MSU Remote System

Fiber Interface Bi-Directional Amplifer

User's Manual

rev 1

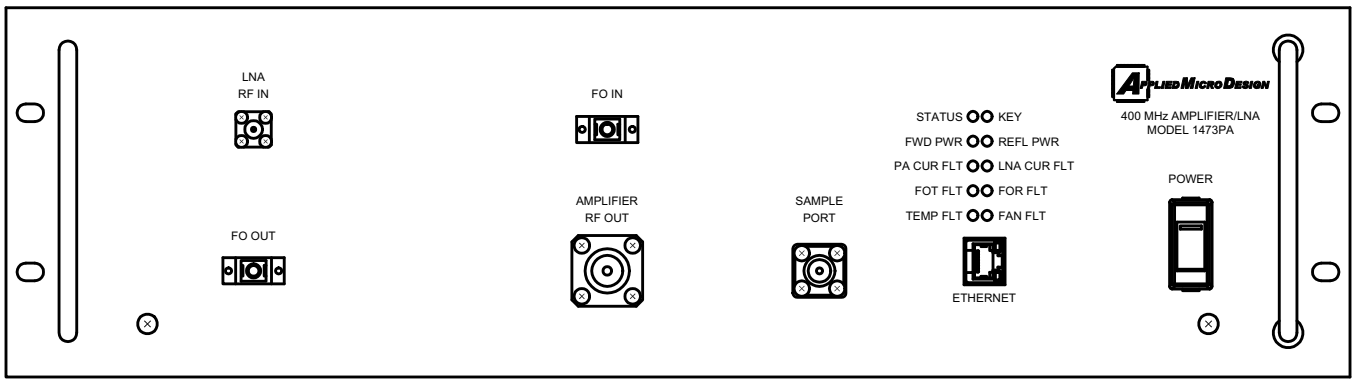


Table of Contents

Notes, Cautions, and Warnings

Invisible laser light is used on these equipment.

DO NOT look directly into the fiber optic connectors when unit is in operation.

Connect RF Output to existing Distributed Antenna System (DAS) cable only.

DO NOT operate equipment with unauthorized antennas, cables, and/or coupling devices.

DO NOT operate equipment unless all RF connectors are secure.

DO NOT operate equipment unless it has been installed and inspected by a qualified radio technician.

Description

There are two major elements to the MSU system; the Head End (HE) hardware and the Remote Hardware.

There is one HE and multiple remotes. Each remote consists of a single Fiber-Fed Power Amplifier (FFPA) chassis.

In the Downlink (DL) path, signals from user radios (Motorola radios that are FCC certified) are input to the DL HE hardware. These signals are filtered, converted to light by a Fiber Optic Transmitter, combined with signals from a Motorobo repeater, and transmitted to the FFPA via fiber optic cable. In the FFPA chassis, the light from the fiber optic cable is converted back to RF by a Fiber Optic Receiver, and the RF is input to a power amplifier module. The amplified RF is input to a bandpass filter; the filtered RF feeds the Distributed Antenna System (DAS) in the building where the remote hardware is located.

