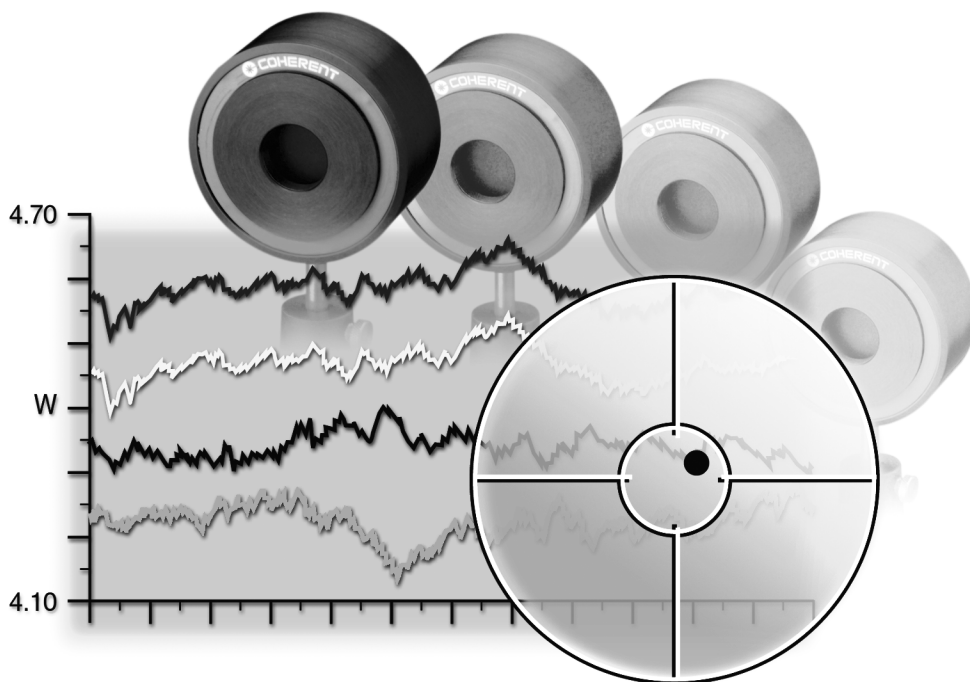


LaserPAD™ PC

LaserPAD™ PC

Multi-Channel Laser Power Analysis Display



User Manual



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Multi-Channel
Laser Power Analysis Display
User Manual



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General Description



The LaserPAD™ PC Software combined with the Coherent SmartSensor™ Interface Module (SSIM) is a power analysis tool that interfaces with the full line of Coherent Smart detectors. LaserPAD PC software provides many custom combinations of multi-channel power and position analysis.

The Coherent Smart detectors and SSIM measures all CW lasers commonly manufactured today, from the UV to the IR, with rated power from nanowatts to kilowatts. Simply plug the appropriate detector head into the SSIM.

The SmartSensor Interface module is a unique detector interface. This module interfaces with any Coherent Thermal or Semiconductor SmartSensors. The SSIM contains the input amplifiers and digital converters necessary to accurately analyze CW laser power and position. When this circuitry is combined with the capability to utilize Coherent SmartSensor technology, you now have a stand-alone black box power meter. The USB or serial communication port transmits the corrected CW laser power and beam position for display and analysis with the LaserPAD PC application. The serial and USB interface is perfectly suited to communicate with any compatible host computer. The SSIM software can also be updated with the USB port.

Features

CW Power Measurement

The LaserPAD PC software combined with the SmartSensor Interface module supports CW power measurement. (See Appendix A for a list of supported detectors.)

Semiconductor and Thermal detectors are compatible with the SSIM, providing power measurement capability to 5 kW.

Versatility

More than just a power meter, the LaserPAD PC software also provides beam position and multi-channel power measurement capability.

Hot Swapping

The LaserPAD PC software allows swapping of detector heads and SSIM modules while the application is running. The LaserPAD PC software detects when a module or detector is connected or disconnected.

SmartSensor Technology

Smart detectors use Coherent's SmartSensor technology. Each SmartSensor has an EEPROM that stores the characteristics and calibration data for the detector. Detector information is loaded by the SSIM at start-up. This eliminates the need to make manual changes associated with unique detector settings.

Beam Alignment

Thermal disk CW sensors provide a quadrant display of beam position on the detector head. Centering the beam on the detector head achieves maximum accuracy.

Broad Wavelength Range

Coherent SmartSensors cover the Wavelength spectrum from 0.19 to 10.6 μ meters.

Features

Ease of Use

The LaserPAD PC software provides many separate display windows accessible with a single mouse click. Each window is designed to accomplish a variety of specific measurement tasks.

Portability

The compact, lightweight SSIM can be mounted in a variety of locations. The SSIM can operate on batteries with serial communication or power provided by the USB connection.

Reliability

The SSIM is designed to withstand the rigors of process control or long-term stability measurements. Coherent's rugged detector head design has been the industry standard for more than 30 years.

Accuracy

The combination of SmartSensor technology, laser Wavelength entry, and accurate beam positioning information create a highly accurate laser measurement system.

Unpacking

The LaserPAD SmartSensor Interface module and detector heads are shipped in foam inserts. Batteries are installed in the SSIM prior to shipment. To insure correct battery operation, the batteries require an initial overnight charging (14 hours).

Visually check all cartons for damage before unpacking. If there is no visible damage, remove all items from the cartons and inspect for damage. Advise Coherent of any damage immediately. A Returned Material Authorization shall be issued for any damaged instruments (see the last page of this manual for service information).

USB Driver Installation

USB communication with the SmartSensor Interface module (SSIM) requires the installation of proper USB drivers. The following process describes a generic means to load the drivers. The appearance of the dialogs will vary with different Windows operating systems, but the process will remain basically the same. The following screen images were captured on Windows 98 Second Addition.

▶ *NOTE: Install USB drivers prior to installation of the LaserPAD PC application.*

1. Connect the SSIM to the host PC running in Windows. Turn the SSIM power switch to the ON position. The following dialog will appear when the device is detected.



USB Driver

2. You will be prompted to select the type of search for proper drivers. Select the Recommended search type.



3. When prompted to specify the location of the driver file, select your CD drive only and click Next.



USB Driver

- The following name should be displayed as the correct file. EZUSBW2K.INF. This file name is required to install the proper USB drivers. If this name does not appear, click the Back button and modify the search parameters to display the correct file name.

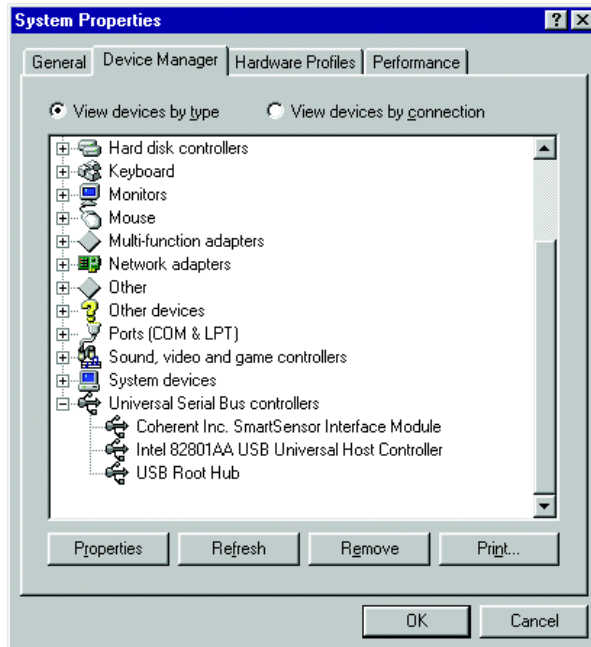


- The Next button should display a dialog indicating the installation process is complete. You may be prompted to restart your computer.



USB Driver

6. Verify the proper driver installation by connecting the SSIM and move the Power switch to the ON position. Wait for 30 seconds to ensure the SSIM is initialized. Right Click on My Computer and select Properties from the displayed menu. Select the Hardware Device Manager. Scroll to the bottom of the dialog and click the (+) sign adjacent to the Universal Serial Bus Controllers label. A list of USB devices will be displayed. Verify that the Coherent Inc. Smart Sensor Interface Module label is displayed.



7. Driver installation complete.

Software Installation

Description

The LaserPAD PC software installation includes the following:

- LaserPAD PC multi-channel laser measurement application.
- Separate data folders to store a variety of measurement results.

Installation CD Contents

- LaserPAD PC installation components
- SmartSensor Interface module USB Drivers
- SSIM Update application (Update utility for SSIM software)
- SSIM.hex (SSIM software)
- User Manual (Adobe Acrobat™ version of the LaserPAD PC user manual)
- Adobe Acrobat (Application required to view the user manual)

System Requirements

The SSIM operates via USB on any USB compatible computer running Windows 98, Windows Me, Windows 2000 or Windows XP. Windows 95 and Windows NT systems support serial communication only.

Minimum System Requirements

- Laptop or Desktop PC with a Pentium II 233MHz processor
- 64 MB Memory
- 30 MB Free Hard Drive space
- CD-Rom
- USB / Serial Communication port
- 800 x 600 Screen Resolution
- 256 Colors

■■■■► *NOTE: The 256 color setting does not support the LaserPAD PC icon or custom colors.*

Software Installation

Recommended System

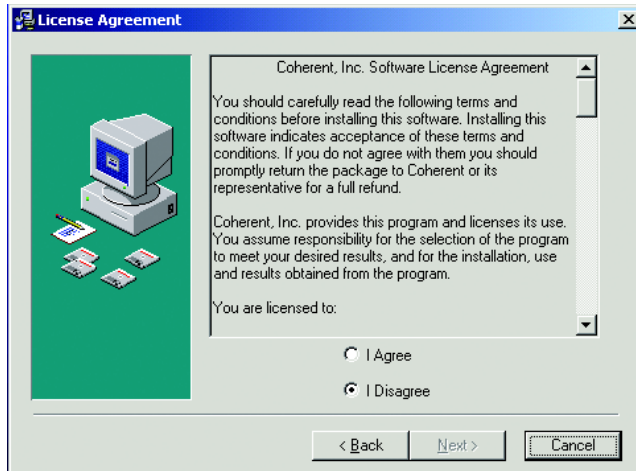
- Pentium III 500 MHz processor
- 128 MB memory
- 1024 x 768 screen resolution
- 32 Bit colors

■■■■➔ *NOTE: The recommended system supports normal software operation. It is better to use the most modern hardware if possible.*

Installation Procedure

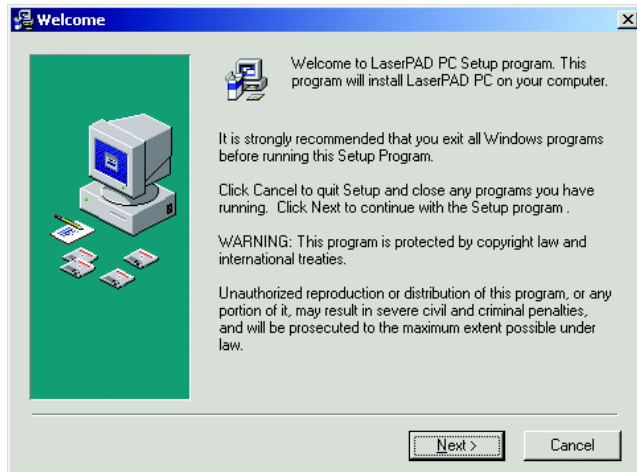
Insert the LaserPAD PC software CD in the computer CD drive. The auto-run process should begin the installation automatically. If the auto-run does not start automatically, select Run from the Start Menu and type the CD drive letter followed by \setup.exe then press enter.

1. The License screen appears. Select I Agree to bring the Next button into focus

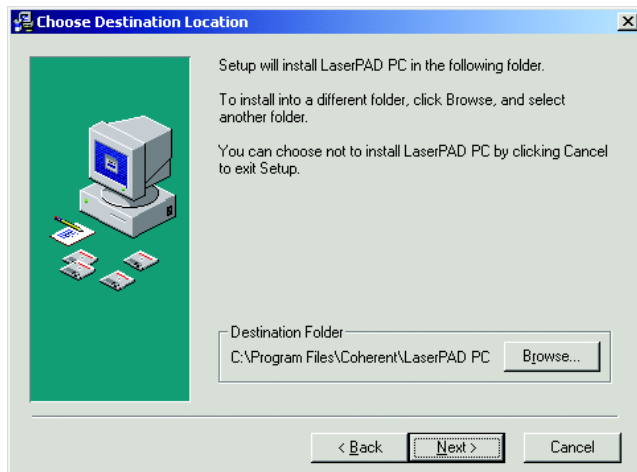


2. The Welcome screen appears. Click Next to continue the installation process.

Software Installation

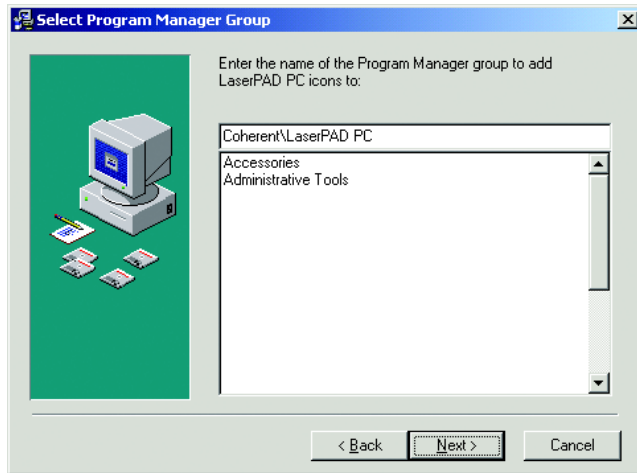


3. The Next button allows the user to select the path for installation. Use the Browse button to select a custom installation location. The default path is: C:\Program Files\Coherent\LaserPAD PC.

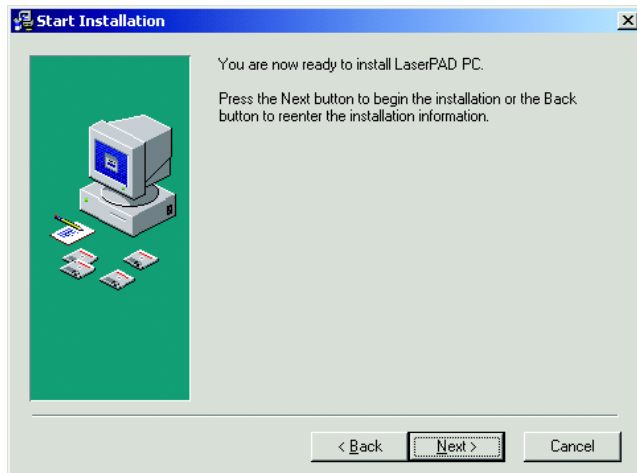


4. The next installation step displays the name shown by the Windows program manager.

Software Installation

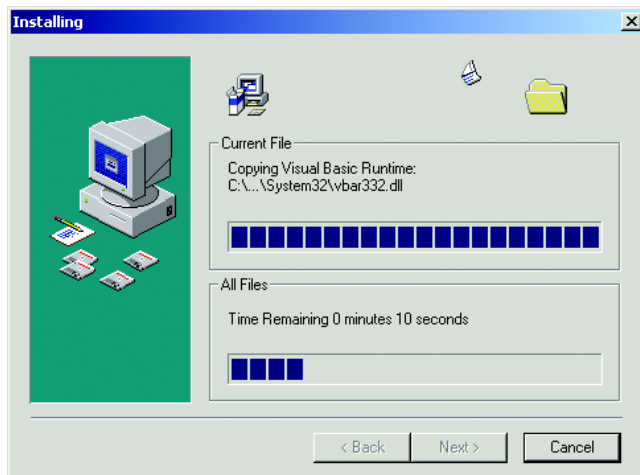


5. You are now ready to load the LaserPAD PC software.

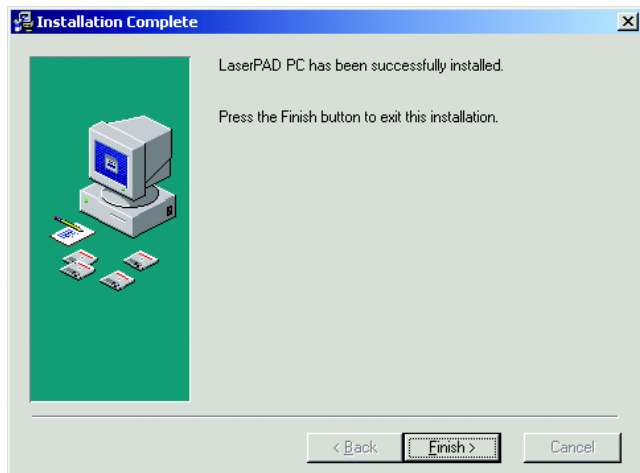


6. The Next button begins the file transfer process.

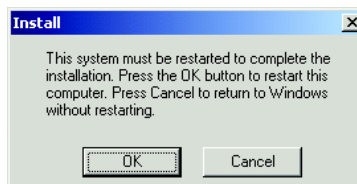
Software Installation



7. When the files are loaded, click the Finish button to complete the installation.



8. You must restart your computer to complete the installation.



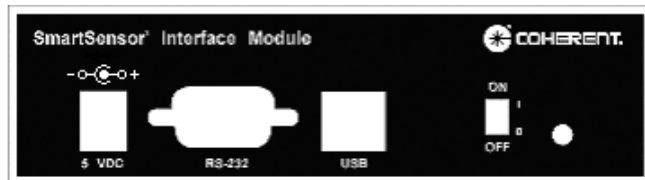
Controls & Connections

Input Panel



Detector Input – Connection to the Coherent SmartSensor detector using a DB-25 connector.

Output Panel



5 VDC Power Input (Center Positive) – Connect the provided 5V power supply. The power supply is designed for the following AC input requirements: 100-240V, ~0.2A, 50-60 Hz. The 5V input also provides battery charging capability for the SmartSensor Interface module (SSIM). When the 5V supply is connected to the SSIM, the battery charges regardless of the power switch position. A USB connection provides sufficient power to run the SSIM without a need for batteries or an external supply. The USB connection does not provide battery charging capability.

■■■■► *NOTE: A fully charged battery typically operates the SSIM for 12 hours continuously. Do not exceed this 12 hour cycle without recharging. A low battery condition requires an overnight charging cycle (approximately 14 hours).*

Controls & Connections

RS-232 Input/Output – Connect the Host PC to the SSIM with a Null Modem cable. The LaserPAD PC application supports a maximum of 2 serial connections simultaneously.

USB Input/Output – Connection between the SSIM and the LaserPAD PC host computer. The LaserPAD PC application supports a maximum of four SSIMs simultaneously. The LaserPAD PC application allows the user to connect greater than four SSIMs and select any four for active display.



Power Off/On – Switches input power on and off to the SSIM. Use the power switch to reboot the SmartSensor Interface Module if necessary.

Power Indicator LED – The LED illuminates when the 5V power is active and the power switch is in the ON position.

Operational Overview

LaserPAD PC software provides the capability to collect and analyze data from four Smart detectors simultaneously. The LaserPAD PC software automatically detects more than four detectors and modules to provide the capability to switch between them while the application is running.








Restored Detector Specific Settings – All software settings are stored in association with the detector serial number in a master file. Each time the detector is connected, the LaserPAD PC application restores all previous software settings. These settings include: Display Units, Wavelength, Quick Wavelengths, Attenuation, Display Averaging, Target Style, Window Sizes, Color settings, Pass / Fail Statistics settings, Alarm settings, Unit Tracking, Custom Power settings, Trend Setup parameters, Position Stability Setup parameters, Alignment Screen settings and Alignment Calibration, Quick Notes settings and Data Log settings.

Hardware Properties Window – The Hardware Properties window displays information associated with all detectors and modules connected. The LaserPAD PC application can analyze data from four detectors simultaneously. The USB connection can support more than four connections. Information associated with all connected modules and detectors is displayed in the Hardware Properties window regardless if they are active or not. Green icons  indicate detectors that are active. Active Record files are also displayed in the Hardware Properties window. Record files are designated with a Play icon . A right mouse click on a module or detector description displays a menu containing controls to open and close detector windows.





Application Menu Items – The application menus (File, View, Mode, Settings, Window and Help) contain global application controls. The Open function allows the user to open a variety of application specific file types. The Save function saves a configuration file containing all detector window settings and data collection setup parameters. The Print function allows the user to print a specific detector window or the entire application workspace. The View menu items are used to set all active detectors to display the same window. The View menu also provides access to the Hardware Properties window and the capability of closing all windows. The Mode menu selects display units that can be applied to all detector windows currently active. The Settings menu contains controls for setting the SSIM communication method, dialog restoration controls and the capability of restoring factory display color settings. Tile functions are

Operational Overview













controlled from the Window menu. Active detector windows are also listed in the Window menu. The Help menu contains Help Contents, Coherent Contact information and software version information.

Application Tool Bar – The LaserPAD PC tool bar contains common application specific functions. The Open button  accesses saved LaserPAD PC file data. The LaserPAD PC application allows the user to save Configuration settings, Recorded data, Data Logs, Trend data, Position Stability data and Quick Notes. The Save  button saves .cfg Configuration files. The Print  function prints a detector window or the entire application workspace. The Custom Display button  provides the capability to create a custom Multi-channel live power display window. The Custom Display window also contains features to add custom math functions. The Stop and Play buttons   pause and resume live screens and data collection for all active windows. The Stop and Play buttons are not available with the Log and Record windows. The Hardware Properties button  accesses hardware information on connected hardware, or opens a Record file. The Hardware Properties window provides detector window display controls.


Application Status Bar – The application status bar displays the number of detectors and modules detected by the LaserPAD PC application. Clicking on the detector or module Status Bar pane to display the Hardware Properties window. The Hardware Properties window displays information associated with the modules and detectors connected. The Application Status bar displays the system time and date.

Detector Window Tool Bar –The Detector Window tool bar accesses detector specific controls. The Units button  selects the unit types for all detector windows. Click on the Units logo to cycle the available units (Watts, dBm and dB). This control also contains a drop-down function to directly select units. The Set / Clear Offset button  subtracts the power value as an offset or sets a new dB reference. In power mode, click the button a second time to clear the offset value. The Reset Live Stats button  clears all accumulated Home Screen statistical data. The statistical data is not displayed by default. This data can be selectively displayed with the detector settings dialog. Click the Wavelength button to change the input laser Wavelength. Clicking the Lambda icon displays a Wavelength entry dialog. The Wavelength button  also contains a drop down with up to 10 Quick Wavelength settings. The Quick Wavelength

Operational Overview

values can be entered in the detector settings. The Stop  and Play  buttons pause and resume data collection. The Record button  displays a Record window. The Record function collects data at a rate of 10 Hz. This data can be saved and replayed with any detector screen. Recorded data is collected and displayed in all detector screens in the same fashion as live data. The Settings button  displays a multi-tab settings dialog. Please review the Detector settings screen section for additional information. The Home screen , Tune screen , Trend screen , Position Stability screen , Alignment screen , Large Display screen , Quick Notes screen  and Log Window  are displayed with one left mouse click on the appropriate tool bar button. Review detailed information associated with each screen for additional information. Semiconductor detectors do not provide position information. The Position Stability and Alignment screens are not available when Semiconductor detectors are connected.

Detector Window Status Bar – The Detector window status bar displays a variety of detector specific settings. The Wavelength, Attenuation and Average settings are displayed in the status bar. Left clicking the Wavelength value displays the Wavelength entry dialog. Left clicking the Average or Attenuation value displays the Detector settings dialog. The Temp indicator in the status bar indicates normal Thermal detector operation. When a Thermal detector temperature exceeds 100° C, the over temperature condition is indicated by a red Temp status bar panel. Left clicking the Temp status bar panel displays the Alarms setting dialog. The right side of the detector status bar is reserved for any user alarms that are active. The user alarm designators are displayed when active. Red indicators are shown when a user specified value is exceeded. Left click on this large panel to display the alarm settings.

Home Screen – The Home screen displays live power and position information simultaneously. The Alignment target displays the beam position relative to the detector aperture. Power values display with selected units and settings. The Statistics panel displays the detector settings and the selected user specified Pass / Fail statistics. Left click the panel to set the user specified Pass / Fail statistics. The Large Display button  is available when the Home screen is active. The Large Display screen displays the power in a large font easily seen at a distance. The Alignment target and Statistical information are not available on the Large Font screen.

Operational Overview

Tune Screen – The Tune screen provides features to optimize laser output power. A live Tune bar and scale indicators provide a bar display of the power. A peak numerical value and peak scale indicator displays the maximum value. The user can reset peak indicators at any time.

