ViaLiteHD
Support Modules

User Guide

HRS-HB-11

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Instrument Care and Safety Information

*Please read the whole of this section before using your **ViaLiteHD** product. It contains important safety information and will enable you to get the most out of your Fibre Optic Link.*

Electrical Safety

The ***ViaLiteHD*** chassis is a Safety Class 1 product (having metal case directly connected to earth via the power supply cable).

When operating the equipment note the following precautions:

- Hazardous voltages exist within the equipment. There are no user serviceable parts inside; the covers should only be removed by a qualified technician.
- There are no user replaceable fuses in the chassis mounted equipment. Replacement should only be carried out by a ***ViaLite Communications*** technician.
- The chassis earth stud SHOULD be connected to the safety earth.
- When using a 2 pin power supply cable the chassis earth stud MUST be connected to the safety earth.
- The ***ViaLiteHD*** Power Supply Modules do not have an isolating switch on the mains voltage inlet. For this reason, the ***ViaLiteHD*** Chassis must be installed within easy reach of a clearly labelled dual pole mains isolation switch, which supplies the equipment.

ESD Precautions

The ***ViaLiteHD*** support modules are equipped with high frequency active electronics, without the correct handing they will be susceptible to damage.

Precautions for handling electro-static sensitive devices should be observed when handling all ***ViaLiteHD*** modules. Technicians should ensure that they use effective personal grounding (i.e. ESD wrist strap etc.) when servicing the equipment. Any equipment or tools used should be grounded to prevent static charge build-up. Good practice should be observed at all times for reference see relevant standards.
EN 61340-5-1, “Protection of Electronic Devices from Electrostatic Phenomena – General Requirements”

Optical Safety

The ***ViaLiteHD*** serial digital and Ethernet devices contain optical sources (usually laser diodes) operating at nominal wavelengths of 1270nm to 1610nm.

These devices are rated as EN60825-1 as CLASS 1 radiation emitting devices. A class 1 laser is safe under all conditions of normal use.

When operating the equipment note the following precautions:

- Never look into the end of an optical fibre directly or by reflection either with the naked eye or through an optical instrument.
- Never leave equipment with radiating bare fibres – always cap the connectors.
- Do not remove equipment external covers when operating.

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1 Introduction

The ***ViaLiteHD*** RF Fibre Optic Links (FOLs) are a family of fibre optically coupled link systems designed for the transmission of RF analogue signals over long distances for the communications market. ***ViaLiteHD*** is a product brand manufactured by Pulse Power and Measurement Ltd (PPM). ***ViaLite communications*** is a division of Pulse Power and Measurement Ltd (PPM).

The ***ViaLiteHD*** system offers a family of support modules that provide range of functions that can be used stand alone or with its RF Fibre Optic Links (FOLs).

This handbook covers the following ***ViaLiteHD*** RF support modules:

- Amplifier module
  - HRA
- Serial Digital modem
  - HRB
- Splitter module
  - HRD
- RF switch module
  - HRS
- Gigabit Ethernet optical link module
  - HRE
- LNB power supply module
  - HRP

For complete information and product familiarisation, this handbook should be read in conjunction with all other relevant handbooks for your ***ViaLiteHD*** system.

1.1 *ViaLiteHD* and *ViaLite Classic* compatibility

The RF interfaces of most ***ViaLiteHD*** and ***ViaLite Classic*** are compatible. However the physical size, mounting systems and control of the modules are different, so it will not be possible to fit ***ViaLiteHD*** module in a ***ViaLite Classic*** chassis or housing and vice versa. However it is possible for chassis of different types to interwork and be used to expand existing systems. Listed below is a brief summary of inter family compatibility.

Amplifier module	Compatible RF interfaces
Splitter module	Compatible RF interfaces
RF switch module	Compatible RF interfaces, control interface not compatible [1]

[1] It would be possible under some configurations, to extend the RF switches open collector input control interface to another chassis. This would require the construction of a custom wire loom. Contact ***Vialite Communication*** or your local agent for more details.

2 Setting up and understanding the modules

This section describes the connection of your RF support modules and the operation with other system elements.

Please read fully all relevant documents for information on installing your ***ViaLiteHD*** equipment before commissioning your RF fibre optic link system.

2.1 Module operation

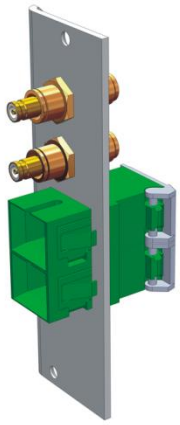
2.1.1 5HP blind mate plug-in modules

All ***ViaLiteHD*** plug-in modules are hot-swappable, so it is not necessary to power-down the chassis before inserting a module. All blind mate optical connectors are provided with spring loaded covers that will protect the optics of any inserted modules. As there is no cover on the opposite side, mating cables should not be installed until the slot modules are present. There are 2 types of blind mate, type 'D' and type 'E' as shown in the images below. A type 'E' module is not compatible with a type 'D' rack plate. Likewise a type 'D' module is not compatible with a type 'E' rack plate. Should this happen in error stoppers will prevent any damage to the connectors.

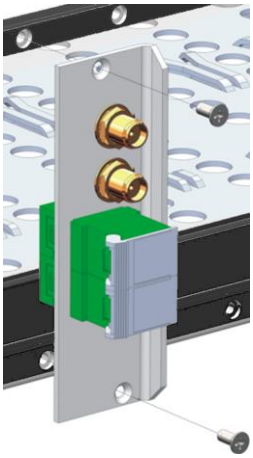
To install a blind mate module and matching interface plate

- Firstly inspect the rear blind mating plate [1], ensure that the connector barrels are fitted into all RF connectors (Type 'D') and are centrally aligned.
- Remove protective covers from the inside face of the optical connector if fitted.
- Ensure that the rear plate is free of any dust and contamination, if necessary clean with filtered compressed air.
- Screw the blind mating plate into the appropriate slot at the rear of the chassis, using the supplied screws and a "Pozidriv Number 1" screwdriver [2]
- Push the release button of the module handle down and simultaneously pull the top of the handle towards you.
- Align the module upright and perpendicular to the front face of the chassis so that the PCB slides into the "crow's feet" card guides top and bottom. [3]
- Gently push the module down its guide, applying pressure via the handle (without locking it), you may also apply pressure between the LED and test connector [4].
- As the module is fully mated the top of the handle should snap back and lock in position.
- The pawls of the handle should be fully engaged in the matching slots.
- If power is applied to the chassis the module power LED should light as soon as the module is fully inserted.
- Connect any interface cables to the blind mate plate, at the rear of the chassis.

Type 'D' blind mates



[1]



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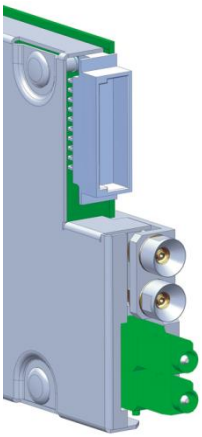

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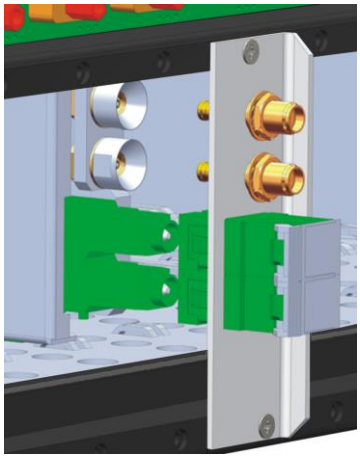
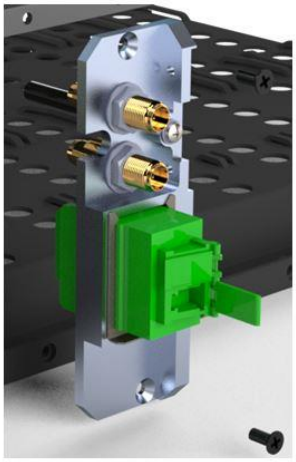


[4]

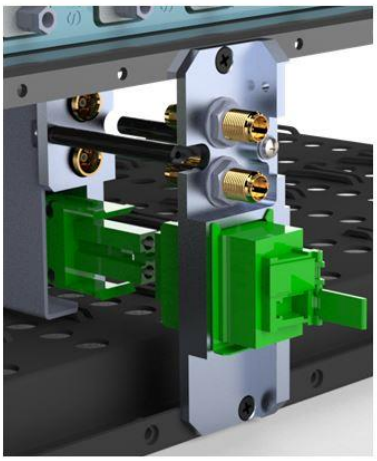
Type ‘E’ blind mates

[1]



[2]

[3]



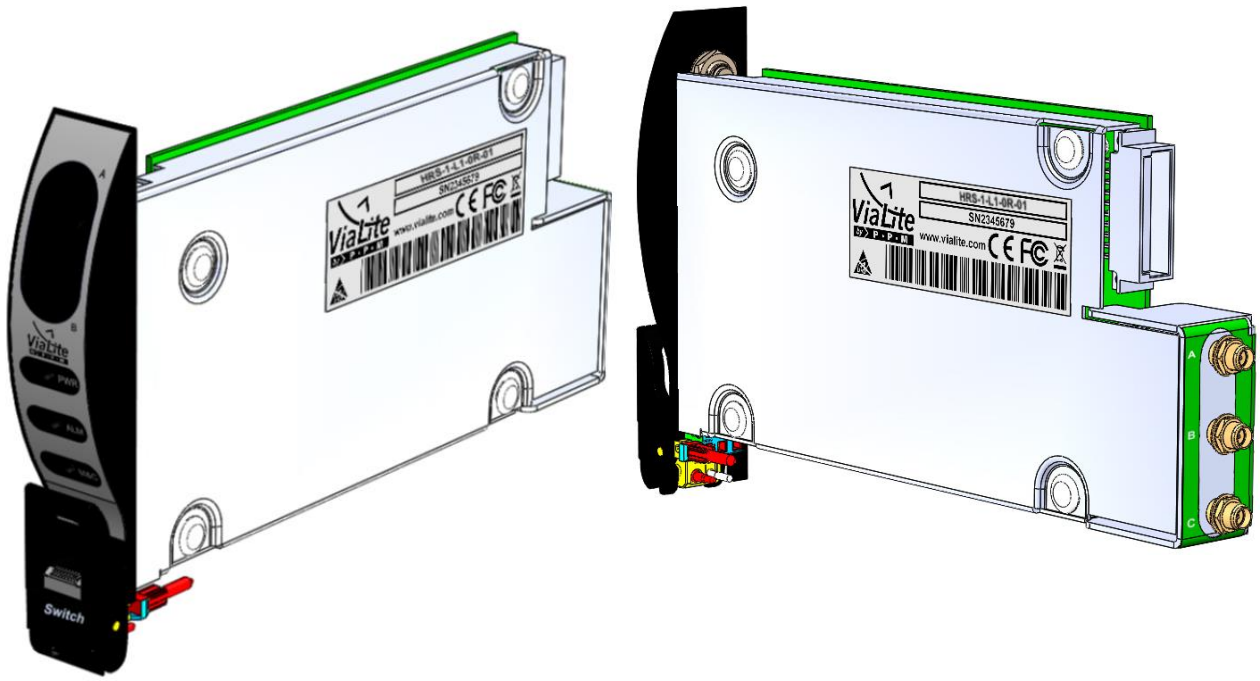
[4]

To remove a blind mate module

- Push the release button of the module handle down and simultaneously pull the top of the handle towards you.
- Apply pressure via the handle and gently withdraw the module from the chassis.
- Check that the RF mating barrel is retained by the chassis Blind mating plate
- All cables will be retained by the chassis.

2.1.2 5HP standard plug-in modules

All ***ViaLiteHD*** plug-in modules are hot-swappable, so it is not necessary to power-down the chassis before inserting a module. All standard optical connectors are retained by the module, so it will be necessary to either disconnect any cables or have a sufficiently long service loop when removing modules.



To install a 5HP standard module and matching interface plate

- The protective covers on the connectors may be left in place.
- Push the release button of the module handle down and simultaneously pull the top of the handle towards you.
- Align the module upright and perpendicular to the front face of the chassis so that the PCB slides into the “crow’s feet” card guides top and bottom.
- Gently push the module down its guide, applying pressure via the handle, you may also apply pressure between the LED and test connector.
- As the module is fully mated the top of the handle should snap back and lock in position.
- The pawls of the handle should be fully engaged in the matching slots.
- If power is applied to the chassis the module power LED should light as soon as the module is fully inserted
- Remove protective covers and connect any interface cables

To remove a 5HP Standard module

- Disconnect any cables if necessary
- Push the release button of the module handle down and simultaneously pull the top of the handle forwards.
- Apply pressure via the handle and gently withdraw the module from the chassis.

2.1.3 Blue Link modules

The Blue Link module is fully enclosed and built with connectorised interfaces with electromagnetic shielding. This allows system integrators and equipment manufacturers an easy route to build RF/optical interfaces into their own equipment. The small form factor and integrated design should allow the module to be easily integrated into end user equipment.

2.1.4 Yellow Link modules

The Yellow Link module has an edge connector for DC and alarm connections, an integrated RF shield, and a very small overall form factor. This allows system integrators and equipment manufacturers to very simply integrate this on a motherboard giving an easy route to build RF/optical interfaces into their own design. The low volume of this module allows it to easily be fitted into existing mechanical housings.

2.2 Using the support module

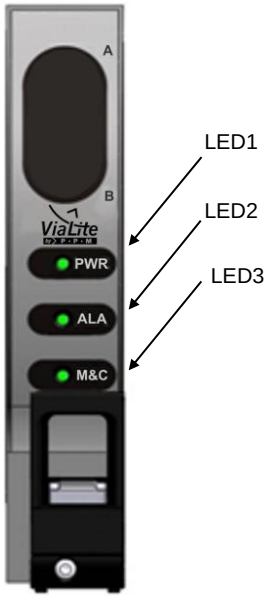
2.2.1 Connecting the module

Connect the transmitter module to the power source, cross-site fibre optic cable and RF signal as described in section 2.1. The RF input signal applied to the signal connector should be within the maximum and minimum signal levels given in the technical specifications in section 6.

2.2.2 Front panel Indicators, plug in modules

Each plug-in module has three front panel LEDs for indication of the state of the module. The following table shows the operation of the front panel LEDs of the amplifier.

	Colour	Plug-in Module
LED1	GREEN	Normal
	No light	PSU fail
LED2	GREEN	Normal
	Flashing GREEN	Minor Alarm
	RED	Major alarm
LED3	GREEN	I2C enabled
	Flashing GREEN	I2C active
	AMBER	I2C disabled



2.2.3 Module summary alarm

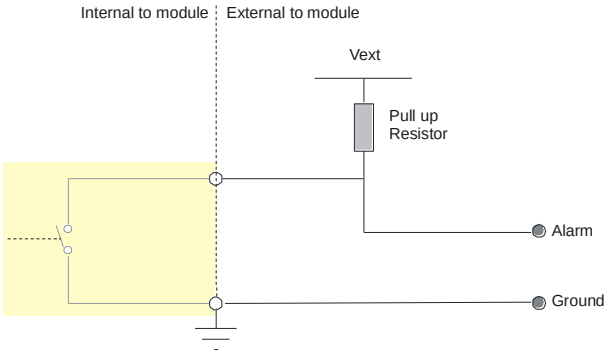
Each module has a single summary alarm, which registers the status of the module. Activation of this alarm registers an internal fault and the module should be replaced with a spare and returned to your local ***ViaLite Communications*** representative. The alarm state should be

accompanied by a fault status on one of the front panel Status LEDs.

The summary alarm is indicated by use of open drain logic. The alarm logic is OPEN when in an ALARM state and SHORT when in a NORMAL (non alarm) state. The module will remain in an ALARM state until the ALARM condition is cleared, there is no latching.

2.2.4 Connecting to the summary alarm

The alarm output pin should be connected to a suitable current source (a positive voltage via a 10kohm pull-up resistor is adequate). When the module is in a working (non-alarm) state, the alarm output pin is short circuited to ground by the module. If the module enters an alarm state, the alarm pin is released to a high impedance state and current is no longer drawn from the constant current source. In the case of a positive voltage and pull-up resistor, the voltage on the alarm output pin will rise to indicate the alarm state. It follows that, if a module is removed from the chassis, the alarm will be raised for that module position.



The capability of the open collector is dependent on the module that provides it.
The typical capability of the Open Collector/Drain is 50mA maximum current sink and 15V maximum voltage (Vext)

2.2.5 Module analogue monitor

The analogue monitor available on the chassis case connector (see the HRK-3 case handbook) is NOT used by this module. The pin for these module positions will be open circuit.

Function	Amplifier	Splitter	RF switch
Analogue monitor A	Not Used	Not Used	Not Used
Analogue monitor B	Not Used	Not Used	Not Used

2.2.6 RF connectors

ViaLiteHD products are fitted with a range of standard RF connectors. The RF modules are all fitted with FEMALE connectors. When connecting the modules ensure that you have both the correct type and impedance of connector. Listed below are the connector types available.

Front panel test connectors, plug in modules only
- BNC 50 ohms bayonet
- BNC 75 ohms bayonet

Rear Input / Output connectors, plug in modules only
- SMA 50 ohms screw on
- BNC 75 ohms bayonet
- F-Type 75 ohms screw on

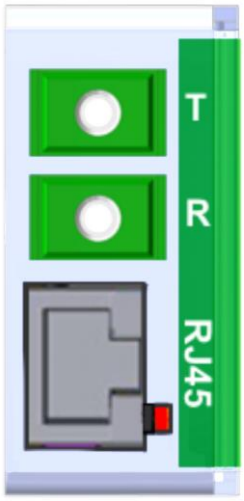
Not all connector types are available on all types of module. If you are unsure of the connector type your module is fitted with this can be determined from the part number (see section 5). Blind mating modules are fitted with a floating RF connector, mating between the plug in module and the chassis rear plate. This is a purely internal interface and should not be connected by any means other than via the supplied chassis interface.

Warning! Use of incorrect impedance connectors may also cause intermittent connections and in extreme cases result in physical damage to the connector.
Warning! Use of incorrect impedance connector will result in mismatch increasing the system loss and reducing flatness.
Warning! Use of incorrect impedance cable will result in mismatch increasing the system loss and reducing flatness.

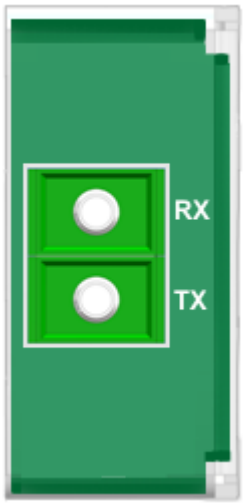
2.2.7 RF and optical rear input and output ports

All modules are fitted with one, two or three rear RF ports. All new Blind mate modules are supplied with an appropriate chassis interface plate. LEFT and RIGHT refer to connection to adjacent module, referenced to the front view.

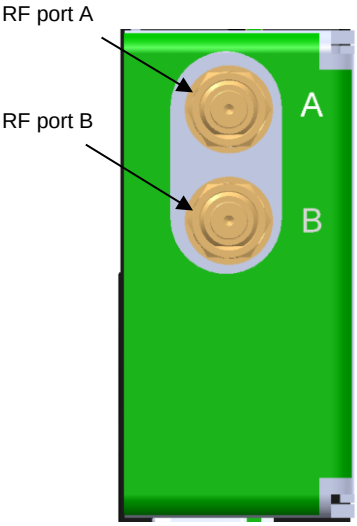
Function	Single Amplifier	Splitter	RF switch 3 port
Port A	RF IN	S1	LEFT
Port B	RF OUT	COMMON	COMMON
Port C	Not Used	S2	RIGHT
Port D	Not Used	Not Used	Not Used



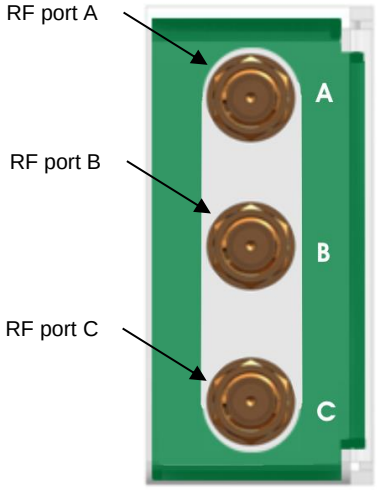
Standard rear interface
Gigabit Ethernet



Standard rear interface
Serial Digital



Rear interface
Single Amplifier



Standard rear interface
Splitter or switch

2.3 Controlling amplifier module

ViaLiteHD RF links are factory preset and ready to operate. However they can be software controlled or manually controlled via the DIP switches fitted to each module.

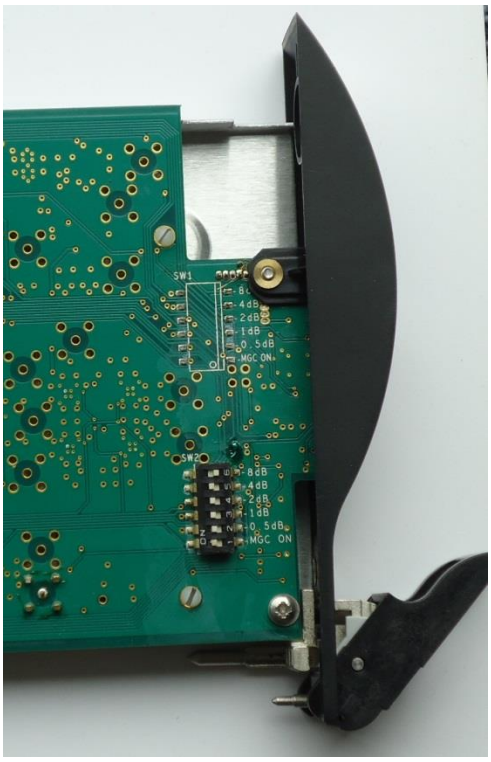
2.3.1 Manual control

The Plug-in amplifier modules can be manually configured to set various operational parameters. The dual in line package (DIP) switch SW2 control these configurations, and is located on the bottom side of the PCB and can be accessed by withdrawing the module by approximately a third of its length

2.3.2 Manual control, DIP switch functions

Located on the bottom side of the module board, DIP switch SW2) provides manual control of various functions. SW2 is dedicated to manual gain control (MGC). Once MGC_ON is switched on, internal RF attenuators can be set directly to a desired level.

