

GOING FUTURE TODAY.



OFN80 series

Optical Fibre Nodes



Operating Manual

Before starting operation of the device

HINWEIS: *Read this operating manual attentively! It contains important information about installation, ambient conditions and maintenance of the device. Keep this operating manual for future use and for handover in the event of a change of owner. A PDF version of this manual is available to download on the ASTRO website (there may be a more recent version).*

The ASTRO company confirms that the information in this manual was correct at the time of printing, but it reserves the right to make changes, without prior notice, to the specifications, the operation of the device and the operating manual.

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Symbols and conventions used

Symbols used in these instructions

Pictograms are visual symbols with specific meanings. You will encounter the following pictograms in this installation and operating manual:



Warning about situations in which electrical voltage and non-observance of the instructions in this manual pose a risk of fatal injuries.



Warning about various dangers to health, the environment and material.



Warning about thermal dangers (risk of burns).



Warning about high laser radiation emitted from a device, connector or adapter (risk of eye damage).



Recycling symbol: indicates components or packaging materials which can be recycled (cardboard, inserts, plastic film and bags). Used batteries must be disposed of at approved recycling points. Batteries must be completely discharged before being disposed of.



This symbol indicates components which must not be disposed of with household rubbish.

Proper use

The OFN80 Fibre Nodes can only be used for transmitting analogue modulated TV and Data services via optical fibre networks. Modification of the devices or use for any other purpose is not permitted, and will immediately void any guarantee provided by the manufacturer.

Target group of this manual

Installation and starting operation

The target group for installation and starting operation of the ASTRO optical transmission technology are qualified experts who have training enabling them to perform the work required in accordance with EN 60728-11 and EN 62368-1. Unqualified person are not allowed to install and start operation of the device.

Device configuration

Target group for the configuration of the ASTRO fibre nodes are persons who have received instructions and have training enabling them to perform a configuration. Knowledge of EN 60728-11 and EN 62368-1 is not necessary for configuration.

Device description

The delivery is comprised of the following parts:

- ☐ OFN80 Fibre Node
- ☐ Operating manual
- ☐ Optionally available: mountable fibre storage box for OFN80 (order number 212 184), see left

WDM versions for single-fibre versions as well as dual-fibre versions with GPON block filter are available (see Fig. 1 - 4).

- [1] Mains connection
- [2] Cover screw
- [3] LED input level display
- [4] Drill holes for mounting
- [5] Bushing for earth cable



Fig. 1: Fibre Node OFN80-FRL-1310-WF



Fig. 2: Fibre Node OFN80-FRL-1610-1F-85

- [1] HF level attenuator (configured via pad)
- [2] Input equalization, slope (Configured via jumper)
- [3] Slot for duplex filter for forward/return separation
- Available duplex filters:
65/85 MHz, 85/104 MHz and 204/258 MHz
- [4] Attenuator for nominal HF upstream level (configured via pad)
- [5] HF output socket
- [6] Measuring point (forward signal or return signal feed)
- [7] Ingress noise reduction (configured via jumpers)
- [8] Optical return output socket (SC/APC)
- [9] Optical forward input socket (SC/APC)
- [10] Additional attenuator in return path (e.g. for fine adjustment of MER; alternatively usable as 15 MHz high-pass filter) (configured via pad)
- [11] Selection of continuous or burst mode (configured via jumper)
- [12] LED display of return path laser activity

