

## Resourcesat- 1 Satellite

IRS – P6 (RESOURCESAT-I) is a global mission having three imaging sensors namely LISS 3, AWiFS and LISS 4 . This satellite provides a three tier imaging capability with a 23.5 meter resolution multi-spectral LISS 3 camera, with 56 meter resolution multi-spectral AWiFS camera and with a 5.8 meter resolution LISS 4 camera operating in multi spectral or mono mode of imaging.

### Orbital Characteristics of the satellite

Orbit	Near-polar, Sun-synchronous
Altitude	817 Km
Semi-major Axis	7195.04 Km
Eccentricity	0.001 IRS
Inclination	98.715 degrees
Argument of Perigee	90 degrees
Repeat Cycle	24 days
Orbits per Cycle	341
Minutes per Orbit	101.349 minutes
Equatorial Crossing (descending)	10:30 $\pm$ 00:05 AM
Longitude of Path 1	29.7 degrees W (descending node)
Latitude of Row 5	~80 degrees N (descending node)
Row number of Equator	75

### **Ground distance between**

Adjacent paths	117.52 km (at Equator)
Successive tracks	2820.5 km

### **Swath**

L4 MONO at Nadir	70 km
LISS-4 at Nadir	23.5 km
LISS-3 at Nadir	142 km
AWiFS at Nadir	737 km

### **Revisit**

L4 MONO ( $\pm$ 26 degrees tilt)	Better than 5 days
LISS-4 ( $\pm$ 26 degrees tilt)	Better than 5 days
LISS-3	24 days
AWiFS	5 days

### **L4 MONO & LISS-4 tilt accuracy**

Step size	0.02 degrees
Repeatability	$\pm$ 0.1 degrees

Sensor Characteristics

<b>Parameter</b>	<b>LISS-4</b>	<b>LISS3</b>	<b>AWiFS</b>
Ground sampling Distance in meters	5.8 at nadir	23.5	56 (nadir) 70 (at field edge)
Spectral Bands	B2, B3, B4 (MX-multi-spectral) B2 or B3 or B4 (Mono mode)	B2, B3, B4,B5	B2, B3, B4, B5
Swath in kilometers	23.8 (MX-multi-spectral) 70Km (Mono mode)	141	740
Saturation radiance (mw/cm <sup>2</sup> /sr/micron)	B2: 55 B3: 47 B4: 31.5	B2: 28-31 B3: 25-38 B4: 27-30 B5: 7.5	B2: 53 B3: 47 B4: 31.5 B5: 7.5
Integration time in Milli-seconds	0.877714	3.32	9.96
Radiometric resolution	7 bit	7bit	10bit
Gains			

The specifications of LISS3 and AWiFS sensor are given in the **Tables 1** and **2** and scene geometry of payloads LISS-3 and AWiFS are described in **Figures 1** to **4**. LISS-3 and AWiFS camera operate in four spectral bands in the VNIR (Visible Near IR) and SWIR (Short Wave IR) range.

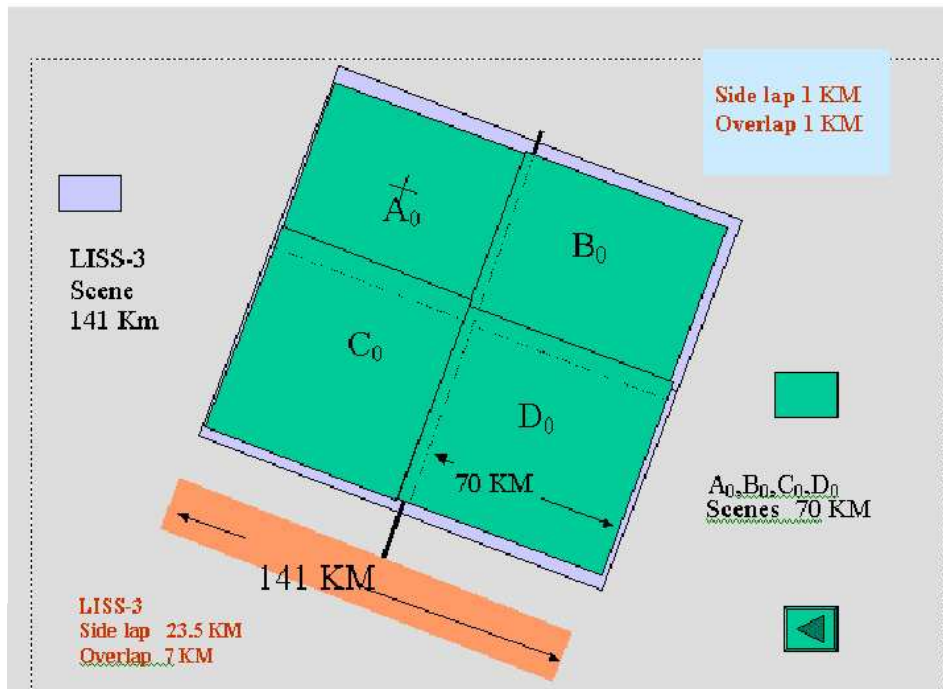
**Table 1 LISS-3 Sensor**

Sr. No	Parameter	Value			
1	IGFOV	(μ rad)			
	Across Track (VNIR & SWIR)	28.8			
	Along Track (VNIR)	20.2			
	Along Track (SWIR)	28.8			
2	Ground Sampling Distance at Nadir	(Meters)			
	Across Track Along Track	23.5 22			
3	Swath	141 Km			
4	Bands	B2(μm) 0.52- 0.59	B3(μm) 0.62- 0.68	B4(μm) 0.77- 0.86	B5(μm) 1.55- 1.70
5	Quantization	7 bits			

