

FCC PART 15.247

TEST REPORT

For

Lierda Science & Technology Group Co.,Ltd.

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FCC ID: N8NLS4WF-CC3221

Report Type: C II PC	Product Type: WIFI Module
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Report Number: RKS160407001-00B	
Report Date: 2016-05-27	
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Note: This test report is prepared for the customer shown above and for the equipment described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp.

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Issue
1	RKS160407001-00D	Original Report	2016-04-29
2	RKS160407001-00B	C II PC Report	2016-05-27

Note:

This is an amended report application based on RKS160407001-00D , the details as below

1. Changing the model No. from “LSD4WF-3221I5SS ” to “LSD4WF-3221I6SS”.
2. Antenna types have changed, LSD4WF-3221I5SS is the PCB antenna, LSD4WF-3221I6SS is an external antenna.

Based on the above difference, so tested the “SPURIOUS EMISSIONS”, other test data and photos were copied from the original report RKS160407001-00D that issued on 2016-04-29.

FCC §15.203 - ANTENNA REQUIREMENT

Applicable Standard

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

- a. Antenna must be permanently attached to the unit.
 - b. Antenna must use a unique type of connector to attach to the EUT.
- Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Connector Construction

The EUT has one integral antenna arrangement for wifi, which was permanently attached and the antenna gain is 0.2 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

Result: Compliance.

FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

FCC §15.247 (d); §15.209; §15.205;

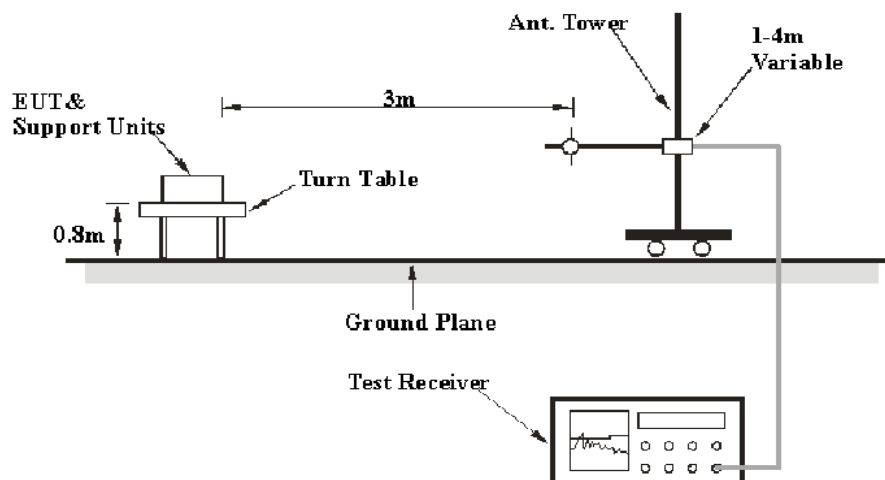
Measurement Uncertainty

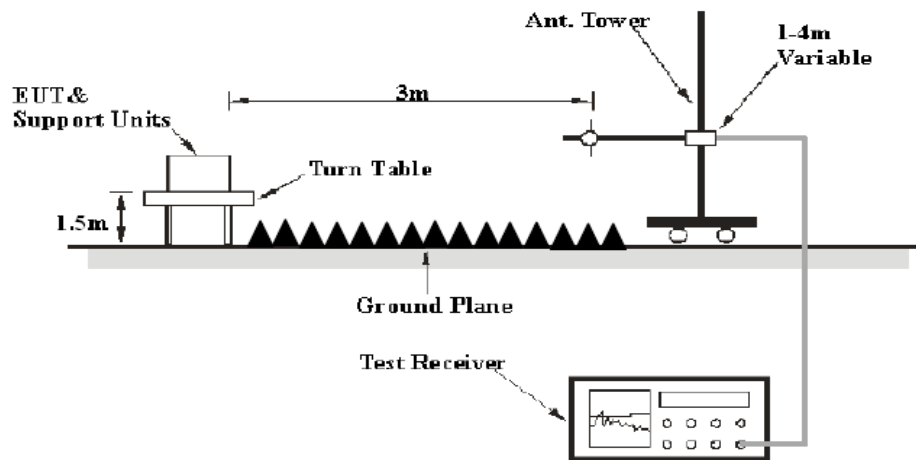
All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency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

Based on CISPR 16-4-2:2011, the expanded combined standard uncertainty of radiation emissions at Bay Area Compliance Laboratories Corp. (Kunshan) is 5.91 dB for 30MHz-1GHz and 4.92 dB for above 1GHz, 1.95dB for conducted measurement at antenna port. And the uncertainty will not be taken into consideration for the test data recorded in the report

EUT Setup

Below 1 GHz:



Above 1GHz:

The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, and FCC 15.247 limits.

