2408LT
Stand-Alone L-Band Fiber Optic Transmitter

Instruction Manual

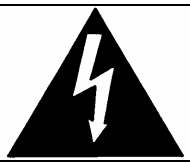
EVERTZ MICROSYSTEMS LTD.
5288 John Lucas Drive,
Burlington, Ontario, Canada
L7L 5Z9

Phone:	+1 905-335-3700	Internet:	Sales:	sales@evertz.com
Sales Fax:	+1 905-335-3573		Tech Support:	service@evertz.com
Tech Support Phone:	+1 905-335-7570		Web Page:	http://www.evertz.com
Tech Support Fax:	+1 905-335-7571			

Revision 1.5, August 2009

This page left intentionally blank

IMPORTANT SAFETY INSTRUCTIONS

	The lightning flash with arrowhead symbol within an equilateral triangle is intended to alert the user to the presence of un-insulated “Dangerous voltage” within the product’s enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.
	The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (Servicing) instructions in the literature accompanying the product.

- Read these instructions
- Keep these instructions.
- Heed all warnings.
- Follow all instructions.
- Do not use this apparatus near water
- Clean only with dry cloth.
- Do not block any ventilation openings. Install in accordance with the manufacturer’s instructions.
- Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
- Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than other. A grounding-type plug has two blades and a third grounding prong. The wide blade or the third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
- Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles and the point where they exit from the apparatus.
- Only use attachments/accessories specified by the manufacturer
- Unplug this apparatus during lightning storms or when unused for long periods of time.
- Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

WARNING
TO REDUCE THE RISK OF FIRE OR ELECTRIC – SHOCK, DO NOT EXPOSE THIS APPARATUS TO RAIN OR MOISTURE

WARNING
DO NOT EXPOSE THIS EQUIPMENT TO DRIPPING OR SPLASHING AND ENSURE THAT NO OBJECTS FILLED WITH LIQUIDS ARE PLACED ON THE EQUIPMENT

WARNING
TO COMPLETELY DISCONNECT THIS EQUIPMENT FROM THE AC MAINS, DISCONNECT THE POWER SUPPLY CORD PLUG FROM THE AC RECEPTACLE

WARNING
THE MAINS PLUG OF THE POWER SUPPLY CORD SHALL REMAIN READILY OPERABLE

INFORMATION TO USERS IN EUROPE

NOTE

This equipment with the CE marking complies with both the EMC Directive (2004/108/EC) and the Low Voltage Directive (2006/95/EC) issued by the Commission of the European Community.

Compliance with these directives implies conformity to the following European standards:

- EN60065 Product Safety
- EN55103-1 Electromagnetic Interference Class A (Emission)
- EN55103-2 Electromagnetic Susceptibility (Immunity)

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to the European Union EMC directive. 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 his own expense.

CE	EN600065 EN55103-1: 1996 EN55103-2: 1996	Safety Emission Immunity

	EN504192 2005 Waste electrical products should not be disposed of with household waste. Contact your Local Authority for recycling advice

INFORMATION TO USERS IN THE U.S.A.

NOTE

FCC CLASS A DIGITAL DEVICE OR PERIPHERAL

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 his own expense.

WARNING

Changes or modifications not expressly approved by Evertz Microsystems Ltd. could void the user's authority to operate the equipment. Use of unshielded plugs or cables may cause radiation interference. Properly shielded interface cables with the shield connected to the chassis ground of the device must be used.

Evertz Microsystems Ltd FC For Commercial Use	Tested to comply with FCC Standards	This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: This device may cause harmful interference, and this device must accept any interference received, including interference that may cause undesired operation.

REVISION HISTORY

REVISION	DESCRIPTION	DATE
1.0	First Release	Jan 08
1.1	Removed 2406LT	Jul 08
1.2	Added Safety and Compliance Info	Sept 08
1.3	Updated specifications and connector information	Sept 08
1.4	Updated specifications, other corrections	July 09
1.5	Updated connector info, other corrections	Aug 09

CAUTION

If the LNB POWER LED is on or flashing, there will be DC voltage for LNB power at the RF INPUT connector. This can damage some test equipment.