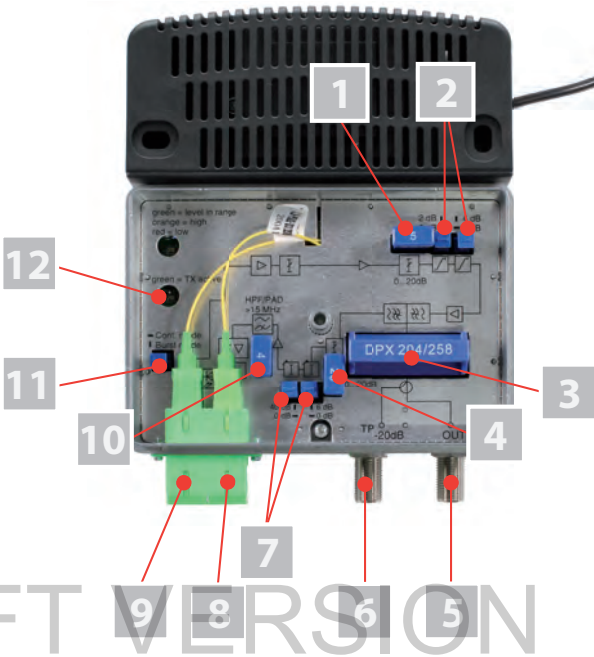


Fig. 3: Fibre Node OFN80-FRL-1310-WF, open

[1] HF level attenuator (configured via pad)

[2] Input equalization, slope (Configured via jumper)

[3] Slot for diplex filter for forward/return separation

Available diplex filters:

65/85 MHz, 85/104 MHz and 204/258 MHz)

[4] Attenuator for nominal HF upstream level (configured via pad)

[5] HF output socket

[6] Measuring point (forward signal or return signal feed)

[7] Ingress noise reduction (configured via jumpers)

[8] Optical socket for forward and return (SC/APC)

[9] Additional attenuator in return path (e.g. for fine adjustment of MER; alternatively usable as 15 MHz high-pass filter) (configured via pad)

[10] Selection of continuous or burst mode (configured via jumper)

[11] LED display of return path laser activity

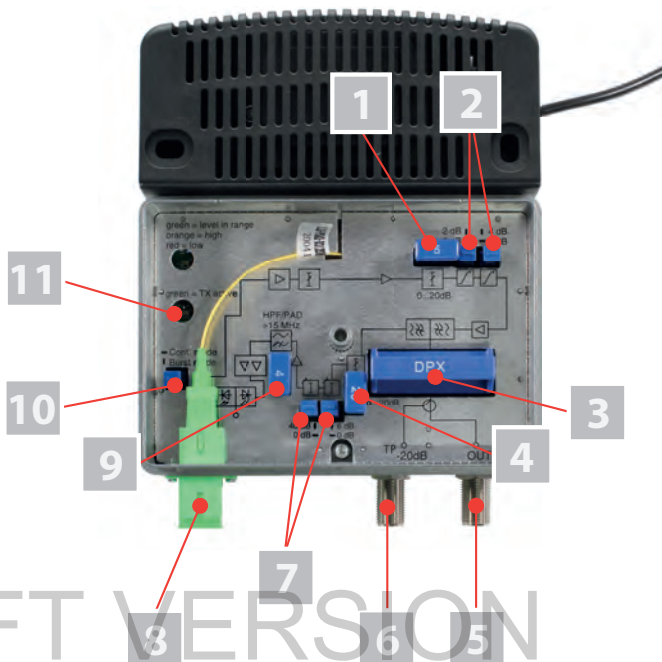


Fig. 4: WDM version with one optical jack for forward and return (here: Fibre Node OFN80-FRL-1610-1F-85, open)

The fibre nodes of the OFN80 series have the CE marking. This confirms that the product conforms to the relevant EC directives and the requirements specified in them.

Important safety information

To avoid any hazardous situations to the extent possible, you must adhere to the following safety information:

ACHTUNG: *Failure to observe this safety information may result in personal injury due to electrical and thermal dangers!*

Proper use

- ☐ Only use the device at the approved operating sites and in the ambient conditions allowed (as described in the following), and only for the purpose described in the section "Proper use".

Before starting operation of the device

HINWEIS: *Read this operating manual attentively! It contains important information about installation, ambient conditions and maintenance of the device. Keep this operating manual for future use and for handover in the event of a change of owner or operator. A PDF version of this manual is available to download on the ASTRO website (there may be a more recent version).*

- ☐ Check the packaging and the device for transport damage immediately. Do not start operation of a device that has been damaged.
- ☐ Transporting the device by the power cable may damage the mains cable or the strain relief, and is therefore not permitted.

