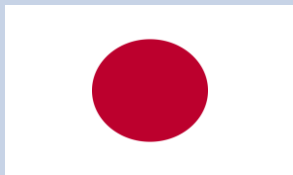




# BIRDS-4

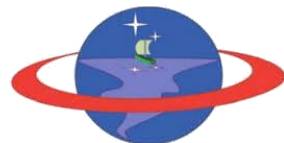
JOINT GLOBAL MULTI-NATION BIRDS  
SATELLITE PROJECT



# Power Budget



**Kyutech**  
Kyushu Institute of Technology



**La SEINE**

12 April 2019



# Power Generation

Parameters	Abbreviations/Units	Values
Solar cell efficiency	( $\eta_{pv}$ )	0.293
Solar constant	(sPower,[W/m <sup>2</sup> ])	1366.1
Number of solar cell on each side	(nPX, nPY, nMY, nPZ, nMZ)	2
Area per one solar panel of satellite	(cArea,[m <sup>2</sup> ])	0.003018
CubeSat Power Generation	[mW]	1640
Energy available per one orbit	[mWh]	1640
Energy loss in blocking diode	[mWh]	240
Efficiency of Electronics devices{dc/dc}	[ $\eta_1$ ]	0.8
<b>Total energy available per orbit</b>	<b>[mWh]</b>	<b>1072</b>





# Subsystem Level Power Budget

COMPONENTS	Maximum power allocated (mW)	Duration per orbit (h)	Energy per Orbit (mWh)
OBC-EPS and FAB	410	1.5	615
COM UHF (RX)	160	1.05	168
COM UHF (TX-CW)	450	0.45	202.5
COM UHF (TX-Telemetry)	4200	0.117	491.4
APRS-DP & SF-WARD (RX)	430	0.25	107.5
APRS-DP & SF-WARD (TX)	1070	0.11	117.7
CAM Module	300	0.017	5.1
ICU(CAM MCU also ON) Mission	100	1	100
Mission Boss	20	1.5	30

COMPONENTS	Maximum power allocated (mW)	Duration per orbit (h)	Energy per Orbit (mWh)
TMCR Mission(all devices ON)	50	1.5	75
PSC Mission	25	1	25
HNT Mission	100	1.5	150
ADCS Stabilization(MTQ, MCU, sensors ON)	100	1	100
ADCS Determination (MCU and sensors ON)	200	1.5	300
ADCS Pointing (RW,MTQ,MCU,sensors ON)	700	0.12	84
GPS(ADCS chip ON)	160	1.5	240
Burner Circuit	12600 (one time)	$2.78 \times 10^{-4}$	3.5

# Mission Power budget

Command uplink and Beacon	985.5 mWh
Image and sensor data Downlink	1,476.9 mWh
Camera Mission (mode 1 and 2)	1,290.6 mWh
Camera Mission (mode 3 and 4)	1,314.6 mWh
ADCS Determination	1,525.5 mWh
ADCS Stabilization	1,625.5 mWh

APRS-DP and SF-WARD Mission	1,240.7 mWh
HNT Mission	795 mWh
PSC Mission	1,040.5 mWh
TMCR Mission	1,330.5 mWh
ICU Mission	1,085.5 mWh
Deployment(30 mins)	618.5 mWh
Average Energy consumption	1,194.11 mWh