

INPUT - LINK BUDGET

Cubesat Ka-Band Transceiver	
Transmit power (W)	7
Antenna gain (dB)	26
LNA gain (dB)	0
LNA noise figure (dB)	0
Preamp gain (dB)	30
Preamp noise figure (dB)	1.21
Receiver sensitivity (dBm)	-98
Line and connector attenuation (dB)	0

Ground Station Ka-Band Transceiver	
Ground Station Altitude (m/ASL)	899
Transmit power (W)	25
Antenna gain (dB)	85.9
LNA gain (dB)	1
LNA noise figure (dB)	0.88
Preamp gain (dB)	30
Preamp noise figure (dB)	1
Receiver sensitivity (dBm)	-110
Line and connector attenuation (dB)	0

Status		
Lunar Derby	Downlink	YES
	Uplink	YES
Deep Space Derby	Downlink	YES
	Uplink	YES

Cubesat UHF Transceiver	
Transmit power (W)	1
Antenna gain (dB)	8
LNA gain (dB)	0
LNA noise figure (dB)	0
Preamp gain (dB)	30
Preamp noise figure (dB)	1.12
Receiver sensitivity (dBm)	-98
Line and connector attenuation (dB)	0

Ground Station UHF Transceiver	
Ground Station Altitude (m/ASL)	899
Transmit power (W)	25
Antenna gain (dB)	85.9
LNA gain (dB)	0
LNA noise figure (dB)	0.88
Preamp gain (dB)	30
Preamp noise figure (dB)	1
Receiver sensitivity (dBm)	-110
Line and connector attenuation (dB)	0

Status		
Lunar Derby	Downlink	YES
	Uplink	YES
Deep Space Derby	Downlink	YES
	Uplink	YES

Deep Space Derby Link Budget

Spacecraft (Alpha Cubesat)	Value
Satellite Alt. (M)	4000000000
Transmit frequency (Hz)	3.2E+10
Transmit power (W)	7
Antenna gain (dB)	26
LNA gain (dB)	0
LNA noise figure (dB)	0
Preamp gain (dB)	30
Preamp noise figure (dB)	1.21
Receiver sensitivity (dBm)	-97.5
Line and connector attenuation (dB)	0
Tx Gain (dB)	64.45
Rx Gain (dB)	152.29
Detection Threshold (dB)	7
Demodulation Threshold (dB)	12

Ground Station (DSS-25)	Value
Ground Station Alt. (M)	899
Transmit frequency (Hz)	32000000000
Transmit power (W)	25
Antenna gain (dB)	85.87
LNA gain (dB)	1
LNA noise figure (dB)	0.88
Preamp gain (dB)	30
Preamp noise figure (dB)	1
Receiver sensitivity (dBm)	-110
Line and connector attenuation (dB)	0
Tx Gain (dB)	129.8494001
Rx Gain (dB)	199.47
Detection Threshold (dB)	3
Demodulation Threshold (dB)	9

PROPAGATION LOSS			DOWNLINK				UPLINK			
Elevation	Distance (M)	FSPL	Rx signal	Link Budget	Detect	Demod	Rx signal	Link Budget	Detect	Demod
0	4,006,385,196	-254.608	-190.157	9.313	YES	YES	-124.759	27.531	YES	YES
1	4,006,274,005	-254.608	-190.157	9.313	YES	YES	-124.758	27.532	YES	YES
2	4,006,162,838	-254.608	-190.157	9.313	YES	YES	-124.758	27.532	YES	YES
3	4,006,051,729	-254.607	-190.156	9.314	YES	YES	-124.758	27.532	YES	YES
4	4,005,940,713	-254.607	-190.156	9.314	YES	YES	-124.759	27.531	YES	YES
5	4,005,829,823	-254.607	-190.156	9.314	YES	YES	-124.759	27.531	YES	YES
6	4,005,719,093	-254.607	-190.156	9.314	YES	YES	-124.757	27.533	YES	YES
7	4,005,608,557	-254.606	-190.155	9.315	YES	YES	-124.757	27.533	YES	YES
8	4,005,498,249	-254.606	-190.155	9.315	YES	YES	-124.757	27.533	YES	YES
9	4,005,388,201	-254.606	-190.155	9.315	YES	YES	-124.756	27.534	YES	YES
10	4,005,278,449	-254.606	-190.155	9.315	YES	YES	-124.756	27.534	YES	YES
11	4,005,169,024	-254.605	-190.154	9.316	YES	YES	-124.756	27.534	YES	YES
12	4,005,059,962	-254.605	-190.154	9.316	YES	YES	-124.756	27.534	YES	YES
13	4,004,951,294	-254.605	-190.154	9.316	YES	YES	-124.756	27.534	YES	YES
14	4,004,843,054	-254.605	-190.154	9.316	YES	YES	-124.755	27.535	YES	YES
15	4,004,735,276	-254.604	-190.153	9.317	YES	YES	-124.755	27.535	YES	YES
16	4,004,627,992	-254.604	-190.153	9.317	YES	YES	-124.755	27.535	YES	YES

