

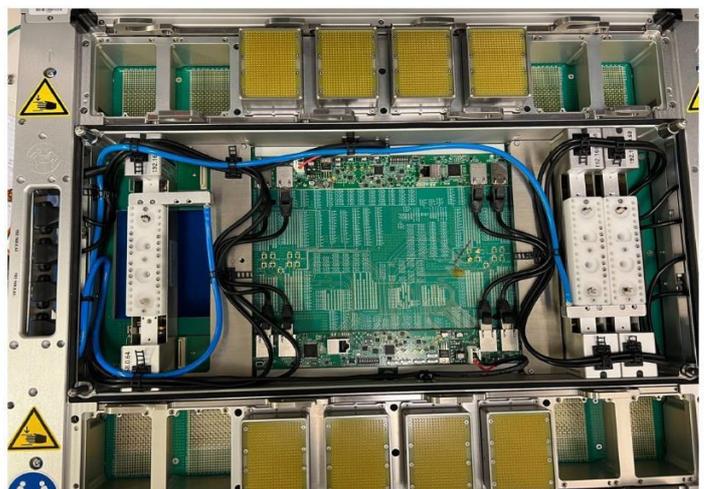
USER MANUAL

multiLane

AT93000 Diagnostics User Manual

Instrument Troubleshooting Guide

AT93000 Diagnostics Guide-rev1.0
September 2022



Notices

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General Safety Summary

Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it. To avoid potential hazards, use this product only as specified.

Only qualified personnel should perform service procedures.

While using this product, you may need to access other parts of the system. Read the General Safety Summary in other system manuals for warnings and cautions related to operating the system.

To Avoid Fire or Personal Injury

Use Proper Power Cord. Only use the power cord specified for this product and certified for the country of use.

Observe All Terminal Ratings. To avoid fire or shock hazard, observe all ratings and markings on the product. Consult the product manual for further ratings information before making connections to the product.

Do not apply a potential to any terminal, including the common terminal that exceeds the maximum rating of that terminal.

Do Not Operate Without Covers.

Do not operate this product with covers or panels removed.

Avoid Exposed Circuitry. Do not touch exposed connections and components when power is present.

Do Not Operate with Suspected Failures.

If you suspect there is damage to this product, have it inspected by qualified service personnel.

Do Not Operate in Wet/Damp Conditions. Do Not Operate in an Explosive Atmosphere. Keep Product Surfaces Clean and Dry



Caution statements identify conditions or practices that could result in damage to this product or

Contents

Contents.....	3
Table of Figures.....	4
Purpose of this User Manual	5
System Nomenclature.....	5
Items used for diagnostics.....	6
Quick checks before running hardware diagnostics.....	6
Ping Check.....	6
Docking Checks	6
Twinning Frame Cables Routing Checks.....	6
SMPM connector checks.....	7
Faceplate Checks.....	8
Backplane Jumper and Sync Cable Checks.....	8
Diagnostic GUI Manual Disclaimer.....	9
Diagnostic GUI	10
AT-BERT.....	10
AT-DSO	12
AT-BERT and AT-DSO.....	14
Change IP address, Firmware and FPGA	14
Connecting Instruments Examples.....	15
Appendix I: Create a Model File	17
Appendix II: Change IP address, Firmware and FPGA.....	18
Changing the IP Address.....	18
Updating the Firmware:	20
Updating the FPGA:.....	21

Table of Figures

Figure 1: AT93000 internal view.....	5
Figure 2: AT93000 cassette and backplane numbering	5
Figure 3: SMPM male connectors on loadboard blindmate connectors	Figure 4:
SMPM female connectors on Multilane cassettes	7
Figure 5: AT93000 faceplate	8
Figure 6: AT93000 +12V power.....	8
Figure 7: ATE Diagnostic GUI.....	10
Figure 8: Adding Module.....	10
Figure 9: Module Settings	11
Figure 10: Monitor.....	11
Figure 11: Loopback	12
Figure 12: Module Settings	13
Figure 13: Monitor – Configuring.....	13
Figure 14: Monitor - Eye Diagrams	14
Figure 15: AT93000-POGO	15
Figure 16: Example on Eye Diagram Configuration – AT4039E + AT4025.....	16
Figure 17: Example on Eye Diagram Configuration – AT4039E + AT4025.....	16
Figure 19: Adding Instrument in Model File.....	17
Figure 20: Model-Editor	17

Purpose of this User Manual

The purpose of this User Manual is to help isolate Multilane-related failure mechanisms inside the AT93000 twinning frame shown in Figure 1.

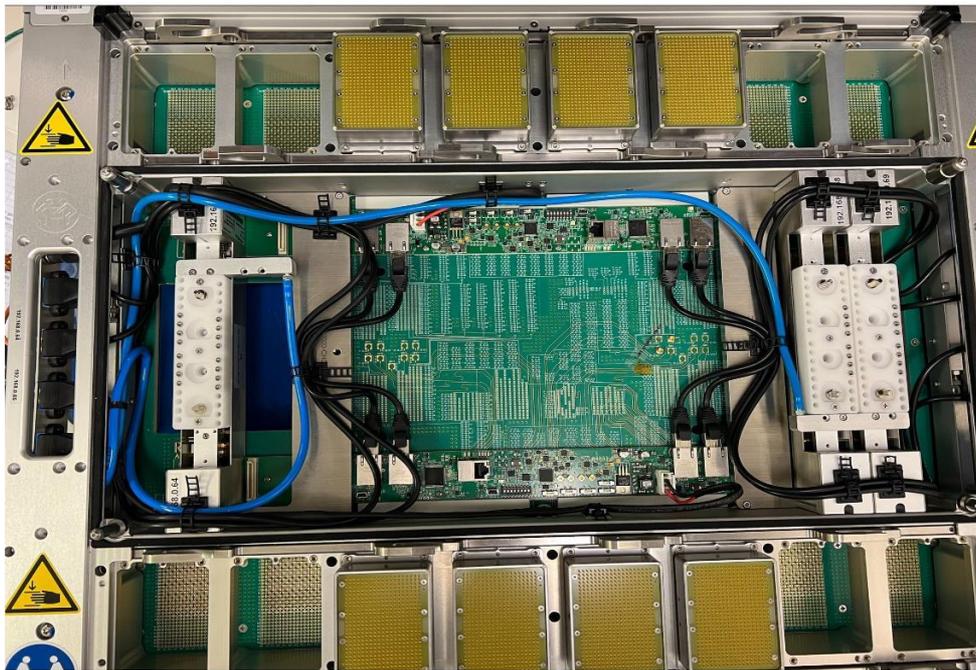


Figure 1: AT93000 internal view

System Nomenclature

The cassette and backplane numbering are shown in Figure 2. The V93000 digital pogo block locations are also noted in this figure.