The adapter was connected to a 120 VAC/60 Hz power source.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 25 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Detector
30 MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz	/	Ave.

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1 GHz, peak and Average detection modes for frequencies above 1 GHz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Sonoma Instrument	Amplifier	330	171377	2015-09-16	2016-09-16
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2015-11-12	2016-11-11
Sunol Sciences	Broadband Antenna	JB3	A090314-2	2015-11-07	2016-11-06
ETS	Horn Antenna	3115	6229	2015-11-07	2016-11-06
EMCO	Horn Antenna	3116	9510-2384	2015-11-07	2016-11-06
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2015-11-12	2016-11-11
Mini	Pre-amplifier	ZVA-183-S+	857001418	2015-09-16	2016-09-16
DUCOMMUN	Pre-amplifier	ALN-22093530-01	990147	2015-09-16	2016-09-16
champrotek	Chamber	Chamber A	1#	2015-09-17	2016-09-17
R&S	Auto test Software	EMC32	V 09.10.0	-	-
BACL	RF cable	KS-LAB-012	KS-LAB-012	2015-06-16	2016-12-15

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Kunshan) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.205, 15.209 and 15.247.

8.64 dB at 30.727500 MHz in the Vertical polarization

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level complies with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cispr}$$

In BACL, $U_{(Lm)}$ is less than U_{cispr} , if L_m is less than L_{lim} , it implies that the EUT complies with the limit.