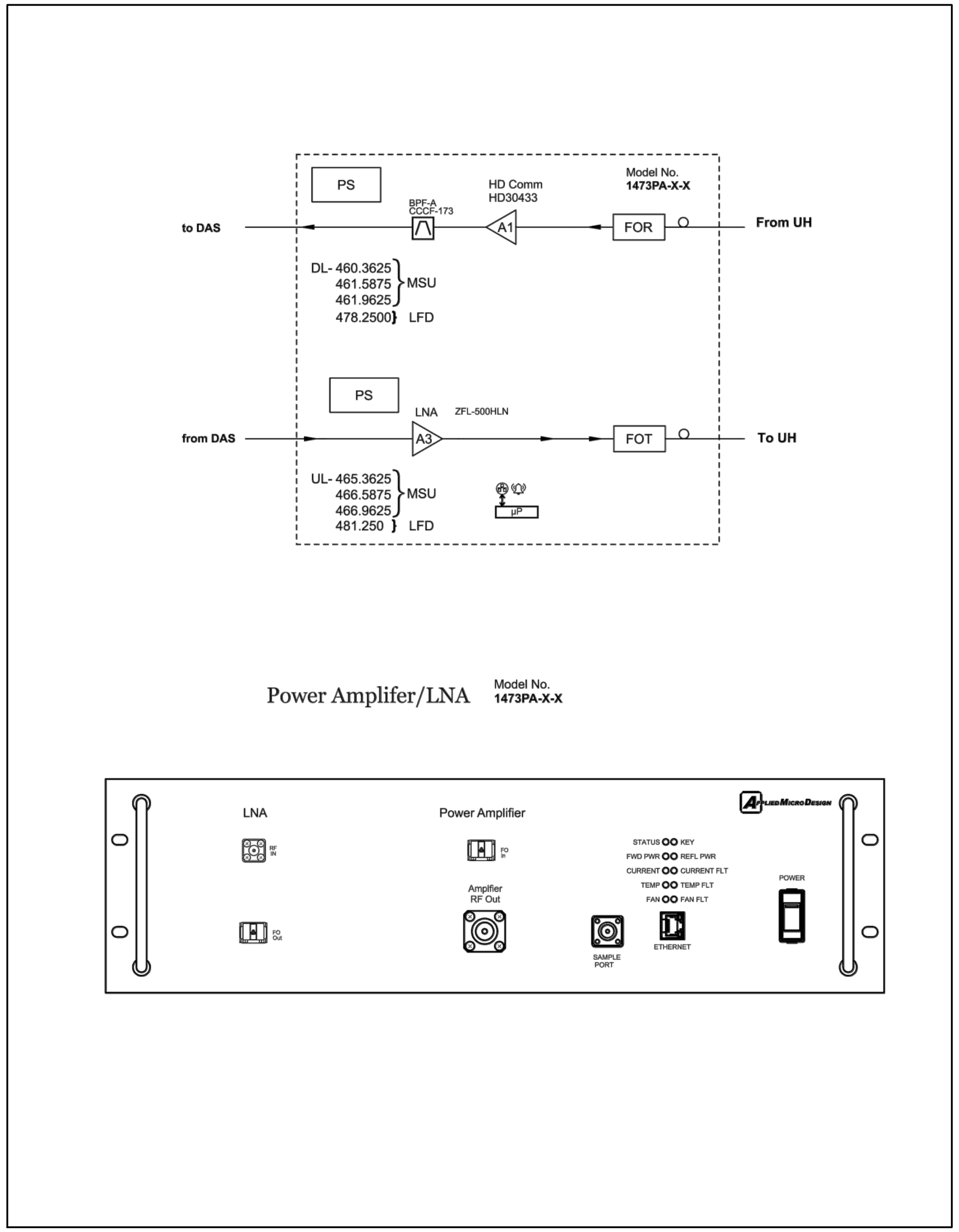
In the Uplink (UL) path, signals from portable radios are input the DAS. These signals are amplified in a Low Noise Amplifier (LNA) in the FFPA, converted to light by a Fiber Optic Transmitter, and transmitted to the Head End via fiber optic cable. In the Head End rack, the light from the fiber optic cable is converted back to RF by a Fiber Optic Receiver, and the RF is input to a power amplifier module. The amplified RF is fed to the outside antenna via a duplexer.

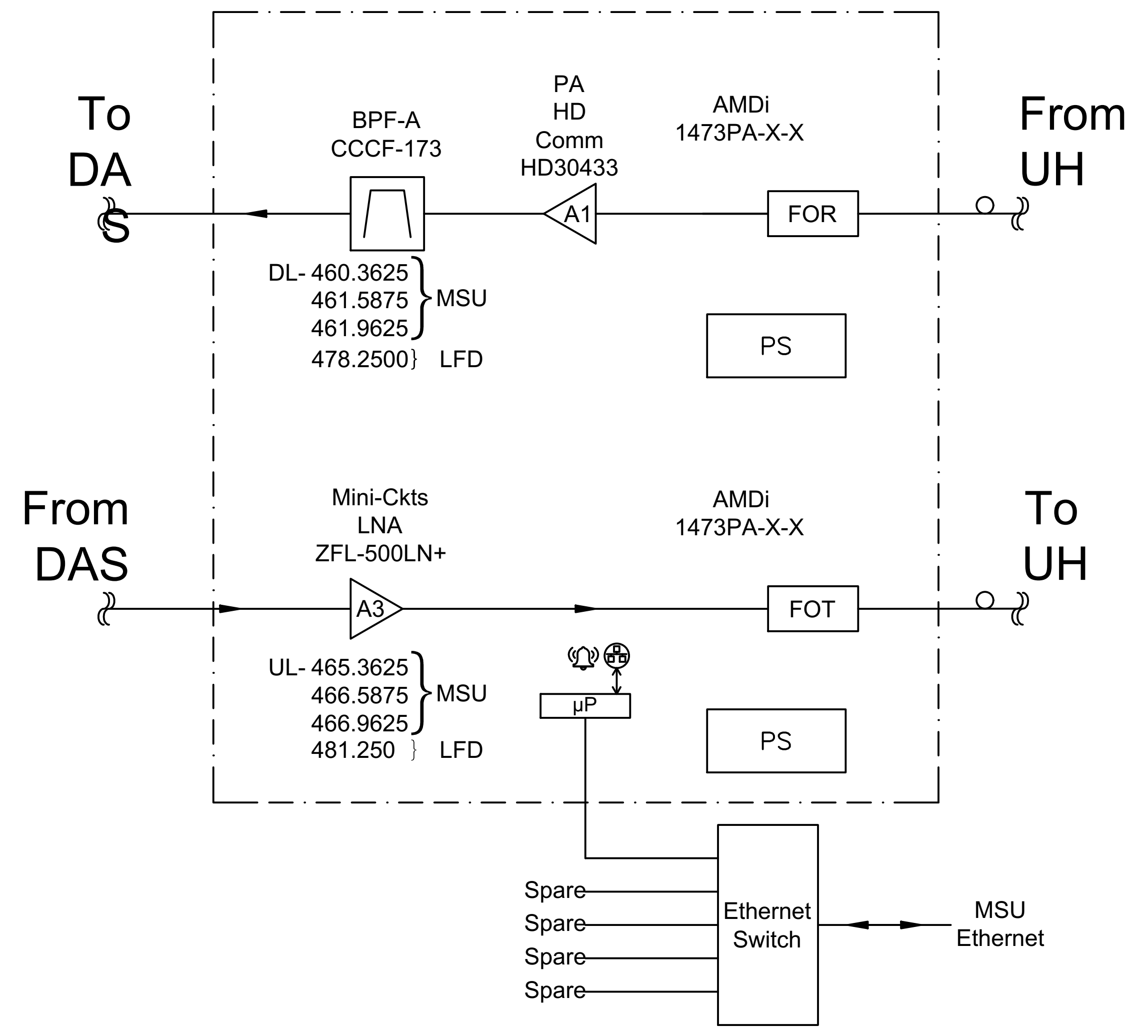
A front panel Look Port on the front panel of the FFPA allows the user to sample the signal without interrupting main line communications. The Look Port sample is 40 dB below the main RF output port.

