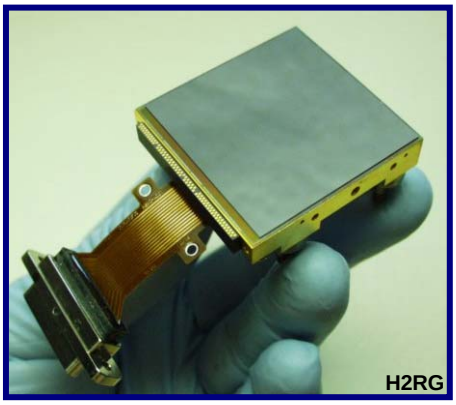
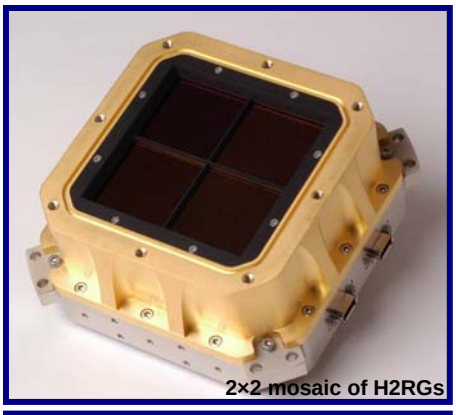
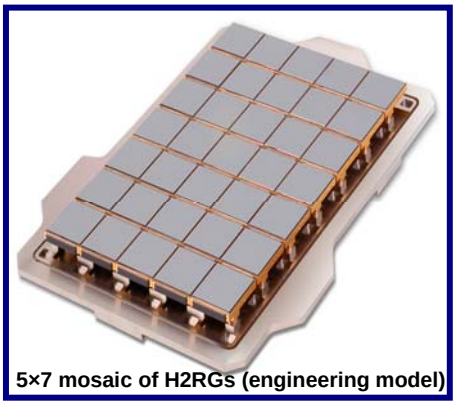
Teledyne Imaging Sensors
HAWAII-2RG™
Visible & Infrared Focal Plane Array

The 2048×2048 pixel HAWAII-2RG™ (H2RG) is the state-of-the-art readout integrated circuit for visible and infrared astronomy in ground-based and space telescope applications.

- Large (2048×2048 pixel) array with 18 µm pixel pitch.
- Compatible with Teledyne Imaging Sensors (TIS) HgCdTe infrared (IR) and silicon PIN HyViSI™ visible detectors, providing sensing of any spectral band from soft X-ray to 5.5 µm.
- Substrate-removed HgCdTe enhances the J-band QE, enables response into the visible spectrum (70% QE down to 400nm) and eliminates fluorescence from cosmic radiation absorbed in the substrate.
- Reference rows and columns for common-mode noise rejection.
- Guide window output – windowing with simultaneous science date acquisition of full array. Programmable window which may be read out at up to 5 MHz pixel rate for guiding. Readout is designed to allow interleaved readout of the guide window and the full frame science data.
- Selectable number of outputs (1, 4, or 32) and user-selectable scan directions provide complete flexibility in data acquisition.
- Built with modularity in mind – the array is 4-side-buttable to allow assembly of large mosaics of 2048×2048 H2RG modules, such as TIS' 4096×4096 mosaic FPA and larger mosaics.
- Fully compatible with the TIS SIDECAR™ ASIC Focal Plane Electronics.


H2RG


2×2 mosaic of H2RGs


5×7 mosaic of H2RGs (engineering model)

*For more information, please email **Richard Blank** at **rblank@teledyne.com** or call +1 **805 373-4083.***

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HAWAII-2RG™ specification table for infrared arrays

Parameter	Unit	Value		
		1.7μm	2.5μm	5.3μm
Read-out integrated circuit (ROIC)		HAWAII-2RG™		
Number of Pixel (1)	#	2048 x 2048		
Pixel Size	μm	18		
Outputs		Programmable 1, 4, 32		
Power Dissipation (2)	mW	≤ 0.5		
Detector Material		HgCdTe		
Detector Substrate		CdZnTe - Removed		
Cutoff wavelength: 1.7μm: @ 140 K (50% of peak QE) 2.5μm: @ 77 K (50% of peak QE) 5.3μm: @ 40 K (50% of peak QE)	μm	1.65 - 1.85	2.45 - 2.65	5.3 - 5.5
Mean Quantum Efficiency (QE) 0.4 - 1.0 μm	%	≥ 50 (goal is 70)	≥ 60 (goal is 70)	
Mean Quantum Efficiency (QE): 1.7μm: 1.0 - 1.6 μm 2.5μm: 1.0 - 2.4 μm 5.3μm: 1.0 - 5.0 μm	%	≥ 70 (goal is ≥ 80)		
Median Dark current: 1.7μm: @ 0.25 V bias and 140 K 2.5μm: @ 0.25 V bias and 77 K 5.3μm: @ 0.175 V bias and 40 K	e-/s	≤ 0.2 (goal is ≤ 0.02)	≤ 0.01	≤ 0.5 (goal is ≤ 0.05)
Median Readout Noise (single CDS) at 100 kHz pixel readout rate	e-	≤ 20 (goal is 15)	≤ 15 (goal is 10)	≤ 18 (goal is 12)
Well Capacity at 0.25 V bias (0.175V bias for 5.3μm cutoff)	e-	≥ 80,000 (goal is ≥ 100,000)		≥ 65,000 (goal is ≥ 85,000)
Crosstalk (3)	%	≤ 2		
Operability (4)	%	≥ 95 (goal is ≥ 99)		
Cluster: 50 or more contiguous inoperable pixels	#	≤ 0.5% of array		
SCA Flatness (5)	μm	≤ 30 (goal is 10)		
Planarity (6)	μm	≤ 50 (goal is 25)		

(1) There are 2040 x 2040 pixels for light detection plus 4 rows and columns of reference pixel on each side
(2) At 100 kHz pixel read-out rate, unbuffered, 4 outputs. Does not include external current source; power has to be optimized by the user with respect to the system in which the device is used
(3) Crosstalk includes both optical and electrical components
(4) A pixel is considered operable if QE ≥ 35%, dark current ≤ 1 e-/sec, and CDS noise is 50 e-
(5) Maximum variation (peak-to-valley) in image plane
(6) Parallelism of image plane location with respect to mounting plane