Trend Screen – The Trend screen provides multi-channel power vs time information in a graphical form. Eight plots can be displayed simultaneously. Each plot can collect power from any active detector. Custom math function plots can be displayed using active detectors combined with common math operations. A measurement cursor is provided to display numerical information relating to individual data samples. Statistical data is automatically compiled and can be displayed on a separate screen by clicking the Stats button in the Options tab. The statistical data and points can be saved in a text or Microsoft Excel™ format.

Position Stability Screen – The Position Stability screen displays X and Y position data simultaneously for a single detector channel. The data is displayed in a strip chart and polar form. Data can be displayed as absolute or relative. The graphical zoom can be increased to a level of 32x, for precision visual analysis. The Position Stability screen also provides cursor measurement of individual data points and the capability to store the results to a text or Microsoft Excel file.

Alignment Screen – The Alignment screen provides position information relative to a selected zoom level. The aperture relative to the zoom level is displayed along with graphical and numeric position data. The Alignment screen provides a key feature to allow precision alignment calibration. The Alignment Calibration process consists of displacing the beam a known 5.0 mm increment and the software corrects for the difference between the actual distance and the default calibration values. The calibration process provides a high level of accuracy for absolute and relative position measurements.

Quick Notes – The Quick Notes function takes a snapshot of the beam position, power and statistical information. Each time the user selects the Quick Notes function a new data set is collected based on the items selected in the Quick Notes settings. The collection of Quick Notes are displayed in a special window with controls to clear and save the compiled Quick Notes

Operational Overview

Record Function – The Record function collects data in a program specific format. When the user recalls and plays the data, it can be displayed with each of the detector windows. The replayed data is displayed in the same fashion as a live detector. For example: The user can collect a 60 second Record file in the lab and take the data back to a desk, then replay the data on the Trend screen with a custom math function. The Trend screen collects and display the data just like a live detector. The statistical results are compiled and the data can be saved to a Trend file. The Record Playback function provides speed controls to enhance the viewing process.

|||▶ *NOTE: The Record function provides an exact duplication of the lab environment. The recorded detector file will replay each and every data point as it was collected in the lab. The Record function will allow the user to analyze the same set of data points under a variety of display and analysis conditions.*

Data Logging – The Data Logging function provides specific controls for the data collection process. The Data Logging process can collect data points at user specified intervals of time or number of points. Data Logging can be set to ignore data that does not pass the specified Pass / Fail statistics. The Data Log file contains header information and the array of points.

SmartSensor Interface Module Software Update

Description

The SmartSensor Interface Module (SSIM) contains the software required to interface with Coherent SmartSensors. The SSIM software manages the internal circuitry, SmartSensor calibration information, calculations and data transmission. If any function is changed or a feature is added, the SSIM software can be upgraded by the user. The update software is located on the installation CD or can be downloaded from the Coherent web site.

System Requirements

The host computer requires an active USB port for the SSIM software update. The software update can be accomplished with the following Windows operating systems: Windows 98, Windows 2000, Windows ME and Windows XP.

Software Information

The SSIM software update requires the software update file (ssimx.hex). The x in the file name corresponds to the revision of the file. The ssim.hex file can be obtained from a floppy disk, E-Mail or the Coherent Web Site.

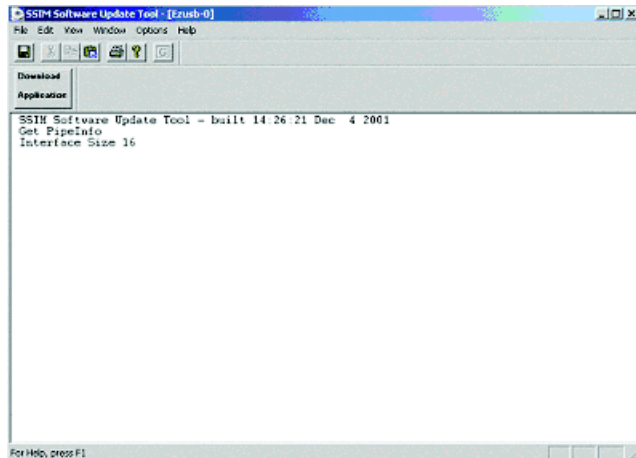
SSIM Update Installation

1. Insert the LaserPAD Installation CD in the computer CD drive. When the LaserPAD installation begins, select Cancel to abort the LaserPAD PC installation.
2. Click on the Window Start button and select Run. Type D:\SSIM Update\Setup.exe (D represents the CD drive letter. Enter your CD drive letter in place of D if necessary).
3. Follow the screen prompts to complete the installation. The SSIM Update installation proceeds in the same fashion as the LaserPAD PC installation. Review the LaserPAD PC software installation section for additional information.

SmartSensor Interface Module Software Update

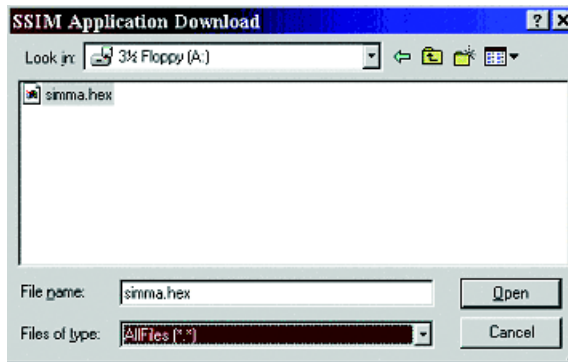
SSIM Software Update Procedure

1. With the host PC running, connect a USB cable between the SmartSensor Interface Module (SSIM) and the host PC.
2. Move the SSIM power switch to the ON position. The host PC detects the SSIM as new hardware. If the proper USB drivers do not reside on the host PC, you may be prompted to load them. The USB drivers are located on the LaserPAD PC software installation CD. Place the LaserPAD PC software installation CD in the host computer CD drive. Type the CD drive letter in the Windows dialog box, which is asking for the location of the USB driver files, and click OK.
3. To start the SSIM Update software Click on the Windows Start button and select Programs then Coherent and SSIM Update.
4. The following screen should appear. Click on the large Download Application button on the screen.



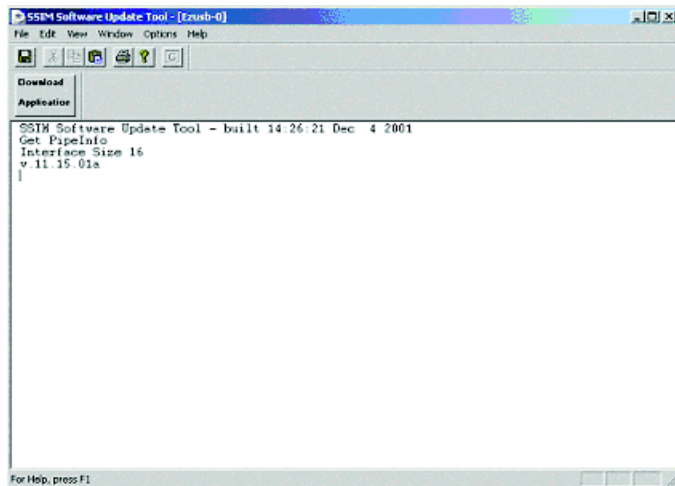
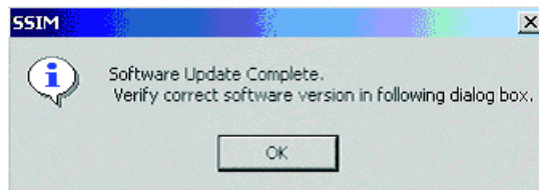
5. When the Download Application button is clicked, a standard Windows Open dialog box appears. Use this box to specify the location of the ssim.hex file. The example shown below would correspond to a floppy disk update.

SmartSensor Interface Module Software Update



6. When the Open button is clicked, the file is loaded in the SmartSensor Interface module. This process takes approximately 30 seconds for the update to complete.


➡ *NOTE: Do not turn off power to the SmartSensor Interface module during the software update process.*



7. SSIM Update complete

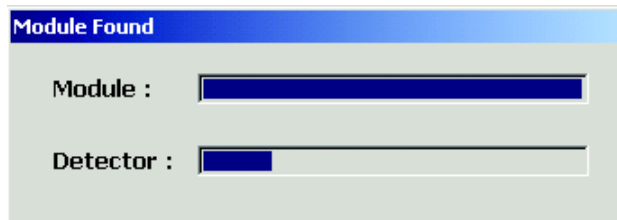
Startup

Parameters Restored at Startup

When the LaserPAD PC application starts, it checks for all connected SSIMs and Smart detectors. Settings are restored for any detector previously connected. All settings are restored from a Master Configuration file. The Master Configuration file contains all screen and measurement settings. The screen settings include the display colors and all settings selected on each display screen (Home, Tune, Trend, Position Stability and Alignment). The measurement settings include the settings selected in the multi-tab Detector Settings dialog. Access the Detector Settings dialog by clicking the Detector window settings button .

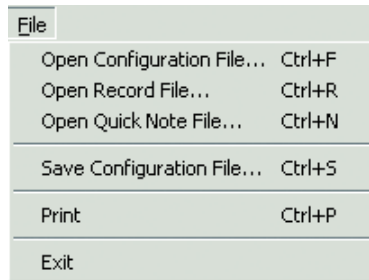
Module Found Dialog

When the LaserPAD PC application starts, a Module Found dialog is displayed for each module detected. Progress indicators are displayed as the module and detector information is loaded by the LaserPAD PC application. When all modules and detectors are loaded, the number of modules and detectors are displayed in the Application status bar. Left clicking a module or detector pane displays the Hardware Properties window. The startup process is completed by displaying the Home screen for each module / detector combination.

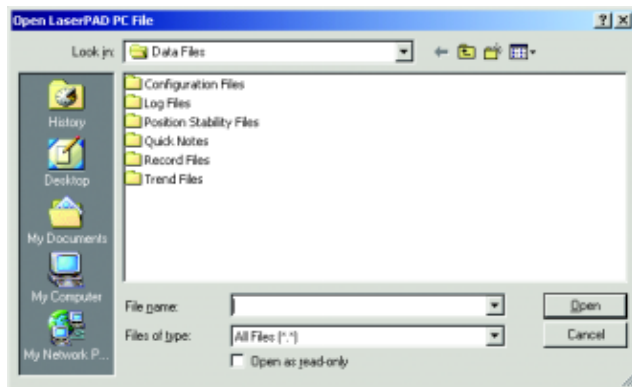


LaserPAD PC Menu Items



File Menu



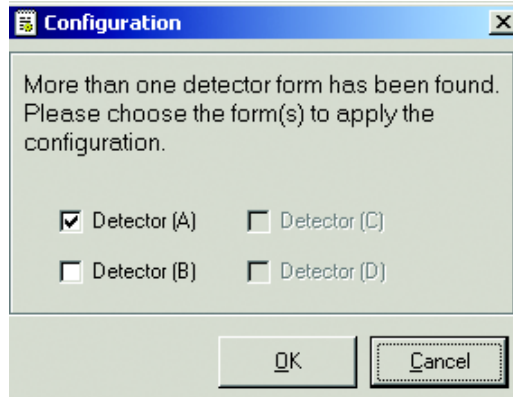
Open File – The Open File function displays an Open File dialog with the appropriate data folder contents displayed. The data folders are automatically created when the LaserPAD PC application is installed. The LaserPAD PC Record and Configuration files utilize an application specific file format. All LaserPAD PC data files are stored in a format that can be displayed with standard Microsoft viewing or analysis applications such as Notepad or Excel. The .txt and .rtf files can be viewed with the LaserPAD PC application. The .xls files must be viewed with Microsoft Excel.




LaserPAD PC Menu Items


Open Configuration File (.cfg) – When multiple detectors are connected, the Open Configuration File function displays a dialog to allow the user to specify which detector channel(s) to apply the selected configuration file. The same configuration file can be applied to multiple detectors. The configuration file contains all screen and measurement settings. The screen settings include the Display Colors and all settings selected on each display screen (Home, Tune, Trend, Position Stability and Alignment). The measurement settings include all of the selected items in the Detector settings. Access the Detector settings dialog by clicking the Detector window settings button . When the OK button is clicked in the Open Configuration dialog, a secondary dialog will appear if multiple detectors are connected. The secondary dialog allows the user to apply the configuration to any active detector. A new configuration file can be saved by clicking the Save button  in the application tool bar. All settings for the selected detector window are saved to a new configuration file. Review details associated with the Save button for additional information.

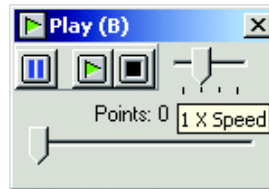
||||▶ *NOTE: A Default.cfg file is contained in the Configuration file folder to restore factory default settings.*




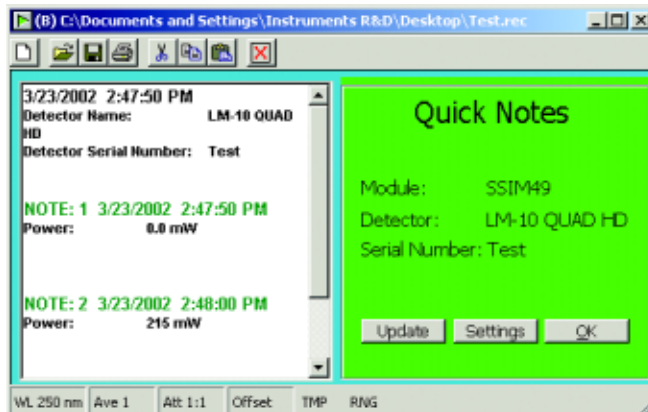
LaserPAD PC Menu Items

Open Record File (.rec) – The Open Record file function displays the Record File Playback window with the playback controls. The Record file contains application specific data that can be displayed in each display window (Home, Tune, Trend, Position Stability and Alignment). Review the Record button  for details associated with the Record file functions.


 *NOTE: A maximum of 10 Record files can be opened.*

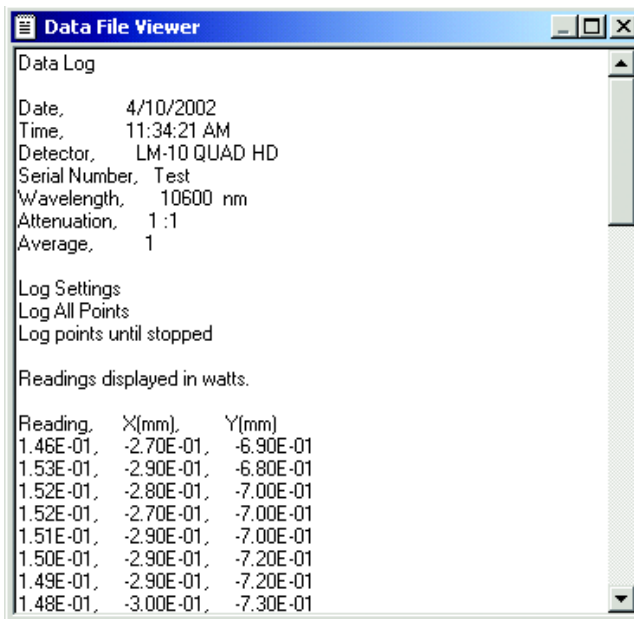


Open Quick Notes (.rtf or .txt) – The Quick Notes file displays in two types of windows based on the .rtf or .txt file extension. The .rtf files are displayed as a multi-color rich text format in the custom Quick Notes window. The .txt Quick Notes files are displayed in a generic text window. When the Quick Notes window is open, additional Quick Notes can be added to an existing Quick Notes file, utilizing the Quick Notes controls and settings. The Quick Notes controls are contained in the Detector window. The Quick Notes settings are contained in the Detector settings dialog accessed from the Detector window settings button . Review the details associated with the Quick Notes tool bar button for additional information.



LaserPAD PC Menu Items

Open Log File (.txt) – The Open Log file function displays .txt Log files only. Log files that are saved in .xls format must be displayed with Microsoft Excel. To store a new Log file, click the Detector settings button and select the data parameters in the Data Log tab. With the proper settings selected, click the Log button  to collect and save data. Review the Data Log section for additional information.



LaserPAD PC Menu Items

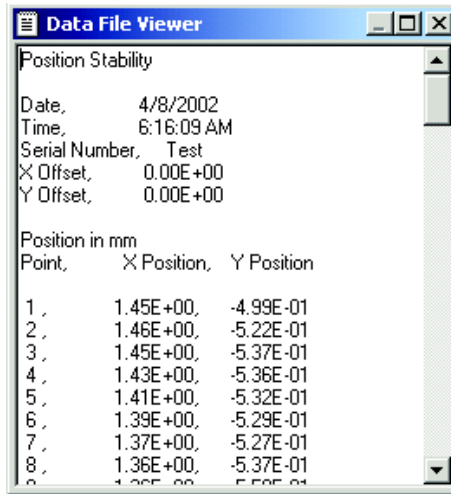
Open Trend File (.txt) – The Open Trend file function displays .txt Trend files only. Trend files that are saved in .xls format must be displayed with Microsoft Excel. The Trend file contains the Trend setup information and the results based on the settings at the time of data collection. Review the details associated with the Trend screen for further information.

The screenshot shows a window titled "Data File Viewer" with a scrollable list of data. The data is organized into sections: Trending Information, Plot Information, and a table of individual data points.

| Power vs Time Trending | | | |
|------------------------|--------------|--------------|----------|
| Date, | 4/1/2002 | | |
| Time, | 6:30:07 AM | | |
| Points, | 72 | | |
| Duration, | 7.1 Sec | | |
| Interval, | 100 mSec | | |
| Plot #, | Plot 1, | Plot 2, | Plot 3 |
| Description, | Channel (B), | Channel (A), | A+B |
| Serial Number, | Test, | 00ma93, | N/A |
| Wavelength, | 10600 nm, | 1064 nm, | N/A |
| Average, | 1, | 1, | N/A |
| Attenuation, | 1:1, | 1:1, | N/A |
| Max, | 27.4 dBm, | 90.4 uW, | 5.49E-01 |
| Mean, | 25.8 dBm, | 90.3 uW, | 3.81E-01 |
| Min, | 25.0 dBm, | 90.2 uW, | 3.13E-01 |
| Delta, | 23.7 dBm, | 233 nW, | 2.36E-01 |
| Sigma, | 17.4 dBm, | 72 nW, | 5.52E-02 |
| Offset/Ref, | -90.0 dBm, | 0 nW, | N/A |
| Point, | dBm, | Watts, | Value |
| 1, | 2.74E+01, | 9.02E-05, | 5.49E-01 |
| 2, | 2.72E+01, | 9.02E-05, | 5.28E-01 |
| 3, | 2.70E+01, | 9.02E-05, | 5.05E-01 |
| 4, | 2.69E+01, | 9.02E-05, | 4.89E-01 |
| 5, | 2.68E+01, | 9.02E-05, | 4.77E-01 |
| 6, | 2.67E+01, | 9.02E-05, | 4.71E-01 |

LaserPAD PC Menu Items


Open Position Stability File (.txt) – The Open Position Stability file function displays .txt Position Stability files only. Position Stability files saved in .xls format must be displayed with Microsoft Excel. The Position Stability file contains setup information and the results based on the settings at the time of data collection. Review the details associated with the Position Stability screen for additional information.



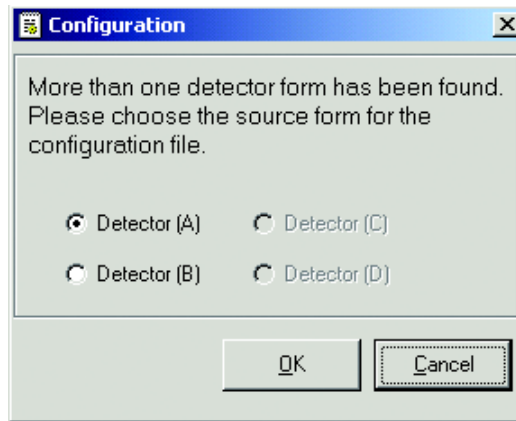
The screenshot shows a window titled "Data File Viewer" with a scrollable list of data. The data is organized into two sections: "Position Stability" and "Position in mm".

| Position Stability | | |
|--------------------|------------|--|
| Date, | 4/8/2002 | |
| Time, | 6:16:09 AM | |
| Serial Number, | Test | |
| X Offset, | 0.00E+00 | |
| Y Offset, | 0.00E+00 | |

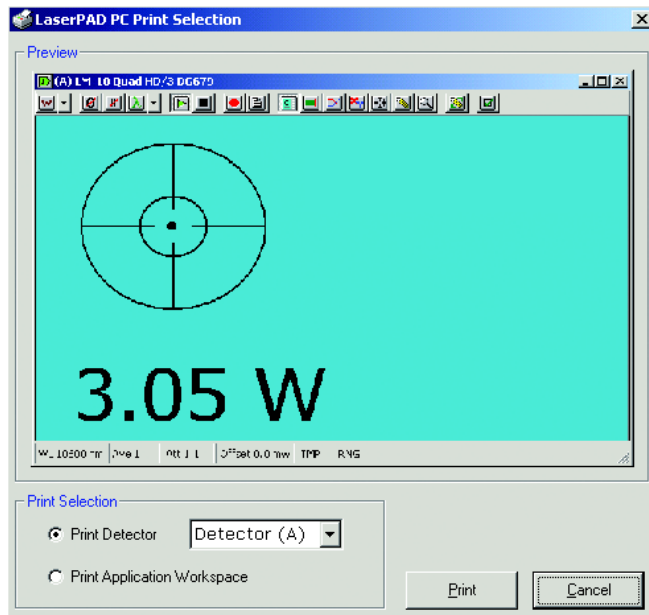
| Position in mm | | |
|----------------|-------------|------------|
| Point, | X Position, | Y Position |
| 1, | 1.45E+00, | -4.99E-01 |
| 2, | 1.46E+00, | -5.22E-01 |
| 3, | 1.45E+00, | -5.37E-01 |
| 4, | 1.43E+00, | -5.36E-01 |
| 5, | 1.41E+00, | -5.32E-01 |
| 6, | 1.39E+00, | -5.29E-01 |
| 7, | 1.37E+00, | -5.27E-01 |
| 8, | 1.36E+00, | -5.37E-01 |
| 9, | 1.35E+00, | -5.50E-01 |

Save Configuration File – The Save Configuration file function stores all settings for any detector window that is active. When a single detector is connected, a Save As dialog appears to save the file in the Configuration Files folder. When multiple detectors are connected, the user is prompted to select which detector configuration will be saved to the Configuration file. The configuration file contains all screen settings and measurement settings. The screen settings include the Display Colors and all settings selected on each display screen (Home, Tune, Trend, Position Stability and Alignment). The Measurement settings include all of the settings selected in the Detector settings dialog. Access the Detector settings dialog by clicking the Detector window settings button .


LaserPAD PC Menu Items



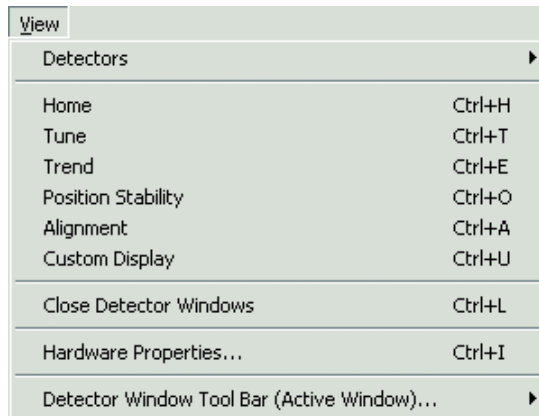
Print – The Print function displays a Print contents window. Radio button selections allow the user to specify the detector window or the entire application window for printing. The selection is previewed in the Print dialog. The Detector Window selection contains a combo box to select the detector channel for printing. The Print Application Workspace radio button selects the entire application window for printing. When the contents are selected for printing, the OK button displays a dialog to select the print function and printer settings.




LaserPAD PC Menu Items

Exit – When the LaserPAD PC exits, settings for each active detector window are saved to a Master Configuration file by detector serial number. The Master Configuration file contains all screen settings and measurement settings. The screen settings include the Display Colors and all settings selected on each display screen (Home, Tune, Trend, Position Stability and Alignment). The measurement settings include all of the items selected in the Detector settings dialog. Access the settings by clicking the Detector settings button . Exit the LaserPAD PC application with the menu item, LaserPAD PC icon in the application title bar, X in the application title bar or Alt+F4.