Danger of optical radiation

This product is laser class 1M (according IEC 60825-1 Safety of Laser Products) and therefore several safety precautions must be applied.

- ☐ Exposure to class 1M laser radiation is possible on open connectors or connected fibre patch cords. Do not view exposed fibre or connector ends when handling or maintaining optical equipment. Do not view with optical instruments into open connectors or fibre ends on switched on devices. Make sure all wherever a fibre inspection is required, that the inspected fibre or connector is completely optical radiation free.
- ☐ Due to the high optical radiation and improper handling of optical fibre connections and devices, there could be risks for the operating and service personnel. Access should be restricted to trained personnel only.





- ☐ Never look directly or with optical inspection tools into the end of a fibre which is connected to a transmitter or optical amplifier and which is in operation. If the eyes are exposed to optical radiation, which are above the acceptable maximum, this could cause permanent damage to the eye.

Installation, operation, maintenance

- ☐ The device may only be installed and operated by qualified persons (in accordance with EN 60065) or by persons who have been instructed by qualified persons. Maintenance work may only be carried out by qualified service personnel.
- ☐ The installation site must be planned in a way that prevents children from playing with the device and its connections.
- ☐ Dangerous voltages and the threat of optical laser radiation are present within the powered on unit at all times.
- ☐ Always replace protective caps on optical connectors and patch cords when not in use to avoid dust intake. Before connecting clean connectors with lint free cloth and pure alcohol or with any professional tools for cleaning connectors and adapters. The typical connectors fitted are SC/APC 8° or LC/APC 8° (green couplers).
- ☐ The electrical connection conditions must correspond to the specifications on the device type plate.
- ☐ To avoid damage due to overheating, the device may only be installed on vertical surfaces. The installation basis should be level and non-flammable. Operating position: Device vertical, with power cable outlet at the bottom.
- ☐ The ambient temperatures specified in the technical data must be complied with, even when climatic conditions change (e.g. due to sunlight). If the device overheats, the insulation used to isolate the mains voltage may be damaged.
- ☐ The device and its cable may only be operated away from radiant heat and other sources of heat.
- ☐ To avoid trapped heat, ensure there is good ventilation on all sides. Installing the device in recesses or covering the installation location, e.g. with curtains, is not permitted. Ventilation openings may not be covered.
- ☐ If the device is installed in a cabinet, ensure adequate air convection is possible to avoid exceeding the maximum ambient temperature permitted for the device.
- ☐ No objects may be placed on the device.



- ☐ The subscriber network must be earthed in accordance with EN 60728-11, and must remain earthed even when the device is removed. Furthermore, the earth connection on the device can be used. Devices within hand's reach must be integrated into the potential equalisation together. Operating the device without an earth conductor, without earthing the device or without using device potential equalisation is not permitted.
- ☐ The device does not feature protection against water and may therefore only be operated and connected in dry rooms. It must not be exposed to spraying or dripping water, to condensation, or to similar sources of moisture.
- ☐ The electrical system supplying current to the device, e.g. a house installation, must incorporate safety devices against excessive current, earth leakages and short-circuiting in accordance with EN 60950-1.
- ☐ To operate the device (protection class I), it must be connected to mains power sockets with a protective earth conductor.
- ☐ All adhere to all applicable national safety regulations and standards.
- ☐ The mains plug is used as a mains voltage disconnect unit in the event of servicing and danger, and must therefore be accessible and be able to be operated at any time. The device is operational when connected to the mains power.
- ☐ Excess mechanical loads (e.g. falling, impacts, vibrations) may damage insulation used to provide protection from mains voltage.
- ☐ High excess currents (lightning strike, surges in the power utility grid) may damage insulation used to provide protection from mains voltage.
- ☐ Do not insert any objects through the ventilation slots.
- ☐ If there is no information about intended use (e.g. operating site, ambient conditions), or the operating manual does not include the corresponding information, then you must consult the manufacturer of this device to ensure that the device may be installed. If you do not receive any information on this from the manufacturer, do not start operating the device.