17	4,004,521,235	-254.604	-190.153	9.317	YES	YES	-124.755	27.535	YES	YES
18	4,004,415,038	-254.604	-190.153	9.317	YES	YES	-124.754	27.536	YES	YES
19	4,004,309,433	-254.604	-190.153	9.317	YES	YES	-124.754	27.536	YES	YES
20	4,004,204,453	-254.603	-190.152	9.318	YES	YES	-124.754	27.536	YES	YES
21	4,004,100,129	-254.603	-190.152	9.318	YES	YES	-124.754	27.536	YES	YES
22	4,003,996,494	-254.603	-190.152	9.318	YES	YES	-124.753	27.537	YES	YES
23	4,003,893,578	-254.603	-190.152	9.318	YES	YES	-124.753	27.537	YES	YES
24	4,003,791,415	-254.602	-190.151	9.319	YES	YES	-124.753	27.537	YES	YES
25	4,003,690,035	-254.602	-190.151	9.319	YES	YES	-124.753	27.537	YES	YES
26	4,003,589,469	-254.602	-190.151	9.319	YES	YES	-124.753	27.537	YES	YES
27	4,003,489,748	-254.602	-190.151	9.319	YES	YES	-124.752	27.538	YES	YES
28	4,003,390,903	-254.602	-190.151	9.319	YES	YES	-124.752	27.538	YES	YES
29	4,003,292,963	-254.601	-190.150	9.320	YES	YES	-124.752	27.538	YES	YES
30	4,003,195,960	-254.601	-190.150	9.320	YES	YES	-124.752	27.538	YES	YES
31	4,003,099,922	-254.601	-190.150	9.320	YES	YES	-124.752	27.538	YES	YES
32	4,003,004,879	-254.601	-190.150	9.320	YES	YES	-124.751	27.539	YES	YES
33	4,002,910,861	-254.601	-190.150	9.320	YES	YES	-124.751	27.539	YES	YES
34	4,002,817,895	-254.600	-190.149	9.321	YES	YES	-124.751	27.539	YES	YES
35	4,002,726,012	-254.600	-190.149	9.321	YES	YES	-124.751	27.539	YES	YES
36	4,002,635,238	-254.600	-190.149	9.321	YES	YES	-124.751	27.539	YES	YES
37	4,002,545,602	-254.600	-190.149	9.321	YES	YES	-124.750	27.540	YES	YES
38	4,002,457,132	-254.600	-190.149	9.321	YES	YES	-124.750	27.540	YES	YES
39	4,002,369,854	-254.599	-190.148	9.322	YES	YES	-124.750	27.540	YES	YES
40	4,002,283,795	-254.599	-190.148	9.322	YES	YES	-124.750	27.540	YES	YES
41	4,002,198,982	-254.599	-190.148	9.322	YES	YES	-124.750	27.540	YES	YES
42	4,002,115,441	-254.599	-190.148	9.322	YES	YES	-124.749	27.541	YES	YES
43	4,002,033,197	-254.599	-190.148	9.322	YES	YES	-124.749	27.541	YES	YES
44	4,001,952,277	-254.598	-190.147	9.323	YES	YES	-124.749	27.541	YES	YES
45	4,001,872,704	-254.598	-190.147	9.323	YES	YES	-124.749	27.541	YES	YES
46	4,001,794,503	-254.598	-190.147	9.323	YES	YES	-124.749	27.541	YES	YES
47	4,001,717,699	-254.598	-190.147	9.323	YES	YES	-124.749	27.541	YES	YES
48	4,001,642,314	-254.598	-190.147	9.323	YES	YES	-124.748	27.542	YES	YES
49	4,001,568,373	-254.598	-190.147	9.323	YES	YES	-124.748	27.542	YES	YES
50	4,001,495,897	-254.597	-190.146	9.324	YES	YES	-124.748	27.542	YES	YES

51	4,001,424,910	-254.597	-190.146	9.324	YES	YES	-124.748	27.542	YES	YES
52	4,001,355,433	-254.597	-190.146	9.324	YES	YES	-124.748	27.542	YES	YES
53	4,001,287,487	-254.597	-190.146	9.324	YES	YES	-124.748	27.542	YES	YES
54	4,001,221,094	-254.597	-190.146	9.324	YES	YES	-124.747	27.543	YES	YES
55	4,001,156,273	-254.597	-190.146	9.324	YES	YES	-124.747	27.543	YES	YES
56	4,001,093,046	-254.597	-190.146	9.324	YES	YES	-124.747	27.543	YES	YES
57	4,001,031,430	-254.596	-190.145	9.325	YES	YES	-124.747	27.543	YES	YES
58	4,000,971,446	-254.596	-190.145	9.325	YES	YES	-124.747	27.543	YES	YES
59	4,000,913,112	-254.596	-190.145	9.325	YES	YES	-124.747	27.543	YES	YES
60	4,000,856,446	-254.596	-190.145	9.325	YES	YES	-124.747	27.543	YES	YES
61	4,000,801,465	-254.596	-190.145	9.325	YES	YES	-124.747	27.543	YES	YES
62	4,000,748,186	-254.596	-190.145	9.325	YES	YES	-124.746	27.544	YES	YES
63	4,000,696,625	-254.596	-190.145	9.325	YES	YES	-124.746	27.544	YES	YES
64	4,000,646,800	-254.596	-190.145	9.325	YES	YES	-124.746	27.544	YES	YES
65	4,000,598,724	-254.595	-190.145	9.325	YES	YES	-124.746	27.544	YES	YES
66	4,000,552,413	-254.595	-190.144	9.326	YES	YES	-124.746	27.544	YES	YES
67	4,000,507,881	-254.595	-190.144	9.326	YES	YES	-124.746	27.544	YES	YES
68	4,000,465,142	-254.595	-190.144	9.326	YES	YES	-124.746	27.544	YES	YES
69	4,000,424,209	-254.595	-190.144	9.326	YES	YES	-124.746	27.544	YES	YES
70	4,000,385,094	-254.595	-190.144	9.326	YES	YES	-124.746	27.544	YES	YES
71	4,000,347,811	-254.595	-190.144	9.326	YES	YES	-124.746	27.544	YES	YES
72	4,000,312,369	-254.595	-190.144	9.326	YES	YES	-124.745	27.545	YES	YES
73	4,000,278,781	-254.595	-190.144	9.326	YES	YES	-124.745	27.545	YES	YES
74	4,000,247,056	-254.595	-190.144	9.326	YES	YES	-124.745	27.545	YES	YES
75	4,000,217,204	-254.595	-190.144	9.326	YES	YES	-124.745	27.545	YES	YES
76	4,000,189,235	-254.595	-190.144	9.326	YES	YES	-124.745	27.545	YES	YES
77	4,000,163,157	-254.595	-190.144	9.326	YES	YES	-124.745	27.545	YES	YES
78	4,000,138,979	-254.595	-190.144	9.326	YES	YES	-124.745	27.545	YES	YES
79	4,000,116,707	-254.594	-190.143	9.327	YES	YES	-124.745	27.545	YES	YES
80	4,000,096,348	-254.594	-190.143	9.327	YES	YES	-124.745	27.545	YES	YES
81	4,000,077,910	-254.594	-190.143	9.327	YES	YES	-124.745	27.545	YES	YES
82	4,000,061,397	-254.594	-190.143	9.327	YES	YES	-124.745	27.545	YES	YES
83	4,000,046,815	-254.594	-190.143	9.327	YES	YES	-124.745	27.545	YES	YES
84	4,000,034,168	-254.594	-190.143	9.327	YES	YES	-124.745	27.545	YES	YES

