FCC Part 15C Test Report

FCC ID: 2AGZ3S00911

Product Name:	Starry Launch
Trademark:	Starry
Model Name :	S00912 L36104CPWD
Prepared For : Address :	Starry, Inc 38 Chauncy St Ste 200, Boston, MA 02111
Prepared By : Address :	Shenzhen BCTC Testing Co., Ltd. BCTC Building & 1-2F, East of B Building, Pengzhou Industrial, Fuyuan 1st Road, Qiaotou Community, Fuyong Street, Bao'an District, Shenzhen, China
Test Date:	Oct. 18, 2019 – Oct. 22, 2019
Date of Report :	Oct. 23, 2019
Report No.:	BCTC-LH190901198-1E

TEST RESULT CERTIFICATION

Applicant's name ..... :	Starry, Inc
Address ..... :	38 Chauncy St Ste 200, Boston, MA 02111
Manufacture's Name..... :	ShenZhen Spacetek Technology Co.,Ltd
Address ..... :	3F, NO.2Huafeng first science&technology Park, SanWei, Baoan District ShenZhen, China
Product description	
Product name ..... :	Starry Launch
Trademark ..... :	Starry
Model and/or type reference :	S00912 L36104CPWD
Standards ..... :	FCC Part15.247 ANSI C63.10:2013

This device described above has been tested by BCTC, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.247) , Subpart C			
Standard Section	Test Item	Judgment	Remark
15.247 (d)	Radiated Spurious Emission	PASS	
15.205	Restricted Band of Operation	PASS	
15.247 (d)	Band Edge (Out of Band Emissions)	PASS	

NOTE:

(1)" N/A" denotes test is not applicable in this Test Report

1.1 TEST FACILITY

Shenzhen BCTC Testing Co., Ltd.
Add. : BCTC Building & 1-2F, East of B Building, Pengzhou Industrial, Fuyuan 1st Road, Qiaotou Community, Fuyong Street, Bao'an District, Shenzhen, China
FCC Test Firm Registration Number: 712850
IC Registered No.: 23583

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement **y** ± **U** , where expended uncertainty **U** is based on a standard uncertainty multiplied by a coverage factor of **k=2** , providing a level of confidence of approximately **95** %。

No.	Item	Uncertainty
1	3m camber Radiated spurious emission(30MHz-1GHz)	U=4.3dB
2	3m chamber Radiated spurious emission(1GHz-18GHz)	U=4.5dB
3	3m chamber Radiated spurious emission(18GHz-40GHz)	U=3.34dB
4	Conducted Adjacent channel power	U=1.38dB
5	Conducted output power uncertainty Above 1G	U=1.576dB
6	Conducted output power uncertainty below 1G	U=1.28dB
7	humidity uncertainty	U=5.3%
8	Temperature uncertainty	U=0.59℃

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

<table>
<tr><td>Equipment</td><td>Starry Launch</td></tr>
<tr><td>Trade Name</td><td>Starry</td></tr>
<tr><td>Model Name</td><td>S00912, L36104CPWD</td></tr>
<tr><td>Model Difference</td><td>All the model are the same circuit and RF module, except mod el names</td></tr>
<tr><td>Product Description</td><td>
<table>
<tr><td>Operation Frequency:</td><td>802.11b/g/n20MHz:2412~2462 MHz
802.11n40MHz:2422~2452 MHz</td></tr>
<tr><td>Modulation Type:</td><td>WIFI: OFDM/DSSS</td></tr>
<tr><td>Bit Rate of Transmitter</td><td>802.11b:11/5.5/2/1 Mbps
802.11g:54/48/36/24/18/12/9/6Mbps
802.11n Up to 150Mbps</td></tr>
<tr><td>Number Of Channel</td><td>802.11b/g/n20MHz:11 CH
802.11n40MHz: 7 CH</td></tr>
<tr><td>Antenna Designation:</td><td>Please see Note 3.</td></tr>
</table>
Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical specification, please refer to the User's Manual.
</td></tr>
<tr><td>Channel List</td><td>Please refer to the Note 2.</td></tr>
<tr><td>Ratings</td><td>DC 12V</td></tr>
<tr><td>Adapter</td><td>Model: MKS-1201000S
Input: 100-240V~50/60Hz 0.3A
Output: 12.0V 1000mA</td></tr>
<tr><td>Connecting I/O Port(s)</td><td>Please refer to the User's Manual</td></tr>
</table>

Note:

1. For a more detailed features description, please refer to the manufacturer’s specifications or the User's Manual.
2 The Testing software is “adb command”, The power level set “--txpwr 14”.

3.

Channel List for 802.11b/g/n(20)							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2412	04	2427	07	2442	10	2457
02	2417	05	2432	08	2447	11	2462
03	2422	06	2437	09	2452		

Channel List for 802.11n(40)							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
03	2422	05	2432	07	2442	09	2452
04	2427	06	2437	08	2447		

4.

Table for Filed Antenna

Ant.	Model Name	Antenna Type	Gain (dBi)	NOTE
A	N/A	External antenna	5	
B	N/A	External antenna	5	

Note1: Directional Gain=5dBi+10log(2)=8.01dBi
Note2: The EUT 802.11n (20) and 802.11n(40) is support MIMO mode.

2.2 DESCRIPTION OF TEST MODES

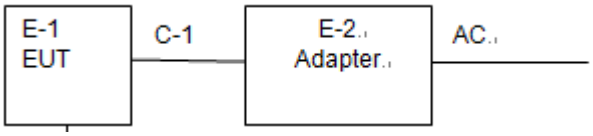
For Radiated Emission	
Final Test Mode	Description
Mode 1	802.11b CH1/ CH6/ CH11
Mode 2	802.11g CH1/ CH6/ CH11
Mode 3	802.11n20 CH1/ CH6/ CH11
Mode 4	802.11n40 CH3/ CH6/ CH9

Note:

(1) The measurements are performed at all Bit Rate of Transmitter, the worst data was reported.

2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Radiated Spurious Emission



2.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
E-1	Starry Launch	N/A	S00912	N/A	EUT
E-2	Adapter	N/A	MKS-1201000S	N/A	EUT

Item	Shielded Type	Ferrite Core	Length	Note
C-1	NO	NO	1.2M	DC cable unshielded

Note:

(1) The support equipment was authorized by Declaration of Confirmation.

(2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.

2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation Test equipment

Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Spectrum Analyzer (9kHz-26.5GHz)	Agilent	E4407B	MY45109572	2019.06.13	2020.06.12
2	Test Receiver (9kHz-7GHz)	R&S	ESR7	101154	2019.06.13	2020.06.12
3	Bilog Antenna (30MHz-3GHz)	SCHWARZBECK	VULB9163	VULB9163-942	2019.06.22	2020.06.21
4	Horn Antenna (1GHz-18GHz)	SCHWARZBECK	BBHA9120D	1541	2019.06.22	2020.06.21
5	Horn Antenna (18GHz-40GHz)	SCHWARZBECK	BBHA9170	822	2019.06.22	2020.06.21
6	Amplifier (9KHz-6GHz)	SCHWARZBECK	BBV9744	9744-0037	2019.06.25	2020.06.24
7	Amplifier (0.5GHz-18GHz)	SCHWARZBECK	BBV9718	9718-309	2019.06.25	2020.06.24
8	Amplifier (18GHz-40GHz)	MITEQ	TTA1840-35-HG	2034381	2019.06.17	2020.06.16
9	Loop Antenna (9KHz-30MHz)	SCHWARZBECK	FMZB1519B	014	2019.06.25	2020.06.24
10	RF cables1 (9kHz-30MHz)	Huber+Suhnar	9kHz-30MHz	B1702988-0008	2019.06.25	2020.06.24
11	RF cables2 (30MHz-1GHz)	Huber+Suhnar	30MHz-1GHz	1486150	2019.06.25	2020.06.24
12	RF cables3 (1GHz-40GHz)	Huber+Suhnar	1GHz-40GHz	1607106	2019.06.25	2020.06.24
13	Power Metter	Keysight	E4419	\	2019.06.17	2020.06.16
14	Power Sensor (AV)	Keysight	E9 300A	\	2019.06.17	2020.06.16
15	Spectrum Analyzer 20kHz-26.5GHz	KEYSIGHT	N9020A	MY49100060	2019.06.13	2020.06.12
16	Spectrum Analyzer 9kHz-40GHz	R&S	FSP40	100363	2019.06.13	2020.06.12
17	D.C. Power Supply	LongWei	TPR-6405D	\	\	\
18	Software	Frad	EZ-EMC	FA-03A2 RE	\	\

