# J-Cube: Frequently Asked Questions

## General

### Q1. What do 1U and 2U and 3U mean?

Answer: These are CubeSat sizes. In the beginning (before the Year 2000), CubeSat sizes were not standardized. They were designed with many sizes, many shapes, and many configurations. So this made deployment expensive because the deployers varied.

Then the world decided to converge on a size standard. The CubeSat standard was born. So roughly:

1U = 10 cm x 10 cm x 10 cm

2U = 10 cm x 10 cm x 20 cm

3U = 10 cm x 10 cm x 30 cm

### Q2. So the size is standardized. Is the bus standardized?

Answer: Yes and no. Many CubeSat developers design one from scratch, for a variety of reasons. For example, some developers enjoy this challenge.

You can buy a bus commercially -- but these are costly. On the other hand, you can get started right away with your payload development. If your budget is limited: *We recommend the BIRDS Bus*. It has flight heritage from BIRDS-1, BIRDS-2, BIRDS-3, and BIRDS-4 satellite projects. You can use it on an open source basis (MIT License). This means the designs are free; but you have to buy components and assemble them. The BIRDS Bus is particularly suitable for capacity building (universities, high schools, developing countries, etc.).

Go here for information on the BIRDS Bus:

https://birdsopensource.github.io/

### Q3. How does my CubeSat get into space?

Answer: There are two methods:

(1) Direct rocket launch

(2) ISS (International Space Station) deployment

For (1), your satellite rides into space on a rocket.

For (2), your satellite first gets delivered to the ISS. Then, from there, it gets deployed into low-earth orbit. Advantage: Your satellite need not be as robust as for (1). (1) is a more violent ride. Disadvantage of (2): Your orbit does not deviate from the ISS orbit very much (between 450 and 480 km above the Earth). And the orbit inclination is similar to the ISS inclination.

Advantage of (1): If you need a much higher orbit (say 800 km), then it is possible. Just find the rocket that would take it there. However, note that (1) is usually more expensive than (2).

**Q4. What is the difference between KiboCube and J-Cube?**

Answer: KiboCube is a program between UNOOSA and JAXA; it was started in 2015 (it is about 7 years old). The launch is free, but getting KiboCube is hard: several parties (nations) compete for it. And often, KiboCube is offered to only one party per year. So it is hard to get. But it is free, if you get it.

J-Cube is a program between JAXA and UNISEC; it was started in 2021 (it is less than one year old); it just got started. It is not free like KiboCube; rather, it is low cost. Main advantage: If you put up that money, then you have a slot to go to the ISS. But only 12U is offered per year; so slots go to applicants on a "first come, first serve" basis. Nevertheless, your odds of success are much higher than with KiboCube. You should consider J-Cube for a secure, low-cost ride into space.

By the way, both are ISS deployments under JAXA supervision.

**Q5. I have no time and no skills to make a satellite. Can I just buy a 1U CubeSat?**

Yes, there are many vendors, such as GOMSPACE. In some cases, this would be the best option for you. However, if you want to train engineers on space engineering, then that option is no good. As a first step, buy components from GOMSPACE (for example) and challenge your engineers to put it together. This approach has been tried by many first-time projects (e.g., the *Irazu Project* of Costa Rica).

When you buy CubeSat components, it is recommended to buy from a single vendor as components from different vendors often have problems of interface incompatibility.

**Q6. My country is launching a satellite for the first time. How do I raise the funds for it?**

This money problem has been faced by many institutions in many nations. Here is some advice. For the first satellite, it is hard to get government funding because you lack credibility. On the other hand, it is easy to collect donations because, after all, it is the *First Satellite of Your Nation*. For many patriots, being first is significant. If you are creative and energetic, you can raise the needed funds. Others have done it.

For the second satellite, the situation reverses. It becomes hard to get donations: Few people care about donating money for the second satellite. They usually only care about No. 1. On the other hand, if your first satellite was reasonably successful, then you have credibility. You can approach the government for funding; we are sure they will listen to your case.

**Training matters**

**Question 1.**

What is the required English proficiency level for space science & engineering graduate programs in Japan?