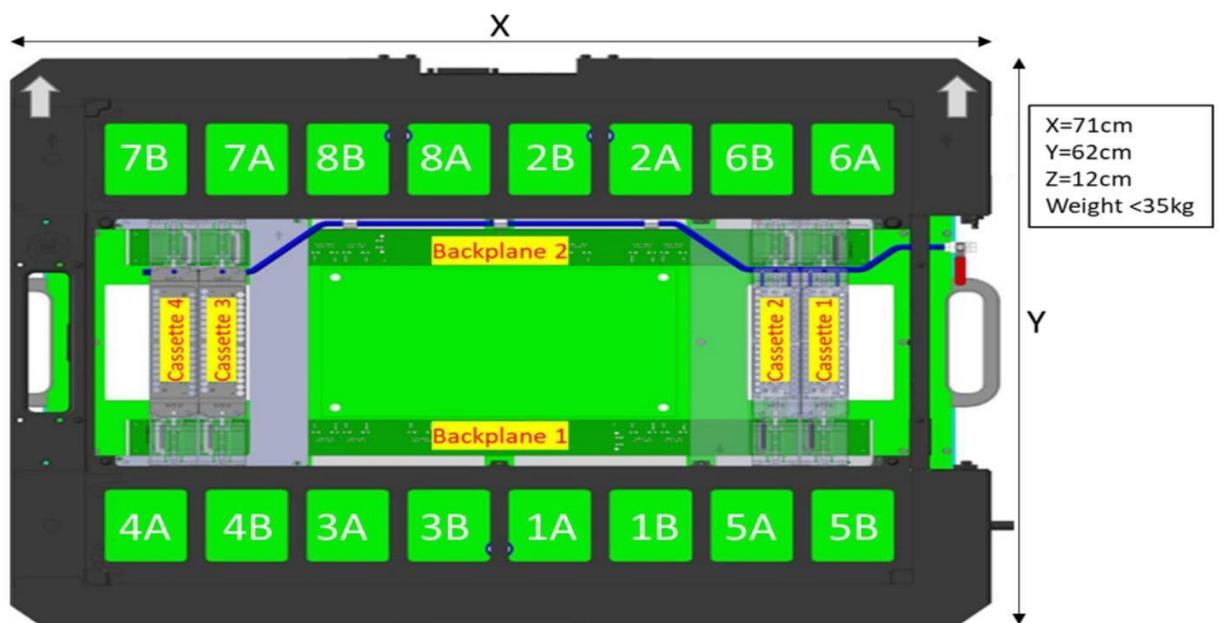


Figure 2: AT93000 cassette and backplane numbering

Items used for diagnostics

- 1) Voltmeter to check 12V on the backplane (optional).
- 2) External diagnostic brackets with F-F connectors if needed.
- 3) Diagnostic GUI available on MultiLane's public website. The file is [here](#).

Quick checks before running hardware diagnostics

Ping Check

Start by trying to ping an instrument using its IP address to make sure that the instrument is turned ON and a proper Ethernet connection is available.

Docking Checks

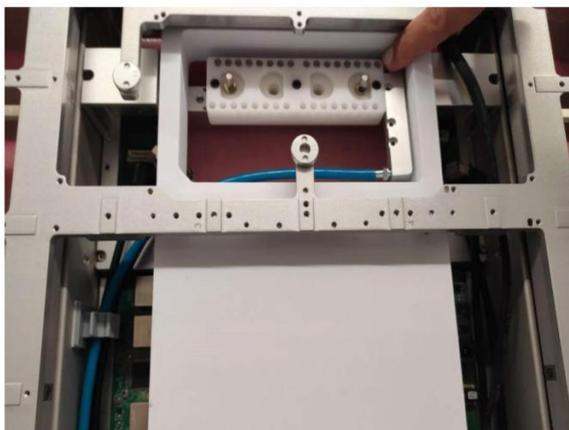
- || See Advantest manuals for proper docking procedures.
- || Is AT93000 Twinning Frame properly docking to V93000?
- || Is DUT Loadboard properly docking to AT93000? This can be done manually or using the Advantest docking remote control.

Twinning Frame Cables Routing Checks

Checking the cable routing do not get pinched by the bridge beam (every service engineer should have a 3D printed bridge beam to check this). A pinched cable can be the field problem, so these kinds of things should be checked before touching the instruments.

- || Is the +12V power cable in good condition?
- || Are the Ethernets cables in good condition?
- || Both air cables are in good condition?

3D Printed Bridge Beam Top Side View



SMPM connector checks

- ▮ Are all SMPM male connectors on the loadboard stiffener straight? Make sure none are bent. Figure 3.
- ▮ Are all SMPM female connectors on the Multilane cassettes free of dirt and in good condition? Figure 4.



Figure 3: SMPM male connectors on loadboard blindmate connectors

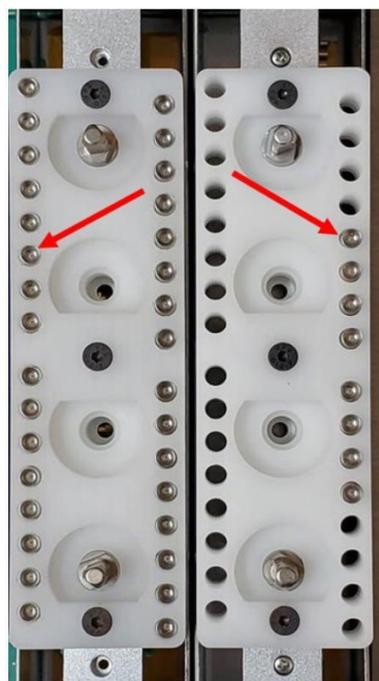


Figure 4: SMPM female connectors on Multilane cassettes

Faceplate Checks

- ▮ Refer to Figure 5.
- ▮ Are Power, Ethernet and Air Supply securely attached to AT93000 faceplate?
- ▮ Is 12V power plugged into test floor outlet and power supply switch turned on?
 - Switch is on backside of 12V power supply box.
 - If 12V supply is suspect, measure +12V across the diode shown in Figure 6 on both backplanes
- ▮ Are ethernet cables plugged into ethernet switches connected to the V93000?
- ▮ Is air cooling supply ON and flowing > 1CFM into the twinning frame?

