# Pulsed Laser Power Measurement Systems


## Accurate, reproducible tool for hard to measure VCSELs and lasers

**Ideal for beam power measurement**
Labsphere's Pulsed Laser Power Measurement Systems ensure an accurate, reproducible method of determining the total power from a collimated or divergent laser or laser diode. Specifically designed for laser applications, the spheres are ideal for measuring the total power of a beam of optical radiance. Because of the unique geometry of the sphere, beam power measurements are independent of beam polarization, and are insensitive to beam alignment.

The attenuation which accompanies the sphere throughput also alleviates detector saturation. The systems can be used with an open port and can be apertured with an array of optional fiber adaptors for laser diode modules or port reducers.

**Flexible design**
Each system consists of a laser power measurement sphere, post, post holder and base assembly, a detector assembly, and multi-wavelength calibration. A second detector port gives the user the flexibility to add an additional detector assembly for broader spectral sensitivity, or add a spectrometer for spectral characterization.

An input port that permits a beam of radiation is machined into the sphere. A detector, located just off the entrance port, views the sphere wall next to the entrance port. The field of view of the detector is designed to limit the viewing area so that highly divergent sources may be input without effecting measurement accuracy.

The systems provide options for laser power measurement over the 350 to 1700 nm wavelength region for optical powers ranging from nW to tens of watts. The system's calibrations are traceable to the National Institute of Standards and Technology (NIST).

The 2, 4, or 6 inch diameter integrating spheres are coated with Labsphere's Spectraflect® or Infragold®, or fabricated from Spectralon®, our highly reflective diffuse material. All options are durable and highly stable over time. These diffuse reflective interiors ensure the accurate integration of light.

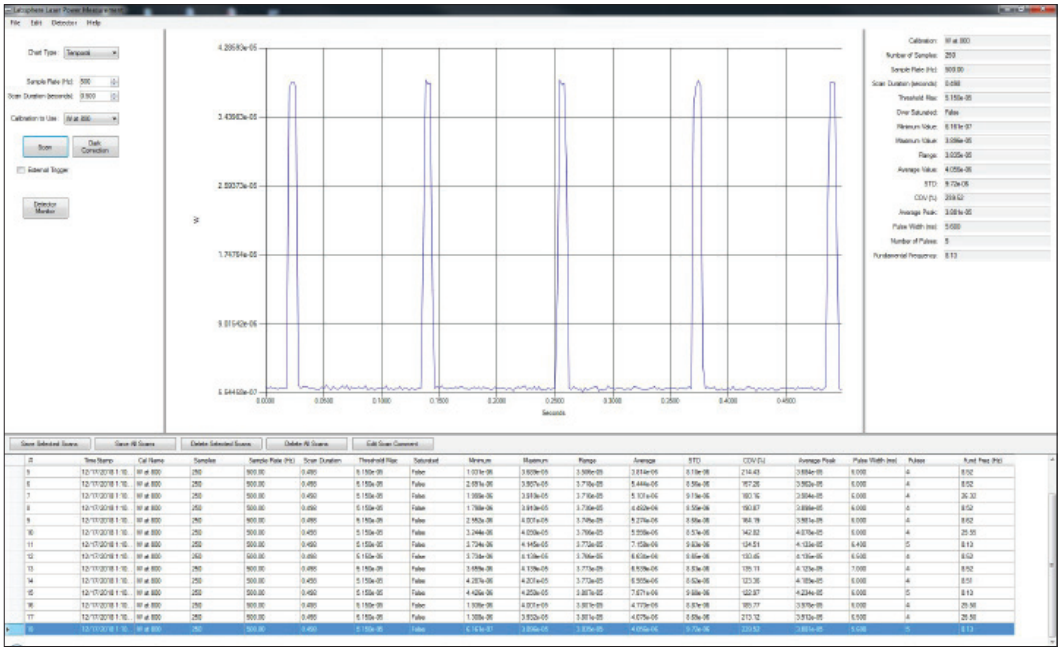
### Value:

- Spectraflect, Infragold or Spectralon sphere interiors for reduced alignment sensitivity
- Sturdy port frames for mounting fiber accessories
- Second detector port for a spectrometer or additional fiber
- Three integrating sphere size options
- Two detector options
- NIST traceable system calibrations

### Measures:

- VCSELs
- Lasers
- Laser diodes
- Laser diode modules
- Pulsed laser
- Divergent monochromatic sources

