



OPTRIBUTION®



The Experts in RF Signal Handling

Optribution® Optical Transmission and Distribution of RF Signals



Products:

DEV 71xy -	Optribution® Chassis
DEV 72xy -	Optical Transmitter Modules
DEV 73xy -	Optical Receiver Modules
DEV 751x -	Optical Splitter Modules
DEV 76xy -	Optical Multiplexer/Demultiplexer Modules
DEV 78xy -	Breakout Cables

Features:

- /// CWDM Solutions for up to 8 Channels
- /// Chassis providing up to 20 Slots with up to 40 Optical Links
- /// Different Optical Modules with different Features for different Frequency Ranges and Distances
- /// Low Noise Figure (10 dB)
- /// Cabling, Distribution, Matrix Switch, or Redundancy Options with 50 Ohm or 75 Ohm Impedance
- /// 1+1 or $m*(n+1)$ Redundancy Switching can be integrated for Optical Transmission Lines (with $m = 1...8$, $n = 4...16$)
- /// Redundant Power Supplies
- /// Remote Control and Surveillance
- /// Optional Optical Equipment (Splitters, (De-) Multiplexers)
- /// Integrated Signal Recording

Application Areas:

- /// Cable Head End Stations with distant Dish Farms
- /// Redundant distributed Dish Farms
- /// Satellite Ground Stations



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OPTRIBUTION®

DEV 7000 Series



Front DEV 7113



Rear DEV 7113



Front DEV 7114



Rear DEV 7114

Your Ultimate RF over Fiber Downlink Solution and More

Imagine the ability to flawlessly transport, protect, switch, broadcast and monitor scores of downlink RF signals from LNB to receiver – all with a single device.

Add the ability to transport RF signals from an entire satellite or more at superior fiber optic quality around your facility, or between facilities, with easy-to-use, centralized switching, distribution, monitoring and control.

Until recently, when cable head ends or satellite ground stations needed to transport RF signals over distances via fiber, to split and distribute multiple feeds - while monitoring and switching redundant upstream and downstream signal equipment for reliability - it took numerous devices.

It took a group of dedicated devices to perform all of the required tasks.

Now all this has changed with the introduction of DEV's breakthrough technology integration.

We call it Optribution® which stands for combined optical transmission and RF distribution, and a game-changing new series of products from DEV.

DEV's Solution

DEV Systemtechnik has developed the Optribution® series which integrates optical transmission, redundancy switching, and RF signal distribution in a few chassis, which can be configured very flexible according to the needs of the customer.

The Technical Concept

The DEV Optribution® series features products which can be combined to meet the requirements of the specific application.

The DEV 7000 product series is based on a variety of optical transmitter modules (DEV 72xy) and optical receiver modules (DEV 73xy). In addition to being offered for Transmit or Receive operation, separate modules are available for operation with different frequency ranges.

Available module options offer a wide variety of feature sets, ranging from single or twin basic optical modules for very cost-effective solutions - up to top performance optical modules for advanced CWDM applications (in combination with optical de/multiplexers, DEV 76xy options). The optical modules are intended to be installed in the DEV 71xy chassis, which are presented in this data sheet. For smaller optical transmission applications, the 1 RU Universal Transmission Chassis DEV 4111 is available; please refer to the corresponding data sheet.

Optionally, the chassis can be equipped with splitter modules and/or switching modules to achieve 1+1 or $m*(n+1)$ redundancy for the optical transmission system (with $m = 1...8$, $n = 4...16$).

The chassis DEV 7114 was developed to combine optical reception with RF distribution and can be equipped with splitter options and matrix switch options to distribute the regained RF signals according to the requirements of the specific application.

Another key feature of the DEV Optribution® series is the integrated control and surveillance capability via Web Interface and via SNMP remote protocol support.



OPTRIBUTION®

DEV 7000 Series



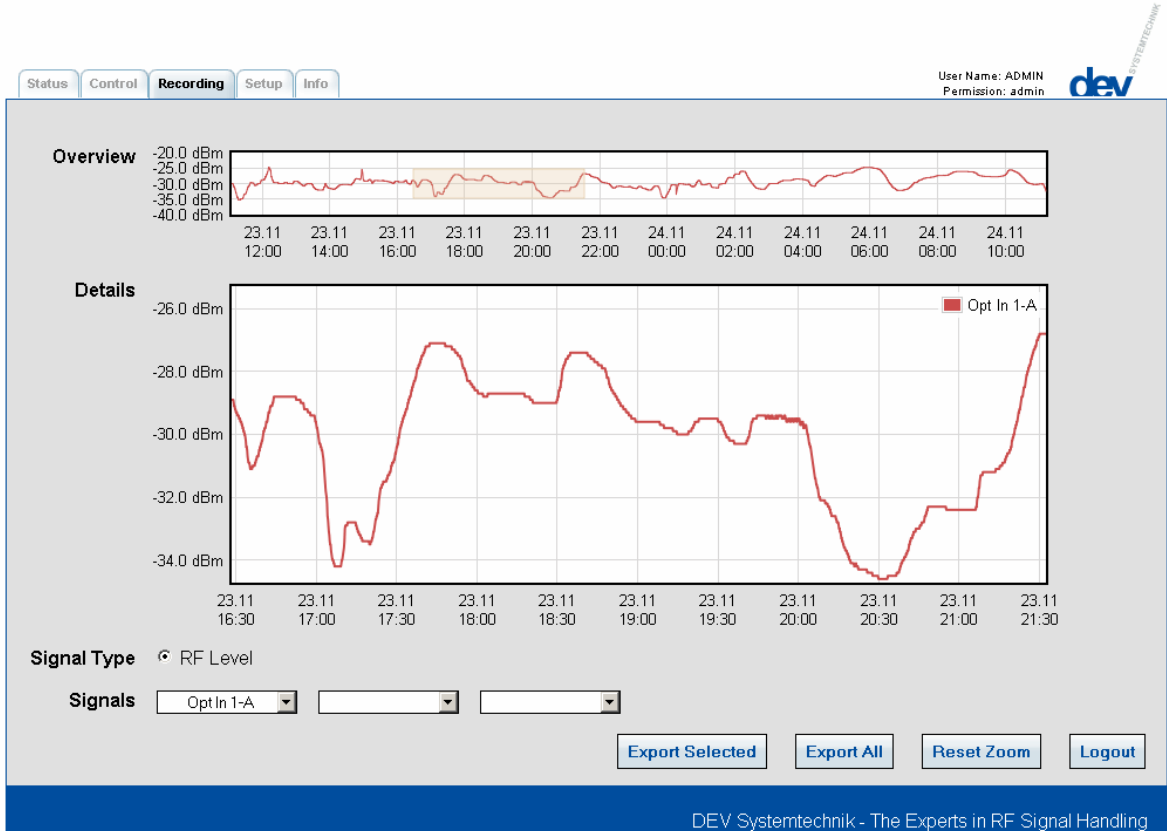
Front DEV 7152



Rear DEV 7152

The Intelligent Optribution® Outdoor Chassis DEV 7152 was designed to be installed close to an antenna and is intended for the optical transmission of the received RF signals. The outdoor chassis can be equipped with up to five optical modules, which provides possibilities for various applications:
Either the chassis is equipped with five (basic, advanced or top performance) optical transmitter modules thus providing five optical links.
Or the chassis is equipped with five twin optical transmitter modules thus providing ten optical links.