85	4,000,023,460	-254.594	-190.143	9.327	YES	YES	-124.745	27.545	YES	YES
86	4,000,014,694	-254.594	-190.143	9.327	YES	YES	-124.745	27.545	YES	YES
87	4,000,007,874	-254.594	-190.143	9.327	YES	YES	-124.745	27.545	YES	YES
88	4,000,003,001	-254.594	-190.143	9.327	YES	YES	-124.745	27.545	YES	YES
89	4,000,000,076	-254.594	-190.143	9.327	YES	YES	-124.745	27.545	YES	YES
90	3,999,999,101	-254.594	-190.143	9.327	YES	YES	-124.745	27.545	YES	YES

Deep Space Derby Link Budget

Spacecraft (Alpha Cubesat)	Value
Satellite Alt. (M)	4E+09
Transmit frequency (Hz)	4600000000
Transmit power (W)	1
Antenna gain (dB)	8
LNA gain (dB)	0
LNA noise figure (dB)	0
Preamp gain (dB)	30
Preamp noise figure (dB)	1.12
Receiver sensitivity (dBm)	-97.5
Line and connector attenuation (dB)	0
Tx Gain (dB)	38.00
Rx Gain (dB)	134.38
Detection Threshold (dB)	7
Demodulation Threshold (dB)	12

Ground Station (DSS-25)	Value
Ground Station Alt. (M)	899
Transmit frequency (Hz)	4600000000
Transmit power (W)	25
Antenna gain (dB)	85.87
LNA gain (dB)	0
LNA noise figure (dB)	0.88
Preamp gain (dB)	30
Preamp noise figure (dB)	1
Receiver sensitivity (dBm)	-110
Line and connector attenuation (dB)	0
Tx Gain (dB)	129.8494
Rx Gain (dB)	198.47
Detection Threshold (dB)	3
Demodulation Threshold (dB)	9

PROPAGATION LOSS			DOWNLINK				UPLINK			
Elevation	Distance (M)	FSPL	Rx signal	Link Budget	Detect	Demod	Rx signal	Link Budget	Detect	Demod
0	4,006,385,196	-217.760	-179.760	18.710	YES	YES	-87.911	46.469	YES	YES
1	4,006,274,005	-217.760	-179.760	18.710	YES	YES	-87.911	46.469	YES	YES
2	4,006,162,838	-217.760	-179.760	18.710	YES	YES	-87.910	46.470	YES	YES
3	4,006,051,729	-217.759	-179.759	18.711	YES	YES	-87.910	46.470	YES	YES
4	4,005,940,713	-217.759	-179.759	18.711	YES	YES	-87.911	46.469	YES	YES
5	4,005,829,823	-217.759	-179.759	18.711	YES	YES	-87.911	46.469	YES	YES
6	4,005,719,093	-217.759	-179.759	18.711	YES	YES	-87.909	46.471	YES	YES
7	4,005,608,557	-217.759	-179.759	18.711	YES	YES	-87.909	46.471	YES	YES
8	4,005,498,249	-217.758	-179.758	18.712	YES	YES	-87.909	46.471	YES	YES
9	4,005,388,201	-217.758	-179.758	18.712	YES	YES	-87.909	46.471	YES	YES
10	4,005,278,449	-217.758	-179.758	18.712	YES	YES	-87.908	46.472	YES	YES
11	4,005,169,024	-217.758	-179.758	18.712	YES	YES	-87.908	46.472	YES	YES
12	4,005,059,962	-217.757	-179.757	18.713	YES	YES	-87.908	46.472	YES	YES
13	4,004,951,294	-217.757	-179.757	18.713	YES	YES	-87.908	46.472	YES	YES
14	4,004,843,054	-217.757	-179.757	18.713	YES	YES	-87.907	46.473	YES	YES
15	4,004,735,276	-217.757	-179.757	18.713	YES	YES	-87.907	46.473	YES	YES
16	4,004,627,992	-217.756	-179.756	18.714	YES	YES	-87.907	46.473	YES	YES
17	4,004,521,235	-217.756	-179.756	18.714	YES	YES	-87.907	46.473	YES	YES
18	4,004,415,038	-217.756	-179.756	18.714	YES	YES	-87.907	46.473	YES	YES
19	4,004,309,433	-217.756	-179.756	18.714	YES	YES	-87.906	46.474	YES	YES
20	4,004,204,453	-217.755	-179.755	18.715	YES	YES	-87.906	46.474	YES	YES
21	4,004,100,129	-217.755	-179.755	18.715	YES	YES	-87.906	46.474	YES	YES

