

...designed for perfect signals

1:1 redundant RF-over-Fiber System

The 1:1 redundant FiberLinkplus RF-over-Fiber system is available in 1RU/19" and 4RU/19" rack mount design. It is designed for flexible, high quality, secure and stable optical transmission in a 1:1 redundant configuration for up to 16 RF signals (10MHz, IF, L-Band, Extended L-Band and Broadband) over a distance of up to 20km.

The 1RU/19" chassis can be populated with 2 TX/RX modules for a single 1:1 redundant or 4 TX/RX modules for a dual x 1:1 redundant operation. The 4RU/19" chassis can hold up to 32 TX/RX modules for max. 16 x 1:1 redundant operation.

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.

Once an active TX or RX module fails, the corresponding hot-standby TX or RX module becomes active thus ensuring an almost 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, 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 7" touchscreen while remote configuration is available via its Ethernet-Interface (WebGUI, SNMP).

This professional 1:1 redundant RF-over-Fiber system stands for perfect RF performance, secure signal distribution and is perfectly suited for Teleports, Satellite Earth Stations, Broadcasting and Cable/IPTV operations.

**depends on chassis type*



FEATURES & BENEFITS

- ▶ Versatile 1:1 redundant 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/RX modules (max. 2 x 1:1 redundant operation)
- ▶ 4RU/19" rack mount chassis for max. 32 TX/RX modules (max. 16 x 1:1 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
- ▶ 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

TECHNICAL SPECIFICATIONS

1RU/19" and 4RU/19" Chassis

Dimensions:	1RU/19" (260mm deep) or 4RU/19" (300mm deep)
Power Supply:	85 – 265V, 50/60Hz, 1:1 redundant (hot-swappable)
Power Consumption:	<20W (1RU/19"), <600W (4RU/19")
Frequency Range:	FLCR1111 <i>plus</i> , FLCR1211 <i>plus</i> and FLCR41611 <i>plus</i> 800 – 2500MHz FLCR1111B <i>plus</i> , FLCR1211B <i>plus</i> and FLCR41611B <i>plus</i> 10/40 – 3200MHz
Insertion Loss:	-4dB @ all paths
TX/RX Module Capacity:	2 slots for 1 x 1:1 redundant operation @ 1RU/19" chassis 4 slots for max. 2 x 1:1 redundant operation @ 1RU/19" chassis 32 slots for max. 16 x 1:1 redundant operation @ 4RU/19" chassis
RF Connectors @ Chassis:	50Ohm SMA(f) or 75Ohm F(f)
Local Configuration:	LC-Display/keypads or 7" colored touchscreen display
Remote Configuration:	Ethernet (WebGUI, SNMPv2c)
LNB Bypass:	FLCR1111 <i>plus</i> , FLCR1211 <i>plus</i> and FLCR41611 <i>plus</i> = YES (not for broadband operation) FLCR1111B <i>plus</i> , FLCR1211B <i>plus</i> and FLCR41611B <i>plus</i> = NO
MTBF:	
FLCR1111<i>plus</i>/FLCR1211<i>plus</i>:	>400kHrs at 25°C / 24 hrs.
FLCR11611<i>plus</i>:	>207kHrs at 25°C / 24 hrs.
Operating Temperature:	0°C to 45°C
Storage Temperature:	-10°C to 70°C
Humidity:	90%, non-condensing
RoHS:	Compliant

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

Modulation Type:	Direct
F/O Diff. EFF:	0,15 to 0.17 W/A
Dynamic Range:	-50dBm to 0dBm
Max. Link Gain:	24dB (±1,0dB)
Gain Stability:	< ±0,3dB
Group Delay Distortion:	<2ns
Nominal RF Input Level:	0dBm
Noise Figure:	< 24dB
SFDR:	-107dB Hz typ.
RF Output Power:	+13dBm max.
IMA3 @ -10dBm:	< -60dBc

Link Specifications Broadband (50 – 3200MHz)