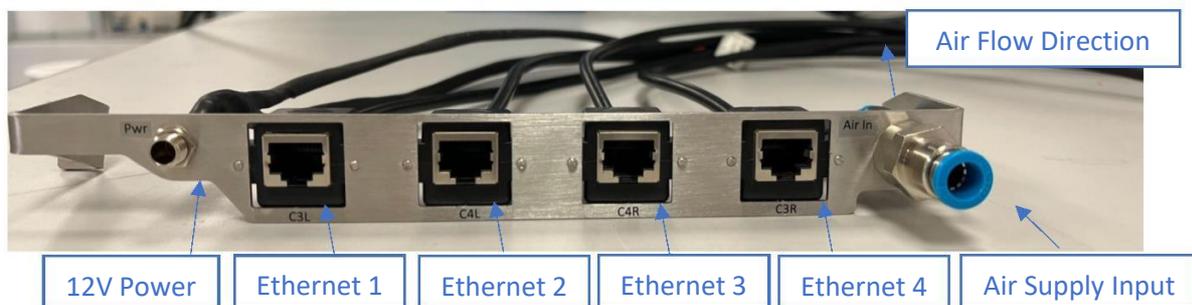


Figure 5: AT93000 faceplate

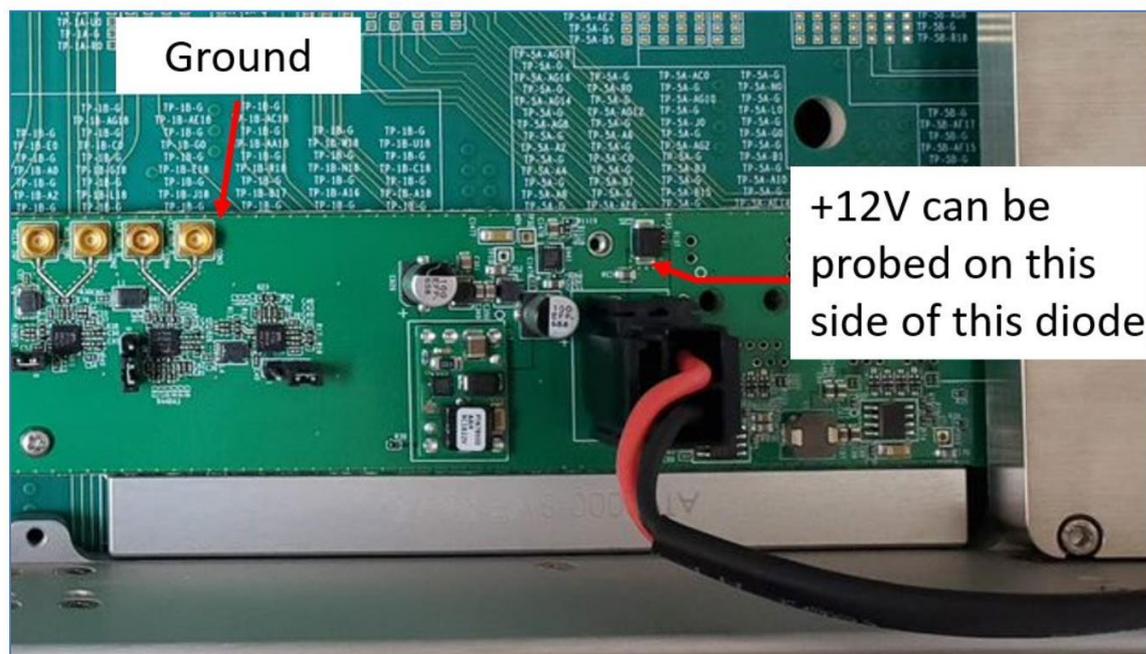


Figure 6: AT93000 +12V power

Backplane Jumper and Sync Cable Checks

Make sure the backplane jumpers and sync cables between backplanes 1 and 2 are properly installed for your application. Each application may require different jumper settings and a different cable installation. Consult the application's documentation for correct settings

Diagnostic GUI Manual Disclaimer

This manual describes diagnostic GUI operation where the Source and Measure instruments are both present inside the Multilane twinning frame assembly.

Examples of Source and Measure:

Example #	Backplane Source	Backplane Measure	Described in this manual
1	BERT Tx	BERT Rx	YES
2	BERT Tx	DSO Rx	YES
3	None	DSO Rx	NO (contact Multilane)

In Example 3 above, an external source must be used to perform DSO Rx diagnostics. The diagnostic GUI supports the following Multilane benchtop instruments that can be used as sources; however, cabling to the DSO Rx backplane should be done with the assistance of Multilane support.

	External Source	Backplane Measure	Described in this manual
4	ML-4039E	DSO Rx	NO (contact Multilane)
5	ML-4039D	DSO Rx	NO (contact Multilane)
6	ML-4035	DSO Rx	NO (contact Multilane)

In addition, if the customer wants to use an external DSO to review the BERT Tx window characteristics, the following configuration is also supported by the GUI:

Example #	Backplane Source	External Measure	Described in this manual
7	BERT Tx	ML4025	NO (contact Multilane)

Diagnostic GUI

When the GUI is opened, three options are available: “Load from Model File”, “Skip”, and “Create a Model File”.

1. Load from Model File: allows the user to browse a previously made Model File containing the instruments info including IP addresses in order to run diagnostics with a simple click. One can always manually add additional instruments.
2. Skip: allows the user to only manually add the instruments needed for diagnostics.
3. Create a Model File: user can use this option to create or modify a model file in a simple and easy way. Refer to [Appendix 1](#) for more info.

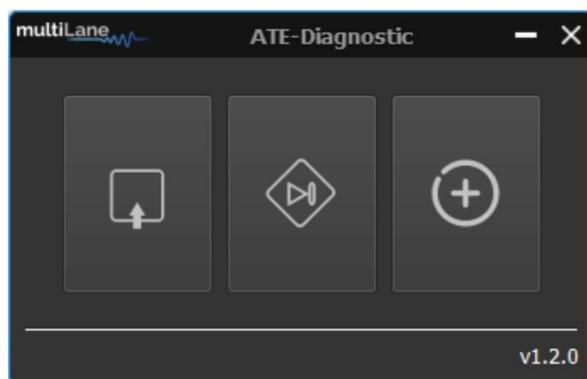


Figure 7: ATE Diagnostic GUI

Once the instruments are inserted, by loading a model file or adding them manually by specifying the IP and type as shown in Figure 8, the user can begin the diagnostics process.

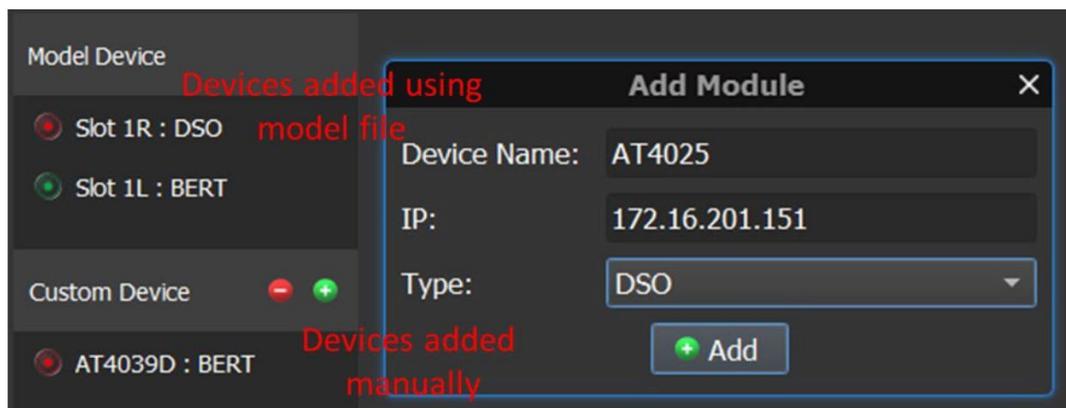


Figure 8: Adding Module

AT-BERT

Connect to your desired BERT by clicking on the red dot next to it; the dot should turn into green in case of successful connectivity. Once a connection is secured, the user will be able to access three different sections listed below. “Save” button will allow user to save all the instrument’s info shown in Module Settings and Loopback sections, while the bottom Logger section lists the successful processes.

Module Settings

In module settings the user will be able to detect the instrument’s temperature in addition to the board revision, FW revision, calibration, IP address, supported FW options, and others, as shown in Figure 9.

