Lab Code: 200167-0

FCC PART 101, SUBPART Q
TYPE APPROVAL
MEASUREMENT AND TEST REPORT

For

Rayawave Incorporated

12707 High Bluff Drive Suite 200
San Diego, CA 92130

FCC ID: USPAB70100

This Report Concerns:	Product type:
☒ Original Report	Point-to-Point Millimeter Transceiver System

Test Engineer:	James Ma
Report Number:	R0701241
Report Date:	2007-02-01
Reviewed By:	Hans Mellberg, VP of Engineering
Prepared By:	**Bay Area Compliance Laboratories Corp.** 1274 Anvilwood Ave. Sunnyvale, CA 94089, USA Tel: (408) 732-9162 Fax: (408) 732 9164

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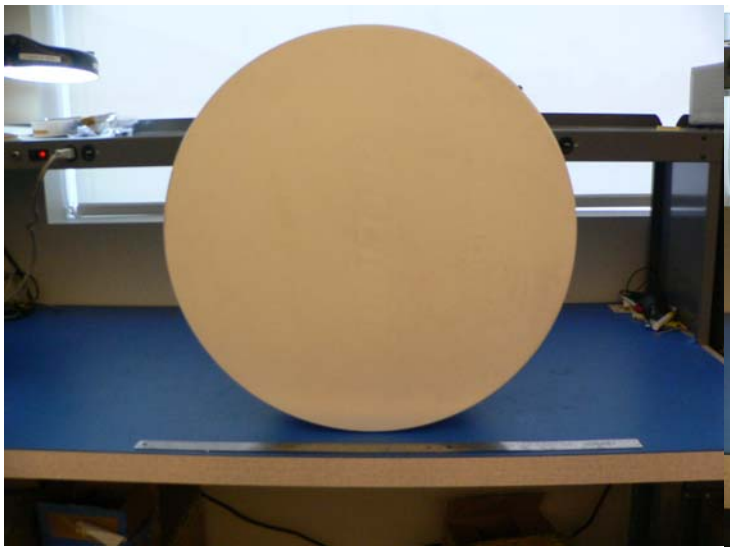
1 GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

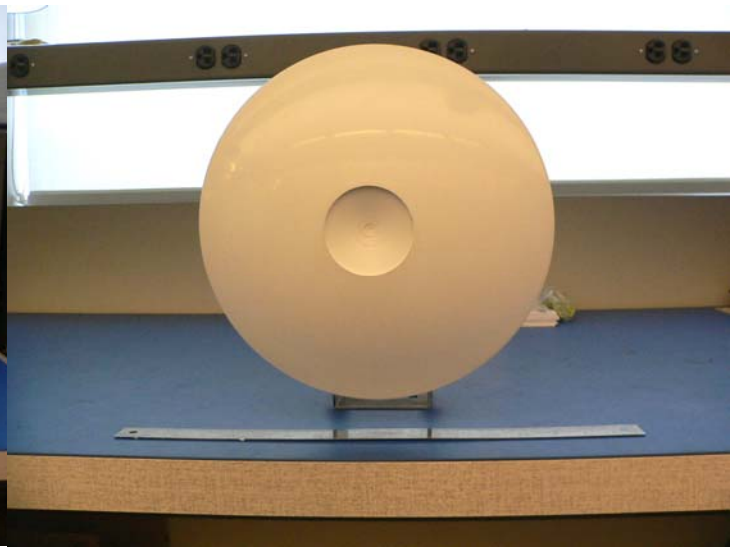
The *Rayawave Incorporation's* product, FCC ID: USPAB70100 or the "EUT" as referred to in this report is a Point-to-Point Millimeter Wave Transceiver System. The EUT operates in the 71-76 GHz band. Under FCC ID: USPAB70100 there exist two models; Model AireBeam 70-100-12 which employs a 12" 43 dBi antenna and Model: AireBeam 70-100-24 which employs a 24" 51 dBi antenna. It is designed for use in an outdoor setting with clear line-of-sight between points. This product requires a licence for implementation and is generally designed for light to heavy industrial or commercial deployment.

** The test data gathered are from typical production sample, serial number: S0410600001 for A unit and S05206000013 for B unit provided by the manufacturer.*

1.2 EUT Photo



Model: AireBeam 70-1250-24, 24" Antenna



Model: AireBeam 70-1250-12, 12" Antenna

1.3 Mechanical Description

The EUT is a device meant for permanent attachment with approximate measurements of: 505 mm L x 625 mm W x 625 mm H for AireBeam 70-100-24 and 405 mmL x 310 mmW x 310 mmH which operate at 73.8 GHz or 74.8 GHz .

This type approval report is prepared on behalf of *Rayawave Inc.* in accordance with Part 2, Subpart J, Part 101 Subpart Q of the Federal Communication Commissions rules.

The objective of the manufacture is to determine compliance with FCC rules, Part 101 for Modulation Characteristics, Field strength of spurious radiation, RF Exposure, RF output power, Occupied Bandwidth and Frequency Stability.

1.4 Related Submittal(s)/Grant(s)

No Related Submittals

1.5 Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of Federal Regulations Title 47 Part 2, Sub-part J as well as the following parts:

Applicable Standard:

Part 101 Subpart Q SERVICE AND TECHNICAL RULES FOR THE 70/80/90 GHZ BANDS

All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratory, Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

1.6 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in the field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the values ranging from ±2.0 dB for Conducted Emissions tests and ±4.0 dB for Radiated Emissions tests are the most accurate estimates pertaining to uncertainty of EMC measurements at BACL Corp.