View Menu



Detectors – The Detectors menu item accesses all connected detectors. The LaserPAD PC application displays a maximum of four active detectors. Four detector windows can be active at a time. The Detectors menu item displays a list of all detectors. Active detectors are indicated by a check mark. Add a detector window by clicking a detector not indicated with a check mark.

 **NOTE:** When four detectors are active, you will be prompted when attempting to open a fifth detector. The message will indicate that the maximum number of detectors are currently displayed.

LaserPAD PC Menu Items

Home – Displays Home screen view for all active detector windows. Review the Home screen for additional information.

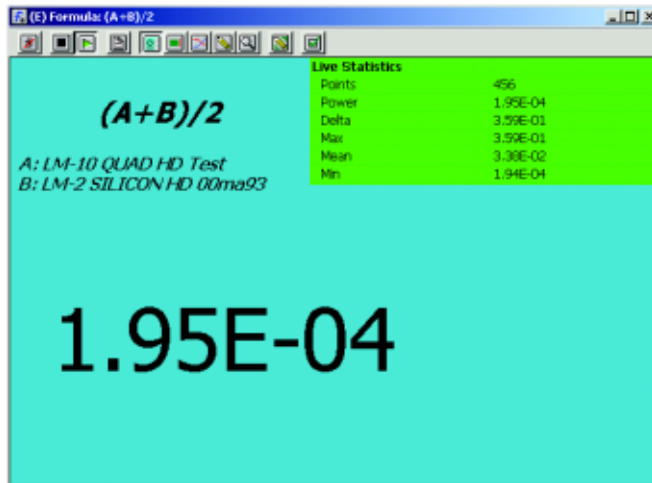
Tune – Displays Tune screen view for all active detector windows. Review the Tune Screen for additional information.

Trend – Displays Trend screen view for all active detector windows. Review the Trend screen for additional information.

Position Stability – Displays Position Stability screen view for all active detector windows. Review the Position Stability screen for additional information.

Alignment – Displays Alignment screen view for all active detector windows. Review the Alignment screen for additional information.

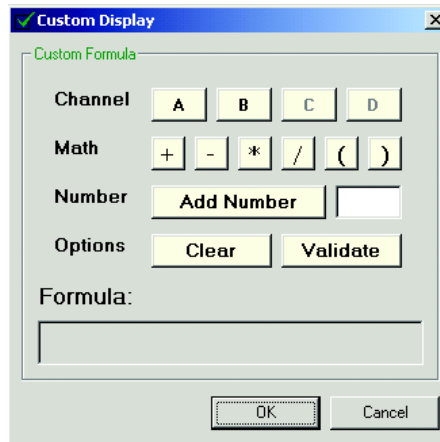
Custom Display – The Custom Display function provides the capability to create a custom multi-channel live power display window. The Custom Display also contains features to add custom math functions. When the user selects the Custom Display menu item or Tool Bar button, the setup dialog appears. Click on any active item in the dialog to generate a Custom Display. The selected items appear in the Formula bar at the bottom of the dialog. When the OK button is clicked, the formula is validated and the Custom Display window is created.



NOTE: The Custom Display Window displays values in exponential form. No units are displayed in this window. Values are calculated in terms of power and individual units are not displayed.

LaserPAD PC Menu Items

Custom Display Setup – The Custom Display Setup contains the controls necessary to construct a Custom Display window.



Channel – The Channel section of the dialog displays the active detector channels in Black and inactive channels in Grey. Click on any active channel to add it to the formula. Active channels can consist of live detectors or record files. The custom display provides the capability to combine data from live detectors and previously recorded data.

|||➔ *NOTE: The LaserPAD PC software does not maintain a fixed order of module detection. When multiple detectors are connected, the channel letter designator in the Detector title bar may change from session to session.*

|||➔ *NOTE: Utilize the Hardware Properties window to review hardware information associated with each active channel.*

Math – The Math section allows adds math operations to the custom display. The math functions can add, subtract, multiply or divide any combination of active channels. The brackets provide a second level of segregated math operations. Each time a math button is clicked, the associated operation is added to the formula bar.

Tip: When the custom formula is complete, click the Validate button to verify the formula.

LaserPAD PC Menu Items

Add Number – The Add Number section allows the user to enter numeric values to the formula. For example: This function averages channel (A) and channel (B) by entering $(A+B)/2$. Enter the number in the field and click the Add button. The number will be added to the formula.

Options – The Options section is used to clear or validate the formula. The Clear button clears the entire formula. The Validate button informs the user if the formula is valid. The Validate button does not provide information on the source of error. Common formula errors include the following:

- Two channels selected without a mathematical operation between them.
- A mathematical operation or number at the end of the formula.
- No closing parenthesis.
- Math operation beginning or ending the formula. Math operation beginning or ending within the parenthesis.

Formula Bar – The Formula bar contains the selected function. The Clear button removes the entire formula displayed.

Custom Window – The preceding Custom Window screen image displays a custom formula to average detector (A) and detector (B). The Custom Window displays the formula in the window and the formula bar. The Custom Window displays the value in a large font and displays a complete list of compiled statistics:

Points – The Points value displays the number of points contained in the statistics.

Power – Current power value.

Delta – The Delta value represents the difference between the maximum and minimum statistical values.




Max – The Max value corresponds to the maximum power value collected.

Mean – The Mean value corresponds to the average value for all data points collected.

Min – The Min value corresponds to the minimum power value.

LaserPAD PC Menu Items

The Custom Window tool bar provides the following controls:

Reset Live Stats – The Reset Live Stats button clears the data compiled. Click the Stop button  to pause the display. Clear the Live Stats  and click the Play  button to resume data collection with a new set of statistical values. Use this sequence to clear stats and begin data collection when ready.

Stop and Play – The Stop and Play buttons  pause and resume data collection in the Custom window.

Data Log – The Data Log function is available in the Custom window. Review the Data Log button for additional information.

Home View – The Home view corresponds to the Custom window previously described.

Tune – The Tune screen is fully functional and available in the Custom window. Review the Tune detector window tool bar Button for additional information.



Quick Notes – The Quick Notes function is available in the Custom window. The Quick Notes header includes the Formula and the detector information for each channel in the custom formula. Review the Quick Notes button for additional information.

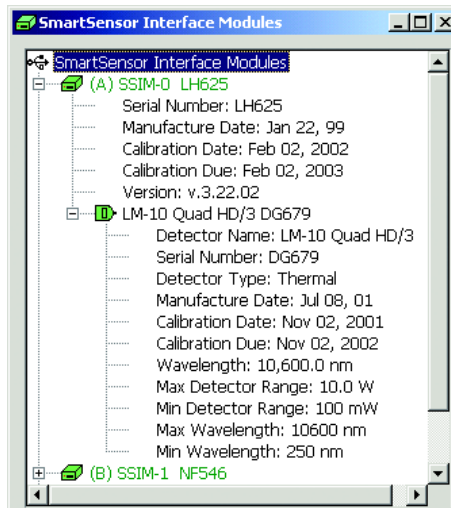
Large Display – The Custom window large display function displays the value in a large font and removes the Statistics panel from the Home screen. The Large Font button is not available when the Home screen is not active.

Settings – The Settings button displays the settings available to the Custom window. These settings include: Display Colors, Quick Notes, Data Log and Live Pass/Fail Statistics. Review the Settings button for additional information.

Close Detector Windows – Closes all detector display windows that are active.

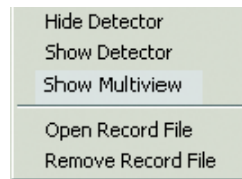
LaserPAD PC Menu Items

Hardware Properties Window – The Hardware Properties window displays information associated with all hardware that is connected. The Hardware Properties Window also contains detector window display controls. A green icon  next to the Module or Detector  description indicates that a window is active for the associated module or detector. Clicking on the (+) next to a module or detector description to display a list of properties for the associated module or detector. The module properties include: Serial Number, Manufacture Date, Calibration Date, Calibration Due Date and Firmware Version. The Detector Properties include: Detector Name, Detector Serial Number, Detector Type (Quantum or Thermal), Manufacture Date, Calibration Date, Calibration Due Date, Wavelength, Min and Max Detector Range, Min and Max Wavelength Range. Right clicking a module or detector description, shows a menu containing display controls.



LaserPAD PC Menu Items

Hardware Properties Display Controls – Access the display controls by right clicking a detector or module description in the Hardware Properties window. The display controls are shown as a menu. When a green icon indicates an active detector window, the Hide Detector item closes the associated detector window. When a detector window is not active, the Show Detector item displays the Home screen for the selected detector. A maximum of four active windows can be selected simultaneously. The Show Multi-view function displays the Home, Tune, Trend and Alignment screens in the same application window for the selected detector or module. The Open and Remove Record File functions add or remove Record files from the Hardware Properties window. The Open Record file function displays an open dialog to add Record files to the Hardware Properties window. The Remove Record File function removes record files from the Hardware Properties window.



Detector Window Tool Bar (Active Window) – The Detector Window Tool Bar menu item provides Keyboard access to Detector Window functions. The Detector windows do not contain menus. The Keyboard “F” keys select or cycle between the specified Detector Window tool bar functions.

▶ *NOTE: When multiple detectors are present, the Keyboard shortcuts are applied to the active detector window. The Active detector window is identified by a colored title bar.*

Change Power Units – The Change Power Units function cycles between the available power units each time the F2 key is pressed. The Available Power Units include: Watts, dBm and dB. Review the Display Mode menu information for detail associated with the power units.

LaserPAD PC Menu Items

Set/Clear offset/dB ref – The F3 key toggles the Display Offset when the Watts or dBm display units are selected. When no offset is active, the F3 key uses the current power value as an offset and subtracts that value from each subsequent reading. When an offset value is active, the F3 key clears the offset value. The F3 key establishes a new dB reference each time it is pressed and the display is set to dB mode. Review the Set/Clear Offset – Set New dB Ref tool bar button for additional information.

Clear Live Stats – The F4 key clears Live Stats from the Home screen when live stats are active. The Live Stats are accessed from the Detector Window settings dialog. Review the information associated with the Detector Window settings dialog for additional information.

Pause/Resume – Each time the F5 key is pressed, the data collection process pauses or resumes based on the current state. When a screen is active and data collection is in process, the F5 key performs a pause function. When the screen is paused, the F5 key resumes data collection. The F5 key pauses and resumes the data collection process for the Trend screen. The F5 key does not have an effect on the Record and Log file data collection process.

Wavelength Change – The F6 key displays the Wavelength dialog. This dialog allows the user to enter a specific Wavelength. The Wavelength value corrects the power reading resulting from a relative difference in the laser input Wavelength. If an entered Wavelength value is outside the detector Wavelength range, a minimum or maximum Wavelength appropriate to the connected detector is returned.

Record Window – The F7 key displays the active detector Record window. The Record window captures data from a detector in an application specific format. The Record window contains data collection controls and a display for the number of points stored. The window first appears with zero points displayed and the Stop button in a down state. Click the Record button to start data collection. The number of points stored begins to increment when data collection is in progress. When data collection is complete, the file can be saved and opened on a separate computer to display each detector window in the same fashion as when an actual detector was connected. Review the Record button for additional information.

▶ *NOTE: Install the LaserPAD PC application on a separate computer to view Record files without the need for supporting hardware.*

LaserPAD PC Menu Items

Log Window – The F8 key displays the Data Log window. The Data Log window contains the same controls as the Record window. The Data Log function generates a text file based on user specified data collection parameters. Review the Data Log settings and the Data Log button for additional information.

Next Screen – The F9 key cycles through all Detector Specific screens. Press the F9 key to display the next screen in the sequence. The display screens cycle in the following order: Home, Tune, Trend, Position Stability, Alignment and Quick Notes. When a Semiconductor detector is connected, the Position Stability and Alignment Screens are not available. Review details associated with each screen for additional information.

Large Display – The F11 key toggles between the Home screen and the Large display. The Large display function shows the Power value in a large font and removes the Statistics panel from the Home screen. The F11 key is not active when the Home screen is not displayed.

Settings – The F12 key displays the Multi-tab settings dialog. The settings dialog contains a variety of detector specific settings. Review the Settings button for additional information.

LaserPAD PC Menu Items

Display Mode Menu

Watts – The Watts menu item switches all display window power units to Watts. The actual units are based on the associated detector and the power input. The following units are supported by the LaserPAD PC: Nanowatts (nW), Microwatts (uW), Milliwatts (mW), Watts (W) and Kilowatts (kW). This setting will be in effect on the Home screen, Large Display screen, Tune screen, Trend screen, Trend files, Quick Notes and Log files.

dBm – The dBm menu item switches all display window power units to dBm. The dBm value is calculated using the following formula:

$$10 \log [\text{power reading in mW}].$$

This setting will be in effect the Home screen, Large Display screen, Tune screen, Trend screen, Trend files, Quick Notes and Log files.

dB – The dB menu item switches all display window power units to dB. When dB is selected, the power value is set as a new dB reference. All subsequent values are displayed relative to the initial dB reference. The dB value is calculated using the following formula:

$$10 \log [\text{power reading} / \text{dB reference power}].$$

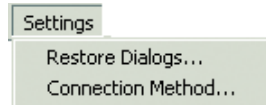
This setting will be in effect the Home screen, Large Display screen, Tune screen, Trend screen, Trend files, Quick Notes and Log files.

||||➤ *NOTE: The Power and dB settings control the function of the Offset button in each Detector window. When the screen is displaying Watts, the button toggles the offset value on and off. When the screen is displaying dB, the button establishes a new dB reference each time it is clicked.*

||||➤ *TIP: Double Click the units displayed on the Home Screen to cycle from Watts to dBm to dB.*

LaserPAD PC Menu Items

Settings Menu

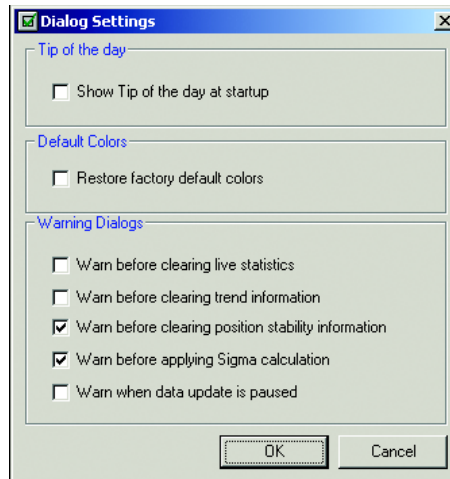


Restore Dialogs – The Restore Dialogs window allows the user to restore dialogs that were previously disabled. This window also allows factory default colors to be restored.

Tip of the day – The Tip of the day check box restores the Tip of the day when the LaserPAD PC application starts. The Tip of the day contains helpful measurement tips.

Default Colors – The Default Colors check box restores the factory colors to all active detector windows. The default color button in the settings dialog represents user specified default colors. The Default Colors check box restores all screen colors with a single mouse click.

Warning Dialogs – The Warning Dialogs section restores dialogs that have been previously disabled by the user. The dialogs listed in this section contain a check box to allow them to be enabled. The Warning Dialogs section allows the user to activate or disable any dialog listed.



Connection Method – The Connection Method window allows the user to specify the method of communication to the SmartSensor Interface module (SSIM).

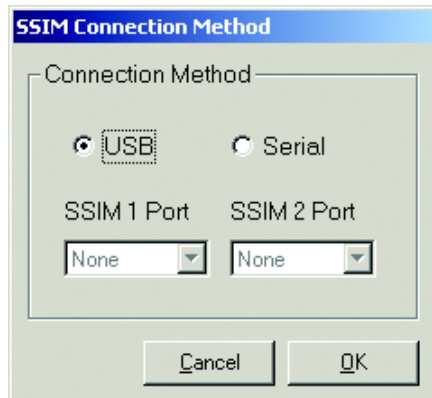
■■■■► *NOTE: The LaserPAD PC application does not support simultaneous USB and Serial communication.*

LaserPAD PC Menu Items

USB – The USB connection method provides advantages over serial communication. A USB connection allows a large number of SSIMs to be connected simultaneously and the user can select between four module/detector connections. The LaserPAD PC application can display a maximum of four detectors simultaneously. A USB connection also provides power to the SSIM. The USB connection does not provide battery charging capability.

Serial – When Serial communication is selected, a maximum of 2 SSIMs can operate with the LaserPAD PC application simultaneously. The Serial radio button activates the two COMM port combo boxes. Select the COMM port for serial communication. The combo box selection includes none and COMM1 – COMM9.

▶ *NOTE: Serial communication requires power to the SSIM. The power can be provided with the rechargeable battery or wall plug included with the SSIM.*



LaserPAD PC Menu Items

Window Menu

Cascade – The Cascade function stacks all active detector windows from top left to bottom right in direction. The cascade action allows a portion of each window to be visible.

Tile Horizontal – The Tile Horizontal function separates each active detector window one on top of the other with a horizontal separation bar.

Tile Vertical – The Tile Vertical function separates each active detector window side by side with a vertical separation bar.

Active Windows – The Title bar information for each active detector window is displayed at the bottom of the Window menu. Review the Detector Window title bar for additional information.

LaserPAD PC Menu Items

Help Menu

Contents – The Contents menu item provides a link to the Help contents. The Help contents window provides access to all help functions such as Contents, Index and Search. The Help contents provide information organized by topics with the appropriate links to related information. The Help Index contains a search engine to find information based on words contained in topic and subtopics. The Search function searches for key words contained in the topic information. The Help menu is also accessible with the F1 key. The Help window is displayed with a 2000 format utilizing split panes and browser navigation.

Coherent on the Web – The Coherent on the Web menu item provides access to Coherent specific Internet sites. Each item spawns the appropriate default browser.

Coherent Home – The Coherent Home selection displays the Coherent Inc Home Page utilizing the default browser on the host PC.

Contact Coherent – The Contact Coherent selection displays a web page containing Contact information for Coherent divisions and services.


E-Mail Tech Support – The E-Mail Tech Support selection displays a blank E-mail message with the appropriate address included for submitting technical questions. Technical question are forwarded directly to a Coherent application engineer. Replies are returned to the E-mail address that the questions originated.

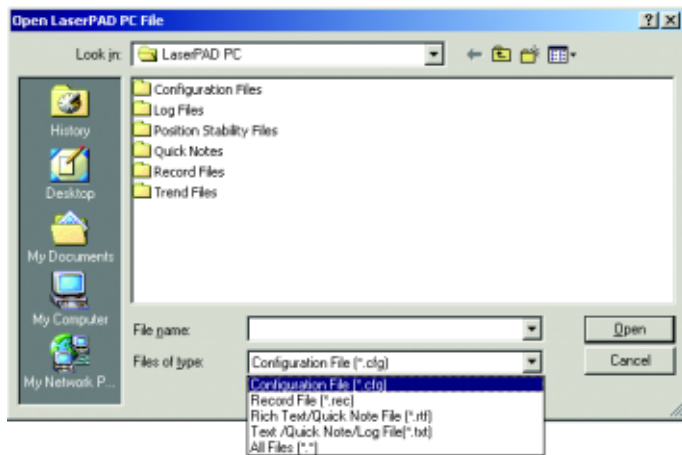
Tip of the Day – The LaserPAD PC Tip of the day provides a sequence of simple measurement tips to provide additional insight to the operation of LaserPAD PC. The Tip of the Day window appears each time the application starts. The Tip of the Day window provides a check box to disable the function.

About LaserPAD PC – The About LaserPAD PC menu item displays a window containing version information on the LaserPAD PC Application software. The LaserPAD PC About screen also contains links the Coherent Web Site and Coherent Contact web page. The System Info button displays the Windows System Information window. The System Information window contains information on the Host PC hardware and operating system.

Application Tool Bar




Open  – The Open tool bar button displays a standard Windows Open dialog. The dialog displays the LaserPAD PC data folders. The Files of Type combo box contains all LaserPAD PC file types. Open the file folder and select All Files (*.*) from the combo box to display the data files contained in each folder.




▶ **NOTE:** Review the following items in the Application File Menu section for additional information:

- Open Configuration File (.cfg)
- Open Quick Notes (.rtf or .txt)
- Open Record File (.rec)


Save  – The Save button provides the capability to save configuration files.

▶ **NOTE:** Review the Save Configuration File Menu Item for additional information.


Print  – The Print button displays a Print Contents window. This window allows you to select a specific Detector window or the entire Application workspace for printing.

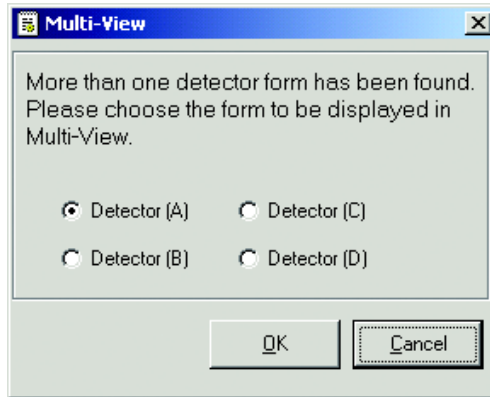
▶ **NOTE:** Review the Print menu item for additional information.


Application Tool Bar

Custom Display  – The Custom Display button provides the capability to create a custom Multi-channel live power display window. The Custom Display window also contains features to add custom math functions.

▮▮▮▮➔ *NOTE: Review the Custom Display View menu Item for additional information.*


Show Multi-view  – The Show Multi-view function displays the Home, Tune, Trend and Alignment screens in the same application window for the selected detector. Select the detector to apply the Multi-view with the following dialog. Select a single detector to be displayed as a Multi-view.



Play  – The Play button resumes active data collection. The Application Play button controls all active windows. The button appears in an Up or Down state. This button is active on the Home Screen, Tune Screen, Trend Screen, Position Stability Screen and Alignment Screen. When the button is selected, it appears in a down state. When the button appears in a down state, data collection continues. The Stop button pauses data collection.


▮▮▮▮➔ *NOTE: The Play button is not available when the Data Log or Record windows are active.*

Application Tool Bar


Stop  – The Stop button pauses data collection for any active screen. A Warning dialog appears for 3 seconds to alert the user that data collection has been paused. This button is active on the Home Screen, Tune Screen, Trend Screen, Position Stability Screen and Alignment Screen. When the button is selected, it appears in a down state. The Play button continues data collection.

|||▶ *NOTE: The Stop button is not available when the Data Log or Record windows are active.*

|||▶ *TIP: Use the Stop Button to Pause data collection on the Trend and Position Stability screen.*

Hardware Properties  – The Display Hardware Properties button displays the Hardware Properties window. The Hardware Properties window displays the SmartSensor Interface Module and Detector information for all devices detected by the LaserPAD PC application.

|||▶ *NOTE: Review the Hardware Properties View menu item for additional information.*

Help  – The Help button displays the Help Contents window. The Help button does not support specific help subjects associated with active functions within the software. Review the details associated with the application Help Contents for further information.

Application Status Bar

Modules Found – The Modules Found pane in the Application status bar displays the number of SSIMs detected. The LaserPAD PC application displays a maximum of four detector windows simultaneously. The Modules Found status bar pane can display values greater than four.

||||➤ *NOTE: Click on the Modules Found pane to display the Hardware Properties window.*

Detectors Found – The Detectors Found status bar pane displays the total number of detectors connected to active SmartSensor Interface Modules. The LaserPAD PC application displays a maximum of four detector windows simultaneously. The Detectors Found pane can display values greater than four.

||||➤ *NOTE: Click on the Modules Found pane to display the Hardware Properties window.*

System Date and Time – The Windows system date and time are displayed in the Application status bar.


Detector Window Title Bar


Detector Designator – The Detector Window title bar contains one of four letter designators (A, B, C and D). These letter designators correspond to the order each Detector or Record file was loaded by the LaserPAD PC application. A maximum of four windows can be displayed and analyzed by the LaserPAD PC software.


|||▶ *NOTE: The LaserPAD PC software does not maintain a fixed order of detection. When multiple detectors are connected, the letter designator may change from session to session.*

Detector or File Description – The Detector or File description is displayed in the Detector Window title bar. The Detector description defaults to the detector name from the Detector EEPROM. When a Record file is displayed in a Detector window, the file name and path is displayed in the Detector Window title bar.

|||▶ *NOTE: The user can specify a custom description to be displayed in the Detector Window title bar. Enter a custom description in the Unit Tracking tab contained in the Detector settings dialog.*


Minimize  – The Detector window minimize function reduces the selected detector window to a Title Bar representation at the bottom of the Application window. The Restore or Maximize button can be clicked to display the minimized detector window.

Maximize  – The Maximize button displays the selected detector window as a full screen display.

Close  – The Close button closes the selected detector window. When multiple views associated with a single detector are displayed, the Close button closes all windows associated with the selected detector.