Maintenance

- ☐ The operating display only shows whether the DC current, which supplies the device components, has been disconnected. However, operating displays (on the power supply unit or the device) that are not lit up in no way indicate that the device is completely disconnected from the mains.
- ☐ Read carefully: EN 60728 - Part 1 Safety requirements: No service work during thunderstorms.

Repair

- ☐ Repairs may only be performed by the manufacturer. Improperly performed repairs may result in considerable dangers for the user.
- ☐ If malfunctions occur, the device must be disconnected from the mains and authorised experts must be consulted. The device may need to be sent to the manufacturer.

Warranty conditions

The general terms and conditions of ASTRO Bit GmbH apply. You will find these in the current catalogue or on the Internet under "www.astro-kom.de".

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Performance description

- ☐ Optical forwards fibre node for CATV
- ☐ Forward frequency 1218 MHz
- ☐ Automatic gain control, LED display for optical input signal
- ☐ Forward attenuation adjustable via pad
- ☐ Equalization / slope in input adjustable via two jumpers (0 dB / 2 dB / 4 dB / 6 dB)
- ☐ Continuous or burst mode selectable in return path via jumper
- ☐ CWDM return path wavelength available
- ☐ Return attenuation adjustable via pad
- ☐ Ingress noise reduction adjustable via jumpers (0 dB / 6 dB / 40 dB)
- ☐ Built-in 230 VAC power supply unit
- ☐ Optional storage box available to protect optical fibres

The devices of the OFN80 series are available in different versions for flexible configuration:

- ☐ Low or high power versions available
- ☐ Different return wavelengths possible (1545-1565 or 1100-1600 nm)
- ☐ Versions with 2 fibres (one forward and one return) with GPON block filter available
- ☐ WDM versions with 1 fibre for forward and return available
- ☐ Diplex filters with different frequencies (65/85, 85/104 or 204/258 MHz) available

Disposal



All of our packaging material (cardboard boxes, inserts, plastic film and bags) is completely recyclable. Electronic devices must not be disposed of with household waste, but rather – according to DIRECTIVE 2012/19/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL from 4 July 2012, on waste electrical and electronic equipment – must be properly disposed of. When it is no longer of use, please bring the device for disposal to one of the public collection points for this purpose.

ASTRO Bit is a member of the Elektro system solution for the disposal of packaging materials. Our contract number is 80395.

Mounting

You can either mount the Fibre Node to a masonry wall using wall plugs or to a perforated or wooden panel using wood screws or sheet metal screws.

This is how to fix the Fibre Node to a stone wall:

VORBEREITUNG:

Drill two holes in a vertical masonry wall and then insert the wall plugs.

The required distance between the two holes is 100 mm.

This is how to fasten the device:

AUFGABE

1. Place the back of the device against the mounting surface so that its attachment points are exactly above two wall plugs. The input and output of the device must point downwards.
2. Now screw the device in place using the screws supplied (drill holes [4] in the unit, see left).

ERGEBNIS:

The module is now fastened and can be connected.



Connecting



VORBEREITUNG:

HINWEIS: Make sure that the node is disconnected from the mains voltage and thus free from optical radiation before connecting it.

The optical fibres to be connected to the device must also be free of optical radiation.

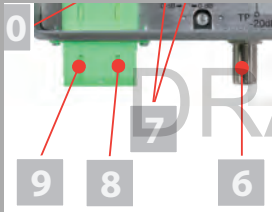
Even if no radiation is visible to the human eye, it may be present and pose a hazard.

Always observe the instructions for avoiding hazards from optical radiation described in the section "Important safety instructions".

This is how to connect the amplifier and connecting cables:

AUFGABE

1. First connect the HF output of the node [6] (see left) to the 75 ohm F connector of a coaxial cable. Plug the F-connector into the output socket of the node and screw the outer ring of the F-connector tight. Make sure that the coaxial cables are laid with a sufficient bending radius.
2. Now connect the optical input [9] and the optical output [8] of the device each to an optical fibre to which an SC/APC connector is attached.
For WDM types, you only need to connect one fibre.
Check that the optical input level corresponds to the correct working range. The value must not exceed +2 dBm, in order not to damage the sensitive input PIN diode. Also clean the optical connection cable with suitable tools/materials before plugging it in!
3. Earth the device by pushing the stripped end of an earth cable through the bushing [5] and fastening the cable end with the grub screw.





