

# Malin Space Science Systems

*Exploration Through Imaging*

## ECAM-IR13S

LWIR (8-14 $\mu$ m) Uncooled Microbolometer,  
1280x1024, 12 $\mu$ m, Shuttered

### Electro-Optical

|                           |                                                    |
|---------------------------|----------------------------------------------------|
| Band                      | LWIR                                               |
| Wavelength Range          | 8-14 $\mu$ m                                       |
| Electronic Shutter Modes  | Rolling                                            |
| Pixels                    | 1.3 Mpixel                                         |
| Horizontal Resolution     | 1280 pixels                                        |
| Vertical Resolution       | 1024 pixels                                        |
| Pixel Pitch               | 12 $\mu$ m                                         |
| Array Diagonal            | 19.7 mm                                            |
| Conversion Bit Depth      | 16 bits                                            |
| NEDT                      | <220mK with F/1.3 lens and 300K target temperature |
| Frame Rate, Native Format | 12 fps                                             |

### Power

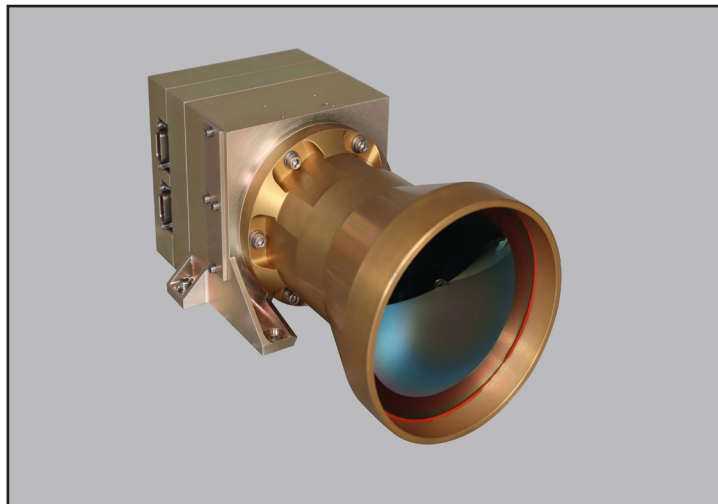
|                |                   |
|----------------|-------------------|
| Supply Voltage | 5V (4.5 to 5.35V) |
| Power, Idle    | 4 W               |
| Power, Imaging | 5.5 W             |

### Thermal

|                           |                                                                 |
|---------------------------|-----------------------------------------------------------------|
| Operating Temperature     | -30 to +40 °C                                                   |
| Protoflight Qualification | -40 to +55 °C                                                   |
| Non-Operating Temperature | -45 to +70 °C                                                   |
| Temperature Sensing       | Redundant internal ISL71590s available for readout on J1 and J2 |

### Survivability

|                              |                                                   |
|------------------------------|---------------------------------------------------|
| Radiation Design Environment | 5 years GEO standard, up to 15 years GEO optional |
| Predicted MTTF               | $7.1 \times 10^5$ hours                           |
| NASA TRL                     | 6                                                 |



ECAM-IR13S

### Features

- High-resolution IR camera
- Shutter for non-uniformity correction
- Applications ranging from orbital rendezvous target acquisition to planetary science
- Standardized ECAM interface
- Optional in-camera non-uniformity correction
- Optional in-camera recording to NAND flash

### Programmability

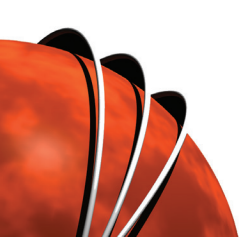
- Shutter Control
- Sensor Clock Rate
- Gain
- Integration
- Region of Interest
- Test Pattern

### Optics

| Effective Focal Length | F/#   | FOV (V° x H°) | Bandpass     |
|------------------------|-------|---------------|--------------|
| WFOV, 18.8 mm          | F/1.2 | 38 x 48       | 8-12 $\mu$ m |
| MFOV, 26.8 mm          | F/1.3 | 26 x 32       | 8-12 $\mu$ m |
| NFOV, 54.5 mm          | F/1.3 | 13 x 16       | 8-12 $\mu$ m |
| VNFOV, 100 mm          | F/1.3 | 7.0 x 8.8     | 8-12 $\mu$ m |

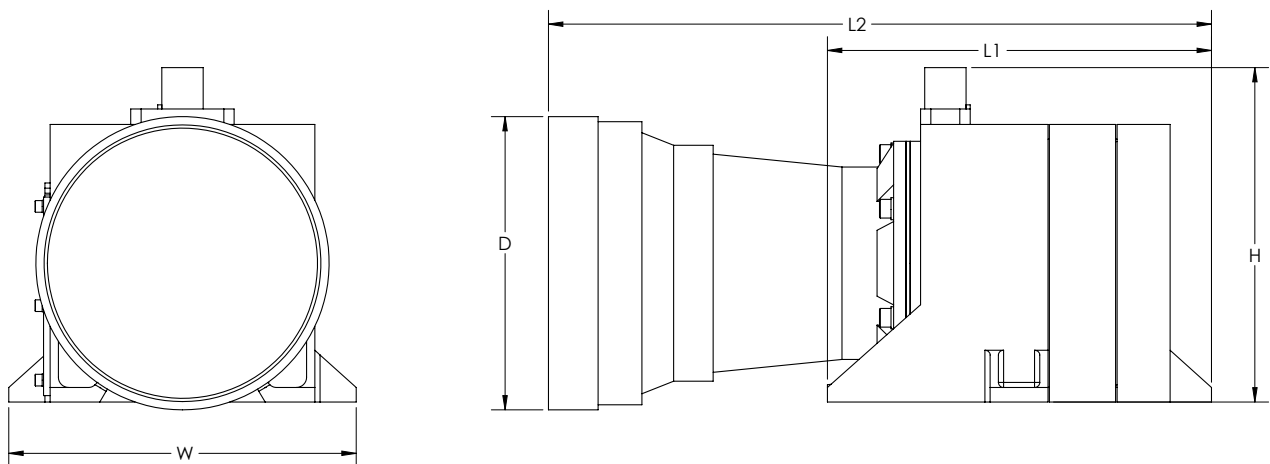
### Digital

|                    |                                                                                |
|--------------------|--------------------------------------------------------------------------------|
| Internal Memory    | 64 byte SpW Rx FIFO<br>512 byte SpW Tx FIFO<br>24 GB NAND Flash (Non-Volatile) |
| Digital Processing | 1-Point Correction<br>8bpp Downsampling                                        |
| Data Interface     | SpaceWire (Single or Dual Port)<br>100 or 200 MBit/s                           |



## ECAM-IR13S

Dimensional Envelope



Mechanical/Interfaces

|                                                   |                                                                |
|---------------------------------------------------|----------------------------------------------------------------|
| Mass<br>w/VNFOV optics, no baffle                 | 1700 g                                                         |
| Dimensional Envelope<br>w/VNFOV optics, no baffle | H: 102 mm<br>W: 107 mm<br>L1: 118 mm<br>L2: 204 mm<br>D: 91 mm |
| Connectors                                        | J1/J2: Micro-D, 15-Socket<br>ECAM Pinout                       |
| Mechanisms                                        | Self-Restoring Shutter                                         |