Alternatively, it is possible to realize redundancy for the transmission for four optical links: This is achieved by ordering a 4+1 redundancy kit, five single channel optical transmitter modules (or two twin optical transmitter modules and a single channel optical transmitter module).
The optical transmission of the Ethernet signals is realized by ordering Option 55. With Option 89, the DEV 7152 is delivered with a pole mount assembly, and with Option 91 the temperature range of the chassis can be extended significantly.
Different breakout cables DEV 78xy are available for establishing the connection (optical or optical and power) to the remote location. Note, that the high ingress protection rating of the DEV 7152 can be achieved with the application of these breakout cables, only.



Integrated Signal Recording

This new functionality enables the capture and storage of instrument data, e.g. the RF level of a signal over time to monitor the signal variation.

All data sources of an instrument are recorded; the recording time interval for the capture can be determined by the user, which results in a recording duration before the oldest value is overwritten.

The following data sources are available:

- RF level of each L-Band signal
- Bias current of each amplifier

The recorded data is represented in a nice graphical display, permitting interactive zoom. And naturally, selected data or all the recorded data can be exported.



Technical Data

DEV 4111 – Universal Transmission Chassis 1 RU

(please refer to the corresponding data sheet)

DEV 7113 – Intelligent Optribution® Chassis 3 RU

Capacity

Front side 20 * 4 HP slots for optical modules (DEV 723x, DEV 7241, DEV 733x, DEV 7341)

Remote Communication

Interfaces (connectors) • Ethernet (RJ-45);
• serial interface RS 232 (Sub-D-9 (f))
Remote control & surveillance (interface) • via Web Interface (Ethernet);
• via SNMP (Ethernet)

Redundant Power Supply

Power supply module slots 2
Number of power supplies 2
Power line redundancy 100...240 V AC.
Power consumption <600 VA

General Specifications

Housing 19" (483 mm), 3 RU (133 mm),
~470 mm depth + max. 80 mm (optical connectors)
Weight ~9 kg (empty chassis)
Environmental conditions ETS 300019 Part 1-3 Class 3.1

DEV 7143 – Optribution® Chassis 3 RU

Capacity

Front side 20 * 4 HP slots for optical modules (DEV 723x, DEV 7241, DEV 733x, DEV 7341)

Power Supply

Power supply module slots 2
Number of power supplies 1
Option 16: 2nd power supply module
The application of the 2nd power supply module is recommended for power supply redundancy.
Power line redundancy 100...240 V AC supplied by:
• one line (if equipped with one power supply module) or
• two different lines (if equipped with two power supply modules)
Power consumption <300 VA / <600 VA with one/two power supply modules installed

General Specifications

Housing 19" (483 mm), 3 RU (133 mm),
~470 mm depth + max. 80 mm (optical connectors)
Weight ~9 kg (empty chassis)
Environmental conditions ETS 300019 Part 1-3 Class 3.1



Technical Data

DEV 7114 – Intelligent Optribution® Chassis 4 RU

Capacity

Front side	16 * 4 HP slots for optical modules (DEV 7231, DEV 7232, DEV 7233, DEV 7331, DEV 7332, DEV 7333) or for functional modules.
Rear side	4 horizontal slots + top slot for the inputs/outputs of cabling options

Remote Communication

Interfaces (connectors)	<ul style="list-style-type: none"> • Ethernet (RJ-45); • serial interface RS 232 (Sub-D-9 (f))
Remote control & surveillance (interface)	<ul style="list-style-type: none"> • via Web Interface (Ethernet); • via SNMP (Ethernet)

Redundant Power Supply

Power supply module slots	3
Number of power supplies	2
	Option 16: 3 rd power supply module
	For more than 8 optical modules the 3 rd power supply module is recommended for keeping the power supply redundancy.
Power line redundancy	100...240 V AC supplied by two different lines
Power consumption	<100 VA / <150 VA with two/three power supply modules installed

Potential Free Contacts

Alarm connector	Sub-D-9 (m)
Contact load	60 V; 0,3 A
Summary Alarm	Via remote interface and via potential free contacts

Two Stage Alarm Signalization for Power Line Failure:

B-Alarm	One power supply unit does not deliver any secondary power.
A-Alarm	All power supply units do not deliver any secondary power.

General Specifications

Housing	19" (483 mm), 4 RU (178 mm), ~490 mm depth + max. 80 mm (optical connectors)
Weight	~10 kg (empty chassis)
Environmental conditions	ETS 300019 Part 1-3 Class 3.1



Technical Data

DEV 7152 – Intelligent Optribution® Outdoor Chassis

Capacity

Front side 5 * 4 HP slots for optical modules
(DEV 723x, DEV 7241, DEV 733x, DEV 7341,
DEV 751x, DEV 76xy, Option 55 (optical to
Ethernet converter module))

Remote Communication

Interfaces (connectors) • Ethernet (RJ-45);
• serial interface RS 232 (Sub-D-9 (f))
Remote control & surveillance (interface) • via Web Interface (Ethernet);
• via SNMP (Ethernet)

Redundant Power Supply

Power supply module slots 2
Number of power supplies 2
Power line 100...240 V AC supplied by one power line
Power consumption <100 VA

General Specifications

Housing 374 mm width, 382 mm height,
405 mm depth (including optional pole mount assembly)
Mounting via 4 bolts
Option 89: via pole mount assembly
(for pole diameters
168...400 mm (6.6...15.7 ”))
Weight ~10 kg (empty chassis)
Operating temperature -30...+45 °C (-22...+113 °F)
Option 91: -30...+60 °C (-22...+140 °F)
Ingress protection rating IP55¹



Technical Data

Cabling Options

Cabling options are required for the direct access to the RF ports of the installed modules.

Cabling options for the DEV 7114 and for the DEV 7152 are to be ordered per RF input or per RF output.

