

SPECIFICATIONS**LONG-WAVE INFRARED IMAGING RADIOMETER
CAMERA SYSTEM**

1.0 Introduction

The Naval Research Laboratory (NRL) has a requirement for a Long-Wave Infrared (LWIR) Imaging Radiometer Camera System capable of capturing crisp, fully calibrated high-speed infrared (IR) image data under varied ambient operating temperature conditions. NRL has chosen the EDIP Jade LWIR system as the quality standard for this specification. The unit offered shall meet or exceed the requirements stated herein.

2.0 Specifications

- A. The sensor's detector shall be of photovoltaic MerCadTelluride (MCT).
- B. The sensor shall have a nominal waveband of approximately 7.8 to 9.3 microns.
- C. The sensor shall have a minimum resolution of 320 pixels x 256 pixels.
- D. The sensor shall have a detector pitch of 30 micrometers.
- E. The sensor's cooling shall be accomplished via a closed-cycle Stirling cooler.
- F. The sensor shall have a user-variable integration time range of 1 microsecond to 10 milliseconds. The integration time shall be variable in one-microsecond increments.
- G. The sensor's Noise Equivalent Temperature Difference (NETD) at 30°C shall be less than 25° milliKelvin.
- H. The sensor shall have a quantum-efficiency greater than 90 percent.
- I. The sensor shall capture images via the snapshot mode of operation.
- J. The sensor shall be capable of accepting and implementing dynamic, user-defined input for sub-array windowing.
- K. The imaging system shall have a calibration and measurement temperature range of -40° to 1500°C.
- L. The imaging system shall have an accuracy of $\pm 2^{\circ}\text{C}$ for measurements up to 100°C and an accuracy of $\pm 2\%$ for measurements above 100°C.

- M. The imaging system shall have a digitizing resolution of 14 bits or better and the output shall be of 14 bits and of RS422-compatible signal capable of being captured by off-the-shelf frame grabbers. Additionally, an RS-170 output from the imaging system shall also be available for analog video.
- N. The imaging system shall have a minimum full frame rate of 30 frames per second. The frame rate shall be user-variable in one-Hertz increments up to 200 Hertz full frame.
- O. The imaging system shall be delivered with a standard f/# of f/2.0.
- P. The imaging system shall have the ability to interchange lenses and shall be delivered with a standard optics kit that includes 12-millimeter (mm) and 25-mm lenses for fields of view (FOV's) of 38° x 31° and 21° x 16°, respectively. The lenses shall have motorized focus for remote operation and a minimum focus distance of 0.6 meters.
- Q. The imaging system shall have the ability to add, remove, and/or replace sub-band filters via a four-position optical filter wheel that can be remotely controlled for filter selection. The Contractor shall provide documentation on filter self-emission data and the compensation method used in camera calibration (e.g., filter cooled or filter is reflected out-of-band with view of cold shield/detector). The imaging system shall be delivered with a standard kit of the following one-inch diameter sub-band filters with corresponding calibration and spectral response data: (1) 7.6 to 11.1 micrometers and (2) 8.0 to 10.3 micrometers.
- R. The imaging system shall be capable of accepting external synchronization commands to start the integration time with a response jitter of less than 1 microsecond.
- S. The camera shall be capable of remote operation over commercially available PC communications interfaces such as RS-232. A Window-based software application shall also be available for configuring, calibrating, operating and collecting imagery/data with the camera. The Contractor shall supply an Interface Control Document on the communication link to the camera.
- T. The camera shall be capable of operating in ambient temperature conditions ranging from -15° to 50° C.
- U. The camera shall be capable of being mounted on a tripod and/or on a pedestal for a positioning system.

V. The system shall be delivered complete with all the required cabling and interfaces for power, communication, control, and data including two 15-meter cables – one cable for interfacing the camera with the current NRL IR Range framegrabber and another cable for interfacing the camera with a Vivid Engineering Camera Link translator. The system shall be delivered in and complete with a reusable foam-lined, watertight case of high impact-proof material.

3.0 Options:

- a. 100-mm lens for an FOV of 5° x 4°.
- b. 200-mm lens for an FOV of 2.5° x 2°.
- c. 8-11 micron FPA response

4.0 Documentation:

The Contractor shall furnish all required documentation necessary to power, install, configure, calibrate, operate, administer, and maintain the LWIR Imaging Radiometer Camera system.

5.0 Warranty:

All hardware shall be warranted in accordance with standard commercial practices, and shall cover all parts and labor. The warranty period shall begin after the LWIR Imaging Radiometer camera system passes NRL's acceptance inspection and testing which shall be performed within a 14 working days of delivery. Software and firmware maintenance shall be provided for a period of one year from date of acceptance.

6.0 Delivery:

All deliverables shall be shipped to NRL-DC, FOB. Destination, no later than 120 days after award.