3. EMC EMISSION TEST

3.1 RADIATED EMISSION MEASUREMENT

3.1.1 RADIATED EMISSION LIMITS (Frequency Range 9kHz-1000MHz)

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	Limit (dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

(1) The limit for radiated test was performed according to FCC PART 15C.

(2) The tighter limit applies at the band edges.

(3) Emission level (dBuV/m)=20log Emission level (uV/m).

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	25GHz
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / *10Hz* for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

3.1.2 TEST PROCEDURE

Below 1GHz test procedure as below:

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Above 1GHz test procedure as below:

g. Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 metre to 1.5 metre(Above 18GHz the distance is 1 meter and table is 1.5 metre).
h. Test the EUT in the lowest channel ,the middle channel ,the Highest channel

Note:

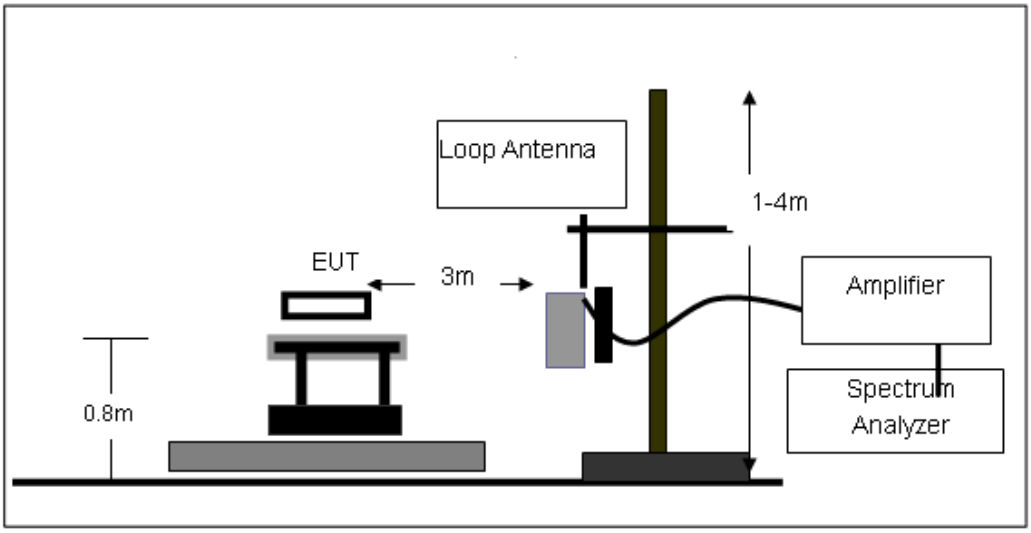
Both horizontal and vertical antenna polarities were tested
and performed pretest to three orthogonal axis. The worst case emissions were reported

3.1.3 DEVIATION FROM TEST STANDARD

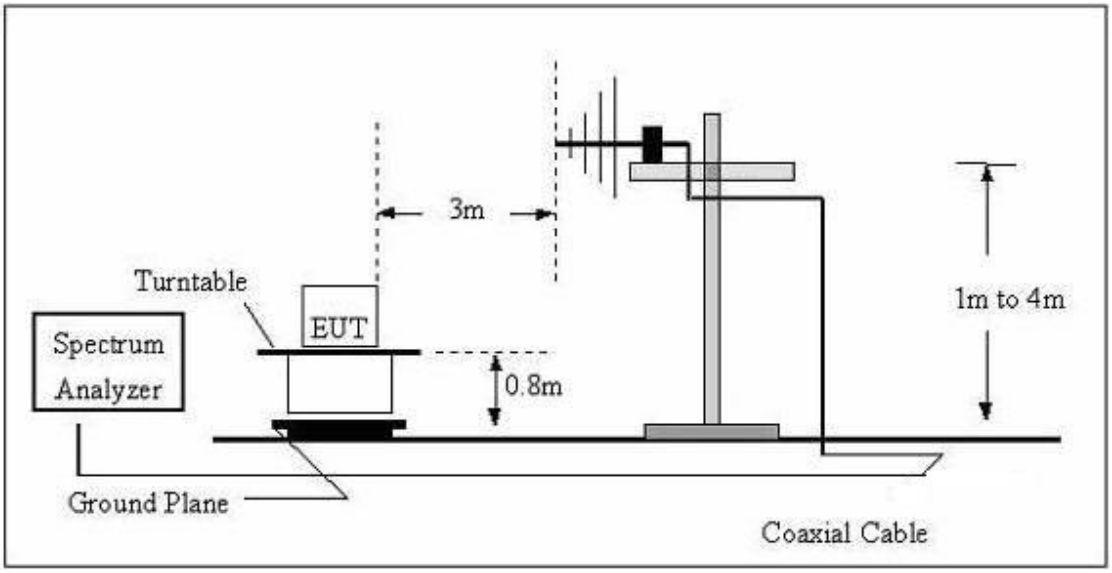
No deviation

3.1.4 TEST SETUP

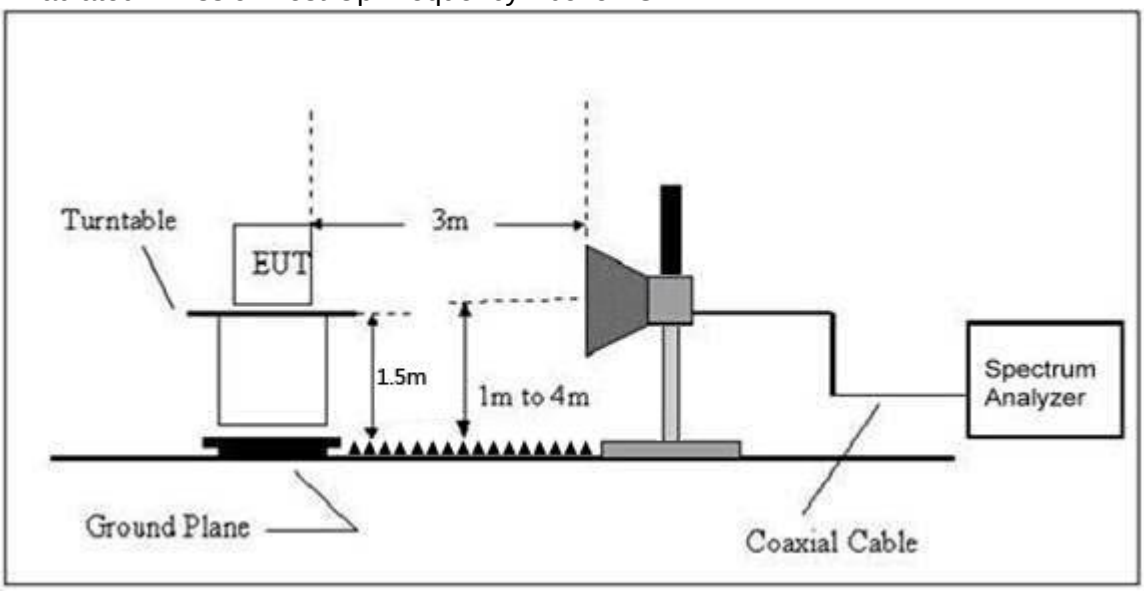
（A）Radiated Emission Test-Up Frequency Below 30MHz