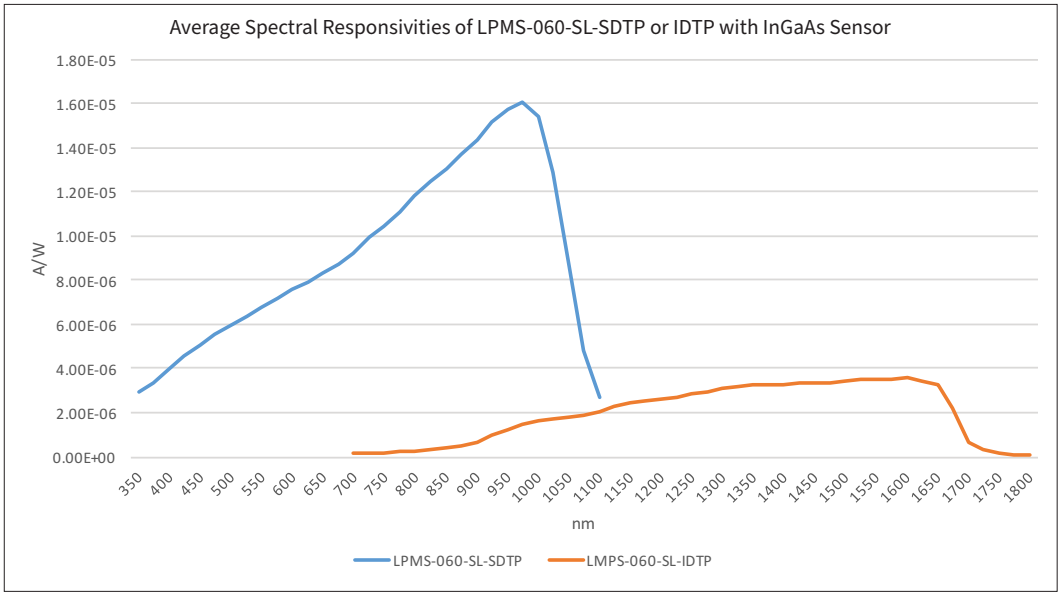

 



Example of Labsphere's Laser Power Measurement Software

## Reported values include:

- Average Radiant Power at nth wavelength (CW)
- Average Peak Radiant Power at nth wavelength (pulsed)
- COV (CW)
- Detector Sampling Rate (Hz)
- Detector Scan Interval (sec)
- Laser Power Density: the instantaneous laser beam power per unit area. W/cm$^2$ with option to beam area in cm$^2$ Require input of beam area
- Max Power (CW)
- Min Power (CW)
- Overrange Warning
- Peak Radiant Power (Pulsed)
- Pulse width or interval of duration of a pulse
- Radiant Power Range (CW)
- Radiant Power (W)
- Repetition Rate/Frequency (Pulsed)
- Standard Deviation (CW)
- Threshold Max for given LPMS detector sensitivity range and system responsivity
- Threshold Min for given LPMS detector sensitivity range and system responsivity
- Total Measurement Time: not necessarily the same as the laser emission duration during the measurement. sec
- Total Pulses
- Wavelength (chosen by customer based on laser output and data table from calibration



## For lower power VIS NIR lasers

| **Model Number:** | **LPMS-020-SF-SDTP** | **LPMS-040-SF-SDTP** | **LPMS-060-SF-SDTP** |
|---|---|---|---|
| **Order Number:** | **AA-01548-100** | **AA-01551-100** | **AA-01554-100** |
| Sphere Material: | Spectraflect | Spectraflect | Spectraflect |
| Sphere Diameter: | 2 inch | 4 inch | 6 inch |
| Sphere Entrance Port Diameter: (port frame) | 0.5 inch | 1.0 inch | 1.0 inch |
| Sphere Sensor Port: (nominal) | 2, 0.5 inch port frames | 2, 0.5 inch port frames | 2, 0.5 inch port frames |
| Sensor: | Silicon | Silicon | Silicon |
| Spectral Range: (nm) | 350 – 1100 | 350 – 1100 | 350 – 1100 |
| Spectral Peak: (nm) | 975 | 975 | 975 |
| Spectral Responsivity: (A/W) | 5.69E-04 @ 975 nm | 1.42E-04 @ 975 nm | 6.33E-05 @ 975 nm |
| Minimum Power at 975 nm: | 1.8 nW | 7.0 nW | 1.6 nW |
| Maximum Power at 975 nm: | 1.8 W | 7 W | 16 W |
| Sampling Rate: | Low 10Hz, High: 5000Hz | Low 10Hz, High: 5000Hz | Low 10Hz, High: 5000Hz |
| Date Recording Rate: | 5kHz with internal sample rate of 20kHz | 5kHz with internal sample rate of 20kHz | 5kHz with internal sample rate of 20kHz |
| Recording Interval: | 0.1 to 0.0002 sec | 0.1 to 0.0002 sec | 0.1 to 0.0002 sec |
| Triggering: | 5V TTL female BNC | 5V TTL female BNC | 5V TTL female BNC |
| Computer Interface: | USB-A | USB-A | USB-A |
| Power Requirements: | USB-A, 5V | USB-A, 5V | USB-A, 5V |
| Operating Temperature: | 20° – 40° C | 20° – 40° C | 20° – 40° C |