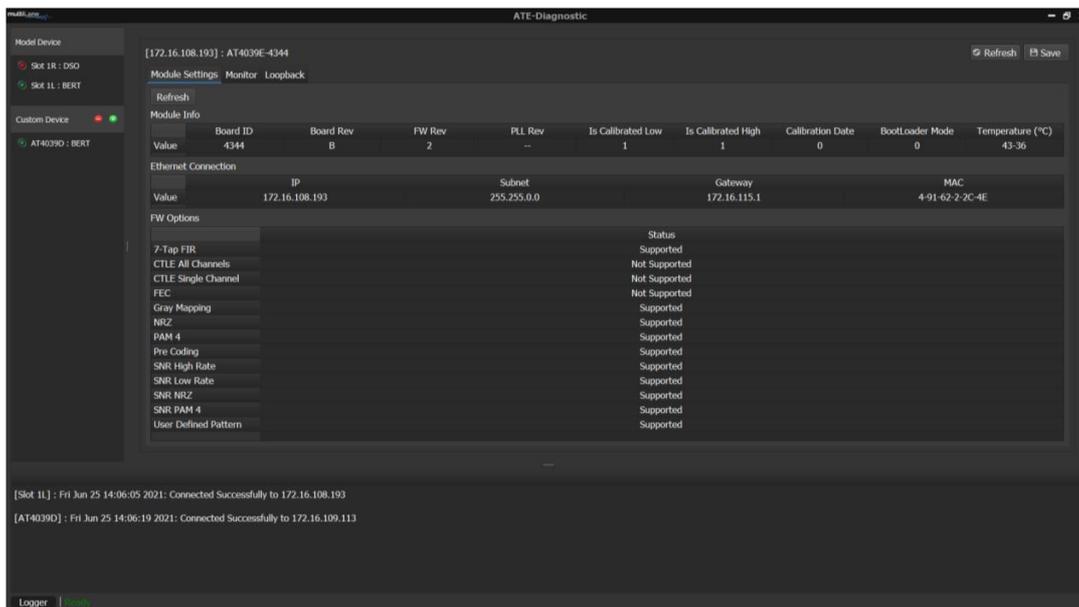


Figure 9: Module Settings

Monitor

In the monitor section, the user can track the different settings applied to the BERT including the amplitude, pre- and post- emphasis, 7 taps, Tx and Rx pattern, and others, as shown in Figure 10.

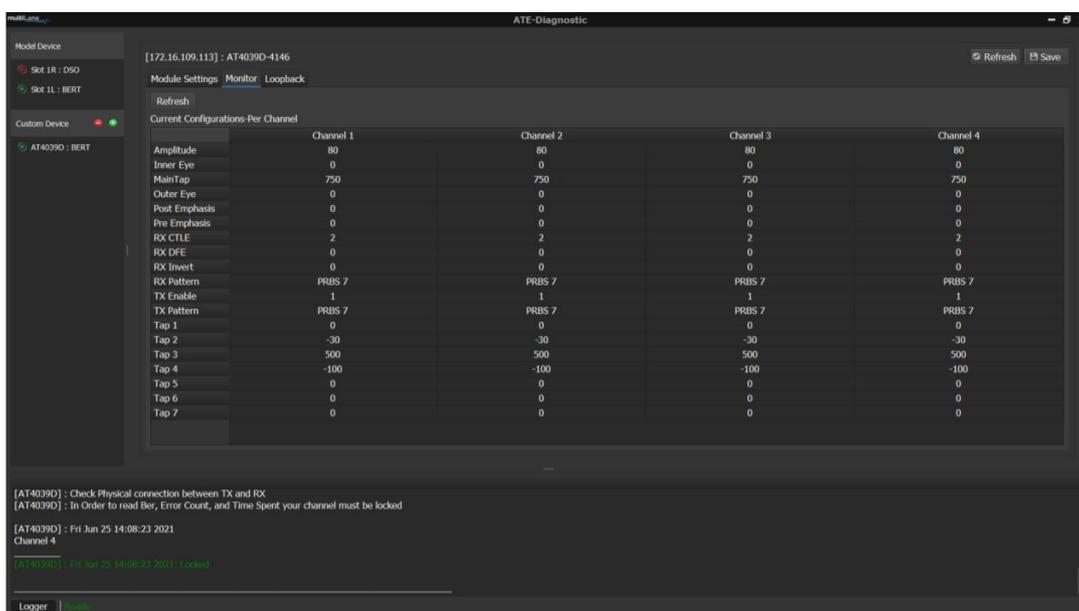


Figure 10: Monitor

Loopback

In loopback section, the user first must “initialize” in order to generate a signal from the BERT. The GUI will specify what settings are being set, and it can be also tracked in the Monitor section. After initialization, a refresh button should be clicked to get latest BER and SNR values. One should also check the lock bar highlighted below, if the lock goes green next to a tested channel, then the **BERT transmit and receive sides work well.**

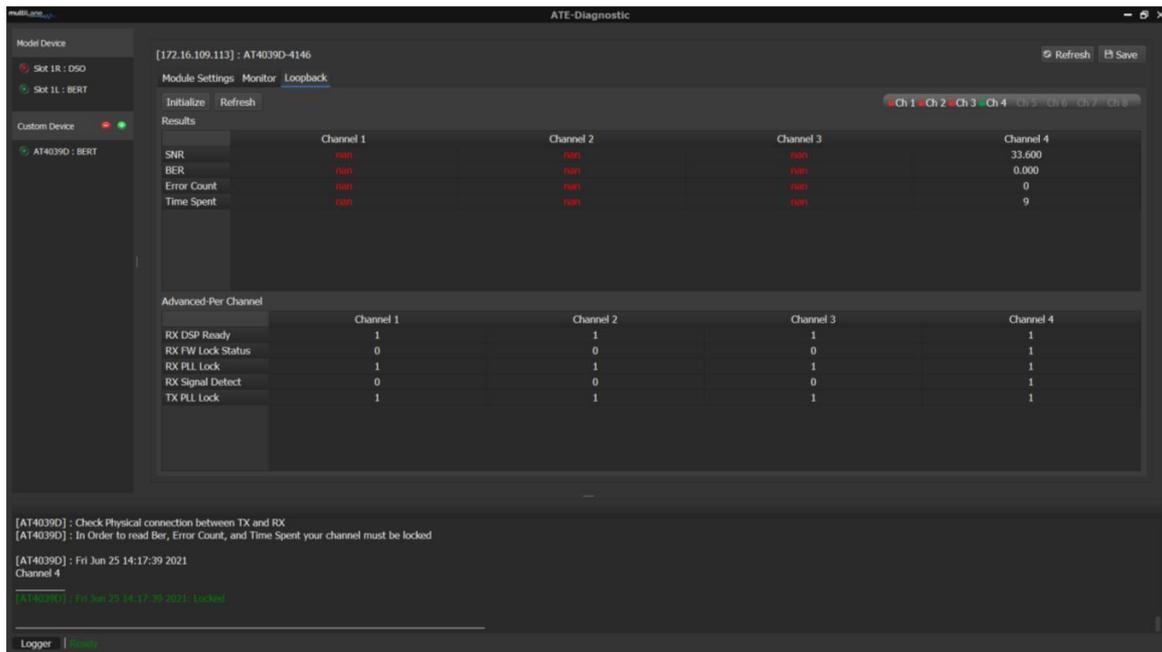


Figure 11: Loopback

AT-DSO

Connect to your desired DSO by clicking on the red dot next to it; the dot should turn into green in case of successful connectivity. Once a connection is secured, the user will be able to access two important different sections listed below. “Save” button will allow user to save all the instrument’s info shown in Module Settings and lock status of Monitor section, while the bottom Logger section lists the successful processes.

Module Settings

In module settings the user will be able to detect the instrument's temperature in addition to the board revision, FW revision, FPGA revision, IP address, supported FW options, calibration coefficients (by clicking "Load Calibration"), and others, as shown in Figure 12.