（B）Radiated Emission Test-Up Frequency 30MHz~1GHz



（C）Radiated Emission Test-Up Frequency Above 1GHz



3.1.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

3.1.6 TEST RESULTS (BETWEEN 9KHZ – 30 MHZ)

Temperature:	26 ℃	Relative Humidity :	54%
Pressure:	101kPa	Test Voltage :	AC 120V/60Hz
Test Mode :	Mode 5	Polarization :	--

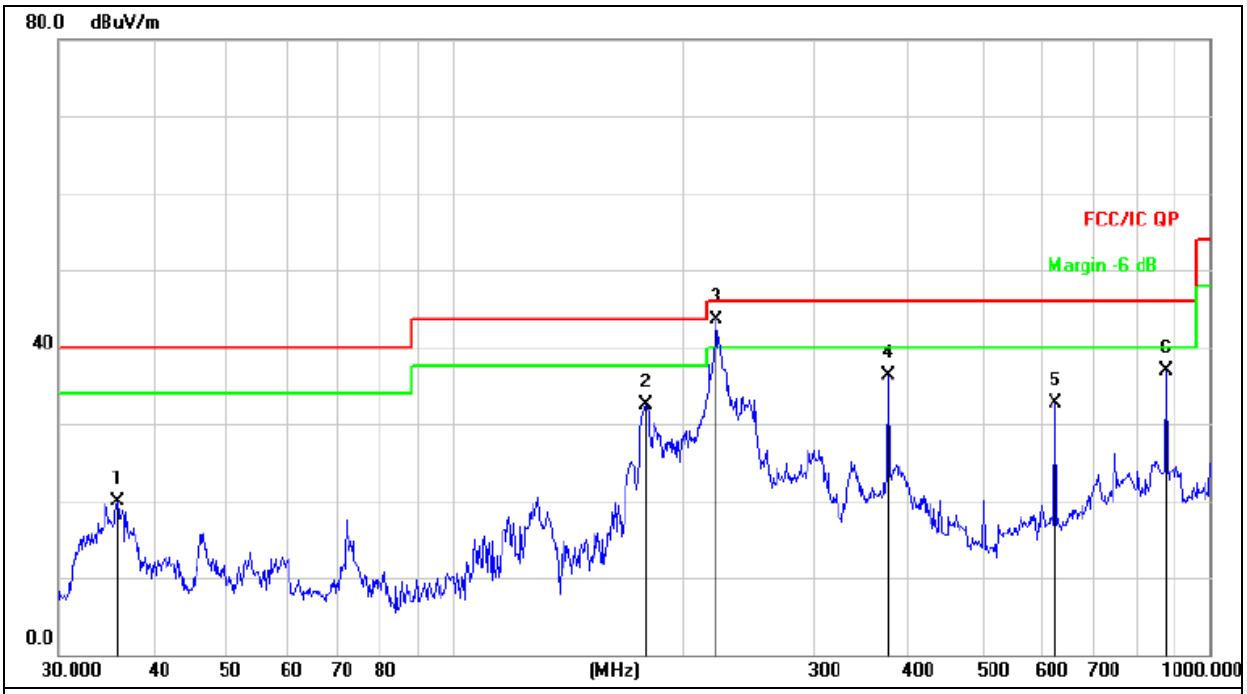
Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	PASS
--	--	--	--	PASS

NOTE:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
Distance extrapolation factor =40 log (specific distance/test distance)(dB);
Limit line = specific limits(dBuv) + distance extrapolation factor.

3.1.7 TEST RESULTS (BETWEEN 30MHZ – 1GHZ)

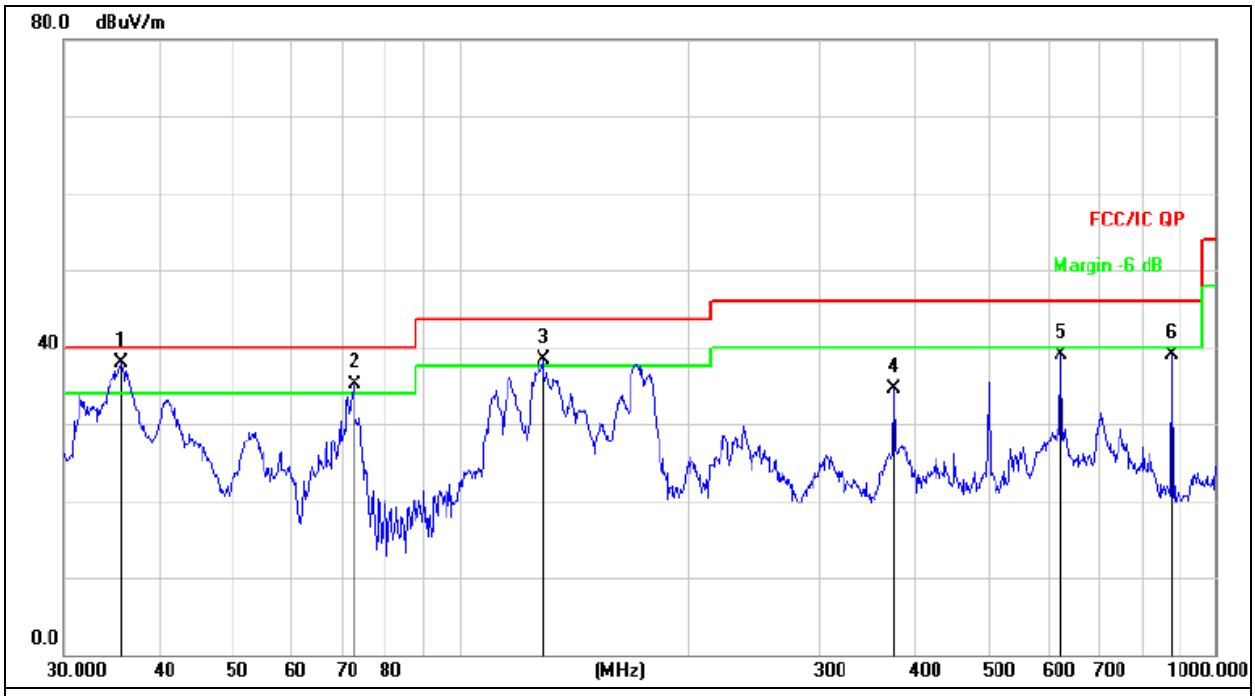
Temperature :	26 ℃	Relative Humidity :	54%
Pressure :	101 kPa	Polarization :	Horizontal
Test Voltage :	AC 120V/60Hz		
Test Mode :	Mode 5		



Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		35.8746	36.07	-16.18	19.89	40.00	-20.11	QP
2		179.3863	50.03	-17.62	32.41	43.50	-11.09	QP
3	*	222.1698	59.27	-15.79	43.48	46.00	-2.52	QP
4		375.9384	47.85	-11.64	36.21	46.00	-9.79	QP
5		625.0779	39.43	-6.67	32.76	46.00	-13.24	QP
6		875.2469	38.82	-2.00	36.82	46.00	-9.18	QP

