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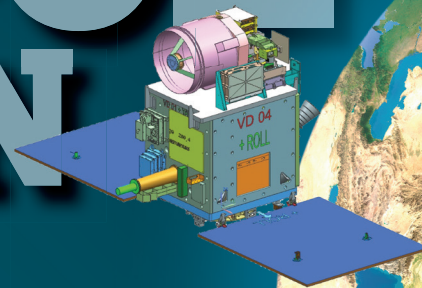


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# SSLV-D1 EOS-02 MISSION



**Indian Space Research Organisation**

**Capacity Building & Public Outreach**

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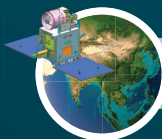
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## MISSION

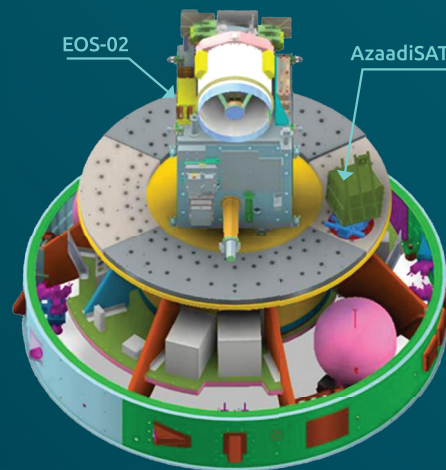
Small Satellite Launch Vehicle (SSLV) is the new launch vehicle of ISRO capable of launching Mini, Micro or Nano satellites (10 to 500 kg mass) to 500 km planar orbit. SSLV is a three-stage vehicle with all solid propulsion stages. The satellite insertion into the intended orbit is achieved through a liquid propulsion-based Velocity Trimming Module (VTM).

The design drivers of SSLV are low cost, low turnaround time, flexibility in accommodating multiple satellites, launch-on-demand feasibility, minimal launch infrastructure requirements, etc.

SSLV-D1 is a mission to launch EOS-02 (Earth Observation Satellite – 02) and a co-passenger satellite, AzaadiSAT, into Low Earth Orbit.

SSLV-D1 launch is planned from the First Launch Pad (FLP), SDSC, SHAR.

## Payload Accommodation in SSLV-D1

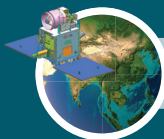


### SSLV-D1 Vehicle Characteristics

Vehicle Height	34 m
Vehicle Diameter	2 m
Lift off Mass	120 t
Vehicle Configuration	SS1 + SS2 + SS3 + VTM

### SSLV-D1 Mission Specifications

Parameter	Specifications
Altitude (km) (wrt. equatorial Earth radius)	356.2
Inclination (deg)	37.21
Launch Azimuth (deg)	135



## SSLV-D1 Stages at a Glance

	Stage 1 (SS1)	Stage 2 (SS2)	Stage 3 (SS3)	VTM
Length (m)	22.5	3.2	2.8	-
Diameter (m)	2	2	1.7	2
Propellant	Solid (HTPB based)	Solid (HTPB based)	Solid (HTPB based)	Liquid (MMH+MON3)
Propellant Mass (t)	87	7.7	4.5	0.05
Action time (s)	117	121	112	-

## New Systems

- SS1 Motor: Third largest solid booster of ISRO.
- SS3 Motor: New composite upper stage solid motor.
- Expandable Bellow based circular separation system for second stage.
- Super capacitors for powering of Pyro systems.
- Ogive composite Payload Fairing with co-cured Cork Thermal protection system.
- Liquid propulsion based terminal stage for precise injection of satellite.

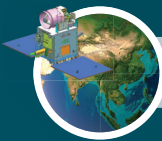
## New Features/ Innovative Approaches

SSLV is a ready-to-transfer vehicle with modular and unified systems and with standard interfaces for end-to-end industrial production.

The features of SSLV that enable the above include:

- Booster motor segment with open joint configuration to minimise segment assembly and launch integration time.
- Direct initiation of Pyro systems with simplified Pyro circuit.
- Separation system / hardware with modular feature for ease of production and minimum turnaround time.
- Unified interstage joint configuration to enable quick integration and launch.
- Multi Satellite accommodation with Multi Satellite Adaptor (MSA) deck.
- Miniaturised low cost avionics systems with industrial COTS Components.
- Low cost NavIC integrated Inertial Navigation system with control class MEMS sensor enabling aided navigation throughout flight regime.
- Digital control system with fully indigenous Electro-mechanical actuators.
- Onboard checkout computer with simple and rapidly reconfigurable checkout system with minimum ground interfaces.

