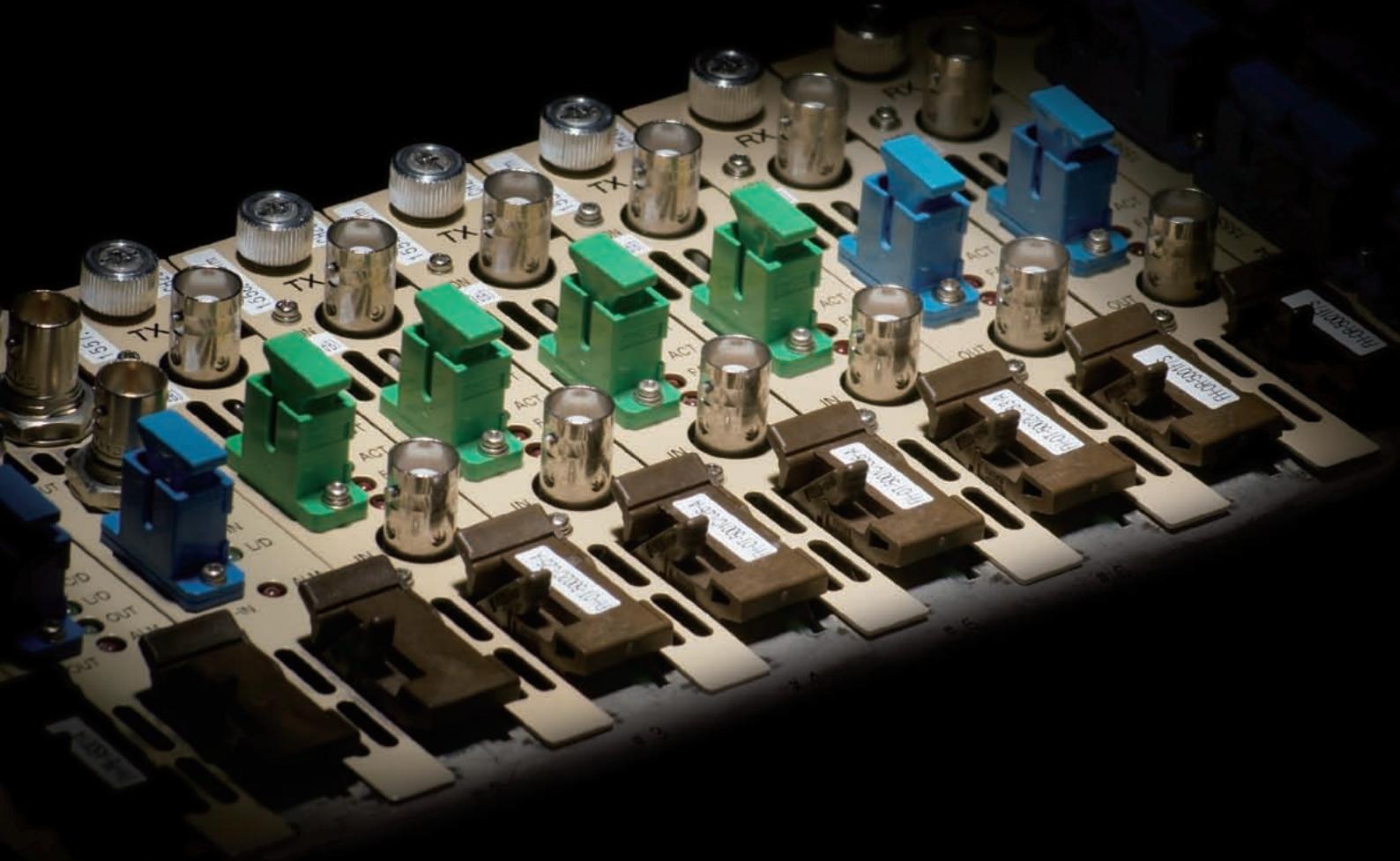
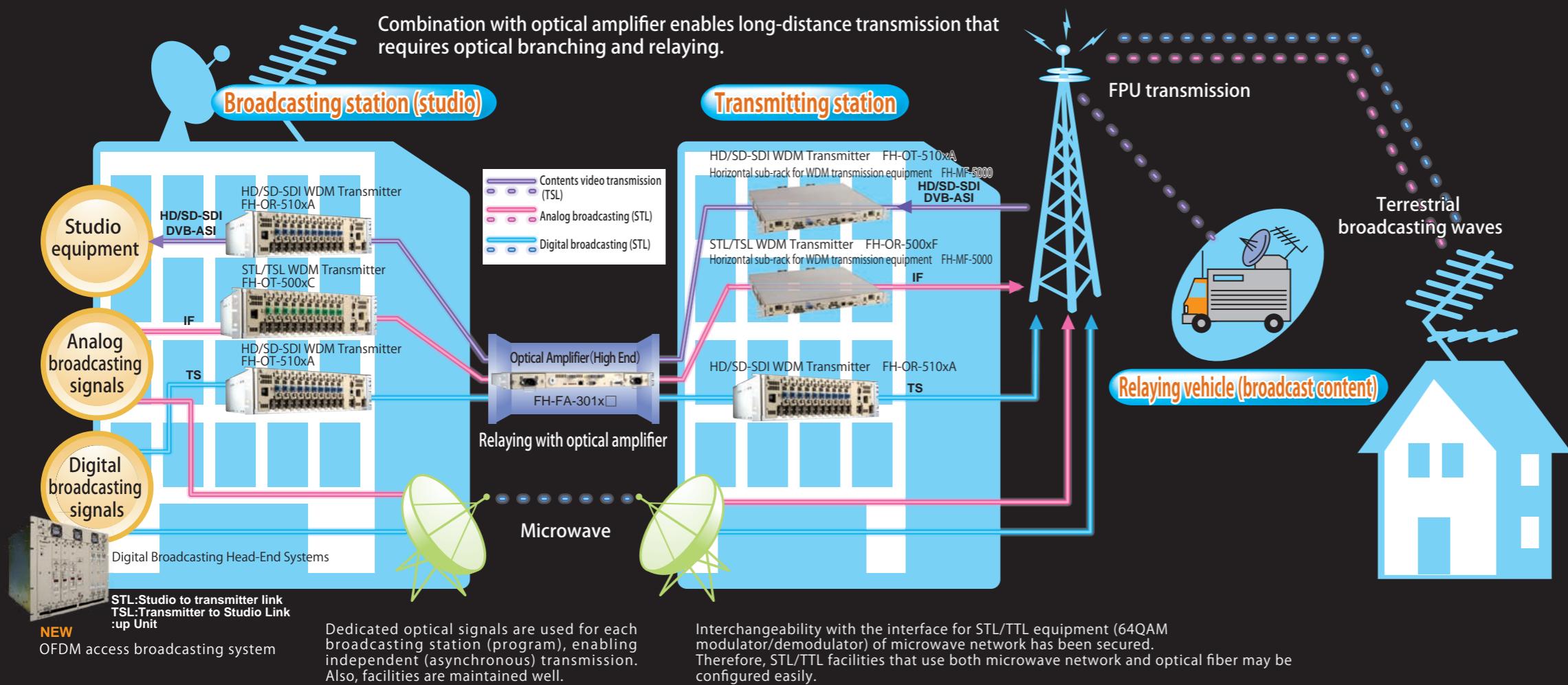
