

...designed for perfect signals

## N+1 & N+2 redundant RF-over-Fiber System

The N+1 and N+2 redundant RF-over-Fiber system of our FiberLinkplus Series comes in sizes of 1RU/19" or 3RU/19". It is designed for flexible, high quality and secure optical transmission of up to 16 RF signals (L-Band, Extended L-Band) over a distance of up to 20km. This redundant RF-over-Fiber allows several N+1 and N+2 redundant configurations and can be populated with 1 - 16 active optical TX/RX modules and up to 4 hot-standby TX/RX modules.

The 1RU/19" chassis can be populated with max. 5 optical TX/RX modules for a 2+1 or 4+1 redundant operation. The 3RU/19" chassis can hold max. 20 TX/RX modules for various N+1 or N+2 redundant operations.

All available chassis are designed to allow mixed population with TX/RX modules within the same chassis, while the chassis are equipped with corresponding RF ports (50Ohm or 75Ohm), which are used either as input or output port as per the individual configuration.

The system features automatic N+1/N+2 redundancy switching as per preconfigured configurations. Once an error at a TX or RX module occurs, the system automatically activates a switchover to a back up TX or RX module thus ensuring an interference free signal transmission at any time.

Additionally, the system comes with beneficial features such as Laser/Link monitoring, status LED's at any TX/RX module, variable gain control, RF power monitoring, hot-swappable TX/RX modules and 1:1 redundant dual power supply.

Configuration and monitoring is possible via the front panel LC-Display or 7" colored touchscreen while remote configuration and monitoring is available via its Ethernet-Interface (WebGUI, SNMP).

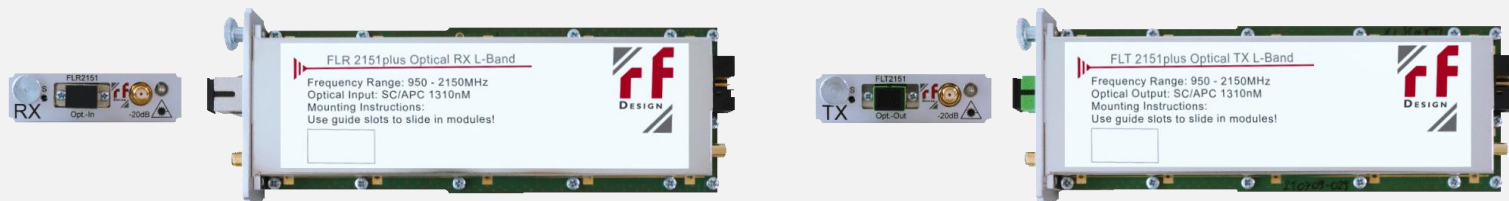
This professional redundant RF-over-Fiber system stands for perfect RF performance, secure signal distribution over fiber and is perfectly suited for Teleports, Satellite Earth Stations, Broadcasting and Cable/IPTV operations.



### FEATURES & BENEFITS

- ▶ Versatile N+1 and N+2 redundant RF-over-Fiber
- ▶ Supporting L-Band 950 – 2150MHz and Extended L-Band 850 – 2450MHz
- ▶ 1RU/19" chassis for 1+1, 2+1 and 4+1 redundant operation
- ▶ 3RU/19" chassis for max. 4 x 4+1 or 2 x 8+2 redundant operation
- ▶ Manual and automatic redundancy switching
- ▶ Hot-swappable TX/RX modules

- ▶ Support of mixed TX/RX population
- ▶ Variable gain control at each TX/RX module
- ▶ RF power monitoring at each TX/RX module
- ▶ Status LED's for each TX/RX module
- ▶ Easy local & remote configuration & monitoring
- ▶ Laser, link, PSU & access status monitoring
- ▶ Excellent quality and superior RF performance
- ▶ 1:1 redundant dual power supply