Temperature :	26 ℃	Relative Humidity :	54%
Pressure :	101kPa	Polarization :	Vertical
Test Voltage :	AC 120V/60Hz		
Test Mode :	Mode 5		



Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1	*	35.7490	54.05	-16.20	37.85	40.00	-2.15	QP
2	!	72.5916	53.84	-18.77	35.07	40.00	-4.93	QP
3	!	129.0146	56.38	-18.15	38.23	43.50	-5.27	QP
4		375.9385	46.09	-11.64	34.45	46.00	-11.55	QP
5		625.0780	45.61	-6.67	38.94	46.00	-7.06	QP
6		875.2470	40.91	-2.00	38.91	46.00	-7.09	QP

3.1.8 TEST RESULTS (1GHZ~25GHZ)

802.11b

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Low Channel:2412MHz									
V	4824.00	66.17	39.55	7.77	25.66	60.05	74.00	-13.95	PK
V	4824.00	50.48	39.55	7.77	25.66	44.36	54.00	-9.64	AV
V	7236.00	65.68	38.33	7.3	24.55	59.20	74.00	-14.80	PK
V	7236.00	49.74	38.33	7.3	24.55	43.26	54.00	-10.74	AV
V	15450.00	51.64	35.23	6.6	26.59	49.60	74.00	-24.40	PK
H	4824.00	65.11	39.55	7.77	25.66	58.99	74.00	-15.01	PK
H	4824.00	51.03	39.55	7.77	25.66	44.91	54.00	-9.09	AV
H	7236.00	65.22	38.33	7.3	23.55	57.74	74.00	-16.26	PK
H	7236.00	48.35	38.33	7.3	23.22	40.54	54.00	-13.46	AV
H	15450.00	51.30	35.45	6.6	27.88	50.33	74.00	-23.67	PK

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Middle Channel:2437MHz									
V	4874.00	66.17	38.89	7.57	25.45	60.30	74.00	-13.70	Pk
V	4874.00	49.16	38.89	7.57	25.45	43.29	54.00	-10.71	AV
V	7311.00	64.98	38.78	7.35	24.78	58.33	74.00	-15.67	Pk
V	7311.00	48.48	38.78	7.35	24.78	41.83	54.00	-12.17	AV
V	15450.00	52.10	35.89	6.42	26.47	49.10	74.00	-24.90	Pk
H	4874.00	63.88	38.89	7.57	25.45	58.01	74.00	-15.99	Pk
H	4874.00	51.66	38.89	7.57	25.45	45.79	54.00	-8.21	AV
H	7311.00	64.55	38.78	7.35	24.78	57.90	74.00	-16.10	Pk
H	7311.00	48.79	38.78	7.35	24.78	42.14	54.00	-11.86	AV
H	15450.00	50.80	36.68	6.42	26.65	47.19	74.00	-26.81	Pk

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
High Channel: 2462MHz									
V	4924.00	65.29	38.75	7.46	25.45	59.45	74.00	-14.55	PK
V	4924.00	49.98	38.75	7.46	25.45	44.14	54.00	-9.86	AV
V	7386.00	65.81	38.65	7.22	24.78	59.16	74.00	-14.84	PK
V	7386.00	49.77	38.65	7.22	24.78	43.12	54.00	-10.88	AV
V	15450.00	52.23	35.58	6.35	26.47	49.47	74.00	-24.53	PK
H	4924.00	64.73	38.75	7.46	25.45	58.89	74.00	-15.11	PK
H	4924.00	51.38	38.75	7.46	25.45	45.54	54.00	-8.46	AV
H	7386.00	65.23	38.65	7.22	24.78	58.58	74.00	-15.42	PK
H	7386.00	49.74	38.65	7.22	24.78	43.09	54.00	-10.91	AV
H	15450.00	51.15	36.42	6.32	26.65	47.70	74.00	-26.30	PK

Remark:

1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier,
Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. In restricted bands of operation, The spurious emissions below the permissible value more than 20dB
4. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

802.11g

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Low Channel:2412MHz									
V	4824.00	64.68	39.55	7.77	25.66	58.56	74.00	-15.44	PK
V	4824.00	50.16	39.55	7.77	25.66	44.04	54.00	-9.96	AV
V	7236.00	65.08	38.33	7.3	24.55	58.60	74.00	-15.40	PK
V	7236.00	51.22	38.33	7.3	24.55	44.74	54.00	-9.26	AV
V	15450.00	50.92	35.23	6.6	26.59	48.88	74.00	-25.12	PK
H	4824.00	64.39	39.55	7.77	25.66	58.27	74.00	-15.73	PK
H	4824.00	52.28	39.55	7.77	25.66	46.16	54.00	-7.84	AV
H	7236.00	65.86	38.33	7.3	23.55	58.38	74.00	-15.62	PK
H	7236.00	49.52	38.33	7.3	23.22	41.71	54.00	-12.29	AV
H	15450.00	50.70	35.45	6.6	27.88	49.73	74.00	-24.27	PK

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Middle Channel:2437MHz									
V	4874.00	65.49	38.89	7.57	25.45	59.62	74.00	-14.38	PK
V	4874.00	49.71	38.89	7.57	25.45	43.84	54.00	-10.16	AV
V	7311.00	66.54	38.78	7.35	24.78	59.89	74.00	-14.11	PK
V	7311.00	52.28	38.78	7.35	24.78	45.63	54.00	-8.37	AV
V	15450.00	51.56	35.89	6.42	26.47	48.56	74.00	-25.44	PK
H	4874.00	64.72	38.89	7.57	25.45	58.85	74.00	-15.15	PK
H	4874.00	52.92	38.89	7.57	25.45	47.05	54.00	-6.95	AV
H	7311.00	64.77	38.78	7.35	24.78	58.12	74.00	-15.88	PK
H	7311.00	49.80	38.78	7.35	24.78	43.15	54.00	-10.85	AV
H	15450.00	50.97	36.68	6.42	26.65	47.36	74.00	-26.64	PK

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
High Channel: 2462MHz									
V	4924.00	64.66	38.75	7.46	25.45	58.82	74.00	-15.18	PK
V	4924.00	50.64	38.75	7.46	25.45	44.80	54.00	-9.20	AV
V	7386.00	67.86	38.65	7.22	24.78	61.21	74.00	-12.79	PK
V	7386.00	53.77	38.65	7.22	24.78	47.12	54.00	-6.88	AV
V	15450.00	52.18	35.58	6.35	26.47	49.42	74.00	-24.58	PK
H	4924.00	64.83	38.75	7.46	25.45	58.99	74.00	-15.01	PK
H	4924.00	53.92	38.75	7.46	25.45	48.08	54.00	-5.92	AV
H	7386.00	64.89	38.65	7.22	24.78	58.24	74.00	-15.76	PK
H	7386.00	48.85	38.65	7.22	24.78	42.20	54.00	-11.80	AV
H	15450.00	51.77	36.42	6.32	26.65	48.32	74.00	-25.68	PK

Remark:

1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier,
Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. In restricted bands of operation, The spurious emissions below the permissible value more than 20dB
4. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

802.11n(20MHz)