The user can turn off the LNB power by switching LNB MODE switch to the OFF position.

TABLE OF CONTENTS

1. OVERVIEW 1

2. INSTALLATION 2

2.1. 2408LT CONNECTIONS 3

2.2. CARE AND HANDLING OF OPTICAL FIBER 3

2.2.1. Safety 3
2.2.2. Assembly 4
2.2.3. Labeling 4
2.2.4. Handling and Connecting Fibers 4

3. 2408LT SPECIFICATIONS 5

3.1. RF INPUT 5

3.2. MONITOR OUTPUT 5

3.3. OPTICAL OUTPUT 5

3.4. ELECTRICAL 5

3.5. PHYSICAL 6

3.6. SYSTEM PERFORMANCE (WHEN COMBINED WITH A 7708LRA) 6

4. STATUS INDICATORS 7

4.1. RF DRIVE INDICATOR 7

4.2. LNB POWER INDICATOR 8

4.3. DC INPUT INDICATOR 8

5. USER CONTROLS 9

5.1. GAIN ADJUST 9

5.2. LNB MODE 9

Figures

Figure 1-1: 2408LT Block Diagram 1
Figure 2-1: 2408LT Module 2
Figure 2-2: 2408LT Mounting Hole Centers and Dimensions – mm [in] 2
Figure 2-3: Reproduction of 2408LT Certification and Identification Label for Models that are Class 1 Laser Products 4

Tables

Table 4-1: LED Trip Points for RF DRIVE LED for Each Gain Setting 7
Table 5-1: Gain Adjustment Switch 9
Table 5-2: LNB Mode Switch 9

1. OVERVIEW

The 2408LT is a fiber optic transmitter used for transporting L-Band satellite signals over a fiber optic cable. The 2408LT accepts one L-Band RF input on an F-Type connector and provides a fiber optic output. An L-Band RF output is also provided for monitoring of the input RF signal. This port provides a copy of the input signal prior to any manual or AGC gain control. The DC power input is via an F-Type connector. The 2408LT sends SmartMON™ monitoring and configuration status information down the fiber for viewing locally at an Evertz SmartMON™-capable fiber optic receiver and remotely via SNMP/VistaLINK®. Please refer to the 7708LRA manual for details on the parameters monitored.

Features:

- Extended L-Band frequency range - 250 to 2250MHz
- Protocol transparent - handles all video, audio and data modulation formats
- RF input signal, configuration status and other operating parameters are relayed over fiber for monitoring by an Evertz SmartMON™-capable fiber optic receiver. With such a receiver, this information can be monitored locally at the receiver's card-edge, or remotely through SNMP and *Vista*LINK®. See fiber optic receiver manual for details.
- Automatic and manual gain control
- L-Band monitor coaxial output
- Can inject LNB power (as provided by connected DC power supply, or regulated down to 13VDC) into the RF input cable for LNB powering
- Can inject 22 kHz (selectable on/off) into the RF input cable for LNB local oscillator control
- -WP version provides IP65 dust and water protection for mounting outdoors without a supplemental enclosure