Detailed instrumentation measurement uncertainties can be found in BACL Corp. report QAP-018.

1.7 Test Facility

The test site used by BACL Corp. to collect radiated and conducted emissions measurement data is located at its facility in Sunnyvale, California, USA.

The test site at BACL Corp. has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11, 1997 and December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. The facility also complies with the test methods and procedures set forth in ANSI C63.4-2003 & TIA/EIA-603.

The Federal Communications Commission and Voluntary Control Council for Interference have the reports on file and they are listed under FCC registration number: 90464 and VCCI Registration No.: R-2463 and C-2698. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL Corp. is a National Institute of Standards and Technology (NIST) accredited laboratory under the National Voluntary Laboratory Accredited Program (Lab Code 200167-0). The current scope of accreditations can be found at http://ts.nist.gov/ts/htdocs/210/214/scopes/2001670.htm.

2 SYSTEM TEST CONFIGURATION

2.1 Justification

The EUT was configured for testing according to TIA/EIA-603 C.
The final qualification test was performed with the EUT operating at normal mode.

2.2 Equipment Modifications

No modifications were made to the EUT.

2.3 Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
SmartBits 2000	Multi Port, Stream, Layer	SMB-2000	5052

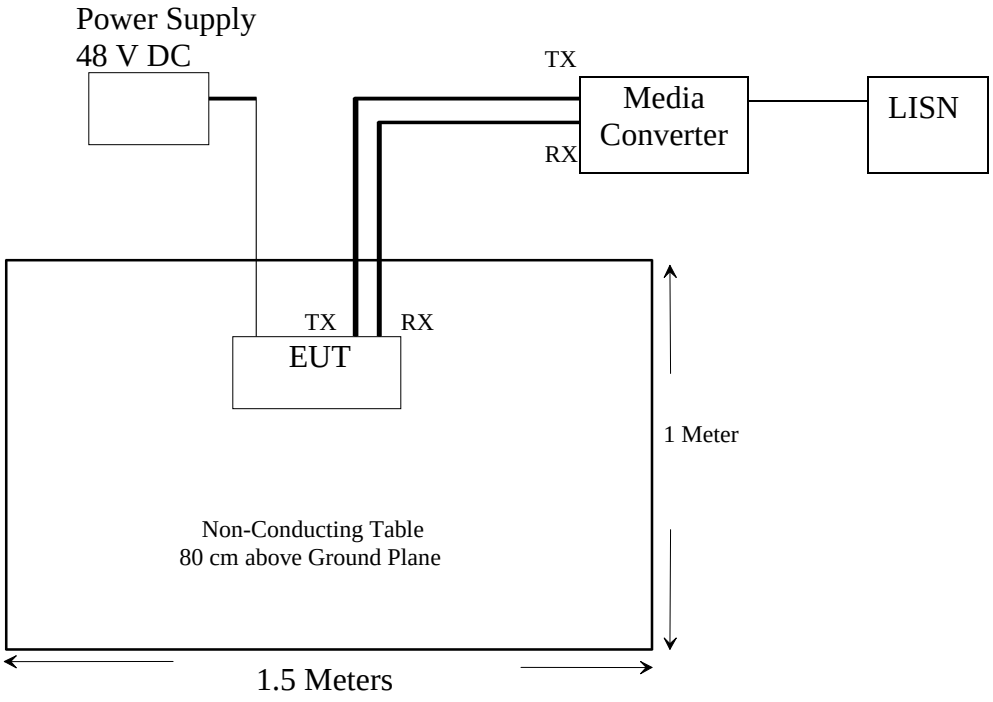
2.4 Power Supply Information

Manufacturer	Description	Model	Serial Number
BK Precision	DC Power Supply	1740	26502000233

2.5 Interface Ports and Cabling

Cable Description	Length (M)	From	To
Optical, Fiber cable	2.0	SmartBits 2000	EUT

2.6 Test Setup Block Diagram



3 SUMMARY OF TEST RESULTS

Results reported relate only to the product tested.

FCC RULES	DESCRIPTION OF TEST	RESULT
§ 2.1047 § 101.141	Modulation Characteristics	NA
§ 2.1053 § 101.111	Field Strength of Spurious Radiation	Compliant
§2.1091 § 101.1525	RF Exposure	Compliant
§ 2.1046, § 101.113	RF Output Power	Compliant
§ 2.1049 § 101.109	Occupied Bandwidth	Compliant
§ 2.1055 (a) § 2.1055 (d) § 101.107	Frequency stability vs. temperature Frequency stability vs. voltage	NA

4 §2.1047 §101.141 – MODULATION CHARACTERISTIC

4.1 Applicable Standard

Requirement: FCC § 2.1047(d). As Part 101.141, there is no requirement for transmitters operating at 70 GHz.

5 §2.1053 / §101.111- HARMONIC & SPURIOUS EMISSIONS

5.1 Applicable Standard

Requirements: CFR 47, § 2.1053 / §101.111 (a) (2) (iii)

For operating frequencies above 15 GHz, In any 1 MHz band, the center frequency of which is removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 + 10 Log_{10} (the mean output power in watts) decibels, or 80 decibels, whichever is the lesser attenuation. The authorized bandwidth includes the nominal radio frequency bandwidth of an individual transmitter/modulator in block-assigned bands. Equipment licensed prior to April 1, 2005 shall only be required to meet this standard in any 4 kHz band.

