ViaLite
Low Frequency Timing Reference Fibre Optic Link

User Manual

LRx-T-HB-5

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Instrument Care and Safety Information

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

Electrical Safety

The ***ViaLite*** Power Supply Units are Safety Class 1 products (having a metal case that is directly connected to earth via the power supply cable).

When operating the equipment note the following:

- Hazardous voltages exist within the equipment. There are no user serviceable parts inside, and the covers should only be removed by suitably qualified personnel.
- The equipment does not have an isolating switch on the mains inlets. Equipment must be installed within easy reach of a clearly labelled dual pole mains isolation switch.
- Make sure that only fuses of the required rated current, and of the specified type (anti-surge, quick blow, etc.) are used for replacement.

Optical Safety

The ***ViaLite*** RF Transmitter modules contain laser diode sources operating from 1270nm to 1610nm. These devices are rated at under IEC825-1 "Safety Of Laser Products", Part 1, First Edition, 1993 as CLASS 1 radiation emitting devices.

When operating the equipment note the following:

- 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 accessible – always cap the connectors.
- Do not remove equipment covers when operating.
- Details of optical connections to the units, compatible fibre types and care instructions can be found in the ***ViaLite*** system handbook. Please read this section before using the link.

Adjustment, maintenance and repair of the equipment should only be carried out by suitably qualified personnel.

For more information on the *ViaLite* range of products, please refer to the generic *ViaLite* system handbook Lxx-HB.

TABLE OF CONTENTS

1 Introduction

The ***ViaLite*** Low Frequency Timing Reference Fibre Optic Link are a family of fibre optically coupled link systems designed for the transmission of various timing reference signals over long distances in electrically noisy environments, or in situations where the loss associated with coaxial cable cannot be tolerated.

This handbook covers the following ***ViaLite*** low frequency timing reference module part numbers:

- Transmitter units with part numbers starting
    - LRT-T1 (10kHz to 50MHz)
- Receiver units with part numbers starting
    - LRR-T1 (10kHz to 50MHz)

A typical system operates as follows.

The users' timing reference signal is input to the Transmitter Module, which contains RF signal conditioning and laser control circuitry. The module modulates the intensity of a beam of light with the RF signal.

The light travels through an optical fibre to the Receiver Module. The distance between transmitter and receiver can range from 10m to >50km depending on the system specified.

The Receiver Module converts the modulated light back into an electrical signal, which is available at the output of the unit.

Care of fibre optic connectors

NB: When the fibre optic cables are not connected, it is essential that the cable and equipment connectors are protected by the Dust Caps provided with the system. Failure to do so may result in damage to the fibre ends, which are critical to the system performance. Please refer to section 2.2 for fibre optic cable handling details.

2 Setting up and Understanding the Link

This section describes the connections between your Low Frequency Timing Reference Fibre Optic Transmitter and Receiver Modules, and the operation of both units in a system.

Please read fully document Lxx-HB for information on installing your ***ViaLite*** equipment before commissioning your RF link system.

2.1 Module Operation

2.1.1 Plug-in Modules

The Plug-In modules are designed for use in PPM's ***ViaLite*** 19" rack case. The module is powered from the rack case backplane and all connections are on the rear panel.

To fit the module, slide it into the desired rack case position until the backplane connector mates with the connector on the back of the unit. Push fully home and tighten the two fixing screws.

2.1.2 Shielded Remote Modules

The shielded remote modules are designed for use in electrically harsh environments and can withstand high electromagnetic fields.

Modules are powered using PPM mains power supplies, of which screened and low-cost versions are available. The module is fully operational once power is applied, and hence it is recommended that timing reference signal and optical connections be made before the unit is powered. The module can be mounted in any orientation using the four fixing holes provided through the case.

2.1.3 OEM Modules

OEM modules are compact and very small in dimensions. They are designed for integration into customers' host systems and can also be used in PPM outdoor environmental boxes.

Modules in this package are powered up by the external DC supply through the module 14pin header connector. The module also has a SMA connector for RF signal connection.

2.2 Fibre Optic Cable & Connectors

2.2.1 Connector and Cable Types

All ***ViaLite*** RF modules use singlemode (9µm/125µm) cable terminated with either FC/APC or E2000/APC optical connectors. Cross-site fibre optic cables are available from PPM as either standard patch leads or heavy-duty multicore cables.