The FFPA has a processor board that monitors overall chassis operation. The processor board controls the enable signal to the amplifier and monitors forward power, reverse power, current, fan status and heat sink temperature. Forward and reverse power are derived from directional couplers built into the amplifier modules.
Heat sink temperature is derived from a thermistor mounted onto the heat sink and amplifier current from a sense resistor in series with the +28-volt power input. The fan has a built-in stopped rotor line which is input to the processor board.

The processor board features optional remote monitoring capability via Ethernet. The Graphical User Interface (GUI) of the Network Management System (NMS) computer can display the status of the amplifier and provide control.

AMDI Provided Data





Typical Remote

CELL GAIN

68 WHITE
STREET #265
RED BANK,
NJ

732-889-4671

Revisions

DATE	DRAWN BY	REVISION NOTE	APPRVD. BY

Site Name/Address:

MSU

Project:

Typical Remote

Scale: N/A

Sheet Size: D

Sheet #: 1of1

Date: 4/7/2016

Drawn By: Matt Jacobs

Drawing #:

System Specification

Downlink

Frequency:	478.2500 MHz
Type:	Class AB
Bandwidth:	18 MHz
Gain:	45 dB *
N.F.:	7 dB
Max. Power Output:	17 dBm
ALC:	20 dBm
Harmonics:	> 60 dBc, 2nd and 3rd
OIP3:	+55 dBm
Impedance:	50 Ohms
Load VSWR:	Infinite, no damage

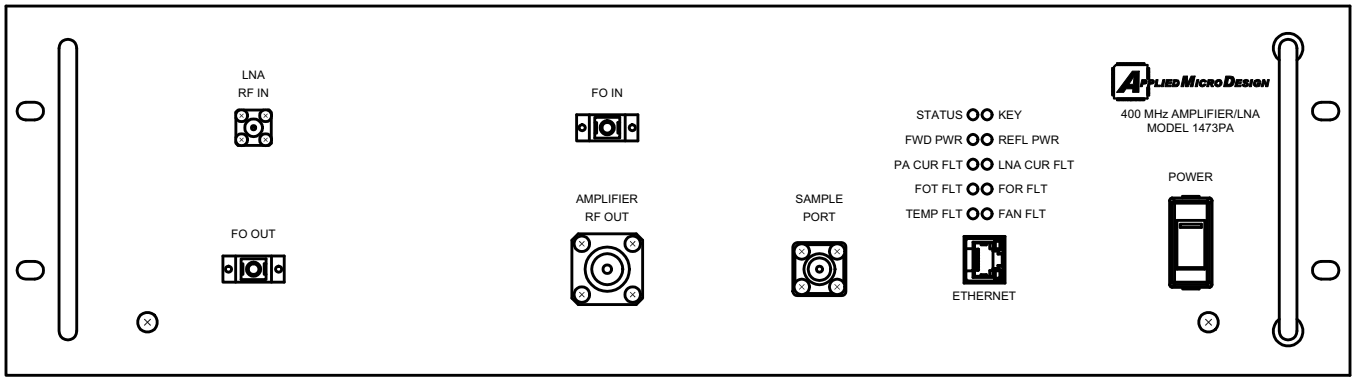
Uplink:

Frequency:	481.2500 MHz
Type:	Linear
Bandwidth:	16 MHz
Gain:	19 dB
NF:	4 dB
Impedance:	50 Ohms
Input Level:	-90 dBm to -10 dBm

Power Supply:	115 V AC
Current:	< 2A
Operating Temp:	-30° to +60° C
Size:	19” x 5.22” x 16”