Detector Window Tool Bar

Description – The Detector Window tool bar controls all detector specific functions. Detector windows do not contain menu selection of functions.

Units  – The Display Units button controls the power units displayed on all screens associated with the selected detector. This button functions in two ways: Click directly on the button to cycle through the available display units. Current display units are indicated on the button. The Units button also contains a drop down function to directly select the units. Click on the down arrow to display the list of available units and select them directly.

Watts – The Watts selection switches power units to Watts. The actual units are based on the associated detector and the power input. The following units are supported by the LaserPAD PC: Nanowatts (nW), Microwatts (uW), Milliwatts (mW), Watts (W) and Kilowatts (kW). This setting will be in effect on the Home screen, Large Display screen, Tune screen, Trend screen, Trend files, Quick Notes and Log files.

dBm – The dBm selection switches power units to dBm. The dBm value is calculated using the following formula:


$$10 \log [\text{power reading in mW}].$$

This setting will be in effect the Home screen, Large Display screen, Tune screen, Trend screen, Trend files, Quick Notes and Log files.


dB – The dB selection switches power units to dB. When dB is selected, the power value is set as a new dB reference. All subsequent values are displayed relative to the initial dB reference. The dB value is calculated using the following formula:



$$10 \log [\text{power reading} / \text{dB reference power}].$$

This setting will be in effect the Home screen, Large Display screen, Tune screen, Trend screen, Trend files, Quick Notes and Log files.

 *NOTE: The Power and dB settings control the function of the Offset button. When the screen displays Watts or dBm, the button toggles the offset value on and off. When the screen is displaying dB, the button establishes a new dB reference each time it is clicked.*

Detector Window Tool Bar

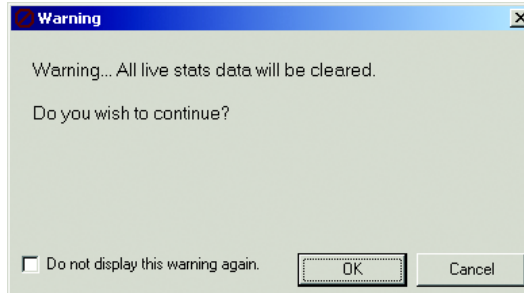
Set / Clear Offset, New dB reference  – This button appears in an Up or Down state when Watts or dBm are selected. The button indicates a mouse click in dB mode. In Watts or dBm display mode, the button subtracts the reading and uses it as an offset. If an offset is present (Button Down), the button clears the offset value. The offset value is displayed in the Home Screen data panel and in the Detector Window title bar. When the Offset function is not active, a zero offset value is indicated. In dB mode, the Set / Clear Offset, New dB reference button uses the current reading as a new dB reference value each time the button is clicked.


Reset Live Stats  – The Reset Live Stats button clears compiled statistical data from the Home screen. The statistical data is not displayed by default. To display statistical data, click the Settings button  in the Detector Window tool bar and select the Live Stats Pass/Fail tab. The settings dialog display a list of statistical parameters available for display. Review the Live Stats Pass/Fail section for additional information.

|||▶ *TIP: Click the Stop button in the Detector Window tool bar to pause statistical data collection. Reset the Live Stats and click the Play button to compile a new set of statistics.*

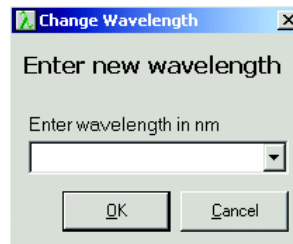
|||▶ *NOTE: When the user clears Stats, the following dialog is displayed to avoid inadvertent loss of data. A Check Box is included in the dialog to not show in the future. The dialog can be restored from the application settings menu.*

Detector Window Tool Bar




Wavelength  - The Wavelength button provides multiple functions. When the user clicks on the Lambda icon, the Wavelength dialog appears. This dialog allows the user to enter a specific Wavelength. The Wavelength value corrects the power reading for variations in detector output resulting from a relative difference in the laser input Wavelength. If an entered Wavelength value is outside the detector Wavelength range, a minimum or maximum Wavelength appropriate to the connected detector is returned. The Wavelength value is displayed in the Home screen data panel and the Detector Window status bar.


|||➔ *NOTE: Click on the Wavelength value in the Detector Window status bar to display the Wavelength dialog.*



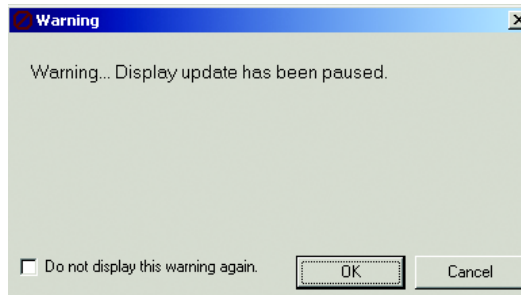
When the user clicks on the Wavelength drop down arrow, a list of Quick Wavelengths and Add Quick Wavelength option appears. Click on any listed Quick Wavelength to change the Wavelength setting to the preset Quick Wavelength value. The Add New Quick Wavelength selection displays the General Settings tab in the Detector settings dialog. Enter a maximum of 10 Quick Wavelengths in the Detector settings dialog. Each entered Quick Wavelength is displayed when the drop down is selected from the Wavelength button. Quick Wavelength values outside the connected detector range are returned as the minimum or maximum value appropriate to the detector.


Detector Window Tool Bar


Play  – The Play button resumes active data collection. The button appears in an Up or Down state. This button is active on the Home screen, Tune screen, Trend screen, Position Stability screen and Alignment screen. When the button is selected, it appears in a down state. When the button appears in a down state, data collection continues. The Stop button pauses data collection.


Stop  – The Stop button pauses data collection for any active screen. A Warning dialog appears for 3 seconds to alert the user the user that data collection has been paused. This button is active on the Home screen, Tune screen, Trend screen, Position Stability screen and Alignment screen. When the button is selected, it appears in a down state. The Play button continues data collection. The Stop button is not available when the Data Log or Record windows are active.


|||➔ *TIP: Use the Stop Button to Pause data collection on the Trend and Position Stability screen.*




Record  – The Record button displays the Record window. The Record window stores an application specific data file for replay on all LaserPAD PC display screens. Review the Record section for additional information.


Data Log  – The Data Log button displays the Data Log window. The Data Log window logs data to a file based on user specified settings. Review the Data Log section for additional information.


Home Screen  – The Home button displays the Home screen. Review the Home screen section for additional information.


Tune Screen  – The Tune button displays the Tune screen. Review the Tune screen section for additional information.


Trend Screen  – The Trend button displays the Trend screen. Review the Trend screen section for additional information.

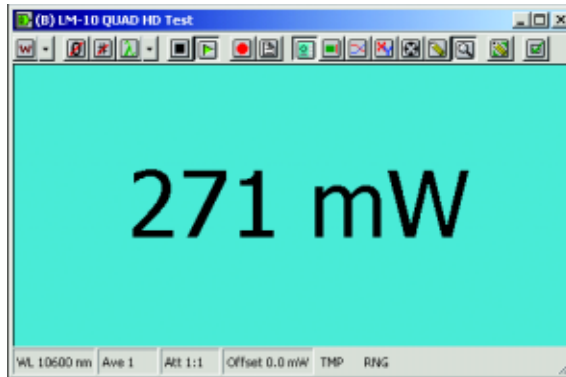
Detector Window Tool Bar


Position Stability Screen  – The Position Stability button displays the Position Stability screen. Review the Position Stability screen section for additional information.


Alignment Screen  – The Alignment button displays the Alignment screen. Review the Alignment screen section for additional information.

Update and Show Quick Notes  – The Update and Show Quick Notes button adds a new Quick Notes entry based on the Quick Notes settings. The Quick Notes Window is displayed when this button is clicked. Review the Quick Notes section for additional information.

Normal / Large Display  – The Large Display button switches the Home screen to the Large Display screen. The Large Display screen displays the Power value in a large font and remove the Statistics panel from the Home screen. The Large Display screen allows Power values to be read from across the room. The Large Display button operates in an Up or Down state. Each time you click the button, the screen toggles from Home screen to a Large Display.



Update Quick Notes  – The Update Quick Notes button adds a new Quick Notes entry based on the Quick Notes settings. The Quick Notes window is not displayed when the user clicks this button. The Update Quick Notes button enters many Quick Notes without viewing the Quick Notes screen. Review the Quick Notes section for additional information.

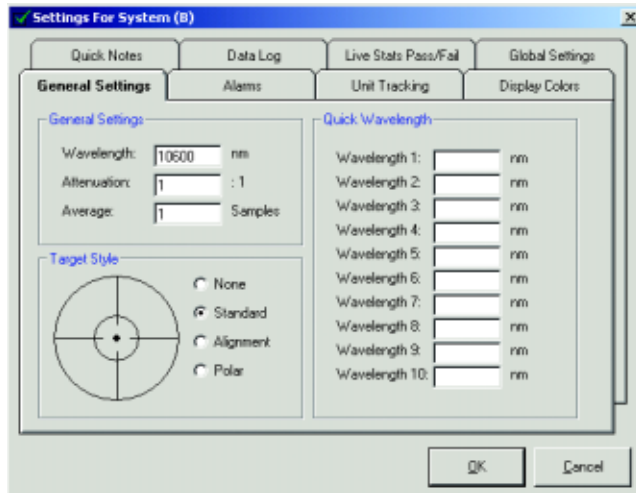
Settings  – The Settings Tool Bar button displays the multi-tab Settings dialog. Review the Detector settings section for additional Information. Each detector creates an entry to a master configuration file.

|||➡ *NOTE: Each time the detector is connected, the software recalls all of the settings associated with the detector by serial number*

Detector Settings

General Settings Tab

The General settings tab contains measurement specific settings and Target style. The Target style is not available when a Semiconductor detector is connected.



General Settings – The General Setting section contains the Wavelength, Attenuation and Average values has an effect on all displayed power.

Wavelength – The Wavelength value corrects the power reading for variations in the laser input Wavelength. If an entered Wavelength value is outside the detector Wavelength range, a minimum or maximum Wavelength appropriate to the connected detector is returned. The Wavelength value is displayed in the Home screen data panel and the Detector Window status bar.

Attenuation – The Attenuation value compensates the power reading for external elements in the beam path. The user can characterize the effect on power from external elements and enter this difference as a multiplier. The attenuation value is multiplied by the power and the result is displayed on all LaserPAD PC screens. All power readings displayed on the Home, Tune, Trend, Record, Data Log and Quick Notes are corrected by the Attenuation value. Set Attenuation values between .001 and 10000.

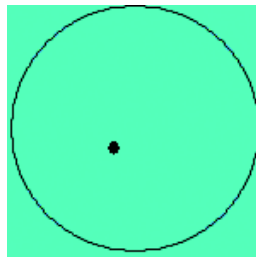
Detector Settings

Average – The displayed value represents a moving average based on the number of samples selected. The Average is applied to the 10 Hz data collection. The moving average sets a buffer based on the number of samples selected for averaging. Data moves through the buffer at a typical rate of 10 Hz. As each point moves into the buffer, the last point will be discarded. The average value of the buffer with the new point will be calculated and displayed. The Home screen display updates at 3Hz. Set the Display average values between 1 and 200 samples.

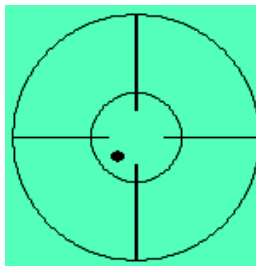
Target Style – The Target Style section determines the type of target displayed on the Home screen. The Standard target is set by default. All Target Styles activate the Out of Alignment condition described in the Standard target style. Reference indicators for the Out of Alignment condition are displayed only on the Standard target style.

||||▶ *NOTE: The Target Style section is not available with a Semiconductor detector.*

None – The Home screen displays the detector input aperture only.

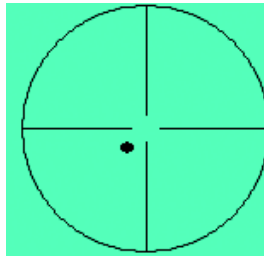


Standard – Detector input aperture and alignment aperture are displayed. The inner circle corresponds to the area where valid power data can be collected. When the dot appears outside of the inner circle, an Out of Alignment message appears on the Home screen and indicated in the status bar.

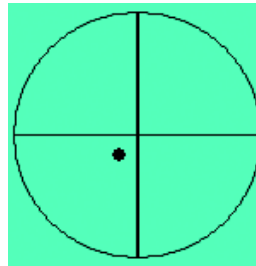



Detector Settings

Alignment – The Alignment target style displays detector input aperture only with vertical and horizontal reference. This selection provides the same appearance as the Alignment screen.



Polar – The Polar target style displays the detector input aperture with a solid vertical and horizontal reference.



Quick Wavelength – The Quick Wavelength section allows the user to enter a maximum of 10 Wavelength values. All values are entered in nm appropriate to the detector range. The user is prompted when entering values outside of the detector range. Each entered Wavelength is accessible from the Home screen Wavelength combo box .

Alarms Tab

The Alarms tab contains user specified min and max visual and audible alarms. Visual alarms appear as red indicators in the status bar. Audible alarms utilize the selected system audio device.

Standard Alarms – Standard alarms utilize factory specified ranges loaded from the detector EEPROM. The Alarm Range settings are not user selectable. Visual alarms are always on to indicate when measurement accuracy is not valid. The Over Temperature condition can damage the detector. Visual and audible Over Temperature alarms are always on by default.

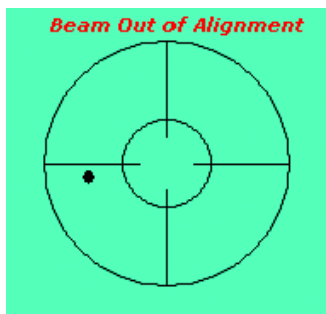
Detector Settings

Over Temp – The Over Temperature condition is valid when a Thermal detector reports a temperature greater than 100° C. Audible and visual are always on to protect the detector from damage. The visual indicator is displayed in conjunction with the audible beep for the duration of the Over Temperature condition. When the temperature returns to a value of less than 100° C, normal operation resumes.

▶ *NOTE: A Semiconductor detector does not support the Detector Over Temp condition.*



Out of Alignment – The Out of Alignment condition is valid when the beam is not located within the inner circle on the Standard alignment target. The Out of Alignment indicator is available regardless of the target style selected. The visual indicator is always on. A user selectable audible indicator is available. An Out of Alignment condition is reported on the Home screen and the status bar.



Detector Settings

Over Range – The Over Range condition is reported when the detector maximum range is exceeded. The Over Range value is loaded from the detector EEPROM. The Over Range condition is designed to protect the detector and is not influenced by the Attenuation setting. An Over Range condition is reported as a Red indicator adjacent to the RNG label in the Detector window status bar. The visual indicator is defaulted to on. User selectable audible indicators are also available.



User Alarms – The User Alarms provide selectable ranges for each parameter. The User Alarms also provide selectable audible and visual indicators. The visual indicators report the exceeded tolerance as a red panel adjacent to the parameter label in the status bar. Selectable audible indicators utilize the computer system audio device. All User Alarms are defaulted to off. Default power values correspond to the EEPROM Detector Min and Max power. Alignment values defaults are 0mm for the X and Y axis. All alarm settings are stored to the master detector file associated by the detector serial number. The Alarm settings are restored each time the detector is connected.



Min Power – The Min Power alarm is a user specified minimum power threshold. The user enters the appropriate units (nW, uW, mW, W, kW). The screen setting controls the selection between Watts, dB and dBm. The entered units must match the current display setting.

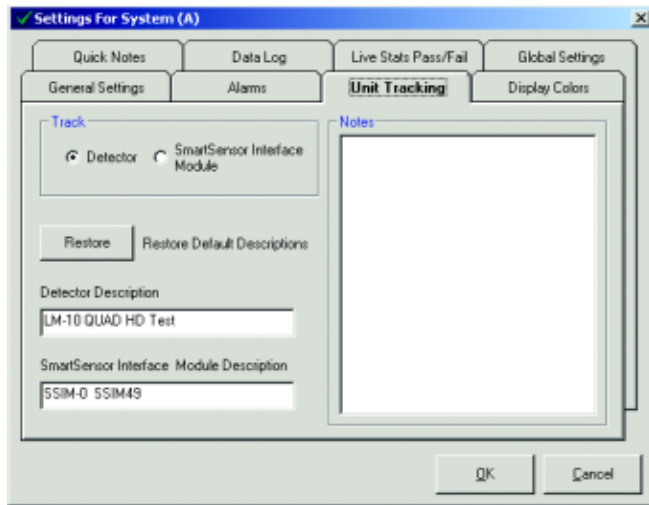
Max Power – The Max Power alarm is a user specified maximum power threshold. The units are controlled in the same fashion as the Min Power.

X and Y Axis – The X and Y axis user alarm is the specified deviation from the detector center in mm. This function works in Absolute Alignment mode only. This setting is not available with a Semiconductor detector.

Detector Settings

Unit Tracking Tab

The Unit Tracking tab provides functions to allow the user to track Detector windows by custom module or detector descriptions. These descriptions are displayed in the Detector Window title bar and Hardware Properties window when selected. Unit Tracking defaults to the detector description. The EEPROM Detector Name / Serial Number and the Module Number / Serial Number are shown as default descriptions.



Track – The Track section provides radio buttons to toggle between tracking by module or detector. These buttons control whether the detector description or the module description is displayed. The information in the description field is displayed when the appropriate radio button is selected.

Restore Default Descriptions – The Restore Default Descriptions button replaces the custom descriptions for both the detector and module. The restored descriptions include the Name and Serial Number from the EEPROM.

Detector Description – The description entered in this field is displayed in the Title Bar and Hardware Properties window when the detector radio button is selected and the corresponding Detector window is active.

Smart Sensor Interface Module Description – The description entered in this field is displayed in the Title bar and Hardware Properties window when the Module radio button is selected and the corresponding Detector window is active.

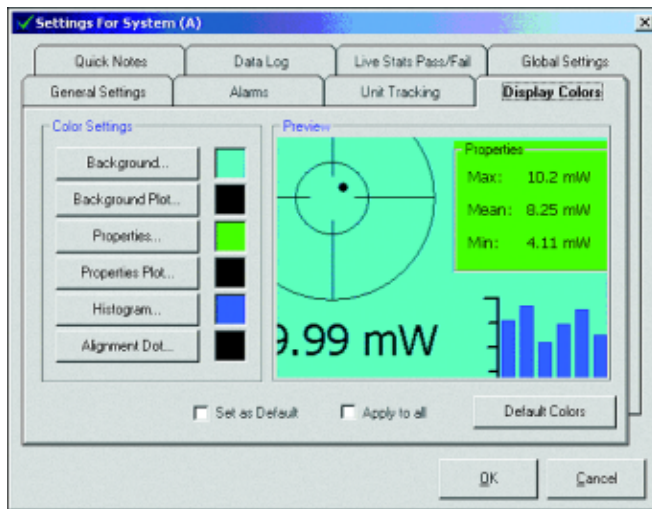
Detector Settings

Notes – Notes can be added with additional information associated with the descriptions entered for tracking. These notes are restored each time a detector or module is connected.

Display Colors Tab

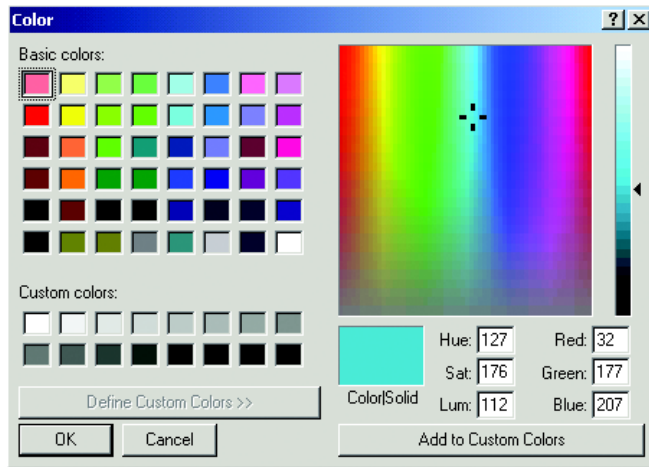
The Display Colors tab allows the user to select custom Background, Plot, Properties Panel, Histogram and Alignment dot colors. A complete windows color pallet is available for all color settings. The Preview pane displays the settings before they are actually applied to the Screens. Color settings are not screen specific. Color settings are applied to all windows for the selected detector. The Set as Default and Apply to all check boxes are Global selections applied to all active detectors.

▶ *NOTE: The Alignment Dot setting is not available for Semiconductor detectors.*



Color Settings – Each item listed displays a complete user selectable custom color pallet. The Basic colors section in the color pallet provides common color selection. The Right side of the color pallet generates a custom color. Drag the black indicators in the color box and brightness bar to generate a custom color. Numeric values for the color parameters can be entered. When the custom color is created, click the Add to Custom Colors button and the custom selection appears in one of the Custom colors boxes. Click on a color box then click OK to utilize the color for the selected detector window parameter. The color is applied to selected items only.

Detector Settings



Preview Window – The Preview window displays a representation of the color settings. Use the Preview window to view the color settings before they are actually applied to the Detector windows.

Set as Default Check Box – The Set as default check box stores current color settings as a default when you click the OK button. The new default colors are available for all detectors windows. Each detector window reflects current default colors when the button is clicked.

|||▶ *NOTE: The Factory Default colors can be restored from the Settings menu under Restore Dialogs*

Apply to all Check Box – When the user checks Apply to all, the color settings are applied to all active detector windows when the OK button is clicked.

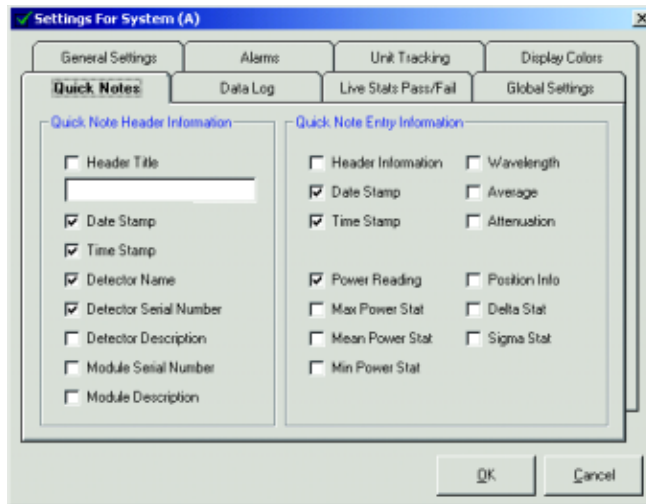
Apply Default Button – When the user clicks the Apply Default button, all color settings represent the stored default. If the default colors are not desired, click the Cancel button in the settings dialog and the previous colors are restored.

Detector Settings

Quick Notes Tab

The Quick Notes tab allows the user to select the type of information that is added with each selection of a Quick Notes function. Each Quick Notes file contains header information. Each Quick Notes entry is defaulted to provide a date and time stamp and a power reading. The user can select additional header and data information by checking the boxes associated with the parameter.

▶ *NOTE: Review the Quick Notes section for additional information.*



Quick Notes Header Information – Check boxes are available to select information that is displayed as header information in the Quick Notes. The header information is added once unless the Header Information box is checked in the Quick Note Entry Information section. Default header information includes: Date / Time stamp, Detector name and Detector serial number. The following information is available to be added in addition to the default.

Header Title – Check box and description field to enter a custom description that is added as a header to the Quick Notes window. The box is not checked by default.

Date – System date

Time – System time

Detector Name – EEPROM name for the detector.

Detector Settings

Detector Serial Number – Self explanatory

Detector Description – The description entered in the Unit Tracking tab is added to Quick Notes when checked.

Module Serial Number – Self explanatory

Module Description – The description entered in the Unit Tracking tab is added to Quick Notes when checked.

Quick Note Entry Information – Check boxes are available to select information that is displayed with each Quick Notes entry. Each entry is defaulted to show the Date, Time and the current power value. The following information is available to be added in addition to the default.

Header Information – This check box adds the header information each time a Quick Note is added.

Date Stamp – System date

Time Stamp – System time

Wavelength – Wavelength setting

Average – Average value

Attenuation – Attenuation setting

Power Reading – This selection adds the display power value when selected. Attenuation, Display averaging and Offset has an effect on this value.

Max Power Stat – Maximum value from the Home screen statistics.

Mean Power Stat – Mean value from the Home screen statistics.

Min Power Stat – Minimum value from the Home screen statistics.

