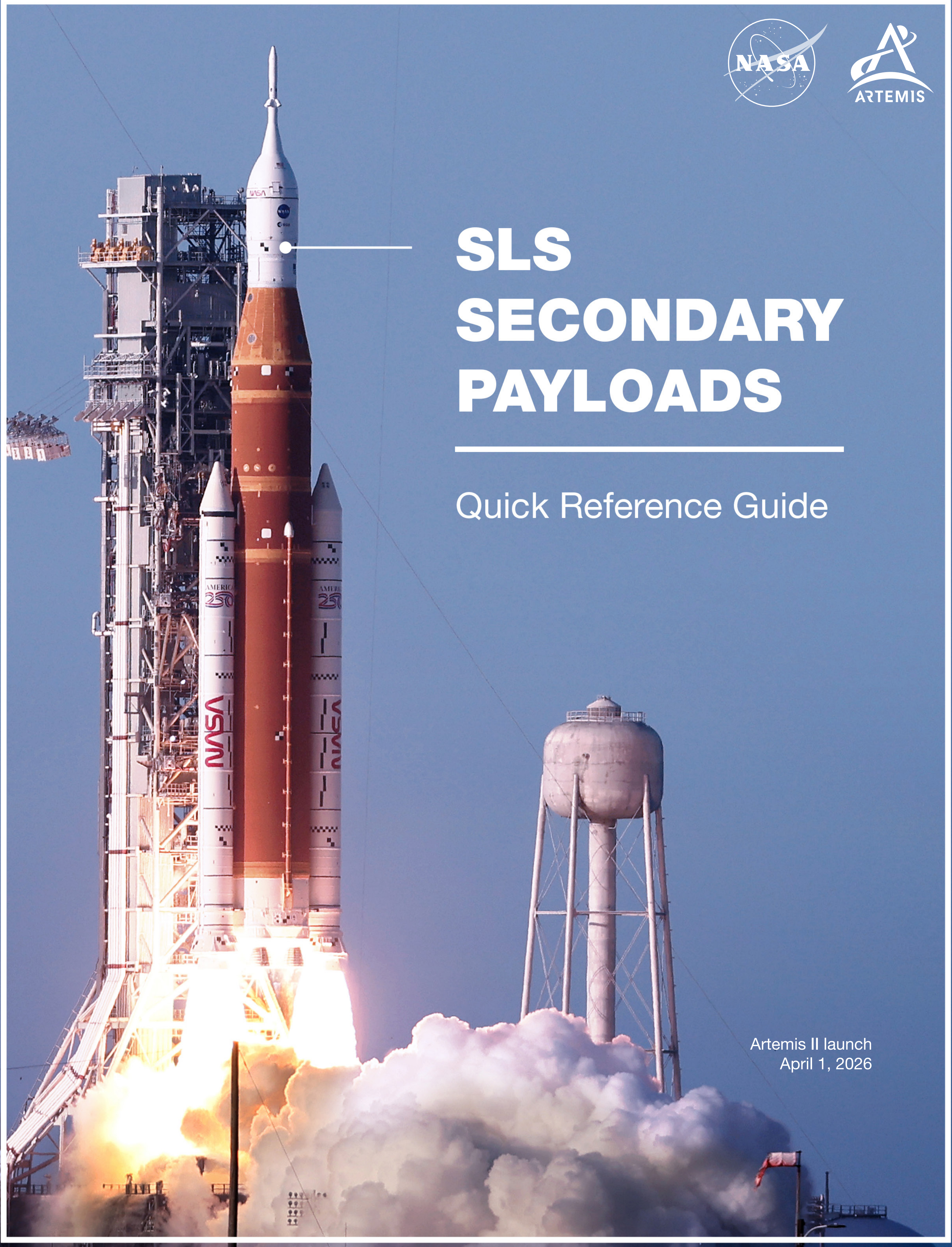
SLS SECONDARY PAYLOADS

Quick Reference Guide



Artemis II launch
April 1, 2026

1 Purpose and Scope

This document provides a payload developer-facing reference for organizations developing CubeSat-class secondary payloads for SLS missions. It is meant to function as one-stop reference: a payload team should be able to read it and understand the design posture, verification mindset, and documentation expected for successful integration.

Figure 1-1. CubeSats deploying from ICPS (top left) after Orion (bottom right) separation during Artemis II. Image courtesy of s2a systems.

What this document does:

- Describes the SLS secondary payload integration concept at the program level
- Explains generic mechanical, electrical, environmental, and operational requirements
- Gives basic flight environments

What this document does not do:

- It does not replace requirements documentation, controlled drawings, or approved procedures
- It does not authorize launch or close safety hazards
- It does not publish every mission-specific environment, timeline, or clearance value
- It does not supersede regulatory, spectrum, export control, planetary protection, or debris obligations