22	4,003,996,494	-217.755	-179.755	18.715	YES	YES	-87.906	46.474	YES	YES
23	4,003,893,578	-217.755	-179.755	18.715	YES	YES	-87.905	46.475	YES	YES
24	4,003,791,415	-217.755	-179.755	18.715	YES	YES	-87.905	46.475	YES	YES
25	4,003,690,035	-217.754	-179.754	18.716	YES	YES	-87.905	46.475	YES	YES
26	4,003,589,469	-217.754	-179.754	18.716	YES	YES	-87.905	46.475	YES	YES
27	4,003,489,748	-217.754	-179.754	18.716	YES	YES	-87.905	46.475	YES	YES
28	4,003,390,903	-217.754	-179.754	18.716	YES	YES	-87.904	46.476	YES	YES
29	4,003,292,963	-217.754	-179.754	18.716	YES	YES	-87.904	46.476	YES	YES
30	4,003,195,960	-217.753	-179.753	18.717	YES	YES	-87.904	46.476	YES	YES
31	4,003,099,922	-217.753	-179.753	18.717	YES	YES	-87.904	46.476	YES	YES
32	4,003,004,879	-217.753	-179.753	18.717	YES	YES	-87.903	46.477	YES	YES
33	4,002,910,861	-217.753	-179.753	18.717	YES	YES	-87.903	46.477	YES	YES
34	4,002,817,895	-217.752	-179.752	18.718	YES	YES	-87.903	46.477	YES	YES
35	4,002,726,012	-217.752	-179.752	18.718	YES	YES	-87.903	46.477	YES	YES
36	4,002,635,238	-217.752	-179.752	18.718	YES	YES	-87.903	46.477	YES	YES
37	4,002,545,602	-217.752	-179.752	18.718	YES	YES	-87.902	46.478	YES	YES
38	4,002,457,132	-217.752	-179.752	18.718	YES	YES	-87.902	46.478	YES	YES
39	4,002,369,854	-217.752	-179.752	18.718	YES	YES	-87.902	46.478	YES	YES
40	4,002,283,795	-217.751	-179.751	18.719	YES	YES	-87.902	46.478	YES	YES
41	4,002,198,982	-217.751	-179.751	18.719	YES	YES	-87.902	46.478	YES	YES
42	4,002,115,441	-217.751	-179.751	18.719	YES	YES	-87.902	46.478	YES	YES
43	4,002,033,197	-217.751	-179.751	18.719	YES	YES	-87.901	46.479	YES	YES
44	4,001,952,277	-217.751	-179.751	18.719	YES	YES	-87.901	46.479	YES	YES
45	4,001,872,704	-217.750	-179.750	18.720	YES	YES	-87.901	46.479	YES	YES
46	4,001,794,503	-217.750	-179.750	18.720	YES	YES	-87.901	46.479	YES	YES
47	4,001,717,699	-217.750	-179.750	18.720	YES	YES	-87.901	46.479	YES	YES
48	4,001,642,314	-217.750	-179.750	18.720	YES	YES	-87.901	46.479	YES	YES
49	4,001,568,373	-217.750	-179.750	18.720	YES	YES	-87.900	46.480	YES	YES
50	4,001,495,897	-217.750	-179.750	18.720	YES	YES	-87.900	46.480	YES	YES
51	4,001,424,910	-217.749	-179.749	18.721	YES	YES	-87.900	46.480	YES	YES
52	4,001,355,433	-217.749	-179.749	18.721	YES	YES	-87.900	46.480	YES	YES
53	4,001,287,487	-217.749	-179.749	18.721	YES	YES	-87.900	46.480	YES	YES
54	4,001,221,094	-217.749	-179.749	18.721	YES	YES	-87.900	46.480	YES	YES
55	4,001,156,273	-217.749	-179.749	18.721	YES	YES	-87.899	46.481	YES	YES
56	4,001,093,046	-217.749	-179.749	18.721	YES	YES	-87.899	46.481	YES	YES
57	4,001,031,430	-217.749	-179.749	18.721	YES	YES	-87.899	46.481	YES	YES
58	4,000,971,446	-217.748	-179.748	18.722	YES	YES	-87.899	46.481	YES	YES
59	4,000,913,112	-217.748	-179.748	18.722	YES	YES	-87.899	46.481	YES	YES
60	4,000,856,446	-217.748	-179.748	18.722	YES	YES	-87.899	46.481	YES	YES
61	4,000,801,465	-217.748	-179.748	18.722	YES	YES	-87.899	46.481	YES	YES
62	4,000,748,186	-217.748	-179.748	18.722	YES	YES	-87.899	46.481	YES	YES
63	4,000,696,625	-217.748	-179.748	18.722	YES	YES	-87.898	46.482	YES	YES
64	4,000,646,800	-217.748	-179.748	18.722	YES	YES	-87.898	46.482	YES	YES

65	4,000,598,724	-217.748	-179.748	18.722	YES	YES	-87.898	46.482	YES	YES
66	4,000,552,413	-217.748	-179.748	18.722	YES	YES	-87.898	46.482	YES	YES
67	4,000,507,881	-217.747	-179.747	18.723	YES	YES	-87.898	46.482	YES	YES
68	4,000,465,142	-217.747	-179.747	18.723	YES	YES	-87.898	46.482	YES	YES
69	4,000,424,209	-217.747	-179.747	18.723	YES	YES	-87.898	46.482	YES	YES
70	4,000,385,094	-217.747	-179.747	18.723	YES	YES	-87.898	46.482	YES	YES
71	4,000,347,811	-217.747	-179.747	18.723	YES	YES	-87.898	46.482	YES	YES
72	4,000,312,369	-217.747	-179.747	18.723	YES	YES	-87.898	46.482	YES	YES
73	4,000,278,781	-217.747	-179.747	18.723	YES	YES	-87.898	46.482	YES	YES
74	4,000,247,056	-217.747	-179.747	18.723	YES	YES	-87.897	46.483	YES	YES
75	4,000,217,204	-217.747	-179.747	18.723	YES	YES	-87.897	46.483	YES	YES
76	4,000,189,235	-217.747	-179.747	18.723	YES	YES	-87.897	46.483	YES	YES
77	4,000,163,157	-217.747	-179.747	18.723	YES	YES	-87.897	46.483	YES	YES
78	4,000,138,979	-217.747	-179.747	18.723	YES	YES	-87.897	46.483	YES	YES
79	4,000,116,707	-217.747	-179.747	18.723	YES	YES	-87.897	46.483	YES	YES
80	4,000,096,348	-217.747	-179.747	18.723	YES	YES	-87.897	46.483	YES	YES
81	4,000,077,910	-217.747	-179.747	18.723	YES	YES	-87.897	46.483	YES	YES
82	4,000,061,397	-217.746	-179.746	18.724	YES	YES	-87.897	46.483	YES	YES
83	4,000,046,815	-217.746	-179.746	18.724	YES	YES	-87.897	46.483	YES	YES
84	4,000,034,168	-217.746	-179.746	18.724	YES	YES	-87.897	46.483	YES	YES
85	4,000,023,460	-217.746	-179.746	18.724	YES	YES	-87.897	46.483	YES	YES
86	4,000,014,694	-217.746	-179.746	18.724	YES	YES	-87.897	46.483	YES	YES
87	4,000,007,874	-217.746	-179.746	18.724	YES	YES	-87.897	46.483	YES	YES
88	4,000,003,001	-217.746	-179.746	18.724	YES	YES	-87.897	46.483	YES	YES
89	4,000,000,076	-217.746	-179.746	18.724	YES	YES	-87.897	46.483	YES	YES
90	3,999,999,101	-217.746	-179.746	18.724	YES	YES	-87.897	46.483	YES	YES

