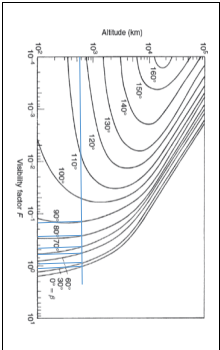


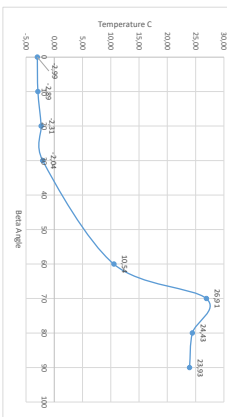
Parameters	Value	Unit	Description
J_s	1414	W/m ²	Solar radiation intensity (constant)
f	0.46		Abundance (Black paint)
a	0.8		Emittance (Black paint)
a/e	1.12		Emittance (Black paint)
Q	0 W		Internal power
Q_e	0.628	W/m ²	Fraction of sunlit orbit
Orbit alt.	550 km		
J_p	232	W/m ²	Planetary radiation intensity
J_p	0.049639	m ²	
A_s surface	0.01316	m ²	
A_s albedo	0.003	m ²	
A_s planetary	0.27		
albedo	572.67	W/m ²	
J_a	0		
J_b	5.67E-08	Wm ⁻² K ⁻⁴	
T	270.1581	K	
$T(C)$	-2.99193	°C	



2705.236
6928
0.390479

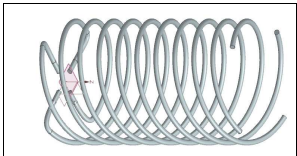
Description	Parameter/Value
Solar radiation intensity (constant)	J_s 1414
Abundance (Black paint)	a 0.8
Emittance (Black paint)	e 0.95
Emittance (Black paint)	a/e 1.12
Internal power	Q 0
Fraction of sunlit orbit	Q_e 0.628
Orbit alt.	J_p 232
Planetary radiation intensity	J_p 0.049639
	A_s surface 0.01316
	A_s albedo 0.003
	A_s planetary 0.27
	albedo 572.67
	J_a 0
	J_b 5.67E-08
	T 270.1581
	$T(C)$ -2.99193

Max Flux (HOT CASE): Beta angle versus Temperature Graph



$J_a = J_s \alpha F^*$	$F_s = \frac{1}{180^\circ} \cos^{-1} \left[\frac{(R^2 + 2Rb) \cdot \gamma^2}{(R + b) \cos \beta} \right] \text{ if } \gamma \geq 0 \text{ if } \beta \geq \beta^*$
	$\beta^* = \sin^{-1} \left[\frac{R}{R + b} \right] \quad 0^\circ \leq \beta^* \leq 90^\circ$
$\sigma = \text{Stefan-Boltzmann constant } (5.67 \times 10^{-8} \text{ W m}^{-2} \text{ K}^{-2})$	

1.	2.	3.
24767637	0	5079558860
$T^4 = \frac{A_{planetary} J_p}{A_{surf} fac \sigma} + \frac{Q}{A_{surf} fac \sigma \epsilon} + \frac{A_{star} J_s}{A_s}$		
<div> <div>Area Calculations:</div> <div> <div>f</div> <div>0.00055 m</div> </div> <div> <div>N</div> <div>0.0316 m</div> </div> <div> <div>OD</div> <div>0.04891 m</div> </div> <div> <div>ID</div> <div>0.04009 m</div> </div> <div> <div>MOD</div> <div>0.042</div> </div> <div> <div>$L_{surface}$</div> <div>0.031984</div> </div> <div> <div>L_{alt}</div> <div>0.08996</div> </div> </div> <div> <div>Outer Surface Area:</div> <div>0.01341 m²</div> </div> <div> <div>+ Cols</div> <div>0.049639 m²</div> </div> <div> <div>$\Delta_{albedo and flux}$</div> <div>0.003</div> </div> <div> <div>Δ_{star}</div> <div>0.024819</div> </div> <div> <div>Half a and p A</div> <div>0.015</div> </div> <div> <div>Average of A's</div> <div>0.01316 m²</div> </div>		



$ \beta < \beta^*$
K^{-1}

$$\frac{1}{urf fac \sigma} + \frac{A_{albedo} J_a}{urf fac \sigma} \left(\frac{\alpha}{\epsilon} \right) (F)$$

$L_s = ((2\pi r)^2 + p^2)^{0.5}$
$L_T = L_s \times N $
$A_{star} = L_T \times \pi \times OD$

NO Very much an assumption

Parameters	Value	Unit	Description
J_s	1414	W/m ²	Solar radiation intensity (constant)
f	0.46		Abundance (Black paint)
a	0.8		Emittance (Black paint)
a/e	1.12		Emittance (Black paint)
Q	0 W		Internal power
Q_e	0.628		Fraction of sunlit orbit
Orbit alt.	550 km		
J_p	232	W/m ²	Planetary radiation intensity
J_p	0.049639	m ²	
A_s surface	0.01316	m ²	
A_s albedo	0.003	m ²	
A_s planetary	0.27		
albedo	572.67	W/m ²	
J_a	451.066	W/m ²	
J_b	5.67E-08	Wm ⁻² K ⁻⁴	
T	271.112	K	
$T(C)$	-2.0802	°C	

Parameters	Value	Unit
J_s	1414	W/m ²
f	0.46	
a	0.8	
a/e	1.12	
Q	0 W	
Q_e	0.628	W/m ²
Orbit alt.	550 km	
J_p	232	W/m ²
J_p	0.04963978	m ²
A_s surface	0.0131672	m ²
A_s albedo	0.0030021	m ²
A_s planetary	0.275	
albedo	568.825	W/m ²
J_a	451.066	W/m ²
J_b	5.67E-08	Wm ⁻² K ⁻⁴
T	270.258265	K
$T(C)$	-2.89161758	°C

Parameter	Value	Unit	Description
J_s	1414	W/m ²	Solar radiation intensity (constant)
f	0.95		Volatility factor
α	0.95		Absorptivity (black paint)
ϵ	0.8		Emissance (black paint)
a/e	1.12		
Q	0 W		Internal power
Q_E	0.382 W		Fraction of sunlight orbit
J_p	232 W/m ²		Planetary radiation intensity
Orbit alt.	550 km		
A_{surface}	0.048639	m ²	
A_{solid}	0.021816	m ²	
A_{absorber}	0.000393	m ²	
A_{planetar}	0.003	m ²	
albedo	0.35		
J_a	445.41	W/m ²	
B	5.67E-08	Wm ⁻² K ⁻⁴	
T	283.895	K	
$T(C)$	105.4497	°C	

1.	2.47E+08	
2.	0	6.28E-09
3.		

Parameter	Value	Unit	Description
J_s	1414	W/m ²	Solar radiation intensity (constant)
f	0.95		Volatility factor
α	0.95		Absorptivity (black paint)
ϵ	0.8		Emissance (black paint)
a/e	1.12		
Q	0 W		Internal power
Q_E	0.382 W		Fraction of sunlight orbit
J_p	232 W/m ²		Planetary radiation intensity
Orbit alt.	550 km		
A_{surface}	0.048639	m ²	
A_{solid}	0.021816	m ²	
A_{absorber}	0.000393	m ²	
A_{planetar}	0.003	m ²	
albedo	0.39		
J_a	380.5074	W/m ²	
B	5.67E-08	Wm ⁻² K ⁻⁴	
T	300.098	K	
$T(C)$	26.9082	°C	

1.	2.47E+08	
2.	0	7.86E-09
3.		

Parameter	Value	Unit	Description
J_s	1414	W/m ²	Solar radiation intensity (constant)
f	0.95		Volatility factor (black paint)
α	0.95		Absorptivity (black paint)
ϵ	0.8		Emissance (black paint)
a/e	1.12		
Q	0 W		Internal power
Q_E	0.382 W		Fraction of sunlight orbit
J_p	232 W/m ²		Planetary radiation intensity
Orbit alt.	550 km		
A_{surface}	0.048639	m ²	
A_{solid}	0.021816	m ²	
A_{absorber}	0.000393	m ²	
A_{planetar}	0.003	m ²	
albedo	0.45		
J_a	159.075	W/m ²	
B	5.67E-08	Wm ⁻² K ⁻⁴	
T	297.2819	K	
$T(C)$	24.1311	°C	

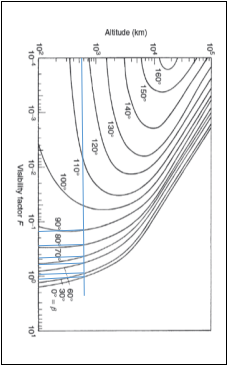
3	
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Parameter	Value	Unit	Description
J_s	1414	W/m ²	Solar radiation intensity (constant)
f	0.95		Volatility factor
α	0.95		Absorptivity (black paint)
ϵ	0.8		Emissance (black paint)
a/e	1.12		
Q	0 W		Internal power
Q_E	0.382 W		Fraction of sunlight orbit
J_p	232 W/m ²		Planetary radiation intensity
Orbit alt.	550 km		
A_{surface}	0.048639	m ²	
A_{solid}	0.021816	m ²	
A_{absorber}	0.000393	m ²	
A_{planetar}	0.003	m ²	
albedo	0.54		
J_a	114.534	W/m ²	
B	5.67E-08	Wm ⁻² K ⁻⁴	
T	297.0781	K	
$T(C)$	23.9281	°C	

1.	2.47E+08	
2.	0	7.54E-09
3.		

1.	2.47E+08	
2.	0	7.54E-09
3.		