Cabling options for the DEV 7113 and for the DEV 7143 are to be ordered per four RF inputs or per four RF outputs.

DEV Systemtechnik offers the following cabling options for the DEV 71xy chassis, :

- Option 40: Cabling 50 Ohm, SMA connector(s) for one/four RF port(s)
- Option 40/N: Cabling 50 Ohm, N connector for one RF port (DEV 7152 only)
- Option 41: Cabling CATV-Band, 75 Ohm, precision F connector(s) for one/four RF port(s)
- Option 42: Cabling L-Band, 75 Ohm, precision F connector(s) for one/four RF port(s)

Specifications

Number of ports	DEV 7114, DEV 7152:	1 per cabling option
	DEV 7113, DEV 7143:	4 per cabling option
Frequency range, impedance, connectors	Option 40:	DC...2300 MHz, 50 Ohm, SMA (f)
	Option 40/N:	DC...2300 MHz, 50 Ohm, N (f)
	Option 41:	DC, 5...862 MHz, 75 Ohm, precision F (f)
	Option 42:	DC, 700...2300 MHz, 75 Ohm, precision F (f)

General Specifications

Weight	Option 40, Option 40/N: ~0.1 kg Option 41, Option 42: ~0.2 kg
Environmental conditions	ETS 300019 Part 1-3 Class 3.1

Note:

- Cabling options for the RF output of an optical receiver module can not be applied in combination with distribution options, with matrix switch options, or with redundancy options.



Technical Data

Distribution Options for DEV 7114

With the application of a distribution option, the output of an optical receiver module installed in a DEV 7114 chassis feeds the input of a 1:8 (up to 16 x), 1:16 (up to 8 x), 1:32 (up to 4 x), 1:64 (up to 2 x), or 1:128 (1 x) Extended L-Band splitter.

The following distribution options are available for the DEV 7114:

- Option 8/50: 1:8, Outputs: 50 Ohm, SMA connectors
- Option 8/75: 1:8, Outputs: 75 Ohm, precision F connectors
- Option 16/50: 1:16, Outputs: 50 Ohm, SMA connectors
- Option 16/75: 1:16, Outputs: 75 Ohm, precision F connectors
- Option 32/50: 1:32, Outputs: 50 Ohm, SMA connectors
- Option 32/75: 1:32, Outputs: 75 Ohm, precision F connectors
- Option 64/50: 1:64, Outputs: 50 Ohm, SMA connectors
- Option 64/75: 1:64, Outputs: 75 Ohm, precision F connectors
- Option 128/50: 1:128, Outputs: 50 Ohm, SMA connectors
- Option 128/75: 1:128, Outputs: 75 Ohm, precision F connectors

The “Y” in Y/50 or Y/75 in the following table is used as a placeholder which can be 8, 16, 32, 64, or 128; “zz” stands either for 50 Ohm or 75 Ohm.

RF Specifications

Number of outputs	8, 16, 32, 64, or 128 per distribution option	
Frequency range	700...2300 MHz	
Impedance, connectors	Option Y/50:	50 Ohm, SMA (f)
	Option Y/75:	75 Ohm, precision F (f)
Return loss	Option Y/50:	>16 dB
	Option Y/75:	>14 dB
Frequency response (full band)	for up to 16 outputs:	±1.0 dB
	Option 32/zz:	±1.5 dB
	Option 64/zz:	±2.0 dB
	Option 128/zz:	±2.5 dB
Frequency response (in any 36 MHz interval)	for up to 16 outputs:	±0.3 dB
	Option 32/zz:	±0.5 dB
	Option 64/zz:	±0.6 dB
	Option 128/zz:	±0.8 dB
Isolation between output ports	>25 dB	
Intermodulation distortion	<-40 dBc	(2 tones, -13 dBm each)

General Specifications

Weight	Option 8/zz:	~0.4 kg
	Option 16/zz:	~0.5 kg
	Option 32/zz:	~0.7 kg
	Option 64/zz:	~1.2 kg
	Option 128/zz:	~2.2 kg
Environmental conditions	ETS 300019 Part 1-3 Class 3.1	

Note:

- Though distribution options for the RF output of an optical receiver module can not be applied in combination with cabling options, with matrix switch options, or with redundancy options, it is possible to combine a number of optical receiver modules in a DEV 7114 chassis with cabling options, distribution options, and with matrix switch options. Naturally, there are restrictions with respect to the quantities for each of these options due to space restrictions on the front side and the rear side of the chassis. Feel free to contact DEV Systemtechnik to discuss your specific requirements!
- To achieve the optimal performance when applying distribution options, the usage of optical receiver modules with variable gain functionality (DEV 7332, DEV 7333) is mandatory.



Technical Data

Matrix Switch Options and Matrix Switch Option Extensions for DEV 7114

With the application of a matrix switch option, the output of four optical receiver modules feed the four inputs of an L-Band matrix switch with 16 (up to 4 x), 32 (up to 2 x), 48 (1 x), or 64 (1 x) outputs.

The following matrix switch options are possible for the DEV 7114:

- Option 4x16/75: 4 Inputs and 16 Outputs: 75 Ohm, precision F connectors
- Option 4x32/75: 4 Inputs and 32 Outputs: 75 Ohm, precision F connectors
- Option 4x48/75: 4 Inputs and 48 Outputs: 75 Ohm, precision F connectors
- Option 4x64/75: 4 Inputs and 64 Outputs: 75 Ohm, precision F connectors

Additionally, matrix switch options with 16 outputs (Option 4x16/75) or 32 outputs (Option 4x32/75) can be extended with the application of a matrix switch option extension. If applied, the output of each of the four optical receiver modules feeding the matrix switch, additionally feeds the input of a splitter with 8 output ports. The following matrix switch option extension types are offered:

- Option 4x8/50: 4 x 8 additional Outputs: 50 Ohm, SMA connectors
- Option 4x8/75: 4 x 8 additional Outputs: 75 Ohm, precision F connectors

The “Y” in 4xY/75 in the following table is used as a placeholder which can be 16, 32, 48, or 64; “zz” stands either for 50 Ohm or 75 Ohm..