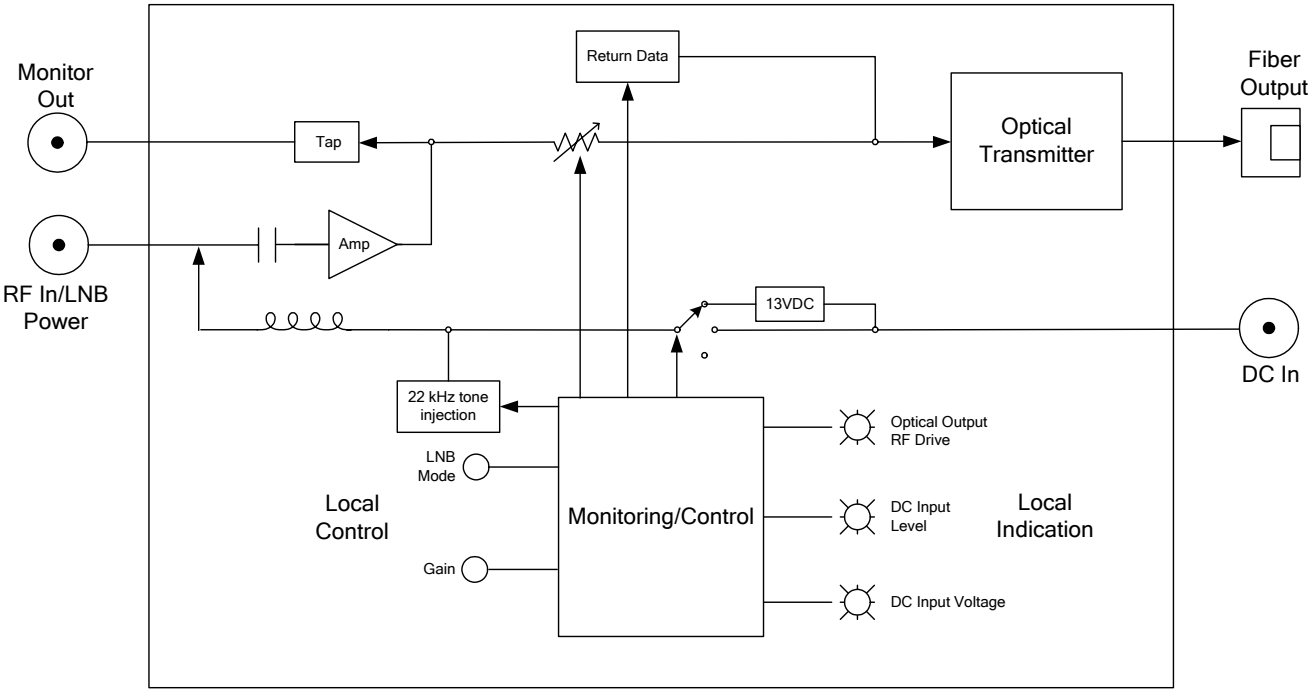


Figure 1-1: 2408LT Block Diagram

2. INSTALLATION

The 2408LT comes in a die cast enclosure with integral mounting flanges. It is recommended that the enclosure be mounted on a flat surface with the connectors facing down. For units with the -WP option exposed to the elements, while not required to prevent water ingress into the unit, good outdoor installation practice suggests the use of waterproof connectors, boots and/or protecting connectors with a wrap of Scotch 130C rubber tape followed by Scotch Super 88 vinyl tape, or equivalent.