Position Info – X and Y position values relative to the detector center in mm.

Delta Stat – difference between the maximum and minimum Power stat

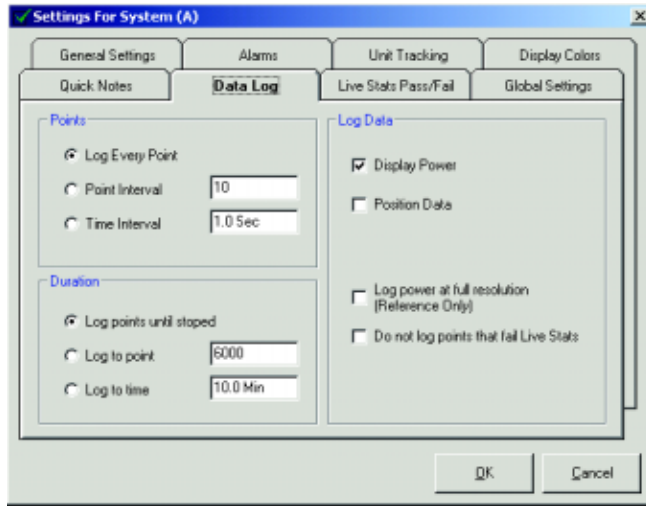
Sigma Stat – The standard deviation based on all of the points collected on the Home screen statistics.

Detector Settings

Data Log Tab

The Data Log tab allows the user to set the collection parameters associated with the data log function. The parameters are saved by detector serial number and restored each time the detector is connected.

▣▣▣▣➔ *NOTE: Review the Data Log section for additional information.*



Points – The Points section provides radio button selection to identify the type of data logging.

Log Every Point – Collects every point at a typical rate of 10 Hz.

Point Interval – Sets the interval between data points. Select the radio button and enter a value to be applied as a data collection interval. A setting of 10 collects data every 10th point.

Time Interval – User specified time between data point collection. Select the radio button and enter a data collection interval value. The value field contains the units entered by the user. The available units are (D) Days, (H) Hours, (M) Minutes and (S) seconds. Enter the single letter following the value to attach the appropriate units.

▣▣▣▣➔ *NOTE: The timed data collection will pause when the Stop is selected from the tool bar.*

Detector Settings

Duration – The Duration section provides radio button selection to identify the data logging duration.

Log points until stopped – Allows for user control of the data logging process. The Data Log window controls start and stop the run. The data logging process continues for the duration of the LaserPAD PC session or when the Stop button is selected.

Log to Point – Logs only a user specified number of points. The Log window Stop button can terminate the run before conclusion. The number of points selected in this window is logged regardless if a portion is ignored resulting from the Do not log points that fail live Stats is selected. In this condition, the number of points ignored during the log session is reported in the Log file.

Log to Time – User specified time duration for the Log run. The Log window Stop button can terminate the run before conclusion.

Log Data – The Log Data section specifies the type of data to log. The default is Display power. The following information is available to be added in addition to the default.

Display Power – This selection adds the display power value when selected. Attenuation and Display averaging has an effect on this value.

Position Data – Uses X and Y Position data relative to the detector center. This function is not available with Semiconductor detectors.

Log Power at Full Resolution – Returns data with four digits plus the exponent (Reference Only). Provides resolution greater than the display. Use this function for power drift analysis.

||||▶ *NOTE: The absolute data accuracy is a function of the published specifications for the Detector and the SSIM. Additional accuracy should not to be implied with the extra digit.*

Detector Settings

Do not log points that fail live stats – This selection ignores points that fail the live stats. The Log file collects all of the data specified by the data collection parameters. The number of points not collected is reported in the log file when this function is selected.

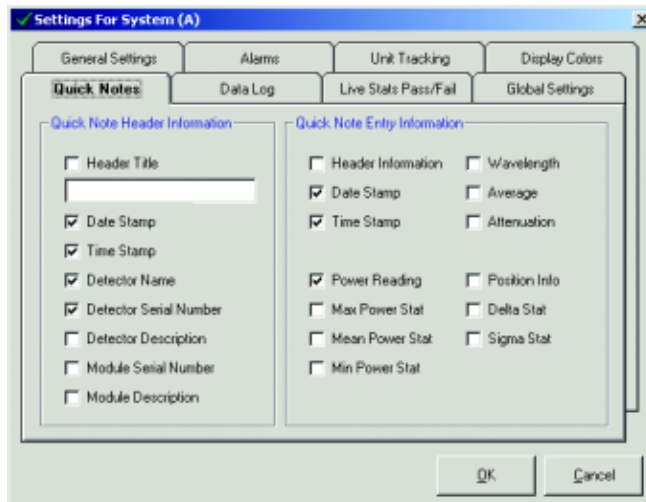
|||➔ *NOTE: Review the section on Live Stats Pass/Fail for a list of available parameters and additional information.*

Live Stats Pass/Fail Tab

The Live Stats Pass/Fail tab allows the user to specify the data parameters shown on the Home screen statistics panel. User entered Min and Max values are available for each parameter. Values collected outside of the user specified parameter are reported based on the Visual, Audible or RS-232 alert setting. A check box is available for each parameter to make it active. The user must also use a check box to activate each Min/Max parameter value. Live stats are off by default.

|||➔ *NOTE: The Enable Live statistics box must be checked for Live stats to be shown on the Home screen.*

|||➔ *TIP: Apply Live Pass / Fail stats in conjunction with the Data Log function. The Data Log can be set to ignore points based on the Pass / Fail settings.*



Detector Settings

Enable Live Statistics – The Enable Live Statistics box must be checked for any Live stats to be displayed on the Home screen. The default is to not check Enable Live statistics.

Failure Options – The Failure Options section selects the type of notification for a failure condition.

Visual Indicator – The Visual indicator is always on. When a failure condition occurs, an “F” is displayed adjacent to the offending parameter in the Home screen data panel. When the value is within the specified limits the F is not displayed.

Audible Alarm – The Audible alarm sends a beep to the system audio device when a failure condition occurs. The beep continues for the duration of the failure condition. When the value is within the specified limits, the beep no longer sounds.

Send ASCII String – The Send ASCII String function sends the string entered in the provided field. The string is transmitted with each measurement in a failure condition.

Append CR/LF – The Append CR/LF selection appends each ASCII string with a carriage return and a line feed.

Send string at initial fail only – The Send string at initial fail only selection sends a single ASCII string at the initial detection of a failure condition. When the measurement returns to a normal condition this function automatically resets and a single new string is sent if the failure condition returns. This function is designed to send a single string when the failure condition is detected instead of continuous strings while the failure condition is valid.

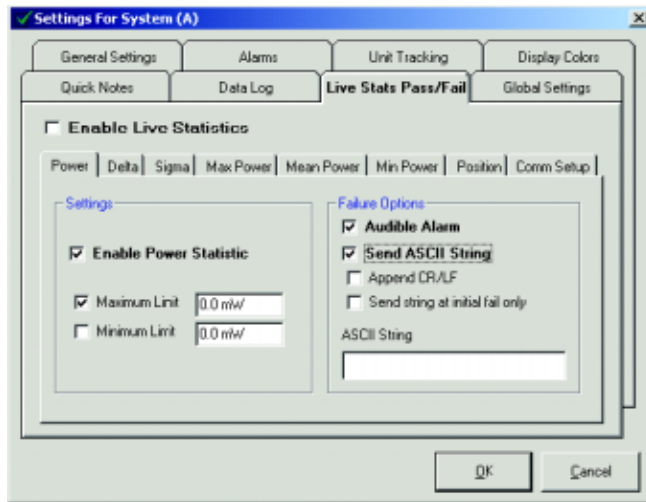
Detector Settings

Comm Setup – The Comm Setup tab establishes the serial communication settings for the Send ASCII String function. Each communication parameter is selectable with a combo box to allow communication with a remote computer. The Load Default Settings button sets the following communication parameters:

- Comm Port – 1
- Baud Rate – 9600
- Parity – None
- Data Bits – 8
- Stop Bits – 1

Comm Selections – The following communication parameters are available for selection in the Comm Setup dialog.

- Comm Port – 1, 2, 3, 4, 5, 6, 7, 8, 9
- Baud Rate – 4800, 9600, 1440, 19200, 28800, 38400, 56000, 115200
- Parity – Even, Mark, None, Odd, Space
- Data Bits – 4, 5, 6, 7, 8
- Stop Bits – 1, 1.5, 2



Detector Settings

Available Parameters – The following parameters are available for Live Pass/Fail Stats. Each data parameter and the corresponding values must have the adjacent box checked for the parameter and limit to be active. The user must enter units with each power related parameter. The available units are detector specific. Review the Min and Max Detector range in the Hardware Properties window to verify the available units. Enter the first letter for the appropriate unit following the value [(n)nW, (u)uW, (m)mW, (w)W, (k)kW]. Example: 5m for 5 milliwatts. The Position parameter does not require units.

The following parameters are available for Live Statistics Pass/Fail:

Power – The Power statistic uses the display power. The display power is effected by Offset, Attenuation and Averaging.

Delta – The Delta value is calculated by taking the maximum power value minus the minimum power value.

Sigma – The Sigma value is the calculated standard deviation of all display power data available for statistics. When the Sigma parameter is active, a dialog is displayed to warn the user that Live Sigma calculations compile for a maximum of 24 hours. After 24 hours, data collection is paused. A check box is included in the dialog to not show in the future. Restore the dialog by selecting Warn before applying Sigma calculation box in Restore Dialogs.

The Standard Deviation is calculated using the following formula:

x = Each point collected

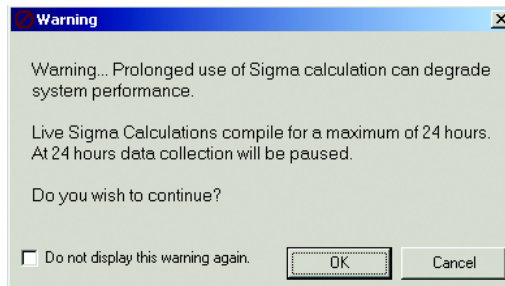
Avg(x) = The average of all points collected

n = The number of points collected

$$\sqrt{\frac{\sum [x - \text{Avg}(x)]^2}{n - 1}}$$

▶ *NOTE: The Sigma parameter may have an effect on system performance when a large number of points are compiled.*

Detector Settings



Max Power – The Max Power value corresponds to the maximum display power detected with the compiled data.

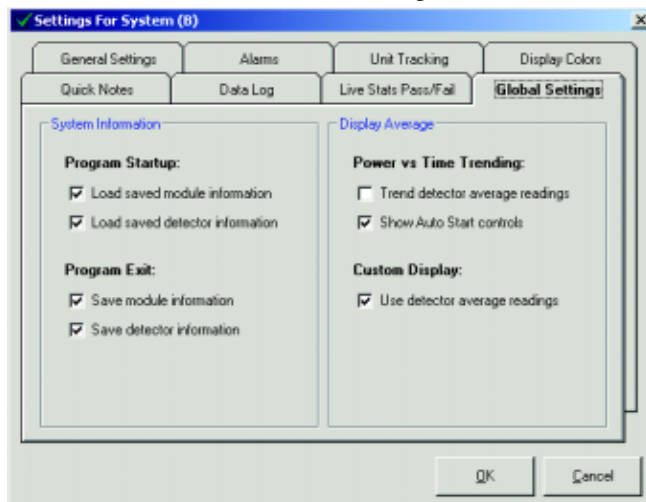
Mean Power – The Mean Power value corresponds to the average of all display power points compiled from the data.

Min Power – The Min Power value corresponds to the minimum display power detected with the compiled data.

Position – The Position parameter detects changes in beam alignment relative to the detector center. This parameter is active in Absolute Alignment mode only. The Position parameter is not available for Semiconductor detectors.

Global Setting Tab

The settings associated with this tab are applied to all detectors and modules connected. See individual Global settings sections for default values.



Detector Settings

System Information – The System Information section determines information loaded and stored from session to session. The default is to load all module and detector information at startup. All module and detector information is defaulted to save at program exit.

Program Startup – The Program Startup section determines if previous detector or module settings are loaded when the LaserPAD PC application starts. When a Load Saved Information box is not checked, all parameters associated with the module or detector are loaded as defaults. The LaserPAD PC application generates a file for each detector containing all screen and measurement settings. All settings are saved to a master file when the LaserPAD PC application is closed. Each time a detector is connected, previous settings are restored based on the detector serial number. When the Load Saved Information box is not checked, the detector settings file is not restored.

Program Exit – The Program Exit section determines if detector or module settings are saved when the LaserPAD PC application exits. When a Save Information box is not checked, all parameters associated with the module or detector are not saved to the detector file. The LaserPAD PC application generates a master detector file entry for each detector containing all screen and measurement settings. Each time a detector is connected, previous settings are restored based on the detector serial number. When the Save Information box is not checked, the settings file is not saved.

|||▶ *TIP: Remove the check from the program exit boxes to test new configurations. Current configurations are not effected when this box is not checked.*

Detector Settings

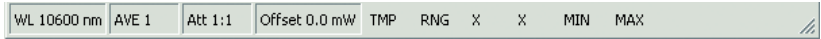
Display Average – The Display Average section applies an average function to the Trend and Custom Display screens. These screens normally use 10Hz data collection with offset and attenuation applied. If averaging is applied to this data the results can be effected. If a noisy laser is to be measured with these screens and the user prefers to apply averaging to the data, the average value setting is applied. These boxes are not checked by default.

Power vs Time Trending – When this box is checked, the average value from the General Settings tab is applied to Power vs Time Trending data.

Show Auto-start Controls – When this box is checked, the Auto-start controls are displayed in the Trend setup tab. These controls allow the user to select a power threshold to start a Trend run. Review the Trend setup tab for additional information.

Custom Display – When this box is checked, the average value from the General settings tab is applied to the Custom Display data.

Detector Window Status Bar



Wavelength – The Wavelength is displayed in the status bar. Click the Wavelength value to display the Wavelength entry dialog. The Wavelength entry dialog sets a new Wavelength value.

Average – The Average value is displayed in the status bar. Click the average value to display the Detector settings dialog. The General settings tab contains a field to enter a new averaging value. Review the Detector settings for additional information.

Attenuation – The Attenuation value is displayed in the status bar. Click the attenuation value to display the Detector settings dialog. The Detector settings dialog contains the field to enter a new attenuation value. Review the Detector settings dialog for additional information.

Offset – The Offset value is displayed in the status bar. Clicking on the Status Bar offset value will set/clear the current offset or establishes a new dB reference. Review the offset section in the Detector window tool bar for additional information.

Alarms – The Alarm section in the status bar contains indicators for the alarms that are active. Each active alarm is indicated with an appropriate label. When a failure condition occurs a Red panel adjacent to each label is displayed. The settings and alarm activation controls are contained in the Alarms tab. The following is a list of the available alarms. Review the Alarms tab in for additional information.



TMP – Temperature

RNG – Over Range

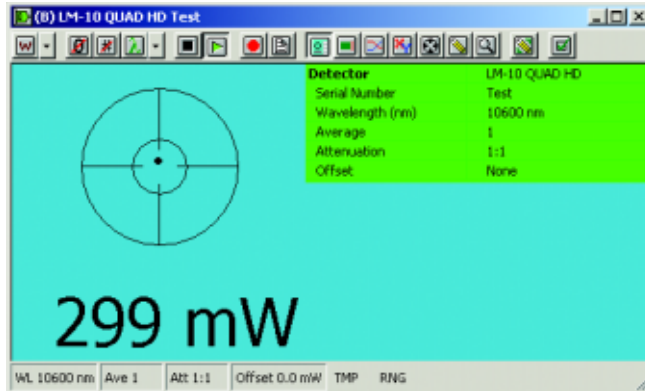
X – X Alignment Position

Y – Y Alignment Position

MIN – Minimum Power

MAX – Maximum Power

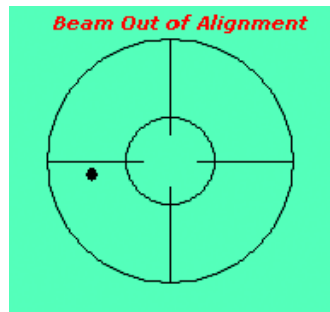
Home Screen



Graphical Pane


Left side of the Home screen displays graphical and numeric results.

Out of Alignment Message – The Out of Alignment message indicates an Out of Alignment condition. When the Alignment dot is outside the Standard Target inner circle, the Out of Alignment condition is reported. The Out of Alignment condition is available with Thermal Quadrant detectors only. Semiconductor detectors do not support the alignment function. The Out of Alignment message appears regardless of the Target Style selected.



Alignment Target – The Alignment target is available with Thermal detectors only. The Alignment Target is not displayed when a Semiconductor detector is connected. The Alignment target display is controlled by the Detector settings dialog. Review the available target style settings for additional information.

Home Screen

Value – The displayed reading is based on user specified units. The available units are: Watts, dBm and dB. Select them by clicking the Units button . When the user clicks the current units displayed on the Units button, the display cycles to the next available unit.

Watts – The Watts selection switches power units to Watts. The actual units are based on the associated detector and the power input. The following units are supported by the LaserPAD PC: Nanowatts (nW), Microwatts (uW), Miliwatts (mW), Watts (W) and Kilowatts (kW). This setting will be in effect on the Home screen, Large Display screen, Tune screen, Trend screen, Trend files, Quick Notes and Log files.

dBm – The dBm selection switches power units to dBm. The dBm value is calculated using the following formula:

$$10 \log [\text{power reading in mW}].$$

This setting will be in effect the Home screen, Large Display screen, Tune screen, Trend screen, Trend files, Quick Notes and Log files.

dB – The dB selection switches power units to dB. When dB is selected, the power value is set as a new dB reference. All subsequent values are displayed relative to the initial dB reference. The dB value is calculated using the following formula:

$$10 \log [\text{power reading} / \text{dB reference power}].$$

This setting will be in effect the Home screen, Large Display screen, Tune screen, Trend screen, Trend files, Quick Notes and Log files.

||||▶ *NOTE: The Power and dB settings control the function of the Offset button. When the screen displays Watts or dBm, the button toggles the offset value on and off. When the screen displays dB, the button establishes a new dB reference each time it is clicked.*

||||▶ *TIP: Double Click the units displayed on the Home screen to cycle from Watts to dBm to dB.*

Home Screen

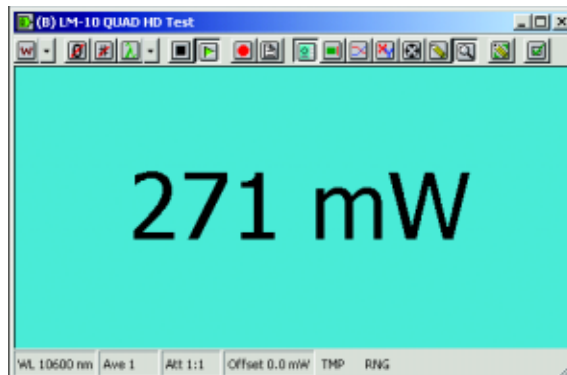
Over Temperature – The Over Temperature condition is valid when a thermal detector reports a temperature greater than 100° C. Audible and visual are always on to protect the detector from damage. The visual indicator is displayed in conjunction with the audible beep for the duration of the Over Temperature condition. When the temperature returns to a value of less than 100° C, normal operation resumes.

▶ *NOTE: Semiconductor detectors do not support the Over Temp condition.*



Normal / Large Display – The Large Display button switches the Home screen to the Large Display screen. The Large display screen displays the Power value in a large font and removes the Statistics panel from the Home screen. Use the Large Display screen to read Power values from across the room. The Large Display button operates in an up or down state. Each time the user clicks the button, the screen toggles from the Home to a Large Display.

▶ *NOTE: The Large Display screen is available only when the Home screen is active.*



Home Screen

Data Pane

The Data pane displays detector information, data specific settings and statistical results. The detector information includes the Detector name and serial number. The data specific settings include the Wavelength, Average, Attenuation and Offset values. The statistical results are not displayed by default.

| | |
|-----------------|---------------|
| Detector | LM-10 QUAD HD |
| Serial Number | Test |
| Wavelength (nm) | 10600 nm |
| Average | 1 |
| Attenuation | 1:1 |
| Offset | None |

Live Stats Pass/Fail – Active Live Pass/Fail stats are displayed in the Home screen data pane. Activate the Pass/Fail stats and assign the limits in the Live Stats Pass/Fail tab in the Detector settings dialog. Please review the Live Stats Pass/Fail tab in the Detector settings section for additional information.

■■■■► *NOTE: The Live Pass / Fail Statistics utilize visual, audible and RS-232 notification of user specified failure conditions.*

| | |
|------------------------|---------------|
| Detector | LM-10 QUAD HD |
| Serial Number | Test |
| Wavelength (nm) | 10600 nm |
| Average | 1 |
| Attenuation | 1:1 |
| Offset | None |
| Live Statistics | |
| Points | 170 |
| Power | 313 mW |
| Delta | 776 mW |
| Max | 776 mW |
| Mean | 184 mW |
| Min | 0.0 mW |
| Position (X,Y) mm | (0.01,-0.06) |

Home Screen

Home Screen Shortcuts

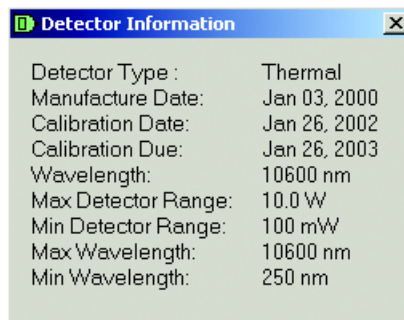
Many Home screen functions can be directly accessed with a mouse click. The mouse cursor changes from a pointer to a hand when a mouse click function is available.

Target – Click on the Alignment target as a shortcut to the Alignment Screen.

|||▶ *NOTE: The Alignment target is not available with Semiconductor detectors.*

Units – Double Click the units displayed on the Home screen to cycle from Watts to dBm to dB.

Detector Information – Click on the Detector name or the Detector serial number to display the detector information.



General Settings – Click on the Wavelength, Average or Attenuation label in the Home screen data pane to access the Detector settings. Click on the Average or Attenuation value in the status bar to access the Detector settings dialog. Review the Detector settings for additional information.

Live Pass / Fail Statistics – When Live Pass / Fail statistics are active, click on a label or value to display the Live Stats Pass/Fail tab. This function allows the user to quickly adjust Pass / Fail parameters and return to the Home screen. Review the Live Stats Pass/Fail tab for additional information.

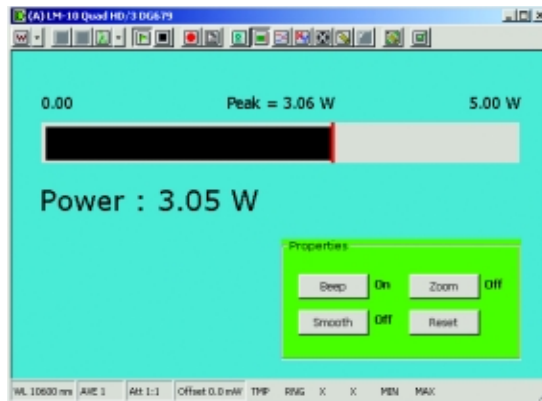
Home Screen

Wavelength – Click on the Wavelength value in the status bar to access the Wavelength dialog. The Wavelength dialog sets a new Wavelength within the specified range of the detector.

Offset – Click on the Offset value in the Detector window status bar to establish a new offset or clear the offset and set a new dB reference.

Alarms – Click on the Right side of the Detector window status bar to display the Alarms settings tab. The Right panel displays active alarms.

Tune Screen



Graphical Pane

The top section on the Tune screen displays graphical and numeric results.

▶ *TIP: Maximize the Tune screen to view the screen from a distance while peaking the laser source.*

Minimum Scale Value – The Minimum scale value corresponds to the minimum scale reading. This value is zero when Zoom is not active.

Peak Value – The Peak value represents the maximum value. The peak value can be reset at any time with the Reset button in the Properties panel.

Maximum Scale Value – The Maximum scale value corresponds to the maximum scale reading available. Each time the maximum scale value is exceeded, the scale increases automatically and a new maximum scale value is displayed. The Auto-scale function works in the positive direction only.

▶ *TIP: Click the Reset button in the Properties panel to set a lower Maximum scale value.*

Tune Bar – The Tune bar responds at a rate of 10Hz. The length of the bar represents the current power relative to the maximum scale value.

