REQUIREMENTS FOR POEM EXPERIMENTAL PAYLOADS

Following are the guidelines for configuration of POEM Experimental payloads. These interface requirements shall be strictly complied to.

I. MECHANICAL INTERFACES

1. Payload shall be configured as a functionally standalone system with its own chassis and mounting provisions.
2. Standard Cubesat dimensions-1U/2U/3U are preferred.
3. M4 or Higher size fasteners shall be used for launcher mounting interfaces.
4. The minimum frequency required with base fixed condition of payload .
   (a) Longitudinal : > 90 Hz. , (b) Lateral : > 45 Hz.
5. Payload shall be designed for Quasi Static Load (QSL) level of Longitudinal 11g and lateral 6g.
6. TML for the materials used shall not be more than 1% and CVCM shall not be more than 0.1%.
7. Signed drawings shall be provided, detailing the dimensions, mechanical interfaces, mounting flange material and surface finish.

I. ELECTRICAL INTERFACES

1. Payload shall preferably use only MIL grade components. Use of commercial/industrial grade components is subject to satisfactory completion of specified acceptance tests.
2. D-Type/ Circular MIL grade connectors shall be used for electrical interfaces.
3. Any additional requirements for the harness, For eg: TS (Twisted-Shielded) shall be specifically mentioned.
4. 4. RF payload frequency/ power & sensitivity shall be finalised only after frequency interference studies with the existing RF elements in POEM/ passenger

payloads and hence shall be communicated in advance before finalisation.

a. Clearance for the usage of frequencies shall be obtained from the respective agencies like ITU before usage.

5. For RF payloads, it is preferred to position antenna as part of the Payload chassis itself. In case of separate antenna requirement, it shall be intimated well in advance, and may be accommodated based on the space & mounting provisions available.
6. Usage of magnets part of the payload shall be intimated in advance for identifying the location for mounting.
7. Configuration Controlled EID (Electrical Interface Details) shall be provided, detailing the type of connectors, identification of signal names of each pins, gauge of wires to be used, twisting & shielding requirements, etc.
8. Deployable systems are to be avoided, and if essential, shall be informed in advance.

II. POWER

1. Payload shall operate using 24-36V power bus (RAW power) provided from POEM.
2. Power input requirement shall be limited to the minimum, and shall not exceed 10W.

   a) Power requirements for the different operational phases of the payload shall be mentioned.

   b) In case of higher power requirement for certain phases of payload operation (For eg: during RF transmission to Ground Station) shall be specifically mentioned.
3. As the raw bus output is not regulated, payloads shall be powered using its own DC/DC convertor with built-in EMI Filter, preferably with short circuit protection.
4. In case of very small payloads with very low current requirements (<40mA), with input voltage requirements of +5V & +/-15V, DC/DC convertors part of

PS4 OP Power System can be utilised. However, this requirement shall be intimated well in advance for capability assessment.

5. To protect the battery in case of inadvertent shorting inside the payloads, protective fuses are provided in the power lines to the payloads.

IV TELEMETRY

1. The functional/ health parameters of POEM can be provided as raw analog/ digital voltage outputs or as serial outputs through RS485 as per the specified custom format of ISRO.

   a. Analog/ Digital outputs can be acquired by Data Acquisition Unit in POEM Telemetry.

   b. RS485 Serial data will be directly acquired by Data Processing Unit, and will be passed to TTPU for transmission. Protocol requirements for telemetry data through RS485 is given in Section 5 of the document.
2. Telemetry link of POEM is shared for POEM Housekeeping data and payload data. Hence, maximum of 6 analog outputs, and 4 digital status monitoring can be acquired through POEM data acquisition unit per payload.
3. Sampling of these parameters shall be limited to maximum of 244 samples/s.
4. In case of RS485 serial outputs, bandwidth shall be limited to maximum of 40Kbps (TBD).
5. Typically, one ISTRAC Ground Station visibility for a pass is limited to 400-500s. Hence, in case of payloads with bulk data rate requirement, it is proposed to have separate Telemetry System including Transmitter (part of the payload) for its telemetry purpose.
6. The list of Parameters, Sampling rate (61/122/244 samples/ sec.), Bit Resolution (8/12) and Input voltage range requirements shall be provided for configuring the Telemetry Format/ Channel, in advance.

V TELECOMMAND

1. ON and OFF provisions are provided for the POEM payloads.
2. Time for switch ON and OFF of these payloads can be configured through Telecommand.
3. In case of payloads with multiple modes of operation, it is suggested to have separate logic built-in part of the payload software itself.
4. In case of tele-command requirement, commands can be passed to Payloads
5. through potential free DRY contact (galvanically isolated relay contacts) or through RS485 link.

VI GENERAL REQUIREMENTS

1. Payload should be capable of re-intialising itself into operating configuration, in case of an unexpected power interruption/ low power during POEM Phase.
2. No specific shielding is provided for the payloads. Hence, sensitive components shall be protected as per design/ additional shielding against radiation levels expected in the orbit.
3. In case of payloads with memory/ processor, suitable hardware/software protection mechanisms shall be implemented for detection and recovery of memory corruptions due to Single Event Upsets (SEU's).
4. Payloads shall be made available for both Electrical & Mechanical Interface verification during PS4 Stage Phase-1 Electrical Checks (T-60days from the launch date).
5. Payloads powering and clearance after assembly to vehicle (at MST) may not be possible due to accessibility restrictions/ RF Interference concerns. Hence, payload team shall do the needful to generate suitable test plan for clearing the payload using standalone test station prior to assembly to PS4 Stage.
6. The equivalent mass dummy with the mounting interfaces identical to flight model shall be made available for mechanical interface generation on the adaptor and use in flight in case of delay in payload readiness.

VII SAFETY REQUIREMENTS

1. All the pressurised systems/ gas bottles part of the payload shall be having a factor of safety of 4 (TBD) as it is required to assemble te payload to POEM stage in pressurised condition.
2. Provision shall be available to vent out the left-out pressure from the tank/ bottle in orbit either through Tele-command or after completion of the experiment.
3. Safety compliance document shall be submitted well in advance for obtaining the clearance from SDSC, Sriharikota Safety committee.