

KEY CHARACTERISTICS AND PERFORMANCE

Spectral Bands:
Visible/Near IR: 9 plus Day/Night Pan Band
Mid-Wave IR: 8
Long-Wave IR: 4
Imaging Optics: 19.1 cm Aperture, 114 cm Focal Length
Band-to-Band Registration (All Bands, Entire Scan) >80% Per Axis
Orbit Average Power: 134 Watts (55% Margin)
Weight: 160 kg (20% Margin)
DATA ACQUISITION PARAMETERS:
Scanned Swath: +/-56 Deg, 3,029 km
Downtrack Swath: 11.87 km, 16 to 32 Detectors in Track
Scan Period: 1.786 Sec.
Horizontal Sample Interval On Ground: <1.6 km @ End of Scan
Data Quantization: 12 Bits - 14 Bit A/D Converters for lower noise
Data Rate (Est. Orbit Average - Actual Rate Varies With Scene):
High-Rate Data (2:1 Rice Compression): 6.7 Mbps (16% Margin)
Low-Rate Data (10:1 JPEG Lossy Compr.): 220 Kilobits/Sec.

Cryogenic Module: Advanced 3-Stage Radiative Cooler Developed On Raytheon IR&D

VIIRS Flight Cooler Radiating Area

VIIRS CFPA Operating Temperature

Cooler No Load Temperature

VIIRS Heat load Radiated to Space - Excluding Control Power, Including Loading By CMIS Antenna & CrIS

Heat Load Margin @ 80K & 296 mW Heat Load

61 x 91 cm

80 Kelvins

64 Kelvins

296 mW

51%

MWIR/LWIR Bands Meet Required Accuracy Over Full Temperature Range (Worst-Case Bands Shown)

10.0

1.0

0.1

180

200

220

240

260

280

300

320

340

Scene Temperature [K]

M12, 3.7microns

M14, 8.55 microns

M15, 10.76 microns

M12 Requirement

M14 Requirement

M15 Requirement

Heritage Hardware Reduces Risk

1 = Space Design Re-Use

2 = C.O.T.S. Hardware

3 = Space Design Heritage

4 = Raytheon-Funded Radiometer Hardware Demonstration

5 = VIIRS Phase I Risk Reduction Hardware

Summary Mass Budget (kg)

Fore & Aft Optics

Cryoradiator & Dewar

On-Board Calibrators

Mechanisms, Doors, Actuators

Mainframe & Structural Elements

Electronics Module

External Cabling & Nadir Panel

Total

SRD Not-To-Exceed Value

Margin

26.4

19.4

9.1

8.7

37.8

49.6

9.0

160.0

200.0

20.0%

Raytheon's Modular, Affordable VIIRS Sensor Meets All Requirements and Facilitates Future Improvements

Band No.	Wave-length (µm)	Horiz Sample Interval (km Downtrack x Crosstrack)		DRIVING EDR(s)	Radi-ance Range	Ltyp or Ttyp	Signal to Noise Ratio (dimensionless) or NEΔT (Kelvins)					
		Nadir	End of Scan				Nadir	E.O.S.	Required	Margin		
VIS/NIR FPA	Silicon PIN Diodes	M 1	0.412	0.742 x 0.259	1.60 x 1.58	Ocean Color Aerosols	Low High	44.9 200	753 1758	435 1016	352 841	23.5% 20.7%
		M 2	0.445	0.742 x 0.259	1.60 x 1.58	Ocean Color Aerosols	Low High	40 230	975 2451	563 1415	380.1 886	48.1% 59.7%
		M 3	0.488	0.742 x 0.259	1.60 x 1.58	Ocean Color Aerosols	Low High	32 270	1065 3045	615 1758	415.6 963	48.0% 82.6%
		M 4	0.555	0.742 x 0.259	1.60 x 1.58	Ocean Color Aerosols	Low High	21 285	931 3272	538 1889	361.8 1018	48.6% 85.6%
		I 1	0.645	0.371 x 0.387	0.80 x 0.789	Imagery EDR	Single	22	326	188	130.7	43.9%
		M 5	0.672	0.742 x 0.259	1.60 x 1.58	Ocean Color Aerosols	Low High	10 233	637 3319	368 1916	242.1 1379	52.0% 38.9%
		M 6	0.752	0.742 x 0.776	1.60 x 1.58	Atmospheric Corr'n	Single	9.6	550	318	199.1	59.5%
	PV HgCdTe	I 2	0.865	0.371 x 0.387	0.80 x 0.789	NDVI	Single	25	435	251	151.2	66.2%
		M 7	0.865	0.742 x 0.259	1.60 x 1.58	Ocean Color Aerosols	Low High	6.4 139	864 3714	499 2144	215.3 1059	131% 102%
		M 8	1.24	0.742 x 0.776	1.60 x 1.58	Cloud Particle Size	Single	5.4	222	128	101	27.1%
		M 9	1.378	0.742 x 0.776	1.60 x 1.58	Cirrus/Cloud Cover	Single	6	246	142	82.7	71.9%
		I 3	1.61	0.371 x 0.387	0.80 x 0.789	Binary Snow Map	Single	7.3	133	77	6	1178%
		M 10	1.61	0.742 x 0.776	1.60 x 1.58	Snow Fraction	Single	7.3	857	495	342.2	44.5%
LWIR	PV HCT	M 11	2.25	0.742 x 0.776	1.60 x 1.58	Clouds	Single	0.12	25.8	14.9	10	49.0%
		I 4	3.74	0.371 x 0.387	0.80 x 0.789	Imagery Clouds	Single	270 K	0.446 K	0.773 K	2.500 K	223%
		M 12	3.70	0.742 x 0.776	1.60 x 1.58	SST	Single	270 K	0.129 K	0.223 K	0.396 K	77.8%
		M 13	4.05	0.742 x 0.259	1.60 x 1.58	SST	Low High	300 K 380 K	0.024 K 0.174 K	0.042 K 0.302 K	0.107 K 0.423 K	155% 40.1%
		M 14	8.55	0.742 x 0.776	1.60 x 1.58	Cloud Top Properties	Single	270 K	0.027 K	0.046 K	0.091 K	97.5%
		M 15	10.762	0.742 x 0.776	1.60 x 1.58	SST	Single	300 K	0.020 K	0.034 K	0.070 K	105%
		I 5	11.45	0.371 x 0.387	0.80 x 0.789	Cloud Imagery	Single	210 K	0.383 K	0.663 K	1.500 K	126%

All Bands Have Comfortable Margin Above EDR-Derived SNR Requirements

Summary Power Budget (Orbit Average W)	
Analog Signal Processing	48.2
Digital Signal Processing	17.3
Controls, Mechanisms, & Telemetry	24.5
Power Supply & Power Conditioning	44.0
Normal Operational Mode TOTAL	134.0
Peak Power - Calibration Mode	176.9
SRD Not-To-Exceed Value	300.0
Power Margin - Normal Operation	55.3%
Power Margin - Calibration	41.0%

Figure 2-1. VIIRS Sensor Configuration, Accommodation, and Performance Summary

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