2 Artemis Secondary Payload System Overview

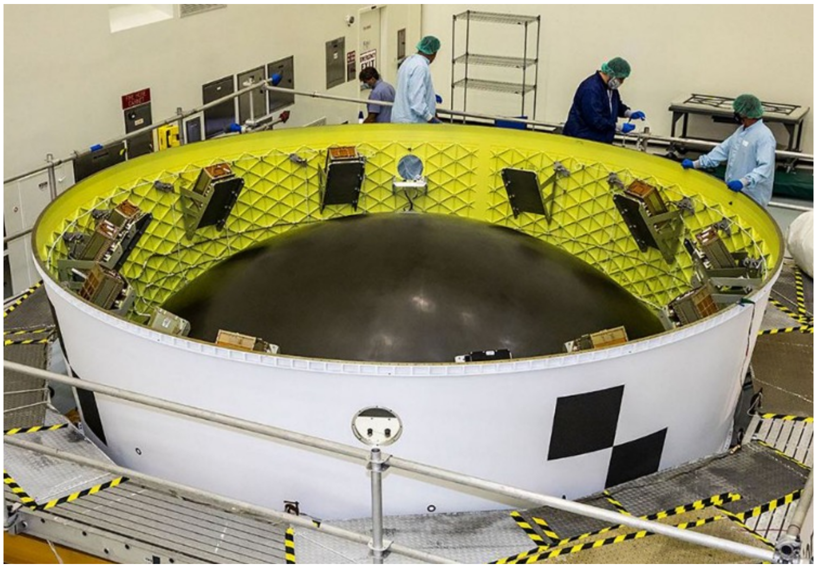


Figure 2-1. The dispensers are shown, nested in the Orion Stage Adapter for Artemis I.

On SLS missions, secondary payloads are accommodated in dispensers mounted in the Orion Stage Adapter (OSA). The OSA can accommodate 6U and 12U CubeSats. Payloads are deployed after Orion separation using spring-ejected dispensers managed by the secondary payload deployment avionics. Artemis mission profiles will differ and can include deployment in LEO, HEO, and/or heliocentric orbit.

2.1 NASA-Provided Hardware

NASA provides the following items:

- Flight dispenser
- Engineering Development Unit dispenser for fit check (As requested and available)
- Flight separation connectors and associated mounting hardware
    - Information on this connector can be found in section 5.1
- Pre-Screened battery cells from NASA's Strategic Reserve (As Requested)

2.2 Why SLS Payloads Are Different

- Requirements for SLS payloads are developed with consideration for crewed missions.
- They may encounter longer dormant periods between integration and deployment
- They remain subordinate to the primary mission timeline and crewed-mission priorities

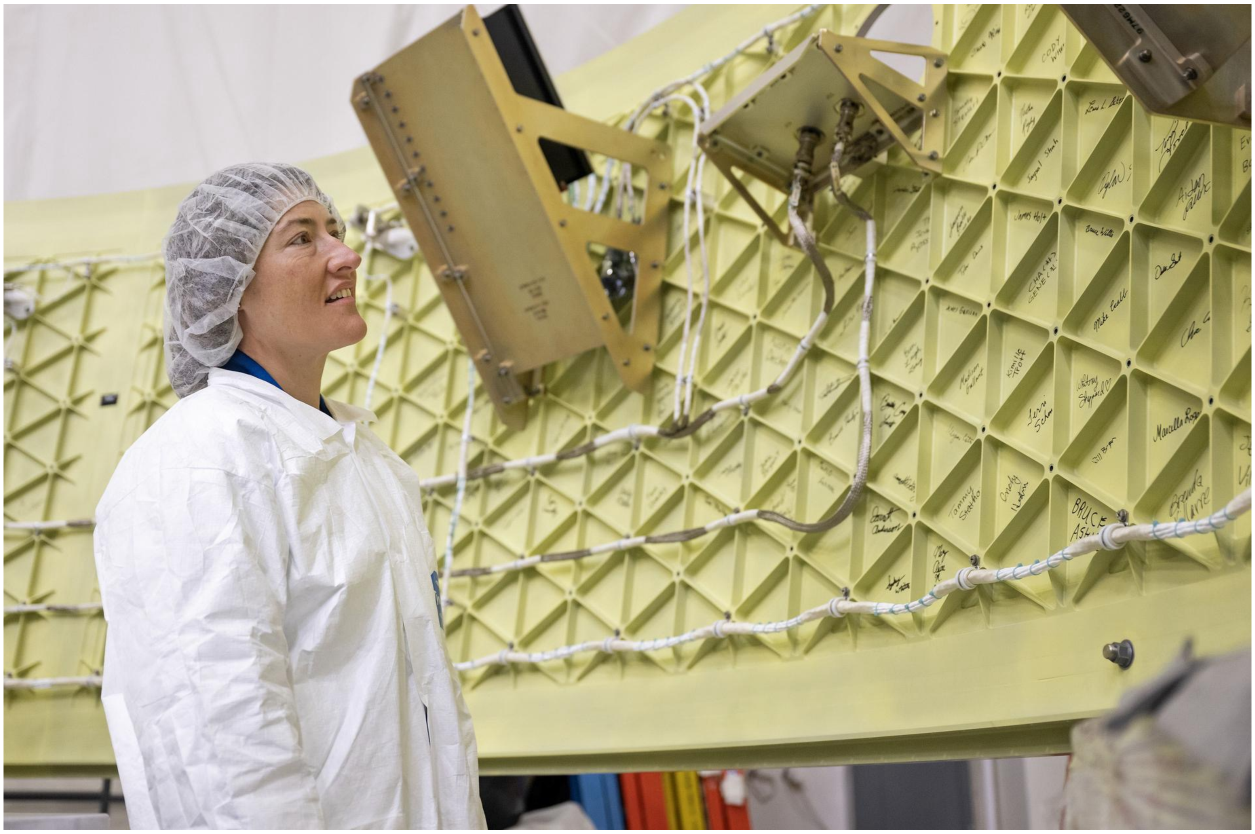


Figure 2-2. Artemis II Astronaut Christina Koch in front of a Secondary Payload Bracket on the OSA.

