2.2 PC Interfaces

2.2.1 PC Connectivity Options for Power/Energy Measurement

Ophir Pyroelectric, Thermal and Photodiode sensors measure at up to 25,000 points per second

Sample data with Ophir power meter at up to 4000 points per second

Ophir power meter capable of on board storage of data of up to 250,000 points and data storage rate of up to 4000 points per second

Ophir sensor to USB interfaces with up to 4 channel connectivity

Ophir Quasar interface with wireless connectivity

Transmit real time data to PC at up to 25,000 points/s per channel (sensor limited) via USB

Transmit stored data or real time data to PC via USB or RS232

Transmit real time data to PC at 500 points per second via Bluetooth

StarLab software (data transmitted via USB or Bluetooth)

StarCom software (data transmitted via RS232)

StarLab software

StarCom software

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2.2.2 Compact Juno USB Interface

Convert your laptop or desktop PC into an Ophir sensor power/energy meter

- From sensor to interface to PC - no power source needed
- Plug and play with all standard Ophir smart sensors
- Position & size measurement with BeamTrack sensors
- Record every energy pulse at up to 10kHz
- Log power and energy, average, statistics, histograms and more with included StarLab application
- LabVIEW VIs and COM Object interface
- Very compact - is just an extension of the smart plug

Smart Sensor to Juno to PC

Ophir's basic smart compact Juno module turns your PC or laptop into a full fledged Ophir laser power/energy meter.
Just install the software, plug the sensor into the Juno module and connect the Juno with a standard USB cable to the PC USB port.
Using the Juno, you can connect several sensors to the PC by using one Juno module for each sensor and, if necessary, a USB hub.

LabVIEW

Juno operating with StarLab software
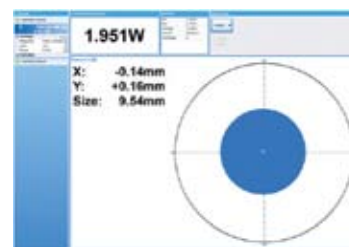
Juno with BeamTrack sensor and StarLab showing beam power, position and size

Specifications

Power Measurement	
Power log period	5s to 500hr.
Energy Measurement	
Max real time data logging to PC	10,000Hz [a]
Trigger input and output	N.A.
Timing	Supports time stamp for each pulse - resolution 10µs
General	
Number of sensors supported	One sensor per unit. Can combine several units with software for display of up to 8 sensors on one PC
Compatible sensors	Supports all standard Ophir pyroelectric, thermal, BeamTrack and photodiode sensors [b]
Power supply	Powered from USB
Dimensions	76 x 55 x 22mm
Notes:	(a) This is the data logging rate for every single point in turbo mode. Above that rate, the instrument will sample points but not log every single point (b) Not including RP, PD300-CIE and BC20

Ordering Information

Item	Description	Ophir P/N
Juno	Compact module to operate one Ophir sensor from your PC USB port. Comes with software. Max repetition rate for every pulse 10kHz. Powered from PC USB port	7Z01250
Juno USB cable	USB-A to MINI-B Cable (1 unit supplied with Juno)	7E01217

2.2.2 Power Meters

2.2.3 Pulsar Multichannel and Triggered USB Interfaces

Convert your laptop or desktop PC into a multichannel power/energy meter

- From sensor to interface to PC
- 1,2 and 4 channel models
- Plug and play with most Ophir sensors
- Record every energy pulse at up to 25kHz
- Measure missing pulses & trigger output with external trigger
- Log power and energy, average, statistics, histograms and more with included StarLab application
- LabVIEW VIs, COM Object Interface and ActiveX software included

Smart Sensor to Pulsar to PC

Ophir's 1-4 channel Pulsar interface turns your PC or laptop into a full fledged Ophir multi-channel laser power/energy meter. Just install the software, plug the sensor into the Pulsar and the USB cable from the Pulsar to the PC USB port. With the Pulsar series, you can connect up to 4 sensors to each module, monitor each pulse at up to 25kHz and utilize external trigger.

