



SP920s-1550 APPLICATION NOTE

SWIR lasers beam Profiling

Increasing usage of SWIR lasers in various devices and applications requires beam profiling as part of the laser operation diagnostics process.

SWIR lasers and especially 1550nm laser, being eye safe, provide the high contrast required for high resolution imaging, thus 1550nm light sources are frequently employed in LIDAR for sensing and range finding applications. Those devices frequently require field, on-site characterization of the laser beam. Due to the high transmittance properties of optical fibers at those wavelengths, 1550 nm lasers are often used in telecommunication devices.

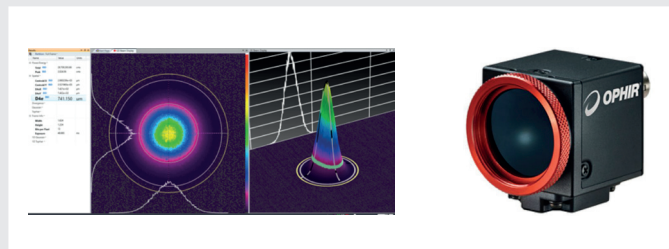
In addition, they are widely used in research and science applications and industrial measurements.

Beam Profiling

Beam profiling is often required as a diagnostics tool to track the profile stability of laser and other light sources for 1550nm and other SWIR wavelengths.

As standard CCD beam profilers are unable to detect wavelengths above 1100 nm, Ophir offers a line of cameras, having a phosphor coating on a standard silicon CCD sensor. This coating is designed to absorb 1440-1605 nm incident photons and emit visible photon towards the CCD, thus creating a beam profile for SWIR wavelengths.

Ophir has recently introduced new model of Phosphor coated CCD Beam Profiler - SP920s-1550.



BeamGage image of Beam Profile of 1550nm laser

SP920s-1550 : just 29x29x29.5mm in size

Compared to other Ophir beam profilers, the CCD resolution is less due to partial photon leakage to neighboring pixels and thus causing some smearing of the image. Therefore, if ISO standard beam profiling is required, the beam size should be at least 600µm. Smaller beams are also measurable but with lower

accuracy compared to Ophir InGaAs sensor cameras or Ophir NanoScan (scanning slit) beam analyzers. However, in case of smaller or focused beams, the SP920s-1550 can be used in combination with the X4 Beam Expander, thus reducing minimal size of analyzed beam to just 150µm.



SP920s-1550 camera equipped with X4 Beam Expander to provide ISO beam profiling and good resolution for narrow and focused laser beams.

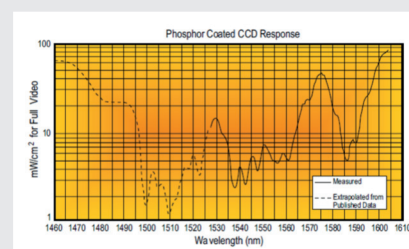
In case better resolution and more accurate measurements are required, Ophir offers InGaAs cameras. However, they are less affordable and, in some regions restricted, by ITAR (International Treaty and Arms Regulations due to military usage capability). Phosphor coated cameras, being less accurate are mostly used to track for laser stability and beam profile form.

A combination of the very compact design of the SP920s-1550 (just 29 x 29 x 29.5 mm) and affordability, enables it to be used in field service and even integrated inside systems equipped with SWIR lasers, VCSELs or other light sources used in remote sensing applications.

The usage of the SP920s-1550 camera is similar to any other Ophir camera, with the only difference that the gamma correction in the BeamGage should be set to 1.95 at: "Source" Tab to correct non-linear response of the coating.

Sensitivity at Other Wavelengths

Although 1550 nm is the most popular wavelength in SWIR region, the nearby wavelengths 1440-1600 are also used in various applications due to their eye safety. When using phosphor coated CCD cameras, it is important to understand the difference in spectral response at different wavelengths.



The expected absorption curve for the Phosphor coated CCD cameras showing higher efficiency of phosphor coating conversion to visible light at 1550nm compared to 1400nm or 1600nm