RF Specifications

Number of inputs	Option 4xY/75:	4
Number of outputs		16, 32, 48, or 64 per matrix switch option; 4 x 8 per matrix switch option extension (Option 4x8/zz)
Frequency range		950...2150 MHz
Impedance, connectors	Option 4x8/50:	50 Ohm, SMA (f)
	(all other options):	75 Ohm, precision F (f)
Tilt		4 dB over entire band
Return loss		>14 dB
Frequency response		±0.6 dB (in any 36 MHz interval)
Isolation between input ports		>25 dB
Intermodulation distortion		<-35 dBc @ 85 dBμV
IMA ₃ output level		<89 dBμV
IMA ₂ output level		<87 dBμV

Input Selection

Switch control	14 V, 18 V and 0 Hz, 22 kHz at each output
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General Specifications

Weight	Option 4x16/75:	~1.0 kg
	Option 4x32/75:	~2.0 kg
	Option 4x48/75:	~3.0 kg
	Option 4x64/75:	~4.0 kg
	Option 4x8/50:	~0.7 kg
	Option 4x8/75:	~0.8 kg
Environmental conditions	ETS 300019 Part 1-3 Class 3.1	

Note:

- Though matrix switch options for the RF output of an optical receiver module can not be applied in combination with cabling options, with distribution options, or with redundancy options, it is possible to combine a number of optical receiver modules in a DEV 7114 chassis with cabling options, distribution options, and with matrix switch options. Naturally, there are restrictions with respect to the quantities for each of these options due to space restrictions on the front side and the rear side of the chassis. Feel free to contact DEV Systemtechnik to discuss your specific requirements!
- To achieve the optimal performance when applying a matrix switch option, the usage of optical receiver modules with variable gain functionality is recommended.



Technical Data

1+1 Redundancy Options

1+1 redundancy options are offered to realize the redundant transmission of an optically converted RF signal.

The following 1+1 redundancy options are offered, distinctions are made regarding the frequency range, impedance/connector, and whether the option is to be applied on the receiver side (Rx) or the transmission side (Tx) of an optical 1+1 redundancy:

- Option 44/75/Rx: Redundancy 1+1 Rx, CATV-Band, 75 Ohm, precision F connectors
- Option 44/75/Tx: Redundancy 1+1 Tx, CATV-Band, 75 Ohm, precision F connectors
- Option 45/50/Rx: Redundancy 1+1 Rx, L-Band, 50 Ohm, SMA connectors
- Option 45/50/Tx: Redundancy 1+1 Tx, L-Band, 50 Ohm, SMA connectors
- Option 45/75/Rx: Redundancy 1+1 Rx, L-Band, 75 Ohm, precision F connectors
- Option 45/75/Tx: Redundancy 1+1 Tx, L-Band, 75 Ohm, precision F connectors

In the following table “4y” stands either for 44 or 45; “zz” stands either for 50 Ohm or 75 Ohm; and “Xx” is used either for Rx (receive side) or Tx (transmit side) of an optical 1+1 redundancy.

RF Specifications

Frequency range	Option 44/zz/Xx:	47...862 MHz
	Option 45/zz/Xx:	950...2150 MHz
Impedance, connectors	Option 45/50/Xx:	50 Ohm, SMA (f)
	Option 4y/75/Xx:	75 Ohm, precision F (f)
Additional frequency response tolerance		±0.5 dB
Switching type	Option 4y/zz/Rx:	Solid state

General Specifications

Weight	~0.3 kg
Environmental conditions	ETS 300019 Part 1-3 Class 3.1

Note:

- 1+1 redundancy options are not available for the chassis DEV 7143 and DEV 7152.
- For a chassis DEV 7113 equipped with single (twin) link optical modules, 1+1 redundancy options can be applied up to 10 x (16 x).
- For a chassis DEV 7114, up to 6 x Option 45/50/Rx can be applied.
- It is not possible to have mix of 1+1 redundancy options and n+1 redundancy kits within one chassis.



Technical Data

n+1 Redundancy Kits

n+1 redundancy kits are offered to realize redundancy for the transmission of n optical links.

The following n+1 redundancy kits are offered, distinctions are made regarding the impedance/connector:

- Option 47/50/4+1 Redundancy Kit 4+1, L-Band, 50 Ohm, SMA connectors
- Option 47/50/N/4+1 Redundancy Kit 4+1, L-Band, 50 Ohm, SMA connectors (DEV 7152 only)
- Option 47/75/4+1 Redundancy Kit 4+1, L-Band, 75 Ohm, precision F connectors
- Option 47/50/8+1 Redundancy Kit 8+1, L-Band, 50 Ohm, SMA connectors
- Option 47/75/8+1 Redundancy Kit 8+1, L-Band, 75 Ohm, precision F connectors
- Option 47/50/12+1 Redundancy Kit 12+1, L-Band, 50 Ohm, SMA connectors
- Option 47/75/12+1 Redundancy Kit 12+1, L-Band, 75 Ohm, precision F connectors
- Option 47/50/16+1 Redundancy Kit 16+1, L-Band, 50 Ohm, SMA connectors
- Option 47/75/16+1 Redundancy Kit 16+1, L-Band, 75 Ohm, precision F connectors

The “n” in n+1 in the following table stands for 4, 8, 12, or 16.

RF Specifications

Number of signal channels (n) per redundancy kit	4, 8, 12, or 16	
Frequency range	950...2150 MHz	
Impedance, connectors	Option 47/50/n+1:	50 Ohm, SMA (f)
	Option 47/75/n+1:	75 Ohm, precision F (f)
Return loss (signal path)	Option 47/50/n+1:	>16 dB
	Option 47/75/n+1:	>14 dB
Additional frequency response tolerance	±0.5 dB	
Switching type	Solid state	

General Specifications

Weight	Option 47/zz/4+1:	~1.0 kg
	Option 47/zz/8+1:	~2.4 kg
	Option 47/zz/12+1:	~3.4 kg
	Option 47/zz/16+1:	~4.4 kg
Environmental conditions	ETS 300019 Part 1-3 Class 3.1	

Note:

- n+1 redundancy kits are not available for optical CATV-Band modules.
- n+1 redundancy kits are not available for the chassis DEV 7143.
- For a chassis DEV 7113 equipped with single link optical modules
4+1 redundancy kits can be applied up to 4 x per chassis,
8+1 redundancy kits can be applied up to 2 x per chassis, and
12+1 and 16+1 redundancy kits can be applied 1 x per chassis.
- For a chassis DEV 7113 equipped with twin link optical modules
4+1 redundancy kits can be applied up to 8 x per chassis, and
8+1, 12+1 and 16+1 redundancy kits can be applied up to 2 x per chassis.
- For a chassis DEV 7114, either 1 x Option 47/50/4+1 or 1 x Option 47/50/8+1 can be applied.
- For a chassis DEV 7152 it is possible to install a single 4+1 redundancy kit in combination with five single link optical modules, or in combination with two twin link optical modules and one single link optical module.
- It is not possible to have mix of n+1 redundancy kits and 1+1 redundancy options within one chassis.

