

### CubeSat-class Spacecraft Bus

#### Applications

- General-purpose 3U CubeSat missions for Earth-observation missions

#### Features

- 3U-size CubeSat
- Modular, customizable architecture
- >1300cc payload volume
- Multiple solar array configurations possible (e.g. "Propeller", "Turkey Tail", "Space Dart")
- Optional GPS
- Supports a minimum of 3 Separation Switches

#### Incorporated Subsystems

- Pumpkin CubeSat Kit<sup>TM</sup> Pro chassis
- Pumpkin 5<sup>th</sup>-generation PMDSAS fixed and/or deployable solar panels with up to 46 triple-junction solar cells (1W BOL each)
- Pumpkin fixed side panels with integrated Pumpkin Panel Release Mechanisms (PRMs)
- MAI MAI-400 ADCS with dual Earth-Horizon Sensors (EHS) for attitude knowledge and control
- Pumpkin Solar Interface Module (SIM)
- Pumpkin ADCS Interface Module, with:
  - AstroDev<sup>TM</sup> Lithium-2<sup>TM</sup> UHF transceiver
  - AstroDev<sup>TM</sup> UHF splitter/phaser
- Pumpkin Battery Module 1 (BM 1), with:
  - 40Wh energy storage
  - 2S2P cell configuration
- Clyde Space XUEPS 6-channel EPS, with:
  - Unregulated VBATT output
  - Regulated +5V\_SYS and VCC\_SYS outputs
- Pumpkin Motherboard (MB), with choice of Pumpkin Pluggable Processor Module (PPM)
- Pumpkin UHF deployable RHCP turnstyle antenna system

#### Also Includes

- Test & validation software



Propeller configuration shown

#### ORDERING INFORMATION

Pumpkin P/N 715-00553

Option Code	Configuration
/00 (standard)	standard
per factory	consult factory

Contact factory for availability of optional configurations.  
Option code /00 shown.



#### CAUTION

Electrostatic  
Sensitive  
Devices

Handle with  
Care



#### User Customization

- End-users can customize this configuration in a variety of ways, e.g., alternate solar panel(s) configuration, alternate transceivers, alternate antennas, etc. Please consult factory for further information.

**CHANGELOG**

Rev.	Date	Author	Comments
A	20140121	AEK	Initial version.
B	20140209	AEK	Added mass table, overall dimensions and exploded view.

## OPERATIONAL DESCRIPTION

Pumpkin's configurable MISC 3 bus is a complete hardware solution for 3U-size CubeSat nanosatellites.

MISC 3 P/N 715-00930 utilizes the MAI MAI-400 miniature ADCS to achieve sub-degree attitude knowledge and control. The remaining Pumpkin bus components (SIM, ADCS I/F Module with transceiver and splitter/phaser, optional GPS, BATT, EPS, C&DH, PRMs and antennas) form an integrated, wiring-free solution with a standardized 104-pin connector interface to the end-user's payload.

An optional GPS receiver – Pumpkin's GPSRM 2 – can be fitted in-between the ADCS I/F Module and the BM 1 Battery Module. The GPS antenna is located on top of the ADCS, on the zenith end of the CubeSat.

## CONSTRUCTION

Pumpkin's MISC 3 P/N 715-00930 employs a highly modular construction with a minimum of internal wiring. Major components include:

- Solar panels (fixed and deployed) with panel release mechanisms (PRMs), temperature sensors and coarse Sun sensors
- CubeSat Kit™ Pro chassis with multiple Separation Switches
- ADCS with Earth Horizon Sensor
- Bus: SIM, ADCS I/F (w/transceiver & splitter), EPS, BATT, C&DH (MB+PPM)
- Quad turnstyle deployable UHF antenna (RHCP)

MISC 3 P/N 715-00930 is intended for nadir pointing of the payload. All of the bus components are arranged at the zenith end. The remaining volume is available for a nadir-facing payload.

