



**OPEN
SOURCE
SATELLITE
INITIATIVE**

A portrait of a young man with long dark hair and glasses, wearing a white t-shirt and a red sash with 'OSSI' on it. He is looking directly at the camera.

My Name is Song Hojun



Mission *Alpha*



There is no Why.

Started 2008.12
as
An Art Project

The First Satellite Launched by an Individual?



**Science
is
Fantasy.**

Talks



Creators Project NYC
Image: derballa



Lift09, Korea

asia
09

What can the
future do for you?

Jeju 제주특별자치도
Your Island for Sustainable Business

ASIANACE

Daum

lift



RX / TX Communication
Solar Charging
Sensors
Attitude Control



YOUR
FUNCTION
MODULE

Low Earth Orbit: 600~2000km

Life: 1~6 years



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Book publishing, Seoul



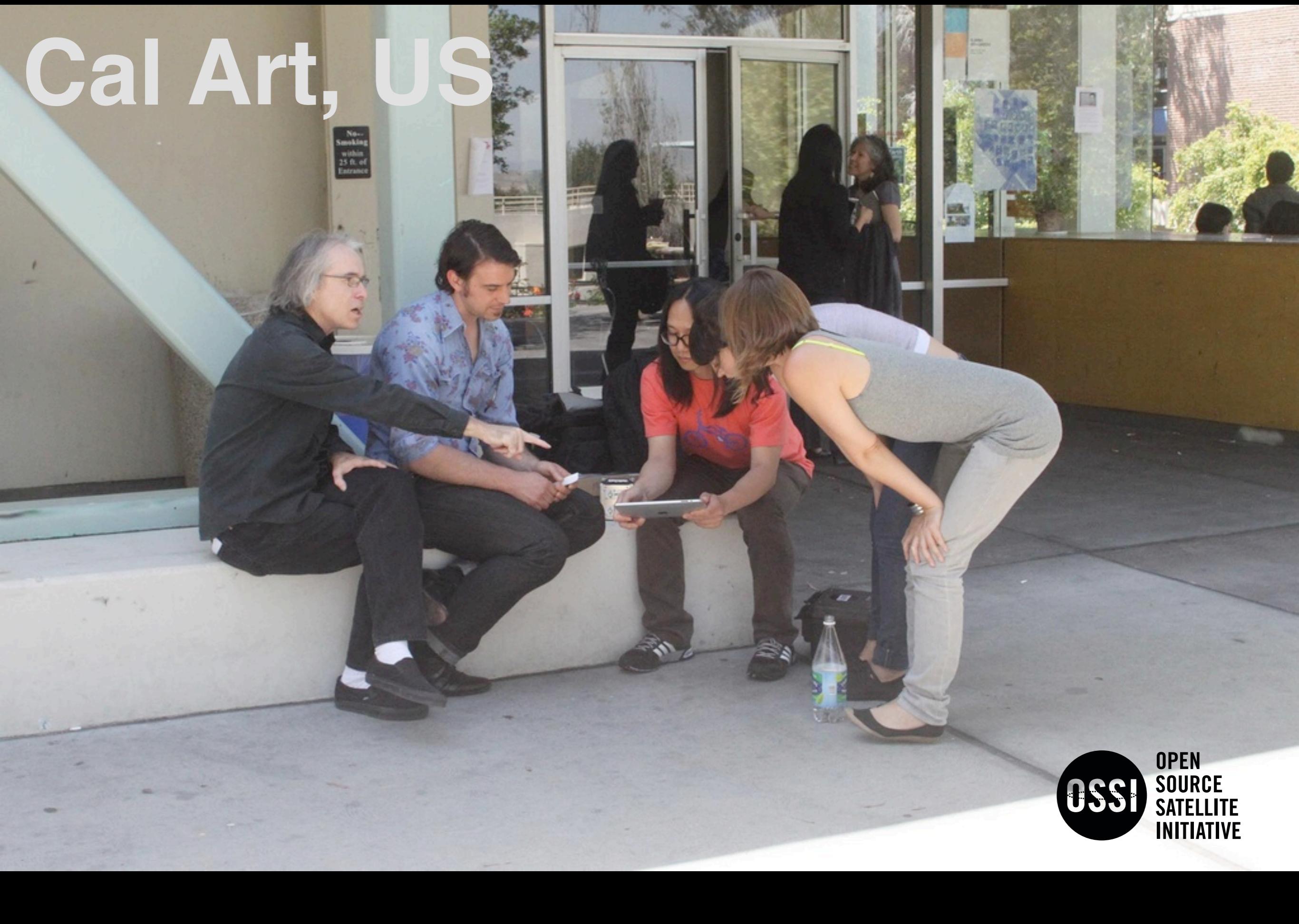
OPEN
SOFTWARE
SATELLITE
INITIATIVE

Machine Project, L.A.



OPEN
SOURCE
SATELLITE
INITIATIVE

Cal Art, US



MIT , US

Hello, MIT



Dorkbot, NYC



EkoParty, Buenos Aires



TMDG, Mar del plata



Gwangju, Korea



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INITIATIVE

CeC, India



OSSI
SOU
SATI
NITE

KYS, Malaysia



RCA, London



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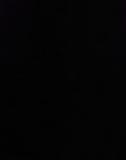
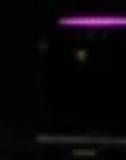
Lift12, Swiss

Cubesat.org

Cal Poly & Stanford Universities' Initiative since 2003

1U Size: 100mm * 100mm * 100mm / 1 kg

50 Cubesats are already in the space



OPEN

100

lift

101

Exhibitions

총 100가지를 드는 방법

1. 인공위성을 조립한다.
2. 티셔츠 10,000장을 팔아서 비용을 마련한다.
3. 로켓드론을 일대한다.
4. 국제 아마추어 무선연맹에서 주파수를 요청한다.
5. 인공위성 조립 마무리하기
6. 테스트한다.
7. 발사 한다. ㅎㅎ
8. 가지고 놀다!!



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Exhibitions



Exhibitions



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Exhibitions



Exhibitions

IF I TELL YOU, I
HAVE TO KILL YOU.



Media



Harper's BAZAAR

TALK

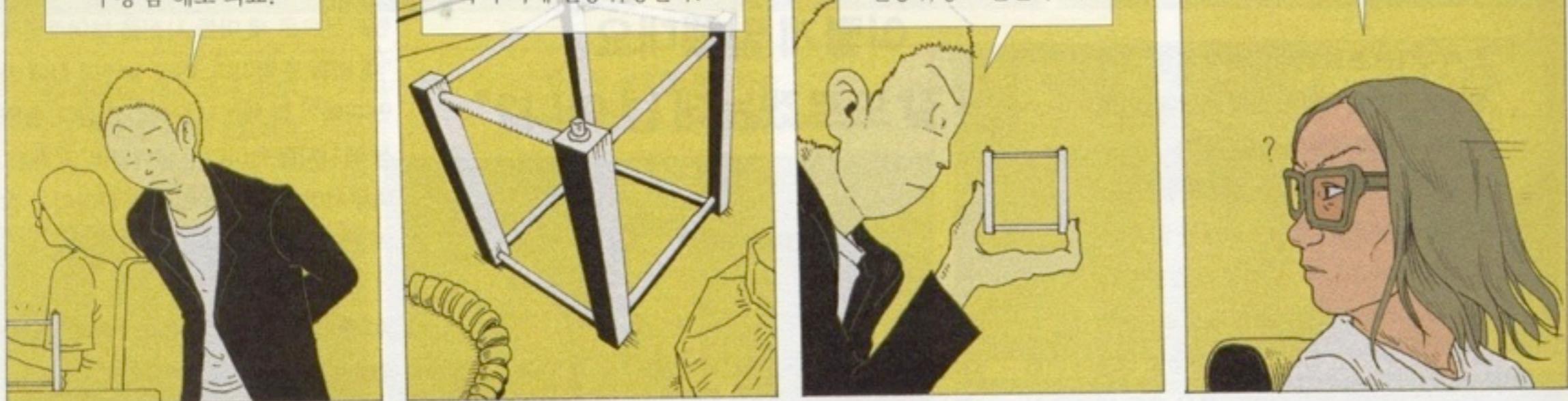


인공위성
쏘는 남자

누군가가 그에게 왜 인공위성을 만들어 띠우냐고 묻는다면 그가 되물을 것이다.
당신은 왜 음악을 듣고 등산을 합니까?



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MONOCLE

BRIEFING ON GLOBAL AFFAIRS, BUSINESS, CULTURE & DESIGN

The art of the sell: the world's best shopkeeping and retail stars

GLOBAL TOUR of the leading buyers, designers, cutters and iterators in the retail and service sector



issue 32 . volume 04
APRIL 2010

- A AFFAIRS** Double Dutch: two takes on nation creation
- B BUSINESS** Back to base: sun, sea and soldiers in the Pacific
- C CULTURE** Going live: the luxury of satellite links
- D DESIGN** Cutting a dash on the streets of São Paulo
- E EDITS** Buying in Bogotá, dining in Auckland and topping it off in Vienna

+ SEOUL: A CITY SERVED UP

C

REPORT
Satellite news



The contracts

There's credibility in a crew and a reporter in a suit (a sharp one is no longer *de rigueur*, crumpled can tell a story, too) with two cameras, a lighting rig, a sound man with a fuzzy mic and a clipboard-wielding, clock-watching producer. There's solidity in this structure, but it's becoming rarer (at time of going to press ABC News announced "substantially fewer people on staff at ABC News"; 300-400 staff or 25 per cent are expected to go). It means business, but it can't run through the rubble with the survivors. So what's the nature of news to be? Set-piece interviews or shooting from the hip? Does it matter that the footage isn't great, if it's of what's actually happening? Both of course, same as it ever was.

Lyse Doucet knows the power of the immediate; "compelling footage is the key – being able to bring the audience with you – into what is happening *now* – is the incomparable moment in journalism." It won't last forever – but the old rule still applies; a big enough story, there will be a satellite. The new news economy is smaller and it's squeezed, but the gold standard is still the satellite. — (M)

Fuzz and how to avoid it

The likes of Eutelsat are keen to stress that the quality of what actually appears on our television screens is not just down to them. Signals are increasingly "crammed" – the temptation for cash-careful terrestrial channels is to save money and try to use a narrower band to broadcast, so they compress their signals and compromise picture quality. — MT

Starship trooper —Seoul

Hojun Song's art is difficult to categorise. In which box would "launching a satellite" belong? Based in Seoul, where he gained an engineering degree, Song (*below*) is planning to launch and operate a small satellite. If he succeeds, he'll be the first individual to do it. "But that's not the point," he says. "Unlike governments and military space programmes, private ventures will create diversity."

Song's also quick to point out that, despite being the frontman of OSSi, the Open Source Satellite Initiative, this is a collective effort. He is assembling his satellite using, where possible, open source components (whose blueprints are available to the public, at no cost). OSSi is taking a collaborative approach to fundraising too; "I came up with an idea of combining a space programme and street art," Song says, explaining how artists from all over the world are designing fundraising T-shirts. "If we can wear and use space in our daily lives this will change the thought that only a few white-gowned scientists can do space science." He aims, in other words, to "bring coolness back into space culture."

The project will cost about \$100,000, the majority of which will be used to pay for the launch. The satellite weighs just 1kg and Song will use a private space company called NovaNano to put it into orbit towards the end of the year.

Song's equipped his Cubesat with two peculiar features: a Big Bang random number generator and a Shooting Star module. The first feature will detect cosmic microwave background (the "echo" of the Big Bang) and will generate a random set of numbers that will be published on a website: "Maybe we'll run a space lottery tied with the T-shirts."

The second feature is a 100W LED light that will be used to pulse Morse-coded messages, chosen by the public, visible from Earth, when the satellite is orbiting overhead. "From a practical point of view, my project might be meaningless," he admits, "but pure science, too, when it seeks for truth, is just fantasy to most people." — MT



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Vogue KOREA

한국판
U G
0 9
157 호
특 가
0 0 원

1호 별책부록
2페이지 하드 커버 사진집

THE SHOW 1996~2009

개적인 쇼마스터들의
작 패션쇼 베스트 셀렉션!

라 <액트리스> 여배우 6인 인터뷰

THE ACTRESS

여정, 이미숙, 고현정,
지우, 김민희, 김옥빈

US
걸'에서 '햇 걸'이 된 시에나 밀러
다일의 황제 마이클 잭슨 오마주
기준과 현빈의 비정한 나날

13th ANNIVERSARY ISSUE!

슈퍼 중의 슈퍼, 클라우디아·나오미·에바의 릴레이 슈팅,
13개 브랜드, 13명 사진가, 13명 모델의 초특급 블록버스터 화보,
13명의 투·클래스 아티스트들과의 콜라보레이션 패션 드리마

N 1228-1166

08



OSI
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테크놀로지 아티스트 송호준의 B612, 소리에 반응
푸른색 LED 백들이 반짝이는 이 외딴 행성에는 역
사와 음악이 공존된다. [gain] = love/depres
 등을 이용해 인터랙티
브이를 만드는 송호준은 '제2의 우주'에서 가장 강력한 무기'
트리니티 기관, 평화기금과 함께 다운 방법으로!

DAZED

KOREA

FIRST TO KNOW

SH MIND
을 재해석하는
드D BEAUTY
선을 사로잡는
크업
와 매치한
팅
전해야 할
템

긴 음악

DAZED
SHOP-
PING

<데이즈드> 3월호를 구입하는 독자분들에게
'크리에이터 20인의 충동구매 목록'이 담긴 별책
<DAZED SHOPPING>을 한정 수량으로 드립니다.

MARCH 2012 #47

& CONFUSED

KOREA

SEVEN FOR EIGHT

세븐이 갈아입은
8벌의 의상과 표정SOMETHING
NEW YORK뉴욕에서 숨가쁘거
포착한 소녀시대 제시카모자는 JILL by JILLSTUART
HATS ON. 티셔츠는
I-AKMAN. 데님 팬츠는
ROCHALL ARTIST.ACROSS THE
UNIVERSE

개인 인공위성을 발사하는
프로젝트만 3년째 하고 있는
송호준은 과학자도 예술가도 아닌
자리에 서서, 우주와 개인 사이 몇
억 광년을 매일 오가고 있다.

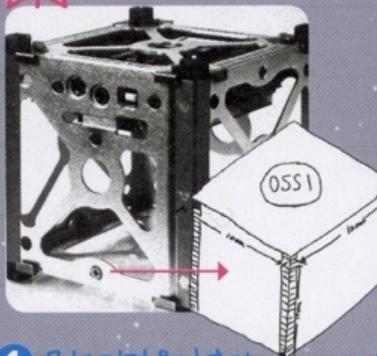
OSSI
OPEN
SOURCE
SATELLITE
INITIATIVE

 OPEN SOURCE SATELLITE INITIATIVE
인공위성을 우주에 보내는
인간들에게 꽤 진취적이다.
작업으로 보였나 보다.
나라에서 만드는 소수의
진보적인 일간지, 미술
여러 분야 예술가들이
온갖 종류의 미디어를
싶어했다. 그리고 각
포스트 모던한 청년
정의를 내렸다. <데
우린 그에게 도대체
왔느냐고 따졌다. 그
정신없이 쏟아낸 고민
많았다. 그가 하는 상
고루했고, 어떤 건
얻은 결론은 그를 이
그를 규정지어서는 안

 ISSUE #47 MARCH 2012
 ISSN 1976-9385
 9 771976 938000

송호준 작가의 상상 노트

인공위성 제작 비용 절약 대작전

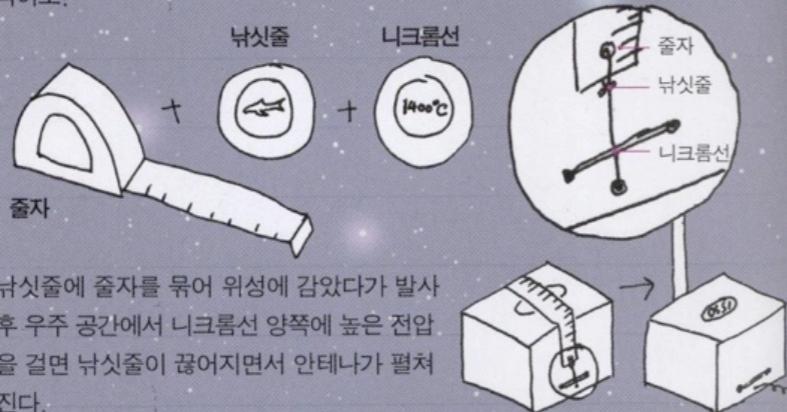


1 몸체 가격을 낮추자

인공위성의 몸체는 가볍고 진동에 잘 견디며 모서리 부분은 전기 절연성(전기가 통하지 않는 성질)이 있어야 한다. 기존의 키트로 파는 것들은 너무 비싸 직접 제작했다. 기존의 키트 값인 600만 원보다 1/30이나 저렴한 20만 원대 인공위성 몸체 완성.

2 구하기 쉬운 재료를 사용하자

우주 공간에서 사용될 태양열판은 충전 능력이 좋은 태양 전지를 이용해야 하고 몸체에 부착할 때도 우주용 실리콘 접착제를 사용해야 한다. 하지만 이런 부품들은 주변에서 쉽게 구할 수 없는 것이 현실. 최근 몇몇 위성들이 핸드폰에 들어가는 것과 같은 리튬 이온 배터리로 발사에 성공했다. 구하기도 쉽고 저렴하니 일석이조!

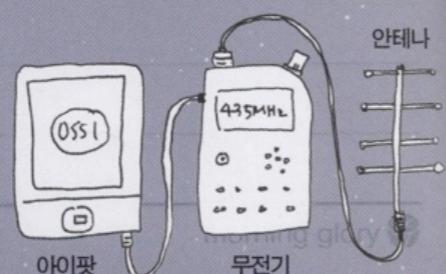


3 로켓 발사는 단체 관광으로!

메인 위성 옆에 끼워 타고 올라가거나 여러 위성이 모여 단체 관광을 떠나면 로켓 임대료를 낮출 수 있다.

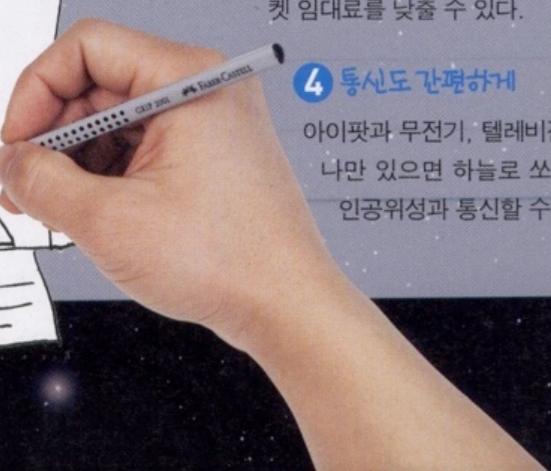
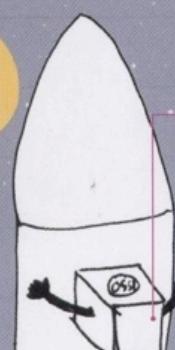
4 통신도 간편하게

아이팟과 무전기, 텔레비전 안테나만 있으면 하늘로 쏘아보낸 인공위성과 통신할 수 있다.

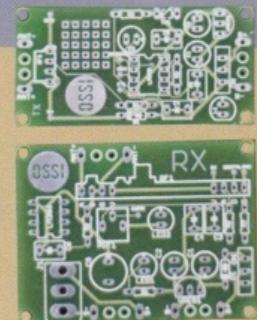


저 단체관광 떠나요~

로켓에
실린
인공위성

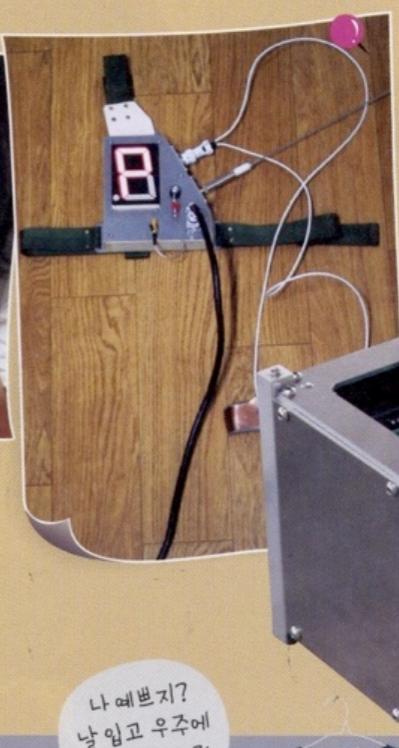


제작 과정 전격 공개!