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Low Channel:2412MHz									
V	4824.00	65.65	39.55	7.77	25.66	59.53	74.00	-14.47	PK
V	4824.00	51.82	39.55	7.77	25.66	45.70	54.00	-8.30	AV
V	7236.00	66.53	38.33	7.3	24.55	60.05	74.00	-13.95	PK
V	7236.00	54.91	38.33	7.3	24.55	48.43	54.00	-5.57	AV
V	15450.00	52.11	35.23	6.6	26.59	50.07	74.00	-23.93	PK
H	4824.00	65.86	39.55	7.77	25.66	59.74	74.00	-14.26	PK
H	4824.00	52.72	39.55	7.77	25.66	46.60	54.00	-7.40	AV
H	7236.00	65.38	38.33	7.3	23.55	57.90	74.00	-16.10	PK
H	7236.00	49.32	38.33	7.3	23.22	41.51	54.00	-12.49	AV
H	15450.00	50.74	35.45	6.6	27.88	49.77	74.00	-24.23	PK

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Middle Channel:2437MHz									
V	4874.00	67.11	38.89	7.57	25.45	61.24	74.00	-12.76	PK
V	4874.00	51.44	38.89	7.57	25.45	45.57	54.00	-8.43	AV
V	7311.00	66.13	38.78	7.35	24.78	59.48	74.00	-14.52	PK
V	7311.00	54.88	38.78	7.35	24.78	48.23	54.00	-5.77	AV
V	15450.00	52.97	35.89	6.42	26.47	49.97	74.00	-24.03	PK
H	4874.00	67.35	38.89	7.57	25.45	61.48	74.00	-12.52	PK
H	4874.00	53.08	38.89	7.57	25.45	47.21	54.00	-6.79	AV
H	7311.00	64.64	38.78	7.35	24.78	57.99	74.00	-16.01	PK
H	7311.00	49.17	38.78	7.35	24.78	42.52	54.00	-11.48	AV
H	15450.00	49.38	36.68	6.42	26.65	45.77	74.00	-28.23	PK

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
High Channel: 2462MHz									
V	4924.00	67.63	38.75	7.46	25.45	61.79	74.00	-12.21	PK
V	4924.00	50.83	38.75	7.46	25.45	44.99	54.00	-9.01	AV
V	7386.00	65.31	38.65	7.22	24.78	58.66	74.00	-15.34	PK
V	7386.00	55.51	38.65	7.22	24.78	48.86	54.00	-5.14	AV
V	15450.00	54.55	35.58	6.35	26.47	51.79	74.00	-22.21	PK
H	4924.00	67.95	38.75	7.46	25.45	62.11	74.00	-11.89	PK
H	4924.00	53.10	38.75	7.46	25.45	47.26	54.00	-6.74	AV
H	7386.00	64.41	38.65	7.22	24.78	57.76	74.00	-16.24	PK
H	7386.00	49.09	38.65	7.22	24.78	42.44	54.00	-11.56	AV
H	15450.00	49.82	36.42	6.32	26.65	46.37	74.00	-27.63	PK

Remark:

1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier,
Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. In restricted bands of operation, The spurious emissions below the permissible value more than 20dB
4. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

802.11n(40MHz)

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Low Channel:2422MHz									
V	4844.00	67.20	39.55	7.77	25.66	61.08	74.00	-12.92	PK
V	4844.00	52.25	39.55	7.77	25.66	46.13	54.00	-7.87	AV
V	7266.00	66.44	38.33	7.3	24.55	59.96	74.00	-14.04	PK
V	7266.00	54.83	38.33	7.3	24.55	48.35	54.00	-5.65	AV
V	15450.00	54.34	35.23	6.6	26.59	52.30	74.00	-21.70	PK
H	4844.00	68.85	39.55	7.77	25.66	62.73	74.00	-11.27	PK
H	4844.00	51.83	39.55	7.77	25.66	45.71	54.00	-8.29	AV
H	7266.00	64.47	38.33	7.3	23.55	56.99	74.00	-17.01	PK
H	7266.00	50.48	38.33	7.3	23.22	42.67	54.00	-11.33	AV
H	15450.00	48.90	35.45	6.6	27.88	47.93	74.00	-26.07	PK

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Middle Channel:2437MHz									
V	4874.00	66.16	38.89	7.57	25.45	60.29	74.00	-13.71	PK
V	4874.00	50.92	38.89	7.57	25.45	45.05	54.00	-8.95	AV
V	7311.00	66.00	38.78	7.35	24.78	59.35	74.00	-14.65	PK
V	7311.00	54.83	38.78	7.35	24.78	48.18	54.00	-5.82	AV
V	15450.00	53.80	35.89	6.42	26.47	50.80	74.00	-23.20	PK
H	4874.00	69.11	38.89	7.57	25.45	63.24	74.00	-10.76	PK
H	4874.00	53.07	38.89	7.57	25.45	47.20	54.00	-6.80	AV
H	7311.00	65.89	38.78	7.35	24.78	59.24	74.00	-14.76	PK
H	7311.00	51.93	38.78	7.35	24.78	45.28	54.00	-8.72	AV
H	15450.00	50.10	36.68	6.42	26.65	46.49	74.00	-27.51	PK

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
High Channel: 2452MHz									
V	4904.00	64.97	38.75	7.38	25.45	59.05	74.00	-14.95	PK
V	4904.00	50.21	38.75	7.38	25.45	44.29	54.00	-9.71	AV
V	7356.00	66.88	38.65	7.15	24.78	60.16	74.00	-13.84	PK
V	7356.00	55.48	38.65	7.15	24.78	48.76	54.00	-5.24	AV
V	15450.00	53.11	35.58	6.25	26.47	50.25	74.00	-23.75	PK
H	4904.00	69.40	38.75	7.38	25.45	63.48	74.00	-10.52	PK
H	4904.00	52.88	38.75	7.38	25.45	46.96	54.00	-7.04	AV
H	7356.00	66.10	38.65	7.15	24.78	59.38	74.00	-14.62	PK
H	7356.00	51.79	38.65	7.15	24.78	45.07	54.00	-8.93	AV
H	15450.00	49.26	36.42	6.25	26.65	45.74	74.00	-28.26	PK

Remark:

1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier,
Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. In restricted bands of operation, The spurious emissions below the permissible value more than 20dB
4. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

3.3 RADIATED BAND EMISSION MEASUREMENT

3.3.1 TEST REQUIREMENT:

FCC Part15 C Section 15.209 and 15.205

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
[1]0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	([2])
13.36-13.41			

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	Class B (dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

(1) The limit for radiated test was performed according to FCC PART 15C.

(2) The tighter limit applies at the band edges.

(3) Emission level (dBuV/m)=20log Emission level (uV/m).

