UPC NanoSat Lab Vibration and TVAC Testing Calendar.

Times are approximations and subject to change*

17th July 2019

16:00 – 17:00 -> Preliminary Laboratory Check. (Check MGSE Adapter Plate Fit, TVAC fit) (Possibility of unpacking beforehand and loading profiles)

18th July 2019

09:00 – 09:30 -> Unpack if not done previous day and initial setup / work plan overview

Vibration Testing (B MODEL)

09:30 – 10:30 -> Set up MGSE and FossaSat-1 B model and initial Sine Resonance Sweep.

	Sine Resonance Sweep
	Full Level Sine
10:30 – 12:30 -> X Axis Test	Sine Resonance Sweep
12:30 – 14:30 -> Y Axis Test	Visual / Functional inspection
14:30 – 16:30 -> Z Axis Test	Low Level Random (20%)
	Full Level Random
	Sine Resonance Sweep
	Visual / Functional Sweep

TVAC

Leftover Time -> TVAC Bakeout Setup

Ideally set up and depressurize TVAC for bakeout before leaving

19th July 2019

Cool down and depressurize TVAC Chamber for removal.

Vibration Testing Summary

Sine Resonance Sweep

Resonance survey sweeps should be conducted before and after full level tests (sine, random on each of the 3 axes).

	Qualification, Acceptance or Protoflight	
Direction Type Sweep rate	X,Y,Z Harmonic 2 oct/min	
Profile	**Frequency, [Hz]**	**Amplitude, [g]**
	5 1000**	0.15* 0.15*

*This value may be modified to correctly identify the natural frequencies of the test item. **The resonance survey shall be extended to correctly identify the first natural frequency as a minimum.

The results of the resonance survey after a full level test should be within 5% of the previous measurement to be considered a success. Variations in excess of this range indicate a possible failure or loosening of a component.

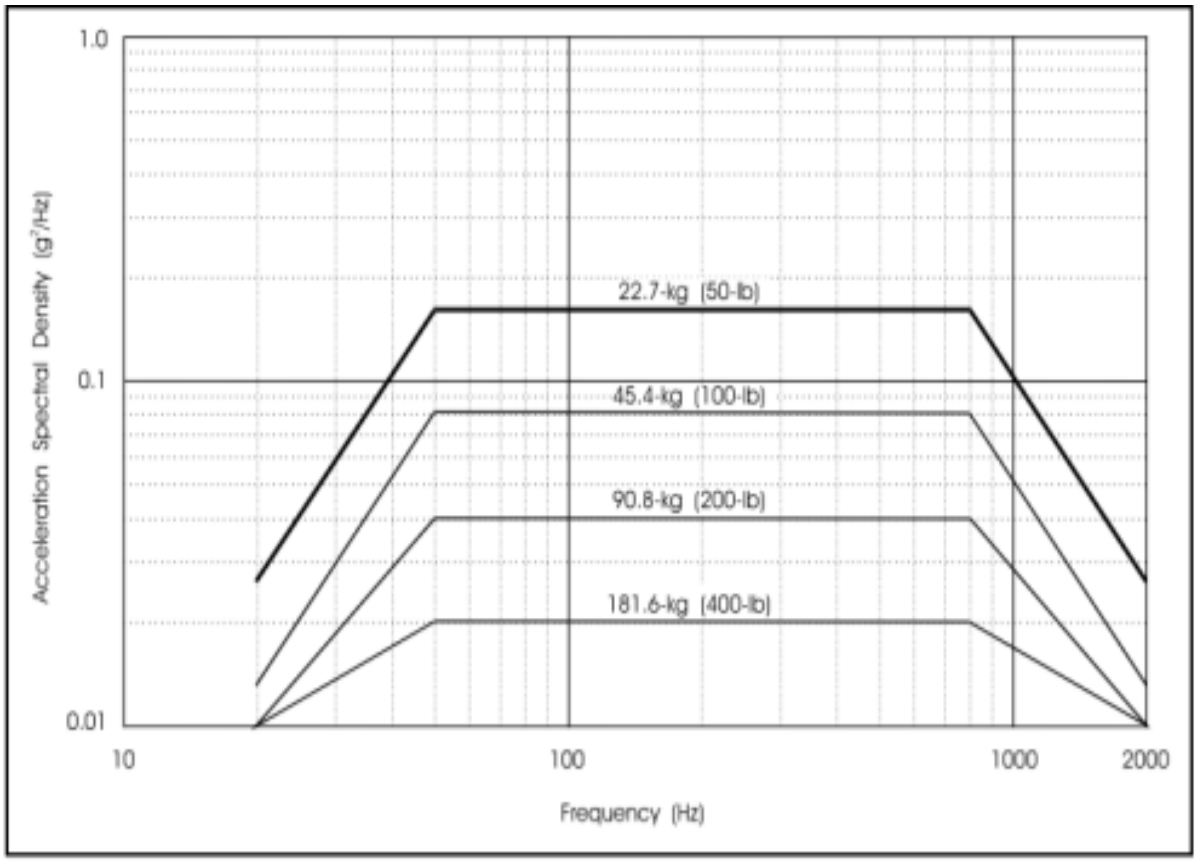
Sinusoidal Vibration

	Qualification	**Acceptance**	**Protoflight**
Sine vibration test	Required	Required	Required
Direction	X,Y,Z	X,Y,Z	X,Y,Z
Level	1.25 x Limit Level	Limit Level	1.25 x Limit Level
Sweep rate	2 oct/min	4 oct/min	4 oct/min

Random Vibration

These levels are applicable to components with a mass of 22.7 kg or less.

Frequency (Hz)	ASD Level (g^2/Hz)	
	Qualification	Acceptance
20 20-50 50-800 800-2000 2000	0.026 +6 dB/oct 0.16 -6 dB/oct 0.026	0.013 +6 dB/oct 0.08 -6 dB/oct 0.013
Overall	14.1 g_{rms}	10.0 g_{rms}
Test time	120 s	120 s



Random vibration test levels.

Thermal Vacuum Bakeout

The test conditions are outlined below:

	Qualification	Acceptance	Protoflight
Bakeout	N/A	Required	Required
Vacuum Pressure		10^{-4} Torr	10^{-4} Torr
Number of Cycles		1	1
Min Temperature		70°C	70°C
Temp. Variation Rate		<5º C /minute	<5º C /minute
Duration	Min. 3 hours after thermal stabilization		

The pass criteria for the bakeout test is a thermal mass loss (TML) value of <1%.

Placement: Hang both satellites from the rack using solar panel deployment spring attachments. **Assure bottom contacts are closed using Kapton Tape.**

Functional test after bakeout following procedure outlined in Satellite Test Plan.

Post-test Handling

Following bakeout, the hardware shall be protected from surface recontamination resulting from further handling and environmental exposure. This may be achieved by bagging the test article after the test is complete. Double bagging minimum using ESD Safe battery.