실제로는 이 벨트를 몸에 착용한 뒤 사람들과 손을 잡아 발생한 전파로 통신 위성과 통신할 예정이다.

이것이 바로 완성된 개인용 인공위성!



로켓 대여비가 되어 줘!

억이나 되는 로켓 대여비는 인공위성이 그려진 티셔츠를 판매해서 마련할 예정이다. 많은 사람들의 힘을 모아 꿈을 이루게 되는 것. 이 티셔츠를 입고 멀게만 느껴지는 우주 과학에 대해 자주 생각해 보기를 바라는 마음으로 만들어 낸 일석이조의 방법이다.



OPEN

OSSI
Space Satellite

weenArt &
Business

379 JAN 2010 www.monthlydesign.co.kr

DESIGN

Monthly Design
15 Designers to
Watch in 2010

특집 2010년 월간 <디자인>이 주목
커버스토리 비씨카드의 디자인 혁
리포트 2009서울디자인페스티벌
리포트 디자인 트렌드 2010 요점 정

민간 인공위성 프로젝트 진행 중인 미디어 디자이너
송호준



profile

고려대학교 전기전자전파공학부를 졸업하고 KAIST(전 ICU) 공학부 대학원을 수료한 뒤 민간 인공 위성 회사 세트렉 이니셔티브(Satrec Initiative)에서 근무했다. <디자인 쇼쇼> <현대매체미술라이트> <선데이 아이스크림> 전 등에 참여했으며, 최근에는 '오픈 소스 인공위성 프로젝트' '이 세상에 서 가장 강력한 무기' '방사능 보석' 등의 프로젝트를 진행 중이다. 현재 오픈 소스 인공위성 프로젝트를 위해 OSSSI(Open Source Satellite Initiative) 연구소를 운영하고 있다. <http://ossi.ssi.re.kr>

OSSI

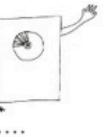
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Answer

- 1 사회참여적인 디자인 트렌드 부분에 다시금 관심을 갖게 되었고
- 2 공공 디자인 역사성과 지역성을 1회용 선전물들 더욱 심한 것은 것이다. 1~2년에 한 번씩 디자인 궁금하다.
- 3 늦게 자고 늦게 일어나는 버릇.

송호준은 어서 빨리 10년 겠다는 야심만만한 계획을 계하게 들릴 수 있을 것 프로젝트는 이미 만반의 힘으로 거듭날 공위성 업체에서 차세대 계부터 테스트까지 진 체에서 일하다 보니 관워보고 싶다는 욕망을 를 비롯한 '견적'도 내놓 저렴했던 거다. 대략 1년 데, 인생의 목표가 포르다는 더 크지. 그래서 나 '뺑쟁이'가 되고 싶지는 않아 '착수'했고, 미국의 가능하다는 사실을 확인해 올라갈 러시아 로켓 유일한 문제는 로켓을 고 포르쉐 살 돈도 없다. 만들고, 많은 사람을 가 떠올린 해결책은 바 사람들에게는 고유 번트에 응모할 수 있게 할 왜 인공위성을 띠우려고 지를 묻고 싶어 하지만 듣고 산을 타는 그것과 가치가 아닌 감성적 가치를 성공시킨 듯하다. 송호준은 기다. 주로 쓰는 재료는 기판, 알루미늄 등이다. 틴타우는 신제품은

_the new's



OSSI

/ story by Tim Chan
/ images courtesy of Ho Jun Song

Space Signals

HO JUN SONG, MUCH LIKE HIS WORK, DEFIES BOUNDARIES. The Korean artist has dabbled in photography, illustration and even DJing, but it's his latest work with satellites that has garnered the most attention, propelling his name into the foreground of space technology and soon, perhaps, into outer space itself.

Called the *Open Source Satellite Initiative*, Song's plan is to build a satellite through open source design (with blueprints and instructions downloaded online) and send it into lower orbit as early as this year. The satellite will be equipped with a random number generator based on "cosmic microwave background radiation," and broadcast Morse code messages visible from Earth.

The goal is to make space technology accessible to a mass audience, while redefining the reach of a modern-day artist. To that effect, Song envisions running a "space lottery" using the random numbers, with the winner receiving a chance to launch a personal satellite of their own. The broadcast messages, meanwhile, will be chosen by the public. "I'm using extreme technologies to initiate social narratives," Song says. "And like myself, I want others to be able to operate and interact with satellites in new and non-conventional ways."

With an engineering background from Korea University and almost half a decade of research done for the project, Song is confident the satellite will take off. And while the materials he's working with read like the periodic table of elements (Uranium, Radon, etc.), Song insists his mission is simple: "I want people to think about [the] space program as something that we see everyday, like street art," he says.

To raise money for a rocket to launch the pocket-sized satellite, Song has recruited artist friends to design T-shirts for the cause. He estimates he will need to sell 10,000 tees to support the launch of one satellite. You can purchase the T-shirts and follow his progress at <http://opensat.cc>.

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THE COLLECTORS

guest curated by Marc & Sara Schiller of

wooster collective



MICKEY SMITH
KOSTAS SEREMETIS
JEN BEKMAN
HERB & DOROTHY
JOSÉ PARLÁ
VALERIE HEGARTY
RONON YANG
MICHAEL ANDERSON
DAN WITZ
JAMES MARSHALL



THE NEW WAY TO WATCH TU p.136

THE COOLEST GADGET PROTOTYPES OF ALL TIME! p.128

THE MOST TOXIC TOWN IN AMERICA p.152

WIRED

The Web is dead.

WHAT
HAPPENED

BY CHRIS ANDERSON

AND
WHY

BY MICHAEL WOLFF

<www> | sep.2010



High Flier

Hojun Song's homebrew satellite is ready for blastoff.

Some geeks glue together model Death Stars. Hojun Song built a fully functioning satellite. Dubbed GOD (global orbiting device), it's set to become the first comsat designed and financed by a private citizen to reach orbit. The tiny (about 60 cubic inches) and cheap (around \$500) device is a masterpiece of DIY engineering: Song hacked together a solar cell, a lithium-ion battery, an Arduino board modded to withstand cosmic rays, and four LED lights powerful enough to be seen from back on Earth. To talk to GOD, he uses the jerry-rigged communication device he's wearing in the photo above. (The cube will transmit Morse code messages that should be visible to an entire hemisphere.) It's all part of what Song calls OSSi—the Open Source Satellite Initiative. "I wanted to lower the space program's barrier to entry," he explains. To make your own satellite, you can download a PDF of instructions, which feature Song's charming hand-drawn illustrations as well as tech specs. But if your heart is set on seeing your handiwork fly across the sky, you'll have to start saving up: Song will fork out \$100,000 to commercial rocket company NovaNano to launch his supercheap creation into orbit. —BRYAN GARDINER



Synthia

n. The unofficial nickname for *Mycoplasma mycoides* JCVI-syn1.0, the first living cell containing a computer-generated synthetic genome. The cell is a modified goat pathogen, and the new DNA it contains is "watermarked" with an encoded URL, famous quotes, and the name of its creator, J. Craig Venter.

Teabonics

n., pl. Derisive term for misspelled and ungrammatical Tea Party protest signs. Spotting instances of Teabonics (e.g., MAKE ENGLISH AMERICA'S OFFICIAL LANGUAGE) has become a popular sport on Flickr and in the blogosphere.

Flash crash

n. A sudden swing in stock prices caused by electronic trading errors. The term was coined in the wake of the trillion-dollar drop in the US stock market on May 6. Since then, stock exchange hiccups from India to Japan have been diagnosed as flash crashes.

Naked government

n. Full disclosure of government expenditures in China. The term was coined by Chinese netizens when a small Szechuan township posted its entire budget—from salaries to entertainment—on the Internet. Outside Communist Party officials now steer clear of the township for fear of having "gifts" and expensive meals made public.

—Jonathan Keats
(jargon@wired.com)

OPEN
SOURCE
SATELLITE
INITIATIVE

DATSTREAM ORIGINALLY SLATED TO STAR IN POPULAR MOVIES: SILENCE OF THE LAMBS: MATT DIAZ; PRETTY WOMAN: MOLLY RINGWALD // DIRTY HARRY: FRANK SINATRA // BEVERLY HILLS COP: SYLVESTER STALLONE // ROSEMARY'S BABY: TOM HANKS // PRETTY WOMAN: KATHRYN MORRISON; ROSEMARY'S BABY: ROB LOWE

0 3 4 SEP 2010

OSSI

PHOTOGRAPH BY Motohiko Hasui



the satellite lights up like shooting stars.

03:38 06:34 CC

Hojun Song South Korea

[Send to a Friend](#)

[Post a comment](#)



Hojun Song is a cutting-edge, tech-obsessed Korean artist breaking boundaries with his passion for telling stories through technology. From building open-source satellites to constructing *The Strongest Weapon in the World*, the visionary leans on his engineering background to project mediations on society via his tactile installations. It's clear that Song hopes to instill a sense of empowerment in the world, through the DIY nature and uplifting undertones in each of his works.

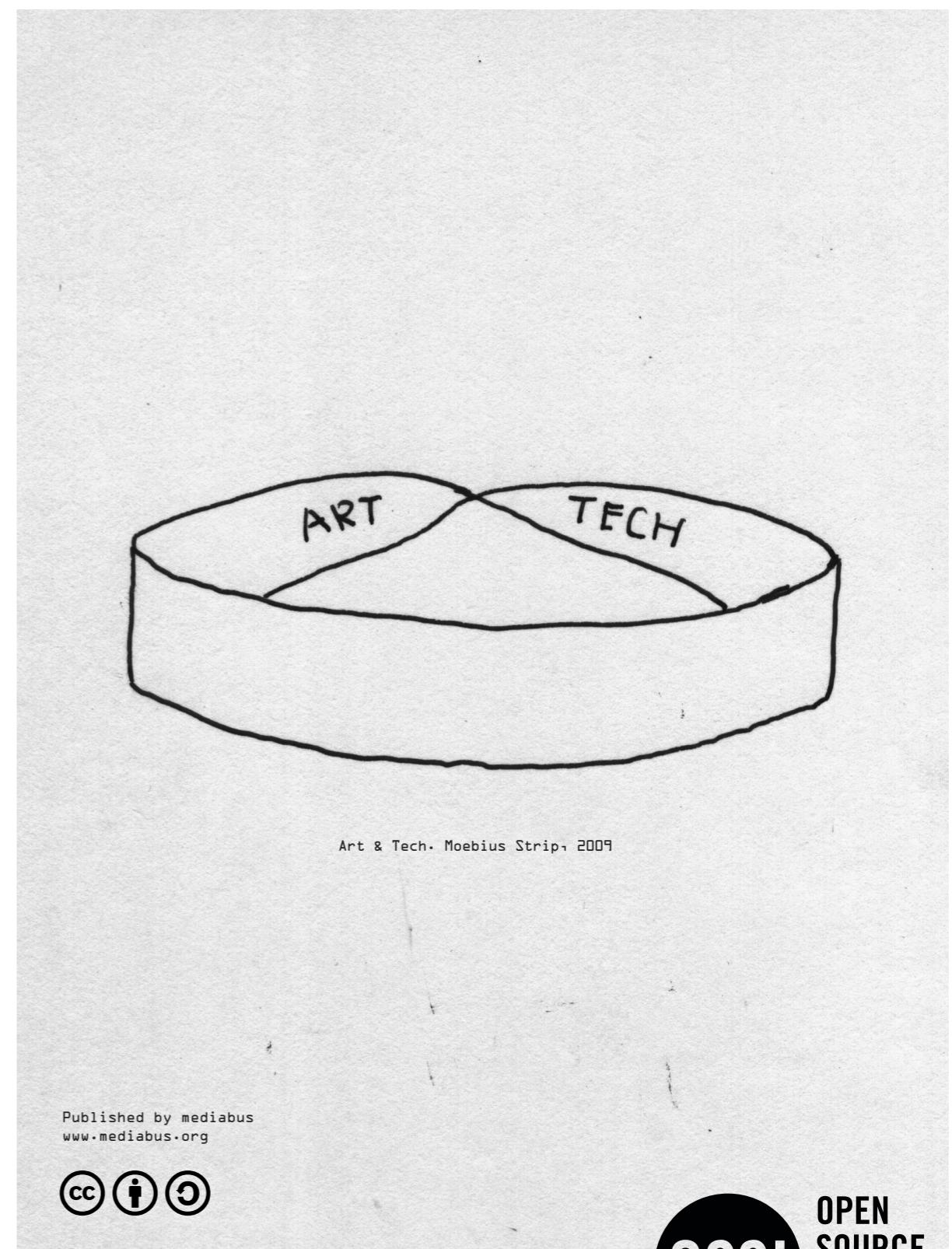
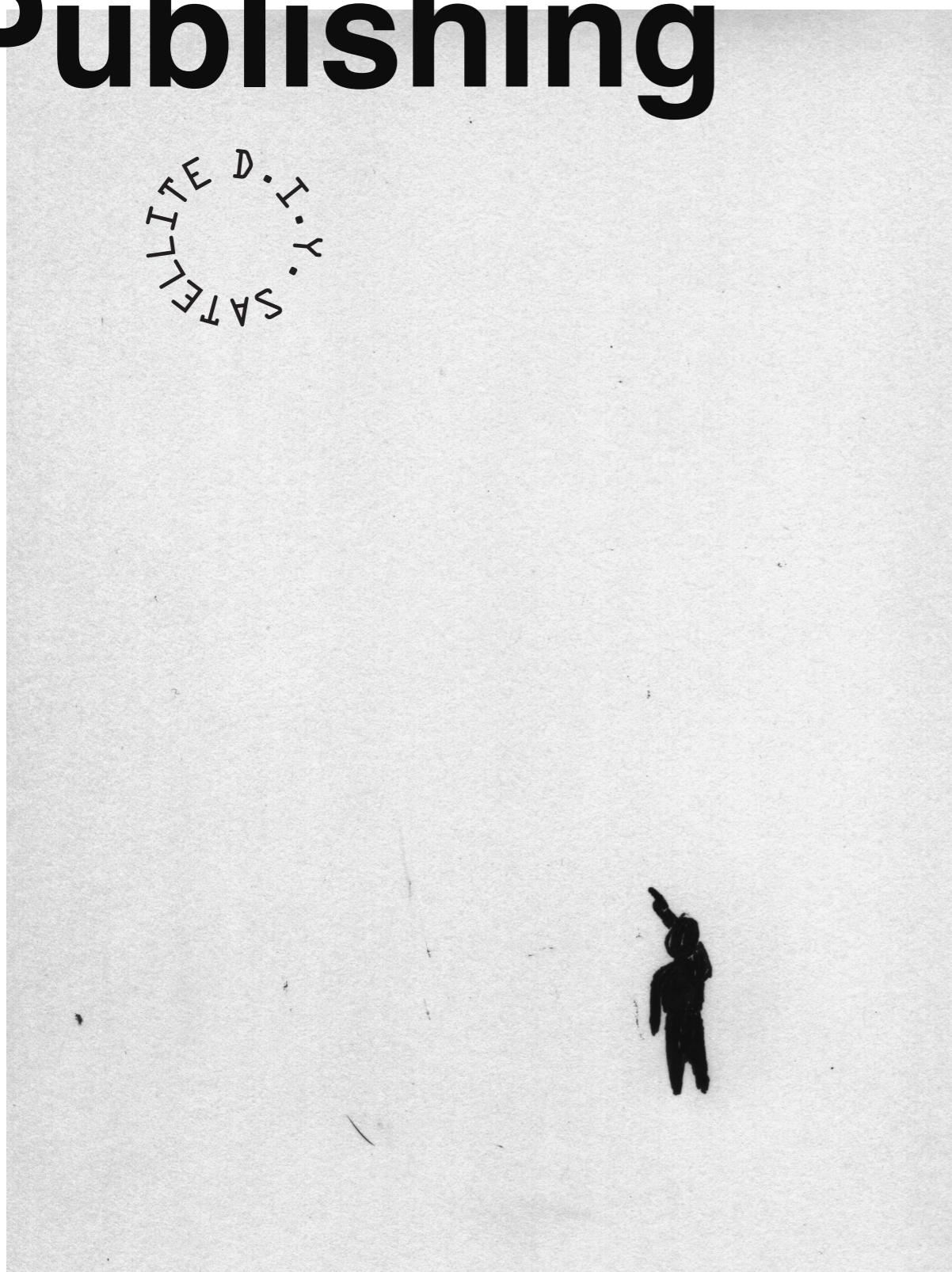
AT A GLANCE

Art futurist.



OPEN
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INITIATIVE

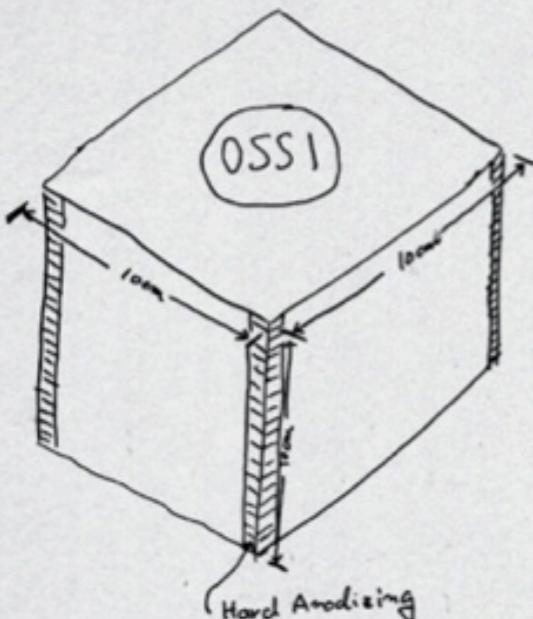
Publishing



SATELLITE D.Y.



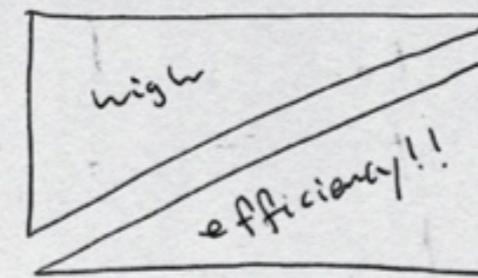
Solar Cell



light weight, high
vibration resistance, hard
anodized aluminum rails for
electrical insulation

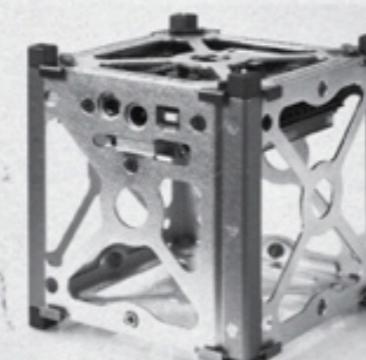
Ready-made Chassis are
expensive, so we build in-
house.

Aluminium Alloy 6061 / 7075
< 1.33kg

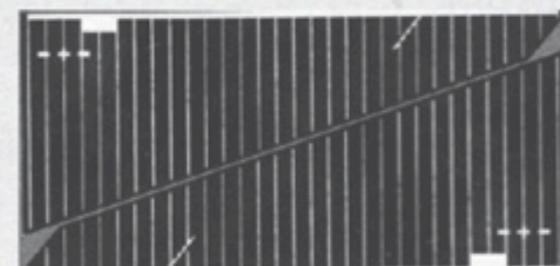


GaAs > Silicon

Unlike normal solar cells you see every day, we need a highly efficient solar cell to build a panel. And to fix the cell onto the panel, we need space-grade silicon adhesive. The problem is that most of these parts are export licensed - i.e. hard to import. But we have good alternative, as follows:



Cubesat Kit from
Pumpkin Co.



