



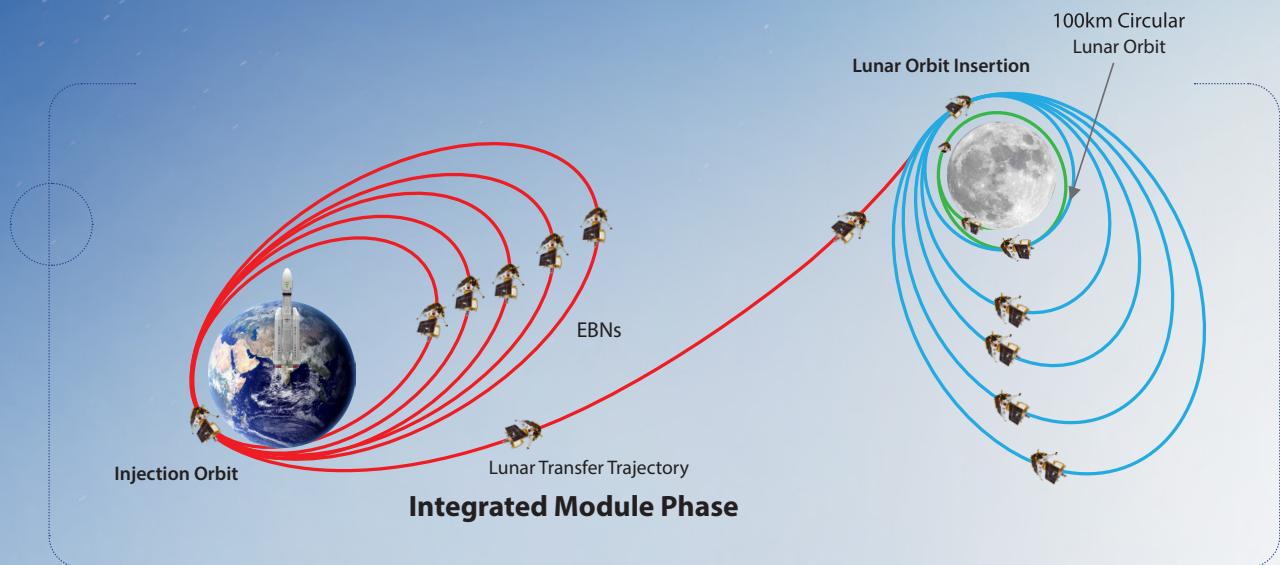
LVM3-M4/CHANDRAYAAN-3 MOON MISSION

Indian Space Research Organisation

LVM3-M4/ Chandrayaan-3 Mission

Chandrayaan-3, India's third lunar exploration mission is ready to take off in fourth operational mission (M4) of LVM3 launcher, ISRO is crossing new frontiers by demonstrating soft landing on lunar surface by its lunar module and demonstrate roving on the lunar terrain. It is expected to be supportive to ISRO's future interplanetary missions.

Additionally the deployment of rover and in-situ scientific experiment will scale new heights in lunar expeditions by deploying Rover. Yes, ISRO is bringing the Moon closer to us.





Mission sequence

The various mission phases are classified as follows:

1. Earth Centric Phase (Phase-1)

- Pre-launch Phase
- Launch and Ascent Phase
- Earth-bound Manoeuvre Phase

2. Lunar Transfer Phase (Phase-2)

- Transfer Trajectory Phase

3. Moon Centric Phase

- Lunar Orbit Insertion Phase (LOI)-(Phase-3)
- Moon-bound Manoeuvre Phase (Phase-4)
- PM and Lunar Module Separation (Phase-5)
- De-boost Phase (Phase-6)
- Pre-landing Phase (Phase-7)
- Landing Phase (Phase-8)
- Normal Phase for Lander and Rover (Phase-9)
- Moon Centric Normal Orbit Phase
(100 km circular orbit) - For Propulsion Module
(Phase-10)



LVM3-M4/ Chandrayaan-3 Mission

Propulsion Module

Chandrayaan-3 consists of an indigenous propulsion module, lander module, and a rover with an objective of developing and demonstrating new technologies required for inter-planetary missions.

