

Introduction

The purpose of this license is to enable the airlink testing of four satellites under three different programs:
Optus, which has two satellites
PanAmSat-11
Horizons-2

Each satellite has at least one bank of transponders, that have both an uplink and a downlink set of channels. These channels are fed via reflector style, High gain antennas. As detailed in the submission for questions, the antenna range with absorber all around them in an attempt to minimize the emission of the downlink frequencies.

For the uplink channels, the test antennas will be horn antennas with approximately 60 degree beamwidth in order to keep the emissions down.

For the downlink channels, the antennas will be as detailed in the subsequent tabs labeled "Optus", "PanAmSat-11", and "Horizons-2". The satellite will be pointing up into the ceiling absorber inside the antenna range where the testing will be placed strategically in order to keep the emissions down.

For the Telemetry channels, including the uplink power control beacons on the satellite, some of the test antennas will have absorber placed around them in order to minimize the external emissions.

In short, we will be testing in an indoor range using enough absorber placed to minimize, as much as possible, the emissions where the tests will take place.

This is a list of all the frequencies that we are planning to test on, including as much information about the test setup as that you might need to process this application. If you need more information, please don't hesitate to contact us.

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Introduction

items that this company (Orbital Sciences) is working on:

channels. With the exception of the telemetry downlink, station 7 of form 442, these antennas will be tested in a range of frequencies.

width. These will also have absorber placed strategically

"PAS_11", and "Horizons_2". The high gain antennas on the satellite will be tested. The satellite will also have absorber

the antennas are omnidirectional. These will also have

possible, the radiation that will leave the highbay building

at power levels, antennas and modulations that I can think of. Please call me and ask. My name and Phone number are:

D1 Satellite									
Transponder Frequencies									
		Channel BW (MHz)	54						
		Band Edges							
		12249.5000	12752.50000	GHz			Power (At Tx Terminals)		Test
	Channel	Frequency (MHz)	Lower Frequency (MHz)	Upper Frequency (MHz)	Frequency Tolerance (Hz)	Polarization	Watts	.dBW	Watts
Downlink	1&9	12281.9	12249.5	12314.3	24563.8	*	150	21.76	0.0740
	2&10	12344.5	12312.1	12376.9	24689	*	150	21.76	0.0740
	3&11	12407.1	12374.7	12439.5	24814.2	*	150	21.76	0.0740
	4&12	12469.7	12437.3	12502.1	24939.4	*	150	21.76	0.0740
	5&13	12532.3	12499.9	12564.7	25064.6	*	150	21.76	0.0740
	6&14	12594.9	12562.5	12627.3	25189.8	*	150	21.76	0.0740
	7&15	12657.5	12625.1	12689.9	25315	*	150	21.76	0.0740
	8&16	12720.1	12687.7	12752.5	25440.2	*	150	21.76	0.0740
	*Channels 1-8 are Vertical Polarization and 9-16 are Horizontal Polarization. Only one polarization will be tested at a time								
		Band Edges							
		13997.5000	14500.50000	GHz			Power (At Tx Terminals)		Test
	Channel	Frequency (MHz)	Lower Frequency (MHz)	Upper Frequency (MHz)	Frequency Tolerance (Hz)	Polarization	Watts	.dBW	Watts
Uplink	1&9	14029.9	13997.5	14062.3	28059.8	**	0.01	-20	0.1585
	2&10	14092.5	14060.1	14124.9	28185	**	0.01	-20	0.1585
	3&11	14155.1	14122.7	14187.5	28310.2	**	0.01	-20	0.1585
	4&12	14217.7	14185.3	14250.1	28435.4	**	0.01	-20	0.1585
	5&13	14280.3	14247.9	14312.7	28560.6	**	0.01	-20	0.1585
	6&14	14342.9	14310.5	14375.3	28685.8	**	0.01	-20	0.1585
	7&15	14405.5	14373.1	14437.9	28811	**	0.01	-20	0.1585
	8&16	14468.1	14435.7	14500.5	28936.2	**	0.01	-20	0.1585
	**Channels 1-8 are Horizontal Polarization and 9-16 are Vertical Polarization. Only one polarization will be tested at a time								
Telemetry and Command Channels									
							Power (At Tx Terminals)		Test
	Channel	Frequency (MHz)	Lower Frequency (MHz)	Upper Frequency (MHz)	Frequency Tolerance (Hz)	Polarization	Watts	.dBW	Watts
Uplink	CMD 1	13986.5	13986	13987	27973	H	0.01	-20	0.1585
	CMD 2	13990.5	13990	13991	27981	H	0.01	-20	0.1585
	CMD 3	13994.5	13994	13995	27989	H	0.01	-20	0.1585
Downlink	TLM 1&3	12243.25	12243.1	12243.4	24486.5	V	7	8.45	13.97
	TLM 2	12245.25	12245.1	12245.4	24490.5	V	7	8.45	13.97
	UPC	12749.5	12749	12750	25499	Circular	1	0	2.00