Modulation Type:	Direct
F/O Diff. EFF:	0,15 to 0.17 W/A
Max. Link Gain:	26dB (±1,0dB)
Gain Stability:	< ±0,3dB
Group Delay Distortion:	<2ns
Nominal RF Input Level:	0dBm
Noise Figure:	< 24dB
SFDR:	-101dB Hz typ.
IMA3 @ -10dBm:	< -50dBc
Input Power Dyn. Range:	-50 to +10dBm
Output IP3:	+30dBm
Output IP1:	+5dBm



10MHz Application

TX Module 10MHz FLT10plus and QTX10

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

RX Module 10MHz FLR10plus and QRX10

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

40MHz – 200MHz Application

TX Module IF 40 – 200MHz FLT251plus

Frequency Range:	40 – 200MHz (IF)
RF Input Connector:	Via Chassis RF I/O ports, Chassis Type FLCR41611Bplus
Measurement Port:	Front side -20dB
Optical Output Connector:	SC/APC
Fiber Type:	Single mode 9/125
RF Input Power Level:	+16dBm max. (damage level)
Frequency Response:	±0,5dB max.
Return Loss:	25dB typ.
OIP3:	+28dBm
SFDR:	< -105dB/Hz
Noise Figure:	12dB
Laser Type:	DFB with Isolator, 35dB Isolation



Laser Class:	1M
Operating Wavelength:	1310nm ±5nm
Optical Output Power:	+3dBm min.
Variable Gain Control:	-12dB to +12dB (1dB steps); -16 to +8dB in 1:1 Configuration; -13 to +11dB in N+M Configuration
RF Power Monitoring:	70dB dynamic range
Status LED's:	OK, Fail, Stand-By
Operating Temperature:	0°C to 45°C
Storage Temperature:	-10°C to 70°C
Humidity:	90%, non-condensing
RoHS:	Compliant

RX Module IF 40 – 200MHz FLR251plus

Frequency Range:	40 – 200MHz (IF)
Optical Input Connector:	SC/APC
Measurement Port:	Front side -20dB
Fiber Type:	Single mode 9/125
RF Output Connector:	Via Chassis RF I/O ports, Chassis Type FLCR41611Bplus
Optical Input Power Level:	-10dBm (min. optical sensitivity)
Frequency Response:	±0,5dB max.
Return Loss:	20dB typ.
OIP3:	+28dBm
SFDR:	< -105dB/Hz
Noise Figure:	12dB
Operating Wavelength:	1310nm – 1560nm
RF Output Power:	+10dBm max.
Variable Gain Control:	0dB to +20dB (1dB steps); 0 to +16dB in 1:1 Configuration; 0 to +19dB in N+M Configuration
RF Power Monitoring:	70dB dynamic range
Status LED's:	OK, Fail, Stand-By
Operating Temperature:	0°C to 45°C
Storage Temperature:	-10°C to 70°C
Humidity:	90%, non-condensing
RoHS:	Compliant

L-Band and Extended L-Band Application

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

Frequency Range:	950 – 2150MHz (L-Band) & 850 – 2450MHz (extended L-Band)
RF Input Connector:	Via Chassis RF I/O ports
Measurement Port:	Front side -20dB (only FLT2151 and FLT2451)
Optical Output Connector:	SC/APC
Fiber Type:	Single mode 9/125
RF Input Power Level:	+16dBm max. (damage level)
Input RF Signal Operational Range:	-60 to -10 dBm or better
Frequency Response:	±0,5dB typ., ±1,0dB max., ±0,25dB@ any 36MHz Window
Return Loss:	15dB typ.
OIP3:	+26dBm
SFDR:	< -102dB/Hz
CNR:	< -45dB in any 36MHz Window
Noise Figure:	12dB



Laser Type:	DFB with Isolator
Laser Class:	1M
Operating Wavelength:	1310nm ±5nm
Optical Output Power:	+3dBm min.
Variable Gain Control:	-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)
Delay Group Variation:	Maximum 2ns over the entire band, maximum 1ns over any 36 MHz range
Switchable LNB-Supply:	13/15/18VDC, 22kHz tone, 450mA max (current monitoring)
RF Power Monitoring:	70dB dynamic range
Status LED's:	OK, Fail, Stand-By
Operating Temperature:	0°C to 45°C
Storage Temperature:	-10°C to 70°C
Humidity:	90%, non-condensing
RoHS:	Compliant