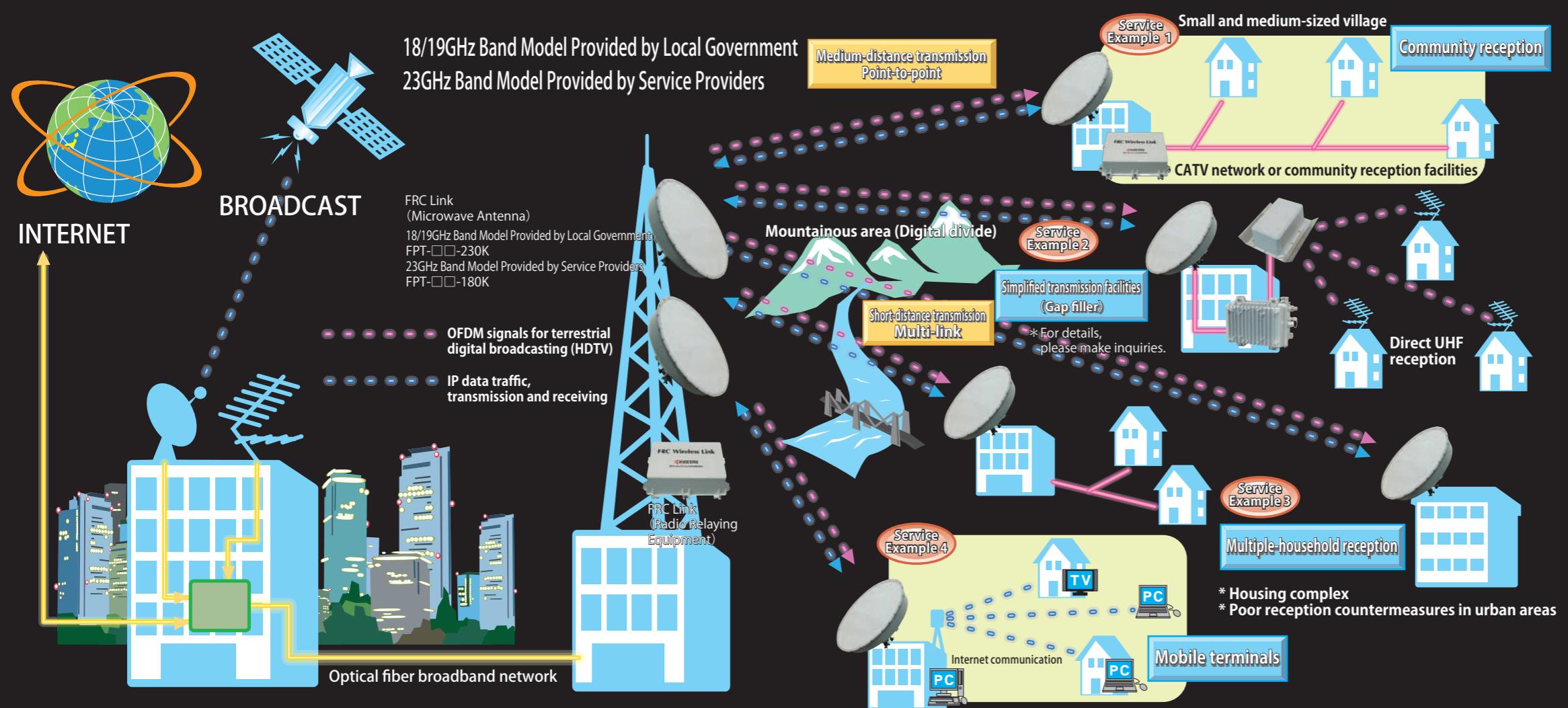