## For mid-power lasers in VIS NIR, more robust

| **Model Number:** | **LPMS-020-SL-SDTP** | **LPMS-040-SL-SDTP** | **LPMS-060-SL-SDTP** |
|---|---|---|---|
| **Order Number:** | **AA-01549-100** | **AA-01552-100** | **AA-01555-100** |
| Sphere Material: | Spectralon | Spectralon | Spectralon |
| Sphere Diameter: | 2 inch | 4 inch (I.D.) | 6 inch (I.D.) |
| Sphere Entrance Port Diameter: (port frame) | 0.5 inch | 1.0 inch | 1.0 inch |
| Sphere Sensor Port: (nominal) | 2, 0.5 inch port frames | 2, 0.5 inch port frames | 2, 0.5 inch port frames |
| Sensor: | Silicon | Silicon | Silicon |
| Spectral Range: (nm) | 350 – 1100 | 350 – 1100 | 350 – 1100 |
| Spectral Peak: (nm) | 975 | 975 | 975 |
| Spectral Responsivity: (A/W) | 9.66E-05 @ 975 nm | 3.55E-05 @ 975 nm | 5.05E-06 @ 975 nm |
| Minimum Power at 975 nm: | 10 nW | 28 nW | 20 nW |
| Maximum Power* at 975 nm: | 10 W | 28 W | 20 W |
| Sampling Rate: | Low 10Hz, High: 5000Hz | Low 10Hz, High: 5000Hz | Low 10Hz, High: 5000Hz |
| Date Recording Rate: | 5kHz with internal sample rate of 20kHz | 5kHz with internal sample rate of 20kHz | 5kHz with internal sample rate of 20kHz |
| Recording Interval: | 0.1 to 0.0002 sec | 0.1 to 0.0002 sec | 0.1 to 0.0002 sec |
| Triggering: | 5V TTL female BNC | 5V TTL female BNC | 5V TTL female BNC |
| Computer Interface: | USB-A | USB-A | USB-A |
| Power Requirements: | USB-A, 5V | USB-A, 5V | USB-A, 5V |
| Operating Temperature: | 20° – 40° C | 20° – 40° C | 20° – 40° C |

* Actual maximum power based on thermal limits of sphere coating and/or material. Contact our sales engineers for further information.

## For lower power NIR lasers

| **Model Number:** | **LPMS-020-SF-IDTP** | **LPMS-040-SF-IDTP** | **LPMS-060-SF-IDTP** |
|---|---|---|---|
| **Order Number:** | **AA-01548-400** | **AA-01551-400** | **AA-01554-400** |
| Sphere Material: | Spectraflect | Spectraflect | Spectraflect |
| Sphere Diameter: | 2 inch | 4 inch | 6 inch |
| Sphere Entrance Port Diameter: (port frame) | 0.5 inch | 1.0 inch | 1.0 inch |
| Sphere Sensor Port: (nominal) | 2, 0.5 inch port frames | 2, 0.5 inch port frames | 2, 0.5 inch port frames |
| Sensor: | InGaAs | InGaAs | InGaAs |
| Spectral Range: (nm) | 800 - 1700 | 800 - 1700 | 800 - 1700 |
| Spectral Peak: (nm) | 1300 | 1300 | 1300 |
| Spectral Responsivity: (A/W) | 9.43E-05 @ 1300 nm | 1.87E-05 @ 1300 nm | 1.05E-05 @ 1300 nm |
| Minimum Power at 1300 nm: | 10 nW | 50 nW | 100 nW |
| Maximum Power* at 1300 nm: | 10 W | 50 W | 100 W |
| Sampling Rate: | Low 10Hz, High: 5000Hz | Low 10Hz, High: 5000Hz | Low 10Hz, High: 5000Hz |
| Date Recording Rate: | 5kHz with internal sample rate of 20kHz | 5kHz with internal sample rate of 20kHz | 5kHz with internal sample rate of 20kHz |
| Recording Interval: | 0.1 to 0.0002 sec | 0.1 to 0.0002 sec | 0.1 to 0.0002 sec |
| Triggering: | 5V TTL female BNC | 5V TTL female BNC | 5V TTL female BNC |
| Computer Interface: | USB-A | USB-A | USB-A |
| Power Requirements: | USB-A, 5V | USB-A, 5V | USB-A, 5V |
| Operating Temperature: | 20° – 40° C | 20° – 40° C | 20° – 40° C |

