

LS-COHL

Multi channel broadband / monochromatic VIS-SWIR light source



Fig. 2. Photo of LS-COHL light source

BASIC INFORMATION:

The LS-COHL light source is a multi-channel calibrated light source developed for realistic simulation of light conditions from dark, moonless nights to ultra bright days in VIS-SWIR spectral band. Design of this light source is optimized for use in systems for testing VIS-SWIR cameras (color VIS cameras, monochrome VIS-NIR cameras, SWIR cameras, VIS-SWIR cameras) working in spectral band from about 400nm to about 2000nm and used for long/medium range surveillance applications.

The LS-COHL source can work in five different modes:

1. halogen bulb of 2856K color temperature in most of VIS-SWIR band,
2. white broadband LED of color temperature over 5000K spectrum in visible range,
3. mixed mode when both halogen and white broadband LED are active at regulated ratio of halogen/LED light intensity,

Next two modes, LS-COHL source is equipped by a set of spectral filters that can be used to select desired spectral band or wavelength while working in halogen mode.

4. calibrated monochromatic light source (532nm, 633 nm, 1064 nm, 1350 nm, 1550 nm, 1660 nm \pm 15 nm),
5. calibrated broadband VIS, NIR&SWIR or SWIR light source.

These advanced simulation capabilities make LS-COHL light source an unique solution on international market.

LS-COHL can be treated as modification of popular LS-SAL light source. Modifications: additional motorized wheel with set of filters to enable expanded modes of work no 4 and 5.

HOW IT WORKS:

The LS-COHL source is an integrated switchable light emitter that is built using two different light sources:

1. IR halogen lamp of approximate 2856K color temperature spectrum from visible to SWIR band,
2. white broadband LED of color temperature over 5000K. These lamps can work as independent blocks or in mixed mode.

Next, LS-COHL source is equipped by a set of spectral filters that makes possible to modify spectrum of halogen/LED source.

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.

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MODES OF WORK:

LS-COHL can work in five modes:

1. Halogen bulb – no filter: broadband light source from 400nm to 2100nm (color temperature equals to 2856K in spectral band from 400nm to 1700nm and non greybody spectrum up to 2100nm). 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. Mixed mode: halogen and LED. Spectrum of emitted light depends on proportion of regulated halogen intensity to LED intensity. Light source is calibrated in cd/m^2 units.
4. Monochromatic mode when halogen bulb is used with one narrow band filter from the set: 532nm, 633 nm, 1064 nm, 1350 nm, 1550 nm, 1660 nm. Light source is calibrated in W/sr m^2 units.
5. Broadband mode when halogen bulb is used with one of broadband filter from the set:
 - VIS only filter: broadband light source that emits light from about 400nm to about 680nm (color temperature equals to 2856K. Light source is calibrated in cd/m^2 units.
 - NIR & SWIR filter: broadband light source that emits light from about 760nm to about 2100nm (color temperature equals to 2856K in spectral band from 400nm to 1300nm). Light source is calibrated in W/sr m^2 units.
 - SWIR only filter: broadband light source that emits light from about 900nm to about 2100nm (color temperature equals to 2856K in spectral band from 400nm to 1300nm). Light source is calibrated in W/sr m^2 units.

Attention: Number of modes of LS-COHL source can be increased by adding new spectral filters.

FEATURES:

- Extremely wide dynamic range (10^9) and continuous regulation of light intensity enables simulation of both ultra bright day conditions and ultra night conditions). There is on the market no light source that could simulate light conditions in so wide range. Some competitors claim that their light sources offer regulation from 0 lx but this level is achieved by switching off the light source not by true precision regulation.
- Ability to regulate spectrum of emitted light in order to simulate conditions at different regions caused by different spectrum of light that illuminate scenery of interest and different spectral reflectance of such scenery. There is on the market no light source that could enable similar spectrum regulation.
- Fully computerized design. Light intensity and mode of work can be controlled from PC.
- Compact design optimized for use in systems for testing VIS-SWIR cameras.
- Open policy of Inframet on recalibration. Inframet delivers information that enables users of LS-COHL light sources to recalibrate these light sources.
- LS-COHL source is optimized for use in image projectors in systems for testing VIS-SWIR cameras. These image projectors (collimators) require from the light source Lambertian emission of light only in narrow angle (typically below 10°). Therefore LS-COHL light source behave like a fully Lambertian source at emission angles up to 15°).

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SPECIFICATIONS

Parameter	Value
	Performance parameters
Light source active diameter	40 mm
Basic modes of work:	1) halogen bulb - no filter 2) visible broadband LED 3) mixed (halogen and LED) 4) halogen bulb with one of monochromatic narrow band filter 5) halogen bulb with one of broadband filter
Temporal stability	<1% (all modes)
	Halogen bulb-no filter
Type of light source	halogen bulb as a polychromatic source of light of color temperature about 2856K up to about 1300nm 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 μ cd/m ² - 1000 cd/m ²
Regulation resolution	10 μ cd/m ² (at low intensity range)
Stabilization time	<90 sec
	Visible LED mode
Light source	white LED
Color temperature	>5000K
Spectral band	0.4-0.72 μ m.
Regulation method	Electronic regulation
Luminance range	At least 0.02cd/m ² - 10000 cd/m ²
Regulation resolution	0.1 mcd/m ²
Stabilization time	<30 sec
	Mixed mode
Light source	halogen bulb and white LED
Spectrum of emitted light	depends on proportion of regulated halogen intensity to LED intensity
Regulation method	Electronic regulation mixed with opto-mechanical regulation
Luminance range	20 μ cd/m ² – 11 kcd/m ²
Regulation resolution	10 μ cd/m ² (at low luminance range)
Stabilization time	<120 sec
Temporal stability	<1%
	Set of narrow band filters
Wavelengths	532nm, CWL = 532 \pm 2 nm, FWHM = 10 \pm 2 nm 633 nm, CWL = 632.8 \pm 2 nm, FWHM = 10 \pm 2 nm 1064 nm, CWL = 1064 \pm 2 nm, FWHM = 10 \pm 2 nm 1350 nm, CWL = 1350 \pm 2.4 nm, FWHM = 12 \pm 2.4 nm 1550 nm, CWL = 1550 \pm 6 nm, FWHM = 30 \pm 6 nm 1660 nm, CWL = 1660 nm \pm 3 nm, FWHM = 13 nm \pm 3 nm
Calibration unit	W/sr m ²
Regulation resolution (at low range)	0.05 mW/sr m ²
	Set of broadband filters
Bands	VIS only – 400 ~ 680 nm NIR & SWIR – 760 ~ 2100 nm SWIR only – 900 ~ 2100 nm
Calibration unit	W/sr m ²
Regulation resolution (at low range)	1 mW/sr m ²
	General features
Work temperature	+5°C to +35°C
Storage temperature	-5°C to +55°C
Humidity	Up to 90% (non condensing)

*specifications are subject to change without prior notice