ML4070 SFP

GUI Manual

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General Safety Precautions

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.
Symbols and Terms in this manual. These terms may appear in this manual:

⚠ **CAUTION:** *Caution statements identify conditions or practices that could result in damage to this product or other property.*

⚠ **CAUTION: Provide adequate cooling.** *Provide adequate cooling to the board to avoid damaging any part of it specifically for the ATE version of the board. Refer to the power section to know the power dissipation values*

Contact MultiLane SAL

MultiLane SAL *is an engineering services company and an OEM supplier of specialty test and communication equipment for the semiconductor and optical transport industries. Multilane delivers ultra-compact test instruments of the highest value and performance for high speed communication and signal integrity applications. The Company has a large engineering team and a fully equipped lab with state of the art equipment, having recently moved to a 6000sq foot facility in* ***Houmal Technology Park (HTP).***

MultiLane SAL *customers can leverage great flexibility and capability in product customization thanks to our team in depth expertise in high speed I/O, Signal Integrity, and access advanced development and test tools. MultiLane has the resources and know-how to meet customer's product development and design requirements. Our R&D has a proven track record in delivering leading edge products and development tool kits to the Automated Test market while applying the production processes to deliver high quality products on schedule and within budget.*

MultiLane SAL*'s team is composed of experienced and disciplined engineers offering products and turnkey solutions of modules and systems for high speed IO, Signal Integrity, SOC development and optical communication from verbal requirements (Architecture, PRD, HW/FW/SW design implementation and characterization).*

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Overview:

The GUI is divided into two Main Tabs:

- Monitor Tab.
- Configuration Tab.

The ML4070 SFP board can accept up to three SFP modules of one channel each. The module A is a Loopback only module.