Warning!
FC/APC and E2000APC are standards for angle-polished connectors and must not be confused with standard FC/PC and E2000 connectors respectively. The two connector-types are not interchangeable and mating one with the other will damage both the cable and the module connectors.

The specification of the FC/APC and E2000APC optical connector is critical to the performance of the complete fibre optic link. System performance can only be guaranteed with fibre optic cables and connectors supplied by PPM. FC/APC connectors must be "narrow key width" (see technical specification).

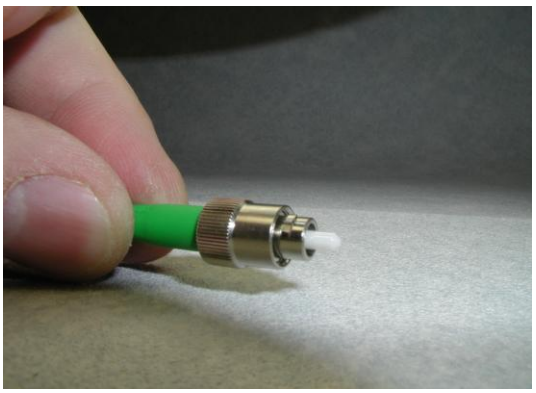
2.2.2 Connecting and Disconnecting

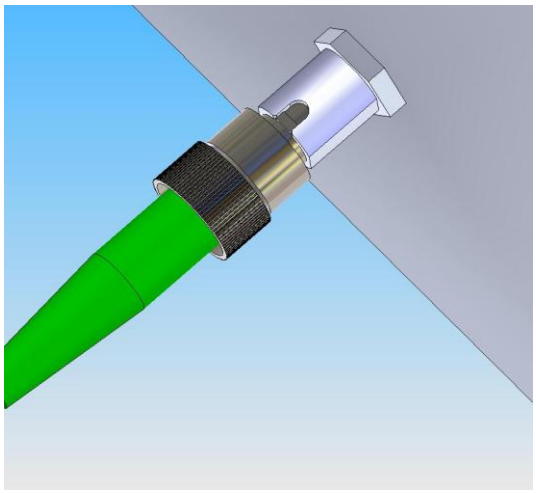
Before connecting optical fibres to the module or to each other, ensure that the mating connectors are clean (see below).

2.2.2.1 FC/APC

To connect FC/APC optical connectors, remove the dustcaps and align the white ceramic centre ferrule on the cable connector with the receptacle. There is a lug on the side of the ferrule, which must match the gap in the receptacle shroud. When they are aligned, gently push the plug home and finger tighten the knurled collet nut onto the threaded receptacle. See Figure 1 below.

Figure 1
(a) showing FC/APC connector with dust cap removed, (b) showing alignment of the lug on the side of the ferrule, which must match the gap in the receptacle shroud before gently pushing the plug home and finger tighten the knurled collet nut onto the threaded receptacle.


(a)


(b)

To disconnect FC/APC connectors, unscrew the knurled collet on the plug and gently withdraw the plug. Replace the dustcaps on both the receptacle and the cable plug.

Warning!
It is possible to tighten the knurled collet without aligning the lug and gap. This will result in poor light transmission. Check that the lug and gap are aligned before tightening the knurled collet.

2.2.2.2 E2000/APC

To connect E2000/APC optical connectors, simply push the connector positively into the receptacle until a click is heard. The protective shutter will automatically lift as the connector is mating.

To disconnect E2000/APC connectors, depress the lever on the connector to disengage, then withdraw the connector from the receptacle. The shutter is spring-loaded and should spring back to protect the ferrule.

Care and Cleaning
The optical connectors should be cleaned **before each and every use**, even where they have been protected with dust caps.

Cleaning items required
- Lint free fibre cleaning tissues and/or cleaning sticks(normal cosmetic tissues produce dust and are not acceptable);
- Reagent grade Iso Propyl Alcohol;
- Air duster or FILTERED compressed air line.

Cable Connector Cleaning
- Dampen a patch of cleaning tissue with IPA and clean all surfaces of the plug ferrule.
- Using a dry cleaning tissue, dry the ferrule and polish the end face.
- Using the air duster, blow away any residue from the end of the connector.

Module Female Receptacle Cleaning (only recommended if problems are being experienced)
- Either use a cleaning stick or twist a cleaning tissue to form a stiff probe, and moisten with IPA. Gently push the probe into the receptacle and twist around several times to dislodge any dirt.
- Repeat the above process with a dry tissue.
- Using the air duster, blow away any residue from the receptacle.