## For mid-power lasers in NIR, more robust

| **Model Number:** | **LPMS-020-SL-IDTP** | **LPMS-040-SL-IDTP** | **LPMS-060-SL-IDTP** |
|---|---|---|---|
| **Order Number:** | **AA-01549-400** | **AA-01552-400** | **AA-01555-400** |
| Sphere Material: | Spectralon | Spectralon | Spectralon |
| Sphere Diameter: | 2 inch | 4 inch (I.D.) | 6 inch (I.D.) |
| Sphere Entrance Port Diameter: (port frame) | 0.5 inch | 1.0 inch | 1.0 inch |
| Sphere Sensor Port: (nominal) | 2, 0.5 inch port frames | 2, 0.5 inch port frames | 2, 0.5 inch port frames |
| Sensor: | InGaAs | InGaAs | InGaAs |
| Spectral Range: (nm) | 800 - 1700 | 800 - 1700 | 800 - 1700 |
| Spectral Peak: (nm) | 1600 | 1600 | 1600 |
| Spectral Responsivity: (A/W) | 2.49E-05 @ 1600 nm | 9.16E-06 @ 1600 nm | 3.55E-06 @ 1600 nm |
| Minimum Power at 1600 nm: | 40 nW | 109 nW | 50 nW |
| Maximum Power* at 1600 nm: | 40 W | 109 W | 50 W |
| Sampling Rate: | Low 10Hz, High: 5000Hz | Low 10Hz, High: 5000Hz | Low 10Hz, High: 5000Hz |
| Date Recording Rate: | 5kHz with internal sample rate of 20kHz | 5kHz with internal sample rate of 20kHz | 5kHz with internal sample rate of 20kHz |
| Recording Interval: | 0.1 to 0.0002 sec | 0.1 to 0.0002 sec | 0.1 to 0.0002 sec |
| Triggering: | 5V TTL female BNC | 5V TTL female BNC | 5V TTL female BNC |
| Computer Interface: | USB-A | USB-A | USB-A |
| Power Requirements: | USB-A, 5V | USB-A, 5V | USB-A, 5V |
| Operating Temperature: | 20° – 40° C | 20° – 40° C | 20° – 40° C |

* Actual maximum power based on thermal limits of sphere coating and/or material. Contact our sales engineers for further information.

# For high-power lasers in NIR, higher heat threshold, robust

| **Model Number:** | **LPMS-040-IG-IDTP** | **LPMS-060-IG-IDTP** |
|---|---|---|
| **Order Number:** | **AA-01550-400** | **AA-01553-400** |
| Sphere Material: | Infragold | Infragold |
| Sphere Diameter: | 4 inch | 6 inch |
| Sphere Entrance Port Diameter: (port frame) | 1.0 inch | 1.0 inch |
| Sphere Sensor Port: (nominal) | 2, 0.5 inch port frames | 2, 0.5 inch port frames |
| Sensor: | InGaAs | InGaAs |
| Spectral Range: (nm) | 800 - 1800 | 800 - 1800 |
| Spectral Peak: (nm) | 1600 | 1600 |
| Spectral Responsivity: (A/W) | 3.41E-06 @ 1600 nm | 1.52E-06 @ 1600 nm |
| Minimum Power at 1600 nm: | 290 nW | 659 nW |
| Maximum Power* at 1600 nm: | 290 W | 659 W |
| Sampling Rate: | Low 10Hz, High: 5000Hz | Low 10Hz, High: 5000Hz |
| Date Recording Rate: | 5kHz with internal sample rate of 20kHz | 5kHz with internal sample rate of 20kHz |
| Recording Interval: | 0.1 to 0.0002 sec | 0.1 to 0.0002 sec |
| Computer Interface: | USB-A | USB-A |
| Power Requirements: | USB-A, 5V | USB-A, 5V |
| Operating Temperature: | 20° – 40° C | 20° – 40° C |

* Actual maximum power based on thermal limits of sphere coating and/or material. Contact our sales engineers for further information.