**Technical Data****Optical Link Specifications DEV 7231 / DEV 7331 or DEV 7241 / DEV 7341****Link Specifications**

Optical link gain	0±3 dB	(with <100 m optical fiber)
Frequency response	±1 dB	
Optical budget	10 dB @ 10 dB C/N with -10 dBm input	
Output P1	-3 dBm	
Gain stability	±2 dB	(0...+50 °C)
Equivalent optical distance	<28 km	
Noise figure of complete link	25 dB	
Intermodulation distortion	<-40 dBc	(two tones @ -23 dBm)
Fiber	Single mode 9/125 µm, Corning SMF28 or equivalent	

Optical Link Specifications DEV 7232 / DEV 7332**Link Specifications**

Optical link gain	-10...+15 dB ±3 dB	(with <100 m optical fiber)
Frequency response	±0.5 dB	
Optical budget	24 dB @ 10 dB C/N with input ≥ -20 dBm	
Output P1	+12 dBm	
Gain stability	±1 dB	(0...+50 °C)
Equivalent optical distance	<68 km @ 1310 nm (ideal optical cable)	
	<120 km @ 1550 nm (ideal optical cable)	
Noise figure of complete link	20 dB	
Intermodulation distortion	<-40 dBc	(two tones @ -23 dBm)
Fiber	Single mode 9/125 µm, Corning SMF28 or equivalent	

Optical Link Specifications DEV 7233 / DEV 7333**Link Specifications**

Optical link gain	-10...+35 dB ±3 dB	(with <100 m optical fiber)
Adjustable tilt	-5...+4 dB	
Frequency response	±0.5 dB	(950...2150 MHz)
	±1.0 dB	(700...2300 MHz)
Optical budget	35 dB @ 10 dB C/N with input ≥ -35 dBm	
Output P1	+13 dBm	
Gain stability	±1 dB	(0...+50 °C)
Equivalent optical distance	<100 km @ 1310 nm (ideal optical cable)	
	<175 km @ 1550 nm (ideal optical cable)	
Noise figure of complete link	10 dB	
Intermodulation distortion	<-40 dBc	(two tones @ -23 dBm)
Fiber	Single mode 9/125 µm, Corning SMF28 or equivalent	

**Technical Data****Optical Link Specifications DEV 7237 / DEV 7337****Link Specifications**

Optical link gain	4±3 dB	(with <100 m optical fiber)
Adjustable tilt	0...18 dB	
Frequency response	±1 dB	
Optical budget	16 dB @ 10 dB C/N with -30 dBm input	
Output P1	+5 dBm	
Gain stability	±2 dB	(0...+50 °C)
Equivalent optical distance	<45 km	
Noise figure of complete link	25 dB	
Intermodulation distortion	<-40 dBc	(two tones @ -23 dBm)
Fiber	Single mode 9/125 µm, Corning SMF28 or equivalent	

DEV 7231 – Basic Optical Transmitter Module L-Band**DEV 7241 – Basic Twin Optical Transmitter Module L-Band****Optical Specifications Output**

Laser type	DFB
Laser class	
(according to IEC 60 825-1)	Class 1M (low risk to eyes, no risk to skin)
Optical power	<2 dBm
Fiber type	Single mode 9/125 µm
Connector options	Option 07: FC/APC Option 08: E2000 HRL (DEV 7241 only) Option 09: SC/APC

RF Specifications Input

Frequency range	950...2150 MHz
Damage level	+10 dBm
Nominal input level	-10 dBm

Bias & Bias Current Alarm

Bias	15+3/-0 V; max. 500 mA	
Adjustable level setting:		
• Upper alarm level	max. 400 mA	(DEV factory setting: 350 mA)
• Lower alarm level	min. 50 mA	(DEV factory setting: 100 mA)
Alarm indication	Via LED on the front panel & via remote communication ²	

RF Sensing

Adjustable threshold level	-10 dBm > threshold level > -50 dBm (DEV factory setting: -40 dBm)	
Threshold level accuracy	±3 dBm	
Threshold repeatability	±0.5 dB	
Alarm indication	Via LED on the front panel & via remote communication ²	

General Specifications

Power consumption	DEV 7231: 15 V; 200 mA (without bias) DEV 7241: 15 V; 400 mA (without bias)
Housing	3 RU (133 mm), 4 HP (20 mm), 100 mm depth
Weight	~0.5 kg
Environmental conditions	ETS 300019 Part 1-3 Class 3.1

Note:

- Bias is not available if the module is installed in a DEV 7143 or in a DEV 4111 without Option 59.

**Technical Data****DEV 7232 – Advanced Optical Transmitter Module L-Band****Optical Specifications Output**

Laser type	DFB
Laser class (according to IEC 60 825-1)	Class 1M (low risk to eyes, no risk to skin)
Optical power	<3 dBm
Fiber type	Single mode 9/125 µm
Wavelength options	Option λ0: 1310 nm Option λ5: 1550 nm
Connector options	Option 07: FC/APC Option 08: E2000 HRL Option 09: SC/APC

RF Specifications Input

Frequency range	950...2150 MHz
Damage level	+20 dBm
Nominal input level	-20...+10 dBm
Input level control	Pre-amplification with automatic RF level limiting function to avoid unwanted intermodulation products

Monitoring Port

Impedance, connector	50 Ohm, SMA (f)
Return loss	>18 dB typ.
Frequency response	= input level – 23 dB ±1.0 dB

Bias & Bias Current Alarm

Bias	15+3/-0 V; max. 500 mA
Adjustable level setting:	
• Upper alarm level	max. 400 mA (DEV factory setting: 350 mA)
• Lower alarm level	min. 50 mA (DEV factory setting: 100 mA)
Alarm indication	Via LED on the front panel & via remote communication ²

RF Sensing

Adjustable threshold level	0 dBm > threshold level > -50 dBm (DEV factory setting: -40 dBm)
Threshold level accuracy	±3 dBm
Threshold repeatability	±0.5 dB
Alarm indication	Via LED on the front panel & via remote communication ²

Low Laser Radiation Alarm

Alarm indication	Via LED on the front panel & via remote communication ²
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General Specifications

Power consumption	15 V; 250 mA (without bias)
Housing	3 RU (133 mm), 4 HP (20 mm), 100 mm depth
Weight	~0.5 kg
Environmental conditions	ETS 300019 Part 1-3 Class 3.1

**Technical Data****DEV 7233 – Top Performance Optical Transmitter Module Extended L-Band****Optical Specifications Output**

