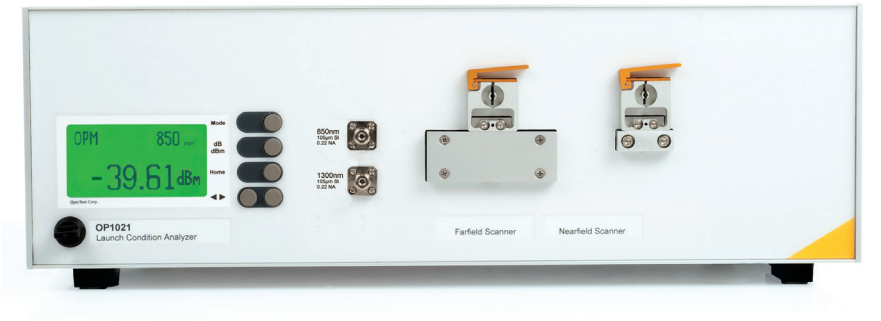
OptoTest

Your Partner in Fiber Optic Test Solutions



OP1021

Launch Condition Analyzer

Instruction Manual

(Includes OPL-LCA Application Software Instructions)

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MnOP1021-RevE

OP1021
online resources

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Overview

The **OP1021 Launch Condition Analyzer** is a convenient and compact benchtop near field and far field scanner for optical fibers. Coupled with windows application OPL-LCA, the user can scan and easily plot both the near field and far field patterns of any compatible fiber. In addition to comparing the near field and far field patterns to standard launch templates, the Encircled Flux is calculated and compared to various IEC templates.

The optical interface of the instrument accepts all standard 2.5mm ferrules. Other connector sizes available upon request.

The OP1021 can be equipped with two internal LEDs with 850nm and 1300nm wavelengths. The internal 105/125µm, 0.22NA fiber allows for overfill testing in most applications.

Initial Preparation

Unpacking and Inspection

The unit was carefully inspected, mechanically, electrically and optically before shipment. When received, the shipping carton should contain the items listed in Standard Contents. Account for and inspect each item. In the event of a damaged instrument, write or call OptoTest Corp, California.

Please retain the shipping container in case re-shipment is required for any reason.

Damaged In Shipment

All instruments are shipped F.O.B. Camarillo when ordered from OptoTest.
If you receive a damaged instrument you should:

1. Report the damage to your shipper immediately.
2. Inform OptoTest Corporation.
3. Save all shipping cartons.

Failure to follow this procedure may affect your claim for compensation.

Standard Contents

1. Model OP1021 Launch Condition Analyzer
2. Power Cord (U.S. Shipments only)
3. USB A-B cable
4. Certificate of Calibration and if requested the Metrology Report
5. Instruction Manual(s)
6. CD with applicable software and documentation (if ordered)
7. Detector Adapters (if applicable)

Definition of Specifications

Dynamic Range

The dynamic range, or measurement range, of the optical power meter spans from the maximal power level the instrument can measure, without major saturation to the detector, to the minimal power level where the thermal noise of the detector becomes greater than the current produced by the incident light. For accurate power measurements, it is NOT recommended to measure power levels at either end of the dynamic range. (see Linearity). The dynamic range is measured by comparing the absolute measured power against a reference power. When the difference between the two exceeds 1dB either end of the dynamic range has been reached.

Linearity

Photodetectors are, by nature, very linear over a wide range of optical input powers, but the power meter electronics can affect the overall system linearity. The power meter linearity is characterized and specified to know the measurement accuracy and linearity over the full dynamic range. For accurate insertion loss measurements only power levels that fall within the range with the best linearity (+/-0.05dB or better) should be measured.

Calibration Wavelength

The calibration wavelengths are the nominal wavelengths of the instruments calibration points. The exact wavelength of each particular calibration is stated in the certificate of calibration.

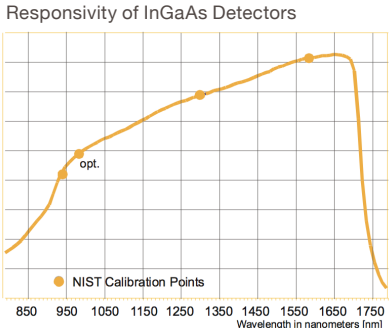
Calibration Traceability

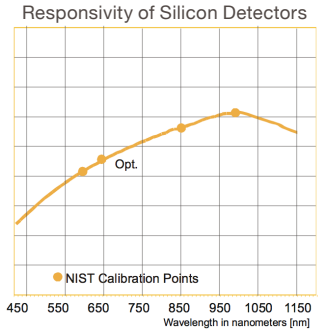
The detector's absolute calibration data is directly traceable to N.I.S.T. at the specified calibration wavelength and the specified power level, typically -10dBm.

Definition of Specifications

Spectral Responsivity

Depending on the detector type, InGaAs (Indium Gallium Arsenide) or Silicon, the spectral responsivity is the efficiency of the detector to convert optical power into electrical current and it varies with wavelength.





Note that other detector types are available such as IN5 (5mm InGaAs) IN10 (10mm InGaAs) as well as WSR (wide spectral range) and might exhibit a different spectral responsivity.

Absolute Accuracy

The absolute accuracy specification includes the total measurement uncertainties involved in the calibration process including the transfer of the absolute power standard from N.I.S.T. Contact OptoTest for the detailed chain of uncertainties.

Optical Power Meter, Channel Performance

For multichannel instruments, the power meter circuit converts and digitizes the optical power level with the given sampling interval. Changes in light levels such as modulation will be averaged within that sampling interval.

Instrument, Warm up Time

Optical power meters, in general, do not need any warm-up time unless the instrument has to acclimate to a changing environment. In order to calibrate the instrument or to perform stable measurements, the instrument should be acclimated for 15 minutes for each 5ºC of temperature differential. For example if the instrument was stored at 18ºC and brought into an environment of 28ºC the instrument should be allowed to warm up for 30 minutes.

Definition of Specifications

Recommended Recalibration Period

This is the recommended time period for re-calibration in order to maintain accuracy specifications. The recommendation is made based upon statistics on detector aging; however it is up to the metrology policies and procedures within each company to define the calibration cycles on optical power meters.

Optical Power Meter, Fiber Compatibility

The amount of aerial coverage of the detector, or the portion of the light emitted from the fiber being measured, depends on the mechanical features of the optical interface, the active area of the detector and the numerical aperture (NA) of the fiber. A fiber with a large NA, for example 100/140 multimode fiber, might not under fill a small area detector hence the absolute power reading will be less than actual.

Return Loss Range

The lower end of the return loss (low return loss = high reflection) defines the level where the instrument is saturated by large reflections. The higher end of the return loss (high return loss = very weak reflections) is given by capability of the instrument to amplify and resolve reflection out of the noise floor.

Return Loss Accuracy

The Return Loss Accuracy is measured using an optical variable attenuator connected to a >98% reflector. The insertion loss of the attenuator is initially quantified against a reference optical power meter. The actual attenuation is then used to calculate the generated reflection, where the resulting reflection = 2x (variable attenuation + insertion loss of attenuator) + reflector coefficient. Accuracy of return loss measurements can also be affected by the reference cable and any excessive losses at the front panel interface.

Definition of Specifications

Reference Cable

The reference cable is the cable with which the DUTs will be measured against. Typically reference cables are required to be of a defined quality with a specified connector/ endface polish.

Instrument, Environmental

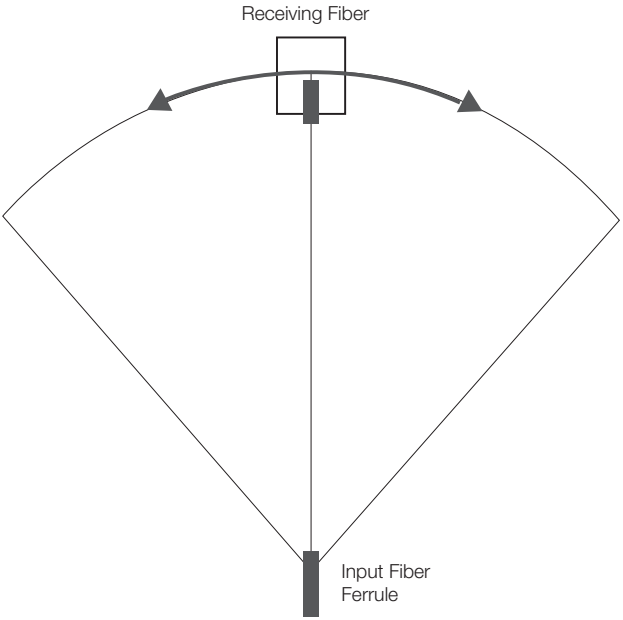
Operating Temperature: This is the temperature range in which the instrument will conform to the specifications after the specified warm up time.

Storage Temperature: This is the temperature range at which the instrument can be stored with the power off without any damage or any loss of specification to the instrument. It is required that the instrument be brought back to within the operating temperature range before it is turned on.

Humidity: The relative non-condensing humidity levels allowed in the operating temperature range.

Principle of Operation

Far Field Scan



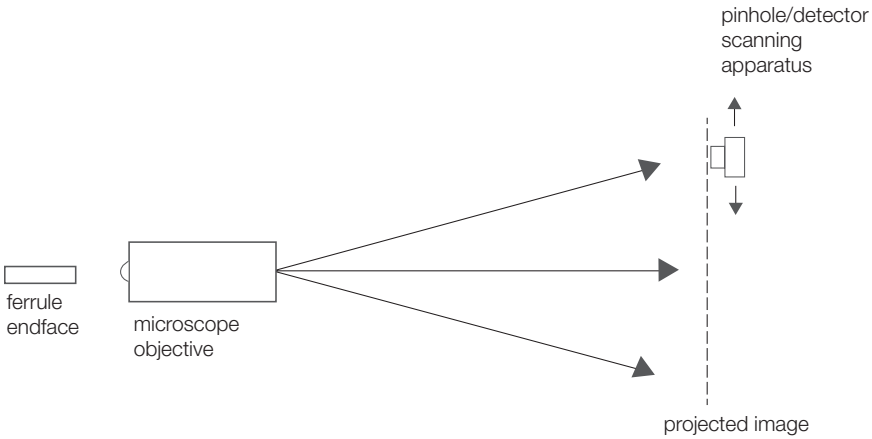
The far field scanner consists of a fiber-coupled detector on a radial actuator to accept the light launched by the input fiber

The OP1021 conforms to the standards specified in TIA-455-177-B Technique 1 for measuring numerical aperture from the far field plot. The far field scan in the OP1021 is performed by moving a 100µm core fiber along the semicircular arc formed by rotating the normal ray to the input fiber endface in a radial motion. The receiver is a 100/250µm fiber that is placed approximately 5cm from the endface of the input fiber and can be rotated from -0.5 radians to +0.5 radians about the radial center.

The far field launch measurement does illustrate the far field launch profile of a fiber. With the far field scan the numerical aperture of the fiber can be measured, given there is an overfilled launch condition.

Principle of Operation

Near Field Scan



The near field scanner consists of a microscope objective and an open-air detector on a series of linear actuators to record the power distribution from the input fiber

The Near Field (NF) describes the optical power density on the surface of a radiating source or the end of a fiber.

The OP1021 complies with IEC 61280-1-4 specifications for a pinhole scanning mechanism to gather the near field distribution. Using a microscope objective, the fiber endface is imaged onto a plane. A pinhole, 100µm in diameter, is situated in front of a detector on this plane and is mechanically scanned across the projected image to gather the near field distribution data.

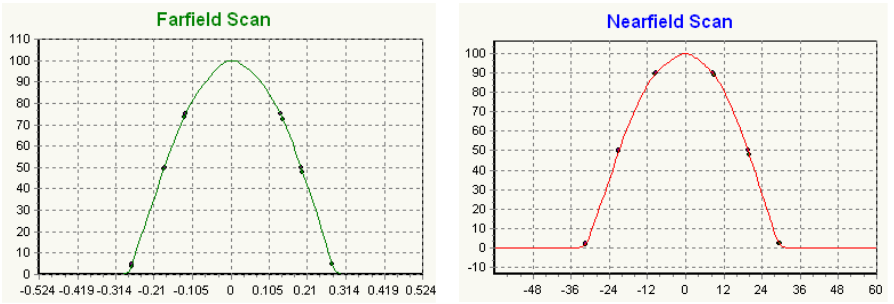
The OP1021 has 3 software controlled positioners to allow for movement in all 3 spatial dimensions. One allows for bringing the image into focus **(z-axis)**, while two allow the system to scan the projected plane **(x, y-axis)** for centering purposes. With a ±250µm effective scan range and a 0.3µm resolution, this near field scanner is capable of analyzing the majority of fiber endfaces and launches.

Launch Conditions

There are three different launch conditions: overfilled, fully filled, and underfilled. Launch conditions are usually only critical when launching into a multimode fiber and they give an idea as to how many modes are propagating within a fiber core.

Overfilled Launch

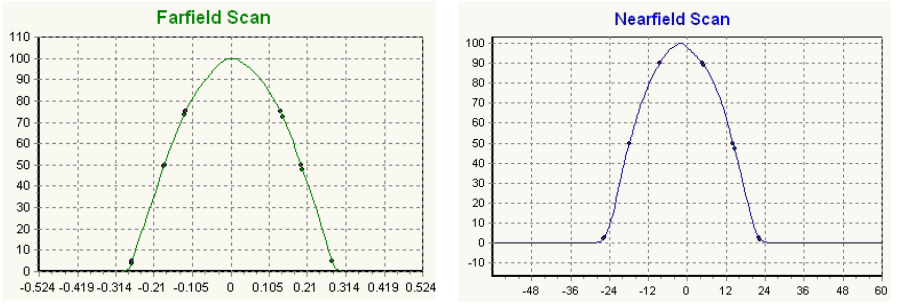
An overfilled launch is one in which the entire core and some of the cladding have light propagating in them. All possible modes within the fiber core are present. The modes traveling in the cladding will typically decrease to zero over large distances. An overfilled launch is usually the result of launching an LED into a multimode fiber or when the light of an overfilled or fully filled fiber is coupled into a fiber with a smaller core.