LabVIEW

Pulsar-4 operating with StarLab software

Specifications

Power Measurement	
Power log period	5s to 500hr.
Energy Measurement	
Max real time data logging to PC	25,000Hz [a]
Trigger input and output	BNC trigger input to enable measurement of missing pulses or to select specific pulses. Can also be configured to give trigger output
Timing	Supports time stamp for each pulse - resolution 1µs
General	
Number of sensors supported	4 / 2 / 1 sensors per unit. Can combine several units with software for display of up to 8 sensors on one PC
Compatible sensors	Supports all standard Ophir pyroelectric, thermal and photodiode sensors [b]
Power supply	12V wall cube power supply plugs into jack on rear. The power supply can be ordered from your local distributor.
Dimensions	189 x 103 x 33mm
Notes:	(a) Limited by the maximum repetition rate of the sensor. At present only the PE9-F can operate up to 25000Hz
	(b) Not including RP, PD300-CIE and BC20 sensors

Ordering Information

Item	Description	Ophir P/N
Pulsar-4	Module to operate up to 4 Ophir sensors from your PC USB port. Comes with software. Max repetition rate for every pulse 25kHz. Has external trigger capability. Powered from wall cube power supply (can be ordered from your local distributor).	7Z01201
Pulsar-2	Same as above but for 2 channels only	7Z01202
Pulsar-1	Same as above but for 1 channel only	7Z01203
Pulsar USB Cable	USB-A to B cable (1 unit supplied with Pulsar)	7E01202
USB Interface (USBI) legacy	Legacy smart sensor to USB interface with similar performance to Juno but larger size. Has analog output. See summary page 112 for specifications	7Z01200

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2.2.4 Quasar Wireless Bluetooth Interface

Straight from your measuring sensor to your laptop or PC with no cables

- Quasar wireless interface connects to any Ophir sensor and broadcasts to your PC
- Wireless range of 10-30 meters depending on surroundings
- Operates from rechargeable battery with typically >40 hours lifetime
- Powerful USB interface with StarLab PC application software included
- Converts your PC into a complete laser power/energy meter
- Log power and energy, average, statistics, histograms and more
- Monitor up to 7 Quasars simultaneously on one PC

Quasar Bluetooth Wireless Sensor to PC Interface

Quasar module connects to any Ophir sensor, thermal, pyroelectric or photodiode

Any PC or laptop connects to Quasar module via Bluetooth adapter and operates as a power/energy meter/data logger

Specification

Sensor Compatibility	All Ophir standard sensors, thermal, photodiode and pyroelectric [a]
Number of Sensors on One PC	Up to 7 Quasars can operate simultaneously and be displayed at the same time on one PC
Operating Range	10-30 meters depending on surroundings when used with built in laptop Bluetooth or Ophir recommended adapter
Power	Powered by rechargeable NiMH battery. Battery life typical 40 hours, 20 hours for pyro sensors. Automatically goes into sleep mode when not connected to PC. Low batt indication. Charges from 12VDC either polarity. The charger can be ordered from your local distributor.
LED Indicator	LED indicator indicates whether connected, in standby or off
Bluetooth Standard	Bluetooth class 1. Connection to PC is transparent to user. Will work with built in laptop Bluetooth and most add on USB to Bluetooth adapters. Ophir recommended USB to Bluetooth adapter Ophir P/N 7E10039 (see table below)
Data Transfer Rate for Pyro Sensors	500Hz
Dimensions	96mm W x 95mm D x 36mm H not including antenna
Connections	15 pin D type sensor connector standard Ophir 12V charger input
Notes:	(a) Not including RP, PD300-CIE and BC20 sensors

Ordering Information

Item	Description	Ophir P/N
Quasar Bluetooth Interface	Module to operate one Ophir sensor from your PC via Bluetooth wireless interface. Comes with software. Max repetition rate for every pulse 500Hz. Powered from built in rechargeable battery. Comes with power supply. Bluetooth adapter required when not available on PC. See next line	7Z01300
USB to Bluetooth adapter	Adapter for PC or Laptop not equipped with built in Bluetooth. This adapter is tested and recommended by Ophir. Quasar is not guaranteed to work with all other adapters on the market	7E10039
Battery Pack for Quasar	Replacement battery pack for Quasar	7E14007

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2.2.5 Summary of Computer Options for Ophir Meters and Interfaces

Communications

With Ophir RS232, USB, Bluetooth and GPIB communication options you can transfer data from the sensor to the PC in real time or offline. You can also control your Ophir power meter from the PC.

- USB standard on Nova II, Vega, StarBright (optional on StarLite) power meters and Juno, Pulsar and USBI PC interfaces
- Bluetooth wireless on the Quasar interface
- RS232 standard with the Laserstar, Nova II, Vega and StarBright optional on the Nova
- GPIB optional with the Laserstar

