

MEASUREMENT PROTOCOL
Intercomparison of Spectral Responsivity of Photodiodes in the Near Infrared

Wavelength Range: 900 nm - 1600 nm.

Transfer artifacts: 5 mm diameter InGaAs photodiodes (sapphire window).

Photodiodes are mounted in 50.8 mm diameter circular holders with a BNC connection on the back plate. Serial numbers are engraved on the mounts for record-keeping.

The diodes are temperature monitored, not temperature controlled. A thermistor has been included in the mount in close proximity to the photodiode to monitor the temperature.

Two bnc connections are provided on the back plate to record the signal and the thermistor. We request that the thermistor resistance be recorded for each measurement.

Measurement:

Three photodiodes will be sent to each participating laboratory.

Laboratories are asked to make three independent measurements of each diode, for a total of nine spectral responsivity measurements over the range from 900 - 1600 nm. We would request spectral responsivity measurements every 50 nm. The independent measurements of each diode should be separated in time by at least one day. An incoherent source, with incident power in the range for 1 μ W to 100 μ W and a beam diameter of 1 mm to 3 mm, is recommended.

Prior to being sent to participating laboratories, each diode will be measured at NIST for spectral responsivity every 5 nm and spectral responsivity uniformity at 900 nm, 1250 nm, and 1600 nm. Upon their return to NIST at each stage in the intercomparison, each diode will again be measured for spectral responsivity. At the end of the intercomparison, each diode will be measured for spectral responsivity and spectral responsivity uniformity.

Two additional sets of three diodes will remain at NIST during the intercomparison. One set will remain at NIST as a control; the other set will be available for distribution should problems with individual diodes arise. They will also be measured at each stage of the intercomparison.

Data:

We would request that the data be attached to an e-mail sent to the NIST contact person upon completion of the measurements and also placed on a floppy disk and mailed back to NIST with the photodiodes.

We would request the following information and format for the data file(s).

Data Format: A total of 7 columns of tab-delimited ASCII text files data for each diode. Individual columns of data should be: wavelength, first responsivity measurement, uncertainty, second responsivity measurement, uncertainty, third responsivity measurement, uncertainty.

Units: Wavelength in nm, Responsivity in A/W, Standard Uncertainty in %.

The data files should look like the following:

Header:

Filename:

Laboratory Name:

Contact Person:

E-mail Address:

Phone:

FAX:

Description of measurements (include reference to any publications describing the facility):

Base of the scale:

Source:

Bandpass (nm):

Beam Size (on the photodetector surface):

Beam Geometry:

Diode 1 S/N:

| | | | | |
|-----------------|---|---|---|---|
| Meas. Date: | 1 | 2 | 3 | |
| Temperature: | 1 | 2 | 3 | |
| Incident Power: | | 1 | 2 | 3 |

Comments:

Data:

| | | | | | | |
|----|----|-------|----|-------|----|-------|
| WL | R1 | u(R1) | R2 | u(R2) | R3 | u(R3) |
|----|----|-------|----|-------|----|-------|

Diode 2 S/N:

| | | | | |
|-----------------|---|---|---|---|
| Meas. Date: | 1 | 2 | 3 | |
| Temperature: | 1 | 2 | 3 | |
| Incident Power: | | 1 | 2 | 3 |

Comments:

Data:

| | | | | | | |
|----|----|-------|----|-------|----|-------|
| WL | R1 | u(R1) | R2 | u(R2) | R3 | u(R3) |
|----|----|-------|----|-------|----|-------|

Diode 3 S/N:

| | | | | |
|-----------------|---|---|---|---|
| Meas. Date: | 1 | 2 | 3 | |
| Temperature: | 1 | 2 | 3 | |
| Incident Power: | | 1 | 2 | 3 |

Comments:

Data:

| | | | | | | |
|----|----|-------|----|-------|----|-------|
| WL | R1 | u(R1) | R2 | u(R2) | R3 | u(R3) |
|----|----|-------|----|-------|----|-------|