The typical near field and far field scans for an overfilled launch

Fully filled Launch

A fully filled launch is much like an overfilled launch, but there will be very little or no modes propagating in the cladding. A fully filled launch is usually the result of coupling the light from an overfilled or fully filled fiber into a fiber with the same core diameter.

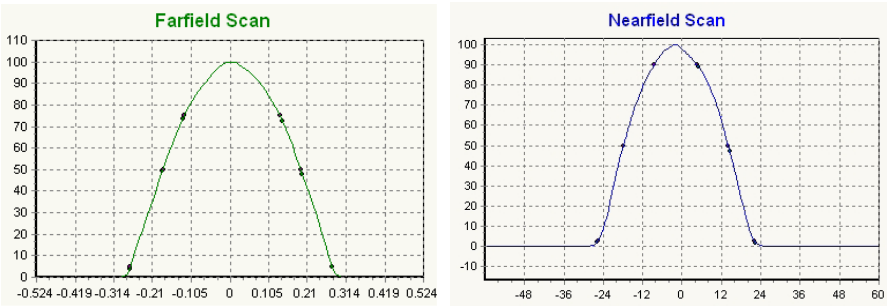


The near field and far field scans for a fully filled launch

Launch Conditions

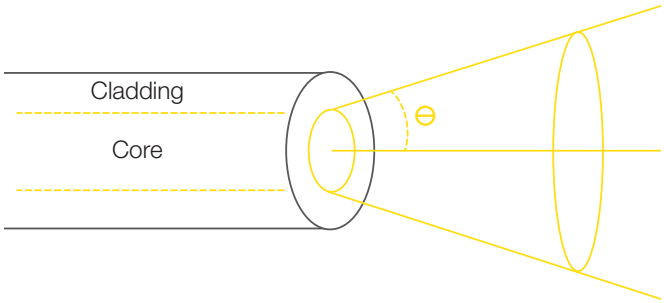
Underfilled Launch

When less than the maximum amount of modes are propagating within a fiber's core this is said to be an underfilled launch. This may be the result of launching a laser into a multimode fiber or coupling the light from a fiber into another fiber with a larger core diameter.



The near field and far field scan of an underfilled launch

Numerical Aperture



The numerical aperture of a fiber is a quantitative measurement of its emission cone

The numerical aperture of a fiber is a measure of a fiber's light gathering ability. It also helps in determining how a fiber responds to bending (micro and macro), its launching efficiency, and the joint losses at a splice.

The numerical aperture is defined as:

$$NA = \sin(\Theta)$$

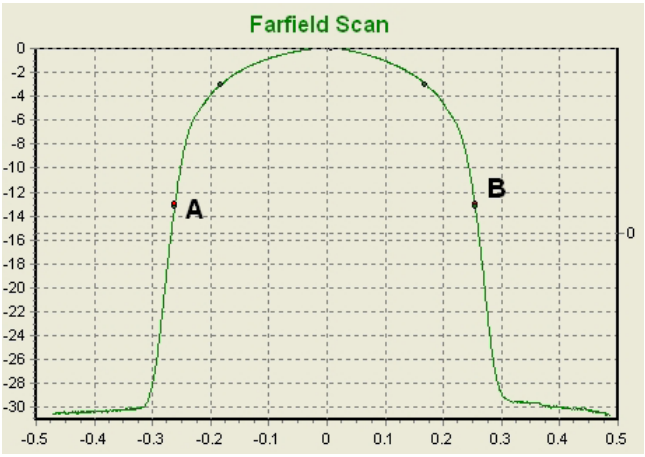
Where Θ is the maximum acceptance and transmittance angle that can be coupled into and out of the fiber. The theoretical numerical aperture is given as:

$$NA_{th}=\sqrt{n_1^2 - n_2^2}$$

Where n_1 and n_2 are the refractive indices of the core and cladding respectively.

Using the far field radiation pattern one can easily find the numerical aperture of a fiber given that there was an overfilled or at least fully filled launch into the fiber under test. Most far field scans are done using normalized power measurements with the maximum being equal to zero or one depending if one is using the dB scale or Watts scale.

Note: This manual, and OPL-LCA, will use the dB scale for all far field and near field scans and hence, will be normalized to zero dB. The 5% points and their corresponding normalized power levels are found on both sides of the plot, which, if using the dB scale, are where the plot magnitude is -13dB relative to the maximum. These points represent the maximum meridianal angle accepted and emitted by the fiber. These two points are labeled **A** and **B** in the following plot.



From points **A** and **B** one can calculate the numerical aperture using the following equation:

$$NA=\sin\left(\frac{\Theta_1+\Theta_2}{2}\right)$$

Where Θ_1 and Θ_2 represent the angles (radians or degrees) at point **A** and **B** respectively. Since the previous graph is measured in dB then the 5% point is found at -13dB relative to the maximum. Since the sine of a small angle can be approximated as the angle itself and the numerical aperture is typically small for optical fibers, the NA can be approximated to:

$$NA \approx \frac{\Theta_1 + \Theta_2}{2}$$

The maximum acceptance angle found from a far field scan will vary depending on the wavelength of the light propagating in the fiber under test. The numerical aperture is typically measured at 850nm, but there are other instances where one would want to find the NA for longer or shorter wavelengths. The shorter the wavelength of light propagating in the fiber the smaller the acceptance angle will be. The relationship between numerical apertures can be described as:

$$NA_{FF} = kNA_{th}$$

Where, NA_{ff} is the far field scan and NA_{th} is the theoretical numerical aperture. k is a scaling constant which is dependant upon which wavelength the far field measurements are being taken. It equals 0.95 for 540nm, 0.96 for 633nm, and very close to 1 for measurements taken at 850nm.

Parking the System for Shipment

There are very fragile motors internal to the OP1021 that can be damaged during shipment if the proper precautions are not taken. Before packaging the OP1021 it is absolutely necessary that the system be placed into **PARK** prior to boxing it up. One can park the system from the front panel or in software.

Parking from the software

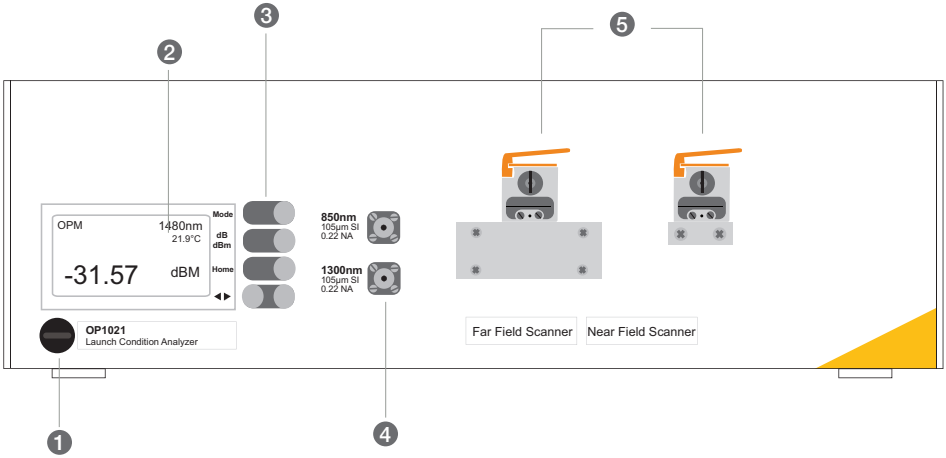
To park the system in the software one must go to the **Setup** tab and press PARK ch is located just below the near field home position. Once this button is pressed, the user can exit the software and power down the system and prepare it for packaging.

Parking from the front panel

If one does not have access to the software it is possible to park the system using the front panel controls of the OP1021. With the system powered on, hold down both of the buttons corresponding to the right and left arrows until the front panel goes blank. One can also hear the motors internal to the OP1021 moving to the **PARK** position.

Note: Once the unit is placed in **PARK** it should not be powered back on prior to shipment. When the unit is powered on it will pull the unit out of **PARK**.

OP1021 Module Layout



1 On/Off

This knob controls the power to the OP1021 module. The knob is fitted with a key to control and monitor usage of the module.

2 Display

This displays the output of the module depending on the current mode.

3 Control Buttons

These allow the user to interact with the OP1021 as described later in the manual.

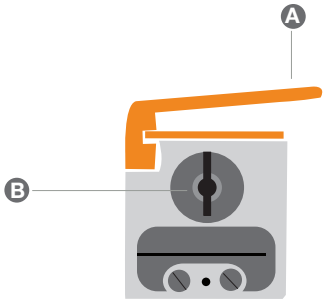
4 Built-in Sources

Internal 50/125, 62.5/125 Fibers.

5 Near Field/Far Field Inputs

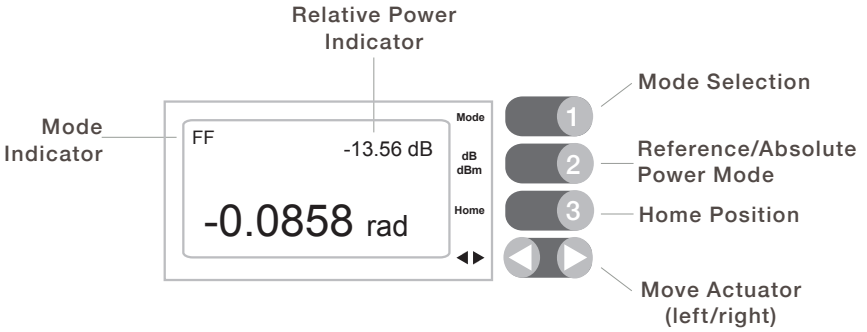
Depending on which scan the user wishes to perform he/she would insert the fiber end into one of these inputs as described in the following section.

Inserting/Removing a Fiber into and out of the OP1021



To insert a fiber into the front panel of the **OP1021**, first apply pressure downward at point Ⓐ in the figure above. Then insert the ferrule into the space denoted as point Ⓑ. Gently slide the ferrule completely in until the ferrule stops. Release pressure from point Ⓐ .The ferrule is screwed by the clamp Ⓑ .To remove the fiber simply press down at Ⓐ again and slide the ferrule out of the slot.

Front Panel Operation



1 *Mode Selection*

The Mode Selection toggles through the various modes of the OP1021. Modes in sequence are:

NF: Near Field Scan
FF: Far Field Scan
OPM: Power Meter

Front Panel Operation

2 *Reference* | *Absolute Mode* dBm/dB

At power-up the absolute optical power received from the selected scanner is displayed. The absolute power is calibrated against a 100/250µm fiber. Pressing Reference/ Absolute stores the current measured power as the reference and displays the relative deviations from that reference then on, until the [dBm/dB] is pressed again to switch back to absolute mode. **Note:** in FF and NF modes the power displayed is always relative and pressing the dB/dBm button only sets the reference power.

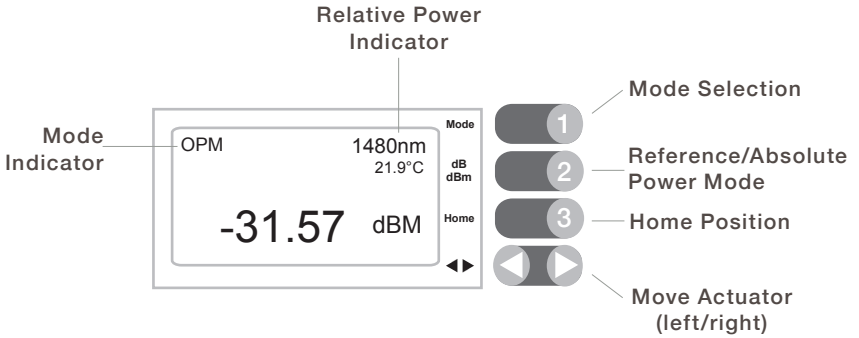
3 *Home Position*

At startup the home position is the center position for near filed and far field. By pressing the **Home Position** button for more than 2 seconds the current position is set to be the new home position. This position is not stored when the unit is turned off.

Move Actuator

The scanning mechanism for the selected scanner is moved to the left or right depending on the key pressed. If the button is held for more than 2 seconds the step size increases gradually from 1 step to 1,000 increments. During the movement the relative position of the scanner is displayed on the LCD.

OPM Mode



Mode Selection

Allows the user to exit OPM mode and go into FF or NF mode.

dB/dBm

Pressing this button will toggle between absolute and relative measurement mode. The detector being used depends on if the NF or FF detector is selected. In relative mode the reference power will be displayed under the **"OPM"** label on the front panel.

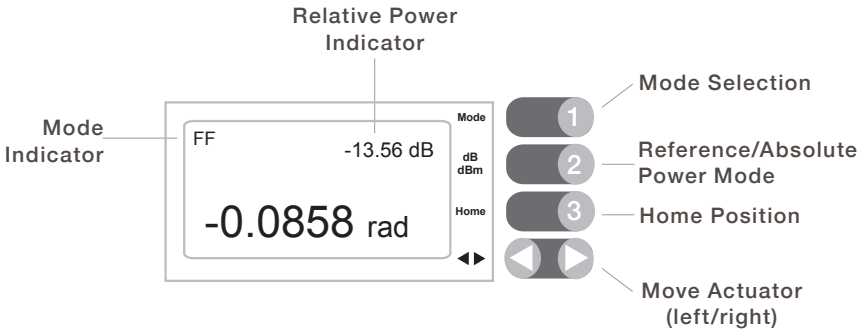
Home

In OPM mode pressing **Home** button will change the detector's calibrated wavelength. The OP1021 is calibrated to 850nm, 980nm, 1300nm, 1310nm, 1480nm, 1550nm, and 1625nm.

Move Actuator

In OPM mode pressing the **"move actuator"** buttons will toggle between the NF detector and the FF detector.

