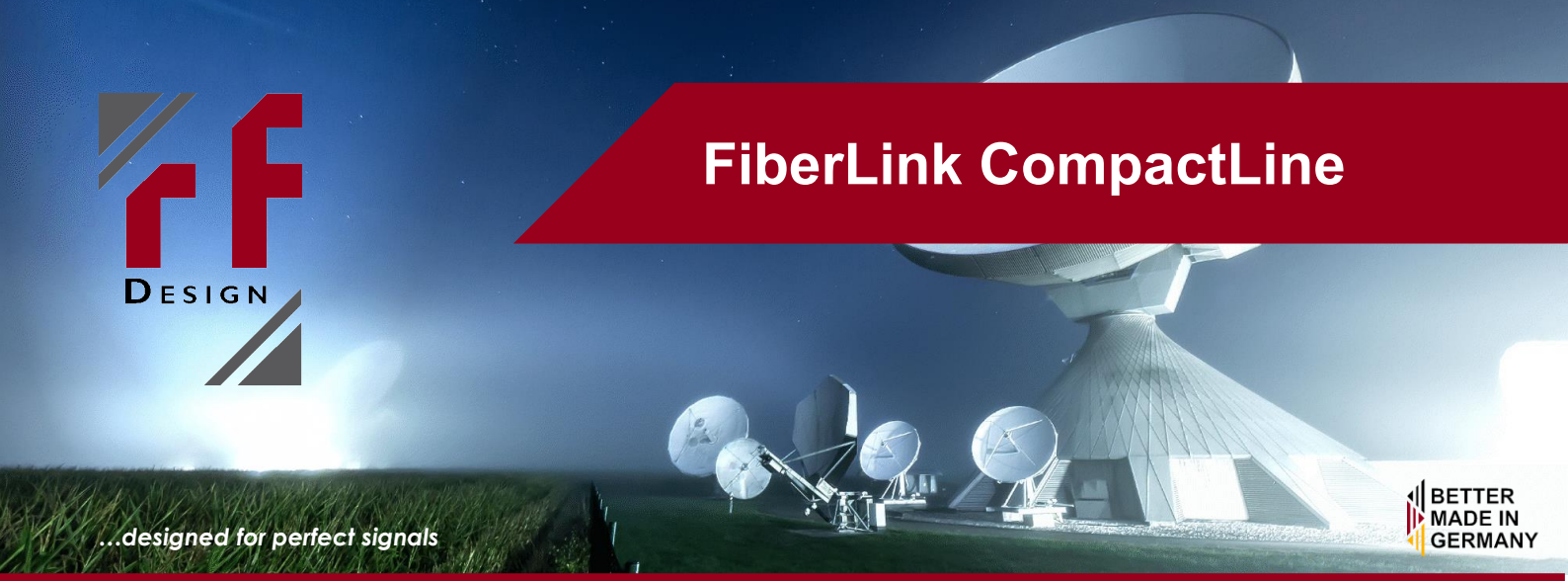


FiberLink CompactLine

16x1 non redundant and 4x1:1, 4x2+1 & 2x4+1 redundant RF-over-Fiber System in 1RU and ODB

The FiberLink CompactLine Series represents both redundant and non-redundant RF-over-fiber system. The 16×1 non-redundant configuration, along with 4×1:1, 4×2+1, and 2×4+1 redundant configurations, is housed in a 1RU/19" rack-mount chassis. In addition, 8×1 non-redundant and 4×1:1, 4×2+1, and 2×4+1 redundant configurations are also available in an IP65-rated outdoor enclosure. It is designed for flexible, high quality and secure optical transmission of RF signals (L-Band, Extended L-Band and Broadband 3,2GHt) over up to 20km.

This redundant RF-over-Fiber allows a quattro 2+1 /1:1 or a dual 4+1 redundant configuration and can be populated with 8/12 active optical TX/RX modules and up to 2/4 hot-standby TX/RX modules. The chassis are designed to allow a 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 2+1/4+1 redundancy switching as per preconfigured configurations. Once an error at a TX or RX module occurs, the system automatically activates a switchover to a backup 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.