All modules will be delivered with DIP switches all set to OFF (clear). Only special manual gain control modules will be delivered with the DIP switches set to the modules factory calibrated gain settings.



Amplifier

Manual Configuration DIP switches

SW2 DIP switch

Single amplifier	All other cards
AMP – 8dB	Not fitted
AMP – 4dB	Not fitted
AMP – 2dB	Not fitted
AMP – 1dB	Not fitted
AMP – 0.5dB	Not fitted
AMP - MGC ON	Not fitted

Manual switch configurations by module type

When view in the orientation illustrated, switching the DIP to the LEFT is OFF (clear) and to the RIGHT is ON (set)

2.3.2.1 DIP switches, AMPLIFIER AGC

The RF gain of the amplifier is the maximum gain minus the sum of all set AGC steps on SW2.
The RF gain can be changed in nominal steps of 0.5dB.

- AMP - MGC ON ON = Module under manual gain control, OFF = Module under software control
- AMP - 0.5dB ON = Attenuation increased by 0.5dB nominal, OFF= no gain increase
- AMP - 1dB ON = Attenuation increased by 1dB nominal, OFF= no gain increase
- AMP - 2dB ON = Attenuation increased by 2dB nominal, OFF= no gain increase
- AMP - 4dB ON = Attenuation increased by 4dB nominal, OFF= no gain increase
- AMP - 8dB ON = Attenuation increased by 8dB nominal, OFF= no gain increase

2.3.2.2 Manual gain control example

- The factory preset maximum gain is 30dB

You wish to decrease the gain to 19dB, a reduction of 11dB from the factory present maximum gain.

- The amplifiers AGC setting will be 11dB, made from the following steps 1+2+8, therefore set the switches as shown below
- AMP1 – 0.5dB=OFF; AMP1 – 1dB=ON; AMP1 – 2dB=ON; AMP1 – 4dB=OFF; AMP1 – 8dB=ON.
- The new gain is now set to 19dB

2.3.3 Changing modules RF gain

The performance specifications in section 6 are only valid for when modules are operated in the factory preset configuration. However the gain of the modules can be changed to suit customer requirements.

2.3.4 Software control, via SNMP controller

ViaLiteHD support modules can be controlled via a ***ViaLiteHD*** SNMP control card fitted in the same chassis; see the SNMP controller handbook for further details. The control card offers control via both a web interface and SNMP.

Remember if you wish to use software control the manual attenuation has to be set to zero, i.e. all poles with the same switch should return to OFF position. Failure to do so may prevent the module from controlling the gain correctly.

2.4 Susceptibility to DC pulses from *ViaLiteHD* modules

All amplifier modules will create a 1-2Vpeak DC transient from the RF output at start up into a 50Ω load (approximately 5V into a 1MΩ load). This may cause failure in some very sensitive spectrum analysers or similar equipment. Please check before connecting your equipment. Contact ***ViaLite Communications*** for more details.

2.5 Protection of *ViaLiteHD* equipment from DC pulses

All modules have AC coupled inputs and/or outputs and will be sensitive to large transients (>5V) applied at the RF connector. This may result in permanent damage to the modules, particularly to low frequency or wideband modules. Contact ***ViaLite Communications*** for more details.

2.6 Module Interface ratings

2.6.1 Logic interface, TTL 5V

Absolute maximum voltage rating	-0.5 to +5.5V	No damage
Input, Logic Low (max)	<0.8V	
Input, Logic High (min)	>2.0V	
Output, Logic Low (max)	<0.4V no load	
Output, Logic High (min)	>4.8V no load	
Drive capability	1k ohms	
Short circuit protection	No	

2.6.2 Logic interface, RS232

Absolute maximum voltage rating	-15 to +15V	No damage
Input, Logic Low (max)	<0.8V	
Input, Logic High (min)	>2.6V	
Output, Logic Low (max)	<-3.2V no load	
Output, Logic High (min)	>+3.2V no load	
Drive capability	3k ohms	
Short circuit protection	Yes	

2.6.3 Logic interface, RS422/485

Absolute maximum voltage rating	-12 to +12V	No damage
Input, Logic Low (max)	<0.8V	Common mode referenced to GND
Input, Logic High (min)	>2.0V	Common mode referenced to GND
Output, Logic Low (max)	<0.8V at 27 ohms	Common mode referenced to GND
Output, Logic High (min)	>2.0V at 27 ohms	Common mode referenced to GND
Output Differential	>1.5V at 27 ohms	
Output Differential	>2.0V at 50 ohms	
Drive capability	27 ohms	
Short circuit protection	Yes	

2.6.4 Logic interface, I2C

Absolute maximum voltage rating	-0.3 to +5.3V	No damage
Input, Logic Low (max)	<1.5V	
Input, Logic High (min)	>3.5V	
Output, Logic Low (max)	<0.6V no load	
Output, Logic High (min)	>4.3V no load	
Drive capability	1k ohms	
Short circuit protection	No	

2.6.5 Logic interface, Open Drain, output

For details of operation see 2.2.4

Operational pull up voltage	0 to 15V No damage
Maximum load current	50mA
Short circuit protection	No

Note: Negative voltage on the output will be clamped by the FET body diode; you must ensure that these do not exceed current rating.
Note: When fitted in a chassis with a controller card (i.e. SNMP and web controller or summary alarm card) or if fitted active backplane (ie SATCOM6) the alarm lines maybe loaded and pulled up, see chassis handbook
Note: When fitted in a chassis or enclosure adjacent to a RF switch or RF splitter card, alarm lines maybe loaded and pulled up, see chassis handbook

2.6.6 Power interface, Vcc, +12V, input

ALL modules EXCEPT High power TX module

Nominal input voltage	12V
Typical input voltage range	11 to 13V
Maximum operational voltage range	9 to 16V

2.6.7 LNB power supply and tone

Voltage set to LOW

Nominal output voltage	13.4V, Output select = LOW
Output voltage range	12.4 to 14.4V
Current rating	700mA per channel for single transmit channel (i.e. single transmitter or transceiver module). 350mA per channel for dual transmit channel, 700mA total (i.e. dual transmitter module).
Short circuit protection	Yes

Voltage set to HIGH

Nominal output voltage	18.5V, Output select = HIGH
Output voltage range	17.5 to 19.5V
Current rating	700mA per channel for single transmit channel (i.e. single transmitter or transceiver module). 350mA per channel for dual transmit channel, 700mA total (i.e. dual transmitter module).
Short circuit protection	Yes

Voltage BOOST active

Nominal output Voltage increased	1V, Output boost = ENABLE

Voltage when set to AUX

Nominal output voltage	22V, AUX mode = ON
Output voltage range	21 to 23V
Current rating	150mA per channel for single transmit channel (i.e. single transmitter or transceiver module). 150mA per channel for dual transmit channel, 300mA total (i.e. dual transmitter module).
Short circuit protection	Yes

TONE active

Nominal output level	0.6Vp-p, Tone Gen = ACTIVE
Output range	0.4 to 1.2Vp-p
Nominal frequency	22kHz
Frequency accuracy	20 to 24 kHz

2.6.8 Ethernet interface, GE

Fitted the Gigabit Ethernet module

Standard	1000BASE-T, 1GB Ethernet, 802.3
Wiring	4 pairs, use CAT6 or CAT5e cable
Voltage range	0.35 to 3.1V

RJ45 Pin, 8 way	Function
1	P1_0
2	N1_0
3	P1_1
4	N1_1
5	P1_2
6	N1_2
7	P1_3
8	N1_3

2.6.9 Alarm inputs, switch and splitter

These are used by the switch and splitter modules ALARM LEFT and ALARM RIGHT

Load	10Kohms pulled up to +5V
Inputs conditions	OKAY condition < 100 ohms to ground ALARM condition > 100Kohms to ground
No damage voltage	-0.5 to +5.5V

2.6.10 RF connectors

Maximum RF input power, no damage	see rating in section 6 or contact ***ViaLite Communication***
Maximum RF output power	see rating in section 6, or contact ***ViaLite Communication***

2.6.11 Optical connections

Maximum usable input power	see rating in section 6 or contact ***ViaLite Communication***
Optical output power	see rating in section 6 or contact ***ViaLite Communication***

3 Module types

3.1 Splitter, module Type

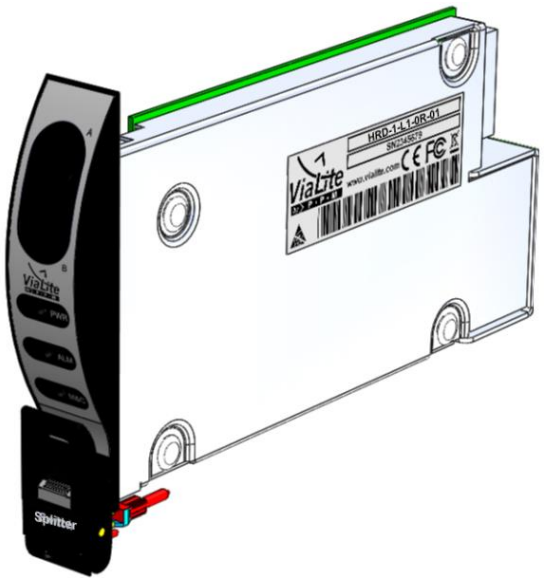
This section covers the following ***ViaLiteHD*** RF support module:

- RF splitter module
  - HRD-1 2 way RF passive splitter, DC ports unswitched
  - HRD-2 2 way RF passive splitter, DC ports switched

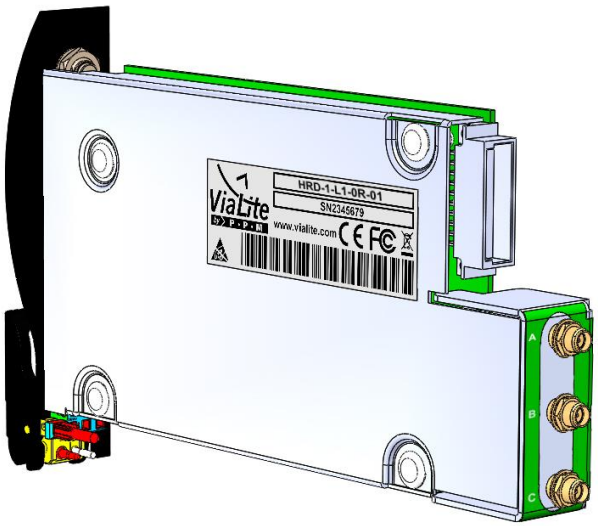
The ***ViaLiteHD*** RF Splitter / Combiner module allows users to implement 1:1 redundancy with ***ViaLiteHD*** RF modules. Together with the ***ViaLiteHD*** dual redundant power supplies and the 1:1 Redundancy RF Switch, the RF Splitter / Combiner provides the highest possible availability for the ***ViaLiteHD*** system. This module is bi-directional and can be used as either a splitter or a combiner.

The ***ViaLiteHD*** RF Splitter / Combiner offers the following key advantages:

- Low insertion loss
- Small 5HP form factor
- Blind mate capability
- DC pass through on RF ports (switched or un-switched)
- Compatibility with ***ViaLiteHD*** chassis



Splitter front view (standard plug-in)



Splitter rear view (standard plug-in)

3.1.1 Splitter, options

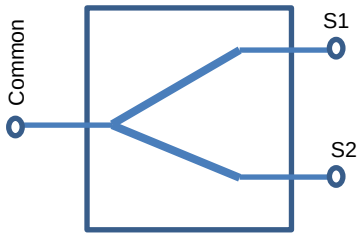
The ***ViaLiteHD*** RF Splitter / Combiner module offer the following options

- 50ohm and 75ohm options
- RF connectors
- Frequency band
- DC pass through
- Switched and un-switched DC paths
- Standard 5HP module
- Blind mate 5HP module

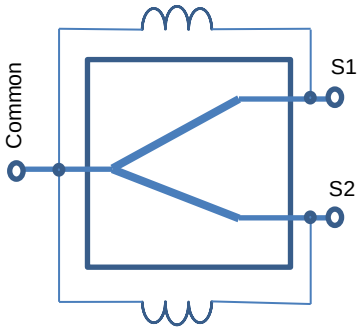
NOTE: Not all combinations of options are available. Contact ***ViaLite Communications*** for more details.

3.1.2 Splitter, DC path

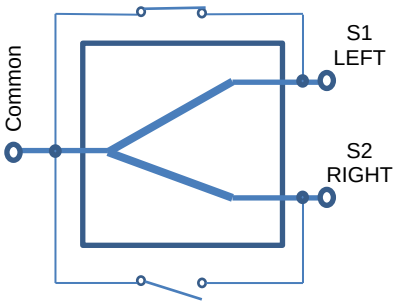
The ***ViaLiteHD*** RF splitter module can pass DC current. Three variants of the splitter are available.



RF splitter, no DC path



RF splitter with un-switched DC path



RF splitter with switched DC path

The diagrams above shows the difference between DC path options offered.

- Splitter with no DC path: All RF ports are DC open circuit
- Un-switched DC path: All ports are permanently DC shorted, any DC voltage on one port is available on the others
- Switched DC path: The common port is DC connected to one of the output ports dependent on the card configuration, see section 3.1.3

Modules can work with voltages up to 20V and currents up to 0.8A. Un-switched version should be chosen only if DC voltage on all three ports should be the same. If devices connected to ports S1 and S2 require different voltage or different tone frequency the splitter with switched DC path should be used.

Note that for the purpose of this manual a term 'DC path' means path for low frequency signals from DC to approx. 50 kHz.

3.1.3 Splitter with switched DC path, module configuration

The mode in which the RF splitter operates is USER configurable. You can change this by using the ***ViaLiteHD*** SNMP and Web controller module. The DEFAULT configuration in which all units are delivered is PREFERRED LEFT. Below is a list of the available modes.

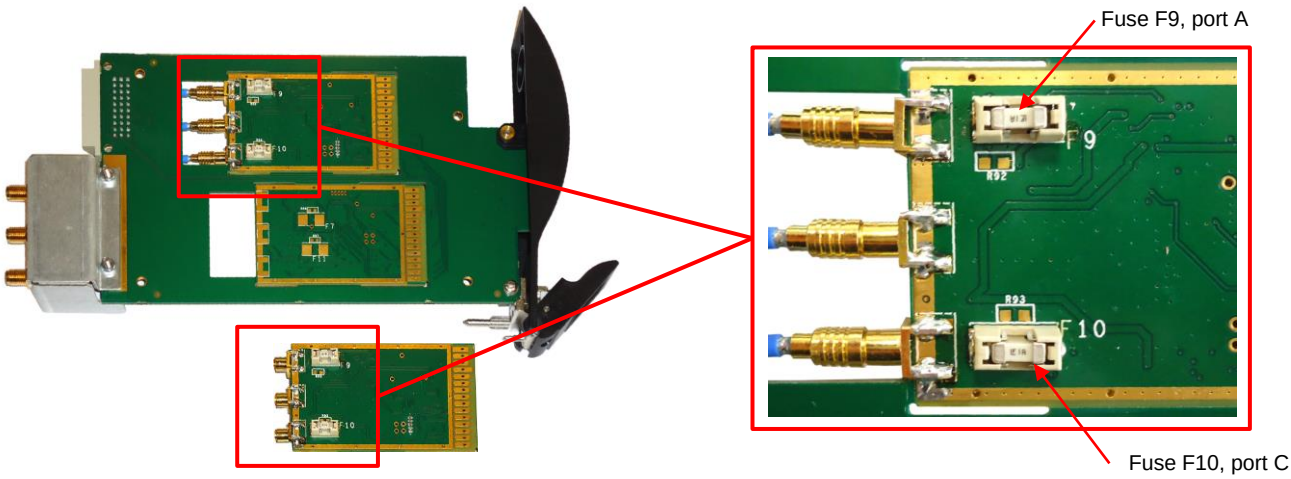
- PREFERRED LEFT – The COMMON is DC connected to the LEFT hand unit, if this unit alarms, it will switch to the RIGHT hand unit.
- PREFERRED RIGHT – The COMMON is DC connected to the RIGHT hand unit, if this unit alarms, it will switch to the LEFT hand unit.
- FORCED LEFT – The COMMON is DC connected to the LEFT irrespective of alarm status.
- FORCED RIGHT – The COMMON is DC connected to the RIGHT irrespective of alarm status.

Note that this is relevant ONLY for DC. RF port behaviour cannot be configured.

3.1.4 Splitter, DC path protection

The DC paths of the splitter are protected from over current with a fuse fitted to each DC output path, these protect the passive components from over stress and permanent damage. The fuses are fast acting "blow once" fuses; these fuses will only fail under gross fault conditions. The fuse is replaceable – access to the fuse is from the bottom of the module. Contact ***ViaLite Communications*** for more details. The modules are protected as follows.

- Splitter with no DC path: No fuse fitted, not required
- Un-switched DC path: L-Band HTS, no fuse fitted, DC components will be protected by other system components in standard configurations.
- Un-switched DC path: Other bands, fuse fitted
- Switched DC path: Fuse fitted



Position of fuses on rear of splitter modules, plug in and yellow link

3.1.5 Splitter, fuse replacement

To replace the fuse of the splitter you will need a set of tweezers.

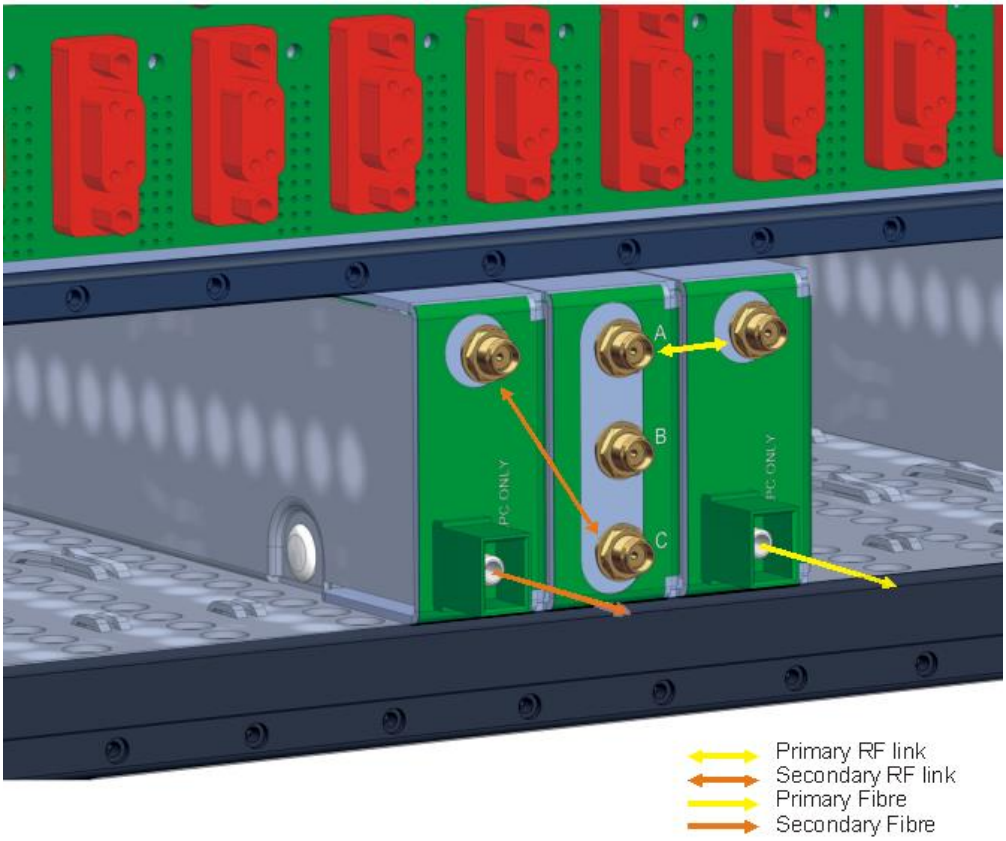
- Remove the module from the chassis.
- Use a pair of tweezers to remove the failed fuse, pulling perpendicularly away from the PCB.
  Fuse F9 is connected to port A
  Fuse F10 is connected to port C
  NOTE: The fuse is fitted in a socket; see below for a picture of the removable part
- Replace the fuse with a suitable part, details below.
- Check the fuse is securely fixed.
- Replace the module.

Suitable replacement fuse:
Description: 1A, 125V, very fast, OMNI-BLOK, SMD socketed
PPM part number: 59993A
Source: Littelfuse Suppliers part number: 0453001.MR

OMNI-BLOK removable fuse

3.1.6 Splitter, installation

The ***ViaLiteHD*** RF Splitter / Combiner module is available in standard plug-in module or blind mate plug-in module; see sections 2.1.1 and 2.1.2 for details on installing these in a chassis. More details are also provided in the chassis handbook HRK-HB. The splitter maybe fitted in any of the 5HP slots. Your RF splitter can be supplied with two flexible RF cables (sold separately) to be used for the rear panel connections.



Typical configuration of Splitter (standard plug-in) with single transmitter modules, cables omitted for clarity

3.1.7 Splitter, connecting the module

The ***ViaLiteHD*** RF Splitter / Combiner module has three rear RF ports that connect to the other RF modules being used. Typically an RF splitter will have its COMMON INPUT port connected to the signal source (such as an LNB output); its OUTPUT S1 port connected to the PRIMARY fibre optic transmitter input and its OUTPUT S2 port connected to the SECONDARY fibre optic transmitter input.