## TECHNICAL SPECIFICATIONS

### 19" Chassis

<b>Dimensions:</b>	1RU/19" (260mm deep) or 3RU/19" (300mm deep)
<b>Power Supply:</b>	85 – 265V, 50/60Hz, dual 1:1 redundancy (hot-swappable)
<b>Power Consumption:</b>	<20W (1RU/19"), <100W (3RU/19")
<b>TX/RX Module Capacity:</b>	2 slots for 1 x 1 + , 3 slots for 1 x 2+1 , 4 slots for 1 x 4+1 redundant operation @ 1RU/19" chassis 20 slots for max. 4 x 4+1 or 2 x 8+2 redundant operation @ 3RU/19" chassis
<b>RF Connectors I/O Ports:</b>	50Ohm SMA(f), 75Ohm F(f), 50Ohm BNC(f)*, 75Ohm BNC(f)*
<b>Local Configuration:</b>	LC-Display/keypads or 7" colored touchscreen display
<b>Remote Configuration:</b>	Ethernet (WebGUI, SNMPv2c)
<b>Operating Temperature:</b>	0°C to 45°C
<b>Storage Temperature:</b>	-10°C to 70°C
<b>Humidity:</b>	90%, non-condensing
<b>RoHS:</b>	Compliant

### Link Specifications (10MHz, IF 200MHz, L-Band 950 – 2150MHz & Extended L-Band 850 – 2450MHz)

<b>Modulation Type:</b>	Direct
<b>F/O Diff. EFF:</b>	0,15 to 0.17 W/A
<b>Dynamic Range:</b>	-50dBm to 0dBm
<b>Max. Link Gain:</b>	24dB (±1,0dB)
<b>Gain Stability:</b>	< ±0,3dB
<b>Group Delay Distortion:</b>	< +/-1ns
<b>Nominal RF Input Level:</b>	-20dBm
<b>Noise Figure:</b>	< 24dB
<b>SFDR:</b>	-107dB Hz typ.
<b>IMA3 @ -10dBm:</b>	< -50dBc

### Link Specifications Broadband (50 – 3200MHz)

<b>Modulation Type:</b>	Direct
<b>F/O Diff. EFF:</b>	0,15 to 0.17 W/A
<b>Dynamic Range:</b>	-50dBm to 0dBm
<b>Max. Link Gain:</b>	24dB (±1,0dB)
<b>Gain Stability:</b>	< ±0,3dB
<b>Group Delay Distortion:</b>	< +/-1ns
<b>Nominal RF Input Level:</b>	-20dBm
<b>Noise Figure:</b>	< 24dB
<b>SFDR:</b>	-101dB Hz typ.
<b>IMA3 @ -10dBm:</b>	< -46dBc



## 10MHz Application

### TX Module 10MHz FLT10plus

<b>Frequency Range:</b>	10MHz
<b>RF Output Connector:</b>	Via Chassis RF I/O ports (50Ohm SMA, 75Ohm F)
<b>Optical Output Connector:</b>	SC/APC
<b>Fiber Type:</b>	Single mode 9/125
<b>RF Input Power Level:</b>	+15dBm max. (damage level)
<b>Return Loss:</b>	25dB typ.
<b>Laser Type:</b>	DFB with Isolator
<b>Laser Class:</b>	1M
<b>Operating Wavelength:</b>	1310nm ±5nm
<b>Optical Output Power:</b>	+3dBm min.
<b>Status LED's:</b>	OK, Fail, Stand-By
<b>Operating Temperature:</b>	0°C to 45°C
<b>Storage Temperature:</b>	-10°C to 70°C
<b>Humidity:</b>	90%, non-condensing
<b>RoHS:</b>	Compliant

### RX Module 10MHz FLR10plus

<b>Frequency Range:</b>	10MHz
<b>Optical Input Connector:</b>	SC/APC
<b>Fiber Type:</b>	Single mode 9/125
<b>RF Output Connector:</b>	Via Chassis RF I/O ports (50Ohm SMA, BNC* or 75Ohm F, BNC*)
<b>Optical Input Power Level:</b>	-5dBm (min. optical sensitivity)
<b>Return Loss:</b>	25dB typ.
<b>Operating Wavelength:</b>	1310nm – 1560nm
<b>RF Output Power:</b>	+10dBm max.
<b>Status LED's:</b>	OK, Fail, Stand-By
<b>Operating Temperature:</b>	0°C to 45°C
<b>Storage Temperature:</b>	-10°C to 70°C
<b>Humidity:</b>	90%, non-condensing
<b>RoHS:</b>	Compliant