* With fiber link gain of zero

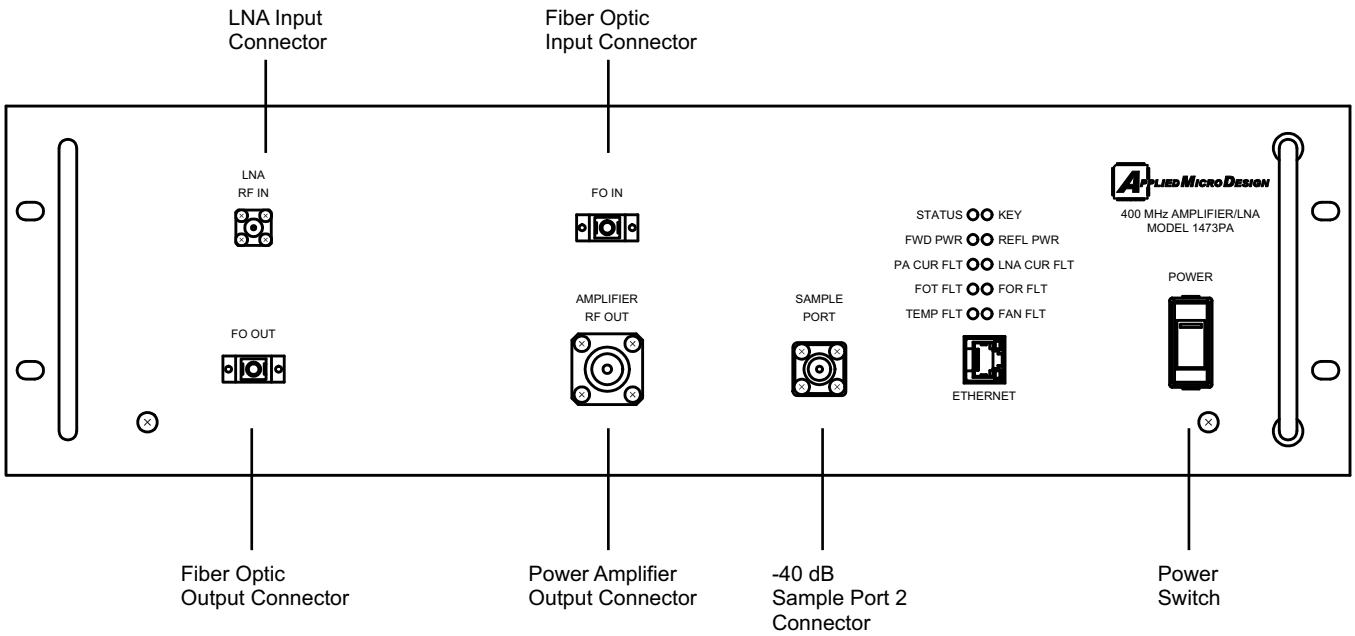
Features



- power amplifier automatic level control (ALC)
- high power amplifier gain
- high power amplifier Third-Order Intercept Point (OIP3)
- sample port at 40 dBc