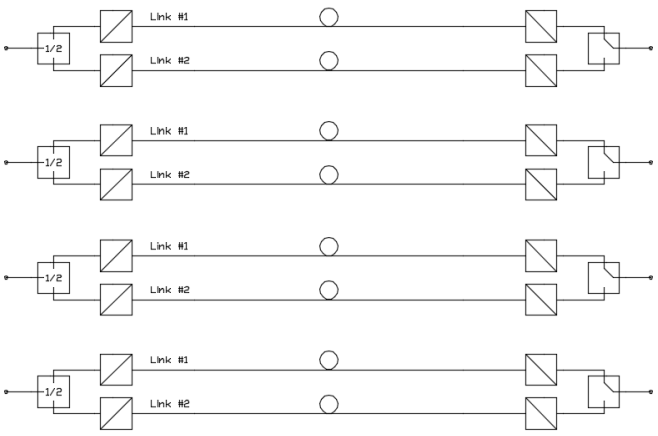
Configuration and monitoring is possible via the front panel LC-Display while remote configuration and monitoring is available via its Ethernet-Interface (WebGUI, SNMP).

FEATURES & BENEFITS

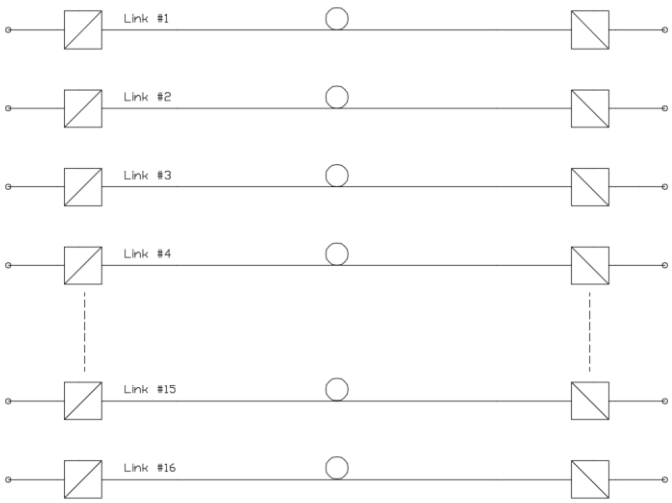
- Versatile16x1, 4x1:1, 4x2+1 & 2x4+1 redundant RF-over-Fiber
- Supporting IF 200MHz, L-Band 950 – 2150MHz, Ext. L-Band 850 – 2450MHz and Broadband 50Mhz – 3250MHz
- 1RU/19" chassis for 1:1, 2+1 and 4+1 redundant operation
- Manual and automatic redundancy switching
- Backup Ports are available at rear side for additional use
- Automatic Frequency and Level equalization (Option)
- 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
- 1:1 redundant dual power supply