Important Notes
- IPA is flammable. Follow appropriate precautions / local guidelines when handling and storing.
- IPA can be harmful if spilt on skin. Use appropriate protection when handling.
- It should only be necessary to clean the female receptacles on the modules if problems are being experienced.

Never inspect an optical fibre or connector with the naked eye or an instrument unless you are convinced that there is no optical radiation being emitted by the fibre. Remove all power sources to all modules, and completely disconnect the optical fibres.

2.2.3 Minimum Bend Radius

Because the optical fibre is made of glass, it is important not to subject it to excessive stress. For this reason, each type of cable has a minimum bend radius (MBR) specification, beyond which the cable cannot be bent without permanent damage occurring.

Minimum Bend Radius of Fibre Optic Cable fitted to OEM modules is 50mm.

MBR specifications for PPM fibre are given in the ***ViaLite*** System Handbook Lxx-HB.

2.3 Using the Transmitter Module

2.3.1 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 input signal applied to the signal connector should be within the maximum and minimum signal levels given in the technical specifications section. This can be viewed or downloaded at the PPM website www.ppm.co.uk.

2.3.2 Front Panel Indicators (Plug-in Modules Only)

The transmitter has two front panel LEDs for indication of the state of the module. The following table shows the operation of the front panel LEDs :

	Upper LED (Power)	**Lower LED (Status)**
	Standard	**Standard**
OFF	Unit Off	Unit Off
GREEN	Unit OK	Laser OK
RED	Internal Fault	Laser Failed

2.3.3 Alarms and Monitors

The transmitter module has a single alarm, which registers the status of the transmit laser. Activation of this alarm registers an internal fault and the unit should be replaced with a spare and returned to your local PPM representative. The alarm state mimics the condition of the front panel Status LED.

Since the alarm is logic HIGH (OPEN) when activated and pulled LOW (SHORT) by a transmitter module in good health, the alarm at that rack position will be activated until a working transmitter is inserted. An unused rack position registers an alarm at that position. This alarm condition can be masked if an LRK1S or LRK2S Rack Case is used. Consult System Handbook Lxx-HB for details.

On the OEM units ONLY. The forward current monitor (IFL) gives an absolute measure of the laser drive current.
V_{IFL} = 68 x Ifwd (A). e.g. Laser drive current of 40mA, produces 2.7V.
Typical room temperature range is 20 to 50mA. [Suggested thresholds: 10/80mA]

2.4 Using the Receiver Module

2.4.1 Connecting the Module

Connect the receiver to the power source, fibre optic cross-site cable and timing signal as described in section 2.1.

2.4.2 Front Panel Indicators (Plug-in Modules Only)

The receiver has two front panel LEDs for indication of the state of the module. The following table shows the operation of the front panel LEDs :

	Upper LED (Power)	**Lower LED (Signal)**
	Standard	**Standard**
OFF	Unit Off	Unit Off
GREEN	Unit OK	Link OK
RED	Internal Fault	Excessive Link Loss

2.4.3 Alarms and Monitors

The receiver module has one alarm and one analogue voltage monitor. The alarm registers the status of the input light level. When the optical power at the input of the receiver unit is above the alarm threshold (equivalent to 20dB optical loss) the alarm is activated. As soon as the received light level is restored to a value above the threshold, the alarm is reset. The alarm state mimics the condition of the front panel Status LED.

Since the alarm is logic HIGH (OPEN) when activated and pulled LOW (SHORT) by a receiver with a strong optical input signal, the alarm at that rack position will be activated until a working receiver is inserted. An unused rack position registers an alarm at that position. This alarm condition can be masked if an LRK1S or LRK2S Rack Case is used. Consult System Handbook Lxx-HB for details.

There is also a Received Light Level (RLL) monitor on the backplane connector. This enables the user to measure received optical power for each channel. This can be done either manually or via a system management console (if applicable) connected to the rack case alarm connector. See document Lxx-HB for details of the Alarm Concentrator Connector.

The RLL monitor gives an absolute measure of the optical power at the receiver module. RLL Output Voltage = 7.75V at nominal system gain (0dB optical loss) and reduces by 0.25dB per dB optical loss (0.125V per dB of RF link loss). This monitor is covered in further detail in the commissioning procedure section. The RLL has a linear monotonic characteristic over a minimum of 20dB optical loss (approx 2.25V to 7.75V).

