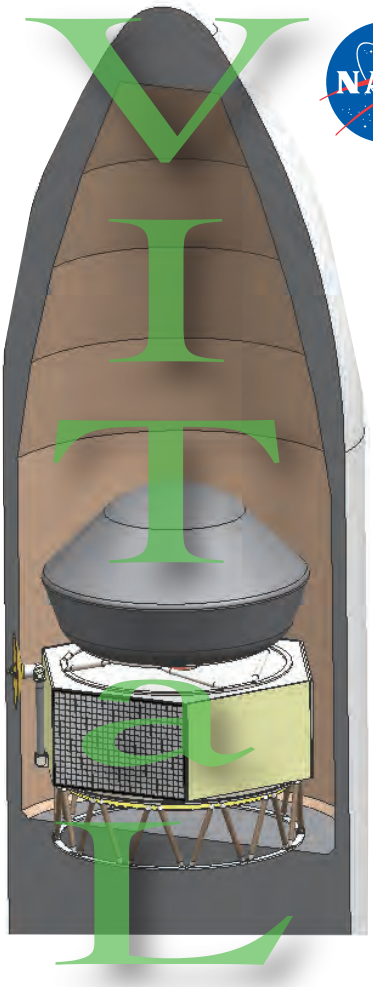


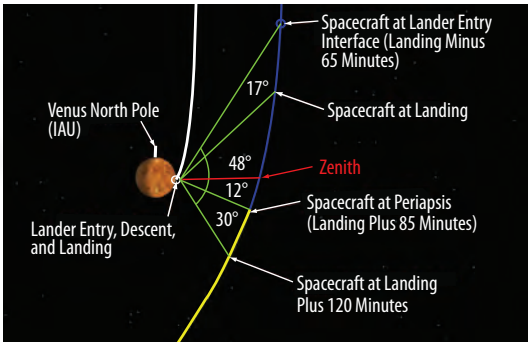
Venus Intrepid Tessera Lander

fact sheet

Mission Concept Study Report to the NRC Decadal Survey
Inner Planets Panel • March 15, 2010
Concept Maturity Level: 4 • Cost Range: Low End Flagship
GSFC • ARC

Nominal Mission:

- Atlas V 551 Launch Vehicle
- Type II trajectory
- Launch on 11/2/2021
- Venus fly-by 4/7/2022
- Descent/Landed science 7/29/2022

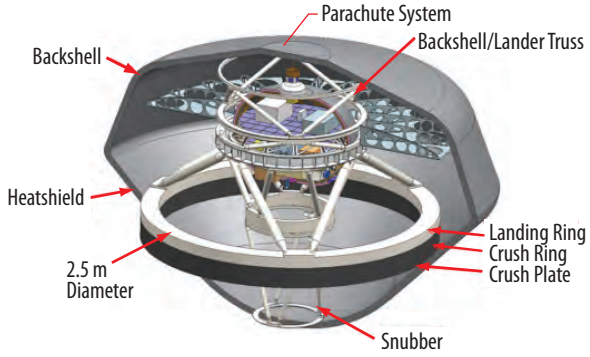


Note: At zenith the carrier S/C is directly overhead of the lander.

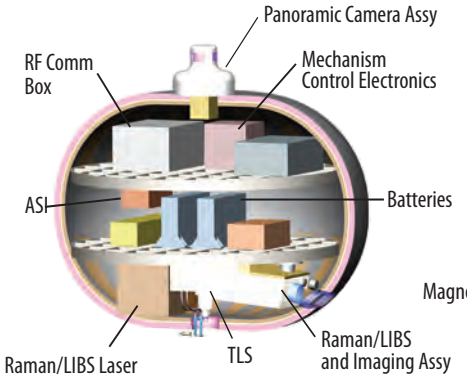
Mission Driving Science Objectives	Measurement	Instrument	Functional Requirement
Characterize chemistry and mineralogy of the surface.	Major, trace elements, mineralogy, NIR spectroscopy	Raman/LIBS; NIR (1.0 micron) descent imager below 1 km, Raman/LIBS context camera	Access to tessera terrain, > 25 *in situ* sample measurements, sample context images
Place constraints on the size and temporal extent of a possible ocean in Venus's past.	Measure D/H ratio in atmospheric water, mineralogy and major element chemistry of surface rocks.	NMS; TLS; Raman/LIBS	*In situ* sampling of the upper and lower (<16 km) atmosphere. Access to and measurement of tessera terrain.
Characterize the morphology and relative stratigraphy of surface units.	Visible and NIR observations of multiple surface units at cm to m scale spatial resolution.	NIR (1.0 micron) descent imager and surface panoramic camera with ~5 filters from 550-1000 nm.	Position of cameras to image the surface, while accommodating expected slopes, platform stability for clear images.

