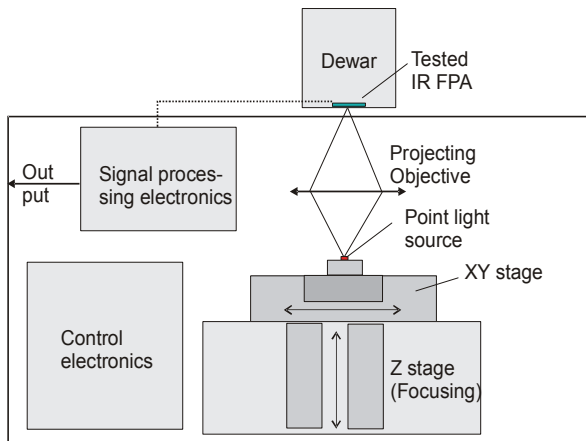


SPOT

Station for measuring spatial responsivity of MWIR FPA sensors



1. Block diagram of SPOT test station

Fig

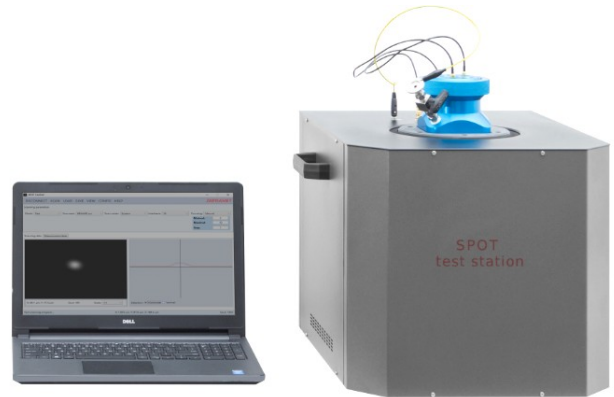


Fig. 2. Photo of Spot test station

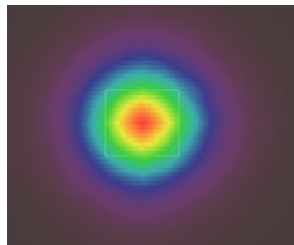


Fig. 3. 2D plot of Spatial Responsivity Function

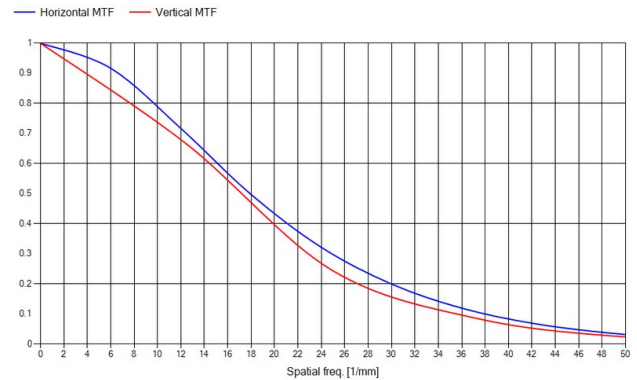


Fig. 4. MTF graph of tested MWIR FPA sensor

1 Basic information

SPOT is a scanning light spot projector that projects ultra small light spot of ultra high intensity on surface of tested MWIR FPA combined with electronic system that measures output signal. It enables direct measurement of spatial responsivity distribution function of MWIR FPA sensors and indirect accurate measurement of Modulation Transfer Function and cross-talk of these imaging sensors.

SPOT can be used for testing fully ready IR FPA sensors where array of photodiodes is integrated with silicon read-out circuit and later control electronics as a final quality tool. Such test can be done by capturing and analysis of output image generated by total IF FPA sensor. However, SPOT is typically used for testing raw IR FPA sensors before hybridization process (aligning and connection to silicon readout electronics) by enabling ultra accurate measuring of spatial responsivity distribution function of photovoltaic diodes implemented on sensitive layer of the sensor. In the latter case the high dynamic electronics is used to amplify and measure signal from a chosen single active pixel.

The differences in results produced by these two methods are significant. The method 1 produces spatial responsivity distribution function of raw MWIR FPA sensor fused with silicon read-out circuit and later control electronics. The electronics significantly influences measurement results. In addition, because of read-out electronics the measurement dynamic is often limited to 8/12bit range. The second method enables ultra accurate spatial responsivity distribution function of only raw MWIR FPA at ultra high dynamic range (over 16 bit) because influence of measuring electronics cooperating with a single pixel on final results is negligible. This ultra accurate measurement spatial responsivity distribution function of raw MWIR FPA at ultra high dynamic range enables improvement of technology of manufacturing photovoltaic (PV) diodes on sensor sensitive area (typically ion implantation process).

The main advantage of SPOT over competitor solutions is ability to concentrate high power radiation (at least 4 mW) on extremely small area (typically about $8\mu\text{m}$) of tested sensor. Such high power density enables to detect even minor defects of manufacturing process of photovoltaic diodes on sensitive layer of the sensor.

SPOT station has been successfully used by several big manufacturers of cooled MWIR FPA sensor to improve manufacturing technology.

SPOT has been originally developed for a manufacturer of MWIR FPAs but this station can be optionally delivered in version for testing SWIR, VIS-NIR or UV FPAs.

SPOT

Station for measuring spatial responsivity of MWIR FPA sensors

2 Features

- Control of: a) 3D coordinates of light spot, b) light intensity,
- Measurement and deconvolution of output signal from the active pixel of tested IR FPA
- Measurement of Spatial Responsivity Function of IR FPA
- Calculation of MTF and crosstalk of tested IR FPA
- Fully computerized system
- Software can show optimal focusing

3 Technical specifications

Parameter	Value
<i>Sensor</i>	
Typical tested sensors	Cooled MWIR FPAs sensitive from 1 μm to about 5.5 μm
Optional tested sensors	SWIR FPAs, VIS-NIR FPAs, UV FPAs
Pixel pitch of tested sensor	Typically > 8 μm Option < 8 μm
FPA resolution	up to SXGA format 1280 x 1024
Responsivity	>0.1 A/W
Accessories	Customer is responsible to deliver read out electronics and dewar
<i>Light spot projector</i>	
Max power of light spot	4 mW
Light spot diameter	< 6 μm at 70% of light power
Dynamic of regulation of light power	At least 100 times
Optics	Near perfect, diffraction limited
Control	From PC via USB
<i>Scanning system</i>	
XY scanning area	At least 10x10 mm
Scanning resolution	rough movement – 2.5 μm ; precision movement: 0.5 μm
Focusing range	18 mm
Focusing resolution	0.5 μm
Control	From PC via USB
<i>Other parameters</i>	
Working temperature	+5°C to 35°C
Storage temperature	-5°C to 55°C
Working humidity	Up to 85%
Storage humidity	Up to 90%

**specifications are subject to change without prior notice*

4 Versions

SPOT is offered in two main versions:

A- testing complete IF FPA sensor integrated with readout circuit and control electronics

B – testing raw IF FPA sensor before hybridization.

Version 2.1

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