LINK SCHEMATIC

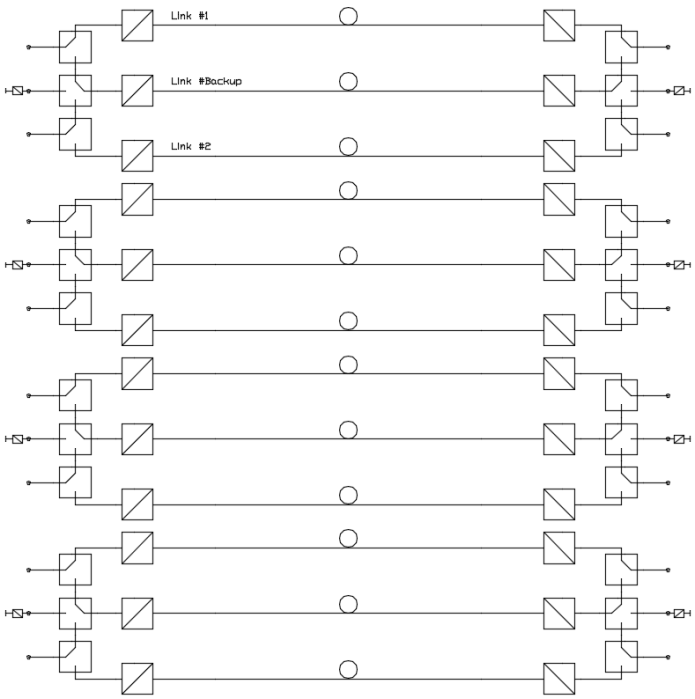
FCLR1411: 4x1:1 Link Schematic



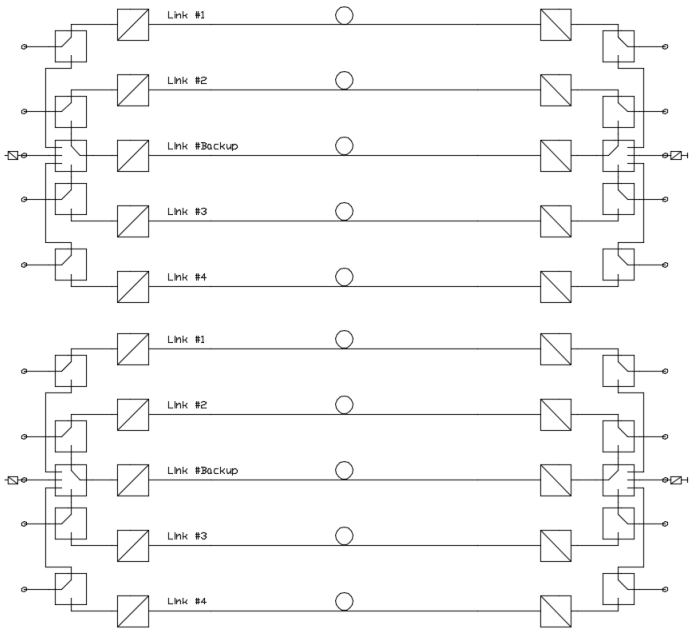
FCLS1161: 16x Single Link Schematic



FCLR1421: 4x2+1 Link Schematic



FCLR1241: 2x4+1 Link Schematic



TECHNICAL SPECIFICATIONS

1RU 19" Chassis

Dimensions:	1RU/19" (360mm deep)
Power Supply:	85 – 265V, 50/60Hz, dual 1:1 redundancy (hot-swappable)
Power Consumption:	<20W
TX/RX Module Capacity:	8(+4) slots for 4 x 1:1 redundant operation 12 slots for 4 x 2+1 redundant operation 10 slots for 2 x 4+1 redundant operation 16 slots for 16 x 1 non redundant operation
RF Connectors I/O Ports:	50Ohm SMA(f), 75Ohm F(f), 50Ohm BNC(f)*, 75Ohm BNC(f)* FCLR1411 (4x1:1): 4 Main RF-Ports FCLR1421 (4x2:1): 8 Main RF-Ports, 4 Backup Ports FCLR1241 (2x4:1): 8 Main RF-Ports, 2 Backup Ports FCLS1161 (16 Single non redundant links): 16 Main RF-Ports
Local Configuration:	LC-Display/keypads
Remote Configuration:	Ethernet (WebGUI, SNMPv2c)
Operating Temperature:	0°C to 45°C
Storage Temperature:	-10°C to 70°C
Humidity:	90%, non-condensing
RoHS:	Compliant
MTBF:	390khours MIL-HDBK-217F (25℃)
Environmental Conditions:	ETS 300019 Part 1-3 Class 3.1E