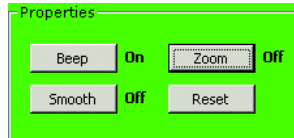
Peak Indicator – The Peak indicator is a stationary Red bar fixed at the peak value. Each time a new peak value is obtained, the indicator moves to represent the new peak value.

Tune Screen

▶ *TIP: Click the Reset button in the Properties panel to reset the Peak indicator.*

Properties

The Properties panel contains control buttons specific to the Tune screen.



Beep – The Beep button toggles the Audible beep on and off. The audible beep sounds each time a new peak value is obtained. The beep function uses the selected windows audio device.

Smooth – The Smooth button adds response smoothing to the Tune bar. This is accomplished by cutting each incremental bar movement in half. The update rate of the Tune bar is doubled to preserve the speed of the response. This effectively makes the Tune bar appear to operate in a smoother fashion.

▶ *TIP: Utilize the Smooth function if the tune bar is moving erratically during the power peaking process.*

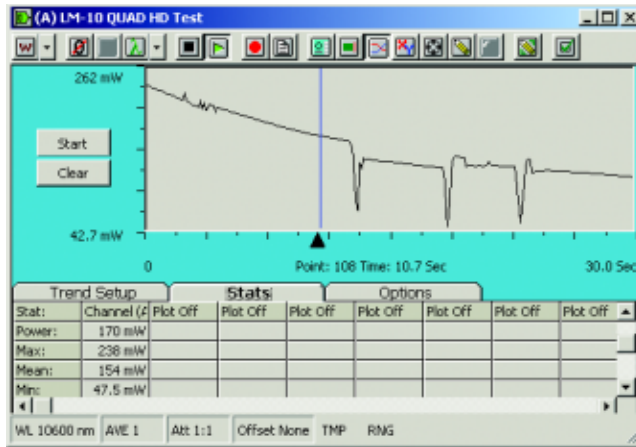
Zoom – The Zoom function rescales the Tune bar based on +/- 20% of the reading. The minimum and maximum scale values changes appropriately. The Auto-scale function is active in Zoom mode. Each time the maximum scale value is exceeded, a new maximum and minimum scale range is established. The Reset button reduces the Tune bar scale. Click the Zoom button again to return to a normal scale function with a constant zero value for the scale minimum.

▶ *TIP: Use the Zoom function for final laser alignment.*

Reset – The Reset button resets the peak value, peak indicator and the maximum scale value. If the Zoom function is active, it remains active after the reset.

Tool Bar Buttons – The Offset, Clear Stats and Large Display buttons are not active in the Tune screen.

Trend Screen

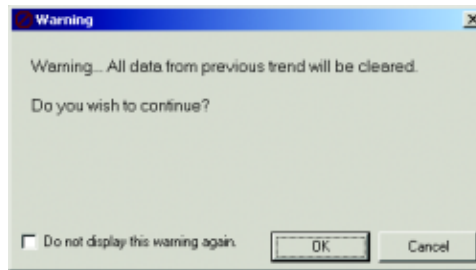


Graphical Pane

The Trend screen graphical pane contains the graphical data plot and display controls.

Start / Stop Button – The Start / Stop button starts a trend run when it is clicked for the first time. The Trend run executes based on the parameters contained in the Trend setup. When the Trend run is in process, the button appears as a Stop button halting the data collection process. If the Start / Stop button is clicked again, the trend data is cleared and data collection starts again based on the data collection parameters.

Clear Data – The Clear button clears all data collected by the Trend run. When the Clear button is clicked a dialog appears to alert the user that the data is lost. The user can choose to not show this dialog in the future. The dialog can be restored from the Settings menu.



▣▣▣▣➡ **NOTE:** Use the Stop and Play button in the Detector Window tool bar to pause and continue data collection.

Trend Screen

Vertical Graph Scale – The vertical graph scale corresponds to the Min and Max values shown in the Trend setup tab. The vertical graph scale is set based on the automatic and manual settings in the Options tab. The vertical graph scale mode can be displayed in eight linear segments or a 10 segment Logarithmic scale. The vertical graph scale contains appropriate units when single power channels are selected. If a Custom Math function is selected, the vertical scale displays as an exponent with no units.

Horizontal Graph Scale – The horizontal scale is based on the duration divided by the 16 fixed horizontal divisions. The duration is set in the Trend setup tab.

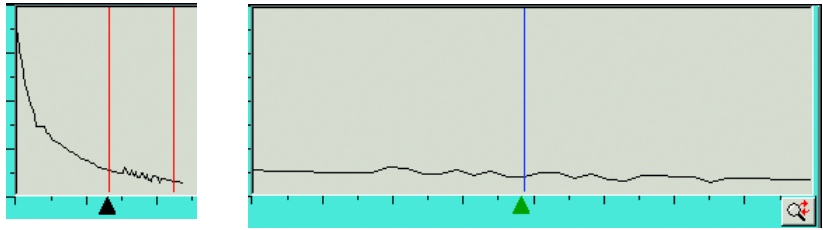
Measurement Cursor – The Trend measurement cursor is available when data is available and data collection is stopped. When data collection is stopped, the measurement cursor appears at the left side of the Trend plot. The measurement cursor data appears in the Graphical pane and the Stats tab. The Graphical pane displays the cursor position. The cursor position is reported as the point value and the associated time. The Stats tab power data represents power at the cursor position. The power value updates each time the cursor is moved.

Measurement Cursor Controls – When data collection is complete or stopped, the measurement cursor appears with a black indicator ▲ attached. Click on the indicator or in the plot area to change the indicator to green. The green color indicates the cursor controls are active. Drag the green indicator to any location by holding the left mouse button. When the indicator is green, the keyboard arrows move the measurement cursor. The left and right keyboard arrows move the cursor in single point increments. The up and down keyboard arrows move the cursor in 10 point increments. The keyboard arrows can be held down for continuous motion.

Zoom – When data is available and data collection is stopped, a Zoom function is available. The user can Zoom on a section of data by clicking and holding the left mouse button on a point corresponding to the start of the zoom section. Hold the left mouse button and move to the end of the data to display. Vertical Red indicators correspond to the selected data. When you release the left mouse button, the zoom data is displayed. When the Zoom is active the magnifying glass icon appears. Click on the icon to return to a normal view.

|||➡ *NOTE: Use the zoom function with greater than two horizontal divisions of displayed for proper operation.*

Trend Screen



Tool Bar Buttons – The Offset, Clear Stats and Large Display buttons are not active in the Trend screen.

Trend Setup Tab

The Trend setup tab controls the data collection process prior to starting the Trend run.

|||▶ *NOTE: The Trend setup tab is shown with the Auto-start controls active. These controls are hidden by default. Activate the Auto-start controls in the Detector Global settings tab.*

| Trend Setup | | Plot Setup | Options |
|--|---------|----------------------------------|----------|
| Vertical Scale | | Power / Division : 1.25 W | |
| Max | 10.0 W | Points | 300 |
| Min | 0.00 nW | Duration | 30.0 Sec |
| | | Time / Division : 1.9 Sec | |
| Trend Auto Start | | | |
| <input checked="" type="checkbox"/> Auto Start | | | |
| | | Plot 1 | > 100 mW |

Vertical Scale – Maximum and minimum vertical scale values are available in the Trend setup tab. When Manual scale is selected from the Options tab, maximum and minimum values can be entered to set the Vertical plot scale. When Automatic scale is selected in the Options tab, the maximum and minimum scale values are updated automatically.

Points – The number of points to be collected in a Trend run is entered in the Points field. The number of points available for a selected duration is determined by the 10 Hz data collection rate. A maximum of 10 points can be collected for each second of data collection. For example, if a 5 second duration is selected, a maximum of 50 points can be collected. The duration setting automatically controls the maximum number of points selected.

Trend Screen

Duration – The duration value is entered to set the length of the Trend run. Units must be entered to accompany the value. Enter the first letter for the Trend run duration time units. (H) Hours, (M) Minutes, (S) Seconds.

||||➤ *NOTE: The maximum Trend duration is limited to 99 hours.*

||||➤ *NOTE: Values entered without units will be displayed as minutes.*

Power / Division – The Power / Division value is based on the Maximum vertical scale value minus the Minimum scale value divided by the 8 (Linear Scale) or 10 (Logarithmic Scale) divisions.

||||➤ *NOTE: The units (Watts, dBm and dB) effect the vertical graph scale and power values.*

Time / Division – The Time / Division value is displayed based on the duration. The Time / Division value corresponds to the duration divided by the 16 Horizontal plot segments.

Trend Auto-start – The Trend Auto-start allows the user to set a specified power threshold to start a Trend run. When Auto-start is active, the duration and interval parameters are executed when the user specified minimum or maximum power threshold has been exceeded.

Auto-start – Check box to make Auto-start active

Plot Combo Box – Select the plot to apply the Auto-start power threshold parameters.

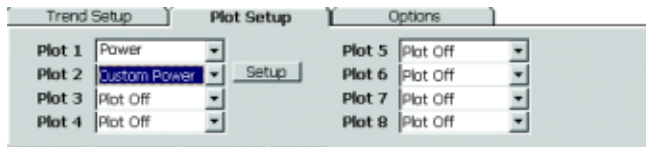
> / < **Indicators** – Use the Greater Than or Less Than symbols to set the power threshold as a minimum or maximum value. The Less Than (<) symbol Auto-starts the Trend run when the power value drops below the selected threshold. The Greater Than (>) symbol Auto-starts the Trend run when the power value exceeds the selected threshold.

Threshold Value – Enter a value to be set as a threshold. When the plot represents a single channel without custom math, enter the appropriate power units. (nW, uW, mW, W kW, dBm, dB)

Trend Screen

Plot Setup Tab

The Plot Setup tab controls the type of data collected during the Trend run. The Plot setup tab is only available with the Trend run is stopped and the data is cleared. Eight separately configured plots can collect data during a single Trend run. A combo box selects the type of data for each plot.



Plot Off – No data is displayed for a plot using this setting. The Plot Off setting is the default for plots 2 – 8..

Power – The detector power value is collected for the selected plot. The Attenuation and Offset have an effect on the power data. Plot 1 defaults to Power.

▣▣▣▣➤ *NOTE: The Average value is available for Trend data collection. Check the appropriate box in the Global Settings tab in the Detector settings dialog.*

Plot Active Detectors – Trend data can be collected from other active detectors connected. Each active detector is available for plot selection. Active detectors are listed by title bar channel letter. The channel letter is shown in the Detector window title bar. Select the channel letter and power values for that detector is plotted.

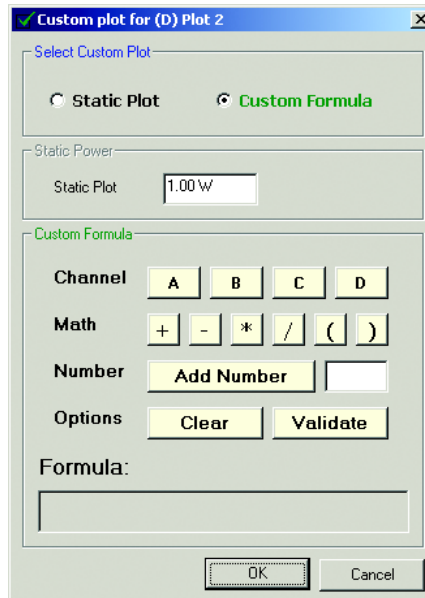
▣▣▣▣➤ *NOTE: Each Detector channel may have different Attenuation and Offset values.*

▣▣▣▣➤ *NOTE: The LaserPAD PC software does not maintain a fixed order of module detection. When multiple detectors are connected, the channel letter designator in the Detector title bar may change from session to session.*

Custom Power

The Custom Power setup displays custom multi-channel math functions. When custom power is selected, a Setup button appears. The Setup button accesses the custom math functions.

Trend Screen



Static Plot – The Static Plot radio button provides the capability to enter a static value. The user entered static value is plotted as a horizontal line corresponding to the power value entered in the Static Plot field.

Custom Formula – The Custom Formula section contains features to add custom math functions. Click on any active item in the dialog to generate a custom formula. The selected items appear in the formula bar at the bottom of the dialog. When the OK button is clicked, the formula is validated.

Channel – The Channel section displays active detector channels in Black and inactive channels in Grey. Click on a active channel to add it to the formula. Active channels can consist of live detectors or record files. The custom display provides the capability to combine data from live detectors and previously recorded data.

|||➡ *NOTE: The LaserPAD PC software does not maintain a fixed order of module detection. When multiple detectors are connected, the channel letter designator in the Detector title bar may change from session to session.*

|||➡ *NOTE: Use the Hardware Properties window to review hardware information associated with each active channel.*

Trend Screen

Math – The Math section allows the user to add math operations to the custom display. The math functions allow the user to add, subtract, multiply or divide any combination of active channels. The brackets provide a second level of segregated math operations. Each time a math button is clicked, the associated operation is added to the Formula Bar.

|||▶ *NOTE: When the custom formula is complete, click the Validate button to verify that formula.*

Add Number – The Add Number section allows the user to add a numeric value to the formula. For example: This function averages channel (A) and channel (B) by entering $(A+B)/2$. Enter the number in the field and click the Add button. The number is added to the formula.

Options – The Options section is used to clear or validate the formula. The Clear button clears the entire formula. The Validate button informs the user if the formula is valid. The Validate button does not provide information on the source of the formula error. Common formula errors include the following:

- Two channels selected without a mathematical operation between them.
- A mathematical or number at the end of the formula.
- No closing parenthesis.
- Math function beginning or ending the formula within the parenthesis.

Formula Bar – The Formula bar contains the selected function. The Clear button removes the entire formula displayed.

Trend Screen

Stats Tab

The Stats tab displays the numerical results associated with the entire Trend run. This tab is active only when a run is stopped and graphical data is displayed.

| Trend Setup | | Stats | | |
|-------------|-------------|----------|----------|---------|
| Stat: | Channel (A) | Plot Off | Plot Off | Plot Of |
| Line: | ----- | | | |
| Power: | 2.93 W | | | |
| Max: | 2.95 W | | | |
| Mean: | 2.93 W | | | |
| Min: | 2.90 W | | | |
| Delta: | 53.3 mW | | | |

Stat – The Stat row contains column labels for the plot type selected. The number of column labels and each individual label title are controlled by the individual settings in the Channel Setup tab.

Line – The Line row displays line color for each corresponding data plot.

Power – The Power value represents the reading at the cursor position. Each time the measurement cursor is moved to a new position, a new power value is displayed for each column of plot data.

Max – The Max value represents the maximum power value contained in the Trend run.

Mean – The Mean value represents the average of all data points collected in the Trend run.

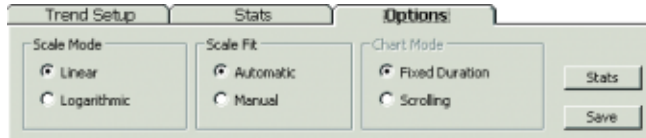
Min – The Max value represents the minimum power value contained within the Trend run.

Delta – The Delta value corresponds to the maximum power value minus the minimum power value collected during the Trend run.

Trend Screen

Options Tab

The Options tab contains controls associated with chart scaling. The scale mode is the only setting that can be applied to collected data. The Options tab also provides buttons to save the Trend data to a file and display complete statistics for each plot.



Scale Mode – The Scale Mode controls the vertical scale to display as Linear or Logarithmic.

Linear – When the Linear radio button is selected, vertical Trend chart scale consists of eight evenly spaced divisions.

Logarithmic – When the Logarithmic radio button is selected, vertical Trend chart scale consists of 10 divisions. The auto-scale function updates as multiples of 10. The Manual scale function allows entries in multiples of 10 only.

▣▣▣▣➔ *NOTE: The Linear Scale provides a finer display resolution than a Logarithmic scale.*

Scale Fit – The Scale Fit radio button sets the control of the vertical chart scale. The Automatic scale selection does not allow specific scale values to be entered when active.

Automatic – The Automatic scale uses the first reading to set the vertical chart scale. The Automatic mode vertical scale is based on +/-10% of the initial reading. When a reading exceeds the scale minimum or maximum, the vertical chart scale is expanded by an additional 10%. This scale expansion occurs each time a scale maximum or minimum is exceeded.

Manual – The Manual scale setting utilizes a user specified minimum and maximum scale value. This function fixes the vertical chart scale. Values that exceed the user specified values are plotted at the top or bottom of the chart as appropriate. Off scale results do not have an effect on statistical data or numerical cursor results. When the Logarithmic vertical chart scale is active, manual chart scale values must be entered in multiples of 10.

Trend Screen

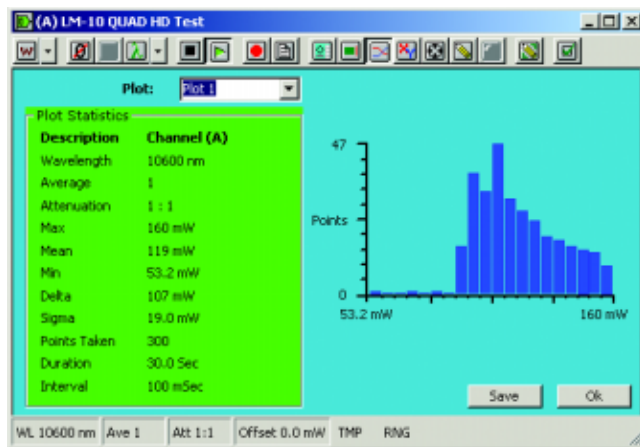
Chart Mode – The Chart Mode setting controls the horizontal display type.

Fixed Duration – The Fixed Duration selection displays the horizontal data based on the number of points and the duration setting selected in the Trend Setup tab. When the selected duration is complete, data collection stops.

Scrolling – The Scroll function uses the points and duration parameters. The Duration setting represents to the horizontal chart scale. Data collection continues until the Stop button is clicked. When the duration is complete, new points are added to the right side of the chart and old points are discarded from the left. This operation provides the appearance of a Strip chart scrolling from right to left. Statistical data (Min, Max and Mean) represents the points displayed and does not represent the complete set of data.

Stats Window

The Stats button located in the Options tab displays a separate window containing complete statistical information and histogram corresponding to the Trend data.



Plot Selection – The combo box allows the user to select the plot for the displayed statistics. All active plots are available for statistical display.

Trend Screen

Plot Statistics

The Trend statistics for the selected plot is displayed in the Plot statistics panel.

Description – The description field contains the Plot description or math formula displayed in the statistics and histogram.

Wavelength – The Wavelength value for a single channel plot is displayed. Custom math functions do not display a Wavelength value.

Average – The Average value is displayed as 1 unless the Trend detector average readings box is checked in the Global Settings tab in the Detector settings dialog. Custom math functions do not display an average value.

Attenuation – The Attenuation value for a single channel plot is displayed. Custom math functions do not display an Attenuation value.

Max – The Max value corresponds to the maximum power value collected.

Mean – The Mean value corresponds to the average value for all data points collected.

Min – The Min value corresponds to the minimum power value collected.

Delta – The Delta value represents the difference between the maximum and minimum statistical values.

Sigma – The Sigma value represents the Standard Deviation for all data points collected.

The Standard Deviation is calculated using the following formula:

x = Each point collected

Avg(x) = The average of all points collected

n = The number of points collected

$$\sqrt{\frac{\sum [x - \text{Avg}(x)]^2}{n - 1}}$$

Points Taken – The Points Taken value displays the number of points contained in the Trend run statistics. If a Trend run is halted prematurely, the value represents the current number of points collected.

Trend Screen

Duration – The total Trend run duration is displayed. The duration represents the data displayed on the chart. If Scrolling mode is selected, the duration does not correspond to the total time data collection was in progress.

Interval – The selected interval between data points is displayed below the duration value.

Histogram – A Histogram for all points contained in the selected plot is displayed in the Stats window. The Histogram is constructed by taking the Delta value divided by 20. This result determines the horizontal bar division on the Histogram. The Histogram vertical scale is set by taking the bar with the maximum number of points.

Save Trend File

Trend files can be saved as the Statistical data only or to include all data points. The Trend screen Save button stores the Statistical Trend data and data points. The Histogram screen Save button saves the Statistical Trend data only. When the Save button is clicked, the Trend data folder is displayed as the default file location. The Save as Type combo box allows the user to select .xls or .txt as the file type saved. The .xls file extension loads directly into Microsoft Excel and can't be viewed directly with the LaserPAD PC application.

The screenshot shows a window titled "Data File Viewer" with the following content:

Power vs Time Trending

Date, 4/5/2002
 Time, 9:33:47 AM
 Points, 126
 Duration, 12.5 Sec
 Interval, 100 mSec

| Plot #: | Plot 1 | Plot 2 | Plot 3 |
|----------------|----------|-------------|-------------|
| Description: | A+B | Channel (B) | Channel (A) |
| Serial Number: | N/A | 00ma93 | Test |
| Wavelength: | N/A | 632.8 nm | 10600 nm |
| Average: | N/A | 1 | 111 |
| Attenuation: | N/A | 1:1 | 1:1 |
| Max: | 2.36E-01 | 8.34 uW | 236 mW |
| Mean: | 1.20E-01 | 8.29 uW | 120 mW |
| Min: | 8.22E-06 | 8.22 uW | 0.0 mW |
| Delta: | 2.36E-01 | 120 mW | 236 mW |
| Sigma: | 7.48E-02 | 29 mW | 74.9 mW |
| Offset/Ref: | N/A | 0 mW | 0.0 mW |

| Point | Value | Watts | Watts |
|-------|----------|----------|----------|
| 1. | 8.28E-06 | 8.28E-06 | 0.00E+00 |
| 2. | 8.28E-06 | 8.28E-06 | 0.00E+00 |
| 3. | 8.28E-06 | 8.28E-06 | 0.00E+00 |
| 4. | 8.29E-06 | 8.29E-06 | 0.00E+00 |
| 5. | 8.29E-06 | 8.29E-06 | 0.00E+00 |
| 6. | 8.29E-06 | 8.29E-06 | 0.00E+00 |
| 7. | 8.29E-06 | 8.29E-06 | 0.00E+00 |
| 8. | 8.28E-06 | 8.28E-06 | 0.00E+00 |
| 9. | 8.25E-06 | 8.25E-06 | 0.00E+00 |
| 10. | 8.22E-06 | 8.22E-06 | 0.00E+00 |
| 11. | 8.22E-06 | 8.22E-06 | 0.00E+00 |

Trend Screen

Trend File Contents – The Trend files contains Trend data and the associated setup parameters.

Header Information – The Header Information for each Trend file contains the following Information.

Date and Time Stamp – The Date and Time that the Trend data was saved. The Date and Time values do not correspond to the time of data collection.

Points – The Point value corresponds to the number of data points contained in the Trend file. The number of points may not represent the setup values if the Trend run is interrupted and saved prior to completion.

Duration – The Duration value represents the amount of time required to collect the data contained in the Trend file. The duration may not represent the setup values if the Trend run is interrupted and saved prior to completion.

Interval – The Interval value is based on the points and duration setup parameters. The Interval value is the result of dividing the setup duration in msec, by the number of points minus one.

Statistics and Column Information – The statistics and column information represents data associated with each plot. Plot specific data parameters and statistical data are contained in this section.

Plot # – The Plot # corresponds to the data displayed in the Stats tab, following data collection.

Description – The description represents the detector channel or custom formula used to collect corresponding data.

Serial Number – The serial number is displayed only for single channel data. When a custom math formula is used, no serial number information is displayed.

Wavelength – The Wavelength is displayed only for single channel data. When a custom math formula is used, no Wavelength information is displayed.

Trend Screen

Average – The Average value is displayed as 1 unless the Trend detector average readings box is checked in the Global Settings tab in the Detector settings dialog. Custom math functions do not display an average value.

Attenuation – The Attenuation value for a single channel plot is displayed. Custom math functions do not display an Attenuation value.

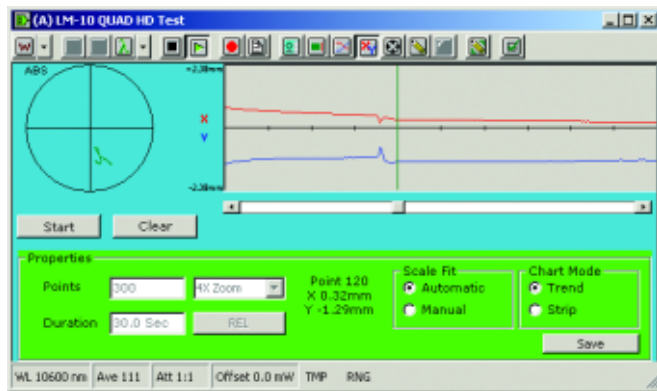
Statistics – Review the section on Trend screen statistics for descriptions on Trend file statistics.