For EIRP= 64.20 dBm, which is equivalent = 159.43 dBµV/m @ 3 meter.
A = 43 + 34.2 dBW = 77.2 dBc.

Emission Limit = 82.23 dBµV/m. @ 3 meter

For EIRP= 56.20 dBm, which is equivalent = 151.43 dBµV/m @ 3 meter.
A = 43 + 26.2 dBW = 69.2 dBc.

Emission Limit = 82.23 dBµV/m. @ 3 meter

Requirements: CFR 47, §101.111 (a) (2) (v) Emissions Mask

The emission mask for the 71–76 GHz, 81–86 GHz, 92–94 GHz, and 94.1–95 GHz bands used in the equation in paragraph (a)(2)(ii) of this section applies only to the edge of each channel, but not to sub-channels established by licensees.

NA: This device is a fixed frequency transceiver with each of two units operating at separate but fixed frequency within the range of 71000 to 76000 MHz.

5.2 Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into antenna which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up 200 GHz.

5.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
OML	WR-12 harmonic Mixer with Horn antenna	M12HW/A	E60120-1	2006-01-23
OML	WR-05 Harmonic Mixer with Horn Antenna	M05HW/A	G60106-1	2006-01-23
OML	WR-03 Harmonic Mixer with Horn Antenna	M03HWD	H60120-1	2006-01-23
OML	Diplexer for Agilent Spectrum Analyzer	DPL26	N/A	N/A
Sonoma Instruments	Pre-amplifier (10 KHz – 2.5 GHz)	317	260407	2006-03-20
Sunol Science Corp.	Broadband Antenna (30 – 3000 MHz)	JB3 Antenna	A020106-2	2006-03-14
HP	Pre, Amplifier (1 ~ 26.5 GHz)	8449B	3147A00400	2006-08-21
Agilent	Analyzer, Spectrum	E4446A	US44300386	2006-03-06
A. R.A	Antenna, Horn, DRG	DRG-118/A	1132	N/R

Statement of Traceability: BACL Corp. attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

5.4 Environmental Conditions

Temperature:	18° C
Relative Humidity:	55%
ATM Pressure:	1020mbar

** The testing was performed by James Ma on 2007-01-29.*

5.5 Test Result

Worst case reading as follows for 24 inches Antenna measured at 3 meters:

-11.1 dB at 437.50 MHz (73.85 GHz)
-11.2 dB at 437.50 MHz (74.76GHz)

For Freq. 147.7 GHz & 149.52 GHz measured at distance 10 cm.

Final scan 1GHz -200GHz , Fundamental = 73.85 GHz)

Frequency MHz	Reading dBµV	Direction Degrees	Height Meters	Polar. H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Distance Factor dB	Corrected Amplitude dBµV/m	101.111 Limit (dBµV/m)	Margin dB
147700.00	62.4	0	1.3	V	24.0	12.5	0.0	29.5	69.4	82.23	-12.8
147700.00	61.1	0	1.3	H	24.0	12.5	0.0	29.5	68.1	82.23	-14.1
1500.00	66.3	270	2.4	V	24.8	1.9	36.3	0.0	56.6	82.23	-25.6
1500.00	64.9	180	2.2	H	24.8	1.9	36.3	0.0	55.2	82.23	-27.0
1250.00	64.2	30	2.2	V	23.3	1.3	36.8	0.0	51.9	82.23	-30.3
3750.00	53.3	200	2.0	V	30.0	2.7	34.8	0.0	51.2	82.23	-31.1
3750.00	52.7	180	2.2	H	30.0	2.7	34.8	0.0	50.6	82.23	-31.7
1250.00	60.8	180	2.2	H	23.3	1.3	36.8	0.0	48.5	82.23	-33.7

Final scan 1GHz -200GHz , Fundamental = 74.76 GHz)

Frequency MHz	Reading dBµV	Direction Degrees	Height Meters	Polar. H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Distance Factor dB	Corrected Amplitude dBµV/m	101.111 Limit (dBµV/m)	Margin dB
149520.00	60.5	0	1.3	V	24.0	12.5	0.0	29.5	67.5	82.23	-14.7
149520.00	58.6	0	1.3	H	24.0	12.5	0.0	29.5	65.6	82.23	-16.6
1687.00	65.4	270	2.4	V	24.8	1.9	36.3	0.0	55.7	82.23	-26.5
1687.00	63.2	60	1.5	H	24.8	1.9	36.3	0.0	53.5	82.23	-28.7
3750.00	51.6	80	2.3	V	30.0	2.7	34.8	0.0	49.5	82.23	-32.8
1250.00	60.8	50	1.0	V	23.3	1.3	36.8	0.0	48.5	82.23	-33.7
3750.00	50.3	180	2.2	H	30.0	2.7	34.8	0.0	48.2	82.23	-34.1
1250.00	60.1	80	2.2	H	23.3	1.3	36.8	0.0	47.8	82.23	-34.4

