



OPTICAL NETWORKS

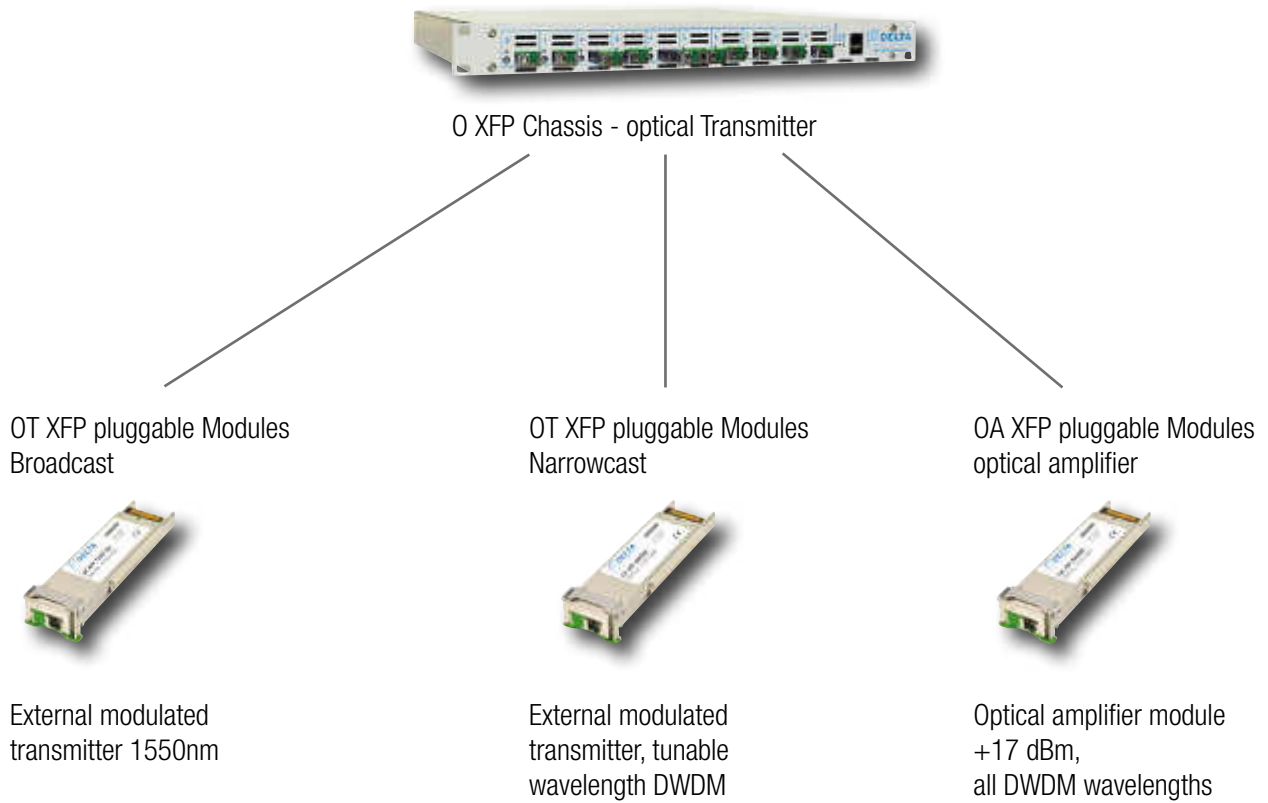






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OPTO XFP SERIES AT A GLANCE



Type	Article-no.	Description
O XFP host system	5700 2689	Host system, XFP-RF Transmitter, 1RU, 10 XFP-RF ports
OT XFP 1550 04	5700 2686	XFP-RF Pluggable TX-Module, Broadcast 1.56µm, 1.2GHz, +4dBm, SBS 14 dBm
OT XFP 1550 07	5700 2687	XFP-RF Pluggable TX-Module, Broadcast 1.56µm, 1.2GHz, +7dBm, SBS 14 dBm
OT XFP 1550 07-H	5700 2920	XFP-RF Pluggable TX-Module, Broadcast 1.56µm, 1.2GHz, +7dBm, SBS 18 dBm
OT XFP DWDM	5700 2688	XFP-RF Pluggable TX-Module, Wavelength-Tunable, QAM, +1.2GHz, +5 dBm, 43 DWDM
OT XFP DWDM-S	5700 2919	XFP-RF Pluggable TX-Module, Wavelength-Tunable, QAM, +1.2GHz, +7 dBm, 16 DWDM
OA XFP DWDM	5700 2813	XFP-RF Pluggable EDFA-Module
OT XFP PS-AC	5700 2691	Power supply, AC 105-264 V
OT XFP PS-DC	57002692	Power supply, DC 36-75 V

XFP HOST SYSTEM CHASSIS

0 XFP Chassis

PRODUCT FEATURES

- High-Density: 10 ports for 10 XFP-RF transmitters in 1 RU chassis
- Individual configuration of OMI, RF amplification, operating mode and SBS status for each of the 10 modules
- Energy Efficient: maximally 5W per module
- User-friendly web browser interface to set up and configure transmitters
- 10 x 75 Ω RF inputs on the rear of the chassis
- Two physically separated Ethernet SNMP ports on front and rear
- USB port for future interface applications
- Option for single or dual power supplies; AC and DC
- Field-Replaceable Cooling Fan
- Mounts into standard 19-inch racks
- Complies with the SCTE HMS HE Optics management Information Base (MIB) Specifications

APPLICATIONS

- 50 MHz to 1218 MHz RF- over Fiber applications
- C- and L-Band Transport and Distribution
- All-Digital QAM networks
- Standard HFC- and RFoG networks
- DOCSIS 3.1 compatible
- Broadcast and Narrowcast services

Delta's XFP Chassis is specifically designed around the new XFP transmitter module.

The reduction of rack-spacing and power consumption in the headend is more than half in comparison to today's technologies. Up to 10 XFP-Modules can be deployed in this 1 rack unit high chassis and consume less than 60 W together. An embedded web server in the chassis allows transmitter modules to be configured with a user-friendly graphical interface through one of the two Ethernet SNMP ports. An element management system can remotely monitor and control the transmitter modules by connecting the chassis to an IP network.

LESS SPACE - MORE VISION



The chassis can be powered with either one AC power supply or one DC power supply in the rear of the chassis. For redundancy, a second power supply can be utilized. For complete powering redundancy in headends or hubs, one AC power supply and one DC power supply can be used.

Product	Article number	Description
0 XFP Chassis	5700 2689	Chassis, XFP-RF transmitter, 1RU, 10 XFP-RF ports

TECHNICAL SPECIFICATIONS

Key Advantages:

- High Density: 10 transmitters per rack-unit
- Power consumption per transmitter less than 5 W
- Redundant powering capability
- User-friendly web browser configuration tool

Parameter	Value
RF Bandwidth	50 MHz to 1.2 GHz
RF Input level	80 dB μ V
RF Flatness	+/- 1.5 dB
Return loss	>18 dB
CSO/ CTB	>60 dB
Link noise figure	<20 dB
RF Input connection	standard F-connector, 75 Ω
RF Test point	Available for each Tx-Module
Dimensions	449 mm (W) x 378 mm (D) x 44.5 mm (H)
Operating Temperature Range	0°C - 50°C
Storage Temperature Range	-40°C - 85°C
Power Consumption	60 Watts, max. (with 10 XFP modules)
Communications interfaces	Ethernet SNMP, RJ-45 on front panel Ethernet SNMP, RJ-45 on rear panel USB port on front panel (future use)
Indicators	LED for each transmitter port(10) Summary LED's for chassis and power supply status
AC Power Supply	105 – 264 Vrms, auto-sensing; 47 – 63 Hz
DC Power Supply	36 – 75 Vdc

1.2 GHz OPTO XFP TRANSMITTER

OT XFP 1550 04 / OT XFP 1550 07

PRODUCT FEATURES

- DOCSIS 3.1 compatible with operating bandwidth up to 1218 MHz
- Mechanical dimensions compliant with 10 Gigabit Small Form Factor (XFP) host-system
- Externally modulated, no dispersion compensation required
- Transmission of up to 79 analogue plus 75 QAM channels
- Link distance of up to 35 km without optical amplification
- Transmitter version with +7 dBm and +4 dBm Optical Output Power
- LC/APC optical connection
- Power consumption < 3.5W
- Built- in digital diagnostic functions
- Compliant with SCTE 195 2013



APPLICATIONS

- Hybrid Fiber Coaxial (HFC) cable access networks
- Transmission of broadcast services
- RFoG technology

Delta's XFP Transmitter is a hot-pluggable optical module that is compliant with SCTE interface specifications. The external modulated XFP transmitter is in a very small package. It can be fully loaded with 79 analogue AM-VSB channels plus 75 Digital QAM channels. The small XFP module significantly increases the density and reduces power consumption for downstream transmitter which can be integrated into today's Hybrid-Fiber Coaxial (HFC) optical platforms and tomorrow's broadband infrastructure equipment.

The OT XFP 1550 04 and OT XFP 1550 07 transmitter modules can complement or replace today's legacy 1310 nm and 1550 nm broadcast transmitters.

Since the wavelength is at 1.55 μm , the optical signal can be multiplexed with a legacy 1.31 μm optical signal to cost-effectively double the capacity of the fiber to the nodes.

Due to lower fiber loss at 1.55 μm , the 7 dBm transmitter can transport signals to a node over fiber up to 35 km regardless of optical dispersion thanks to the modern integrated external modulation technology. Even further distances can be bridged with an additional standard optical amplifier EDFA.

Product	Article number	Description
OT XFP 1550 04	5700 2686	XFP-RF Pluggable TX-Module, Broadcast 1.56 μm , 1.2GHz, +4dBm, SBS 14 dBm
OT XFP 1550 07	5700 2687	XFP-RF Pluggable TX-Module, Broadcast 1.56 μm , 1.2GHz, +7dBm, SBS 14 dBm
OT XFP 1550 07-H	5700 2920	XFP-RF Pluggable TX-Module, Broadcast 1.56 μm , 1.2GHz, +7dBm, SBS 18 dBm (high SBS value)

TECHNICAL SPECIFICATIONS

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Power Supply						
+3.3 V Voltage, Analog	VCC3_ANALOG	3.13		3.46	V	4
+3.3 V Voltage, Digital	VCC3_DIGITAL	3.13		3.46	V	4
+5 V Voltage	VCC5	4.75		5.25	V	4
-5.2 V Voltage	VEE5	-5.46		-4.75	V	4
Supply Current – Vcc3 supply	Icc3			500	mA	
Supply Current – Vcc5 supply	Icc5			500	mA	
Supply Current – Vee5 supply	Iee5			50	mA	
Module total power dissipation	P			3.5	W	1
RF						
Composite RF Input Level	RF _{in}	107,75	110	113,75	dBμV	
Input differential impedance	R _{in}		100		Ω	2
Transmit Disable Voltage	V _D	2.0		Vcc	V	3
Transmit Enable Voltage	V _{EN}	GND		GND+0.8	V	
RF Bandwidth		50		1218	MHz	
RF Flatness, peak to peak						
50-1003 MHz				1.0	dB	
50-1218 MHz				1.5	dB	
RF Input Return Loss, 50-1003 MHz		16.0			dB	
Optical						
Output Opt. Pwr: 9/125 SMF	P _{OUT}					
OT XFP 1550 07		6.75		7.75	dBm	
OT XFP 1550 04		3.75		4.75	dBm	
Optical Wavelength Range		1555		1565	nm	
SBS Supression						
through 20 km of fiber		+14			dBm	5
through 65 km of fiber		+13			dBm	6

Notes:

- Maximum total power value is specified across the full temperature and voltage range
- After internal AC coupling
- Or open circuit
- VCC2 (+1.8 V) is not implemented from the XFP MSA Specification
- SBS suppression measured with the following link: transmitter through EDFA, launch power of +14 dBm, 20 km of fiber, 0 dBm input power into receiver
- SBS suppression measured with the following link: transmitter through EDFA, launch power of +13 dBm, 65 km of fiber, 0 dBm input power into receiver. SBS suppression up to 20 dBm is possible

WAVELENGTH TUNABLE 1.2 GHZ OT XFP DWDM TRANSMITTER

OT XFP DWDM

PRODUCT FEATURES

- DOCSIS 3.1 compatible with operating bandwidth up to 1218 MHz
- Mechanical dimensions compliant with 10 Gigabit Small Form Factor (XFP) host-system
- All-Digital 256 QAM loading up to 154 carriers
- Externally modulated, no dispersion compensation required
- Wavelength-Tunability across entire C-band at 100 GHz spacing
- Link distances up to 60 km
- LC/APC optical connection
- Power consumption < 3.5 W
- Built-in digital diagnostic functions
- Compliant with SCTE 195 2013



APPLICATIONS

- Hybrid Fiber Coaxial (HFC) cable access networks
- 1550 nm Broadcast with DWDM Narrowcast overlay architectures
- All-Digital QAM networks

Delta's XFP Transmitter is a hot-pluggable optical module that is compliant with SCTE interface specifications. The external modulated XFP transmitter is in a very small package. It can be fully loaded with 154 digital QAM channels. The small XFP module significantly increases the density and reduces power consumption for downstream transmitter which can be integrated into today's Hybrid-Fiber Coaxial (HFC) optical platforms and tomorrow's broadband infrastructure equipment.

The wavelength of the transmitter can be tuned by the user within 500 ms. Each DWDM wavelength within the C-band can be selected. This increases operational efficiencies in deploying DWDM networks and reduces inventory of transmitters at different fixed wavelengths. Wavelength-Tunability also opens the possibility of novel HFC architectures that can dynamically route services and increases bandwidth capacity in the cable operator's access network.

Product	Article number	Description
OT XFP DWDM	5700 2688	XFP-RF Pluggable TX-Module, Wavelength-Tunable, QAM, +1.2GHz, +5 dBm, 43 DWDM
OT XFP DWDM-S	5700 2919	XFP-RF Pluggable TX-Module, Wavelength-Tunable, QAM, +1.2GHz, +7 dBm, 16 DWDM

TECHNICAL SPECIFICATIONS

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Power Supply						
+3.3 V Voltage Analog	VCC3_ANALOG	3.13		3.46	V	4
+3.3 V Voltage, Digital	VCC3_DIGITAL	3.13		3.46	V	4
+5 V Voltage	VCC5	4.75		5.25	V	4
-5.2 V Voltage	VEE5	-5.46		-4.75	V	4
Supply Current – Vcc3 supply	Icc3			500	mA	
Supply Current – Vcc5 supply	Icc5			500	mA	
Supply Current – Vee5 supply	Iee5			50	mA	
Module total power dissipation	P			3.5	W	1
RF						
Composite RF Input Level	RF _{in}	105,75	108,75	111,75	dBμV	
Input differential impedance	R _{in}		100		Ω	2
Transmit Disable Voltage	V _D	2.0		Vcc	V	3
Transmit Enable Voltage	V _{EN}	GND		GND+0.8	V	
RF Bandwidth		50		1218	MHz	
RF Flatness, peak to peak						
50-1003 MHz				1.0	dB	
50-1218 MHz				1.5	dB	
RF Input Loss, 50-1003 MHz		16.0			dB	
Optical						
Optical Output Power 9/125 SMF	P _{OUT}	4.75		5.75	dBm	
Optical Wavelength Range		1529.55		1563.05	Nm	
Optical Wavelength Spacing			100		GHz	5
Transmitter Center Wavelength – Beginning of Life	λ	X-25	X	X+25	Pm	6
Transmitter Center Wavelength – End of Life	λ	X-100	X	X+100	Pm	6
Wavelength Tuning Time			0.5	3.0	seconds	
SBS Suppression		+14	+18	+20	dBm	7

Notes:

- Maximum total power value is specified across the full temperature and voltage range
- After internal AC coupling
- Or open circuit
- VCC2 (+1.8 V) is not implemented from the XFP MSA Specification
- Corresponds to approximately 0.8 nm
- X= Specified ITU Grid Wavelength. Wavelength stability is achieved within 10 seconds of power up
- SBS suppression measured with the following link: XFP-Transmitter, EDFA, launch power of +14 dBm, 20 km of fiber, 0 dBm input power into receiver. Transmitter loaded with 153 channels of QAM. SBS dither is enabled on the transmitter