Remote PA/LNA - Front Panel and Indicators

Model No. 1473PA-RMT



steady: amplifer/LNA is operating

steady: amplifier or LNA is operating normally

STATUS	●	●	KEY
FWD PWR	●	●	REFL PWR
PA CUR FLT	●	●	LNA CUR FLT
FOT FLT	●	●	FOR FLT
TEMP FLT	●	●	FAN FLT

steady: amplifier is enabled

steady: amplifier or LNA has either current, reverse power or temperature fault

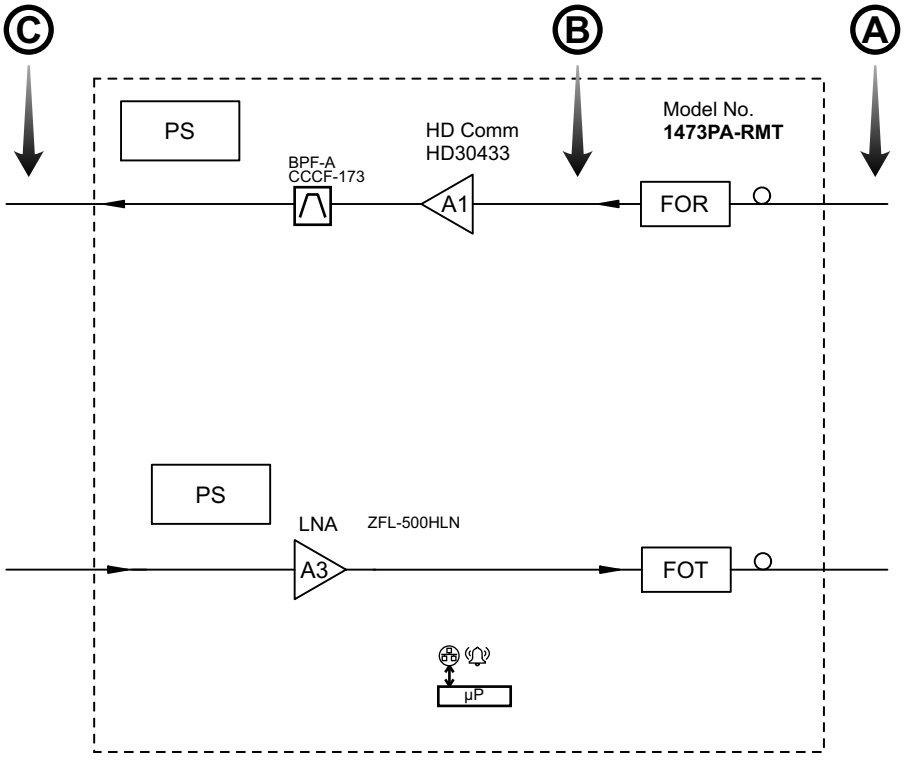
Downlink

The Downlink side of the 1473PA-RMT consists of a fiber optic receiver, a power amplifier and a bandpass filter. The fiber optic laser is applied to " A " shown below. The 1550 nm laser light is converted to radio frequency (RF) signal at " B." At " C " is the amplified and filtered RF signal from " B. "

The amplifier has an Automatic Level Control (ALC) feature. This feature limits the power amplifier output in case the input to the amplifier exceeds the required level.

The power amplifier ALC level is set to +20 dBm.

