

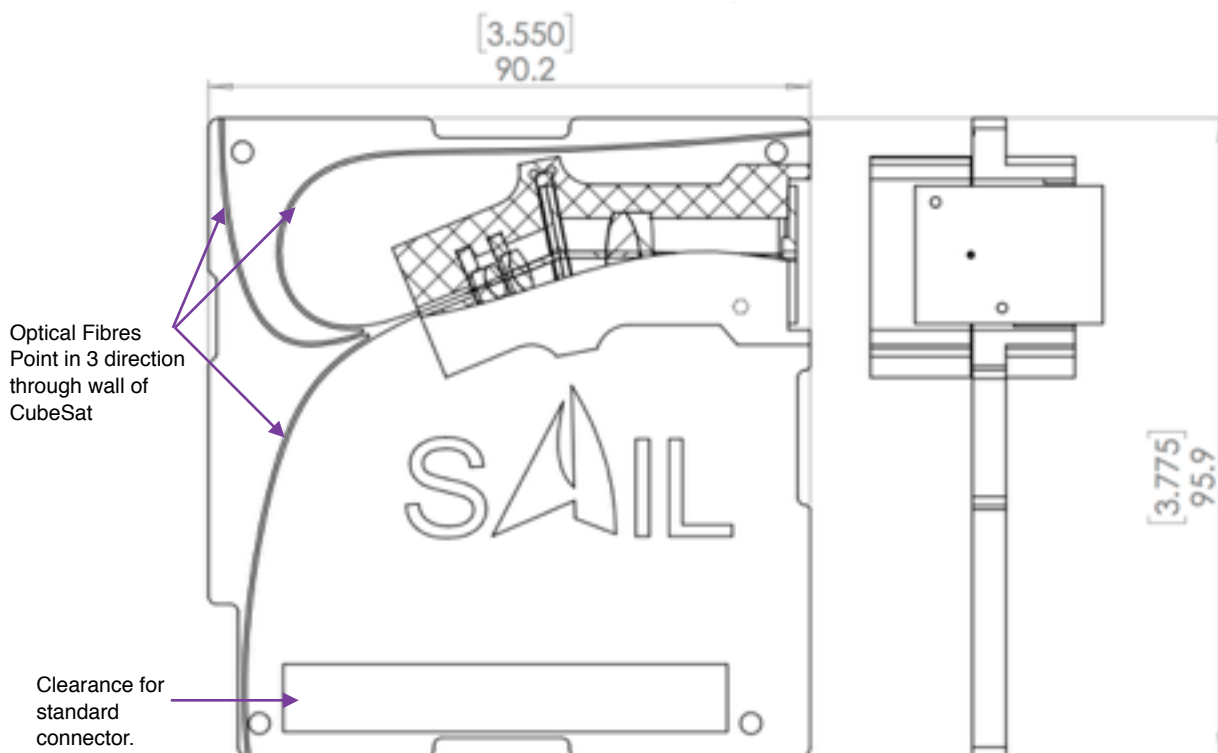
NanoSpec is compact spectrograph with a 3D printed housing intended for deployment in the CubeSat platform. It has been built with 'commercial off the self components', with the exception of the 3D printed housing. The housing has been designed and printed in house at the the Sydney Astrophotonic Instrumentation Laboratory (SAIL).

The spectrograph operates at in the visible (400-700nm) with a spectra resolving power of $R \sim 1000$ (0.5nm). It is fed by a bundle of 7 single-mode fibres. which are arranged to point out the sides of the spacecraft to collect light as the satellite orbits. The arrangement is intended to maximise the chances that the orientation of the spacecraft will allow spectra to be observed of the Earth, Sun, Moon or other astronomical sources (or a combination of these).

The fibres have an acceptance half angle of 5.75 degrees corresponding to a circular area with a radius of 30km when aimed at the earths surface from an orbit of 310km. This provide no spatial image information.

Key Technical Specifications:

		Notes	
Spectral Resolution (@550nm)	0.5nm		
Spatial Resolution (@ 310km)	~10km	There is no spatial imaging ability.	
Spectral Coverage	~400-700nm		
Housing Material	Stratasys P430 ABS PLUS	Our printer uses a controlled source of ABS (P430 ABS Plus from stratasys) thats has been characterised for outgassing by NASA and would be classified as low outgassing (TML=0.37, CVCM=0.00). See https://outgassing.nasa.gov .	



NanoSpec V3 Datasheet

Parts List:

Part	Manufacturer	Manufacturer P#	Material	Description
Colimator lens 1	Thorlabs	AC050-008-A	SCHOTT N-SF6HT, NBAF10	f=7.5 mm, Ø5 mm Achromatic Doublet, ARC: 400-700 nm
Colimator lens 2	Newport	PAC010	SCHOTT SF10, BAFN10	6.35mm achromatic doublet lens with 400 to 700 nm antireflection coated and an effective focal length of 12.7 mm.
Diffraction Grating	Wasatch Photonics	1006-1	Water White glass	Volume Phase Holographic Grating with a line density of 600 lines per mm
Camera Lens	Thorlabs	AC127-025-A	SCHOTT N-BAF10, SF10	AC127-025-A - f=25.0 mm, Ø1/2" Achromatic Doublet, ARC: 400-700 nm
Detector/ Sensor	Electronics123 .com, Inc.	C329BW-UART-board	PCB + OV07221 CMOS detector	C329BW-UART-board Monochrome JPEG Compression VGA Camera Module
3D printed housing	SAIL (inhouse)	NanoSpecV5	stratasys P430 ABS PLUS	Production grade 3D printer material, http://usglobalimages.stratasys.com/Main/Files/Material_Spec_Sheets/MSS_FDM_ABSplusP430.pdf
Fibre and part glue	Epoxy Technology	EPO-TEK® 353ND	two part epoxy	High Temperature & Low CTE Epoxy
optical fibre bundle	Thorlabs	SM600	Silica with Acrylate coating	Optical fibres to collect light and feed spectrograph.