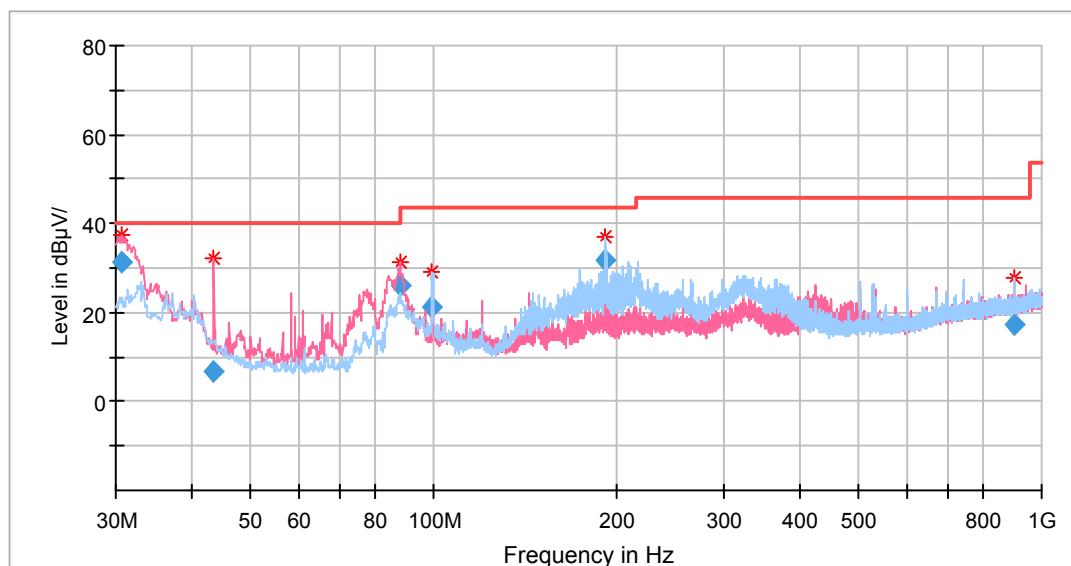
Test Data**Environmental Conditions**

Temperature:	25 °C
Relative Humidity:	40 %
ATM Pressure:	101.0 kPa

The testing was performed by Allen Tian on 2016-05-23

30MHz ~ 1GHz

The worst case was performed under 802.11b mode



Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dB μ V/m)	Margin (dB)
30.727500	37.06	QP	265.0	100.0	V	-5.7	31.36	40.00	8.64
43.458750	19.45	QP	128.0	100.0	V	-12.5	6.95	40.00	33.05
87.957500	43.07	QP	0.0	100.0	V	-17.0	26.07	40.00	13.93
99.476250	35.23	QP	110.0	200.0	H	-14.0	21.23	43.50	22.27
191.868750	43.85	QP	191.0	200.0	H	-12.3	31.55	43.50	11.95
900.090000	17.99	QP	274.0	100.0	H	-0.9	17.09	46.00	28.91

1 GHz-25 GHz**802.11b Mode:**

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBµV/m)	FCC Part 15.247/205/209	
	Reading (dBµV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dB µ V/m)	Margin (dB)
Low Channel (2412 MHz)									
2412	96.62	PK	150.0	200.0	V	3.00	99.62	/	/
2412	87.59	Ave	150.0	200.0	V	3.00	90.59	/	/
2412	95.12	PK	200.0	150.0	H	3.00	98.12	/	/
2412	87.43	Ave	200.0	150.0	H	3.00	90.43	/	/
2386	37.69	Ave	250.0	150.0	V	4.90	42.59	54.00	11.41
2386	48.74	PK	250.0	150.0	V	4.90	53.64	74.00	20.36
2390	36.76	Ave	253.0	150.0	V	4.90	41.66	54.00	12.34
2390	48.36	PK	253.0	150.0	V	4.90	53.26	74.00	20.74
4824	20.42	Ave	156.0	150.0	V	13.80	34.22	54.00	19.78
4824	33.34	PK	156.0	150.0	V	13.80	47.14	74.00	26.86
6962	35.54	PK	267.0	200.0	H	18.90	54.44	74.00	19.56
6962	21.64	Ave	267.0	200.0	H	18.90	40.54	54.00	13.46
7236	31.95	PK	135.0	150.0	V	18.80	50.75	74.00	23.25
7236	18.92	Ave	135.0	150.0	V	18.80	37.72	54.00	16.28

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBµV/m)	FCC Part 15.247/205/209	
	Reading (dBµV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBµV/m)	Margin (dB)
Middle Channel (2437 MHz)									
2437	95.89	PK	200.0	150.0	V	3.00	98.89	/	/
2437	89.37	Ave	200.0	150.0	V	3.00	92.37	/	/
2437	94.45	PK	128.0	200.0	H	3.00	97.45	/	/
2437	87.78	Ave	128.0	200.0	H	3.0 0	90.78	/	/
4874	32.08	PK	244.0	150.0	V	13.9 0	45.98	74.00	28.02
4874	18.75	Ave	244.0	150.0	V	13.9 0	32.65	54.00	21.35
6597	36.04	PK	59.0	200.0	H	17.60	53.64	74.00	20.36
6597	22.04	Ave	59.0	200.0	H	17.60	39.64	54.00	14.36
6990	35.03	PK	279.0	150.0	H	19.00	54.03	74.00	19.97
6990	21.63	Ave	279.0	150.0	H	19.00	40.63	54.00	13.37
7311	34.53	PK	83.0	150.0	V	18.90	53.43	74.00	20.57
7311	22.75	Ave	83.0	150.0	V	18.90	41.65	54.00	12.35

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
High Channel (2462 MHz)									
2462	94.87	PK	185.0	200.0	V	3.00	97.87	/	/
2462	88.72	Ave	185.0	200.0	V	3.00	91.72	/	/
2462	95.02	PK	220.0	150.0	H	3.00	98.02	/	/
2462	88.21	Ave	220.0	150.0	H	3.00	91.21	/	/
2483.5	35.71	Ave	251.0	150.0	V	5.00	40.71	54.00	13.29
2483.5	46.64	PK	251.0	150.0	V	5.00	51.64	74.00	22.36
2488	37.84	Ave	257.0	150.0	V	5.00	42.84	54.00	11.16
2488	48.64	PK	257.0	150.0	V	5.00	53.64	74.00	20.36
4924	25.32	Ave	265.0	150.0	V	14.00	39.32	54.00	14.68
4924	35.31	PK	265.0	150.0	V	14.00	49.31	74.00	24.69
6639	36.51	PK	4.0	150.0	H	17.7	54.21	74.00	19.79
6639	22.78	Ave	4.0	150.0	H	17.7	40.48	54.00	13.52
7386	31.5	PK	39.0	150.0	V	19.80	51.30	74.00	22.70
7386	18.41	Ave	39.0	150.0	V	19.80	38.21	54.00	15.79