Optus

D2 Satellite									
Transponder Frequencies									
		Channel BW (MHz)	36						
		Band Edges							
		11698.9000	12198.60000	GHz			Power (At Tx Terminals)		Test
	Channel	Frequency (MHz)	Lower Frequency (MHz)	Upper Frequency (MHz)	Frequency Tolerance (Hz)	Polarization	Watts	.dBW	Watts
Downlink	B1&B13	11720.5	11698.9	11742.1	23441	†	150	21.76	0.0740
	B2&B14	11762	11740.4	11783.6	23524	†	150	21.76	0.0740
	B3&B15	11803.5	11781.9	11825.1	23607	†	150	21.76	0.0740
	B4&B16	11845	11823.4	11866.6	23690	†	150	21.76	0.0740
	B5&B17	11886.5	11864.9	11908.1	23773	†	150	21.76	0.0740
	B6&B18	11928	11906.4	11949.6	23856	†	150	21.76	0.0740
	B7&B19	11969.5	11947.9	11991.1	23939	†	150	21.76	0.0740
	B8&B20	12011	11989.4	12032.6	24022	†	150	21.76	0.0740
	B9&B21	12052.5	12030.9	12074.1	24105	†	150	21.76	0.0740
	B10&B22	12094	12072.4	12115.6	24188	†	150	21.76	0.0740
	B11&B23	12135.5	12113.9	12157.1	24271	†	150	21.76	0.0740
	B12&B24	12177	12155.4	12198.6	24354	†	150	21.76	0.0740
	†Channels 1-12 are Vertical Polarization and 13-24 are Horizontal Polarization. Only one polarization will be tested at a time								
		Band Edges							
		17298.9000	17798.60000	GHz			Power (At Tx Terminals)		Test
	Channel	Frequency (MHz)	Lower Frequency (MHz)	Upper Frequency (MHz)	Frequency Tolerance (Hz)	Polarization	Watts	.dBW	Watts
Uplink	B1&B13	17320.5	17298.9	17342.1	34641	††	0.01	-20	0.1585
	B2&B14	17362	17340.4	17383.6	34724	††	0.01	-20	0.1585
	B3&B15	17403.5	17381.9	17425.1	34807	††	0.01	-20	0.1585
	B4&B16	17445	17423.4	17466.6	34890	††	0.01	-20	0.1585
	B5&B17	17486.5	17464.9	17508.1	34973	††	0.01	-20	0.1585
	B6&B18	17528	17506.4	17549.6	35056	††	0.01	-20	0.1585
	B7&B19	17569.5	17547.9	17591.1	35139	††	0.01	-20	0.1585
	B8&B20	17611	17589.4	17632.6	35222	††	0.01	-20	0.1585
	B9&B21	17652.5	17630.9	17674.1	35305	††	0.01	-20	0.1585
	B10&B22	17694	17672.4	17715.6	35388	††	0.01	-20	0.1585
	B11&B23	17735.5	17713.9	17757.1	35471	††	0.01	-20	0.1585
	B12&B24	17777	17755.4	17798.6	35554	††	0.01	-20	0.1585
	††Channels 1-12 are Horizontal Polarization and 13-24 are Vertical Polarization. Only one polarization will be tested at a time								