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

Frequency Range:	950 – 2150MHz (L-Band) & 850 – 2450MHz (extended L-Band)
Optical Input Connector:	SC/APC
Measurement Port:	Front side -20dB (only FLR2151 and FLR2451)
Fiber Type:	Single mode 9/125
RF Output Connector:	Via Chassis RF I/O ports, Chassis Type FLCR41611 <i>plus</i> or FLCR41611B <i>plus</i>
Optical Input Power Level:	-5dBm (min. optical sensitivity)
Frequency Response:	±0,5dB typ., ±1,0dB max.
Return Loss:	16dB typ.
OIP3:	+29dBm
SFDR:	< -102dB/Hz
Noise Figure:	12dB
Operating Wavelength:	1310nm – 1560nm
RF Output Power:	+10dBm max.
Variable Gain Control:	0dB to +24dB (1dB steps); 0 to +12dB in 1:1 Configuration; 0 to +23dB in N+M Configuration
RF Power Monitoring:	70dB dynamic range
Status LED's:	OK, Fail, Stand-By
Operating Temperature:	0°C to 45°C
Storage Temperature:	-10°C to 70°C
Humidity:	90%, non-condensing
RoHS:	Compliant

Broadband Application

TX Module Broadband (50 – 3200MHz), FLT3251

Frequency Range:	50 – 3200MHz
RF Input Connector:	Via Chassis RF I/O ports, only with FLCR41611B <i>plus</i> Chassis
Measurement Port:	Front side -20dB
Optical Output Connector:	SC/APC
Fiber Type:	Single mode 9/125
RF Input Power Level:	+10dBm max. (damage level)
Frequency Response:	50MHz – 850MHz ±0,5dB typ., ±1,0dB max. 850MHz – 2450MHz ±1,0dB typ., ±1,5dB max. 2450MHz – 3200MHz ±1,5dB typ., ±2,0dB max.
Return Loss:	14dB typ.



OIP3:	+25dBm
SFDR:	< -101dB/Hz
Noise Figure:	12dB
Laser Type:	DFB with Isolator
Laser Class:	1M
Operating Wavelength:	1310nm ±5nm
Optical Output power:	+3dBm min.
Variable Gain Control:	-12dB to +12dB (1dB steps); -16 to +8dB in 1:1 Configuration; -13 to +11dB in N+M Configuration
RF Power Monitoring:	70dB dynamic range
Status LED's:	OK, Fail, Stand-By
Operating Temperature:	0°C to 45°C
Storage Temperature:	-10°C to 70°C
Humidity:	90%, non-condensing
RoHS:	Compliant

RX Module Broadband (50 – 3200MHz), FLR3251

Frequency Range:	50 – 3200MHz
Optical Input Connector:	SC/APC
Measurement Port:	Front side -20dB
Fiber Type:	Single mode 9/125
RF Output Connector:	Via Chassis RF I/O ports, only with FLCR41611Bplus Chassis
Optical Input Power Level:	~ -10dBm (min. optical sensitivity)
Frequency Response:	50MHz – 850MHz ±0,5dB typ., ±1,0dB max. 850MHz – 2450MHz ±1,0dB typ., ±1,5dB max. 2450MHz – 3200MHz ±1,5dB typ., ±2,0dB max.
Return Loss:	16dB typ.
OIP3:	+27dBm
SFDR:	< -101dB/Hz
Noise Figure:	12dB
Operating Wavelength:	1310nm – 1560nm
RF Output Power:	+10dBm max.
Variable Gain Control:	0dB to +16dB (1dB steps); 0 to +12dB in 1:1 Configuration; 0 to +15dB in N+M Configuration
RF Power Monitoring:	70dB dynamic range
Status LED's:	OK, Fail, Stand-By
Operating Temperature:	0°C to 45°C
Storage Temperature:	-10°C to 70°C
Humidity:	90%, non-condensing
RoHS:	Compliant