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	2300MHz
Stop Frequency	2520
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

3.3.2 TEST PROCEDURE

Above 1GHz test procedure as below:

a. 1. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
g. Test the EUT in the lowest channel,the Highest channel

Note:

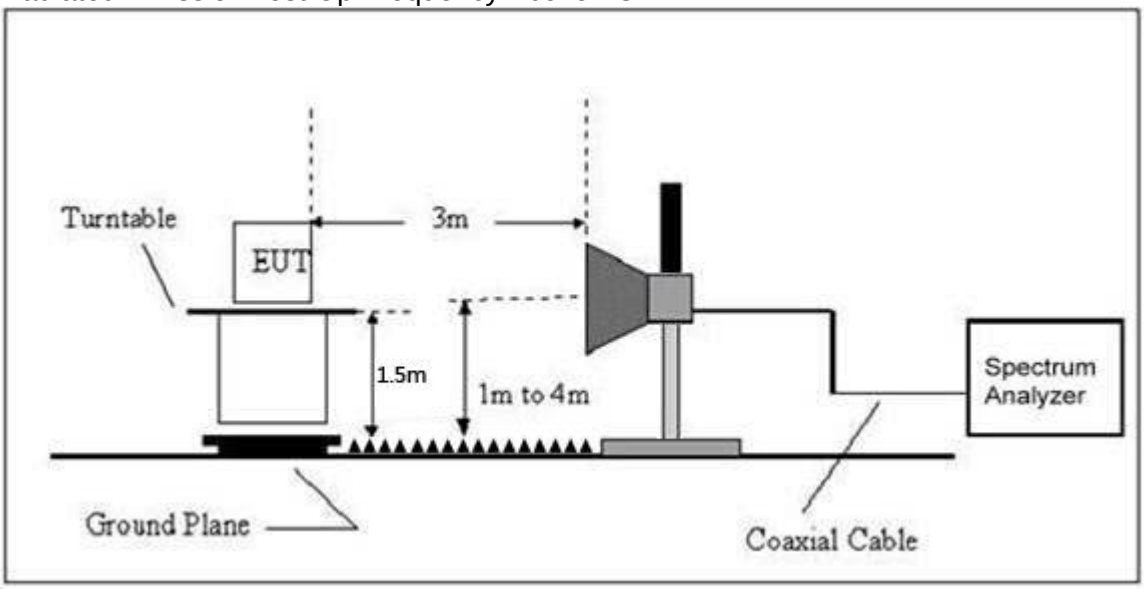
Both horizontal and vertical antenna polarities were tested
and performed pretest to three orthogonal axis. The worst case emissions were reported

3.3.3 DEVIATION FROM TEST STANDARD

No deviation

3.3.4 TEST SETUP

Radiated Emission Test-Up Frequency Above 1GHz



3.3.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

3.3.6 TEST RESULT

	Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB/m)	Emission evel (dBuV/m)	Limits (dBuV/m)		Result
							PK	PK	AV	
802.11b	**Low Channel 2412MHz**									
	H	2390.00	60.05	38.06	7.42	20.15	49.56	74.00	54.00	PASS
	H	2400.00	51.66	38.06	7.42	20.15	41.17	74.00	54.00	PASS
	V	2390.00	62.51	38.06	7.42	20.15	52.02	74.00	54.00	PASS
	V	2400.00	50.78	38.06	7.42	20.15	40.29	74.00	54.00	PASS
	High Channel 2462MHz									
	H	2483.50	61.22	38.17	7.45	20.54	51.04	74.00	54.00	PASS
	H	2485.50	51.93	38.17	7.45	20.54	41.75	74.00	54.00	PASS
	V	2483.50	62.46	38.2	7.45	20.54	52.25	74.00	54.00	PASS
	V	2485.50	51.75	38.2	7.45	20.54	41.54	74.00	54.00	PASS
802.11g	**Low Channel 2412MHz**									
	H	2390.00	59.71	38.06	7.42	20.15	49.22	74.00	54.00	PASS
	H	2400.00	52.75	38.06	7.42	20.15	42.26	74.00	54.00	PASS
	V	2390.00	59.85	38.06	7.42	20.15	49.36	74.00	54.00	PASS
	V	2400.00	55.34	38.06	7.42	20.15	44.85	74.00	54.00	PASS
	High Channel 2462MHz									
	H	2483.50	61.39	38.17	7.45	20.54	51.21	74.00	54.00	PASS
	H	2485.50	50.84	38.17	7.45	20.54	40.66	74.00	54.00	PASS
	V	2483.50	61.69	38.2	7.45	20.54	51.48	74.00	54.00	PASS
	V	2485.50	52.26	38.2	7.45	20.54	42.05	74.00	54.00	PASS
802.11n20	**Low Channel 2412MHz**									
	H	2390.00	60.62	38.06	7.42	20.15	50.13	74.00	54.00	PASS
	H	2400.00	54.98	38.06	7.42	20.15	44.49	74.00	54.00	PASS
	V	2390.00	64.27	38.06	7.42	20.15	53.78	74.00	54.00	PASS
	V	2400.00	51.56	38.06	7.42	20.15	41.07	74.00	54.00	PASS
	High Channel 2462MHz									
	H	2483.50	63.84	38.17	7.45	20.54	53.66	74.00	54.00	PASS
	H	2485.50	54.58	38.17	7.45	20.54	44.40	74.00	54.00	PASS
	V	2483.50	61.80	38.2	7.45	20.54	51.59	74.00	54.00	PASS
	V	2485.50	51.99	38.2	7.45	20.54	41.78	74.00	54.00	PASS
802.11n40	**Low Channel 2422MHz**									
	H	2390.00	61.58	38.06	7.42	20.15	51.09	74.00	54.00	PASS
	H	2400.00	52.80	38.06	7.42	20.15	42.31	74.00	54.00	PASS
	V	2390.00	60.36	38.06	7.42	20.15	49.87	74.00	54.00	PASS
	V	2400.00	52.94	38.06	7.42	20.15	42.45	74.00	54.00	PASS
	High Channel 2452MHz									
	H	2483.50	61.38	38.17	7.45	20.54	51.20	74.00	54.00	PASS
	H	2485.50	52.72	38.17	7.45	20.54	42.54	74.00	54.00	PASS
	V	2483.50	61.22	38.2	7.45	20.54	51.01	74.00	54.00	PASS
	V	2485.50	54.33	38.2	7.45	20.54	44.12	74.00	54.00	PASS

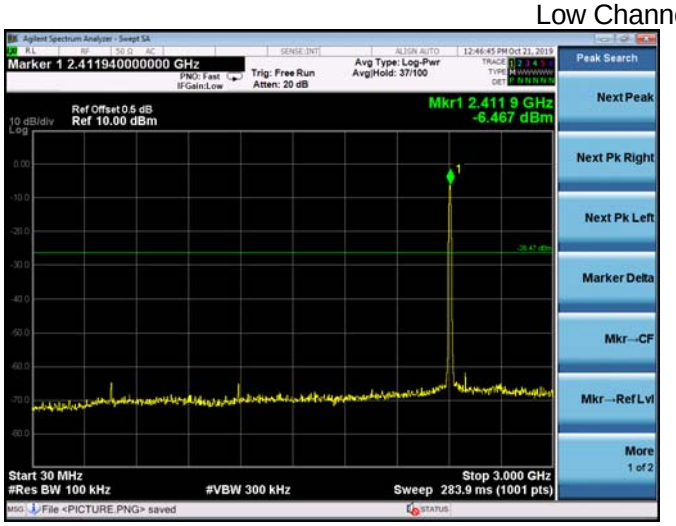
Remark:

1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier, Margin= Emission Level - Limit
2. If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit.
3. In restricted bands of operation, The spurious emissions below the permissible value more than 20dB
4. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