To provide additional protection for the optical fibres, you can use an optional optical fibre (see "Device description" section).

AUFGABE

1. First wrap a few turns of the two fibres for the optical input and output signal around the clips provided in the rear part of the optical fibre box.
2. Then push the rear part of the box onto the two F connectors as shown on the left.
3. Push washers onto the two F connectors and screw the union nuts to the node and the front of the rear part to fasten the two parts together.
4. Plug the two optical cable connectors into the corresponding optical sockets on the device.
5. Finally, put the top of the optical fibre box onto the rear section and screw the two parts together.

ERGEBNIS:

The device is now ready for operation. Now connect the node to the power supply. The LED indicating the input level [3] (see picture on the left) lights up.

Depending on the input signal, the following status can be displayed:

- ☐ Green LED: Input level in the permissible range
- ☐ Orange LED: Input level too high
- ☐ Red LED: Input level too low



Configuration and commissioning

The optical node is configured as follows when delivered:

- ☐ The slot for activating forward attenuation is set to 5 dB
- ☐ The jumpers for selecting forward equalisation (slope) are set to 0 dB
- ☐ The diplex filter in the return path is set to 65/85, 85/104 or 204/258 MHz according to the ordered configuration.

First configure the node for transmitting forward signals:

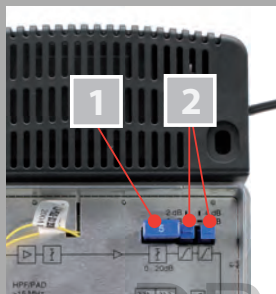
AUFGABE

1. Remove the housing cover by loosening the cover screw.
 2. The Fibre Node OFN80 has an attenuator (pad, 0...20 dB) [1] in the input (see left). Use this to set the required HF attenuation by plugging in the appropriate pad.
 3. You can also set an equalisation (0, 2, 4 or 6 dB) by plugging in the two jumpers [2] accordingly. Observe the labelling next to the jumpers.
-

ERGEBNIS:

The amplifier is now configured for transmitting forward signals.

To transmit return signals, the amplifier must be configured accordingly.



This is to configure the amplifier for transmitting return path signals:

AUFGABE

1. You can adjust the return frequency range by plugging in the diplex filter suitable for that range in the slot [3]. You can choose between 65/85 MHz, 85/104 MHz and 204/258 MHz.
2. You can adjust the nominal HF level in the 70 - 90 dB range by inserting the appropriate pad in the slot [4]. The default setting is 20 dB.
3. Set an ingress noise reduction of 0, 6 or 40 dB by plugging in the two jumpers [7] accordingly. Here too, note the labelling of the jumpers. By default, 0 dB is configured here.
4. In the return path there is an additional attenuator [10], which can be used, for example, for fine-tuning the MER or as a 15 MHz high pass filter. Plug in the corresponding pad for this. The default value is 4 dB.
5. You can choose between the Continuous and Burst modes for the return laser. To do this, you must plug in the jumper [11] accordingly (note the labelling!). Continuous mode is activated on delivery.
6. If the return laser is active, the LED [12] lights up green.

ERGEBNIS:

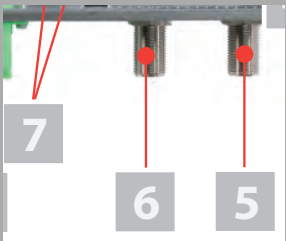
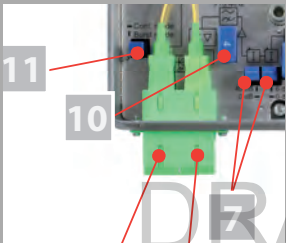
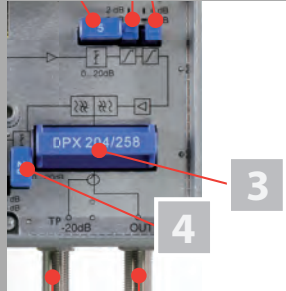
The device is now configured for transmitting forward signals.