TASC Solar Cell
by Spectrolab



OPEN
SOURCE
SATELLITE
INITIATIVE

Reliability As ART

Strong

COMMERCIAL

INDUSTRIAL

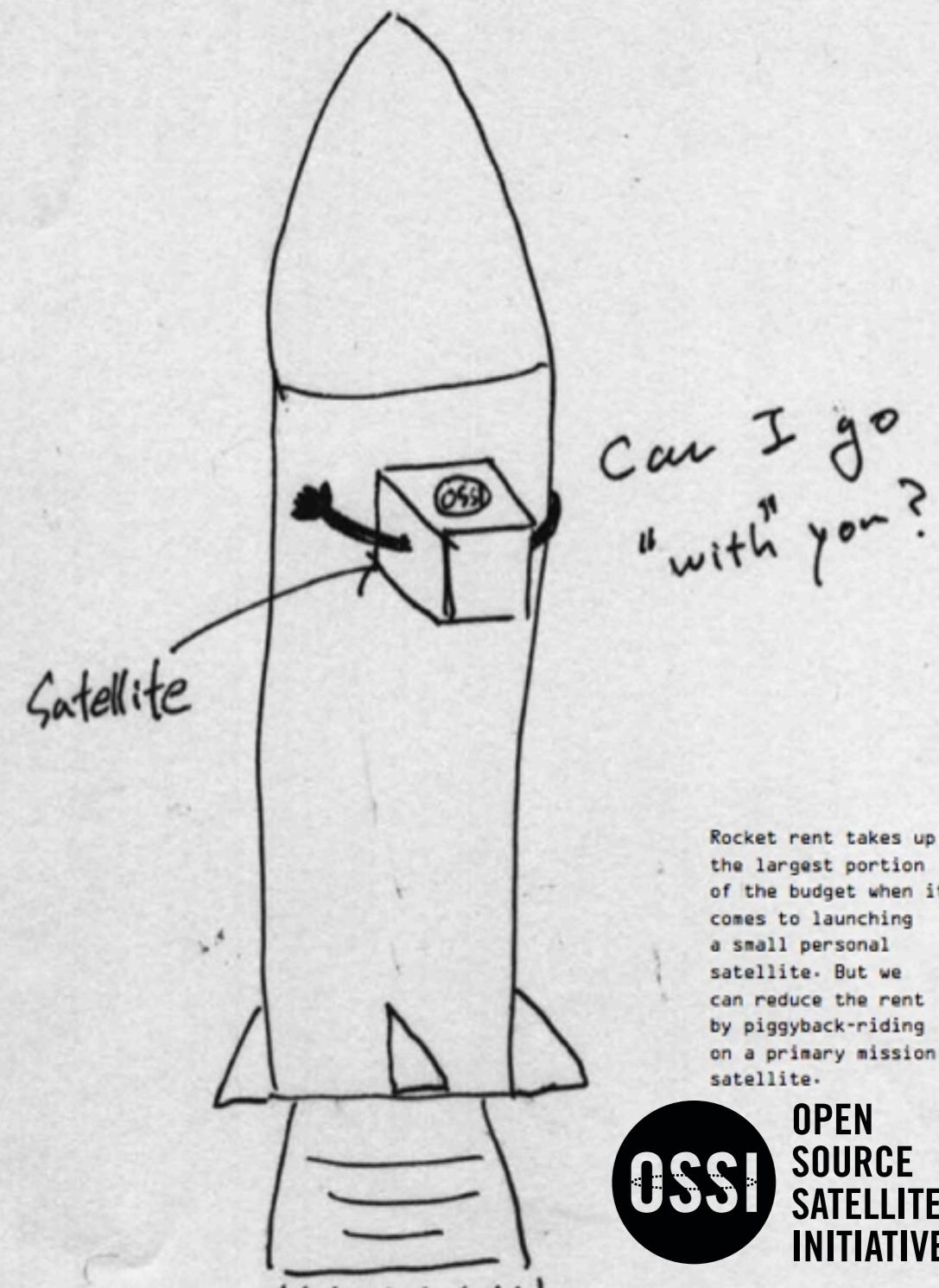
MILITARY

AEROSPACE

In order for an electronic device to be used in a space environment, it needs to tolerate radiations and should have good temperature ratings. What is going to happen when stories can be stored in reliable electronic devices? I'd say "The Strongest Weapon in the World" is an electronic device that stores beauties of the world even under nuclear radiation, which then can also reproduce the beauties in digital format.

Reliability Is ART!

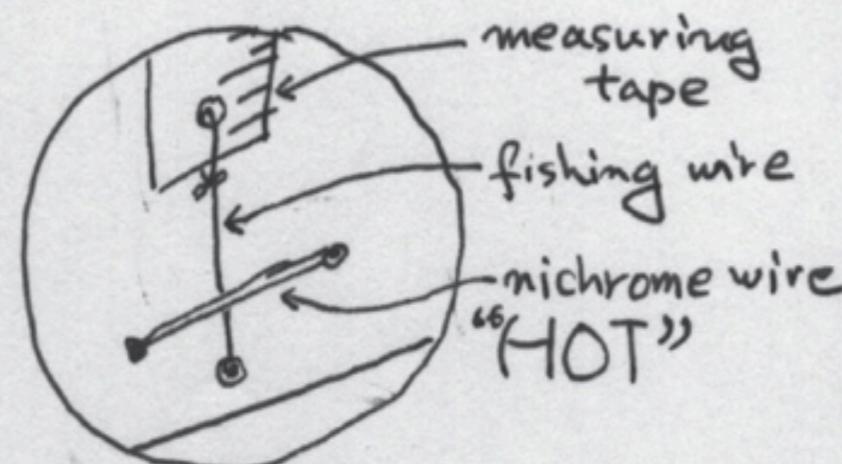
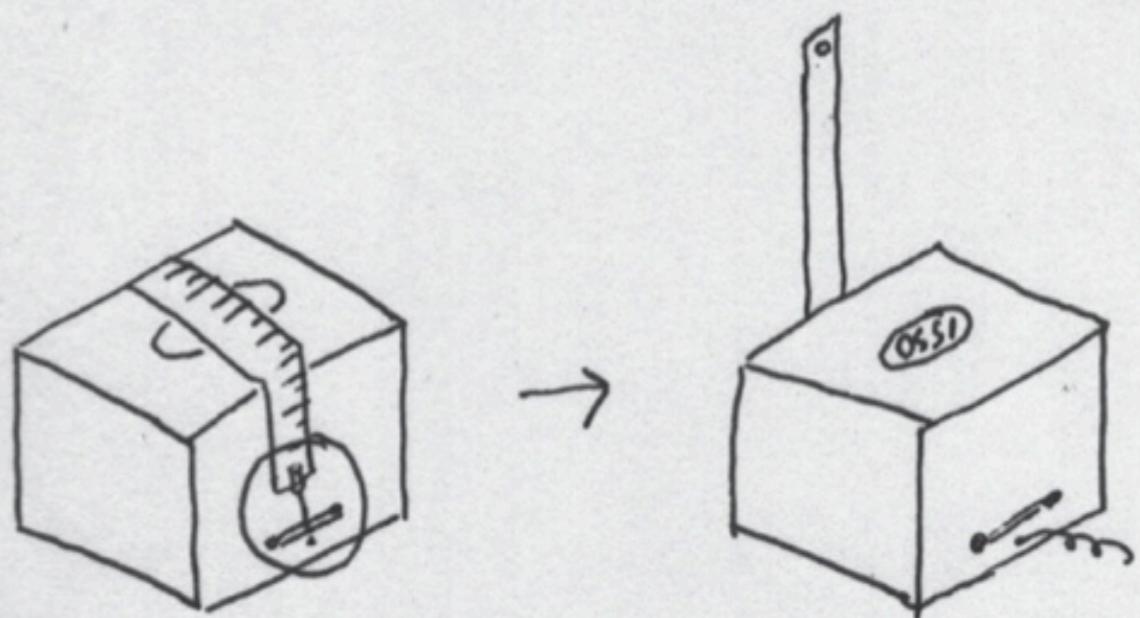
Piggyback Riding



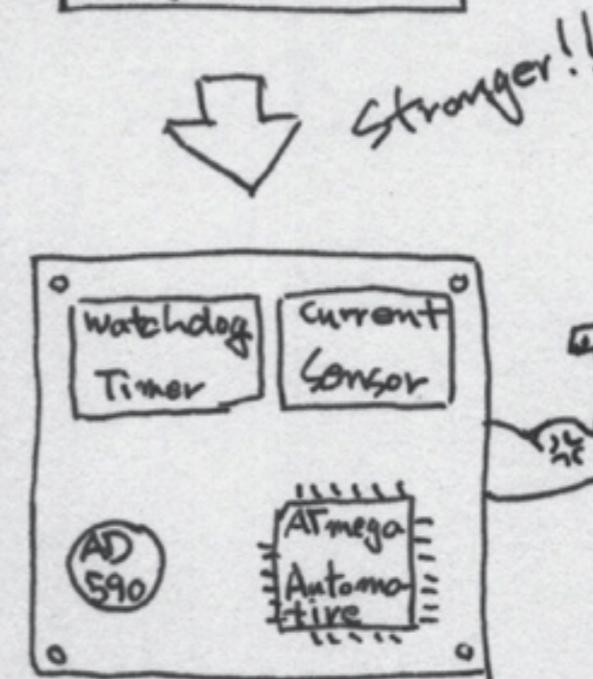
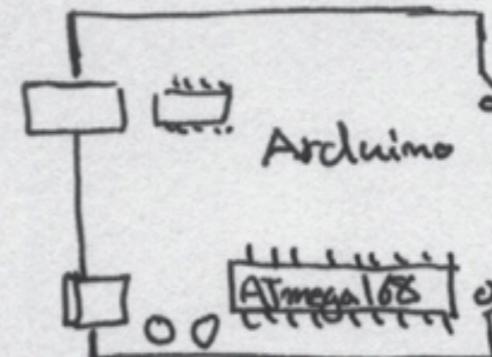
Rocket rent takes up the largest portion of the budget when it comes to launching a small personal satellite. But we can reduce the rent by piggyback-riding on a primary mission satellite.



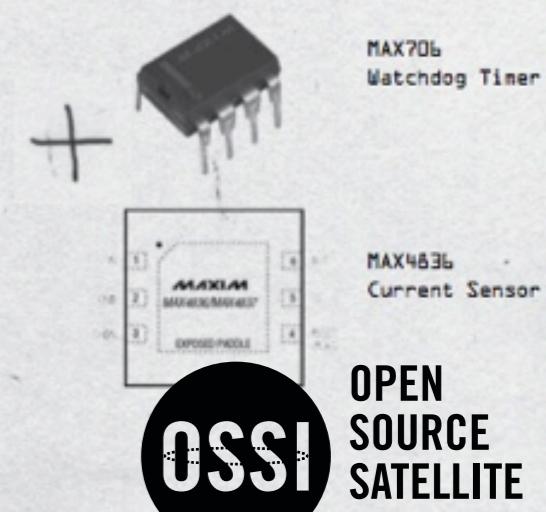
Wrap your satellite with measuring tape and tie fishing wire to the end of the satellite. When high voltage is applied to each end of the nichrome wire, it becomes hot and will cut the fishing wire to deploy the antenna.



Controller



Arduino Duemilanove by arduino.cc



Many artists and hobbyists use Arduino to realize their projects. Using an Arduino board as the main controller for the satellite will give OSSi the chance to cooperate with many creative individuals.

However, to use a bare Arduino board in a space environment might be hard. To mitigate radiation effects, a watchdog timer and current sensors are added. Also the microcontroller is upgraded from commercial to automotive grade to cope with severe temperature changes in space.

Documentary



JOIN THE
RESISTANCE

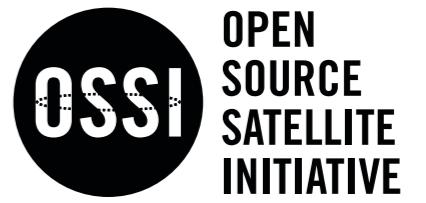
Science is Fantasy.



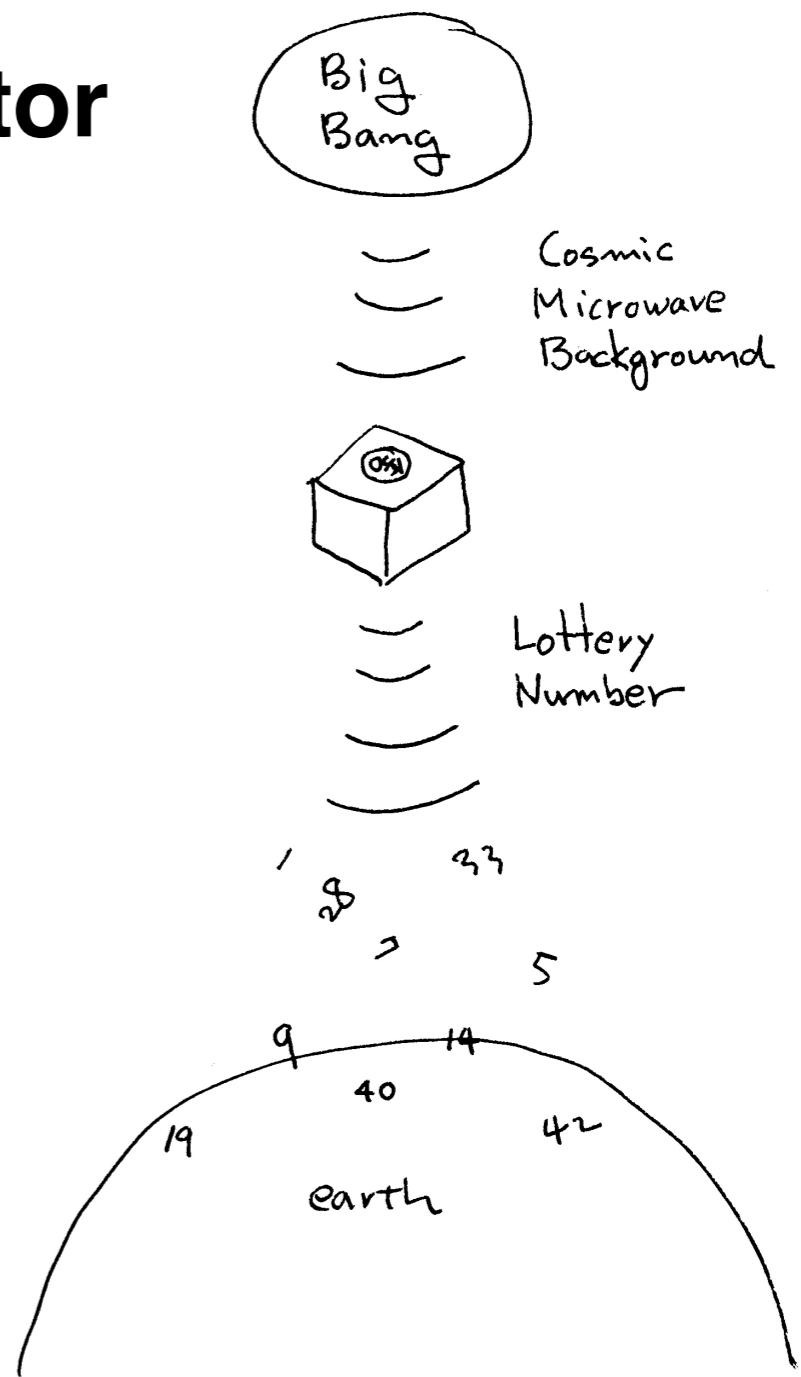
OPEN
SOURCE
SATELLITE
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Fundraising

Satellite Function



1. UHF CMB random number generator
2. Controllable Shooting Star



Funding Rule

Funding through small donations

Funding through cultural events

Funding through selling art products

If you buy OSSI products,
you can apply for
"satellite lotto."





Satelito



Dharma



OSSI



Red Eyes



Bike



Combo



Love



Stars



My Sat



Robot



In-gong we-sung



COMMS



OSSInaut



RAD HARD



Model





GIRLS

STREET

SNOW

SKATE

SURF

BIKE

DIGITAL

BRAND

CATEGORY

T-SHIRTS HOODIES JACKETS PANTS HATS&CAPS BAGS WATCHES SUNGLASSES SHOES ACCESSORIES



OSSI

BRANDS

OSSI

CATEGORIES

ALL

티셔츠(S/S)

잡지/DVD

SERIES

ALL

color:black(s/s)

color:white(s/s)



★ 즐겨찾기 ★

매장안내

입금계좌

입금자를 찾습니다

자유결제

공지사항

Q & A

FOREIGNER

*BLOG
twitter

• 15 건의 상품 (총 15 건) | ALL 남녀공용 여성전용 |

높은가격순 | 낮은가격순



OSSI
DJ.Y. Satellite
7,000 원



OSSI
Satelito
Lavender
35,000 원



OSSI
Dharma
Lake
35,000 원



OSSI
Ossi
White
35,000 원



OSSI
Red Eyes
Brown
35,000 원



OSSI
Bike
Quartz
35,000 원



OSSI
Combo
White
35,000 원



OSSI
I OSS
SAT
35,000 원



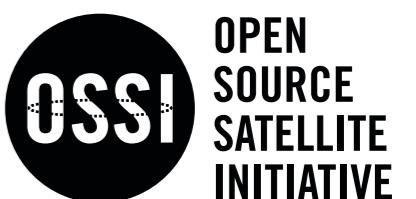
OSSI
Love
Black
35,000 원



OSSI
Stars
Charcoal
35,000 원

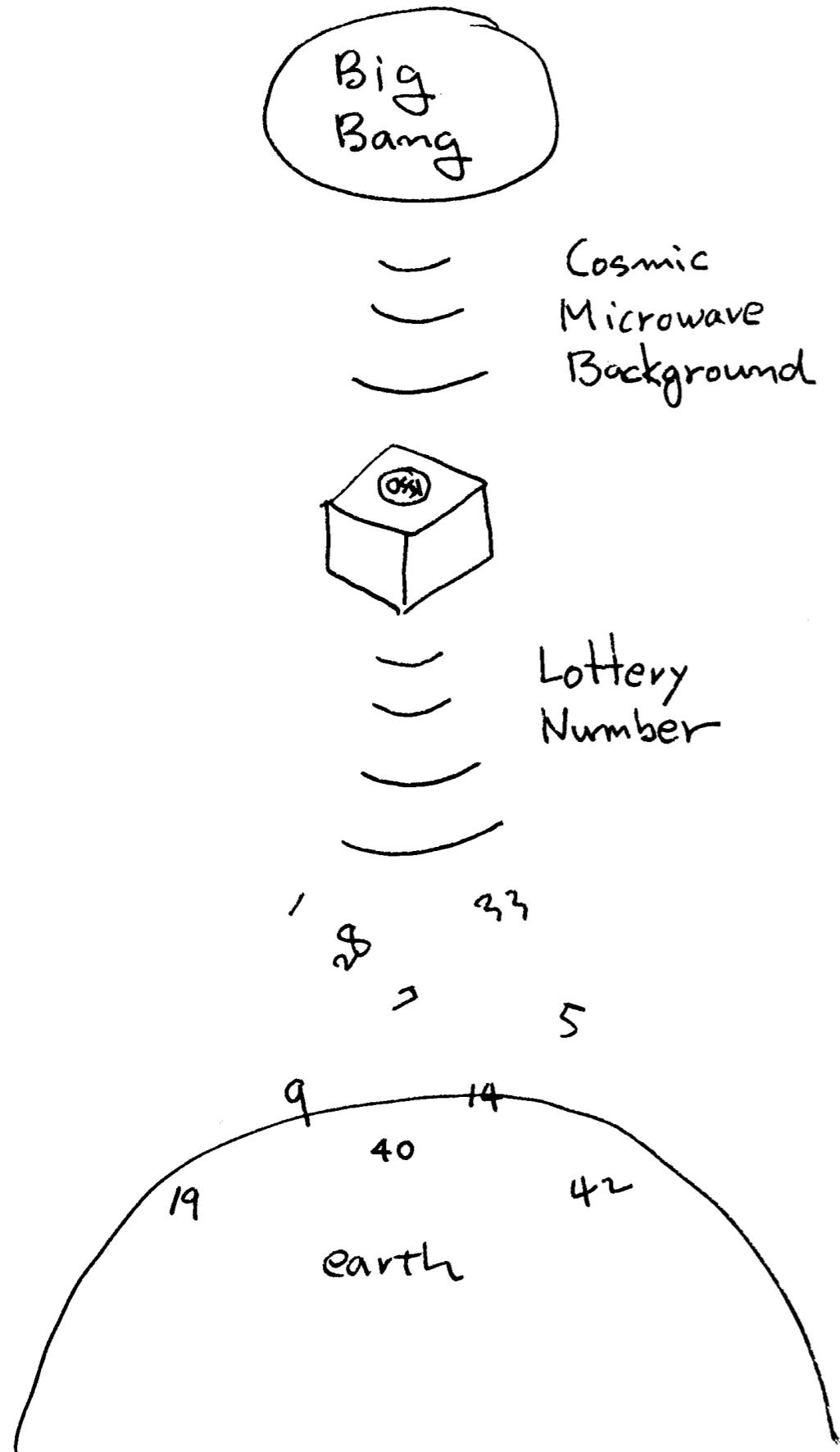


OPEN
SOURCE
SATELLITE
INITIATIVE



OSSI ID Card

No. _____



Thank you for supporting private space program. The profit of selling T-shirts is used to build a satellite and rent a rocket. When the first satellite is launched, it transmits random numbers based on sensed proof of big bang - Comic Microwave Background.