OPTICAL FIBRE AMPLIFIER OA XFP DWDM

PRODUCT FEATURES

- DOCSIS 3.1 compatible
- Mechanical dimensions compliant with 10 Gigabit Small Form Factor (XFP) host-system
- 980nm pump laser module
- High output power up to 17 dBm
- APC (automatic power control) and FLS (forced laser shutdown)
- LVTTL alarm
- Low power consumption
- Compatible with SCTE 195 2013

APPLICATIONS

- Compatible with DELTAs XFP Host System
- Optimized for using in connection with OT XFP DWDM
- Broadcast and narrowcast application
- Narrowband amplification in C-band
- Amplification of DWDM-wavelengths in DWDM-networks due to integrated gain equalizer

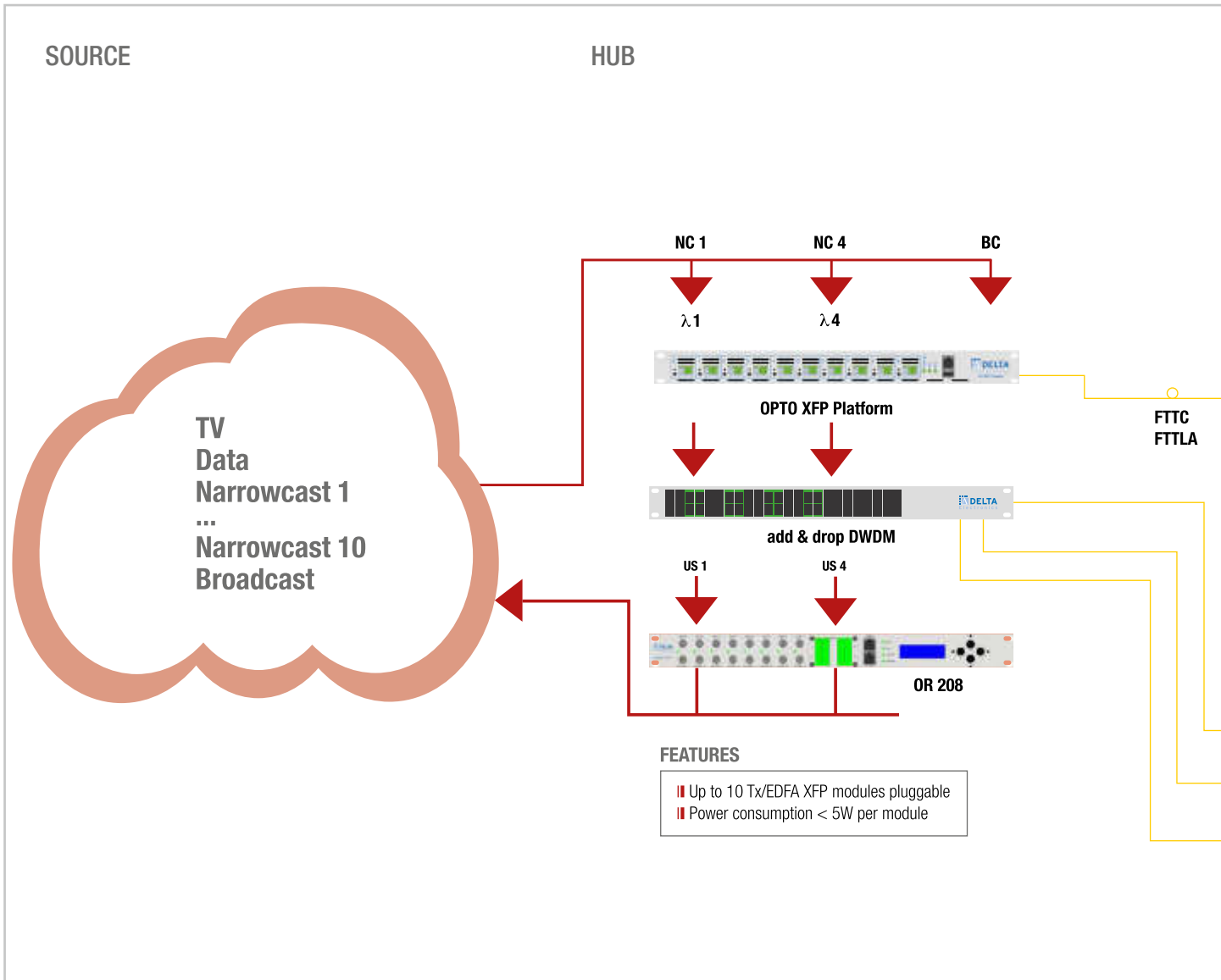


The small, pluggable OA XFP DWDM is a full-functioning EDFA module with control circuitry packaged inside. It is totally compatible with the OPTO XFP host-system in respect of size and pin-map. Due to the small size and easy installation, the OA XFP DWDM is designed for single wavelength applications in fibre optic communication systems in core networks, access networks or CATV networks. The OA XFP DWDM provides very stable output power of up to 17dBm and a noise figure of 6dB in C-band over a wide operating temperature range.

Over I²C all of the alarm-parameters such as output alarm, bias current, temperature and power supply can be analysed.

Type	Article number	Description
OA XFP DWDM	5700 2813	XFP EDFA module, 17dBm optical output power, amplification of all DWDM wavelengths

XFP OVERVIEW



USER



FEATURES

- 1.2 GHz HFC or RFoG Node
- Output level 115 dBμV
- Pluggable design concept: optical and RF modules
- Selectable hinge point 1/1.2 GHz
- Power safe mode



MC 1
MC 4

- FEATURES**
- Transparent for all DS signals
 - Compensation of optical loss
 - OMI transparent

active optical repeater (O-MISO)

DELTA



FEATURES

- RF output level 106-110 dBμV
- Flexible integrated WDM filter concept
- Selectable turn-off threshold

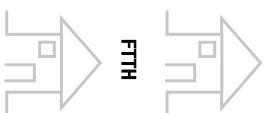


FEATURES

- Various output level 80-99 dBμV
- Cost-effective monitoring
- Digital burst-mode circuit



FTTH



OPTICAL EXTERNAL MODULATED TRANSMITTER 1550 nm OT DWDM 1155-2-xx

Applications:

- Conversion of electrical CATV signals (QAM, AM-VSB, FM) into an optical signal
- Enables the usage of optical amplifier (EDFA) as booster or repeater in order to realize large FTTx networks
- Video overlays in FTTx networks and xPON-application

Features:



- Adjustable DFB Laser, variable in C-band from 1528.77nm to 1560.61nm
- Supports Dense Wavelength Division Multiplexing (DWDM)
- Wavelengths adjustable in an interval of 0.4 nm in C-Band
- High stability of the wavelengths
- Narrow spectrum of laser (0.3 MHz)
- Adjustable SBS-suppression of 13 to 19 dB in 0.1 dB steps
- Adjustable Optical Modulation Index (OMI)
- Automatic (AGC) or manual (MGC) control for laser management
- Outstanding CNR, CSO and CTB values
- Implemented microprocessor, LCD and LED status display
- SNMP and web-based monitoring for all parameters
- OMI, SBS, wavelength AGC and MGC remotely adjustable over WebGUI
- Redundant power supply
- Test socket: RF Test -20dB

Typ	Article number	Optical Output Power (dBm)	Number of Ports	Setting range (nm)
OT-DWDM-1155-02-09	5700 2428	9	2	1550.92 - 1554.14
OT-DWDM-1155-02-11	5700 2539	11	2	1550.92 - 1554.14

TECHNICAL SPECIFICATIONS

Data Sheet

Performance			Index		
			Min	Typ	Max
Optical Features	Input wavelength (λ)	nm			
	Full C-Band		1528.77		1560.61
	Partial C-Band		1550.92		1554.13
	Optical output power (at each output)	dBm	9		11
	Number of ports			2	
	Channels spacing	nm		0.4	
	Tuning speed	ms		20	
	SBS-threshold	dB	13	adjustable	19
	Side mode suppression ratio (SMSR)	dB	45	50	
	Relative intensity noise (RIN)	dB			-160
	Optical return loss			>45	
	Optical connector		SC/APC (further on request)		
RF Features	HF bandwidth	MHz	47 - 1000/1200		
	Input level	dB μ V	70 - 88		
	Frequency range	dB	± 0.75		
	CNR	dB	52.5 PAL-D/60 Ch. 65km Fiber, 0 dBm receiver		
	CSO, CTB	dB	<65		
	Input impedance	Ω	75		
General Features	SNMP network management			RJ45, LAN WebGUI	
	Power supply	VDC	± 36	± 48	± 72
	Power consumption	W			50
	Operating temperature	$^{\circ}$ C	-5	22	65
	Storage temperature	$^{\circ}$ C	-40		85
	Relative humidity	%	5	55	95
	Dimensions	mm		482 x 360 x 44	L x B x H

ERBIUM DOPED FIBER AMPLIFIER - EDFA

Applications:

- Optical amplification for the wavelength of 1550nm
- Realization of vast HFC- and RFoG-networks
- Decentral signal distribution / amplification in FTTx / xPON-networks
- CATV-overlay in FTTx und xPON-networks



Features:

- High optical output power of +18dBm or +21 dBm at each output port (other optical output levels on request)
- Up to 32 possible optical outputs
- Integrated optical isolation of the downstream wavelength of 1550 nm and all other possible wavelengths in upstream for the realization of standard-RFoG, CWDM-RFoG- or GPON-networks
- Low insertion loss in DS&US and high isolation of DS&US (>50dB)
- Low noise figure
- Integrated micro controller and LCD
- Parameter-Display: input/output optical power, pump-bias, temperature and voltage
- Supports SNMP monitoring and WebGUI
- Redundant power supply
- 19", 1 HE Rack Unit type

OA 1155-STANDARD - 18/19/21 dB

Type	Article number	Number of outputs	Optical output power at each output (dBm)	GPON optimized*	CWDM-RFoG*	Rack units
OA 1155-1-18	5700 1613	1	18			1
OA 1155-1-21	5700 1813	1	21			1
OA 1155-4-18	5700 1810	4	18			1
OA 1155-4-21	5700 1809	4	21			1
OA 1155-4-21w	5700 2302	4	21			1
OA 1155-8-21	5700 2426	8	21			1
OA 1155-8-21w	5700 2010	8	21	x	x	1
OA 1155-16-21	5700 2427	16	21			1
OA 1155-16-21w	5700 2009	16	21	x	x	2

TECHNICAL SPECIFICATIONS

Data Sheet

Performance			Index		
			Min	Typ	Max
Merkmale Optik	Opt. input wavelength (λ)	nm	1545		1565
	Optical input level	dBm	-5	3	10
	Optical output power (at each output)	dBm	11		21
	Number of ports		1		32
	Noise ratio	dB	4		5.5
	Maximum gain	dB			27
	Polarization dependent loss	dB		0.1	0.3
	Polarization dependent gain	dB			0.5
	Insertion loss (DS&US) (1550nm in DS, CWDM/ 1550 in US)	dB	0.6	0.9	1.6
	Isolation DS/US	dB	50	58	70
General Features	SNMP Network Management			RJ 45	
	Power supply	V AC	90	230	265
	Power input	W			50
	Operating temperature	°C	0	22	50
	Storage temperature	°C	-40		85
	Relative humidity	%	5	55	95
	Dimensions			482 x 360 x 90	W x D x H
	Weight	kg		11.3	

High Isolation between DS/US necessary. Example:

Return receiver (Rx) Input power (dBm)	Gain and isolation DS / US		Optical DS performance at the input of the Upstream-Rx
-8... -28 dBm	21 dB	30 dB	-9 dBm (noise)
-8... -28 dBm	21 dB	50 dB	-29 dBm (noisefree)

* All of the optical amplifiers can be delivered with a special filter for GPON, RFoG or CWDM-RFoG.
All of the optical amplifiers are RFoG optimized, WebGui and SNMP suitable.

OPTICAL DIRECT MODULATED TRANSMITTER 1310NM

- Modular optical Transmitter for Cable TV signals (CATV)
- Cooled 1310nm DFB laser with electronic multi-point-pre-distortion- keeps intermodulation interference (CTB,CSO) low
- Microprocessor controlled level control (ALC) for uncomplicated electric operation with constant transmission parameters
- Recommended for "Deep Fiber" applications, e.g. HFC Access networks with small coax clusters and FTTx-networks
- Flexible and service-friendly through modular construction, module slots on rear chassis
- 19" Base unit, 1RU with power supply and 2 slots for transmitter modules OTM 813-xx
- Signal connectors on rear chassis, displays and test points on front chassis
- Microprocessor controlled and display functions with alpha-numeric LCD-Display
- Addressable network management interface for remote control of modules and base unit compatible with SNMP
- Alarm and status signalisation with LEDs



Type	OT 813	OTM 813-08	OTM 813-10	OTM 813-12	OTM 813-13.5
Article-No.	5700 1321	5700 1322	5700 1323	5700 1324	5700 1325
Description	base unit with slots for transmitter modules, incl. power supply	optical transmitter module 1310nm, output power 8 dBm (6mW)	optical transmitter module 1310nm, output power 10 dBm (10mW)	optical transmitter module 1310nm, output power 12 dBm (16mW)	optical transmitter module 1310nm, output power 13.5 dBm (22.3mW)

Type	OT 813 / OTM 813-xx	
Optical output power	dBm	8 / 10 / 12 / 13.5, direct modulated DFB-Laser
Optical wavelength	nm	1310 ± 20
RF frequency range	MHz	47 - 870
RF input level	dBμV	80 ± 3 (Multiple channel load > 20AM/TV channel)
C/N	dB	52 (10 km fiber distance, receiver input 0 dBm)
CTB	dB	-67
CSO	dB	-62
RF flatness	dB	± 0.75
RF impedance	Ω	75
RF input return loss	dB	> 16 / 47-550 MHz, > 14 / 550-870 MHz
Operating temperature	°C	+ 5 ... + 40
Overall relative humidity	%	40 - 70
Fibre connector		SC/APC
RF connector		F- connectors
NMS-Interface		RS 232/485, base unit
Operating voltage	V~	230 (86 - 264), Switch mode power supply in base unit
Power consume	W	50 (Base unit with 2 modules)
Laser class		1M, DIN EN 60825-1 (2008)

OPTICAL FORWARD PATH RECEIVER

- Full optical HFC receiver in 19" single rack unit housing
- With optical-electrical converter module with low noise pre-Amplifier
- High output level with low, non-linear distortions (CTB, CSO) through power doubling output stage
- Connections for fibre (SC/APC) and RF socket for signal output on rear chassis
- Modular construction, consisting of base unit with integrated power supply and receiver slot
- Signal connectors on rear chassis, displays and test points on front chassis
- DC test point, optical input level (5V/mW) and level signalization with LED
- Simple Plug & Play operation
- Efficient, energy-saving switch-mode power supply



Type	OR 801
Article-No.	5700 1328
Description	19" Optical receiver, 1 rack unit, 47 – 862 MHz, -6...+3dBm

Type	OR 801	
Operation wavelength (λ)	nm	1000 - 1600
Optical return loss	dB	> 45
Optical input power	dBm	-6 ... +3
RF frequency range	MHz	47 - 862
RF output Level	dB μ V	> 100 (@ 0dBm optical input power, OMI = 4%)
C/N	dB	51
CTB	dB	< -65
CSO	dB	< -62
Test point optical input	V/mW	5
RF impedance	Ω	75
Test point RF output	dB	-20
Operating temperature	$^{\circ}$ C	+ 5 ... + 40
Overall relative humidity	%	40 - 70
Fibre connector		SC/APC
RF connector		F-connectors
Operating voltage	V~	230 (180-244), Switch mode power supply
Power consumption	W	20 (Base unit with receiver module)

OPTICAL RETURN PATH RECEIVER

DELTA Optical return path receiver is designed for converting upstream optical signal into RF signals at the head-end or remote hubs

- Modular return path receiver for optical fibre hubs in HFC and FTTH access networks
- Optical-electrical converter module and with low noise pre-amplifier
- 19" Base unit, 1 rack unit (RU) for 3 receiver modules ORM 200
- High output ability through power doubling output stage
- Contacting of display and test signals via SUB-D Plug to front panel of base unit
- Configurable as "point-to-point" and "point-to-multi-point" links
- User-friendly and tidy: Signal connectors on rear chassis, displays and test points on front chassis



Type	OR 203	ORM 200
Article-No.	5700 1326	5700 1327
Description	19" 1HE, Base unit incl. power supply for 3 return path receiver modules	Optical return path receiver module, 5 - 200 MHz, SC/APC

Type	OR 203 + ORM 200	
Optical wavelength	nm	1000 - 1600
Optical return loss	dB	> 45
Optical input power	dBm	-6 ... +3
RF frequency range	MHz	5 - 200
RF output Level	dB μ V	100 (@ 0dBm optical input power, OMI = 4%)
C/N	dB	51
CTB	dB	< -65
CSO	dB	< -62
Test point optical input	V/mW	5
RF impedance	Ω	75
Test point RF output	dB	-20
Operating temperature	$^{\circ}$ C	+ 5 ... + 40
Overall relative humidity	%	40 - 70
Fibre connector		SC/APC
RF connector		F-Connectors
Operating voltage	V~	230 (180-244)
Power consumption	W	46 (base unit with receiver module)

OPTICAL RETURN PATH RECEIVER RFoG

DELTA Optical return path receiver is designed for RFoG FTTx applications. Converting an upstream optical signal into RF signals at the head-end or remote hubs.

