

SAL light source

Multi channel broadband VIS-SWIR light source

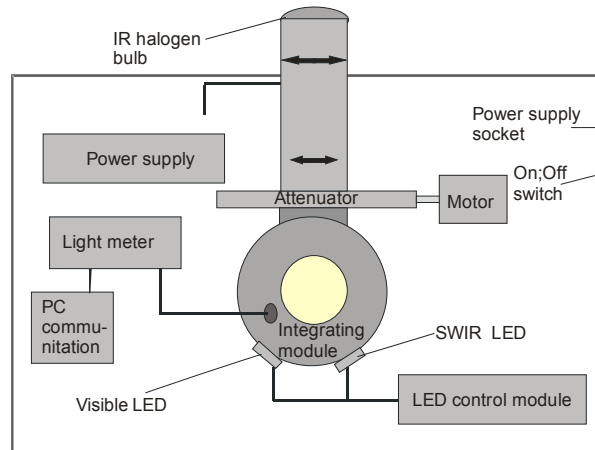


Fig. 1. Block diagram of SAL calibrated light source



Fig. 2. Photos of SAL calibrated light source a)front view, b)back view

BASIC INFORMATION:

The SAL source is an integrated switchable light emitter that is built using three different light sources: 1)IR halogen lamp of approximate 2856K color temperature spectrum from visible to SWIR band, 2) white LED of color temperature over 5000K, 3)monochromatic SWIR LED. Next, SAL source is equipped by a set of spectral filters that can be used to select desired spectral band of halogen lamp.

SAL light source offers extremely high dynamic range, continuous regulation of light intensity, fully computerized design, and compact design.

SAL light source is a multi-channel broadband light source that emits light in wide spectral band from visible to most of SWIR band. This source enables simulation of both day conditions and night conditions that can be met at Earth condition.

SAL light source is optimized for testing SWIR cameras but can be used for any application that requires a calibrated light source of ultra high dynamic and variable spectrum in VIS-SWIR spectral range.

SAL is a perfect choice for both laboratory and field applications.

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HOW IT WORKS :

The SAL source is an integrated switchable light emitter that is built using three different light sources: 1)IR halogen lamp of approximate 2856K color temperature spectrum from visible to SWIR band, 2) white LED of color temperature over 5000K, 3)monochromatic SWIR LED. Next, SAL source is equipped by a set of spectral filters that can be used to select desired spectral band of halogen lamp.

Intensity of the halogen bulb is regulated using an opto-mechanical attenuator that changes light intensity but does not change light color temperature (light spectrum). Intensity of the LED sources is regulated electronically using advanced electronic regulation/stabilization system.

MODES OF WORK:

Due to use of three light sources and a set of spectral filters the SAL light source can work in a series of modes. Typical modes are listed below:

1. Halogen bulb – no filter: broadband light source from 400nm to 2100nm (color temperature equals to 2856K in spectral band from 400nm to 1700nm). Light source is calibrated in cd/m^2 units.
2. White LED: visible light source of color temperature over 5000K. Light source is calibrated in cd/m^2 units.
3. SWIR LED: monochromatic light source at 1060nm spectral band. Light source is calibrated in W/sr m^2 units.
4. Halogen bulb – 1550nm filter: monochromatic light source that emits light at 1550nm wavelength. Light source is calibrated in W/sr m^2 units.
5. Halogen bulb – SWIR only filter: broadband light source that emits light from about 900nm to about 2200nm (color temperature equals to 2856K in spectral band from 400nm to 1700nm). Light source is calibrated in W/sr m^2 units.

Ad 1) This mode is recommended for testing possible work dynamic range of SWIR cameras under Earth illumination condition as luminance ranges at day/night conditions are known. This mode enables also to compare sensitivity of different imagers working in VIS-SWIR range: SWIR cameras to VIS/NIR cameras or to night vision devices.

Ad 2)This mode is recommended for testing color CCD/CMOS cameras.

Ad 3-4)These modes are recommended for measurement of radiometric parameters (Quantum Efficiency, Noise Equivalent Irradiance, Fixed Pattern Noise, Signal to Noise Ratio) of SWIR FPAs/cameras.

Ad 5)This modes enables to achieve higher input radiometric signal than in modes 3-4. It is recommended to be used to measure dynamic range of SWIR sensors.

Attention: Number of modes of SAL source can be increased by adding new spectral filters.

FEATURES:

- Three calibrated light sources combined one device
- Extremely high dynamic range and continuous regulation of light intensity (ability to simulate both ultra bright day conditions and ultra dark night conditions).
- Fully computerized design. Light intensity and type of light source can be controlled from PC.
- There is on the market no light source of similar performance.

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SPECIFICATIONS

Parameter	Value
	<i>Performance parameters</i>
Light source diameter	40 mm
Basic modes of work:	1) halogen bulb - no filter 2) visible LED 3) monochromatic SWIR LED 4) halogen bulb with 1550nm narrow band filter 5) halogen bulb with only SWIR filter
Temporal stability	<1% (all modes)
Type of light source	<i>Halogen bulb-no filter</i> halogen bulb as a polychromatic source of light of color temperature about 2856K up to about 1700nm and non greybody spectrum up to 2100nm
Spectral band	From about 400nm to about 2200nm
Regulation type	continuous
Regulation method	opto-mechanical attenuator
Luminance range	At least $10\mu\text{cd}/\text{m}^2$ - $1000\text{ cd}/\text{m}^2$
Regulation resolution	$10\mu\text{cd}/\text{m}^2$ (at low intensity range)
Stabilization time	<90 sec
	<i>Visible LED mode</i>
Light source	white LED
Color temperature	>5000K
Spectral band	0.4-0.72 μm .
Regulation method	Electronic regulation
Luminance range	At least $0.02\text{cd}/\text{m}^2$ - $5000\text{ cd}/\text{m}^2$
Regulation resolution	$0.01\text{ cd}/\text{m}^2$
Stabilization time	<30 sec
	<i>SWIR LED mode</i>
Light source	Monochromatic SWIR LED
Wavelength	1060nm
Regulation method	Electronic regulation
Radiance range	$0.2\text{ mW}/\text{sr m}^2$ - $8\text{ W}/\text{sr m}^2$
Regulation resolution	$0.1\text{ mW}/\text{sr m}^2$
Stabilization time	<30 sec
	<i>Halogen bulb-1550nm filter</i>
Type of light source	halogen bulb with narrow band 1550nm spectral filter
Spectral band	$1550\pm 15\text{nm}$
Radiance range	At least $0.1\text{ mW}/\text{sr m}^2$ - $1\text{ W}/\text{sr m}^2$
Regulation resolution (at low range)	$0.05\text{ mW}/\text{sr m}^2$
	<i>Halogen bulb-only SWIR filter</i>
Type of light source	halogen bulb with longpass SWIR filter
Spectral band	From about 900nm to 2200nm
Radiance range	At least from about $2\text{ mW}/\text{sr m}^2$ to about $20\text{ W}/\text{sr m}^2$
Regulation resolution (at low range)	$1\text{ mW}/\text{sr m}^2$

*specifications are subject to change without prior notice

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