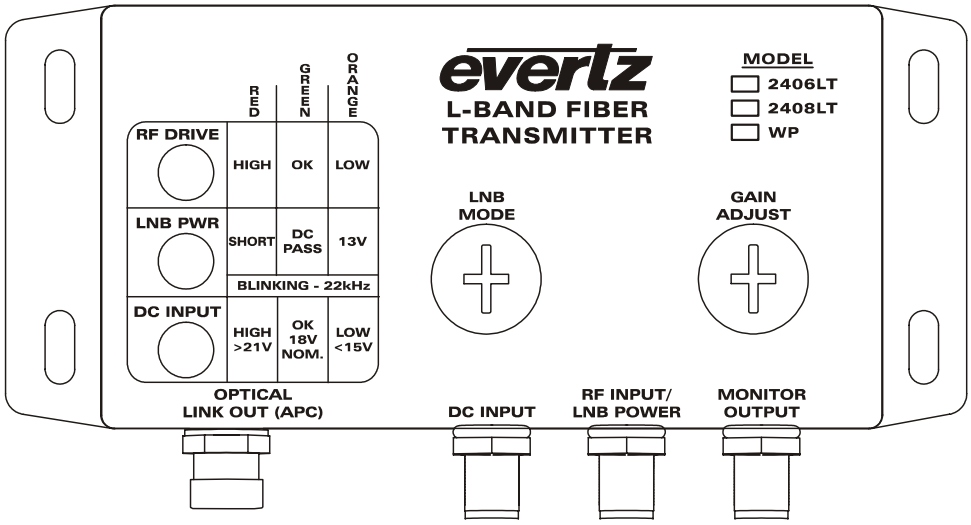


Figure 2-1: 2408LT Module

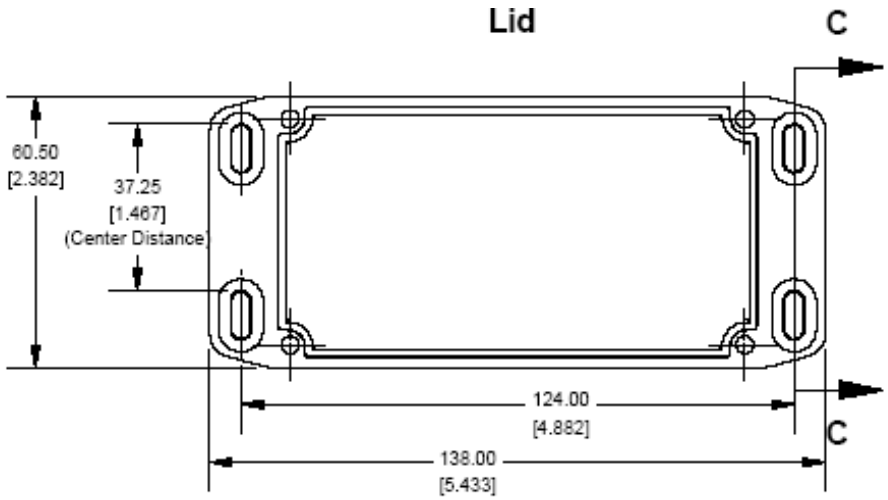


Figure 2-2: 2408LT Mounting Hole Centers and Dimensions – mm [in]

2.1. 2408LT CONNECTIONS

Coaxial connectors accept conductors in the range of 21-19 AWG (0.41-0.64 mm^2). Using a larger conductor will damage the connector. If you are using cable with a center conductor larger than 19 AWG (0.64 mm2), a connector with a fixed or crimp pin of a suitable diameter must be used (e.g. Amphenol Connex 222123 (for RG6) or Canare FP-C series).

RF IN: Input F-Type connector for L-band satellite signals. This connector can also provide LNB power and 22 kHz tone back to the satellite dish.

If LNB POWER LED is on or flashing, there will be DC voltage for LNB power at the RF INPUT connector. This can damage some test equipment.

The user can turn off the LNB power by switching LNB MODE switch to the OFF position.

MONITOR OUT: Output F-Type connector provides a buffered copy of the incoming RF signal for monitoring purposes (signal peaking, etc.) or coaxial distribution.

While unused, it is recommended that this connector be terminated with a 75 Ohm load.

DC IN: Input F-Type connector for DC power supply. Input power supply range is from 9-23 VDC.

Do not exceed 22VDC at the DC input connector or damage to the unit will result.

FIBER OUTPUT: FC/APC female connector with the optical output from the 2408LT. This connector should be connected to the FIBER IN connector of an appropriate Evertz companion receiver model at the destination end with a suitable fiber optic cable. The 2408LT transmits on the 1310 wavelength unless otherwise indicated by the wavelength label.

2.2. CARE AND HANDLING OF OPTICAL FIBER

2.2.1. Safety

CLASS 1 LASER PRODUCT

Background colour: yellow
Triangular band: black
Symbol: black

CAUTION: USE OF ANY CONTROLS, ADJUSTMENTS, OR PROCEDURES OTHER THAN THOSE SPECIFIED HEREIN MAY RESULT IN HAZARDOUS RADIATION EXPOSURE

Background colour: yellow
Triangular band: black
Symbol: black

2.2.2. Assembly

Assembly or repair of the laser sub-module is done only at Evertz facility and performed only by Evertz technical personnel.

2.2.3. Labeling

Certification and Identification labels are combined into one label.