Use this card to participate various future OSSi events. And win a chance to launch your satellite. Universe belongs to everyone.
I & Universe.

개인 우주 프로그램을 지원해주신 당신께 감사드립니다. 티셔츠를 통한 수익은 인공위성을 만들고 발사체를 임대하는데 쓰입니다. 첫 인공위성이 쏘아 올려지면 인공위성은 빅뱅의 증거인 우주 배경 복사를 측정하여 랜덤 숫자를 지상으로 송신하게 됩니다.

카드를 이용하여 다양한 OSSi 이벤트에 참여하세요. 그리고 당신의 위성을 쓸 기회를 가지세요. 우주는 모두의 것입니다. 나 그리고 우주.

Register at
www.opensat.cc

OPEN SOURCE SATELLITE INITIATIVE

2010 Open Source Satellite Initiative
B 421-36, Mangwon-dong, Mapo-gu, Seoul, Korea

Terms & Conditions

Register at www.opensat.cc
The card cannot be reissued.
If you lose your card after registration, you are
eligible for online event only.

사용 조건

www.opensat.cc에서 등록해주세요.
잃어버린 카드는 재발급되지 않습니다.
등록한 후에 카드를 잃어버린 경우, 온라인 이벤트에만 응모
할 수 있습니다.



10,000 T-Shirts



1 Satellite

(9800 to go)



OPEN
SILENT
INITIATIVE



OSSI 옥션스 블링 블링 해서
Krusty와 Joker도 울뻔한



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OSSI
OPEN SOURCE
SATELLITE
INITIATIVE



1A3

XSY

OPEN
SOURCE
SATELLITE
INITIATIVE
OSSI

OPEN
SOURCE
SATELLITE
INITIATIVE

OSSI

밀키스

7-ELEVEN
www.7-eleven.co.kr

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SOURCE
SATELLITE
INITIATIVE

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INITIATIVE





OPEN

SATURDAY

10:00



OSSI 티셔츠 주문서

주문자: 어여름

연락처: 010- 1024

주소: 서울시 강남구 압구정동

주문내역:

OSSI XL 1

총 1장

여름씨 덕에 8월 31일 인공위성 발사됩니다 ^~

사이트에서 티셔츠 꼭 등록하시구요~~페북에 리뷰도 부탁해요!!

티셔츠 이쁘게 입으세요~

호준 드림 !



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SATELLITE
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OPEN

OSS



OPEN

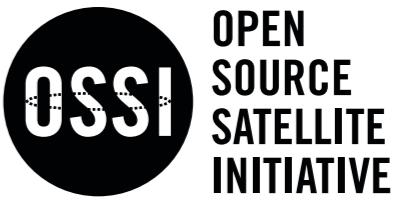
OSS



OPEN
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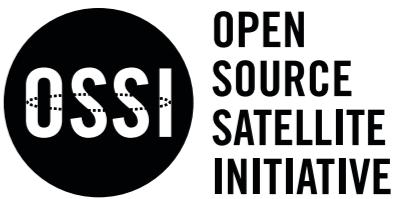
Funding Episodes

FAQ



- Why do you launch your satellite?
- What is ROI (Return On Investment) in OSSI?
- Don't you think you'd better spend that money to help poor people rather than launching a satellite?
- What is the chance of OSSI project being abused by terrorists?
- Is OSSI an art project or a technology project?
- OSSI-1's purpose is not scientific or practical at all.
How do you think OSSI-1 can benefit the world?

Mission *BETA*



Technology
Djing

Finally,

Contract

Paris Air Show June 2011



OPEN
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SATELLITE
INITIATIVE

Launching 31 Aug. 2012

Soyuz 2.1b
Baikonur Cosmodrome
45.9 N, 63.3 E
apogee: 575km
perigee: 290km



Preparing
for
the Launch

Getting Quotes for LV



Launch Vehicle Reservation



**Getting quotes from launch brokers
Commercial VS. Governmental Flight
3rd Party Liability Insurance
Flexible cubesat standard??**

**OSSI's broker: NOVA NANO
Launch Provider: TsSKB-Progress
Contracted on June 2011
Effective on Dec 2011
Delivery: 31st May 2012
Launching: 31st Aug 2012
Time's Too short!!!!**

Soyuz 2.1b
Baikonur Cosmodrome
45.9 N, 63.3 E



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Launch Vehicle Reservation



NOVA NANO



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SATELLITE
INITIATIVE

Getting Commercial Parts w/h Space Heritage



RAD
HARD



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SATELLITE
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Parts & Reference Survey

- Presentation Slides from cubesat.org
- Find papers from cubesat built universities
Swisscube, Cal Poly, University of Tokyo CDR, OUFTI-1,
Delfi-C3
- Datasheets from cubesat kits manufactures
(cubesatkit.com / isispace.nl / clyde-space.com /
gomspace.com / astrodev.com and etc.)
- Google!! (sometimes a good FTP server can be reached)
- Overspec!(Derating): Esp. Capacitors (2 ~ 3 times over)
- Good commercial company reference -> selection reason
RF - Silicon Labs, Motorola, TI
Power - Linear Technology
MCU - Texas Instrument



Satellite Registration

- **National Space Body Registration**

- depends on countries

- 3rd Party Liability Insurance

- **ITU API submit (Required but..)**

- HAM License

- IARU Frequency Coordination

- Request(Gentlemen's agreement but you'd better)



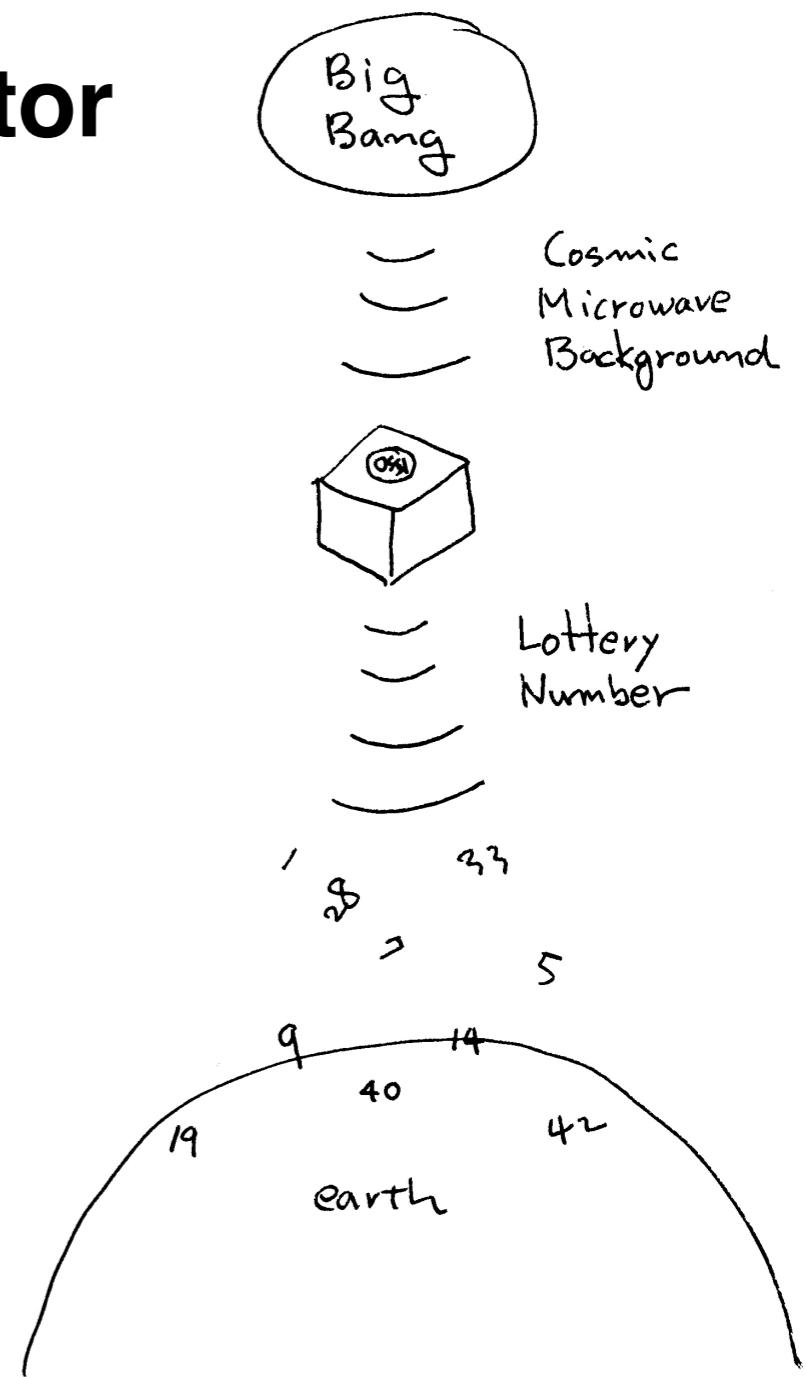
OSSI-1 Satellite

- UHF COMMS:
1Watt~3Watt
- 2FSK (Up 1200bps / Down 9600bps)
- VHF Beacon:
100mW
CW 12~20 WPM
- High Power (44W) LED

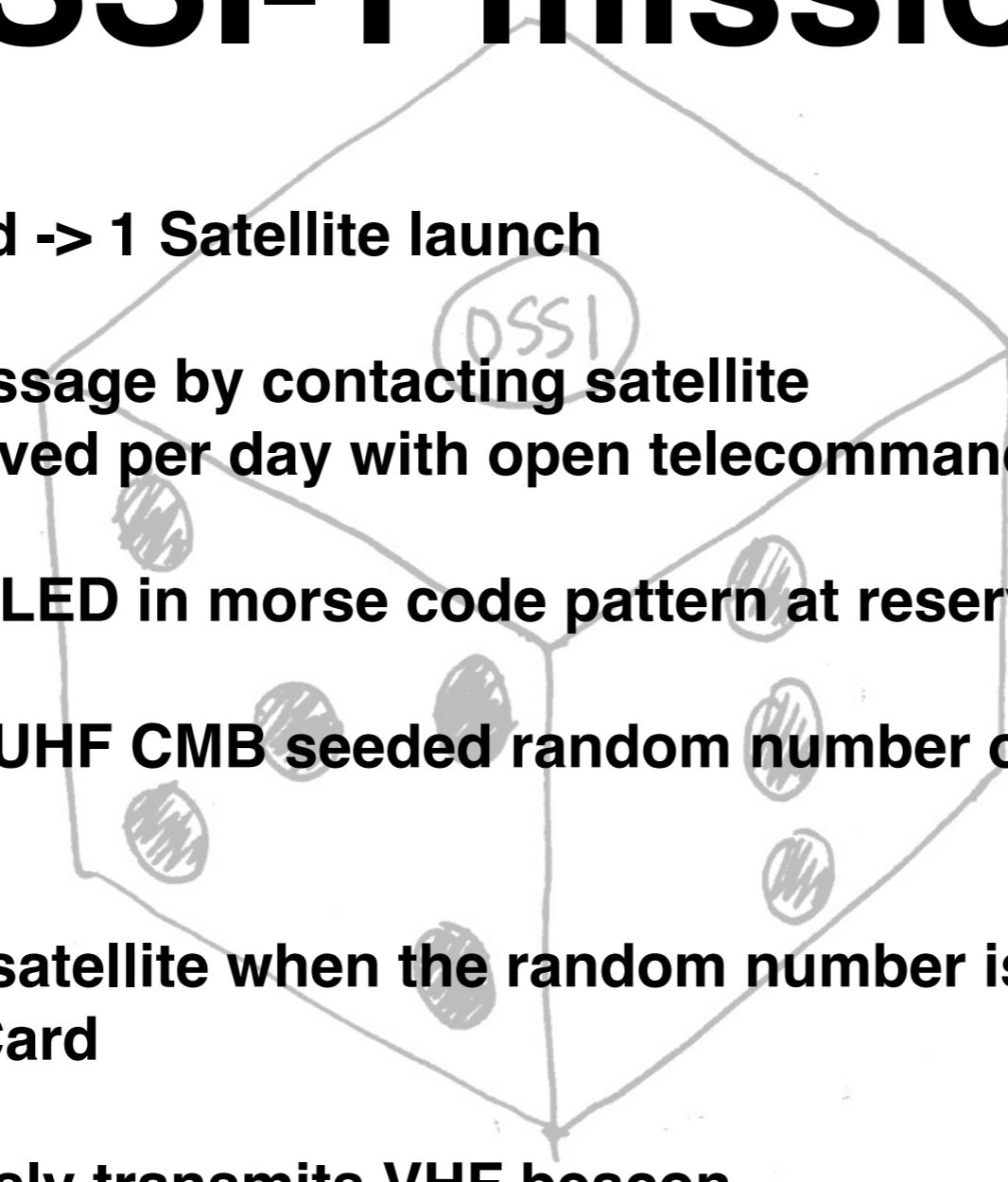
Satellite Mission



1. UHF CMB random number generator
2. Controllable Shooting Star



How OSSI-1 mission works

- 
1. 10,000 T-Shirts sold -> 1 Satellite launch
 2. People reserve message by contacting satellite
first come, first served per day with open telecommand
 3. Satellite blinks the LED in morse code pattern at reserved time
 4. Satellite transmits UHF CMB seeded random number one time
during the flight
 5. A person wins the satellite when the random number is
matched to OSSİ ID Card
 6. Satellite continuously transmits VHF beacon

“A life is beautiful combination of
Randomness”

Structure

OBC

EPS

COMMS

ADACS

GS

**High
Power
LED
Controller**

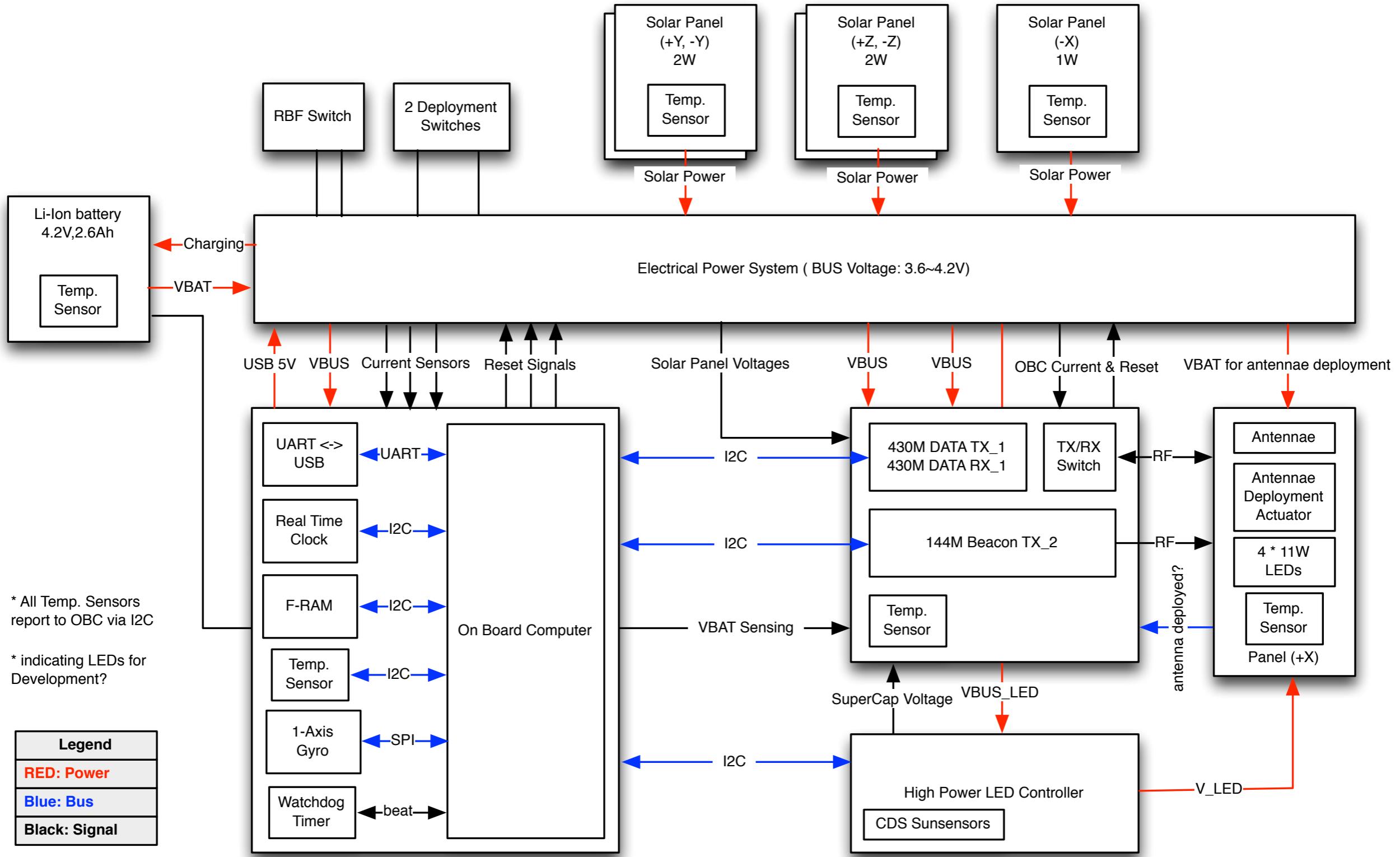
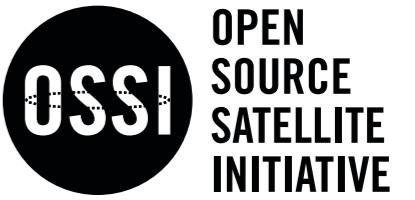


