ETL Systems

Excelling in RF Engineering

Model: SRY-TR-L1-931
& SRY-TR-L1-932

VSAT Fibre System

Typical applications:
- Fibre connectivity between VSAT antenna to a remote control room.
- For links up to 10 km.

ETL's VSAT fibre system consists of one downlink transmission path, with a multiplexed 10 MHz reference signal, and one uplink path with a 10 MHz reference signal. The 10MHz tone is extracted from the uplink input, carried on a separate fibre for best performance and injected into both L-band connectors at the ODU.

The downlink path also provides 13/18 VDC and 22KHz tone for LNB powering and the uplink provides 24V 2A BUC powering. The unit features an Ethernet over fibre port to enable remote M&C of the ODU and external antenna mounted equipment (optional). A non-optical Ethernet version is also available.

Outdoor

850 - 2450 MHz operating frequency range for up & downlinks.

10 MHz Reference Signal for up & downlinks.

LNB & BUC Powering 13/18V, 500mA , 22kHz tone (LNB) 24V, 2A (BUC)

IP65 rated weatherproof housing

Optical Ethernet bi-directional, Gigabit Ethernet connection.

Indoor

850 - 2450 MHz operating frequency range for up & downlinks.

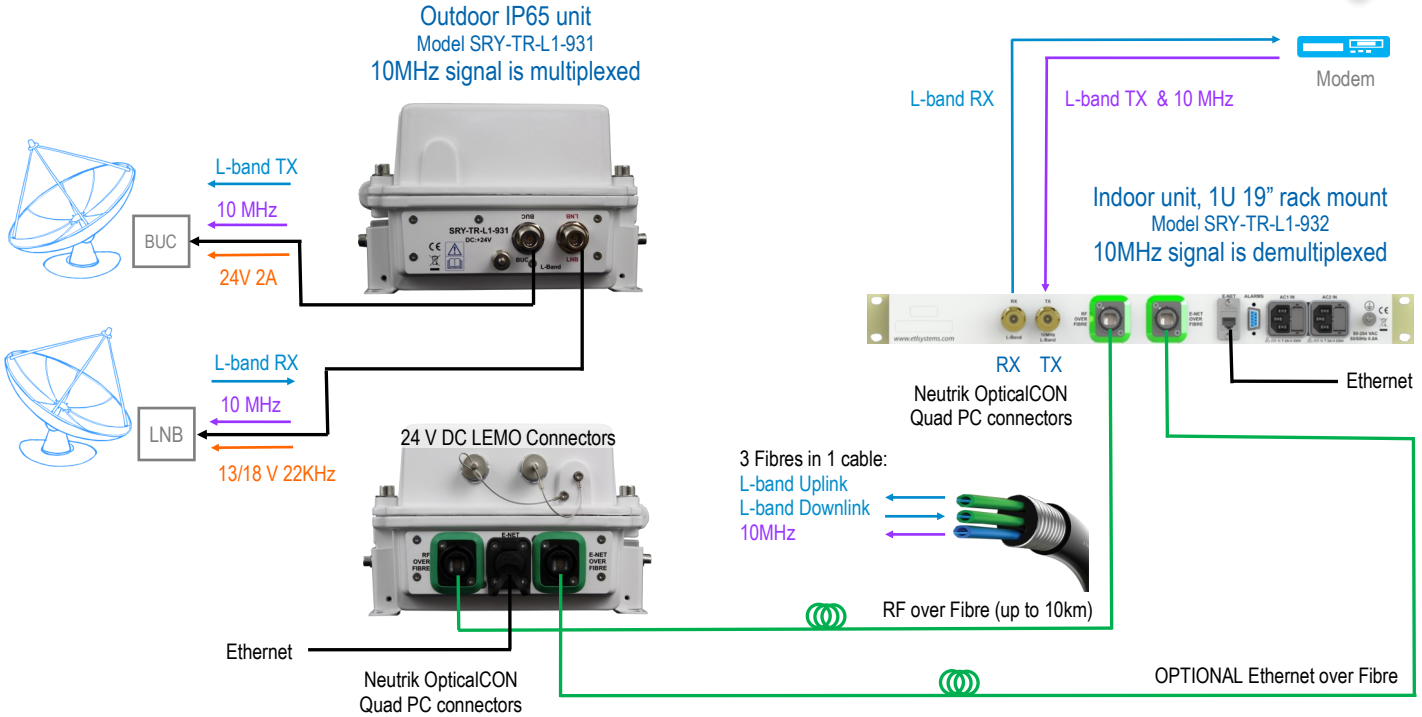
10 MHz Reference Tone extracted from uplink.