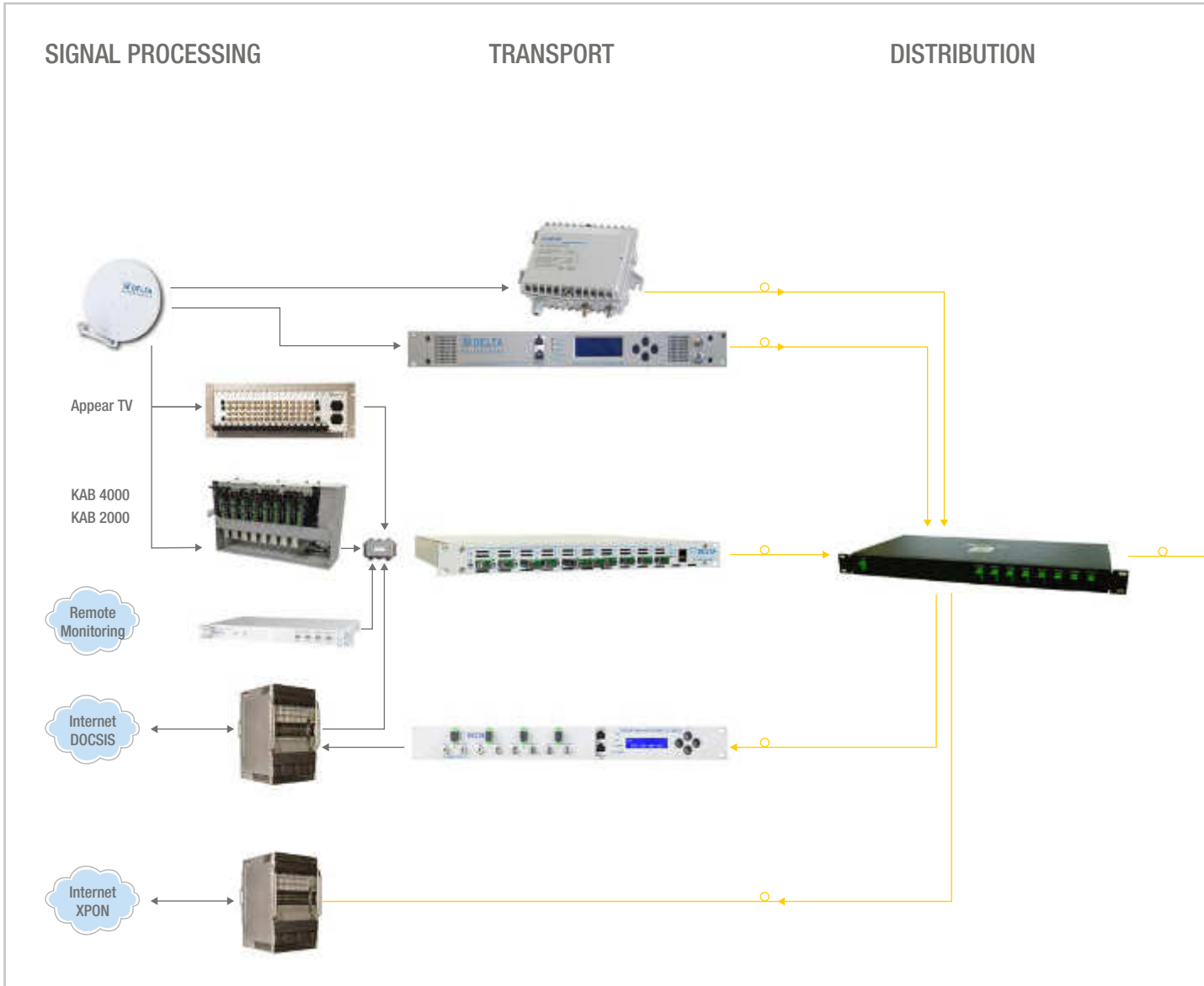
- 4-/8-Port receiver
- All receivers are packed in a standard 19", 1 RU
- Band receiver 1260nm – 1620nm
- Optical input power range -26 dBm to -10 dBm
- RF output power adjustable from 70 to 100 dBμV
- Low noise enables DOCSIS 3.1 upstream channel bonding
- Test / Monitor points for each RF output
- Front mounted SC/APC connectors
- Temperature-range: 0°C to +50°C
- Redundant power supply



Type	OR 204 L	OR 208 L	OR 204 H	OR 208 H
Article-No.	5700 1601	5700 2922	5700 2494	5700 2923
Description	return path receiver 1260..1620nm, 4 inputs, 4 RF-outputs, SC/APC, 80 MHz return path	return path receive 1260..1620nm, 8 inputs, 8 RF-outputs, SC/APC, 80 MHz return path	return path receiver 1260..1620nm, 4 inputs, 4 RF-outputs, SC/APC, 204 MHz return path	return path receiver 1260..1620nm, 8 inputs, 8 RF-outputs, SC/APC, 204 MHz return path

Type		OR 204 L / OR 208 L	OR 204 H / OR 208 H
Operation wavelength (λ)	nm	1260 - 1620	
Receiving Power	dBm	-20 ... -12	
Optical fibre connector		SC/APC	
RF bandwidth	MHz	5-85	5-204
RF output power	dBμV	75 - 95	
Flatness	dB	≤ ± 0.75	
Return loss	dB	16	
RF test point/Monitor	dB	-20 ± 0.5	
RF connector	dB	F-female	
Equivalent input noise	pA/√Hz	0.7	1.0
Power supply	V~	230	
Power consumption per module	W	max. 3	
Operating temperature	°C	0 - +50	
Dimensions (W x D x H)	mm	482 x 310 x 44	

OPTICAL DISTRIBUTION- / ACCESS NETWORK



Professional Headend for signal processing

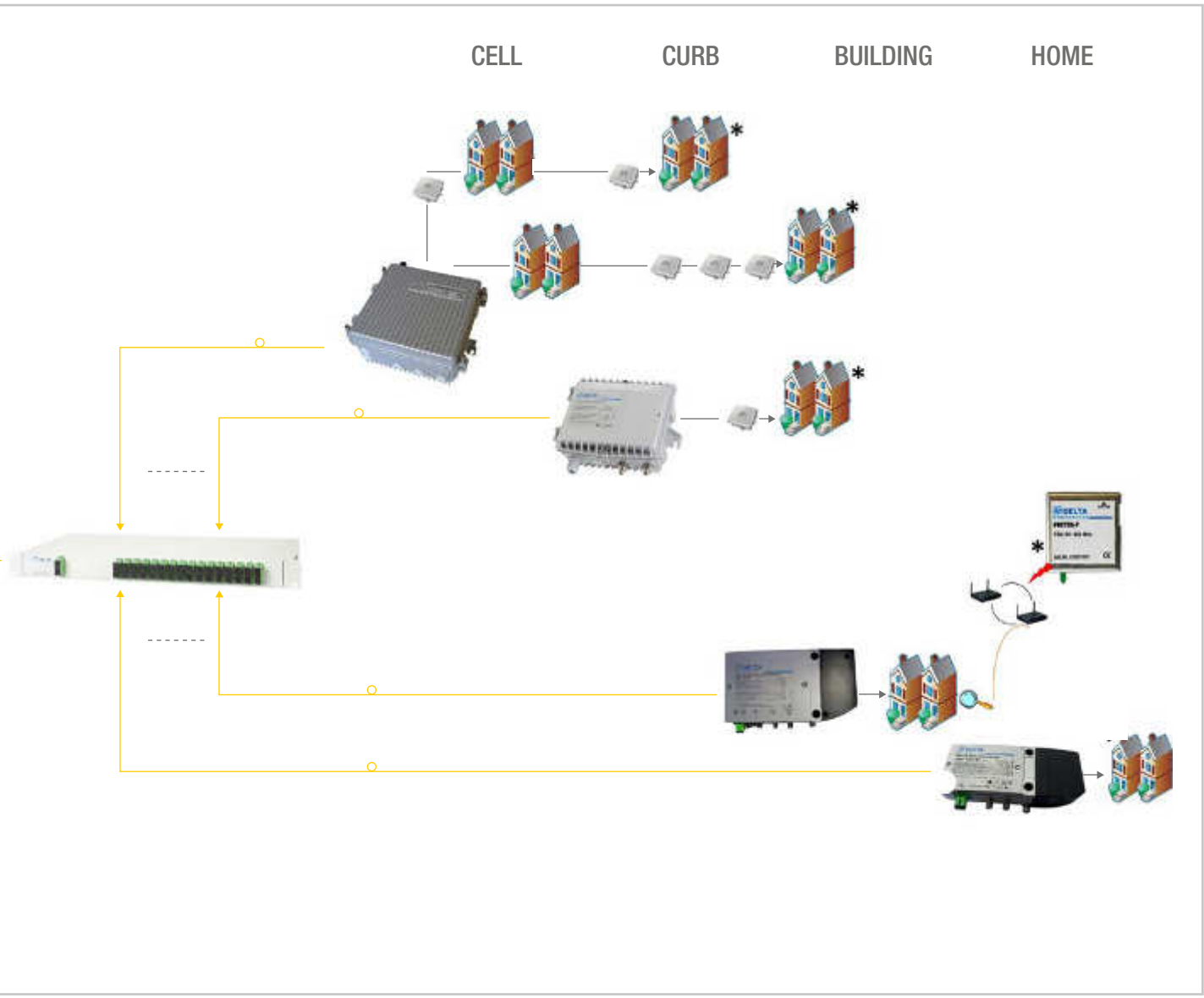
- || appear TV
- || KAB 4000
- || KAB 2000
- || HEC1004, remote monitoring of all components

Optical Headend

- || SAT transmitter 2.5GHz
- || SAT transmitter 5.5GHz
- || CATV transmitter 1.2GHz
- || Optical amplifier
- || Optical return way receiver
- || passive components VT, STA, etc
- || Host System XFP

Optical Passive Network (PON)

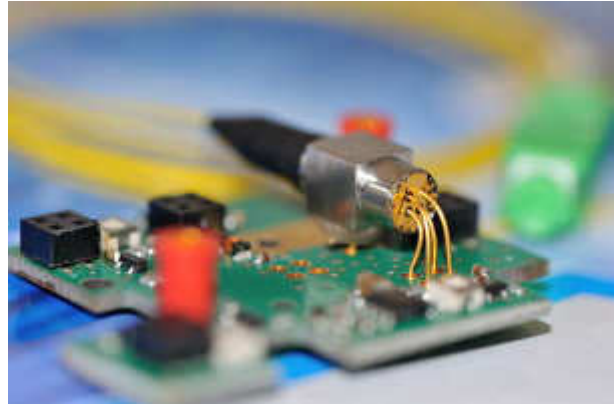
- || Optical wavelength multiplexing
- || Optical splitter



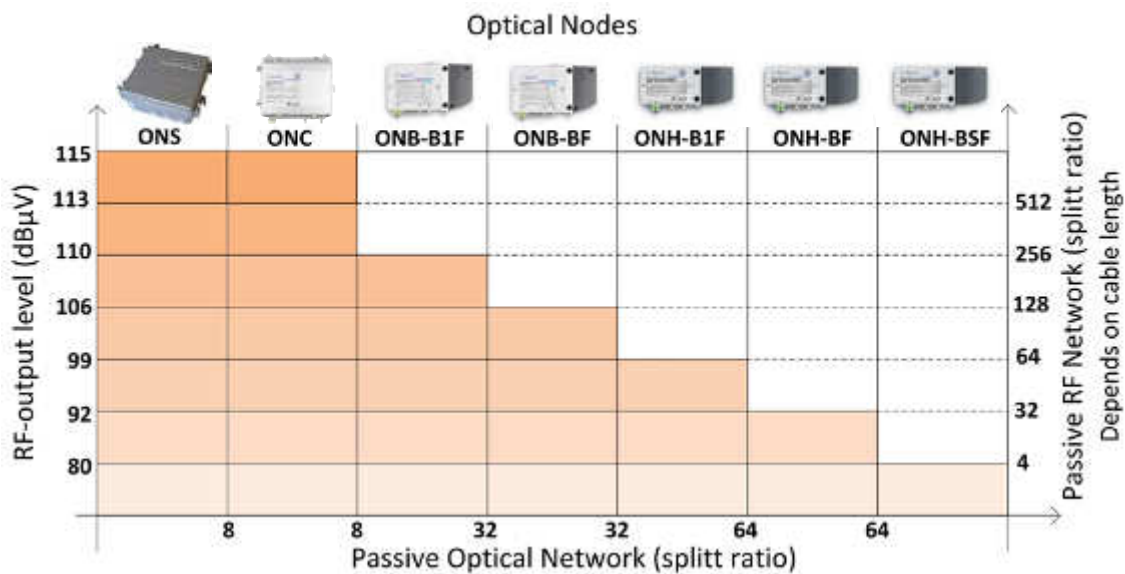
Optical Nodes

- All CWDM wavelengths available
- Burst mode and CW mode
- low cost monitoring
- Green intelligence

PRODUCT OVERVIEW OPTICAL NODES



As a specialist for HFC- and RFoG-networks, DELTA Electronics offers a wide range of optical nodes. They are optimized for the individual applications at different locations. With the smallest optical nodes also a low number of users can be connected to the RFoG-network. Residential districts can be connected to the optical network with bigger nodes such as the ONB, ONC or ONS in a redundant concept.