Far Field/Near Field Mode



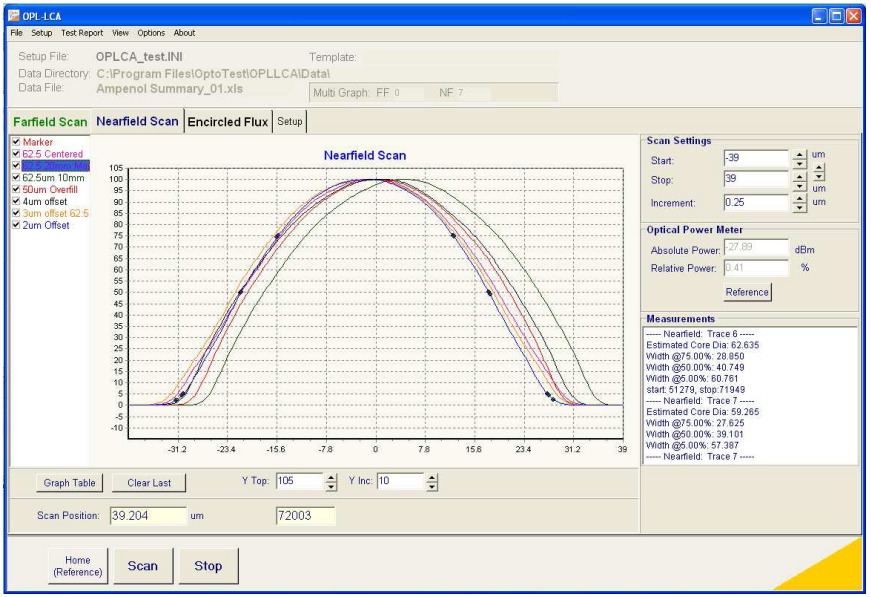
Mode Selection
Allows the user to alternate between modes.

dB/dBm
Pressing **dB/dBm** button will take the current power level and set it as the reference value. This feature is beneficial so the user can find the maximum power point by scanning through the angles and then set that to a reference. Then the user only needs to scan in the positive and negative directions to find the -13dB points.

Home
Pressing **Home** button causes the rotational arm to go back to a set angle. The factory set **Home** is at zero radians.

Move Actuator
These buttons allow the user to move the actuator of the given mode. In far field mode the actuator moves in a radial direction and scans in radians. In the near field mode the actuator moves horizontally across the fiber endface and scans in microns.

OPL-LCA Application Software



Overview

OPL-LCA is the companion software to the OP1021 Launch Condition Analyzer. It offers the following features and functions:

- Displays the near field or far field plot in a user friendly graph
- Allows for a maximum scan angle of ±0.5 radians for the far field plot and ±250µm scan distance for the near field plot
- User defined step size for both near field and far field actuators allowing the user further control of the scan resolution and scan duration
- Data exportation into an Excel spreadsheet for further data analysis
- Manual control of both scanning mechanisms for further user control of scan settings
- Quick chart printing directly from OPL-LCA
- Encircled flux calculations with the ability to load encircled flux templates for various launch condition specifications

Installation

OPL-LCA is shipped or downloaded as a self-extracting executable OPLLCA.EXE.

Upon execution the software is extracted and installed into **C:\program files\OptoTest\OP-LCA**. Included in the installation are sample configuration files.

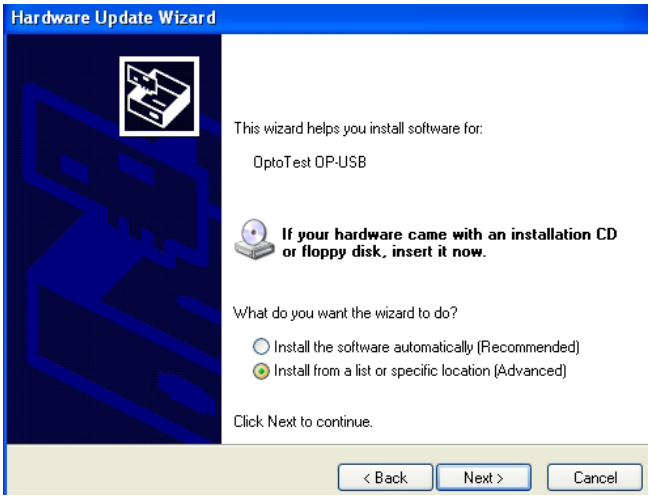
USB Driver Installation

To operate any of the OP-Instruments from the computers' USB bus, the USB driver needs to be installed. By executing the DRIVER.EXE the necessary files are being copied to C:\OptoTest\Driver.

When any of the OP-Instruments are first connected to the computer via USB cable, the operating system will inform you that a new USB device has been connected and eventually starts the wizard.

Follow these steps:

Use the option **"Install from a list or specific location"** that allows you to select the location of the driver yourself.



Use the browse button to locate the directory C:\OptoTest\Driver and proceed with the installation.

Startup

OPL-LCA files used during operation

C:\Program Files\OptoTest\OPL-LCA\OPLLCA.exe	Main executable file
C:\Program Files\OptoTest\OPL-LCA\INI\OPL-LCA.INI	Structured text file that stores the overall settings of OPL-LCA application. Note: This filename and location is fixed.
C:\OptoTest\OPLLCA Files	Data folder that stores the data files and template files.
C:\OptoTest\OPLLCA\Template\NFHomePositions.xls	XLS file which stores various home positions saved by the user.
C:\OptoTest\OPLLCA Files\Template	Directory where all the default template files are store.

Configure OPL-LCA for Operation

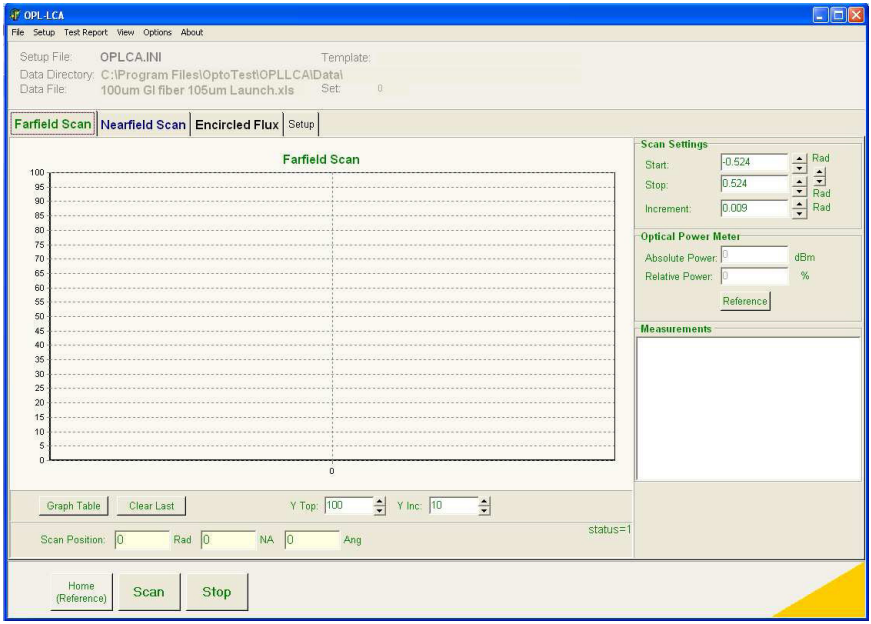
Prior to starting up, the software configures the module and resets the arm position of the far field mechanism and the XYZ-stage position of the near field scanner. Immediately upon clicking on the OPLLCA icon the following screen will appear for about ten seconds.

Note: The user can hear the far field and near field scanning mechanisms adjusting and initializing. Do not turn off the unit or close the software while this initialization is occuring.

Configure OPL-LCA for Operation

After startup the application is configured based on the following files:

1. OPL-LCA.INI, the initial configuration at startup of the application. The user specific setup file as defined in the last Setup/Save Setup is stored in this parameter file.
2. Loading the user specific setup file, for example OPL-LCASetup.INI, all parameters, directory and file locations, as well as operation flags are stored in this file. The application retrieves all those settings and starts up the instruments accordingly.
3. When all the appropriate files are loaded and a compatible instrument is connected OPL-LCA presents the main operation screen:



Operating OPL-LCA

Basic Operation

There are two different modes of operation in OPL-LCA: near field scan and far field scan. Both are performed in similar fashions.

Near Field Scan

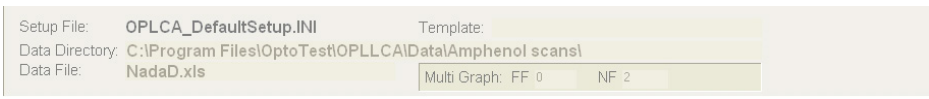
The near field scan is performed by specifying a range for the actuator to scan horizontally across the fiber endface. It is important that this range covers the entire area that is desired to analyze and that the scanning mechanism is centered and focused. Furthermore, the user should select an appropriate step increment for the scan type. If the user is scanning a 9µm core, it wouldn't suffice to have a 1µm step increment, while if a 200µm core fiber was to be analyzed it would be an overkill to select a step size of 0.1µm. From the near field scan the software can calculate and evaluate the encircled flux based on imported encircled flux specifications.

Far Field Scan

A far field plot is performed by an angular scan of the light intensity emitted from a fiber endface at a given distance. The user must specify the limits of this scan from anywhere between -0.5 radians to 0.5 radians. The actuator step size can vary from 0.01 radians to 0.0005 radians. The time involved in each scan depends upon the step resolution. It can vary from 12 seconds with a step size of 0.01 radians to 3 minutes with a step size of 0.0005 radians without any signal processing.

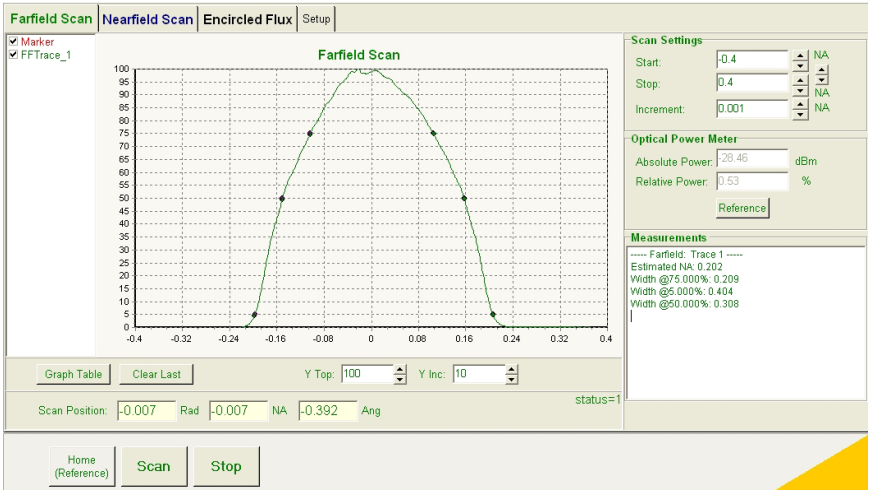
File Information

File information is stored in the top bar of the software. The Setup File, Summary File directory, Test Report file, and Test Report template file, are displayed as well as a running log of the amount of far field and near field scans that are contained in the summary file.



File information bar

Far Field Tab



Files Header

This header is displayed for all OPL-LCA tabs. It conveniently shows the files in use for the current scan. It displays the Setup File, directory to which the test report will be exported to, along with the current filename, and the template being used for the test reports.

Far Field Plot

The scan is displayed within this section. The user can customize the viewing area by altering the text boxes next to the labels “Y Top” and “Y Inc.” “Y Top” changes the vertical value displayed at the top of the graph, while “Y Inc” will change the vertical spacing. The graph can also be manipulated using the mouse:

Left Mouse Click: Holding down the mouse button to highlight a section will zoom in on that portion.

Right Mouse Click: Holding down the right mouse button in the graph area will move the entire graph in the direction to which you scroll.

Far Field Tab

Field Descriptions

Farfield Scan Graph: The scan is displayed within this section. The user can customize the viewing area by altering the text boxes next to the labels **"Y Top"** and **"Y Inc."** **"Y Top"** changes the vertical value displayed at the top of the graph, while **"Y Inc"** will change the vertical spacing. The graph can also be manipulated using the mouse:

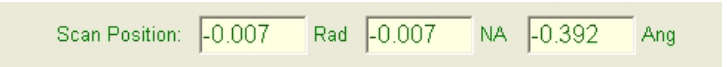
- **Left Mouse Click:** Holding down the mouse button to highlight a section will zoom in on that portion.
- **Right Mouse Click:** Holding down the right mouse button in the graph area will move the entire graph in the direction to which you scroll.

Graph Legend: For each scan a new data series is created. This data series is shown in the legend. Checking or un-checking the box next to the legend description will display or not display the corresponding scan.

Graph Table: Clicking this button will pull up a table with a list of all the active plots displayed and the corresponding data for each one (i.e. numerical aperture, width, etc). This is further discussed under the Creating Test Reports heading of the manual.

Clear Last Button: Clicking the **Clear Last** button will delete the last graph from the display.

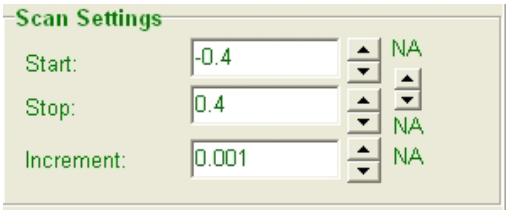
Scan Position: This displays the current position of the actuator's pivotal arm in radians, NA, and in degrees. The NA value is found from finding the sine of the angular position.



Far Field Tab

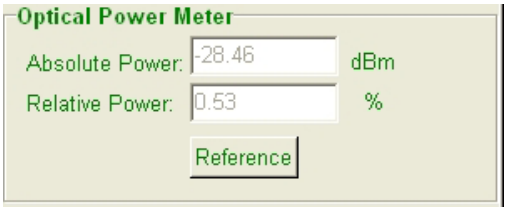
Scan Settings

The user can alter the scan range and scan increment. The maximum scan range is from ±0.5 radians and the range of scan increments is from 0.01 to 0.001 radians.