Lunar Derby Link Budget

Spacecraft (Alpha Cubesat)	Value
Satellite Alt. (M)	400000000
Transmit frequency (Hz)	3.2E+10
Transmit power (W)	7
Antenna gain (dB)	26
LNA gain (dB)	0
LNA noise figure (dB)	0
Preamp gain (dB)	30
Preamp noise figure (dB)	1.21
Receiver sensitivity (dBm)	-97.5
Line and connector attenuation (dB)	0
Tx Gain (dB)	64.45
Rx Gain (dB)	152.29
Detection Threshold (dB)	7
Demodulation Threshold (dB)	12

Ground Station (DSS-25)	Value
Ground Station Alt. (M)	899
Transmit frequency (Hz)	3.2E+10
Transmit power (W)	25
Antenna gain (dB)	85.87
LNA gain (dB)	1
LNA noise figure (dB)	0.88
Preamp gain (dB)	30
Preamp noise figure (dB)	1
Receiver sensitivity (dBm)	-110
Line and connector attenuation (dB)	0
Tx Gain (dB)	129.8494
Rx Gain (dB)	199.47
Detection Threshold (dB)	3
Demodulation Threshold (dB)	9

PROPAGATION LOSS			DOWNLINK				UPLINK			
Elevation	Distance (M)	FSPL	Rx signal	Link Budget	Detect	Demod	Rx signal	Link Budget	Detect	Demod
0	406,519,793	-234.735	-170.284	29.186	YES	YES	-104.885	47.405	YES	YES
1	406,408,614	-234.732	-170.281	29.189	YES	YES	-104.883	47.407	YES	YES
2	406,297,378	-234.730	-170.279	29.191	YES	YES	-104.880	47.410	YES	YES
3	406,186,119	-234.728	-170.277	29.193	YES	YES	-104.878	47.412	YES	YES
4	406,074,870	-234.725	-170.274	29.196	YES	YES	-104.885	47.405	YES	YES
5	405,963,666	-234.723	-170.272	29.198	YES	YES	-104.885	47.405	YES	YES
6	405,852,540	-234.720	-170.269	29.201	YES	YES	-104.871	47.419	YES	YES
7	405,741,528	-234.718	-170.267	29.203	YES	YES	-104.869	47.421	YES	YES
8	405,630,662	-234.716	-170.265	29.205	YES	YES	-104.866	47.424	YES	YES
9	405,519,978	-234.713	-170.262	29.208	YES	YES	-104.864	47.426	YES	YES
10	405,409,510	-234.711	-170.260	29.210	YES	YES	-104.861	47.429	YES	YES
11	405,299,293	-234.709	-170.258	29.212	YES	YES	-104.859	47.431	YES	YES
12	405,189,359	-234.706	-170.255	29.215	YES	YES	-104.857	47.433	YES	YES
13	405,079,745	-234.704	-170.253	29.217	YES	YES	-104.854	47.436	YES	YES
14	404,970,483	-234.701	-170.250	29.220	YES	YES	-104.852	47.438	YES	YES
15	404,861,609	-234.699	-170.248	29.222	YES	YES	-104.850	47.440	YES	YES
16	404,753,157	-234.697	-170.246	29.224	YES	YES	-104.847	47.443	YES	YES
17	404,645,161	-234.694	-170.244	29.226	YES	YES	-104.845	47.445	YES	YES
18	404,537,654	-234.692	-170.241	29.229	YES	YES	-104.843	47.447	YES	YES