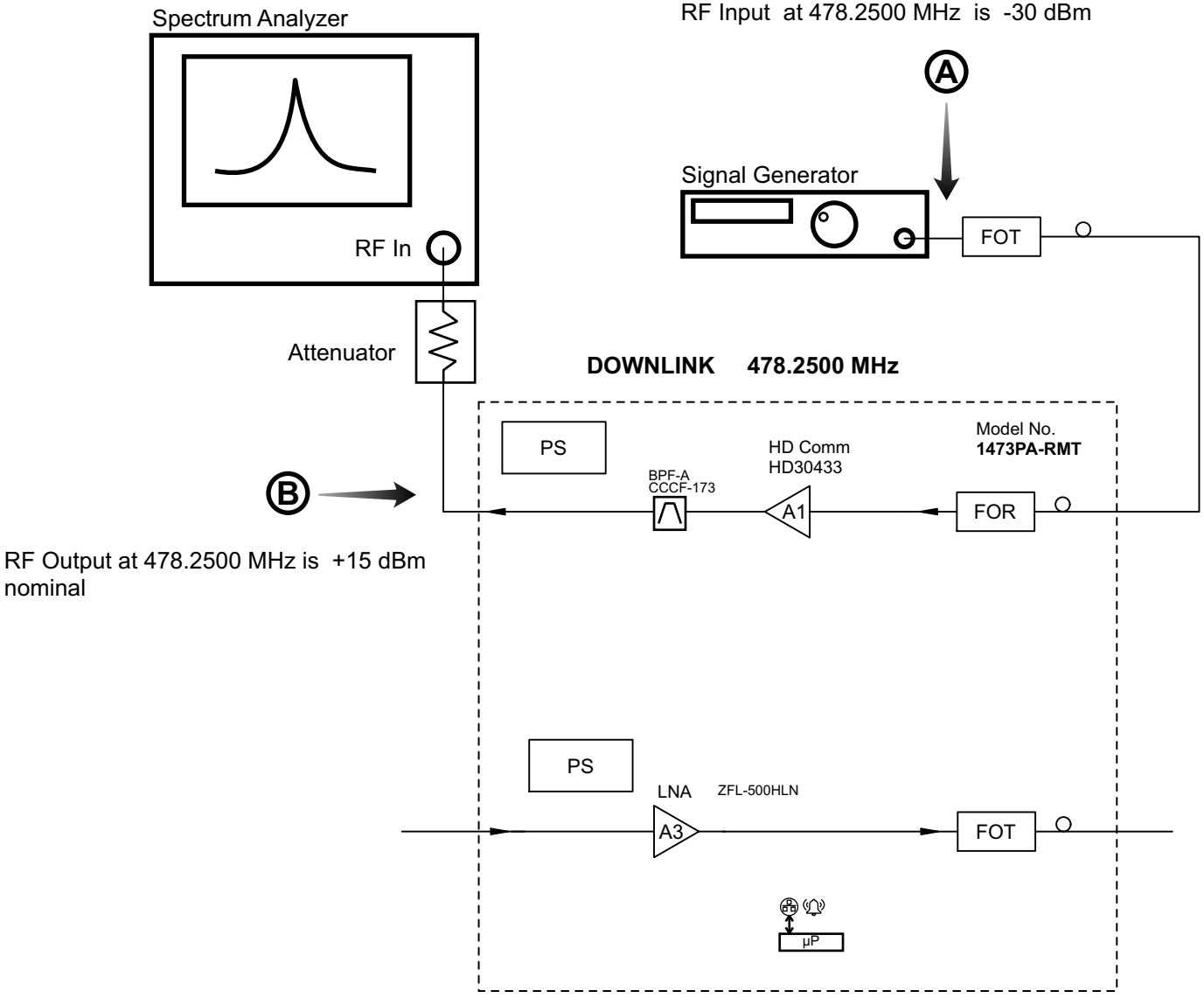
DOWNLINK 478.2500 MHz



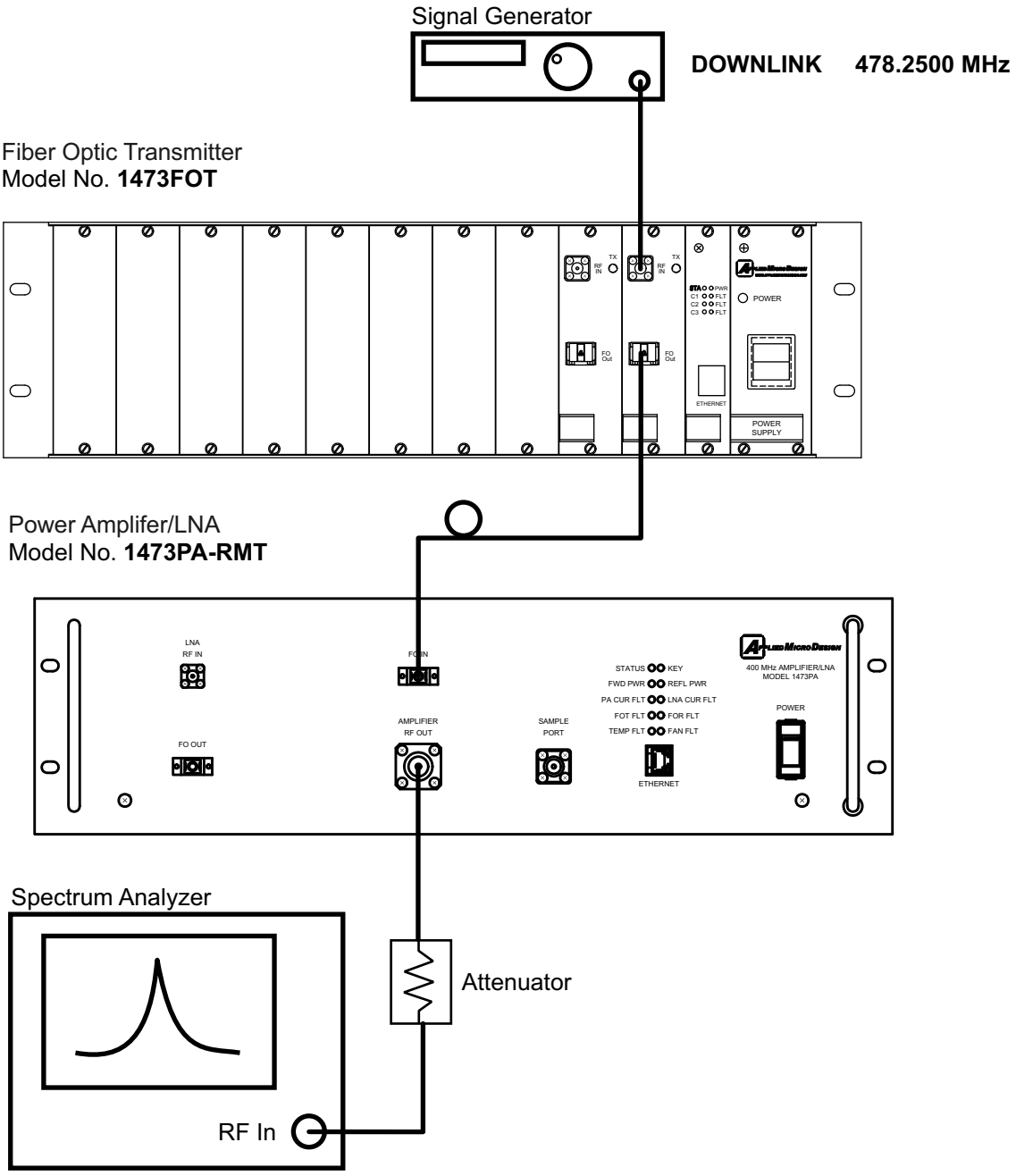
Downlink Test

Shown below is a test set-up of the Downlink side of the 1473PA-RMT. The signal generator is set for 478.2500 MHz with a level of -30 dBm. The signal generator output is applied to a fiber optic transmitter and the optical output is connected to the FO In of the 1473PA-RMT.

At " B " is a 30 dB attenuator connected to the Amplifier RF Out port and also connected to a spectrum analyzer on the other end. The power output expected at " B " is at least +15 dBm.

