

Constants	Standard	Decibels	
Boltzmann Constant, k	1.38E-23	J/K	-228.60 dB
Speed of Light in Vacuum, c	3.00E+08	m/s	
Earth Radius, RE	6378.14	km	
Earth Mu	3.99E+05	km <sup>3</sup> /s <sup>2</sup>	
<b>Frequency</b>			
Frequency of Signal, f	437	MHz	
Wavelength of Signal, λ	0.686	m	
<b>Orbit</b>			
Altitude, h	400	km	400 km ← Orbital altitude during pass goes here
Minimum Elevation Angle, φ	60	deg	60 deg ← Minimum Elevation Angle Goes Here
Line of Sight Range, S	457.4	km	
Orbital Period, T	92.6	min	
S/C Velocity in Circular Orbit, v	7.7	km/s	
S/C Velocity Relative to Ground Station, vr	3.8	km/s	
Maximum Estimated Doppler Shift, df	5.6	kHz	
<b>Transmitter</b>			
Transmitting Antenna Gain, Gt	3.98		6.00 dB ← Transmitter antenna gain goes here
Transmitter Power, P	13.9794000867	dBW	25.000 W ← Transmitter power goes here
ERP, W	99.527	W	19.98 dBW
<b>Path Losses</b>			
Link Loss (or free-space loss), Ls	1.4E-14		-138.5 dB
Atmospheric Attenuation, La	0.631		-2.0 dB ← Atmospheric attenuation goes here
<b>Receiver</b>			
Gain of Receiving Antenna, Gr	3.98		6.0 dB ← Receiver Antenna Gain Goes Here
Polarization Losses, Lp	0.89		-0.5 dB ← Anticipated polarization loss goes here
Receiver System Temperature, Ts	27.5	dBK	560.00 K ← Receiver system noise temperature goes here
Receiver Noise Factor/Figure	3.162		5 dB ← Receiver noise figure goes here
Gain of LNA	1000.00		30 dB ← Low Noise Amplifier (LNA) gain goes here
LNA Noise Figure	1.175		0.7 dB ← Low Noise Amplifier (LNA) noise figure goes here
Bandwidth, B	44.0	dBHz	25.0 kHz ← Receiver bandwidth goes here
System Noise, N	8.38E-16	W	-157.14 dBW
<b>Signal Encoding / Convolution</b>			
Bit Rate, R	2400.00	bps	2400.00 bps ← Data rate goes here
<b>Link Quality</b>			
Received Power, Carrier Power, C	3.18E-09	W	-84.99 dBW
Carrier to Noise, C/N	3790917.920		65.79 dB
Eb/N0	39488728.3		75.96 dB
Minimum Eb/N0	10.0		10.00 dB
Margin, M	35539655.50		65.96 dB

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Original spreadsheet courtesy of Cornell University, Manchester, ZHM3@Cornell.Edu, Atchison, JAA73@Cornell.Edu