The decision for a certain optical node depends on several factors:

- Level of the maximum RF-loss after the optical node (passive splitters, length of coaxial cable, etc.)
- Number of fibers for down- and upstream
- Applied wavelength in both directions
- Operating mode of the laser (burst- or continuous-mode)
- Existing DOCSIS standard and DOCSIS operation in upstream (channel bonding)
- Preferred way of monitoring and or FOSTRA-D (DOCSIS compliant)
- Remote-control with FOSTRA-F (new RFoG Standard): DS ON/OFF, Burst Mode ON/OFF, Ingress Detection Switch 0 / 6 / 45 dB

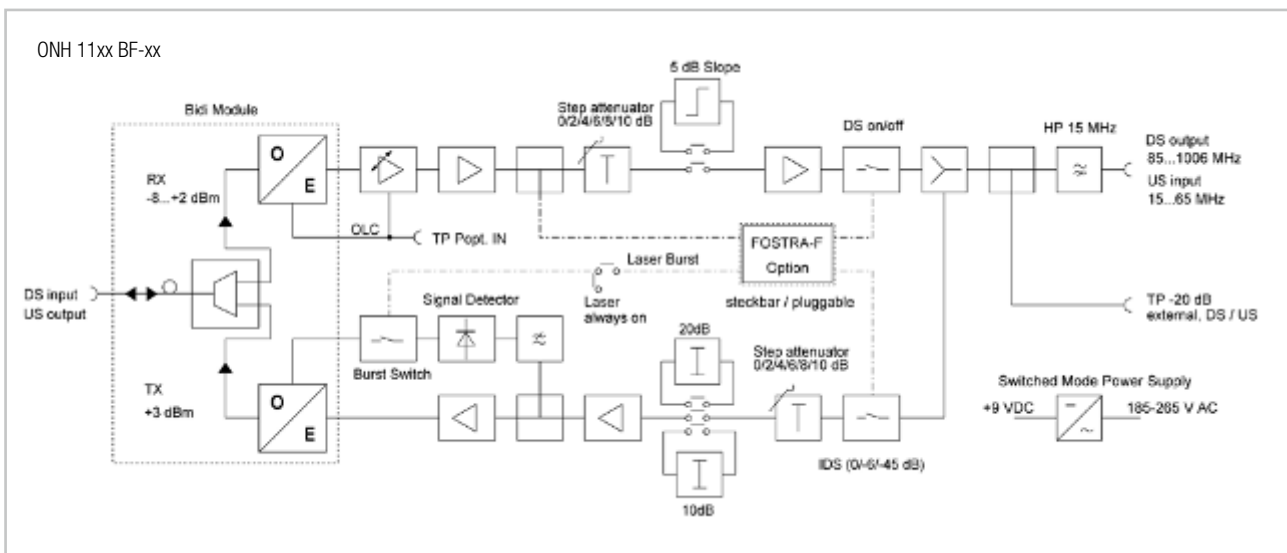
RFoG MICRO NODE - PLUS

Micronode for RFoG networks, FTTH/FTTB applications

- || Extremely low noise optical receiver
- || Constant RF output level at wide optical input power range
- || OLC function based on optical input power
- || Interstage attenuator and slope
- || Optical input power indicator and monitoring LED's
- || RF input and output test point
- || Ultra Low noise DFB- laser with isolator in burst mode operation
- || Internal WDM filter US/DS wavelength for RFoG-Application
- || Wavelength available from 1270nm to 1610nm at CWDM grid to avoid OBI
- || Remote controllable in DS & US due to FOSTRA-F receiver module



Type	ONH 1000	ONH 11xx BSF-xx	ONH 11xx BF-xx	ONH 11xx B1F-xx
Description	Optical Micro-Receiver, 1550nm, 40-1006 MHz, 92 dBµV RF-output level (without return path)	DS: 1310m / 1550nm US: CWDM 80 dBµV RF-output level	DS: 1310m / 1550nm US: CWDM 92 dBµV RF-output level	DS: 1310m / 1550nm US: CWDM 99 dBµV HF-output level



Type		ONH 11xx BSF-xx	ONH 11xx BF-xx	ONH 11xx B1F-xx	
Applications		FTTH, FTTB, DOCSIS-PON/RFoG			
Compact die-cast housing	mm	188 x 85 x 50 / IP 20, In-door			
Weight	kg	0.8			
Fibre connectors		SC/APC			
RF connectors		F-female			
Mains feeding	V~/W	230 / < 6			
Operating temperature	°C	-20...+55, free convection			
Adjustment elements		Step Spin Attenuator and Jumper			
Internal WDM (Tx / Rx)	nm	DS / US			
Downstream	Optical wavelength	nm	1550 ± 10 / 1310 ± 10		
	Optical input power	dBm	-8...+2, max. +2 dBm optical input power		
	Frequency range	MHz	85...1006		
	Frequency response	dB	± 0.7		
	Optical level control (OLC)	dBm	-7...+1 (RF-output level ± 1 dB)		
	RF output level	dBµV	80 ± 1	92 ± 1	99 ± 1
			@ -7...+1 dBm, OMI = 4 %, CTB,CSO > 60 dBc		
	C/N		50 dBc @ -3 dBm, OMI 4%		
	RF level attenuator	dB	0 / 2 / 4 6 / 8 / 10 (Step Spin Attenuator)		
	RF slope	dB	0 / 3 / 6 (Switchable by jumper)		
	Test point RF output	dB	-20 (F-female, external)		
	Monitoring optical input	dBm	Green LED on: input > -10		
	Test point optical input	V/mW	2 (Inside housing)		
	Upstream	DFB Laser / optical power	dBm	3	
Laser operation			Burst Mode (Laser "Delay-Time" ≤ 0,8 µsec) SCTE compliant		
RF input dynamic range		dBµV	76...100 ("Laser ON"@ Min. input RF-Level 76 dBµV)		
Frequency range		MHz	15...65		
RF input level		dBµV	OMI 15% @ 70 (Att. = 0 dB)		
RF input level attenuator	dB	0 / 2 / 4 6 / 8 / 10 (Step Attenuator 2 dB steps), 0 / 10 / 20 dB Jumper Att.			
Monitoring	HEC 1004 Controller		FSK-TX, 868 MHz		
	FOSTRA F Control module		FSK Receiver RX : 868 MHz		

VERSIONS

ONH 11 xx Bx F-xx

Frequency range	US-wavelength	Laser operation, monitoring, RF-output level	DS-wavelength	Diplexer (MHz)
11: up to 1006 MHz	27: 1270 nm 29: 1290 nm 31: 1310 nm 33: 1330 nm 35: 1350 nm 37: 1370 nm 39: 1390 nm 41: 1410 nm 43: 1430 nm 45: 1450 nm 47: 1470 nm 49: 1490 nm 51: 1510 nm 53: 1530 nm 55: 1550 nm 57: 1570 nm 59: 1590 nm 61: 1610 nm	B: burst and continuous-Mode 1: 99 dB μ V _: 92 dB μ V S: 80 dB μ V F: FSK-monitoring prepared	13: 1310 nm 15: 1550 nm	-: 565 (5-65/85) 85: 585 (5-85/105)

Please use the following article numbers when ordering:

Type	Article-No.	Remarks
ONH 1000	5700 1708	Optical receiver 92 dB μ V, 5-1006 MHz
ONH 1127 BF-15	5700 2225	ONH with 1270 nm in US, 1550 in DS, BIDI-module, 92 dB μ V
ONH 1129 BF-15	5700 2226	ONH with 1290 nm in US, 1550 in DS, BIDI-module, 92 dB μ V
ONH 1131 BF-15	5700 2227	ONH with 1310 nm in US, 1550 in DS, BIDI-module, 92 dB μ V
ONH 1133 BF-15	5700 2228	ONH with 1330 nm in US, 1550 in DS, BIDI-module, 92 dB μ V
ONH 1135 BF-15	5700 2229	ONH with 1350 nm in US, 1550 in DS, BIDI-module, 92 dB μ V
ONH 1137 BF-15	5700 2230	ONH with 1370 nm in US, 1550 in DS, BIDI-module, 92 dB μ V
ONH 1139 BF-15	5700 2231	ONH with 1390 nm in US, 1550 in DS, BIDI-module, 92 dB μ V
ONH 1141 BF-15	5700 2232	ONH with 1410 nm in US, 1550 in DS, BIDI-module, 92 dB μ V
ONH 1143 BF-15	5700 2233	ONH with 1430 nm in US, 1550 in DS, BIDI-module, 92 dB μ V
ONH 1145 BF-15	5700 2234	ONH with 1450 nm in US, 1550 in DS, BIDI-module, 92 dB μ V
ONH 1147 BF-15	5700 2235	ONH with 1470 nm in US, 1550 in DS, BIDI-module, 92 dB μ V
ONH 1149 BF-15	5700 2236	ONH with 1490 nm in US, 1550 in DS, BIDI-module, 92 dB μ V
ONH 1151 BF-15	5700 2237	ONH with 1510 nm in US, 1550 in DS, BIDI-module, 92 dB μ V
ONH 1153 BF-15	5700 2238	ONH with 1530 nm in US, 1550 in DS, BIDI-module, 92 dB μ V
ONH 1157 BF-15	5700 2239	ONH with 1570 nm in US, 1550 in DS, BIDI-module, 92 dB μ V
ONH 1159 BF-15	5700 2240	ONH with 1590 nm in US, 1550 in DS, BIDI-module, 92 dB μ V

Type	Article-No.	Remarks
ONH 1161 B1F-15	5700 2112	ONH with 1610 nm in US, 1550 in DS, BIDI-module, 92 dB μ V
ONH 1127 B1F-13	5700 2241	ONH with 1270 nm in US, 1310 in DS, BIDI-module, 99 dB μ V
ONH 1129 B1F-13	5700 2242	ONH with 1290 nm in US, 1310 in DS, BIDI-module, 99 dB μ V
ONH 1133 B1F-13	5700 2243	ONH with 1330 nm in US, 1310 in DS, BIDI-module, 99 dB μ V
ONH 1135 B1F-13	5700 2244	ONH with 1350 nm in US, 1310 in DS, BIDI-module, 99 dB μ V
ONH 1137 B1F-13	5700 2245	ONH with 1370 nm in US, 1310 in DS, BIDI-module, 99 dB μ V
ONH 1139 B1F-13	5700 2246	ONH with 1390 nm in US, 1310 in DS, BIDI-module, 99 dB μ V
ONH 1141 B1F-13	5700 2247	ONH with 1410 nm in US, 1310 in DS, BIDI-module, 99 dB μ V
ONH 1143 B1F-13	5700 2248	ONH with 1430 nm in US, 1310 in DS, BIDI-module, 99 dB μ V
ONH 1145 B1F-13	5700 2249	ONH with 1450 nm in US, 1310 in DS, BIDI-module, 99 dB μ V
ONH 1147 B1F-13	5700 2250	ONH with 1470 nm in US, 1310 in DS, BIDI-module, 99 dB μ V
ONH 1149 B1F-13	5700 2251	ONH with 1490 nm in US, 1310 in DS, BIDI-module, 99 dB μ V
ONH 1151 B1F-13	5700 2252	ONH with 1510 nm in US, 1310 in DS, BIDI-module, 99 dB μ V
ONH 1153 B1F-13	5700 2253	ONH with 1530 nm in US, 1310 in DS, BIDI-module, 99 dB μ V
ONH 1155 B1F-13	5700 2254	ONH with 1550 nm in US, 1310 in DS, BIDI-module, 99 dB μ V
ONH 1157 B1F-13	5700 2255	ONH with 1570 nm in US, 1310 in DS, BIDI-module, 99 dB μ V
ONH 1159 B1F-13	5700 2256	ONH with 1590 nm in US, 1310 in DS, BIDI-module, 99 dB μ V
ONH 1161 B1F-13	5700 2257	ONH with 1610 nm in US, 1310 in DS, BIDI-module, 99 dB μ V
ONH 1127 B1F-15	5700 2258	ONH with 1270 nm in US, 1550 in DS, BIDI-module, 99 dB μ V
ONH 1129 B1F-15	5700 2259	ONH with 1290 nm in US, 1550 in DS, BIDI-module, 99 dB μ V
ONH 1131 B1F-15	5700 2260	ONH with 1310 nm in US, 1550 in DS, BIDI-module, 99 dB μ V
ONH 1133 B1F-15	5700 2261	ONH with 1330 nm in US, 1550 in DS, BIDI-module, 99 dB μ V
ONH 1135 B1F-15	5700 2262	ONH with 1350 nm in US, 1550 in DS, BIDI-module, 99 dB μ V
ONH 1137 B1F-15	5700 2263	ONH with 1370 nm in US, 1550 in DS, BIDI-module, 99 dB μ V
ONH 1139 B1F-15	5700 2264	ONH with 1390 nm in US, 1550 in DS, BIDI-module, 99 dB μ V
ONH 1141 B1F-15	5700 2265	ONH with 1410 nm in US, 1550 in DS, BIDI-module, 99 dB μ V
ONH 1143 B1F-15	5700 2266	ONH with 1430 nm in US, 1550 in DS, BIDI-module, 99 dB μ V
ONH 1145 B1F-15	5700 2267	ONH with 1450 nm in US, 1550 in DS, BIDI-module, 99 dB μ V
ONH 1147 B1F-15	5700 2268	ONH with 1470 nm in US, 1550 in DS, BIDI-module, 99 dB μ V
ONH 1149 B1F-15	5700 2269	ONH with 1490 nm in US, 1550 in DS, BIDI-module, 99 dB μ V
ONH 1151 B1F-15	5700 2270	ONH with 1510 nm in US, 1550 in DS, BIDI-module, 99 dB μ V
ONH 1153 B1F-15	5700 2271	ONH with 1530 nm in US, 1550 in DS, BIDI-module, 99 dB μ V
ONH 1157 B1F-15	5700 2272	ONH with 1570 nm in US, 1550 in DS, BIDI-module, 99 dB μ V
ONH 1159 B1F-15	5700 2273	ONH with 1590 nm in US, 1550 in DS, BIDI-module, 99 dB μ V
ONH 1161 B1F-15	5700 1957	ONH with 1610 nm in US, 1550 in DS, BIDI-module, 99 dB μ V
ONH 1161 B1F-15-85	5700 2675	ONH with 1610 nm in US, 1550 in DS, BIDI-module, 99 dB μ V, 85 MHz

MINI FIBRE NODE

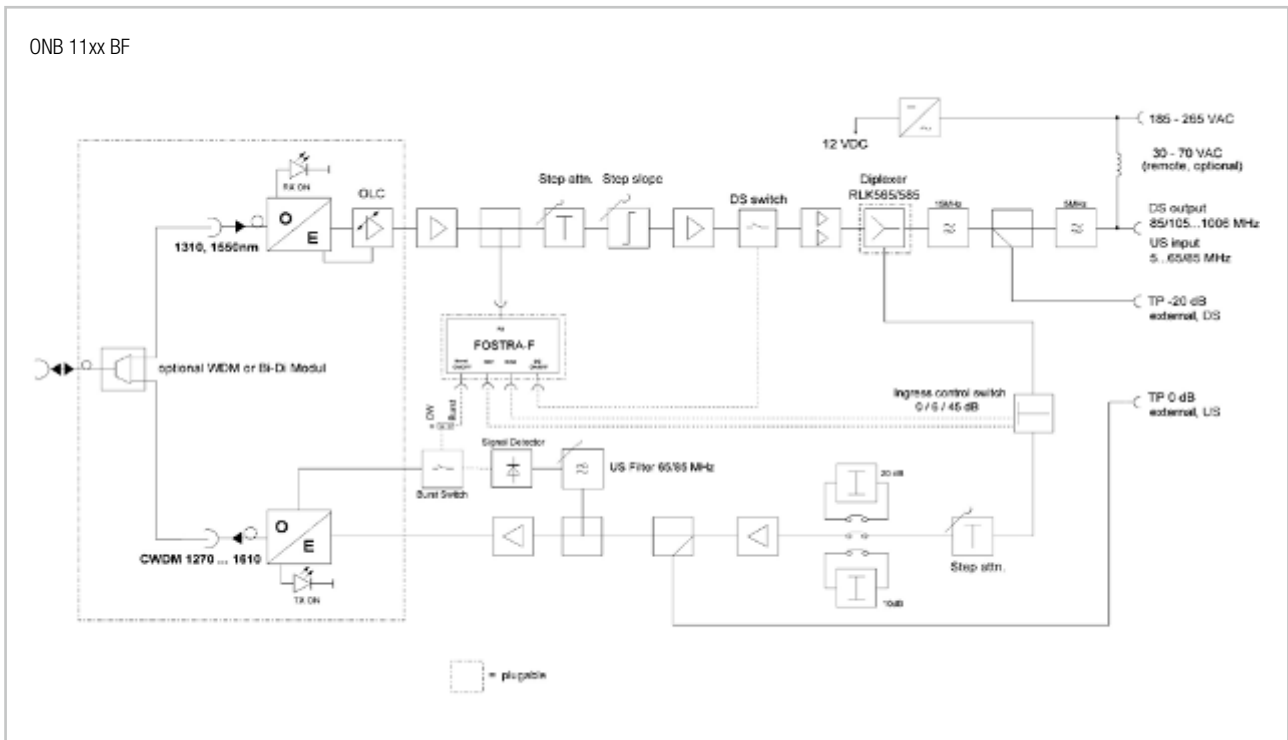
Mini Node for HFC and RFoG networks

FTTH / FTTB- Applications

- || Modular concept for one and two fibre solutions
- || Constant output level over a wide range of optical input power
- || OLC-function based on optical input power
- || Low-noise CWDM DFB-Laser with Burst and CW-Mode (SCTE compliant)
- || Testpoint and monitoring LED for optical input power
- || Upstream with Diplexer RLK565/585 selectable
- || RF-testpoints for Upstream and Downstream
- || Remote controllable in DS & US due to FOSTR-A receiver module
- || Optional remote power
- || Available with GPON-Bypass



