

List of Resources

Version 2.9

loft

Cameras

Loft Orbital offers access to a set of in-orbit imagers.

A customer can task the satellite to generate images and then downlink the data, with the option to use onboard processing.

Panchromatic

ID	Spectral bands	GSD	Swath
Y3-CAM	Panchromatic VNIR	4.75 m	19 km

Multispectral VNIR

ID	Spectral bands	GSD	Swath
Y7-CAM-1	7 bands in VNIR	30 m	120 km

Thermal Infrared

ID	Spectral bands	GSD	Swath
Y7-CAM-2	2 bands in LWIR	71 x 235 m	72 km

Hyperspectral VNIR

ID	Spectral bands	GSD	Swath
Y6-CAM	150 bands in VNIR	10 m	20 km
Y8-CAM	32 bands in VNIR	4.75 m	20 km

Y3-CAM

Panchromatic Imager

 Snapshot

1 band – Panchromatic
VNIR 470 nm to 900 nm

VISIBLE LIGHT



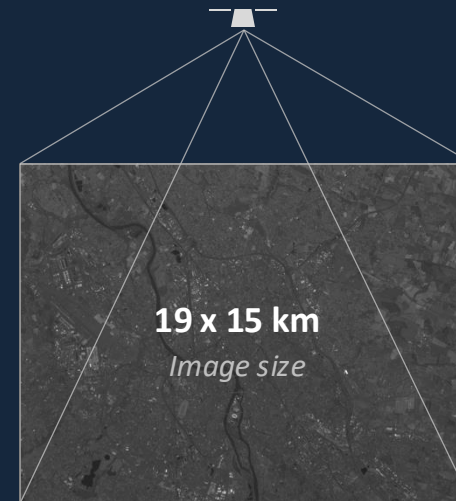
470 nm

900 nm

The swath and spatial resolution (GSD) values are given at 500 km altitude.

YAM-3
SSO 478 km

GSD 4.75 m
Spatial resolution



12 MB

Typical raw image file size



Data formats

- RAW
- CCSDS 122.0-B-2
lossless or lossy

Y6-CAM

Hyperspectral Imager

 Push Broom

150 bands – Hyperspectral
VNIR 470 nm to 900 nm

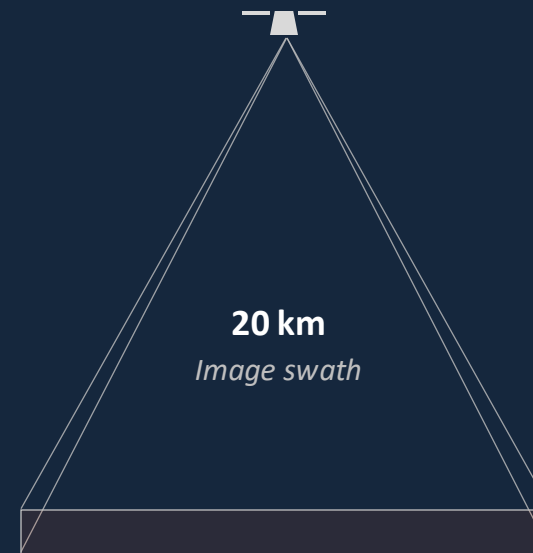


The band distribution is an illustration and may not be fully representative.

The swath and spatial resolution (GSD) values are given at 500 km altitude.

YAM-6
SSO 500 km

GSD 10 m
Spatial resolution



From 1 to 24 MB/km
Per along-track length



Data formats

- RAW
- JPEG2000 – lossless or lossy
- Possible onboard L1B



Post-process available

- dTDI
- Binning
- FMC guidance

Y7-CAM-1

Multispectral Imager

 Push Broom

7 bands – Hyperspectral
VNIR 470 nm to 900 nm






The swath and spatial resolution (GSD) values are given at 500 km altitude..

YAM-7
SSO 507 km



GSD 30 m
Spatial resolution

-  **From 0.1 to 2 MB/km**
Per along-track length
-  **Data formats**
 - RAW
 - JPEG2000 – lossless or lossy
-  **Post-process available**
 - dTDI
 - Binning
 - FMC guidance