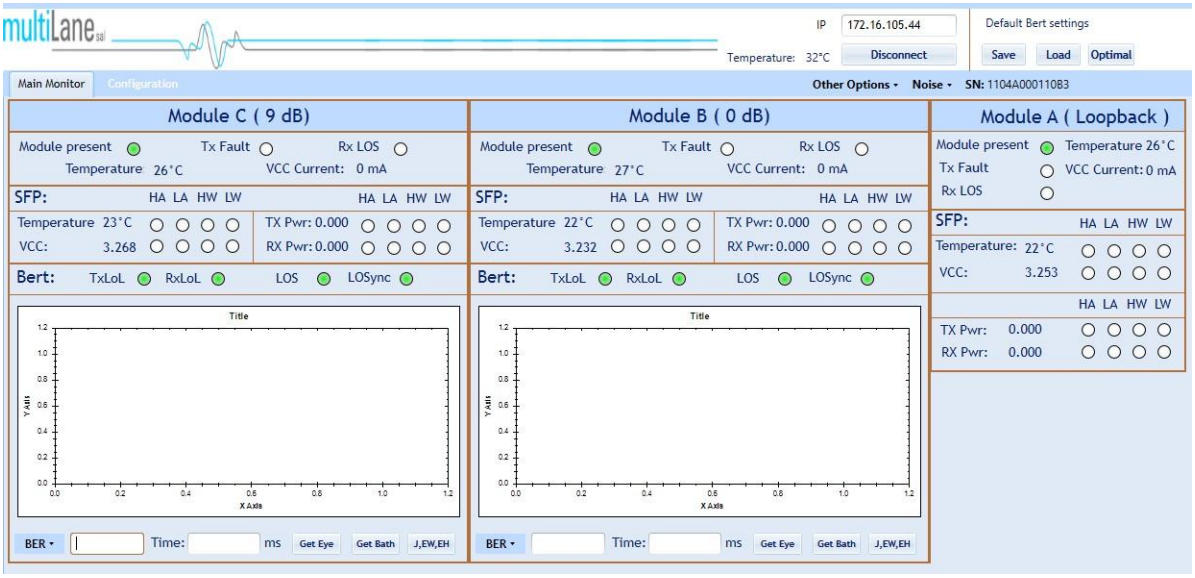

Figure 1: Monitor Tab

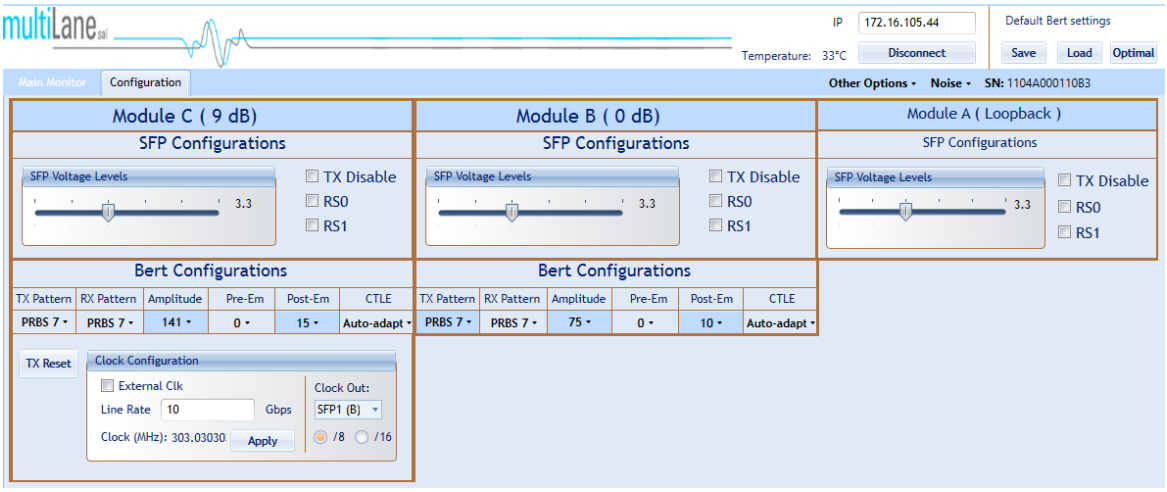

Figure 2: Configuration tab

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Connect through Ethernet:

- Connect the PC to the front panel via the RJ45 connector located on the front panel through an Ethernet cable to be able to control it. In order to connect via Ethernet the IP address of the board is required.
- Note that no drivers are required. You only have to know the current board IP address, you need to enter it in the text box next to the **IP** label shown in the below picture, then click on the **connect** button.

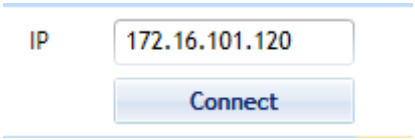
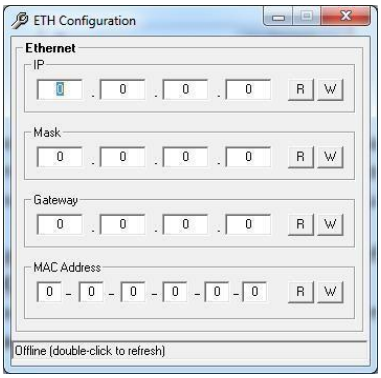


Figure 3: Connect button

- You are now connected.
- Once connected, the **Connect** button turns into **Disconnect** and the board Serial Number will be displayed.
- To make sure that you are connected, you can also ping your device.

Changing the IP Address:

- To change the IP address of the board, you need to install the USB drivers.
- Install the Ethernet configuration software that allows you to read, write the **IP** address, **Mask** and **Gateway** of the instrument.



The instrument is now powered up and connected through the right IP address. Next, you need to configure the signal generated.

Figure 4: Ethernet Configuration

Line Rate Configuration:

- Write the bit rate value next to the **Line Rate** label. The value entered must be in between 8.5-15 &21-30 Gbps per lane.
- Press **Apply** to save the value.
- The GUI will calculate the Clock and display its value in the clock label then the board will generate this clock.

- If External Clk is checked, the board takes its clock from an external source, ignoring the configuration generated from the SiLab.
- The Clock Out configurations allows forwarding the clock signal to an output port. The output is the Line Rate divided by 8 or by 16.

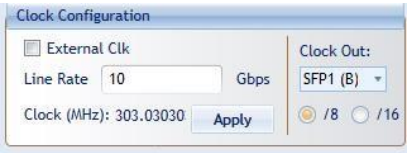


Figure 5: Clock Configuration

Board Temperature:

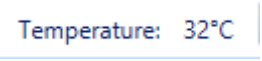


Figure 6: Board temperature

- The Gui displays the temperature read from a sensor placed on the board.

Other options:

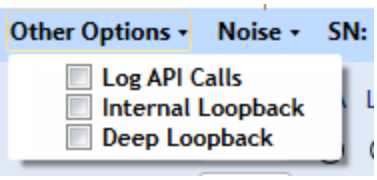


Figure 7: Other options

- When the box '**Log API Calls'** is checked, the GUI generates Log files under the directory where the GUI is deployed, in a folder called LogAPICalls followed by today's date. Note this function consumes disk space and is best disabled if leaving the GUI up and running for more than a day.
- Two log files will be generated by channel. All functions which do not apply at the channel level such as functions at the board level will fall under channel 0's log files. Log files are split into two files per channel:

1- LogAPICalls0.log
2- LogAPIFrequentCalls0.log

- Where LogAPIFrequentCalls0 grows quickly and contains the monitoring functions that are always running in the background to do a status check determining what color to choose for the various LEDs in the GUI.