Ophir Power Meter and Interface Specifications

Model	Nova	Laserstar	Nova II / Vega	StarBright	StarLite	Pulsar-1, 2 or 4	Juno	USB interface (legacy)	Quasar Bluetooth
Communication method	RS232	RS232 / GPIB	USB / RS232	USB / RS232	USB [(c)]	USB	USB	USB	Bluetooth
Power Measurement									
Power log period	5s to 24hr.	12s to 600hr.	12s to 600hr.	1s to 1000hr.	N.A	5s to 500hr.	5s to 500hr.	5s to 500hr.	5s to 500hr.
Max points stored onboard	300	5400	Nova II 5400 Vega 27000	unlimited	N.A	N.A	N.A	N.A	N.A
Max points direct on PC	unlimited	unlimited	unlimited	unlimited	N.A	unlimited	unlimited	unlimited	unlimited
Analog output	1V F.S.	1V F.S.	1V, 2V, 5V, 10V F.S.	1V, 2V, 5V, 10V F.S.	1V F.S.	N.A	N.A	1V F.S.	N.A
Energy Measurement									
Max real time data logging to PC	>10Hz	>30Hz RS232 >1500Hz GPIB[(a)]	>2000Hz USB[(a)] >30Hz RS232	5000Hz USB 30Hz RS232	20Hz [(c)]	25,000Hz [(a)]	10,000Hz [(a)]	2000Hz [(a)]	500Hz
Max onboard data logging rate	>10Hz	>1500Hz [(a)]	4000Hz [(a)]	5000Hz	N.A	N.A	N.A	N.A	N.A
Data transfer rate of a data file from instrument to PC	~50 points/s	~500 points/s	~500 points/s	~500 points/s	N.A	N.A	N.A	N.A	N.A
Max points stored onboard	1000	59,400	Nova II 59,400 Vega 250,000	unlimited	N.A	N.A	N.A	N.A	N.A
Trigger input and output	N.A	N.A	N.A	N.A	N.A	BNC trigger input to enable measurement of missing pulses. Can also be configured to give trigger output	N.A	N.A	N.A
Timing - time stamp for each pulse	N.A	N.A	N.A	resolution 1μs	N.A	resolution 1μs	resolution 10μs	resolution 50ms	resolution 10ms
General									
Automation interface	no	no	yes	yes	yes [(c)]	yes	yes	yes	no
LabVIEW VIs	yes	yes	yes	yes	yes [(c)]	yes	yes	yes	no
Maximum baud rate	19200 [(b)]	38400	38400	115200	N.A	N.A.	N.A.	N.A.	N.A.
PC file format	Text files, spreadsheet compatible ASCII								
Number of sensors supported	One sensor per unit.	One sensor per unit for single channel mode. Two sensors per unit for dual channel mode.	One sensor per unit. Can combine several units with software for display of up to 8 sensors on one PC	One sensor per unit. Can combine several units with software for display of up to 8 sensors on one PC	One sensor per unit. Can combine several units with software for display of up to 8 sensors on one PC	4 / 2 / 1 sensors per unit. Can combine several units with software for display of up to 8 sensors on one PC	One sensor per unit. Can combine several units with software for display of up to 8 sensors on one PC	One sensor per unit. Can combine several units with software for display of up to 8 sensors on one PC	One sensor per unit. Can combine several units with software for display of up to 7 Quasars on one PC
Compatible sensors	Supports most Ophir pyroelectric, thermal and photodiode sensors								
Power supply	Powered from internal rechargeable battery power supply	Powered from internal rechargeable battery power supply	Powered from internal rechargeable battery power supply	Powered from internal rechargeable battery power supply	Powered from internal rechargeable battery power supply	12V wall cube plugs into jack on rear	Powered from USB	Powered from USB	Powered from internal rechargeable battery power supply
Dimensions	205 x 95 x 39mm	228 x 195 x 54mm	208 x 117 x 40mm	213 x 113 x 40mm	213 x 113 x 40mm	189 x 103 x 33mm	76 x 55 x 22mm	155 x 90 x 34mm	96 x 95 x 36mm

Notes:
(a) The above refers to the rate for logging every single point in turbo mode. Above that rate, the instrument will sample points but not log every single point.
(b) For pyroelectric sensors, maximum guaranteed baud rate is 9600.
(c) StarLite must be USB enabled in order to work with StarLab. If your StarLite has not been USB enabled, please contact your Ophir distributor in order to obtain a USB Activation Code.

