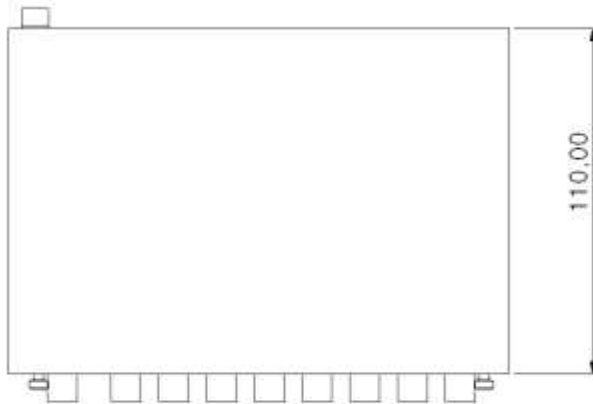
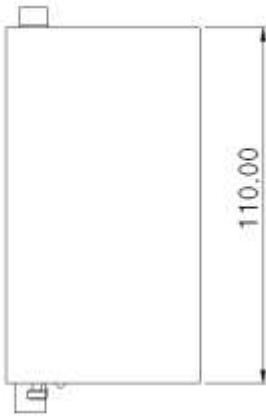
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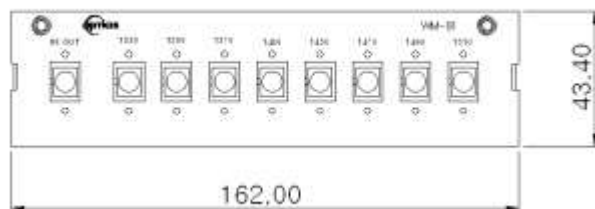
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