- Date of manufacture on this label can be traced by serial number.
- Class 1 Laser Products: The Model number is one of the following 2408LTA13 or 2408LTxx (xx = 27, 29, 31, 33, 35, 37, 43, 45, 47, 49, 51, 53, 55, 57, 59, 61)

Figure 2-3: Reproduction of 2408LT Certification and Identification Label for Models that are Class 1 Laser Products

2.2.4. Handling and Connecting Fibers

Never touch the end face of an optical fiber. Always keep dust caps on optical fiber connectors when not connected and always remember to properly clean the optical end facet of a connector before making a connection.

The transmission characteristics of the fiber are dependent on the shape of the optical core and therefore care must be taken to prevent fiber damage due to heavy objects or abrupt fiber bending. Evertz recommends that the user maintain a minimum bending radius of 5 cm to avoid fiber-bending loss that will decrease the maximum attainable distance of the fiber cable.

3. 2408LT SPECIFICATIONS

3.1. RF INPUT

Connector:	F-type
Conductor Range:	21-19 AWG (0.41-0.64 mm^2)
I/O Impedance:	75 Ω
Return Loss:	>15dB
Input Frequency Range:	250MHz – 2150MHz
Input Power Range:	-10 to –60dBm
AGC Hold Range:	-8 to –38dBm +/- 2dBm
LNB Voltage:	Pass through from DC input -0.3VDC or 13 VDC, selectable
Maximum LNB Current:	500mA, current limited

3.2. MONITOR OUTPUT

Connector:	F type
Conductor Range:	21-19 AWG (0.41-0.64 mm^2)
I/O Impedance:	75 Ω
Return Loss:	>13dB
Output Frequency Range:	250MHz – 2150MHz
Flatness:	±1.0dB @ 250MHz – 2250MHz ±0.5dB @ any 36MHz BW
Output Level:	within -2dB of input

3.3. OPTICAL OUTPUT

Number of outputs:	1
Connector:	Female FC/APC
Operating Wavelength:	
Standard:	1310nm
CWDM:	1270-1610nm
Optical Power:	
1310nm FP:	2 dBm ± 2 dBm
CWDM DFB:	2 dBm ± 2 dBm
Fiber Size:	9 μm core / 125 μm overall

3.4. ELECTRICAL

Voltage:	+11VDC to 22VDC
Power:	3 Watts with no LNB load
EMI/RFI:	Complies with FCC regulations for class A devices Complies with EU EMC directive
Connector:	F type
Conductor Range:	21-19 AWG (0.41-0.64 mm^2)

3.5. PHYSICAL

Dimensions (with flanges):	5.4"L x 2.4"W x 1.2"H (138mm L x 61mm W x 31mm H)
Dust and Water Protection:	IP65 **(-WP version only)**

3.6. SYSTEM PERFORMANCE (WHEN COMBINED WITH A 7708LRA)

Frequency Range:	250MHz - 2150MHz
Flatness:	±1.5dB @ 950MHz - 2250MHz ±0.25dB @ any 36MHz BW
Output Signal Level:	(Input signal) + (TX gain+2) + (RX gain) - (2xOptical Loss) +/-2dBm
Inter-modulation Products:	-55dBc @ (RF input -20dBm, TX/RX gain to 2/0dB)

4. STATUS INDICATORS

The 2408LT module has three LED status indicators on the front of the box to show operational status of the module at a glance.

4.1. RF DRIVE INDICATOR

HIGH: The RF DRIVE LED will be RED when the incoming RF signal plus the module gain is overdriving the laser. Over driving the laser will be manifested as IMD at the receiver.

OK: The RF DRIVE LED will be GREEN when the incoming RF signal plus the module gain is within the normal drive levels for the laser.

LOW: In manual gain mode, the RF DRIVE LED will be ORANGE when the incoming RF signal plus the module gain is under driving the laser, leading to non-optimal signal to noise ratio. In AGC mode, this LED will be ORANGE when the incoming signal drops below the AGC hold range.

Table 4-1 provides a guide for the RF power levels that trip the LED indicators in each gain mode. Trip points are as per the power measured by the 2408LT, which is relayed via SmartMON™ data to the paired receiver. This level may be displayed on the card edge of the paired receiver or through VistaLINK®.