Laser type	DFB	
Laser class (according to IEC 60 825-1)	Class 1M (low risk to eyes, no risk to skin)	
Optical power	<5 dBm	
Fiber type	Single mode 9/125 μ m	
Wavelength options	Option λ 0: 1310 nm	Option λ 1: 1470 nm
	Option λ 2: 1490 nm	Option λ 3: 1510 nm
	Option λ 4: 1530 nm	Option λ 5: 1550 nm
	Option λ 6: 1570 nm	Option λ 7: 1590 nm
	Option λ 8: 1610 nm	
Connector options	Option 07: FC/APC	
	Option 08: E2000 HRL	
	Option 09: SC/APC	

RF Specifications Input

Frequency range	700...2300 MHz
Damage level	+30 dBm
Nominal input level	-35...+10 dBm
Input level control	Lockable auto ranging, the dynamic range of the input signal for optimal laser transmission is -35...+10 dBm

Monitoring Port

Impedance, connector	50 Ohm, SMA (f)	
Return loss	>18 dB typ.	
Frequency response	@ max. gain:	= input level – 4.5 dB \pm 1.0 dB
	@ min. gain:	= input level – 23 dB \pm 1.0 dB

Bias & Bias Current Alarm

Bias	15+3/-0 V; max. 500 mA	
Adjustable level setting:		
• Upper alarm level	max. 400 mA	(DEV factory setting: 350 mA)
• Lower alarm level	min. 50 mA	(DEV factory setting: 100 mA)
Alarm indication	Via LED on the front panel & via remote communication ²	

RF Sensing

Adjustable threshold level	0 dBm > threshold level > -50 dBm (DEV factory setting: -40 dBm)
Threshold level accuracy	\pm 3 dBm
Threshold repeatability	\pm 0.5 dB
Alarm indication	Via LED on the front panel & via remote communication ²

Low Laser Radiation Alarm

Alarm indication	Via LED on the front panel & via remote communication ²
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General Specifications

Power consumption	15 V; 250 mA (without bias)
Housing	3 RU (133 mm), 4 HP (20 mm), 100 mm depth
Weight	~0.5 kg
Environmental conditions	ETS 300019 Part 1-3 Class 3.1

**Technical Data****DEV 7237 – TV Direct Optical Transmitter Module CATV-Band****Optical Specifications Output**

Laser type	DFB
Laser class	
(according to IEC 60 825-1)	Class 1M (low risk to eyes, no risk to skin)
Optical power	<5 dBm
Fiber type	Single mode 9/125 µm
Connector options	Option 07: FC/APC Option 08: E2000 HRL Option 09: SC/APC

RF Specifications Input

Frequency range	47...862 MHz
Damage level	+10 dBm
Nominal input level	-30 dBm

Monitoring Port

Impedance, connector	75 Ohm, precision F (f)
Return loss	>16 dB typ.
Frequency response	= input level – 20 dB ±1.0 dB

RF Sensing

Adjustable threshold level	0 dBm > threshold level > -50 dBm (DEV factory setting: -40 dBm)
Threshold level accuracy	±3 dBm
Threshold repeatability	±0.5 dB
Alarm indication	Via LED on the front panel & via remote communication ²

Low Laser Radiation Alarm

Alarm indication	Via LED on the front panel & via remote communication ²
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General Specifications

Power consumption	15 V; 200 mA
Housing	3 RU (133 mm), 4 HP (20 mm), 100 mm depth
Weight	~0.5 kg
Environmental conditions	ETS 300019 Part 1-3 Class 3.1

**Technical Data****DEV 7331 – Basic Optical Receiver Module L-Band**
DEV 7341 – Basic Twin Optical Receiver Module L-Band**Optical Specifications Input**

Fiber type	Single mode 9/125 μ m
Connector options	Option 07: FC/APC Option 09: SC/APC

RF Specifications Output

Frequency range	950...2150 MHz
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RF Sensing

Adjustable threshold level	0 dBm > threshold level > -50 dBm (DEV factory setting: -40 dBm)
Threshold level accuracy	± 3 dBm
Threshold repeatability	± 0.5 dB
Alarm indication	Via LED on the front panel & via remote communication ²

Low Laser Reception Alarm

Alarm indication	Via LED on the front panel & via remote communication ²
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General Specifications

Power consumption	DEV 7331: 15 V; 200 mA DEV 7341: 15 V; 400 mA
Housing	3 RU (133 mm), 4 HP (20 mm), 100 mm depth
Weight	~0.3 kg
Environmental conditions	ETS 300019 Part 1-3 Class 3.1

**Technical Data****DEV 7332 – Advanced Optical Receiver Module L-Band****Optical Specifications Input**

Fiber type	Single mode 9/125 μm
Wavelength	1100...1650 nm
Connector options	Option 07: FC/APC Option 08: E2000 HRL Option 09: SC/APC

RF Specifications Output

Frequency range	950...2150 MHz
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Monitoring Port

Impedance, connector	50 Ohm, SMA (f)
Return loss	>18 dB typ.
Frequency response	= output level – 20 dB \pm 1.0 dB

Gain Control

Adjustable gain	16 dB
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RF Sensing

Adjustable threshold level	0 dBm > threshold level > -50 dBm (DEV factory setting: -40 dBm)
Threshold level accuracy	\pm 3 dBm
Threshold repeatability	\pm 0.5 dB
Alarm indication	Via LED on the front panel & via remote communication ²

Low Laser Reception Alarm

Alarm indication	Via LED on the front panel & via remote communication ²
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General Specifications

Power consumption	15 V; 250 mA
Housing	3 RU (133 mm), 4 HP (20 mm), 100 mm depth
Weight	~0.3 kg
Environmental conditions	ETS 300019 Part 1-3 Class 3.1

**Technical Data****DEV 7333 – Top Performance Optical Receiver Module Extended L-Band****Optical Specifications Input**

Fiber type	Single mode 9/125 μm
Wavelength	1100...1650 nm
Connector options	Option 07: FC/APC Option 08: E2000 HRL Option 09: SC/APC

RF Specifications Output

Frequency range	700...2300 MHz
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Monitoring Port

Impedance, connector	50 Ohm, SMA (f)
Return loss	>18 dB typ.
Frequency response	= output level – 20 dB \pm 1.0 dB

Gain Control

Adjustable gain	16 dB
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Tilt Control

Adjustable tilt	-5...+4 dB
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RF Sensing

Adjustable threshold level	0 dBm > threshold level > -50 dBm (DEV factory setting: -40 dBm)
Threshold level accuracy	\pm 3 dBm
Threshold repeatability	\pm 0.5 dB
Alarm indication	Via LED on the front panel & via remote communication ²

Low Laser Reception Alarm

Alarm indication	Via LED on the front panel & via remote communication ²
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General Specifications

Power consumption	15 V; 250 mA
Housing	3 RU (133 mm), 4 HP (20 mm), 100 mm depth
Weight	~0.3 kg
Environmental conditions	ETS 300019 Part 1-3 Class 3.1