19	404,430,672	-234.690	-170.239	29.231	YES	YES	-104.840	47.450	YES	YES
20	404,324,248	-234.688	-170.237	29.233	YES	YES	-104.838	47.452	YES	YES
21	404,218,416	-234.685	-170.234	29.236	YES	YES	-104.836	47.454	YES	YES
22	404,113,209	-234.683	-170.232	29.238	YES	YES	-104.834	47.456	YES	YES
23	404,008,662	-234.681	-170.230	29.240	YES	YES	-104.831	47.459	YES	YES
24	403,904,807	-234.679	-170.228	29.242	YES	YES	-104.829	47.461	YES	YES
25	403,801,679	-234.676	-170.225	29.245	YES	YES	-104.827	47.463	YES	YES
26	403,699,310	-234.674	-170.223	29.247	YES	YES	-104.825	47.465	YES	YES
27	403,597,733	-234.672	-170.221	29.249	YES	YES	-104.823	47.467	YES	YES
28	403,496,981	-234.670	-170.219	29.251	YES	YES	-104.820	47.470	YES	YES
29	403,397,087	-234.668	-170.217	29.253	YES	YES	-104.818	47.472	YES	YES
30	403,298,084	-234.666	-170.215	29.255	YES	YES	-104.816	47.474	YES	YES
31	403,200,002	-234.663	-170.212	29.258	YES	YES	-104.814	47.476	YES	YES
32	403,102,875	-234.661	-170.210	29.260	YES	YES	-104.812	47.478	YES	YES
33	403,006,735	-234.659	-170.208	29.262	YES	YES	-104.810	47.480	YES	YES
34	402,911,611	-234.657	-170.206	29.264	YES	YES	-104.808	47.482	YES	YES
35	402,817,537	-234.655	-170.204	29.266	YES	YES	-104.806	47.484	YES	YES
36	402,724,542	-234.653	-170.202	29.268	YES	YES	-104.804	47.486	YES	YES
37	402,632,658	-234.651	-170.200	29.270	YES	YES	-104.802	47.488	YES	YES
38	402,541,913	-234.649	-170.198	29.272	YES	YES	-104.800	47.490	YES	YES
39	402,452,340	-234.647	-170.196	29.274	YES	YES	-104.798	47.492	YES	YES
40	402,363,967	-234.645	-170.194	29.276	YES	YES	-104.796	47.494	YES	YES
41	402,276,823	-234.643	-170.193	29.277	YES	YES	-104.794	47.496	YES	YES
42	402,190,938	-234.642	-170.191	29.279	YES	YES	-104.792	47.498	YES	YES
43	402,106,340	-234.640	-170.189	29.281	YES	YES	-104.790	47.500	YES	YES
44	402,023,057	-234.638	-170.187	29.283	YES	YES	-104.789	47.501	YES	YES
45	401,941,117	-234.636	-170.185	29.285	YES	YES	-104.787	47.503	YES	YES
46	401,860,547	-234.635	-170.184	29.286	YES	YES	-104.785	47.505	YES	YES
47	401,781,376	-234.633	-170.182	29.288	YES	YES	-104.783	47.507	YES	YES
48	401,703,628	-234.631	-170.180	29.290	YES	YES	-104.782	47.508	YES	YES
49	401,627,330	-234.629	-170.178	29.292	YES	YES	-104.780	47.510	YES	YES
50	401,552,509	-234.628	-170.177	29.293	YES	YES	-104.778	47.512	YES	YES
51	401,479,188	-234.626	-170.175	29.295	YES	YES	-104.777	47.513	YES	YES
52	401,407,394	-234.625	-170.174	29.296	YES	YES	-104.775	47.515	YES	YES
53	401,337,150	-234.623	-170.172	29.298	YES	YES	-104.774	47.516	YES	YES

54	401,268,479	-234.622	-170.171	29.299	YES	YES	-104.772	47.518	YES	YES
55	401,201,406	-234.620	-170.169	29.301	YES	YES	-104.771	47.519	YES	YES
56	401,135,953	-234.619	-170.168	29.302	YES	YES	-104.769	47.521	YES	YES
57	401,072,143	-234.617	-170.166	29.304	YES	YES	-104.768	47.522	YES	YES
58	401,009,997	-234.616	-170.165	29.305	YES	YES	-104.767	47.523	YES	YES
59	400,949,535	-234.615	-170.164	29.306	YES	YES	-104.765	47.525	YES	YES
60	400,890,780	-234.614	-170.163	29.307	YES	YES	-104.764	47.526	YES	YES
61	400,833,751	-234.612	-170.161	29.309	YES	YES	-104.763	47.527	YES	YES
62	400,778,468	-234.611	-170.160	29.310	YES	YES	-104.762	47.528	YES	YES
63	400,724,949	-234.610	-170.159	29.311	YES	YES	-104.761	47.529	YES	YES
64	400,673,212	-234.609	-170.158	29.312	YES	YES	-104.759	47.531	YES	YES
65	400,623,277	-234.608	-170.157	29.313	YES	YES	-104.758	47.532	YES	YES
66	400,575,159	-234.607	-170.156	29.314	YES	YES	-104.757	47.533	YES	YES
67	400,528,876	-234.606	-170.155	29.315	YES	YES	-104.756	47.534	YES	YES
68	400,484,443	-234.605	-170.154	29.316	YES	YES	-104.755	47.535	YES	YES
69	400,441,875	-234.604	-170.153	29.317	YES	YES	-104.754	47.536	YES	YES
70	400,401,188	-234.603	-170.152	29.318	YES	YES	-104.754	47.536	YES	YES
71	400,362,395	-234.602	-170.151	29.319	YES	YES	-104.753	47.537	YES	YES
72	400,325,510	-234.601	-170.150	29.320	YES	YES	-104.752	47.538	YES	YES
73	400,290,546	-234.601	-170.150	29.320	YES	YES	-104.751	47.539	YES	YES
74	400,257,514	-234.600	-170.149	29.321	YES	YES	-104.750	47.540	YES	YES
75	400,226,426	-234.599	-170.148	29.322	YES	YES	-104.750	47.540	YES	YES
76	400,197,293	-234.598	-170.148	29.322	YES	YES	-104.749	47.541	YES	YES
77	400,170,125	-234.598	-170.147	29.323	YES	YES	-104.748	47.542	YES	YES
78	400,144,931	-234.597	-170.146	29.324	YES	YES	-104.748	47.542	YES	YES
79	400,121,721	-234.597	-170.146	29.324	YES	YES	-104.747	47.543	YES	YES
80	400,100,501	-234.596	-170.145	29.325	YES	YES	-104.747	47.543	YES	YES
81	400,081,281	-234.596	-170.145	29.325	YES	YES	-104.747	47.543	YES	YES
82	400,064,065	-234.596	-170.145	29.325	YES	YES	-104.746	47.544	YES	YES
83	400,048,861	-234.595	-170.144	29.326	YES	YES	-104.746	47.544	YES	YES
84	400,035,673	-234.595	-170.144	29.326	YES	YES	-104.746	47.544	YES	YES
85	400,024,506	-234.595	-170.144	29.326	YES	YES	-104.745	47.545	YES	YES
86	400,015,365	-234.595	-170.144	29.326	YES	YES	-104.745	47.545	YES	YES
87	400,008,251	-234.594	-170.143	29.327	YES	YES	-104.745	47.545	YES	YES