Function	Splitter	Alarm connection	Notes
Port A	S1	LEFT	Typically this will be the PRIMARY path Should be connected to the adjacent unit on the left when **switched DC** path is used
Port B	COMMON	NA	Typically this is an INPUT

Port C	S2	RIGHT	Typically this will be the SECONDARY path Should be connected to the adjacent unit on the right when **switched DC** path is used

In addition, there is a 30-way DIN type connector at the back of the module, which normally plugs into the relevant socket on the chassis backplane. The pin assignment is given below

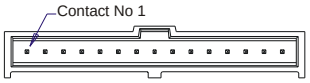
30-way DIN Column A	Function	30-way DIN Column B	Function	30-way DIN Column C	Function
A1	NC	B1	ALARM	C1	NC
A2	NC	B2	ALARM LEFT	C2	NC
A3	NC	B3	ALARM RIGHT	C3	NC
A4	NC	B4	NC	C4	NC
A5	NC	B5	NC	C5	NC
A6	NC	B6	MS	C6	NC
A7	NC	B7	SCL	C7	NC
A8	NC	B8	SDA	C8	NC
A9	VCC	B9	VCC	C9	VCC
A10	GND	B10	GND	C10	GND

The Yellow link uses a 30 pin edge connector and the Blue Link uses a 15-way Molex CGRID connector.

Pin, 30 way EDGE connector	Function
1, 2	NC
3, 4	NC
5, 6	NC
7, 8	GND
9, 10	VCC
11, 12	NC
13, 14	NC
15,16	NC
17, 18	NC
19, 20	ALARM LEFT
21, 22	NC
23, 24	ALARM
25, 26	ALARM RIGHT
27, 28	SCL
29, 30	SDA

Pin, 15 way Blue Link connector	Function
1	NC
2	NC
3	NC
4	GND
5	VCC
6	NC
7	NC
8	NC
9	NC
10	ALARM LEFT
11	NC
12	ALARM
13	ALARM RIGHT
14	SCL
15	SDA

Yellow Link: Top View, 30 way double sided header
Connector Type: 2.54mm double sided edge



Blue Link module: Top view, 15 pin header (male)

Compatible mating connectors

PPM #	Description	Supplier	Supplier part number	PPM #	Description	Supplier	Supplier part number
55708	CGRID3 15 way housing	Molex	90156-0155	59897	Straight connector	Toby Electronics	802-S-30-S-R
54245	Crimp connector 22-24AWG	Molex	90119-2110	59910	Right angle conn	Digikey	EEC15DRAN-ND

Note that for the 30 way PCB edge connector, the top and bottom pin pads are electrically connected through the large via holes in the middle. Hence there are only 15 connections effectively, with 30 pin pads. The PCB connector can be linked to your motherboard through the via holes using standard 2.54mm pitch pin header.

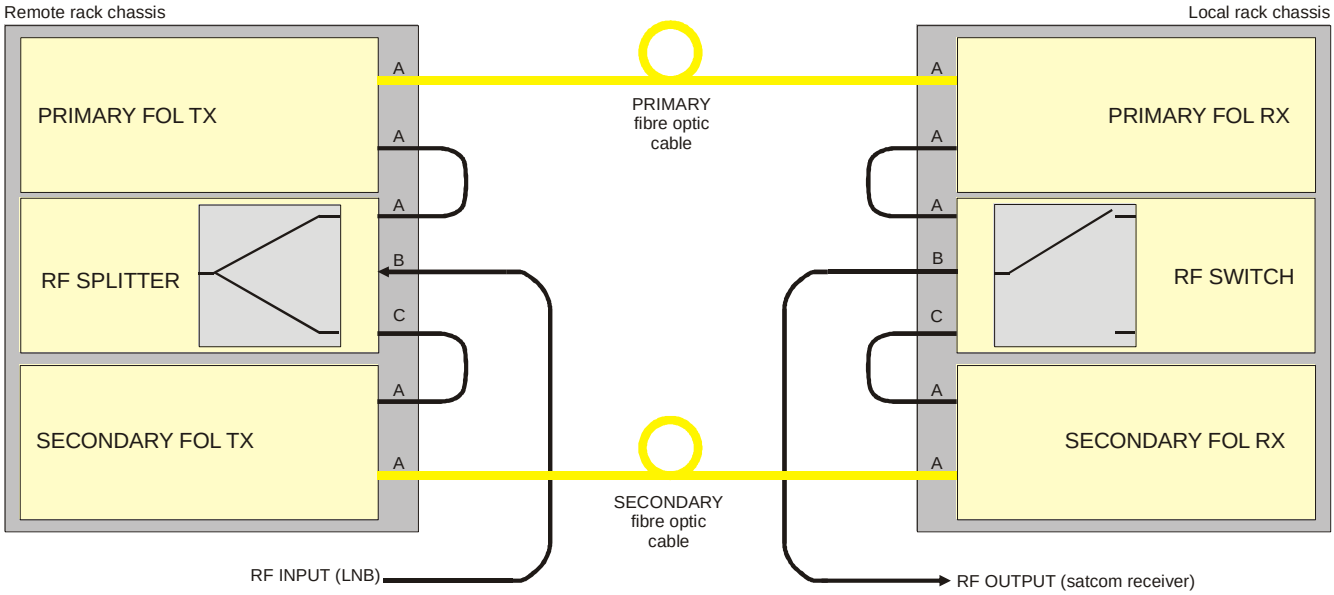
3.1.8 Splitter, front panel indicators

The ***ViaLiteHD*** RF Splitter / Combiner module uses the common front panel signalling scheme detailed in section 2.2.2. It will generate an ALARM under the condition of an internal hardware failure being detected.

3.1.9 Splitter, system integration

In this typical configuration, the RF signal is connected to Port B of the ***ViaLiteHD*** RF splitter and the two outputs, ports A and C are fed into two ***ViaLiteHD*** single transmitter modules. These modules are connected via two separate optical fibres to two ***ViaLiteHD*** single receiver modules. These form the PRIMARY and SECONDARY paths. The RF outputs of the PRIMARY and SECONDARY Receivers are connected to ports A and C respectively of the ***ViaLiteHD*** 3 port Switch module. Port B of the ***ViaLiteHD*** 3 port Switch module is fed to the

user equipment. Control lines in the chassis backplane connect alarms to adjacent slots. These are used to control the status of the switch module and ensuring that the RF Switch selects the SECONDARY path in the event of a failure in the PRIMARY path.



Typical 1:1 redundancy configuration

In this example configuration, the following parts would be required to implement the system.

Quantity	Description	Part Number
Remote chassis		
1	Chassis	HRKxx
2	PSU	HPS-x
2	L-Band HTS single transmitter	HRT-Lx-xx-xx-xxxxx
1	RF Splitter	HRD-x-Lx-0x-x1

Quantity	Description	Part Number
Local chassis		
1	Chassis	HRKxx
2	PSU	HPS-x
2	L-Band HTS single receiver	HRR-Lx-xx-xx
1	3 port RF switch	HRS-x-Lx-0x-x1

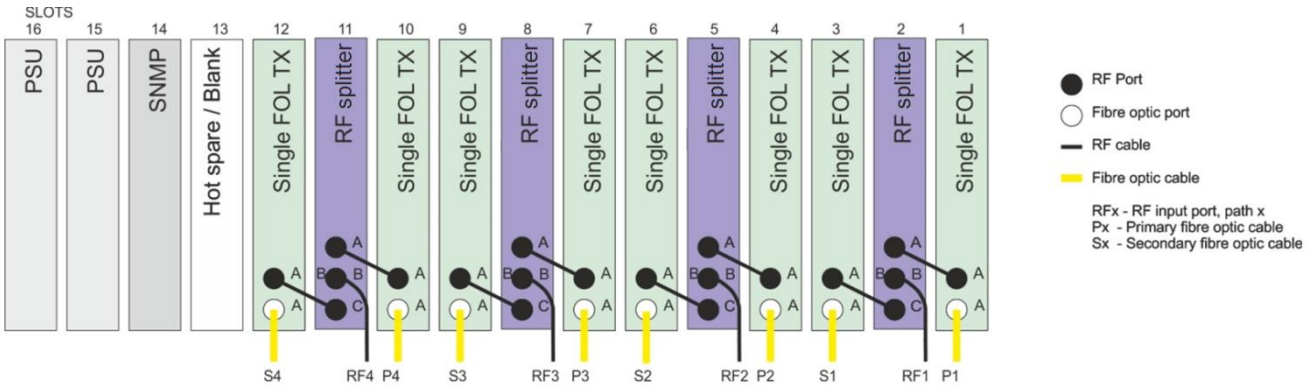
Quantity	Description	Part Number
Cabling		
2	Fibre optic cable	F8R1/x
4	RF cable	737xx

3.1.10 Splitter, 3U chassis configurations, four 1:1 redundant receivers

The chassis configuration below can be used to provide four redundant transmitters in a single ***ViaLiteHD*** 3U chassis. For simplicity the chassis configuration is viewed from the rear.

The blank slot can be used as a storage slot for a hot spare.

For simplicity the chassis configuration is viewed from the rear.



Four 1:1 redundant transmitters using standard plug in modules and splitters, viewed from rear of the chassis

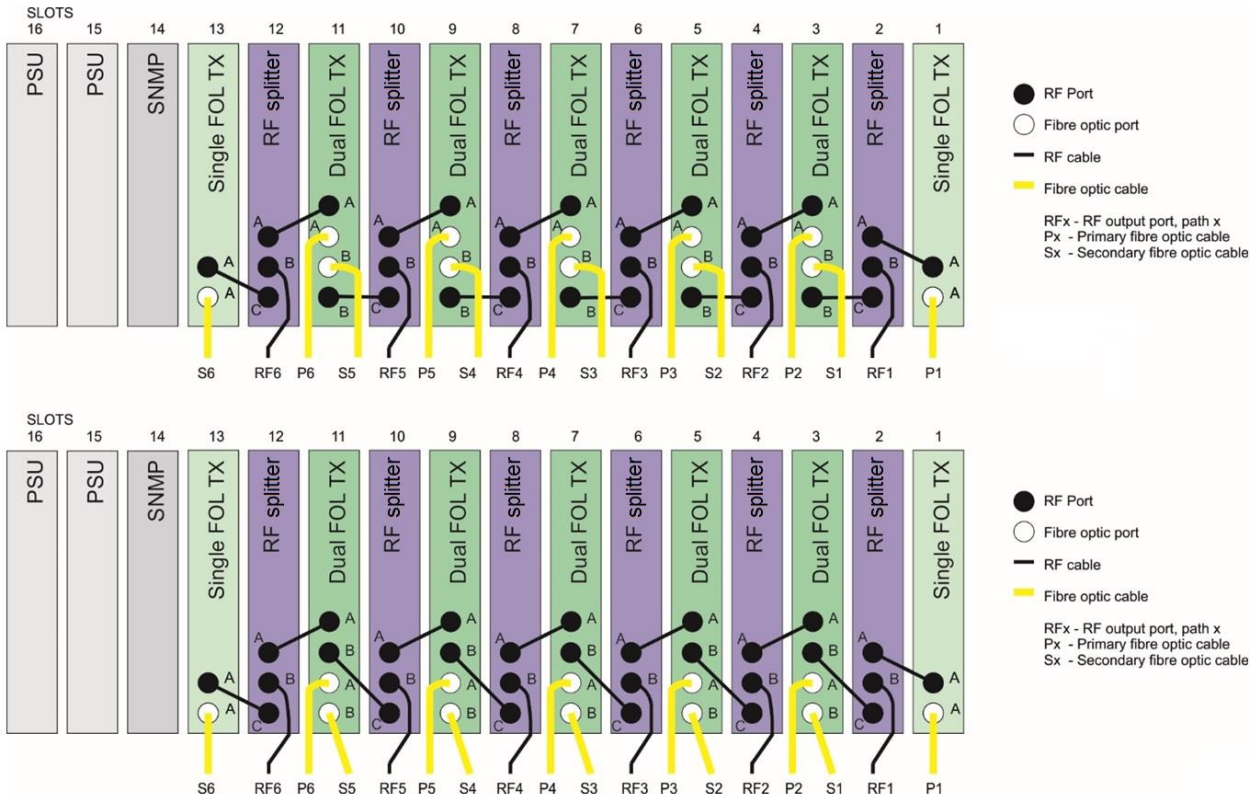
3.1.11 Splitter, 3U chassis configurations, six 1:1 redundant receivers

The chassis configuration below can be used to provide six redundant transmitters in a single ***ViaLiteHD*** 3U chassis. For simplicity the chassis configuration is viewed from the rear. This configuration provides much higher density and 1:1 redundancy under normal operating conditions.

If a dual FOL transmitter module fails redundancy will be lost (for both paths using the card) for the short period that takes to replace the failed unit. The blindmate option greatly reduces service time, the time to replace the failed unit can be as low as 10 seconds, hence this will have minimal effect on availability.

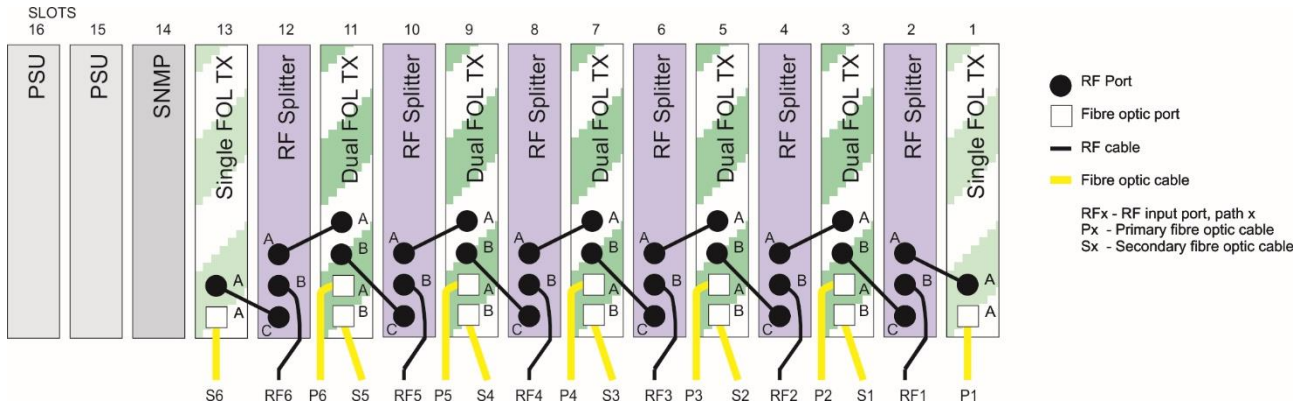
To reduce your spares requirement it is possible to use dual FOL transmitter modules in place of single FOL transmitter module

For simplicity the chassis configuration is viewed from the rear.



Six 1:1 redundant transmitters using standard plug in modules and splitters, viewed from rear of the chassis
Top – Connector configuration A (typically used with FC optical and SMA RF connectors)
Bottom - Connector configuration B (typically used with all other connector configurations)

The rear panel connector configurations are dependent on module type; different module may have different connector configurations. However RF and optical connector can clearly be distinguished and connector letters are clearly shown on the rear panels. Contact ***ViaLite Communications*** or your local agent for more details.



Six 1:1 redundant transmitters using blindmate plug in modules and splitters, viewed from rear of the chassis

3.1.12 Using DC switched splitters with GPS transmitters with GPS mode enabled

ViaLiteHD GPS optical transmitters offer GPS enabled mode. In this mode TX unit senses the current from GPS antenna. If the current drops below certain value the unit will raise an alarm. If splitter has DC switched path one of the TX units will alarm because the DC path between antenna and transmitter is open. To avoid alarms it is therefore not recommended to use such configuration.

3.1.13 Splitter, associated parts

Two matching cables are required for each RF splitter module (these are to be ordered as separate line items), spares and replacements may also be ordered contact ***ViaLite Communications*** for more details.
The standard parts available are detailed below.

Part Number	Description	Application
73739	SMA to SMA, 50 ohm RG405 cable, 0.1m length	50ohm SMA, use for connecting to adjacent slots in same chassis
73740	SMA to SMA, 50 ohm RG405 cable, 0.3m length	50ohm SMA, use for connecting to non-adjacent slots in same chassis
73741	SMA to SMA, 50 ohm RG405 cable, 0.5m length	50ohm SMA, use for connecting between adjacent chassis
73747	BNC to BNC, 50 ohm RG405 cable, 0.1m length	50ohm BNC, use for connecting to adjacent slots in same chassis
73748	BNC to BNC, 50 ohm RG405 cable, 0.3m length	50ohm BNC, use for connecting to non-adjacent slots in same chassis
73749	BNC to BNC, 50 ohm RG405 cable, 0.5m length	50ohm BNC, use for connecting between adjacent chassis
73750	BNC to BNC, 75 ohm cable, 0.1m length	75ohm BNC, use for connecting to adjacent slots in same chassis
73751	BNC to BNC, 75 ohm cable, 0.3m length	75ohm BNC, use for connecting to non-adjacent slots in same chassis
73752	BNC to BNC, 75 ohm cable, 0.5m length	75ohm BNC, use for connecting between adjacent chassis

3.1.14 Splitter, maintenance and fault finding guide

Refer to the following table that gives a list of commonly encountered problems and suggested solutions.

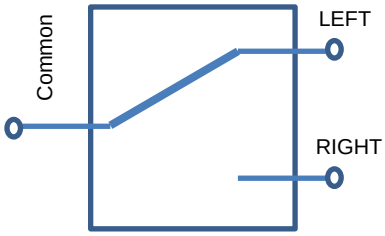
Fault	Possible Causes	Solution
Power LED does not illuminate.	Power is not connected to the PSU.	Connect mains power to the rear of the PSU. Check fuses of power leads.
	Module is not fully inserted.	Check module is properly aligned and handle pawls are fully engaged. Check there are no obstructions to the rear such as optical cable protective covers.
Difficulty inserting module.	Incorrect alignment.	Check that the module is correctly fitted in card guides.
	Incorrect module slot.	Check that module is in correct slot. Slots 1-13 for 5HP modules.
No output signal at one or both ports	No input signal connected	Connect input / power input device
	Proper connection not made	Ensure RF connector is properly mated

3.2 Module Type RF switch 3 port

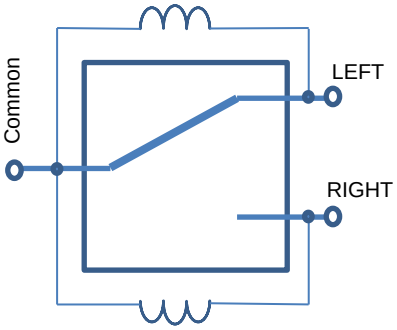
This section covers the following ***ViaLiteHD*** RF support module:

- RF switch module
  - HRS-1 3 port, high isolation, DC ports unswitched
  - HRS-4 3 port, high isolation, DC ports switched

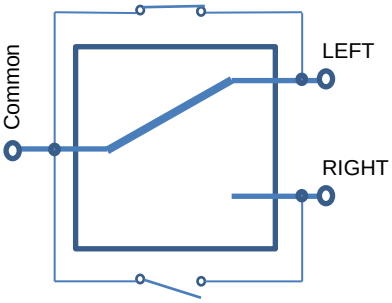
LEFT and RIGHT are ALWAYS referenced to the front view of the chassis.



RF switch



RF switch with un-switched DC path

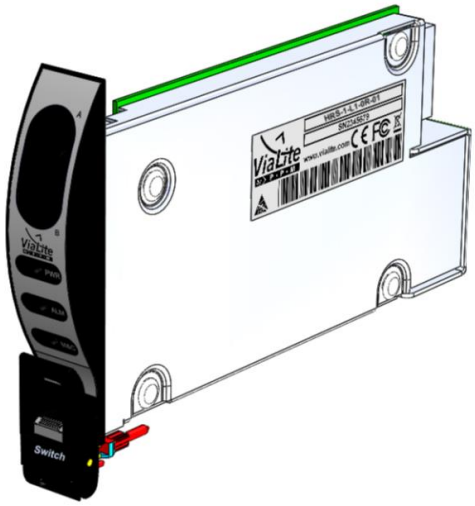


RF switch with switched DC path

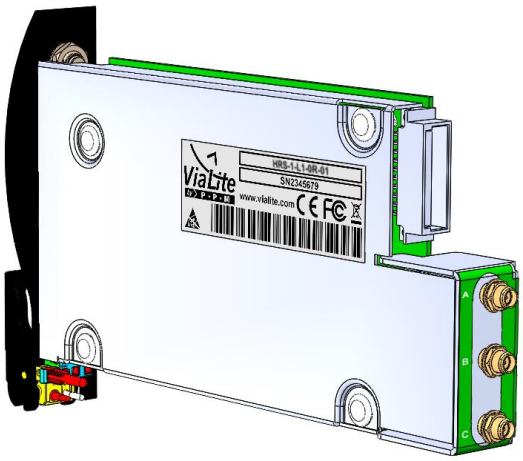
The ***ViaLiteHD*** RF Switch module allows users to implement 1:1 redundancy with ***ViaLiteHD*** RF modules. Together with the ***ViaLiteHD*** dual redundant power supplies and the 1:1 Redundancy RF Splitter / Combiner, the RF Switch provides the highest possible availability for the ***ViaLiteHD*** system. The switch may also be used for a wide range of customer specific applications. The module is bi-directional.

The ***ViaLiteHD*** 3 port high isolation RF switch offers the following key advantages:

- High isolation, two RF switches per path
- Small 5HP form factor
- Blind mate capability
- Compatibility with ***ViaLiteHD*** chassis
- Backplane connection of alarms from adjacent modules when used with ***ViaLiteHD*** chassis
- DC path between common port and left/right. The path can be switched (DC path exists only between RF connected ports) or un-switched (all ports DC shorted).