Offset/Ref – The Offset/Ref value represents the Offset value for single channel data displays. Custom math functions do not display an Offset/Ref value. When single channel data is collected in Watts or dBm, the value represents the offset value. When data is collected in dB mode, the value represents the dB reference power.

Data Points – The data point section is available for file data that was saved with the button in the Trend Options tab. Data saved from the Statistics screen does not contain the data points. The data point section contains columns of individual data points for each data plot. These points can be exported to other applications for further analysis.

Position Stability Screen

(Quadrant Thermal Detectors Only)



Graphical Pane

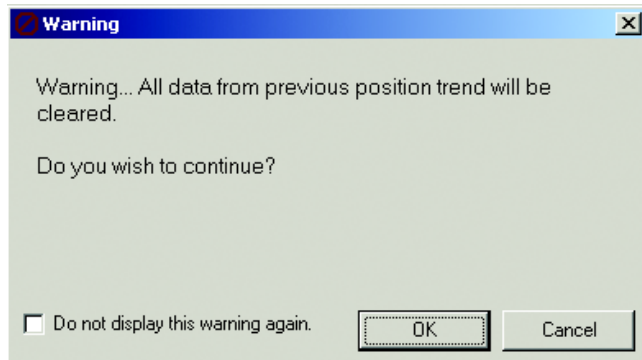
The Position Stability graphical pane displays position data in polar and strip chart form

Polar Plot – The Polar plot displays the position data in polar form. When no data is present, the Polar plot displays an alignment dot to aid in setting the desired beam position prior to data collection. The alignment dot provides a live representation of beam position. When Position Stability data collection is active, each unique position value is plotted. The Polar plot is comprised of four separate quadrants. Negative X values are plotted on the left side of the Polar plot. Positive X values are plotted on the right side of the Polar plot. Negative Y values are plotted on the bottom of the Polar plot and Positive Y values are plotted in the top region.

Start / Stop Button – The Start button begins a Position Stability run when the users clicks it for the first time. The Position Stability run executes based on the setup parameters. When the Position Stability run is in process, the button appears as a Stop button and halts the data collection process. When data collection is halted, the Stop button appears as a Start button. A Clear Button also appears. By clicking the Start or Clear button data is cleared. The Clear button clears data and allows the user to set new data collection parameters. The Start button clears data and starts data collection based on the current data collection parameters.

Position Stability Screen

Clear Data – The Clear button clears all data collected by the Trend run. When the Clear button is clicked a dialog appears to alert the user that the data is lost. The user can choose to not show this dialog in the future. The dialog can be restored from the Application Settings menu.



Vertical Graph Scale – The vertical graph scale represents the detector aperture divided by the displayed zoom level. The vertical scale values represent $\pm 1/2$ of the detector aperture/zoom level. The center of the vertical scale represents the detector center. Positive values correspond to X displacement to the Right and Y displacement up on the detector surface. The vertical graph scale is controlled with the automatic or manual scale setting.

Horizontal Graph Scale – The horizontal graph scale displays the duration setting. The central plot region contains 10 minor tick marks for reference. Divide the duration setting by 10 to obtain the reference time for each tick mark.

Measurement Cursor – The Position Stability measurement cursor is available when data is available and data collection is stopped. When data collection is stopped, the measurement cursor appears at the left side of the Position Stability plot. The measurement cursor data appears in the Properties panel. The point and the associated time value is displayed with the X and Y position values corresponding to the cursor position. The Time, Point and values are updated with each new cursor position.

Position Stability Screen

Measurement Cursor Controls – When data collection is complete or stopped, the measurement cursor appears with scroll bar controls. The measurement cursor does not support direct dragging of the cursor. The measurement cursor drag operation is accomplished by dragging the scroll control box below the graph. Click each scroll arrow to move the cursor in single increments. Click to the left or right of the scroll box to move the cursor in increments of 10. Click on any part of the scroll bar to make the keyboard arrows active. A blinking scroll bar box indicates active keyboard operation. The left and right keyboard arrows move the measurement cursor in increments of 1. The up and down keyboard arrows move the cursor in 10 point increments. The keyboard arrows can be held down for continuous motion.


Zoom – When data is available and data collection is stopped, a Zoom function is available. Zoom on a section of data by holding the left mouse button on a point corresponding to the start of the zoom section. Hold the left mouse button and move to the end of the desired data. Vertical Red indicators correspond to the selected data. When you release the left mouse button, the zoom data is displayed. When the Zoom is active the magnifying glass icon appears. Click on the icon to return to a normal view.

Properties

The Plot Setup properties control all aspects of the Position Stability data collection process.

Points – The number of points to be collected in a Position Stability run is entered in the Points field. The number of points available for a selected duration is determined by the 10 Hz data collection rate. A maximum of 10 points can be collected for a second of data collection duration. For example, if a 5 second duration is selected, a maximum of 50 points can be collected. The duration setting automatically controls the maximum number of points selected.

Duration – The duration value is entered to set the length of the Position Stability run. Units must be entered to accompany the value. Enter the first letter for the desired Trend Run duration time units. (H) Hours, (M) Minutes, (S) Seconds.

 *NOTE: Values entered without units will be displayed in minutes.*

Position Stability Screen

Zoom – The Zoom selection controls the vertical scale on the Polar plot and the Strip chart. The zoom values range from 1x to 32x in increments of 2. The zoom level can be changed at any time during the data collection process, when the scale fit is set to Manual. A zoom value of 1 corresponds to the detector aperture. Other zoom values scales the plot by taking the detector aperture value divided by the zoom level.

Absolute / Relative Display – The Mode setting is displayed to the upper left of the Polar plot. Absolute mode displays data relative to the center of the detector aperture. The relative function plots all of the data relative to the first point collected. The first point is set to a zero value and all subsequent points are plotted relative to the first data point.

Scale Fit – The Scale Fit selection allows the user to control the vertical chart scale.

Automatic Scale – When the Automatic radio button is selected the vertical chart scale is adjusted automatically. The zoom function is not available when Automatic is selected. The initial vertical scale is set to 1/32 of the detector aperture. The scale values continue to increase in 2x increments up to the detector aperture value as needed during data collection.

Manual Scale – When Manual radio button is selected, the Zoom setting controls the vertical chart scale. A Zoom value of 1 corresponds to the detector aperture. Other Zoom values scales the plot by taking the detector aperture value divided by the Zoom level.

Chart Mode – The Chart mode determines the horizontal aspect of the data collection process.

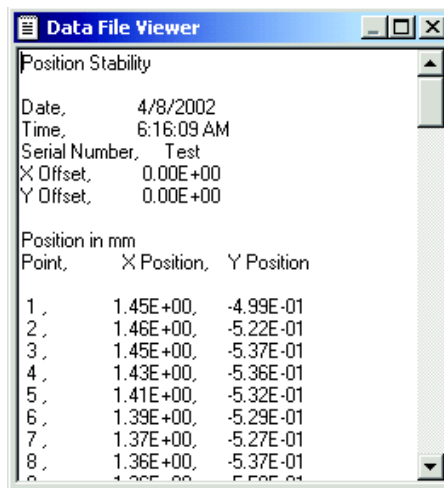
Fixed Duration – The Fixed Duration selection displays the horizontal data based on the number of points and the duration setting. When the selected duration is complete, data collection stops.

Scrolling – The Scroll Mode function uses the points and duration parameters. The Duration setting corresponds to the horizontal chart scale. Data collection continues until the Stop button is clicked. When the duration is complete, new points are added to the right side of the graph and old points are discarded from the left side of the chart. This operation provides the appearance of a Strip chart scrolling from right to left.

Position Stability Screen

Save – The Save button saves all of the results as a text or Microsoft Excel file. When the Save button is clicked, the Position Stability data folder is displayed as the default file location. The Save as Type combo box allows the user to select .xls or .txt as the file type saved. The .xls file extension loads directly into Microsoft Excel and can't be viewed directly with the LaserPAD PC application.

Position Stability File Contents – The Position Stability file contains header information and the data points collected. The header information includes a Time/Date stamp, Detector serial number, Number of points, Duration, Mode (Absolute or Relative) and Offset values. The Offset values represent the Offset in Relative mode. Offset values are displayed as 0.00E+00 in Absolute mode. Each individual data point is displayed as individual X and Y columns.

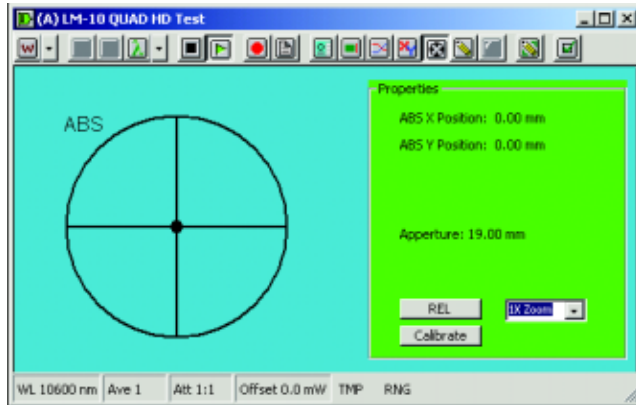


The screenshot shows a window titled "Data File Viewer" with a list of data for "Position Stability". The data includes a date and time stamp, a serial number, and offset values for X and Y. Below this is a table of position data in millimeters, with columns for Point, X Position, and Y Position. The X Position values are in scientific notation (e.g., 1.45E+00) and the Y Position values are in scientific notation (e.g., -4.99E-01).

| Point | X Position | Y Position |
|-------|------------|------------|
| 1 | 1.45E+00 | -4.99E-01 |
| 2 | 1.46E+00 | -5.22E-01 |
| 3 | 1.45E+00 | -5.37E-01 |
| 4 | 1.43E+00 | -5.36E-01 |
| 5 | 1.41E+00 | -5.32E-01 |
| 6 | 1.39E+00 | -5.29E-01 |
| 7 | 1.37E+00 | -5.27E-01 |
| 8 | 1.36E+00 | -5.37E-01 |

Alignment Screen

(Quadrant Thermal Detectors Only)



Graphical Pane

The Graphical pane contains the Alignment Target and the Mode setting.

Alignment Target – The Target style is fixed. The outer circle corresponds to the aperture value based on the Zoom level setting.

▣▣▣▣➤ *NOTE: Double click the Alignment target to toggle between Relative and Absolute alignment mode.*

Mode Label – ABS or REL label is displayed, based on the Mode setting.

Properties

The Properties panel contains Alignment screen settings and data.

Position Data – The Alignment screen position data represents the beam position based on the Relative or Absolute mode setting.

X and Y Offset Values – X and Y Offset values are displayed when Relative mode is active. When Absolute mode is active, no offset values are displayed in the Properties panel. Review the Absolute/Relative button for additional information.

Aperture – The Aperture value is based on the detector aperture divided by the Zoom setting. This value updates each time a new zoom setting is selected.

Alignment Screen

Absolute / Relative Button – The mode setting is displayed to the upper left of the Alignment Target. The button displays the mode not currently active. Absolute mode displays data relative to the center of the detector aperture. The relative function uses the value as an offset when the Relative button is clicked. The offset value is subtracted from the data and the result is displayed. When Relative mode is active, the offset values are displayed in the Properties panel.

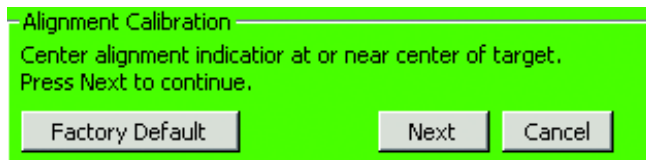
Zoom – The Zoom level is controlled by a combo box containing values from 1x – 32x in increments of 2. A Zoom value of 1 corresponds to the detector aperture. Other Zoom values displays the aperture as the detector aperture value divided by the Zoom level.

Calibrate – The Alignment Calibration increases the absolute accuracy of Position Stability and Alignment data. The process requires a Micrometer and a laser source with a beam diameter less than 3mm. The Alignment Calibration process provides a multiplier correction to the default factory alignment calibration settings.

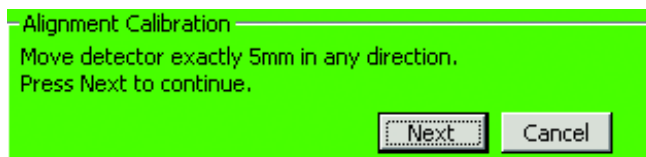
Alignment Calibration Procedure:

Step 1: Mount the detector on a micrometer stage to translate the beam horizontally across the detector surface. Center the laser source on the detector.

Step 2: Click the Alignment screen calibrate button in the Properties panel. A separate panel for Alignment calibration appears.

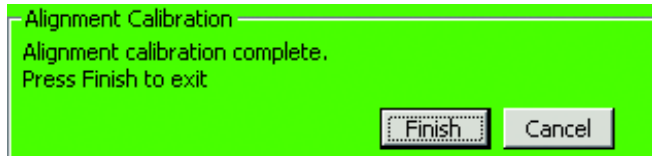


Step 3: Verify the beam centering and click Next in the Alignment Calibration panel.



Alignment Screen

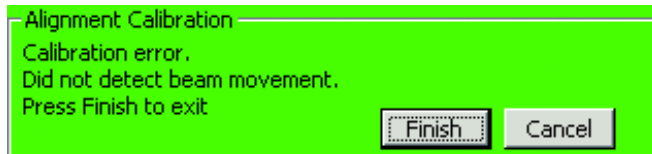
Step 4: Use the micrometer stage to translate the detector exactly 5mm. Click the Next button.



Step 5: The Finish button calculates a calibration multiplier and saves the value to the application detector file based on the detector serial number.

|||▶ *NOTE: Click the Cancel button at any time to abort the calibration without saving changes.*

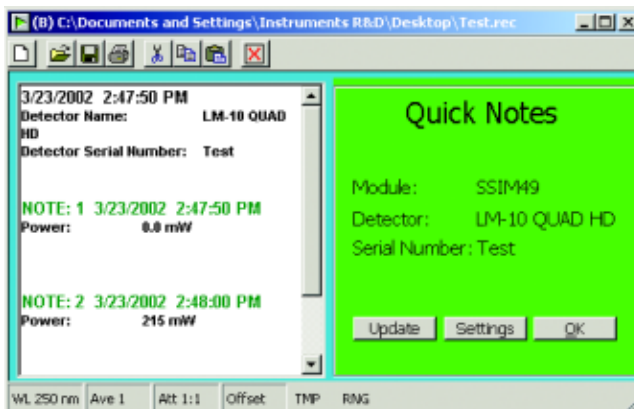
|||▶ *NOTE: If the calibration process does not detect movement during Step 4, the following dialog is displayed. No calibration values are saved in this condition.*





Quick Notes

General Description

The Quick Notes function takes a snapshot of the beam position and power. Each time the user selects Quick Notes, a new data set is collected. The items selected in the Quick Notes Settings dialog determine the data collected. The Quick Notes are displayed in a special window with controls to clear and save the compiled Quick Notes.



Update and Show Quick Notes  – The Update and Show Quick Notes button adds Quick Notes based on the settings and display the results in the Quick Notes window.

Add Quick Notes  – The Add Quick Notes button adds a Quick notes entry to Quick Notes based on the Quick Notes settings. When this button is clicked, the Quick Notes window is not displayed.


Quick Notes Screen – The Quick Notes screen displays the Quick Notes results and provides access to controls for data addition, settings and file operations.


Quick Notes


Quick Notes Tool Bar


The Quick Notes tool bar contains controls to start New, Open, Save, Print, Cut, Copy, Paste and Close Quick Notes.





New  – The New button clears Quick Notes. The User is prompted to save Quick Notes when the New button is clicked.


Open  – The Open button displays an Open dialog with the Quick Notes data folder contents. The Quick Notes file displays in two types of windows based on the .rtf or .txt file extension. The .rtf files are displayed as a multi-color rich text format in the custom Quick Notes window. The .txt Quick Notes files are displayed in a generic text window. When the Quick Notes window is open, additional Quick Notes can be added to an existing Quick Notes file, using the Quick Notes controls and settings. The Quick Notes settings are contained in the multi-tab settings dialog accessed from the Detector window.


Save  – The Save button saves the Quick Notes in the Quick Notes data folder. The default file extension is .rtf to display the Quick Notes in the custom window when the file is opened from the LaserPAD PC application. Select the .txt file extension to save the Quick Notes as generic text for analysis with external applications.

Print  – The Print button prints the contents in the Quick Notes window. A print dialog appears and allows the user to select printers and printing preferences.

Cut  – The Cut button copies the selected contents to the Clip Board and removes them from the Quick Notes window.

Copy  – The Copy button places the selected contents on the Clip Board without removing them from the Quick Notes window.

Paste  – The Paste button copies the contents from the Clip Board to the selected position in the Quick Notes window.

Close  – The Close button closes the Quick Notes window. The user is not prompted to save Quick Notes when closing the window. If Quick Notes are available, the user is prompted when the LaserPAD PC application closes or the detector window closes.

Quick Notes

Results Pane

The Quick Notes results pane contains header information and the Quick Notes results. The Results pane operates in the same fashion as a text editor. Quick Notes appear as text. The user can click on any portion of the Results pane to add, delete or edit displayed information.

Header Information – The Header information is applied with the first Quick Notes entry. The information contained in the header is selected from the Quick Notes tab in the Detector settings. Review the Quick Notes tab for additional information.

■■■■► *NOTE: The Header Information can be added with each Quick Notes entry if selected as data in the Quick Notes tab.*

Header Title – The Quick Notes header title allows the user to enter a custom description that is added as a header to the Quick Notes window.

Date – System date

Time – System time

Detector Name – EEPROM name for the detector.

Detector Serial Number – Self explanatory

Detector Description – The description entered in the Unit Tracking tab is added to Quick Notes when this item is selected.

Module Serial Number – Self explanatory

Module Description – The description entered in the Unit Tracking tab is added to Quick Notes when this item is selected.

Quick Notes Data – The Quick Notes Data is added to each Quick Notes entry. The data contents are selected from the Quick Noted tab in the Detector settings. Review the Quick Notes tab for additional information.

Header Information – When selected, header information is copied each time a Quick Note is added.

Date Stamp – System date

Quick Notes

Time Stamp – System time

Wavelength – Wavelength setting

Average – Average value

Attenuation – Attenuation setting

Power Reading - This selection adds the display power value when selected. Attenuation, offset and display averaging has an effect on this value.

Max Power Stat – Maximum value from the Home screen statistics.

Mean Power Stat – Mean value from the Home screen statistics.

Min Power Stat – Minimum value from the Home screen statistics.

Position Info – X and Y position values relative to the detector center in mm.

Delta Stat – Difference between the maximum and minimum Power stat

Sigma Stat – The Standard Deviation based on all of the points collected on the Home screen statistics.

The Standard Deviation is calculated using the following formula:

x = Each point collected

Avg(x) = The average of all points collected

n = The number of points collected

$$\sqrt{\frac{\sum [x - \text{Avg}(x)]^2}{n - 1}}$$

Quick Notes

Properties

The Properties Panel contains Module / Detector information and buttons to access Quick Notes controls.

Information – The Module serial number, Detector name and Detector serial number are displayed in the Properties panel.

Update Button – Each time the user clicks the Update button a new Quick Notes entry is added to the Results pane. The contents of the entry are based on the Quick Notes settings.

Settings Button – The Settings button provides access to the Quick Notes settings. Review information associated with the Quick Notes Detector settings dialog for additional information.

OK Button – The OK button returns to the screen previously displayed before Quick Notes were selected. The OK button does not have an effect on data previously collected.

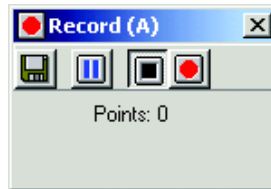
Record


General Description

A Record file stores Wavelength, Power and Position data points at a rate of 10Hz. When the user opens a Record file, the data can be replayed on each screen. The Record Playback provides controls to Start, Stop and control the speed of data replay. The Recorded data is stored in an application specific format. Unlike the Log data, the data collection parameters are not selectable. The data is collected at a rate of 10 Hz and the Record window Play and Stop controls are the only means to Start and Stop data collection.


Record Window


When the Record button is clicked, the Record window is displayed. The Record window contains data collection controls and a display for the number of points stored. The window first appears with zero points displayed and the Stop button in a down state. Click the Record button to start data collection. The number of points stored increment when data collection is in progress.



Save  – The Save button in the Record window saves collected Record data. When the Save button is clicked, a Save As dialog appears with the Record folder displayed as a default file location.

NOTE: *The Record files must use a .rec file extension for proper operation.*

Pause  – The Pause button interrupts the data collection process. When the Pause button is selected, it appears in a down state. Resume data collection by clicking the Record button.

Stop  – The Stop button terminates data collection. When the Stop button is selected, it appears in a down state. When the Record button is selected again, data is cleared and new data is collected.

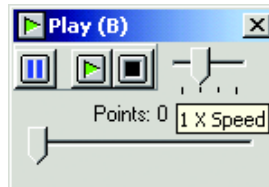
Record

Record – The Record button starts or resumes data collection. When data collection is paused, the Record button resumes data collection. When the Stop button is selected, new data is collected when the Record button is clicked. When the Stop button is clicked, the user is prompted to save the data before it is cleared.


Points – The Points display indicates the number of points collected. When the user exits the Record window, they are prompted to save collected data points.


Playback Window


The Playback window controls the display of previously recorded data. The Title bar in the Playback window indicates the detector display window.




Playback Controls – The Record playback window contains controls to select, start, stop, pause and control the speed of the data playback.

Pause  – The Pause button interrupts the data playback process. When the Pause button is selected, it appears in a down state. Click the Pause button again to resume data collection.

Play  – The Play button starts the data playback process. When the replay is in progress, the Play button appears in a down state. The Play button does not resume the data playback process when paused.

Stop  – The Stop button resets the data playback process. When the Stop button is selected, the points display indicates 0 and the slider returns to the left. The Play button starts the replay process from the beginning.

Playback Speed Control  – The Record File playback speed is controlled by a slider. This control allows the user to select a range of Playback speed from 0.5x (5Hz replay rate), up

Record

to a 4x speed (40Hz replay rate). Hold down the left mouse button and drag the indicator to the desired playback speed. A tool tip appears indicating the speed selection when the user holds the mouse over the slider. When the user clicks on the speed selection, an outline appears indicating that this selection is in focus. When the speed selection is in focus, the left and right keyboard arrows can move the speed selection. The playback speed defaults to a replay speed of 1x (10Hz).

Points – The Playback window displays the number of data points. This value is updated when the Playback is in progress or the Data slider is moved to a new position. The Playback data was collected at a fixed rate of 10 Hz.

▶ *TIP: The display point value can provide a relative indicator of time based on the point value. Record data is collected at a rate of 10Hz. 10 points correspond to 1 second of record time.*

Playback Selection Bar



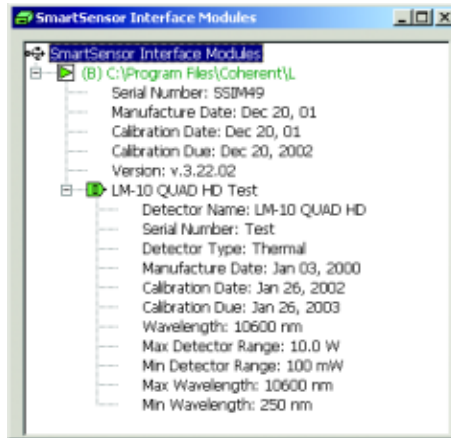
–The Playback Selection bar controls the data point display. The slider arrows increment the point value in single steps. Hold the left mouse button down and drag the slider. When the slider is in focus it is outlined. The left and right keyboard arrows increment the slider in single steps, when it is in focus. The Up and Down keyboard arrows increment the slider in steps of 10. Hold-down functions are available for the arrows and the mouse button. The Stop button resets the slider to point #1.

Playback Screens – A Record file can be replayed on any detector screen (Home, Tune, Trend, Position Stability, Alignment, Log, Quick Notes and Custom Display). When a detector screen is active, the display represents the Record file point selected. The Play button updates the screen at the selected speed.

Settings – The following settings are not available when a record file is active: Wavelength, Quick Wavelength, Unit Tracking and the Record function.

Record

Hardware Properties – The Hardware Properties screen displays Hardware Properties associated with the Record file. When a Record file is open, the Play icon designates the Hardware Properties associated with a Record file. The module and detector information associated with the Record file can be displayed when expanded. The Hardware information provides the same contents as a live detector and provides a status snapshot at the time of data collection.