88	400,003,168	-234.594	-170.143	29.327	YES	YES	-104.745	47.545	YES	YES
89	400,000,118	-234.594	-170.143	29.327	YES	YES	-104.745	47.545	YES	YES
90	399,999,101	-234.594	-170.143	29.327	YES	YES	-104.745	47.545	YES	YES

Lunar Derby Link Budget

Spacecraft (Alpha Cubesat)	Value
Satellite Alt. (M)	4E+08
Transmit frequency (Hz)	4.6E+08
Transmit power (W)	1
Antenna gain (dB)	8
LNA gain (dB)	0
LNA noise figure (dB)	0
Preamp gain (dB)	30
Preamp noise figure (dB)	1.12
Receiver sensitivity (dBm)	-97.5
Line and connector attenuation (dB)	0
Tx Gain (dB)	38.00
Rx Gain (dB)	134.38
Detection Threshold (dB)	7
Demodulation Threshold (dB)	12

Ground Station (DSS-25)	Value
Ground Station Alt. (M)	899
Transmit frequency (Hz)	4600000000
Transmit power (W)	25
Antenna gain (dB)	85.87
LNA gain (dB)	0
LNA noise figure (dB)	0.88
Preamp gain (dB)	30
Preamp noise figure (dB)	1
Receiver sensitivity (dBm)	-110
Line and connector attenuation (dB)	0
Tx Gain (dB)	129.8494001
Rx Gain (dB)	198.47
Detection Threshold (dB)	3
Demodulation Threshold (dB)	9

PROPAGATION LOSS			DOWNLINK				UPLINK			
Elevation	Distance (M)	FSPL	Rx signal	Link Budget	Detect	Demod	Rx signal	Link Budget	Detect	Demod
0	406,519,793	-197.887	-159.887	38.583	YES	YES	-68.037	66.343	YES	YES
1	406,408,614	-197.884	-159.884	38.586	YES	YES	-68.035	66.345	YES	YES
2	406,297,378	-197.882	-159.882	38.588	YES	YES	-68.033	66.347	YES	YES
3	406,186,119	-197.880	-159.880	38.590	YES	YES	-68.030	66.350	YES	YES
4	406,074,870	-197.877	-159.877	38.593	YES	YES	-68.037	66.343	YES	YES
5	405,963,666	-197.875	-159.875	38.595	YES	YES	-68.037	66.343	YES	YES
6	405,852,540	-197.873	-159.873	38.597	YES	YES	-68.023	66.357	YES	YES
7	405,741,528	-197.870	-159.870	38.600	YES	YES	-68.021	66.359	YES	YES
8	405,630,662	-197.868	-159.868	38.602	YES	YES	-68.018	66.362	YES	YES
9	405,519,978	-197.865	-159.865	38.605	YES	YES	-68.016	66.364	YES	YES
10	405,409,510	-197.863	-159.863	38.607	YES	YES	-68.014	66.366	YES	YES
11	405,299,293	-197.861	-159.861	38.609	YES	YES	-68.011	66.369	YES	YES
12	405,189,359	-197.858	-159.858	38.612	YES	YES	-68.009	66.371	YES	YES
13	405,079,745	-197.856	-159.856	38.614	YES	YES	-68.007	66.373	YES	YES
14	404,970,483	-197.854	-159.854	38.616	YES	YES	-68.004	66.376	YES	YES
15	404,861,609	-197.851	-159.851	38.619	YES	YES	-68.002	66.378	YES	YES
16	404,753,157	-197.849	-159.849	38.621	YES	YES	-68.000	66.380	YES	YES
17	404,645,161	-197.847	-159.847	38.623	YES	YES	-67.997	66.383	YES	YES
18	404,537,654	-197.844	-159.844	38.626	YES	YES	-67.995	66.385	YES	YES