## 40MHz – 200MHz Application

### TX Module IF 40 – 200MHz FLT251plus

<b>Frequency Range:</b>	40 – 200MHz (IF)
<b>RF Input Connector:</b>	Via Chassis RF I/O ports (50Ohm SMA, 75Ohm F)
<b>Measurement Port:</b>	Frontside -20dB
<b>Optical Output Connector:</b>	SC/APC
<b>Fiber Type:</b>	Single mode 9/125
<b>RF Input Power Level:</b>	+16dBm max. (damage level)
<b>Frequency Response:</b>	±0,5dB max.
<b>Return Loss:</b>	25dB typ.
<b>OIP3:</b>	+28dBm
<b>SFDR:</b>	< -105dB/Hz
<b>Noise Figure:</b>	12dB
<b>Laser Type:</b>	DFB with Isolator, 35dB Isolation
<b>Laser Class:</b>	1M
<b>Operating Wavelength:</b>	1310nm ±5nm
<b>Optical Output Power:</b>	+3dBm min.
<b>Variable Gain Control:</b>	-12dB to +12dB (1dB steps); -16 to +8dB in 1:1 Configuration; -13 to +11dB in N+M Configuration
<b>RF Power Monitoring:</b>	70dB dynamic range
<b>Status LED's:</b>	OK, Fail, Stand-By
<b>Operating Temperature:</b>	0°C to 45°C
<b>Storage Temperature:</b>	-10°C to 70°C
<b>Humidity:</b>	90%, non-condensing
<b>RoHS:</b>	Compliant

### RX Module IF 40 – 200MHz FLR251plus

<b>Frequency Range:</b>	40 – 200MHz (IF)
<b>Optical Input Connector:</b>	SC/APC
<b>Measurement Port:</b>	Frontside -20dB
<b>Fiber Type:</b>	Single mode 9/125
<b>RF Output Connector:</b>	Via Chassis RF I/O ports (50Ohm SMA, 75Ohm F)
<b>Optical Input Power Level:</b>	-10dBm (min. optical sensitivity)
<b>Frequency Response:</b>	±0,5dB max.
<b>Return Loss:</b>	20dB typ.
<b>OIP3:</b>	+28dBm
<b>SFDR:</b>	< -105dB/Hz
<b>Noise Figure:</b>	12dB
<b>Operating Wavelength:</b>	1310nm – 1560nm
<b>RF Output Power:</b>	+10dBm max.
<b>Variable Gain Control:</b>	0dB to +20dB (1dB steps) ; 0 to +16dB in 1:1 Configuration ; 0 to +19dB in N+M Configuration
<b>RF Power Monitoring:</b>	70dB dynamic range
<b>Status LED's:</b>	OK, Fail, Stand-By
<b>Operating Temperature:</b>	0°C to 45°C
<b>Storage Temperature:</b>	-10°C to 70°C
<b>Humidity:</b>	90%, non-condensing
<b>RoHS:</b>	Compliant



## L-Band and Extended L-Band Application

### TX Module (L-Band 950 – 2150MHz & Extended L-Band 850 – 2450MHz), FLT2150, FLT2151, FLT2450, FLT2451

<b>Frequency Range:</b>	950 – 2150MHz (L-Band) & 850 – 2450MHz (extended L-Band)
<b>RF Input Connector:</b>	Via Chassis RF I/O ports, Frontside Measurement Port -20dB FLT2151 and FLT2451
<b>Fiber Type:</b>	Connector SC/APC, Single mode 9/125
<b>RF Input Power Level:</b>	+15dBm max. (damage level)
<b>Input RF Signal Operational Range:</b>	-60 to -10 dBm or better
<b>Frequency Response:</b>	±0,5dB typ., ±1,0dB max., ±0,25dB@ any 36MHz Window
<b>Return Loss:</b>	16dB typ.
<b>OIP3:</b>	+20dBm
<b>SFDR:</b>	< -102dB/Hz
<b>CNR:</b>	< -45dB in any 36MHz Window
<b>Noise Figure:</b>	12dB
<b>Laser Type:</b>	DFB with Isolator
<b>Laser Class:</b>	1M
<b>Operating Wavelength:</b>	1310nm ±5nm
<b>Optical Output Power:</b>	+3dBm min.
<b>Variable Gain Control:</b>	-12dB to +12dB (1dB steps); -16 to +8dB in 1:1 Configuration; -13 to +11dB in N+M Configuration, Manual Gain Control (MGC), Automatic Gain Control (AGC)
<b>Delay Group Variation:</b>	Maximum 2ns over the entire band, maximum 1ns over any 36 MHz range
<b>Switchable LNB-Supply:</b>	13/15/18VDC, 22kHz tone, 450mA max (current monitoring)
<b>RF Power Monitoring:</b>	70dB dynamic range
<b>Status LED's:</b>	OK, Fail, Stand-By
<b>Operating Temperature:</b>	0°C to 45°C
<b>Storage Temperature:</b>	-10°C to 70°C
<b>Humidity:</b>	90%, non-condensing
<b>RoHS:</b>	Compliant