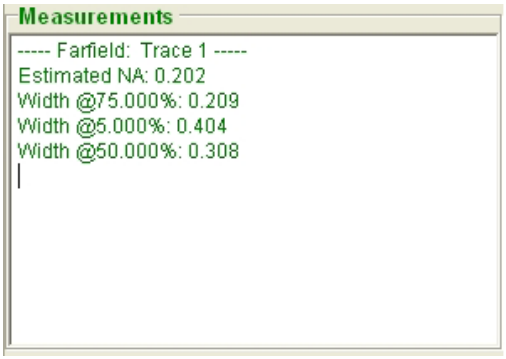
Optical Power Meter

The user can view the current absolute power received by the detector as well as the relative power.



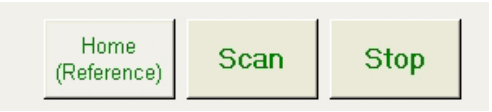
Measurement Display

This text box outputs various measurements for each scan: maximum power, X and Y position of 5% points, and the calculated numerical aperture.



Far Field Tab

Control Buttons



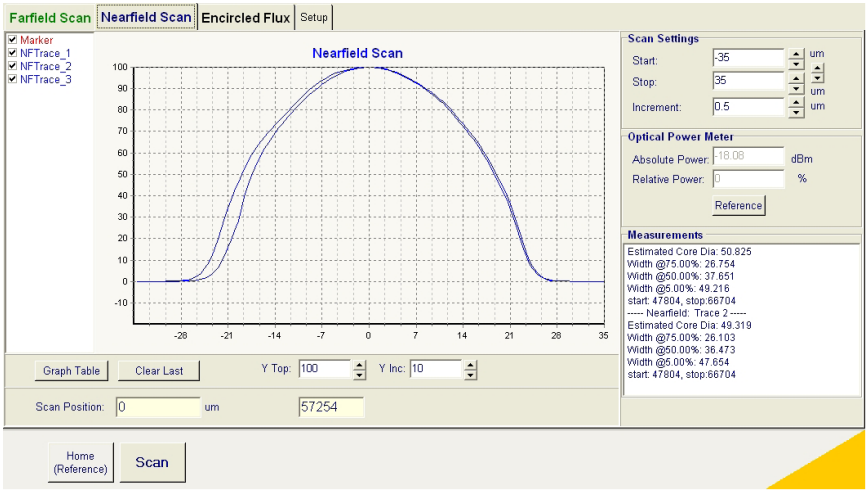
Home (Reference): Pressing **Home** causes the scanning arm to go back to the “Home” position, which is close to zero radians. When the arm is at this position it will reference this position causing the following measurements to be relative to the middle position. This allows for the software to display a graph normalized to the center position.

Scan: This begins the scanning process. If **Home** is not pressed prior to scanning, the software will automatically return to “Home”, reference the signal, and begin the scan. During the scanning process there is a “Stop” button that is active, which allows the user to stop a scan that is currently in progress.

Note: If the unit’s position is far from the home position it is a good practice to always press the **Home (Reference)** button prior to running a scan.

Stop: This button is only active during the scanning process. It will stop the scanning process if pressed. **Note:** the user will be prompted after this button is pressed to confirm that the process is being stopped.

Near Field Scan



Files Header

This header is displayed for all OPL-LCA tabs. It conveniently shows the files in use for the current scan. It displays the Setup File, directory to which the test report will be exported to, along with the current filename, and the template being used for the test reports.

Near Field Scan

This displays the current near field scan. The buttons and options function similar as with the far field scan.

Scan Position

There are two numbers displayed in this section. The first is the scan position in micrometers relative to the home position. The number in the box to the right is the raw actuator position for the scan axis.

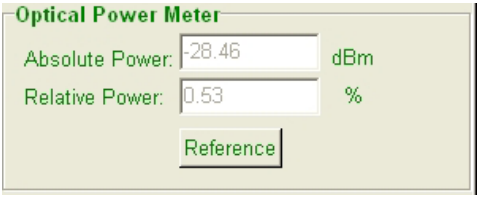
Scan Settings

Here the user can configure the scanning range. The maximum scanning range in each axis is ±150µm and the minimum scanning step size is 0.1µm.

Near Field Scan

Optical Power Meter

The user can view the current absolute power received by the detector as well as the relative power.



Measurement Display

This text box displays measurements related to the past and previous scans. For each scan the software will output the widths associated with the marker values under the **Setup** tab and it will also output the measured core size according to the 2.5% point.

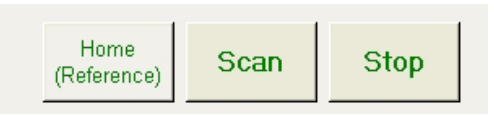
Control Buttons

Home (Reference): Pressing **Home** causes the scanning arm to go back to the "Home" position, which is close to zero radians. When the arm is at this position it will reference this position causing the following measurements to be relative to the middle position. This allows for the software to display a graph normalized to the center position.

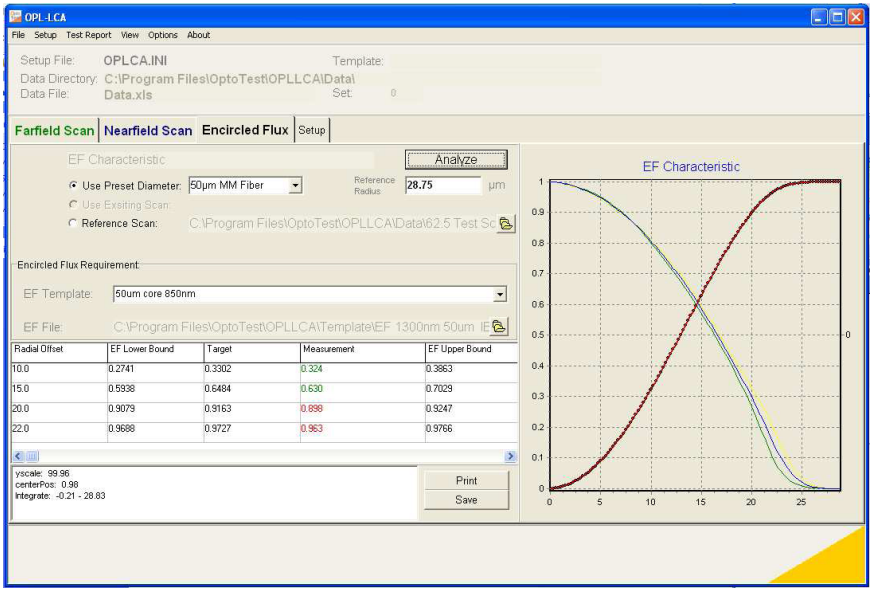
Scan: This begins the scanning process. If **Home** is not pressed prior to scanning, the software will automatically return to "Home", reference the signal, and begin the scan. During the scanning process there is a "Stop" button that is active, which allows the user to stop a scan that is currently in progress.

Note: If the unit's position is far from the home position it is a good practice to always press the **Home (Reference)** button prior to running a scan.

Stop: This button is only active during the scanning process. It will stop the scanning process if pressed. **Note:** the user will be prompted after this button is pressed to confirm that the process is being stopped.



Encircled Flux Tab



Encircled Flux Setup

Here the user can choose the limits of integration for the encircled flux calculation. It is common to use a value of 1.15*radius. The user can select the type of fiber from the drop down menu located to the right of the **"Use Preset Diameter"** label. If this is selected then the software will calculate the Reference radius and place it in the Reference Radius field. This value will be used for the limits of integration. This limit of integration can be defined as well by using a **"Reference Scan"** to be selected from an existing excel file of a previous scan. To analyze the near field distribution click the **Analyze** button.

Encircled Flux Requirement

The drop down menu labeled EF Template has 4 present encircled flux standard templates according to IEC 61300-1. If a custom template is to be used, the user can specify that file by clicking on the open file icon next to the label EF File. The user can select an excel file with a list of encircled flux requirements and it will be displayed in the spreadsheet below. Once the **Analyze** button is pressed the software will interpolate the values at each specified radial offset. The interpolated values at the points of interest will be displayed in either red or green font denoting whether the point fell in or out of specification.

Encircled Flux Tab

EF Characteristic Graph

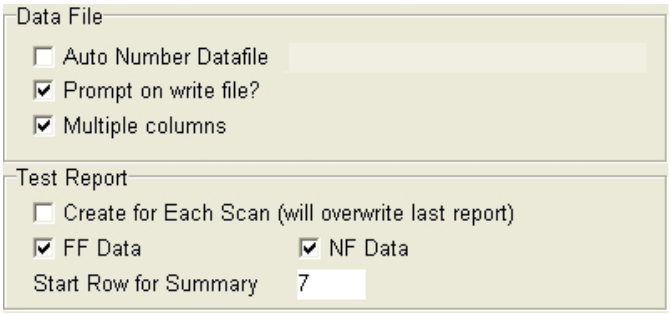
This displays the EF graph corresponding to the current near field scan. There are 4 traces displayed in the graph. The red trace is the encircled flux graph. The other three traces correspond to the near field scan that was analyzed. The green trace corresponds to the left side of the NF scan, the yellow trace corresponds to the right side, and the blue is the average of those two. The blue trace is the trace that is analyzed for the encircled flux.

Print/Save Buttons

To save the encircled flux data to an Excel file press the **Save** button. To print the EF graph click the **Print** button. This will open the current EF file in Excel and allow the user to print the file.

Setup Tab

Data File



Prompt on write file: Selecting this will cause the software to prompt the user any time a new file is being created.

Auto number Data File: If the user is taking multiple scans and doesn't want to have to name each file individually the software will do it automatically by placing a number at the end of the specified data filename and then incrementing that number for each new scan that is performed.

Multiple Columns: Checking this box will instruct the software to append the scans to the data file. The summary file will contain all data for the scans which were performed.

Create for Each Scan: With this box checked the software will always write data to the Test Report.

Note: If this box is checked the Test Report will be overwritten each time a new scan is performed. Data will be lost.
If soft copies of each scan need to be saved leave this box unchecked and create files using the **Create Test Report** button under the Graph Table.

FF Data / NF Data: Checking either of these boxes instructs the software to output the data to the test report. Sometimes the user may just want to work with the FF scanner or just the NF scanner. This controls how the data is output to the test report. This will be discussed in further detail under the **Creating Test Reports'** portion of the manual.

Start Row for Summary: This is the row where the data will begin in the test report.

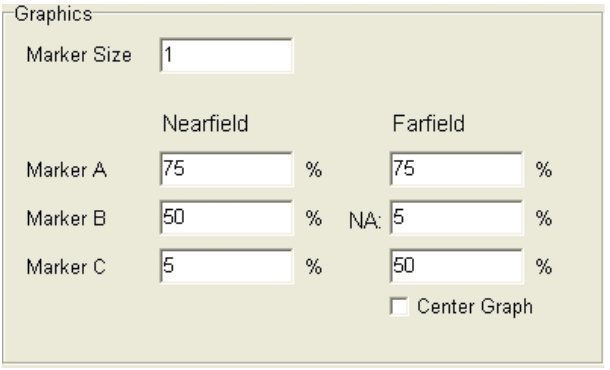
Setup Tab

Measurement

Average Power Readings: The number in this text box denotes how many power readings will be averaged for each data point. So for each data point that is displayed on the plot, near field or far field, the amount of samples specified in this text box will be taken at that angle or distance and then averaged together yielding the data point's value. This leads to a smoother graph and will lessen the effects of outlying power readings. Conversely, the more averages the software takes the longer the scan will take to complete.

Use Range Hold: This will force the OP1021 to not change power meter ranges and will get rid of gain switching spikes, which may occur when switching from one gain stage to the next.

Graphics



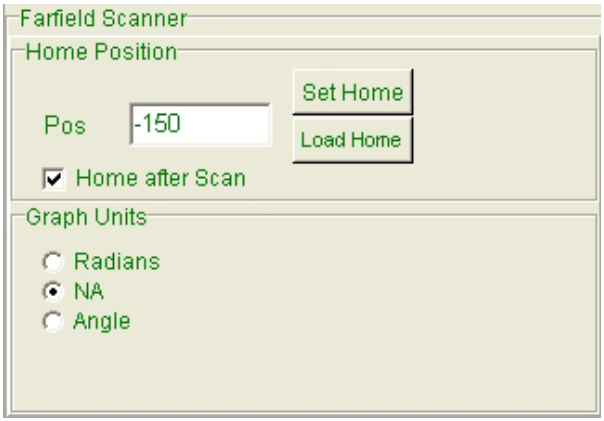
Marker Size: This text box allows the user to change the radius size of the critical data point markers. The units relate to the graph y-axis type.

Markers: The user can specify marker magnitudes where the width of the scan is measured. For the FF measurement the NA is calculated using Marker B.

The check box under the far field markers labeled **"Center Graph"**, if checked, will center the far field graph based on the peak power once the scan is completed.

Setup Tab

Far Field Scanner



Set Home: Pressing this button will set the home position to the position specified in the box to the left given that it is not outside the bounded limits.

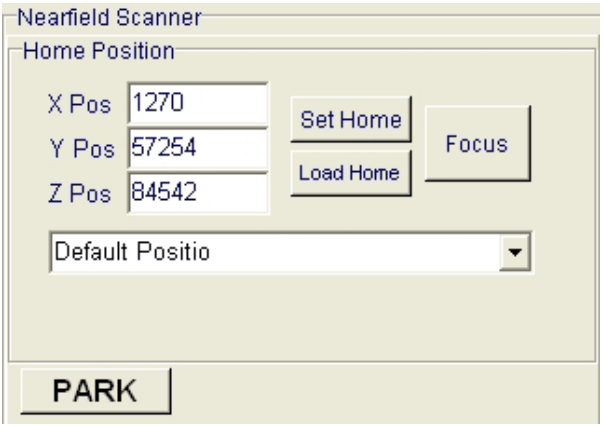
Note: The home position is stored as a mechanical position associated with the far field arm, not in angles, radians, or degrees.