19	404,430,672	-197.842	-159.842	38.628	YES	YES	-67.993	66.387	YES	YES
20	404,324,248	-197.840	-159.840	38.630	YES	YES	-67.990	66.390	YES	YES
21	404,218,416	-197.837	-159.837	38.633	YES	YES	-67.988	66.392	YES	YES
22	404,113,209	-197.835	-159.835	38.635	YES	YES	-67.986	66.394	YES	YES
23	404,008,662	-197.833	-159.833	38.637	YES	YES	-67.984	66.396	YES	YES
24	403,904,807	-197.831	-159.831	38.639	YES	YES	-67.981	66.399	YES	YES
25	403,801,679	-197.829	-159.829	38.641	YES	YES	-67.979	66.401	YES	YES
26	403,699,310	-197.826	-159.826	38.644	YES	YES	-67.977	66.403	YES	YES
27	403,597,733	-197.824	-159.824	38.646	YES	YES	-67.975	66.405	YES	YES
28	403,496,981	-197.822	-159.822	38.648	YES	YES	-67.973	66.407	YES	YES
29	403,397,087	-197.820	-159.820	38.650	YES	YES	-67.970	66.410	YES	YES
30	403,298,084	-197.818	-159.818	38.652	YES	YES	-67.968	66.412	YES	YES
31	403,200,002	-197.816	-159.816	38.654	YES	YES	-67.966	66.414	YES	YES
32	403,102,875	-197.813	-159.813	38.657	YES	YES	-67.964	66.416	YES	YES
33	403,006,735	-197.811	-159.811	38.659	YES	YES	-67.962	66.418	YES	YES
34	402,911,611	-197.809	-159.809	38.661	YES	YES	-67.960	66.420	YES	YES
35	402,817,537	-197.807	-159.807	38.663	YES	YES	-67.958	66.422	YES	YES
36	402,724,542	-197.805	-159.805	38.665	YES	YES	-67.956	66.424	YES	YES
37	402,632,658	-197.803	-159.803	38.667	YES	YES	-67.954	66.426	YES	YES
38	402,541,913	-197.801	-159.801	38.669	YES	YES	-67.952	66.428	YES	YES
39	402,452,340	-197.799	-159.799	38.671	YES	YES	-67.950	66.430	YES	YES
40	402,363,967	-197.798	-159.798	38.672	YES	YES	-67.948	66.432	YES	YES
41	402,276,823	-197.796	-159.796	38.674	YES	YES	-67.946	66.434	YES	YES
42	402,190,938	-197.794	-159.794	38.676	YES	YES	-67.944	66.436	YES	YES
43	402,106,340	-197.792	-159.792	38.678	YES	YES	-67.943	66.437	YES	YES
44	402,023,057	-197.790	-159.790	38.680	YES	YES	-67.941	66.439	YES	YES
45	401,941,117	-197.788	-159.788	38.682	YES	YES	-67.939	66.441	YES	YES
46	401,860,547	-197.787	-159.787	38.683	YES	YES	-67.937	66.443	YES	YES
47	401,781,376	-197.785	-159.785	38.685	YES	YES	-67.936	66.444	YES	YES
48	401,703,628	-197.783	-159.783	38.687	YES	YES	-67.934	66.446	YES	YES
49	401,627,330	-197.782	-159.782	38.688	YES	YES	-67.932	66.448	YES	YES
50	401,552,509	-197.780	-159.780	38.690	YES	YES	-67.931	66.449	YES	YES
51	401,479,188	-197.778	-159.778	38.692	YES	YES	-67.929	66.451	YES	YES
52	401,407,394	-197.777	-159.777	38.693	YES	YES	-67.927	66.453	YES	YES
53	401,337,150	-197.775	-159.775	38.695	YES	YES	-67.926	66.454	YES	YES

54	401,268,479	-197.774	-159.774	38.696	YES	YES	-67.924	66.456	YES	YES
55	401,201,406	-197.772	-159.772	38.698	YES	YES	-67.923	66.457	YES	YES
56	401,135,953	-197.771	-159.771	38.699	YES	YES	-67.922	66.458	YES	YES
57	401,072,143	-197.770	-159.770	38.700	YES	YES	-67.920	66.460	YES	YES
58	401,009,997	-197.768	-159.768	38.702	YES	YES	-67.919	66.461	YES	YES
59	400,949,535	-197.767	-159.767	38.703	YES	YES	-67.918	66.462	YES	YES
60	400,890,780	-197.766	-159.766	38.704	YES	YES	-67.916	66.464	YES	YES
61	400,833,751	-197.764	-159.764	38.706	YES	YES	-67.915	66.465	YES	YES
62	400,778,468	-197.763	-159.763	38.707	YES	YES	-67.914	66.466	YES	YES
63	400,724,949	-197.762	-159.762	38.708	YES	YES	-67.913	66.467	YES	YES
64	400,673,212	-197.761	-159.761	38.709	YES	YES	-67.912	66.468	YES	YES
65	400,623,277	-197.760	-159.760	38.710	YES	YES	-67.910	66.470	YES	YES
66	400,575,159	-197.759	-159.759	38.711	YES	YES	-67.909	66.471	YES	YES
67	400,528,876	-197.758	-159.758	38.712	YES	YES	-67.908	66.472	YES	YES
68	400,484,443	-197.757	-159.757	38.713	YES	YES	-67.907	66.473	YES	YES
69	400,441,875	-197.756	-159.756	38.714	YES	YES	-67.907	66.473	YES	YES
70	400,401,188	-197.755	-159.755	38.715	YES	YES	-67.906	66.474	YES	YES
71	400,362,395	-197.754	-159.754	38.716	YES	YES	-67.905	66.475	YES	YES
72	400,325,510	-197.753	-159.753	38.717	YES	YES	-67.904	66.476	YES	YES
73	400,290,546	-197.753	-159.753	38.717	YES	YES	-67.903	66.477	YES	YES
74	400,257,514	-197.752	-159.752	38.718	YES	YES	-67.903	66.477	YES	YES
75	400,226,426	-197.751	-159.751	38.719	YES	YES	-67.902	66.478	YES	YES
76	400,197,293	-197.751	-159.751	38.719	YES	YES	-67.901	66.479	YES	YES
77	400,170,125	-197.750	-159.750	38.720	YES	YES	-67.901	66.479	YES	YES
78	400,144,931	-197.750	-159.750	38.720	YES	YES	-67.900	66.480	YES	YES
79	400,121,721	-197.749	-159.749	38.721	YES	YES	-67.900	66.480	YES	YES
80	400,100,501	-197.749	-159.749	38.721	YES	YES	-67.899	66.481	YES	YES
81	400,081,281	-197.748	-159.748	38.722	YES	YES	-67.899	66.481	YES	YES
82	400,064,065	-197.748	-159.748	38.722	YES	YES	-67.898	66.482	YES	YES
83	400,048,861	-197.747	-159.747	38.723	YES	YES	-67.898	66.482	YES	YES
84	400,035,673	-197.747	-159.747	38.723	YES	YES	-67.898	66.482	YES	YES
85	400,024,506	-197.747	-159.747	38.723	YES	YES	-67.897	66.483	YES	YES
86	400,015,365	-197.747	-159.747	38.723	YES	YES	-67.897	66.483	YES	YES
87	400,008,251	-197.747	-159.747	38.723	YES	YES	-67.897	66.483	YES	YES

88	400,003,168	-197.746	-159.746	38.724	YES	YES	-67.897	66.483	YES	YES
89	400,000,118	-197.746	-159.746	38.724	YES	YES	-67.897	66.483	YES	YES
90	399,999,101	-197.746	-159.746	38.724	YES	YES	-67.897	66.483	YES	YES