### RX Module (L-Band 950 – 2150MHz & Extended L-Band 850 – 2450MHz), FLR2150, FLR2151, FLR2450, FLR2451

<b>Frequency Range:</b>	950 – 2150MHz (L-Band) & 850 – 2450MHz (extended L-Band)
<b>Fiber Type:</b>	Connector SC/APC, Single mode 9/125
<b>RF Output Connector:</b>	Via Chassis RF I/O ports, Frontside Measurement Port -20dB FLR2151 and FLR2451
<b>Optical Input Power Level:</b>	-5dBm (min. optical sensitivity)
<b>Frequency Response:</b>	±0,5dB typ., ±1,0dB max.
<b>Return Loss:</b>	16dB typ.
<b>OIP3:</b>	+20dBm
<b>SFDR:</b>	< -102dB/Hz
<b>Noise Figure:</b>	12dB
<b>Operating Wavelength:</b>	1310nm – 1560nm
<b>RF Output Power:</b>	+5dBm max.
<b>Variable Gain Control:</b>	0dB to +24dB (1dB steps); 0 to +20dB in 1:1 Configuration; 0 to +23dB in N+M Configuration
<b>RF Power Monitoring:</b>	70dB dynamic range
<b>Status LED's:</b>	OK, Fail, Stand-By
<b>Operating Temperature:</b>	0°C to 45°C
<b>Storage Temperature:</b>	-10°C to 70°C
<b>Humidity:</b>	90%, non-condensing
<b>RoHS:</b>	Compliant



## Broadband Application

### TX Module Broadband (50 – 3200MHz), FLT3251

<b>Frequency Range:</b>	50 – 3200MHz
<b>RF Input Connector:</b>	Via Chassis RF I/O ports, Frontside Measurement Port -20dB
<b>Fiber Type:</b>	SC/APC, Single mode 9/125
<b>RF Input Power Level:</b>	+10dBm max. (damage level)
<b>Frequency Response:</b>	50MHz – 850MHz $\pm 0,5$ dB typ., $\pm 1,0$ dB max. 850MHz – 2450MHz $\pm 1,0$ dB typ., $\pm 1,5$ dB max. 2450MHz – 3200MHz $\pm 1,5$ dB typ., $\pm 2,0$ dB max.
<b>Return Loss:</b>	14dB typ.
<b>OIP3:</b>	+25dBm
<b>SFDR:</b>	< -101dB/Hz
<b>Noise Figure:</b>	12dB
<b>Laser Type:</b>	DFB with Isolator
<b>Laser Class:</b>	1M
<b>Operating Wavelength:</b>	1310nm $\pm 5$ nm
<b>Optical Output Power:</b>	+3dBm min.
<b>Variable Gain Control:</b>	-12dB to +12dB (1dB steps); -16 to +8dB in 1:1 Configuration; -13 to +11dB in N+M Configuration
<b>RF Power Monitoring:</b>	70dB dynamic range
<b>Status LED's:</b>	OK, Fail, Stand-By
<b>Operating Temperature:</b>	0°C to 45°C
<b>Storage Temperature:</b>	-10°C to 70°C
<b>Humidity:</b>	90%, non-condensing
<b>RoHS:</b>	Compliant

### RX Module Broadband (50 – 3200MHz), FLR3251

<b>Frequency Range:</b>	50 – 3200MHz
<b>Fiber Type:</b>	SC/APC, Single mode 9/125
<b>RF Output Connector:</b>	Via Chassis RF I/O ports, Frontside Measurement Port -20dB
<b>Optical Input Power Level:</b>	~ -10dBm (min. optical sensitivity)
<b>Frequency Response:</b>	50MHz – 850MHz $\pm 0,5$ dB typ., $\pm 1,0$ dB max. 850MHz – 2450MHz $\pm 1,0$ dB typ., $\pm 1,5$ dB max. 2450MHz – 3200MHz $\pm 1,5$ dB typ., $\pm 2,0$ dB max.
<b>Return Loss:</b>	16dB typ.
<b>OIP3:</b>	+27dBm
<b>SFDR:</b>	< -101dB/Hz
<b>Noise Figure:</b>	12dB
<b>Operating Wavelength:</b>	1310nm – 1560nm
<b>RF Output Power:</b>	+10dBm max.
<b>Variable Gain Control:</b>	0dB to +16dB (1dB steps); 0 to +12dB in 1:1 Configuration; 0 to +15dB in N+M Configuration
<b>RF Power Monitoring:</b>	70dB dynamic range
<b>Status LED's:</b>	OK, Fail
<b>Operating Temperature:</b>	0°C to 45°C
<b>Storage Temperature:</b>	-10°C to 70°C
<b>Humidity:</b>	90%, non-condensing
<b>RoHS:</b>	Compliant