IP65 Outdoor Box

Dimensions:	500 x 350 x 250mm
Power Supply:	85 – 265V, 50/60Hz, dual 1:1 redundancy
Power Consumption:	<20W
TX/RX Module Capacity:	FCLRODB1411: 8 slots for 4 x 1:1 redundant operation + 1 slot for 10MHz RX FCLRODB1221: 6 slots for 2 x 2+1 redundant operation + 1 slot for 10MHz RX FCLRODB1141: 5 slots for 1 x 4+1 redundant operation + 1 slot for 10MHz RX FCLRODB1801: slots for 8 links non redundant operation + 1 slot for 10MHz RX
RF Connectors I/O Ports:	50Ohm N(f)
Local Configuration:	LC-Display/keypads
Remote Configuration:	Ethernet (WebGUI, SNMPv2c)
Temperature Control:	Fan temperature managed
Standard:	IP65
Operating Temperature:	0°C to 45°C
Storage Temperature:	-10°C to 70°C
Humidity:	90%, non-condensing
RoHS:	Compliant
MTBF:	390khours MIL-HDBK-217F (25℃)
Environmental Conditions:	ETS 300019 Part 1-3 Class 3.1E

CompactLine Automatic Link Setup Function

Software License for Chassis

Frequency Range:	50 – 2500MHz (depends on assembled card in each slot)
Management:	Via RX/TX WebGui and/or SNMP
Function:	RF-Link Measurement S21 Parameter in defined frequency range Frequency Response on RX side
RF Input Power Level:	-10dBm
Frequency Step:	10MHz

Link Specifications (10MHz, 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
IP1dB:	+3dBm
MDS:	IF: -71dBm; L-Band -63dBm; Extended L-Band -62dBm
Dynamic Range:	IF: 73dB; L-Band 66dB; Extended L-Band 64dB
Max. Link Gain:	26dB (±1,0dB), 20dB in 1:1 configuration
Gain Stability:	< ±0,3dB
Group Delay Distortion:	<+/-1ns
Nominal RF Input Level:	-20dBm
Noise Figure:	< 24dB
SFDR:	112dB/Hz 2/3
IMA3 @ -10dBm:	< -50dBc

Link Specifications Broadband (50 – 3200MHz)	
Modulation Type:	Direct
F/O Diff. EFF:	0,15 to 0.17 W/A
IP1dB:	+3dBm
MDS:	-59dBm
Dynamic Range:	62dB
Max. Link Gain:	26dB (±1,0dB) , 20dB in 1:1 configuration
Gain Stability:	< ±0,3dB
Group Delay Distortion:	<+/-1ns
Nominal RF Input Level:	-20dBm
Noise Figure:	< 24dB
SFDR:	112dB/Hz 2/3
IMA3 @ -10dBm:	< -46dBc

10MHz Application

TX Module 10MHz FLT10*CL*

Frequency Range:	10MHz
RF Output Connector:	Via Chassis RF I/O ports, Measurement Port Front Side SMA(f)
Optical Output Connector:	SC/APC
Fiber Type:	Single mode 9/125
RF Input Power Level:	+15dBm max. (damage level)
Return Loss:	18dB min.
Laser Type:	DFB with Isolator
Laser Class:	1M
Phase Noise:	-149dBc/Hz @ 100Hz -150dBc/Hz @ 1kHz -151dBc/Hz @ 10kHz -152dBc/Hz @ 100kHz -152dBc/Hz @ 1MHz
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
MTTF:	10e6 hours

RX Module 10MHz FLR10*CL*

Frequency Range:	10MHz
Optical Input Connector:	SC/APC
Fiber Type:	Single mode 9/125
RF Output Connector:	Via Chassis RF I/O ports, Measurement Port Front Side SMA(f)
Optical Input Power Level:	-5dBm (min. optical sensitivity)
Return Loss:	18dB min.
Phase Noise:	-140dBc/Hz @ 100Hz -145dBc/Hz @ 1kHz -147dBc/Hz @ 10kHz -147dBc/Hz @ 100kHz -147dBc/Hz @ 1MHz
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
MTTF:	10e6 hours

