



# FiberLink2plus (Broadband 10MHz – 3.2GHz)

...designed for perfect signals



## Dual Channel RF-over-Fiber System

The FiberLink2plus incorporates 1RU/19" and 3RU/19" rack mount chassis with capacity for maximum 4 or 16 dual optical TX and/or RX modules and the corresponding optical TX and RX modules available for various RF frequency ranges.

It allows distribution of up to 32 RF signals over optical fiber and is perfectly suited for flexible and high-quality optical transmission of up to 32 RF signals covering a frequency range of 10MHz – 3.2GHz over a distance of up to 20km.

The 1RU/19" chassis variants hold up to 4 dual TX/RX modules (max. 8 optical links) while the 3RU/19" chassis can be populated with up to 16 dual TX/RX modules (max. 32 links optical links).

Additionally, this dual 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 are possible via the front-panel LC-Display or 7" touchscreen while remote configuration is available via its Ethernet-Interface (WebGUI, SNMP).

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



### FEATURES & BENEFITS

- ▶ Versatile and flexible RF-over-Fiber system
- ▶ Max. 10 – 3200MHz frequency coverage
- ▶ 1RU/19" chassis for max. 4 dual TX or RX modules (8 links)
- ▶ 3RU/19" chassis for max. 16 dual TX or RX modules (32 links)
- ▶ Hot-swappable TX/RX modules
- ▶ Support of mixed TX/RX population
- ▶ Variable gain control at each TX/RX module (MGC & AGC)

- ▶ Switchable LNB-supply & 10MHz Through in LBand and Ext-LBand Modules
- ▶ RF power monitoring at each dual TX/RX module
- ▶ Status LED's for each dual 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 CHASSIS AND MODULES

- ▶ 1RU/19" chassis for max. 4 dual TX/RX modules: FL2C1140
- ▶ 3RU/19" chassis for max. 16 dual TX/RX modules: FL2C3160
- ▶ 40MHz – 200MHz IF Application: FL2T450/FL2R450
- ▶ 950MHz – 2150MHz L-Band Application: FL2T4250/FL2R4250

- ▶ 850MHz – 2450MHz Extended L-Band Application: FL2T4850/FL2R4850
- ▶ 50MHz – 3200MHz Broadband Application: FL2T6450/FL2R6450
- ▶ 10MHz Application: FL2T10-50B/ FL2R10-50B

## TECHNICAL SPECIFICATIONS

**1RU/19" Chassis - FL2C1140 carrying max. 4 modules / 3RU/19" Chassis - FL2C3160 carrying 16 modules**

<b>Dimensions:</b>	1RU/19" rack mount (260mm deep) or 3RU/19" rack mount (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 4 <sup>th</sup> page (order information)
<b>TX/RX Module Capacity:</b>	Max. 4 slots for max. 8 optical links @ 1RU/19" chassis Max. 16 slots for max. 32 optical links @ 3RU/19" chassis
<b>Local Configuration:</b>	LC-Display/keypads or 7" colored touchscreen display
<b>Remote Configuration:</b>	Ethernet-Interface (WebGUI, SNMPv2c)
<b>Operating Temperature:</b>	-10°C to 50°C
<b>Storage Temperature:</b>	-20°C to 70°C
<b>Humidity:</b>	90%, non-condensing
<b>RoHS:</b>	Compliant
<b>EMI/RFI Compliance:</b>	FCC Part 15, Class 1

### 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>	-80dBm to 0dBm
<b>Max. Link Gain:</b>	10MHz: +3dB fix, IF: 40dB (±1,0dB), L-Band/Ext.-L-Band: 30dB (±1,0dB)
<b>Gain Stability:</b>	< ±0,3dB
<b>Group Delay Distortion:</b>	<2ns
<b>Nominal RF Input Level:</b>	-10dBm
<b>Noise Figure:</b>	< 24dB
<b>SFDR:</b>	10MHz & IF < -116dB/Hz <sup>2/3</sup> , L-Band/Ext. L-Band < -110dB/Hz <sup>2/3</sup>
<b>RF Output Power:</b>	+13dBm max.
<b>IMA3 @ -10dBm:</b>	< -50dBc
<b>Output IP3:</b>	+27dBm
<b>Output IP1:</b>	+10dBm