Parameters	Value	Unit	Description
J_s	1414	W/m ²	Solar radiation intensity (constant)
f	1.5		Velocity factor
e	0.8		Emittance (Black paint)
a/e	1.12		Emittance (Black paint)
Q	0 W		Internal power
f	0.6277 %		Fraction of sunlit orbit
J_p	224 W/m ²		Planetary radiation intensity
J_p	224 W/m ²		Planetary radiation intensity
A, surface	0.048639 m ²		
A, solar	0.01316 m ²		
A, albedo	0.003 m ²		
A, planetary	0.003 m ²		
J_a	509.04 W/m ²		
B	0 °		
SB	5.67E-08 Wm ⁻² K ⁻⁴		
T	269.415 K		
T (C)	-3.7851 °C		



$$J_o = J_o A F$$

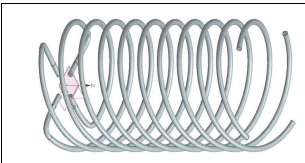
$$f_e = \frac{1}{180^\circ} \cos^{-1} \left[\frac{(h^2 + 2Rb)^{1/2}}{(R + h) \cos \beta} \right] \text{ if } \\ = 0 \text{ if } |\beta| \geq \beta^*$$

$$\beta^* = \sin^{-1} \left[\frac{R}{R + h} \right] \text{ } ^\circ \text{ } \sigma^* \leq \beta \leq 90^\circ$$

$$\sigma = \text{Stefan-Boltzmann constant } (5.67 \times 10^{-8} W m^{-2} I$$

$$1. \quad 23877987 \quad 2. \quad 0.502847778 \quad 3.$$

$$T^4 = \frac{A_{\text{outer}} J_p}{A_{\text{surf}} f_{\text{acc}} \sigma} + \frac{Q}{A_{\text{surf}} f_{\text{acc}} \sigma} + \frac{A_{\text{outer}} J_o}{A_{\text{st}}}$$



Area Calculations:	
P	0.000955 m
N	0.01548 m
OD	2.5
ID	0.04391 m
MO	0.04009
A, surface	0.042
LL	0.0353984
LT	0.08996
Outer Surface Area:	
A, albedo and planet	0.01241 m ²
4 coils	0.048639 m ²
And - And	0.003
A, solid	0.024810
half surface A	0.012405
half surface B	0.012405
Average of A's	0.01316 m ²

$$| \theta | < \beta^*$$

$$\left(\frac{r}{R} \right)^4$$

$$\frac{3}{w f_{\text{acc}} \sigma} + A_{\text{albedo}} J_o \left(\frac{r}{R} \right) (f)$$

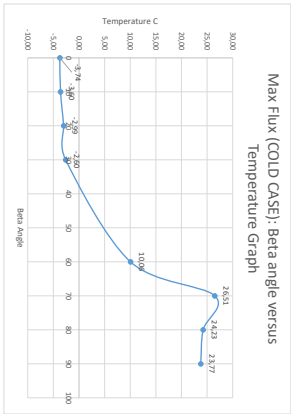
$$L_1 = (2 \pi r)^2 + p^2 j_{\text{vac}}$$

$$L_T = |L_1 \times N$$

$$A_{\text{outer}} = L_T \times \pi \times OD$$

NB: Very much an assumption

Parameters	Value	Unit	Description
J_s	1414	W/m ²	Solar radiation intensity (constant)
f	1.5		Velocity factor
e	0.8		Emittance (Black paint)
a/e	1.12		Emittance (Black paint)
Q	0 W		Internal power
f	0.649 %		Fraction of sunlit orbit
J_p	550 W/m ²		Planetary radiation intensity
J_p	224 W/m ²		Planetary radiation intensity
A, surface	0.048639 m ²		
A, solar	0.01316 m ²		
A, albedo	0.003 m ²		
A, planetary	0.003 m ²		
J_a	404.404 W/m ²		
B	30 °		
SB	5.67E-08 Wm ⁻² K ⁻⁴		
T	270.5196 K		
T (C)	-2.6935 °C		



Parameter	Value	Description
J_{S}	144 W/m ²	Solar radiation intensity (constant)
f	0.9	Visibility factor
a	0.95	Absorbance (black paint)
e	0.8	Emissivity (black paint)
θ_{e}	120°	Effective angle
θ_{r}	0 W	Internal power
f	0.285 %	Fraction of sunlight
J_{e}	237 W/m ²	
J_{e}	550 km	
J_{p}	224 W/m ²	Polyurethane radiation intensity
A_{surface}	0.04963 m ²	
A_{solr}	0.01316 m ²	
A_{albedo}	0.003 m ²	
$A_{\text{polyurethane}}$	0.003 m ²	
T_{albedo}	407.212 K	
T_{p}	60°	
δ	5.67E-08 W/m ² ·K ⁴	
T	283.2098 K	
$T(\text{C})$	10.05857 °C	

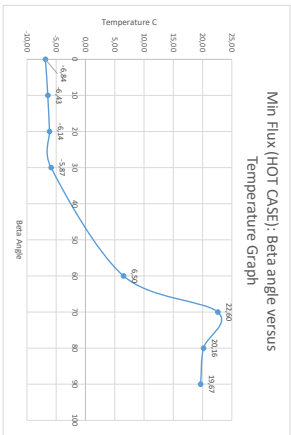
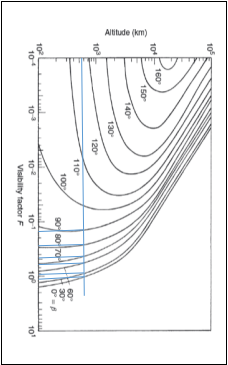
Parameter	Value	Unit	Description
λ	14.4	W/m ²	Solar radiation intensity
F	0.69		Visibility factor
α	0.95		Absorptance (black paint)
σ	0.8		Emissivity (black paint)
θ	1.0	W	Internal power
τ	1 %		Fraction of waste orbit
\dot{m}	237	W/m ²	
ρ	550	kg	
\dot{Q}_{orbit}	224	W/m ²	Planetary radiation intensity
A_{surface}	0.049839	m ²	
A_{solar}	0.01316	m ²	
A_{infrared}	0.003	m ²	
$A_{\text{planetary}}$	0.003	m ²	
\dot{m}_{radio}	351.2765	W/m ²	
\dot{m}_{radio}	70	W	
\dot{m}_{B}	5.67E-08	W/m ² ·K ⁴	
T	298.6557	K	
T (C)	26.50572	°C	

	Parameter	Unit
1.	B _s	14.14 W/m ²
2.	F	0.25
3.	a	0.95
4.	b	0.8
5.	d ₀	1.0 m
6.	D	0 W
7.	f	1 %
8.	J _e	237 W/m ²
9.	Orbit alt.	550 km
10.	J _p	224 W/m ²
11.	A _{surface}	0.0406839 m ²
12.	A _{sunstr}	0.07613 m ²
13.	A _{Albedo}	0.003 m ²
14.	A _{Albedostr}	0.003 m ²
15.	A _{absorb}	0.003 m ²
16.	J _{absorb}	146.47 W/m ²
17.	B	80 °
18.	S _B	5.67 E-08 Wm ⁻² K ⁻⁴
19.	T	297.807 K
20.	T	24.2306 K

Parameter	Description
I_0	Solar radiation intensity (constant)
f	Visibility factor
F	Absorbance (black paint)
F_{white}	Emissivity (black paint)
F_{white}	Emissivity (black paint)
Q	Internal power
α	Fraction of sunlight or light
I_{pan}	Panetary radiation intensity
A_{surface}	A _{surface}
A_{solid}	A _{solid}
A_{liquid}	A _{liquid}
A_{ice}	A _{ice}
B	B
S_0	S_0
T	T
$T(\text{C})$	T (C)

Value	Description
14.4 W/m ²	Solar radiation intensity (constant)
0.15	Visibility factor
0.95	Absorptance (black paint)
1.8	Emissance (black paint)
1.1 W	
0 W	Internal power
1 %	Fraction of sunlight
237 W/m ²	
50 km	Planetary radiation intensity
0.249639 m ²	
0.01316 m ²	
0.003 m ²	
0.003 m ²	
0.151	
108.173 W/m ²	
90 °	
5.67E08 W/m ² K ⁴	
585.9223 K	
23.77226 °C	

Parameters	Value	Unit	Description
J_s	1332	W/m ²	Solar radiation intensity (constant)
f	1.5		Volatility factor
ρ	0.93		Volatility factor (Black paint)
ϵ	0.8		Emissance (Black paint)
a/e	1.12		Internal Power
Q	0 W		Internal Power
f	0.6277 %		Fraction of sunlit orbit
J_{orbit}	227	W/m ²	
$J_{\text{orbit alt.}}$	227	W/m ²	Planetary radiation intensity
J_p	0.008639	m ²	
A, surface	0.0316	m ²	
A, solar	0.003	m ²	
A, albedo	0.003	m ²	
A, planetary	0.003	m ²	
A, albedo	0.003	m ²	
J_a	539.46	W/m ²	
B	0 °		
SB	5.67E-08	Wm ⁻² K ⁻⁴	
T	266.323	K	
T (C)	-6.9371	°C	



$$J_o = J_o A^T$$

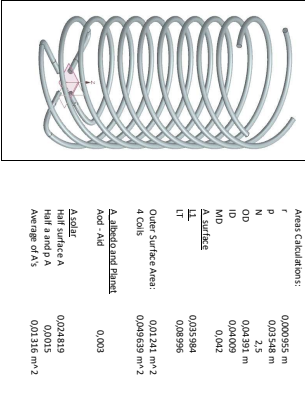
$$J_e = \frac{1}{180^\circ} \cos^{-1} \left[\frac{(h^2 + 2R h)^{1/2}}{(R + h) \cos \theta} \right] \text{ if } \theta = 0 \text{ if } |\theta| \geq 90^\circ$$