40MHz – 200MHz Application

TX Module IF 40 – 200MHz FLT251CL

Frequency Range:	40 – 200MHz (IF)
RF Input Connector:	Via Chassis RF I/O ports
Measurement Port:	Frontside -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:	18dB min.
OIP3:	+23dBm
SFDR:	112dB/Hz 2/3
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:	+6dB
RF Power Monitoring:	65dB 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
MTTF:	10e6 hours
RoHS:	Compliant

RX Module IF 40 – 200MHz FLR251CL

Frequency Range:	40 – 200MHz (IF)
Optical Input Connector:	SC/APC
Measurement Port:	Frontside -20dB
Fiber Type:	Single mode 9/125
RF Output Connector:	Via Chassis RF I/O ports
Optical Input Power Level:	-10dBm (min. optical sensitivity)
Frequency Response:	±0,5dB max.
Return Loss:	18dB min.
OIP3:	+23dBm
SFDR:	112dB/Hz 2/3
Noise Figure:	12dB
Operating Wavelength:	1310nm – 1560nm
RF Output Power:	+10dBm max.
Variable Gain Control:	0dB to +20dB
RF Power Monitoring:	65dB 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
MTTF:	10e6 hours
RoHS:	Compliant

L-Band and Extended L-Band Application

TX Module (L-Band 950 – 2150MHz & Extended L-Band 850 – 2450MHz), FLT2151CL, FLT2451CL

Frequency Range:	950 – 2150MHz (L-Band) & 850 – 2450MHz (extended L-Band)
RF Input Connector:	Via Chassis RF I/O ports, Frontside Measurement Port -20dB
Fiber Type:	Connector SC/APC, 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:	+20dBm
SFDR:	112dB/Hz 2/3
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:	0 to +6dB Manual Gain Control (MGC) (Automatic Gain Control (AGC) on request), Step 0,25dB
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:	65dB 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
MTTF:	10e6 hours
RoHS:	Compliant

RX Module (L-Band 950 – 2150MHz & Extended L-Band 850 – 2450MHz), FLR2151CL, FLR2451CL

Frequency Range:	950 – 2150MHz (L-Band) & 850 – 2450MHz (extended L-Band)
Fiber Type:	Connector SC/APC, Single mode 9/125
RF Output Connector:	Via Chassis RF I/O ports, Frontside Measurement Port -20dB
Optical Input Power Level:	-5dBm (min. optical sensitivity)
Frequency Response:	±0,5dB typ., ±1,0dB max.
Return Loss:	16dB typ.
OIP3:	+20dBm
SFDR:	112dB/Hz 2/3
Noise Figure:	12dB
Operating Wavelength:	1310nm – 1560nm
RF Output Power:	+5dBm max.
Variable Gain Control:	0dB to +20dB (MGC) (Automatic Gain Control (AGC) on request), Step 0,25dB
RF Power Monitoring:	65dB 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
MTTF:	10e6 hours
RoHS:	Compliant

Broadband Application

TX Module Broadband (50 – 3200MHz), FLT3251CL

Frequency Range:	50 – 3200MHz
RF Input Connector:	Via Chassis RF I/O ports, Frontside Measurement Port -20dB
Fiber Type:	SC/APC, 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:	+20dBm
SFDR:	112dB/Hz 2/3
Noise Figure:	12dB
Laser Type:	DFB with Isolator
Laser Class:	1M
Operating Wavelength:	1310nm ±5nm
Optical Output Power:	+3dBm min.
Variable Gain Control:	0 to +6dB (MGC) (Automatic Gain Control (AGC) on request only), Step 0,25dB
RF Power Monitoring:	65dB 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
MTTF:	10e6 hours
RoHS:	Compliant