2.5 LNA Feed

All information in this section refers to fibre optic transmitter modules only. LNA voltages are fed **out** through the RF **input** connector on the Tx modules.

OEM Modules

Modules in this range DO NOT offer an internally generated LNA feed voltage.
Some modules do offer an ability to route a user fed LNA voltage through PIN 13 on the 14-way header, details shown below.
When using PPM Outdoor Enclosure, external LNA feed is available via the outdoor enclosure motherboard.

Plug-In Modules

Depending on bandwidth there are options for internally generated 5V or 12V LNA feed, and special options to route a user fed LNA voltage through PIN 14 of the rear 15-way D-sub Connector, details shown below.
It is not possible to route a user fed LNA voltage through PIN 14 of the rear 15-way D-sub Connector on any modules that have been purchased with internally generated LNA feeds.

Module Series	**Module**		
	OEM Modules	**Plug-In Modules**	
		Standard & Standard Options	**Special Options (please contact PPM when ordering, no part code exists)**
T, Timing 10kHz-50MHz	External +/-36Vdc 180mA LNA feed allowed. To enable apply voltage to PIN 13 of the 14 way header connector.	LRT-T1-6R-0x-S1310 (0 in Transmitter part number signifies standard external feed +/-36Vdc at 180mA max from PIN 14 of the 15-way D-sub connector on chassis or converter sleeve) LRT-T1-6R-1x-S1310 (1 in Transmitter part number signifies standard internally generated 5Vdc feed @ 80mA) LRT-T1-6R-2x-S1310 (2 in Transmitter part number signifies standard internally generated 12Vdc feed @ 80mA)	None

3 System Integration

3.1 Link Loss Budget Calculations

The link gain (Transmitter RF input level to Receiver RF output level) depends on the following factors:

- Optical loss (due to connector insertion loss and optical fibre loss)
- Transmitter gain setting
- Receiver gain setting

The actual link gain can be determined as follows:

Link gain = Nominal Link Gain – 2 x (optical loss) [dB]

where

Optical loss = connector insertion losses + fibre losses

3.1.1 Optical Loss

The additional **electrical** insertion loss in dB resulting from **optical** losses is equal to 2 times that of the **optical** loss in dB. This is due to the physics of the optical-to-electrical conversion process in the receiver. For example, a 1dB increase in optical insertion loss will result in a 2dB decrease drop in RF signal at the output of the optical receiver.

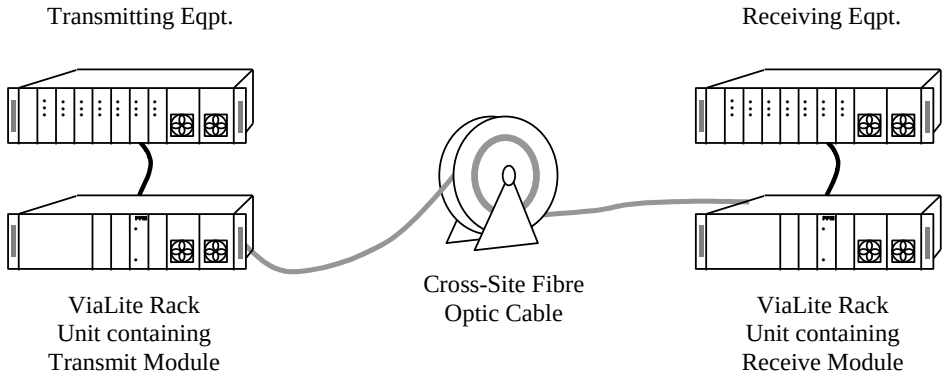
For single-mode fibre (e.g. SMF28), the **optical** loss at the 1310nm operating wavelength of the ***ViaLite*** RF Analogue links is 0.4dB/km. For 1550nm operating wavelength, the **optical** loss of the ***ViaLite*** RF Analogue link is 0.2dB/km This is increased if the fibre is under excessive tension, compression or is bent into a small radius.

For clean, new, undamaged single-mode connectors, the **optical** insertion loss is typically 0.12dB per connector. The losses at the optical connections at the Transmitter and Receiver are allowed for during manufacture of the module, and may be ignored during link gain calculations.

For short links (<250m) containing no additional optical connectors, and in which the fibre is not subject to any strain, then the optical path loss can be ignored.

3.2 Typical System Configuration

The diagram below illustrates a typical transmission system configuration.



