

# TSIM

## Simple tester of thermal imagers



Fig. 1. Photo of TSIM 110 test system

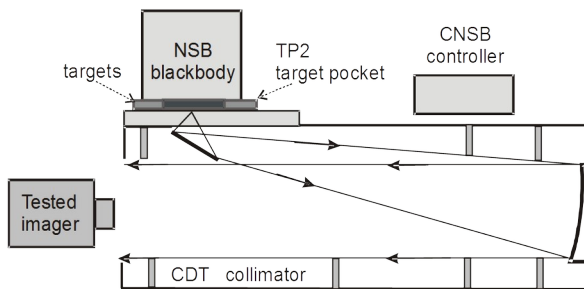


Fig. 2. Block diagram of TSIM test system

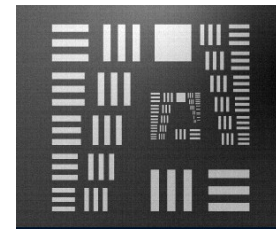


Fig. 3. Image of IR USAF1951 target

### BASIC INFORMATION:

Inframet offers DT series test systems based on ultra high performance TCB blackbodies and high resolution reflective collimators for testing thermal imagers. These test systems offer accurate measurement of a long series of parameters of thermal imagers needed for their precision evaluation. However, DT series systems are also quite expensive. Therefore Inframet decided to offer also simplified, low cost system coded as TSIM for customers that cannot afford for DT systems and accept strongly limited test capabilities: measurement of resolution, relative sensitivity, infinity focusing, and support for boresight.

TSIM is a stand alone system that projects images of manually changed IR targets illuminated using NSB blackbody to the tested imager. The system built is from five main blocks: CDT off axis reflective collimator of standard resolution (not suitable for testing long range imagers), NSB40 blackbody .

CNSB controller, TP2 target pocket, a set of IR targets. CDT reflective collimator works as an image projector for the IR target set at its focal plane and irradiated by NSB40 blackbody.

TSIM typically project two types of thermal imagers: a) Image of a cross target (two sizes are possible), b) image of IR USAF 1951 target. Thermal contrast of projected images can be regulated using CNSB controller changing temperature of NSB blackbody. It should be noted that in NSB40 is a non stabilized blackbody. User can regulate of temperature but temperature is not stabilized and not accurately measured (only relative indication is available).

TSIM is a perfect tool for manufacturers of thermal imagers or maintenance workshops that need simple, low cost tools to check resolution and focusing and to compare sensitivity between several imagers.

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### VERSIONS

TSIM test systems are modular test systems that can be delivered in form of different versions of slightly different configurations. The basic division of TSIM series system is based on output aperture of the collimator: TSIM 60: 60mm; TSIM 110: 110mm; TSIM 150: 150mm; TSIM 200:200mm; TSIM 250: 250mm.

### TECHNICAL SPECIFICATIONS

Technical specifications of of TSIM test station are presented below.

Collimator	CDT660SR for TSIM 60; CDT11100SR for TSIM 110; CDT15150SR for TSIM 150; CDT20200SR (or CDT20160SR) for TSIM 200; CDT25250SR for TSIM 250
Collimator type	reflective, off-axis
Aperture	TSIM 60: 60mm; TSIM 110: 110mm; TSIM 150: 150mm; TSIM 200:200mm; TSIM 250: 250mm
Focal length	TSIM 60: 600mm; TSIM 110: 1000mm; TSIM 150: 1500mm; TSIM 200:2000mm; TSIM 250: 2500mm
Spectral range	0.4-15 $\mu$ m
Spatial resolution	not less than 30 mrad-1 for CDT660SR and CDT11100SR not less than 50 mrad-1 for bigger models
Mirror manufacturing accuracy	L/3 at 630 nm
Coating	Protected aluminum
Field of view	2.7°
Operating temperature	10°C to 35°C
Dimensions	Depends on model from about 610x140x210 to 2610x350x400
Mass	Depends on model from about 7 kg to 50 kg
<b>Blackbody</b>	
Model	NSB40
Type	Non stabilized
Radiator dimensions	40x40 mm
Emissivity	$\geq 0.96$
Differential temperature range	At least -10°C to +10°C from ambient
Dimensions	From 100x110x130 mm
Mass	1 kg
<b>Targets</b>	
Cross targets	Line length 7 mm or 14 mm (other sizes are possible)
USAF 1951 IR target	
Spatial frequency of 3-bar patterns of in lp/mm units	1,00 – 14,30 lp/mm
Spatial frequencies range of 3-bar patterns in lp/mrad units	Multiply range in lp/mm units by collimator focal length in meters
<b>Other parameters</b>	
Power supply	220/110 VAC 50/60Hz
Operating temperature	+5°C ÷ +35 °C
Mass	Depends on model from about 10 kg to 60 kg

Options: More IR targets can be delivered.

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### Optional boresight of laser systems

TSIM can be also optionally delivered in version capable to do boresight of thermal sight to a small laser range finders/pointers using additional boresight tools.

In this case a set of laser sensing cards are delivered: high sensitivity TEG card, TEP – medium sensitivity converter of SWIR laser pulsed light into thermal radiation. The card is located at collimator focal plane. The cards work as converter of SWIR laser pulsed light into thermal radiation visible for tested thermal imager.

If option is interesting then please add letter L to system code (see section Versions)

Attention: Aperture of collimator of TSIM system should least partially overlap both optics of thermal imager and optics of LRF.



Fig. 4. Position of optics of tested system relative to collimator aperture: a) perfect, b) barely acceptable

### SUMMARY

TSIM test system is a near perfect solution for a moderate cost system for basic tests of thermal imager.

*Version 2.1*

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