The propulsion module will carry the lander and rover from injection orbit to till 100 km lunar orbit. It also carries a Spectro-polarimetry of Habitable Planetary Earth (SHAPE) payload to study the spectral and polarimetric measurements of earth from the lunar orbit.

The main function of Propulsion Module is to carry the LM from launch vehicle injection orbit to till Lander separation.



Major Specifications of Propulsion Module

Sl.No	Parameter	Specifications
1.	Lunar Polar Orbit	From 170 x 36500 km to lunar polar orbit
2.	Mission life	Carrying Lander Module & Rover upto ~100 x 100 km launch injection. Subsequently, operation of experimental payload for a period of 3 to 6 months.
3.	Structure	Modified version of I-3 K
4.	Dry Mass	448.62 kg (including pressurant)
5	Propellant Mass	1696.39 kg
6.	Total PM Mass	2145.01 kg
7.	Power Generation	738 W, Summer solstices and with bias
8.	Communication	S-Band Transponder (TTC) – with IDSN
9.	Attitude Sensors	CASS, IRAP, Micro star sensor
10.	Propulsion System	Bi-Propellant Propulsion System (MMH + MON3)



LVM3-M4/ Chandrayaan-3 Mission



Major Specifications of Lander

Mission life : 1 Lunar day (14 Earth days)
Mass : 1749.86 kg including Rover
Power : 738 W (Winter solstice)
Payloads : 3
Dimensions (mm³) : 2000 x 2000 x 1166
Communication : ISDN, Ch-2 Orbiter, Rover
Landing site : 69.367621 S, 32.348126 E

Major Specifications of Rover

Mission Life : 1 Lunar day
Mass : 26 kg
Power : 50 W
Payloads : 2
Dimensions (mm³) : 917 x 750 x 397
Communication : Lander

Lander Payloads



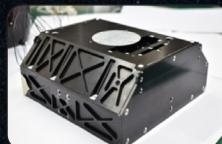
RAMBHA-LP Langmuir Probe

To measure the near surface plasma (ions and electrons) density and its changes with time.



ChaSTE Chandra's Surface Thermo-physical Experiment

To carry out the measurements of thermal properties of lunar surface near polar region.



ILSA Instrument for Lunar Seismic Activity

To measure seismicity around the landing site and delineating the structure of the lunar crust and mantle.

Rover Payloads



APXS Alpha Particle X-Ray Spectrometer

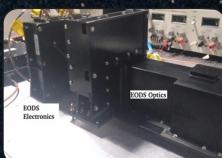
To derive the chemical composition and infer mineralogical composition to further enhance our understanding of lunar surface.



LIBS Laser Induced Breakdown Spectroscopy

To determine the elemental composition (Mg, Al, Si, K, Ca, Ti, Fe) of lunar soil and rocks around the lunar landing site.

Propulsion Module Payload



SHAPE Spectro-polarimetry of Habitable Planet Earth

An experimental payload to study the spectro-polarimetric signatures of the habitable planet Earth in the near-infrared (NIR) wavelength range (1-1.7 μm).