Optus

Telemetry and Command Channels									
							Power (At Tx Terminals)		Test
		Frequency (MHz)	Lower Frequency (MHz)	Upper Frequency (MHz)	Frequency Tolerance (Hz)	Polarization	Watts	.dBW	Watts
Uplink	CMD 1	13986.5	13986	13987	27973	H	0.01	-20	0.1585
	CMD 2	13990.5	13990	13991	27981	H	0.01	-20	0.1585
	CMD 3	13994.5	13994	13995	27989	H	0.01	-20	0.1585
Downlink	TLM 1&3	12243.25	12243.1	12243.4	24486.5	V	7	8.45	13.97
	TLM 2	12245.25	12245.1	12245.4	24490.5	V	7	8.45	13.97
	UPC	12749.5	12749	12750	25499	Circular	1	0	2.00

Optus

ERP							
.dBW	Modulation	Modulation Rate (Hz)	Deviation (Hz)	Necessary Bandwidth (MHz)	Antenna Beamwidth (Degrees)	Manufacturer	Model Number
-11.31	CW	N/A	N/A	1	6	ETI	2000HAI
-11.31	CW	N/A	N/A	1	6	ETI	2000HAI
-11.31	CW	N/A	N/A	1	6	ETI	2000HAI
-11.31	CW	N/A	N/A	1	6	ETI	2000HAI
-11.31	CW	N/A	N/A	1	6	ETI	2000HAI
-11.31	CW	N/A	N/A	1	6	ETI	2000HAI
-11.31	CW	N/A	N/A	1	6	ETI	2000HAI
-11.31	CW	N/A	N/A	1	6	ETI	2000HAI
ERP							
.dBW	Modulation	Modulation Rate (Hz)	Deviation (Hz)	Necessary Bandwidth (MHz)	Antenna Beamwidth (Degrees)	Manufacturer	Model Number
-8.00	CW	N/A	N/A	1	60	Agilent	E8247C
-8.00	CW	N/A	N/A	1	60	Agilent	E8247C
-8.00	CW	N/A	N/A	1	60	Agilent	E8247C
-8.00	CW	N/A	N/A	1	60	Agilent	E8247C
-8.00	CW	N/A	N/A	1	60	Agilent	E8247C
-8.00	CW	N/A	N/A	1	60	Agilent	E8247C
-8.00	CW	N/A	N/A	1	60	Agilent	E8247C
-8.00	CW	N/A	N/A	1	60	Agilent	E8247C
ERP							
.dBW	Modulation	Modulation Rate (Hz)	Deviation (Hz)	Necessary Bandwidth (MHz)	Antenna Beamwidth (Degrees)	Manufacturer	Model Number
-8.00	FM	N/A	400000	1	60	Comtech	UT-4514
-8.00	FM	N/A	400000	1	60	Comtech	UT-4514
-8.00	FM	N/A	400000	1	60	Comtech	UT-4514
11.45	BPSK	4800	N/A	0.3	Omni	Alenia	0131958A03
11.45	BPSK	4800	N/A	0.3	Omni	Alenia	0131958A03
3.00	CW	N/A	N/A	1	Omni	Alenia	0138751A01

Optus

ERP							
.dBW	Modulation	Modulation Rate (Hz)	Deviation (Hz)	Necessary Bandwidth (MHz)	Antenna Beamwidth (Degrees)	Manufacturer	Model Number
-8.00	FM	N/A	400000	1	60	Comtech	UT-4514
-8.00	FM	N/A	400000	1	60	Comtech	UT-4514
-8.00	FM	N/A	400000	1	60	Comtech	UT-4514
11.45	BPSK	4800	N/A	0.3	Omni	Alenia	0131958A03
11.45	BPSK	4800	N/A	0.3	Omni	Alenia	0131958A03
3.00	CW	N/A	N/A	1	Omni	Alenia	0138751A01