2.3 Software Solutions

2.3.1 StarLab

StarLab turns your PC into a laser power/energy multi-channel station

Extensive Graphic Display of Data
- Line Plot, Histogram, Bar chart, Simulated Analog Needle
- Multiple data sets on one graph or separate graphs on the same screen

Advanced Measurement Processing
- Power/Energy Density, Scale Factor, Normalize against a reference
- Multi-channel comparisons
- User defined mathematical equations: channels A/B, (A-B)/C etc.
- Position & size measurement with BeamTrack sensors

Data Logging for Future Review
- Can be displayed graphically or saved in text format
- Easily exported to an Excel spreadsheet

Fully supports StarBright, StarLite, Vega, Nova-II, Pulsar, Juno and USBI devices with all standard Ophir sensors

Flexible Display Options with StarLab

Choose which channels to display
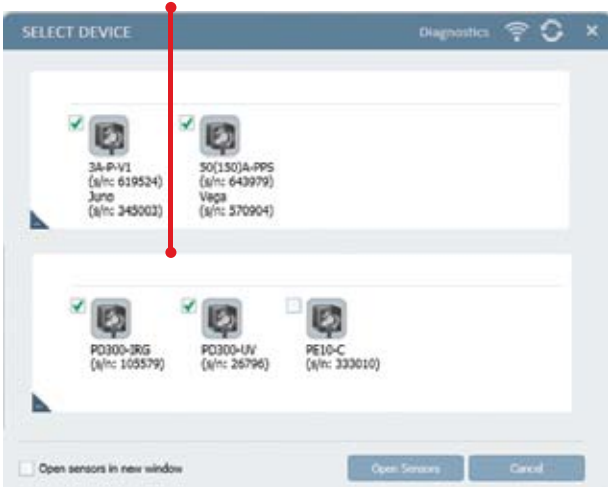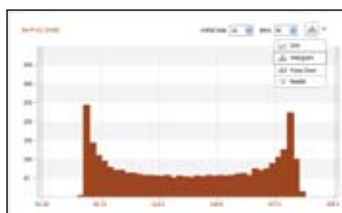

Setup screen
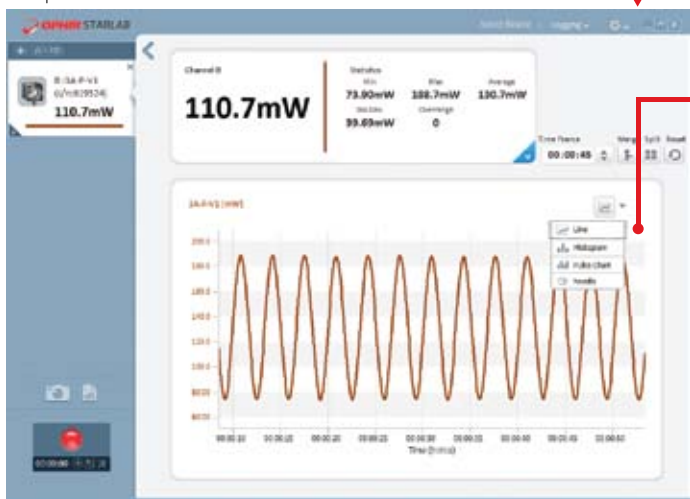
One of the above screens is maximized

You may choose to display them separately

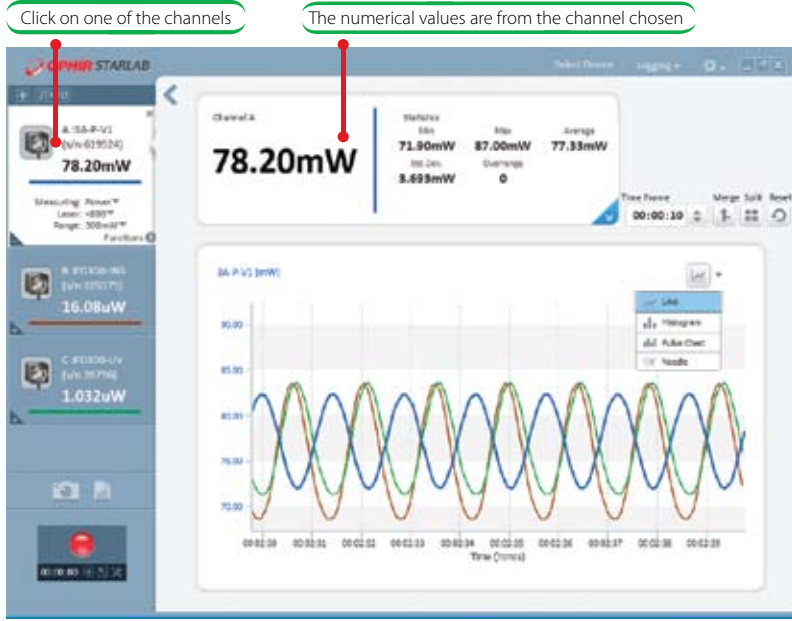Maximize one of the sources
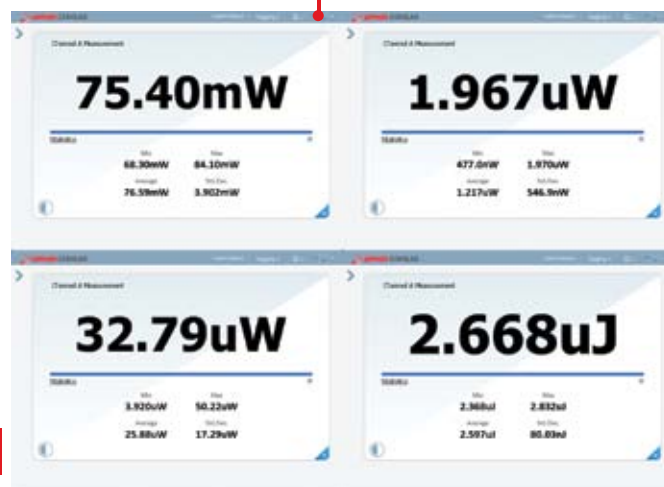
Choose line graph