Transport Systems

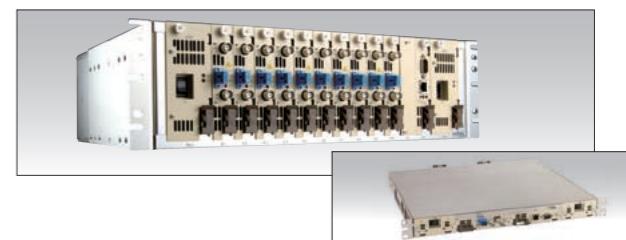


FURUKAWA ELECTRIC



1 HD/SD-SDI WDM Transmitter

FH-OT-510xA FH-OR-510xA



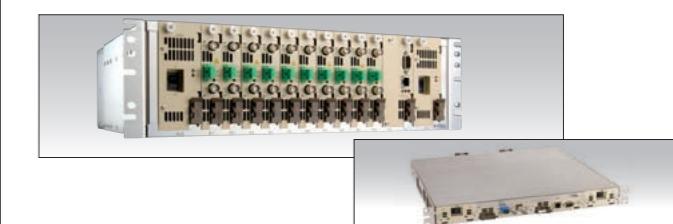
This is transmission equipment for digital broadcast content (HD-SDI, SD-SDI) signals. The transmitter is compatible with DWDM and CWDM and multiplex transmission is possible with RF, IF and communication signals.