2.3 SLS Payload Constraints

The following table provides a high-level overview of what type of interfaces and requirements a payload can expect during an SLS mission.

Table 2-1. Overview of Payload Accommodation

Topic	Constraint
Envelope	6U and/or 12U class payloads depending on mission – Baseline Rocket Lab CSD-class Dispenser
Mass	<14kg (6U),<26 kg (12U)
Power state	Powered off (limited exceptions up to 300 μA) and inhibited via at least 3 separation switches prior to deployment No power supplied from BMS to Vsys for 15 seconds post-deployment
Electrical Connections for Communication with Payload on the Ground / Pad	After handover to NASA and integration of payload, there will be no access (physical or electrical) aside from NASA personnel performing battery charging, if required.
Battery Charging	Integrated payload battery charging opportunities may be provided before and after integration to the SLS vehicle.
Environment	Test to provided levels in flight configuration (integrated spacecraft + dispenser assembly) for both random vibe and QSL
Operations	No operations for 15 seconds post-deployment, OEM sharing at key points during early operations

3 Programmatic Interface and Data Exchange

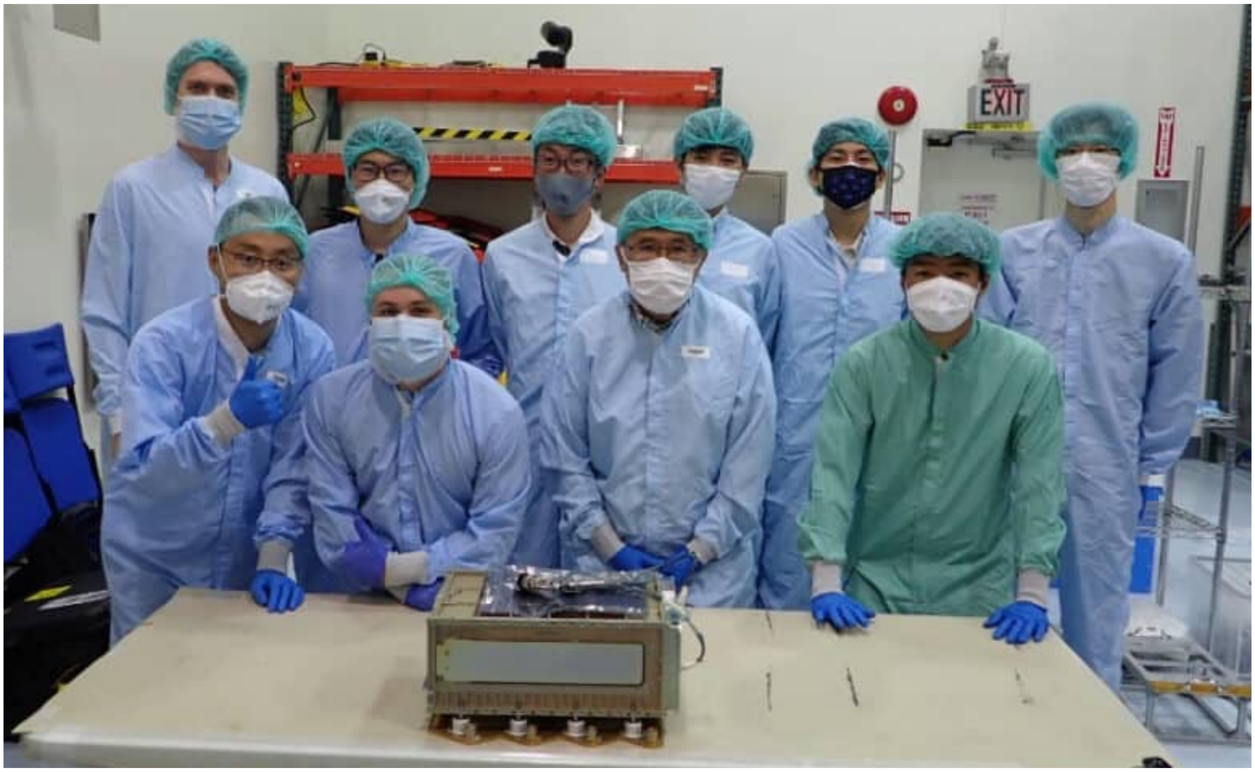


Figure 3-1. Payload team just prior to handoff of their hardware to NASA.

3.1 Secondary Payload Integration Milestones

These milestones may occur concurrently but are generally executed in this order.