Type	ONB 1000 / ONB 1000-1	ONB 11xx BF-X	ONB 11xx B1F-X	ONB 11xx B1F-10
Description	Optical Mini receiver 5...1006 MHz 106 dBµV / 110 dBµV RF-output level	DS: 1550nm / 1310nm US: CWDM 5...1006 MHz 106 dBµV RF-output level	DS: 1550nm / 1310nm US: CWDM 5...1006 MHz 110 dBµV RF-output level	DS: 1260-1620nm US: CWDM 5...1006 MHz 110 dBµV RF-output level 1 or 2 fibre node



Type		ONB 11xx B	
Applications		HFC, FTTC, DOCSIS-PON/RfoG	
Compact die-cast housing		210 x 123 x 70 / IP 50, In-door	
Weight	kg	1.3	
Fiber connectors		SC/APC, 2 pcs (without internal WDM), 1 pcs (with internal WDM)	
RF connectors		F-Buchse	
Mains feeding	V~/W	185...265 / 13.5	
Operating temperature	°C	-20...+55 Free convection	
Adjustment elements		Step Spin Regler 2 dB steps for level and slope control	
Internal WDM (Tx / Rx)	nm	DS / US	
Downstream	Optical wavelength	nm	1550 / 1310 (others on request)
	Optical input power	dBm	-8...+2
	Frequency range	MHz	-7...+1 (RF-output level \pm 1 dB)
	Frequency response	dB	47/85...1006 (Diplexer RLK 30 / 65)
	Optical level control (OLC)	dBm	\pm 0.7
	RF output level	dB μ V	106 @ -7...+1 dBm, OMI = 4% (CTB,CSO > 60 dBc, 41Ch. PAL, 54 Ch.QAM, Flat) 110 @ -7...+1 dBm, OMI = 4% (CTB,CSO > 60 dBc, 41Ch. PAL, 54 Ch.QAM, Slope 5dB)
	C/N		53 @ -3 dBm, OMI 4%
	RF level attenuator	dB	0 / 2 / 4 6 / 8 / 10 Step Spin Controller
	RF slope	dB	0 / 2 / 4 6 / 8 / 10 Step Spin Controller
	Test point RF output	dB	Green LED on: input > -10
Upstream	Monitoring optical input	dBm	2 (Inside enclosure)
	Test point optical input	V/mW	+3
	DFB Laser / optical power	dBm	Burst Mode, Laser „Delay-Time“ < 1 μ Sec
	Laser operation		74 ... 100 („Laser ON“ @ 70 dB μ V)
	RF input dynamic range	dB μ V	15..65/85 as well as 15..85/105
	Frequency range	MHz	OMI 15% @ 72 (Att. = 0 dB)
	RF input level	dB μ V	0 / 2 / 4 6 / 8 / 10 Step Spin, 0/10/20dB Jumper Attn.
RF input level attenuator	dB	Green LED on: output power available	
Monitoring	HEC Controller		FSK-TX, 868 MHz
	FOSTRA F Control module		FSK Receiver RX : 868 MHz

VERSIONS

ONB R 11 xx BF-xx-x-xx

Powering (V~)	Frequency range (MHz)	US-wave-length	Laser operation, monitoring	DS-wave-length	Number of Fibres	Diplexer (MHz)
-: local powering 230 V~	11: up to 1006 MHz	27: 1270 nm 29: 1290 nm	B: burst mode and continuous mode	13: 1310 nm	1: one fiber for US and DS	-: RLK 565 (5-65/85)
R: remote powering 28-65 V~	12: up to 1218 MHz	31: 1310 nm 33: 1330 nm 35: 1350 nm 37: 1370 nm 39: 1390 nm 41: 1410 nm 43: 1430 nm 45: 1450 nm 47: 1470 nm 49: 1490 nm 51: 1510 nm 53: 1530 nm 55: 1550 nm 57: 1570 nm 59: 1590 nm 61: 1610 nm	F: FSK-monitoring -: RF-output level 106 dBμV 1: RF-output level 110 dBμV	15: 1550 nm 10: 1260-1620 nm	2: one fiber for US and one fiber for DS GPON: one fiber for RFoG and GPON bypass filter	85: RLK 585 (5-85/105) 204: RLK 5204 (5-204/ 258)

Please use the following article numbers when ordering:

Type	Article-No.	Remarks
ONB 1000	5700 1958	Optical receiver, 106 dBμV, 5-1006 MHz
ONB 1000-1	5700 2528	Optical receiver, 110 dBμV, 5-1006 MHz
ONB 1127 BF-13-1	5700 2179	ONB with 1270 nm in US, 1310 in DS, integrated WDM
ONB 1129 BF-13-1	5700 2180	ONB with 1290 nm in US, 1310 in DS, integrated WDM
ONB 1133 BF-13-1	5700 2181	ONB with 1330 nm in US, 1310 in DS, integrated WDM
ONB 1135 BF-13-1	5700 2182	ONB with 1350 nm in US, 1310 in DS, integrated WDM
ONB 1137 BF-13-1	5700 2183	ONB with 1370 nm in US, 1310 in DS, integrated WDM
ONB 1139 BF-13-1	5700 2184	ONB with 1390 nm in US, 1310 in DS, integrated WDM
ONB 1141 BF-13-1	5700 2185	ONB with 1410 nm in US, 1310 in DS, integrated WDM
ONB 1143 BF-13-1	5700 2186	ONB with 1430 nm in US, 1310 in DS, integrated WDM
ONB 1145 BF-13-1	5700 2187	ONB with 1450 nm in US, 1310 in DS, integrated WDM
ONB 1147 BF-13-1	5700 2188	ONB with 1470 nm in US, 1310 in DS, integrated WDM
ONB 1149 BF-13-1	5700 2189	ONB with 1490 nm in US, 1310 in DS, integrated WDM
ONB 1151 BF-13-1	5700 2190	ONB with 1510 nm in US, 1310 in DS, integrated WDM
ONB 1153 BF-13-1	5700 2191	ONB with 1530 nm in US, 1310 in DS, integrated WDM
ONB 1155 BF-13-1	5700 2192	ONB with 1550 nm in US, 1310 in DS, integrated WDM
ONB 1157 BF-13-1	5700 2193	ONB with 1570 nm in US, 1310 in DS, integrated WDM
ONB 1159 BF-13-1	5700 2194	ONB with 1590 nm in US, 1310 in DS, integrated WDM
ONB 1161 BF-13-1	5700 2195	ONB with 1610 nm in US, 1310 in DS, integrated WDM
ONB 1127 BF-15-1	5700 2274	ONB with 1270 nm in US, 1550 in DS, integrated WDM
ONB 1129 BF-15-1	5700 2275	ONB with 1290 nm in US, 1550 in DS, integrated WDM
ONB 1131 BF-15-1	5700 1963	ONB with 1310 nm in US, 1550 in DS, integrated WDM

Type	Article-No.	Remarks
ONBR 1131 B1F-10-2-85	5700 2771	ONB with 1310 nm in US, 1260/1620 in DS, integrated WDM, 2 fiber, RLK 85
ONBR 1133 B1F-10-2-85	5700 2770	ONB with 1330 nm in US, 1260/1620 in DS, integrated WDM, 2 fiber, RLK 85
ONBR 1135 B1F-10-2-85	5700 2769	ONB with 1350 nm in US, 1260/1620 in DS, integrated WDM, 2 fiber, RLK 85
ONBR 1137 B1F-10-2-85	5700 2768	ONB with 1370 nm in US, 1260/1620 in DS, integrated WDM, 2 fiber, RLK 85
ONBR 1139 B1F-10-2-85	5700 2767	ONB with 1390 nm in US, 1260/1620 in DS, integrated WDM, 2 fiber, RLK 85
ONBR 1141 B1F-10-2-85	5700 2766	ONB with 1410 nm in US, 1260/1620 in DS, integrated WDM, 2 fiber, RLK 85
ONBR 1143 B1F-10-2-85	5700 2765	ONB with 1430 nm in US, 1260/1620 in DS, integrated WDM, 2 fiber, RLK 85
ONBR 1145 B1F-10-2-85	5700 2764	ONB with 1450 nm in US, 1260/1620 in DS, integrated WDM, 2 fiber, RLK 85
ONBR 1147 B1F-10-2-85	5700 2572	ONB with 1470 nm in US, 1260/1620 in DS, integrated WDM, 2 fiber, RLK 85
ONBR 1149 B1F-10-2-85	5700 2573	ONB with 1490 nm in US, 1260/1620 in DS, integrated WDM, 2 fiber, RLK 85
ONBR 1151 B1F-10-2-85	5700 2574	ONB with 1510 nm in US, 1260/1620 in DS, integrated WDM, 2 fiber, RLK 85
ONBR 1153 B1F-10-2-85	5700 2575	ONB with 1530 nm in US, 1260/1620 in DS, integrated WDM, 2 fiber, RLK 85
ONBR 1155 B1F-10-2-85	5700 2576	ONB with 1550 nm in US, 1260/1620 in DS, integrated WDM, 2 fiber, RLK 85
ONBR 1157 B1F-10-2-85	5700 2577	ONB with 1570 nm in US, 1260/1620 in DS, integrated WDM, 2 fiber, RLK 85
ONBR 1159 B1F-10-2-85	5700 2578	ONB with 1590 nm in US, 1260/1620 in DS, integrated WDM, 2 fiber, RLK 85
ONBR 1161 B1F-10-2-85	5700 2579	ONB with 1610 nm in US, 1260/1620 in DS, integrated WDM, 2 fiber, RLK 85
ONB 1127 B1F-10-1-85	5700 2783	ONB with 1270 nm in US, 1260/1620 in DS, integrated WDM, 1 fiber, RLK 85
ONB 1129 B1F-10-1-85	5700 2784	ONB with 1290 nm in US, 1260/1620 in DS, integrated WDM, 1 fiber, RLK 85
ONB 1131 B1F-10-1-85	5700 2785	ONB with 1310 nm in US, 1260/1620 in DS, integrated WDM, 1 fiber, RLK 85
ONB 1133 B1F-10-1-85	5700 2786	ONB with 1330 nm in US, 1260/1620 in DS, integrated WDM, 1 fiber, RLK 85
ONB 1135 B1F-10-1-85	5700 2787	ONB with 1350 nm in US, 1260/1620 in DS, integrated WDM, 1 fiber, RLK 85
ONB 1137 B1F-10-1-85	5700 2788	ONB with 1370 nm in US, 1260/1620 in DS, integrated WDM, 1 fiber, RLK 85
ONB 1139 B1F-10-1-85	5700 2789	ONB with 1390 nm in US, 1260/1620 in DS, integrated WDM, 1 fiber, RLK 85
ONB 1141 B1F-10-1-85	5700 2790	ONB with 1410 nm in US, 1260/1620 in DS, integrated WDM, 1 fiber, RLK 85
ONB 1143 B1F-10-1-85	5700 2791	ONB with 1430 nm in US, 1260/1620 in DS, integrated WDM, 1 fiber, RLK 85
ONB 1145 B1F-10-1-85	5700 2792	ONB with 1450 nm in US, 1260/1620 in DS, integrated WDM, 1 fiber, RLK 85
ONB 1147 B1F-10-1-85	5700 2793	ONB with 1470 nm in US, 1260/1620 in DS, integrated WDM, 1 fiber, RLK 85
ONB 1149 B1F-10-1-85	5700 2794	ONB with 1490 nm in US, 1260/1620 in DS, integrated WDM, 1 fiber, RLK 85
ONB 1151 B1F-10-1-85	5700 2795	ONB with 1510 nm in US, 1260/1620 in DS, integrated WDM, 1 fiber, RLK 85
ONB 1153 B1F-10-1-85	5700 2796	ONB with 1530 nm in US, 1260/1620 in DS, integrated WDM, 1 fiber, RLK 85
ONB 1155 B1F-10-1-85	5700 2797	ONB with 1550 nm in US, 1260/1620 in DS, integrated WDM, 1 fiber, RLK 85
ONB 1157 B1F-10-1-85	5700 2798	ONB with 1570 nm in US, 1260/1620 in DS, integrated WDM, 1 fiber, RLK 85
ONB 1159 B1F-10-1-85	5700 2799	ONB with 1590 nm in US, 1260/1620 in DS, integrated WDM, 1 fiber, RLK 85
ONB 1161 B1F-10-1-85	5700 2800	ONB with 1610 nm in US, 1260/1620 in DS, integrated WDM, 1 fiber, RLK 85
ONB 1000 - 1 - GPON	5700 2634	ONB with 1550 nm in DS, integrated GPON Bypass-filter
ONB 1161 B1F- GPON	5700 2594	ONB with 1610 nm in US, 1550 in DS, integrated GPON Bypass-filter

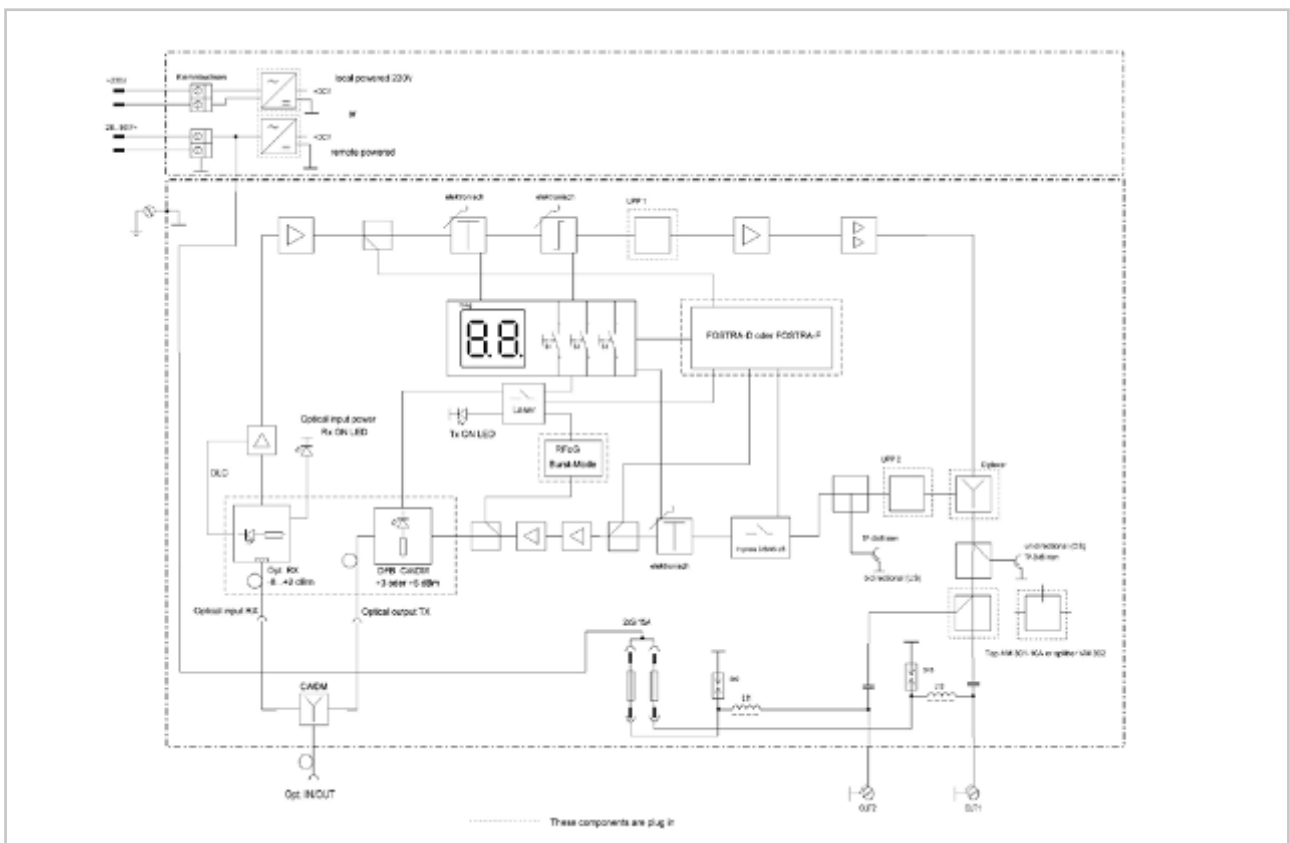
MEDIUM FIBRE NODE FOR HFC / FTTx

**A Fibre Node for the modernisation of HFC-networks
Especially suitable for FTTLA in 1.2 GHz HFC-networks and
reduction of the coaxial cluster**