3 port switch front view (standard plug-in)



3 port switch rear view (standard plug-in)

3.2.1 RF switch 3 port, options

The ***ViaLiteHD*** RF switch module offer the following options

- 50ohm
- RF connectors
- Frequency band (L-Band HTS, wideband 10MHz-3GHz and GPS)
- High speed switching
- Standard 5HP module
- Blind mate 5HP module
- DC path
- DC ports switch or un-switched

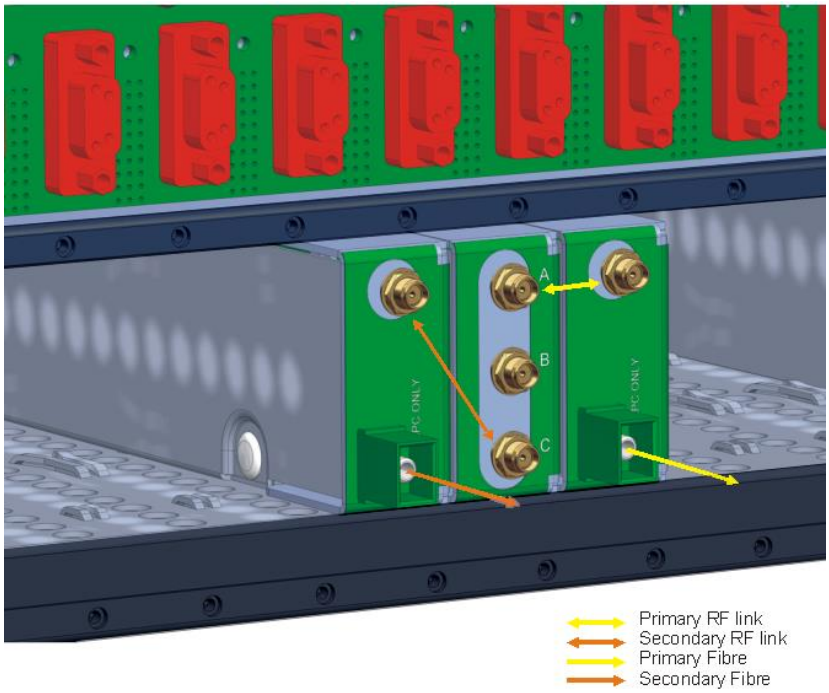
NOTE: Not all combinations of options are available. Contact ***ViaLite Communications*** for more details.

- Operation below 10MHz is possible but power handing performance will be impacted. Contact ***ViaLite Communications*** for more details.

3.2.2 Switch, installation

The ***ViaLiteHD*** RF switch module is available in standard plug-in module or blind mate plug-in module; see sections 2.1.1 and 2.1.2 for details on installing these in a chassis. More details are also provided in the chassis handbook HRK-HB. The switch maybe fitted in any of the 5HP slots. Your RF switch can be supplied with two flexible RF cables (sold separately) to be used for the rear panel connections.

The control lines for the RF switch are hardwired on the ***ViaLiteHD*** chassis to each adjacent slot. In a default set up the RF switch should be fitted between the two modules that you wish to switch. With the primary module being on the left hand side as viewed from the front of the chassis (i.e. lowest numbered slot) and the secondary module being on the right hand side as viewed from the front of the chassis (i.e. the highest number slot). The alarms from each adjacent module are feed to the switch allowing it to asynchronously switch.



Typical configuration of switch (standard plug-in) with single receiver modules, cables omitted for clarity

3.2.3 Switch, connecting the module

The ***ViaLiteHD*** RF switch module has three rear RF ports that connect to other RF modules being used. Typically an RF switch will have its COMMON OUTPUT port connected to an RF receiver (such as a sat comm. receiver / decoder); its INPUT LEFT port connected to the PRIMARY fibre optic receiver [in slot N-1, where N is the slot the splitter module is fitted in] output and its OUTPUT RIGHT port connected to the SECONDARY fibre optic receiver [in slot N+1] output

Function	Splitter	Notes
Port A	LEFT	Typically this will be the PRIMARY path
Port B	COMMON	Typically the signal output
Port C	RIGHT	Typically this will be the SECONDARY path

3.2.4 Switch, module configurations

The mode in which the RF switch operates is USER configurable. You can change this by using the ***ViaLiteHD*** SNMP and Web controller module. The DEFAULT configuration in which all units are delivered is PREFERRED LEFT. Below is a list of the available modes.

- PREFERRED LEFT – The COMMON is connected to the LEFT hand unit, if this unit alarms, it will switch to the RIGHT hand unit.
- PREFERRED RIGHT – The COMMON is connected to the RIGHT hand unit, if this unit alarms, it will switch to the LEFT hand unit.
- FORCED LEFT – The COMMON is connected to the LEFT irrespective of alarm status.
- FORCED RIGHT – The COMMON is connected to the RIGHT irrespective of alarm status.

3.2.5 Switch, front panel indicators and alarms

The ***ViaLiteHD*** RF switch module uses the common front panel signalling scheme detailed in section 2.2.2. The RF switch module will generate an ALARM if either of these conditions occurs.

- A module internal hardware failure is detected
- The module is FORCED to switch to an adjacent RF module, which has an active ALARM

3.2.6 Switch, DC path

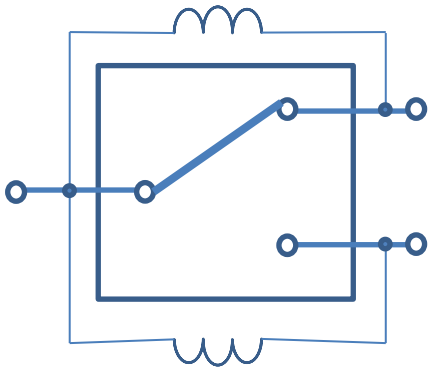
The ***ViaLiteHD*** RF switch module can pass DC current. Three variants of the switch are available as described below.

3.2.6.1 No DC path

In this variant there is no DC connection between ports.

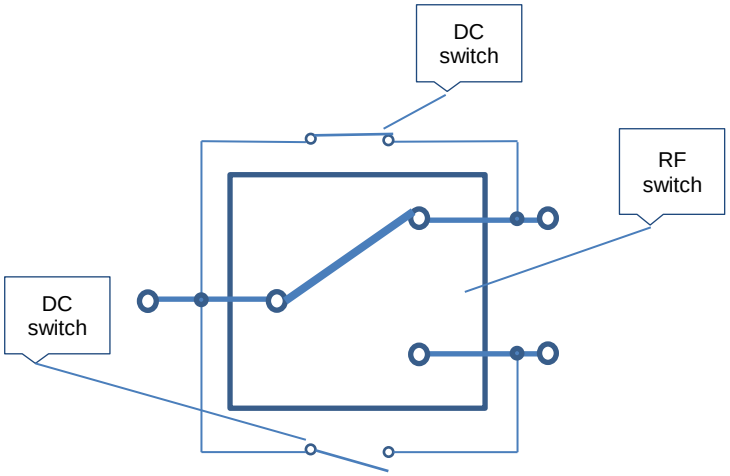
3.2.6.2 Unswitched DC path

All ports are DC shorted as shown in the diagram below. Maximum current for the path is 0.8A.



3.2.6.3 Switched DC path

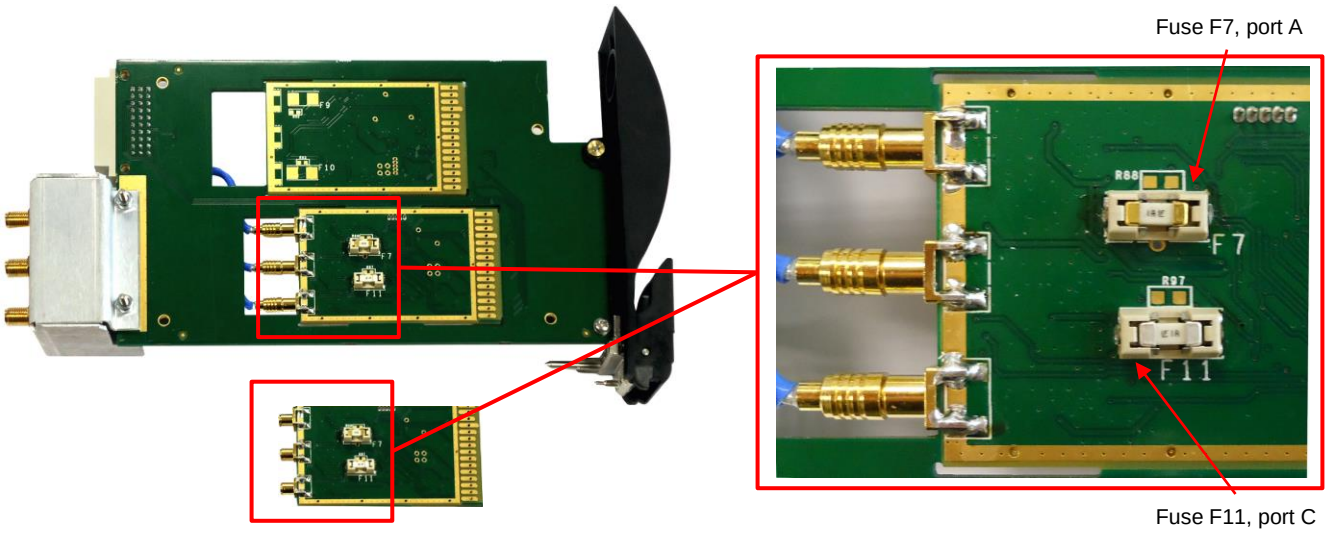
In this variant the module consists of an RF switch and two DC switches providing the DC path only between ports connected in RF domain. See diagram below. This DC path can work with voltages from 0V to 20V at currents up to 0.8A.



3.2.7 Switch, DC path protection

The DC paths of the switch are protected from over current with a fuse fitted to each DC output path; these protect the passive components from over stress and permanent damage. The fuses are fast acting "blow once" fuses; these fuses will only fail under gross fault conditions. The fuse is replaceable – access to the fuse is from the bottom of the module. Contact ***ViaLite Communications*** for more details. The modules are protected as follows.

- No DC path: No fuse fitted, not required
- Un-switched DC path: Fuse fitted
- Switched DC path: Fuse fitted



Position of fuses on rear of switch modules, plug in and Yellow Link

3.2.8 Switch, fuse replacement

To replace the fuse of the switch you will need a set of tweezers.

- Remove the module from the chassis.
- Use a pair of tweezers to remove the failed fuse, pulling perpendicularly away from the PCB.
  Fuse F7 is connected to port A
  Fuse F11 is connected to port C
  NOTE: The fuse is fitted in a socket; see below for a picture of the removable part
- Replace the fuse with a suitable part, details below.
- Check the fuse is securely fixed.
- Replace the module.

OMNI-BLOK removable fuse

Suitable replacement fuse:
Description: 1A, 125V, very fast, OMNI-BLOK, SMD socketed
PPM part number: 59993A
Source: Littlefuse Suppliers part number: 0453001.MR

3.2.9 Switch, connecting the module

The ***ViaLiteHD*** RF switch module has 3 RF connectors, the upper one is Left and the lower one is Right. The middle connector is Common port.

Function	Switch	Notes
Port A	Left	Typically this will be the PRIMARY path
Port B	COMMON	Typically this is an INPUT
Port C	Right	Typically this will be the SECONDARY path

In addition, there is a 30-way DIN type connector at the back of the module, which normally plugs into the relevant socket on the chassis backplane. The pin assignment is given below

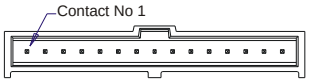
30-way DIN Column A	Function	30-way DIN Column B	Function	30-way DIN Column C	Function
A1	NC	B1	ALARM	C1	NC
A2	NC	B2	ALARM LEFT	C2	NC
A3	NC	B3	ALARM RIGHT	C3	NC
A4	NC	B4	NC	C4	NC
A5	NC	B5	NC	C5	NC
A6	NC	B6	MS	C6	NC
A7	NC	B7	SCL	C7	NC
A8	NC	B8	SDA	C8	NC
A9	VCC	B9	VCC	C9	VCC
A10	GND	B10	GND	C10	GND

The Yellow Link uses a 30 pin edge connector and the Blue Link uses a 15-way Molex CGRID connector.

Pin, 30 way EDGE connector	Function
1, 2	NC
3, 4	NC
5, 6	NC
7, 8	GND
9, 10	VCC
11, 12	NC
13, 14	NC
15,16	NC
17, 18	NC
19, 20	ALARM LEFT
21, 22	NC
23, 24	ALARM
25, 26	ALARM RIGHT
27, 28	SCL
29, 30	SDA

Pin, 15 way Blue Link connector	Function
1	NC
2	NC
3	NC
4	GND
5	VCC
6	NC
7	NC
8	NC
9	NC
10	ALARM LEFT
11	NC
12	ALARM
13	ALARM RIGHT
14	SCL
15	SDA

Yellow Link: Top View, 30 way double sided header
Connector Type: 2.54mm double sided edge



Blue Link module: Top view, 15 pin header (male)

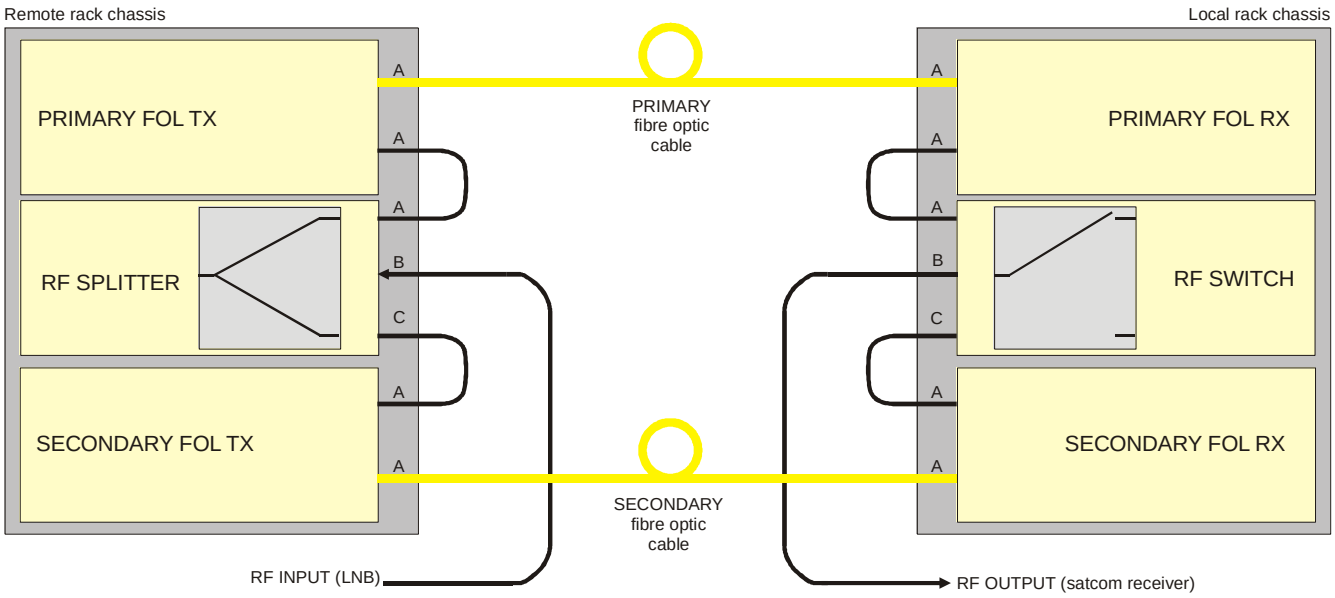
Compatible mating connectors

PPM #	Description	Supplier	Supplier part number	PPM #	Description	Supplier	Supplier part number
55708	CGRID3 15 way housing	Molex	90156-0155	59897	Straight connector	Toby Electronics	802-S-30-S-R
54245	Crimp connector 22-24AWG	Molex	90119-2110	59910	Right angle conn	Digikey	EEC15DRAN-ND

Note that for the 30 way PCB edge connector, the top and bottom pin pads are electrically connected through the large via holes in the middle. Hence there are only 15 connections effectively, with 30 pin pads. The PCB connector can be linked to your motherboard through the via holes using standard 2.54mm pitch pin header.

3.2.10 Switch, system integration

In this typical configuration, the RF signal is connected to Port B of the ***ViaLiteHD*** RF splitter and the two outputs, ports A and C are fed into two ***ViaLiteHD*** single transmitter modules. These modules are connected via two separate optical fibres to two ***ViaLiteHD*** single receiver modules. These form the PRIMARY and SECONDARY paths. The RF outputs of the PRIMARY and SECONDARY Receivers are connected to ports A and C respectively of the ***ViaLiteHD*** 3 port switch module. Port B of the ***ViaLiteHD*** 3 port switch module is fed to the user equipment. Control lines in the chassis backplane connect alarms to adjacent slots. These are used to control the status of the switch module and ensuring that the RF Switch selects the SECONDARY path in the event of a failure in the PRIMARY path.



Typical 1:1 redundancy configuration

In this example configuration, the following parts would be required to implement the system.

Quantity	Description	Part Number
Remote chassis		
1	Chassis	HRKxx
2	PSU	HPS-x
2	L-Band HTS single transmitter	HRT-Lx-xx-xx-xxxxx
1	RF Splitter	HRD-x-Lx-0x-x1

Quantity	Description	Part Number
Local chassis		
1	Chassis	HRKxx
2	PSU	HPS-x
2	L-Band HTS single receiver	HRR-Lx-xx-xx
1	3 port RF switch	HRS-x-Lx-0x-x1

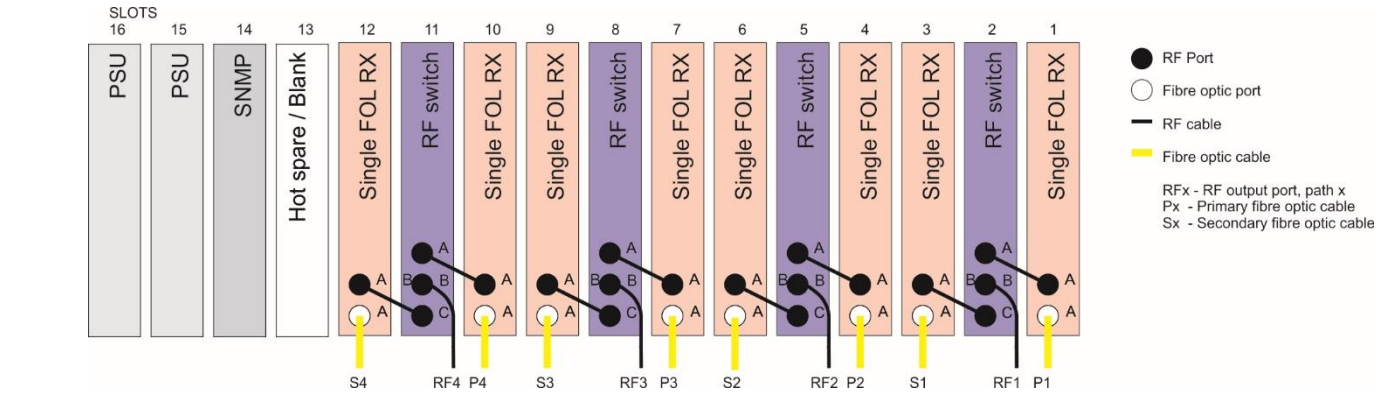
Quantity	Description	Part Number
Cabling		
2	Fibre optic cable	F8R1/x
4	RF cable	737xx

3.2.11 Switch, 3U chassis configurations, four 1:1 redundant transmitters

The chassis configuration below can be used to provide four redundant transmitters in a single ***ViaLiteHD*** 3U chassis.

The blank slot can be used as a storage slot for a hot spare

For simplicity the chassis configuration is viewed from the rear.



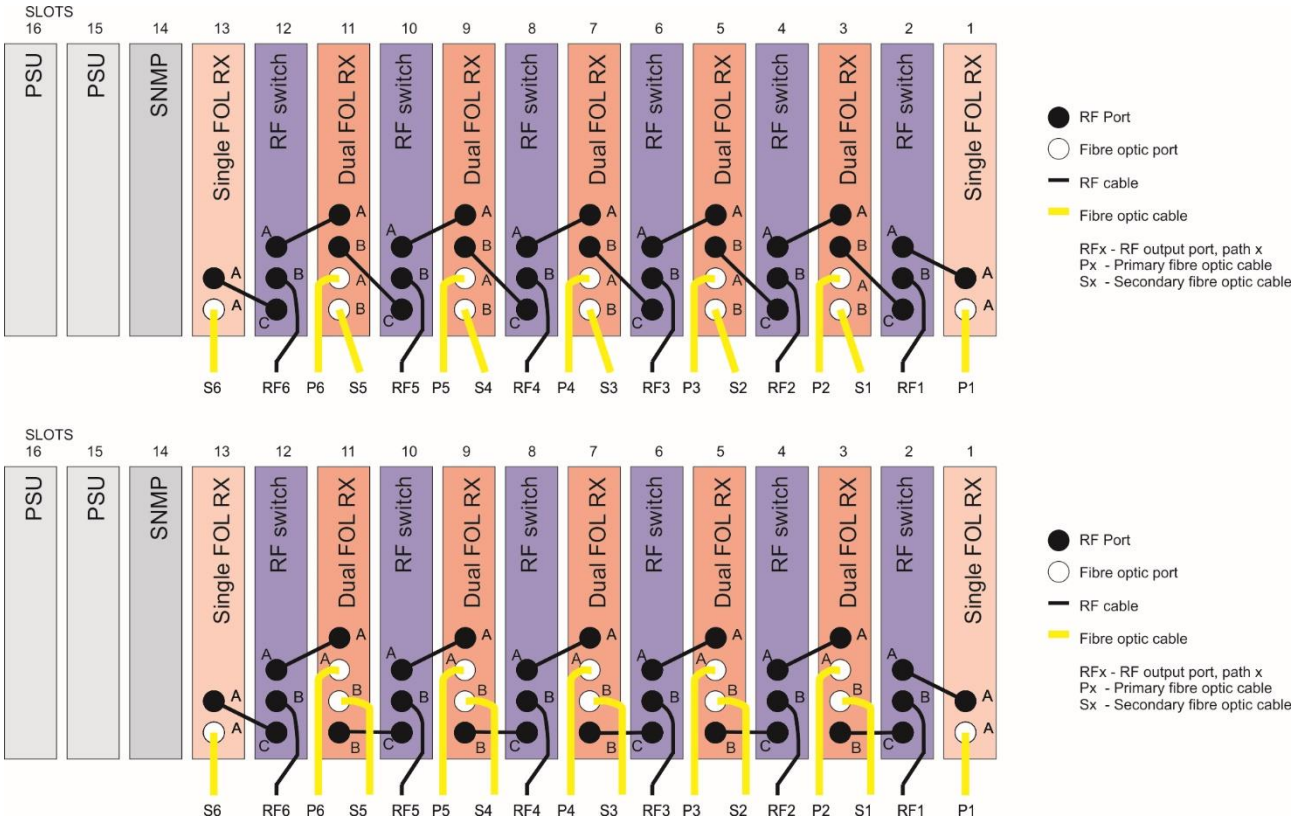
Four 1:1 redundant receivers using standard plug in modules and switches, viewed from rear of chassis

3.2.12 **Switch, 3U chassis configurations, six 1:1 redundant receivers**

The chassis configuration below can be used to provide six redundant receivers in a single ***ViaLiteHD*** 3U chassis.
This configuration provides much higher density and 1:1 redundancy under normal operating conditions.