- Payload onboarding and baseline requirements
- Safety reviews and submittals
- Environmental test/verification campaign
- Flight unit delivery, processing and closeout
- Launch and deployment

4 Radio Frequency Compatibility

Payloads must prove that their RF architecture does not interfere with the RF systems on the ground, in the SLS/Orion, or in the various other systems they may come in contact with as part of the Artemis missions.

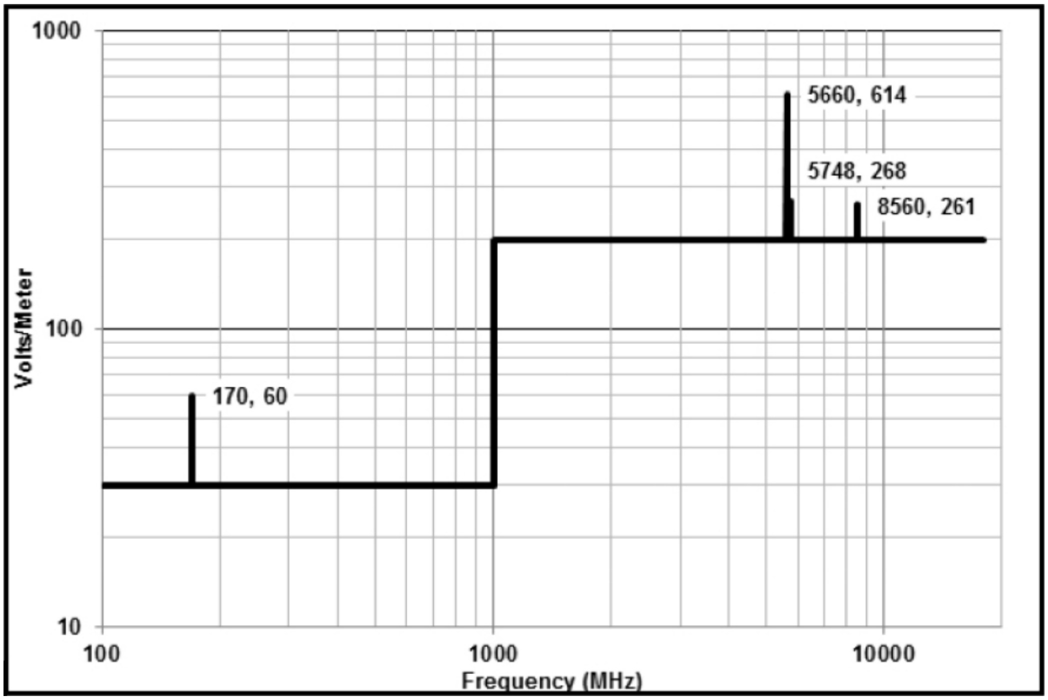


Figure 4-1. Electric Field Strength Limits

Table 4-1. Artemis Protected Frequencies

Artemis Protected Frequency Range (MHz)
121.5/123.5/156.3/156.8/243.0/282.8 ± 0.0125
406.04 ± 0.0125
1575.42 ± 10
2041.0271 ± 3
2106.4063 ± 3
2109.445 ± 1.03
2216.5 ± 3
2287.5 ± 3
2290.8 ± 1.03
5025 – 5850

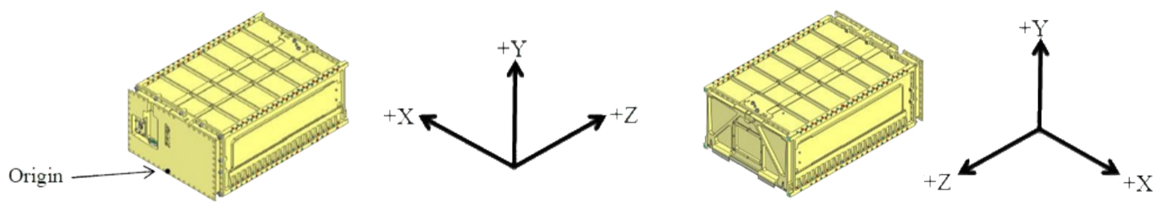
5 Environmental Testing

Payloads are required to perform Random Vibe and Quasi-Static Loads testing. All other environments are provided for reference in Chapter 6. If preferred, Qualification/Acceptance criteria can be provided.

Table 5-1. Static Load Profiles

	X-Long	Y-Lateral	Z-Normal
	[g]	[g]	[g]
Amplitude	14.3	14.3	14.3
Peak to Peak	28.7	28.7	28.7

Values given refer to the coordinate system shown below. This is test criteria that includes a factor of safety. Sine burst must be conducted using an oscillating wave form that is ≤1/3 of the payload's lowest natural frequency when hard mounted to the vibration table.



ProtoFlight Test (60 seconds/axis)		
Frequency (Hz)	All Axes Payload Random Vibration Criteria with Isolator Effects*	
10-20	0.1	g^2/Hz
20-45	5.15	dB/Octave
45-80	0.4	g^2/Hz
80-125	-15.53	dB/Octave
125-600	0.04	g^2/Hz
600-2000	-3.46	dB/Octave
2000	0.01	g^2/Hz
Composite	8.54	g-rms

Figure 5-1. Notional Random Vibe Test Levels and Duration

*Levels account for isolator effects and should be applied at the dispenser chassis mounting interface.

