



# FiberLinkplus Supporting 10MHz – 3,2GHz

...designed for perfect signals



## RF-over-Fiber System (Non redundant)

The FiberLinkplus RF-over-Fiber system for non-redundant optical transmission of RF signals is available in sizes of 1RU/19" and 3RU/19" rack mount design. It is perfectly suited for flexible and high quality optical transmission of up to 16 RF signals (10MHz, IF, L-Band, Extended L-Band and broadband) over a distance of up to 20 km.

The 1RU/19" chassis variants hold up to 4 optical TX/RX modules while the 3RU/19" chassis can be populated with up to 16 TX/RX modules.

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.

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

Configuration and monitoring is possible via the front-panel LC-Display or 5,7" touchscreen while remote configuration is available via its Ethernet-Interface (WebGUI, SNMP).

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



### FEATURES & BENEFITS

- ▶ Versatile and flexible RF-over-Fiber system
- ▶ Supporting 10MHz, IF 40 – 200MHz, L-Band 950 – 2150MHz, Extended L-Band 850 – 2450MHz and Broadband 3,2GHz
- ▶ 1RU/19" rack mount chassis for max. 4 TX or RX modules
- ▶ 3RU/19" rack mount chassis for max. 16 TX or RX modules
- ▶ 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
- ▶ Switchable LNB-supply
- ▶ 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

### AVAILABLE MODULES

- ▶ 10MHz Application: FLT10/FLR10
- ▶ 40MHz – 200MHz IF Application: FLT251/FLR251
- ▶ 950MHz – 2150MHz L-Band Application: FLT2150/FLR2150 & FLT2151/FLR2151

- ▶ 850MHz – 2450MHz Ext. L-Band Application: FLT2450/FLR2450 & FLT2451/FLR2451
- ▶ 50MHz – 3200MHz Broadband Application: FLT3251/FLR3251

## TECHNICAL SPECIFICATIONS

### 1RU/19" and 3RU/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>	<10W (1RU/19"), <600W (3RU/19")
<b>Frequency Range:</b>	10 – 3200MHz
<b>TX/RX Configurations:</b>	See 7 <sup>th</sup> page (order information)
<b>TX/RX Module Capacity:</b>	Max. 4 slots @ 1RU/19" chassis Max. 16 slots @ 3RU/19" chassis
<b>RF Connectors @ Chassis:</b>	50Ohm SMA(f) or 75Ohm F(f)
<b>Local Configuration:</b>	LC-Display/keypads or 5.7" colored touchscreen display
<b>Remote Configuration:</b>	Ethernet (WebGUI, SNMPv2c)
<b>LNB Bypass:</b>	Yes
<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 (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 ( $\pm 1,0$ dB)
<b>Gain Stability:</b>	< $\pm 0,3$ dB
<b>Group Delay Distortion:</b>	<2ns
<b>Nominal RF Input Level:</b>	-20dBm
<b>Noise Figure:</b>	< 24dB
<b>SFDR:</b>	-107dB Hz typ.
<b>RF Output Power:</b>	+10dBm max.
<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 ( $\pm 1,0$ dB)
<b>Gain Stability:</b>	< $\pm 0,3$ dB
<b>Group Delay Distortion:</b>	<2ns
<b>Nominal RF Input Level:</b>	-20dBm
<b>Noise Figure:</b>	< 24dB
<b>SFDR:</b>	-101dB Hz typ.
<b>IMA3 @ -10dBm:</b>	< -50dBc
<b>Output IP3:</b>	+15dBm
<b>Output IP1:</b>	+3dBm

## 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
<b>Measurement Port:</b>	Frontside -20dB (only FLT2151 and FLT2451)
<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>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>	15dB 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>Optical Input Connector:</b>	SC/APC
<b>Measurement Port:</b>	Frontside -20dB (only FLR2151 and FLR2451)
<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>	-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 (50Ohm SMA, others on request)
<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>	+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>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, others on request)
<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