Item	Specifications	
	Transmission side (FH-OT-510xA)	Reception side (FH-OR-510xA)
SDI input/output	Transmission signal format SMPTE292M(1.485Gbps), 259M(143-360Mbps), 344M(540Mbps), DVB-ASI(270Mbps)	
Optical output section	Number of input/output ports 1ch	1ch (other monitor port: 1ch)
Optical connector	Input/output impedance 75Ω unbalanced/BNC type (female)	
Optical fiber	Jitter 0.2UI or less	
Monitoring/control interface	Optical output wavelength 1,545.32~1,557.36nm	—
Power supply/power consumption	Received wavelength —	1,460~1,620nm
Dimensions/mass	Optical output power +7dBm (DWDM), +0dBm (CWDM)	—
	Optical input power —	-18dBm (standard) / -28dBm (high-sensitivity)
	Optical connector SC/SC	
	Optical fiber 1.31μm zero-dispersion, SMF 10/125μm	
	Monitoring/control interface SNMP/WEB/TELNET/Dry contact	
	Monitored items Optical input/output power, LD current, LD temp., Data rate, Re-clock	
	Power supply/power consumption AC100V/200VA or less (full implementation)	
	Dimensions/mass 483(W)x415(D)x132.6(H) mm(excluding projections)/Approx. 22kg (full implementation)	

2

STL/TSL WDM Transmitter

FH-OT-500xC FH-OR-500xF



The equipment enables transmission of relay signals between broadcasting stations, broadcasting station and transmission station and from transmission station to broadcasting station. It is compatible with DWDM, and multiplexing with SDI signals and communication signals is possible.

Item	Specifications	
	Transmission side (FH-OT-500xC)	Reception side (FH-OR-500xF)
Transmission signal format	QAM, OFDM, PSK, NTSC/VSB-AM	
Transmission frequency	10~200MHz	
Number of transmission channels	1ch	
Impedance/connector	50Ω BNC type (female)	
RF input/output signal power	-13dBm	-10dBm (standard)
Optical output wavelength	1,557.36~1,551.72nm (compatible with ITU GRID ch25 to ch32)	—
Received wavelength	—	1.55μm band
Optical output power	Within +9dBm±1dB	—
Optical input power	—	-16dBm (standard)
Optical fiber	1.31μm zero-dispersion, SMF 10/125μm	
Optical connector	SC-APC (Angled PC)	
Modulation method	Optical intensity modulation	
VSWR	1.5 or less	
Frequency deviation within bandwidth	3.0dBp-p or less (when paired face-to-face)	
CNR (Note)	32dB or more (noise bandwidth: 18MHz)	
Power supply/power consumption	AC100V/200VA or less (full implementation)	
Dimensions/mass	483(W)x415(D)x132.6(H) mm(excluding projections)/Approx. 22kg (full implementation)	

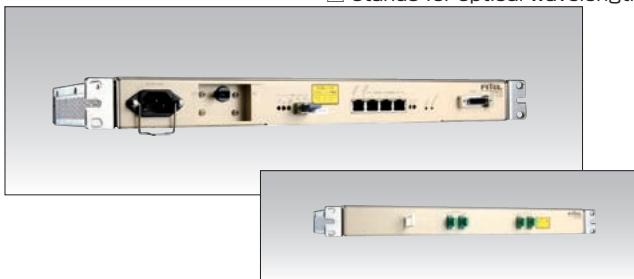
Note: Performance when paired with the company's optical receiver: optical transmission loss of 25dB

3

Fast Ethernet WDM Transmitter

FH-WU-□030xA
FH-WF-A0302A

* □ stands for optical wavelength

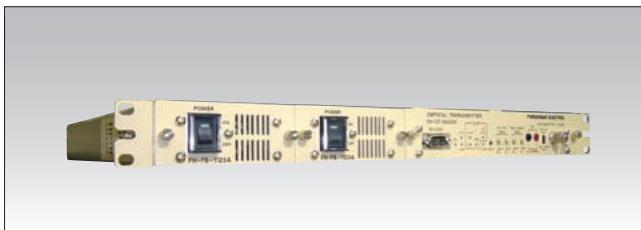


This is a compact transmitter capable of wavelength-multiplex transmission of video and other main signals with Ethernet signals. It is also applicable to the conventional optical transmission systems, thereby enabling IP communication function to be added without increasing the optical fiber.