Design Philosophy

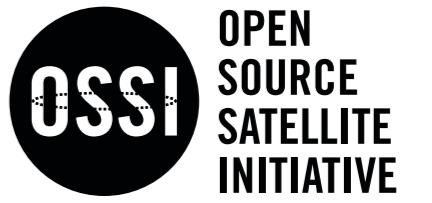


D.I.Y. & Accessible

Overview

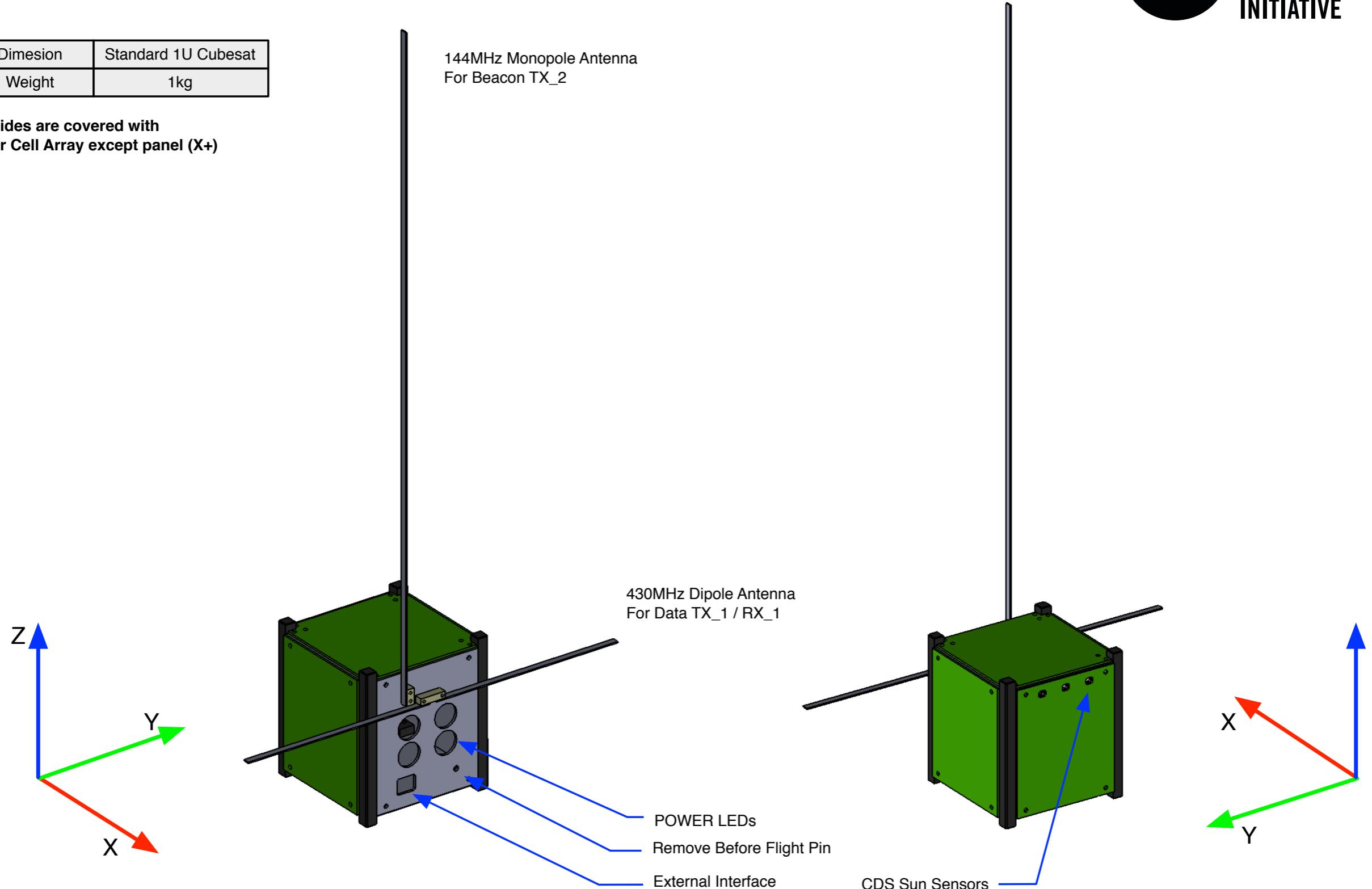


Structure



Dimension	Standard 1U Cubesat
Weight	1kg

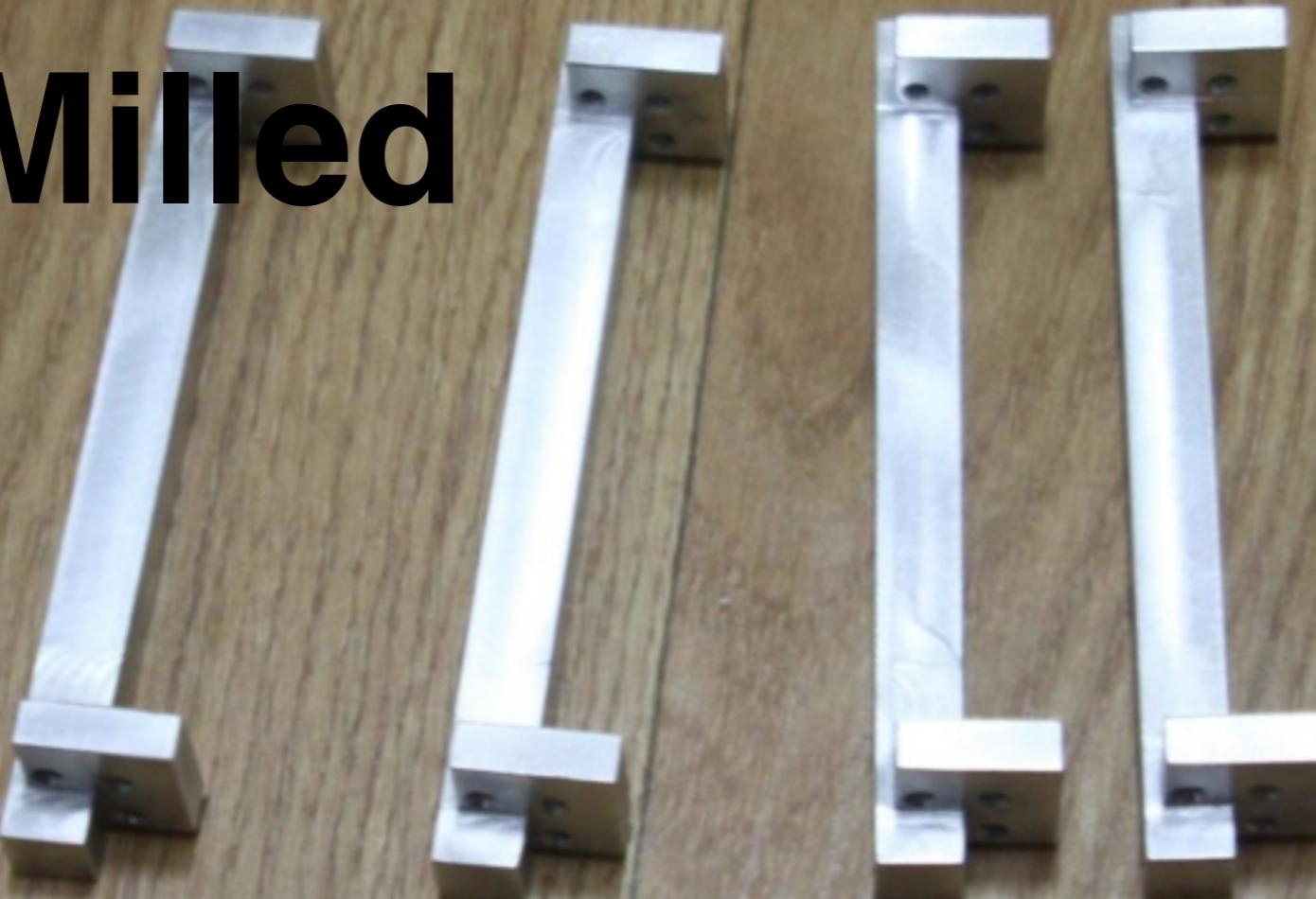
All sides are covered with
Solar Cell Array except panel (X+)

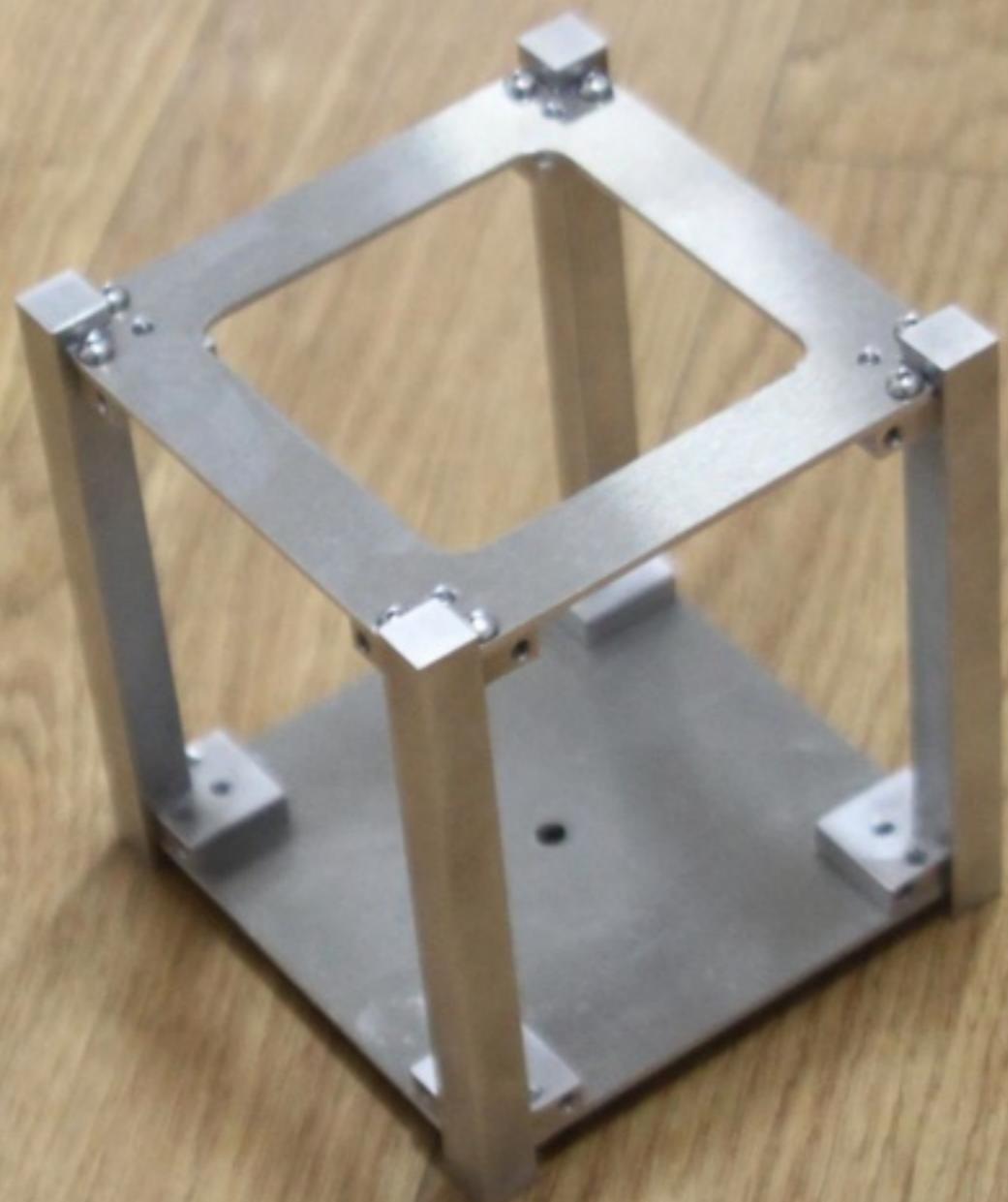


Ref: Univ of Tokyo

Structure

AL6061-T6
Hand Milled

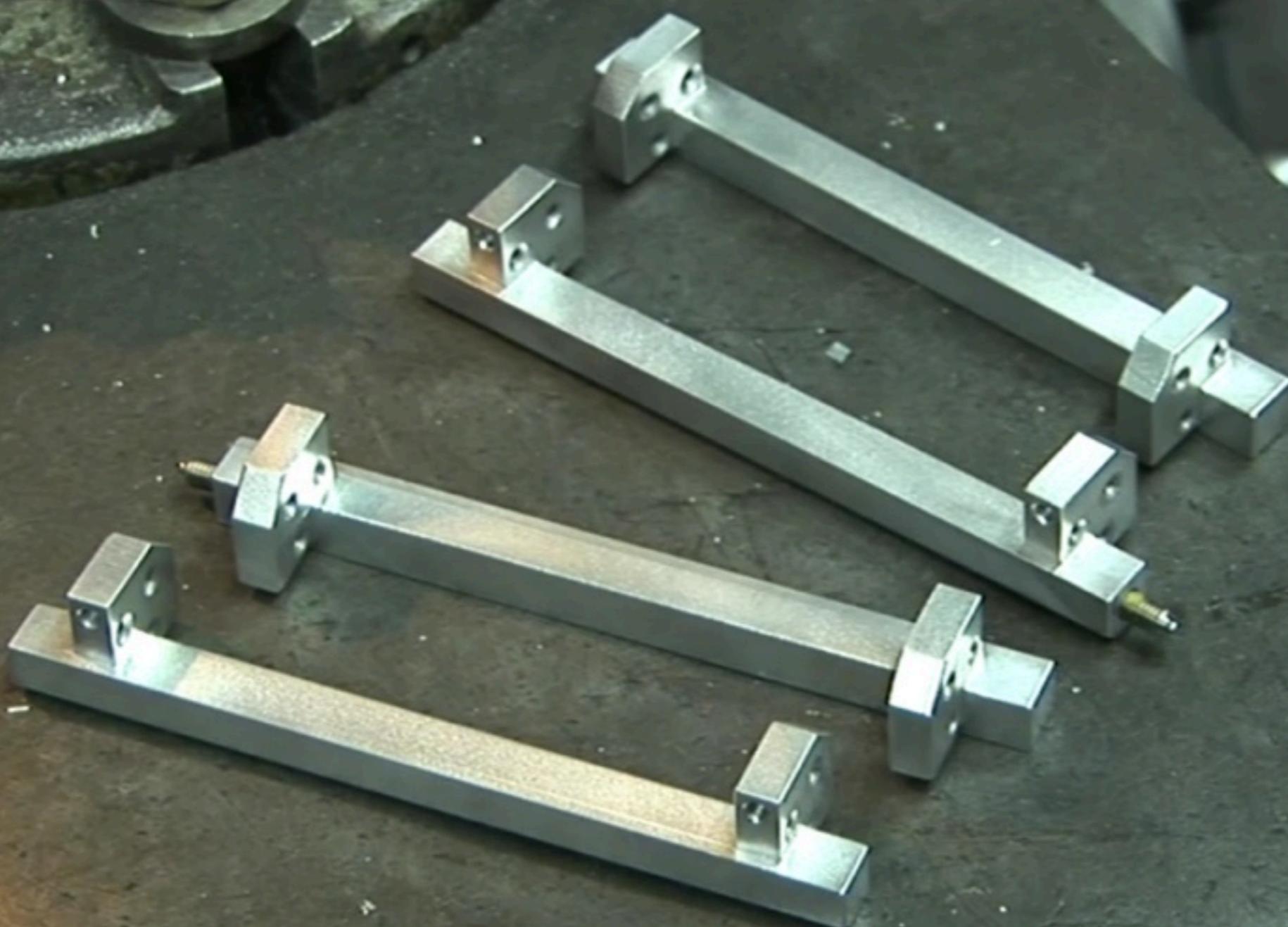




고장나면
나의우주이야기

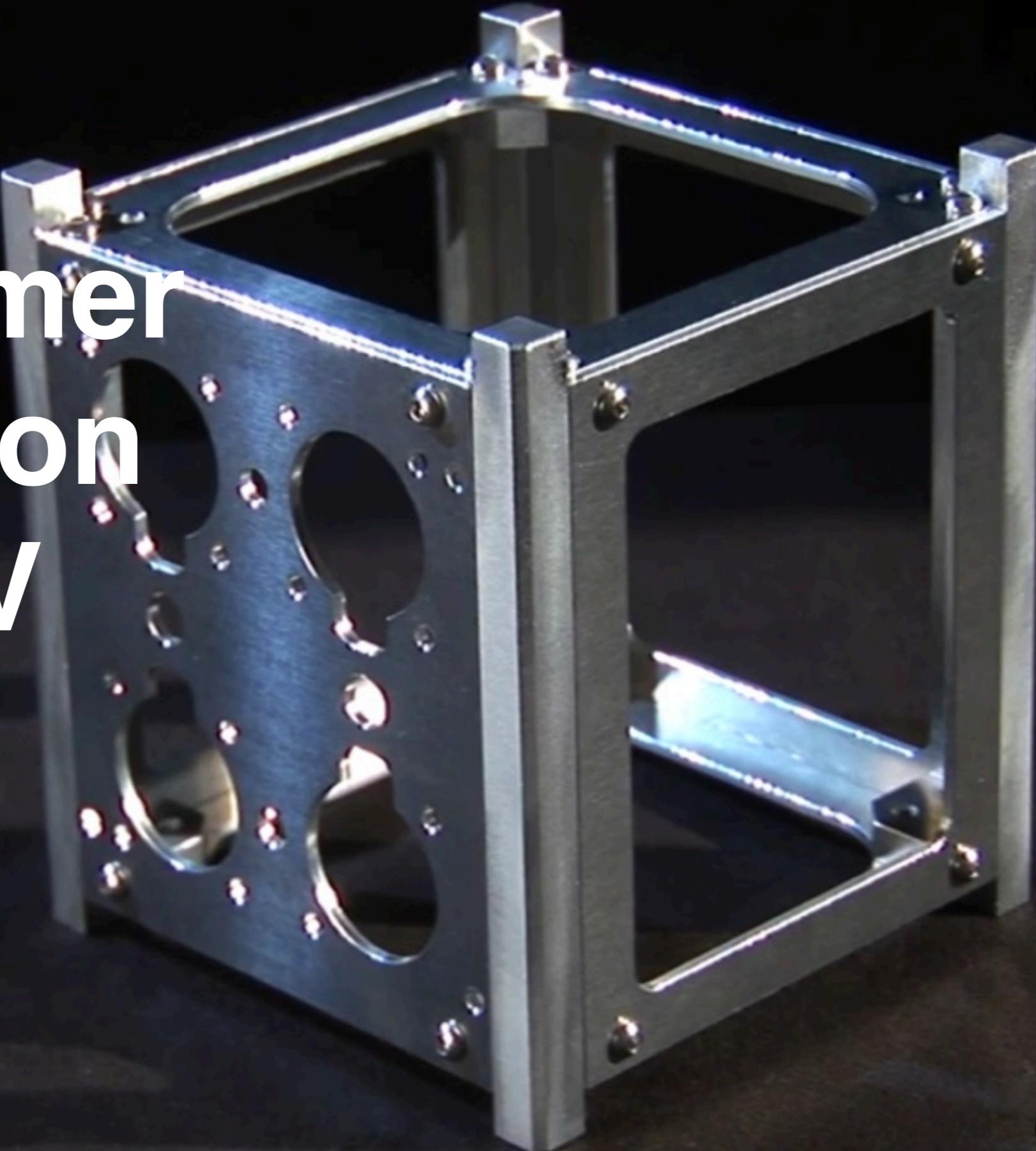
KBS1 HD

나의우주이야기



OSSI
OPEN
SOURCE
SATELLITE

Slimmer
Version
on TV



Deployment Switch



Butt Contact Pushbutton Switches

DIMENSIONS In Inches (and millimeters)

Normally Closed-SPST								
39-2								
39-4								
 H = HEX MTG NUT .063-.010 (1.60 - 0.25) THICK .219-.10 (5.56 - 0.25) ACROSS FLATS E.I.A. DATE CODE LABEL* 8-40 UNS-2A THREAD .105-.005 (2.67 - 0.13) DIA. .780 (19.81) REF. A = .175 -.025 (4.45 - 0.64) B = .125 -.010 (3.18 - 0.25) C = .390 -.010 (9.91 - 0.25) D = .100 (2.54) MAX. .100 ±.010 (2.54 ± 0.25) .250 ±.010/ .005 (6.35 ± 0.25/ 0.13) DIAMETER *.Label increases nominal diameter to .255 (6.48)								
Rating at 115 Vac Resistive	Rating at 220 Vac Resistive	Operations at Rated Load	Part Number	Cap Color				
1/4 Amp	1/8 Amp	250,000	39-2	Black				
Action	Total Travel	Actuating Force (oz.)	Mtg. Hole					
Momentary	.042 ± .010 (1.07 ± 0.25)	.4 + 4 - 2	.172 (4.37) DIA.					