$$\theta^* = \sin^{-1} \left[\frac{R}{R + h} \right] \quad 0^\circ \leq \theta^* \leq 90^\circ$$

$$\sigma = \text{Stefan-Boltzmann constant } (5.67 \times 10^{-8} \text{ W m}^{-2} \text{ K}^{-4})$$

$$1. \quad 2. \quad 3.$$

$$T^4 = \frac{A_{\text{outer}} J_o}{A_{\text{surf}} f_{\text{acc}} \sigma} + \frac{Q}{A_{\text{surf}} f_{\text{acc}} \sigma} + \frac{A_{\text{outer}} J_o}{A_{\text{surf}}}$$



$$| \theta | < \theta^*$$

$$\left(\frac{R}{R + h} \right)$$

$$T^4 = \frac{A_{\text{outer}} J_o}{A_{\text{surf}} f_{\text{acc}} \sigma} + \frac{Q}{A_{\text{surf}} f_{\text{acc}} \sigma} + \frac{A_{\text{outer}} J_o}{A_{\text{surf}}}$$

$$L_1 = (2\pi r)^2 + p^2 j_{\text{acc}}$$

$$L_T = |L_1 \times N|$$

$$A_{\text{outer}} = L_T \times \pi \times OD$$

Parameter	Value	Unit	Description
J_s	1332	W/m ²	Solar radiat
f	1.45		Volatility fa
ρ	0.93		Volatility fa
ϵ	0.8		Emissance
a/e	1.12		Internal po
Q	0 W		Internal po
f	0.6297 %		Fraction of
J_{orbit}	227	W/m ²	
$J_{\text{orbit alt.}}$	227	W/m ²	Planetary r
J_p	0.008639	m ²	
A, surface	0.0316	m ²	
A, solar	0.003	m ²	
A, albedo	0.003	m ²	
A, planetary	0.003	m ²	
A, albedo	0.003	m ²	
J_a	560.106	W/m ²	
B	10 °		
SB	5.67E-08	Wm ⁻² K ⁻⁴	
T	266.735	K	
T (C)	-6.6688	°C	

NB: Very much an assumption

Parameters	Value	Unit	Description
J_s	1332	W/m ²	Solar radiation intensity (constant)
f	1.2		Volatility factor
ρ	0.93		Volatility factor (Black paint)
ϵ	0.8		Emissance (Black paint)
a/e	1.12		Internal Power
Q	0 W		Internal Power
f	0.648 %		Fraction of sunlit orbit
J_{orbit}	227	W/m ²	
$J_{\text{orbit alt.}}$	227	W/m ²	Planetary radiation intensity
J_p	0.008639	m ²	
A, surface	0.0316	m ²	
A, solar	0.003	m ²	
A, albedo	0.003	m ²	
A, planetary	0.003	m ²	
A, albedo	0.003	m ²	
J_a	424.908	W/m ²	
B	30 °		
SB	5.67E-08	Wm ⁻² K ⁻⁴	
T	267.308	K	
T (C)	-5.6689	°C	

Parameters	Value	Unit	Description
J_s	1332	W/m ²	Solar radiation intensity (constant)
f	1.2		Volatility factor
ρ	0.93		Volatility factor (Black paint)
ϵ	0.8		Emissance (Black paint)
a/e	1.12		Internal Power
Q	0 W		Internal Power
f	0.648 %		Fraction of sunlit orbit
J_{orbit}	227	W/m ²	
$J_{\text{orbit alt.}}$	227	W/m ²	Planetary radiation intensity
J_p	0.008639	m ²	
A, surface	0.0316	m ²	
A, solar	0.003	m ²	
A, albedo	0.003	m ²	
A, planetary	0.003	m ²	
A, albedo	0.003	m ²	
J_a	522.144	W/m ²	
B	20 °		
SB	5.67E-08	Wm ⁻² K ⁻⁴	
T	267.014	K	
T (C)	-5.1566	°C	

Min Flux (HOT CASE): Beta angle versus Temperature Graph

Parameter	Value	Unit	Description
J_s	1332	W/m ²	Solar radiation intensity (constant)
f	0.9		Visibility factor
ϵ	0.8		Emittance (Black paint)
a/e	0.8		Emittance (Black paint)
q/e	1.12		Emittance (Black paint)
Q	0 W		Internal power
f	0.785	%	Fraction of sunlit orbit
J_e	232	W/m ²	
J_p	232	W/m ²	
J_o	0.00639	m ²	Planetary radiation intensity
J_p	0.01316	m ²	
A_s	0.003	m ²	
A_{albedo}	0.003	m ²	
$A_{planetar}$	419.58	W/m ²	
J_p	60 °		
B	5.67E-08	Wm ⁻² K ⁻⁴	
T	279.5535	K	
T	650.948	°C	

Parameter	Value	Unit	Description
J_s	1332	W/m ²	Solar radiation intensit
f	0.69		Visibility factor
ϵ	0.8		Emittance (Black paint)
a/e	0.8		Emittance (Black paint)
q/e	1.12		Emittance (Black paint)
Q	0 W		Internal power
f	1 %		Fraction of sunlit orbit
J_e	232	W/m ²	
J_p	232	W/m ²	
J_o	0.00639	m ²	Planetary radiation int
J_p	0.01316	m ²	
A_s	0.003	m ²	
A_{albedo}	0.003	m ²	
$A_{planetar}$	358.4412	W/m ²	
J_p	70 °		
B	5.67E-08	Wm ⁻² K ⁻⁴	
58			
T	295.7494	K	
T	22.99597	°C	

Parameter	Value	Unit	Description
J_s	1332	W/m ²	Solar radiation intensit
f	0.25		Visibility factor
ϵ	0.8		Emittance (Black paint)
a/e	0.8		Emittance (Black paint)
q/e	1.12		Emittance (Black paint)
Q	0 W		Internal power
f	1 %		Fraction of sunlit orbit
J_e	232	W/m ²	
J_p	232	W/m ²	
J_o	0.00639	m ²	Planetary radiation int
J_p	0.01316	m ²	
A_s	0.003	m ²	
A_{albedo}	0.003	m ²	
$A_{planetar}$	149.85	W/m ²	
J_p	80 °		
B	5.67E-08	Wm ⁻² K ⁻⁴	
58			
T	293.427	K	
T	20.0066	°C	

Parameter	Value	Unit	Description
J_s	1332	W/m ²	Solar radiation intensity (constant)
f	0.12		Visibility factor
ϵ	0.8		Emittance (Black paint)
a/e	0.8		Emittance (Black paint)
q/e	1.12		Emittance (Black paint)
Q	0 W		Internal power
f	1 %		Fraction of sunlit orbit
J_e	232	W/m ²	
J_p	232	W/m ²	
J_o	0.00639	m ²	Planetary radiation intensity
J_p	0.01316	m ²	
A_s	0.003	m ²	
A_{albedo}	0.003	m ²	
$A_{planetar}$	107.892	W/m ²	
J_p	90 °		
B	5.67E-08	Wm ⁻² K ⁻⁴	
58			
T	292.4515	K	
T	19.66511	°C	

Parameter	Value	Unit	Description
J_s	1332	W/m ²	Solar radiation intensity (constant)
f	0.12		Visibility factor
ϵ	0.8		Emittance (Black paint)
a/e	0.8		Emittance (Black paint)
q/e	1.12		Emittance (Black paint)
Q	0 W		Internal power
f	1 %		Fraction of sunlit orbit
J_e	232	W/m ²	
J_p	232	W/m ²	
J_o	0.00639	m ²	Planetary radiation intensity
J_p	0.01316	m ²	
A_s	0.003	m ²	
A_{albedo}	0.003	m ²	
$A_{planetar}$	107.892	W/m ²	
J_p	90 °		
B	5.67E-08	Wm ⁻² K ⁻⁴	
58			
T	292.4515	K	
T	19.66511	°C	

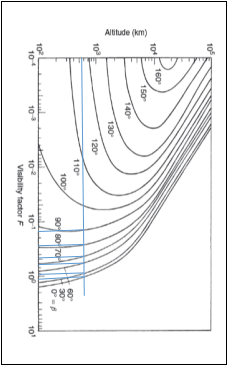
Parameter	Value	Unit	Description
J_s	1332	W/m ²	Solar radiation intensity (constant)
f	0.12		Visibility factor
ϵ	0.8		Emittance (Black paint)
a/e	0.8		Emittance (Black paint)
q/e	1.12		Emittance (Black paint)
Q	0 W		Internal power
f	1 %		Fraction of sunlit orbit
J_e	232	W/m ²	
J_p	232	W/m ²	
J_o	0.00639	m ²	Planetary radiation intensity
J_p	0.01316	m ²	
A_s	0.003	m ²	
A_{albedo}	0.003	m ²	
$A_{planetar}$	107.892	W/m ²	
J_p	90 °		
B	5.67E-08	Wm ⁻² K ⁻⁴	
58			
T	292.4515	K	
T	19.66511	°C	

Parameter	Value	Unit	Description
J_s	1332	W/m ²	Solar radiation intensity (constant)
f	0.12		Visibility factor
ϵ	0.8		Emittance (Black paint)
a/e	0.8		Emittance (Black paint)
q/e	1.12		Emittance (Black paint)
Q	0 W		Internal power
f	1 %		Fraction of sunlit orbit
J_e	232	W/m ²	
J_p	232	W/m ²	
J_o	0.00639	m ²	Planetary radiation intensity
J_p	0.01316	m ²	
A_s	0.003	m ²	
A_{albedo}	0.003	m ²	
$A_{planetar}$	107.892	W/m ²	
J_p	90 °		
B	5.67E-08	Wm ⁻² K ⁻⁴	
58			
T	292.4515	K	
T	19.66511	°C	