or histogram

or needle display

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Multiple Sensors displayed together

Click on one of the channels

The numerical values are from the channel chosen

Here multi line graph display has been chosen

Settings and functions may be opened to adjust then minimized as needed

Additional functions are avilable from the "Functions" tab
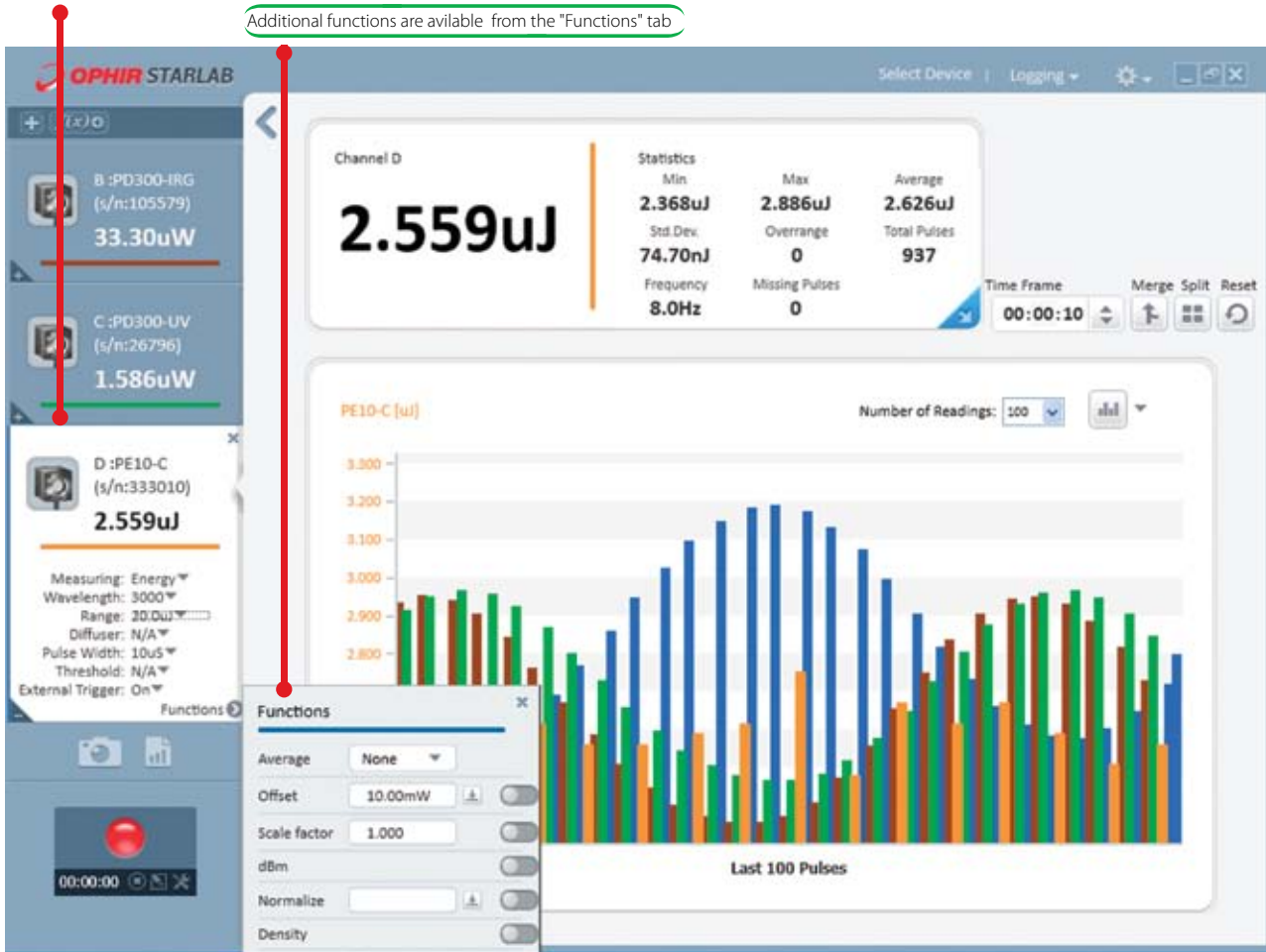
Here multi line histogram display has been chosen