Grayhill 39-2

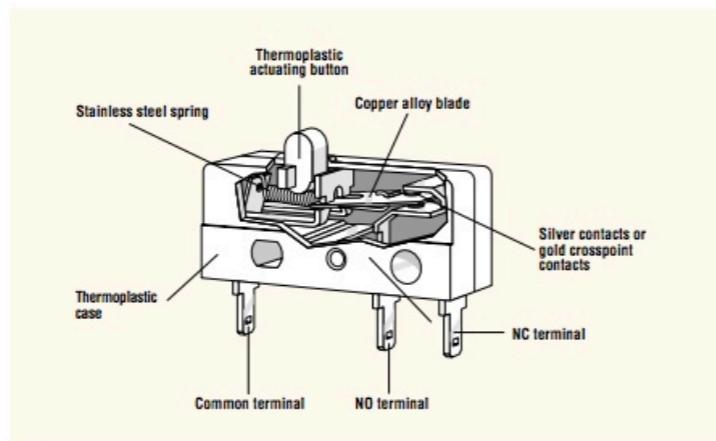
Swisscube heritage
easy integration to
hand milled structure

SUBMINIATURE E Series

Features

- 4 current ratings
- Choice of actuator
- 5 terminal types
- 3 contact arrangements
- Long life coil spring mechanism
- DC ratings available upon request
- High-temperature version available

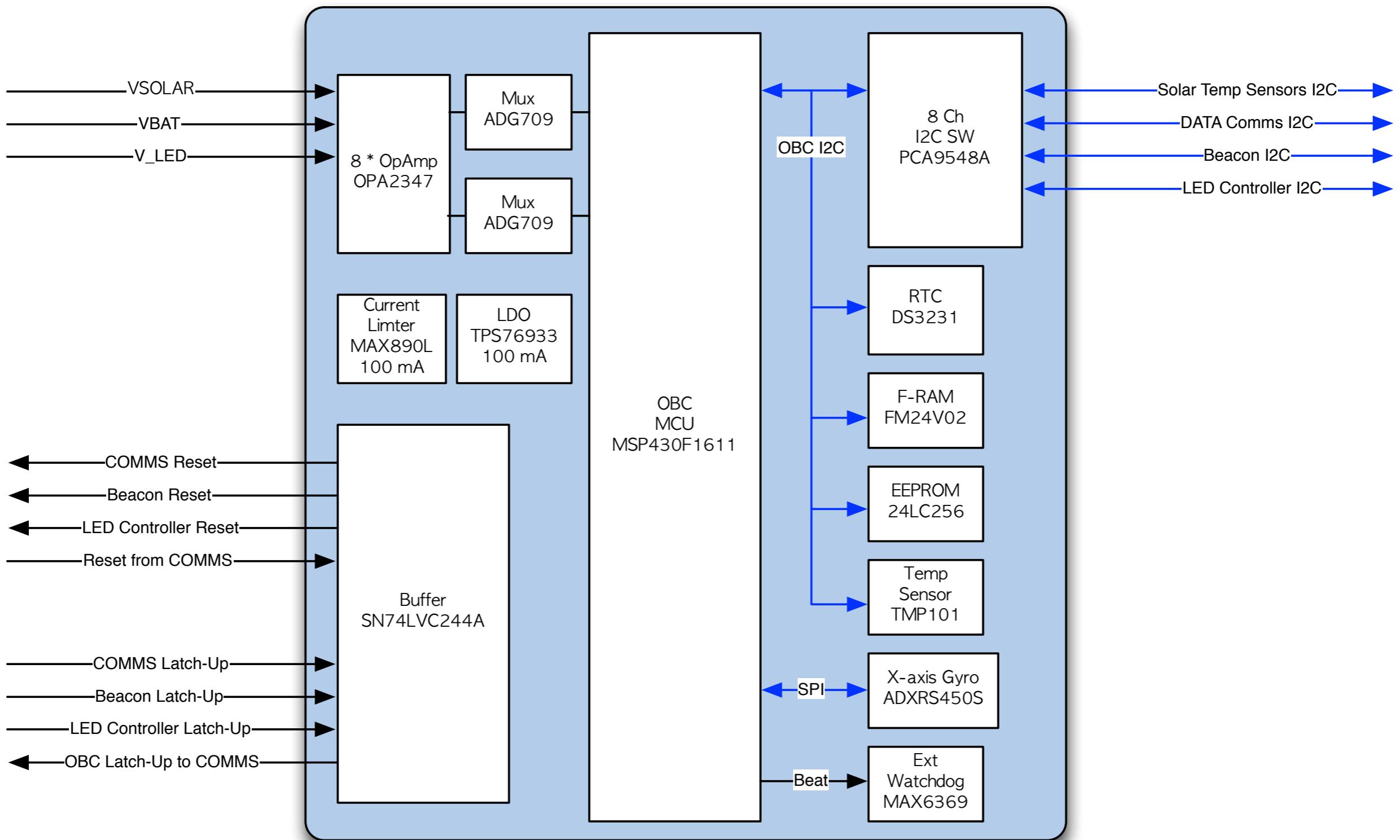
Subminiature modules take less space than individual subminiature switches fastened side-by-side. For applications requiring 2, 3, 4 or 5-circuit control in a compact space, the special molded case design helps speed assembly since there is only one part to handle and install rather than 2, 3, 4 or 5 individual switches.



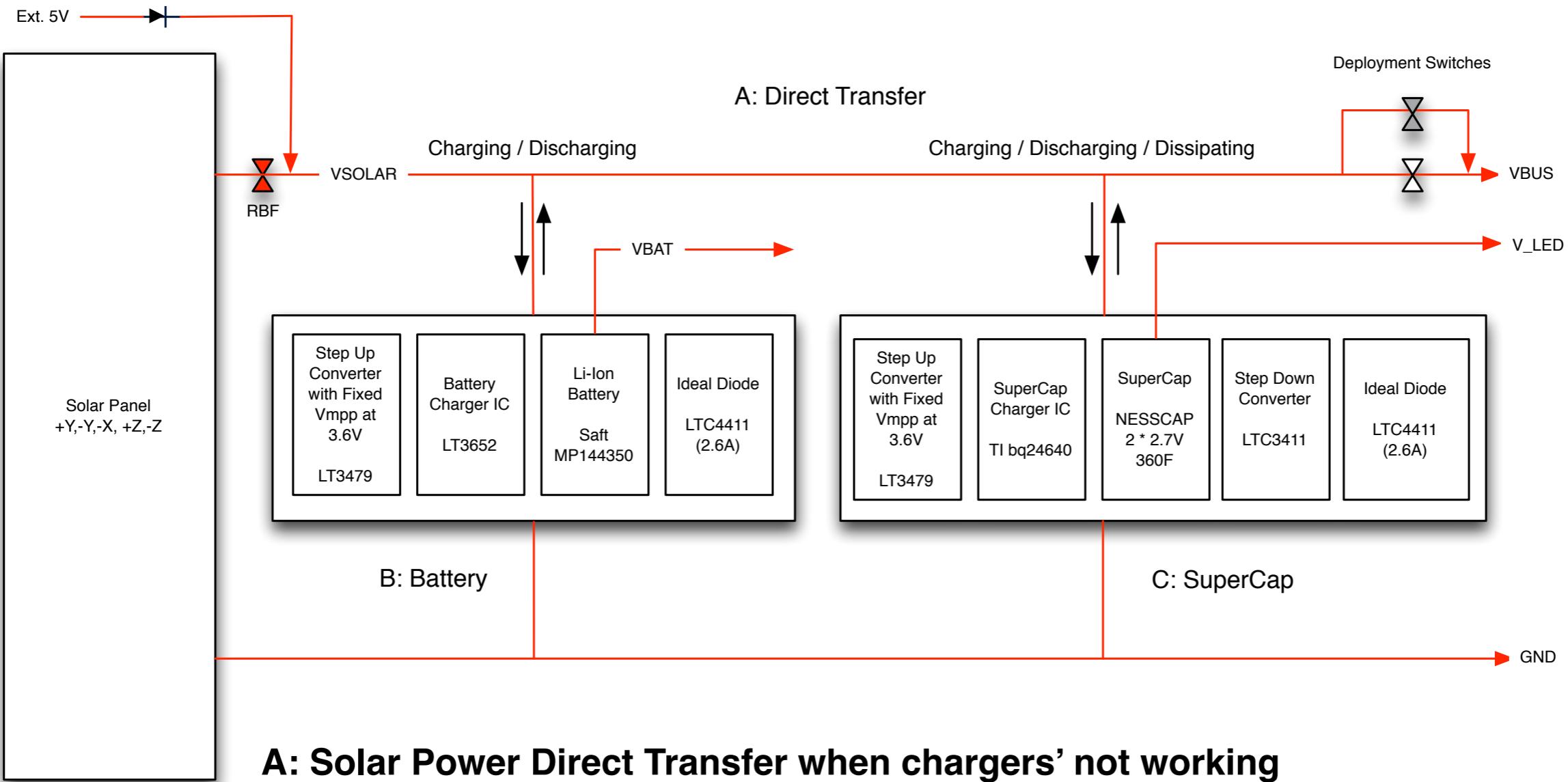
Cherry E62-10K

many Cubesat heritages
easy integration to
slim structure

OBC



EPS (1)



A: Solar Power Direct Transfer when chargers' not working

B: Battery Power

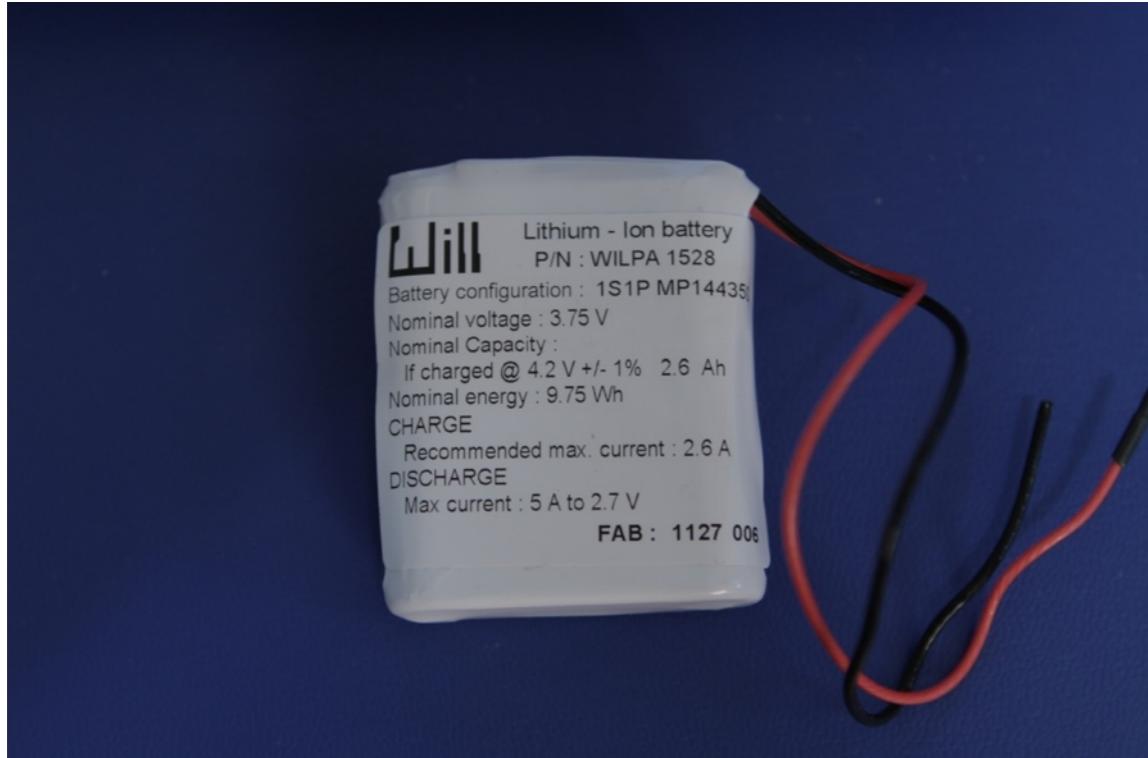
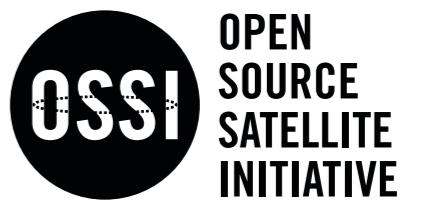
C: Supercap Power

- Supercap serves as dissipation unit as well due to its self discharge rate
- Supercap provides high current to LED Payload

* Fixed Voltage MPP -> No digital control, No MCU

Ref: SwissCube

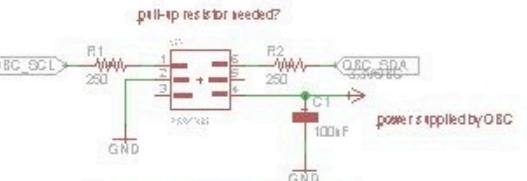
EPS (1-1)



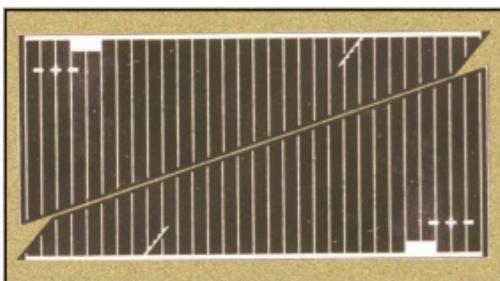
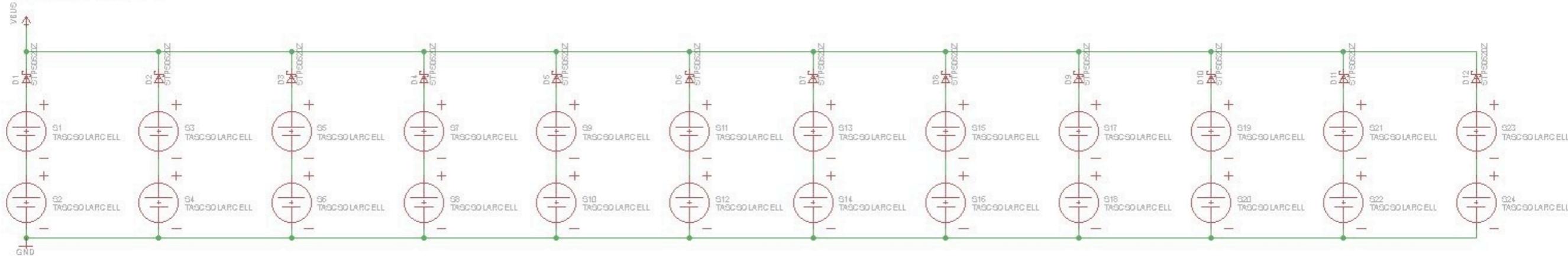
Saft MP144350
2600mAh
Good Temp Characteristics
Discharge: -50~60 C
Charge: -20 C~60 C

NESSCAP SuperCap
2.7V, 360F
Low ESR: 3.2 mOhm
Max Current: 226A
-40~65 C
100K leveling resistor for series connection

EPS (1-2)



pointable address pins needs to be added



- 2 Spectrolab TASC Solar cell in series with a blocking diode
- Highly Parallel-Configured PV system-> No bypass diodes
- $V_{mpp} \approx V_{bus}$

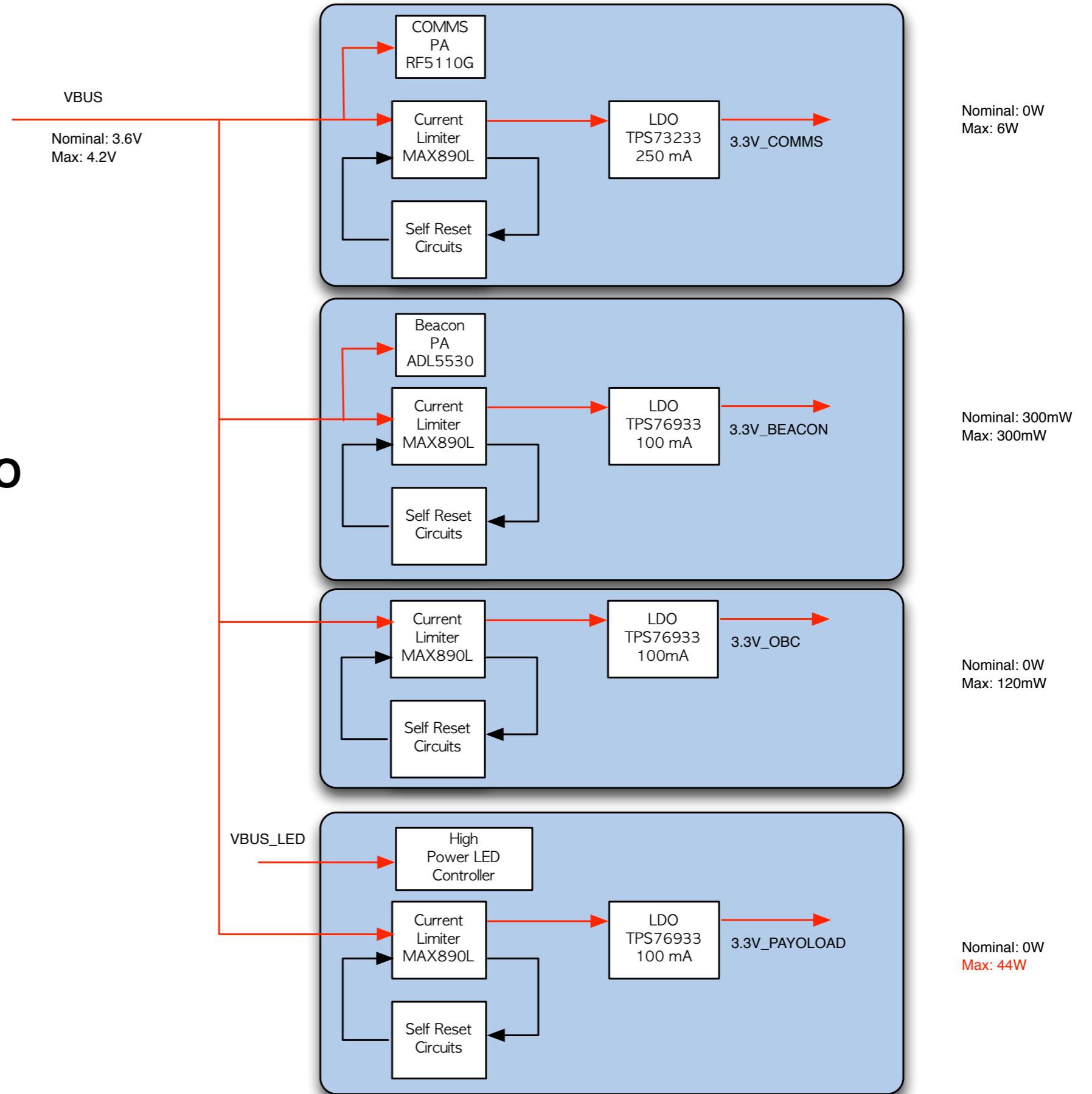
Ref: <http://vtb.enr.sc.edu/vtbwebsite/downloads/publications/Parrallel-Connected%20Solar%20PV%20Systems.pdf>

Ref: SwissCube

EPS (2)

Need thorough understanding on LatchUp behavior

What happens to GPIO when MCU is dead?