Parameter	Value	Unit	Description
J_s	1332	W/m ²	Solar radiation intensity (constant)
f	0.25		Visibility factor
ϵ	0.8		Emittance (Black paint)
a/e	0.8		Emittance (Black paint)
q/e	1.12		Emittance (Black paint)
Q	0 W		Internal power
f	1 %		Fraction of sunlit orbit
J_e	232	W/m ²	
J_p	232	W/m ²	
J_o	0.00639	m ²	Planetary radiation intensity
J_p	0.01316	m ²	
A_s	0.003	m ²	
A_{albedo}	0.003	m ²	
$A_{planetar}$	149.85	W/m ²	
J_p	80 °		
B	5.67E-08	Wm ⁻² K ⁻⁴	
58			
T	293.427	K	
T	20.0066	°C	

Parameter	Value	Unit	Description
J_s	1332	W/m ²	Solar radiation intensity (constant)
f	0.25		Visibility factor
ϵ	0.8		Emittance (Black paint)
a/e	0.8		Emittance (Black paint)
q/e	1.12		Emittance (Black paint)
Q	0 W		Internal power
f	1 %		Fraction of sunlit orbit
J_e	232	W/m ²	
J_p	232	W/m ²	
J_o	0.00639	m ²	Planetary radiation intensity
J_p	0.01316	m ²	
A_s	0.003	m ²	
A_{albedo}	0.003	m ²	
$A_{planetar}$	149.85	W/m ²	
J_p	80 °		
B	5.67E-08	Wm ⁻² K ⁻⁴	
58			
T	293.427	K	
T	20.0066	°C	

Parameters	Value	Unit	Description
J_s	1332	W/m ²	Solar radiation intensity (constant)
f	1.5		Volatility factor
ρ	0.93		Emittance (Black part)
ϵ	0.8		Emittance (Black part)
a/e	1.12		Internal Power
Q	0 W		Fraction of sunlit orbit
f	0.6277 %		
$J_{\text{orbit alt.}}$	224 W/m ²		Planetary radiation intensity
J_p	224 W/m ²		
J_{surface}	0.048639 m ²		
A_{surface}	0.0316 m ²		
A_{albedo}	0.003 m ²		
A_{planet}	0.003 m ²		
J_{albedo}	473.52 W/m ²		
J_{B}	0 °		
B	5.67E-08 Wm ⁻² K ⁻⁴		
S_B	-7.29793 °C		
T	265.6025 K		
$T(^{\circ}\text{C})$	-7.29793 °C		



$$J_o = J_o A^P$$

$$f_e = \frac{1}{180^{\circ}} \cos^{-1} \left[\frac{(R^2 + 2RH)^{1/2}}{(R + h) \cos \beta} \right] \quad \text{if}$$

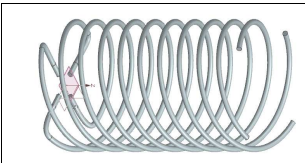
$$= 0 \quad \text{if } |\beta| \geq \beta^{\circ}$$

$$\beta^{\circ} = \sin^{-1} \left[\frac{R}{R + h} \right] \quad 0^{\circ} \leq \beta^{\circ} \leq 90^{\circ}$$

$$\sigma = \text{Stefan-Boltzmann constant } (5.67 \times 10^{-8} \text{ W m}^{-2} \text{ K}^{-2})$$

$$1. \quad 23877987 \quad 2. \quad 0.4737782019 \quad 3.$$

$$T^4 = \frac{A_{\text{albedo}} J_p}{A_{\text{surf}} f_{\text{acc}} \sigma} + \frac{Q}{A_{\text{surf}} f_{\text{acc}} \sigma} + \frac{A_{\text{albedo}} J_o}{A_{\text{st}}}$$



Area Calculations:	
P	0.000955 m
N	0.00348 m
OD	2.5
ID	0.04391 m
MO	0.04009
A_{surface}	0.042
LL	0.0353984
LT	0.08996

Outer Surface Area:	
A_{Gals}	0.01241 m ²
A_{Gals}	0.048639 m ²
Albedo and Planet:	
$Albedo - Alid$	0.003

A_{Solid}	0.024810
$A_{\text{Surface A}}$	0.048639
$A_{\text{Surface B}}$	0.048639
Average of A_{A}	0.01316 m ²

$$| \theta | < P^{\circ}$$

$$(\kappa-4)$$

$$\frac{3}{w f f_{\text{acc}} \sigma} + A_{\text{albedo}} J_o \left(\frac{\alpha}{\epsilon} \right) (f)$$

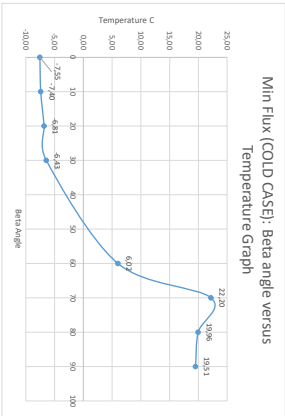
$$L_1 = (C_2 \pi r)^2 + p^2 v_{\text{u.s.}}$$

$$L_P = |L_1 \times N|$$

$$A_{\text{outer}} = L_P \times \pi \times OD$$

NB: Very much an assumption

Parameters	Value	Unit	Description
J_s	1332	W/m ²	Solar radiation intensity (constant)
f	1.5		Volatility factor
ρ	0.93		Emittance (Black part)
ϵ	0.8		Emittance (Black part)
a/e	1.12		Internal Power
Q	0 W		Fraction of sunlit orbit
f	0.648 %		
$J_{\text{orbit alt.}}$	550 W/m ²		Planetary radiation intensity
J_p	224 W/m ²		
J_{surface}	0.048639 m ²		
A_{surface}	0.0316 m ²		
A_{albedo}	0.003 m ²		
A_{planet}	0.003 m ²		
J_{albedo}	380.952 W/m ²		
J_{B}	30 °		
B	5.67E-08 Wm ⁻² K ⁻⁴		
S_B	2.39F-08		
T	265.7316 K		
$T(^{\circ}\text{C})$	-65.42842 °C		



Min Flux (COLD CASE): Beta angle versus Temperature Graph

Parameter	Value	Unit	Description
J_s	1332	W/m ²	Solar radiation intensity (constant)
f	0.9		Visibility factor
τ	0.99		Atmospheric transmittance (Black paint)
ϵ	0.8		Emissance (Black paint)
α/ϵ	1.12		
Q	0 W		Internal power
f	0.785	%	Fraction of sunlit orbit
J_e	223	W/m ²	
J_p	224	W/m ²	Planetary radiation intensity
J_p	0.048639	m ²	
A_s	0.01316	m ²	
A_s	0.003	m ²	
A_s	0.003	m ²	
A_s	0.003	m ²	
J_p	388.616	W/m ²	
B	60 °		
S_B	5.67E-08	Wm ⁻² K ⁻⁴	
T	279.585	K	
T	60254.9	°C	

Parameter	Value	Unit	Description
J_s	1332	W/m ²	Solar radiation intensit
f	0.69		Visibility factor
τ	0.99		Atmospheric transmittance (Black paint)
ϵ	0.8		Emissance (Black paint)
α/ϵ	1.12		
Q	0 W		Internal power
f	1 %		Fraction of sunlit orbit
J_e	227	W/m ²	
J_p	224	W/m ²	Planetary radiation intensity
J_p	0.048639	m ²	
A_s	0.01316	m ²	
A_s	0.003	m ²	
A_s	0.003	m ²	
J_p	380.868	W/m ²	
B	70 °		
S_B	5.67E-08	Wm ⁻² K ⁻⁴	
T	295.348	K	
T	22.286	°C	

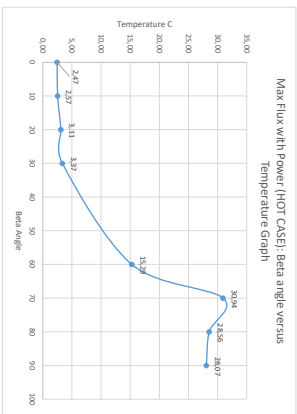
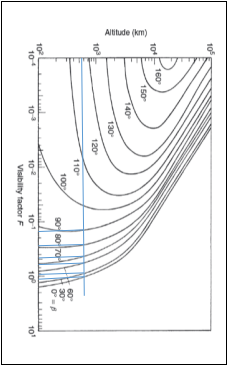
Parameter	Value	Unit	Description
J_s	1332	W/m ²	Solar radiation intensity (constant)
f	0.25		Visibility factor
τ	0.99		Atmospheric transmittance (Black paint)
ϵ	0.8		Emissance (Black paint)
α/ϵ	1.12		
Q	0 W		Internal power
f	1 %		Fraction of sunlit orbit
J_e	237	W/m ²	
J_p	224	W/m ²	Planetary radiation intensity
J_p	0.048639	m ²	
A_s	0.01316	m ²	
A_s	0.003	m ²	
A_s	0.003	m ²	
J_p	139.86	W/m ²	
B	80 °		
S_B	5.67E-08	Wm ⁻² K ⁻⁴	
T	293.098	K	
T	19.998	°C	

Parameter	Value	Unit	Description
J_s	1332	W/m ²	Solar radiation intensity (constant)
f	0.12		Visibility factor
τ	0.99		Atmospheric transmittance (Black paint)
ϵ	0.8		Emissance (Black paint)
α/ϵ	1.12		
Q	0 W		Internal power
f	1 %		Fraction of sunlit orbit
J_e	224	W/m ²	
J_p	224	W/m ²	Planetary radiation intensity
J_p	0.048639	m ²	
A_s	0.01316	m ²	
A_s	0.003	m ²	
A_s	0.003	m ²	
J_p	101.888	W/m ²	
B	90 °		
S_B	5.67E-08	Wm ⁻² K ⁻⁴	
T	293.658	K	
T	19.988	°C	