**ORDER INFORMATION**

**19" Chassis**

Type	Type-No.:	Short Description	Chassis size	Capacity TX/RX slots	Max. links	RF coax I/O connectors
FLCR1111 <i>plus</i> -50S FLCR1111 <i>plus</i> -75F FLCR1111 <i>plus</i> -50B* FLCR1111 <i>plus</i> -75B*	9000918 9001320 on request on request	1RU/19" modular TX/RX chassis, 2 TX/RX slots, 1 x 1+1 TX/RX redundancy, 1 RF coax I/O's, local config. via LC-Display/keypad, remote config. via Ethernet-Interface (WebGUI, SNMP), 1:1 redundant dual PSU	1RU/19"	1 1+1 redundancy	1	2 x 50Ohm SMA(f) 2 x 75Ohm F(f) 2 x 50Ohm BNC(f)* 2 x 75Ohm BNC(f)*
FLCR1121 <i>plus</i> -50S FLCR1121 <i>plus</i> -75F FLCR1121 <i>plus</i> -50B* FLCR1121 <i>plus</i> -75B*	9000737 on request on request on request	1RU/19" modular TX/RX chassis, 3 TX/RX slots, 1 x 2+1 TX/RX redundancy, 2 RF coax I/O's, local config. via LC-Display/keypad, remote config. via Ethernet-Interface (WebGUI, SNMP), 1:1 redundant dual PSU	1RU/19"	3 2+1 redundancy	1	2 x 50Ohm SMA(f) 2 x 75Ohm F(f) 2 x 50Ohm BNC(f)* 2 x 75Ohm BNC(f)*
FLCR1141 <i>plus</i> -50S FLCR1141 <i>plus</i> -75F FLCR1141 <i>plus</i> -50B* FLCR1141 <i>plus</i> -75B*	9000736 on request on request on request	1RU/19" modular TX/RX chassis, 5 TX/RX slots, 1 x 4+1 TX/RX redundancy, 4 RF coax I/O's, local config. via LC-Display/keypad, remote config. via Ethernet-Interface (WebGUI, SNMP), 1:1 redundant dual PSU	1RU/19"	5 4+1 redundancy	1	4 x 50Ohm SMA(f) 4 x 75Ohm F(f) 4 x 50Ohm BNC(f)* 4 x 75Ohm BNC(f)*
FLCR3441 <i>plus</i> -50S FLCR3441 <i>plus</i> -75F FLCR3441 <i>plus</i> -50B* FLCR3441 <i>plus</i> -75B*	9001175 9000923 on request on request	3RU/19" modular TX/RX chassis, 20 TX/RX slots, min. 2+1, max. 4 x 4+1 TX/RX redundancy, 16 RF coax I/O's, local config. via touchscreen, remote config. via Ethernet-Interface (WebGUI, SNMP), 1:1 redundant dual PSU	3RU/19"	20 Max. 4 x 4+1 redundancy	16	16 x 50Ohm SMA(f) 16 x 75Ohm F(f) 16 x 50Ohm BNC(f)* 16 x 75Ohm BNC(f)*
FLCR3282 <i>plus</i> -50S FLCR3282 <i>plus</i> -75F FLCR3282 <i>plus</i> -50B* FLCR3282 <i>plus</i> -75B*	9000922 on request on request on request	3RU/19" modular TX/RX chassis, 20 TX/RX slots, min. 2+1, max. 2 x 8+2 TX/RX redundancy, 16 RF coax I/O's, local config. via touchscreen, remote config. via Ethernet-Interface (WebGUI, SNMP), 1:1 redundant dual PSU	3RU/19"	16 Max. 2 x 8+2 redundancy	16	16 x 50Ohm SMA(f) 16 x 75Ohm F(f) 16 x 50Ohm BNC(f)* 16 x 75Ohm BNC(f)*