Item	Specifications
System configuration	Filter unit(1U) + HUB unit(1U)
Interface (HUB unit)	RJ45(10 Base/100 Base)x 4 ports; LC optical connector(Optical Ethernet 100 Base)x 1ch(1 port each for input/output) *Optical cable connecting the HUB unit and filter unit are attached as standard.
Interface (Filter unit)	SC connector(APC) 3 ports; Main signal x 1 port(input port by the upstream side, output port by the downstream side). Optical Ethernet signals input x 1 port; Optical Ethernet signals output x 1 port
Number of transmission channels	3 waves
Optical wavelength	1,550nm band(video and other main signals), 1,510nm band(Optical Ethernet signals/upstream*) 1,490nm band(Optical Ethernet signals/downstream*) * Other optical Ethernet wavelengths are also available. Feel free to contact us.
Loss budget(transmission distance)	Standard: 26dB High-output power: 31dB(Adjustment is needed when video multiplexing)
Optical filter insertion loss at main signal channel	1.0dB or less(2.0dB or less when paired)
Ease of maintenance	Since the optical filter and HUB sections are in different units, the HUB section can be replaced without affecting the main signals.
Power supply/power consumption	AC100V/35VA or less (HUB unit)
Dimensions/mass	480(W) x 369(D) x 43.7(H) mm(1U) (excluding projections) / HUB≤5kg, Optical filter≤5kg

4

Ultra Broadband Optical Transmitter (2.6GHz-compatible)

FH-OT-26023C

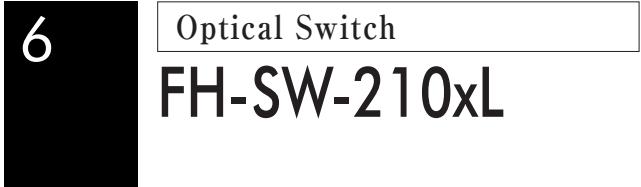
The transmitter sends CATV transmission signals between 70 and 770MHz, and BS and CS-IF signals between 950 and 2,602 MHz by converting them into optical intensity modulated signals.

Item		Specifications
Input section	Transmission frequency band	70~770MHz, 950~2,602MHz
	Max. transmission channel	11ch(analog), 80ch(digital) (950~2602MHz) 36ch(BS-CS-IF)
	RF signal input level	76dB μ V(analog), 66dB μ V(digital) (950~2602MHz) 76dB μ V(BS-CS-IF)
Output section	Light-emitting element	Laser diode
	Optical output wavelength	1,550nm band
	Optical connector	SC-APC (Angled PC)
	Optical output power/optical output port	+9dBmW±1dB
Performance	CNR (Note 1)	46dB or more(70~770MHz), 26dB or more(950~2,602MHz)
	CSO (Note 2)	-56dB or less(77~770MHz)
	CTB (Note 2)	-56dB or less(77~770MHz)
	IM3 (Note 2)	-59dB or less(950~2,602MHz)
	IM2 (Note 2)	-36dB or less(950~2,602MHz)
	Power supply/power consumption	AC100V/50VA or less
	Dimensions/mass	480(W) x 401(D) x 43.7(H) mm(excluding projections)/3.4kg or less

Note 1: Performance when paired with the company's optical receiver(fiber length: 20km, optical reception level: -8dBmW)
Note 2: Performance when paired with the company's optical receiver(fiber length: 20km, optical reception level: -2dBmW)

5

DWDM External Modulation Optical Transmitter

FH-OT-8601B

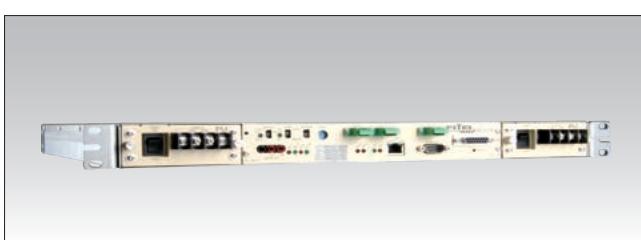
This is an optical transmitter for long-distance transmission of RF broadcast signals. Multiple-channel, long-distance transmission of video signals is possible in combination with optical amplifiers. It is externally modulated, compatible with DWDM wavelength of ITU-G, and can be multiplexed in various ways. The transmitter can also be made compatible with the L-band.