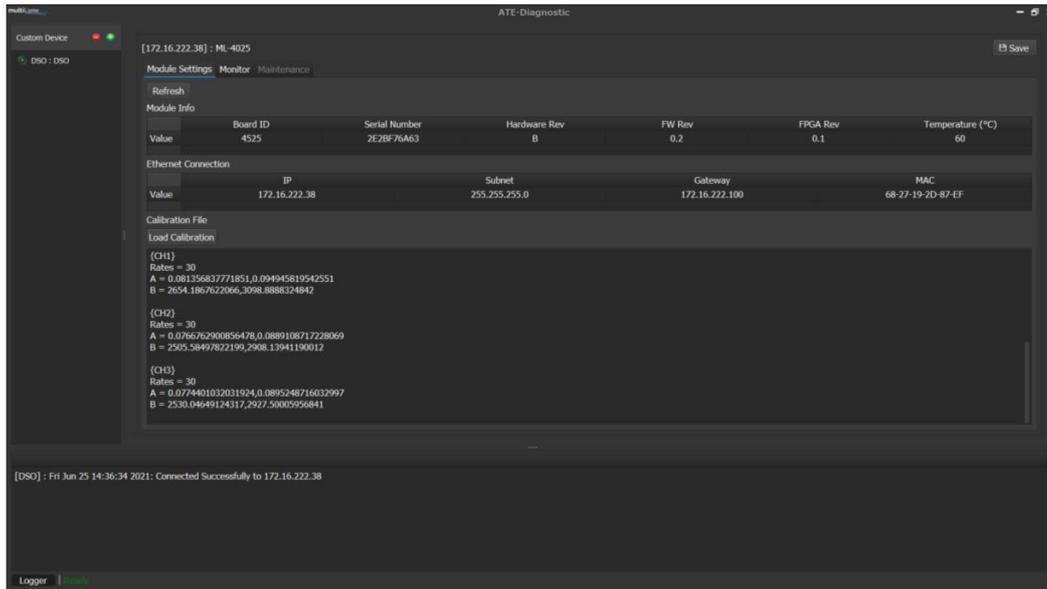


Figure 12: Module Settings

Monitor

In the monitor section, the user will be able to detect Eye diagrams of the signal coming from the BERT (if connected). First click on "Configure" and select the specs of the signal received from the BERT as shown in Figure 12. Then click on refresh to detect the eye diagrams, Figure 13. One should also check the lock bar highlighted below, if the lock goes green next to a tested channel, then the **DSO receiver and clock input are working well**.

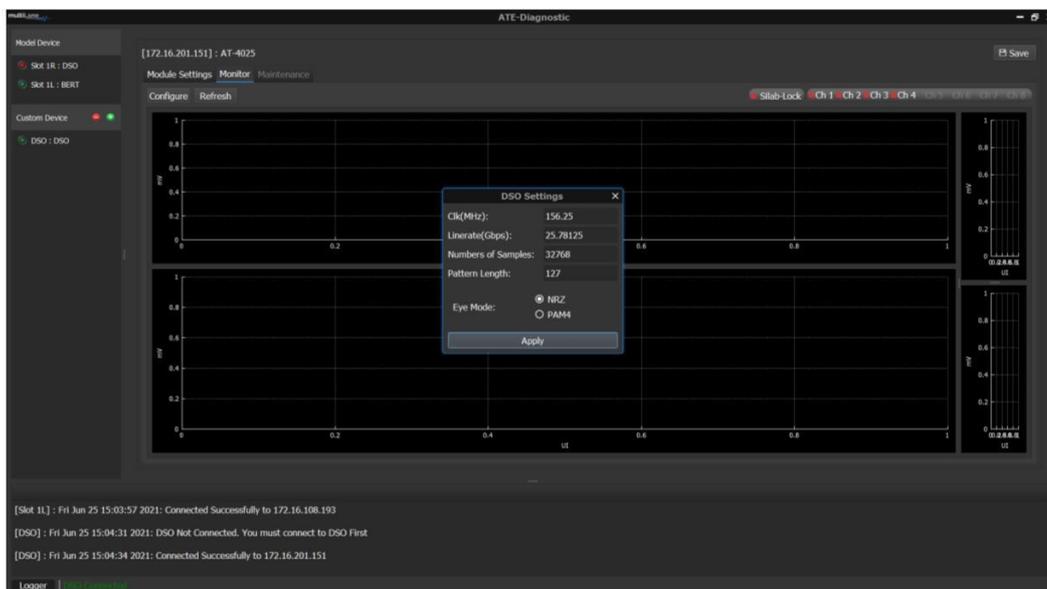


Figure 13: Monitor – Configuring

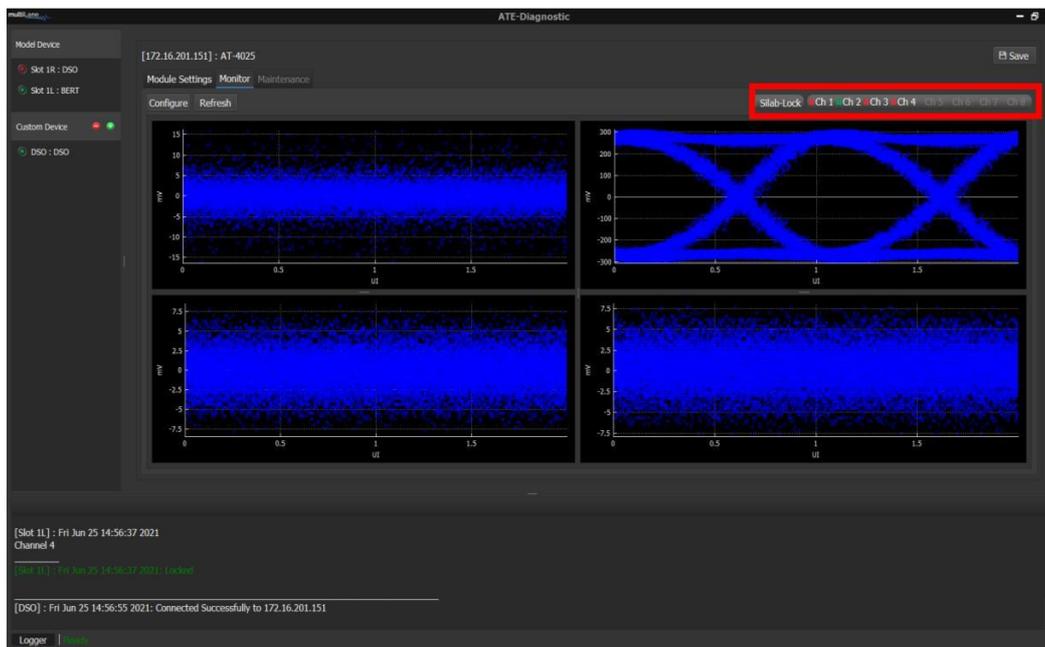


Figure 14: Monitor - Eye Diagrams

AT-BERT and AT-DSO

The user can connect to as many BERTs and DSOs as needed using the Diagnostic GUI. By that, one should refer to the [Loopback](#) section of the BERT to generate a signal and detect it on the [Monitor](#) section of the DSO.