Load Home: This will load the home position into the edit box. The home position is loaded automatically when the software is loaded.

Graph Units: The far field plot can be displayed in either radians, degrees or in NA units. NA units are simply the sine of the scan angle for each position.

Setup Tab

Near Field Scanner



Home Position: The user can display and change the current **"Home"** settings in these three boxes. To display the current home settings click on Load Home. The home settings are loaded from the module itself and stored in an EEProm chip, so two different modules will likely have two different home positions. The user can alter the home position by clicking on the text boxes and altering the numbers. To save the **"Home"** position one need only press the **Set Home** button.

Note: Pressing the **Set Home** button will store the setting to the EEProm chip in the module and will overwrite any previous home position settings.

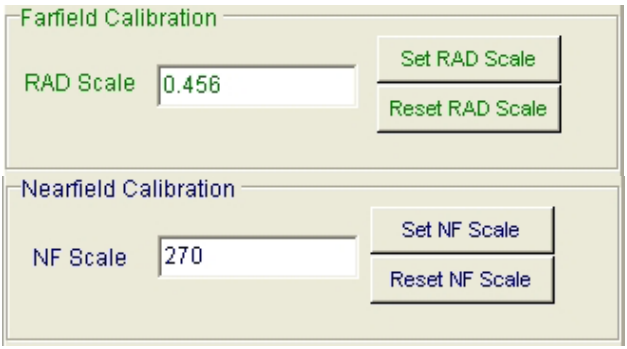
Focus: Pressing this button will bring up a focus screen which, when a GI fiber is placed into the input of the near field scanner, will allow the user to center and focus the near field apparatus. This will be described later in the manual.

Park: This button will force the two actuator arms to go to a "safe" position. This must be done when the unit is to be shipped or an adapter is going to be changed.

Note: In version 1.0.1.54 of OPL-LCA a drop down menu was added which allows the user to import different home positions. This is good if either the fiber has an offset core, or the focus position at a certain wavelength is different than for normal 850/1300 measurements. Select the proper home position for the scan from the drop down menu. The home position will be put into the X Pos, Y Pos, and Z Pos boxes. For the home position to be set, the user must click the **Set Home** button.

Setup Tab

Far Field/Near Field Calibration



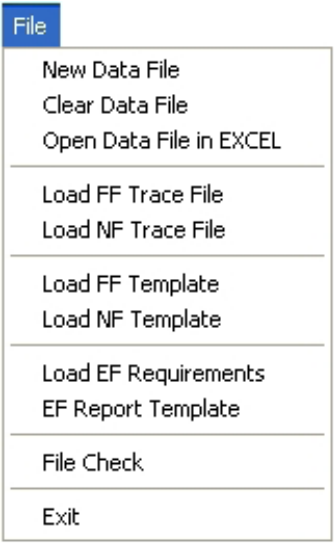
Rad Scale: This is the conversion factor for converting the far field arm steps to angles.

Note: Do not change this unless the calibration of the system is outside of specification.

NF Scale: This is the conversion factor which converts actuator movements in the y-axis to a distance measurement.

Setup Tab

OPL-LCA Menus



New Data File: This will allow the user to select a directory and filename for the software to output the Excel spreadsheet. The Data File will store information for all scans which are performed.

Clear Data File: This will clear the datafile of all the scans performed. This will also clear all of the scans displayed in the software's graphs as well.

Open Data File in Excel: This will launch Excel (if the computer has it) and display the current data file.

Load NF/FF Trace File: Allows the user to load a previous NF scan from its Test Report.

Load FF/NF Template: The user can load a template which will be displayed on the FF or NF graph, which will allow a user to verify launches based on these template criteria.

Load EF Requirements: The user can specify the EF Requirement file here.

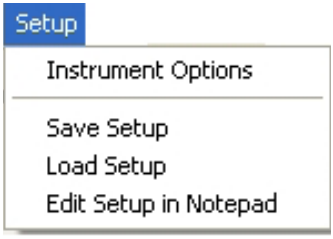
EF Report Template: This will allow the user to specify the report template for the encircled flux report.

File Check: Selecting this function will display all of the current files being used by the software. (INI file, template files, etc.)

Exit: Exits the program and will ask the user if they would like to save the INI file.

Setup Tab

OPL-LCA Menus



Instrument Options: Takes the user to the Setup Tab.

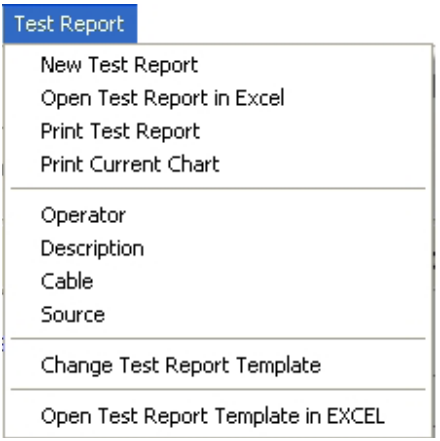
Save Setup: Allows the user to specify a file to which key software settings will be saved to.

Load Setup: The user can choose a setup from a previous session.

Edit Setup in Notepad: Launches Windows Notepad to allow the user to edit the INI file. (Note: This should only be done for troubleshooting issues.)

Setup Tab

OPL-LCA Menus



New Test Report: The user can specify a new test report file. The test report, unlike the data file, only stores information for one far field scan and one near field scan.

Open Test Report in Excel: Allows the user to launch Excel and view the test report.

Print Test Report: This will print out the test report front page.

Print Current Chart: This will print the active chart using the default printer connected to the user's computer.

Operator: Allows the user to input their name to be displayed on the test reports.

Description: Describes the test conditions of these scans.

Cable: The user can add the description of the cable.

Source: The source type can be entered here for reference purposes in the datafile.

Change Test Report Template: The user can specify a predesigned template for the test report to be based on.

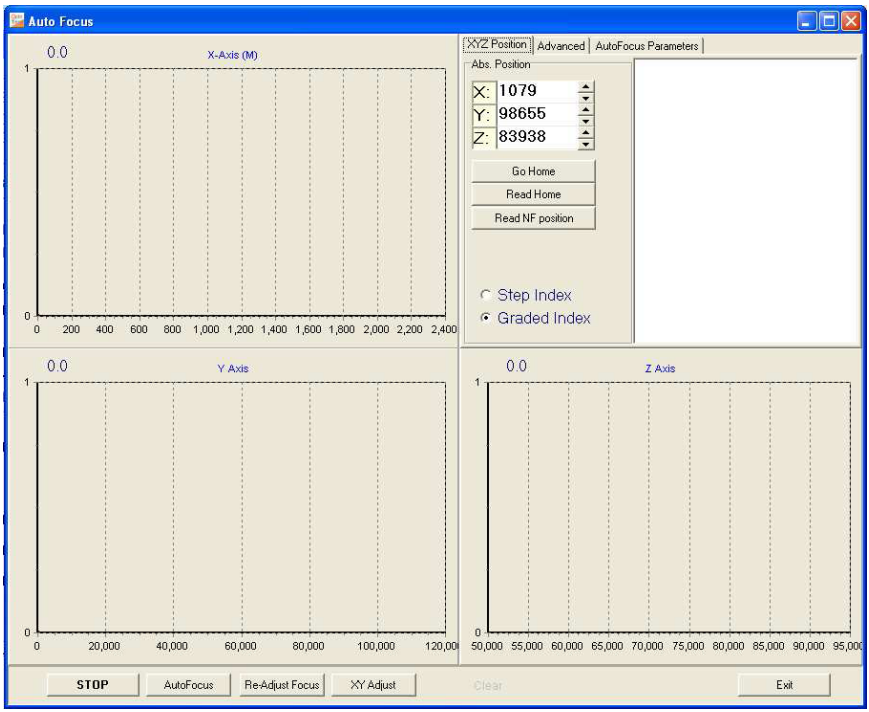
Open Test Report Template in EXCEL: Launches Excel for the user to view and edit the current template file. If the template file is edited in Excel, it must be saved in Excel, and then reloaded using the Change Test Report Template selection in this menu.

Focusing/Centering the Near Field Scanner

To properly perform a near field scan it is imperative that the near field scanning positioners are correctly aligned. There are 3-axes, XYZ, which need to be aligned.

The X and Y axes control the plane in which the scan will be measured, and the Z axis controls the focus on the fiber. For a near field scan to be properly analyzed for encircled flux measurements the scanning mechanism must be centered and focused.

Begin to align the positioners if they appear out of focus or not centered properly, then click on the **Focus** button under the Near Field Scanner heading in the Setup tab. This will pull up the following screen:

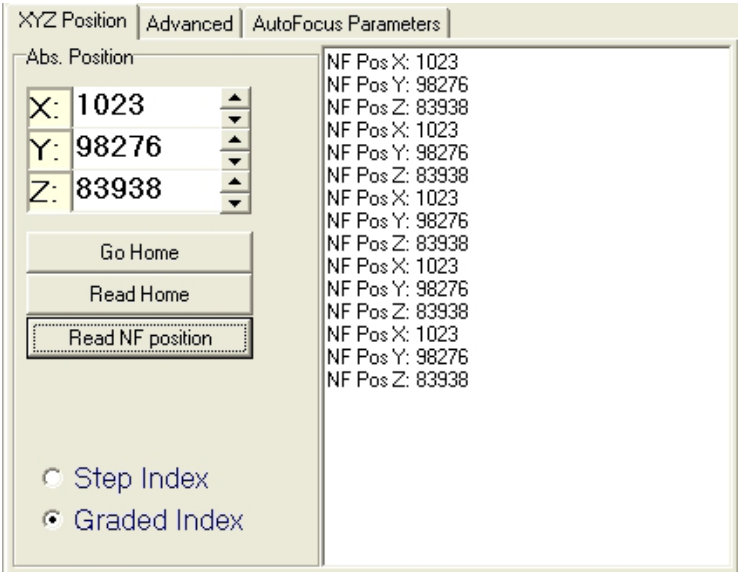


OPL-LCA's near field focus screen

Focusing/Centering the Near Field Scanner

Focus/Centering Form

There are three tabs under this form.



XYZ Position Tab

This tab shows the current home position and allows the user to choose which type of cable will be used for centering and focusing. It is best to use a graded index fiber for both centering and focusing.

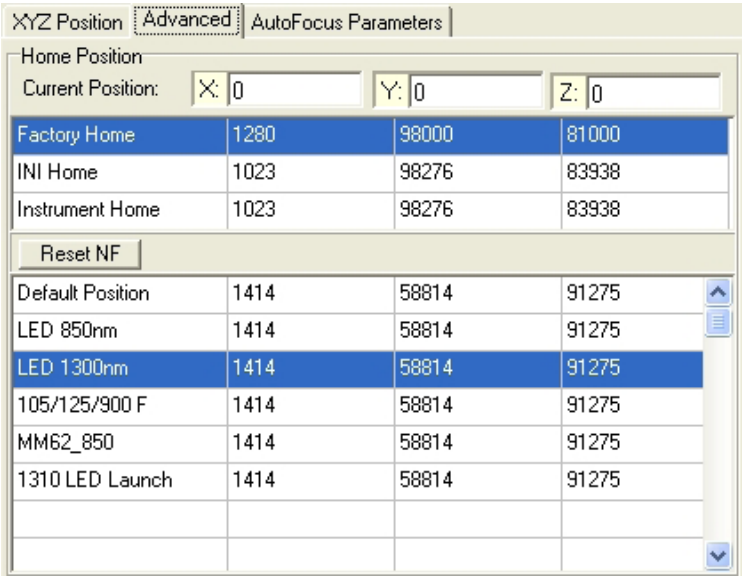
There are three buttons in this tab. The **Go Home** button instructs the unit to go to its home positions. The **Read Home** button will read the home position from the unit. The **Read NF position** button will read the current position the NF scanner is in.

Focusing/Centering the Near Field Scanner

Advanced Tab

The advanced tab shows the different home positions which are stored in different locations. The Factory Home is the home position which is hard stored in the unit. This cannot be changed. In the case the software loses the home position, the user can reset the home position to the Factory Home positions. The INI home is the home position stored in the INI file for the software, this can be overwritten and changed.

The Instrument Home is stored in EEProm and is stored anytime the user presses the Set Home button under the Setup tab. The positions displayed in the table under the Reset NF button are the positions associated with the preset home positions which can be selected from the drop down menu under the Near Field Scanner heading of the Setup tab. Double clicking on any one of these rows will allow the user to alter that particular preset home and its title.

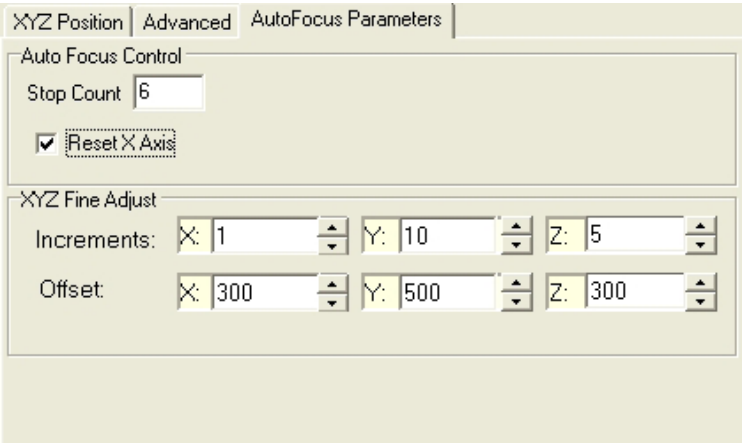


Focusing/Centering the Near Field Scanner

Auto Focus Parameters

This tab allows the user to control how the autofocus procedures will be executed. The Auto Focus Control settings allows the user to define how many iterations the software will complete before determining a center and focus position. Leaving these settings at 6 and having the **"Reset X Axis"** box checked are fine.