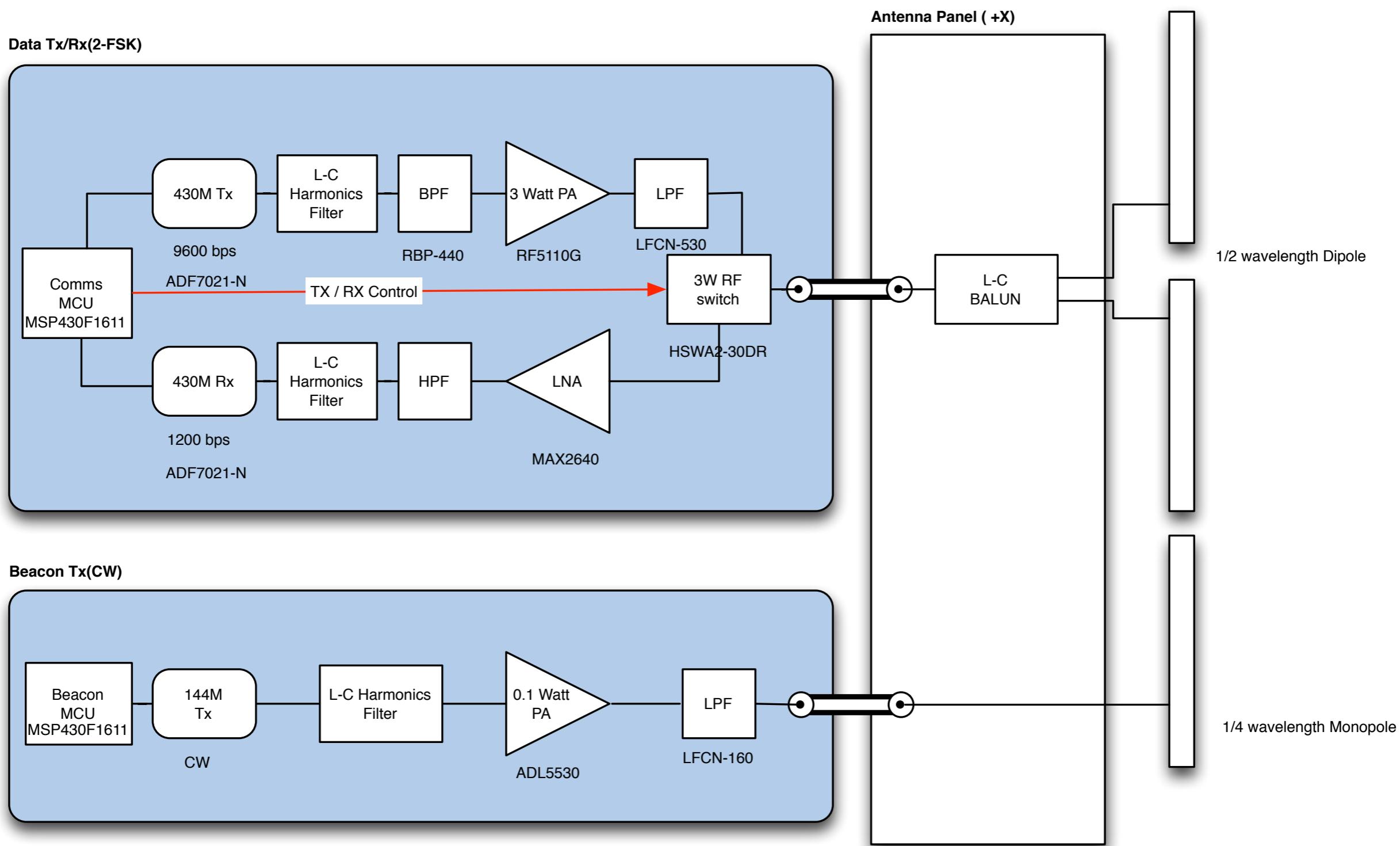


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COMMS / Beacon



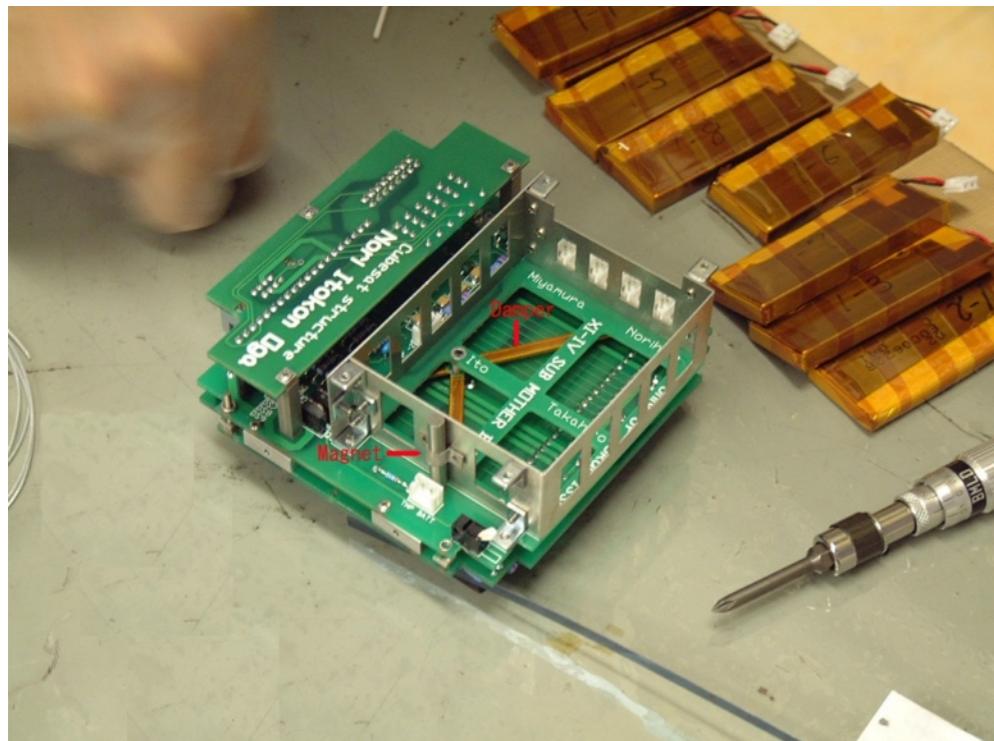
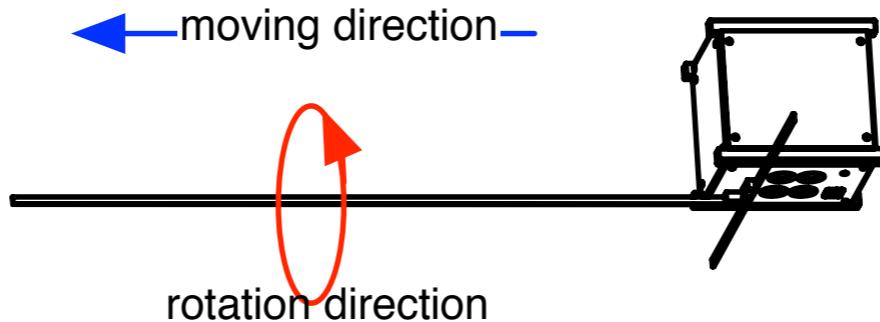
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ADACS



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University of Tokyo Cubesat Passive ACS

Attitude Determine

1 gyro

3 CDS

6 panel temperature values
belief in PMAS reference

Attitude Control - PMAS

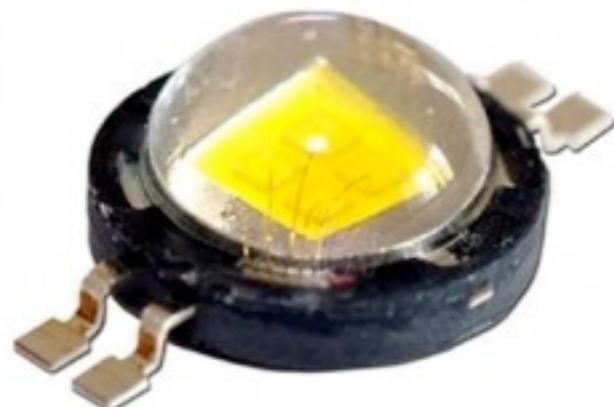
OSSI's choice -> Same as Univ. of Tokyo.

Magnet: AlNiCo-5, 5pi * 25mm

**Hysteresis Damper: Nikel 45~50% Permalloy
JIS(C-2531) PB Series / UNS K94840**

- Hard to simulate ADACS for me :(-

High Power LED Controller

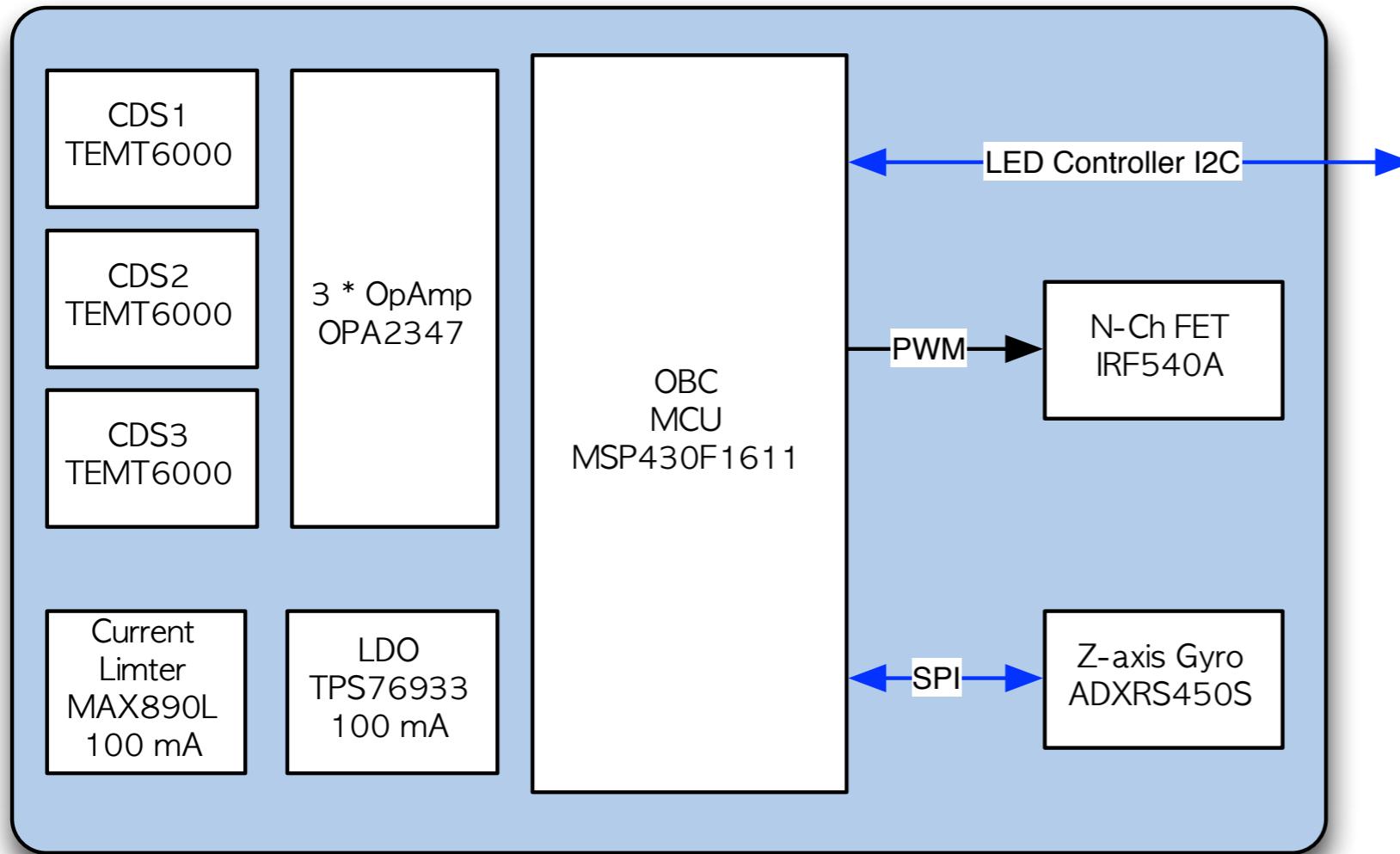


LED: SSC p7 11W White LED
Forward Current: 2.8A
Forward Voltage: 3.6V (= VBUS)
Brightness: 900 lumen
Color Temp: 6300K

Total of 4 LEDs (44W) in Parallel
High Current drawn from SuperCap
Can be seen from binocular on earth

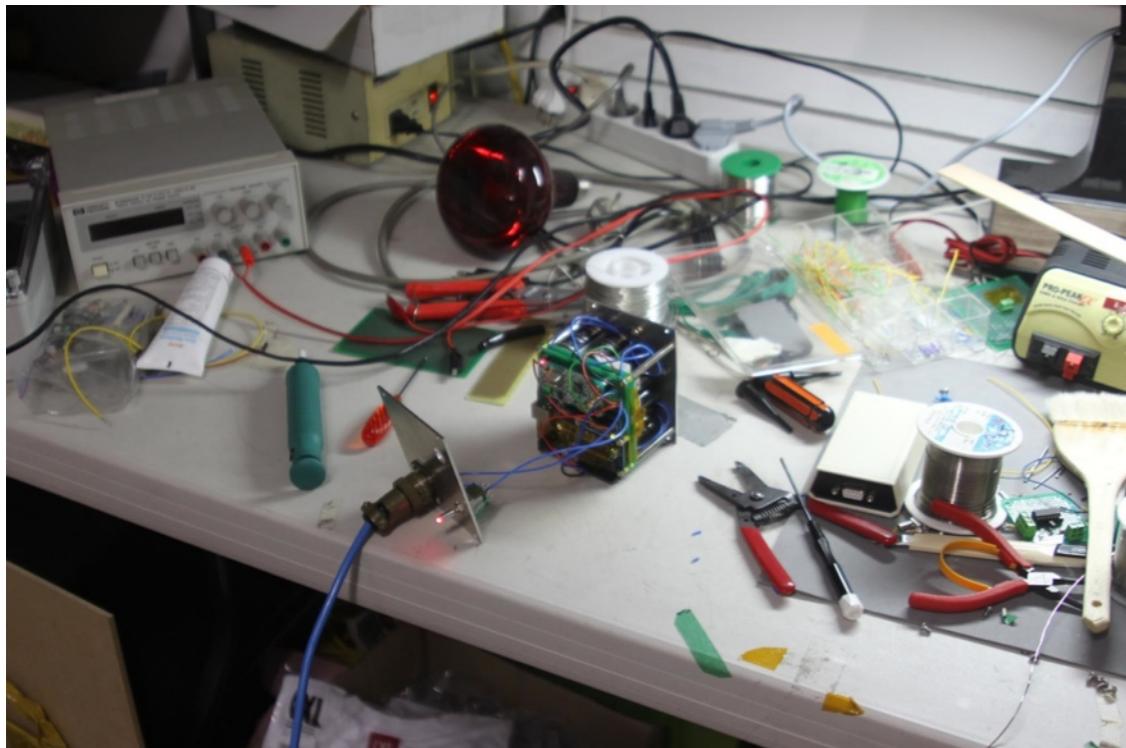
Also used as,
- Redundant Power Source
- Dissipation

High Power LED Controller



- LED Driver: PWM FET Direct Drive
- 3 CDS and Z-axis Gyro determines the Earth direction
- Operates only in eclipse
- High Power -> Good insulation needed

High Power LED Controller



- Fully On 16 seconds
- Space Twitter!
- High Self Discharge rate
 - one shooting start event per day
 - can be used as dissipation system

Ground Station



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Base Station (Seoul)

