

SWIR-LF Sensor Product Information Sheet

August 2017

Solid State Scientific Corporation (SSSC) developed a compact, long focal length, real-time, multi-spectral imaging sensor prototype for enhanced Intelligence, Reconnaissance and Surveillance (ISR).

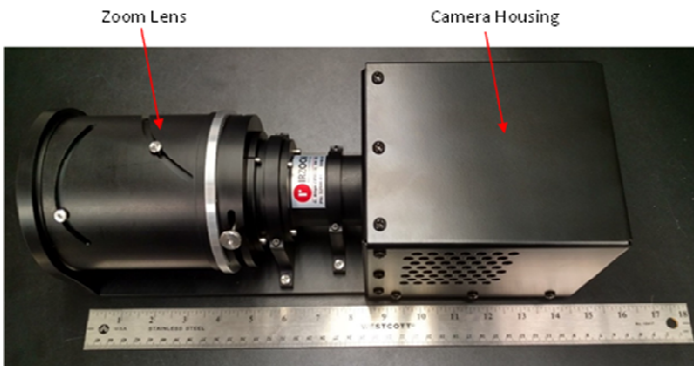
SSSC SWIR Concept

The Short-Wave Infrared - Long Focal (SWIR-LF) sensor was designed for small airborne and ground based platforms. The imager is a portable multispectral sensor designed with the following characteristics:

- Compact
- Multi-spectral Zoom lens
- Long focal length
- Based on a COTS camera

Current Configuration

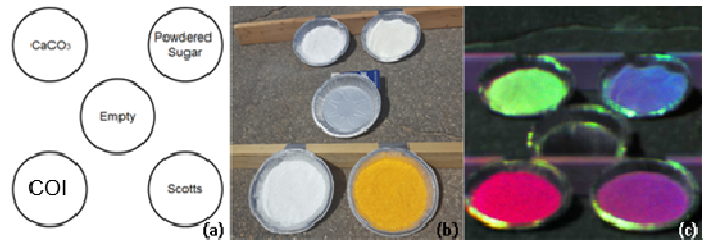
The SWIR-LF spectral sensor simultaneously images four application-specific color bands in the SWIR (nominally 1.0 μm to 1.6 μm), and employs a 1280 x 1024 staring camera to capture one spectral data cube (nominally 460x460x4) during each frame of the camera. The completed sensor is shown below and is equipped with the first ever, real-time optical zoom capability for multi-spectral imaging. The Field Of View (FOV) of the sensor is continuously variable from 2.3-5.0 degrees and corresponds to a focal length between 33-100 mm. The sensor was designed to be compatible with integration into an existing payload on a Program of Record platform such as the RQ-21A Blackjack.



4-color multi-spectral sensor including zoom optics

Sample Data

SSSC collected data for three different focal lengths 33 mm, 58 mm and 100 mm. The natural focal length of the optical system is 58 mm without the zoom lens attached and was used to collect preliminary baseline data. The processed data depicting a false color image of the preliminary results is shown below. SSSC was able to distinguish the Chemical of Interest (COI) from the other materials.



(a) Material layout. (b) Visible image of setup. (c) SWIR color combination image

Specifications

Selected sensor specifications are shown below:

Parameter	Value
Array Size	1280 x 1024
Pixel Size	12.5 micron pixel
Frame Rate	60 Hz
Output	Camera Link
Spectral Output	~1-1.7 μm
Camera Power	< 3 W
Image Size	460 x 460 x 4
Number of spectral bands	4
Focal Length	33-100 mm Continuous Zoom
Field of View	2.3-5.0 degrees

Applications

The SWIR-LF system has other applications in ISR including imaging in turbulent environments. At night, the spectral bands enable low-light level and active imaging. The sensor operates at standard video rates and can produce broadband video data by co-adding the spectral image frames, thus it will provide the full functionality of a broadband SWIR sensor including imaging through fog and smoke.