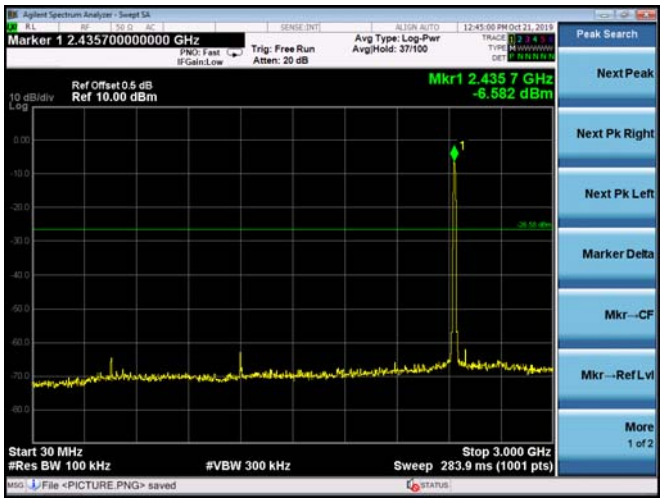
CONDUCTED EMISSION MEASUREMENT

802.11b

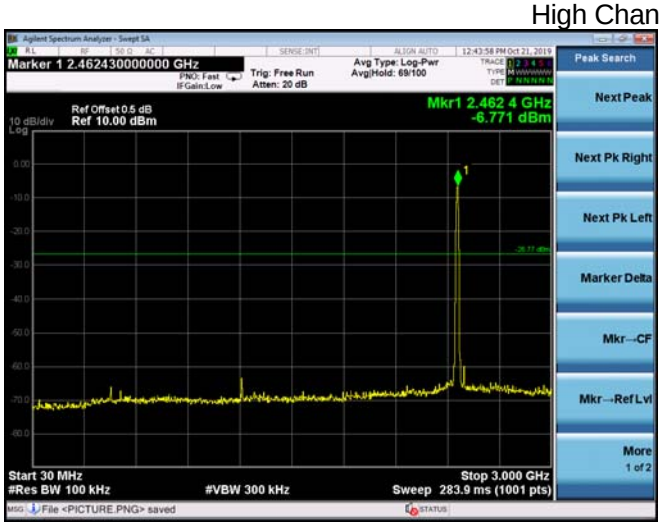
Low Channel 2412MHz



Middle Channel 2437MHz

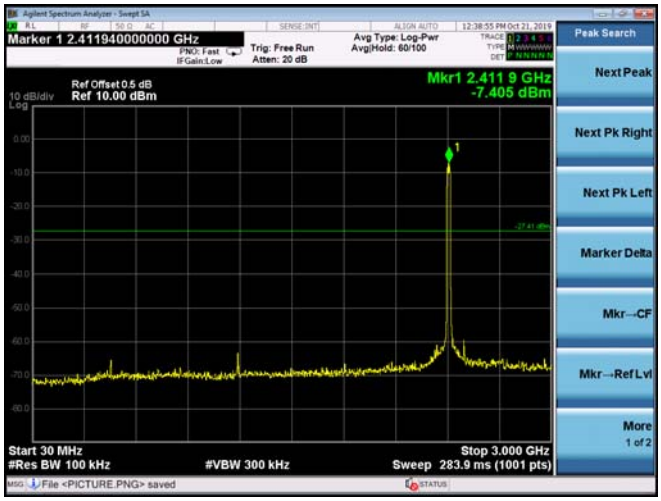


High Channel 2462MHz

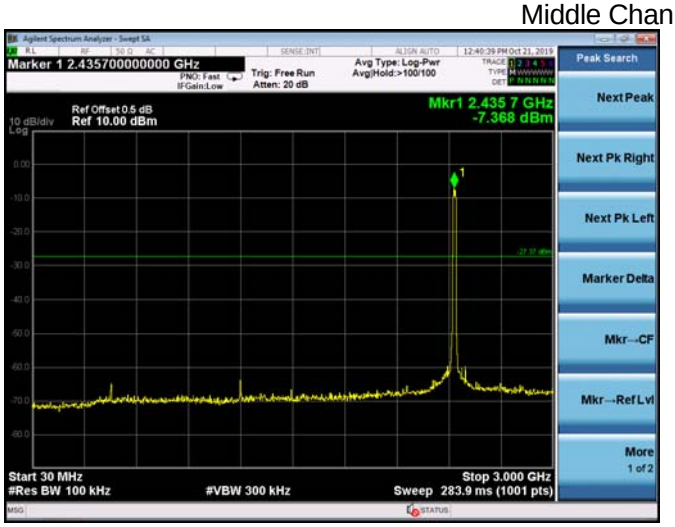


802.11g

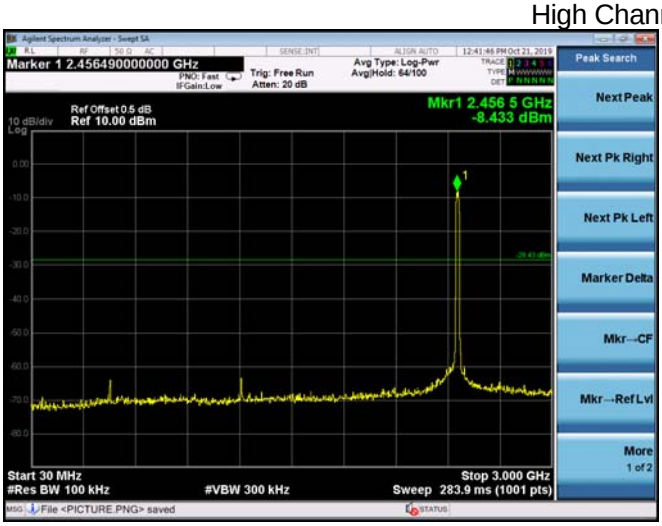
Low Channel 2412MHz



Middle Channel 2437MHz



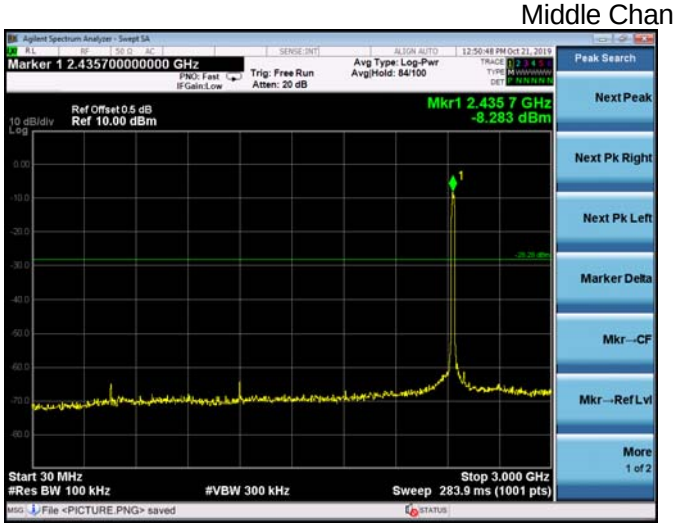
High Channel 2462MHz



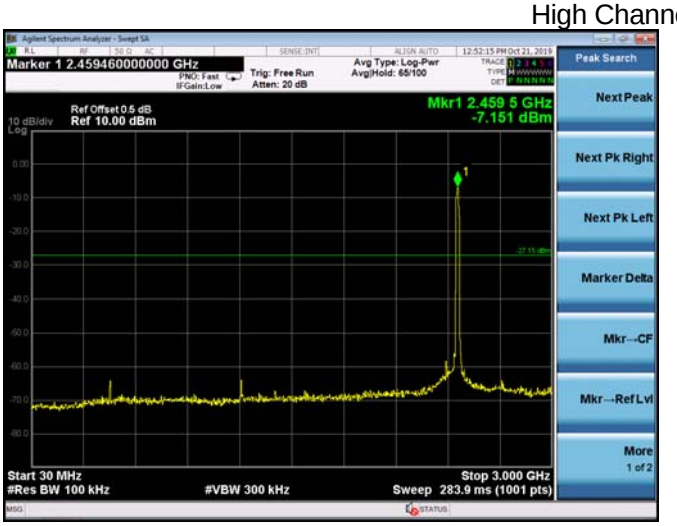