### 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>	-70dBm to 0dBm
<b>Max. Link Gain:</b>	26dB (±1,0dB)
<b>Gain Stability:</b>	< ±0,5dB
<b>Group Delay Distortion:</b>	<2ns
<b>Nominal RF Input Level:</b>	-10dBm
<b>Noise Figure:</b>	< 24dB
<b>SFDR:</b>	IF < -105dB/Hz <sup>2/3</sup>
<b>RF Output Power:</b>	+13dBm max.
<b>IMA3 @ -10dBm:</b>	< -50dBc
<b>Output IP3:</b>	+27dBm
<b>Output IP1:</b>	+10dBm

## 10MHz APPLICATION

### TX-Module 10MHz FL2T10-50B

Frequency Range:	10MHz
RF Connector:	BNC(f) 50Ohm
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; DIN EN 60825-1
Operating Wavelength:	1310nm ±5nm
Optical Output Power:	+3dBm min.
Channel Isolation:	>60dB
Operating Temperature:	-10°C to 50°C
Storage Temperature:	-20°C to 70°C
Humidity:	90%, non-condensing
RoHS:	Compliant
EMI/RFI Compliance:	FCC Part 15, Class 1

### RX-Module 10MHz FL2R10-50B

Frequency Range:	10MHz
Optical Input Connector:	SC/APC
Fiber Type:	Single mode 9/125
RF Output Connector:	BNC(f) 50Ohm
Optical Input Power Level:	-5dBm (min. optical sensitivity)
Return Loss:	25dB typ.
Operating Wavelength:	1310nm – 1560nm
RF Output Power:	+10dBm max.
Channel Isolation:	>60dB
Operating Temperature:	-10°C to 50°C
Storage Temperature:	-20°C to 70°C
Humidity:	90%, non-condensing
RoHS:	Compliant
EMI/RFI Compliance:	FCC Part 15, Class 1

## 40MHz – 200MHz APPLICATION

### TX Module IF 40 – 200MHz FL2T450plus

<b>Frequency Range:</b>	40 – 200MHz (IF)
<b>RF Input Connector:</b>	2 x 50Ohm SMA, others connector types available on request
<b>Optical Output Connector:</b>	2 x SC/APC
<b>Fiber Type:</b>	Single mode 9/125
<b>RF Input Power Level:</b>	+16dBm max. (damage level)
<b>RF Input Signal Range in MGC</b>	0 to -80dBm in MGC, 0 to -40dBm in AGC mode
<b>Frequency Response:</b>	±0,5dB max.
<b>Return Loss:</b>	18dB min.
<b>OIP3:</b>	>+30dBm
<b>SFDR:</b>	< -110dB/Hz <sup>2/3</sup>
<b>Noise Figure:</b>	< 12dB
<b>Laser Type:</b>	DFB with Isolator, 35dB Isolation min.
<b>Laser Class:</b>	1M; DIN EN 60825-1
<b>Operating Wavelength:</b>	1310nm ±5nm
<b>Optical Output Power:</b>	+3dBm min.
<b>Variable Gain Control:</b>	-10dB to +20dB, MGC & AGC (AGC reference -40dBm to 0dBm)
<b>RF Power Monitoring:</b>	70dB dynamic range, ~ -50 to +20dBm
<b>Channel Isolation:</b>	> 40dB
<b>Operating Temperature:</b>	-10°C to 50°C
<b>Storage Temperature:</b>	-20°C to 70°C
<b>Humidity:</b>	90%, non-condensing
<b>RoHS:</b>	Compliant
<b>EMI/RFI Compliance:</b>	FCC Part 15, Class 1