6 OTHER ENVIRONMENTS

The following environments are provided for reference only.

6.1 DEPLOYMENT SPEED AND TIPOFF

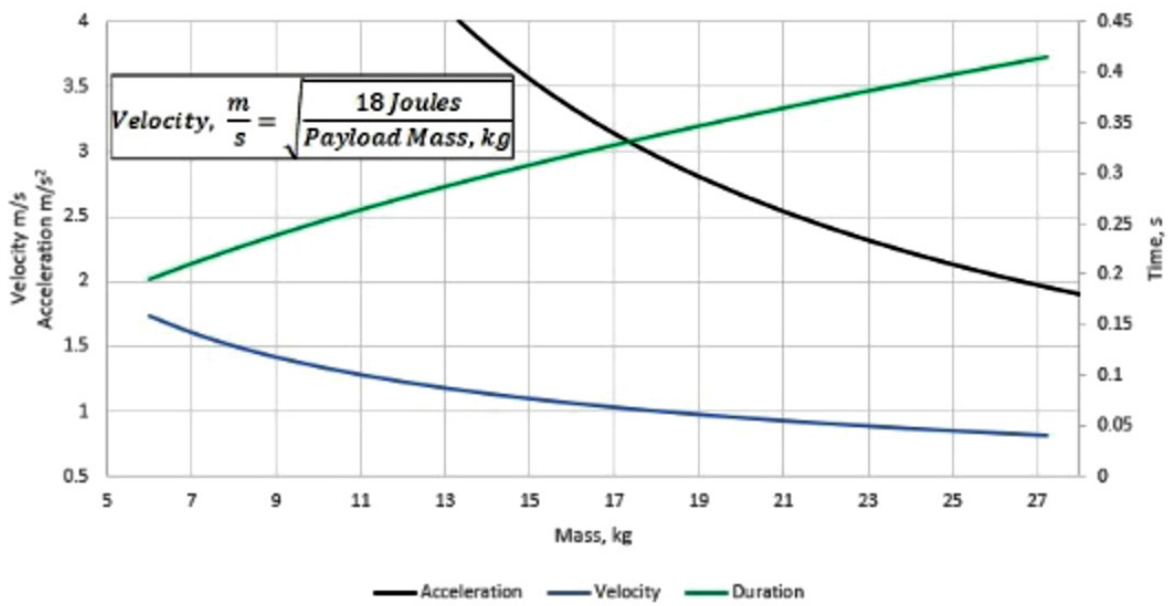


Figure 6-1. Deployment Speed

SPLs could experience rotation rates, also known as tip-off rates, when deployed from either a 6U or 12U dispenser at < 10 deg/sec per axis after the payload is fully ejected.

6.2 Natural Frequency Coupling

Payload developers should ensure that the lowest frequency in the lateral axis be above 90 Hz, in the normal axis to be above 46 Hz, and in the long axis to be above 50 Hz to avoid interaction with launch vehicle dynamics. These frequencies are calculated with the spacecraft assemblies constrained to ground at tab interface with the CSD. Violation of the criteria above should be addressed by detailed evaluation of the hardware for payload frequencies that do couple with the vehicle assembly isolation system.