# Ordering Information

| Model Number | Description | Order Number |
|---|---|---|
| LPMS-020-SF-IDTP | Spectraflect 2 inch, 3 port CW and pulsed laser power measurement system with high speed InGaAs detector and control software and UI 800 nm to 1700 nm every 10 nm. Watts at X nm | AA-01548-400 |
| LPMS-020-SF-SDTP | Spectraflect 2 inch, 3 port CW and pulsed laser power measurement system with high speed Silicon detector and control software and UI 350 nm to 1100 nm every 10 nm. Watts at X nm | AA-01548-100 |
| LPMS-020-SL-IDTP | Spectralon 2 inch, 3 port CW and pulsed laser power measurement system with high speed InGaAs detector and control software and UI 800 nm to 1700 nm every 10 nm. Watts at X nm | AA-01549-400 |
| LPMS-020-SL-SDTP | Spectralon 2 inch, 3 port CW and pulsed laser power measurement system with high speed Silicon detector and control software and UI 350 nm to 1100 nm every 10 nm. Watts at X nm | AA-01549-100 |
| LPMS-040-IG-IDTP | Infragold 4 inch, 3 port CW and pulsed laser power measurement system with high speed InGaAs detector and control software and UI 800 nm to 1700 nm every 10 nm. Watts at X nm | AA-01550-400 |
| LPMS-040-SF-IDTP | Spectraflect 4 inch, 3 port CW and pulsed laser power measurement system with high speed InGaAs detector and control software and UI 800 nm to 1700 nm every 10 nm. Watts at X nm | AA-01551-400 |
| LPMS-040-SF-SDTP | Spectraflect 4 inch, 3 port CW and pulsed laser power measurement system with high speed Silicon detector and control software and UI  350 nm to 1100 nm every 10 nm. Watts at X nm | AA-01551-100 |
| LPMS-040-SL-IDTP | Spectralon 4 inch, 3 port CW and pulsed laser power measurement system with high speed InGaAs detector and control software and UI 800 nm to 1700 nm every 10 nm. Watts at X nm | AA-01552-400 |
| LPMS-040-SL-SDTP | Spectralon 4 inch, 3 port CW and pulsed laser power measurement system with high speed Silicon detector and control software and UI  350 nm to 1100 nm every 10 nm. Watts at X nm | AA-01552-100 |
| LPMS-060-IG -IDTP | Infragold 6 inch, 3 port CW and pulsed laser power measurement system with high speed InGaAs detector and control software and UI 800 nm to 1700 nm every 10 nm. Watts at X nm | AA-01553-400 |
| LPMS-060-SF-IDTP | Spectraflect 6 inch, 3 port CW and pulsed laser power measurement system with high speed InGaAs detector and control software and UI 800 nm to 1700 nm every 10 nm. Watts at X nm | AA-01554-400 |
| LPMS-060-SF-SDTP | Spectraflect 6 inch, 3 port CW and pulsed laser power measurement system with high speed Silicon detector and control software and UI 350 nm to 1100 nm every 10 nm. Watts at X nm | AA-01554-100 |
| LPMS-060-SL-IDTP | Spectralon 6 inch, 3 port CW and pulsed laser power measurement system with high speed InGaAs detector and control software and UI 800 nm to 1700 nm every 10 nm. Watts at X nm | AA-01555-400 |
| LPMS-060-SL-SDTP | Spectralon 6 inch, 3 port CW and pulsed laser power measurement system with high speed Silicon detector and control software and UI 350 nm to 1100 nm every 10 nm. Watts at X nm | AA-01555-100 |
| SDA-050-HS1 | Silicon detector assembly - high speed. Mounts on PF-050 0.5 inch port frame | AS-81067-000 |
| IDA-050-HS1 | Silicon detector assembly - high speed. Mounts on PF-050 0.5 inch port frame | AS-81067-001 |

# Optional Accessories

| | | |
|---|---|---|
| SMA-050-SF/SL | Adaptor, SMA, 0.5”, SF/SL | AS-02428-004 |
| SMA-100-SF/SL | Adaptor, SMA, 1.0”, SF/SL | AS-02428-008 |
| SMA-050-IG | Adaptor, SMA, 0.5”, Infragold | AS-02432-004 |
| SMA-100-IG | Adaptor, SMA, 1.0”, Infragold | AS-02432-008 |
| SMA-050-FB | Adaptor, SMA, 0.5”, Flat Black | AS-02436-004 |
| SMA-100-FB | Adaptor, SMA, 1.0”, Flat Black | AS-02436-008 |
| LPMS-SDA-UG | Upgrade kit: Silicon detector and preamp, port frame adaptor, aperture/filter holder and LPMS software | AA-01575-000 |
| LPMS-IDA-UG | Upgrade kit: InGaAs detector and preamp, port frame adaptor, aperture/filter holder and LPMS software | AA-01576-000 |