### RX Module IF 40 – 200MHz FL2R450plus

<b>Frequency Range:</b>	40 – 200MHz (IF)
<b>Optical Input Connector:</b>	2 x SC/APC
<b>Fiber Type:</b>	Single mode 9/125
<b>RF Output Connector:</b>	2 x 50Ohm SMA, others connector types available on request
<b>Optical Input Power Level:</b>	-10dBm (min. optical sensitivity)
<b>Frequency Response:</b>	±0,5dB max.
<b>Return Loss:</b>	18dB min.
<b>OIP3:</b>	+30dBm
<b>SFDR:</b>	< -110dB/Hz <sup>2/3</sup>
<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 min. (1dB steps), MGC & AGC (AGC reference -40dBm to 0dBm)
<b>RF Power Monitoring:</b>	70dB dynamic range, ~ -50 to +20dBm
<b>Channel Isolation:</b>	> 40dB
<b>Operating Temperature:</b>	-10°C to 50°C
<b>Storage Temperature:</b>	-20°C to 70°C
<b>Humidity:</b>	90%, non-condensing
<b>RoHS:</b>	Compliant
<b>EMI/RFI Compliance:</b>	FCC Part 15, Class 1

## L-BAND AND EXTENDED L-BAND APPLICATION

### Dual TX Module (L-Band 950 – 2150MHz & Extended L-Band 850 – 2450MHz) FL2T4250plus, FL2T4850plus

<b>Frequency Range:</b>	950 – 2150MHz (L-Band) & 850 – 2450MHz (extended L-Band)
<b>RF Input Connector:</b>	2 x 50Ohm SMA(f), 2 x 50Ohm BNC(f)*, 2 x 75Ohm F(f) or 2 x 75Ohm BNC(f)*
<b>Optical Output Connector:</b>	2 x 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 min.
<b>OIP3:</b>	+26dBm
<b>SFDR:</b>	< -103dB/Hz <sup>2/3</sup>
<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; DIN EN 60825-1
<b>Operating Wavelength:</b>	1310nm ±5nm
<b>Optical Output Power:</b>	+3dBm min.
<b>Variable Gain Control:</b>	-15dB to +15dB (1dB steps), 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 & short circuit protection)
<b>RF Power Monitoring:</b>	70dB dynamic range, ~ -50 to +20dBm
<b>Status LED's:</b>	OK, Fail, Stand-By
<b>Operating Temperature:</b>	-10°C to 50°C
<b>Storage Temperature:</b>	-20°C to 70°C
<b>Humidity:</b>	90%, non-condensing
<b>RoHS:</b>	Compliant
<b>EMI/RFI Compliance:</b>	FCC Part 15, Class 1

### Dual RX Module (L-Band 950 – 2150MHz & Extended L-Band 850 – 2450MHz) FL2R4250plus, FL2R4850plus

<b>Frequency Range:</b>	950 – 2150MHz (L-Band) & 850 – 2450MHz (extended L-Band)
<b>Optical Input Connector:</b>	2 x SC/APC
<b>Fiber Type:</b>	Single mode 9/125
<b>RF Output Connector:</b>	2 x 50Ohm SMA(f), 2 x 50Ohm BNC(f)*, 2 x 75Ohm F(f) or 2 x 75Ohm BNC(f)*
<b>Optical Input Power Level:</b>	-5dBm (min. optical sensitivity)
<b>Optical Damage Power Level:</b>	+6dBm
<b>Frequency Response:</b>	±0,5dB typ., ±1,0dB max.
<b>Return Loss:</b>	16dB min.
<b>OIP3:</b>	+29dBm
<b>SFDR:</b>	< -103dB/Hz <sup>2/3</sup>
<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 +30dB (1dB steps), MGC & AGC (AGC reference -40dBm to 0dBm)
<b>RF Power Monitoring:</b>	70dB dynamic range, ~ -50 to +20dBm
<b>Status LED's:</b>	OK, Fail, Stand-By
<b>Operating Temperature:</b>	-10°C to 50°C
<b>Storage Temperature:</b>	-20°C to 70°C
<b>Humidity:</b>	90%, non-condensing
<b>RoHS:</b>	Compliant
<b>EMI/RFI Compliance:</b>	FCC Part 15, Class 1