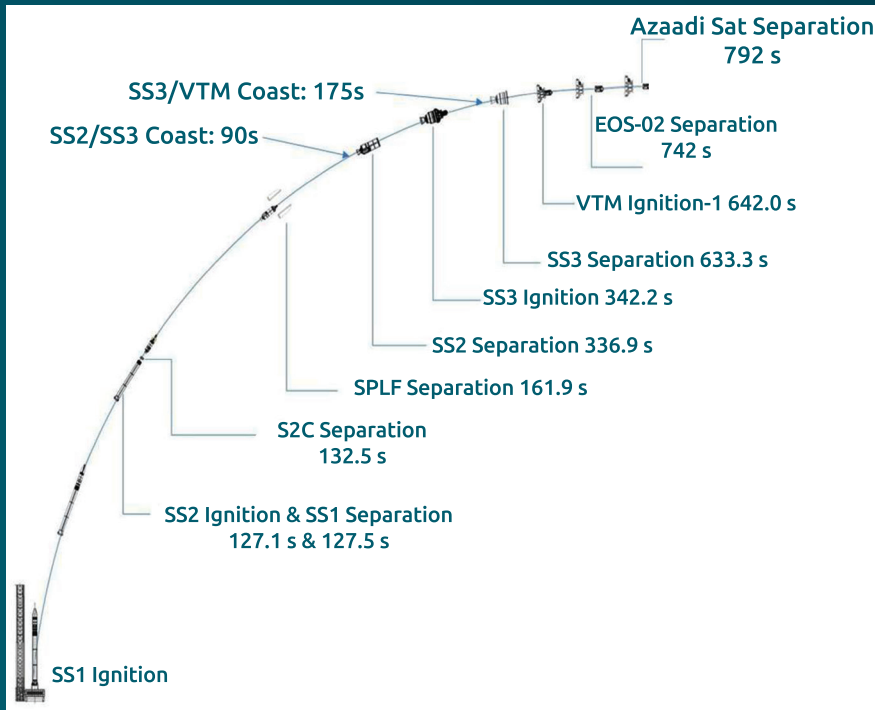




SSLV-D1/EOS-02

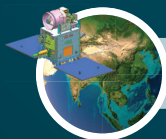


# SSLV-D1 FLIGHT SEQUENCE



## SSLV-D1 Typical Flight Profile (Below information Based on FRR Issue-1 Rev-0 Data)

Event	Time (s)	Altitude (km)
SS1 Ignition	0.0	-
SS2 Ignition	127.1	92.55
SS1 Separation	127.5	93.16
S2C Separation	132.5	100.69
SPLF Separation	161.9	142.90
SS2 Separation	336.9	327.85
SS3 Ignition	342.2	330.88
SS3 Separation	633.3	356.30
VTM Ignition-1	642.0	356.30
EOS-02 Separation	742.0	356.30
AzaadiSAT Separation	792.0	356.30



SSLV-D1/EOS-02



## EOS-02

EOS-02 is an experimental optical remote sensing satellite with a high spatial resolution. The objective of EOS-02 is to realise and fly an experimental imaging satellite with a short turn-around time and to demonstrate launch on demand capability. EOS-02 belongs to microsatellite series of spacecrafts. The bus configuration is derived from IMS-1 bus.

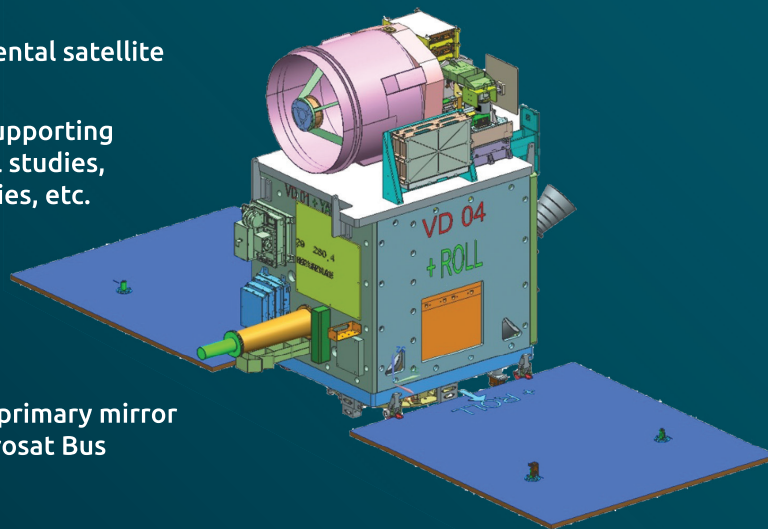
### Mission Objectives

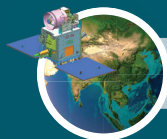
- Design and development of an agile and experimental satellite with an imaging payload.
- Providing inputs on thermal anomalies towards supporting applications in the domains of geo-environmental studies, forestry, hydrology, agriculture, soil, coastal studies, etc.

### New Technologies

New technologies realised for the Microsat series of spacecrafts include:

- Payloads with a common fore optics and metallic primary mirror realised with the limited mass and volume of Microsat Bus





SSLV-D1/EOS-02



## EOS-02

### Configuration Summary

- The structural construction is of aluminum honeycomb. Cuboid structure of 552 mm x 600 mm x 600 mm is designed and qualified for a total spacecraft mass of 145 kg.
- Mainframe/Bus subsystems are integrated independent payloads. All payload elements are accommodated on the top deck.
- The two solar panels generating 350 W power are the only deployable appendages.
- The platform is highly agile with a manoeuvrability of  $3.5^\circ/s$  and a pointing accuracy of  $0.1^\circ$ .
- The payload data transmission rate is 32 Mbps in X-Band.

## AzaadiSAT

AzaadiSAT is a 8U Cubesat weighing around 8 kg. It carries 75 different payloads each weighing around 50 grams and conducting femto-experiments. Girl students from rural regions across the country were provided guidance to build these payloads. The payloads are integrated by the student team of "Space Kidz India". The payloads include a UHF-VHF Transponder working in ham radio frequency to enable voice and data transmission for amateur radio operators, a solid state PIN diode-based Radiation counter to measure the ionising radiation in its orbit, a long-range transponder and a selfie camera. The ground system developed by 'Space Kidz India' will be utilised for receiving the data from this satellite.

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