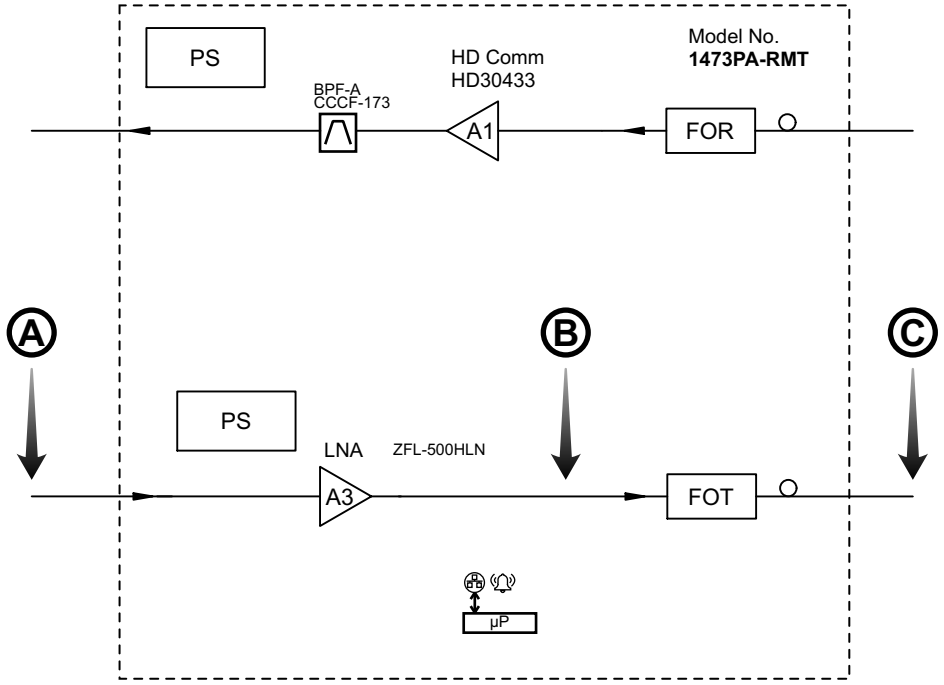


Downlink Test Set-Up



Uplink

The Uplink side of the 1473PA-RMT consists of a Low-Noise Amplifier (LNA) and a fiber optic transmitter. The RF signal is applied to " A " shown below, it is amplified by the LNA and comes out at a higher level at " B. " The RF signal from the LNA is converted to 1550 nm laser light by the fiber optic transmitter and comes out at " C. "