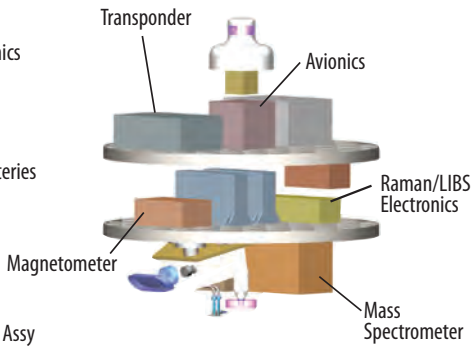
Lander Aeroshell (Cruise Configuration)

A low center of gravity Ring Lander in the Aeroshell

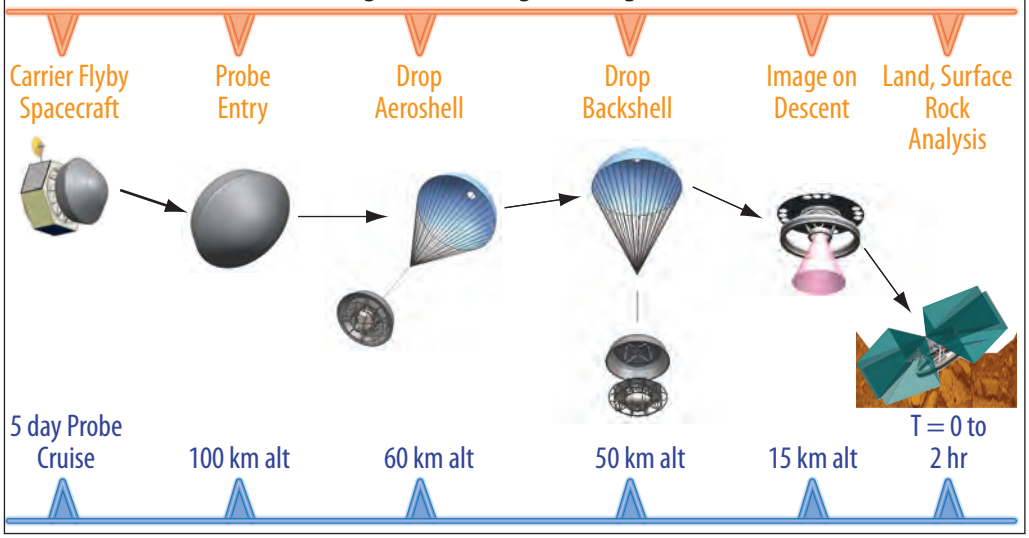


Pressure Vessel (Transparent View)

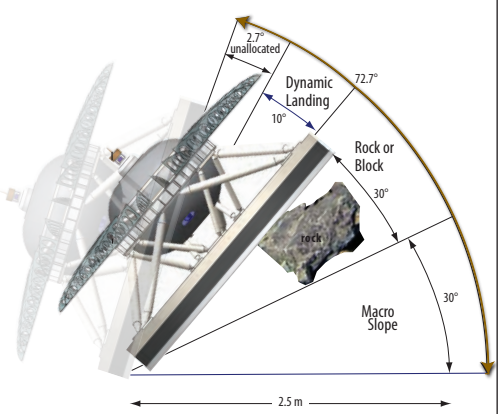




Probe timeline illustrates configuration changes throughout science mission duration.