C-Band Transponder Channels								
		Band Edges						
		3697.6	4200	GHz			Power (At Tx Terminals)	
	Channel	Frequency (MHz)	Lower Frequency(MHz)	Upper Frequency (MHz)	Frequency Tolerance (Hz)	Polarization	Watts	.dBW
Downlink	1&2	3730	3697.6	3762.4	7460	*	150	21.76
	3&4	3790	3757.6	3822.4	7580	*	150	21.76
	5&6	3850	3817.6	3882.4	7700	*	150	21.76
	7&8	3915	3876.6	3953.4	7830	*	150	21.76
	9&10	3980	3947.6	4012.4	7960	*	150	21.76
	11&12	4040	4007.6	4072.4	8080	*	150	21.76
	13&14	4100	4067.6	4132.4	8200	*	150	21.76
	15&16	4165	4126.6	4200	8330	*	150	21.76
*The Odd channels are Vertical Polarization and the Even channels are Horizontal Polarization. Only one polarization will be tested at a time								
		Band Edges						
		5925	6428.4	GHz			Power (At Tx Terminals)	
	Channel	Frequency (MHz)	Lower Frequency(MHz)	Upper Frequency (MHz)	Frequency Tolerance (Hz)	Polarization	Watts	.dBW
Uplink	1&2	5955	5925	5987.4	11910	**	0.01	-20
	3&4	6015	5982.6	6047.4	12030	**	0.01	-20
	5&6	6075	6042.6	6107.4	12150	**	0.01	-20
	7&8	6140	6101.6	6178.4	12280	**	0.01	-20
	9&10	6205	6172.6	6237.4	12410	**	0.01	-20
	11&12	6265	6232.6	6297.4	12530	**	0.01	-20
	13&14	6325	6292.6	6357.4	12650	**	0.01	-20
	15&16	6390	6351.6	6428.4	12780	**	0.01	-20
**The Odd channels are Horizontal Polarization and the Even channels are Vertical Polarization. Only one polarization will be tested at a time								
C-Band Uplink Power Control Beacons								
							Power (At Tx Terminals)	
	Channel	Frequency (MHz)	Lower Frequency(MHz)	Upper Frequency (MHz)	Frequency Tolerance (Hz)	Polarization	Watts	.dBW
Downlink	ULPC1	3701	3700.5	3701.5	7402	H	1	0
	ULPC2	4199.5	4199	4200	8399	V	1	0
Ku Band Transponder Channels								
		Channel BW (MHz)	36					
		Band Edges						

		10700	11151.6	GHz			Power (At Tx Terminals)		
	Channel	Frequency (MHz)	Lower Frequency(MHz)	Upper Frequency (MHz)	Frequency Tolerance (Hz)	Polarization	Watts	.dBW	
Downlink	1&13	10722	10700	10743.6	21444	†	150	21.76	
	3&15	10802	10780.4	10823.6	21604	†	150	21.76	
	5&17	10822	10800.4	10843.6	21644	†	150	21.76	
	7&19	11222	11200.4	11243.6	22444	†	150	21.76	
	9&21	11302	11280.4	11323.6	22604	†	150	21.76	
	11&23	11382	11360.4	11403.6	22764	†	150	21.76	
	25&31	10970	10948.4	10991.6	21940	†	150	21.76	
	27&33	11050	11028.4	11071.6	22100	†	150	21.76	
	29&35	11130	11108.4	11151.6	22260	†	150	21.76	
†Channels 1,3,5,7,9,11,25,27 & 29 are Vertical Polarization and 13,15,17,19,21,23,31,33 & 35 are Horizontal Polarization. Only one polarization will be used.									
		Band Edges							
		12750.4	13955.6	GHz			Power (At Tx Terminals)		
	Channel	Frequency (MHz)	Lower Frequency(MHz)	Upper Frequency (MHz)	Frequency Tolerance (Hz)	Polarization	Watts	.dBW	
Uplink	1&13	12772	12750.4	12793.6	25544	††	0.01	-20	
	3&15	12852	12830.4	12873.6	25704	††	0.01	-20	
	5&17	12932	12910.4	12953.6	25864	††	0.01	-20	
	7&19	13022	13000.4	13043.6	26044	††	0.01	-20	
	9&21	13102	13080.4	13123.6	26204	††	0.01	-20	
	11&23	13182	13160.4	13203.6	26364	††	0.01	-20	
	25&31	13774	13752.4	13795.6	27548	††	0.01	-20	
	27&33	13854	13832.4	13875.6	27708	††	0.01	-20	
	29&35	13934	13912.4	13955.6	27868	††	0.01	-20	
††Channels 1,3,5,7,9,11,25,27 & 29 are Horizontal Polarization and 13,15,17,19,21,23,31,33 & 35 are Vertical Polarization. Only one polarization will be used.									
Telemetry and Command Channels									
								Power (At Tx Terminals)	
	Channel	Frequency (MHz)	Lower Frequency(MHz)	Upper Frequency (MHz)	Frequency Tolerance (Hz)	Polarization	Watts	.dBW	
Uplink	CMD 1	13246.5	13246	13247	26493	H	0.01	-20	
	CMD 2	13995.5	13995	13996	27991	V	0.01	-20	
Downlink	TLM 1	11448	11447.85	11448.15	22896	V	10	10	
	TLM 2	11449	11448.85	11449.15	22898	V	10	10	