RX Module Broadband (50 – 3200MHz), FLR3251CL

Frequency Range:	50 – 3200MHz
Fiber Type:	SC/APC, Single mode 9/125
RF Output Connector:	Via Chassis RF I/O ports, Frontside Measurement Port -20dB
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:	+20dBm
SFDR:	112dB/Hz 2/3
Noise Figure:	12dB
Operating Wavelength:	1310nm – 1560nm
RF Output Power:	+10dBm max.
Variable Gain Control:	0dB to +20dB (MGC) (Automatic Gain Control (AGC) on request) , Step 0,25dB
RF Power Monitoring:	65dB dynamic range
Status LED´s:	OK, Fail
Operating Temperature:	0°C to 45°C
Storage Temperature:	-10°C to 70°C
Humidity:	90%, non-condensing
MTTF:	10e6 hours
RoHS:	Compliant

ORDER INFORMATION

19" Chassis

Type	Type-No.:	Short Description	Chassis size	Capacity TX/RX slots	Max. links	RF coax I/O connectors
FCLS1161-50S FCLS1161-75F* FCLS1161-50B* FCLS1161-75B*	9001384 on request on request on request	1RU/19" modular TX/RX chassis, 16 TX/RX slots non redundant, 16 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"	16 slots	16	16 x 50Ohm SMA(f) 16 x 75Ohm F(f)* 16 x 50Ohm BNC(f)* 16 x 75Ohm BNC(f)*
FCLR1411-50S FCLR1411-75F* FCLR1411-50B* FCLR1411-75B*	9001408 on request on request on request	1RU/19" modular TX/RX chassis, 12 TX/RX slots for 4 x 1:1 TX/RX redundancy, 12 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"	12 slots (8 slots for TX/RX and 4 slots for splitter or switch)	8	16 x 50Ohm SMA(f) 16 x 75Ohm F(f)* 16 x 50Ohm BNC(f)* 16 x 75Ohm BNC(f)*
FCLR1421-50S FCLR1421-75F* FCLR1421-50B* FCLR1421-75B*	9001368 on request on request on request	1RU/19" modular TX/RX chassis, 12 TX/RX slots, 4 x 2+1 TX/RX redundancy, 12 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"	12 slots 4 x 2+1	12	12 x 50Ohm SMA(f) 12 x 75Ohm F(f)* 12 x 50Ohm BNC(f)* 12 x 75Ohm BNC(f)*
FCLR1241-50S FCLR1241-75F* FCLR1241-50B* FCLR1241-75B*	9001369 on request on request on request	1RU/19" modular TX/RX chassis, 10 TX/RX slots, 2 x 4+1 TX/RX redundancy, 10 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"	10 slots 2 x 4+1	10	10 x 50Ohm SMA(f) 10 x 75Ohm F(f)* 10 x 50Ohm BNC(f)* 10 x 75Ohm BNC(f)*
FCLRODB1221 CompactLine*	9001402	Outdoor Box, IP65, 2 x 2+1 TX/RX,10MHz RX, local and remote config Ethernet-Interface (WebGUI, SNMP), 1:1 red. PSU	500x 400x 250mm	2 x 2+1	6	7 x 50Ohm N
FCLRODB1141 CompactLine*	9001406	Outdoor Box, IP65, 1 x 4+1 TX/RX,10MHz RX, local and remote config Ethernet-Interface (WebGUI, SNMP), 1:1 red. PSU	500x 400x 250mm	1 x 4+1	5	6 x 50Ohm N
FCLRODB1411 CompactLine*	9001411	Outdoor Box, IP65, 4x 1:1 TX/RX,10MHz RX, local and remote config Ethernet-Interface (WebGUI, SNMP), 1:1 red. PSU	500x 400x 250mm	4 x 1:1	8	9 x 50Ohm N
FCLRODB1801 CompactLine	9001439	Outdoor Box, IP65, 8x TX/RX,10MHz RX, local and remote config Ethernet-Interface (WebGUI, SNMP), 1:1 red. PSU	500x 400x 250mm	9 x single	9	9 x 50Ohm N
FCLRODB11601 CompactLine	9001485	Outdoor Box, IP65, 16x TX/RX,10MHz RX, local and remote config Ethernet-Interface (WebGUI, SNMP), 1:1 red. PSU	500x 400x 250mm	16 + 1 single	16+1	17 x 50Ohm N
FCLR1GETH	9001457	1GBit Ethernet Interface over Fiber Module for 1U Chassis and Outdoor Box	-	-	1	RJ45 and SC