**Answer 1.**

For an example, in Kyushu Institute of Technology, candidates are required to submit an official test score of a standardised test (such as TOEFL) equivalent to the Common European Framework of Reference for Languages (CEFR). The grade for CEFR must be B2 or higher.

The requirement levels differ depending on universities you apply to.

**Question 2.**

How much time is required to apply for graduate programs?

**Answer 2.**

A minimum of 6 months. For instance, April admissions are opened in October of the previous year and closes approximately 2~4 weeks later. The exact application period depends on the school you apply to.

**Question 3.**

What is the minimum requirement for a graduate degree program applicant in Japan?

**Answer 3.**

When applying for master's program in typical Japanese universities, you are required to show that you have attained a minimum of 16 years of schooling up to the bachelor's degree level. You should submit transcripts and official degree certificates as a proof.

When applying for a doctoral program, you should submit official master's degree certificate (& completion certificate if available), in addition to official academic transcripts.

If you expect to finish the Bachelor or master's degree by the time of your enrolment in Japan, you need to prepare an official letter from the school to say that you are expected to graduate with a degree.

**Question 4.**

Is there financial support for graduate students?

**Answer 4.**

Financial support comes as scholarships/ grants which are quite competitive. It is better to secure funding or some sort of scholarship for your graduate study. In Japan there are various types of scholarship from both government and private organisations.

**Question 5.**

In developing our satellites, could we have assistance from Japanese universities?

**Answer 5.**

Yes. Having a collaborative research agreement (CRA), i.e., a contract, is a good approach. For instance, in Kyushu Institute of Technology, the CRA includes environmental testing of your satellite to meet JAXA's standard, assistance with safety documents preparations, as well as delivering the satellite to JAXA to be launched to the ISS and released from there.

**Deployment matters**

**Q1. What are the requirements that our CubeSat needs to meet (dimensions, weight, electrical design, etc.)?**

Answer

Read the Japanese Experiment Module (JEM) Payload Accommodation Handbook. Do not deviate from it. Otherwise, you will be in trouble.

**Q2. Regarding early operation of the satellite, what are the requirements or restrictions for the beacon? Can the satellite emit a beacon automatically immediately after the**

**deployment from ISS? Or do we have to send a command to start the beacon transmission?**

The satellite should not transmit any radio signals until it is sufficiently far from the ISS (more than 30 minutes after the satellite is released).

If the satellite emits a beacon automatically, (most university CubeSats have this option, because there is less chance of losing the satellite signal), you can ask other ground stations to receive the beacon signal. Many satellites using amateur radio frequencies ask the amateur radio community to receive the beacon signal.

**Q3. Can RBFs or fuses be used as inhibit functions in EPS circuits?**

RBF cannot be used as an inhibit function because the satellite deployer has no access window.

A fuse may be used as a short circuit prevention function, but functional evaluation is required. CubeSat uses batteries and solar cells as its energy sources. The satellite needs to have 3 inhibits to prevent the power at battery or solar cell from reaching the payload. In addition, the safety functions are required for battery overcharge protection, over-discharge protection, and short-circuit protection. When mechanical switches or electronic switches (MOSFETs) are used for the inhibits, these are regarded as safety functions.

**Q4. Can we have triangular shape at the rail end?**

No. Multiple CubeSats will be installed in the satellite deployer. Other satellites may be mounted on the +Z side of your satellite. At that time, the +Z end face of the rail is in contact with the -Z rail end face of the satellite in front. Normally, a deployment switch or spring plunger is attached to the end face of the -Z rail of CubeSat. If the +Z rail end face does not have enough face, this deployment switch or spring plunger cannot be pushed in. Therefore, you need to use rails that meet the requirements of the JEM Payload Accommodation Handbook.

**Q5. Companies such as ISIS and Exolaunch are providing deployer systems that utilises the internal volume of POD more efficiently. At the end of the deployer, there is an open volume to accept a Tuna can type antenna system or others. Can we use a Tuna can type antenna system?**

No. The backplane of the satellite deployer used by J-Cube is a flat plate. There is no hole/ opening for the Tuna can to go through. Therefore, you cannot use the Tuna can type antenna.