802.11g Mode:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Low Channel (2412 MHz)									
2412	94.33	PK	185.0	200.0	V	3.00	97.33	/	/
2412	88.01	Ave	185.0	200.0	V	3.00	91.01	/	/
2412	93.35	PK	95.0	200.0	H	3.00	96.35	/	/
2412	87.75	Ave	95.0	200.0	H	3.00	90.75	/	/
2383	44.41	PK	260.0	150.0	V	4.90	49.31	74.00	24.69
2383	30.79	Ave	260.0	150.0	V	4.90	35.69	54.00	18.31
2389	47.45	PK	251.0	150.0	V	4.90	52.35	74.00	21.65
2389	32.58	Ave	251.0	150.0	V	4.90	37.48	54.00	16.52
4824	35.86	PK	262.0	150.0	V	13.80	49.66	74.00	24.34
4824	21.58	Ave	262.0	150.0	V	13.80	35.38	54.00	18.62
6653	22.73	Ave	207.0	150.0	V	17.8	40.53	54.00	13.47
6653	36.03	PK	207.0	150.0	V	17.8	53.83	74.00	20.17
7236	32.43	PK	186.0	150.0	H	18.80	51.23	74.00	22.77
7236	19.19	Ave	186.0	150.0	H	18.80	37.99	54.00	16.01

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Middle Channel (2437 MHz)									
2437	94.65	PK	295.0	200.0	V	3.00	97.65	/	/
2437	89.34	Ave	295.0	200.0	V	3.00	92.34	/	/
2437	94.34	PK	150.0	200.0	H	3.00	97.34	/	/
2437	89.01	Ave	150.0	200.0	H	3.00	92.01	/	/
4874	23.63	Ave	136.0	150.0	V	13.90	37.53	54.00	16.47
4874	37.04	PK	136.0	150.0	V	13.90	50.94	74.00	23.06
6611	35.70	PK	240.0	200.0	V	17.70	53.40	74.00	20.60
6611	22.34	Ave	240.0	200.0	V	17.70	40.04	54.00	13.96
6976	21.69	Ave	76.0	150.0	V	18.90	40.59	54.00	13.41
6976	35.14	PK	76.0	150.0	V	18.90	54.04	74.00	19.96
7311	34.13	PK	207.0	150.0	V	18.90	53.03	74.00	20.97
7311	20.62	Ave	207.0	150.0	V	18.90	39.52	54.00	14.48

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
High Channel (2462 MHz)									
2462	95.77	PK	175.0	200.0	V	3.00	98.77	/	/
2462	90.71	Ave	175.0	200.0	V	3.00	93.71	/	/
2462	93.56	PK	100.0	150.0	H	3.00	96.56	/	/
2462	88.34	Ave	100.0	150.0	H	3.00	91.34	/	/
2483.5	55.26	PK	245.0	150.0	H	5.00	60.26	74.00	13.74
2483.5	33.41	Ave	245.0	150.0	H	5.00	38.41	54.00	15.59
2487	48.07	PK	128.0	150.0	H	5.00	53.07	74.00	20.93
2487	29.85	Ave	128.0	150.0	H	5.00	34.85	54.00	19.15
4924	38.48	PK	269.0	150.0	V	14.00	52.48	74.00	21.52
4924	24.82	Ave	269.0	150.0	V	14.00	38.82	54.00	15.18
6611	22.34	Ave	140.0	150.0	V	17.70	40.04	54.00	13.96
6611	35.57	PK	140.0	150.0	V	17.70	53.27	74.00	20.73
7386	34.10	PK	82.0	200.0	V	19.80	53.90	74.00	20.10
7386	19.45	Ave	82.0	200.0	V	19.80	39.25	54.00	14.75