Parameter	Value	Unit	Description
J_s	1332	W/m ²	Solar radiation intensity (constant)
f	0.12		Visibility factor
τ	0.99		Atmospheric transmittance (Black paint)
ϵ	0.8		Emissance (Black paint)
α/ϵ	1.12		
Q	0 W		Internal power
f	1 %		Fraction of sunlit orbit
J_e	224	W/m ²	
J_p	224	W/m ²	Planetary radiation intensity
J_p	0.048639	m ²	
A_s	0.01316	m ²	
A_s	0.003	m ²	
A_s	0.003	m ²	
J_p	101.888	W/m ²	
B	90 °		
S_B	5.67E-08	Wm ⁻² K ⁻⁴	
T	293.658	K	
T	19.988	°C	

Parameter	Value	Unit	Description
J_s	1332	W/m ²	Solar radiation intensity (constant)
f	0.12		Visibility factor
τ	0.99		Atmospheric transmittance (Black paint)
ϵ	0.8		Emissance (Black paint)
α/ϵ	1.12		
Q	0 W		Internal power
f	1 %		Fraction of sunlit orbit
J_e	224	W/m ²	
J_p	224	W/m ²	Planetary radiation intensity
J_p	0.048639	m ²	
A_s	0.01316	m ²	
A_s	0.003	m ²	
A_s	0.003	m ²	
J_p	101.888	W/m ²	
B	90 °		
S_B	5.67E-08	Wm ⁻² K ⁻⁴	
T	293.658	K	
T	19.988	°C	

Parameters	Value	Unit	Description
J_s	1414	W/m ²	Solar radiation intensity (constant)
f	1.5		Volatility factor
ϵ	0.8		Emittance (Black point)
a/e	1.12		Emittance (Black point)
Q	1 W		Internal power
I_{E}	0.628		Fraction of sunlit orbit
J_{E}	232	W/m ²	
J_{P}	232	W/m ²	Planetary radiation intensity
$J_{\text{A, surface}}$	0.048639	m ²	
$J_{\text{A, solar}}$	0.0316	m ²	
$J_{\text{A, albedo}}$	0.003	m ²	
$J_{\text{A, planetary}}$	0.003	m ²	
J_{B}	572.67	W/m ²	
B	0 °		
SB	5.67E-08	Wm ⁻² K ⁻⁴	
T	275.6212	K	
$T(C)$	2.47268	°C	



$$J_o = J_o A^P$$

$$f_r = \frac{1}{180^\circ} \cos^{-1} \left[\frac{(R + 2Rn)^{1/2}}{(R + n) \cos \beta} \right] \quad \text{if } \beta < \beta^*$$

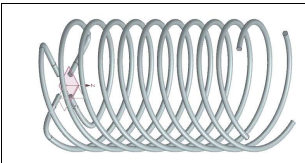
$$= 0 \quad \text{if } |\beta| \geq \beta^*$$

$$\beta^* = \sin^{-1} \left[\frac{R}{R + n} \right] \quad 0^\circ \leq \beta^* \leq 90^\circ$$

$$\sigma = \text{Stefan-Boltzmann constant } (5.67 \times 10^{-8} \text{ W m}^{-2} \text{ K}^{-4})$$

$$1. \quad 2. \quad 3. \quad 2472687 \quad 4.44E+08 \quad 5.07558800$$

$$T^4 = \frac{A_{\text{planetary}} J_p}{A_{\text{sur}} f_{\text{acc}} \sigma} + \frac{Q}{A_{\text{sur}} f_{\text{acc}} \sigma} + \frac{A_{\text{albedo}} J_o}{A_{\text{st}}}$$



Area Calculations:	
P	0.000955 m
N	0.03548 m
OD	2.5
ID	0.04391 m
W0	0.04009
A, surface	0.042
LL	0.0353984
LT	0.08996
Outer Surface Area:	
A, albedo and planet	0.01241 m ²
A, globe	0.048639 m ²
And - And	0.003
A, globe	0.048639
A, surface A	0.04391
A, albedo	0.0353984
Average of A's	0.01316 m ²

$$r/|\beta| < \rho^*$$

$$(\kappa^{-4})$$

$$\frac{3}{\pi f_{\text{acc}} \sigma} + A_{\text{albedo}} J_o \left(\frac{\alpha}{\epsilon} \right) (f)$$

$$L_1 = (2\pi r)^2 + p^2 v_{\text{rel}}^2$$

$$L_P = |L_1 \times N$$

$$A_{\text{outer}} = L_P \times \pi \times OD$$

NB: Very much an assumption

Parameters	Value	Unit	Description
J_s	1414	W/m ²	Solar radiation intensity (constant)
f	1.5		Volatility factor
ϵ	0.8		Emittance (Black point)
a/e	1.12		Emittance (Black point)
Q	1 W		Internal power
I_{E}	0.628		Fraction of sunlit orbit
J_{E}	232	W/m ²	
J_{P}	232	W/m ²	Planetary radiation intensity
$J_{\text{A, surface}}$	0.048639	m ²	
$J_{\text{A, solar}}$	0.0316	m ²	
$J_{\text{A, albedo}}$	0.003	m ²	
$J_{\text{A, planetary}}$	0.003	m ²	
J_{B}	451.066	W/m ²	
B	30 °		
SB	5.67E-08	Wm ⁻² K ⁻⁴	
T	275.6199	K	
$T(C)$	3.30869	°C	

Parameters	Value	Unit	Description
J_s	1414	W/m ²	Solar radiation intensity (constant)
f	1.5		Volatility factor
ϵ	0.8		Emittance (Black point)
a/e	1.12		Emittance (Black point)
Q	1 W		Internal power
I_{E}	0.628		Fraction of sunlit orbit
J_{E}	232	W/m ²	
J_{P}	232	W/m ²	Planetary radiation intensity
$J_{\text{A, surface}}$	0.04863978	m ²	
$J_{\text{A, solar}}$	0.03169717	m ²	
$J_{\text{A, albedo}}$	0.00300221	m ²	
$J_{\text{A, planetary}}$	0.00300221	m ²	
J_{B}	563.8325	W/m ²	
B	10 °		
SB	5.67E-08	Wm ⁻² K ⁻⁴	
T	275.715521	K	
$T(C)$	2.5056262	°C	

[illegible]

Parameter	Unit	Description
1. Solar irradiance	14.0 W/m ²	Solar irradiance
2. Air velocity	0.69 m/s	Air velocity
3. Humidity ratio	0.95	Humidity ratio
4. Air density	0.8 kg/m ³	Air density
5. Air specific heat	1.12 kJ/kg·K	Air specific heat
6. Air thermal conductivity	1 W/m·K	Air thermal conductivity
7. Air thermal diffusivity	1 × 10 ⁻⁷ m ² /s	Air thermal diffusivity
8. Air thermal capacity	237 J/m ² ·K	Air thermal capacity
9. Air thermal resistance	550 K	Air thermal resistance
10. Air thermal conductance	232 W/m ²	Air thermal conductance
11. Air thermal capacitance	0.048639 m ²	Air thermal capacitance
12. Air thermal inductance	0.01316 m ²	Air thermal inductance
13. Air thermal resistance	0.003 m ²	Air thermal resistance
14. Air thermal capacitance	0.003 m ²	Air thermal capacitance
15. Air thermal inductance	380.972 W/m ²	Air thermal inductance
16. Air thermal resistance	70 °C	Air thermal resistance
17. Air thermal capacitance	5.67 × 10 ⁻⁸ W/m ² ·K	Air thermal capacitance
18. Air thermal inductance	30.3864 K	Air thermal inductance
19. Air thermal resistance	30.3864 K	Air thermal resistance

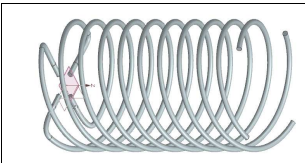
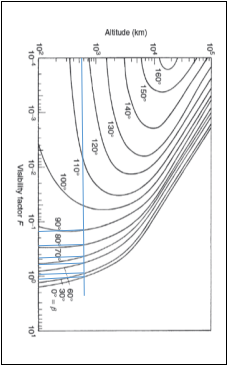
Parameter/Value	Ion Intensity (constant)
15 F	34.4
19 F	0.7
a (black scan)	0.95
b (black scan)	1.2
e	0.1
16 O	1.5
17 O	0.1
F E	1
12 C	1
13 C	2.3
Orth. alt.	558
12 P	2.3
A. surface	0.046635
A. polar	0.01314
A. libero	0.001
A. libero	0.001
A. libero	0.001
12 H	158.077
B	86
5B	5.67E-07

Unit	Description
W/m ²	Solar radiation intensity (constant)
	Visibility factor
	Absorbance (Black paint)
	Emissivity (Black paint)
W	Internal power
%	Fraction of planet orbit
W/m ²	
km	
W/m ²	Planetary radiation intensity
m ²	
m ²	
m ²	
W/m ²	
Wm ² K ⁻⁴	
K	
°C	

Parameter/Value	Unit	Description
15	14.14 W/m ²	Solar radiation intensity (constant)
F	0.15	Visibility factor
a	0/95	Absorbance (Black paint)
e	0.8	Emissance (Black paint)
3/e	1.12 W	Internal power
1.E	1 %	Fraction of sunlight orbit
1p	237 W/m ²	
	550 km	
Orbit alt.	232 W/m ²	
1/p	0.006839 m ²	Planetary radiation intensity
A_solar	0.01316 m ²	
A_albedo	0.003 m ²	
A_receiver	0.003 m ²	
Albedo	0.053	
B	114.633 W/m ²	
80 °		
58	5.67e-08 W/m ² K ⁴	