Item	Specifications
Input section	Transmission frequency band 70~770MHz
	RF input power 80dB μ V
	RF monitor level/connector -20dB over input power/F type
	Optical output wavelength 1,550~1,560nm, 1,570nm (ITU-grid)
	Optical output wavelength adjustable range ±100GHz(in steps of 50GHz)
	Optical output power/optical output port +8.5dBm (standard) / 2 ports
	SBS suppression Can be set between +13.0 to +19.0dBm (in steps of 0.5dB)
Performance	RF return loss 15dB or more
	Relative intensity noise (RIN) -158dB/Hz or less(-160dB/Hz as standard)
	CNR (Note) 50.0dB or more
	CSO (Note) 65.0dB or more
	CTB (Note) 65.0dB or more
Others	External control terminal Monitoring and control are possible with Ethernet 10/100 interface, Web browser software and SNMP
	Power supply/power consumption AC100V/80VA or less
	Dimensions/mass 480(W) x 464(D) x 49(H) mm (JIS), 483(W) x 464(D) x 44.5(H) mm (EIA) (excluding projections)/12kg or less

Note: Performance when paired with the company's optical receiver(at optical input of 0dBm)

6

Optical Switch

FH-SW-210xL

The optical switch is optimum for redundant configuration of optical transmission channel. It is also compatible with SNMP, and automatic switching and forced switching would also be possible at remote unmanned stations.

Item		Specifications
Input section	model	FH-SW-2101L FH-SW-2102L
	Wavelength	1,530~1,570nm 1,280~1,340nm
	Number of terminals	2 inputs(lines A and B) / 1 output
	Optical connector	SC-APC(Angled PC), SC-SPC #Can be designated at the time of ordering
	Max. input level	+23dBm +16dBm
	Insertion loss	2dB or less 2.3dB or less
	Isolation	50dB or more
Control mode selector	Automatic switching threshold level	Setting is possible between -10dBm and +17dBm Setting is possible between -10dBm and +5dBm
	Switching time	50ms or less
	Operation line switching mode selector(Auto/A-Fix/B-Fix)	Auto: switches optical channel automatically or by remote control; A-Fix/B-Fix: fixes optical channel for operation
	Main line selection (Remote/A/B)	Remote: designates main line by remote control; A: operates line A as main line; B: operates line B as main line
	Return mode selection (Auto/Manual)	Auto: returns automatically when the main line has recovered; Manual: does not return automatically even when the main line has recovered
	Power supply/power consumption	AC100V or DC-48V/AC35VA or less DC15W or less
	Dimensions/mass	480(W) x 397(D) x 43.7(H) mm(excluding projections)/Approx. 9kg

7

Optical Amplifier (pizza box type)

FH-FA-20xx□

Optical Amplifier (High-End)

FH-FA-301x□



SNMP manageable single port optical amplifiers for video transmission, with 1U height compact chassissis (19" rack mountable).

Item		Specifications
Input section	Wavelength	1,550~1,560nm
Optical input power	Optical input connector	0~10dBm
Optical fiber	SC-APC (Angled PC)	
Optical connector	1.31μm zero-dispersion, SMF 10/125μm	
Number of optical output	SC-APC (Angled PC)	
Optical output power	FH-FA-2014A 13.0dBm, FH-FA-2015A 16.5dBm, FH-FA-2016A 19.0dBm, FH-FA-2017A 22.0dBm	
Noise figure	5.0dB or less (@Pin=0dBm)	
Monitoring/control	Monitoring/control interface	SNMP/WEB/TELNET/Dry contact
Alarm	Loss of input, Output deterioration, LD current, LD temperature, PU, FAN, etc.	
Status monitor	Optical input power, optical output power, LD current, LD temp., etc.	
Control	Enable/ disable pump LDs, etc.	
LED	IN, PU0, PU1, FAN, FAIL: Red LED turns on in case of alarm. LD : Green LED turns on in case that the pump LDs are enabled. ACT: Green LED turns on in case that power is supplied properly.	
Total alarm contact output	CRITICAL/MAJOR/MINOR (Alarm contact outputs are made by assigning each alarm to CRITICAL, MAJOR or MINOR. The assignment configuration can be changed.)	
Power supply/power consumption	AC100V or DC-48V 28W/56VA or less (13dBm), 30W/60VA or less (16.5dBm), 35W/70VA or less (19dBm), 50W/100VA or less (22dBm)	
Dimensions/Mass	483(W)×400(D)×43.7(H) mm (excluding projections)/9kg or less	