Test ERP								
Watts	.dBW	Modulation	Modulation Rate (Hz)	Deviation (Hz)	Necessary Bandwidth (MHz)	Antenna Beamwidth (Degrees)	Manufacturer	Model Number
0.0535	-12.72	CW	N/A	N/A	1	6	ETI	2000HAI
0.0535	-12.72	CW	N/A	N/A	1	6	ETI	2000HAI
0.0535	-12.72	CW	N/A	N/A	1	6	ETI	2000HAI
0.0535	-12.72	CW	N/A	N/A	1	6	ETI	2000HAI
0.0535	-12.72	CW	N/A	N/A	1	6	ETI	2000HAI
0.0535	-12.72	CW	N/A	N/A	1	6	ETI	2000HAI
0.0535	-12.72	CW	N/A	N/A	1	6	ETI	2000HAI
0.0535	-12.72	CW	N/A	N/A	1	6	ETI	2000HAI
Test ERP								
Watts	.dBW	Modulation	Modulation Rate (Hz)	Deviation (Hz)	Necessary Bandwidth (MHz)	Antenna Beamwidth (Degrees)	Manufacturer	Model Number
0.1585	-8.00	CW	N/A	N/A	1	60	Agilent	E8247C
0.1585	-8.00	CW	N/A	N/A	1	60	Agilent	E8247C
0.1585	-8.00	CW	N/A	N/A	1	60	Agilent	E8247C
0.1585	-8.00	CW	N/A	N/A	1	60	Agilent	E8247C
0.1585	-8.00	CW	N/A	N/A	1	60	Agilent	E8247C
0.1585	-8.00	CW	N/A	N/A	1	60	Agilent	E8247C
0.1585	-8.00	CW	N/A	N/A	1	60	Agilent	E8247C
0.1585	-8.00	CW	N/A	N/A	1	60	Agilent	E8247C
Test ERP								
Watts	.dBW	Modulation	Modulation Rate (Hz)	Deviation (Hz)	Necessary Bandwidth (MHz)	Antenna Beamwidth (Degrees)	Manufacturer	Model Number
2.00	3.00	CW	N/A	N/A	1	Omni	Alenia	0138751A01
2.00	3.00	CW	N/A	N/A	1	Omni	Alenia	0138751A01