Final scan 30MHz -1GHz , Fundamental = 73.85GHz

Frequency	Reading	Direction	Height	Polar	Antenna Loss	Cable loss	Amplifier	Corrected Amplitude	101.111	
MHz	dBµV	Degree	Meter	H / V	dB	dB	dB	dBµV/m	Limit	Margin
437.50	88.6	250	1.0	V	16.5	4.4	38.3	71.2	82.23	-11.1
437.50	88.1	280	2.8	H	16.5	4.4	38.3	70.7	82.23	-11.6
38.60	82.0	50	1.2	V	17.3	1.4	38.5	62.3	82.23	-20.0
250.00	83.6	250	1.0	V	11.9	3.4	38.4	60.5	82.23	-21.7
250.00	83.1	280	2.8	H	11.9	3.4	38.4	60.0	82.23	-22.2
74.60	86.2	330	1.2	V	8.1	1.8	38.4	57.7	82.23	-24.6
74.60	84.4	270	2.1	H	8.1	1.8	38.4	55.9	82.23	-26.4
38.60	71.4	270	3.2	H	17.3	1.4	38.5	51.7	82.23	-30.6

Final scan 30MHz -1GHz , fundamental = 74.76 GHz

Frequency	Reading	Direction	Height	Polar	Antenna Loss	Cable loss	Amplifier	Corrected Amplitude	101.111	
MHz	dBµV	Degree	Meter	H / V	dB	dB	dB	dBµV/m	Limit	Margin
437.50	88.5	250	1.0	V	16.5	4.4	38.3	71.1	82.23	-11.2
437.50	87.4	280	2.8	H	16.5	4.4	38.3	70.0	82.23	-12.3
375.00	88.2	250	1.0	V	15.5	4.1	38.4	69.5	82.23	-12.8
375.00	85.6	280	2.8	H	15.5	4.1	38.4	66.9	82.23	-15.4
38.40	80.4	75	1.8	V	17.3	1.4	38.5	60.7	82.23	-21.6
80.90	81.3	330	1.2	V	8.1	1.9	38.4	52.9	82.23	-29.4
80.90	79.4	270	2.1	H	8.1	1.9	38.4	51.0	82.23	-31.3
38.40	60.2	270	3.2	H	17.3	1.4	38.5	40.5	82.23	-41.8

5.6 Test Result

Worst case reading as follows for 12 inches Antenna measured at 3 meters:

-5.8 dB at 437.50 MHz (73.85 GHz)
-8.0 dB at 437.50 MHz (74.76GHz)

For Freq. 147.7 GHz & 149.52 GHz measured at distance 10 cm.

Final scan 1GHz -200GHz , Fundamental = 73.85 GHz)

Frequency MHz	Reading dBµV	Direction Degree	Height Meter	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Distance Factor dB	Corrected Amplitude dBµV/m	101.111 Limit (dBµV/m)	Margin dB
147700.00	56.4	0	1.3	V	24.0	12.5	0.0	29.5	63.4	82.23	-18.8
147700.00	55.1	0	1.3	H	24.0	12.5	0.0	29.5	62.1	82.23	-20.1
1500.00	60.2	200	2.4	V	24.8	1.9	36.3	0.0	50.5	82.23	-31.7
3750.00	50.1	90	2.4	V	30.0	2.7	34.8	0.0	48.0	82.23	-34.3
1500.00	55.3	180	2.2	H	24.8	1.9	36.3	0.0	45.6	82.23	-36.6
1250.00	55.2	120	2.4	V	23.3	1.3	36.8	0.0	42.9	82.23	-39.3
3750.00	43.6	120	2.2	H	30.0	2.7	34.8	0.0	41.5	82.23	-40.8
1250.00	52.1	180	2.2	H	23.3	1.3	36.8	0.0	39.8	82.23	-42.4

Final scan 1GHz -200GHz , Fundamental = 74.76 GHz)

Frequency MHz	Reading dBµV	Direction Degree	Height Meter	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Distance Factor dB	Corrected Amplitude dBµV/m	101.111 Limit (dBµV/m)	Margin dB
149520.00	56.2	0	1.3	V	24.0	12.5	0.0	29.5	63.2	82.23	-19.0
149520.00	54.3	0	1.3	H	24.0	12.5	0.0	29.5	61.3	82.23	-20.9
1687.00	58.3	120	2.4	V	24.8	1.9	36.3	0.0	48.6	82.23	-33.6
1687.00	56.8	180	2.2	H	24.8	1.9	36.3	0.0	47.1	82.23	-35.1
3750.00	47.4	90	2.4	V	30.0	2.7	34.8	0.0	45.3	82.23	-37.0
1250.00	56.4	120	2.4	V	23.3	1.3	36.8	0.0	44.1	82.23	-38.1
1250.00	56.1	100	2.2	H	23.3	1.3	36.8	0.0	43.8	82.23	-38.4
3750.00	44.6	110	2.2	H	30.0	2.7	34.8	0.0	42.5	82.23	-39.8

Final scan 30MHz -1GHz , Fundamental = 73.85GHz

Frequency	Reading	Direction	Height	Polar	Antenna Loss	Cable loss	Amplifier	Corrected Amplitude	101.111	
MHz	dBµV	Degree	Meter	H / V	dB	dB	dB	dBµV/m	Limit	Margin
437.50	83.7	250	1.0	V	16.5	4.4	38.3	66.3	82.23	-16.0
437.50	82.4	280	2.8	H	16.5	4.4	38.3	65.0	82.23	-17.3
38.60	76.4	90	1.8	V	17.3	1.4	38.5	56.7	82.23	-25.6
250.00	77.3	250	1.0	V	11.9	3.4	38.4	54.2	82.23	-28.0
250.00	76.1	220	2.8	H	11.9	3.4	38.4	53.0	82.23	-29.2
74.60	80.4	200	1.2	V	8.1	1.8	38.4	51.9	82.23	-30.4
74.60	77.3	220	2.1	H	8.1	1.8	38.4	48.8	82.23	-33.5
38.60	62.2	120	3.2	H	17.3	1.4	38.5	42.5	82.23	-39.8