There are six boxes located under the XYZ Fine Adjust heading. The three boxes on the top labeled **"Increments"** correspond to the increment by which the axes will scan for alignment. The three boxes labeled **"Offset"** correspond to the beginning and ending positions where each axis will scan with respect to the current home position. If the current home position is X:1400, Y:55000, and Z: 92000, then the alignment process for the above figure will scan from X: 1100 to 1700, in 1 step increments, Y: 54500 to 55500, in 10 step increments, and Z: 91700 to 92300, in 5 step increments.



Focusing/Centering the Near Field Scanner

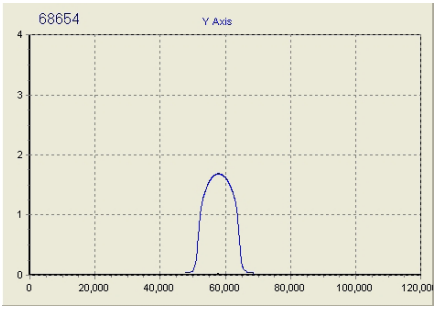
Note: It is not necessary to re-focus and re-center each time a scan is performed, but when a new fiber is inserted into the near field input it is good practice to re-center the scanner. The unit is in focus when fibers are swapped, but many times the center may be different. To do this use only the **XY adjust** procedure and
do not use the **Re-Adjust Focus** procedure.

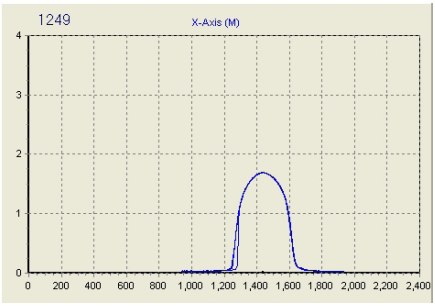
In most cases the near field scanner is already somewhat aligned, meaning it is already close to center and close to its focus position. In this case, one only needs to go through a couple iterations to find the center of the fiber. One must setup under the AutoFocus Parameters tab how fine or coarse the alignment scans will be. It is sometimes best to perform the centering/focusing process twice. Once with coarse settings and another with fine settings.

For coarse settings edit the boxes under the AutoFocus Parameters tab to values such as:

X: increments = 5, X: Offset = 500
Y: increments = 100, Y:Offset =10000
Z: increments = 100, Z: Offset =10000

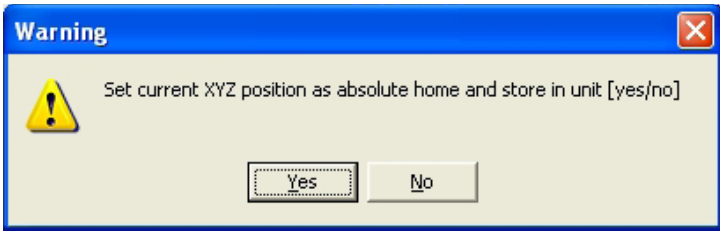
With the fiber connected to a light source on one end (one can use the internal source of the OP1021 for an overfilled launch) and the other end connected into the NF input, press the **XY adjust** button. This process is looking for the center of the fiber. The X and Y axes will be scanned in alternating modes and the graphs should look something like this:





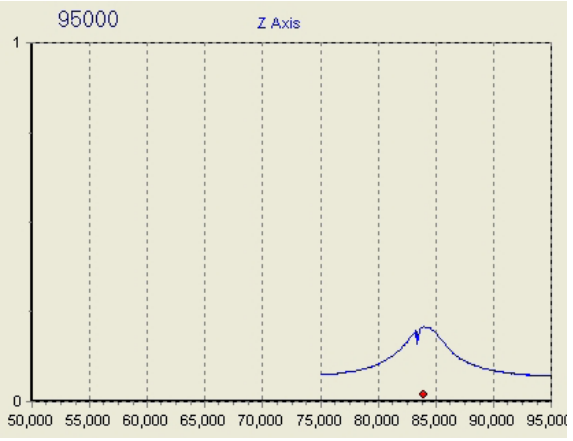
Focusing/Centering the Near Field Scanner

The software will guide the unit through the process and after six iterations the sequence will end and the software will yield a message:



Click the **Yes** button. This will store the current home positions found during the process.

Now the unit needs to be focused correctly. Press the **Re-adjust Focus** button. The software will scan the z-axis for the amount of iterations specified under the **Autofocus Parameters** tab. The z-axis graph should look something like this:



Focusing/Centering the Near Field Scanner

The peak of the scan corresponds to where the unit is most focused. This position is marked with a red dot and saved as the focus position. At the termination of the scan the user will once again be prompted if the current XYZ position should be stored. Select **Yes** button.

This process was the coarse alignment, now for more accurate results the settings under the AutoFocus Parameters tab must be altered for higher resolution scans. Under AutoFocus Parameters the settings should be as follows.

X: increments = 1, X: Offset = 200
Y: increments = 10, Y:Offset = 1000
Z: increments = 5, Z: Offset = 500

Once again, repeat the focusing/centering process and the resulting home position is an accurate home position.

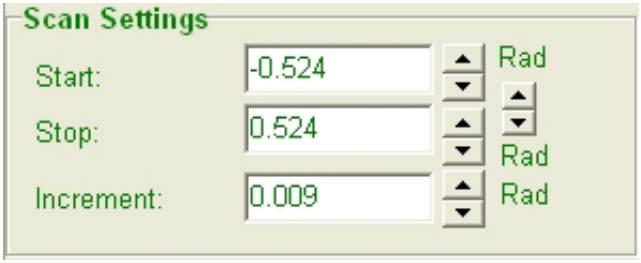
Launch Conditions: From Beginning to End

Far Field Scanning

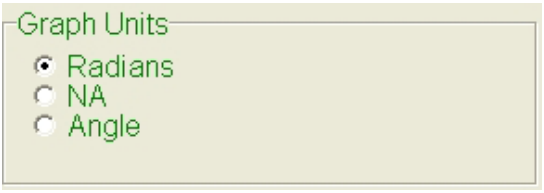
Scanning the far field of a fiber is as basic as setting your scan limits and increments, specifying a file and then clicking the scan button.

To begin, place a clean fiber which needs its launch verified into the input of the far field scanning apparatus. Select the far field tab and press the **Home (Reference)** button at the bottom of the screen.
This will send the far field scanner to its home position, which if correctly aligned, will also be the maximum power value, and then it will take a reference power reading.

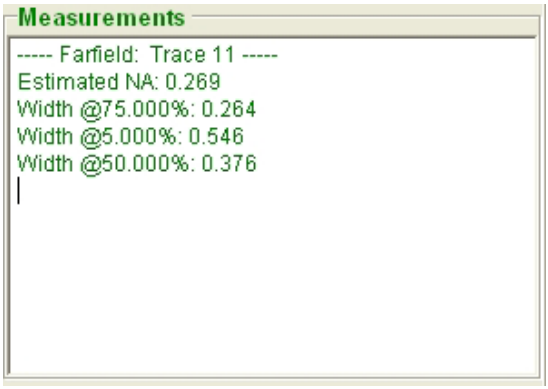
Set your scan limits in the appropriate boxes to the desired range and set the increment to the desired resolution.

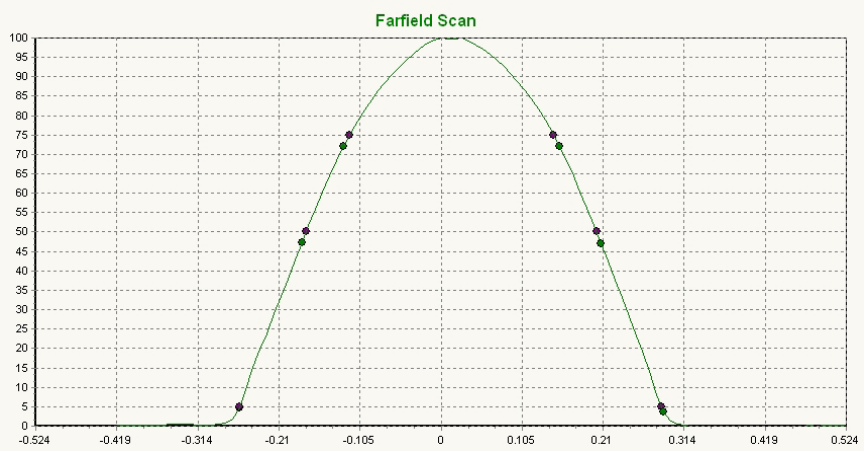


One can also choose what units the graph will be displayed in by selecting one of the corresponding radio buttons under the far field section of the Setup tab.



Click on the **Scan** button and the software will begin to step the far field scanner from the scan start position to the scan stop position at increments specified by the scan increment setting. At the completion of the scan the software will calculate and display the specified marker widths and the measured NA in the memo box at the bottom right of the screen.





FF scan of 62.5/125 MM Graded Index fiber

Launch Conditions: From Beginning to End

Near Field Scanning

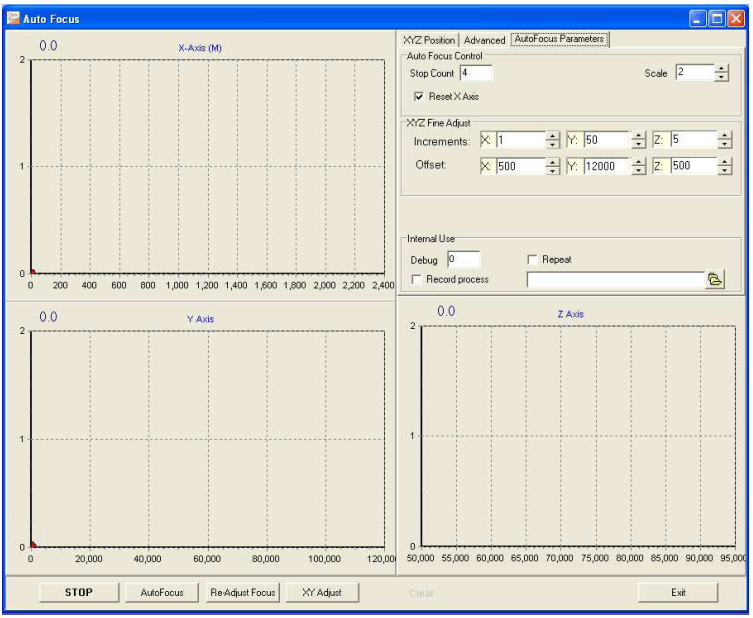
Getting a reliable near field scan requires the hardware to be aligned with the input fiber. To realign/center/focus the near field scanner one needs a graded index fiber (preferably the fiber for which the launch conditions are to be measured). Insert the fiber into the near field mechanism with a light source connected to the other end of the fiber.

Focusing the near field scanner

Note: Focusing the near field scanner is only necessary when the unit is out of alignment. Also it is not necessary to focus each time a new fiber is inserted into the near field input, but it is advised to re-center the scanner each time a fiber is inserted into the input.

Note 2: For version OPL-LCA version 1.0.1.54 and later use the centering/focusing procedure described under the heading **"Centering/Focusing the near field scanner"** earlier in the manual.

Navigate to the **Setup** tab and press the **Focus** button under the **"Near Field Scanner Home Position"** group box. This will open up the following page:



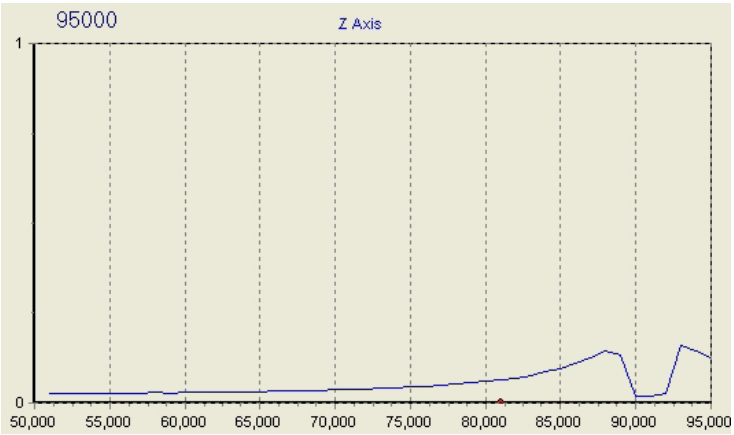
Launch Conditions: From Beginning to End

Focusing the near field scanner

This page shows the 3 axes which will be scanned to align the system. The **“X”** and **“Y”** axes scan the image plane, while the z-axis will focus the system. The purpose of this scan is to find the center of the image and bring the image into focus. Before running the autofocus tool make sure that the Graded Index radio button is selected. Once the fiber is in place (connected to the near field input), press the **AutoFocus** button. Data will be output into the memo box in the upper right corner giving information to the various positions which will be found. The autofocus process will first scan the z-axis, find a maximum, then scan the x-axis, find a maximum, then scan the y-axis and find a maximum. This procedure will be repeated until the user presses the **Stop** button. It is advisable that this process be allowed to go through at least 7 iterations of scanning all three axes before it yields a reliable **“Home Position”**. There is a number box, at the bottom right of the Memo box, which shows how many times the software has gone through this process.