Remote control & monitoring of ODU via optical Ethernet link

Resilience from dual redundant power supplies (IDU & ODU)

Local control & monitoring via front panel push buttons & display

System Schematic



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Model: SRY-TR-L1-931
Outdoor Unit

RF Parameters				
Frequency Range		850 to 2450 MHz (Extended L-band)		
Flatness	850 to 2450 MHz	±1.5 dB (N-Type)		Full TX &RX link with SRY-TR-L1-932, 1m fibre. Input -10 dBm, output -10 dBm
		±2.0 dB (F-Type)		
	Any 36MHz, 850-2450MHz	±0.4 dB		
Return Loss	50 ohm N-type	18 dB typical	10 dB minimum	All RF connectors are female DC power may be present on connectors Do not connect to power source
	75 ohm F-type	12 dB typical	8 dB minimum	
Input 1 dB Gain Compression Point		+6 dBm typical		Measured with SRY-TR-L1-932, 1m fibre, 0dB link gain, 1950 MHz
OIP3	Typical	20 dBm		**Test condition:** SRY-TR-L1-932, 1m fibre, 0dB gain, -22 dBm tones at 2150 and 2152 MHz
	Worst case	17 dBm		
IMD3		-84 dBc typical		**Test condition:** SRY-TR-L1-932, 1m fibre, 0dB gain link, -22dBm tones at 2150 and 2152 MHz
CNR (in any 36MHz)		-74 dB typical		**Test condition:** SRY-TR-L1-932, 1m fibre, 0 dBm RF i/p power, 0 dBm RF o/p total power.
Noise Figure	Typical	24 dB		**Test condition:** SRY-TR-L1-932, 1m fibre, 0 dBm RF i/p power, 0 dBm o/p power .**N.B 0dB gain**
	Worst case	27 dB		
Group Delay variation	Over full band	2 ns		**Test condition:** SRY-TR-L1-932, 1m fibre, 0 dBm RF i/p power, 0 dBm o/p power
	Over any 36MHz	1 ns		
SFDR	Typical	112 dB/Hz$^{2/3}$		**Test condition:** SRY-TR-L1-932, 1m fibre, 0dB gain, -22 dBm tones at 2150 and 2152 MHz
	Minimum	108 dB/Hz$^{2/3}$		
10 MHz Level		-5 to +5 dBm		
L-Band Link Phase Noise (Additive) Single side-band Phase Noise	10 Hz	<-70 dBc/Hz		**Test condition:** SRY-TR-L1-932, 1m fibre, 0 dBm RF i/p power, 0 dBm o/p power Measured Phase Noise performance is typically 10dB better
	100 Hz	<-80 dBc/Hz		
	1 kHz	<-90 dBc/Hz		
	10 kHz	<-100 dBc/Hz		
	100 kHz	<-110 dBc/Hz		
	1 MHz	<-120 dBc/Hz		
10MHz Ref Link Phase Noise (Additive) Single side-band Phase Noise	10 Hz	<-110 dBc/Hz		
	100 Hz	<-120 dBc/Hz		
	1 kHz	<-130 dBc/Hz		
	10 kHz	<-135 dBc/Hz		
	100 kHz	<-145 dBc/Hz		
	1 MHz	<-145 dBc/Hz		
Max RF Input		0 dBm (total power) Operational level		
MGC range		+30 dB		0.25 dB steps
Absolute Max RF input		+16 dBm total power		Damage level, NOT operational.

Optical Parameters		
Laser Type	DFB	Two stage isolator for improved performance
Optical Wavelength	1310 ± 10 nm	
Optical Power Output	+6 ± 2.5 dBm	
Link Loss Budget	4 dB	Maximum recommended optical loss
Optical Connectors	Neutrik opticalCON QUAD PC	Single mode fibre Use PC connectors only

Power		
PSU	Dual Redundant Power Inputs	
Power Connectors	LEMO EEL.1k.302.CLD	
Power Input Voltage	24V DC	
Power Consumption	15W	No LNB and BUC power
Max Power	75W	Max LNB and BUC
BUC Power	24V, 2A	Switchable. Short circuit protected
LNB Power	13/18V, 500mA, 22kHz tone	Switchable. Short circuit protected

System Control		
Remote Control	Via Ethernet, TCP/IP, SNMP, Web browser	
Local RJ45 Ethernet	10/100/1000BASE-T	Neutrik etherCON IP65 shell
Fibre Ethernet	1000BASE-LX	Neutrik opticalCON QUAD two positions used

Environmental		
Operating Temperature	-40°C to +60°C	
Storage Temperature	-40°C to +90°C	
Environmental Rating	IP65 rated. Weatherproof for outside operation	Connectors are weatherproof to IP65 when mated
Humidity	20 to 90% non-condensing	Relative Humidity
Altitude	10,000 ft AMSL operational 30,000 ft AMSL storage/transport Above Mean Sea Level	

Physical	
Dimensions	300x206x131mm
Weight	3.5 kg
RF connectors	50Ω N-type and 75Ω F-type

Note 1: The specification is subject to regular reviews and will be updated from time to time as part of our continuing product development and improved spec accuracy.
Note 2: Operation beyond the quoted limits stated above may cause instantaneous and