- || Compact optical receiver with modular return way
- || High RF output level and dynamic range, 2 outputs
- || Low noise impedance receiver
- || Low noise DFB- laser in burst or CW mode operation
- || Optical level control (OLC) based on optical input power
- || 7-Segment display for various monitoring options and easy control
- || Optional remote power
- || Internal fibre splice management
- || Return way transmitter available in CWDM-grid (1270 - 1610nm)



Type	ONC 1200	ONCR 1200	ONCR 12xx	ONCR 12xx-BFD
Beschreibung	optical receiver 5...1218 MHz 115 dBµV RF-output level	optical receiver 5...1218 MHz 115 dBµV RF-output level	DS: selectable US: CWDM 5...1218 MHz 115 dBµV RF-output level	DS: selectable US: CWDM 5...1218 MHz 115 dBµV RF-output level controllable



Type		ONC(R) 1200, ONCR 12xx, ONCR 12xx-BFD	
Applications		HFC, FTTC/FTTB	
Compact die-cast housing	mm	225 x 195 x 95 / IP 65, out-door	
Fibre connectors (internal)		SC/APC (internal fibre slice management)	
Connectors		PG 11-RF output , PG 13.5 (opt. fibre feed-through)	
Mains feeding	V~/W	185...265 / 20	
Remote feeding	V~	28...65 / 0.67 A @ 30 VAC, 10 A	
Operating temperature	°C	-20...+55	
OLC	dBm	-7...+1 (RF output ±1dB, AGC)	
Adjustment elements	dB	0...15 (electronically adjustable in 1dB steps, 7-segm.display+micro)	
Return laser module		various available (3,6dBm DFB)	
RF outputs		1 od. 2 (with 2-way splitter or tab module 10 od. 20 dB)	
Downstream	Optical wavelength	nm	1260 ... 1620
	Optical input power	dBm	-8...+2
	Optical return loss	dB	≥ 20 -1.75/Okt. (65 - 1218 MHz) ≥ 20 -2/Okt. (85 - 1218 MHz) ≥ 20 -3/Okt. (204-1218 MHz) min 12 @ 1218 MHz
	Frequency range	MHz	85...1218 MHz
	Frequency response	dB	± 0.7 max. ±1
	RF output power	dBμV	115 CENELEC, flat, CTB/CSO >60dB
	C/N	dBc	50 @ -3 dBm, OMI 4%
	RF slope	dB	0...15 dB (electronically adjustable in 1dB steps)
	RF level adjustment	dB	0...15 dB (electronically adjustable in 1dB steps)
	RF test point	dB	20 (internal)
Monitoring optical input	dBm	greenLED on: input > -10	
Optical input power		7-segment display, power meter function	
Upstream	Laser wavelength	nm	1270 - 1610
	Optical Power	dBm	3;6
	Optical return loss	dB	60
	Frequency range	MHz	5...65/85/204 (Diplexer RLK 65 / 85 / 204)
	RF input level (CWDM)	dBμV	65, OMI 7% @ 0 dB attn
	RF input level attenuator	dB	0...15 (electronically adjustable in 1 dB steps)
	RF test point	dB	-20 (internal)
Monitoring optical output		Green LED on: output power available	

VERSIONS

ONC R 12xx BFD-xx-x-xx

Powering (V~)	Frequency range (MHz)	US-wave-length	Laser operation, monitoring	DS-wave-length	Number of Fibres	Diplexer (MHz)
-: local powering 230 V~	11: up to 1006 MHz	27: 1270 nm 29: 1290 nm	B: burst mode and continuous mode	15: 1550 nm	1: one fiber for US and DS	-: RLK 565 (5-65/85)
R: remote powering 28-65 V~	12: up to 1218 MHz	31: 1310 nm 33: 1330 nm 35: 1350 nm 37: 1370 nm 39: 1390 nm 41: 1410 nm 43: 1430 nm 45: 1450 nm 47: 1470 nm 49: 1490 nm 51: 1510 nm 53: 1530 nm 55: 1550 nm 57: 1570 nm 59: 1590 nm 61: 1610 nm	F: FSK-monitoring D: Docsis	10: 1260-1620 nm	2: one fiber for US and one fiber for DS GPON: one fiber for RFOG and GPON bypass filter	85: RLK 585 (5-85/105) 204: RLK 5204 (5-204/ 258)

Type	Article-No.	Remarks
ONC 1200	5700 2895	Optical Compact Receiver, 5-1200 MHz, 230 V~
ONCR 1200	5700 2896	Optical Compact Receiver, 5-1200 MHz, 28-65 V~
ONCR 1227 BFD-10-2-85	5700 2714	1270 in US, 1260-1620 in DS, 28-65 V~, BFD, 5-1218 MHz
ONCR 1229 BFD-10-2-85	5700 2715	1290 in US, 1260-1620 in DS, 28-65 V~, BFD, 5-1218 MHz
ONCR 1231 BFD-10-2-85	5700 2716	1310 in US, 1260-1620 in DS, 28-65 V~, BFD, 5-1218 MHz
ONCR 1233 BFD-10-2-85	5700 2717	1330 in US, 1260-1620 in DS, 28-65 V~, BFD, 5-1218 MHz
ONCR 1235 BFD-10-2-85	5700 2718	1350 in US, 1260-1620 in DS, 28-65 V~, BFD, 5-1218 MHz
ONCR 1237 BFD-10-2-85	5700 2719	1370 in US, 1260-1620 in DS, 28-65 V~, BFD, 5-1218 MHz
ONCR 1239 BFD-10-2-85	5700 2720	1390 in US, 1260-1620 in DS, 28-65 V~, BFD, 5-1218 MHz
ONCR 1241 BFD-10-2-85	5700 2721	1410 in US, 1260-1620 in DS, 28-65 V~, BFD, 5-1218 MHz
ONCR 1243 BFD-10-2-85	5700 2722	1430 in US, 1260-1620 in DS, 28-65 V~, BFD, 5-1218 MHz
ONCR 1245 BFD-10-2-85	5700 2723	1450 in US, 1260-1620 in DS, 28-65 V~, BFD, 5-1218 MHz
ONCR 1247 BFD-10-2-85	5700 2724	1470 in US, 1260-1620 in DS, 28-65 V~, BFD, 5-1218 MHz
ONCR 1249 BFD-10-2-85	5700 2725	1490 in US, 1260-1620 in DS, 28-65 V~, BFD, 5-1218 MHz
ONCR 1251 BFD-10-2-85	5700 2726	1510 in US, 1260-1620 in DS, 28-65 V~, BFD, 5-1218 MHz
ONCR 1253 BFD-10-2-85	5700 2727	1530 in US, 1260-1620 in DS, 28-65 V~, BFD, 5-1218 MHz
ONCR 1255 BFD-10-2-85	5700 2728	1550 in US, 1260-1620 in DS, 28-65 V~, BFD, 5-1218 MHz
ONCR 1257 BFD-10-2-85	5700 2729	1570 in US, 1260-1620 in DS, 28-65 V~, BFD, 5-1218 MHz
ONCR 1259 BFD-10-2-85	5700 2730	1590 in US, 1260-1620 in DS, 28-65 V~, BFD, 5-1218 MHz
ONCR 1261 BFD-10-2-85	5700 2731	1610 in US, 1260-1620 in DS, 28-65 V~, BFD, 5-1218 MHz
ONCR 1227-10-2-85	5700 2897	1270 in US, 1260-1620 in DS, 28-65 V~, 5-1218 MHz, standard version
ONCR 1229-10-2-85	5700 2898	1290 in US, 1260-1620 in DS, 28-65 V~, 5-1218 MHz, standard version
ONCR 1231-10-2-85	5700 2899	1310 in US, 1260-1620 in DS, 28-65 V~, 5-1218 MHz, standard version
ONCR 1233-10-2-85	5700 2900	1330 in US, 1260-1620 in DS, 28-65 V~, 5-1218 MHz, standard version
ONCR 1235-10-2-85	5700 2901	1350 in US, 1260-1620 in DS, 28-65 V~, 5-1218 MHz, standard version
ONCR 1237-10-2-85	5700 2902	1370 in US, 1260-1620 in DS, 28-65 V~, 5-1218 MHz, standard version
ONCR 1239-10-2-85	5700 2903	1390 in US, 1260-1620 in DS, 28-65 V~, 5-1218 MHz, standard version
ONCR 1241-10-2-85	5700 2904	1410 in US, 1260-1620 in DS, 28-65 V~, 5-1218 MHz, standard version
ONCR 1243-10-2-85	5700 2905	1430 in US, 1260-1620 in DS, 28-65 V~, 5-1218 MHz, standard version
ONCR 1245-10-2-85	5700 2906	1450 in US, 1260-1620 in DS, 28-65 V~, 5-1218 MHz, standard version
ONCR 1247-10-2-85	5700 2907	1470 in US, 1260-1620 in DS, 28-65 V~, 5-1218 MHz, standard version
ONCR 1249-10-2-85	5700 2908	1490 in US, 1260-1620 in DS, 28-65 V~, 5-1218 MHz, standard version
ONCR 1251-10-2-85	5700 2909	1510 in US, 1260-1620 in DS, 28-65 V~, 5-1218 MHz, standard version
ONCR 1253-10-2-85	5700 2910	1530 in US, 1260-1620 in DS, 28-65 V~, 5-1218 MHz, standard version
ONCR 1255-10-2-85	5700 2911	1550 in US, 1260-1620 in DS, 28-65 V~, 5-1218 MHz, standard version
ONCR 1257-10-2-85	5700 2912	1570 in US, 1260-1620 in DS, 28-65 V~, 5-1218 MHz, standard version
ONCR 1259-10-2-85	5700 2913	1590 in US, 1260-1620 in DS, 28-65 V~, 5-1218 MHz, standard version
ONCR 1261-10-2-85	5700 2914	1610 in US, 1260-1620 in DS, 28-65 V~, 5-1218 MHz, standard version

SEGMENTABLE FIBRE NODE 2X2 FOR HFC

ONS 9238 is one of the most advanced optical nodes dedicated to traditional HFC and FTTB networks. Besides its compact size the node is distinguished by a high output level and a low power consumption. The ONS can be adjusted uninterruptedly and is remote controllable with FOISTRA control modules. The main advantages of the device include the following modes:

- „AUTOALIGNMENT“, depending on the given input parameters of optical signal and the parameters of RF output signal, it enables automatic internal control, which ensures that the programmed parameters are obtained.

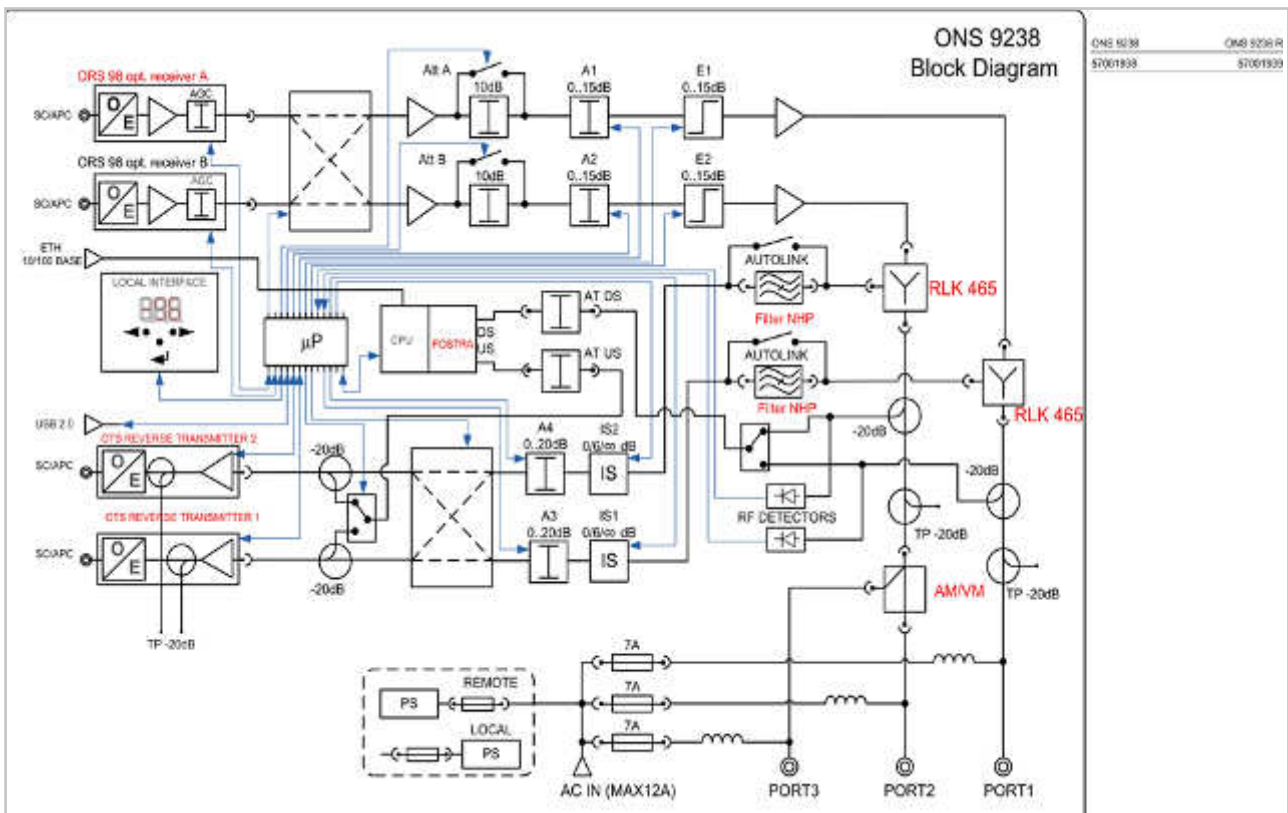


The ONS can be equipped with monitoring module including RJ45 or SFP interface.

Depending on the need, there is a possibility of remote monitoring using fibre optic or copper medium. Total independence from DOCSIS infrastructure and RF parameter measurement system allows the operator to consciously control and change the quality of received signals. ONS 9238 can cooperate with an optical switch, forming an independent monitoring infrastructure or optional with DOCSIS or HMS monitoring system.