Chassis						
Type	Type-No.:	Short Description	Chassis Size	Capacity TX/RX Slots	Max. Links	RF Coax I/O Connectors
FLC1120 <i>plus</i> -50S FLC1120 <i>plus</i> -75F	9000953 on request	1RU/19" rackmount modular TX/RX chassis, 2 TX/RX slots, 2 RF coax I/O's, local configuration via LC-Display/keypads, remote configuration via Ethernet-Interface (WebGUI, SNMP), 1:1 redundant dual power supply	1RU/19"	2	2	2 x 50Ohm SMA(f) 2 x 75Ohm F(f)
FLC1140 <i>plus</i> -50S FLC1140 <i>plus</i> -75F	9001111 9000978	1RU/19" rackmount modular TX/RX chassis, 4 TX/RX slots, 4 RF coax I/O's, local configuration via LC-Display/keypads, remote configuration via Ethernet-Interface (WebGUI, SNMP), 1:1 redundant dual power supply	1RU/19"	4	4	2 x 50Ohm SMA(f) 2 x 75Ohm F(f)
FLC3160 <i>plus</i> -50S FLC3160 <i>plus</i> -75F	9000909 9000946	3RU/19" rackmount modular TX/RX chassis, 16 TX/RX slots, 16 RF coax I/O's, local configuration via touchscreen display, remote configuration via Ethernet-Interface (WebGUI, SNMP), 1:1 redundant dual power supply	3RU/19"	16	16	16 x 50Ohm SMA(f) 16 x 75Ohm F(f)

## 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, Optical Output SC/APC	SC/APC	10MHz
FLR10 <i>plus</i>	9001091	Optical Receiver RX-Module, 10MHz, Optical 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 Output SC/APC, variable gain control, switchable LNB-supply, RF power monitoring, frontside measurement port -20dB	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, variable gain control, RF power monitoring, frontside measurement port -20dB	SC/APC	40 – 200MHz

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

Type	Type-No.:	Short Description	Optical I/O Connector	Frequency Range
FLT2150 <i>plus</i>	9000887	Optical Transmitter TX-Module, 950 – 2150MHz, RF coax Input via FLC(R) chassis RF coax I/O panel, Optical Output SC/APC, variable gain control, switchable LNB-supply, RF power monitoring	SC/APC	950 – 2150MHz
FLR2150 <i>plus</i>	9000888	Optical Receiver RX-Module, 950 – 2150MHz, Optical Input SC/APC, RF coax Output via FLC(R) chassis RF coax I/O panel, variable 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	Optical I/O Connector	Frequency Range
FLT2151plus	9001077	Optical Transmitter TX-Module, 950 – 2150MHz, RF coax Input via FLC(R) chassis RF coax I/O panel, Optical Output SC/APC, variable gain control, switchable LNB-supply, RF power monitoring, frontside measurement port -20dB	SC/APC	950 – 2150MHz
FLR2151plus	9001078	Optical Receiver RX-Module, 950 – 2150MHz, Optical Input SC/APC, RF coax Output via FLC(R) chassis RF coax I/O panel, variable 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	Optical I/O Connector	Frequency Range
FLT2450plus	9000886	Optical Transmitter TX-Module, 850 – 2450MHz, RF coax Input via FLC(R) chassis RF coax I/O panel, Optical Output SC/APC, variable gain control, switchable LNB-supply, RF power monitoring	SC/APC	850 – 2450MHz
FLR2450plus	9000885	Optical Receiver RX-Module, 850 – 2450MHz, Optical Input SC/APC, RF coax Output via FLC(R) chassis RF coax I/O panel, variable 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	Optical I/O Connector	Frequency Range
FLT2451plus	9001080	Optical Transmitter TX-Module, 850 – 2450MHz, RF coax Input via FLC(R) chassis RF coax I/O panel, Optical Output SC/APC, variable gain control, switchable LNB-supply, RF power monitoring, frontside 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, variable gain control, RF power monitoring, frontside measurement port -20dB	SC/APC	850 – 2450MHz

**TX & RX Module Broadband 50MHz – 3200MHz**

Type	Type-No.:	Short Description	Optical I/O 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, variable gain control, RF power monitoring, frontside 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, variable gain control, RF power monitoring, frontside measurement port -20dB	SC/APC	50 – 3200MHz