Change IP address, Firmware and FPGA

If the IP address, Firmware and FPGA needs to be changed, the field service engineer needs to be referred to our public website, V93000 ATE Test Solutions and refer to the Application Notes where you can find the PDF about Changing IP, FW, and FPGA.

Application Notes



Changing IP, FW, FPGA

The user could change the IP address and Firmware through the Diagnostic GUI using a USB cable over an Ethernet cable.

- || Using AT1000 backplane: The user should plug the USB cable into the connector located on the backplane.
- || Using AT4000 Backplane RevD: The user should plug the USB cable into the connector located on the backplane and plug the instrument into the U453 Slot of the backplane.

The user could change the FPGA through the Diagnostic GUI using an Ethernet cable.

- || Using AT1000 backplane: The user should use an ethernet cable.
- || Using AT4000 Backplane RevD: The user should use an ethernet cable and can plug the instrument into any slot of the backplane. (U450, U451, U452, U453)

Refer to [Appendix II](#) for more info.

Connecting Instruments Examples

For the user to run a BER or observe an eye diagram, the transmitted signal of the BERT should be connected to its error detectors or DSO channels respectively. One should always refer to the instrument's datasheet or user manual for the pinouts.

Suggested Minimum Materials to connect Tx to Rx channels:

Multilane P/N	Description	Quantity	Color Used in this document
AT93000-POGO	Blindmate connector shown in Figure 15	1 or 2	
TM40-0200-01	Cable: 1x1 38cm, SMPM-BM(f) <-> 1.85mm(m)	2 (ship as matched pairs)	Green Lines
TM40-0430-01	Cable: 1x1 38cm, SMPM-BM(f) <-> 1.85mm(f)	2 (ship as matched pairs)	Red Lines

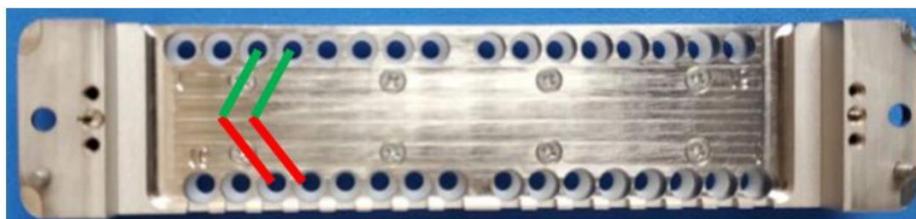


Figure 15: AT93000-POGO

NOTES:

- ▮ All of the instruments datasheets and user manuals are available on [MultiLane website](#).
 - ▮ Refer to the [System User Manual](#) for clock routing.
 - ▮ Refer to the [Diagnostic Kit Manual](#) for cables routing.
1. Figure 16 and Figure 17 shows the configuration of an AT4039E (or AT4039D) signal (Tx) transmitted into the AT4025 channels (Rx) for eye diagram observation. Both ATs are in the same cassette.

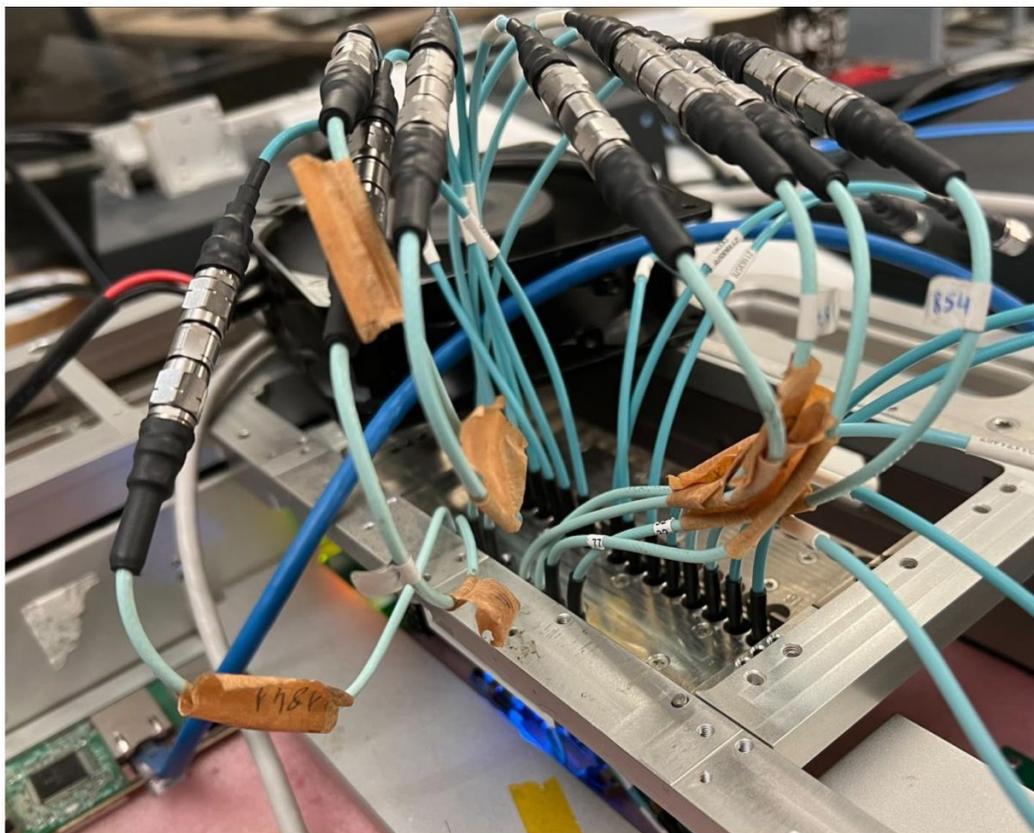


Figure 16: Example on Eye Diagram Configuration – AT4039E + AT4025

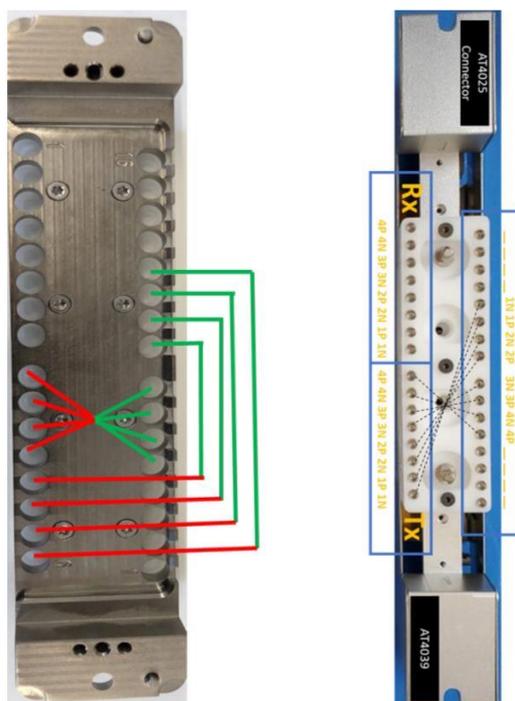


Figure 17: Example on Eye Diagram Configuration – AT4039E + AT4025

Appendix I: Create a Model File

This option allows the user to create or modify a model file by clicking on “Load” or “Save”, in addition to the “add” and “remove” buttons concerned in instruments.

1. Add: as seen in Figure 19, adding an instrument will request the type, IP, number of channels, slot number of the cassette location and the name of the instrument that can be set to the user’s desire and not necessarily the real name of the instrument.