upon request only

TX & RX Module 10MHz

Type	Type-No.:	Short Description	Optical I/O Connector	Frequency Range
FLT10CL TX 10MHz	9001378	Optical Transmitter TX-Module, 10MHz, RF coax Input via 1RU chassis RF coax I/O panel, Optical Output SC/APC, RF-Power Mon. & Mon-Port.	SC/APC	10MHz
FLR10CL RX 10MHz	9001379	Optical Receiver RX-Module, 10MHz, Optical Input SC/APC, RF coax Output via 1RU chassis RF coax I/O panel, RF-Power Mon. & Mon-Port.	SC/APC	10MHz

TX & RX Module IF 40 – 200MHz

Type	Type-No.:	Short Description	Optical I/O Connector	Frequency Range
FLT251CL TX 200MHz	9001376	Optical Transmitter TX-Module, 40 – 200MHz, RF coax Input via 1RU chassis RF coax I/O panel, Optical Output SC/APC, gain control, RF-Power Mon.&Mon-Port.	SC/APC	40 – 200MHz
FLR251CL RX 200MHz	9001377	Optical Receiver RX-Module, 40 – 200MHz, Optical Input SC/APC, RF coax Output via 1RU chassis RF coax I/O panel, gain control, RF Power Mon.&Mon-Port	SC/APC	40 – 200MHz

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

Type	Type-No.:	Short Description	Connector	Frequency Range
FLT2151CL TX L-Band	9001374	Optical TX-Module, 950 – 2150MHz, RF coax Input via 1RU chassis RF coax I/O panel, Optical Output SC/APC, gain control, LNB-supply, RF power monitoring, measurement port -20dB	SC/APC	950 – 2150MHz
FLR2151CL RX L-Band	9001375	Optical RX-Module, 950 – 2150MHz, Optical Input SC/APC, RF coax Output via 1RU 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 with frontside measurement port -20dB

Type	Type-No.:	Short Description	Connector	Frequency Range
FLT2451CL TX Ext L-Band	9001372	Optical TX-Module, 850 – 2450MHz, RF coax Input via 1RU chassis RF coax I/O panel, Optical Output SC/APC, gain control, LNB-supply, RF power monitoring, measurement port -20dB	SC/APC	850 – 2450MHz
FLR2451CL RX Ext L-Band	9001373	Optical Receiver RX-Module, 850 – 2450MHz, Optical Input SC/APC, RF coax Output via 1RU 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
FLT3251CL TX 3,2GHz	9001370	Optical Transmitter TX-Module, 50 – 3200MHz, RF coax Input via 1RU chassis RF coax I/O panel, Optical Output SC/APC, gain control, RF power monitoring, measurement port -20dB	SC/APC	50 – 3200MHz
FLR3251CL RX 3,2GHz	9001371	Optical Receiver RX-Module, 50 – 3200MHz, Optical Input SC/APC, RF coax Output via 1RU chassis RF coax I/O panel, gain control, RF power monitoring, measurement port -20dB	SC/APC	50 – 3200MHz

Splitter & Switch Modules Broadband 50MHz – 3200MHz for 1:1 Operation Units

Type	Type-No.:	Short Description	Connector	Frequency Range
FLT12SPCL	9001409	TX 1:2 Passive Splitter Module for 1:1 Operation on TX side	-	50 – 3200MHz
FLR21SWCL	9001410	RX 2:1 Passive Switch Module for 1:1 Operation on RX side	-	50 – 3200MHz

Options

Type	Type-No.:	Short Description
Option ALS	9001510	Automatic Link Setup Function
Option AGC TX/RX	on request	Automatic Gain Control Function

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