\*upon request only

**TX & RX Module 10MHz**

Type	Type-No.:	Short Description	Optical I/O Connector	Frequency Range
FLT10 <i>plus</i>	9001090	Optical Transmitter TX-Module, 10MHz, RF coax Input via FLC(R) chassis RF coax I/O panel, Opti. Output SC/APC	SC/APC	10MHz
FLR10 <i>plus</i>	9001091	Optical Receiver RX-Module, 10MHz, Opt. Input SC/APC, RF coax Output via FLC(R) chassis RF coax I/O panel	SC/APC	10MHz

**TX & RX Module IF 40 – 200MHz**

Type	Type-No.:	Short Description	Optical I/O Connector	Frequency Range
FLT251 <i>plus</i>	9000914	Optical Transmitter TX-Module, 40 – 200MHz, RF coax Input via FLC(R) chassis RF coax I/O panel, Optical Out-put SC/APC, gain control, RF-Power Mon. & Mon-Port.	SC/APC	40 – 200MHz
FLR251 <i>plus</i>	9000915	Optical Receiver RX-Module, 40 – 200MHz, Optical Input SC/APC, RF coax Output via FLC(R) chassis RF coax I/O panel, gain control, RF Power Mon. & Mon-Port	SC/APC	40 – 200MHz



**TX & RX Module L-Band 950 – 2150MHz**

Type	Type-No.:	Short Description	Connector	Frequency Range
FLT2150plus	9000887	Optical TX-Module, 950 – 2150MHz, RF coax Input via FLC(R) chassis RF coax I/O panel, Optical Output SC/APC, gain-control, RF power monitoring	SC/APC	950 – 2150MHz
FLR2150plus	9000888	Optical RX-Module, 950 – 2150MHz, Optical Input SC/APC, RF coax Output via FLC(R) chassis RF coax I/O panel, gain-control, RF power monitoring	SC/APC	950 – 2150MHz

**TX & RX Module L-Band 950 – 2150MHz with frontside measurement port -20dB**

Type	Type-No.:	Short Description	Connector	Frequency Range
FLT2151plus	9001077	Optical TX-Module, 950 – 2150MHz, RF coax Input via FLC(R) chassis RF coax I/O panel, Optical Output SC/APC, gain control, LNB-supply, RF power monitoring, measurement port -20dB	SC/APC	950 – 2150MHz
FLR2151plus	9001078	Optical RX-Module, 950 – 2150MHz, Optical Input SC/APC, RF coax Output via FLC(R) chassis RF coax I/O panel, gain control, RF power monitoring, frontside measurement port -20dB	SC/APC	950 – 2150MHz

**TX & RX Module Extended L-Band 850 – 2450MHz**

Type	Type-No.:	Short Description	Connector	Frequency Range
FLT2450plus	9000886	Optical TX-Module, 850 – 2450MHz, RF coax Input via FLC(R) chassis RF coax I/O panel, Optical Output SC/APC, gain control, switchable LNB-supply, RF power monitoring	SC/APC	850 – 2450MHz
FLR2450plus	9000885	Optical RX-Module, 850 – 2450MHz, Optical Input SC/APC, RF coax Output via FLC(R) chassis RF coax I/O panel, gain control, RF power monitoring	SC/APC	850 – 2450MHz

**TX & RX Module Extended L-Band 850 – 2450MHz with frontside measurement port -20dB**

Type	Type-No.:	Short Description	Connector	Frequency Range
FLT2451plus	9001080	Optical TX-Module, 850 – 2450MHz, RF coax Input via FLC(R) chassis RF coax I/O panel, Optical Output SC/APC, gain control, LNB-supply, RF power monitoring, measurement port -20dB	SC/APC	850 – 2450MHz
FLR2451plus	9001085	Optical Receiver RX-Module, 850 – 2450MHz, Optical Input SC/APC, RF coax Output via FLC(R) chassis RF coax I/O panel, gain control, RF power monitoring, measurement port -20dB	SC/APC	850 – 2450MHz

**TX & RX Module Broadband 50MHz – 3200MHz with frontside measurement port -20dB**

Type	Type-No.:	Short Description	Connector	Frequency Range
FLT3251plus	9001098	Optical Transmitter TX-Module, 50 – 3200MHz, RF coax Input via FLC(R) chassis RF coax I/O panel, Optical Output SC/APC, gain control, RF power monitoring, measurement port -20dB	SC/APC	50 – 3200MHz
FLR3251plus	9001097	Optical Receiver RX-Module, 50 – 3200MHz, Optical Input SC/APC, RF coax Output via FLC(R) chassis RF coax I/O panel, gain control, RF power monitoring, measurement port -20dB	SC/APC	50 – 3200MHz