3.
7.5.1E-09

Parameters	Value	Unit	Description
J_s	1414	W/m ²	Solar radiation intensity (constant)
f_s	1.5		Volatility factor
f	0.75		Volatility factor (Black paint)
e	0.8		Emissance (Black paint)
a/e	1.12		
Q	1 W		Internal power
f	0.6277 %		Fraction of sunlit orbit
f_s	224 W/m ²		
f_p	224 W/m ²		Planetary radiation intensity
J_p	0.048639 m ²		
A, surface	0.01316 m ²		
A, solar	0.003 m ²		
A, albedo	0.003 m ²		
A, planet	0.003 m ²		
A, planet	509.04 W/m ²		
J_a	0 °		
B	5.67E-08 Wm ⁻² K ⁻⁴		
SB			
T	274.9384 K		
T (C)	1.768972 °C		



Area Calculations:	
P	0.000955 m
N	0.00348 m
OD	2.5
ID	0.04391 m
MO	0.04009
A, surface	0.042
LL	0.0353984
LT	0.08996
Outer Surface Area:	
A Gals	0.01241 m ²
A albedo and planet	0.048639 m ²
$And - And$	0.003
Δ SOLAR	
Half surface A	0.024105
Half surface B	0.024105
Average of A's	0.01316 m ²

$$J_o = J_o A F$$

$$f_s = \frac{1}{180^\circ} \cos^{-1} \left[\frac{(h^2 + 2RB)^{1/2}}{(R + h) \cos \theta} \right] \text{ if } \theta = 0 \text{ if } |\theta| \geq 90^\circ$$

$$\theta^* = \sin^{-1} \left[\frac{R}{R + h} \right] \text{ } 0^\circ \leq \theta^* \leq 90^\circ$$

$$\sigma = \text{Stefan-Boltzmann constant } (5.67 \times 10^{-8} W m^{-2} I$$

$$1. \quad 2387797 \quad 2. \quad 4.44E+08 \quad 5.09E+778$$

$$T^4 = \frac{A_{outer} J_o}{A_{sur} f_{acc} \sigma} + \frac{Q}{A_{sur} f_{acc} \sigma} + \frac{A_{under} J_o}{A_{st}}$$

$$| \theta | < \theta^*$$

$$(\epsilon - 4)$$

$$T = \frac{A_{outer} J_o}{A_{sur} f_{acc} \sigma} + \frac{A_{under} J_o}{A_{st}} \left(\frac{\alpha}{\epsilon} \right) (f)$$

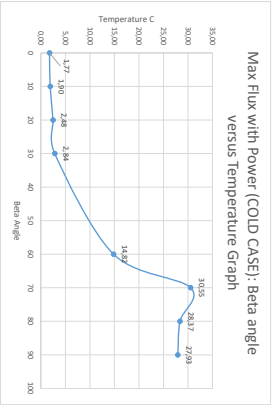
$$L_1 = (C2\pi r)^2 + p^2 j_{\text{vac}}$$

$$L_T = |L_1 \times N$$

$$A_{outer} = L_T \times \pi \times OD$$

NB: Very much an assumption

Parameters	Value	Unit	Description
J_s	1414	W/m ²	Solar radiation intensity (constant)
f_s	1.5		Volatility factor
f	0.75		Volatility factor (Black paint)
e	0.8		Emissance (Black paint)
a/e	1.12		
Q	1 W		Internal power
f	0.648 %		Fraction of sunlit orbit
f_s	224 W/m ²		
J_p	224 W/m ²		Planetary radiation intensity
A, surface	0.048639 m ²		
A, solar	0.01316 m ²		
A, albedo	0.003 m ²		
A, planet	0.003 m ²		
A, planet	404.404 W/m ²		
J_a	30 °		
B	5.67E-08 Wm ⁻² K ⁻⁴		
SB			
T	275.0834 K		
T (C)	2.860035 °C		



Parameters	Value	Unit	Description
J_s	1414	W/m ²	Solar radiation intensity (constant)
f_s	1.5		Volatility factor
f	0.75		Volatility factor (Black paint)
e	0.8		Emissance (Black paint)
a/e	1.12		
Q	1		Internal power
f	0.6364 %		Fraction of sunlit orbit
f_s	224 W/m ²		
J_p	224 W/m ²		Planetary radiation intensity
A, surface	0.048639 m ²		
A, solar	0.01316 m ²		
A, albedo	0.003 m ²		
A, planet	0.003 m ²		
A, planet	494.9 W/m ²		
J_a	20 °		
B	5.67E-08 Wm ⁻² K ⁻⁴		
SB			
T	275.6315 K		
T (C)	2.479597 °C		

$$J_o = J_o A F$$

$$f_s = \frac{1}{180^\circ} \cos^{-1} \left[\frac{(h^2 + 2RB)^{1/2}}{(R + h) \cos \theta} \right] \text{ if } \theta = 0 \text{ if } |\theta| \geq 90^\circ$$

$$\theta^* = \sin^{-1} \left[\frac{R}{R + h} \right] \text{ } 0^\circ \leq \theta^* \leq 90^\circ$$

$$\sigma = \text{Stefan-Boltzmann constant } (5.67 \times 10^{-8} W m^{-2} I$$

$$1. \quad 2387797 \quad 2. \quad 4.44E+08 \quad 5.09E+778$$

$$T^4 = \frac{A_{outer} J_o}{A_{sur} f_{acc} \sigma} + \frac{Q}{A_{sur} f_{acc} \sigma} + \frac{A_{under} J_o}{A_{st}}$$

Parameters	Value	Unit	Description
J_s	1414	W/m ²	Solar radiat
f_s	1.45		Volatility fa
f	0.75		Volatility fa
e	0.8		Emissance
a/e	1.12		
Q	1 W		Internal po
f	0.6297 %		Fraction of
f_s	224 W/m ²		
J_p	224 W/m ²		Planetary r
A, surface	0.048639 m ²		
A, solar	0.01316 m ²		
A, albedo	0.003 m ²		
A, planet	0.003 m ²		
A, planet	502.1335 W/m ²		
J_a	10 °		
B	5.67E-08 Wm ⁻² K ⁻⁴		
SB			
T	275.0834 K		
T (C)	1.960032 °C		

$$1. \quad 2387797 \quad 2. \quad 4.44E+08$$

Parameter	Value	Unit	Description
J_s	1414	W/m ²	Solar radiation intensity (constant)
f	0.9		Visibility factor
ϵ	0.8		Emissivity (Black paint)
a/e	0.8		Emissance (Black paint)
q/e	1.12		
Q	1 W		Internal power
f	0.785 %		Fraction of sunlit orbit
J_e	224	W/m ²	
J_p	224	W/m ²	Planetary radiation intensity
J_p	0.048639	m ²	
A_{surface}	0.01316	m ²	
A_{Solar}	0.003	m ²	
A_{Albedo}	0.003	m ²	
A_{Planetar}	407.232	W/m ²	
J_p	407.232	W/m ²	
B	60 °		
S_B	5.67E-08	Wm ⁻² K ⁻⁴	
T	287.748	K	
$T(^{\circ}\text{C})$	14.6445	°C	

Parameter	Value	Unit	Description
J_s	1414	W/m ²	Solar radiation intensit
f	0.69		Visibility factor
ϵ	0.8		Emissivity (Black paint)
a/e	0.8		Emissance (Black paint)
q/e	1.12		
Q	1 W		Internal power
f	1 %		Fraction of sunlit orbit
J_e	227	W/m ²	
J_p	224	W/m ²	Planetary radiation intensity
J_p	0.048639	m ²	
A_{surface}	0.01316	m ²	
A_{Solar}	0.003	m ²	
A_{Albedo}	0.003	m ²	
A_{Planetar}	351.2376	W/m ²	
J_p	351.2376	W/m ²	
B	70 °		
S_B	5.67E-08	Wm ⁻² K ⁻⁴	
T	304.6986	K	
$T(^{\circ}\text{C})$	30.9495	°C	

Parameter	Value	Unit	Description
J_s	1414	W/m ²	Solar radiation intensity (constant)
f	0.25		Visibility factor
ϵ	0.8		Emissivity (Black paint)
a/e	0.8		Emissance (Black paint)
q/e	1.12		
Q	1 W		Internal power
f	1 %		Fraction of sunlit orbit
J_e	237	W/m ²	
J_p	224	W/m ²	Planetary radiation intensity
J_p	0.048639	m ²	
A_{surface}	0.01316	m ²	
A_{Solar}	0.003	m ²	
A_{Albedo}	0.003	m ²	
A_{Planetar}	148.47	W/m ²	
J_p	148.47	W/m ²	
B	80 °		
S_B	5.67E-08	Wm ⁻² K ⁻⁴	
T	303.555	K	
$T(^{\circ}\text{C})$	30.3055	°C	

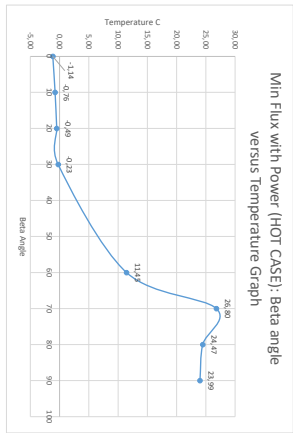
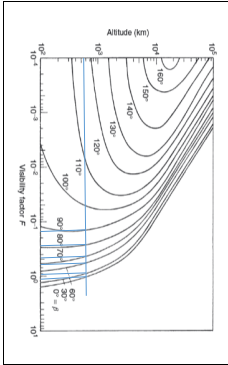
Parameter	Value	Unit	Description
J_s	1414	W/m ²	Solar radiation intensity (constant)
f	0.12		Visibility factor
ϵ	0.8		Emissivity (Black paint)
a/e	0.8		Emissance (Black paint)
q/e	1.12		
Q	1 W		Internal power
f	1 %		Fraction of sunlit orbit
J_e	224	W/m ²	
J_p	224	W/m ²	Planetary radiation intensity
J_p	0.048639	m ²	
A_{surface}	0.01316	m ²	
A_{Solar}	0.003	m ²	
A_{Albedo}	0.003	m ²	
A_{Planetar}	108.171	W/m ²	
J_p	108.171	W/m ²	
B	90 °		
S_B	5.67E-08	Wm ⁻² K ⁻⁴	
T	304.058	K	
$T(^{\circ}\text{C})$	27.2578	°C	