Y7-CAM-2

Thermal Infrared Imager

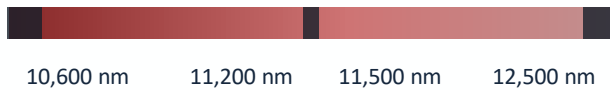
 Push Broom

2 bands – Multispectral

LWIR 10,600 nm to 11,200 nm

LWIR 11,500 nm to 12,500 nm

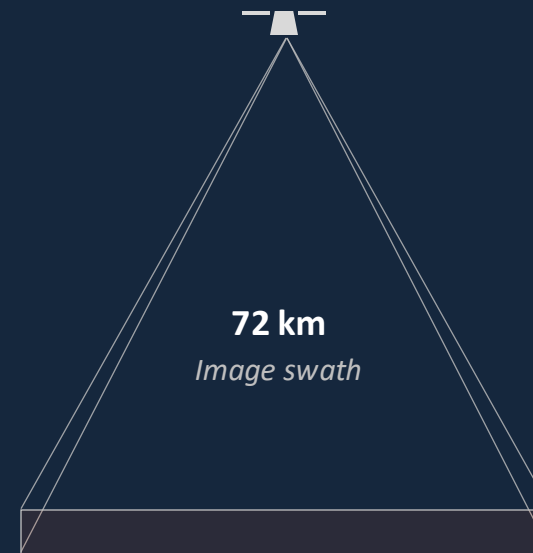
LONG WAVELENGTH INFRARED



The swath and spatial resolution (GSD) values are given at 525 km altitude.

YAM-7

SSO 500 km – 550km



GSD 71 m x 235 m

Spatial resolution
(Cross Track x Along Track)



From 4 MB/km

Per along-track length

Y8-CAM

Hyperspectral Imager

 Push Broom

32 bands tunable (1 nm accuracy)

– Hyperspectral

VNIR 442 nm to 884 nm

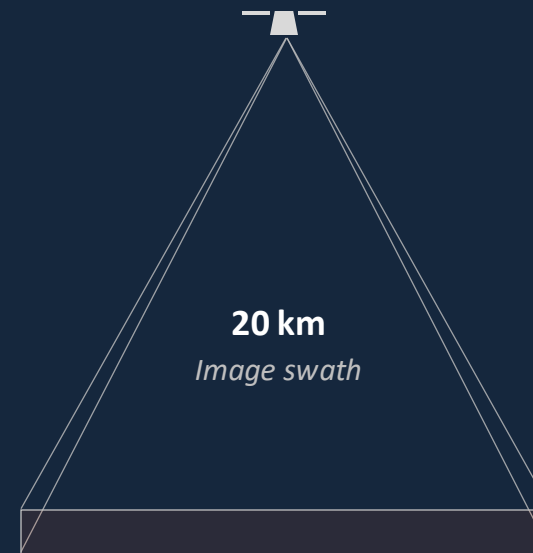


The band distribution is an illustration and may not be fully representative.


The swath and spatial resolution (GSD) values are given at 500 km altitude.

YAM-8
SSO 500-600 km


GSD 4.75 m
Spatial resolution



 **From 1 to 40 MB/km**
Per along-track length

 **Data formats**

- RAW
- CCSDS 122.0-B-2 lossless or lossy

 **Post-process available**

- dTDI
- Binning
- FMC guidance


Radiofrequency - Reception

Loft Orbital offers access to the capabilities of a software-defined radio, allowing listening to a diverse range of frequencies.



Y3/6/Y8-RFR-1

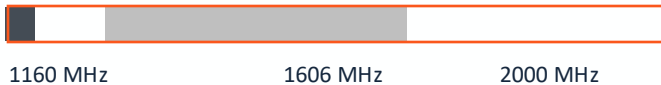
RX L Band

 Positioning,
Navigation and
Timing

 Jammer detection

GNSS Bands
1160 – 1606 MHz

L-BAND



Zenith Coverage

YAM

SSO 500 - 600 km



Earth coverage
(only on Y3 and Y6)

Available GNSS Bands
GPS - L1 L2 L5
GLONASS - G1 G2 G3
Galileo - E1 E5a E5b E6
BeiDou - B1 B2 B2a B3



Figure of Merit

G/T > -28 dB/K peak

Gain-to-noise-temperature



I/Q recordings

0.4 MHz bandwidth: max
~ 10 minutes length

4 MHz bandwidth: max ~
20 seconds length



Spectral analysis

16,384 points FFT
Recording campaigns of
several hours

Maximum bandwidth:
15 MHz



Additional features

Integration of customer
software IP acceleration

Y3-RFR-2

Rx S Band

 Internet of Things

 Signal Intelligence

S-Band
2000 – 2500 MHz

S-BAND



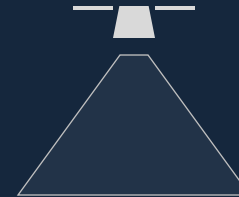
2000 MHz

2500 MHz

The Center frequency and bandwidth are tunable anywhere within payload's available frequency range.

YAM

SSO 500 - 600 km



Earth coverage



Figure of Merit

G/T > -25 dB/K peak

Gain-to-noise-temperature



I/Q recordings

0.4 MHz bandwidth: max ~
10 minutes length

4 MHz bandwidth: max
~ 20 seconds length



Spectral analysis

16,384 points FFT
Recording campaigns of
several hours

Maximum bandwidth:
15 MHz



Additional features

Integration of customer
software IP acceleration

Y6-RFR-2

Rx S Band

 Maritime Radar

 Signal Intelligence

S-Band
2900 – 3100 MHz

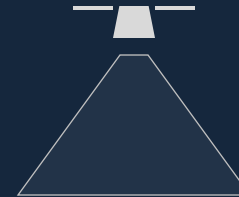
S-BAND



The Center frequency and bandwidth are tunable anywhere within payload's available frequency range.