802.11n20

Low Channel 2412MHz

Middle Channel 2437MHz

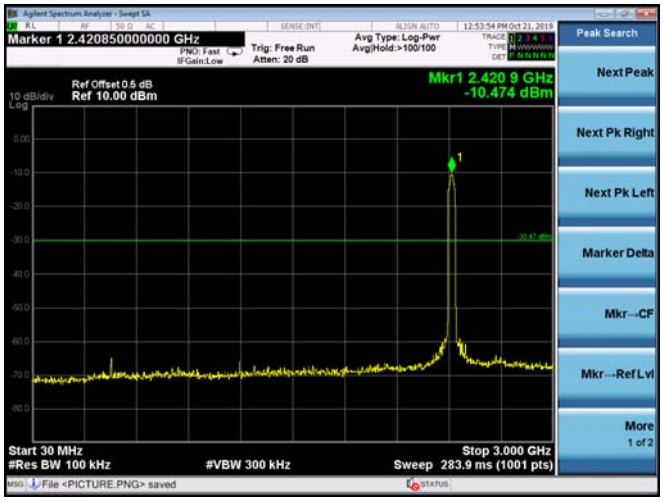


High Channel 2462MHz

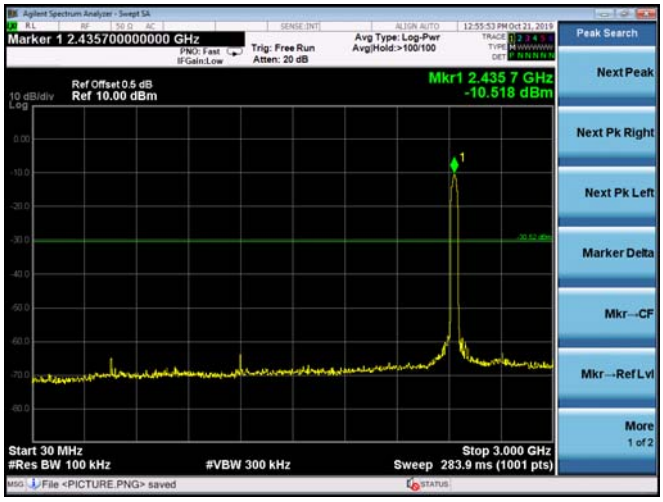


802.11n40

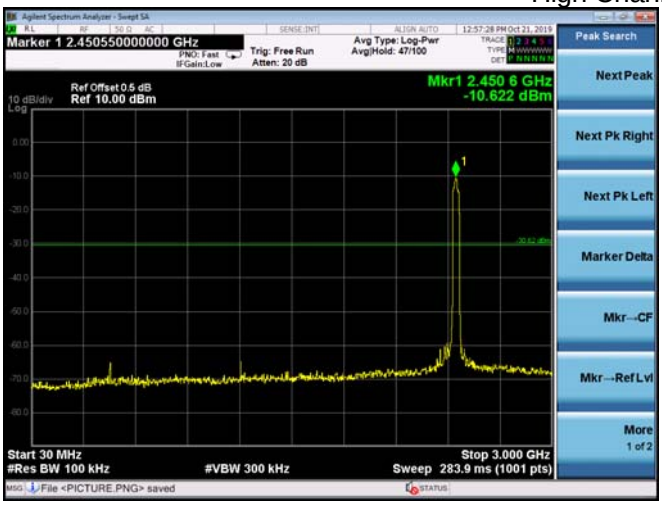
Low Channel 2422MHz



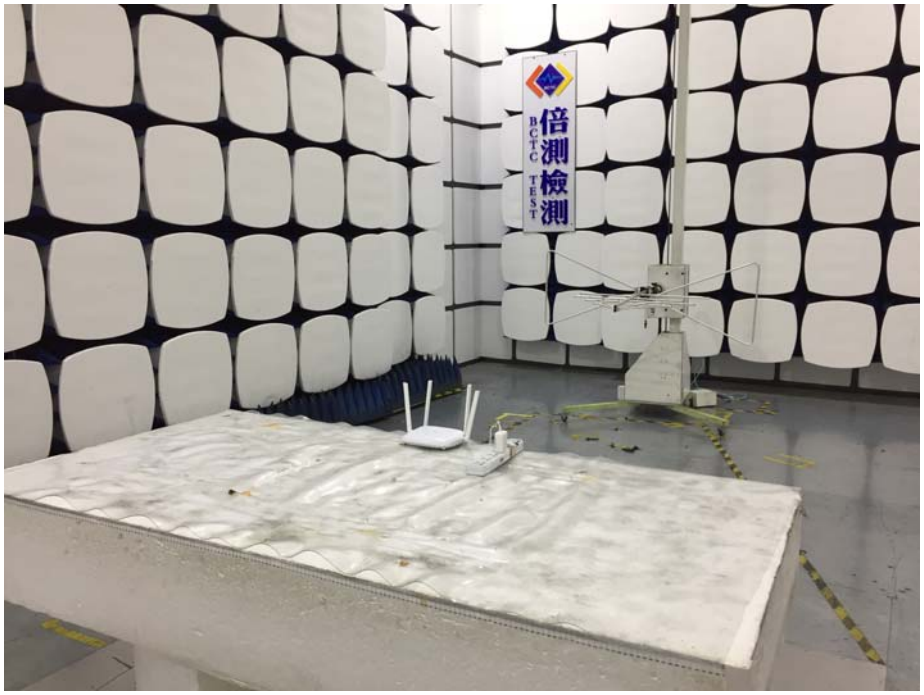
Middle Channel 2437MHz



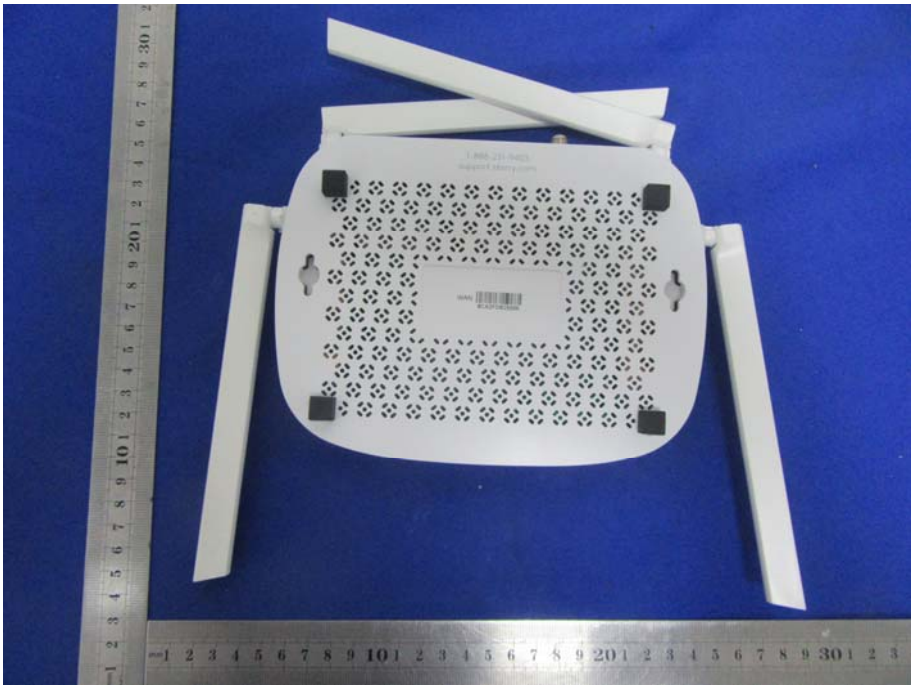
High Channel 2452MHz



Radiated Measurement Photos



4. EUT PHOTO



※※※※※ **END OF REPORT** ※※※※※