Parameter	Value	Unit	Description
J_s	1414	W/m ²	Solar radiation intensity (constant)
f	0.12		Visibility factor
ϵ	0.8		Emissivity (Black paint)
a/e	0.8		Emissance (Black paint)
q/e	1.12		
Q	1 W		Internal power
f	1 %		Fraction of sunlit orbit
J_e	224	W/m ²	
J_p	224	W/m ²	Planetary radiation intensity
J_p	0.048639	m ²	
A_{surface}	0.01316	m ²	
A_{Solar}	0.003	m ²	
A_{Albedo}	0.003	m ²	
A_{Planetar}	108.171	W/m ²	
J_p	108.171	W/m ²	
B	90 °		
S_B	5.67E-08	Wm ⁻² K ⁻⁴	
T	304.058	K	
$T(^{\circ}\text{C})$	27.2578	°C	

Parameter	Value	Unit	Description
J_s	1414	W/m ²	Solar radiation intensity (constant)
f	0.25		Visibility factor
ϵ	0.8		Emissivity (Black paint)
a/e	0.8		Emissance (Black paint)
q/e	1.12		
Q	1 W		Internal power
f	1 %		Fraction of sunlit orbit
J_e	237	W/m ²	
J_p	224	W/m ²	Planetary radiation intensity
J_p	0.048639	m ²	
A_{surface}	0.01316	m ²	
A_{Solar}	0.003	m ²	
A_{Albedo}	0.003	m ²	
A_{Planetar}	148.47	W/m ²	
J_p	148.47	W/m ²	
B	80 °		
S_B	5.67E-08	Wm ⁻² K ⁻⁴	
T	303.555	K	
$T(^{\circ}\text{C})$	30.3055	°C	

Parameter	Value	Unit	Description
J_s	1414	W/m ²	Solar radiation intensity (constant)
f	0.12		Visibility factor
ϵ	0.8		Emissivity (Black paint)
a/e	0.8		Emissance (Black paint)
q/e	1.12		
Q	1 W		Internal power
f	1 %		Fraction of sunlit orbit
J_e	224	W/m ²	
J_p	224	W/m ²	Planetary radiation intensity
J_p	0.048639	m ²	
A_{surface}	0.01316	m ²	
A_{Solar}	0.003	m ²	
A_{Albedo}	0.003	m ²	
A_{Planetar}	108.171	W/m ²	
J_p	108.171	W/m ²	
B	90 °		
S_B	5.67E-08	Wm ⁻² K ⁻⁴	
T	304.058	K	
$T(^{\circ}\text{C})$	27.2578	°C	

Parameters	Value	Unit	Description
J_s	1332	W/m ²	Solar radiation intensity (constant)
f	1.5		Velocity factor
e	0.8		Emissance (Black paint)
a/e	1.12		Emissance (Black paint)
Q	1 W		Internal power
f	0.6277 %		Fraction of sunlit orbit
J_p	232	W/m ²	Planetary radiation intensity
J_p	232	W/m ²	Planetary radiation intensity
A, surface	0.048639	m ²	
A, solar	0.01316	m ²	
A, albedo	0.003	m ²	
A, planetary	0.003	m ²	
A, albedo	0.003	m ²	
B	539.46	W/m ²	
B	0		
B	5.67E-08	Wm ⁻² K ⁻⁴	
T	272.0083	K	
T (C)	-1.56975	°C	



Parameter	Value	Unit	Description
J_s	1332	W/m ²	Solar radiation intensity (constant)
f	0.9		Visibility factor
τ	0.99		Atmospheric transmittance (Black paint)
ϵ	0.8		Emissance (Black paint)
α/ϵ	1.12		
Q	1 W		Internal power
f	0.785 %		Fraction of sunlit orbit
J_e	232	W/m ²	
J_p	232	W/m ²	
J_0	0.00639	m ²	Planetary radiation intensity
A_s	0.01316	m ²	
A_s	0.01316	m ²	
A_s	0.003	m ²	
A_s	0.003	m ²	
J_0	419.58	W/m ²	
J_0	60 °		
B	5.67E-08	Wm ⁻² K ⁻⁴	
T	288.5975	K	
T	11.47+26	°C	

Parameter	Value	Unit	Description
J_s	1332	W/m ²	Solar radiation intensit
f	0.69		Visibility factor
τ	0.99		Atmospheric transmittance (Black paint)
ϵ	0.8		Emissance (Black paint)
α/ϵ	1.12		
Q	1 W		Internal power
f	1 %		Fraction of sunlit orbit
J_e	232	W/m ²	
J_p	232	W/m ²	
J_0	0.00639	m ²	Planetary radiation intensity
A_s	0.01316	m ²	
A_s	0.01316	m ²	
A_s	0.003	m ²	
A_s	0.003	m ²	
J_0	358.4412	W/m ²	
J_0	70 °		
B	5.67E-08	Wm ⁻² K ⁻⁴	
T	289.5511	K	
T	26.00112	°C	

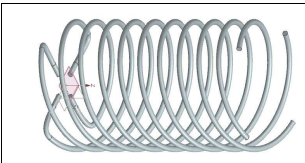
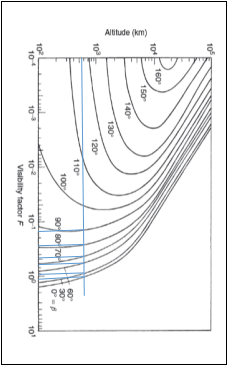
Parameter	Value	Unit	Description
J_s	1332	W/m ²	Solar radiation intensity (constant)
f	0.25		Visibility factor
τ	0.99		Atmospheric transmittance (Black paint)
ϵ	0.8		Emissance (Black paint)
α/ϵ	1.12		
Q	1 W		Internal power
f	1 %		Fraction of sunlit orbit
J_e	232	W/m ²	
J_p	232	W/m ²	
J_0	0.00639	m ²	Planetary radiation intensity
A_s	0.01316	m ²	
A_s	0.01316	m ²	
A_s	0.003	m ²	
A_s	0.003	m ²	
J_0	140.85	W/m ²	
J_0	80 °		
B	5.67E-08	Wm ⁻² K ⁻⁴	
T	279.517	K	
T	26.0659	°C	

Parameter	Value	Unit	Description
J_s	1332	W/m ²	Solar radiation intensity (constant)
f	0.12		Visibility factor
τ	0.99		Atmospheric transmittance (Black paint)
ϵ	0.8		Emissance (Black paint)
α/ϵ	1.12		
Q	1 W		Internal power
f	1 %		Fraction of sunlit orbit
J_e	232	W/m ²	
J_p	232	W/m ²	
J_0	0.00639	m ²	Planetary radiation intensity
A_s	0.01316	m ²	
A_s	0.003	m ²	
A_s	0.003	m ²	
J_0	107.892	W/m ²	
J_0	90 °		
B	5.67E-08	Wm ⁻² K ⁻⁴	
T	293.1408	K	
T	23.95079	°C	

Parameter	Value	Unit	Description
J_s	1332	W/m ²	Solar radiation intensity (constant)
f	0.12		Visibility factor
τ	0.99		Atmospheric transmittance (Black paint)
ϵ	0.8		Emissance (Black paint)
α/ϵ	1.12		
Q	1 W		Internal power
f	1 %		Fraction of sunlit orbit
J_e	232	W/m ²	
J_p	232	W/m ²	
J_0	0.00639	m ²	Planetary radiation intensity
A_s	0.01316	m ²	
A_s	0.003	m ²	
A_s	0.003	m ²	
J_0	107.892	W/m ²	
J_0	90 °		
B	5.67E-08	Wm ⁻² K ⁻⁴	
T	293.1408	K	
T	23.95079	°C	

Parameter	Value	Unit	Description
J_s	1332	W/m ²	Solar radiation intensity (constant)
f	0.12		Visibility factor
τ	0.99		Atmospheric transmittance (Black paint)
ϵ	0.8		Emissance (Black paint)
α/ϵ	1.12		
Q	1 W		Internal power
f	1 %		Fraction of sunlit orbit
J_e	232	W/m ²	
J_p	232	W/m ²	
J_0	0.00639	m ²	Planetary radiation intensity
A_s	0.01316	m ²	
A_s	0.003	m ²	
A_s	0.003	m ²	
J_0	107.892	W/m ²	
J_0	90 °		
B	5.67E-08	Wm ⁻² K ⁻⁴	
T	293.1408	K	
T	23.95079	°C	

Parameters	Value	Unit	Description
J_s	1332	W/m ²	Solar radiation intensity (constant)
f	1.5		Volatility factor
ρ	0.75		Emittance (Black paint)
ϵ	0.8		Emittance (Black paint)
a/e	1.12		Internal Power
Q	1 W		Fraction of sunlight orbit
f	0.6277 %		
J_{orbit}	224	W/m ²	
$J_{\text{orbit alt.}}$	224	W/m ²	Planetary radiation intensity
J_p	0.048639	m ²	
A, surface	0.01316	m ²	
A, solar	0.003	m ²	
A, albedo	0.003	m ²	
A, planet	0.003	m ²	
A, planet	479.52	W/m ²	
J_{orbit}	0 °		
B	5.67E-08	Wm ⁻² K ⁻⁴	
SB	271.3399	K	
T	271.3399	K	
T (C)	-1.68034	°C	