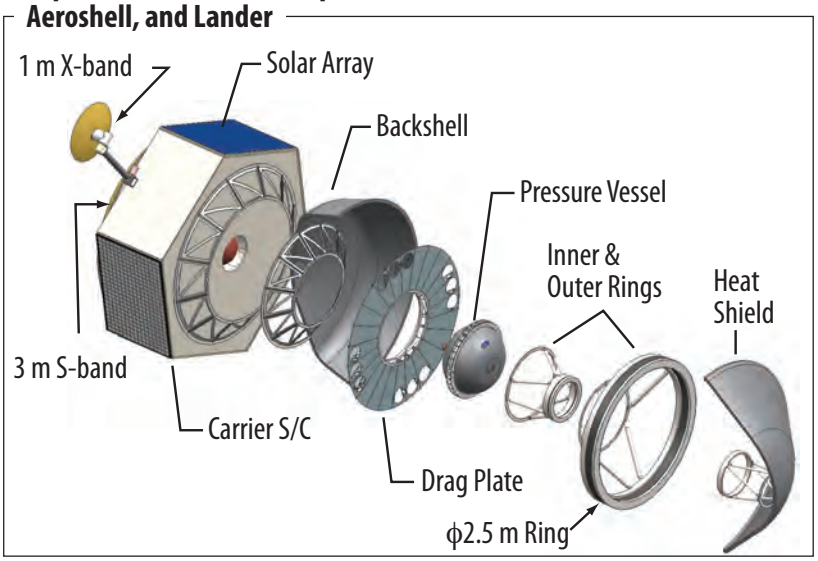
Ring design landing slope capability.



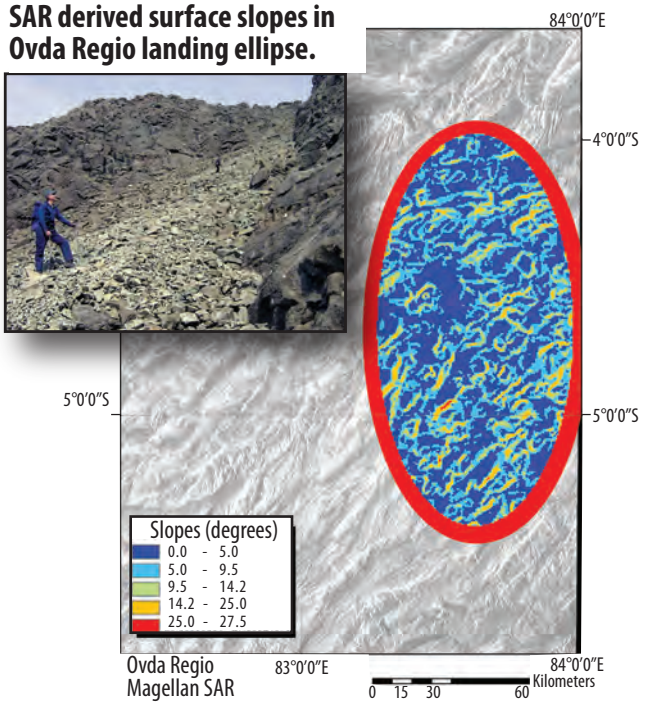
Venus Intrepid Tessera Lander

fact sheet

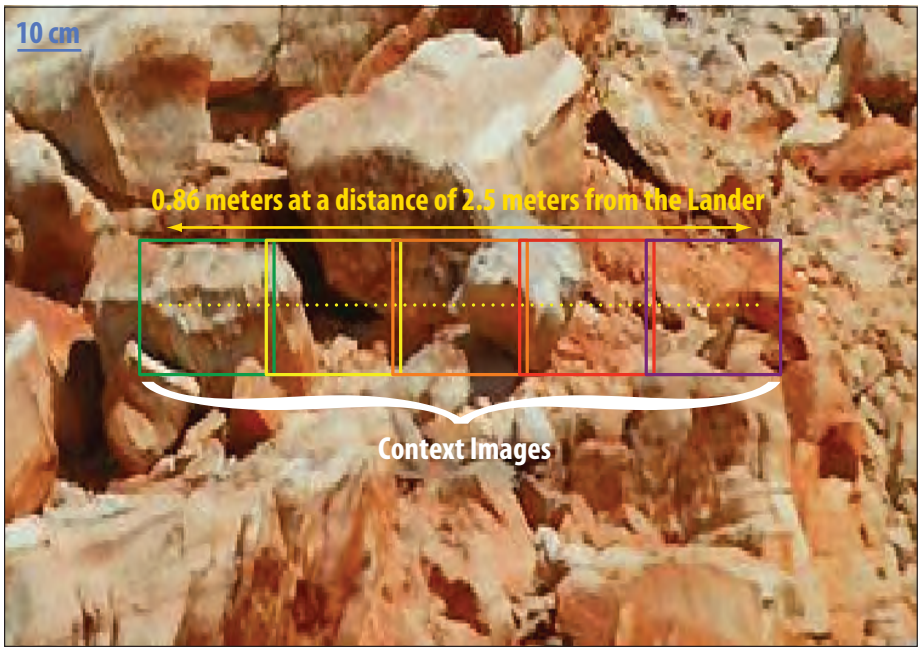
Exploded view of Carrier Spacecraft, Aeroshell, and Lander