The link gain for the fixed gain systems depends solely on the loss through the optical fibre link from transmitter to receiver.

This makes the calculation of link gain a simple matter for calculation:

Link gain = Nominal Link Gain – 2 x (optical loss) [dB]

where the optical loss of individual components in the optical link (fibre, bulkhead connectors, splitters etc.) can be calculated from the typical values shown in section 3.1.

There is a Received Light Level (RLL) monitor output on the receive modules which can be used to measure the amount of laser light from the transmitter reaching the receiver during operation. This feature is only available on plug-in receiver modules.

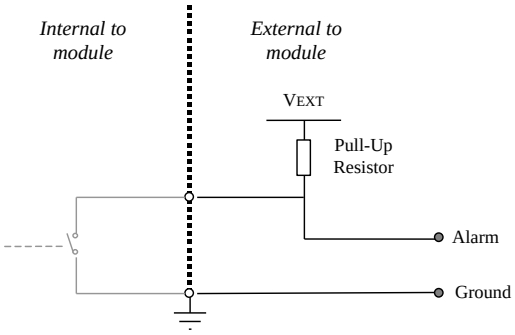
The RLL threshold alarm (which is triggered when the RLL drops below a preset level) can be used to determine if the optical link has been damaged or degraded. This is visible as an alarm on the front panel and an open collector alarm on the alarm concentrator connector (see handbook Lxx-HB).

3.3 Alarms & Monitoring

3.3.1 Module Alarm Output

The circuit below shows how the alarm output should be configured for all types of ViaLite module. The switch (to the left of the dotted line) is internal to the module. The circuitry to the right of the dotted line is provided by the system user*.

In the presence of an alarm condition, the module will act as a high impedance node and will NOT sink current. This is a fail-safe system in that an alarm condition will be raised when a module is not present. This is an important factor when commissioning link management systems, as blank module positions will register module faults.



* This circuitry is also provided by the Redundancy Switch module and the Alarm Concentrator module. When either of these modules are used, the alarm outputs can not be considered "VOLT FREE". This is because the Redundancy Switch module and the Alarm Concentrator modules use the same module alarm outputs to detect whether a unit has failed. When these modules are used, a voltage of between 5V and 12V may be present on the 'Alarm' output line when the module is in the failed mode. When the module is working correctly, the voltage on the 'Alarm' output line will be 0V (+1.0/-0). If true "VOLT FREE" contacts are required, please consult PPM.

Maximum current = 50mA
Maximum voltage = 15V

3.3.2 Module Monitor Output

All modules also provide an analogue monitor output for monitoring the condition of the Optical transmitter / receiver. Details of the monitor can be found in the technical specifications in section 5 of this document.

3.3.3 Monitoring via SNMP and web page

For many installations a critical requirement is the ability for overall system health to be monitored remotely. This is achieved using a ViaLite SNMP Network Monitoring Module which allows users to monitor the status all fibre optic modules and power supplies in a ViaLite rack. A single Network Monitoring Module also has the capability to monitor all modules in a second rack where required.

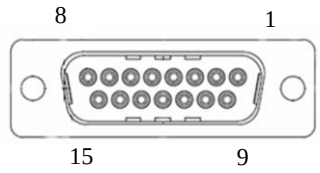
By connecting to a LAN via the front mounted Ethernet port on the module all alarm information is immediately accessible via a Web page (using standard browsers) or SNMP compliant management system.

Contact PPM or your local agent for more details

3.3.4 Module Alarm & Monitor Connection, Plug-in

Connection is made to the module by the 15-way D-Sub connector on the rear of the rack backplane.

Pin	Function
1	Do Not Connect
2	Do Not Connect
3	Do Not Connect
4	Do Not Connect
5	Alarm Output
6	+12V from rack supply
7	External Feed (option)
8	Ground
9	Do Not Connect
10	Do Not Connect
11	Do Not Connect
12	Do Not Connect
13	Analogue Monitor Output
14	External LNA Feed (option)
15	Ground



View looking into connector

3.3.5 Module Alarm & Monitor Connection, Shielded Remote

Connection is made to the module by the Lemo 1B 8-pole free plug on the rear of the rack backplane.

