

Expected submodule power consumptions

<u>parameter</u>	<u>worst case</u>	<u>best case</u>	<u>expected</u>	<u>allocated</u>	<u>unit</u>	<u>comment</u>
437 MHz transmitter						
operational time per orbit	600	300	360		sec	
emitted power	2	1	1,5		W	
efficiency	0,4	0,6	0,5			
power consumption	5	1,67	3		3W	
energy consumption	3000	500	1080	1300	J/orbit	With 1 transmission each orbit
437 MHz receiver(optional)						
operational time per orbit	6000	6000	6000			
power consumption	0,3	0,1	0,2		0,25W	
energy consumption	1800	600	1200	1200	J/orbit	
Beacon						
operational time per orbit	400	200	300		sec	
emitted power	1	0,6	0,8		W	
efficiency	0,4	0,6	0,5			
power consumption	2,5	1	1,6		2W	
energy consumption	1000	200	480	600	J/orbit	
TT&C transmitter						
operational time per orbit	600	300	360		sec	
emitted power	2	1	1,5		W	
efficiency	0,4	0,6	0,5			
Power consumption	5	1,67	3		3W	
energy consumption	3000	500	1080	1300	J/orbit	With 1 transmission each orbit
TT&C receiver						
operational time per orbit	6000	6000	6000		sec	equal to orbit time
power consumption	0,3	0,1	0,15		0,2W	
energy consumption	1800	600	900	1200	J/orbit	
Camera						
power consumption per image	0,2	0,2	0,2		0,5W	
operational time per orbit	5	3	4,5		5sec	
energy consumption	1	0,6	0,9	2,5	J/orbit	If 1 picture taken each orbit
ADCS system (standby)						
MCU power consumption	0,3	0,2	0,25		W	
sensor power consumption	0,1	0,02	0,05		W	Expending on number and type of sensors
total power consumption	0,4	0,22	0,3	0,35	W	Without attitude corrections

operational time per orbit	6000	6000	6000	2000	sec	equal to orbit time Without attitude corrections
energy consumption	2400	1290	1800	2000	J/orbit	
<u>Power management system</u>						
MCU power consumption	0,3	0,1	0,2		W	Depending on number and type of sensors
sensor power consumption	0,05	0	0,02		W	
total power consumption	0,35	0,1	0,22	0,3	W	
operational time per orbit	6000	6000	6000		sec	
energy consumption	2100	606	1290	1500	J/orbit	
<u>OBDH system</u>						
MCU power consumption	0,3	0,2	0,25		W	Including data storage unit including temperature sensors for entire sat
sensor power consumption	0,3	0,05	0,25		W	
Total power consumption	0,6	0,25	0,5	0,6	W	
operational time per orbit	6000	6000	6000		sec	
energy consumption	3600	1500	3000	3000	J/orbit	

Energy and Power budget based on equal to		100 minute orbit 6000 seconds			
<u>Allowed energy consumption per orbit</u>		power			
Subsystem	(W, maximum)	(W, avg/orbit)	energy (J/orbit)		Comment
OBDH system with sensors and data storage	0,6	0,6	3000		
TT&C transmitter	3	0,22	1300		
TT&C receiver	0,2	0,2	1200		
437MHz transmitter	3	0,22	1300		
437MHz receiver	0,25	0,20	1200		Optional, usually deactivated
145 MHz beacon	2	0,10	600		
ADCS system(standby) with sensors	0,35	0,33	2000		
Power management system with sensors	0,3	0,25	1500		
Camera	0,5	0,00	10		1 picture taken each orbit
Total power consumption	10,2	2,12	W		Charge power not included
Total energy consumption per orbit			12110 J/orbit		
Energy production parameters	Worst case	Best case	expected	unit	
Total solar cell area	0,06	0,07	0,07	m ²	Depending on cell area
Solar radiation power in LEO	1310	1353	1353	W/m ²	
Cell efficiency	0,15	0,28	0,2		Depending on cell type
Used cell area	0,25	0,3	0,25		Depending on sun angle
produced power	2,95	7,64	4,46	W	
Illuminated orbit	0,6	0,8	0,6		Depending on orbit parameters
Orbit time	6000	6000	6000	sec	Depending on orbit altitude
Aquired energy	10 611	36 660	16 074	J/orbit	
Energy available for attitude control and payload	-1 499	24 550	3 964	J/Orbit	
Energy storage parameters	Worst case	Best case	expected	unit	
Battery capacity	1	4	2	Ah	Depending on battery type
Main battery voltage	7,2	7,2	7,20	V	Depending on max needed V
Energy storage capacity	25920	103680	51840	J	
Energy taken from storage per orbit	4844	2422	4844	J	
Available charging time	3600	4800	3600	sec	
Needed charge power	1,35	0,50	1,35	W	
Discharge percentage	18,69	2,34	9,34	%	Should not exceed 30%