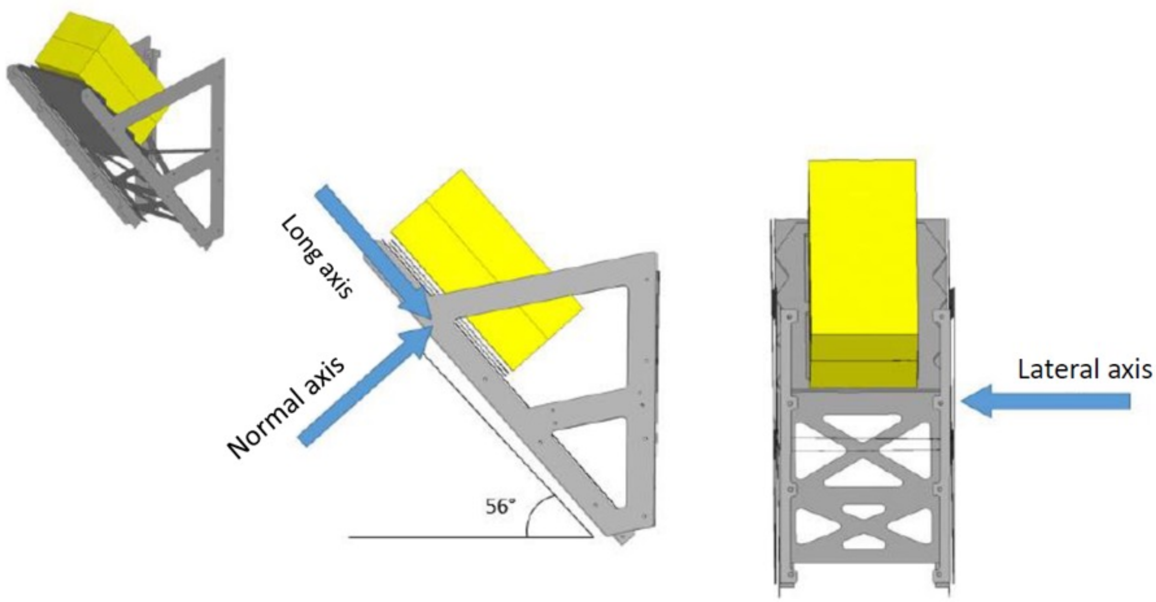


Figure 6-2. Axis Definition for Natural Frequency Coupling

6.3 Acoustic Environment

Table 6-1. Acoustic Environments

Frequency (Hz)	Sound Pressure Level, Acceptance (dB re: 20 μPa)	Sound Pressure Level, Protoflight / Qualification (dB re: 20 μPa)
20	115.4	118.4
25	120.7	123.7
31.5	125.5	128.5
40	130.1	133.1
50	131.5	134.5
63	132.8	135.8
80	133.5	136.5
100	133.8	136.8
125	134.2	137.2
160	134.0	137
200	134.0	137
250	132.2	135.2
315	130.1	133.1
400	127.4	130.4
500	125.7	128.7
630	125	128
800	124	127
1000	123	126
1250	122	125
1600	121	124
2000	120	123
2500	119	122
3150	118	121
4000	117	120
5000	116	119
6300	115	118
8000	114	117
10000	113	116
Overall Sound Pressure	143.5	146.5

6.4 Shock Environments

Table 6-2. 95/50 Shock Environments for All Shock Events at SPL-Dispenser Interface (Q=10)