Pin Number	Function
1	Alarm Output
2	Do Not Connect
3	Do Not Connect
4	Ground
5	Vsupply
6	Do Not Connect
7	Do Not Connect
8	Analogue Monitor Output

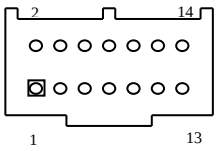
Looking into panel mount socket

Looking into Assembled plug

3.3.6 Module Alarm & Monitor Connection, OEM

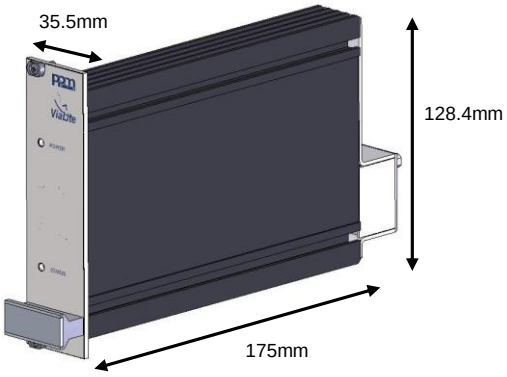
Connection is made to the module by the 14pin boxed header Molex (C-Grid III), 0.1" dual row connector. All OEM modules are supplied with a 250mm interface cable.

Pin Number	Name	Cable Colour	Function
1	Tx_A	Pink	Do Not Connect
2	Rx_A	Pink	Do Not Connect
3	Tx_B	Pink	Do Not Connect
4	Rx_B	Pink	Do Not Connect
5	Dig_Alm	Orange	Alarm Output
6	RTS	Pink	Do Not Connect
7	+Va	Red	+12V from supply
8	0v	Black	Ground
9	Rx_232	Pink	Do Not Connect
10	Tx_232	Purple	Do Not Connect
11	0v	Black	Ground
12	Det_Opt_Tx	Pink	Do Not Connect
13	LNA_Feed	White	External LNA Feed (option)
14	An_Alm	Green	Analogue Monitor Output