**Technical Data****DEV 7337 – TV Direct Optical Receiver Module CATV-Band****Optical Specifications Input**

Fiber type	Single mode 9/125 μm
Connector options	Option 07: FC/APC Option 08: E2000 HRL Option 09: SC/APC

RF Specifications Output

Frequency range	47...862 MHz
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Monitoring Port

Impedance, connector	75 Ohm, precision F (f)
Return loss	>16 dB typ.
Frequency response	= output level – 20 dB \pm 1.0 dB

Tilt Control

Adjustable tilt	0...18 dB
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RF Sensing

Adjustable threshold level	0 dBm > threshold level > -50 dBm (DEV factory setting: -40 dBm)
Threshold level accuracy	\pm 3 dBm
Threshold repeatability	\pm 0.5 dB
Alarm indication	Via LED on the front panel & via remote communication ²

Low Laser Reception Alarm

Alarm indication	Via LED on the front panel & via remote communication ²
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General Specifications

Power consumption	15 V; 100 mA
Housing	3 RU (133 mm), 4 HP (20 mm), 100 mm depth
Weight	~0.3 kg
Environmental conditions	ETS 300019 Part 1-3 Class 3.1

**Technical Data****DEV 7512, DEV 7514, DEV 7518 – Optical Splitter Modules****Optical Specifications**

Number of optical inputs	1
Number of optical outputs	DEV 7512: 2 DEV 7514: 4 DEV 7518: 8
Wavelength	1310±20 nm
Connector options	Option 07: FC/APC (not for DEV 7512) Option 08: E2000 HRL Option 09: SC/APC
Optical insertion loss	DEV 7512: 3 dB DEV 7514: 7 dB DEV 7518: 10 dB

General Specifications

Housing	DEV 7512: 3 RU (133 mm), 4 HP (20 mm) DEV 7514, DEV 7518: 3 RU (133 mm), 6 HP (30 mm)
Weight	DEV 7512: ~0.3 kg DEV 7514: ~0.4 kg DEV 7518: ~0.5 kg
Environmental conditions	ETS 300019 Part 1-3 Class 3.1

DEV 7612, DEV 7614, DEV 7618 – Optical Demultiplexer Modules**Optical Specifications**

Number of optical inputs	1
Number of optical outputs	DEV 7612: 2 DEV 7614: 4 DEV 7618: 8
Wavelength	DEV 7618: Port λ1: 1470 nm DEV 7618: Port λ2: 1490 nm DEV 7614, DEV 7618: Port λ3: 1510 nm DEV 7612, DEV 7614, DEV 7618: Port λ4: 1530 nm DEV 7612, DEV 7614, DEV 7618: Port λ5: 1550 nm DEV 7614, DEV 7618: Port λ6: 1570 nm DEV 7618: Port λ7: 1590 nm DEV 7618: Port λ8: 1610 nm
Connector options	Option 07: FC/APC Option 08: E2000 HRL Option 09: SC/APC
Passband bandwidth	±7.5 nm (typ.)
Worst optical insertion loss in minimum passband	<1 dB
Adjacent channel isolation	>37 dB
Directivity	>50 dB

General Specifications

Housing	3 RU (133 mm), 4 HP (20 mm)
Weight	~0.3 kg
Environmental conditions	ETS 300019 Part 1-3 Class 3.1

**Technical Data****DEV 7621, DEV 7641, DEV 7681 – Optical Multiplexer Modules****Optical Specifications**

Number of optical inputs	DEV 7621: 2 DEV 7641: 4 DEV 7681: 8
Number of optical outputs	1
Wavelength	DEV 7681: Port λ1: 1470 nm DEV 7681: Port λ2: 1490 nm DEV 7641, DEV 7681: Port λ3: 1510 nm DEV 7621, DEV 7641, DEV 7681: Port λ4: 1530 nm DEV 7621, DEV 7641, DEV 7681: Port λ5: 1550 nm DEV 7641, DEV 7681: Port λ6: 1570 nm DEV 7681: Port λ7: 1590 nm DEV 7681: Port λ8: 1610 nm
Connector options	Option 07: FC/APC Option 08: E2000 HRL Option 09: SC/APC
Passband bandwidth	±7.5 nm (typ.)
Worst optical insertion loss in minimum passband	<1 dB
Adjacent channel isolation	>37 dB
Directivity	>50 dB

General Specifications

Housing	3 RU (133 mm), 4 HP (20 mm)
Weight	~0.3 kg
Environmental conditions	ETS 300019 Part 1-3 Class 3.1

**Order Information****Optribution® Chassis**

DEV 7113	Intelligent Optribution® Chassis 3 RU
Option 55	Optical to Ethernet Converter Module
DEV 7143	Optribution® Chassis 3 RU
Option 16	Additional Power Supply Module (2 nd Power Supply)
DEV 7114	Intelligent Optribution® Chassis 4 RU
Option 16	Additional Power Supply Module (3 rd Power Supply)
Option 55	Optical to Ethernet Converter Module
DEV 7152	Intelligent Optribution® Outdoor Chassis
Option 55	Optical to Ethernet Converter Module
Option 89	Pole Mount Assembly (for pole diameters 168...400 mm (6.6...15.7"))
Option 91	Extended Temperature Range (-30...+60 °C (-22...+140 °F))

Cabling Options ³

Option 40	Cabling 50 Ohm, SMA connector(s) for 1/4 RF port(s)
Option 40/N	Cabling 50 Ohm, N connector for 1 RF port (DEV 7152 only)
Option 41	Cabling CATV-Band, 75 Ohm, precision F connector(s) for 1/4 RF port(s)
Option 42	Cabling L-Band, 75 Ohm, precision F connector(s) for 1/4 RF port(s)

Distribution Options for DEV 7114 ³

Option 8/50	1:8, Outputs: 50 Ohm, SMA connectors
Option 8/75	1:8, Outputs: 75 Ohm, precision F connectors
Option 16/50	1:16, Outputs: 50 Ohm, SMA connectors
Option 16/75	1:16, Outputs: 75 Ohm, precision F connectors
Option 32/50	1:32, Outputs: 50 Ohm, SMA connectors
Option 32/75	1:32, Outputs: 75 Ohm, precision F connectors
Option 64/50	1:64, Outputs: 50 Ohm, SMA connectors
Option 64/75	1:64, Outputs: 75 Ohm, precision F connectors
Option 128/50	1:128, Outputs: 50 Ohm, SMA connectors
Option 128/75	1:128, Outputs: 75 Ohm, precision F connectors