## BROADBAND APPLICATION

### TX Module Broadband (50 – 3200MHz) FL2T6450plus

<b>Frequency Range:</b>	50 – 3200MHz
<b>RF Input Connector:</b>	2 x 50Ohm SMA(f), other connector types available on request
<b>Optical Output Connector:</b>	2 x 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 $\pm 0,5\text{dB}$ typ., $\pm 1,0\text{dB}$ max. ; 850MHz – 2450MHz $\pm 1,0\text{dB}$ typ., $\pm 1,5\text{dB}$ max. 2450MHz – 3200MHz $\pm 1,5\text{dB}$ typ., $\pm 2,0\text{dB}$ max.
<b>Return Loss:</b>	14dB min.
<b>OIP3:</b>	+25dBm
<b>SFDR:</b>	< -101dB/Hz <sup>2/3</sup>
<b>Noise Figure:</b>	12dB
<b>Laser Type:</b>	DFB with Isolator
<b>Laser Class:</b>	1M; DIN EN 60825-1
<b>Operating Wavelength:</b>	1310nm $\pm 5\text{nm}$
<b>Optical Output Power:</b>	+3dBm min.
<b>Variable Gain Control:</b>	-15dB to +15dB (1dB steps), MGC & AGC (AGC reference -40dBm to 0dBm)
<b>RF Power Monitoring:</b>	70dB dynamic range
<b>Status LED's:</b>	OK, Fail, Stand-By
<b>Operating Temperature:</b>	-10°C to 50°C
<b>Storage Temperature:</b>	-20°C to 70°C
<b>Humidity:</b>	90%, non-condensing
<b>RoHS:</b>	Compliant
<b>EMI/RFI Compliance:</b>	FCC Part 15, Class 1

### RX Module Broadband (50 – 3200MHz) FL2R6450plus

<b>Frequency Range:</b>	50 – 3200MHz
<b>Optical Input Connector:</b>	2 x SC/APC
<b>Fiber Type:</b>	Single mode 9/125
<b>RF Output Connector:</b>	2 x 50Ohm SMA(f), other connector types available on request
<b>Optical Input Power Level:</b>	~ -10dBm (min. optical sensitivity)
<b>Frequency Response:</b>	50MHz – 850MHz $\pm 0,5\text{dB}$ typ., $\pm 1,0\text{dB}$ max. ; 850MHz – 2450MHz $\pm 1,0\text{dB}$ typ., $\pm 1,5\text{dB}$ max. 2450MHz – 3200MHz $\pm 1,5\text{dB}$ typ., $\pm 2,0\text{dB}$ max.
<b>Return Loss:</b>	16dB min.
<b>OIP3:</b>	+27dBm
<b>SFDR:</b>	< -101dB/Hz <sup>2/3</sup>
<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 +30dB (1dB steps), MGC & AGC (AGC reference -40dBm to 0dBm)
<b>RF Power Monitoring:</b>	70dB dynamic range
<b>Status LED's:</b>	OK, Fail
<b>Operating Temperature:</b>	-10°C to 50°C
<b>Storage Temperature:</b>	-20°C to 70°C
<b>Humidity:</b>	90%, non-condensing
<b>RoHS:</b>	Compliant
<b>EMI/RFI Compliance:</b>	FCC Part 15, Class 1



## ORDER INFORMATION

Chassis					
Type	Type-No.:	Short Description	Chassis Size	Capacity TX/RX Slots	Max. Links
FL2C1140plus	9001108	1RU/19" modular TX/RX chassis, 4 slots for Dual TX/RX modules, local configuration via LC-Display/keypads, remote configuration via Ethernet-Interface (WebGUI, SNMP), 1:1 redundant dual power supply	1RU/19"	4	8
FL2C3160plus	9001107	3RU/19" modular TX/RX chassis, 16 slots for Dual TX/RX modules, local configuration via colored touchscreen display, remote configuration via Ethernet-Interface (WebGUI, SNMP), 1:1 redundant dual power supply 150W	3RU/19"	16	32

### TX & RX Module IF 40 – 200MHz

Type	Type-No.:	Short Description	Optical I/O Connector	Frequency Range
FL2T450plus-50B	9001109	Dual Optical Transmitter TX Module, IF 40 - 200MHz, RF coax Input 2 x 50Ohm BNC(f), Optical Output 2 x SC/APC, variable gain control, RF power monitoring	2 x SC/APC	40 – 200MHz
FL2R450plus-50B	9001110	Dual Optical Receiver RX Module, IF 40 - 200MHz, RF coax Output 2 x 50Ohm BNC(f), Optical Input 2 x SC/APC, variable gain control, RF power monitoring	2 x SC/APC	40 – 200MHz