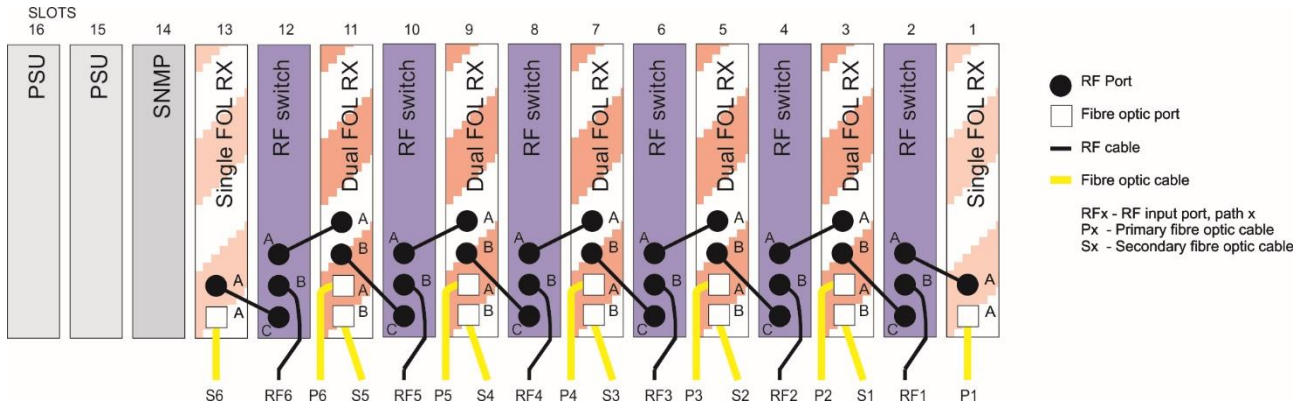
If a dual FOL receiver module fails redundancy will be lost (for both paths using the card) for the short period that takes to replace the failed unit. The blindmate option greatly reduces service time, the time to replace the failed unit can be as low as 10 seconds, and hence this will have minimal effect on availability.

For simplicity the chassis configuration is viewed from the rear.



Six 1:1 redundant receivers using standard plug in modules and switches, viewed from rear of the chassis
Top – Connector configuration A (typically used with FC optical and SMA RF connectors)
Bottom - Connector configuration B (typically used with all other connector configurations)

The rear panel connector configurations are dependent on module type; different module may have different connector configurations. However RF and optical connector can clearly be distinguished and connector letters are clearly shown on the rear panels. Contact ***ViaLite Communications*** or your local agent for more details.



Six 1:1 redundant receivers using blindmate plug in modules and switches, viewed from rear of the chassis

3.2.13 Switch, 3U chassis configurations, six and four 1:1 redundant receivers

This chassis configuration would use one chassis equipped with transmitters and switches and another with receivers and switches. This has the advantage of reducing the loss ahead of the transmitter, which is advantageous in low signal scenarios.

If you wish to use this type of redundancy you must however assure that you control system that is capable of the following. It must force the PRIMARY RECEIVER's RF SWITCH, to switch to the SECONDARY RECEIVER in the event of a MAJOR ALARM on the PRIMARY TRANSMITTER; typically a failure in the transmitter will cause an RLL alarm in the receiver, hence this will happen automatically.

It must also force the PRIMARY TRANSMITTER's RF SWITCH, to switch to the SECONDARY TRANSMITTER in the event of a MAJOR ALARM on the PRIMARY RECEIVER. This will require that the control systems of the local and remote chassis are able to talk to each other and force status changes on the switches; this could be achieved by using ***ViaLiteHD*** SNMP and web controller with your SNMP management software.

3.2.14 Switches, associated parts

Two matching cables are required for each RF switch module (these are to be ordered as separate line items), spares and replacements may also be ordered contact ***ViaLite Communications*** for more details.

The standard parts available are detailed in section 3.1.12 of this handbook.

3.2.15 Switch, maintenance and fault finding guide

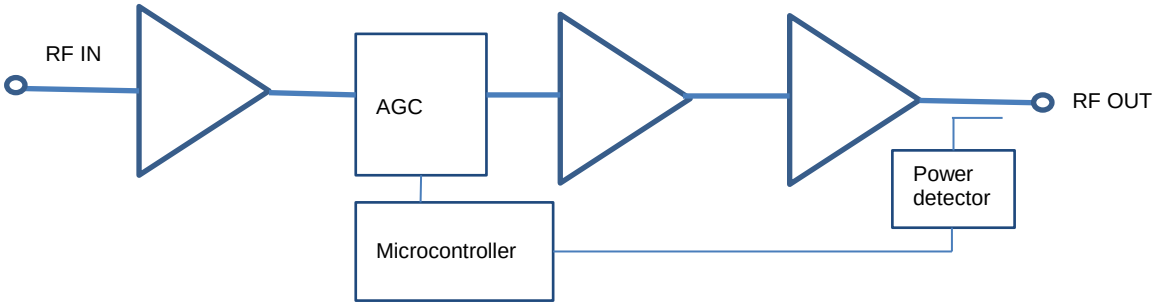
Refer to the following table that gives a list of commonly encountered problems and suggested solutions.

Fault	Possible Causes	Solution
Power LED does not illuminate.	Power is not connected to the PSU.	Connect mains power to the rear of the PSU. Check fuses of power leads.
	Module is not fully inserted.	Check module is properly aligned and handle pawls are fully engaged.
		Check there are no obstructions to the rear such as optical cable protective covers.
Difficulty inserting module.	Incorrect alignment.	Check that the module is correctly fitted in card guides.
	Incorrect module slot.	Check that module is in correct slot. Slots 1-13 for 5HP modules.
No output signal at one or both ports	No input signal connected	Connect input / power input device
	Proper connection not made	Ensure RF connector is properly mated
Switch not connected to desired port	RF cards has active alarm	Check RF card configuration and alarm status, rectify and issues
	Incorrect configuration	Check and reprogram switch configuration

3.3 Module Type Amplifier

This section covers the following ***ViaLiteHD*** RF support module:

- Amplifier module
  - HRA-1 single amplifier



The ***ViaLiteHD*** amplifier allows you to provide additional gain in your equipment chassis. The gain of the amplifier is controlled either via manual gain control switches, SNMP (requires SNMP and web controller) or via Web GUI (requires SNMP and web controller). When under SNMP or Web GUI control the amplifier may also use AGC. It also has an RF detector that reports power and is used for automatic gain control.

Some units are also fitted with a DC pass through. This allows DC current to pass from the input to the output of the module, which may be used to power external hardware via the coaxial cable.

The ***ViaLiteHD*** frequency source offers the following key advantages:

- Small 5HP form factor
- Blindmate capability
- Gain control, both manual and automatic
- RF power detector
- Compatibility with ***ViaLiteHD*** chassis

3.3.1 Amplifier, options

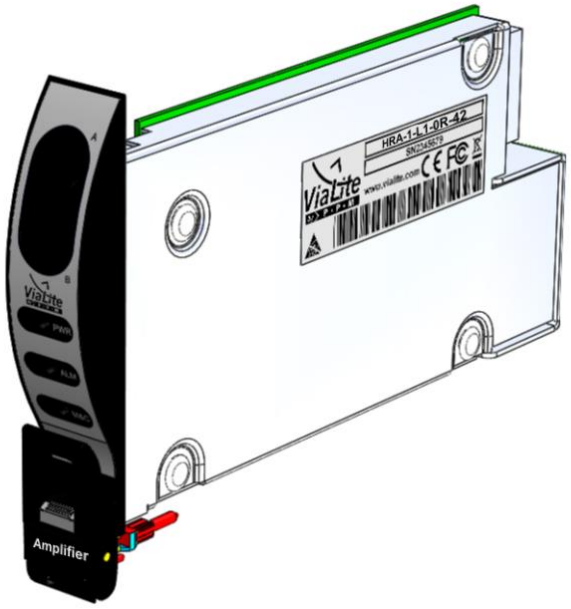
The ***ViaLiteHD*** amplifier module offers the following options

- Frequency band (1GHz, LBand, 3GHz)
- 50ohm and 75ohm options
- DC pass through
- Standard 5HP module
- Blind mate 5HP module

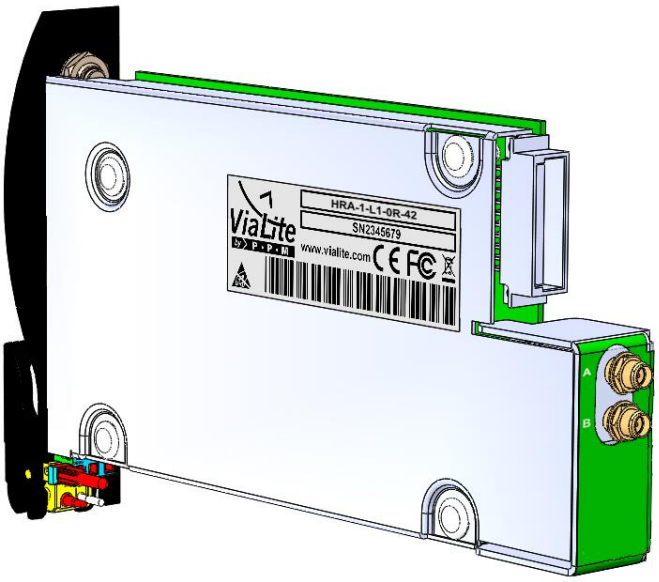
NOTE: Not all combinations of options are available. Contact ***ViaLite Communications*** for more details.

3.3.2 Amplifier, installation

The ***ViaLiteHD*** amplifier module is available in standard plug-in module or blind mate module; see sections 2.1.1 and 2.1.2 for details on installing these in a chassis. More details are also provided in the chassis handbook HRK-HB. Your amplifier can be supplied with flexible RF cables to be used for the rear panel connections.



Amplifier front view (standard plug-in)



Amplifier rear view (standard plug-in)

3.3.3 Amplifier, connecting the module

The ***ViaLiteHD*** amplifier module has two rear RF ports.

Function	Single Amplifier
Port A	RF IN
Port B	RF OUT

3.3.4 Amplifier, front panel indicators and alarms

The ***ViaLiteHD*** amplifier module uses the common front panel signalling scheme detailed in section 2.2.2. The amplifier module will generate a hardware front panel ALARM if any of these conditions occurs.

- A module internal hardware failure is detected

Additionally the amplifier module will generate a software ALARM if any of these conditions occurs.

- Output power level is not in the desired range
- AGC power control is out of range

3.3.5 Amplifier, gain control

The amplifier module is gain controllable and may have its gain changed. The amplifier is factory configured to have maximum gain.

3.3.5.1 Amplifier, gain control, manual via DIP switches

See sections 2.3.2.1 and 2.3.2.2.

3.3.5.2 Amplifier, gain control, manual via GUI

The amplifier may be gain controlled with a ***ViaLiteHD*** SNMP and Web controller module. When controlled by this method the gain maybe software programmed to your desired level. Full details are given in the ***ViaLiteHD*** controller handbook.

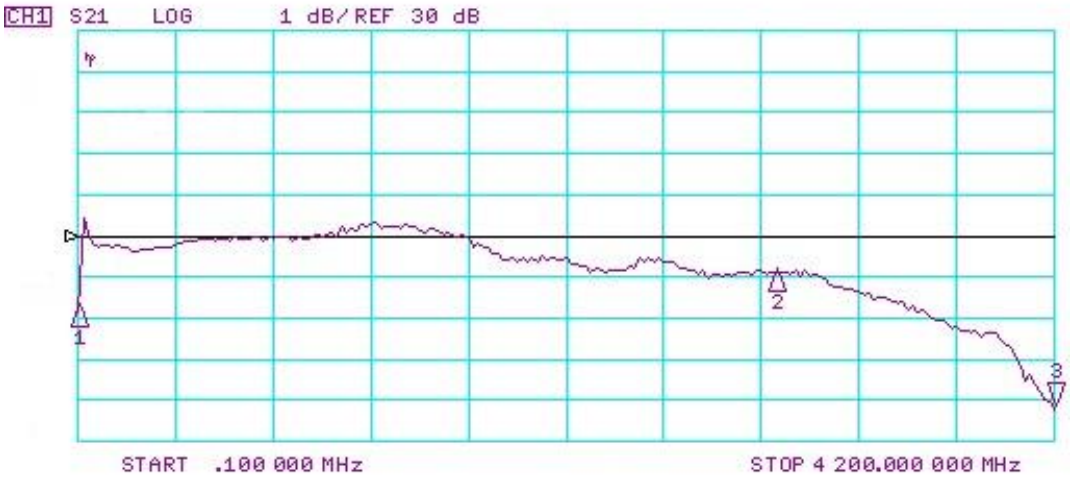
3.3.5.3 Amplifier, gain control, automatic gain control via GUI

The amplifier may be automatically gain controlled with a ***ViaLiteHD*** SNMP and Web controller module. When controlled by this method a desired output level is preset and the amplifier will attempt to slowly change the gain of the module to achieve this, within the gain window of the unit. Full details are given in the ***ViaLiteHD*** controller handbook.

3.3.5.4 Amplifier, performance versus gain, amplitude

The amplifier has a flat wideband response; the flatness is not significantly affected by the set gain. The first three figures show the typical frequency response of a wideband (10 - 3000MHz) amplifier module at different gain settings.

Figures below are typical wideband modules responses.

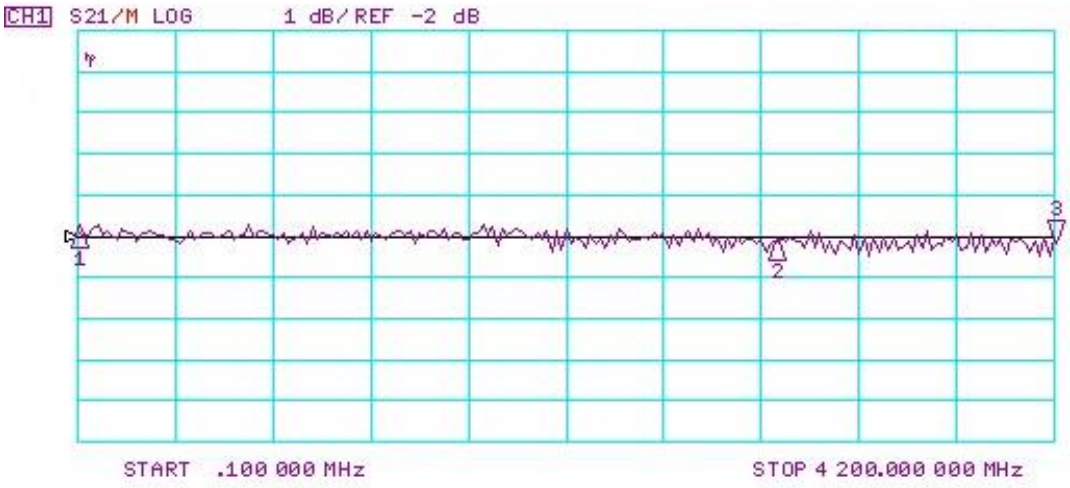


Gain versus frequency, gain set to maximum, gain 30dB

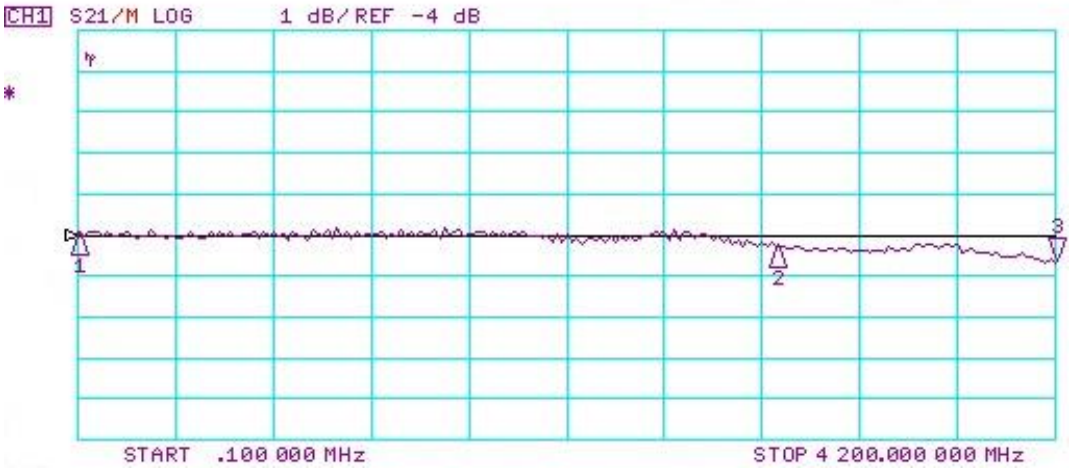
Gain versus frequency, gain set to median, gain 22dB

Gain versus frequency, gain set to minimum, gain 14.5dB

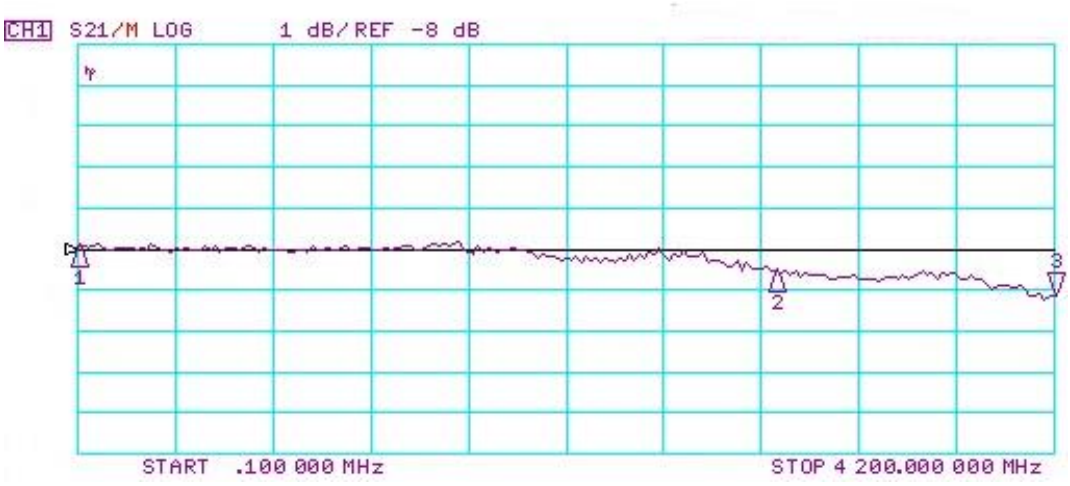
There is very little change in flatness as the gain is controlled below are three plots that show the deviation in flatness of the 2, 4, 8 dB attenuation steps.