Model SRY-TR-L1-931-xxxxxx
IP65 rated unit

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Indoor Unit

RF Parameters				
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Flatness	850 to 2450 MHz	±1.5 dB (N-Type)		Full TX &RX link with SRY-TR-L1-931, 1m fibre. Input -10 dBm, output -10 dBm
		±2.0 dB (F-Type)		
	Any 36MHz, 850-2450MHz	±0.4 dB		
Return Loss	50 ohm N-type	18 dB typical	10 dB minimum	All RF connectors are female DC power may be present on connectors Do not connect to power source
	75 ohm F-type	12 dB typical	8 dB minimum	
Input 1 dB Gain Compression Point		+6 dBm typical		Measured with SRY-TR-L1-931, 1m fibre, 0dB link gain, 1950 MHz
OIP3	Typical	20 dBm		**Test condition:** SRY-TR-L1-931, 1m fibre, 10dB gain, -22 dBm tones at 2150 and 2152 MHz
	Worst case	17 dBm		
IMD3		-84 dBc typical		**Test condition:** SRY-TR-L1-931, 1m fibre, 0dB gain link, -22dBm tones at 2150 and 2152 MHz
CNR (in any 36MHz)		-74 dB typical		**Test condition:** SRY-TR-L1-931, 1m fibre, 0 dBm RF i/p power, 0 dBm RF o/p total power.
Noise Figure	Typical	24 dB		**Test condition:** SRY-TR-L1-931, 1m fibre, 0 dBm RF i/p power, 0 dBm o/p power **N.B 0dB gain**
	Worst case	27 dB		
Group Delay variation	Over full band	2 ns		**Test condition:** SRY-TR-L1-931, 1m fibre, 0 dBm RF i/p power, 0 dBm o/p power
	Over any 36MHz	1 ns		
SFDR	Typical	112 dB/Hz$^{2/3}$		**Test condition:** SRY-TR-L1-931, 1m fibre, 0dB gain, -22 dBm tones at 2150 and 2152 MHz
	Minimum	108 dB/Hz$^{2/3}$		
10 MHz Level		-5 to +5 dBm		
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	100 Hz	<-120 dBc/Hz		
	1 kHz	<-130 dBc/Hz		
	10 kHz	<-135 dBc/Hz		
	100 kHz	<-145 dBc/Hz		
	1 MHz	<-145 dBc/Hz		
L-band Link Phase Noise (Additive) Single Side-band	10 Hz	<-70 dBc/Hz		**Test condition:** SRY-TR-L1-931, 1m fibre, 0 dBm RF i/p power, 0 dBm o/p power Measured Phase Noise performance is typically 10dB better
	100 Hz	<-80 dBc/Hz		
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	10 kHz	<-100 dBc/Hz		
	100 kHz	<-110 dBc/Hz		
	1 MHz	<-120 dBc/Hz		
Max RF Input		0 dBm (total power) Operational level		
MGC range		+30 dB		0.25 dB steps
Range of max i/p level for optimised 0 dB link **		0 to -30 dBm		With SRY-TR-L1-931
Absolute Max RF input		+16 dBm total power		Damage level, NOT operational.
BUC / LNB power		None		

Optical Parameters		
Laser Type	DFB	Two stage isolator for improved performance
Optical Wavelength	1310 ± 10 nm	
Optical Power Output	+6 ± 2.5 dBm	
Link Loss Budget	4 dB	Maximum recommended optical loss
Optical Connectors	Neutrik opticalCON QUAD PC	Single mode fibre

Power		
PSU	Dual Redundant Power Supplies	Not hot swap
Power Input Voltage	85 to 264 VAC 50/60 Hz	
Power Consumption	15W	

System Control		
Remote Control	Via Ethernet, TCP/IP, SNMP, Web browser	
Local RJ45 Ethernet	10/100/1000BASE-T	
Fibre Ethernet	1000BASE-LX	
Temperature monitors	Internal temperature monitor	
Monitoring includes	Laser Optical Output Power RF power at input & at laser Status of amplifier stages	Each RF over Fibre channel

Environmental		
Operating Temperature	0°C to +50°C	
Storage Temperature	-40°C to +90°C	
Location	Indoor use only	
Humidity	20 to 85% non-condensing	Relative Humidity
Altitude	10,000 ft AMSL operational 30,000 ft AMSL storage/transport Above Mean Sea Level	

Physical	
Dimensions	1U high x 350mm deep
Weight	3 kg
RF connectors	50Ω N-type and 75Ω F-type

Note 1: The specification is subject to regular reviews and will be updated from time to time as part of our continuing product development and improved spec accuracy.
Note 2: Operation beyond the quoted limits stated above may cause instantaneous and permanent damage.

Model SRY-TR-L1-932-xxxxxx
Indoor unit

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RoHS COMPLIANT
Pb-Free
ISO 9001 QUALITY MANAGEMENT
UKAS MANAGEMENT SYSTEMS 015