

## Introduction

File Number 0286-EX-PL-2005  
Confirmation Number EL140434

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, and 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.

Ross Coffelt (703) 406-5782

## Introduction

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

channels. With the exception of the telemetry downlink, mission 7 of form 442, these antennas will be tested in a number 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:

Optus

D1 Satellite									
Transponder Frequencies									
		Channel BW (MHz)	54						
		Band Edges							
		10.7000	11.45000	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	12254.9	12308.9	24563.8	*	150	21.76	0.0740
	2&10	12344.5	12317.5	12371.5	24689	*	150	21.76	0.0740
	3&11	12407.1	12380.1	12434.1	24814.2	*	150	21.76	0.0740
	4&12	12469.7	12442.7	12496.7	24939.4	*	150	21.76	0.0740
	5&13	12532.3	12505.3	12559.3	25064.6	*	150	21.76	0.0740
	6&14	12594.9	12567.9	12621.9	25189.8	*	150	21.76	0.0740
	7&15	12657.5	12630.5	12684.5	25315	*	150	21.76	0.0740
	8&16	12720.1	12693.1	12747.1	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							
		14.0029	14.4951	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	14002.9	14056.9	28059.8	**	0.01	-20	0.1585
	2&10	14092.5	14065.5	14119.5	28185	**	0.01	-20	0.1585
	3&11	14155.1	14128.1	14182.1	28310.2	**	0.01	-20	0.1585
	4&12	14217.7	14190.7	14244.7	28435.4	**	0.01	-20	0.1585
	5&13	14280.3	14253.3	14307.3	28560.6	**	0.01	-20	0.1585
	6&14	14342.9	14315.9	14369.9	28685.8	**	0.01	-20	0.1585
	7&15	14405.5	14378.5	14432.5	28811	**	0.01	-20	0.1585
	8&16	14468.1	14441.1	14495.1	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							
		11.7025	12.19500	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	11702.5	11738.5	23441	†	150	21.76	0.0740
	B2&B14	11762	11744	11780	23524	†	150	21.76	0.0740
	B3&B15	11803.5	11785.5	11821.5	23607	†	150	21.76	0.0740
	B4&B16	11845	11827	11863	23690	†	150	21.76	0.0740
	B5&B17	11886.5	11868.5	11904.5	23773	†	150	21.76	0.0740
	B6&B18	11928	11910	11946	23856	†	150	21.76	0.0740
	B7&B19	11969.5	11951.5	11987.5	23939	†	150	21.76	0.0740
	B8&B20	12011	11993	12029	24022	†	150	21.76	0.0740
	B9&B21	12052.5	12034.5	12070.5	24105	†	150	21.76	0.0740
	B10&B22	12094	12076	12112	24188	†	150	21.76	0.0740
	B11&B23	12135.5	12117.5	12153.5	24271	†	150	21.76	0.0740
	B12&B24	12177	12159	12195	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							
		17.3025	17.7950	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	17302.5	17338.5	34641	††	0.01	-20	0.1585
	B2&B14	17362	17344	17380	34724	††	0.01	-20	0.1585
	B3&B15	17403.5	17385.5	17421.5	34807	††	0.01	-20	0.1585
	B4&B16	17445	17427	17463	34890	††	0.01	-20	0.1585
	B5&B17	17486.5	17468.5	17504.5	34973	††	0.01	-20	0.1585
	B6&B18	17528	17510	17546	35056	††	0.01	-20	0.1585
	B7&B19	17569.5	17551.5	17587.5	35139	††	0.01	-20	0.1585
	B8&B20	17611	17593	17629	35222	††	0.01	-20	0.1585
	B9&B21	17652.5	17634.5	17670.5	35305	††	0.01	-20	0.1585
	B10&B22	17694	17676	17712	35388	††	0.01	-20	0.1585
	B11&B23	17735.5	17717.5	17753.5	35471	††	0.01	-20	0.1585
	B12&B24	17777	17759	17795	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
-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						
		3.7	4.2	GHz			Power (At Tx Terminals)	
	Channel	Frequency (MHz)	Lower Frequency(MHz)	Upper Frequency (MHz)	Frequency Tolerance (Hz)	Polarization	Watts	.dBW
Downlink	1&2	3730	3703	3757	7460	*	150	21.76
	3&4	3790	3763	3817	7580	*	150	21.76
	5&6	3850	3823	3877	7700	*	150	21.76
	7&8	3915	3883	3947	7830	*	150	21.76
	9&10	3980	3953	4007	7960	*	150	21.76
	11&12	4040	4013	4067	8080	*	150	21.76
	13&14	4100	4073	4127	8200	*	150	21.76
	15&16	4165	4133	4197	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						
		5.93	6.43	GHz			Power (At Tx Terminals)	
	Channel	Frequency (MHz)	Lower Frequency(MHz)	Upper Frequency (MHz)	Frequency Tolerance (Hz)	Polarization	Watts	.dBW
Uplink	1&2	5955	5928	5982	11910	**	0.01	-20
	3&4	6015	5988	6042	12030	**	0.01	-20
	5&6	6075	6048	6102	12150	**	0.01	-20
	7&8	6140	6108	6172	12280	**	0.01	-20
	9&10	6205	6178	6232	12410	**	0.01	-20
	11&12	6265	6238	6292	12530	**	0.01	-20
	13&14	6325	6298	6352	12650	**	0.01	-20
	15&16	6390	6358	6422	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						