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

Type	Type-No.:	Short Description	Optical I/O Connector	Frequency Range
FL2T4250plus-50S	9001114	Dual Optical Transmitter TX Module, 950 - 2150MHz, RF coax Input 2 x 50Ohm SMA(f), Optical Output 2 x SC/APC, variable gain control, switchable LNB-supply, RF power monitoring	2 x SC/APC	950 – 2150MHz
FL2R4250plus-50S	9001115	Dual Optical Receiver RX Module, 950 - 2150MHz, RF coax Output 2 x 50Ohm SMA(f), Optical Input 2 x SC/APC, variable gain control, RF power monitoring	2 x SC/APC	950 – 2150MHz
FL2T4250plus-50B	9001333	Dual Optical Transmitter TX Module, 950 - 2150MHz, RF coax Input 2 x 50Ohm BNC(f), Optical Output 2 x SC/APC, variable gain control, switchable LNB-supply, RF power monitoring	2 x SC/APC	950 – 2150MHz
FL2R4250plus-50B	9001334	Dual Optical Receiver RX Module, 950 - 2150MHz, RF coax Output 2 x 50Ohm BNC(f), Optical Input 2 x SC/APC, variable gain control, RF power monitoring	2 x SC/APC	950 – 2150MHz
FL2T4250plus-75F	9001319	Dual Optical Transmitter TX Module, 950 - 2150MHz, RF coax Input 2 x 75Ohm F(f), Optical Output 2 x SC/APC, variable gain control, switchable LNB-supply, RF power monitoring	2 x SC/APC	950 – 2150MHz
FL2R4250plus-75F	9001318	Dual Optical Receiver RX Module, 950 - 2150MHz, RF coax Output 2 x 75Ohm F(f), Optical Input 2 x SC/APC, variable gain control, RF power monitoring	2 x SC/APC	950 – 2150MHz
FL2T4250plus-75B	9001202	Dual Optical Transmitter TX Module, 950 - 2150MHz, RF coax Input 2 x 75Ohm BNC(f), Optical Output 2 x SC/APC, variable gain control, switchable LNB-supply, RF power monitoring	2 x SC/APC	950 – 2150MHz

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

Type	Type-No.:	Short Description	Optical I/O Connector	Frequency Range
FL2T4850plus-50S	9001116	Dual Optical Transmitter TX Module, 850 - 2450MHz, RF coax Input 2 x 50Ohm SMA(f), Optical Output 2 x SC/APC, variable gain control, switchable LNB-supply, RF power monitoring	2 x SC/APC	850 – 2450MHz
FL2R4850plus-50S	9001117	Dual Optical Receiver RX Module, 850 - 2450MHz, RF coax Output 2 x 50Ohm SMA(f)*, Optical Input 2 x SC/APC, variable gain control, RF power monitoring	2 x SC/APC	850 – 2450MHz

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

Type	Type-No.:	Short Description	Optical I/O Connector	Frequency Range
FL2T6450plus	9001112	Dual Optical Transmitter TX Module, 50 - 3200MHz, RF coax Input 2 x 50Ohm SMA(f), Optical Output 2 x SC/APC, variable gain control, RF power monitoring	2 x SC/APC	50 – 3200MHz
FL2R6450plus	9001113	Dual Optical Receiver RX-Module, 50 - 3200MHz, RF coax Output 2 x 50Ohm SMA(f), Optical Input 2 x SC/APC, variable gain control, RF power monitoring	2 x SC/APC	50 – 3200MHz

**TX & RX Module 10MHz**

Type	Type-No.:	Short Description	Optical I/O Connector	Frequency Range
FL2T10-50B	9001196	Dual Optical Transmitter TX Module, 10MHz, RF coax Input 2 x 50Ohm BNC(f), Optical Output 2 x SC/APC	2 x SC/APC	10MHz
FL2R10-50B	9001197	Dual Optical Receiver RX-Module, 10MHz, RF coax Output 2 x 50Ohm BNC(f), Optical Input 2 x SC/APC	2 x SC/APC	10MHz

*\*upon request*