

Coug Sat-1 Orbital Energy Budget

This sheet analyzes the energy in and out of the satellite per orbit

Total Energy	3.23 Wh
Used Energy Sun	1.80 Wh
Used Energy Eclipse	0.60 Wh
Remaining	0.83 Wh

Time in Sun	1.1 hours	Time is based off a beta angle of 0° (Worst case)
Time in Eclipse	0.4 hours	Worst case orbit relative to sun
Panel Qty	1.40 Panels	1 Face = 1 Panel
Panel Power	2.1 W	2 Faces = $\sqrt{2} \cdot 0.9 = 1.27$ Panels 3 Faces = $\sqrt{3} \cdot 0.85 = 1.47$ Panels

Power Channel	Load	Voltage	Current	Power	Duty cycle	Hours Per Orbit	Energy	Note
3V3-Always	EPS	3.3 V	30 mA	99 mW	100%	1.50 hr	0.149 Wh	
3V3-0	IHU	3.3 V	20 mA	66 mW	100%	1.50 hr	0.099 Wh	
3V3-1	IHU SD	3.3 V	60 mA	198 mW	10%	0.15 hr	0.030 Wh	
3V3-2	ADCS	3.3 V	20 mA	66 mW	100%	1.50 hr	0.099 Wh	
3V3-3	IMU	3.3 V	45 mA	149 mW	100%	1.50 hr	0.223 Wh	Four IMUs: Average all of them
3V3-4	GPS	3.3 V	55 mA	182 mW	100%	1.50 hr	0.272 Wh	
3V3-5	IFJR & SD	3.3 V	90 mA	297 mW	0%	0.00 hr	0.000 Wh	Once per software update
3V3-6	RCS & Radio	3.3 V	105 mA	347 mW	100%	1.50 hr	0.520 Wh	
3V3-7	Plant Lighting	3.3 V	50 mA	165 mW	50%	0.75 hr	0.124 Wh	Same frequency as March equinox
3V3-8	Plant Camera	3.3 V	390 mA	1287 mW	0.02%	0.00 hr	0.000 Wh	Once a day for 20s
3V3-9	Plant Sensors	3.3 V	25 mA	83 mW	0.3%	0.00 hr	0.000 Wh	Once an hour for 10s
3V3-10	Radiation Sensor	3.3 V	15 mA	50 mW	8%	0.13 hr	0.006 Wh	Once an hour for 5min
3V3-11	Ground Camera	3.3 V	390 mA	1287 mW	1%	0.01 hr	0.011 Wh	Once an hour for 20s
3V3-12		3.3 V	0 mA	0 mW	0%	0.00 hr	0.000 Wh	
Unreg-0	Magnetorquers	3.7 V	100 mA	370 mW	50%	0.75 hr	0.278 Wh	100mA per coil for detumble, 30mA for maneuver
Unreg-1	EPS Heater 0	3.7 V	250 mA	925 mW	13%	0.19 hr	0.173 Wh	Half the time when eclipsed
Unreg-2	EPS Heater 1	3.7 V	250 mA	925 mW	13%	0.19 hr	0.173 Wh	Half the time when eclipsed
Unreg-3	TX Amplifier	3.7 V	300 mA	1110 mW	13%	0.20 hr	0.222 Wh	Once a minute for 8 sec
Unreg-4	Deployables	3.7 V	1000 mA	3700 mW	0%	0.00 hr	0.000 Wh	Once per launch
Unreg-5	Plant Heater	3.7 V	250 mA	925 mW	13%	0.19 hr	0.173 Wh	Half the time when eclipsed
Unreg-6		3.7 V	0 mA	0 mW	0%	0.00 hr	0.000 Wh	

Coug Sat-1 Orbital Energy Budget (Safe Mode)

This sheet analyzes the energy in and out of the satellite per orbit

Total Energy	3.23 Wh	Time in Sun	1.1 hours	Time is based off a beta angle of 0° (Worst case)
Used Energy Sun	0.91 Wh	Time in Eclipse	0.4 hours	Worst case orbit relative to sun
Used Energy Eclipse	0.30 Wh	Panel Qty	1.40 Panels	1 Face = 1 Panel
Remaining	2.01 Wh	Panel Power	2.1 W	2 Faces = $\sqrt{2} \times 0.9 = 1.27$ Panels 3 Faces = $\sqrt{3} \times 0.85 = 1.47$ Panels

Power Channel	Load	Voltage	Current	Power	Duty cycle	Hours Per Orbit	Energy	Note
3V3-Always	EPS	3.3 V	30 mA	99 mW	100%	1.50 hr	0.149 Wh	
3V3-0	IHU	3.3 V	20 mA	66 mW	100%	1.50 hr	0.099 Wh	
3V3-1	IHU SD	3.3 V	60 mA	198 mW	0%	0.00 hr	0.000 Wh	
3V3-2	ADCS	3.3 V	20 mA	66 mW	50%	0.75 hr	0.050 Wh	
3V3-3	IMU	3.3 V	45 mA	149 mW	15%	0.23 hr	0.033 Wh	Four IMUs: Talk to one, others standby
3V3-4	GPS	3.3 V	55 mA	182 mW	0%	0.00 hr	0.000 Wh	
3V3-5	IFJR & SD	3.3 V	90 mA	297 mW	0%	0.00 hr	0.000 Wh	
3V3-6	RCS & Radios	3.3 V	105 mA	347 mW	100%	1.50 hr	0.520 Wh	
3V3-7	Plant Lighting	3.3 V	50 mA	165 mW	0%	0.00 hr	0.000 Wh	
3V3-8	Plant Camera	3.3 V	390 mA	1287 mW	0.00%	0.00 hr	0.000 Wh	
3V3-9	Plant Sensors	3.3 V	25 mA	83 mW	0.0%	0.00 hr	0.000 Wh	
3V3-10	Radiation Sensor	3.3 V	15 mA	50 mW	0%	0.00 hr	0.000 Wh	
3V3-11	Ground Camera	3.3 V	390 mA	1287 mW	0%	0.00 hr	0.000 Wh	
3V3-12		3.3 V	0 mA	0 mW	0%	0.00 hr	0.000 Wh	
Unreg-0	Magnetorquers	3.7 V	100 mA	370 mW	10%	0.15 hr	0.056 Wh	100mA per coil for detumble, 30mA for maneuver
Unreg-1	EPS Heater 0	3.7 V	250 mA	925 mW	13%	0.19 hr	0.173 Wh	Half the time when eclipsed
Unreg-2	EPS Heater 1	3.7 V	250 mA	925 mW	13%	0.19 hr	0.173 Wh	Half the time when eclipsed
Unreg-3	TX Amplifier	3.7 V	300 mA	1110 mW	7%	0.10 hr	0.111 Wh	Once a minute for 4 sec (CW Beacon)
Unreg-4	Deployables	3.7 V	1000 mA	3700 mW	0%	0.00 hr	0.000 Wh	
Unreg-5	Plant Heater	3.7 V	250 mA	925 mW	0%	0.00 hr	0.000 Wh	Hopefully plants do not die
Unreg-6		3.7 V	0 mA	0 mW	0%	0.00 hr	0.000 Wh	