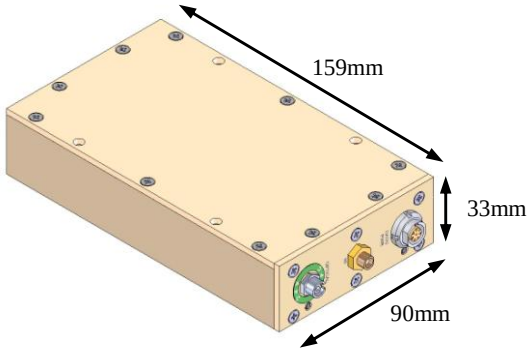


Top view, 14 pin header

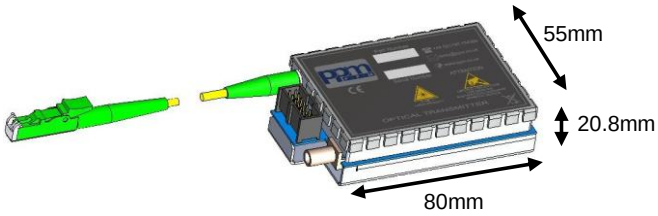
3.3.7 Mechanical Dimensions



Plug in module



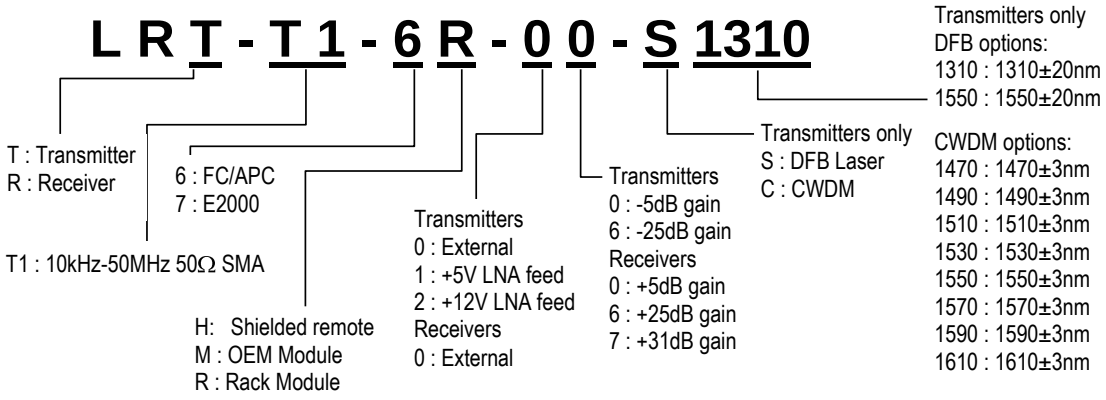
Shielded remote module



OEM module

Contact PPM for detailed dimensions

4 Part Numbering



5 Technical Specifications

	Units		Rack mounted High Input Level	Rack mounted Low Input Level	Rack mounted Optical Splitting	Rack mounted High Gain	Rack mounted Standard gain
Transmitter			LRT-T1-6R-06-S1310	LRT-T1-6R-00-S1310	LRT-T1-6R-06-S1310	LRT-T1-6R-00-S1310	LRT-T1-6R-05-S1310
Receiver			LRR-T1-6R-06	LRR-T1-6R-00	LRR-T1-6R-07	LRR-T1-6R-07	LRR-T1-6R-05
Frequency Range	MHz		0.01-50	0.01-50	0.01-50	0.01-50	0.01-50
Impedance	Ω		50	50	50	50	50
VSWR	(Typ)		1:1.5	1:1.5	1:1.5	1:1.5	1:1.5
Link Gain	dB (Nom)	a	0	0	6	26	0
Transmitter Gain		a	Fixed (-25dB)	Fixed (-5dB)	Fixed (-25dB)	Fixed (-5dB)	Fixed (-15dB)
Receiver Gain		a	Fixed (+25dB)	Fixed (+5dB)	Fixed (+31dB)	Fixed (+31dB)	Fixed (+15dB)
Flatness, Fullband	dB (Max)	a h j	±0.5	±0.5	±0.5	±0.5	±0.5
Flatness, Fullband	dB (Typ)	a h j	±0.2	±0.2	±0.2	±0.2	±0.2
Gain Stability over temperature, Link	dB (max)	a	±3	±3	±3	±3	±3
Gain Stability with temperature, Tx	dB/°C (Typ)	a	0.09	0.09	0.09	0.09	0.09
Gain Stability with temperature, Rx	dB/°C (Typ)	a	0.05	0.05	0.05	0.05	0.05
Gain Stability	dB (Typ)		0.25 @ 24 hrs	0.25 @ 24 hrs	0.25 @ 24 hrs	0.25 @ 24 hrs	0.25 @ 24 hrs
IMD	dB (Typ)	c	-30	-29	-42	-40	-46
CNR	dB (Typ)	b	60	62	60	62	56
Nominal input Signal	dBm		0	-20	0	-20	-20
Nominal output Signal	dBm		0	-20	0	-20	-20
P1dB$_{input}$	dBm (Min)	c k	12	-12	8	-16	0
P1dB$_{input}$	dBm (Typ)	c k	13	-8	9	-12	1
IP3$_{input}$	dBm (Min)	a k	24	0	21	-4	12
IP3$_{input}$	dBm (Typ)	a k	25	4	22	0	13
IP3$_{output}$	dBm (Typ)	c k	15	-5	21	20	3
Noise Figure	dB (Max)	a k	43	20	43	20	28
Noise Figure	dB (Typ)	a k	37	15	37	15	22
Noise Figure	dB (Typ)	c k	43	21	43	22	27.5
CNR , 1MHz BW @ -40dB IMD	dB (Typ)	a	82	83	79	79	85
CNR , 1MHz BW @ -40dB IMD	dB (Typ)	c	76	77	76	77	79
SFDR	dB/Hz⅔ (Typ)	b	108	108	105	105	110
Maximum Input Power	dBm (Min)		25	13	25	13	13
Power Tx	W (Max)		3.1	3.1	3.1	3.1	2.4
Power Rx	W (Max)		2.2	1.9	2.3	2.3	2.3
Power Tx	W (Typ)		3	2.8	3	2.8	2.3
Power Rx	W (Typ)		1.9	1.5	2	2.1	2.2
RF connector			50Ω SMA	50Ω SMA	50Ω SMA	50Ω SMA	50Ω SMA
Module Supply Voltage							
Rack modules			+12V ± 0.5V	+12V ± 0.5V	+12V ± 0.5V	+12V ± 0.5V	+12V ± 0.5V
OEM modules			+12V ± 0.5V	+12V ± 0.5V	+12V ± 0.5V	+12V ± 0.5V	+12V ± 0.5V
External LNA Supply Voltage			EITHER:	Internally generated +5V @ 80mA to RF centre conductor			
Rack Plug-in AND Shielded remote modules			OR:	Internally generated +12V @ 80mA to RF centre conductor			
			OR:	±36V max. 180mA max. from External LNA Feed to RF centre conductor			
OEM module			ONLY:	±36V max. 180mA max. from External LNA Feed to RF centre conductor			
Optical Wavelength	nm	d e	1310 ± 20	1310 ± 20	1310 ± 20	1310 ± 20	1310 ± 20
Laser Type		f	DFB	DFB	FP	DFB	DFB
Optical Power Output	dBm (Typ)		4.5	4.5	4.5	4.5	4.5
Optical Connector		g	FC/APC	FC/APC	FC/APC	FC/APC	FC/APC
			FC/APC: Suhner FCPC-Z/M-A601 narrow keywidth: >60dB return loss				
			E2000/APC: Suhner FLSH-2000-A608: >60dB return loss				
			Use with other types may compromise system performance.				
Power LED			GREEN Indicates DC power is applied to the module				
TX status LED			GREEN: Transmitter laser functioning, RED: Transmitter laser degraded				
RX status LED			GREEN: Received light level above threshold RED: Received light level below threshold Received light level threshold, 20dB±3dB optical loss				
TX Alarm output			Open drain alarm: OPEN: okay, CURRENT SINK: Laser Degraded				
RX Alarm output			Open drain alarm: OPEN: okay, CURRENT SINK: RLL below threshold				
TX monitor output (OEM only)			None				
RX monitor output			Analogue Received Light Level (RLL) monitor. VOLTAGE = 7.75V nominal @ 0dB optical loss reduces by 0.25V per dB of optical loss				
Operating temperature range			-10°C to +50°C	-10°C to +50°C	-10°C to +50°C	-10°C to +50°C	-10°C to +50°C
Storage temperature range			-40°C to +70°C	-40°C to +70°C	-40°C to +70°C	-40°C to +70°C	-40°C to +70°C
Gain Stability over Temperature Link	dB (Typ)	a	< +/-3dB over operating range				
Gain Stability over Temperature TX	dB (Typ)	a	<0.05dB/°C below 40°C typ., <0.08dB/°C above 40°C typ.				
Gain Stability over Temperature RX	dB (Typ)	a	<0.03dB/°C typ.				
MTBF–Ground, fixed, 50°C, MIL-HDBK-217			Rx - 300,000 Hours incl. contribution from housing (plug-in) Tx – 60,000 Hours incl. contribution from housing (plug-in)				