Functions and Logging

Functions

Click on f(x) to open another trace combining measured values

Define function combining measured values

New trace is now added per defined function

Logging

Click on log button and logging of values starts

Files are stored here. They may be viewed graphically OR numerically


```
;PC Software:StarLab Version 3.00 Build 19
;Logged:25/05/2014 at 09:33:22
;Channel B:Vega Thermopile 3A-P-V1 (s/n:999999)  VG2.31 (s/n:657028)
;Channel A:Juno Photodiode PD300 (s/n:694646)  JN1.24 (s/n:606180)
;Math M:(A-B)^2

;Channel B:statistics
;Min:3.440mw
;Max:12.22mw
;Average:7.882mw
;Std.Dev.:3.078mw
;Overrange:0
;First Pulse Arrived : 25/05/2014 at 09:33:22.562000
Timestamp    Channel B      F(B)       Channel A    Math M
    0.000    1.762e-002    6.620e-003
    0.064    1.836e-002    7.360e-003
    0.128    1.911e-002    8.110e-003
    0.136                              1.067e-002   6.554e-006
    0.193    1.986e-002    8.860e-003
    0.203                              8.480e-003   1.444e-007
    0.256    2.057e-002    9.570e-003
    0.269                              6.540e-003   9.181e-006
    0.321    2.123e-002    1.023e-002
    0.354                              4.900e-003   2.841e-005
    0.384    2.182e-002    1.082e-002
    0.406                              3.550e-003   5.285e-005
    0.449    2.232e-002    1.132e-002
    0.865    2.291e-002    1.191e-002
    0.870                              3.400e-004   1.339e-004
    0.928    2.258e-002    1.158e-002
    0.936                              3.600e-004   1.259e-004
    0.993    2.216e-002    1.116e-002
    1.003                              4.800e-004   1.141e-004
    1.056    2.164e-002    1.064e-002
    1.070                              7.600e-004   9.761e-005
    1.120    2.104e-002    1.004e-002
    1.136                              1.340e-003   7.569e-005
    1.184    2.038e-002    9.380e-003
    1.203                              2.370e-003   4.914e-005
    1.664    1.558e-002    4.580e-003
```
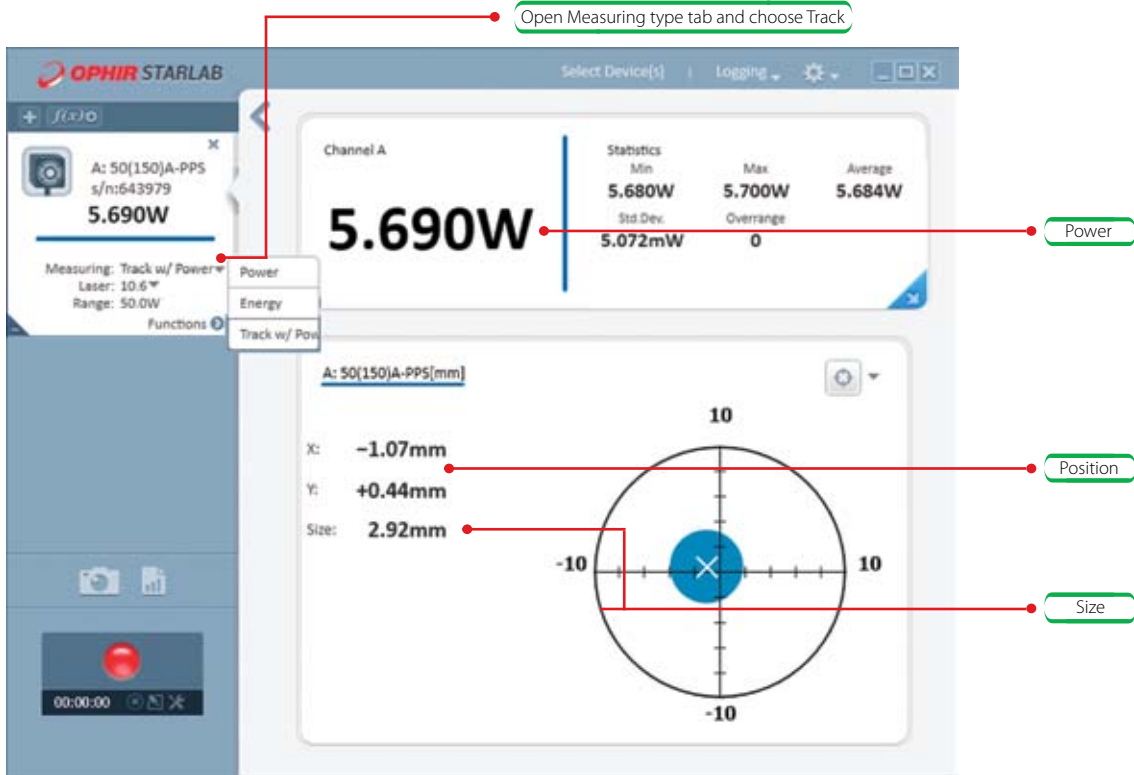
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BeamTrack Power/Position/Size Screens