Matrix Switch Options for DEV 7114 ³

Option 4x16/75	4 Inputs and 16 Outputs: 75 Ohm, precision F connectors
Option 4x32/75	4 Inputs and 32 Outputs: 75 Ohm, precision F connectors
Option 4x48/75	4 Inputs and 48 Outputs: 75 Ohm, precision F connectors
Option 4x64/75	4 Inputs and 64 Outputs: 75 Ohm, precision F connectors

Matrix Switch Option Extensions

Option 4x8/50	4 x 8 additional Outputs: 50 Ohm, SMA connectors
Option 4x8/75	4 x 8 additional Outputs: 75 Ohm, precision F connectors

1+1 Redundancy Options ³

Option 44/75/Rx	Redundancy 1+1 Rx, CATV-Band, 75 Ohm, precision F connectors
Option 44/75/Tx	Redundancy 1+1 Tx, CATV-Band, 75 Ohm, precision F connectors
Option 45/50/Rx	Redundancy 1+1 Rx, L-Band, 50 Ohm, SMA connectors
Option 45/50/Tx	Redundancy 1+1 Tx, L-Band, 50 Ohm, SMA connectors
Option 45/75/Rx	Redundancy 1+1 Rx, L-Band, 75 Ohm, precision F connectors
Option 45/75/Tx	Redundancy 1+1 Tx, L-Band, 75 Ohm, precision F connectors

**Order Information (cont.)****n+1 Redundancy Kits** ³

Option 47/50/4+1	Redundancy Kit 4+1, L-Band, 50 Ohm, SMA connectors
Option 47/75/4+1	Redundancy Kit 4+1, L-Band, 75 Ohm, precision F connectors
Option 47/50/8+1	Redundancy Kit 8+1, L-Band, 50 Ohm, SMA connectors
Option 47/75/8+1	Redundancy Kit 8+1, L-Band, 75 Ohm, precision F connectors
Option 47/50/12+1	Redundancy Kit 12+1, L-Band, 50 Ohm, SMA connectors
Option 47/75/12+1	Redundancy Kit 12+1, L-Band, 75 Ohm, precision F connectors
Option 47/50/16+1	Redundancy Kit 16+1, L-Band, 50 Ohm, SMA connectors
Option 47/75/16+1	Redundancy Kit 16+1, L-Band, 75 Ohm, precision F connectors

Optical Transmitter Modules

DEV 7231	Basic Optical Transmitter Module L-Band
DEV 7232	Advanced Optical Transmitter Module L-Band
DEV 7233	Top Performance Optical Transmitter Module Extended L-Band
DEV 7237	TV Direct Optical Transmitter Module CATV-Band
DEV 7241	Basic Twin Optical Transmitter Module L-Band

Connector Options:

Option 07	Optical Connector FC/APC
Option 08	Optical Connector E2000 HRL ⁴
Option 09	Optical Connector SC/APC

Wavelength Options:

Option Lambda 0	λ 0: 1310 nm (for DEV 7233 and DEV 7232 only)
Option Lambda 1	λ 1: 1470 nm (for DEV 7233 only)
Option Lambda 2	λ 2: 1490 nm (for DEV 7233 only)
Option Lambda 3	λ 3: 1510 nm (for DEV 7233 only)
Option Lambda 4	λ 4: 1530 nm (for DEV 7233 only)
Option Lambda 5	λ 5: 1550 nm (for DEV 7233 and DEV 7232 only)
Option Lambda 6	λ 6: 1570 nm (for DEV 7233 only)
Option Lambda 7	λ 7: 1590 nm (for DEV 7233 only)
Option Lambda 8	λ 8: 1610 nm (for DEV 7233 only)

Optical Receiver Modules

DEV 7331	Basic Optical Receiver Module L-Band
DEV 7332	Advanced Optical Receiver Module L-Band
DEV 7333	Top Performance Optical Receiver Module Ext. L-Band
DEV 7337	TV Direct Optical Receiver Module CATV-Band
DEV 7341	Basic Twin Optical Receiver Module L-Band

Connector Options:

Option 07	Optical Connector FC/APC
Option 08	Optical Connector E2000 HRL ⁴
Option 09	Optical Connector SC/APC

Optical Splitter Modules

DEV 7512	Optical 1:2 Splitter Module, 1310 nm
DEV 7514	Optical 1:4 Splitter Module, 1310 nm
DEV 7518	Optical 1:8 Splitter Module, 1310 nm

Connector Options:

Option 07	Optical Connector FC/APC (not for DEV 7512)
Option 08	Optical Connector E2000 HRL
Option 09	Optical Connector SC/APC

**Order Information (cont.)****Optical Demultiplexer/Multiplexer Modules ⁵**

DEV 7612	Optical 1:2 Demultiplexer Module
DEV 7614	Optical 1:4 Demultiplexer Module
DEV 7618	Optical 1:8 Demultiplexer Module
DEV 7621	Optical 2:1 Multiplexer Module
DEV 7641	Optical 4:1 Multiplexer Module
DEV 7681	Optical 8:1 Multiplexer Module

Connector Options:

Option 07	Optical Connector FC/APC
Option 08	Optical Connector E2000 HRL
Option 09	Optical Connector SC/APC

Breakout Cables for DEV 7152 ⁶

DEV 7811	Breakout Cable with 4 Optical Cables, 10 m length
DEV 7812	Breakout Cable with 8 Optical Cables, 10 m length
DEV 7824	Breakout Cable with 4 Optical Cables and Power, 10 m length
DEV 7825	Breakout Cable with 8 Optical Cables and Power, 10 m length

Connector Options:

Option 07	Optical Connector FC/APC
Option 08	Optical Connector E2000 HRL
Option 09	Optical Connector SC/APC
Option 49	Breakout Cable Extension by 5 m ⁷

Remarks

- ¹ The ingress protection rating is possible only with the application of breakout cables DEV 78xy.
- ² Not in combination with DEV 7143.
- ³ For conditions and restrictions to apply these options please refer to the corresponding technical data section.
- ⁴ Not available for the optical modules DEV 7231, DEV 7331, and DEV 7341.
- ⁵ Common port of the module is FC/APC (Option 07), E2000 HRL (Option 08), or SC/APC (Option 09), the delivery includes the appropriate number of patch cables with the corresponding optical connector type on one side and LC connectors to be connected to the DEV 76xy on the other side.
- ⁶ The optical connectors of all breakout cables DEV 78xy needs to be specified via Option 07, Option 08, or Option 09. Note, that the same type of optical connector is applied on both sides of the breakout cable!
- ⁷ Option 49 can be ordered multiple times for all breakout cables DEV 78xy.

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