SNMP manageable single port optical amplifiers with 1U height compact chassissis. High speed AGC overcomes the SDI check field signals (pathological signals), by suppressing the transient of the EDFA against the low frequency input signals, making them safely applicable to HD/SD-SDI video transmission systems.

Item		Specifications		
Optics	Wavelength	1,545 ~ 1,560 nm		
	Control mode of EDFA	Automatic Gain Control (AGC)		
	Number of wavelengths	1 - 4ch	1 - 8ch	1 - 8ch
	Optical input power	-8~-+5 dBm/ch	-8~-+5 dBm/ch	-28~-20 dBm/ch
	Gain (set value)	9dB	8dB	30dB
	Saturated output power	+20dBm Typ.	+22dBm Typ.	+19dBm Typ.
	Gain flatness	≤1.5dB p.p	≤1.5dB p.p	≤1.5dB p.p
	Noise figure	6.0dB or less @Pin=-8dBm/ch	6.0dB or less @Pin=-8dBm/ch	6.3dB or less @Pin=-28~-20dBm/ch
	Power supply	AC100+/~10V, 50/60 Hz		
Power, Mechanics, etc.	Power consumption	38W/ 70VA or less	65W/ 115VA or less	38W/ 70VA or less
	Laser safety class (Note)	Class 1M	Class 3B	Class 1M
	Dimensions	483(W)×400(D)×44.0 (H) mm		
	Mass	9kg or less		

Note: According to IEC 60825 - 1 Edition 1.2 (2001 - 08)

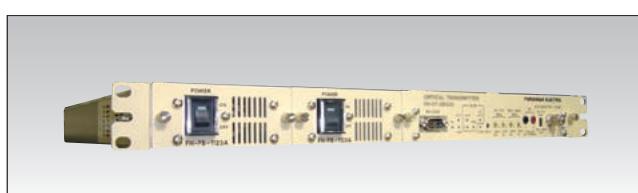
9

Ultra-Broadband Optical Receiver (2.6GHz-compatible)

FH-OR-26021A

Digital Broadcasting Head-End Systems

**Pass-through System
Trans-modulation System
Common Head-End for i-HITS/JC-HITS
Additional System for Access Broad-
casting with Participant Station EPG**



10

This is an optical video receiver that is compatible with up to 2,602MHz band. It is of a highly reliable design with power supply redundancy configuration. Further, the monitoring signals are SNMP-compatible, enabling remote control and monitoring.

Item		Specifications
Input section	Receiving optical wavelength	1,550nm/1,310nm
	Optical connector	SC-APC (Angled PC)
	Receiving optical power	-2~-+2dBmW
Output section	Optical modulation method	Direct intensity modulation method
	Transmission frequency band	70~770MHz, 950~2,602MHz
	Max. transmission channel (70~770MHz)	11ch (analog), 80ch (digital)
	(950~2602MHz)	36ch (BS-CS-IF)
	RF signal (70~770MHz)	91dBμV (analogue), 81dBμV (digital)
	input power (950~2602MHz)	91dBμV (BS-CS-IF)
Performance	CNR (Note 1)	52dB or more (70~770MHz), 32dB or more (950~2,602MHz)
	CSO (Note 2)	-56dB or less (70~770MHz)
	CTB (Note 2)	-60dB or less (70~770MHz)
	IM3 (Note 2)	-59dB or less (950~2,602MHz)
	IM2 (Note 2)	-36dB or less (950~2,602MHz)
	Power consumption	AC100V/50VA or less
	Dimensions/mass	480(W)×401(D)×43.7(H) mm (excluding projections)/Approx. 6.5kg

Note 1: Performance when paired with the company's optical receiver (optical fiber length: 20km; Optical reception power: -2dBmW)

Note 2: Performance when paired with the company's optical receiver (optical fiber length: 20km; Optical reception power: +2dBmW)

Wide range of head-end equipment compatible with various digital broadcasting is available.