a	nominal input power @ 0dB optical loss
b	nominal input power @ 1dB optical loss
c	nominal output power @ 5dB optical loss
d	1550nm options available
e	CWDM options available
f	DFB = Distributed feedback laser, FP = Fabry-Perot laser
g	Connector options FC/APC, E2000 available
h	Variable gain units flatness is quoted at 0dB gain offset
j	Gain variance across control range less than double that at 0dB
k	Measured at 1.2GHz
	Unless stated all test quotes @ 25°C after 15 minutes warm up

6 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
"+12V" LED is not illuminated on the Plug-In PSU.	Power is not attached to the PSU. Fuse has blown in PSU.	Connect mains power to the PSU. Replace fuse.
Power LED does not light on Shielded Remote Module.	Power source not connected.	Connect power source.
Power LED lights up RED.	External Feed is in current limit.	Check external load.
Status LED lights up RED but RF signal is present.	Laser degraded.	Return to local PPM office.
Status LED lights up RED and no RF signal is present.	Low optical level at receiver.	Check optical link for breaks / kinks
Status LED lights up GREEN but no RF signal is present.	Gain adjustment set too low. RF feed not connected.	Increase gain setting. Check RF connections.

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

However, in the event of any problems or queries arising about the equipment, please contact PPM or your local agent.

7 Product Warranty

The Company guarantees its products, and will maintain them for a period of three years from the date of shipment and at no cost to the customer. Extended warranty options are available at the time of purchase.

Please note that the customer is responsible for shipping costs to return the unit to PPM.

The Company or its agents will maintain its products in full working order and make all necessary adjustments and parts replacements during the Company's normal working hours provided that the Customer will pay at the rates currently charged by the Company for any replacements made necessary by accident, misuse, neglect, wilful act or default or any cause other than normal use.

Claims must be made promptly, and during the guarantee period.

IMPORTANT: -

Please contact both your selling agent and PPM prior to returning any goods for Warranty or Non-Warranty repairs. Goods will not be accepted without a valid Goods Return Number (GRN)

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