Frequency (Hz)	SRS (G)
100	24.2
1500	800
10,000	800

6.5 Depressurization Environment

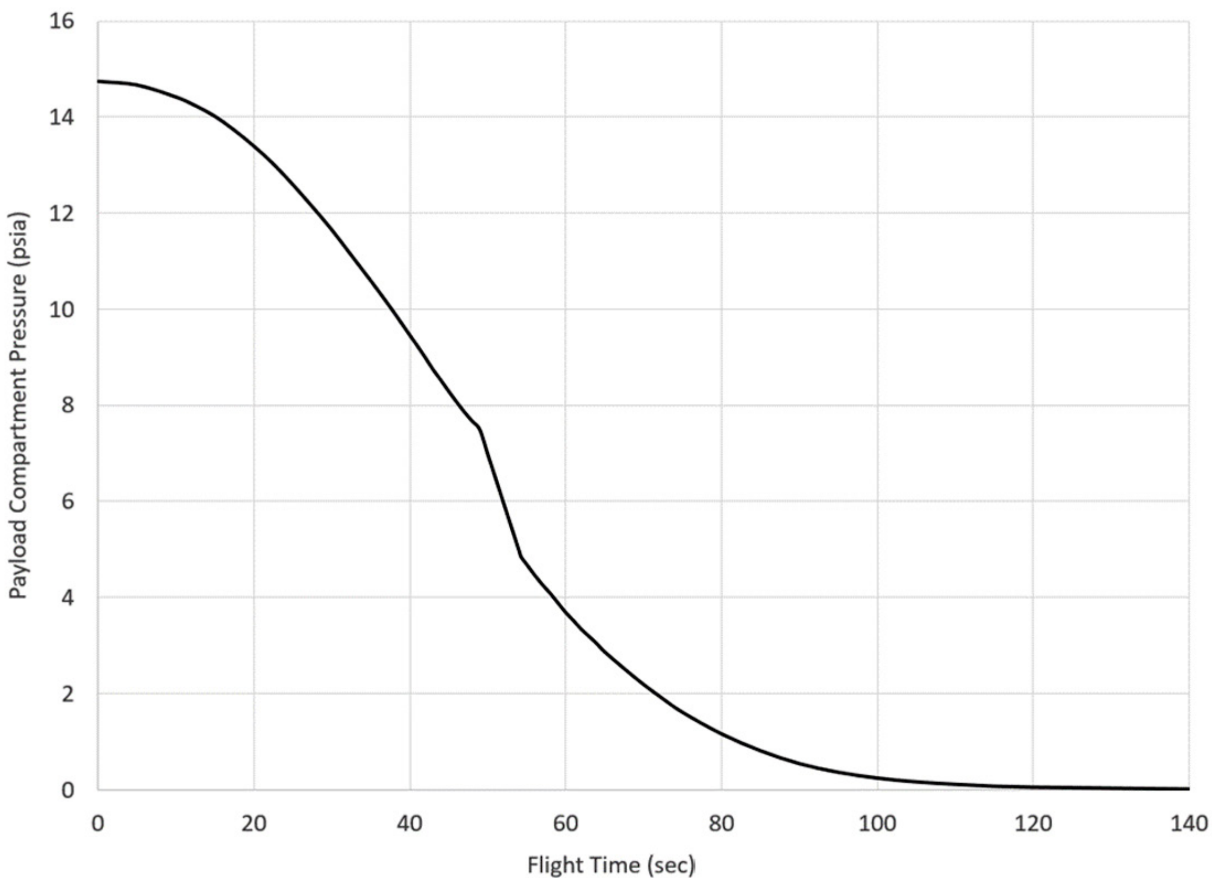


Figure 6-3. Depressurization Environment during Ascent

Table 6-3. Tabulated Depressurization Environment

Time (sec)	Secondary Payload Pressure Profile (psia)	Time (sec)	Secondary Payload Pressure Profile (psia)
0.0	14.745	57.0	4.28
5.0	14.67	58.0	4.10
10.0	14.42	59.0	3.90
12.5	14.24	60.0	3.70
15.0	14.02	61.0	3.53
17.5	13.73	62.0	3.35
20.0	13.40	63.0	3.20
22.5	13.03	64.0	3.05
25.0	12.60	65.0	2.88
27.5	12.14	67.5	2.53
30.0	11.66	70.0	2.20
32.5	11.13	72.5	1.90
35.0	10.60	75.0	1.62
37.5	10.05	80.0	1.17
40.0	9.47	85.0	0.82
41.0	9.24	90.0	0.55
42.0	9.00	95.0	0.37
43.0	8.75	100.0	0.25
44.0	8.53	105.0	0.17
45.0	8.30	110.0	0.12
46.0	8.08	115.0	0.08
47.0	7.87	120.0	0.06
48.0	7.68	125.0	0.05
49.0	7.50	130.0	0.04
50.0	7.00	135.0	0.03
51.0	6.50	140.0	0.02
52.0	6.00	145.0	0.01
53.0	5.50	150.0	0.008
54.0	5.00	151.0	0.007
54.3	4.85	152.0	0.006
55.0	4.70	153.0	0.005
56.0	4.48	150.0	0.004

6.6 Thermal and Humidity Environments

There are two primary thermal environments the payload will experience, the on-the-ground environment in the VAB, and the pad-to-orbit environment during rollout and launch.

6.6.1 VAB Environment

Table 6-4. VAB Environmental Conditions

Environmental Conditions	Temperature (°F)	Humidity
VAB Towers B & E	39°-90°	18.1% - 98.9%

6.6.2 Pad-to-Orbit Environment

Table 6-5. Dispenser Interface Temperature from Pad to Orbit

Case	Prelaunch (°F)	Ascent up to On-Orbit (°F)
Phase, MAX	101.0	95.0
Phase, MIN	17.0	3.0

6.7 Electromagnetic Environment (EME)

There are two primary EMEs the payload will experience, on-the-ground through ascent, and on-orbit.

6.7.1 Launch RF EME

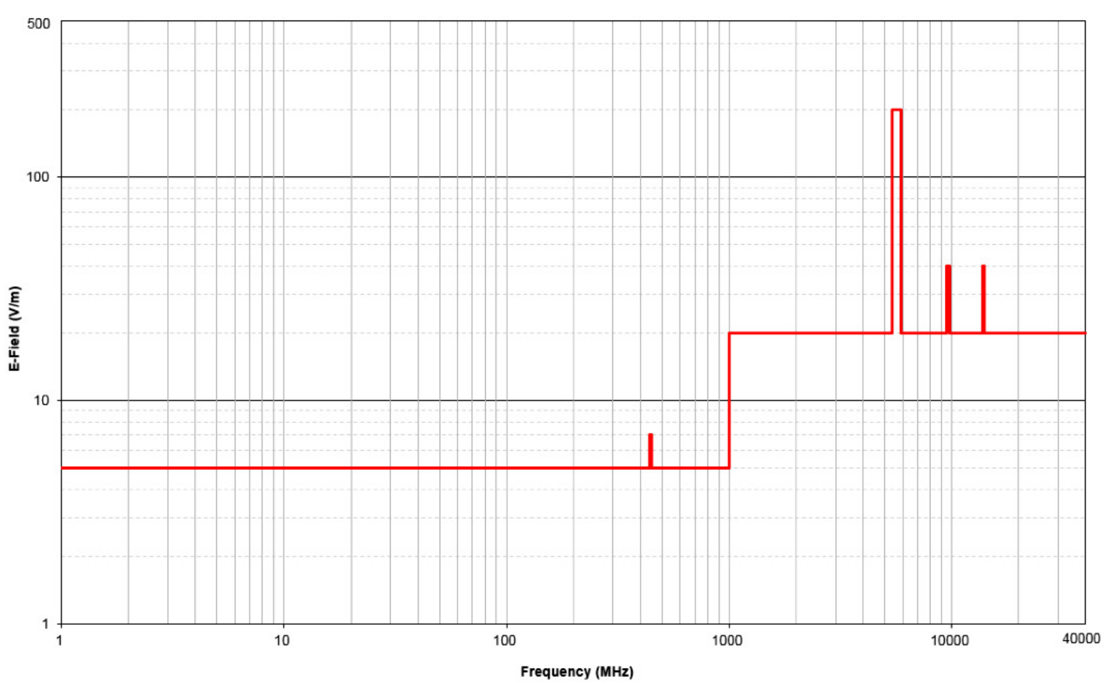


Figure 6-4. Launch RF EME (Peak Environment)