Gain variance from maximum gain, 2dB gain step



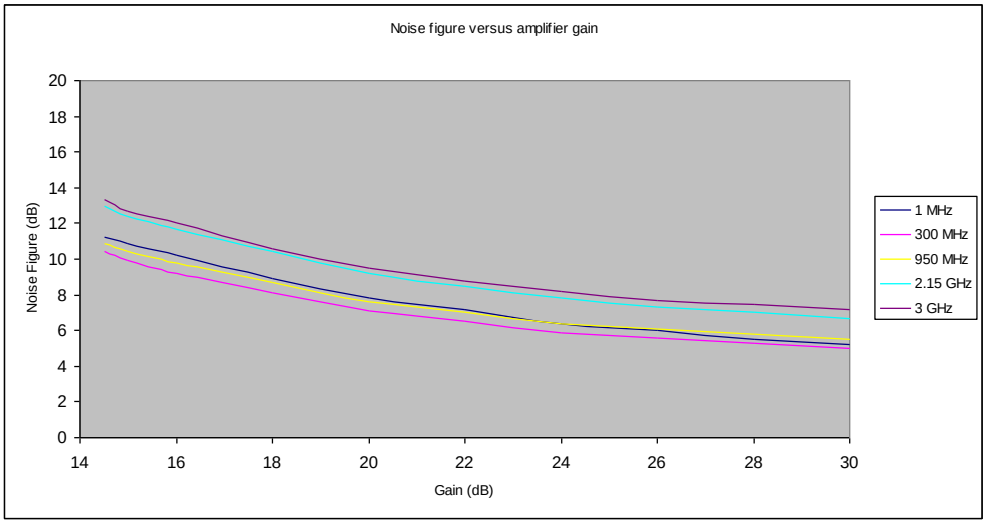
Gain variance from maximum gain, 4dB gain step



Gain variance from maximum gain, 8dB gain step

3.3.5.5 Amplifier, performance versus gain, noise figure

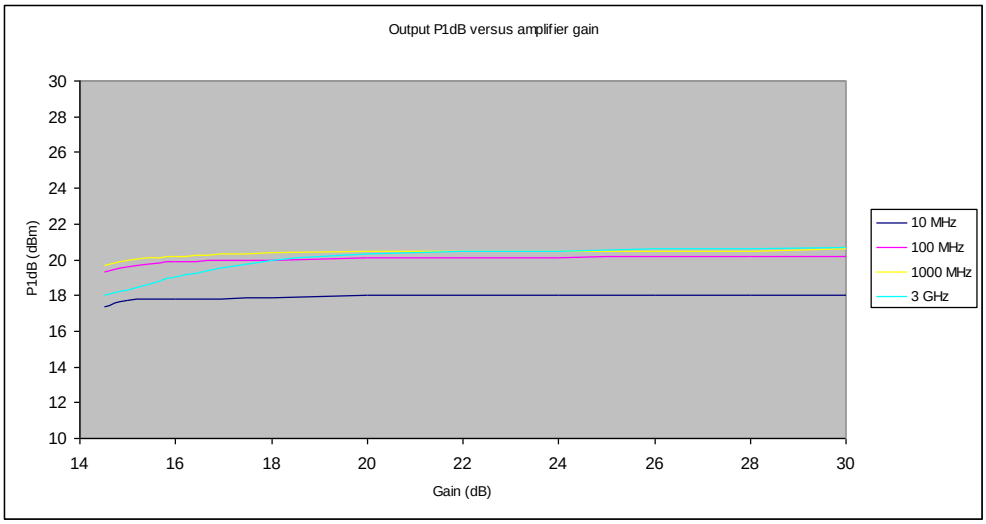
The noise figure of the amplifier is dependent in the attenuator setting. Operating the amplifier with maximum gain will reduce the noise figure. Noise figure increases slightly at higher frequencies. When operating at higher gain (greater than 25dB) the noise figure is only marginally affected by the gain. Figures below are typical wideband modules responses,



Noise figure versus amplifier gain

3.3.5.6 Amplifier, performance versus gain, output P1dB

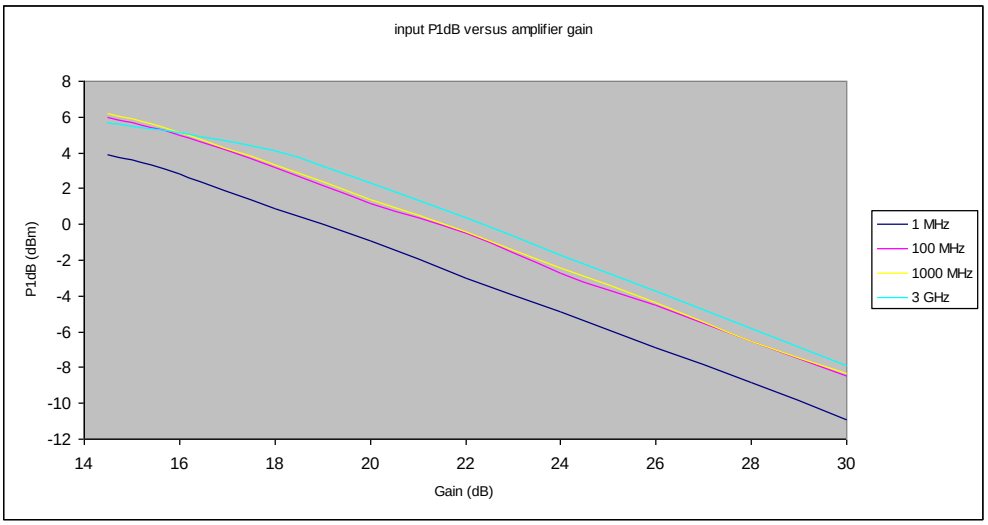
The output one decibel compression point is only marginally affected by the amplifier gain unless operating at its lowest gain settings. It is only slightly affected by frequency, dropping slightly at frequencies below 100 MHz. Figures below are typical wideband modules responses.



Output one decibel compression point versus amplifier gain

3.3.5.7 Amplifier, performance versus gain, input P1dB

The input one decibel compression point of the amplifier is dependent on the attenuator setting. Figures below are typical wideband modules responses.

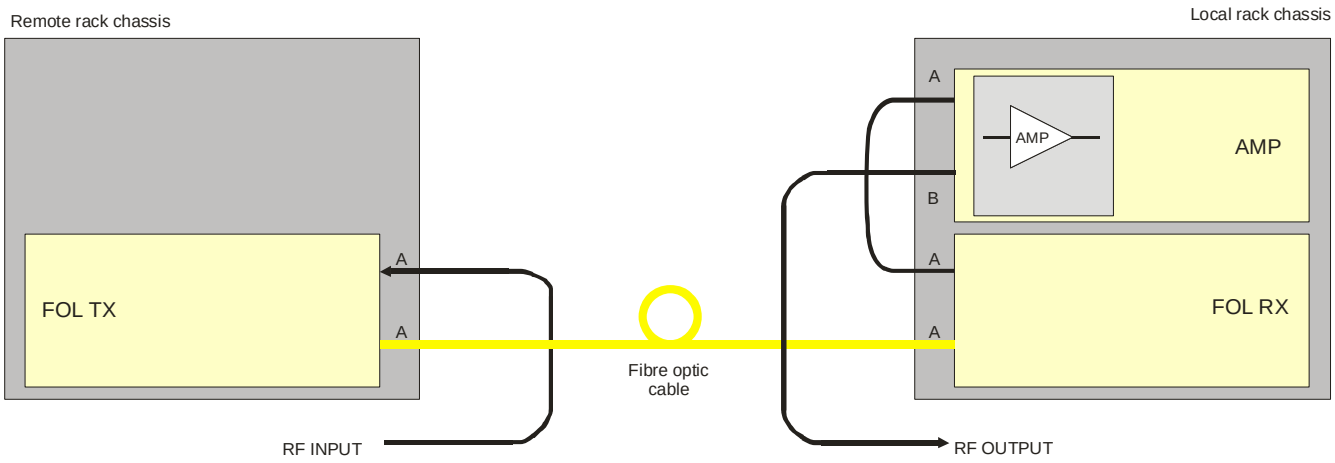


Input one decibel compression point versus amplifier gain

3.3.6 Amplifier, system integration

In this typical configuration, additional amplification is provided for a GPS signal so it can be split and distributed to multiple devices. The RF signal is connected to Port A of the ***ViaLiteHD*** single transmitter module. This module is connected via the optical fibre to the ***ViaLiteHD*** single receiver module.

The RF output of the receiver is connected to port A of the ***ViaLiteHD*** amplifier module. Port B of the ***ViaLiteHD*** amplifier module is fed to the user equipment.



In this example configuration, the following parts would be required to implement the system.

Quantity	Description	Part Number
Remote chassis		
1	Chassis	HRK3S
2	PSU	HPS
1	GPS single FOL transmitter	HRT-G1-8D-10-S1310

Quantity	Description	Part Number
Local chassis		
1	Chassis	HRK3S
2	PSU	HPS
1	GPS single receiver	HRR-G1-8D-00
1	Amplifier, with DC path	HRA-1-L1-0R-42

Quantity	Description	Part Number
Cabling		
1	Fibre optic cable	F8R1/x
1	RF cable	73739

3.3.7 Amplifier, associated parts

Cables are available to allow you to connect you frequency source, a selection of the standard parts available are detailed below.

For a range of 50 Ohm cable see the table in section 3.1.12

3.3.8 Amplifier, maintenance and fault finding guide

Refer to the following table that gives a list of commonly encountered problems and suggested solutions.

Fault	Possible Causes	Solution
Power LED does not illuminate.	Power is not connected to the PSU.	Connect mains power to the rear of the PSU. Check fuses of power leads.
	Module is not fully inserted.	Check module is properly aligned and handle pawls are fully engaged. Check there are no obstructions to the rear such as optical cable protective covers.
Difficulty inserting module.	Incorrect alignment.	Check that the module is correctly fitted in card guides.
	Incorrect module slot.	Check that module is in correct slot. Slots 1-13 for 5HP modules.
No output signal	No input signal connected	Connect input / power input device
	Proper connection not made	Ensure RF connector is properly mated

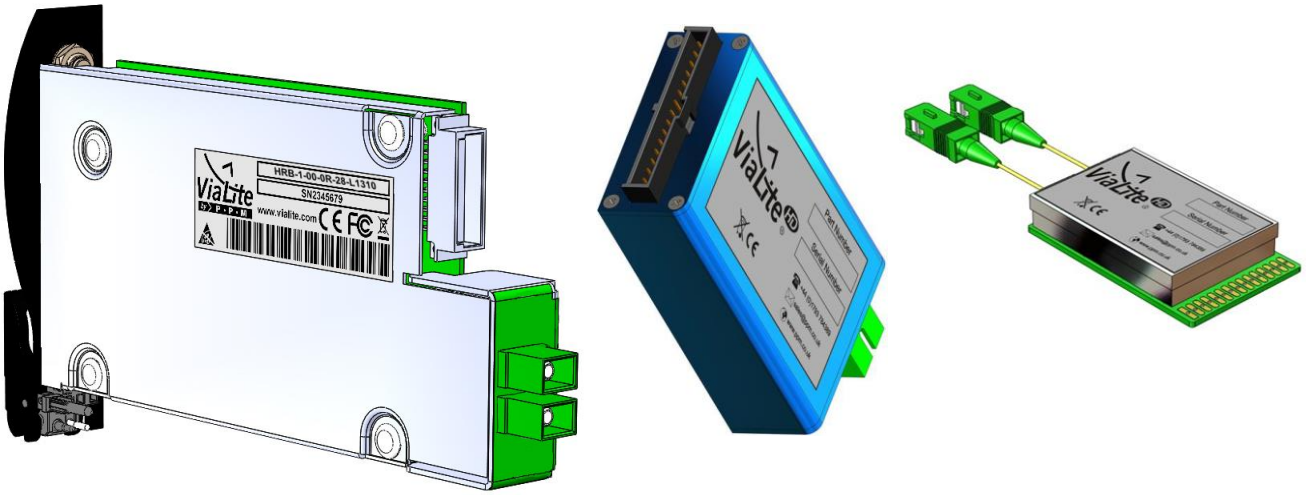
3.4 Serial Digital Modem

This section covers the following ***ViaLiteHD*** RF support module:

- Serial Digital Modem module, which supports the following signal formats
  - RS422/485 and RS232
  - Standard TTL (10kohm) and high power TTL (50ohm or 600ohm)

The ***ViaLiteHD*** serial digital modem is a 10Mbps digital optical transceiver offering the following key advantages:

- Small 5HP form factor of plug-in type
- User software and DIP switch configurable RS422/485 data rate
- User software and DIP switch configurable TTL input impedance
- Dual LED display mode, alarm or signal
- Laser power and receive light level monitoring
- Compatibility with ***ViaLiteHD*** chassis
- In addition to the 5HP plug-in type (left), Yellow link (right) and Blue link (middle) are also available (see picture below).



3.4.1 Serial Digital Modem, options

The ***ViaLiteHD*** serial digital modem module offers the following options

- Selectable control mode: software (I2C) or hardware (DIP switch)
- RS422/485 data rate: 115kbps, 500kbps and 10Mbps
- TTL input impedance: 50ohm, 600ohm and 10kohm
- TTL drive capability: 50ohm or standard a few kohm
- LED display mode: alarm or data signal
- Plug-in, Yellow link, and Blue Link formats

NOTE: Not all combinations of options are available. Contact ***ViaLite Communications*** for more details.

3.4.2 Serial Digital Modem, installation

The ***ViaLiteHD*** serial digital modem is available in standard plug-in module, see sections 2.1.1 and 2.1.2 for details on installing these in a chassis. More details are also provided in the chassis handbook HRK-HB. The serial digital modem may be fitted in any of the 5HP slots. For the Yellow link and Blue Link refer to section 2.1.3 and 2.1.4.

3.4.3 Serial Digital Modem, connecting the module

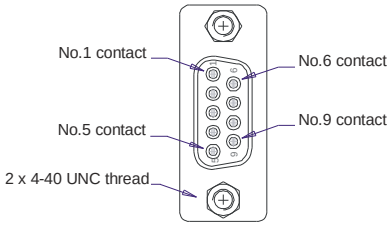
The ***ViaLiteHD*** serial digital modem has two rear optical ports, the upper one is Rx input and the lower one is Tx output. These ports should be connected to your optical fibre transmission path.

In addition, there is a 30-way DIN type connector at the back of the module, which normally plugs into the relevant socket on the chassis backplane. The pin assignment is given below

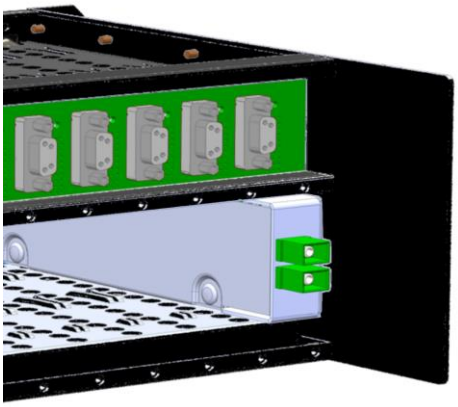
30-way DIN Column A	Function	30-way DIN Column B	Function	30-way DIN Column C	Function
A1	NC	B1	ALARM	C1	NC
A2	NC	B2	NC	C2	NC
A3	NC	B3	NC	C3	NC
A4	Tx_422/485_IN+	B4	RATE_SEL	C4	Rx_422/485_OUT+
A5	Tx_422/485_IN-	B5	OHM_SEL	C5	Rx_422/485_OUT-
A6	Tx_232_IN / TTL_IN	B6	MS	C6	Rx_232_OUT / TTL_OUT
A7	NC	B7	SCL	C7	RTS_485
A8	NC	B8	SDA	C8	NC
A9	VCC	B9	VCC	C9	VCC
A10	GND	B10	GND	C10	GND

When plugged in ***ViaLiteHD*** chassis, each slot has a DE9 connector (highlighted in red in the picture below) on the backplane for data signal line connections. The pin assignment for this connector is given below.

D-Type 9 way, pins	Function
1	GND
2	Tx_422/485_IN+
3	Tx_422/485_IN-
4	Tx_232_IN / TTL_IN
5	NC
6	Rx_422/485_OUT+
7	Rx_422/485_OUT-
8	Rx_232_OUT / TTL_OUT
9	RTS_485



Module connector:
9 way D-Type connector female



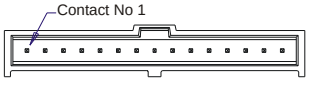
The connectors in red are located on the backplane of the HD chassis and specifically designed for digital signal connections with your system.

The Yellow link uses a 30 pin edge connector and the Blue Link uses a 15-way Molex CGRID connector.

30 way Yellow Link connector, pins	Function
1, 2	Tx_422/485_IN+
3, 4	Tx_422/485_IN-
5, 6	Tx_232_IN / TTL_IN
7, 8	GND
9, 10	VCC
11, 12	Rx_422/485_OUT+
13, 14	Rx_422/485_OUT-
15,16	Rx_232_OUT / TTL_OUT
17, 18	RTS_485
19, 20	RATE_SEL
21, 22	MAN_MODE
23, 24	ALARM
25, 26	OHM_SEL
27, 28	SCL
29, 30	SDA

15 way Blue Link connector, pins	Function
1	Tx_422/485_IN+
2	Tx_422/485_IN-
3	Tx_232_IN / TTL_IN
4	GND
5	VCC
6	Rx_422/485_OUT+
7	Rx_422/485_OUT-
8	Rx_232_OUT / TTL_OUT
9	RTS_485
10	RATE_SEL
11	MAN_MODE
12	ALARM
13	OHM_SEL
14	SCL
15	SDA

YELLOW LINK: Top View, 30 way double sided header
Connector Type: 2.54mm double sided edge connector



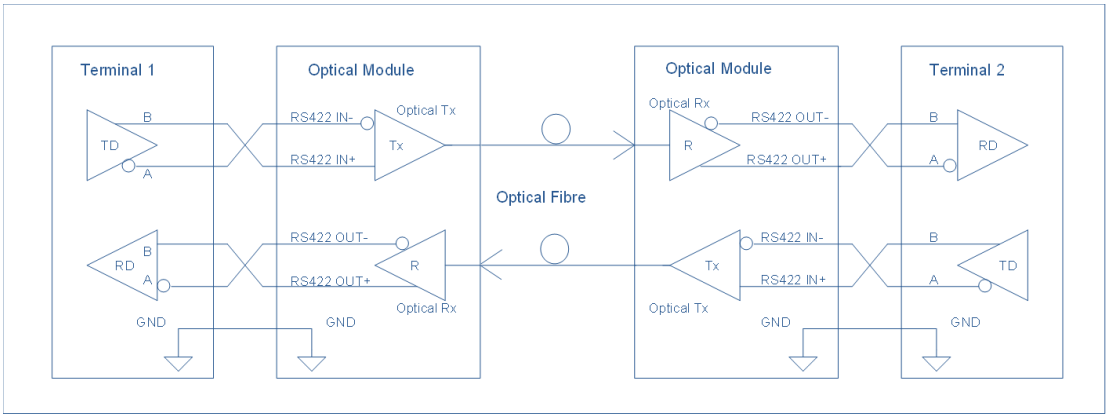
Blue Link module: Top view, 15 pin header (male)

Compatible mating connectors

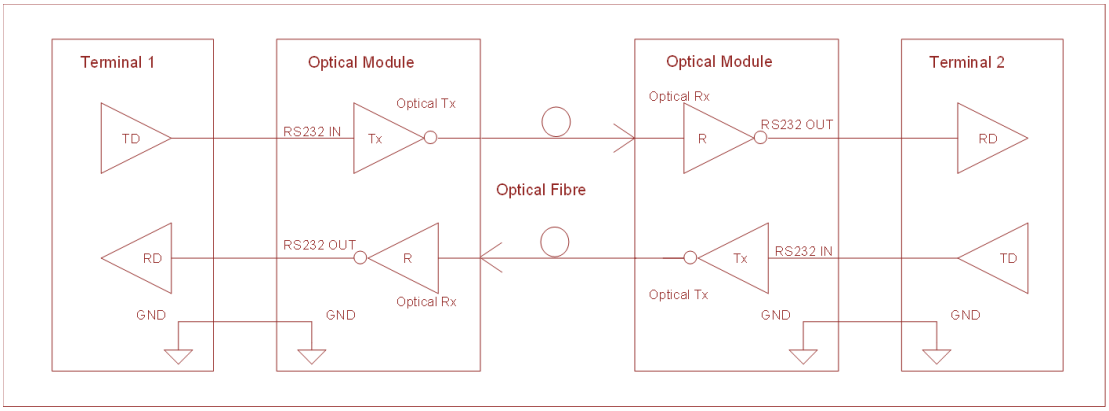
PPM #	Description	Supplier	Supplier part number	PPM #	Description	Supplier	Supplier part number
55708	CGRID3 15 way housing	Molex	90156-0155	59897	Straight connector	Toby Electronics	802-S-30-S-R
54245	Crimp connector 22-24AWG	Molex	90119-2110	59910	Right angle conn	Digikey	EEC15DRAN-ND

Note that for the 30 way PCB edge connector, the top and bottom pin pads are electrically connected through the large via holes in the middle. Hence there are only 15 connections effectively, with 30 pin pads. The PCB connector can be linked to your motherboard through the via holes using standard 2.54mm pitch pin header.

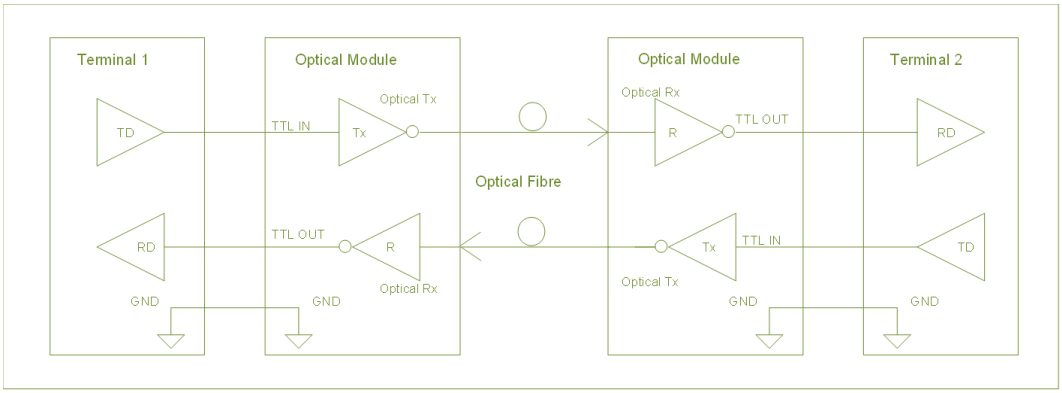
The following circuit diagrams illustrate data line connections for RS422/485, RS232 and TTL applications. For multi-driver RS485 application, you may need to add connection to RTS_485 to mute the driver.



RS422/485 signal connection



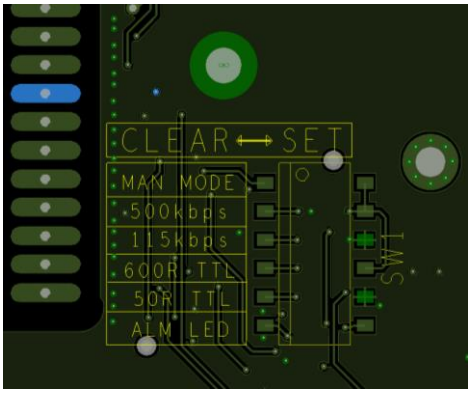
RS232 signal connection



TTL signal connection

3.4.4 Serial Digital Modem, module configurations

For ***ViaLiteHD*** plug-in module, the SW1 on the backside of the module (see the picture below), can be used to manually configure some module operations. If the MAN MODE of SW1 switch is set, the module is in the manual mode, and the RS422/485 operational data rate, TTL input impedance and alarm LED display mode can be changed manually by sliding appropriate SW1 switches. The relevant software configuration setup or the default factory setup will be overridden in this case. If the MAN MODE switch is cleared, the module will return to the software mode and can be controlled by a ***ViaLiteHD*** SNMP controller. The last software setup, or default setup if has not been changed, is stored inside the module's MCU.