YAM

SSO 500 - 600 km



Horizon coverage



I/Q recordings

0.4 MHz bandwidth: max ~ 10 minutes length

4 MHz bandwidth: max ~ 20 seconds length
(No LNA in chain)



Spectral analysis

16,384 points FFT
Recording campaigns of several hours
Maximum bandwidth: 15 MHz



Additional features

Integration of customer software IP acceleration

Y8-RFR-2

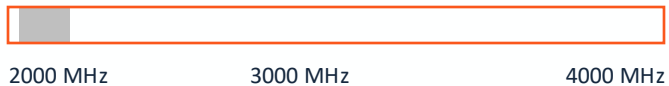
Rx S Band

 Internet of Things

 Signal Intelligence

S-Band
2060 – 2110 MHz

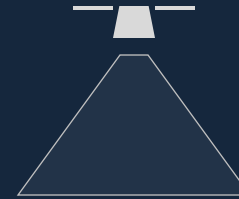
S-BAND



The Center frequency and bandwidth are tunable anywhere within payload's available frequency range.

YAM

SSO 500 - 600 km



Earth coverage



I/Q recordings

0.4 MHz bandwidth: max ~ 10 minutes length

4 MHz bandwidth: max ~ 20 seconds length



Spectral analysis

16,384 points FFT
Recording campaigns of several hours

Maximum bandwidth:
15 MHz




Additional features

Integration of customer software IP acceleration

Y3-RFR-3

Rx UHF

 Communication & signal intelligence

 Aircraft system monitoring

UHF-Band

865 – 924 MHz

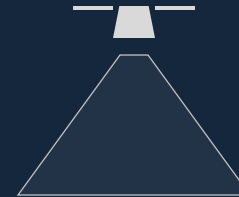
UHF



The Center frequency and bandwidth are tunable anywhere within payload's available frequency range.

YAM

SSO 500 - 600 km



Earth coverage



Figure of Merit

G/T > -25 dB/K peak

Gain-to-noise-temperature



I/Q recordings

0.4 MHz bandwidth: max ~ 10 minutes length

4 MHz bandwidth: max ~ 20 seconds length




Additional features

Integration of customer software IP acceleration

Y6-RFR-3

Rx UHF

 Communication & signal intelligence

 Aircraft system monitoring

UHF-Band
300 – 500 MHz

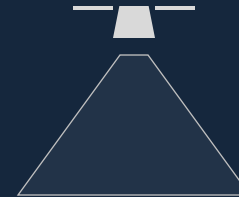
UHF



The Center frequency and bandwidth are tunable anywhere within payload's available frequency range.

YAM

SSO 500 - 600 km



Earth coverage



Figure of Merit

G/T > -23 dB/K peak

Gain-to-noise-temperature



I/Q recordings

0.4 MHz bandwidth: max
~ 10 minutes length

4 MHz bandwidth: max ~
20 seconds length



Spectral analysis

16,384 points FFT
Recording campaigns of
several hours

Maximum bandwidth:
15 MHz




Additional features

Integration of customer
software IP acceleration

Y6-RFR-4

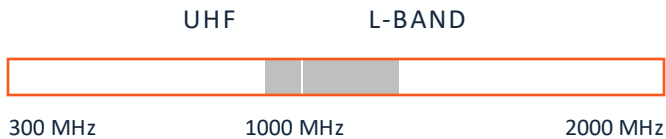
Rx UHF

 Communication & signal intelligence

 Aircraft system monitoring

UHF-Band

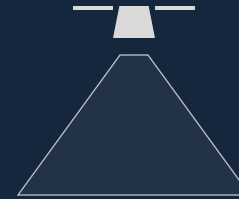
840 – 1200 MHz



The Center frequency and bandwidth are tunable anywhere within payload's available frequency range.

YAM

SSO 500 - 600 km



Earth coverage



Figure of Merit

G/T > -21 dB/K peak

Gain-to-noise-temperature



I/Q recordings

0.4 MHz bandwidth: max
~ 10 minutes length

4 MHz bandwidth: max ~
20 seconds length



Spectral analysis

16,384 points FFT
Recording campaigns of
several hours

Maximum bandwidth:
15 MHz



Additional features

Integration of customer
software IP acceleration

Hub Gateway

Loft provides ways to exchange data with the spacecraft using other means than the usual ground station uplink and downlink.

