

SIT

Tester of VIS-SWIR imaging sensors



Fig. 1. Photo of the SIT test system

BASIC INFORMATION:

SIT is a test station developed for testing imaging sensors (or camera cores) sensitive in VIS-SWIR spectral bands. In detail SIT enables measurement of radiometric and spectral parameters of VIS-SWIR imaging sensors (silicon, black silicon, InGaAs) sensitive in spectral band from 400nm to 2200nm. Following parameters can be measured: relative spectral sensitivity, responsivity, Noise Equivalent Irradiance, D^* (Normalized Detectivity), and spatial noise.

Comparing SIT system to another test system for testing VIS-SWIR sensors called VIT it can be said that main advantage of SIT is continuous regulation of wavelength and main disadvantage is lower number of measured parameters. It is assumed that tested image sensor is integrated with control electronics (delivered by customer or third parties) that can generate output images in standard electronics formats like Camera Link, GigE, HD SDI, etc. Therefore practically SIT test station enable direct testing of camera cores sensitive in VIS-SWIR spectral bands.

HOW IT WORKS:

From design point of view SIT system is a sum of two main blocks: 1) calibrated light source of regulated continuously wavelength and light intensity called SITO, and 2) image processing system (PC, frame grabber, software) called IPS system. Tested image sensor located at output of the SITO light source called the Light plate. The sensor is uniformly irradiated with light of required wavelength and irradiance. Tested sensor generates images in one of standards of electronic imaging. The images are captured, analysed by IPS system and important parameters of VIS-SWIR imaging sensors are determined.

SITO light source is a sophisticated multi module device. All functions of SITO light source are controlled from PC: powering of the IR halogen bulb, attenuator control, monochromator control, control of filter slider, and readout from two light meters.

It should be noted that on international market there are many variable wavelength light sources. However there are very few calibrated light sources of precisely regulated wavelength and light intensity. Therefore SITO combined with IPS system form an unique test system.

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SPECIFICATIONS

Parameter	Value
<i>SITO light source</i>	
Type	monochromatic light source of variable wavelength and light intensity
Spectral band of regulated wavelength	400 nm to 2200nm
Diameter of the output light plate	≥ 24 mm (Low intensity mode) ≥ 6 mm (High intensity mode)
Non-uniformity (spatial uncertainty)	1% (at low intensity mode in central 20mm part)
Resolution of wavelength regulation	not worse than 1 nm
Type of wavelength regulation	continuous using software
Width of spectral band of monochromator	manual step regulation 5/10/20/30nm
Recommended width of spectral band	≥ 20 nm
Calibration of light intensity	1. Sensor plate irradiance [$\mu\text{W}/\text{cm}^2$] 2. Simulated target plane exitance for F2 optics [$\mu\text{W}/\text{cm}^2$]
Maximal irradiance level at sensor plane (at 30nm band in any wavelength of 600-2200nm band)	at least $0.1 \mu\text{W}/\text{cm}^2$ (Low intensity mode) at least $0.5 \mu\text{W}/\text{cm}^2$ (High intensity mode)
Minimal simulated irradiance level at sensor plate	not higher than $10 \text{ pW}/\text{cm}^2$
Dynamic of regulation of light intensity	at least 10000 times (can be optionally extended)
Type of light intensity regulation	continuous – using software
Light intensity stability	not worse 1.5%
<i>IPS system</i>	
Acceptable formats of electronic images from tested sensor	CameraLink, GigE, HD SDI, HDMI (list can be extended)
Measured parameters	D^* (Normalized Detectivity), Responsivity, Noise Equivalent Irradiance, spatial noise, relative spectral sensitivity, linearity
<i>General parameters</i>	
Work temperature range	+5°C to +35°C
Storage temperature range	-5°C to +55°C
Humidity range	Up to 90% (non condensing)
Mass	58kg
Dimensions	173 x 43 x 28 cm

Version 1.2

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