Home Screen (Record Playback) – The Home screen display provides the same appearance as a live detector. The screen updates at a rate of 3Hz to make the scrolling values readable to the user. When the keyboard arrows single step the display, values previously collected at the 10Hz rate increments at a user specified interval. The 3Hz update is active only in continuous playback mode.

Tune (Record Playback) – The Tune screen is fully functional and is not limited when a Record file is active.

Trend (Record Playback) – The Trend screen operates under the following conditions when a Record file is active:

The Trend screen collects data from the same Record file multiple times if the selected Trend duration is greater than the Record file duration. When the Record file completes the Playback cycle, the Trend pauses. When you run the Playback cycle again, the Trend continues to plot data from the same Record file.

Record

The Playback window scroll bar adds data to Trend run. The scroll bar adds data when dragged in either direction at any speed. When the Scroll bar is dragged in the reverse direction data continues to be added in the forward direction.

Position Stability (Record Playback) – The Position Stability screen operates under the following conditions when a Record file is active:

The Position Stability screen collects data from the same Record file multiple times if the selected data collection duration is greater than the Record file duration. When the Record file completes the Playback cycle, the data collection pauses. When you run the Playback cycle again, data collection continues to plot data from the same Record file.

The Playback window scroll bar can add data to the Position Stability run. The scroll bar adds data when dragged in either direction at any speed. When the Scroll bar is dragged in the reverse direction data continues to be added in the forward direction.

Alignment (Record Playback) – The Calibrate function is not available with a Record file. Remaining Alignment screen functions are available without limitation.

Large Display (Record Playback) – The Large Display provides the same appearance as a live detector. The screen updates at a rate of 3Hz to make the scrolling values readable to the user. When the keyboard arrows single step the display, each point collected at the 10Hz rate is displayed. The 3Hz update is active only in continuous playback mode.

Quick Notes (Record Playback) - The Quick Notes screen is fully functional and is not limited when a Record file is active. The only limitation is when multiple Quick Notes are collected from the same point in the Record file. The Quick Notes function utilizes the system time to provide the Time and Date stamp. Multiple entries using the same Record file point displays with different time information and the same value.

Record

Log (Record Playback) – The Data Log process collects data from the same Record file multiple times if the selected data collection duration is greater than the Record file duration. When the Record file completes the Playback cycle, the data collection pauses. When you run the Playback cycle again, data collection continues from the same Record File.

The Playback window scroll bar adds data to the Log file. The scroll bar adds data when dragged in either direction at any speed. When the scroll bar is dragged in the reverse direction data continues to be added in the forward direction.

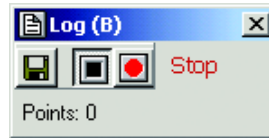
Data Log

General Description


The Data Log collects user specified Power and Position data at selectable intervals and durations.

Data Log Window

The Data Log window contains the data collection controls to generate a log file based on the Log file settings.



Title Bar – The Data Log window title bar indicates the corresponding detector for Data Log collection.

Close  – The Close button closes the Data Log window. When data is present, the user is prompted to save when the Close button is clicked.

Save – The Save button in the Log window displays a Save As dialog. The Log files folder is displayed as the default file location. .txt or .xls file extensions are available.

Stop – The Stop button stops the data collection process. The data log process does not provide the capability to stop and resume data collection.

Data Collection Status – Text is provided to indicate the status of data collection.


Stop – A stop condition is indicated when the window opens and when data collection is stopped. The Stop text indicates that data collection is halted.

Log – When data collection is in progress, Log replaces the Stop indicator.

Points – The Points value indicates the number of data points collected in the log file.

Data Log

Data Log Settings

The Data Log settings control the method of data collection and the data parameters collected. The Data Log settings are located in the Detector settings window. Click the Detector setting button  and select the Data Log tab to access the following items.

Points – The Points section provides radio button selection identifying the type of data logging.

Log Every Point – Collects every point at a typical rate of 10 Hz.

Point Interval – Sets the interval between the collection of data points. Select the radio button and enter a value for a data collection interval. A setting of 10 collects every 10th point.

Time Interval – User specified time between data point collection. Select the radio button and enter a value for a data collection interval. The value field also contains the units entered by the user. The available units are (D) Days, (H) Hours, (M) Minutes and (S) seconds. Enter the single letter following the value to attach the appropriate units.

||||➤ *NOTE: Values entered without units will be returned in minutes.*

Duration – The Duration section provides radio button selection to identify the data logging duration.

Log points until stopped – Allows for user control of the data logging process. The controls in the Data Log window start and stop data collection. The data logging process continues for the duration of the LaserPAD PC session or when the Stop button is selected.

Log to Point – Logs only a user specified number of points. The Log window can stop data collection before conclusion. The number of points selected in this window is logged regardless if a portion is ignored resulting from the Do not log points that fail live Stats is selected. In this condition, the number of points ignored during the log session is reported in the Log file.

Log to Time – User specified time duration for the Log run. The Log window can stop data collection prior to conclusion.

Data Log

Log Data – The Log Data section specifies the type of data to log. The default is Display power. The following information is available to be added in addition to the default.

Display Power – This selection adds the display power value when selected. Attenuation and display averaging has an effect on this value.

Position Data – Uses X and Y Position data relative to the detector center. This function is not available with Semiconductor detectors.

Log Power at Full Resolution – Returns data with four digits plus the exponent (Reference Only). Provides resolution greater than the display. Use this function for power drift analysis.

||||➤ *NOTE: The absolute accuracy is a function of the published specifications for the Detector and the SSIM and additional accuracy is not to be implied with the extra digit.*

Do not log points that fail live stats – This selection ignores points that fail the live stats. The Log file collects all of the data specified by the data collection parameters. The number of points not collected is reported in the Log file when this function is selected.

||||➤ *NOTE: Review the section on Live Stats Pass/Fail for a list of available parameters and additional information.*

Data Log

Data Log File

The Data Log file contains header information and data based on the user selected settings.

Header Information – The Data Log header contains the following information:

Date – The date that the Log file was saved

Time – The Time that the Log file was saved

▣▣▣▣➤ **NOTE:** *The Date and Time stamp does not correspond to the time of data collection.*

Detector – The Detector name.

Serial Number – The Detector serial number

Wavelength – The Wavelength setting at the time of data collection

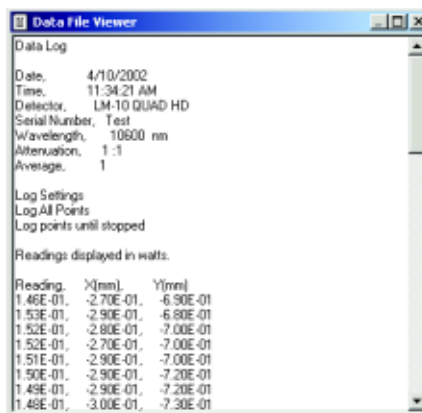
Attenuation – The Attenuation setting at the time of data collection

Average – The Average setting at the time of data collection

Log Setting – List of the Data Collection parameters from the Log settings tab.

Power Displayed in Watts – This string represents the display units selected at the time of data collection.

Data – The data is contained in separate columns for Power, X Position and Y Position. All values are displayed in exponent form without units attached for easy spreadsheet analysis.



Specifications

Ranges: Microprocessor controlled. Ranges determined by EEPROM in SmartSensor heads.

Communication: USB and RS-232 Communication between Host Computer and SmartSensor Interface Module.

Note: *USB Protocol supports up to 127 USB devices. Coherent has tested communication with 15 modules simultaneously. Communication with greater than 15 modules can be verified per customer requirements.*

Data Stream: The SSIM streams data at a rate of 10Hz.

CW Thermal Detector: Provides CW Power and Beam Position Data. See Appendix A for accuracy specifications and input beam limitations.

Semiconductor Sensor: Provides CW Power Data. See Appendix A for accuracy specifications and input beam limitations.

Memory: The SSIM has the capability to buffer multiple commands to process in a serial order.

Note: Data streaming occurs at a rate of 10 Hz, commands may be processed at a slower rate, based on the host system and the protocol required to process the commands.

Operating Temperature: 5° C to 40° C

Safety Features: Sensor over-temperature, alignment and over-range events.

Size: 5.25 long x 5 wide x 1.26 thick (13.3 cm x 12.7 cm x 3.2 cm).

Weight: 0.88 lbs. (0.400 Kg), with batteries.

DC Input Requirements: 5V Center Positive Jack Input. Wall Plug and Rechargeable Battery included.

AC wall plug input requirements: 100-240V, -0.2 A, 50-60 Hz

6V Internal rechargeable battery pack: Recharged automatically during AC operation. Battery life: 12 hours typical. Complete recharge cycle is 14 hours.

Appendix A: Supported Coherent SmartSensors™

NOTE: Call Coherent for an updated list of detectors if the desired detector is not shown.

Thermal SmartSensors

| Catalog Number | Name | Power | | | Aperture (mm) | Notes | Spectral Range (μm) | Accuracy (± %) | Sensor Coating (note m) |
|----------------|------|---------|------------------|----------------|---------------|-------|---------------------|----------------|-------------------------|
| | | Max (W) | Min (W) (note f) | Resolution (W) | | | | | |

Standard Thermal Sensors: 6000 W/cm² maximum CW power density

| | | | | | | | | | |
|---------|---------------|-----|----------|-------|----|------|-----------|---|-----|
| 33-7832 | LM-200XL HTD | 200 | 1.0 | 0.1 | 55 | c | 0.25-10.6 | 4 | HTD |
| 33-7857 | LM-200 HTD | 200 | 0.2, 0.1 | 0.01 | 19 | k | 0.25-10.6 | 5 | HTD |
| 33-7840 | LM-200 HTD | 200 | 0.2, 0.1 | 0.01 | 19 | f | 0.25-10.6 | 5 | HTD |
| 33-7865 | LM-200B HTD | 200 | 0.2, 0.1 | 0.01 | 19 | c, w | 0.25-10.6 | 5 | HTD |
| 33-7873 | LM-150 FS HTD | 150 | 0.1 | 0.01 | 19 | r | 0.25-10.6 | 5 | HTD |
| 33-7881 | LM-100XL HTD | 100 | 1.0 | 0.1 | 40 | | 0.25-10.6 | 4 | HTD |
| 33-7899 | LM-100 HTD | 100 | 0.1 | 0.01 | 19 | | 0.25-10.6 | 2 | HTD |
| 33-0472 | LM-100B HTD | 100 | 0.1 | 0.01 | 38 | c, w | 0.25-10.6 | 4 | HTD |
| 33-7915 | LM-45 HTD | 45 | 0.1 | 0.01 | 19 | | 0.25-10.6 | 2 | HTD |
| 33-7923 | LM-10 HTD | 10 | 0.01 | 0.001 | 16 | | 0.25-10.6 | 2 | HTD |
| 33-7931 | LM-3 HTD | 3 | 0.01 | 0.001 | 19 | | 0.25-10.6 | 2 | HTD |

High Power Thermal Sensors: 2500 W/cm² maximum CW power density

| | | | | | | | | | |
|---------|---------|------|--------|----------|----|-----|-----------|---|---|
| 33-1132 | LM-5000 | 5000 | 300 | 1.0 | 55 | a,e | 0.25-10.6 | 5 | H |
| 33-1124 | LM-2500 | 2500 | 150 | 1.0 | 55 | a,e | 0.25-10.6 | 5 | H |
| 33-1116 | LM-1000 | 1000 | 2.0,10 | 0.1, 1.0 | 38 | b | 0.25-10.6 | 5 | H |

Volume Absorbers for High Peak Power: 1 GW/cm² at 10 ns maximum peak power

| | | | | | | | | | |
|---------|--------|----|----------|------|----|---|----------|-----|---|
| 33-0917 | LM-80V | 80 | 0.5, 0.1 | 0.01 | 38 | h | 0.19-6.0 | 4 | V |
| 33-0993 | LM-30V | 30 | 0.1 | 0.01 | 19 | h | 0.19-6.0 | 3.5 | V |

Excimer Special Coated Sensors: 2000 W/cm² maximum power density

| | | | | | | | | | |
|---------|-----------|-----|----------|------|----|------|-----------|---|----|
| 33-1108 | LM-200XLE | 200 | 1.0 | 0.1 | 55 | c | 0.19-0.35 | 4 | UV |
| 33-1033 | LM-100E | 100 | 0.5, 0.1 | 0.01 | 40 | | 0.19-0.35 | 5 | UV |
| 33-4508 | LM-100EB | 100 | 0.5, 0.1 | 0.01 | 38 | c, w | 0.19-0.35 | 5 | UV |

High Sensitivity Thermal Sensors: 400 W/cm² maximum power density

| | | | | | | | | | |
|---------|---------|-----|-------|--------|---|--|----------|---|---|
| 33-0928 | LM-1 | 1.0 | 0.001 | 0.0001 | 9 | | 0.25-2.5 | 5 | P |
| 33-7956 | LM-1 IR | 1.0 | 0.001 | 0.0001 | 9 | | 1.0-10.6 | 5 | P |

Special Purpose Sensors: 2500 W/cm² maximum CW power density

| | | | | | | | | | |
|---------|-------------|------|-----|------|----|-------|-----------|---|-----|
| 33-1215 | Beam Finder | 1000 | 2.0 | 0.1 | 35 | b,d,e | 0.3-10.6 | 5 | H |
| 33-7907 | LM-20 HTD | 20 | 0.1 | 0.01 | 19 | p | 0.25-10.6 | 2 | HTD |

All SmartSensors are supplied with a 1.8 m (6 ft) cable (unless otherwise noted), stand and NIST traceable Calibration Certificate.

- (a) 7.5 liter/min cooling water required. Maximum temperature deviation 3%/min. Maximum flow deviation 2%/min.
- (b) 4 liter/min cooling water required. Maximum temperature deviation 3%/min. Maximum flow deviation 2%/min.
- (c) 1 liter/min cooling water required. Maximum temperature deviation 3%/min. Maximum flow deviation 2%/min.
- (d) Designed for system integration for measurement of power and position, for use on the Ultima only (supplied with 6 m (20 ft) cable and cooling hoses).
- (e) Supplied with 6 m (20 ft) cable.
- (f) Damage limit: Pulse 1 GW/cm², measured at 1.06 μm, (10 ns pulse). Varies with wavelength, derate by 50% 0.26-0.35 μm, by 90% below 0.26 μm. Maximum Average Power Density 30 W/cm².
- (k) Must be used with 110 VAC power for internal fan cooling for powers above 50 Watts.
- (m) See coating specifications and maximum power density limits on page 22 of the Power & Energy Meters Catalog.
- (p) Designed for system integration, must be mounted to a heat sink.
- (r) Intermittent duty (2 min @ 150 W; 5 min @ 100 W; 20 min @ 40 W). See page 24 of the Power & Energy Meters Catalog for further details.
- (t) Must be used with 220 VAC power for internal fan cooling for powers above 50 Watts.
- (w) These sensors require water cooling to operate at the maximum specified power ratings. They can also be operated using convection and conduction cooling methods. See details on cooling methods and associated power ratings in the OEM sensor section, pages 28-31 of the Power & Energy Meters Catalog.

Appendix A: Supported Coherent SmartSensors™

Semiconductor SmartSensors

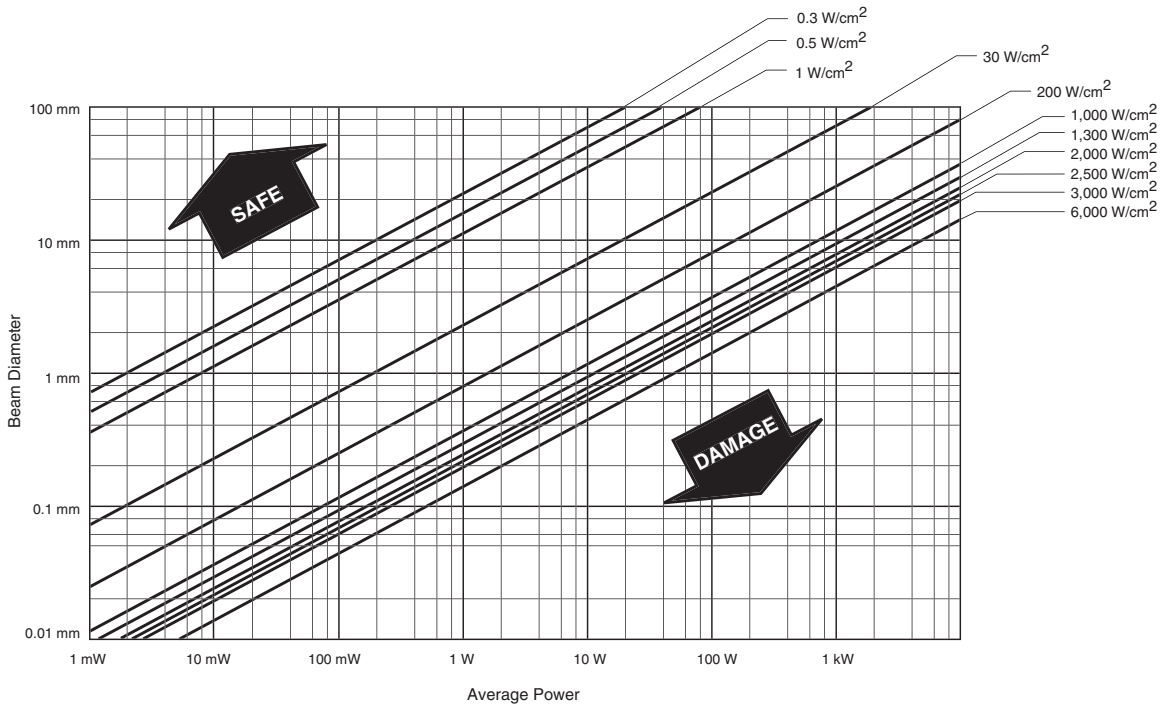
| Catalog Number | Name | Power | | | Aperture (mm) | Spectral Range (μm) | Accuracy (±%) | Maximum Power Density (W/cm²) | Max Power with Attenuator (W) |
|----------------|----------|----------|----------|-----------------|---------------|---------------------|---------------|-------------------------------|-------------------------------|
| | | Max (mW) | Min (μW) | Resolution (nW) | | | | | |
| 33-0951 | LM-2 UV | 30 | 0.01 | 1.00 | 6.0 | 0.25-0.4 | 8 | 0.3 | NA |
| 33-0936 | LM-2 VIS | 50 | 0.01 | 1.00 | 7.9 | 0.4-1.064 | 5 | 1.0 | 5.0 |
| 33-0944 | LM-2 IR | 10 | 0.5 z | 1.00 | 5.0 | 0.8-1.55 | 4.5 | 0.5 | 5.0 |

All SmartSensors are supplied with a 1.8 m (6 ft) cable, stand and NIST traceable Calibration Certificate.

(z) 1 μW for FieldMaster.

ISO 9002 Certified

Appendix B: Safe Detector Operating Region



Variation of beam diameter and power for average power densities of thermal and semiconductor sensors. Safe operating limit above damage threshold lines.

Appendix C: SmartSensor™ Interface Module Circuit and Operation Description

Each power (detector) head contains a temperature sensor, electrically erasable programmable read only memory (EEPROM) and either a photodiode or thermopile detector. At power On, the firmware interrogates the EEPROM to determine which type of detector is present.

Amplifier gains and analog switches (mux) are adjusted to match the information received from the EEPROM. The 16-bit analog-to-digital converter (A/D) switches between channels 1 and 2 to measure either sensor output or temperature. This data is then sent through the Interface to the Microprocessor.

The program in the Microprocessor controls the mux, amplifier gains, and A/D converter channels. The memory and serial communication are selectively reached by the Microprocessor through the Decoder. The Decoder interprets the Microprocessor address lines to determine which device the Microprocessor wants to talk to.

The thermoelectric detector heads have four outputs that determine beam position and laser power. The Microprocessor scans the mux through the four outputs and the temperature signal to arrive at a power reading (with the Gain Amplifier set to provide maximum signal strength). The A/D then converts the outputs for the Microprocessor.

Semiconductor detector heads have one output. They use a current-to-voltage converter to precondition the output before it reaches the Gain Amplifier. The A/D then converts the output for the Microprocessor.

The Microprocessor reads the A/D output and computes the power based on the data loaded from the SmartSensor EEPROM. The quadrant output from a Thermal SmartSensor provides position information to the Microprocessor. The Microprocessor organizes the power and position information for RS-232 serial transmission. The LaserPAD PC Software receives the power and position data stream at a rate of 10 Hz.

Appendix D: Troubleshooting Tips

| PROBLEM | PROBABLE CAUSE | SOLUTION |
|---|--|---|
| Software does not detect SmartSensor Interface Module. | Dead Battery in SmartSensor Interface Module. | Connect 5V wall plug to the SmartSensor Interface Module for a 14 hour complete charging cycle. |
| | Serial Cable or USB is not properly connected to SmartSensor Interface Module. | Verify proper serial cable connection between the host computer and the SmartSensor Interface Module. |
| Software does not detect the SmartSensor. | Smart Detector is not connected properly to the SmartSensor Interface Module. | Secure the DB 25 head connector at the SmartSensor Interface Module. |
| | Smart Detector EEPROM is faulty. | Contact Coherent for Service. |
| | SmartSensor Interface Module is faulty. | Contact Coherent for Service. |
| Previous Settings are not restored. | The Global settings are set to not Save or Load previous settings. | Select the Detector settings button in the Detector window. Click the Global Settings Tab and check all boxes to Save and Load Module/Detector information. |
| Unexpected Reading | Attenuation Value is not correct. | Verify that the Attenuation value is set to 1 for direct power measurement. |
| Batteries do not hold a charge. | Rechargeable battery pack is faulty. | Contact Coherent for Replacement Battery Pack. |
| Semiconductor Sensor Power Readings are not correct. | The Wavelength settings do not match the laser source. | Verify the Wavelength value matches the Laser Source. |
| Semiconductor Sensor Power Readings do not increase as the laser power increases. | The Semiconductor Sensor is saturated. | Verify that the laser input is within the proper range specified in Appendix B of this manual. |
| Slow response to change in power. | Large Average Value is selected. | Verify that the Average value is set to 1. |

Warranty

The seller warrants to the original Buyer each item manufactured by it to be free from defects in material and workmanship for a period of time and under such conditions as specified in the Seller's warranty for the individual product, or for twelve (12) months from delivery if a warranty for the individual product is not specified. Major sub-systems manufactured by other firms but integrated into the Seller's systems are covered by the original Manufacturer's warranty. The Seller's liability under valid warranty claims is limited to repair or replacement at the Seller's plant or the Buyer's location, all at the option of the Seller.

THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, WHETHER WRITTEN, ORAL OR IMPLIED AND SHALL BE THE BUYER'S SOLE REMEDY AND THE SELLER'S SOLE LIABILITY ON CONTRACT OR WARRANTY OR OTHERWISE FOR THE PRODUCT. THE SELLER DISCLAIMS ANY IMPLIED WARRANTY OR MERCHANTABILITY OR FITNESS FOR PURPOSE.

All claims under warranty must be made promptly after occurrence of circumstances giving rise thereto, must be received within the applicable warranty period by the Seller, and shall be subject to the terms and conditions stated herein. Such claims should include the product serial number, the date of shipment, and a full description of the circumstances giving rise to the claim. Before any products are returned for repair and/or adjustment, authorization for the return and instructions as to how and where these Products should be shipped must be obtained from the Seller. Any product returned to the Seller for examination and/or warranty repair shall be sent prepaid via the means of transportation indicated as acceptable by the Seller. The Seller reserves the right to reject any warranty claim on any item that has been shipped by non-acceptable means of transportation. When any product is returned for examination and inspection, or for any other reason, the Buyer and its shipping agency shall be responsible for all damage resulting from improper packing or handling, and for loss in transit, notwithstanding any defect of non-conformity in the Product. In all cases, the Seller has sole responsibility for determining the cause and nature of failure, and the Seller's determination with regard thereto shall be final.

If it is found the Seller's Product has been returned without cause and is still serviceable, the Buyer is notified and the Product returned at the Buyer's expense. A charge for testing and examination may, in the Seller's sole discretion, be made on products so returned.

Sales and Service Information

Thirty years of innovation

Coherent has been the world leader in the manufacture of lasers, and the instruments to measure them, for over thirty years. Coherent Auburn Division offers complete solutions for laser characterization, process control, and system design.

You may contact your local representative or Coherent Auburn Division for further information regarding these items. Call and ask for one of our customer care specialists. Purchase orders may be placed by phone, fax or mail. Online orders can be placed at www.CoherentInc.com

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