Test ERP								
Watts	.dBW	Modulation	Modulation Rate (Hz)	Deviation (Hz)	Necessary Bandwidth (MHz)	Antenna Beamwidth (Degrees)	Manufacturer	Model Number
0.0535	-12.72	CW	N/A	N/A	1	6	ETI	2000HAI
0.0535	-12.72	CW	N/A	N/A	1	6	ETI	2000HAI
0.0535	-12.72	CW	N/A	N/A	1	6	ETI	2000HAI
0.0535	-12.72	CW	N/A	N/A	1	6	ETI	2000HAI
0.0535	-12.72	CW	N/A	N/A	1	6	ETI	2000HAI
0.0535	-12.72	CW	N/A	N/A	1	6	ETI	2000HAI
0.0535	-12.72	CW	N/A	N/A	1	6	ETI	2000HAI
0.0535	-12.72	CW	N/A	N/A	1	6	ETI	2000HAI
0.0535	-12.72	CW	N/A	N/A	1	6	ETI	2000HAI
I be tested at a time								
Test ERP								
Watts	.dBW	Modulation	Modulation Rate (Hz)	Deviation (Hz)	Necessary Bandwidth (MHz)	Antenna Beamwidth (Degrees)	Manufacturer	Model Number
0.1585	-8.00	CW	N/A	N/A	1	60	Agilent	E8247C
0.1585	-8.00	CW	N/A	N/A	1	60	Agilent	E8247C
0.1585	-8.00	CW	N/A	N/A	1	60	Agilent	E8247C
0.1585	-8.00	CW	N/A	N/A	1	60	Agilent	E8247C
0.1585	-8.00	CW	N/A	N/A	1	60	Agilent	E8247C
0.1585	-8.00	CW	N/A	N/A	1	60	Agilent	E8247C
0.1585	-8.00	CW	N/A	N/A	1	60	Agilent	E8247C
0.1585	-8.00	CW	N/A	N/A	1	60	Agilent	E8247C
0.1585	-8.00	CW	N/A	N/A	1	60	Agilent	E8247C
will be tested at a time								
Test ERP								
Watts	.dBW	Modulation	Modulation Rate (Hz)	Deviation (Hz)	Necessary Bandwidth (MHz)	Antenna Beamwidth (Degrees)	Manufacturer	Model Number
0.1585	-8.00	FM	N/A	400000	1	60	Comtech	UT-4514
0.1585	-8.00	FM	N/A	400000	1	60	Comtech	UT-4514
19.95	13.00	BPSK	4800	N/A	0.3	Omni	Alenia	0131958A03
19.95	13.00	BPSK	4800	N/A	0.3	Omni	Alenia	0131958A03

Horizons_2

Transponder Channels									
Band Edges									
11698.4 12201.6 GHz									
Channel	Frequency (MHz)	Lower Frequency (MHz)	Upper Frequency (MHz)	Frequency Tolerance (Hz)	Polarization	Power (At Tx Terminals)		Test	
						Watts	.dBW	Watts	
Downlink	1	11720	11698.4	11741.6	23440	H	150	21.76	0.0501
	13	11758	11714.8	11801.2	23516	V	150	21.76	0.0501
	2	11760	11738.4	11781.6	23520	H	150	21.76	0.0501
	3	11800	11778.4	11821.6	23600	H	150	21.76	0.0501
	14	11838	11794.8	11881.2	23676	V	150	21.76	0.0501
	5	11840	11818.4	11861.6	23680	H	150	21.76	0.0501
	15	11918	11874.8	11961.2	23836	V	150	21.76	0.0501
	6	11920	11898.4	11941.6	23840	H	150	21.76	0.0501
	7	11960	11938.4	11981.6	23920	H	150	21.76	0.0501
	16	11998	11954.8	12041.2	23996	V	150	21.76	0.0501
	8	12000	11978.4	12021.6	24000	H	150	21.76	0.0501
	9	12040	12018.4	12061.6	24080	H	150	21.76	0.0501
	17	12060	12038.4	12081.6	24120	V	150	21.76	0.0501
	10	12080	12058.4	12101.6	24160	H	150	21.76	0.0501
	18	12100	12078.4	12121.6	24200	V	150	21.76	0.0501
	11	12120	12098.4	12141.6	24240	H	150	21.76	0.0501
	19	12140	12118.4	12161.6	24280	V	150	21.76	0.0501
	12	12160	12138.4	12181.6	24320	H	150	21.76	0.0501
	20	12180	12158.4	12201.6	24360	V	150	21.76	0.0501
	Band Edges								
13998.4 14500 GHz									
Channel	Frequency (MHz)	Lower Frequency (MHz)	Upper Frequency (MHz)	Frequency Tolerance (Hz)	Polarization	Power (At Tx Terminals)		Test	
						Watts	.dBW	Watts	
Uplink	1	14020	13998.4	14041.6	28040	V	0.01	-20	0.1585
	13	14058	14014.8	14101.2	28116	H	0.01	-20	0.1585
	2	14060	14038.4	14081.6	28120	V	0.01	-20	0.1585
	3	14100	14078.4	14121.6	28200	V	0.01	-20	0.1585
	14	14138	14094.8	14181.2	28276	H	0.01	-20	0.1585
	5	14180	14158.4	14201.6	28360	V	0.01	-20	0.1585
	15	14218	14174.8	14261.2	28436	H	0.01	-20	0.1585
	6	14220	14198.4	14241.6	28440	V	0.01	-20	0.1585
	7	14260	14238.4	14281.6	28520	V	0.01	-20	0.1585
	16	14298	14254.8	14341.2	28596	H	0.01	-20	0.1585
8	14300	14278.4	14321.6	28600	V	0.01	-20	0.1585	