- 1 GHz frequency range
- Designed to work in HFC, FTTLA, FTTLN, FTTB or FTTC networks
- Easy configuration, electronic adjustment and universal plug-in modules
- Built-in AGC (Automatic Gain Control)
- 3-DIGIT LED display
- 2x2 full redundancy and segmentation in forward and reverse
- Local or remote powering
- Monitoring via SNMP v2c and WWW

Type	ONS 9238	ONS 9238 R	ONS 9238/FOISTRA D	ONS 9238 R/FOISTRA D
Article-No.	5700 1938	5700 1939	5700 2087	5700 2088
Description	Segm. Fibre Node 2x2	Rem. Segm. Fibre Node 2x2	Segm. Fibre Node 2x2	Rem. Segm. Fibre Node 2x2



Type		ONS 9238	
Applications		HFC, FTTC/FTTB	
Compact die-cast housing	mm	245 x 207 x 125 / IP 65, Out-door	
Fibre connectors (internal)		SC/APC	
Connectors		PG 11 or 5/8" RF out, PG 13,5 (Optical fibre cable input)	
Mains feeding	V~/W	185...265 / < 35 (ONS 9238)	
Remote feeding	V~	28...70 / 0,67 A @ 30 VAC, 10 A (ONS 9238 R, 57001939)	
Operating temperature	°C	-20...+55, Free convection	
Testpoint A1, A2	dB	-20 (internal)	
Return laser module		various available (DFB, FP, CWDM)	
RF outputs		2 x 2 (redundant)	
Downstream RX	Optical wavelength	nm	1100 ...1650 (ORS 98 module)
	Optical input power	dBm	-7...+2 (1310nm)
	OLC		Yes (-6 ... +0 dBm, optical level control)
	Optical return loss	dB	> 45
	Frequency range	MHz	85...1006 (Diplex filter RLK 465)
	Frequency response	dB	± 0.75
	Output level 1310nm @ -3 dBm		
	E1 and E2 = 6 dB slope, 3,5% OMI		2 x 114 dBµV (acc. CENELEC 42 CTB/CSO > 60 dBc)
	E1 and E2 = 6 dB slope, 4,0% OMI		2 x 116 dBµV (acc. CENELEC 42 CTB/CSO > 58 dBc)
	C/N	dBc	52 @ -3 dBm, OMI 4%
Interstage Att. A1, A2	dB	0...15 dB (adjustable by electronic step attenuators in 0,5 dB steps)	
Interstage slope E1, E2	dB	0...15 dB (adjustable by electronic step attenuators in 0,5 dB steps)	
RF test point	dB	-20 (internal)	
Upstream TX	Laser / optical power		1310/1610 nm: FP or DFB-Laser / 0 or 3 dBm CWDM 1470...1610 nm: DFB-Laser / 3 dBm
	(e.g. OTS 1610 D, 1610 nm DFB + 3 dBm)		
	Frequency range	MHz	5...65 (other on request)
	RF input level (CWDM)	dBµV	OMI 10 % @ 70, 0 dB attn
	RF level attenuator A3, 4	dB	0...20 (1 dB step attn.)
RF test point	dB	-20 (internal)	
Monitoring optical output		Green LED on: output power available	

Modules for ONS 9238

Type	Article-No.	Description
ORS 98	5700 1940	RX-Module 1260 -1620nm, -7...2 dBm
OTS 1310 D	5700 1941	TX-Module, DFB 1310nm, +3 dBm
OTS 1610 D	5700 1942	TX-Module, DFB 1610nm, +3 dBm
OTS 1xxx CWDM	on request	TX-Module, CWDM 1xxxnm, +3 dBm
RLK 465 (2x)	5700 1945	Diplexer 5 - 65/85-1000 MHz
NHP 915	5700 1946	Rev path filter FPA 15 - 65 MHz
VM 902	5700 1947	Output splitter VM 2-fach 3.5 dB
AM 9-01-10	5700 1948	Output RF Tap AM 10 dB
FOSTRA D	on request	DOCSIS Transponder
JUM-ONS	5700 1984	0 dB Jumper for output 2

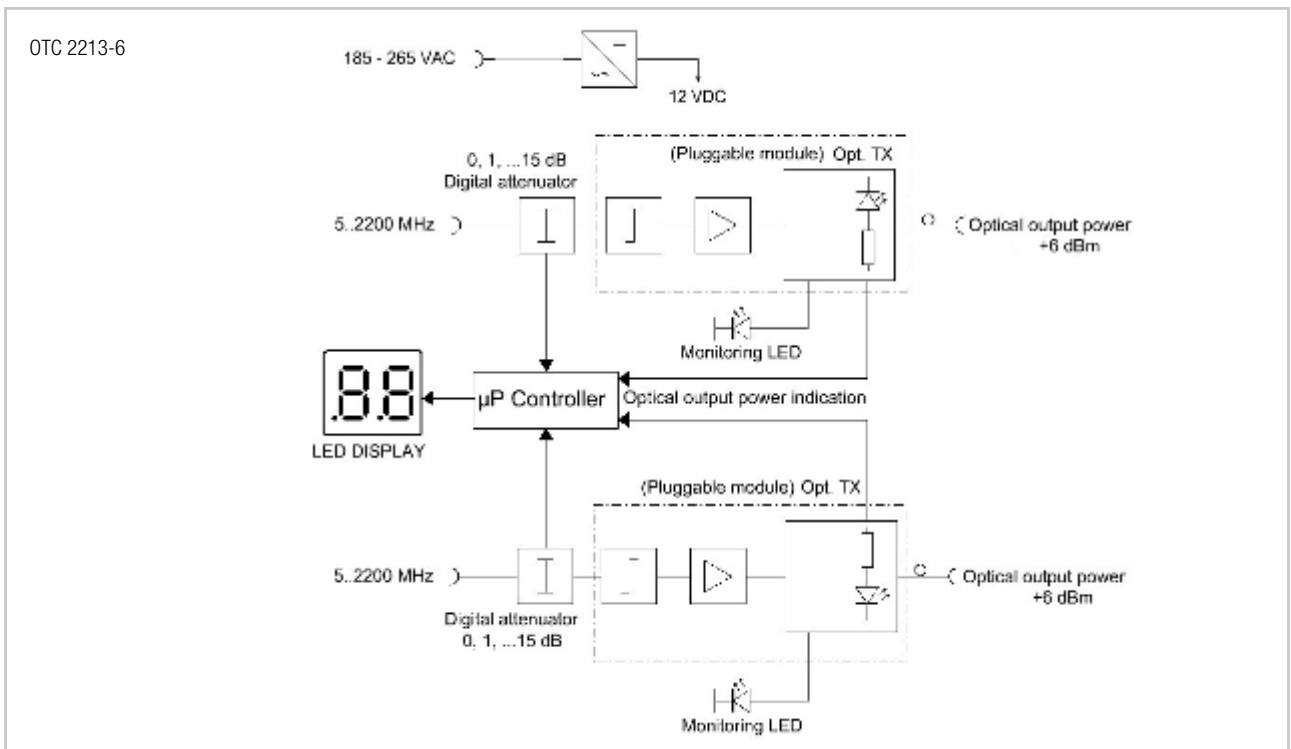
OPTICAL CATV / SAT-IF TRANSMITTER

Optical compact transmitter for RF and IF signals over fibre

- Compact optical transmitter with 2 or 4 pluggable modules
- Compatible with the compact receiver ORC 2400 with up to 4 receiver modules
- Bandwidth 47...2250 MHz
- Ready for analogue PAL TV channels, SAT QPSK distribution
- High linearity, DFB Laser with internal optical isolator
- Low distortion wavelengths: 1270, 1310, 1330, 1350 nm
- Up to 30 km fibre length



Type	OTC 2113-6	OTC 2213-6	OTC 2413-6
Article-No.	5700 1532	5700 1534	5700 2925
Description	Optical compact transmitter, single version with 1 transmitter module 6 dBm	Optical compact transmitter, twin version with 2 transmitter modules 6 dBm	Optical compact transmitter, quattro version with 4 transmitter modules 6 dBm



Type		OTC 2x13-6
Applications		CATV and SAT over fibre
Operation wavelength (λ)	nm	1290, 1310, 1330, 1350
Optical output power	dBm	+6 (Indication on LED display)
Laser class		1M, DIN EN 60825-1 (2008)
RF bandwidth	MHz	5 ... 2250
Frequency flatness	dB	± 0.5 , 5 ... 2250 MHz
RF input level PAL	dB μ V	76...91, ATT = 0...15 dB @ OMI 4% (OTC 2213-6)
Maximum input Level	dB μ V	93
Laser type		un-cooled DFB
RF return loss	dB	> 14, up to 2200 MHz
Optical return loss	dB	> 55
RF Input level attenuator	dB	0...15 (Indication and Setting on LED display, 1 dB steps)
Monitoring optical output		Green LED on (output power available)
Optical Link SAT-IF		with ORC 2200
Optical budget OTC2213-6		
QPSK	dB	> 15 dB (BER degradation factor ~ 10)
Fibre connectors		SC/APC
RF connectors		F female
LNB-power supply	V/mA	12.8 / max. 500
Compact die-cast housing	mm	225 x 190 x 86
Operating voltage	V~	185...265
Operating temperature	$^{\circ}$ C	0...+55
Weight	kg	2

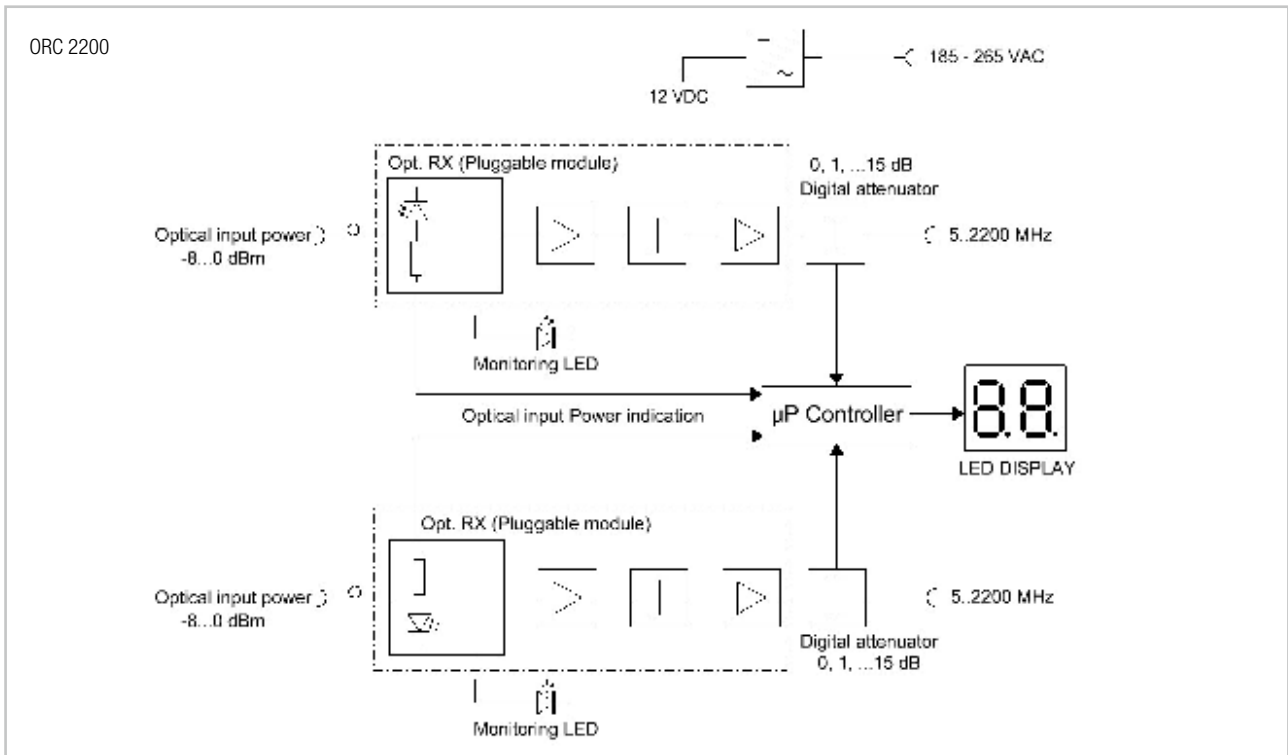
OPTICAL CATV / SAT-IF RECEIVER

Optical compact receiver for RF and IF over fibre

- Compact optical receiver with 1,2 or 4 pluggable modules
- Compatible with the compact transmitter OTC 2x13-6
- Bandwidth 47...2250 MHz
- Ready for analogue PAL TV channels, SAT QPSK distribution
- Electronic control of RF output level attenuation for each module on the LED display
- Measurement of the optical input power for each module on the LED display
- Monitoring LEDs



Type	ORC 2100	ORC 2200	ORC 2400
Article-No.	5700 1533	5700 1535	5700 2924
Description	Optical compact receiver, Single version with 1 receiver-module 5 ... 2250 MHz	Optical compact receiver, Dual version with 2 receiver-modules 5 ... 2250 MHz	Optical compact receiver, Quattro version with 4 receiver-modules 5 ... 2250 MHz



Type		ORC 2x00
Applications		CATV and SAT over fibre
Operation wavelength (λ)	nm	1290 ... 1610
Optical input power	dBm	-8 ... 0 (+2 dBm, absolute Max.)
RF bandwidth	MHz	5 ... 2250 (Max. 2400 MHz)
Frequency response	dB	± 0.75 (5 – 2200 MHz, measured with OTC 2213)
RF output level	dB μ V	89 ± 1 @ 0dBm, OMI = 4% (measured with OTC 2213)
RF return loss	dB	> 14, up to 2200 MHz
Optical return loss	dB	> 55
RF output level attenuator	dB	Electronic control, 1 dB steps, 0..15dB (Indication and Setting on LED display)
Optical input power (digital)	dBm	-8.5 ... 0 (Indication on LED display)
Monitoring optical input		Green LED on: input power > -8 dBm
Fibre connectors		SC/APC
RF connectors		F-female
Dimensions	mm	225 x 190 x 86 / IP 54
Power supply	V~	185...265
Operating temperature	°C	0...+55
Weight	kg	2

OPTICAL PLC SPLITTER 1260...1620NM

- Wide operation wavelength 1260...1620nm
- Good uniformity and low insertion loss
- Low polarization dependent loss
- 1 x 2, 1 x 4, 1 x 8, 1 x 16, 1 x 32 and 1 x 64 type splitters with SC/APC connectors (optional LC/APC) in 19" 1U chassis



Type	OCP 1-02 SC	OCP 1-04 SC	OCP 1-08 SC	OCP 1-16 SC	OCP 1-32 SC	OCP 1-64 SC
Article-No.	5700 1894	5700 1895	5700 1896	5700 1576	5700 1577	5700 1900
Description	Optical PLC Splitter 1200..1620nm, 1 Input, 2 Outputs, SC/APC, 19"RU	Optical PLC Splitter 1200..1620nm, 1 Input, 4 Outputs, SC/APC, 19"RU	Optical PLC Splitter 1200..1620nm, 1 Input, 8 Outputs, SC/APC, 19"RU	Optical PLC Splitter 1200..1620nm, 1 Input, 16 Outputs SC/APC, 19" 1RU	Optical PLC Splitter 1200..1620nm, 1 Input, 32 Outputs, SC/APC, 19" 1RU	Optical PLC Splitter 1200..1620nm, 1 Input, 64 Outputs, SC/APC, 19" 1RU

Type	OCP 1-xx SC	
Operation wavelength (λ)	nm	1260...1620
Insertion loss		
1 x 2 Splitter	dB	3.7
1 x 4 Splitter	dB	7.2
1 x 8 Splitter	dB	10.5
1 x 16 Splitter	dB	13.8
1 x 32 Splitter	dB	17.2
1 x 64 Splitter	dB	20.5
Polarization dependent loss	dB	< 0.3
Uniformity		
1 x 2 Splitter	dB	< 0.6
1 x 4 Splitter	dB	< 0.8
1 x 8 Splitter	dB	< 1.0
1 x 16 Splitter	dB	< 1.5
1 x 32 Splitter	dB	< 2
1 x 64 Splitter	dB	< 2.5
Return loss	dB	\geq 55
Optical fibre connector		SC/APC
Fibre type		SMF-28e
Operating temperature	$^{\circ}$ C	-40 ~ +85
Storage temperature	$^{\circ}$ C	-40 ~ +85
Max. input power	dBm	24.5
Dimensions	mm	482 x 225 x 44 (19" 1RU)

OPTICAL WAVELENGTH DIVISION MULTIPLEXER

Optical wavelength- division multiplexer multiple optical carrier signals on a single optical fibre by using different wavelength to carry different signals.