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- **Internal Loopback**: After enabling the internal loopback, the RX will be connected to the TX in the 4 channels, and the user will not be able to make TX generation anymore.
- **Deep Loopback**: enable loopback for gearbox 2 (Module A and C).

Noise:

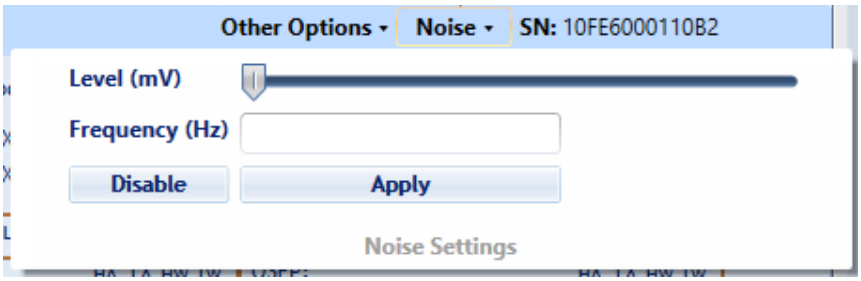

Figure 8: Noise Dropdown Menu

- **Noise Dropdown Menu**: Set the Noise Level and frequency for all channels.

Module Monitor:

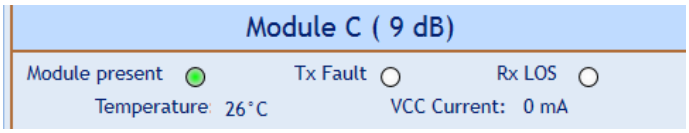

Figure 9: Module monitor

Module pins:

- **Module present**: Turns green when the module is connected correctly to the board.
- **Tx Fault:** Turns red to indicate that the module transmitter has detected a fault condition
- **Rx LOS:** Turns red to indicate a RX loss of lock.

Board measurements:

- **Temperature**: Displays the temperature read from a sensor placed near the module on the board.
- **VCC Current**: Displays the current passing through VCC power rail.

Internal measurements and flags

- **SFP Temp:** Displays the SFP internally measured temperature.
- **SFP VCC:** Displays the SFP internally measured voltage.
- **HA**: High Alarm

- **LA**: Low Alarm
- **HW**: High Warning
- **LW**: Low Warning

These flags reflects the stat of the module temperature and voltage.

Channel Monitor:

In order to start BER measurements, the instrument ports should be in the loopback mode, which means TX port should be connected to the RX.

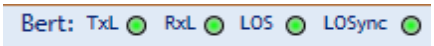

Figure 10 Bert Lock

To monitor the BER function, we have dedicated a LED to make sure it is locked.

- If the RxL LED is green that means the RX is locked to the incoming data.
- If the RxL LED is red that means the RX is not locked to the incoming data. There is a possibility that the cables are not connected correctly, thus try the invert function at the TX and RX sides; if the problem persists check the connections of your cables. The patterns of the Detector are automatically modified when you change the generator pattern value.

If the channel is locked, we can draw the Eye, Bathtub and get its BER.

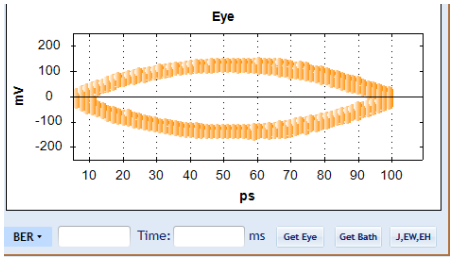

Figure 11 Eye Diagram

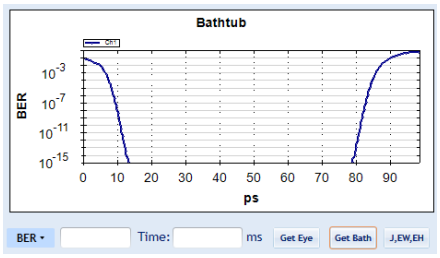

Figure 12 Bathtub

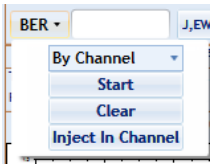

Figure 13 BER measurements

We can get the BER by module or for all the modules.

We can also calculate **J2/J9** and **Eye Width** and **Height**. Note that to calculate J2/J9 you must run the Bathtub first and to calculate EW/EH you must plot the Eye diagram first.