Final scan 30MHz -1GHz , fundamental = 74.76 GHz

Frequency	Reading	Direction	Height	Polar	Antenna Loss	Cable loss	Amplifier	Corrected Amplitude	101.111	
MHz	dBµV	Degree	Meter	H / V	dB	dB	dB	dBµV/m	Limit	Margin
437.50	81.5	180	1.0	V	16.5	4.4	38.3	64.1	82.23	-18.2
437.50	80.2	180	2.8	H	16.5	4.4	38.3	62.8	82.23	-19.5
375.00	80.3	120	1.0	V	15.5	4.1	38.4	61.6	82.23	-20.7
375.00	78.9	120	2.8	H	15.5	4.1	38.4	60.2	82.23	-22.1
38.40	73.4	90	1.8	V	17.3	1.4	38.5	53.7	82.23	-28.6
80.90	72.2	150	1.2	V	8.1	1.9	38.4	43.8	82.23	-38.5
80.90	70.2	150	2.1	H	8.1	1.9	38.4	41.8	82.23	-40.5
38.40	60.3	100	3.2	H	17.3	1.4	38.5	40.6	82.23	-41.7

6 §1.1307(b) (1), §2.1091 & 101.1525 - RF EXPOSURE

According to §1.1310 and §2.1091 RF exposure is calculated.

Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Averaging Time (minute)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*($180/f^2$)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density

MPE Prediction

Predication of MPE limit at a given distance
Equation from page 18 of OET Bulletin 65, Edition 97-01

$S = PG/4\pi R^2$

Where: S = power density
P = power input to antenna
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna

EUT with 24" 51 dBi Antenna

73.85 GHz Transmitter

Maximum peak output power at antenna input terminal:	13.20 (dBm)
Maximum peak output power at antenna input terminal:	20.89(mW)
Prediction distance:	480 (cm)
Predication frequency:	73850 (MHz)
Antenna Gain (typical):	51 (dBi)
antenna gain:	125892 (numeric)
Power density at predication frequency at 480 cm:	0.908 (mW/cm^2)
MPE limit for uncontrolled exposure at prediction frequency:	1 (mW/cm^2)

74.76 GHz Transmitter

Maximum peak output power at antenna input terminal:	10.62 (dBm)
Maximum peak output power at antenna input terminal:	11.53 (mW)
Prediction distance:	350 (cm)
Predication frequency:	74760 (MHz)
Antenna Gain (typical):	51 (dBi)
antenna gain:	125892 (numeric)
Power density at predication frequency at 350 cm:	0.943 (mW/cm^2)
MPE limit for uncontrolled exposure at prediction frequency:	1 (mW/cm^2)

EUT with 12" 43 dBi Antenna

73.85 GHz Transmitter

Maximum peak output power at antenna input terminal:	13.20 (dBm)
Maximum peak output power at antenna input terminal:	20.89(mW)
Prediction distance:	190 (cm)
Predication frequency:	73850 (MHz)
Antenna Gain (typical):	43 (dBi)
antenna gain:	19953 (numeric)
Power density at predication frequency at 190 cm:	0.918 (mW/cm^2)
MPE limit for uncontrolled exposure at prediction frequency:	1 (mW/cm^2)

74.76 GHz Transmitter

Maximum peak output power at antenna input terminal:	10.62 (dBm)
Maximum peak output power at antenna input terminal:	11.53 (mW)
Prediction distance:	140 (cm)
Predication frequency:	74760 (MHz)
Antenna Gain (typical):	43 (dBi)
antenna gain:	19953 (numeric)
Power density at predication frequency at 190 cm:	0.934 (mW/cm^2)
MPE limit for uncontrolled exposure at prediction frequency:	1 (mW/cm^2)

6.1 Test Result

Minimum operating distance for 24” 51 dBi antenna is 480 cm, and 190 cm for 12” 43 dBi antenna.

Please refer to the table below for summary of test results:

Antenna Size	Gain (dBi)	Frequency Setting (GHz)	Max Output Power (mW)	Prediction Distance (cm)	Power density at predication (mW/cm^2)	MPE limit (mW/cm^2)
24”	51	73.85	20.89	480	0.908	1.0
24”	51	74.76	11.53	350	0.943	1.0
12”	43	73.85	20.89	190	0.918	1.0
12”	43	74.76	11.53	140	0.934	1.0

7 §2.1046, §101.113 – Transmitter Power Limitation

7.1 Applicable Standard

Frequency band (MHz)	Maximum allowable EIRP \1\ \2\ Fixed \1\ ,\2\ (dBW)	Mobile (dBW)
928.0-929.0(2)	+17	.....
932.0-932.5(2)	+17	.....
932.5-935.0	+40	.....
941.0-941.5(2)	+30	+14
941.5-944.0	+40	.....
952.0-960.0(2)	+40	+14
1,850-1,990	+45	.....
2,110-2,150	+45	.....
2,150-2,180 \3\	+45	.....
2,180-2,200	+45	.....
2,450-2,500	+45	.....
2,500-2,686	.....	.....
2,686-2,690	+45	.....
3,700-4,200	+55	.....
5,925-6,425	+55	.....
6,425-6,525	.....	+35
6,525-6,875	+55	.....
10,550 to 10,600 5	+55	
10,600 to 10,680 5	+40	
10,700-11,700	+55	.....
12,200-12,700 \11\	+50	
12,700-13,200 \4\	+50	.....
13,200-13,250 \4\	+55	.....
14,200-14,400 \12\	+45	.....
17,700-18,600	+55	.....
18,600-18,800 \6\	+35	.....
18,800-19,700	\5\ +55	.....
21,200-23,600 \10\	+55	.....
24,250-25,250	\5\ +55	.....
27,500-28,350 \9\	+55	.....
29,100-29,250	(\7\)	.....
31,000 to 31,075 8, 9	30 dBW/MHz	30 dBW/MHz
31,075 to 31,225 8, 9	30 dBW/MHz	30 dBW/MHz
31,225 to 31,300 8, 9	30 dBW/MHz	30 dBW/MHz
38,600-40,000	+55	.....
92,000-95,000	+55	+55