Open Measuring type tab and choose Track

Power

Position

Size

Power / Position / Size screen

Click on this tab and choose "stability"

Position stability screen

Displays beam center wander weighted for dwell time at each position

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2.3.2 System Integrator Solutions

Besides their use as stand-alone, fully featured laser power/energy meters, Ophir devices are easily incorporated into larger end-user applications. This allows system integrators to leverage Ophir's excellence in measurement capabilities with legacy analysis packages.

Communication Protocols

All Ophir devices support one or two forms of communication with the PC.

Device	RS232	USB	GPIB	Bluetooth
Vega	●	●		
Nova II	●	●		
StarBright	●	●		
StarLite*		●		
LaserStar	●		●	
Nova	●			
Quasar				●
Juno		●		
USB Interface		●		
Pulsar		●		

* With USB activation code

USB

Ophir provides a common interface for communication and control of all of our USB speaking devices. OphirLMMeasurement is a COM object that is included as part of the StarLab installation (StarLab 2.10 and higher) that allows the system integrator to take control of the StarBright, StarLite, Juno, Nova-II, Pulsar, USBI and Vega devices; integrating them into his in-house measurement and analysis package.

For communication via USB, device drivers and additional support software must be installed on your PC. These components are installed as part of the StarLab application's installation process.

RS232

RS232 communication is the simplest to integrate into your Customized Solutions (OEM) application. Integrated Development Environments (IDE's) such as Microsoft Visual Studio provide functions and methods for accessing the PC's com port.

The following is all that you need to get your RS232 applications up and running
- Appendix A5 of the StarCom User Manual (P/N 1J06025) contains an alphabetical listing and detailed description of all commands available with the StarBright, Nova, Nova-II, Vega and LaserStar devices.
- Appendix A4 of the StarCom User Manual (P/N 1J06025) gives an example of polling the Nova device for measurements. This was written in VB6.
- An appropriate RS232 assembly.
- Nova RS232 Assembly (P/N 7Y78105[a]) for use with the Nova device.
- Nova II / Vega RS232 cable (P/N 7E01206) for use with the Nova-II and Vega devices (included with the Nova II / Vega).
- LaserStar RS232 cable (P/N 7E01121, included with the LaserStar).
- StarBright RS232 cable (P/N 7E01213, included with the StarBright).

GPIB

Besides RS232, the LaserStar can also communicate via GPIB (IEEE 488.1). Using the SDK supplied by the vendor of your GPIB controller hardware, a LaserStar IEEE cable (P/N 7Y78300[b]) and the StarCom User Manual, you can integrate the LaserStar into your GPIB solution.

Bluetooth

Bluetooth system integration for the Quasar is easily accomplished, in a similar way to our RS232 devices. For more information (and a list of commands), please contact Ophir.

2.3.2 Power Meters

System Integrators will need the following components:

- OphirLMMeasurement COM Object.pdf. lists and describes the methods and events available for configuring, controlling and uploading measurements from Ophir devices.
- OphirLMMeasurement.dll. COM object component developed and supplied by Ophir for communication with the StarBright, StarLite, Juno, Nova-II, Pulsar, USBI and Vega devices. The COM object is registered when the application is installed. OphirLMMeasurement COM Object.pdf describes how to register it on another PC where the Ophir application has not been installed.
- Standard USB cable for use with the Pulsar and USBI devices (included).
- Standard mini-B USB cable for use with the Juno device (included).
- Nova II / Vega USB cable (P/N 7E01205) for use with the Nova-II and Vega devices (included with the Nova II / Vega).

Ophir provides example projects of COM Object clients in VC#, VB.NET and LabVIEW. These are found in the Automation Examples subdirectory of our StarLab PC Application.