Y6-HGW

RF Inter-Satellite Link (ISL)

Leveraging 

 Low latency data delivery

Coverage

From -60° to +60° latitude



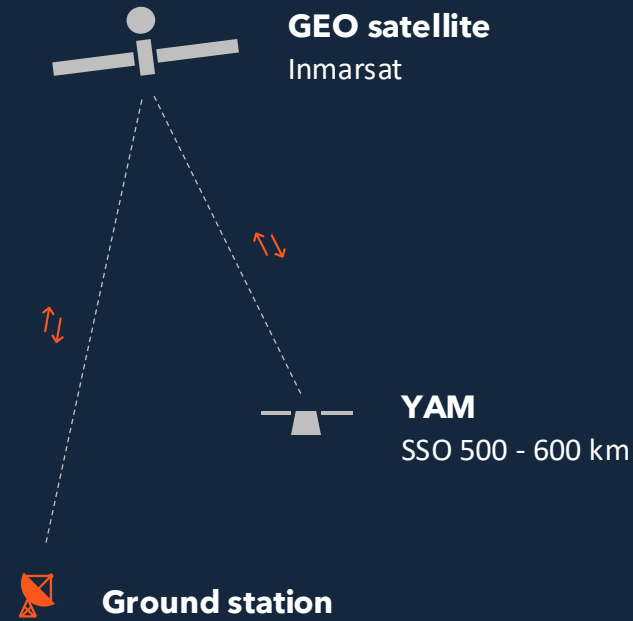
The RF ISL provides a real-time two-way link between the ground and the satellite by relying on a GEO satellite relay.



Data-rate

Uplink up to 200 kbps

Downlink up to 200 kbps



Hub Compute and Processing

Loft offers a new way to develop, test, and validate software applications for space systems, to then seamlessly deploy them to satellites in orbit using Loft's space infrastructure tools and platforms.

Here are some application examples of the onboard computing capabilities:

- Image processing
- Radiofrequency analysis
- Event detection and alert management

Y6-HCP

	YAM-6 Y6-HCP-1	YAM-6 Y6-HCP-2	YAM-6 Y6-HCP-3	YAM-6 Y6-HCP-4
CPU	5 CPU cores 2 GHz	5 CPU cores 2 GHz	3 CPU cores 1.2 GHz	1 CPU core 1.2 GHz
RAM	7 GB	7 GB	1 GB	256 MB
Storage	40 GB ephemeral 500 GB persistent	40 GB ephemeral 500 GB persistent	10 GB ephemeral 128 GB persistent	1 GB ephemeral 64 GB persistent
GPU	256 CUDA Cores 1.33 TFLOPS FP16	256 CUDA Cores 1.33 TFLOPS FP16	None	None

Y7-HCP

	YAM-7 Y7 - HCP - 1	YAM-7 Y7 - HCP - 2	YAM-7 Y7 - HCP - 3
CPU	5 CPU cores 2 GHz	3 CPU cores 1.2 GHz	1 CPU core 1.2 GHz
RAM	7 GB	1 GB	256 MB
Storage	40 GB ephemeral 500 GB persistent	10 GB ephemeral 128 GB persistent	1 GB ephemeral 64 GB persistent
GPU	256 CUDA Cores 1.33 TFLOPS FP16	None	None

Y8-HCP

	YAM-8 Y8 - HCP - 1	YAM-8 Y8 - HCP - 2	YAM-8 Y8 - HCP - 3
CPU	5 CPU cores 2 GHz	3 CPU cores 1.2 GHz	1 CPU core 1.2 GHz
RAM	7 GB	1 GB	256 MB
Storage	40 GB ephemeral 500 GB persistent	10 GB ephemeral 128 GB persistent	1 GB ephemeral 64 GB persistent
GPU	256 CUDA Cores 1.33 TFLOPS FP16	None	None

Annexes

Glossary

Optics

- FPS Frames per Seconds
- FWHM Full Width at Half Maximum
- GSD Ground Sample Distance
- LWIR Long Wavelength Infrared
- MTF Modulation Transfer Function
- RGB Red Green Blue
- SNR Signal-to-Noise Ratio
- TDI Time Delay and Integration
- TIR Thermal Infrared
- VNIR Visible and Near Infrared

Loft Orbital Products

- YAM-x Yet Another Mission (Satellite name)
- YAC-x Yet Another Constellation (Constellation name)

Radiofrequency

- EIRP Effective Isotropic Radiated Power
- GNSS Global navigation satellite system
- G/T Gain-to-Noise-Temperature
- I/Q In-Phase and Quadrature Components
- RFFE RF Front End
- SDR Software Defined Radio

Compute

- FLOPS Floating Point Operations
- FP16 16-bit Floating Point (aka Half Precision)
- ML Machine Learning

Space Related

- FMC Forward Motion Compensation
- SSO Sun Synchronous Orbit



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