7.2 Test Procedure

Conducted:

The RF output of the transmitter was connected to the spectrum analyzer through sufficient attenuation.

7.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
OML	WR-12 harmonic Mixer with Horn antenna	M12HW/A	E60120-1	2006-01-23
OML	Diplexer for Agilent Spectrum Analyzer	DPL26	N/A	N/R
Agilent	Spectrum Analyzer	E4446A	US44300386	2006-03-06

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

7.4 Environmental Conditions

Temperature:	19° C
Relative Humidity:	58%
ATM Pressure:	1018mbar

** The testing was performed by James Ma on 2007-01-29.*

7.5 Test Results

12" ANTENNA

Frequency GHz	Reading dBm	Antenna Gain dB	Correction Factor dBm	Correction Factor dBW	101.113 limit dBW	Margin	Comments	Testing Condition
73.85	13.20	43.0	56.20	26.20	55	-28.80	Fund/Peak	CW
74.76	10.62	43.0	53.62	23.62	55	-31.38	Fund/Peak	CW

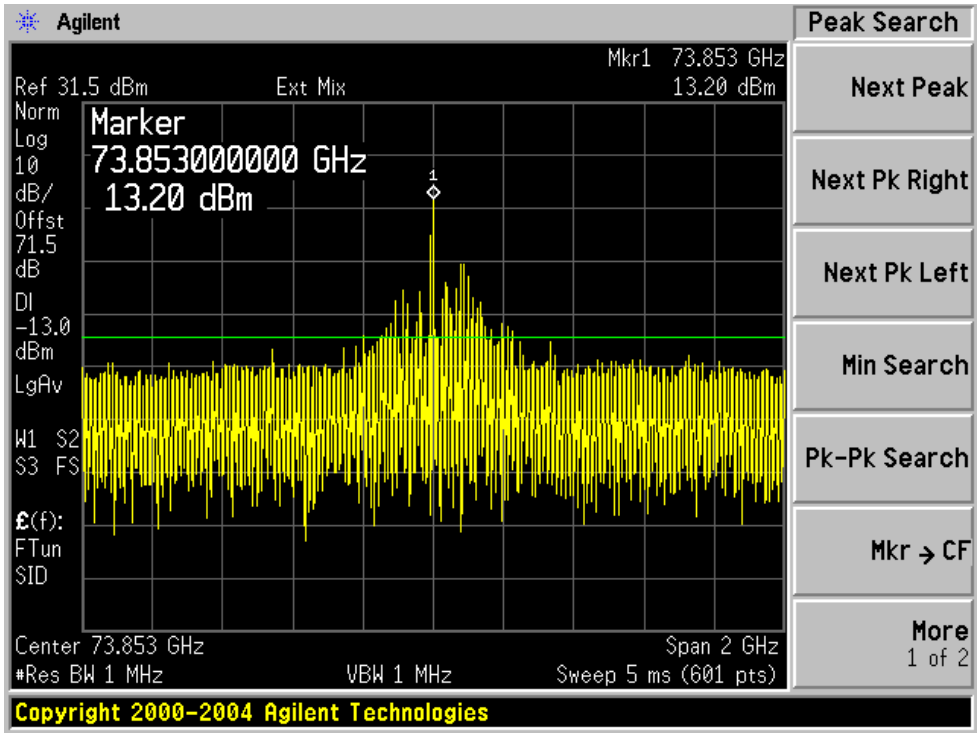
24" ANTENNA

Frequency GHz	Reading dBm	Antenna Gain dB	Correction Factor dBm	Correction Factor dBW	101.113 limit dBW	Margin	Comments	Testing Condition
73.85	13.20	51.0	64.20	34.20	55	-20.80	Fund/Peak	CW
74.76	10.62	51.0	61.62	31.62	55	-23.38	Fund/Peak	CW