Measuring

A measuring socket [6] with 20 dB decoupling attenuation is provided at the output. You can use this to:

- ☐ Determine the output level for the forward range
- ☐ Feed return signals behind the return amplifier in the upstream direction

HINWEIS: After configuring the Fibre Node and completing the measurements, it is strongly recommended to terminate the test socket with a FUR 75 terminating resistor to ensure operation in compliance with the standards.



Troubleshooting

If the device is not functioning correctly, please perform the following checks:

- ☐ Check whether the device is connected to the required mains voltage (100 VAC - 240 VAC, 50-60 Hz).
- ☐ Check whether the coaxial cable and the optical cable are connected correctly, and that there are no breaks or short circuits in the connectors.

If the problem cannot be resolved, please contact the ASTRO customer service.

Maintenance and repair

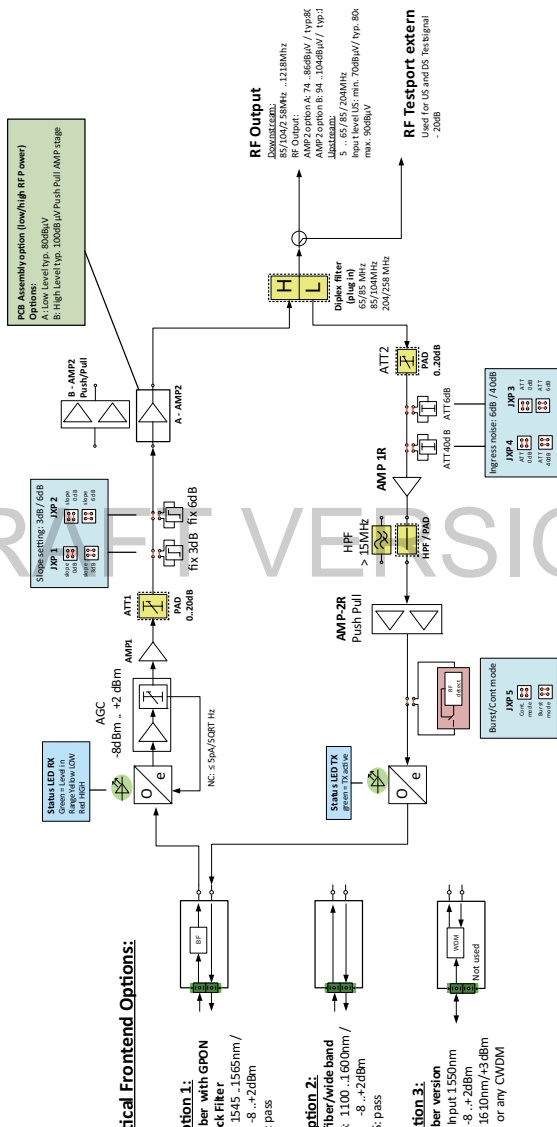
ACHTUNG: *The following safety information must be observed when performing maintenance and repair work. Failure to observe this safety information may result in personal injury due to electrical and thermal dangers!*

- ☐ The operating display only shows whether the DC current, which supplies the device components, has been disconnected from the mains voltage. If the operating display (for the power supply unit or the device) does not light up, this does not mean that the device has been fully disconnected from the mains voltage. There may still be voltages in the device that are dangerous to touch. You may therefore not open the device.
- ☐ The cover for the power supply unit is designed to prevent accidental contact with voltages that are dangerous to touch, and must not be removed.
- ☐ Read carefully: EN 60728 - Part 1 Safety requirements: No service work during thunderstorms.
- ☐ A defective device may only be repaired by the manufacturer to ensure that components with the original specification are used (e.g. power cable, fuse). Improperly performed repairs may result in considerable dangers for the user or installer. If malfunctions occur, the device must therefore be disconnected from the mains and authorised experts must be consulted. The device may need to be sent to the manufacturer.