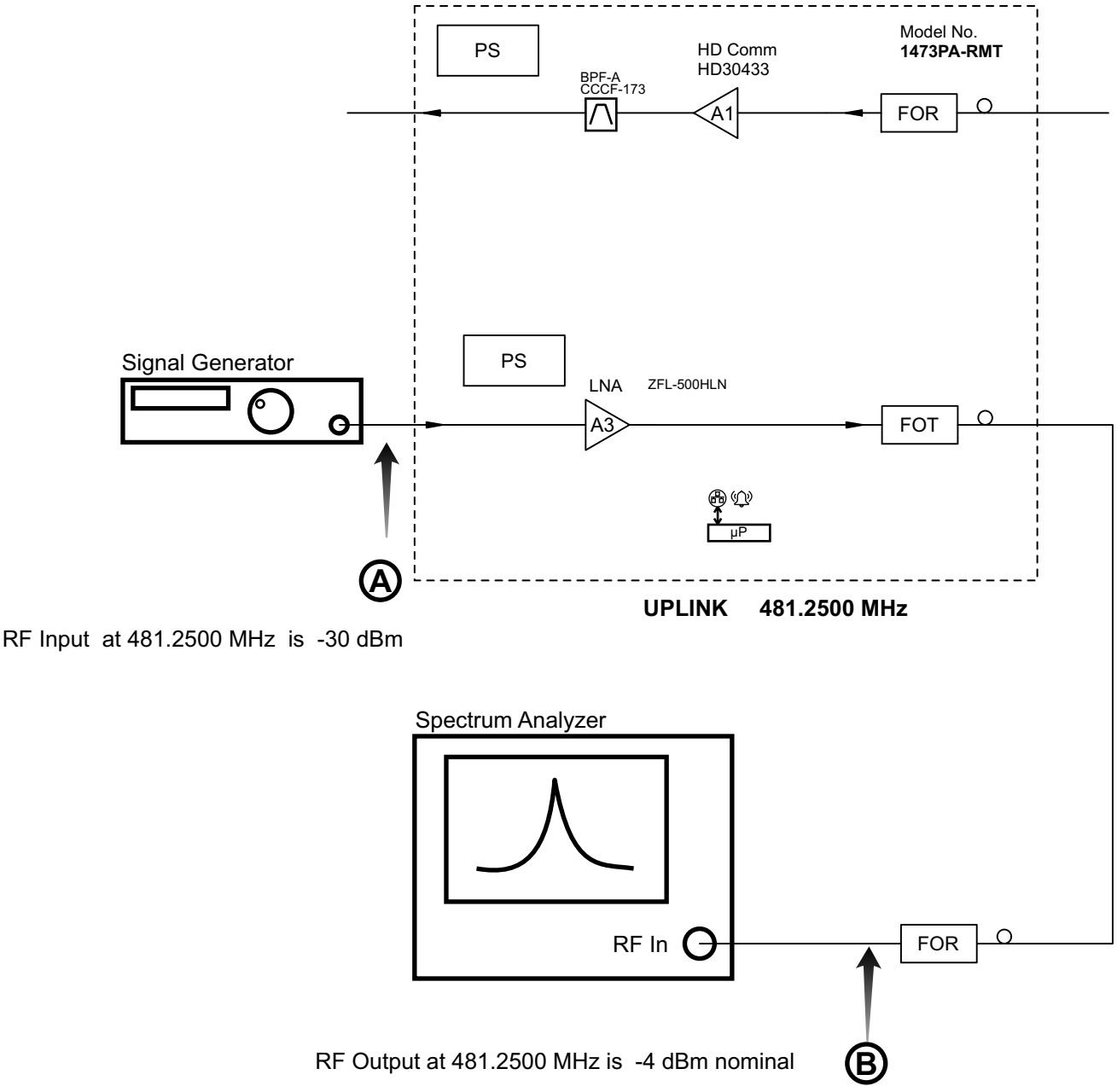


UPLINK 481.2500 MHz

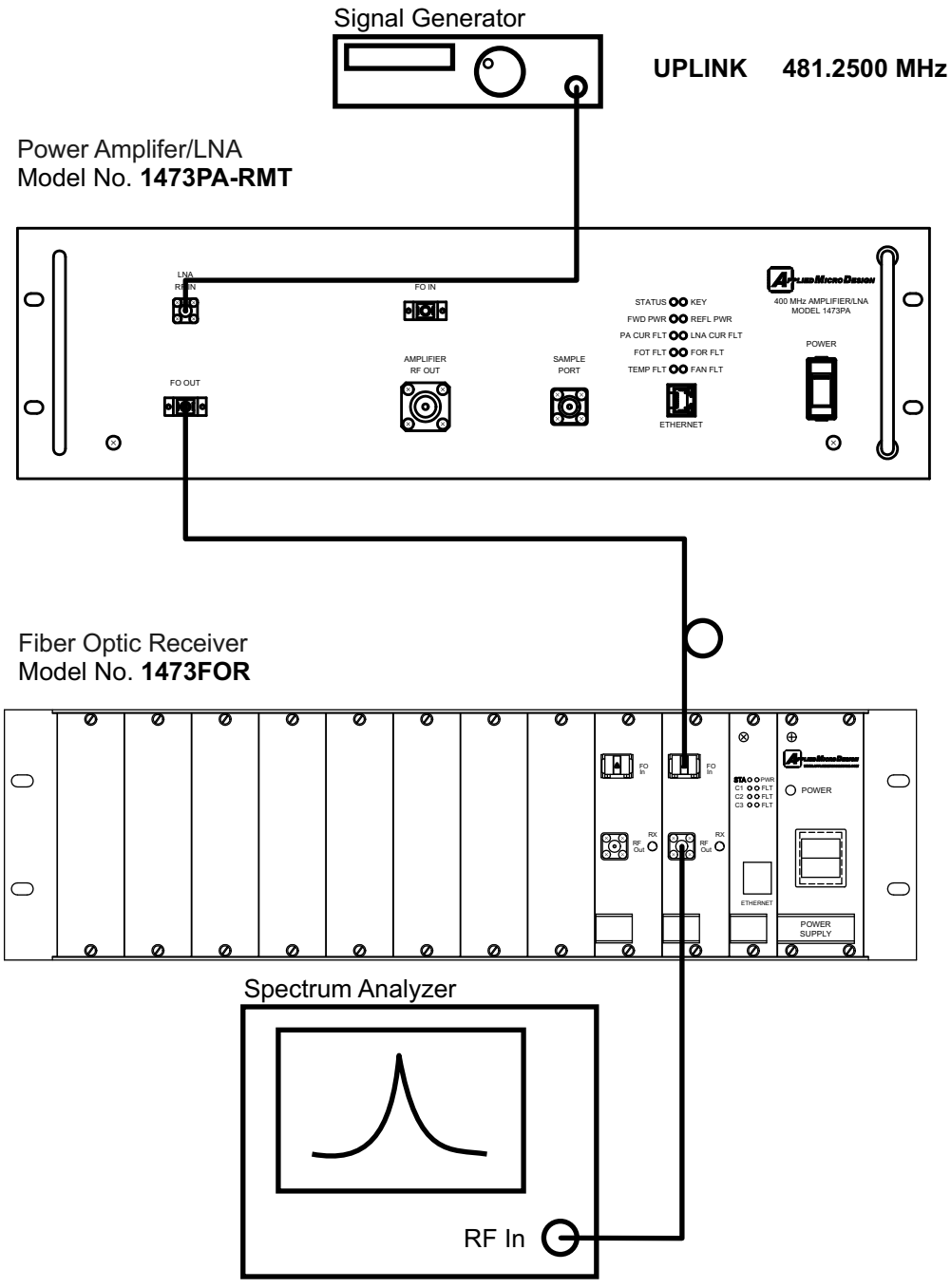
Uplink Test

Shown below is a test set-up of the Uplink side of the 1473PA-RMT. The signal generator is set for 481.2500 MHz with a level of -30 dBm. The signal generator output is applied to the LNA RF In at " A. "

The FO Out optical output is connected to a fiber optic receiver. The RF Out of the fiber optic receiver is then connected to a spectrum analyzer. The power output expected at " B " is around -4 dBm.



Uplink Test Set-Up




AMDi
Applied Micro Design Inc.