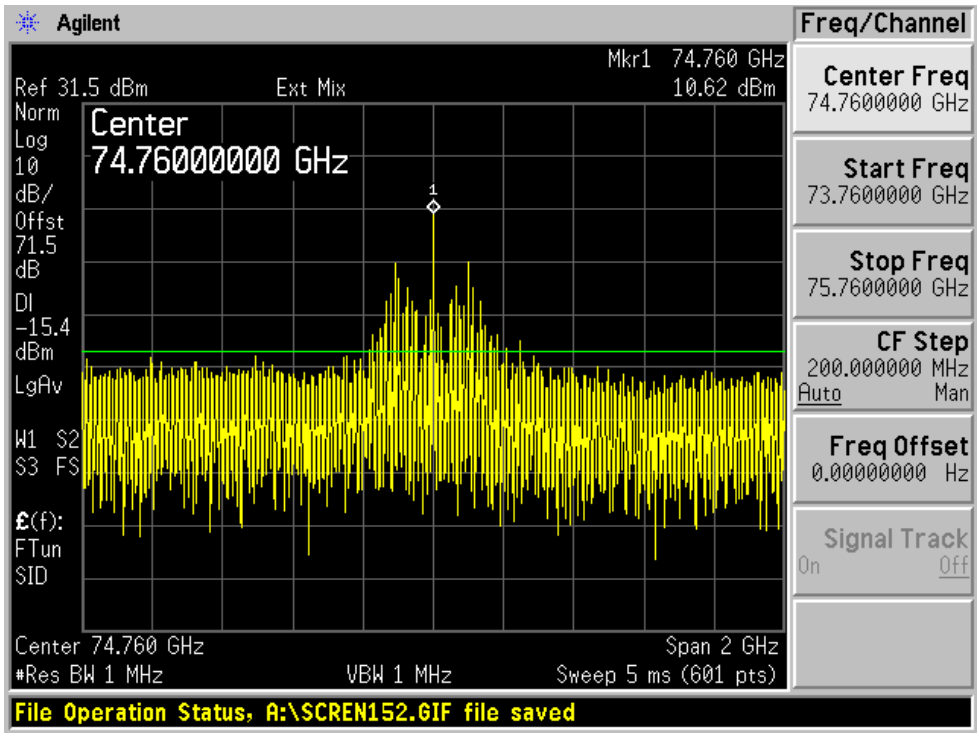
7.6 Test Results

Please refer to the following plots.

Unit A


Agilent
Peak Search
Mkr1 73.853 GHz
Ref 31.5 dBm
Ext Mix
13.20 dBm
Norm
Log
10
dB/
Offst
71.5
dB
Dl
-13.0
dBm
LgAv
W1 S2
S3 FS
£(f):
FTun
SID
Marker
73.853000000 GHz
13.20 dBm
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Center 73.853 GHz
Span 2 GHz
#Res BW 1 MHz
VBW 1 MHz
Sweep 5 ms (601 pts)
Copyright 2000-2004 Agilent Technologies

Unit B


Agilent
Freq/Channel
Mkr1 74.760 GHz
Ref 31.5 dBm
Ext Mix
10.62 dBm
Norm
Log
10
dB/
Offst
71.5
dB
Dl
-15.4
dBm
LgAv
W1 S2
S3 FS
£(f):
FTun
SID
Center
74.76000000 GHz
Center Freq
74.7600000 GHz
Start Freq
73.7600000 GHz
Stop Freq
75.7600000 GHz
CF Step
200.000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Center 74.760 GHz
Span 2 GHz
#Res BW 1 MHz
VBW 1 MHz
Sweep 5 ms (601 pts)
File Operation Status, A:\SCREN152.GIF file saved

8 §2.1049 & §101.109- OCCUPIED BANDWIDTH

8.1 Applicable Standard

Frequency band (MHz)	Maximum authorized bandwidth
928 to 929	25 kHz 1 5 6
932 to 932.5, 941 to 941.5	12.5 kHz 1 5 6
932.5 to 935, 941.5 to 944	200 kHz \1\
952 to 960	200 KHz 1 5 6
1,850 to 1,990	10 MHz \1\
2,110 to 2,130	3.5 MHz
2,130 to 2,150	800 or 1600 KHz \1\
2,150 to 2,160	10 MHz
2,160 to 2,180	3.5 MHz
2,180 to 2,200	800 or 1600 KHz \1\
2,450 to 2,483.5	625 KHz \2\
2,483.5 to 2,500	800 KHz
3,700 to 4,200	20 MHz
5,925 to 6,425	30 MHz \1\
6,425 to 6,525	25 MHz
6,525 to 6,875	10 MHz \1\
10,550 to 10,680	5 MHz \1\
10,700 to 11,700	40 MHz \1\
12,200 to 12,700\8\	500 megahertz
13,200 to 13,250	25 MHz
17,700 to 18,140	220 MHz \1\
18,140 to 18,142	2 MHz
18,142 to 18,580	6 MHz
18,580 to 18,820	20 MHz \1\
18,820 to 18,920	10 MHz
18,920 to 19,160	20 MHz \1\
19,160 to 19,260	10 MHz
19,260 to 19,700	220 MHz \1\
21,200 to 23,600	50 MHz \1\ \4\
24,250 to 25,250	40 MHz \7\
27,500 to 28,350	850 MHz
29,100 to 29,250	150 MHz
31,000 to 31,075	75 MHz
31,075 to 31,225	150 MHz
31,225 to 31,300	75 MHz
38,600 to 40,000	50 MHz \7\
71,000 to 76,000	**5000 MHz**
81,000 to 86,000	5000 MHz
92,000 to 95,000	(\3\)

8.2 Test Procedure

The RF output of the transmitter was connected to the spectrum analyzer through sufficient attenuation.

The resolution bandwidth of the spectrum analyzer was set at 1 MHz and the 26 dB Bandwidth was recorded.