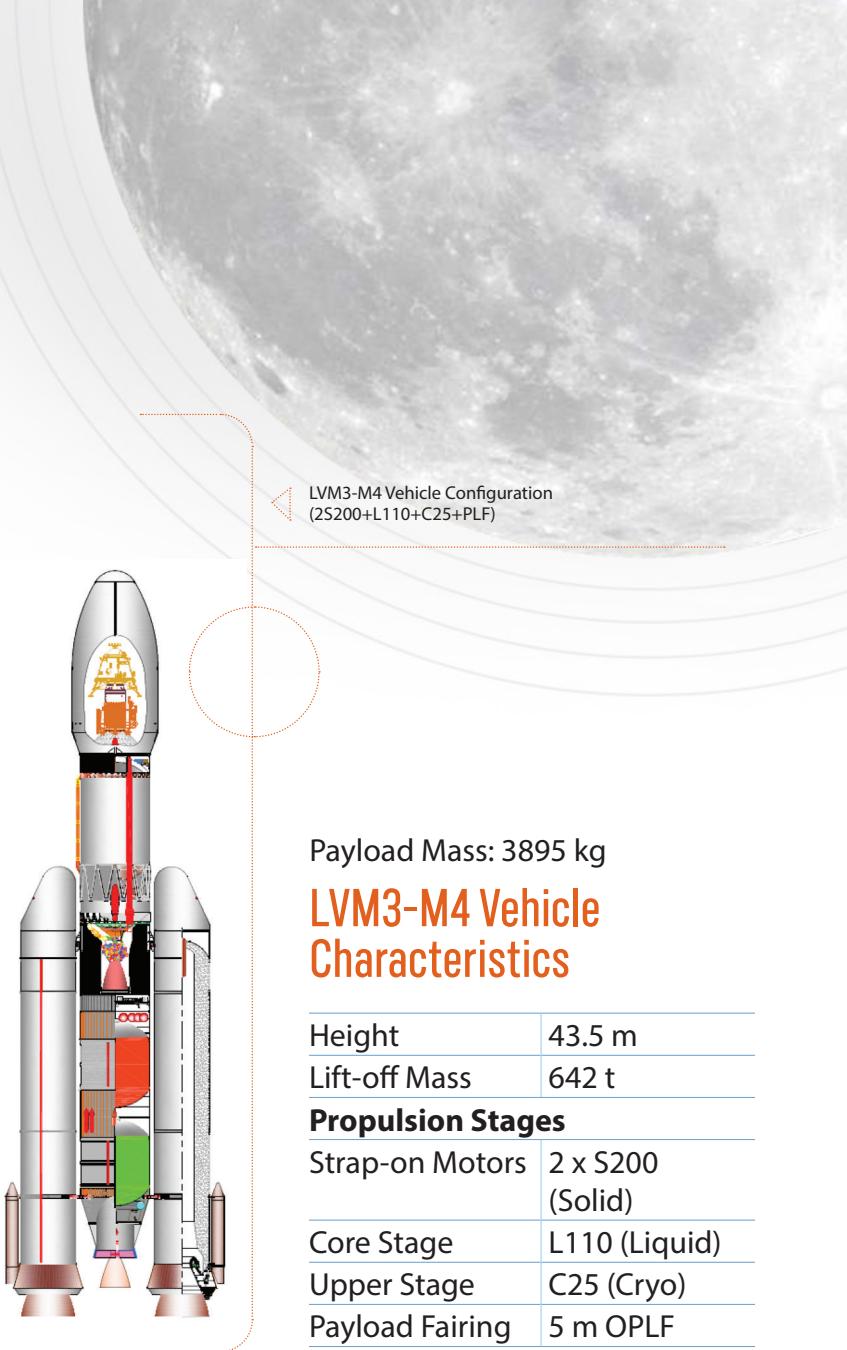
LVM3-M4/ Chandrayaan-3 Mission

LVM3 is the operational heavy lift launch vehicle of ISRO and has a spectacular pedigree of completing 6 consecutive successful missions. This is the 4th operational flight of LVM3, aims to launch the Chandrayaan-3 spacecraft to Geo Transfer Orbit (GTO).