Block diagram

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Typ	Code	available options
OFN80-FRx-yyy-zz-dd	FRx	F: Forward path / R: Return Path / x: L-low Power, H: high power
	yyyy	Reverse Transmitter wavelength (details see below: e.g 1310/1610 etc)
	zz	Feature field: 00: no feature (2 fiber version) WF: GPON block filter in forward path (2 fiber version) 1F: WDM for forward and return path (1 fiber version)
	dd	Diplexer frequency: 65: 65/85 MHz 85: 85/104 MHz
Optical node type		Forward and return path
Optical characteristics forward path		
Optical input wavelength	[nm]	OFN80-FRx-yyy-WF-dd: 1545 .. 1565 OFN80-FRx-yyy-00-dd: 1100 .. 1600 OFN80-FRx-yyy-1F-dd: 1545 .. 1565
Optical input power (max. range)	[dBm]	-10 .. +3 (beyond AGC range, HF Ausgangspegel ändert sich um 2dB je 1dB Änderung des optischen Pegels, höhere optische Leistungen zerstören den Receiver PIN)
AGC range	[dB]	-8... +2
Equivalent noise current typ.	[pA/√Hz]	≤ 5
Optical return loss	[dB]	≥ 45
LED forward path level indication		green: -8.0 .. +2,0 dBm, yellow: < -8,0 dBm, red: > +2,0 dBm
RF characteristics forward path		
Diplex filter configuration	[MHz]	65/85, 85/104 oder 204/258 (see dd Code)
Forward path frequency range	[MHz]	85/104/258 - 1218 (see dd Code)
Flatness	[dB]	± 1,5
RF Level max. acc. EN 60728-3, 119 Channels, QAM 256: BER < 1E-9	[dBμV]	OFN80-FRL-yyy-zz-dd: 82 OFN80-FRH-yyy-zz-dd: 100 (adjustable via Pads 0 ... 20 dB)
Attenuation in forward path		0 ..20 dB Pads
Equalizer / Slope setting	[dB]	0 / 3 / 6 / 9 (fix adjustment with 2 jumpers)
Output Return Loss	[dB]	≥ 18 - 1,5 dB/oct, min. 12
Output Impedance	[dB]	75
RF testpoint	[dB]	-20 ± 1,0
Optical characteristics return path		
Optical Wavelength	[nm]	OFN80-FRx-yyy-00-dd: yyyy = 1270/1290 ...1610 ± 3 nm OFN80-FRx-yyy-WF-dd: yyyy = 1270/1290 ...1610 ± 3 nm OFN80-FRx-yyy-1F-dd: yyyy = 1270/1290 ... 1490/1510/1590/1610 ± 3 nm
Optical Power	[dBm]	+3,0 (DFB Laser)

Gain characteristic flatness	[dB]	±1,0
RF characteristics return path		
Nominal RF upstream level acc. EN 60728-3 24 Channels, QAM 256,	[dBμV]	70 ... 90 (adjustable with Pads 0 ... 20 dB)
Frequency range upstream	[MHz]	5-65, 5-85 or 5-204 (see dd Code)
Rückweg Pads		ATT2: First Stage ATT Pad 0..20 dB ATT3: Second Stage ATT Pad 0 .. 10 dB plugin socket or filter
Ingress Rauschminderung	[dB]	0 / 6 / 40 (fix setting with jumpers)
Burst mode parameters / SCTE174_2010 7.1.3 FIGURE 4		
Laser turn on time	μs	≤ 1.3
Laser turn off time	μs	≤ 1.6
Laser turn on level	dBμV	67
Laser turn off level	dBμV	58
Remaining optical power laser off	dBm	< -30
Mode of return laser	[dB]	continuous or burst mode (selectable with jumper)
Common data		
Optical connector type		SC/APC
Fibre type		Single mode 9/125
Power supply	[VAC / Hz]	230 / 50
Power consumption	[W]	≤ 7,5
IP Protection class		IP 20
RF Output connector / Test connector		F-female
Mounting and operation heighth	[m]	< 4000 over N.N.
Dimensions (L x W x H)	[mm]	122 x 155 x 55
Ambient temperature	[°C]	-20...+55

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