8.3 Test Equipment List and Details

Manufacturer	Description	Serial Number	Model	Calibration Date
OML	WR-12 harmonic Mixer with Horn antenna	E60120-1	M12HW/A	2006-01-23
OML	Diplexer for Agilent Spectrum Analyzer	N/A	DPL26	N/A
HP	Analyzer, Spectrum	US44300386	E4446A	2006-03-06

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

8.4 Environmental Conditions

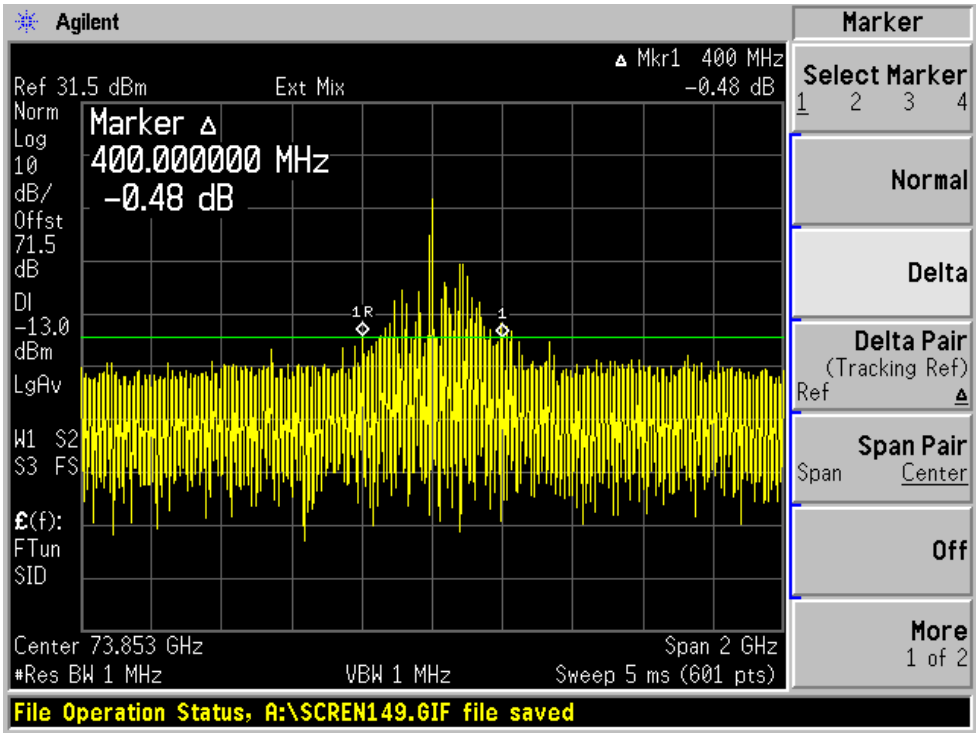
Temperature:	19° C
Relative Humidity:	58%
ATM Pressure:	1018 mbar

** The testing was performed by James Ma on 2007-01-29.*

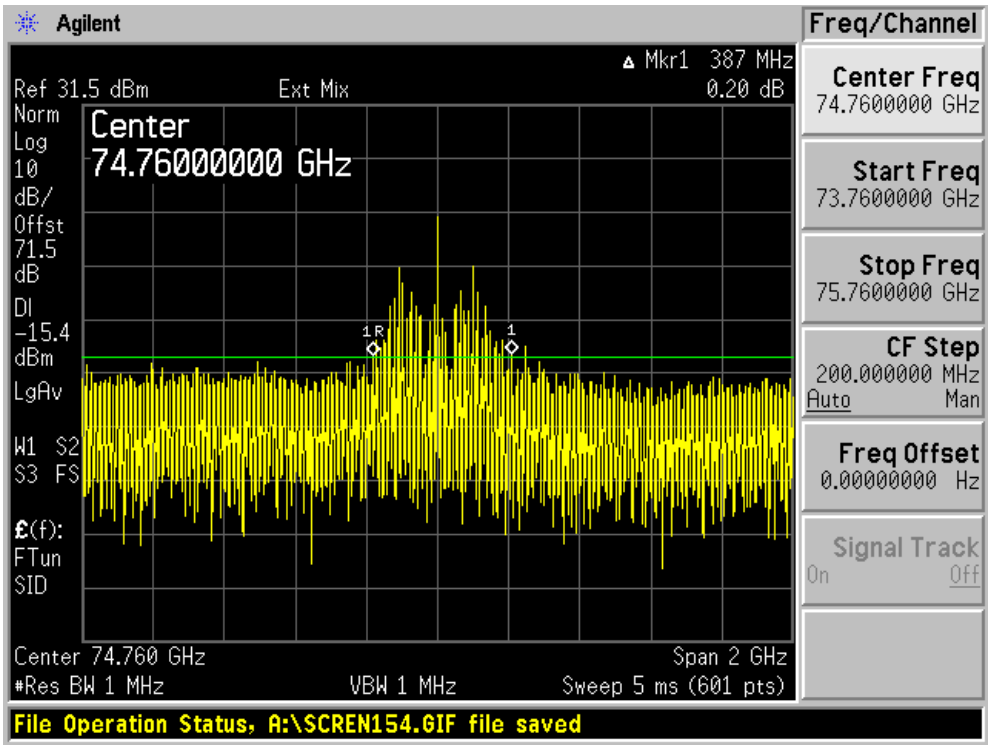
8.5 Test Results

Please refer to the following plots.

Plots of 26 dB Bandwidth for 73.85 GHz Transmitter



Plots of 26 dB Bandwidth for 74.76 GHz Transmitter



9 §2.1055 (a), §2.1055 (d), §101.107- FREQUENCY STABILITY

9.1 Applicable Standard

Requirements: FCC § 2.1055 (a), § 2.1055 (d). As Part 101.107, there is no requirement for device operating at 71,000 to 76,000 MHz.