After each axis scan, the software will update the home position. When the user stops the process the most recent autofocus positions will be the **”Home Position”.** The scan process looks something like this:

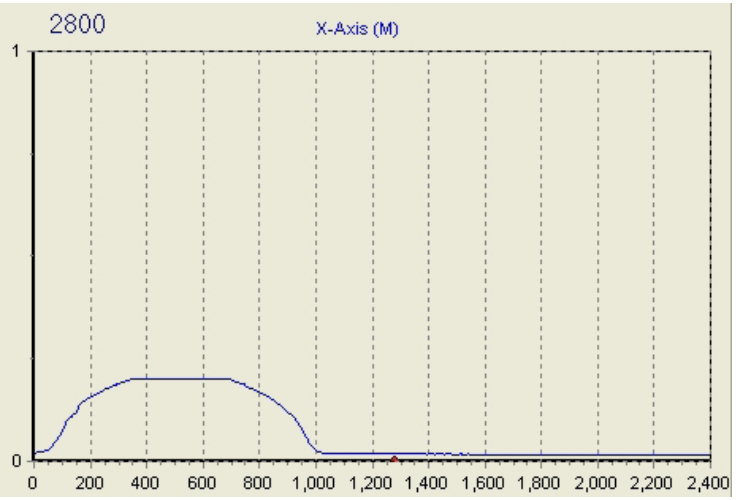
First, a scan of the z-axis:



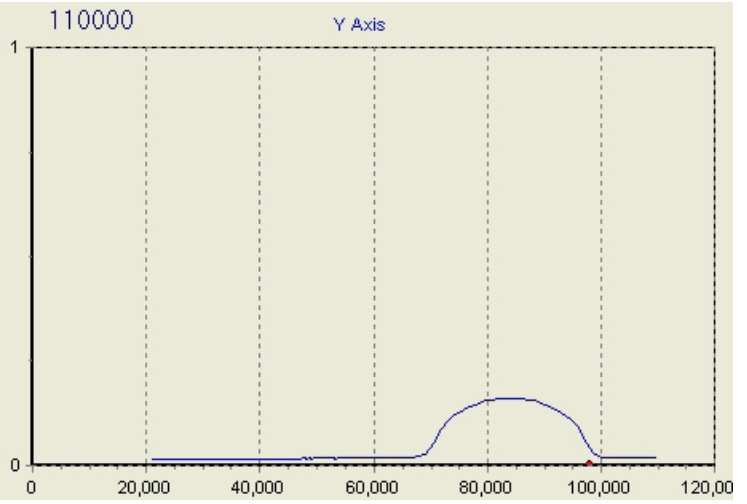
Launch Conditions: From Beginning to End

Focusing the near field scanner

Second, a scan of the x-axis:



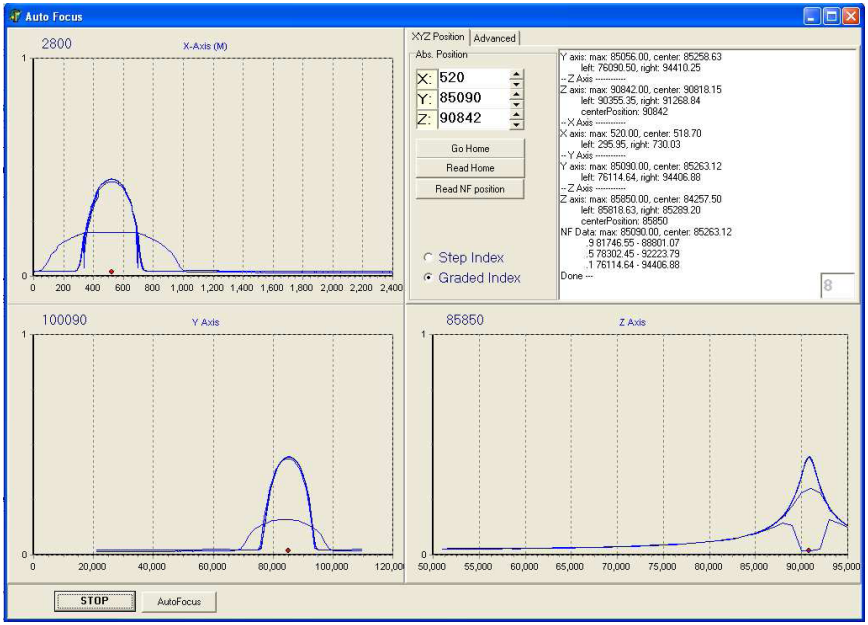
Third, a scan of the y-axis:



Launch Conditions: From Beginning to End

Focusing the near field scanner

The software stops the process after 7 iterations and the page should look something like this:



The user can press the stop button once it appears that the unit is centered. Upon pressing the **Stop** button or allowing the software to run through all 7 iterations the software will ask the user if they would like to save the current XYZ position as the **"Home Position"**. Select **Yes**. The unit is now centered and focused. One can verify that the unit is focused by inserting a step index fiber and verifying that the steepness of the slope of the core/cladding interface goes from its 5% point to its 75% point within 4µm of spatial distance.

Note: This process will not change the focus of the system, but removing and inserting fiber can cause slight center misalignments, where the unit is no longer centered.

Launch Conditions: From Beginning to End

Removing and Inserting Fibers

Near field measurements are susceptible to misalignment. It is recommended that when inserting a fiber into the input of the near field scanner that the user pay attention to the keying of the connector type. Each time this cable is removed and connected to the input the fiber should be aligned similarly each time. If a new fiber is to be used, though, it is recommended that the system be re-centered. The system does not need to be refocused, because the focus does not change with the new connector. To re-center the unit click on the **XY adjust** button under the Focus pop-up. This will scan the x and y axis to find the peak of the scans. The graph should look something like this: Once the peaks have been found, the unit will yield a pop-up: **"Set the current XYZ position as absolute home and store in unit?"** Select the **Yes** button.

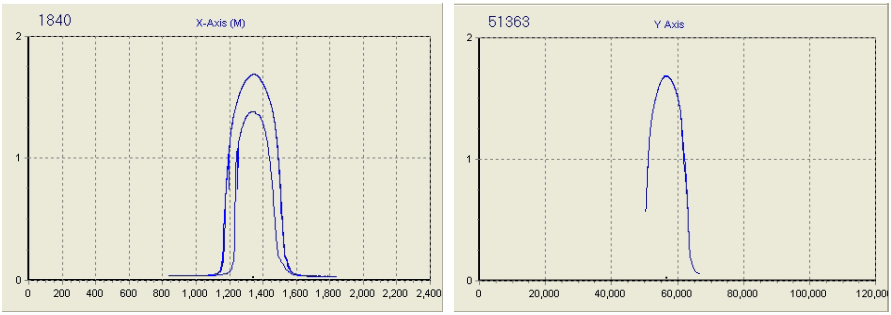


Figure 6: When a peak has been found, the scan should show a smooth curve with a single crest

Once the centering of the system has been done, one can perform a **Re-adjust focus** to verify that the system is focused. This must be done after a center positioning has been completed. These scans will also look for a peak, but just in the z-axis.

Performing a Near Field Scan

Once the unit is focused, close out of the Autofocus page and navigate to the **Near Field Scan** tab.

Note: It is recommended that once the unit is centered, the input fiber not be moved. Removing the fiber and reinserting it could cause the system to not be centered due to the fact that the core of the fiber may not be centered in the ferrule, yielding slight inaccuracies in the near field scan.

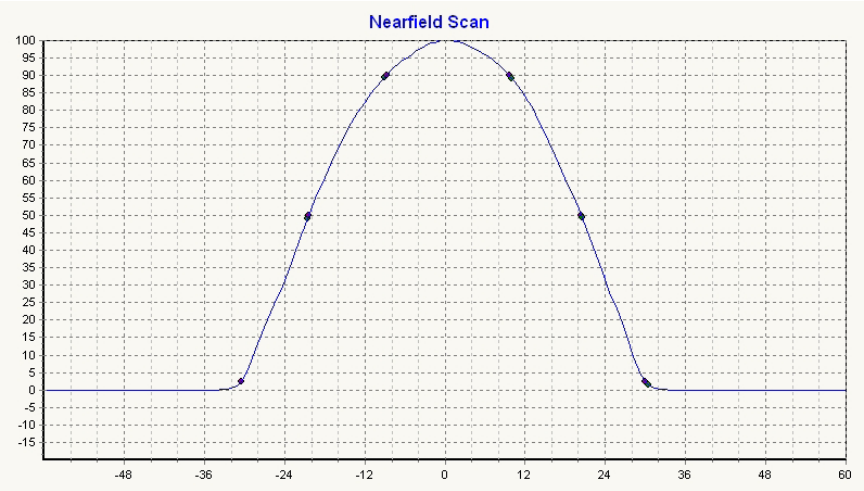
Launch Conditions: From Beginning to End

Performing a Near Field Scan

Implement the launch condition you will be testing on the cable while it is inserted into the near field scanner. Under the **Near Field Scan** tab press the **Home (Reference)** button. This puts the near field scanner into its home position, where it is centered and focused. The software will also measure the near field intensity at this position as a point of reference.

Set the **"Scan Settings"** so that the range between the start and stop positions are larger than the expected core radius. For instance, if one is scanning a 62.5µm fiber, set the limits to ±40µm, so that the entire core is scanned. Set the increment for the desired resolution. Sometimes it is best to begin with a large increment to increase scan speed, then when it is believed that the correct launch is produced, set the increment small to get a higher resolution scan with more data points.

Click on the **Scan** button. The unit will begin stepping from the start position until the stop position. After the unit is done scanning, the software will analyze the 2.5% points to yield the measured core diameter. The software will also automatically scale the scan such that the peak is normalized to 100% and the minimum (dark portion) is pulled down to zero to yield a scan which has the dark image subtracted from it. The resulting scan will look something like this:

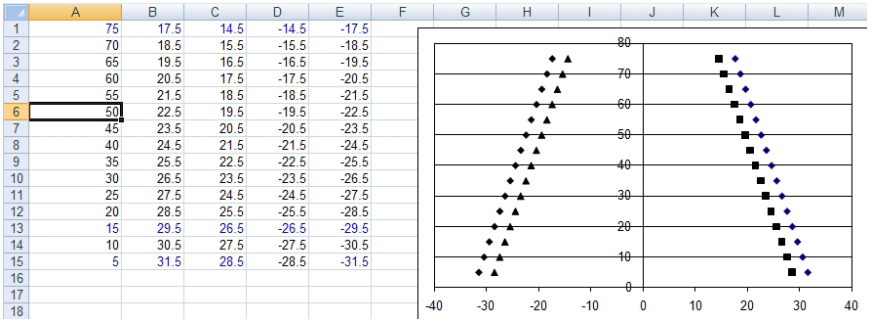


Near field Scan of MM GI 62.5/125 Fiber

Launch Conditions: From Beginning to End

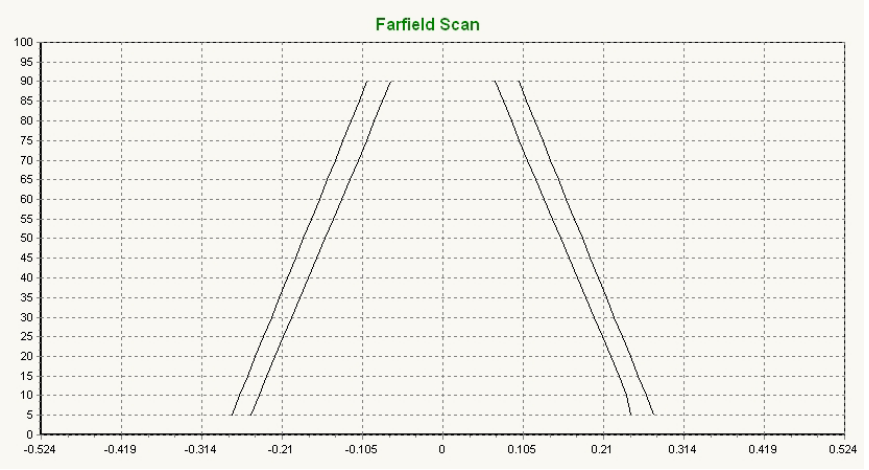
Loading FF/NF Templates

If the FF or NF scans need to be evaluated based on a certain template, such as a 70/70 Launch then these templates can just be loaded in by selecting **"Load NF/FF Template"** from the File menu. A sample template looks like this:



	A	B	C	D	E
1	75	17.5	14.5	-14.5	-17.5
2	70	18.5	15.5	-15.5	-18.5
3	65	19.5	16.5	-16.5	-19.5
4	60	20.5	17.5	-17.5	-20.5
5	55	21.5	18.5	-18.5	-21.5
6	50	22.5	19.5	-19.5	-22.5
7	45	23.5	20.5	-20.5	-23.5
8	40	24.5	21.5	-21.5	-24.5
9	35	25.5	22.5	-22.5	-25.5
10	30	26.5	23.5	-23.5	-26.5
11	25	27.5	24.5	-24.5	-27.5
12	20	28.5	25.5	-25.5	-28.5
13	15	29.5	26.5	-26.5	-29.5
14	10	30.5	27.5	-27.5	-30.5
15	5	31.5	28.5	-28.5	-31.5
16					
17					
18					

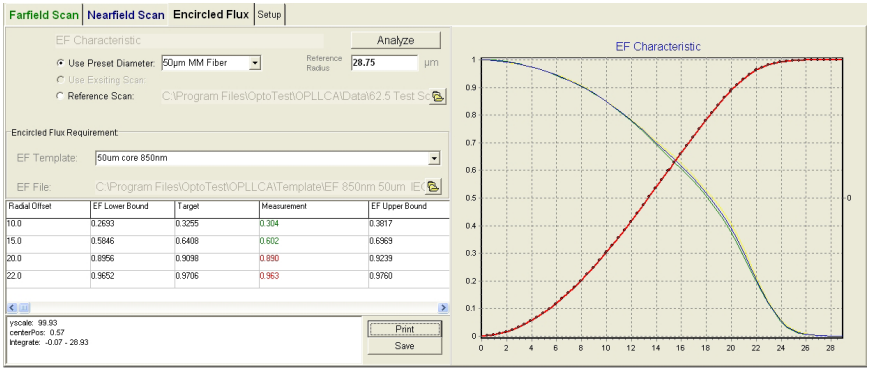
The software inputs the 5 columns on the left and plots them in the software, producing clear lines that allow the user to evaluate the launch condition. The following image shows what it would look like if a 70/70 template was loaded for the FF scan.



Launch Conditions: From Beginning to End

Encircled Flux Calculations/Graph

For an encircled flux graph to be produced the near field scan needs to be performed. The software can either use the most current near field scan or the user can load an old near field scan by selecting from the File menu **“Load NF Trace File”**. Choosing to load the NF trace file will display the NF trace in the Near Field graph. To then produce an encircled flux graph navigate to the Encircled Flux tab.