Table 6-6. Launch RF EME (Peak Environment)

Frequency (MHz)	Peak (V/m)	Average (V/m)
437–447	7	5
2,040	8	8
2,106	7	7
2,865	17	5
3,100–3,500	9	5
4,440	9	9
4,560	9	9
4,640	9	9
4,740	9	9
5,400–5,650	113	5
5,650.01-5,850	189	11
5,850.01–5,900	113	21
5,900.01–5,925	21	21
9,370–9,500	17	5
9,500.01–9,800	40	7
9,800.01–9,990	17	5
13,750–14,000	32	32

6.7.2 On-Orbit RF EME

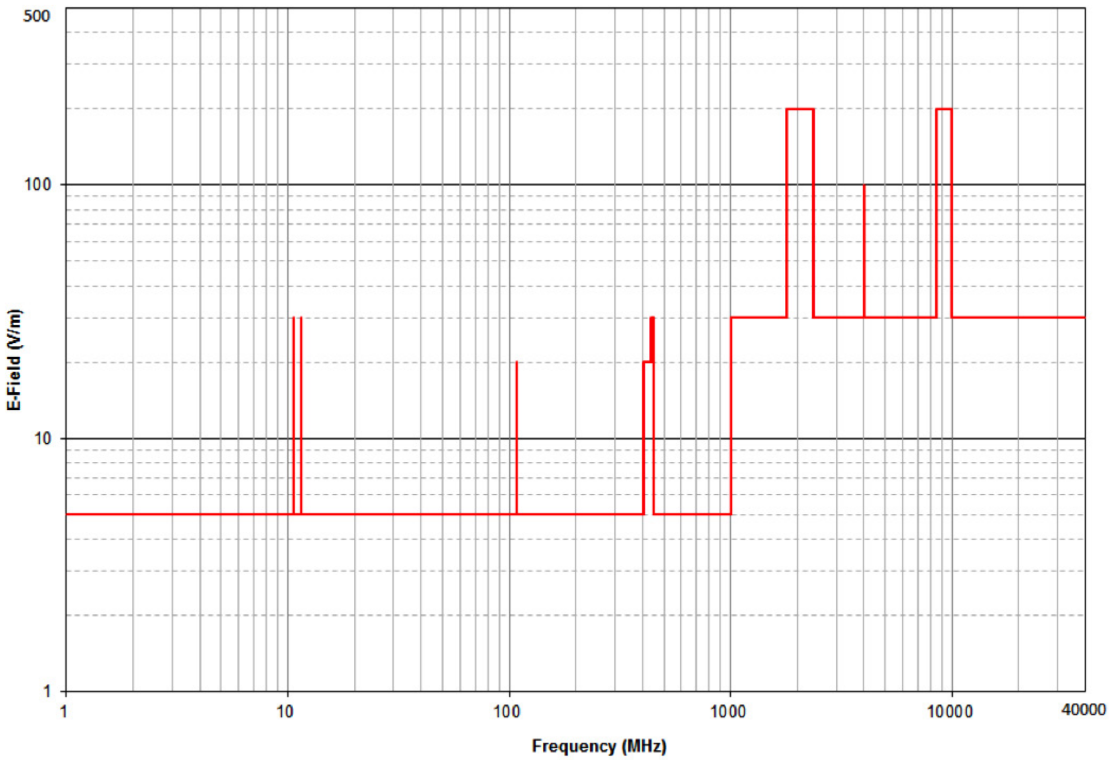


Figure 6-5. On-Orbit RF EME (Peak Environment)

Table 6-7. Tabulated On-Orbit RF EME (Peak Environment)

Frequency (MHz)	Peak (V/m)	Average (V/m)
11–12	10	10
108	17	17
404–420.00	11	5
420.01–437.00	14	14
437.01–447.00	23	14
447.01–450.00	14	14
1,175–1,375	30	8
1,550–1,786.99	14	5
1,787.00	43	43
1,787.1–2,090.99	14	5
2,091.00	30	30
2,091.1–2,110.00	14	5
2,110.01–2,120.00	30	30
2,120.01–2,144.99	14	5

Frequency (MHz)	Peak (V/m)	Average (V/m)
2,145.00	93	5
2,145.10–2,379.99	14	5
2,380.00	189	189
2,380.1–2,839.99	14	7
2,840.00	24	6
2,840.1–2,869.99	14	6
2,870.00	24	6
2,870.1–2,950.99	14	6
2,951.00	22	5
2,951.1–3,999.99	14	6
4,000.00	85	85
4,000.1–5,399.99	15	5
5,400.00–5,659.99	27	5
5,660.00	27	11
5,660.1–5,850.00	27	5
5,850.01–5,925.00	27	25
5,925.01–6,425	9	9
7,155–7,189	24	24
7,209	6	6
8,500–8,559.99	7	5
8,560.00	117	117
8,560.10–9,354.99	7	5
9,355.00	142	5
9,355.1–9,999.99	7	5
10,000.00	48	5
10,593.00	10	10
14,000–14,500	10	10
16,700	17	10
23,530–23,575	24	24
34,316	7	7
34,500–35,200	11	11

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