- ICOM IC-970
- TM-D710A
- USRP GNU Radio

Mobile Station

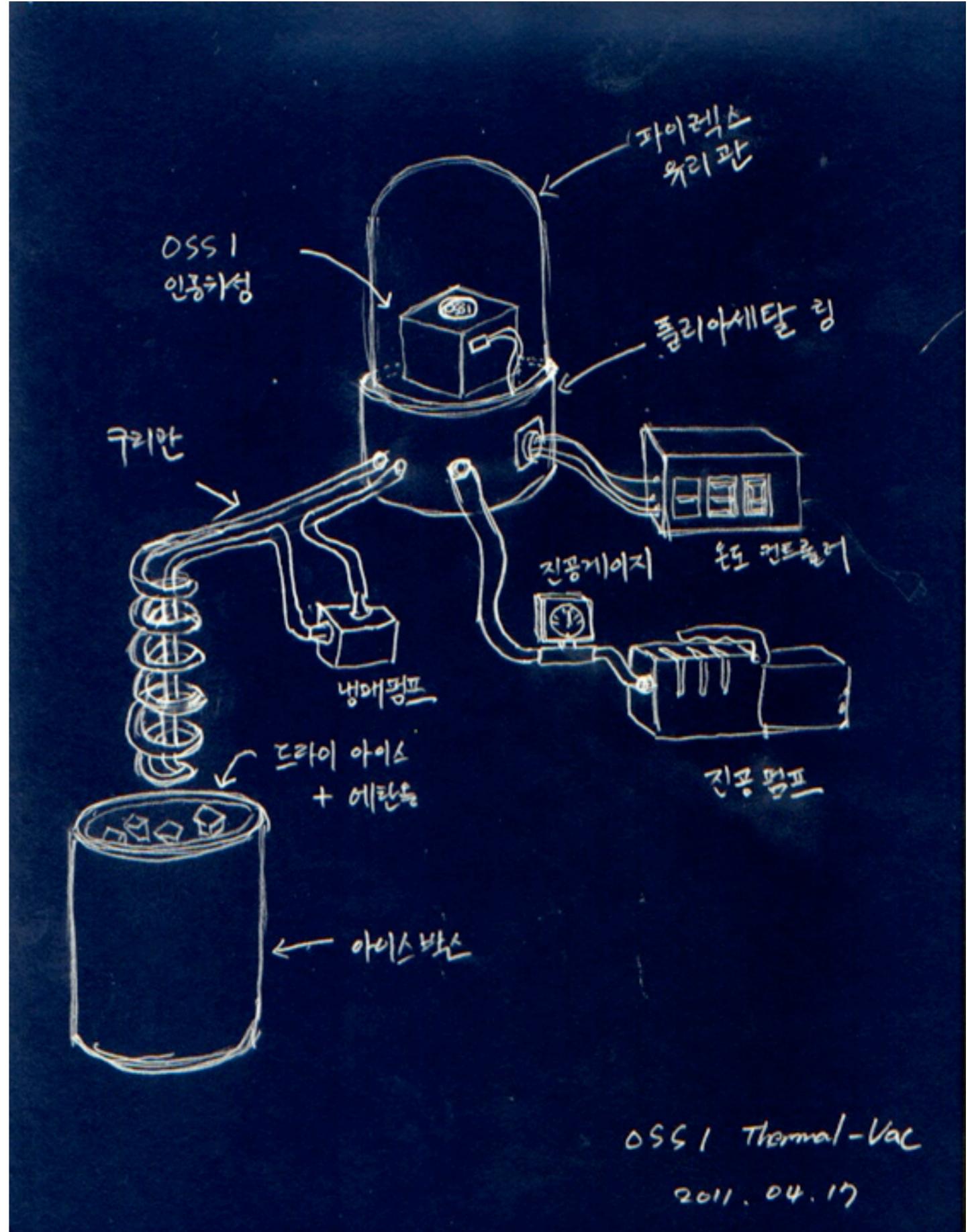
- FUNCube Dongle
- TM-D710A

Cheap Test



Thermal Vacuum Chamber

T Cycle: -30~50 C
Manual cooling
 10^{-2} Torr
Ref: Bryan Klofas CTEC



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Cheap Spectrum Analyzers



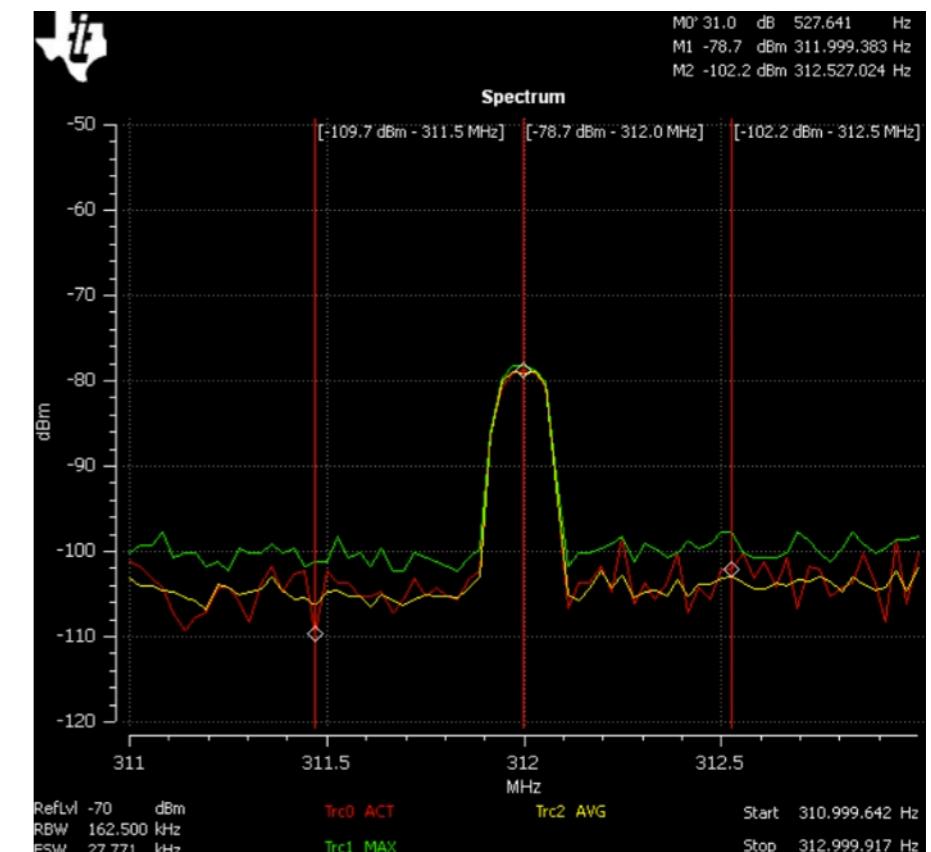
USRP 1 GNU radio, ettus research



FUNcube Dongle Pro



TI SA430



TI SA430 Measurement

Low RF Power SWR Meter

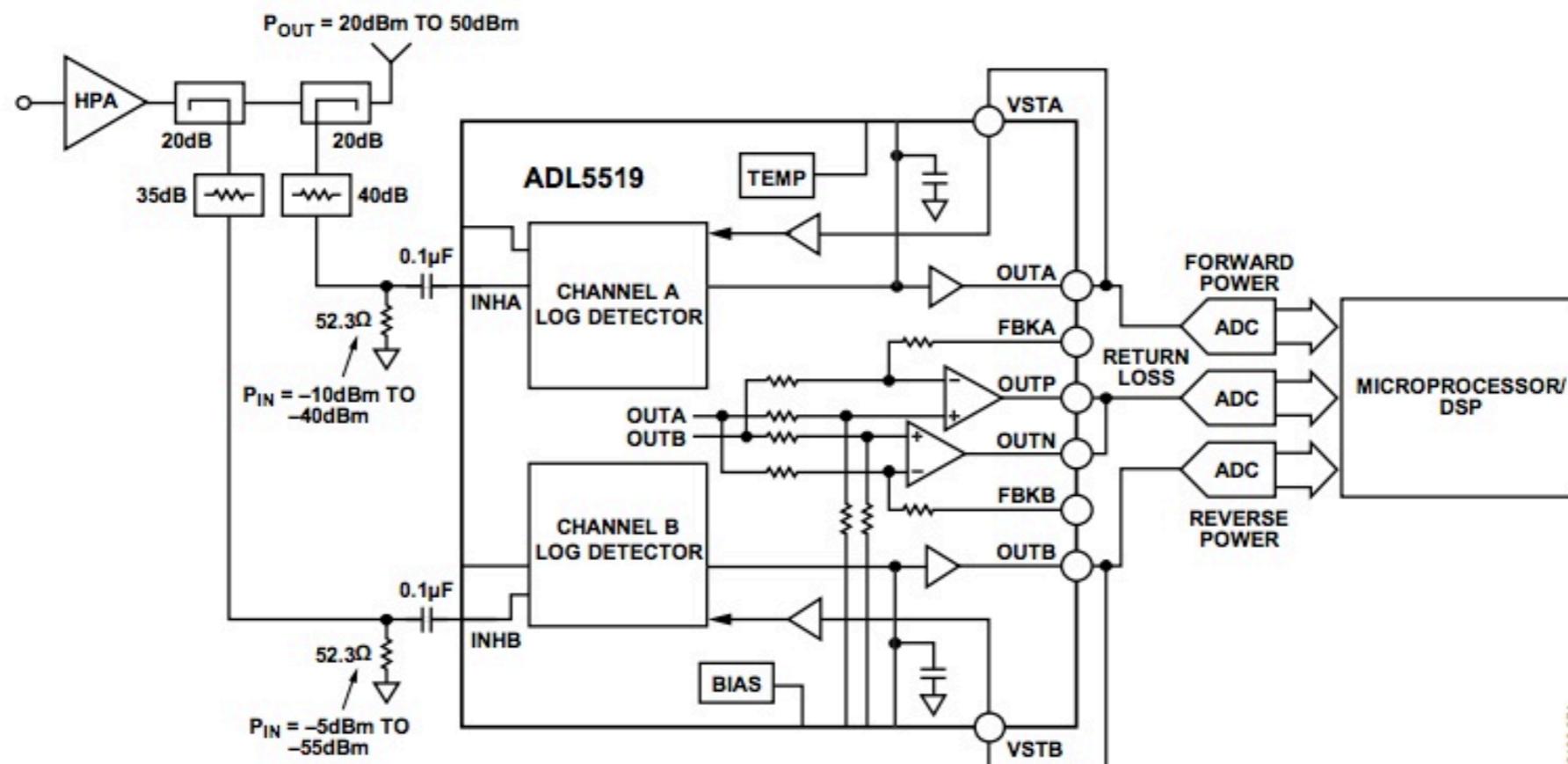


Figure 71. ADL5519 Configuration for Measuring Reflection Coefficients

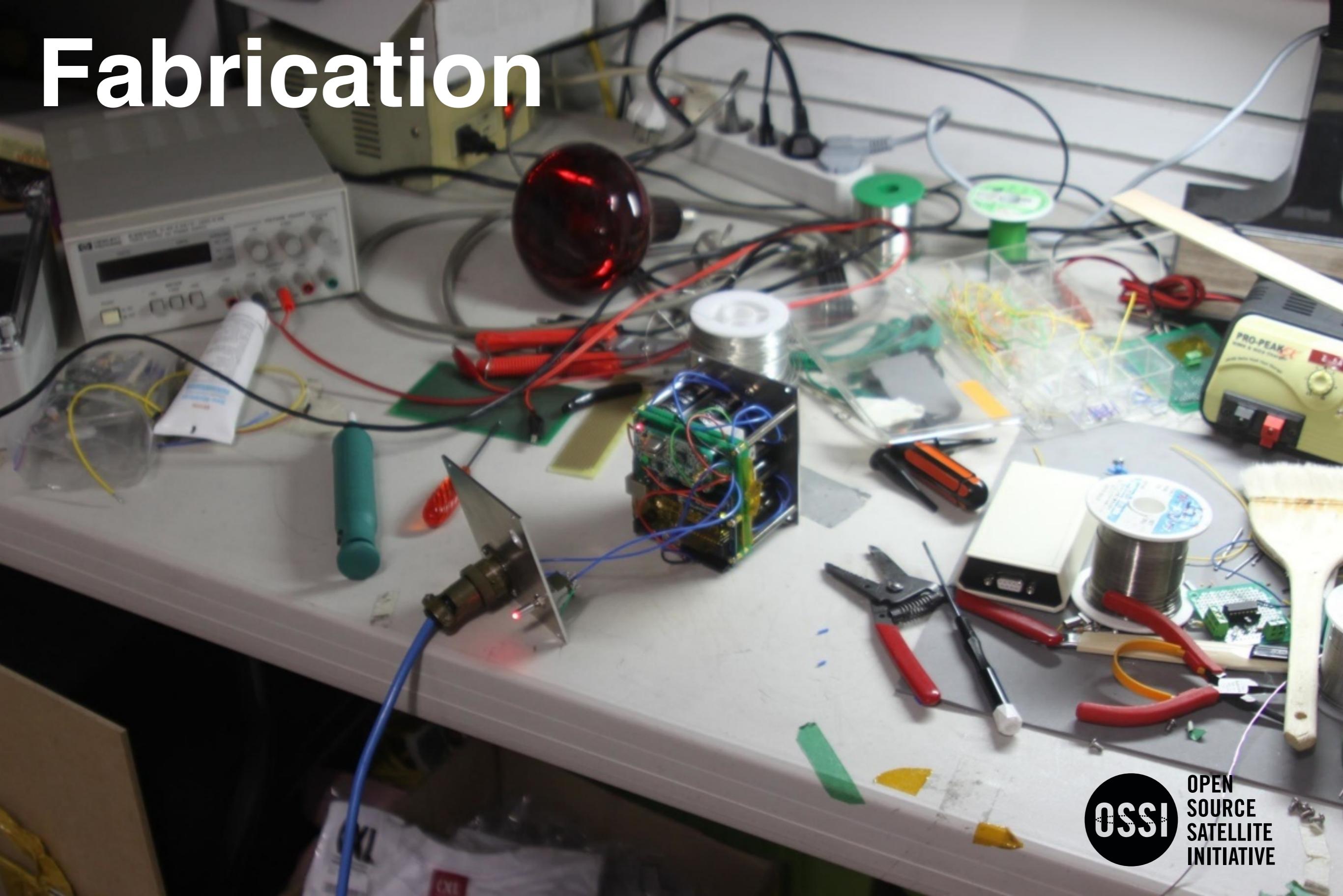
06190-J74

- Normal SWR meter for HAM is not suitable for low RF power impedance matching
- With ADL5519 Log Power Detector + Directional Coupler + MCU, we can build cheap and accurate SWR meter for low Power RF
- Easy Cheap way of matching impedance for nano satellite PA (20dBm to 33dBm)



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Fabrication



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PCB

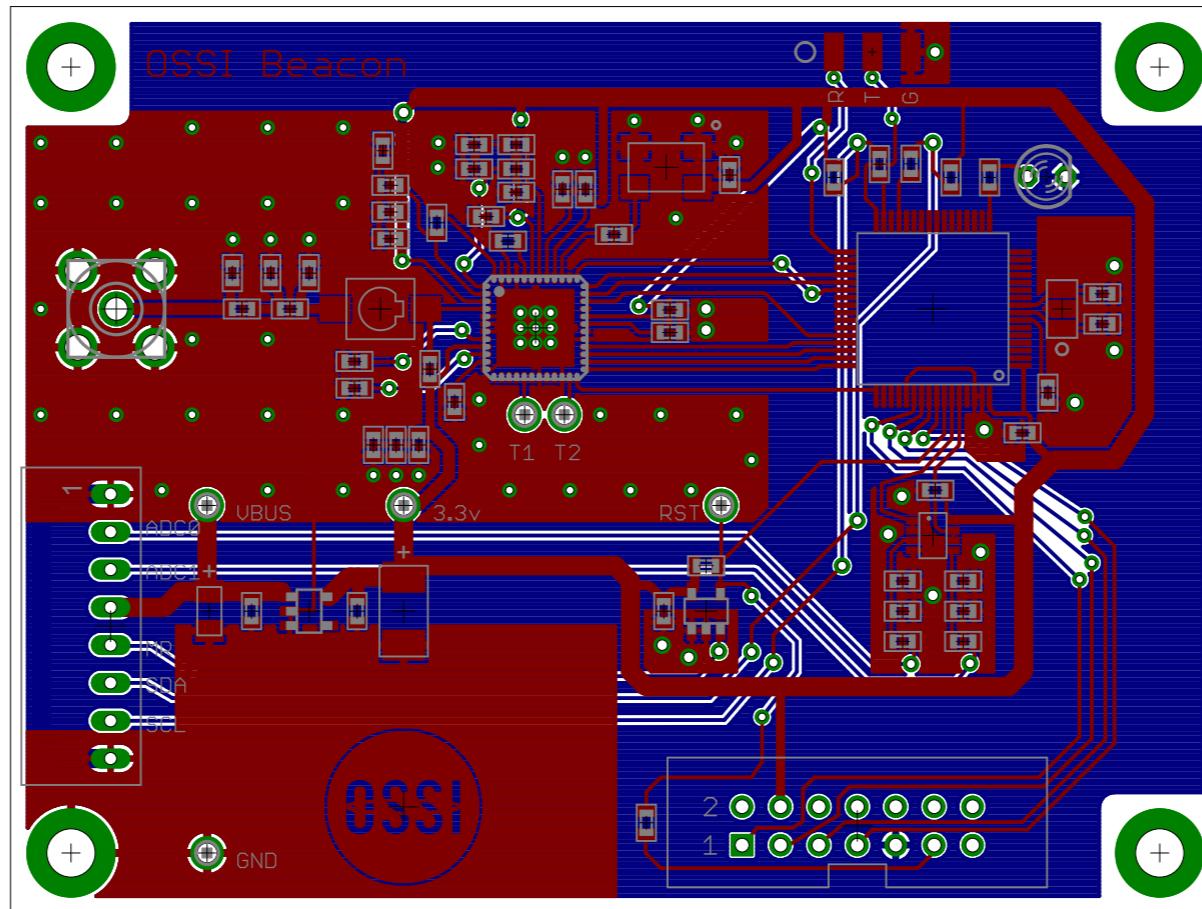
2 Layer

- Cheap
- Free CAD tools- i.e. Eagle CAD
- Hard to make it compact
- Not good for thermal conduction

6 Layer

- Expensive
- dedicated thermal conduction chassis GND layer
- better signal

PCB



2 Layer example: OSSI Beacon

- No thermal conduction layer directly connected to Structure

Chemicals

Hard to know

Hard to find

Hard to buy

For Conformal Coating?

For SolarCell Protection?

Alternative for NuSil Products?



Many cubesats used
3M Scotch-Weld EC-2216 Epoxy

Work Room



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Work Room



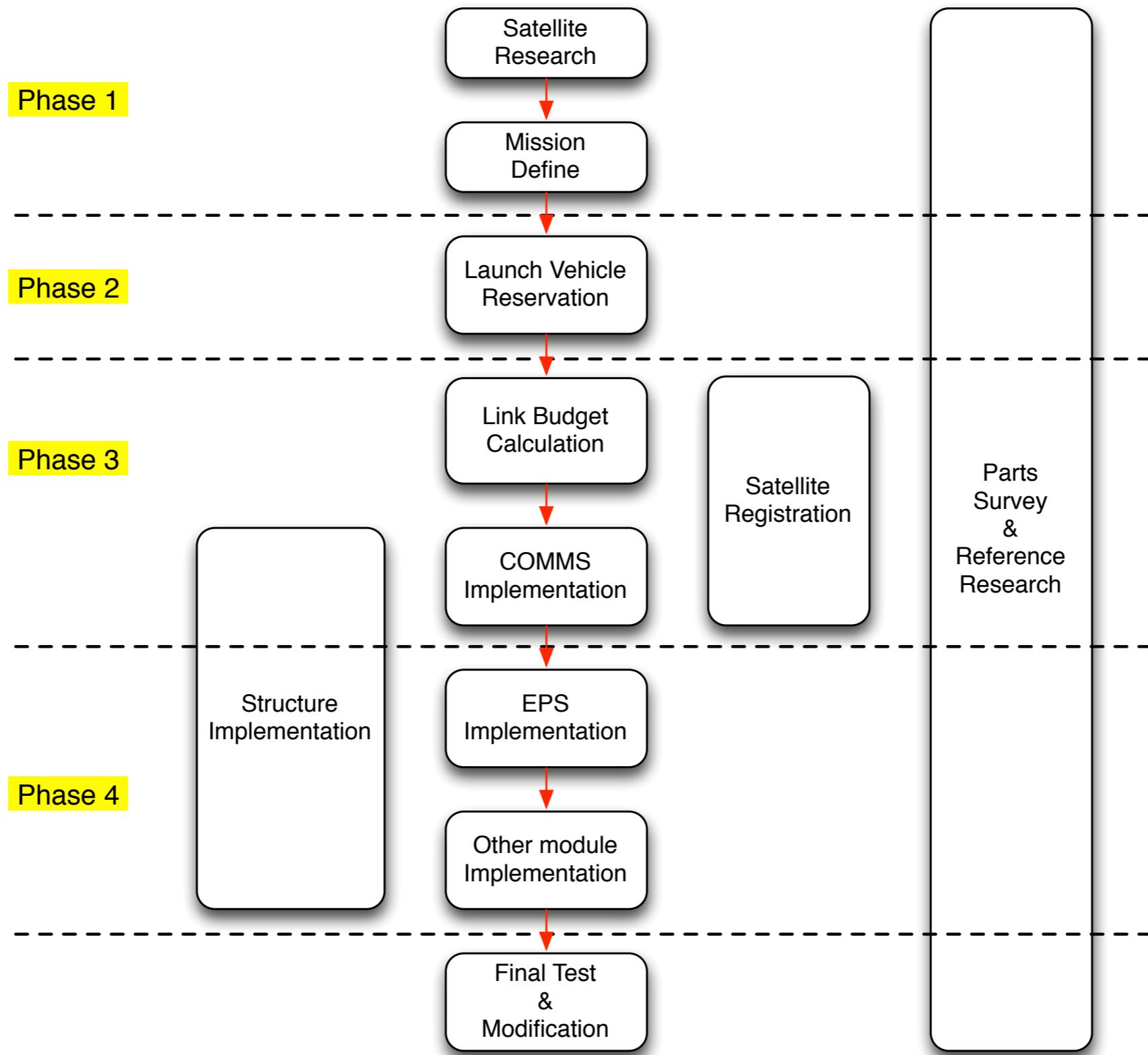
OSSI
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Lesson learned

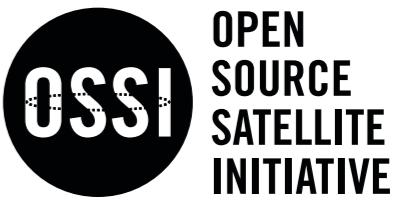


- LV comes suddenly, so.. but?
- COMMS first!!!! if you want to communicate
- do not expect to much attentions for personal satellite
- Good open source project is difficult
- Selling T-shirts is much more interesting
- Have as many engineer friend as possible
- Build first, research more when needed

Management for Private Space Program



Suggestions for Private Space Program



- 1.COMMS standard for more private space programs**
- 2.Easier hardware platform**
- 3.OpenBOM**

COMMS Suggestion

- CDMA or TDMA for UHF or S -band
- Reserve certain bandwidth and share

Beginner Platform

- Battery-less (Solar Cell and small SuperCap)
- Low Power COMMS (BPSK)
- Latch Up Protection
- One Consolidated board

Experimental platform

- DSP+DAC + Modulator
- Similar to SDR (ex USRP from ettus research lab)

Very Kind Open Source™

- High Res Pictures
- Reasons for Selections
- Build Guidelines

OpenB.O.M.

- Space Heritage
- Alternatives
- Purchase Info
- Reasons for Selections
- Web Sharing Platform



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Launching 31 Aug. 2012



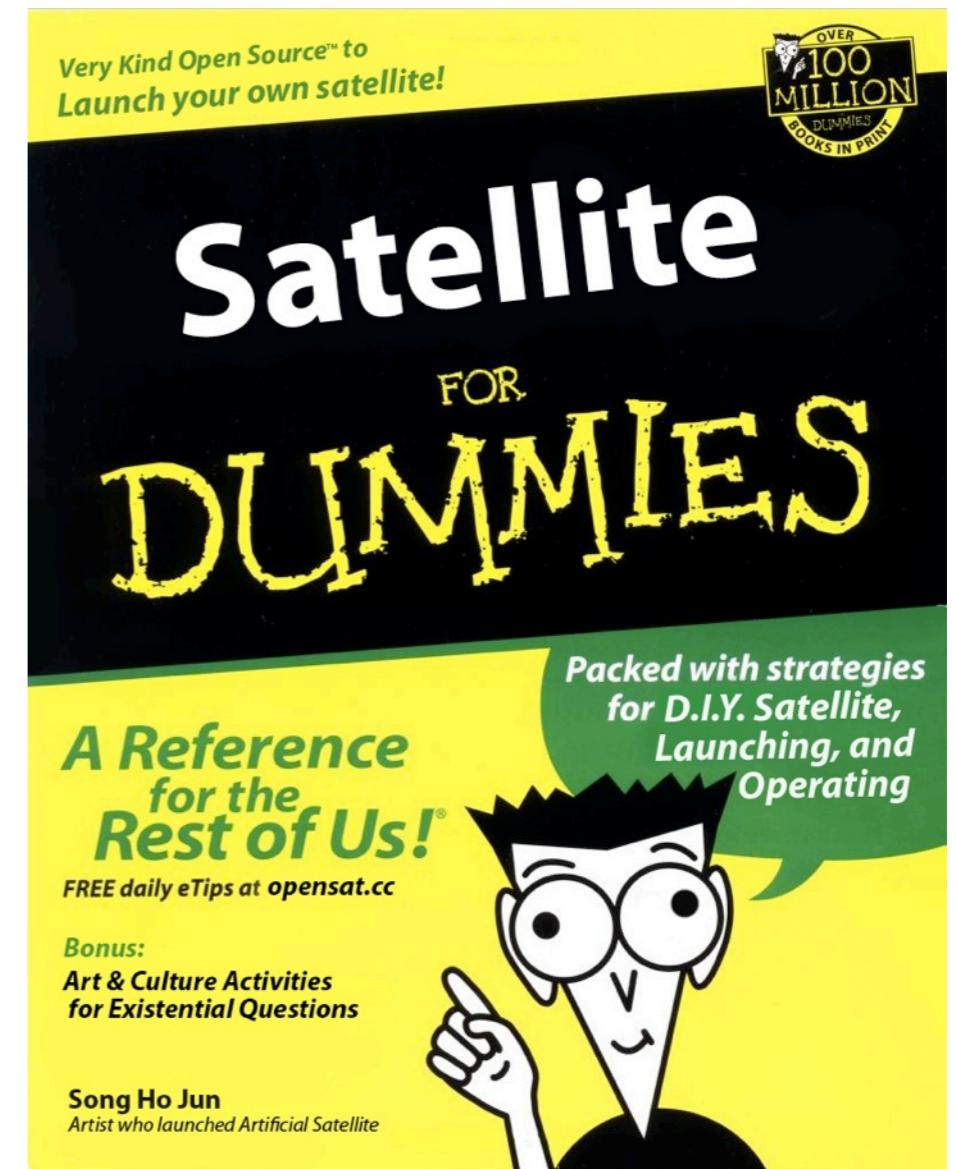
Mission v1.0



1. Testing a 100% commercial-grade a nano size satellite
2. Publishing a satellite manual
3. Building a open source platform for nano satellite
4. Cultural Space Program

Target Audience:
Hobbyist (or HAM)

fake book cover, 2009



PASSIONATE
AMATEUR



티셔츠를 사주세요

Buy T-shirts for me



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songhojun@gmail.com
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