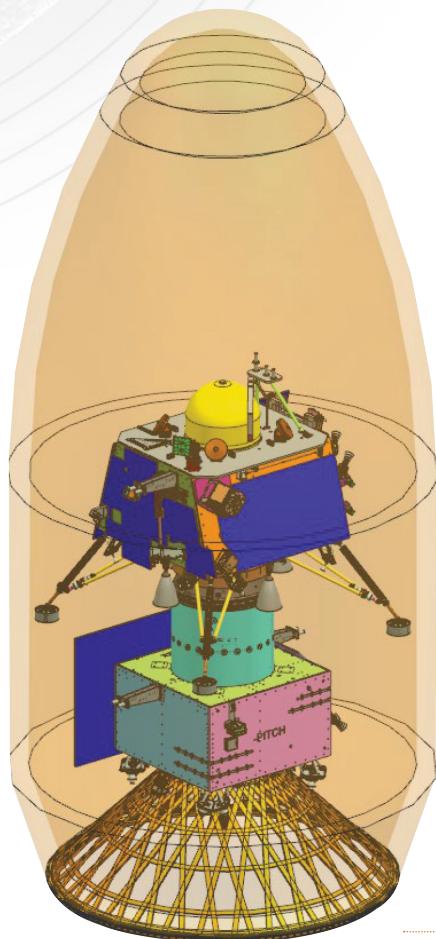
LVM3 has proved its versatility to undertake most complex missions like:

- Injecting multi-satellites
- Mission planning to ensure safe relative distance among separated satellites through re-orientation and velocity addition maneuvers.
- Multi orbit (LEO, MEO, GEO) and execute interplanetary missions.
- India's largest and heaviest launch vehicle ferrying Indian and international customer satellites.

LVM3-M4 will be launched from the Second Launch Pad (SLP), SDSC, SHAR.



Payload Accommodation



LVM3-M4 Mission Specifications

GTO Apogee	36500 ± 500 km
GTO Perigee	170 ± 3.5 km
Inclination	21.3°
Argument of Perigee	$178 \pm 0.2^{\circ}$
Launch Pad	SLP
Launch Azimuth	107°

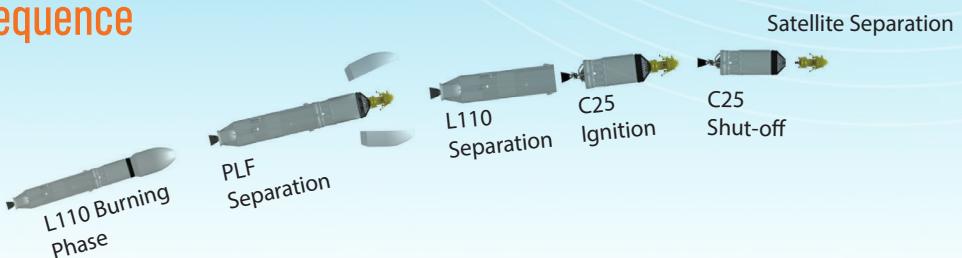
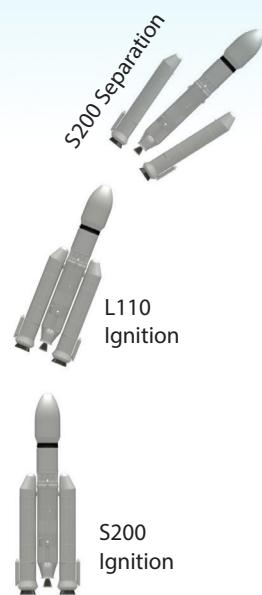
LVM3-M4 Stages at a Glance

Stages	Strap-Ons (2 x S200)	Core Stage (L110)	Upper Stage (C25)
Length (m)	26.22	21.4	13.5
Diameter (m)	3.2	4.0	4.0
Propellant Type	Solid (HTPB)	Liquid (UH25 + N ₂ O ₄)	Cryo (LH ₂ & LOX)
Propellant Mass (t)	204.5 (each)	115.8	28.6