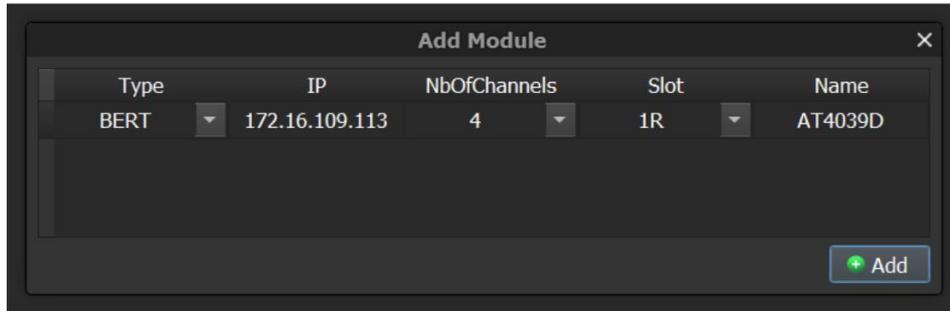


Figure 18: Adding Instrument in Model File

2. Remove: after adding an instrument, or if a model file is loaded, one can always delete one of the instruments channels or drag all of them to delete the entire instrument as shown in Figure 20.

NOTES:

In addition to the previous, the following can also be done as seen in Figure 20:

1. Add model file description
2. Specify the calibration status of the BERT: OFF, Factory, or custom by writing the path of the calibration file extracted from the ATE Calibration GUI available on MultiLane website.

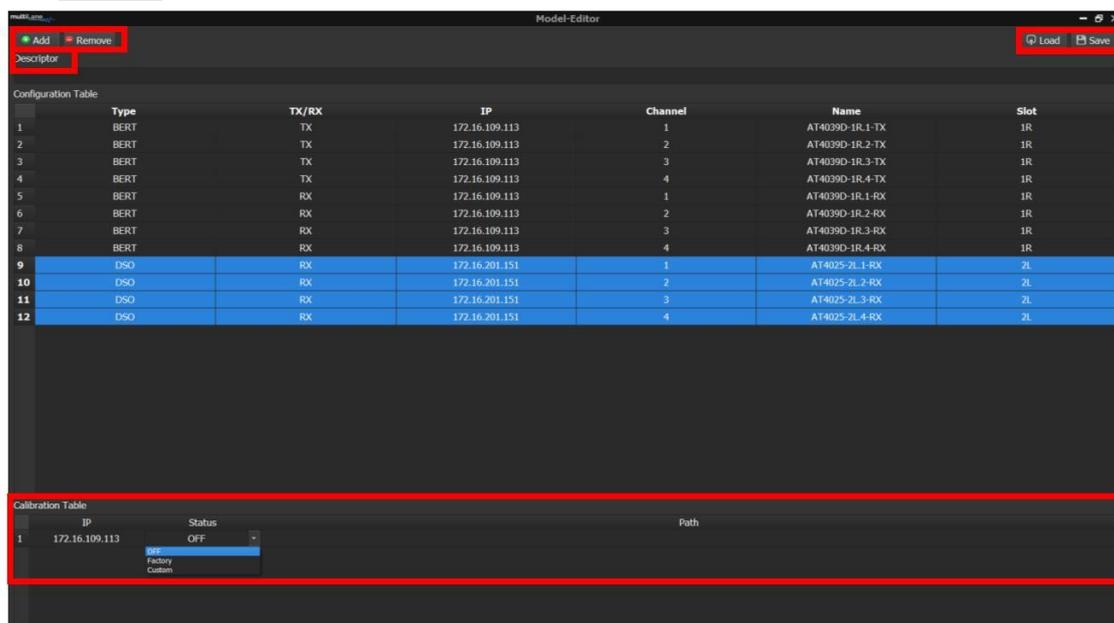
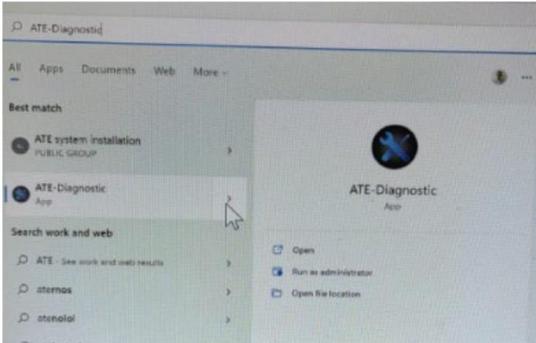


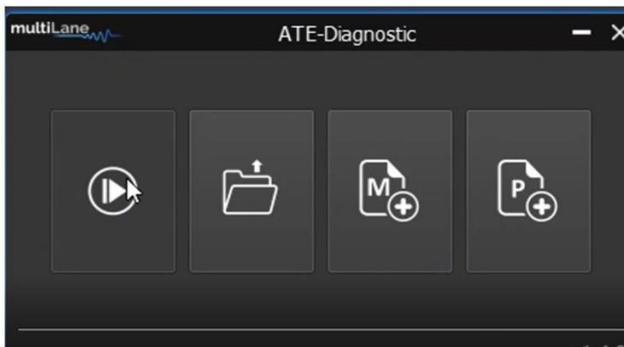
Figure 19: Model-Editor

Changing the IP Address

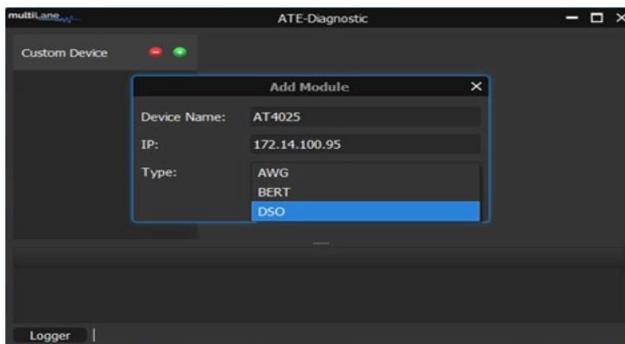
- i. Launch ATE-Diagnostic



- ii. Select the start button

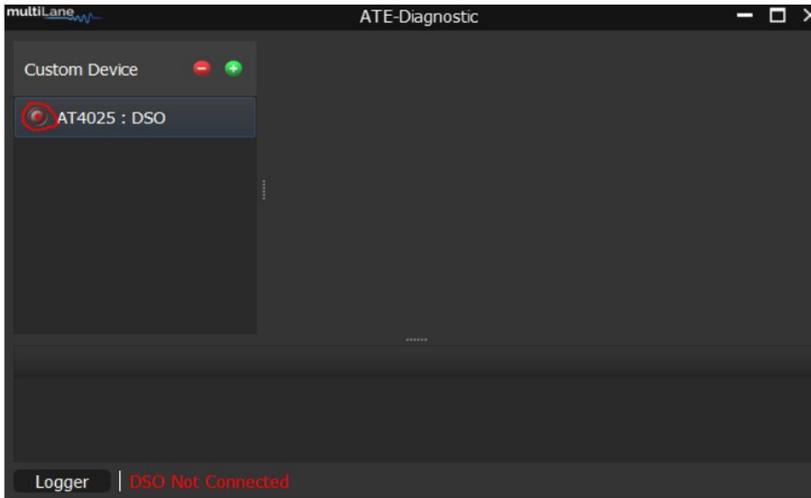


- iii. Select the instrument to change the IP address:

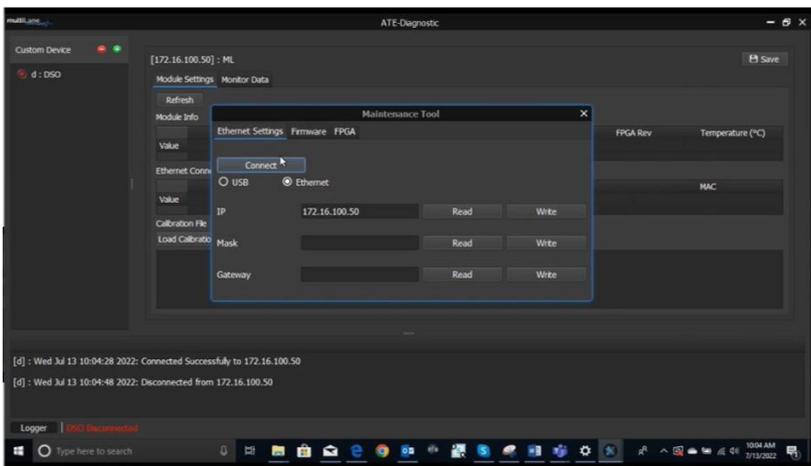


Write the device Name, and the corresponding IP address, and select the type (BERT, DSO, AWG). Select the Add button.

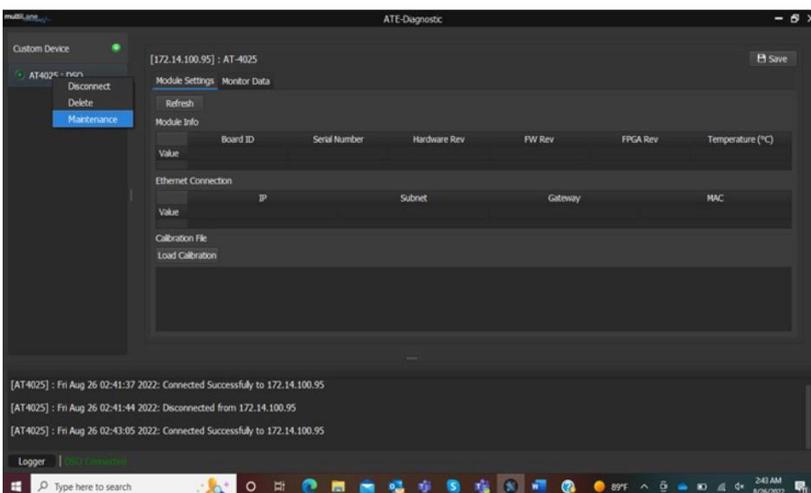
Click on the red circle next to the Device Name located on the left to connect to the instrument. When the device is connected, then the circle will turn green.



After connecting to the instrument, the red circle will turn green. Click on the **refresh** button to check the device settings.

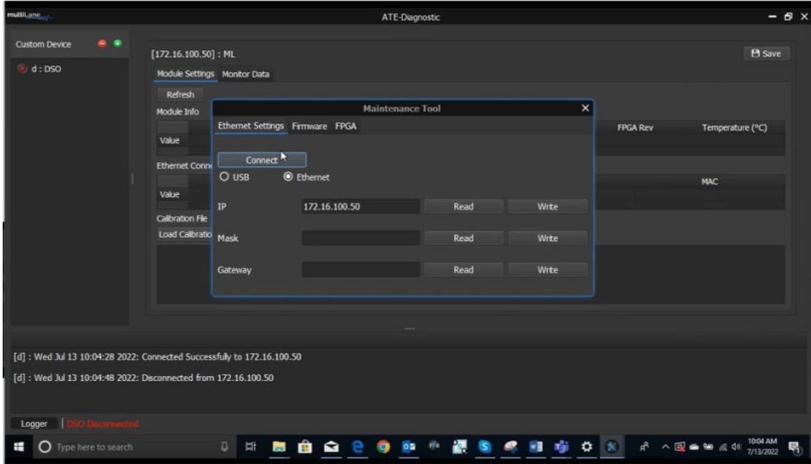


Right-click on the device name and click on the **Maintenance Tool** to change the IP address, Network Mask, or Gateway; apply write.



NOTES:

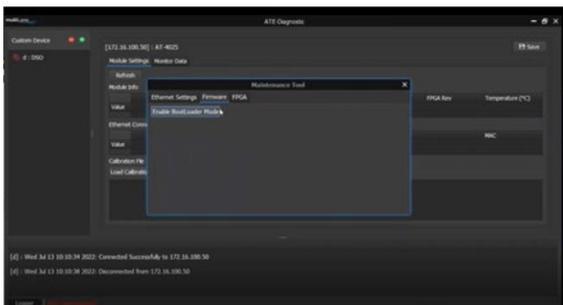
One should use a USB cable over an Ethernet cable if the cassette is removed and connected to AT1000.



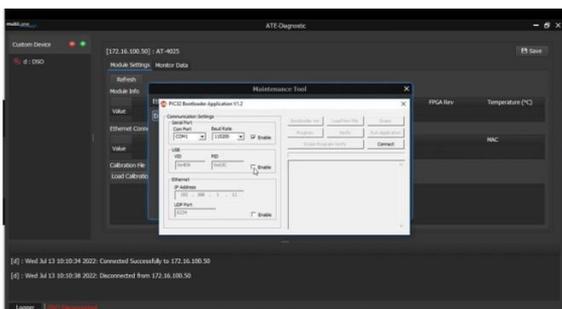
Updating the Firmware:

Contact MultiLane ATE Support to make sure you have the right Firmware file before programming. If the wrong Firmware is programmed onto a device, it could potentially break the unit.

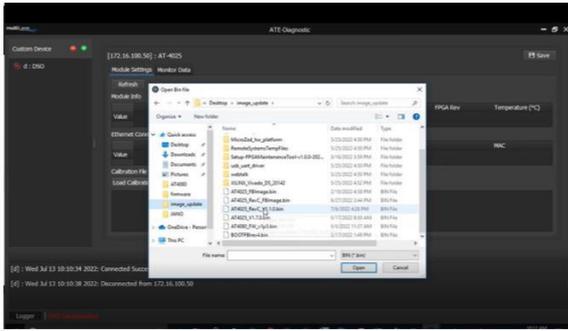
i. Select Firmware



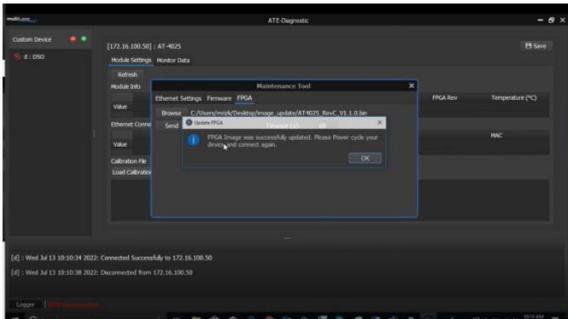
ii. Select a **USB** cable to connect.



- ii. Load the latest FPGA program



- iii. Upload the latest FPGA program



The unit reconnect then needs to be power cycled via the Diagnostic GUI, and the fact that the FPGA is reading as the updated version confirmed. *Do not skip this step.*