- CWDM- channels available
- Low insertion Loss
- Wide pass band
- High channel isolation
- High Stability and Reliability
- Compatible with any FTTH PON technology



Type	OWDM 1-02 SC	OWDM 1-03 SC	OWDM 1-02 SC RFOG
Article-No.	5700 1629	5700 1854	5700 2340
Description	Opt. WDM , für RFOG 1550 / 1610nm, SC/APC, 19" 1HE	Optical Wavelength Division multiplexer, developed especially for GPON solution with RF Overlay or GPON + RFOG system, 1550 / 1610 / 1310	Opt. WDM, 1260-1620 / 1550nm SC/APC mini tube

Type	OWDM 1-xx SC	
Operation wavelength (λ)	nm	1470 ... 1610, CWDM- channels (ITU-T G.694.2)
Center Wavelength	nm	± 0.5
Channel Spacing	nm	20 (CWDM- Network)
Insertion Loss		
1 x 2	dB	< 0.7
1 x 3	dB	< 1.4
1 x 4	dB	< 1.5
1 x 8	dB	< 3.0
Channel ripple	dB	≤ 0.3
Isolation	dB	≥ 40
Return Loss	dB	≥ 45
Max. input power	dBm	24.5
Operating temperature	$^{\circ}\text{C}$	0 ~ +70
Storage temperature	$^{\circ}\text{C}$	-40 ~ +85
Dimensions (W x D x H)	mm	482 x 225 x 44

OPTICAL REPEATER - MULTIPLE INPUTS SINGLE OUTPUT

O-MISO

Downstream:

- Transparent for all DS signals
- Pluggable XFP-EDFA, 17 dBm
- GPON/RFoG separation possible
- Integrated WDM filters and splitter
- FOSTRA F monitoring
- Fiber redundancy concept



Upstream:

- Totally avoiding of OBI
- Simple optical node with one wavelength
- CW operating mode (without OBI)
- OMI transparent, 18 CWDM available
- Compensation of optical loss caused by splitter
- Save fibers: several RFoG clusters on one fiber
- Standard RFoG return path receiver

Type	Article-No.	Description
O-MISO 1-8	5700 2926	Optical Upstream Repeater 8 x Inputs, 1x Output
O-MISO 1-16	5700 2816	Optical Upstream Repeater 16 x Inputs, 1x Output
O-MISO 1-32	5700 2927	Optical Upstream Repeater 32 x Inputs, 1x Output

OPTOPAD - OPTICAL MEASURING DEVICE

- Identification of the signal quality with the OMI App
- Applicable everywhere where CATV signals are transferred over fiberglass
- Simple application without further measuring devices
- Optical and USB interface available
- Level adjustment manually or automatically
- Recommendation of optimal OMI value
- Portable
- Article-No. 5700 2337



Technical Data	Unit		Remarks
Opt. input wavelength (λ)	nm	1260-1620	
Optical input power	dBm	Minimal -4 dBm Maximal 17 dBm	
Frequency range	MHz	15-1006	
Number of HF carriers		100 digital, 100 analogue	
OMI measuring range	Type 1	1 carrier 13%-50%	
		100 carriers 1,5%-5%	
	Type 2	1 carrier 5%-50%	
		100 carriers 0.1%-5%	
Operating temperature	°C	0...50	
Fibre optic connection		SC/APC	Patch cords for other connections
Battery life	hrs.	2	
USB-interface			
Fibre optic connection		SC/APC	
Dimensions	mm	116x72x24	
Storage temperature	°C	-20...60	

OPTICAL CLEANING KIT

Careful cleaning of fibre optic connectors

- Easy to clean
- Up to 50 times cleaning



Type	OCT 1	OCT 2
Article-No.	5700 1864	5700 1865
Description	Cleaning tool 1.25 mm, LC/APC	Cleaning tool 2.25 mm, FC/APC, LC/APC

OPTICAL FIBRE PATCH CORD

- Excellent mechanical endurance and low insertion loss
- Standard exact plastic material, good exchangeability
- Cable diameter: Ø 3mm
- Single mode cable type SC, FC, LC, E2000/APC
- FTTx, Optical fibre CATV and test equipments



Type	OMPC 02 E2-FC	OMPC 02 E2-SC	OMPC 02 SC-FC	OMPC 02 SC-SC	OMPC 02 LC-SC	OMPC 02 LC-LC
Article-No.	5700 0920	5700 0921	5700 0922	5700 0923	5700 2917	5700 2918
Description	Optical fiber patch cord, Single mode E2000 - FC/APC, 2 meters	Optical fiber patch cord, Single mode, E2000 - SC/APC, 2 meters	Optical fiber patch cord, Single mode, SC - FC/APC, 2 meters	Optical fiber patch cord, Single mode, SC - SC/APC, 2 meters	Optical fiber patch cord, Single mode LC - SC/APC, 2 meters	Optical fiber patch cord, Single mode LC - LC/APC, 2 meters

Type	OMPC 02 xx-yy	
Insertion loss	dB	< 0.2
Return loss	dB	≥ 45
Mode-Operation	Single Mode, 9 / 125 µm	
Type	8 ° APC	
Operating temperature	°C	-40 - +75
Storage temperature	°C	-40 - +85
Length	m	2

OPTICAL ATTENUATOR

Fibre optical attenuator reduces optical signal in fixed attenuation values

- Low insertion loss
- High stability
- Connector type attenuator SC, FC/APC
- Use in optical fibre networks and test equipments



Type	OATN 01 SC	OATN 03 SC	OATN 06 SC	OATN 10 SC
Article-No.	5700 2674	5700 0910	5700 0911	5700 0912
Description	Optical attenuator, -1 dB, FC/APC	Optical attenuator, -3 dB, FC/APC	Optical attenuator, -6 dB, SC/APC	Optical attenuator, -10 dB, SC/APC

Type	OATN xx-yy	
Attenuation value	dB	1.2, ... 10 ± 0.5 (Others on request)
Operation wavelength (λ)	nm	1200 - 1600
Return loss	dB	≥ 60 APC ≥ 55 PC
Max. optical input power	dBm	26.5
Fiber type	SC, FC/APC	
Operation temperature	°C	-30 - +75
Storage temperature	°C	-40 - +85

OPTICAL POWER METER

Fibre optical power meter for accurate measure of optical signal levels in FTTX deployments

- || Hand held
- || Auto power off
- || Backlight LCD display
- || Self calibration
- || Power measurements in dBm or mw, insertion loss in dB



Type		OPM 200
Article-No.		5700 1862
Description		Optical power meter, -50...+26 dBm

Type		OPM 200
Measurement range	dBm	-50...+26
Operation wavelength (λ)	nm	800 - 1700 (850,1310,1490,1550,1590,1610 calibrated)
Accuracy/Resolution		$\pm 5\%$, 0.01
Connector		FC (Interchangeable to SC, ST, 2.5mm universal)
Power supply		Battery 1.5 V AA (Operation app. 140h)
Operating Temperature	$^{\circ}\text{C}$	-10 - +60
Dimensions	mm	190 x 100 x 50

OPTICAL LIGHT SOURCE

Optical light source (transmitter) for simple screening of fibre-optic networks

- || Fibre optical light source / transmitter for easy testing of optical network structures
- || Hand held
- || Auto power off
- || Backlight LCD display

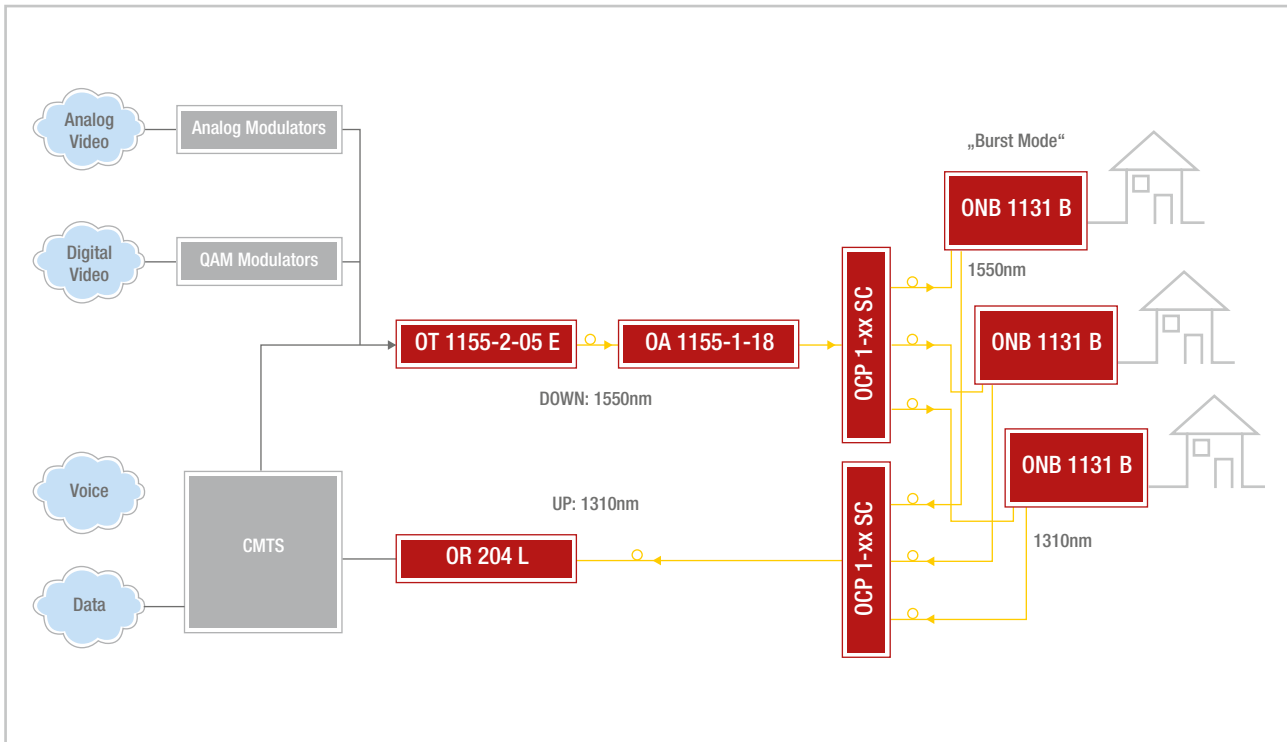


Type		OLS 103
Article-No.		5700 1863
Description		Optical light source, 1310, 1550, 1610nm

Type		OLS 103
Light power	dBm	0...-5, adjustable
Transmitted wavelengths (λ)	nm	1310,1550,1610 (Other wavelengths on request)
Spectrum wide	nm	< 5.5
Connector		FC (Interchangeable to SC, ST, 2.5 mm universal)
Power supply		Battery 1.5 V AA (Operation app. 140 h)
Operating Temperature	$^{\circ}\text{C}$	-10 - +50
Dimensions	mm	190 x 100 x 50

FTTx-APPLICATIONS – RFOG NETWORK SYSTEM

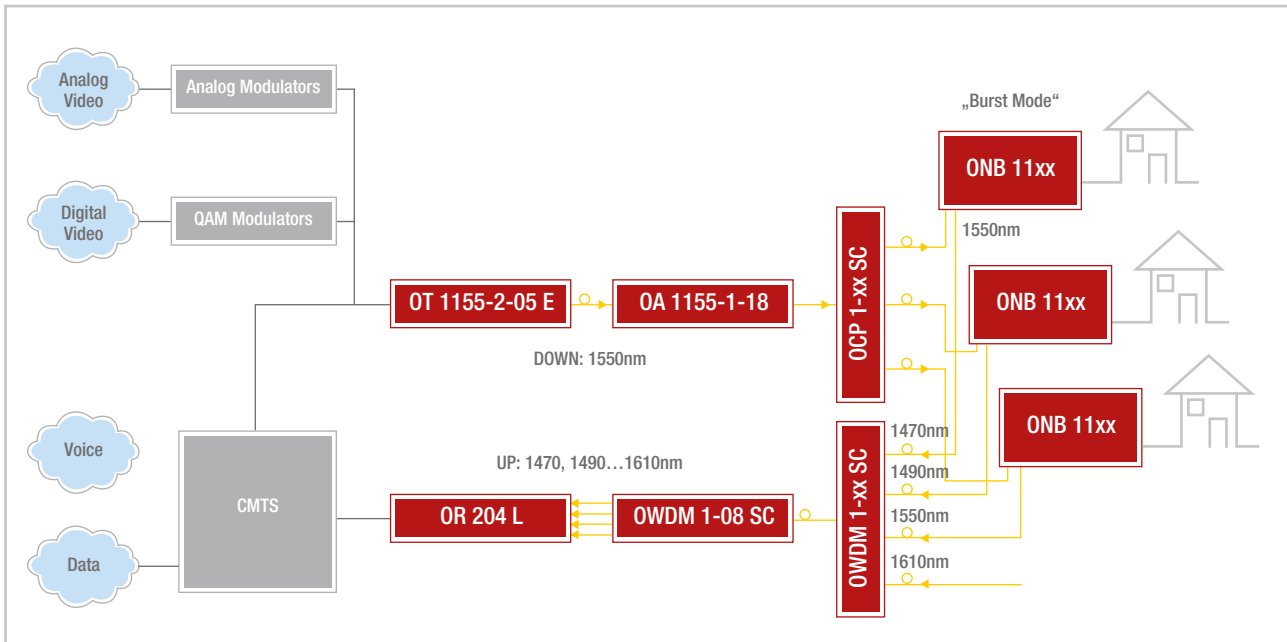
2 fibre-system application "Burst operation"



Splitter	Description
1 x 16	<ul style="list-style-type: none"> Distance 1 + 2 up to 28 km available, Return laser power +3 dBm Mini node C/N = 52 @ 0 dBm, OMI = 4 % Pin = -20 dBm @ Return path receiver OR 204 L
1 x 32	<ul style="list-style-type: none"> Distance 1 + 2 up to 19 km available, Return laser power +3 dBm Mini node C/N = 52 @ 0 dBm, OMI = 4 % Pin = -20 dBm @ Return path receiver OR 204 L
1 x 64	<ul style="list-style-type: none"> Distance 1 + 2 up to 10 km available, Return laser power +3 dBm Mini node C/N = 52 @ 0 dBm, OMI = 4 % Pin = -20 dBm @ Return path receiver OR 204 L

FTTx-APPLICATION – RFOG NETWORK SYSTEM

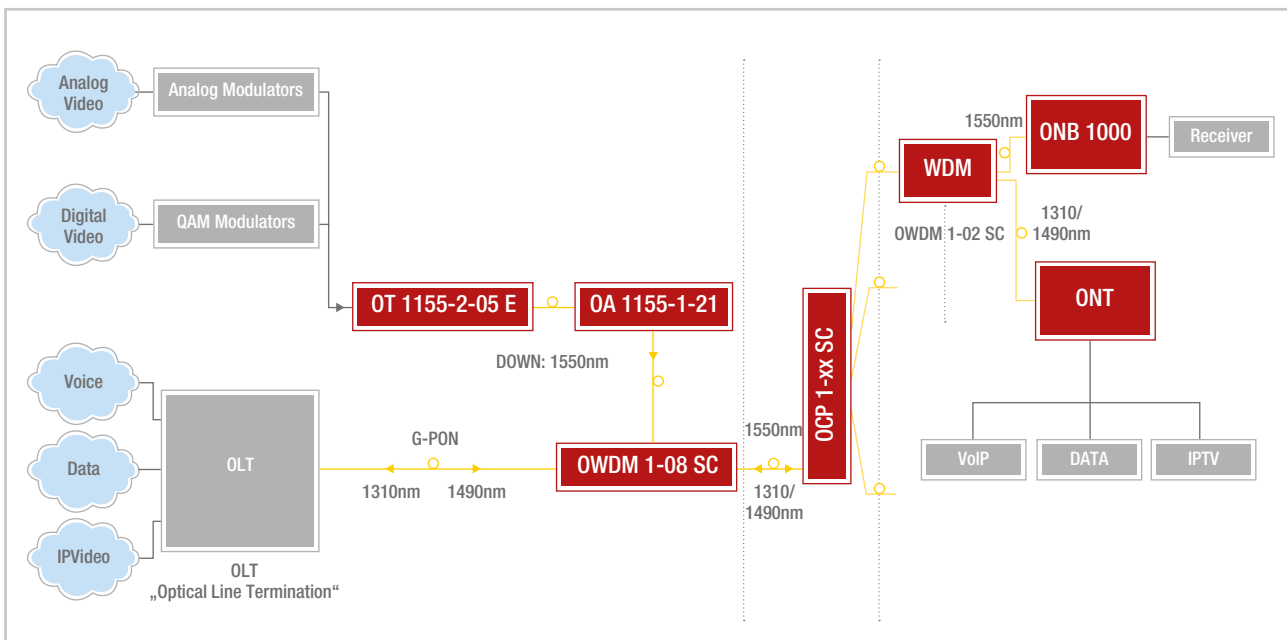
2 fibre-systems application "CWDM operation, return way"



Splitter	Description
1 x 16	<ul style="list-style-type: none"> Distance 1 + 2 up to 7 km available, Return path Laser power 0dBm with ONB 11xx (1470,...,1610nm) Mini node C/N = 52 @ 0 dBm, OMI = 4 %

FTTx-APPLICATION – GPON + RF OVERLAY

1-fibre-system



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