Nominal Input Level (dBm)	Setting	Gain (dB)	LOW Trip (dBm)	HIGH Trip (dBm)
-10 to –40dBm	0	AGC	-40	-5
-14	1	+2	-19	-8
-16	2	+4	-21	-10
-18	3	+6	-23	-12
-20	4	+8	-25	-14
-22	5	+10	-27	-16
-24	6	+12	-29	-18
-26	7	+14	-31	-20
-28	8	+16	-33	-22
-30	9	+18	-35	-24
-32	A	+20	-37	-26
-34	B	+22	-39	-28
-36	C	+24	-41	-30
-38	D	+26	-43	-32
-40	E	+28	-45	-34
-42	F	+30	-47	-36

Table 4-1: LED Trip Points for RF DRIVE LED for Each Gain Setting

4.2. LNB POWER INDICATOR

SHORT: The LNB PWR LED will be RED if the connected load is in a short circuit or overload condition.

DC PASS: The LNB PWR LED will be GREEN when the LNB power mode is set to DC PASS. In this mode, DC input from the connected power supply is fed to the LNB. The voltage seen by the LNB will be approximately equal to the voltage supplied by the connected DC power supply minus 0.3VDC minus cable drop.

13V: The LNB PWR LED will be ORANGE when the LNB power mode is set to 13 VDC. In this mode, the LNB is supplied with regulated 13VDC.

When the LNB PWR LED is **blinking**, there will be a 22 kHz tone present in addition to LNB power.

If the LNB PWR LED is on or flashing, there will be DC voltage for LNB power at the RF IN connector. This can damage some test equipment.

The user can turn off the LNB power by switching the LNB MODE switch to the Off position.

4.3. DC INPUT INDICATOR

HIGH >21V: The DC IN LED will be RED if the supply voltage at the DC input is greater than 21 Volts.

OK 18V NOM.: The DC IN LED will be GREEN when the supply voltage at the DC input is between 15 and 21 Volts (18 Volts nominal).

LOW <15V: The DC IN LED will be ORANGE when the supply voltage at the DC input is less than 15 Volts.

5. USER CONTROLS

User controls are located behind the two removable hole plugs on the front of the unit. These plugs are threaded and may be removed and installed with a Philips head screwdriver. When installing, ensure that the plugs are snug so as to prevent water/dust ingress, but do not over tighten and distort the rubber washer.

5.1. GAIN ADJUST

Gain adjustment is via a 16 position rotary switch located behind the GAIN ADJUST hole plug. The switch itself is marked 0-9 and A-F, and may be rotated using a small Philips screwdriver. Each step on the rotary switch represents a 2 dB gain change, with position 0 being AGC mode. AGC will maintain the output of the 2408LT at a constant level even if the input signal level changes, but remains within the AGC hold range.

Switch Position	Function
0	AGC
1	Manual Gain 2 dB
2	Manual Gain 4 dB
3-F	Manual Gain 6 dB to 30 dB in 2dB steps

Table 5-1: Gain Adjustment Switch

If conducting frequency response sweeps, both the 2408LT and the companion receiver should NOT be an AGC mode and should be set to a manual gain value.

5.2. LNB MODE

The 2408LT has the ability to inject 22 kHz tone and the DC voltage supplied by the connected power supply into the cable that is connected to the RF input. This allows both powering of the LNB as well as control of the local oscillator. Adjustments are made via a 16 position rotary switch located behind the LNB MODE hole plug. The switch itself is marked 0-9 and A-F, and may be rotated using a small Philips screwdriver.

Switch Position	LNB Power	22 kHz
0	OFF	OFF
1	DC PASS	OFF
2	DC PASS	ON
3	13 VDC	OFF
4	13 VDC	ON
5–F	OFF	OFF

Table 5-2: LNB Mode Switch

If the LNB PWR LED is on or flashing, there will be DC voltage for LNB power at the RF INPUT connector. This can damage some test equipment. The user can turn off the LNB power by switching LNB MODE switch to the Off position.

This page left intentionally blank