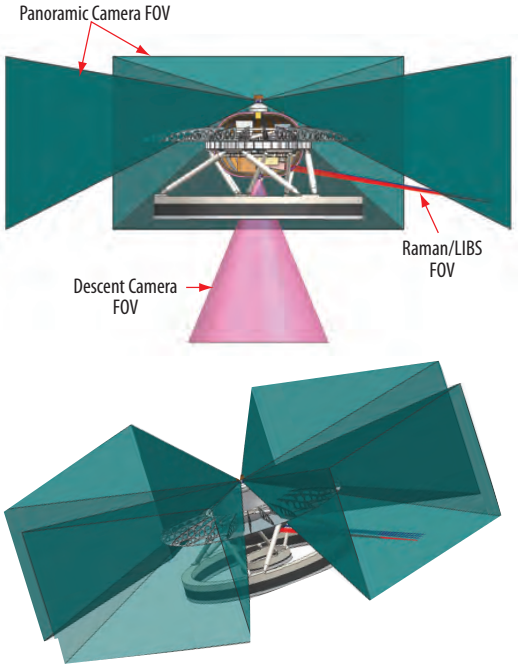


SAR derived surface slopes in Ovda Regio landing ellipse.

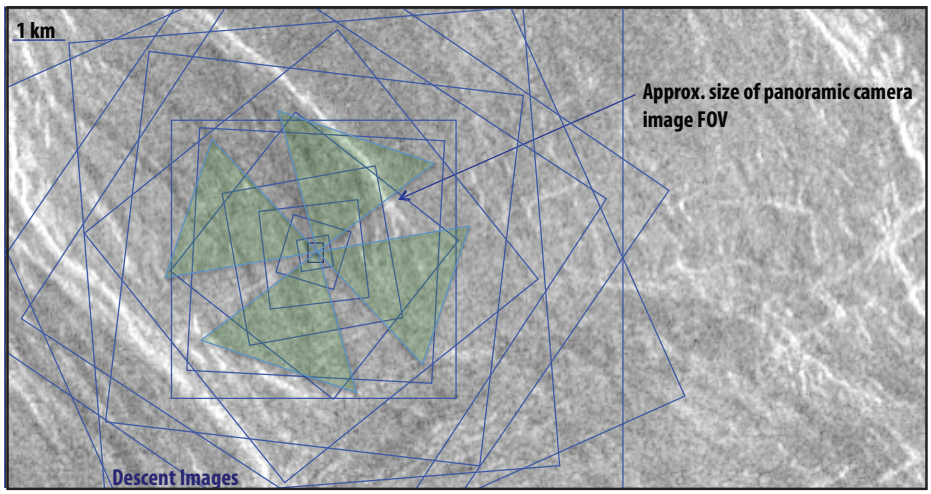


Raman/LIBS Survey Measurements and Context Images





Descent and Panoramic Imagery



Mass Breakdown

Component	CBE [kg]	Allow [%]	Max Mass [kg]
Lander	1051	30%	1366
Lander Science Payload & Accum.	48	30%	63
Lander Subsystems	1002	30%	1303
Mechanical/Structure	283	30%	368
Landing System	603	30%	784
Thermal	67	30%	87
Power	12	30%	16
Avionics	28	30%	36
RF Comm	9	30%	12
Aeroshell	1051	30%	1379
Spacecraft	846	30%	1100
Satellite *(S/C + Probe)* Dry Mass	2948	30%	3845
Satellite Wet Mass	3299	30%	4200
LV Throw Mass available to lift Wet			5141