**Table 2 AWiFS Sensor**

Sr. No	Parameter	Value			
1	IGFOV	(μ rad)			
	Across Track (VNIR & SWIR)	69			
	Along Track (VNIR)	50			
	Along (SWIR)	69			
2	Ground Sampling Distance	(meters)			
	Across Track Along Track	56 (at nadir), 70 (off nadir) 66			
3	Swath	~ 740 Km, with two heads			
4	Bands	B2 (μm) 0.52- 0.59	B3 (μm) 0.62- 0.68	B4 (μm) 0.77- 0.86	B5 (μm) 1.55- 1.70
5	Quantization	10 bits			

The swath of LISS-3 is 141 km in all four bands. Since the swath of LISS-3 in all the four bands is greater than the inter orbit distance (117.5 Km), the sensor scans the entire globe once in every cycle without gaps.



**Figure 1 Schematic description of LISS-3 scene geometry**

The referencing scheme of LISS-3 consists of 341 paths numbered from west to east. Each path consists of 149 rows. Consecutive paths are covered with an interval of five days. If path 1 is covered on day one, path 2 will be covered on day six. The AWiFS referencing scheme is also based on LISS-3 scene centre. However, due to large coverage of each of AWiFS scene (740kmX740km), there is an overlap of 84% between adjacent paths at equator. Similarly, the overlap between adjacent rows is 82%.

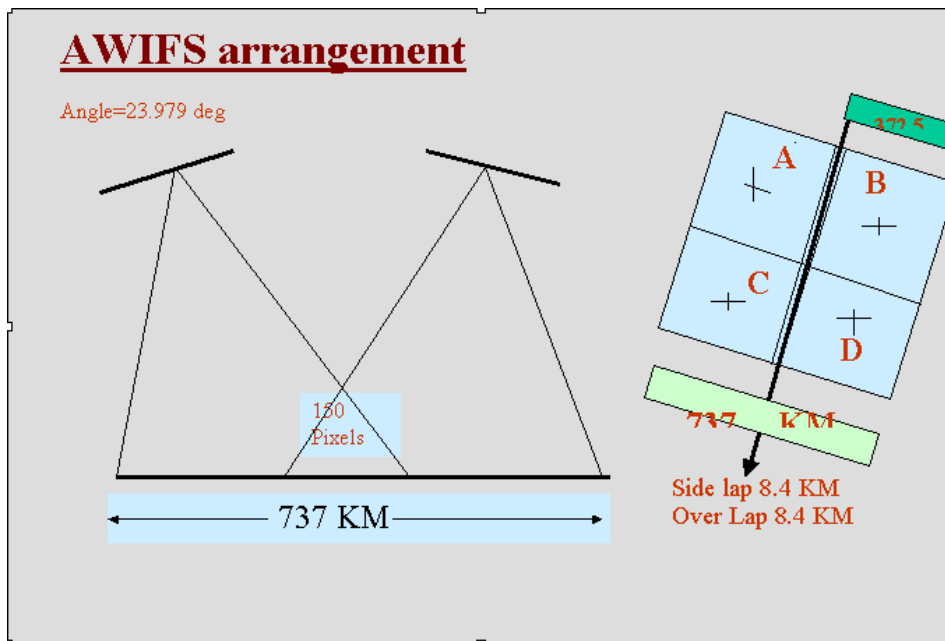


Figure 2 AWiFS ground projection of two cameras and scene geometry

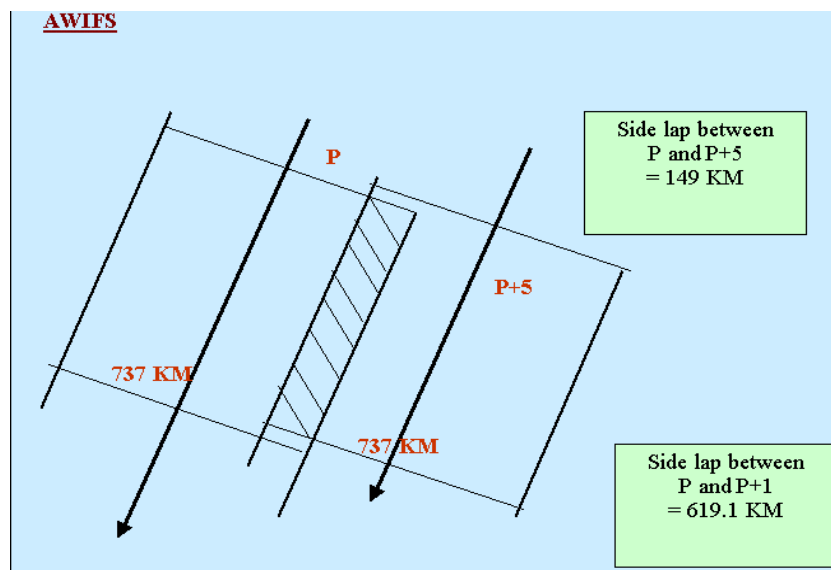


Figure 3 Schematic description of AWiFS coverage and SideLap

For further information : <http://www.isro.org/> <http://www.nrsc.gov.in/>