The alarm LED (i.e. LED 2) on the front panel or the Blue link LED has two optional display modes. The display mode is data by default. In this mode, one data pulse generates one green LED flash, unless the module is in the alarm state in which case the LED will be red. This flash can be triggered by the data stream in either transmitter and/or receiver. The data mode display is most effective for low data rate such as 1 PPS. When the data rate is high, the LED display may appear constantly on. The other mode is the alarm mode in which the green colour means normal and the red colour means alarm, the same as that for other RF modules.

Yellow link and Blue Link modules do not have DIP switches available. However, one can change the voltage on Pin 11 MAN_MODE to toggle between the manual and software mode. Linking Pin 5 VCC directly to Pin 11 will set the module to the manual mode and leaving Pin 5 unconnected will set the module to the software mode. Once in the manual mode, linking VCC Pin 5 to either Pin 10 RATE_SEL and/or Pin 13 OHM_SEL will set the data rate to 500kbps data rate and/or the impedance to 600R. The LED display mode is default to the data mode for blue link modules and it is possible to change it using a ***ViaLiteHD*** SNMP controller.

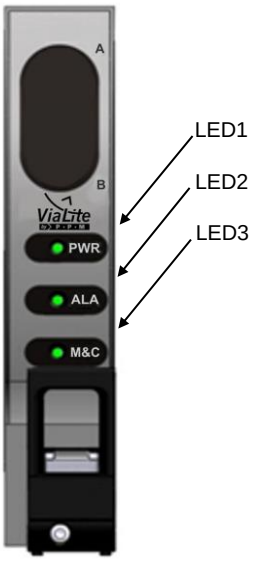
In manual mode, if both 500kbps and 115kbps are set or clear at the same time, the data rate will be set to 10Mbps. If only one switch is set, the data rate will be the one corresponding to that switch. Similarly, if both 600R and 50R are set or clear at the same time, the impedance will be set to 10K.

To be able to use the DIP switch or the edge connector to configure the options manually described above, the module I2C soft switch must remain in the DIP control mode. This is the factory default setup. Changing the control mode to the I2C control mode will disable all manual functions. This change can only be made at the factory or with a ***ViaLiteHD*** SNMP controller installed in the system. See ***ViaLiteHD*** controller handbook for more details. The I2C control mode is intended for system debug only.

3.4.5 Serial Digital Modem, front panel indicators and alarms

The ***ViaLiteHD*** serial digital modem module uses the common front panel signalling scheme detailed in section 2.2.2. If major alarm occurs, the open drain alarm line will be set high.

	Colour	Plug-in Module
LED1 POWER	GREEN	Normal
	No light	PSU fail
LED2 ALARM	GREEN	Normal or minor alarm, in alarm display mode
	Flashing GREEN	Passing signal, in data display mode
	RED	Major alarm, in any mode
LED3 I2C	GREEN	I2C enabled
	Flashing GREEN	I2C active
	AMBER	I2C disabled



3.4.6 Serial Digital Modem, maintenance and fault finding guide

Refer to the following table that gives a list of commonly encountered problems and suggested solutions.

Fault	Possible Causes	Solution
Power LED does not illuminate.	Power is not connected to the PSU.	Connect mains power to the rear of the PSU. Check fuses of power leads.
	Module is not fully inserted.	Check module is properly aligned and handle pawls are fully engaged. Check there are no obstructions to the rear such as optical cable protective covers.
Difficulty inserting module.	Incorrect alignment.	Check that the module is correctly fitted in card guides.
	Incorrect module slot.	Check that module is in correct slot. Slots 1-13 for 5HP modules.
Alarm LED in ALARM state.	Laser degraded.	Return to local ***ViaLite Communications*** office.
	Low optical level at receiver.	Check optical link for breaks / kinks. Check all optical connectors are clean.
No light of alarm LED.	LED display mode set to data and no passing signal.	Change to alarm mode, feed correct signal.
No data signal.	Incorrect connection.	Check pin-out and connection cable.
	Low RLL.	Check if alarm LED is red.
	Low/no optical transmitter power.	Check if alarm LED is red.

The ***ViaLiteHD*** range of modules is engineered and calibrated for optimum performance and accuracy before dispatch.

In the event of any problems or queries arising with the equipment, please contact ***ViaLite Communications*** or your local agent.

3.5 Gigabit Ethernet Fibre Optic Link

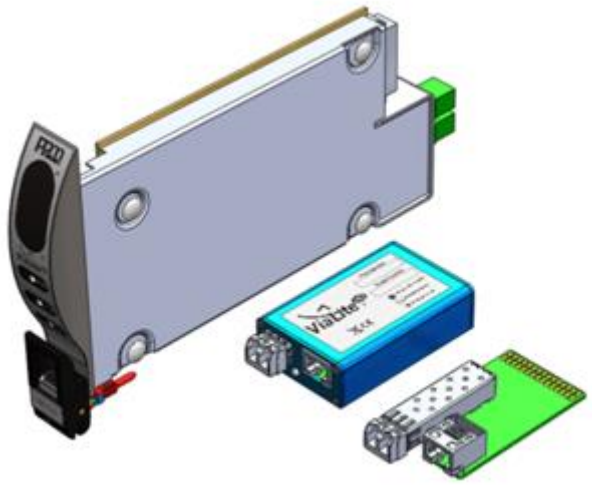
This section covers the following ***ViaLiteHD*** support module:

- Gigabit Ethernet Fibre Optic Link (referred as GE FOL hereafter)

The ***ViaLiteHD*** GE FOL unit provides the interface between 1000BASE-T (1Gb Ethernet over copper twisted pair) and 1000BASE-X (1Gb Ethernet over fibre).

The ***ViaLiteHD*** GE FOL offers the following key advantages:

- Small 5HP form factor of plug-in type
- Compatibility with ***ViaLiteHD*** chassis
- In addition to the 5HP plug-in type, Yellow link and Blue Link are also available (see picture below)



The ***ViaLiteHD*** GE FOL options:

- Wavelength: single mode 1310nm, 1550nm, CWDM, DWDM
- Range: 10km, 40km and 70km SM
- Plug-in, Yellow link and Blue Link

NOTE: Not all combinations of options are available. Contact ***ViaLite Communications*** for more details.

3.5.1 GE FOL, installation

The ***ViaLiteHD*** GE FOL is available in standard plug-in module - see section 2.1.2 for details on installing these in a chassis. More details are also provided in the chassis handbook HRK-HB. The card may be fitted in any of the 5HP slots.

3.5.2 GE FOL connecting the module

The ***ViaLiteHD*** GE FOL has two rear optical ports, the upper one is Tx output and the lower one is Rx input. These ports should be connected to your optical fibre transmission path. Also at the rear there is a RJ-45 connector. This connector can be connected to any device supporting 1GB Ethernet – 1000BASE-T. Ensure that fibre connectors are clean and are of correct type. Chassis mounted version use APC connectors. Yellow link and Blue Link units use LC PC connectors for fibre connection. The TX port is on the left when viewed from the front of the unit.

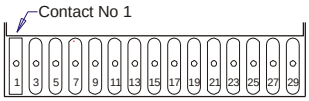
In addition, there is a 30-way DIN type connector at the back of the module, which normally plugs into the relevant socket on the chassis backplane. The pin assignment is given below.

30-way DIN Column A	Function	30-way DIN Column B	Function	30-way DIN Column C	Function
A1	NC	B1	ALARM	C1	NC
A2	NC	B2	NC	C2	NC
A3	NC	B3	NC	C3	NC
A4	NC	B4	NC	C4	NC
A5	NC	B5	NC	C5	NC
A6	NC	B6	MS	C6	NC
A7	NC	B7	SCL	C7	NC
A8	NC	B8	SDA	C8	NC
A9	VCC	B9	VCC	C9	VCC
A10	GND	B10	GND	C10	GND

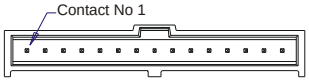
The Yellow link uses a 30 pin edge connector and the Blue Link uses a 15-way Molex CGRID connector.

Pin, 30 way Yellow Link connector	Function
1, 2	NC
3, 4	NC
5, 6	NC
7, 8	GND
9, 10	VCC
11, 12	NC
13, 14	NC
15,16	NC
17, 18	NC
19, 20	NC
21, 22	NC
23, 24	ALARM
25, 26	NC
27, 28	SCL
29, 30	SDA

Pin, 15 way Blue Link connector	Function
1	NC
2	NC
3	NC
4	GND
5	VCC
6	NC
7	NC
8	NC
9	NC
10	NC
11	NC
12	ALARM
13	NC
14	SCL
15	SDA



YELLOW LINK: Top View, 30 way double sided header
Connector Type: 2.54mm double sided edge



BLUE LINK module: Top view, 15 pin header (male)

Compatible mating connectors

PPM #	Description	Supplier	Supplier part number	PPM #	Description	Supplier	Supplier part number
55708	CGRID3 15 way housing	Molex	90156-0155	59897	Straight connector	Toby Electronics	802-S-30-S-R
54245	Crimp connector 22-24AWG	Molex	90119-2110	59910	Right angle conn	Digikey	EEC15DRAN-ND

Note that for the 30 way PCB edge connector, the top and bottom pin pads are electrically connected through the large via holes in the middle. Hence there are only 15 connections effectively, with 30 pin pads. The PCB connector can be linked to your motherboard through the via holes using standard 2.54mm pitch pin header.

3.5.3 GE FOL, module operation

- Connect both fibres. Check TX of the FOL is connected to the RX of the other device and RX of the FOL to TX (see connection diagram below)

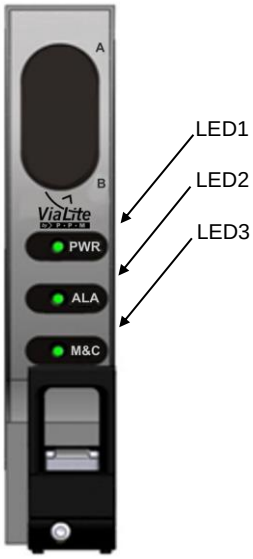
  For the WDM version only one fibre is used, however one should check if the other device transmits at correct wavelength
- Connect the RJ45 patchcord.

The unit should start normal operation after auto-negotiation has finished. The auto-negotiation can take several seconds depending on the particulars of the system. The green LED by RJ45 connector shows status of the link. Solid light indicates valid link without data, flashing green indicates valid link with data being transferred. The red LED means that no valid link can be established.

3.5.4 GE FOL, front panel indicators and alarms

The ***ViaLiteHD*** GE FOL module uses the common front panel signalling scheme. The module will generate an ALARM if there is no valid link available.

	Colour	Plug-in Module
LED1	GREEN	Normal
	No light	PSU fail
LED2	GREEN	Normal
	RED	Alarm (no valid link)
LED3	GREEN	I2C enabled
	Flashing GREEN	I2C active
	AMBER	I2C disabled



3.5.5 GE FOL, rear panel indicators

On chassis mounted card there is an LED located at the rear of the unit by the RJ45 connector. For the Yellow link and Blue Link units there is an LED at the front using the same scheme.

Colour	Plug-in module (located at the rear)	Yellow link and Blue Link (located at the front)
GREEN	Valid link	Valid link
GREEN flashing	Valid link with activity	Valid link with activity
RED	No valid link	No valid link

3.5.6 GE FOL, maintenance and fault finding guide

Refer to the following table that gives a list of commonly encountered problems and suggested solutions.

Fault	Possible Causes	Solution
Power LED does not illuminate.	Power is not connected to the PSU. Module is not fully inserted.	Connect mains power to the rear of the PSU. Check fuses of power leads. Check module is properly aligned and handle pawls are fully engaged. Check there are no obstructions to the rear such as optical cable protective covers.
Difficulty inserting module.	Incorrect alignment. Incorrect module slot.	Check that the module is correctly fitted in card guides. Check that module is in correct slot. Slots 1-13 for 5HP modules.
Alarm LED in ALARM state.	Wrong fibre connection	Check if fibres are clean undamaged and

	No copper cable connected One of the interconnected devices not supporting Gigabit Ethernet	connected with correct polarity Connect the cable Check system compatibility
RJ45 Link and traffic LEDs not illuminated, when connected	Not connected via RJ45 to a Gigabit device	RJ45 port MUST be connected to a Gigabit device

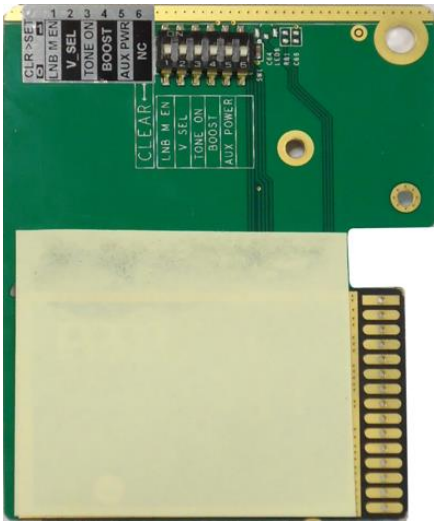
The ***ViaLiteHD*** range of modules is engineered and calibrated for optimum performance and accuracy before dispatch.

In the event of any problems or queries arising with the equipment, please contact ***ViaLite Communications*** or your local agent.

3.6 LNB power supply

This section covers the following ***ViaLiteHD*** support module:
- LNB power supply module (referred as LNB hereafter)

LNB power supply modules can be used in a SATCOM6 outdoor enclosure.
Main features:
- Internally generated +13V and+18V selectable LNB voltage,
- Output voltage boosted by 1V - option,
- Auxiliary mode with +22V output,
- Switchable 22kHz signalling tone,
- 700mA output current.



3.6.1 LNB module installation

LNB modules can be installed in slot 7 and 8 of the SATCOM6. Refer to the HEA-xx-HB - SATCOM6 handbook for more information.

3.6.2 LNB module SNMP configuration

LNB module can be configured using an SNMP controller. Refer to ***ViaLiteHD*** Controller Handbook to find more about controlling via the GUI. Below is a description of the settings.

Switch description	**Function**	**Default factory setting**
Power Block	Sets the power block status, it can be ENABLED (on) or DISABLED (off)	DISABLED
Output select	Sets the output voltage, it can be LOW (13V nominal) or HIGH (18V nominal)	LOW
Tone Gen	Sets the output tone status, ON (22kHz tone) or OFF (no tone)	OFF
Output Boost	Sets the output boost status, ENABLED (+1V) or DISABLED (no extra voltage).	DISABLED
AUX Mode	Sets the auxiliary mode, it can be ON (+22V nominal output) or DISABLED (normal)	DISABLED
Tone output	Sets the tone generation type, it can be ACTIVE (22kHz on) or DSQIN (do not use)	ACTIVE
Current threshold	Set the current threshold to LOW (6mA) or HIGH (12mA)	HIGH
Current limit	Sets the current limit STATIC (simple clamp) or ACTIVE (pulsed current limiting)	STATIC

3.6.3 LNB module manual configuration

LNB module can be configured manually using on-board DIP switches. Below is description of DIP switch settings..

Switch description	Function	Default factory setting
LNB M EN	Enables manual control	CLR
V_SEL	Selects output voltage (+13V or +18V)	CLR
TONE ON	Turns ON/OFF the 22kHz tone	CLR
BOOST	If set output voltage is boosted by 1V comparing to the nominal value to compensate for cable losses	CLR
AUX PWR	Sets the output to +22V	CLR

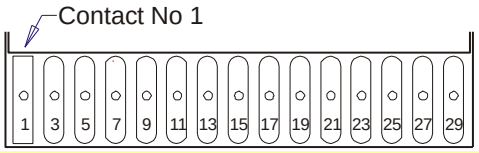
These controls are also present on the Yellow Link connector

3.6.4 LNB module interface

Connector pin assignment

Pin, 30 way Yellow Link connector	Function
1, 2	LNB_M_EN*
3, 4	V_SEL*
5, 6	TONE_ON*
7, 8	GND
9, 10	VCC
11, 12	NC
13, 14	NC
15,16	NC
17, 18	LNB OUT
19, 20	BOOST*
21, 22	NC
23, 24	ALARM
25, 26	AUX PWR*
27, 28	SCL
29, 30	SDA

* These control can be used for manual configuration
CLR = GND or Open circuit (module pulled down via internal 10Kohm to GND)
SET = +12V (module fitted with internal 24Kohm series resistor)



YELLOW LINK: Top View, 30 way double sided header
Connector Type: 2.54mm double sided edge

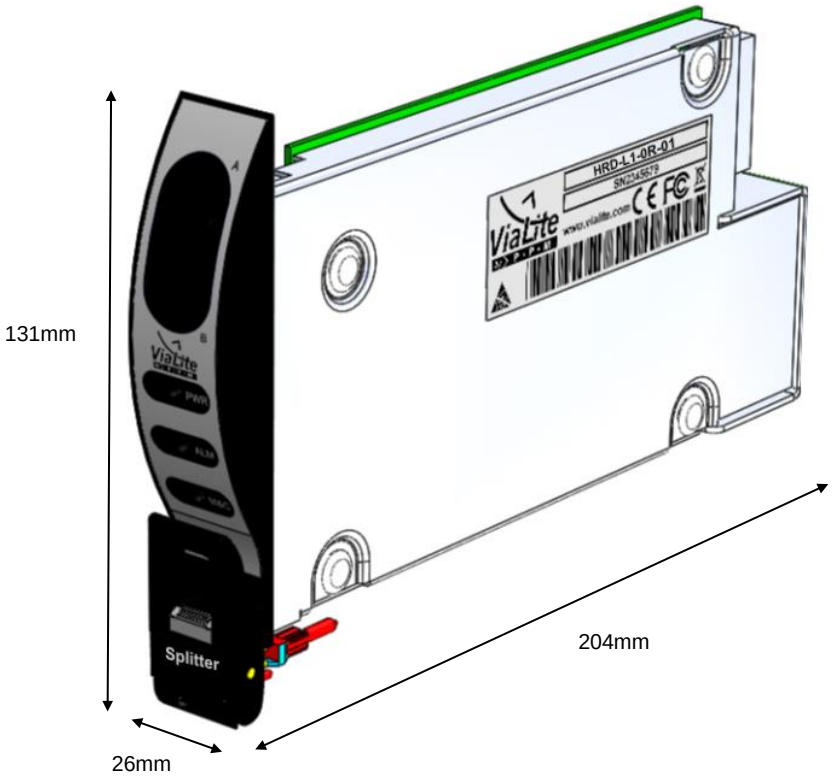
Compatible mating connectors

PPM #	Description	Supplier	Supplier part number	PPM #	Description	Supplier	Supplier part number
55708	CGRID3 15 way housing	Molex	90156-0155	59897	Straight connector	Toby Electronics	802-S-30-S-R
54245	Crimp connector 22-24AWG	Molex	90119-2110	59910	Right angle conn	Digikey	EEC15DRAN-ND

Note that for the 30 way PCB edge connector, the top and bottom pin pads are electrically connected through the large via holes in the middle. Hence there are only 15 connections effectively, with 30 pin pads. The PCB connector can be linked to your motherboard through the via holes using standard 2.54mm pitch pin header.

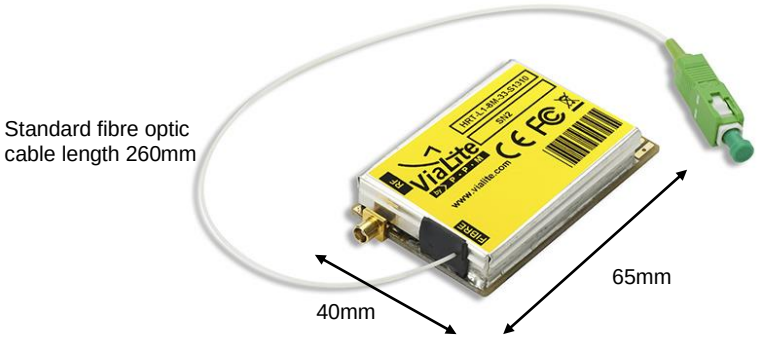
4 Mechanical dimensions

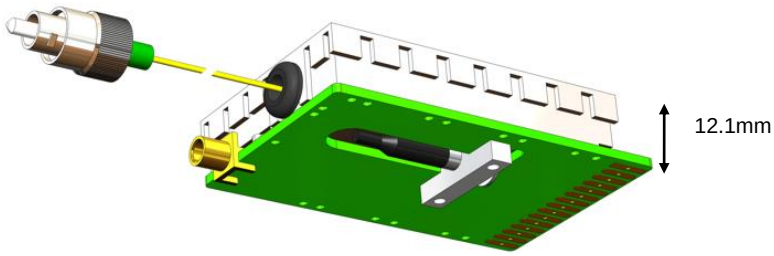
4.1 Plug in module - dimensions



Weight: 220g typical
300g maximum

4.2 Yellow Link module - dimensions



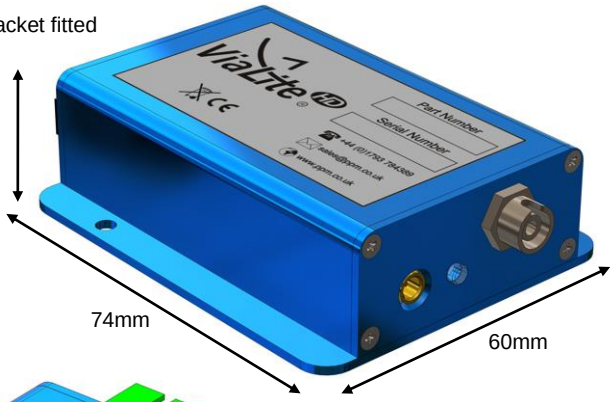


Detailed mechanical drawings are available of all ***ViaLiteHD*** modules on request.