Note: The OphirFastX (for Pulsar devices) as well as the OphirUsbX (for Nova-II, USBI and Vega devices) ActiveX packages are included with the StarLab installation so as to not disrupt legacy Customized Solutions (OEM) installations by customers. However, new features will not be added to them. For new designs, we highly recommend using OphirLMMeasurement.
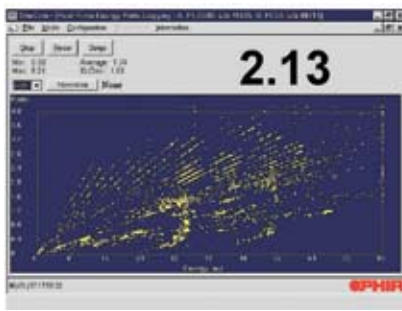
Note: (a) P/N 7Y78105 replaces P/N 78105
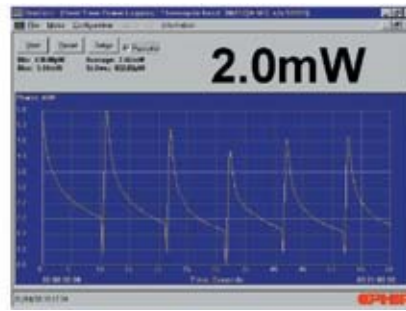Note: (b) P/N 7Y78300 replaces P/N 78300

2.3.3 StarCom

This software is supplied with the Nova II, Laserstar, Vega and Nova with RS232 option. It allows you to measure, analyze and record power and energy from any Ophir sensor.
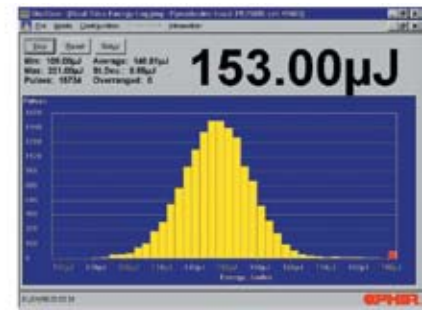You can log the data from each sensor simultaneously to file.

Plot of ratio of energy B/A vs. energy A

Plot of power vs. time

Histogram plot of energy distribution

2.3.4 LabVIEW Solutions

Ophir has long recognized the growing LabVIEW community of developers. For over 10 years, we have been providing LabVIEW libraries for all of our devices. These are full open-source applications that can be used as is or tailored by the LabVIEW programmer to his specific needs.

These starter applications are basic software only that allows the LabVIEW programmer to experiment freely to fully feel the strength of our devices' respective command sets.

These applications contain VIs (Virtual Instruments) to control the instrument. You can combine VIs to create successively larger and more versatile larger VIs by simply connecting them together. Users can create sophisticated, custom applications in minutes. In most cases, applications can be built and tested even before the instrument even arrives. The versatility of these tools is limitless.

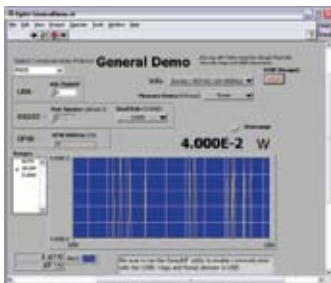All of our LabVIEW libraries can be downloaded from our web site: www.ophiropt.com
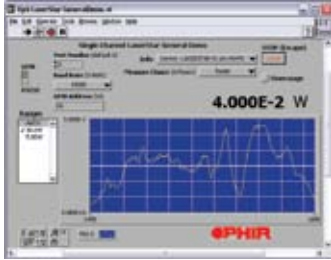
VI Libraries
Ophnova.llb
Library supplied for use with the Nova. Communication is in RS232 and is based on NI-VISA.

Ophlstrd.llb
Library supplied for use with the Dual-Channel LaserStar. Communication can be set to RS232 or GPIB and is based on NI-VISA.

OphInstr.llb
This library can be configured to work with the Nova-II, Vega, USB Interface or Single-Channel LaserStar devices. It can also work with the Juno with a Thermopile or Photodiode sensors. It can be set to RS232, USB or GPIB. It is based on NI-VISA for all 3 communication protocols. Therefore to work with it in USB, first run the **SwapINF** utility that we provide to configure your PC to replace the USB drivers supplied by Ophir with drivers supplied by National Instruments.

LabVIEW COM Demo.llb
Library supplied for use with all of our USB speaking devices (StarBright, StarLite, Juno, Nova-II, Pulsar, USBI, Vega). Makes use of our COM object. Included with our StarLab application.