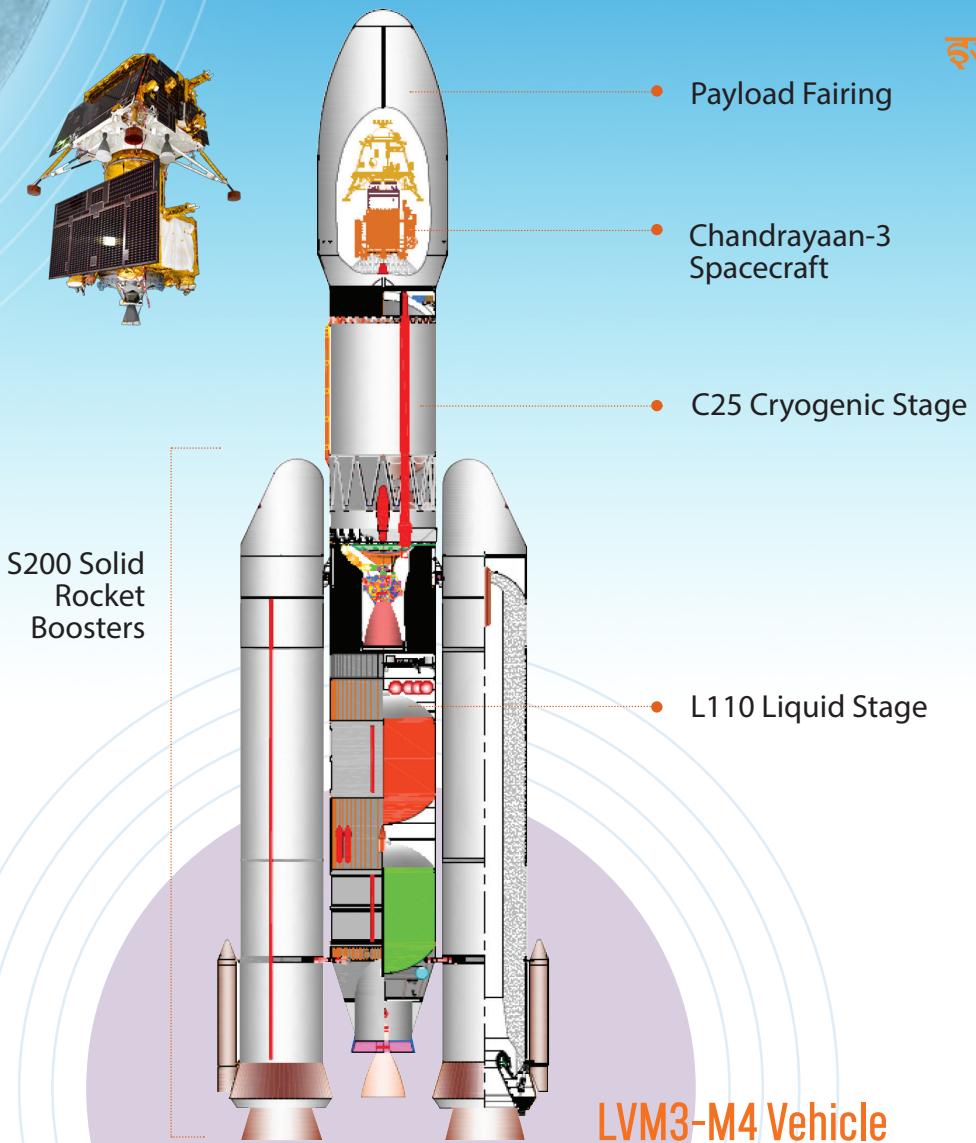


LVM3-M4/ Chandrayaan-3 Mission

Nominal Flight Sequence



Event	Flight Time (s)	Altitude (km)	Inertial Velocity (km/s)
2xS200 Ignition	0.00	0.024	0.452
L110 Ignition	108.10	44.668	1.788
2xS200 Separation	127.00	62.171	1.969
PLF Separation	194.96	114.805	2.560
L110 Separation	305.56	175.352	4.623
C25 Ignition	307.96	176.573	4.621
C25 Shut-off	954.42	174.695	10.242
Satellite Separation	969.42	179.192	10.269



Integration Activities of LVM3-M4



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