Area Calculations:	
P	0.000955 m
N	0.00348 m
OD	2.5
ID	0.04391 m
W	0.04009
A, surface	0.042
LL	0.035394
LT	0.08996
Outer Surface Area:	
4 coils	0.01241 m ²
A, albedo and planet	0.048639 m ²
And - And	0.003
A, solid	
half surface A	0.024102
half surface B	0.024102
Average of A's	0.01316 m ²

$$J_o = J_o A^P$$

$$f_e = \frac{1}{180^\circ} \cos^{-1} \left[\frac{(R^2 + 2Rh)}{(R + h) \cos \theta} \right] \text{ if } \theta = 0 \text{ if } |\theta| \geq \theta^*$$

$$\theta^* = \sin^{-1} \left[\frac{R}{R + h} \right] \text{ } 0^\circ \leq \theta^* \leq 90^\circ$$

$$\sigma = \text{Stefan-Boltzmann constant } (5.67 \times 10^{-8} \text{ W m}^{-2} \text{ } ^\circ\text{K}^{-2})$$

$$1. \quad 23877987 \quad 2. \quad 4.44\text{E-08} \quad 3. \quad 4.79782019$$

$$T^4 = \frac{A_{\text{outer}} J_o}{A_{\text{sur}} f_{\text{acc}} \sigma} + \frac{Q}{A_{\text{sur}} f_{\text{acc}} \sigma} + \frac{A_{\text{outer}} J_o}{A_{\text{st}}}$$

$$| \theta | < \theta^*$$

$$(\kappa-4)$$

$$\frac{3}{w f_{\text{acc}} \sigma} + A_{\text{solid}} J_o \left(\frac{\alpha}{\epsilon} \right) (f)$$

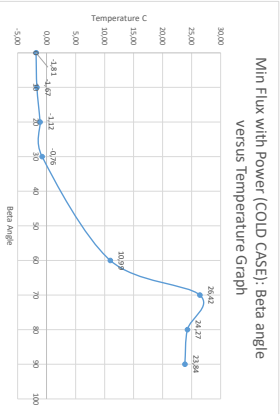
$$L_1 = (C \pi r)^2 + p^2 j_{\text{vac}}$$

$$L_T = |L_1 \times N$$

$$A_{\text{outer}} = L_T \times \pi \times OD$$

NB: Very much an assumption

Parameters	Value	Unit	Description
J_s	1332	W/m ²	Solar radiation intensity (constant)
f	1.5		Volatility factor
ρ	0.75		Emittance (Black paint)
ϵ	0.8		Emittance (Black paint)
a/e	1.12		Internal Power
Q	1 W		Fraction of sunlight orbit
f	0.649 %		
J_{orbit}	224	W/m ²	
$J_{\text{orbit alt.}}$	224	W/m ²	Planetary radiation intensity
J_p	0.048639	m ²	
A, surface	0.01316	m ²	
A, solar	0.003	m ²	
A, albedo	0.003	m ²	
A, planet	0.003	m ²	
A, planet	380.952	W/m ²	
J_{orbit}	30 °		
B	5.67E-08	Wm ⁻² K ⁻⁴	
SB	271.3399	K	
T	271.3399	K	
T (C)	-1.67803	°C	



Unit	Description
W/m ²	Solar radiation intensity (constant)
	Volatility factor
	Emittance (Black paint)
	Emittance (Black paint)
	Internal Power
%	Fraction of sunlight orbit
W/m ²	
W/m ²	
W/m ²	Planetary radiation intensity
m ²	
m ²	
m ²	
m ²	
W/m ²	
Wm ⁻² K ⁻⁴	
K	
°C	

$$1. \quad 23877987 \quad 2. \quad 4.44\text{E-08} \quad 3. \quad 4.79782019$$

$$T^4 = \frac{A_{\text{outer}} J_o}{A_{\text{sur}} f_{\text{acc}} \sigma} + \frac{Q}{A_{\text{sur}} f_{\text{acc}} \sigma} + \frac{A_{\text{outer}} J_o}{A_{\text{st}}}$$

Parameters	Value	Unit	Description
J_s	1332	W/m ²	Solar radiat
f	1.45		Volatility fa
ρ	0.75		Emittance
ϵ	0.8		Emittance
a/e	1.12		Internal po
Q	1 W		Fraction of
f	0.6298 %		
J_{orbit}	224	W/m ²	
$J_{\text{orbit alt.}}$	224	W/m ²	Planetary r
J_p	0.048639	m ²	
A, surface	0.01316	m ²	
A, solar	0.003	m ²	
A, albedo	0.003	m ²	
A, planet	0.003	m ²	
A, planet	473.193	W/m ²	
J_{orbit}	10 °		
B	5.67E-08	Wm ⁻² K ⁻⁴	
SB	271.4286	K	
T	271.4286	K	
T (C)	-1.67742	°C	

Parameter	Value	Unit	Description
J_s	1332	W/m ²	Solar radiation intensity (constant)
f	0.9		Visibility factor
τ	0.99		Atmospheric transmittance (Black paint)
ϵ	0.8		Emissance (Black paint)
a/e	1.12		
Q	1 W		Internal power
f	0.785 %		Fraction of sunlit orbit
J_e	223	W/m ²	
J_p	224	W/m ²	Planetary radiation intensity
J_p	0.048639	m ²	
A_{surface}	0.01316	m ²	
A_{solar}	0.003	m ²	
A_{albedo}	0.003	m ²	
A_{planetar}	388.616	W/m ²	
J_p	60 °		
B	5.67E-08	Wm ⁻² K ⁻⁴	
T	288.1384	K	
T (C)	10.9841	°C	

Parameter	Value	Unit	Description
J_s	1332	W/m ²	Solar radiation intensit
f	0.69		Visibility factor
τ	0.99		Atmospheric transmittance (Black paint)
ϵ	0.8		Emissance (Black paint)
a/e	1.12		
Q	1 W		Internal power
f	1 %		Fraction of sunlit orbit
J_e	227	W/m ²	
J_p	224	W/m ²	Planetary radiation intensity
J_p	0.048639	m ²	
A_{surface}	0.01316	m ²	
A_{solar}	0.003	m ²	
A_{albedo}	0.003	m ²	
A_{planetar}	380.8688	W/m ²	
J_p	70 °		
B	5.67E-08	Wm ⁻² K ⁻⁴	
T	299.5654	K	
T (C)	26.4165	°C	

Parameter	Value	Unit	Description
J_s	1332	W/m ²	Solar radiation intensity (constant)
f	0.25		Visibility factor
τ	0.99		Atmospheric transmittance (Black paint)
ϵ	0.8		Emissance (Black paint)
a/e	1.12		
Q	1 W		Internal power
f	1 %		Fraction of sunlit orbit
J_e	237	W/m ²	
J_p	224	W/m ²	Planetary radiation intensity
J_p	0.048639	m ²	
A_{surface}	0.01316	m ²	
A_{solar}	0.003	m ²	
A_{albedo}	0.003	m ²	
A_{planetar}	139.86	W/m ²	
J_p	80 °		
B	5.67E-08	Wm ⁻² K ⁻⁴	
T	297.4248	K	
T (C)	24.2728	°C	

Parameter	Value	Unit	Description
J_s	1332	W/m ²	Solar radiation intensity (constant)
f	0.12		Visibility factor
τ	0.99		Atmospheric transmittance (Black paint)
ϵ	0.8		Emissance (Black paint)
a/e	1.12		
Q	1 W		Internal power
f	1 %		Fraction of sunlit orbit
J_e	224	W/m ²	
J_p	224	W/m ²	Planetary radiation intensity
J_p	0.048639	m ²	
A_{surface}	0.01316	m ²	
A_{solar}	0.003	m ²	
A_{albedo}	0.003	m ²	
A_{planetar}	101.898	W/m ²	
J_p	90 °		
B	5.67E-08	Wm ⁻² K ⁻⁴	
T	286.6912	K	
T (C)	23.8422	°C	

Parameter	Value	Unit	Description
J_s	1332	W/m ²	Solar radiation intensity (constant)
f	0.12		Visibility factor
τ	0.99		Atmospheric transmittance (Black paint)
ϵ	0.8		Emissance (Black paint)
a/e	1.12		
Q	1 W		Internal power
f	1 %		Fraction of sunlit orbit
J_e	224	W/m ²	
J_p	224	W/m ²	Planetary radiation intensity
J_p	0.048639	m ²	
A_{surface}	0.01316	m ²	
A_{solar}	0.003	m ²	
A_{albedo}	0.003	m ²	
A_{planetar}	101.898	W/m ²	
J_p	90 °		
B	5.67E-08	Wm ⁻² K ⁻⁴	
T	286.6912	K	
T (C)	23.8422	°C	

Parameter	Value	Unit	Description
J_s	1332	W/m ²	Solar radiation intensity (constant)
f	0.12		Visibility factor
τ	0.99		Atmospheric transmittance (Black paint)
ϵ	0.8		Emissance (Black paint)
a/e	1.12		
Q	1 W		Internal power
f	1 %		Fraction of sunlit orbit
J_e	224	W/m ²	
J_p	224	W/m ²	Planetary radiation intensity
J_p	0.048639	m ²	
A_{surface}	0.01316	m ²	
A_{solar}	0.003	m ²	
A_{albedo}	0.003	m ²	
A_{planetar}	101.898	W/m ²	
J_p	90 °		
B	5.67E-08	Wm ⁻² K ⁻⁴	
T	286.6912	K	
T (C)	23.8422	°C	