OPL-LCA’s Encircled Flux tab

Under the Encircled Flux tab, select the radius for the fiber for which the encircled flux will be calibrated.

The user can either select the predetermined **“Integration Radius”** under the **“Use Preset Diameter”** pull down menu. For IEC standards a good approximation for the integral radius is 1.15* nominal radius, which for 50µm fiber is 28.75µm and for 62.5µm fiber is 35.9375. When the fiber type is selected the Reference Radius value will be displayed in the edit box next to its label.

To have the software analyze the encircled flux graph at specific points, which correlate to a standard, then these standards need to be selected. One can do this by selecting one of the user predefined standards from the **“EF Template”** drop down. Or one can select the file from the **“EF File”** heading.

The EF File defines the parameters the software will check to determine whether the scans are within specification for EF compliance

Launch Conditions: From Beginning to End

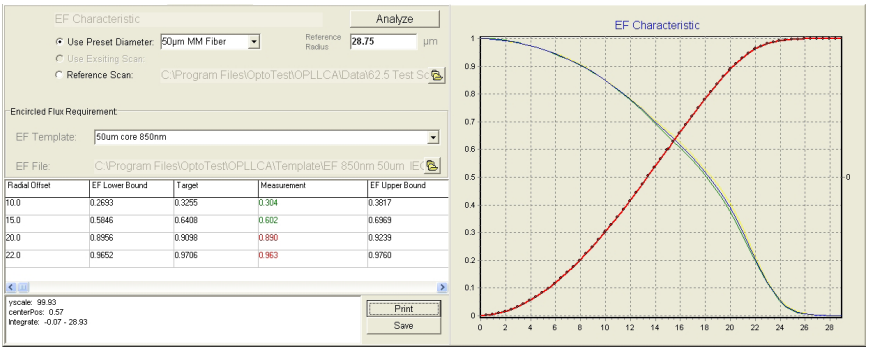
Encircled Flux Calculations/Graph

After the file is selected the name of the file is displayed as well. The software comes with preset EF requirements for IEC 61300-1, but the user can edit an existing template to fit a specific requirement other than IEC 61300-1. The file looks like this:

	A	B	C	D
1	Radial Offset	EF Lower Bound	Target	EF Upper Bound
2	10	0.2693	0.3255	0.3817
3	15	0.5846	0.6408	0.6969
4	20	0.8956	0.9098	0.9239
5	22	0.9652	0.9706	0.976

This file can be edited if the specifications are to be changed. The user can specify up to 8 data points where the encircled flux graph will be evaluated.

Once the specifications are loaded, the data will be imported into the spreadsheet. Then the encircled flux graph can be calculated. Click on the **Analyze** button. This will import the most recent near field scan and produce the corresponding encircled flux graph using the integral radius specified under the **Analyze** button. The page should look something like this:



If a hard copy is required then the user can select the **Print** button, which will open Excel and a sheet showing the EF specifications with the graph. The data for the graph will be displayed on the second tab of the Excel file. To save the data to a specific filename then click on the **Save** button. The user will then be prompted to enter a filename for the EF data.

Launch Conditions: From Beginning to End

Encircled Flux Calculations/Graph

If a different reference radius is to be used and it is known by the user, then that value can just be entered into the box next to the **"Reference Radius"** label. Clicking **Analyze** button will then produce another EF graph which implements that reference radius.

Reloading the factory home position

In some instances when the positioners are incorrectly set to a home position, it may become difficult to refocus and re-center the near field scanner. At these moments one can load the Factory Home Position.

To do this one needs to click the **Focus** button under Near Field Scanner heading of the Setup tab. When the auto focus form appears select the **Advanced** tab. Under the advanced tab there will be a table which displays the Factory, INI, and Instruments home positions. Copy on a sheet of paper the Factory home positions for each axis.

Close out of the auto-focus form and select the Setup tab. Under the Near Field Scanner heading alter the home position to be the same as the factory home position recorded earlier. Once all positions are entered for the X, Y, and Z axes, press the **Set Home** button. Then select **Setup|Save Setup** from the main menu.
This process will correctly restore the factory home position. From here one needs to run through the centering/focusing process to find a more exact home position.

Collecting data in the Datafile and the Test Report

OPL-LCA has two files that it exports data to. One file, **"the data file"**, functions like a summary report of all the scans performed during a session and **"the Test Report"** is a file that holds data for only one near field and one far field scan.

The Data File

The data file stores information for all scans performed. The first sheet of the spreadsheet is a summary of all the scans. It stores the various marker measurements for each file and other data. The columns in the spreadsheet are as follows:

Launch Conditions: From Beginning to End

Far Field Scan Data Columns

Col	Label	Description
B	Date	Displays the date the scan was performed
C	Time	Time the scan was performed
D	Operator	The operator performing the scan
E	Scan #	The scan number for the far field scan
F	Trace Desc.	The corresponding description for that scan. This corresponds to the legend of the far field graph. This can be changed in the software as described later under the Graph Table heading
G	Range	
H	Beg.	The beginning of the scan in the designated measurements units
I	End	The end of the scan in the designated measurements units
J	Inc.	The specified increment for the scan
K, N, Q	MrK X L	This displays the measurement for the left side of the scan corresponding to the Marker's value
L, O, R	Mrk X R	This displays the measurement for the right side of the scan corresponding to the Marker's value
M, P, S	Width	The width between the left side and right side at the corresponding marker points
T	NA	Displays the NA of the far field plot

Launch Conditions: From Beginning to End

Near Field Data Columns

Col	Label	Description
U	Scan #	The scan number for the near field scan
V	Trace Desc.	The corresponding description for that scan. This corresponds to the legend of the near field graph. This can be changed in the software as described later under the Graph Table heading
W	Range	
X	Beg.	The beginning of the scan in the designed measurements units
Y	End	The end of the scan in the designated measurements units
Z	Inc.	The specified increment for the scan
AA, AD, AG	Mrk X L	This displays the measurement for the left side of the scan corresponding to the Marker's value
AB, AE, AH	Mrk X R	This displays the measurement for the right side of the scan corresponding to the Marker's value
AC, AF, AI	Width	The width between the left side and right side at the corresponding marker points
AJ	Core(µm)	Displays the core size as measured at the 2.5% mark of the corresponding near field scan

Far Field/Near Field Sheets

The far field data is stored on the second sheet of the data file spreadsheet and the near field data is stored on the third sheet. The data is arranged as below.

Row	Data Type	Description
1	Legend Label	This is the label from the legend of the near field or far field graph associated with this particular scan
2	Date	Date the scan was performed
3	Time	Time the scan was performed
4	Description	Description of the corresponding scan
5	Source	This is the value the user puts into the source box under the Test Report menu
6	Fiber Type	This is the value the user puts into the fiber box under the Test Report menu
8	Scan Data	This is where data associated with the scan begins. The first column is the x axis (angle for FF scan, µm for NF scan) and the second column is the irradiance at that position

Launch Conditions: From Beginning to End

Test Report File

The test report stores data for a single near field scan and far field scan. The user can specify a template file which will be imprinted onto the test report. There are three test report templates supplied with the software. These files are:

File name	Description
NFFF Template Report.xls	Template report where both the NF scan and FF scan will be displayed with graphs and data points
NF Template.xls	This file assumes only near field data is to be used
FF Template.xls	This file assumes only far field data is to be used

The supplied templates can be altered with Excel or a compatible software package. Once the template has been edited the file must be loaded into the software again for the changes to take effect.

Configuring the Test Report

To configure the test report, first a file must be designated. This is done under the **Test Report** menu. Once a file is specified the user must decide what type of data is this test report going to store. If only near field scans will be stored, then make sure, under the **Setup** tab, the box next to **"NF Data"** is checked and the box next to **"FF Data"** is not checked. Conversely, the opposite should be done if only FF data is to be stored. If both are to be stored then check both boxes. These boxes determine how and where the data is output to the test report file.

Loading in a Test Report Template

To load a template file, click on **"Change Test Report Template"** under the **Test Report** menu. Select the appropriate template for the types of scans which will be performed. Refer to the table above for the appropriate template file.

Launch Conditions: From Beginning to End

Viewing/Printing the Test Report

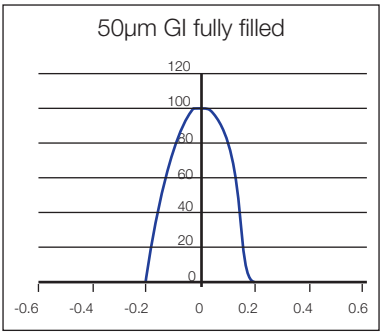
After the appropriate scans have been performed one can view and/or print the Test Report. To open the file in Excel select **"Open Test Report in Excel"** under the **Test Report** menu and Excel will display the file. To print the file, select **"Print Test Report"** under the **Test Report** menu. A sample test report is below:

Far Field Data:

Analysis

Marker	Left	Right	Width
A	-0.105	0.107	0.212
B	-0.198	0.207	0.405
C	-0.151	0.159	0.310

NA @ 5 0.203

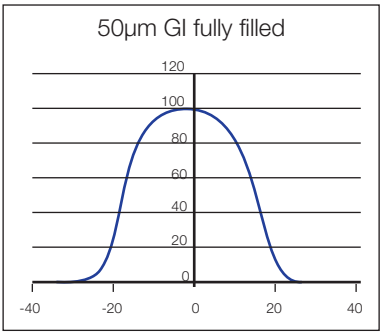


Near Field Data:

Analysis

Marker	Left	Right	Width
A	-12.595	12.848	25.443
B	-17.985	18.301	36.286
C	-23.995	23.974	47.969

Est. Core Size (µm) 49.486

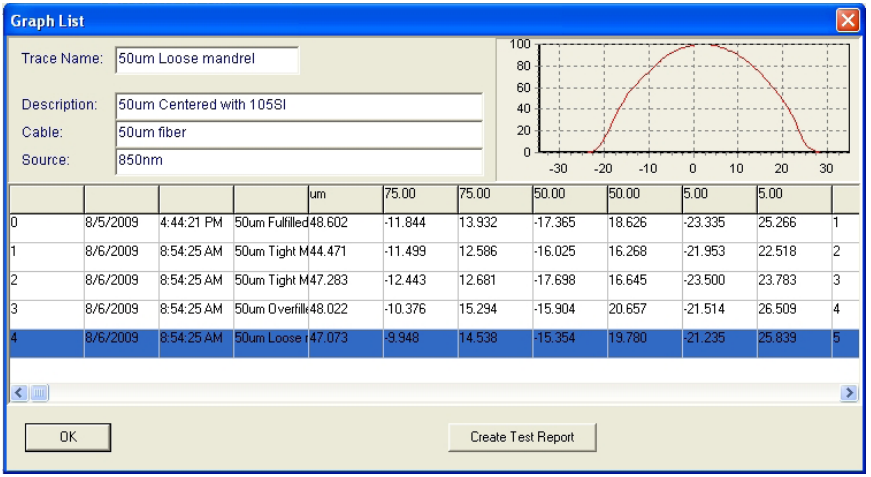


Sample Test Report for both NF and FF scans

Launch Conditions: From Beginning to End

Graph Table

The **"graph table"** for each scan allows the user to organize the various scans that are visible on the graph. To open the graph table, click the **Graph Table** button under the corresponding graph.



Graph Table

The graph table allows the user to assign descriptions to each scan that has been performed. The different scans that were performed are displayed in the table at the bottom of the pop-up. Left clicking on the different rows will cause the software to display the scan in the top right and also load its different parameters. One can change these parameters using the fields at the top. To change the parameters select the row associated with the scan for which the parameters will be edited.

Property	Description
Trace Name	This is the value that will be displayed in the legend of the NF or FF graph
Description	This is the description of the scan. This will also be output to both the summary data file and the test report
Cable	Description of the cable used. This is output to the summary data file only
Source	Description of the source type. This is output to the summary data file only. Creating Test Reports in the Graph Table

Launch Conditions: From Beginning to End

Creating Test Reports in the Graph Table

If one needs to keep soft copies of the scans it is recommended that the user have the box **"Create Test Report for Each Scan"**, under the **Setup** tab, unchecked. This will prevent the overwriting of data to the Test Report. Once the box is unchecked perform the various scans, then open the **Graph Table** popup. Select the scan for which the test report is to be created and edit its various properties.

Once the properties are edited correctly, click on the **Create Test Report** button. A prompt will pop-up asking if the user would like to print the test report. If one selects **Yes** the software will open the test report in Excel, if one selects **No** then the data is only output for the selected scan to the test report specified under the **Test Report** menu.

Note: This will only output the data for the selected scan. If the test report is to have both the near field and far field data then one needs to do this for the near field scan and also the far field scan.

To create another test report, one needs to specify another test report name under the **Test Report** menu.

Changing Front Panel Adapters

To change connector adapters it is a good practice to **"Park"** the near field apparatus. There is a lens which normally is positioned very close to the adapter. The park function pulls the lens far away from the adapter so that the lens does not get scratched. Pressing the **Park** button under the **Setup** menu will instruct the instrument to park.

To disconnect the adapter there are two hex bolts connecting the adapter to the mainframe, which need to be unscrewed. A hex wrench for these bolts is supplied with the system. Gently remove the adapter and then replace it with the new adapter. When connecting the new adapter, screw both bolts in tightly and while screwing them in alternate between each bolt so that one is not screwed all the way in, while the other still has yet to be screwed. This will eliminate some alignment concerns.

Once the new adapter is in place, the system will need to be re-centered and re-focused. It is best to perform an **XY adjust** and then perform a **Re-focus**.

Warranty Information

See our Terms and Conditions at www.optotest.com for warranty information.

NOTE: Do not send instruments for any reason without contacting OptoTest headquarters first. To request an RMA contact OptoTest at +1.805.987.1700 or customerservice@optotest.com.

Notes

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For Application Notes, more detailed Testing Instructions, and the most up-to-date OptoTest News go to ***www.optobuzz.com***

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