802.11n-HT20 Mode:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Low Channel (2412 MHz)									
2412	93.78	PK	180.0	200.0	V	3.00	96.78	/	/
2412	88.02	Ave	180.0	200.0	V	3.00	91.02	/	/
2412	93.33	PK	88.0	200.0	H	3.00	96.33	/	/
2412	87.74	Ave	88.0	200.0	H	3.00	90.74	/	/
2387	32.68	Ave	217.0	150.00	H	4.90	37.58	54.00	16.42
2387	51.89	PK	217.0	150.00	H	4.90	56.79	74.00	17.21
2389	35.24	Ave	259.0	150.00	V	4.90	40.14	54.00	13.86
2389	54.06	PK	259.0	150.00	V	4.90	58.96	74.00	15.04
4824	24.13	Ave	262.0	200.00	V	13.80	37.93	54.00	16.07
4824	38.39	PK	262.0	200.00	V	13.80	52.19	74.00	21.81
6639	35.79	PK	194.0	150.00	H	17.70	53.49	74.00	20.51
6639	22.78	Ave	194.0	150.00	H	17.70	40.48	54.00	13.52
7236	32.49	PK	228.0	150.00	H	18.80	51.29	74.00	22.71
7236	19.23	Ave	228.0	150.00	H	18.80	38.03	54.00	15.97

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Middle Channel (2437 MHz)									
2437	94.25	PK	180.0	200.0	V	3.00	97.25	/	/
2437	87.65	Ave	180.0	200.0	V	3.00	90.65	/	/
2437	93.89	PK	150.0	200.0	H	3.00	96.89	/	/
2437	88.23	Ave	150.0	200.0	H	3.00	91.23	/	/
4874	36.76	PK	247.0	150.0	V	13.90	50.66	74.00	23.34
4874	22.38	Ave	247.0	150.0	V	13.90	36.28	54.00	17.72
6625	35.38	PK	214.0	150.0	H	17.70	53.08	74.00	20.92
6625	22.39	Ave	214.0	150.0	H	17.70	40.09	54.00	13.91
6976	35.21	PK	314.0	150.0	H	18.90	54.11	74.00	19.89
6976	21.69	Ave	314.0	150.0	H	18.90	40.59	54.00	13.41
7311	34.83	PK	191.0	150.0	V	18.90	53.73	74.00	20.27
7311	20.62	Ave	191.0	150.0	V	18.90	39.52	54.00	14.48

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBµV/m)	FCC Part 15.247/205/209	
	Reading (dBµV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBµV/m)	Margin (dB)
High Channel (2462 MHz)									
2462	93.65	PK	200.0	200.0	V	3.00	96.65	/	/
2462	86.23	Ave	200.0	200.0	V	3.00	89.23	/	/
2462	92.89	PK	110.0	150.0	H	3.00	95.89	/	/
2462	87.03	Ave	110.0	150.0	H	3.00	90.03	/	/
2483.5	56.04	PK	52.0	150.0	H	5.00	61.04	74.00	12.96
2483.5	35.17	Ave	52.0	150.0	H	5.00	40.17	54.00	13.83
2490	35.55	Ave	257.0	150.0	V	5.10	40.65	54.00	13.35
2490	50.51	PK	257.0	150.0	V	5.10	55.61	74.00	18.39
4924	26.02	Ave	264.0	200.0	V	14.00	40.02	54.00	13.98
4924	40.64	PK	264.0	200.0	V	14.00	54.64	74.00	19.36
6653	35.97	PK	315.0	150.0	H	17.8	53.77	74.00	20.23
6653	22.73	Ave	315.0	150.0	H	17.8	40.53	54.00	13.47
7386	36.50	PK	191.0	150.0	V	19.80	56.30	74.00	17.70
7386	20.42	Ave	191.0	150.0	V	19.80	40.22	54.00	13.78

Note:

- 1) Correction Factor=Antenna factor (RX) + cable loss – amplifier factor
- 2) Margin = Limit - Limit – Corrected Amplitude
- 3) emissions more than 20dB lower below the limits were not reported