		10.7	11.45	GHz		Power (At Tx Terminals)		
	Channel	Frequency (MHz)	Lower Frequency(MHz)	Upper Frequency (MHz)	Frequency Tolerance (Hz)	Polarization	Watts	.dBW
Downlink	1&13	10722	10704	10740	21444	†	150	21.76
	3&15	10802	10784	10820	21604	†	150	21.76
	5&17	10822	10804	10840	21644	†	150	21.76
	7&19	11222	11204	11240	22444	†	150	21.76
	9&21	11302	11284	11320	22604	†	150	21.76
	11&23	11382	11364	11400	22764	†	150	21.76
	25&31	10970	10952	10988	21940	†	150	21.76
	27&33	11050	11032	11068	22100	†	150	21.76
	29&35	11130	11112	11148	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						
		12.75	14	GHz		Power (At Tx Terminals)		
	Channel	Frequency (MHz)	Lower Frequency(MHz)	Upper Frequency (MHz)	Frequency Tolerance (Hz)	Polarization	Watts	.dBW
Uplink	1&13	12772	12754	12790	25544	††	0.01	-20
	3&15	12852	12834	12870	25704	††	0.01	-20
	5&17	12932	12914	12950	25864	††	0.01	-20
	7&19	13022	13004	13040	26044	††	0.01	-20
	9&21	13102	13084	13120	26204	††	0.01	-20
	11&23	13182	13164	13200	26364	††	0.01	-20
	25&31	13774	13756	13792	27548	††	0.01	-20
	27&33	13854	13836	13872	27708	††	0.01	-20
	29&35	13934	13916	13952	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.								
<b>Telemetry and Command Channels</b>								
						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									
11.72 12.18 GHz									
Power (At Tx Terminals) Test									
Channel	Frequency (MHz)	Lower Frequency (MHz)	Upper Frequency (MHz)	Frequency Tolerance (Hz)	Polarization	Watts	.dBW	Watts	Test
Downlink	1	11720	11702	11738	23440	H	150	21.76	0.0501
	13	11758	11722	11794	23516	V	150	21.76	0.0501
	2	11760	11742	11778	23520	H	150	21.76	0.0501
	3	11800	11782	11818	23600	H	150	21.76	0.0501
	14	11838	11802	11874	23676	V	150	21.76	0.0501
	5	11840	11822	11858	23680	H	150	21.76	0.0501
	15	11918	11882	11954	23836	V	150	21.76	0.0501
	6	11920	11902	11938	23840	H	150	21.76	0.0501
	7	11960	11942	11978	23920	H	150	21.76	0.0501
	16	11998	11962	12034	23996	V	150	21.76	0.0501
	8	12000	11982	12018	24000	H	150	21.76	0.0501
	9	12040	12022	12058	24080	H	150	21.76	0.0501
	17	12060	12042	12078	24120	V	150	21.76	0.0501
	10	12080	12062	12098	24160	H	150	21.76	0.0501
	18	12100	12082	12118	24200	V	150	21.76	0.0501
	11	12120	12102	12138	24240	H	150	21.76	0.0501
	19	12140	12122	12158	24280	V	150	21.76	0.0501
	12	12160	12142	12178	24320	H	150	21.76	0.0501
	20	12180	12162	12198	24360	V	150	21.76	0.0501
	Band Edges								
14.02 14.48 GHz									
Power (At Tx Terminals) Test									
Channel	Frequency (MHz)	Lower Frequency (MHz)	Upper Frequency (MHz)	Frequency Tolerance (Hz)	Polarization	Watts	.dBW	Watts	Test
Uplink	1	14020	14002	14038	28040	V	0.01	-20	0.1585
	13	14058	14022	14094	28116	H	0.01	-20	0.1585
	2	14060	14042	14078	28120	V	0.01	-20	0.1585
	3	14100	14082	14118	28200	V	0.01	-20	0.1585
	14	14138	14102	14174	28276	H	0.01	-20	0.1585
	5	14180	14162	14198	28360	V	0.01	-20	0.1585
	15	14218	14182	14254	28436	H	0.01	-20	0.1585
	6	14220	14202	14238	28440	V	0.01	-20	0.1585
7	14260	14242	14278	28520	V	0.01	-20	0.1585	
16	14298	14262	14334	28596	H	0.01	-20	0.1585	
8	14300	14282	14318	28600	V	0.01	-20	0.1585	

Horizons\_2

	9	14340	14322	14358	28680	V	0.01	-20	0.1585
	17	14360	14342	14378	28720	H	0.01	-20	0.1585
	10	14380	14362	14398	28760	V	0.01	-20	0.1585
	18	14400	14382	14418	28800	H	0.01	-20	0.1585
	11	14420	14402	14438	28840	V	0.01	-20	0.1585
	19	14440	14422	14458	28880	H	0.01	-20	0.1585
	12	14460	14442	14478	28920	V	0.01	-20	0.1585
	20	14480	14462	14498	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



Horizons\_2

-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
<b>ERP</b>							
.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