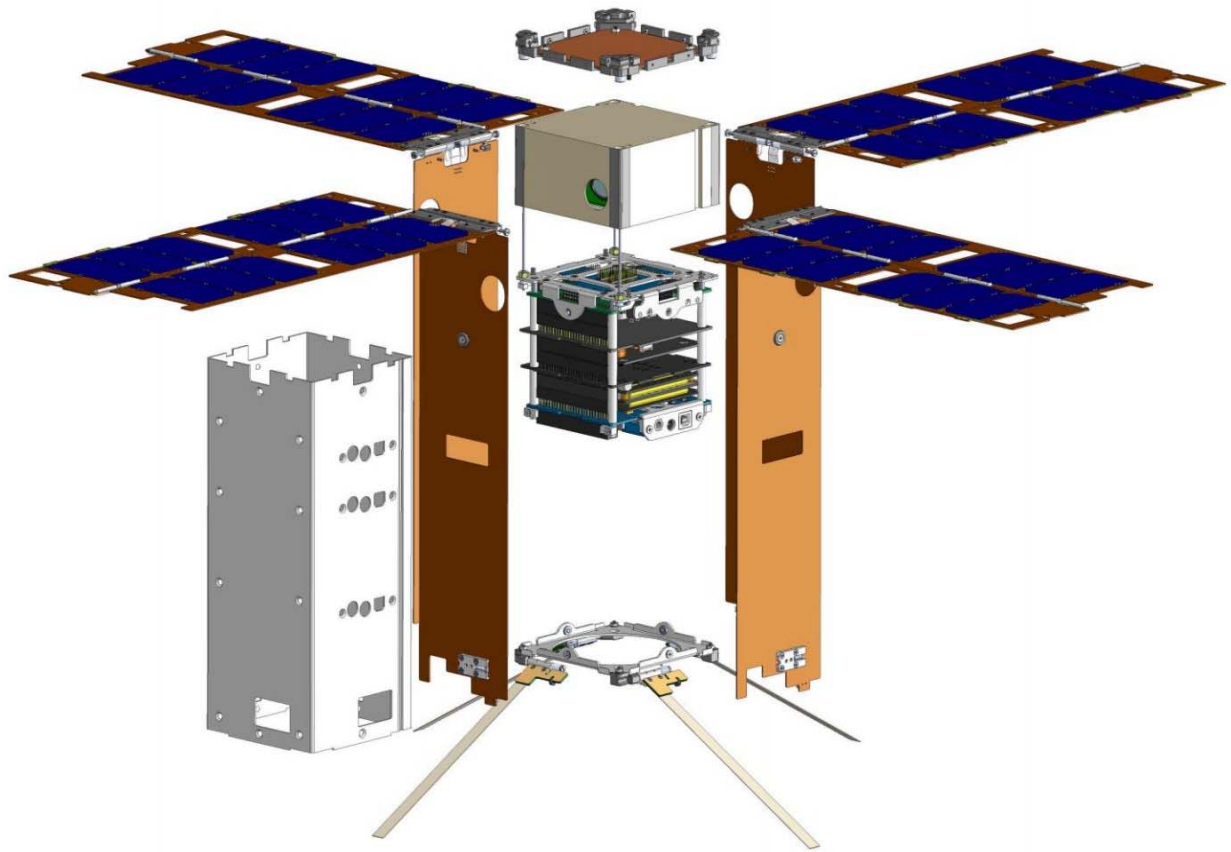


Figure 1: Exploded View

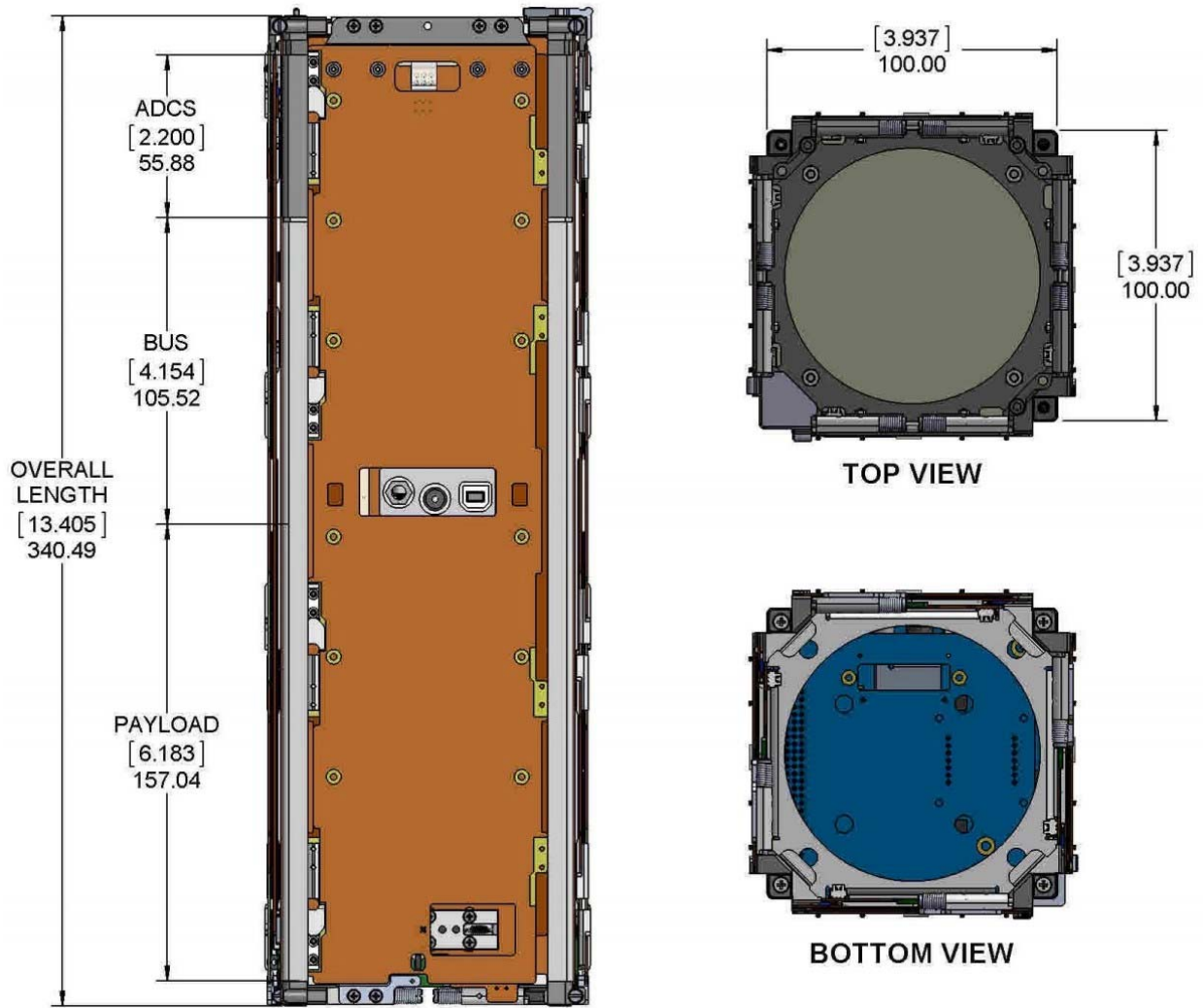


Figure 2: External dimensions (stowed), showing internal lengths associated with ADCS, bus and payload

**ABSOLUTE MAXIMUM RATINGS**

Parameter	Symbol	Value	Units
Operating temperature <sup>1</sup>	T <sub>A</sub>	-40 to +85	°C

**PHYSICAL CHARACTERISTICS**

Parameter	Conditions / Notes	Symbol	Min	Typ	Max	Units
Mass	Estimated, when outfitted in "propeller" configuration with four fixed and eight deployable solar panels.			2800		g
Overall length (Z)	Conforms to CubeSat specification			340.5		mm
Overall width (X)				100.0		
Overall depth (Y)				100.0		
Aperture on zenith end				88		mm

Item	Breakdown	Qty	Mass (g)
<b>MISC 3 Chassis</b>		1	<b>317</b>
<b>ADACS</b>	MAI-400	1	<b>672</b>
<b>ADACS Adapter Plate</b>		1	<b>35</b>
<b>High-Rise Module</b>	High-Rise Spacer + Feet + Hardware	1	<b>54</b>
	High-Rise PCB Placeholder	1	<b>19</b>
<b>Solar Interface Module</b>		1	<b>22</b>
<b>ADACS Interface Module</b>	Including Li-2 Radio and Splitter	1	<b>91</b>
<b>EPS Module</b>	Clyde Space XUEPS	1	<b>194</b>
<b>Battery Module</b>	Clyde Space Battery	1	<b>258</b>
<b>C&amp;DH Module</b>	Pumpkin Motherboard + PPM	1	<b>112</b>
<b>MISC 3 Panel Assembly</b>		4	<b>209</b>
	MISC 3 Deployable Winglet		62
	MISC 3 Center Deployable		61
	MISC 3 Side Panel with PRM		55
	Panel Brace		12
	Deployable Panel Hardware		19
<b>Antenna Sub-Assembly</b>	Balun PCB + antenna element + antenna hinge + spring + RF cable	4	<b>10</b>
<b>Large Aperture Cover Plate</b>	Including four feet	1	<b>37</b>
<b>Hardware</b>	Standoffs, Threaded Rods, Harnesses, Screws, Etc.		<b>113</b>
<b>Complete MISC 3</b>	Total satellite mass without user payload		<b>2800</b>

**Figure 3: Component and total masses**

<sup>1</sup> For most components. A few notable components are not specified for operation over the entire industrial temperature range; these may include the ADACS and individual batteries. Please consult the manufacturer's datasheets for more information.

## TRADEMARKS

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