Module Configuration:

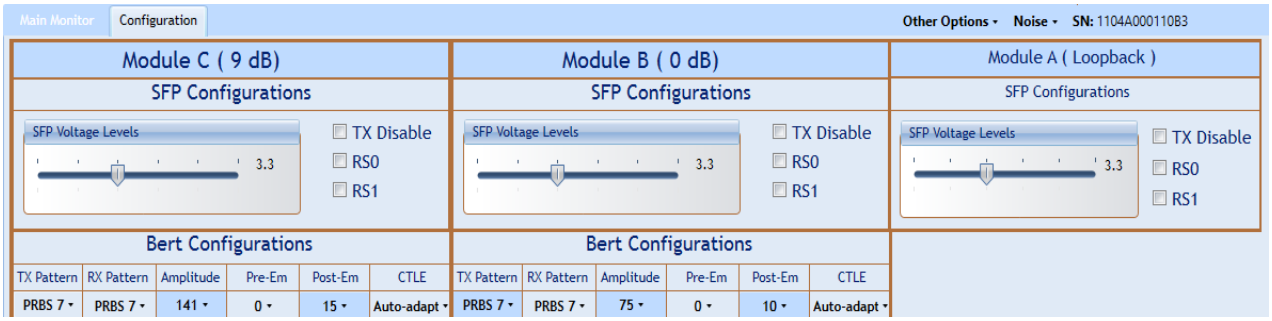

Figure 144 Module configuration

- **SFP Voltage Levels**: Change the Voltage level of the SFP module. Values are between 3.1V and 3.6V.
- **TX Disable:** disable the Transmitter.
- **RS0:** Select for RX signaling rate greater than 4.25 GBd.
- **RS1:** Select for TX signaling rate greater than 4.25 GBd.

Channel Bert Configuration:

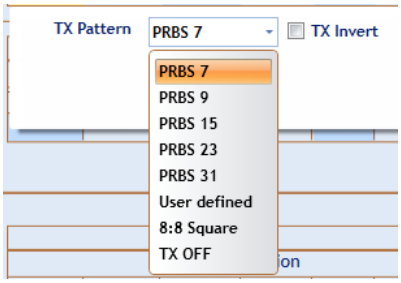

Figure 155: PRBS

1- In the **TX Pattern** group box, select the pattern required; the available patterns are 7, 9, 15, 23, 31, user defined (sequence of bits in **Hexadecimal**) and 8:8 square. To make the TX off, choose the **TX OFF**

2- In the **RX Pattern** group box, select the pattern required; the available patterns are 7, 9, 15, 23, 31, auto verification and 8:8 square

- Channel will be locked if the data received at RX matches the selected pattern -If the user selects **Automatic Verification**, the software will try to detect the received signal pattern and if it is inverted; upon success it will show the result and the LED will indicate that the channel is locked.

TX Pattern tab is used for Configuring Generated signal, RX Pattern tab is used for pattern verification.

3- This instrument includes 3 sliders to shape the form of the eye diagram, amplitude, Pre-emphasis and Post-emphasis. All slider values and other configurations are saved in the EPROM:

-Amplitude: TX output amplitude is between 0mV and 100mV if not calibrated.

-Pre Emphasis: TX output Pre-emphasis amplitude value could be changed from 0 to 20%.

-Post Emphasis: TX output Signal Post-emphasis amplitude value could be changed from 0 to 35%.

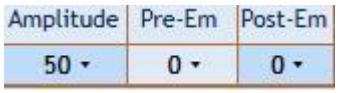

Figure 16: Amplitude, Pre-Em, Post-Em

4- CTLE Tab allows the user to select the DFE level; DFE varies from 0 to 10 dB to compensate for cable loss from the DUT to the BERT and to de-embed the system losses.

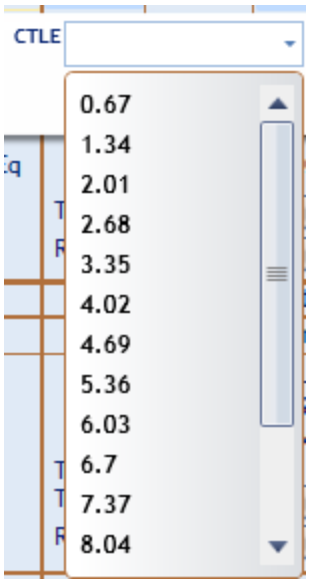

Figure17: CTLE

Default Bert settings:

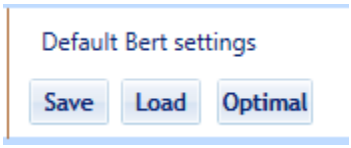

Figure 17 Default Bert settings

The Save button saves the Bert configurations for all the channels from all the modules to reload them later.

The Optimal button loads the optimal Bert configurations for all the channels.

Manual Revision History

This section describes the changes that were implemented in this document. The changes are listed by revision, starting with the most current publication.

Revision 1.0: March 4th, 2018; First publication of this document, preliminary revision.

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