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	9	14340	14318.4	14361.6	28680	V	0.01	-20	0.1585
	17	14360	14338.4	14381.6	28720	H	0.01	-20	0.1585
	10	14380	14358.4	14401.6	28760	V	0.01	-20	0.1585
	18	14400	14378.4	14421.6	28800	H	0.01	-20	0.1585
	11	14420	14398.4	14441.6	28840	V	0.01	-20	0.1585
	19	14440	14418.4	14461.6	28880	H	0.01	-20	0.1585
	12	14460	14438.4	14481.6	28920	V	0.01	-20	0.1585
	20	14480	14458.4	14500	28960	H	0.01	-20	0.1585
Telemetry and Command Channels									
							Power (At Tx Terminals)		Test
	Channel	Frequency (MHz)	Lower Frequency (MHz)	Upper Frequency (MHz)	Frequency Tolerance (Hz)	Polarization	Watts	.dBW	Watts
Uplink	CMD 1	14000.5	14000	14001	28001	H	0.01	-20	0.1585
	CMD 2	14499.5	14499	14500	28999	V	0.01	-20	0.1585
Downlink	TLM 1	12196	12195.85	12196.15	24392	H	7	8.45	13.97
	TLM 2	12198.63	12198.48	12198.78	24397.25	H	7	8.45	13.97
	ULPC1	12198	12197.5	12198.5	24396	H	1	0	2.00
	ULPC2	11701.5	11701	11702	23403	V	1	0	2.00

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-8.00	CW	N/A	N/A	1	60	Agilent	E8247C
-8.00	CW	N/A	N/A	1	60	Agilent	E8247C
-8.00	CW	N/A	N/A	1	60	Agilent	E8247C
-8.00	CW	N/A	N/A	1	60	Agilent	E8247C
-8.00	CW	N/A	N/A	1	60	Agilent	E8247C
-8.00	CW	N/A	N/A	1	60	Agilent	E8247C
-8.00	CW	N/A	N/A	1	60	Agilent	E8247C
-8.00	CW	N/A	N/A	1	60	Agilent	E8247C
ERP							
.dBW	Modulation	Modulation Rate (Hz)	Deviation (Hz)	Necessary Bandwidth (MHz)	Antenna Beamwidth (Degrees)	Manufacturer	Model Number
-8.00	FM	N/A	400000	1	60	Comtech	UT-4514
-8.00	FM	N/A	400000	1	60	Comtech	UT-4514
11.45	BPSK	4800	N/A	0.3	Omni	Alenia	0131958A03
11.45	BPSK	4800	N/A	0.3	Omni	Alenia	0131958A03
3.00	CW	N/A	N/A	1	Omni	Alenia	0138751A01
3.00	CW	N/A	N/A	1	Omni	Alenia	0138751A01