Weight transmitter 60g typical
Weight receiver 55g typical

4.3 Blue Link module - dimensions

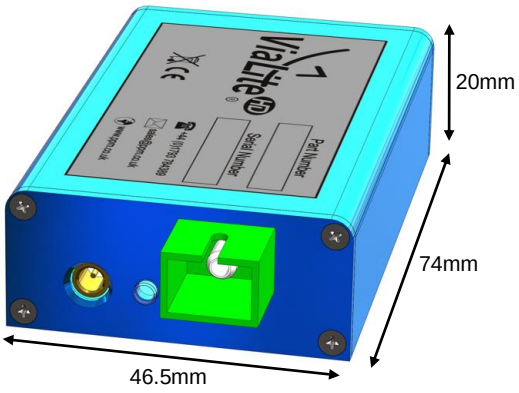
With mounting bracket fitted



All units are supplied with a mounting bracket.
The unit may be secured by:

2*M2.5 tapped hole on the underside
OR
2*M3 clearance holes in the mounting bracket

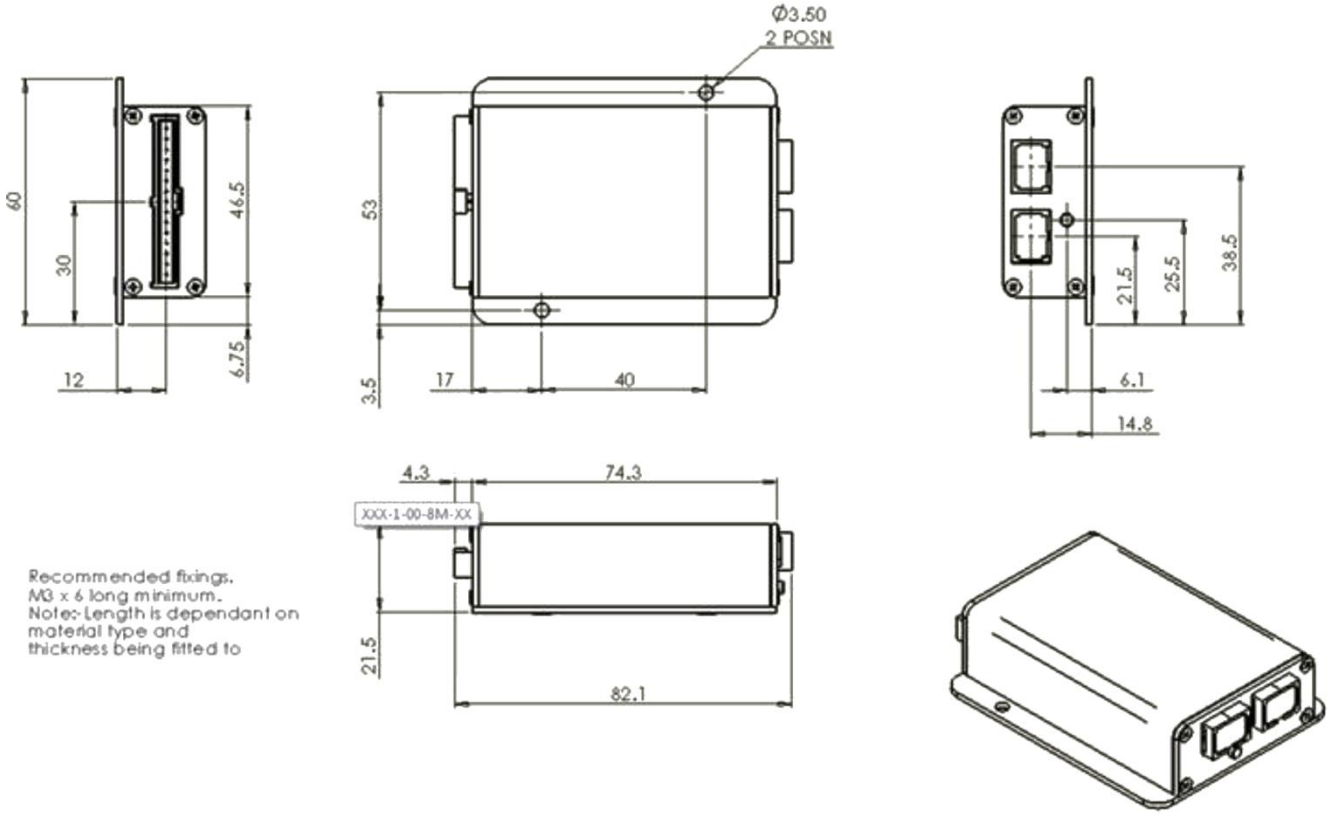
Without mounting bracket fitted



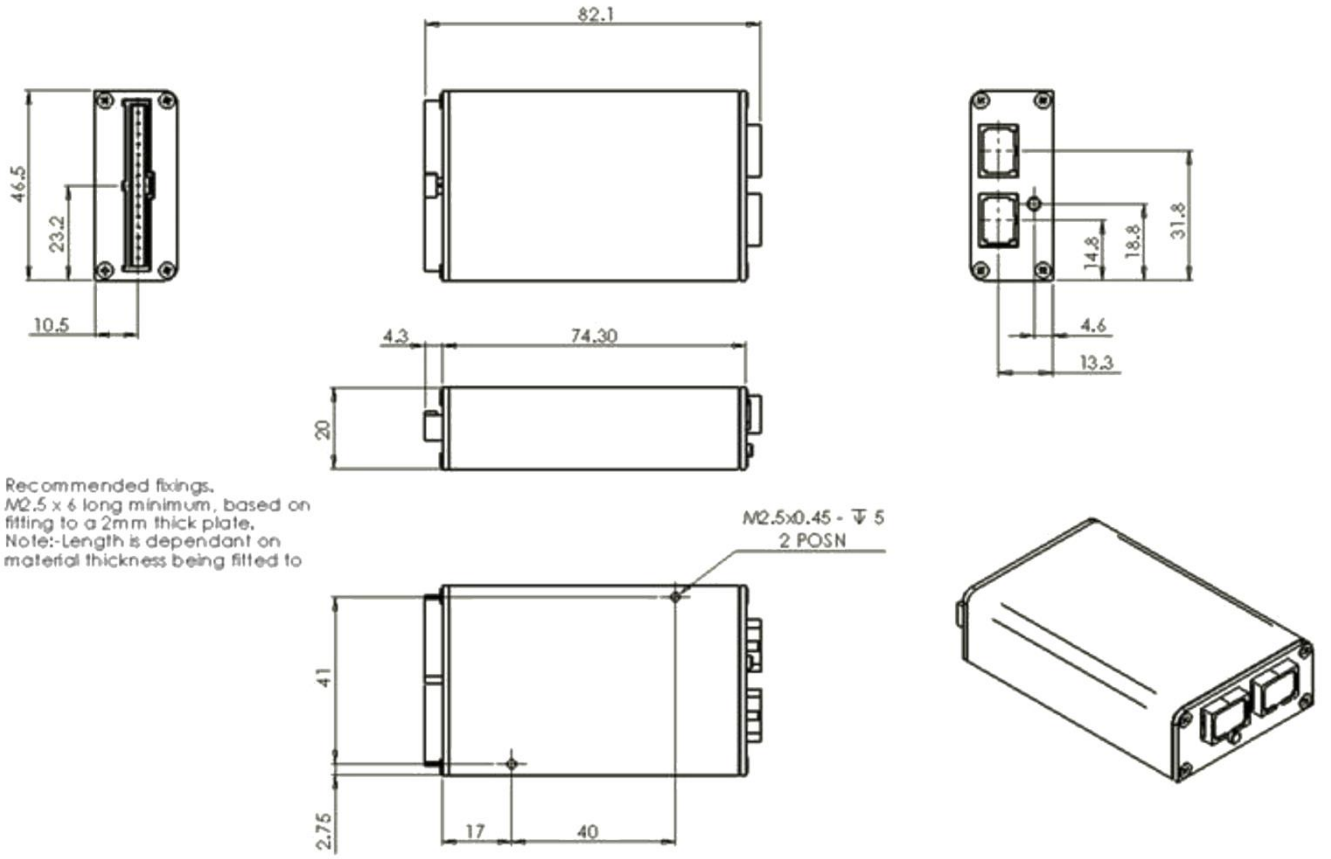
Detailed mechanical drawings are available of all ***ViaLiteHD*** modules on request.

Weight with mounting bracket fitted 130g typical
Weight without mounting bracket fitted 112g typical

4.3.1 **Blue Link – mounting dimensions, with rear plate**



4.3.2 **Blue Link – mounting dimensions, without rear plate**



5 Part numbering

For part numbering please refer to the relevant datasheet which can be found on our website or contact us.

6 Technical specifications

6.1 Technical specification, Splitter

6.1.1 Technical specification, Splitter, L-Band HTS

	Units		L-Band HTS 50 ohms without DC path	L-Band HTS 50 ohms with DC path	L-Band HTS 75 ohms
Module			HRD-1-L1-0R-01	HRD-2-L1-0R-41	HRD-1-L3-0R-41
Frequency range	MHz		700-2450		
Impedance, RF connector			50Ω SMA		75Ω BNC
VSWR	(typ)	[k]	1:1.5		
Insertion loss, path S1, port A-B	dB (typ)	[k]	4.2	4.8	4.0
Insertion loss, path S2, port C-B	dB (typ)	[k]	4.2	4.8	4.4
Flatness, fullband	dB (typ)		±0.4	±0.4	±0.4
Insertion loss, path S1, port A-B	dB (max)	[k]	5.0	5.5	5.0
Insertion loss, path S2, port C-B	dB (max)	[k]	5.0	5.5	5.0
Isolation, port A-C	dB (typ)		20	20	13
Maximum input Signal	dBm		+24		

DC pass though, maximum current	A		No DC path	0.8	No DC path
DC pass though, maximum Voltage	V		No DC path	25	No DC path
Power	W (max)		0.4		

Summary Alarm output			Open drain alarm: OPEN: Okay, CURRENT SINK: Alarm
Operating temperature range			-10°C to +50°C
Storage temperature range			-40°C to +70°C

All tests @ 25°C after 15 minutes warm up

[k] Measured @ 1.2GHz

6.1.2 Technical specification, Splitter, Wideband

	Units		Wideband 50 ohms without DC path			Wideband 50 ohms with DC path		
Module			HRD-1-S1-0R-01			HRD-2-S1-0R-41		
Frequency range	MHz		10-3000					
Impedance, RF connector			50Ω SMA					
VSWR	(typ)	[k]	1:1.5					
	MHz		10-1000	1000–2500	2500-3000	10-1000	1000–2500	2500-3000
Insertion loss, path S1, port A-B	dB (typ)	[k]	3.9	4.4	5.3	4.8	5.5	6.0
Insertion loss, path S2, port C-B	dB (typ)	[k]	3.9	4.3	5.2	4.8	5.5	5.5
Flatness, fullband	dB (typ)		±0.9					
Insertion loss, path S1, port A-B	dB (max)		4.5	5.0	6.0	5.3	6.0	6.5
Insertion loss, path S2, port C-B	dB (max)		4.5	5.0	6.0	5.3	6.0	6.5
Isolation, port A-C	dB (typ)		20	20	18	20	20	18
Maximum input Signal	dBm		+24					

DC pass though, maximum current	A		No DC pass through	0.8
DC pass though, maximum Voltage	V			25
Power	W (max)		0.4	

Summary Alarm output			Open drain alarm: OPEN: Okay, CURRENT SINK: Alarm
Operating temperature range			-10°C to +50°C
Storage temperature range			-40°C to +70°C

All tests @ 25°C after 15 minutes warm up

[k] Measured @ midband

6.2 Technical specification, 3 port switch

6.2.1 Technical specification, 3 port switch, L-Band HTS, high isolation

	Units		L-Band HTS 50 ohms without DC path	L-Band HTS 50 ohms with DC path	L-Band HTS 75 ohms
Module			HRS-1-L1-0R-01	HRS-4-L1-0R-41	HRS-1-L3-0R-01
Frequency range	MHz		700-2450		
Impedance, RF connector			50Ω SMA	50Ω SMA	75Ω BNC
VSWR	(typ)	[k]	1:1.5		
Insertion loss, LEFT, port A-B	dB (typ)	[k]	1.8	2.3	2.7
Insertion loss, RIGHT, port C-B	dB (typ)	[k]	1.8	2.3	2.7
Flatness, fullband	dB (typ)		±0.3	±0.4	±0.5
Insertion loss, LEFT, port A-B	dB (max)	[k]	2.5	3	3.5
Insertion loss, RIGHT, port C-B	dB (max)	[k]	2.5	3	3.5
Isolation, port A-C	dB (typ)		60	60	45
Maximum input Signal	dBm		+24		
DC pass-through current	A		No DC path	0.8	No DC path

Switching speed	uS (typ)		15
Power	W (max)		0.4

Summary Alarm output			Open drain alarm: OPEN: Okay, CURRENT SINK: Alarm
Operating temperature range			-10°C to +50°C
Storage temperature range			-40°C to +70°C

All tests @ 25°C after 15 minutes warm up

[k] Measured @ 1.2GHz

6.2.2 Technical specification, 3 port switch, wideband, high isolation, 50 ohm

	Units		Wideband 50 ohms without DC path			Wideband 50 ohms with DC path		
Module			HRS-1-S1-0R-01			HRS-4-S1-0R-41		
Frequency range	MHz		10-3000					
Impedance, RF connector			50Ω SMA					
VSWR	(typ)	[k]	1:1.5					
	MHz		10-50	50-1000	1000-3000	10-50	50-1000	1000-3000
Insertion loss, LEFT, port A-B	dB (typ)	[k]	2.0	1.7	2.5	3.0	2.5	3.0
Insertion loss, RIGHT, port C-B	dB (typ)	[k]	2.0	1.7	2.5	3.0	2.5	3.0
Flatness, fullband	dB (typ)		±0.5					
Insertion loss, LEFT, port A-B	dB (max)	[k]	2.75	2.5	3.0	3.7	3.0	3.7
Insertion loss, RIGHT, port C-B	dB (max)	[k]	2.75	2.5	3.0	3.7	3.0	3.7
Isolation, port A-C	dB (typ)		70	70	60	70	70	60
Maximum input Signal	dBm		+24					

Switching speed	uS (typ)		15
Power	W (max)		0.4

Summary Alarm output			Open drain alarm: OPEN: Okay, CURRENT SINK: Alarm
Operating temperature range			-10°C to +50°C
Storage temperature range			-40°C to +70°C

All tests @ 25°C after 15 minutes warm up

[k] Measured @ midband

6.2.3 Technical specification, 3 port switch, L-Band HTS, Low loss, 50 ohms

	Units		L-Band HTS 50 ohms
Module			HRS-3-L1-0R-01
Frequency range	MHz		700-2450
Impedance, RF connector			50Ω SMA
VSWR	(typ)	[k]	1:1.5
Insertion loss, LEFT, port A-B	dB (typ)	[k]	1.3
Insertion loss, RIGHT, port C-B	dB (typ)	[k]	1.3
Insertion loss, LEFT, port A-B	dB (max)	[k]	2
Insertion loss, RIGHT, port C-B	dB (max)	[k]	2
Isolation, port A-C	dB (typ)		45
Flatness, fullband	dB (typ)		±0.3
Maximum input Signal	dBm		+24

Switching speed	uS (typ)		15
Power	W (max)		0.4

Summary Alarm output			Open drain alarm: OPEN: Okay, CURRENT SINK: Alarm
Operating temperature range			-10°C to +50°C
Storage temperature range			-40°C to +70°C

All tests @ 25°C after 15 minutes warm up

[k] Measured @ 1.2GHz

6.3 Technical specification, Amplifier, single channel 30dB gain

	Units		Single Wideband 50 ohms
Module			HRA-1-S1-0R-02
Frequency range	MHz		10-3000
Impedance, RF connector			50Ω SMA
Stability			Unconditionally stable
VSWR	(typ)	[k]	1:1.5
Gain, maximum set	dB (typ)	[k]	30
Gain control range	dB (typ)	[k]	15.5
Gain control			Manual / SGC / AGC
Flatness, whole band	dB (typ)		±1.5
Noise figure [at maximum gain]	dB (typ)	[k]	6
Noise figure [at maximum gain]	dB (max)		9
P1dB, output [at maximum gain]	dB (typ)	[k]	20.5
P1dB, output [at maximum gain]	dB (min)		18.5
Maximum input Signal	dBm		+13

DC pass though, maximum current	A		No DC pass through
Power	W (typ)		2.4
Power	W (Max)		3.2

Summary Alarm output			Open drain alarm: OPEN: Okay, CURRENT SINK: Alarm
Operating temperature range			-10°C to +50°C
Storage temperature range			-40°C to +70°C

All tests @ 25°C after 15 minutes warm up

[k] Measured @ 1.2GHz

6.4 Technical specification, Serial digital modem

Item	Units		Value
Module type for RS232			HRB-1-00-8R-28-L1310
Module type for RS422			HRB-1-00-8R-28-L1310
Module type for RS485			HRB-1-00-8R-28-L1310
Module type for TTL			HRB-1-00-8R-29-L1310
Data Rate 1 (RS422 and RS485)	kbps	[a]	0 - 115
Data Rate 2 (RS422 and RS485)	kbps	[a]	0 - 500
Data Rate 3 (RS422 and RS485)	Mbps	[a]	0 - 10
Data Rate (TTL)	Mbps		0 - 10
Data Rate (RS232)	kbps		0 - 460
Input Impedance (RS422 and RS485)	ohm		120
Input Impedance (RS232)	kohm		>= 3
Input Impedance 1 (TTL)	ohm	[a]	50
Input Impedance 2 (TTL)	ohm	[a]	600
Input Impedance 3 (TTL)	kohm	[a]	10
TTL Drive Capability	ohm		50
Duty Cycle Distortion	%	[b]	5
Bit Error Rate	10E-8		< 1
RS Output Rise/Fall Time	ns	[c]	< 25
Jitter	mUI		< 10 (rms), 100(peak)
Delay	us	[d]	< 5

Optical Power	dBm (typ)		-10 (mean), -7 (peak)
Optical Budget	dB		10
Power	W (typ)		0.7
Power	W (max)		1.2

Summary Alarm output			Open drain alarm: OPEN: Okay, CURRENT SINK: Alarm
Operating temperature range			-10°C to +50°C
Storage temperature range			-40°C to +70°C

All tests @ 25°C after 15 minutes warm up

[a] configurable, [b] @115kbps, [c] @10Mbps, [c] with 1m fibre,

6.5 Technical specification, Gigabit Ethernet Fibre Optic Link

	Units		Value
Module type, 10km range			HRE-1-09-8R-20-L1310
Module type, 40km range			HRE-2-09-8R-20-S1550
Module type, 70km range			HRE-3-09-8R-20-S1550
Data rate	Gbps		1
Fibre interface			Gigabit Ethernet IEEE 802.3z Full duplex, two fibres

Optical Wavelength	nm	[a] [b] [c]	1310 ± 20 1550 ± 20 1550 ± 20 (1310nm/CWDM options available)
Average optical output power	dBm (typ)	[a] [b] [c]	-10 to -3 -3 to +3 0 to +5
Distance	km	[a] [b] [c]	10 40 70
Optical path loss	dB (typ)	[a] [b] [c]	0 to 10 0 to 20 5 to 23
Power	W (typ)		1.9

Summary Alarm output			Open drain alarm: OPEN: Okay, CURRENT SINK: Alarm
Operating temperature range			-20°C to +50°C
Storage temperature range			-40°C to +70°C

All tests @ 25°C after 15 minutes warm up

[a] 1310nm ,
[b] standard 1550nm,
[c] long distance 1550nm (min. 5dB optical attenuation required)

6.6 Technical specification, LNB Power Supply

	Units		Value
Input voltage	V		9 to 15
Max. output current	mA		700
Nominal output voltage	V		13 18 22
Efficiency	%		89 (typ)
Control, options			GUI [a] SNMP [a] Manual via on board DIP switches

Summary Alarm output			Open drain alarm: OPEN: Okay, CURRENT SINK: Alarm
Operating temperature range			-20°C to +50°C
Storage temperature range			-40°C to +70°C

All tests @ 25°C after 15 minutes warm up

[a] Requires compatible controller

7 Maintenance and fault finding guide

Refer to the following table that gives a list of commonly encountered problems and suggested solutions.

Fault	Possible Causes	Solution
Power LED does not illuminate.	Power is not connected to the PSU.	Connect mains power to the rear of the PSU. Check fuses of power leads.
	Module is not fully inserted.	Check module is properly aligned and handle pawls are fully engaged. Check there are no obstructions to the rear such as optical cable protective covers.
Difficulty inserting module.	Incorrect alignment.	Check that the module is correctly fitted in card guides.
	Incorrect module slot.	Check that module is in correct slot. Slots 1-13 for 5HP modules.
Alarm LED in ALARM state.	LNA Feed is in current limit.	Check external load.
	Laser degraded.	Return to local ***ViaLite Communications*** office.
	Low optical level at receiver.	Check optical link for breaks / kinks. Check all optical connectors are clean.
Low signal level.	Gain adjustment set too low.	Increase gain setting.
	RF feed not connected.	Check RF connections.
	Optical loss to high.	Check Optical connections.
	Incorrect manual or software gain settings.	Reset to factory default. Or reset to known good configuration.
High intermodulation levels.	Gain adjustment set too high.	Decrease gain setting.
	Incorrect manual or software gain settings	Reset to factory default. Or reset to known good configuration.

The ***ViaLiteHD*** range of RF Transmit and Receive Modules are precision engineered and calibrated for optimum performance and accuracy before dispatch.

In the event of any problems or queries arising with the equipment, please contact ***ViaLite Communications*** or your local agent.

8 Product Warranty

The guarantee / warranty period, unless otherwise agreed in writing, shall be as stated in document F292 - PPM Manufactured Product – Warranty, which is available at: https://ppm.co.uk/warranty-periods/. Extended warranty options are available at the time of purchase.

Prior to returning any goods for warranty or non-warranty repairs please contact PPM / ***ViaLite Communications*** for a returns reference.

9 FCC Approval

Information to the user of ***ViaLiteHD*** products
For a Class A digital device or peripheral, the following instructions are furnished to the user. This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at their own expense.

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