ORDER INFORMATION

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	9000918 9001320	1RU/19" modular TX/RX rack mount chassis, 2 TX/RX slots, 1 x 1:1 TX/RX redundancy, 1 RF coax I/O, local configuration via LC-Display/keypad, remote configuration via Ethernet-Interface (WebGUI, SNMP), 1:1 redundant dual power supply	1RU/19"	1 x 1:1 redundancy	1	2 x 50Ohm SMA(f) 2 x 75Ohm F(f)
FLCR1111B <i>plus</i> -50S	on request	1RU/19" modular TX/RX rack mount chassis, Broadband 10/40 – 3200MHz, no LNB Bypass, 2 TX/RX slots, 1 x 1:1 TX/RX redundancy, 1 RF coax I/O, local configuration via LC-Display/keypad, remote configuration via Ethernet-Interface (WebGUI, SNMP), 1:1 redundant dual power supply	1RU/19"	1 x 1:1 redundancy	1	2 x 50Ohm SMA(f)
FLCR1211 <i>plus</i> -50S FLCR1211 <i>plus</i> -75F	9000939 9000986	1RU/19" modular TX/RX rack mount chassis, 4 TX/RX slots, 2 x 1:1 TX/RX redundancy, 2 RF coax I/O's, local configuration via LC-Display/keypad, remote configuration via Ethernet-Interface (WebGUI, SNMP), 1:1 redundant dual power supply	1RU/19"	2 x 1:1 redundancy	2	4 x 50Ohm SMA(f) 4 x 75Ohm F(f)
FLCR1211B <i>plus</i> -50S	9001007	1RU/19" modular TX/RX rack mount chassis, Broadband 10/40 – 3200MHz, no LNB Bypass, 4 TX/RX slots, 2 x 1:1 TX/RX redundancy, 2 RF coax I/O's, local configuration via LC-Display/keypad, remote configuration via Ethernet-Interface (WebGUI, SNMP), 1:1 redundant dual power supply	1RU/19"	2 x 1:1 redundancy	2	4 x 50Ohm SMA(f)
FLCR41611 <i>plus</i> -50S FLCR41611 <i>plus</i> -75F	9000889 9000987	4RU/19" modular TX/RX rack mount chassis, 32 TX/RX slots, 16 x 1:1 TX/RX redundancy, 16 RF coax I/O's, local configuration via touchscreen, remote configuration via Ethernet-Interface (WebGUI, SNMP), 1:1 redundant dual power supply	4RU/19"	16 x 1:1 redundancy	16	16 x 50Ohm SMA(f) 16 x 75Ohm F(f)
FLCR41611B <i>plus</i> -50S	9001004	4RU/19" modular TX/RX rack mount chassis Broadband 10/40 – 3200MHz, no LNB Bypass, 32 TX/RX slots, 16 x 1:1 TX/RX redundancy, 16 RF coax I/O's, local configuration via touchscreen, remote configuration via Ethernet-Interface (WebGUI, SNMP), 1:1 redundant dual power supply	4RU/19"	16 x 1:1 redundancy	16	16 x 50Ohm SMA(f)

TX & RX Modules 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, RF coax Output via FLC(R) chassis RF coax I/O panel, Optical Input SC/APC,	SC/APC	10MHz
QTX10-50S 10MHz TX	9001220	Optical 10MHz TX module for QLink series, RF input 50Ohm SMA(f), Optical Output SC/PC	SC/APC	10MHz
QRX10-50S 10MHz RX	9001219	Optical 10MHz RX module for QLink series, Optical input SC/APC, RF output 50Ohm SMA(f)	SC/APC	10MHz



TX & RX Module IF 40 – 200MHz

Type	Type-No.:	Short Description	Optical I/O Connector	Frequency Range
FLT251plus	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, front side measurement port -20dB	SC/APC	40 – 200MHz
FLR251plus	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, front side 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
FLT2150plus	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
FLR2150plus	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 front side 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, front side 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, front side 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 front side 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, front side measurement port -20dB	SC/APC	850 – 2450MHz
FLR2451plus	9001081	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, front side 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, front side 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, front side measurement port -20dB	SC/APC	50 – 3200MHz

OPTIONS

Type	Type-No.:	Short Description
FLCR-10MHz-11 Option	9001305	10MHz link option, 1:1 redundant 10MHz link operation, for FLCR-ODA0811plus outdoor enclosure and FLCR41611plus 4RU/19" rack mount indoor chassis, optical TX (QTX10) and/or RX (QRX19) modules not included