

SINIS

System for basic tests of SWIR cameras



Fig. 1. Photo of SINIS60-A1 test system

1 BASIC INFORMATION

For over a decade Inframet offers ST systems as ultra advanced test systems for testing surveillance SWIR cameras sensitive in VIS-SWIR spectral range. These systems built as completed test systems in form of computerized image projectors and PC set with software enable measurement of all important parameters of SWIR cameras and are capable to simulate any illumination condition on Earth. Next, ST have already proved their value in a series of top world laboratories by accurate testing SWIR cameras for long range surveillance or for space missions. However, ST systems are characterized by one drawback: high price due to use of ultra advanced computerized multi-channel calibrated light sources (coded as LS-SAL light source) and high value of workload to develop test software.

SINIS system can be treated as a cost effective solution for testing SWIR cameras. It is based on manual halogen light source coded as LS-MAH-SW (non calibrated in basic version) in contrast to computerized calibrated SAL light source. Next, targets are manually inserted when in ST system targets are automatically exchanged using MRW-8 rotary wheel. Finally, SINIS is typically delivered as an image projector without PC and test software (it is assumed that these blocks are delivered by customer if needed). All these changes in design have enabled significant price reduction comparing to typical ST test system.

2 HOW IS BUILT?

SINIS system is built from following blocks: CDT collimator (three models of different aperture and different focal length are offered), LS-MAH-SW light source (offered in a series of versions), TAMAH target adapter to enable manual insertion of test targets, Set of targets, Set of spectral filters.

3 TECHNICAL PARAMETERS

3.1 Collimator

SINIS is typically built using one of three collimators: CDT660HR collimator, CDT11100HR collimator, CDT15150HR collimator. SINIS built using CDT11100HR is coded as SINIS 110, and SINIS built using CDT15150HR is coded as SINIS 150.

Table 1. Parameters of CDT collimators.

Parameter	CDT660HR	CDT11100HR	CDT15150
Aperture	60mm	110mm	150 mm
Focal length	600 mm	1000 mm	1500 mm
Collimator resolution	60 lp/mrad	110 lp/mrad	130 lp/mrad

Detail parameter of CDT collimators are shown in data sheet <https://www.inframet.com/Data%20sheets/CDT.pdf>

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3.2 Light source

Table 2. Parameters of LS-MAH-SW light source

Parameter	Value
Light emission source	Halogen bulb
Light source diameter	40 mm
Spectral band	At least 400nm to 2000nm (optimized for 400-1600nm)
Light spectrum	Light spectrum up to about 1600nm resemble spectrum of ideal light of 2856K color temperature
Method of regulation of light intensity	Manual rotation of a knob that controls opto-mechanical attenuator
Range of regulation of light intensity of the light emitter	At least 60 mcd/m ² to 6 kcd/m ² - basic version
Method of regulation of light spectrum	Manual insertion of bandpass or narrow band filters (only in advanced versions)
Total dynamic of light source	At least 10 ⁵ - basic version
Emission angle	Lambertian source at angles up to 15° (optimized to cooperate with CDT collimator)
Calibration	Basic version: non calibrated
Work temperature	+5°C to +35°C
Storage temperature	-5°C to +55°C
Humidity	Up to 90% (non condensing)
Dimensions	280x260x230
Mass	8 kg

3.3 TAMAH target adapter

Mechanical adapter to enable manual insertion of a test target at collimator focal plane.

3.4 Set of test targets

SINIS is typically offered with a single positive 100% contrast USAF 1951 resolution target (groups from 0 to 6). Number of targets can be optionally expanded.

4 OPTIONS

SINIS is typically offered in 3 versions based on three collimators: CDT660HR collimator, CDT11100HR collimator, CDT15150HR collimator. However, different collimators can be offered too. Other options as below:

4.1 Rotary wheel

A1. TAMAH target adapter to enable manual insertion of test targets is replaced by MRW-8 rotary wheel that can be controlled using external electronic controller https://www.inframet.com/Data_sheets/MRW8.pdf.

4.2 Calibration in photometric units:

B1. External luminance meter that measures absolute value of emitter luminance in cd/m² units. Additional meter is delivered. Internal electronics is modified.

B2. LS-MAH communicates with PC. Software can be used to read and display current light luminance. Internal electronics is modified. PC with proper software to communicate with LS-MAH is delivered.

4.3 Light spectrum

B1. Modified design of LS-MAS source enables regulation of light spectrum using manually inserted set of three band pass filters: visible only, NIR only.

B2. Modified design enables regulation of light spectrum using manually inserted set of three band pass filters (visible only, NIR and SWIR only, SWIR only) and a set of eight narrow band filters of 10nm spectral bands.

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Center wavelengths: 400nm, 500nm, 600nm, 700nm, 800nm, 900nm, 1000nm, 1100nm. Bigger number of filters or other wavelengths are possible.

B3. As in B2 but spectral radiance in $W/m^2 sr \mu m$ units can be measured and absolute value is displayed by software. Attention: B3 option is possible only if A2 option is chosen, too.

4.4 Test targets

C1. Set of five variable contrast USAF1951 targets is delivered.

C2. Additional targets for MTF measurements are delivered: slanted edge and slanted L shape target.

C3. Set of 3 pinhole targets is delivered.

4.5 Light regulation dynamic

E1. Light regulation dynamic is increased to 10^7 . It means that luminance can be regulated in range at least from $0.06 mcd/m^2$ to $6 kcd/m^2$ and LS-MAH can be used to simulate dark night conditions.

If option is interesting then please add option code. SINIS 110 A1B2C3 means systems with options A1,B2 and C3.

SUMMARY

SINIS test system is a near perfect solution for a moderate cost system for basic tests of SWIR cameras. Due to high dynamic of its light source this test system can simulate both day and night condition. The system can be delivered in a series of versions of different configurations.

Data sheet v.1.3

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