- OFDM signal processor (backup-compatible) FH-SP-M420□C
- Terrestrial digital transmodulator FH-TM-M4101A
- BS digital transmodulator FH-TM-M1103A
- Transmodulation unit commonly used with HITS FH-TM-M3102A
- MPEG-2 encoder unit FH-EN-M0101A
- TS multiplex unit FH-MU-M0601A
- SI/EPG transmission unit FH-TG-M0101A
- Terrestrial digital QAM/QAM conversion unit FH-TG-M5104A
- BS-exclusive QAM/QAM conversion unit FH-TM-M5106A
- SI input-equipped QAM/QAM conversion unit FH-TM-M5107A
- HDTV encoder unit FH-EN-M0102A
- SDI input encoder unit FH-EN-M0103A
- TS multiplex unit for terrestrial digital broadcasting FH-MU-M0702A
- OFDM modulation unit FH-MD-M1108A

NEW

11

FRC Link (23GHz Radio Relaying Equipment)



NEW

This equipment realizes hybrid optical fiber and radio transmission. The 23GHz band is optimum for relaying broadcast waves.

Item		Specifications
23GHz link (transmitter)	Input frequency band	UHF band (470~710 MHz)
	Output frequency band	23GHz band
	Compatible modulation methods	64/256QAM (DOCSIS 1.x, 2.0), OFDM (ISDB-T)
	Dimensions/Mass	343 (W) × 257 (D) × 495 (H) mm (excluding projections) / 22kg
	Input frequency band	25~125MHz (tentative)
	Output frequency band	23GHz band
	Compatible modulation methods	QPSK, 8QAM, 16QAM, 32QAM, 64QAM, 128QAM
	Dimensions/mass	343 (W) × 257 (D) × 495 (H) mm (excluding projections) / 22kg or less

This is a product of Kyocera Communication Systems Co., Ltd.

12

FRC Link (18/19GHz Radio Relaying Equipment)



NEW

This equipment realizes hybrid optical fiber and radio transmission. The 18/19GHz band is optimum for service providers involved in government administration.

Item		Specifications
19GHz link	Input frequency band	60MHz of UHF band
	Output frequency band	19GHz band (Blocks 1 to 4)
	Compatible modulation methods	64/256QAM (DOCSIS 1.x, 2.0), OFDM (ISDB-T)
	Dimensions/Mass	343 (W) × 257 (D) × 495 (H) mm (excluding projections) / 22kg
18GHz link	Input frequency band	15~42MHz
	Output frequency band	18GHz band (Blocks 1 to 4)
	Compatible modulation methods	QPSK, 8QAM, 16QAM, 32QAM, 64QAM, 128QAM
	Dimensions/mass	TDMA, A-TDMA, S-CDMA per DOCSIS 2.0
		343 (W) × 257 (D) × 495 (H) mm (excluding projections) / 22kg or less

This is a product of Kyocera Communication Systems Co., Ltd.

13

FRC Link (Microwave Antenna)

FPT-□□-230K(23GHz series)
FPT-□□-180K(18GHz series)

※□ indicates diameter.



NEW

This is a microwave antenna for FRC link. Its directivity is especially excellent.

Model	Aperture diameter (m)	Gain (dBi)			Beam width (°)	Cross polarization discrimination (dB)	Frequency band (MHz)	VSWR	
		21.2GHz	22.4GHz	23.6GHz					
23GHz	FPT06-230K	0.6	39.3	39.8	40.3	1.7	32	60	1.20
	FPT09-230K	0.9	42.8	43.3	43.8	1.2	32	62	1.20
	FPT12-230K	1.2	45.3	45.8	46.3	0.8	32	63	1.20

Model	Gain (dBi)	Beam width (°)		Beam width (°)	VSWR	VSWR
		18.5GHz	19.5GHz			
18GHz	FPT06-180K	0.6	37.5	1.8	1.20	1.20
	FPT09-180K	0.9	41	1.3		
	FPT12-180K	1.2	43.5	0.9		

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For inquiries, contact:

FURUKAWA ELECTRIC CO., LTD.

<http://www.furukawa.co.jp/broadband/english/>